1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER

Type	Symmetric, 3 element, single stage, 2 phase torque converter
Stall torque ratio	2.05 — 2.35
Nominal diameter mm (in)	246 (9.69)
Stall speed (at sea level)	2,200 — 2,700 rpm
One-way clutch	Sprague type one-way clutch

2. OIL PUMP

Type	Parachoid constant-displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT

Type	4-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	2 sets
One-way clutch (sprague type)	1 sets

4. TRANSMISSION GEAR RATIO

1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Rev	2.272

5. PLANETARY GEAR AND PLATE

Number of front sun gear teeth	33
Number of front pinion teeth	21
Number of front internal gear teeth	75
Number of rear sun gear teeth	42
Number of rear pinion teeth	17
Number of rear internal gear teeth	75
Number of high clutch drive plates	4
Number of low clutch drive plates	5
Number of reverse clutch drive plates	2
Number of drive plates for the 2-4 brake	3
Number of drive plates for low & reverse brake	5

6. SELECTOR POSITION

P (Park)	Transmission is in neutral, output member is fixed, engine start is possible
R (Reverse)	Transmission in reverse for backing up
N (Neutral)	Transmission is in neutral and engine start is possible
D (Drive)	4-forward automatic gear change 1st ← → 2nd ←→ 3rd ←→ 4th
SPORT mode	4-forward automatic gear change 1st ←→ 2nd ←→ 3rd ←→ 4th
Manual mode (+)	4-forward manual gear change (shift up) 1st → 2nd → 3rd → 4th
Manual mode (–)	4-forward manual gear change (shift down) 1st ← 2nd ← 3rd ← 4th
Control method	Wire cable type

7. HYDRAULIC CONTROL AND LUBRICATION

Type		Electronic hydraulic control [4 forward gear changes made by electronic signals of vehicle speed and accelerator (throttle) opening]
Fluid	Recommended materials	SUBARU ATF HP
	Alternative	IDEMITSU “ATF HP”, Castrol “Transmax J”
Fluid capacity ℓ (US qt, Imp qt)		9.3 — 9.6 (9.8 — 10.1, 8.2 — 8.4)
Lubrication system		Forced feed lubrication with oil pump
Oil		Automatic transmission fluid (see above)

8. COOLING AND HARNESS

Cooling system	Liquid-cooler
Inhibitor switch	12 poles
Transmission harness	20 poles

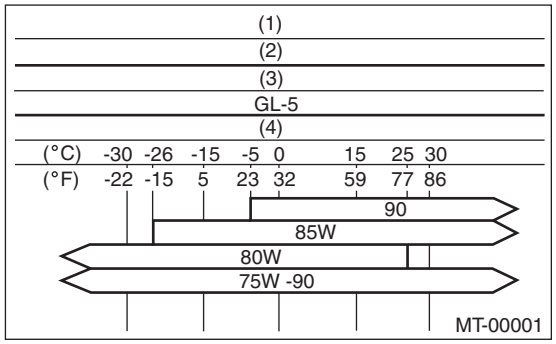
9. TRANSFER

Transfer type	Multi-plate transfer (MPT)
Number of transfer clutch drives & driven plates	5
Control method	Electronic hydraulic type
Lubricant	Same automatic transmission fluid as used in the automatic transmission
Reduction gear ratio	1.000 (53/53)

10.FINAL REDUCTION GEAR

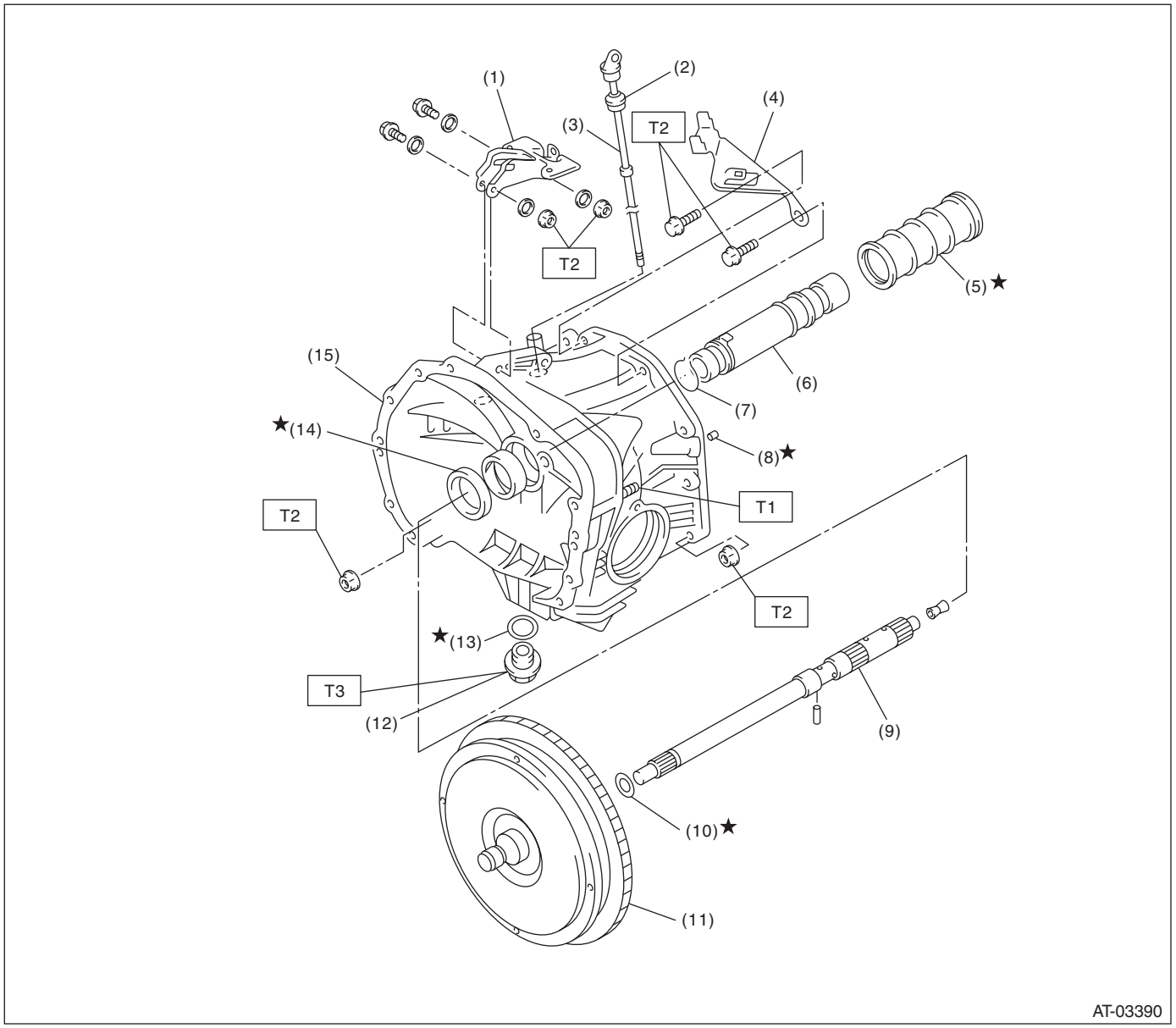
Model	Except for OUTBACK	OUTBACK
Front final reduction gear ratio	4.111 (37/9)	4.444 (40/9)

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)	1.1 — 1.3 (1.2 — 1.4, 1.0 — 1.1)

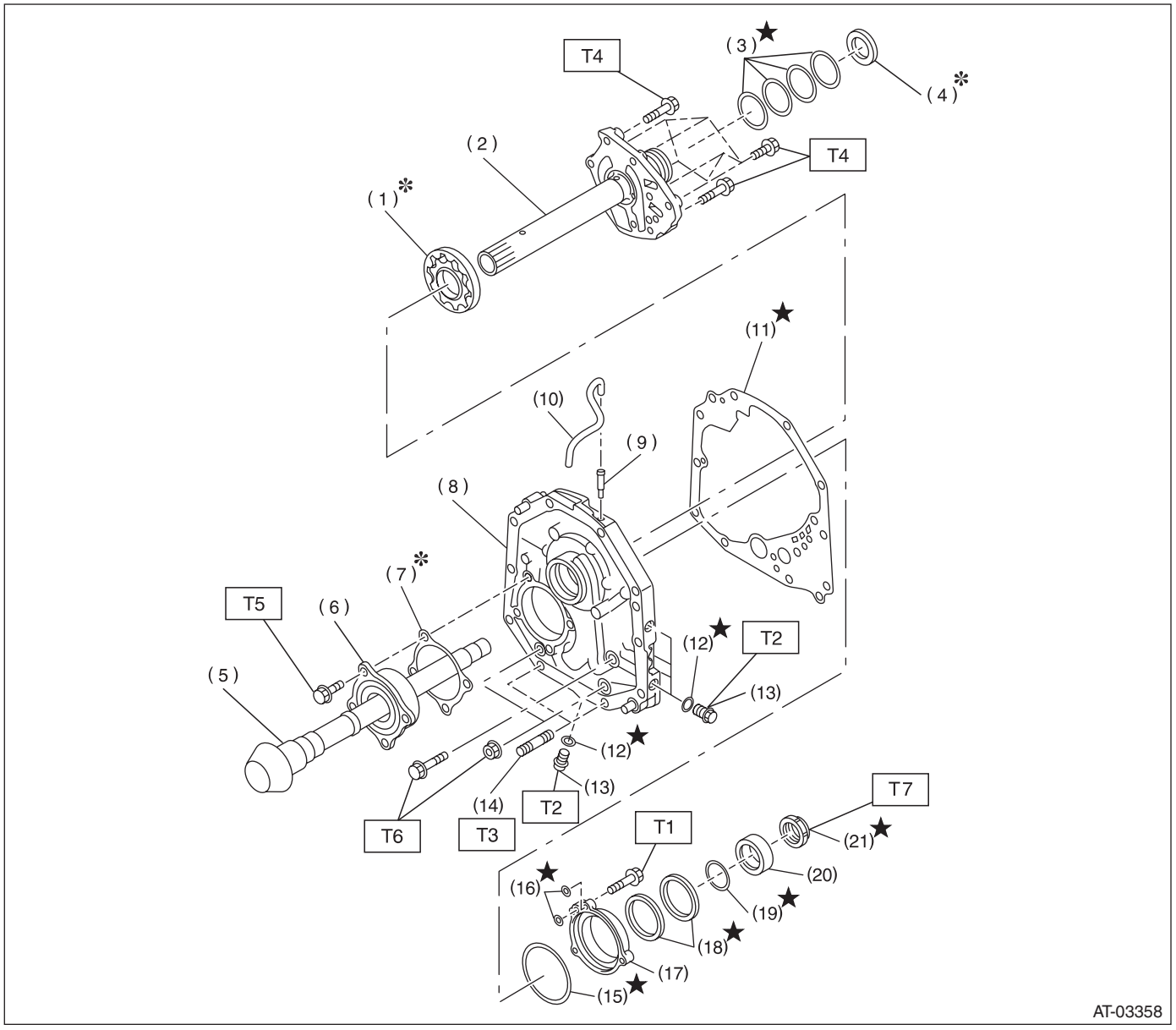
B: COMPONENT

1. TORQUE CONVERTER AND CASE



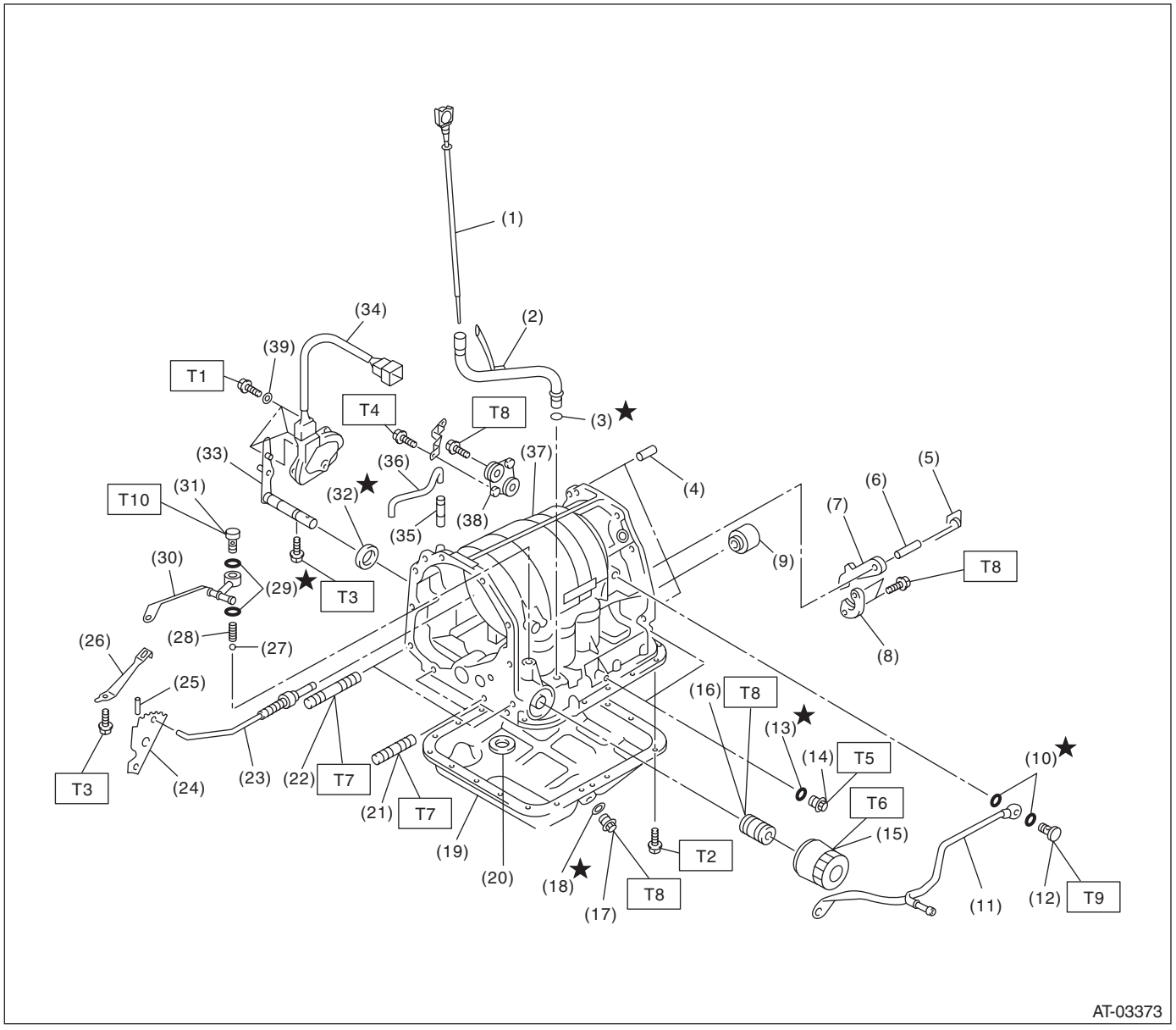
(1)	Pitching stopper bracket	(8)	Oil drain pipe	(15)	Converter case
(2)	O-ring	(9)	Input shaft		
(3)	Differential oil level gauge	(10)	O-ring	***Tightening torque:N·m (kgf-m, ft-lb)***	
(4)	Stay	(11)	Torque converter ASSY	***T1:***	***18 (1.8, 13.3)***
(5)	Seal pipe	(12)	Drain plug	***T2:***	***41 (4.2, 30.4)***
(6)	Oil pump shaft	(13)	Gasket	***T3:***	***44 (4.5, 32.5) (Aluminum gasket)***
(7)	Clip	(14)	Oil seal		***70 (7.1, 51.6) (Copper gasket)***

2. OIL PUMP



(1)	Oil pump rotor	(11)	Gasket	(21)	Lock nut
(2)	Oil pump cover	(12)	O-ring		
(3)	Seal ring	(13)	Test plug	***Tightening torque:N·m (kgf-m, ft-lb)***	
(4)	Thrust needle bearing	(14)	Stud bolt	***T1:***	***7 (0.7, 5.1)***
(5)	Drive pinion shaft	(15)	O-ring	***T2:***	***13 (1.3, 9.4)***
(6)	Roller bearing	(16)	O-ring	***T3:***	***18 (1.8, 13.3)***
(7)	Shim	(17)	Oil seal retainer	***T4:***	***25 (2.5, 18)***
(8)	Oil pump housing	(18)	Oil seal	***T5:***	***40 (4.1, 30)***
(9)	Nipple	(19)	O-ring	***T6:***	***42 (4.3, 31)***
(10)	Air breather hose	(20)	Drive pinion collar	***T7:***	***116 (11.8, 85)***

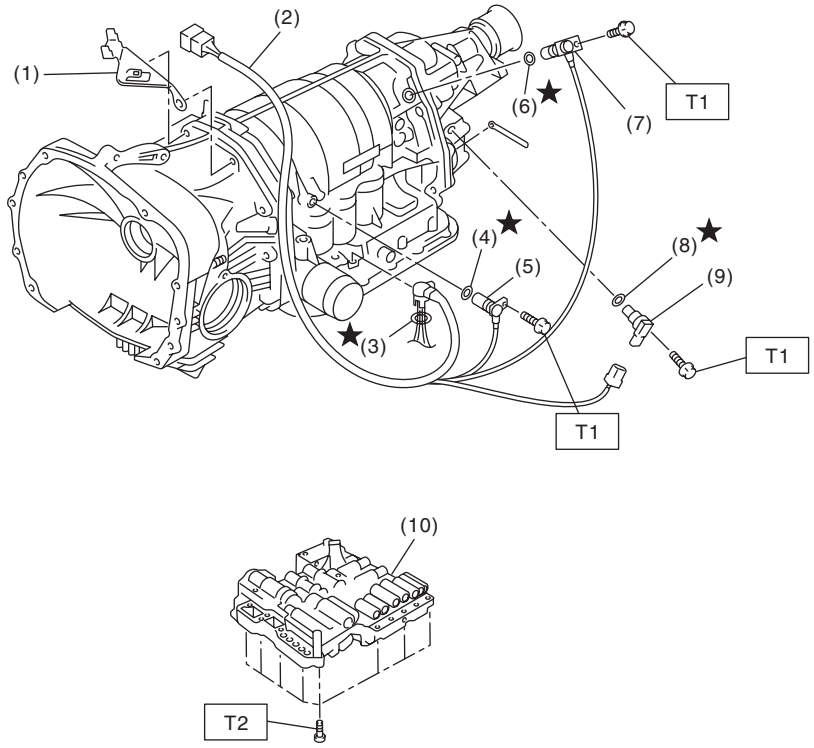
3. TRANSMISSION CASE AND CONTROL DEVICE



(1) ATF level gauge
(2) Oil charge pipe
(3) O-ring
(4) Straight pin
(5) Return spring
(6) Shaft
(7) Parking pawl
(8) Parking support
(9) Bushing
(10) Gasket
(11) Inlet pipe
(12) Union screw
(13) O-ring
(14) Test plug
(15) Oil filter
(16) Oil filter stud bolt
(17) Drain plug
(18) Gasket
(19) Oil pan
(20) Magnet
(21) Stud bolt (short)
(22) Stud bolt (long)
(23) Parking rod
(24) Manual plate
(25) Spring pin
(26) Detention spring
(27) Ball
(28) Spring
(29) Gasket
(30) Outlet pipe
(31) Union screw
(32) Oil seal
(33) Select lever
(34) Inhibitor switch ASSY
(35) Nipple
(36) Air breather hose
(37) Transmission case
(38) Plate ASSY
(39) Washer

Tightening torque:N·m (kgf-m, ft-lb)	
T1:	***3.4 (0.35, 2.5)***
T2:	***5 (0.5, 3.6)***
T3:	***6 (0.6, 4)***
T4:	***12 (1.2, 8.7)***
T5:	***13 (1.3, 10)***
T6:	***14 (1.4, 10)***
T7:	***18 (1.8, 13.3)***
T8:	***25 (2.5, 18)***
T9:	***40 (4.1, 29.5)***
T10:	***44 (4.5, 32.5)***

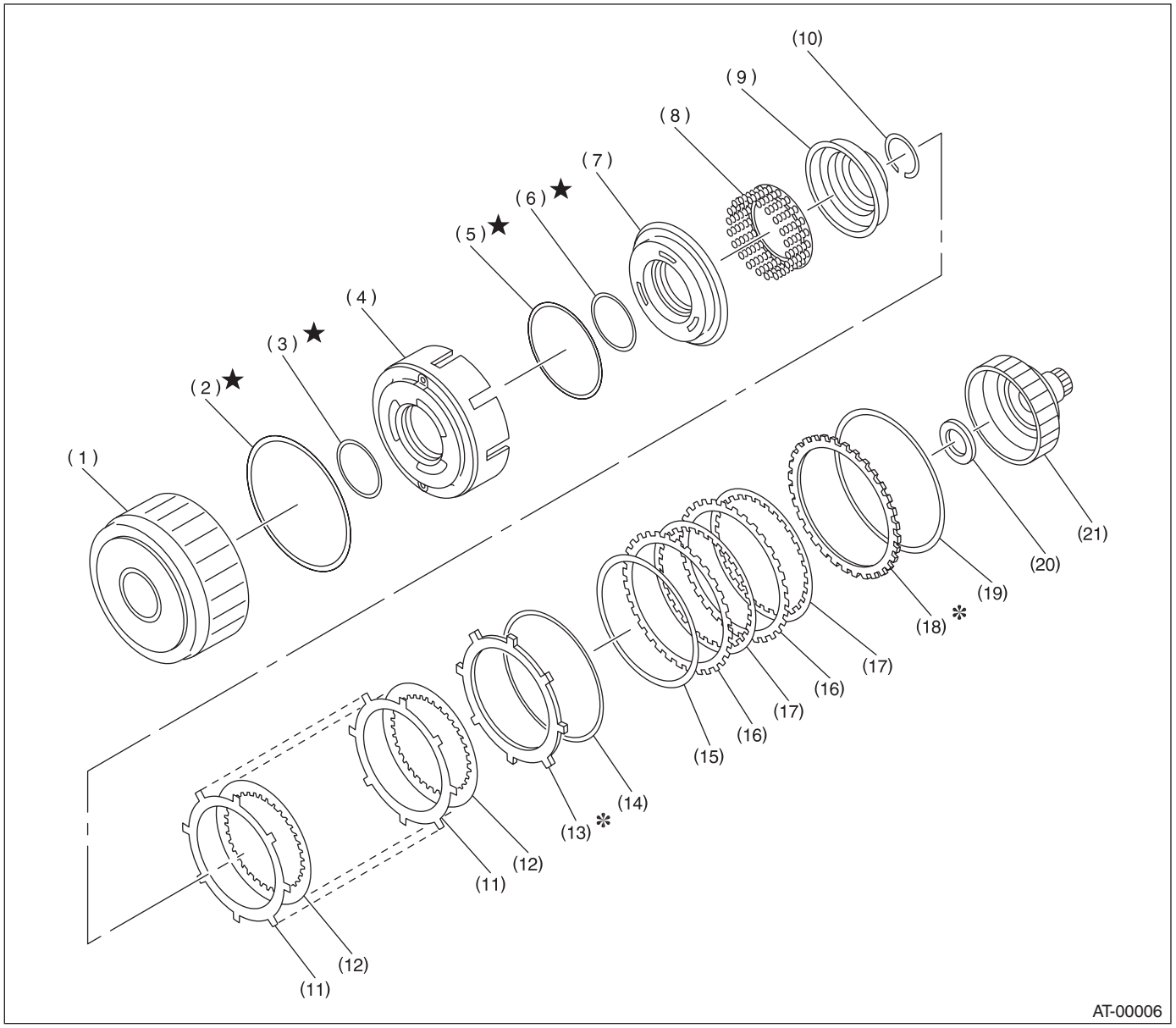
4. CONTROL VALVE AND HARNESS ROUTING



(1)	Stay	(6)	O-ring
(2)	Transmission harness	(7)	Front vehicle speed sensor
(3)	O-ring	(8)	O-ring
(4)	O-ring	(9)	Rear vehicle speed sensor
(5)	Torque converter turbine speed sensor	(10)	Control valve body

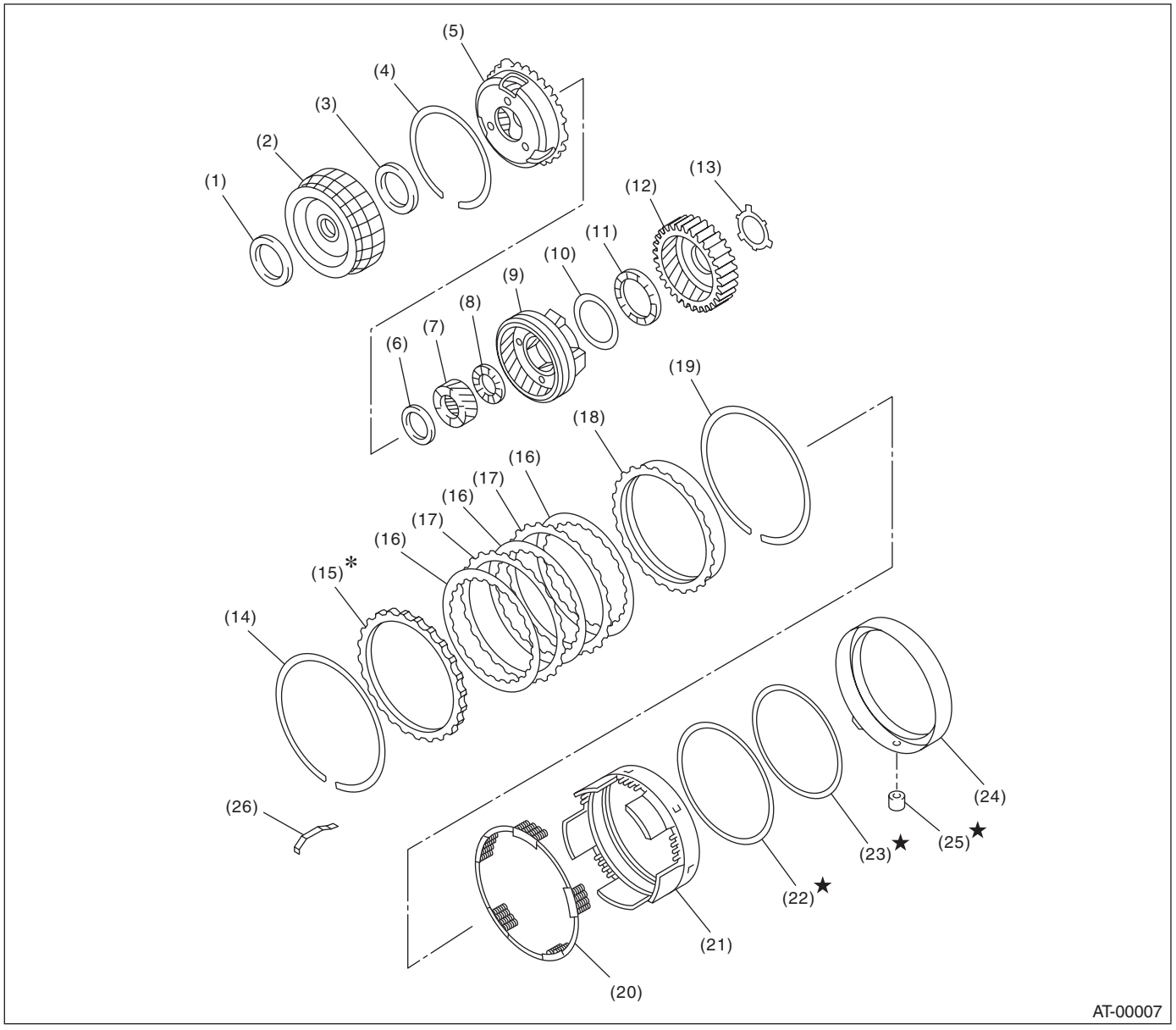
Tightening torque:N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.1)
T2: 8 (0.8, 5.8)

5. HIGH CLUTCH AND REVERSE CLUTCH



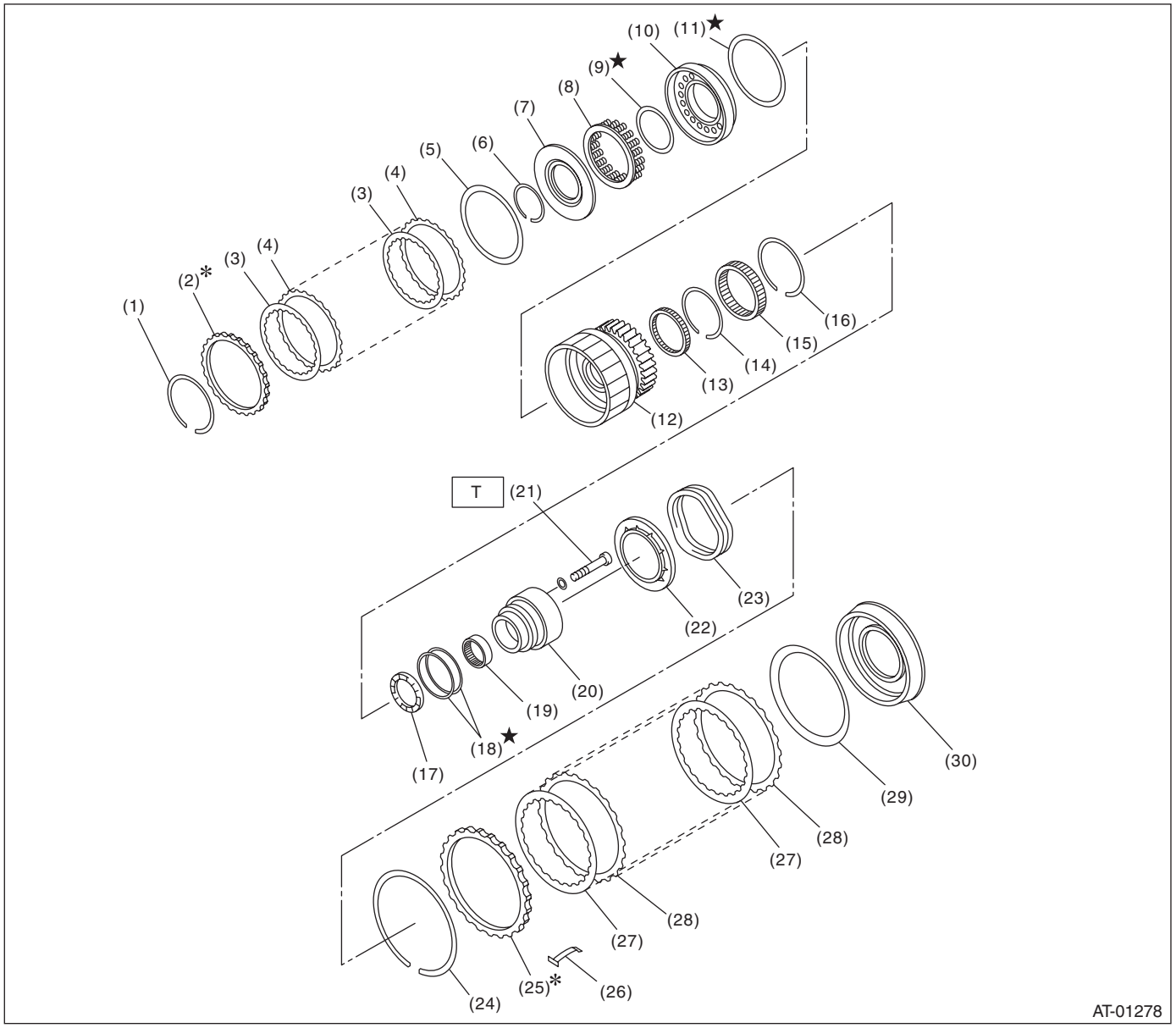
(1) High clutch drum
(2) Lip seal
(3) D-ring
(4) Reverse clutch piston
(5) D-ring
(6) D-ring
(7) High clutch piston
(8) Spring retainer
(9) Cover
(10) Snap ring
(11) Driven plate (high clutch)
(12) Drive plate (high clutch)
(13) Retaining plate (high clutch)
(14) Snap ring
(15) Dish plate
(16) Driven plate (reverse clutch)
(17) Drive plate (reverse clutch)
(18) Retaining plate (reverse clutch)
(19) Snap ring
(20) Thrust needle bearing
(21) High clutch hub

6. PLANETARY GEAR AND 2-4 BRAKE



(1) Thrust needle bearing
(2) Front sun gear
(3) Thrust needle bearing
(4) Snap ring
(5) Front planetary carrier
(6) Thrust needle bearing
(7) Rear sun gear
(8) Thrust needle bearing
(9) Rear planetary carrier
(10) Washer
(11) Thrust needle bearing
(12) Rear internal gear
(13) Washer
(14) Snap ring
(15) Retaining plate
(16) Drive plate
(17) Driven plate
(18) Pressure rear plate
(19) Snap ring
(20) Spring retainer
(21) 2-4 brake piston
(22) D-ring
(23) D-ring
(24) 2-4 brake piston retainer
(25) 2-4 brake seal
(26) Leaf spring

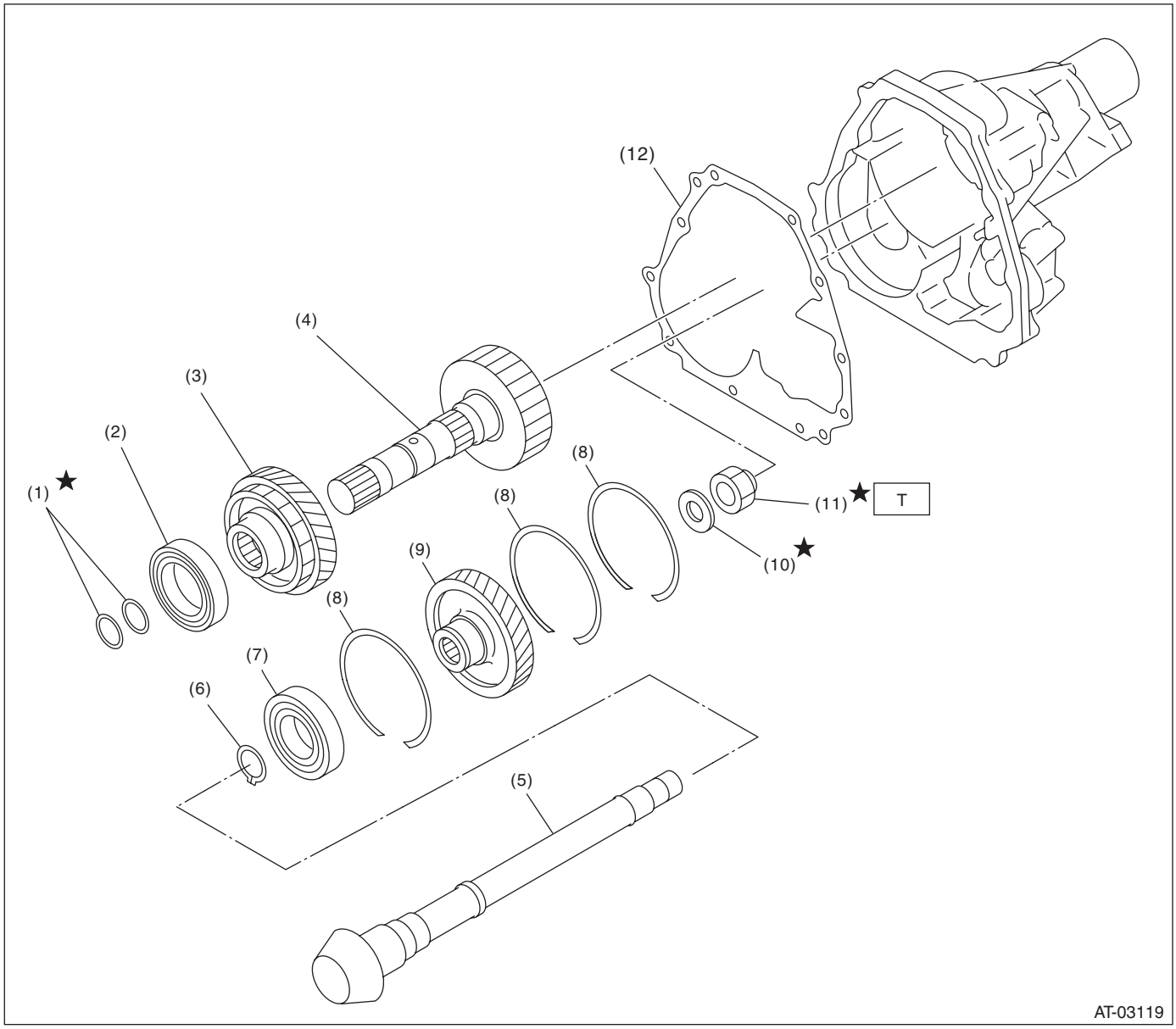
7. LOW CLUTCH AND LOW & REVERSE BREAK



(1) Snap ring
(2) Retaining plate
(3) Drive plate
(4) Driven plate
(5) Dish plate
(6) Snap ring
(7) Cover
(8) Spring retainer
(9) D-ring
(10) Low clutch piston
(11) D-ring
(12) Low clutch drum
(13) Needle bearing
(14) Snap ring
(15) One-way clutch
(16) Snap ring
(17) Thrust needle bearing
(18) Seal ring
(19) Needle bearing
(20) One-way clutch inner race
(21) Socket bolt
(22) Spring retainer
(23) Return spring
(24) Snap ring
(25) Retaining plate
(26) Leaf spring
(27) Drive plate
(28) Driven plate
(29) Dish plate
(30) Low & reverse brake piston

Tightening torque:N·m (kgf-m, ft-lb)
T: 25 (2.5, 18)

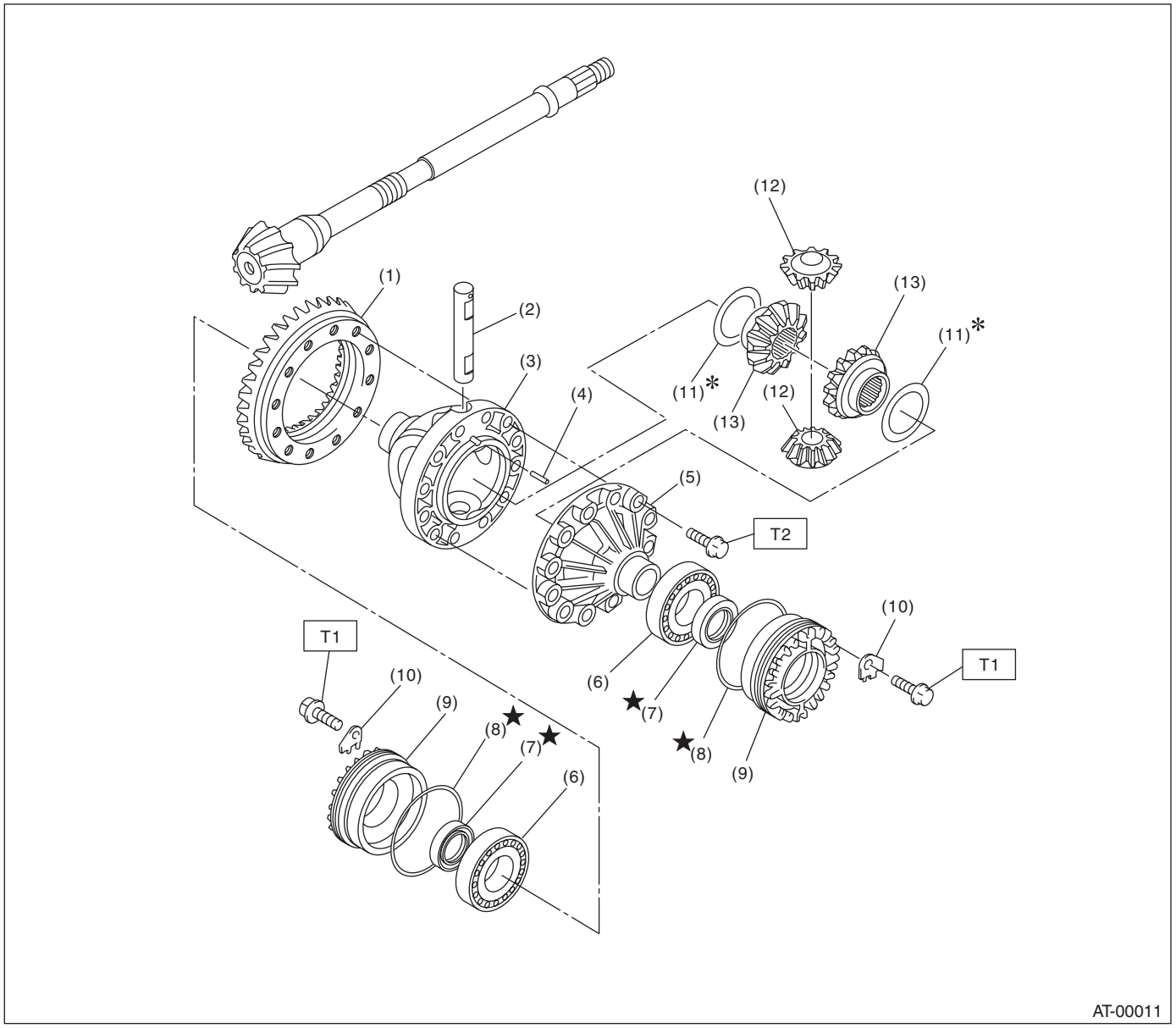
8. REDUCTION GEAR



(1) Seal ring
(2) Ball bearing
(3) Reduction drive gear
(4) Reduction drive shaft
(5) Drive pinion shaft
(6) Snap ring
(7) Ball bearing
(8) Snap ring
(9) Reduction driven gear
(10) Washer
(11) Lock nut
(12) Gasket

Tightening torque:N·m (kgf-m, ft-lb)
T: 100 (10.2, 73.8)

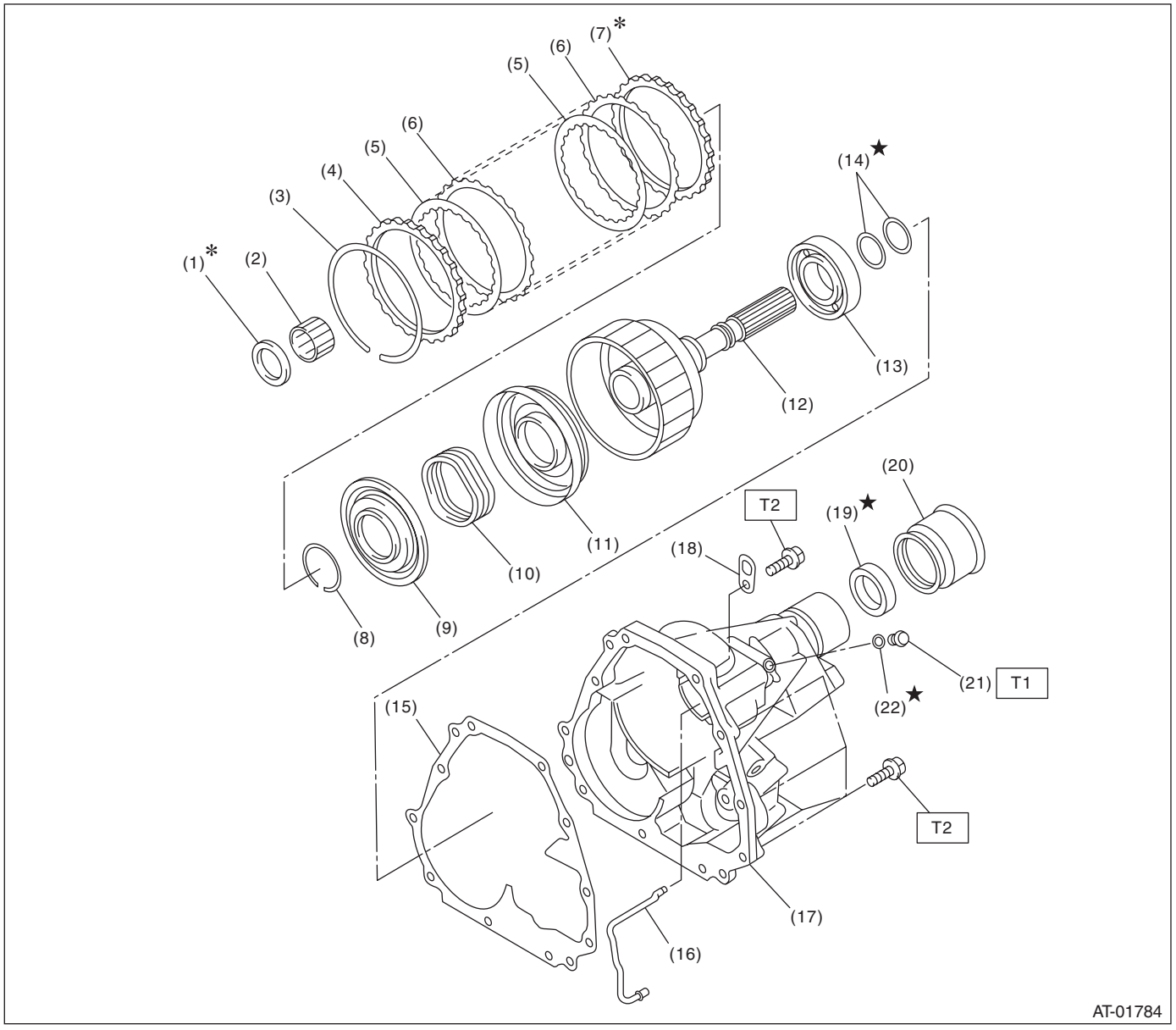
9. DIFFERENTIAL GEAR



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

Tightening torque:N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18)
T2: 62 (6.3, 45.6)

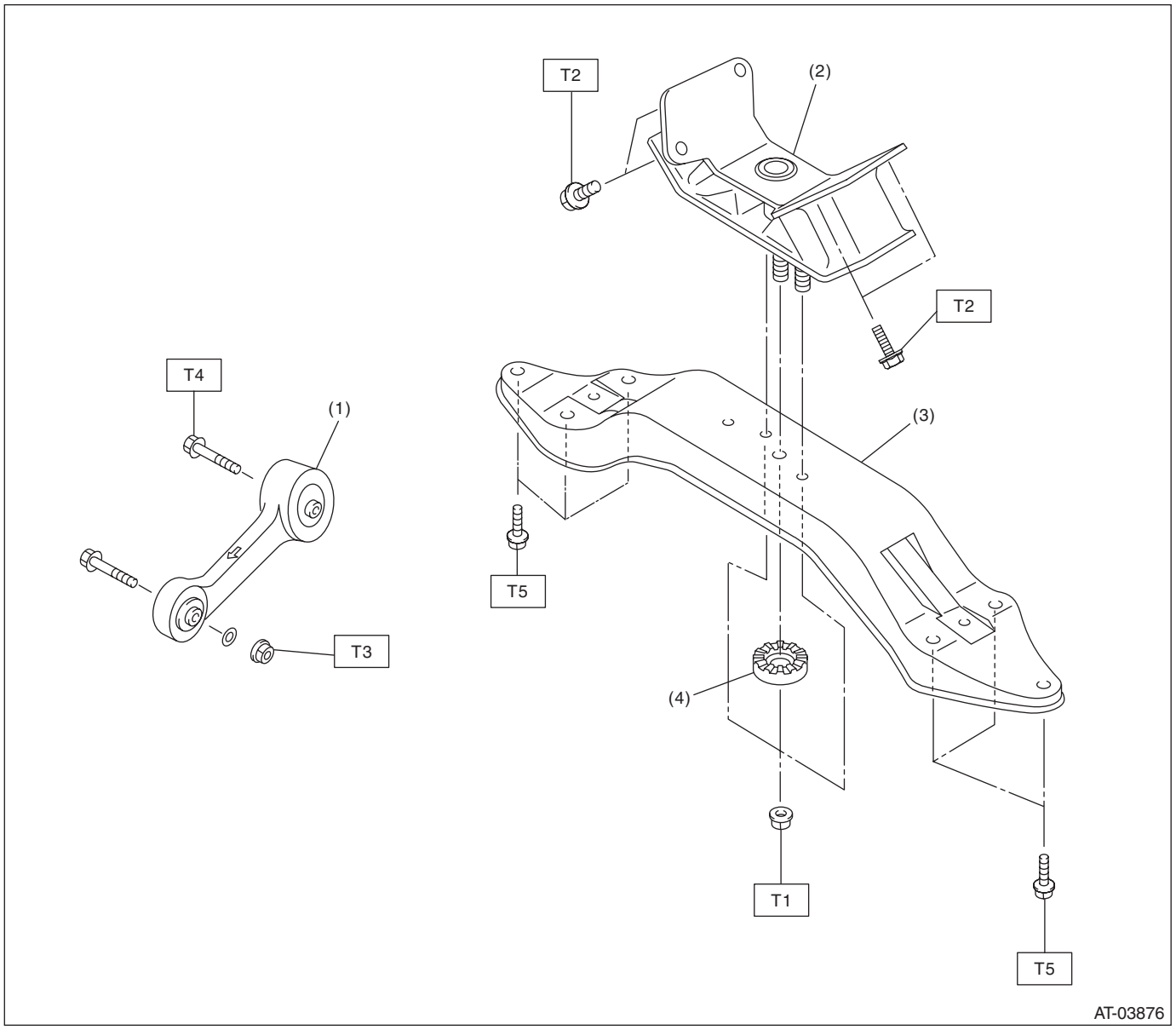
10.TRANSFER AND EXTENSION CASE



(1) Thrust needle bearing
(2) Needle bearing
(3) Snap ring
(4) Driven plate (Thick)
(5) Drive plate
(6) Driven plate (Thin)
(7) Retaining plate
(8) Snap ring
(9) Transfer piston seal
(10) Return spring
(11) Transfer clutch piston
(12) Rear drive shaft
(13) Ball bearing
(14) Seal ring
(15) Gasket
(16) Transfer clutch pipe
(17) Extension case
(18) Transmission hanger
(19) Oil seal
(20) Dust cover
(21) Test plug
(22) O-ring

Tightening torque:N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 25 (2.5, 18)

11.TRANSMISSION MOUNTING



(1) Pitching stopper
(2) Rear cushion rubber
(3) Crossmember
(4) Stopper

Tightening torque:N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 40 (4.1, 30)
T3: 50 (5.1, 37)
T4: 58 (5.9, 43)
T5: 75 (7.6, 55)

C: CAUTION

• Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Do not place the oil pan with its inner side facing up until it is installed, to prevent intrusion of foreign matter into the 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 gear oil, grease or the equivalent. Do not mix gear oil, 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 the specified points.
• Apply gear oil or ATF onto sliding or revolution surfaces before installation in view of components usage.
• 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 seal.
• When disassembling the AT, be sure to use nylon gloves and paper towels. Do not use cloth gloves or waste cloth.

D: PREPARATION TOOL

1. SPECIAL TOOL

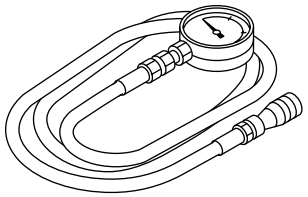
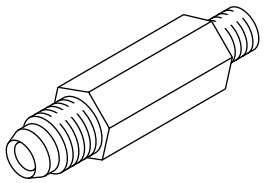
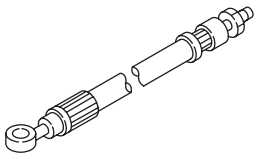
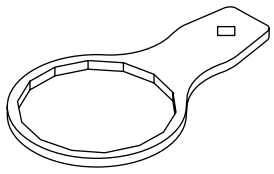
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used at the oil pump housing when measuring reverse clutch pressure and line pressure.
 ST-498897700	498897700	ADAPTER SET	Used for measuring transfer clutch pressure.
 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing the ATF filter.

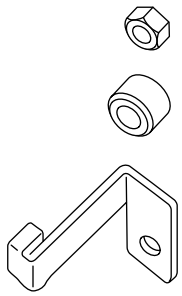
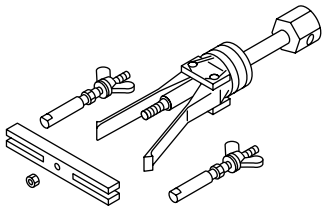
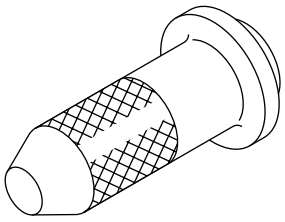
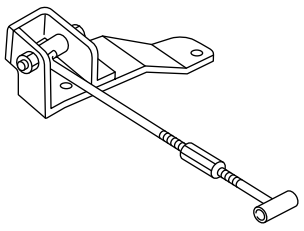
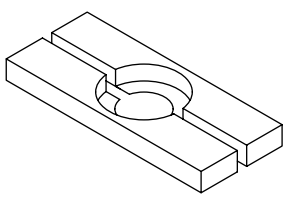
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST-398527700	398527700	PULLER ASSY	• Used for removing the extension case roller bearing. • Used for removing the extension oil seal. • Used for removing the front differential side retainer bearing outer race. • Used for removing the front differential side retainer oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing the extension oil seal.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting the engine.
 ST-498077000	498077000	REMOVER	Used for removing the differential taper roller bearing.

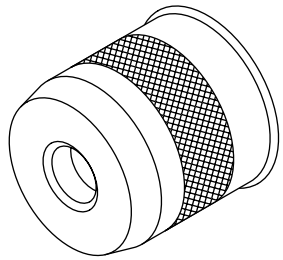
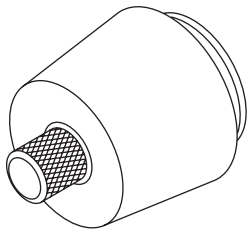
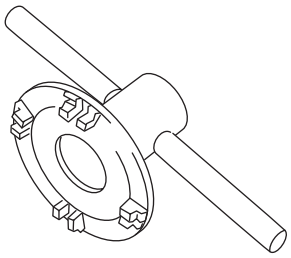
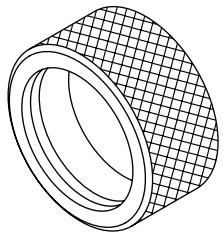
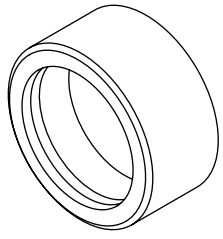
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499247400	499247400	INSTALLER	• Used for installing the transfer outer snap ring. • Used together with the GUIDE (499257300).
 ST-499257300	499257300	SNAP RING OUTER GUIDE	• Used for installing the transfer outer snap ring. • Used together with the INSTALLER (499247400).
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	• Used for removing and installing the differential side retainer. • WRENCH ASSY (499787000) can also be used.
 ST-398437700	398437700	DRIFT	Used for installing the converter case oil seal.
 ST-398487700	398487700	INSTALLER	Used for installing the front differential taper roller bearing.

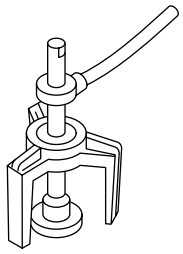
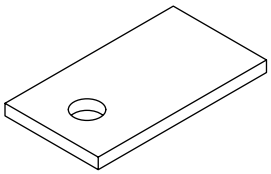
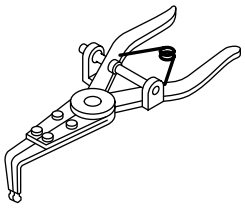
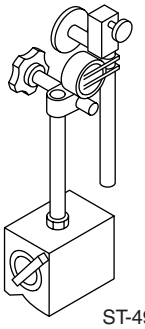
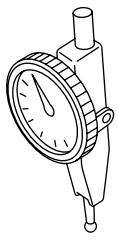
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing the clutch spring.
 ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 ST-399893600	399893600	PLIERS	Used for removing and installing the clutch spring.
 ST-498247001	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).

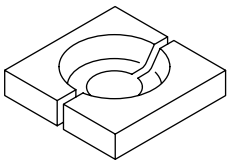
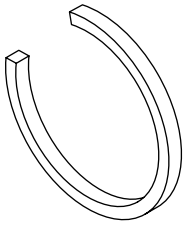
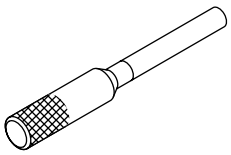
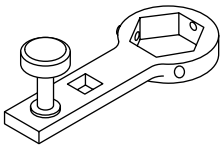
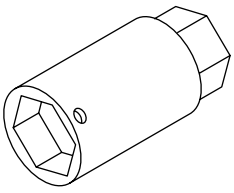
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498517000	498517000	REPLACER	Used for removing the front roller bearing.
 ST-398623600	398623600	SEAT	Used for removing the spring of the transfer clutch piston.
 ST-499267300	499267300	STOPPER PIN	Used for installing the inhibitor switch.
 ST-499787700	499787700	WRENCH	Used for removing and installing the drive pinion lock nut.
 ST-499787500	499787500	ADAPTER	Used for removing and installing the drive pinion lock nut.

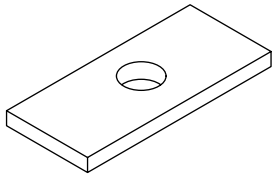
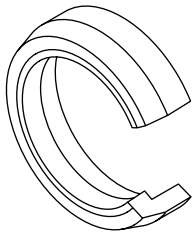
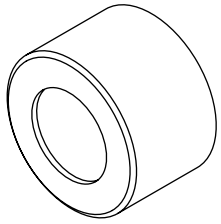
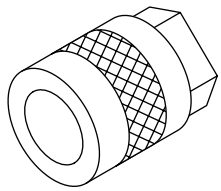
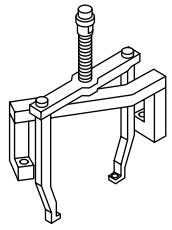
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398643600	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
 ST-498627100	498627100	SEAT	Used for holding the low clutch piston retainer spring when installing snap ring.
 ST-499577000	499577000	GAUGE	Used for measuring the mating surface of the transmission to the end face of the reduction gear.
 ST-499737000	499737000	PULLER	Used for removing the reduction driven gear assembly.
 ST-499737100	499737100	PULLER SET	Used for removing the reduction drive gear assembly.

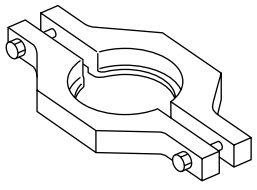
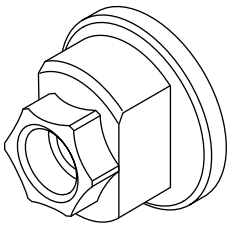
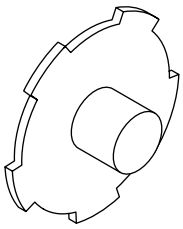
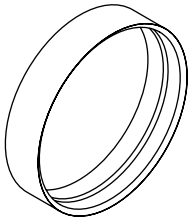
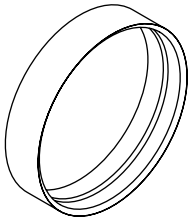
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077600	498077600	REMOVER	Used for removing the ball bearing.
 ST-498937110	498937110	HOLDER	Used for removing and installing the drive pinion lock nut.
 ST-498677100	498677100	COMPRESSOR	Used for installing the 2-4 brake snap ring.
 ST-498437000	498437000	HIGH CLUTCH PISTON GUIDE	Used for installing the high clutch piston.
 ST-498437100	498437100	LOW CLUTCH PISTON GUIDE	Used for installing the low clutch piston.

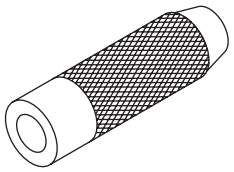
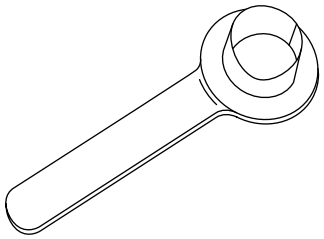
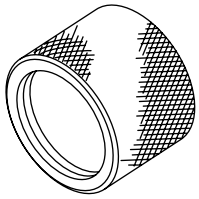
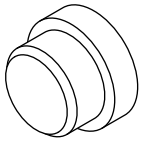
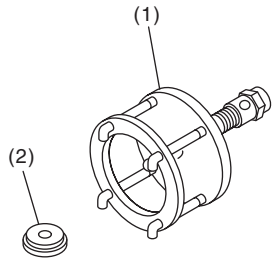
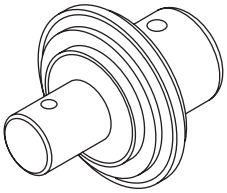
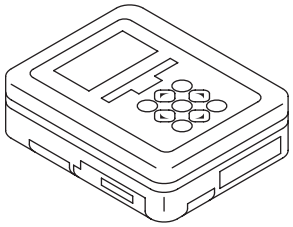
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899580100	899580100	INSTALLER	Used for press-fitting the ball bearing of the transfer clutch.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for installing the axle shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST-398497701	398497701	SEAT	Used for installing the needle bearing.
 ST-899524100	899524100	PULLER SET	Use only the bolt. • Used together with the PULLER SET (499737100). • Used together with the PULLER (499737000). 1. Puller 2. Cap

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499247300	499247300	INSTALLER	Used for installing the oil pump housing retainer oil seal.
 ST1B020XU0	1B020XU0	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system

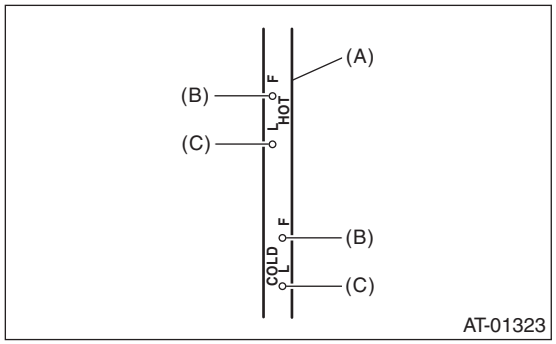
2. GENERAL TOOL

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 differential gear oil drain plug.
Push/pull gauge	Used for measuring the piston stroke of each clutch.

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 4AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
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 or 2 minutes, and measure the ATF level.



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

4) Make sure that the ATF level is between upper and lower marks of the HOT side.
5) If the ATF level is below the lower mark, add recommended ATF until the fluid level is between upper and lower marks.

NOTE:
- Be careful not to exceed the upper level.
- Be wary of the ATF level when filling. If the ATF is filled to the upper level while the transmission is cold, it is in an overfilled condition and the oil will over flow.

6) 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 4AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) 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.

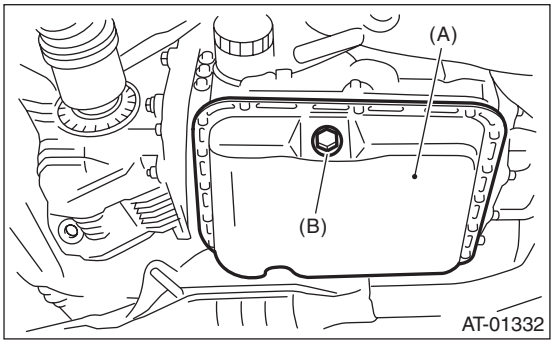
B: REPLACEMENT

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

CAUTION:
After running the engine or after idling for a long time, the ATF is hot. Be careful not to burn yourself.
3) Check the condition of ATF. <Ref. to 4AT-27, CONDITION CHECK, Automatic Transmission Fluid.>
4) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



(A) Oil pan
(B) ATF drain plug

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

Recommended fluid:
SUBARU ATF HP

Substitute fluid:
IDEMITSU “ATF HP”
Castrol “Transmax J”

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

Capacity when transmission is overhauled:
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
7) Bleed the air of control valve.
<Ref. to 4AT-58, Air Bleeding of Control Valve.>
8) Check the level and leaks of ATF.
<Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

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

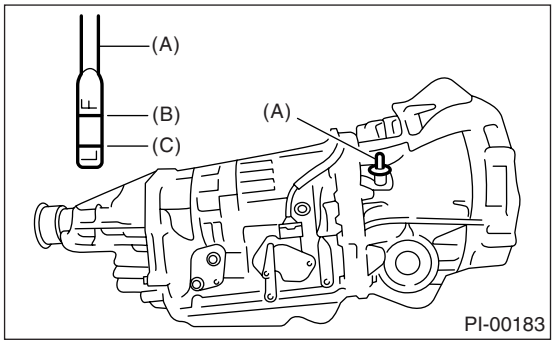
Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Excessive wear of the internal of the transmission body.	Replace ATF and check if AT operates correctly.
Thick and varnish-form fluid.	Burned clutch, etc.	Replace ATF and check the AT body or vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water mixed in fluid.	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 oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Make sure the level gauge is inserted correctly and in the proper orientation.
4) Remove the level gauge again and note the reading. If the differential gear 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 fill oil to the “F” line or more.



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

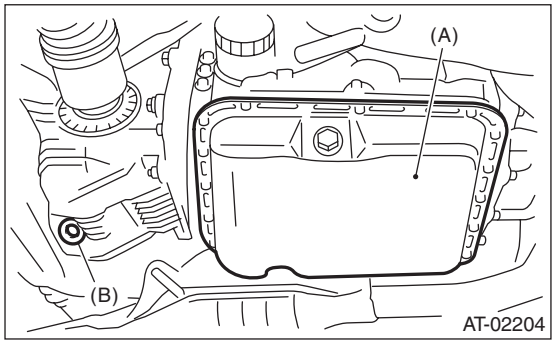
B: REPLACEMENT

1) Lift the vehicle.
2) Remove the differential gear oil drain plug using TORX ® bit T70, and drain the differential gear oil completely.

CAUTION:
• After running the engine or after idling for a long time, the differential gear oil is 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 causing fires. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
3) Tighten the differential gear oil drain plug using TORX® bit T70.

NOTE:
Use a new gasket.

Tightening torque:
Aluminum gasket
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Copper gasket
70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Oil pan
(B) Differential gear oil drain plug

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

Recommended gear oil:
<Ref. to 4AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Gear oil capacity:
1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)
6) Check the level of differential gear oil.
<Ref. to 4AT-28, 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 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 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 “D” range, check that rpm does not change abruptly.
• Check slip lock-up with following procedure. Subaru Select Monitor is required for judgment.
Before starting the check, make sure that no DTC is displayed using the Subaru Select Monitor. If there is a DTC, perform the corrective action according to the DTC. Recheck to see that the DTC has been cleared, then start the slip lock-up check.
1) The check is to be performed on a flat and straight road or on a free roller.

NOTE:
• Slip lock-up will not operate when the vehicle is lifted up off of its wheels, since there is no surface resistance.
• When checking on the free roller, the driving resistance will be slightly inadequate. It will be easier to judge if the foot brake is lightly applied while performing the check.

2) Connect the Subaru Select Monitor.
3) Check the ATF temperature using the Subaru Select Monitor.

NOTE:
• Make sure that the ATF temperature is between 50 — 100°C (122 — 212°F).
• If the temperature is low, warm-up the ATF by running the vehicle.
4) Start the engine, and set so that the lock-up duty can be read on the data display of the Subaru Select Monitor.
5) Drive the vehicle at a constant speed of 35 — 40 km/h (22 — 25 MPH).
6) Read the lock-up duty while vehicle is running.

Standard
25 — 45%

NOTE:
• The reading may be slightly lower on a free roller.
• Slip lock-up control is not operating if the lock-up duty is 5% or less, or when the lock-up duty goes down immediately after starting to rise. In these cases, improper ATF or deterioration of the ATF may be the cause. Check the amount of ATF or replace the fluid, then recheck.

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. TRANSFER CLUTCH

Check for tight corner braking phenomenon when the vehicle is moved forward with the steering fully turned.

10.OIL LEAKAGE

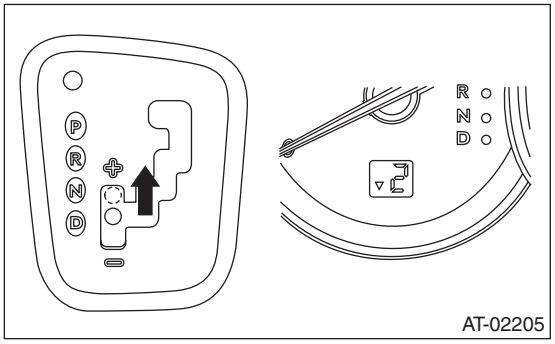
After the driving test, inspect for oil leaks.

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 “R” and “2nd 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) Increase the ATF temperature to 70 to 80°C (158 to 176°F) by idling the engine for approximately 30 minutes (with select lever set to “N” or “P”).
7) Place the wheel chocks at the front and rear of all wheels and apply the parking brake.
8) Move the manual linkage to ensure it operates properly, and then set to the “2nd gear of manual mode”.



9) While pressing hard on the foot brake pedal, slowly depress the accelerator pedal to full throttle.
10) When the engine speed stabilizes, 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.
12) If the stall speed in “2nd gear of manual mode” is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify this, conduct the same test as above in “R” range.
13) Perform the stall tests with the select lever in “D” range.

NOTE:
- Do not continue the stall test for 5 seconds or more at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction will cause the engine oil and ATF 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 automatic transmission from sustaining damage.

Stall speed (at sea level):
2,200 — 2,700 rpm

Stall speed (at sea level)	Range	Cause
Below specified value	2nd gear on manual mode, R	• Throttle valve is not fully open • Engine malfunction • One-way clutch of the torque converter is slipping
Over specified value	D	• Line pressure too low • Low clutch slipping • One-way clutch malfunctioning
	R	• Line pressure too low • Reverse clutch slipping • Low & reverse brake slipping
	2nd gear of manual mode	• Line pressure too low • Low clutch slipping • 2-4 brake slipping

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. This is used for checking the condition of the low clutch, reverse clutch, low & reverse brake and one-way clutch.

- Perform the test at normal operation fluid temperature of 70 — 80°C (158 — 176°F).
- Be sure to allow a 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 which takes from shifting the lever until the shock is felt.
Time lag: 1.2 seconds or less
If “N” → “D” time lag is longer than specified:

- Line pressure too low
- Low clutch worn
- One-way clutch not operating properly
- D-ring worn

4) In the same manner, measure the time lag of “N” → “R”.
Time lag: 1.5 seconds or less
If “N” → “R” time lag is longer than specified:

- Line pressure too low
- Reverse clutch worn
- Low & reverse brake worn
- D-ring worn

7. Line Pressure Test

A: MEASUREMENT

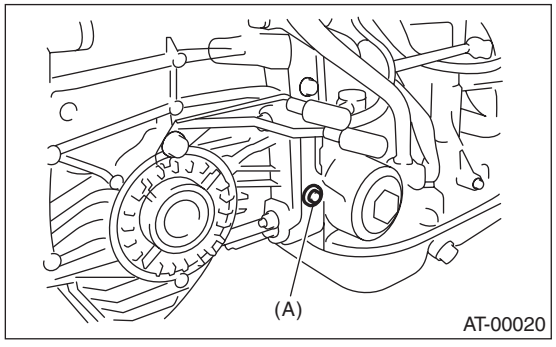
NOTE:
If the clutch or brake shows a signs of slipping or shift feel is not correct, check the line pressure.

• Excessive shock during up-shift or if shifting takes place at a higher point than for normal conditions, this may be due to the line pressure being too high.

• Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of clutch, brake or control valve.

1) Line pressure measurement (under no load):
   (1) Before measuring line pressure, jack-up all the wheels.
   (2) Maintain the ATF temperature at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the temperature above after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)
2) Line pressure measurement (under heavy load)
   (1) Before measuring line pressure, apply both the foot and parking brakes with all wheels chocked (Same as for “stall” test conditions).
   (2) Measure the line pressure when the select lever is in “R” or 2nd of manual mode with engine under stall conditions.
   (3) Measure the line pressure within 5 seconds after shifting the select lever to each position. (If the line pressure needs to be measured again, allow the engine to idle and cool it down for more than 1 minute.)
   (4) Maintain the ATF temperature at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above temperature after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)
3) Remove the test plug and attach the ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



(A) Test plug

4) Connect the ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

5) Check for duty ratio changes by adjusting the acceleration pedal position using the Subaru Select Monitor.

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle valve angle	Line pressure kPa (kg/cm^2, psi)
Manual mode (2nd)	25 — 35	Full open	1,000 — 1,300 (10.2 — 13.3, 145 — 189)
R	15 — 25	Full open	1,500 — 1,850 (15.3 — 18.9, 217 — 268)
D	35 — 43	Full closed	500 — 800 (5.1 — 8.2, 73 — 116)

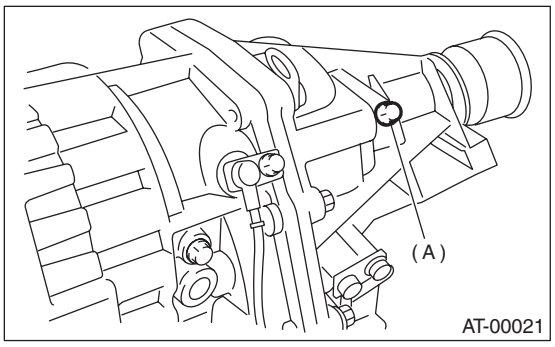
8. Transfer Clutch Pressure Test

A: INSPECTION

Check the transfer clutch pressure in accordance with the following chart in the same manner as line pressure. <Ref. to 4AT-32, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY

NOTE:
• Before setting to FWD mode, install the spare fuse on the FWD mode switch.



(A) Test plug

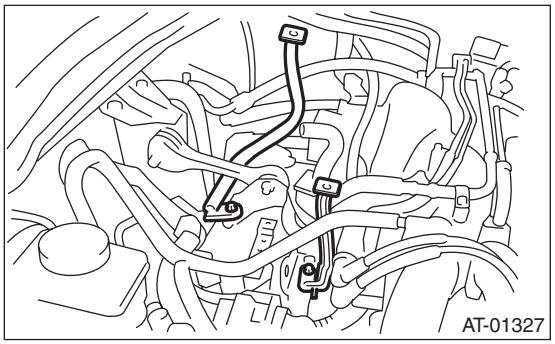
• If no oil pressure is produced or if it does not change in AWD mode, the control valve body may be malfunctioning.
• If oil pressure is produced in FWD mode, there is the same problem as the AWD mode.

Range position	ON duty ratio (%)	Acceleration opening angle (%)	Standard transfer clutch pressure kPa (kg/cm^2, psi)	
			AWD mode	FWD mode
Manual mode (2nd)	95	Fully opened (100)	1,000 — 1,200 (10.2 — 12.2, 145 — 174)	—
	60	Adjust ON Duty ratio to 60%.	500 — 700 (5.1 — 7.1, 73 — 102)	—
	—	Fully closed (0)	—	0 (0, 0)
N or P	5	Fully closed (0)	0	—

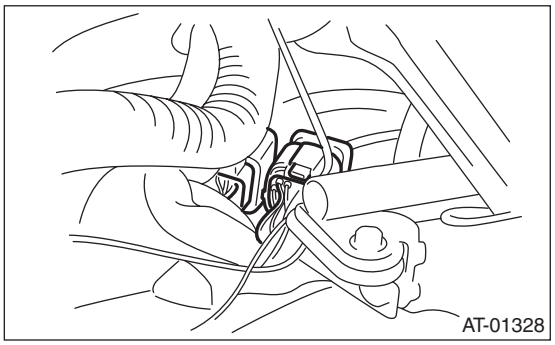
9. Automatic Transmission Assembly

A: REMOVAL

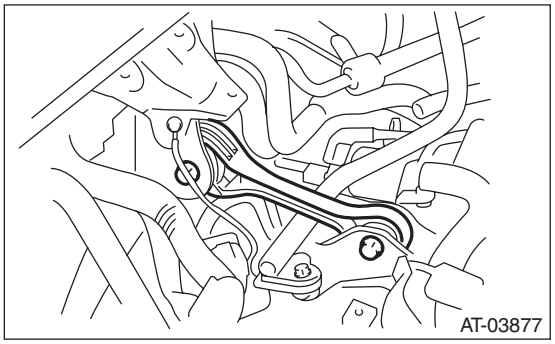
1) Set the vehicle on a lift.
2) Open the front hood and support with the hood stay.
3) Disconnect the ground cable from the battery.
4) Remove the air intake duct.
<Ref. to IN(H4SO)-8, REMOVAL, Air Intake Duct.>
5) Remove the air intake chamber.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
6) Remove the air cleaner case stay.


AT-01327

7) Disconnect the following connectors.
(1) Transmission harness connectors


AT-01328

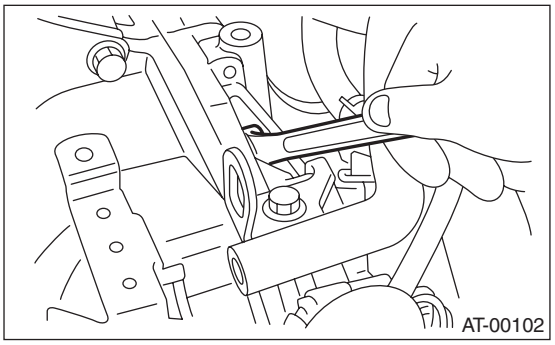
(2) Transmission ground terminal
8) Remove the starter.
<Ref. to SC(H4SO)-6, REMOVAL, Starter.>
9) Remove the pitching stopper.


AT-03877

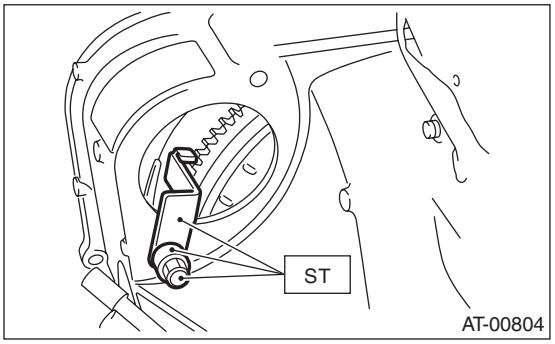
10) Separate the torque converter assembly from the drive plate.

CAUTION:
- **Be careful not to damage the mounting bolts.**
- **Be careful not to drop bolts into the converter case.**

(1) Remove the V-belt covers.
(2) Remove the service hole plug.
(3) Remove the bolts which hold the torque converter assembly to the drive plate.
(4) Place the wrench on the crank pulley bolt, and remove all the bolts while rotating the crank pulley a little bit at a time.


AT-00102

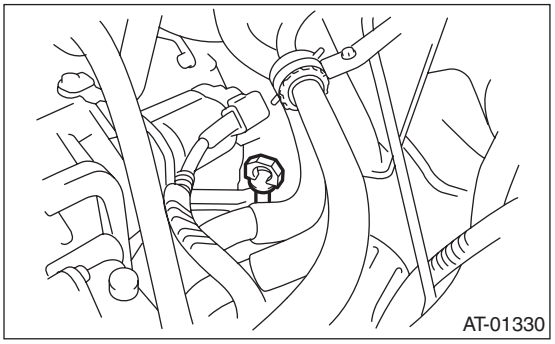
11) Attach the ST to the converter case.
ST 498277200 STOPPER SET



AT-00804

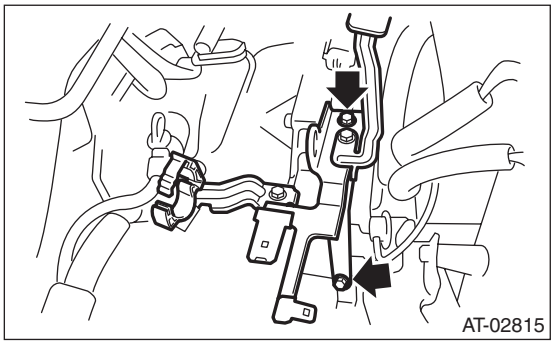
12) Remove the ATF level gauge.

NOTE:
Plug the opening to prevent entry of foreign particles into the transmission fluid.

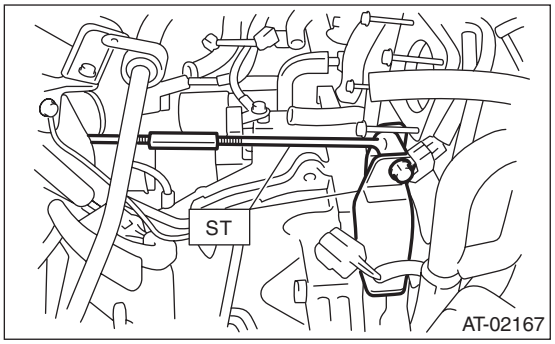

AT-01330

13) Remove the throttle body. <Ref. to FU(H4SO)-11, REMOVAL, Throttle Body.>

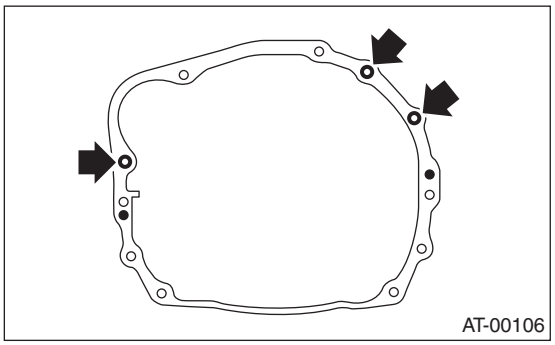
14) Disconnect the engine harness, then remove the harness connector from the engine harness bracket.
15) Remove the engine harness bracket.



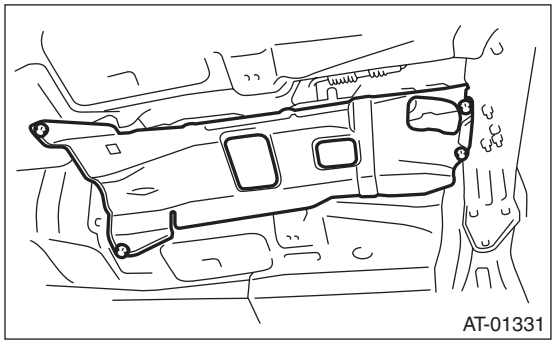
16) Remove the pitching stopper bracket.
17) Set the ST.
ST 41099AC000 ENGINE SUPPORT ASSY



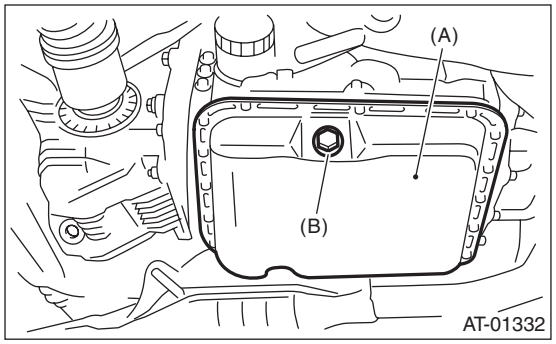
18) Remove the bolts which hold the upper side of the transmission to the engine.



19) Lift the vehicle.
20) Remove the under cover.
21) Remove the front, center and rear exhaust pipes and the muffler.
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
22) Remove the heat shield cover.

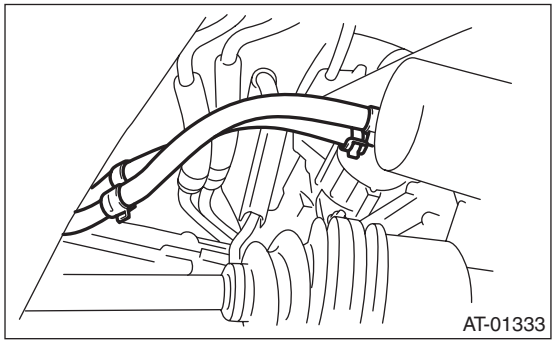


23) Remove the ATF drain plug to drain ATF.



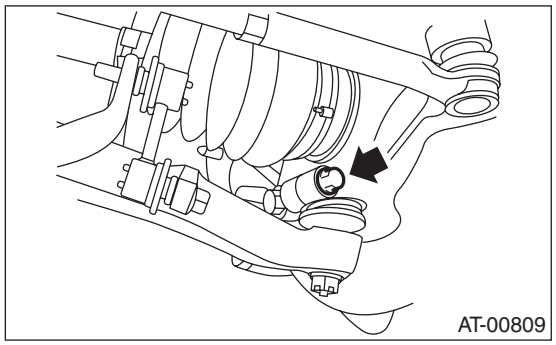
(A) Oil pan
(B) ATF drain plug

24) Disconnect the ATF cooler hoses from the pipes of the transmission side, and remove the oil charge pipe.



25) Remove the propeller shaft.
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
26) Remove the shift select cable.
<Ref. to CS-28, REMOVAL, Select Cable.>
27) Remove the brackets (two) which hold front stabilizer.

28) Remove the bolt securing the ball joint of the front arm to housing.



29) Pull out the front drive shaft from the transmission.

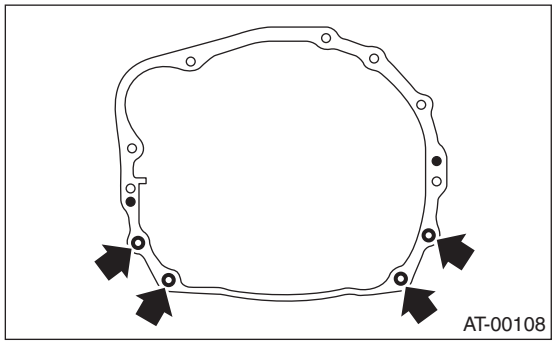
(1) Using a tire lever or a crow bar, etc., pull out until the front drive shaft transmission side joint slides move smoothly.

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

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

30) Remove the bolts which hold the clutch housing cover.

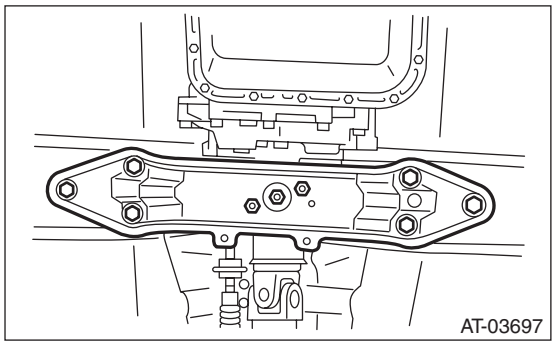
31) Remove the bolts which hold the lower side of transmission to the engine.



32) Place the transmission jack under the transmission.

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

33) Remove the transmission rear crossmember from the vehicle.

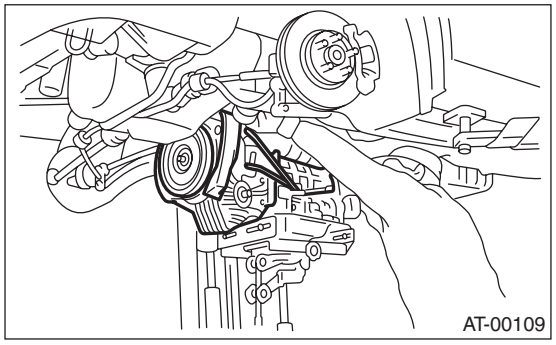


34) While lowering the transmission jack gradually, fully retract the engine support, and then tilt the engine rearward.

NOTE:
Retract the support until the clearance between front crossmember and converter case becomes approx. 10 mm (0.39 in).

35) Remove the transmission.

NOTE:
Remove the transmission and torque converter as a single unit from engine.



36) Remove the rear cushion rubber from the transmission assembly.

B: INSTALLATION

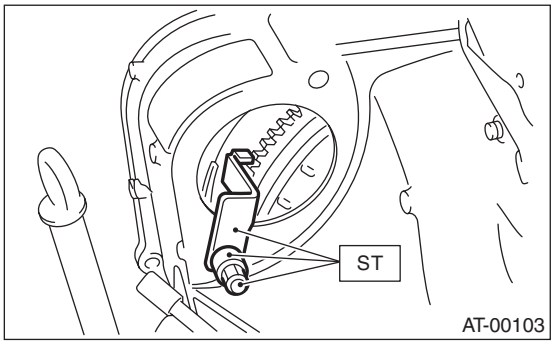
1) Replace the differential side oil seal with a new part.

NOTE:
When a new oil seal has been installed, replacement is not required.

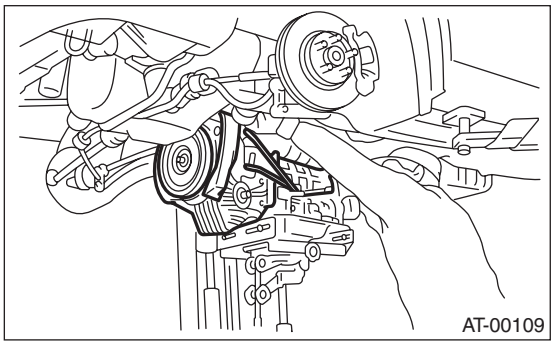
2) Install the rear cushion rubber to the transmission assembly.

Tightening torque:
40 N·m (4.1 kgf-m, 30 ft-lb)

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



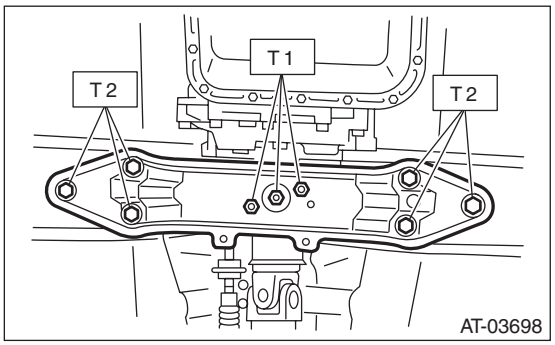
4) Install the transmission onto the engine.
(1) Lift-up the transmission gradually using transmission jack.



(2) Engage at the spline section.
(3) While raising the transmission jack gradually, turn the screw of engine support, and then tilt the engine forward.

5) Install the transmission rear crossmember.

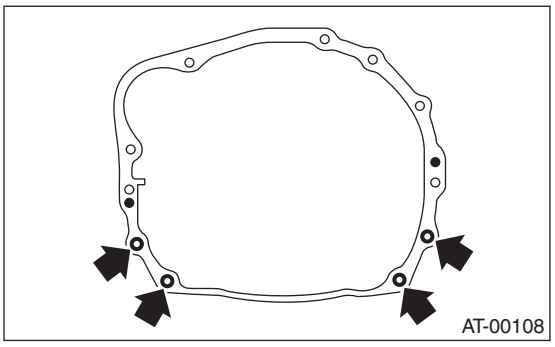
Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 75 N·m (7.6 kgf-m, 55 ft-lb)



6) Remove the transmission jack.

7) Tighten the bolts which hold the lower side of the transmission to the engine.

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

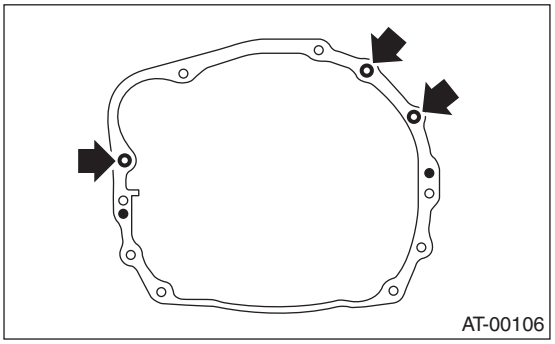


8) Install the clutch housing cover bolts.
9) Lower the lift.
10) Connect the engine and transmission.
(1) Remove the ST from converter case.

NOTE:
When removing the ST, be careful not to drop it into converter case.
ST 498277200 STOPPER SET

(2) Install the starter.
<Ref. to SC(H4SO)-6, INSTALLATION, Starter.>
(3) Tighten the bolts which hold the upper side of the transmission to engine.

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



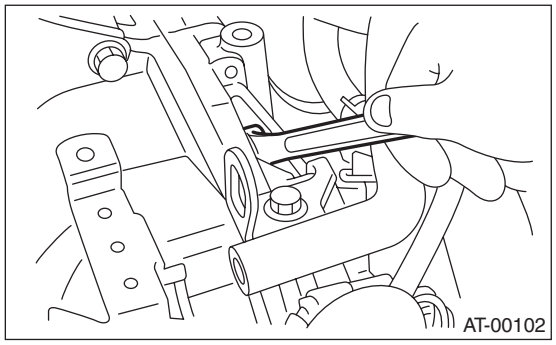
11) Install the torque converter assembly to the drive plate.

CAUTION:
- **Be careful not to damage the mounting bolts.**
- **Be careful not to drop bolts into the converter case.**

(1) Tighten the bolts which hold the torque converter assembly to the drive plate.

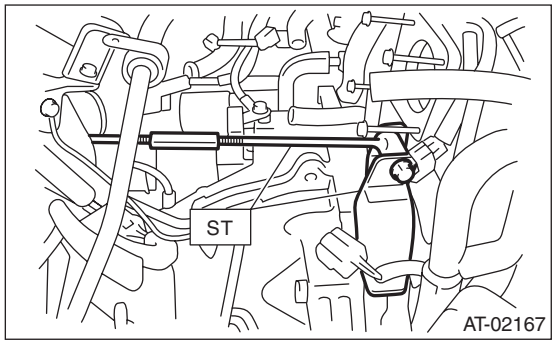
(2) Place the wrench on the crank pulley bolt, and remove all the bolts while rotating the crank pulley a little bit at a time.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



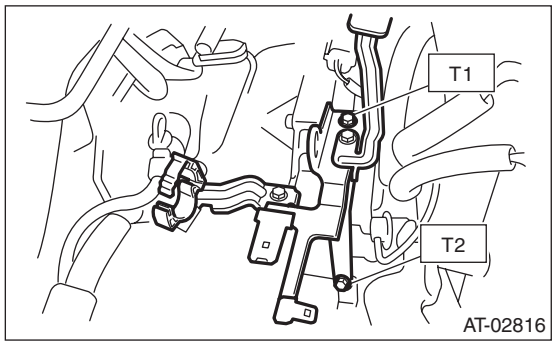
(3) Fit the plug to service hole.
(4) Install the V-belt cover.

12) Remove the ST.



13) Install the engine harness bracket.

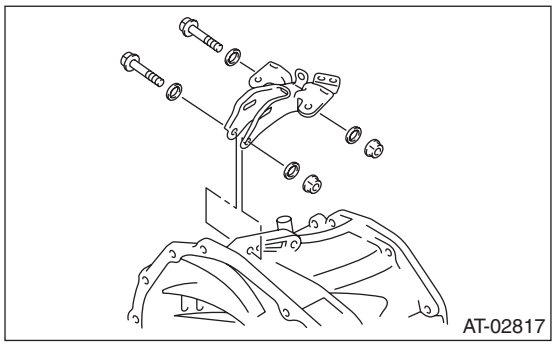
Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.6 ft-lb)
T2: 36 N·m (3.6 kgf-m, 26.0 ft-lb)



14) Install the harness connector to engine harness bracket, then connect the harness.

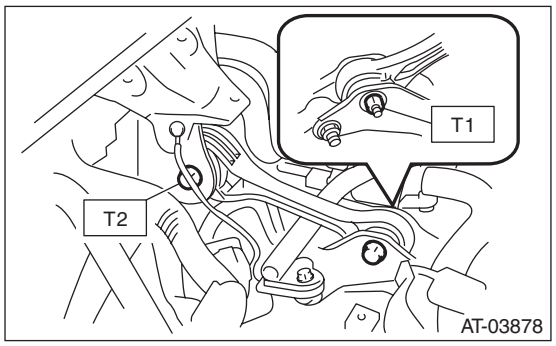
15) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

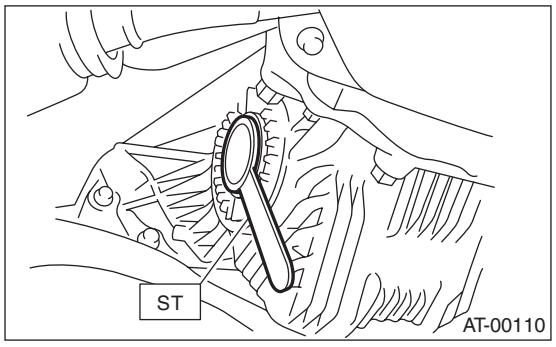


16) Install the throttle body. <Ref. to FU(H4SO)-11, INSTALLATION, Throttle Body.>
17) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)

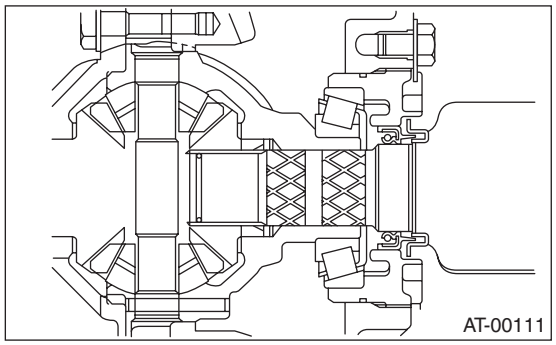


18) Lift the vehicle.
19) Replace the circlip of the front drive shaft with a new part.
20) Apply grease to the oil seal lip.
21) Attach the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR



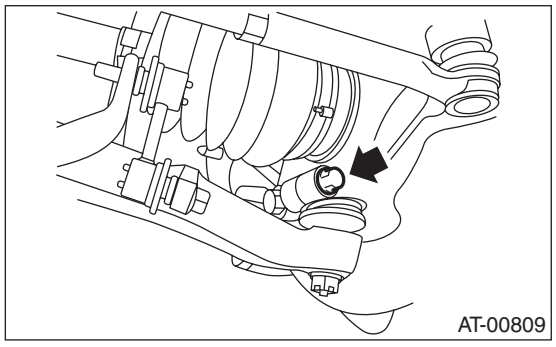
22) Align and insert the spline of the front drive shaft to the splines of the differential bevel gear, and remove the ST.
ST 28399SA010 OIL SEAL PROTECTOR

23) Insert the front drive shaft into the transmission securely by pressing the front housing from the outside.



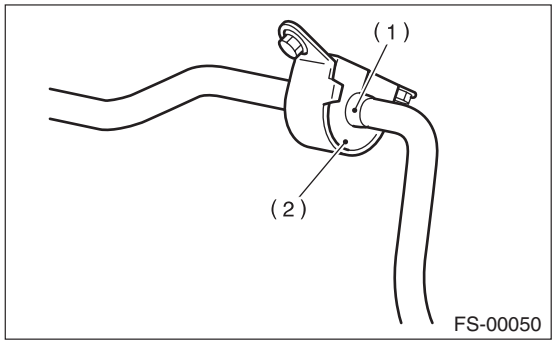
24) Install the ball joint into the housing.
25) Tighten the attachment bolts.

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



26) Install the stabilizer to the crossmember.

NOTE:
• Install the bushing (on front crossmember side) while aligning it with the paint mark on the stabilizer.
• Make sure the bushing and stabilizer are marked with the same identification colors (paint mark) when installing.

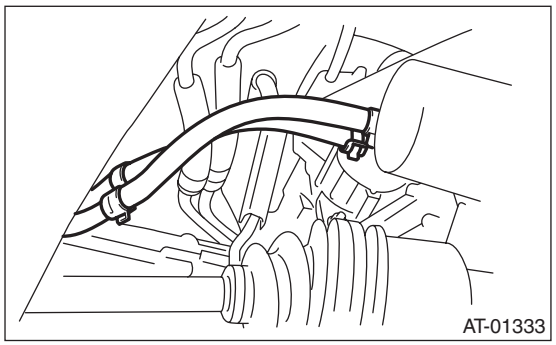


(1) Identification mark on stabilizer
(2) Bushing identification color

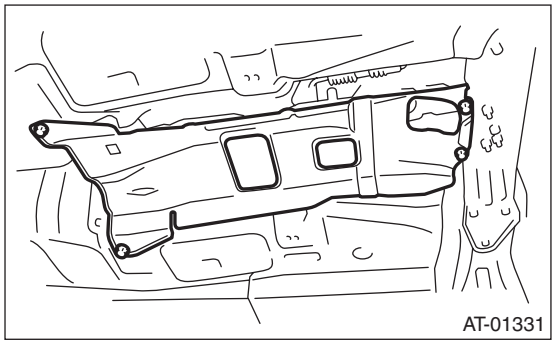
27) Always tighten the rubber bushing locations with wheels in full contact with the ground and the vehicle at curb weight.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

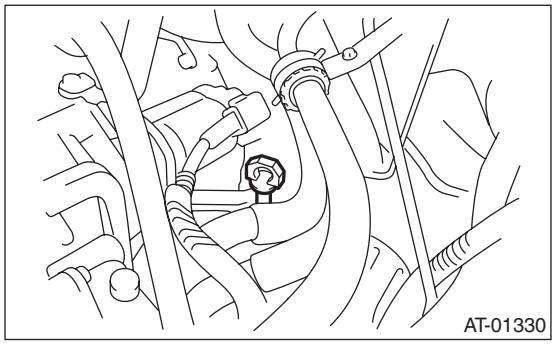
28) Install the shift select cable onto select lever.
<Ref. to CS-29, INSTALLATION, Select Cable.>
29) Install the oil charge pipe, and connect the ATF cooler hoses to the pipe.



30) Install the propeller shaft.
<Ref. to DS-11, INSTALLATION, Propeller Shaft.>
31) Install the heat shield cover.



32) Install the rear exhaust pipe and muffler assembly.
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
33) Install the front and center exhaust pipe.
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
34) Install the under cover.
35) Lower the lift.
36) Install the ATF level gauge.



37) Connect the following connectors.
(1) Transmission harness connectors
(2) Transmission ground terminal
38) Install the air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

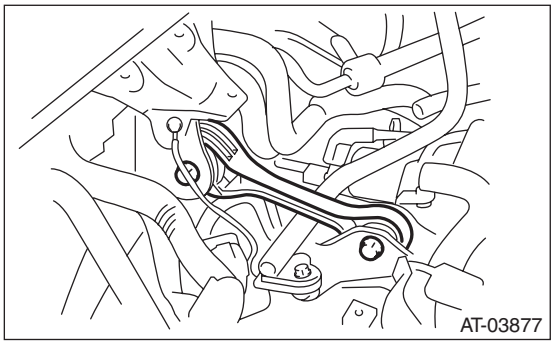
39) Install the air intake chamber.
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
40) Install the air intake duct.
<Ref. to IN(H4SO)-8, INSTALLATION, Air Intake Duct.>
41) From the gauge hole, add ATF until the fluid level is between the upper and lower level on the “COLD” side of the level gauge. <Ref. to 4AT-26, Automatic Transmission Fluid.>
42) Lower the vehicle from the lift.
43) Check the differential gear oil level. <Ref. to 4AT-28, Differential Gear Oil.>
44) Check the select lever operation.
<Ref. to 4AT-45, INSPECTION, Inhibitor Switch.>
45) Bleed the air of control valve. <Ref. to 4AT-58, Air Bleeding of Control Valve.>
46) Check the ATF level. <Ref. to 4AT-26, Automatic Transmission Fluid.>
47) Execute the learning control promotion. <Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>
48) Perform the road test.
<Ref. to 4AT-29, Road Test.>

10. Transmission Mounting System

A: REMOVAL

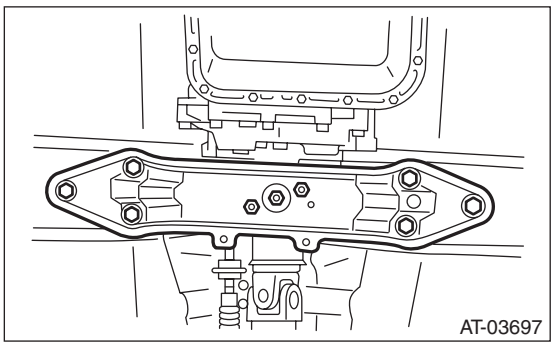
1. PITCHING STOPPER

1) Remove the air intake chamber.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
2) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1) Disconnect the ground cable from the battery.
2) Jack-up the vehicle and support it with rigid racks.
3) Remove the front, center and rear exhaust pipes and the muffler.
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
4) Remove the heat shield cover.
5) Set the transmission jack under transmission. Make sure that the support plate of transmission jack does not touch the oil pan.
6) Remove the transmission rear crossmember.



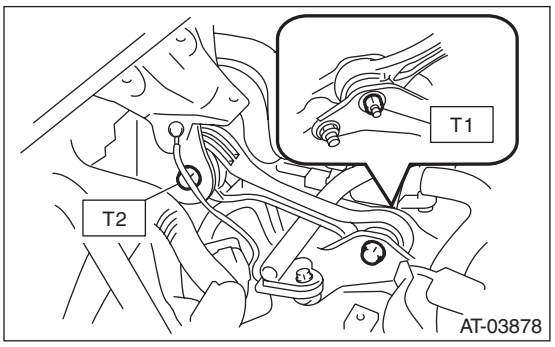
7) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



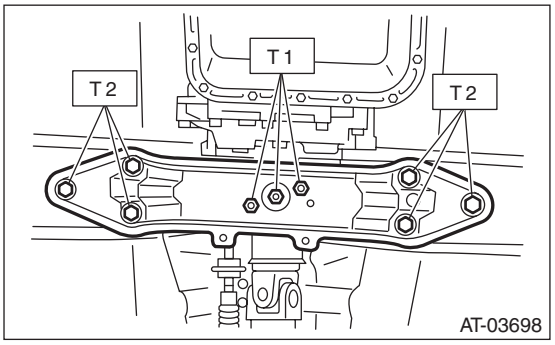
2) Install the air intake chamber.
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)
2) Install the cross member.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 75 N·m (7.6 kgf-m, 55 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover.
5) Install the front, center and rear exhaust pipes, and the muffler.
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

C: INSPECTION

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

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Check that there are no cracks, hardening or damage on rubber parts.

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. 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 4AT-43, REPLACEMENT, Extension Case Oil Seal.>

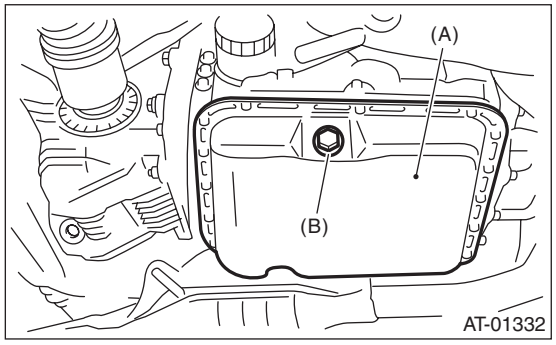
B: REPLACEMENT

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

CAUTION:
After running the engine or after idling for a long time, the ATF is hot. Be careful not to burn yourself.
4) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



(A) Oil pan
(B) ATF drain plug

5) Remove the rear exhaust pipe and muffler.
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
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.
12) Install the rear exhaust pipe and muffler.
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
13) Pour ATF into the oil charge pipe.

Recommended fluid:
SUBARU ATF HP

Substitute fluid:
IDEMITSU "ATF HP"
Castrol "Transmax J"

Capacity:
Fill with the same amount of ATF as drained.
14) Bleed the air of the control valve.
<Ref. to 4AT-58, Air Bleeding of Control Valve.>
15) Check the level and leaks of the ATF. <Ref. to 4AT-26, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

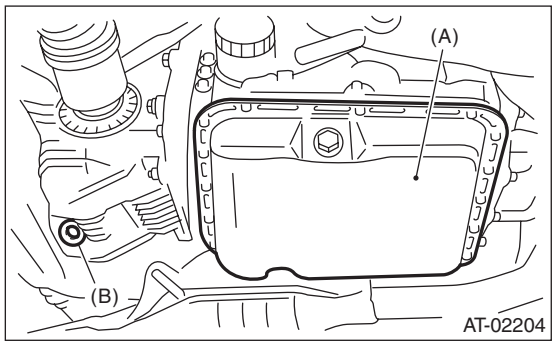
A: INSPECTION

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) Lift the vehicle.
2) Remove the front exhaust pipe and center exhaust pipe. <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
3) Remove the differential gear oil drain plug using TORX® bit T70, and then drain differential gear oil.

CAUTION:
• After running the engine or after idling for a long time, the differential gear oil is 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 causing fires. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.



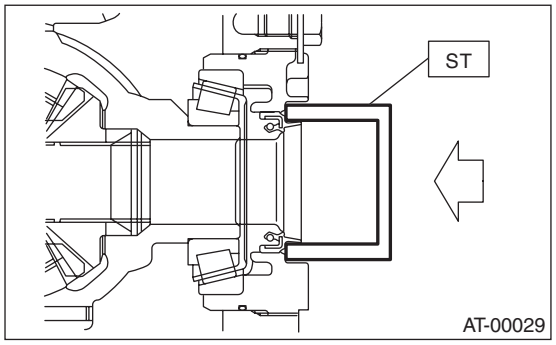
(A) Oil pan
(B) Differential gear oil drain plug

4) Tighten the differential gear oil drain plug.

NOTE:
Use a new gasket.

Tightening torque:
Aluminum gasket
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Copper gasket
70 N·m (7.1 kgf-m, 51.6 ft-lb)

5) Separate the front drive shaft from the transmission. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
6) Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.
7) Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



8) Apply gear oil to the oil seal lips.
9) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
10) Install the front exhaust pipe and the center exhaust pipe. <Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
11) Lower the vehicle.
12) Pour gear oil into the gauge hole.

Recommended gear oil:
<Ref. to 4AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Gear oil capacity:
1.1 — 1.3 ℓ (1.3 — 1.4 US qt, 1.0 — 1.1 Imp qt)
13) Check the level of differential gear oil. <Ref. to 4AT-28, INSPECTION, Differential Gear Oil.>

13.Inhibitor Switch

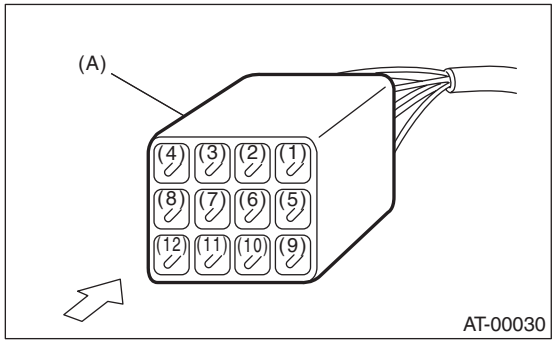
A: INSPECTION

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) Disconnect the inhibitor switch connector.
2) Check continuity in inhibitor switch circuits with the select lever moved to each position.

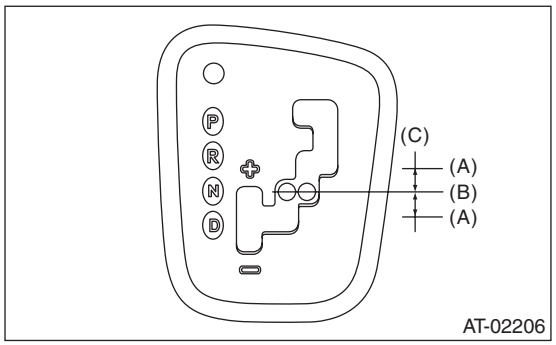
NOTE:
• Also check that there is no continuity in the ignition circuit when the select lever is in the “R” and “D” ranges.
• If the inhibitor switch does not operate, check for poor contact of the connector on transmission side.

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



(A) Inhibitor switch connector

3) Check that there is continuity at equal points when the select lever is turned 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 4AT-45, ADJUSTMENT, Inhibitor Switch.>

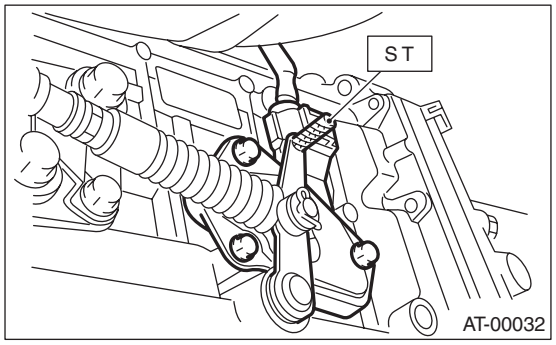


(A) Continuity does not exist.
(B) Continuity exists.
(C) 1.5°

4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-31, ADJUSTMENT, Select Cable.>

B: ADJUSTMENT

1) Set the select lever to “N” range.
2) Loosen the three inhibitor switch securing bolts.
3) Insert the ST as vertical as possible into the holes in the inhibitor switch lever and switch body.
ST 499267300 STOPPER PIN



4) Tighten the three inhibitor switch securing bolts.

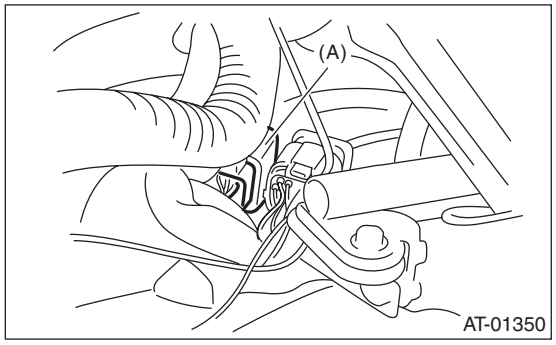
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

5) Repeat the above checks. If the inhibitor switch is determined to be “faulty”, replace it.

C: REMOVAL

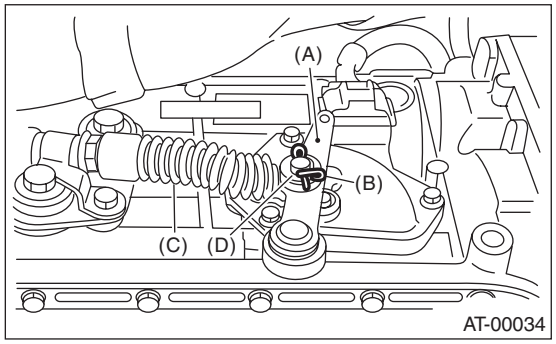
1) Set the vehicle on a lift.
2) Set the select lever to “N” range.
3) Remove the air intake chamber.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>

4) Disconnect the inhibitor switch connector.



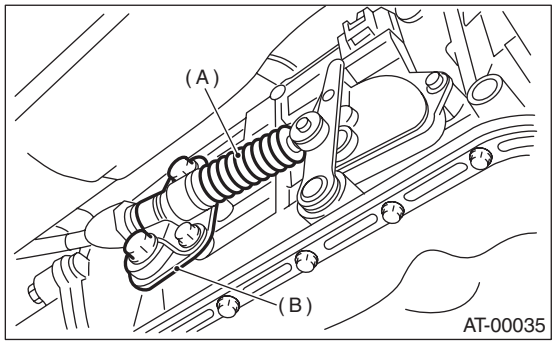
(A) Inhibitor switch connector

5) Remove the inhibitor switch connector from the stay.
6) Lift the vehicle.
7) Remove the front and center exhaust pipes.
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
8) Remove the snap pin and washer from the range select lever.



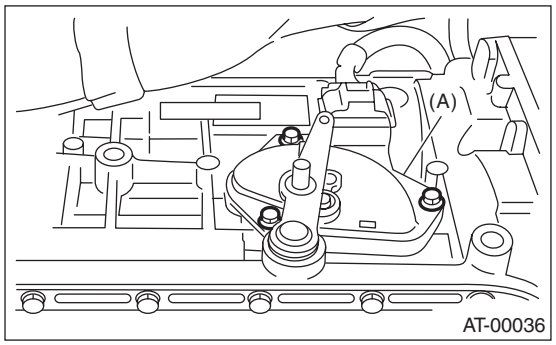
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Washer

9) Remove the plate assembly from the transmission case.



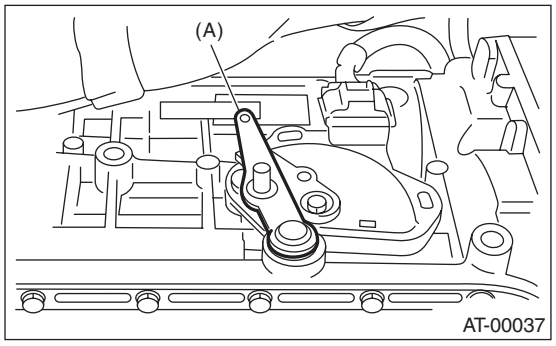
(A) Select cable
(B) Plate ASSY

10) Remove the three inhibitor switch securing bolts.



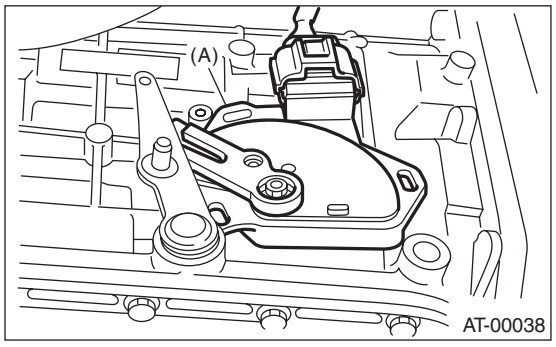
(A) Inhibitor switch

11) Move the range select lever to the parking position (left side).



(A) Range select lever

12) Remove the inhibitor switch from the transmission.



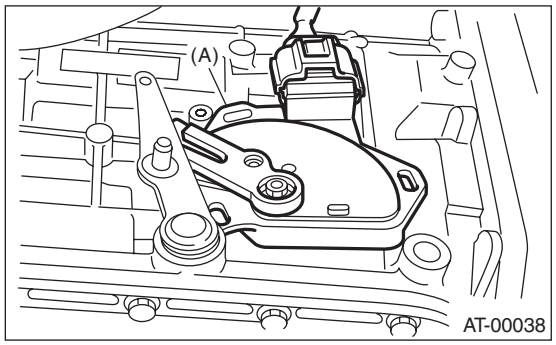
(A) Inhibitor switch

13) Disconnect the inhibitor switch harness connector from the inhibitor switch.

D: INSTALLATION

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

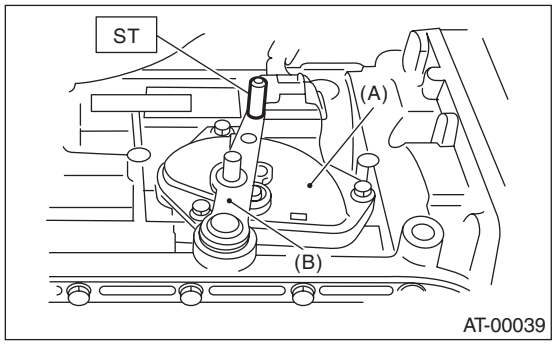
2) Install the inhibitor switch to the transmission case.



(A) Inhibitor switch

3) Move the range select lever to the neutral position.
4) Tighten the three inhibitor switch securing bolts using the ST.
ST 499267300 STOPPER PIN

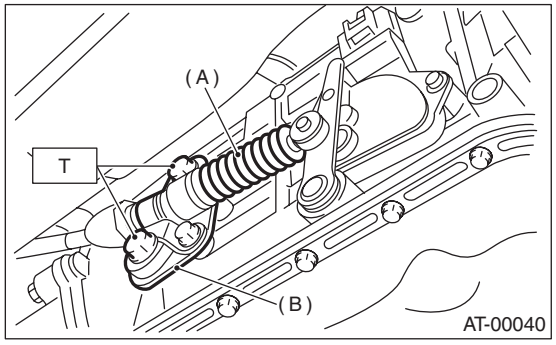
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



(A) Inhibitor switch
(B) Range select lever

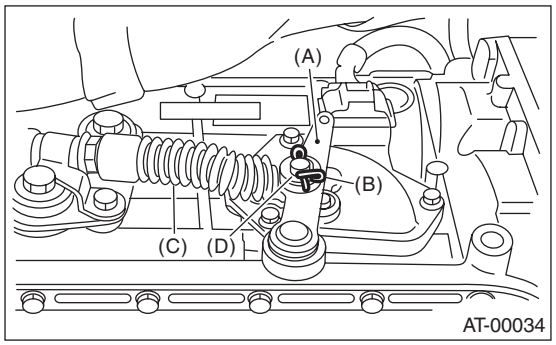
5) Install the select cable to the range select lever.
6) Install the plate assembly to the transmission.

Tightening torque:
T: 25 N·m (2.5 kgf-m, 18 ft-lb)



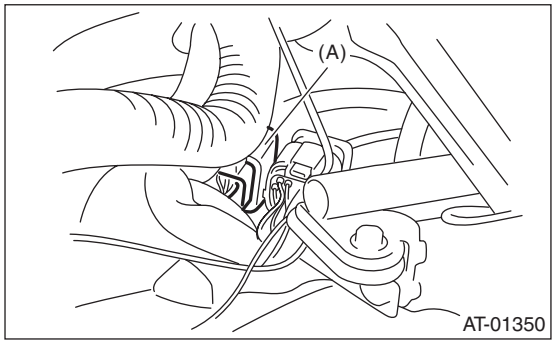
(A) Select cable
(B) Plate ASSY

7) Install the washer and snap pin to the range select lever.



(A) Range select lever
(B) Snap ring
(C) Select cable
(D) Washer

8) Install the front and center exhaust pipe.
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
9) Lower the vehicle.
10) Install the inhibitor switch connector to the stay.
11) Connect the inhibitor switch connector.



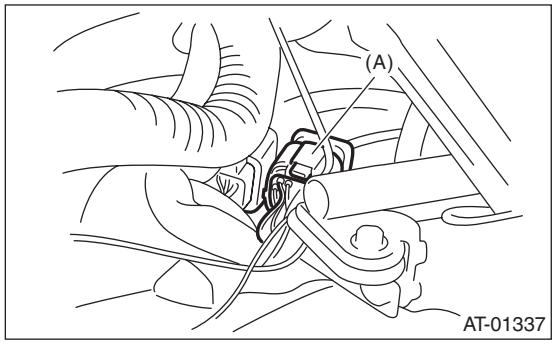
(A) Inhibitor switch connector

12) Install the air intake chamber.
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
13) Inspect the inhibitor switch. <Ref. to 4AT-45, INSPECTION, Inhibitor Switch.>

14.Front Vehicle Speed Sensor

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from the battery.
3) Remove the air intake chamber.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
4) Disconnect the transmission connector.



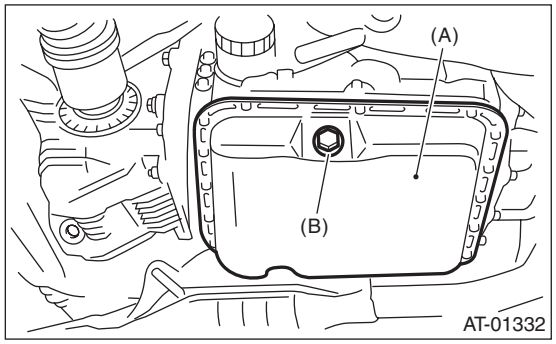
(A) Transmission connector

5) Remove the pitching stopper. <Ref. to 4AT-41, REMOVAL, Transmission Mounting System.>
6) Remove the transmission connector from stay.
7) Lift the vehicle.
8) Clean the transmission exterior.
9) Remove the ATF drain plug to drain ATF.

CAUTION:
After running the engine or after idling for a long time, the ATF is hot. Be careful not to burn yourself.
10) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

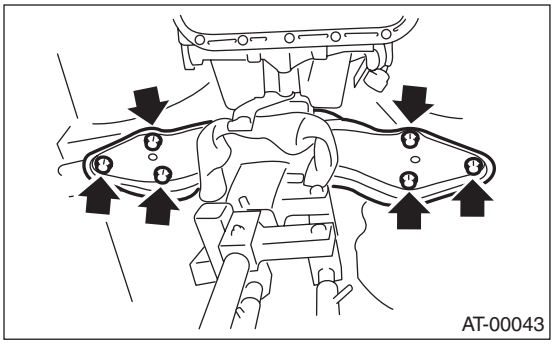
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



(A) Oil pan
(B) ATF drain plug

11) Remove the front, center and rear exhaust pipes and muffler. <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
12) Remove the shield cover.
13) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
14) Place the transmission jack under the transmission.

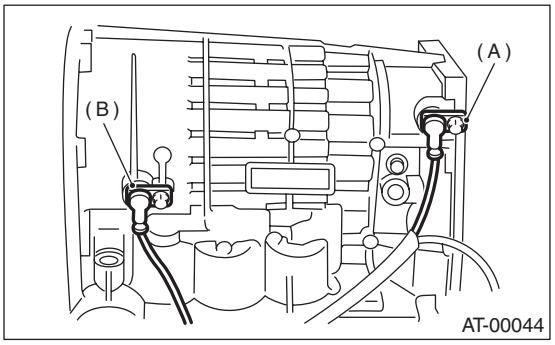
NOTE:
Make sure that the support plate of transmission jack does not touch the cross.
15) Remove the transmission rear crossmember bolt.



16) Lower the transmission jack.

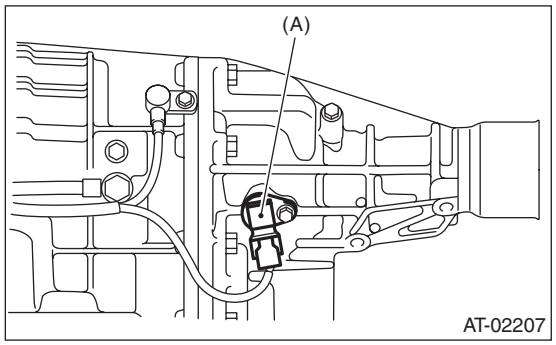
NOTE:
Do not separate the transmission jack and transmission.
17) Remove the oil cooler inlet and outlet pipes.

NOTE:
When removing the outlet pipe, be careful not to lose the ball and spring used with retaining screw.
18) Remove the front vehicle speed sensor and torque converter turbine speed sensor.



(A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

19) Disconnect the connector from the rear vehicle speed sensor.

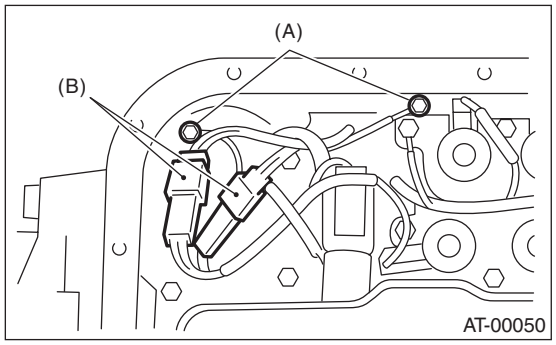


(A) Rear vehicle speed sensor

20) Remove the oil pan.

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

21) Disconnect the harness connector and transmission ground terminal.

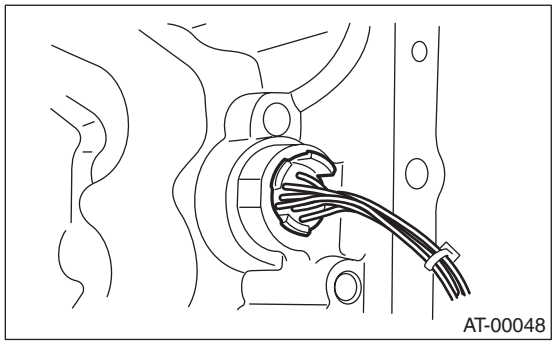


(A) Transmission ground
(B) Harness connector

22) Remove the harness assembly.

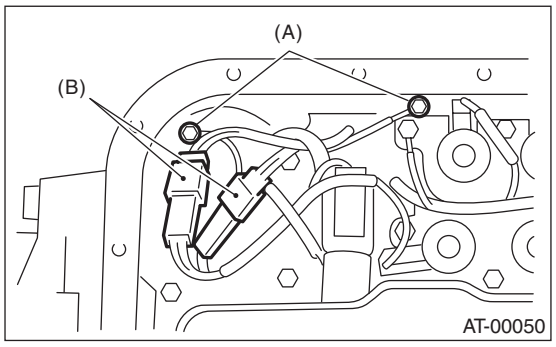
B: INSTALLATION

1) Pass the harness assembly through the hole in transmission case.



2) Connect the harness connector and transmission ground.

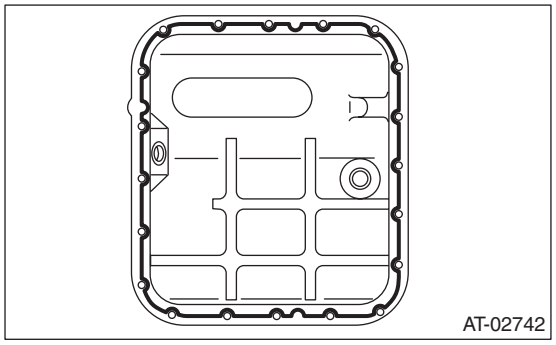
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Transmission ground
(B) Harness connector

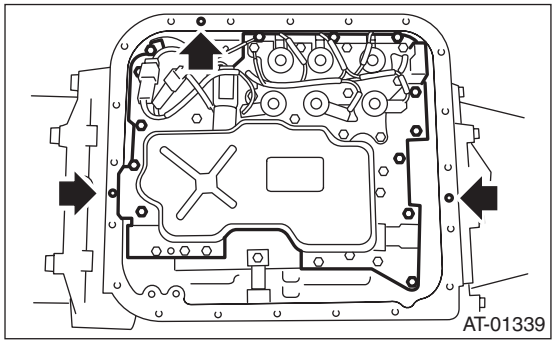
3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

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



4) Apply an adequate amount of liquid gasket to the three holes excluding the screw holes of the transmission case.

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



5) Install the oil pan.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

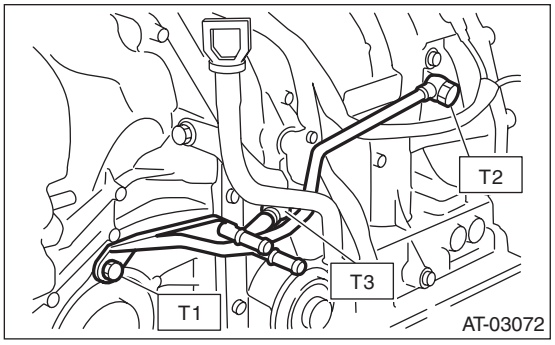
6) Install the front vehicle speed sensor and torque converter turbine speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

7) Connect the connector to the rear vehicle speed sensor.
8) Install the oil cooler pipe.

NOTE:
Use a new copper washer.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18 ft-lb)
T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)
T3: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



9) Install the transmission rear crossmember bolt.

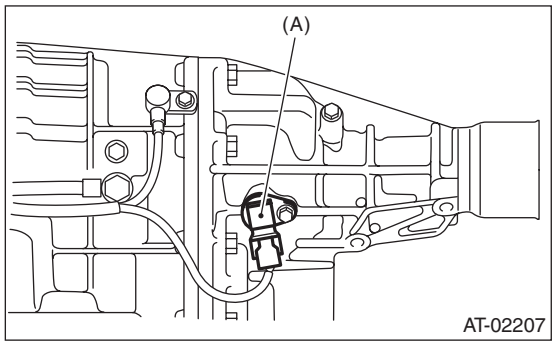
Tightening torque:
75 N·m (7.6 kgf-m, 55 ft-lb)

10) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
11) Install the shield cover.
12) Install the front, center and rear exhaust pipes, and the muffler.
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
13) Lower the vehicle.
14) Install the transmission connector to the stay.
15) Install the pitching stopper. <Ref. to 4AT-41, INSTALLATION, Transmission Mounting System.>
16) Install the air intake chamber.
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
17) Fill with the same amount of ATF as drained.
18) Bleed the air of control valve.
<Ref. to 4AT-58, Air Bleeding of Control Valve.>
19) Inspect the level of ATF. <Ref. to 4AT-26, Automatic Transmission Fluid.>
20) Execute the learning control promotion. <Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

15.Rear Vehicle Speed Sensor

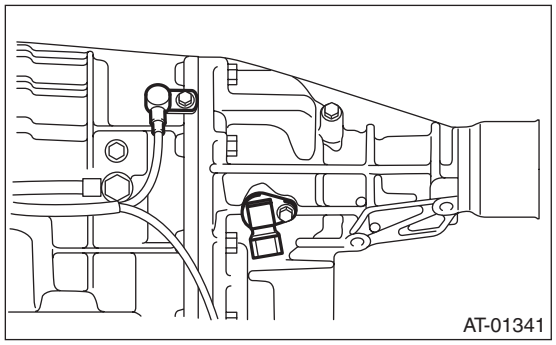
A: REMOVAL

1) Set the vehicle on a lift, and then lift the vehicle.
2) Disconnect the connector from the rear vehicle speed sensor.



(A) Rear vehicle speed sensor

3) Remove the rear vehicle speed sensor.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Replace the O-ring with a new part.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

16. Torque Converter Turbine Speed Sensor

A: REMOVAL

For removal procedure of the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor”. <Ref. to 4AT-48, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

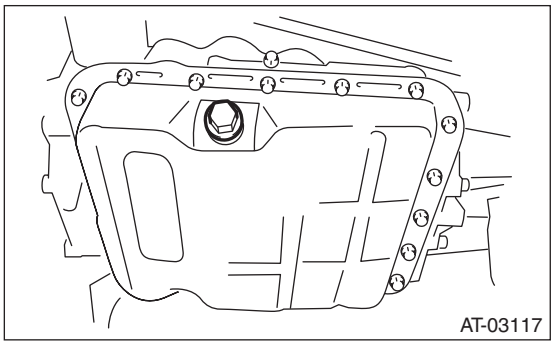
For installation procedure of the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor”. <Ref. to 4AT-49, INSTALLATION, Front Vehicle Speed Sensor.>

17.Control Valve Strainer

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from the battery.
3) Lift up the vehicle.
4) Clean the transmission exterior.
5) Remove the drain plug (ATF) to drain the ATF.

CAUTION:
The ATF will be extremely hot after driving. Be careful not to receive burns.

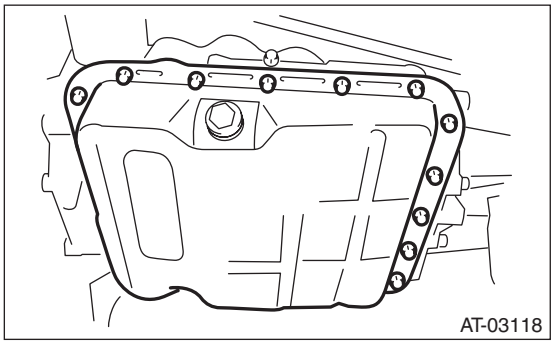


6) Perform replacement with a new gasket, and tighten the drain plug (ATF).

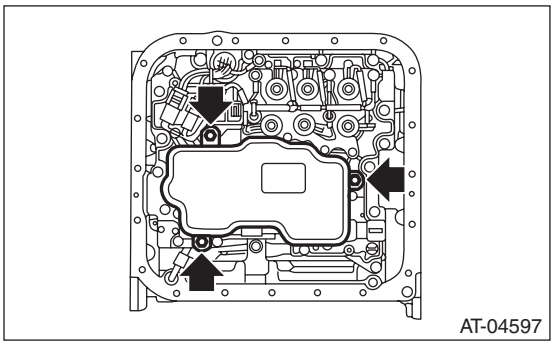
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

7) Remove the oil pan.

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



8) Remove the magnet.
9) Clean the magnet.
10) Completely remove the remaining liquid gasket on the transmission case and oil pan.
11) Remove the control valve strainer tightening bolt, and remove control valve strainer from the control valve body.



B: INSTALLATION

1) Check the control valve body for dust and other foreign matter.
2) Mount new control valve strainer to the control valve body.
(1) Apply ATF to the entire perimeter of the O-ring on the control valve strainer.

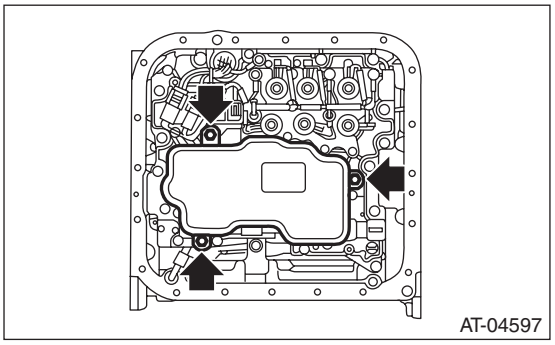
CAUTION:
Protect the O-ring from dust and dirt while applying ATF.

(2) Install the control valve strainer to the control valve body from the O-ring side.

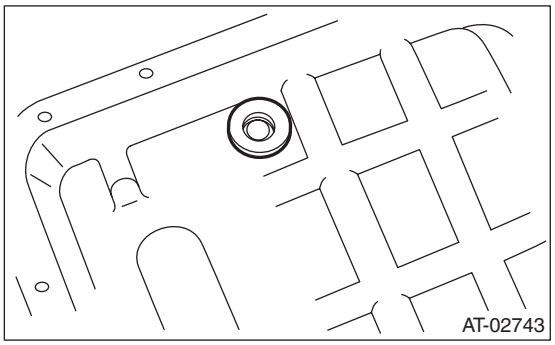
CAUTION:
If the control valve strainer is pushed in at an angle, the O-ring may be damaged. Be sure to push in the control valve strainer straight to install.

(3) Tighten the three bolts.

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

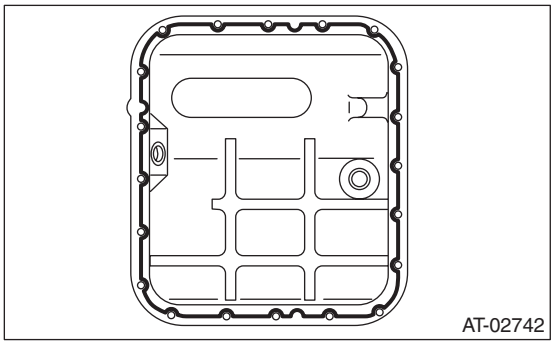


3) Attach the magnet at the specified position of the oil pan.



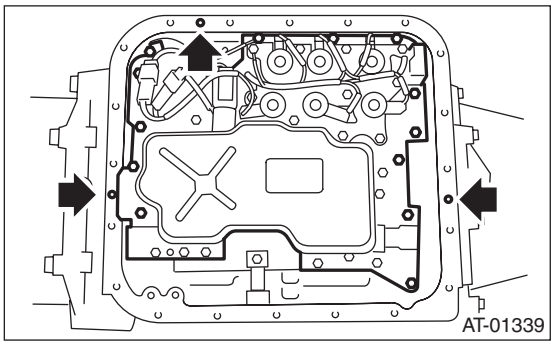
4) Apply proper amount of liquid gasket to the entire oil pan mating surface.

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



5) Fill the three holes aside from the bolt holes in the transmission case, with liquid gasket.

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) Fill ATF from the oil charge pipe.

Recommended fluid:
<Ref. to 4AT-3, HYDRAULIC CONTROL AND LUBRICATION, SPECIFICATION, General Description.>

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

8) Bleed the air of control valve. <Ref. to 4AT-58, Air Bleeding of Control Valve.>
9) Check the ATF level. <Ref. to 4AT-26, Automatic Transmission Fluid.>

C: INSPECTION

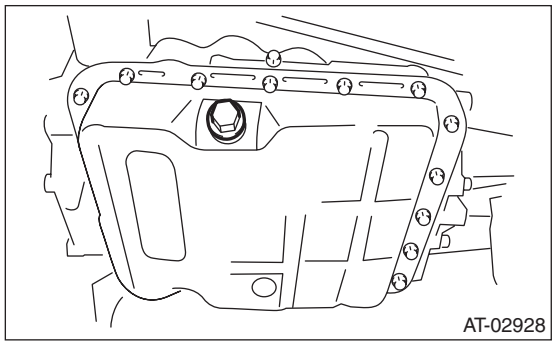
Check the control valve strainer for holes, damages or adhesion of dust and other foreign particles.

18.Control Valve Body

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from the battery.
3) Lift the vehicle.
4) Clean the transmission exterior.
5) Remove the ATF drain plug to drain ATF.

CAUTION:
After running the engine or after idling for a long time, the ATF is hot. Be careful not to burn yourself.



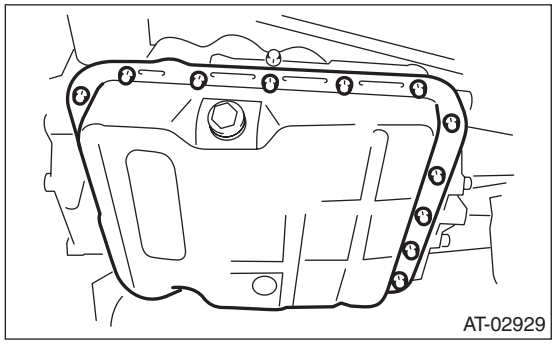
6) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

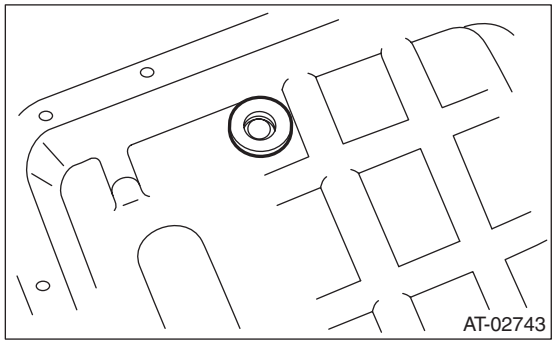
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

7) Remove the oil pan.

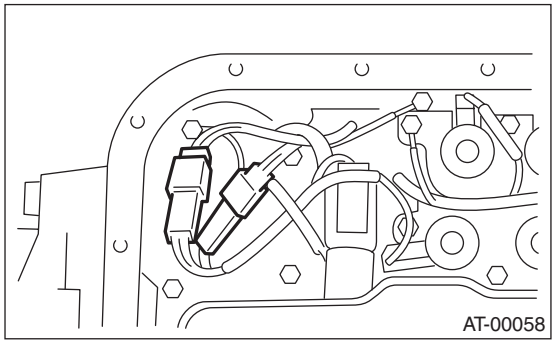
NOTE:
Be sure to prevent the entering of dust and other foreign matters into oil pan.



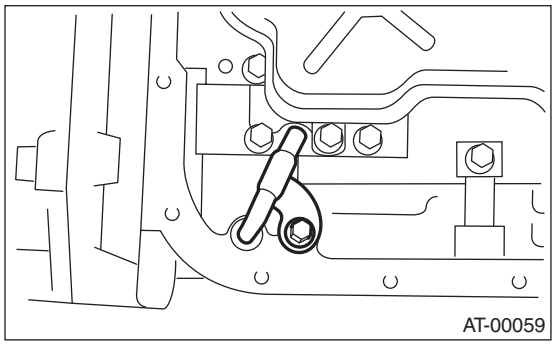
8) Remove the magnet.



9) Clean the magnet.
10) Completely remove the remaining liquid gasket on the transmission case and oil pan.
11) Disconnect the control valve connector.

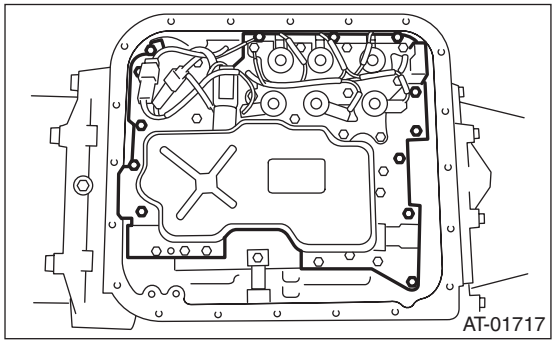


12) Remove the oil cooler pipe.



13) Remove the control valve body.

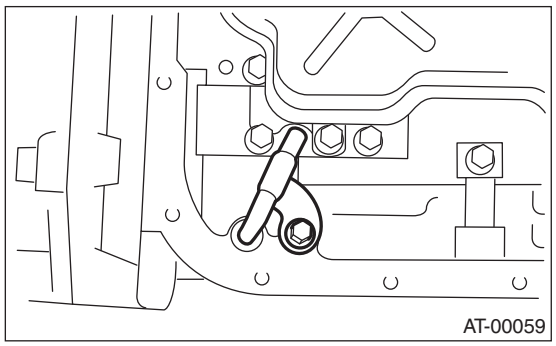
NOTE:
The control valve body is replaced as an assembly only, because it is a non-disassembly part.



B: INSTALLATION

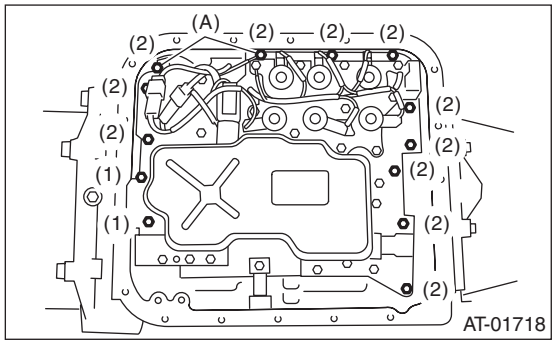
1) Check the control valve body for dust and other foreign matter.
2) Temporarily install the control valve body and ground cable to the transmission, then install the oil cooler pipe.

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



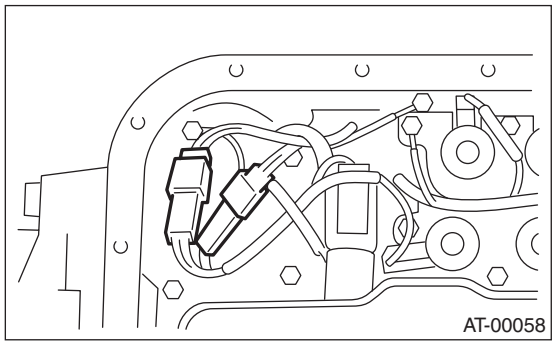
3) Tighten the bolts equally.

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

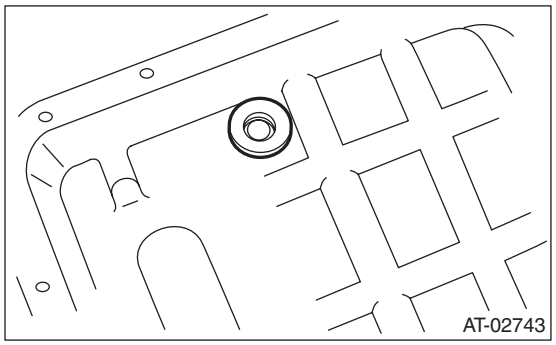


(A) Transmission ground
Bolt length mm (in)
(1) 35 (1.38)
(2) 30 (1.18)

4) Connect the control valve connector.

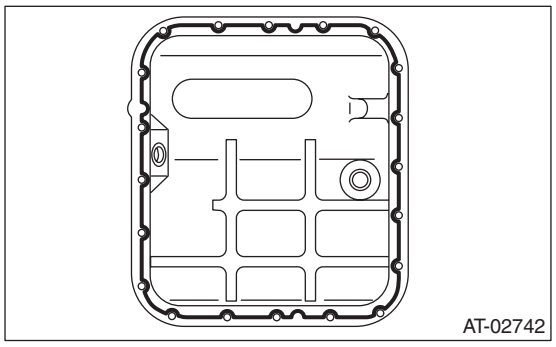


5) Attach the magnet at the specified position of the oil pan.



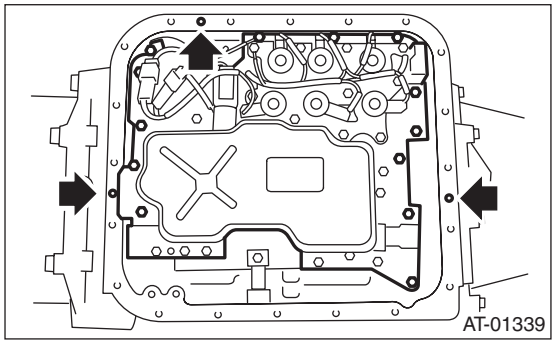
6) Apply liquid gasket to the oil pan.

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



7) Fill the 3 holes aside from the bolt holes in the transmission case, with liquid gasket.

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



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

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

9) Fill ATF from the oil charger pipe.

Recommended fluid:
SUBARU ATF HP

Substitute fluid:
IDEMITSU "ATF HP"
Castrol "Transmax J"

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

10) Bleed the air of control valve body. <Ref. to 4AT-58, Air Bleeding of Control Valve.>
11) Check the ATF level.
<Ref. to 4AT-26, Automatic Transmission Fluid.>
12) Execute the learning control promotion. <Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

C: INSPECTION

Check parts for holes, damages or adhesion of dust and other foreign particles

19.Air Bleeding of Control Valve

A: PROCEDURE

1) Set the select lever to the “P” range and apply the parking brake, then raise the vehicle on a lift.
2) Connect the Subaru Select Monitor to the vehicle.
3) Using the Subaru Select Monitor, check that there is no DTC being output.
4) Using the Subaru Select Monitor, check that the ATF temperature is 60°C (140°F) or less. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>
5) Close the Subaru Select Monitor.
6) Disengage manual mode, then turn the ignition switch to OFF.
7) Set the select lever to “R” range.
8) Depress the brake pedal fully until the air bleeding is completed.
9) Turn the ignition switch to ON.
10) Shift the select lever to the “P” range, and wait for 3 seconds or more.
11) Shift the select lever to “R” range, and wait for 3 seconds or more.
12) Shift the select lever to “N” range, and wait for 3 seconds or more.
13) Shift the select lever to “D” range, and wait for 3 seconds or more.
14) Shift the select lever to “N” range, and wait for 3 seconds or more.
15) Slowly depress the accelerator pedal to full throttle.
16) Slowly release the accelerator pedal to full close.
17) Start the engine.
18) Set the select lever to the “D” range.
19) Run the Subaru Select Monitor.
20) Select {Each System Check} in the Main Menu of the Subaru Select Monitor.
21) On the System Selection Menu display screen, select “Transmission”. Air bleed of the control valve will start in the transmission. At this time, the SPORT indicator light in the combination meter blinks at 2 Hz. When the SPORT indicator light does not blink, repeat the procedures from step 4).
22) Air bleed of the control valve is complete when the SPORT indicator light in the combination meter turns off, from blinking at 2 Hz.

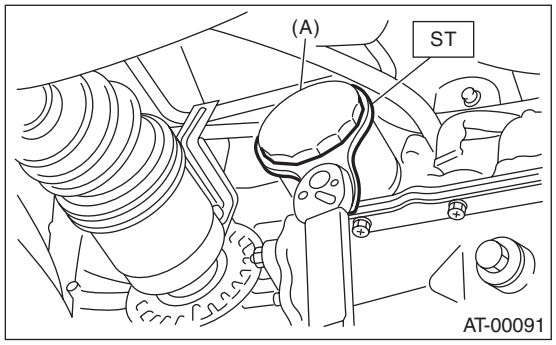
NOTE:
When blinking of SPORT indicator light changes from 2 Hz to 4 Hz during air bleed, repeat the procedures from step 4).

23) Set the select lever to the “N” range, and then turn the ignition switch to OFF.
24) Set the select lever to the “P” range. The air bleed operation is complete.

20.ATF Filter

A: REMOVAL

NOTE:
The ATF filter is maintenance free.
1) Lift the vehicle.
2) Using the ST, remove the ATF filter.
ST 498545400 OIL FILTER WRENCH



(A) ATF filter

B: INSTALLATION

1) Apply a thin coat of ATF to the oil seal part of new ATF filter.
2) Install the ATF filter. Turn it by hand, being careful not to damage oil seal.
3) Tighten the ATF filter using ST.
Calculate the ATF filter tightening torque using following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 78 mm (3.07 in)
L2: Torque wrench length
Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.2)

NOTE:
Attach ST to the torque wrench as straight as possible.
ST 498545400 OIL FILTER WRENCH
4) Fill the ATF.
5) Inspect the level of ATF. <Ref. to 4AT-26, Automatic Transmission Fluid.>

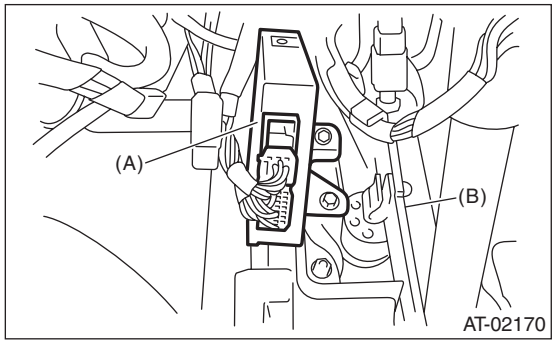
C: INSPECTION

Check for rusting, holes, ATF leaks or other damage.

21. Transmission Control Module (TCM)

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Remove the instrument panel lower cover and remove the connector.
3) Disconnect the connector from TCM.



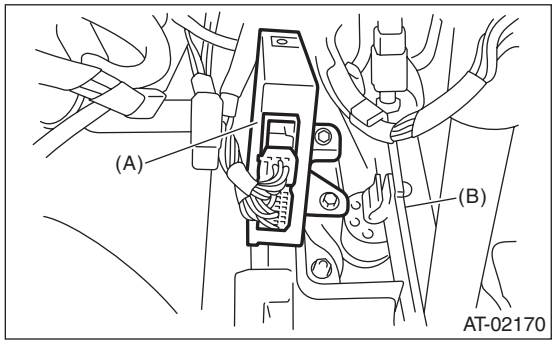
(A) Transmission control module (TCM)
(B) Brake pedal

4) Remove the TCM.

B: INSTALLATION

1) Install the TCM.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



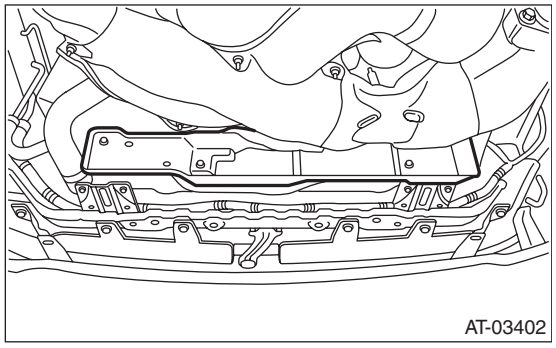
(A) Transmission control module (TCM)
(B) Brake pedal

2) Connect the connector to the TCM.
3) Install in the reverse order of removal.
4) Execute the learning control promotion. <Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

22.ATF Cooler Pipe and Hose

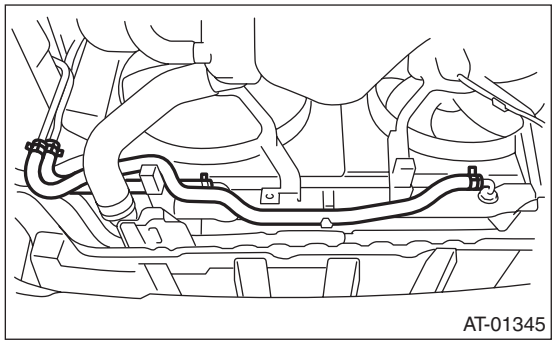
A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the battery.
3) Lift the vehicle.
4) Remove the under cover.
5) Remove the heat shield cover.



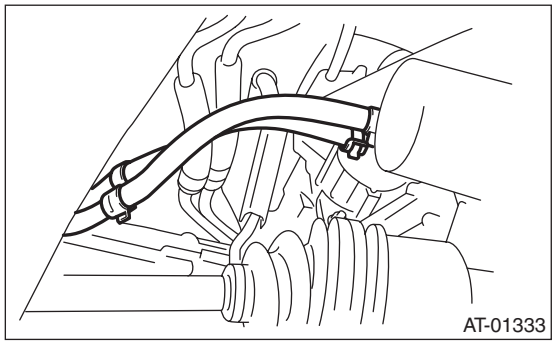
6) Disconnect the ATF cooler hose from the radiator.

NOTE:
• Do not use a screwdriver or other pointed tools.
• If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.

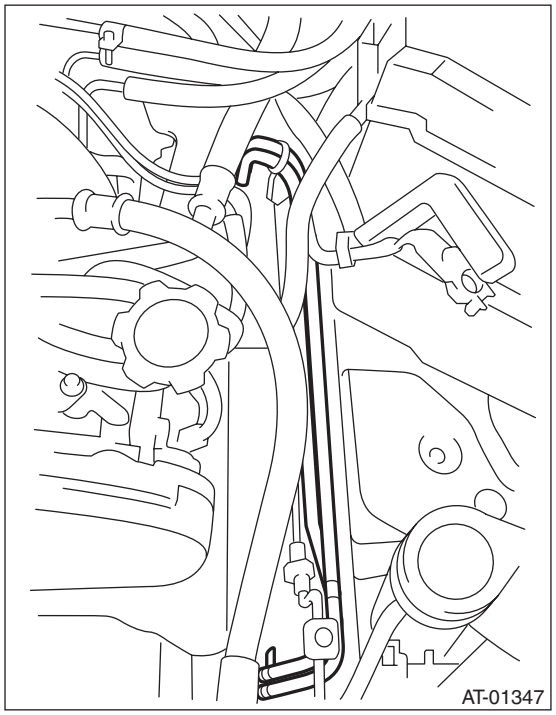


7) Disconnect the ATF cooler hoses from the pipes.

NOTE:
• Do not use a screwdriver or other pointed tools.
• If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.

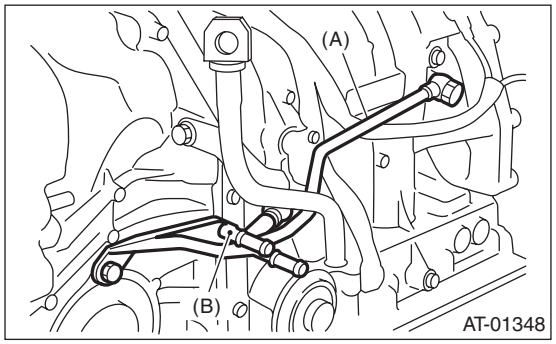


8) Disconnect the ATF cooler pipe from frame.



9) Remove the oil cooler inlet and outlet pipes.

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

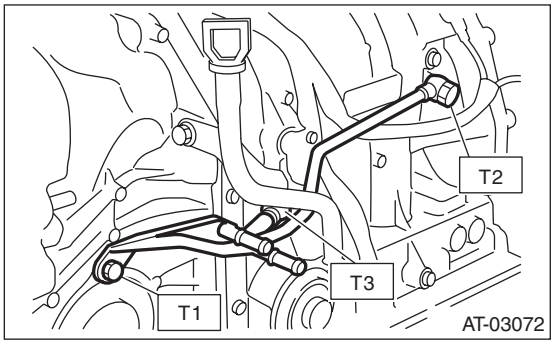


(A) Inlet pipe
(B) Outlet pipe

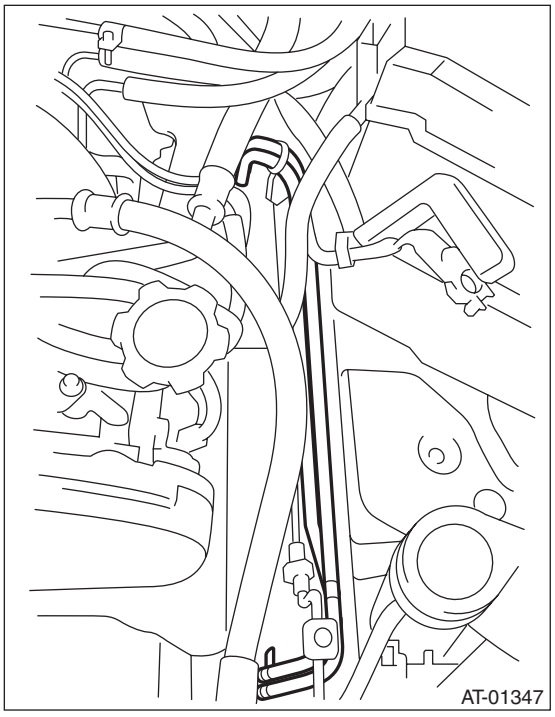
B: INSTALLATION

1) Install the oil cooler inlet and outlet pipes with new washers.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18 ft-lb)
T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)
T3: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

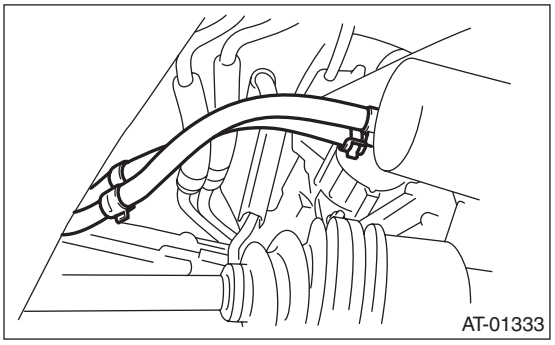


2) Install the ATF cooler pipe to frame.



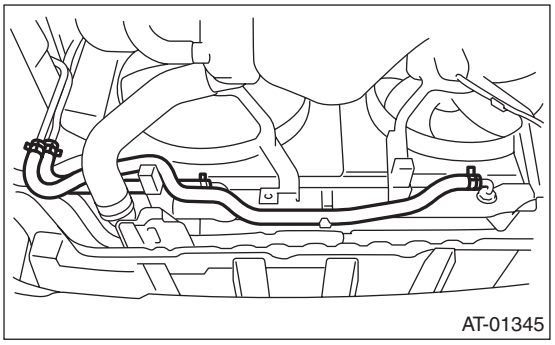
3) Connect the ATF cooler hose to the pipe on the transmission side.

NOTE:
• Install so that the hose is not folded over, excessively bent or twisted.
• Insert the hose to the specified position.

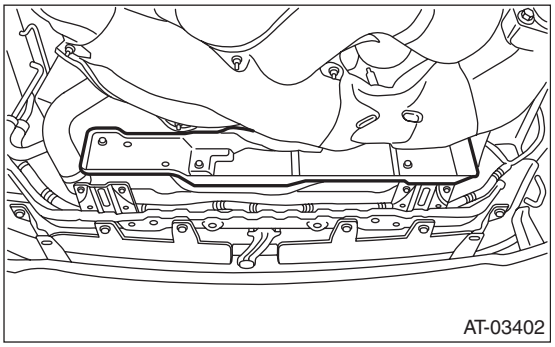


4) Connect the ATF cooler hose to the pipe on the radiator side.

NOTE:
• Install so that the hose is not folded over, excessively bent or twisted.
• Insert the hose to the specified position.



5) Install the heat shield cover.



6) Install the under cover.
7) Install the battery.
8) Fill the ATF. <Ref. to 4AT-26, Automatic Transmission Fluid.>

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

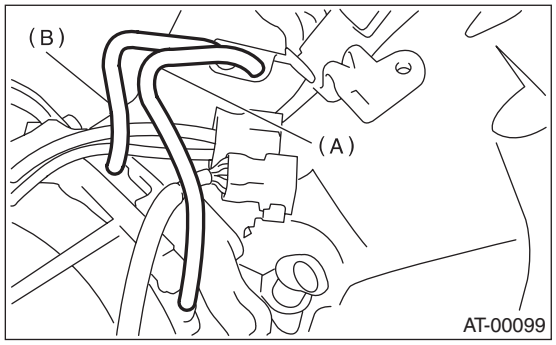
C: INSPECTION

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

23.Air Breather Hose

A: REMOVAL

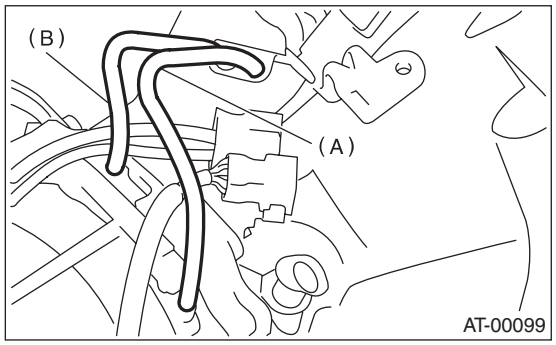
1) Remove the air intake chamber.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
2) Disconnect the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

B: INSTALLATION

1) Install the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

2) Install the air intake chamber.
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>

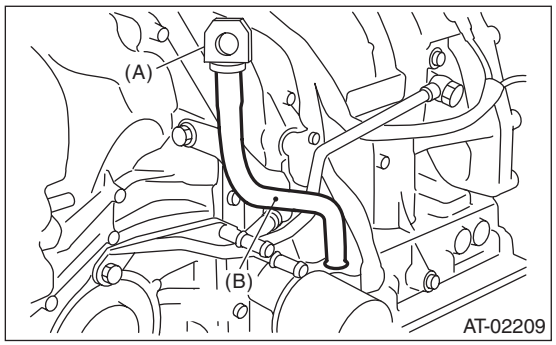
C: INSPECTION

Make sure the hose is not cracked or clogged.

24.Oil Charge Pipe

A: REMOVAL

1) Remove the air intake chamber.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
2) Remove the oil charge pipe, and then remove the O-ring from the flange side.

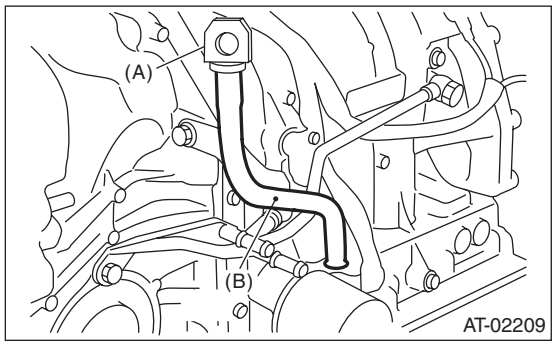


(A) Oil level gauge
(B) Oil charge pipe

B: INSTALLATION

1) Apply ATF on a new O-ring and install together with the oil charge pipe.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



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

2) Install the air intake chamber.
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

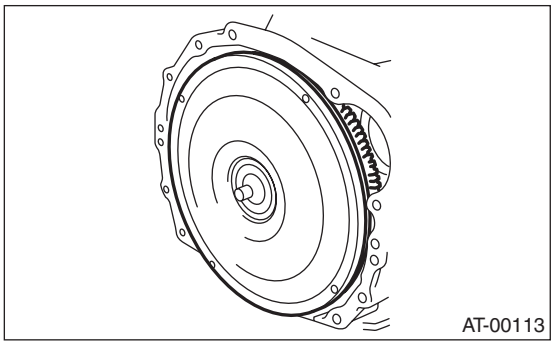
Make sure the oil charge pipe is not deformed or damaged.

25.Torque Converter Assembly

A: REMOVAL

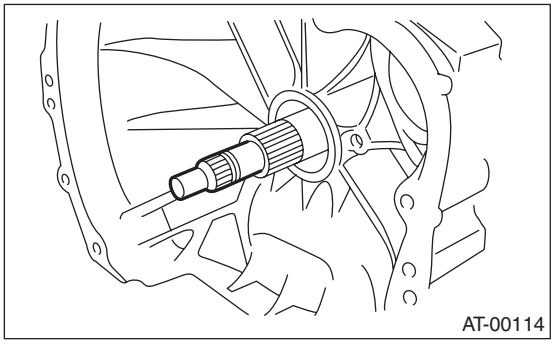
1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly and oil pump shaft horizontally.

NOTE:
Be sure not to scratch the inside of bushing in oil pump shaft.



3) Remove the input shaft.

NOTE:
When the torque converter assembly is removed, the input shaft will also come off.

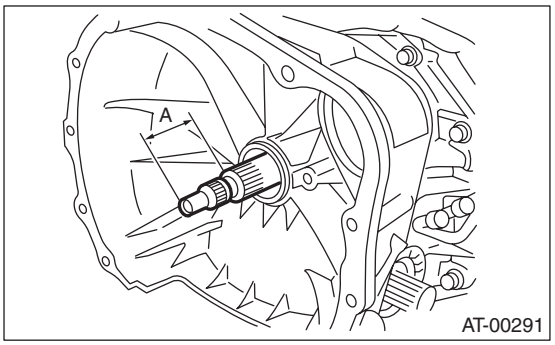


4) Remove the oil pump shaft from torque converter assembly as necessary.

B: INSTALLATION

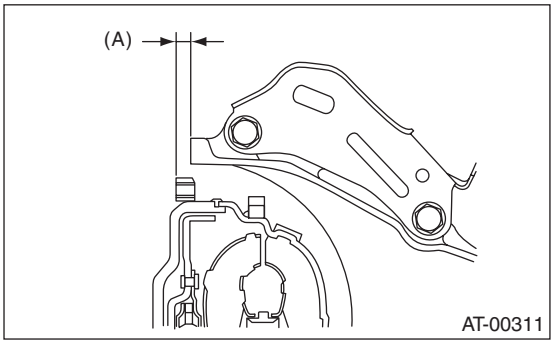
1) When the oil pump shaft is removed, install the shaft to converter case.
2) Install the oil pump shaft to the torque converter assembly, and make sure the clip is secured on the groove.
3) Apply ATF to the O-ring and insert on the input shaft while rotating the shaft slowly by hand.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



4) While holding the torque converter assembly by hand, carefully install it to the converter case. Take care not to damage the bushing. Do not allow the oil pump shaft bushing to touch the starter shaft part of the oil pump cover inappropriately.
5) Slowly rotate the shaft by hand to engage the splines securely, then check that dimension A is within the specified range.

Dimension A:
2.7 — 2.9 mm (0.106 — 0.114 in)



(A) Dimension A

6) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

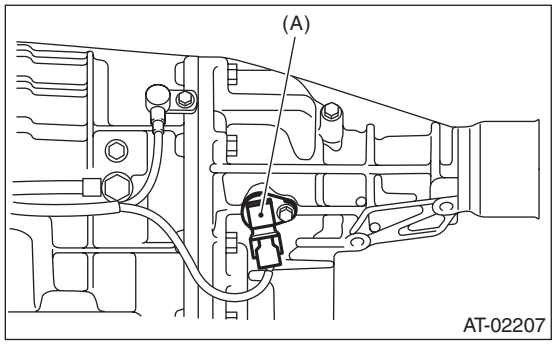
C: INSPECTION

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

26.Extension Case

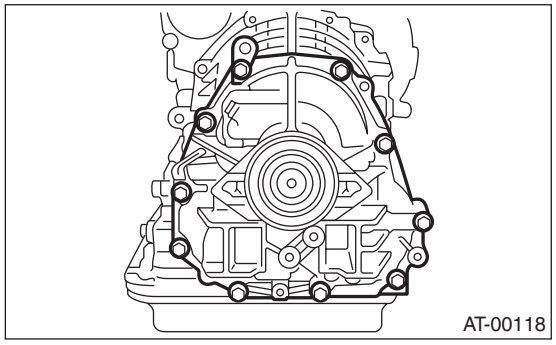
A: REMOVAL

1) Remove the transmission assembly.
<Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor.



(A) Rear vehicle speed sensor

3) Separate the transmission case and extension case section.

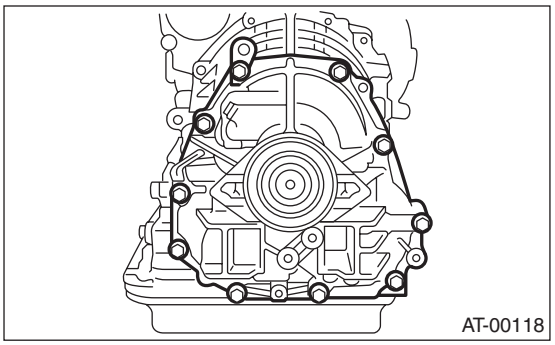


B: INSTALLATION

1) Apply vaseline to the contact surface, and attach the selected thrust needle bearing to the end surface of the reduction drive gear.

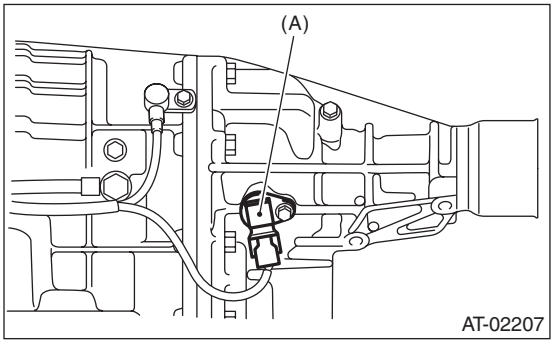
NOTE:
Install the thrust needle bearing in the correct direction.
2) Install a new gasket.
3) Install the extension case to transmission case.
4) Tighten bolts to secure the extension case.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



5) Install the rear vehicle speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)



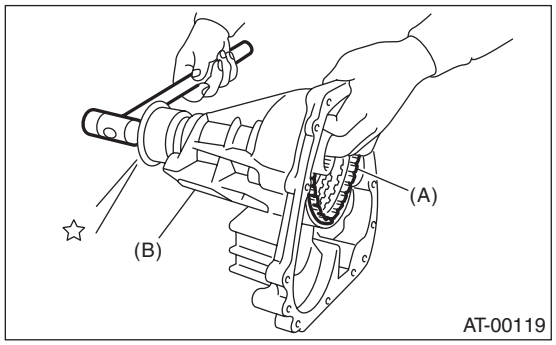
(A) Rear vehicle speed sensor

6) Install the transmission assembly.
<Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

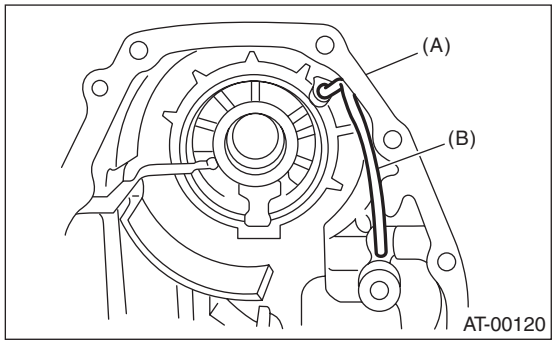
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

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



(A) Extension case
(B) Transfer clutch

2) Remove the transfer clutch pipe while being careful not to deform the pipe.

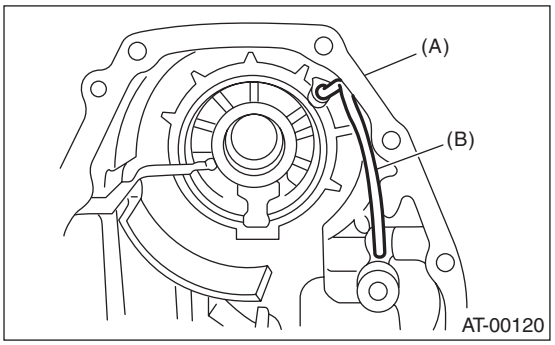


(A) Extension case
(B) Transfer clutch pipe

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

D: ASSEMBLY

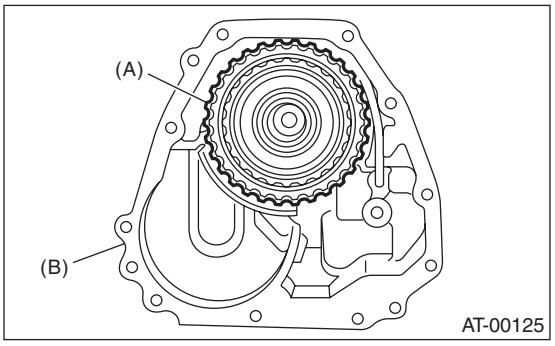
1) Press-fit the new oil seal using ST and the press.
ST 498057300 INSTALLER
2) Press-fit the dust cover.
3) Install the transfer clutch pipe to the extension case while being careful not to deform the pipe.



(A) Extension case
(B) Transfer pipe

4) Install the transfer clutch assembly to the case.

NOTE:
- Be careful not to damage the seal ring.
- Press-fit the clutch assembly to the bottom of the bearing shoulder completely.



(A) Transfer clutch
(B) Extension case

E: INSPECTION

- Blow with compressed air to make sure the transfer pipe and extension case routes are not clogged or leaking.
- Inspect the extension end play, and adjust it to within the standard value.

<Ref. to 4AT-72, ADJUSTMENT, Transfer Clutch.>

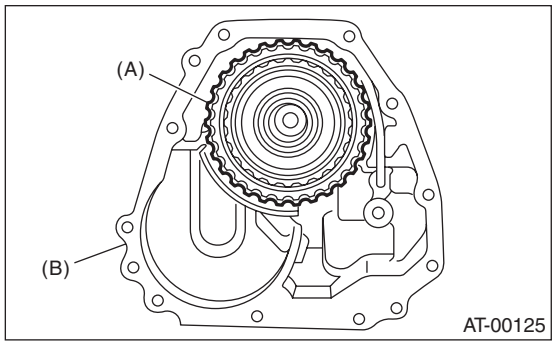
27.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case, and then remove the transfer clutch. <Ref. to 4AT-67, REMOVAL, Extension Case.> <Ref. to 4AT-68, DISASSEMBLY, Extension Case.>

B: INSTALLATION

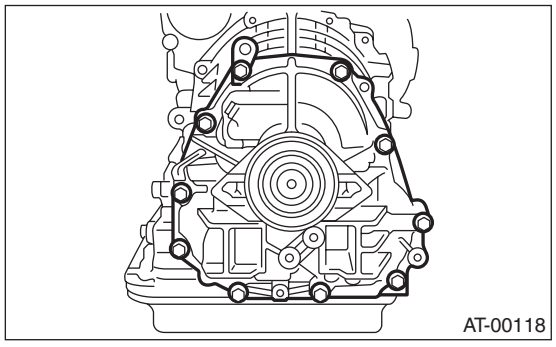
1) Select the thrust needle bearing. <Ref. to 4AT-72, ADJUSTMENT, Transfer Clutch.>
2) Install the transfer clutch assembly to the case.



(A) Transfer clutch
(B) Extension case

3) Tighten the bolts to secure the case.

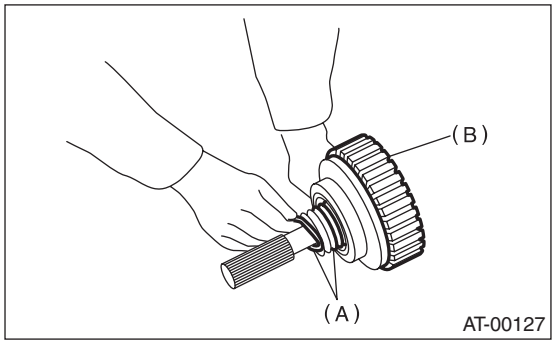
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



4) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

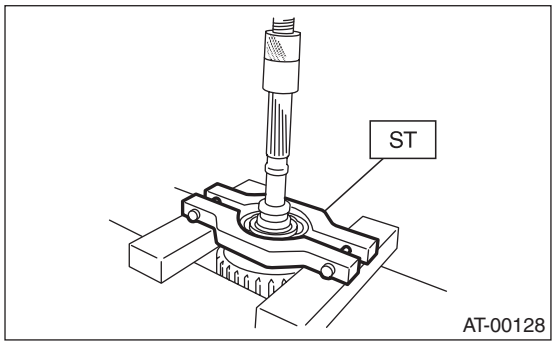
C: DISASSEMBLY

1) Remove the seal ring.

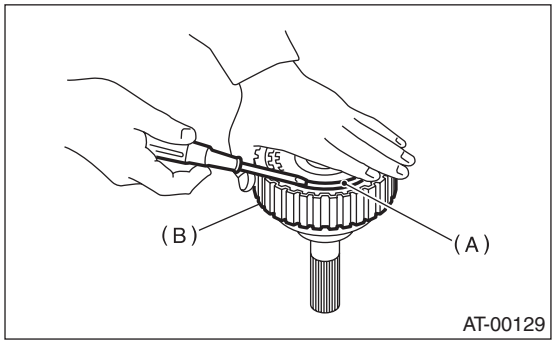


(A) Seal ring
(B) Transfer clutch

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

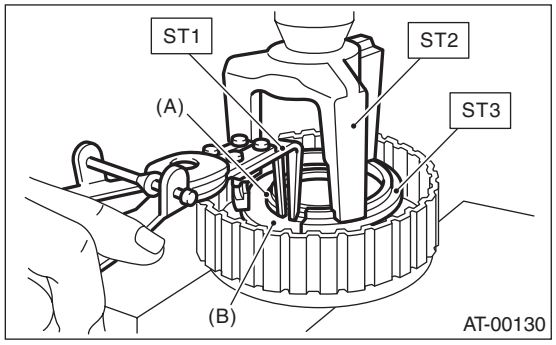


3) Remove the snap ring, and then take out the pressure plate, drive plate and driven plate.



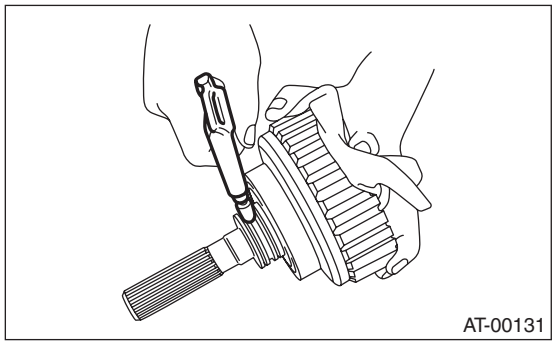
(A) Snap ring
(B) Transfer clutch

4) Using the ST1, ST2 and ST3, remove the snap ring, then take out the return spring and transfer clutch piston seal.
ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



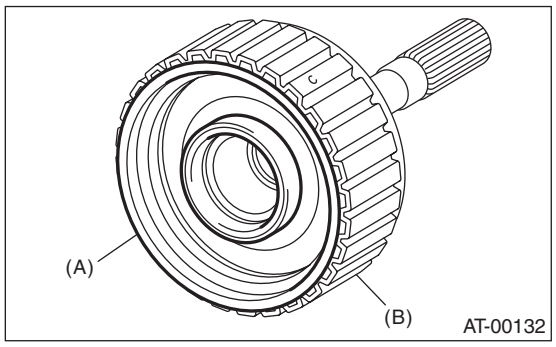
(A) Snap ring
(B) Transfer piston seal

5) Apply compressed air to the rear drive shaft, to remove the transfer clutch piston.



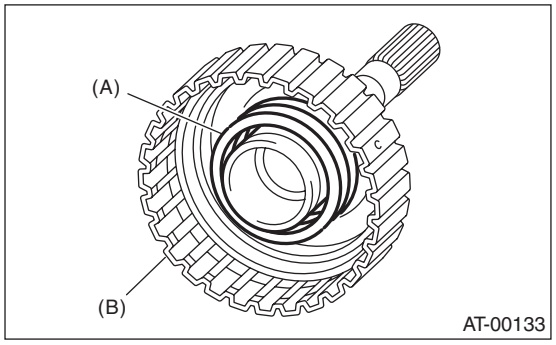
D: ASSEMBLY

1) Install the transfer clutch piston.



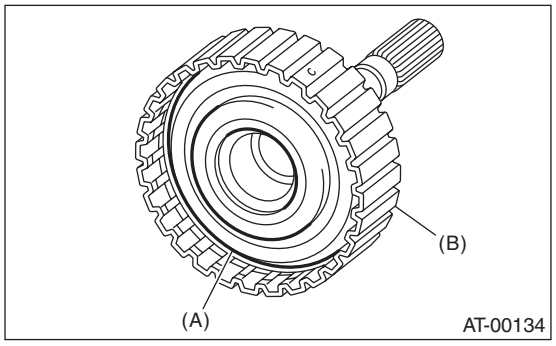
(A) Transfer clutch piston
(B) Rear drive shaft

2) Install the return spring to transfer clutch piston.



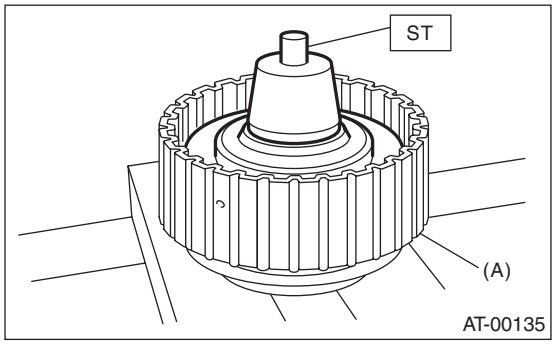
(A) Return spring
(B) Rear drive shaft

3) Apply ATF to the lip of transfer clutch piston seal, then install.



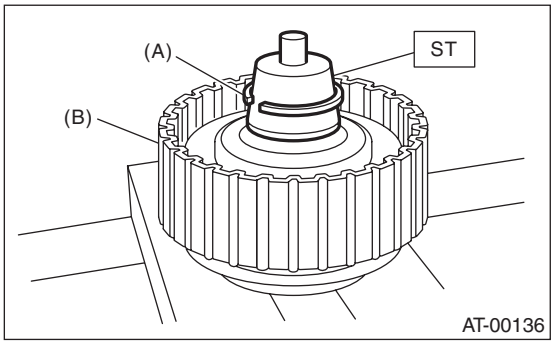
(A) Transfer clutch piston seal
(B) Rear drive shaft

4) Attach the ST to the rear drive shaft.
ST 499257300 SNAP RING OUTER GUIDE



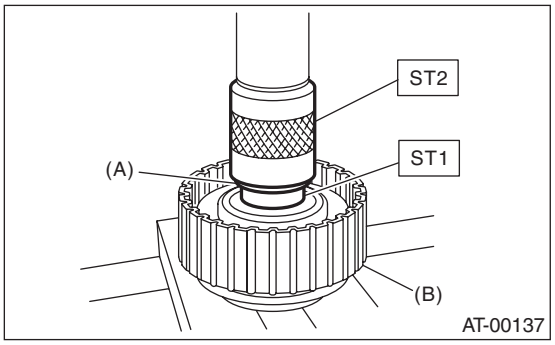
(A) Transfer clutch

5) Install the snap ring to the ST.
ST 499257300 SNAP RING OUTER GUIDE



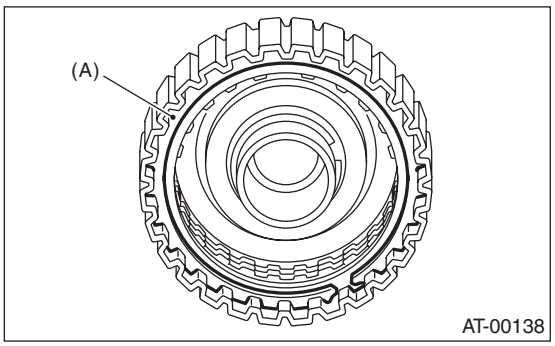
(A) Snap ring
(B) Transfer clutch

6) Install the snap ring to the rear drive shaft using ST1 and ST2.
ST1 499257300 SNAP RING OUTER GUIDE
ST2 499247400 INSTALLER



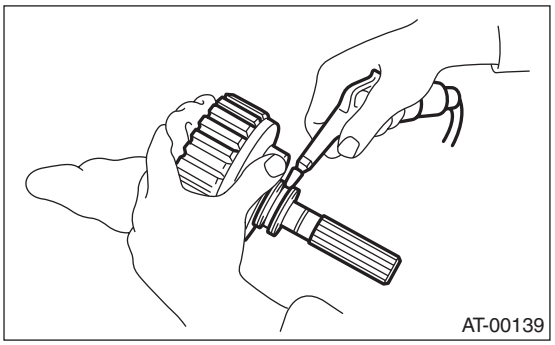
(A) Snap ring
(B) Transfer clutch

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

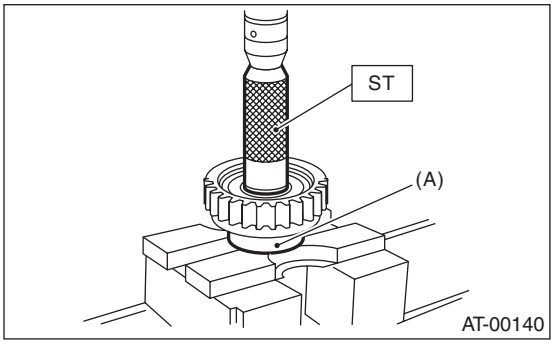


(A) Snap ring

8) Apply compressed air to see if the assembled parts move smoothly.



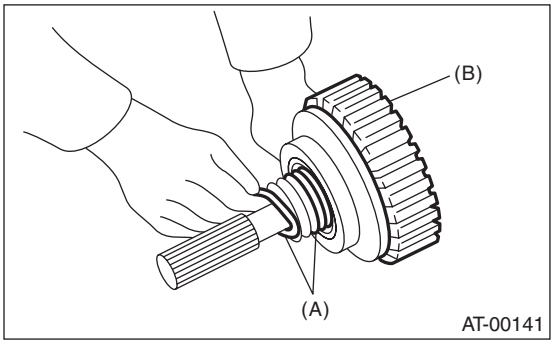
9) Check clearance between the snap ring and pressure gauge. <Ref. to 4AT-72, INSPECTION, Transfer Clutch.>
10) Press-fit new ball bearing using ST.
ST 899580100 INSTALLER



(A) Ball bearing

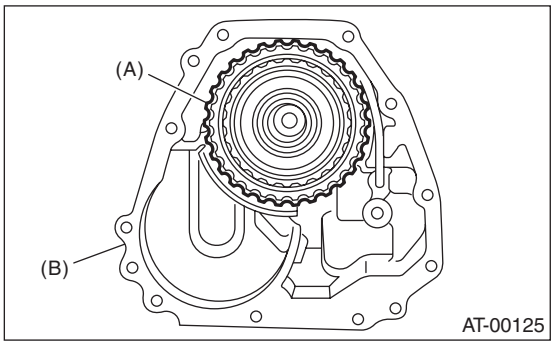
11) Apply vaseline to a new seal ring and attach to the seal ring groove of the shaft.

NOTE:
While installing the seal ring, not to stretch the seal ring excessively.



(A) Seal ring
(B) Transfer clutch

12) Install the transfer clutch assembly while taking care not to damage the seal ring.



(A) Transfer clutch
(B) Extension case

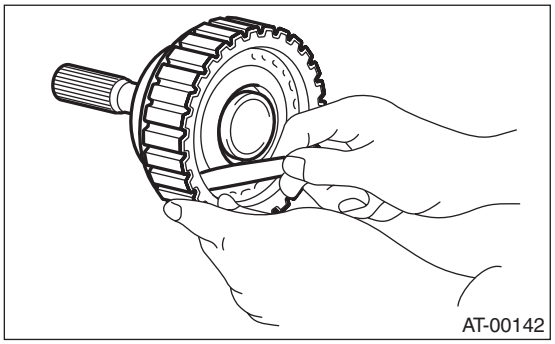
E: INSPECTION

- 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.
- Inspect the D-ring for damage.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 4AT-72, ADJUSTMENT, Transfer Clutch.>

1) Check clearance between the snap ring and pressure gauge.
2) Before measuring clearance, place same thickness shims on both sides to prevent the pressure plate from tilting.
3) If the clearance exceeds the service limits, replace the plate set (drive plate and driven plate), and select and adjust a pressure plate to be within the initial standard value.

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:
1.6 mm (0.063 in)

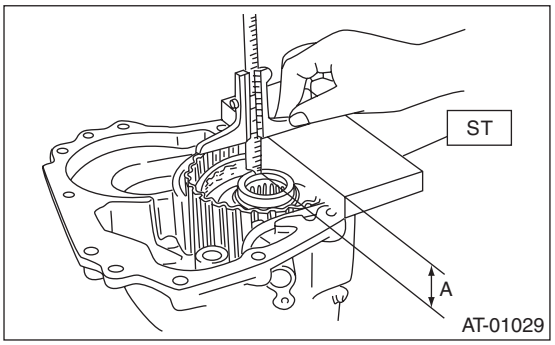


Pressure plate	
Part number	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

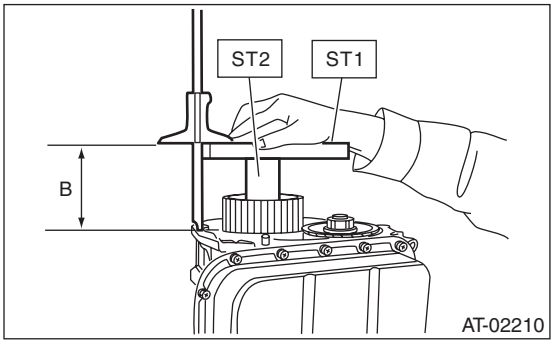
4) Check for tight corner braking phenomenon when the vehicle is moved forward with the steering fully turned. If tight corner braking occurs, perform the following procedures.
(1) With the steering wheel held at fully turned position, drive the vehicle in “D” range and with vehicle speed at approx. 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) Measure the distance “A” from the end of ST to the rear drive shaft using the ST.
ST 398643600 GAUGE



2) Measure distance “B” from the transmission case mating surface to the end of ST using ST1 and ST2.
ST1 398643600 GAUGE
ST2 499577000 GAUGE



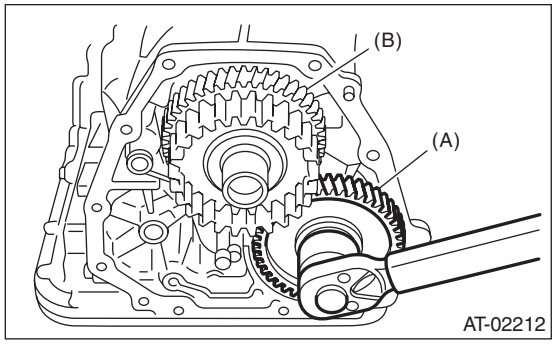
3) Calculation formula:
T = A – B + 35.4 mm
[T = A – B + 1.3937 in]
T: Thrust needle bearing thickness
A: Distance from the end of the ST to end of rear drive shaft
B: Distance from the mating surface of the transmission case to the end of the ST

Thrust needle bearing	
Part number	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

28.Reduction Driven Gear

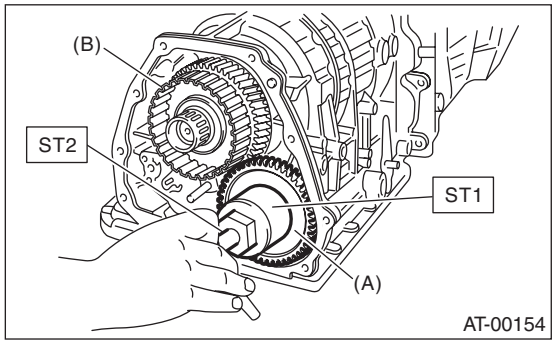
A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-67, REMOVAL, Extension Case.>
3) Set the range select lever to the “P” range.
4) Lift the crimped section, and then remove the lock nut.



(A) Reduction driven gear
(B) Reduction drive gear

5) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737000 PULLER
ST2 899524100 PULLER SET

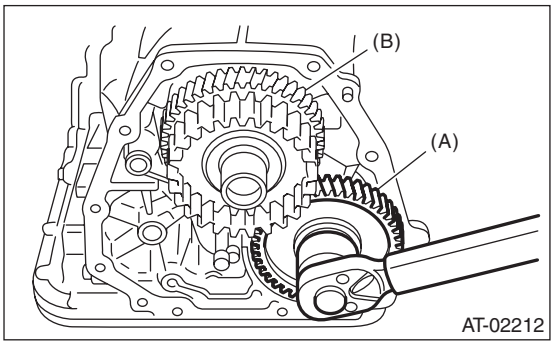


(A) Reduction driven gear
(B) Reduction drive gear

B: INSTALLATION

1) Set the range select lever to the “P” range.
2) Using a plastic hammer, install the reduction driven gear assembly and the new washer, and tighten the new drive pinion lock nut.

Tightening torque:
100 N·m (10.2 kgf-m, 73.8 ft-lb)

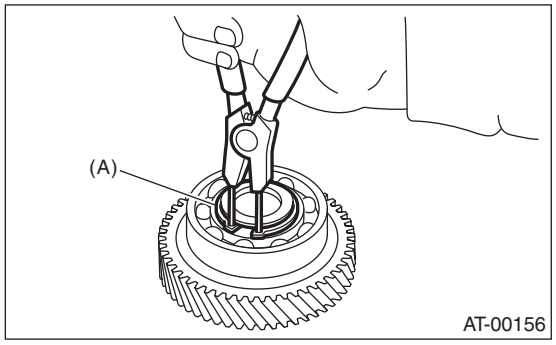


(A) Reduction driven gear
(B) Reduction drive gear

3) After tightening, stake the lock nut securely.
4) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-67, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

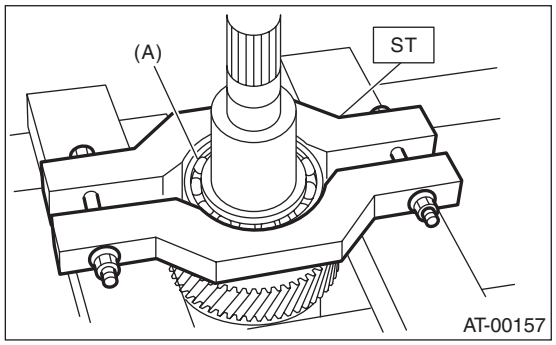
C: DISASSEMBLY

1) Remove the snap ring from reduction driven gear.



(A) Snap ring

2) Remove the ball bearing from reduction driven gear using ST.
ST 498077600 REMOVER

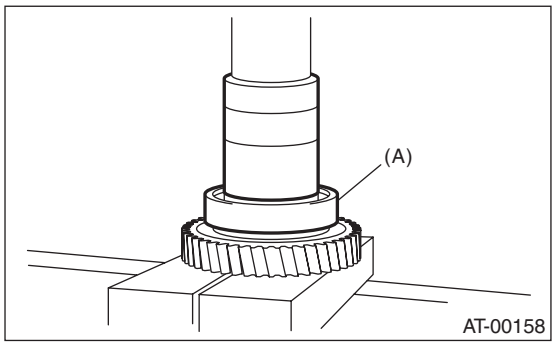


(A) Ball bearing

3) Remove the snap ring from reduction driven gear.

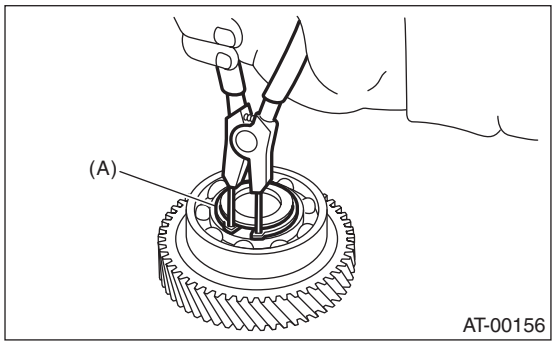
D: ASSEMBLY

1) Install the snap ring to reduction driven gear.
2) Install the new ball bearing to reduction driven gear using press.



(A) Ball bearing

3) Install the snap ring to reduction driven gear.



(A) Snap ring

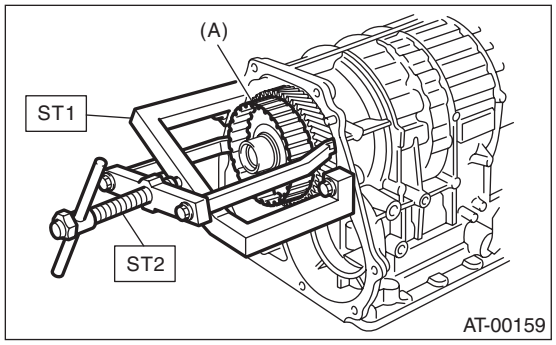
E: INSPECTION

Make sure the ball bearing and gear is not deformed or damaged.

29.Reduction Drive Gear

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-67, REMOVAL, Extension Case.>
3) Remove the reduction driven gear. <Ref. to 4AT-74, REMOVAL, Reduction Driven Gear.>
4) Using the ST, extract the reduction drive gear.
ST1 499737100 PULLER
ST2 899524100 PULLER SET

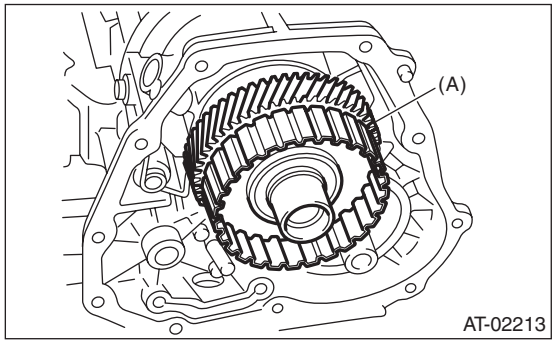


(A) Reduction drive gear

B: INSTALLATION

1) Install the reduction drive gear assembly.

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

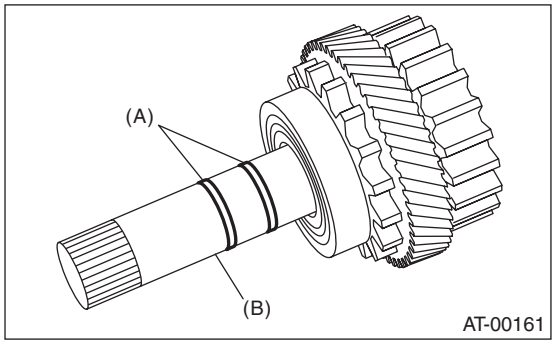


(A) Reduction drive gear

2) Install the reduction driven gear. <Ref. to 4AT-74, INSTALLATION, Reduction Driven Gear.>
3) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-67, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

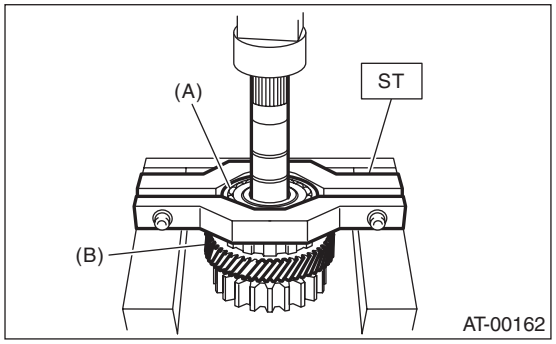
C: DISASSEMBLY

1) Take out the seal ring.



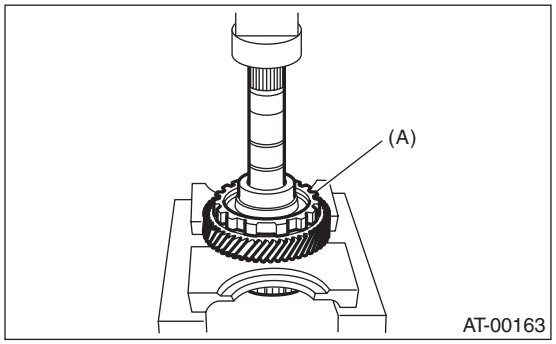
(A) Seal ring
(B) Reduction drive shaft

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



(A) Ball bearing
(B) Reduction drive gear

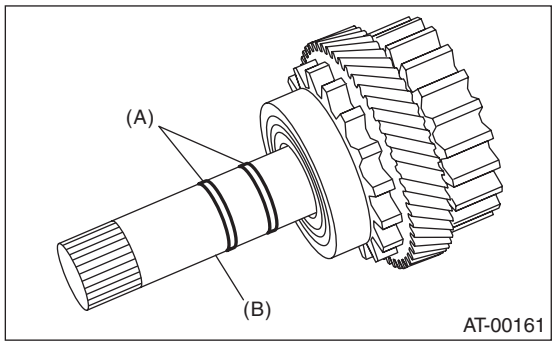
3) Apply vaseline to the outer surface of seal ring and shaft groove.



(A) Reduction drive gear

D: ASSEMBLY

1) Press-fit the reduction drive gear to shaft.
2) Press-fit the new ball bearing into reduction drive gear.
3) Apply vaseline onto the seal ring outer surface and shaft grooves.
4) Apply ATF to new seal rings and install them.



(A) Seal ring
(B) Reduction drive shaft

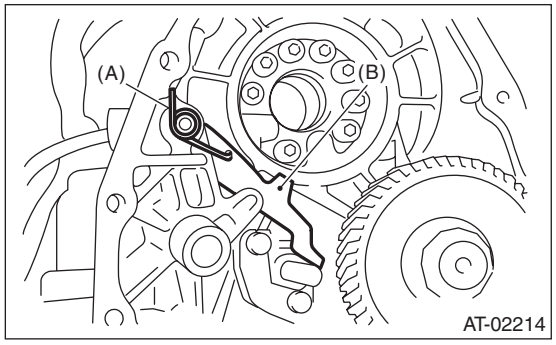
E: INSPECTION

• Rotate the bearing by hand, and check that it rotates smoothly.
• Check parts for holes, damage or adhesion of dust and other foreign particles.
• Inspect the extension end play, and adjust it to the standard value. <Ref. to 4AT-72, ADJUSTMENT, Transfer Clutch.>

30.Parking Pawl

A: REMOVAL

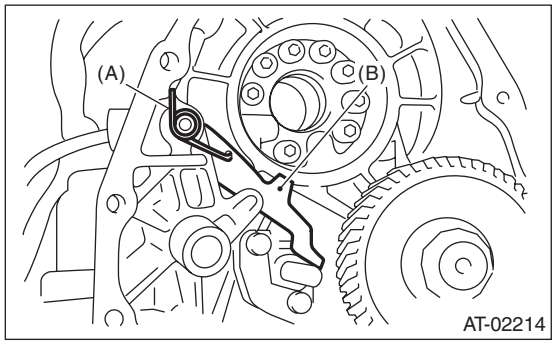
1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-67, REMOVAL, Extension Case.>
3) Remove the reduction drive gear. <Ref. to 4AT-76, REMOVAL, Reduction Drive Gear.>
4) Remove the parking pawl, return spring and shaft.



(A) Return spring
(B) Parking pawl

B: INSTALLATION

1) Install the parking pawl, return spring and shaft.



(A) Return spring
(B) Parking pawl

2) Install the reduction drive gear. <Ref. to 4AT-76, INSTALLATION, Reduction Drive Gear.>
3) Install the rear vehicle speed sensor and extension case. <Ref. to 4AT-67, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

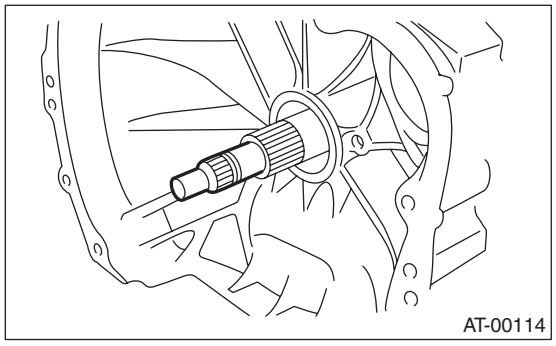
C: INSPECTION

Check the tab of the parking pole on the reduction gear for wear or other damage.

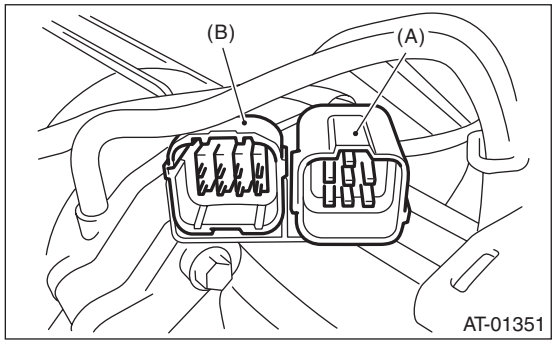
31.Converter Case

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 4AT-66, REMOVAL, Torque Converter Assembly.>
3) Remove the input shaft.



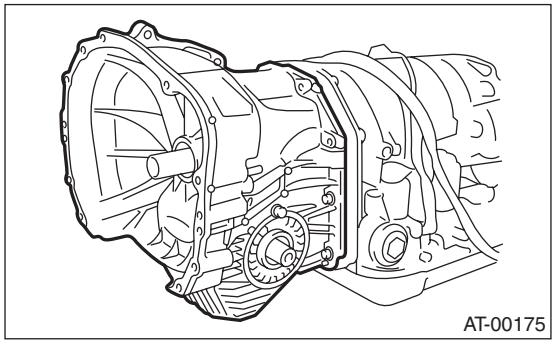
4) Lift-up the lever on the rear side of connector, and then disconnect it from the stay.
5) Disconnect the inhibitor switch connector from the stay.



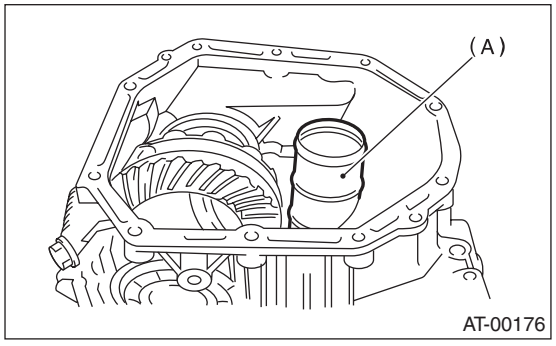
(A) Transmission connector
(B) Inhibitor switch connector

6) Remove the oil charge pipe. <Ref. to 4AT-65, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-61, REMOVAL, ATF Cooler Pipe and Hose.>
8) Remove the converter case alignment bolt, and then separate the transmission case and converter case by lightly tapping with a plastic hammer.

NOTE:
• Be careful not to damage the oil seal and bushing in the converter case with the oil pump cover.
• Do not loosen the rubber seal.



9) Remove the seal pipe.

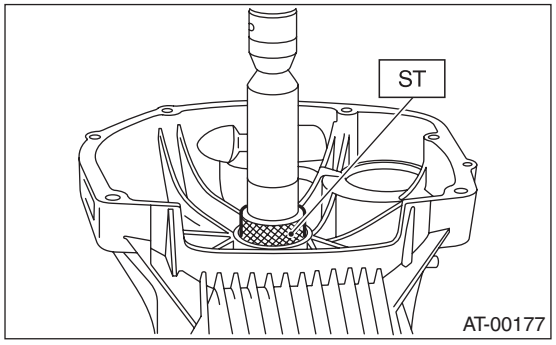


(A) Seal pipe

10) Remove the differential assembly. <Ref. to 4AT-93, REMOVAL, Front Differential Assembly.>
11) Remove the oil seal from converter case.

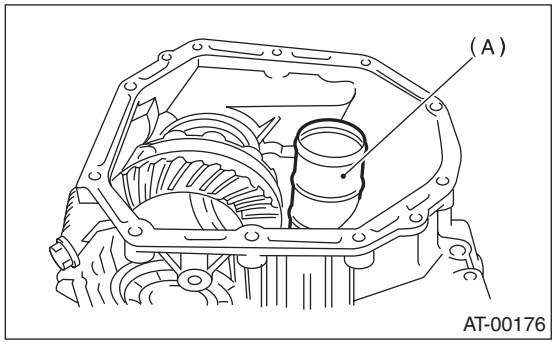
B: INSTALLATION

1) Check the appearance of each component and clean them.
2) Press-fit the oil seal to converter case using ST.
ST 398437700 DRIFT



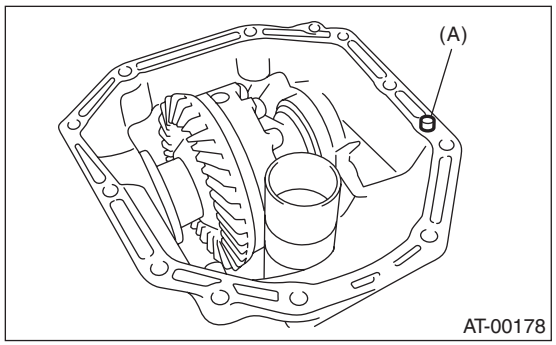
3) Install the differential assembly to the case. <Ref. to 4AT-93, INSTALLATION, Front Differential Assembly.>
4) Install the right and left side retainers. <Ref. to 4AT-97, ADJUSTMENT, Front Differential Assembly.>

5) Install new seal pipe to converter case.



(A) Seal pipe

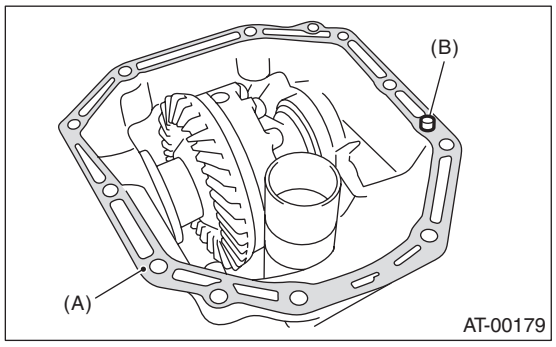
6) Install the rubber seal to converter case.



(A) Rubber seal

7) Apply proper amount of liquid gasket to the entire matching surface of converter case.

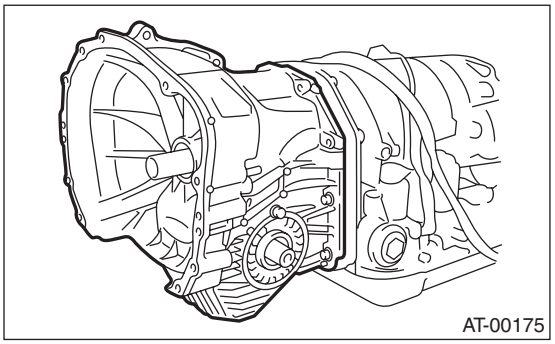
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(A) THREE BOND 1215
(B) Rubber seal

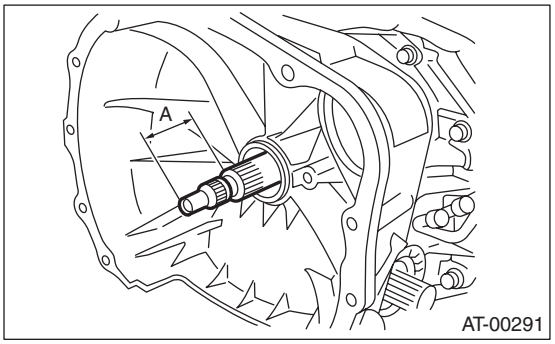
8) Install the converter case without damaging bushing and oil seal.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



9) Insert the inhibitor switch and transmission connector to the stay.
10) Install the air breather hose. <Ref. to 4AT-64, INSTALLATION, Air Breather Hose.>
11) Install the oil cooler pipe. <Ref. to 4AT-62, INSTALLATION, ATF Cooler Pipe and Hose.>
12) Install the oil charge pipe with O-ring. <Ref. to 4AT-65, INSTALLATION, Oil Charge Pipe.>
13) Insert the input shaft while rotating it lightly by hand, and then check the amount of protrusion.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



14) Install the torque converter assembly. <Ref. to 4AT-66, INSTALLATION, Torque Converter Assembly.>
15) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

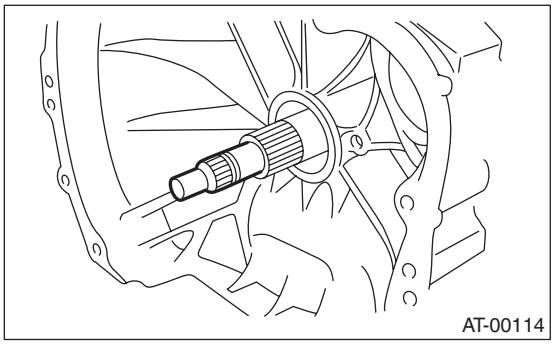
C: INSPECTION

Measure the backlash, and then adjust it to be within standard values. <Ref. to 4AT-90, ADJUSTMENT, Drive Pinion Shaft Assembly.>

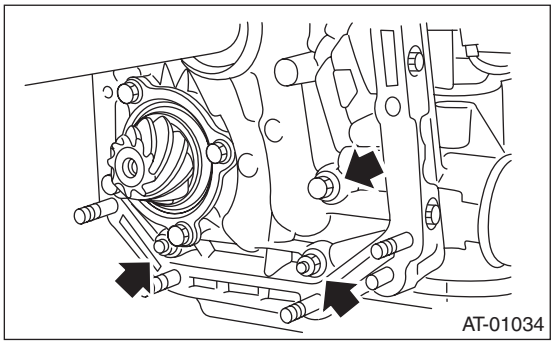
32.Oil Pump Housing

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 4AT-66, REMOVAL, Torque Converter Assembly.>
3) Remove the input shaft.

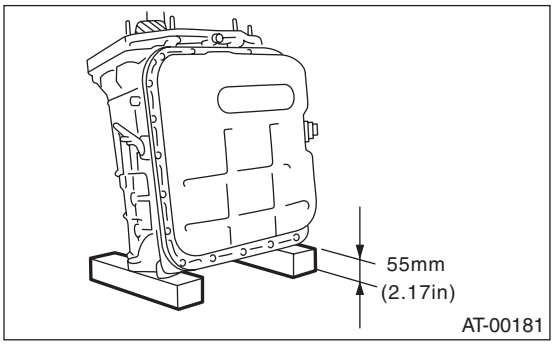


4) Lift-up the lever on the rear side of transmission harness connector, and then remove it from the stay.
5) Remove the inhibitor switch connector from the stay.
6) Remove the oil charge pipe. <Ref. to 4AT-65, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-61, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separate the converter case and transmission case. <Ref. to 4AT-79, REMOVAL, Converter Case.>
9) Separate the transmission case and extension case section. <Ref. to 4AT-67, REMOVAL, Extension Case.>
10) Remove the reduction drive gear. <Ref. to 4AT-76, REMOVAL, Reduction Drive Gear.>
11) Remove the reduction driven gear. <Ref. to 4AT-74, REMOVAL, Reduction Driven Gear.>
12) Loosen the oil pump housing mounting bolts.

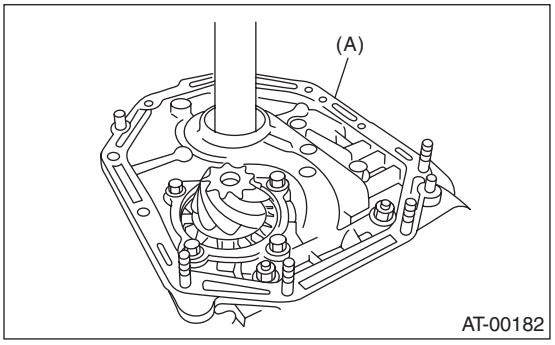


13) Place two wooden blocks on the workbench, and stand the transmission case with the rear end facing down.

NOTE:
• Be careful not to scratch the rear mating surface of the transmission case.
• Check the height of the wooden blocks to avoid damaging the parking rod protruding from the mating surface, and the drive pinion.



14) Remove the oil pump housing and adjusting thrust washer.

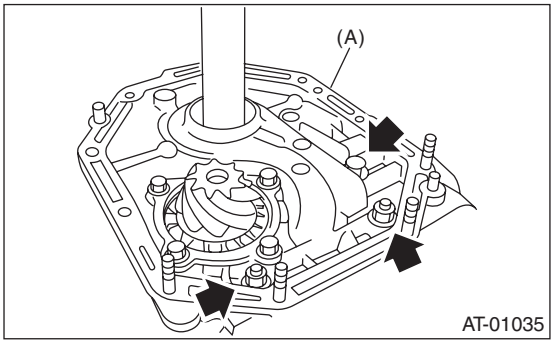


(A) Oil pump housing

B: INSTALLATION

1) Secure the oil pump housing with two nuts and a bolt.

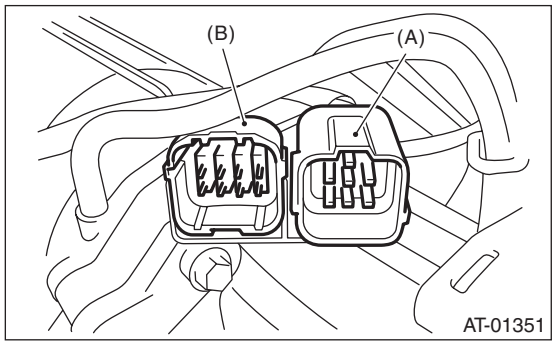
Tightening torque:
42 N·m (4.3 kgf-m, 31 ft-lb)



(A) Oil pump housing

2) Install the converter case to the transmission case assembly. <Ref. to 4AT-79, INSTALLATION, Converter Case.>
3) Install the reduction driven gear. <Ref. to 4AT-74, INSTALLATION, Reduction Driven Gear.>

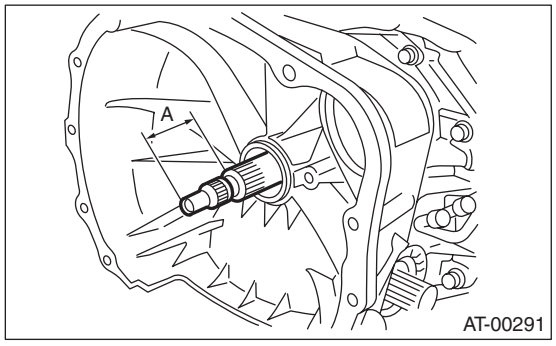
4) Install the reduction drive gear. <Ref. to 4AT-76, INSTALLATION, Reduction Drive Gear.>
5) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-67, INSTALLATION, Extension Case.>
6) Insert the inhibitor switch and transmission connector to the stay.



(A) Transmission connector
(B) Inhibitor switch connector

7) Install the oil cooler pipe. <Ref. to 4AT-62, INSTALLATION, ATF Cooler Pipe and Hose.>
8) Install the oil charge pipe together with an O-ring. <Ref. to 4AT-65, INSTALLATION, Oil Charge Pipe.>
9) Insert the input shaft while rotating it lightly by hand, and then check the amount of protrusion.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

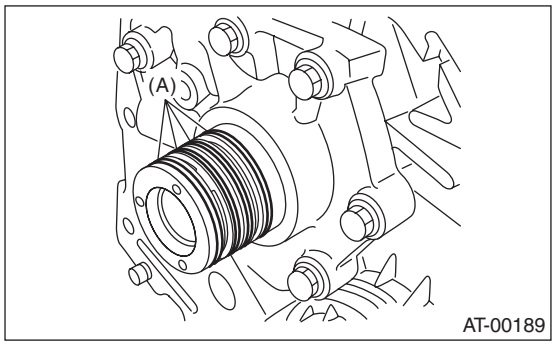


10) Install the torque converter assembly. <Ref. to 4AT-66, INSTALLATION, Torque Converter Assembly.>
11) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

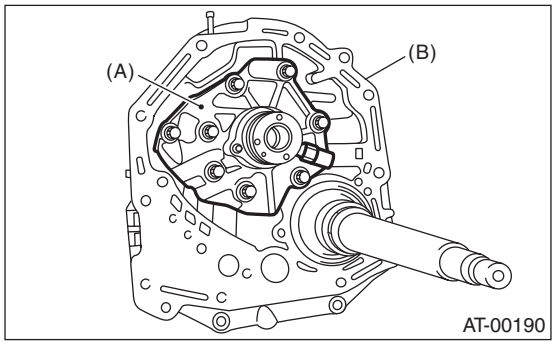
1. OIL PUMP COVER

1) Remove the four seal rings.



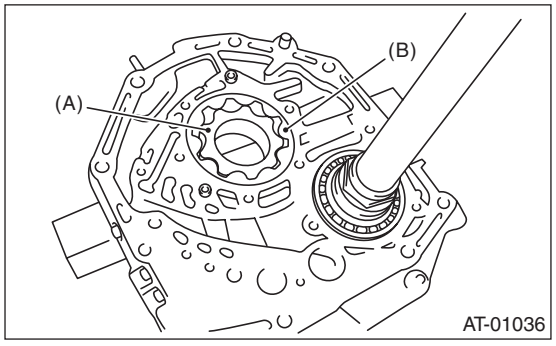
(A) Seal ring

2) Remove the cover by lightly tapping the end of the stator shaft.



(A) Oil pump cover
(B) Oil pump housing

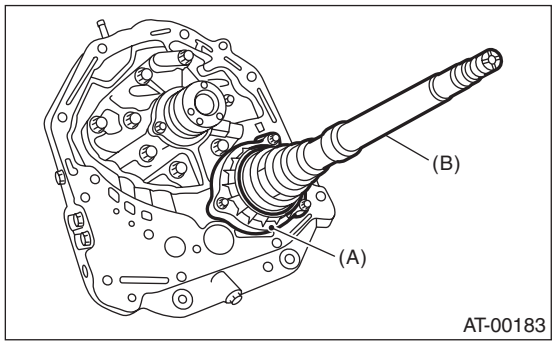
3) Remove the inner and outer rotors.



(A) Inner rotor
(B) Outer rotor

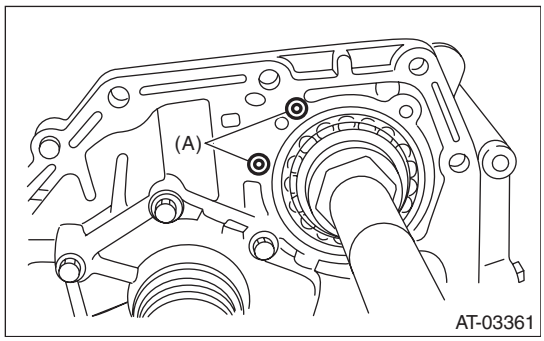
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



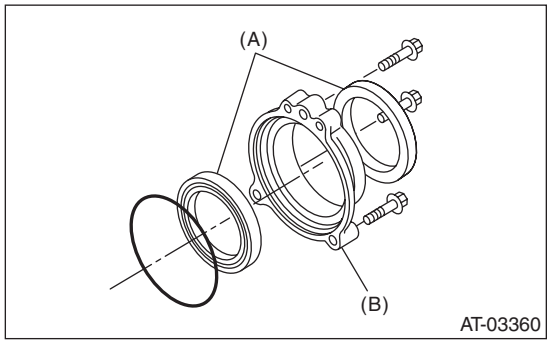
(A) Oil seal retainer
(B) Drive pinion shaft

2) Remove the O-ring.



(A) O-ring

3) Remove the oil seal from the oil seal retainer.

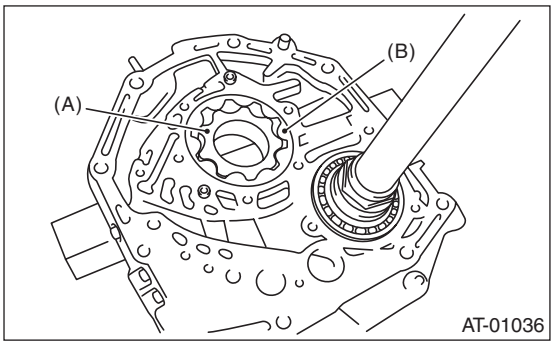


(A) Oil seal
(B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

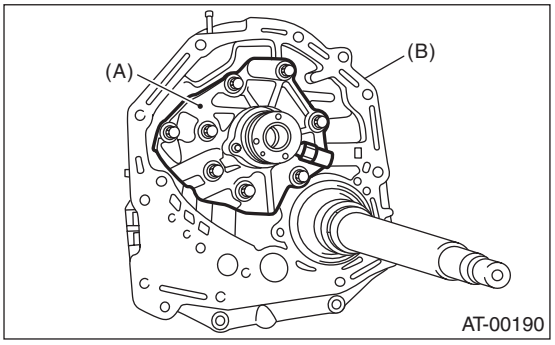
1) Install the oil pump rotor assembly to oil pump housing.



(A) Inner rotor
(B) Outer rotor

2) Align both pivots with the pivot holes of the cover, and then install the oil pump cover while being careful not to apply excessive force to the pivots.

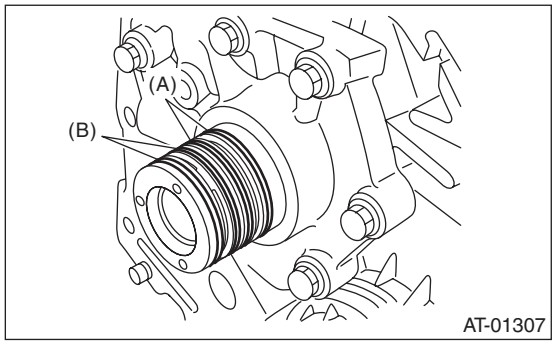
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



(A) Oil pump cover
(B) Oil pump housing

3) After assembling, turn the oil pump shaft to check for smooth rotation of rotor.
4) Apply vaseline to the oil seal retainer and new seal rings, and install them. After installing, adjust the tooth contact with the drive pinion backlash. <Ref. to 4AT-86, ADJUSTMENT, Oil Pump Housing.>

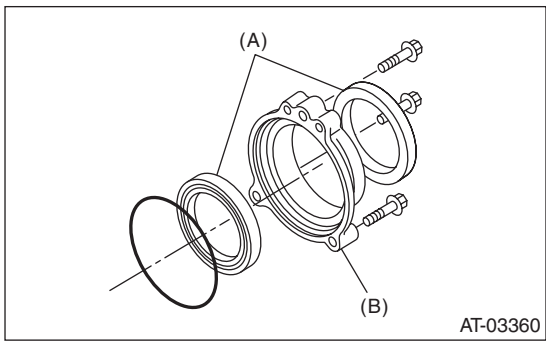
NOTE:
There are two types of seals. They are identified by color. Install at the proper positions by referring to the figure.



(A) Seal ring (Black)
(B) Seal ring (Brown)

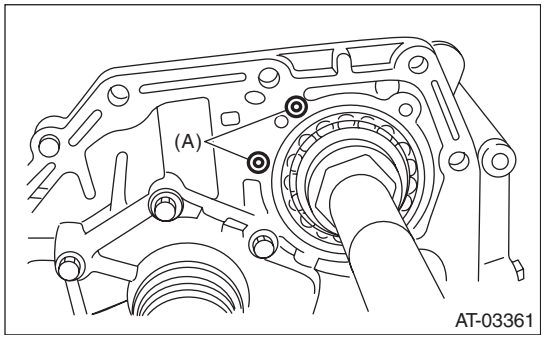
2. OIL SEAL RETAINER

1) Apply ATF to two new oil seals and install them to the oil seal retainer in the proper direction using the ST.
ST 499247300 INSTALLER



(A) Oil seal
(B) Oil seal retainer

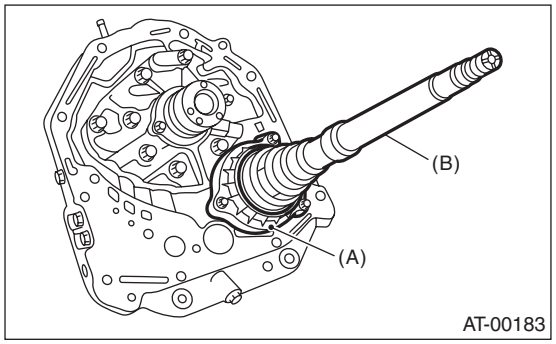
2) Apply ATF to a new O-ring an install it to the oil seal retainer using vaseline. Install the seal to the oil pump housing bore.



(A) O-ring

3) Install the oil seal being careful not to damage oil seal lip, and secure it using three bolts.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

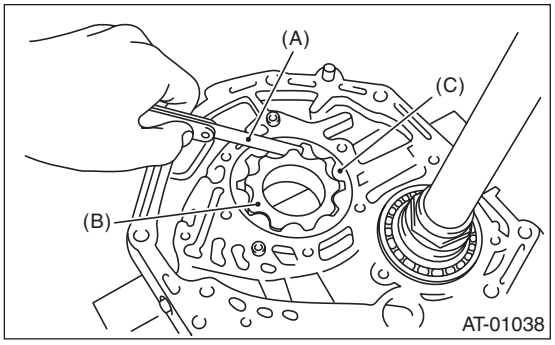


(A) Oil seal retainer
(B) Drive pinion shaft

E: INSPECTION

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 the oil pump. With rotor gears facing each other, measure the crest-to-crest clearance.

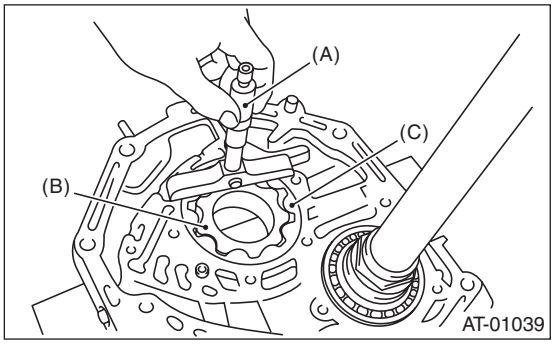
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(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 — 0.04 mm (0.0008 — 0.0016 in)



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

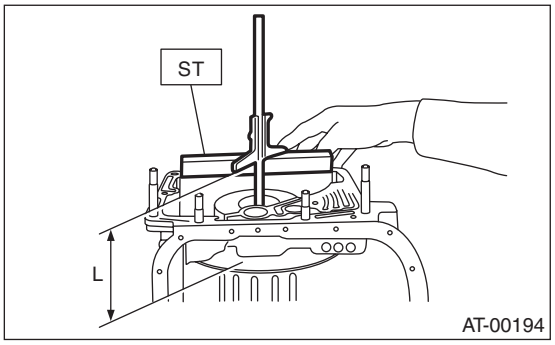
   (3) If the depth and/or side clearance are not within the specification, replace the rotor assembly.

Oil pump rotor assembly	
Part number	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

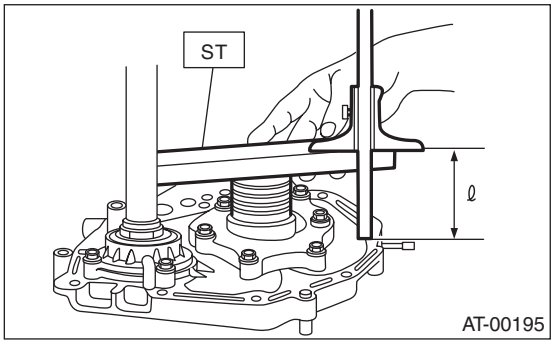
Measure the total end play and adjust it to be within specifications. <Ref. to 4AT-86, ADJUSTMENT, Oil Pump Housing.>

F: ADJUSTMENT

1) Using the ST, measure the length “L”, from the mating surface of the transmission to the recessed portion of the high clutch drum.
ST 398643600 GAUGE

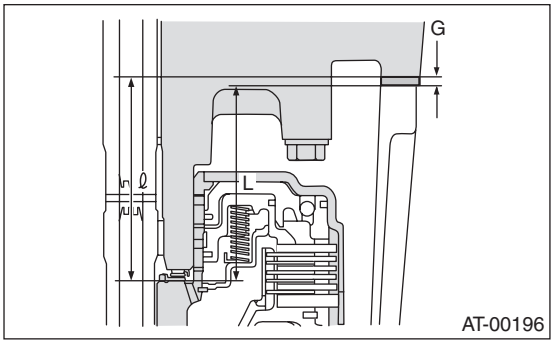


2) Using the ST, measure the length from the oil pump housing mating surface to the top surface of the oil pump cover with the thrust needle bearing.
ST 398643600 GAUGE



3) Calculation of total end play
Select a suitable bearing race from the table below so that clearance C will be within 0.25 to 0.55 mm (0.0098 to 0.0217 in).
C = (L + G) – ℓ

C	Clearance between concave section of high clutch and end of clutch drum support
L	Length from case mating surface to the concave portion of the high clutch
G	Gasket thickness [0.28 mm (0.0110 in)]
ℓ	Height from the housing mating surface to the upper surface of the clutch drum support



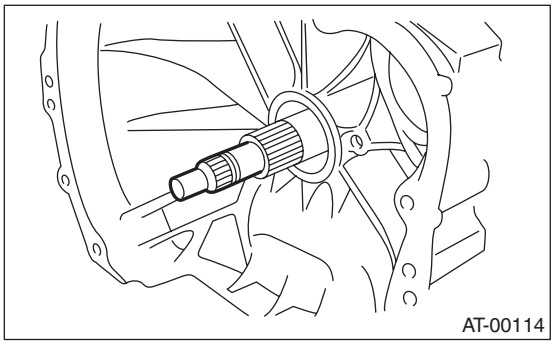
Thrust needle bearing	
Part number	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

4) After completing the end play adjustment, insert the bearing race into the high clutch race. Apply vaseline to install the thrust needle bearing to the oil pump cover.
5) After correctly installing the new gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of case.
6) Install both parts with dowel pins aligned. Make sure there is no clearance at the mating surface.

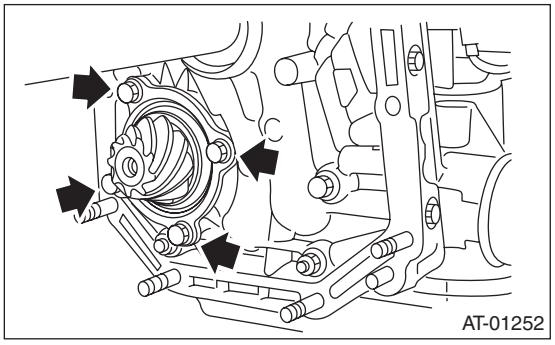
33.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 4AT-66, REMOVAL, Torque Converter Assembly.>
3) Remove the input shaft.


AT-00114

4) Lift-up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
5) Disconnect the inhibitor switch connector from the stay.
6) Disconnect the air breather hose. <Ref. to 4AT-64, REMOVAL, Air Breather Hose.>
7) Remove the oil charge pipe. <Ref. to 4AT-65, REMOVAL, Oil Charge Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-61, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separate the converter case and transmission case. <Ref. to 4AT-79, REMOVAL, Converter Case.>
10) Separate the transmission case and extension case section. <Ref. to 4AT-67, REMOVAL, Extension Case.>
11) Remove the reduction drive gear. <Ref. to 4AT-76, REMOVAL, Reduction Drive Gear.>
12) Remove the reduction driven gear. <Ref. to 4AT-74, REMOVAL, Reduction Driven Gear.>
13) Remove the drive pinion shaft mounting bolt and remove the drive shaft assembly from oil pump housing.

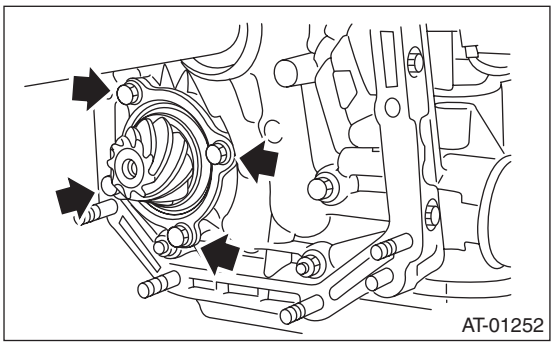

AT-01252

B: INSTALLATION

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

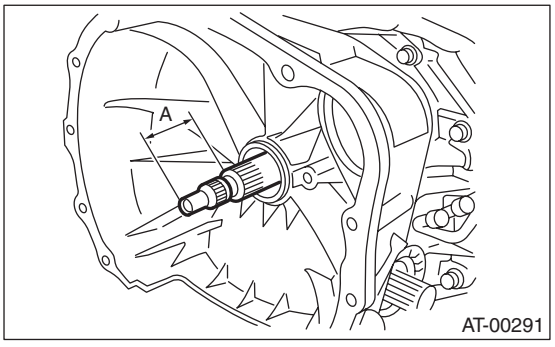
NOTE:
- Be careful not to bend the shim.
- Be careful not to press-fit the pinion into housing bore.

Tightening torque:
40 N·m (4.0 kgf-m, 30 ft-lb)


AT-01252

2) Join the torque converter case with the transmission case. <Ref. to 4AT-79, INSTALLATION, Converter Case.>
3) Install the reduction driven gear. <Ref. to 4AT-74, INSTALLATION, Reduction Driven Gear.>
4) Install the reduction drive gear. <Ref. to 4AT-76, INSTALLATION, Reduction Drive Gear.>
5) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-67, INSTALLATION, Extension Case.>
6) Insert the inhibitor switch and transmission connector to the stay.
7) Install the oil cooler inlet and outlet pipes. <Ref. to 4AT-62, INSTALLATION, ATF Cooler Pipe and Hose.>
8) Install the oil charge pipe with O-ring.
9) Insert the input shaft while rotating it lightly by hand, and then check the amount of protrusion.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



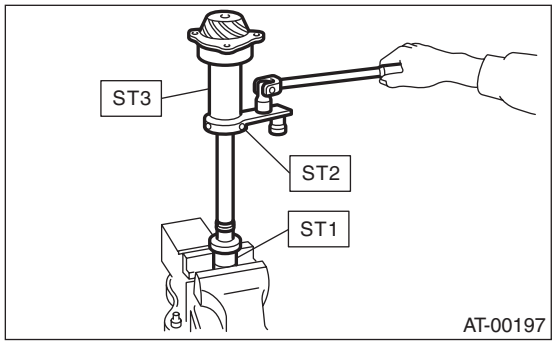
AT-00291

10) Install the torque converter assembly. <Ref. to 4AT-66, INSTALLATION, Torque Converter Assembly.>

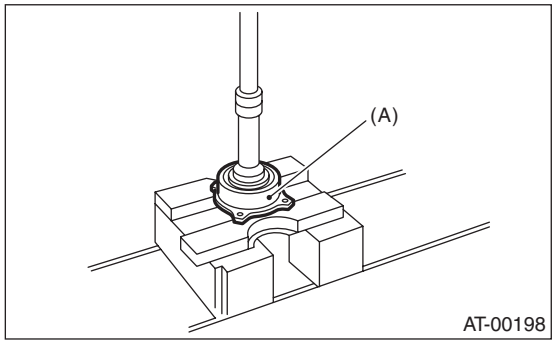
11) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1) Remove the crimped part of the lock nut, 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 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

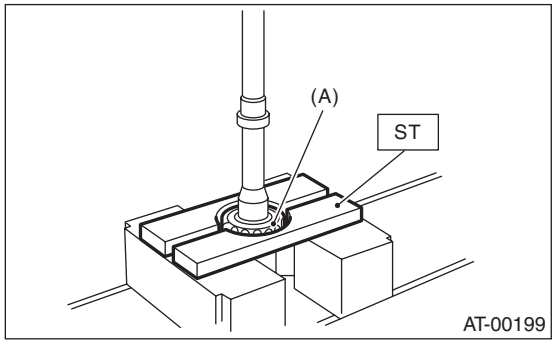


2) Remove the O-ring.
3) Separate the roller bearing and outer race from shaft using a press.



(A) Outer race

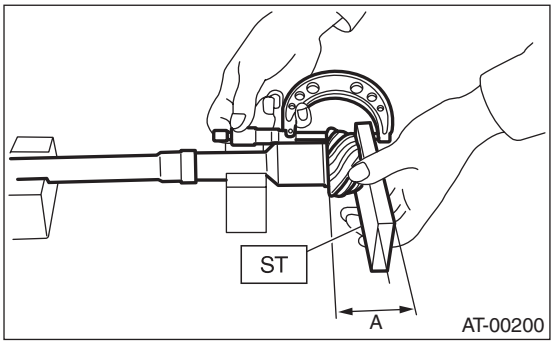
4) Separate the front roller bearing from shaft using a press and ST.
ST 498517000 REPLACER



(A) Front roller bearing

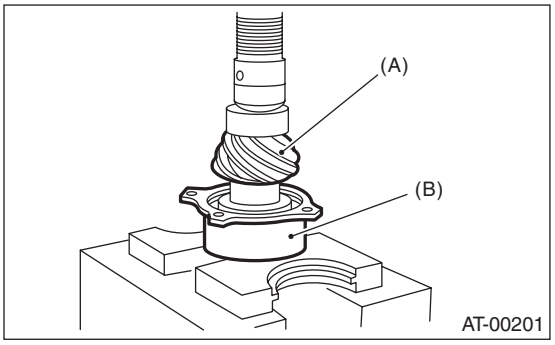
D: ASSEMBLY

1) Measure the dimension “A” of the 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

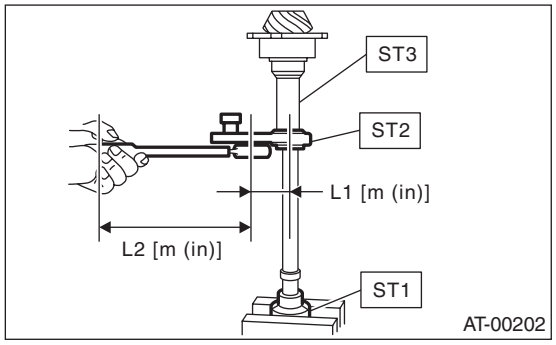
3) After applying ATF to a new O-ring and fitting it to the shaft, attach the drive pinion collar to shaft.
4) Install the lock washer to drive pinion shaft in the proper direction.

5) Tighten the new lock nuts using ST1, ST2 and ST3.
Calculate the lock washer and lock nut specifications using following formula.
T2 = L2/(L1 + L2) × T1
T1: 116 N·m (11.8 kgf-m, 85.3 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)
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)

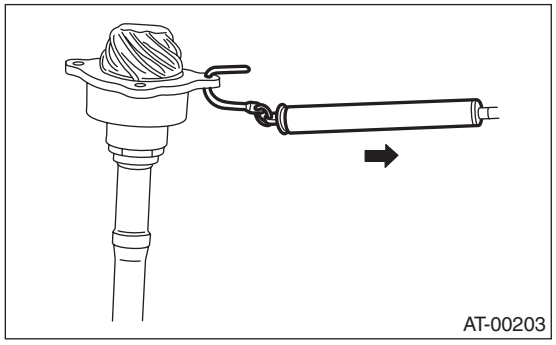
ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

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



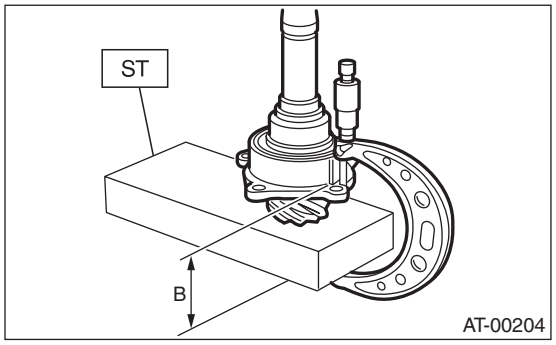
6) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

Starting torque:
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



7) Crimp the locknut in 2 locations.

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



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

Drive pinion shim	
Part number	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

E: INSPECTION

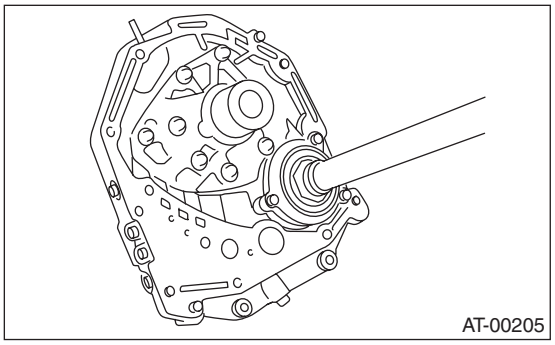
- Make sure that all component parts are free of scratches, holes and other faults.
- Adjust the tooth alignment. <Ref. to 4AT-90, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

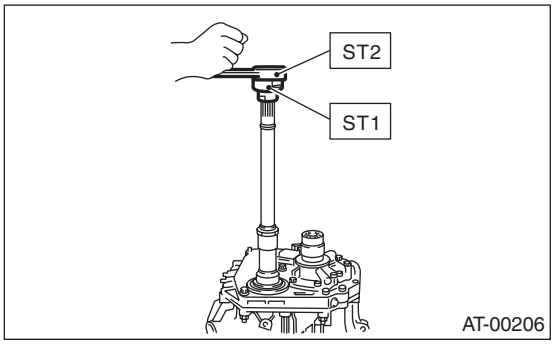
1) Remove the liquid gasket from the mating surface completely.
2) Install the oil pump housing assembly to the converter case, and secure them by tightening the four bolts evenly.

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, 30.4 ft-lb)


AT-00205

3) Rotate the drive pinion a few times using ST1 and ST2.
ST1 498937110 HOLDER
ST2 499787700 WRENCH

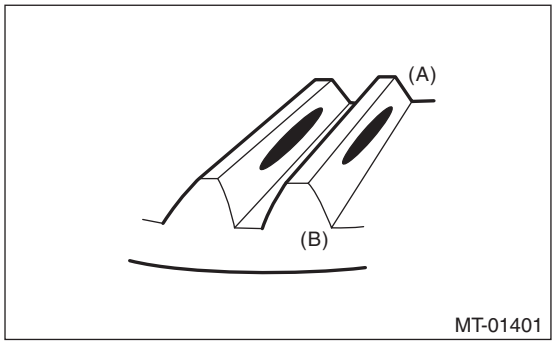


AT-00206

4) Adjust the drive pinion and driven gear backlash. <Ref. to 4AT-97, ADJUSTMENT, Front Differential Assembly.>
5) Apply red lead evenly to the surfaces of three or four teeth on the driven gear. Rotate the drive pinion back and forward several times. Remove the oil pump housing, and check the teeth contact pattern. If the teeth contact is inappropriate, adjust the backlash or thickness of the shim. <Ref. to 4AT-97, 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.)

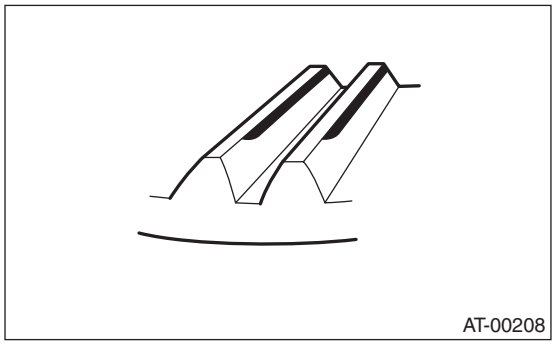


MT-01401

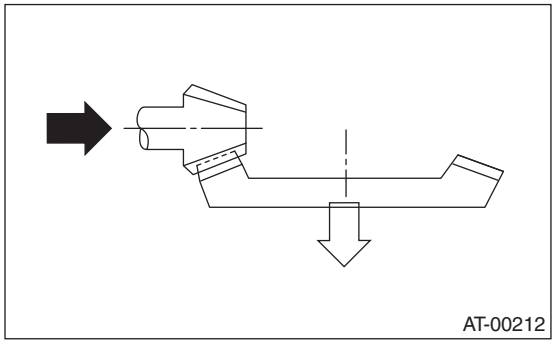
(A) Toe side
(B) Heel side

- Face contact

Check item: Backlash is too large.
Contact pattern


AT-00208

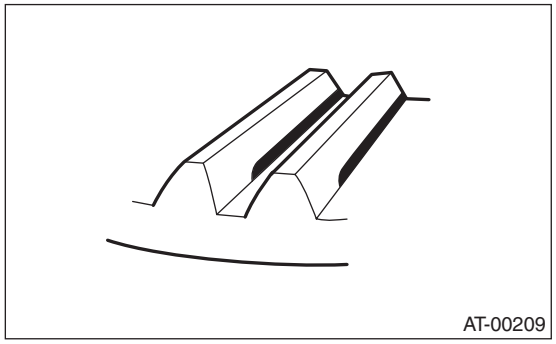
Corrective action: Increase thickness of pinion height adjusting washer according to the procedures for moving the drive pinion closer to the driven gear.


AT-00212

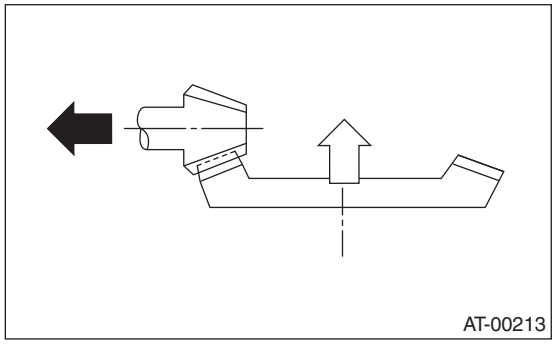
- Flank contact

Check item: Backlash is too small.

Contact pattern



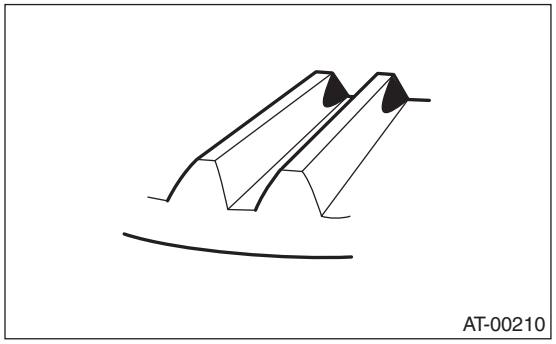
Corrective action: Reduce thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion away from the driven gear.



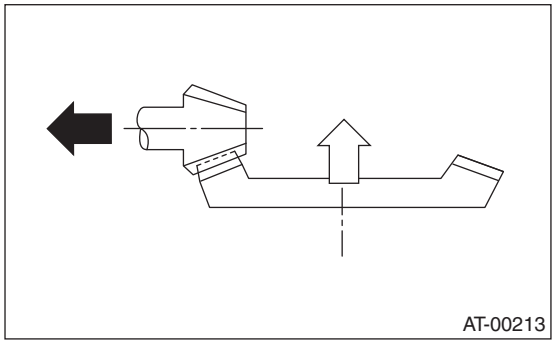
- Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern

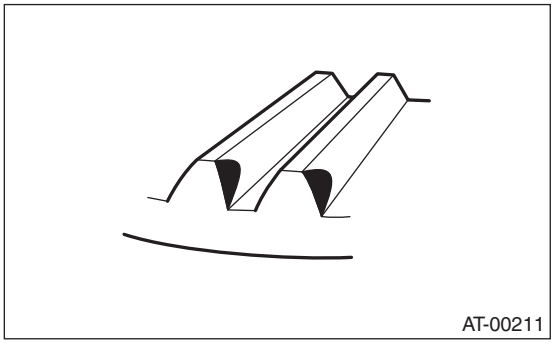


Corrective action: Reduce thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion away from the driven gear side.

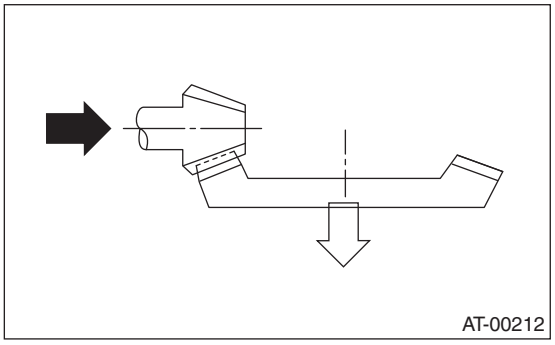


- Heel contact (outside end contact)

Check item: Teeth contact area is too small.
Contact pattern

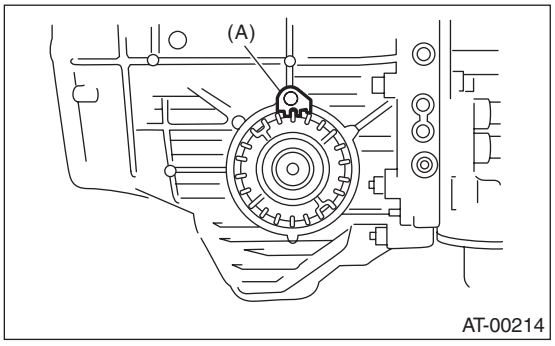


Corrective action: Increase thickness of pinion height adjusting washer according to the procedures for moving the drive pinion closer to the driven gear.



6) 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 ft-lb)

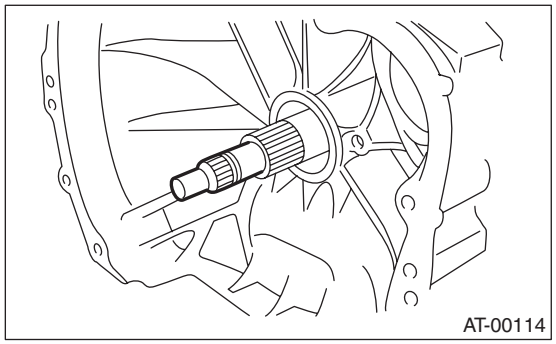


(A) Lock plate

34.Front Differential Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 4AT-66, REMOVAL, Torque Converter Assembly.>
3) Remove the input shaft.

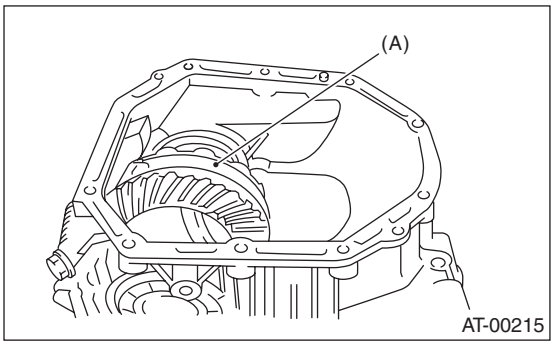

AT-00114

4) Lift-up the lever on the rear side of transmission harness connector, and then remove it from the stay.
5) Remove the inhibitor switch from the stay.
6) Remove the oil charge pipe. <Ref. to 4AT-65, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-61, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separate the converter case from the transmission case. <Ref. to 4AT-79, REMOVAL, Converter Case.>
9) Remove the seal pipe.
10) Remove the differential side retainers using ST.

NOTE:
Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.
ST 499787000 WRENCH ASSY
11) Remove the differential assembly while being careful not to damage the attachment part of retainer.

B: INSTALLATION

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



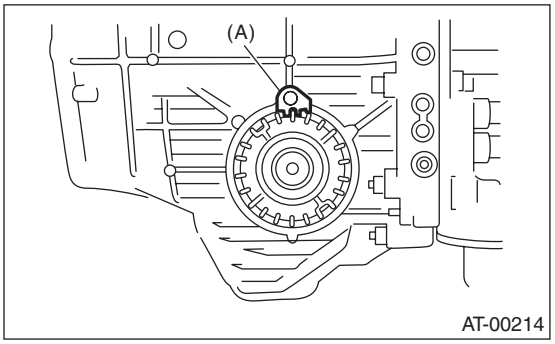
AT-00215

(A) Differential ASSY

2) Install the O-ring to the left and right side retainers.
3) Using the ST, install the side retainer. <Ref. to 4AT-97, ADJUSTMENT, Front Differential Assembly.>
ST 18630AA010 WRENCH ASSY

NOTE:
ST 499787000 WRENCH ASSEMBLY can also be used.
4) Adjust the backlash of the front differential. <Ref. to 4AT-97, ADJUSTMENT, Front Differential Assembly.>
5) Install the lock plate.

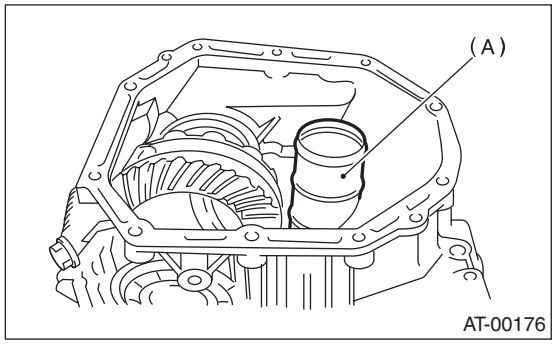
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



AT-00214

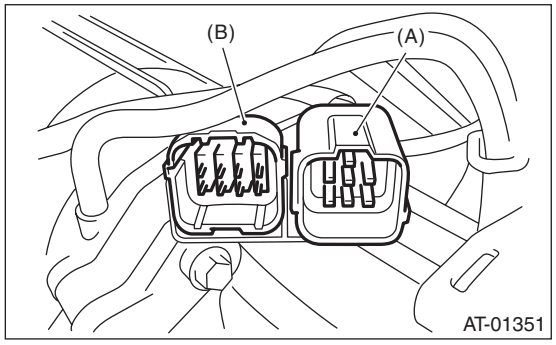
(A) Lock plate

6) Install new seal pipe to converter case.



(A) Seal pipe

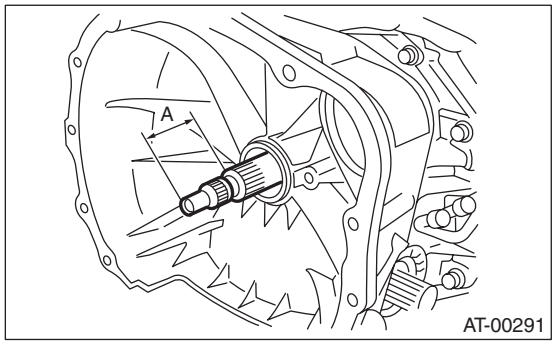
7) Install the converter case to the transmission case. <Ref. to 4AT-79, INSTALLATION, Converter Case.>
8) Insert the inhibitor switch and transmission connector to the stay.



(A) Transmission connector
(B) Inhibitor switch connector

9) Install the oil cooler pipe. <Ref. to 4AT-62, INSTALLATION, ATF Cooler Pipe and Hose.>
10) Install the oil charge pipe together with an O-ring. <Ref. to 4AT-65, INSTALLATION, Oil Charge Pipe.>
11) Insert the input shaft while rotating it lightly by hand, and then check the amount of protrusion.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

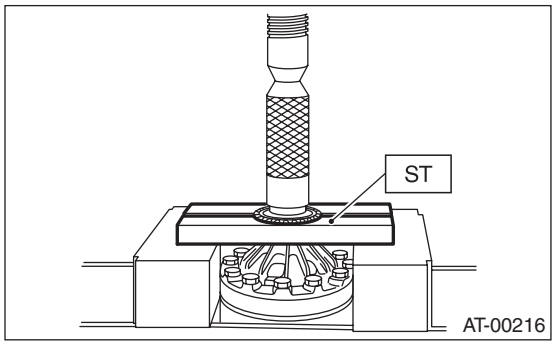


12) Install the torque converter assembly. <Ref. to 4AT-66, INSTALLATION, Torque Converter Assembly.>
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

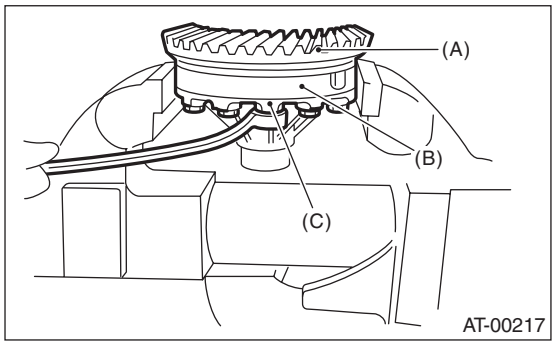
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Remove the taper roller bearing using the ST and a press.
ST 498077000 REMOVER

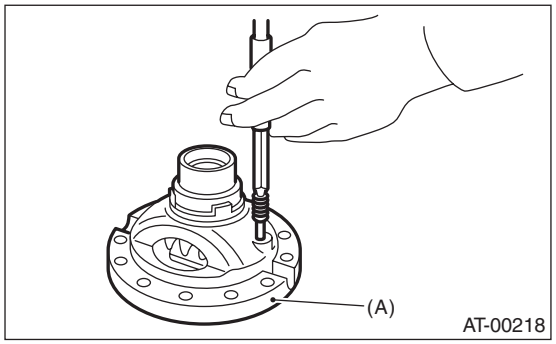


2) Secure the case in a vise, remove the hypoid driven gear tightening bolts, and then separate the hypoid driven gear into case (RH) and case (LH).



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

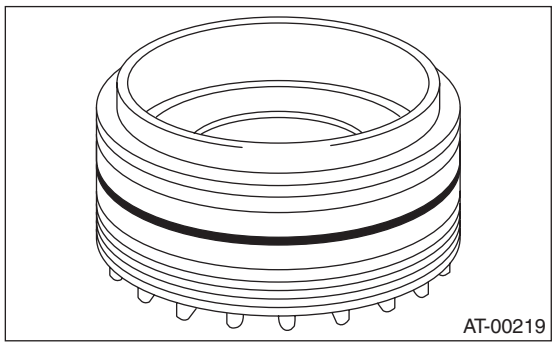
3) Pull out the straight pin and shaft, and then remove the differential bevel gear, washer and differential bevel pinion.



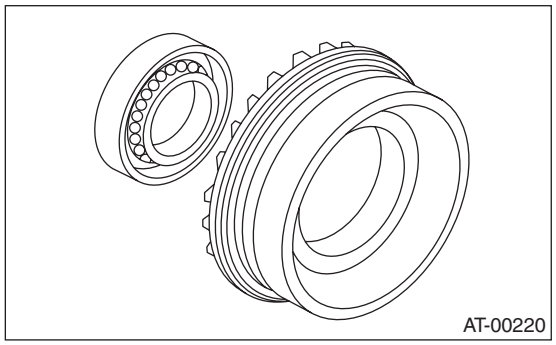
(A) Differential case (RH)

2. SIDE RETAINER

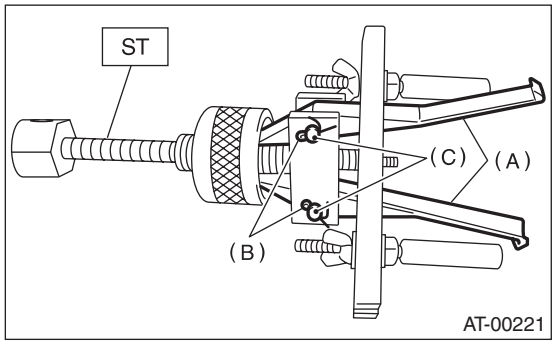
NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.
1) Remove the O-ring.



2) Remove the oil seal.

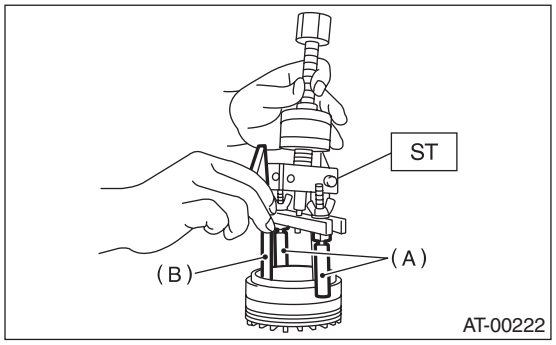


3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER ASSY



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

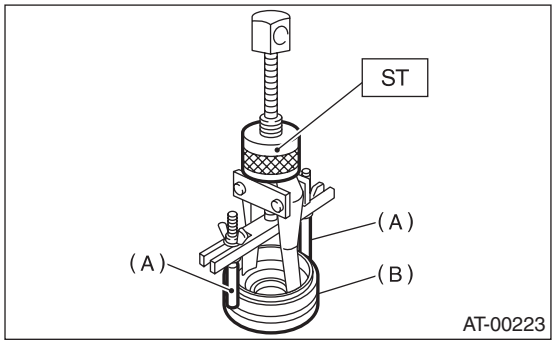
4) Attach two claws to the outer race, and set the ST to side retainer.
ST 398527700 PULLER ASSY



(A) Shaft
(B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.
6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.
ST 398527700 PULLER ASSY

NOTE:
Replace the bearing inner and outer races as a single unit.

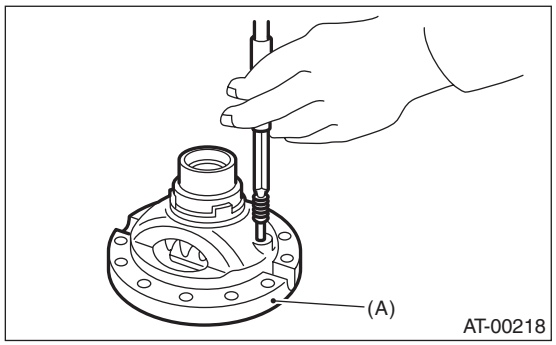


(A) Shaft
(B) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

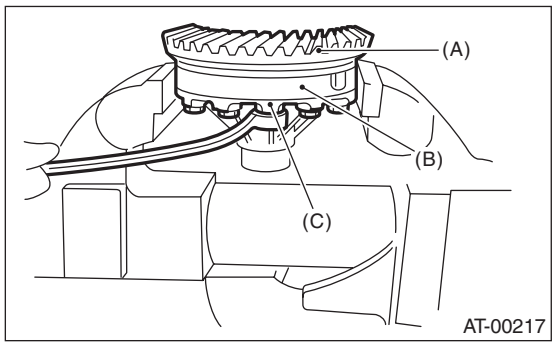
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
2) Attach the straight pin in the reverse direction.



(A) Differential case (RH)

3) Install the washer and differential bevel gear to the differential case (LH). Put the differential case (RH) on the case, and assemble two cases.
4) Install the hypoid driven gear and secure by tightening the bolt.

Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)

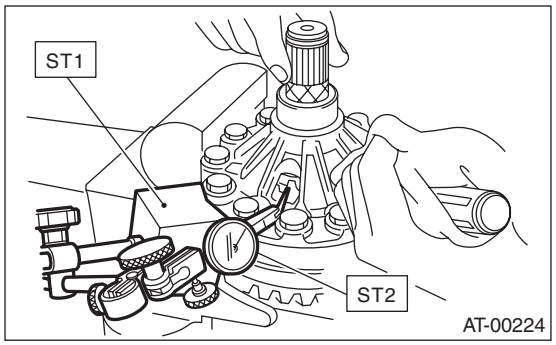


(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

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 though the access window of case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
• Measure the backlash by applying a pinion tooth between two bevel gear teeth.
• Fix the bevel pinion gear in place with a screwdriver or similar tool when measuring.

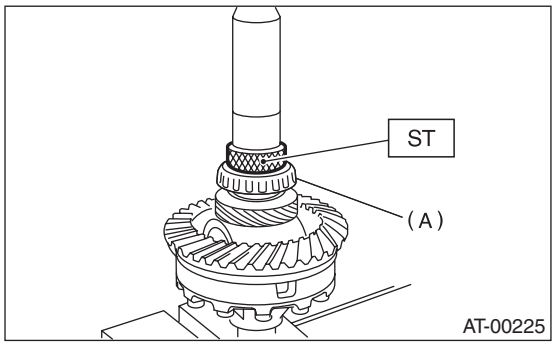
Standard:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



(3) If the backlash is out of specification, select a washer from the table below.

Washer	
Part number	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

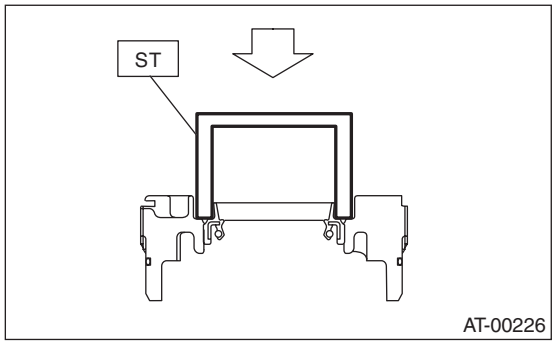
6) Using the ST, install the taper roller bearing.
ST 398487700 DRIFT



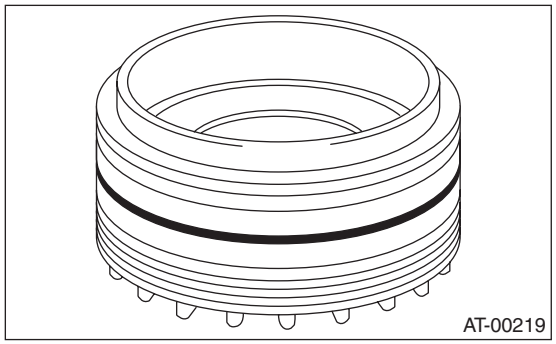
(A) Taper roller bearing

2. SIDE RETAINER

1) Install the bearing outer race to side retainer.
2) Install a new oil seal using the ST and a hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



3) Apply gear oil to a new O-ring and install.



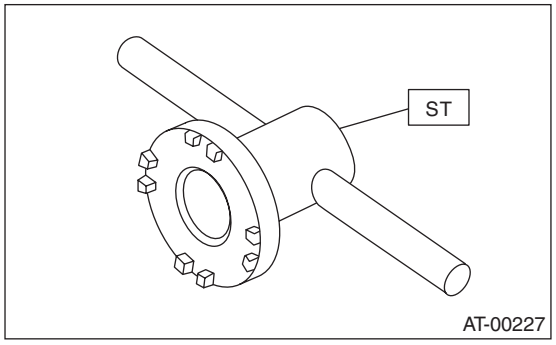
E: INSPECTION

• Check each component for scratches, damage or other faults.
• Measure the backlash, and then adjust it to be within specification.
<Ref. to 4AT-97, ADJUSTMENT, Front Differential Assembly.>

F: ADJUSTMENT

1) Using the ST, screw-in the retainer until resistance is felt.
ST 18630AA010 WRENCH COMPL RETAINER

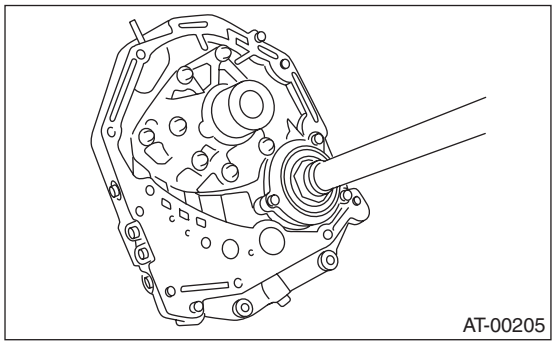
NOTE:
• Screw-in the RH side slightly deeper than the LH side.
• ST 499787000 WRENCH ASSEMBLY can also be used.



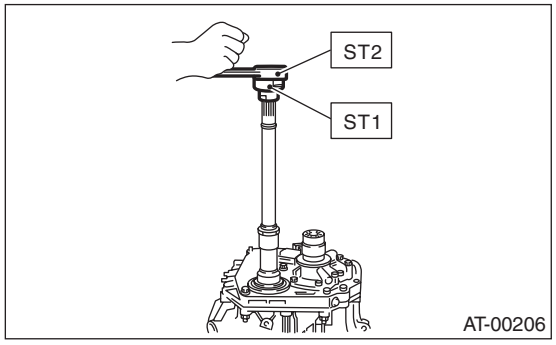
2) Remove the oil pump housing.
3) Remove the liquid gasket from the mating surface completely.
4) Install the oil pump housing assembly to the converter case, and secure them by tightening the four bolts evenly.

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

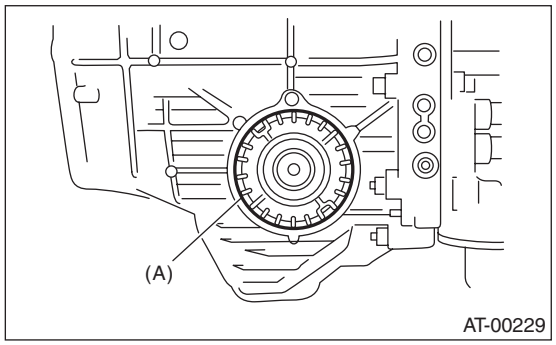
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



5) Rotate the drive pinion a few times using ST1 and ST2.
ST1 498937110 HOLDER
ST2 499787700 WRENCH

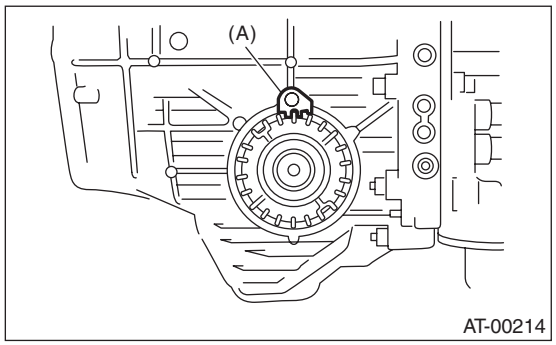


6) Tighten the LH retainer by rotating the shaft until resistance is felt. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft no longer be turned. This is the “zero” state.



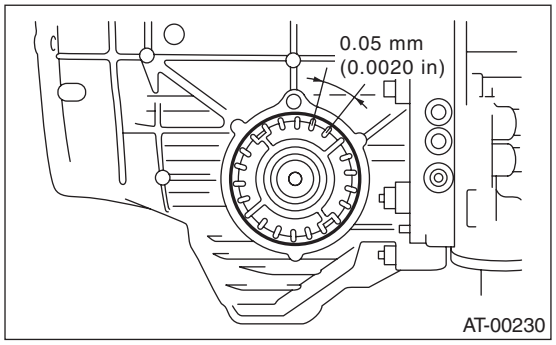
(A) Retainer

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.



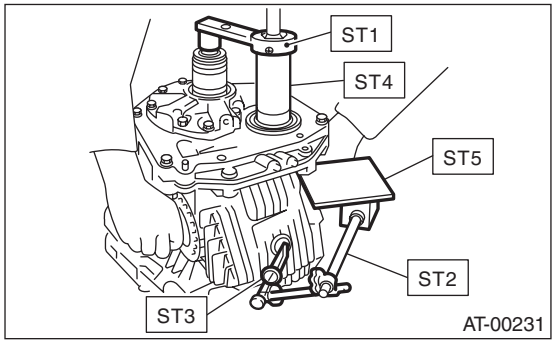
(A) Lock plate

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



8) Front differential section
Install the axle shaft to both sides of the front differential section.
Part No. 38415AA000 Axle shaft
9) Turn the drive pinion several times using ST1, and check to see if the backlash is within the specification using ST2, ST3, ST4 and ST5.
ST1 499787700 WRENCH
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE
ST4 499787500 ADAPTER
ST5 498255400 PLATE

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

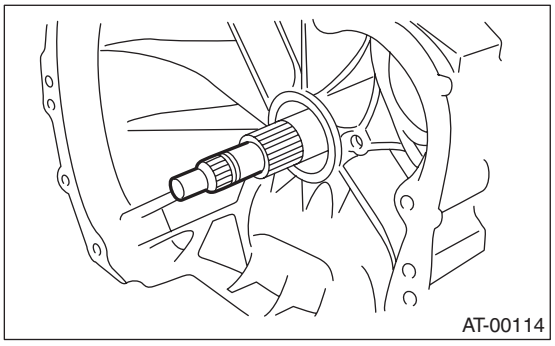


10) Adjust the teeth contact of the front differential and drive shaft. <Ref. to 4AT-90, ADJUSTMENT, Drive Pinion Shaft Assembly.>

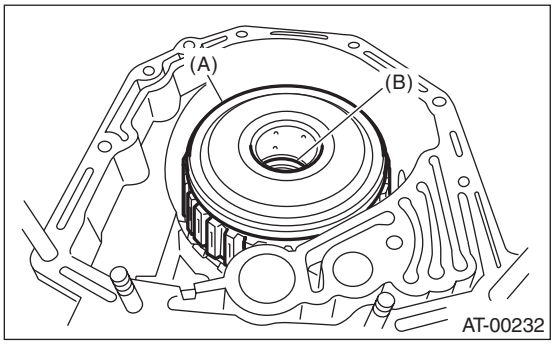
35.AT Main Case

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 4AT-66, REMOVAL, Torque Converter Assembly.>
3) Remove the input shaft.

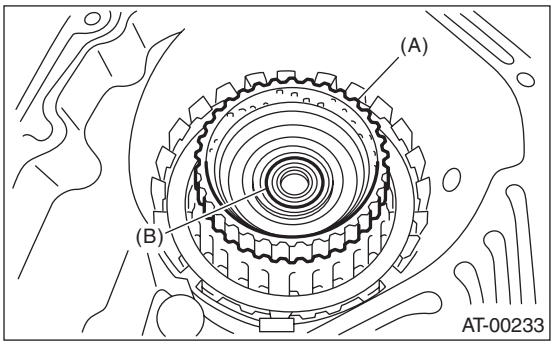


4) Lift-up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
5) Disconnect the inhibitor switch connector from the stay.
6) Disconnect the air breather hose.
7) Remove the oil charge pipe. <Ref. to 4AT-65, REMOVAL, Oil Charge Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-61, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separate the converter case from the transmission case. <Ref. to 4AT-79, REMOVAL, Converter Case.>
10) Remove the oil pump housing.
<Ref. to 4AT-81, REMOVAL, Oil Pump Housing.>
11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



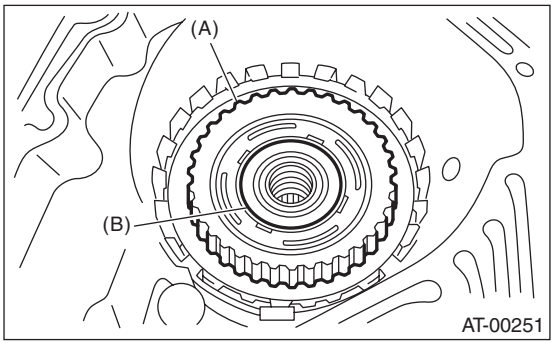
(A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing

12) Take out the high clutch hub and thrust bearing.



(A) High clutch hub
(B) Thrust needle bearing

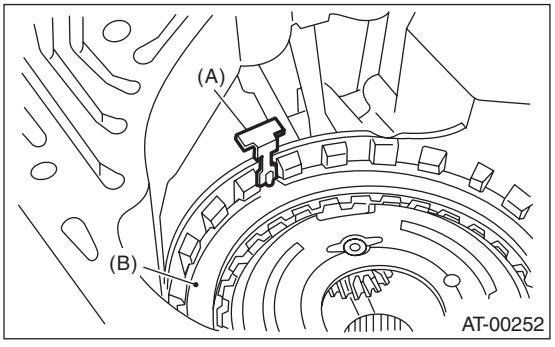
13) Take out the front sun gear and thrust needle bearing.



(A) Front sun gear
(B) Thrust needle bearing

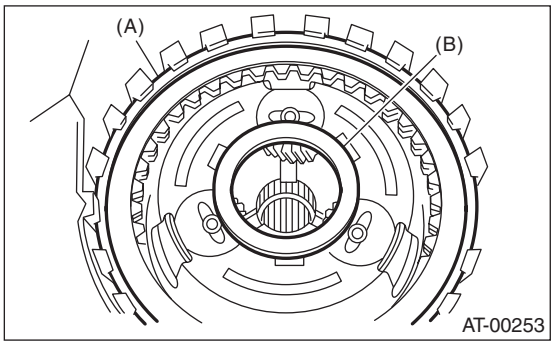
14) Pull out the leaf spring, being careful not to break it.

NOTE:
Remove it while pressing down on the lower leaf spring.



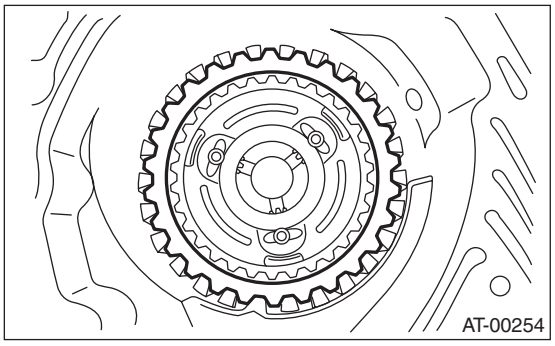
(A) Leaf spring
(B) Retaining plate

15) Remove the snap ring and thrust needle bearing.

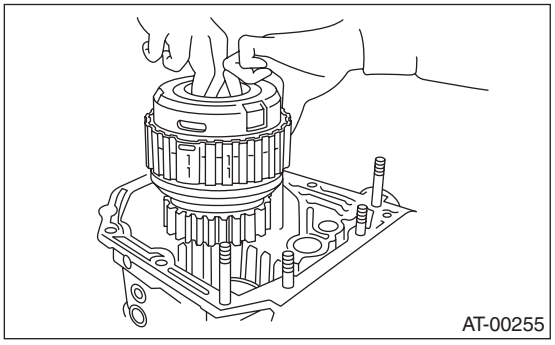


(A) Snap ring
(B) Thrust needle bearing

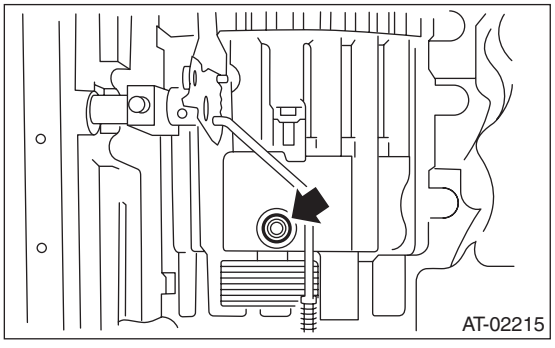
16) Take out the retaining plate, drive plate and driven plate of 2-4 brake.



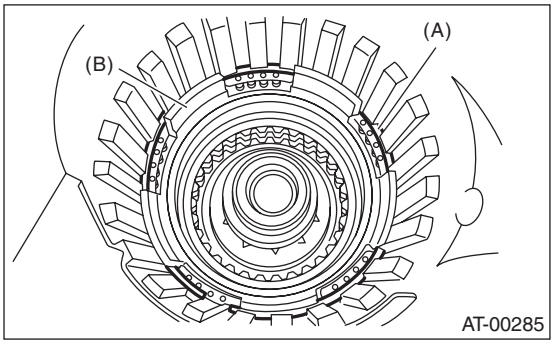
17) Take out the thrust needle bearing, planetary gear assembly and low clutch assembly.



18) Remove the 2-4 brake seal.

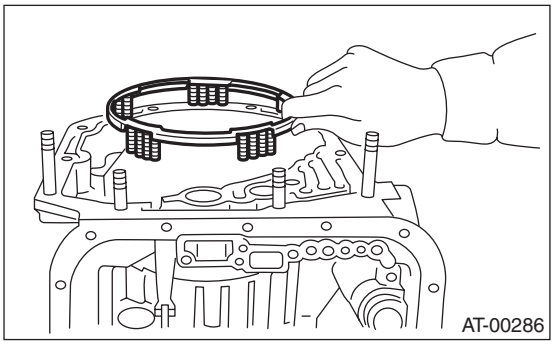


19) Remove the snap ring.

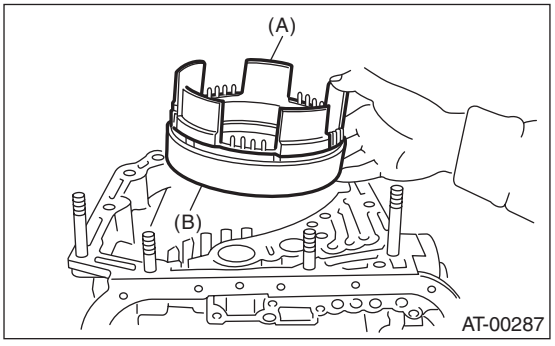


(A) Snap ring
(B) 2-4 brake piston

20) Take out the 2-4 brake return spring.

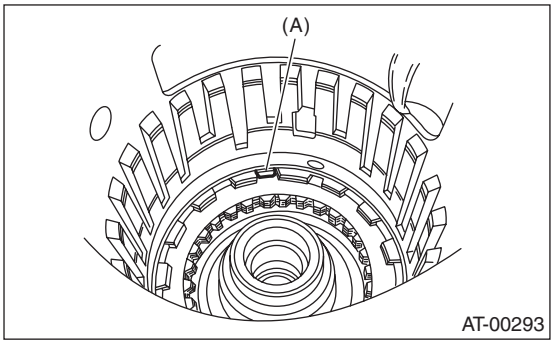


21) Remove the 2-4 brake piston and piston retainer while taking care not to damage them.



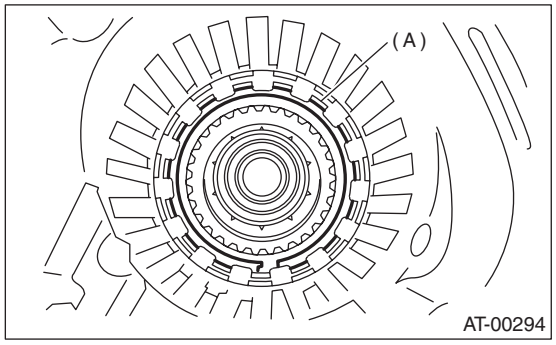
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

22) Pull out the leaf spring without bending it.



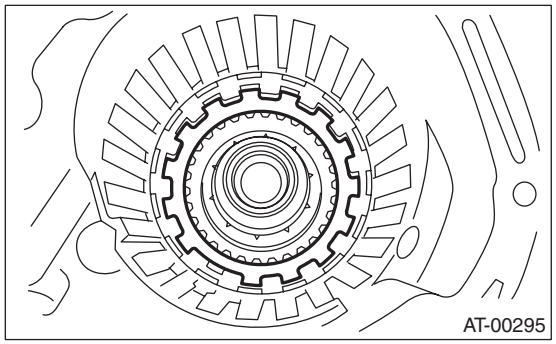
(A) Leaf spring

23) Remove the snap ring.

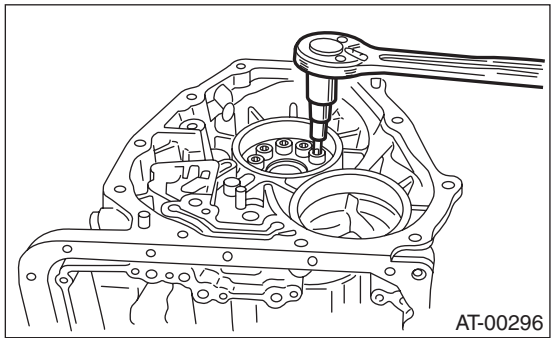


(A) Snap ring

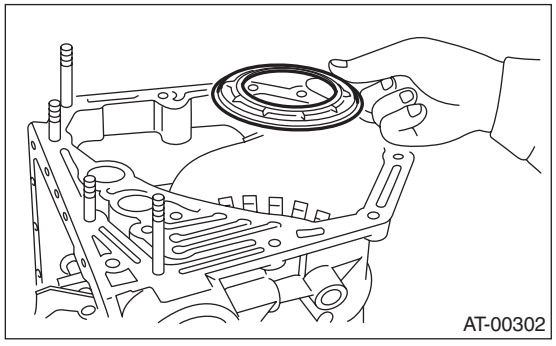
24) Take out the retaining plate, drive plate, driven plate and dish plate.



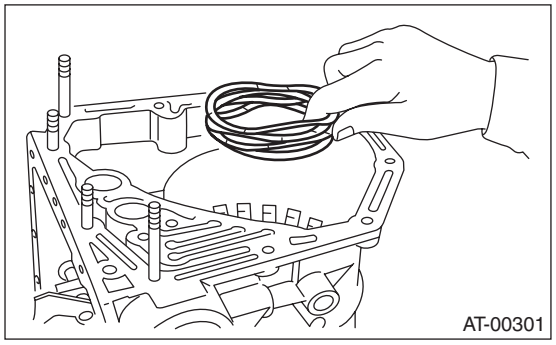
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race by hand.



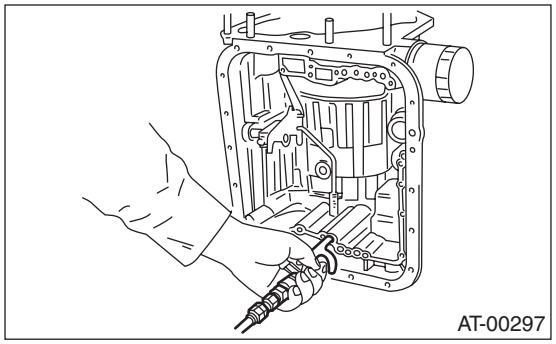
26) Remove the spring retainer.



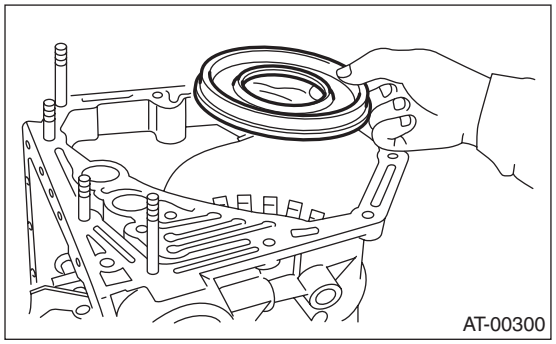
27) Take out the return spring.



28) Apply compressed air.



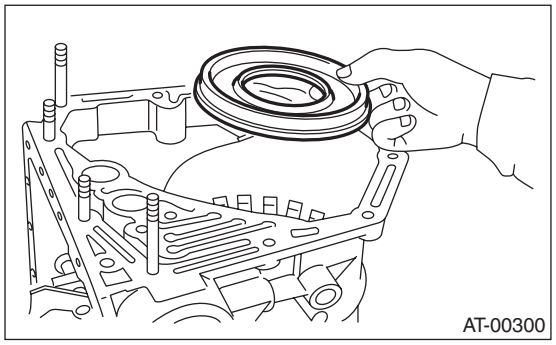
29) Take out the low & reverse piston.



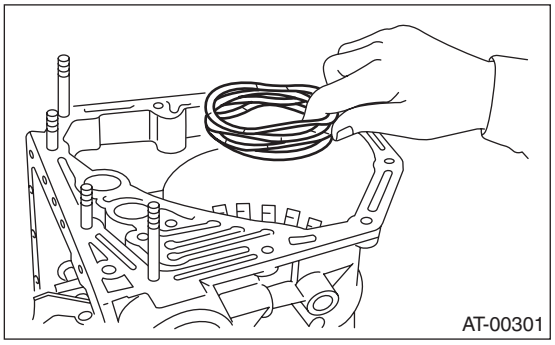
B: INSTALLATION

1) Install the low & reverse brake piston.

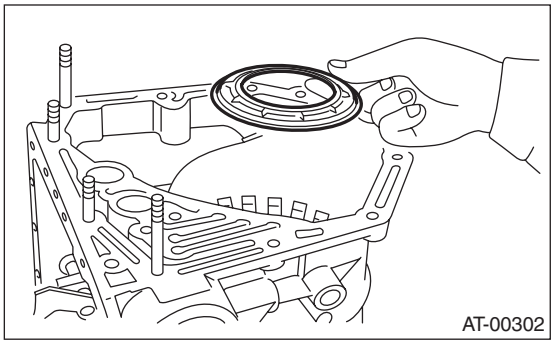
NOTE:
- Take care not to damage the lip seal.
- Apply ATF to the lip.



2) Install the return spring.

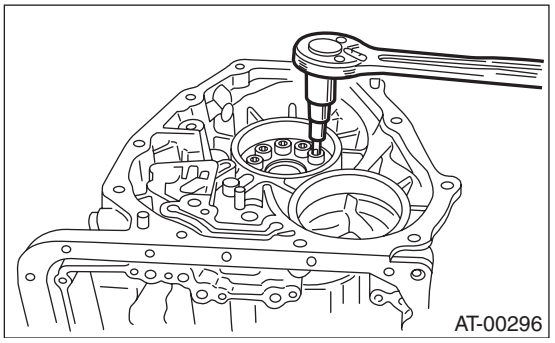


3) Install the spring retainer.



4) Install the one-way clutch inner race, spring retainer and return spring.
5) Tighten the socket head bolts evenly from the rear side of transmission case.

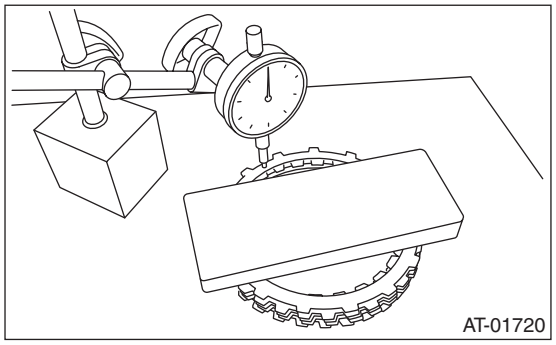
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



6) Place the front side of transmission body up.
7) Install the thrust needle bearing.
8) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
9) Set the micro gauge to retaining plate, and read its scale.

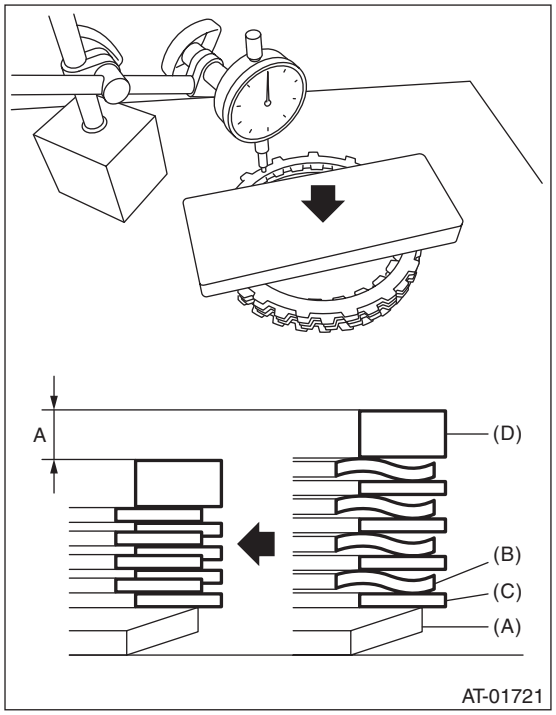
NOTE:
The value, which is read in the gauge at this time, is zero point.
10) Scale and record the weight "Z" of a flat board which will be put on retaining plate.

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 83 N (8.5 kgf, 18.7 lb).
11) Put the flat board on retaining plate.



12) Using the following formula, read the push/pull gauge, and calculate "N".
N = 83 N (8.5 kgf, 18.7 lb) – Z
N: Value indicated on push/pull gauge
83 N (8.5 kgf, 18.7 lb) : Load applied to clutch plate
Z: Flat board weight
13) Press the center of retaining plate by applying a force of N using push/pull gauge, and then measure and record the height A. Measure at three or more locations spaced by equal distances and take the average value.

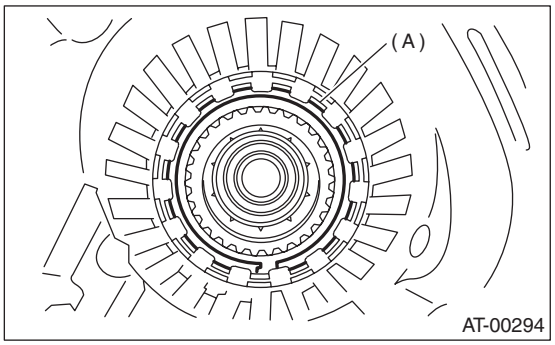
NOTE:
If measuring in three locations, measure every 120°. If measuring in four locations, measure every 90°.



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

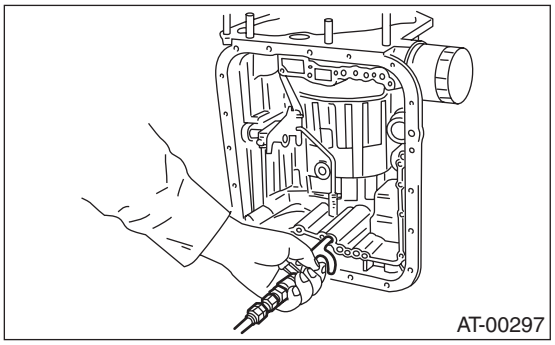
14) Installation of the low & reverse brake:
Install the dish plate, driven plate, drive plate and retaining plate, and then secure them with a snap ring.

NOTE:
Pay attention to the orientation of the dish plate.



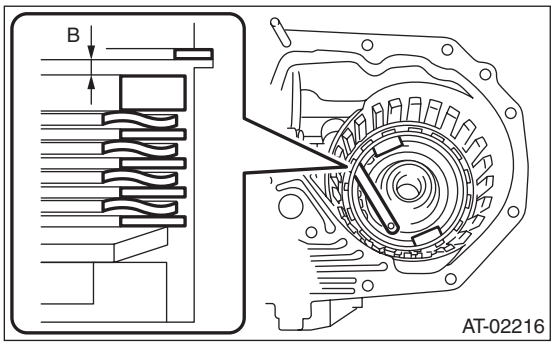
(A) Snap ring

15) Apply compressed air intermittently to check for operation.



16) Place same thickness shims on both sides to prevent plate from tilting, then measure and record the clearance B.

NOTE:
Do not push in the shim down with force to a point where the waves on the drive plate will be crushed.



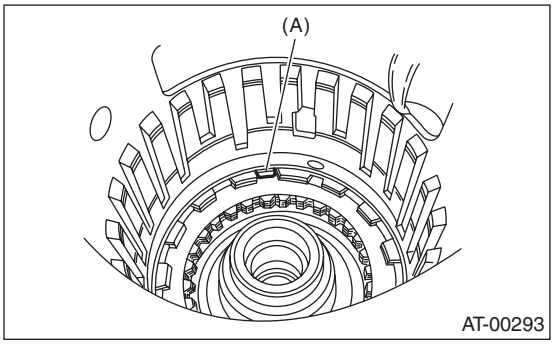
17) Piston stroke calculation
Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new part and adjust it within the initial specification.
T = A + B
T: Piston stroke
A: Amount of drive plate compression
B: Clearance between retaining plate and snap ring

Initial standard:
2.15 — 2.65 mm (0.085 — 0.104 in)

Limit thickness:
2.95 mm (0.116 in)

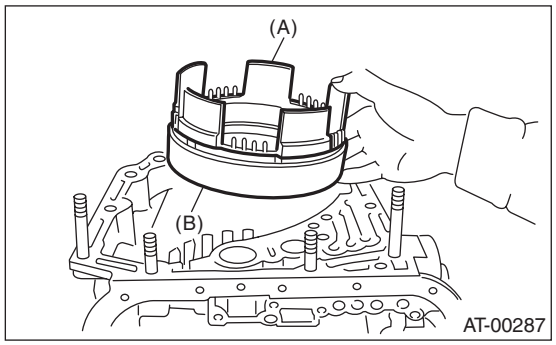
Retaining plate	
Part number	Thickness mm (in)
31667AA420	3.8 (0.150)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

18) Install the leaf spring of the low & reverse brake.



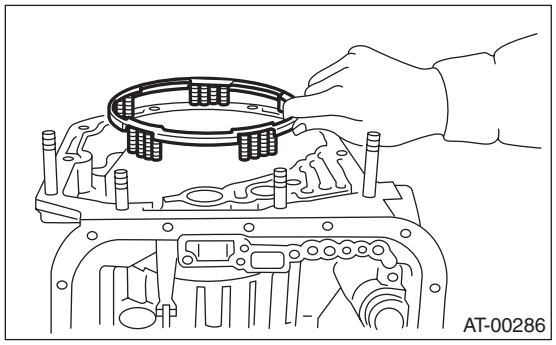
(A) Leaf spring

19) Install the 2-4 brake piston and 2-4 brake retainer by aligning the hole of the 2-4 brake retainer with the hole on the transmission case.



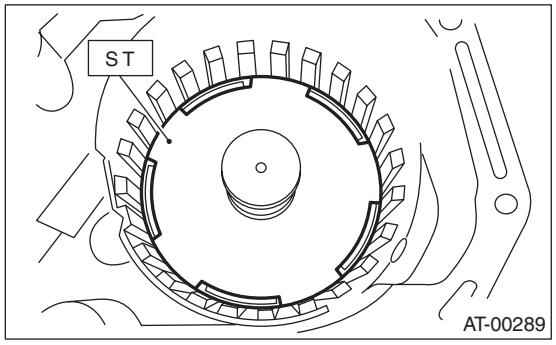
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

20) Install 2-4 brake piston return spring to the transmission case.

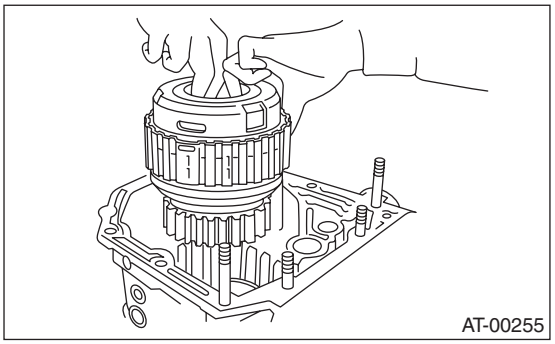


21) Position the snap ring in the transmission. Using ST, press the snap ring into the specified location.

ST 498677100 COMPRESSOR



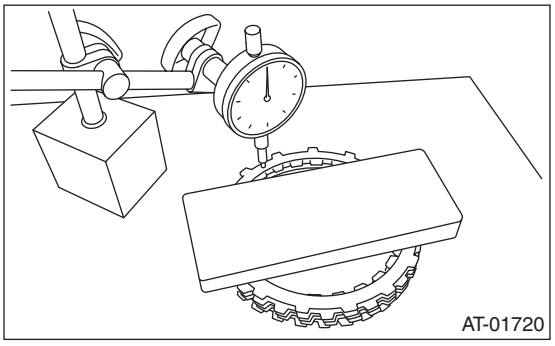
22) Install the planetary gear and low clutch assembly to the transmission case.
Install carefully while rotating the low clutch and planetary gear assembly slowly, paying special attention not to damage the seal ring.



23) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
24) Set the micro gauge to retaining plate, and read its scale.

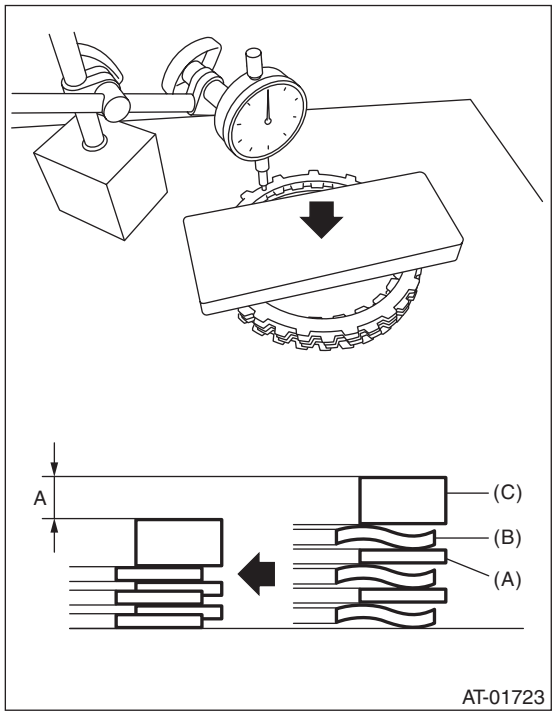
NOTE:
The value, which is read in the gauge at this time, is zero point.
25) Scale and record the weight “Z” of a flat board which will be put on retaining plate.

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 100 N (10.2 kgf, 22.5 lb).
26) Put the flat board on retaining plate.



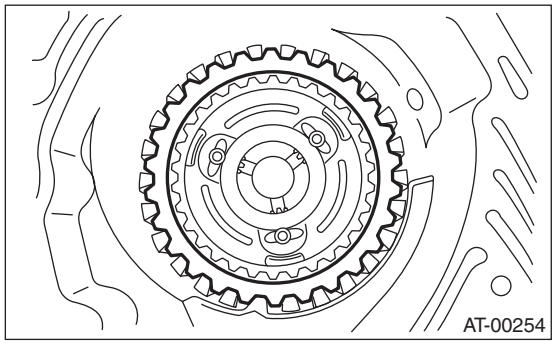
27) Using the following formula, read the push/pull gauge, and calculate “N”.
N = 100 N (10.2 kgf, 22.5 lb) – Z
N: Value indicated on push/pull gauge
100 N (10.2 kgf, 22.5 lb) : Load applied to clutch plate
Z: Flat board weight
28) Press the center of retaining plate by applying a force of N using push/pull gauge, and then measure and record the height A. Measure at three or more locations spaced by equal distances and take the average value.

NOTE:
If measuring in three locations, measure every 120°. If measuring in four locations, measure every 90°.

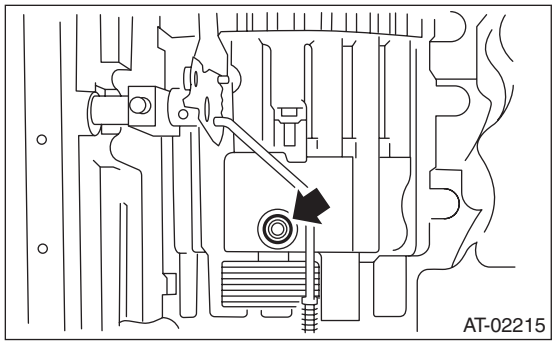


(A) Driven plate
(B) Drive plate
(C) Retaining plate

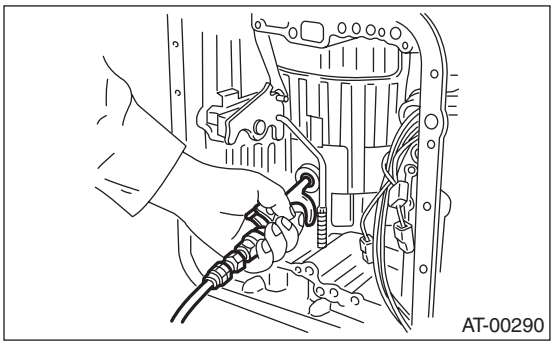
29) Install the pressure plate, drive plate, driven plate, retaining plate and snap ring.



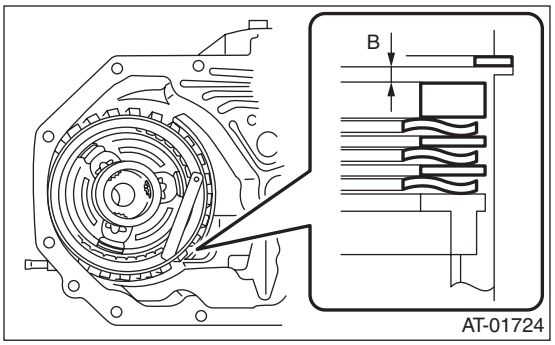
30) Install a new 2-4 brake oil seal to the transmission case.



31) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.



32) Measure the clearance B between the retaining plate and snap ring.



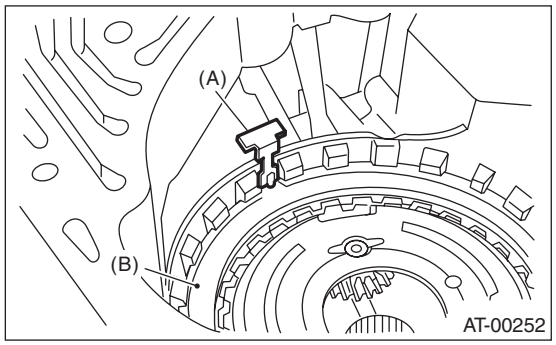
33) Piston stroke calculation
Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new part and adjust it within the initial specification.
T = A + B
T: Piston stroke
A: Amount of drive plate compression
B: Clearance between retaining plate and snap ring

Initial standard:
1.7 — 2.1 mm (0.067 — 0.083 in)

Limit thickness:
2.3 mm (0.091 in)

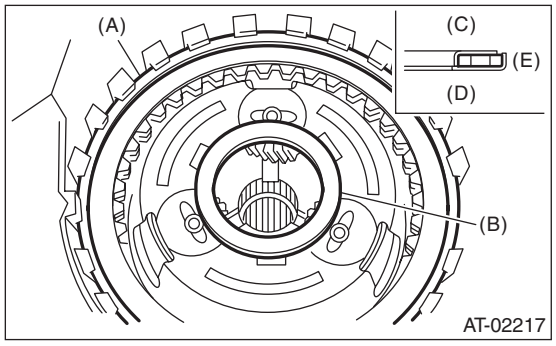
Retaining plate	
Part number	Thickness mm (in)
31567AA991	5.6 (0.220)
31567AB001	5.8 (0.228)
31567AB011	6.0 (0.236)
31567AB021	6.2 (0.244)
31567AB031	6.4 (0.252)
31567AB041	6.6 (0.260)

34) Be careful not to mistake the location of the leaf spring to be installed.



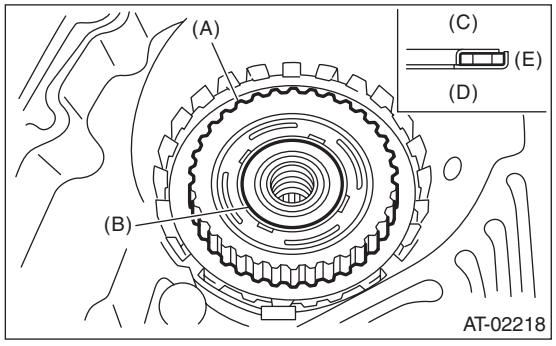
(A) Leaf spring
(B) Retaining plate

35) Install the thrust needle bearing in the correct direction.



(A) Snap ring
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

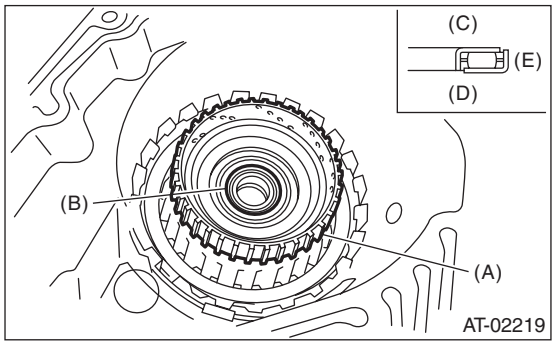
36) Install the front sun gear and the thrust needle bearing.



(A) Front sun gear
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

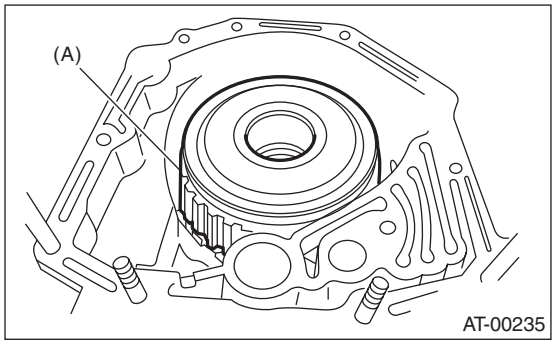
37) Install the high clutch hub.
Attach the thrust needle bearing to hub using vaseline, and then install the hub by correctly engaging the splines of the front planetary carrier.

38) Install the thrust needle bearing in the proper direction.



(A) High clutch hub
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

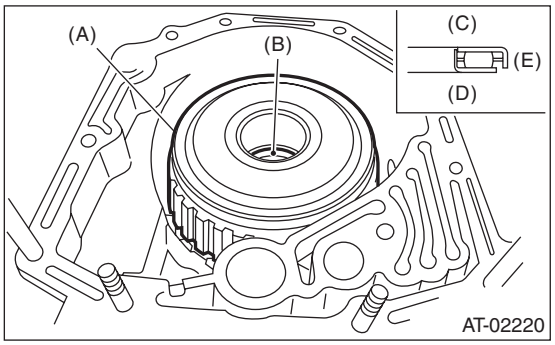
39) Install the high clutch assembly.



(A) High clutch and reverse clutch ASSY

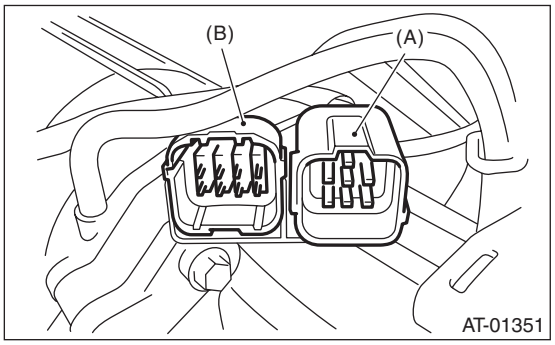
40) Adjust the total end play. <Ref. to 4AT-86, ADJUSTMENT, Oil Pump Housing.>

41) Install the thrust needle bearing in the proper direction.



(A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

42) Install a new gasket along with the oil pump housing assembly. <Ref. to 4AT-81, INSPECTION, Oil Pump Housing.>
43) Install the converter case to the transmission case assembly. <Ref. to 4AT-79, INSTALLATION, Converter Case.>
44) Insert the inhibitor switch and transmission connector to the stay.
45) Install the air breather hose. <Ref. to 4AT-64, INSTALLATION, Air Breather Hose.>

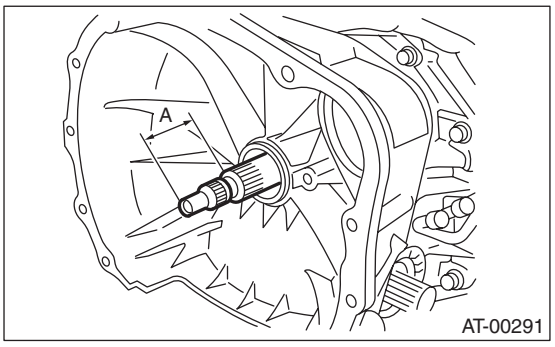


(A) Transmission connector
(B) Inhibitor switch connector

46) Install the oil cooler pipe. <Ref. to 4AT-62, INSTALLATION, ATF Cooler Pipe and Hose.>
47) Install the oil charge pipe together with an O-ring. <Ref. to 4AT-65, INSTALLATION, Oil Charge Pipe.>

48) Insert the input shaft while rotating it lightly by hand, and then check the amount of protrusion.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

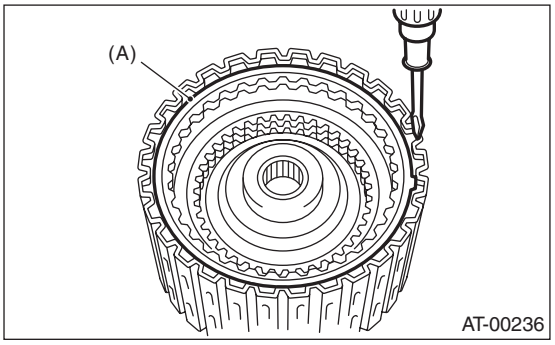


49) Install the torque converter assembly. <Ref. to 4AT-66, INSTALLATION, Torque Converter Assembly.>
50) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

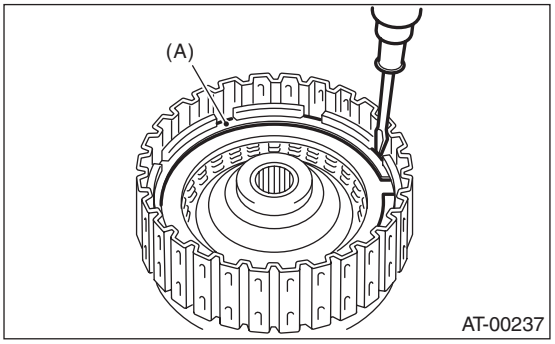
1. HIGH CLUTCH AND REVERSE CLUTCH

1) Remove the snap ring, and then take out the retaining plate, drive plate and driven plate.



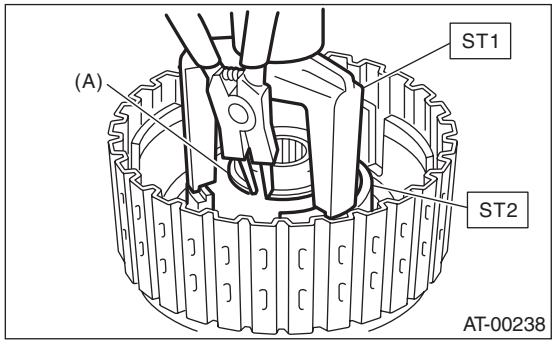
(A) Snap ring

2) Remove the snap ring, and then take out the retaining plate, drive plate and driven plate.



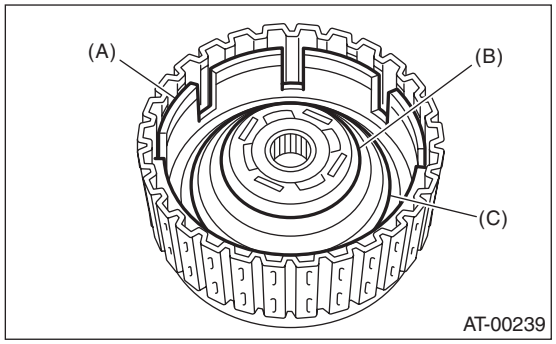
(A) Snap ring

3) Using the ST1 and ST2, remove the snap ring.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT



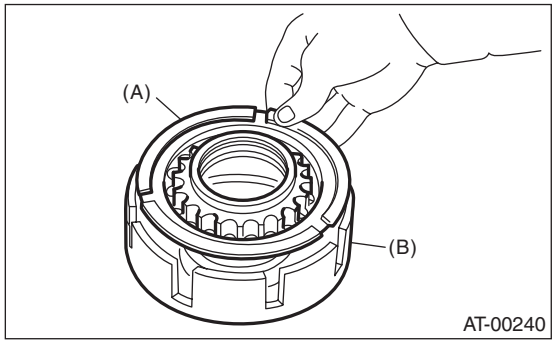
(A) Snap ring

4) Take out the clutch cover, spring retainer, high clutch piston and reverse clutch piston.



(A) Reverse clutch piston
(B) Cover
(C) Return spring

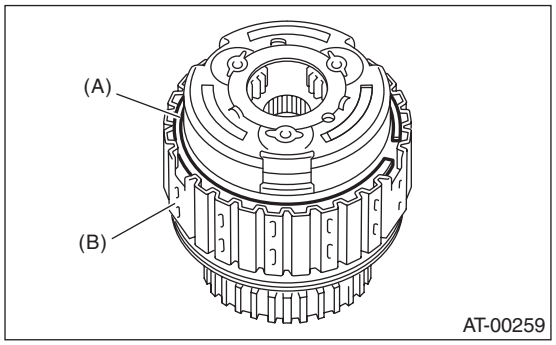
5) Remove the seal ring and lip seal from the high clutch piston and reverse clutch piston.



(A) High clutch piston
(B) Reverse clutch piston

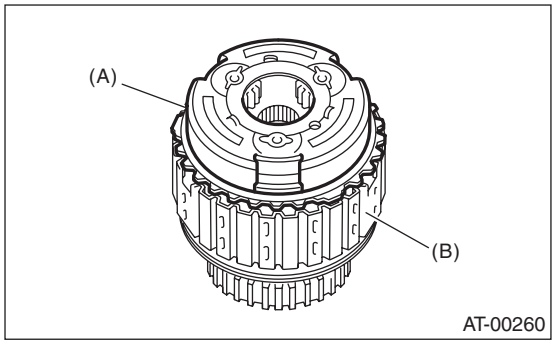
2. PLANETARY GEAR AND LOW CLUTCH

1) Remove the snap ring from low clutch drum.



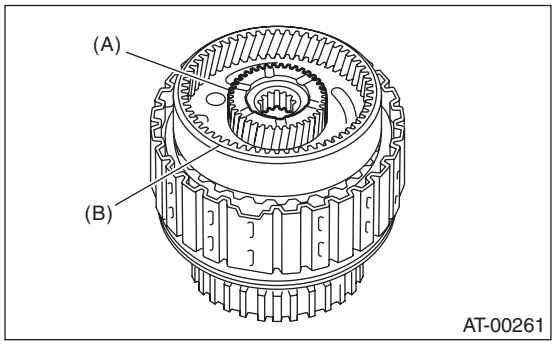
(A) Snap ring
(B) Low clutch drum

2) Take out the front planetary carrier.



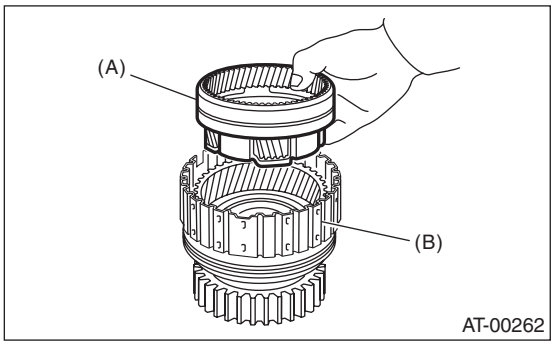
(A) Front planetary carrier
(B) Low clutch drum

3) Take out the rear sun gear.



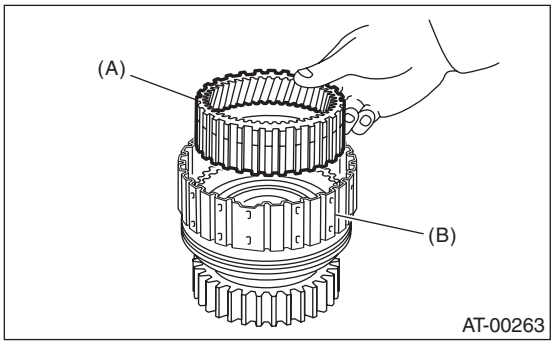
(A) Rear sun gear
(B) Rear planetary carrier

4) Take out the rear planetary carrier, washer and thrust needle bearing.



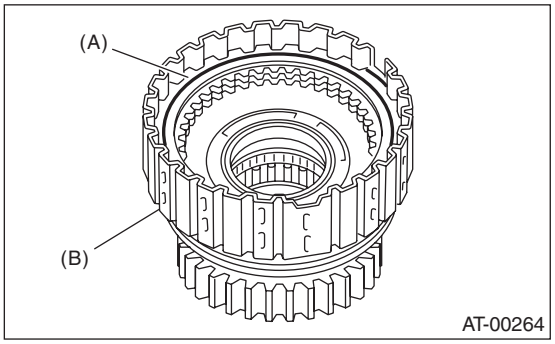
(A) Rear planetary carrier
(B) Low clutch drum

5) Take out the rear internal gear.



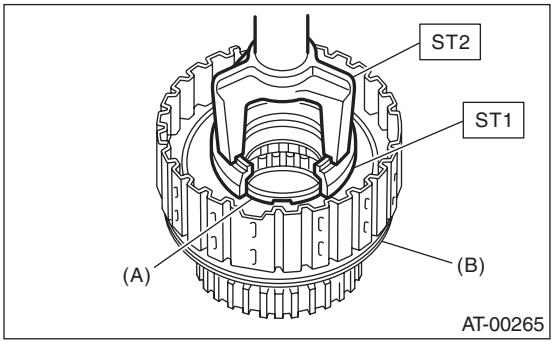
(A) Rear internal gear
(B) Low clutch drum

6) Remove the snap ring from low clutch drum.



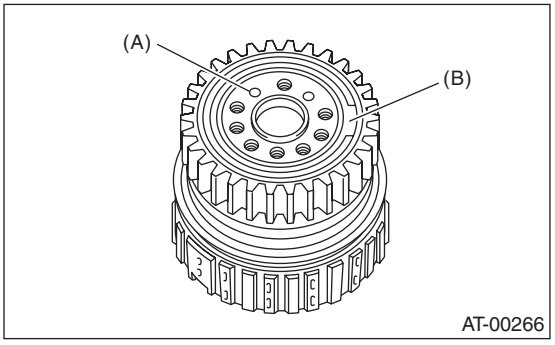
(A) Snap ring
(B) Low clutch drum

7) Compress the spring retainer and remove the snap ring from the low clutch drum using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



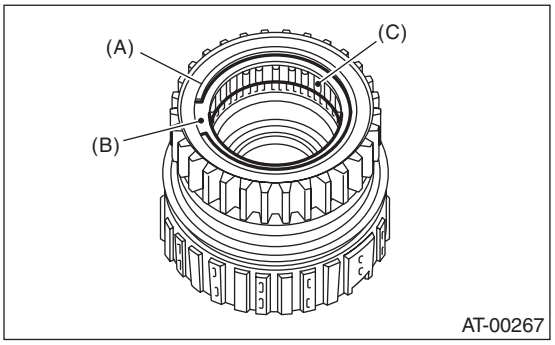
(A) Snap ring
(B) Low clutch drum

8) Remove the one-way clutch. <Ref. to 4AT-99, REMOVAL, AT Main Case.>
9) Install the one-way clutch inner race to the low clutch drum, and then apply compressed air to remove the low clutch piston.



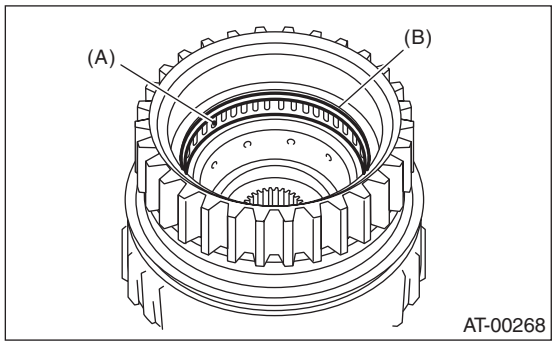
(A) Apply compressed air.
(B) One-way clutch inner race

10) Remove the one-way clutch inner race.
11) Remove the one-way clutch after taking out the snap ring.



(A) Snap ring
(B) Plate
(C) One-way clutch

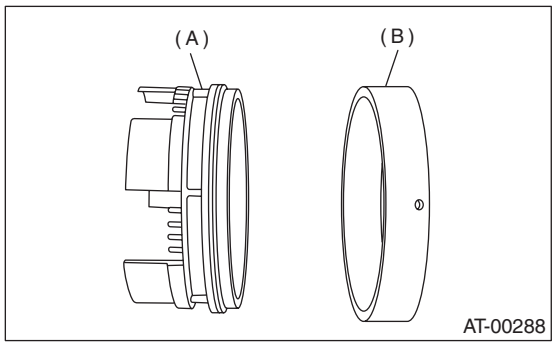
12) Remove the needle bearing after taking out the snap ring.



(A) Needle bearing
(B) Snap ring

3. 2-4 BRAKE

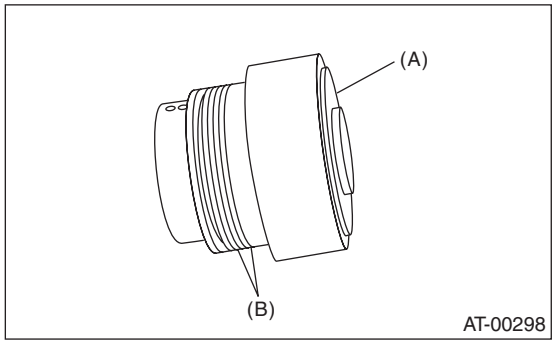
Separate the 2-4 brake piston and piston retainer.



(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

1) Remove the seal ring.

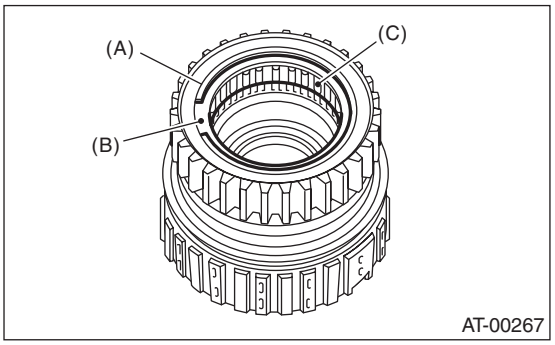


(A) One-way clutch inner race
(B) Seal ring

2) Remove the needle bearing using ST.
ST 398527700 PULLER ASSY

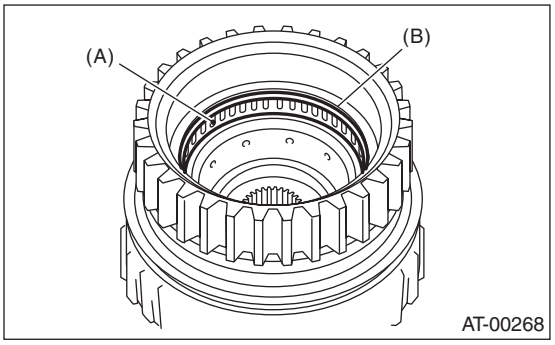
5. ONE-WAY CLUTCH OUTER RACE

1) Remove the one-way clutch after taking out the snap ring.



(A) Snap ring
(B) Plate
(C) One-way clutch

2) Remove the needle bearing after taking out the snap ring.

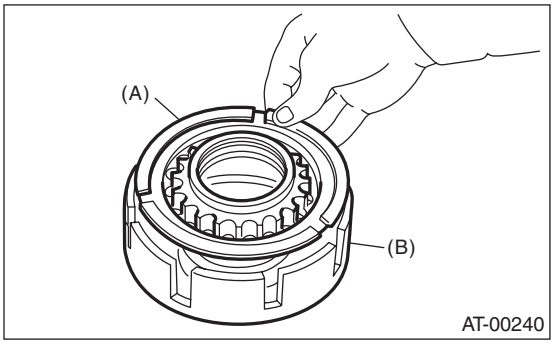


(A) Needle bearing
(B) Snap ring

D: ASSEMBLY

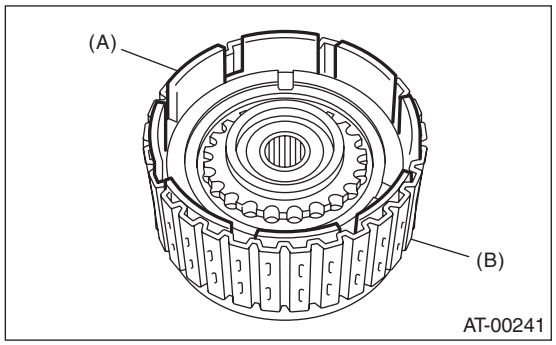
1. HIGH CLUTCH AND REVERSE CLUTCH

1) Install the seal ring and lip seal to the high clutch piston and reverse clutch piston.
2) Install the high clutch piston to the reverse clutch piston.



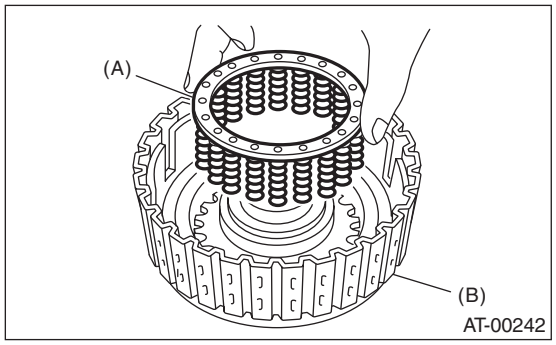
(A) High clutch piston
(B) Reverse clutch piston

3) Install the reverse clutch piston to the high clutch drum. Align the groove on reverse clutch piston with the groove on high clutch drum during installation.



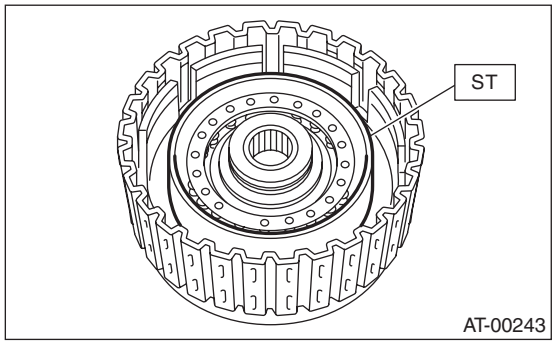
(A) Reverse clutch piston
(B) High clutch drum

4) Install the spring retainer to the high clutch piston.



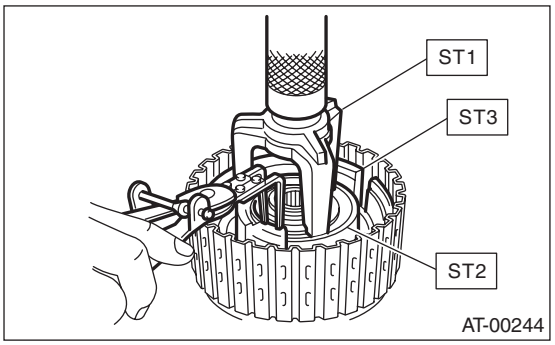
(A) Spring retainer
(B) High clutch drum

5) Attach the ST to the high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GUIDE



6) Install the cover to the high clutch piston while making sure not to bend the high clutch piston seal.

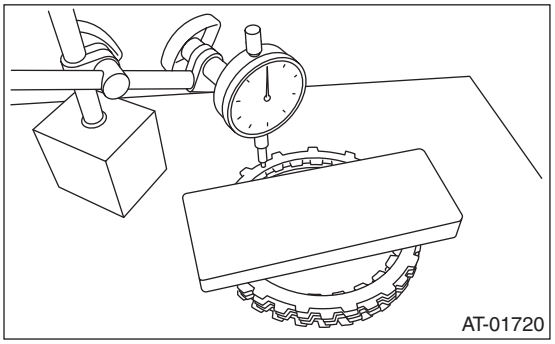
7) Install the snap ring using ST1 and ST2.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT
ST3 498437000 HIGH CLUTCH PISTON GUIDE



8) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
9) Set the micro gauge to retaining plate, and read its scale.

NOTE:
The value, which is read in the gauge at this time, is zero point.
10) Scale and record the weight “Z” of a flat board which will be put on retaining plate.

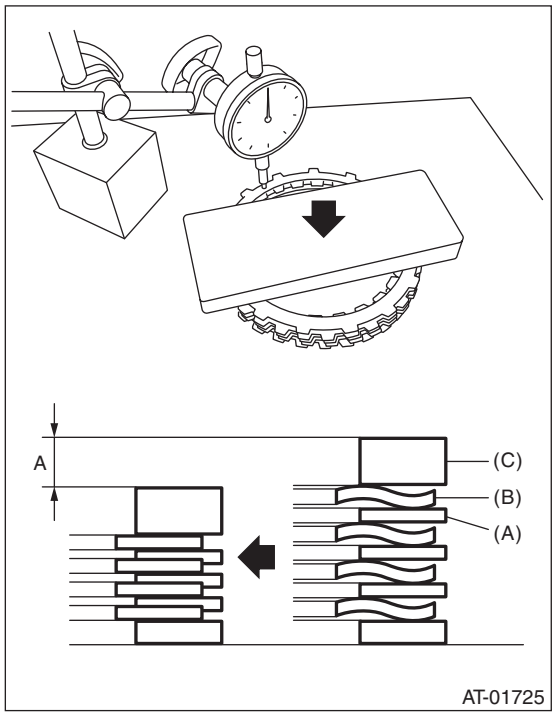
NOTE:
• Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
• Use a flat board weighing less than 250 N (25.5 kgf, 56.2 lb).
11) Put the flat board on retaining plate.



12) Using the following formula, read the push/pull gauge, and calculate “N”.
N = 250 N (25.5 kgf, 56.2 lb) – Z
N: Value indicated on push/pull gauge
250 N (25.5 kgf, 56.2 lb) : Load applied to clutch plate
Z: Flat board weight

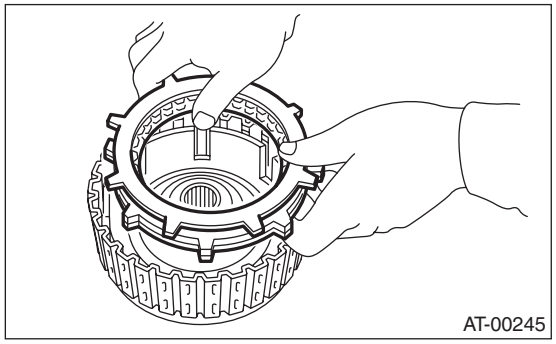
13) Press the center of retaining plate by applying a force of N using push/pull gauge, and then measure and record the height A. Measure at three or more locations spaced by equal distances and take the average value.

NOTE:
If measuring in three locations, measure every 120°. If measuring in four locations, measure every 90°.



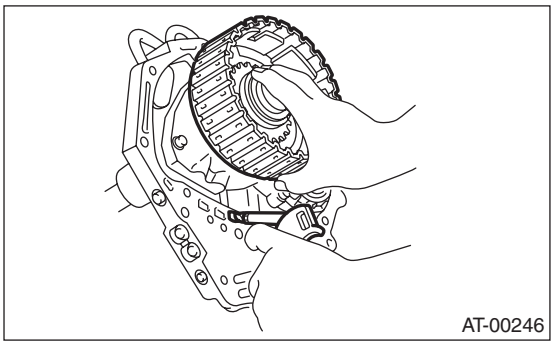
(A) Driven plate
(B) Drive plate
(C) Retaining plate

14) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.

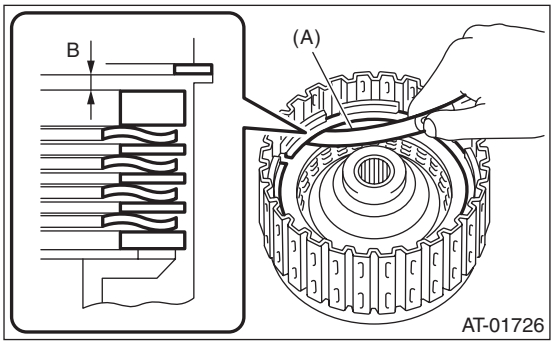


15) Install the snap ring to high clutch drum.

16) Apply compressed air intermittently to check for operation.



17) Measure and record the clearance B between the retaining plate and snap ring. (High clutch)
At this time, do not press down the retaining plate.



(A) Thickness gauge

18) Piston stroke calculation
Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new part and adjust it within the initial specification.
T = A + B
T: Piston stroke
A: Amount of drive plate compression
B: Clearance between retaining plate and snap ring

Initial standard:
2.0 — 2.3 mm (0.079 — 0.091 in)

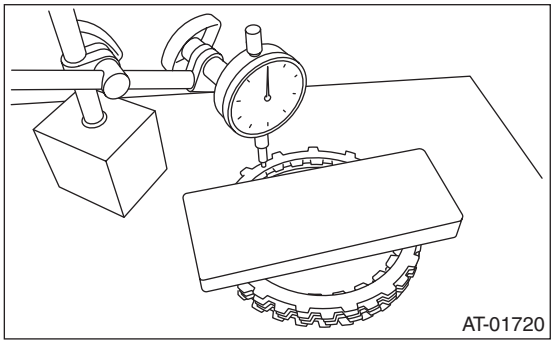
Limit thickness:
2.6 mm (0.102 in)

High clutch retaining plate	
Part number	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

19) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
20) Set the micro gauge to retaining plate, and read its scale.

NOTE:
The value, which is read in the gauge at this time, is zero point.
21) Scale and record the weight “Z” of a flat board which will be put on retaining plate.

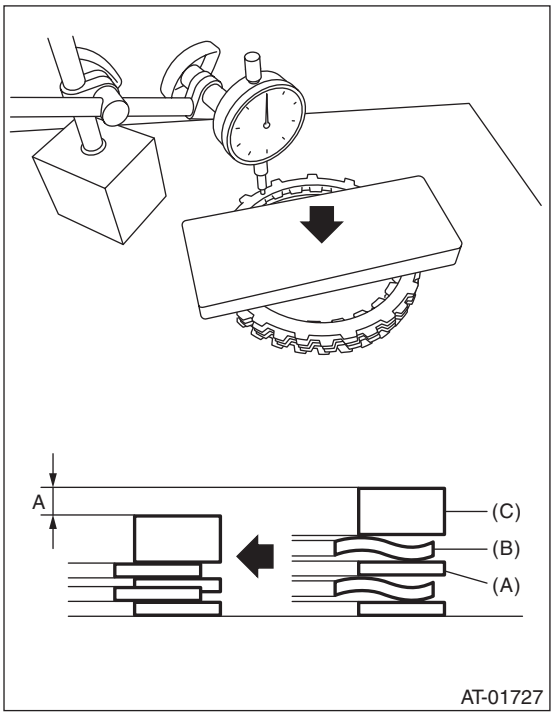
NOTE:
• Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
• Use a flat board of its weight less than 150 N (15.3 kgf, 33.7 lb).
22) Put the flat board on retaining plate.



23) Using the following formula, read the push/pull gauge, and calculate “N”.
N =150 N (15.3 kgf, 33.7 lb) – Z
N: Value indicated on push/pull gauge
150 N (15.3 kgf, 33.7 lb) : Load applied to clutch plate
Z: Flat board weight

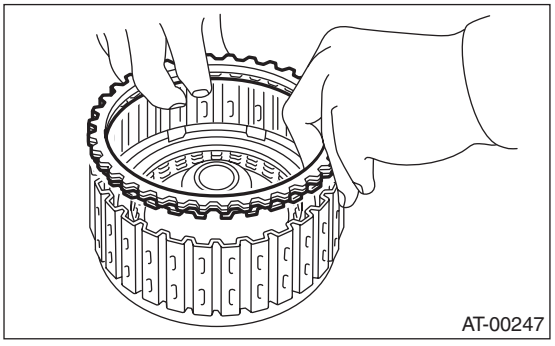
24) Press the center of retaining plate by applying a force of N using push/pull gauge, and then measure and record the height A. Measure at three or more locations spaced by equal distances and take the average value.

NOTE:
If measuring in three locations, measure every 120°. If measuring in four locations, measure every 90°.

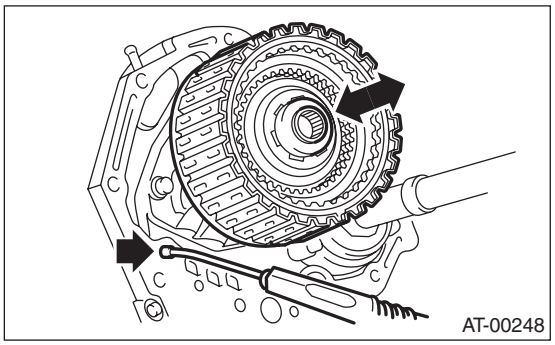


(A) Driven plate
(B) Drive plate
(C) Retaining plate

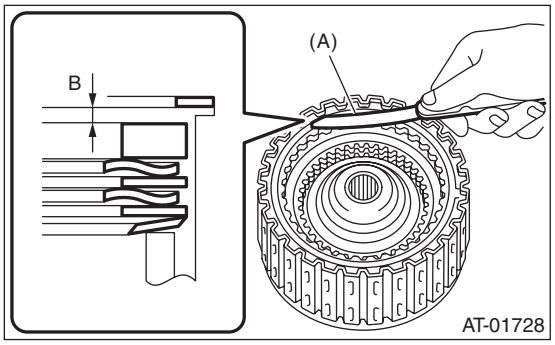
25) Install the driven plate, drive plate, retaining plate and snap ring.



26) Apply compressed air intermittently to check for operation.



27) Measure and record the clearance B between the retaining plate and snap ring. (Reverse clutch) At this time, do not press down the retaining plate.



(A) Thickness gauge

28) Piston stroke calculation
Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new part and adjust it within the initial specification.
T = A + B
T: Piston stroke
A: Amount of drive plate compression
B: Clearance between retaining plate and snap ring

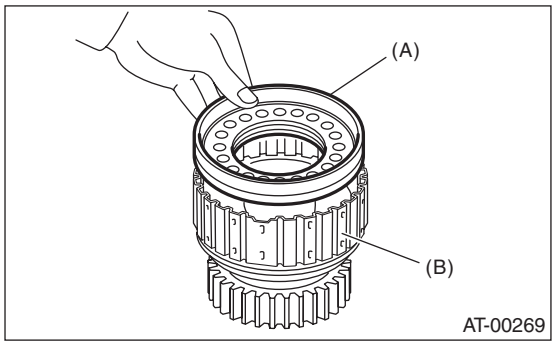
Initial standard:
1.1 — 1.4 mm (0.043 — 0.055 in)

Limit thickness:
1.6 mm (0.063 in)

Reverse clutch retaining plate	
Part number	Thickness mm (in)
31567AA910	4.0 (0.157)
31567AA920	4.2 (0.165)
31567AA930	4.4 (0.173)
31567AA940	4.6 (0.181)
31567AA950	4.8 (0.189)
31567AA960	5.0 (0.197)
31567AA970	5.2 (0.205)
31567AA980	5.4 (0.213)

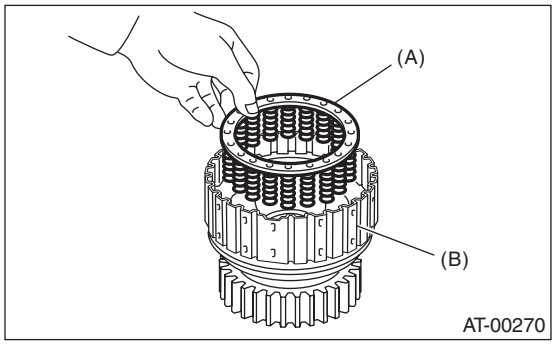
2. PLANETARY GEAR AND LOW CLUTCH

1) Apply ATF to the D-ring, and then install it to the low clutch piston.
2) Install the low clutch piston to low clutch drum.



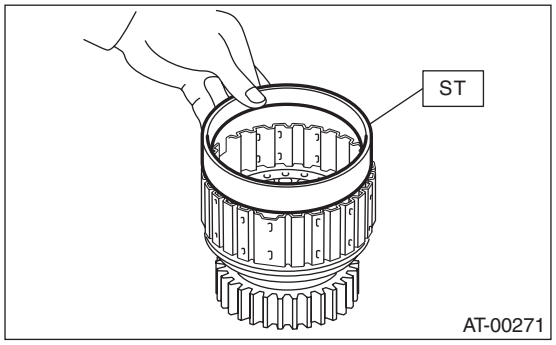
(A) Low clutch piston
(B) Low clutch drum

3) Install the spring retainer to low clutch piston.



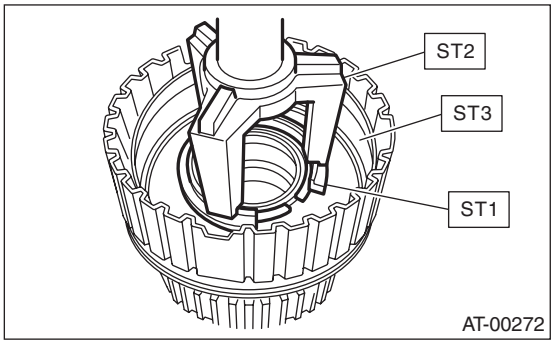
(A) Spring retainer
(B) Low clutch drum

4) Attach the ST to the low clutch drum.
ST 498437100 LOW CLUTCH PISTON GUIDE

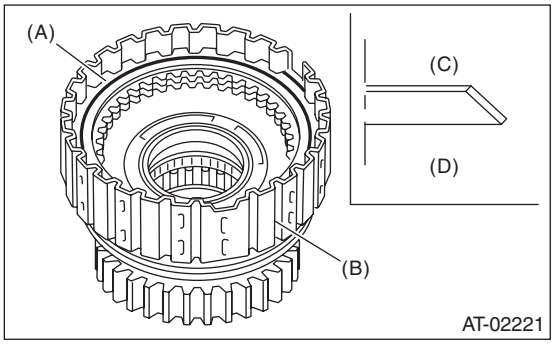


5) Using ST1 and ST2, set the cover on the piston and press against it, and attach the snap ring. At this time, be careful not to bend the cover seal.

ST1	498627100	SEAT
ST2	398673600	COMPRESSOR
ST3	498437100	LOW CLUTCH PISTON GUIDE

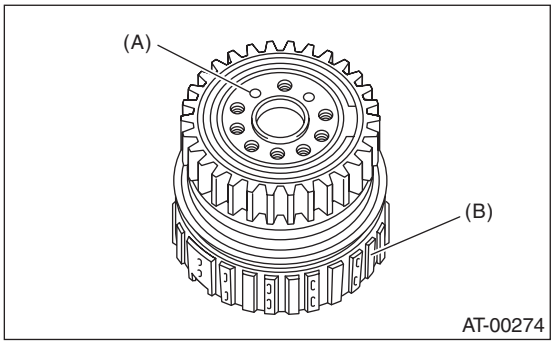


6) Install the dish plate, driven plate, drive plate and retaining plate, and then secure them with a snap ring.



(A) Snap ring
(B) Low clutch drum
(C) Dish plate
(D) Low clutch piston side

7) Check the low clutch for operation.
(1) Remove the one-way clutch. <Ref. to 4AT-99, REMOVAL, AT Main Case.>
(2) Set the one-way clutch inner race, and apply compressed air for checking.

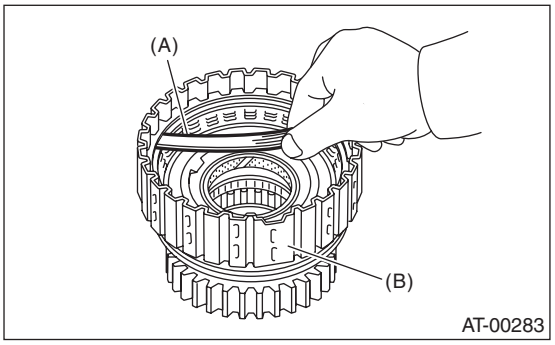


(A) Apply compressed air.
(B) Low clutch drum

8) Check the low clutch clearance.
(1) Place same thickness shims on both sides to prevent plate from tilting.
(2) Check the clearance between retaining plate and low clutch operation.

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:
1.6 mm (0.063 in)

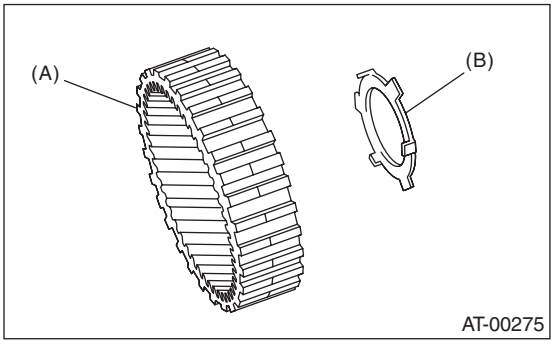


(A) Thickness gauge
(B) Low clutch drum

If the clearance exceeds the service limits, replace the drive plate and select and adjust the retaining plate to within default standard values.

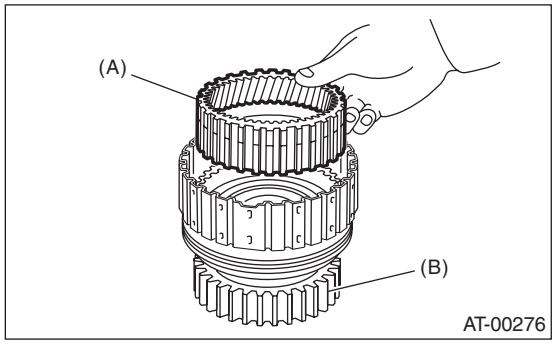
Retaining plate	
Part number	Thickness mm (in)
31567AB050	3.8 (0.150)
31567AB060	4.0 (0.157)
31567AB070	4.2 (0.165)
31567AB080	4.4 (0.173)
31567AB090	4.6 (0.181)

9) Install the washer to the rear internal gear.



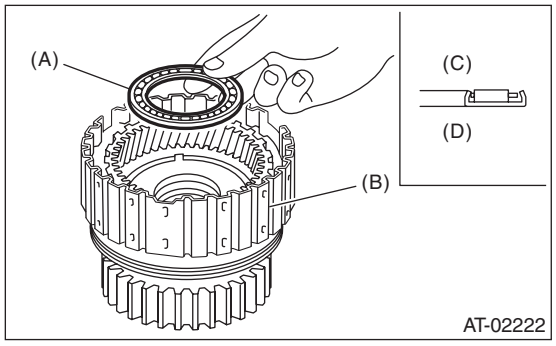
(A) Rear internal gear
(B) Washer

10) Install the rear internal gear.



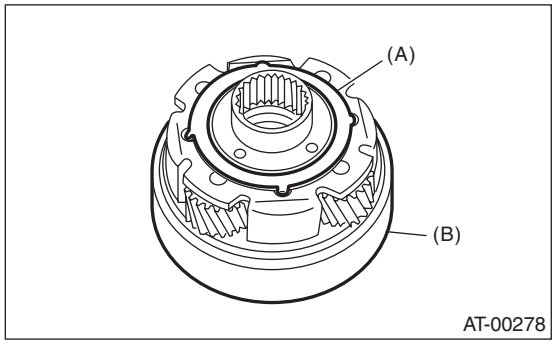
(A) Rear internal gear
(B) Low clutch drum

11) Install the thrust needle bearing in the correct direction.



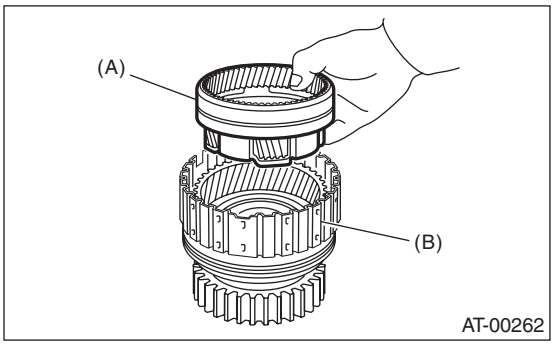
(A) Thrust needle bearing
(B) Low clutch drum
(C) Rear planetary carrier side
(D) Low clutch piston side

12) Install the washer by aligning the protrusion of the washer with the hole of the rear planetary carrier.



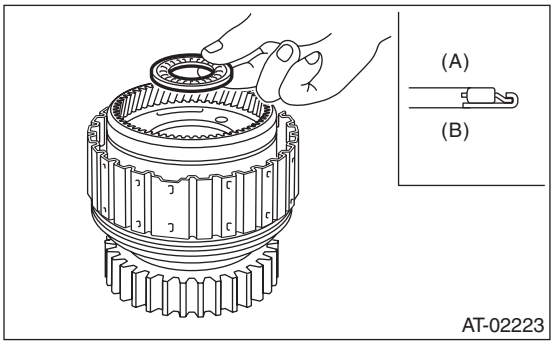
(A) Washer
(B) Rear planetary carrier

13) Install the rear planetary carrier to the low clutch drum.



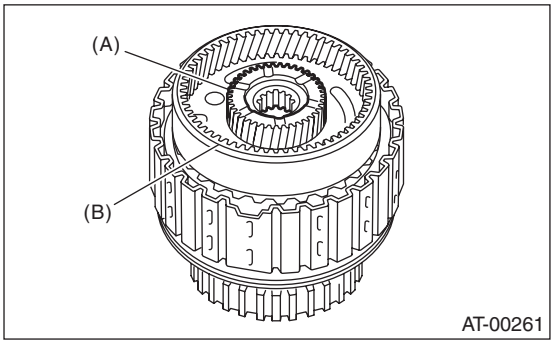
(A) Rear planetary carrier
(B) Low clutch drum

14) Install the thrust needle bearing in the correct direction.



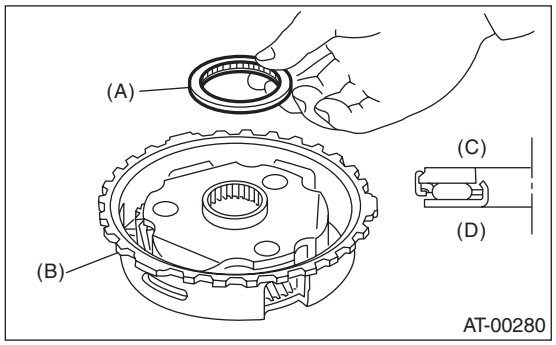
(A) Rear sun gear side
(B) Rear planetary carrier side

15) Install the rear sun gear in the proper direction.



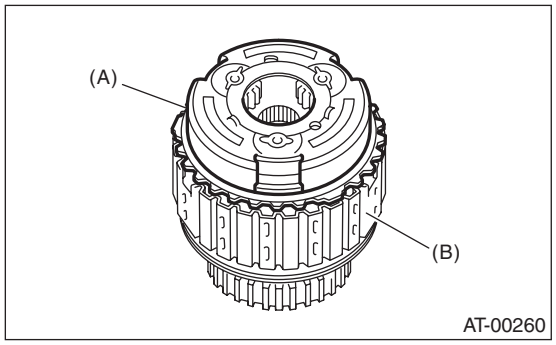
(A) Rear sun gear
(B) Rear planetary carrier

16) Install the thrust needle bearing in the proper direction.



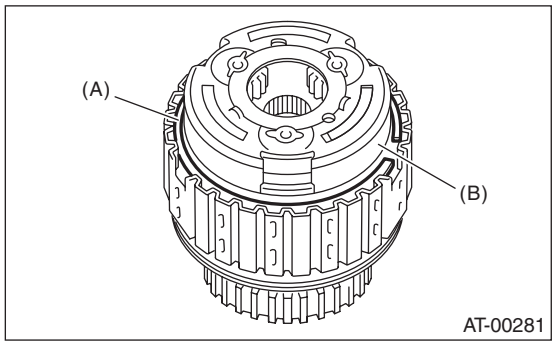
(A) Thrust needle bearing
(B) Front planetary carrier
(C) Rear sun, gear side
(D) Front planetary carrier side

17) Install the front planetary carrier to the low clutch drum.



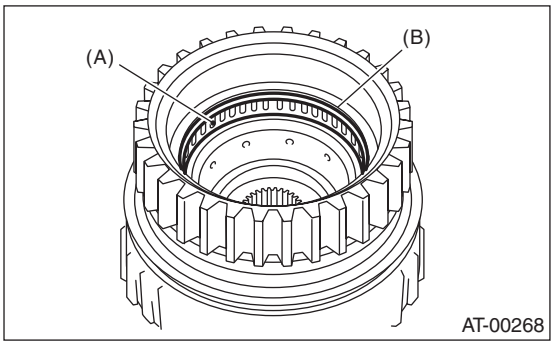
(A) Front planetary carrier
(B) Low clutch drum

18) Install the snap ring to the low clutch drum.



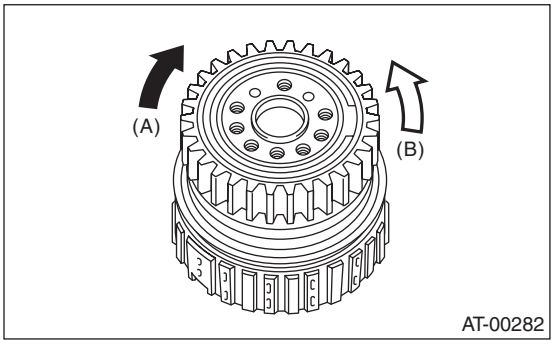
(A) Snap ring
(B) Front planetary carrier

19) Install the needle bearing, and then secure with the snap ring.



(A) Needle bearing
(B) Snap ring

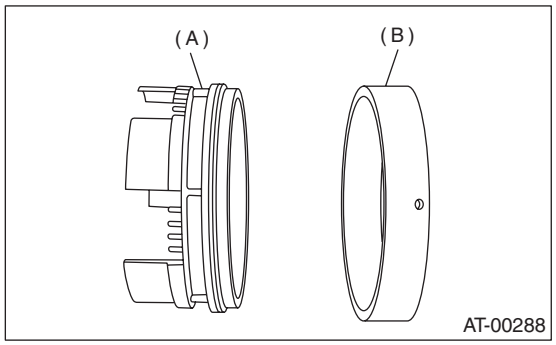
20) Install the one-way clutch and one-way clutch inner race, then secure with the snap ring.
21) Set the inner race. Make sure that the clutch locks in the clockwise direction and rotates freely in the counterclockwise direction.



(A) Lock
(B) Free

3. 2-4 BRAKE

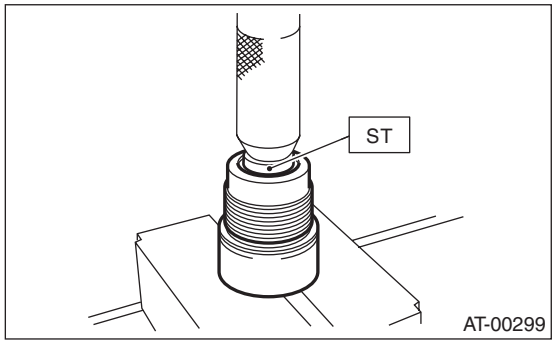
1) Apply ATF to the D-ring, and then install it to the 2-4 brake piston.
2) Install 2-4 brake piston to 2-4 brake piston retainer.



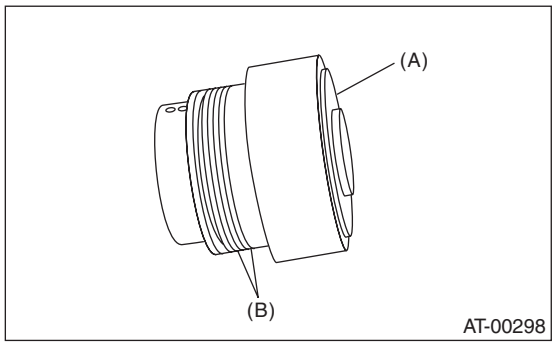
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

1) Install the needle bearing to inner race using ST and a press.
ST 398497701 SEAT



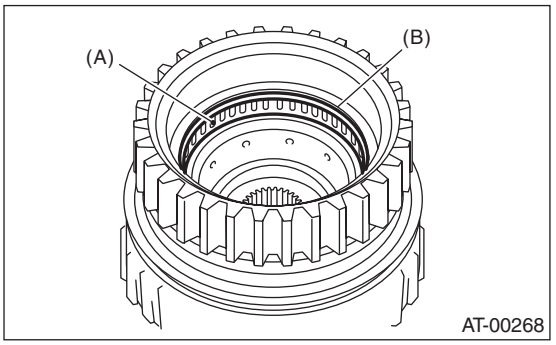
2) Apply vaseline to the groove of the inner race and seal ring.
3) Install two seal rings to the one-way clutch inner race.



(A) One-way clutch inner race
(B) Seal ring

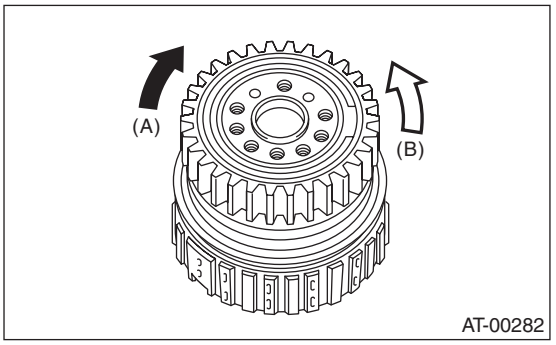
5. ONE-WAY CLUTCH OUTER RACE

1) Install the needle bearing, and then secure with the snap ring.



(A) Needle bearing
(B) Snap ring

2) Install the one-way clutch, and then secure with the snap ring.
3) Set the inner race. Make sure that the clutch locks in the clockwise direction and rotates freely in the counterclockwise direction.



(A) Lock
(B) Free

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Check the following items.
- Drive plate facing for wear or damage
- Driven plate for discoloration (burned color)
- Snap ring wear, return spring setting and breakage, and snap ring retainer deformation
- Lip seal and D-ring damage
- Piston and drum check ball operation
- Adjust the total end play. <Ref. to 4AT-86, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Check the following items.
- Drive plate facing for wear or damage
- Driven plate for discoloration (burned color)
- Snap ring wear, return spring setting and breakage, and spring retainer deformation
- Lip seal and D-ring damage
- Piston check ball operation
- Measure the total end play and adjust it to be within specifications. <Ref. to 4AT-86, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Check the following items.
- Drive plate facing for wear or damage
- Driven plate for discoloration (burned color)
- Snap ring wear and spring retainer deformation
- Lip seal and D-ring damage
- Measure the total end play and adjust it to be within specifications. <Ref. to 4AT-86, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- Check that the snap ring is not damaged and the seal ring is not deformed.
- Measure the total end play and adjust it to be within specifications. <Ref. to 4AT-86, ADJUSTMENT, Oil Pump Housing.>

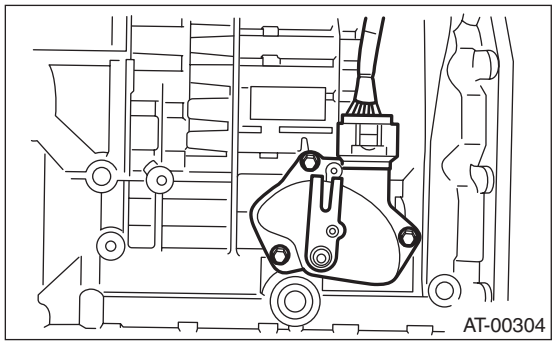
5. LOW & REVERSE BRAKE

Check the following items.
- Drive plate facing for wear or damage
- Driven plate for discoloration (burned color)
- Snap ring wear and spring retainer deformation

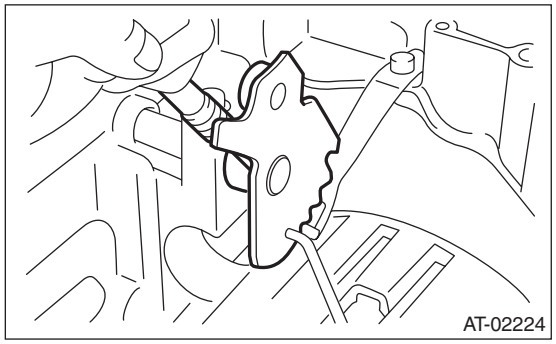
36.Transmission Control Device

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 4AT-66, REMOVAL, Torque Converter Assembly.>
3) Remove the input shaft.
4) Lift-up the lever on the rear side of transmission harness connector, and then remove it from the stay.
5) Disconnect the air breather hose. <Ref. to 4AT-64, REMOVAL, Air Breather Hose.>
6) Remove the inhibitor switch connector from the stay.
7) Wrap vinyl tape around the nipple attached to the air breather hose.
8) Remove the pitching stopper bracket.
9) Remove the inhibitor switch.

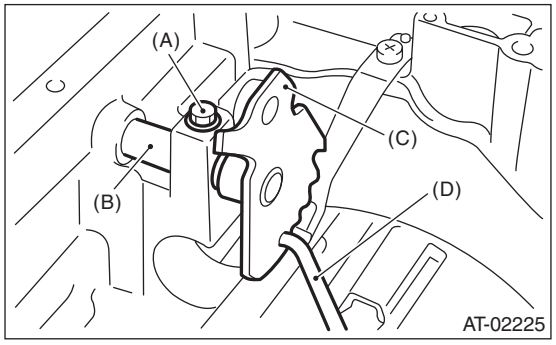


10) Remove the control valve body assembly. <Ref. to 4AT-55, REMOVAL, Control Valve Body.>
11) Pull out the straight pin of manual plate.



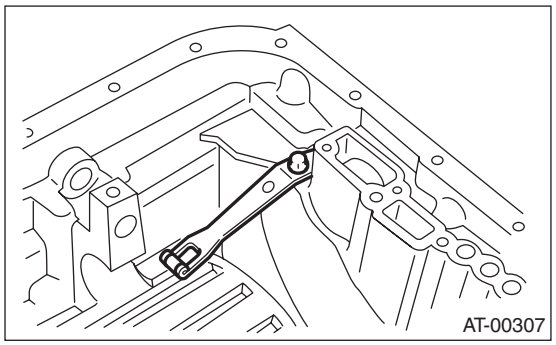
12) Remove the bolts securing select lever, and then remove the select lever, manual plate and parking rod.

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

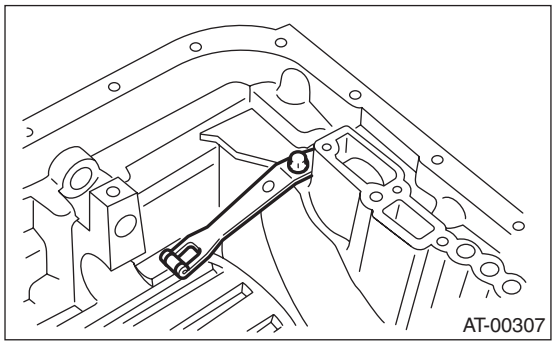
13) Remove the detention spring.



B: INSTALLATION

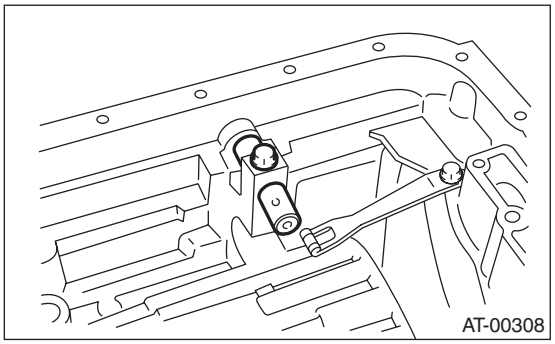
1) Install the detention spring to the transmission case.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

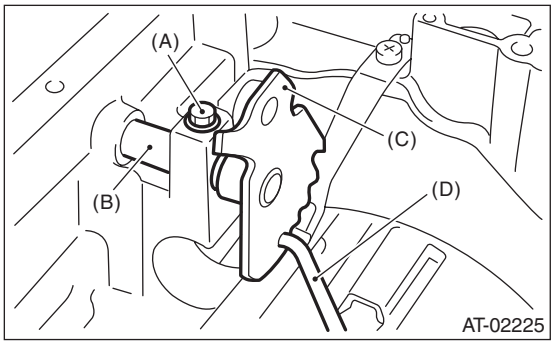


2) Insert the select lever, and then tighten the bolt.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

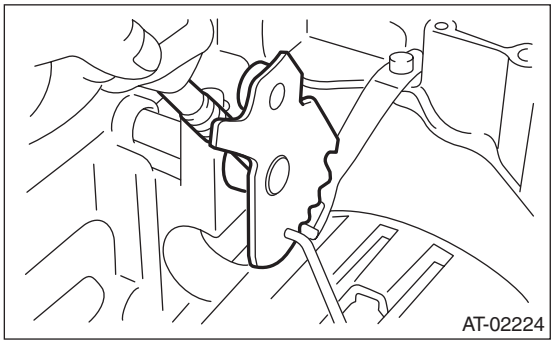


3) Insert the manual plate and parking rod.



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

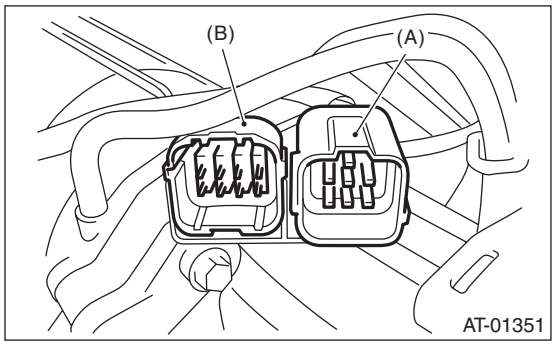
4) Insert a new straight pin to manual plate.



5) Install the oil pan and the control valve assembly. <Ref. to 4AT-56, INSTALLATION, Control Valve Body.>
6) Turn over the transmission case to its original position.
7) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

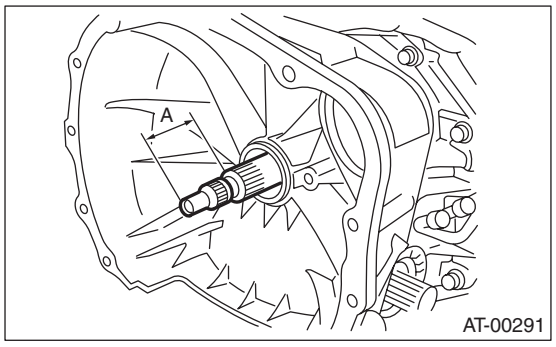
8) Install and adjust the inhibitor switch. <Ref. to 4AT-45, Inhibitor Switch.>
9) Insert the inhibitor switch and transmission connector to the stay.



(A) Transmission connector
(B) Inhibitor switch connector

10) Install the air breather hose. <Ref. to 4AT-64, INSTALLATION, Air Breather Hose.>
11) Insert the input shaft while rotating it lightly by hand, and then check the amount of protrusion.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter assembly. <Ref. to 4AT-66, INSTALLATION, Torque Converter Assembly.>
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-36, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

4AT(diag)

		Page
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1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Model	Turbo	Non-turbo
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	2.0	1.9
Nominal diameter	250 mm (9.84 in)	
Stall speed (at sea level)	3,100 — 3,500 rpm	2,400 — 2,800 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	4 sets
One-way clutch (sprague type)	3 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	Turbo	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	5
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	4
Number of low coast brake drive plates	3	

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
Manual mode (+)	Manual gear change 1st → 2nd → 3rd → 4th → 5th
Manual mode (–)	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	Specified fluid: SUBARU ATF Recommended fluid: IDEMITSU ATF HP Castrol Transmax J NOTE: Use of the recommended fluid is permitted only in regions where the specified fluid is not available.
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

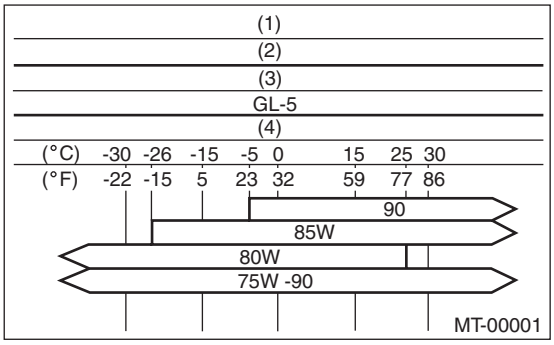
9. TRANSFER

Model	2.5 L	3.0 L
Transfer type	Variable torque distribution (VTD)	
Number of transfer clutch drives and driven plates	3	
Reduction gear ratio	1.000 (41/41)	

10.FINAL REDUCTION GEAR

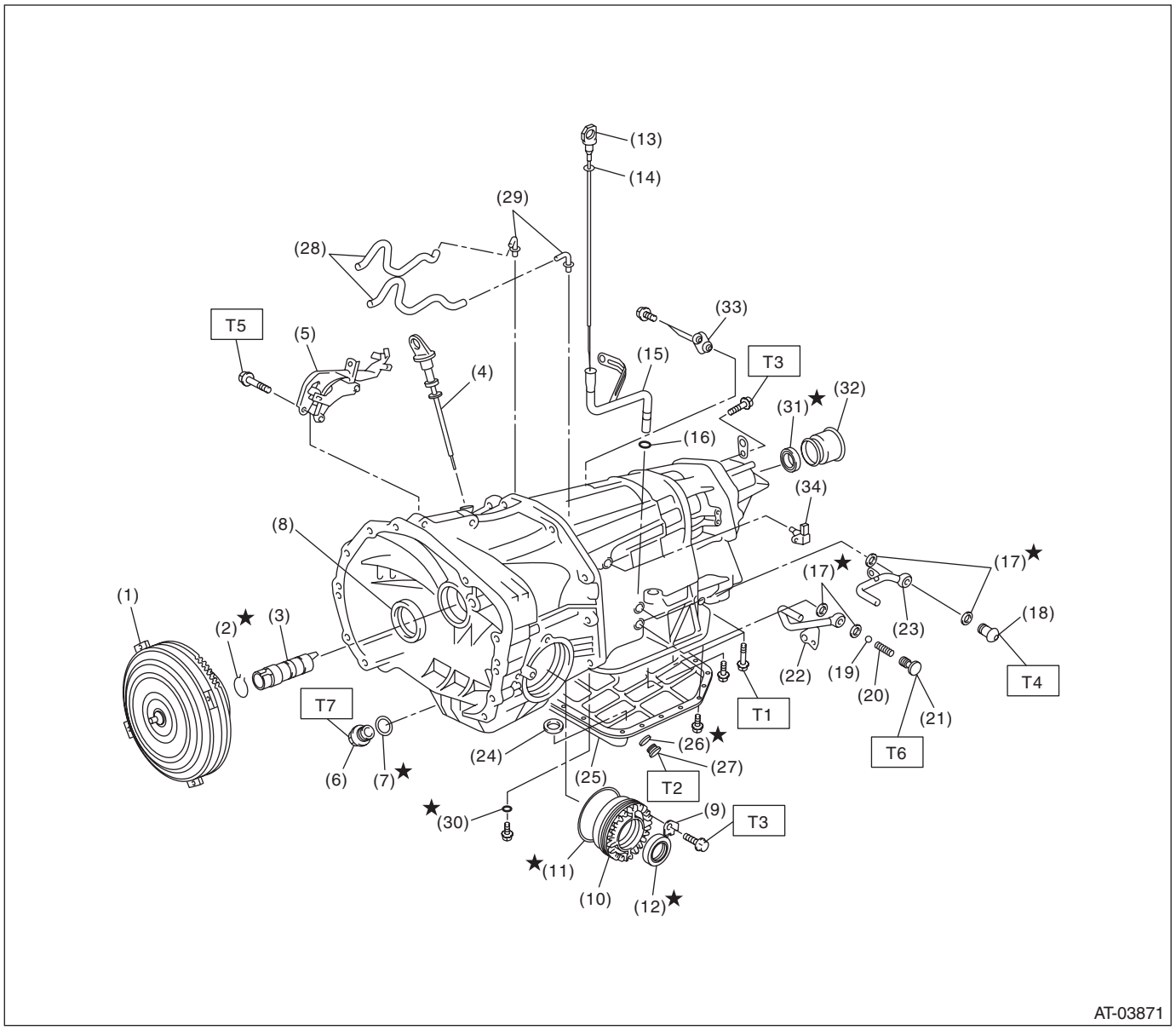
Model	OBK 2.5 XT OBK 3.0 R	2.5 GT LTD
Front final reduction gear ratio	3.272	3.083

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 gear oil capacity ℓ (US qt, Imp qt)	1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3)

B: COMPONENT

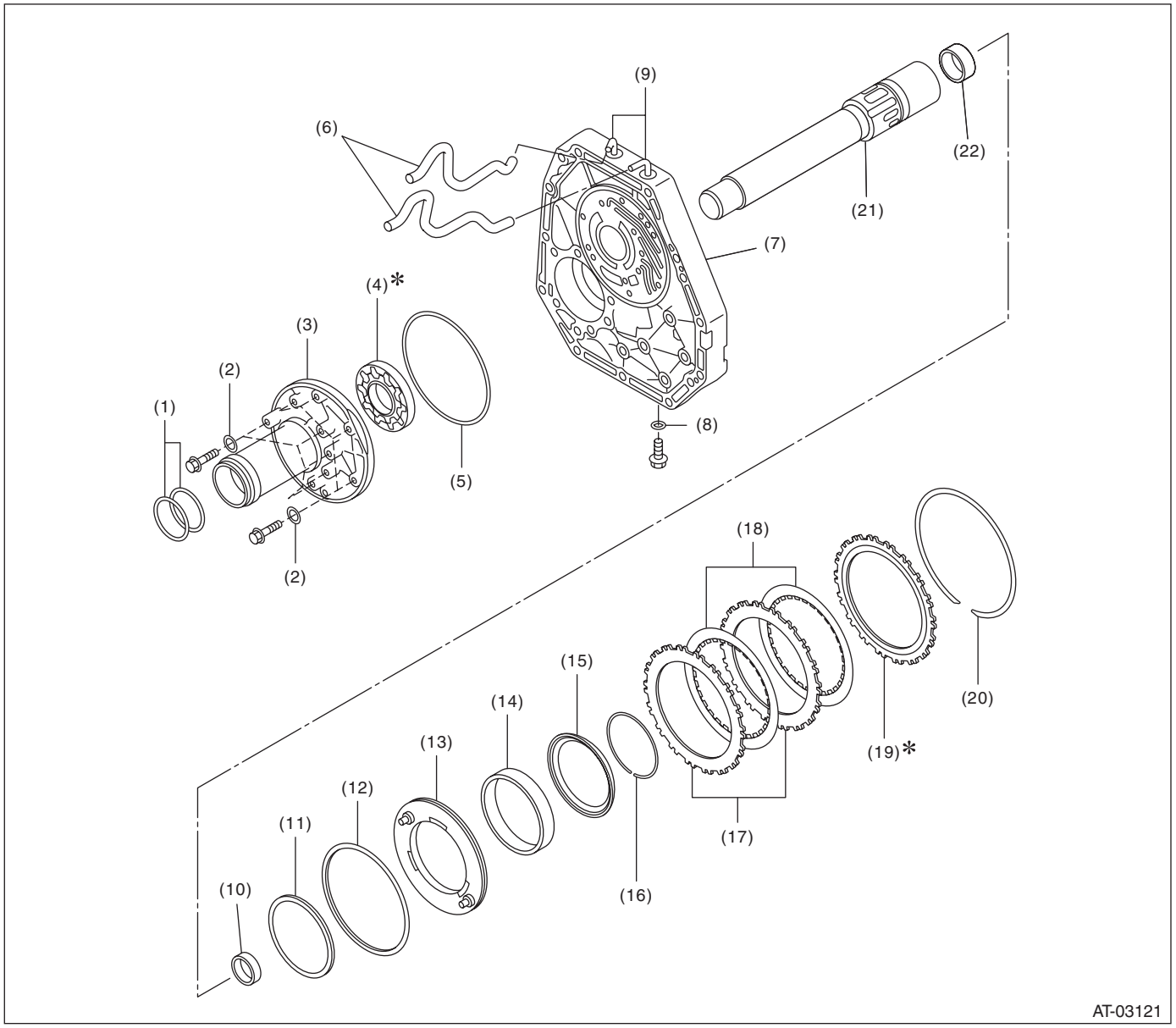
1. TORQUE CONVERTER CLUTCH & TRANSMISSION ASSEMBLY



(1) Torque converter ASSY
(2) Circlip
(3) Oil pump shaft
(4) Differential oil level gauge
(5) Pitching stopper bracket
(6) Differential oil 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) Magnet
(25) Oil pan
(26) Gasket
(27) ATF drain hose
(28) Breather hose
(29) Nipple
(30) O-ring
(31) Oil seal
(32) Dust cover
(33) Floating bracket
(34) Turbine speed sensor 1

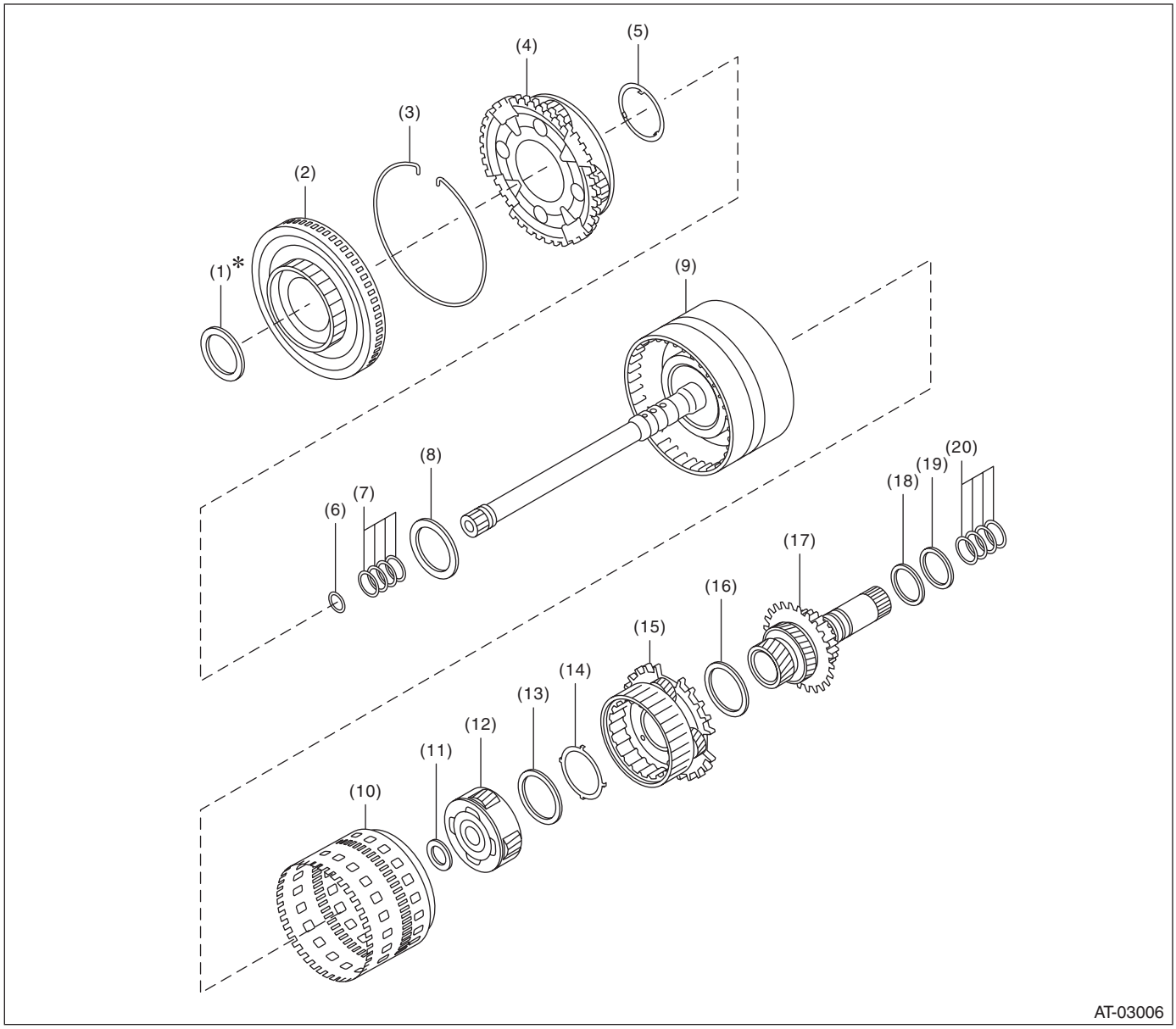
Tightening torque:N·m (kgf-m, ft-lb)	
T1:	***5 (0.5, 3.7)***
T2:	***20 (2.0, 14.8)***
T3:	***25 (2.5, 18)***
T4:	***40 (4.1, 29.5)***
T5:	***41 (4.2, 30.2)***
T6:	***45 (4.6, 33.2)***
T7:	***70 (7.1, 51.6)***

2. OIL PUMP & FRONT BRAKE



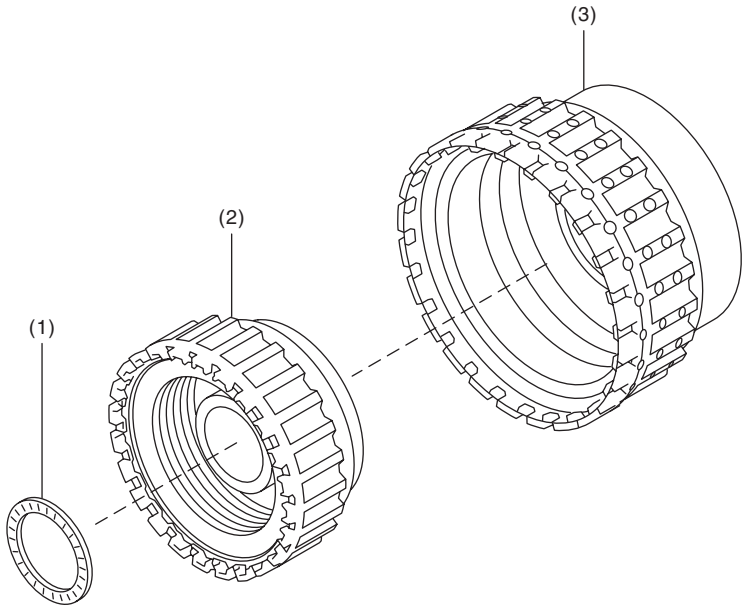
(1) O-ring
(2) Washer
(3) Oil pump housing
(4) Oil pump rotor
(5) O-ring
(6) Air breather hose
(7) Oil pump cover
(8) O-ring
(9) Nipple
(10) Needle bearing
(11) D-ring (Inner)
(12) D-ring (Outer)
(13) Front brake piston
(14) Return spring
(15) Retainer
(16) Snap ring
(17) Driven plate
(18) Drive plate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

3. FRONT PLANETARY CARRIER AND MIDDLE & REAR PLANETARY CARRIER



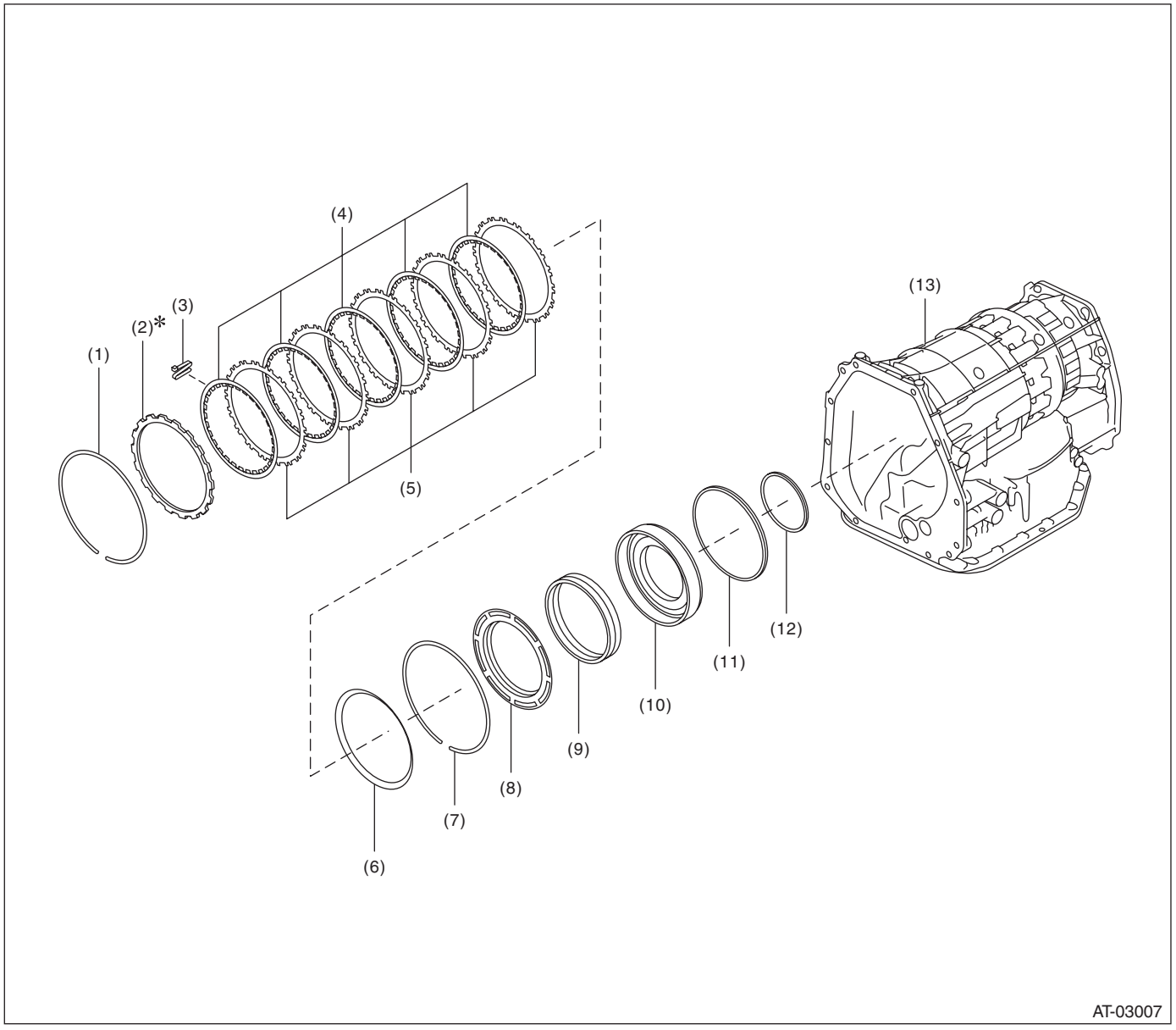
(1) Thrust bearing
(2) Front sun gear ASSY
(3) Snap ring
(4) Front carrier ASSY
(5) Race bearing
(6) O-ring
(7) Seal ring
(8) Thrust bearing
(9) Input clutch ASSY
(10) Rear internal gear ASSY
(11) Thrust bearing
(12) Middle carrier ASSY
(13) Thrust bearing
(14) Race bearing
(15) Rear carrier ASSY
(16)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

4. DIRECT CLUTCH AND HIGH & LOW REVERSE CLUTCH



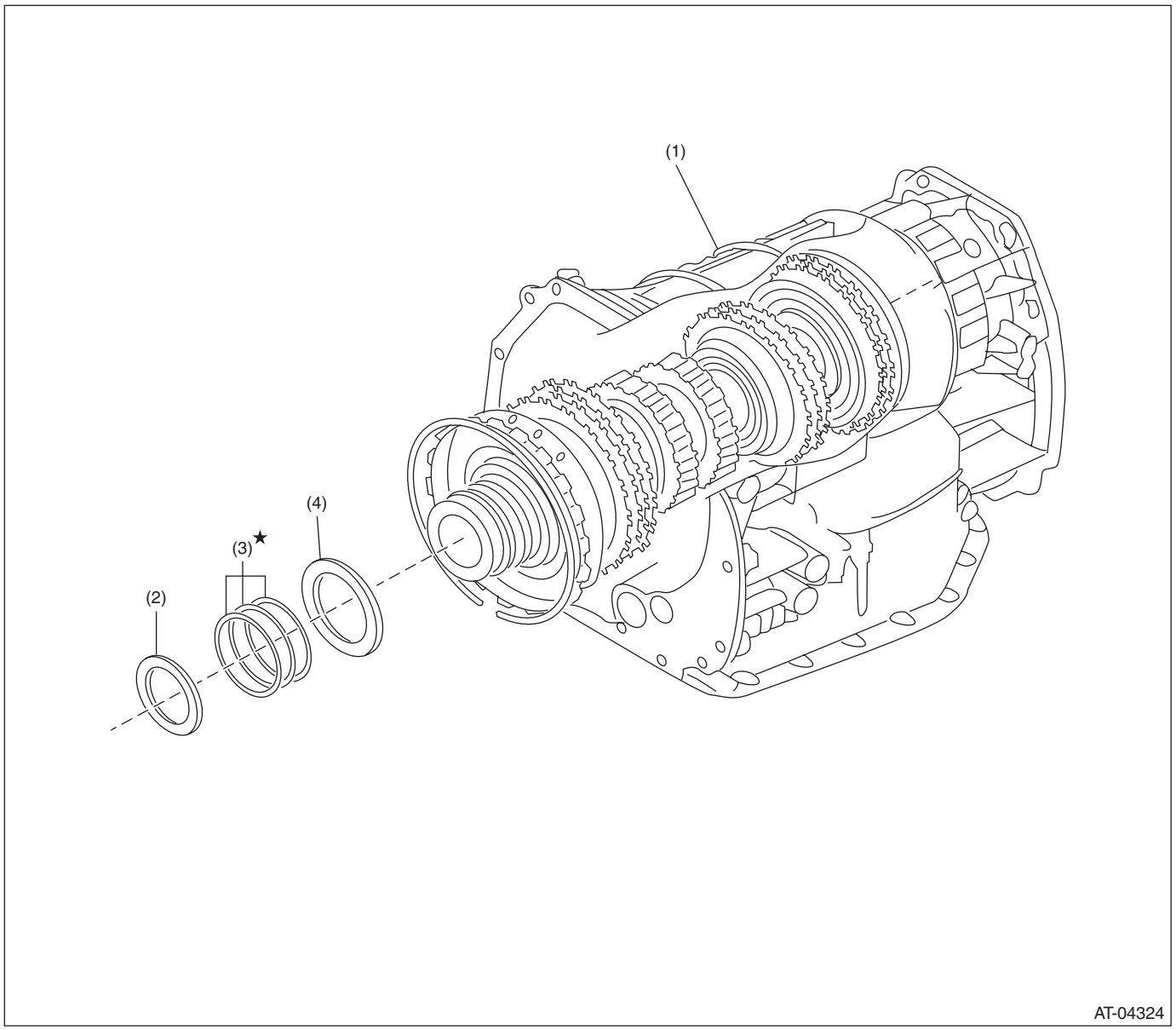
(1) Thrust bearing
(2) High & low reverse clutch ASSY
(3) Direct clutch ASSY

5. REVERSE BRAKE



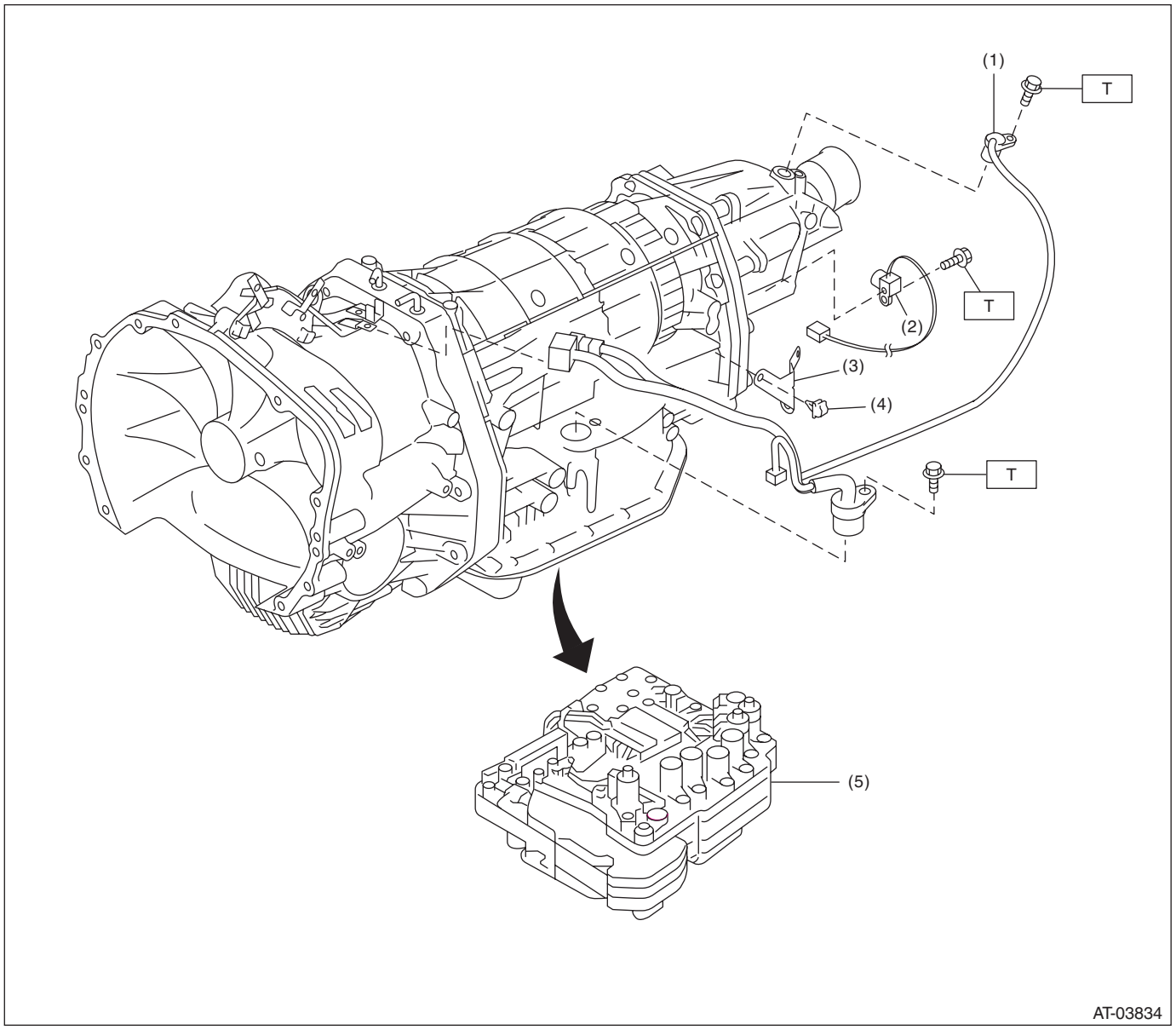
(1) Snap ring
(2) Retainer plate
(3) Leaf spring
(4) Drive plate
(5) Driven plate
(6) Dish plate
(7) Snap ring
(8) Retainer
(9) Leaf spring
(10) Reverse brake piston
(11) D-ring (Outer)
(12) D-ring (Inner)
(13) AT main case

6. SHORT AT ASSEMBLY



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

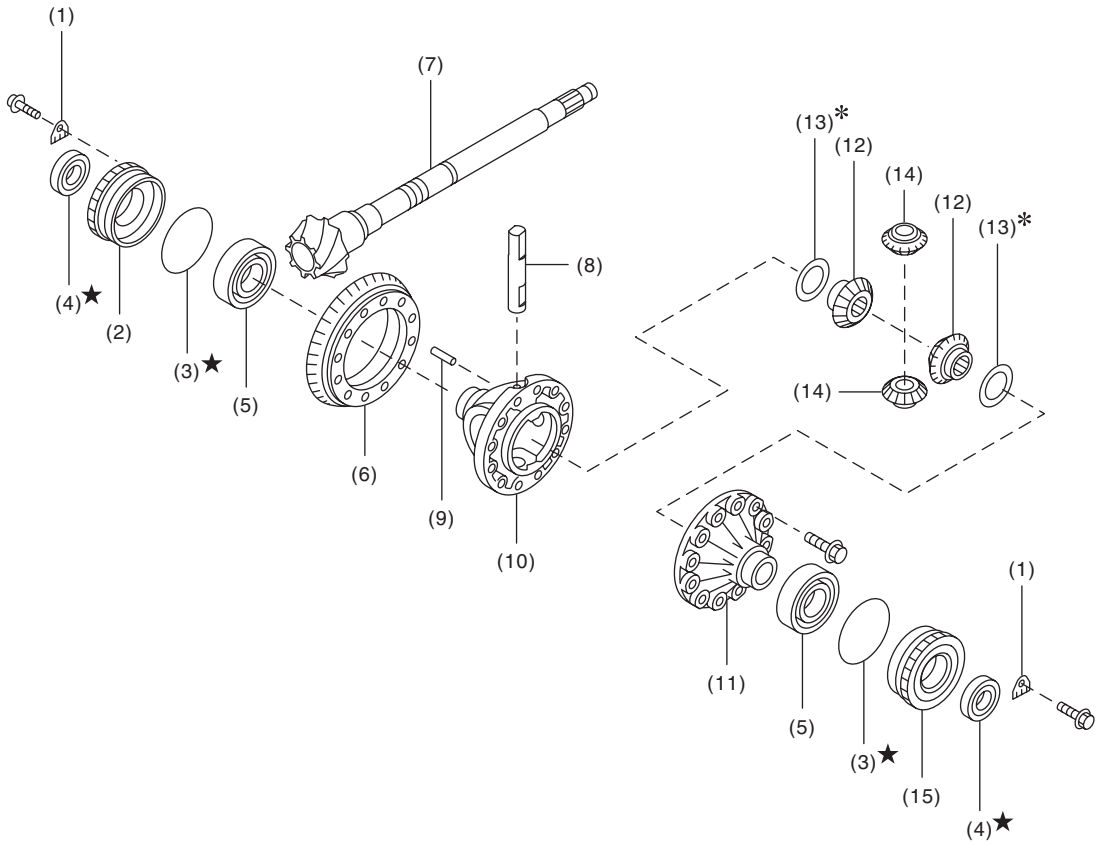
7. CONTROL VALVE & TRANSMISSION HARNESS



(1) Transmission harness ASSY
(2) Front vehicle speed sensor
(3) Harness bracket
(4) Clip
(5) Control valve ASSY

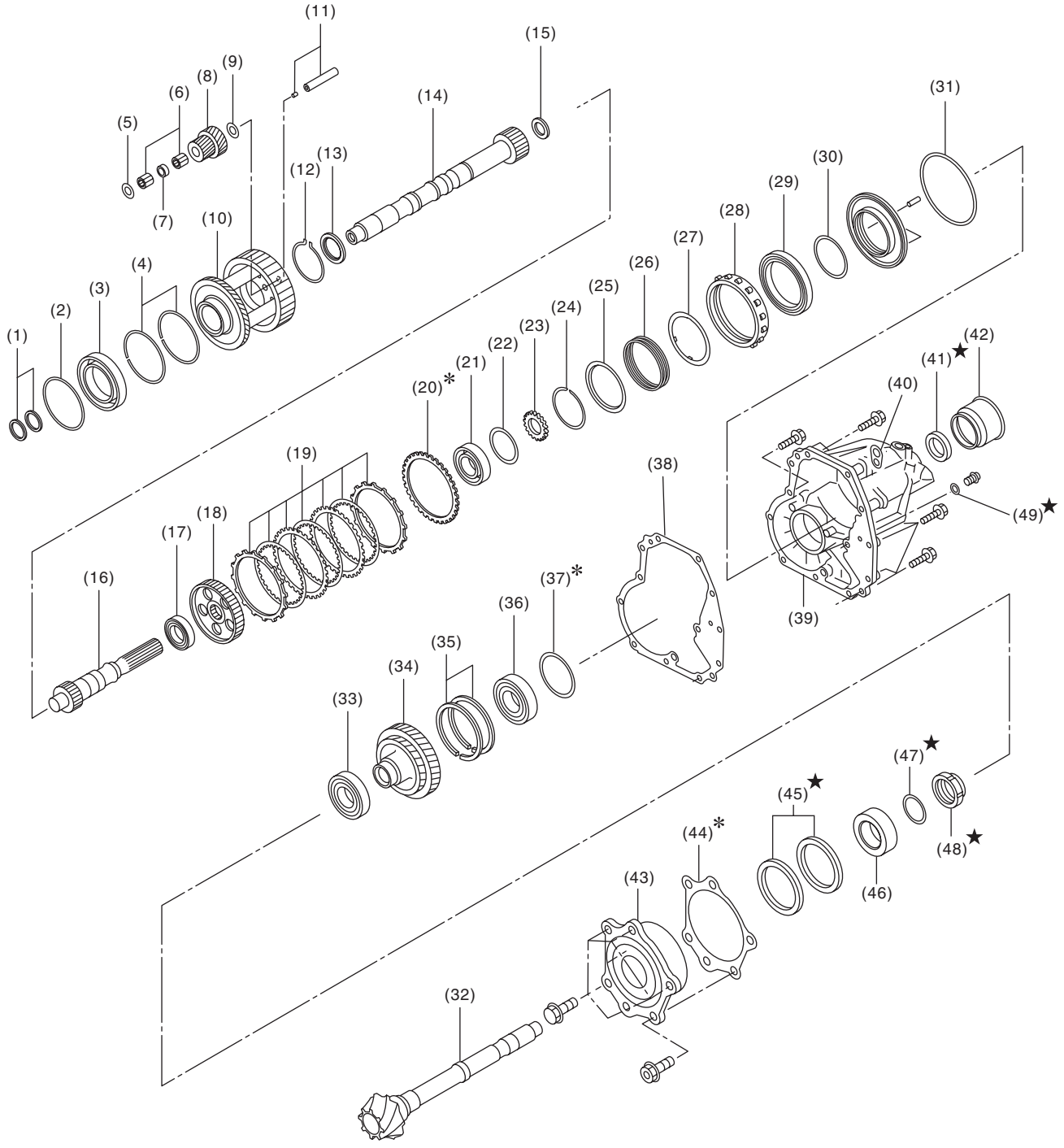
Tightening torque:N·m (kgf-m, ft-lb)
T: 7(0.7, 5.2)

8. DIFFERENTIAL GEAR



(1) 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

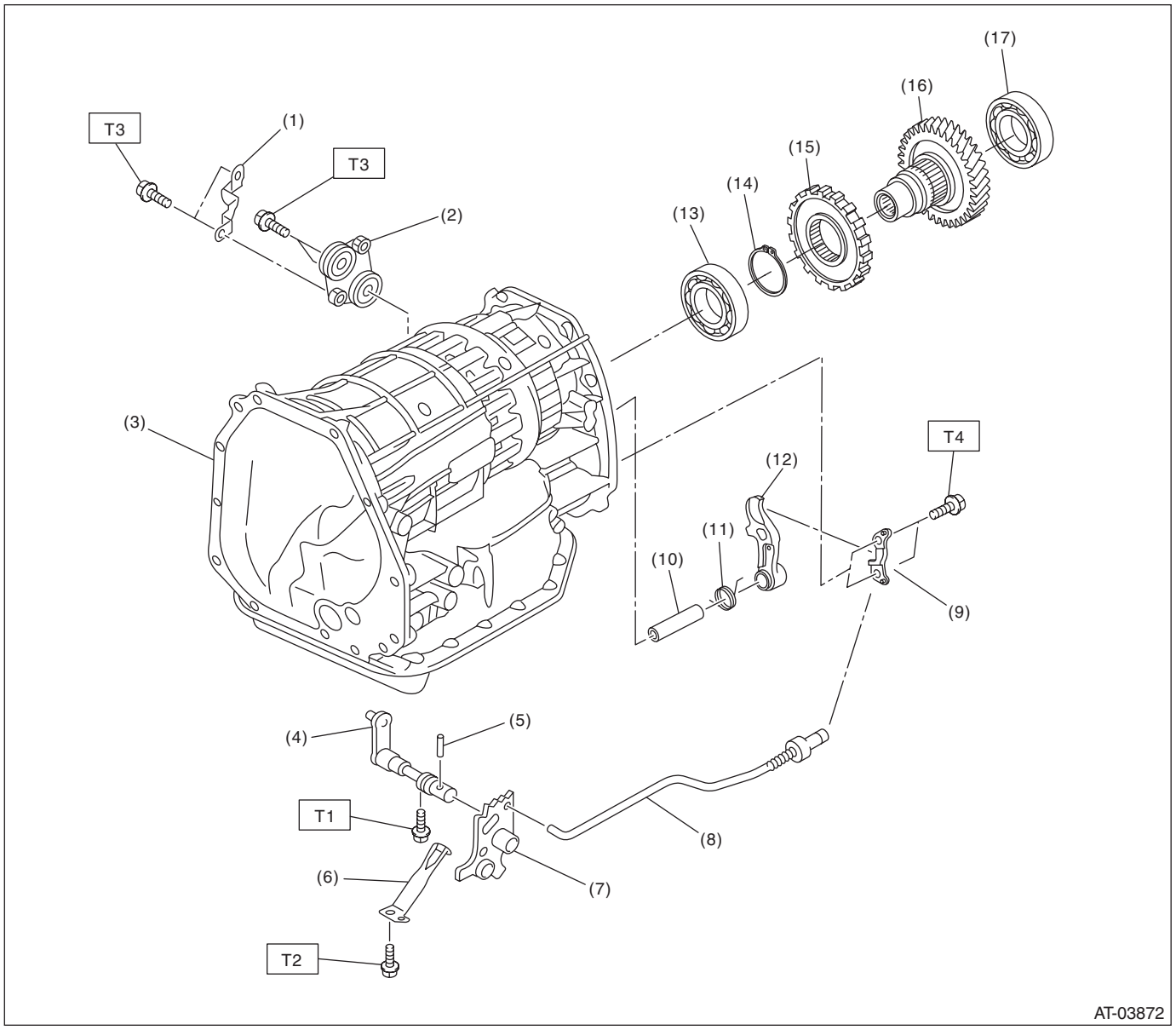
9. TRANSFER CASE, EXTENSION CASE & REDUCTION GEAR



AT-03533

(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) Washer
(10) Planetary carrier ASSY
(11) Planetary pinion shaft ASSY
(12) Snap ring
(13) Thrust bearing
(14) Intermediate shaft
(15) Thrust washer
(16) Rear drive shaft
(17) Ball bearing
(18) Transfer clutch hub
(19) Transfer clutch plate
(20) Driven plate No. 3
(21) Ball bearing
(22) Rear drive shaft shim
(23) Revolution gear
(24) Snap ring
(25) Clutch spring retainer
(26) Return spring
(27) Spring retainer
(28) Pressure plate
(29) Ball bearing
(30) O-ring
(31) D-ring
(32) Drive pinion shaft
(33) Ball bearing
(34) Reduction driven gear
(35) Snap ring
(36) Ball bearing
(37) Shim
(38) Shim
(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

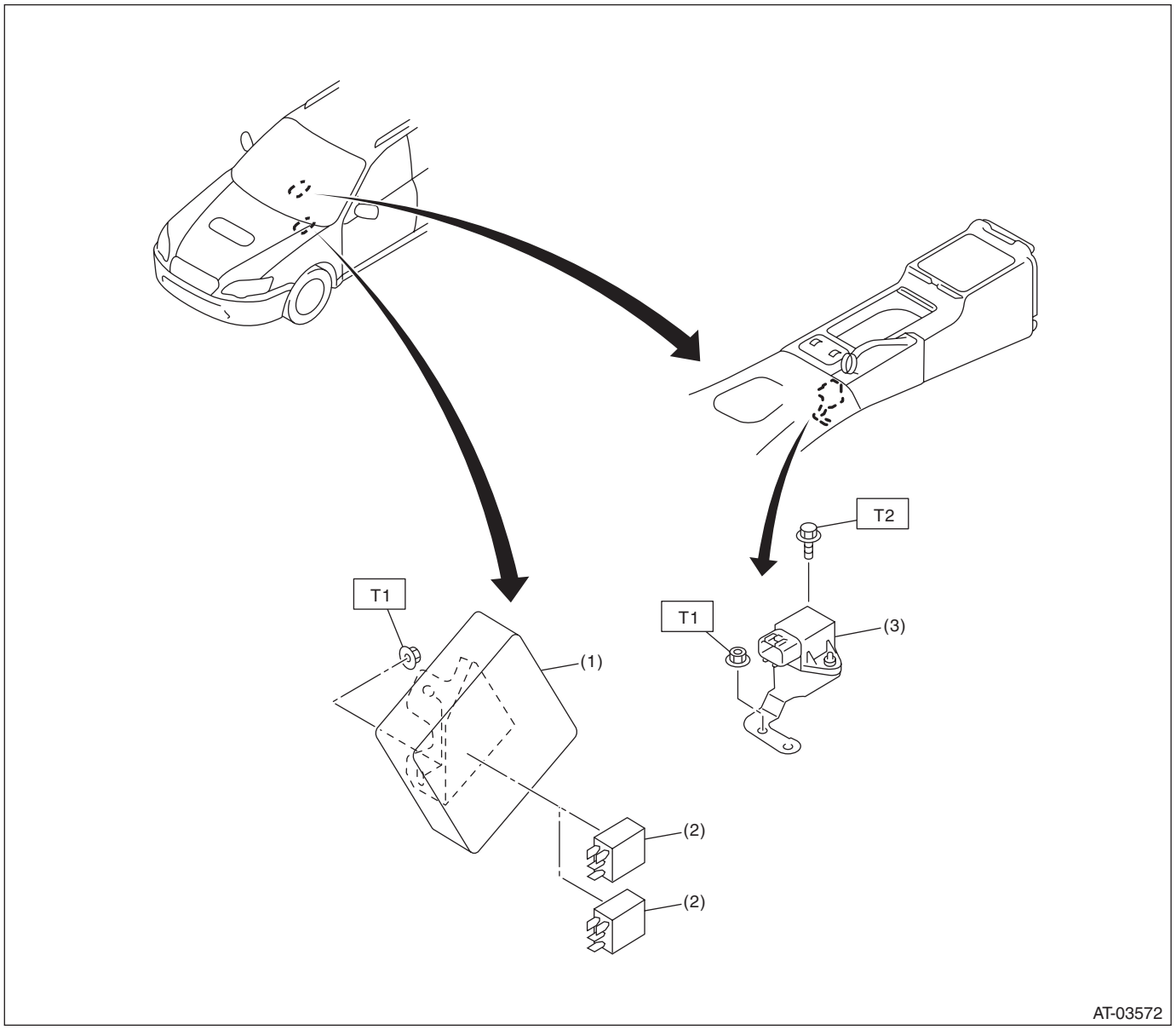
10.TRANSMISSION CONTROL DEVICE & PARKING SUPPORT



(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

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

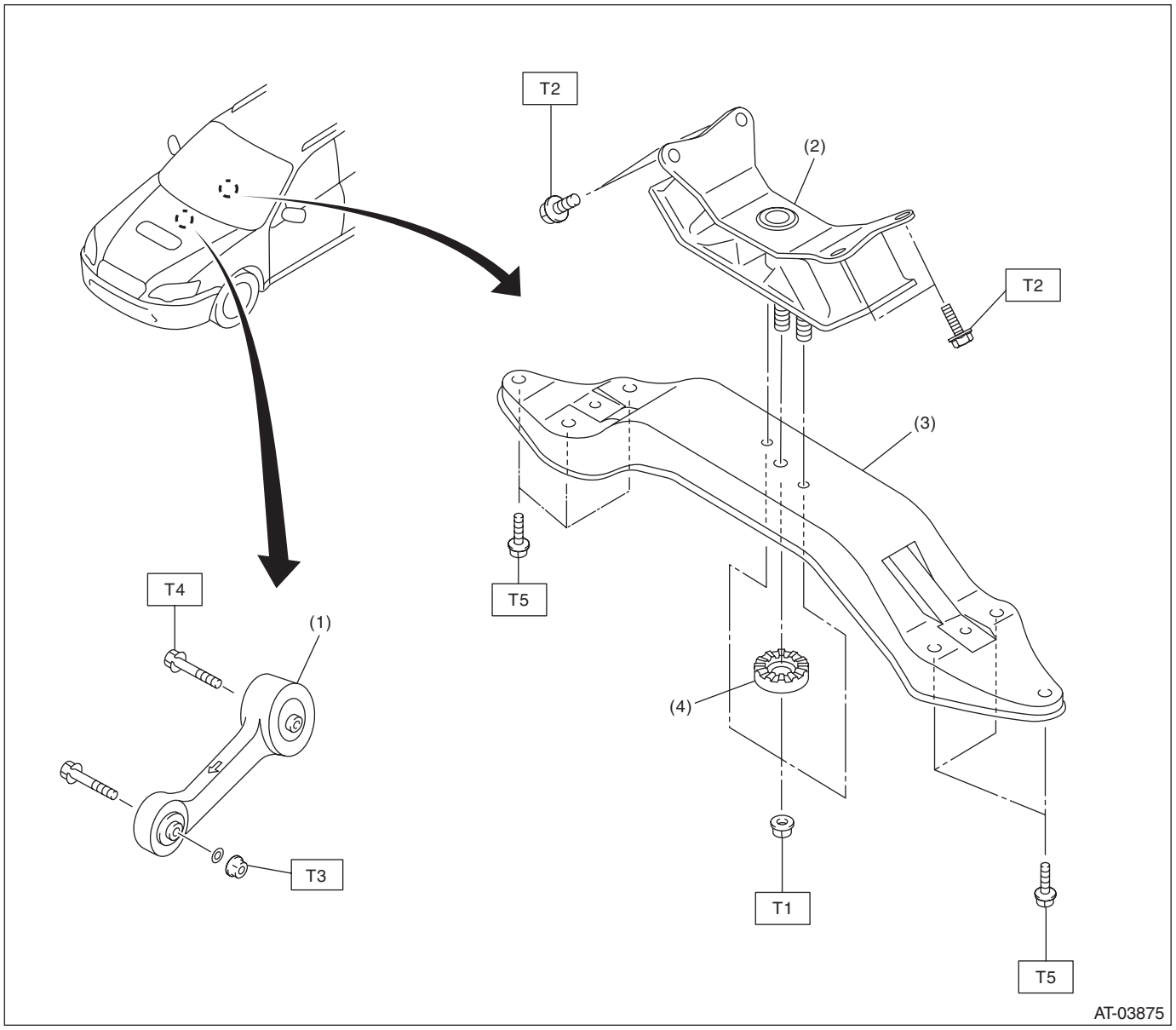
11.TRANSMISSION CONTROL MODULE



(1) Transmission control module (TCM)
(2) Relay
(3) Lateral G sensor

Tightening torque:N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 24.5 (2.5, 18.1)

12.TRANSMISSION MOUNTING



(1) Pitching stopper
(2) Rear cushion rubber
(3) Crossmember
(4) Stopper

Tightening torque:N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 40 (4.1, 29.5)
T3: 50 (5.1, 36.9)
T4: 58 (5.9, 42.8)
T5: 75 (7.6, 55.3)

C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- 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 the 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 seal.

D: PREPARATION TOOL

1. SPECIAL TOOL

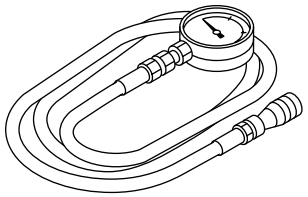
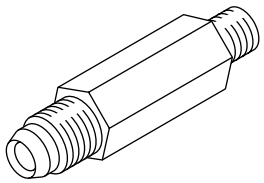
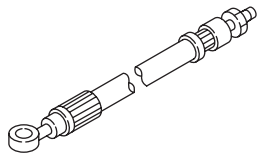
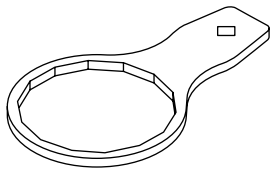
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used together with oil pump cover installed on when measuring line pressure.
 ST-498897700	498897700	OIL PRESSURE ADAPTER	Used for measuring transfer clutch pressure.
 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing the ATF filter.

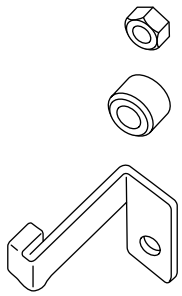
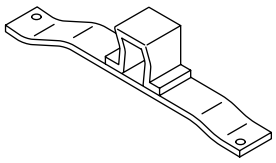
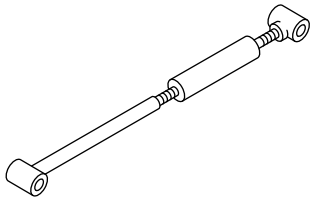
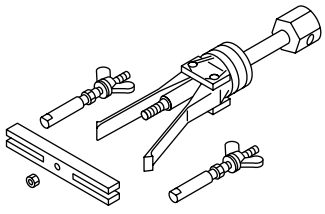
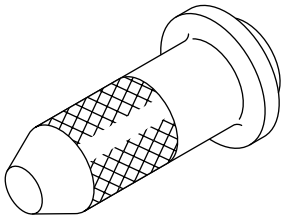
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	• Used for removing and installing automatic transmission assembly to engine. • Used for preventing the torque converter from falling.
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 ST-398527700	398527700	PULLER ASSY	• Used for removing the extension case roller bearing. • Used for removing the extension oil seal. • Used for removing the front differential side retainer bearing outer race. • Used for removing the front differential side retainer oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing the extension oil seal.

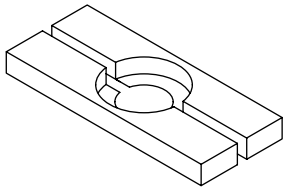
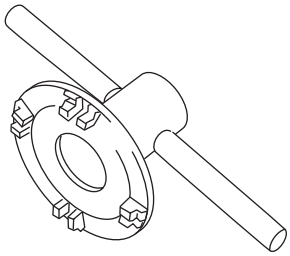
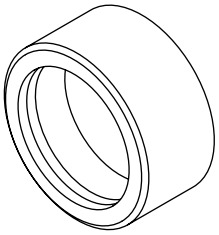
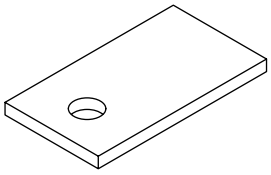
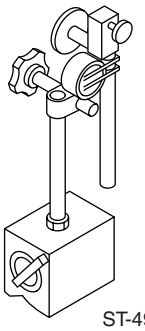
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	Used for removing the differential taper roller bearing.
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
 ST-398487700	398487700	DRIFT	Used for installing the front 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 the DIAL GAUGE (498247100).

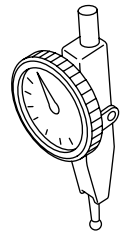
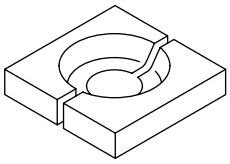
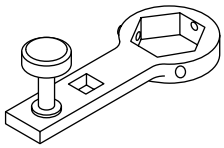
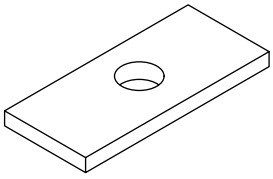
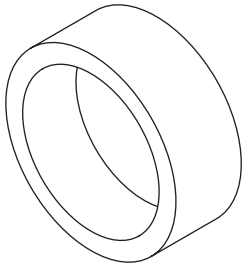
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring the gear backlash. • Used together with the MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing the front roller bearing.
 ST-499787700	499787700	WRENCH	Used for removing and installing the drive pinion lock nut.
 ST-398643600	398643600	GAUGE	Used for measuring the 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.

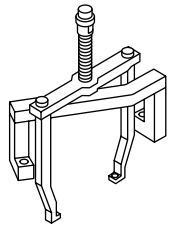
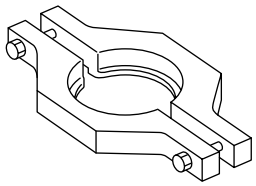
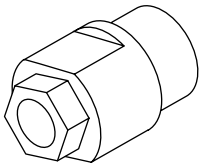
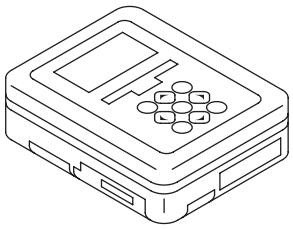
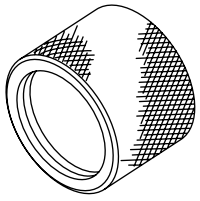
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499737100	499737100	PULLER SET	Used for removing the reduction driven gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing the ball bearing.
 ST18667AA010	18667AA010	HOLDER	• Used for removing and installing the drive pinion lock nut. • Used as a handle to rotate gear when checking tooth contact.
 ST1B020XU0	1B020XU0	SUBARU SELECT MONITOR KIT	Used for troubleshooting the electrical system.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.

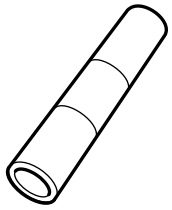
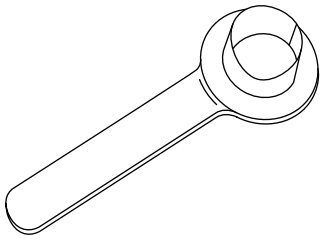
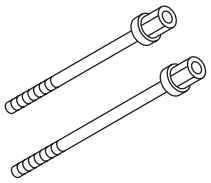
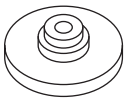
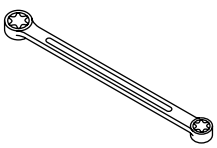
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18654AA000	18654AA000	INSTALLER	Used for removing and installing the ball bearing.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
 ST18763AA000	18763AA000	COMPRESSOR SHAFT	Used for disassembling multi-plate clutch for shift transmission.
 ST18765AA000	18765AA000	COMPRESSOR SUPPORT	Used for disassembling multi-plate clutch for shift transmission.
 ST18676AA020	18676AA020	TORX® WRENCH	Used for disassembling torque converter case.

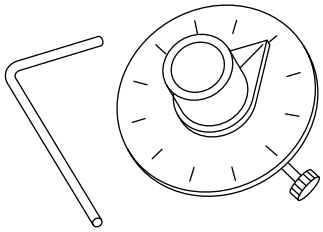
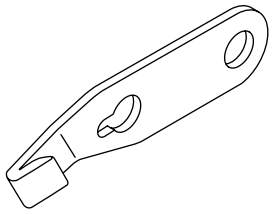
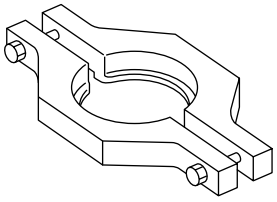
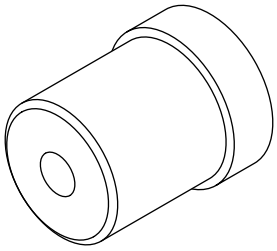
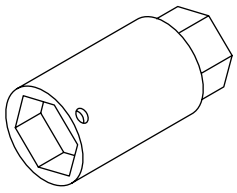
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18854AA000	18854AA000	ANGLE GAUGE	• Used for tightening parking support. • Used for installing the drive plate.
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.
 ST-498077300	498077300	REMOVER	Used for removing ball bearing of reduction driven gear.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing the oil seal.
 ST-499787500	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.

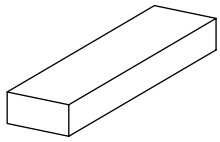
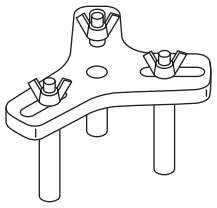
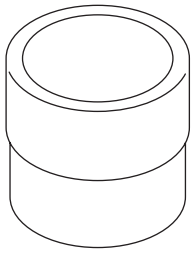
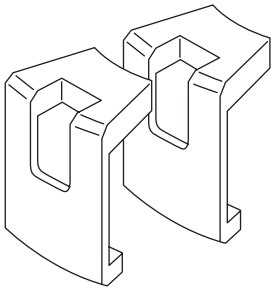
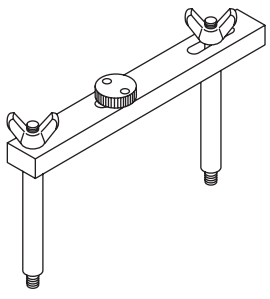
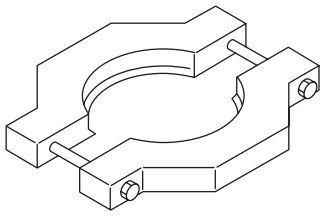
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499575400	499575400	GAUGE	Used for measuring height of total end play.
 ST18762AA000	18762AA000	COMPRESSOR SPECIAL TOOL	Used for disassembling multi-plate clutch for shift transmission.
 ST-499755602	499755602	PRESS	Used for installing the parking gear.
 ST18680AA010	18680AA010	HOLDER GEAR	Used for removing reduction driven gear assembly. (2-piece set)
 ST18766AA000	18766AA000	SUPPORT PULLER	Used for removing reduction driven gear assembly.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18767AA000	18767AA000	REMOVER	• Used to pull out the parking gear. • Used to pull out the bearing from the VTD assembly.

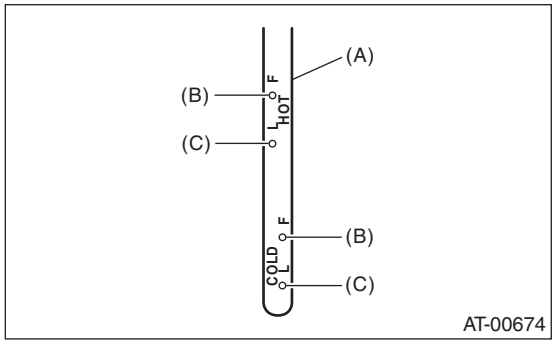
2. GENERAL TOOL

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 differential gear oil drain plug.
Snap ring pliers	Used for removing and installing each snap ring.

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) displayed on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
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 or 2 minutes, and measure the ATF level.



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

4) Make sure that the ATF level is between upper and lower marks of the HOT side.
5) 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.**

6) 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) displayed on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) 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.

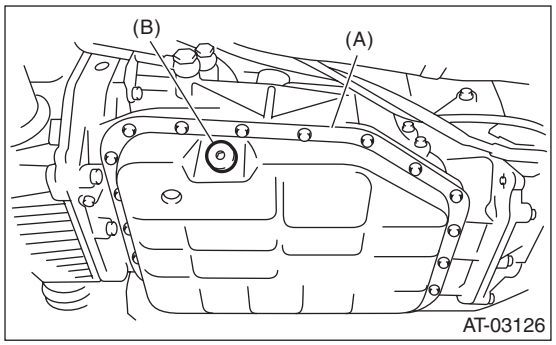
B: REPLACEMENT

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 long idle running, the ATF is hot. Be careful not to burn yourself.
3) Check the condition of ATF.
<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.

Specified fluid:
SUBARU ATF

Recommended fluid:
IDEMITSU ATF HP
Castrol Transmax J

NOTE:
Use of the recommended fluid is permitted only in regions where the specified fluid is not available.

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.

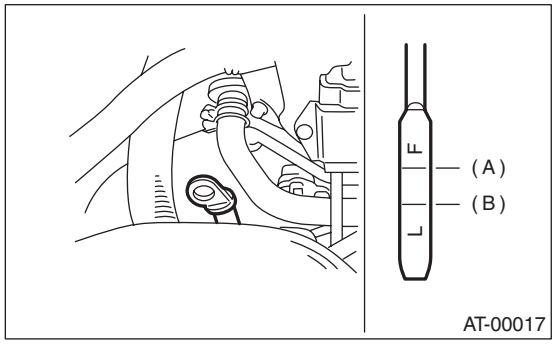
Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Internal metal parts of transmission body are excessively worn.	Replace ATF and check if AT operates correctly.
Is thick and is a varnish-form fluid.	Clutch etc. is burned.	Replace ATF and check the 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.
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 differential gear 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

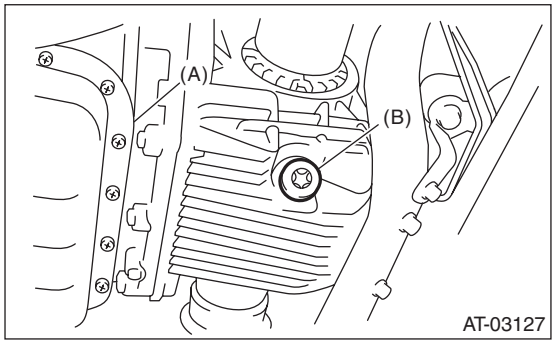
B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the differential gear oil drain plug using TORX® bit T70, and then drain differential gear oil.

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 differential gear oil drain plug using TORX® bit T70.

NOTE:
Use a new gasket.

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



(A) Oil pan
(B) Differential gear oil drain plug

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

Recommended gear oil:
<Ref. to 5AT-3, 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 by shifting down from 5th to 4th range while driving in 5th gear of manual mode [50 to 60 km/h (31 to 37 MPH)].
• Check the 3rd gear engine brake by 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 by 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 by 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. It should be conducted to measure the engine stall speeds in “R” and “2nd 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)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Place the wheel chocks at the front and rear of all wheels and apply the parking brake.
8) Move the manual linkage 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.
12) Perform the procedure for “R” range in the same way as “2nd on manual mode”.

NOTE:
• Do not continue the stall test for FIVE SECONDS OR MORE at a time (from fully closed throttle to fully open throttle until stall speed reading). 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.

Stall speed (at sea level):
Turbo model
3,100 — 3,500 rpm
Non-turbo model
2,400 — 2,800 rpm

Stall speed (at sea level)	Range	Possible faulty part
Below specified value	R	• Engine • One-way clutch of torque converter clutch
Over specified value	2nd gear of manual mode	• Line pressure too low • Forward brake • Forward brake one-way clutch • Direct clutch • 3rd one-way clutch
	R	• Line pressure too low • Reverse 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, forward 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
Specification: 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
Specification: 1.5 seconds or less

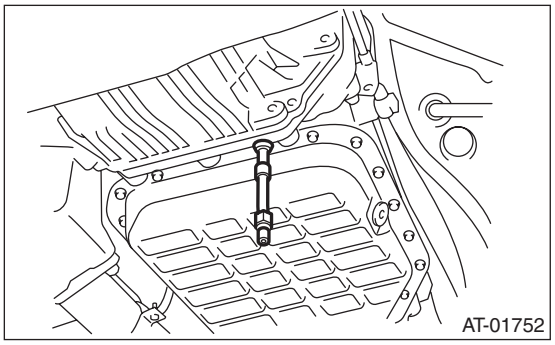
If “N” → “R” time lag is longer than specification:

- 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.
• Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of clutch, brake or control valve.
1) Set the vehicle on a lift.
2) Remove the under cover.
3) Remove the test plug and attach the ST.
ST 498897200 OIL PRESSURE ADAPTER



4) Set the ST1 and ST2.
ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY
5) Lower the vehicle, and pull ST1 and ST2 into the vehicle.
ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY
6) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
(1) Start the engine.
(2) Run the Subaru Select Monitor.
(3) On the «Main Menu» display screen, select the {Each System Check}.
(4) On the «System Selection Menu» display screen, select {Transmission Control System}.
(5) Select the [OK] after the information of transmission type is displayed.
(6) On the «Transmission Diagnosis» display screen, select {Current Data Display & Save}.
(7) On the «Transmission Diagnosis» display screen, select the {Data Display}.
(8) Using the scroll key, display the «P/L solenoid target oil pressure».
7) Perform the line pressure 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.
• Adjust the throttle valve angle in order to match the “P/L Solenoid Pressure” displayed on the Subaru Select Monitor.

Range of the selector lever	Throttle valve angle	ATF temperature condition	“P/L Solenoid Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm^2, psi)
D	Full closed	45 — 55°C (113 — 131°F)	490	385 — 555 (3.93 — 5.66, 55.8 — 80.5)
	Full open		1,370	1,235 — 1,475 (12.59 — 15.04, 179.1 — 213.9)
R	Full closed		1,370	1,530 — 1,925 (15.60 — 19.6, 221.9 — 279.2)

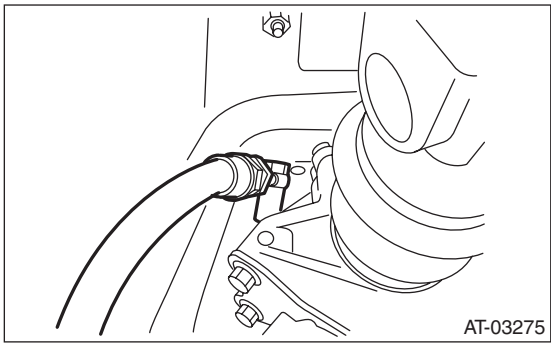
8. Transfer Clutch Pressure Test

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 attach the ST.

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

ST 498897700 OIL PRESSURE ADAPTER
ST 498897800 ADAPTER SET



4) Set the ST.
ST 498575400 OIL PRESSURE GAUGE ASSY
5) Lower the vehicle, and pull ST3 into the vehicle.
ST1 498897700 OIL PRESSURE ADAPTER
ST2 498897800 ADAPTER SET
ST3 498575400 OIL PRESSURE GAUGE ASSY
6) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Perform the transfer clutch 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 throttle valve angle in order to obtain the “T/F Solenoid Pressure” displayed on the Subaru Select Monitor.
8) Remove the ST and install the test plug.

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)
9) Install the heat shield cover.

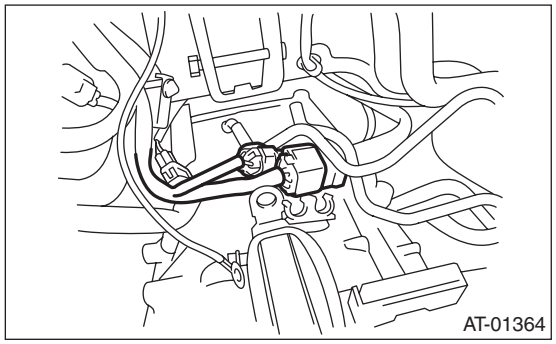
Range of the selector lever	Throttle valve angle	ATF temperature condition	“T/F Solenoid Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm^2, psi)
D	Full open	45 — 55°C (113 — 131°F)	900	800 — 915 (8.16 — 9.33, 116.0 — 132.7)
	Partial throttle		500	400 — 535 (4.08 — 5.46, 58.0 — 77.6)
N	Full closed		0	0 — 50 (0 — 0.51, 0 — 7.3)

9. Automatic Transmission Assembly

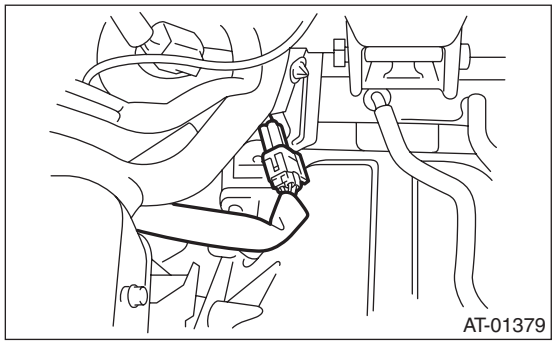
A: REMOVAL

1) Set the vehicle on a lift.
2) Open the front hood and support with the hood stay.
3) Disconnect the ground cable from battery.
4) Remove the collector cover.
5) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
6) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
7) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
8) Remove the air breather hose. <Ref. to 5AT-62, REMOVAL, Air Breather Hose.>
9) Remove the starter. <Ref. to SC(H4SO)-6, REMOVAL, Starter.>
10) Disconnect the following connectors.

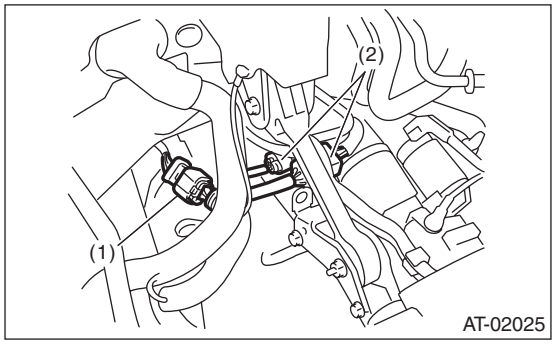
- Turbo model
  1. Transmission harness connectors



  2. Front oxygen (A/F) sensor

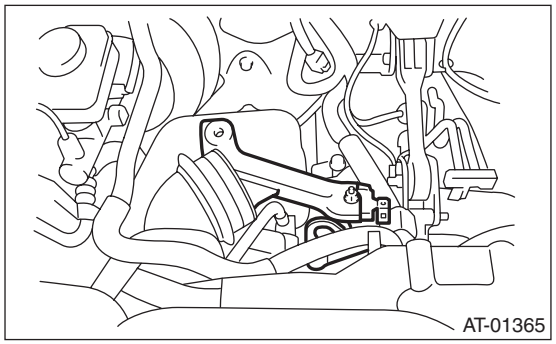


- Non-turbo model

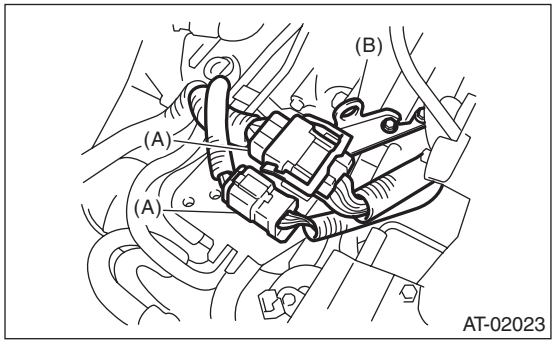


(1) Front oxygen (A/F) sensor
(2) Transmission harness connectors

11) Remove the intercooler stay and engine hanger rear. (Turbo model)

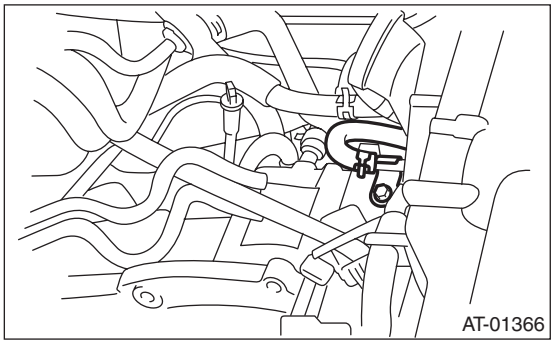


12) Disconnect the engine harness connectors, and then remove the engine hanger rear. (Non-turbo model)



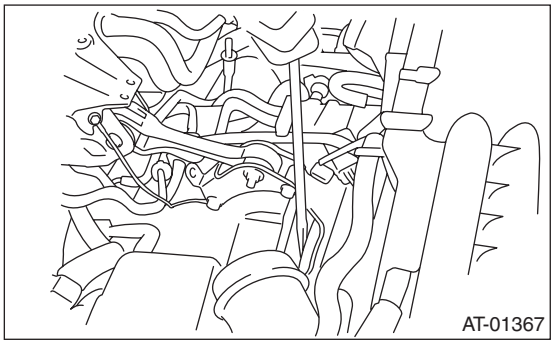
(A) Engine harness connectors
(B) Engine hanger rear

13) Remove the water by-pass pipe. (Turbo model)

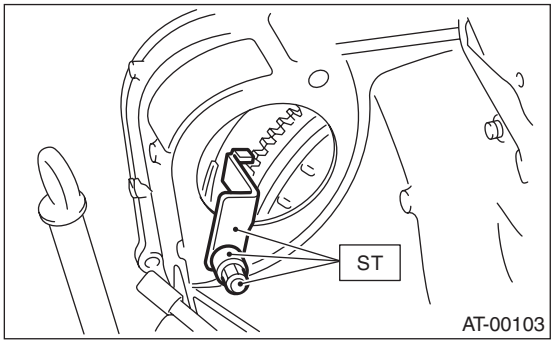


14) Separate the torque converter from drive plate.
(1) Remove the service hole plug.
(2) Remove the bolts which hold torque converter to drive plate.
(3) Remove the four bolts by rotating the crank pulley a little at a time.
(4) Make sure the torque converter moves freely by rotating with finger through the starter installation hole.

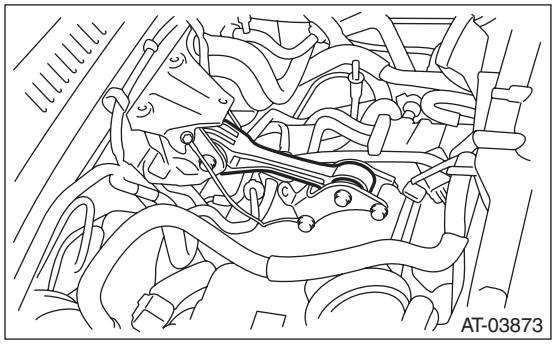
CAUTION:
Be careful not to drop bolts into converter housing.



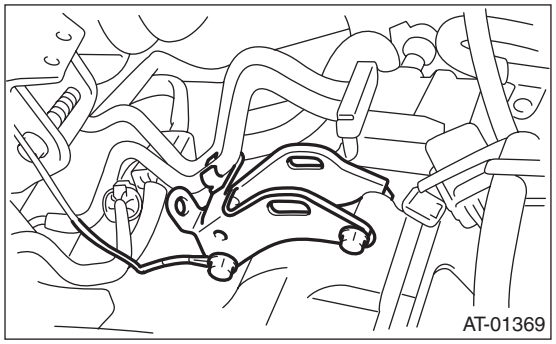
15) Attach the ST to the converter case.
ST 498277200 STOPPER SET



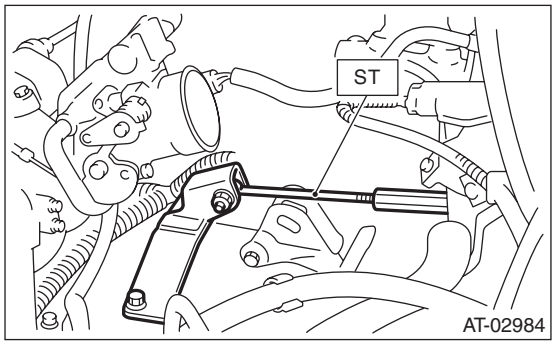
16) Remove the pitching stopper.



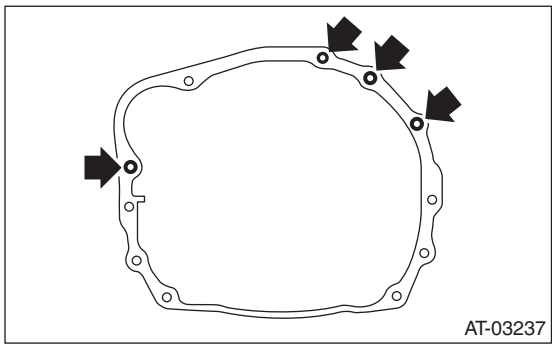
17) Remove the pitching stopper bracket.



18) Set the ST.
ST 41099AC000 ENGINE SUPPORT ASSY

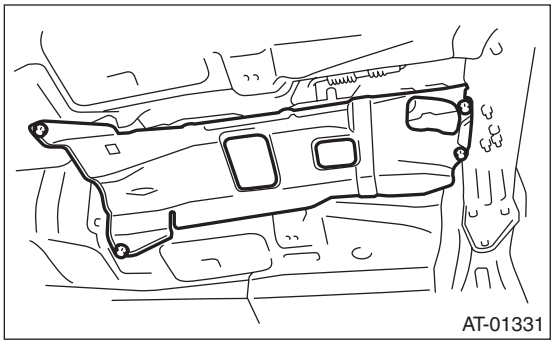


19) Remove the air intake duct. (Turbo model) <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
20) Remove the air cleaner case. (Turbo model) <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>
21) Remove the transmission mounting bolt (upper side).

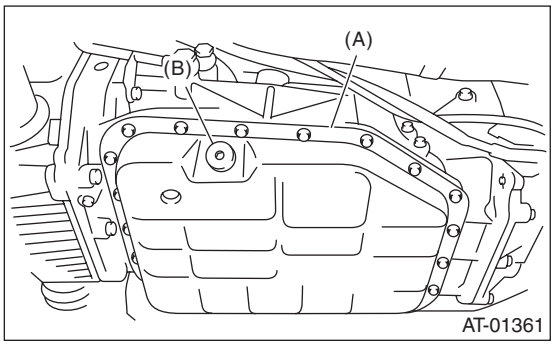


22) Lift-up the vehicle. (Turbo model)

23) Remove the under cover. (Turbo model)
24) Remove the center and rear exhaust pipes and the muffler. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
25) Remove the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
26) Remove the heat shield cover.


AT-01331

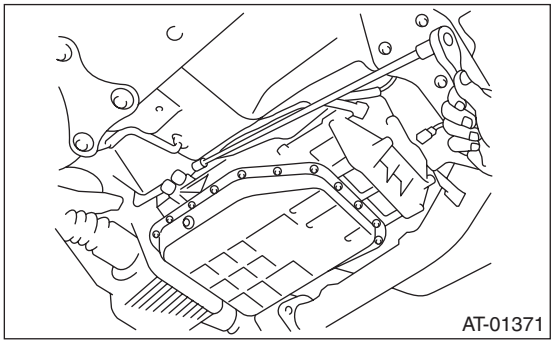
27) Remove the ATF drain plug to drain ATF.



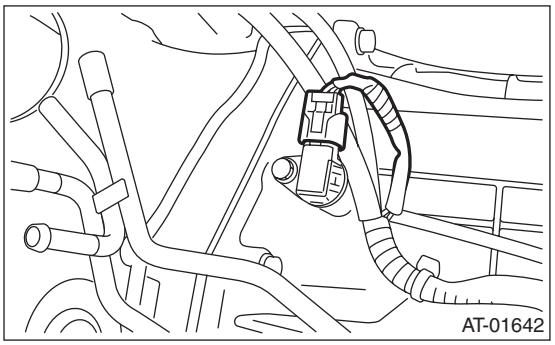
AT-01361

(A) Oil pan
(B) Drain plug

28) Remove the oil charge pipe.

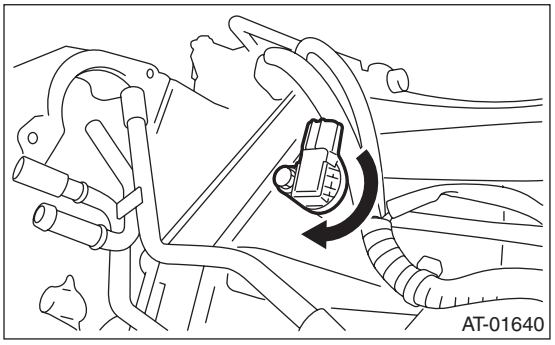

AT-01371

29) Disconnect the connector from turbine speed sensor 1.

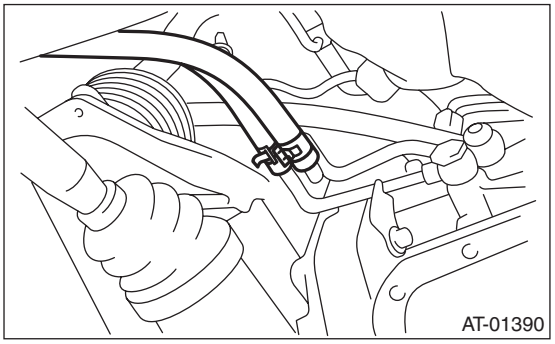

AT-01642

30) Remove the turbine speed sensor 1 connector 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.

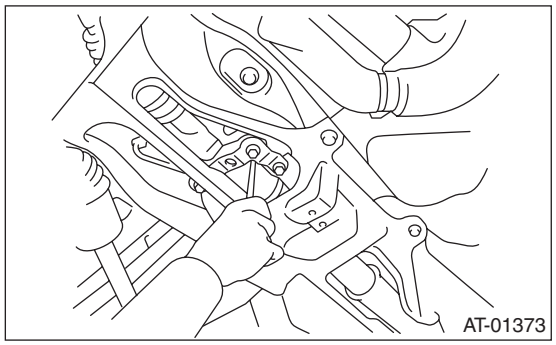

AT-01640

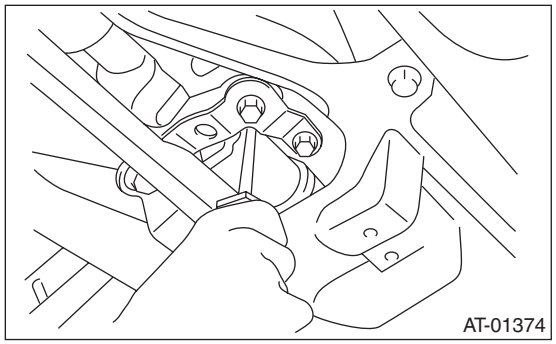
31) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
32) Remove the shift select cable. <Ref. to CS-28, REMOVAL, Select Cable.>
33) Disconnect the hose from the ATF inlet and outlet pipes.


AT-01390

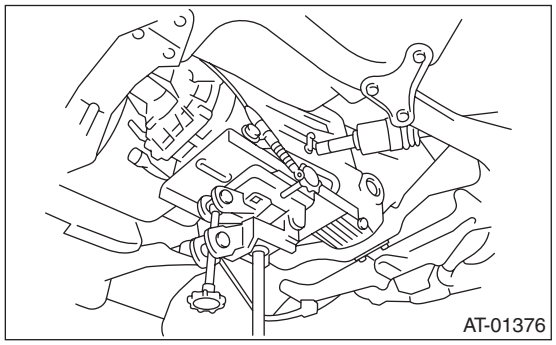
34) Remove the front crossmember support plate. <Ref. to FS-14, REMOVAL, Front Crossmember Support Plate.>

35) Remove the two clutch housing cover securing bolts.

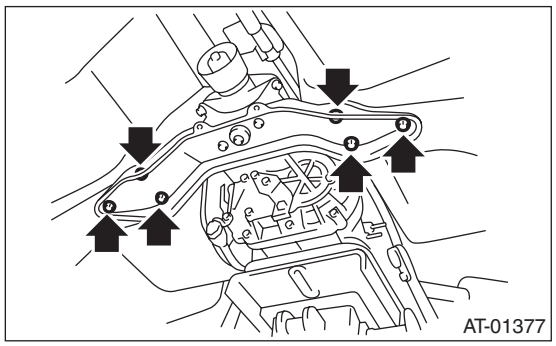




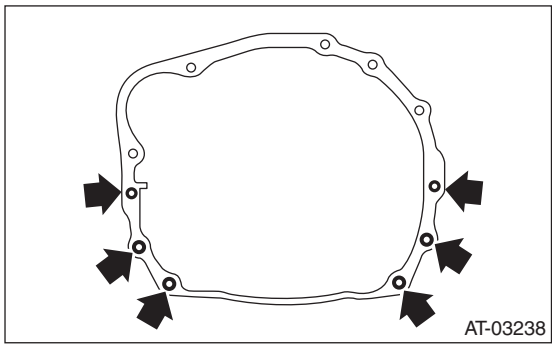
36) Remove the front stabilizer bracket. <Ref. to FS-15, REMOVAL, Front Stabilizer.>
37) Remove the bolts which secure front ball joint to the housing. <Ref. to FS-16, REMOVAL, Front Ball Joint.>
38) Pull out the drive shaft from transmission.
39) Set the transmission jack under the transmission.



40) Remove the rear crossmember.



41) Remove the transmission mounting bolt (lower side).

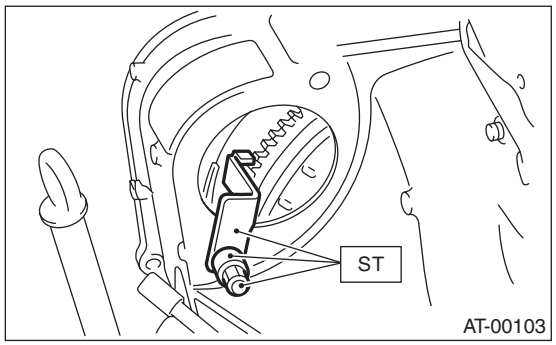


42) Remove the transmission.

NOTE:
• Turn the engine support assembly from the vehicle under body to the left (to shorten the engine support length), and lower the rear of the engine for easy disassembly.
• Be careful not to allow breather pipe and etc. to touch the vehicle body when detaching the automatic transmission assembly by pulling it backward.

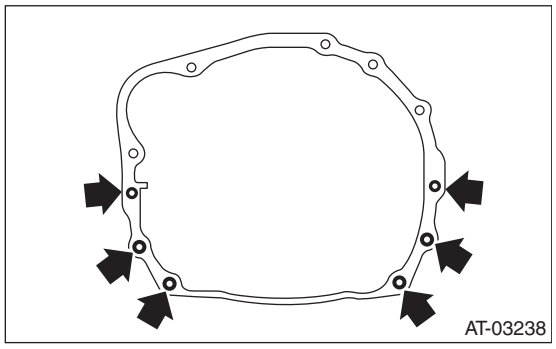
B: INSTALLATION

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



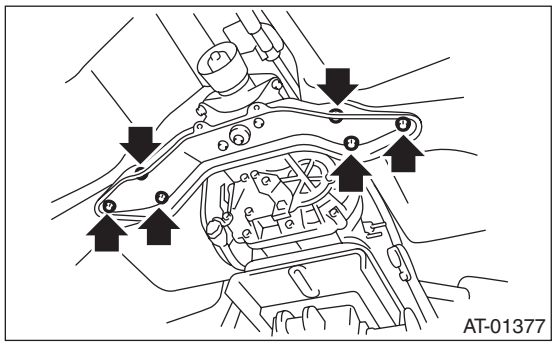
2) Install the transmission onto the engine.
(1) Lift-up the transmission gradually using transmission jack.
(2) Engage at the spline.
3) Install the engine mounting bolt (lower side).

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



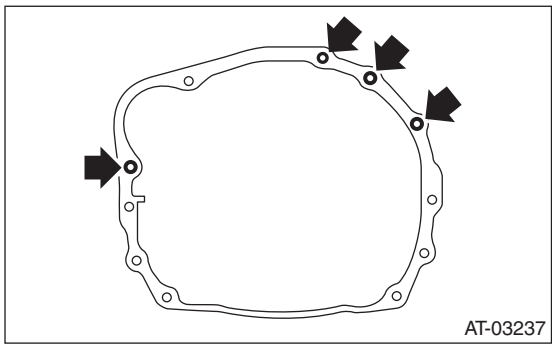
4) Install the transmission rear crossmember.

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



5) Remove the transmission jack.
6) Lower the vehicle.
7) Install the engine mounting bolt (upper side).

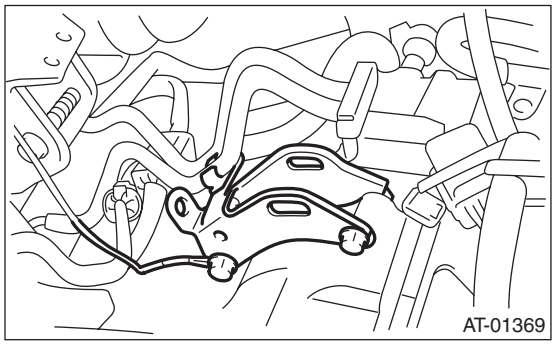
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



8) Remove the ST from converter case.
ST 498277200 STOPPER SET
9) Install the starter. <Ref. to SC(H4SO)-6, INSTALLATION, Starter.>
10) Install the torque converter to drive plate.
(1) Install the bolts which hold torque converter to drive plate.
(2) Install all four bolts by rotating the crank pulley a little at a time.
(3) Install the service hole.

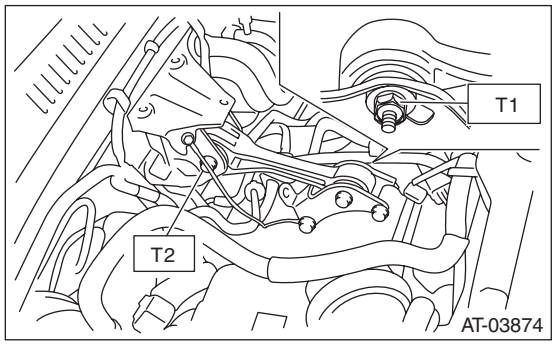
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)
11) Remove the ST and install the pitching stopper bracket.

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



12) Install the pitching stopper.

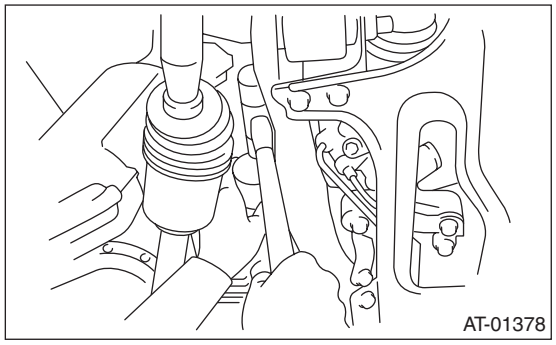
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



13) Lift-up the vehicle.
14) Replace the front differential side retainer oil seal.
(1) Remove the oil seal by using flat tip screwdriver etc.
(2) Install a new oil seal using ST.

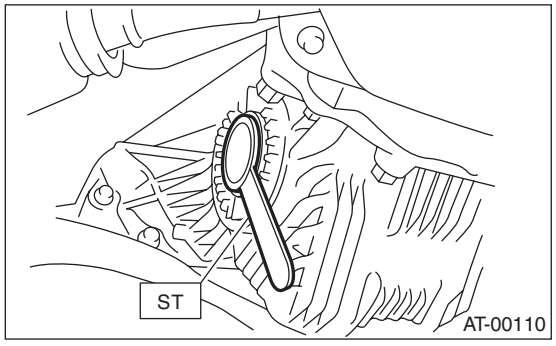
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
• Apply oil to the oil seal lips.
• Be sure to replace the differential side oil seal after the procedure of removing front drive shaft from transmission.



15) Apply grease to the oil seal lips.
16) Set the ST to side retainer.

ST 28399SA000 OIL SEAL PROTECTOR

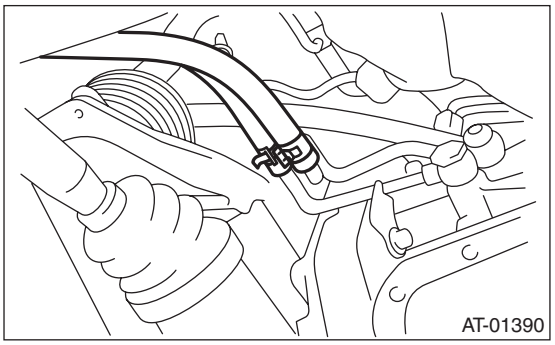


17) Install the front drive shaft into the transmission.

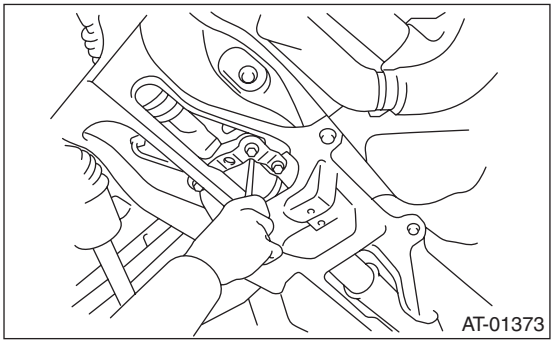
NOTE:
Replace the circlip of drive shaft with a new part.
18) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.

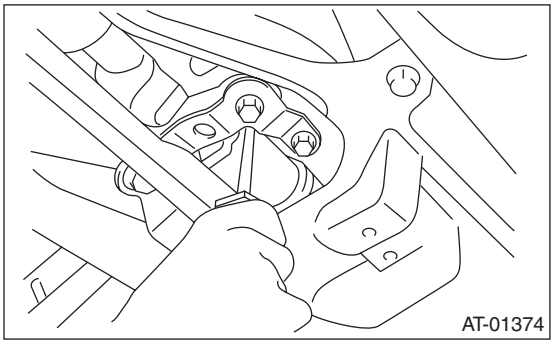
ST 28399SA000 OIL SEAL PROTECTOR

19) Install the inlet and outlet hoses to the ATF inlet and outlet pipes.



20) Insert the ball joint into housing. <Ref. to FS-16, INSTALLATION, Front Ball Joint.>
21) Install the front stabilizer bracket. <Ref. to FS-15, INSTALLATION, Front Stabilizer.>
22) Install the clutch housing cover securing bolts.

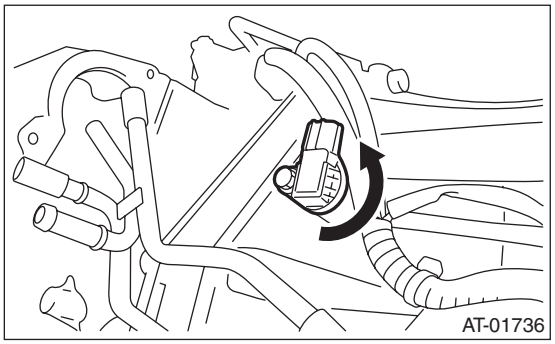




23) Install the front cross support plate. <Ref. to FS-14, INSTALLATION, Front Crossmember Support Plate.>
24) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
25) Install the shift select cable. <Ref. to CS-29, INSTALLATION, Select Cable.>

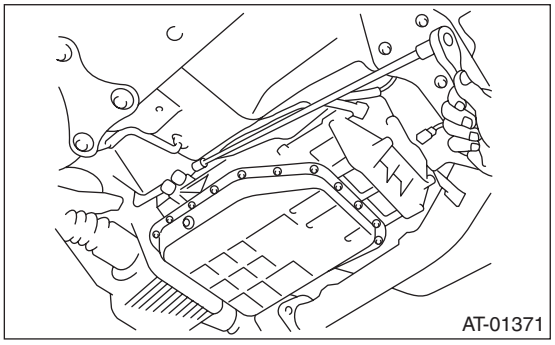
26) Install the turbine speed sensor 1 and harness, and then connect the connector.

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

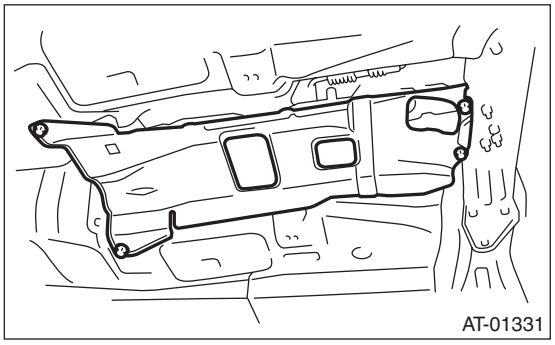


27) Install the oil charge pipe.

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

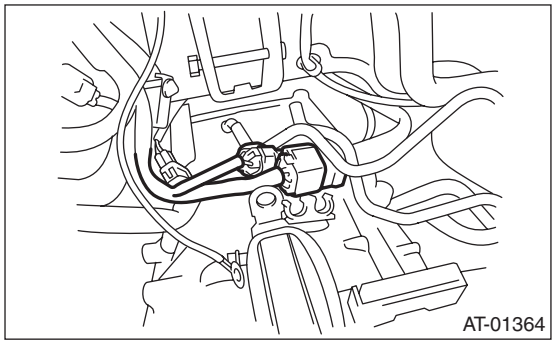


28) Install the heat shield cover.

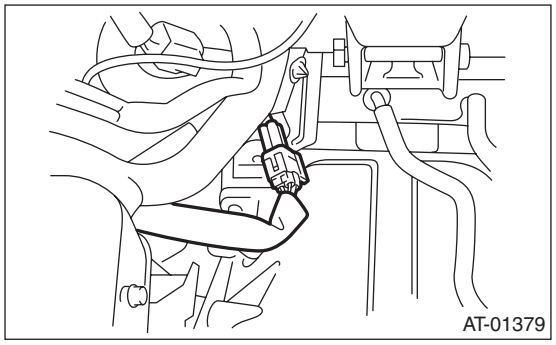


29) Install the center, rear exhaust pipes and the muffler. (Turbo model) <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
30) Install the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
31) Install the under cover.
32) Lower the vehicle.
33) Install the air cleaner case.
<Ref. to IN(H4DOTC)-8, INSTALLATION, Air Cleaner Case.>
34) Install the air intake duct.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Intake Duct.>
35) Connect the following connectors.

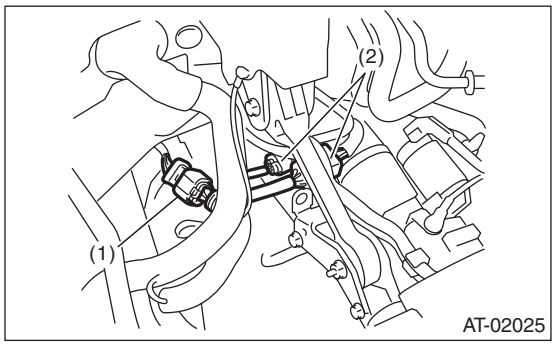
- Turbo model
  1. Transmission harness connectors



  2. Front oxygen (A/F) sensor

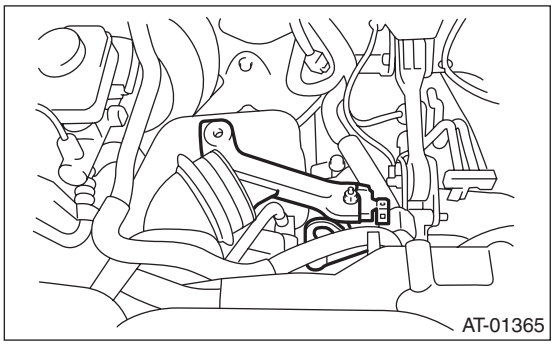


- Non-turbo model

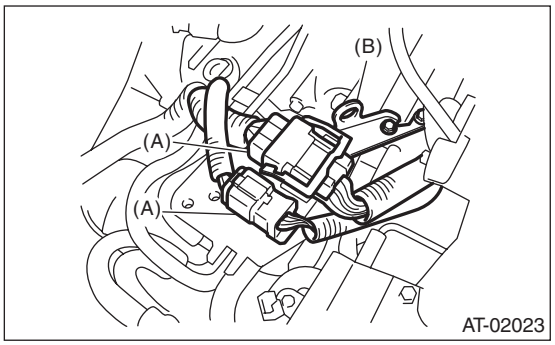


(1) Front oxygen (A/F) sensor
(2) Transmission harness connectors

36) Install the intercooler stay RH and engine hanger rear. (Turbo model)

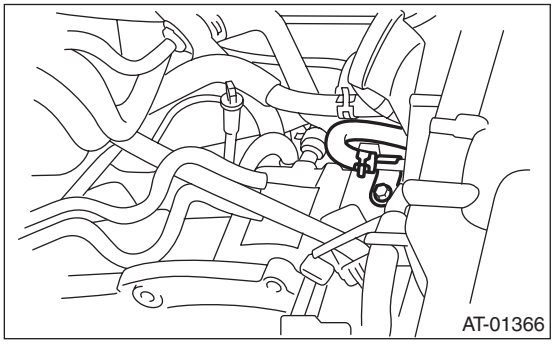


37) Install the engine hanger rear, and then connect the engine harness connector. (Non-turbo model)



(A) Engine harness connectors
(B) Engine hanger rear

38) Install the water by-pass pipe. (Turbo model)



39) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>
40) Install the air breather hose. <Ref. to 5AT-62, INSTALLATION, Air Breather Hose.>
41) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
42) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
43) Install the air cleaner case. (Non-turbo model) <Ref. to IN(H6DO)-5, INSTALLATION, Air Cleaner Case.>
44) Install the collector cover.
45) Connect the battery ground cable to the battery.
46) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
(1) Connect the Subaru Select Monitor to the data link connector.
(2) Turn the ignition switch to ON (engine OFF) and run the Subaru Select Monitor.
(3) Ensure that the select lever is in the “P” range.
(4) On the «Main Menu» display screen, select the {Each System Check}.
(5) On the «System Selection Menu» display screen, select {Transmission Control System}.
(6) Select the [OK] after the information of transmission type is displayed.
(7) On the «Transmission Diagnosis» display screen, select the {Clear Memory 2}.
47) Perform the inspection with driving the vehicle 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.

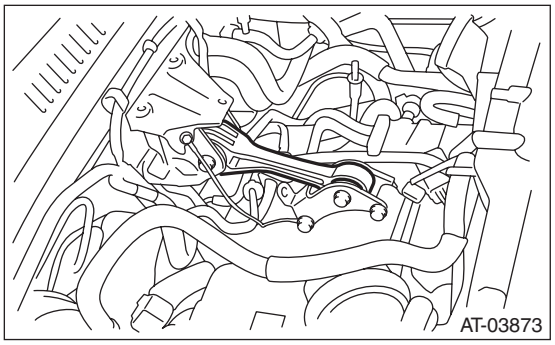
NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

10.Transmission Mounting System

A: REMOVAL

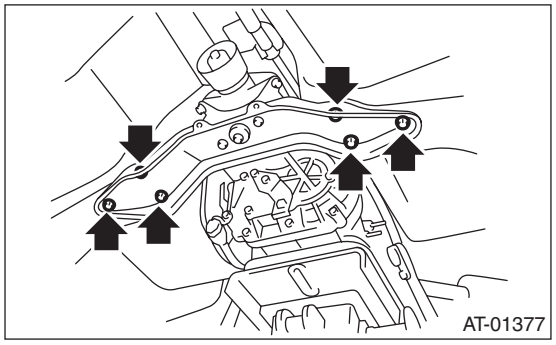
1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack-up the vehicle and support it with rigid racks.
3) Remove the center and rear exhaust pipes and the muffler. (Turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
4) Remove the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
5) Remove the heat shield cover.
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.



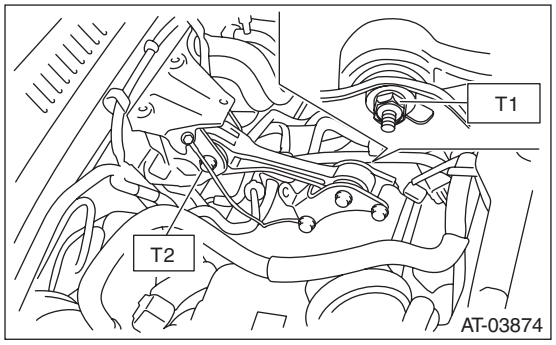
8) Remove the rear cushion rubber from transmission.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

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



2) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
4) Connect the battery ground cable to the battery.

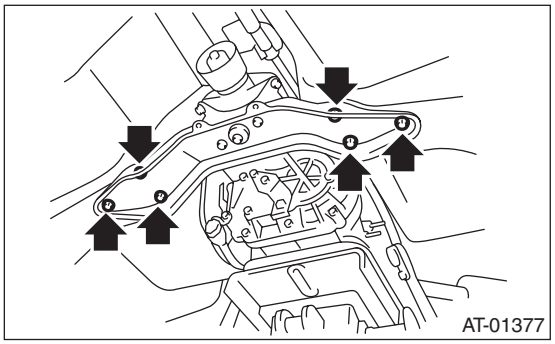
2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Install the rear cushion rubber to the transmission.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install the cross member.

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



3) Remove the transmission jack.
4) Install the heat shield cover.
5) Install the center, rear exhaust pipes and the muffler. (Turbo model)
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
6) Install the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
7) Connect the battery ground cable to the battery.

C: INSPECTION

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

1. PITCHING STOPPER

Check pitching stopper for bends or damage. Check that there are no cracks, hardening or damage on rubber parts.

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

Check the 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-46, REPLACEMENT, Extension Case Oil Seal.>

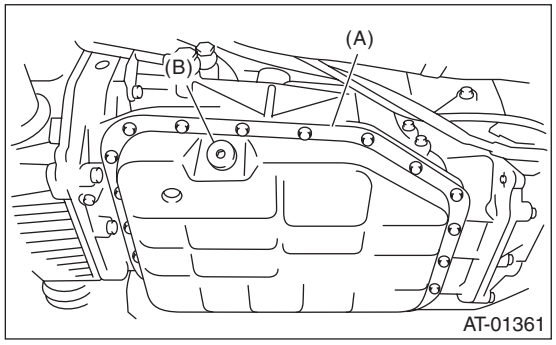
B: REPLACEMENT

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

CAUTION:
Immediately after the vehicle has been running or after idling for a long time, the ATF will be hot. Be careful not to burn yourself.
4) Tighten the ATF drain plug.

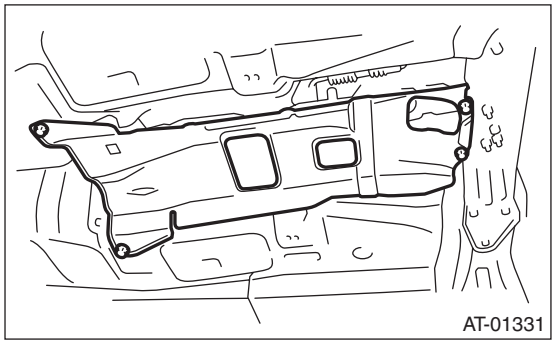
NOTE:
Use a new gasket.

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

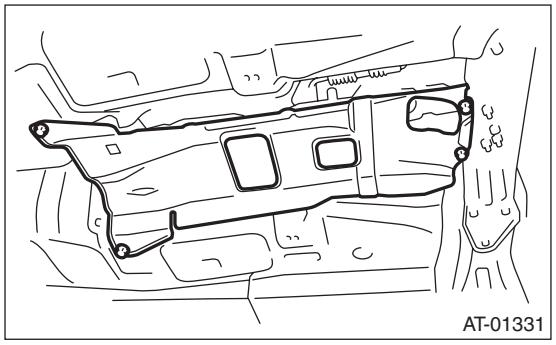


(A) Oil pan
(B) ATF drain plug

5) Remove the rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
6) Remove the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
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
10) Using the ST, install the oil seal.
ST 498057300 INSTALLER
11) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
12) Install the heat shield cover.



13) Install the rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-12, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
14) Install the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
15) Pour ATF from the oil charge pipe.

Specified fluid:
SUBARU ATF

Recommended fluid:
IDEMITSU ATF HP
Castrol Transmax J

NOTE:
Use of the recommended fluid is permitted only in regions where the specified fluid is not available.

Capacity:
Fill with the same amount of ATF as drained.
16) Check the level and leaks of the ATF. <Ref. to 5AT-28, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

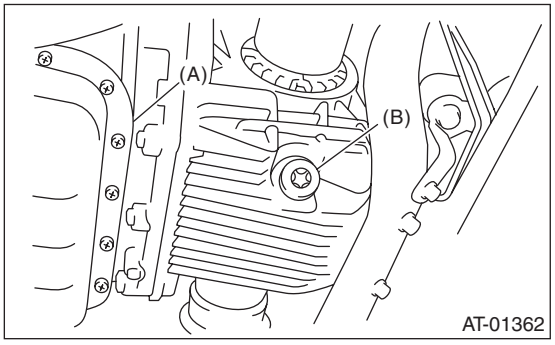
A: INSPECTION

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) Lift-up the vehicle.
2) Remove the front exhaust pipe and center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
3) Remove the front exhaust pipe. (Non-turbo model) <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.>
4) Remove the differential gear oil drain plug using TORX® bit T70, and then drain differential gear oil.

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.



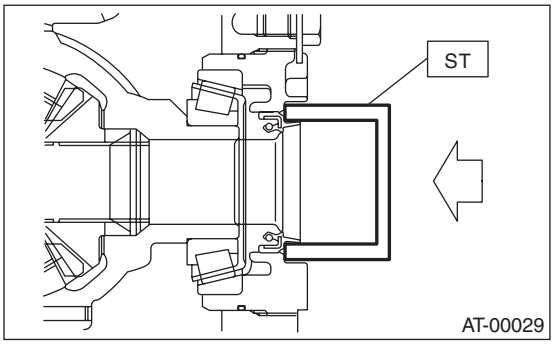
(A) Oil pan
(B) Differential gear oil drain plug

5) 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)

6) Separate the front drive shaft from the transmission. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
7) Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.
8) Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



9) Apply oil to the oil seal lips.
10) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
11) Install the front exhaust pipe and the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-6, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
12) Install the front exhaust pipe. (Non-turbo model) <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>
13) Lower the vehicle.
14) Pour gear oil into the gauge hole.

Recommended gear oil:
<Ref. to 5AT-3, 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)
15) Check the level of differential gear oil. <Ref. to 5AT-30, INSPECTION, Differential Gear Oil.>

13.Inhibitor Switch

A: INSPECTION

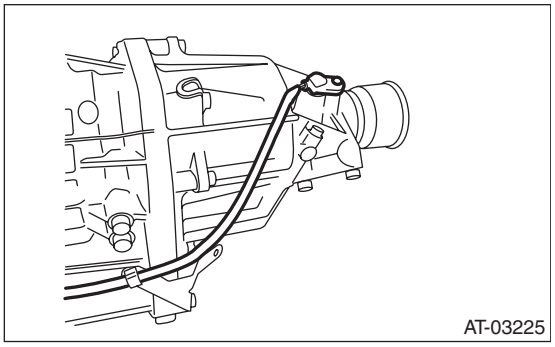
Inhibitor switch cannot be checked, because the inhibitor switch is installed on control valve assembly. When a malfunction occurs, refer to 5AT (diag) section. <Ref. to 5AT(diag)-33, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Front Vehicle Speed Sensor

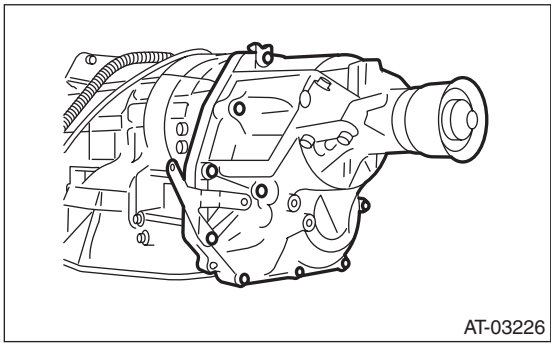
A: REMOVAL

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

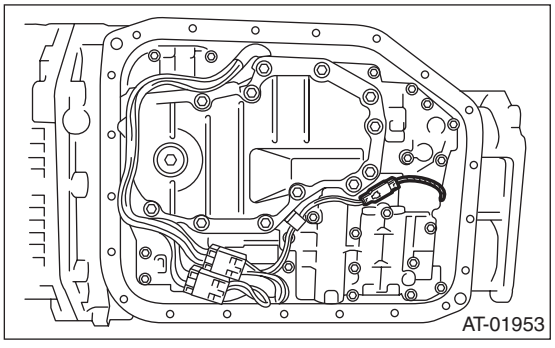
NOTE:
Secure the harness of the rear vehicle speed sensor to the transmission body using wire etc.


AT-03225

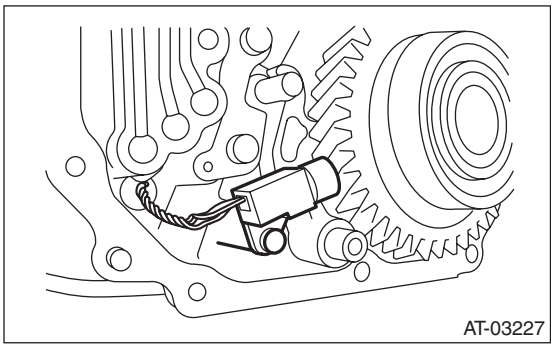
3) Remove the extension case.


AT-03226

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-01953

8) Remove the front vehicle speed sensor securing bolt.

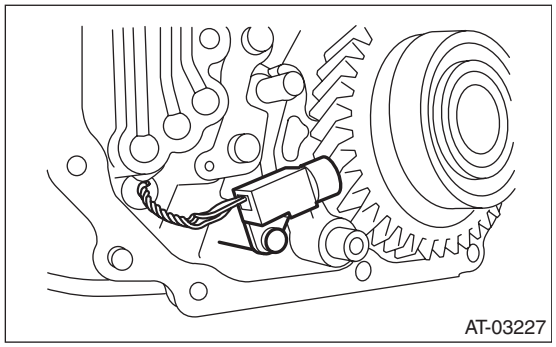

AT-03227

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

B: INSTALLATION

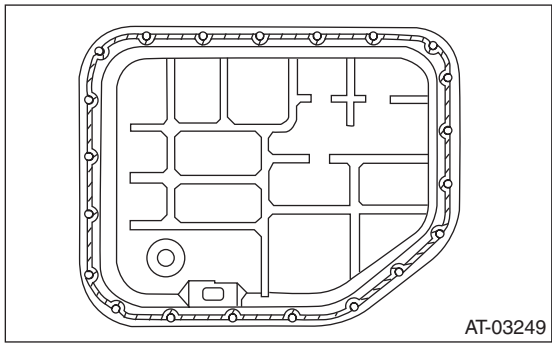
1) Install the front vehicle speed sensor.

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



2) Connect the front vehicle speed sensor connector.
3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

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

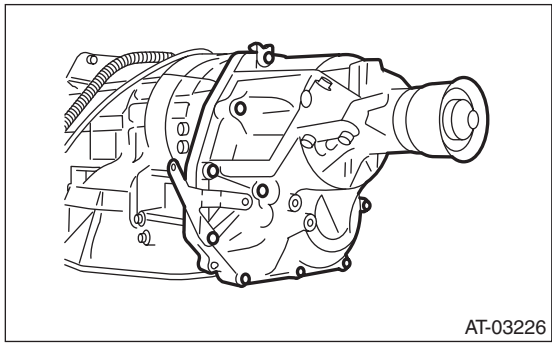


4) Install the oil pan by equally tightening the bolts.

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

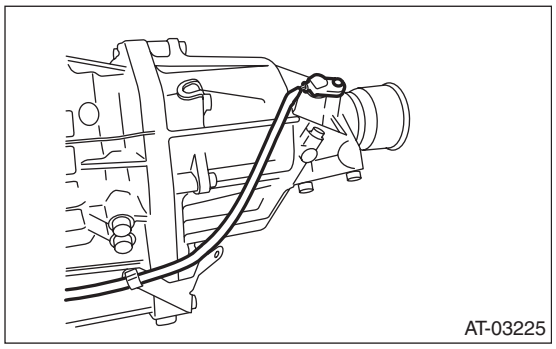
5) Install the center differential carrier. <Ref. to 5AT-73, INSTALLATION, Center Differential Carrier.>
6) Install the extension case.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



7) Install the rear vehicle speed sensor.

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

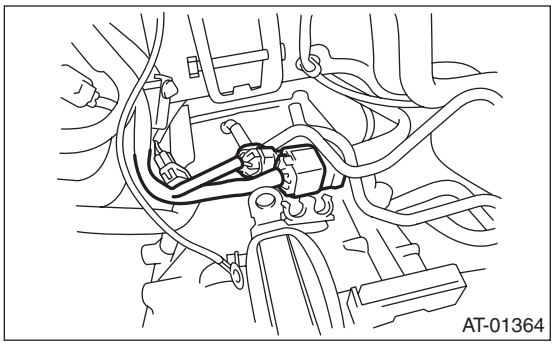


8) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>
9) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>
10) Check the level and leaks of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>

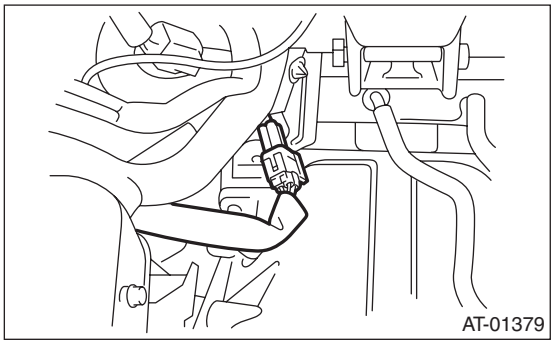
15.Rear Vehicle Speed Sensor

A: REMOVAL

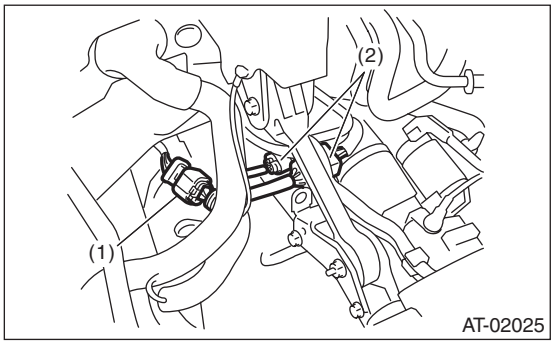
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
5) Disconnect the following connectors.
- Turbo model
  1. Transmission harness connectors



  2. Front oxygen (A/F) sensor



- Non-turbo model

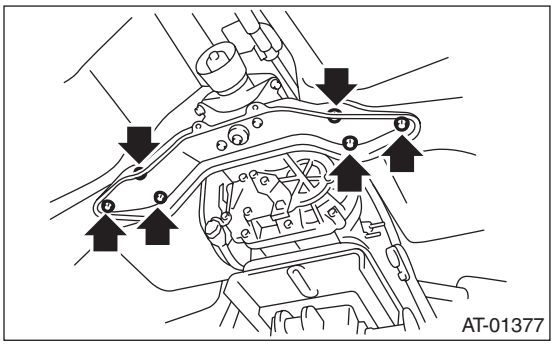


(1) Front oxygen (A/F) sensor
(2) Transmission harness connectors

6) Remove the transmission harness connector and front oxygen (A/F) sensor connector from the stay.
7) Lift-up the vehicle.
8) Clean the transmission exterior.
9) Drain the ATF completely. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>
10) Remove the center and rear exhaust pipes and the muffler. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
11) Remove the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
12) Remove the heat shield cover.
13) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
14) Place the transmission jack under the transmission.

NOTE:
Make sure that the support plate of transmission jack does not touch the cross.

15) Remove the transmission rear crossmember bolt.



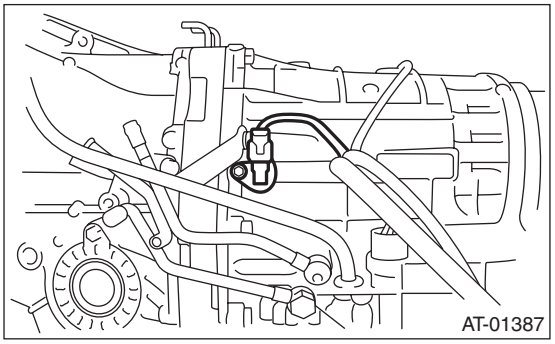
16) Lower the transmission jack.

NOTE:
Do not separate the transmission jack and transmission.

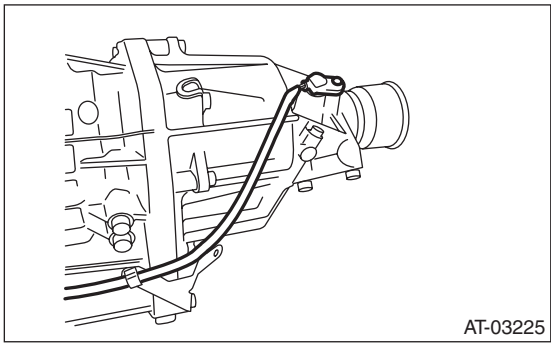
17) Remove the oil charge pipe. <Ref. to 5AT-63, REMOVAL, Oil Charge Pipe.>
18) Remove the ATF cooler inlet and outlet pipes.

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

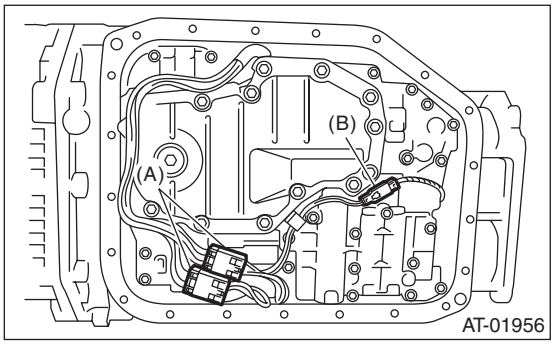
19) Disconnect the connector from turbine speed sensor 1.



20) Remove the rear vehicle speed sensor.

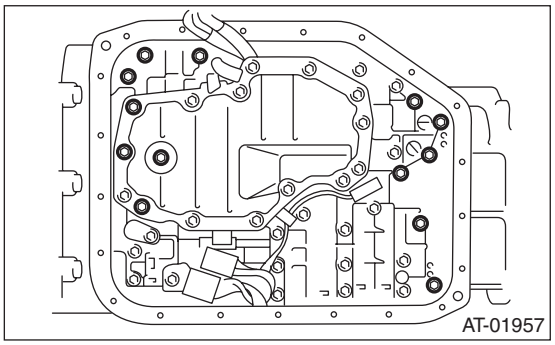


21) Remove the oil pan.
22) Disconnect the control valve connector and front vehicle speed sensor connector.

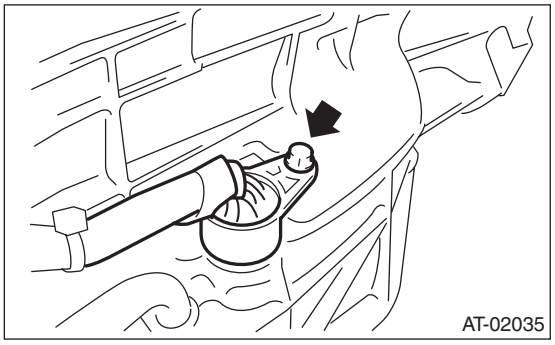


(A) Control valve connector
(B) Front vehicle speed sensor connector

23) Remove the control valve body.



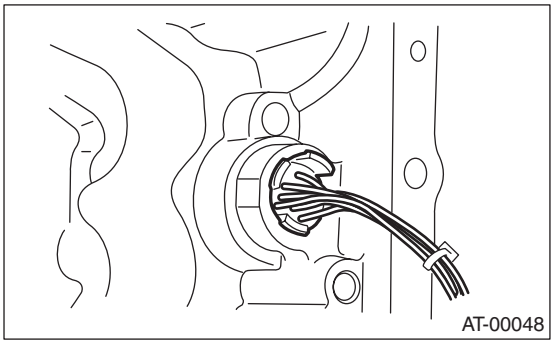
24) Remove the bolt securing harness of transmission main case.



25) Remove the harness assembly.

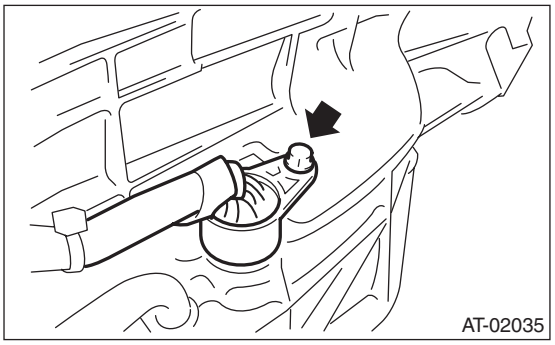
B: INSTALLATION

1) Pass the harness assembly through the hole in transmission case.



2) Install the securing bolt of transmission main case.

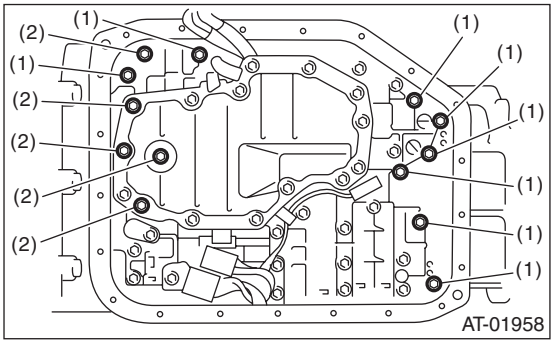
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



3) Install the control valve body.

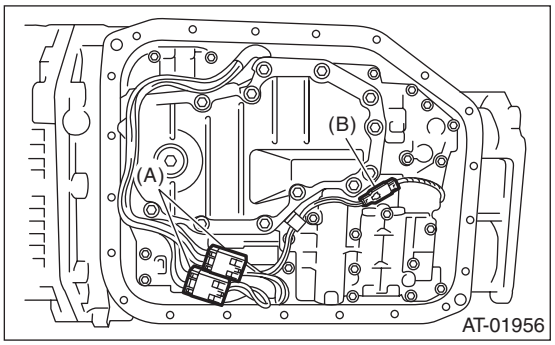
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

NOTE:
Be careful not to catch harness in.



(1) 58 mm (2.28 in)
(2) 65 mm (2.56 in)

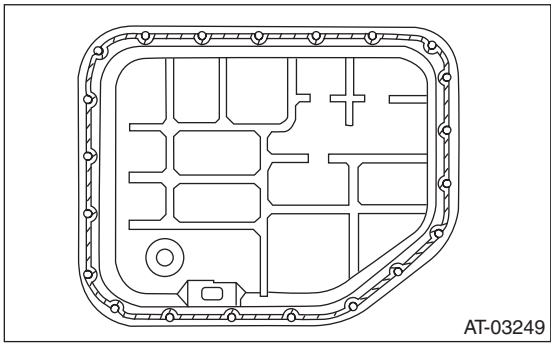
4) Connect the control valve connector and front vehicle speed sensor connector.



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

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

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



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

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

7) Install the rear vehicle speed sensor and turbine speed sensor 1, and then fasten the harness.

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

8) Install a new aluminum washer and oil cooler pipe.

Tightening torque:
40 N·m (4.1 kgf-m, 29.51 ft-lb) (ATF inlet pipe)
45 N·m (4.6 kgf-m, 33.2 ft-lb) (ATF outlet pipe)

9) Install the oil charge pipe. <Ref. to 5AT-63, INSTALLATION, Oil Charge Pipe.>
10) Install the transmission rear crossmember bolt.

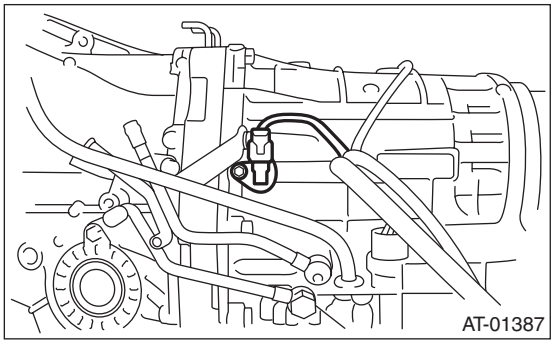
Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)

11) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
12) Install the heat shield cover.
13) Install the center, rear exhaust pipes and the muffler. (Turbo model)
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
14) Install the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
15) Lower the vehicle.
16) Install the transmission connector to the stay, and then connect the connector.
17) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
18) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
19) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>
20) Check the level and leaks of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>
21) Execute the learning control promotion. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

16.Turbine Speed Sensor 1

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Disconnect the turbine speed sensor 1 connector.



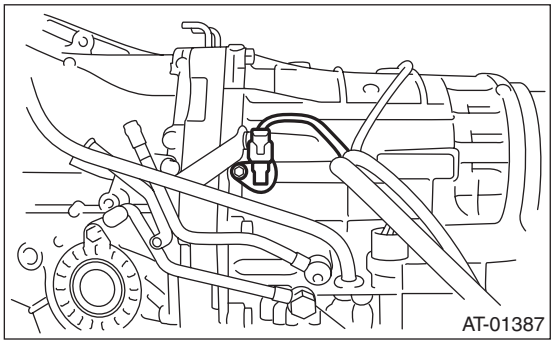
5) Remove the turbine speed sensor 1.

B: INSTALLATION

1) Install the turbine speed sensor 1.

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

2) Connect the turbine speed sensor 1 connector.



3) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
4) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

17.Control Valve Body

A: REMOVAL

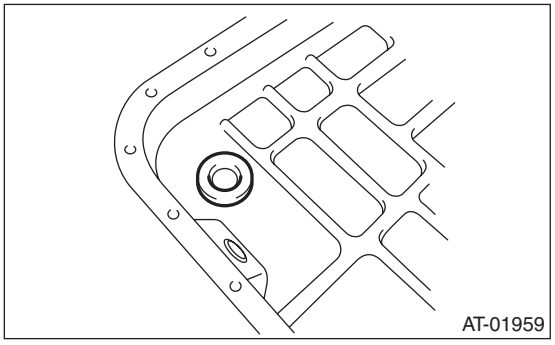
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Lift-up the vehicle.
4) Clean the transmission exterior.
5) Remove the ATF drain plug to drain ATF.

CAUTION:
Immediately after the vehicle has been running or after idling for a long time, the ATF will be hot. Be careful not to burn yourself.
6) Tighten the ATF drain plug.

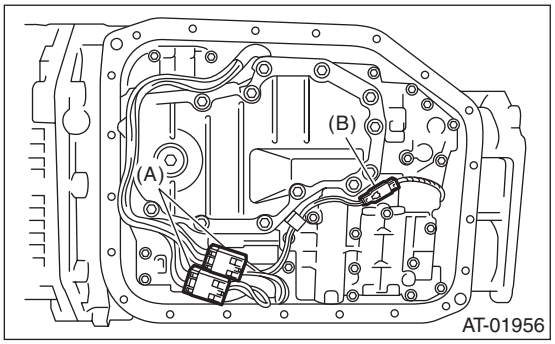
NOTE:
Use a new gasket.

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

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



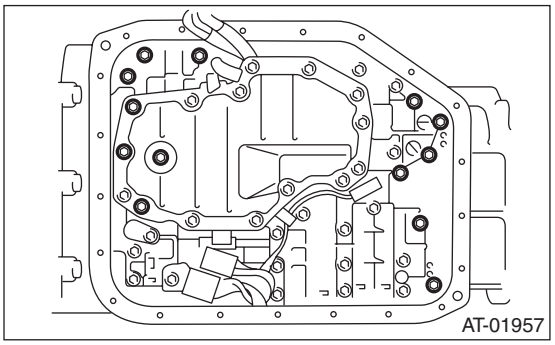
9) Clean the magnet.
10) Completely remove the remaining liquid gasket on the transmission case and oil pan.
11) Disconnect the control valve connector and front vehicle speed sensor connector.



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

12) Remove the control valve body.

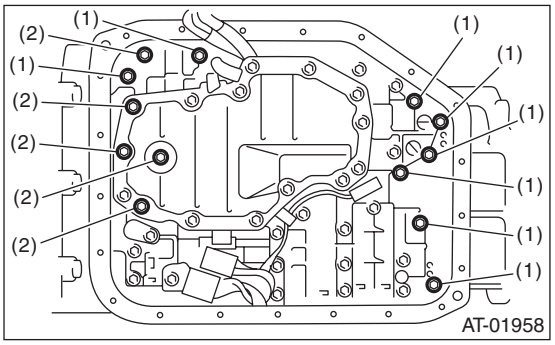
NOTE:
The control valve body is replaced as an assembly only, because it is a non-disassembly part.



B: INSTALLATION

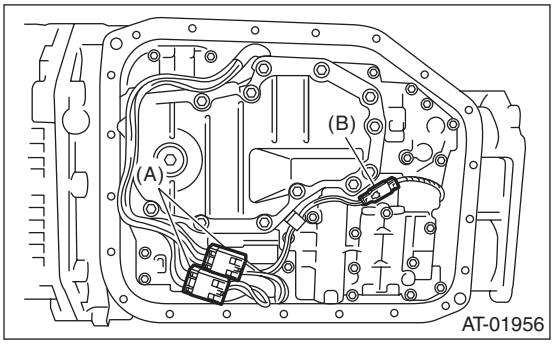
1) Check the control valve body for dust and other foreign matter.
2) Install the control valve body to transmission by equally tightening the bolts.

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



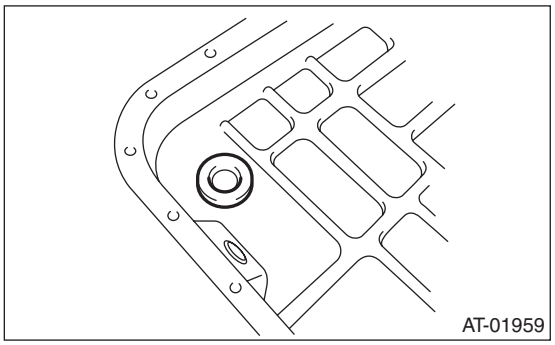
(1) 58 mm (2.28 in)
(2) 65 mm (2.56 in)

3) Connect the control valve connector.



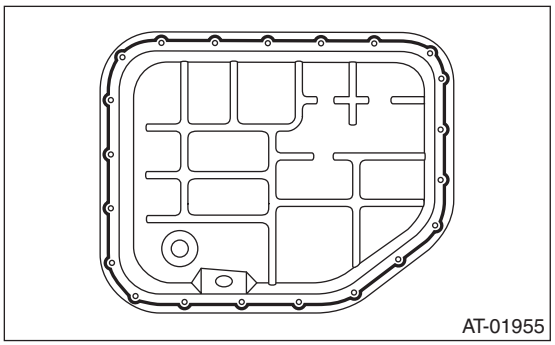
(A) Control valve connector
(B) Front vehicle speed sensor connector

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)



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

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

7) Pour ATF through the oil charge pipe.

Specified and recommended fluid:
<Ref. to 5AT-2, SPECIFICATION, General Description.>

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

8) Check the ATF level.
<Ref. to 5AT-28, Automatic Transmission Fluid.>
9) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
10) Perform the inspection with driving the vehicle 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.

NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

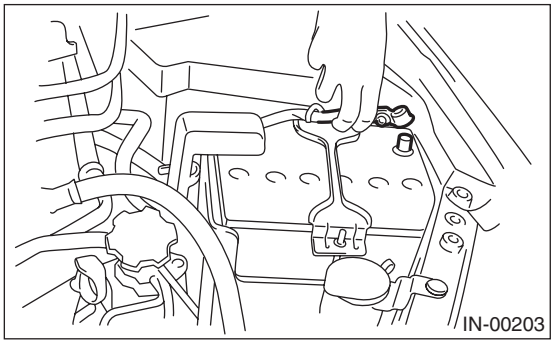
C: INSPECTION

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

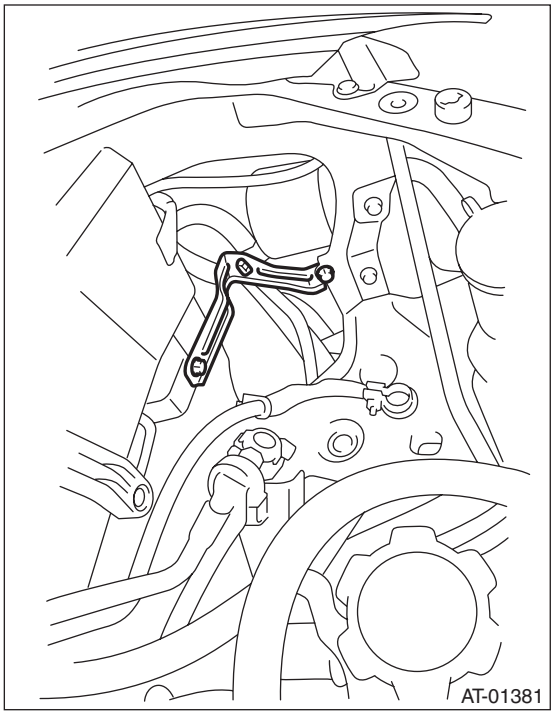
18.ATF Filter

A: REMOVAL

NOTE:
The ATF filter is maintenance free.
1) Disconnect the batteryground cable and remove the battery from the vehicle.



2) Remove the harness securing bracket.



3) Using the ST, remove the ATF filter.
ST 498545400 OIL FILTER WRENCH

B: INSTALLATION

1) Apply a thin coat of ATF to the oil seal part of new ATF filter.
2) Install the ATF filter. Turn it by hand, being careful not to damage oil seal.
3) Tighten the ATF filter using ST.
Calculate the ATF filter tightening torque using following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 78 mm (3.07 in)
L2: Torque wrench length
Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.4)

NOTE:
Align the ST with the torque wrench while tightening the ATF filter.
ST 498545400 OIL FILTER WRENCH
4) Fill ATF.
5) Inspect the level of ATF. <Ref. to 5AT-28, Automatic Transmission Fluid.>
6) Install the harness securing bracket.
7) Install the battery.

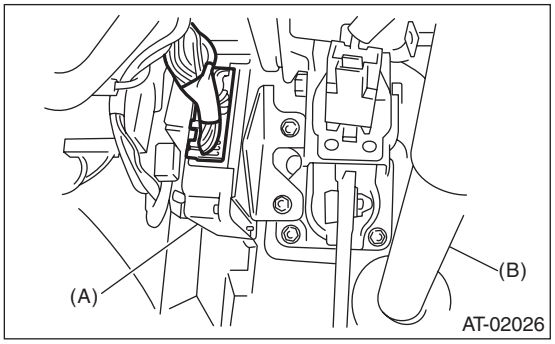
C: INSPECTION

Check for rust, hole, ATF leaks or other damage.
Replace the part if any damage is found in the inspection.

19.Transmission Control Module (TCM)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lower cover and then disconnect the connector.
3) Disconnect the connector from TCM.



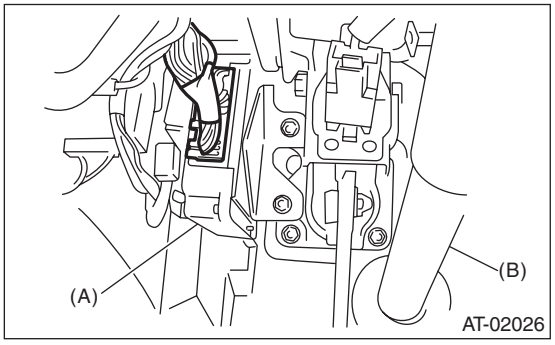
(A) Transmission control module (TCM)
(B) Steering column

4) Remove the relay from TCM body.
5) Remove the TCM.

B: INSTALLATION

1) Install the relay to TCM body.
2) Install the TCM.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



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

3) Connect the connector to the TCM.
4) Install in the reverse order of removal.
5) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
6) Perform the inspection with driving the vehicle at the end of repair work, and make sure there is no faulty as below;

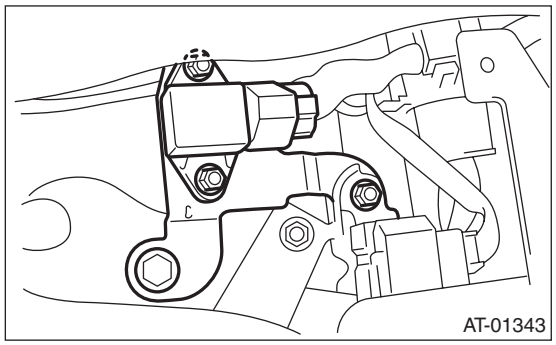
- Excessive shift shock
- Oil leakage from the transmission body, etc.
- Occurrence of noise caused by interference etc.

NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

20.Lateral G Sensor

A: REMOVAL

1) Remove the console box. <Ref. to EI-51, REMOVAL, Console Box.>
2) Disconnect the connector from the lateral G sensor.

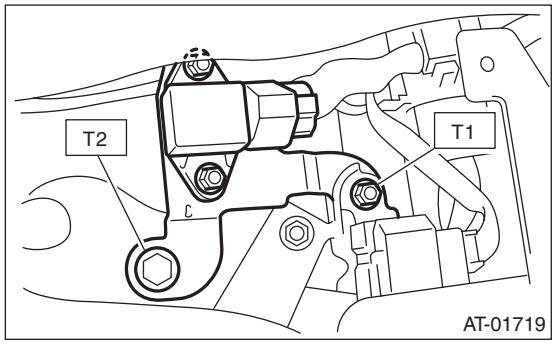


3) Remove the lateral G sensor.

B: INSTALLATION

Install in the reverse order of removal.

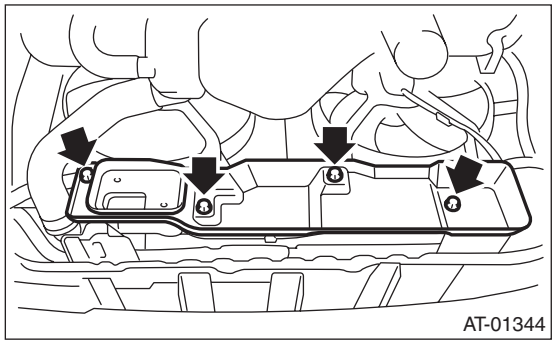
Tightening torque:
T1: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
T2: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



21.ATF Cooler Pipe and Hose

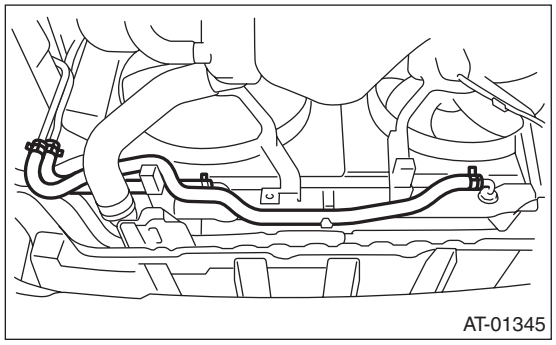
A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the battery.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the radiator under cover.



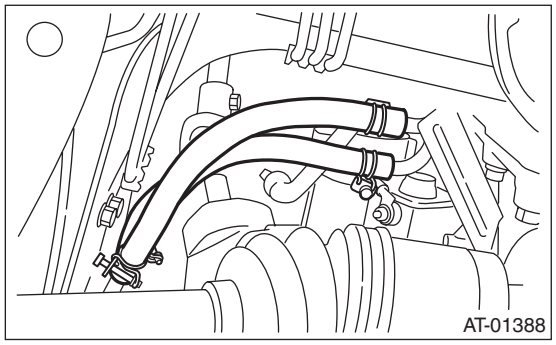
6) Disconnect the ATF cooler hose from the radiator.

NOTE:
• Do not use a screwdriver or other pointed tools.
• If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.

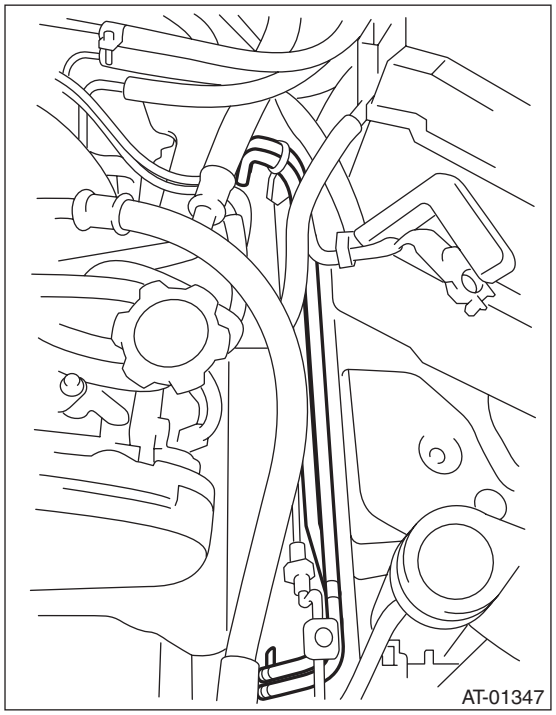


7) Disconnect the ATF cooler hoses from the pipes.

NOTE:
• Do not use a screwdriver or other pointed tools.
• If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.

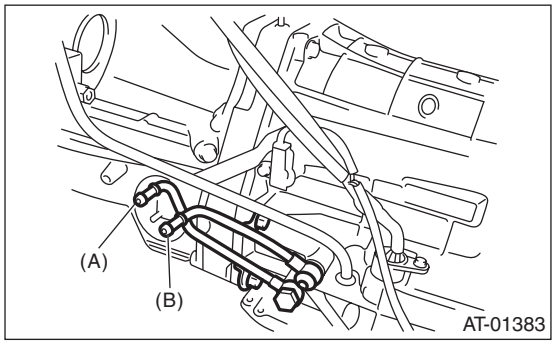


8) Disconnect the ATF cooler pipe from frame.



9) Remove the oil cooler inlet and outlet pipes.

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

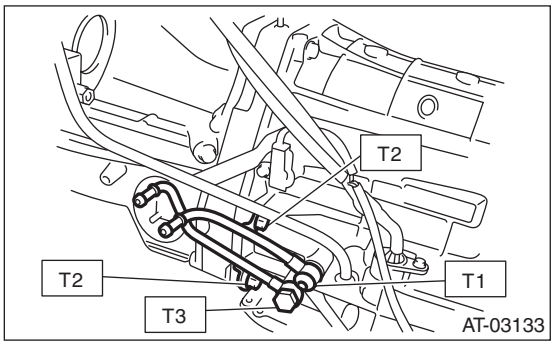


(A) Outlet pipe
(B) Inlet pipe

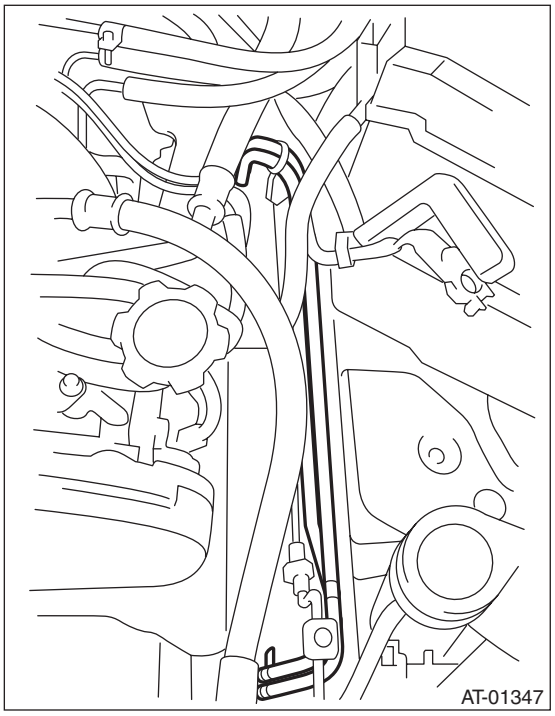
B: INSTALLATION

1) Install the oil cooler inlet and outlet pipes with new washer.

Tightening torque:
T1: 40 N·m (4.1 kgf-m, 29.5 ft-lb)
T2: 41 N·m (4.2 kgf-m, 30.4 ft-lb)
T3: 45 N·m (4.6 kgf-m, 33.2 ft-lb)

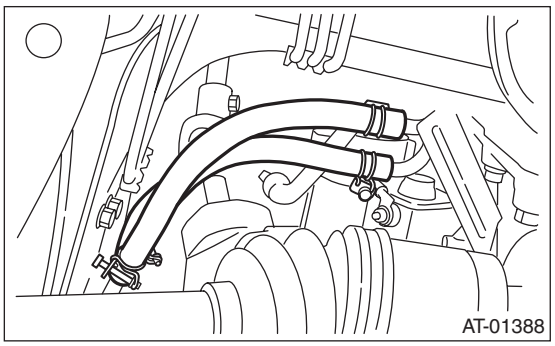


2) Install the ATF cooler pipe to frame.



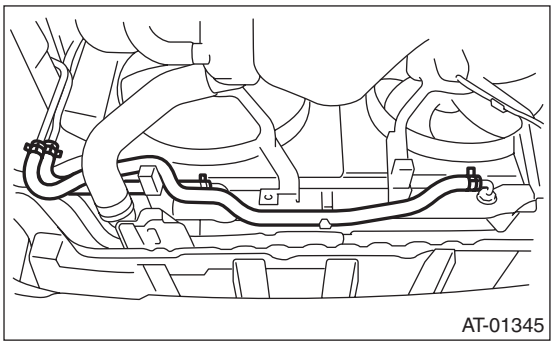
3) Connect the ATF cooler hose to the pipe on the transmission side.

NOTE:
• Install so that the hose is not folded over, excessively bent or twisted.
• Insert the hose to the specified position.

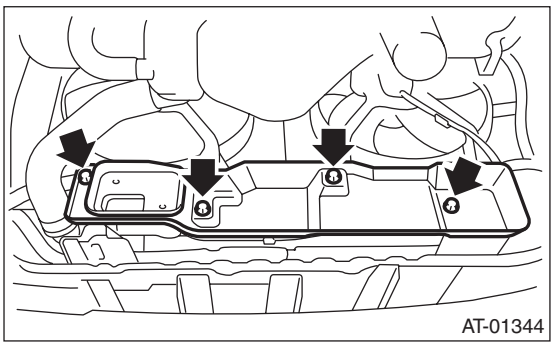


4) Connect the ATF cooler hose to the pipe on the radiator side.

NOTE:
• Install so that the hose is not folded over, excessively bent or twisted.
• Insert the hose to the specified position.



5) Install the radiator under cover.
Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



6) Install the under cover.
7) Install the battery.
8) Fill ATF. <Ref. to 5AT-28, Automatic Transmission Fluid.>

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

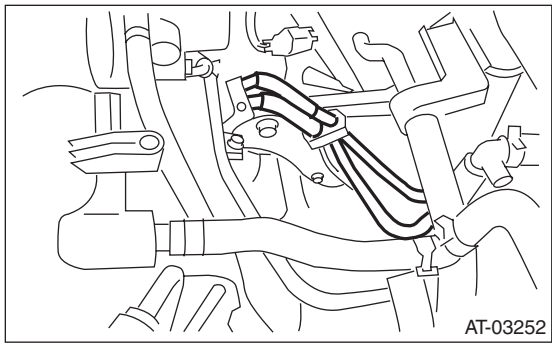
C: INSPECTION

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

22.Air Breather Hose

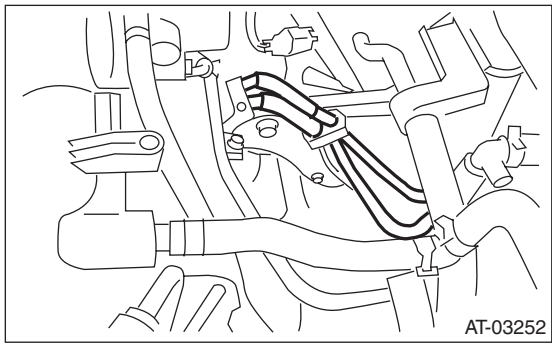
A: REMOVAL

1) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
3) Disconnect the air breather hose.



B: INSTALLATION

1) Connect the air breather hose.



2) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

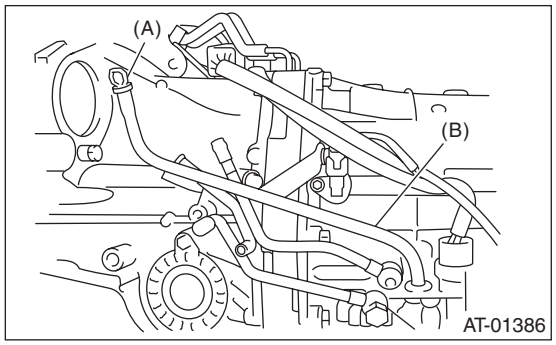
C: INSPECTION

Make sure the hose is not cracked or clogged.

23.Oil Charge Pipe

A: REMOVAL

1) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
3) Remove the oil charge pipe, and then remove the O-ring from flange side.

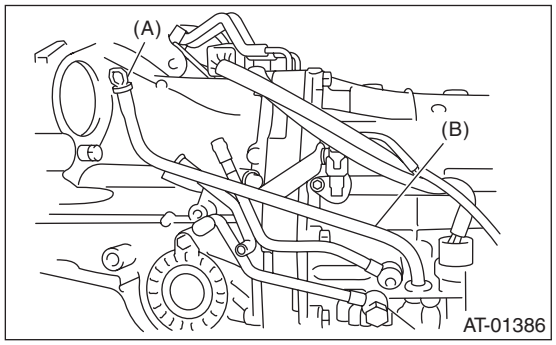


(A) Oil level gauge
(B) Oil charge pipe

B: INSTALLATION

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

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



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

2) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

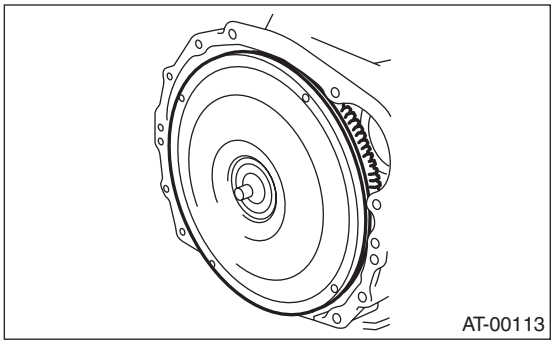
Make sure the oil charge pipe is not deformed or damaged.

24.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.



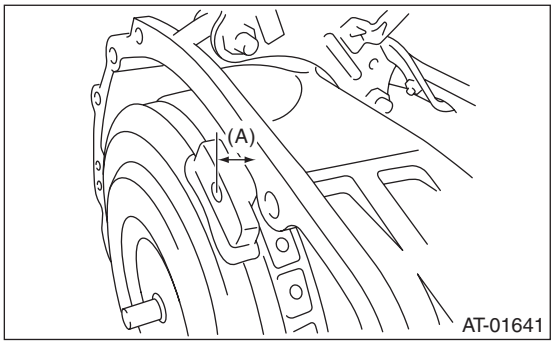
3) Remove the oil pump shaft from torque converter as necessary.

B: INSTALLATION

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

NOTE:
Make sure the clip 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



(A) Dimension A

6) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

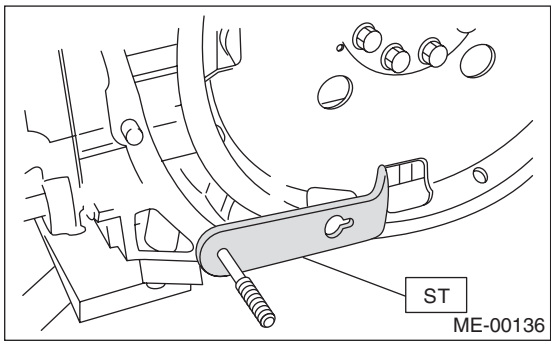
C: INSPECTION

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

25.Drive Plate

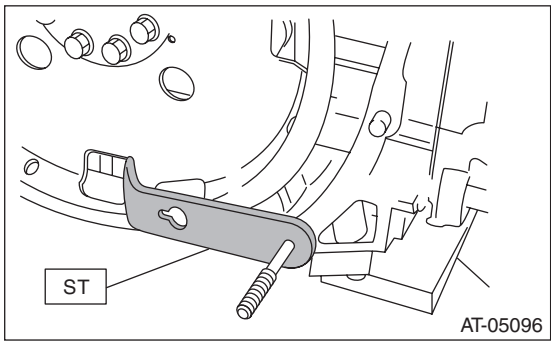
A: REMOVAL

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.
ST 498497100 CRANKSHAFT STOPPER



B: INSTALLATION

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



3) Tighten the drive plate in three stages. (turbo model)
(1) Tighten the drive plate mounting bolt.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)
(2) Additionally tighten the drive plate mounting bolts.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)
(3) While checking the tightening angle with the ST, further tighten the drive plate mounting bolts.

Tightening angle:
30°±5°
ST 18854AA000 ANGLE GAUGE

4) Tighten the drive plate to the specified torque. (non-turbo model)

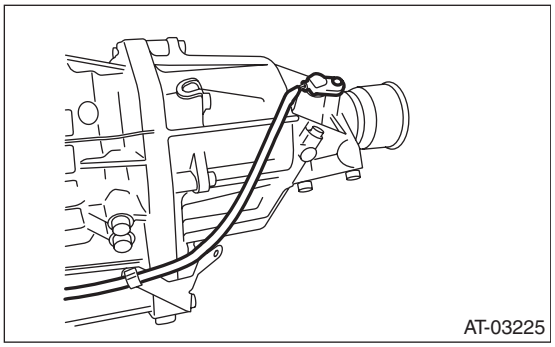
NOTE:
Tighten the drive plate mounting bolts gradually. Each bolt should be tightened in a crisscross order.

Tightening torque:
81 N·m (8.3 kgf-m, 60 ft-lb)
5) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

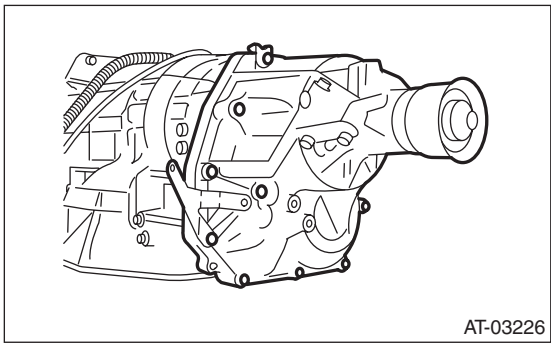
26.Extension Case

A: REMOVAL

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


AT-03225

3) Remove the extension case.

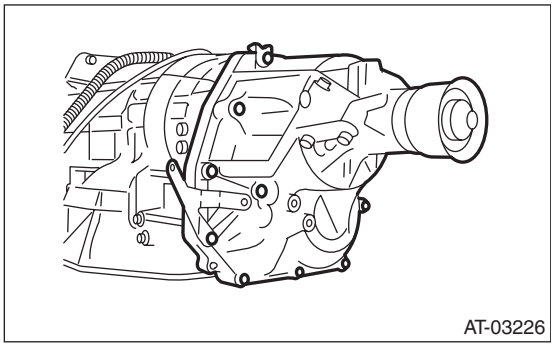

AT-03226

B: INSTALLATION

1) Attach the selected reduction driven gear shim to end surface of reduction driven gear with vaseline. <Ref. to 5AT-72, ADJUSTMENT, Reduction Driven Gear.>
2) Install the extension case.

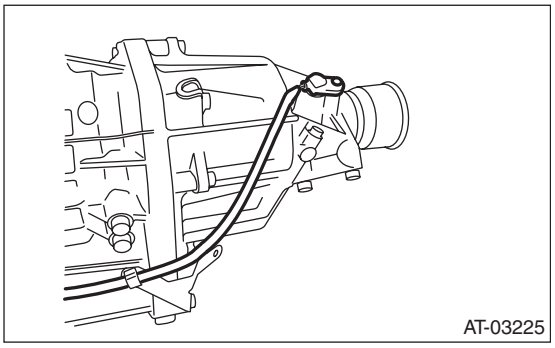
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)


AT-03226

3) Install the rear vehicle speed sensor.

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

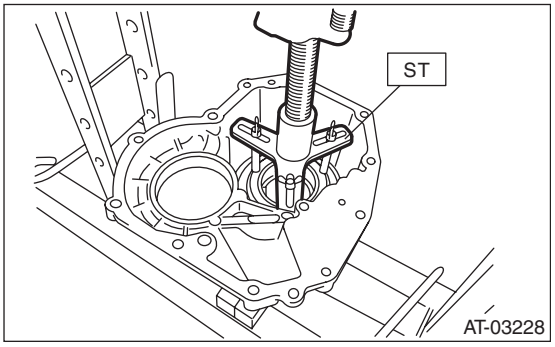

AT-03225

4) Install the transmission assembly.
<Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

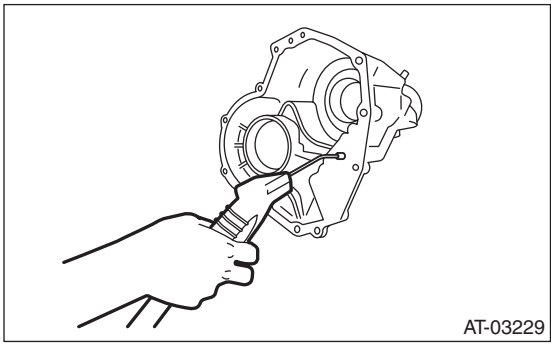
1) Take out the transfer clutch and multi-plate clutch hub assembly by lightly tapping the end of rear drive shaft.

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



AT-03228

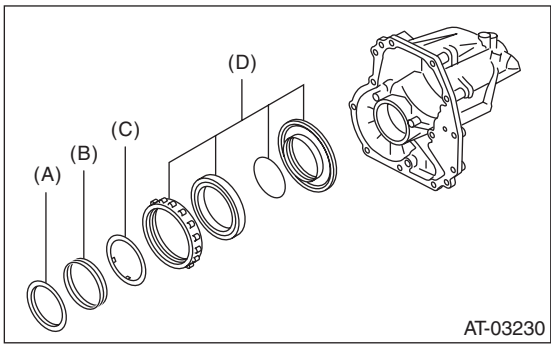
3) Remove the clutch piston by applying compressed air.


AT-03229

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

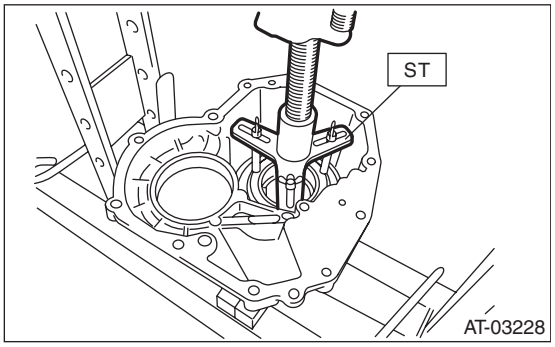
D: ASSEMBLY

1) Press-fit the new oil seal using ST and the press.
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-68, INSTALLATION, Transfer Clutch.>
6) Install the multi-plate hub assembly.

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-68, ADJUSTMENT, Transfer Clutch.>

27.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-66, REMOVAL, Extension Case.>, <Ref. to 5AT-66, DISASSEMBLY, Extension Case.>

B: INSTALLATION

1) Select the rear drive shaft shim. <Ref. to 5AT-68, ADJUSTMENT, Transfer Clutch.>
2) Select driven plate No. 3. <Ref. to 5AT-68, ADJUSTMENT, Transfer Clutch.>
3) Install the extension case. <Ref. to 5AT-66, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

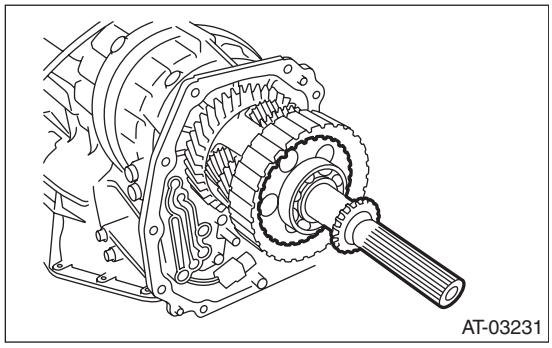
C: INSPECTION

- 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-68, ADJUSTMENT, Transfer Clutch.>

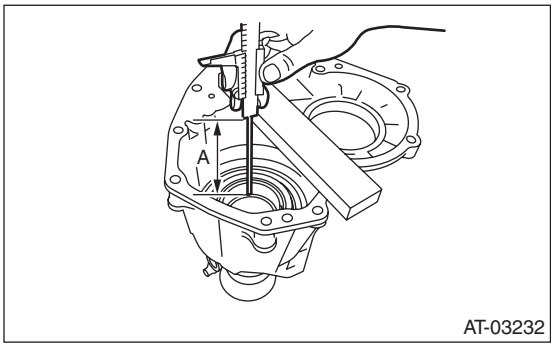
D: ADJUSTMENT

1. REAR DRIVE SHAFT SHIM SELECTION

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


AT-03231

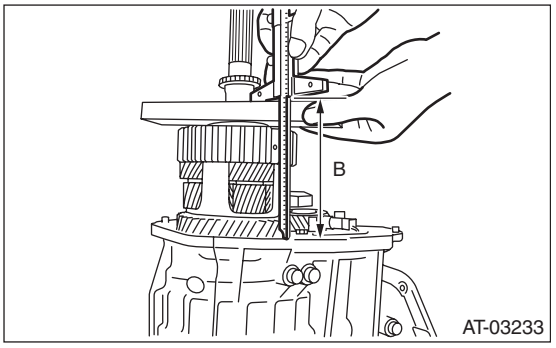
2) Using the ST, measure the depth “A”, which is from mating surface of extension case to ball bearing outer ring contact surface.
ST 398643600 GAUGE



AT-03232

A Measured value

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



AT-03233

B Measured value

4) Calculation formula:
When clearances are 0.05 mm (0.0020 in):
T (mm) = A – B + 0.23
[T (in) = A – B + 0.009]
When clearances are 0.25 mm (0.0098 in):
T (mm) = A – B + 0.03
[T (in) = A – B + 0.001]
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

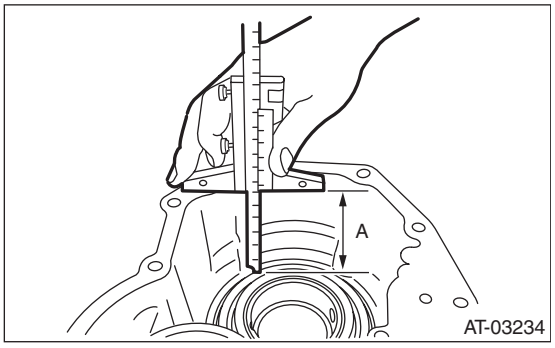
Standard:
0.05 — 0.25 mm (0.0020 — 0.0098 in)

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))

Adjustment shim	
Part number	Thickness mm (in)
33281AA040	0.2 (0.008)
33281AA050	0.5 (0.020)
33281AA060	0.3 (0.012)

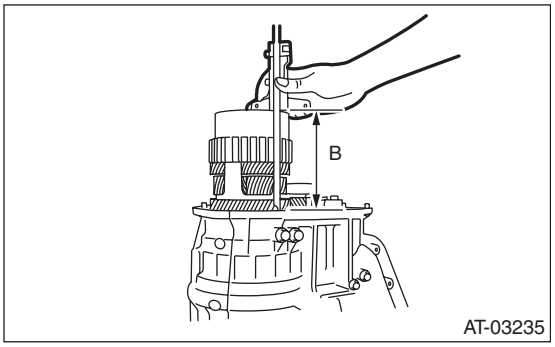
2. SELECTION OF DRIVEN PLATE NO. 3

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 multi-plate clutch (LSD) piston.



3) Using the ST, measure the height “B” from the AT main case mating surface to end of ST, and then subtract the thickness of ST (piston guide) (50 mm (1.97 in)) from measured value.

ST 398744300 PISTON GUIDE



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

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

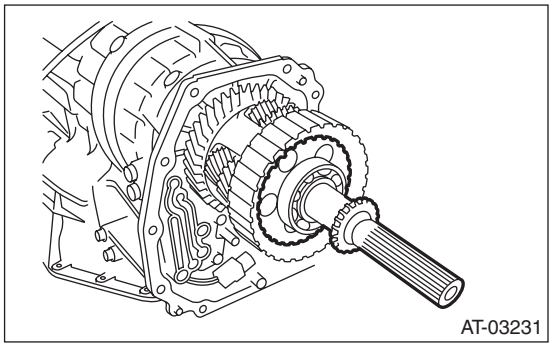
NOTE:
Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 398744300 PISTON GUIDE). When not using the ST,
When clearances are 0.2 mm (0.008 in):
T (mm) = A – (B – α – 0.28) – 0.2
[T (in) = A – (B – α – 0.011) – 0.008]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – 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 extension case to multi-plate clutch (LSD) 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.

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

28.Rear Drive Shaft

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 then remove the extension case. <Ref. to 5AT-66, REMOVAL, Extension Case.>
3) Pull out the rear driveshaft from center differential assembly.



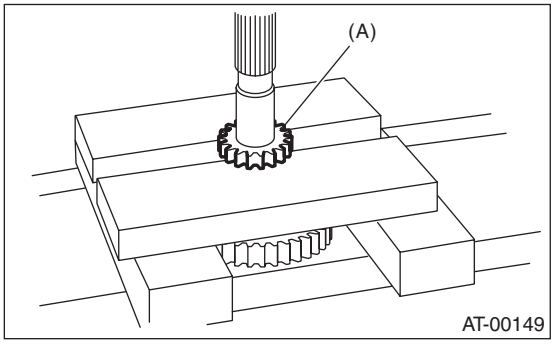
4) Remove the drive plate and driven plate.

B: INSTALLATION

1) Select the shim. <Ref. to 5AT-68, ADJUSTMENT, Transfer Clutch.>
2) Install drive plate and driven plate.
3) Insert the rear driveshaft into the center differential assembly.
4) Combine the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-66, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

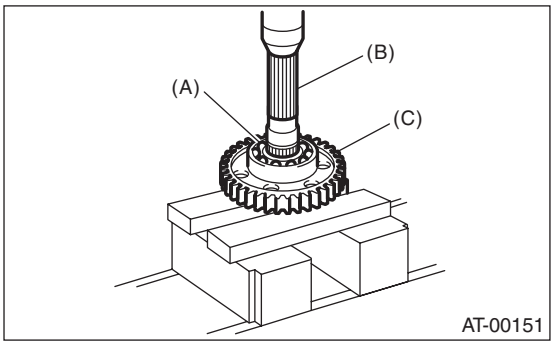
C: DISASSEMBLY

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.

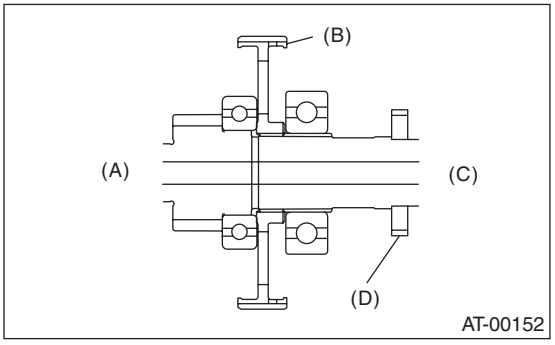


(A) Rear ball bearing
(B) Rear drive shaft
(C) Clutch hub

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

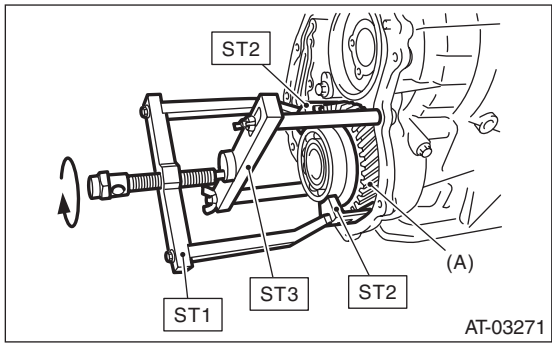
E: INSPECTION

- 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-68, ADJUSTMENT, Transfer Clutch.>

29.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 wheel speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-66, 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



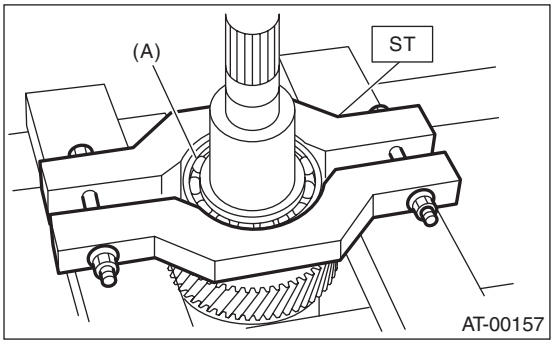
(A) Reduction driven gear

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-72, ADJUSTMENT, Reduction Driven Gear.>
4) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-66, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

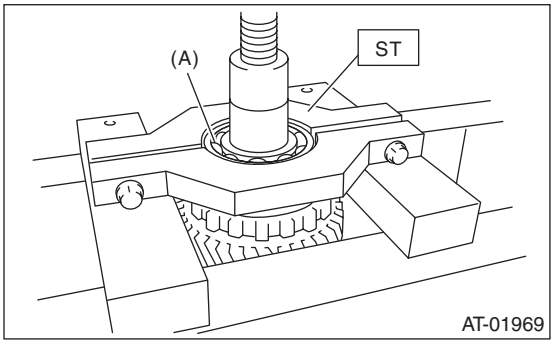
C: DISASSEMBLY

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



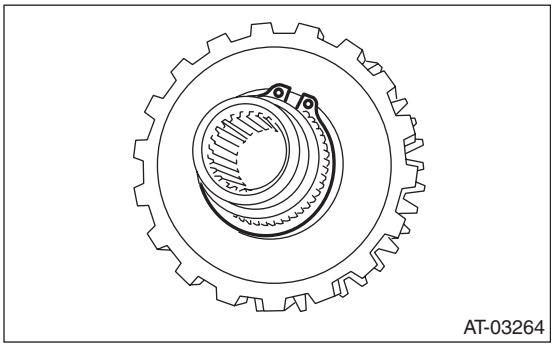
(A) Ball bearing

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

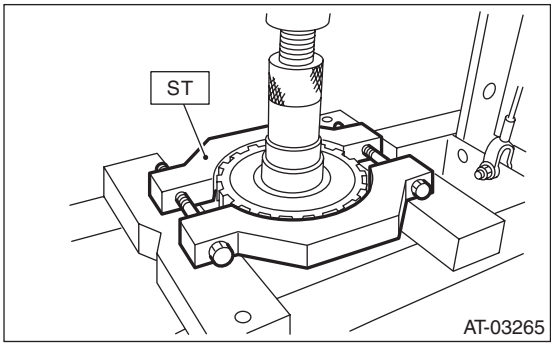


(A) Ball bearing

3) Remove the snap ring of the parking gear.

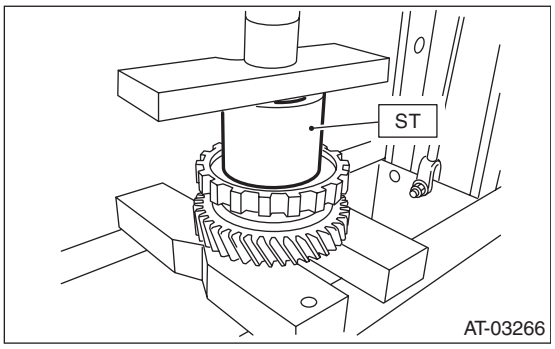


4) Using the ST, remove the parking gear.
ST 18767AA000 REMOVER

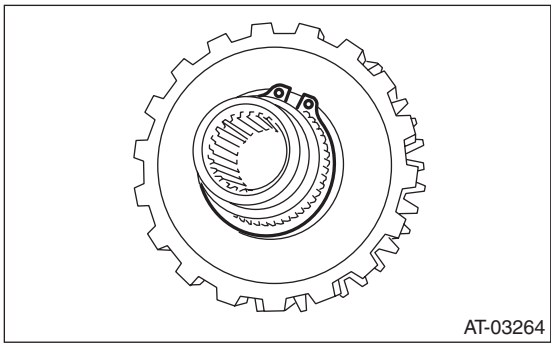


D: ASSEMBLY

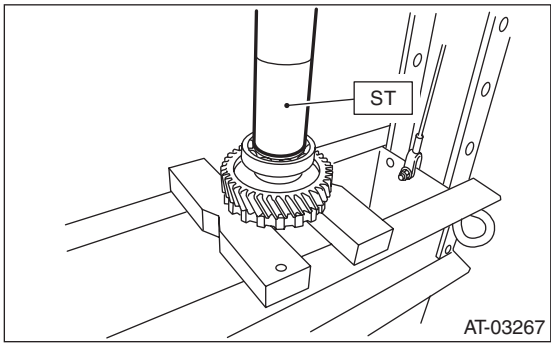
1) Using the ST, install the parking gear.
ST 499755602 PRESS



2) Install the snap ring.

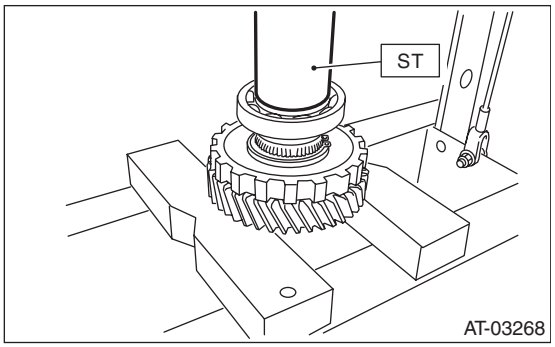


3) Install the new ball bearing to reduction driven gear using press.
ST 18654AA000 INSTALLER



(A) Ball bearing 1

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

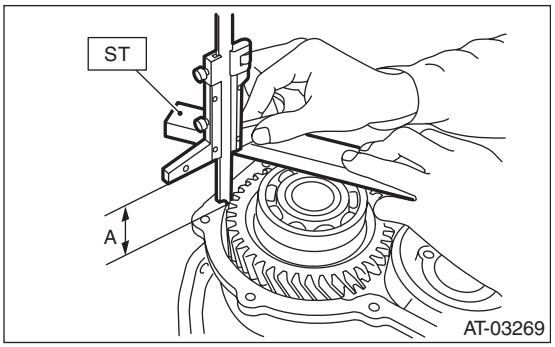


E: INSPECTION

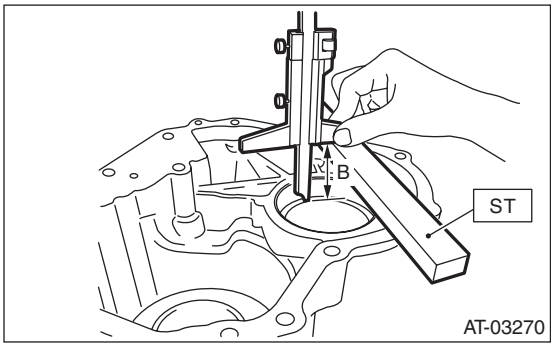
Make sure the ball bearing and gear is not deformed or damaged.

F: ADJUSTMENT

1) Using the ST, measure the height “A” from the AT main case mating surface to 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



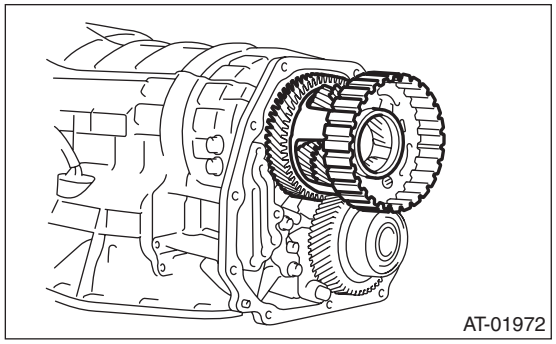
3) Calculation formula:
Select the ball bearing shim from the table to adjust clearances within 0.05 — 0.25 mm (0.0020 — 0.0098 in).
When clearances are 0.05 mm (0.0020 in):
T (mm) = B – A + 0.23
[T (in) = B – A + 0.0091]
When clearances are 0.25 mm (0.0098 in):
T (mm) = B – A + 0.03
[T (in) = B – A + 0.0011]
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

Reduction gear shim	
Part number	Thickness mm (in)
31288AA030	0.2 (0.008)
31288AA050	0.5 (0.020)
31288AA060	0.3 (0.012)

30.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-66, REMOVAL, Extension Case.>
3) Extract the rear drive shaft. <Ref. to 5AT-70, REMOVAL, Rear Drive Shaft.>
4) Pull out the center differential carrier assembly.

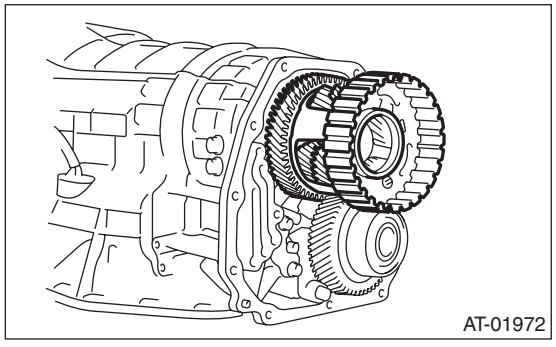


5) Pull out the shim(s) from transmission case.

B: INSTALLATION

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

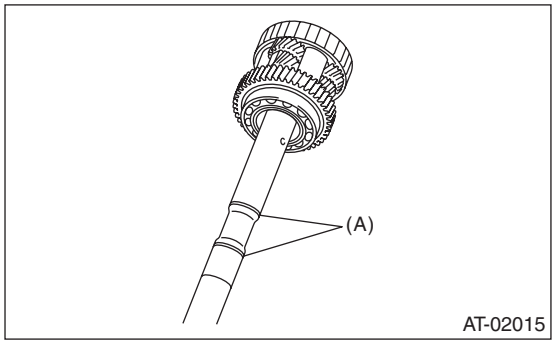
NOTE:
Press-fit it to the bottom of bearing shoulder completely.



2) Insert the rear drive shaft. <Ref. to 5AT-70, INSTALLATION, Rear Drive Shaft.>
3) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-66, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

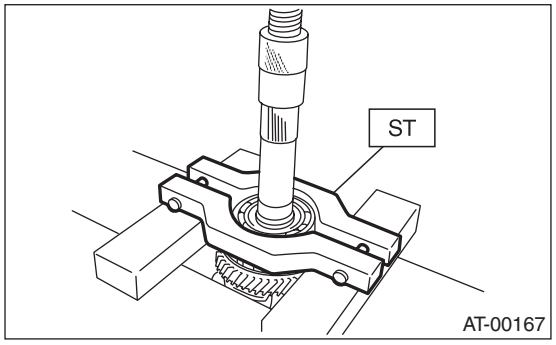
C: DISASSEMBLY

1) Remove the seal ring.

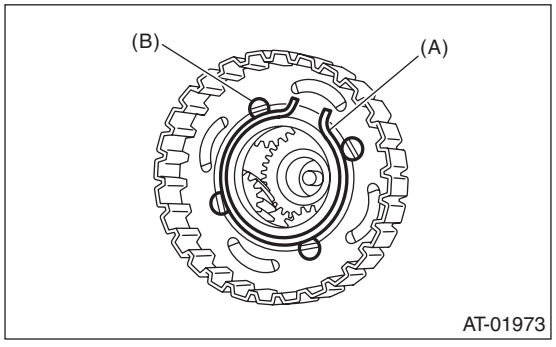


(A) Seal ring

2) Using a press and ST, remove the ball bearing.
ST 498077600 REMOVER

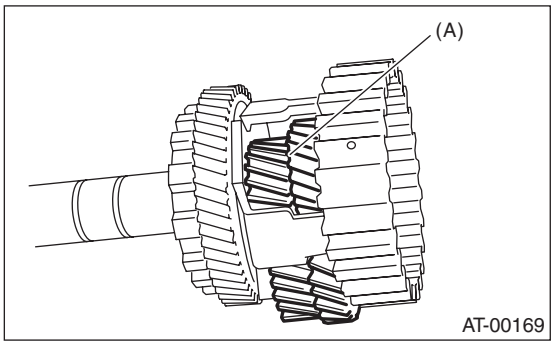


3) Remove the snap ring, and pull out the shaft from center differential assembly.



(A) Snap ring
(B) Shaft

4) Remove the thrust washers, pinion gears and washers from center differential assembly.

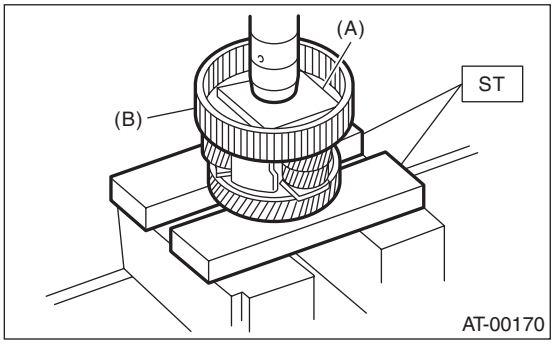


(A) Pinion gear

5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

1) Install the thrust washer onto intermediate shaft.
2) Install the thrust bearing onto intermediate shaft.
3) Install the pinion gears and washers.
4) Insert the shaft into the center differential assembly.
5) Install the snap ring.
6) Using a press, install a new ball bearing into the center differential assembly.
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.

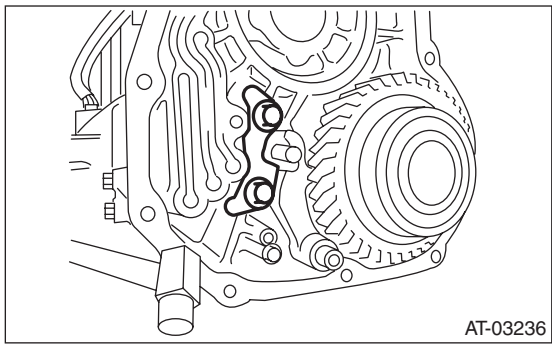
E: INSPECTION

• 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-68, ADJUSTMENT, Transfer Clutch.>

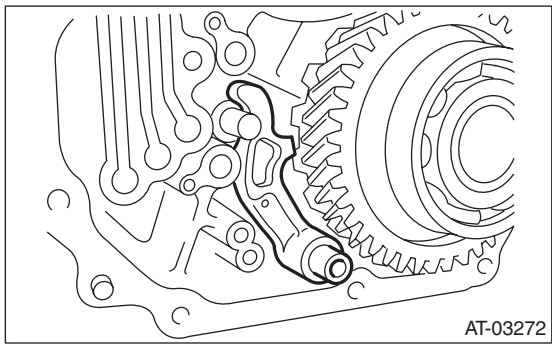
31.Parking Pawl

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-66, 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-49, REMOVAL, Front Vehicle Speed Sensor.>
5) Remove the parking support actuator.

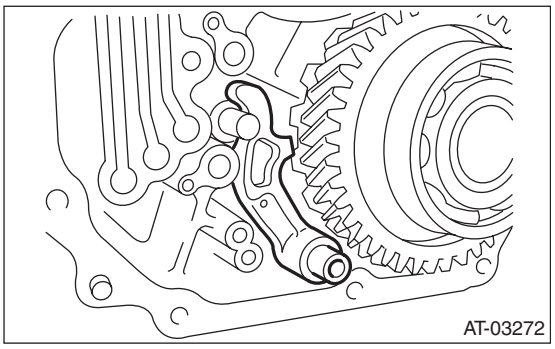


6) Remove the parking pawl, parking pawl shaft and return spring.



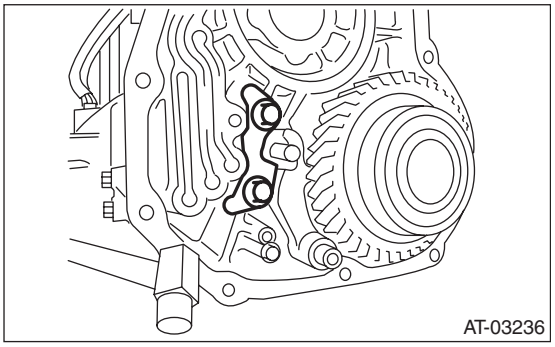
B: INSTALLATION

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±2 N·m (1.0±0.2 kgf-m, 7.4±1.5 ft-lb)

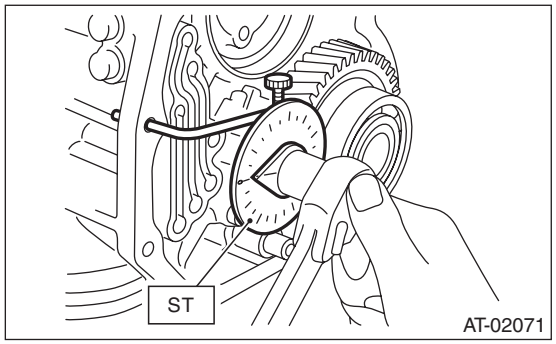


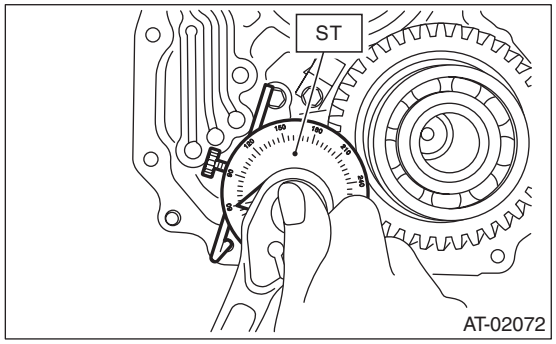
4) Using the ST, tighten the bolts which tightened in step 3) with specified angle.

Tightening angle:
17°±2°

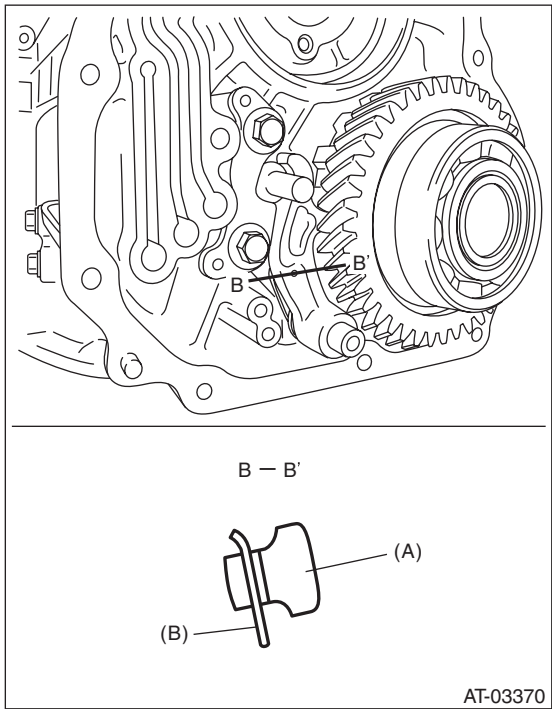
ST 18854AA000 ANGLE GAUGE

NOTE:
Do not use extension as much as possible.





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-66, INSTALLATION, Extension Case.>
9) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

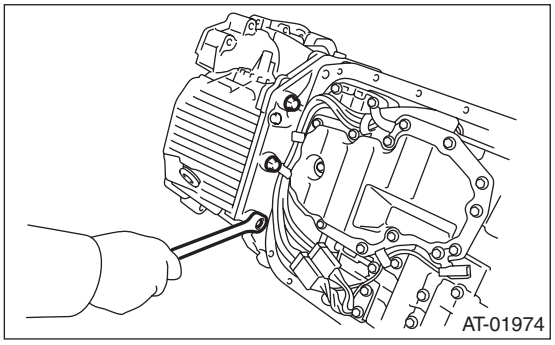
C: INSPECTION

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

32.Converter Case

A: REMOVAL

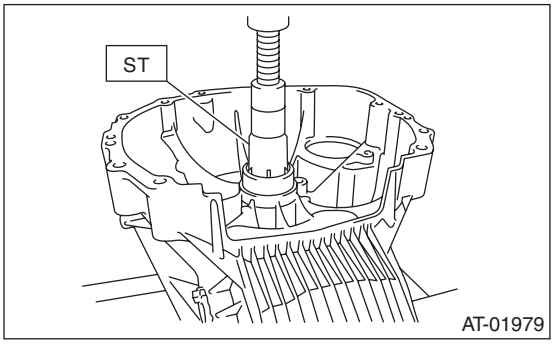
1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the torque converter assembly. <Ref. to 5AT-64, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the turbine speed sensor 1. <Ref. to 5AT-54, REMOVAL, Turbine Speed Sensor 1.>
5) Remove the oil charge pipe. <Ref. to 5AT-63, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Filter.>
7) Remove the converter case attachment bolts.
8) Lay along the transmission body, and then remove the oil pan.
9) Remove the three converter case mounting bolts (TORX®).
ST 18676AA020 TORX® WRENCH



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

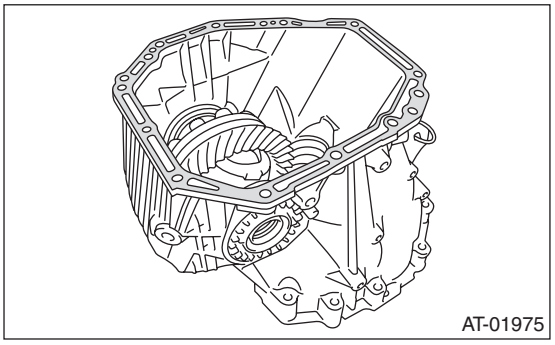
B: INSTALLATION

1) Check the appearance of each component and clean them.
2) Press-fit the oil seal to converter case using ST.
ST 499587100 OIL SEAL INSTALLER



3) Install the differential assembly to the case. <Ref. to 5AT-88, INSTALLATION, Front Differential Assembly.>
4) Install the right and left side retainers. <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.>
5) Apply proper amount of liquid gasket to the entire matching surface of converter case.

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

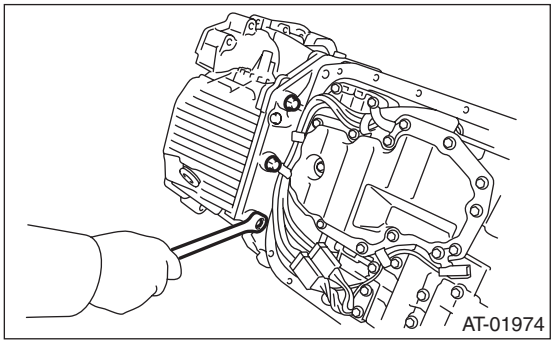


6) Install the converter case assembly without damaging bushing and oil seal.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

7) Install the three converter case mounting bolts (TORX®).
ST 18676AA020 TORX® WRENCH

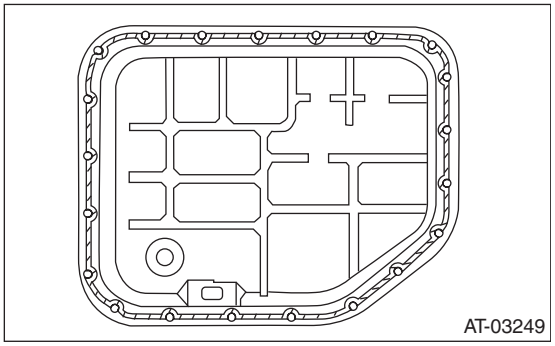
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



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)

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



9) Install the transmission harness connector to the stay.
10) Install the air breather hose. <Ref. to 5AT-62, INSTALLATION, Air Breather Hose.>
11) Install the ATF filter pipe. <Ref. to 5AT-57, INSTALLATION, ATF Filter.>
12) Install the oil charge pipe with O-ring. <Ref. to 5AT-63, INSTALLATION, Oil Charge Pipe.>
13) Install the torque converter assembly. <Ref. to 5AT-64, INSTALLATION, Torque Converter Assembly.>
14) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

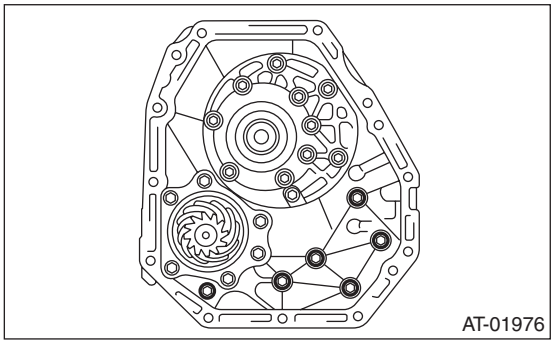
C: INSPECTION

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

33.Oil Pump Cover

A: REMOVAL

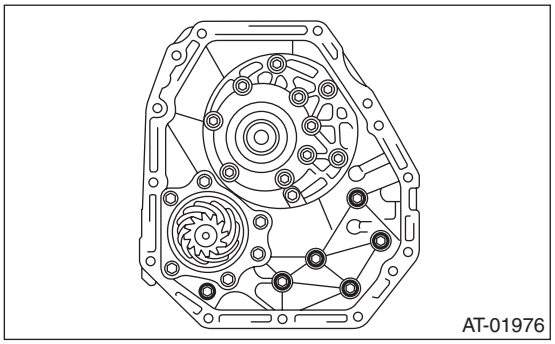
1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-64, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-63, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Filter.>
6) Separate the converter case and transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
7) 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.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

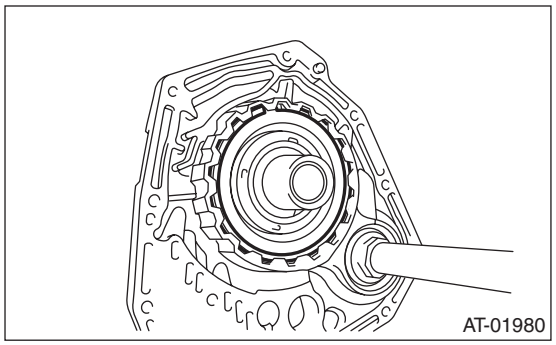


2) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-77, INSTALLATION, Converter Case.>
3) Install the transmission harness connector to the stay.
4) Install the ATF filter pipe. <Ref. to 5AT-57, INSTALLATION, ATF Filter.>
5) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-63, INSTALLATION, Oil Charge Pipe.>
6) Install the torque converter assembly. <Ref. to 5AT-64, INSTALLATION, Torque Converter Assembly.>
7) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

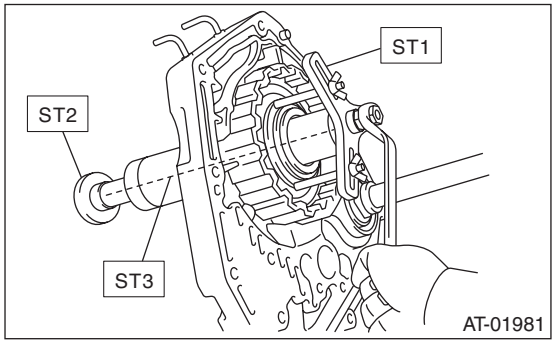
1. FRONT BRAKE

1) Remove the snap ring.



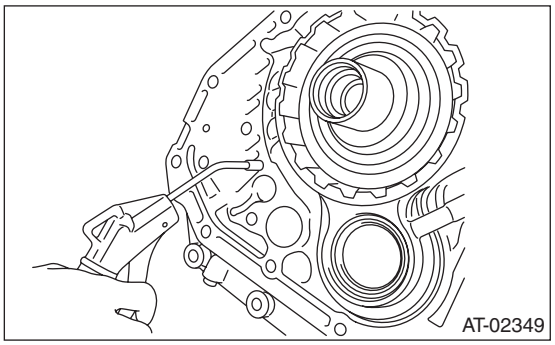
2) Remove the retainer plate, drive plate and driven plate.
3) Using the ST1, ST2 and ST3, remove the snap ring.

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



4) Remove the retainer and return spring.

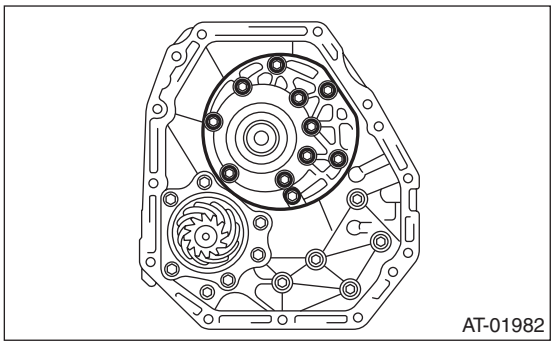
5) Remove the front brake piston using compressed air.



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

2. OIL PUMP

1) Take out the oil pump housing.



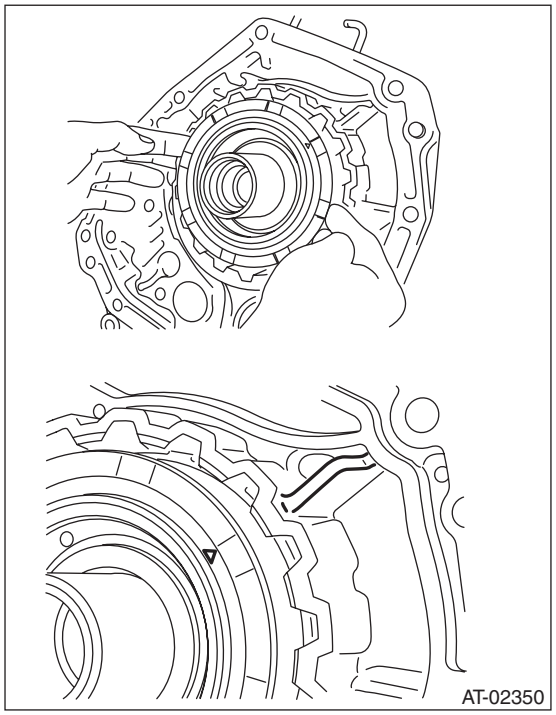
2) Take out the oil pump body.

D: ASSEMBLY

1. FRONT BRAKE

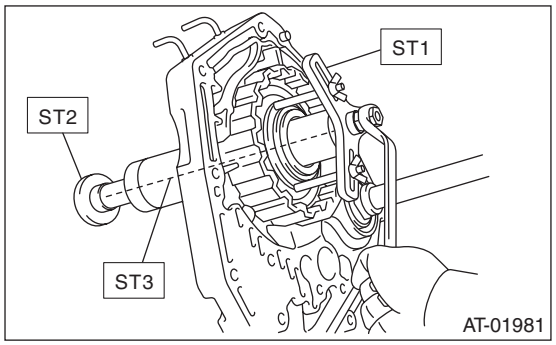
1) Apply ATF to D-ring, and then install it to the front brake piston.
2) Install the front brake piston to oil pump cover.

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



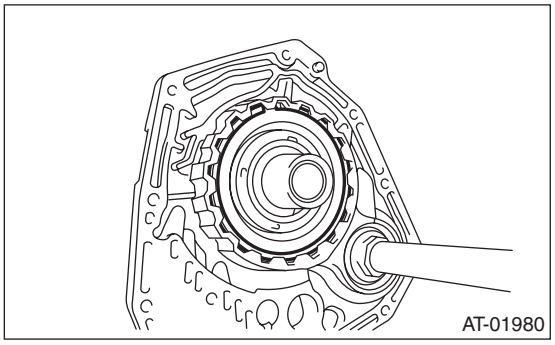
3) Install the retainer and return spring.
4) Install the front brake piston assembly using ST1, ST2 and ST3.

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



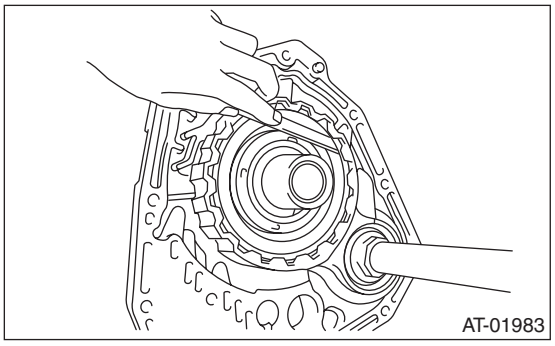
5) Install the genuine driven plate instead of retainer plate, and temporarily assemble the drive plate and driven plate.
Part No. 31536AA290DRIVEN PLATE

6) Install the snap ring.



7) Measure the clearance between retainer plate and snap ring, and then select the suitable retainer plate from table.

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



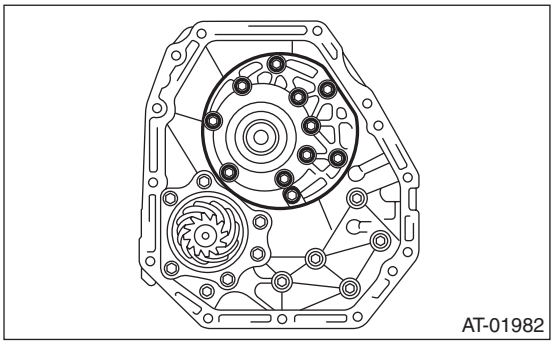
Front brake retainer plate	
Part number	Thickness mm (in)
31567AB130	3.4 (0.134)
31567AB140	3.6 (0.142)
31567AB150	3.8 (0.150)
31567AB160	4.0 (0.157)

8) Remove the snap ring, replace the drive plate used in measurement of clearance with the retainer 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.
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

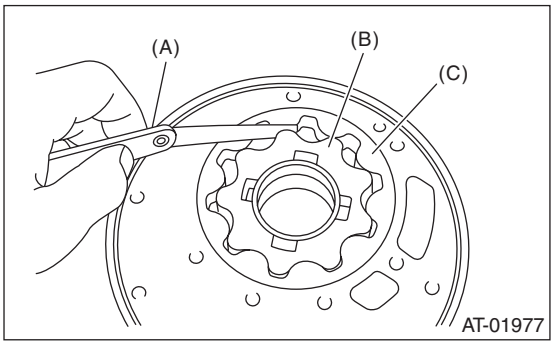
Check the following items.
- Drive plate facing for wear and damage
- Snap ring for wear, return spring for damage, and retainer for damage
- Piston for damage
- D-ring for damage

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.

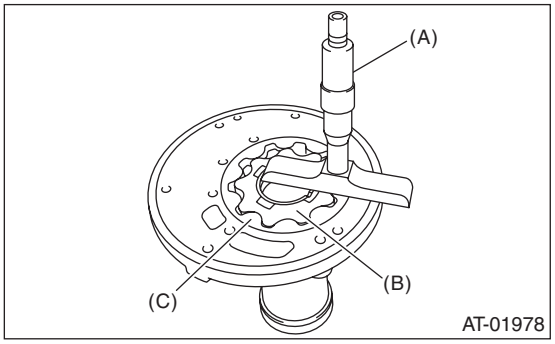
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(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 depth and/or side clearance are not within the specification, replace the rotor assembly.

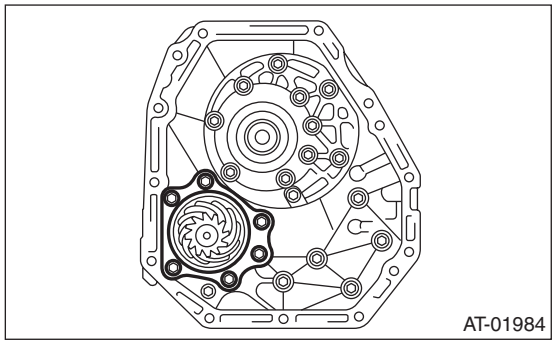
Oil pump rotor assembly	
Part number	Thickness mm (in)
15008AA130	11.37 — 11.38 (0.4476 — 0.4480)
15008AA140	11.38 — 11.39 (0.4480 — 0.4484)
15008AA150	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust it to be within specifications. <Ref. to 5AT-101, ADJUSTMENT, AT Main Case.>

34.Drive Pinion Shaft 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 assembly. <Ref. to 5AT-64, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose. <Ref. to 5AT-62, REMOVAL, Air Breather Hose.>
5) Remove the oil charge pipe. <Ref. to 5AT-63, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Filter.>
7) Separate the converter case and transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
8) Remove the drive pinion shaft mounting bolts, and then remove the drive pinion shaft assembly from oil pump cover.


AT-01984

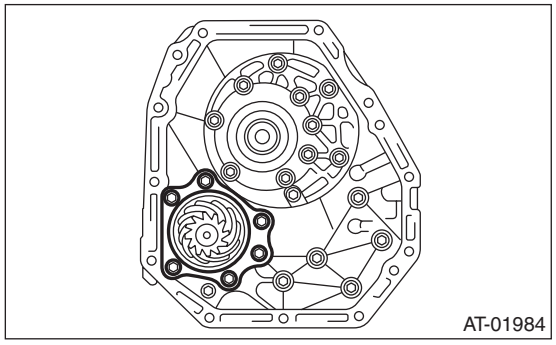
9) Remove the oil pump cover from AT main case. <Ref. to 5AT-79, Oil Pump Cover.>

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)

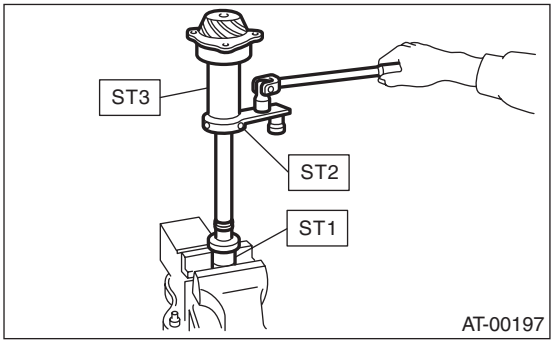

AT-01984

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 filter pipe. <Ref. to 5AT-57, INSTALLATION, ATF Filter.>
6) Install the oil charge pipe with O-ring.
7) Install the torque converter assembly. <Ref. to 5AT-64, INSTALLATION, Torque Converter Assembly.>
8) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

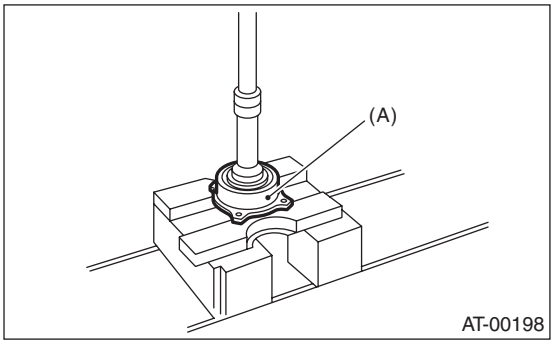
1) Flatten the lock nut tab, and then remove the lock nut while holding the rear spline part of the shaft using ST1 and ST2. Pull out the drive pinion collar.

ST1	18667AA010	HOLDER
ST2	499787700	WRENCH
ST3	499787500	ADAPTER



AT-00197

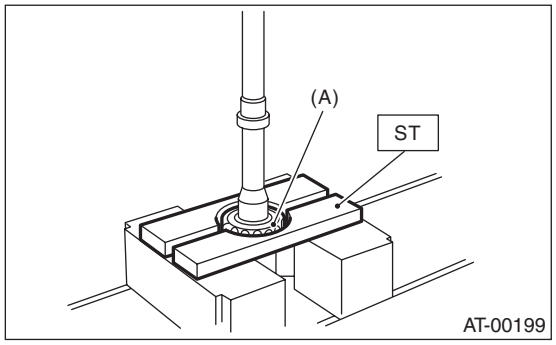
2) Remove the O-ring.
3) Separate the roller bearing and outer race from shaft using a press.



AT-00198

(A) Outer race

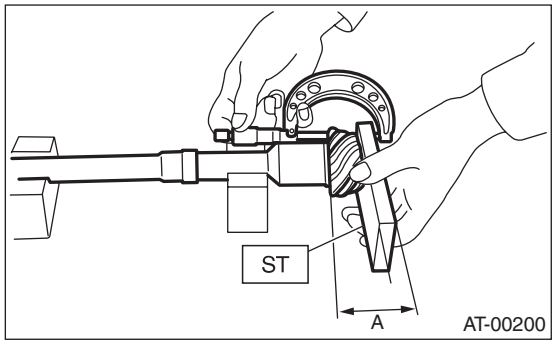
4) Separate the front roller bearing from shaft using a press and ST.
ST 498517000 REPLACER



(A) Front roller bearing

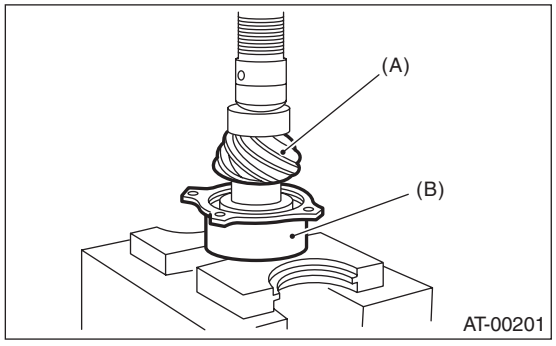
D: ASSEMBLY

1) Measure the dimension “A” of the 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

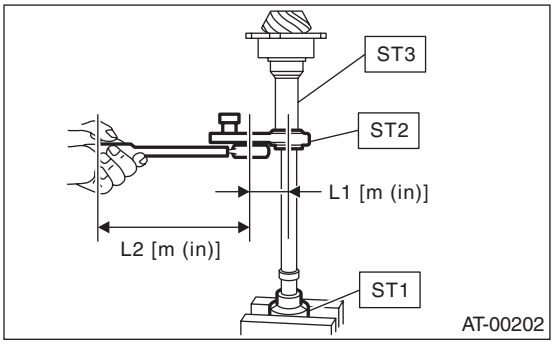
3) After fitting a new O-ring to the shaft, attach the drive pinion collar to the shaft.
4) Install the lock washer to drive pinion shaft in the proper direction.

5) Tighten the new lock nuts using ST1, ST2 and ST3.
Calculate the lock washer and lock nut specifications using following formula.
T2 = L2/(L1 + L2) × T1
T1: 116 N·m (11.8 kgf-m, 85.3 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)
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)

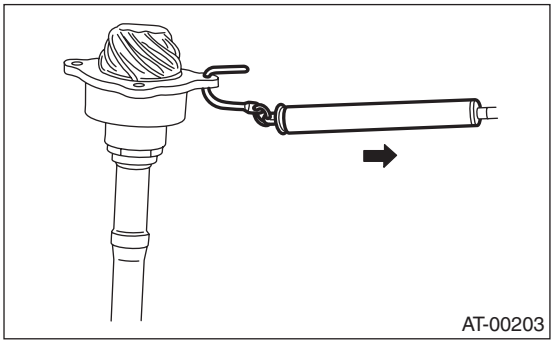
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

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



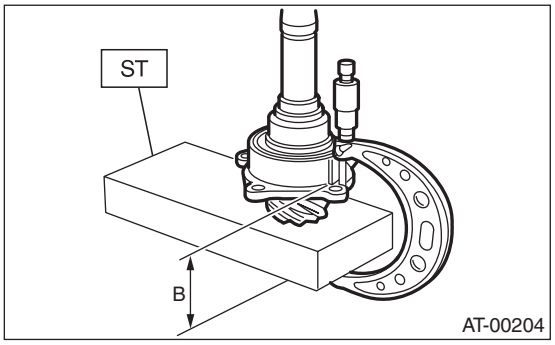
6) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

Starting torque:
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



7) Crimp the locknut in 2 locations.

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



9) Calculate the thickness “t” (mm) of the drive pinion shim.
$t = 6.5 \pm 0.0625 - (B - A)$
10) Select three or less shims from following table.

Drive pinion shim	
Part number	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.>

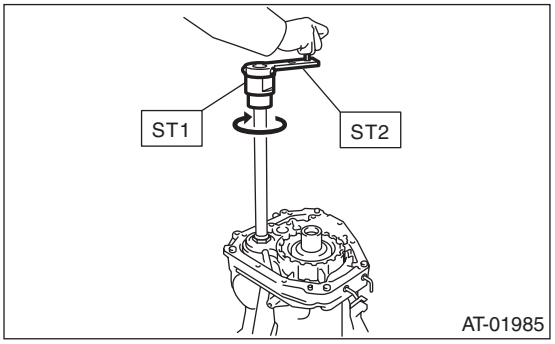
F: ADJUSTMENT

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

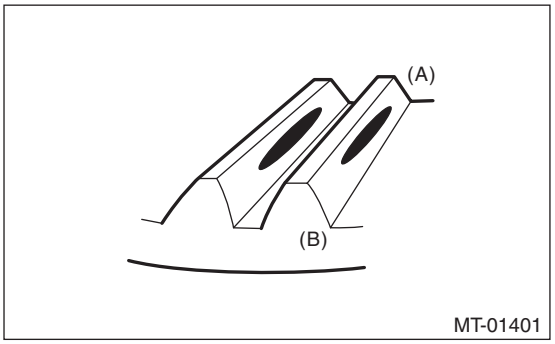
NOTE:
Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

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



4) Adjust the drive pinion and hypoid driven gear backlash. <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.>
5) Apply red lead evenly to the surfaces of three or four teeth on 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 shim thickness. <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.)

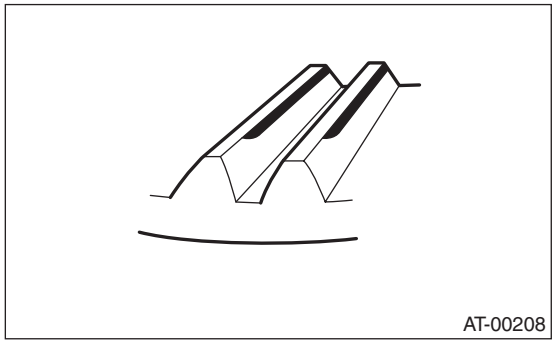


(A) Toe side
(B) Heel side

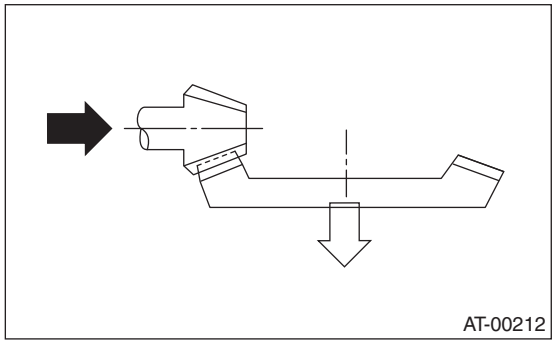
• Face contact

Check item: Backlash is too large.

Contact pattern



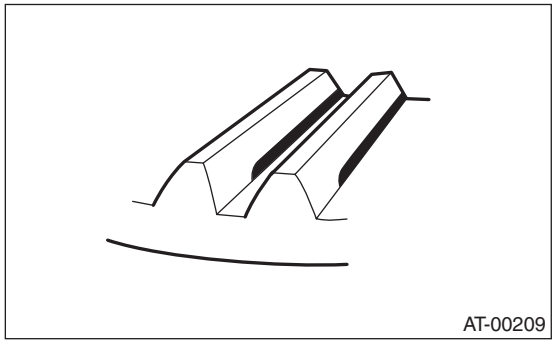
Corrective action: Increase thickness of pinion height adjusting washer according to the procedures for moving the drive pinion closer to the driven gear.



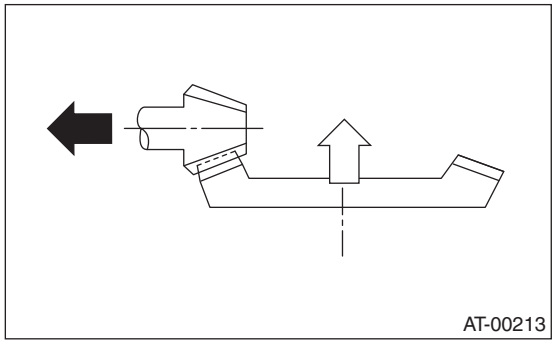
• Flank contact

Check item: Backlash is too small.

Contact pattern



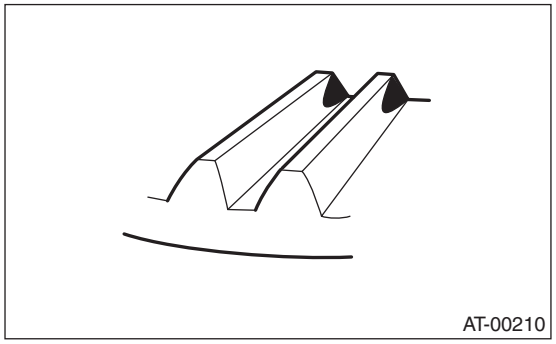
Corrective action: Reduce thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion away from the driven gear.



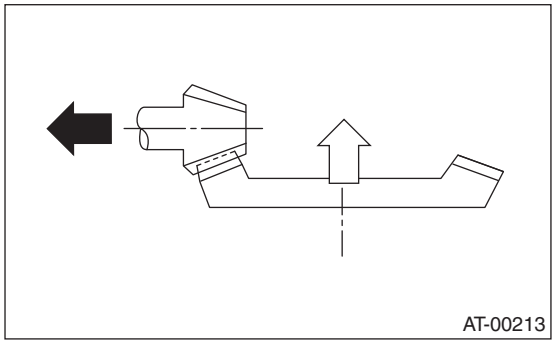
• Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



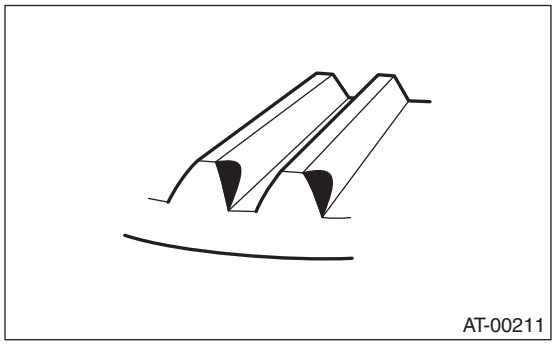
Corrective action: Reduce thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion away from the driven gear side.



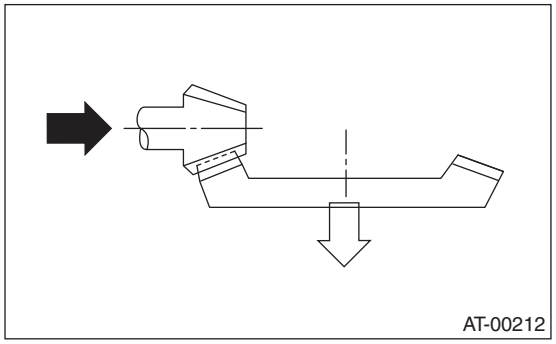
• Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern

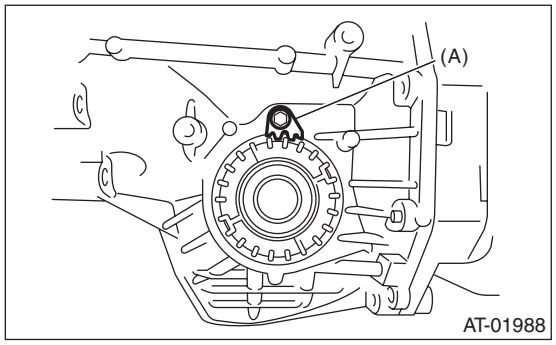


Corrective action: Increase thickness of pinion height adjusting washer according to the procedures for moving the drive pinion closer to the driven gear.



6) 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 ft-lb)



(A) Lock plate

35.Front Differential 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 assembly. <Ref. to 5AT-64, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-63, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Filter.>
6) Separate the converter case from the transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
7) Remove the differential side retainers using ST.

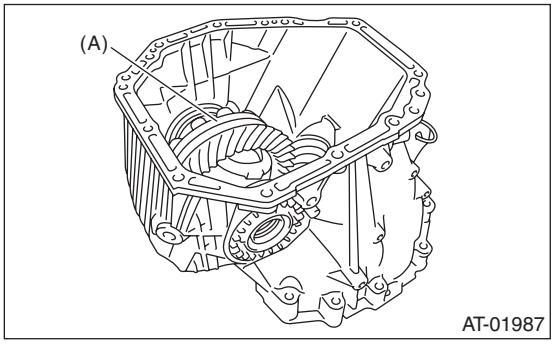
NOTE:
Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.

ST 18630AA010 WRENCH COMPL RETAINER

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

B: INSTALLATION

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



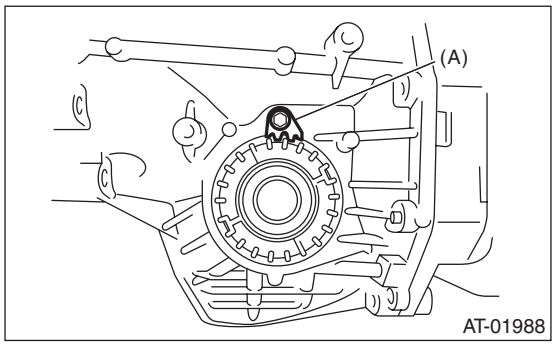
(A) Differential ASSY

2) Install the O-ring to left and right side retainer.
3) Using the ST, install the side retainer. <Ref. to 5AT-88, INSTALLATION, 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 ft-lb)



(A) Lock plate

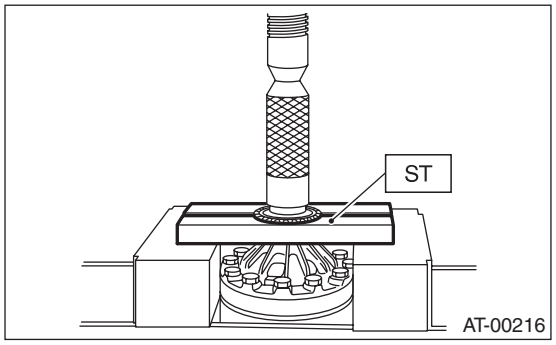
6) Install the converter case to the transmission case. <Ref. to 5AT-77, INSTALLATION, Converter Case.>
7) Install the transmission harness connector to the stay.
8) Install the ATF filter pipe. <Ref. to 5AT-57, INSTALLATION, ATF Filter.>
9) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-63, INSTALLATION, Oil Charge Pipe.>
10) Install the torque converter assembly. <Ref. to 5AT-64, INSTALLATION, Torque Converter Assembly.>
11) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

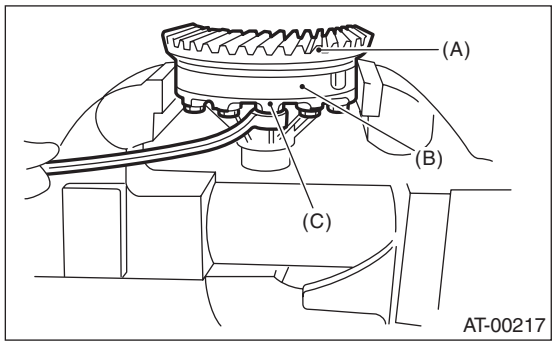
1. DIFFERENTIAL CASE ASSEMBLY

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

ST 498077000 REMOVER

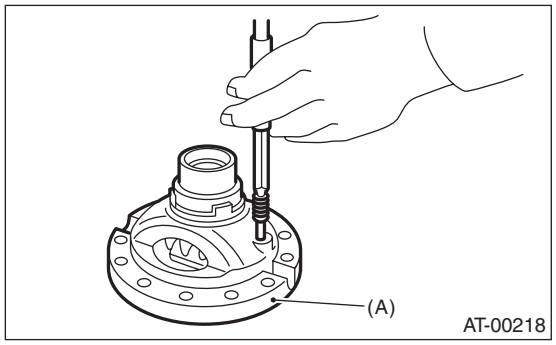


2) Secure the case in a vise, remove the hypoid driven gear tightening bolts, and then separate the hypoid driven gear into case (RH) and case (LH).



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

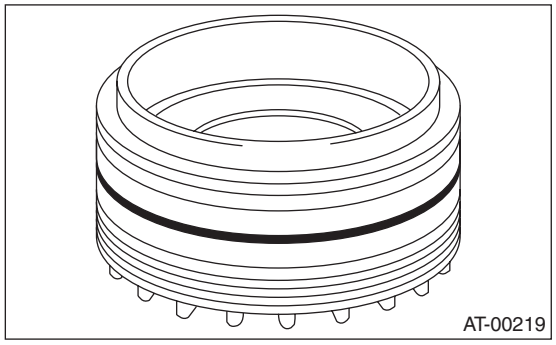
3) Pull out the straight pin and shaft, and then remove the differential bevel gear, washer and differential bevel pinion.



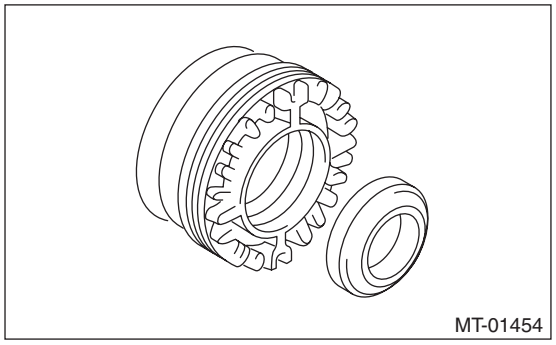
(A) Differential case (RH)

2. SIDE RETAINER

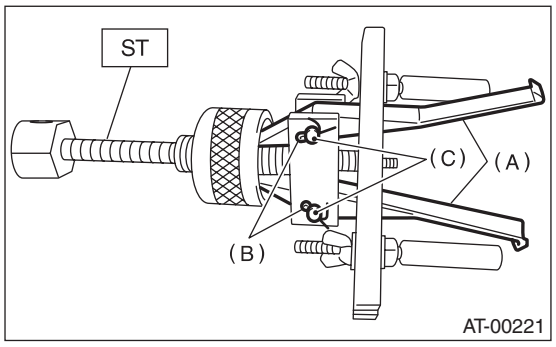
NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.
1) Remove the O-ring.



2) Remove the oil seal.

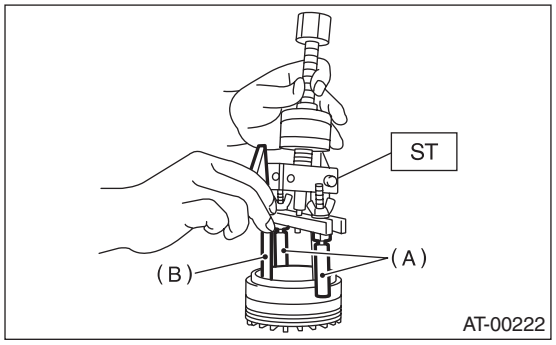


3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER ASSY



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

4) Attach two claws to the outer race, and set the ST to side retainer.
ST 398527700 PULLER ASSY

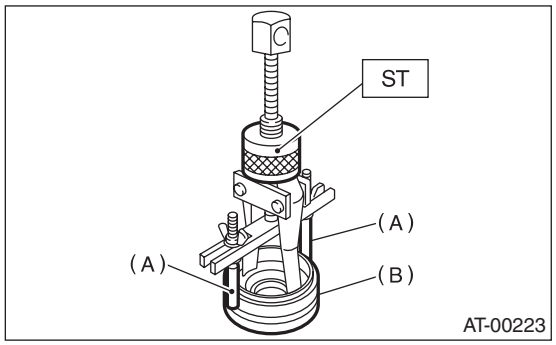


(A) Shaft
(B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.

6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.
ST 398527700 PULLER ASSY

NOTE:
Replace the bearing inner and outer races as a single unit.

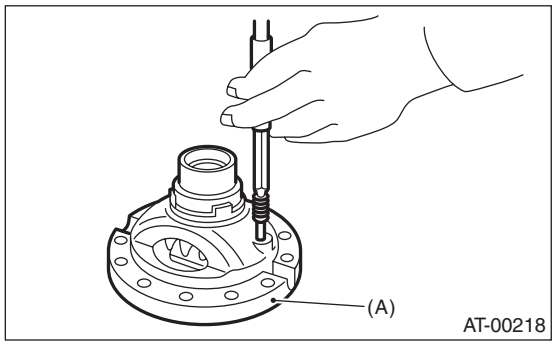


(A) Shaft
(B) Side retainer

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.

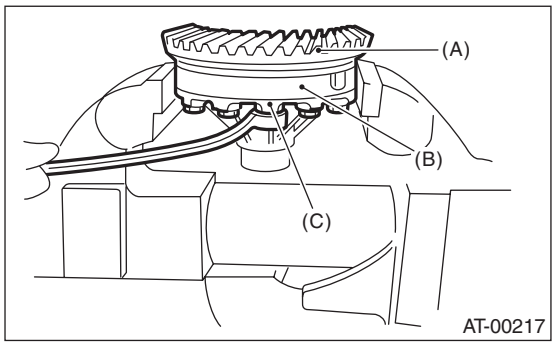


(A) Differential case (RH)

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

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

Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)

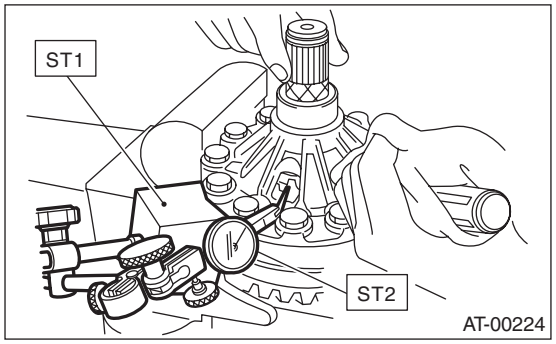


(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

5) Measurement of backlash (Selection of washer)
(1) Install the SUBARU genuine axle shaft to differential case.
Part No. 38415AA070AXLE SHAFT
(2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 though the access window of case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
• Measure the backlash by applying a pinion tooth between two bevel gear teeth.
• Fix the bevel pinion gear in place with a screwdriver or similar tool when measuring.

Standard:
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.

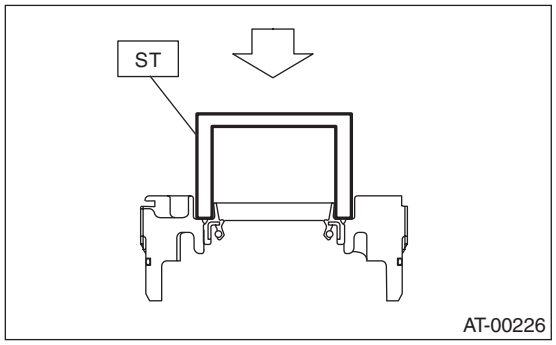
Washer	
Part number	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

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

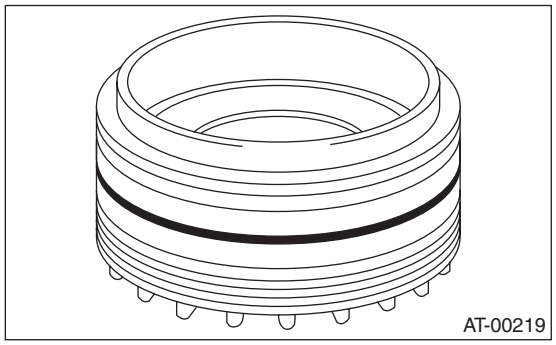
2. SIDE RETAINER

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) Install a new oil seal using ST.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Apply oil to the oil seal lips.



3) Install a new O-ring.



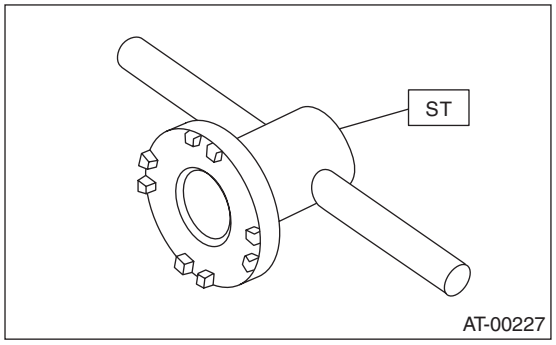
E: INSPECTION

• 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 RH side slightly deeper than the LH side.
ST 18630AA010 WRENCH ASSY

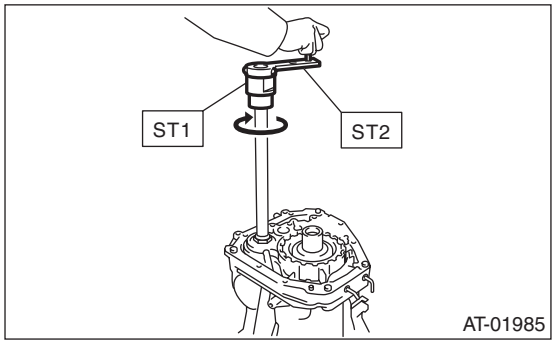


2) Remove the oil pump cover.
3) Remove the liquid gasket from the mating surface completely.
4) Install the oil pump cover to converter case, and secure them with tightening four bolts evenly.

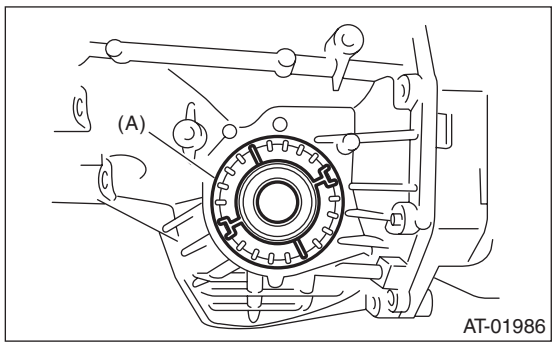
NOTE:
Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

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

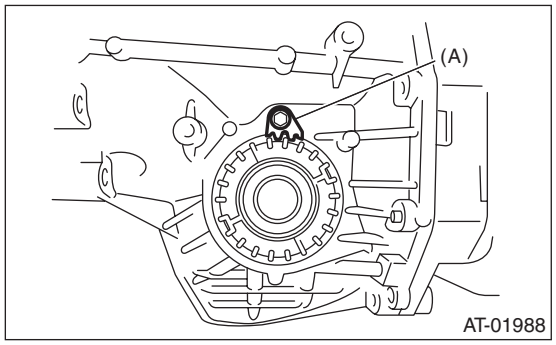


6) Tighten the LH retainer by rotating the shaft until resistance is felt. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft no longer be turned. This is the “zero” state.



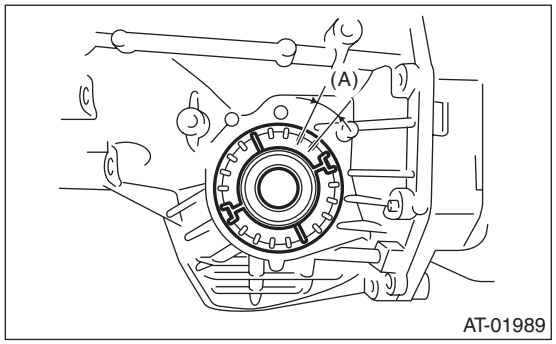
(A) Retainer

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 tooth changes the backlash approx. 0.05 mm (0.0020 in).



(A) 0.05 mm (0.0020 in)

8) Turn the drive pinion several times using ST1, and check to see if the backlash is within the specification using ST2, ST3, ST4 and ST5.

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

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

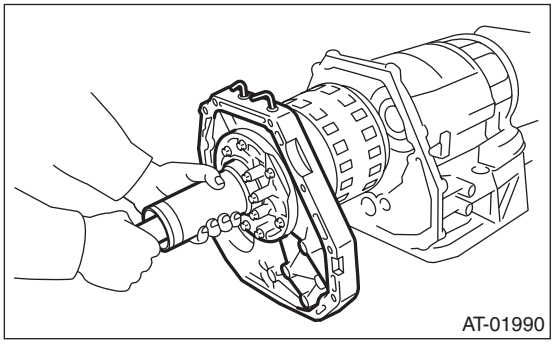
9) Adjust the teeth contact of the front differential and drive shaft. <Ref. to 5AT-85, ADJUSTMENT, Drive Pinion Shaft Assembly.>

36.AT Main Case

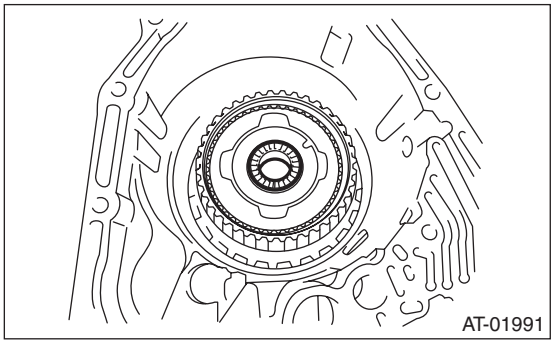
A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-64, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose.
5) Remove the oil charge pipe. <Ref. to 5AT-63, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Filter.>
7) Remove the extension case. <Ref. to 5AT-66, REMOVAL, Extension Case.>
8) Remove the center differential carrier. <Ref. to 5AT-73, REMOVAL, Center Differential Carrier.>
9) Remove the reduction driven gear. <Ref. to 5AT-71, REMOVAL, Reduction Driven Gear.>
10) Separate the converter case from the transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
11) Remove the control valve body. <Ref. to 5AT-55, REMOVAL, Control Valve Body.>
12) Remove the oil pump cover.
<Ref. to 5AT-79, REMOVAL, Oil Pump Cover.>

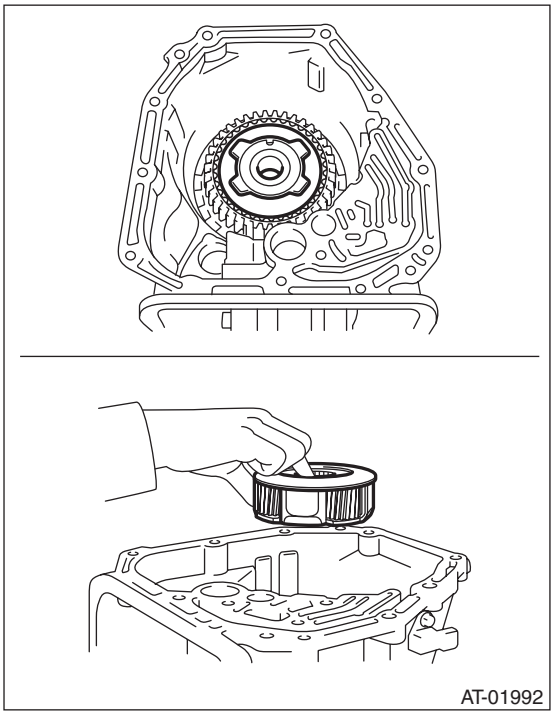
NOTE:
The input clutch pack assembly and front sun gear assembly are also removed together.


AT-01990

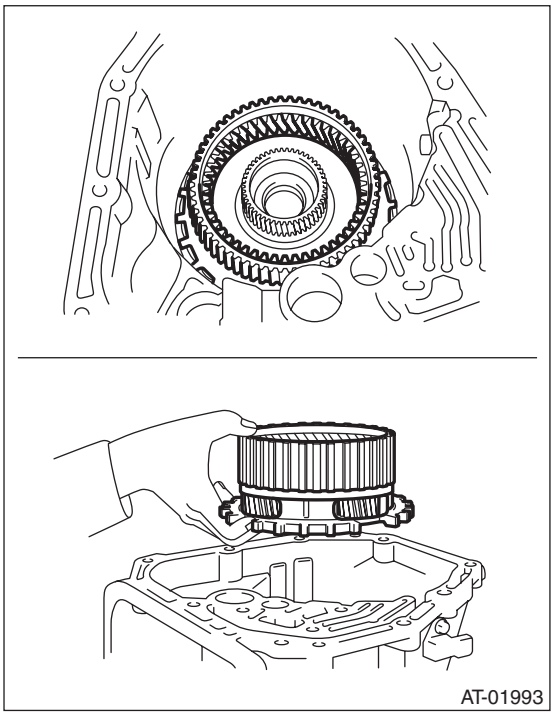
13) Remove the needle bearing of the middle carrier assembly.


AT-01991

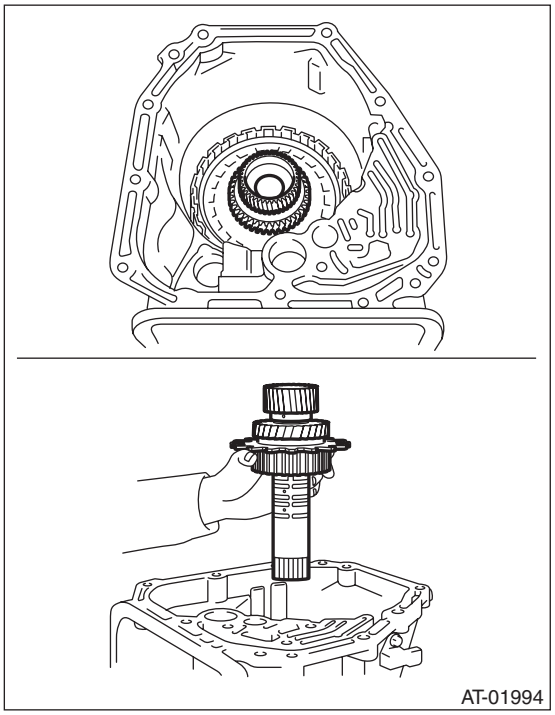
14) Remove the middle carrier assembly.


AT-01992

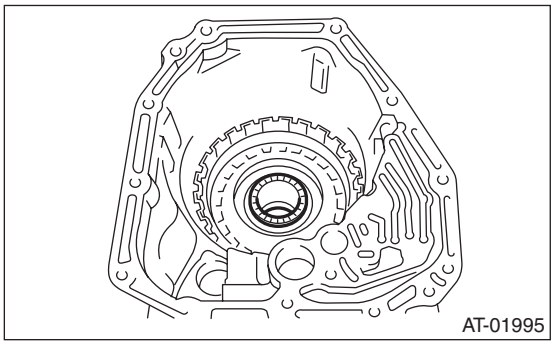
15) Remove the rear carrier assembly.


AT-01993

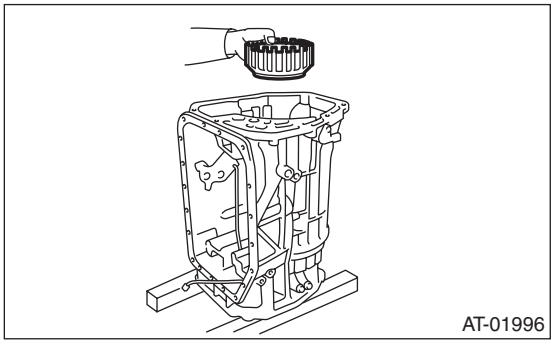
16) Remove the middle & rear sun gear assembly.



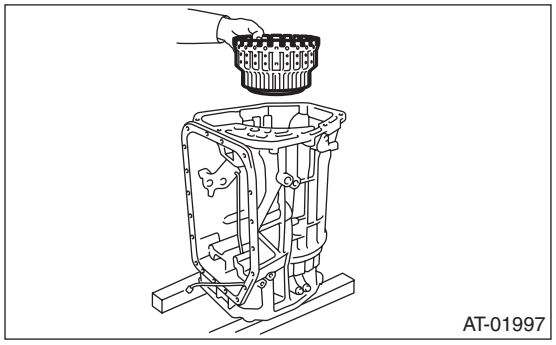
17) Remove the thrust needle bearing of high & low reverse clutch.



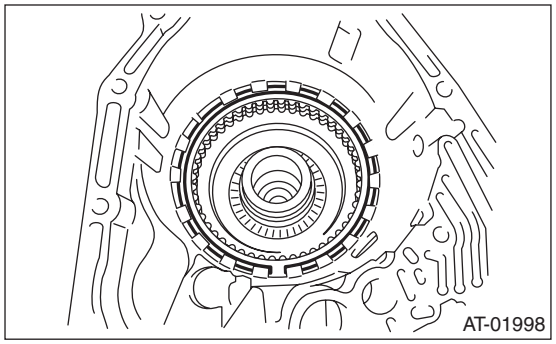
18) Remove the high & low reverse clutch assembly.



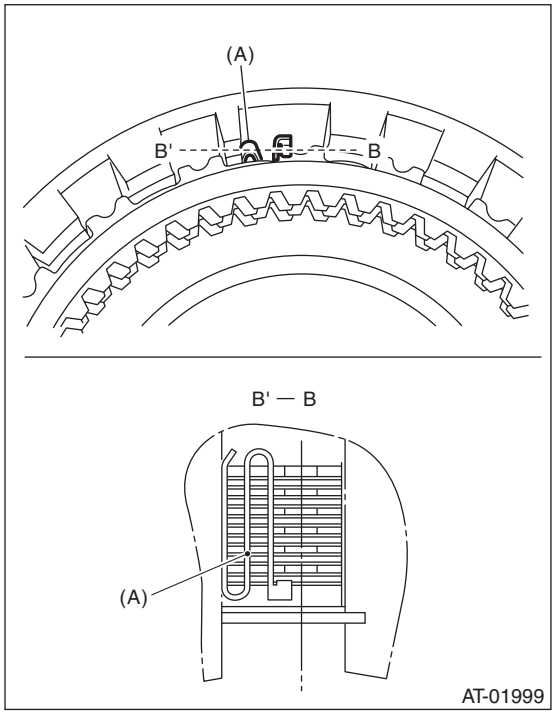
19) Remove the direct clutch assembly.



20) Remove the snap ring of reverse brake.



21) Remove the retaining plate.
22) Remove the leaf spring.

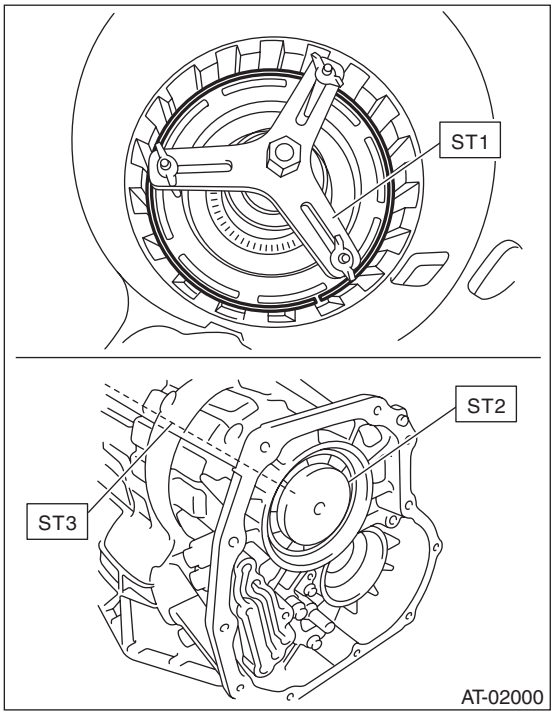


(A) Leaf spring

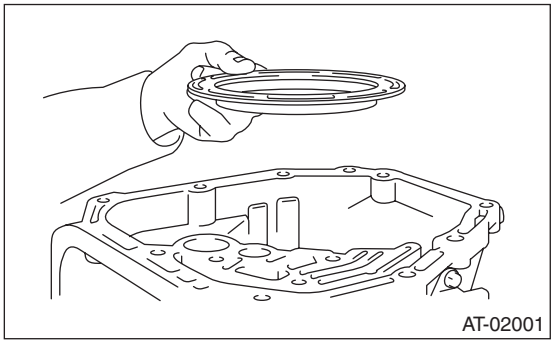
23) Take out the drive plate, driven plate and dish plate.

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

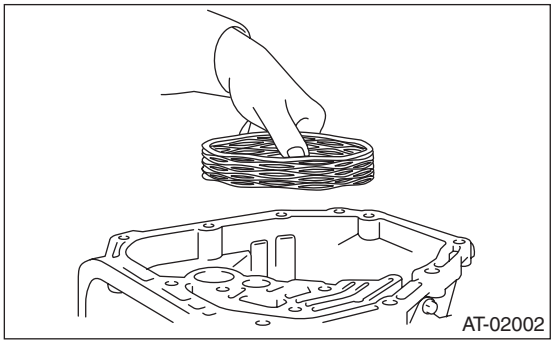
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT



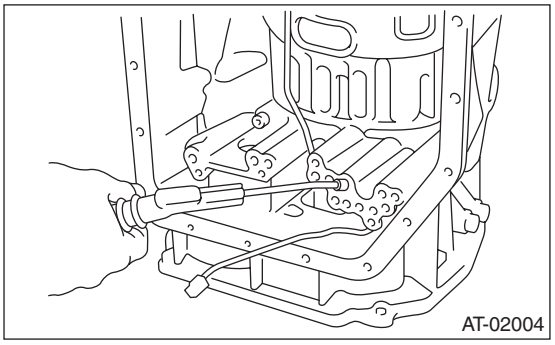
25) Remove the spring retainer.



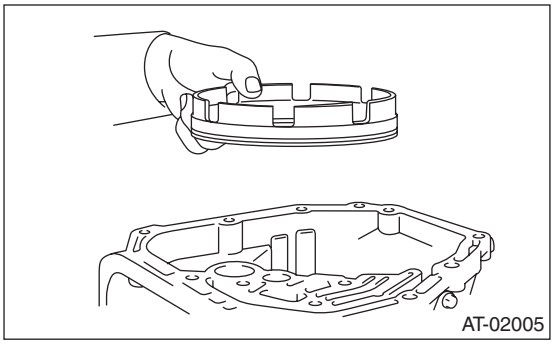
26) Remove the return spring.



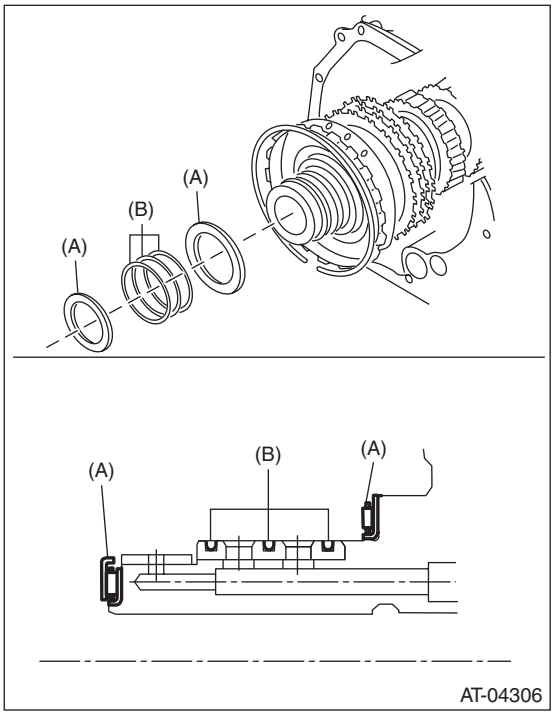
27) Apply compressed air.



28) Remove the reverse brake piston.



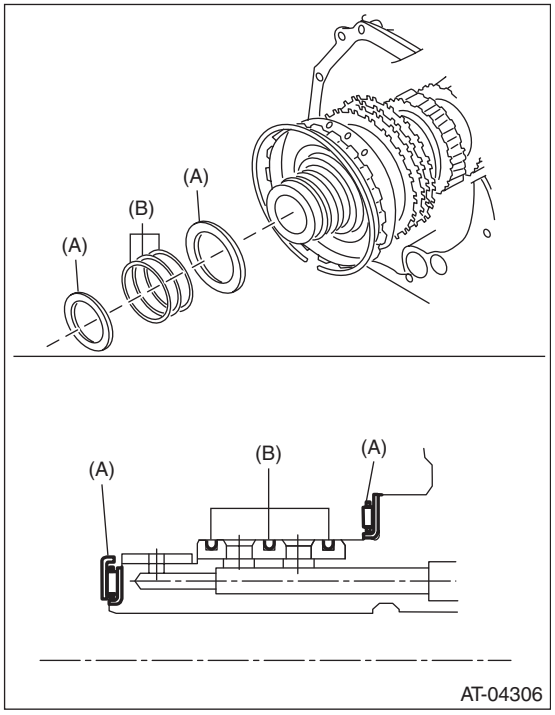
29) Remove the thrust bearings and seal rings.



(A) Thrust bearing
(B) Seal ring

B: INSTALLATION

1) Apply ATF to new seal rings.
2) Install the thrust bearings and new seal rings to the drum support.

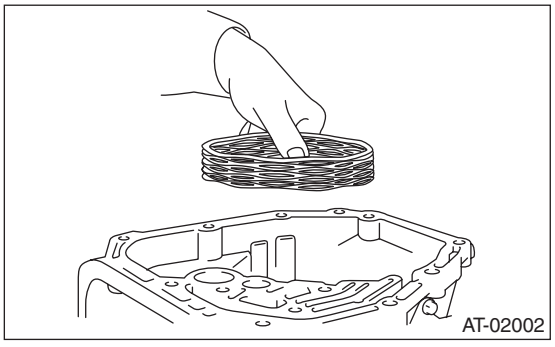


(A) Thrust bearing
(B) Seal ring

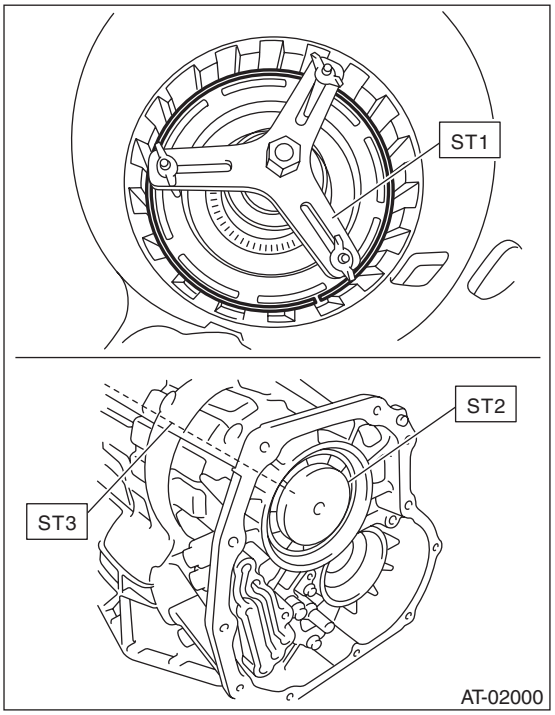
3) Install the reverse brake piston.

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

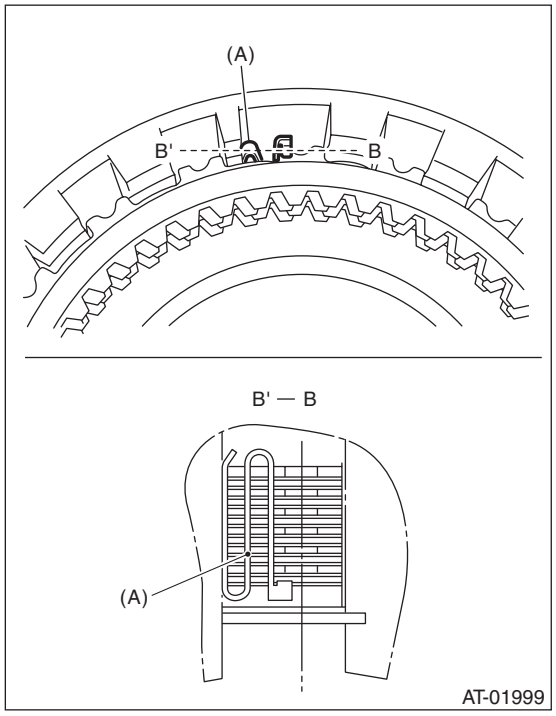


6) Install the dish plate.

NOTE:
When installing, make sure that the identification mark is facing the front side of transmission.

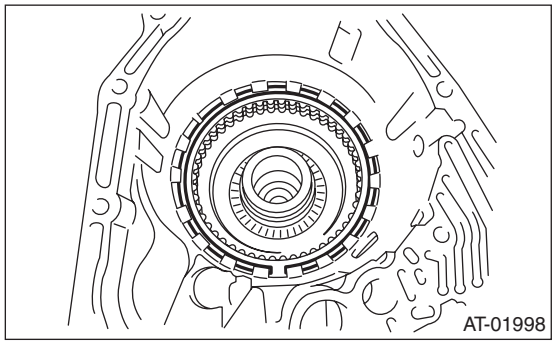
7) Install the drive plate and driven plate.

8) Install the leaf spring.



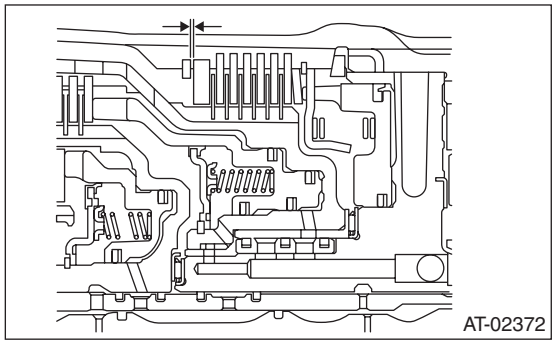
(A) Leaf spring

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



11) Perform the clearance check of reverse brake.
(1) Measure the clearance between retainer plate and snap ring using thickness gauge.

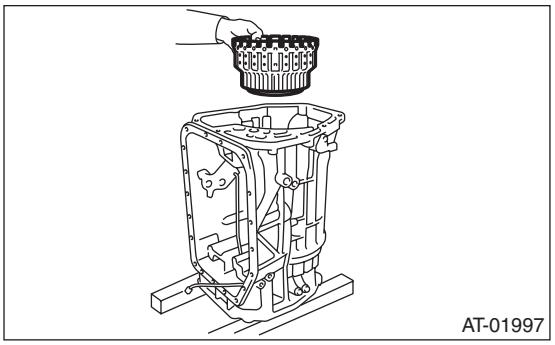
Standard:
0.7 — 1.1 mm (0.028 — 0.043 in)



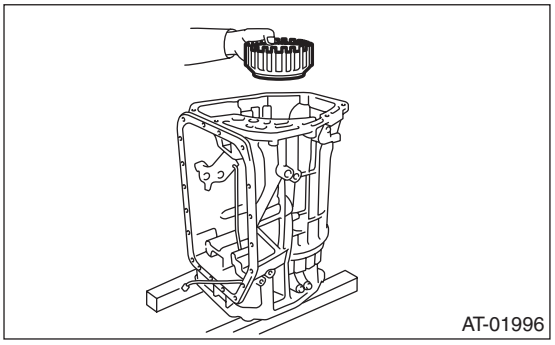
(2) If it is out of specification, select a suitable retainer plate from the following table and assemble it.

Retainer plate	
Part number	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)

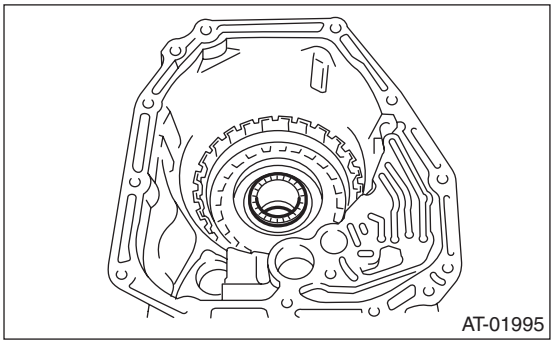
12) Install the direct clutch assembly.



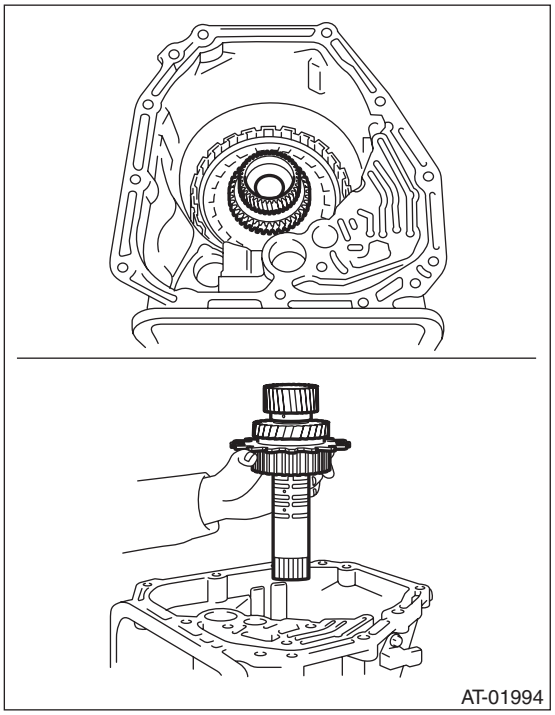
13) Install the high & low reverse clutch assembly.



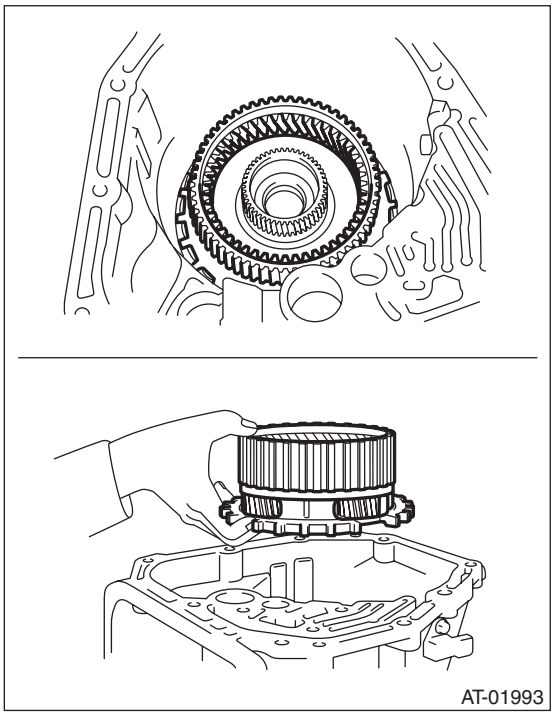
14) Install the thrust needle bearing of the high & low reverse clutch.



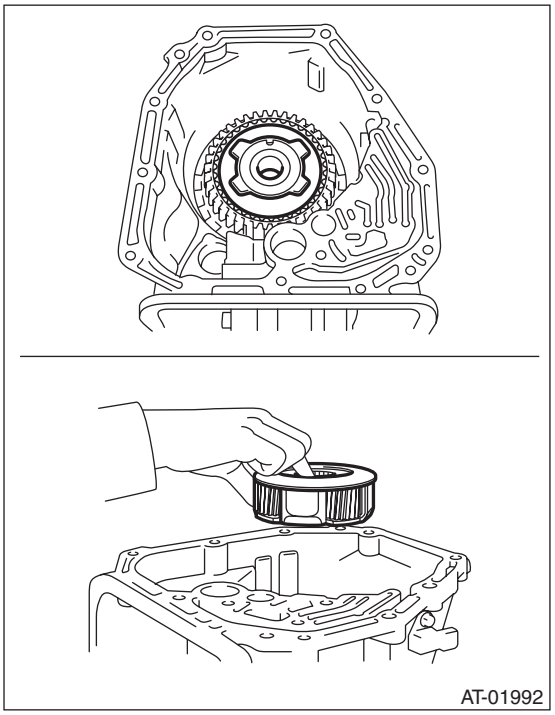
15) Install the middle & rear sun gear assembly.



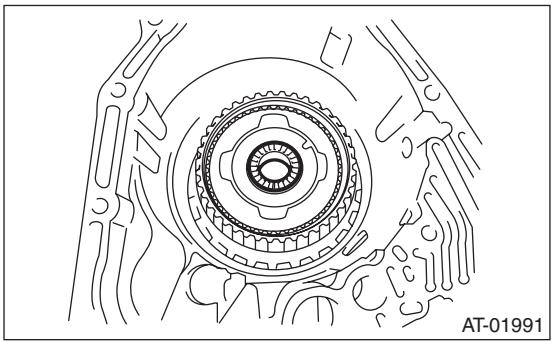
16) Install the rear carrier assembly.



17) Install the middle carrier assembly.

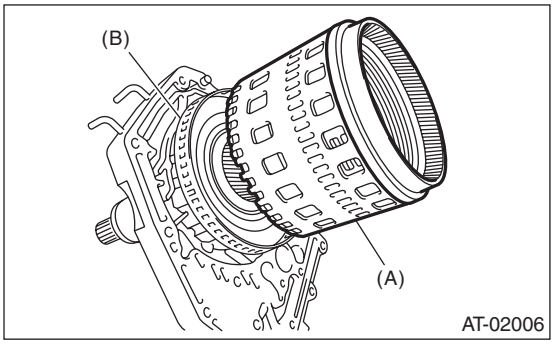


18) Install the thrust needle bearing of middle carrier assembly.



19) Measure the total end play, and select the bearing. <Ref. to 5AT-101, ADJUSTMENT, AT Main Case.>

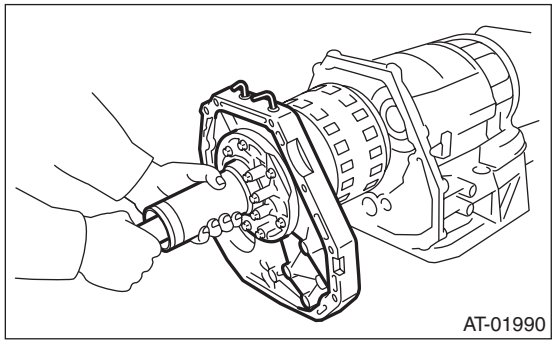
20) Install the impact clutch pack assembly to oil pump cover.



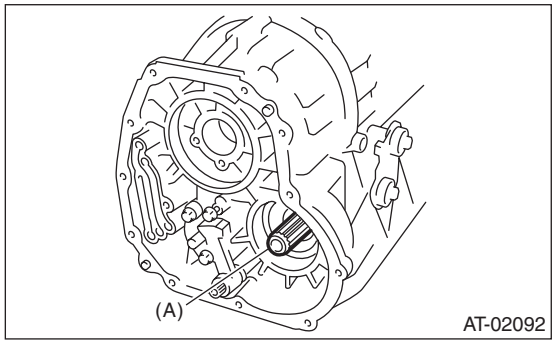
(A) Impact clutch pack ASSY
(B) Front sun gear ASSY

21) Turn the transmission sideways.

22) 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.



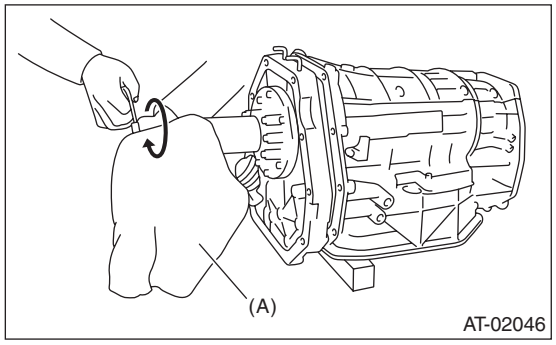
(3) Make sure the rear end of drive pinion shaft is engaged to the spline of reduction driven gear.



(A) Drive pinion shaft

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

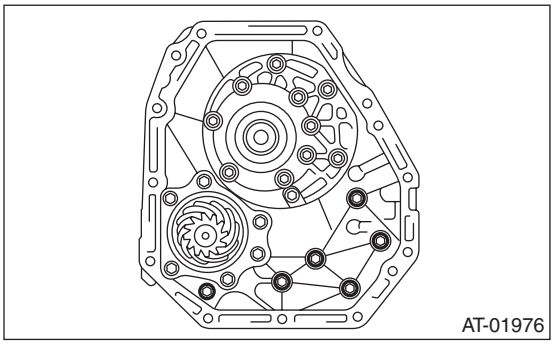
NOTE:
Work with pressing the oil pump cover.



(A) Cloth

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

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



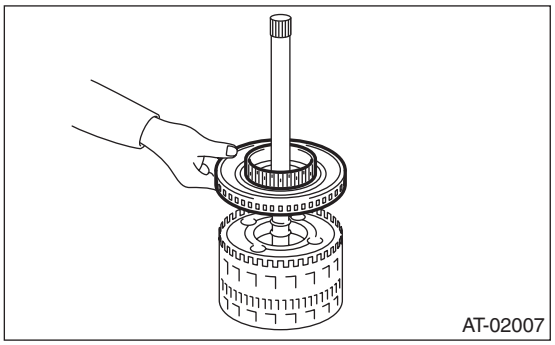
23) Install the center differential carrier. <Ref. to 5AT-73, INSTALLATION, Center Differential Carrier.>
24) Install the reduction driven gear. <Ref. to 5AT-71, INSTALLATION, Reduction Driven Gear.>
25) Install the extension case. <Ref. to 5AT-66, INSTALLATION, Extension Case.>
26) Install the control valve body. <Ref. to 5AT-55, INSTALLATION, Control Valve Body.>
27) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-77, INSTALLATION, Converter Case.>
28) Install the air breather hose. <Ref. to 5AT-62, INSTALLATION, Air Breather Hose.>
29) Install the ATF filter pipe. <Ref. to 5AT-57, INSTALLATION, ATF Filter.>
30) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-63, INSTALLATION, Oil Charge Pipe.>
31) Install the torque converter assembly. <Ref. to 5AT-64, INSTALLATION, Torque Converter Assembly.>
32) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>
33) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
34) Perform the inspection with driving the vehicle 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.

NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

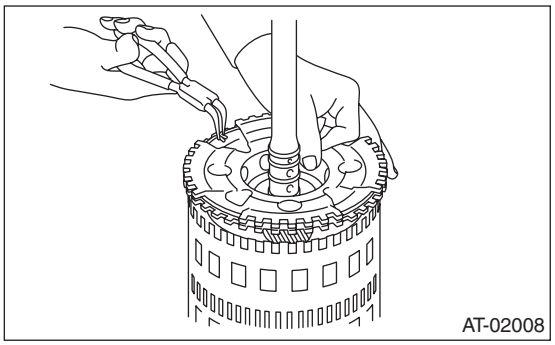
C: DISASSEMBLY

1. INPUT CLUTCH PACK ASSEMBLY

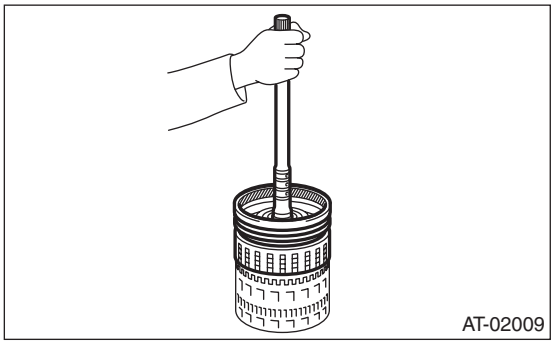
1) Remove the front sun gear.



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



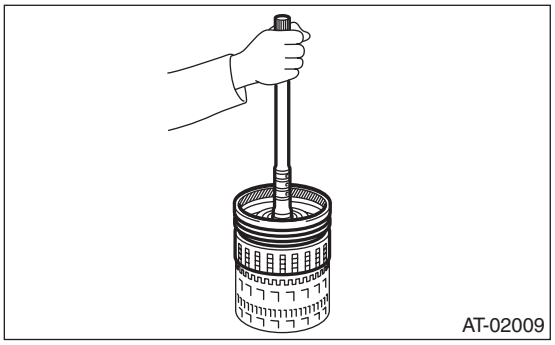
3) Remove the input clutch assembly from rear internal gear.



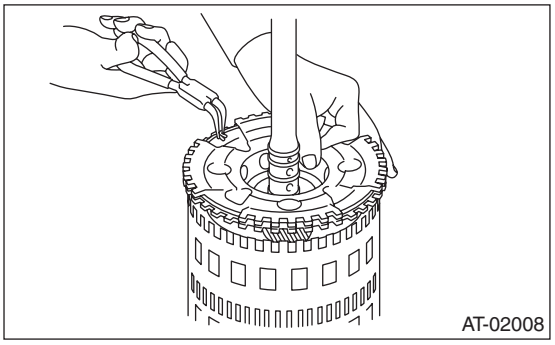
D: ASSEMBLY

1. INPUT CLUTCH PACK ASSEMBLY

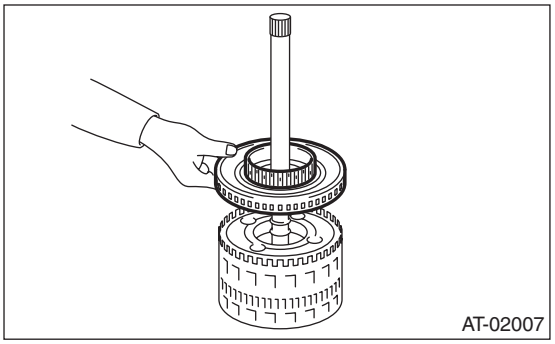
1) Assemble the input clutch assembly to rear internal gear.



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



3) Install the front sun gear.



E: INSPECTION

1. FRONT, MIDDLE & REAR PLANETARY CARRIER ASSEMBLY

Check the following items.

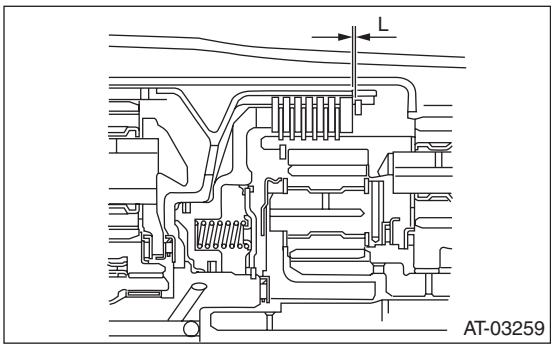
- Visually inspect the tooth surface of planetary gear, and replace with new part if damaged, broken or excessively worn.
- Inspect the planetary carrier body for damage or breakage.

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 direct clutch assembly.
- Check for damage on the drive plate, driven plate and snap ring, and replace the entire input clutch assembly if damaged.

Standard:

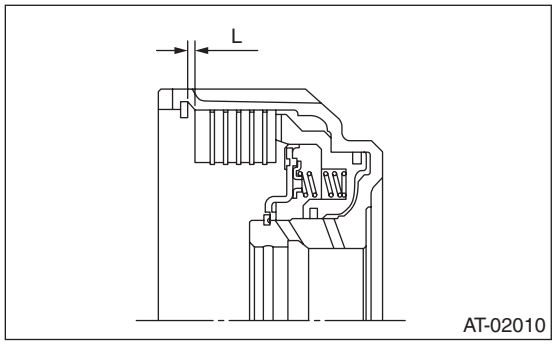
0.7 — 1.1 mm (0.028 — 0.043 in)



3. HIGH & LOW REVERSE CLUTCH ASSY

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.

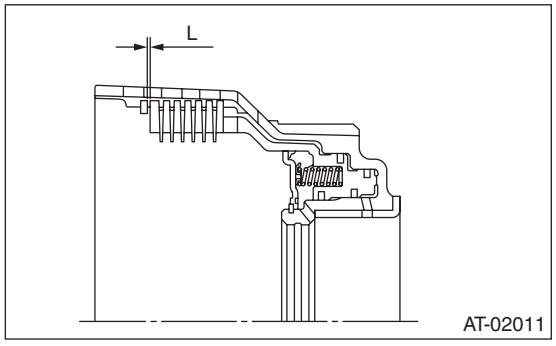
Standard:
1.8 — 2.2 mm (0.070 — 0.087 in)



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 them as direct clutch assembly.

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

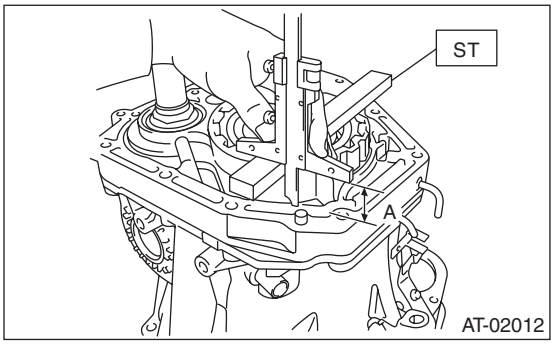


5. REVERSE BRAKE

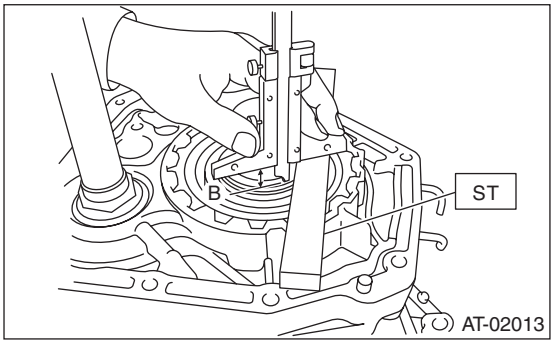
Check the following items.
- Drive plate facing for wear or damage
- Snap ring for wear, return spring for breakage, and spring retainer for deformation
- Lip seal and D-ring for damage
- Piston operation

F: ADJUSTMENT

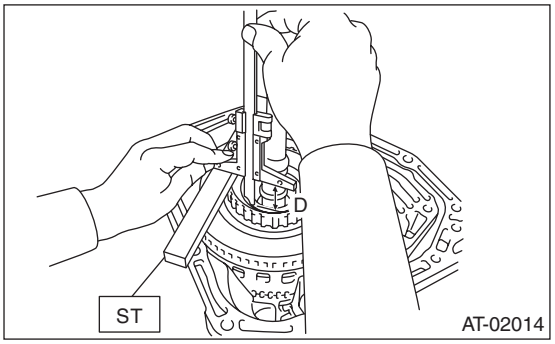
1) Using the ST, measure the height “A” from the AT main case mating surface to convex surface of oil pump cover.
ST 499575400 GAUGE



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 thrust bearing transferring surface of front sun gear.
ST 499575400 GAUGE



5) Set the value as “E” which subtract the thickness of ST (GAUGE) from the measured value on step 4).
Calculation: E (mm) = D – 15
[E (in) = D – 0.59]

6) Calculation formula:
Select one thrust bearing from the table to adjust clearance within 0.25 — 0.55 mm (0.0098 — 0.022 in).
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 (0.022 in):
T (mm) = E – C + 0.27
[T (in) = E – C + 0.012]
T: Thrust bearing clearance
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

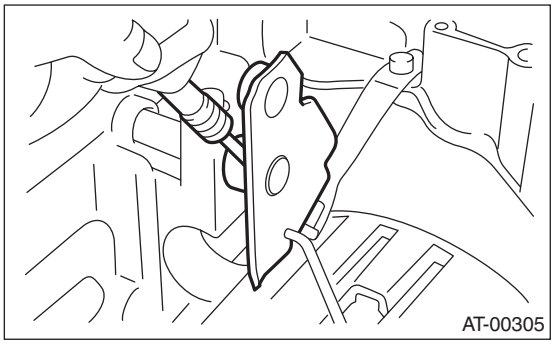
NOTE:
Calculation formula for “T” above is applied when measuring with the ST (499575400 GAUGE). In the calculation without using ST, substitute the thickness of collar used to calculate the value “E” on step 5).

Thrust bearing	
Part number	Thickness mm (in)
806548020	3.2 (0.126)
606548030	3.4 (0.134)
806548040	3.6 (0.142)
806548050	3.8 (0.150)
806548060	4.0 (0.157)
806548070	4.2 (0.165)

37.Transmission Control Device

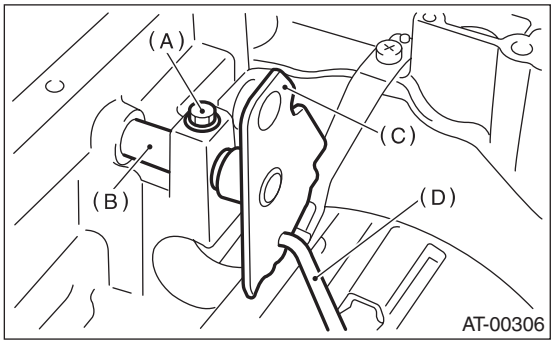
A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-64, 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) Disconnect the air breather hose. <Ref. to 5AT-62, REMOVAL, Air Breather Hose.>
5) Wrap vinyl tape around the nipple attached to the air breather hose.
6) Remove the pitching stopper bracket.
7) Remove the control valve body assembly. <Ref. to 5AT-55, REMOVAL, Control Valve Body.>
8) Pull out the straight pin of manual plate.



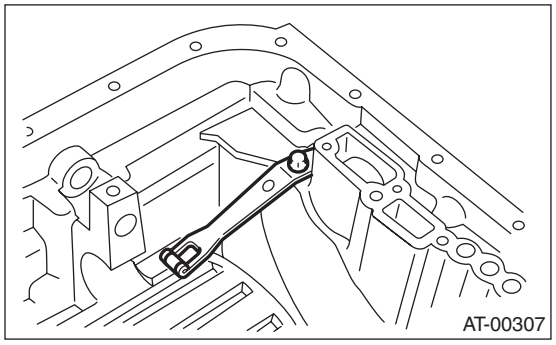
9) Remove the bolts securing select lever, and then remove the select lever, manual plate and parking rod.

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

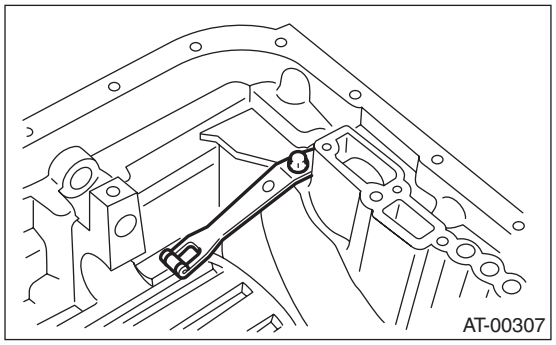
10) Remove the detention spring.



B: INSTALLATION

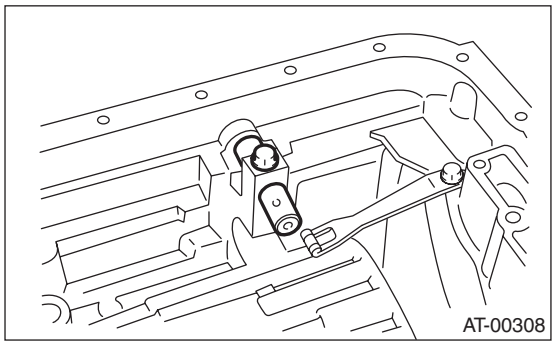
1) Install the detention spring to the transmission case.

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

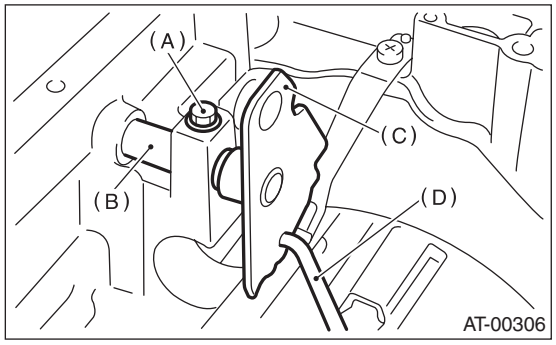


2) Insert the select lever, and then tighten the bolt.

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

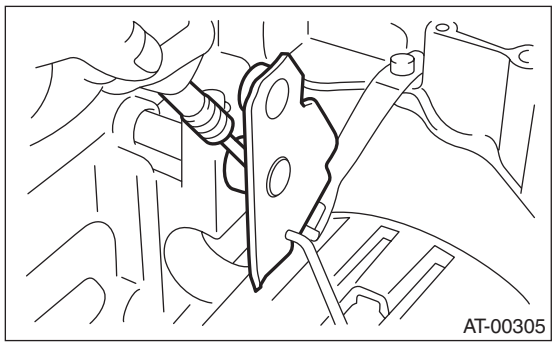


3) Insert the manual plate and parking rod.



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

4) Insert the spring pin to the manual plate.



5) Install the oil pan and the control valve assembly. <Ref. to 5AT-55, INSTALLATION, Control Valve Body.>
6) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

7) Insert the transmission connector to the stay.
8) Install the air breather hose. <Ref. to 5AT-62, INSTALLATION, Air Breather Hose.>
9) Install the torque converter assembly. <Ref. to 5AT-64, INSTALLATION, Torque Converter Assembly.>
10) Install the transmission assembly to the vehicle. <Ref. to 5AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

5AT(diag)

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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 4AT(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the following items which may influence AT problems. • General Inspection <Ref. to 4AT(diag)-5, INSPECTION, General Description.> • Disconnection of harness connector • Visual check for harness damage • Oil leakage • Stall speed test <Ref. to 4AT-30, Stall Test.> • Line pressure test <Ref. to 4AT-32, Line Pressure Test.> • Transfer clutch pressure test <Ref. to 4AT-33, Transfer Clutch Pressure Test.> • Time lag test <Ref. to 4AT-31, Time Lag Test.> • Road test <Ref. to 4AT-29, Road Test.> • Inhibitor switch <Ref. to 4AT-45, Inhibitor Switch.>	Is the unit that is thought to influence the AT problem working properly?	Go to step **2**.	Repair or replace each item.
2	**ATF TEMPERATURE WARNING LIGHT INSPECTION.** Start the engine and wait for 2 seconds or more.	Is the ATF temperature warning light blinking?	Go to step **4**.	Go to step **3**.
3	**ATF TEMPERATURE WARNING LIGHT INSPECTION.** 1) Turn the ignition switch to OFF. 2) Check the ATF temperature warning light. <Ref. to 4AT(diag)-22, INSPECTION, AT Oil Temp Warning Light Display.> 3) Turn the ignition switch to ON and wait for at least 2 seconds. 4) Start the engine.	Is the ATF temperature warning light blinking?	Go to step **4**.	Go to step **5**.
4	**CHECK DTC.** Display DTC. NOTE: If the communication function of Subaru Select Monitor cannot be executed normally, check communication circuit. <Ref. to 4AT(diag)-24, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed?	Go to step **6**. NOTE: Record all DTC.	Go to step **5**.
5	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-83, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using “General Diagnostic Table”. <Ref. to 4AT(diag)-94, Diagnostics with Phenomenon.> 3) Perform the Inspection Mode. <Ref. to 4AT(diag)-19, Inspection Mode.> 4) Display DTC.	Is DTC displayed?	Go to step **6**.	Finish the diagnosis.

	Step	Check	Yes	No
6	**PERFORM DIAGNOSIS.** 1) Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-30, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(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 4AT(diag)-19, Inspection Mode.> 5) Display DTC.	Is DTC displayed?	Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-30, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following item when 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 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 warning light (ATF temperature warning light)	❑ Blinks continuously	❑ Does not blink	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ SPORT mode		
Driving condition	❑ Not affected ❑ At racing ❑ While decelerating	❑ At starting ❑ While accelerating ❑ While turning (❑ RH/❑ LH)	❑ While idling ❑ While cruising
SPORT mode	❑ ON ❑ OFF		
Symptom	❑ 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 ( )		

3. General Description

A: CAUTION

• 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 TCM diagnostics or servicing.

• 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.

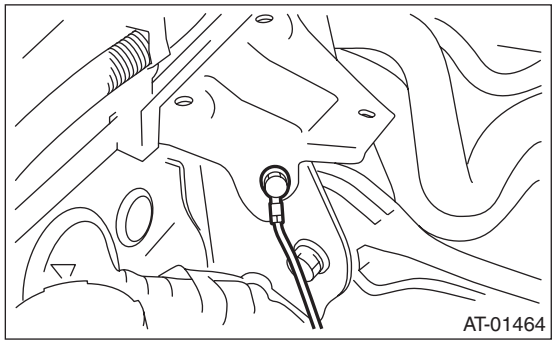
Standard voltage: 12 V or more

Specific gravity: 1.260 or more

2. TRANSMISSION GROUND

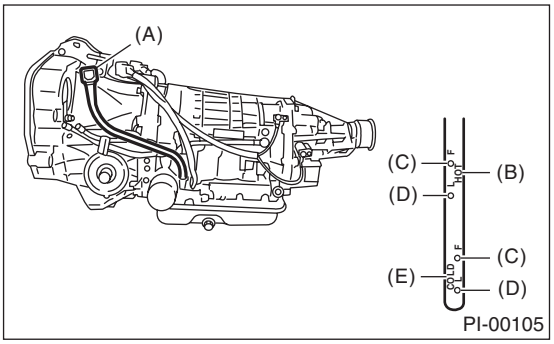
Make sure that the ground terminal bolt is tightened securely.
Chassis side

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

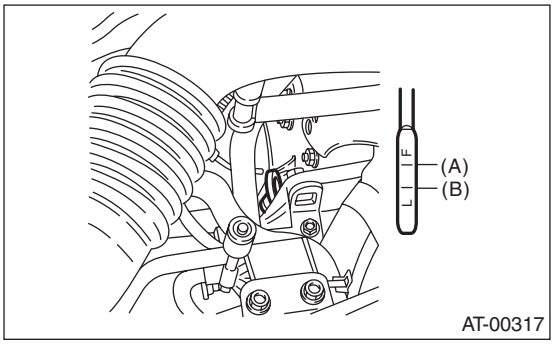
Make sure that ATF level is the specified amount. <Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>



(A) Level gauge
(B) Inspection position when "HOT"
(C) Upper level
(D) Lower level
(E) Inspection position when "COLD"

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure the front differential oil level is the specified amount. <Ref. to 4AT-28, INSPECTION, Differential Gear Oil.>

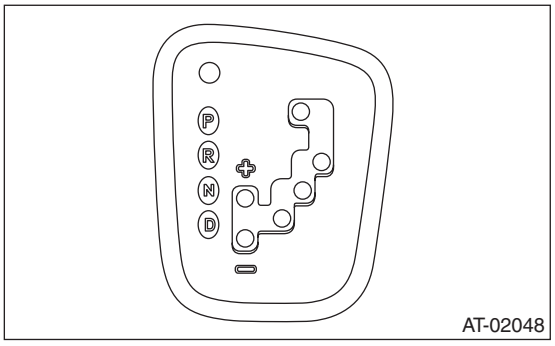


(A) Upper level
(B) Lower level

5. OPERATION OF SELECT LEVER

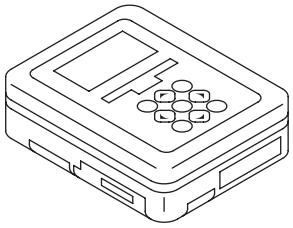
Make sure there is no noise, dragging or contact pattern in each select lever range.

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



C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	TOOL NAME	REMARKS
 ST1B020XU0	1B020XU0	SUBARU SELECT MONITOR KIT	Used for troubleshooting for electrical system.

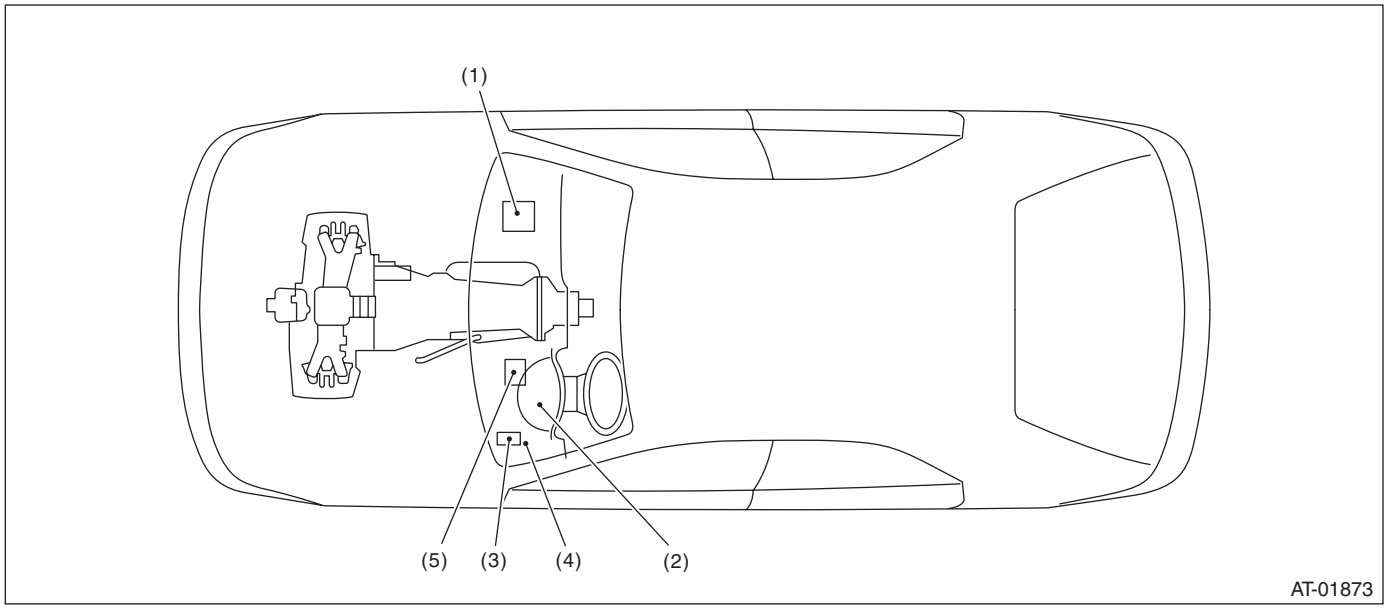
2. GENERAL TOOL

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

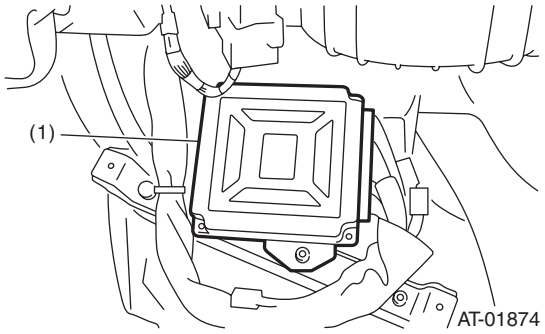
4. Electrical Component Location

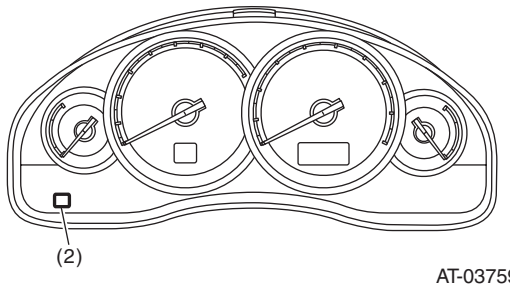
A: LOCATION

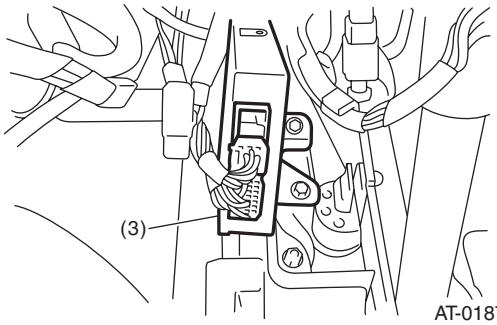
1. CONTROL MODULE

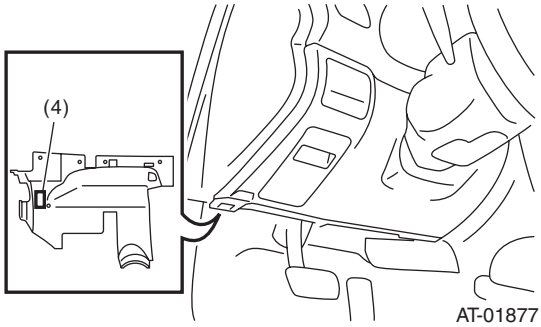


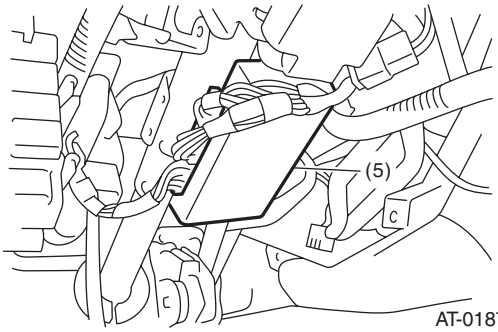
(1) Engine control module (ECM)
(2) ATF temperature warning light (AT temperature warning light)
(3) Transmission control module (TCM)
(4) Data link connector
(5) Body integrated unit


(1)
AT-01874

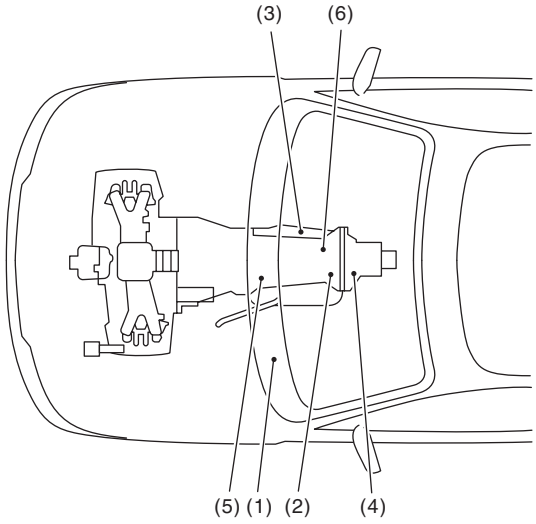

(2)
AT-03759


(3)
AT-01875


(4)
AT-01877

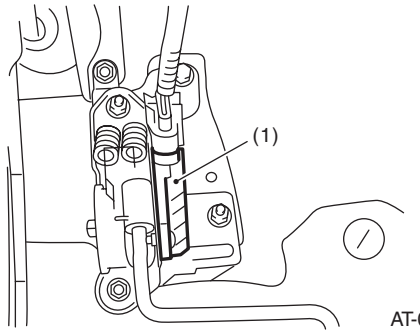

(5)
AT-01876

2. SENSOR

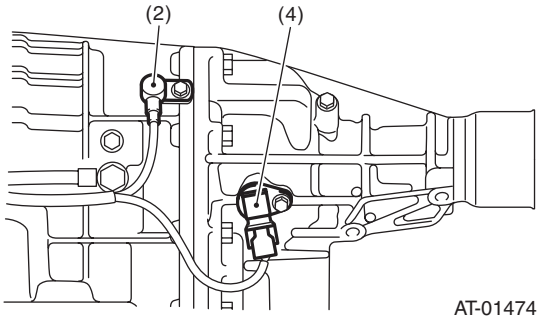


AT-02979

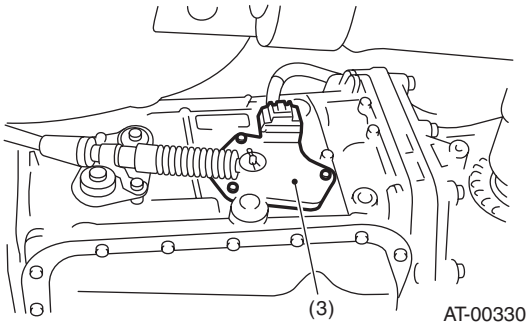
(1) Accelerator pedal position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Torque converter turbine speed sensor
(6) ATF temperature sensor



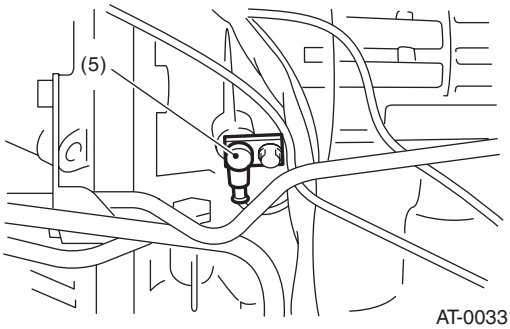
AT-00375



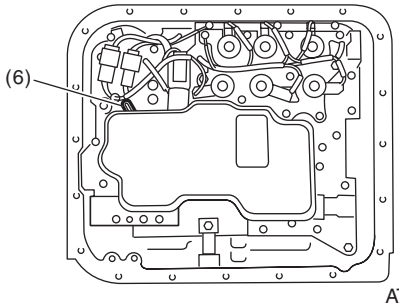
AT-01474



AT-00330

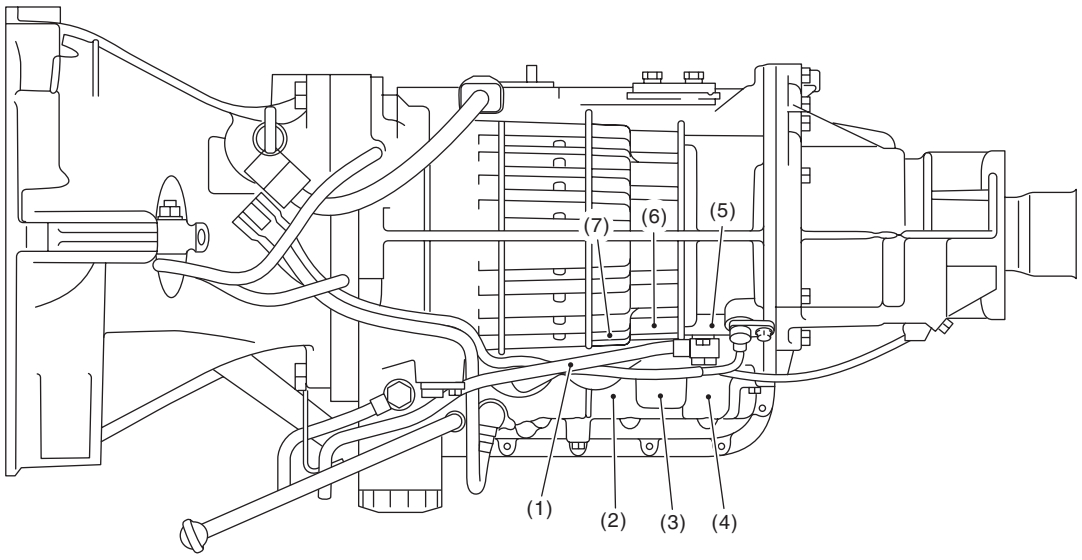


AT-00331

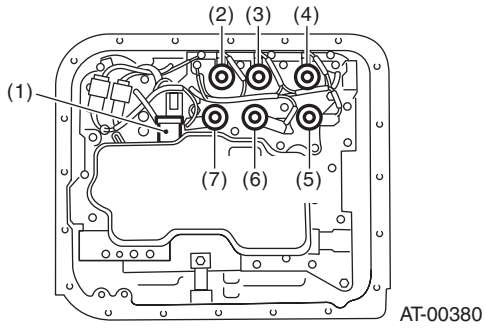


AT-00378

3. SOLENOID

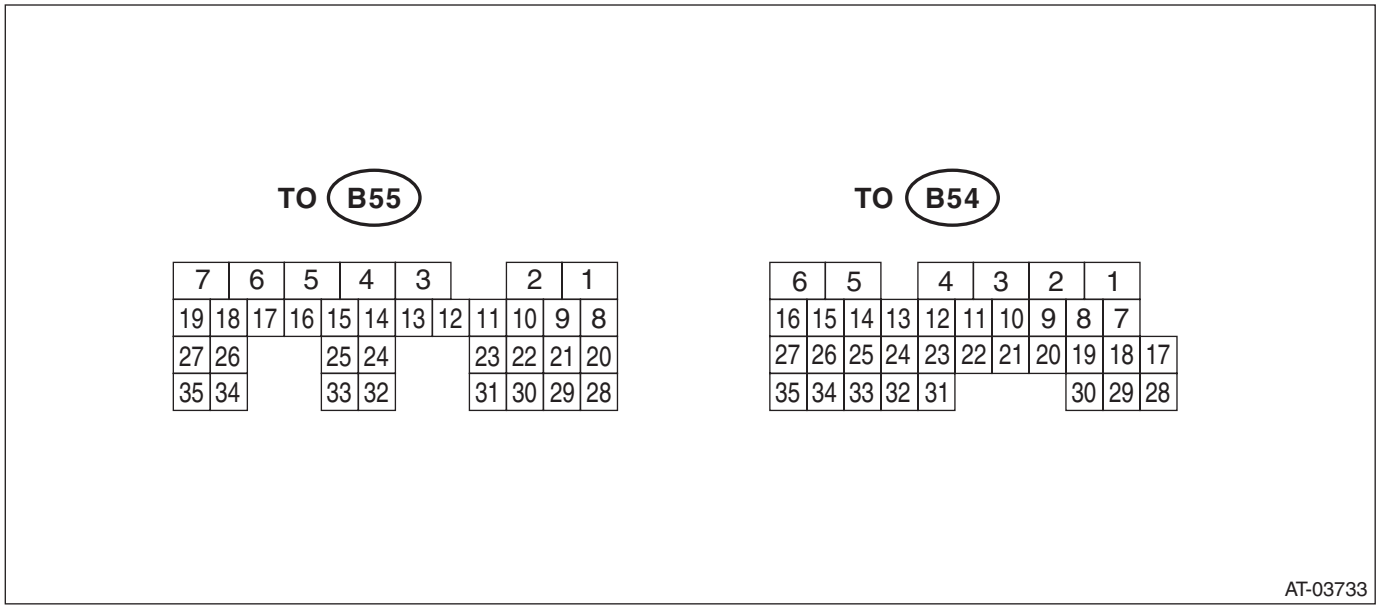


(1) Line pressure linear solenoid
(2) High clutch duty solenoid
(3) 2-4 brake duty solenoid
(4) Low & reverse duty solenoid
(5) Low clutch duty solenoid
(6) Transfer duty solenoid
(7) Lock-up duty solenoid



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

A: ELECTRICAL SPECIFICATION



Check with ignition switch ON.						
Contents		Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
		Positive terminal	Ground terminal			
Backup power supply		(B55) No. 27	Chassis ground	—	10 — 13	—
		(B55) No. 26	Chassis ground			
		(B55) No. 25	Chassis ground			
ACC power supply		(B55) No. 12	Chassis ground	Ignition Switch ACC	10 — 13	—
Ignition power supply		(B55) No. 1	Chassis ground	Ignition Switch ON	10 — 13	—
		(B55) No. 2	Chassis ground			
Inhibitor switch	“P” range switch	(B55) No. 14	Chassis ground	Select lever “P” range	Less than 1	—
				Select lever Except “P” range	8 or more	—
	“N” range switch	(B55) No. 11	Chassis ground	Select lever “N” range	Less than 1	—
				Select lever Except “N” range	8 or more	—
	“R” range switch	(B55) No. 13	Chassis ground	Select lever “R” range	Less than 1	—
				Select lever Except “R” range	8 or more	—
	“D” range switch	(B55) No. 10	Chassis ground	Select lever “D” range	Less than 1	—
				Select lever Except “D” range	8 or more	—
ATF temperature sensor		(B54) No. 23	(B54) No. 12	ATF temperature 20°C (68°F)	3.5 — 4.3	2.5k — 7.0 k
				ATF temperature 80°C (176°F)	1.0 — 2.2	300 — 800
ATF temperature sensor ground		(B54) No. 12	Chassis ground	—	0	Less than 1 (When inserting connector) ∞ (When disconnecting connector)

Check with ignition switch ON.					
Contents	Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
	Positive terminal	Ground terminal			
Rear vehicle speed sensor	(B54) No. 26	(B54) No. 15	20 km/h (12 MPH) Vehicle speed at least	2 or more (AC range)	—
Rear vehicle speed sensor ground	(B54) No. 15	Chassis ground	—	0	Less than 1 (When inserting connector) ∞ (When disconnecting connector)
Front vehicle speed sensor	(B54) No. 27	(B54) No. 16	—	—	450 — 650
Front vehicle speed sensor ground	(B54) No. 16	Chassis ground	—	—	—
Torque converter turbine speed sensor	(B54) No. 1	(B54) No. 2	Engine idling after warm-up (“D” range)	0	450 — 650
			Engine idling after warm-up (“N” range)	1 or more (AC range)	
Torque converter turbine speed sensor ground	(B54) No. 2	Chassis ground	—	—	—
Engine speed signal	(B55) No. 11	Chassis ground	Ignition switch ON (engine OFF)	Less than 1	—
			Ignition switch ON (with engine ON)	5 or more (AC range)	—
Line pressure linear solenoid	(B54) No. 4	(B54) No. 3	Ignition switch ON (with engine OFF) Throttle fully closed in “R” range after warm-up.	3.7 — 7.7	4.0 — 6.0
			Ignition switch ON (with engine OFF) Throttle fully closed in “R” range after warm-up.	1.1 — 5.1	
Line pressure linear solenoid ground	(B54) No. 3	Chassis ground	—	Less than 1	Less than 1
Lock-up duty solenoid	(B54) No. 6	Chassis ground	When lock up occurs.	10.5 or more	2.0 — 4.5
			When lock up is released.	Less than 1	
Transfer duty solenoid	(B54) No. 5	Chassis ground	With fuse installed to FWD switch	Less than 1	2.0 — 4.5
			With fuse removed from FWD switch (1st gear)	2.0 — 3.0	
2-4 brake duty solenoid	(B55) No. 4	Chassis ground	“P” or “N” range	5.0 or more	2.0 — 4.5
			2nd or 4th gear	Less than 1	
High clutch duty solenoid	(B55) No. 6	Chassis ground	3rd or 4th gear	Less than 1	2.0 — 4.5
			“P” or “N” range	5.0 or more	
Low clutch duty solenoid	(B55) No. 7	Chassis ground	1st or 2nd gear	Less than 1	2.0 — 4.5
			“P” or “N” range	5.0 or more	
Low & reverse duty solenoid	(B55) No. 5	Chassis ground	Except “1” range	5.0 or more	2.0 — 4.5
			Driving at 1st gear on manual mode (15 km/h (9.3 MPH) or more)	2.5 — 5.0	

Check with ignition switch ON.					
Contents	Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
	Positive terminal	Ground terminal			
Range lock signal	(B55) No. 3	Chassis ground	Vehicle speed in “D” range 0 km/h (0 MPH)	10.5 or more	7 — 18
			Vehicle speed in “D” range 20 km/h (12 MPH)	Less than 1	
Data link signal (Subaru Select Monitor)	(B55) No. 8	Chassis ground	—	—	—
CAN communication signal (+)	(B54) No. 18	Chassis ground	Ignition switch ON	Pulse signal	—
CAN communication signal (–)	(B54) No. 17	Chassis ground	Ignition switch ON	Pulse signal	—
FWD switch	(B55) No. 10	Chassis ground	Fuse removed	10.5 or more	—
			Fuse installed	1 or less	—
System ground circuit	(B55) No. 20	Chassis ground	—	0	Less than 1
	(B55) No. 21	Chassis ground	—	0	Less than 1
	(B55) No. 22	Chassis ground	—	0	Less than 1
	(B55) No. 23	Chassis ground	—	0	Less than 1

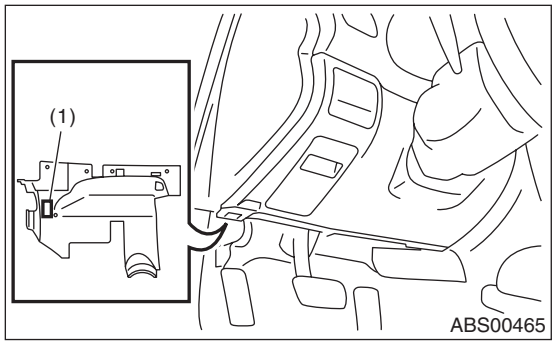
6. Subaru Select Monitor

A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit.
2) Connect the diagnosis cable to the Subaru Select Monitor.
3) Connect the Subaru Select Monitor to the data link connector.

(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(1) Data link connector

(2) Connect the diagnosis cable to the data link connector.

NOTE:
Do not connect scan tools except for Subaru Select Monitor or OBD-II general scan tool.

4) Turn the ignition switch to ON (engine OFF) and run the Subaru Select Monitor.
5) On the «Main Menu» display screen, select the {Each System Check}.
6) On the «System Selection Menu» display screen, select the {Transmission}.
7) Select the [OK] after the information of transmission type is displayed.
8) On the «Transmission Diagnosis» screen, select {DTC Display}.

NOTE:
• For details concerning operation procedures, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-28, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check}.
2) On the «System Selection Menu» display screen, select the {Transmission}.
3) Select the [OK] after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save}.
5) On the «Transmission Diagnosis» display screen, select the {Data Display}.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.

A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Accelerator pedal position sensor	Throttle voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Accelerator pedal position sensor power supply	Throttle sensor voltage	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2 — 4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Low clutch duty ratio	L/C Duty	%
High clutch duty ratio	H/C Duty	%
Low & reverse brake duty ratio	L&R/B Duty	%
Accelerator position	Acceleration Opening Angle	%
FWD switch signal	FWD SW	ON or OFF
Stop light switch signal	Stop Light SW	ON or OFF
Anti lock brake system signal	ABS signal	ON or OFF
Parking range signal	P Range Signal	ON or OFF
Neutral range signal	N Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
AT diagnosis light output signal	Diagnosis Light	ON or OFF
Cruise control signal	Cruise Control Signal	ON or OFF
ATF temperature light	ATF temperature light	ON or OFF
Up shift signal	Up SW	ON or OFF
Down shift signal	Down SW	ON or OFF
Sport mode signal	Tiptronic Mode Switch	ON or OFF
Shift lock solenoid signal	Shift Lock Solenoid	ON or OFF

NOTE:
For details concerning operation procedures, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {Each System Check}.
2) On the «System Selection Menu» display screen, select the {Transmission}.
3) Select the [OK] after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Clear Memory}.

NOTE:
If {Clear Memory 2} is selected and performed, DTC and learned control memory are cleared. If Clear Memory 2 is performed, execute the advance operation of learning control. <Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

4. FACILITATION OF LEARNING CONTROL

1) Shift the select lever to “P” range, and apply the parking brake.
2) Lift-up the vehicle.
3) Connect the Subaru Select Monitor to the data link connector, and then turn the ignition switch to ON.
4) Perform {Clear Memory 2} using the Subaru Select Monitor. <Ref. to 4AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
5) Using the Subaru Select Monitor, check that there is no DTC displayed. <Ref. to 4AT(diag)-15, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>
6) Warm-up the engine until the ATF temperature displayed on the Subaru Select Monitor reaches 60 — 90°C (140 — 194°F). <Ref. to 4AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Shift the select lever to “R” range.
8) Turn all switches including headlight, air conditioner, seat heater, rear defogger and etc. OFF.
9) Wait for 30 seconds or more with the ignition key turned to OFF.
10) When “Communication Failed!” is displayed on Subaru Select Monitor, press the brake pedal fully until the learning control promotion is completed.
11) Turn the ignition switch to ON.
12) Change Subaru Select Monitor to «Transmission Diagnosis» display screen. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>
13) Check that the Subaru Select Monitor is returned to normal operation.
14) Shift the select lever to “P” range, and then wait for 3 seconds or more.
15) Shift the select lever to “R” range, and then wait for 3 seconds or more.
16) Shift the select lever to “N” range, and then wait for 3 seconds or more.
17) Shift the select lever to “D” range, and then wait for 3 seconds or more.
18) Shift the select lever to “N” range, and then wait for 3 seconds or more.
19) Slowly depress the accelerator pedal to full open.
20) Slowly release the accelerator pedal to full close.
21) Start the engine, and idle it.
22) Shift the select lever to “D” range.
23) Start learning control promotion. At this time, the SPORT indicator light in the combination meter will start blinking at 2 Hz. When the SPORT indicator light does not blink, turn the ignition switch to OFF and repeat the procedures from step 4). When the SPORT indicator light blinking at 2 Hz goes OFF, facilitation of learning control is completed.

NOTE:
When blinking of SPORT indicator light changes from 2 Hz to 4 Hz during learning control promotion, repeat the procedure from step 4).
24) Shift the select lever to “N” range, and then turn the ignition switch to OFF.
25) Shift the select lever to “P” range to complete the learning control promotion.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to “Subaru Select Monitor” for information on how to display a DTC. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>
For details concerning DTCs, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-28, List of Diagnostic Trouble Code (DTC).>

NOTE:
It is not possible to read the DTC by ATF temperature warning light.

8. Inspection Mode

A: PROCEDURE

WARNING:
Observe the traffic law when driving on public roads.
1) Shift the select lever to “D” range, and then drive the vehicle at 60 km/h (37 MPH) for at least 10 seconds.
2) Drive the vehicle with manual mode.

9. Clear Memory Mode

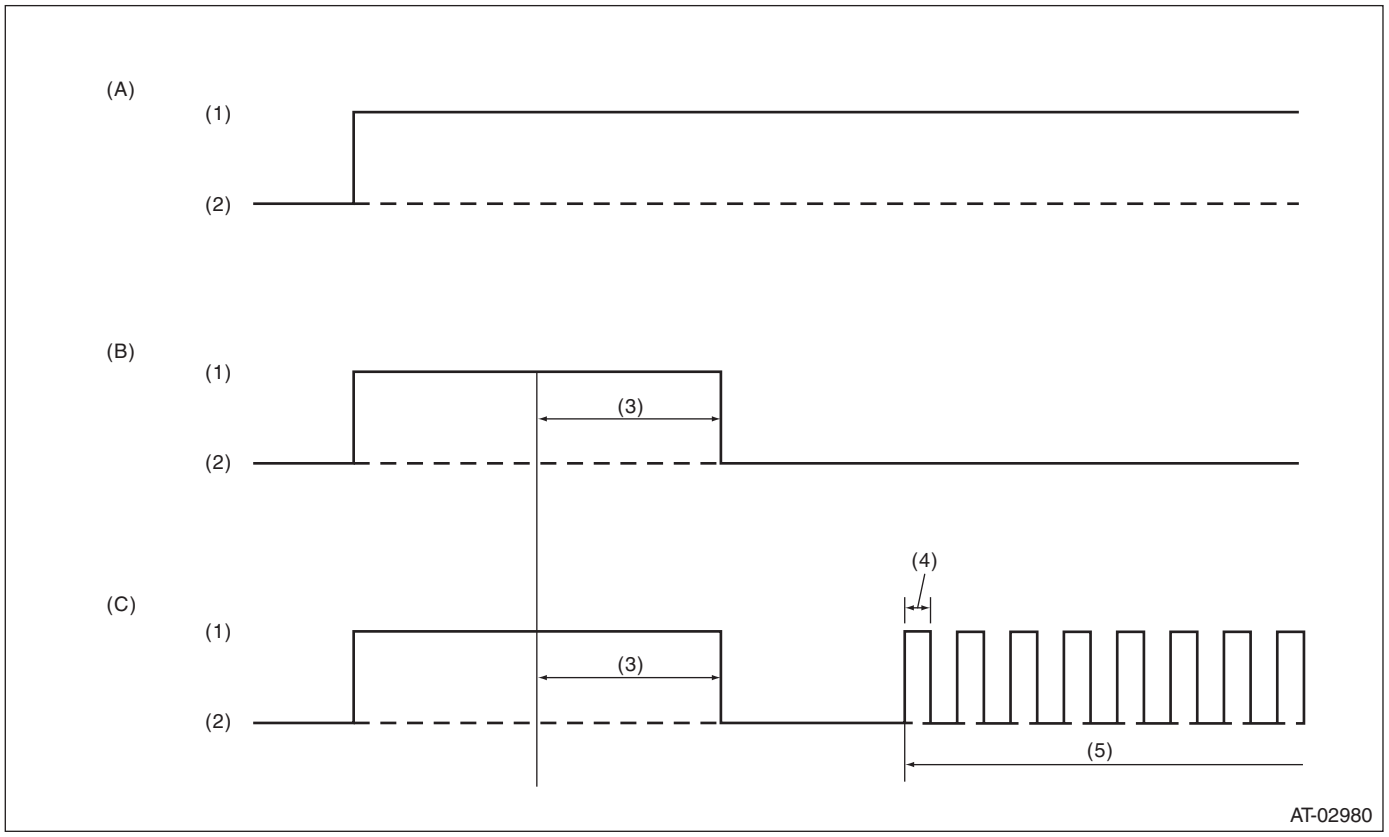
A: OPERATION

Refer to “Subaru Select Monitor” for information about how to clear a DTC.
<Ref. to 4AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

10.AT Oil Temp Warning Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, the ATF temperature warning light blinks when a malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a DTC during the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the ATF temperature warning light does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the Subaru Select Monitor. Warning light signal patterns are shown in the figure.

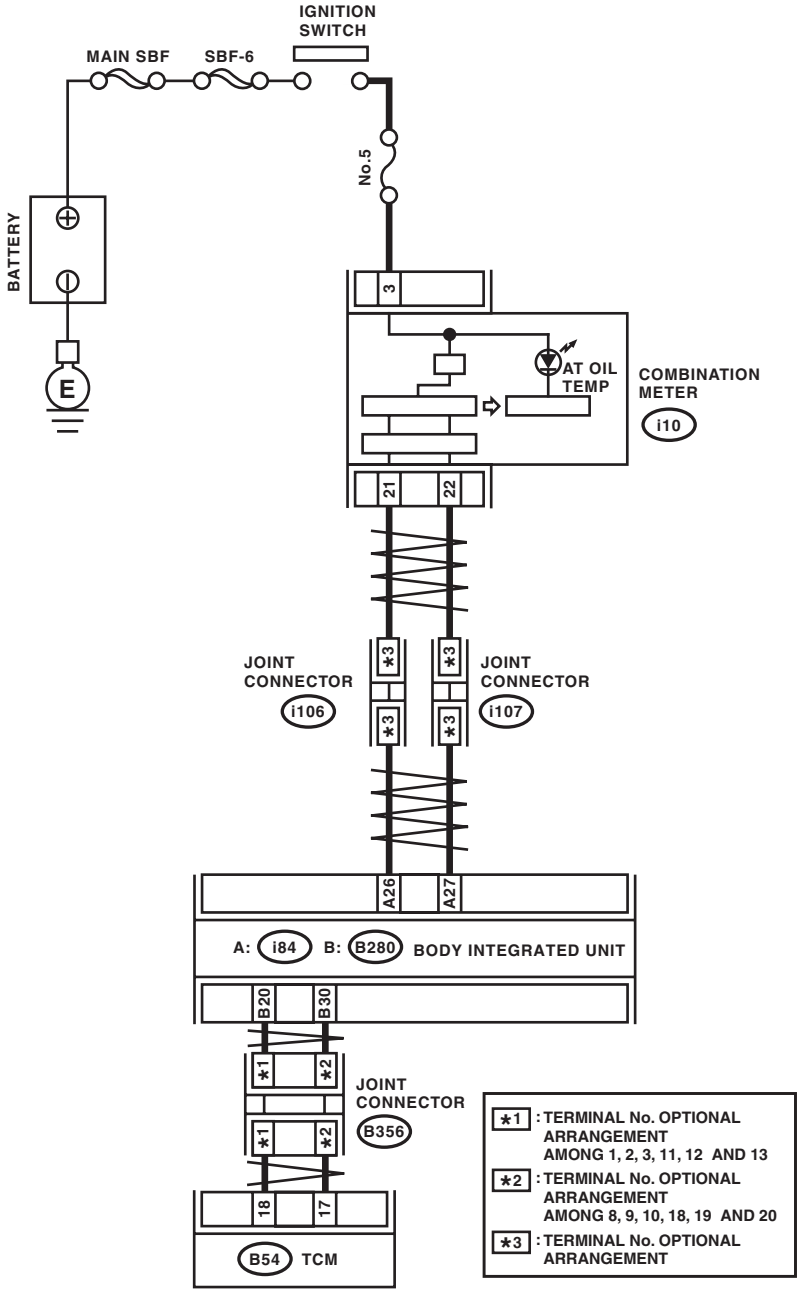


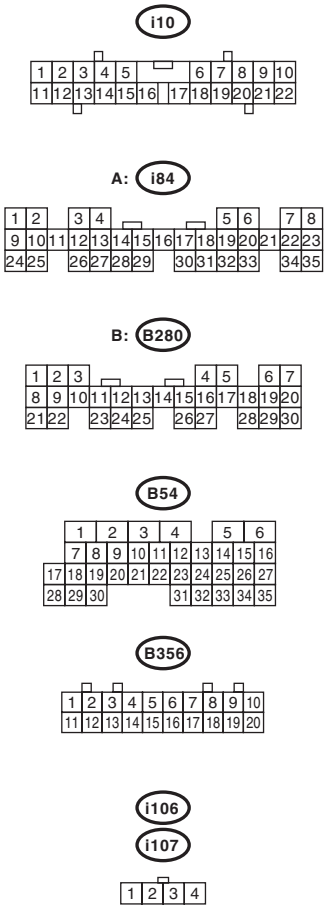
(A)	Ignition switch ON (engine OFF)	(B)	Normal (engine ON)	(C)	Faulty (engine ON)
(1)	ON	(3)	2 seconds	(5)	Blink
(2)	OFF	(4)	0.25 seconds		

Perform the inspection when the ATF temperature warning light does not operate correctly. <Ref. to 4AT(diag)-22, INSPECTION, AT Oil Temp Warning Light Display.>

B: INSPECTION

DIAGNOSIS:
ATF temperature warning light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), the ATF temperature warning light does not illuminate.
WIRING DIAGRAM:





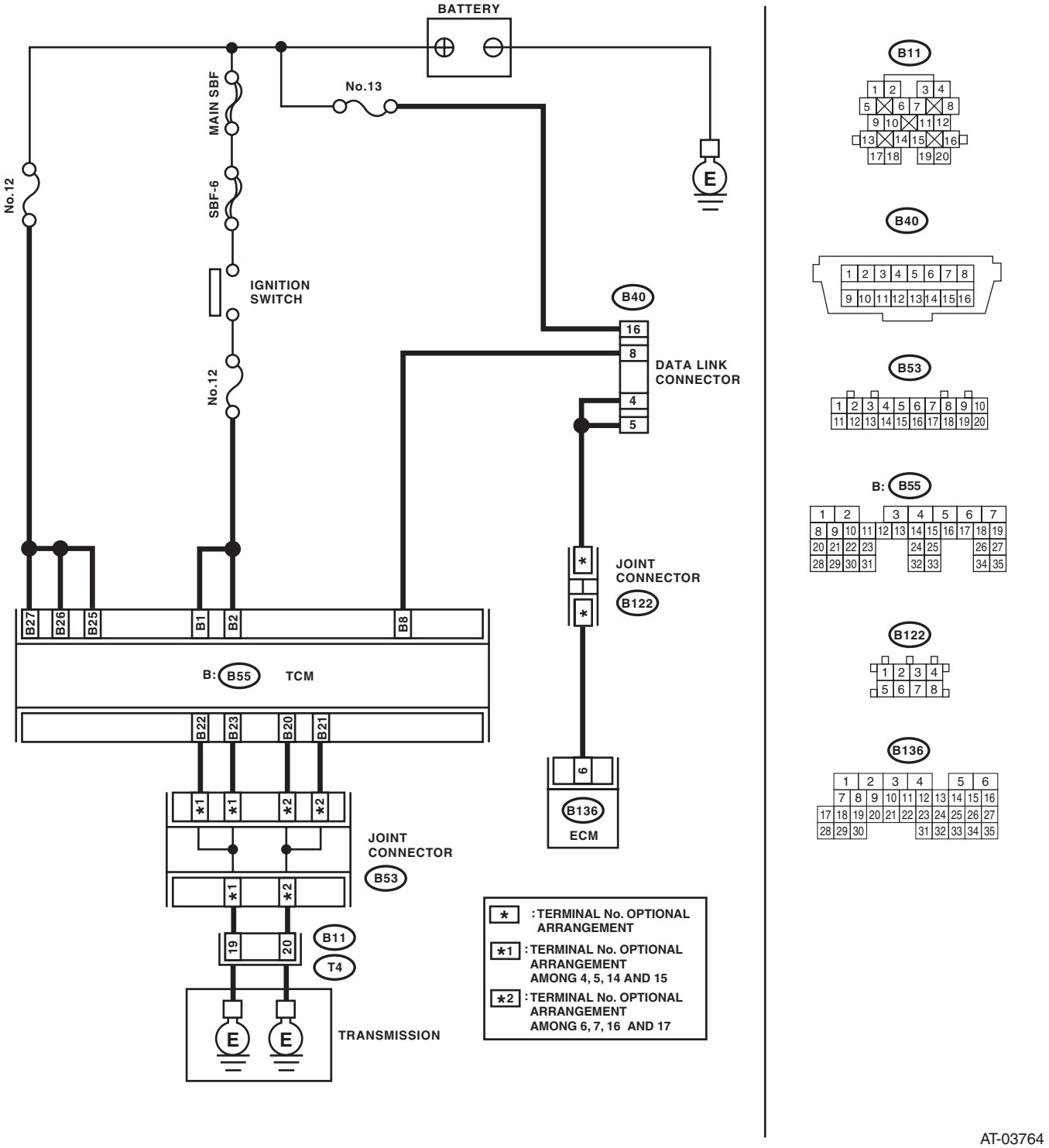
AT-03763

	Step	Check	Yes	No
1	**ATF TEMPERATURE WARNING LIGHT INSPECTION.** Turn the ignition switch to ON.	Does the ATF temeprature warning light illuminate?	Go to step **2**.	Perform the self-diagnosis of combination meter.
2	**ATF TEMPERATURE WARNING LIGHT INSPECTION.** After the ignition switch is ON, wait for at least 2 seconds.	Does the ATF temeprature warning light illuminate?	Go to step **3**.	Go to step **4**.
3	**ATF TEMPERATURE WARNING LIGHT INSPECTION.** Start the engine.	Does the ATF temeprature warning light go off?	Normal. Go back to "Basic Diagnostic Procedure". <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>	Go to step **7**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** Connect the Subaru Select Monitor to the 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 4AT(diag)-24, Diagnostic Procedure for Subaru Select Monitor Communication.>
5	**CHECK TCM.** Display the current data of TCM using Subaru Select Monitor.	Is the "Diagnosis Light" output signal "ON"?	Go to step **6**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
6	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the "ATF oil temperature light" input signal on "Illuminate"?	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>	Check DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>
7	**CHECK TCM.** Display the current data of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is the "Diagnosis Light" output signal "ON"?	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>	Go to step **8**.
8	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the "ATF oil temperature light" input signal on "Illuminate"?	Check DTC of body integrated unit. Perform the diagnosis according to DTC. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>

11.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-03764

	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.
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.** 1) Disconnect the connectors from the ECM. 2) Measure the resistance of harness between data link connector and ECM. ***Connector & terminal*** ***(B40) No. 4 — (B136) No. 6:*** ***(B40) No. 5 — (B136) No. 6:***	Is resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between data link connector and ECM.
4	**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 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between data link connector and ground terminals.
5	**CHECK ENGINE GROUND CIRCUIT.** Check the engine ground circuit.	Is the engine ground circuit normal?	Go to step **6**.	Repair ground circuit of ECM.
6	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to transmission system can be executed normally.	Is the name of system displayed on Subaru Select Monitor?	Go to step **11**.	Go to step **7**.
7	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Check whether communication to engine system can be executed normally.	Is the name of system displayed on Subaru Select Monitor?	Go to step **9**.	Go to step **8**.
8	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the connectors of TPM control unit, airbag control module, body integrated unit, and ABSCM&H/U. **CAUTION:** **When disconnecting the connector from airbag control module, always follow the precautions on AB section. <Ref. to AB-4, CAUTION, General Description.>** 4) Check whether communication to transmission system can be executed normally.	Is the name of system displayed on Subaru Select Monitor?	Check each control module.	Go to step **9**.

	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors of TCM, ECM, TPM control unit, airbag control module, body integrated unit, and ABSCM&H/U. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B40) No. 8 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **10**.	Check harness and connector between each control module and data link connector.
10	**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. 8 (+) — Chassis ground (–):***	Is the voltage 1 V or more?	Check harness and connector between each control module and data link connector.	Go to step **11**.
11	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B55) No. 8 — (B40) No. 8:***	Is resistance less than 1 Ω?	Go to step **12**.	Repair the harness and connector between TCM and data link connector.
12	**CHECK INSTALLATION OF TRANSMISSION HARNESS CONNECTOR.**	Is the transmission harness connector connected to bulkhead harness connector?	Go to step **13**.	Connect the bulkhead harness connector to transmission harness connector.
13	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply and data link connector?	Repair the poor contact.	Go to step **14**.
14	**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*** ***(B55) No. 27 (+) — Chassis ground (–):*** ***(B55) No. 26 (+) — Chassis ground (–):*** ***(B55) No. 25 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **16**.	Go to step **15**.
15	**CHECK FUSE (NO. 12).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 12).	Is the fuse (No. 12) blown out?	Replace the fuse (No. 12). If the replaced fuse (No. 12) blows out easily, repair the short circuit of harness between fuse (No. 12) and TCM.	Repair the open circuit of harness between fuse (No. 12) and TCM, or fuse (No. 12) and battery, and poor contact of the connector.
16	**CHECK IGNITION 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 (–):***	Is the voltage 10 — 13 V?	Go to step **18**.	Go to step **17**.

	Step	Check	Yes	No
17	**CHECK FUSE (NO. 12).** Remove the fuse (No. 12).	Is the fuse (No. 12) blown out?	Replace the fuse (No. 12). If the replaced fuse (No. 12) blows out easily, repair the short circuit of harness between fuse (No. 12) and TCM.	Repair the open circuit of harness between fuse (No. 12) and TCM, or fuse (No. 12) and battery, and poor contact of the connector.
18	**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 and transmission connector. ***Connector & terminal*** ***(B55) No. 20 — (B11) No. 19:*** ***(B55) No. 21 — (B11) No. 19:*** ***(B55) No. 22 — (B11) No. 20:*** ***(B55) No. 23 — (B11) No. 20:***	Is resistance less than 1 Ω?	Go to step **19**.	Repair the open circuit of harness between TCM and transmission harness connector, and poor contact of connector.
19	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.** Measure the resistance of the harness between transmission and transmission ground. ***Connector & terminal*** ***(T4) No. 19 — Transmission ground:*** ***(T4) No. 20 — Transmission ground:***	Is resistance less than 1 Ω?	Go to step **20**.	Repair the open circuit of the harness between transmission and transmission ground.
20	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

12.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Contents	Diagnosis content	Reference
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction short circuit	<Ref. to 4AT(diag)-30, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), 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 open.	<Ref. to 4AT(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 shorted.	<Ref. to 4AT(diag)-40, DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Input/Turbine Speed Sensor Circuit	Torque converter turbine speed sensor malfunction, open or shorted input signal circuit	<Ref. to 4AT(diag)-43, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Torque Converter/ Brake Switch “B” Circuit Low	Brake switch malfunction, open input signal circuit	<Ref. to 4AT(diag)-45, 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 shorted input signal circuit	<Ref. to 4AT(diag)-48, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Torque Converter/ Brake Switch “B” Circuit High	Brake switch malfunction, shorted input signal circuit	<Ref. to 4AT(diag)-50, DTC P0724 BRAKE SWITCH CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine Speed Input Circuit	Open or shorted engine speed output signal circuit	<Ref. to 4AT(diag)-52, DTC P0725 ENGINE SPEED INPUT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor or control valve malfunction	<Ref. to 4AT(diag)-53, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor or control valve malfunction	<Ref. to 4AT(diag)-53, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor or control valve malfunction	<Ref. to 4AT(diag)-53, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor or control valve malfunction	<Ref. to 4AT(diag)-53, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0736	Reverse Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor or control valve malfunction	<Ref. to 4AT(diag)-54, 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 4AT(diag)-55, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque Converter Clutch Circuit Electrical	Lock-up solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-56, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	Line pressure linear solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-59, DTC P0748 PRESSURE CONTROL SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Contents	Diagnosis content	Reference
P0753	Shift Solenoid “A” Electrical	Low clutch duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-61, DTC P0753 SHIFT SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid “B” Electrical	2-4 brake duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-64, DTC P0758 SHIFT SOLENOID “B” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0763	Shift Solenoid “C” Electrical	High clutch duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-67, DTC P0763 SHIFT SOLENOID “C” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0768	Shift Solenoid “D” Electrical	Low & reverse clutch duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-70, DTC P0768 SHIFT SOLENOID “D” 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 4AT(diag)-73, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Rear vehicle speed sensor is faulty or input signal circuit is open or shorted.	<Ref. to 4AT(diag)-75, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1707	AT AWD Solenoid Valve Circuit Malfunction	Transfer duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-78, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	CAN Communication Circuit	CAN communication circuit is open or shorted.	<Ref. to 4AT(diag)-80, DTC P1718 CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	SPORT Mode Switch Circuit	Sport shift switch is faulty or input signal circuit is open or shorted.	<Ref. to 4AT(diag)-81, DTC P1817 SPORT MODE SWITCH CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

13.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

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

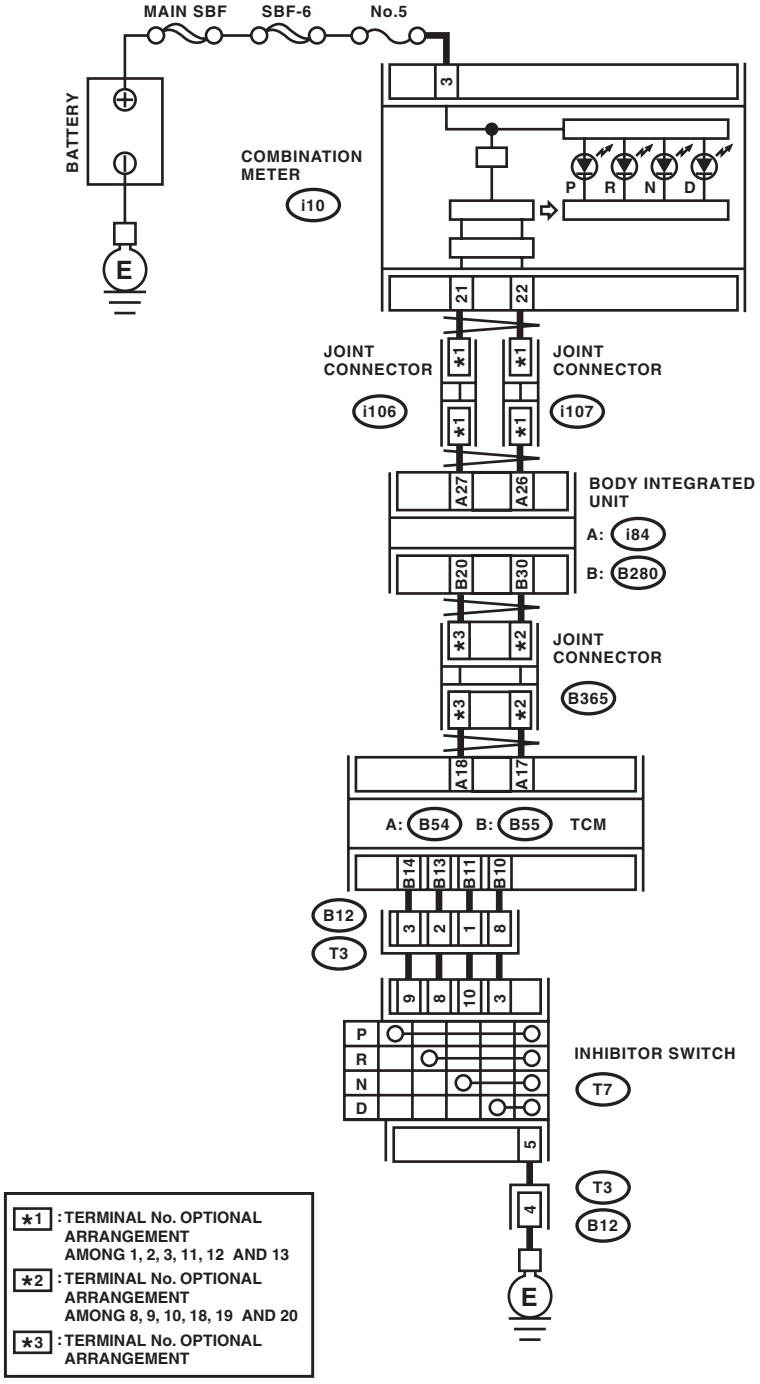
DTC DETECTING CONDITION:

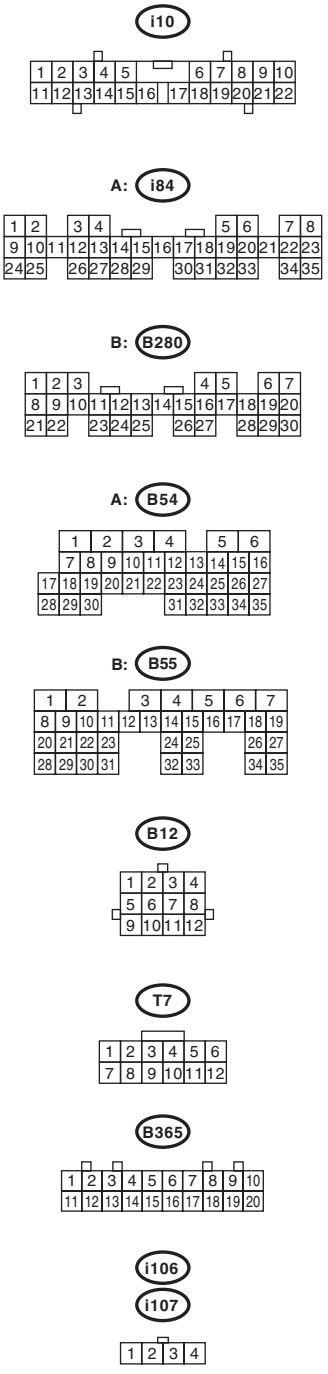
- Inhibitor switch is faulty.
- At least 2 range signal is input.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- The range position of the select lever and the AT select lever position indicator light on the combination meter do not match.

WIRING DIAGRAM:





AT-03765

	Step	Check	Yes	No
1	**CHECK INDICATOR LIGHT.** 1) Turn the ignition switch to ON. 2) Shift the select lever to "P" range.	Does the "P" range indicator light on combination meter illuminate?	Go to step **2**.	Go to step **12**.
2	**CHECK INDICATOR LIGHT.**	Does the "P" range indicator light on combination meter illuminate?	Go to step **26**.	Go to step **3**.
3	**CHECK INDICATOR LIGHT.**	Does the "N" range indicator light on combination meter illuminate?	Go to step **33**.	Go to step **4**.
4	**CHECK INDICATOR LIGHT.**	Does the "D" range indicator light on combination meter illuminate?	Go to step **40**.	Go to step **5**.
5	**CHECK "P" RANGE SWITCH.** 1) Connect the Subaru Select Monitor to the data link connector. 2) Shift the select lever to "R" range.	Does the "P" range LED of Subaru Select Monitor illuminate?	Go to step **19**.	Go to step **6**.
6	**CHECK INDICATOR LIGHT.**	Does the "P" range indicator light on combination meter illuminate?	Go to step **8**.	Go to step **7**.
7	**CHECK "R" RANGE SWITCH.**	Does the "R" range LED of Subaru Select Monitor illuminate?	Go to step **23**.	Go to step **20**.
8	**CHECK INDICATOR LIGHT.** Shift the select lever to "N" range.	Does the "P" range indicator light on combination meter illuminate?	Go to step **10**.	Go to step **9**.
9	**CHECK "N" RANGE SWITCH.**	Does the "N" range LED of Subaru Select Monitor illuminate?	Go to step **30**.	Go to step **27**.
10	**CHECK INDICATOR LIGHT.** Shift the select lever to "D" range.	Does the "D" range indicator light on combination meter illuminate?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11**.
11	**CHECK "D" RANGE SWITCH.**	Does the "D" range LED of Subaru Select Monitor illuminate?	Go to step **37**.	Go to step **34**.
12	**CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between inhibitor switch and chassis ground. ***Connector & terminal*** ***(T7) No. 5 — Chassis ground:***	Is the resistance 1 Ω or more?	Go to step **13**.	Repair the open circuit of harness between inhibitor switch and chassis ground, and poor contact of the connector.

	Step	Check	Yes	No
13	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 14 — (T7) No. 9:***	Is resistance less than 1 Ω?	Go to step **14**.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
14	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to "P" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **15**.	Go to step **41**.
15	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to any range other than "P". 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Go to step **16**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
16	**CHECK BODY INTEGRATED UNIT.** Read the data of inhibitor switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "7" displayed?	Go to step **17**.	Check the body integrated unit.
17	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **18**.
18	**CHECK COMBINATION METER.** Check the "P" range indicator light. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the "P" range indicator light bulb OK?	Go to step **41**.	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>
19	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) 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 **42**.	Repair ground short circuit in "P" range circuit.
20	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 13 — (T7) No. 8:***	Is resistance less than 1 Ω?	Go to step **21**.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.

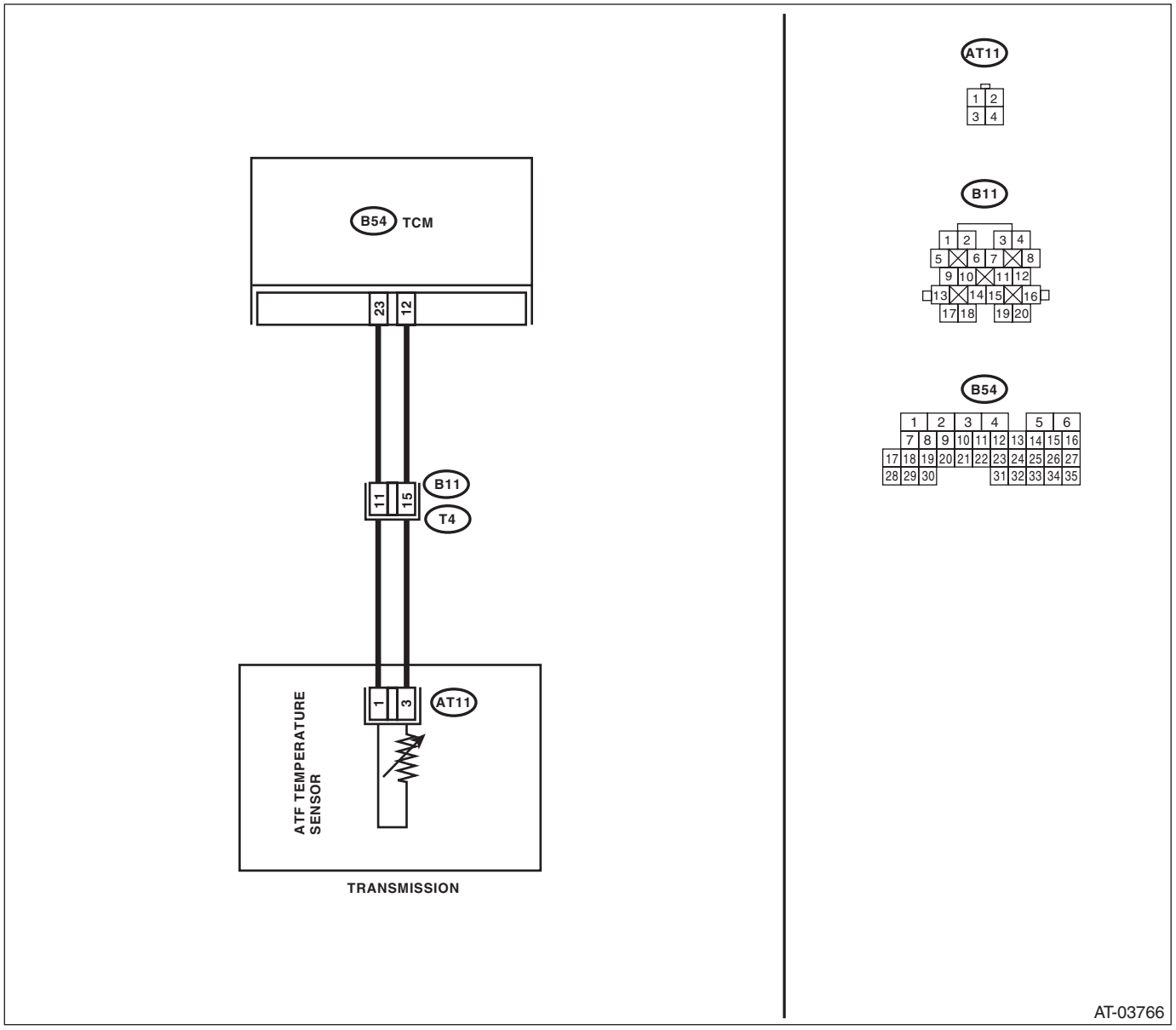
	Step	Check	Yes	No
21	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to "R" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **22**.	Go to step **41**.
22	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to other than "R" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Go to step **41**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
23	**CHECK BODY INTEGRATED UNIT.** Read the data of shift position from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "6" displayed?	Go to step **24**.	Check the body integrated unit.
24	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **25**.
25	**CHECK COMBINATION METER.** Check the "R" range indicator light. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the "R" range indicator light OK?	Go to step **41**.	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>
26	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **41**.	Repair ground short circuit in "R" range circuit.
27	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 11 — (T7) No. 10:***	Is resistance less than 1 Ω?	Go to step **28**.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
28	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to "N" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **29**.	Go to step **41**.

	Step	Check	Yes	No
29	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to any range other than "N" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Go to step **41**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
30	**CHECK BODY INTEGRATED UNIT.** Read the data of shift position from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "5" displayed?	Go to step **31**.	Check the body integrated unit.
31	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **32**.
32	**CHECK COMBINATION METER.** Check the "N" range indicator light. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the "N" range indicator light OK?	Go to step **41**.	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>
33	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **41**.	Repair the ground short circuit in "N" range circuit.
34	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 10 — (T7) No. 3:***	Is resistance less than 1 Ω?	Go to step **35**.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
35	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to "D" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **36**.	Go to step **41**.
36	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to any range other than "D" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 10 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Go to step **41**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
37	**CHECK BODY INTEGRATED UNIT.** Read the data of inhibitor switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "4" displayed?	Go to step **38**.	Check the body integrated unit.

	Step	Check	Yes	No
38	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **39**.
39	**CHECK COMBINATION METER.** Check the “D” range indicator light. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the “D” range indicator light OK?	Go to step **41**.	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>
40	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 10 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **41**.	Repair ground short circuit in “D” range circuit.
41	**CHECK POOR CONTACT.**	Is there poor contact in the inhibitor switch circuit?	Repair the poor contact.	Go to step **42**.
42	**CHECK INHIBITOR SWITCH.**	Is the inhibitor switch in the normal position?	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to 4AT-45, Inhibitor Switch.> <Ref. to CS-28, Select Cable.>

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Input signal circuit to ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:

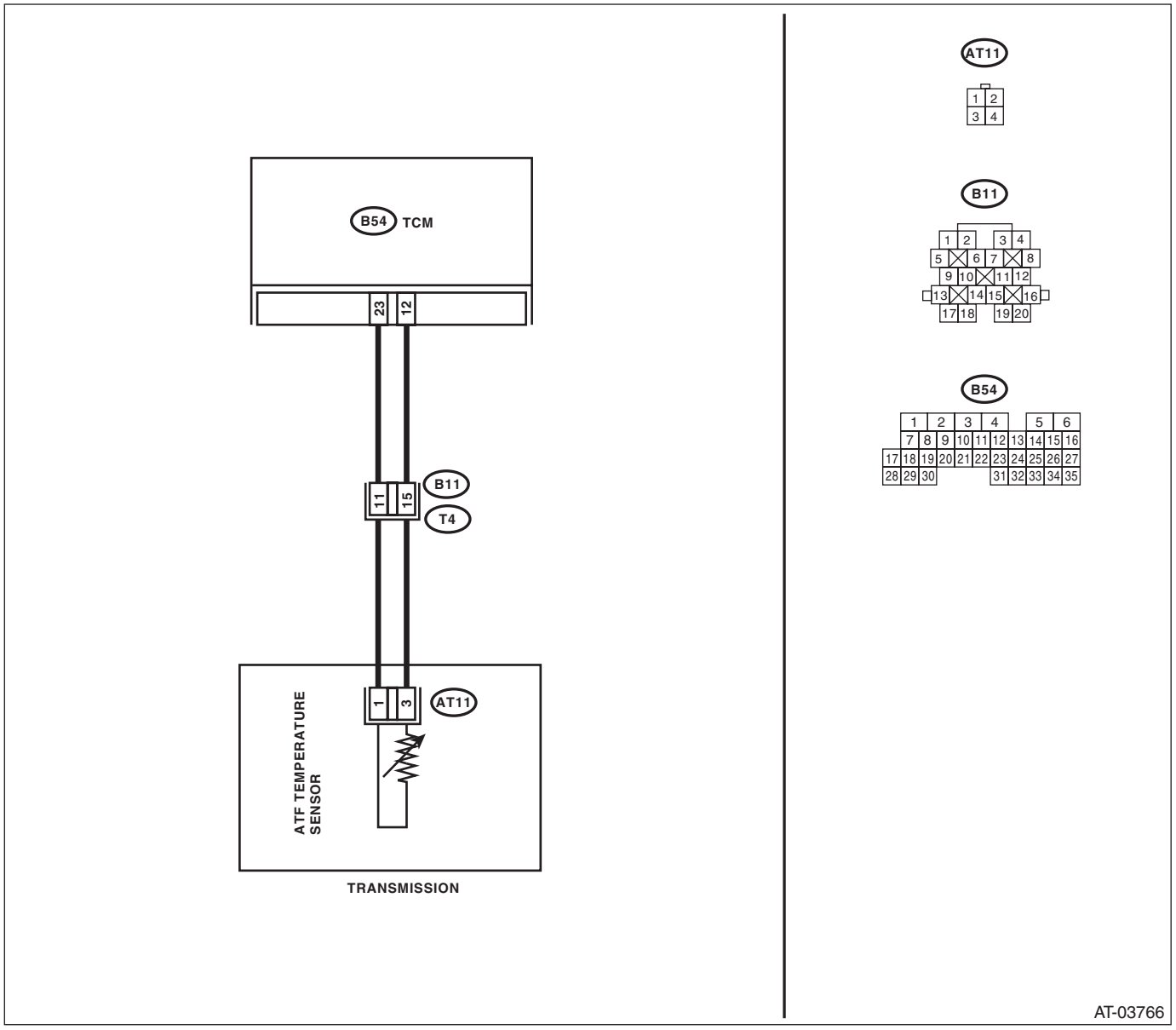


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 23 — (B11) No. 11:***	Is 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 ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 12 — (B11) No. 15:***	Is resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector.
3	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 15:***	Is the resistance between 300 — 800 Ω?	Go to step **4**.	Go to step **7**.
4	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 15:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **5**.	Go to step **7**.
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector to transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON (engine OFF). 4) Read the data of ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness and poor contact of ATF temperature sensor and transmission connector.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** 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 and support with rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve connector. 7) Measure the resistance of harness between ATF temperature sensor and transmission connector. ***Connector & terminal*** ***(T4) No. 11 — (AT11) No. 1:***	Is resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between ATF temperature sensor and transmission connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between ATF temperature sensor and transmission connector. ***Connector & terminal*** ***(T4) No. 15 — (AT11) No. 3:***	Is resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between ATF temperature sensor and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 11 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **10**.	Repair the short circuit of harness between ATF temperature sensor and transmission connector.
10	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 15 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>	Repair the short circuit of harness between ATF temperature sensor and transmission connector.

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Input signal circuit to ATF temperature sensor is shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:

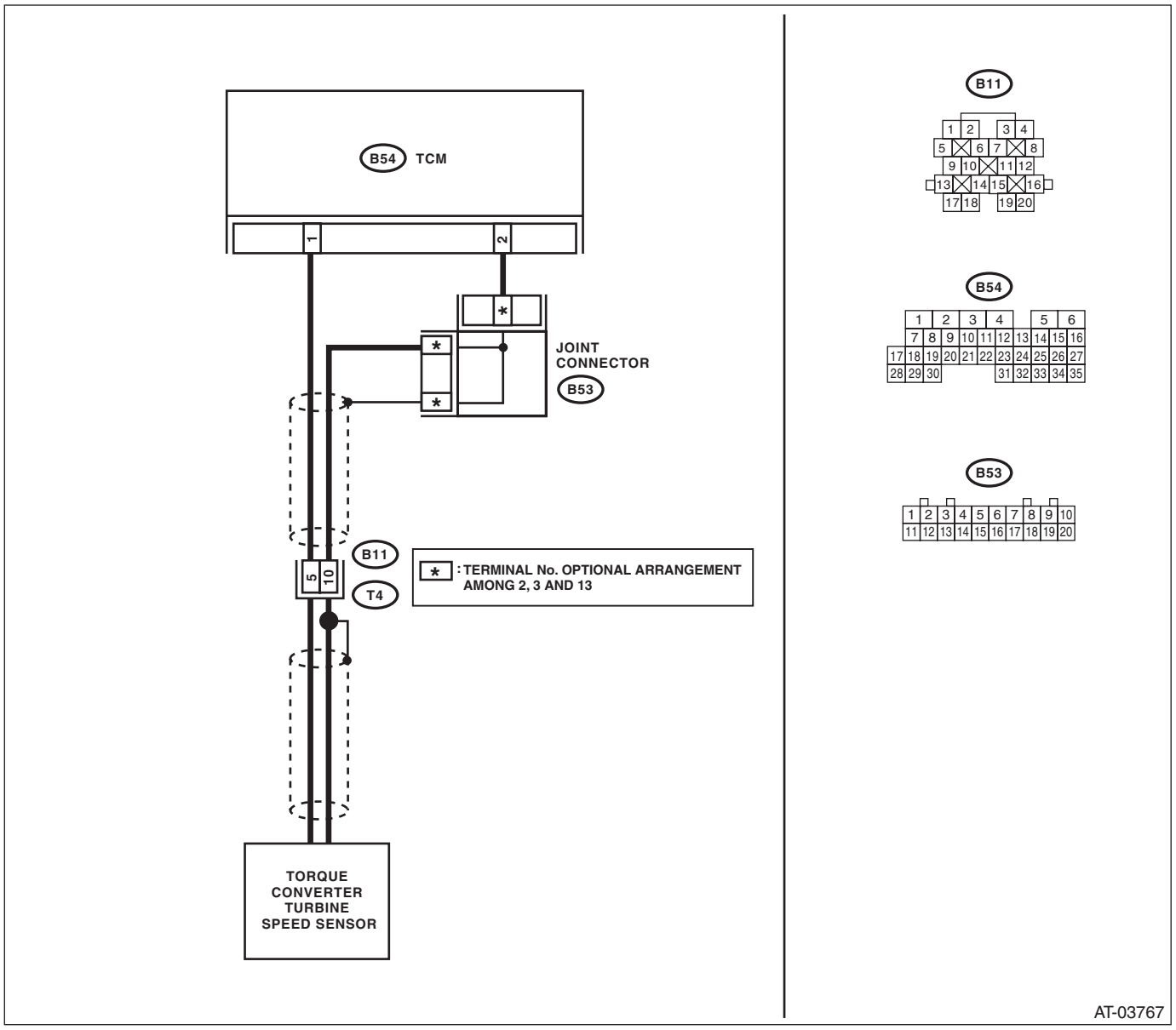


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 23 — No. 12:***	Is the resistance 500 Ω or more?	Go to step **2**.	Go to step **4**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 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**.	Go to step **4**.
3	**CHECK HARNESS.** Measure the resistance between TCM connector terminals while shaking the harness. ***Connector & terminal*** ***(B54) No. 23 — No. 12:***	Does the resistance change?	Go to step **4**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) 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 **5**.	Repair the short circuit of harness between TCM and transmission harness.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness between TCM and transmission harness.
6	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 15:***	Is the resistance 500 Ω or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Go to step **7**.
7	**CHECK TRANSMISSION HARNESS.** 1) Lift up the vehicle and place it on rigid racks. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the oil pan. 4) Disconnect the harness connector from control valve. 5) Measure the resistance between ATF temperature sensor connector terminals. 6) Measure the resistance between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 11 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Replace the transmission harness.

	Step	Check	Yes	No
8	**CHECK TRANSMISSION HARNESS.** Measure the resistance between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 15 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **9**.	Replace the transmission harness.
9	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between control valve connector terminals. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance 500 Ω or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

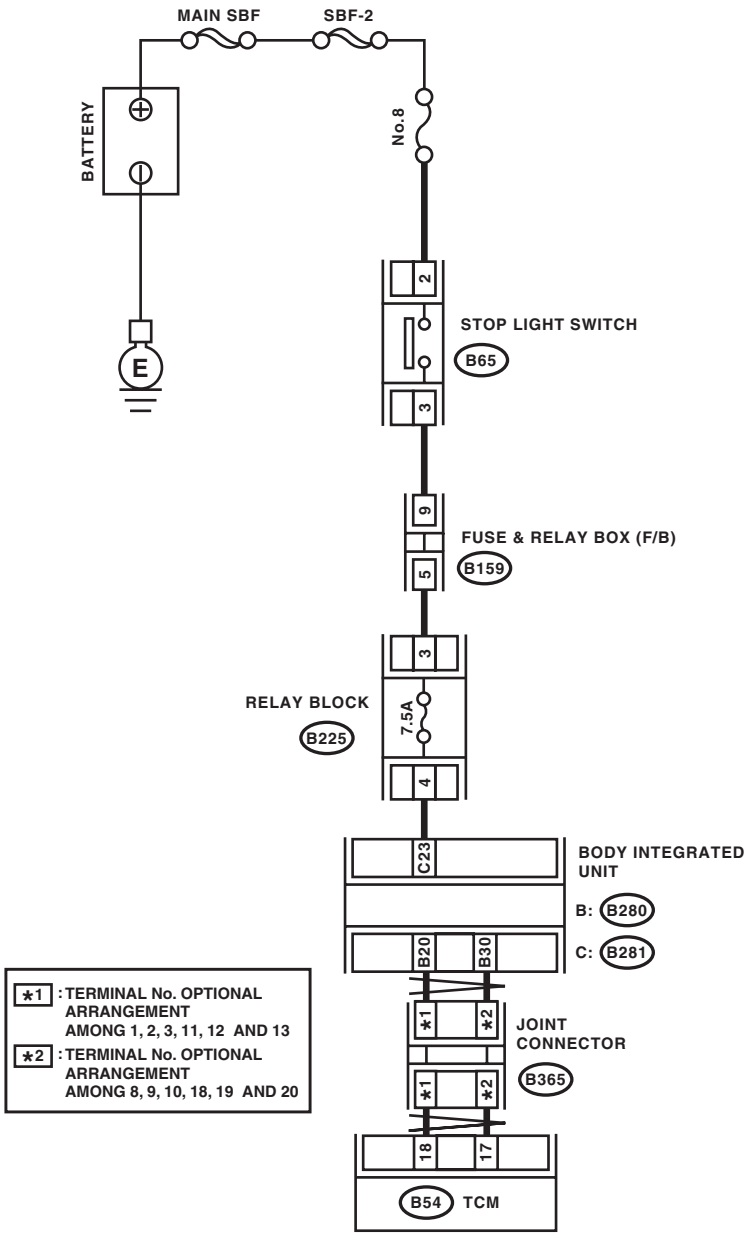
DTC DETECTING CONDITION:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:

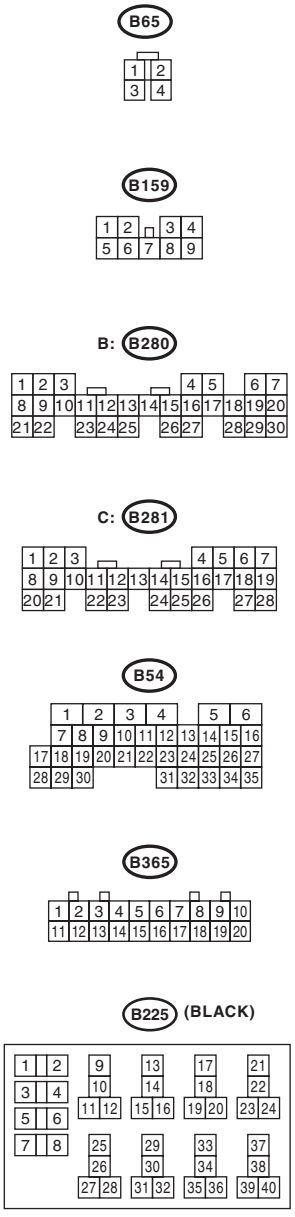


	Step	Check	Yes	No
1	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 5 — No. 10:***	Is the resistance between 450 — 650 Ω?	Go to step **2**.	Replace the torque converter turbine speed sensor. <Ref. to 4AT-52, Torque Converter Turbine Speed Sensor.>
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 1 — (B11) No. 5:***	Is resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 2 — (B11) No. 10:***	Is resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between TCM and transmission connector, and poor contact of the connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between TCM and transmission connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of the harness between TCM and transmission connector, and poor contact of connector.
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON, and run the Subaru Select Monitor. 4) Start the engine. 5) Shift the select lever to "P" or "N" range. 6) Read the data of "Turbine Revolution Speed" using Subaru Select Monitor. • Compare the tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **7**.
7	**CHECK POOR CONTACT.**	Is there poor contact in torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

E: DTC P0719 BRAKE SWITCH CIRCUIT LOW

DTC DETECTING CONDITION:
Brake switch malfunction, open input signal circuit
TROUBLE SYMPTOM:
Gear is not shifted down when driving a down hill.
WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK DTC.**	Does the DTC of CAN communication appear in the on-board diagnostics test mode?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**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 replaced fuse (No. 8) has blown out easily, repair the short circuit of harness between fuse (No. 8) and stop light switch.	Go to step **3**.
3	**CHECK FUSE (7.5 A).** Remove the fuse (7.5A).	Is the fuse (7.5A) blown out?	Replace the fuse (7.5A). If the replaced fuse (7.5A) blows out easily, repair the short circuit of harness between fuse (7.5A) and TCM.	Go to step **4**.
4	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monnitor. 5) Depress the brake pedal. 6) Read the data of “Stop Light Switch” using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **5**.	Go to step **6**.
5	**CHECK TCM.** Read the data of “Stop Light Switch” using Subaru Select Monitor. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is ON displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
6	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Depress the brake pedal. 2) Disconnect the connector from body integrated unit. 3) Measure the voltage of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***(B281) No. 23 (+) — (B65) No. 3 (–):***	Is the voltage 10 V or more?	Go to step **9**.	Go to step **7**.
7	**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 and stop light switch. ***Connector & terminal*** ***(B281) No. 23 — (B65) No. 3:***	Is resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between body integrated unit and stop light switch.

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** Measure the resistance of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***(B281) No. 23 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **9**.	Repair the short circuit of harness between body integrated unit and stop light switch.
9	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

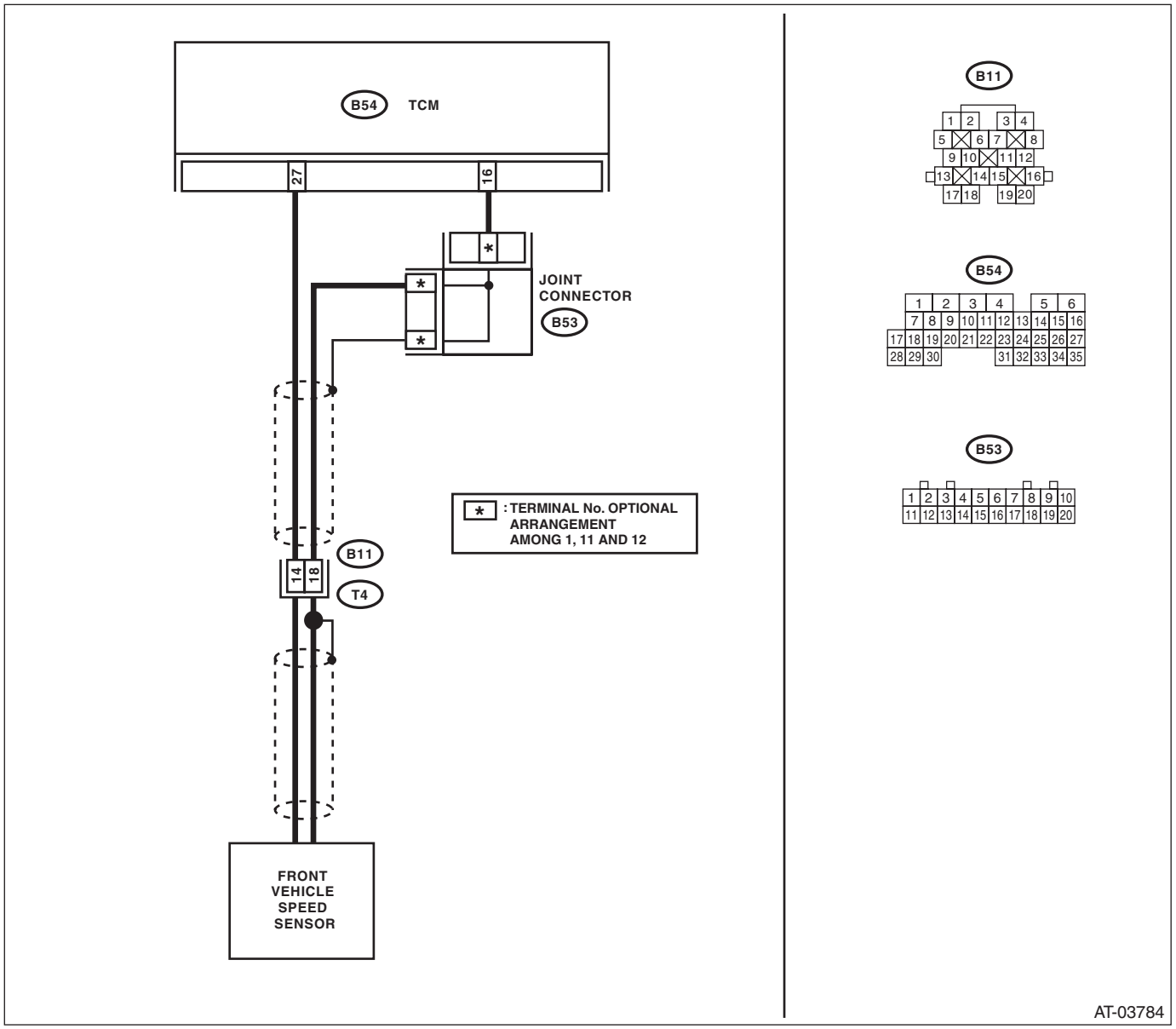
DTC DETECTING CONDITION:

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

TROUBLE SYMPTOM:

Driving performance is poor.

WIRING DIAGRAM:

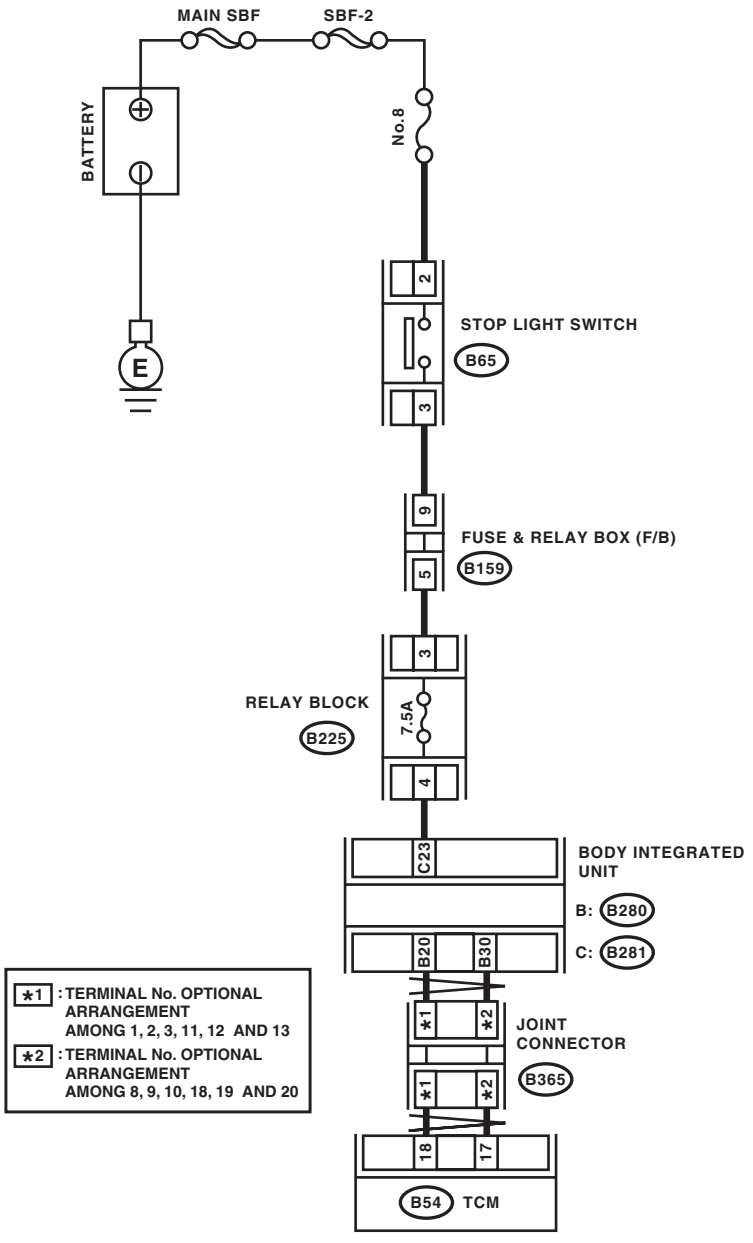


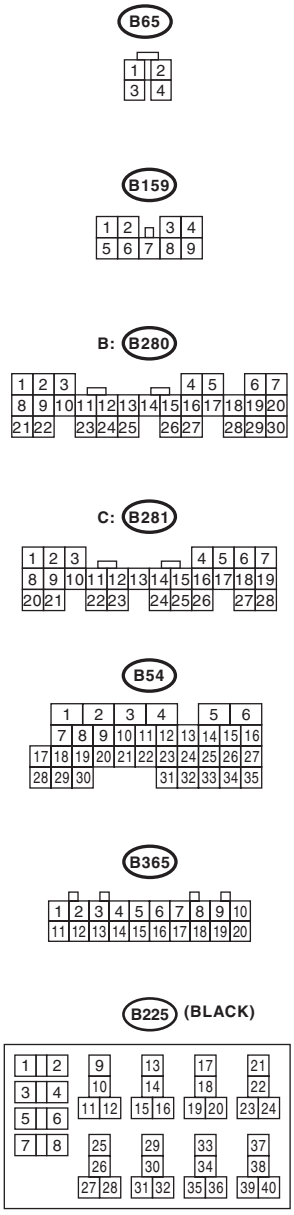
Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 27 — (B11) No. 14:***	Is resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 18:***	Is resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector, and poor contact of the connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) 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.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of the harness between TCM and transmission connector, and poor contact of connector.
5	**CHECK FRONT VEHICLE SPEED SENSOR.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 14 — No. 18:***	Is the resistance between 450 — 650 Ω?	Go to step **6**.	Replace the front vehicle speed sensor. <Ref. to 4AT-48, Front Vehicle Speed Sensor.>
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect the Subaru Select Monitor to the data link connector. 3) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 4) Turn the ignition switch to ON, and run the Subaru Select Monitor. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. • Compare the speedometer with Subaru Select Monitor indications. • Vehicle speed is indicated in "km/h" or "MPH" 7) Slowly increase the vehicle speed to 60 km/h (37 MPH). NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor front wheel speed data increases?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness in of front vehicle speed sensor circuit.	Go to step **7**.
7	**CHECK POOR CONTACT.**	Is there poor contact in front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

G: DTC P0724 BRAKE SWITCH CIRCUIT HIGH

DTC DETECTING CONDITION:
Brake switch malfunction, open input signal circuit
TROUBLE SYMPTOM:
Gear is not shifted down when driving a down hill.
WIRING DIAGRAM:





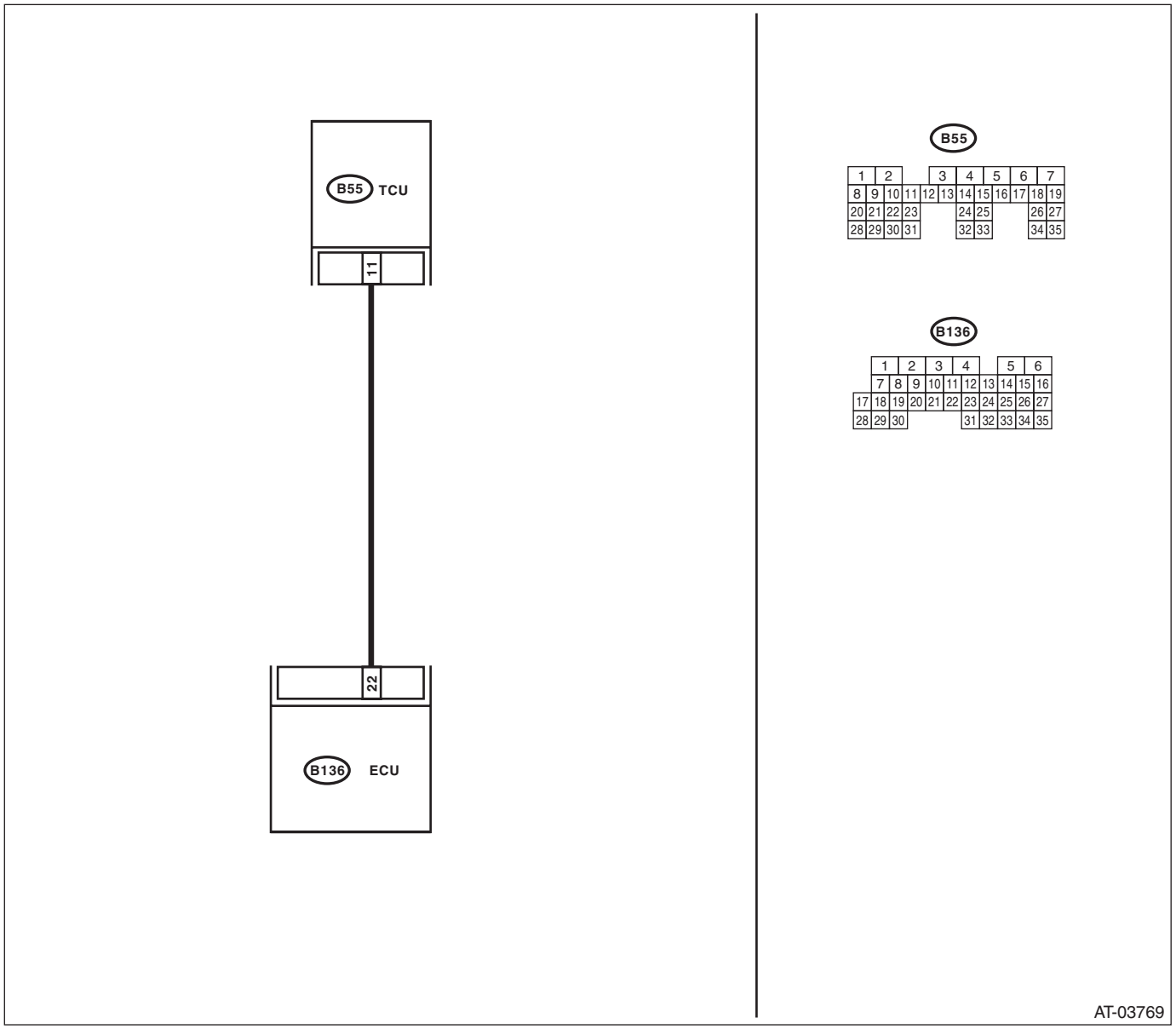
AT-03768

	Step	Check	Yes	No
1	**CHECK DTC.**	Does the DTC of CAN communication appear in the on-board diagnostics test mode?	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 the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monnitor. 5) Read the data of “Stop Light Switch” using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	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 4AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***(B281) No. 23 (+) — 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. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Replace the 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 the body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Repair the short circuit of harness between TCM and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

H: DTC P0725 ENGINE SPEED INPUT CIRCUIT

DTC DETECTING CONDITION:
Engine speed input signal circuit is open or shorted.
TROUBLE SYMPTOM:
- No lock-up occurs. (After engine is warmed-up)
- ATF temperature warning light remains ON when the vehicle speed is “0”.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM. ***Connector & terminal*** ***(B55) No. 11 — (B136) No. 22:***	Is resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and ECM connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Run the engine at idle. 5) Read the data of “Engine Speed” using Subaru Select Monitor. • Display shows engine speed signal value sent from ECM.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in the TCM and ECM.	Go to step **4**.
4	**CHECK POOR CONTACT.**	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step **5**.
5	**CONFIRM DTC P0725.** Replace the ECM with a new part.	Does the DTC appear again, after the memory has been cleared?	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>	Replace the ECM.

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-54, 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 4AT(diag)-54, 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 4AT(diag)-54, 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 4AT(diag)-54, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC P0736 REVERSE INCORRECT RATIO

DTC DETECTING CONDITION:
Vehicle sensor, torque converter turbine speed sensor or control valve malfunction
TROUBLE SYMPTOM:

- Shift point is too high or too low.
- Excessive shift shock
- Tight corner braking phenomenon occurs.
- Gear is not shifted to reverse.
- Gear position is held by fail safe function.

	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. 3) Read the value of "Accel. opening angle" on Subaru Select Monitor display.	Does the value of "Accel. opening angle" change from 0% to 100% smoothly when throttle is operated from fully closed to fully open?	Go to step **2**.	Check the accelerator pedal position sensor circuit.
2	**CHECK FRONT VEHICLE SPEED SENSOR.** 1) Lift up the vehicle and support with rigid racks. 2) Start the engine. 3) Shift the select lever to "D" range and slowly increase vehicle speed. NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.>	Does the vehicle speed displayed by Subaru Select Monitor roughly correspond with vehicle speed indicated by the combination meter?	Go to step **3**.	Check the front vehicle speed sensor circuit.
3	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Shift the select lever to "P" or "N" range. 2) Idle the engine.	Does the value of torque converter turbine speed sensor displayed by Subaru Select Monitor roughly correspond with the value of tachometer in combination meter?	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.	Check the torque converter turbine speed sensor circuit.

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

DTC DETECTING CONDITION:

- Lock up clutch malfunction
- Sticky valve

TROUBLE SYMPTOM:

No lock-up occurs.

	Step	Check	Yes	No
1	**CHECK LOCK-UP DUTY SOLENOID CIRCUIT.** Diagnose according to DTC P0743 procedure.	Is there any fault?	Repair or replace the lock up duty solenoid circuit.	Go to step **2**.
2	**CHECK INHIBITOR SWITCH CIRCUIT.** Diagnose according to DTC P0705 procedure.	Is there any fault?	Repair or replace the inhibitor switch circuit.	Go to step **3**.
3	**CHECK STOP LIGHT SWITCH CIRCUIT.** Diagnose according to DTC P0719 and P0724 procedures.	Is there any fault?	Repair or replace the stop light switch circuit.	Go to step **4**.
4	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Diagnose according to DTC P0712 AND P0713 procedure.	Is there any fault?	Repair or replace the ATF temperature sensor circuit.	Go to step **5**.
5	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. 3) Read the value of “Accel. opening angle” on Subaru Select Monitor display.	Does the value of accelerator pedal position sensor change from 0% to 100% smoothly when throttle is operated from fully closed to fully open?	Go to step **6**.	Check the accelerator pedal position sensor circuit.
6	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Shift the select lever to “P” or “N” range. 2) Idle the engine.	Does the value of turbine speed displayed by Subaru Select Monitor almost correspond with the value of the tachometer?	Go to step **7**.	Check the torque converter turbine speed sensor circuit.
7	**CHECK ENGINE SPEED SIGNAL.** Idle the engine.	Does the value of turbine speed displayed by Subaru Select Monitor almost correspond with the value of the tachometer?	There is transmission assembly mechanical malfunction.	Check the engine speed signal circuit.

O: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

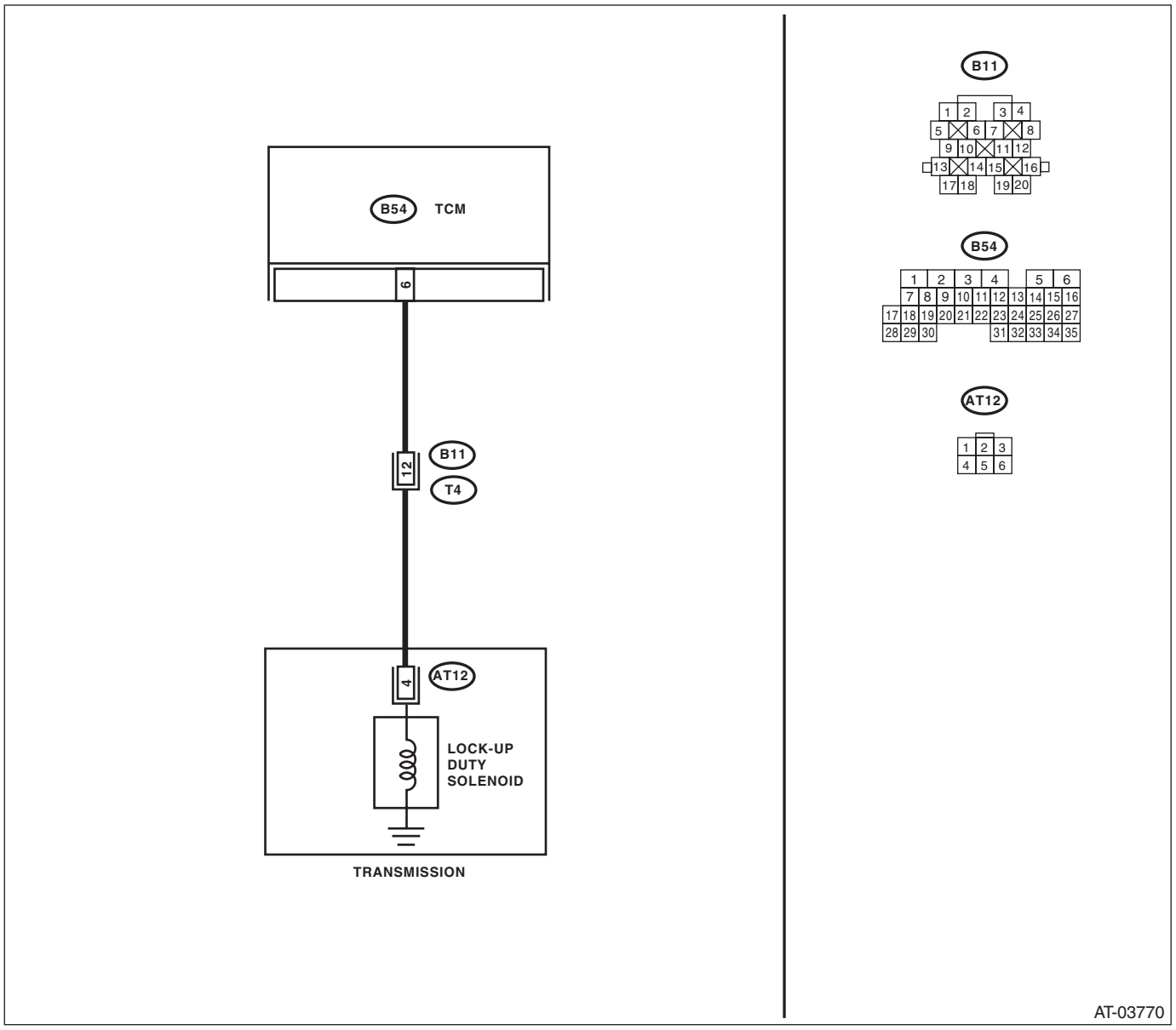
DTC DETECTING CONDITION:

Output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC.**	Do multiple DTCs appear in the on-board diagnostics test mode?	Go to other DTC.	Go to step **2**.
2	**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. 6 — (B11) No. 12:***	Is resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of the harness connector 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 between TCM and transmission connector.
4	**CHECK LOCK-UP DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 12 — No. 20:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **5**.	Go to step **8**.
5	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Connect the Subaru Select Monitor to the data link connector. 4) Start the engine, and run the Subaru Select Monitor. 5) Start the engine and warm-up the engine until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read the data of "Lock Up Duty Ratio" using Subaru Select Monitor. • Lock-up duty solenoid is indicated in "%". 7) Shift the select lever to "D", and slowly increase vehicle speed to 60 km/h (37 MPH). NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.>	Is the measured value 95%?	Go to step **6**.	Go to step **7**.

	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** Return the engine to idling speed, shift the select lever to "N" range and read the data. NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.>	Is the measured value 5%?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **7**.
7	**CHECK POOR CONTACT.**	Is there poor contact in lock-up duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
8	**CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).** 1) Disconnect the transmission connector. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between lock-up duty solenoid and transmission ground. ***Connector & terminal*** ***(AT12) No. 4 — Transmission ground:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **9**.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>
9	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between lock-up duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 12 — (AT12) No. 4:***	Is resistance less than 1 Ω?	Go to step **10**.	Repair the open circuit of harness between TCM and transmission connector.
10	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 12 — Transmission ground:***	Is the resistance 1 MΩ or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in lock-up duty solenoid and transmission.	Repair the short circuit of harness between lock-up duty solenoid and transmission connector.

P: DTC P0748 PRESSURE CONTROL SOLENOID “A” ELECTRICAL

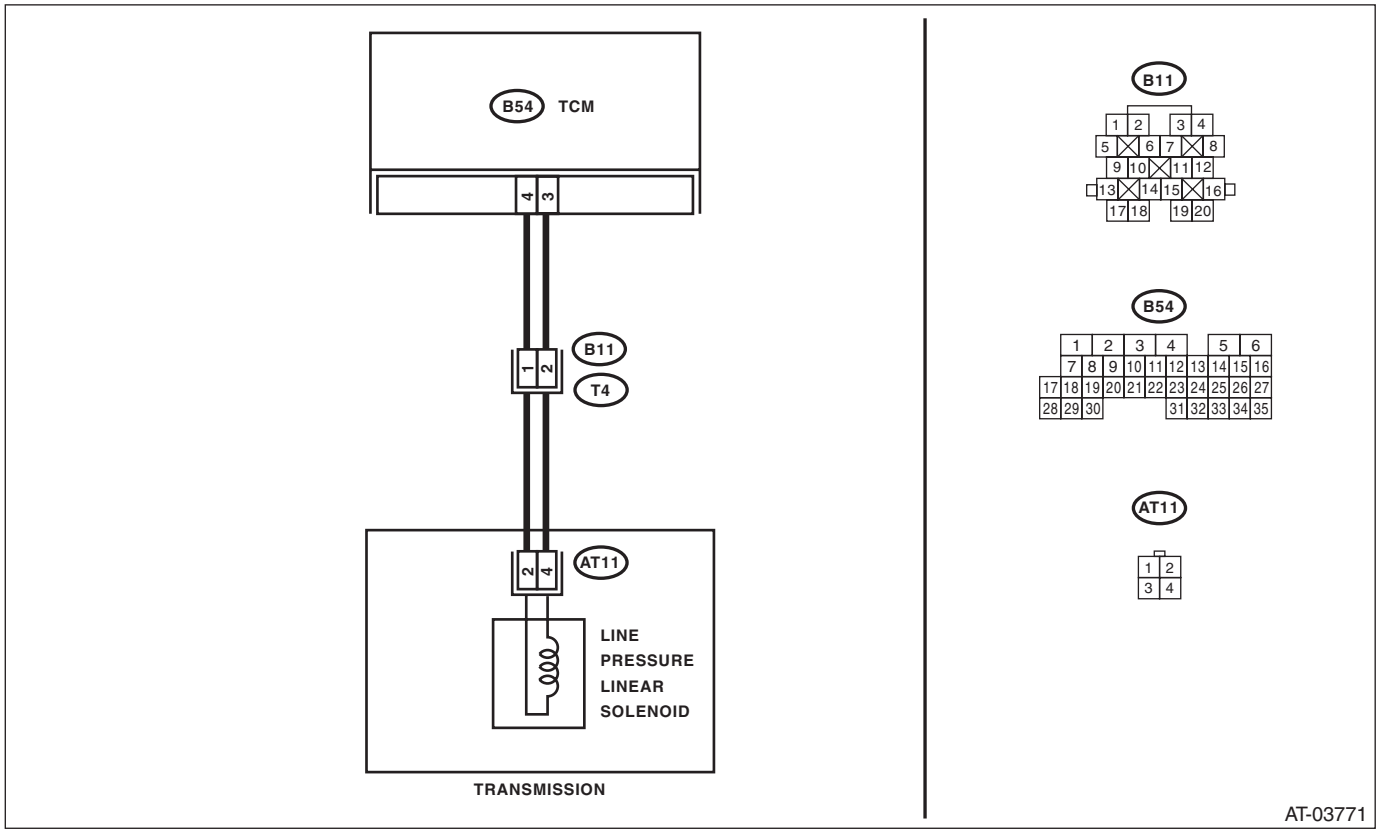
DTC DETECTING CONDITION:

Output signal circuit of line pressure linear solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

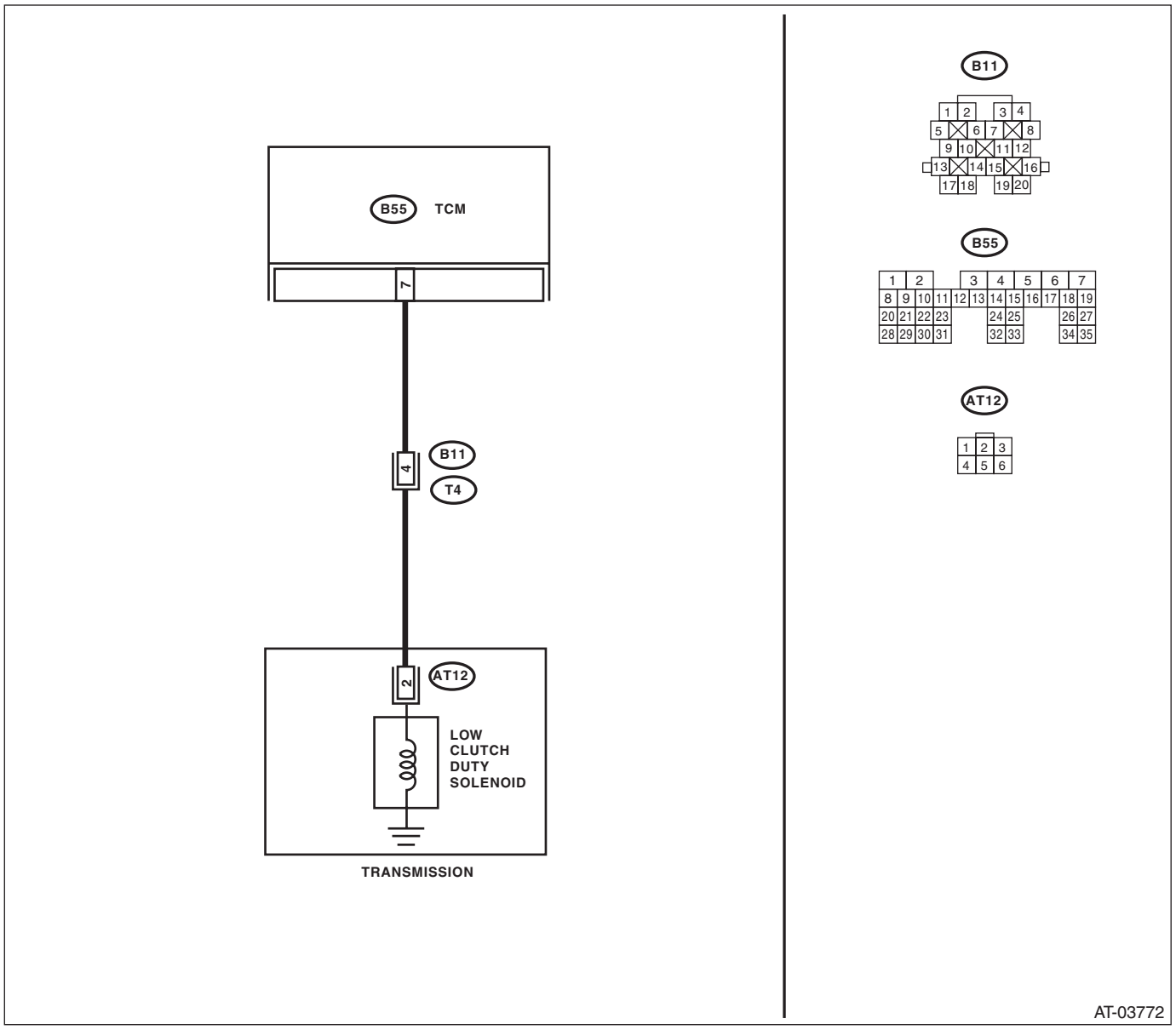
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 3 — (B11) No. 2:*** ***(B54) No. 4 — (B11) No. 1:***	Is 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. 3 — Chassis ground:*** ***(B54) 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 LINE PRESSURE LINEAR SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 1 — No. 2:***	Is the resistance between 4 — 8 Ω?	Go to step **5**.	Go to step **4**.
4	**CHECK LINE PRESSURE LINEAR SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance of line pressure linear solenoid connector terminals. ***Connector & terminal*** ***(AT11) No. 2 — No. 4:***	Is the resistance between 4 — 8 Ω?	Go to step **5**.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE LINEAR SOLENOID.** Measure the resistance of harness between line pressure linear solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 2 — (AT11) No. 4:*** ***(T4) No. 1 — (AT11) No. 2:***	Is resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between line pressure linear solenoid and transmission connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE LINEAR SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 1 — Transmission ground:*** ***(T4) No. 2 — Transmission ground:***	Is the resistance 1 MΩ or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in line pressure linear solenoid and transmission.	Repair the short circuit of harness between line pressure linear solenoid and transmission connector.

Q: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of low clutch duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:

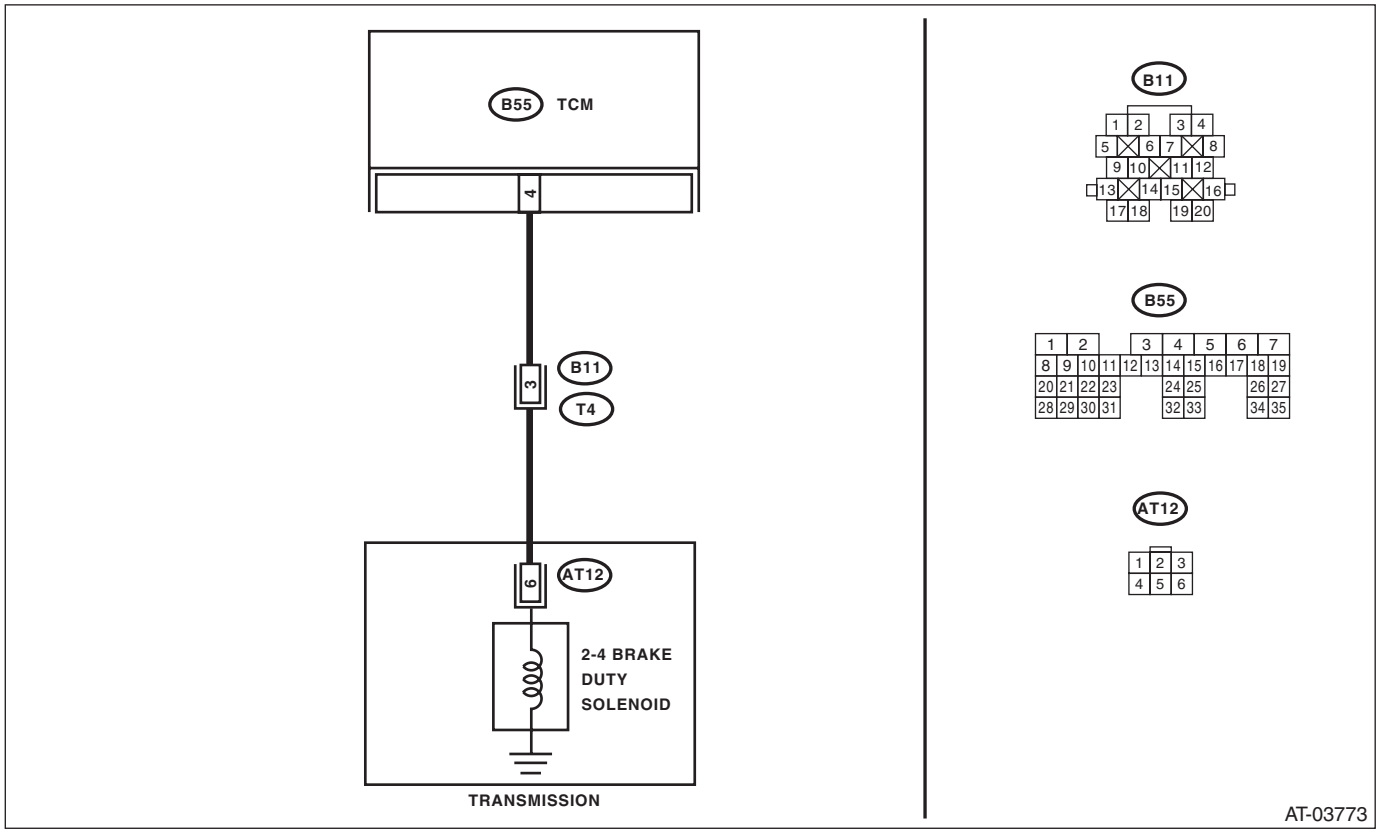


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 7 — (B11) No. 4:***	Is 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 TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission 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.
3	**CHECK LOW CLUTCH DUTY SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 4 — No. 20:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **4**.	Go to step **7**.
4	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Warm-up the transmission until the ATF temperature exceeds approximately 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (with engine OFF). 6) Shift the select lever to “P” or “N” range, and depress the accelerator pedal. 7) Read the data of “Low Clutch Duty Ratio” using Subaru Select Monitor. • Low clutch duty solenoid is indicated in “%”.	Is the measured value 100%?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON (engine OFF). 2) Shift the select lever to “D” range. 3) Read the data of “Low Clutch Duty Ratio”.	Is the measured value 0%?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in transmission.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in low clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK LOW CLUTCH DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between low clutch duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT12) No. 2 — Transmission ground:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **8**.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW CLUTCH DUTY SOLENOID.** Measure the resistance of harness between low clutch duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 4 — (AT12) No. 2:***	Is resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between low clutch duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW CLUTCH DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 4 — Transmission ground:***	Is the resistance 1 MΩ or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector of the low clutch duty solenoid and transmission.	Repair the short circuit of harness between low clutch duty solenoid and transmission connector.

R: DTC P0758 SHIFT SOLENOID “B” ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of 2-4 brake duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:

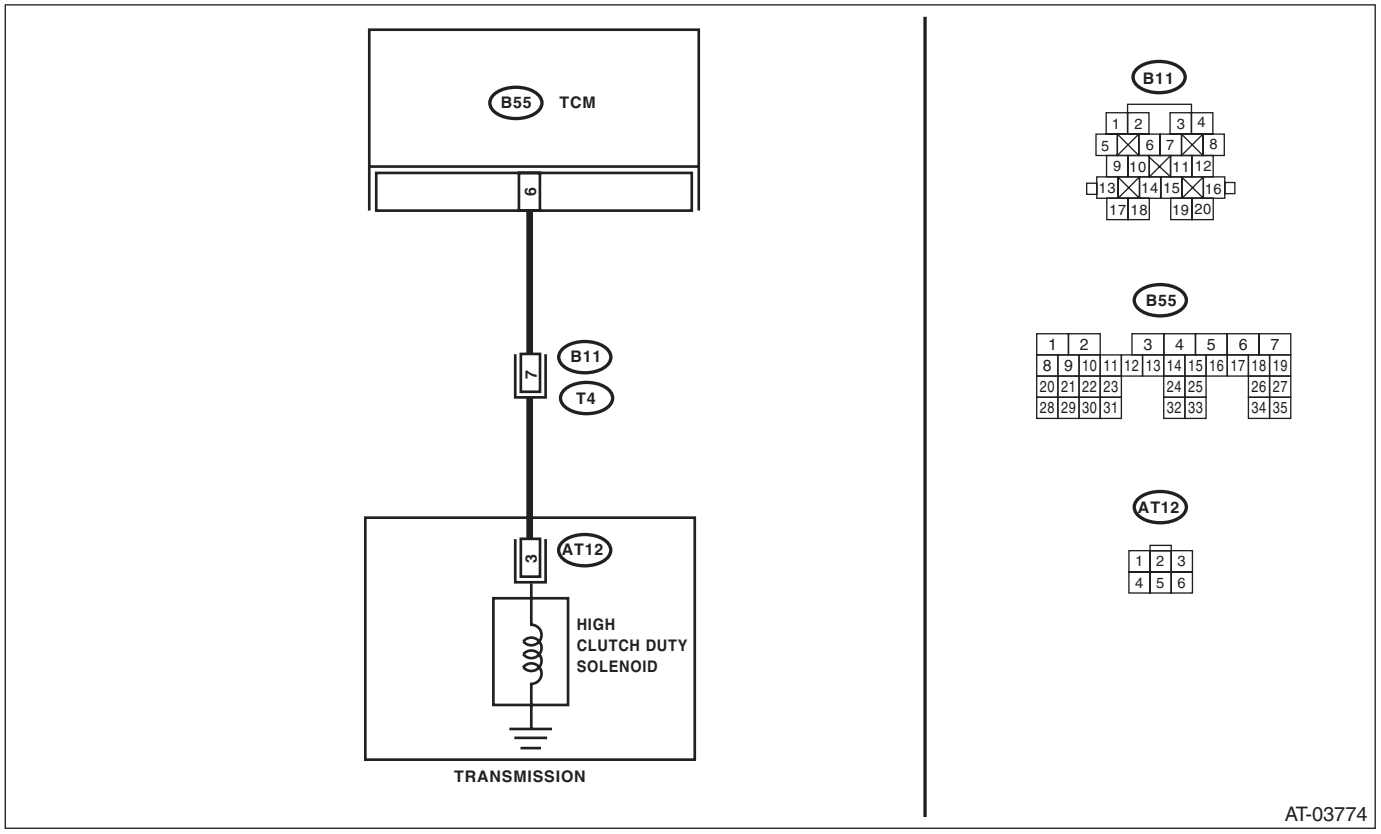


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 4 — (B11) No. 3:***	Is 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 2-4 BRAKE DUTY SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 3 — No. 20:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **4**.	Go to step **7**.
4	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Warm-up the transmission until the ATF temperature exceeds approximately 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (with engine OFF). 6) Shift the select lever to “N” range, and depress the accelerator pedal. 7) Read the data of “Brake Clutch Duty Ration” using Subaru Select Monitor. 2-4 brake duty solenoid is indicated in “%”.	Is the measured value 100%?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** Shift the select lever to 2nd on manual mode.	Is the measured value 0%?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from 2-4 brake duty solenoid. 4) Measure the resistance of harness between 2-4 brake duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT3) No. 6 — Transmission ground:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **8**.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between 2-4 brake duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 3 — (AT12) No. 6:***	Is resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between 2-4 brake duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 3 — Transmission ground:***	Is the resistance 1 MΩ or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in 2-4 brake duty solenoid and transmission.	Repair the short circuit of harness between 2-4 brake duty solenoid and transmission connector.

S: DTC P0763 SHIFT SOLENOID "C" ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of high clutch duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:



	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. 6 — (B11) No. 7:***	Is 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 TRANSMISSION.** Measure the resistance of the harness connector 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.
3	**CHECK HIGH CLUTCH DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 7 — No. 20:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **4**.	Go to step **7**.
4	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Connect the Subaru Select Monitor to the data link connector. 4) Start the engine, and run the Subaru Select Monitor. 5) Start the engine and warm-up the engine until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read the data of "High Clutch Duty Ratio" using Subaru Select Monitor. • High clutch duty solenoid is indicated in "%". 7) Shift the select lever to "D", and slowly increase vehicle speed to measure at 3rd or 4th. NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.>	Is the measured value 0%?	Go to step **5**.	Go to step **6**.

	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** Return the engine to idling speed and shift the select lever to "N" range. NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.>	Is the measured value 100%?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in high clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
7	**CHECK HIGH CLUTCH DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the oil pan, and disconnect the control valve body connector. 4) Measure the resistance between high clutch duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT12) No. 3 — Transmission ground:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **8**.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between high clutch duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 7 — (AT12) No. 3:***	Is resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between TCM and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 7 — Transmission ground:***	Is the resistance 1 MΩ or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in high clutch duty solenoid and transmission.	Repair the short circuit of harness between high clutch duty solenoid and transmission connector.

T: DTC P0768 SHIFT SOLENOID “D” ELECTRICAL

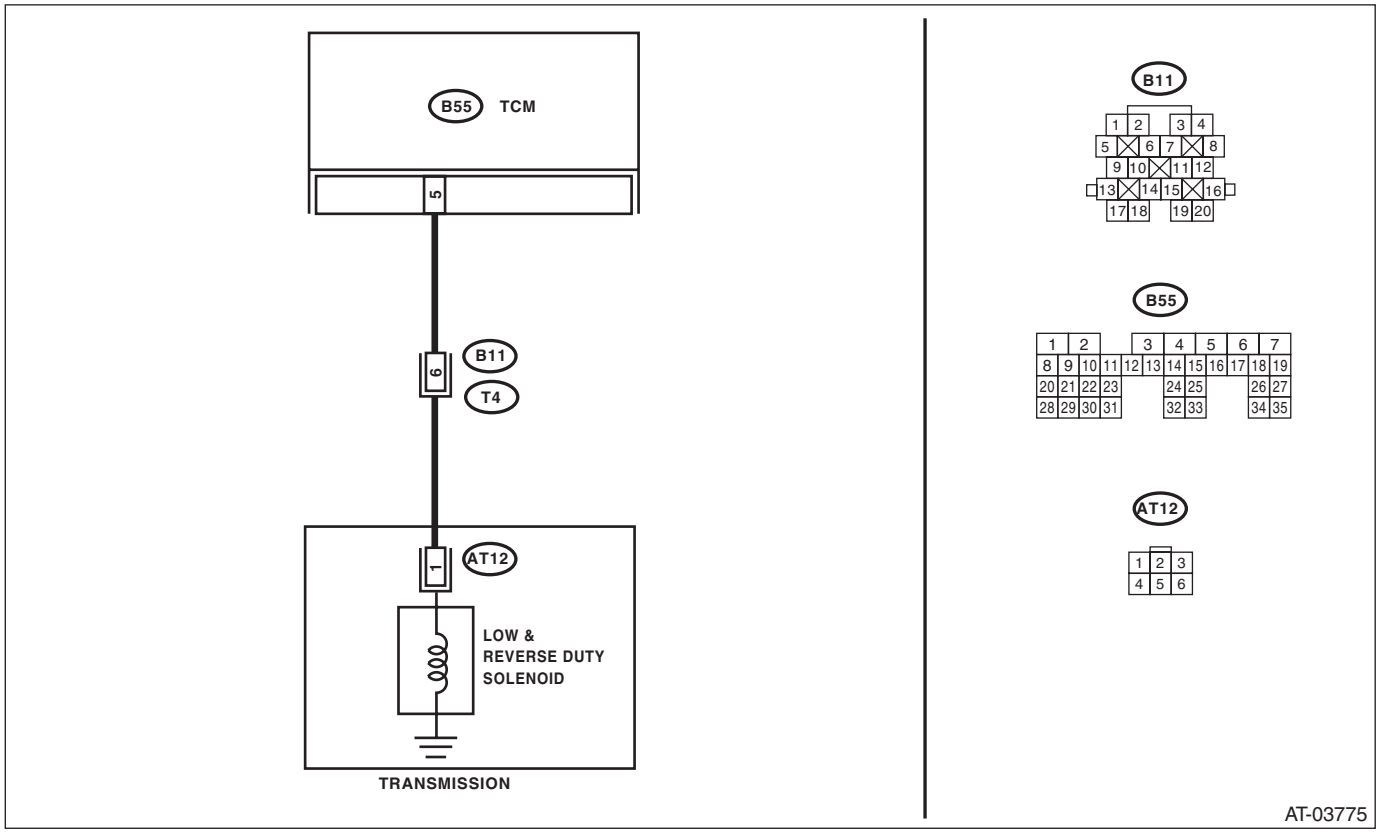
DTC DETECTING CONDITION:

The output signal circuit of low & reverse duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Gear is not changed.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 5 — (B11) No. 6:***	Is 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.
3	**CHECK LOW & REVERSE DUTY SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — No. 20:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **4**.	Go to step **7**.
4	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Warm-up the transmission until the ATF temperature exceeds approximately 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (with engine OFF). 6) Shift the select lever to "N" range. 7) Read the data of "L&R/B duty ratio" using Subaru Select Monitor. • Low & reverse duty solenoid is indicated in "%".	Is the measured value 100%?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 2) Shift the select lever to manual mode, and then hold it on 1st. Slowly increase the vehicle speed up to 15 km/h (9 MPH), and then return the accelerator pedal. NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.> 3) Read the data of "L&R/B duty ratio".	Is the measured value 55%?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK POOR CONTACT.**	Is there poor contact in the low & reverse duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
7	**CHECK LOW & REVERSE BRAKE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between low & reverse duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT12) No. 1 — Transmission ground:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **8**.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE DUTY SOLENOID.** Measure the resistance of harness between low & reverse duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 6 — (AT12) No. 1:***	Is resistance less than 1 Ω?	Go to step **9**.	Repair open circuit of harness between low & reverse duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 6 — Transmission ground:***	Is the resistance 1 MΩ or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in low & reverse duty solenoid and transmission.	Repair the short circuit of the harness between the low & reverse duty solenoid and the transmission connector.

U: DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

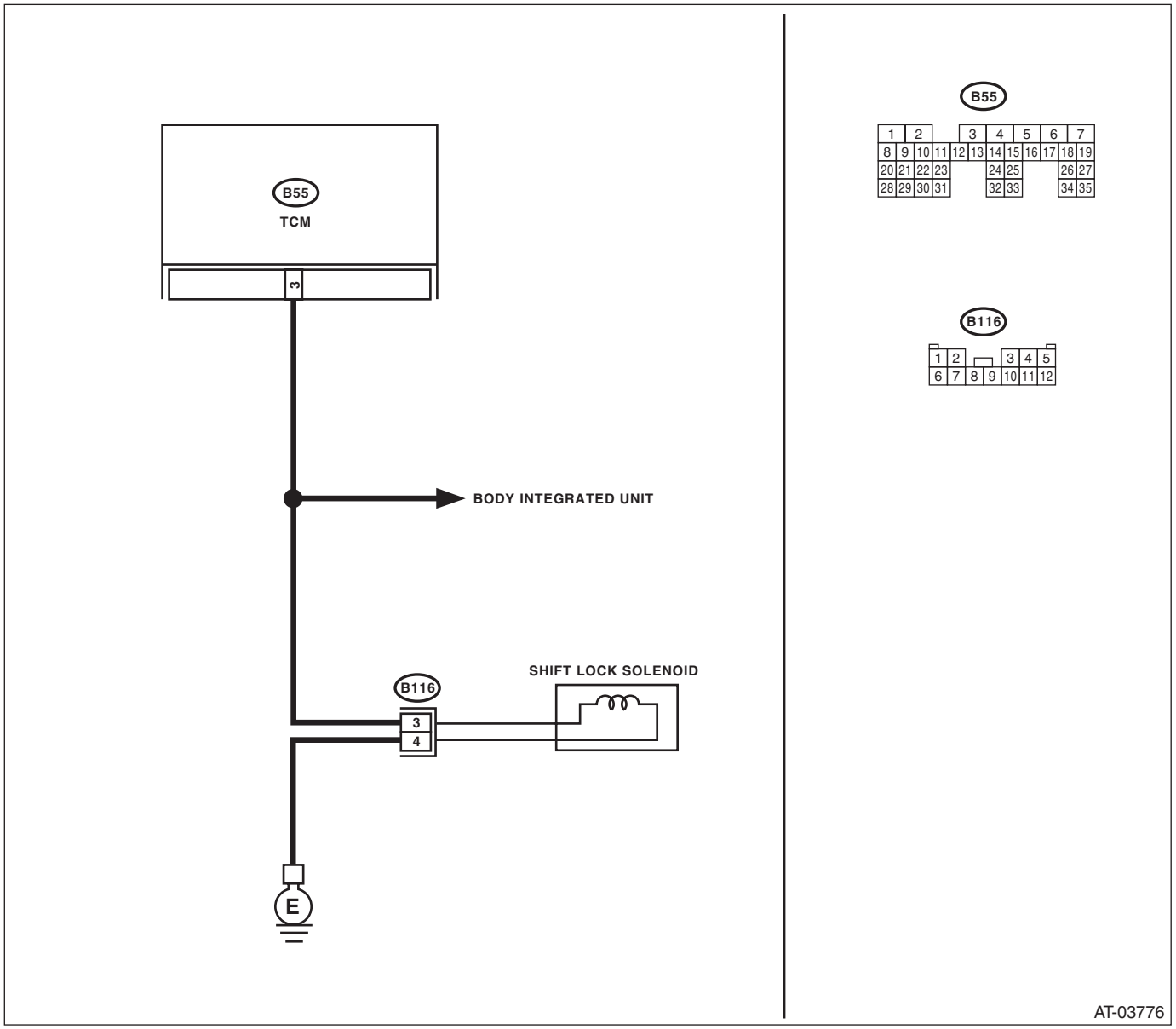
DTC DETECTING CONDITION:

Shift lock solenoid malfunction, open or short reverse inhibitor control circuit

TROUBLE SYMPTOM:

- Gear is shifted from “N” range to “P” range during driving at 20 km/h (12 MPH) or more.
- Gear cannot be shifted from “N” range to “R” range.

WIRING DIAGRAM:

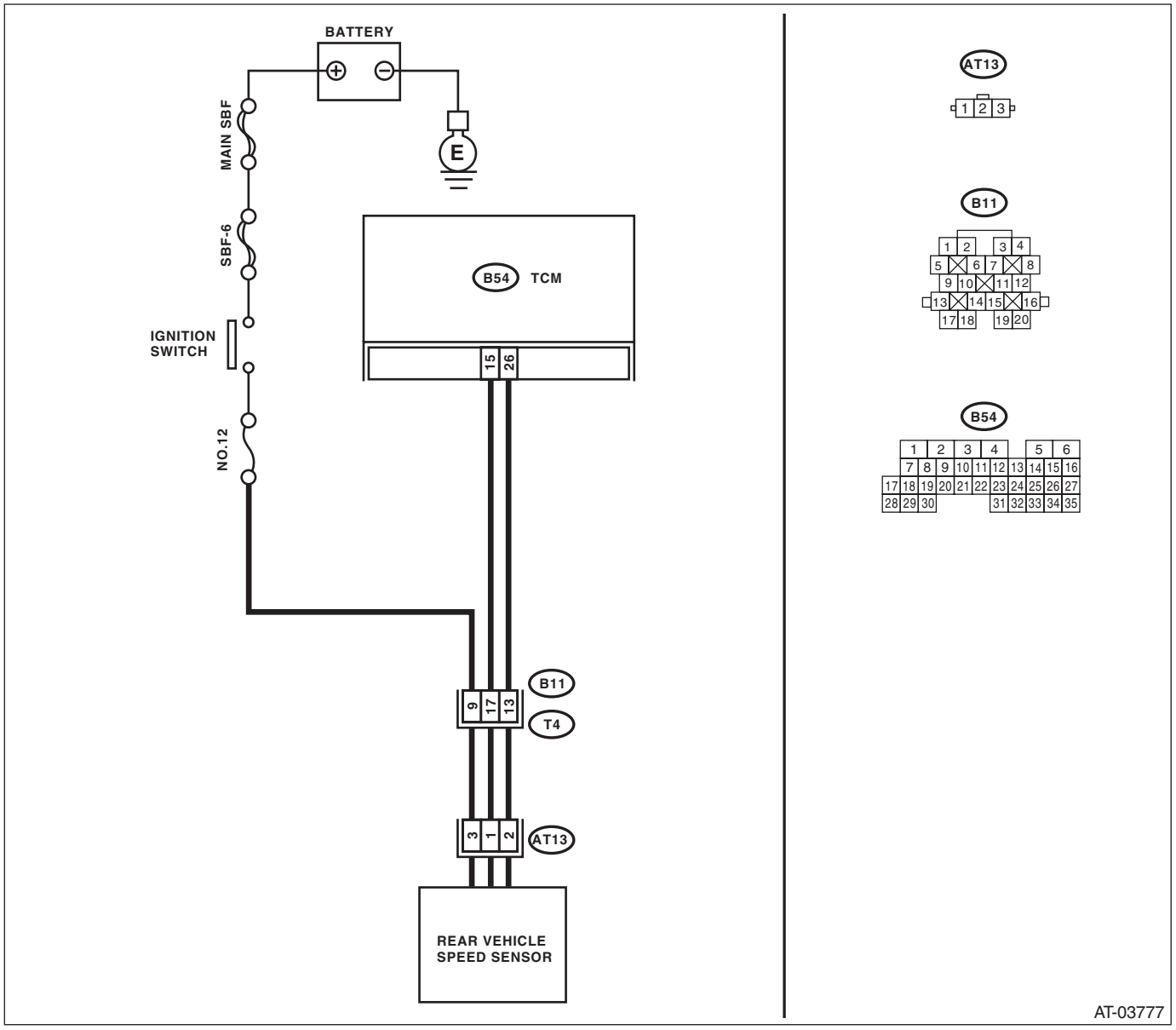


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and shift lock solenoid. 3) Measure the resistance of harness between TCM and shift lock solenoid connector. ***Connector & terminal*** ***(B55) No. 3 — (B116) No. 3:***	Is resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and shift lock solenoid connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** Measure the resistance of the harness between TCM and chassis ground. ***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 shift lock solenoid connector.
3	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between chassis ground and shift lock solenoid connector.
4	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid terminals. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance between 12 — 18 Ω?	Go to step **5**.	Replace the shift lock solenoid.
5	**CHECK OUTPUT SIGNAL OF TCM.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Shift the select lever to “D” range. 4) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 (+) — Chassis ground (–):***	Is the voltage 10.5 V or more?	Go to step **6**.	Go to step **7**.
6	**CHECK OUTPUT SIGNAL OF TCM.** 1) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 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 may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.> 4) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in the reverse inhibitor control circuit.	Go to step **7**.
7	**CHECK POOR CONTACT.**	Is there poor contact in the reverse inhibitor control circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

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

DTC DETECTING CONDITION:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
No lock up or tight corner braking phenomenon is occured.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear vehicle speed sensor. Turn the ignition switch to ON. 3) Measure the ignition power supply voltage between rear vehicle speed sensor connector and transmission ground. ***Connector & terminal*** ***(AT13) No. 3 (+) — Transmission ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Check harness between rear vehicle speed sensor and battery for open circuit, short or poor contact. Repair the harness if required.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between TCM connector and rear vehicle speed sensor connector. ***Connector & terminal*** ***(B54) No. 15 — (AT13) No. 1:***	Is resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit or poor contact of the connector in harness between TCM and rear vehicle speed sensor connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and rear vehicle speed sensor connector. ***Connector & terminal*** ***(B54) No. 26 — (AT13) No. 2:***	Is resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit or poor contact of the connector in harness between TCM and rear vehicle speed sensor connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between TCM and rear vehicle speed sensor connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 26 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness between TCM and rear vehicle speed sensor connector.
6	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **8**.	Go to step **7**.

	Step	Check	Yes	No
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.> 4) Measure the AC voltage between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 26 (+) — No. 15 (–):***	Is the voltage approx. 2 V or more?	Go to step **9**.	Replace the rear vehicle speed sensor.
8	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Set the oscilloscope to TCM connector terminals. ***Connector & terminal*** ***Positive probe; (B54) No. 26:*** ***Ground lead; (B54) No. 15:*** 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-24, Clear Memory Mode.> 5) Measure the signal voltage indicated on oscilloscope.	Is the pulse voltage approx. 5 V?	Go to step **9**.	Replace the rear vehicle speed sensor.
9	**CHECK POOR CONTACT.**	Is there poor contact in rear vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

W: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

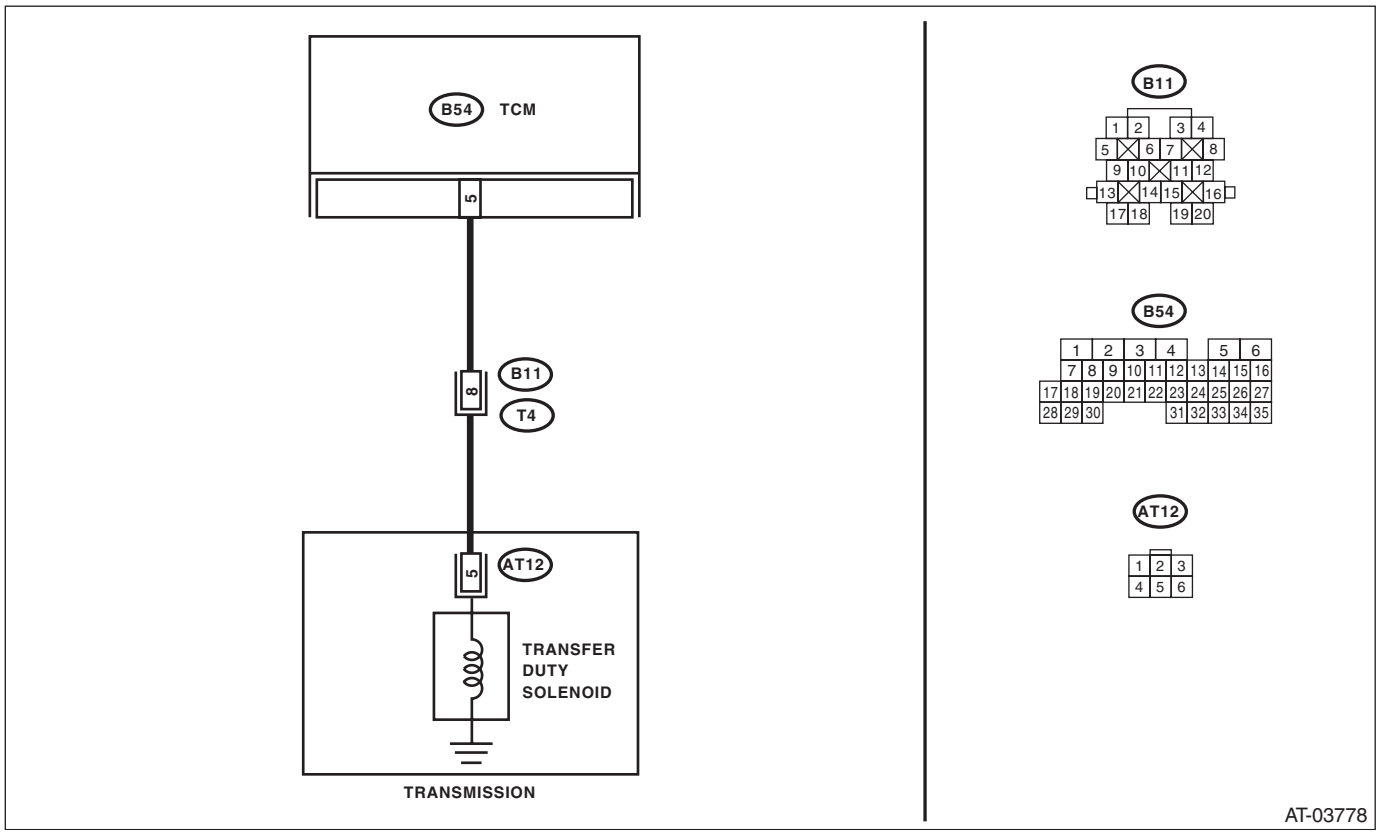
DTC DETECTING CONDITION:

Output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

- Tight corner braking phenomenon is occurred.
- Front wheel slips on the slippery road.

WIRING DIAGRAM:



	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. 5 — (B11) No. 8:***	Is 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 TRANSMISSION.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) 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.
3	**CHECK TRANSFER DUTY SOLENOID.** Measure the resistance between transmission connector and transmission terminals. ***Connector & terminal*** ***(T4) No. 8 — No. 20:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **4**.	Go to step **7**.
4	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON (engine OFF) and run the Subaru Select Monitor. 4) Shift the select lever to the “N” range, and fully close the throttle pedal. (Vehicle speed is 0 km/h (0 MPH)) 5) Read the data of “Transfer duty Ratio” using Subaru Select Monitor. Transfer duty solenoid is indicated in “%”.	Is the value approx. 5%?	Go to step **5**.	Go to step **6**.
5	**CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR.** 1) Shift the select lever to “D” range. 2) Read the data of “Transfer duty Ratio” using Subaru Select Monitor. Transfer duty solenoid is indicated in “%”.	Is the measured value approx. 18 — 35%?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6**.
6	**CHECK POOR CONTACT.**	Is there poor contact in transfer duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).** 1) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain ATF until it cools down.** 3) Remove the extension case, and disconnect the connector from transfer duty solenoid. 4) Measure the resistance between transfer duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT12) No. 5 — Transmission ground:***	Is the resistance between 2.0 — 6.0 Ω?	Go to step **8**.	Replace the control valve body. <Ref. to 4AT-55, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transfer duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 8 — (AT12) No. 5:***	Is resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between transfer duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 8 — Transmission ground:***	Is the resistance 1 MΩ or more?	Even if the ATF temperature warning light blinks, the circuit is in normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or poor contact in the transfer duty solenoid and transmission.	Repair short circuit of the harness between the transfer duty solenoid and transmission connector.

X: DTC P1718 CAN COMMUNICATION CIRCUIT

NOTE:
Refer to “Body Integrated Unit” for diagnosis of P1718. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

Y: DTC P1817 SPORT MODE SWITCH CIRCUIT

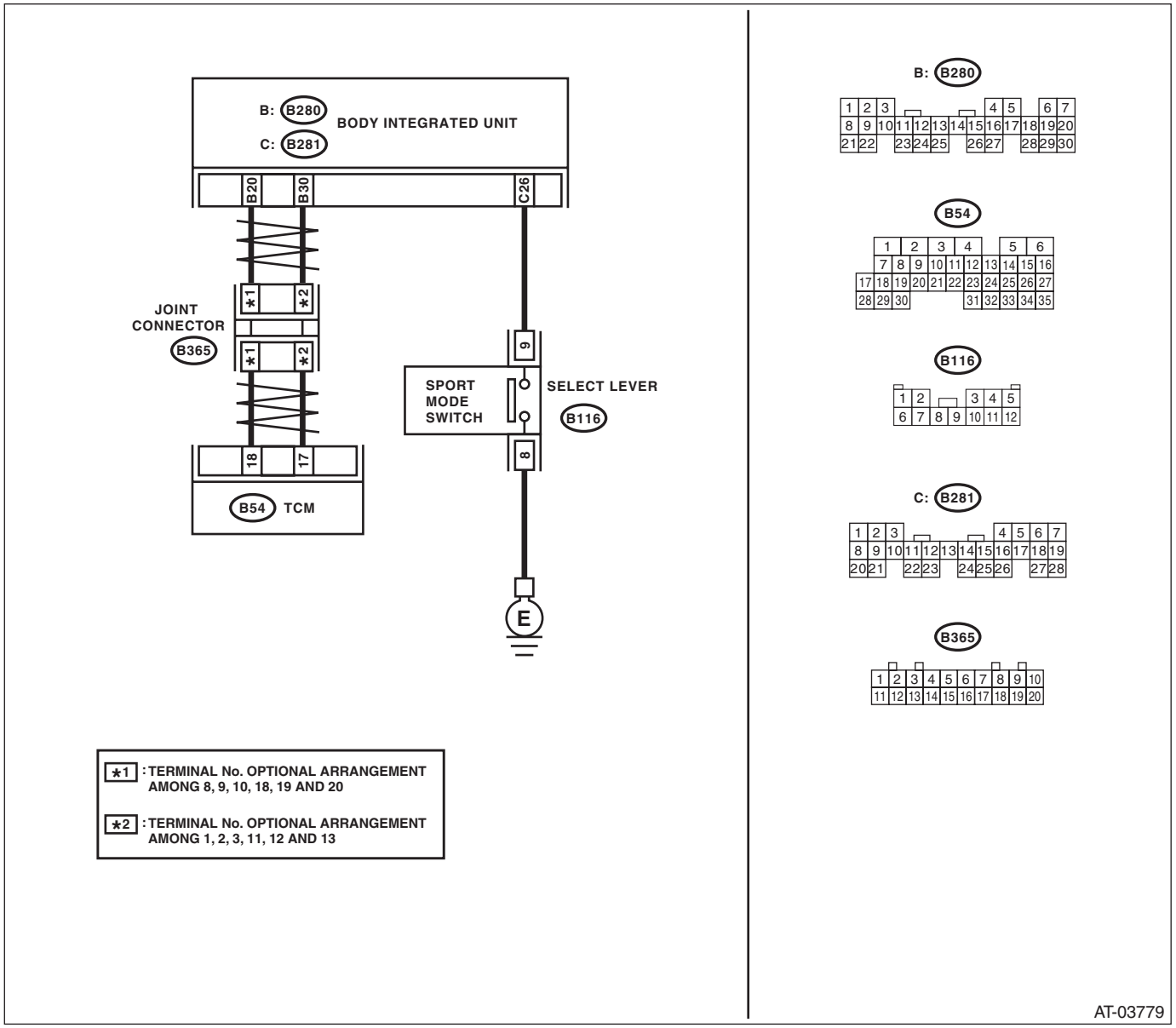
DTC DETECTING CONDITION:

The input signal circuit of SPORT shift switch is shorted.

TROUBLE SYMPTOM:

- Manual mode can not be set.
- The SPORT indicator light does not illuminate.
- No SPORT mode occurs.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to “P” range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3**.	Go to step **7**.
3	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever from “P” to “D” range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Go to step **4**.	Replace the select lever assembly. <Ref. to CS-24, Select Lever.>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to SPORT mode. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **5**.	Replace the select lever assembly. <Ref. to CS-24, Select Lever.>
5	**CHECK INHIBITOR SWITCH.** Shift the select lever from “P” to “D” range.	Is the indication of range position indicator light in combination meter synchronized with position of select lever?	Go to step **6**.	Adjust the inhibitor switch and select cable. <Ref. to 4AT-45, ADJUSTMENT, Inhibitor Switch.> <Ref. to CS-31, ADJUSTMENT, Select Cable.>
6	**CHECK INPUT SIGNAL FROM TCM.** 1) Shift the select lever from “P” to “D” range. 2) Read the TIP mode SW data of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Even if the ATF temperature warning light blinks, the circuit is in normal condition. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
7	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from body integrated unit and select lever. 3) Measure the resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 26 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the short circuit of harness between body integrated unit and SPORT shift switch.
8	**CHECK SPORT SHIFT SWITCH.** 1) Shift the select lever to “P” range. 2) Measure the resistance of SPORT shift switch connector terminals. ***Terminals*** ***No. 9 — No. 8:***	Is the resistance 1 MΩ or more?	Check the body integrated unit.	Replace the select lever assembly. <Ref. to CS-24, Select Lever.>

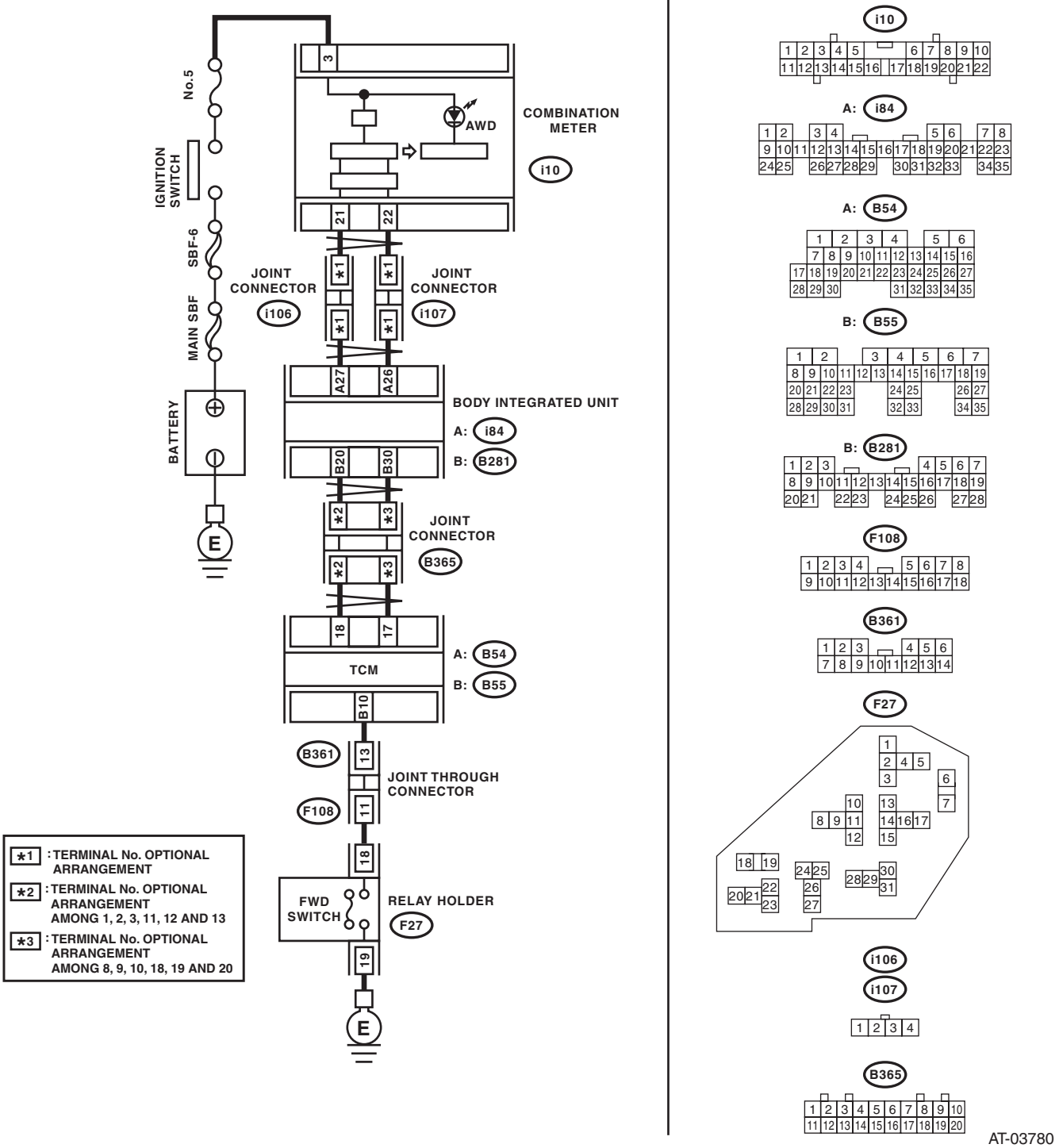
14.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK FWD SWITCH

DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD signal circuit is open or shorted.

WIRING DIAGRAM:



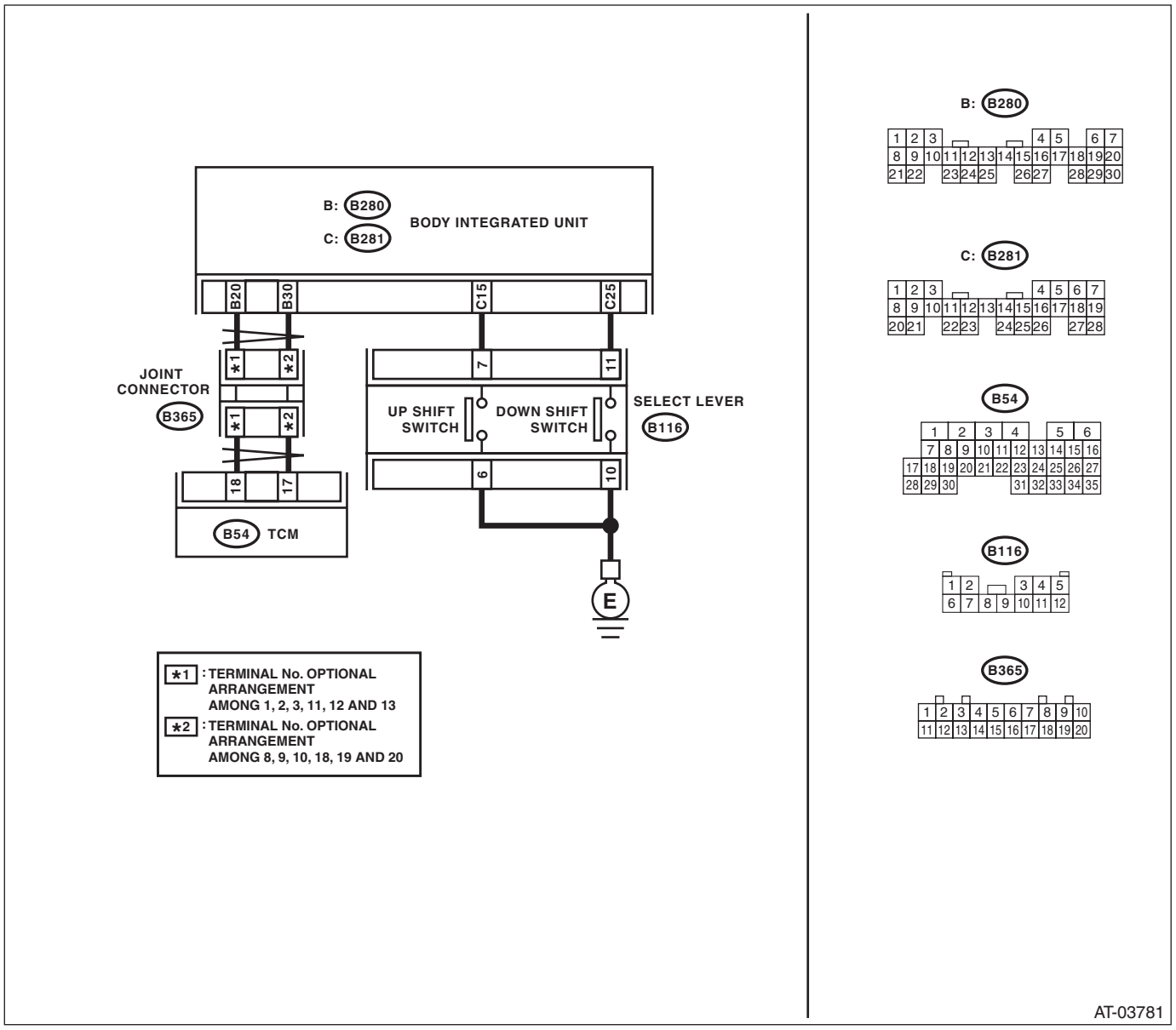
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	Step	Check	Yes	No
1	**CHECK SPARE FUSE.**	Is the spare fuse OK?	Go to step **2**.	Replace the fuse.
2	**CHECK FWD SWITCH.** Connect the Subaru Select Monitor to the data link connector.	When the fuse is inserted to FWD switch, does the LED illuminate?	Go to step **3**.	Go to step **4**.
3	**CHECK COMBINATION METER.**	Does the AWD warning light illuminate?	Go to INSPECTION FOR SPORT SHIFT SWITCH. <Ref. to 4AT(diag)-86, CHECK SPORT SHIFT SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **9**.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance of harness between TCM and FWD switch connector. ***Connector & terminal*** ***(B55) No. 10 — (F27) No. 18:***	Is resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between TCM and FWD switch connectors.
5	**CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between FWD switch and chassis ground. ***Connector & terminal*** ***(F27) No. 19 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between FWD switch connector and chassis ground.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** Measure the resistance of harness connector between TCM and body to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 10 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the short circuit of harness between TCM and FWD switch connectors.
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing the fuse to FWD switch connector. ***Connector & terminal*** ***(B55) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8**.	Go to step **10**.
8	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM with the fuse removed from FWD switch connector. ***Connector & terminal*** ***(B55) No. 10 (+) — Chassis ground (–):***	Is the voltage 10.5 V or more?	Go to step **9**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
9	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **10**.
10	**CHECK COMBINATION METER.** Check the AWD warning light. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the AWD warning light OK?	Go to step **11**.	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>

Step		Check	Yes	No
11	CHECK POOR CONTACT.	Is there poor contact in FWD switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>

B: CHECK SPORT SHIFT SWITCH

DIAGNOSIS:
Input signal circuit of SPORT shift switch is open or shorted.
TROUBLE SYMPTOM:
Does not shift on manual mode.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SPORT SHIFT SWITCH.** 1) Move the select lever to SPORT mode. 2) Shift and hold the select lever to up side. 3) Read the "Up Switch" data of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **2**.	Go to step **3**.
2	**CHECK SPORT SHIFT SWITCH.** 1) Shift and hold the select lever to down side. 2) Read the "Down Switch" data of TCM using Subaru Select Monitor.	Is ON displayed?	Go to the procedure "INSPECTION FOR SPORT SHIFT INDICATOR LIGHT". <Ref. to 4AT(diag)-90, CHECK SPORT SHIFT INDICATOR, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **12**.
3	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Shift and hold the select lever to up side. 3) Read the "TIP UP SW" data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **4**.	Go to step **5**.
4	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Check the TCM.
5	**CHECK SPORT SHIFT SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from SPORT shift switch. 3) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 6 — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between SPORT shift switch and chassis ground.
6	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 7:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Replace the guide plate assembly.
7	**CHECK SPORT SHIFT SWITCH.** 1) Shift and hold the select lever to up side. 2) Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 7:***	Is resistance less than 1 Ω?	Go to step **8**.	Replace the guide plate assembly.

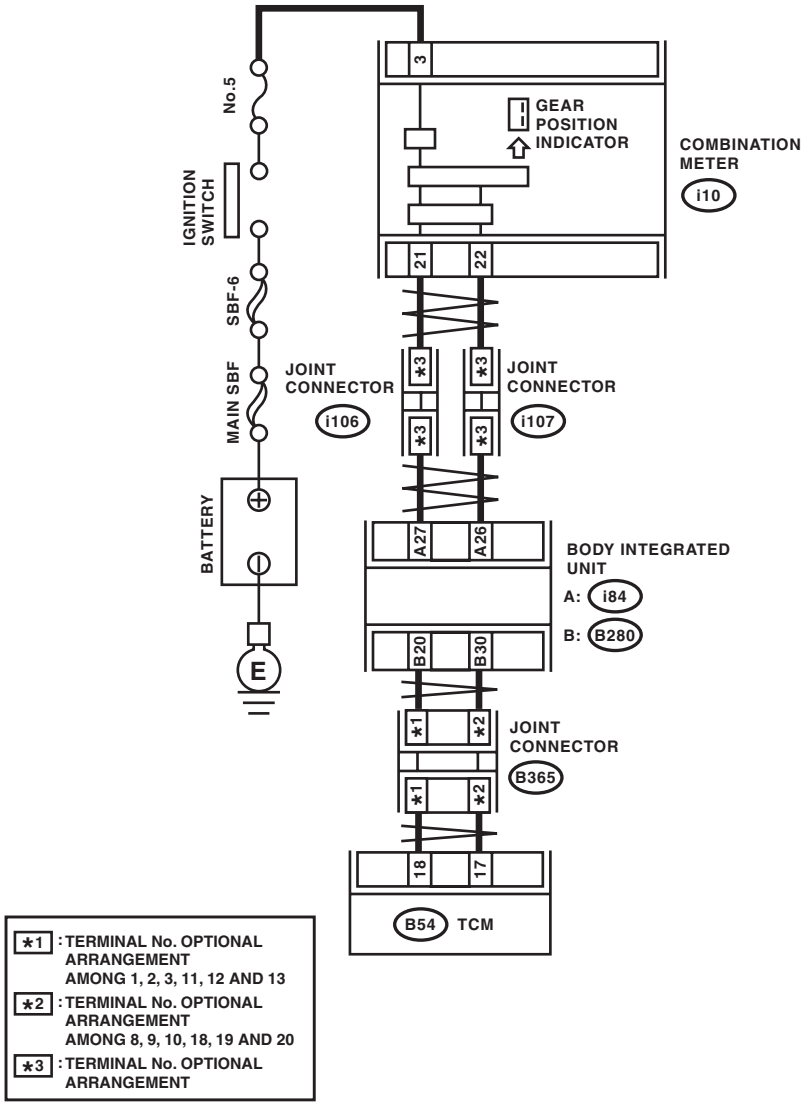
	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between body integrated unit connector and SPORT shift switch connector. ***Connector & terminal*** ***(B116) No. 7 — (B281) No. 15:***	Is resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between SPORT shift switch connector and TCM connector, or poor contact in connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH.** Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **10**.	Repair the short circuit of harness between SPORT shift switch connector and TCM connector.
10	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (–):***	Is the voltage 1.5 — 8 V?	Go to step **11**.	Replace the body integrated unit.
11	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift and hold the select lever to up side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **21**.	Replace the body integrated unit.
12	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Shift and hold the select lever to down side. 3) Read the “TIP DOWN SW” data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **13**.	Go to step **14**.
13	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Check the TCM.
14	**CHECK SPORT SHIFT SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from SPORT shift switch. 3) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 10 (+) — Chassis ground:***	Is resistance less than 1 Ω?	Go to step **15**.	Repair the open circuit of harness between SPORT shift switch and chassis ground.
15	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 11:***	Is the resistance 1 MΩ or more?	Go to step **16**.	Replace the guide plate assembly.

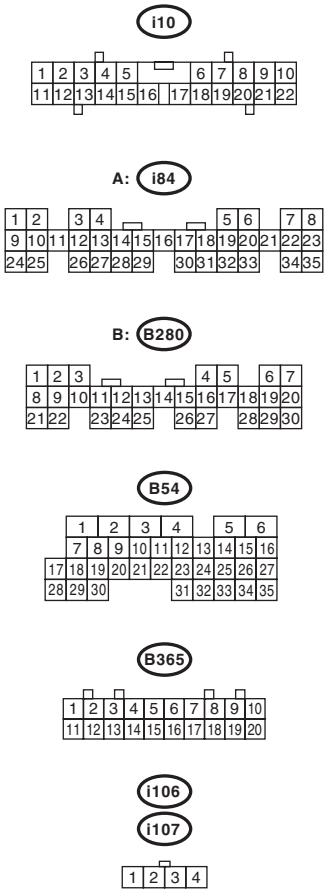
	Step	Check	Yes	No
16	**CHECK SPORT SHIFT SWITCH.** 1) Shift and hold the select lever to down side. 2) Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 11:***	Is resistance less than 1 Ω?	Go to step **17**.	Replace the guide plate assembly.
17	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between body integrated unit connector and SPORT shift switch connector. ***Connector & terminal*** ***(B116) No. 11 — (B281) No. 25:***	Is resistance less than 1 Ω?	Go to step **18**.	Repair the open circuit of harness between SPORT shift switch connector and TCM connector, or poor contact in connector.
18	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **19**.	Repair the short circuit of harness between SPORT shift switch connector and TCM connector.
19	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (–):***	Is the voltage 1.5 — 8 V?	Go to step **20**.	Go to step **21**.
20	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift and hold the select lever to down side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **21**.	Replace the body integrated unit. <Ref. to 4AT-60, Transmission Control Module (TCM).>
21	**CHECK POOR CONTACT.**	Is there poor contact in the SPORT shift switch circuit?	Repair the poor contact.	A temporary poor contact of the SPORT shift switch circuit connector or harness.

C: CHECK SPORT SHIFT INDICATOR

DIAGNOSIS:
Output signal circuit of SPORT shift indicator is open or shorted.
TROUBLE SYMPTOM:
- SPORT shift indicator does not display or remains displayed.
- SPORT shift indicator display does not change.

WIRING DIAGRAM:



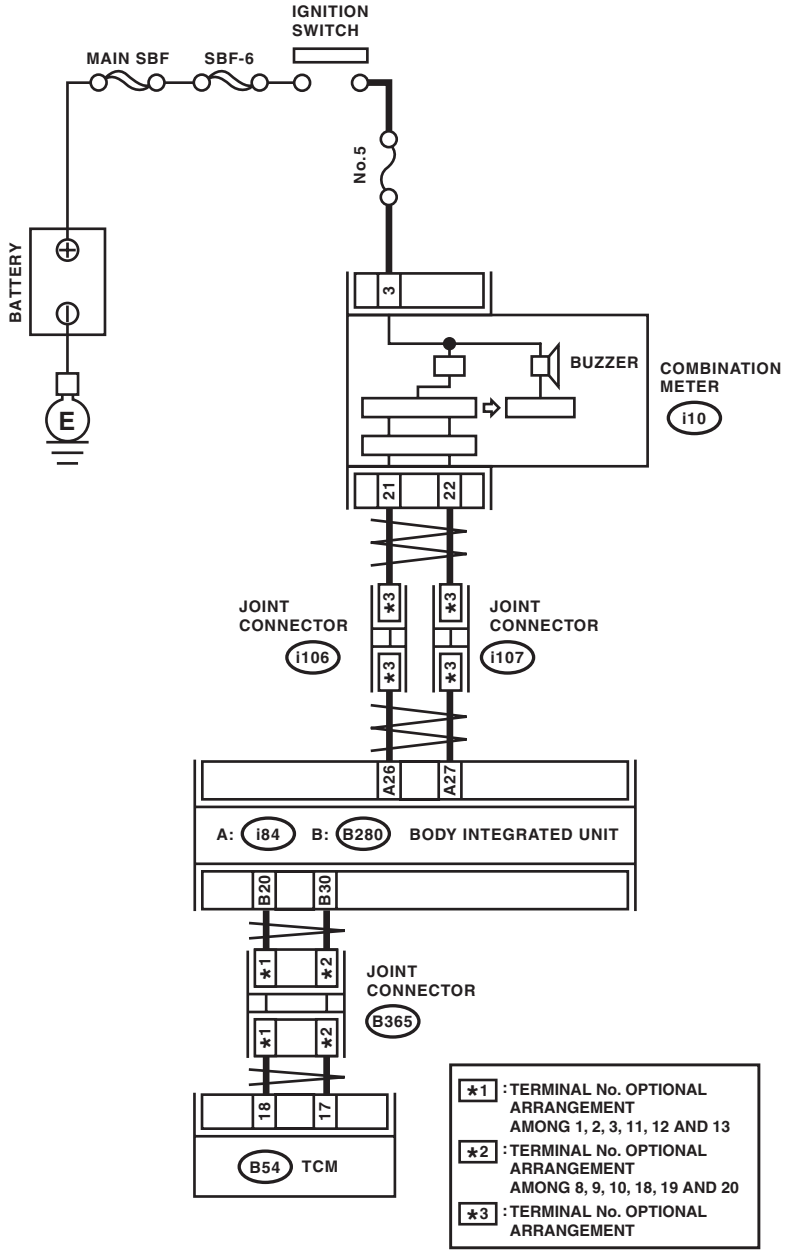


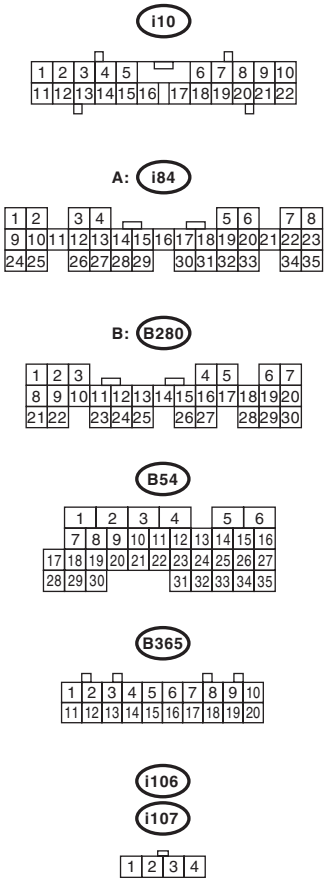
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	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TCM.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monnitor. 5) Shift the select lever to SPORT mode. 6) Up-shift the select lever. 7) Read the “Gear Position” data of TCM using Subaru Select Monitor.	Is the gear position 2?	Go to step **3**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
3	**CHECK TCM.** 1) Down-shift the select lever. 2) Read the “Gear Position” data of TCM using Subaru Select Monitor.	Is the gear position 1?	Go to step **4**.	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT.** Read the data of SPORT shift gear position using Subaru Select Monitor.	Is the SPORT shift gear position 2?	Go to step **5**.	Check the body integrated unit.
5	**CHECK COMBINATION METER.** <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the SPORT shift indicator OK?	INSPECTION OF BUZZER <Ref. to 4AT(diag)-92, CHECK BUZZER, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>

D: CHECK BUZZER

DIAGNOSIS:
Output signal circuit of buzzer is open or shorted.
TROUBLE SYMPTOM:
Buzzer remains beeping.
WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monnitor. 5) Read the data of “SPORT shift (buzzer)” of body integrated unit using Subaru Select Monitor.	Is the SPORT shift buzzer display “ON”?	Replace the TCM. <Ref. to 4AT-60, Transmission Control Module (TCM).>	Go to step **2**.
2	**CHECK COMBINATION METER.** <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the buzzer OK?	Perform Diagnostics with Phenomenon. <Ref. to 4AT(diag)-94, Diagnostics with Phenomenon.>	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>

15.Diagnostics with Phenomenon

A: INSPECTION

Symptom	Problem parts
Starter does not operate when select lever is in “P” or “N” range. Starter operates when select lever is in “R” or “D” range.	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Abnormal noise when select lever is in “P” or “N”.	• Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	• Strainer • ATF level too high or too low
Noise occurs while driving in “D1”.	• Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D2”.	
Noise occurs while driving in “D3”.	• Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D4”.	• Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Vehicle moves when select lever is in “N” range.	• Select cable • Inhibitor switch • TCM • Low clutch
Shock occurs when select lever is shifted from “N” to “D” range.	• Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Low clutch duty solenoid • Low clutch • TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is shifted from “N” to “D” range.	• Control valve • Low clutch • Line pressure linear solenoid • Seal ring • Front gasket of transmission case
Shock occurs when select lever is shifted from “N” to “R” range.	• Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when the select lever is shifted from “N” to “R” range.	• Control valve • Low & reverse clutch • Reverse clutch • Line pressure linear solenoid • Seal ring • Front gasket of transmission case

Symptom	Problem parts
Vehicle does not start in any shift range. (Engine stalls)	• Parking brake mechanism • Planetary gear
Vehicle does not start in any shift range. (Engine operates)	• Strainer • Line pressure linear solenoid • Control valve • Drive pinion • Hypoid gear • Axle shaft • Differential gear • Oil pump • Input shaft • Output shaft • Planetary gear • Drive plate • ATF level is too low • Front gasket of transmission case
Vehicle does not start in “R” range only. (Engine operates)	• Select cable • Select lever • Line pressure linear solenoid • Control valve • Low & reverse clutch • Reverse clutch
Vehicle does not start in “R” range only. (Engine stalls)	• Low clutch • 2-4 brake • Planetary gear • Parking brake mechanism
Vehicle does not start in “D” range. (Engine operates)	• Low clutch • One-way clutch
Vehicle does not start in “D” range. (Engine stalls)	Reverse clutch
Vehicle does not start in “R” range only. (Engine operates)	Control valve
Acceleration during standing start is poor. (High rpm stall)	• Control valve • Low clutch • Reverse clutch • ATF level is too low • ATF deterioration • Front gasket of transmission case • Differential gear oil level too high or too low
Acceleration during standing start is poor. (Low rpm stall)	• Oil pump • Torque converter one-way clutch • Engine performance
Acceleration is poor when select lever is in “D” range. (Normal rpm stall)	• TCM • Control valve • High clutch • 2-4 brake • Planetary gear
Acceleration is poor when select lever is in “R” range. (Normal rpm stall)	• Control valve • High clutch • 2-4 brake • Planetary gear
No shift occurs from 1st to 2nd gear.	• TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Accelerator pedal position sensor • Control valve • 2-4 brake
No shift occurs from 2nd to 3rd gear.	• TCM • Control valve • High clutch

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	• TCM • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when select lever is shifted from 4th gear to 3rd gear.	• Inhibitor switch • TCM • Accelerator pedal position sensor • Control valve
Engine brake is not effected when select lever is shifted from 3rd gear to 2nd gear.	Control valve
Engine brake is not effected when select lever is shifted from 2nd gear to 1st gear.	• Control valve • Low & reverse brake
Shift characteristics are erroneous.	• Inhibitor switch • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Accelerator pedal position sensor • Control valve • Ground
No lock-up occurs.	• TCM • Accelerator pedal position sensor • ATF temperature sensor • Control valve • Lock-up facing • Engine speed signal
Parking brake does not function.	• Select cable • Select lever • Parking mechanism
Shift lever cannot be moved or is hard to move from “P” range.	
ATF spurts out.	ATF level too high
Differential oil spurts out.	Differential gear oil level too high
Differential oil level changes excessively.	• Seal pipe • Double oil seal
Odor is produced from ATF supply pipe.	• High clutch • 2-4 brake • Low & reverse clutch • Reverse clutch • Lock-up facing • ATF deterioration
Shock occurs when shifting from 1st to 2nd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • Low & reverse duty solenoid
Slippage occurs when shifting from 1st to 2nd gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake

Symptom	Problem parts
Shock occurs when shifting from 2nd to 3rd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Low & reverse duty solenoid • Control valve • High clutch • 2-4 brake • ATF deterioration • Engine performance • High clutch duty solenoid
Slippage occurs when shifting from 2nd to 3rd gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • High clutch • 2-4 brake • Low & reverse duty solenoid
Shock occurs when shifting from 3rd to 4th gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • Low clutch duty solenoid • 2-4 brake • ATF deterioration • Engine performance
Slippage occurs when shifting from 3rd to 4th gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake
Shock occurs when shifting from 3rd to 2nd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • High clutch duty solenoid
Shock occurs when shifting from 2nd to 1st gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • Low & reverse brake duty solenoid

Symptom	Problem parts
Shock occurs when accelerator pedal is released from medium speed.	• TCM • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • Lock-up damper • Engine performance
Vibration occurs during straight-forward operation.	• TCM • Lock-up duty solenoid • Lock-up facing • Lock-up damper
Vibration occurs during turns. (Tight corner braking phenomenon)	• TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Transfer clutch • Transfer valve • Transfer duty solenoid • ATF deterioration • Harness
Front wheel slippage occurs during standing starts.	• TCM • Front vehicle speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Control valve • Transfer clutch • Transfer valve • Transfer pipe • Transfer duty solenoid
It is not set in FWD mode.	• TCM • Transfer clutch • Transfer valve • Transfer duty solenoid • Fuse
Select lever is hard to move.	• Select cable • Select lever • Detent spring • Manual plate
Select lever is excessively hard to move. (Unreasonable resistance)	• Detent spring • Manual plate
Select lever slips out of selected shift position during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detent spring • Manual plate
Manual mode can not be set.	• SPORT shift switch • TCM • Body integrated unit
Gear does not change though the select lever is operated in manual mode.	• Up shift switch • Down shift switch • TCM • Body integrated unit
AWD warning light remains blinking or illuminated.	• Tire size • Tire pressure • TCM • FWD switch • Harness

AUTOMATIC TRANSMISSION

5AT

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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 checklist. <Ref. to 5AT(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the following items which may influence AT problems. • 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-48, Inhibitor Switch.>	Is the unit that is thought to influence the AT problem working properly?	Go to step **2**.	Repair or replace each item.
2	**CHECK AT OIL TEMP LIGHT.** After the ignition switch is turned to ON, wait for at least 2 seconds.	Does the AT OIL TEMP light illuminate?	Go to step **4**.	Go to step **3**.
3	**CHECK AT OIL TEMP LIGHT.** 1) Turn the ignition switch to OFF. 2) Check the AT OIL TEMP light. <Ref. to 5AT(diag)-24, INSPECTION, AT Oil Temp Warning Light Display.> 3) After the ignition switch is turned to ON, wait for at least 2 seconds.	Does the AT OIL TEMP light blink?	Go to step **4**.	Go to step **5**.
4	**CHECK DTC.** Read the DTC. <Ref. to 5AT(diag)-19, 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)-26, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed?	Go to step **6**. NOTE: Record all DTC.	Go to step **5**.
5	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-127, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. <Ref. to 5AT(diag)-20, Inspection Mode.> 4) Display DTC.	Is DTC displayed?	Go to step **6**.	Inspect using “General Diagnostic Table”. <Ref. to 5AT(diag)-135, General Diagnostic Table.>

	Step	Check	Yes	No
6	**PERFORM DIAGNOSIS.** 1) Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-33, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-29, 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)-20, Inspection Mode.> 5) Display DTC.	Is DTC displayed?	Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-33, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Inspect using “General Diagnostic Table”. <Ref. to 5AT(diag)-135, General Diagnostic Table.>

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)		
Symptom	❑ 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 warning light (AT OIL TEMP light)	❑ Blinks continuously	❑ 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 ❑ While cruising
Manual mode	❑ ON ❑ OFF		

3. General Description

A: CAUTION

• 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.

• 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.

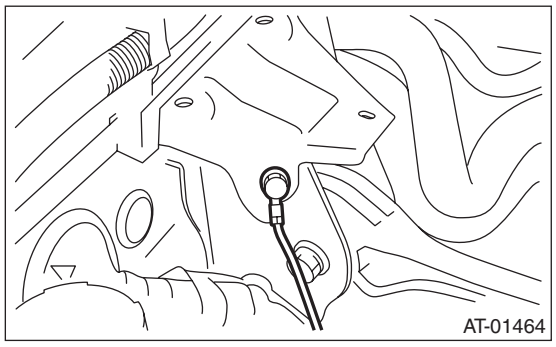
Standard voltage:
12 V or more

Specific gravity:
1.260 or more

2. TRANSMISSION GROUND

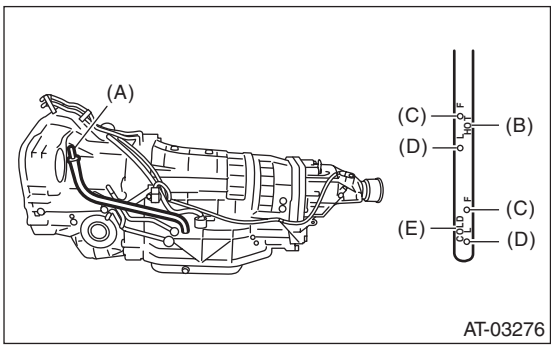
Make sure that the ground terminal bolt is tightened securely.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

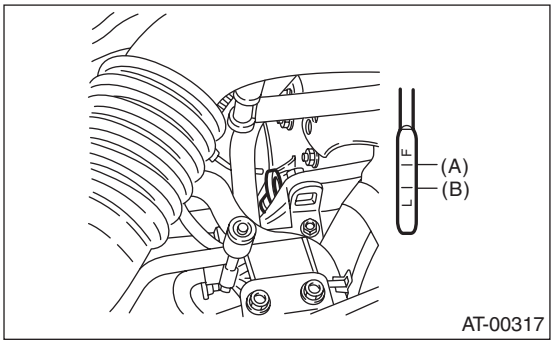
Make sure that ATF level is the specified amount. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>



(A) Level gauge
(B) Inspection position when "HOT"
(C) Upper level
(D) Lower level
(E) Inspection position when "COLD"

4. FRONT DIFFERENTIAL OIL LEVEL

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

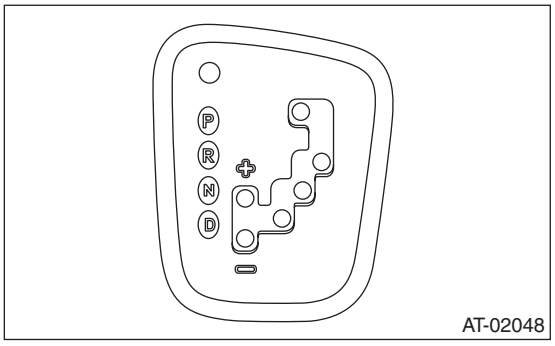


(A) Upper level
(B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

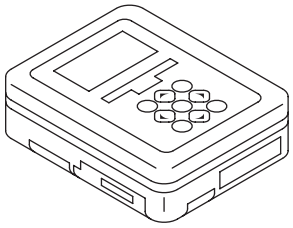
Make sure there is no noise, dragging or contact pattern in each select lever range.

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



C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B020XU0	1B020XU0	SUBARU SELECT MONITOR KIT	Used for troubleshooting the electrical system.

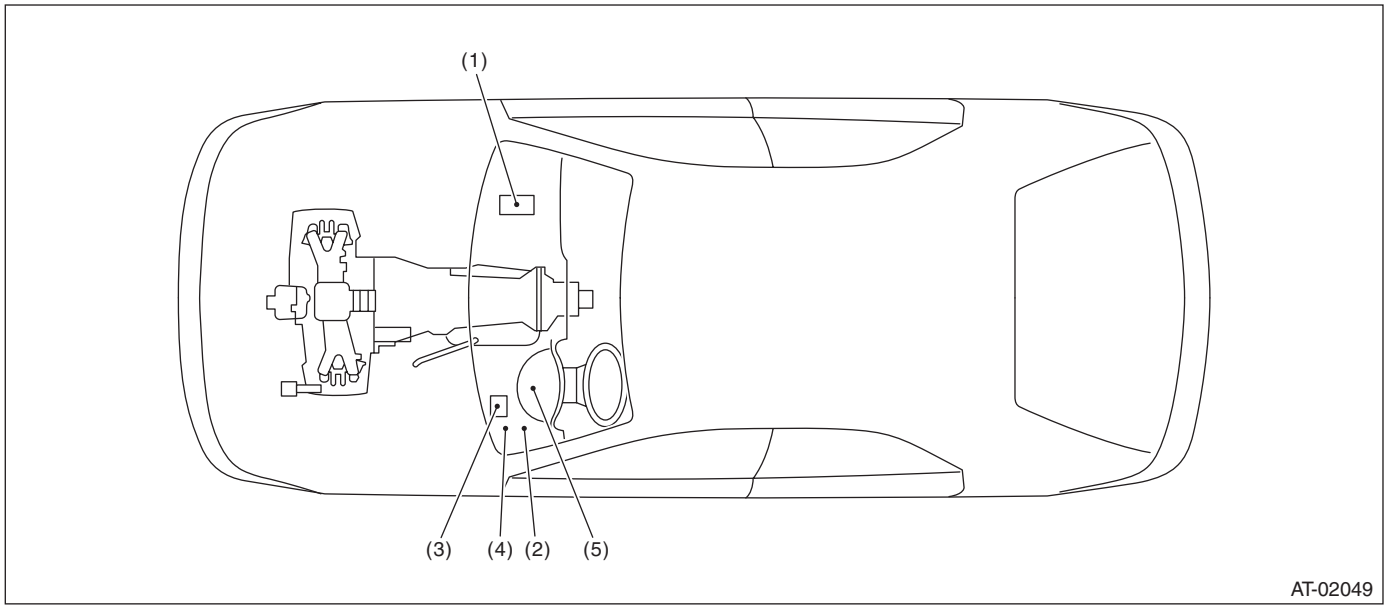
2. GENERAL TOOL

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

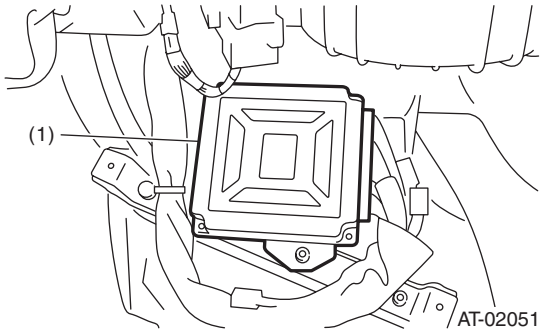
4. Electrical Component Location

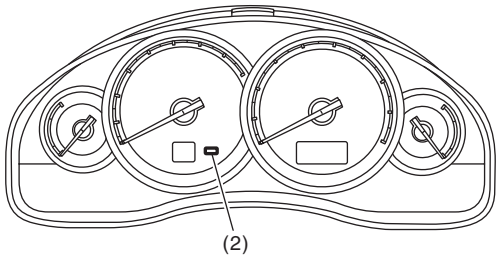
A: LOCATION

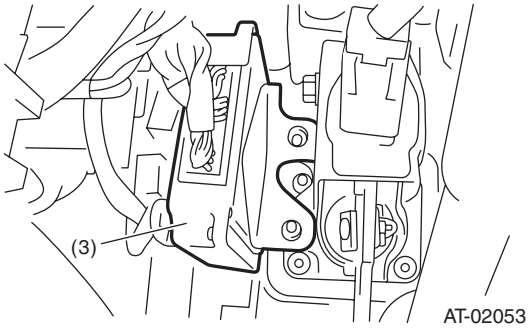
1. CONTROL MODULE

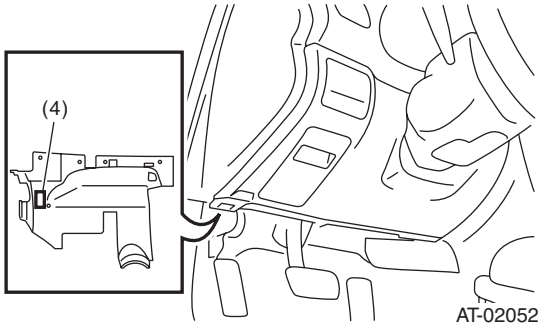


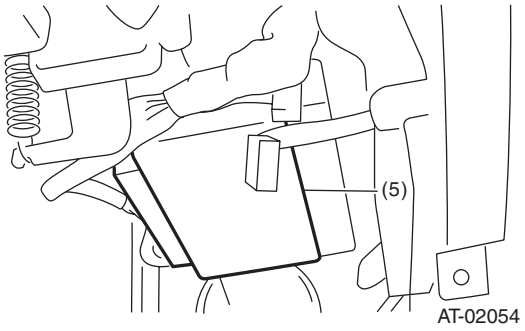
(1) Engine control module (ECM)
(2) AT OIL TEMP light (AT warning light)
(3) Transmission control module (TCM)
(4) Data link connector
(5) Body integrated unit


(1)
AT-02051

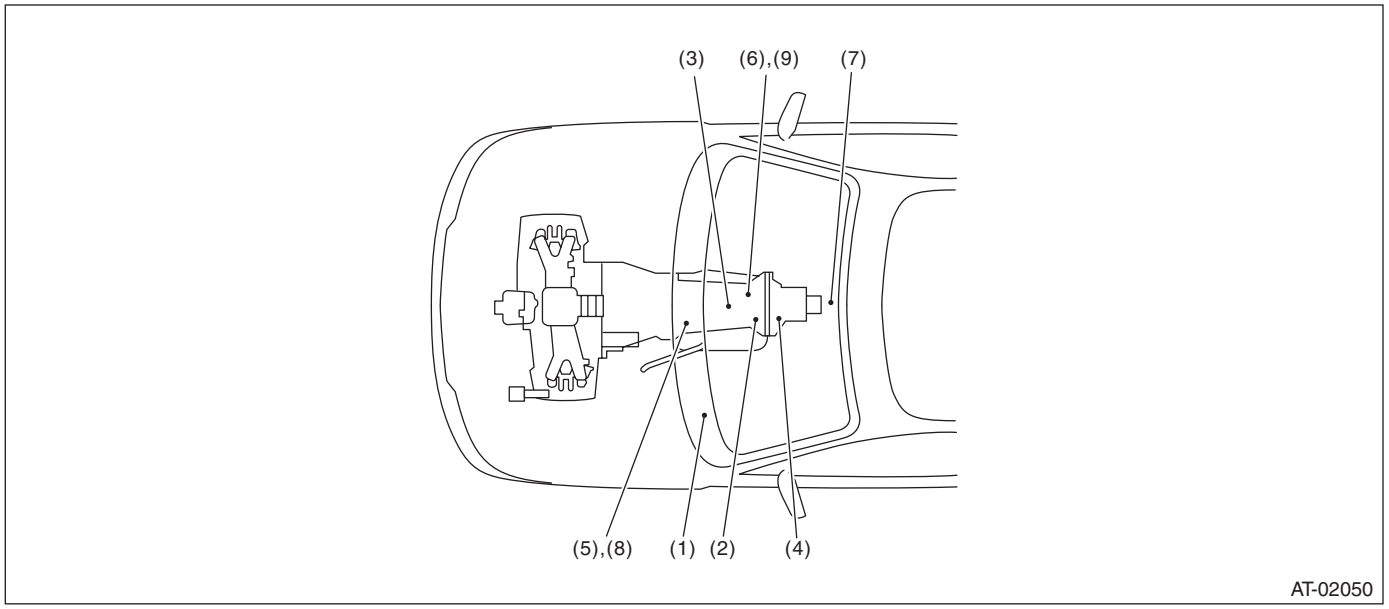

(2)
AT-01470


(3)
AT-02053

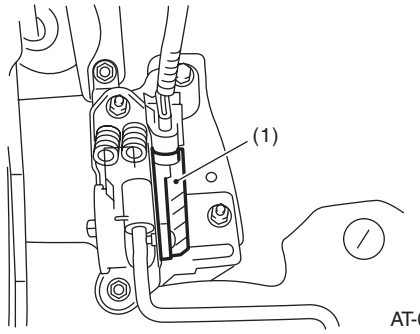

(4)
AT-02052


(5)
AT-02054

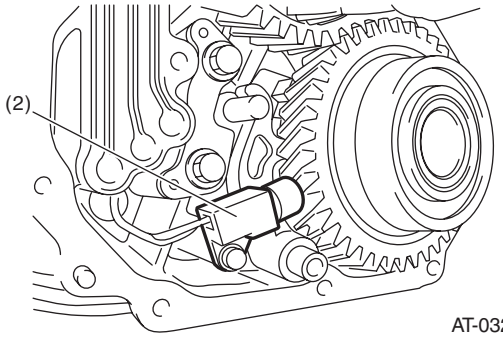
2. SENSOR



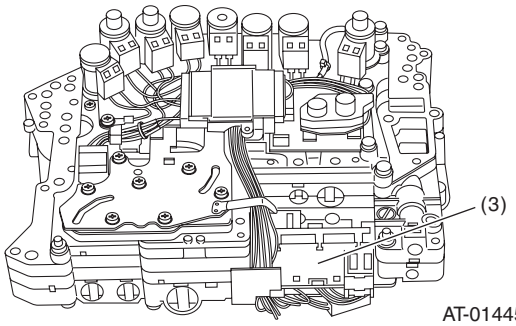
(1) Accelerator pedal position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Turbine speed sensor 1
(6) ATF temperature sensor 1
(7) Lateral G sensor
(8) Turbine speed sensor 2
(9) ATF temperature sensor 2



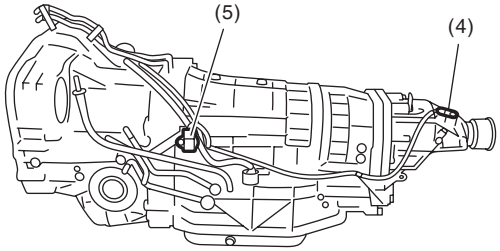
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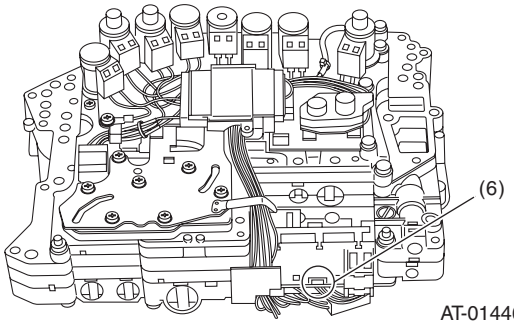
AT-03281



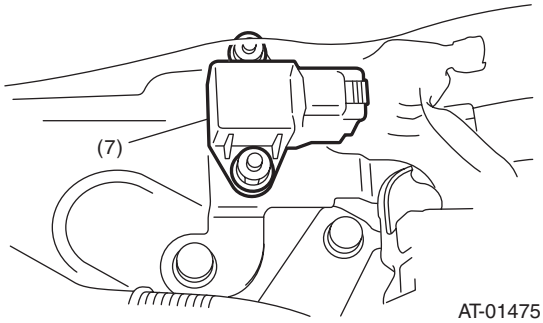
AT-01445



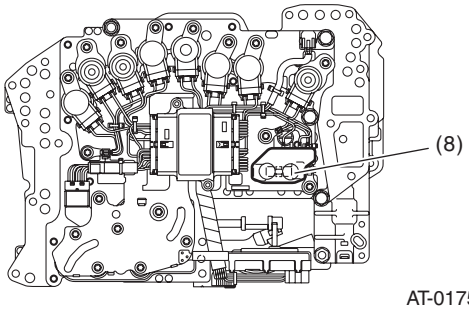
AT-03282



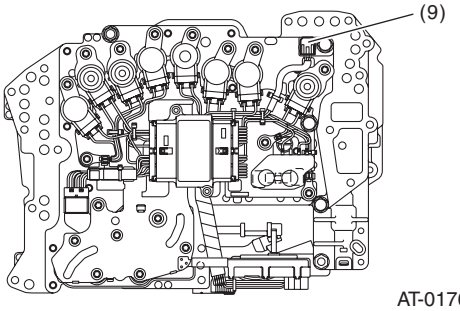
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AT-01475

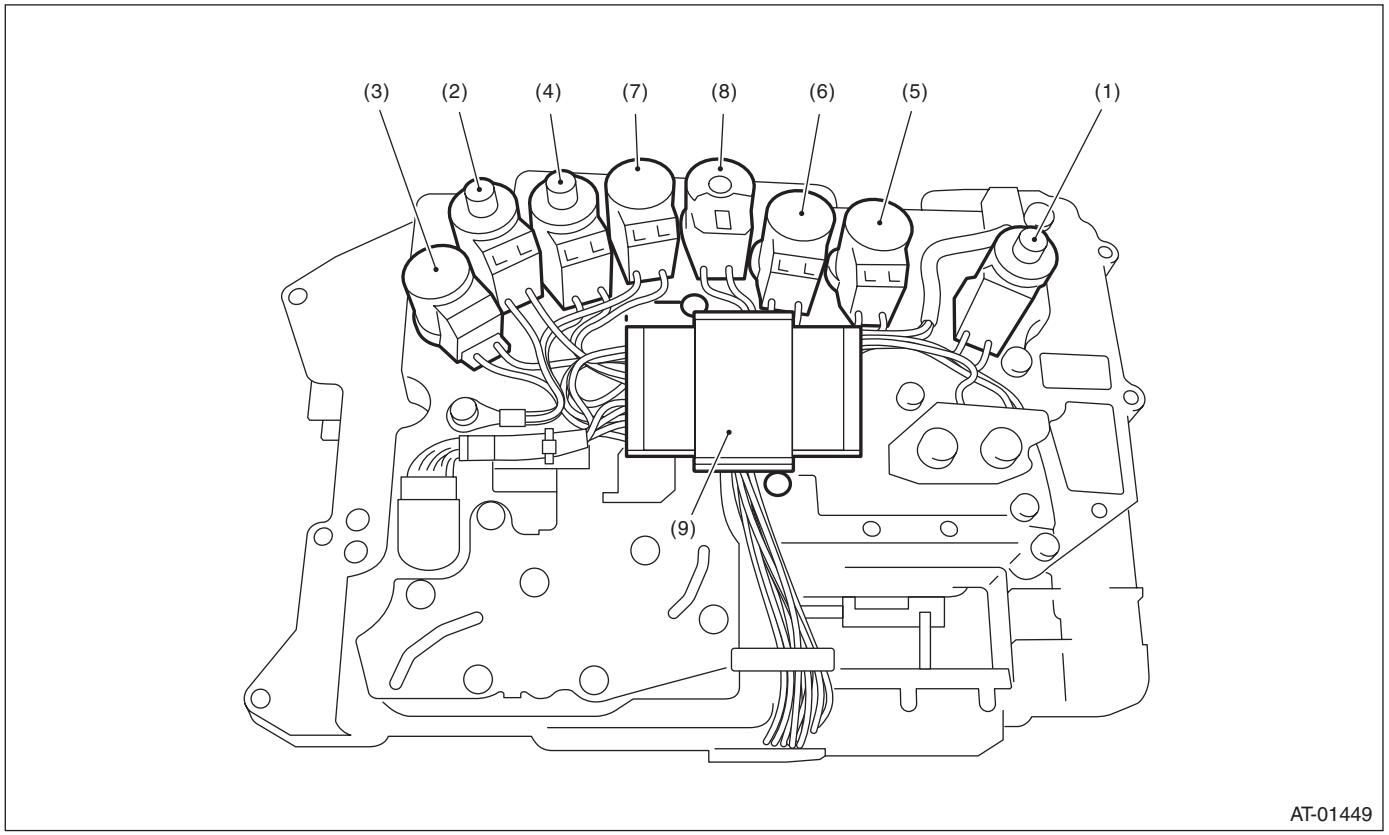


AT-01759



AT-01760

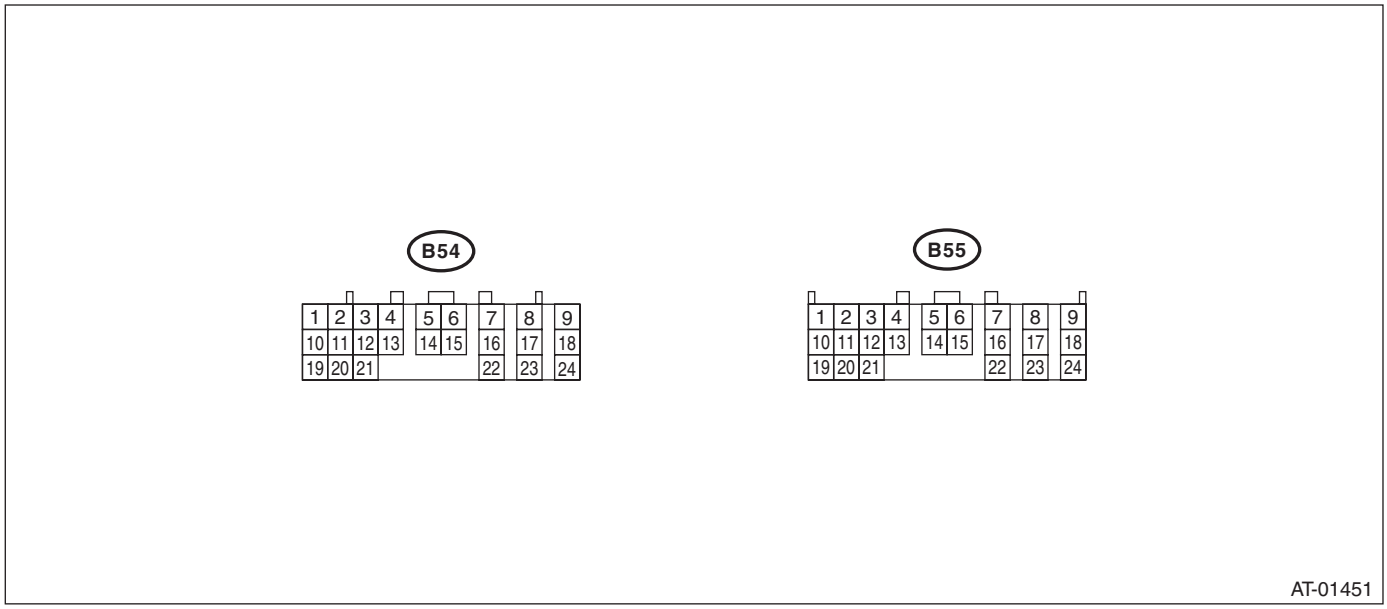
3. SOLENOID



(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) Low coast brake solenoid
(9) Memory box

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

A: ELECTRICAL SPECIFICATION



NOTE:
The measurement should be performed after warming up.

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
P/L solenoid output	B54	9	Engine ON, "P" range, accelerator OFF, brake ON	Approx. 4.0 — 6.0 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			Manual mode 1st, accelerator OFF, brake ON	Approx. 2.0 — 4.0 V		
PVIGN power supply	B54	8	Ignition switch ON	Power supply voltage	—	
		7	Ignition switch ON	Power supply voltage	—	
I/C oil pressure switch input	B54	6	—	—	—	The condition of I/C oil pressure switch cannot be read by the tester.
Power GND	B54	5	Always	Approx. 0 V	—	
CAN communication line (+)	B54	4	—	—	—	
CAN communication line (–)	B54	3	—	—	—	
ATF temperature sensor 1 input	B54	2	Ignition switch ON	2.5 — 2.9 V (ATF temperature 20°C (68°F)) 0.8 — 1.0 V (ATF temperature 80°C (176°F))	4.0 — 5.0 kΩ (ATF temperature 20°C (68°F)) 0.7 — 0.9 kΩ (ATF temperature 80°C (176°F))	
Battery power supply	B54	1	Always	Power supply voltage	—	

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
I/C solenoid output	B54	18	While driving at 1st-3rd of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 4th or 5th of manual mode	Approx. 0 V		
H & LR/C solenoid output	B54	17	While driving at 2nd of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 3rd-5th of manual mode	Approx. 0 V		
Control valve power supply output	B54	16	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
LC/B solenoid output	B54	15	While driving at 1st-2nd of manual mode	Power supply voltage	5 — 17 Ω (ATF temperature 25°C (77°F))	
			While driving at 3rd-5th of manual mode	Approx. 0 V		
Power GND	B54	14	Always	Approx. 0 V	—	
Analog GND (sensor GND)	B54	13	Always	Approx. 0 V	—	
LC/B oil pressure switch input	B54	12	—	—	—	The condition of LC/B oil pressure switch cannot be read by the tester.
ATF temperature sensor 2 input	B54	11	Ignition switch ON	2.3 — 2.7 V (ATF temperature 20°C (68°F)) 0.6 — 0.8 V (ATF temperature 80°C (176°F))	3.0 — 3.6 kΩ (ATF temperature 20°C (68°F)) 0.4 — 0.6 kΩ (ATF temperature 80°C (176°F))	
PVIGN power supply relay output	B54	10	Ignition switch ON	0 — 1.5 V	—	
Fr/B solenoid output	B54	24	While driving at other than 4th of manual mode	Approx. 4.5 — 6.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 4th of manual mode	Approx. 0 V		
L/U solenoid output	B54	23	When lock-up	Approx. 3.5 — 5.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			When not lock-up	Approx. 0 V		
D/C solenoid output	B54	22	While driving at 1st or 5th of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 2nd-4th of manual mode	Approx. 0 V		
D/C oil pressure switch input	B54	21	—	—	—	The condition of D/C oil pressure switch cannot be read by the tester.
Subaru Select Monitor communication line	B54	20	—	—	—	
Control GND	B54	19	Always	Approx. 0 V	—	

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
H&LR/C oil pressure switch input	B55	8	While driving at 2nd of manual mode	Power supply voltage	—	
			While driving at 3rd-5th of manual mode	Approx. 0 V		
Front vehicle speed sensor input	B55	7	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 530 — 610 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2,160 — 2,410 rpm		Use the Subaru Select Monitor.
Inhibitor switch 1 input	B55	4	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “N” range	1.5 V or less		
Inhibitor switch 2 input	B55	3	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “D” range	1.5 V or less		
Accessory power supply	B55	2	Accessory switch ON	Power supply voltage	—	
			Accessory switch OFF	Approx. 0 V		
Ignition power supply	B55	1	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
Rear vehicle speed sensor input	B55	18	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 530 — 610 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2,160 — 2,410 rpm		Use the Subaru Select Monitor.
Fr/B oil pressure switch input	B55	17	Ignition switch ON, engine ON, while driving at other than 4th	Approx. 0 V	—	
			Ignition switch ON, engine ON, while driving at 4th	Power supply voltage		
Turbine speed sensor 1 input	B55	16	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.

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
Range lock solenoid output	B55	15	Ignition switch ON, while stopping at "D" range	Approx. Power Supply Voltage –1.2 V	7 — 21 Ω	
			Ignition switch ON, vehicle speed at least 20 km/h (12 MPH)	Approx. 0 V		
Inhibitor switch 3 input	B55	14	Ignition switch ON, "R" range	4.0 — 5.0 V	—	
			Ignition switch ON, "D" range	1.5 V or less		
Inhibitor switch 4 input	B55	13	Ignition switch ON, "P" range	4.0 — 5.0 V	—	
			Ignition switch ON, "D" range	1.5 V or less		
Control valve communication line	B55	12	—	—	—	
Back-up light relay output	B55	11	Ignition switch ON, "R" range	1.5 V	90 — 110 Ω (ATF temperature 25°C (77°F))	
			Ignition switch ON, other than "R" range	Power supply voltage		
Ignition power supply	B55	10	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
AWD solenoid output	B55	23	Engine ON, "P" range or "N" range, accelerator OFF	Approx. 0 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			Engine ON, "D" range, accelerator OFF, brake ON	Approx. 2.0 — 3.0 V		
Turbine speed sensor 2 input	B55	22	2nd of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,300 — 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.
Control GND	B55	21	Always	Approx. 0 V	—	
Inhibitor switch 3 open circuit monitor input	B55	20	Ignition switch ON, "R" range	4.0 — 5.0 V	—	
			Ignition switch ON, "D" range	1.5 V or less		
PN signal output	B55	19	Ignition switch ON, Other than "P" range or "N" range	Power supply voltage	—	ECM should be connected correctly.
			Ignition switch ON, "P" range or "N" range	0 — 1.0 V	—	

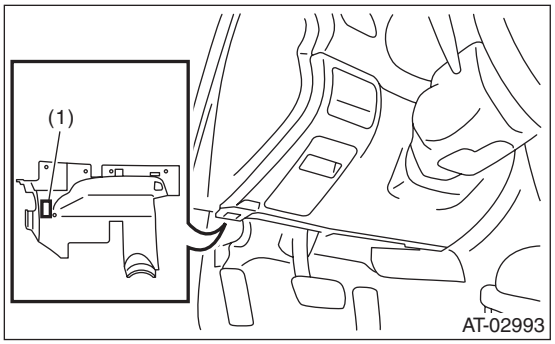
6. Subaru Select Monitor

A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit.
2) Connect the diagnosis cable to the Subaru Select Monitor.
3) Connect the Subaru Select Monitor to the data link connector.

(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to the data link connector.

NOTE:
Do not connect scan tools except for Subaru Select Monitor.

4) Turn the ignition switch to ON (engine OFF) and run the Subaru Select Monitor.
5) On the «Main Menu» display screen, select the {Each System Check}.
6) On the «System Selection Menu» display screen, select the {Transmission}.
7) Select the [OK] after the information of transmission type is displayed.
8) On the «Transmission Diagnosis» screen, select {DTC Display}.

NOTE:
• For details concerning operation procedures, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning the diagnostic trouble codes (DTC), refer to the List of DTC. <Ref. to 5AT(diag)-29, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check}.
2) On the «System Selection Menu» display screen, select the {Transmission}.
3) Select the [OK] after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save}.
5) On the «Transmission Diagnosis» display screen, select the {Data Display}.

6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Item	Display	Unit of measure
Engine speed signal	Engine Speed	rpm
Battery voltage	Battery Voltage	V
Accelerator pedal position sensor	Acceleration 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
Lateral G sensor	Lateral G Sensor	V
ATF temperature sensor 1 signal	ATF Temp.	°C
ATF temperature sensor 2 signal	ATF Temp. 2	°C
Turbine speed sensor 1 signal	Turbine Revolution Speed 1	rpm
Turbine speed sensor 2 signal	Turbine Revolution Speed 2	rpm
High & low reverse clutch solenoid indicator current	H&LR/C Solenoid Current	A
Direct clutch solenoid indicator current	D/C Solenoid Current	A
Front brake solenoid indicator current	F/B Solenoid Current	A
Input clutch solenoid indicator current	I/C Solenoid Current	A
Line pressure solenoid indicator current	P/L Solenoid Current	A
Lock-up solenoid indicator current	L/U Solenoid Current	A
Transfer solenoid indicator current	AWD Solenoid Current	A
High & low reverse clutch solenoid target oil pressure	H&LR/C Solenoid Target Pressure	kPa
Direct clutch solenoid target oil pressure	D/C Solenoid Target Pressure	kPa
Front brake solenoid target oil pressure	F/B Solenoid Target Pressure	kPa
Input clutch solenoid target oil pressure	I/C Solenoid Target Pressure	kPa
Line pressure solenoid target oil pressure	P/L Solenoid Target Pressure	kPa
Lock-up solenoid target oil pressure	L/U Solenoid Target Pressure	kPa
Transfer solenoid target oil pressure	AWD Solenoid Target Pressure	kPa
Ignition switch	Ignition Switch	ON Input or OFF Input
Manual mode switch signal	Tiptronic Mode Switch	ON or OFF
Cruise control ON signal	Cruise Control Signal	ON or OFF
Manual mode down shift signal	Down SW	ON or OFF
Stop light switch signal	Stop Light SW	ON or OFF
Manual mode up shift signal	Up SW	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 Light	ON or OFF
Shift lock solenoid signal	Shift Lock Solenoid	ON or OFF
Parking range signal	P Range Signal	ON or OFF
P/N range output signal	P/N Signal	ON or OFF
Neutral range signal	N Range Signal	ON or OFF
Inhibitor switch 1 input signal	Inhibitor SW1	High or Low
Inhibitor switch 2 input signal	Inhibitor SW2	High or Low
Inhibitor switch 3 input signal	Inhibitor SW3	High or Low
Inhibitor switch 4 input signal	Inhibitor SW4	High or Low
Inhibitor switch 3 monitor input signal	Inhibitor SW3 Monitor	High or Low
Backup light relay output signal	Back-up light relay	ON or OFF
High & low reverse clutch oil pressure switch input signal	H&LR/C Oil Pressure SW	ON or OFF
Direct clutch oil pressure switch input signal	D/C Oil Pressure SW	ON or OFF
Front brake oil pressure switch input signal	Fr/B Oil Pressure SW	ON or OFF

Item	Display	Unit of measure
Input clutch oil pressure switch input signal	I/C Oil Pressure SW	ON or OFF
Low coast brake oil pressure switch input signal	LC/B Oil Pressure SW	ON or OFF
Low coast brake solenoid input signal	LC B Solenoid	ON or OFF

NOTE:
For details concerning operation procedures, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

NOTE:
To clear the previous DTC, use {Clear Memory}, and to clear the learned value, use {Clear Memory 2}.
1) Check that the select lever is in “P” range.
2) On the «Main Menu» display screen, select the {Each System Check}.
3) On the «System Selection Menu» display screen, select the {Transmission}.
4) Select the [OK] after the information of transmission type is displayed.
5) On the «Transmission Diagnosis» display screen, select the {Clear Memory}.

NOTE:
If {Clear Memory 2} is selected and performed, DTC are not cleared.
6) When ‘Done’ is shown on the display screen, turn the ignition switch to OFF and close the Subaru Select Monitor. To turn the ignition switch to ON again, wait for 10 seconds or more.

NOTE:
For details concerning operation procedures, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to “Subaru Select Monitor” for information about how to obtain and understand DTC. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>

NOTE:
DTC can not be read by the AT OIL TEMP light.

8. Inspection Mode

A: PROCEDURE

WARNING:
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 select lever 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.

9. Clear Memory Mode

A: OPERATION

Use “Subaru Select Monitor” to clear DTC. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

NOTE:
DTC cannot be cleared without using Subaru Select Monitor.

10.Learning Control

A: GENERAL DESCRIPTION

Be sure to perform the {Clear Memory 2} only when the following services have been performed. And when the shifting shock is occurred during the total check with vehicle driving, perform the learning with following procedures. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

- Replacement of TCM
- Replacement of transmission assembly
- Simultaneous replacement of TCM and transmission assembly
- Replacement of clutches
- Replacement of control valve body

CAUTION:
When {Clear Memory 2} is executed, DTC may not be cleared.

B: PROCEDURE

1) Turn the ignition switch to ON.
2) Turn the A/C switch to OFF.
3) Turn the headlight switch to OFF.
4) Turn the rear defogger switch to OFF.
5) Start the engine.
6) Connect the Subaru Select Monitor to the vehicle.
7) Drive the vehicle for 5 — 10 km (3 — 6 miles) to warm up ATF temperature to be 70°C (158°F) or more.
8) Set the SI drive selector to “S” mode. (Turbo model)
9) While checking that the throttle opening angle on Subaru Select Monitor is within the specified range, shift the gear from 1st → 2nd, 2nd → 3rd, and 3rd → 4th, while driving the vehicle at “D” range. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>

Acceleration opening angle:
Turbo model:
10%±2%
Non-turbo model:
12.5%±2%

10) While checking that the throttle opening angle on Subaru Select Monitor is within the specified range, upshift the gear from 4th → 5th while driving the vehicle at “D” range.

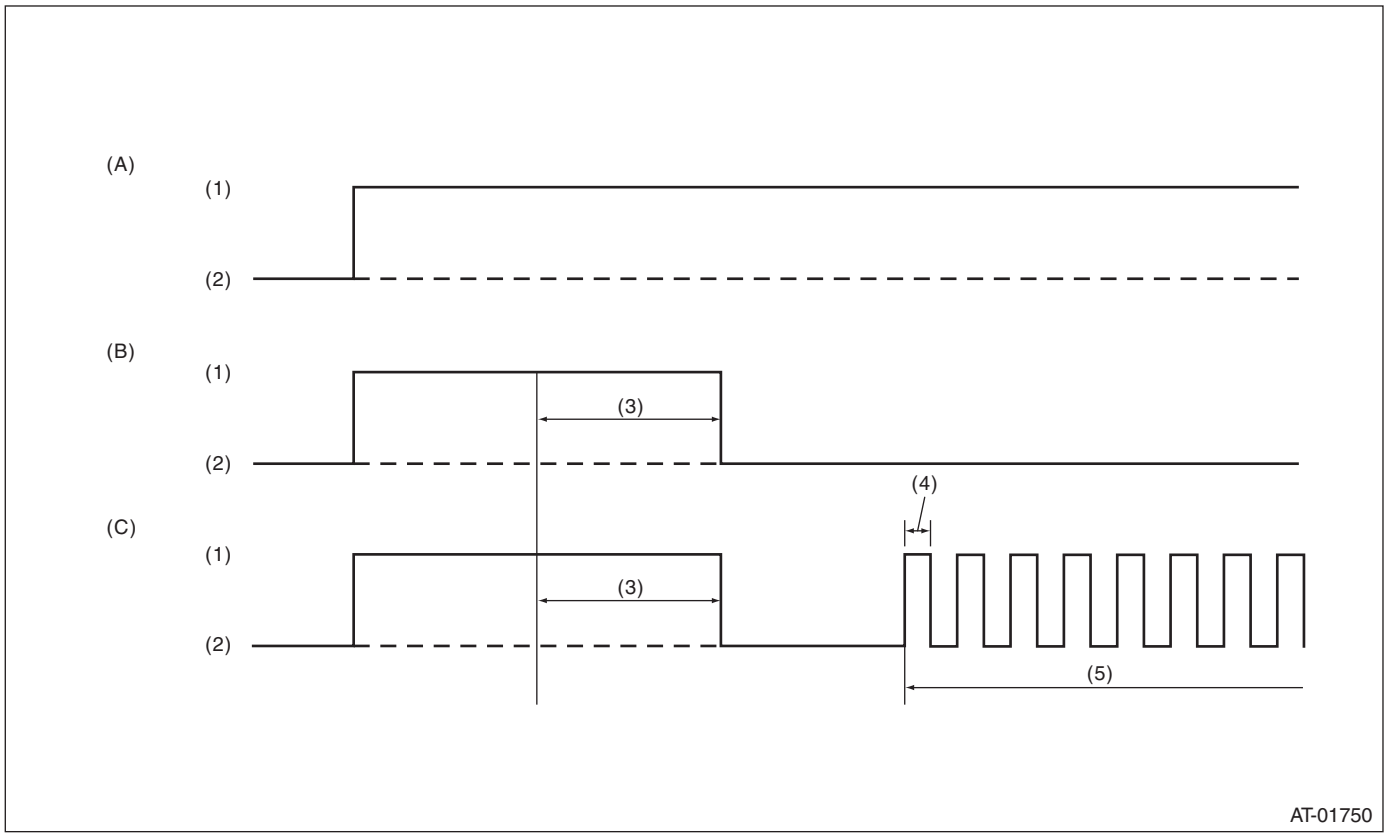
Acceleration opening angle:
Turbo model:
12.5%±2%
Non-turbo model:
15.5%±2%

11) Repeat the steps 8) and 9) until the reducing effect of the shifting shock is felt.
12) If reducing of shifting shock is not felt after 5 cycles, recheck that the learning conditions (throttle opening angle, ATF temperature, etc.) are as specified and recheck that other parts are normal.

11.AT Oil Temp Warning Light Display

A: OPERATION

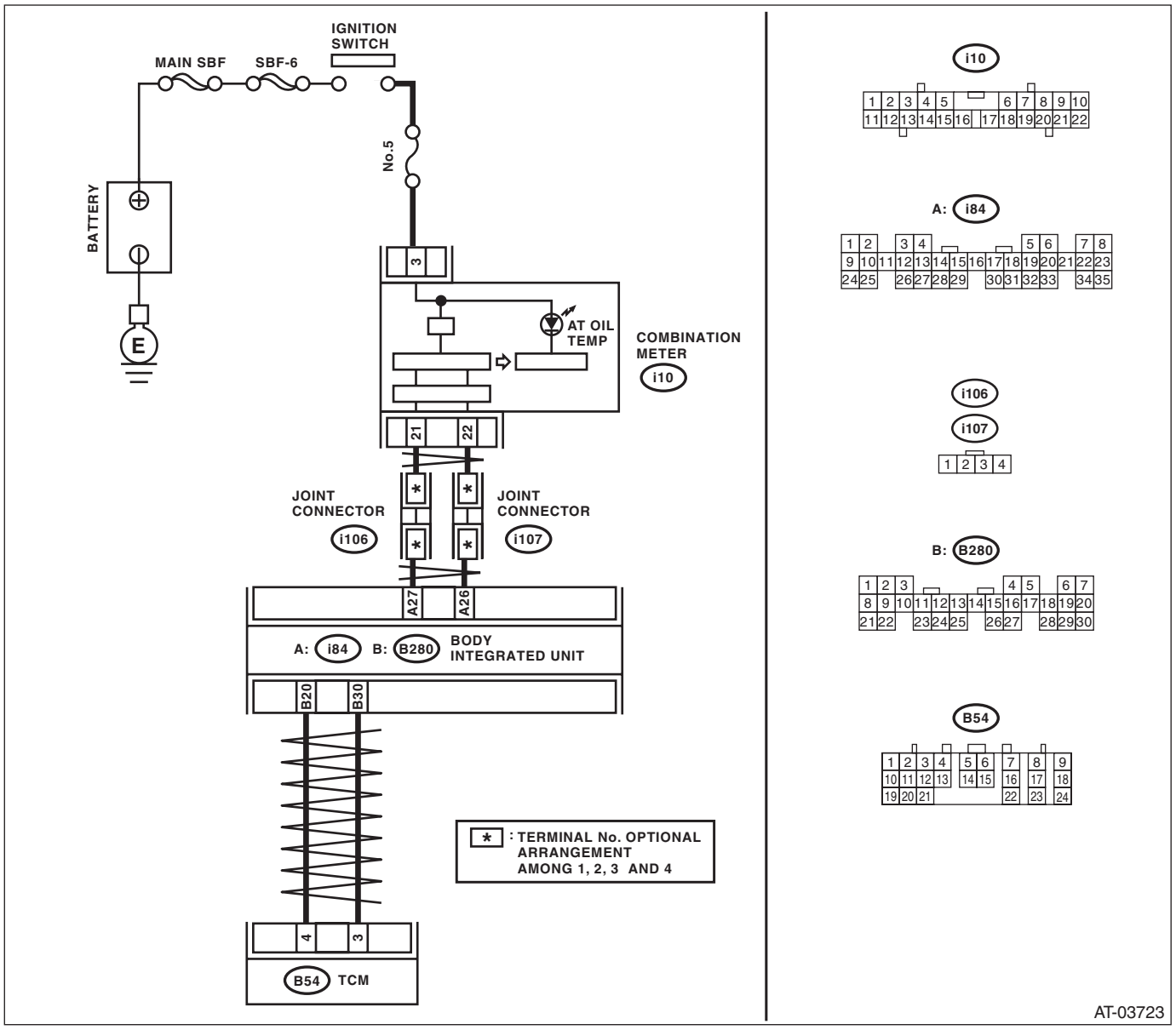
When any on-board diagnostics item is malfunctioning, the AT OIL TEMP light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a DTC during the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP light does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using Subaru Select Monitor. Indicator light signal patterns are as shown in the figure.
When the AT OIL TEMP light does not operate normally but no DTC is stored, perform the AT OIL TEMP light inspection. <Ref. to 5AT(diag)-24, INSPECTION, AT Oil Temp Warning Light Display.>



(A)	Ignition switch (engine OFF)	(B)	Normal (engine ON)	(C)	Faulty (engine ON)
(1)	ON	(3)	2 sec.	(5)	Blink
(2)	OFF	(4)	0.25 sec.		

B: INSPECTION

DIAGNOSIS:
AT OIL TEMP light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), AT OIL TEMP light does not illuminate.
WIRING DIAGRAM:

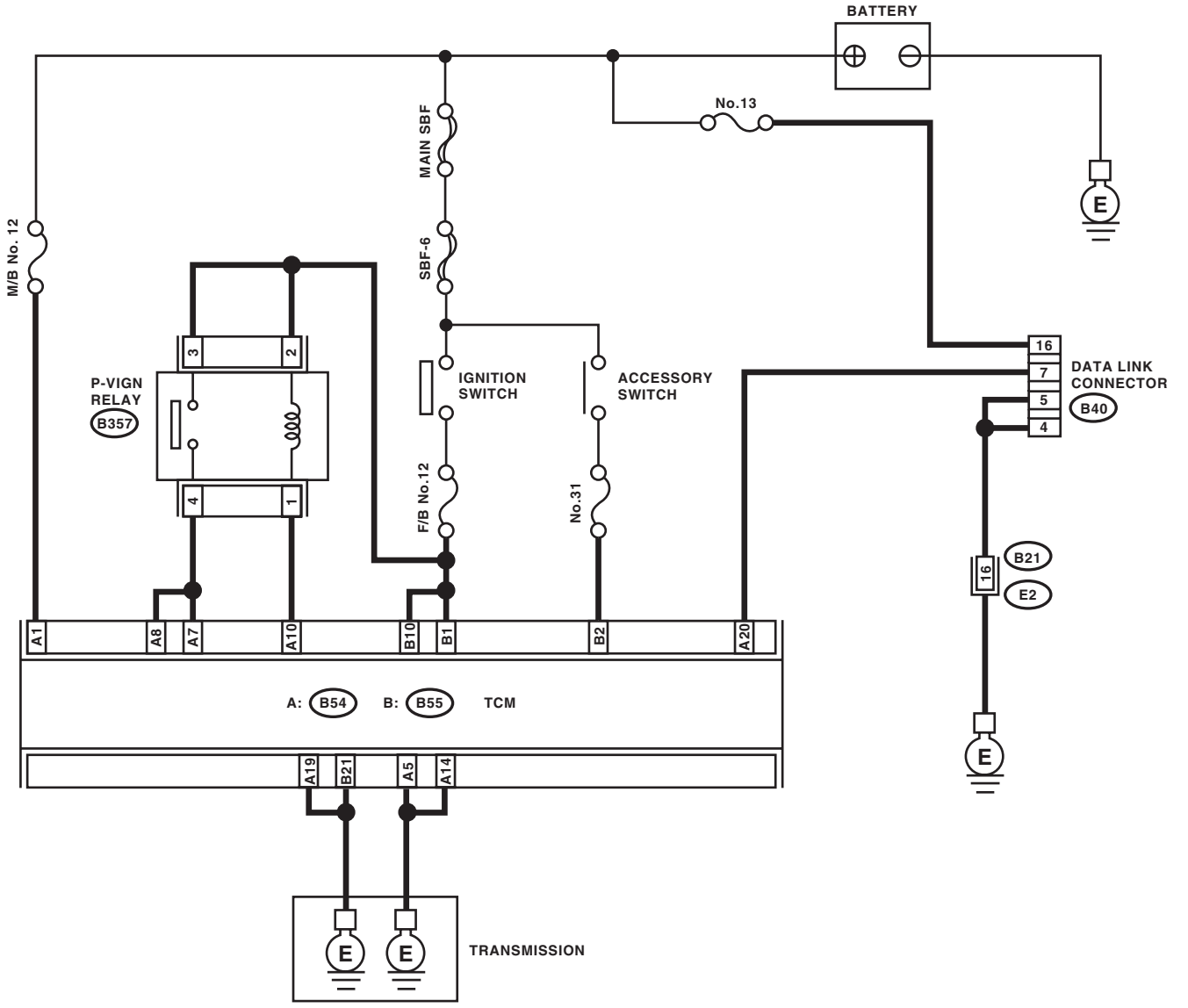


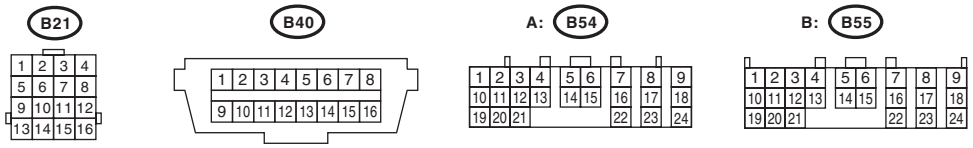
	Step	Check	Yes	No
1	**CHECK AT OIL TEMP LIGHT.** Turn the ignition switch to ON.	Does the AT OIL TEMP light illuminate?	Go to step **2**.	Perform the self-diagnosis of combination meter.
2	**CHECK AT OIL TEMP LIGHT.** After the ignition switch is ON, wait for at least 2 seconds.	Does the AT OIL TEMP 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?	Normal. Go back to "Basic Diagnostic Procedure". <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>	Go to step **7**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** Connect the Subaru Select Monitor to the 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)-26, Diagnostic Procedure for Subaru Select Monitor Communication.>
5	**CHECK TCM.** Display the current data of TCM using Subaru Select Monitor.	Is the "Diagnosis Light" output signal "ON"?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
6	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Does the "SPORT Light" input signal "Illuminate"?	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>	Check DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>
7	**CHECK TCM.** 1) Start the engine. 2) Display the current data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	Is the "Diagnosis Light" output signal "ON"?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **8**.
8	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Does the "AT OIL TEMP light" input signal "Illuminate"?	Check DTC of body integrated unit. Perform the diagnosis according to DTC. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>

12.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-03760

	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **2**.	Repair harness connector between the battery and data link connector, and poor contact of the connector.
2	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure the resistance of harness between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:*** ***(B40) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between data link connector and ground terminal, and poor contact of connector.
3	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to the transmission system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **8**.	Go to step **4**.
4	**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 whether communication to engine system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **6**.	Go to step **5**.
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the connector from ECM. 4) Turn the ignition switch to ON. 5) Check whether communication to transmission system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step **6**.
6	**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. 10 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Check harness and connector between each control module and data link connector.
7	**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. 10 (+) — Chassis ground (–):***	Is the voltage 1 V or more?	Check harness and connector between each control module and data link connector.	Go to step **8**.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B54) No. 20 — (B40) No. 10:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the harness and connector between TCM and data link connector.
9	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is TCM connector connected to TCM?	Go to step **10**.	Connect the TCM connector to TCM.

	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 IN CONNECTORS.**	Is there poor contact in 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. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **15**.	Go to step **13**.
13	**CHECK FUSE (NO. 12).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 12).	Is the fuse (No. 12) blown out?	Replace the fuse (No. 12).	Go to step **14**.
14	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance 10 Ω or less?	Replace the fuse (No. 12). If the replaced fuse (No. 12) blows out easily, repair the short circuit of harness between fuse (No. 12) and TCM.	Go to step **15**.
15	**CHECK IGNITION 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. 10 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **17**.	Go to step **16**.
16	**CHECK FUSE (NO. 12).** Remove the fuse (No. 12).	Is the fuse (No. 12) blown out?	Replace the fuse (No. 12). If the replaced fuse (No. 12) blows out easily, repair the short circuit of harness between fuse (No. 12) 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. 19 — Transmission ground:*** ***(B55) No. 21 — Transmission ground:*** ***(B54) No. 5 — Transmission ground:*** ***(B54) No. 14 — 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 IN CONNECTORS.**	Is there poor contact in TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

13.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference target
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction, open or short circuit	<Ref. to 5AT(diag)-33, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor 1 malfunction, or open input signal circuit	<Ref. to 5AT(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 1 malfunction, short input signal circuit	<Ref. to 5AT(diag)-40, 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, short input signal circuit	<Ref. to 5AT(diag)-43, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Torque Converter/Brake Switch “B” Circuit Low	Brake switch malfunction, open input signal circuit, body integrated unit malfunction, CAN communication failure	<Ref. to 5AT(diag)-46, DTC P0719 BRAKE SWITCH CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	Front wheel speed sensor is faulty or input signal circuit, ground, power supply is open or shorted.	<Ref. to 5AT(diag)-48, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Torque Converter/Brake Switch “B” Circuit High	Brake switch malfunction, short circuit of input signal, body integrated unit, CAN communication failure	<Ref. to 5AT(diag)-51, DTC P0724 BRAKE SWITCH CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine Speed Input Circuit	Open or short engine speed output signal circuit, ECM malfunction, CAN communication failure	<Ref. to 5AT(diag)-53, DTC P0725 ENGINE SPEED INPUT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle sensor, turbine speed sensor, control valve malfunction or shift clutch malfunction	<Ref. to 5AT(diag)-53, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle sensor, turbine speed sensor, control valve malfunction or shift clutch malfunction	<Ref. to 5AT(diag)-53, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-53, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-53, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0735	Gear 5 Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-53, DTC P0735 GEAR 5 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0736	Reverse Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-54, 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)-55, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P0743	Torque Converter Clutch Circuit Electrical	L/U solenoid circuit malfunction or L/U solenoid body malfunction	<Ref. to 5AT(diag)-57, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	Line pressure solenoid circuit malfunction or line pressure solenoid body malfunction	<Ref. to 5AT(diag)-59, 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 Function Malfunction	<Ref. to 5AT(diag)-61, 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 malfunction or Fr/B solenoid body 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	Shift Solenoid “B” Performance 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 malfunction or I/C solenoid body malfunction	<Ref. to 5AT(diag)-69, 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)-71, 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 malfunction or H&LR/C solenoid body malfunction	<Ref. to 5AT(diag)-74, 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)-76, 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 malfunction or D/C solenoid body malfunction	<Ref. to 5AT(diag)-79, DTC P0768 SHIFT SOLENOID “D” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	Shift Solenoid “E” Performance or Stuck Off	LC/B solenoid malfunction	<Ref. to 5AT(diag)-81, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0773	Shift Solenoid “E” Electrical	• LC/B solenoid circuit malfunction or LC/B solenoid body malfunction • OFF malfunction of PVIGN relay circuit or relay body	<Ref. to 5AT(diag)-84, 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. • Blown out of TCM+B fuse	<Ref. to 5AT(diag)-87, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0817	Starter Disable Circuit	• PN signal output circuit is open or shorted. • ECM Source Voltage Is Abnormal • Blown out of TCM+B fuse	<Ref. to 5AT(diag)-90, DTC P0817 STARTER DISABLE CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0882	TCM Power Input Signal Low	PVIGN relay output circuit is open, shorted or relay malfunction	<Ref. to 5AT(diag)-92, DTC P0882 TCM POWER INPUT SIGNAL LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P0957	Backup Light Relay Circuit Low	Back-up relay output circuit is open, shorted or relay OFF malfunction	<Ref. to 5AT(diag)-94, DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0958	Backup Light Relay Circuit High	Back-up relay output circuit is open, shorted or relay ON malfunction	<Ref. to 5AT(diag)-96, DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1601	TCM Data Communication Failure	Communication Failure between TCM and Memory Box	<Ref. to 5AT(diag)-98, DTC P1601 TCM DATA COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Rear wheel speed sensor is faulty or input circuit, ground, power supply is open or shorted.	<Ref. to 5AT(diag)-100, 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 malfunction or AWD solenoid body malfunction	<Ref. to 5AT(diag)-103, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1710	Torque Converter Turbine 2 Speed Signal Circuit 2 Malfunction	Torque converter sensor 2 malfunction, input circuit, ground, power open, short circuit	<Ref. to 5AT(diag)-105, DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT 2 MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1716	ATF Temp. Sensor 2 Circuit Low	ATF temperature sensor 2 malfunction, or open input signal circuit	<Ref. to 5AT(diag)-108, DTC P1716 ATF TEMP. SENSOR 2 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1717	ATF Temp. Sensor 2 Circuit High	ATF temperature sensor 2 malfunction, short input signal circuit	<Ref. to 5AT(diag)-111, DTC P1717 ATF TEMP. SENSOR 2 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	AT Can Communication Circuit	CAN communication line bus-off or open circuit, ECM short circuit, ABS/VDCCM or integrated CU malfunction	<Ref. to 5AT(diag)-113, DTC P1718 AT CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1760	Lateral Acceleration Sensor Performance Problem	Faulty lateral G sensor	<Ref. to 5AT(diag)-114, DTC P1760 LATERAL ACCELERATION SENSOR PERFORMANCE PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1761	Lateral Acceleration Sensor Circuit Low	Lateral G sensor is faulty, input signal circuit is open, or CAN communication failure occurs.	<Ref. to 5AT(diag)-117, DTC P1761 LATERAL ACCELERATION SENSOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1762	Lateral Acceleration Sensor Circuit High	Lateral G sensor is faulty or input signal circuit is shorted.	<Ref. to 5AT(diag)-120, DTC P1762 LATERAL ACCELERATION SENSOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1798	Gear 1 Engine Brake	Malfunction of clutch oil pressure related to 1st engine brake, solenoid current malfunction	<Ref. to 5AT(diag)-122, DTC P1798 GEAR 1 ENGINE BRAKE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1799	Interlock	Malfunction of clutch oil pressure which emit interlock, solenoid current malfunction	<Ref. to 5AT(diag)-123, DTC P1799 INTERLOCK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	SPORT Mode Switch Circuit (Manual Switch)	Manual mode switch is shorted, or switch malfunction	<Ref. to 5AT(diag)-124, DTC P1817 SPORT MODE SWITCH CIRCUIT (MANUAL SWITCH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1840	Transmission Fluid Pressure Sensor/Switch A Circuit	Fr/B oil pressure switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-126, DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH A CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P1842	Transmission Fluid Pressure Sensor/Switch C Circuit	I/C oil pressure switch is open or shorted, or switch malfunction.	<Ref. to 5AT(diag)-126, DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH C CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1843	Transmission Fluid Pressure Sensor/Switch D Circuit	D/C oil pressure switch is open or shorted, or switch malfunction.	<Ref. to 5AT(diag)-126, DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH D CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1844	Transmission Fluid Pressure Sensor/Switch E Circuit	H&LR/C oil pressure switch is open or shorted, or switch malfunction.	<Ref. to 5AT(diag)-126, DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH E CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

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

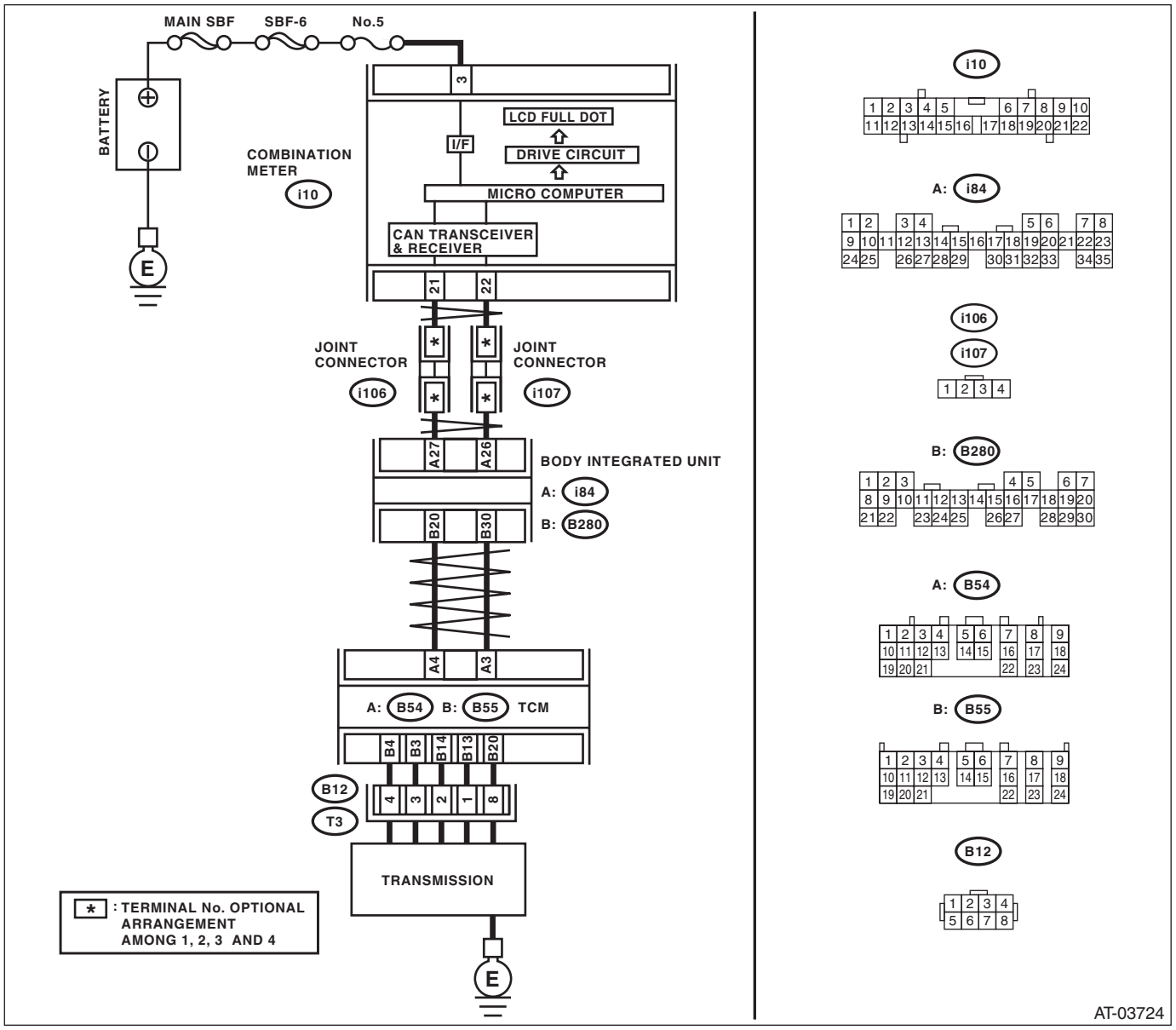
DTC DETECTING CONDITION:

The inhibitor switch is open or short.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Shift indicator light does not match with select lever.
- Shift indicator light does not illuminate.
- N-D, N-R shock occur.

WIRING DIAGRAM:

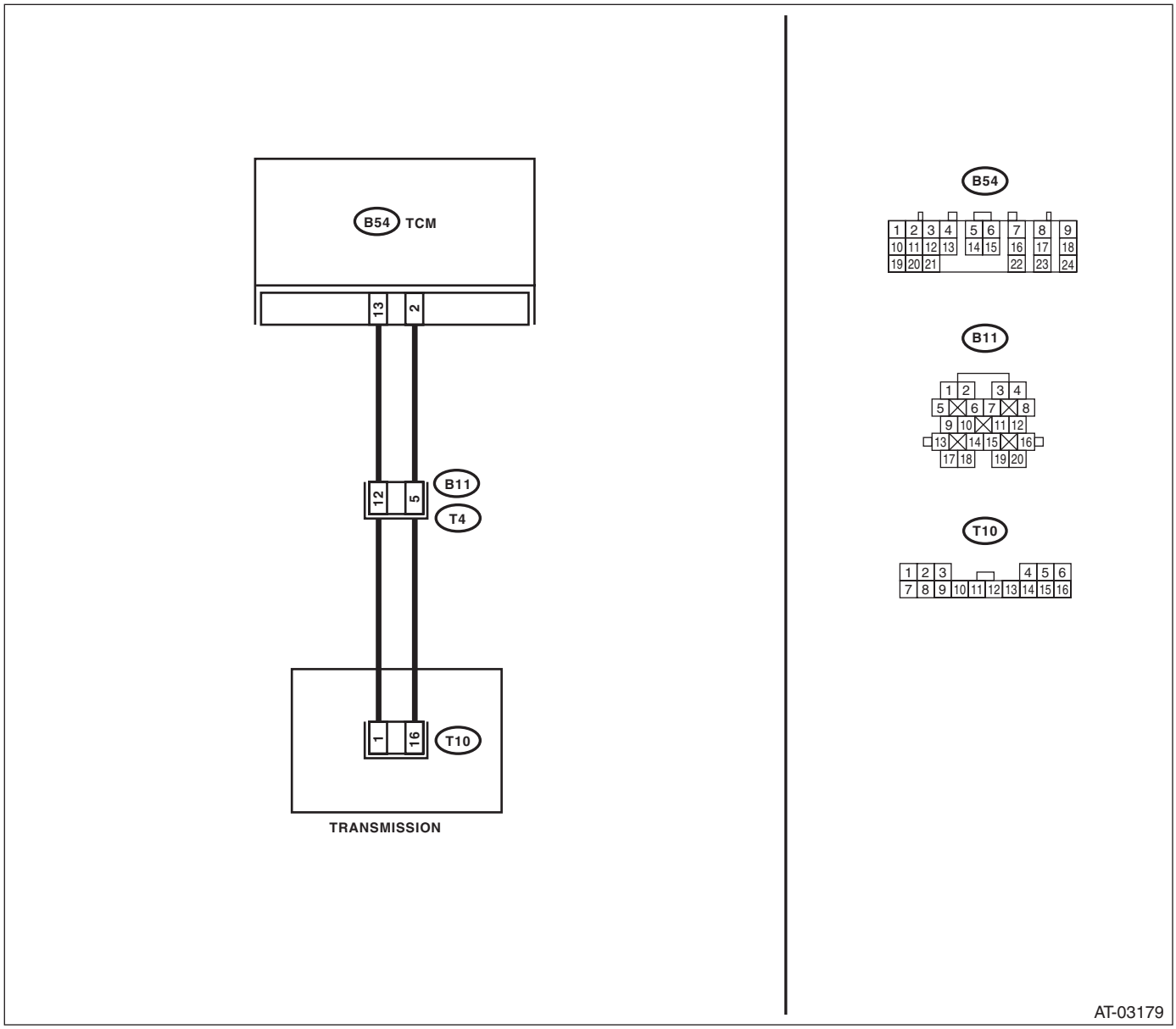


	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK INHIBITOR SWITCH.** 1) Shift the select lever to "P" range. 2) Check input signal of inhibitor SW 1 — 4 and inhibitor SW 3 monitor using Subaru Select Monitor.	Is all displayed "High"?	Go to step **4**.	Go to step **3**.
3	**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 about the item which indicated Low on step 3. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:*** ***(B55) No. 3 — Chassis ground:*** ***(B55) No. 14 — Chassis ground:*** ***(B55) No. 13 — Chassis ground:*** ***(B55) No. 20 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness between TCM connector and chassis ground.
4	**CHECK INHIBITOR SWITCH.** 1) Shift the select lever to "D" range. 2) Check input signal of inhibitor SW 1 — 4 and inhibitor SW 3 monitor using Subaru Select Monitor.	Is all displayed Low?	Go to step **6**.	Go to step **5**.
5	**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 and transmission connector about the item which indicated High on step 5. ***Connector & terminal*** ***(B55) No. 4 — (B12) No. 4:*** ***(B55) No. 3 — (B12) No. 3:*** ***(B55) No. 14 — (B12) No. 2:*** ***(B55) No. 13 — (B12) No. 1:*** ***(B55) No. 20 — (B12) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between TCM connector and transmission connector.
6	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 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. 4 (+) — (B54) No. 19 (–):*** ***(B55) No. 3 (+) — (B54) No. 19 (–):*** ***(B55) No. 14 (+) — (B54) No. 19 (–):*** ***(B55) No. 13 (+) — (B54) No. 19 (–):*** ***(B55) No. 20 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V for the inhibitor SW 1 — 4? Is the voltage 3.5 — 5.5 V for the inhibitor SW 3 monitor?	Go to step **8**.	Go to step **7**.

	Step	Check	Yes	No
7	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
8	**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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 4 — (T10) No. 6:*** ***(T3) No. 3 — (T10) No. 5:*** ***(T3) No. 2 — (T10) No. 4:*** ***(T3) No. 1 — (T10) No. 3:*** ***(T3) No. 8 — (T10) No. 2:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between control valve body connector and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 6 — Transmission ground:*** ***(T10) No. 5 — Transmission ground:*** ***(T10) No. 4 — Transmission ground:*** ***(T10) No. 3 — Transmission ground:*** ***(T10) No. 2 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **10**.	Repair the short circuit of harness between control valve body connector and transmission connector.
10	**CHECK POOR CONTACT.**	Is there any poor contact in inhibitor SW 1 — 4 or inhibitor SW 3 monitor circuit?	Repair the poor contact.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Input signal circuit to ATF temperature sensor 1 is open.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:

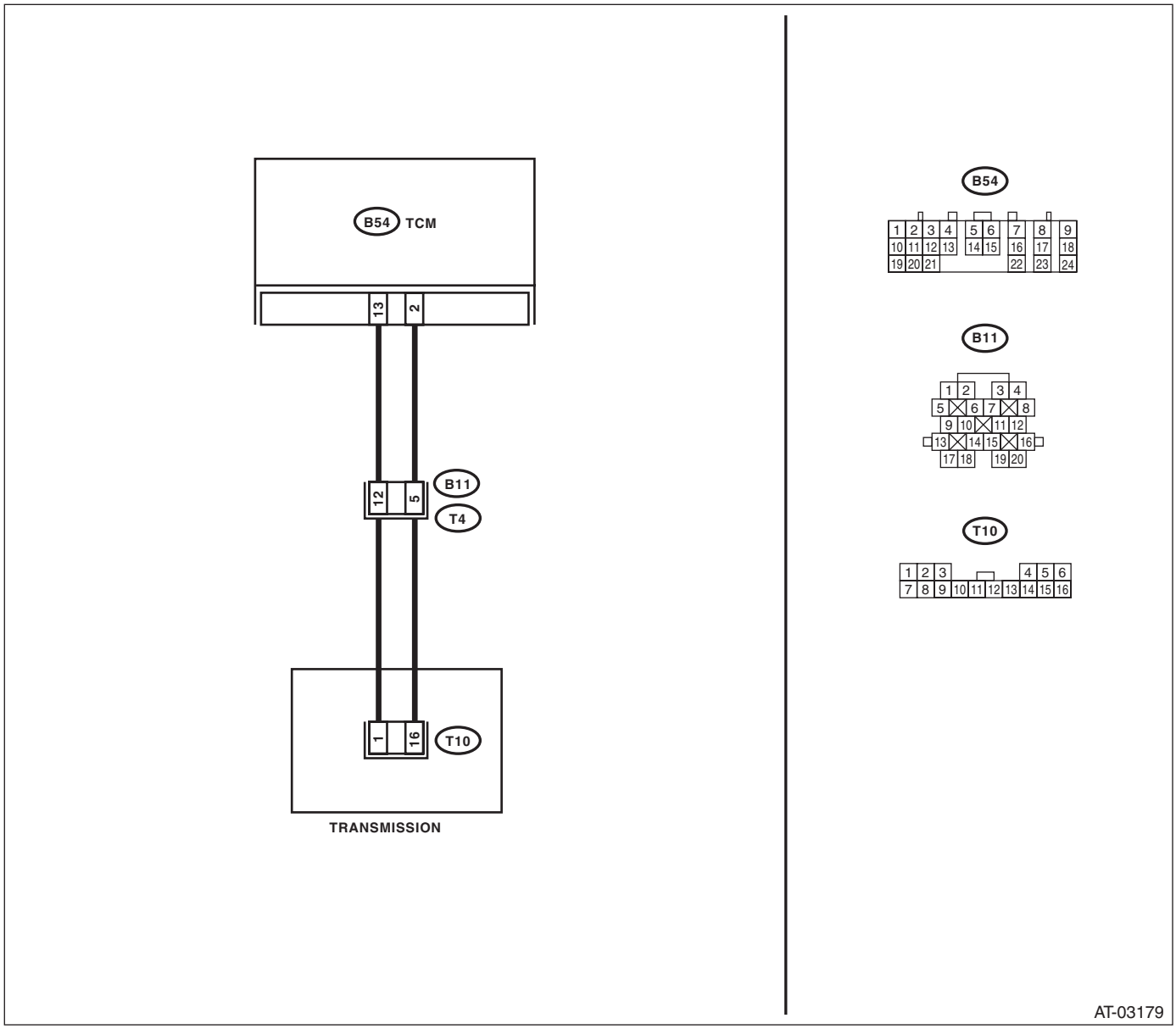


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 2 — (B11) No. 5:***	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) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 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 between 500 — 1,200 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**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **6**.

	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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 12 — (T10) No. 1:*** ***(T4) No. 5 — (T10) No. 16:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Repair the open circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor 1 circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Input signal circuit to ATF temperature sensor 1 is shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:



	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*** ***(B54) No. 13 — Chassis ground:*** ***(B54) No. 2 — 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) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 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 between 500 — 1,200 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**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **6**.

	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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 1 — Chassis ground:*** ***(T10) No. 16 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Repair the short circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor 1 circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

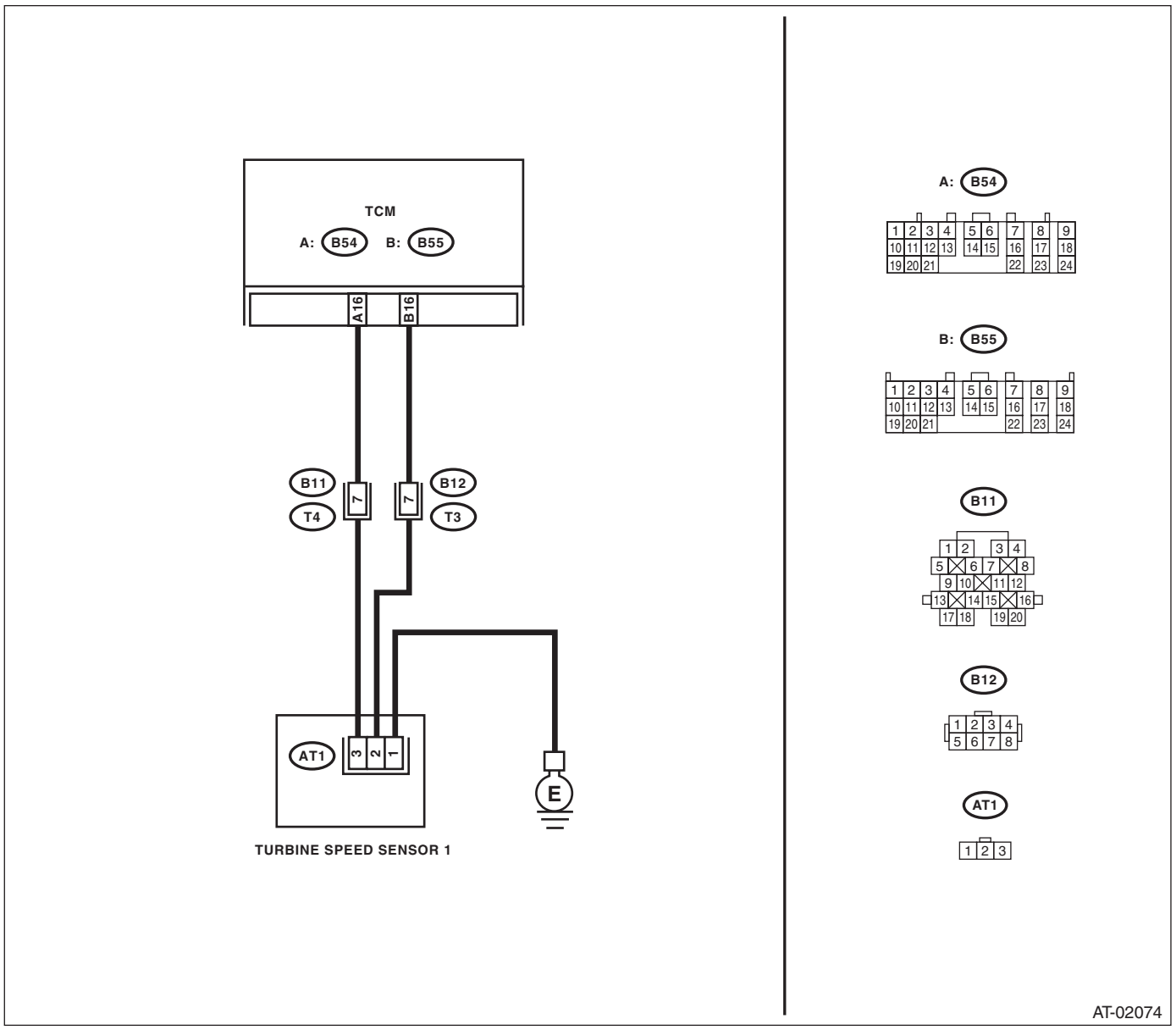
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Excessive shift shock
- Does not shift to 5th

WIRING DIAGRAM:

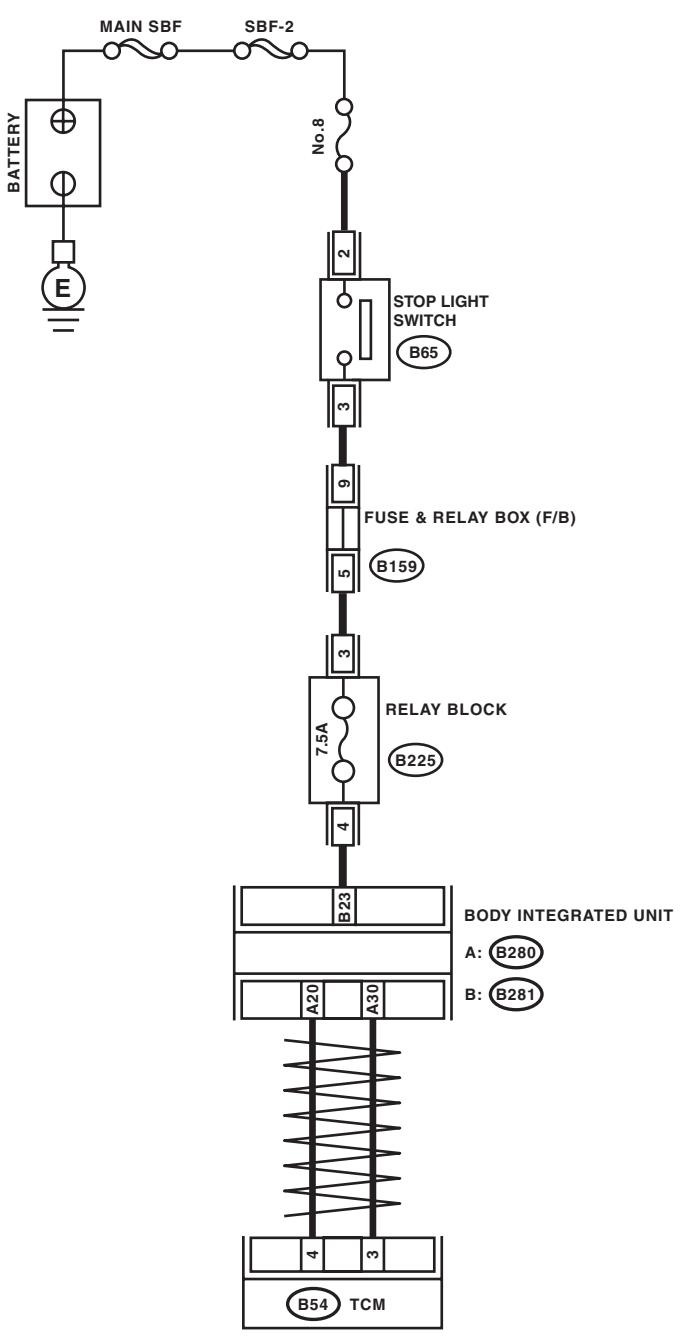


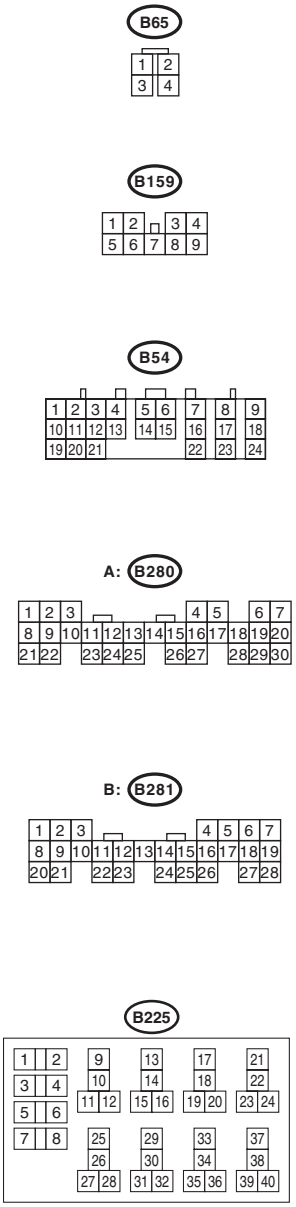
	Step	Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step **2**.	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC P0882 for PVIGN power supply relay.
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*** ***(B54) No. 16 — (B11) No. 7:*** ***(B55) No. 16 — (B12) 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*** ***(B54) No. 16 — Chassis ground:*** ***(B55) No. 16 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to the TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 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-58, Transmission Control Module (TCM).>
5	**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 securely to the transmission body? Is there any serious damage in the harness and terminal?	Go to step **6**.	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.>
6	**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*** ***(T4) No. 7 — (AT1) No. 3:*** ***(T3) No. 7 — (AT1) No. 2:*** ***(AT1) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.

	Step	Check	Yes	No
7	**CHECK HARNESS ASSEMBLY.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(T4) No. 7 — Chassis ground:*** ***(T3) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the short circuit of harness between TCM and transmission connector.
8	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Start the engine, and set the vehicle in 4th speed driving condition of manual mode. NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed. 4) Read the current data of turbine speed sensor 1 using the Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-23, Clear Memory Mode.>	Does the value of the turbine speed sensor 1 change depending on the acceleration, deceleration and shifting range of the vehicle?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Replace the turbine speed sensor 1. <Ref. to 5AT-54, Turbine Speed Sensor 1.>

E: DTC P0719 BRAKE SWITCH CIRCUIT LOW

DTC DETECTING CONDITION:
Brake switch malfunction, open input signal circuit
TROUBLE SYMPTOM:
Brake down control is not operated at SPORT mode.
WIRING DIAGRAM:





AT-03831

	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)	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK FUSE.** Remove the fuse (7.5A) in the relay block.	Is the fuse (7.5A) blown out?	Replace the fuse (7.5A). If the replaced fuse (7.5A) has blown out easily, repair short circuit of harness between fuse (7.5A) and TCM.	Go to step **4**.
3	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monnitor. 5) Depress the brake pedal. 6) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **4**.	Go to step **5**.
4	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	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-58, Transmission Control Module (TCM).>
5	**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*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **8**.	Go to step **6**.
6	**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 and stop light switch. ***Connector & terminal*** ***(B281) No. 23 — (B65) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between body integrated unit and stop light switch.
7	**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 & terminal*** ***(B281) No. 23 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the short circuit of harness between body integrated unit and stop light switch.
8	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

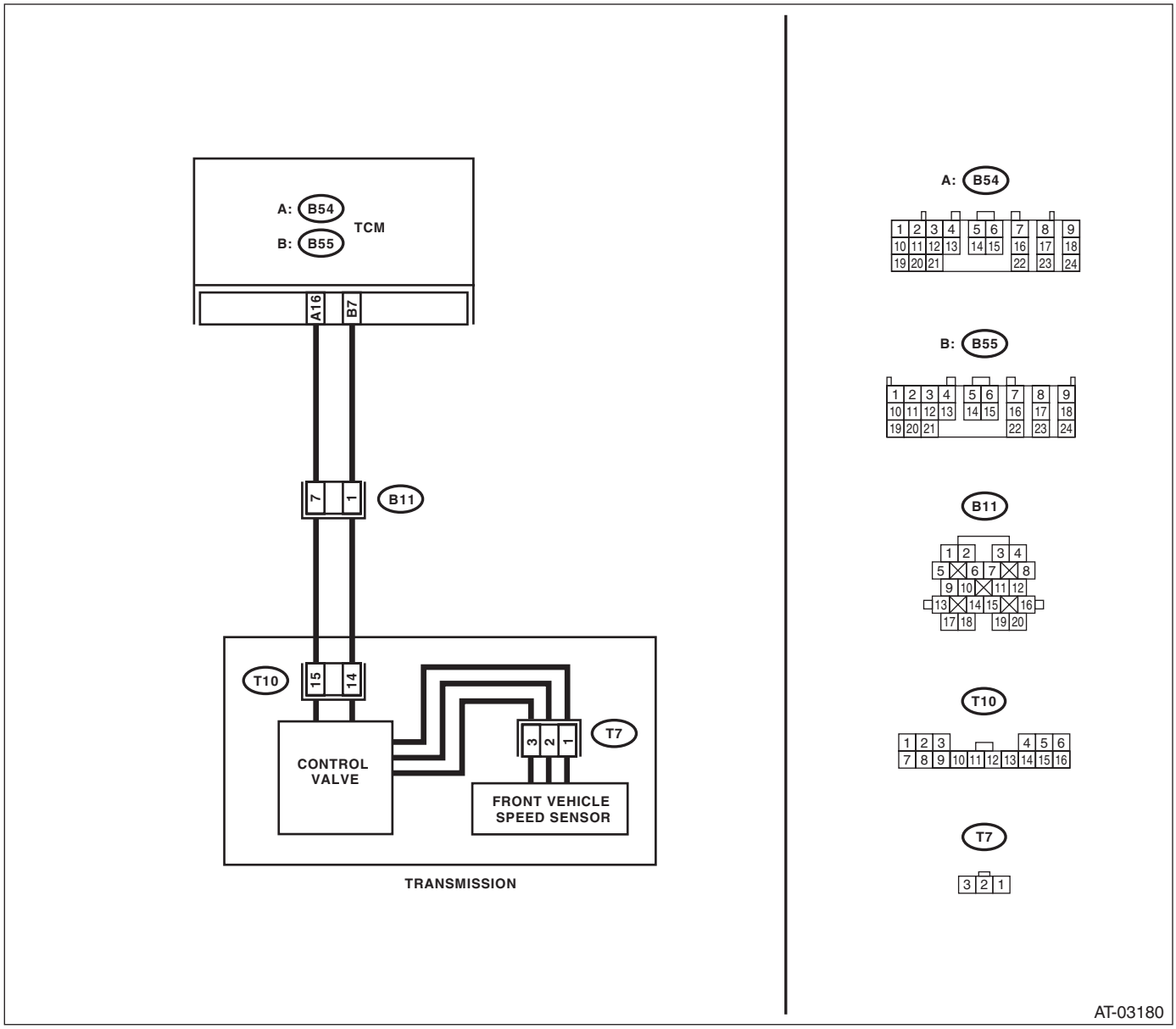
DTC DETECTING CONDITION:

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

TROUBLE SYMPTOM:

- Deterioration of shifting quality.
- Driving performance is poor.

WIRING DIAGRAM:



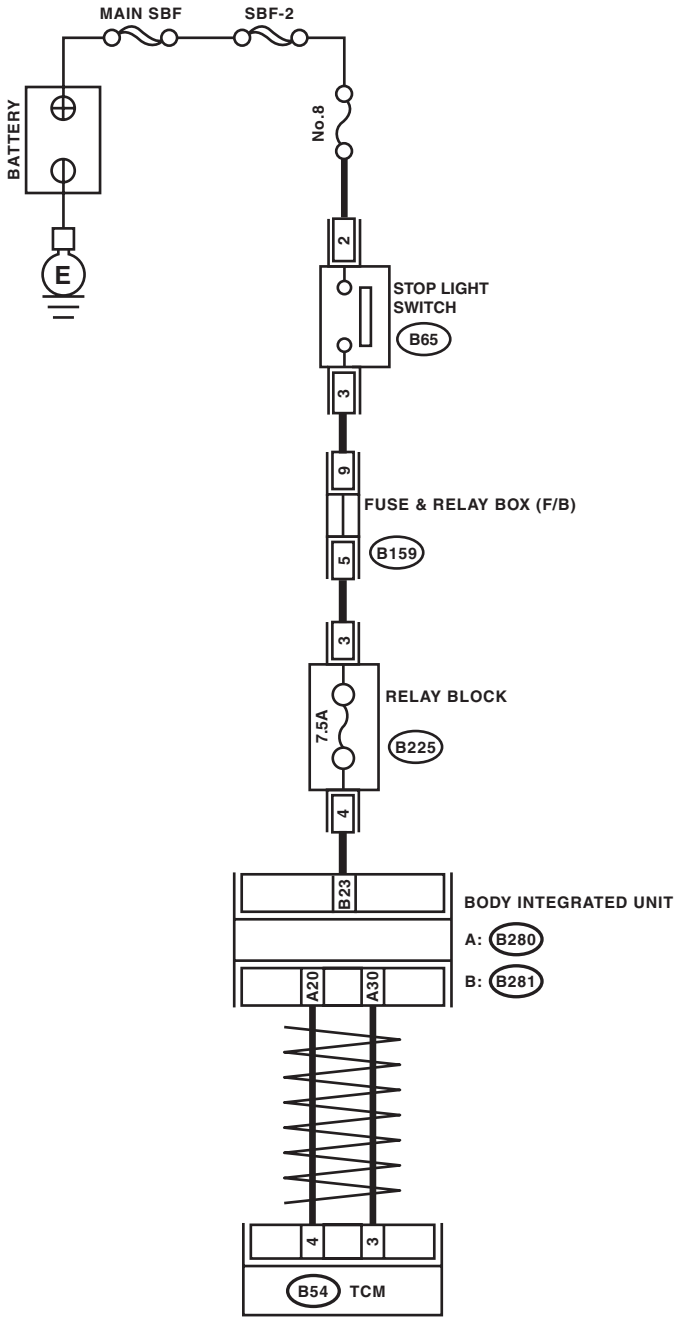
Step		Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step **2**.	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC P0882 for PVIGN power supply relay.

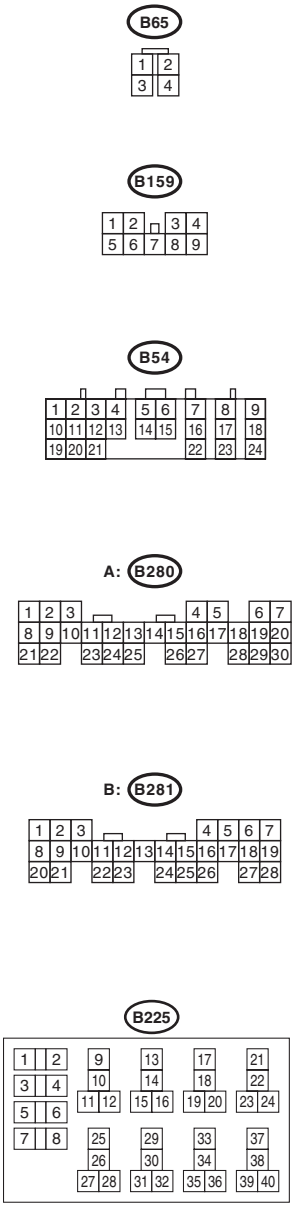
	Step	Check	Yes	No
2	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 7:*** ***(B55) No. 7 — (B11) No. 1:***	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. 7 — Chassis ground:*** ***(B54) No. 16 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to the TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 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-58, Transmission Control Module (TCM).>
5	**CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.** 1) Lift the vehicle, and rotate the propeller shaft by hand. 2) Measure the voltage change between TCM connector terminals during rotation. ***Connector & terminal*** ***(B55) No. 7 (+) — (B54) No. 19 (–):***	Does the voltage repeat changing 0 V ←→ 4 — 6 V during propeller shaft rotation?	Go to step **8**.	Go to step **6**.
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Start the engine, and drive it. 4) Read the current data of front wheel speed using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-16, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the value of the front wheel speed change depending on the acceleration and deceleration of the vehicle?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **7**.

	Step	Check	Yes	No
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 7 — (T10) No. 15:*** ***(B11) No. 1 — (T10) No. 14:***	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. 15 — Transmission ground:*** ***(T10) No. 14 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **9**.	Repair the short circuit of harness between transmission connector and transmission ground.
9	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.** 1) Disconnect the connector from vehicle speed sensor. 2) Measure the resistance of harness between control valve body connector and vehicle speed sensor connector. ***Connector & terminal*** ***(T15) No. 15 — (T7) No. 3:*** ***(T15) No. 14 — (T7) No. 2:*** ***(T7) No. 1 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **10**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
10	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.** Measure the resistance of harness between control valve body connector and transmission ground. ***Connector & terminal*** ***(T10) No. 15 — Transmission ground:*** ***(T10) No. 14 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the vehicle speed sensor.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>

G: 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:





AT-03831

	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)	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 the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monnitor. 5) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3**.	Go to step **4**.
3	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	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-58, Transmission Control Module (TCM).>
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*** ***(B281) No. 23 (+) — 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. 2 — (B65) No. 3:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Replace the 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*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Repair the short circuit of harness between TCM and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

H: DTC P0725 ENGINE SPEED INPUT CIRCUIT

DTC DETECTING CONDITION:
Information of engine speed is not correctly received from ECM.
TROUBLE SYMPTOM:
No lock-up occurs. (After engine is warmed-up)

Step		Check	Yes	No
1	**CHECK DTC OF ECM.**	Is DTC of AT CAN communication circuit detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication circuit detected?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK DTC OF TCM.**	Is any of following DTC detected ?/Output Speed Sensor Circuit/AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-54, 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)-54, 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)-54, 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)-54, 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)-54, 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 OF TCM.**	Is any DTC of the followings detected? P0715, P0720, P0753, P0758, P0763, P0768, P0773, P0751, P0756, P0761, P0766, P0771, P1706, P1710, P1798, P1799	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TURBINE SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 2) Start the engine, and drive it. 3) Read the current data of torque converter turbine speed using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-16, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the displayed value of the Subaru Select Monitor change according to engine speed and shifting?	Go to step **3**.	Perform the diagnosis according to DTC P0715, P1710.
3	**CHECK FRONT AND REAR VEHICLE SPEED SENSORS.**	Do the values displayed for each of the Subaru Select Monitor and the speedometer substantially match?	Go to step **4**.	Perform the diagnosis according to DTC P0720, P1706.
4	**CHECK INHIBITOR SWITCH.**	Do the values displayed for the Subaru Select Monitor and the meter indicator match?	Go to step **5**.	Perform the diagnosis according to DTC P0705.
5	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After restarting the engine, check that the SPORT indicator light is not blinking, and perform a drive check based on the Inspection Mode. <Ref. to 5AT(diag)-20, PROCEDURE, Inspection Mode.>	Is DTC displayed again?	Check the DTC. Then, when proceeded again to step 5, go to step 6.	Go to step **6**.
6	**CHECK AFTER REPAIR.**	Is the trouble symptom unrepeatable (malfunction in shifting such as excessive shift shock, engine speed increases excessively when shifting)?	Replace the transmission assembly.	Temporary poor contact occurs. Check that the harness connector is not faulty.

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

DTC DETECTING CONDITION:

- Defective lock-up clutch or 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, P0725, P0753, P0758, P0763, P0768, P0773, P0751, P0756, P0761, P0766, P0771, P1710, P1718, P1798, P1799	Perform the diagnosis according to each DTC.	Go to step **2**.
2	**DRIVING CHECK FOR LOCK-UP CONDITION.** 1) Perform a drive check based on the Inspection Mode with the following conditions. <Ref. to 5AT(diag)-20, PROCEDURE, Inspection Mode.> (1) Read the current data of throttle opening angle using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (2) Keep the same vehicle speed at 60 km/h with 10% or less throttle opening angle which is read currently on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (3) Read the current data of L/U solenoid target pressure using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (4) Check the engine speed and turbine speed when the L/U solenoid target value displayed on Subaru Select Monitor is 500 kPa or more.	Are the engine speed and turbine speed almost the same?	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.	Go to step **3**.

	Step	Check	Yes	No
3	**DRIVING CHECK FOR LOCK-UP CONDITION.** 1) Clear the memory. <Ref. to 5AT(diag)-18, OPERATION, Subaru Select Monitor.> 2) Perform a drive check based on the Inspection Mode with the following conditions. <Ref. to 5AT(diag)-20, PROCEDURE, Inspection Mode.> (1) Read the current data of throttle opening angle using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (2) Keep the same vehicle speed at 60 km/h with 10% or less throttle opening angle which is read currently on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (3) Read the current data of L/U solenoid target pressure using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (4) Drive the vehicle continuously for one minutes or more with the L/U solenoid target value displayed on Subaru Select Monitor at 500 kPa or more. 3) Turn the ignition switch to OFF. 4) Turn the ignition switch to ON. (engine ON) 5) Perform the step 2) again.	Does the AT OIL TEMP light blink and is DTC P0741 displayed?	Replace the transmission assembly when DTC P0741 is displayed. When DTC other than P0741 is displayed, perform the diagnosis corresponding to the DTC.	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

P: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

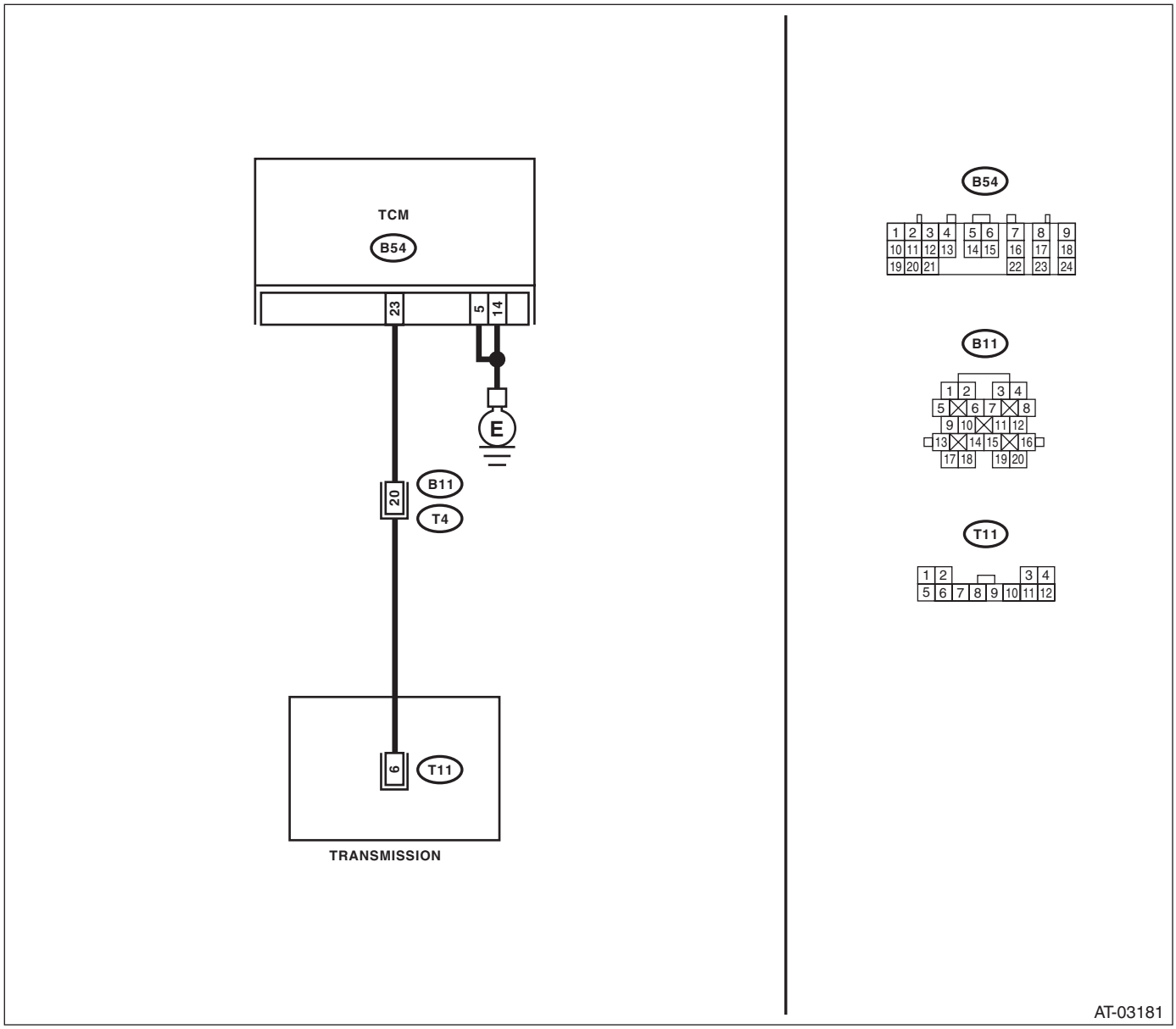
DTC DETECTING CONDITION:

The output signal circuit of lock up solenoid is open or shorted.

TROUBLE SYMPTOM:

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

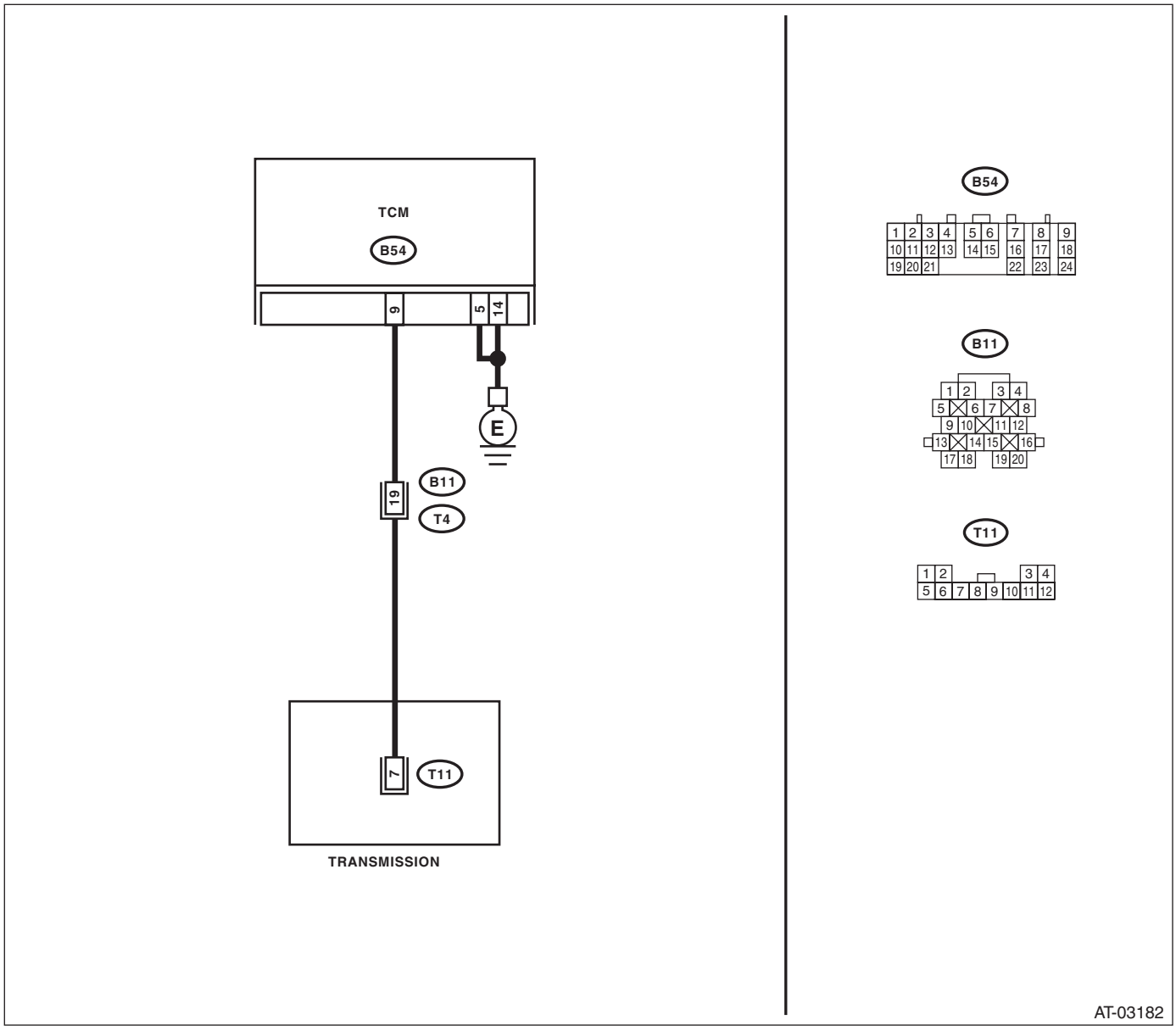
WIRING DIAGRAM:



	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. 23 — (B11) No. 20:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM connector 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 connector and transmission connector.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. NOTE: Do not drain ATF until it cools down. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 20 — (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 chassis ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 6 — Chassis 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*** ***(T11) No. 6 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, 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, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, 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:



	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. 9 — (B11) No. 19:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 19 — (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 — Chassis 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*** ***(T11) No. 7 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, 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, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, 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

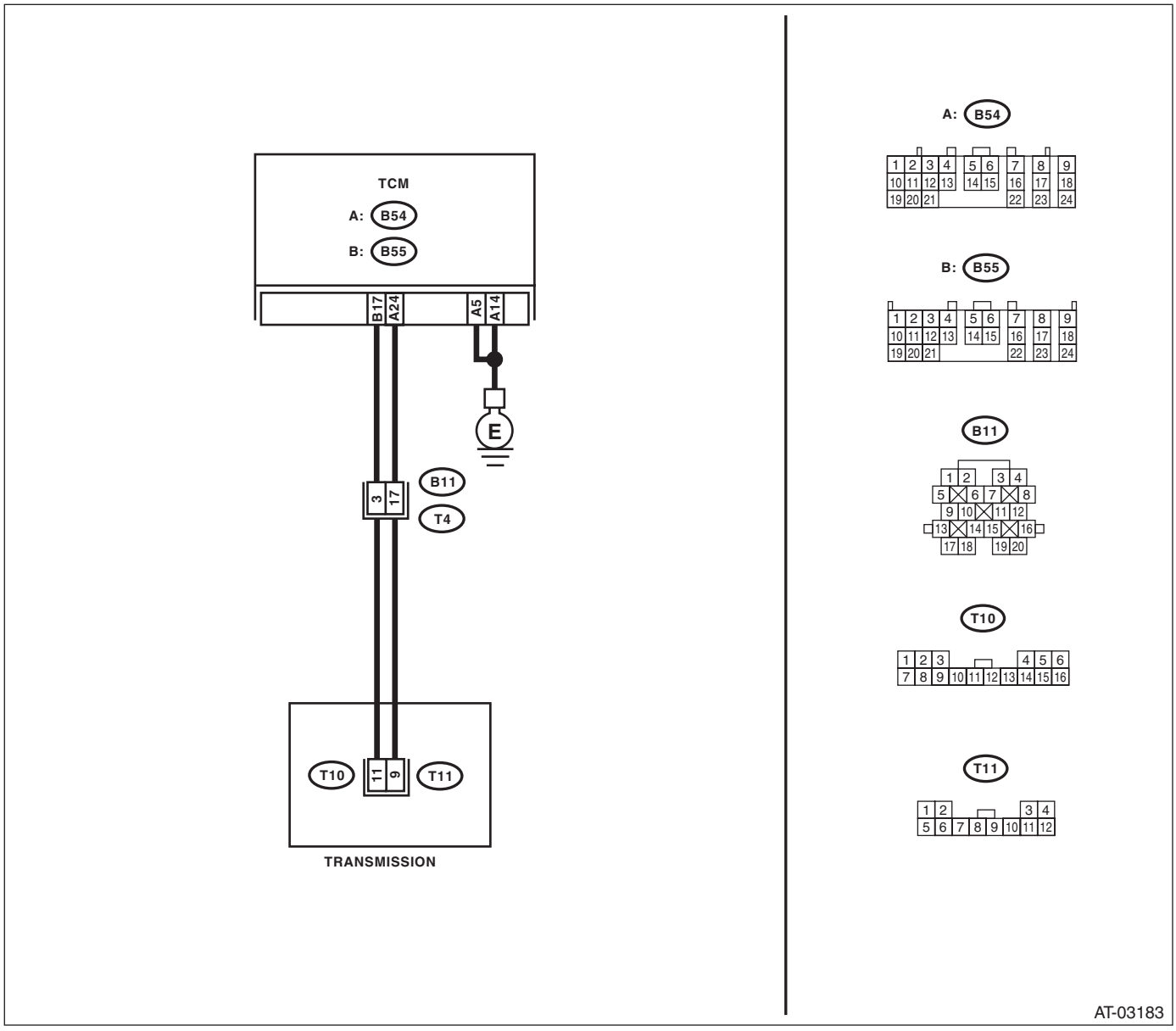
DTC DETECTING CONDITION:

Output signal of front brake solenoid does not match with oil pressure.

TROUBLE SYMPTOM:

Locked to 4th or 5th gear.

WIRING DIAGRAM:

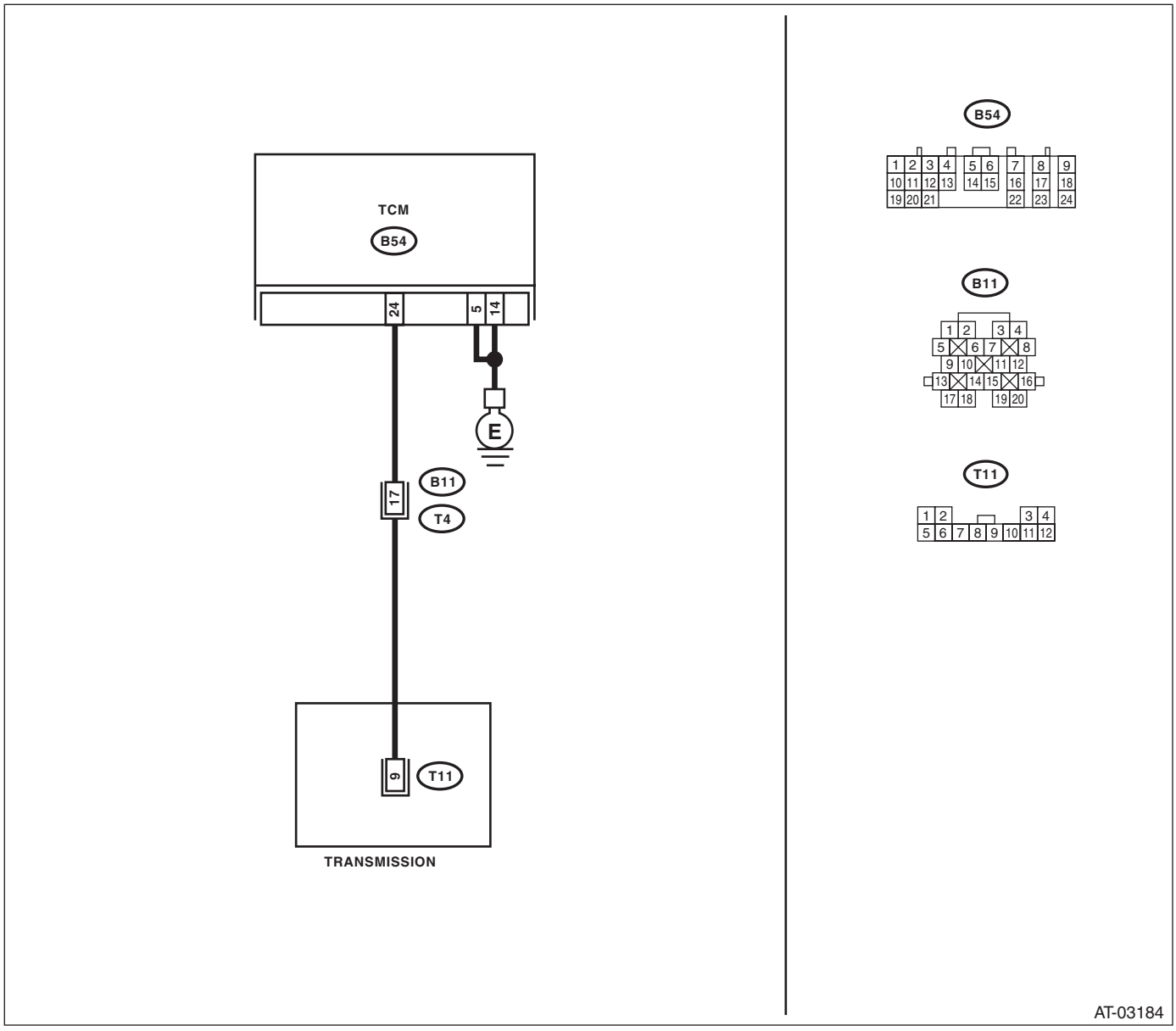


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 24 — (B11) No. 17:*** ***(B55) No. 17 — (B11) No. 3:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	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. 17 — 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 USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of Fr/B oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 1st speed while checking the current gear position using Subaru Select Monitor. 4) Check input signal of Fr/B oil pressure SW.	Is ON displayed?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 17 — (T11) No. 9:*** ***(B11) No. 3 — (T10) No. 11:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Replace the transmission harness assembly.

	Step	Check	Yes	No
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T4) No. 3 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Replace the transmission harness assembly.

S: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

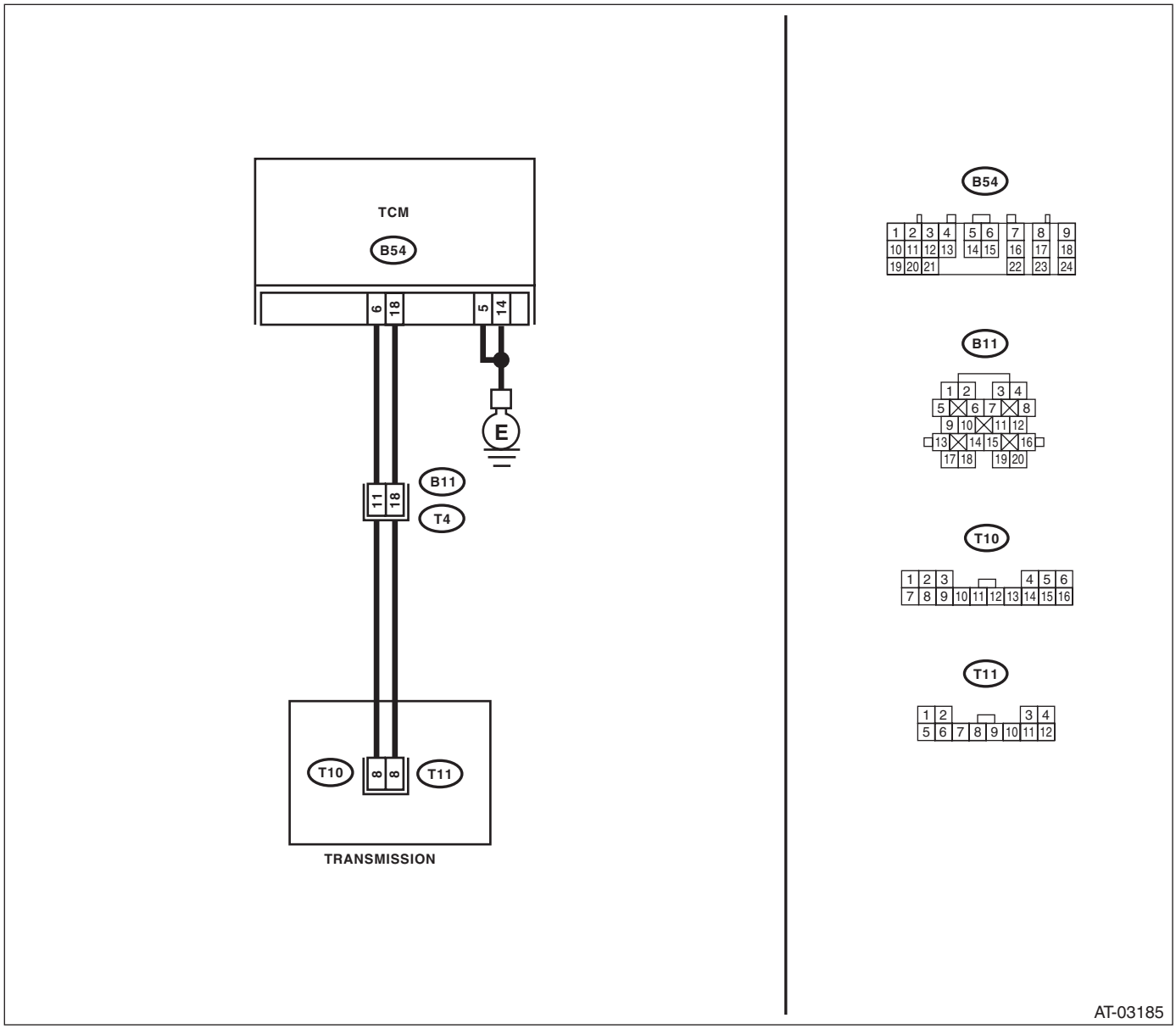
DTC DETECTING CONDITION:
Output signal circuit of front brake solenoid is open or shorted.
TROUBLE SYMPTOM:
Locked to 4th or 5th gear.
WIRING DIAGRAM:



	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. 24 — (B11) No. 17:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM connector 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. 24 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 17 — (T11) No. 9:***	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. 9 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body and transmission connector.
5	**CHECK FRONT BRAKE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 9 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, 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, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, 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 4th gear.
WIRING DIAGRAM:

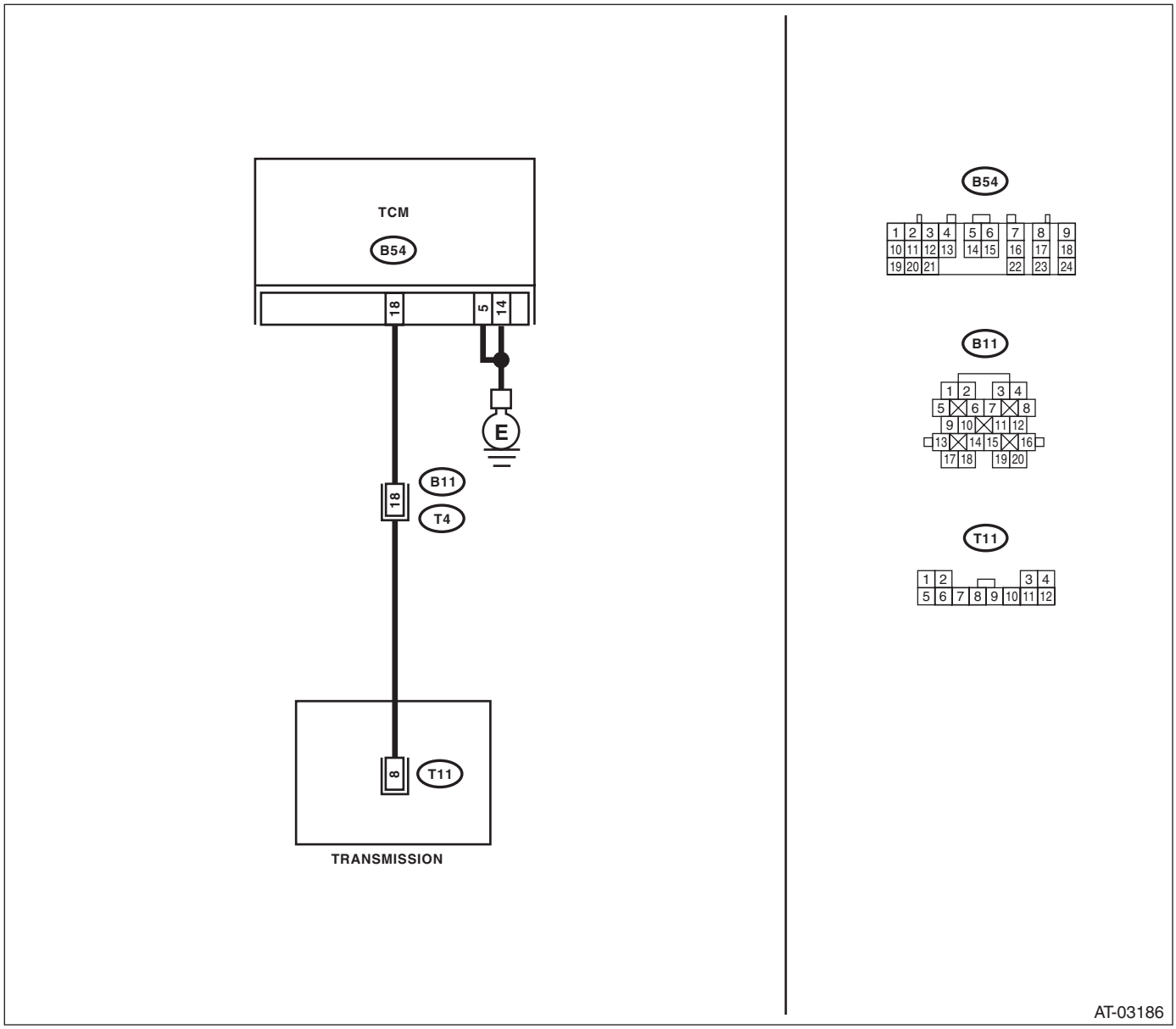


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 18:*** ***(B54) No. 6 — (B11) No. 11:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	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. 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.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of I/C oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Drive the vehicle on 4th speed of “D” range with checking current gear position using Subaru Select Monitor. 4) Check input signal of I/C oil pressure SW.	Is ON displayed?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — (T11) No. 8:*** ***(T4) No. 11 — (T10) No. 8:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Replace the transmission harness assembly.

	Step	Check	Yes	No
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 11 — (T10) No. 13:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, 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 4th gear.
WIRING DIAGRAM:



	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 and transmission connector. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 18:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	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*** ***(B54) No. 18 — 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 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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — (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 chassis ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 8 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between transmission connector and control valve body connector.
5	**CHECK INPUT CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 8 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, 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, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, 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

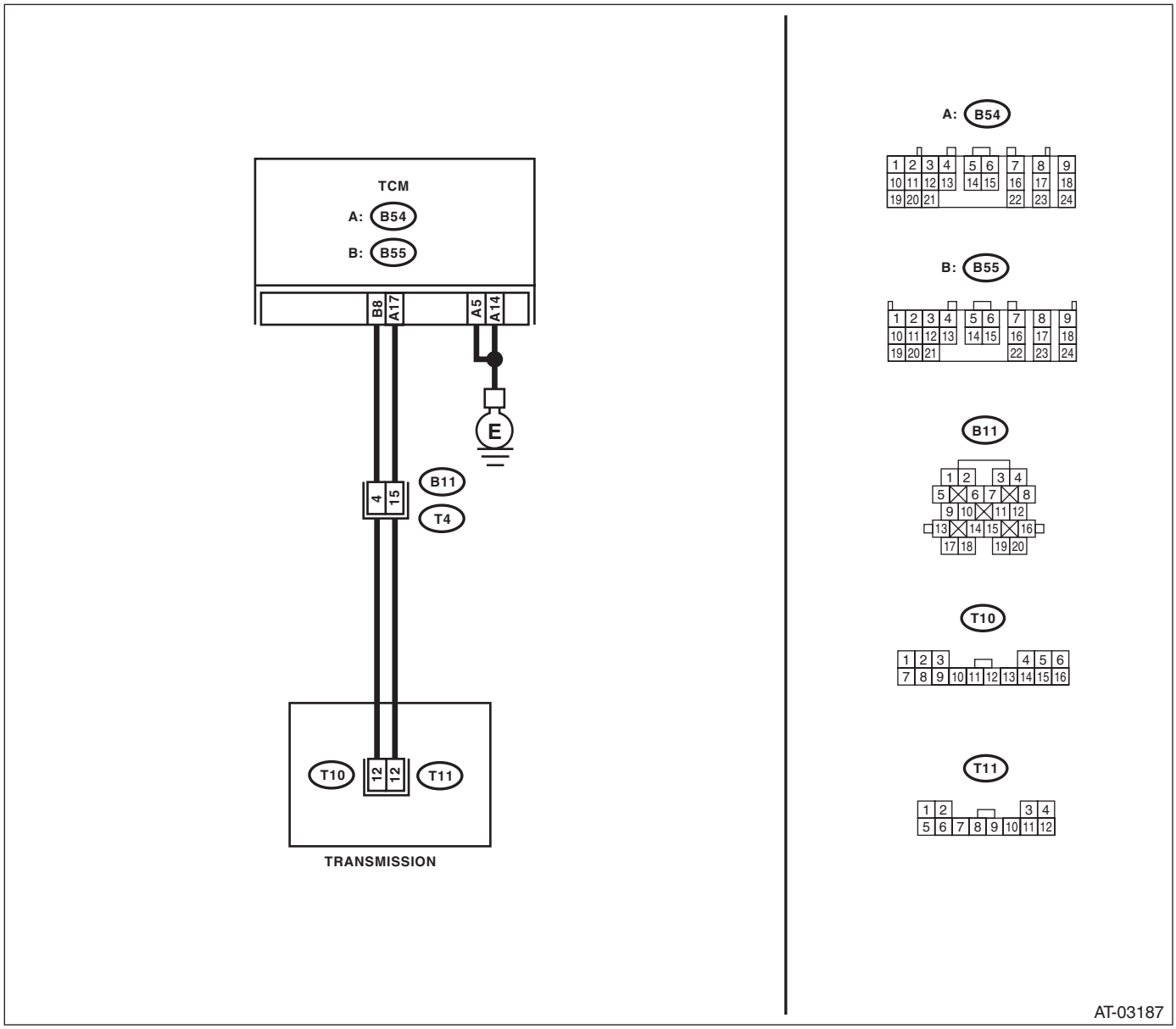
DTC DETECTING CONDITION:

Output signal value of high & low reverse clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:

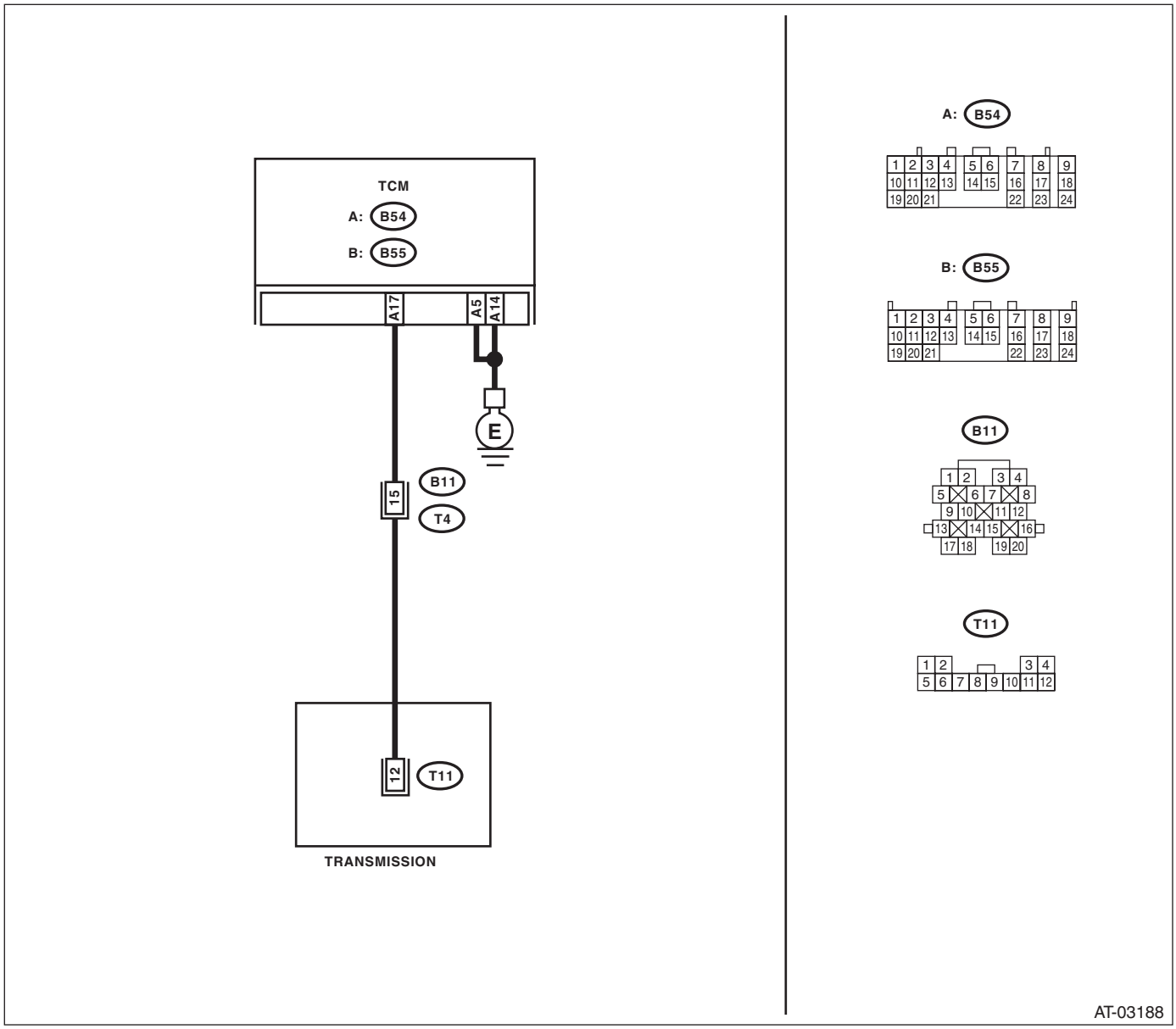


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 17 — (B11) No. 15:*** ***(B55) No. 8 — (B11) No. 4:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	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. 8 — 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 USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check the input signal of the H&LR/C oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to "D" range and brake ON (1st) with checking current gear position using Subaru Select Monitor. 4) Check the input signal of the H&LR/C oil pressure SW.	Is ON displayed?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — (T11) No. 12:*** ***(T4) No. 4 — (T10) No. 12:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Replace the transmission harness assembly.

	Step	Check	Yes	No
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 4 — (T10) No. 12:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, 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 4th gear.
WIRING DIAGRAM:



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 and transmission connector. ***Connector & terminal*** ***(B54) No. 17 — (B11) No. 15:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM connector and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — (T11) No. 12:***	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 of harness connector between control valve body connector and chassis ground. ***Connector & terminal*** ***(T11) No. 12 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the open 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*** ***(T11) No. 12 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, 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, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, 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

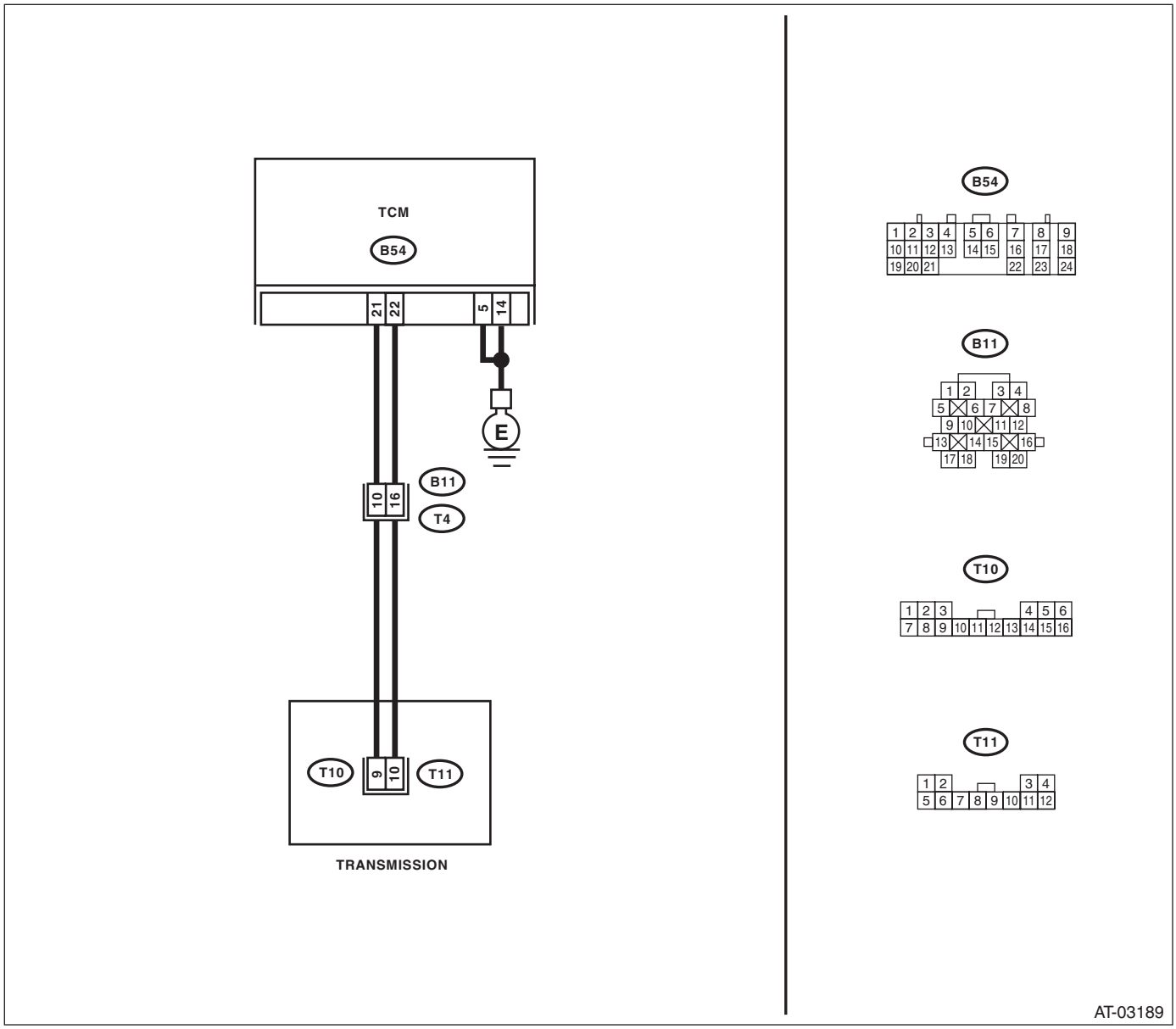
DTC DETECTING CONDITION:

Output signal value of direct clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	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 and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 16:*** ***(B54) No. 21 — (B11) No. 10:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	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*** ***(B54) 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 USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of D/C oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 2nd speed of manual mode and brake ON with checking current gear position using Subaru Select Monitor. 4) Check input signal of D/C oil pressure SW.	Is ON displayed?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 16 — (T11) No. 10:*** ***(T4) No. 10 — (T10) No. 9:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Replace the transmission harness assembly.

	Step	Check	Yes	No
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 10 — (T10) No. 13:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Replace the transmission harness assembly.

Y: DTC P0768 SHIFT SOLENOID “D” ELECTRICAL

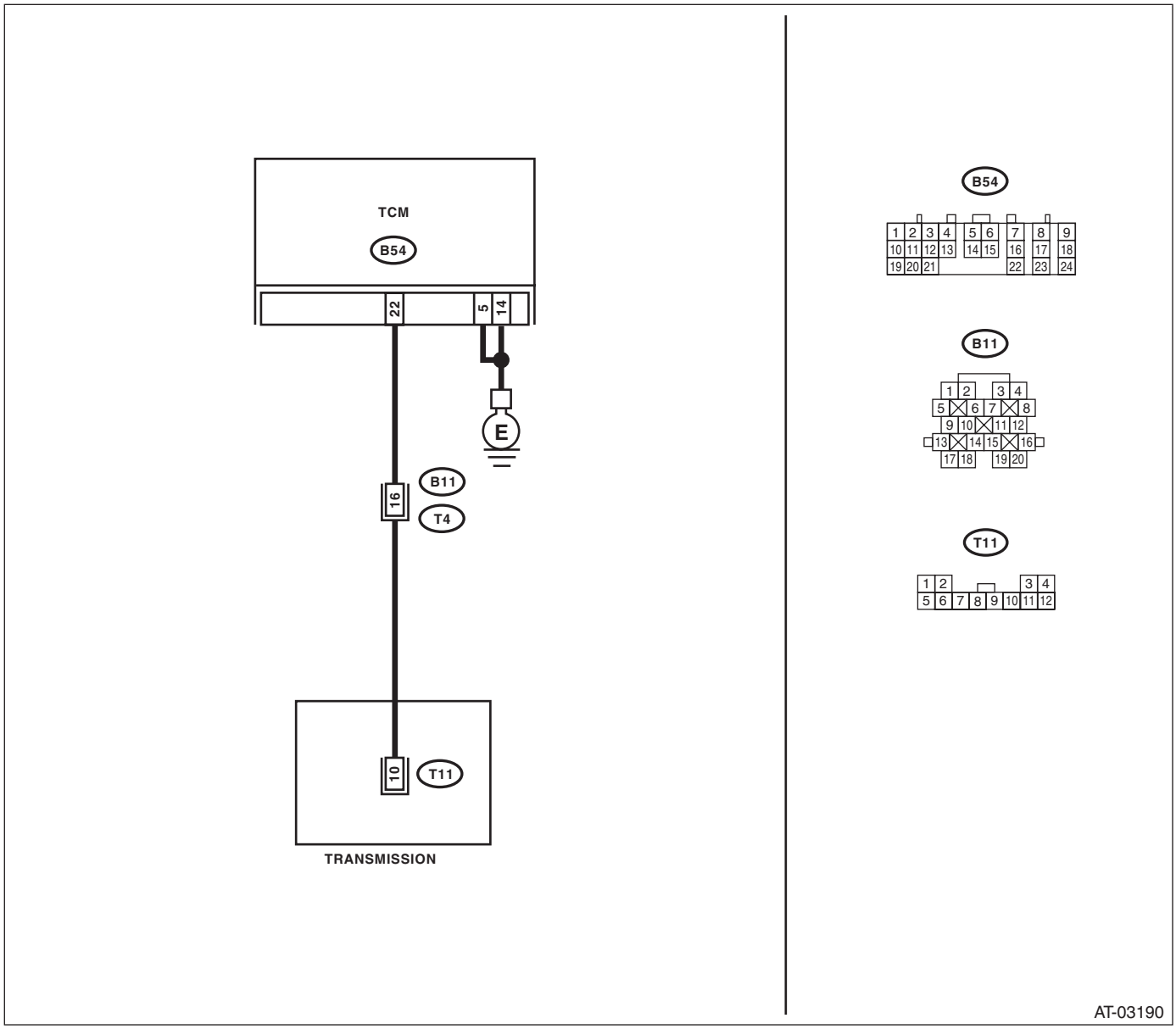
DTC DETECTING CONDITION:

The output signal circuit of direct clutch solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	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 and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 16:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM connector 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. 22 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 16 — (T11) No. 10:***	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 chassis ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 10 — Chassis 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 of harness connector between control valve body connector and transmission ground. ***Connector & terminal*** ***(T11) No. 10 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, 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, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, 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

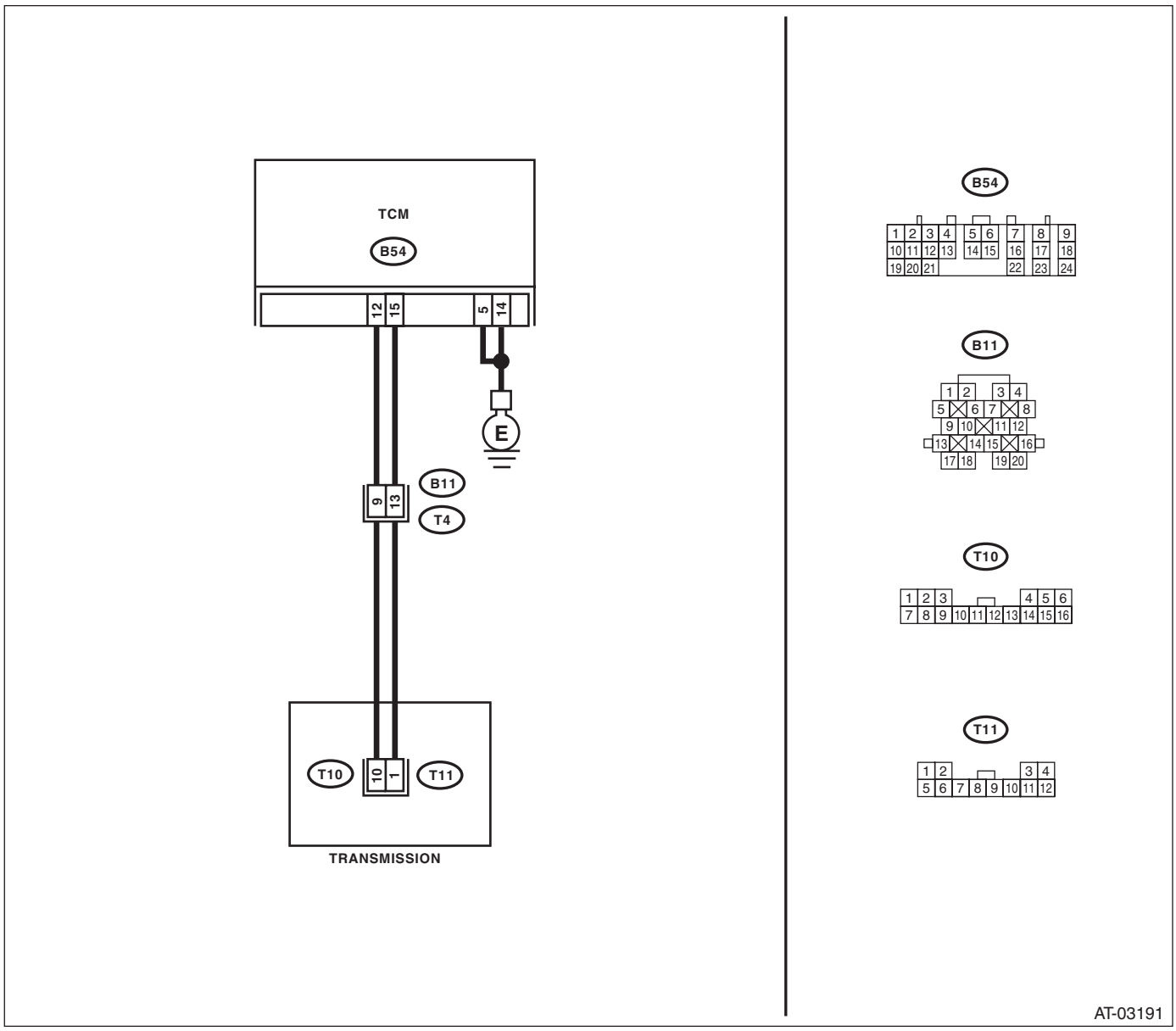
DTC DETECTING CONDITION:

Output signal value of low coast brake solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

- Locked to 2nd gear.
- Engine brake does not function at 1st or 2nd of manual mode.

WIRING DIAGRAM:



	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 and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 13:*** ***(B54) No. 12 — (B11) No. 9:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	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*** ***(B54) No. 12 — 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 USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of LC/B oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Drive the vehicle on 2nd speed of manual mode 15 km/h (9 MPH) with checking current gear position using Subaru Select Monitor. 4) Check input signal of LC/B oil pressure SW.	Is ON displayed?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 13 — (T11) No. 1:*** ***(T4) No. 9 — (T10) No. 10:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Replace the transmission harness assembly.

	Step	Check	Yes	No
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 9 — (T10) No. 13:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Repair the short circuit of harness between transmission connector and control valve body connector.

AA:DTC P0773 SHIFT SOLENOID “E” ELECTRICAL

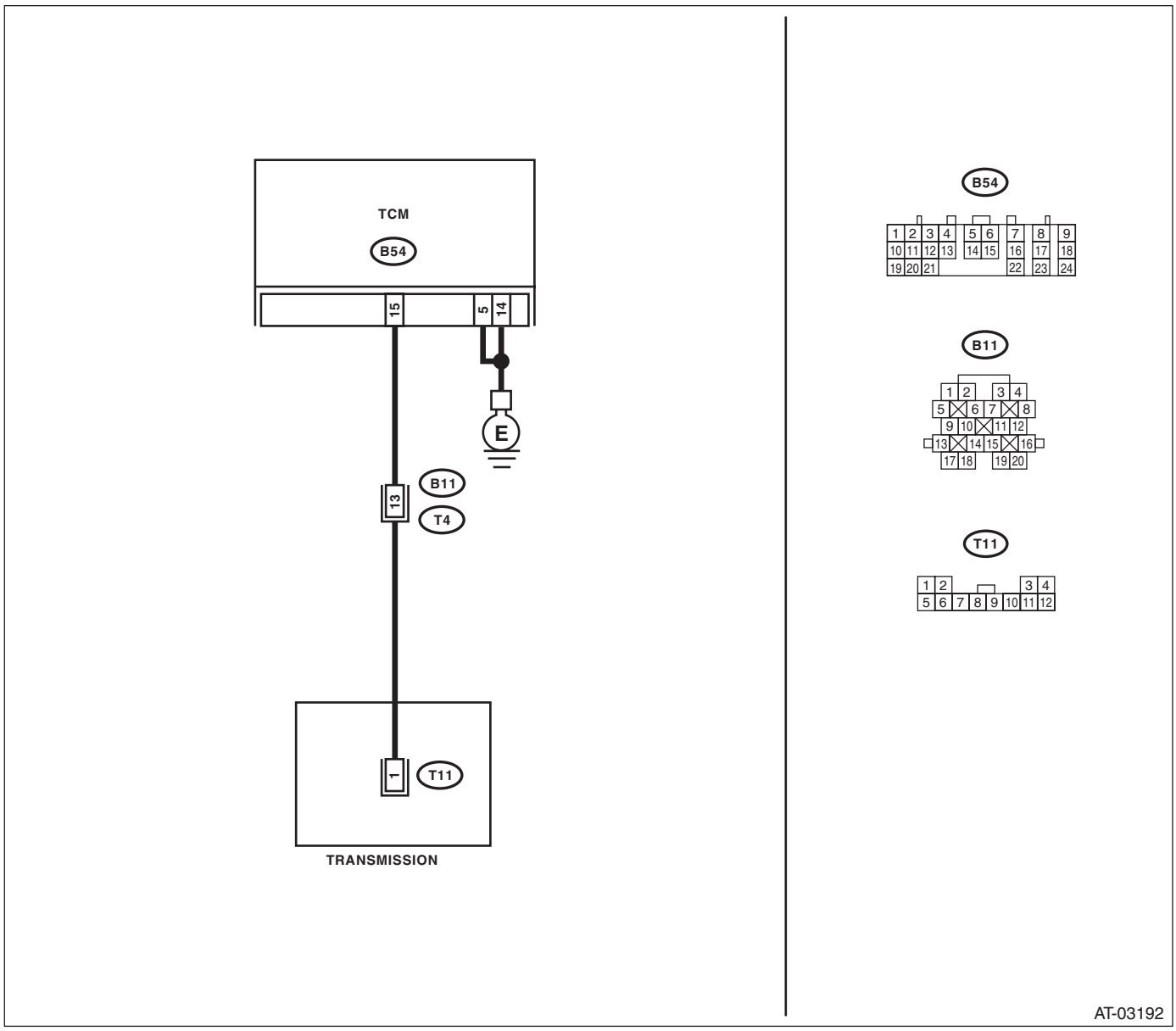
DTC DETECTING CONDITION:

Output signal circuit of low coast brake solenoid is open or shorted.

TROUBLE SYMPTOM:

- Locked to 2nd gear.
- Engine brake does not function at 1st or 2nd of manual mode.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC (P0802) of the PVIGN relay detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**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 and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 13:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure the resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM connector and transmission connector.
4	**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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 13 — (T11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between transmission connector and control valve body connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 1 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness between control valve body connector and transmission ground.
6	**CHECK LOW COAST BRAKE SOLENOID.** Measure the resistance of harness connector between control valve body connector and transmission ground. ***Connector & terminal*** ***(T11) No. 1 — Transmission ground:***	Is the resistance between 5 — 17 Ω?	Go to step **7**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
7	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **8**.

Step		Check	Yes	No
8	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Perform the P0882 diagnosis. <Ref. to 5AT(diag)-92, DTC P0882 TCM POWER INPUT SIGNAL LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB:DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

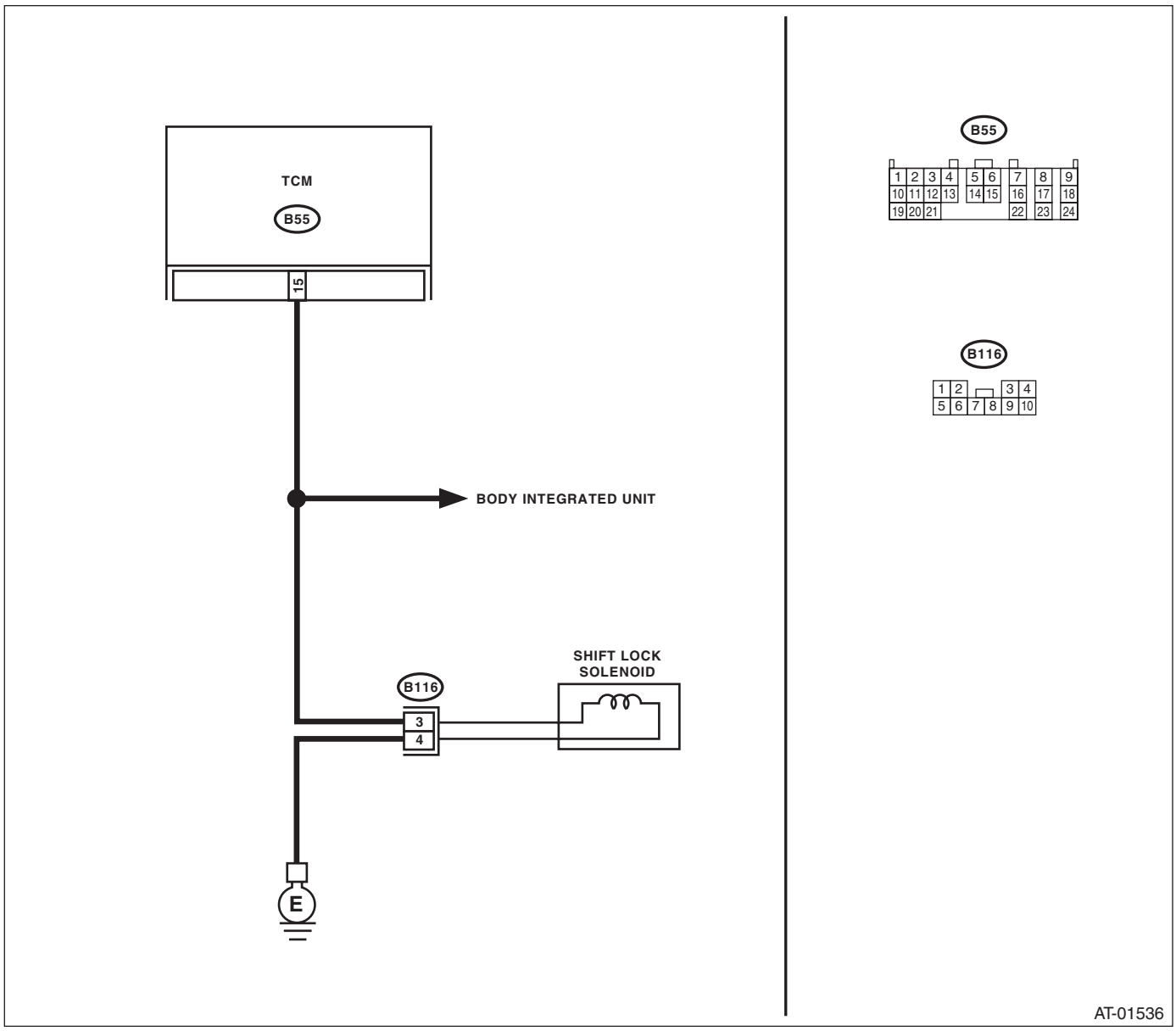
DTC DETECTING CONDITION:

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 can not be shifted from “N” range to “R” range though the vehicle is parked.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse M/B (No. 12).	Is the fuse M/B (No. 12) blown out?	Replace the fuse M/B (No. 12). If the replaced fuse has blown out easily, repair short circuit of harness between fuse M/B (No. 12) and TCM.	Go to step **2**.
2	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) With the brake pedal depressed, shift the select lever to "D" range. 3) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage 10.5 V or more?	Go to step **3**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and shift lock solenoid. 3) Measure the resistance of harness between TCM and shift lock solenoid connector. ***Connector & terminal*** ***(B55) No. 15 — (B116) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between TCM and shift lock solenoid connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** Measure the resistance of the harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between TCM and shift lock solenoid connector.
5	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between chassis ground and shift lock solenoid connector.
6	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid terminals. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance between 7 — 21 Ω?	Go to step **7**.	Replace the shift lock solenoid.

	Step	Check	Yes	No
7	**CHECK OUTPUT SIGNAL OF TCM.** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 2) Start the engine. 3) Shift the select lever to "D" range and slowly increase vehicle speed to exceed 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-16, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if the AT OIL TEMP light illuminates, the circuit is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in the reverse inhibitor control circuit.	Go to step **8**.
8	**CHECK POOR CONTACT.**	Is there poor contact in the reverse inhibitor control circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

AC:DTC P0817 STARTER DISABLE CIRCUIT

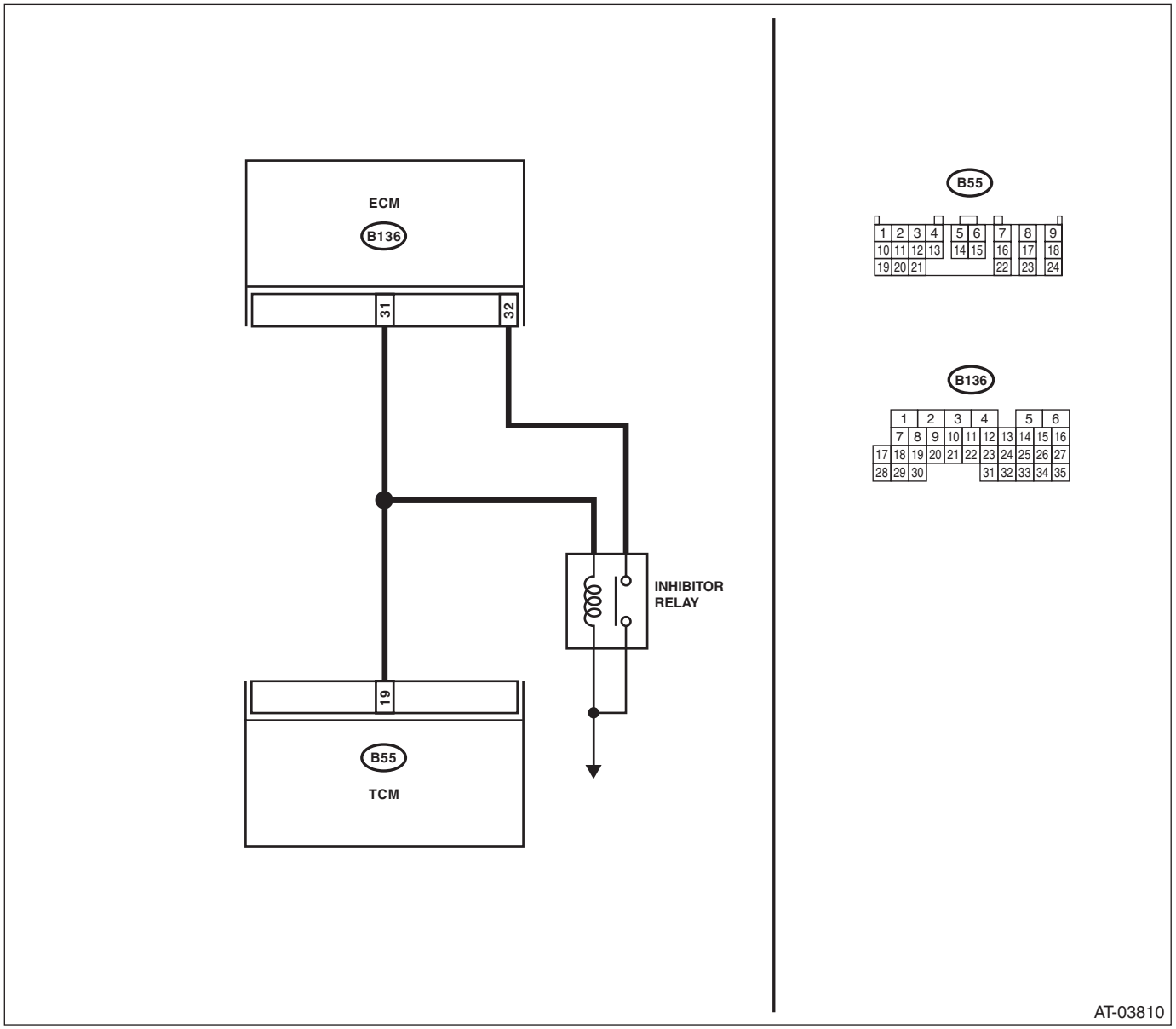
DTC DETECTING CONDITION:

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:



	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 concerning ECM.
3	**CHECK FUSE (NO. 32).** 1) Turn the ignition switch to OFF. 2) Remove the fuse.	Is the fuse (No. 32) blown out?	Replace the fuse (No. 32). If the replaced fuse (No. 32) blows out easily, repair the short circuit of harness between fuse (No. 32) and TCM.	Go to step **4**.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 19 — (B136) No. 31 :***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness between transmission connector and chassis ground.
6	**CHECK TCM OUTPUT SIGNAL.** 1) Connect the TCM and ECM connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Shift the select lever to “P” range. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (–):***	Is the voltage 1 V or less?	Go to step **7**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
7	**CHECK TCM OUTPUT SIGNAL.** 1) Shift the select lever to “D” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
8	**CHECK 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 of ECM.

AD:DTC P0882 TCM POWER INPUT SIGNAL LOW

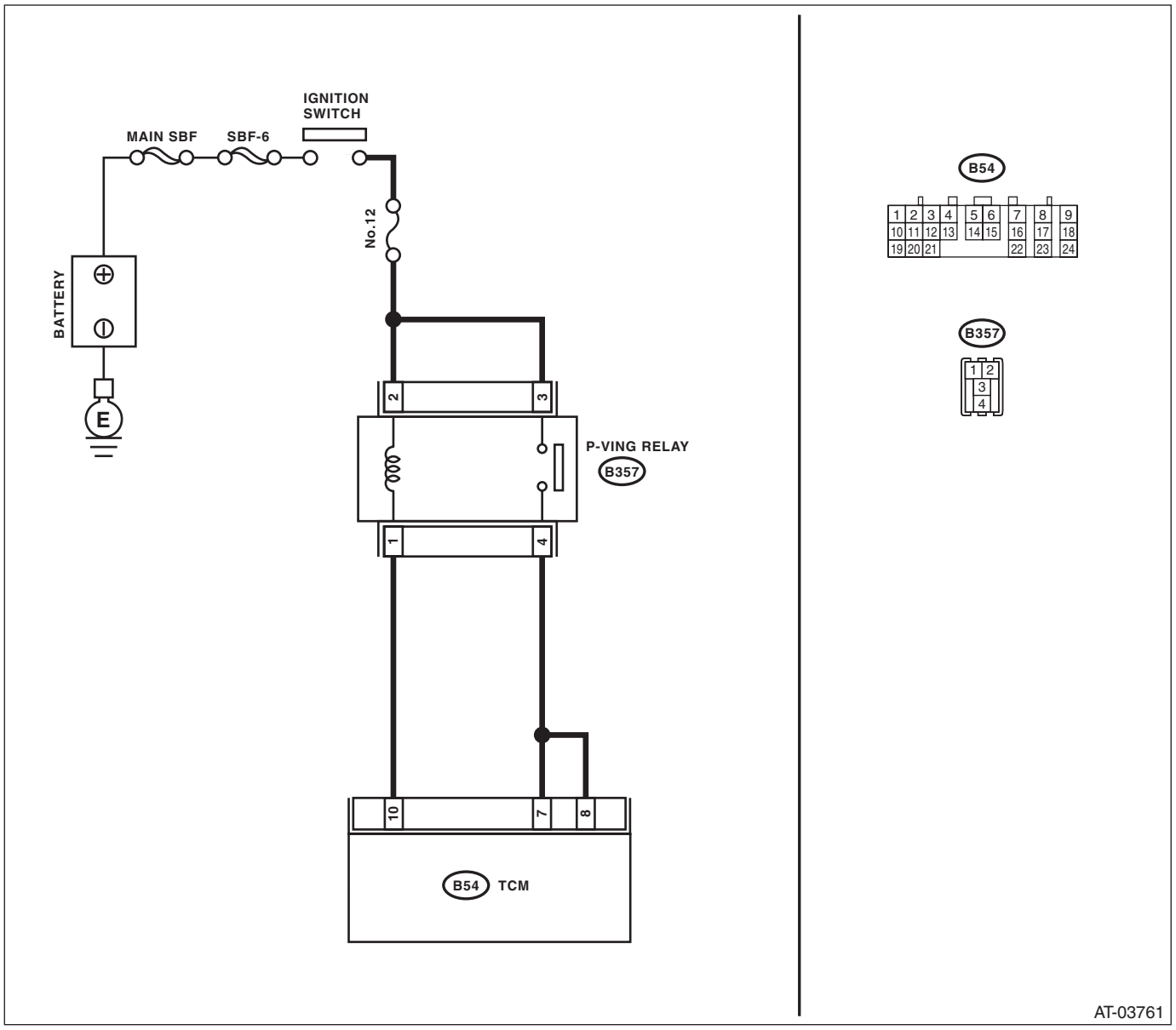
DTC DETECTING CONDITION:

Malfunction of PVIGN power supply relay or open, short circuit of PVIGN power supply circuit.

TROUBLE SYMPTOM:

Gear is not changed.

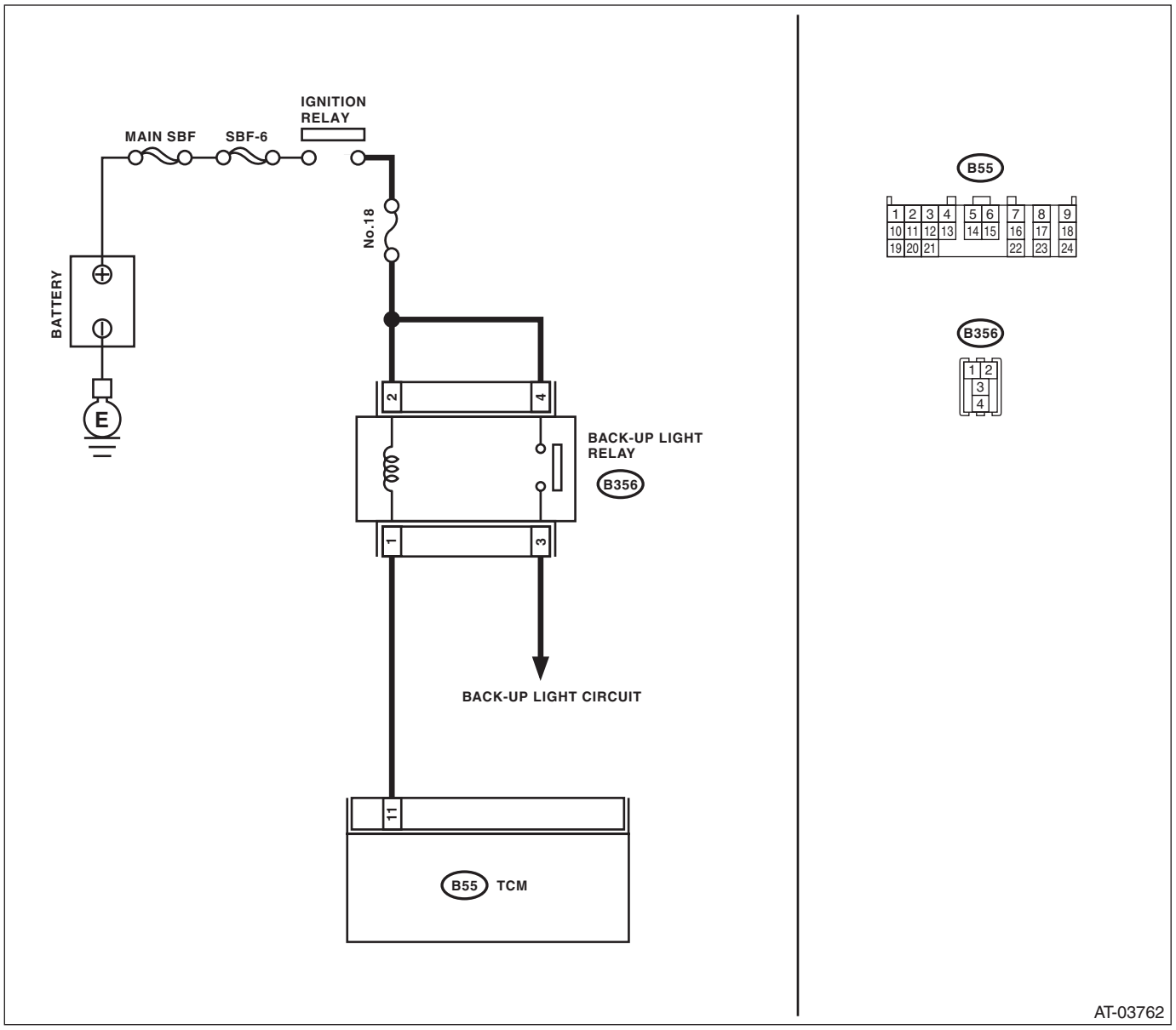
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the MAIN SBF, SBF 8 and fuse (No. 12), and then check those are not blown out.	Is the fuse blown out?	Replace the fuse. If the replaced fuse has blown out easily, repair the short circuit of harness of each fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE FOR PVIGN RELAY.** Measure the voltage between PVIGN relay and chassis ground. ***Connector & terminal*** ***(B357) No. 2 (+) — Chassis ground (–):*** ***(B357) No. 3 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **3**.	Repair the open circuit of harness between fuse (No. 12) and PVIGN relay.
3	**CHECK HARNESS BETWEEN PVIGN RELAY OF TCM.** Measure the resistance between TCM connector and PVIGN relay connector. ***Connector & terminal*** ***(B54) No. 10 — (B357) No. 1:*** ***(B54) No. 7 — (B357) No. 4:*** ***(B54) No. 8 — (B357) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness.
4	**CHECK PVIGN POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 (+) — Chassis ground (–):*** ***(B54) No. 8 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Temporary poor contact. Recheck the harness between TCM and relay. (Lightly move the harness and check that the open or short circuit is not occurred.)	Go to step **5**.
5	**CHECK PVIGN RELAY OUTPUT OF TCM.** Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage 1.5 V or less?	Replace the PVIGN relay.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

AE:DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW

DTC DETECTING CONDITION:
Short circuit of back-up light relay output circuit
TROUBLE SYMPTOM:
Back-up light does not illuminate in “R” range.
WIRING DIAGRAM:



	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*** ***(B55) No. 11 — (B356) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (engine OFF) 2) Move the select lever to “P” range. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
5	**CHECK TCM OUTPUT SIGNAL.** 1) Set the select lever to “R” range. 2) Is the voltage 1 V or less? 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage 1.0 — 2.0 V?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.** Measure the voltage between back-up light relay and chassis ground. ***Connector & terminal*** ***(B356) No. 2 (+) — Chassis ground (–):*** ***(B356) No. 4 (+) — 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 P0958 BACKUP LIGHT RELAY CIRCUIT HIGH

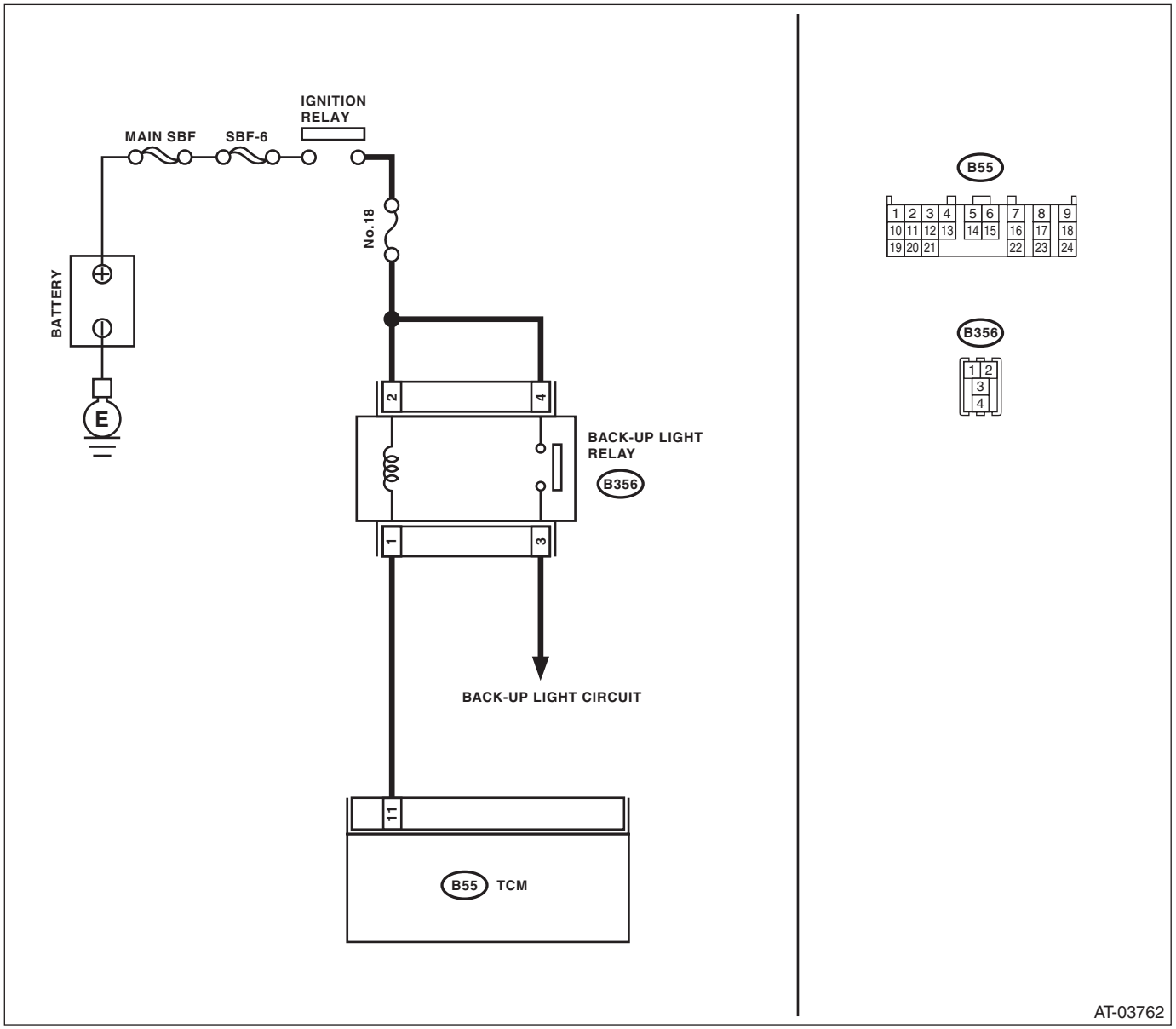
DTC DETECTING CONDITION:

Backup light relay malfunction, or open/short circuit in back-up light relay output circuit

TROUBLE SYMPTOM:

- Back-up light does not illuminate in “R” range.
- Back-up light always illuminate except in “R” range.

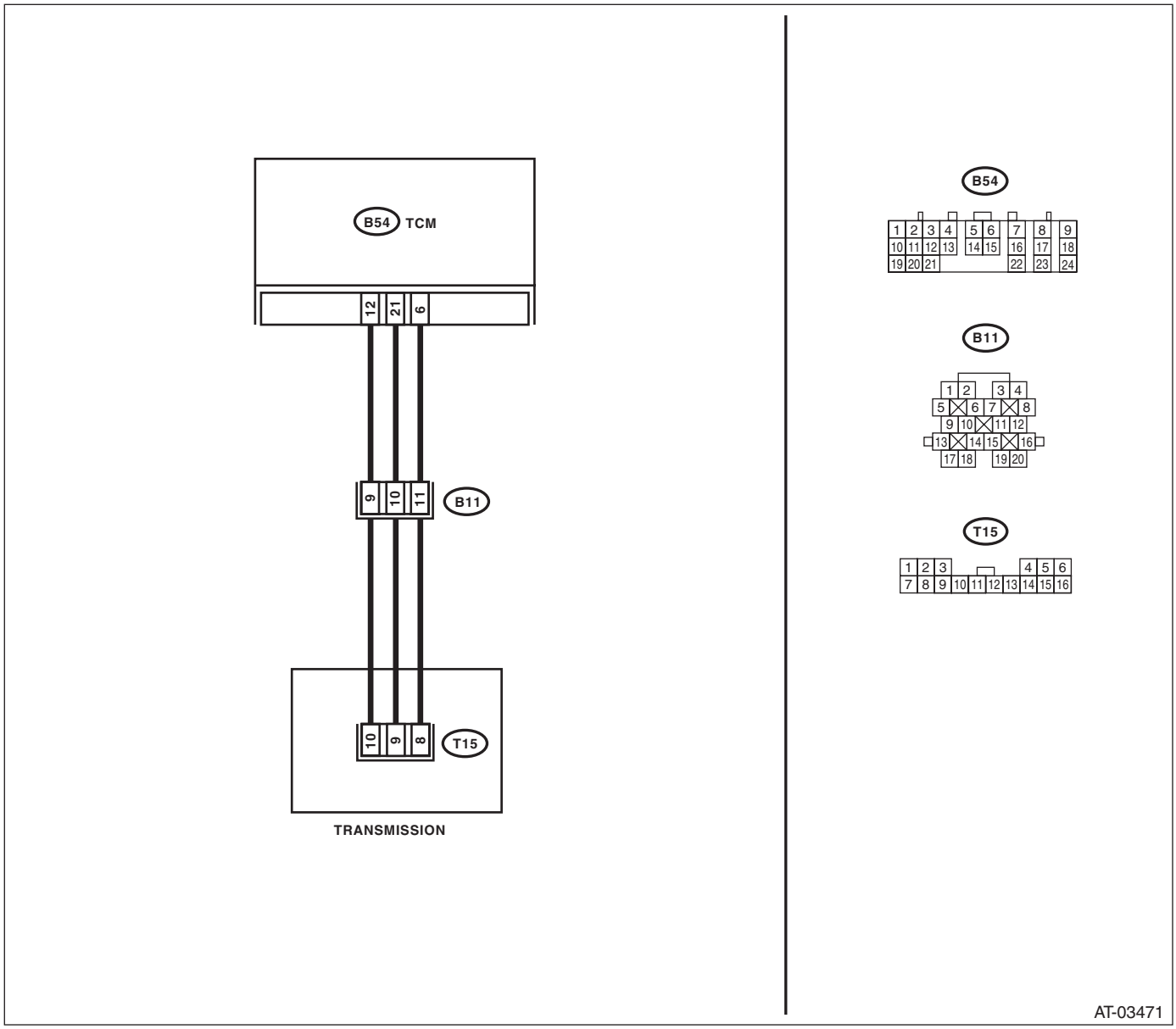
WIRING DIAGRAM:



	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*** ***(B55) No. 11 — (B356) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (engine OFF) 2) Move the select lever to “P” range. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
5	**CHECK TCM OUTPUT SIGNAL.** 1) Set the select lever to “R” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage 1.0 — 2.0 V or less?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.** Measure the voltage between back-up light relay and chassis ground. ***Connector & terminal*** ***(B356) No. 2 (+) — Chassis ground (–):*** ***(B356) No. 4 (+) — 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.

AG:DTC P1601 TCM DATA COMMUNICATION FAILURE

DTC DETECTING CONDITION:
Communication does not complete between control valve memory box.
TROUBLE SYMPTOM:
Shifting quality malfunction
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK IMPROPER CONNECTION OF TRANSMISSION CONNECTOR.** Check loose connection on TCM connector (B54).	Is there poor contact of the connector?	Connect it securely.	Go to step **2**.
2	**CHECK DTC OF TCM.**	Is DTC of oil pressure switch detected?	Perform the diagnosis according to DTC.	Go to step **3**.

	Step	Check	Yes	No
3	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **4**.	Go to step **5**.
4	**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. 12 — (B11) No. 9:*** ***(B54) No. 21 — (B11) No. 10:*** ***(B54) No. 6 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:*** ***(B54) No. 21 — Chassis ground:*** ***(B54) No. 6 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness between TCM and transmission connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION CONNECTOR AND CONTROL VALVE BODY CONNECTOR.** Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 9 — (T10) No. 10:*** ***(B11) No. 10 — (T10) No. 9:*** ***(B11) No. 11 — (T10) No. 8:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between transmission connector and control valve body connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION CONNECTOR AND CONTROL VALVE BODY CONNECTOR.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(B11) No. 9 — Chassis ground:*** ***(B11) No. 10 — Chassis ground:*** ***(B11) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the short circuit of harness between transmission connector and control valve body connector.
8	**CHECK POOR CONTACT.** NOTE: Data communication failure is detected when the malfunction occurred on inspection area above while transmission assembly is replacing or "Clear Memory 2" is performing. When the repair is performed with following diagnosis above, perform the "Clear Memory 2", and then recheck that the DTC of TCM data communication failure is not detected.	Is there any open or poor contact of connector (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Replace the transmission assembly. <Ref. to 5AT-36, Automatic Transmission Assembly.>

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

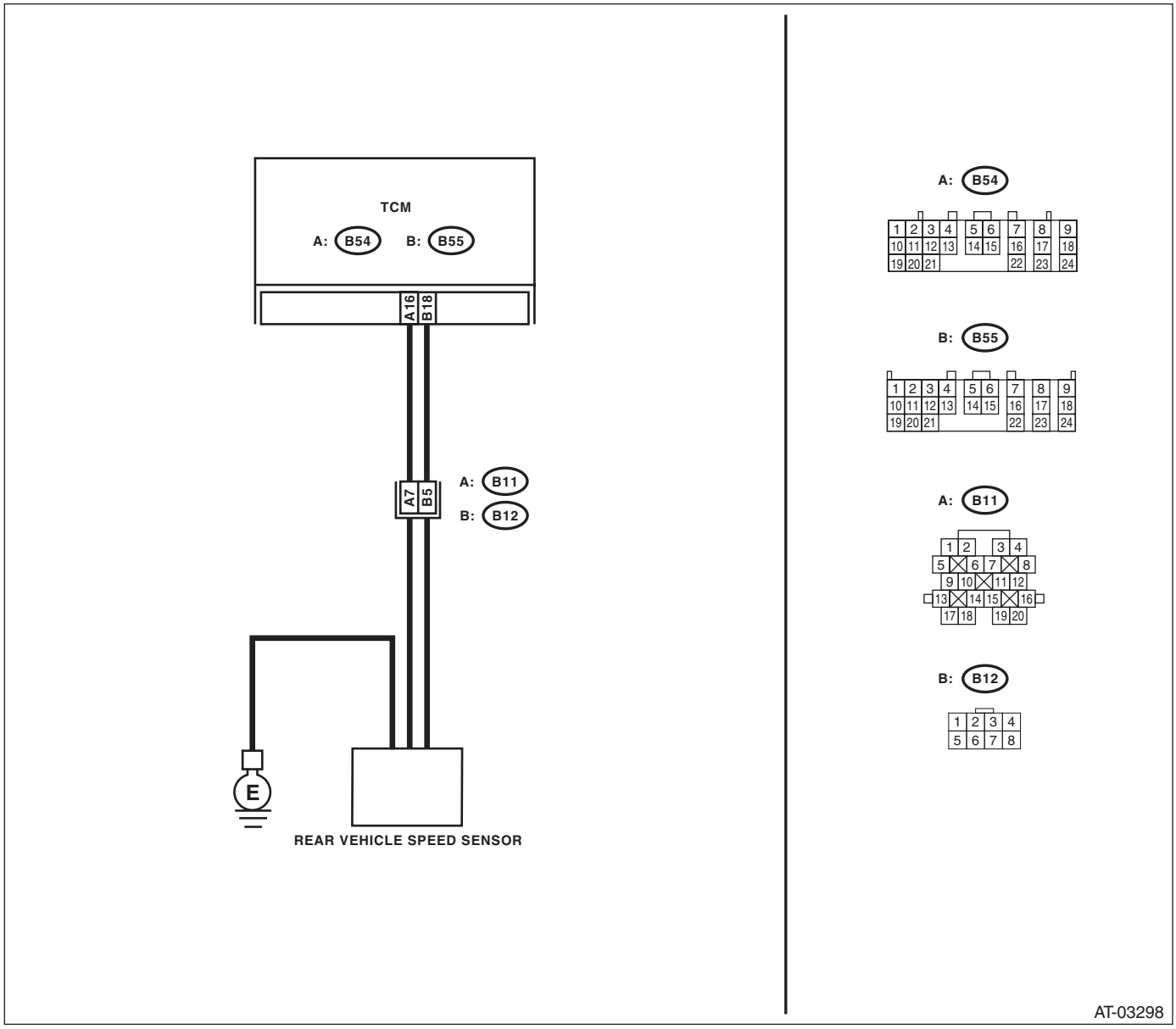
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Shifting quality malfunction
- Tight corner braking phenomenon occurs.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, 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. Perform the diagnosis according to DTC P0882 for PVIGN power supply relay.
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. 18 — (B12) No. 5:*** ***(B54) No. 16 — (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*** ***(B54) No. 16 — Chassis ground:*** ***(B55) No. 18 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to the TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 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-58, Transmission Control Module (TCM).>
5	**CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.** 1) Lift the vehicle, and rotate the propeller shaft by hand. 2) Measure the voltage change between TCM connector terminals during rotation. ***Connector & terminal*** ***(B55) No. 18 (+) — (B54) No. 19 (–):***	Does the voltage repeat changing 0 V ←→ 4 — 6 V during propeller shaft rotation?	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.>

	Step	Check	Yes	No
7	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Start the engine, and drive the vehicle. 4) Read the current data of front wheel speed using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-16, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the value of the front wheel speed depending on the acceleration and deceleration of the vehicle?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair poor contact of harness in ATF temperature sensor and transmission connector.	Replace the transmission harness.

AI: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

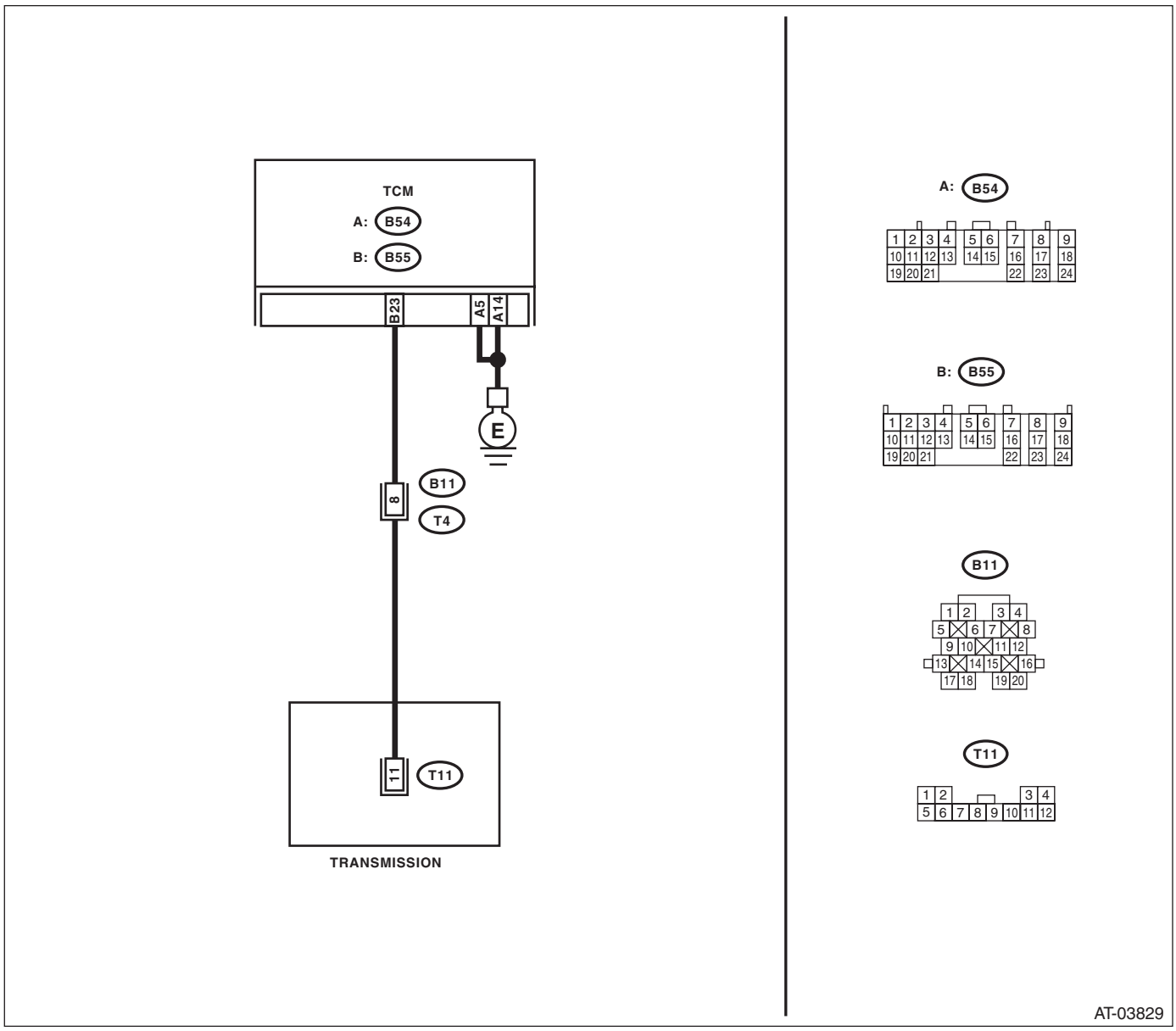
DTC DETECTING CONDITION:

Output signal circuit of transfer solenoid is open or shorted.

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



	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 and transmission connector. ***Connector & terminal*** ***(B55) No. 23 — (B11) No. 8:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM connector 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. 23 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 8 — (T11) No. 11:***	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. 11 — 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 AWD SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 11 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, 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, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

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

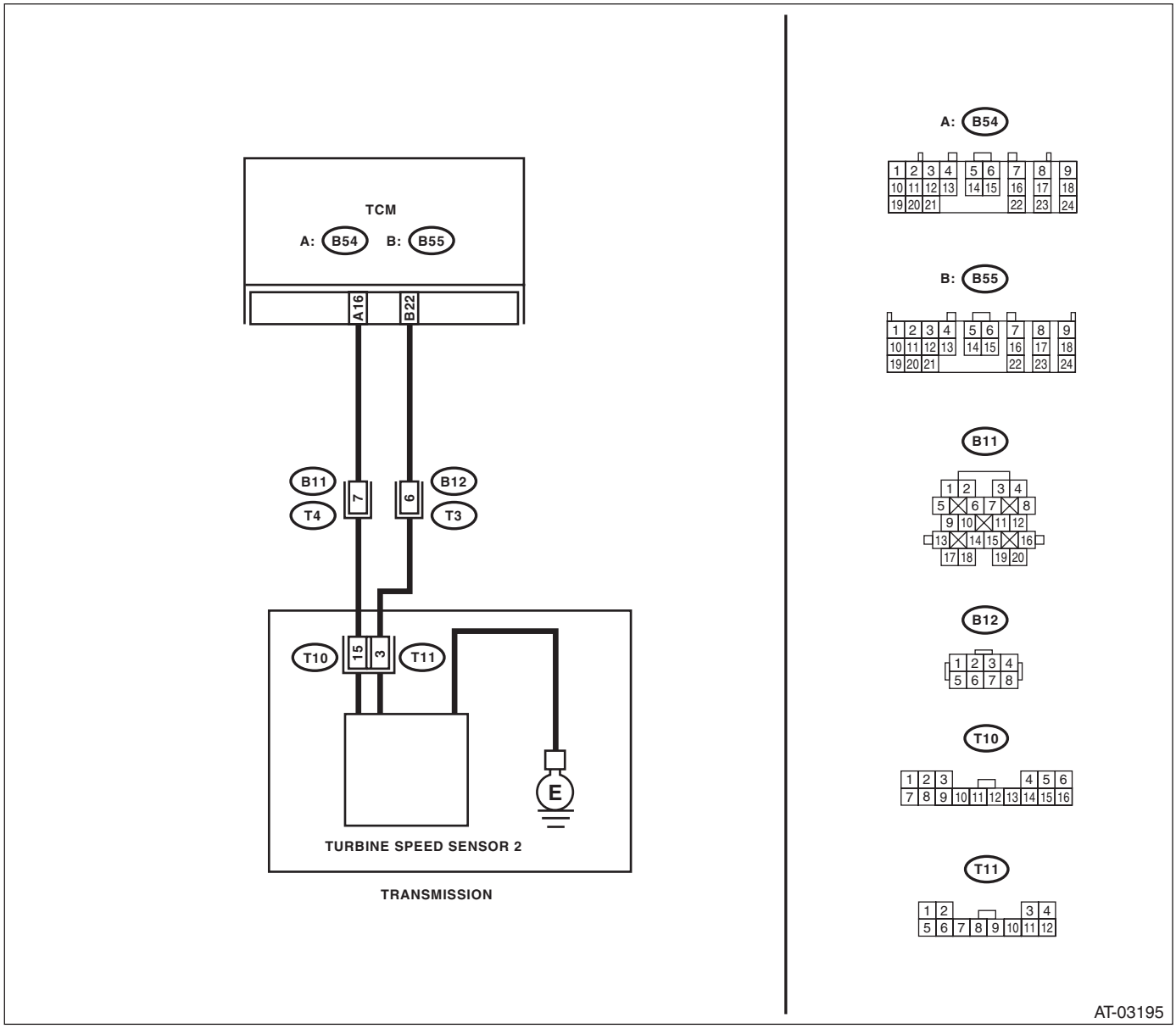
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Excessive shift shock
- Does not shift to 5th

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, 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. Perform the diagnosis according to DTC P0882 for PVIGN power supply relay.
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. 22 — (B12) No. 6:*** ***(B54) No. 16 — (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. 22 — Chassis ground:*** ***(B54) No. 16 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to the TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 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-58, Transmission Control Module (TCM).>
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 3) Start the engine, and set the vehicle in 1st speed driving condition of manual mode. 4) Read the current data of torque converter turbine speed 2 using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-16, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the value of the turbine speed sensor 2 change depending on the acceleration, deceleration and shifting gear of the vehicle?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness of turbine speed sensor 2 and transmission connector.	Go to step **6**.

	Step	Check	Yes	No
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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 6 — (T11) No. 3:*** ***(T4) No. 7 — (T10) No. 15:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between transmission connector and control valve body connector.
7	**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:*** ***(T10) No. 15 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Repair the short circuit of harness between transmission connector and transmission ground.

AK:DTC P1716 ATF TEMP. SENSOR 2 CIRCUIT LOW

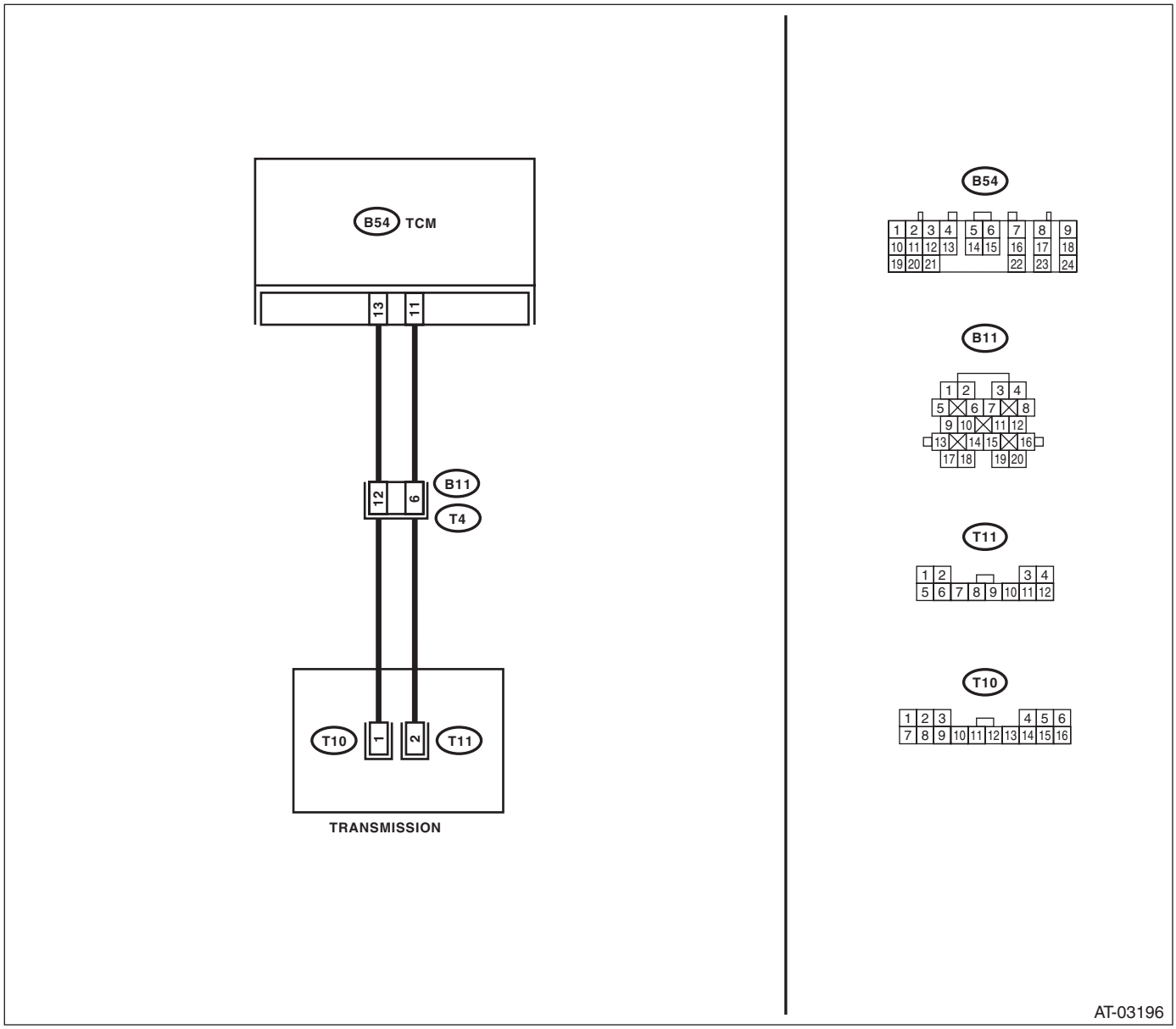
DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor 2 is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	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 and transmission connector. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 11 — (B11) No. 6:***	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) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No. 12:***	Is the resistance between 300 — 700 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. 6 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contacts of harnesses of ATF temperature sensor and transmission connector.	Go to step **6**.

	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 and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 12 — (T10) No. 1:*** ***(T4) No. 6 — (T11) No. 2:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Repair the open circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.** Check poor contact of ATF temperature sensor 1 circuit.	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

AL:DTC P1717 ATF TEMP. SENSOR 2 CIRCUIT HIGH

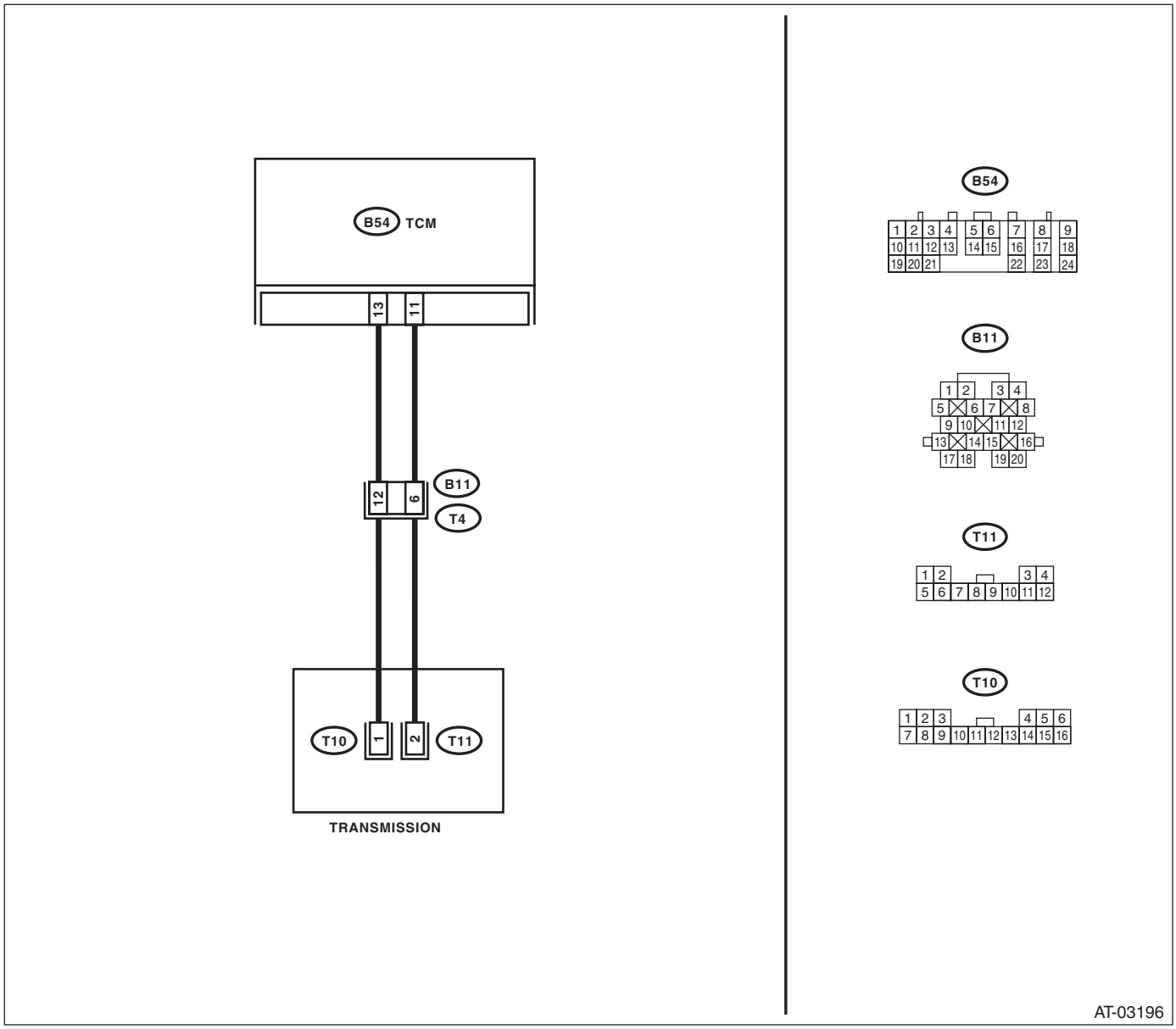
DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor 2 is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	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*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 11 — (B11) No. 6:***	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) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No. 12:***	Is the resistance between 300 — 700 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. 6 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contacts of harnesses of ATF temperature sensor and transmission connector.	Go to step **6**.

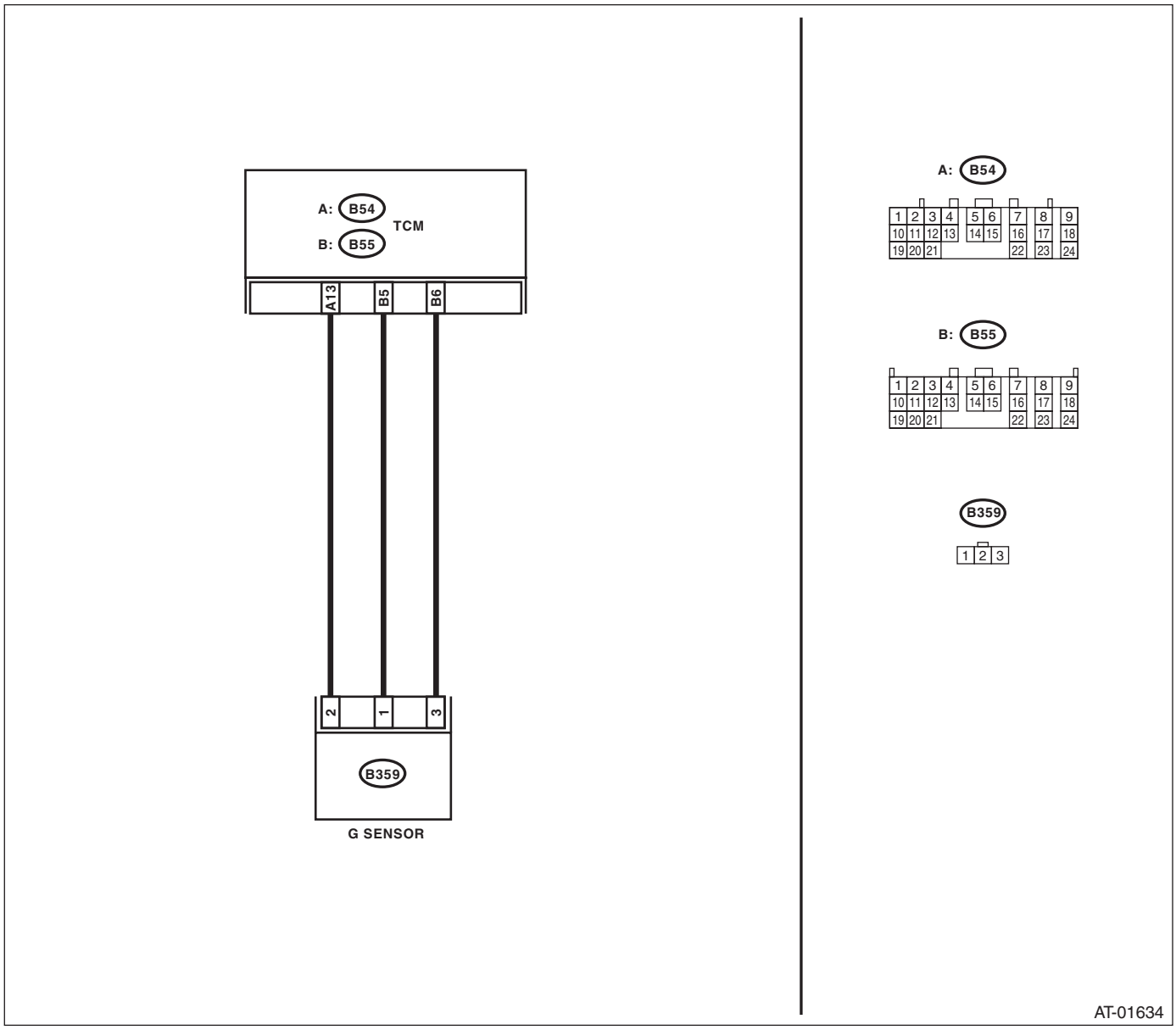
	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 1 — Chassis ground:*** ***(T11) No. 2 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-55, Control Valve Body.>	Repair the short circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.** Check poor contact of ATF temperature sensor 1 circuit.	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>

AM:DTC P1718 AT CAN COMMUNICATION CIRCUIT

NOTE:
DTC P1718 AT CAN communication circuit, refer to “LAN System”. <Ref. to LAN(diag)-12, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

AN:DTC P1760 LATERAL ACCELERATION SENSOR PERFORMANCE PROBLEM

DTC DETECTING CONDITION:
Lateral G sensor output voltage fault
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK VEHICLE CONDITION.**	Is the vehicle a model with VDC, which has the VDC OFF switch on the instrument panel?	Go to step **2**.	Go to step **4**.
2	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication detected?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK DTC OF ABS.**	Is DTC of ABS detected?	Perform the diagnosis according to DTC of ABS.	Temporary poor contact occurs. Recheck for defective parts in harness and connectors.
4	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in the Subaru Select Monitor. 2) Read the Subaru Select Monitor display.	Is the reading indicated on monitor display 2.3 to 2.7 V?	Go to step **5**.	Go to step **10**.
5	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Select {Current Data Display & Save} in the Subaru Select Monitor. 6) Read the Subaru Select Monitor display.	Is the value on the display 3.3 — 4.3 V with the lateral G sensor inclined 90° to right?	Go to step **6**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
6	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** Read the Subaru Select Monitor display.	Is the value on the display 0.7 — 1.7 V with the lateral G sensor inclined 90° to left?	Go to step **7**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
7	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and lateral G sensor?	Repair the connector.	Go to step **8**.
8	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **9**.
9	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
10	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 13 — (B55) No. 6:***	Is the resistance between 5.0 and 6.0 kΩ?	Go to step **11**.	Repair the harness between lateral G sensor and TCM.

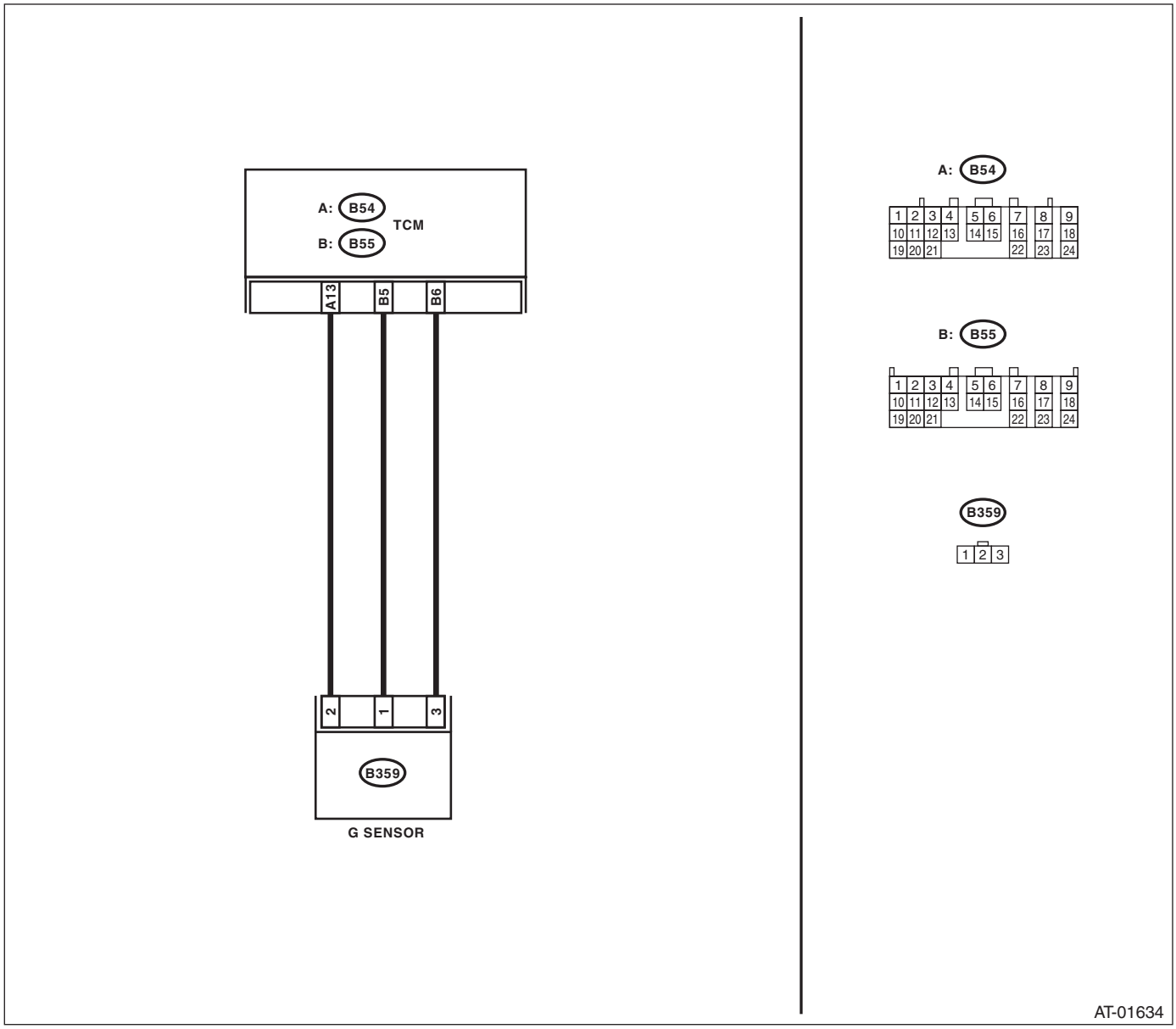
	Step	Check	Yes	No
11	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 2.3 — 2.7 V when lateral G sensor is in horizontal position?	Go to step **12**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
12	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined 90° to right?	Go to step **13**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
13	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined 90° to left?	Go to step **14**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
14	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Perform the Clear Memory Mode. 4) Perform the Inspection Mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **15**.
15	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AO:DTC P1761 LATERAL ACCELERATION SENSOR CIRCUIT LOW

DTC DETECTING CONDITION:

- Lateral G sensor open circuit or output voltage fault (Model without VDC)
- CAN communication failure (Model with VDC)

WIRING DIAGRAM:

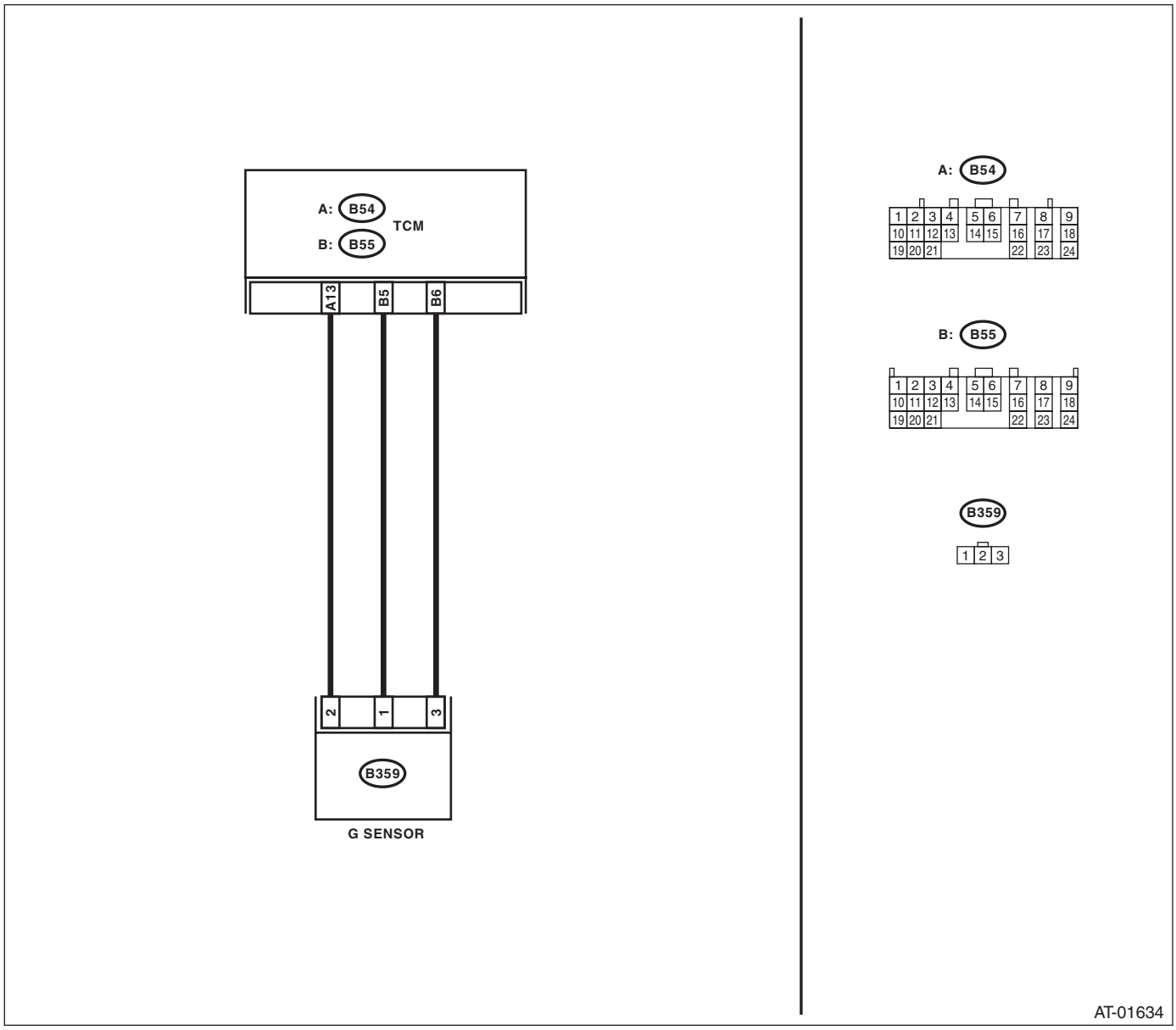


	Step	Check	Yes	No
1	**CHECK VEHICLE CONDITION.**	Is the vehicle a model with VDC, which has the VDC OFF switch on the instrument panel?	Go to step **2**.	Go to step **4**.
2	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication detected?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK DTC OF ABS.**	Is DTC of ABS detected?	Perform the diagnosis according to DTC of ABS.	Temporary poor contact occurs. Recheck for defective parts in harness and connectors.
4	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in the Subaru Select Monitor. 2) Read the lateral G sensor output on Subaru Select Monitor.	Is the reading indicated on monitor display 2.3 to 2.7 V when lateral G sensor is level?	Go to step **5**.	Go to step **8**.
5	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and lateral G sensor?	Repair the connector.	Go to step **6**.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **7**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
8	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 13 — (B55) No. 6:***	Is the resistance between 5.0 and 6.0 kΩ?	Go to step **9**.	Repair the harness between lateral G sensor and TCM.
9	**CHECK GROUND SHORT OF HARNESS.** 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 **10**.	Repair the harness between lateral G sensor and TCM. Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
10	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the TCM connector. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 2.3 — 2.7 V when lateral G sensor is in horizontal position?	Go to step **11**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>

	Step	Check	Yes	No
11	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined 90° to right?	Go to step **12**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
12	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined 90° to left?	Go to step **13**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
13	**CHECK TCM.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Perform the Clear Memory Mode. 4) Perform the Inspection Mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **14**.
14	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AP:DTC P1762 LATERAL ACCELERATION SENSOR CIRCUIT HIGH

DTC DETECTING CONDITION:
Lateral G sensor output voltage fault
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK VEHICLE CONDITION.**	Is the vehicle a model with VDC, which has the VDC OFF switch on the instrument panel?	Go to step **2**.	Go to step **4**.
2	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication detected?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK DTC OF ABS.**	Is DTC of ABS detected?	Perform the diagnosis according to DTC of ABS.	Temporary poor contact occurs. Recheck for defective parts in harness and connectors.

	Step	Check	Yes	No
4	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in the Subaru Select Monitor. 2) Read the lateral G sensor output on Subaru Select Monitor.	Is the reading indicated on monitor display 2.3 to 2.7 V when lateral G sensor is level?	Go to step **5**.	Go to step **8**.
5	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between TCM and lateral G sensor?	Repair the connector.	Go to step **6**.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **7**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
8	**CHECK INFORMATION STORED IN FREEZE FRAME DATA.** Read the lateral G sensor output on Subaru Select Monitor.	Is the reading on monitor 4.65 V or more?	Go to step **9**.	Go to step **15**.
9	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 5 — No. 1:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **10**.	Repair the harness connector between the lateral G sensor and ABSCM&H/U.
10	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Disconnect the connector from the lateral G sensor. 4) Disconnect the connector from TCM. 5) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **11**.	Repair the harness between lateral G sensor and TCM.
11	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **12**.	Repair the harness between lateral G sensor and TCM.
12	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between TCM and lateral G sensor?	Repair the connector.	Go to step **13**.
13	**CHECK TCM.** 1) Connect all connectors. 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **14**.
14	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

	Step	Check	Yes	No
15	**CHECK LATERAL G SENSOR INPUT VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 1 (+) — No. 2 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **16**.	Repair the harness between lateral G sensor and TCM.
16	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 5 — No. 6:***	Is the resistance between 5.0 and 5.6 kΩ?	Go to step **17**.	Repair the harness between lateral G sensor and TCM.
17	**CHECK LATERAL G SENSOR.** 1) Connect the connector to lateral G sensor. 2) Connect the TCM connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 2.3 — 2.7 V when lateral G sensor is in horizontal position?	Go to step **18**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
18	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined 90° to right?	Go to step **19**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
19	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined 90° to left?	Go to step **20**.	Replace the lateral G sensor. <Ref. to 5AT-59, Lateral G Sensor.>
20	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and lateral G sensor?	Repair the connector.	Go to step **21**.
21	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **22**.
22	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AQ:DTC P1798 GEAR 1 ENGINE BRAKE

NOTE:
Refer to DTC P0771 for diagnostic procedure. <Ref. to 5AT(diag)-81, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AR:DTC P1799 INTERLOCK

DTC DETECTING CONDITION:

Perform the interlock judgment when the oil pressure switch pattern detects the specified interlock patterns other than shifting.

TROUBLE SYMPTOM:

Locked to 2nd or 4th gear depending on the vehicle condition at the time of diagnosis.

Step		Check	Yes	No
1	**CHECK DTC OF TCM.**	Is any DTC of the followings detected? P0751, P0753, P0756, P0758, P0761, P0763, P0766, P0768, P0771, P0773, P1798	Perform the diagnosis according to DTC.	Go to step **2**.
2	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After starting the engine again, perform a drive check with the following conditions. (1) Keep the speed at 20 km/h with manual mode in 1st. (2) Read the I/C oil pressure switch data of TCM while driving using Subaru Select Monitor.	Is OFF displayed?	Go to step **3**.	Perform the diagnosis according to DTC P0756.
3	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After starting the engine again, perform a drive check based on the Inspection Mode with the following conditions. <Ref. to 5AT(diag)-20, PROCEDURE, Inspection Mode.> (1) Keep the speed at 20 km/h with manual mode in 1st. (2) Read the D/C oil pressure switch data while driving using Subaru Select Monitor.	Is OFF displayed?	Go to step **4**.	Perform the diagnosis according to DTC P0766.
4	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After starting the engine again, perform a drive check with the following conditions. (1) Drive the vehicle at the same speed with manual mode in 3rd, 4th and 5th. (2) Read the LC/B oil pressure switch data while driving using Subaru Select Monitor.	Is the display OFF for all of 3rd, 4th and 5th?	Go to step **5**.	Perform the diagnosis according to DTC P0771.
5	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After restarting the engine, perform a drive check based on the Inspection Mode. <Ref. to 5AT(diag)-20, PROCEDURE, Inspection Mode.>	Is DTC displayed?	Replace the control valve body.	Temporary poor contact occurs. Check that the harness connector is not faulty.

AS:DTC P1817 SPORT MODE SWITCH CIRCUIT (MANUAL SWITCH)

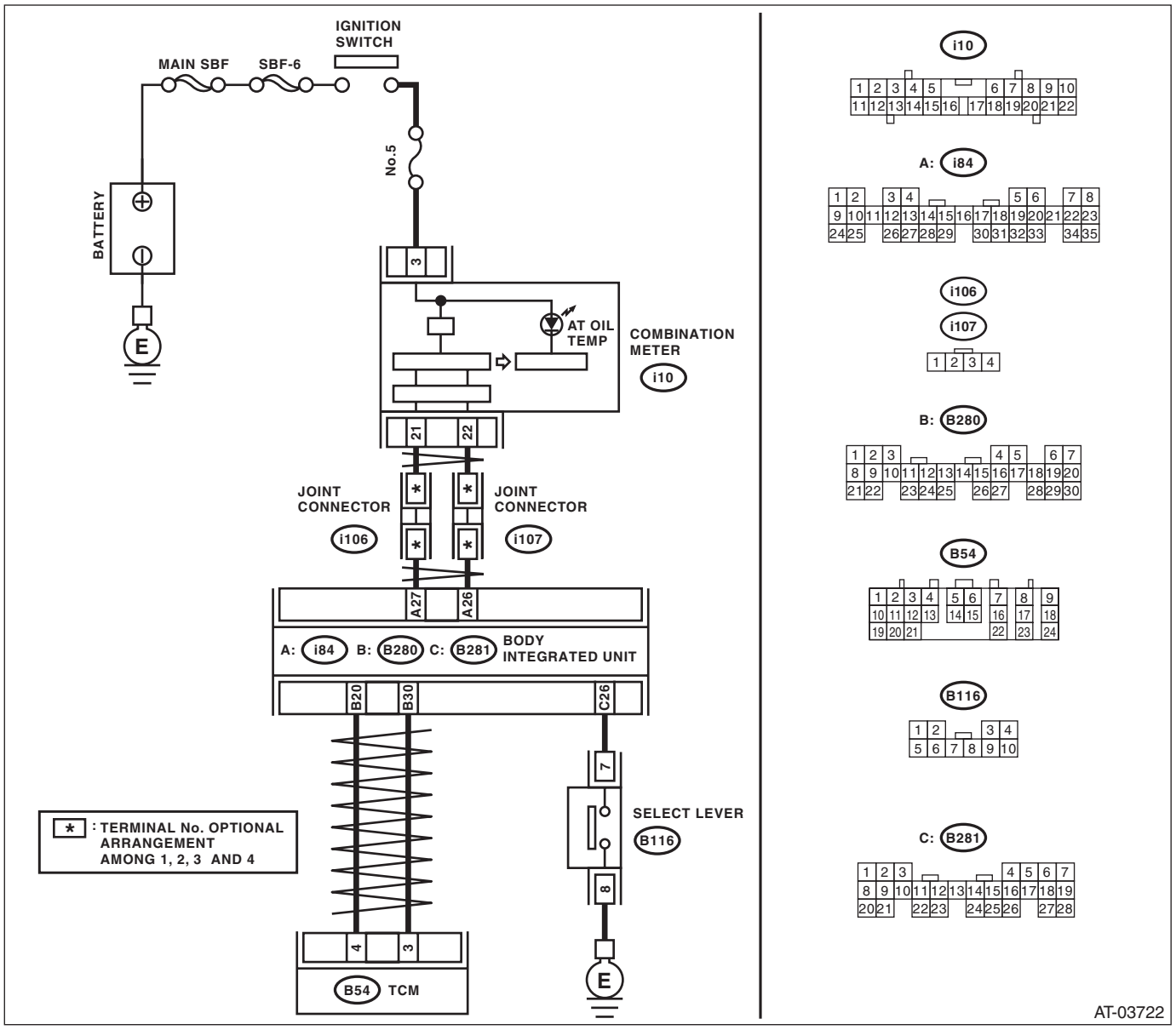
DTC DETECTING CONDITION:

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

TROUBLE SYMPTOM:

When shifting to “N” → “D”, the SPORT shift indicator light illuminates.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to "P" range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3**.	Go to step **7**.
3	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever from "P" to "D" range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Go to step **4**.	Replace the select lever assembly. <Ref. to CS-24, Select Lever.>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to manual mode. 2) Shift the select lever to other than "D" range. 3) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **5**.	Replace the select lever assembly. <Ref. to CS-24, Select Lever.>
5	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) and AT CAN communication circuit displayed?	Perform the diagnosis according to each DTC.	Go to step **6**.
6	**CHECK INPUT SIGNAL FROM TCM.** 1) Shift the select lever from "P" to "D" range. 2) Read the manual mode SW data of TCM using the Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Even if the AT OIL TEMP light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
7	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect harness connector from body integrated unit and select lever. 3) Measure the harness resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 27 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the short circuit of harness between body integrated unit and manual mode.
8	**CHECK MANUAL MODE SWITCH.** 1) Shift the select lever to "P" range. 2) Measure the resistance between harness connector terminals of manual mode switch. ***Terminals*** ***(B116) No. 9 — No. 8***	Is the resistance 1 MΩ or more?	Check the body integrated unit.	Replace the select lever assembly. <Ref. to CS-24, Select Lever.>

AT: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)-61, DTC P0751 SHIFT SOLENOID “A” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AU: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).>

AV: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)-76, DTC P0766 SHIFT SOLENOID “D” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AW:DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH E CIRCUIT

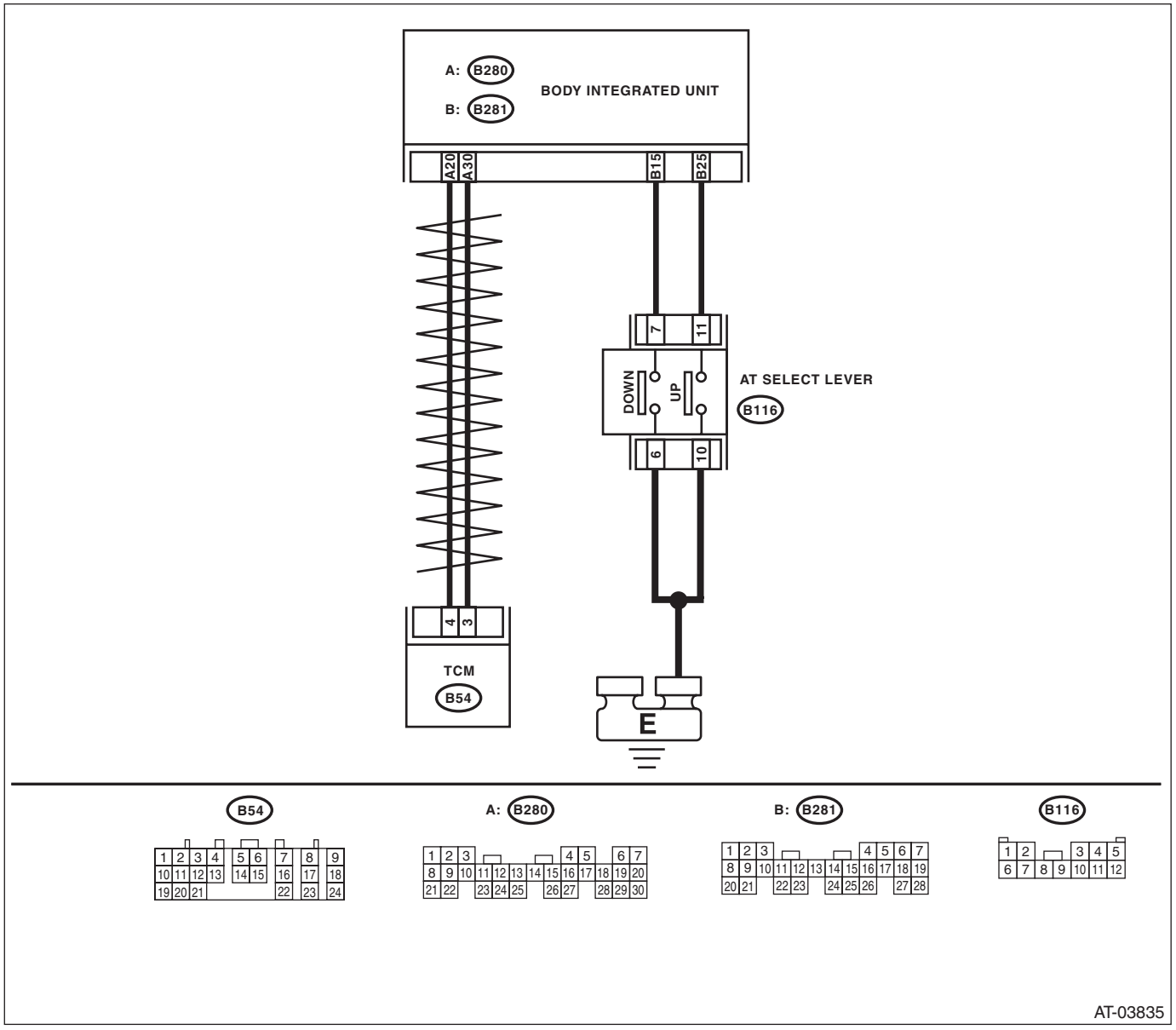
DTC DETECTING CONDITION:
High & low reverse clutch oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0761 for diagnostic procedure. <Ref. to 5AT(diag)-71, DTC P0761 SHIFT SOLENOID “C” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

15.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK MANUAL MODE SWITCH

DIAGNOSIS:
Input signal circuit of manual mode switch is open or shorted.
TROUBLE SYMPTOM:
Does not shift on manual mode.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Perform ON/OFF operation on the manual mode switch. 2) Read the data of manual mode switch signal using Subaru Select Monitor.	Is the ON/OFF normally detected?	Go to step **2**.	Go to step **7**.
2	**CHECK DTC OF BODY INTEGRATED UNIT.**	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK TCM.** 1) Perform ON/OFF operation on the manual mode switch. 2) Read the data of manual mode switch signal using Subaru Select Monitor.	Is the ON/OFF normally detected?	Go to step **4**.	Go to step **5**.
4	**CHECK SPORT SHIFT INDICATOR LIGHT OF COMBINATION METER.**	Is the SPORT shift indicator light OK?	Go to step **6**.	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>
5	**CHECK DTC OF TCM.**	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>
6	**CHECK DTC OF METER.**	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Replace the meter.
7	**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 harness between manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 6 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between manual mode switch and chassis ground.
8	**CHECK MANUAL MODE SWITCH.** Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 7:***	Is the resistance 1 MΩ or more?	Go to step **9**.	Replace the guide plate assembly.
9	**CHECK MANUAL MODE SWITCH.** 1) Move the select lever to manual mode. 2) Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 7:***	Is the resistance less than 1 Ω?	Go to step **10**.	Replace the guide plate assembly.
10	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between body integrated unit connector and manual mode switch connector. ***Connector & terminal*** ***(B116) No. 7 — (B281) No. 15:***	Is the resistance less than 1 Ω?	Go to step **11**.	Repair the open circuit of harness between manual mode switch connector and TCM connector, or poor contact in connector.

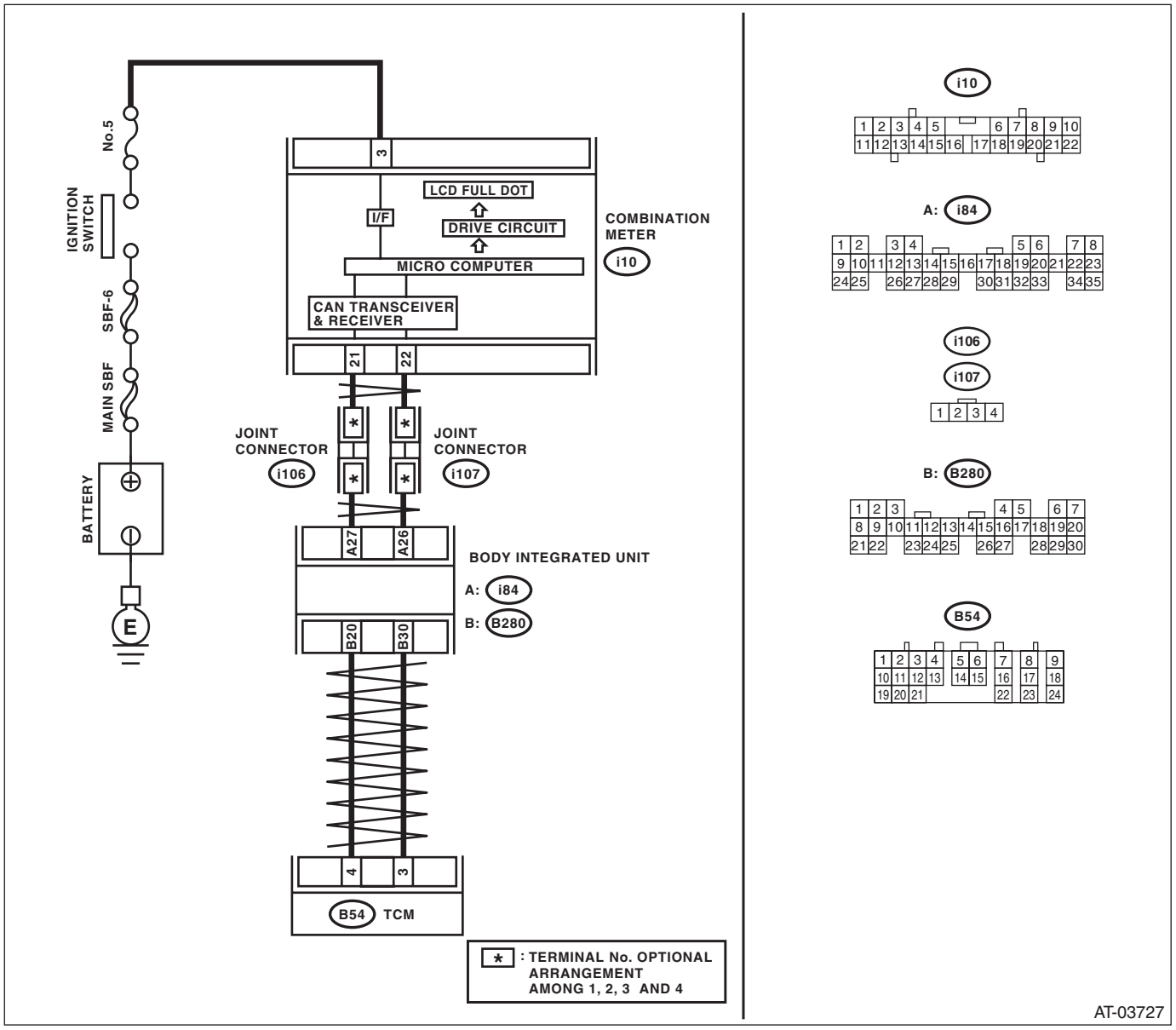
	Step	Check	Yes	No
11	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **12**.	Repair the short circuit of harness between manual mode switch connector and TCM connector.
12	**CHECK INPUT SIGNAL TO TCM.** 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage of signal to TCM. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **13**.	Replace the body integrated unit. <Ref. to SL-53, Body Integrated Unit.>
13	**CHECK INPUT SIGNAL TO TCM.** 1) Shift and hold the select lever to up side. 2) Measure the voltage of signal to TCM. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **14**.	Replace the body integrated unit. <Ref. to SL-53, Body Integrated Unit.>
14	**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 harness between manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 10 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **15**.	Repair the open circuit of harness between manual mode switch and chassis ground.
15	**CHECK MANUAL MODE SWITCH.** Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 11:***	Is the resistance 1 MΩ or more?	Go to step **16**.	Replace the guide plate assembly.
16	**CHECK MANUAL MODE SWITCH.** 1) Move the select lever to manual mode. 2) Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 11:***	Is the resistance less than 1 Ω?	Go to step **17**.	Replace the guide plate assembly.
17	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between body integrated unit connector and manual mode switch connector. ***Connector & terminal*** ***(B116) No. 11 — (B281) No. 25:***	Is the resistance less than 1 Ω?	Go to step **18**.	Repair the open circuit of harness between the manual mode switch connector and body integrated unit connector, or poor contact of connector.

	Step	Check	Yes	No
18	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.** 1) Disconnect the steering roll connector. 2) Measure the resistance of harness between manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **19**.	Repair the short circuit of harness between manual mode switch connector and body integrated unit connector.
19	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **20**.	Replace the body integrated unit. <Ref. to SL-53, Body Integrated Unit.>
20	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift and hold the select lever to up side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **21**.	Replace the body integrated unit. <Ref. to SL-53, Body Integrated Unit.>
21	**CHECK POOR CONTACT.**	Is there poor contact in the manual mode switch circuit?	Repair the poor contact.	Temporary poor contact of the manual mode switch circuit connector or harness

B: CHECK SPORT SHIFT INDICATOR LIGHT

DIAGNOSIS:
Output signal circuit of SPORT shift indicator light is open or shorted.
TROUBLE SYMPTOM:
- SPORT shift indicator light does not illuminate or remains illuminated.
- SPORT shift indicator light display does not change.

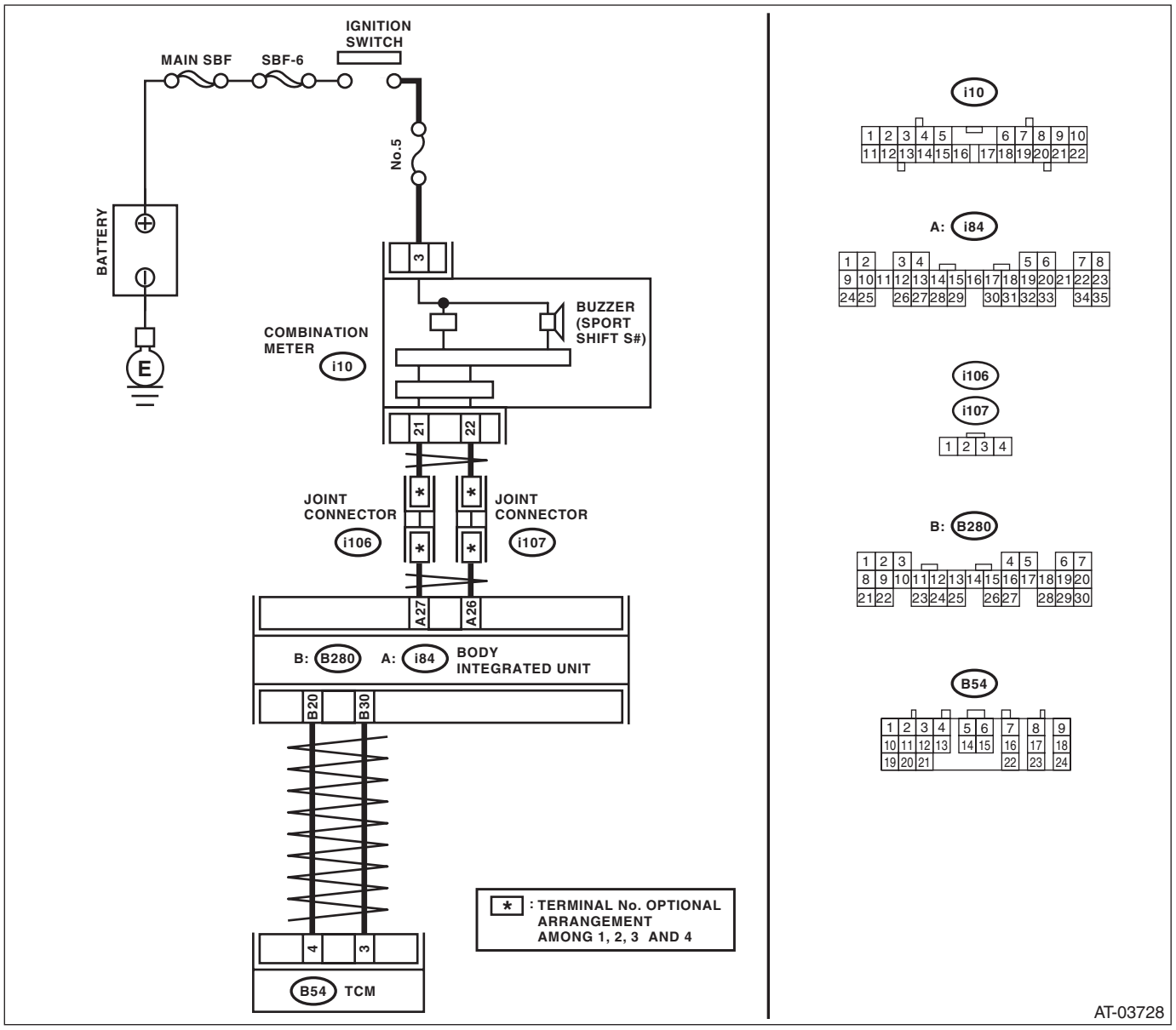
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** Check DTC of the body integrated unit.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TCM.** Check DTC of TCM.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **4**.
3	**CHECK TCM.** 1) Shift the select lever in order of P → R → N → D. 2) Read the shift position data of TCM using the Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is each of parking range signal, reverse range signal, neutral range signal and drive range signal ON when the select lever is in each position?	Go to step **4**.	Replace the TCM with a correct part and check operation.
4	**CHECK BODY INTEGRATED UNIT.** 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Run the Subaru Select Monnitor. 4) Shift the select lever in order of P → R → N → D. 5) Read the shift position data of the body integrated unit using the Subaru Select Monitor. <Ref. to LAN(diag)-13, DISPLAY OF ANALOG DATA, OPERATION, Subaru Select Monitor.>	Does the shift position of the select lever match the shift position displayed in the Subaru Select Monitor?	Go to step **5**.	Replace the body integrated unit. <Ref. to SL-53, Body Integrated Unit.>
5	**CHECK BODY INTEGRATED UNIT.** 1) Shift the select lever to manual mode side, and then shift up the select lever. 2) Read the SPORT shift stage data of the body integrated unit using the Subaru Select Monitor. <Ref. to LAN(diag)-13, DISPLAY OF ANALOG DATA, OPERATION, Subaru Select Monitor.>	Is the SPORT shift stage “2” in the Subaru Select Monitor?	Go to step **6**.	Check the select lever. <Ref. to CS-27, INSPECTION, Select Lever.>
6	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is there any fault in the combination meter?	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>	System is normal at present. A temporary poor contact of connector or harness may be the cause. Repair the poor contact in harness between combination meter and TCM connector.

C: CHECK BUZZER

DIAGNOSIS:
Output signal circuit of buzzer is open or shorted.
TROUBLE SYMPTOM:
Buzzer remains beeping.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** Check DTC of the body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TCM.** Check DTC of TCM.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK BUZZER STOP.** Disconnect the connector (B54).	Does the buzzer stop?	Replace the TCM. <Ref. to 5AT-58, Transmission Control Module (TCM).>	Go to step **4**.
4	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monnitor. 5) Read the data of SPORT shift buzzer using Subaru Select Monitor.	Is the SPORT shift buzzer display “ON”?	Replace the body integrated unit. <Ref. to SL-53, Body Integrated Unit.>	Go to step **5**.
5	**CHECK COMBINATION METER.**	Is the buzzer OK?	Refer to “Symptom Related Diagnostic”. <Ref. to 5AT(diag)-135, General Diagnostic Table.>	Replace the combination meter assembly. <Ref. to IDI-19, Combination Meter.>

16.General Diagnostic Table

A: INSPECTION

Symptoms	Problem parts
Shifting vehicle speed is low on “D” range.	• Vehicle speed sensor 1 and vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • ATF temperature sensor • CAN communication signal
Shifting vehicle speed is high on “D” range.	• Vehicle speed sensor 1 and vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Brake switch signal • Lateral G sensor • ATF temperature sensor
Excessive 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 • PVIGN relay
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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition

General Diagnostic Table

Symptoms	Problem 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Low coast 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • Lock up solenoid valve • ATF temperature sensor 1 and 2
Noise at “R”, “N” and “D” range.	• Fluid level and condition • Engine speed signal • ATF temperature sensor 1 and 2
Hold at “D” range or 1st on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Direct clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor

Symptoms	Problem parts
Hold at “D” range or 2nd on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Low coast 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Low coast 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 • PVIGN relay
Hold at “D” range or 5th on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Up switch • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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

General Diagnostic Table

Symptoms	Problem 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • PVIGN relay
Gear does not shift down to 2nd on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 1 and 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • CAN communication signal

Symptoms	Problem 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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 • Vehicle speed sensor 1 and vehicle speed sensor 2 • 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	Problem 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 • Low coast 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 • Low coast 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 • Vehicle speed sensor 1, 2
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 • Vehicle speed sensor 1, 2
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

Symptoms	Problem parts
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
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 • Vehicle speed sensor 1 and 2
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.

General Diagnostic Table

Symptoms	Problem parts
Engine cannot start on “N” or “P” range	• Key switch and starter • Control cable adjustment • Inhibitor switch • CAN communication line • TCM
Engine start other than “N” or “P” range	• Key switch and starter • Control cable adjustment • Inhibitor switch • TCM
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

5MT

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1. General Description

A: SPECIFICATION

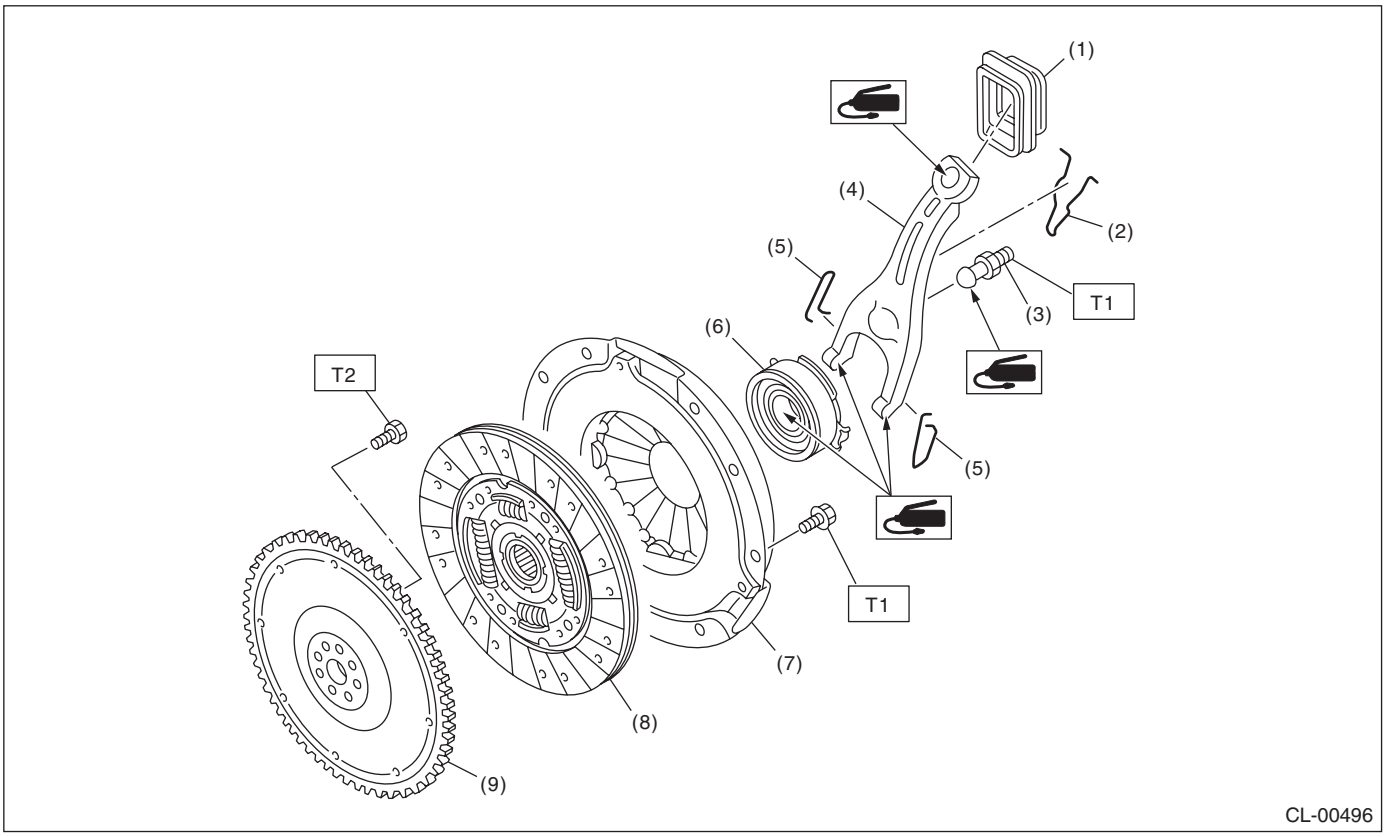
Model			2.5 L non-turbo	2.5 L Turbo
Transmission type			5MT	
Clutch cover	Type		Push type	
	Diaphragm set load	N (kgf, lbf)	5,688 (580, 1,279)	7,850 (800, 1,764)
Clutch disc	Facing material		Woven	
	O.D. × I.D. × thickness	mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	230 × 155 × 3.2 (9.06 × 6.10 × 0.126)
	Spline outer diameter	mm (in)	25.2 (0.992)	
	Depth of rivet head mm (in)	Standard value	1.3 — 1.9 (0.051 — 0.075)	
		Limit of sinking	0.3 (0.012)	
	Deflection limit	mm (in)	0.7 (0.027) at R = 110 (4.33)	1.0 (0.039) 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)	135 — 140 (5.31 — 5.51)
	Free play	mm (in)	4 — 13 (0.16 — 0.51)	
Flywheel	Type		Flexible	

Model			2.5 L Turbo
Transmission type			6MT
Clutch cover	Type		Pull type
	Diaphragm set load	N (kgf, lbf)	7,160 (730, 1,610)
Clutch disc	Facing material		Woven
	O.D. × I.D. × thickness mm (in)	Flywheel side	240 × 160 × 3.2 (9.45 × 6.30 × 0.126)
		Clutch cover side	240 × 160 × 3.5 (9.45 × 6.30 × 0.138)
	Spline outer diameter	mm (in)	25.2 (0.992)
	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	0.3 (0.012)
	Deflection limit	mm (in)	1.0 (0.039) at R = 110 (4.33)
Clutch release lever ratio			1.7
Release bearing			Grease-packed self-aligning
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)
	Free play	mm (in)	4 — 13 (0.16 — 0.51)
Flywheel	Type		Conventional

B: COMPONENT

1. CLUTCH ASSEMBLY

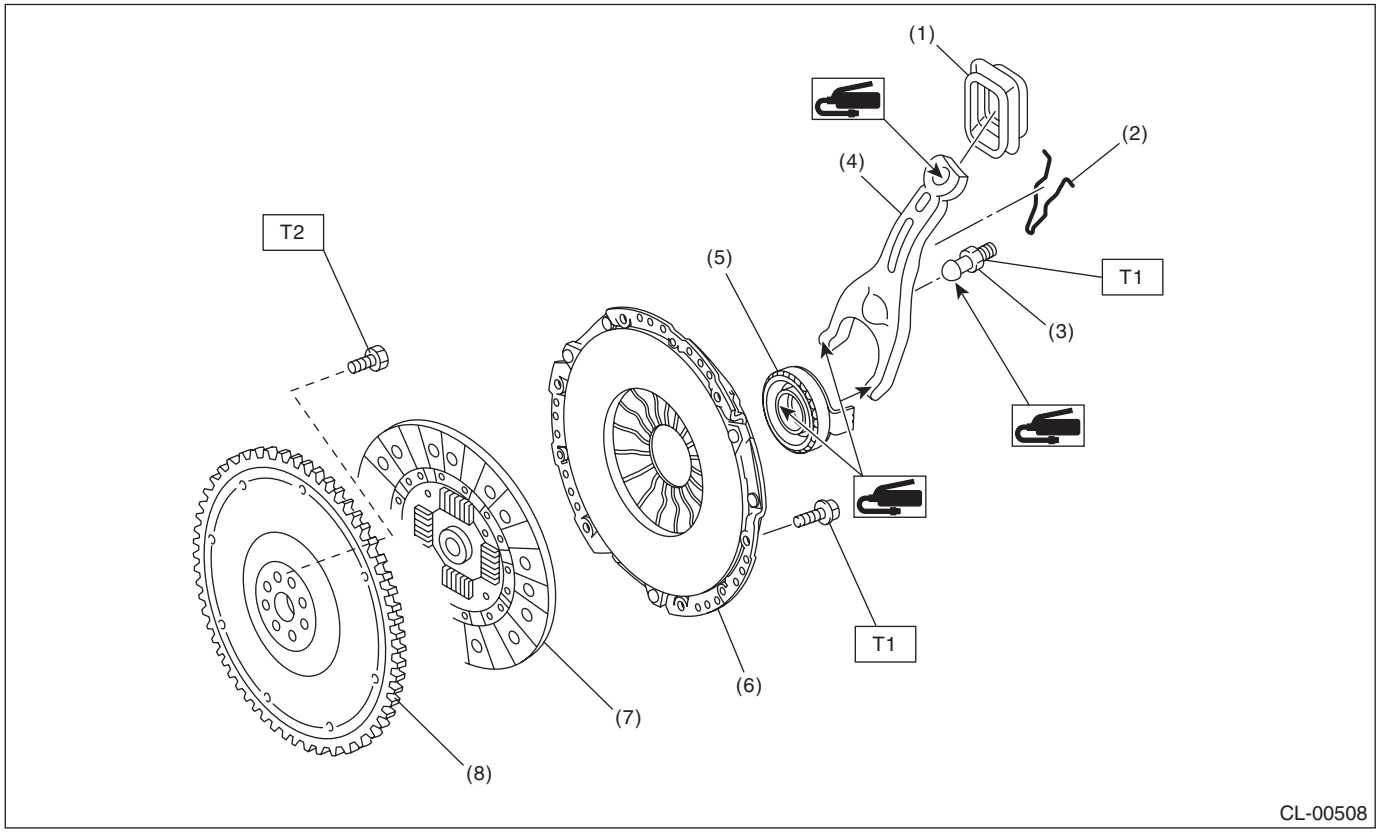
- 5MT non-turbo model



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

Tightening torque:N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

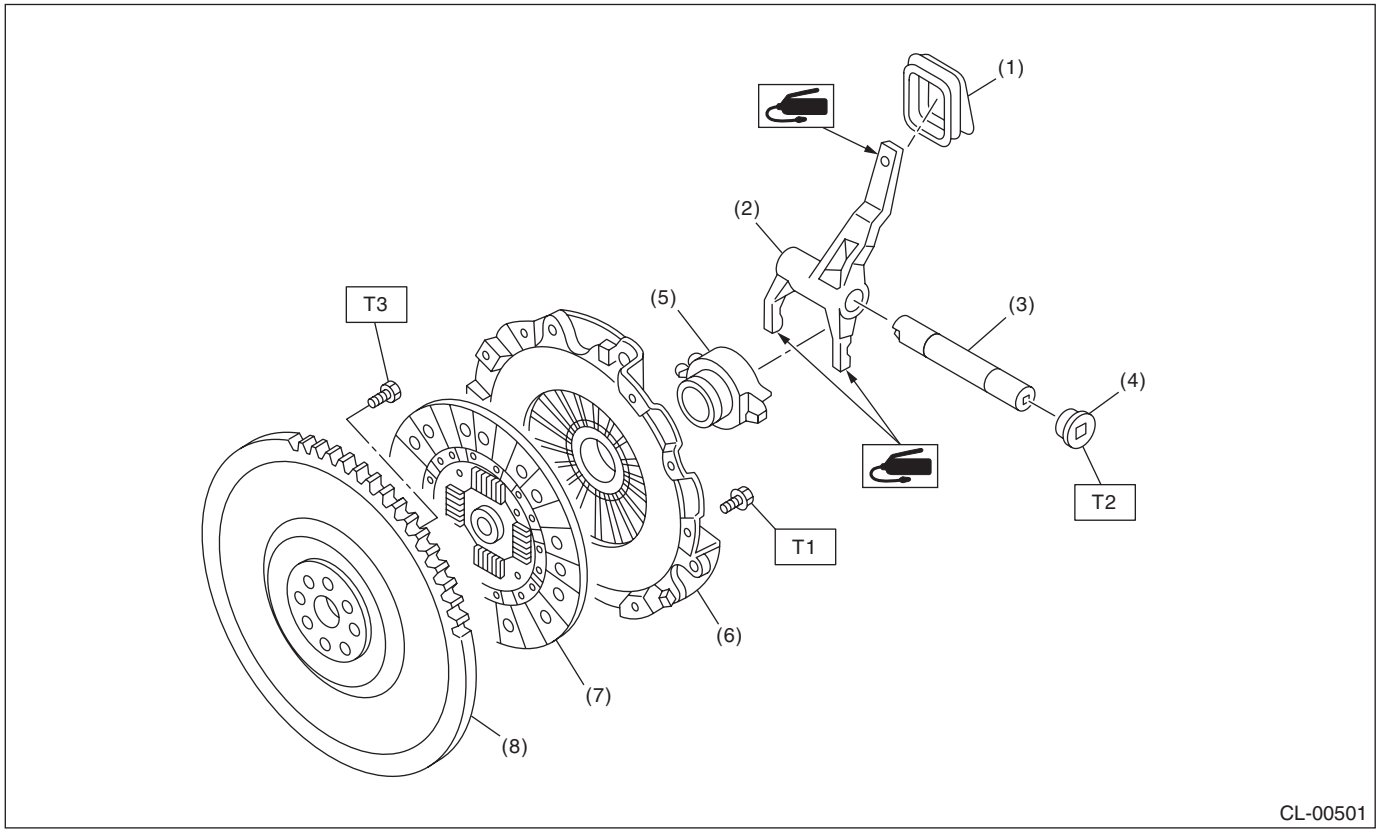
- 5MT turbo model



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

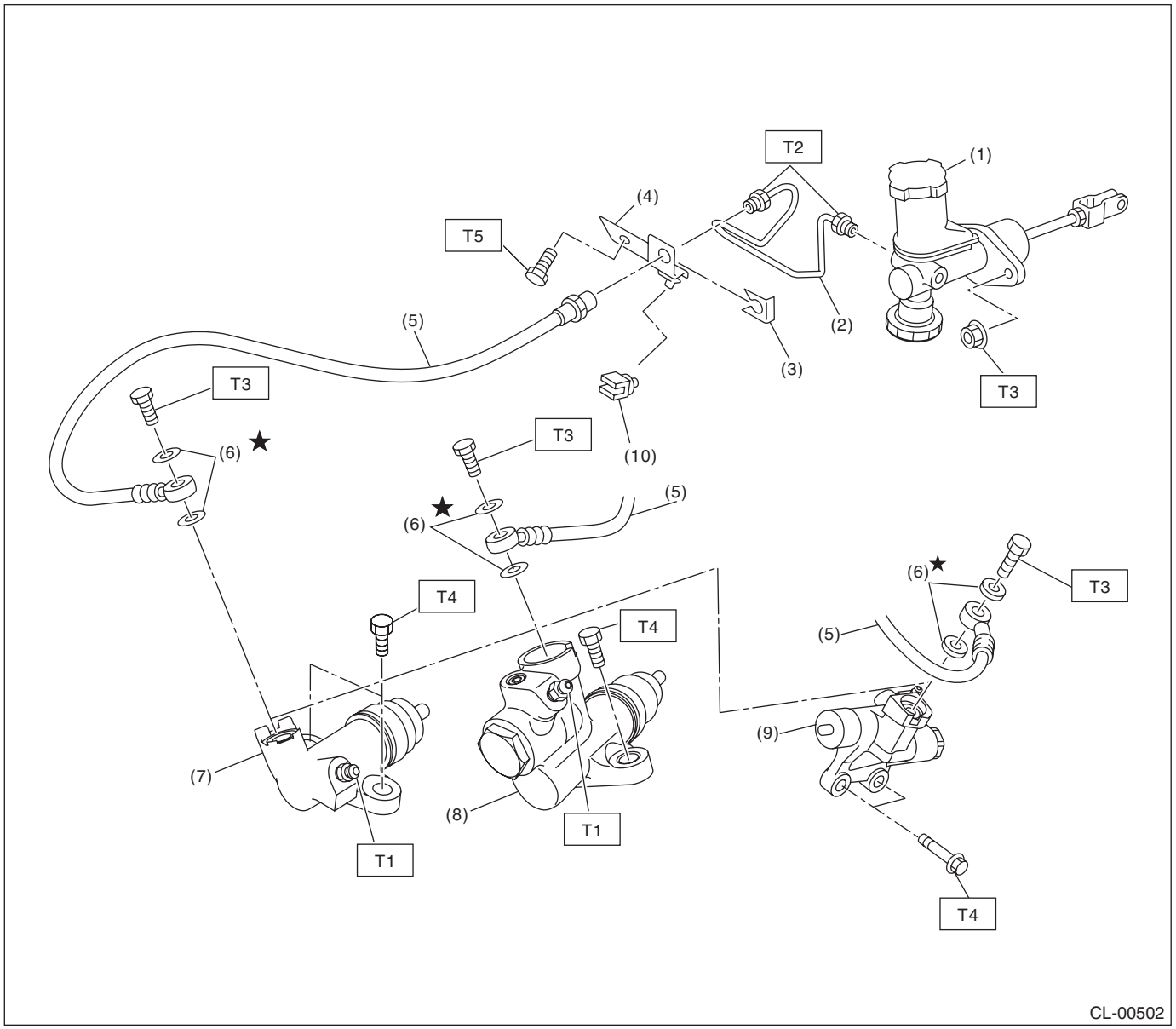
Tightening torque:N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

- 6MT model



(1)	Dust cover	(5)	Release bearing	***Tightening torque:N·m (kgf-m, ft-lb)***
(2)	Release lever	(6)	Clutch cover	***T1: 16 (1.6, 11.8)***
(3)	Release shaft	(7)	Clutch disc	***T2: 44 (4.5, 32.5)***
(4)	Plug	(8)	Conventional flywheel	***T3: 81 (8.2, 59.4)***

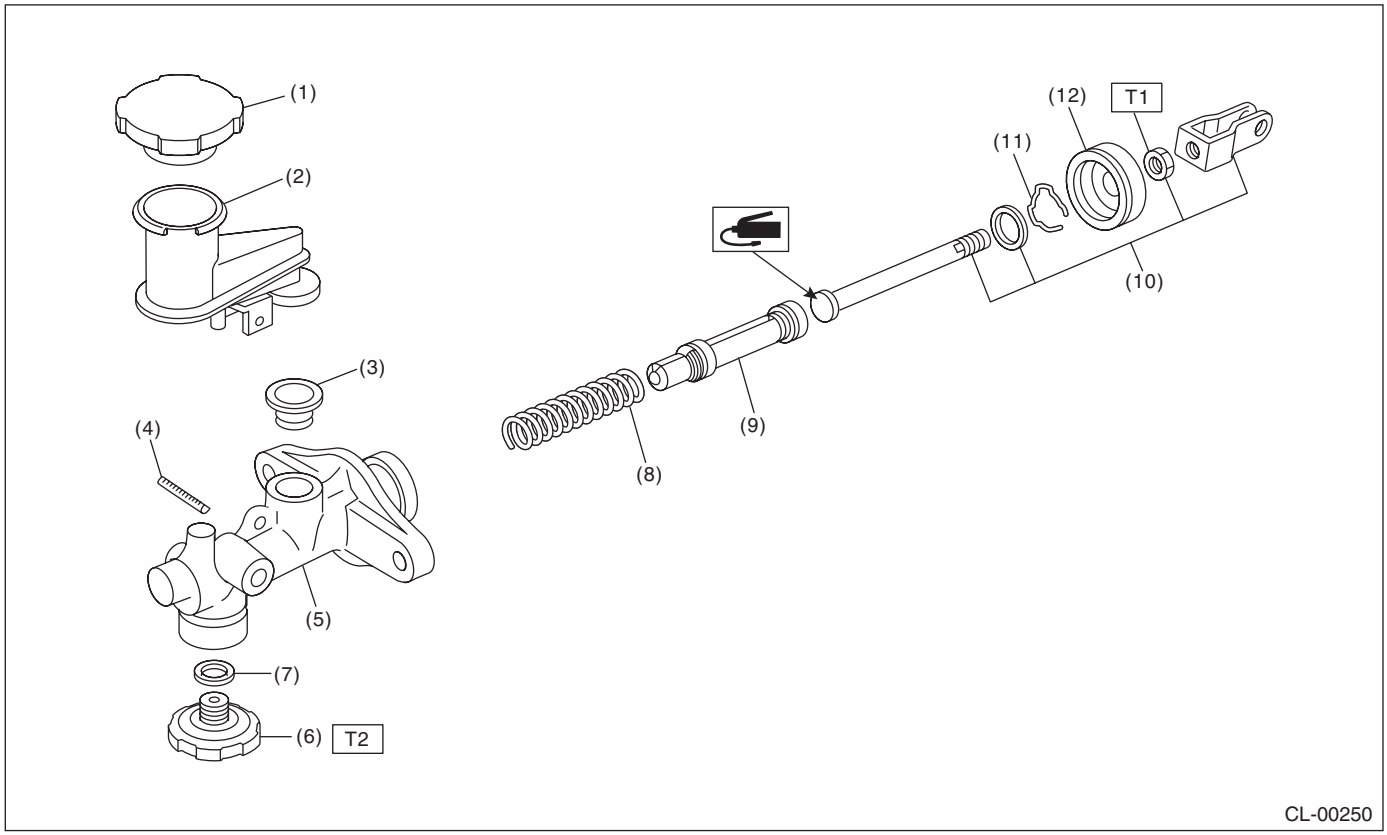
2. CLUTCH PIPE AND HOSE



(1) Master cylinder ASSY
(2) Clutch pipe
(3) Clamp
(4) Bracket
(5) Clutch hose
(6) Washer
(7) Operating cylinder (5MT non-turbo model)
(8) Operating cylinder (5MT turbo model)
(9) Operating cylinder (6MT turbo model)
(10) Clip

Tightening torque:N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 15 (1.5, 10.8)
T3: 18 (1.8, 13.0)
T4: 37 (3.8, 27.5)
T5: 25 (2.5, 18.4)

3. MASTER CYLINDER

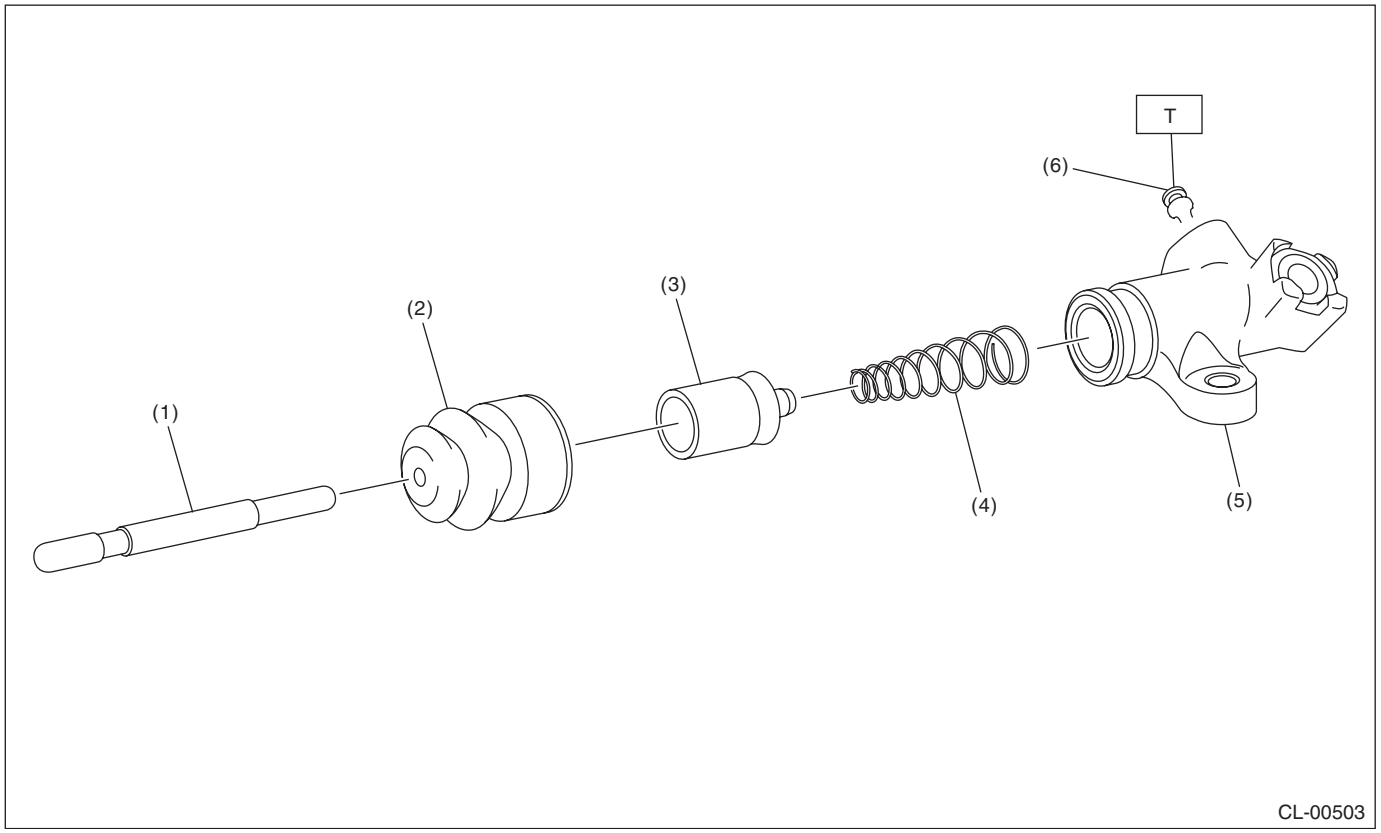


(1)	Reservoir cap	(7)	Gasket
(2)	Reservoir tank	(8)	Return spring
(3)	Oil seal	(9)	Piston
(4)	Straight pin	(10)	Push rod ASSY
(5)	Master cylinder	(11)	Piston stop ring
(6)	Clutch damper	(12)	Cylinder boot

Tightening torque:N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7)
T2: 46.6 (4.75, 34.4)

4. OPERATING CYLINDER

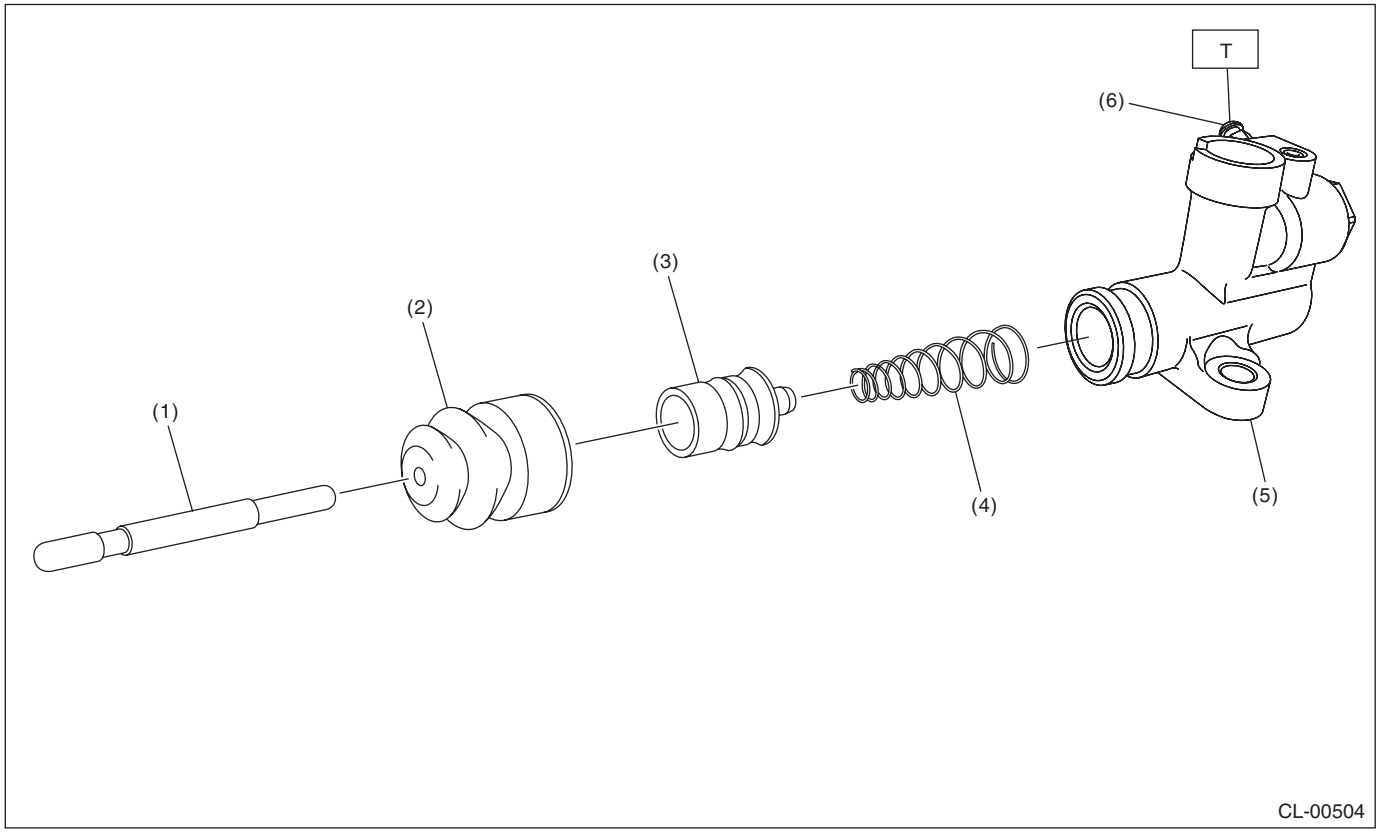
- 5MT non-turbo model



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

Tightening torque:N·m (kgf-m, ft-lb)
T: 8 (0.8, 5.8)

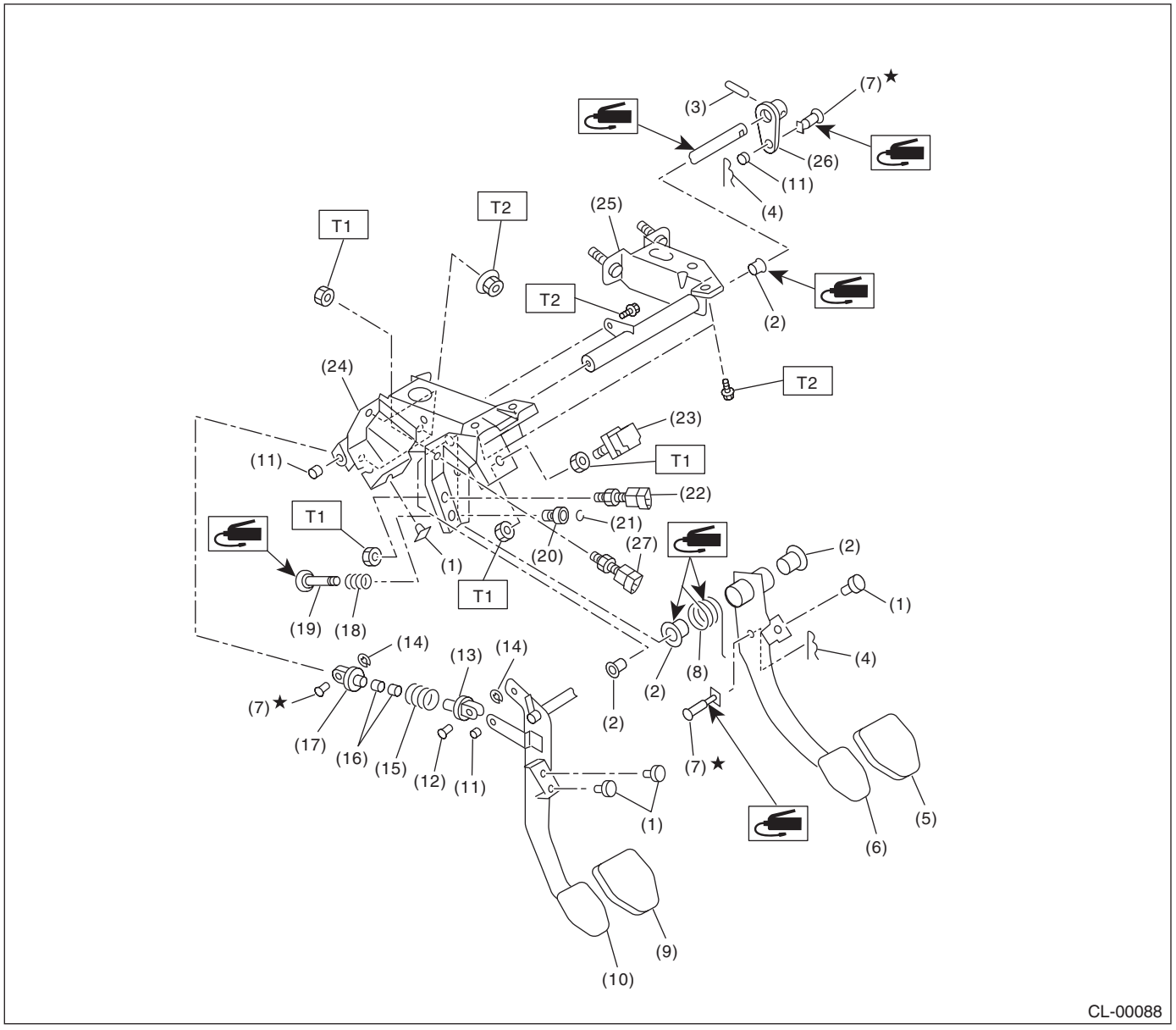
- 5MT turbo model



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

Tightening torque:N·m (kgf-m, ft-lb)
T: 8 (0.8, 5.8)

5. CLUTCH PEDAL



(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Brake pedal spring
(9) Clutch pedal pad
(10) Clutch pedal
(11) Bushing C
(12) Clutch clevis pin
(13) Assist rod A
(14) Clip
(15) Assist spring
(16) Assist bushing
(17) Assist rod B
(18) Spring S
(19) Rod S
(20) Bushing S
(21) Clip
(22) Clutch switch (Cruise control)
(23) Stop light switch
(24) Pedal bracket
(25) Clutch master cylinder bracket
(26) Lever
(27) Clutch switch (Clutch start)

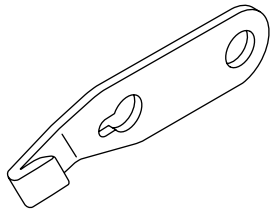
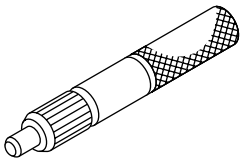
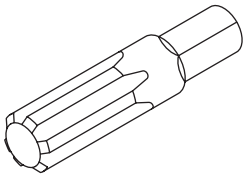
Tightening torque:N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

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 when loosening/tightening bolts, etc.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used for installing the clutch disc to the flywheel.
 ST-499057000	499057000	TORX® PLUS	Used for removing the flywheel (dual mass flywheel type).

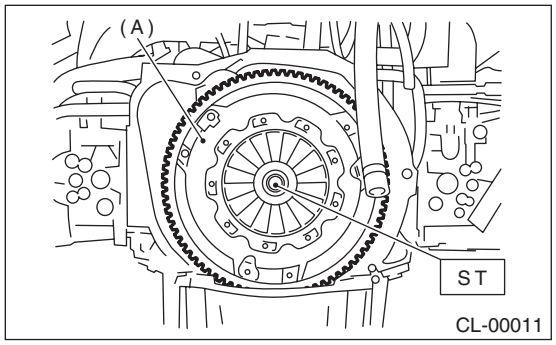
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Dial gauge	Used for measuring clutch disc run-out.
Depth gauge	Used for measuring clutch disc wear.

2. Clutch Disc and Cover

A: REMOVAL

NOTE:
The illustration below is for a 5MT non-turbo model. However, perform the same procedures for models other than 5MT non-turbo model as well.
1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.> <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Insert the ST on the flywheel.
ST 499747100 CLUTCH DISC GUIDE



(A) Clutch cover

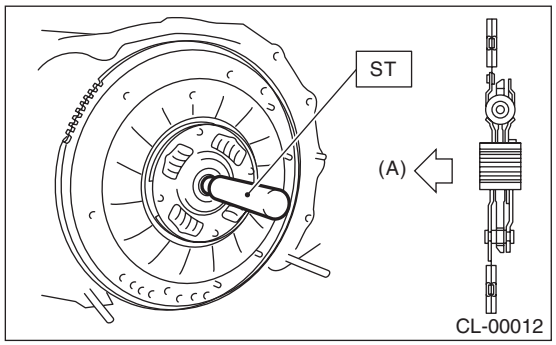
3) Remove the clutch cover and clutch disc.

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

B: INSTALLATION

NOTE:
The illustration below is for a 5MT non-turbo model. However, perform the same procedures for models other than 5MT non-turbo model as well.
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

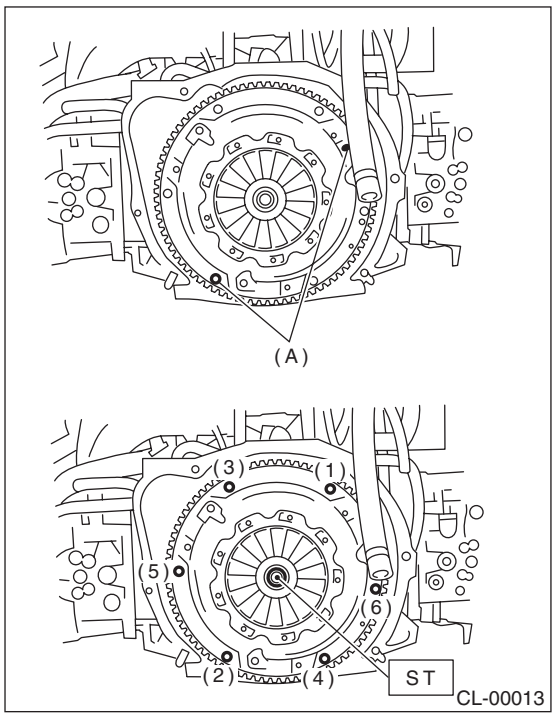


(A) Flywheel side

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

NOTE:
• When installing the clutch cover to the fly wheel, position the clutch cover so that the distance between unbalance marks (● paint marks) is at least 120°. (The unbalance marks ● indicate the directions of residual unbalance.)
• Note the front and rear of the clutch disc when installing.
• Tighten the clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross order.

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



(A) Unbalance mark (paint)

3) Remove the ST.
ST 499747100 CLUTCH DISC GUIDE
4) Install the transmission assembly. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.> <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

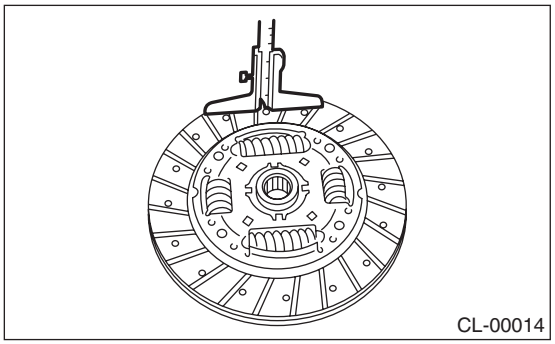
NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.

1. CLUTCH DISC

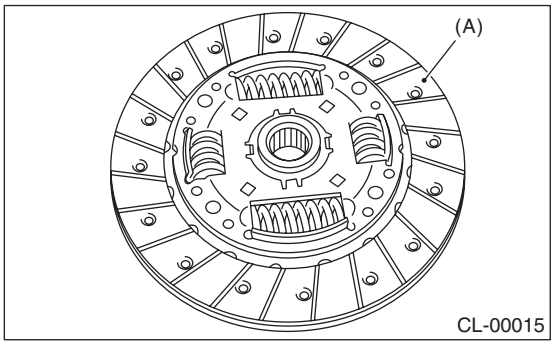
1) Facing wear:
Measure the depth from the facing surface to the rivet head. Replace if the face is worn locally or worn down to less than the specified value.

Depth to rivet head:
Limit of sinking
0.3 mm (0.012 in)

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



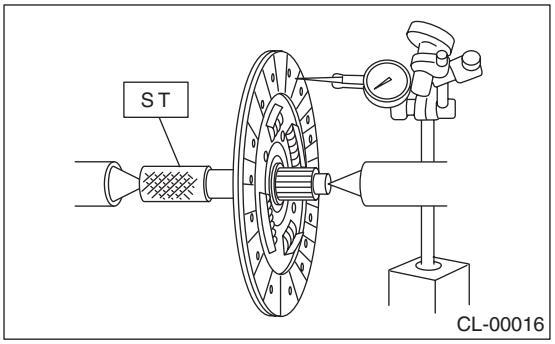
2) Hardened facing
Replace the clutch disc.
3) Oil soakage on facing
Replace the clutch disc and inspect the transmission front oil seal, transmission case mating surface, engine rear oil seal and other locations for oil leakage.



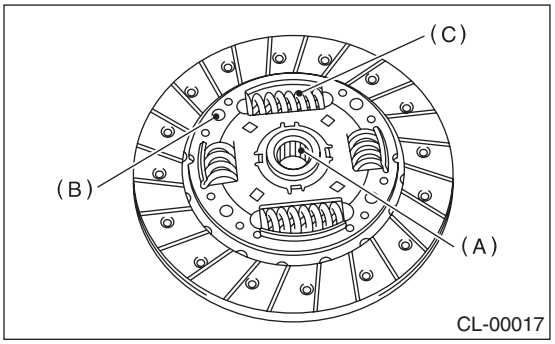
(A) Clutch facing

4) Deflection on facing:
If deflection exceeds the specified value at the outer circumference of the facing, replace the clutch disc.
ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:
Turbo model
1.0 mm (0.039 in) at R = 110 mm (4.33 in)
Non-turbo model
0.7 mm (0.027 in) at R = 110 mm (4.33 in)



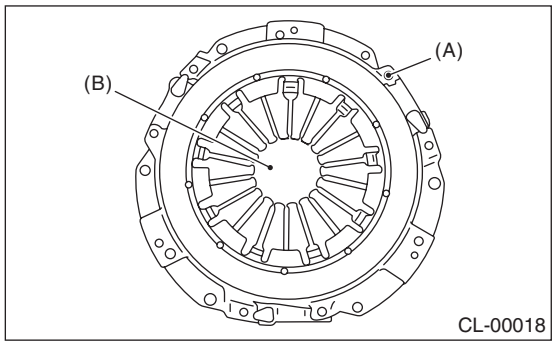
5) If there is spline wear, loose rivets, failed damper springs, etc., replace the clutch disc.



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

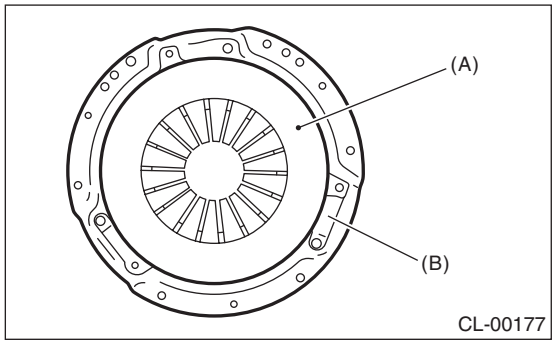
2. CLUTCH COVER

NOTE:
Visually check the following items without disassembling, and replace or repair if defective.
1) Loose thrust rivet
2) Damaged or worn bearing contact area at the center of diaphragm spring



(A) Thrust rivet
(B) Diaphragm spring

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



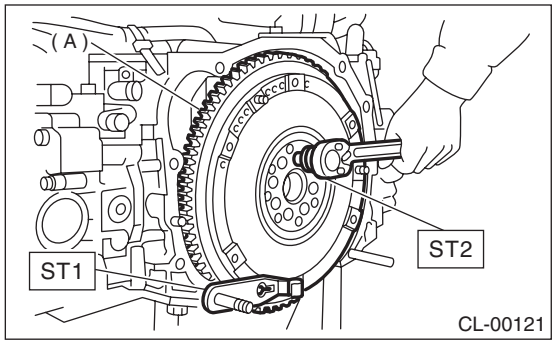
(A) Pressure plate
(B) Strap plate

3. Flywheel

A: REMOVAL

1. 5MT TURBO MODEL

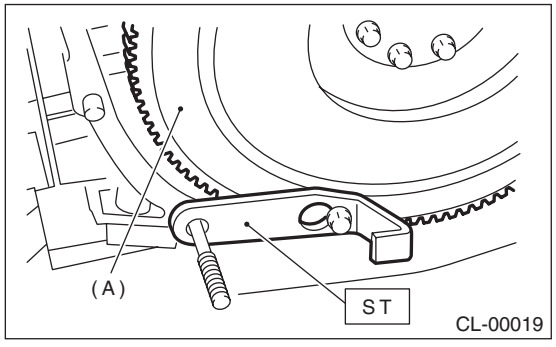
1) Remove the transmission assembly. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-13, REMOVAL, Clutch Disc and Cover.>
3) Using ST1 and ST2, remove the flywheel.
ST1 498497100 CRANKSHAFT STOPPER
ST2 499057000 TORX® PLUS



(A) Flywheel

2. EXCEPT FOR 5MT TURBO MODEL

1) Remove the transmission assembly. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.> <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-13, REMOVAL, Clutch Disc and Cover.>
3) Using the ST, remove the flywheel.
ST 498497100 CRANKSHAFT STOPPER

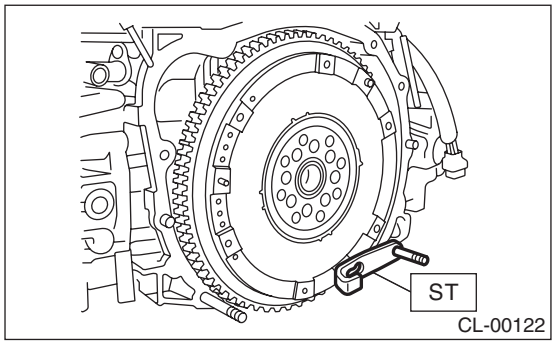


(A) Flywheel

B: INSTALLATION

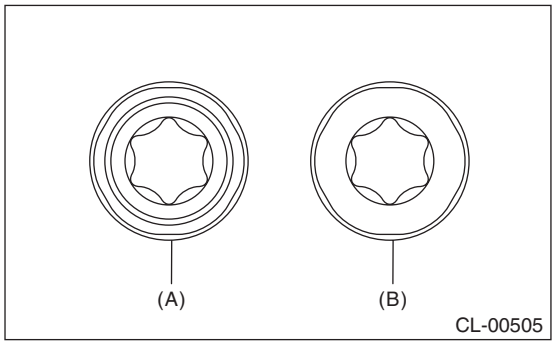
1. 5MT TURBO MODEL

1) Install the flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



2) Tighten the flywheel mounting bolts to the specified torque.
ST 499057000 TORX® PLUS

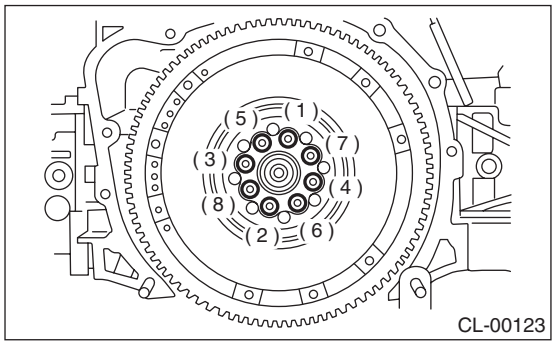
CAUTION:
The bolts without identification groove as shown in the figure must be used as flywheel attaching bolts for 5MT turbo model.



(A) Bolt with identification groove
(B) Bolt without identification groove

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

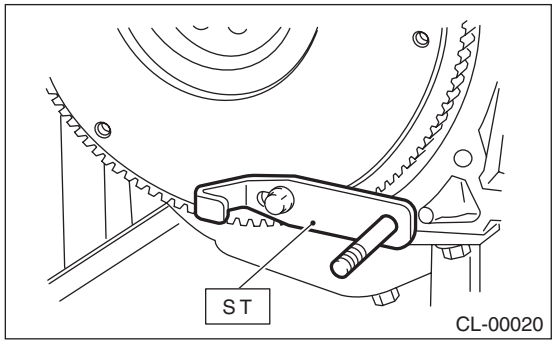
Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)



3) Install the clutch disc and cover. <Ref. to CL-13, INSTALLATION, Clutch Disc and Cover.>
4) Install the transmission assembly. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

2. EXCEPT FOR 5MT TURBO MODEL

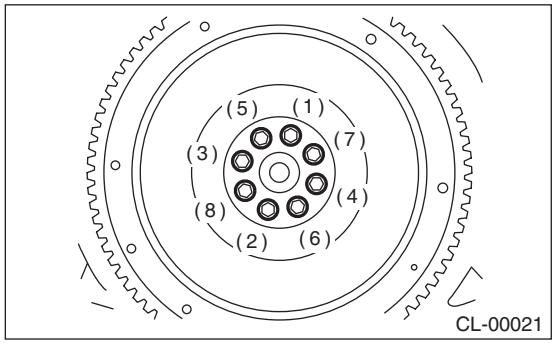
1) Install the flywheel and ST.
ST 499747100 CRANKSHAFT STOPPER



2) Tighten the flywheel mounting bolts to the specified torque.

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

Tightening torque:
5MT model
72 N·m (7.3 kgf-m, 52.8 ft-lb)
6MT model
81 N·m (8.2 kgf-m, 59.4 ft-lb)

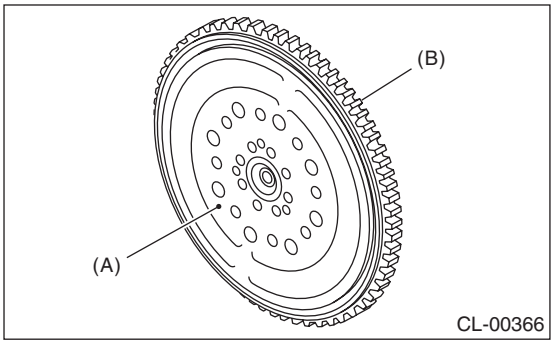


3) Install the clutch disc and cover. <Ref. to CL-13, INSTALLATION, Clutch Disc and Cover.>
4) Install the transmission assembly. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.> <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

NOTE:
The illustration below is for a Turbo model. However, perform the same procedures for the Non-turbo model.

CAUTION:
Since this bearing is grease-sealed and is a non-lubrication type, do not wash with gasoline or any solvents.
1) Damage on sliding surface of facing and the ring gear
If defective, 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.

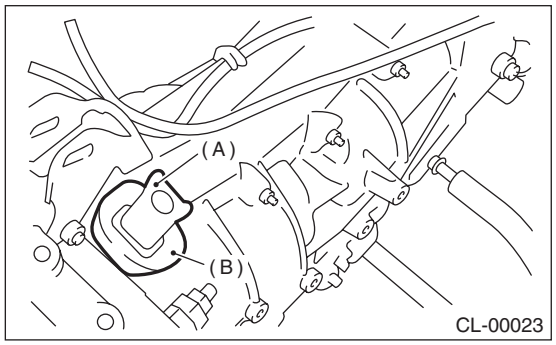
4. Release Bearing and Lever

A: REMOVAL

1. 5MT MODEL

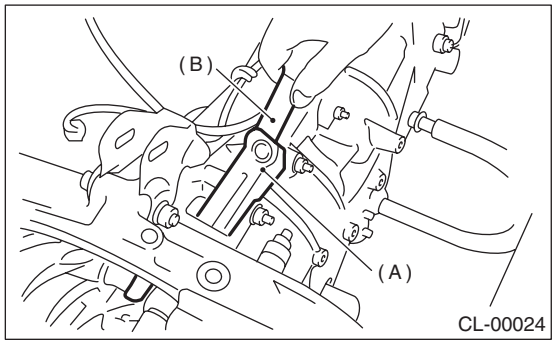
1) Remove the transmission assembly from vehicle body.
<Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the two clips from the release lever and remove the release bearing. (Non-turbo model)

CAUTION:
Be careful not to deform the clips.
3) Remove the release bearing from the clutch release lever. (Turbo model)
4) Remove the dust cover.



(A) Release lever
(B) Dust cover

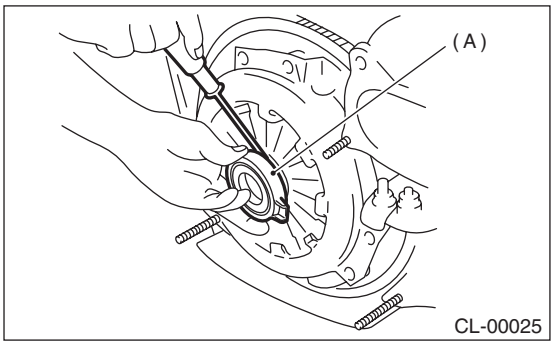
5) Remove the lever spring from the pivot with a screwdriver by accessing it through the clutch housing release lever hole. Then remove the release lever.



(A) Release lever
(B) Screwdriver

2. 6MT MODEL

1) Remove the transmission assembly from vehicle body. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Remove the release lever from the transmission.
3) Install the release bearing to the engine side.
4) Using a flat tip screwdriver, remove the release bearing from the clutch cover.



(A) Release bearing

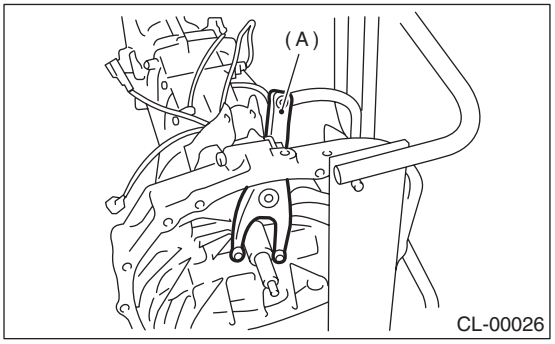
B: INSTALLATION

1. 5MT MODEL

NOTE:
Apply the specified grease to lubricate the following points before installation.
- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)

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.

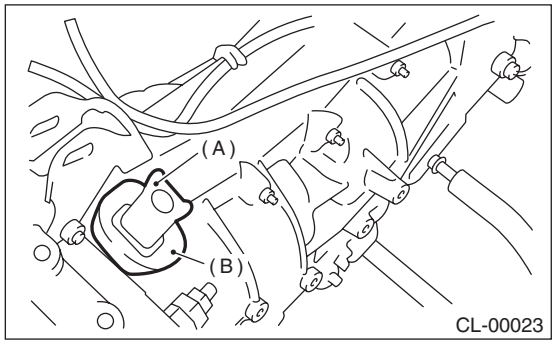
NOTE:
- Apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of the release lever and operating cylinder.
- Observing from the main case hole, check that the lever spring is installed securely.



(A) Release lever

2) Install the release bearing and fasten it with two clips. (Non-turbo model)
3) Install the release bearing. (Turbo model)

4) Install the dust cover.

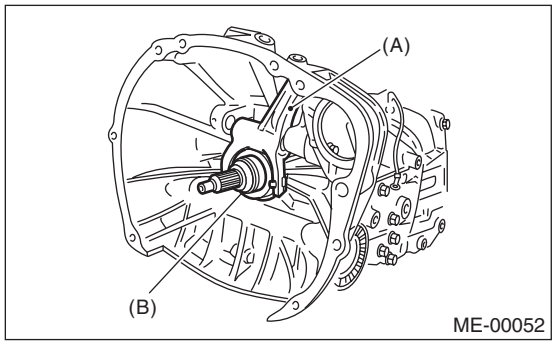


(A) Release lever
(B) Dust cover

5) Check the bearing for smooth movement by operating the release lever.
6) Install the transmission assembly.
<Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

2. 6MT MODEL

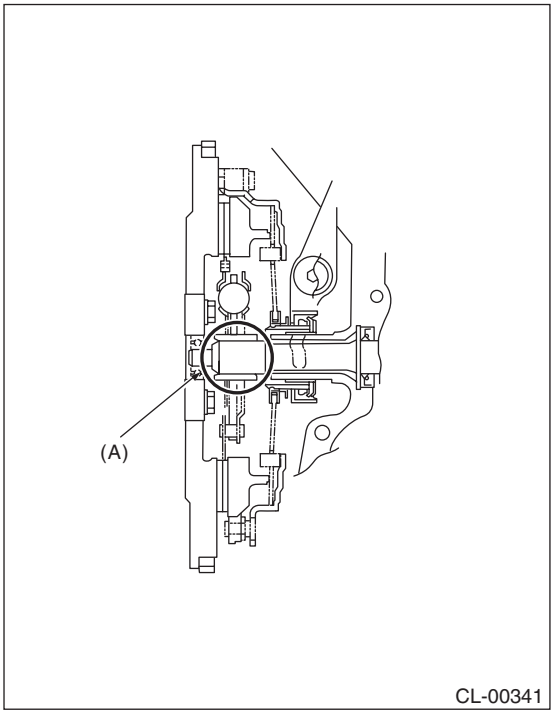
1) Attach the release bearing to the transmission.
2) Insert the release lever into the release bearing tab.



(A) Release lever
(B) Release bearing

3) Apply grease to splines.

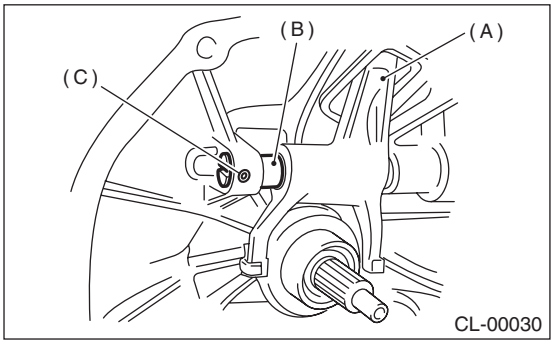
Grease:
NICHIMOLY N-130



(A) Spline

4) Insert the release shaft into the release lever.

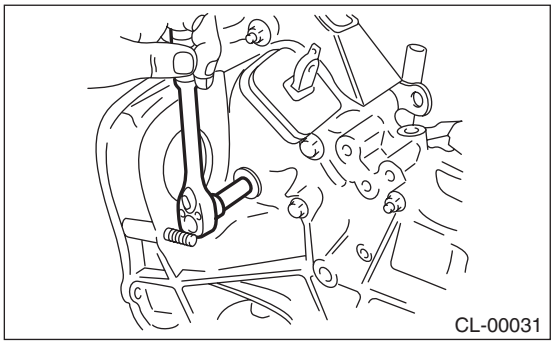
NOTE:
Make sure the cut portion of the release shaft comes into contact with the spring pin.



(A) Release lever
(B) Release shaft
(C) Spring pin

5) Tighten the plugs.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



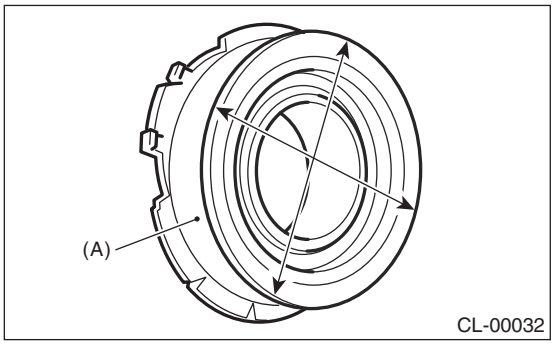
6) Check the release bearing and release lever for smooth movement by operating the release lever.
7) Install the transmission assembly. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. RELEASE BEARING

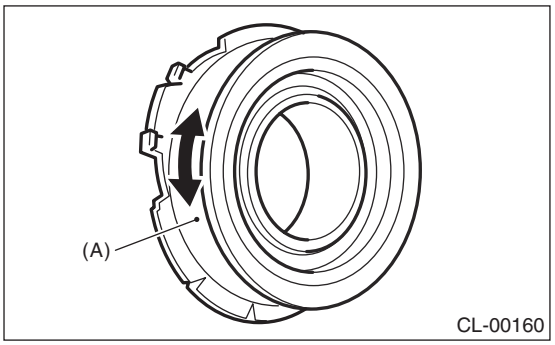
NOTE:
Since this bearing is grease-sealed and is a non-lubrication type, do not wash with gasoline or any other solvent when servicing the clutch.
1) Check the bearing for smooth movement by applying force to the bearing in the radial direction.

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.

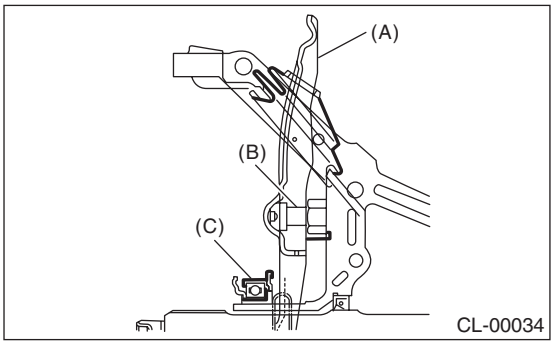


(A) Bearing case

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

2. RELEASE LEVER

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



(A) Clutch release lever
(B) Pivot
(C) Clutch release bearing

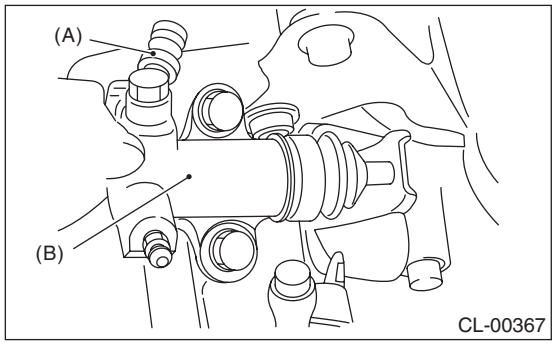
5. Operating Cylinder

A: REMOVAL

1) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Disconnect the clutch hose from the operating cylinder.

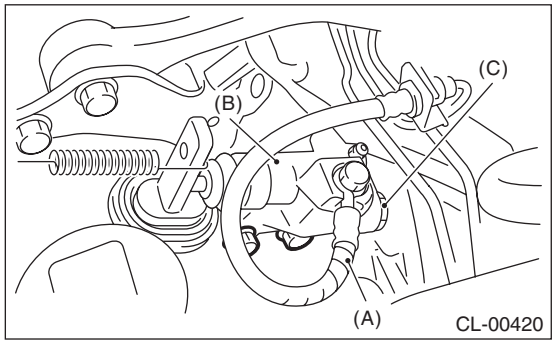
CAUTION:
• Cover the hose joint to prevent the clutch fluid from flowing out.
• Do not loosen or remove the cap bolts. (5MT turbo model)
• 5MT model

NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.



(A) Clutch hose
(B) Operating cylinder

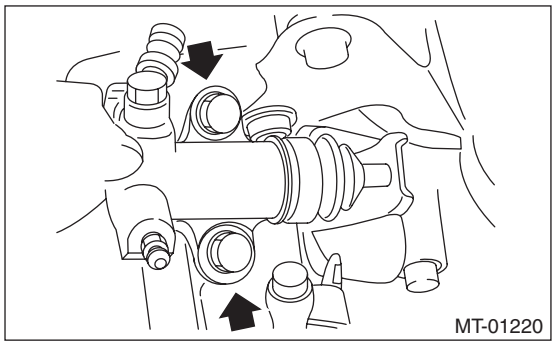
• 6MT model



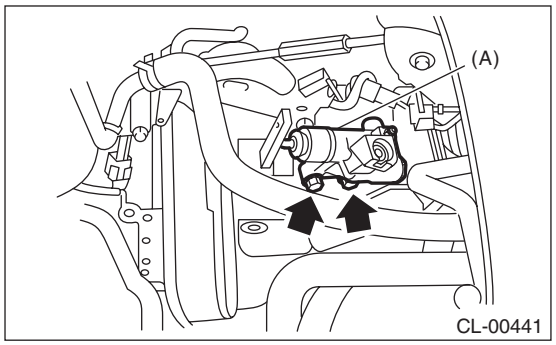
(A) Clutch hose
(B) Operating cylinder
(C) Cap bolt

4) Remove the operating cylinder from the transmission.
• 5MT model

NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.



• 6MT model



(A) Operating cylinder

B: INSTALLATION

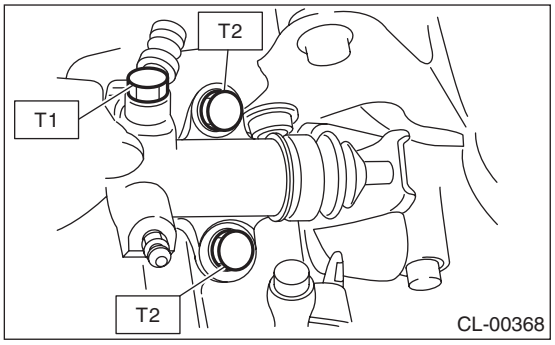
1. 5MT MODEL

1) Install in the reverse order of removal.

NOTE:
Before installing the operating cylinder, apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of the release lever and operating cylinder.

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)

NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.



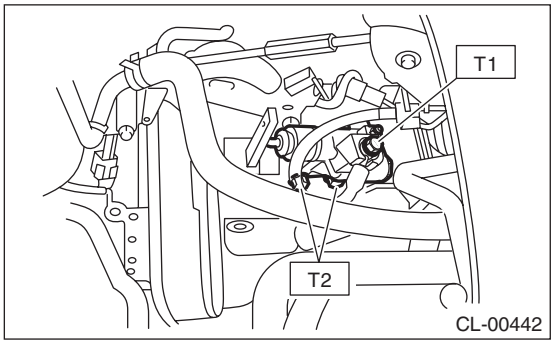
2) After bleeding air from the operating cylinder, ensure that the clutch operates properly.
<Ref. to CL-29, Clutch Fluid Air Bleeding.>

2. 6MT MODEL

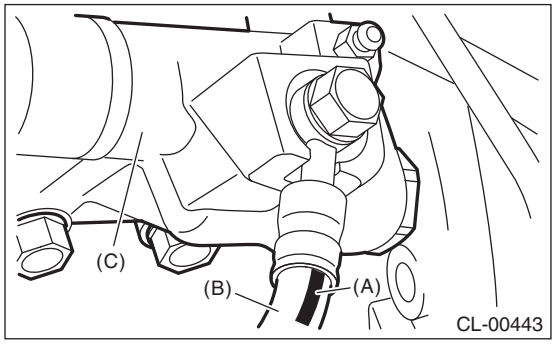
1) Install in the reverse order of removal.

NOTE:
Before installing the operating cylinder, apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of the release lever and operating cylinder.

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 41 N·m (4.2 kgf-m, 30.2 ft-lb)



NOTE:
• Be sure to install the clutch hose with the mark side facing upward.
• Be careful not to twist the clutch hose during installation.



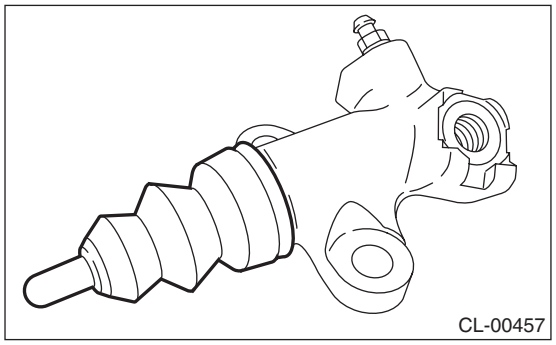
(A) Mark
(B) Clutch hose
(C) Operating cylinder

2) After bleeding air from the operating cylinder, ensure that the clutch operates properly.
<Ref. to CL-29, Clutch Fluid Air Bleeding.>

C: DISASSEMBLY

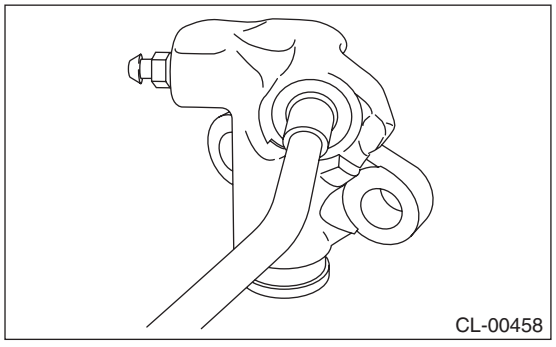
1) Remove the boots and push rod assembly.

NOTE:
The illustration below is for a Non-turbo model.



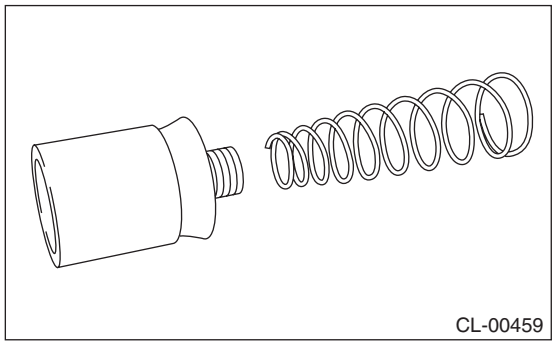
2) Apply compressed air through clutch hose attaching port.

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



3) Separate the piston and piston spring.

NOTE:
The illustration below is for a Non-turbo model.



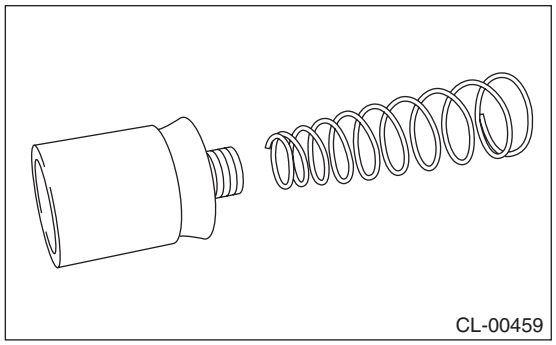
D: ASSEMBLY

NOTE:
During assembly, apply hydraulic oil to all parts.

Recommended brake fluid
FMVSS No. 116, fresh DOT3 or 4 brake fluid

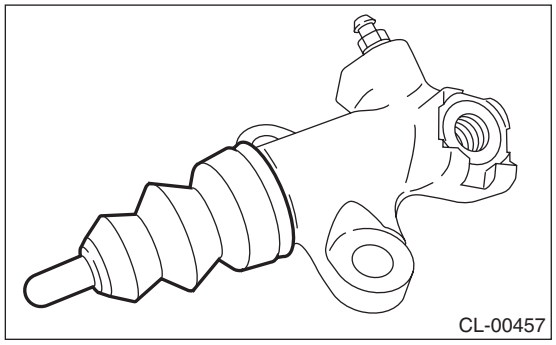
1) Install the piston spring to the piston.

NOTE:
The illustration below is for a Non-turbo model.



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

NOTE:
The illustration below is for a Non-turbo model.



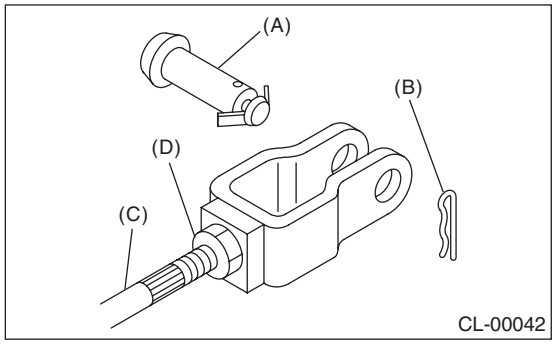
E: INSPECTION

1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
2) Check the operating cylinder for fluid leakage or damage on the boot. If any leakage or damage is found, replace the operating cylinder.

6. Master Cylinder

A: REMOVAL

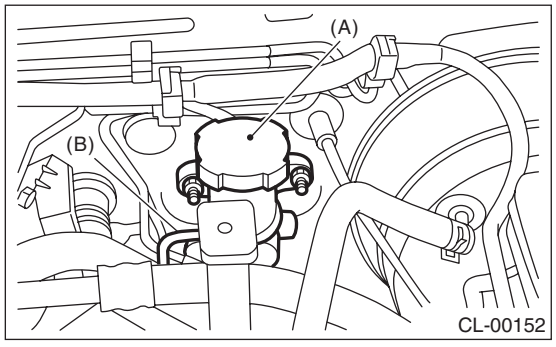
1) Thoroughly drain the brake fluid from the reservoir tank.
2) Remove the snap pin and clevis pin, and then separate the push rod of the master cylinder from clutch pedal.



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

3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the clutch pipe from the master cylinder.
6) Remove the master cylinder and reservoir tank as a unit.

CAUTION:
Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wipe off quickly if spilled.



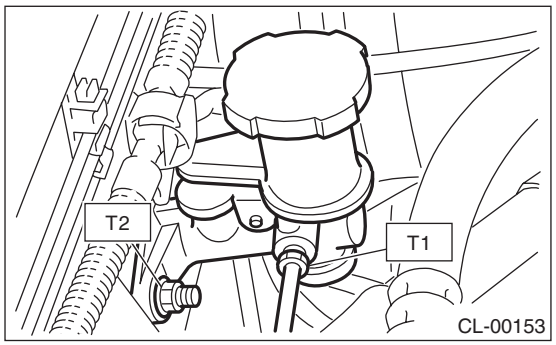
(A) Master cylinder ASSY
(B) Clutch pipe

B: INSTALLATION

1) Install the master cylinder to the vehicle body, and connect the clutch pipe to the master cylinder.

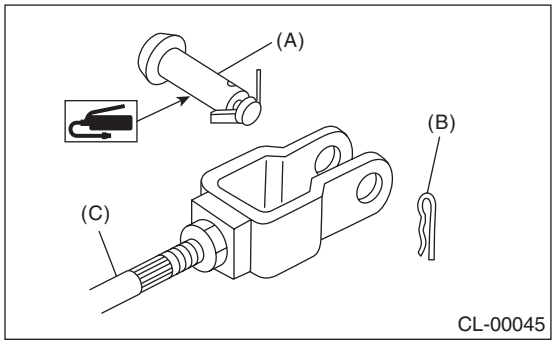
NOTE:
Check that the pipe is routed properly.

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



2) Connect the push rod of the master cylinder to the clutch pedal, and install the clevis pin and snap pin.

NOTE:
Apply grease to the clevis pin.

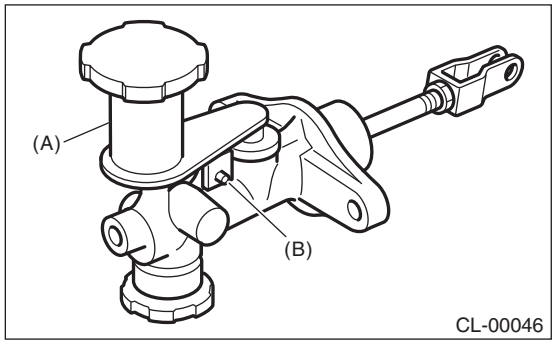


(A) Clevis pin
(B) Snap pin
(C) Push rod

3) After bleeding air from the clutch system, ensure that the clutch operates properly.
<Ref. to CL-29, Clutch Fluid Air Bleeding.>
4) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
5) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

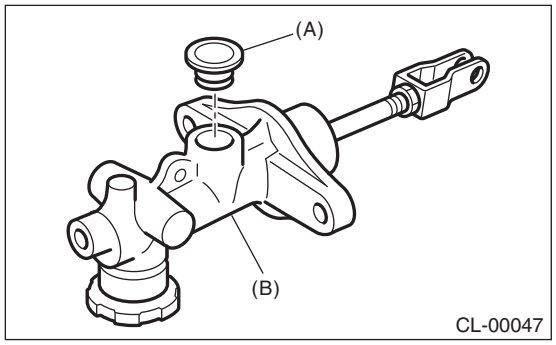
C: DISASSEMBLY

1) Remove the straight pin and reservoir tank.



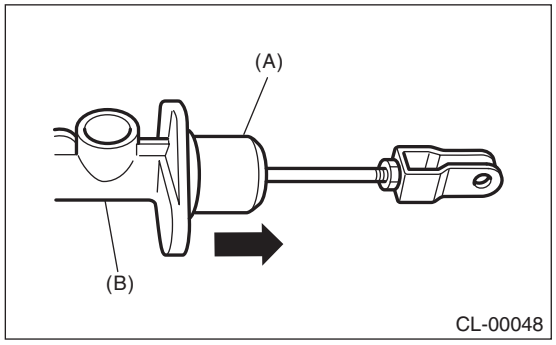
(A) Reservoir tank
(B) Straight pin

2) Remove the oil seal.



(A) Oil seal
(B) Master cylinder

3) Move the cylinder boot towards the rear.



(A) Cylinder boot
(B) Master cylinder

4) Remove the snap ring.

CAUTION:
Be careful when removing the snap ring, to prevent the rod, washer, piston and return spring from flying out.

5) Remove the clutch damper.

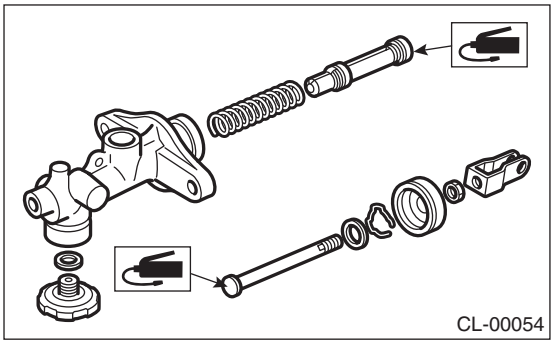
D: ASSEMBLY

1) Install the clutch damper.

Tightening torque:
46.6 N·m (4.75 kgf-m, 34.4 ft-lb)

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

Grease:
SILICONE GREASE G40M (Part No. 004404003)

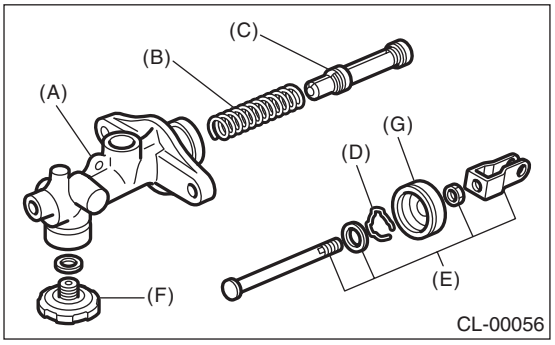


3) Assemble in the reverse order of disassembly.

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)

E: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring, gasket, clutch damper, cylinder boot or hose, replace the faulty part.

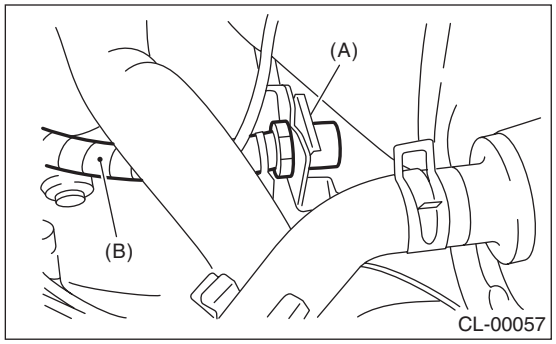


(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Stop ring
(E) Push rod ASSY
(F) Clutch damper
(G) Cylinder boot

7. Clutch Pipe and Hose

A: REMOVAL

1) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Drain the clutch fluid. <Ref. to CL-28, Clutch Fluid.>
4) Disconnect the clutch pipe from the clutch hose and master cylinder.
5) Pull out the clamp, then remove the clutch hose from the bracket.



(A) Clamp
(B) Clutch hose

6) Disconnect the hose from the operating cylinder.
7) Remove the bracket.

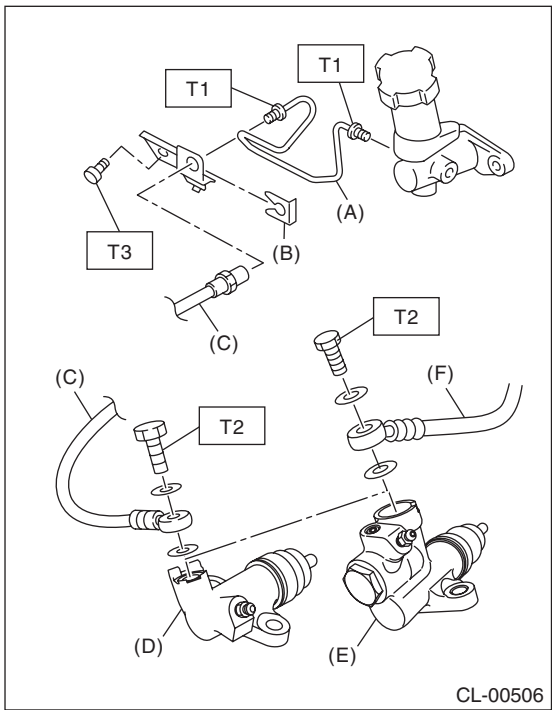
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Bleed air from the clutch fluid. <Ref. to CL-29, Clutch Fluid Air Bleeding.>

- 5MT model

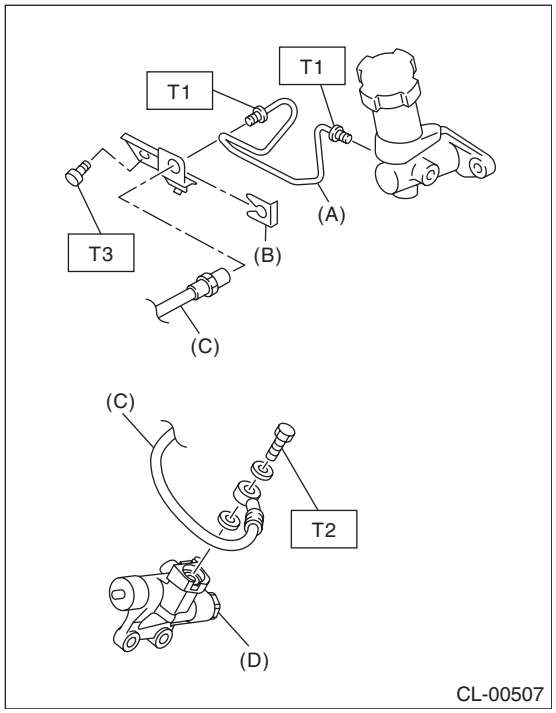
Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T3: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Clutch pipe
(B) Clip
(C) Clutch hose (Non-turbo model)
(D) Operating cylinder (Non-turbo model)
(E) Operating cylinder (Turbo model)
(F) Clutch hose (Turbo model)

- 6MT model

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T3: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Clutch pipe
(B) Clip
(C) Clutch hose
(D) Operating cylinder (6MT turbo model)

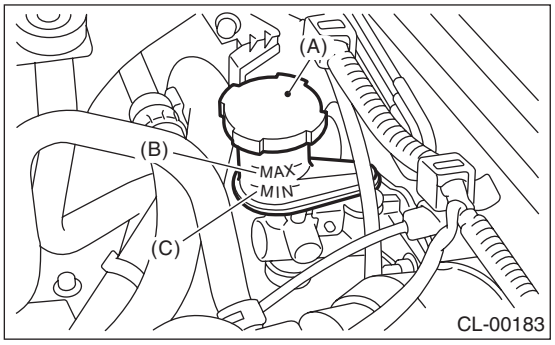
C: INSPECTION

Check pipes and hoses for cracks, breakage or damage. Check joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace the defective pipe or hose.

8. Clutch Fluid

A: INSPECTION

1) Park the vehicle on a level surface.
2) Inspect the fluid level using the scale on the outside of the reservoir tank. If the level is below “MIN”, add fluid to bring it up to “MAX”, and also inspect for leakage.



(A) Reservoir tank
(B) MAX. level
(C) MIN. level

B: REPLACEMENT

CAUTION:
• Use new FMVSS No. 116, DOT3 or 4 brake fluid.
• Cover the bleeder with cloth to prevent brake fluid from being splashed on surrounding parts when loosening the bleeder.
• Avoid mixing different brands of brake fluid to prevent the quality of fluid 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 brake fluid to prevent entry of air.
• Clutch pedal must be operated very slowly.
• For convenience and safety, it is advisable to have two people working.
• The amount of brake fluid required is approximately 70 m ℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

1) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Drain the brake fluid from the reservoir tank.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

5) If necessary, bleed air from the clutch fluid. <Ref. to CL-29, Clutch Fluid Air Bleeding.>

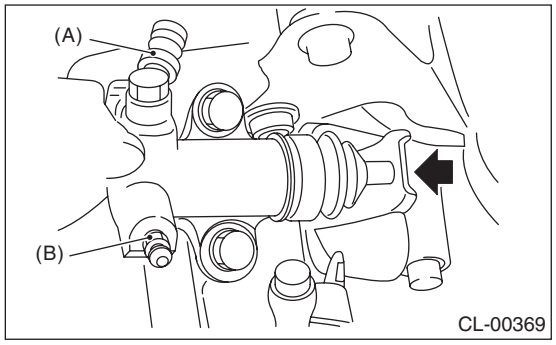
9. Clutch Fluid Air Bleeding

A: PROCEDURE

1. 5MT MODEL

NOTE:
Bleed air from the oil line with help of a co-worker.
1) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Fit one end of a vinyl tube into the air bleeder of the operating cylinder, and put the other end into a brake fluid container.

NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.

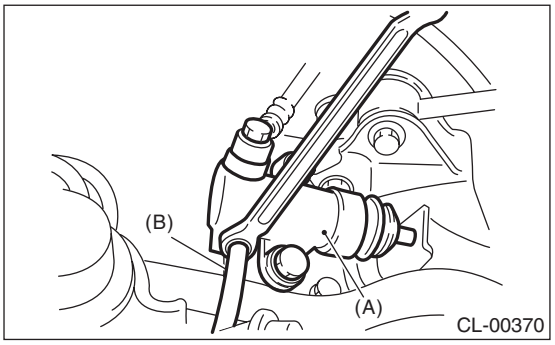


(A) Clutch hose
(B) Air bleeder

4) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

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

NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.

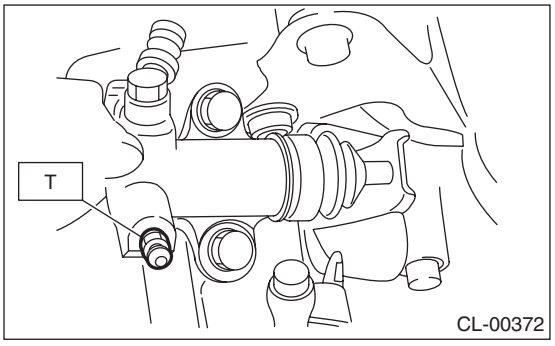


(A) Operating cylinder
(B) Vinyl tube

5) Repeat procedure 4), until there are no more air bubbles in the vinyl tube.
6) Tighten the air bleeder.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.

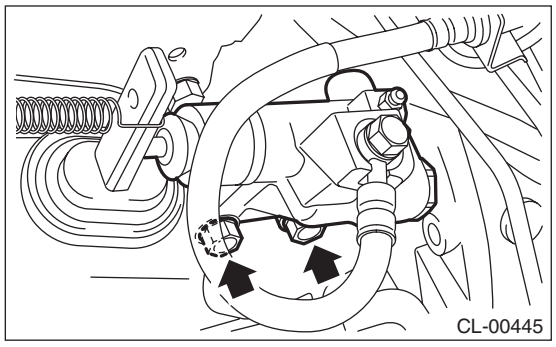


7) After stepping on the clutch pedal, make sure that there are no leaks evident in the entire clutch system.
8) After bleeding the air from clutch system, ensure that the clutch operates properly.

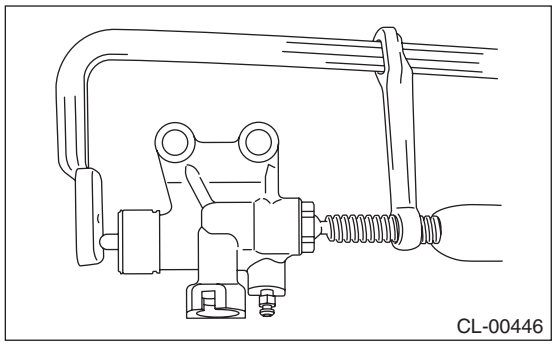
2. 6MT MODEL

NOTE:
Bleed air from the oil line with help of a co-worker.
1) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Fit one end of a vinyl tube to the air bleeder of the master cylinder, and put the other end into a brake fluid container.
3) Remove the operating cylinder.

NOTE:
Do not remove the clutch hose.

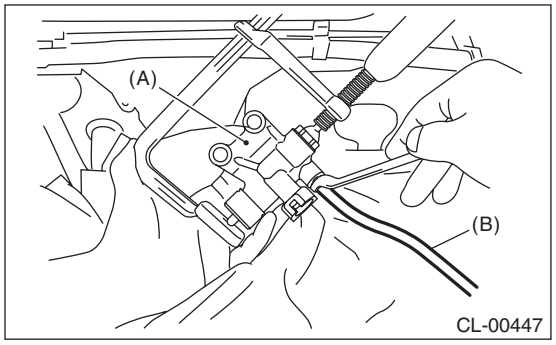


4) Hold the piston with a clamp to prevent piston from popping out.



5) Fit one end of a vinyl tube into the air bleeder of the operating cylinder, and put the other end into a brake fluid container.
6) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

NOTE:
When performing this procedure, place the screw portion of the air bleeder higher than the end of operating cylinder.



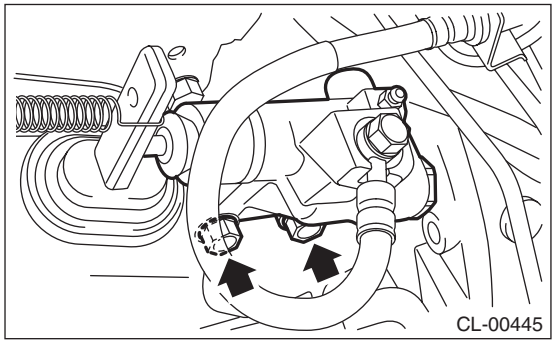
(A) Operating cylinder
(B) Vinyl tube

7) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:
Cover the bleeder with cloth to prevent brake fluid from being splashed on surrounding parts when loosening the bleeder.
8) Tighten the air bleeder.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)
9) Install the operating cylinder.

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

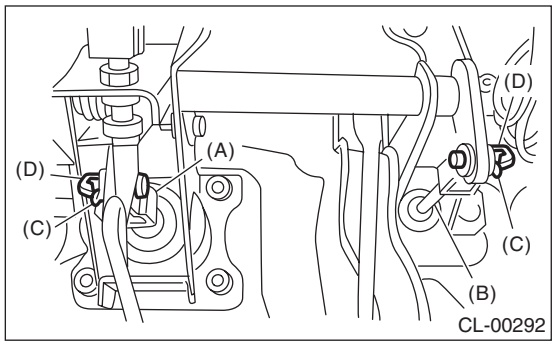


10) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
11) After bleeding air from system, ensure that the clutch operates properly.
12) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

10.Clutch Pedal

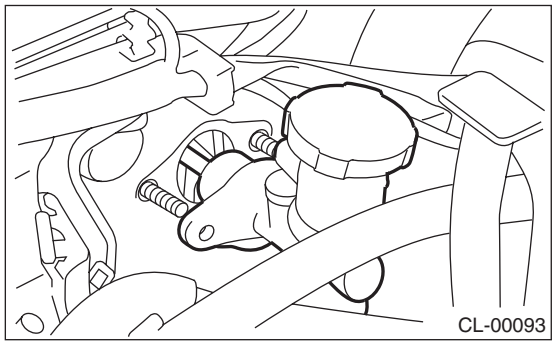
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the steering column. <Ref. to PS-17, REMOVAL, Tilt Steering Column.>
3) Disconnect the connectors of the stop light switch and clutch switch.
4) Remove the snap pins from clevis pins which secure the lever to the push rod and operating rod.
5) Pull out the clevis pins which secures the lever to the push rod and operating rod.



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

6) Remove the nut which secures the clutch master cylinder.



7) Remove the bolt which secures the brake pedal and clutch pedal, and remove the pedal assembly.

B: INSTALLATION

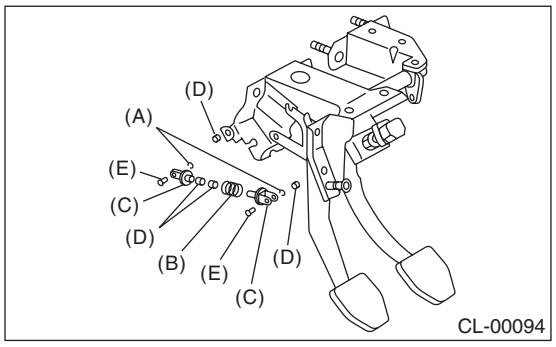
1) Install in the reverse order of removal.

Tightening torque:
T: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

CAUTION:
Always use a new clevis pin.
2) Adjust the clutch pedal after installation. <Ref. to CL-32, ADJUSTMENT, Clutch Pedal.>

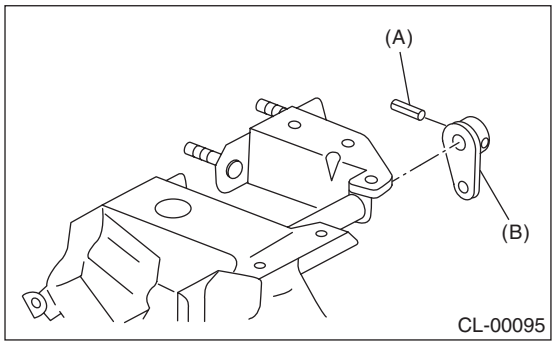
C: DISASSEMBLY

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



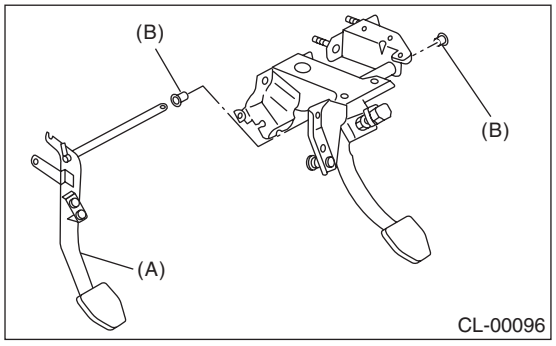
(A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

3) Extract the spring pin and remove the lever.



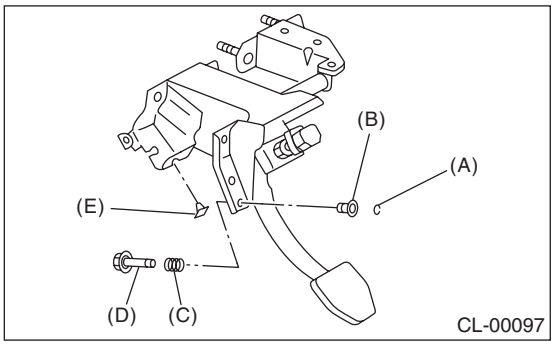
(A) Pin
(B) Lever

4) Remove the clutch pedal and bushing.



(A) Clutch pedal
(B) Bushing

5) Remove the stopper, clip and rod S, and remove the spring and bushing S.



(A) Clip
(B) Bushing S
(C) Spring S
(D) Rod S
(E) Stopper

6) Remove the stopper from the clutch pedal.
7) Remove the clutch pedal pad.

D: ASSEMBLY

1) Temporarily assemble the clutch switch, etc. to pedal bracket.
2) Clean the clutch pedal and brake pedal bushing holes, apply a thin coat of grease, and install the bushings.
3) Align the holes of the pedal bracket, clutch pedal and brake pedal, and install the brake pedal return spring, assist rod, spring and bushing.

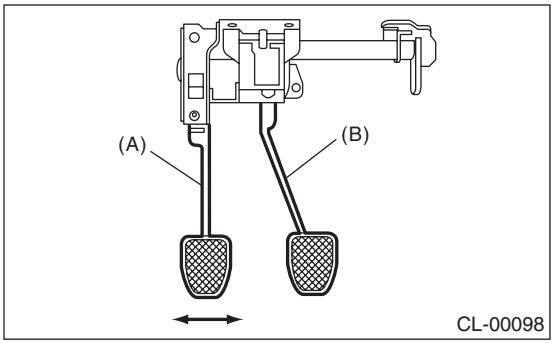
NOTE:
Clean the inside of bushings and apply a thin coat of grease before installing the spacer.

E: INSPECTION

1. CLUTCH PEDAL

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

Deflection of the clutch pedal:
Service limit
5.0 mm (0.197 in) or less



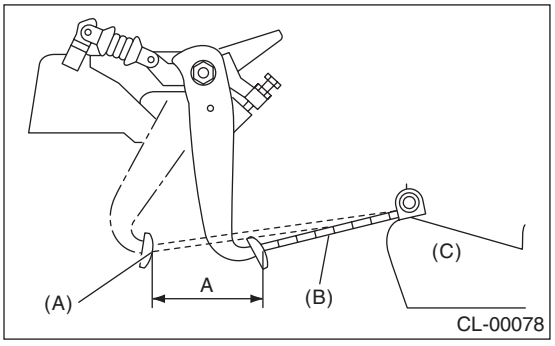
(A) Clutch pedal
(B) Brake pedal

F: ADJUSTMENT

1) Measure the full stroke of the clutch pedal.

NOTE:
• Measure the leading end of the seat cushion and center of the pedal.
• Align the seat with the seventh notch position from the position at the very front.

Specified clutch pedal full stroke A:
5MT non-turbo model and 6MT model:
130 — 135 mm (5.12 — 5.31 in)
5MT turbo model:
135 — 140 mm (5.31 — 5.51 in)

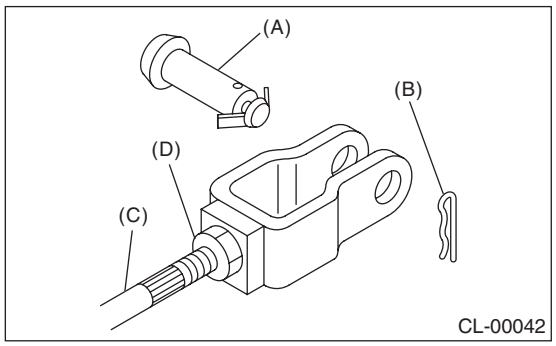


(A) Clutch pedal (Full stroke condition)
(B) Scale
(C) Seats

2) If the full stroke is not within the specified value, loosen the clutch switch lock nut to adjust.

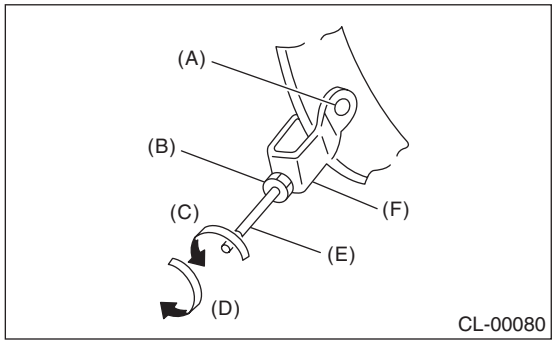
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

3) Loosen the push rod lock nuts.



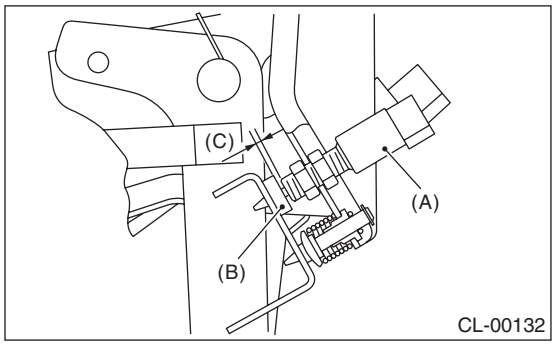
(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Push rod lock nut

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



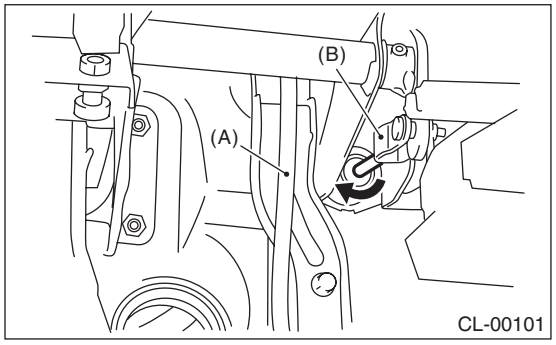
(A) Clevis hole
(B) Push rod lock nut
(C) In the shorter direction
(D) In the longer direction
(E) Push rod
(F) U shaped hardware

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



(A) Clutch switch
(B) Stopper
(C) Clearance

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



(A) Accelerator pedal
(B) Clevis

8) Check that the clevis pin moves smoothly by moving it in the left and right directions.
9) Tighten the push rod lock nut.

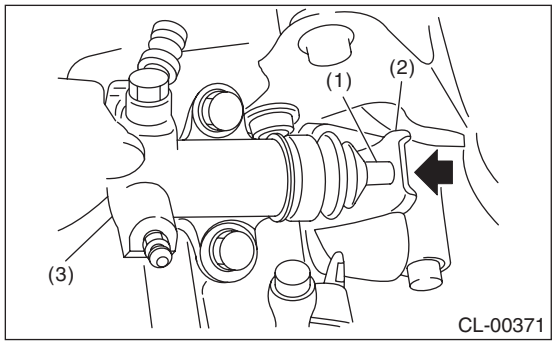
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

10) Depress and release the clutch pedal two or three times to ensure that the clutch pedal and release fork operate smoothly. If the clutch pedal and release fork do not operate smoothly, bleed air from the clutch hydraulic system. <Ref. to CL-29, Clutch Fluid Air Bleeding.>
11) Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not within specifications, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:
5MT non-turbo model and 6MT model:
130 — 135 mm (5.12 — 5.31 in)
5MT turbo model:
135 — 140 mm (5.31 — 5.51 in)

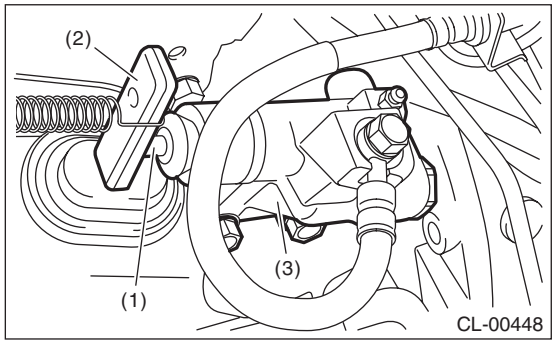
12) Move the clevis pin to left, then to right. The clevis pin should move without resistance even if it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.
13) Push the release lever until the operating cylinder push rod retracts. Make sure that the clutch fluid level in the reservoir tank increases. If the clutch fluid level increases, the hydraulic clutch is properly adjusted; if the fluid level does not increase or the push rod does not retract, replace the master cylinder. <Ref. to CL-24, Master Cylinder.>
• 5MT model

NOTE:
The illustration below is for a Non-turbo model. However, perform the same procedures for the Turbo model.



(1) Push rod
(2) Release lever
(3) Operating cylinder

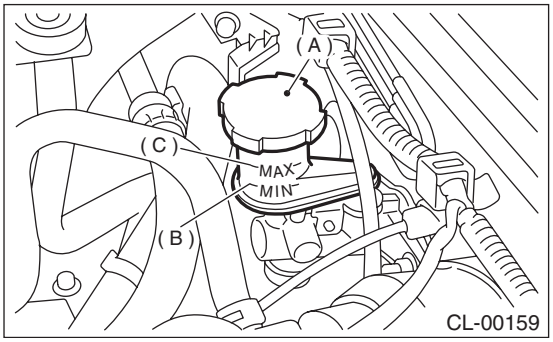
• 6MT model



(1) Push rod
(2) Release lever
(3) Operating cylinder

14) Check the fluid level using the scale on the outside of the reservoir tank. If the level is below “MIN”, fill fluid up to “MAX” level.

Recommended clutch fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid



(A) Reservoir tank
(B) MIN. level
(C) MAX. level

11.Clutch Switch

A: REMOVAL

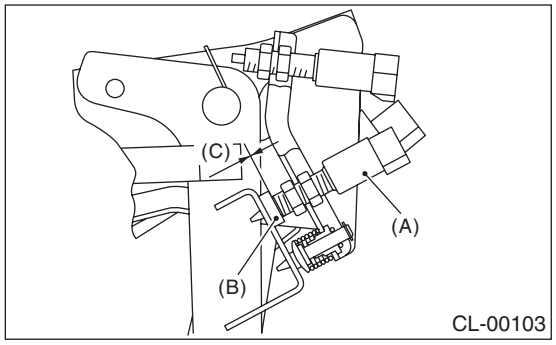
1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover.
3) Disconnect the connector from clutch switch.
4) Remove the clutch switches.

B: INSTALLATION

1. CLUTCH SWITCH (WITH CRUISE CONTROL)

1) Install so that there is a gap of 0 mm (0 in) of the clutch switch and clutch pedal stopper.

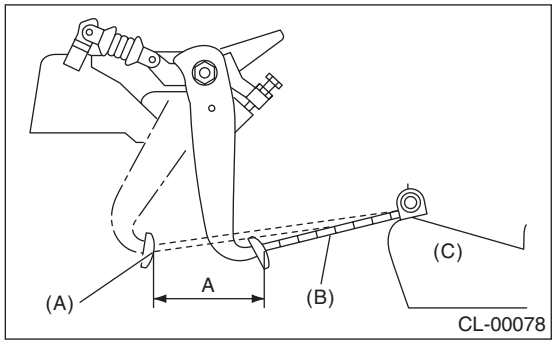
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Clutch switch
(B) Stopper
(C) 0 mm (0 in)

2) Measure the stroke of the clutch pedal.

Clutch pedal standard full stroke: A
5MT non-turbo model and 6MT model
130 — 135 mm (5.12 — 5.31 in)
5MT turbo model
135 — 140 mm (5.31 — 5.51 in)



(A) Clutch pedal (Full stroke condition)
(B) Scale
(C) Seats

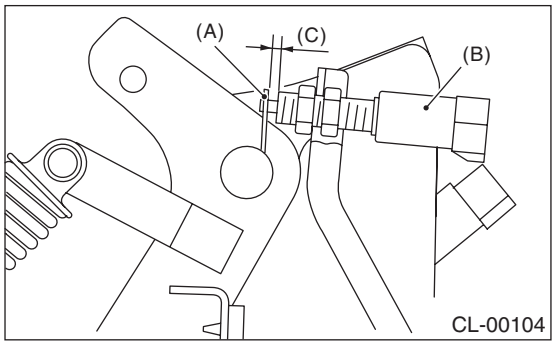
3) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-32, ADJUSTMENT, Clutch Pedal.>

4) Connect the clutch switch connector.

2. CLUTCH SWITCH (CLUTCH START)

1) Fully depress the clutch and hold it.
2) Install the clutch pedal plate and clutch pedal so that the gap between them is 2 — 2.5 mm (0.08 — 0.10 in), and then tighten the lock nut.

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



(A) Plate
(B) Clutch pedal
(C) 2 — 2.5 mm (0.08 — 0.10 in)

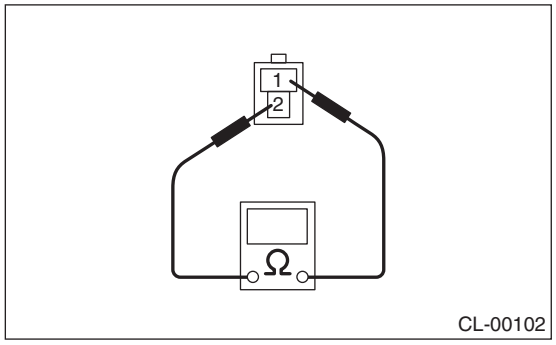
3) Connect the clutch switch connector.
4) Make sure that engine does not start with clutch pedal not depressed.
5) Make sure that engine starts with clutch pedal fully depressed.

C: INSPECTION

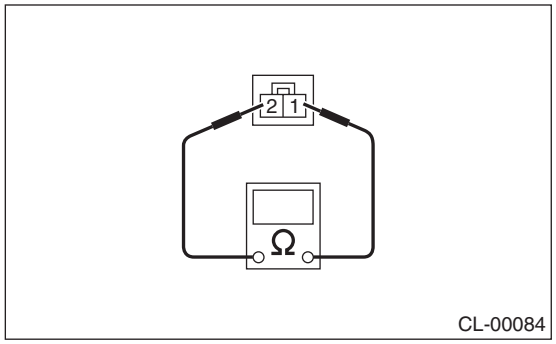
1) Make sure that engine does not start with clutch pedal not depressed. If the engine starts, adjust the clutch switch and inspect the starter interlock circuit.
2) Make sure that engine starts with clutch pedal fully depressed. If the engine does not start, adjust the clutch switch and inspect the starter interlock circuit.
3) Check the clutch switch for continuity. If the resistance is not at the standard value, replace the switch.
(1) Disconnect the clutch switch connector.
(2) Measure the resistance between terminal 1 and 2 of the switch.

Condition	Terminal No.	Specified resistance
When clutch pedal is depressed	1 and 2	Less than 1 Ω
When the clutch pedal is depressed.	1 and 2	1 MΩ or more

Clutch switch (Clutch start)

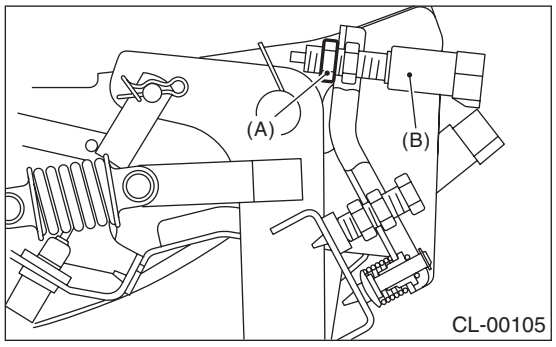


Clutch switch (Cruise control)



D: ADJUSTMENT

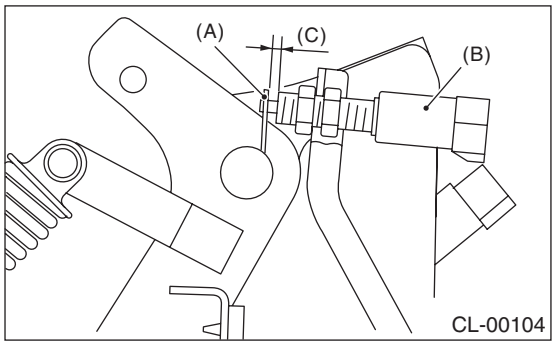
1) Loosen the lock nut of clutch switch (clutch start).



(A) Lock nut
(B) Clutch switch (Clutch start)

2) Fully depress the clutch and hold it.

3) Adjust the gap of the clutch pedal plate and the clutch switch to be 2 — 2.5 mm (0.08 — 0.10 in).



(A) Plate
(B) Clutch switch (Clutch start)
(C) 2 — 2.5 mm (0.08 — 0.10 in)

4) Tighten the lock nut.

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

12.General Diagnostic Table

A: INSPECTION

1. CLUTCH

Symptom	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	Correct or replace.
	(e) Defective release bearing holder	Correct 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-38, 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	Correct 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	Correct or replace.
	(e) Loose disc rivets	Replace the clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Improper adjustment of the pitching stopper	Adjust.

Symptom	Possible cause	Corrective action
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.
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

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

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

	Step	Check	Yes	No
1	**CHECK GEAR NOISE.** 1) Start the engine. 2) Disengage the clutch and shift quickly from neutral to reverse in idling condition.	Is there any abnormal noise from the transmission gear?	Go to step **2**.	Clutch is normal.
2	**CHECK GEAR NOISE.** Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds.	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) Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds. 2) With the clutch disengaged, 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
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

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FRONT SUSPENSION

FS

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2. Wheel Alignment 7
3. Front Crossmember Support Plate 14
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5. Front Ball Joint 16
6. Front Arm 18
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8. Front Crossmember 25
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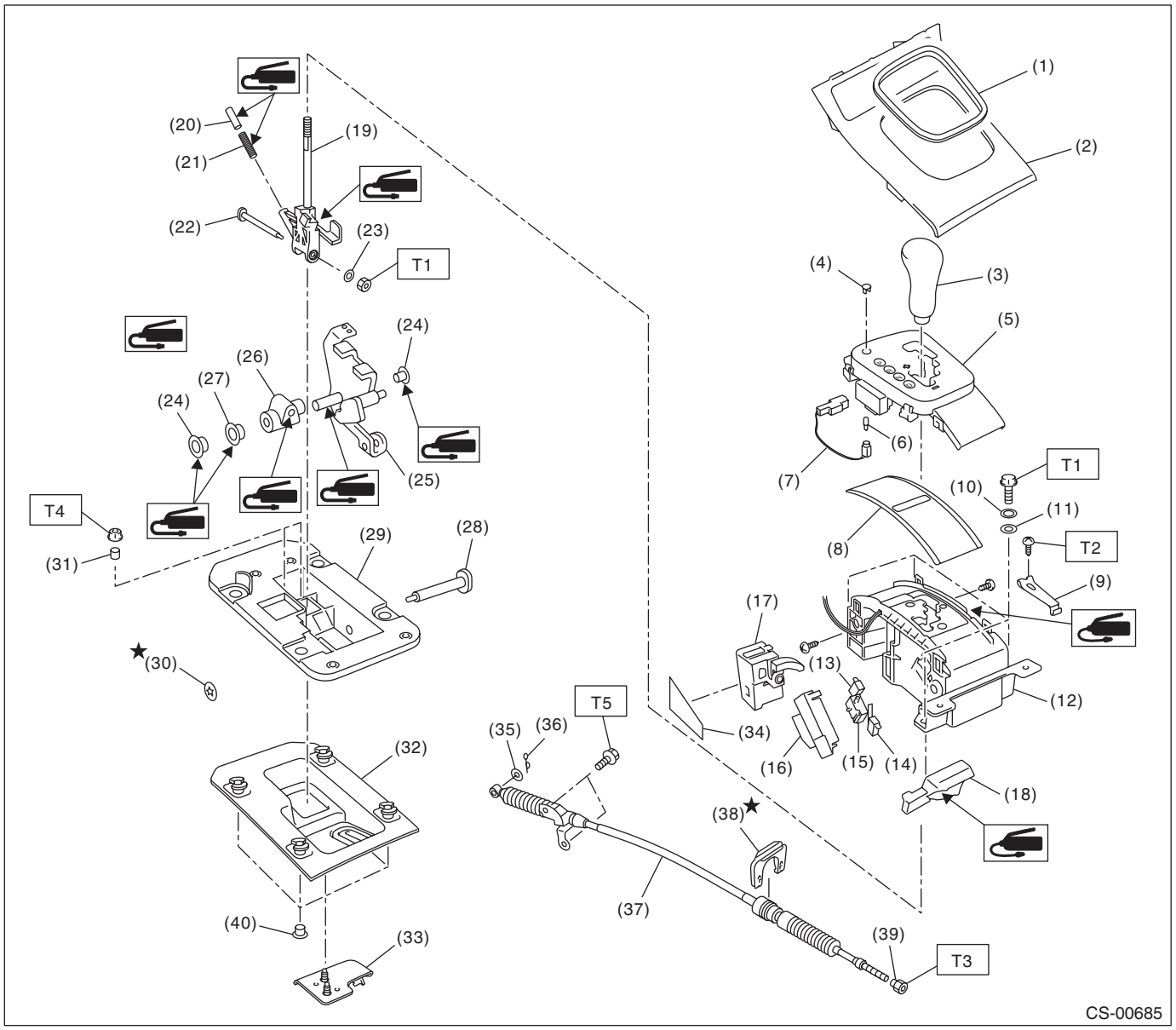
1. General Description

A: SPECIFICATION

Item		Specification
Swing torque of rod against lever	N (kgf, lb)	3.7 (0.38, 0.84) or less

B: COMPONENT

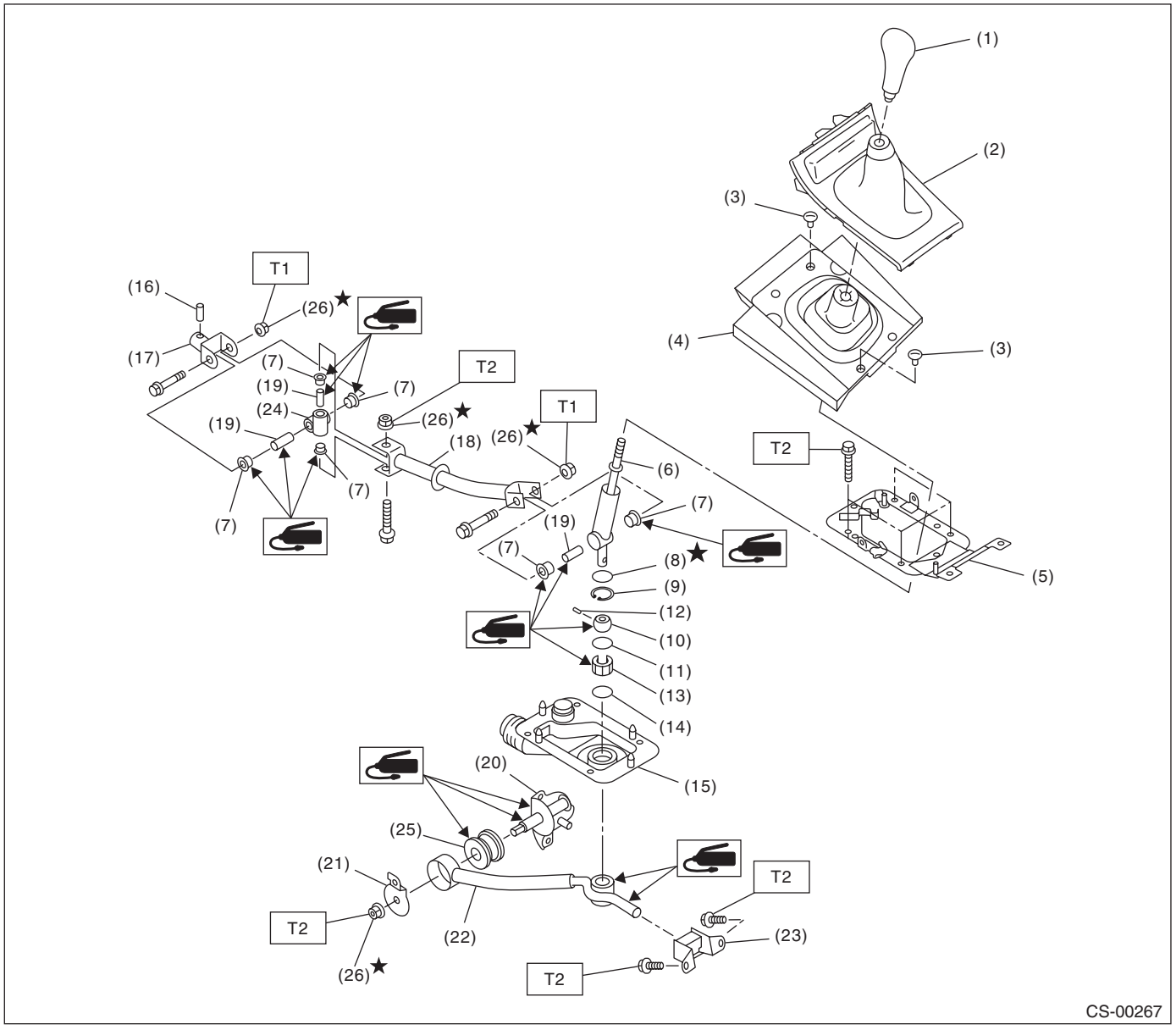
1. AT SELECT LEVER



(1) Ring indicator
(2) Front cover
(3) Grip
(4) Release cover
(5) Indicator ASSY
(6) Indicator bulb
(7) Valve harness
(8) Blind
(9) Detent spring
(10) Spring washer
(11) Washer
(12) Guide plate upper
(13) Up switch
(14) Down switch
(15) SPORT mode switch
(16) Switch cover
(17) Shift lock solenoid ASSY
(18) Check plate
(19) Lever ASSY
(20) Check ball
(21) Return spring
(22) Shaft
(23) Washer
(24) Bushing A
(25) Arm ASSY
(26) Bushing plate
(27) Bushing B
(28) Shaft
(29) Plate lower
(30) Clamp
(31) Collar
(32) Gasket
(33) Cable bracket
(34) Seat
(35) Washer
(36) Snap pin
(37) Select cable
(38) Clamp
(39) Nut A
(40) Bushing

Tightening torque:N·m (kgf-m, ft-lb)
T1: 5.1 (0.52, 3.8)
T2: 6.9 (0.70, 5.1)
T3: 7.5 (0.76, 5.5)
T4: 12.7 (1.3, 9.4)
T5: 18 (1.8, 13.3)

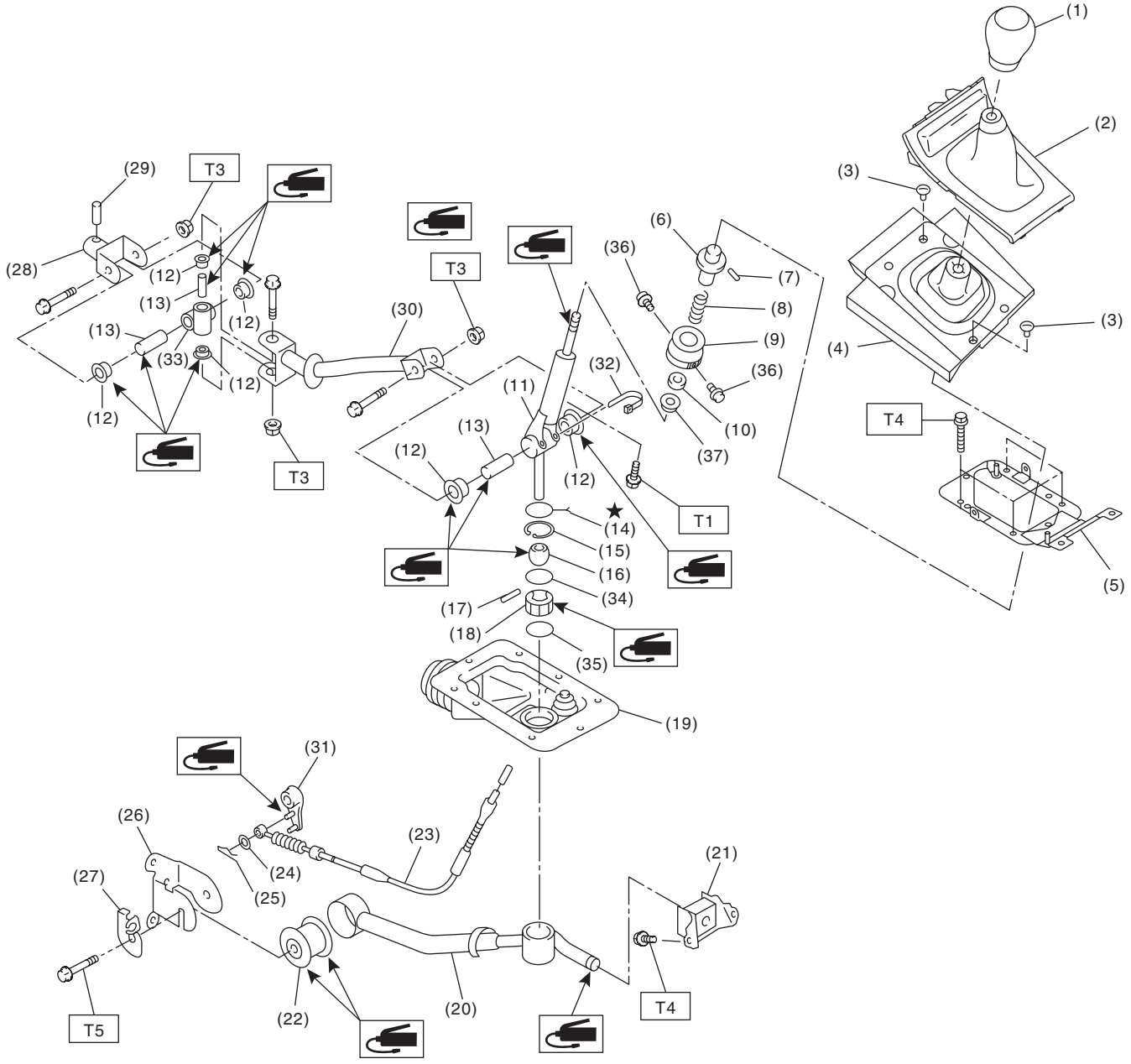
2. 5MT GEAR SHIFT LEVER



(1) Gear shift knob
(2) Front cover ASSY
(3) Clamp
(4) Boot and insulator ASSY
(5) Plate ASSY
(6) Lever
(7) Bushing
(8) Lock wire
(9) Snap ring
(10) Bushing
(11) O-ring
(12) Spring pin
(13) Bushing B
(14) O-ring
(15) Boot
(16) Spring pin
(17) Joint
(18) Rod
(19) Spacer
(20) Bracket
(21) Washer
(22) Stay
(23) Cushion rubber
(24) Boss
(25) Bushing
(26) Self-locking nut

Tightening torque:N·m (kgf-m, ft-lb)
T1: 12 (1.2, 8.9)
T2: 18 (1.8, 13.3)

3. 6MT GEAR SHIFT LEVER



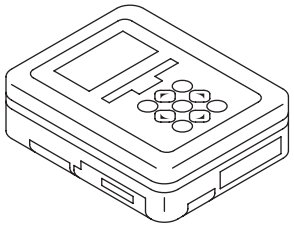
CS-00561

(1) Gear shift knob
(2) Front cover ASSY
(3) Clamp
(4) Boot and insulator ASSY
(5) Plate ASSY
(6) Slider
(7) Spring pin
(8) Spring
(9) Holder
(10) Seat cushion
(11) Lever
(12) Bushing
(13) Spacer
(14) Lock wire
(15) Snap ring
(16) Bushing
(17) Spring pin
(18) Bushing
(19) Boot
(20) Stay
(21) Cushion rubber
(22) Bushing
(23) Reverse check cable
(24) Washer
(25) Snap pin
(26) Bracket
(27) Cable plate
(28) Joint
(29) Spring pin
(30) Rod
(31) Reverse check lever
(32) Band clip
(33) Boss
(34) O-ring
(35) O-ring
(36) Screw
(37) Spring seat

Tightening torque:N·m (kgf-m, ft-lb)
T1: 1.3 (0.13, 0.96)
T2: 7.5 (0.76, 5.5)
T3: 12 (1.2, 8.9)
T4: 18 (1.8, 13.3)
T5: 32 (3.3, 23.6)

C: PREPARATION TOOL

1. SPECIAL TOOL

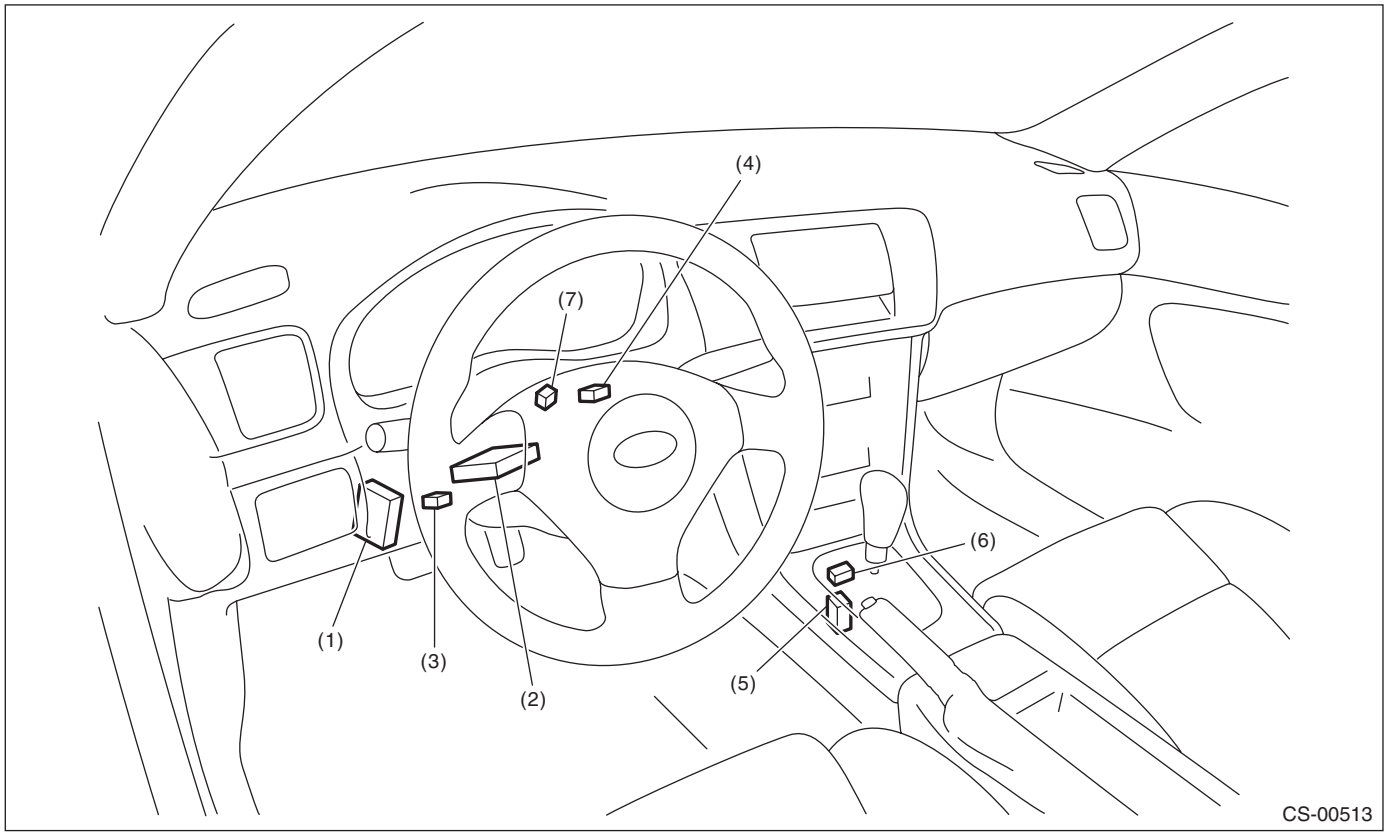
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B020XU0	1B020XU0	SUBARU SELECT MONITOR KIT	Used for troubleshooting the electrical system.

D: CAUTION

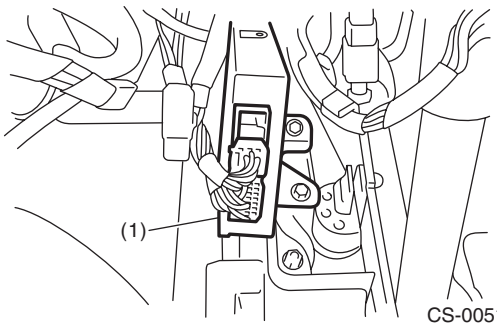
• Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine fluid, grease etc. or equivalent. Do not mix fluid, grease, etc. of different grades or manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolving surfaces before installation.
• Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
• Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
• Before disconnecting electrical connectors, be sure to disconnect the negative terminal from battery.

2. AT Shift Lock Control System

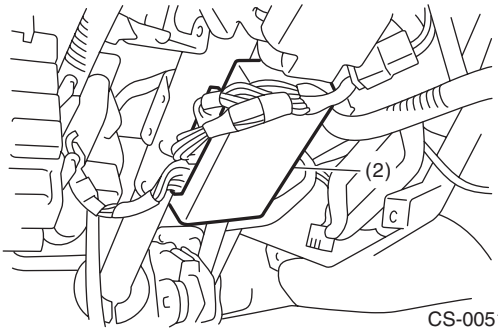
A: LOCATION



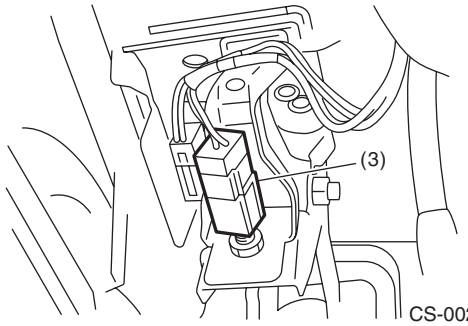
(1) TCM (“P” range)
(2) Body integrated unit
(3) Stop light switch
(4) Key cylinder (with built-in key warning switch)
(5) Shift lock solenoid ASSY
(6) “P” range switch
(7) Key lock solenoid



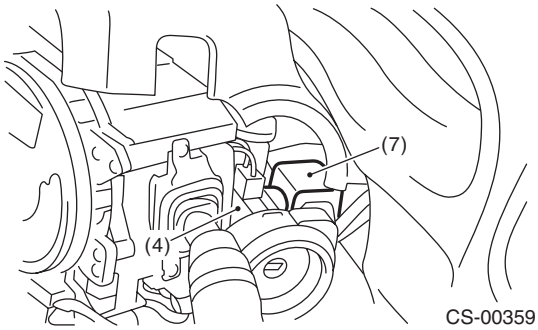
CS-00514



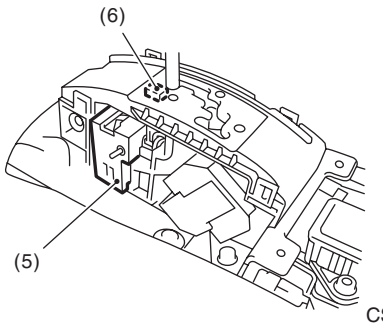
CS-00515



CS-00270

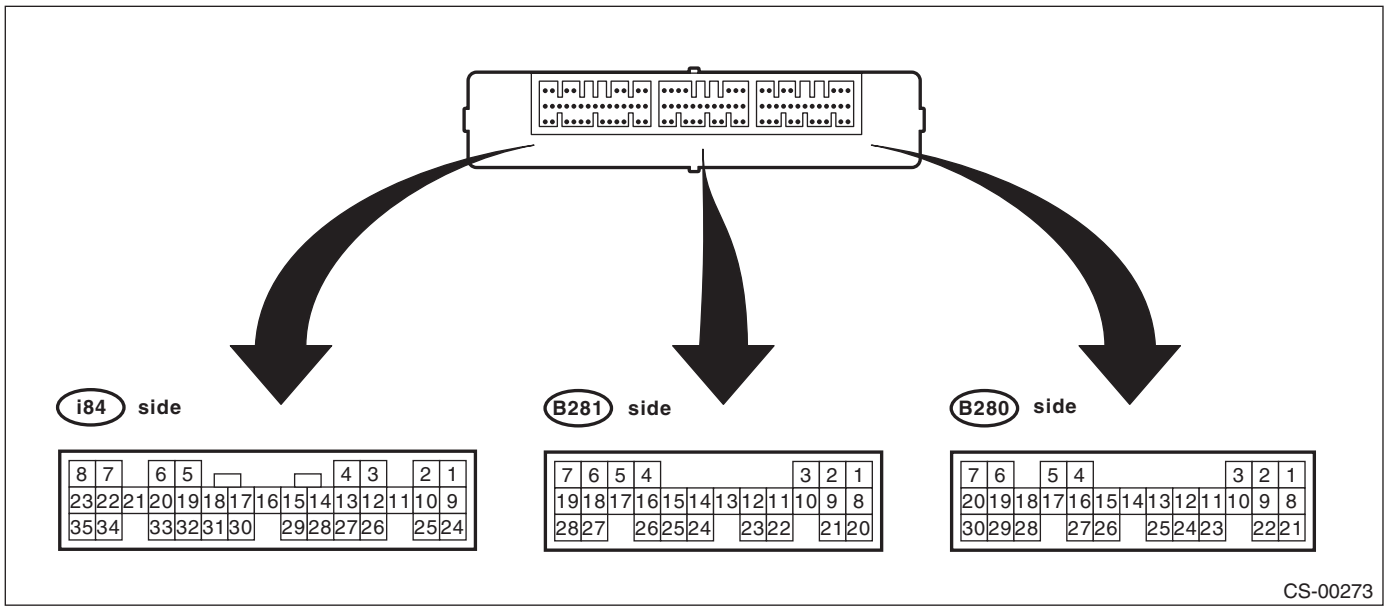


CS-00359



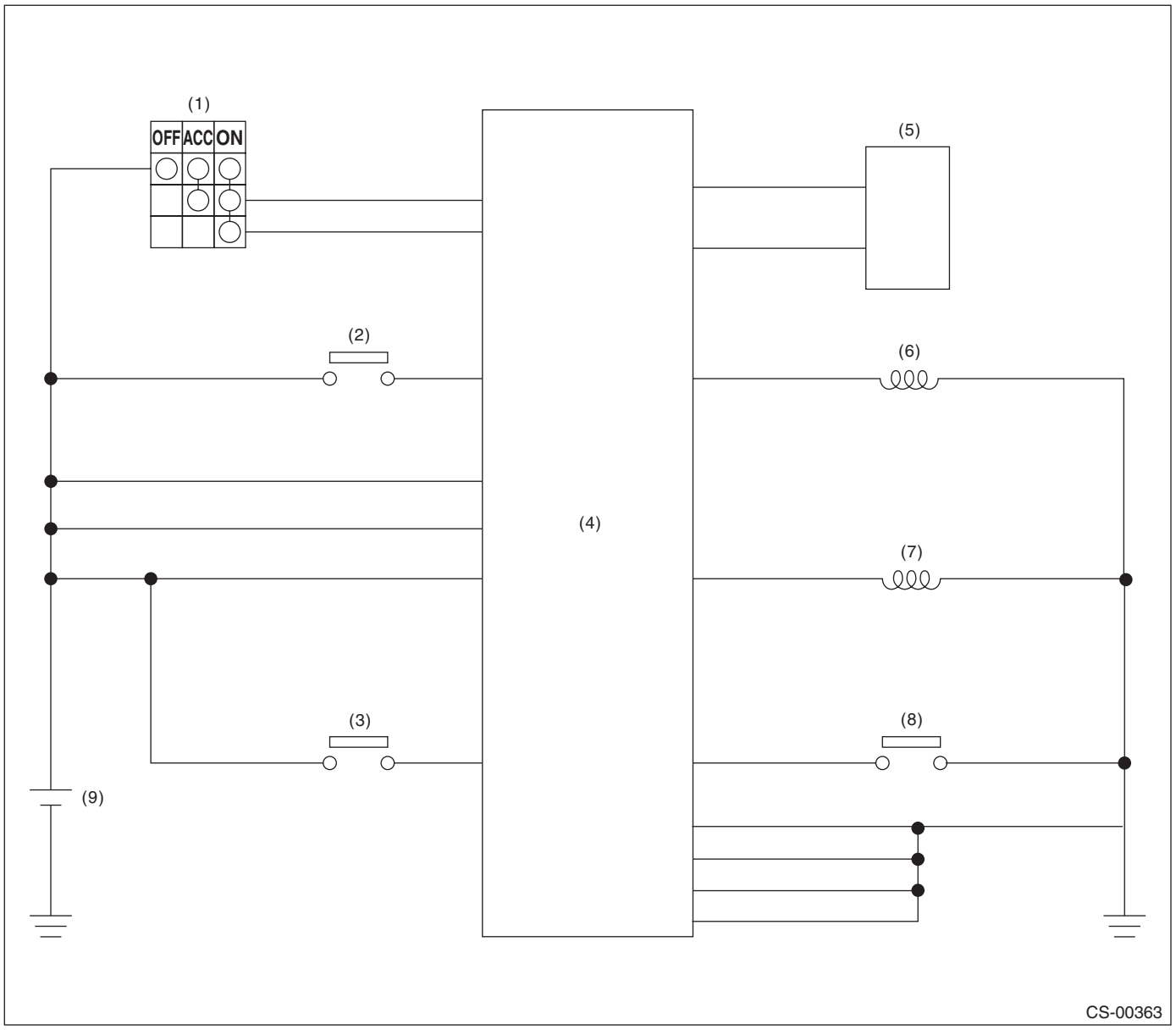
CS-00543

B: ELECTRICAL SPECIFICATION



Item	To connector No.	Terminal No.	Input/Output signal Measured value and measuring conditions
Backup power supply	B281	1	9 — 16 V
		2	
	i84	7	
Ignition power supply	B280	1	10 — 15 V when ignition switch is at ON or START.
	i84	24	10 — 15 V when ignition switch is at ACC.
TCM (“P” range)	B280	20	Pulse signal
	B280	30	
Stop light switch	B281	23	9 — 16 V when stop light switch is ON. 0 V when stop light switch is OFF.
“P” range switch	B281	13	0 V when select lever is in “P” range. 9 — 16 V when select lever is in other positions than “P” range.
Shift lock solenoid signal	i84	6	8.5 — 16 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	B281	7	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B280	5	7.5 — 16 V when ignition switch is turned ON, with select lever in “P” range and brake switch ON. 0 V at other conditions than above.
Ground	B280	22	—
	i84	21	
	B281	8	
		9	

C: WIRING DIAGRAM



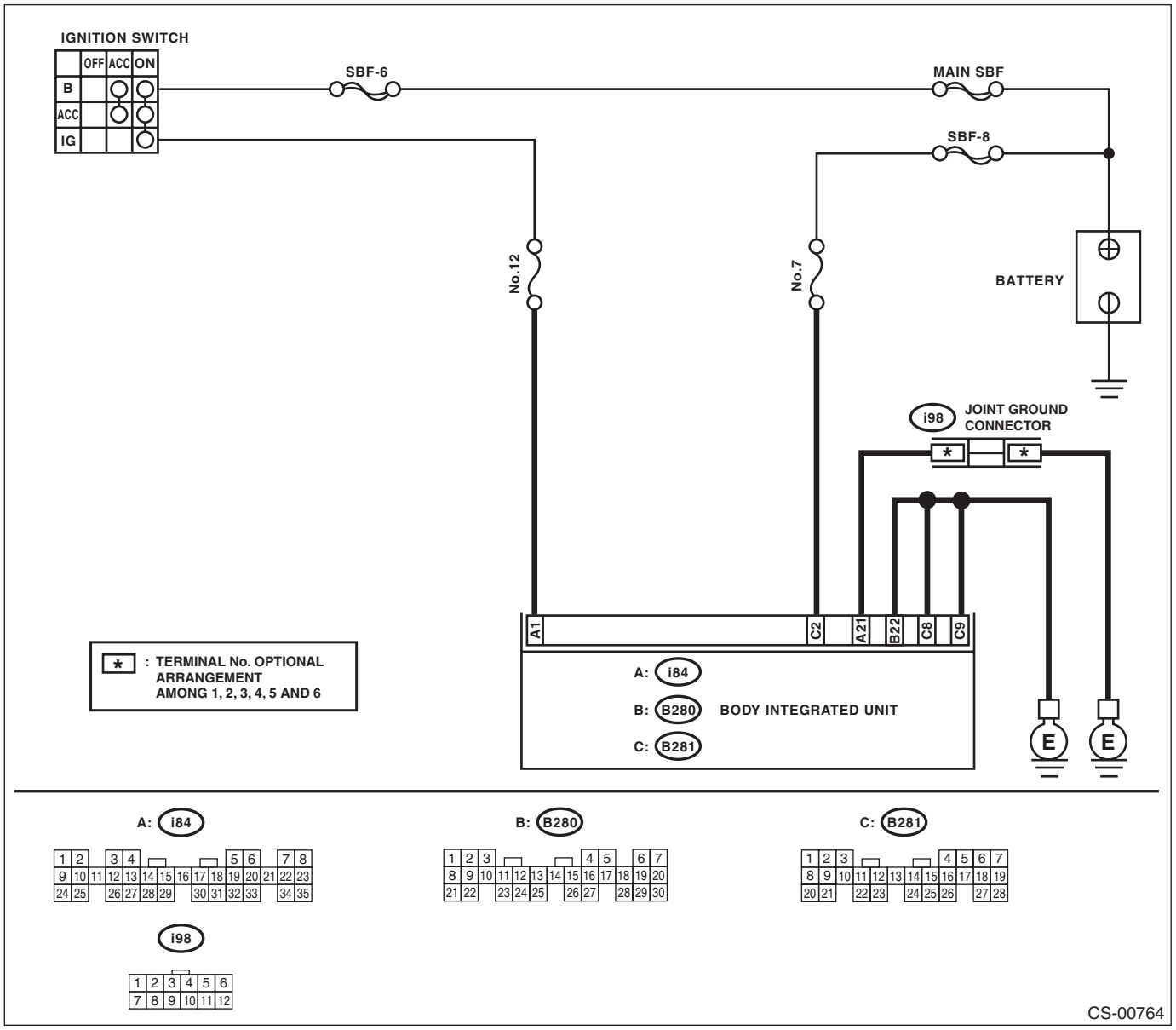
(1) Ignition switch
(2) Stop light switch
(3) Key warning switch
(4) Body integrated unit
(5) TCM (“P” range)
(6) Key lock solenoid
(7) Shift lock solenoid
(8) “P” range switch
(9) Battery

D: INSPECTION

1. SHIFT LOCK OPERATION

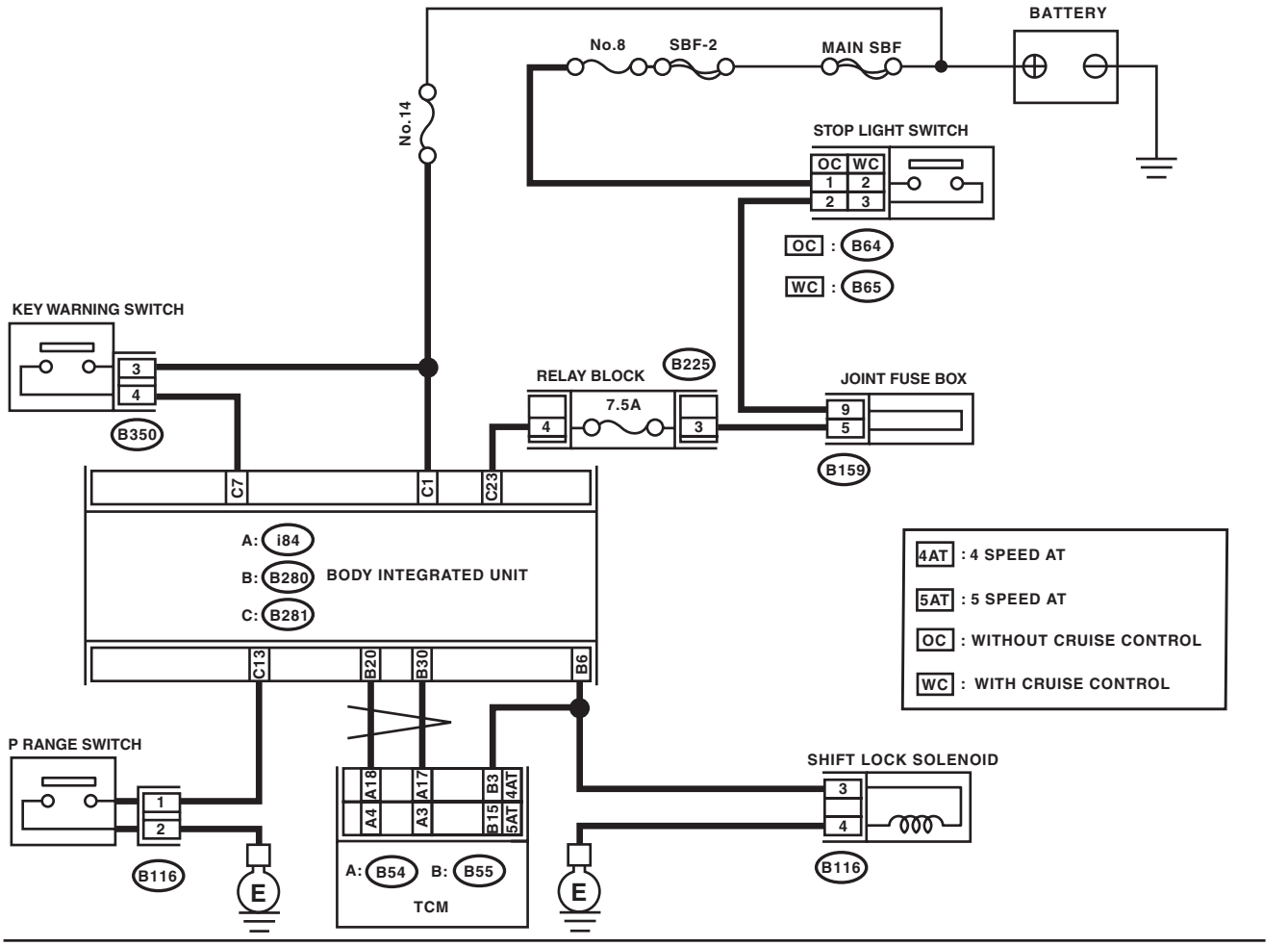
	Step	Check	Yes	No
1	**CHECK SHIFT LOCK.** 1) Turn the ignition switch to ON. 2) Shift the select lever to the “P” range.	While brake pedal is not depressed, is it possible to move the select lever from the “P” range to other ranges?	Inspect “SELECT LEVER CANNOT BE SHIFT LOCKED”. <Ref. to CS-15, SELECT LEVER CANNOT BE SHIFTED, INSPECTION, AT Shift Lock Control System.>	Go to step **2**.
2	**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 **3**.	Inspect “SELECT LEVER SHIFT LOCK CANNOT BE RELEASED”. <Ref. to CS-17, SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED., INSPECTION, AT Shift Lock Control System.>
3	**CHECK KEY INTERLOCK.**	When the select lever is set to other than “P” range, can the ignition switch be turned to the “LOCK” position?	Go to step **4**.	Go to step **5**.
4	**CHECK BACKUP POWER SUPPLY CIRCUIT.** Inspect the backup power supply circuit. <Ref. to CS-14, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is the backup power supply circuit operating properly?	Perform the inspection of “KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED”. <Ref. to CS-17, SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED., INSPECTION, AT Shift Lock Control System.>	Repair the backup power supply circuit.
5	**CHECK KEY INTERLOCK.**	When the select lever is in the “P” range, can the ignition switch be turned to the “LOCK” position?	AT shift lock system is normal.	Perform the inspection of “KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED”. <Ref. to CS-17, SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED., INSPECTION, AT Shift Lock Control System.>

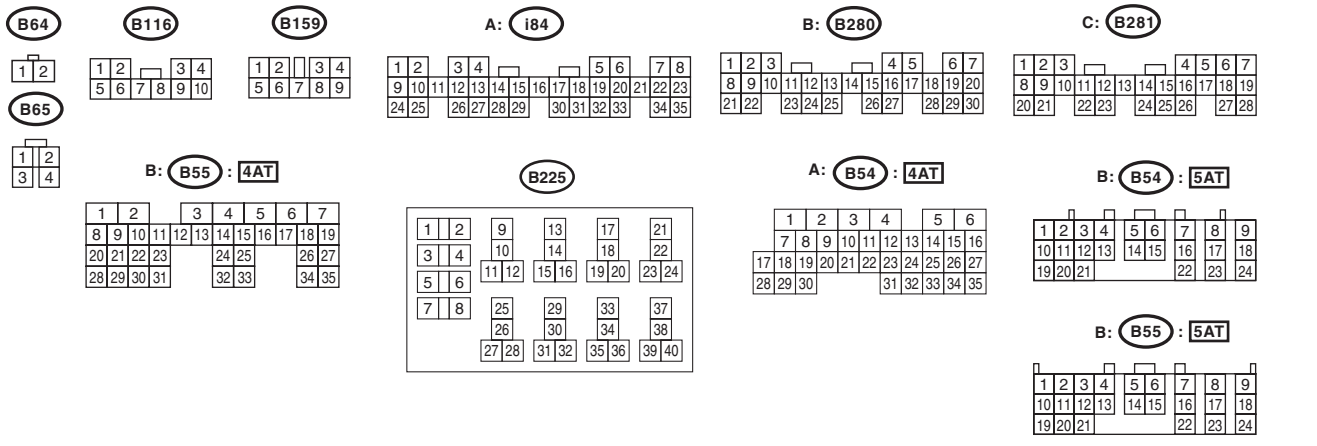
2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT



Step		Check	Yes	No
1	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	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 CONNECTOR 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*** ***(i84) No. 21 — Chassis ground:*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8 — Chassis ground:*** ***(B281) No. 9 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between the body integrated unit and chassis ground.
3	**CHECK POOR CONTACT.**	Is there poor contact in connector?	Repair the poor contact.	Check the body integrated unit.

3. SELECT LEVER CANNOT BE SHIFTED

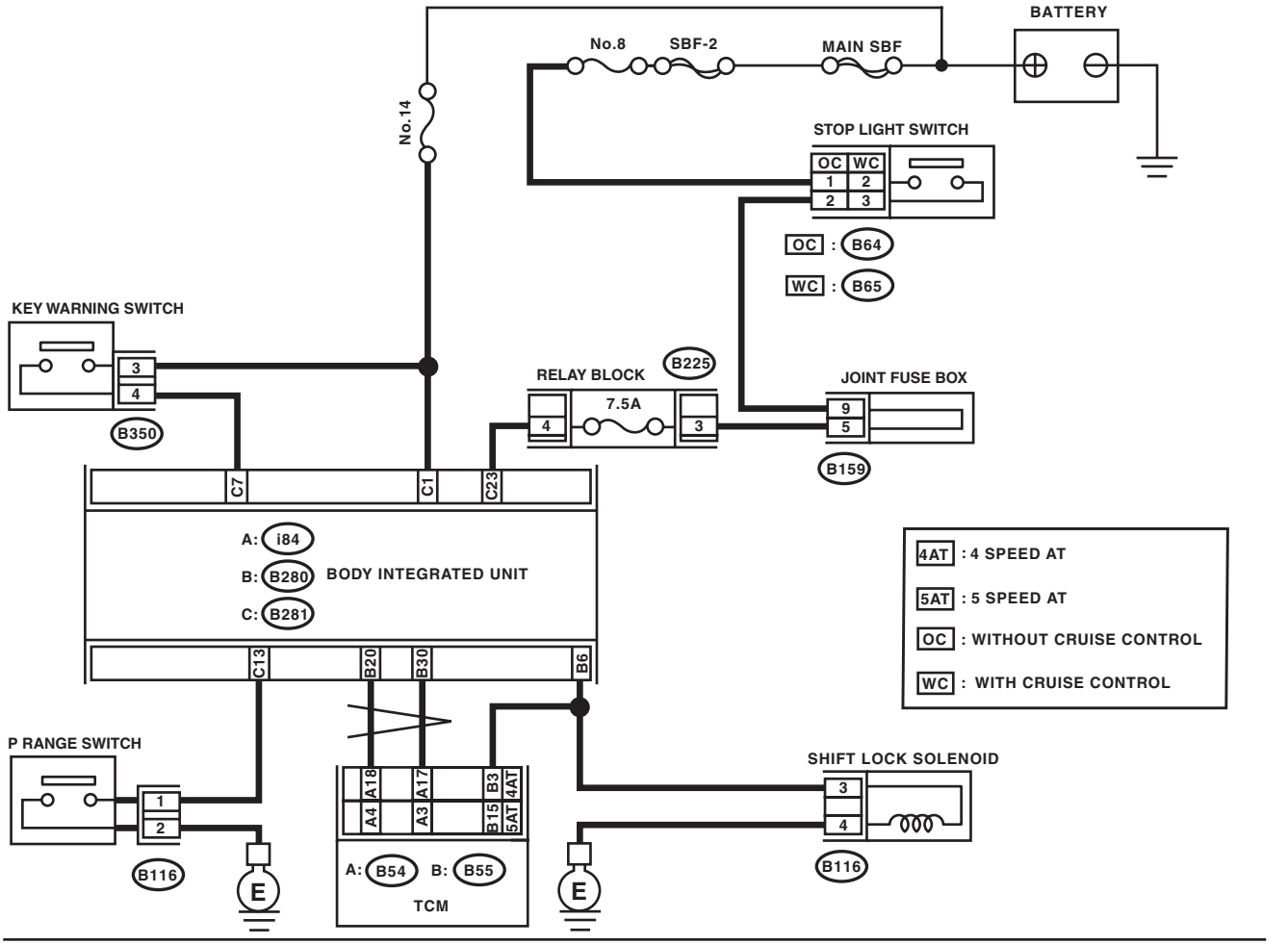


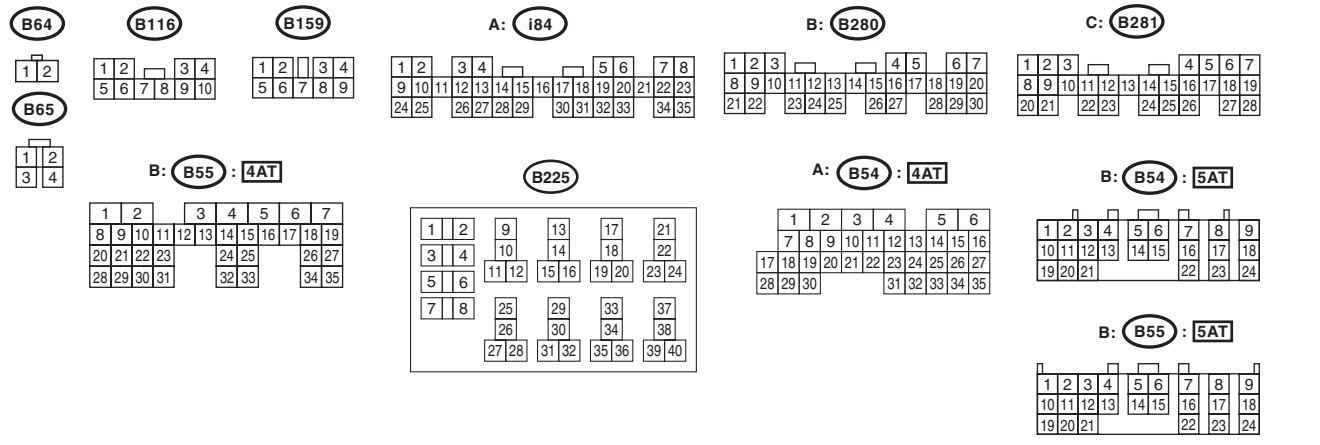


CS-00791

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch and run the Subaru Select Monitor. 4) Read the output signal of shift lock solenoid from the Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "OFF" displayed?	Go to step **4**.	Go to step **2**.
2	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** Read the input signal of stop light switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "OFF" displayed?	Go to step **4**.	Go to step **3**.
3	**CHECK STOP LIGHT SWITCH INPUT SIGNAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit. 3) Turn the ignition switch to ON. 4) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Check the stop light system.	Check the body integrated unit.
4	**CHECK SHIFT LOCK SOLENOID OUTPUT VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of shift lock solenoid. 3) Turn the ignition switch to ON. 4) Measure the voltage between the shift lock solenoid connector and chassis ground. ***Connector & terminal*** ***(B116) No. 3 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **5**.	Check the shift lock solenoid unit.
5	**CHECK SHIFT LOCK SOLENOID OUTPUT VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit. 3) Turn the ignition switch to ON. 4) Measure the voltage between the shift lock solenoid connector terminal and chassis ground. ***Connector & terminal*** ***(B116) No. 3 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **6**.	Check the body integrated unit.
6	**CHECK SHIFT LOCK SOLENOID OUTPUT VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Turn the ignition switch to ON. 4) Measure the voltage between the shift lock solenoid connector terminal and chassis ground. ***Connector & terminal*** ***(B116) No. 3 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Repair or replace the shorted circuit of harness between body integrated unit and shift lock solenoid.	Check the TCM.

4. SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED.





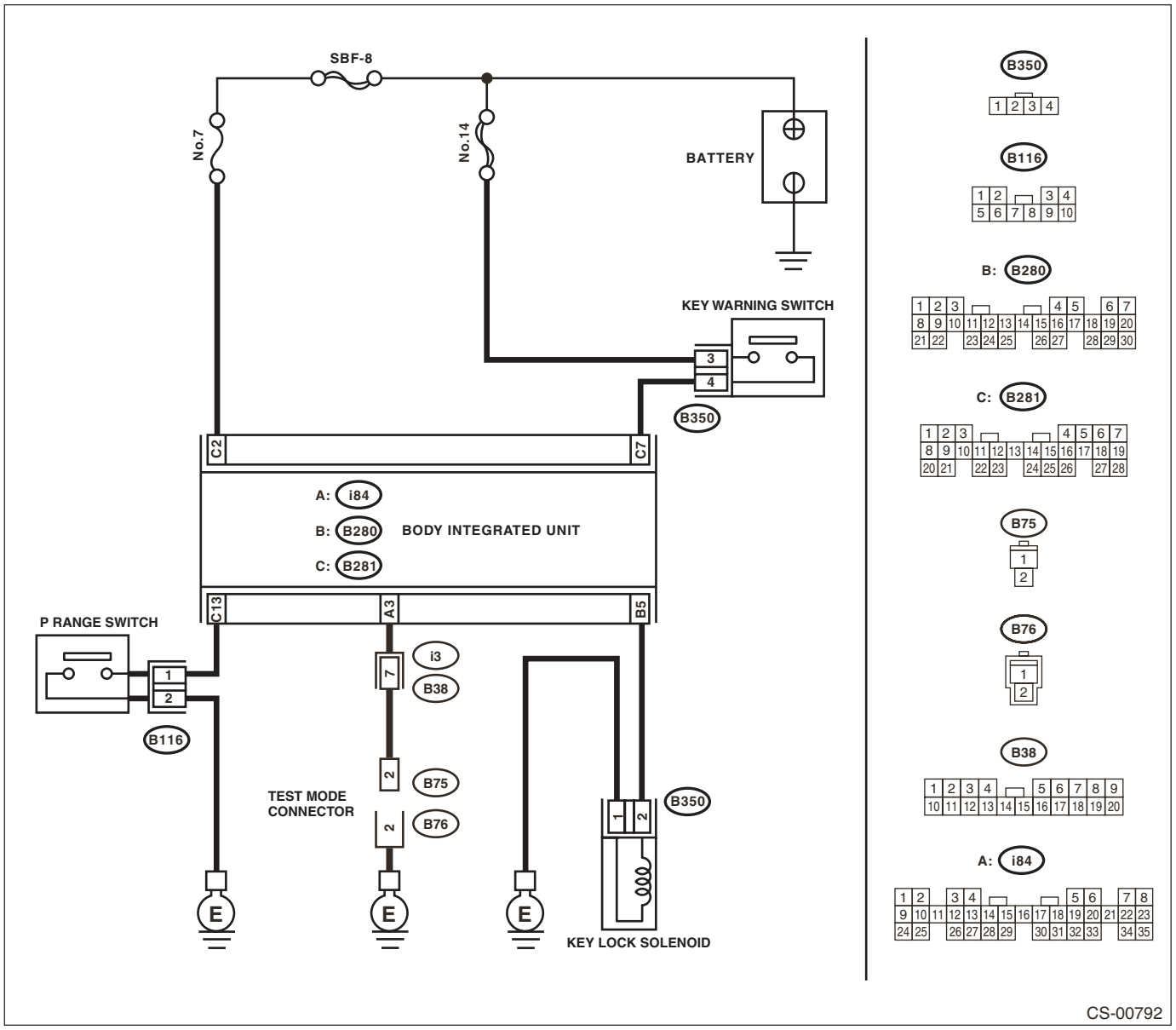
CS-00791

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch and run the Subaru Select Monitor. 4) Depress the brake pedal. 5) Read the output signal of shift lock solenoid from the Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is “ON” displayed?	Go to step **11**.	Go to step **2**.
2	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Depress the brake pedal. 2) Read the input signal of stop light switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is “ON” displayed?	Go to step **3**.	Go to step **7**.
3	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** Read the input signal of shift position from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is “7” displayed?	Go to step **4**.	Go to step **15**.
4	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** Read the input signal of “P” range switch from the Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is “ON” displayed?	Go to step **5**.	Go to step **8**.
5	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** CHECK KEY WARNING SWITCH INPUT SIGNAL USING SUBARU SELECT MONITOR. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is “ON” displayed?	Go to step **6**.	Go to step **17**.
6	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of the body integrated unit. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repair or replace it according to the DTC.	Check the body integrated unit.
7	**CHECK STOP LIGHT SWITCH INPUT SIGNAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit. 3) Depress the brake pedal. 4) Measure the voltage between the body integrated unit connector terminal and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **18**.	Check the stop light system.

	Step	Check	Yes	No
8	**CHECK "P" RANGE SWITCH.** 1) Shift the select lever to "P" range. 2) Turn the ignition switch to OFF. 3) Disconnect the connector of the "P" range switch. 4) Measure the resistance between "P" range switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **9**.	Replace the "P" range switch.
9	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND BODY INTEGRATED UNIT.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between "P" range switch and chassis ground. ***Connector & terminal*** ***(B281) No. 13 — (B116) No. 1:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair the open circuit of harness between the body integrated unit and the "P" range switch.
10	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND BODY INTEGRATED UNIT.** Measure the resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **18**.	Repair the short circuit of harness between body integrated unit and "P" range switch.
11	**CHECK OUTPUT POWER SUPPLY OF BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of shift lock solenoid. 3) Turn the ignition switch to ON. 4) Measure the voltage between the shift lock solenoid connector and chassis ground. ***Connector & terminal*** ***(B116) No. 3 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **14**.	Go to step **12**.
12	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND BODY INTEGRATED UNIT.** Measure the resistance between shift lock solenoid and body integrated unit. ***Connector & terminal*** ***(B280) No. 6 — (B116) No. 3:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair the open circuit of harness between shift lock solenoid connector and body integrated unit.
13	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B280) No. 6 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **14**.	Repair short circuit of harness between shift lock solenoid and chassis ground.
14	**CHECK SHIFT LOCK SOLENOID.** Connect the battery to the shift lock solenoid connector terminal, and then operate the solenoid. ***Terminals*** ***No. 3 (+) — No. 4 (–):***	Does the shift lock solenoid operate normally?	Go to step **18**.	Replace the shift lock solenoid unit.
15	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** Read the input signal of "P" range from the Subaru Select Monitor. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step **10**.	Adjust the inhibitor switch and cable.

	Step	Check	Yes	No
16	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of the body integrated unit.	Is DTC displayed?	Repair or replace it according to the DTC.	Check the body integrated unit and TCM.
17	**CHECK KEY WARNING SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of body integrated unit. 3) Measure the voltage between the body integrated unit harness connector terminal and chassis ground with the key inserted. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **18**.	Check the key warning switch circuit.
18	**CHECK POOR CONTACT.**	Is there poor contact?	Repair or replace the poor contact of the connector terminal or harness.	Replace the body integrated unit.

5. KEY INTERLOCK DOES NOT LOCK OR RELEASE



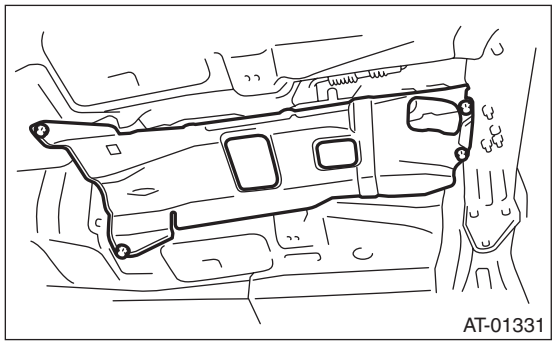
	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. 4) Depress the brake pedal. 5) Read the input signal of the key warning switch from the Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Shift the select lever to the "P" range. 2) Read the input signal of "P" range switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step **3**.	Go to step **8**.
3	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of the body integrated unit. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC (B0105) displayed?	Repair or replace it according to the DTC.	Check the body integrated unit.
4	**CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH.** 1) Disconnect the connector of key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. ***Connector & terminal*** ***(B350) No. 3 (+) — Chassis ground (–):***	Is the voltage 9 — 16 V?	Go to step **5**.	Repair the open or short circuit of harness between battery and key warning switch.
5	**CHECK KEY WARNING SWITCH.** Measure the resistance between connector terminals of key warning switch. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1 MΩ or more?	Replace the key warning switch.	Go to step **6**.
6	**CHECK KEY WARNING SWITCH.** 1) Remove the key. 2) Measure the resistance between connector terminals of key warning switch. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Replace the key warning switch.
7	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH.** 1) Disconnect the connector of body integrated unit. 2) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 7 (+) — Chassis ground (–):***	Is the voltage 9 V or more?	Go to step **8**.	Repair the open circuit of harness between body integrated unit and key warning switch.
8	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between "P" range switch and chassis ground. ***Connector & terminal*** ***(B116) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the short circuit of harness between "P" range switch and body integrated unit.

	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH.** 1) Disconnect the connector of the "P" range switch. 2) Measure the resistance of harness between the body integrated unit and the "P" range switch. ***Connector & terminal*** ***(B116) No. 1 — (B281) No. 13:***	Is the resistance 1 MΩ or more?	Repair the open circuit of harness between the body integrated unit and the "P" range switch.	Go to step **10**.
10	**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 the resistance 1 MΩ or more?	Repair the open circuit of harness between "P" range switch and chassis ground.	Go to step **11**.
11	**CHECK "P" RANGE SWITCH.** 1) Shift the select lever to the "P" range. 2) Measure the resistance between "P" range switch connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 1 Ω?	Go to step **12**.	Replace the "P" range switch.
12	**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. 2 — No. 1:***	Is the resistance 1 MΩ or more?	Go to step **13**.	Replace the "P" range switch.
13	**CHECK BACKUP POWER SUPPLY CIRCUIT.** Inspect the backup power supply circuit. <Ref. to CS-14, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is the backup power supply circuit operating properly?	Go to step **14**.	Repair the backup power supply circuit.
14	**CHECK TEST MODE CONNECTOR.** 1) Check that the test mode connector is disconnected. 2) Measure the resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(i84) No. 3 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **15**.	Repair the short circuit of the harness between the body integrated unit and test mode connector.
15	**CHECK KEY LOCK SOLENOID.** 1) Disconnect the connector from the key lock solenoid. 2) Measure the resistance of key lock solenoid connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance between 10 — 30 Ω?	Go to step **16**.	Replace the key lock solenoid.
16	**CHECK OPERATION.** 1) Connect all connectors. 2) Operate the key lock solenoid.	Does the key lock solenoid operate normally?	A temporary poor contact of connector or harness may be the cause.	Check the body integrated unit.

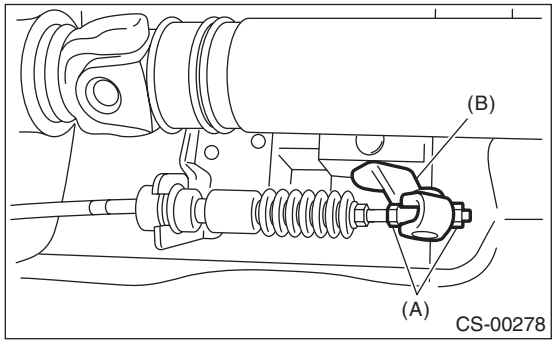
3. Select Lever

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from the battery.
3) Shift the select lever to “N” range.
4) Lift the vehicle.
5) Remove the rear exhaust pipe and muffler.
• SOHC MODEL
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
• DOHC 3.0 L model
<Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
6) Remove the heat shield cover.

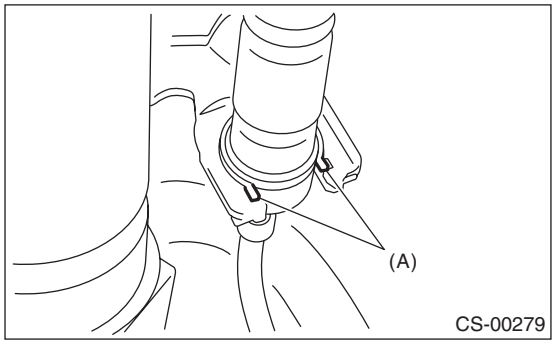


7) Remove the cable from arm assembly.



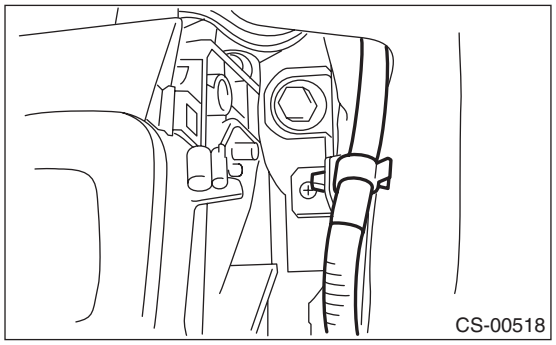
(A) Adjusting nut
(B) Arm ASSY

8) Raise the claw of clamp to remove the cable.

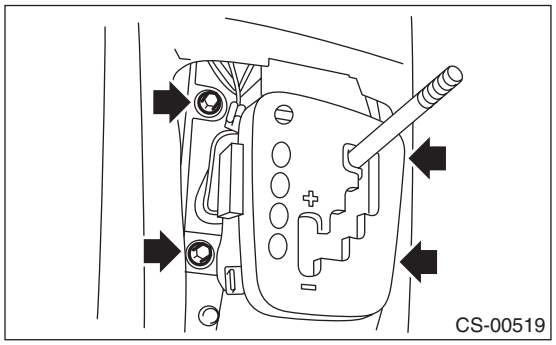


(A) Claw

9) Lower the vehicle.
10) Remove the console box. <Ref. to EI-51, REMOVAL, Console Box.>
11) Remove the center console. <Ref. to EI-52, REMOVAL, Center Console.>
12) Remove the harness clips from the bracket.



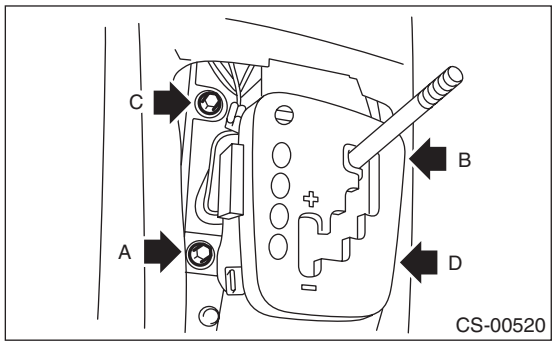
13) Disconnect the connectors, and then remove the four bolts to take out the select lever assembly from vehicle body.



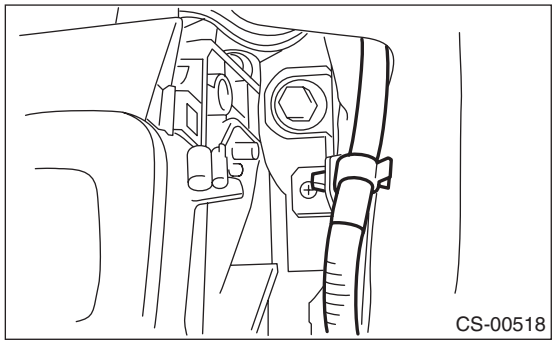
B: INSTALLATION

1) Set the select lever to vehicle body.
2) Tighten the four bolts to install the select lever to vehicle body, and then connect the connector.
(1) Temporarily tighten the bolt A.
(2) Tighten the bolt B.
(3) Tighten the bolt A.
(4) Tighten the bolts C and D.

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



3) Install the harness clips to the bracket.

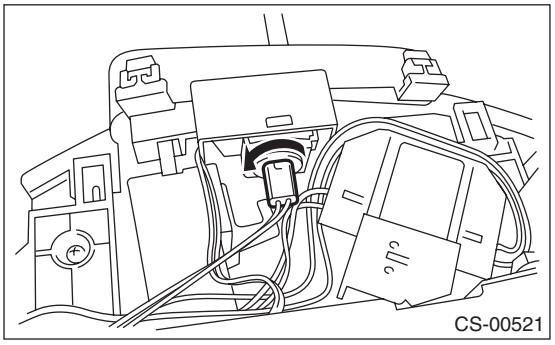


4) Install the center console. <Ref. to EI-53, INSTALLATION, Center Console.>
5) Install the console box. <Ref. to EI-51, INSTALLATION, Console Box.>
6) Shift the select lever to “N” range.
7) Lift the vehicle.
8) Shift the range select lever to the “N” range.
9) Secure the cable to the bracket. <Ref. to CS-29, INSTALLATION, Select Cable.>
10) Adjust the select cable position. <Ref. to CS-31, ADJUSTMENT, Select Cable.>
11) After the completion of adjustment, confirm that the select lever operates properly at all range positions.
12) Install the heat shield cover.
13) Install the rear exhaust pipe and muffler.
• SOHC MODEL
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-12, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
• DOHC 3.0 L model
<Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
14) Inspect the following items. When a malfunction is found in the inspection, adjust the select cable and inhibitor switch.

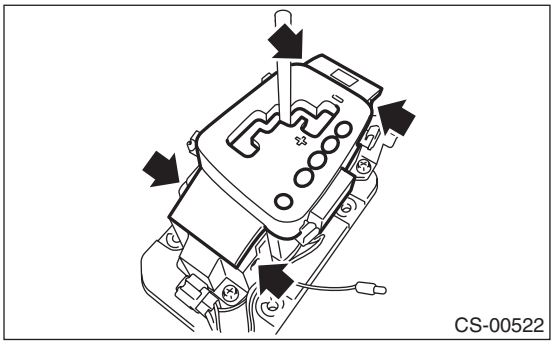
NOTE:
Inhibitor switch for 5AT model is not adjustable. <Ref. to CS-31, ADJUSTMENT, Select Cable.> <Ref. to 4AT-45, ADJUSTMENT, Inhibitor Switch.>
(1) Engine starts when the select lever is in “P” and “N” range, but not in other ranges.
(2) Back-up light illuminates when the select lever is in the “R” range, but not in other ranges.
(3) Select lever and indicator positions are matched.

C: DISASSEMBLY

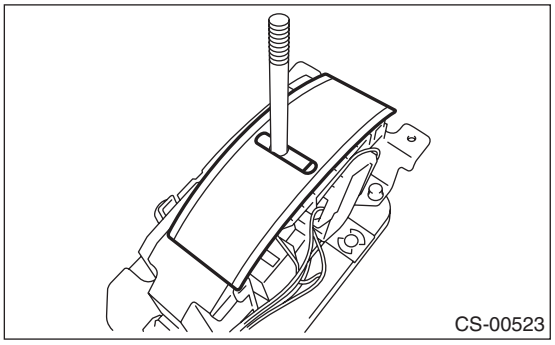
1) Shift the select lever to “N” range.
2) Remove the indicator light.



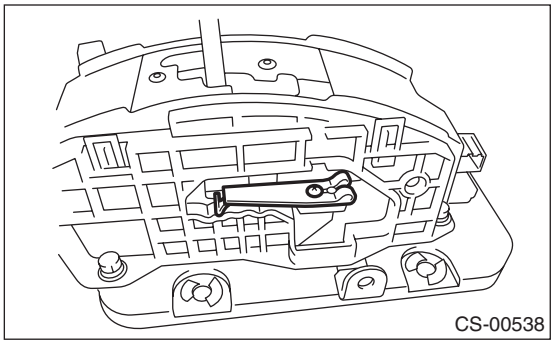
3) Remove the grip.
4) Remove the indicator assembly.



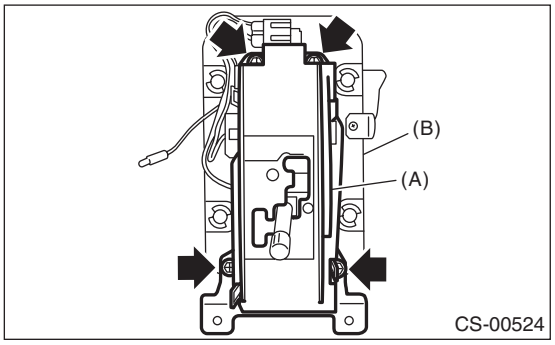
5) Remove the blind.



6) Shift the select lever to the N range, and then remove the detent spring.

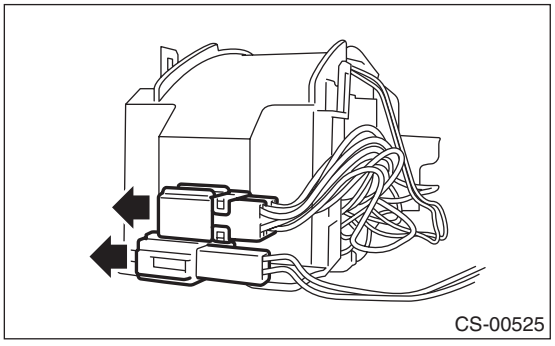


7) Remove the bolt, and separate the guide plate upper from plate lower.

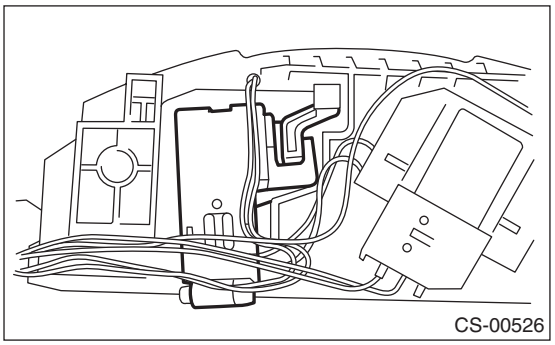


(A) Guide plate upper
(B) Plate lower

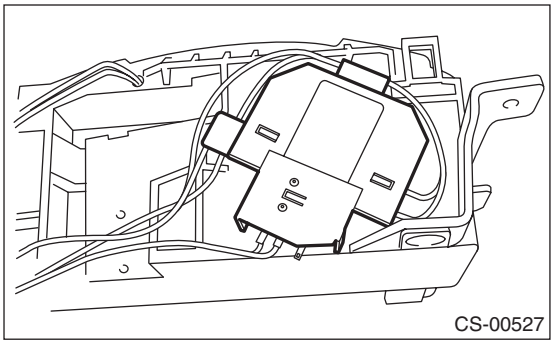
8) Remove the connector from the guide plate upper.



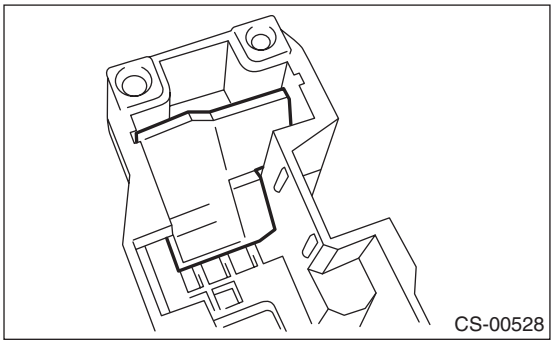
9) Remove the sheet, and remove the shift lock solenoid assembly.



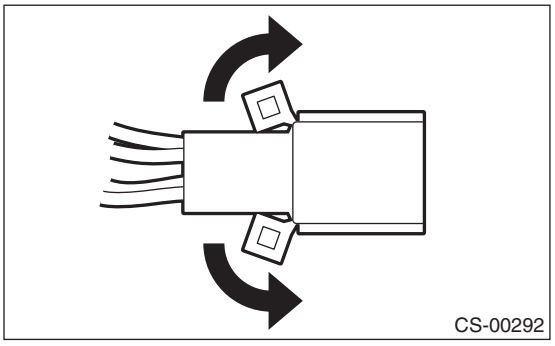
10) Remove the switch assembly.



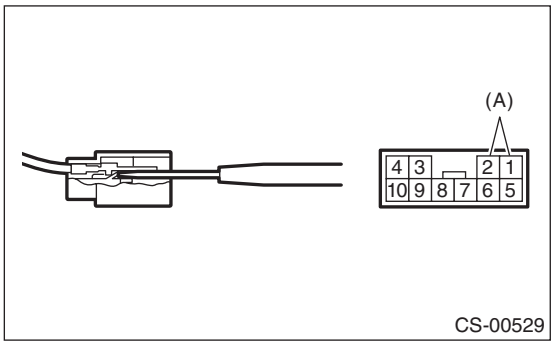
11) Remove the check plate.



12) Raise the claw of connector.

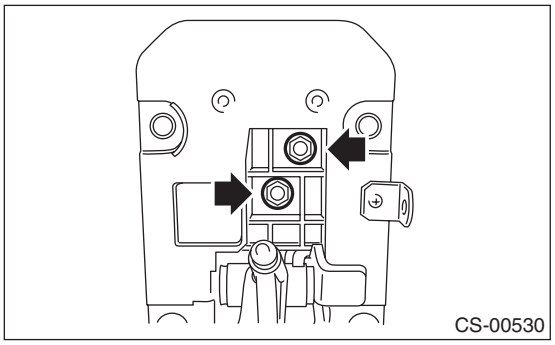


13) Disconnect the terminals of the SPORT mode switch and shift lock solenoid assembly from the connector, using a flat-tip screwdriver with a thin tip.

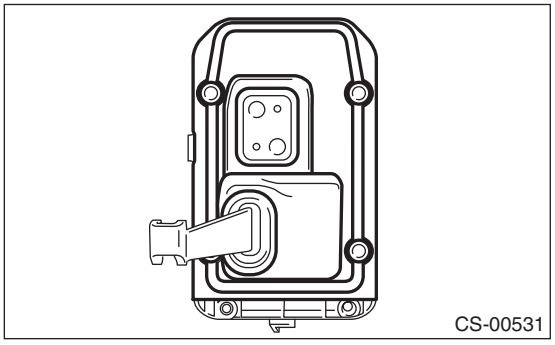


(A) "P" range switch

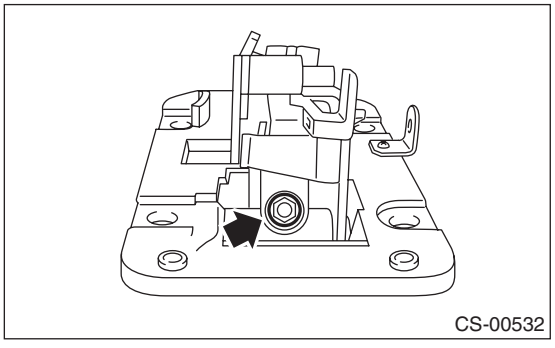
14) Remove the cable bracket.



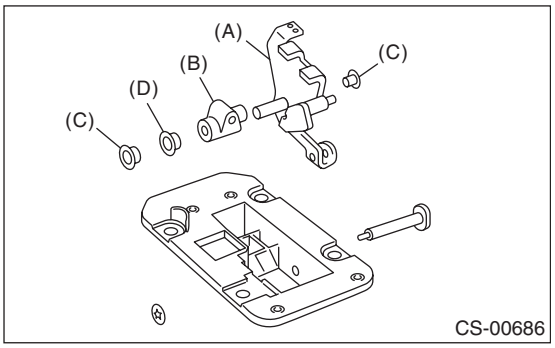
15) Remove the cover.



16) Remove the select lever assembly.



17) Remove the clamp, and remove the arm assembly and bushing plate.

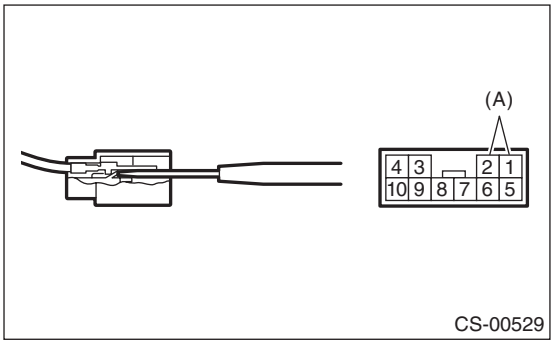


(A) Arm ASSY
(B) Bushing plate
(C) Bushing A
(D) Bushing B

D: ASSEMBLY

1) Clean all the parts before assembly.
2) Apply grease [Multemp AC-D or equivalent] to each part. <Ref. to CS-3, AT SELECT LEVER, COMPONENT, General Description.>
3) Assemble in the reverse order of disassembly.

NOTE:
• Refer to "COMPONENT" for each tightening torque. <Ref. to CS-3, AT SELECT LEVER, COMPONENT, General Description.>
• Connect the switch terminal to the connector.



(A) "P" range switch

4) After completing installation, shift the select lever from "P" range to "D" range, then check whether the indicator and select lever matches, whether the pointer and position mark matches and what the operating force is.

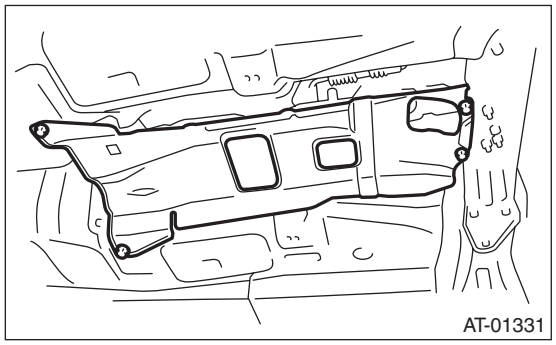
E: INSPECTION

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

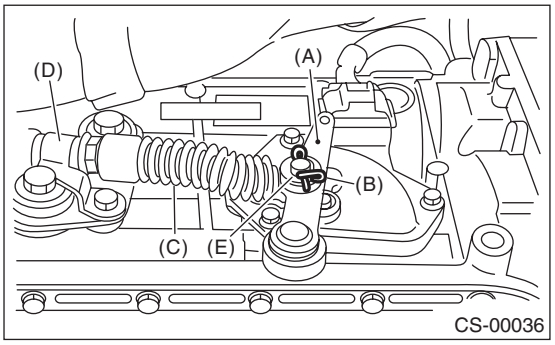
4. Select Cable

A: REMOVAL

1) Set the vehicle on a lift.
2) Shift the select lever to “N” range.
3) Disconnect the ground cable from the battery.
4) Lift the vehicle.
5) Remove the front, center and rear exhaust pipes and the muffler. (SOHC and DOHC non-turbo model)
• SOHC MODEL
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-7, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
• DOHC 3.0 L model
<Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
6) Remove the center and rear exhaust pipes and the muffler. (DOHC turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
7) Remove the heat shield cover.


AT-01331

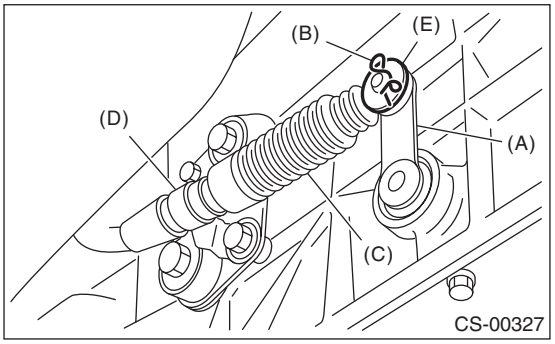
8) Remove the snap pin and washer from range select lever.
• 4AT



CS-00036

(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

• 5AT

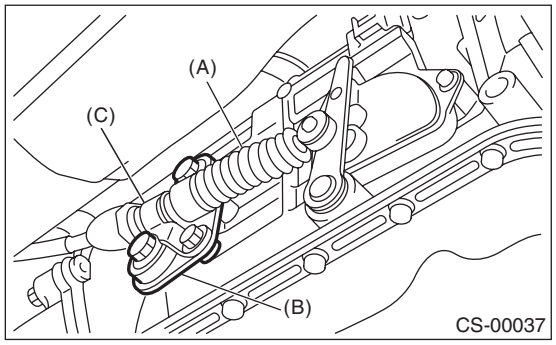


CS-00327

(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

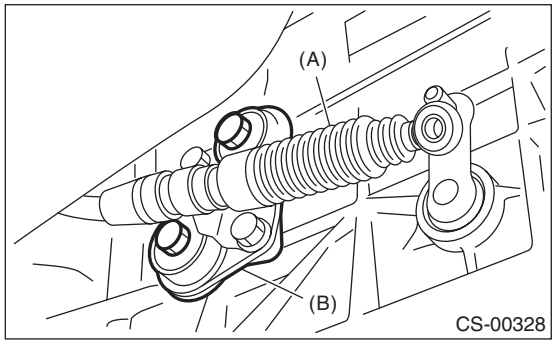
9) Remove the plate assembly from the transmission case.

- 4AT



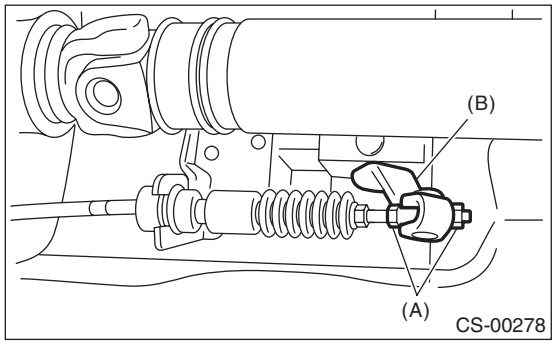
(A) Select cable
(B) Plate ASSY
(C) Bracket

- 5AT



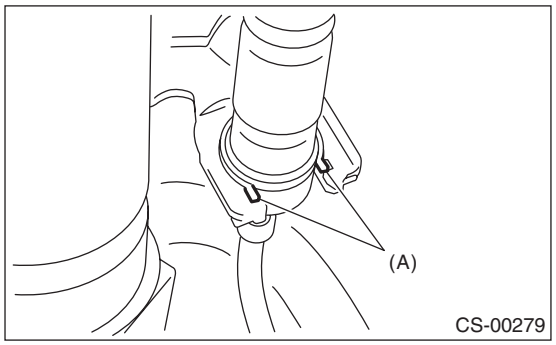
(A) Select cable
(B) Plate ASSY

10) Disconnect the cable from arm assembly.



(A) Adjusting nut
(B) Arm ASSY

11) Raise the claw of clamp to remove the cable from bracket.



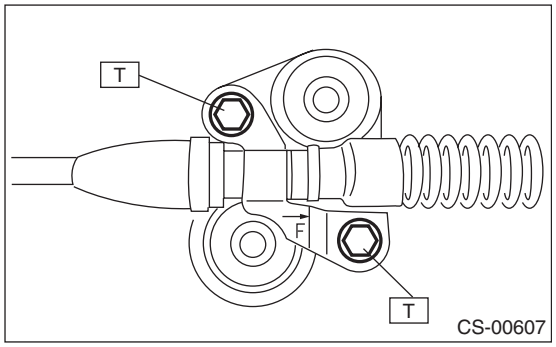
(A) Claw

12) Remove the select cable from plate assembly.

B: INSTALLATION

1) Install the select cable to plate assembly.

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

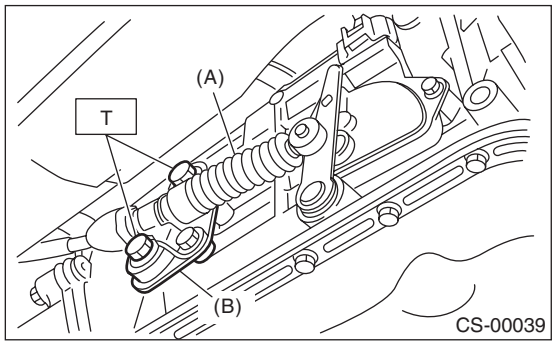


2) Install the select cable to range select lever.

3) Install the plate assembly to transmission.

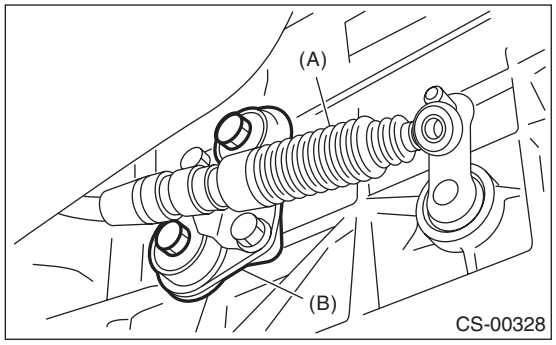
Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

- 4AT



(A) Select cable
(B) Plate ASSY

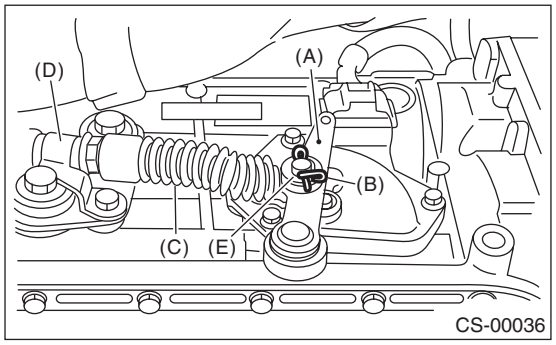
- 5AT



(A) Select cable
(B) Plate ASSY

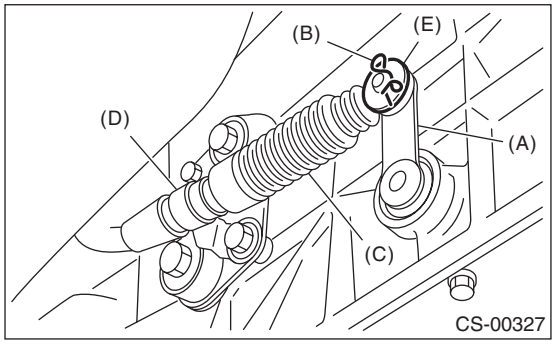
4) Install the washer and snap pin to range select lever.

- 4AT



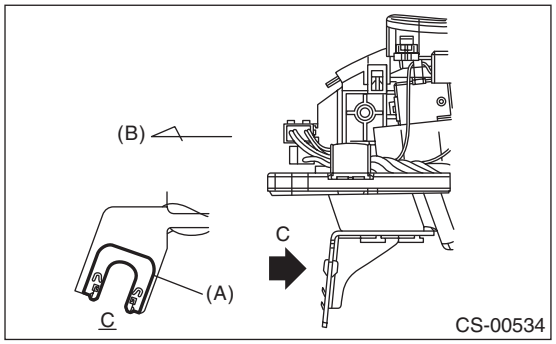
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

- 5AT



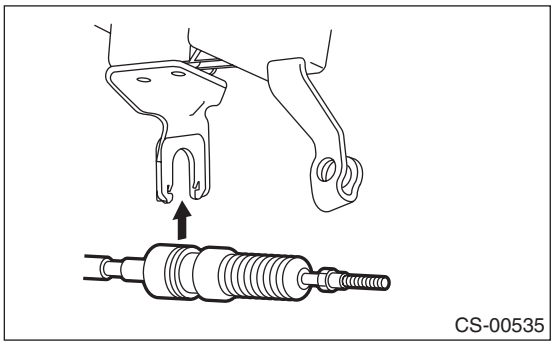
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

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

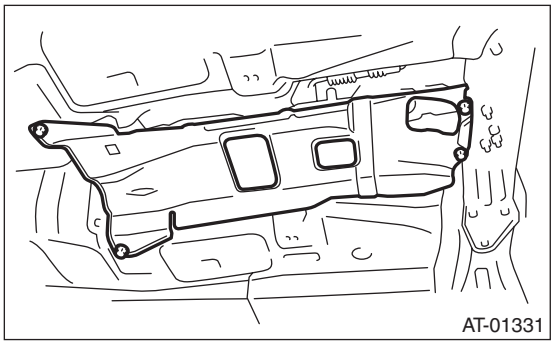


(A) Clamp
(B) Forward

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-31, ADJUSTMENT, Select Cable.>
8) Install the heat shield cover.



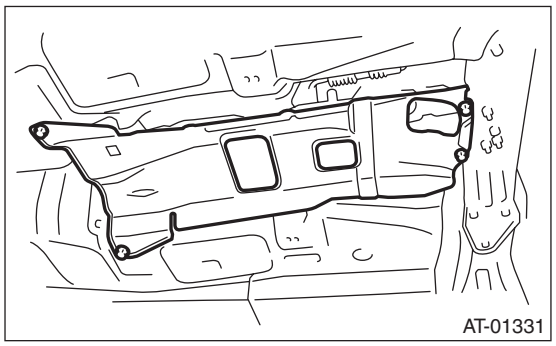
9) Install the front, center and rear exhaust pipes, and the muffler. (SOHC and DOHC non-turbo model)
• SOHC MODEL
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-7, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
• DOHC 3.0 L model
<Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
10) Install the center, rear exhaust pipes and the muffler. (DOHC turbo model)
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

C: INSPECTION

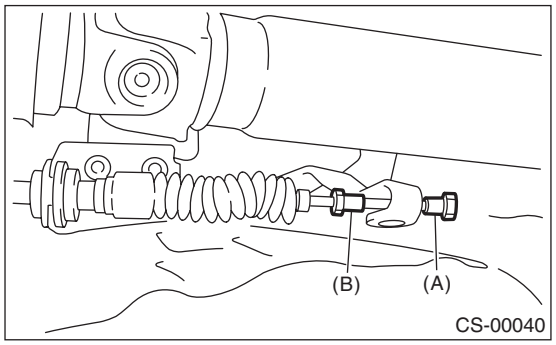
Check the removed cable and replace or adjust if damaged, rusty or malfunctioning.
1) Check the cable for smooth operation.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends and cracks.
4) Check the boot for damage, cracks and deterioration.
5) Move the select lever from “P” to “D” range. Check the existence of feel to contact the detents in each range. If the detents cannot be felt or the position pointer is improperly aligned, adjust the cable.
6) Check if the starter motor rotates when the select lever is set to “P” range.
7) Check the back-up light illumination when the select lever is in “R” range.
8) Check the parking lock operation when the select lever is in “P” range.

D: ADJUSTMENT

1) Shift the select lever to “N” range.
2) Remove the rear exhaust pipe and muffler.
• SOHC MODEL
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
• DOHC 3.0 L model
<Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
3) Remove the heat shield cover.

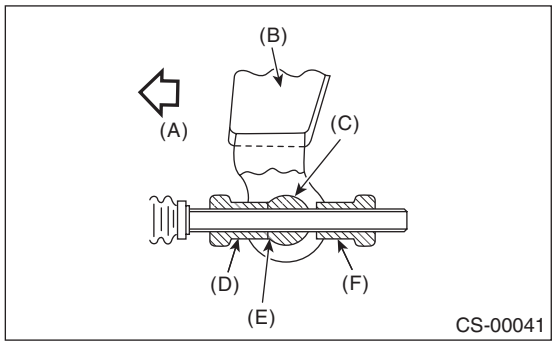


4) Loosen the adjusting nuts on both sides.



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

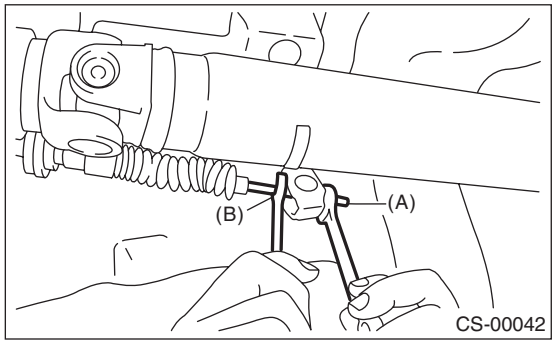
5) With the select lever pushed towards the rear of the vehicle, turn the adjustment nut B until it just contacts the connector. Then loosen the nut for 1/2 turn.



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

6) Set a spanner wrench to adjusting nut B so that it does not rotate, and then tighten the adjusting nut A.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



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

7) After the completion of adjustment, confirm that the select lever operates normally at all ranges.
8) Install in the reverse order of removal.

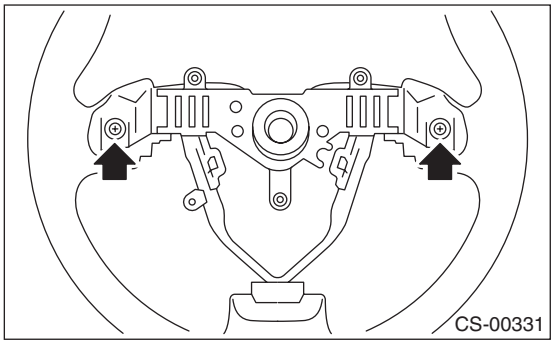
5. AT Steering Shift Switch

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Set the tire to the straight-ahead position.
3) Remove the airbag module. <Ref. to AB-15, REMOVAL, Driver's Airbag Module.>

WARNING:
If airbag modules are mounted, always refer to "Airbag System" when performing airbag module service. <Ref. to AB-15, INSPECTION, Driver's Airbag Module.>

4) Remove the steering wheel. <Ref. to PS-14, REMOVAL, Steering Wheel.>
5) Remove the cover from steering wheel.
6) Remove the AT steering shift switch mounting screws from the left and right side, one on each side.

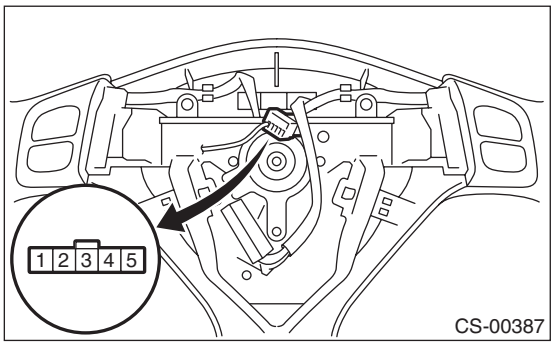


7) Remove the steering shift switch.

B: INSTALLATION

1) Clean all parts before installation.
2) Install in the reverse order of removal.
3) After completing installation, set the select lever to the SPORT shift side and confirm that manual mode "1" illuminates on the combination meter.
4) Operate the steering shift switch and confirm that "2" illuminates on the combination meter.

C: INSPECTION

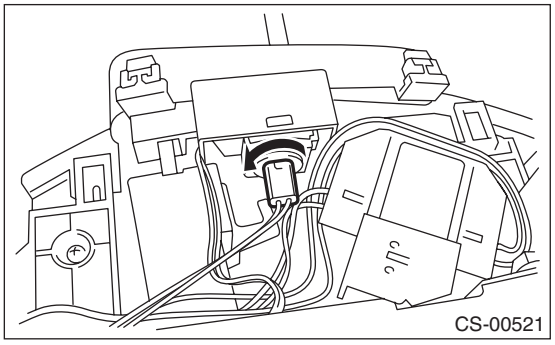


Step		Check	Yes	No
1	**SHIFT-UP SWITCH CONTINUITY CHECK.** 1) Press the shift-up switch. 2) Measure the resistance between the shift switch connector terminals. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace the steering shift switch.
2	**SHIFT-DOWN SWITCH CONTINUITY CHECK.** 1) Press the shift-down switch. 2) Measure the resistance between the shift switch connector terminals. ***Terminals*** ***No. 3 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the steering shift switch.
3	**CHECK SHIFT SWITCH INSULATION.** 1) Do not operate the shift switch. 2) Measure the resistance between the shift switch connector terminals. ***Terminals*** ***No. 3 — No. 2:*** ***No. 3 — No. 4:***	Is the resistance 1 Ω?	Steering shift switch is normal.	Replace the steering shift switch.

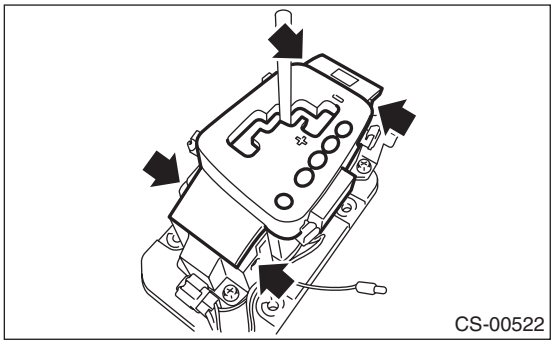
6. AT Shift Lock Solenoid and "P" Range Switch

A: REMOVAL

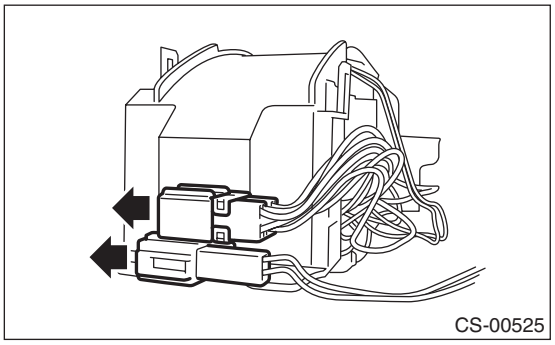
1) Remove the console box. <Ref. to EI-51, REMOVAL, Console Box.>
2) Disconnect the connector.
3) Remove the indicator bulb.


CS-00521

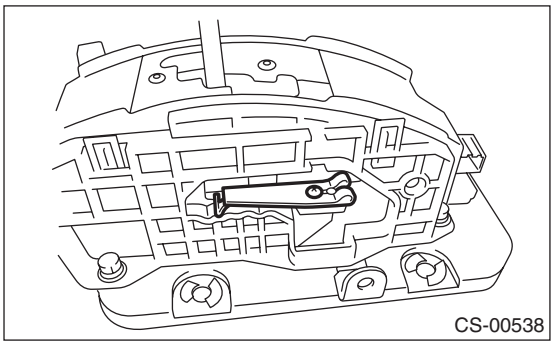
4) Remove the grip.
5) Remove the indicator cover.


CS-00522

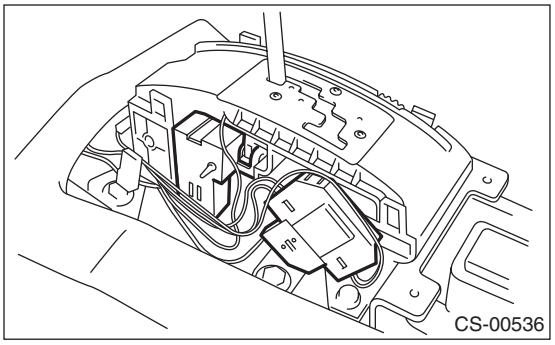
6) Disconnect the connector from the guide plate upper.


CS-00525

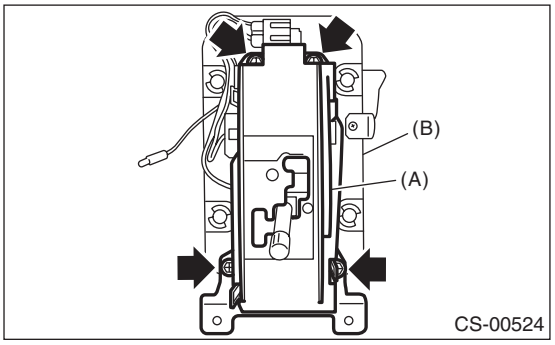
7) Shift the select lever to the N range, and then remove the detent spring.


CS-00538

8) Remove the switch assembly and shift lock solenoid assembly.

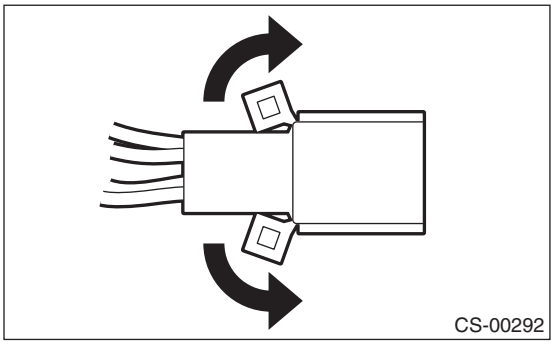

CS-00536

9) Remove the bolt to remove the guide plate upper (A) from the plate lower (B).

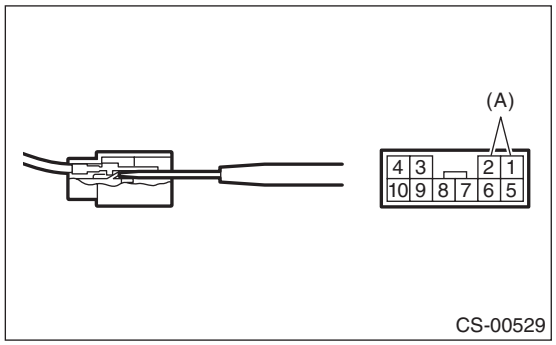


CS-00524

10) Raise the claw of the connector.


CS-00292

11) Disconnect the terminal of the "P" range switch from connector, using a flat-tip screwdriver with a thin tip.

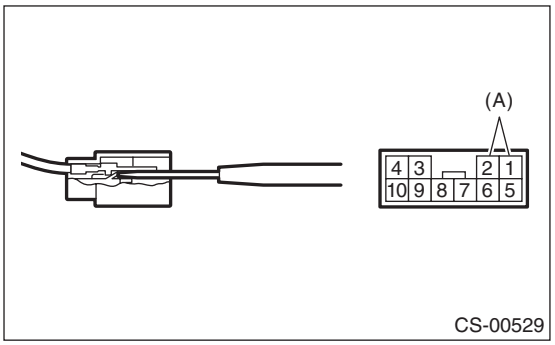


(A) "P" range switch

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
• Refer to "COMPONENT" for each tightening torque. <Ref. to CS-3, AT SELECT LEVER, COMPONENT, General Description.>
• Connect the "P" range switch terminal to connector.



(A) "P" range switch

C: INSPECTION

Step		Check	Yes	No
1	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance between 12 — 18 Ω?	Go to step **2**.	Replace the shift lock solenoid.
2	**CHECK SHIFT LOCK SOLENOID.** Connect the battery to shift lock solenoid connector terminal, and then operate the solenoid. ***Terminals*** ***No. 3 (+) — No. 4 (–):***	Does the shift lock solenoid operate normally?	Go to step **3**.	Replace the shift lock solenoid.
3	**CHECK "P" RANGE SWITCH.** 1) Move 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.
4	**CHECK "P" RANGE SWITCH.** 1) Set the select lever to other than "P" range. 2) Measure the resistance between "P" range switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 MΩ or more?	Normal operation	Replace the "P" range switch.

7. Body Integrated Unit

A: NOTE

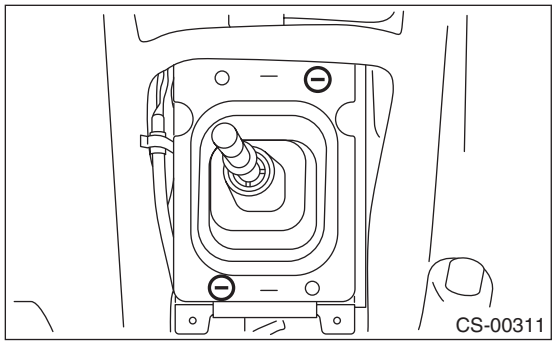
Refer to “Body Integrated Unit” for removal and installation procedure. <Ref. to SL-53, Body Integrated Unit.>

8. MT Gear Shift Lever

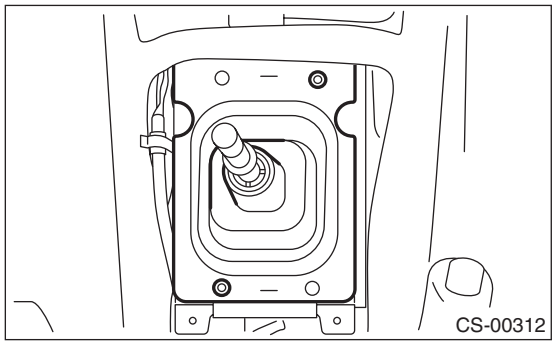
A: REMOVAL

1. 5MT MODEL

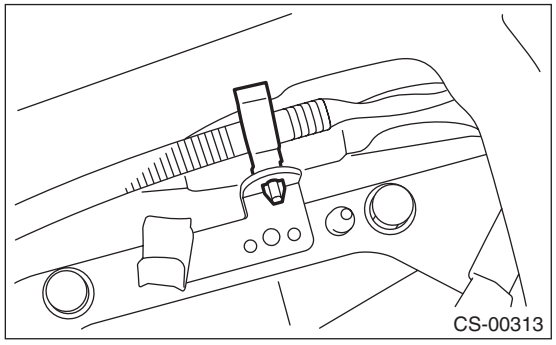
1) Set the vehicle on a lift.
2) Disconnect the ground cable from the battery.
3) Remove the gear shift knob.
4) Remove the console box. <Ref. to EI-51, REMOVAL, Console Box.>
5) Remove the front cover assembly.
6) Remove the clamp.



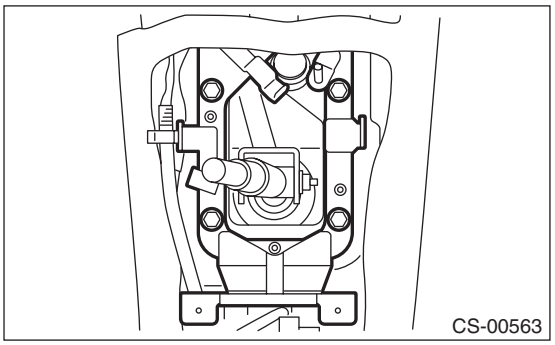
7) Remove the bushing and insulator assembly.



8) Remove the harness clamp from the plate assembly.



9) Remove the plate assembly from the vehicle body.

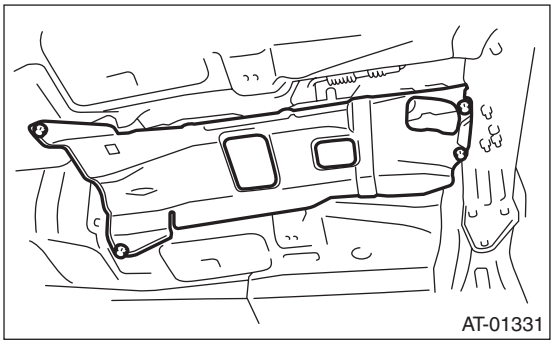


10) Lift the vehicle.
11) Remove the rear exhaust pipe and muffler.
- SOHC and DOHC 2.0 L model

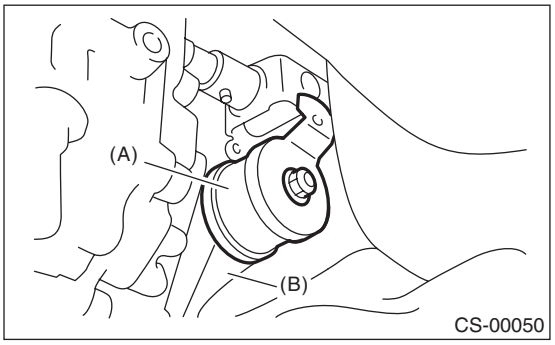
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
- DOHC turbo model

<Ref. to EX(H4DOTC)-12, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, REMOVAL, Joint Pipe.>

12) Remove the heat shield cover.

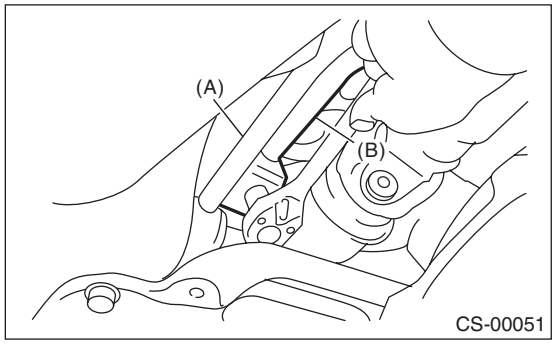


13) Remove the stay from transmission bracket.



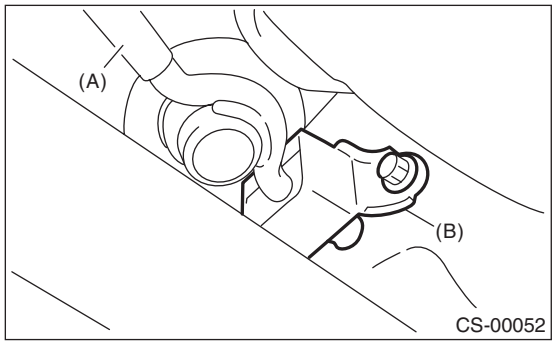
(A) Stay
(B) Transmission bracket

14) Remove the rod from joint.



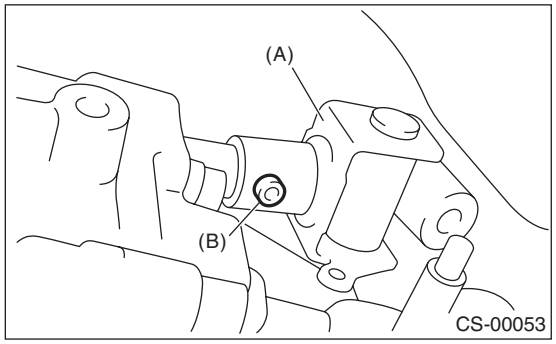
(A) Stay
(B) Rod

15) Remove the cushion rubber from the vehicle body.



(A) Stay
(B) Cushion rubber

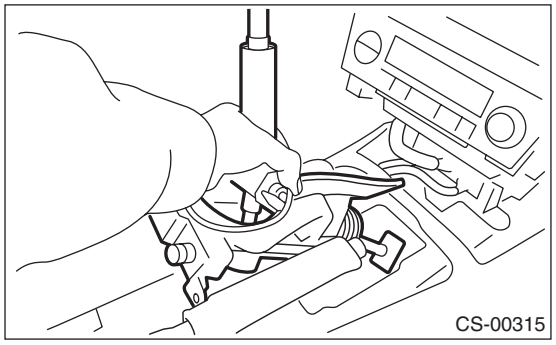
16) Extract the spring pin and remove the joint.



(A) Joint
(B) Spring pin

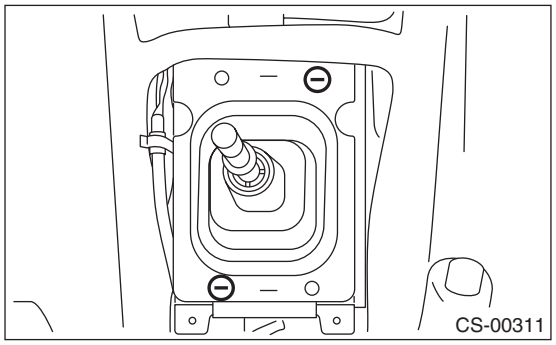
17) Lower the vehicle.

18) Remove the gear shift lever.

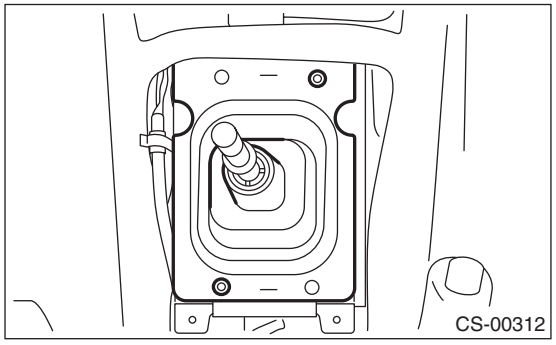


2. 6MT MODEL

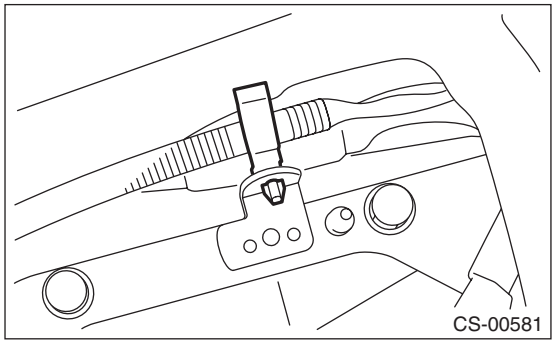
1) Set the vehicle on a lift.
2) Disconnect the ground cable from the battery.
3) Remove the gear shift knob.
4) Remove the console box front. <Ref. to EI-51, REMOVAL, Console Box.>
5) Remove the front cover assembly.
6) Remove the clamp.



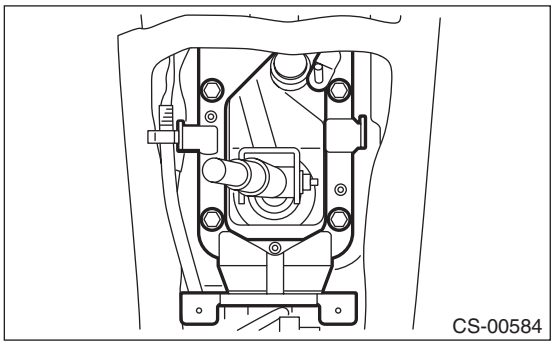
7) Remove the bushing and insulator assembly.



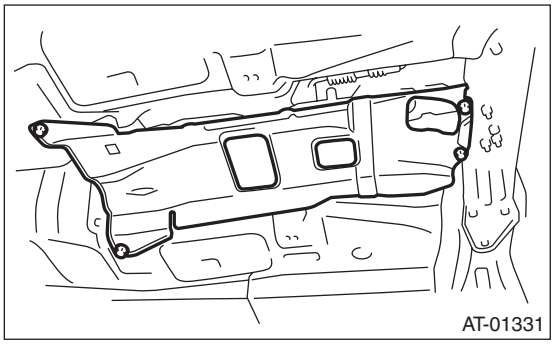
8) Remove the harness clamp from the plate assembly.



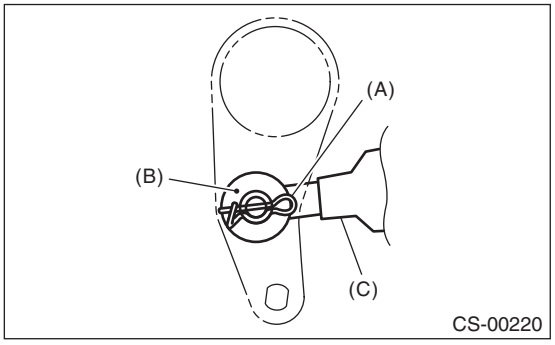
9) Remove the plate assembly from the vehicle body.



10) Lift the vehicle.
11) Remove the under cover.
12) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
13) Remove the heat shield cover.



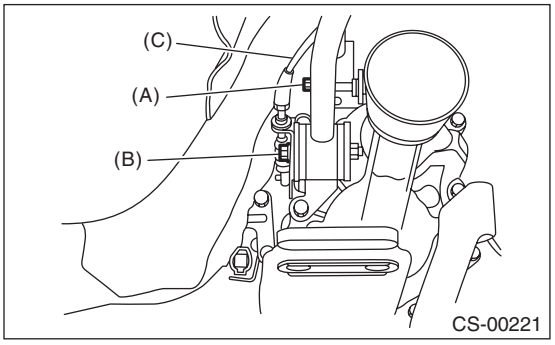
14) Remove the crossmember. <Ref. to 6MT-31, REMOVAL, Transmission Mounting System.>
15) Remove the snap pin and washer, and remove the reverse check cable from the reverse check lever.



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

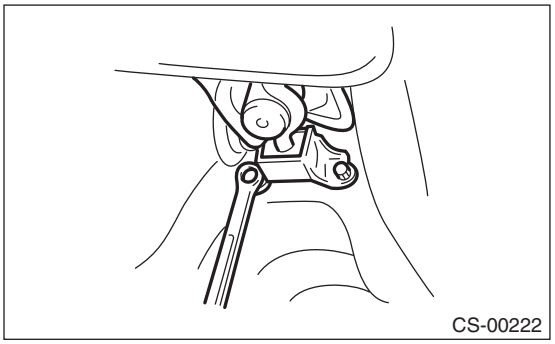
16) Move the transmission to the right side, and remove the joint COMPL, stay bolts and reverse check cable.

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



(A) Joint COMPL bolt
(B) Stay bolt
(C) Reverse check cable

17) Remove the cushion rubber from the vehicle body.



18) Lower the vehicle.
19) Remove the gear shift lever.

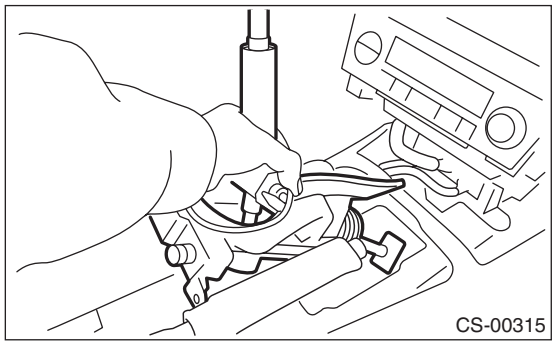
B: INSTALLATION

1. 5MT MODEL

1) Install the joint to the transmission and secure with a spring pin.

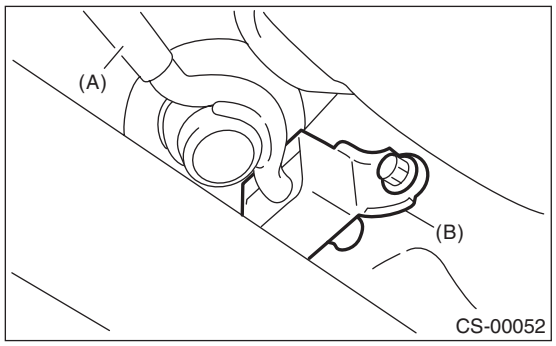
2) Insert the gear shift lever from the room side.

NOTE:
Insert the rod and the stay, and then temporarily set them onto the transmission mount.



3) Lift the vehicle.
4) Mount the cushion rubber on the vehicle body.

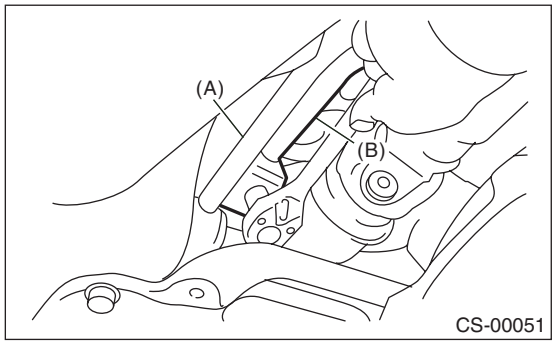
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Stay
(B) Cushion rubber

5) Using new self-locking nuts, connect the rod to the joint.

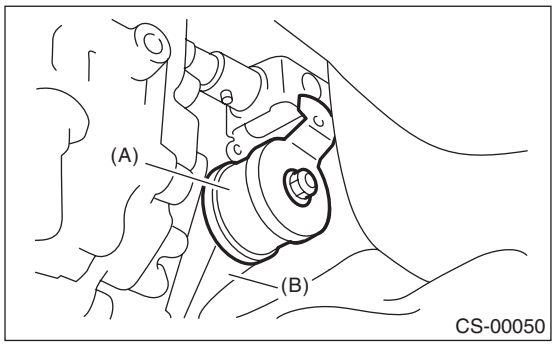
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Stay
(B) Rod

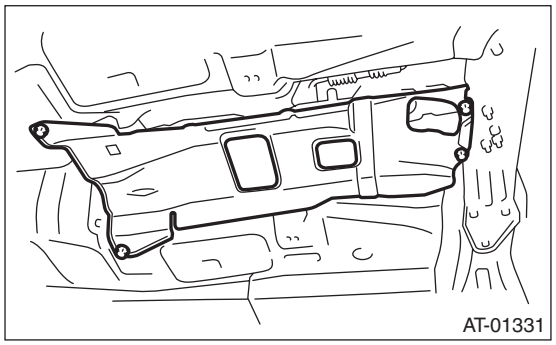
6) Using new self-locking nuts, connect the stay to the transmission bracket.

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



(A) Stay
(B) Transmission bracket

7) Install the heat shield cover.



8) Install the rear exhaust pipe and muffler.
- SOHC and DOHC 2.0 L model

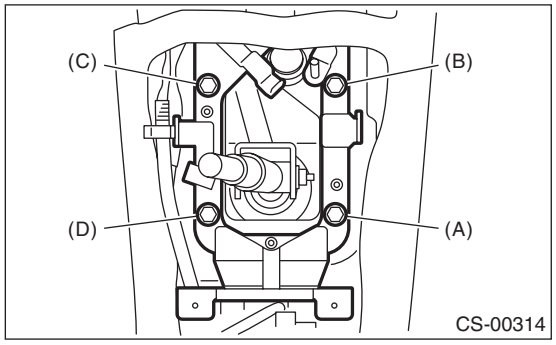
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
- DOHC turbo model

<Ref. to EX(H4DOTC)-12, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, INSTALLATION, Joint Pipe.>

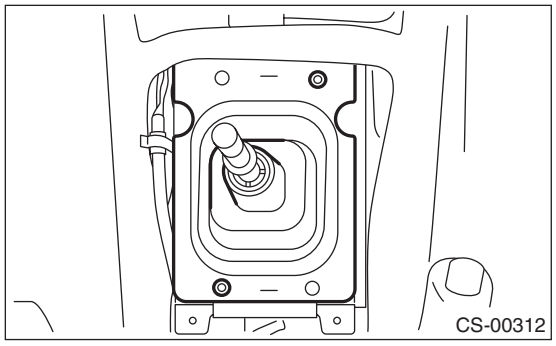
9) Install the plate assembly to the vehicle body.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)
(1) Set the plate assembly to the vehicle.
(2) Temporarily tighten the bolt (A).
(3) Tighten the bolt (B).
(4) Tighten the bolt (A).

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



10) Install the harness clamp to the plate.
11) Install the boot and insulator assembly, and secure with a clamp.



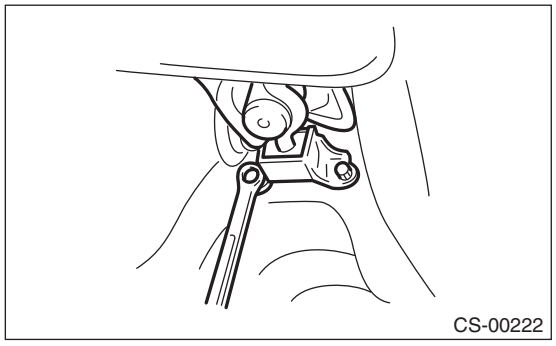
12) Install the front cover assembly.
13) Install the console box. <Ref. to EI-51, INSTALLATION, Console Box.>

2. 6MT MODEL

1) Insert the gear shift lever from the room side.

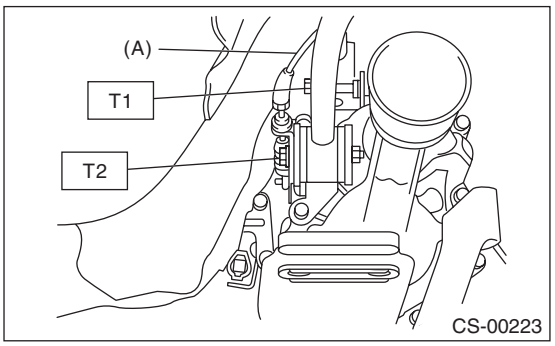
NOTE:
After inserting the rod and stay, temporarily put them onto transmission mount.
2) Mount the cushion rubber on the vehicle body.

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



3) Move the transmission to the right side of the vehicle, and attach the joint COMPL and stay.

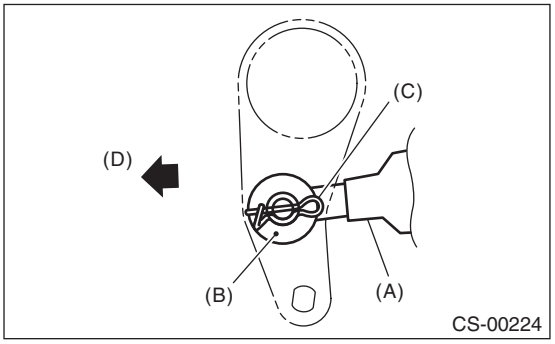
Tightening torque:
T1: 12 N·m (1.2 kgf-m, 8.9 ft-lb)
T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Reverse check cable

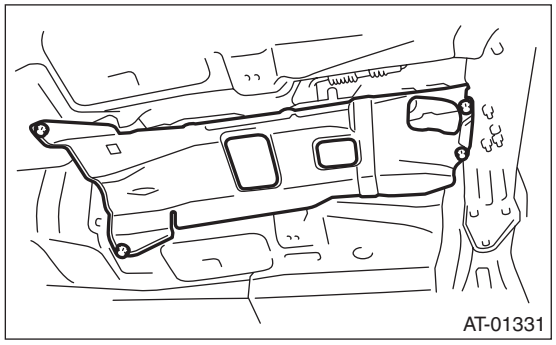
4) Install the cross member. <Ref. to 6MT-31, INSTALLATION, Transmission Mounting System.>
5) Install the reverse cable end, washer and snap pin to the reverse check lever.

NOTE:
• Take care to install the snap pin in proper direction.
• Before installing, adjust the reverse check cable. <Ref. to CS-56, ADJUSTMENT, Reverse Check Cable.>



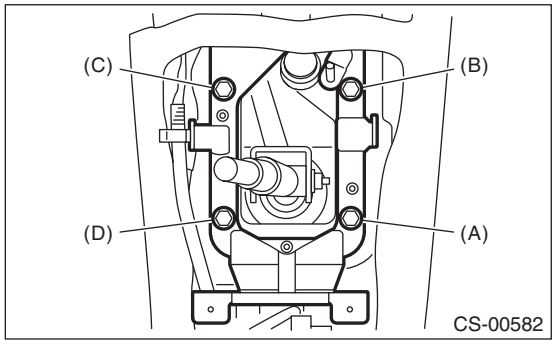
(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

6) Install the heat shield cover.

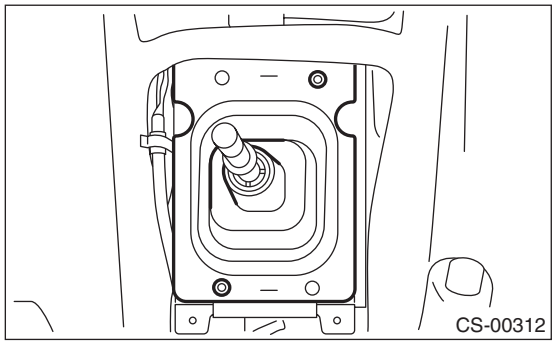


7) Install the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
8) Install the under cover.
9) Install the plate assembly to the vehicle body.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)
(1) Set the plate assembly to the vehicle.
(2) Temporarily tighten the bolt (A).
(3) Tighten the bolt (B).
(4) Tighten the bolt (A).
(5) Tighten the bolts (C) and (D).



10) Install the harness clamp to the plate assembly.
11) Install the boot and insulator assembly, and secure with a clamp.

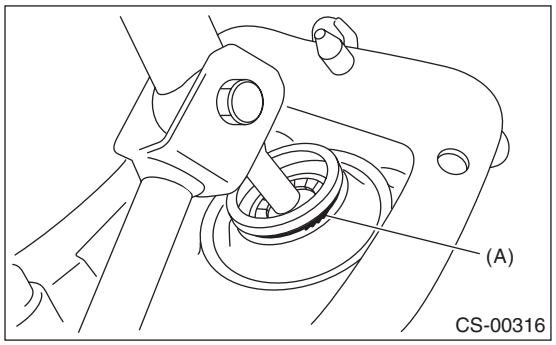


12) Install the front cover assembly.
13) Install the console box. <Ref. to EI-51, INSTALLATION, Console Box.>
14) Check that the gear shift can be shifted to each gear properly.

C: DISASSEMBLY

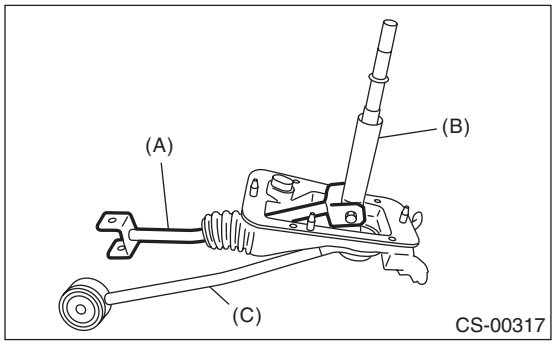
1. 5MT MODEL

1) Remove the lock wires.



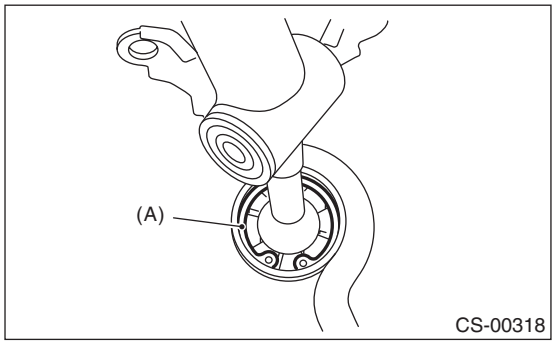
(A) Lock wire

2) Remove the rod from lever.



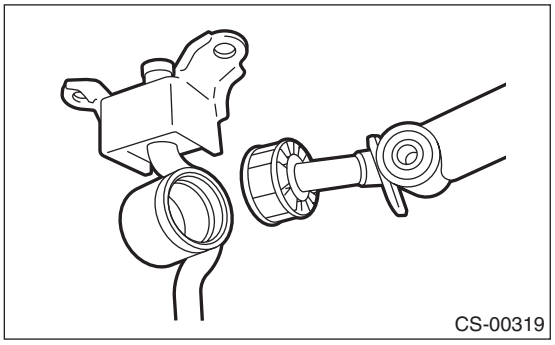
(A) Rod
(B) Lever
(C) Stay

3) Separate the rod and inner boot.
4) Remove the snap ring from the stay.

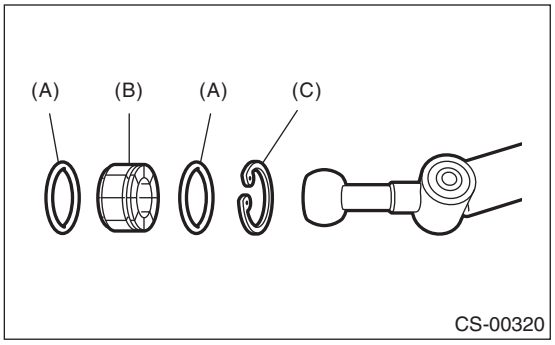


(A) Snap ring

5) Separate the gear shift lever and the stay.

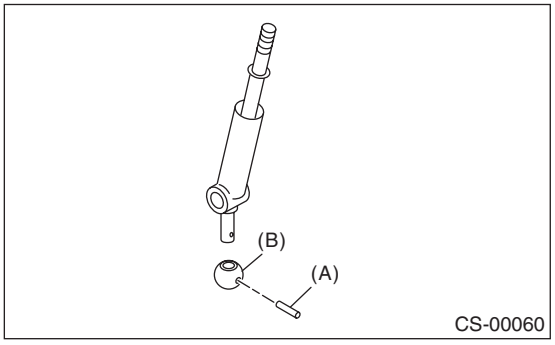


6) Remove the boot, bushing and snap ring from gear shift lever.



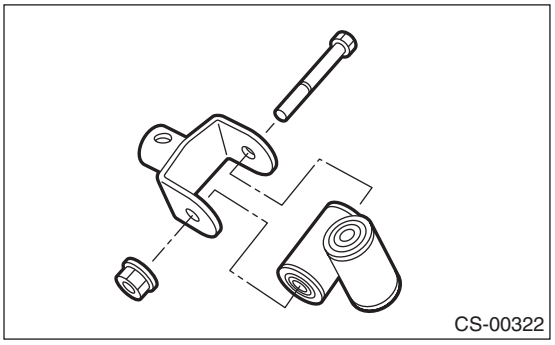
(A) O-ring
(B) Bushing
(C) Snap ring

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

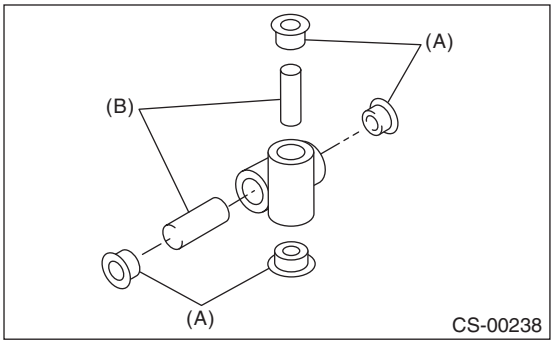


(A) Spring pin
(B) Bushing

8) Remove the boss from the joint.

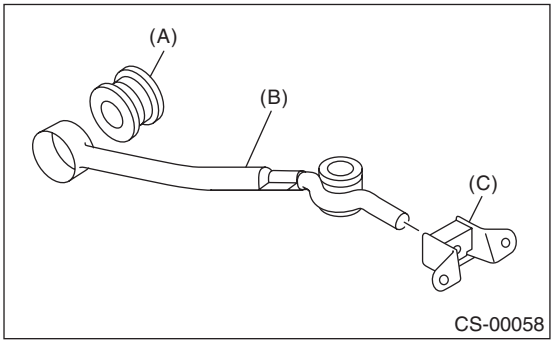


9) Remove the bushing and spacer from the boss.



(A) Bushing
(B) Spacer

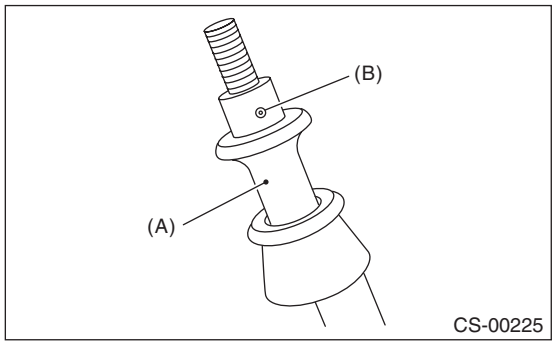
10) Remove the bushing and cushion rubber from the stay.



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

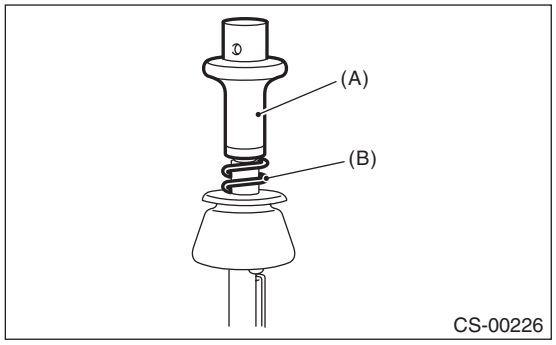
2. 6MT MODEL

1) Remove the spring pin from the slider.



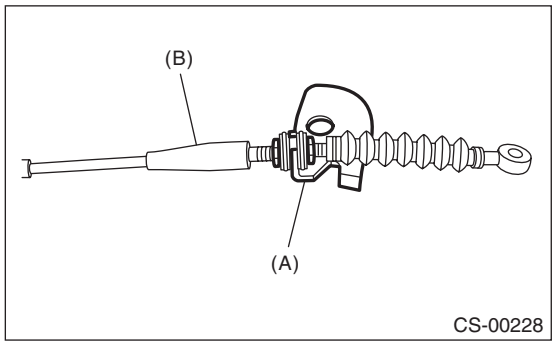
(A) Slider
(B) Spring pin

2) Remove the slider and spring.



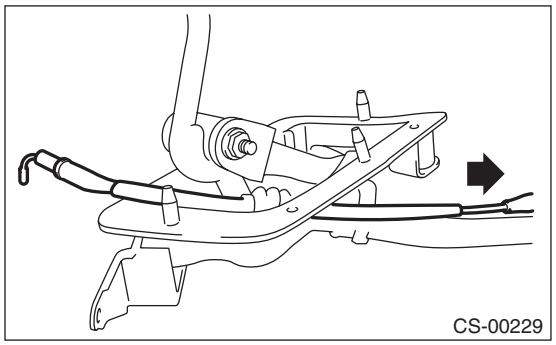
(A) Slider
(B) Spring

3) Cut the band clip.
4) Remove the reverse check cable from the cable plate.

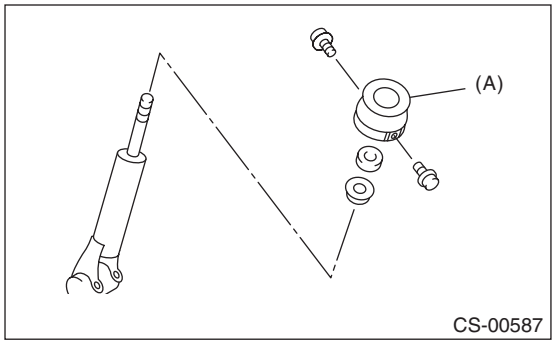


(A) Cable plate
(B) Reverse check cable

5) Remove the reverse check cable from the gear shift assembly.



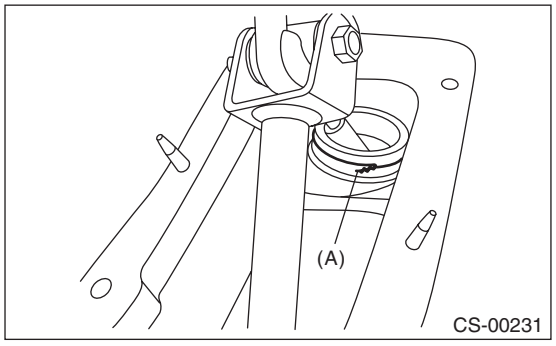
6) Remove the holder and spring.



(A) Holder

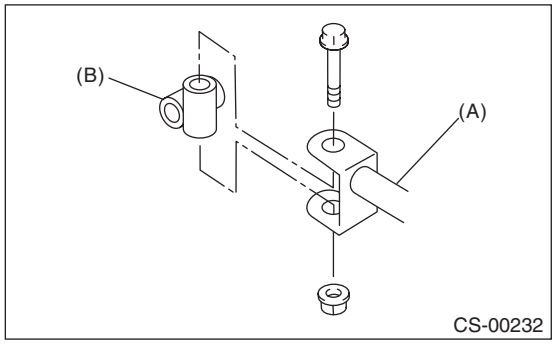
7) Disassemble the lock wires.

NOTE:
Do not reuse the lock wire.



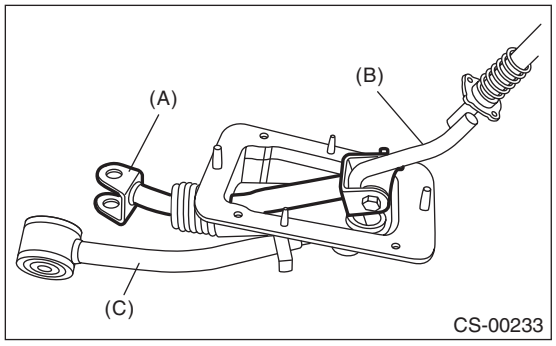
(A) Lock wire

8) Remove the boss from the rod.



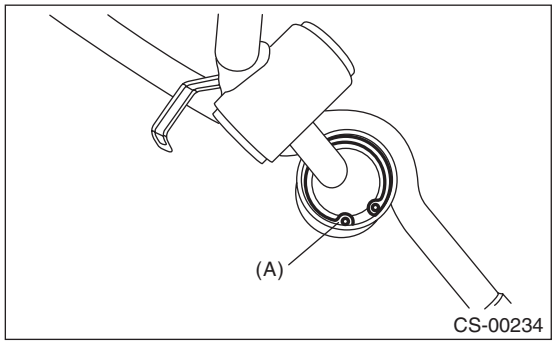
(A) Rod
(B) Boss

9) Remove the rod from lever.



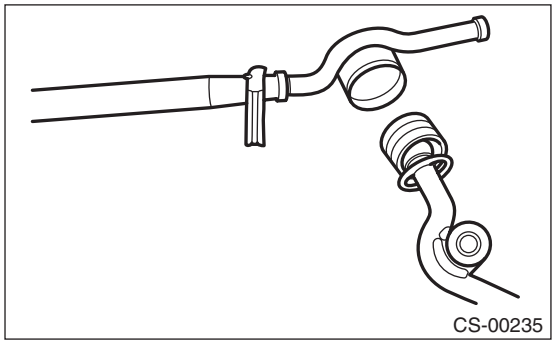
(A) Rod
(B) Lever
(C) Stay

10) Separate the rod and inner boot.
11) Remove the snap ring from the stay.

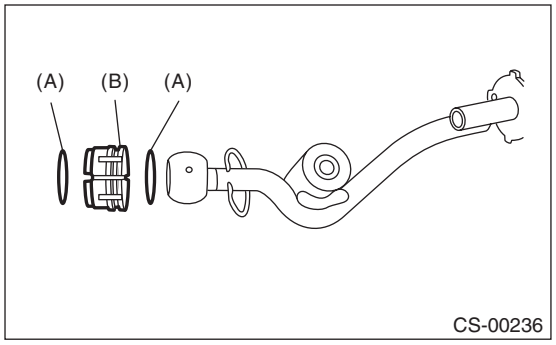


(A) Snap ring

12) Separate the gear shift lever and the stay.

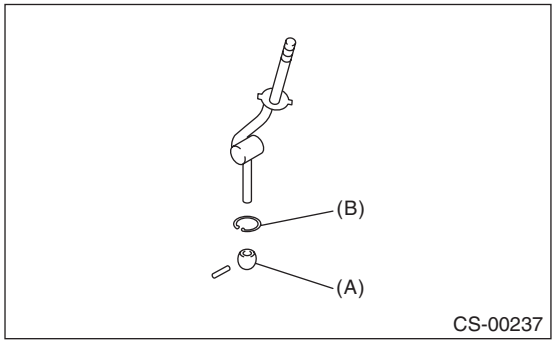


13) Remove the boot and bushing from gear shift lever.



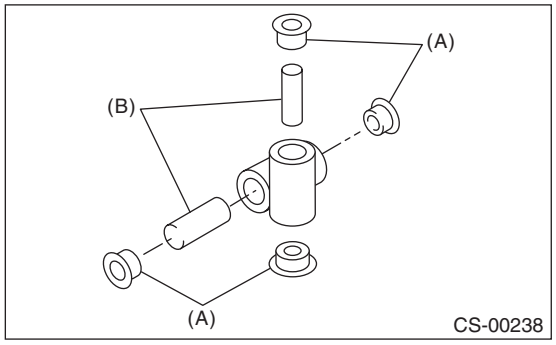
(A) O-ring
(B) Bushing

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



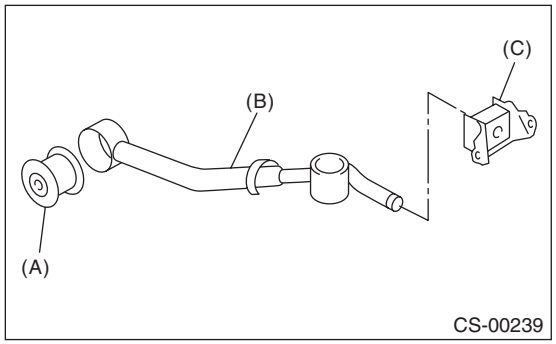
(A) Bushing
(B) Snap ring

15) Remove the bushing and spacer from the boss.



(A) Bushing
(B) Spacer

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

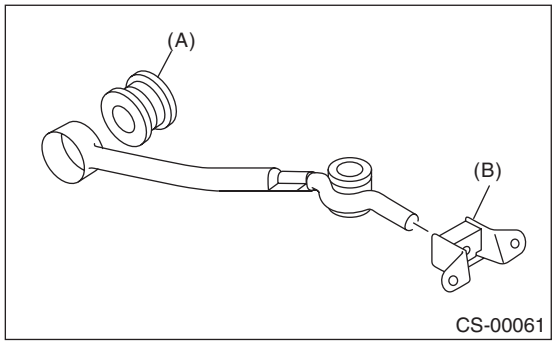


(A) Bushing
(B) Stay
(C) Cushion rubber

D: ASSEMBLY

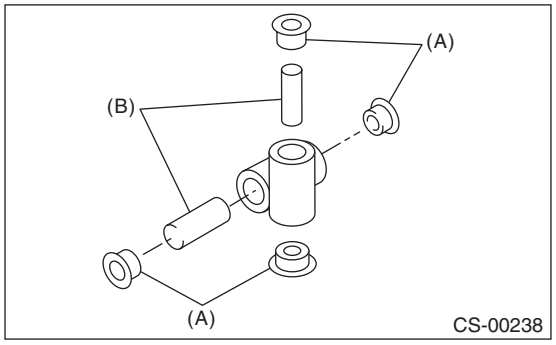
1. 5MT MODEL

NOTE:
• Clean all the parts before assembly.
• Apply grease [KOPR-KOTE (Part No. 003603001) or equivalent] to each part.
1) Mount the bushing and cushion rubber to the stay.



(A) Bushing
(B) Cushion rubber

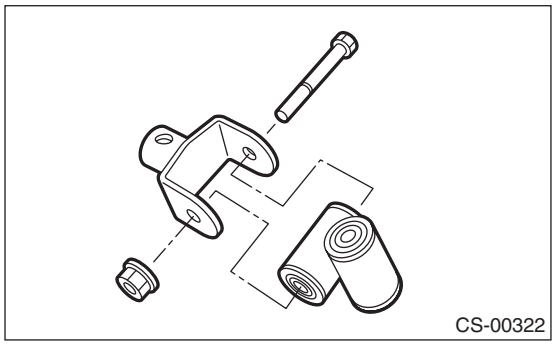
2) Install the bushing and spacer to boss.



(A) Bushing
(B) Spacer

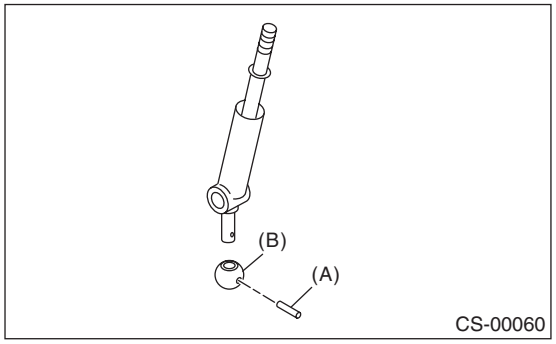
3) Using new self-locking nuts, install the boss to the joint.

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



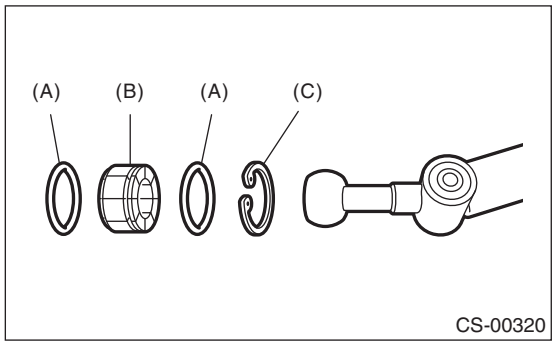
4) Install the snap ring to gear shift lever and install the bushing.

NOTE:
Apply grease to the bushing.



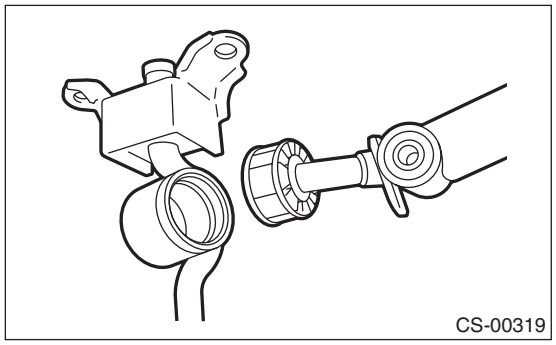
(A) Spring pin
(B) Bushing

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

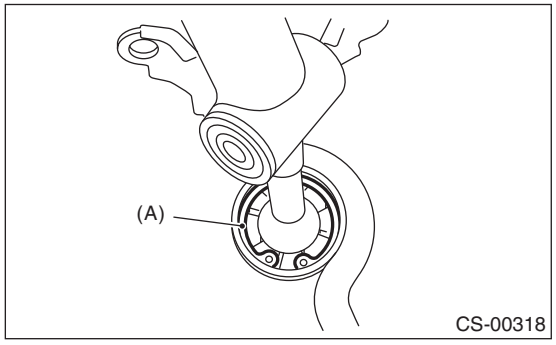


(A) O-ring
(B) Bushing
(C) Snap ring

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



7) Install the washer and snap ring.

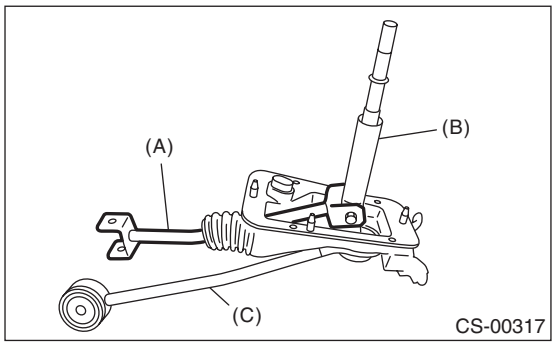


(A) Snap ring

8) Insert the gear shift lever and rod into boot hole.

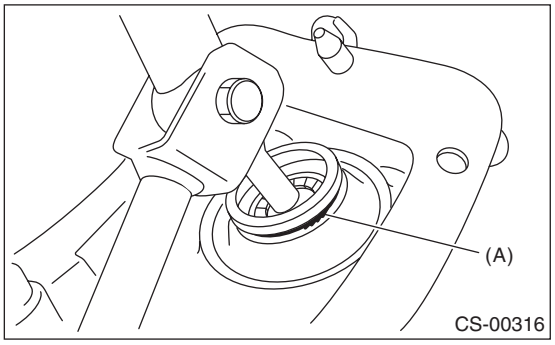
9) Install the rod.

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



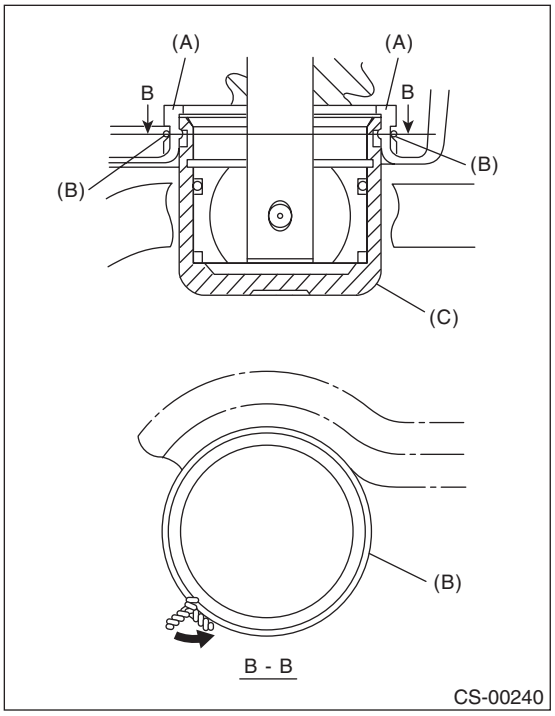
(A) Rod
(B) Lever
(C) Stay

10) Install a new lock wire.



(A) Lock wire

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

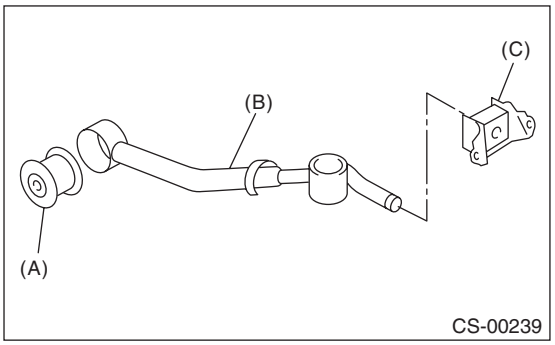


(A) Inner boot
(B) Lock wire
(C) Stay

2. 6MT MODEL

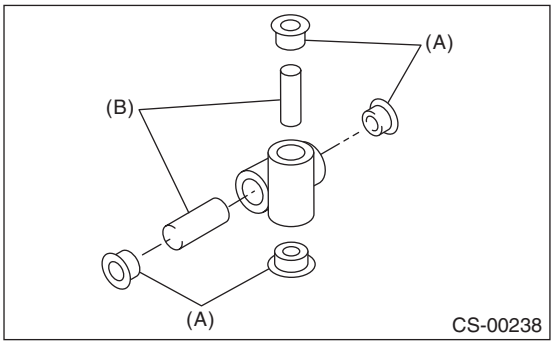
NOTE:
- Clean all the parts before assembly.
- Apply NIGTIGHT LYW No. 2 grease or equivalent to each part.

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



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

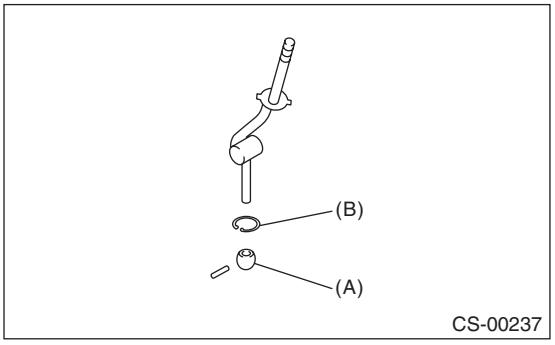
2) Install the bushing and spacer to boss.



(A) Bushing
(B) Spacer

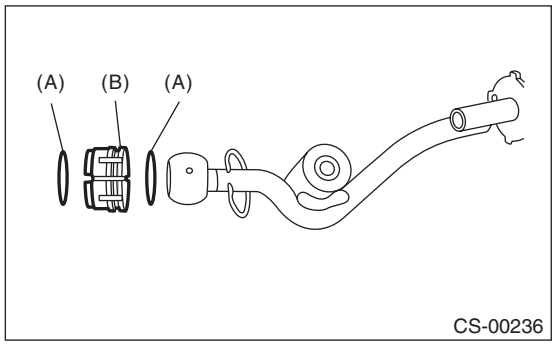
3) Install the snap ring to gear shift lever and install the bushing.

NOTE:
Apply grease to the bushing.



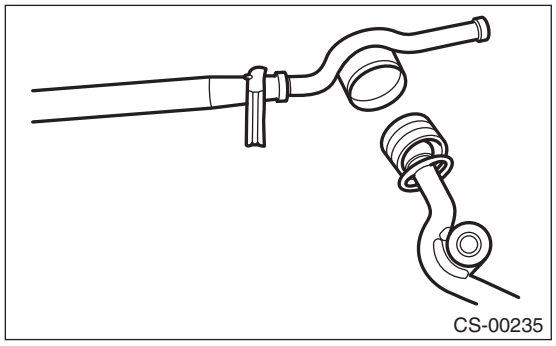
(A) Bushing
(B) Snap ring

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

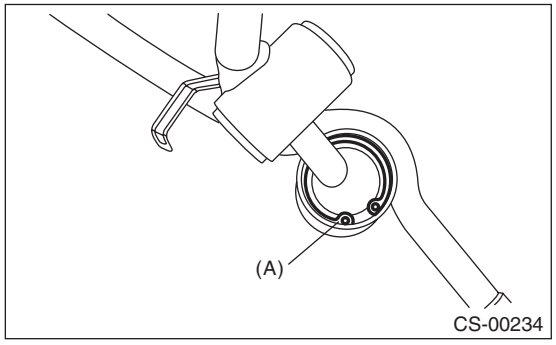


(A) O-ring
(B) Bushing

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



6) Install the washer and snap ring.

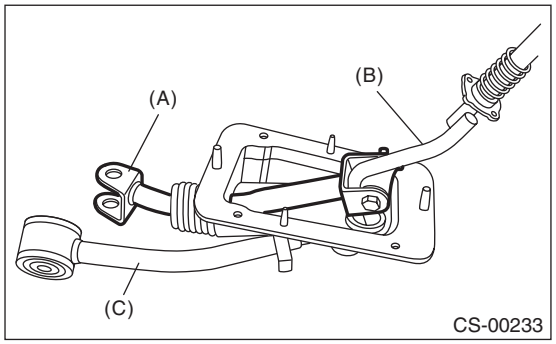


(A) Snap ring

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

8) Install the rod.

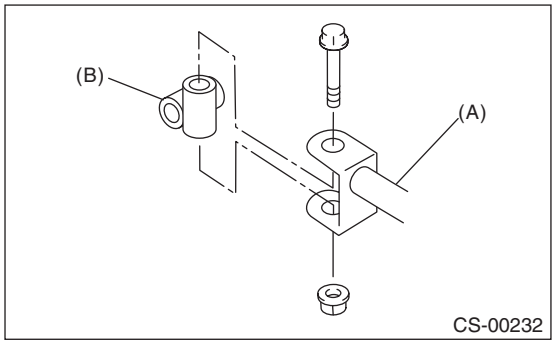
Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)



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

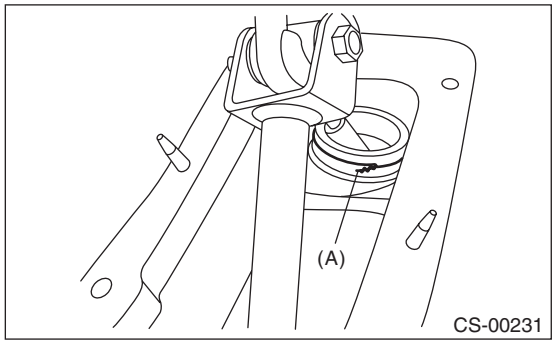
9) Install the boss to the rod.

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



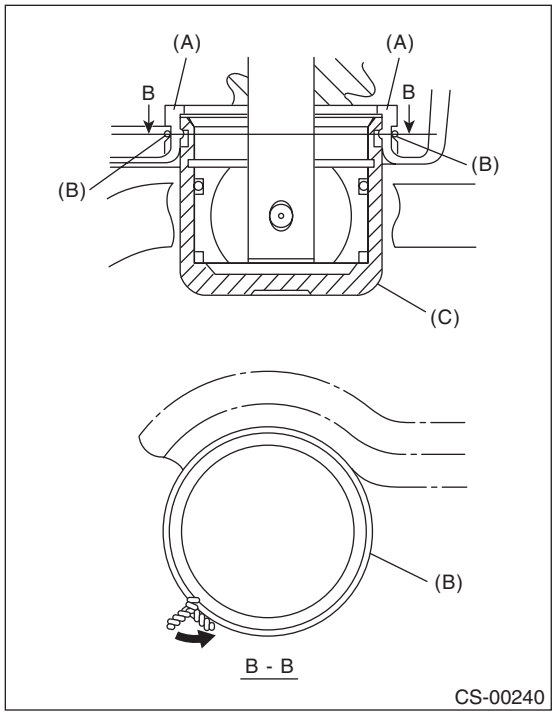
(A) Rod
(B) Boss

10) Install a new lock wire.



(A) Lock wire

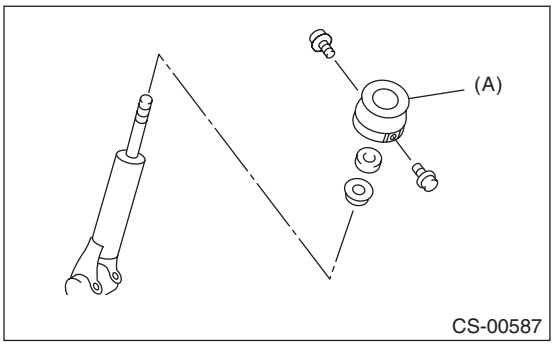
NOTE:
- Install the lock wire to the stay groove.
- Bend the extra wire to the same direction of lock wire winding.



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

11) Install the holder.

Tightening torque:
1.3 N·m (0.13 kgf-m, 0.96 ft-lb)

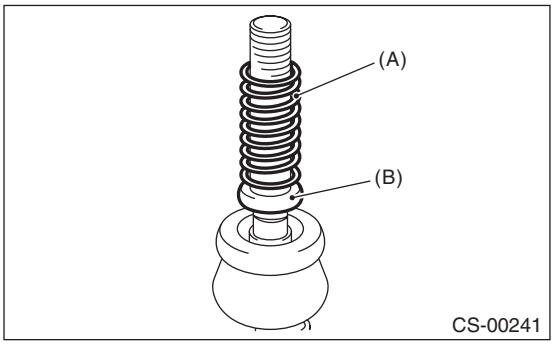


(A) Holder

12) Insert the reverse check cable into the boot hole.
13) Insert the reverse check cable to the gear shift assembly, and affix with a band clip.

NOTE:
- Cut the excess band clip.
- Make sure that the reverse check cable is inserted into the gear shift lever assembly without interspace.

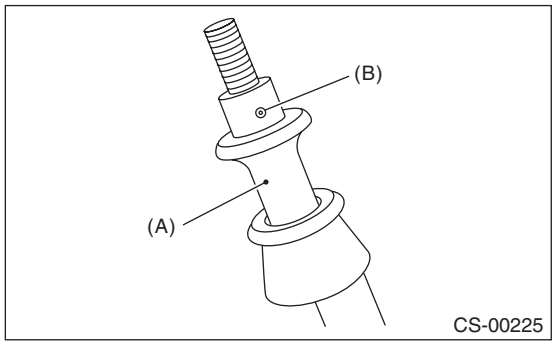
14) Attach the seat cushion and spring.



(A) Spring
(B) Seat cushion

15) Using the spring pin, fix the end of reverse check cable and slider.

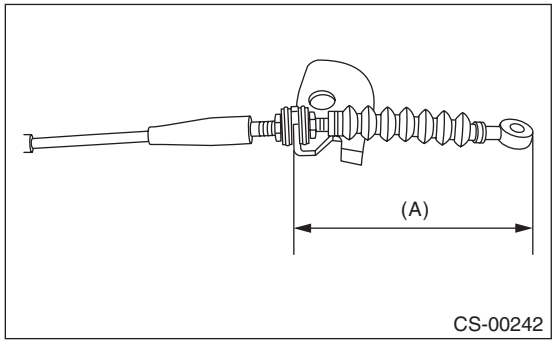
NOTE:
Apply grease to the moving part of slider.



(A) Slider
(B) Spring pin

16) With the cable pulled (the slider is lowered), adjust the distance between the edge of cable plate and the reverse check cable to 84 mm (3.31 in), and tighten the lock nut.

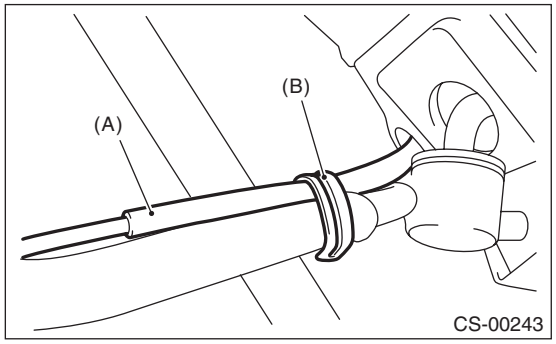
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

17) Fix the reverse check cable to the stay clip.

NOTE:
Install the reverse check cable on top of the stay.

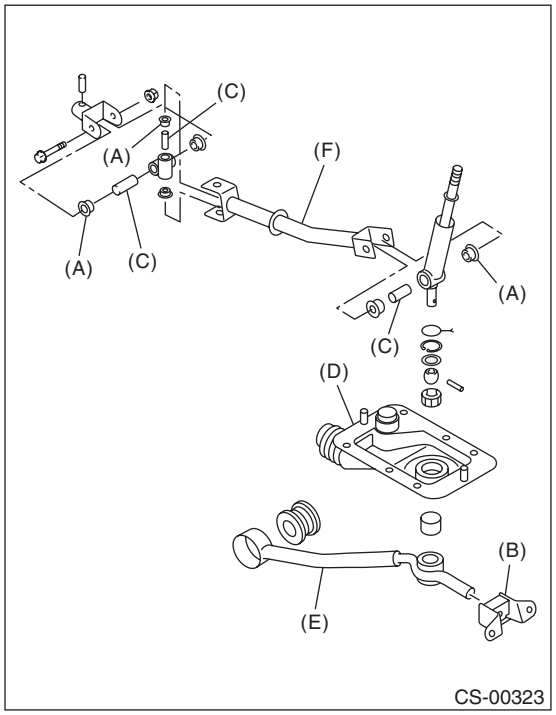


(A) Reverse check cable
(B) Clip

E: INSPECTION

1. 5MT MODEL

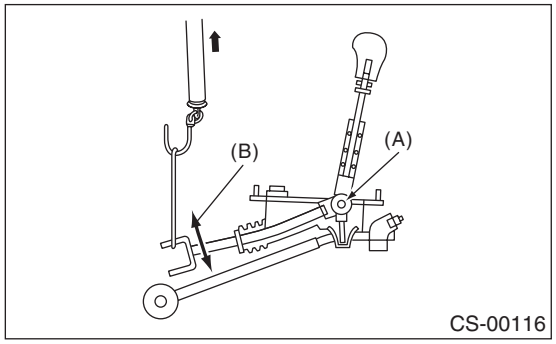
1) Check the parts (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. If necessary, correct or replace faulty parts. Compare the removed parts with new parts to judge if there are damages or not.



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

2) Check the swing torque of rod linked with the gear shift lever.
If the torque exceeds the specifications, replace the bushing or retighten nuts.

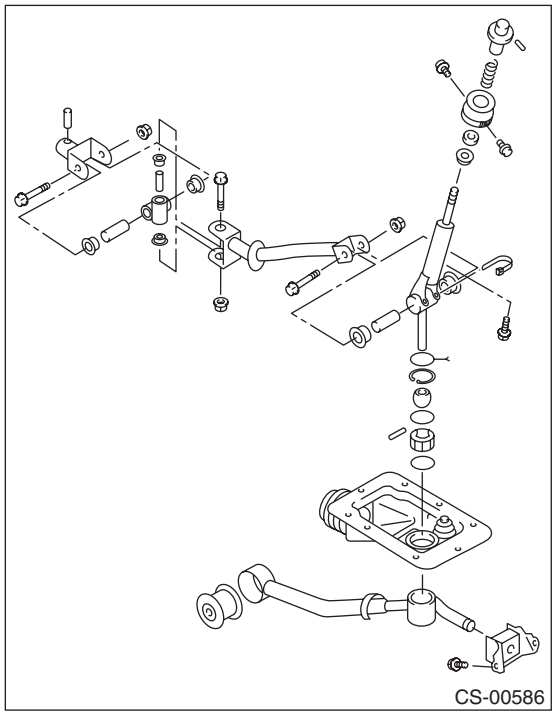
Swing torque:
3.7 N (0.38 kgf, 0.83 lbf) or less



(A) Pivot
(B) Swing torque

2. 6MT MODEL

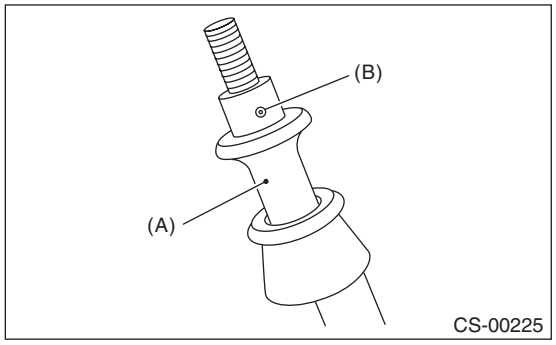
Check the parts (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. If necessary, correct or replace faulty parts. Compare the removed parts with new parts to judge if there are damages or not.



9. Reverse Check Cable

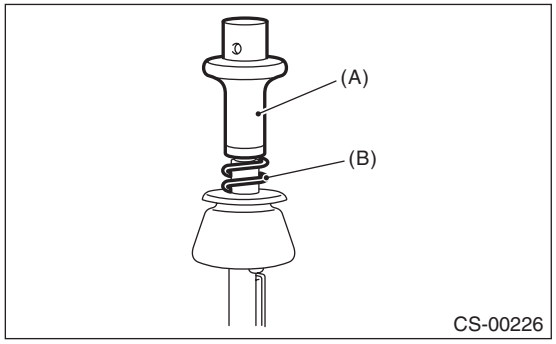
A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the gear shift knob.
3) Remove the console box front. <Ref. to EI-51, REMOVAL, Console Box.>
4) Remove the front cover assembly.
5) Remove the spring pin from the slider.



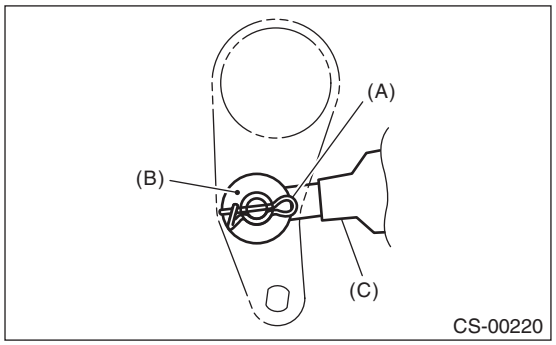
(A) Slider
(B) Spring pin

6) Remove the slider and spring.



(A) Slider
(B) Spring

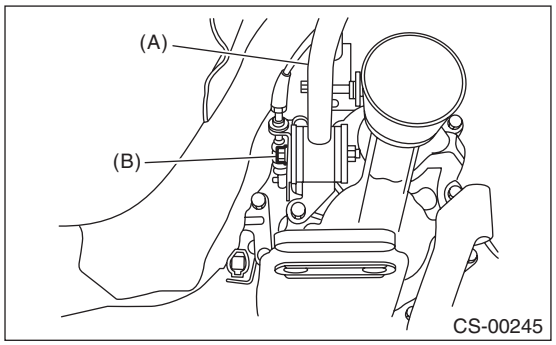
7) Cut the band clip, and separate the reverse check cable from the gear shift lever.
8) Lift the vehicle.
9) Remove the under cover.
10) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
11) Remove the crossmember. <Ref. to 6MT-31, REMOVAL, Transmission Mounting System.>
12) Remove the snap pin and washer, and separate the reverse check cable from the reverse check lever.



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

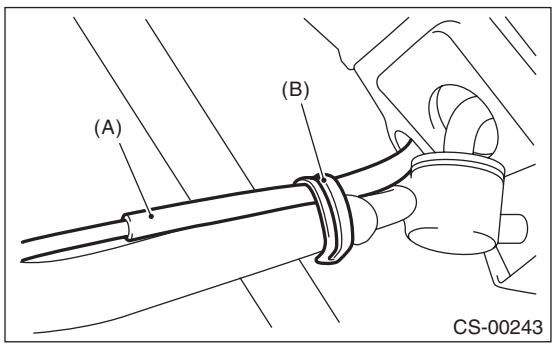
13) Move the transmission to the right side, and remove the stay bolts and reverse check cable.

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



(A) Stay
(B) Stay bolt

14) Lift the stay clip, and separate the stay and reverse check cable.

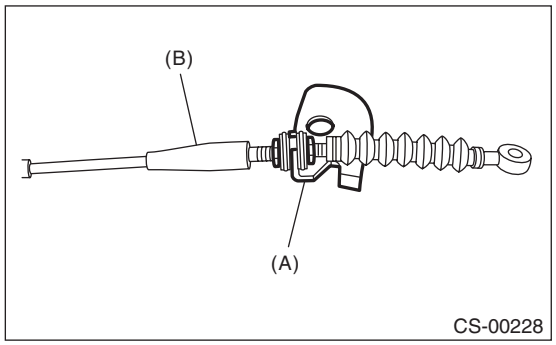


(A) Reverse check cable
(B) Clip

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

NOTE:
Be careful not to damage the inner boot.

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



(A) Cable plate
(B) Reverse check cable

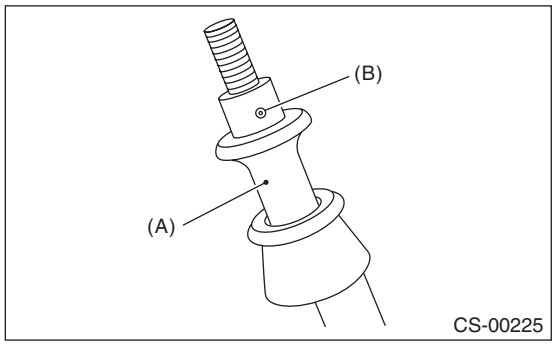
B: INSTALLATION

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

NOTE:
- Cut the excess band clip.
- Make sure that the reverse check cable is inserted into the gear shift lever assembly without interspace.

3) Using the spring pin, fix the end of reverse check cable and slider.

NOTE:
Apply grease to the moving part of slider.

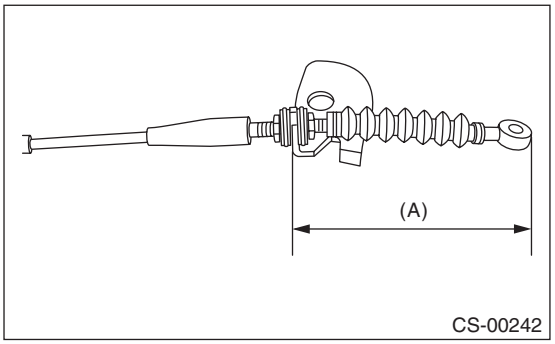


(A) Slider
(B) Spring pin

4) Lift the vehicle.

5) With the cable pulled (the slider is lowered), adjust the distance between the edge of cable plate and the reverse check cable to 84 mm (3.31 in), and tighten the lock nut.

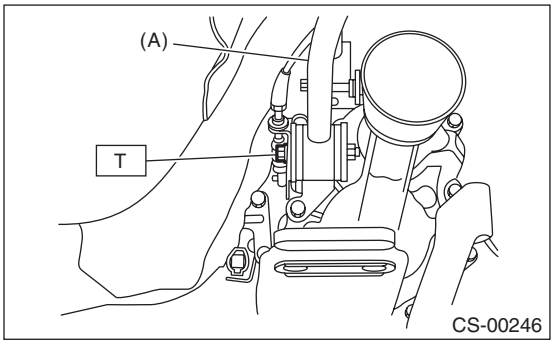
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

6) Move the transmission to the right side, and attach the stay.

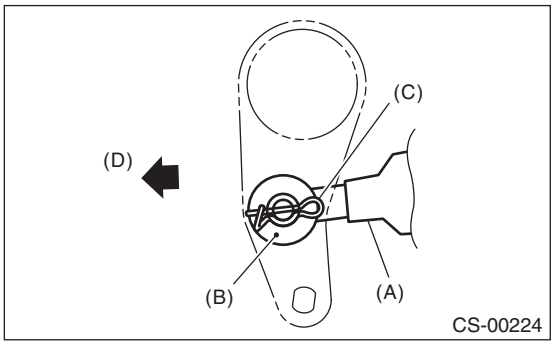
Tightening torque:
T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Stay

7) Attach the reverse check cable, washer and snap pin to the reverse check lever.

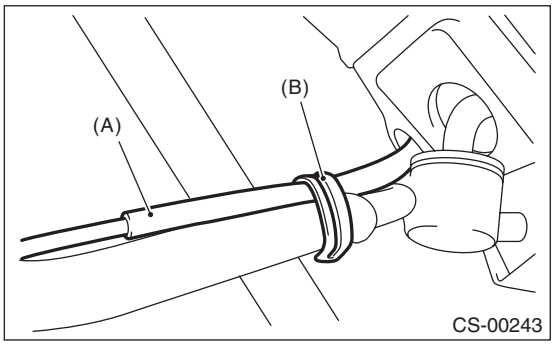
NOTE:
Take care to install the snap pin in proper direction.



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

8) Fix the reverse check cable to the stay clip.

NOTE:
Install the reverse check cable on top of the stay.



(A) Reverse check cable
(B) Clip

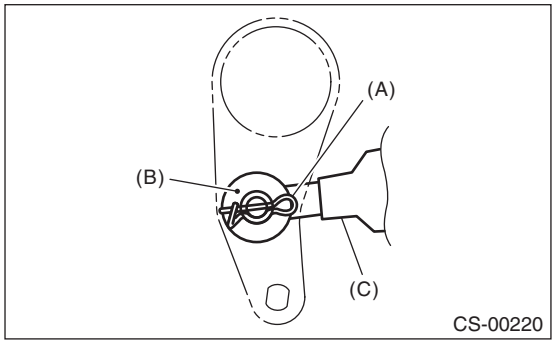
9) Install the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
10) Lower the vehicle.
11) Install the front cover assembly.
12) Install the console box. <Ref. to EI-51, INSTALLATION, Console Box.>

C: INSPECTION

1) Make sure the slider works smoothly. If it does not move, adjust the reverse check cable, or check the slider for damage. <Ref. to CS-56, ADJUSTMENT, Reverse Check Cable.>
2) Check that the gear is shifted to the reverse when the slider is lifted. If the gear is not shifted to the reverse, adjust the reverse check cable. <Ref. to CS-56, ADJUSTMENT, Reverse Check Cable.>
3) Check that the gear is not shifted to the reverse when the slider is not lifted. If the gear is shifted to the reverse, adjust or replace the reverse check cable. <Ref. to CS-56, ADJUSTMENT, Reverse Check Cable.>

D: ADJUSTMENT

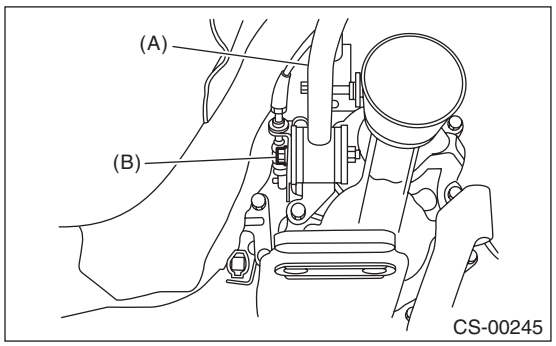
1) Set the vehicle on a lift.
2) Remove the under cover.
3) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
4) Remove the crossmember. <Ref. to 6MT-31, REMOVAL, Transmission Mounting System.>
5) Remove the snap pin and washer, and separate the reverse check cable from the reverse check lever.



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

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

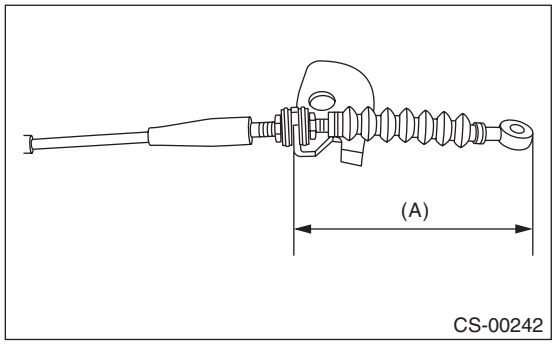
NOTE:
If the transmission is not moved aside, the stay bolts may contact the body and cause damage.



(A) Stay
(B) Stay bolt

7) With the cable pulled (the slider is lowered), adjust the distance between the edge of cable plate and the reverse check cable to 84 mm (3.31 in), and tighten the lock nut.

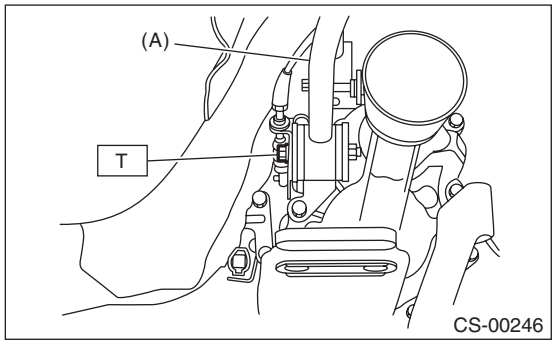
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

8) Move the transmission to the right side, and attach the stay.

Tightening torque:
T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)

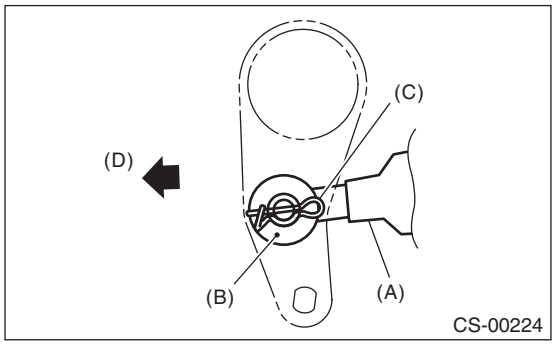


(A) Stay

9) Install the cross member. <Ref. to 6MT-31, INSTALLATION, Transmission Mounting System.>
10) Install the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

11) Attach the reverse check cable, washer and snap pin to the reverse check lever.

NOTE:
Take care to install the snap pin in proper direction.



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

12) Install the under cover.

10.General Diagnostic Table

A: INSPECTION

Symptoms	Possible cause	Corrective action
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.	Adjust 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.

AUTOMATIC TRANSMISSION

4AT

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1. General Description

A: SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Model			2.5 L non-turbo model		2.5 L turbo model	
			Except for OUTBACK	OUTBACK	Except for OUTBACK	OUTBACK
Type			5-forward speeds and 1-reverse			
Transmission gear ratio		1st	3.454		3.166	
		2nd	2.062		1.882	
		3rd	1.448		1.296	
		4th	1.088		0.972	
		5th	0.780	0.871	0.738	
		Reverse	3.333			
Front reduction gear	Final	Type of gear	Hypoid			
		Gear ratio	3.900	4.111	3.900	4.444
Rear reduction gear	Transfer	Type of gear	Helical			
		Gear ratio	1.000			
	Final	Type of gear	Hypoid			
		Gear ratio	3.900	4.111	3.900	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 and viscous coupling)			
Transmission gear oil			GL-5			
Transmission gear oil capacity		Single-range model	3.5 ℓ (3.7 US qt, 3.1 Imp qt)			

2. TRANSMISSION GEAR OIL

Recommended oil:
GL-5 (75W-90) or equivalent

3. TRANSMISSION CASE ASSEMBLY

Drive pinion shim adjustment

Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Drive pinion shim			
Part number	Thickness mm (in)	Part number	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension “A” mm (in)	Part number	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

4. DRIVE PINION ASSEMBLY

Preload adjustment of thrust bearing

Starting torque:
0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part number	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part number	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

5. REVERSE IDLER GEAR

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance:
6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part number	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust the clearance using washers.

Reverse idler gear to transmission case wall clearance:
0 — 0.5 mm (0 — 0.020 in)

Washer (20.5 × 26 × t)			
Part number	Thickness mm (in)	Part number	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

6. SHIFTER FORK AND ROD

Select a suitable shifter fork so that both the coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

Rod end clearance:
A: 3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)
B: 1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)

1st-2nd shifter fork		
Part number	Mark	Remarks
32804AA060	1	Approaches 1st gear by 0.2 mm (0.008 in).
32804AA070	No mark	Standard
32804AA080	3	Approaches 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part number	Mark	Remarks
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)

5th shifter fork (Non-turbo model), Identification paint (pink)		
Part number	Mark	Remarks
32812AA201	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA211	No mark	Standard
32812AA221	9	Moves away from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (Turbo model), Identification paint (blue)		
Part number	Mark	Remarks
32812AA231	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA241	No mark	Standard
32812AA251	9	Moves away from 5th gear by 0.2 mm (0.008 in).

7. TRANSFER CASE OR REAR CASE

Neutral position adjustment

Adjusting shim	
Part number	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part number	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part number	Mark	Angleθ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

8. EXTENSION ASSEMBLY

Preload of the taper roller bearing (amount of standard protrusion):

0.2 — 0.3 mm (0.008 — 0.012 in)

NOTE:
Be sure that the amount of preload is within the standard value.

Thrust washer (50 × 61 × t)	
Part number	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)

Thrust washer to center differential side clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part number	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)

9. FRONT DIFFERENTIAL

Bevel gear to pinion backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 × 50 × t)			
Part number	Thickness mm (in)	Part number	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

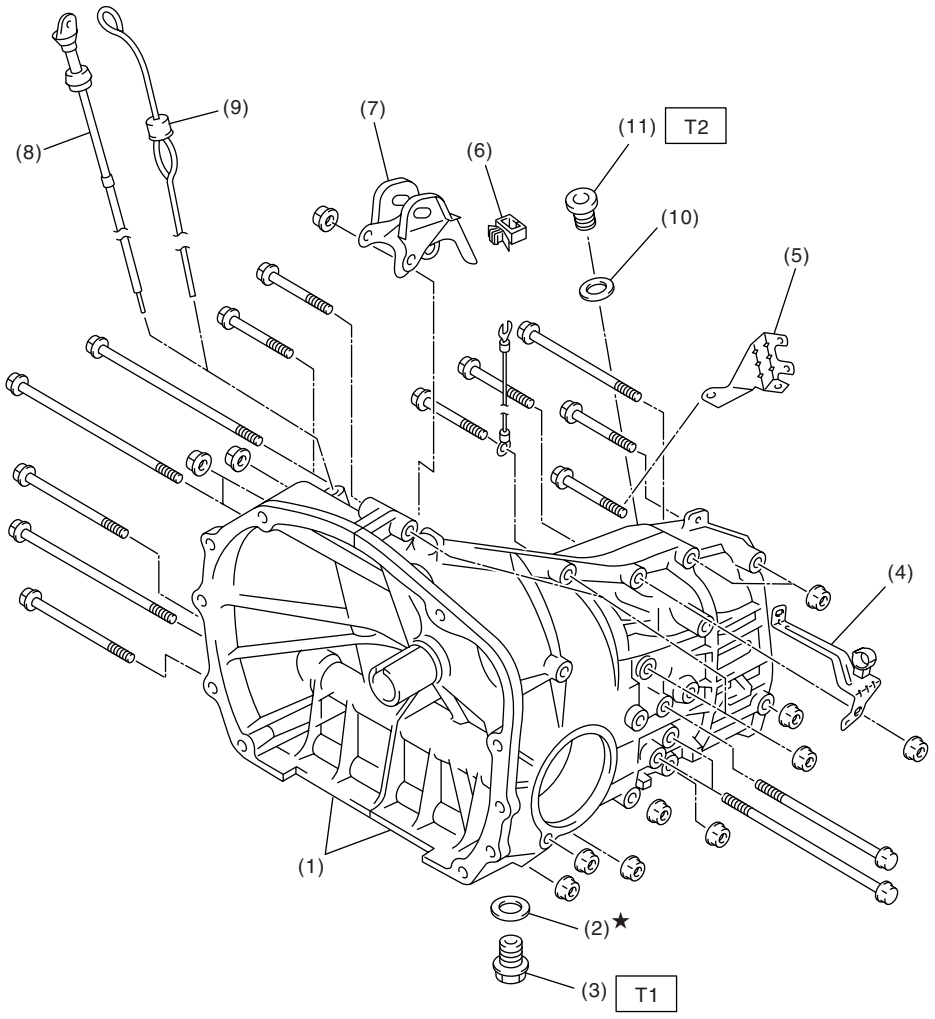
10.TRANSFER DRIVE GEAR

Snap ring (Outer-30) to ball bearing clearance:
0.01 — 0.15 mm (0.0004 — 0.0059 in)

Snap ring (Outer-30)	
Part number	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

B: COMPONENT

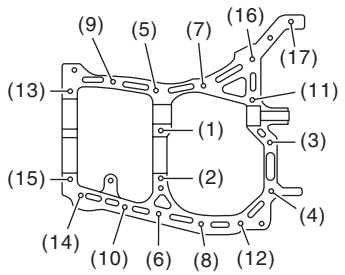
1. TRANSMISSION CASE



(1)	Transmission case ASSY	(6)	Clamp
(2)	Gasket	(7)	Pitching stopper bracket
(3)	Drain plug	(8)	Oil level gauge (Non-turbo model)
(4)	Harness bracket (Non-turbo model)	(9)	Oil level gauge (Turbo model)
		(10)	Gasket
(5)	Harness bracket (Turbo model)	(11)	Plug

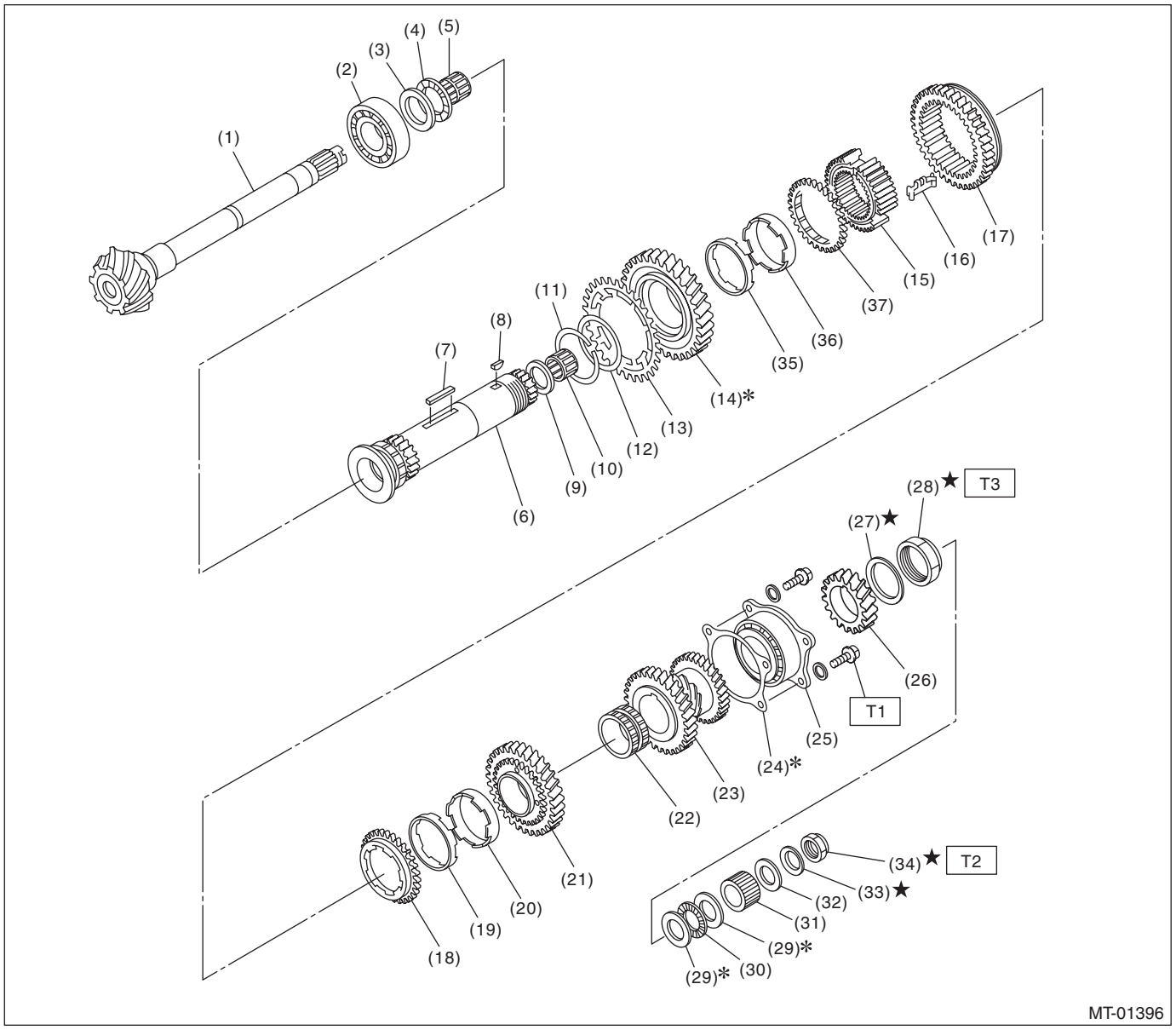
Tightening torque:N·m (kgf-m, ft-lb)
T1: 44 (4.5, 32.5) (Aluminum gasket)
70 (7.1, 51.6) (Copper gasket)
T2: 60 (6.1, 43.7)

- 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	39 (4.0, 28.9)

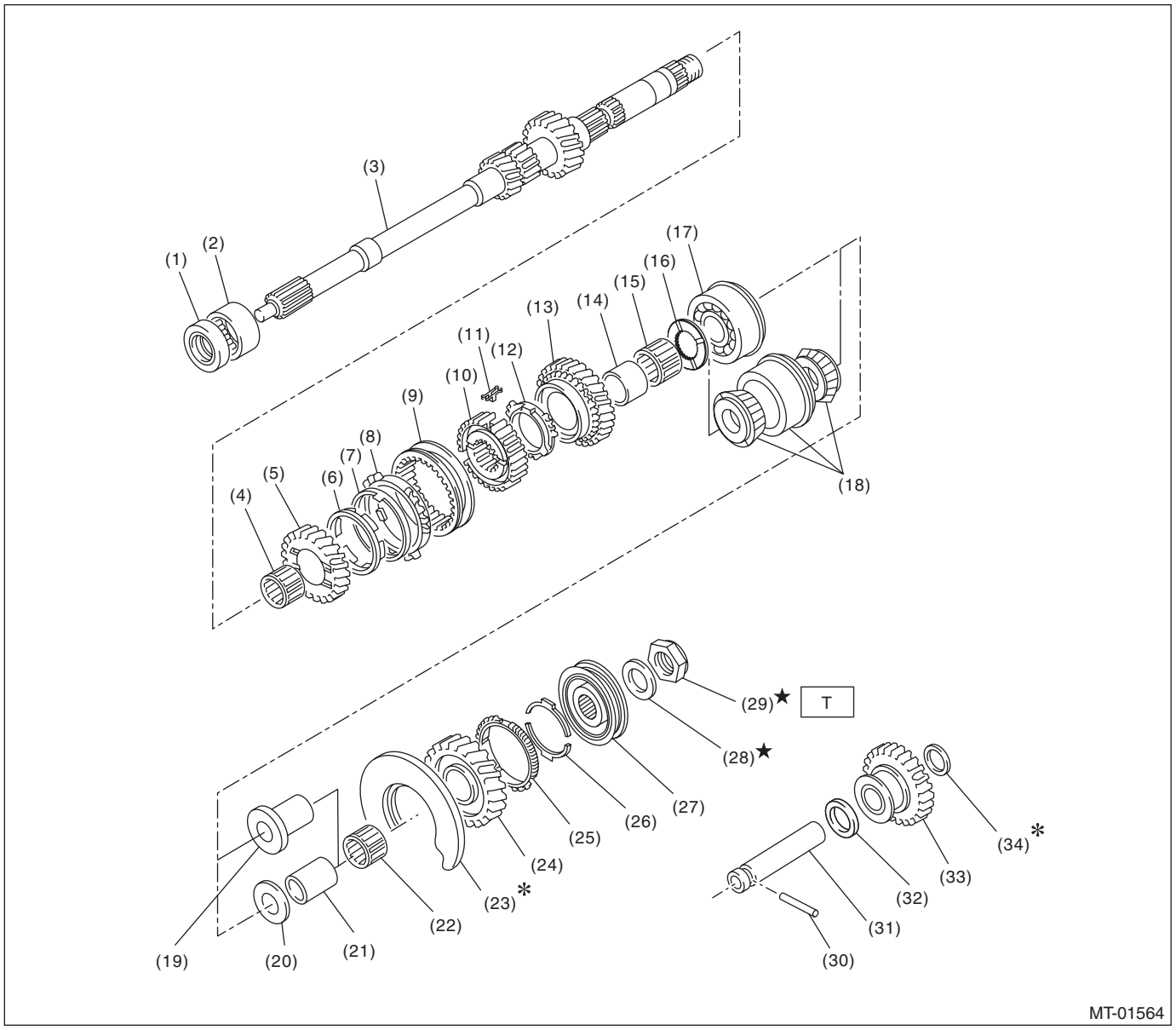
2. DRIVE PINION ASSEMBLY



(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Driven shaft
(7) Key
(8) Woodruff key
(9) Drive pinion collar
(10) Needle bearing
(11) Outer snap ring (2.5 L non-turbo model)
(12) Washer (2.5 L non-turbo model)
(13) Sub gear (2.5 L non-turbo model)
(14) 1st driven gear
(15) 1st-2nd synchronizer hub
(16) Insert key
(17) Reverse driven gear
(18) Outer baulk ring
(19) Synchro cone
(20) Inner baulk ring
(21) 2nd driven gear
(22) 2nd driven gear bushing
(23) 3rd-4th driven gear
(24) Driven pinion shim
(25) Roller bearing
(26) 5th driven gear
(27) Lock washer
(28) Lock nut
(29) Washer
(30) Thrust bearing
(31) Differential bevel gear sleeve
(32) Washer
(33) Lock washer
(34) Lock nut
(35) Inner baulk ring
(36) Synchro cone
(37) Outer baulk ring

Tightening torque:N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22.1)
T2: 120 (12.2, 88.5)
T3: 260 (26.5, 191.7)

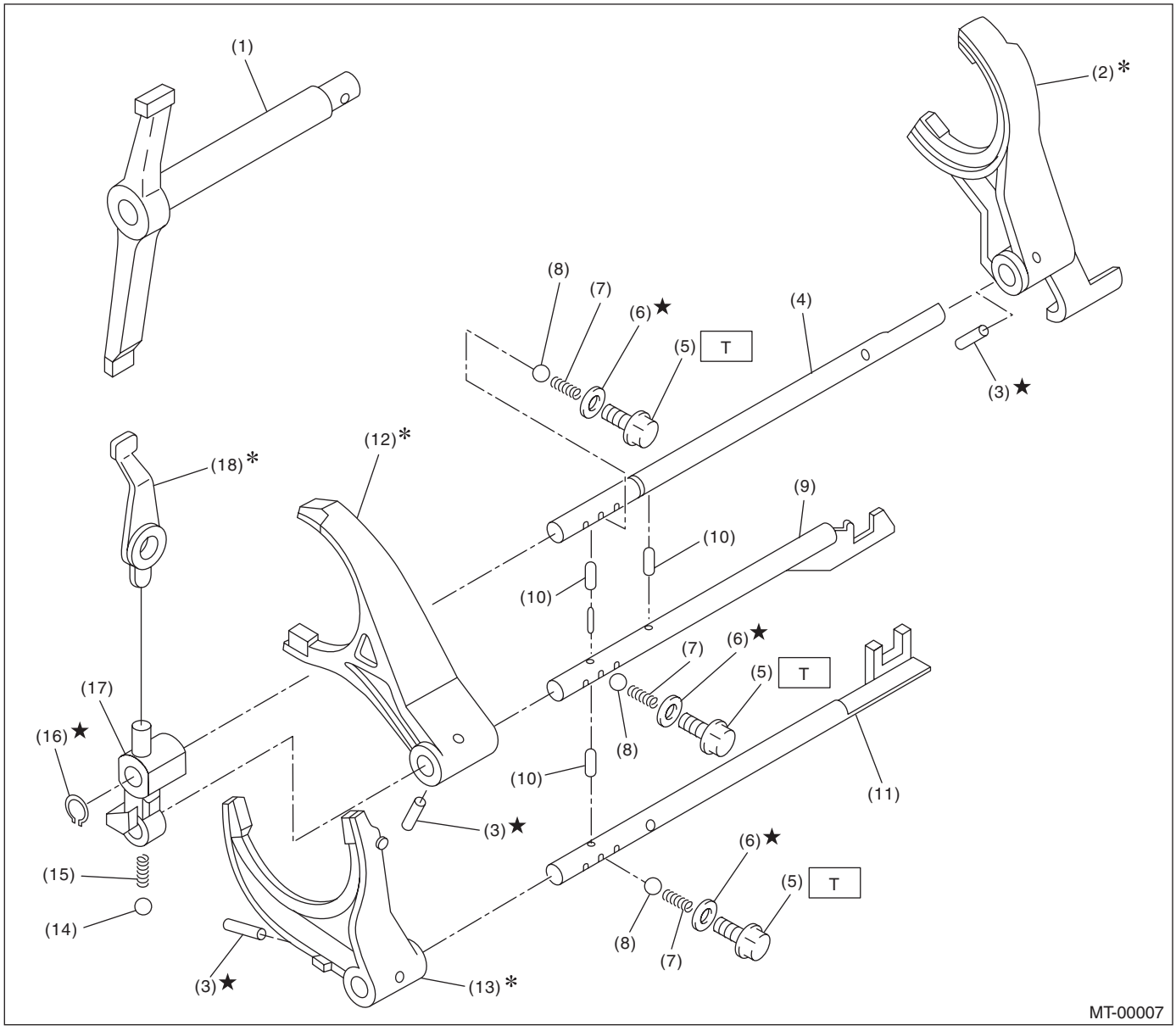
3. MAIN SHAFT FOR SINGLE-RANGE



(1) Oil seal
(2) Needle bearing
(3) Transmission 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 key
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) Needle bearing
(16) 4th gear thrust washer
(17) Ball bearing (Non-turbo model)
(18) Taper roller bearing (Turbo model)
(19) 5th needle bearing race (Turbo model)
(20) 5th gear thrust washer (Non-turbo model)
(21) 5th needle bearing race (Non-turbo model)
(22) Needle bearing
(23) Main shaft rear plate
(24) 5th drive gear
(25) 5th baulk ring
(26) Baulk lever
(27) 5th hub & sleeve No. 2
(28) Lock washer
(29) Lock nut
(30) Straight pin
(31) Reverse idler gear shaft
(32) Washer
(33) Reverse idler gear
(34) Washer

Tightening torque:N·m (kgf-m, ft-lb)
T: 120 (12.2, 88.5)

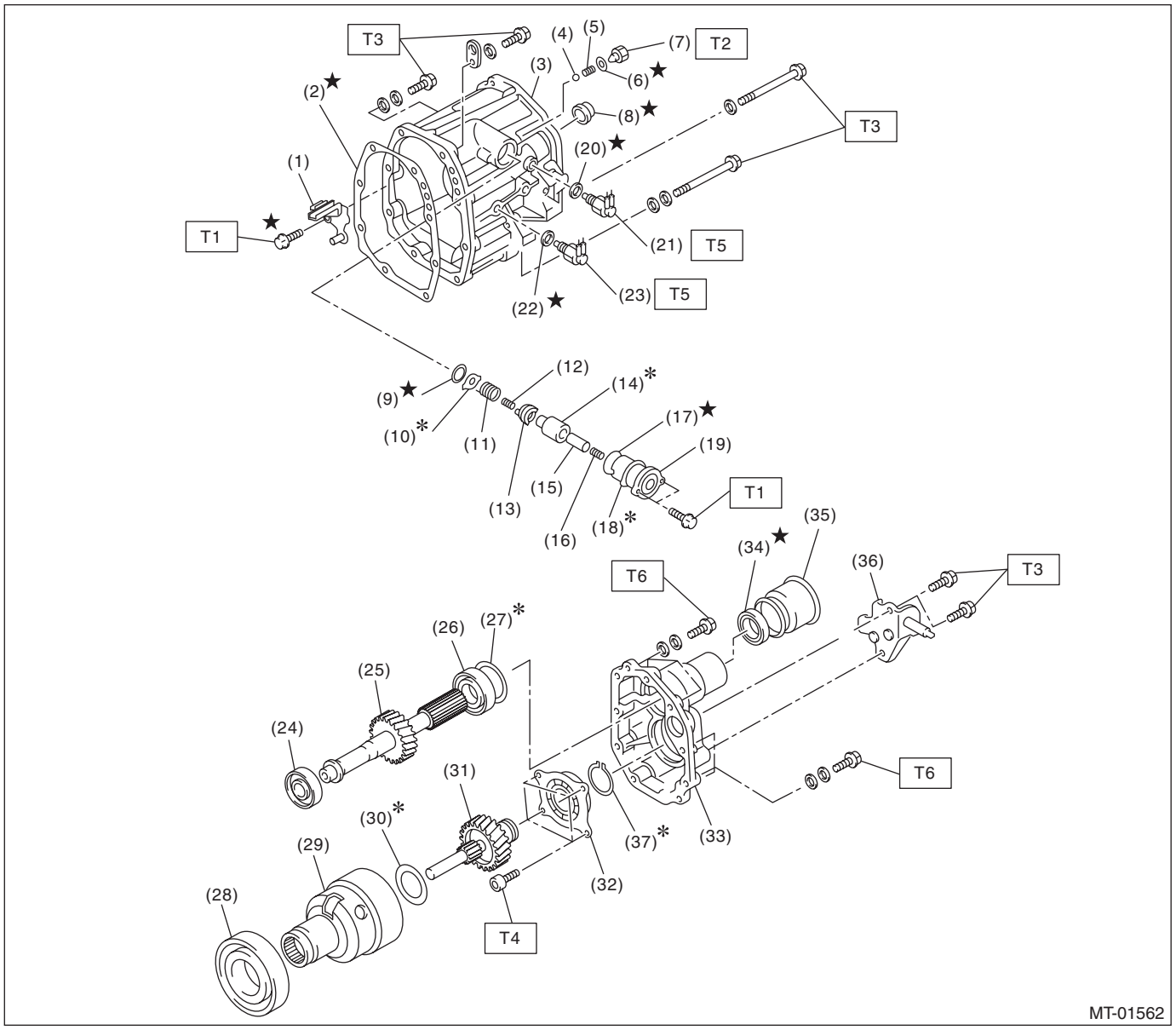
4. SHIFTER FORK AND SHIFTER ROD



(1) Shifter arm
(2) 5th shifter fork
(3) Straight pin
(4) Reverse fork rod
(5) Checking ball plug
(6) Gasket
(7) Checking ball spring
(8) Ball
(9) 3rd-4th fork rod
(10) Interlock plunger
(11) 1st-2nd fork rod
(12) 3rd-4th shifter fork
(13) 1st-2nd shifter fork
(14) Ball
(15) Spring
(16) Snap ring (Outer)
(17) Reverse fork rod arm
(18) Reverse shifter lever

Tightening torque:N·m (kgf-m, ft-lb)
T: 19.5 (2.0, 14.5)

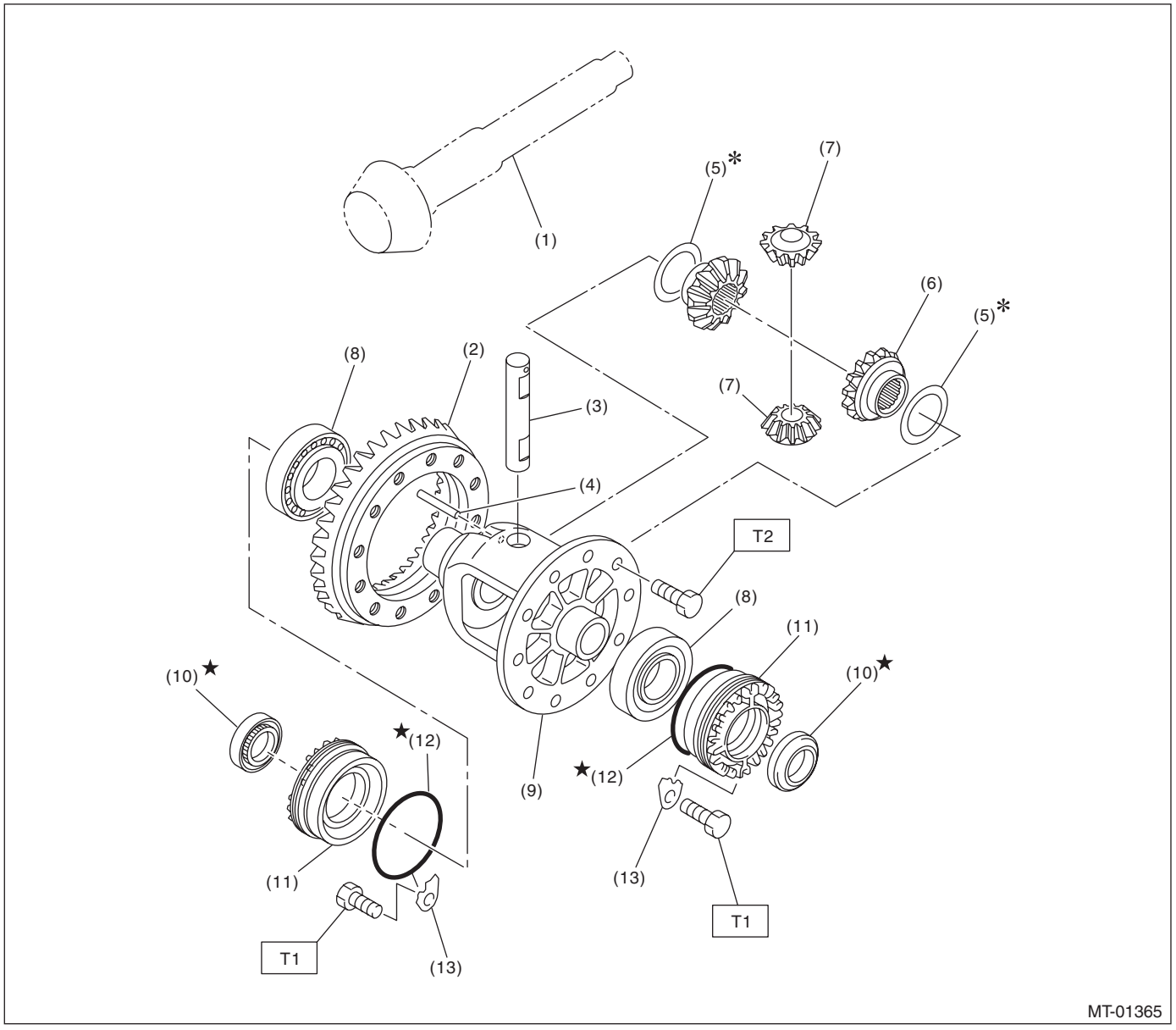
5. TRANSFER CASE AND EXTENSION



(1) Oil guide
(2) Gasket
(3) Transfer case
(4) Ball
(5) Reverse accent spring
(6) Gasket
(7) Plug
(8) Oil seal
(9) Snap ring (Inner)
(10) Reverse check plate
(11) Reverse check spring
(12) Reverse return spring
(13) Reverse check cam
(14) Reverse accent shaft
(15) Return spring cap
(16) Return spring
(17) O-ring
(18) Adjusting select shim
(19) Reverse check sleeve
(20) Gasket
(21) Neutral position switch
(22) Gasket
(23) Back-up light switch
(24) Roller bearing
(25) Transfer driven gear
(26) Roller bearing
(27) Adjusting washer
(28) Ball bearing
(29) Center differential
(30) Adjusting washer
(31) Transfer drive gear
(32) Ball bearing
(33) Extension case
(34) Oil seal
(35) Dust cover
(36) Shift bracket
(37) Snap ring

Tightening torque:N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 9.75 (1.0, 7.2)
T3: 24.5 (2.5, 18.1)
T4: 26 (2.7, 20)
T5: 32.3 (3.3, 23.8)
T6: 40 (4.1, 29.7)

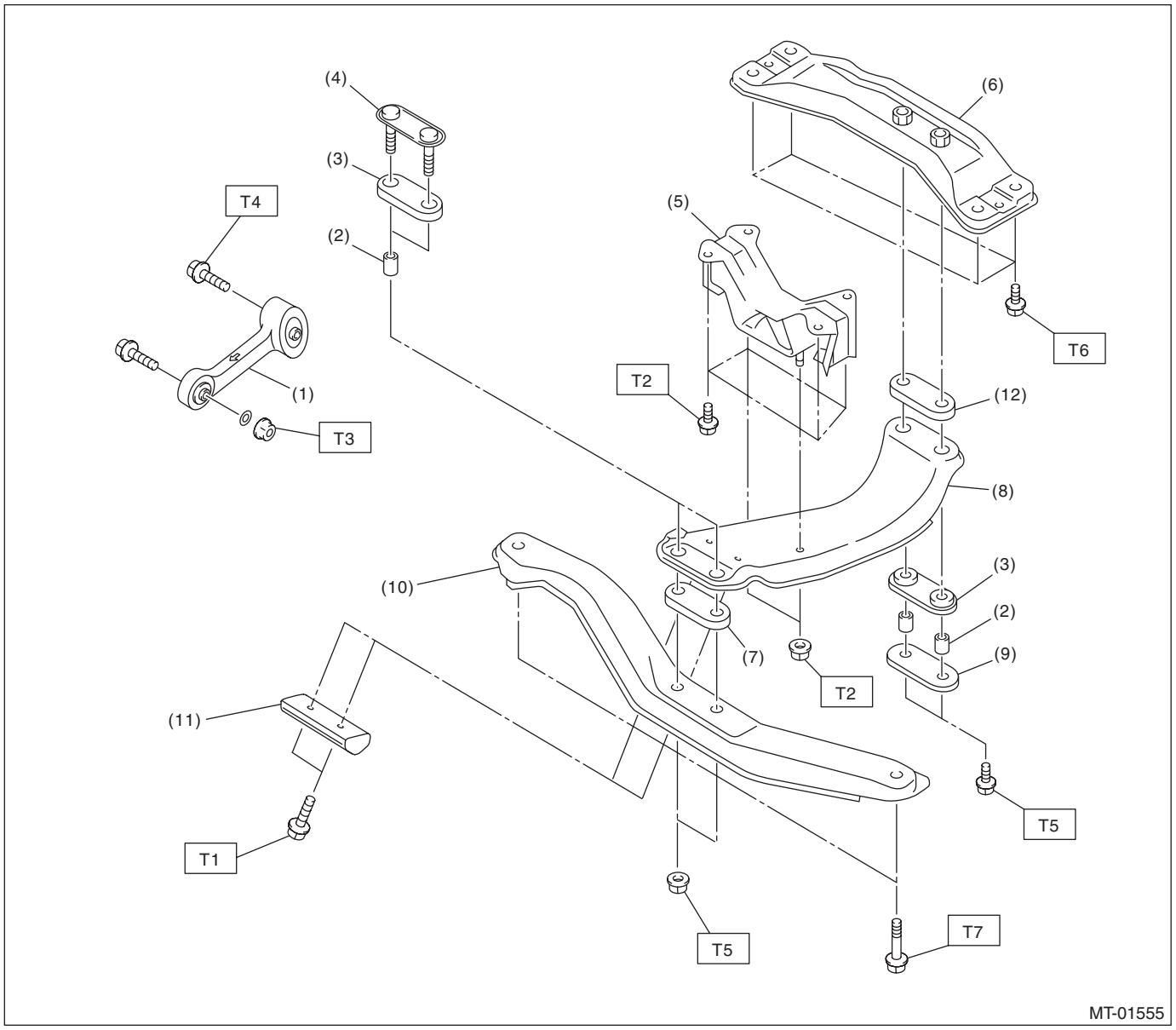
6. FRONT DIFFERENTIAL



(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

Tightening torque:N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.4)
T2: 62 (6.3, 45.6)

7. TRANSMISSION MOUNTING



(1)	Pitching stopper	(7)	Upper cushion rubber
(2)	Spacer	(8)	Center crossmember
(3)	Lower cushion rubber	(9)	Rear plate
(4)	Front plate	(10)	Front crossmember
(5)	Transmission cushion rubber	(11)	Dynamic damper
(6)	Rear crossmember	(12)	Rear cushion rubber

Tightening torque:N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 35 (3.6, 26)
T3: 50 (5.1, 36.9)
T4: 58 (5.9, 42.8)
T5: 70 (7.1, 51.6)
T6: 75 (7.6, 55)
T7: 140 (14.3, 103)

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 the 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 liquid gasket.

D: PREPARATION TOOL

1. SPECIAL TOOL

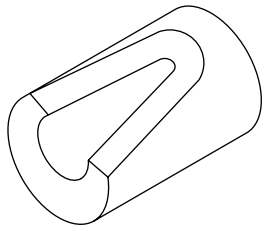
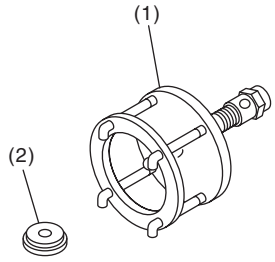
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399411700	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.
 ST-899524100	899524100	PULLER SET	Used for removing and installing the roller bearing (Differential). (1) Puller (2) Cap

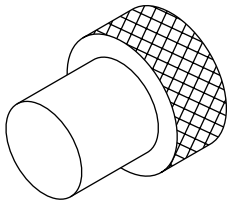
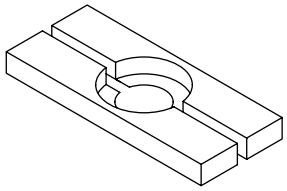
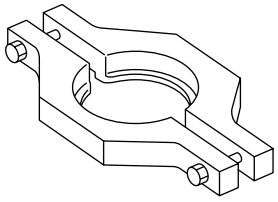
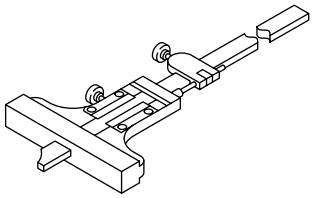
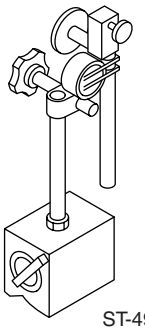
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399780104	399780104	WEIGHT	Used for measuring preload on the roller bearing.
 ST-498077000	498077000	REMOVER	Used for removing the roller bearing of the drive pinion shaft.
 ST-498077300	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.
 ST-498147001	498147001	DEPTH GAUGE	Used for adjusting the main shaft axial end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between the side gear and pinion, and the hypoid gear. • Used together with the DIAL GAUGE (498247100).

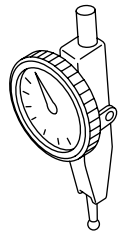
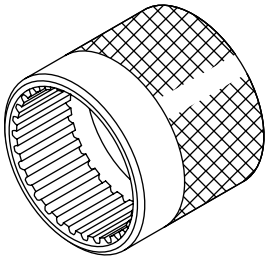
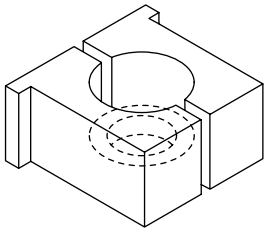
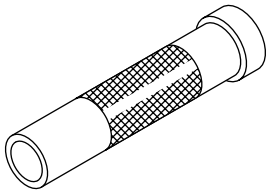
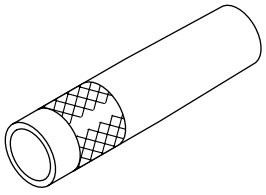
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between the side gear and pinion, and the hypoid gear. • Used together with the MAGNET BASE (498247001).
 ST-498427100	498427100	STOPPER	Used for securing the drive pinion shaft assembly and the driven gear assembly when removing the drive pinion shaft assembly lock nut.
 ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing the lock nut of the transmission main shaft.
 ST-499277100	499277100	BUSHING 1-2 INSTALLER	• Used for installing the 1st driven gear thrust plate and the 1st-2nd driven gear bushing. • Used for installing the roller bearing outer race to the differential case.
 ST-499277200	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings and the 5th driven gear onto the driven shaft.

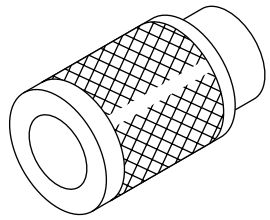
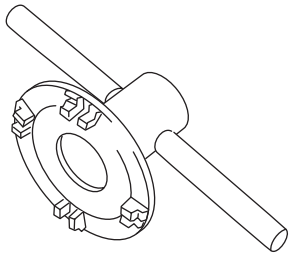
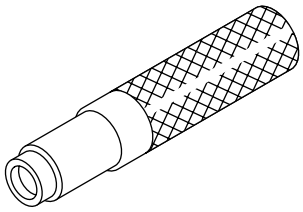
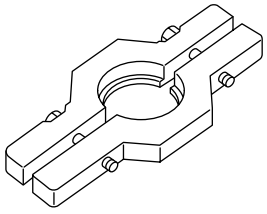
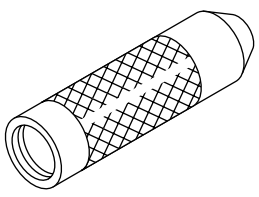
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499757002	499757002	INSTALLER	• Used for installing the snap ring (OUT 25), and ball bearing (25 × 26 × 17). • Used for installing the bearing cone of the transfer driven gear (extension core side).
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	• Used for removing and installing the differential side retainer. • WRENCH ASSEMBLY (499787000) can also be used.
 ST-499827000	499827000	PRESS	Used for installing the speedometer oil seal when attaching the speedometer cable to the transmission.
 ST-499857000	499857000	5TH DRIVEN GEAR REMOVER	Used for removing the 5th driven gear.
 ST-499877000	499877000	RACE 4-5 INSTALLER	• Used for installing the 4th needle bearing race and ball bearing onto the transmission main shaft. • Used together with the REMOVER (899714110).

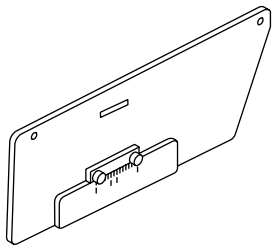
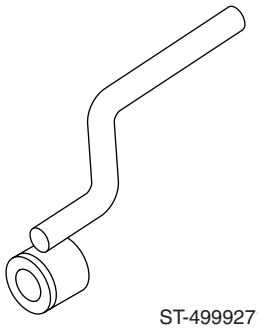
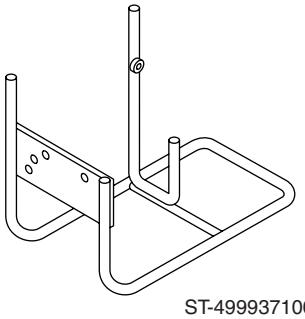
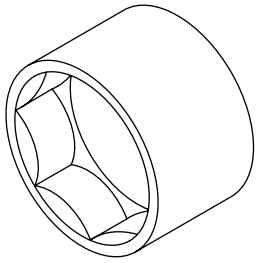
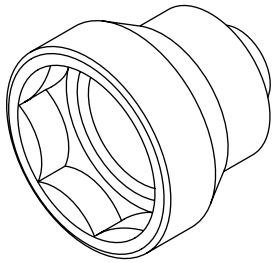
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting the drive pinion shim.
 ST-499927100	499927100	HANDLE	Used for fitting the transmission main shaft.
 ST-499937100	499937100	TRANSMISSION STAND SET	Used for disassembling and assembling the transmission.
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing the driven pinion lock nut and main shaft lock nut.
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing the driven gear assembly lock nut.

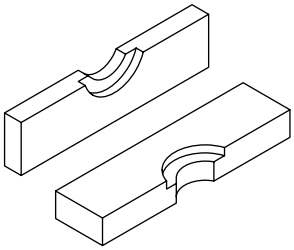
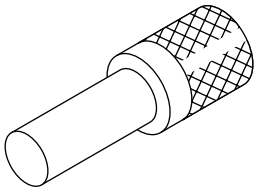
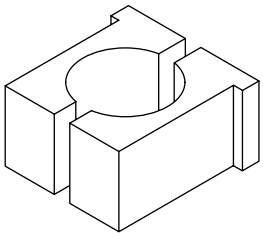
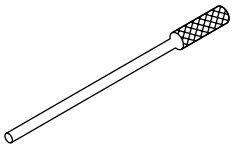
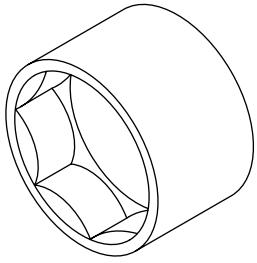
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899714110	899714110	REMOVER	Used for fixing the transmission main shaft, drive pinion and rear drive shaft.
 ST-899864100	899864100	REMOVER	Used for removing transmission main shaft and drive pinion parts.
 ST-899884100	899884100	HOLDER	Used for tightening the lock nut on the sleeve.
 ST-899904100	899904100	REMOVER	Used for removing and installing the straight pin.
 ST-899988608	899988608	SOCKET WRENCH (27)	Used for removing and installing the drive pinion lock nut.

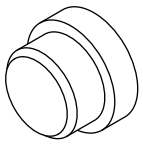
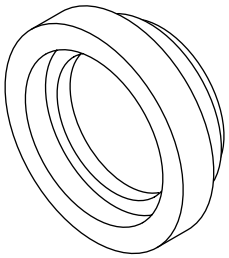
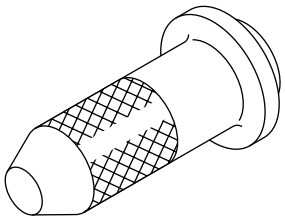
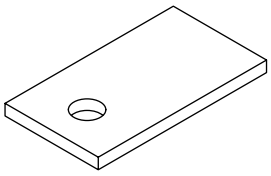
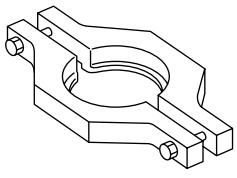
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398497701	398497701	ADAPTER	• Used for installing roller bearing onto the differential case. • Used together with the INSTALLER (499277100).
 ST-499587000	499587000	INSTALLER	Used for installing the driven gears to the driven shaft.
 ST-498057300	498057300	INSTALLER	Used for installing the extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.
 ST-498077400	498077400	SYNCHRONIZER CONE REMOVER	• Used for removing the synchronizer cone of the main shaft. • Used for removing 5th driven gear of the drive pinion shaft.

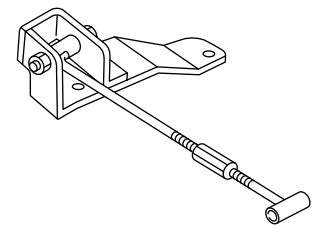
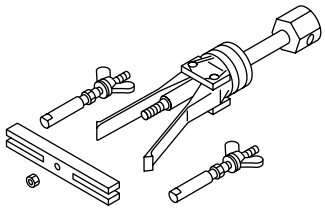
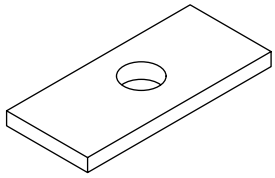
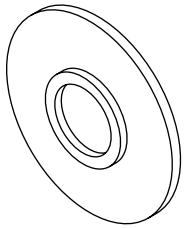
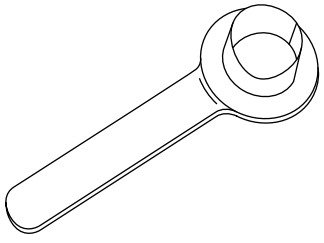
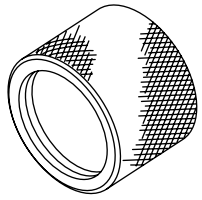
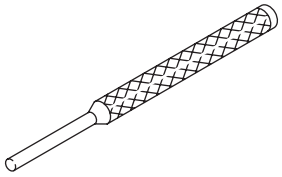
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AC000	41099AC000	ENGINE SUPPORT BRACKET	Used for supporting the engine.
 ST-398527700	398527700	PULLER ASSY	Used for removing the extension case roller bearing.
 ST-398643600	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
 ST-398177700	398177700	INSTALLER	• Used for installing the bearing cone of transfer driven gear (transfer case side). • Used for installing the ball bearing of the transfer drive gear.
 ST28399SA010	28399SA010	FRONT DRIVE SHAFT OIL SEAL PROTECTOR	Used for protecting the oil seal from damage when inserting the front drive shaft.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST-398791700	398791700	STRAIGHT PIN REMOVER	Used for installing and removing the straight pin.

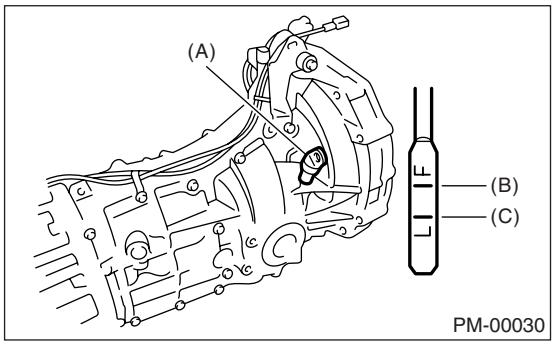
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
TORX® bit T70	Used for installing and removing the differential gear oil drain plug.

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 level gauge all the way. Be sure that the 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 at the lower level or less, 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

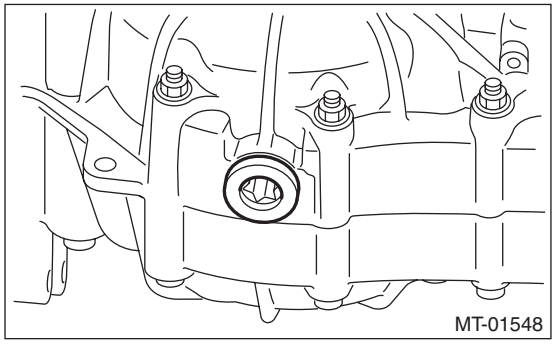
B: REPLACEMENT

1) Pull out the oil level gauge.
2) Lift the vehicle.
3) Using the TORX ® bit T70, remove the drain plug, and drain the transmission gear oil completely.

CAUTION:
• Immediately after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.
• Be careful not to spill the transmission gear oil on the exhaust pipe, to prevent emission of smoke or causing a fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
4) Using the TORX ® bit T70, tighten the transmission gear oil drain plug.

NOTE:
• Tighten the drain plug of the transmission gear oil after draining the transmission gear oil.
• Use a new gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)
70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket)



5) Lower the vehicle.
6) Pour gear oil through the gauge hole.

Recommended gear oil:
GL-5 (75W-90) or equivalent

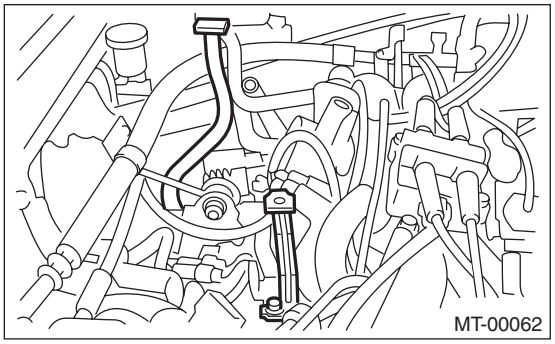
Gear oil capacity:
3.5 ℓ (3.7 US qt, 3.1 Imp qt)
7) Measure the transmission gear oil level to check that it is within specifications.

CAUTION:
When inserting the level gauge into transmission, align the protrusion on the top part of the level gauge with the notch in the gauge hole.

3. Manual Transmission Assembly

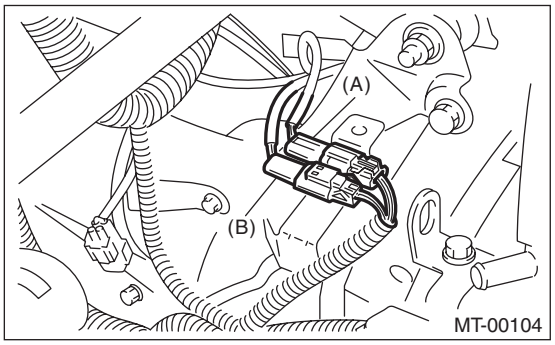
A: REMOVAL

1) Set the vehicle on a lift.
2) Open the front hood fully, and support with stay.
3) Disconnect the ground cable from battery.
4) Drain transmission gear oil completely.
5) Remove the air intake chamber and air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.> <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
6) Remove the air intake chamber stay. (Non-turbo model)


MT-00062

7) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
8) Disconnect the connector back-up light switch & neutral position switch.

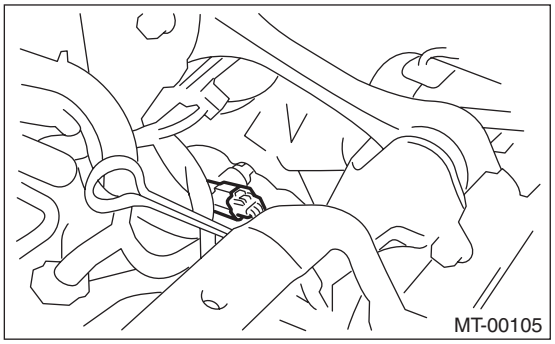
- Non-turbo model



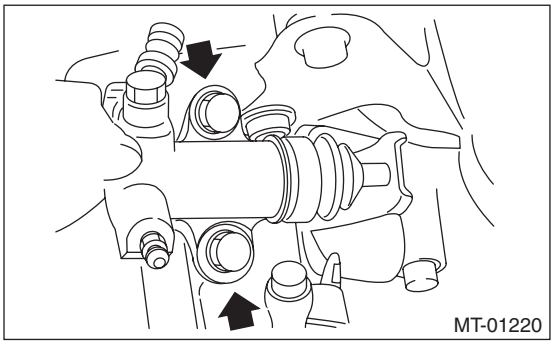
MT-00104

(A) Neutral position switch connector (Brown)
(B) Back-up light switch connector (Gray)

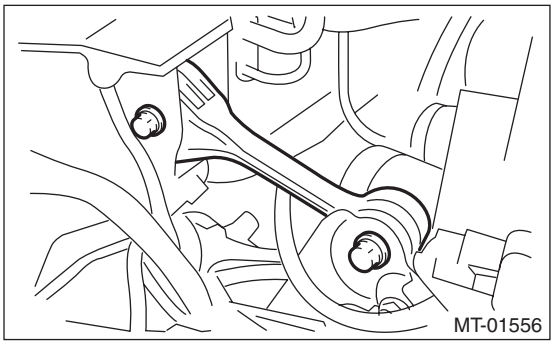
- Turbo model


MT-00105

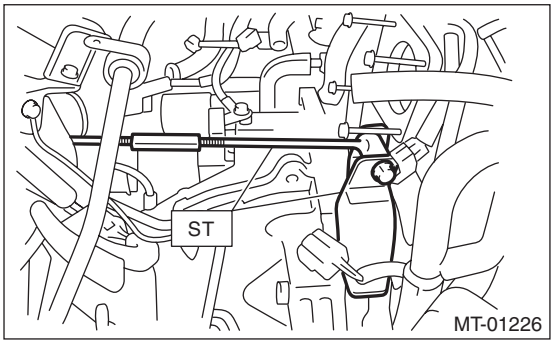
9) Remove the starter. <Ref. to SC(H4SO)-6, REMOVAL, Starter.>
10) Remove the operating cylinder from the transmission, and suspend on a wire.


MT-01220

11) Remove the pitching stopper.

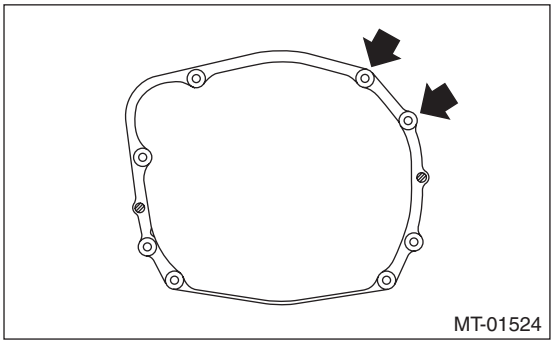

MT-01556

12) Set the ST.
ST 41099AC000 ENGINE SUPPORT ASSY



MT-01226

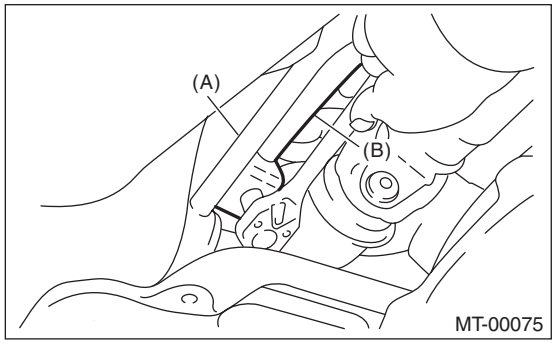
13) Remove the bolts which hold upper side of transmission to engine.


MT-01524

14) Lift the vehicle.
15) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>

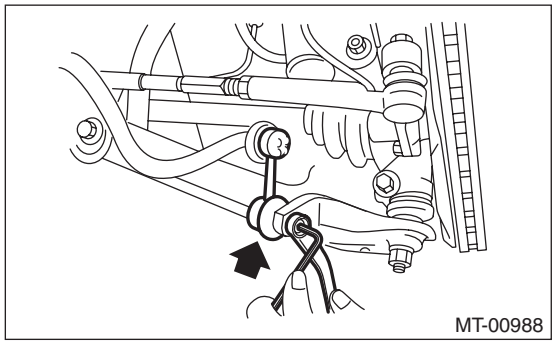
16) Remove the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
17) Remove the rear exhaust pipe and muffler.

CAUTION:
When removing the exhaust pipes, be careful each exhaust pipe does not drop out.
18) Remove the heat shield cover. (If equipped)
19) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
20) Remove the gear shift rod and the stay from the transmission.
(1) Disconnect the stay from the transmission.
(2) Remove the gear shift rod from the transmission.

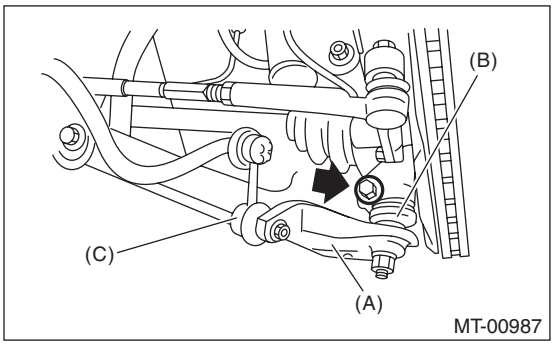


(A) Stay
(B) Gear shift rod

21) Remove the stabilizer link from the front arm.

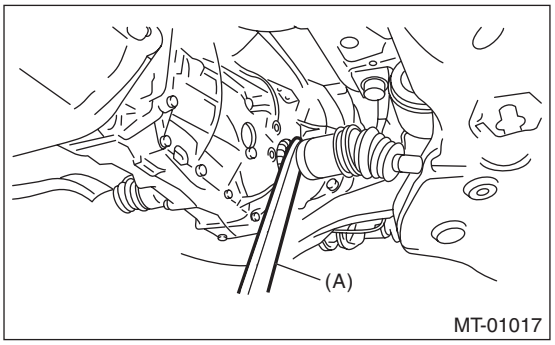


22) Remove the bolt securing the ball joint of the front arm to the housing, then separate the front arms and the housing.



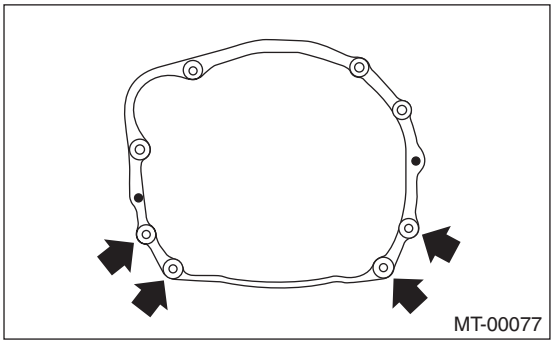
(A) Front arm
(B) Ball joint
(C) Stabilizer link

23) Using a crowbar, remove the left and right front drive shaft from the transmission.



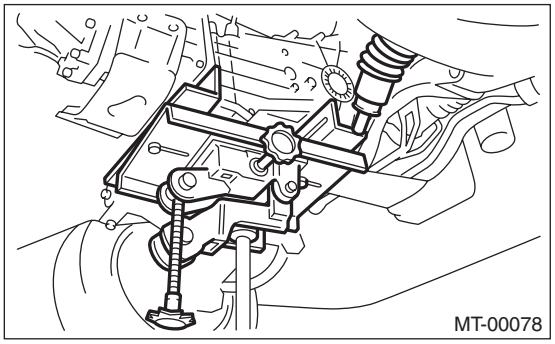
(A) Bar

24) Remove the bolts and nuts which hold lower side of transmission to engine.

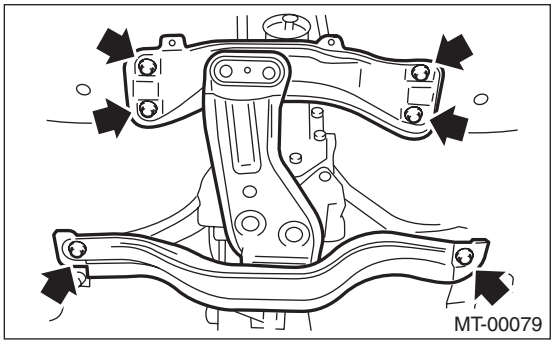


25) Place the transmission jack under the transmission.

CAUTION:
Always support the transmission case with a transmission jack.



26) Remove the transmission rear crossmember from the vehicle.



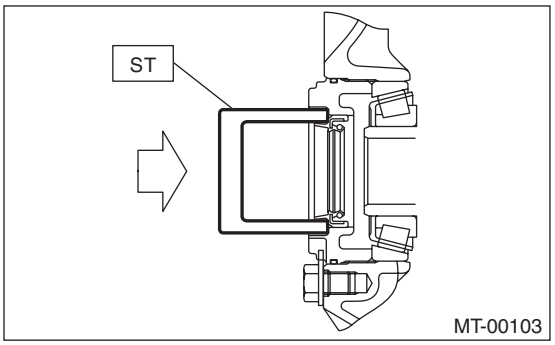
27) Tighten the turnbuckle of the ST while lowering the transmission jack to tilt the engine assembly towards the back.
28) Remove the transmission.

NOTE:
Move the transmission jack towards the rear until the main shaft is withdrawn from the clutch disc.
29) Separate the transmission assembly from the rear cushion rubber.

B: INSTALLATION

1) Replace the differential side retainer oil seal. <Ref. to 5MT-32, REPLACEMENT, Differential Side Retainer Oil Seal.>
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Be sure to replace the differential side retainer oil seal after the removing the front drive shaft.



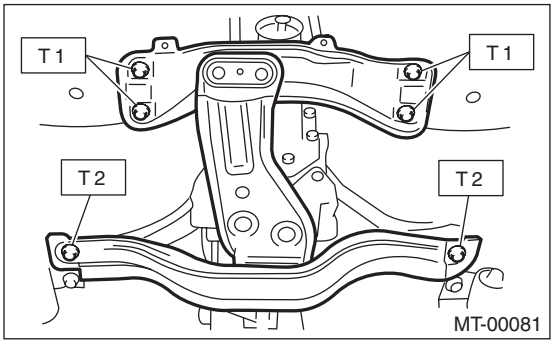
2) Install the rear cushion rubber to the transmission assembly.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

3) Install the transmission onto the engine.
(1) Lift-up the transmission gradually using a transmission jack.
(2) Engage at the spline section.

NOTE:
Be careful not to hit the main shaft against the clutch housing cover.
4) Loosen the turnbuckle of the ST while raising the transmission jack to return the engine to its original position.
5) Install the transmission rear crossmember.

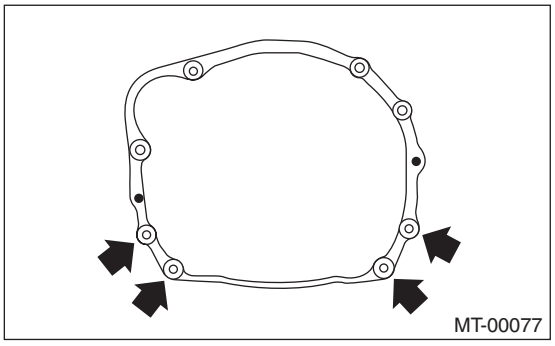
Tightening torque:
T1: 75 N·m (7.6 kgf-m, 55 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



6) Take out the transmission jack.

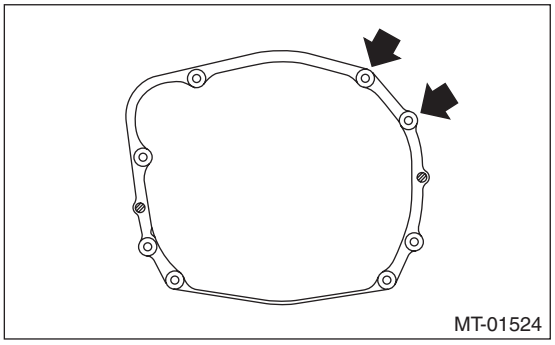
7) Tighten the bolts and nuts which hold the lower side of transmission to the engine.

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

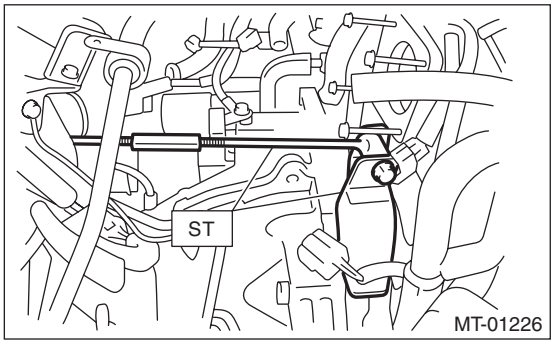


8) Connect the transmission to the engine.
(1) Install the starter.
<Ref. to SC(H4SO)-6, INSTALLATION, Starter.>
(2) Tighten the bolts which hold the upper side of the transmission to the engine.

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

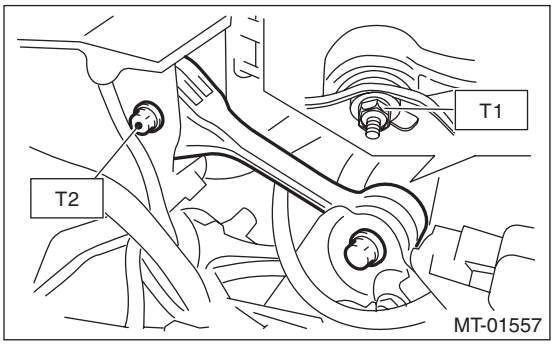


9) Remove the ST.

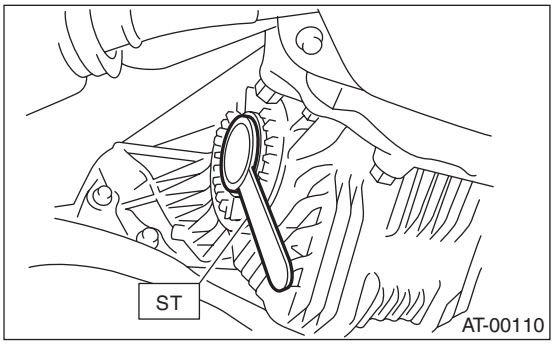


10) Install the pitching stopper.

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

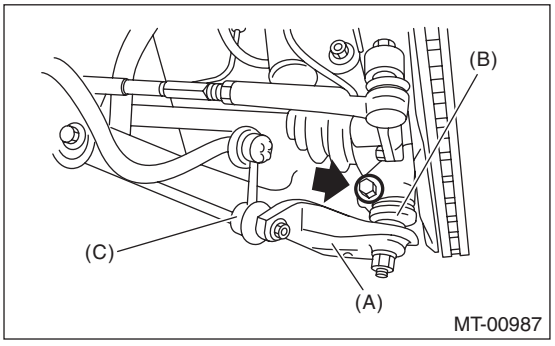


11) Lift the vehicle.
12) Install the front drive shaft into the transmission.
ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR



13) Insert the ball joints of the front arm into the housing, then tighten the installing bolts.

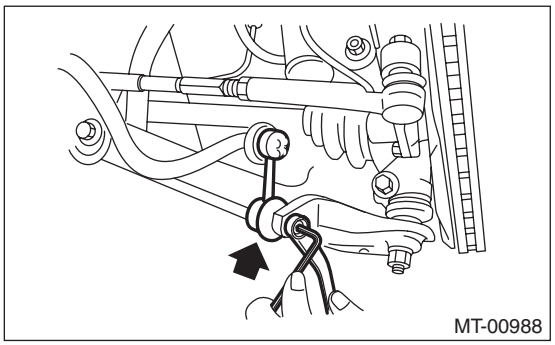
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



(A) Front arm
(B) Ball joint
(C) Stabilizer link

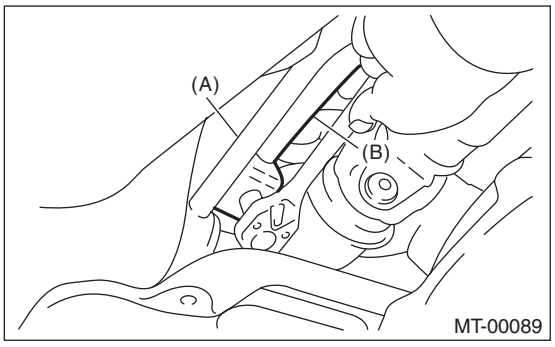
14) Attach the stabilizer link to the front arm.

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



15) Attach the gear shift rod and stay.
(1) Attach the gear shift rod to the transmission.

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



(A) Stay
(B) Gear shift rod

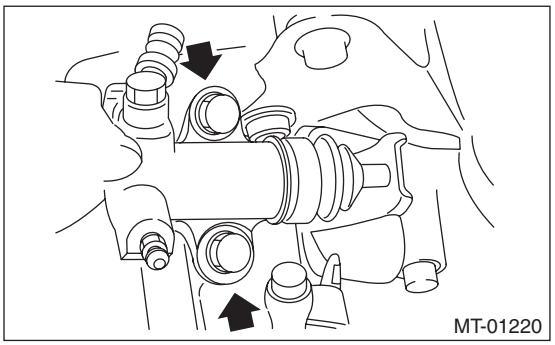
(2) Attach the stay to the transmission.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

16) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
17) Install the heat shield cover. (If equipped)
18) Install the rear exhaust pipe and muffler.
19) Install the front exhaust pipe and the center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
20) Install the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

21) Install the operating cylinder.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)



22) Connect the following connectors.
(1) Transmission ground cable

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Neutral position switch connector
(3) Back-up light switch connector

23) Fill transmission gear oil through the transmission level gauge hole.
24) Install the air intake chamber stay. (Non-turbo model)

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

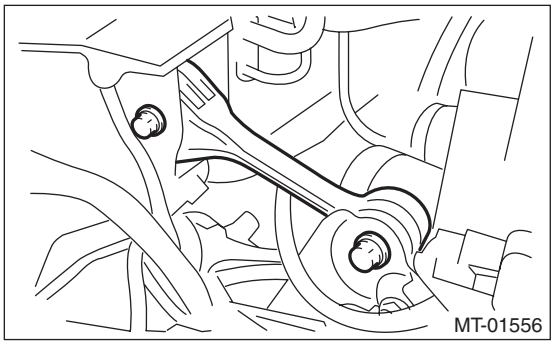
25) Install the air intake chamber and air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
26) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
27) Connect the battery ground cable to the battery.
28) Take off the vehicle from lift arms.

4. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
3) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the pitching stopper.

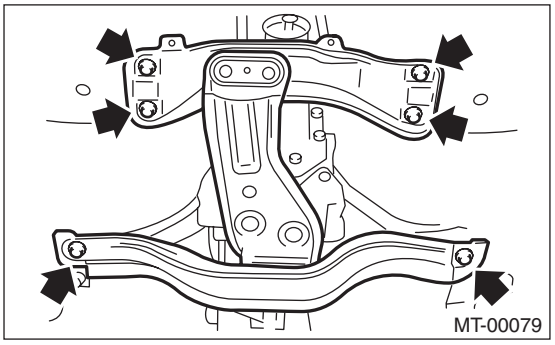


2. CROSSMEMBER AND CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Lift the vehicle.
3) Remove the front exhaust pipe. (Non-turbo model) <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
4) Remove the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
5) Remove the rear exhaust pipe and muffler.
6) Remove the heat shield cover. (If equipped)
7) Set the transmission jack under the transmission body.

CAUTION:
Always support the transmission case with a transmission jack.

8) Remove the rear crossmember.



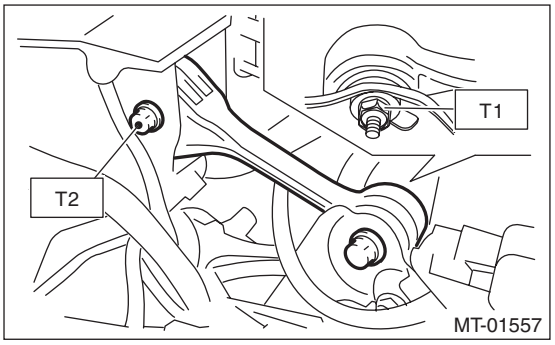
9) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

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



2) Install the air intake chamber and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
3) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
4) Connect the battery ground cable to the battery.

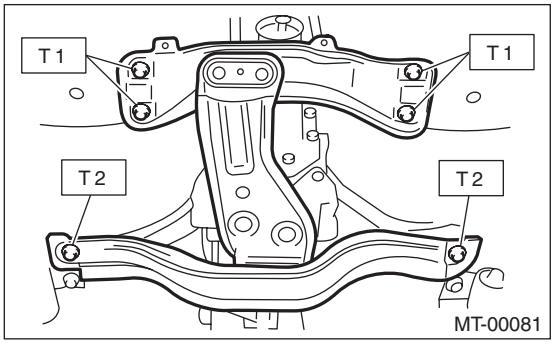
2. CROSSMEMBER AND CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install the rear crossmember.

Tightening torque:
T1: 75 N·m (7.6 kgf-m, 55 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front exhaust pipe. (Non-turbo model) <Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
6) Install the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
7) Install the rear exhaust pipe and muffler.
8) Lower the vehicle.
9) Connect the battery ground cable to the battery.

C: INSPECTION

Perform the following inspection procedures and repair or replace faulty parts.

1. PITCHING STOPPER

Check the pitching stopper for bends or damage. Check that the rubber is not stiff, cracked or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

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

5. Oil Seal

A: INSPECTION

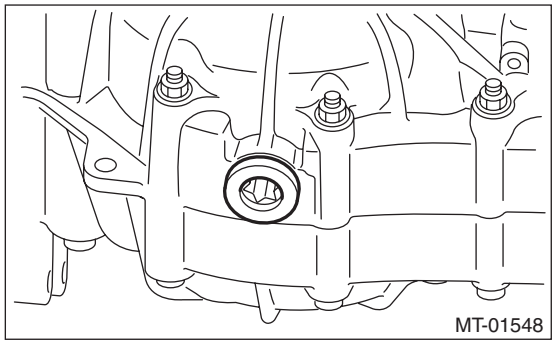
Check for leakage of gear oil from the oil seal. If there is oil leakage, replace with a new oil seal.

B: REPLACEMENT

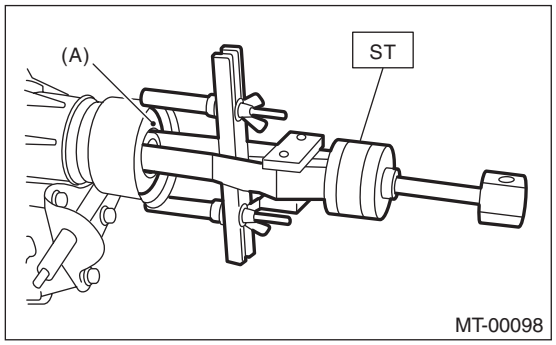
1) Clean the transmission exterior.
2) Using the TORX ® bit T70, remove the drain plug, and drain the transmission gear oil completely.
3) Using the TORX ® bit T70, tighten the transmission gear oil drain plug.

NOTE:
Use a new gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)
70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket)

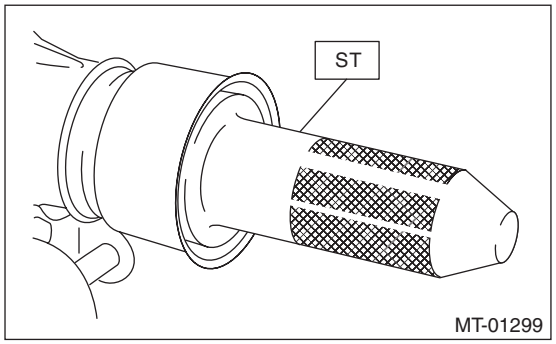


4) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
5) Remove the heat shield cover. (If equipped)
6) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
7) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

8) Using the ST, install the oil seal.
ST 498057300 INSTALLER



9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
10) Install the heat shield cover. (If equipped)
11) Install the rear exhaust pipe and muffler. <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
12) Pour in gear oil and check the oil level. <Ref. to 5MT-23, REPLACEMENT, Transmission Gear Oil.>

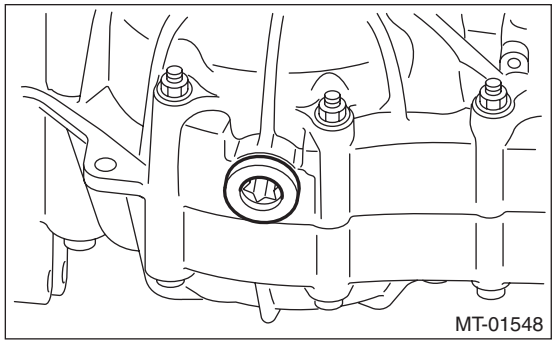
6. Differential Side Retainer Oil Seal

A: INSPECTION

Check for leakage of gear oil from the differential side retainer oil seal. If there is oil leakage, replace with a new oil seal.

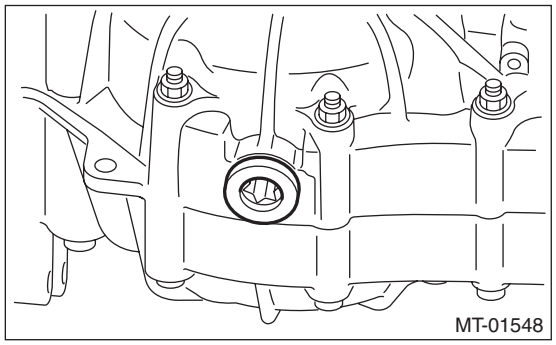
B: REPLACEMENT

1) Lift the vehicle.
2) Remove the differential gear oil drain plug using TORX ® bit T70, and drain the differential gear oil completely.



3) Replace the gasket with a new part and tighten the differential oil drain plug using the TORX® bit T70.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)
70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket)

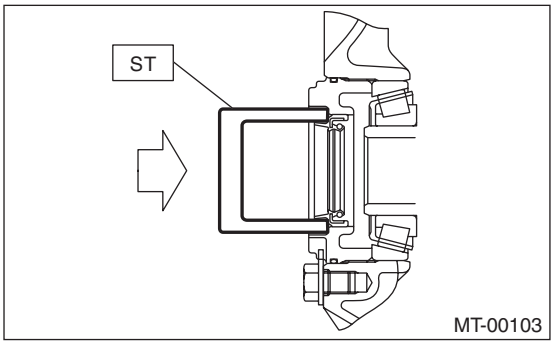


4) Remove the front and center exhaust pipes. <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
5) Separate the front drive shaft from the transmission. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
6) Remove the differential side retainer oil seal.

NOTE:
• Be sure to replace the differential side retainer oil seal after the procedure of removing front drive shaft from transmission.
• To remove the oil seal, use ST 398527700 PULLER ASSY. When removing the part by using a flat tip screwdriver, be careful not to scratch the differential side retainer.

7) Using the ST, install the differential side retainer oil seal by lightly tapping with a plastic hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Apply oil to the oil seal lips.



8) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR
9) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
10) Lower the vehicle.
11) Pour gear oil through the gauge hole. <Ref. to 5MT-23, REPLACEMENT, Transmission Gear Oil.>

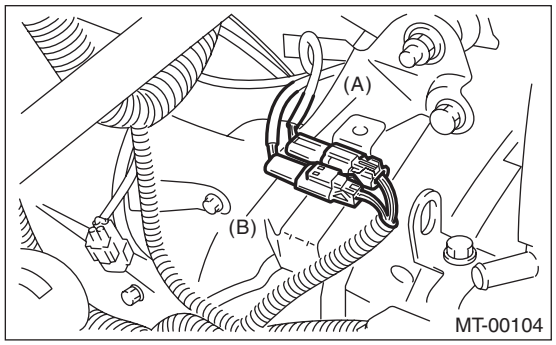
7. Switches and Harness

A: REMOVAL

1. BACK-UP LIGHT SWITCH & NEUTRAL POSITION SWITCH

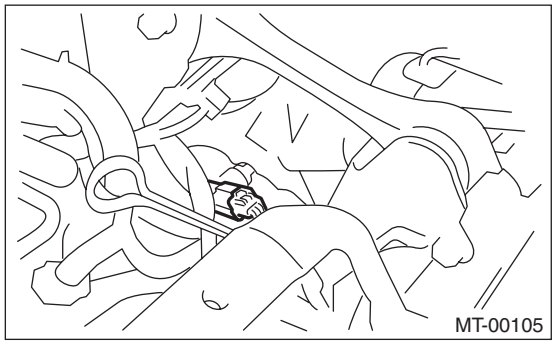
1) Disconnect the ground cable from battery.
2) Remove the air intake chamber and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Disconnect the connector back-up light switch & neutral position switch.

- Non-turbo model

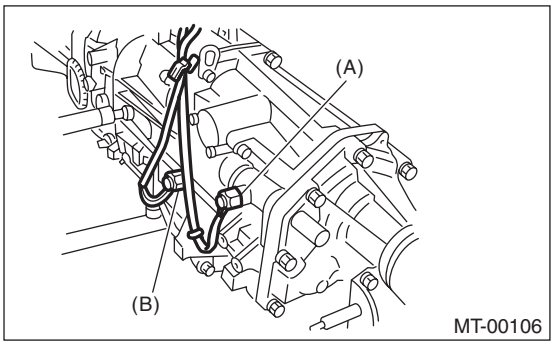


(A) Neutral position switch connector (Brown)
(B) Back-up light switch connector (Gray)

- Turbo model



5) Lift the vehicle.
6) Remove the back-up light switch & neutral position switch with the harness.



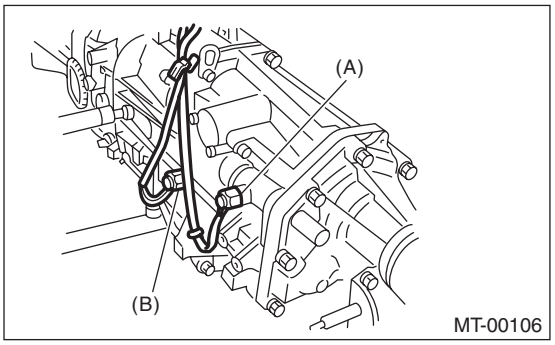
(A) Neutral position switch (Brown)
(B) Back-up light switch (Gray)

B: INSTALLATION

1. BACK-UP LIGHT SWITCH & NEUTRAL POSITION SWITCH

1) Install the back-up light switch & neutral position switch with the harness.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Neutral position switch
(B) Back-up light switch

2) Connect the connectors of back-up light switch & neutral position switch.
3) Install the air intake chamber and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
4) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
5) Connect the battery ground cable to the battery.

C: INSPECTION

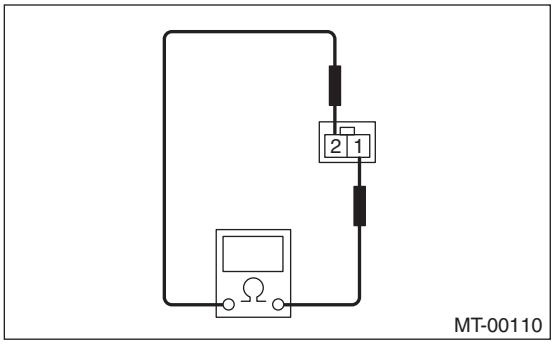
1. BACK-UP LIGHT SWITCH

Check the back-up light switch. <Ref. to LI-8, INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH

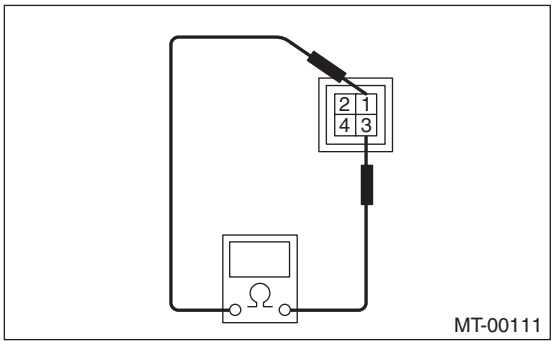
1) Turn the ignition switch to OFF.
2) Disconnect the connector of neutral position switch.
3) Measure the resistance between neutral position switch terminals.

- Non-turbo model



Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		1 MΩ or more

- Turbo model



Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 Ω
Other positions		1 MΩ or more

4) Replace faulty parts.

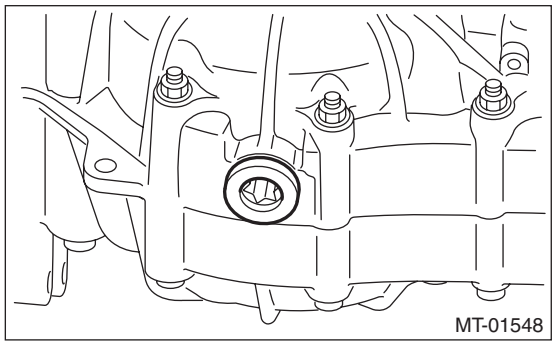
8. Preparation for Overhaul

A: PROCEDURE

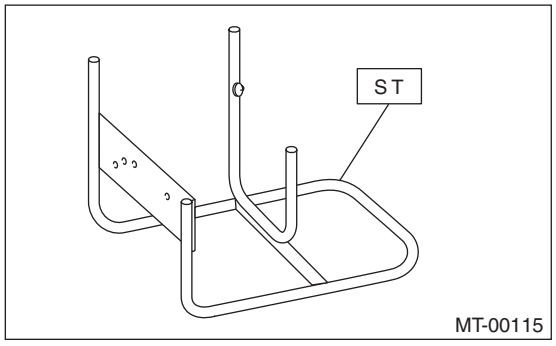
1) Clean oil, grease, dirt and dust from the transmission.
2) Using the TORX ® bit T70, remove the drain plug, and drain the transmission gear oil completely.
3) Using the TORX ® bit T70, tighten the transmission gear oil drain plug.

NOTE:
Use a new gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)
70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket)



4) Attach the transmission to the ST.
ST 499937100 TRANSMISSION STAND

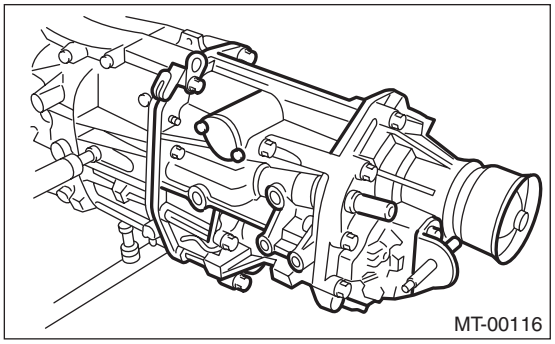


5) Apply oil to rotating parts before assembly.
6) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
7) Gaskets, lock washers and lock nuts must be replaced with new parts.
8) Apply liquid gasket to the specified areas to prevent leakage.

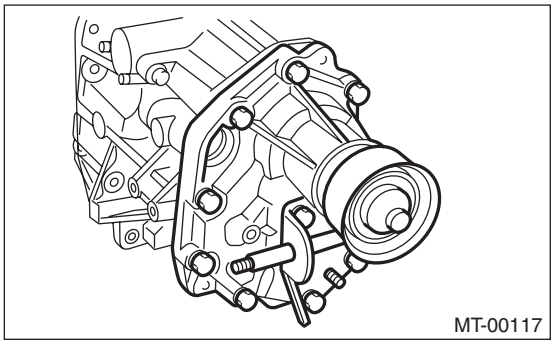
9. Transfer Case and Extension Case Assembly

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch & neutral position switch. <Ref. to 5MT-33, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly.

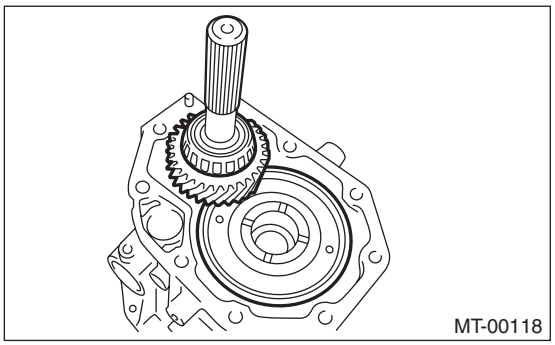

MT-00116

4) Remove the shifter arm.
5) Remove the extension case assembly.

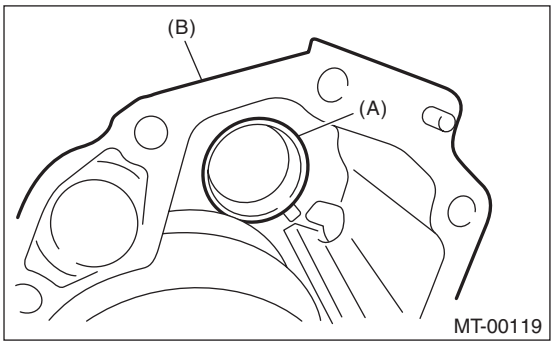

MT-00117

B: INSTALLATION

1) Install the center differential and transfer driven gear into the transfer case.


MT-00118

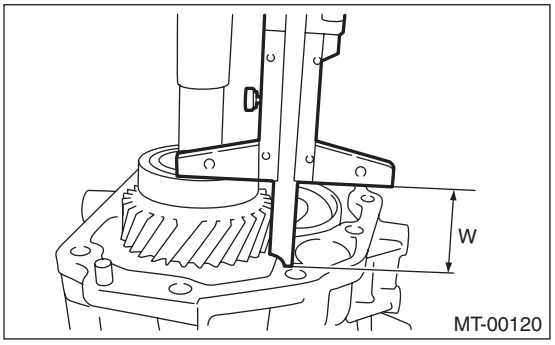
2) Remove the bearing outer race from the extension case.



MT-00119

(A) Bearing outer race
(B) Extension case

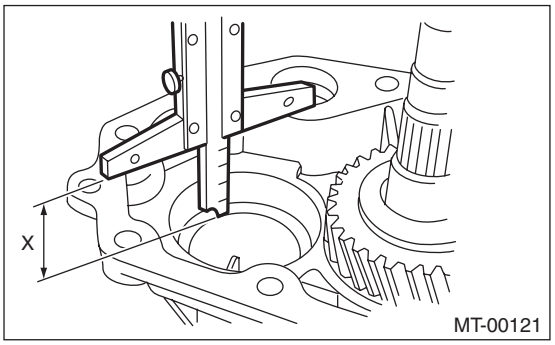
3) While holding the bearing outer race horizontally, rotate the driven shaft for ten turns.
4) Measure the height “W” between transfer case and taper roller bearing on the transfer driven gear.



MT-00120

5) Measure depth “X” on bearing insertion part of the extension case.

NOTE:
Measure with bearing outer race and thrust washer removed.



MT-00121

6) Calculate the tight “t” using following calculation.
t = X – W + (0.2 — 0.3 mm (0.008 — 0.012 in))

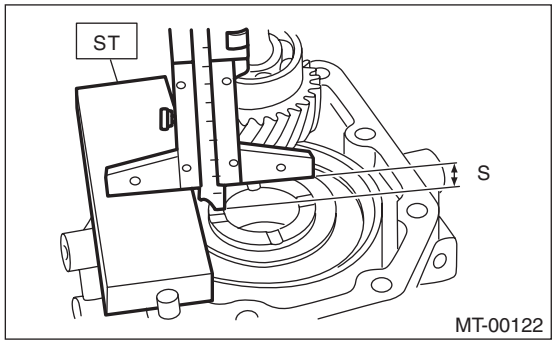
7) Select the washer with the nearest value in the following table.

Preload of the taper roller bearing (amount of standard protrusion):
0.2 — 0.3 mm (0.008 — 0.012 in)

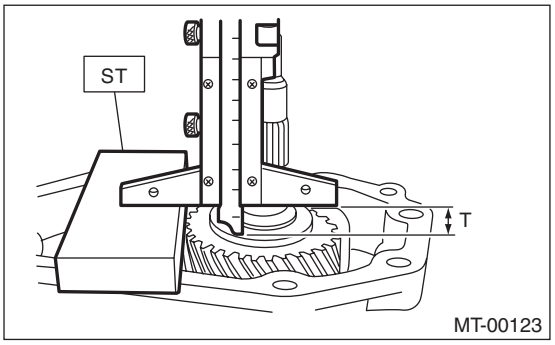
NOTE:
Be sure that the amount of preload is within the standard value.

Thrust washer (50 × 61 × t)	
Part number	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)

8) Fit the thrust washers on the transfer drive shaft.
9) Install the bearing outer race into the extension case.
10) Measure the depth “S” between transfer case and center differential.
ST 398643600 GAUGE



11) Measure the height “T” between the extension case and transfer drive gear.
ST 398643600 GAUGE



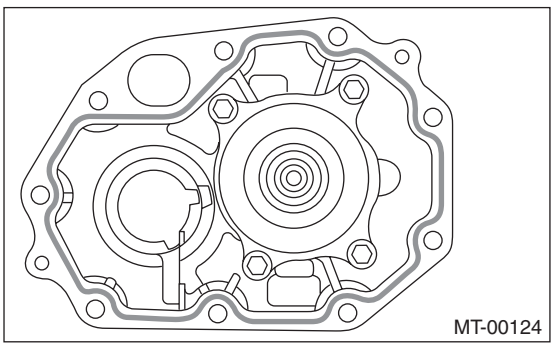
NOTE:
ST thickness [15 mm (0.59 in)]
12) Calculate thrust washer thickness “U” using the following calculation:
U = S + T – 30 mm (1.18 in) [Thickness of ST]
13) Select a suitable washer in the following table.

Standard clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part number	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)

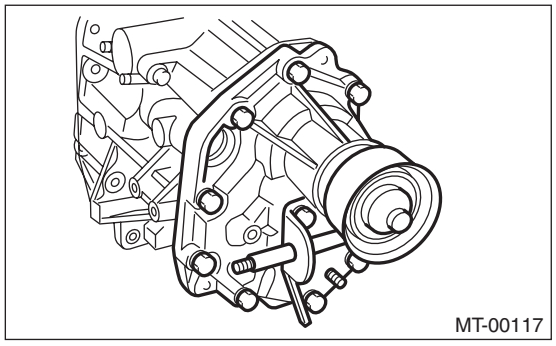
14) Fit the thrust washer onto the center differential.
15) Apply a proper amount of liquid gasket to the transfer case mating surface.

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

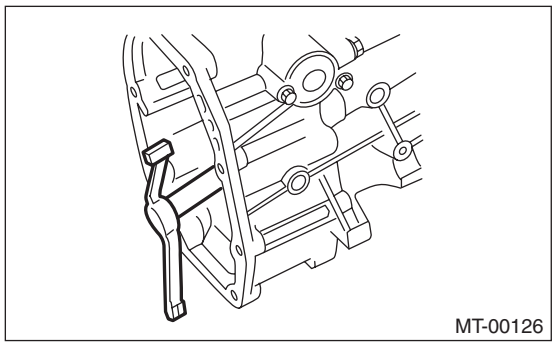


16) Install the extension assembly into the transfer case.

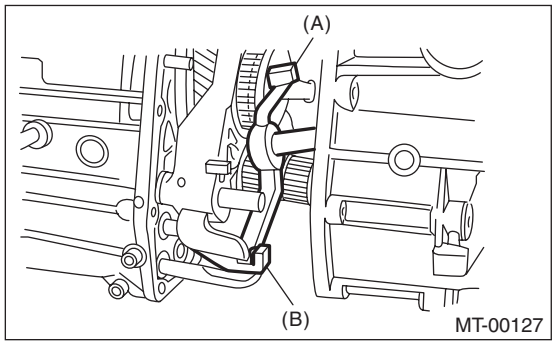
Tightening torque:
40 N·m (4.1 kgf-m, 29.7 ft-lb)


MT-00117

17) Attach the shifter arm to transfer case.


MT-00126

18) Hang the shifter arm on 3rd-4th fork rod.

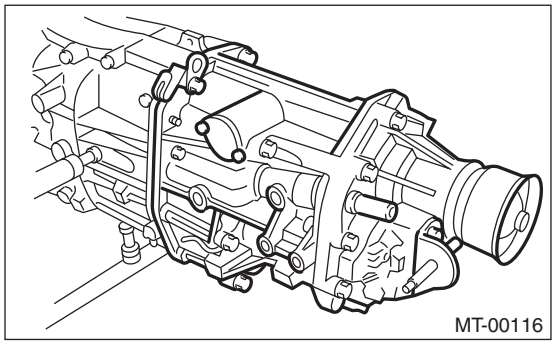


MT-00127

(A) Shifter arm
(B) 3rd-4th fork rod

19) Install the extension case assembly along with the transfer case to the transmission case.

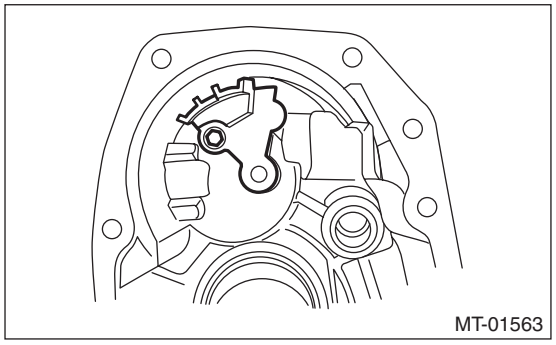
Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)


MT-00116

C: DISASSEMBLY

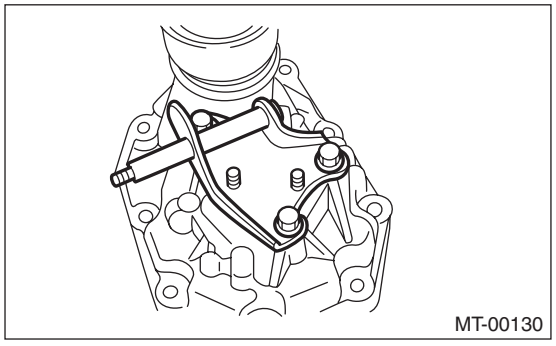
1. TRANSFER CASE

1) Remove the reverse check assembly. <Ref. to 5MT-45, REMOVAL, Reverse Check Sleeve.>
2) Remove the oil guide.


MT-01563

2. EXTENSION CASE

1) Remove the transfer drive gear assembly. <Ref. to 5MT-40, REMOVAL, Transfer Drive Gear.>
2) Remove the shift bracket.


MT-00130

3) Remove the oil seal from the extension case. <Ref. to 5MT-31, Oil Seal.>

D: ASSEMBLY

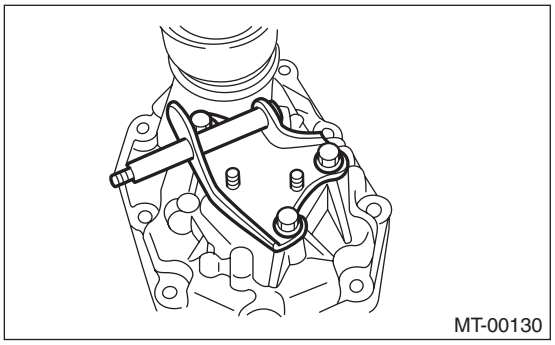
1. EXTENSION CASE

1) Using the ST, install the oil seal to the extension case. <Ref. to 5MT-31, Oil Seal.>

NOTE:
Use a new oil seal.

2) Install the shift bracket to extension case.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



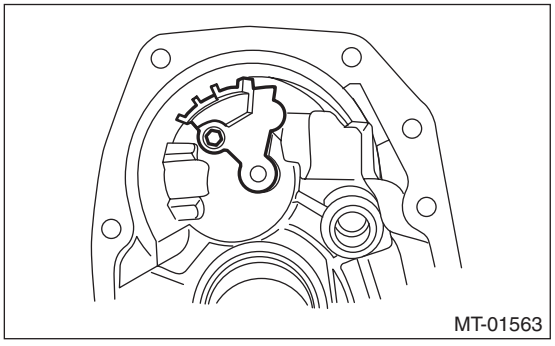
3) Install the transfer drive gear to the extension case. <Ref. to 5MT-40, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE

1) Install the oil guide to the transfer case.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

NOTE:
Use a new installing bolt.

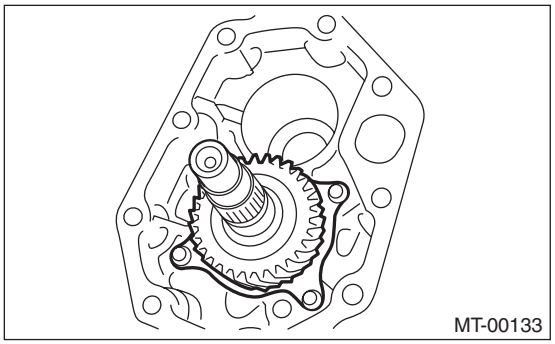


2) Install the reverse check sleeve assembly to the transfer case. <Ref. to 5MT-45, INSTALLATION, Reverse Check Sleeve.>

10.Transfer Drive Gear

A: REMOVAL

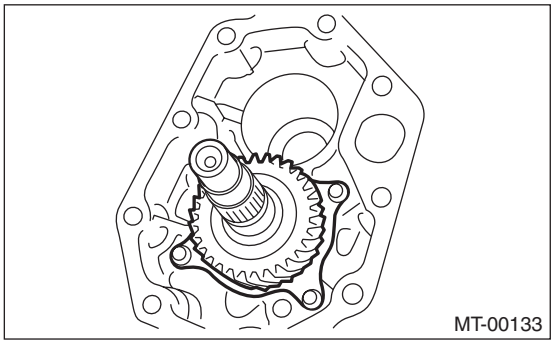
1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch & neutral position switch. <Ref. to 5MT-33, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.
6) Remove the transfer drive gear.


MT-00133

B: INSTALLATION

1) Install the transfer drive gear.

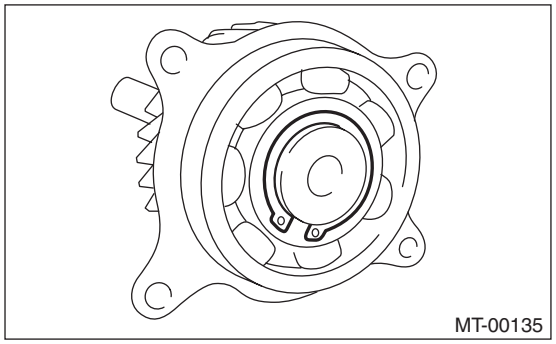
Tightening torque:
26 N·m (2.7 kgf-m, 20 ft-lb)


MT-00133

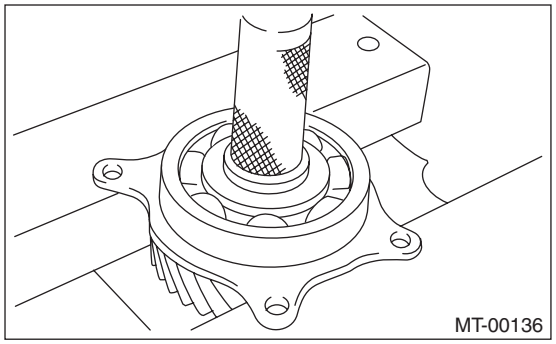
2) Install the transfer driven gear.
3) Install the extension case assembly.
4) Install the transfer case and the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the snap ring.


MT-00135

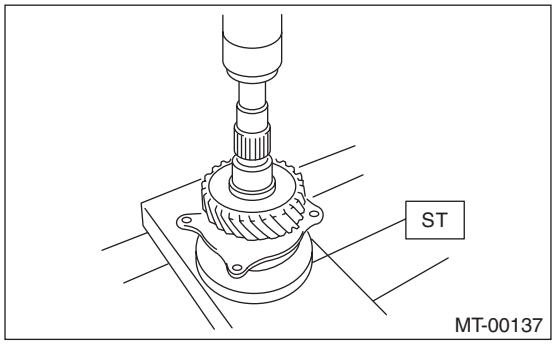
2) Remove the ball bearing.


MT-00136

D: ASSEMBLY

1) Set the ST against the inner race of the bearing, and install the drive shaft.
ST 398177700 INSTALLER

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



MT-00137

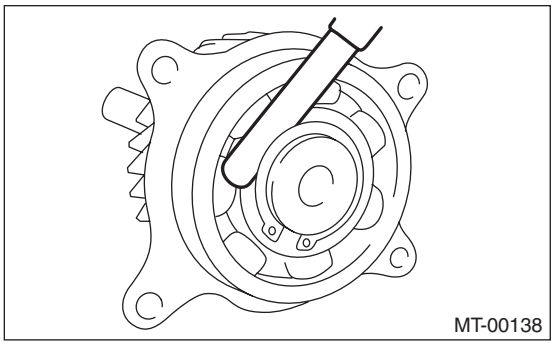
2) Install the snap ring on the transfer drive shaft.
3) Inspect the clearance between the snap ring and the ball bearing. <Ref. to 5MT-41, INSPECTION, Transfer Drive Gear.>

E: INSPECTION

1) Bearing
Replace the bearings in the following cases.
- In case of broken or rusty bearings
- In case of worn or damaged bearings
- 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)



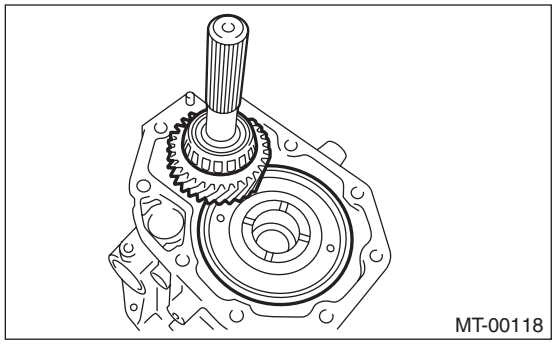
If the measurement is not within specification, select a suitable snap ring and replace it.

Snap ring (Outer-30)	
Part number	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

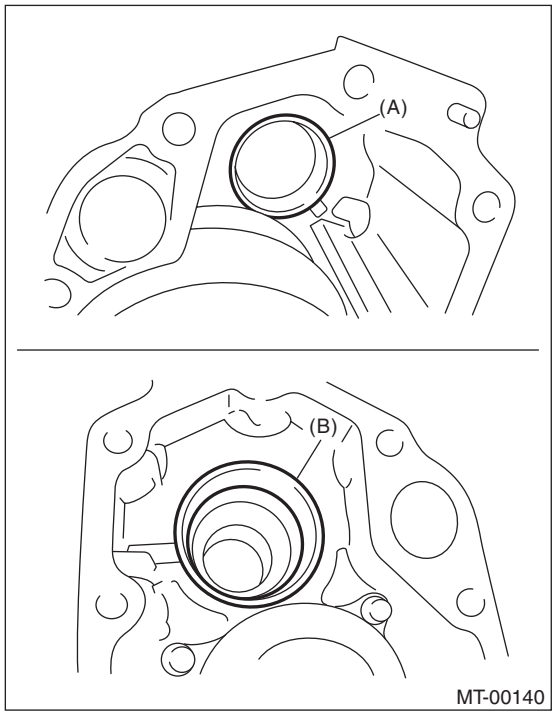
11.Transfer Driven Gear

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch & neutral position switch. <Ref. to 5MT-33, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.



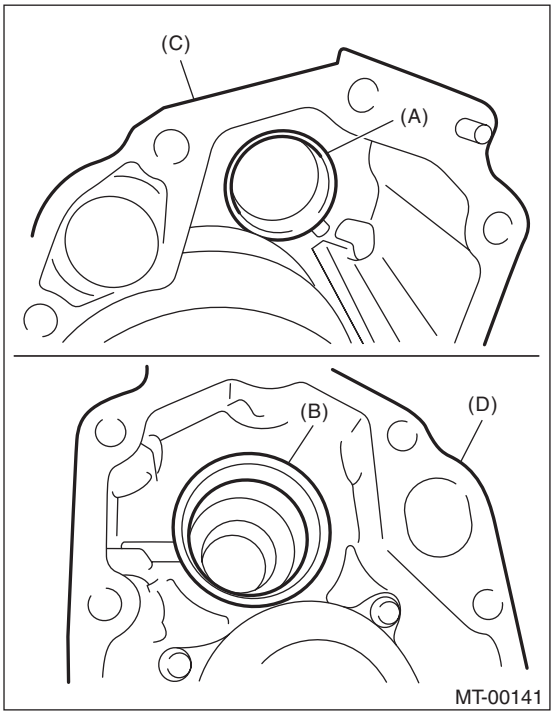
6) Remove bearing outer races from the extension case and transfer case.



(A) Bearing outer race (Transfer case side)
(B) Bearing outer race (Extension case side)

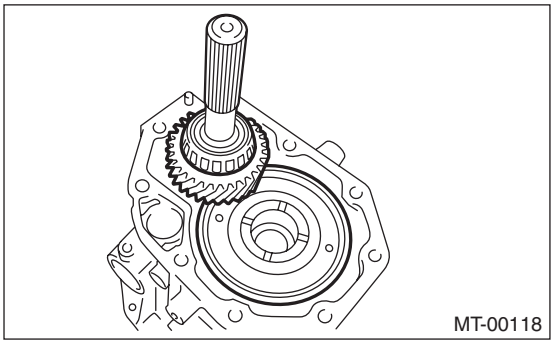
B: INSTALLATION

1) Install the bearing outer races to extension case and transfer case.



(A) Bearing outer race
(B) Bearing outer race
(C) Transfer case
(D) Extension case

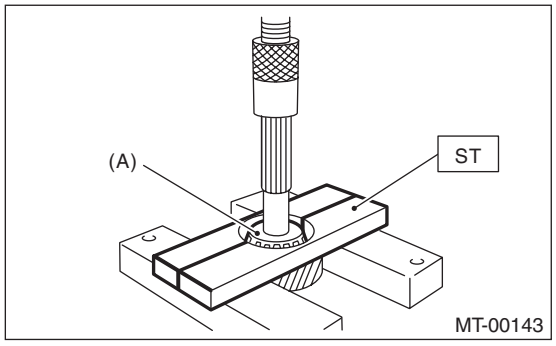
2) Install the transfer driven gear.



3) Install the transfer case and the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>
5) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

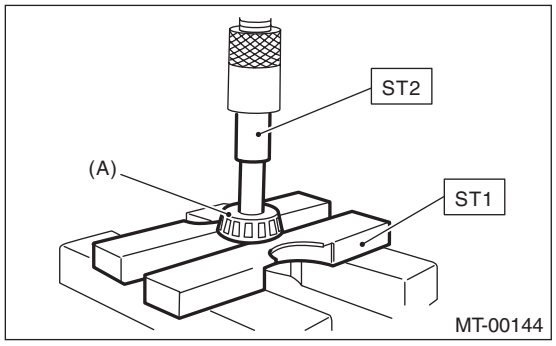
C: DISASSEMBLY

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

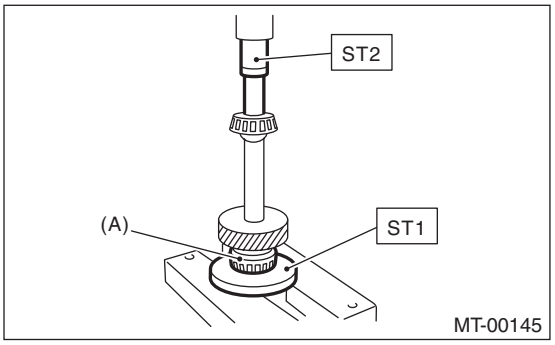


(A) Roller bearing

D: ASSEMBLY

1) Using the ST, install the roller bearing (extension case side).
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

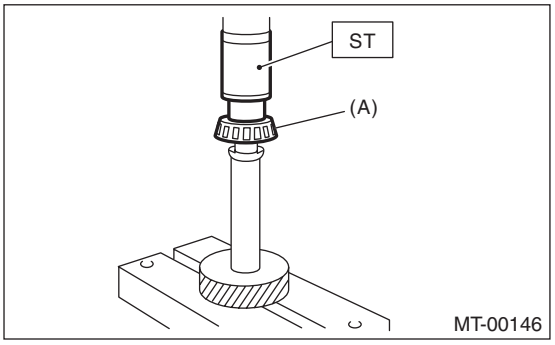
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

2) Using ST, install the roller bearing (transfer case side).
ST 499757002 INSTALLER

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

E: INSPECTION

1) Bearing
Replace the bearings in the following cases.
- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.

2) Driven gear
If the driven gear tooth surface and 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 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transfer driven gear. <Ref. to 5MT-42, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential.

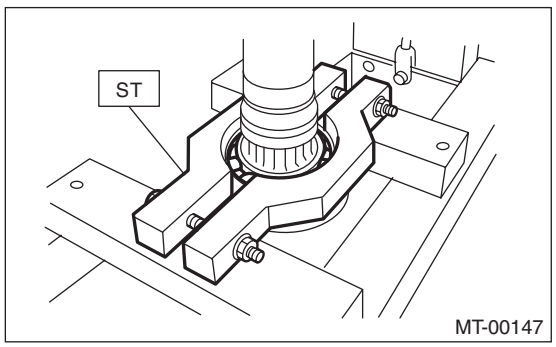
B: INSTALLATION

1) Install the center differential into transfer case.
2) Install the transfer driven gear. <Ref. to 5MT-42, INSTALLATION, Transfer Driven Gear.>
3) Install the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:
Center differential is a non-disassembled part which should not be disassembled.
Remove the ball bearing using ST.

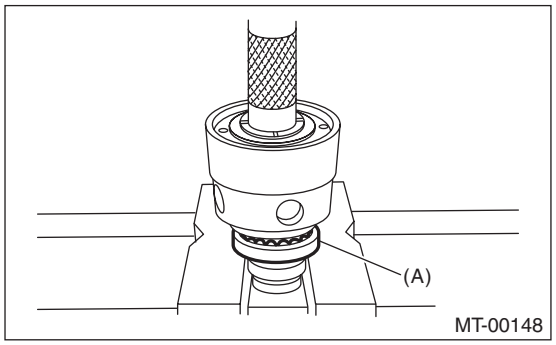
NOTE:
Do not reuse the ball bearing.
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



D: ASSEMBLY

Install the ball bearing into 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).



(A) Ball bearing

E: INSPECTION

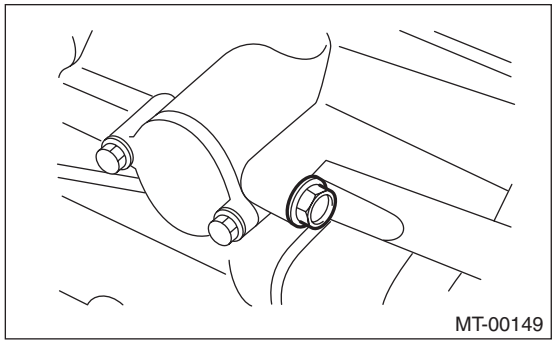
1) Bearing
Replace the bearings in the following cases.
- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When bearing has other defects.

2) Center differential
Replace the center differential case assembly if worn or damaged.

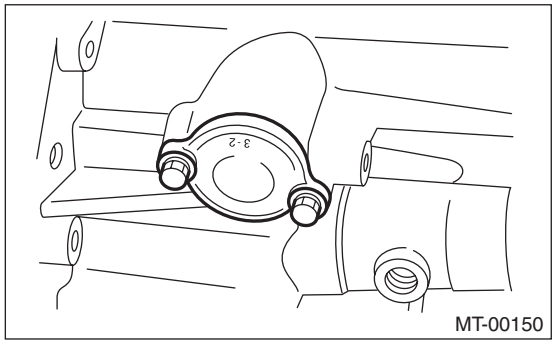
13.Reverse Check Sleeve

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the shifter arm.
4) Remove the plug, gasket, reverse accent spring, and reverse check ball.


MT-00149

5) Remove the reverse check sleeve.

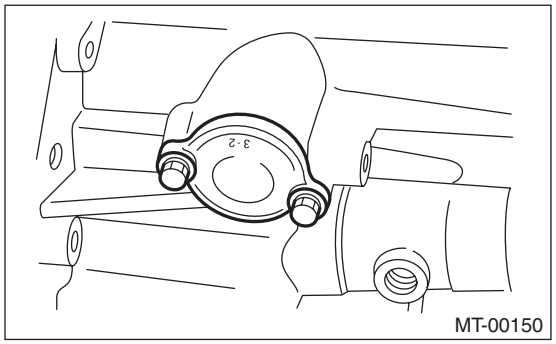


MT-00150

B: INSTALLATION

1) Install the reverse check sleeve.

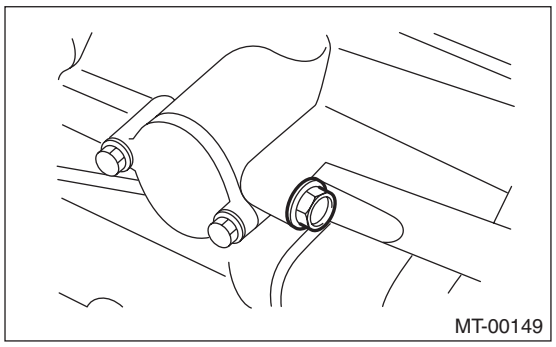
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



MT-00150

2) Install ball, reverse accent spring, gasket and plug to the transfer case.

Tightening torque:
9.75 N·m (1.0 kgf-m, 7.2 ft-lb)

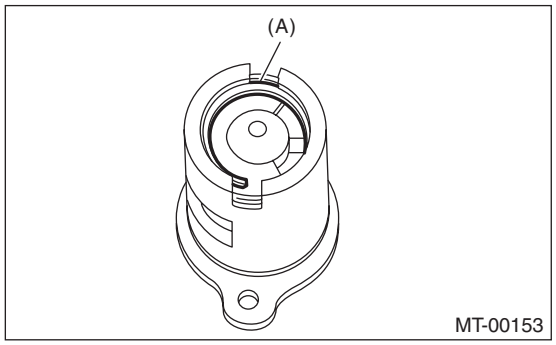

MT-00149

3) Attach the shifter arm to the transfer case assembly.
4) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

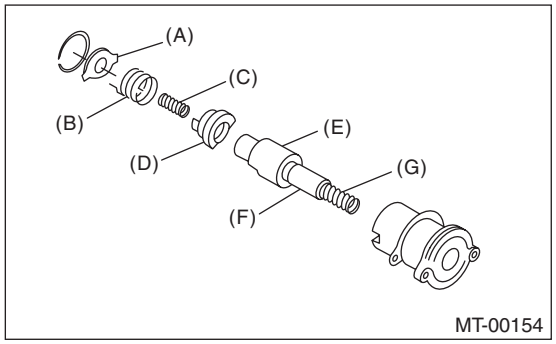
1) Cover the reverse check sleeve with a rag, and remove the snap ring using a screwdriver.

NOTE:
Replace the snap ring with a new part if it is deformed or spring force is weakened.



(A) Snap ring

2) Remove the reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

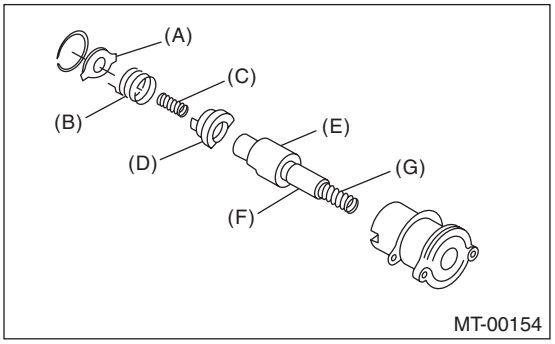
3) Remove the O-ring.

NOTE:
- Use new O-rings.
- Be careful not to damage the adjusting shim between reverse check sleeve assembly and the case.

D: ASSEMBLY

1) Install the return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring (5th-Rev) and reverse check spring to the reverse check sleeve.

NOTE:
Be sure to position the bent section of reverse check spring to fit in the groove of the check cam.

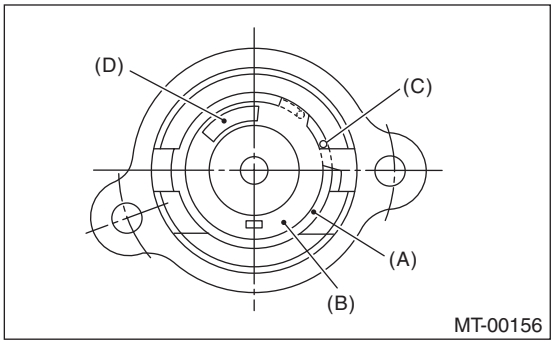


(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

2) Hook the curved section of the reverse check spring over the reverse check plate.
3) Rotate the cam so that the protrusion of the reverse check cam comes to the opening of the plate.
4) With cam held in that position, install the reverse check plate onto the reverse check sleeve and hold in place with the snap ring.
5) Position the new O-ring in the groove of sleeve.

E: INSPECTION

• Make sure the cutout of the reverse accent shaft is aligned with the opening in the reverse check sleeve.
• Turn the cam by hand to check for smooth rotation.
• Move the cam and shaft all the way toward the plate, and make sure it releases.
If the cam does not return properly, replace the reverse check spring. If the shaft does not return, check for scratches on the inner surface of sleeve. If the sleeve is in good order, replace the spring.



(A) Snap ring
(B) Reverse check plate
(C) Checking spring
(D) Check cam

• Select a suitable reverse accent shaft and reverse check plate. <Ref. to 5MT-47, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

1) Shift the gear into 3rd gear position.
2) Because of the return spring, until the arm contacts the stopper the shifter arm will feel lighter moving towards 1st/2nd gear and heavier towards the reverse gear.
3) Make adjustment so that the heavy stroke (reverse side) is a little heavier than the lighter stroke (1st/2nd side).
4) To adjust, remove the bolts holding the reverse check sleeve assembly to the case, and move the sleeve assembly outward, then place an adjustment shim between the sleeve assembly and the case to adjust the clearance.

CAUTION:
Be careful not to damage the O-ring when placing shims.

NOTE:
• When the shim is removed, the neutral position will move closer to reverse; when the shim is added, the neutral position will move closer to 1st gear.
• If it is not possible to adjust the clearance with only shims, replace the reverse accent shaft and re-adjust.

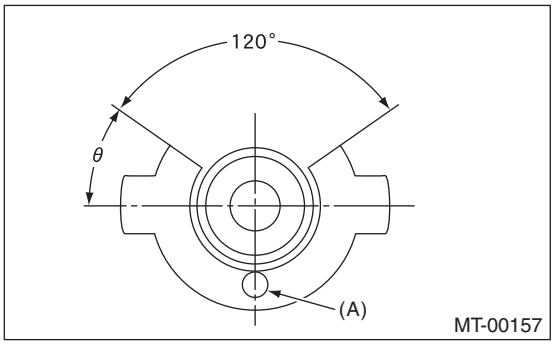
Adjusting shim	
Part number	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part number	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

1) Shift the shifter arm to “5th” and then to reverse to see if the reverse check mechanism operates properly.
2) Also check to see if the arm returns to neutral when released from the reverse position. If the arm does not return properly, replace the reverse check plate.

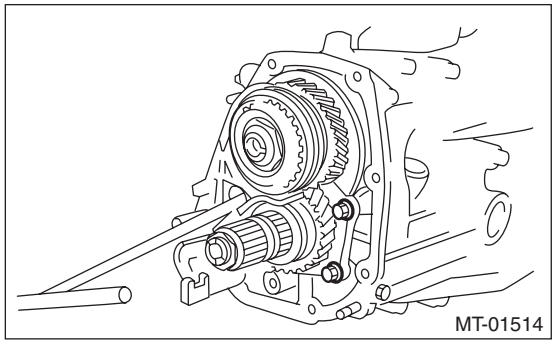
Reverse check plate			
Part number	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



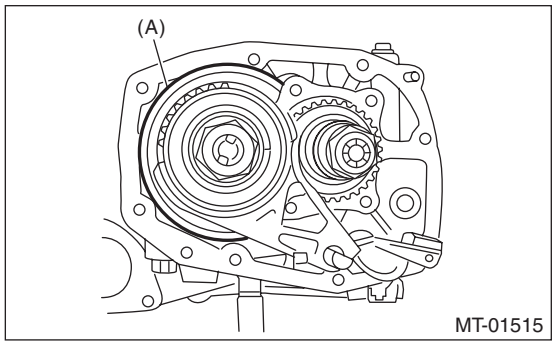
14.Transmission Case

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-18, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the bearing mounting bolt.


MT-01514

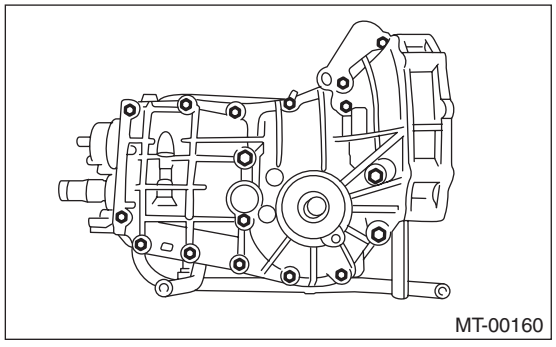
5) Remove the main shaft rear plate.



MT-01515

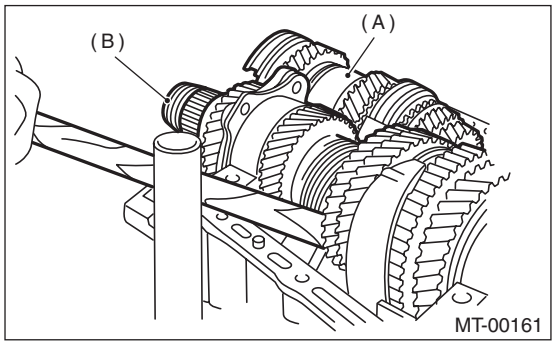
(A) Main shaft rear plate

6) Separate the transmission case into the right and left cases by loosening the coupling bolts and nuts.


MT-00160

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.

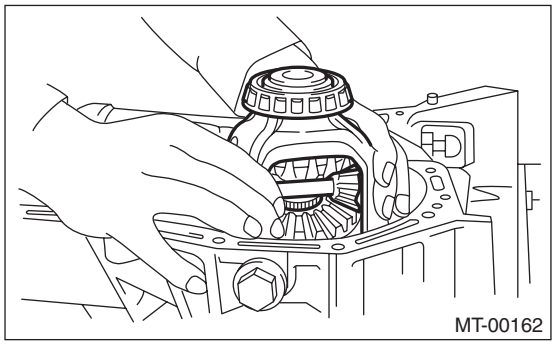


MT-00161

(A) Main Shaft Assembly for Single-Range
(B) Drive pinion shaft ASSY

8) Remove the main shaft assembly for single-range.
9) 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-00162

B: INSTALLATION

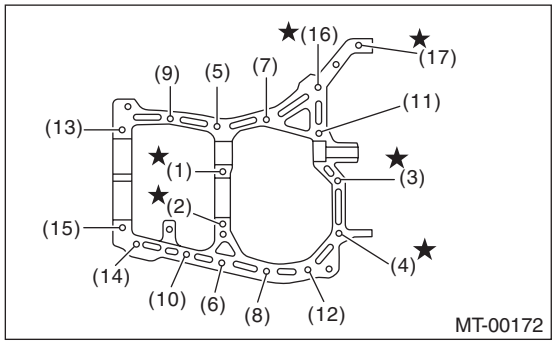
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with cleaning solvent.
2) Install the front differential assembly.
3) Install the main shaft assembly for single-range.
Install the transmission case knock pin into the knock pin hole of needle bearing.
4) Install the drive pinion shaft assembly.
Install the transmission case knock pin into the roller bearing knock pin hole.
5) 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

6) With brackets and clips as shown in the figure, tighten the seventeen bolts.

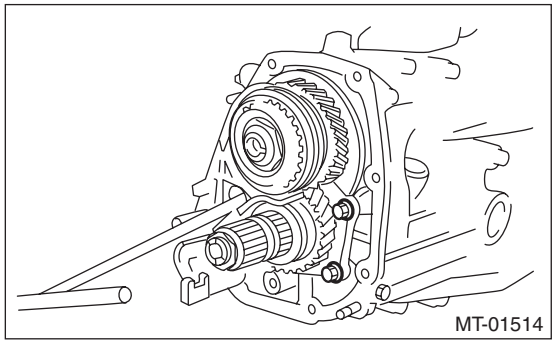
NOTE:
• Insert the bolts from the bottom and tighten the nuts at the top.
• Put the cases together so that the drive pinion shim and input shaft holder shims are not caught between cases.

Tightening torque:
8 mm bolt
25 N·m (2.5 kgf-m, 18.1 ft-lb)
★ ***10 mm bolt***
39 N·m (4.0 kgf-m, 28.9 ft-lb)



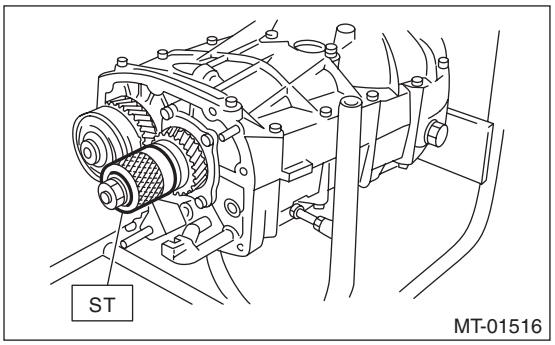
7) Tighten the ball bearing mounting bolts.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

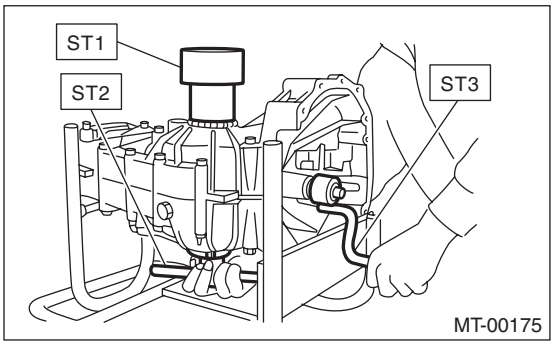


8) Perform backlash adjustment of the hypoid gear and preload measurement of the roller bearing:

NOTE:
Attach the ST on drive pinion assembly.
ST 498427100 STOPPER



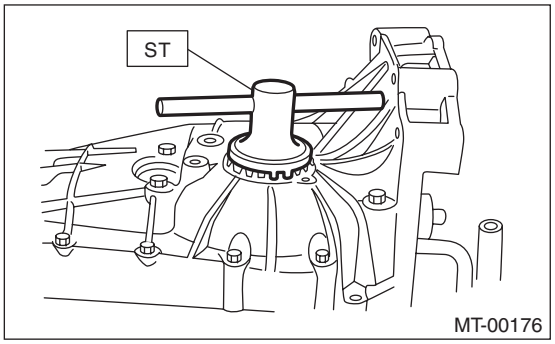
9) Place the transmission with the left side of case facing downward, and put ST1 on bearing cup.
10) Screw the retainer assembly from the bottom into left case using ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th, and turn the shaft several times. Screw in the retainer while 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



11) Remove the weight, and screw in the retainer without the O-ring on the upper side, 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



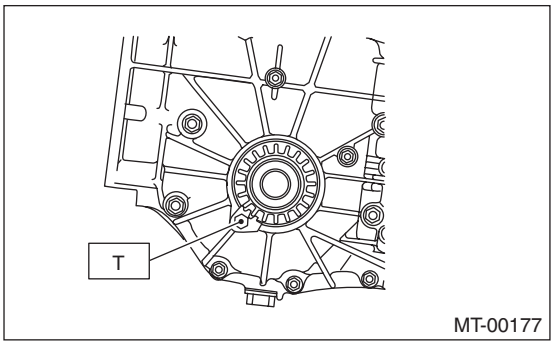
12) Loosen the retainer on the lower side by 3 notches and turn the retainer on the upper side by the same amount in order to apply backlash.
13) Rotate the retainer of the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
14) Tighten temporarily both the upper and lower lock plates, and put marks both the holder and lock plate for later readjustment.

NOTE:
If it is hard to install the lock plates, reverse the sides and install them.

15) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.
16) Inspect and adjust backlash and tooth contact of the hypoid gear. <Ref. to 5MT-69, INSPECTION, Front Differential Assembly.>
17) After checking the tooth contact of the hypoid gears, 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 retainer was tightened previously. Install the lock plate.

NOTE:
- Count number of turns while loosening retainer and record it.
- Perform this for both upper and lower retainers.

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



18) Select the main shaft rear plate. <Ref. to 5MT-56, ADJUSTMENT, Main Shaft Assembly for Single-range.>
19) Install the clutch release lever and bearing. <Ref. to CL-18, INSTALLATION, Release Bearing and Lever.>
20) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, 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 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-49, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-57, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly for single-range.

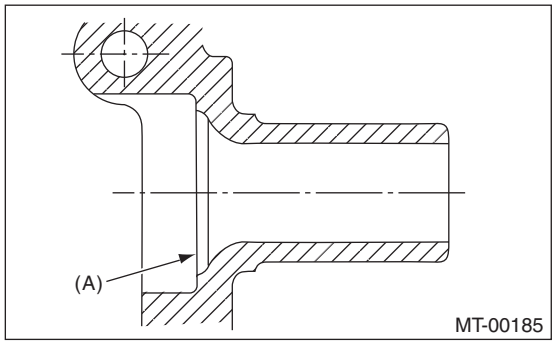
B: INSTALLATION

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 UNILUBE #2 (or equivalent) to the sealing lip of the oil seal.
• Use a new oil seal.

2) Install the transmission case knock pin into the knock pin hole of the needle bearing outer race.

NOTE:
Align the end face of the seal with surface (A) when installing the oil seal.



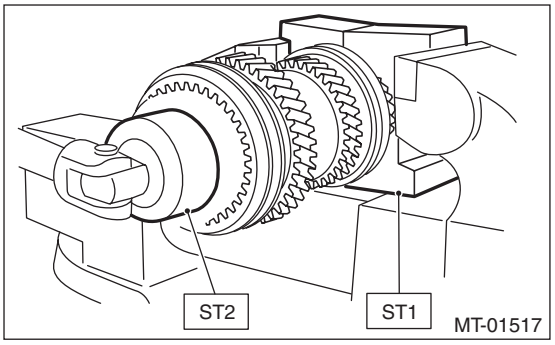
3) Install the drive pinion assembly. <Ref. to 5MT-57, INSTALLATION, Drive Pinion Shaft Assembly.>
4) Install the transmission case. <Ref. to 5MT-50, INSTALLATION, Transmission Case.>
5) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

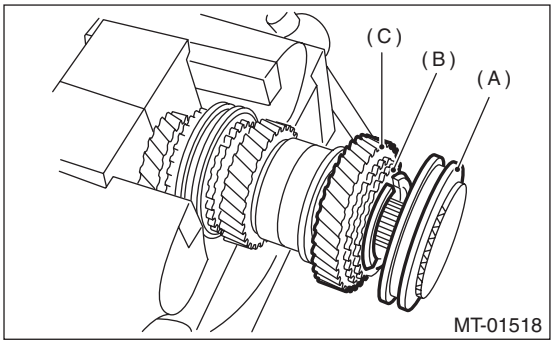
1) Put vinyl tape around main shaft spline to protect the oil seal from damage. Then pull out the oil seal and needle bearing by hand.
2) Remove the lock nut from transmission main shaft assembly for single range.

NOTE:
Flatten the lock nut tab before removing the lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



3) Remove the 5th hub & sleeve No. 2, baulk lever, baulk ring, 5th drive gear & needle bearing.

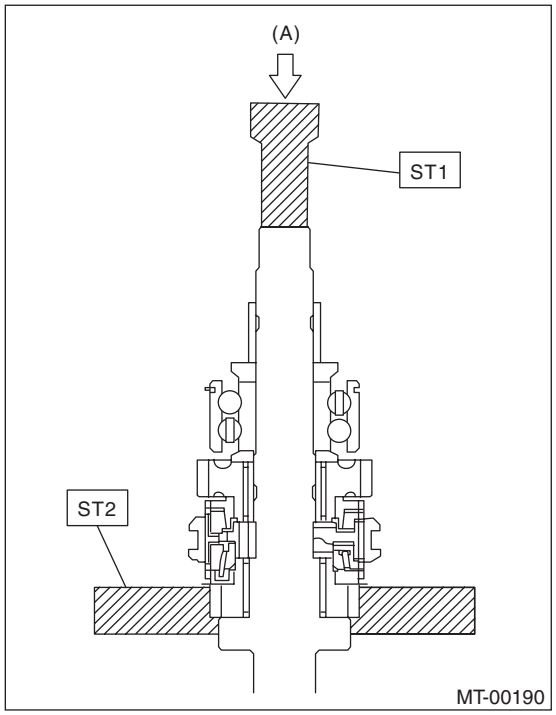


(A) 5th hub & sleeve No. 2
(B) Baulk ring
(C) 5th drive gear

4) Using ST1 and ST2, remove the rest of the parts.

NOTE:
• When replacing the sleeve & hub, replace them as a set.
• Do not disassemble the sleeve & hub; the aligning position is pre-matched.
• If it is necessary to disassemble, mark the engaging points on the splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER

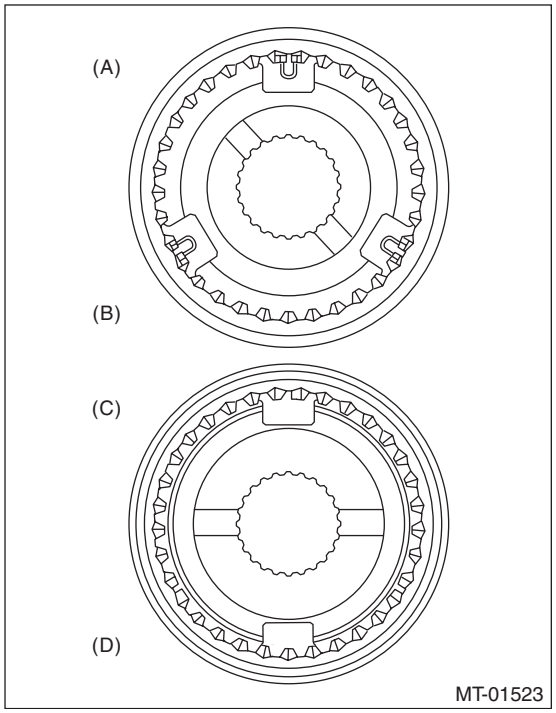


(A) Press

D: ASSEMBLY

1) When the sleeve & hub assemblies have been disassembled, reassemble by aligning the alignment marks.

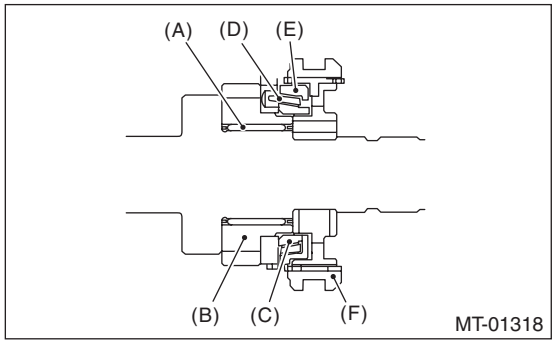
NOTE:
Position the open ends of the spring 120° apart.



(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th hub & sleeve No. 2
(D) 5th gear side

2) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve & hub assembly for the 3rd needle bearing, on the transmission main shaft.

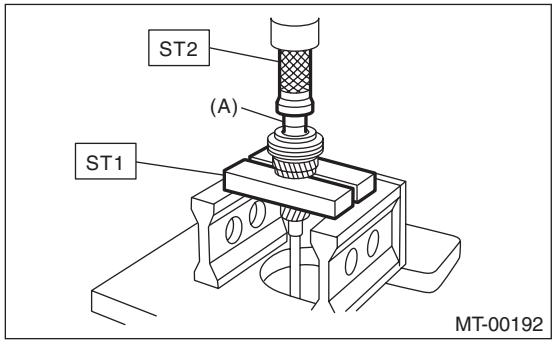
NOTE:
Align the groove in baulk ring with the shifting insert.



(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve & hub ASSY

3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and press.

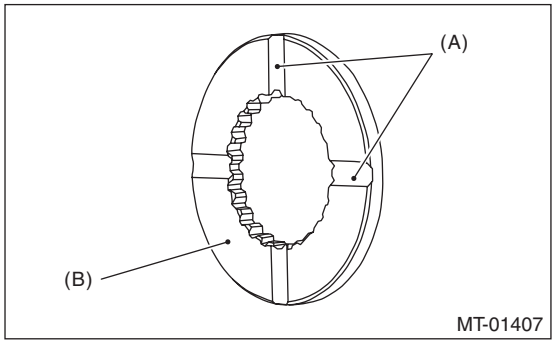
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to the transmission main shaft.

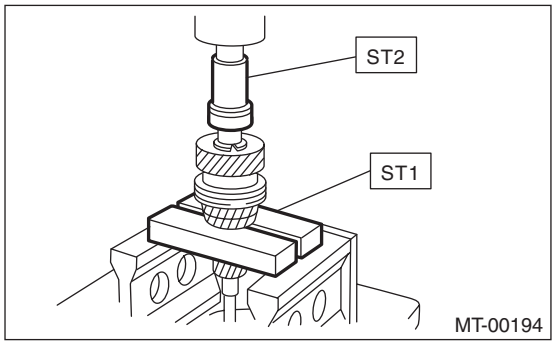
NOTE:
Align the baulk ring and gear & hub assembly with the key groove.



(A) Groove
(B) 4th gear side

5) Press-fit the ball bearing into the rear section of transmission main shaft using ST1, ST2 and a press.

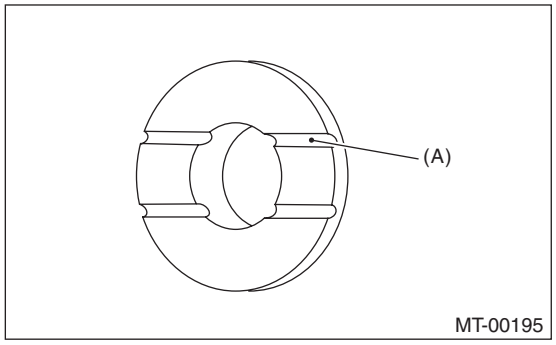
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

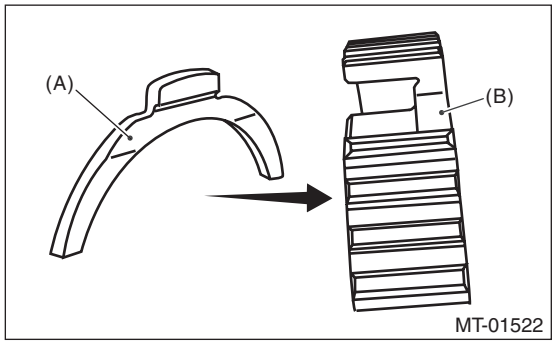
NOTE:
Make sure the thrust washer is oriented in the correct direction.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to the 5th gear side.

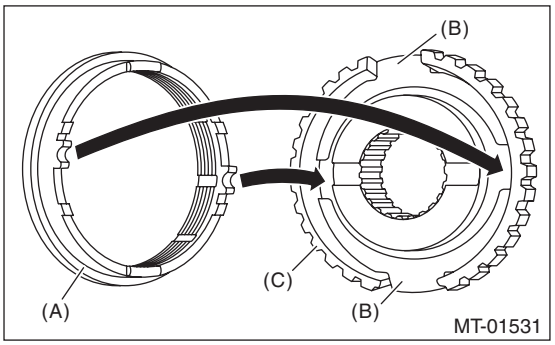
7) Install rest of the parts to the rear section of the transmission main shaft.

CAUTION:
• Install the baulk lever so that the concave side faces toward the 5th hub.

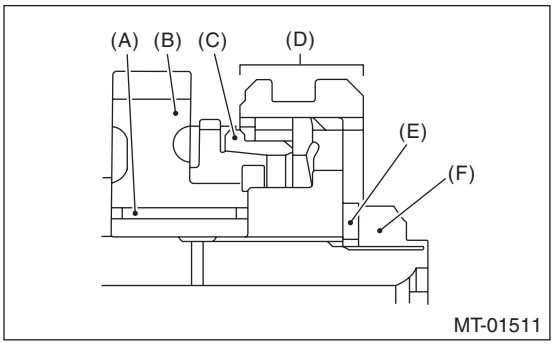


(A) Baulk lever
(B) 5th hub

• Fit the convex portions of baulk ring with the gaps between baulk levers.



(A) Baulk ring
(B) Baulk lever
(C) 5th hub



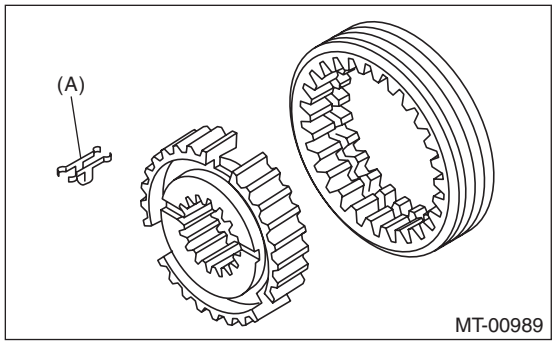
(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th hub & sleeve No. 2
(E) Lock washer
(F) Lock nut

8) Tighten the lock nuts to the specified torque using ST1 and ST2.
9) Crimp lock nuts in two locations after tightening.
ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

E: INSPECTION

Disassembled parts should be washed clean first with cleaning solvent and 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 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 ring in following cases:
• When the inner surface and end face are damaged.
• When the ring inner surface is abnormally or partially worn down.
• When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert key
Replace the insert key if deformed, excessively worn or defective in any way.



(A) Insert key

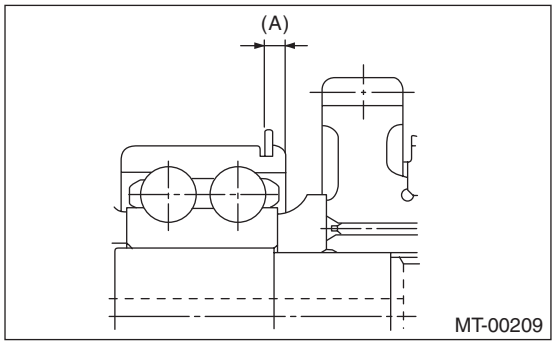
6) Oil seal
Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

F: ADJUSTMENT

Selection of main shaft rear plate:
Using the ST, measure the protrusion amount (A) of ball 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.
ST 498147001 DEPTH GAUGE

Dimension (A) mm (in)	Part number	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

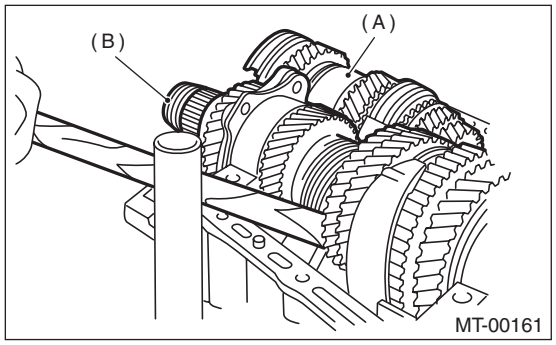


16.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-49, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly.

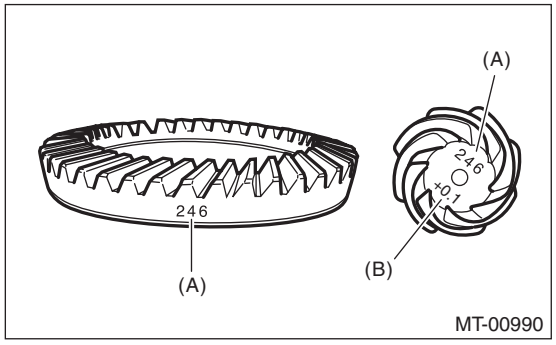
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft ASSY for single-range
(B) Drive pinion shaft ASSY

B: INSTALLATION

1) Remove the front differential assembly.
2) Alignment marks/numbers on hypoid gear set: 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.

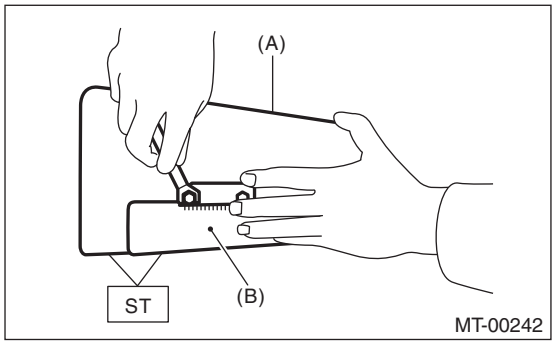


(A) Set number
(B) Number for shim adjustment

3) Place the drive pinion shaft assembly on transmission main case RH without shim and tighten the bearing mounting bolts.
4) Perform inspection and 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



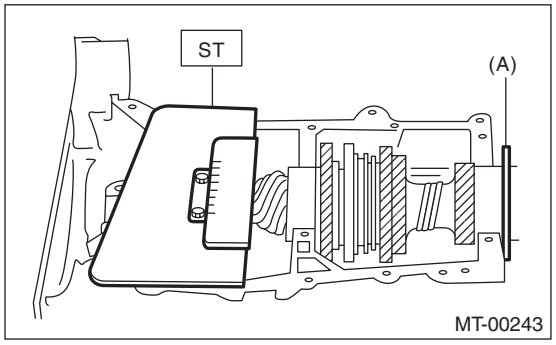
(A) Plate
(B) Scale

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 –.)

ST 499917500 DRIVE PINION GAUGE ASSY

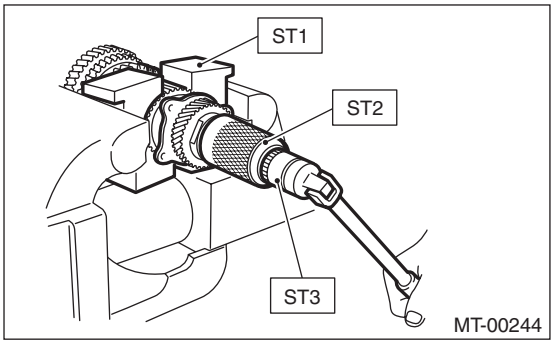
8) Select one to three shims in the following table for the value determined as described above, and take the shim(s) which thickness is closest to the said value.

Drive pinion shim	
Part number	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)

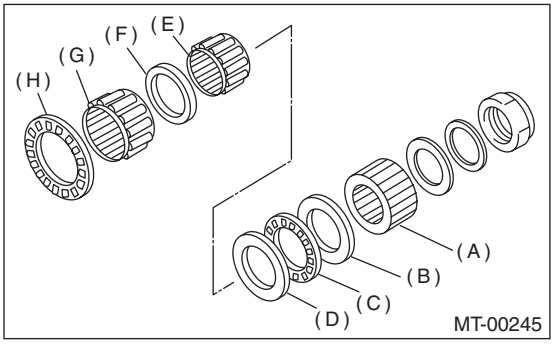
9) Install the front differential assembly. <Ref. to 5MT-66, INSTALLATION, Front Differential Assembly.>
10) Set the transmission main shaft assembly for single range and drive pinion assembly in the install location. (When doing so, there will be no clearance between the two when moved all the way to the front). Inspect a suitable 1st-2nd, 3rd-4th and 5th shifter fork so that the coupling sleeve and reverse driven gear are positioned in the center of the synchronizing mechanism. <Ref. to 5MT-63, INSPECTION, Drive Pinion Shaft Assembly.>
11) Install the transmission case. <Ref. to 5MT-50, INSTALLATION, Transmission Case.>
12) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
13) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, 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.
1) Flatten the tab of the axle nut. Remove the lock nut with ST1, ST2 and ST3.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)



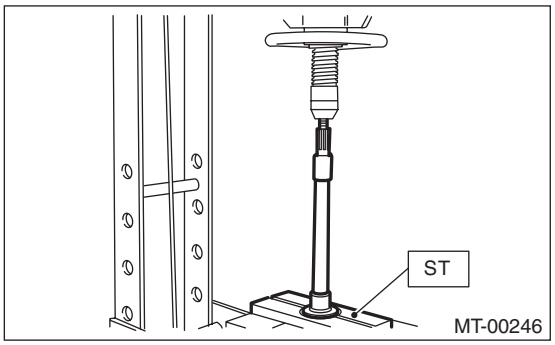
2) Draw out the drive pinion from driven shaft. Remove the differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing and drive pinion collar.



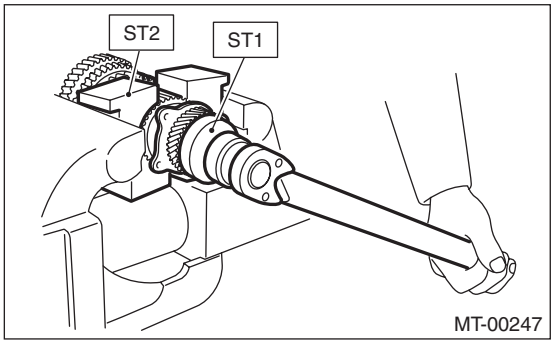
(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

3) Remove the roller bearing and washer using ST and a press.

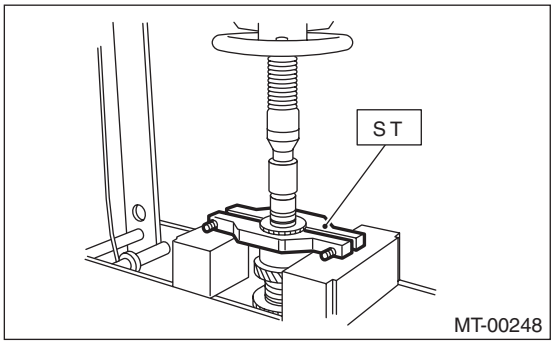
NOTE:
Do not reuse the roller bearing.
ST 498077000 REMOVER



4) Flatten the tab of the axle nut. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER

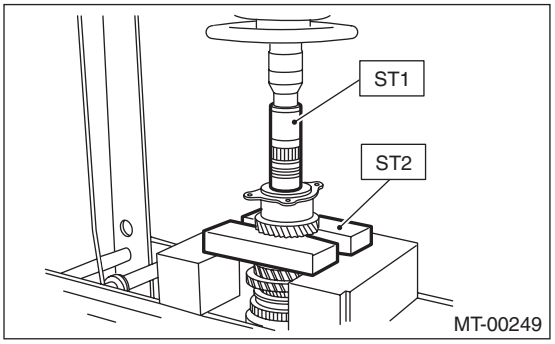


5) Remove the 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

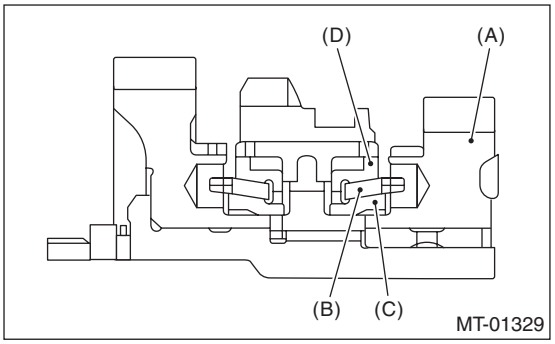


6) Remove the woodruff key.

7) Remove the roller bearing and 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER

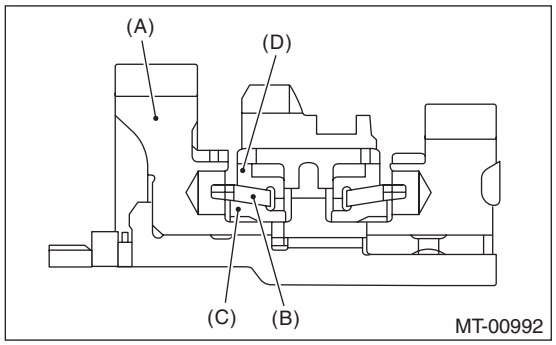


8) Remove the key.
9) Remove the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



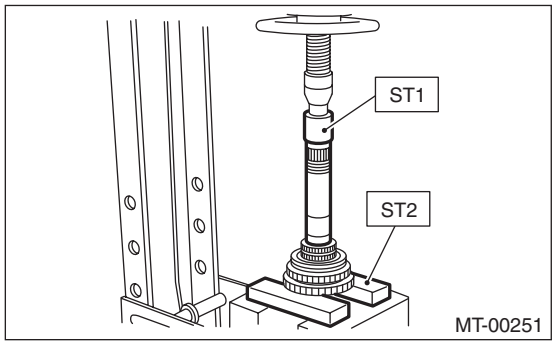
(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

10) Remove the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, 2nd gear bushing, gear and hub using ST1 and ST2.



(A) 1st driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

NOTE:
If necessary, use the new gear & hub assembly, when replacing the gear or hub assembly. Because these must engage at the specified point, avoid disassembly as much as possible. If it must be disassembled, mark the engaging point on the spline beforehand.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER

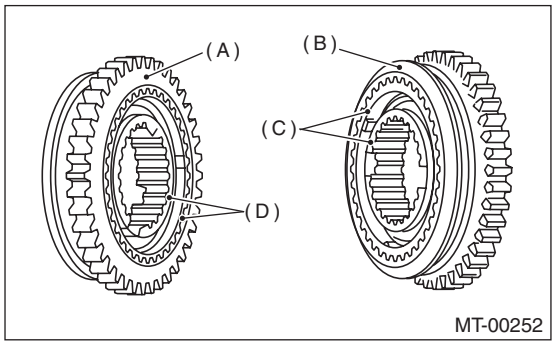


11) Remove the sub gear, washer, and outer snap ring for the 1st driven gear. (2.5 L non-turbo model)

D: ASSEMBLY

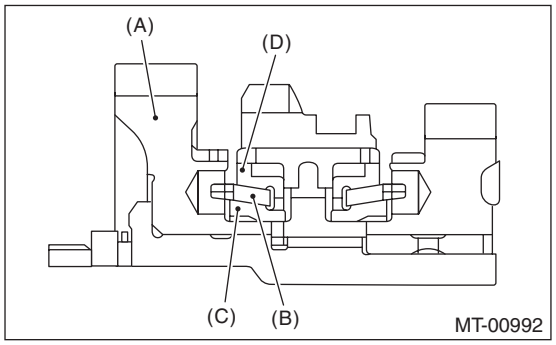
1) Install the sleeve and gear & hub assembly by matching alignment marks.

NOTE:
Use the new gear & hub assembly, if replacing the gear or hub.



(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

2) Install the washer, outer snap ring and sub gear onto the 1st driven gear. (2.5 L non-turbo model)
3) Install the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, gear & hub assembly onto driven shaft.



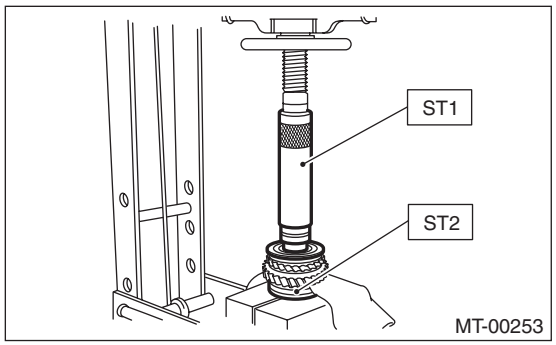
(A) 1st driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

NOTE:
• Take care to install the gear & hub assembly in proper direction.
• Align the baulk ring and gear & hub assembly with the key groove.

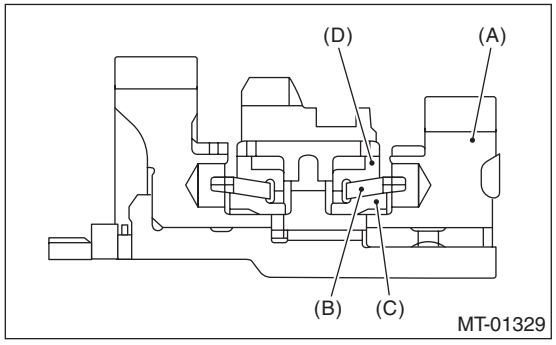
4) Install the 2nd driven gear bushing onto the driven shaft using ST1, ST2 and a press.

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
• 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
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



5) Install the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring, and insert them onto driven shaft.

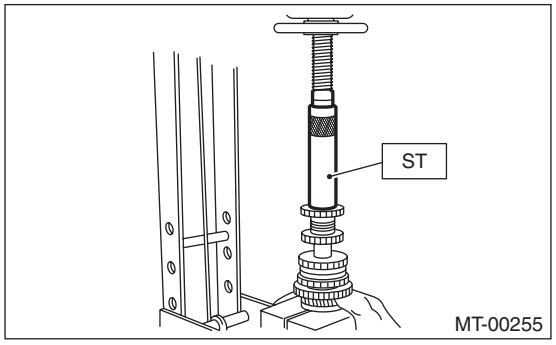


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

6) After installing key on driven shaft, install the 3rd-4th driven gear using an ST and a press.

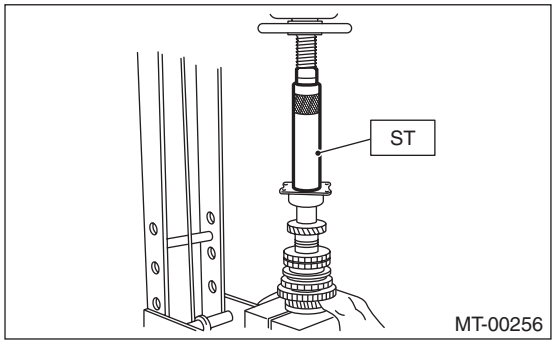
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
Align the groove in baulk ring with the insert.
ST 499277200 INSTALLER



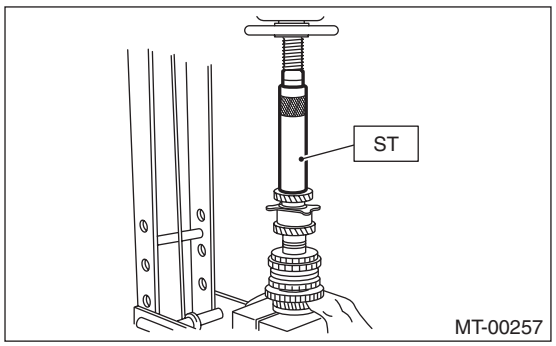
7) Install a set of roller bearings onto the driven shaft using the ST and a press.

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST 499277200 INSTALLER



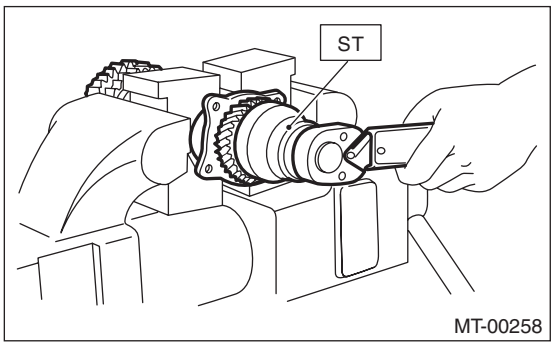
8) Position the woodruff key in groove of the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and a press.

CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST 499277200 INSTALLER

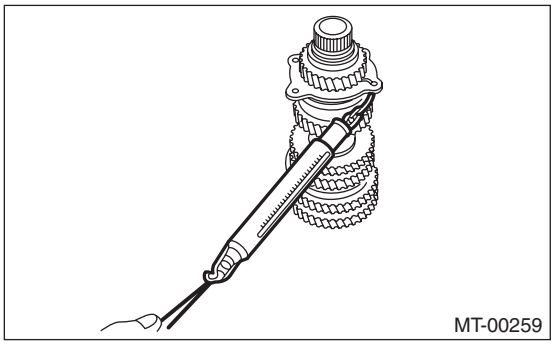


9) Install the lock washer. Install the lock nut and tighten to the specified torque using the ST.
ST 499987300 SOCKET WRENCH (50)

Tightening torque:
260 N·m (26.5 kgf-m, 191.7 ft-lb)

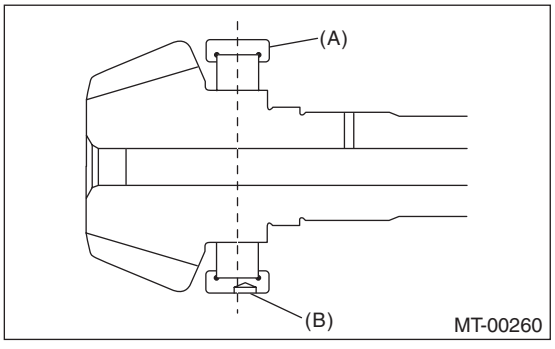


NOTE:
- Crimp the locknut in 2 locations.
- Using a spring scale, check that starting torque of the roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33 lbf).



10) Install the roller bearing onto drive pinion.

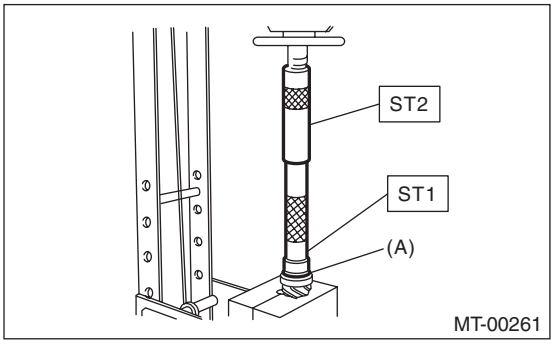
NOTE:
When installing the roller bearing, note its directions (front and rear) because the knock pin hole of outer race is offset.



(A) Roller bearing
(B) Knock pin hole

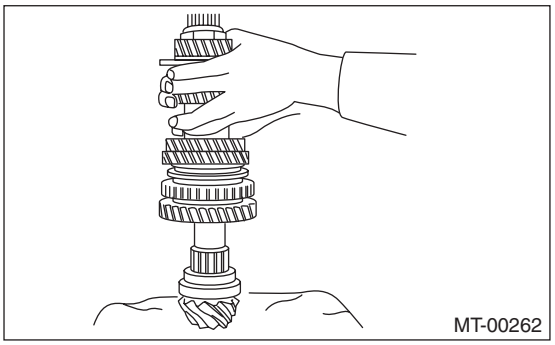
11) Install the washer using ST1, ST2 and a press.

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



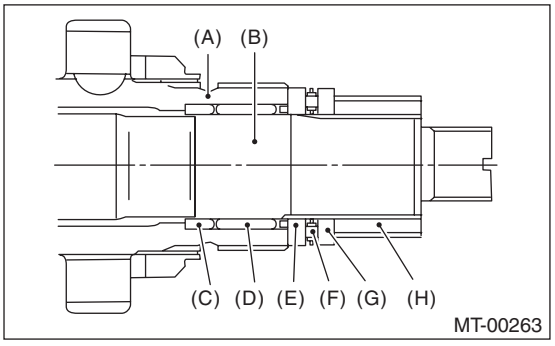
(A) Washer

12) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



13) 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.

NOTE:
Be careful to install the spacer in the proper direction.

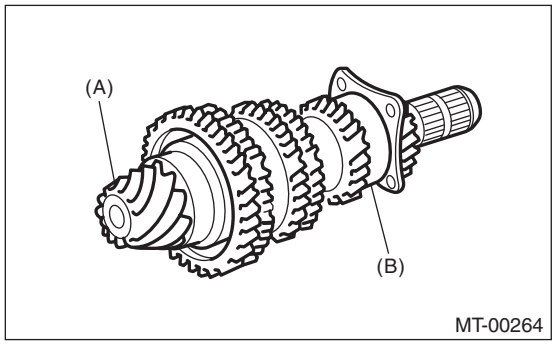


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

14) Adjust the thrust bearing preload. <Ref. to 5MT-64, THRUST BEARING PRELOAD, ADJUSTMENT, Drive Pinion Shaft Assembly.>

E: INSPECTION

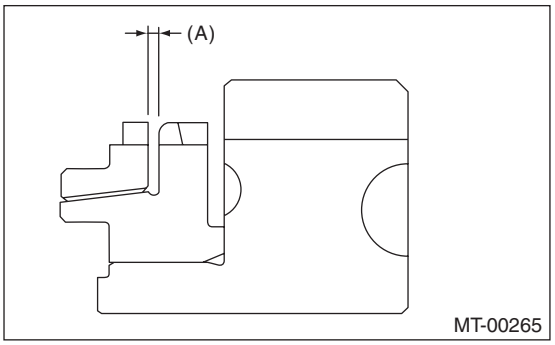
Disassembled parts should be washed clean first with cleaning solvent and then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• When the bearing balls, outer races and inner races are broken or rusty.
• When the bearing is worn.
• When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike other bearings.



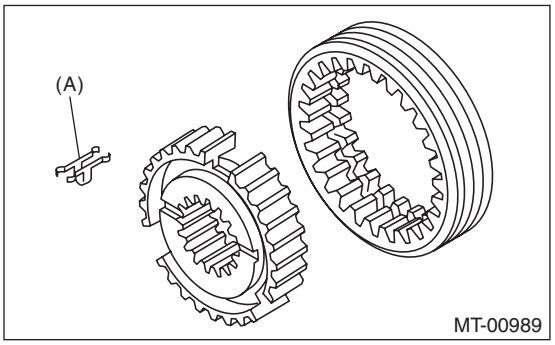
(A) Drive pinion shaft
(B) Ball bearing

• 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 the bearings in the following cases.
• Replace 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 ring in following cases:
• 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 ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



• When the contact surface of synchronizer ring insert is scratched or abnormally worn.
5) Shifting insert key
Replace the insert key if deformed, excessively worn or defective in any way.



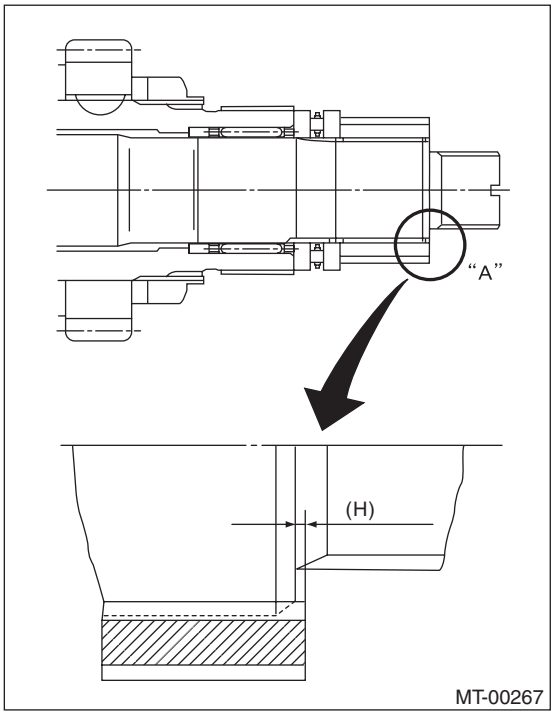
(A) Insert key

6) Oil seal
Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn or defective in any way.

F: ADJUSTMENT

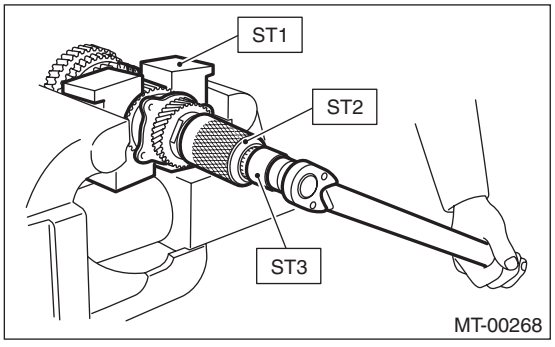
1. THRUST BEARING PRELOAD

1) Select a suitable adjusting washer No. 1 to so that dimension (H) will be zero in a visual check. Position the washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut.(18 × 13.5)



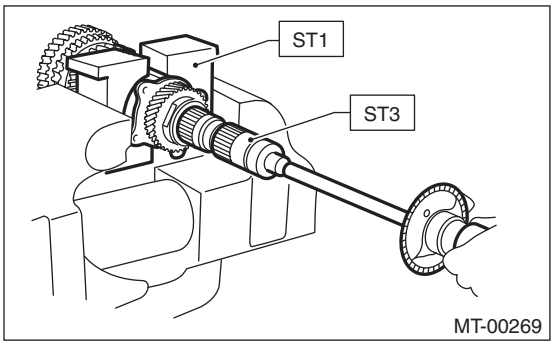
2) Using the ST1, ST2 and ST3, tighten the new lock nut to the specified torque.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

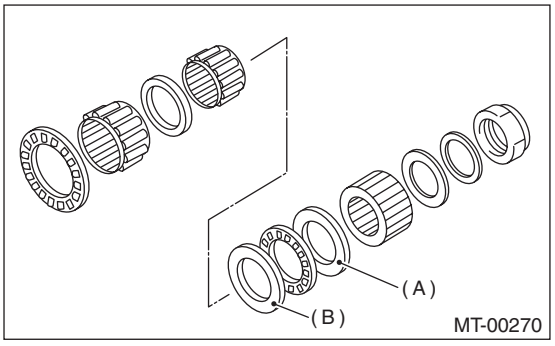


3) After removing the ST2, measure the starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)



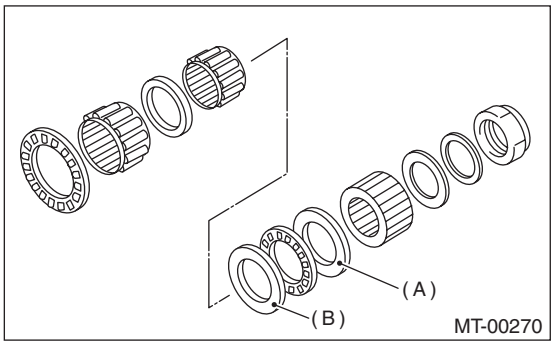
4) If the starting torque is not within the specified limit, select new adjusting washer No. 1 and recheck starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Adjusting washer No. 1	
Part number	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) When the specified starting torque cannot be obtained by adjusting washer No. 1, select adjusting washer No. 2 from the following table. Repeat procedures 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part number	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

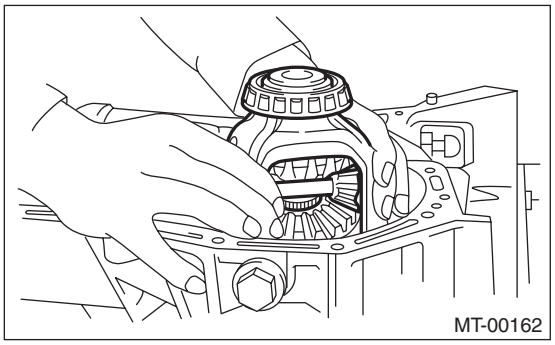
6) Recheck that the starting torque is within the specified range, then crimp the lock nut at four positions.

17.Front Differential Assembly

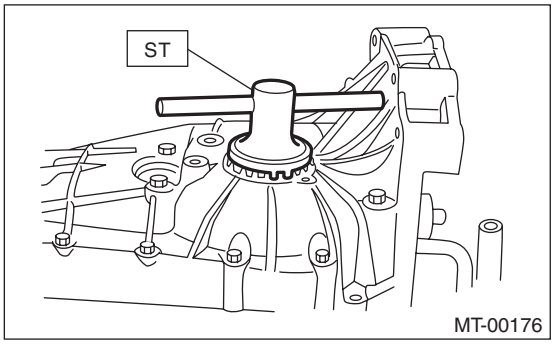
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-49, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-57, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly for single-range. <Ref. to 5MT-52, 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.



7) Remove the differential side retainers using ST.
ST 18630AA010 WRENCH COMPL RETAINER

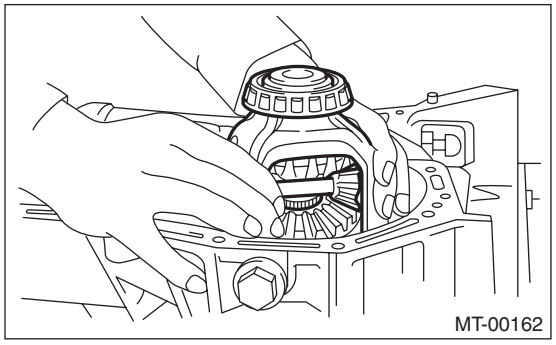


8) Remove the bearing outer race from the transmission case.
ST 398527700 PULLER ASSY

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.

NOTE:
Be careful not to fold the sealing lip of oil seal.

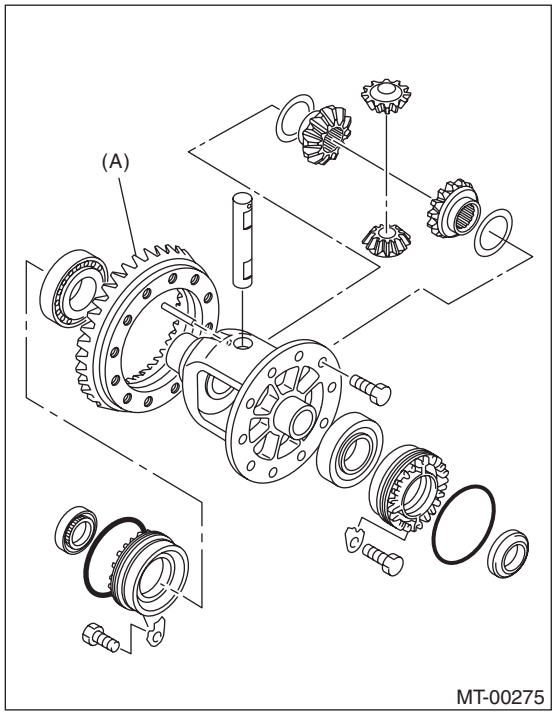


4) Install the main shaft assembly for single-range. <Ref. to 5MT-52, INSTALLATION, Main Shaft Assembly for Single-range.>
5) Install the drive pinion assembly. <Ref. to 5MT-57, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install the transmission case. <Ref. to 5MT-50, INSTALLATION, Transmission Case.>
7) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
8) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

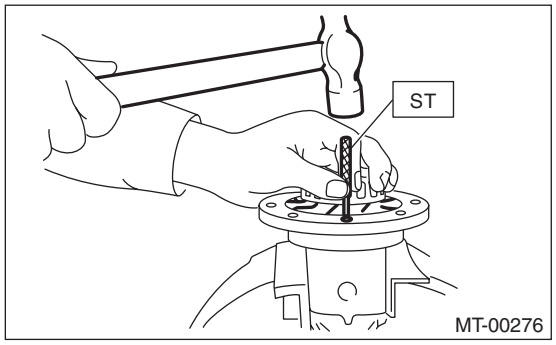
1. DIFFERENTIAL CASE ASSEMBLY

1) Loosen the twelve bolts and remove hypoid driven gear.

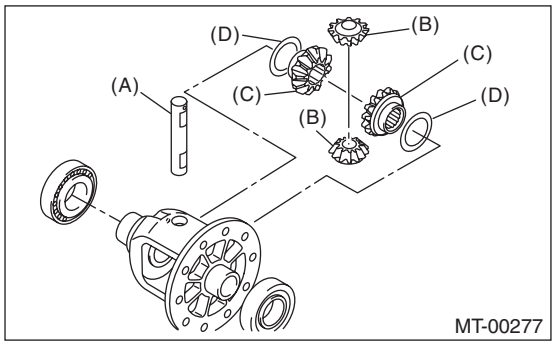


(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear side.
ST 899904100 REMOVER

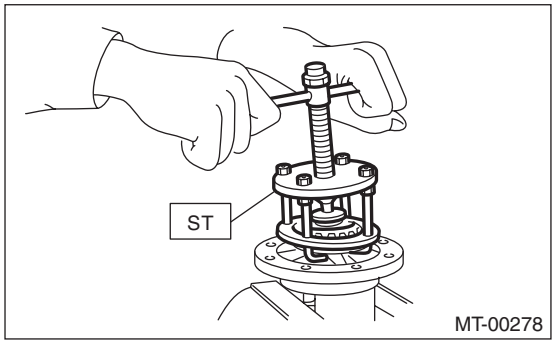


3) Pull out the pinion shaft, and remove the differential bevel pinion, differential bevel gear and washer.



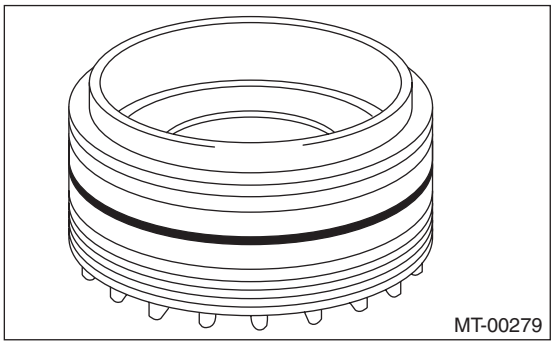
(A) Pinion shaft
(B) Differential bevel pinion
(C) Differential bevel gear
(D) Washer

4) Using the ST, remove the roller bearing.
ST 899524100 PULLER SET



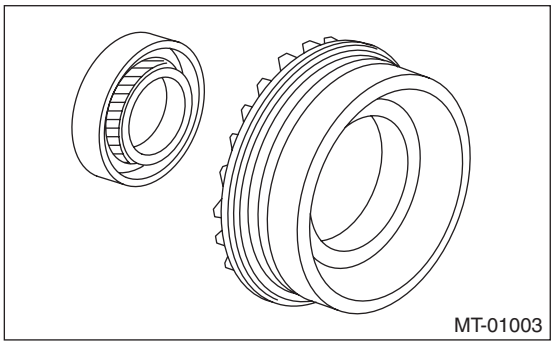
2. SIDE RETAINER

1) Remove the O-ring.



2) Remove the oil seal.

NOTE:
- Remove using the flat tip screwdriver.
- Do not reuse the oil seal. Replace the oil seal with a new part.

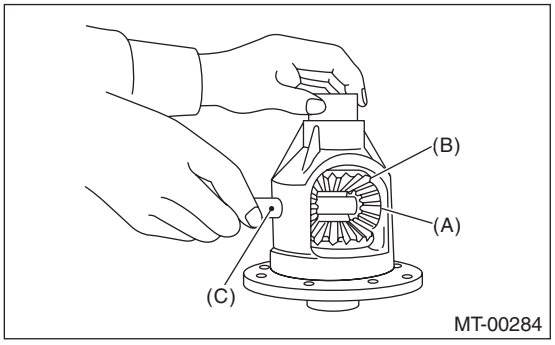


D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the differential bevel gear and differential bevel pinion together with washers, and insert the pinion shaft.

NOTE:
Face the chamfered side of washer toward gear.

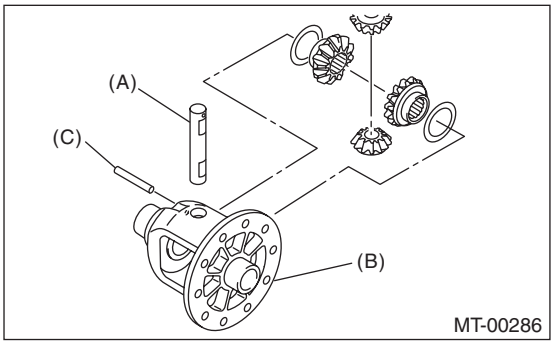


(A) Differential bevel pinion
(B) Differential bevel gear
(C) Pinion shaft

2) Measure the backlash between differential bevel gear and differential pinion. If backlash is not within specified value, install a suitable washer to adjust. <Ref. to 5MT-70, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

3) Align the pinion shaft and differential case with each hole, and drive the straight pin into the holes from the hypoid driven gear using the ST.

NOTE:
Lock the straight pin after installing.
ST 899904100 REMOVER

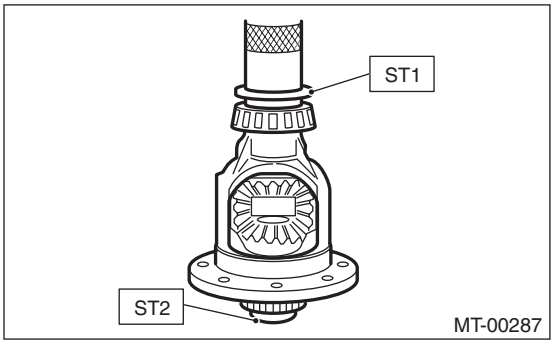


(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install the roller bearing to differential case.

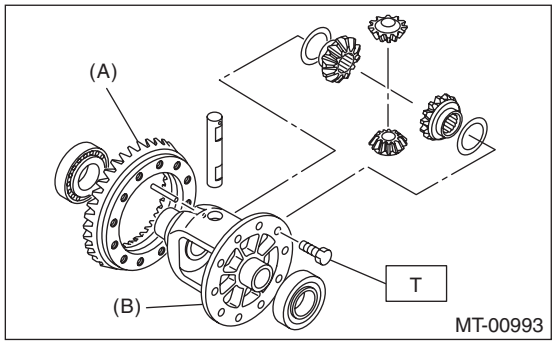
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

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.

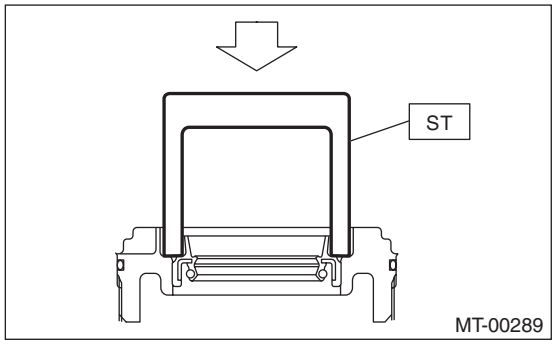
Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)



(A) Hypoid driven gear
(B) Differential case

2. SIDE RETAINER

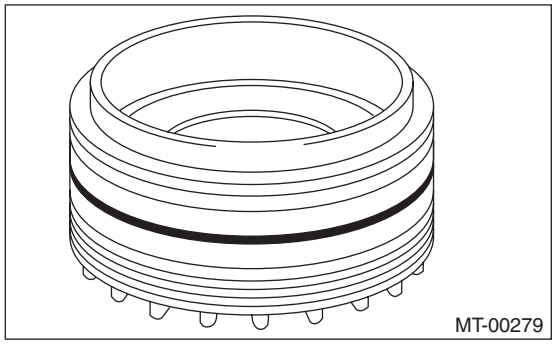
1) Install a new oil seal.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



CAUTION:
• When press-fitting the oil seal to the side retainer, tap with a plastic hammer etc. to press in.
• Never use a press.

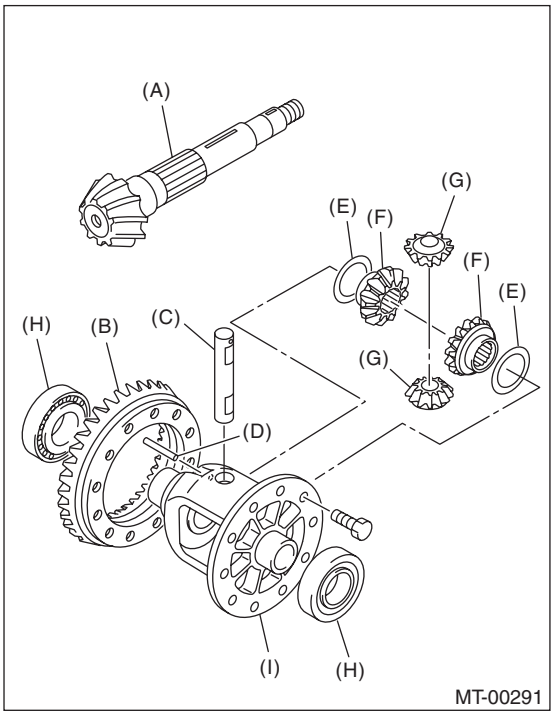
2) Install a new O-ring.

NOTE:
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 is worn or damaged.
• 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 has worn or damaged sliding surfaces.

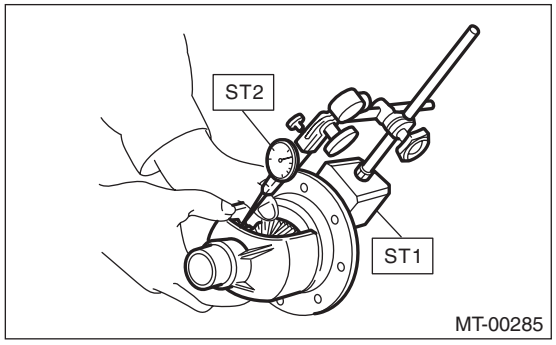


(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Roller bearing
(I) Differential case

1. BEVEL PINION GEAR BACKLASH

Measure the backlash between the bevel gear and pinion. If backlash is not within specified value, install a suitable washer to adjust. <Ref. to 5MT-70, ADJUSTMENT, Front Differential Assembly.>
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

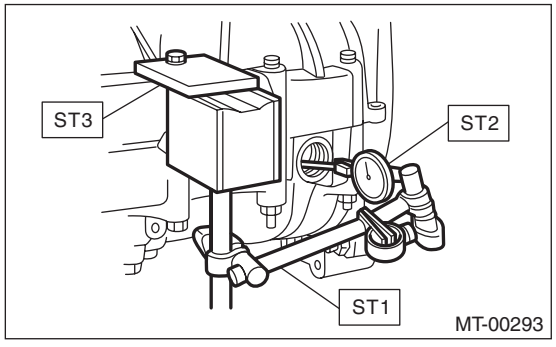
Standard backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH

1) Set the ST1, ST2 and ST3. Insert the needle through transmission oil drain plug hole so that the needle 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
Part No. 38415AA100AXLE SHAFT

Backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

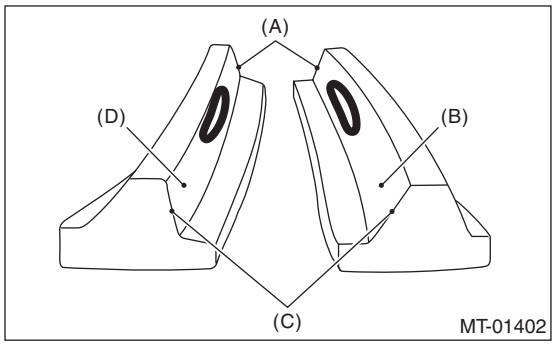


NOTE:
If the backlash is outside the specified range, adjust it by turning the side retainer in the right side case.

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. If it is improper, make adjustment. <Ref. to 5MT-70, 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 5MT-67, DISASSEMBLY, Front Differential Assembly.>
2) Select a different washer from the table and install.

Washer	
Part number	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)

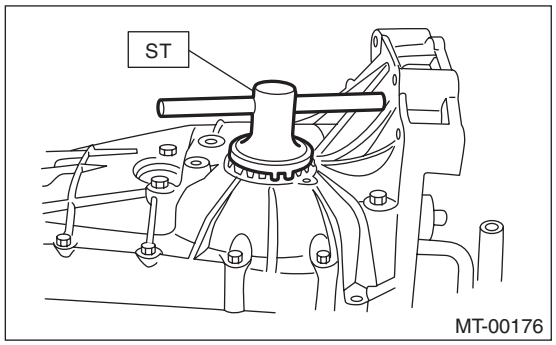
3) Adjust until the standard value is obtained.

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

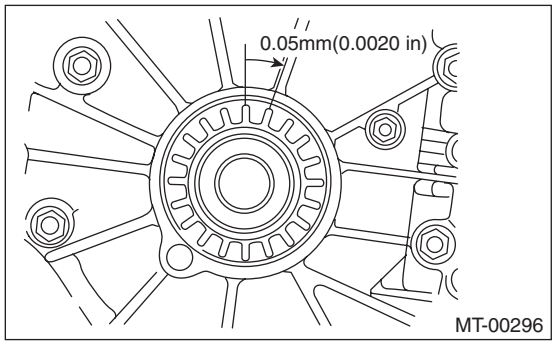
2. HYPOID GEAR BACKLASH

Adjust the backlash by turning the holder in the RH side case.

ST 18630AA010 WRENCH COMPL RETAINER



NOTE:
Each time side retainer rotates one tooth, backlash changes by 0.05 mm (0.020 in).

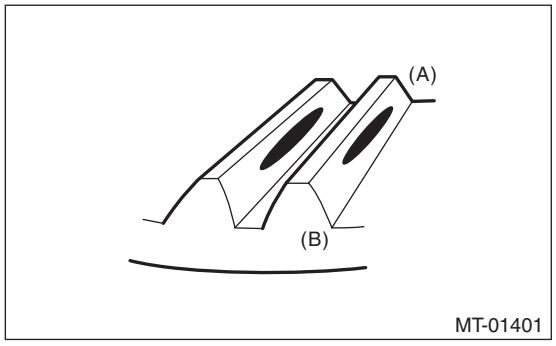


3. TOOTH CONTACT OF HYPOID GEAR

1) Adjust until correct teeth contact is obtained.
2) Check tooth contact, and perform the adjustment as follows.

- Tooth contact

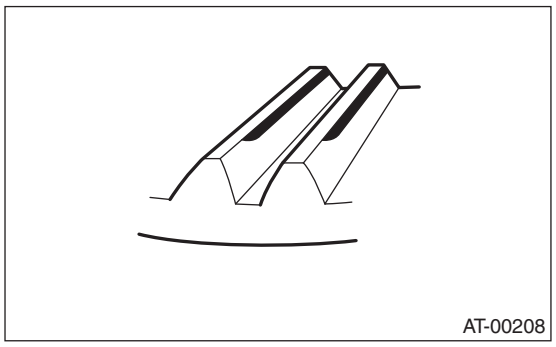
Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)



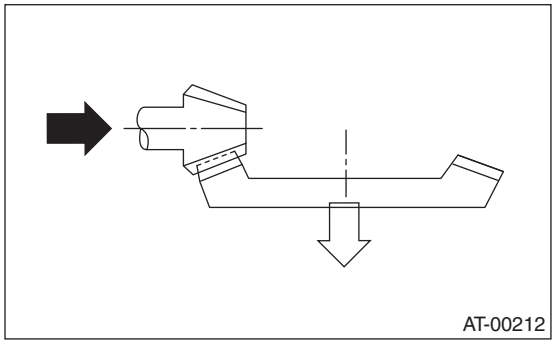
(A) Toe side
(B) Heel side

- Face contact

Check item: Backlash is too large.
Contact pattern

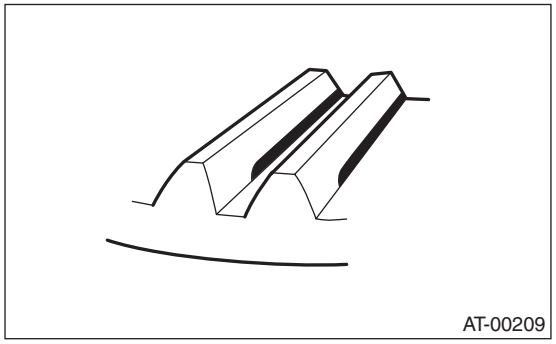


Corrective action: Reduce thickness of pinion height adjusting washer in order to bring the drive pinion closer to driven gear side.

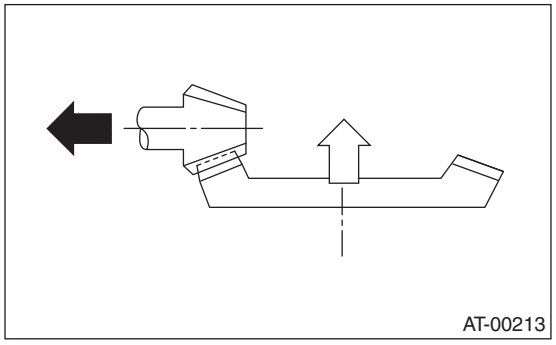


- Flank contact

Check item: Backlash is too small.
Contact pattern

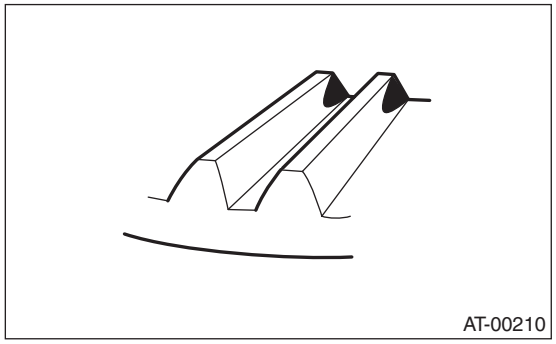


Corrective action: Increase the thickness of the pinion height adjusting washer in order to place the drive pinion away from the driven gear.

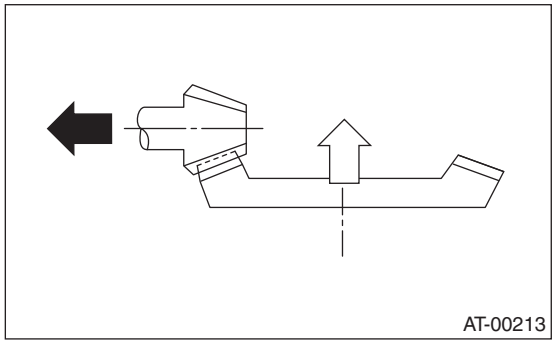


- Toe contact (inside contact)

Check item: Teeth contact area is too small.
Contact pattern

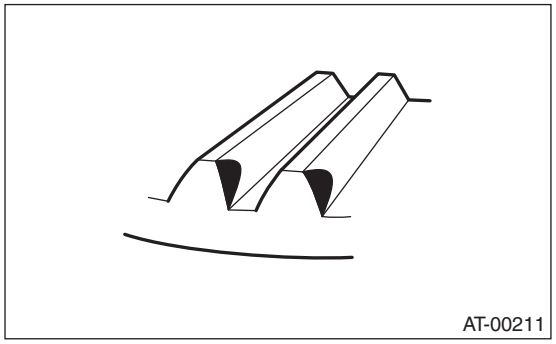


Corrective action: Increase thickness of pinion height adjusting washer according to the procedures for moving the drive pinion closer to the driven gear.

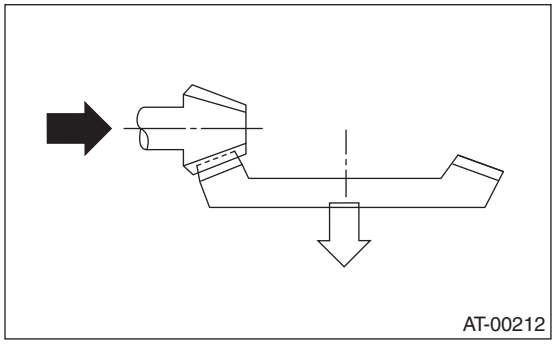


- Heel contact (outside end contact)

Check item: Teeth contact area is too small.
Contact pattern



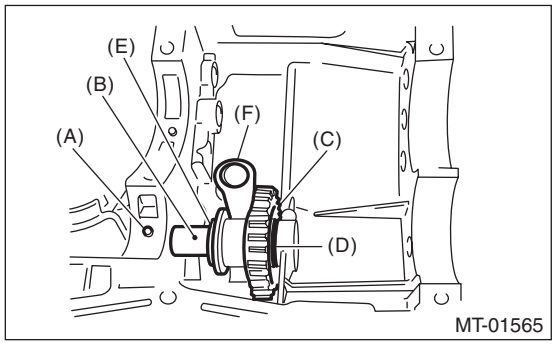
Corrective action: Reduce thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion away from the driven gear.



18.Reverse Idler Gear

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 5MT-33, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-49, REMOVAL, Transmission Case.>
5) Remove the drive pinion shaft assembly. <Ref. to 5MT-57, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly for single-range. <Ref. to 5MT-52, REMOVAL, Main Shaft Assembly for Single-range.>
7) Remove the front differential assembly. <Ref. to 5MT-66, REMOVAL, Front Differential Assembly.>
8) Remove the shifter forks and rods. <Ref. to 5MT-75, REMOVAL, Shifter Fork and Rod.>
9) Pull out the straight pin, and remove the reverse idler gear shaft, washer, reverse idler gear and washer.



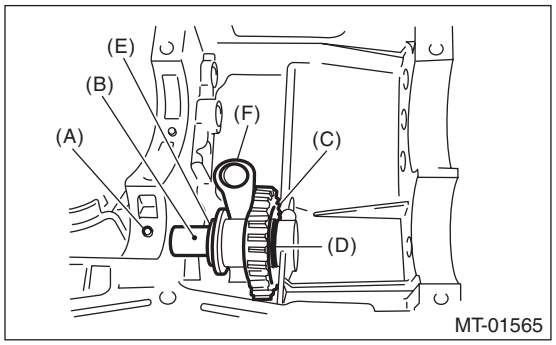
(A) Straight pin
(B) Reverse idler gear shaft
(C) Reverse idler gear
(D) Washer
(E) Washer
(F) Reverse shifter lever

10) Remove the reverse shifter lever.

B: INSTALLATION

1) Install the reverse shifter lever, washer, reverse idler gear, washer and reverse idler gear shaft, and secure them with the straight pin.

NOTE:
Be sure to install the reverse idler gear shaft from rear side.



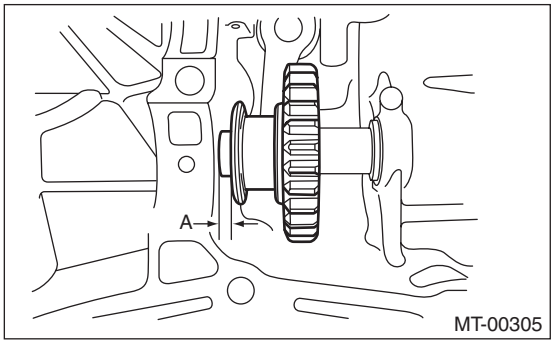
(A) Straight pin
(B) Reverse idler gear shaft
(C) Reverse idler gear
(D) Washer
(E) Washer
(F) Reverse shifter lever

2) Check and adjust clearance between the reverse idler gear and the timing case wall surface. <Ref. to 5MT-73, INSTALLATION, Reverse Idler Gear.> <Ref. to 5MT-74, ADJUSTMENT, Reverse Idler Gear.>
3) Install the shifter forks and rods. <Ref. to 5MT-75, INSTALLATION, Shifter Fork and Rod.>
4) Install the front differential assembly. <Ref. to 5MT-66, INSTALLATION, Front Differential Assembly.>
5) Install the main shaft assembly for single-range. <Ref. to 5MT-52, INSTALLATION, Main Shaft Assembly for Single-range.>
6) Install the drive pinion shaft assembly. <Ref. to 5MT-57, INSTALLATION, Drive Pinion Shaft Assembly.>
7) Install the transmission case. <Ref. to 5MT-50, INSTALLATION, Transmission Case.>
8) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>
9) Install the back-up light switch & neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>
10) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

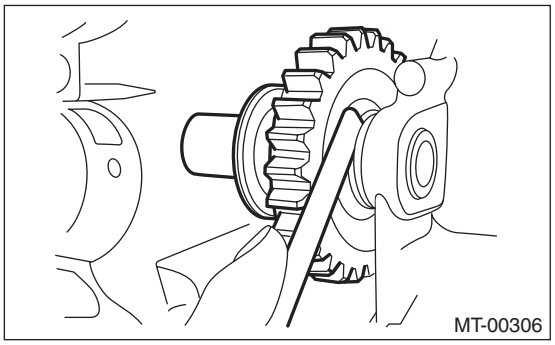
1) Move the reverse shifter rod toward the reverse side. Check the clearance between the reverse idler gear and the timing case wall surface.
If out of specification, select an appropriate reverse shifter lever and adjust.

Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



2) After installing a suitable reverse shifter lever, shift into neutral. Check the clearance between the reverse idler gear and the timing case wall surface.
If out of specification, select the appropriate washer and adjust.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

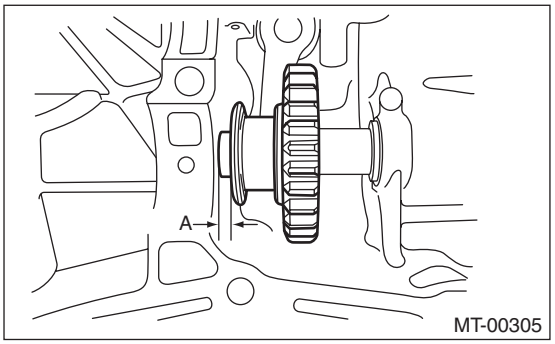


3) Check the reverse idler gear and shaft for damage. Replace if it is damaged.

D: ADJUSTMENT

1) Select the appropriate reverse shifter lever from the table below, and adjust until the clearance between the reverse idler gear and transmission case wall is within specification.

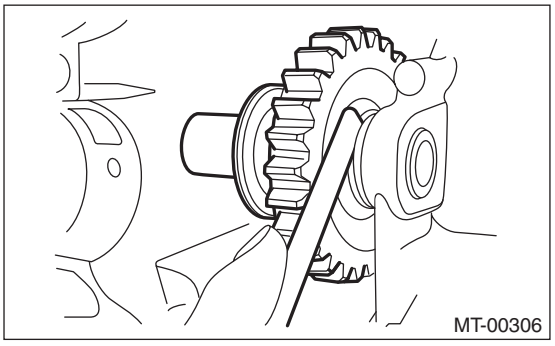
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



Reverse shifter lever		
Part number	Mark	Remarks
32820AA070	7	Far from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select the appropriate washer from the table below, and adjust until the clearance between the reverse idler gear and transmission case wall is within specification.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

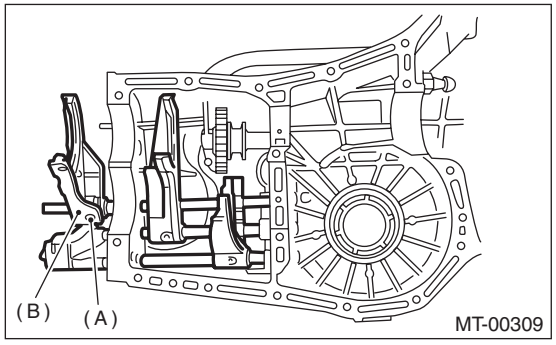


Washer	
Part number	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

19.Shifter Fork and Rod

A: REMOVAL

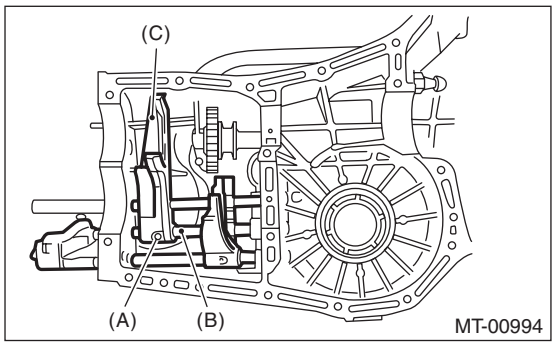
1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-24, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 5MT-33, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-36, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-49, REMOVAL, Transmission Case.>
5) Remove the drive pinion shaft assembly. <Ref. to 5MT-57, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly for single-range. <Ref. to 5MT-52, REMOVAL, Main Shaft Assembly for Single-range.>
7) Remove the front differential assembly. <Ref. to 5MT-66, REMOVAL, Front Differential Assembly.>
8) Drive out the straight pin by tapping with the ST, and pull out the 5th shifter fork.
ST 398791700 STRAIGHT PIN REMOVER



(A) Straight pin
(B) 5th shifter fork

9) Remove the plugs, springs and check balls.
10) Drive out the straight pin by tapping with the ST, and pull out the 3rd – 4th fork rod and shifter fork.

NOTE:
When removing the rod, keep other rods in neutral. Also, when pulling out the straight pin, remove it toward the inside of case so that it does not hit against the case.
ST 398791700 STRAIGHT PIN REMOVER



(A) Straight pin
(B) 3rd-4th fork rod
(C) Shifter fork

11) Drive out the straight pin by tapping with the ST, and pull out the 1st – 2nd fork rod and shifter fork.
ST 398791700 STRAIGHT PIN REMOVER
12) Remove the snap ring (outer), and pull out the reverse fork rod from reverse fork rod arm. Then take out the ball, spring and interlock plunger from the rod.
And then remove the rod.

NOTE:
When pulling out the reverse fork rod arm, be careful not to let the ball pop out of arm.
13) Remove the reverse shifter lever.

B: INSTALLATION

1) Install the reverse arm fork spring, ball and interlock plunger to the reverse fork rod arm. Insert the reverse fork rod into the hole of the reverse fork rod arm, and hold it with snap ring (outer) using ST.

NOTE:
Apply grease to plunger to prevent it from falling.
ST 399411700 ACCENT BALL INSTALLER
2) Position the ball, spring and new gasket in the reverse shifter rod hole on the left side of transmission case, and tighten the checking ball plug.
3) Install the 1st-2nd fork rod into 1st-2nd shifter fork through the hole on the rear of transmission case.

4) Align the holes in the rod and the fork, and drive the new straight pin into these holes using the ST.

NOTE:
- Set other rods to neutral.
- Make sure the interlock plunger is on the 3rd-4th fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

5) Attach the interlock plunger on 3rd-4th fork rod.

NOTE:
Apply grease to plunger to prevent it from falling.

6) Attach the 3rd-4th fork rod into 3rd-4th shifter fork through the hole on the rear of transmission case.

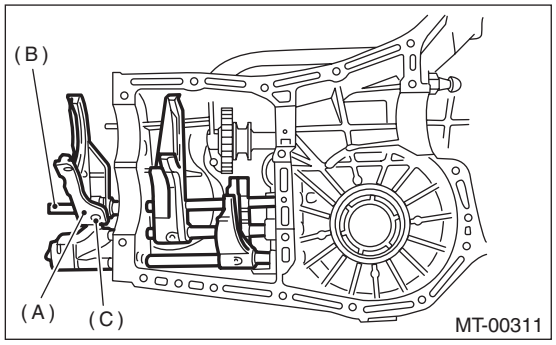
7) Align the holes in the rod and the fork, and drive the new straight pin into these holes.

NOTE:
- Set the reverse fork rod to neutral.
- Make sure the interlock plunger (before installation) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

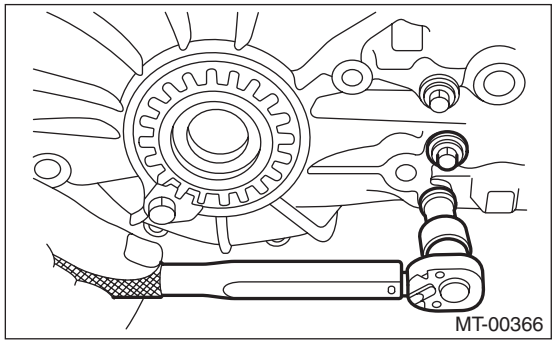
8) Install the 5th shifter fork onto the rear of reverse fork rod. Align the holes in the two parts and drive new straight pin into the specified place.

ST 398791700 STRAIGHT PIN REMOVER



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

9) Position the balls, check ball springs and new gaskets into holes of the 3rd-4th fork rods and 1st-2nd fork rods, and install the plugs.



10) Install the front differential assembly. <Ref. to 5MT-66, INSTALLATION, Front Differential Assembly.>

11) Install the main shaft assembly for single-range. <Ref. to 5MT-52, INSTALLATION, Main Shaft Assembly for Single-range.>

12) Install the drive pinion shaft assembly. <Ref. to 5MT-57, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install the transmission case. <Ref. to 5MT-50, INSTALLATION, Transmission Case.>

14) Install the transfer case together with the extension case assembly. <Ref. to 5MT-36, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch & neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-26, INSTALLATION, Manual Transmission Assembly.>

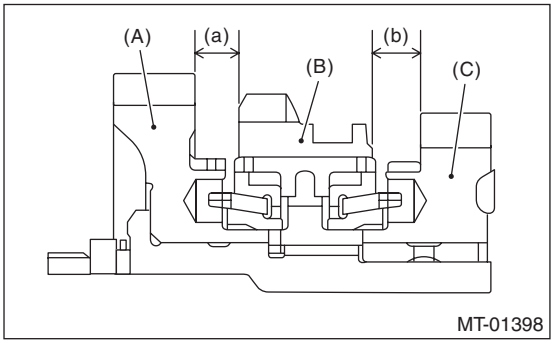
C: INSPECTION

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 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
9.5 mm (0.374 in)

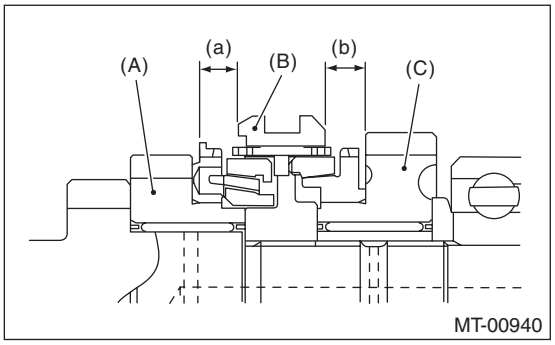


(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

1st-2nd shifter fork		
Part number	Mark	Remarks
32804AA060	1	Approaches 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Moves away from 2nd 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) and (b):
7.3 mm (0.287 in)

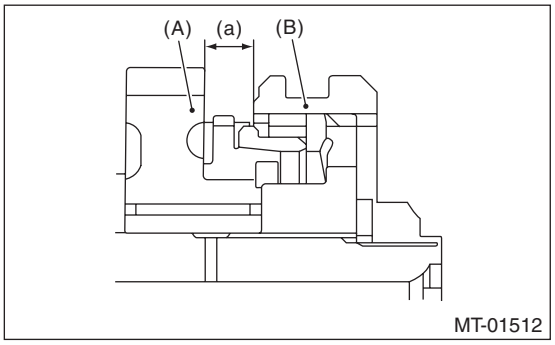


(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

3rd-4th shifter fork		
Part number	Mark	Remarks
32810AA061	1	Approaches 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Moves away from 3rd gear by 0.2 mm (0.008 in).

5) Inspect the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



(A) 5th drive gear
(B) Coupling sleeve

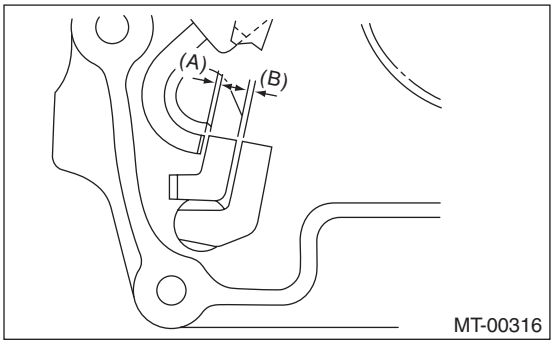
5th shifter fork (Non-turbo model), Identification paint (pink)		
Part number	Mark	Remarks
32812AA201	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA211	No mark	Standard
32812AA221	9	Moves away from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (Turbo model), Identification paint (blue)		
Part number	Mark	Remarks
32812AA231	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA241	No mark	Standard
32812AA251	9	Moves away from 5th gear by 0.2 mm (0.008 in).

6) Inspect the rod end clearances (A) and (B). If any clearance is not within specifications, replace the rod or fork as required.

Clearance (A):
3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)

Clearance (B):
1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)



20.General Diagnostic Table

A: INSPECTION

1. MANUAL TRANSMISSION

Symptom	Possible cause	Corrective action
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: 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 and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of gear spline	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact or wear between synchronizer ring and gear cone	Correct or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (caused by slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 3rd drive gear and needle bearing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Noise emitted from transmission NOTE: If a noise is heard when the vehicle is parked with its engine idling and if a noise ceases when the clutch is disengaged, it may be considered that the noise is coming from the transmission.	(a) Insufficient or improper lubrication	Lubricate with specified oil or replace.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

2. DIFFERENTIAL

Symptoms	Possible cause	Corrective action
1. Broken differential (case, gear, bearing, etc.) NOTE: Noise will occur, and eventually the differential will not be able to operate due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble the differential and replace broken components. At the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of the clutch	Readjust the preload and backlash of the bearing, and the contact surface of gear.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of the drive pinion and the hypoid driven gear	Adjust.
	(e) 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 tightening 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	Lubricate.
	(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.

MANUAL TRANSMISSION AND DIFFERENTIAL

6MT

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1. General Description

A: SPECIFICATION

1. MANUAL TRANSMISSION AND FRONT DIFFERENTIAL

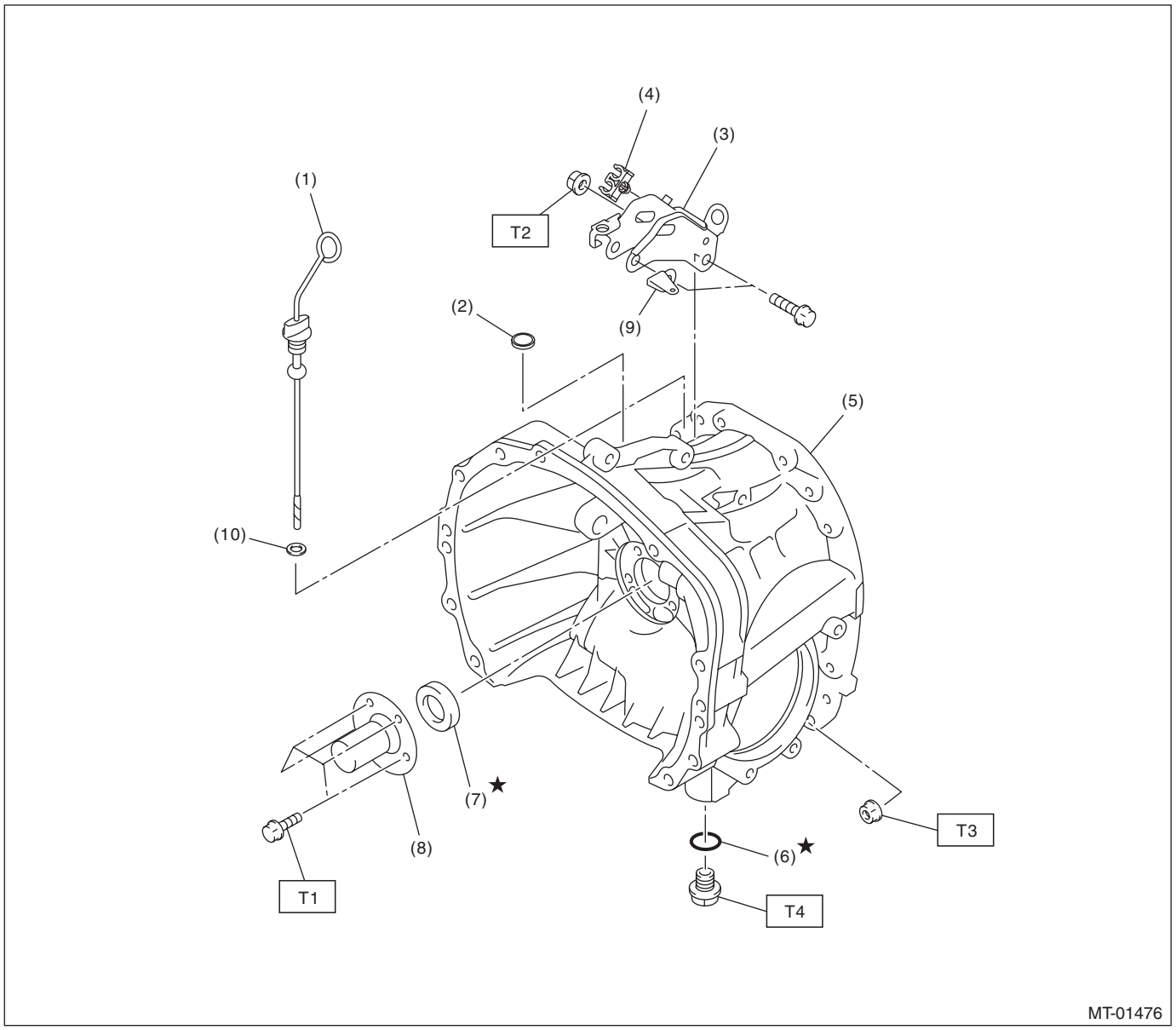
Type			6-forward speeds and 1-reverse
Transmission gear ratio		1st	3.636
		2nd	2.235
		3rd	1.521
		4th	1.137
		5th	0.891
		6th	0.707
		Rev.	3.545
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	3.900
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.100
	Final	Type of gear	Hypoid
		Gear ratio	3.545
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 4, bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, bevel gear: 2 and viscous coupling)
Transmission gear oil			GL-5
Transmission gear oil capacity			4.1 ℓ (4.3 US qt, 3.6 Imp qt)

2. TRANSMISSION GEAR OIL

Recommended oil:
GL-5 (75W-90) or equivalent

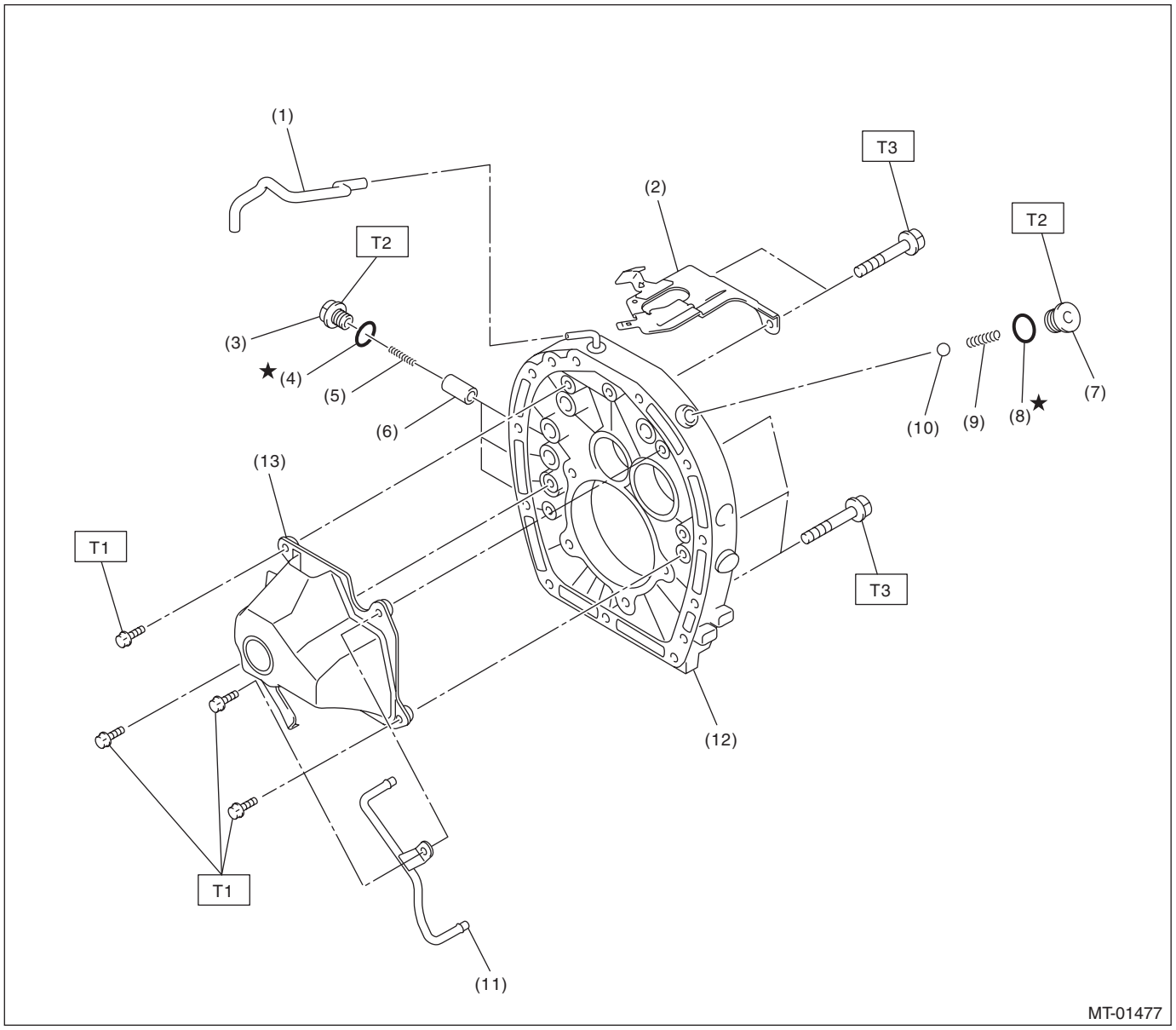
B: COMPONENT

1. CLUTCH HOUSING



(1)	Oil level gauge	(6)	Gasket	***Tightening torque:N·m (kgf-m, ft-lb)***
(2)	Plug	(7)	Oil seal	***T1: 6.4 (0.65, 4.7)***
(3)	Pitching stopper bracket	(8)	Clutch release bearing guide	***T2: 41 (4.2, 30.2)***
(4)	Clip	(9)	Return spring bracket	***T3: 50 (5.1, 36.9)***
(5)	Clutch housing	(10)	O-ring	***T4: 70 (7.1, 51.6)***

2. ADAPTER PLATE

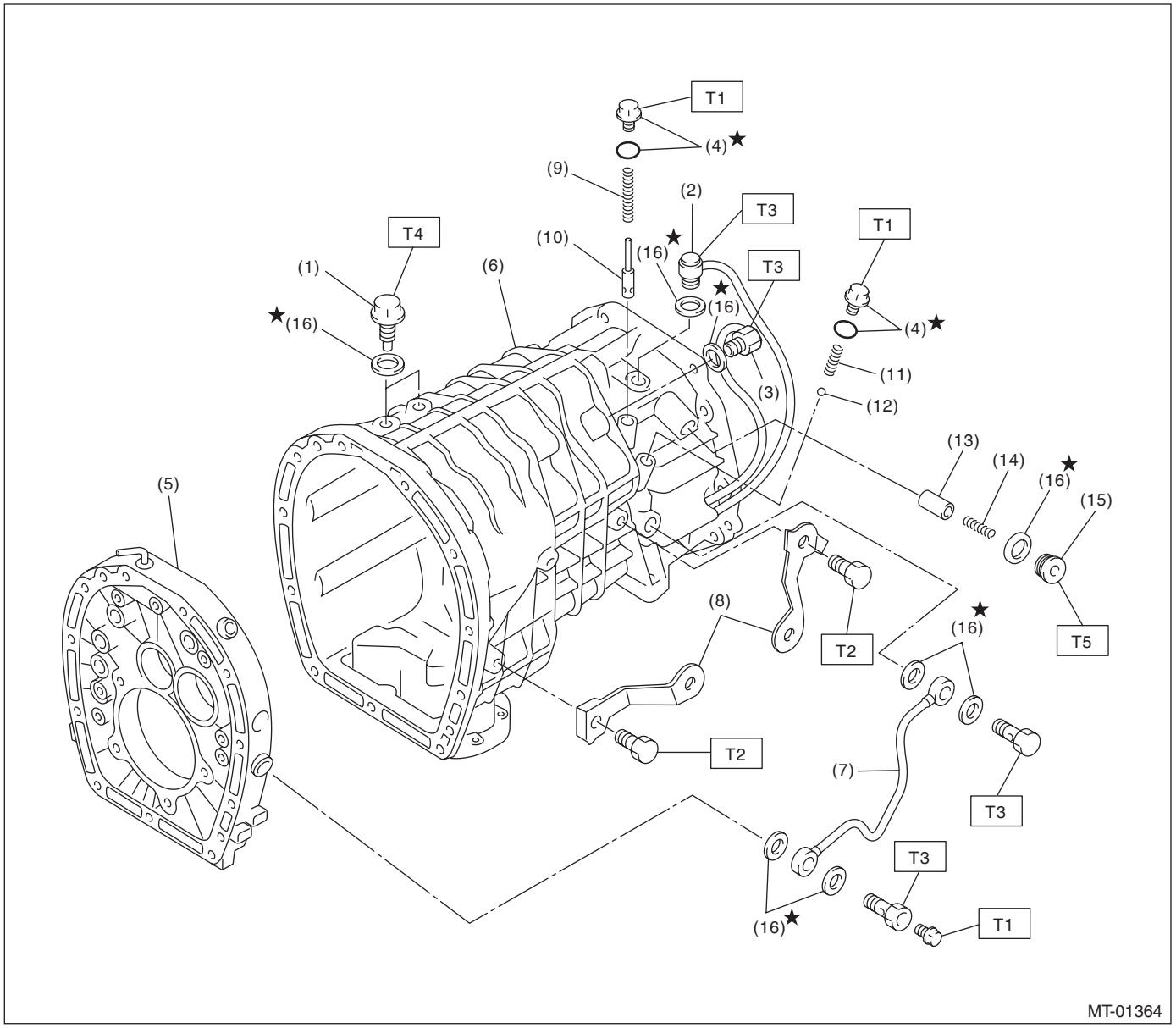


(1) Breather hose
(2) Transmission harness stay
(3) Plug
(4) Gasket
(5) Spring
(6) Plunger
(7) Checking ball plug
(8) Gasket
(9) Checking ball spring
(10) Ball
(11) Lubrication pipe
(12) Adapter plate
(13) Oil chamber

Tightening torque:N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 37 (3.8, 27.3)
T3: 50 (5.1, 36.9)

3. TRANSMISSION CASE

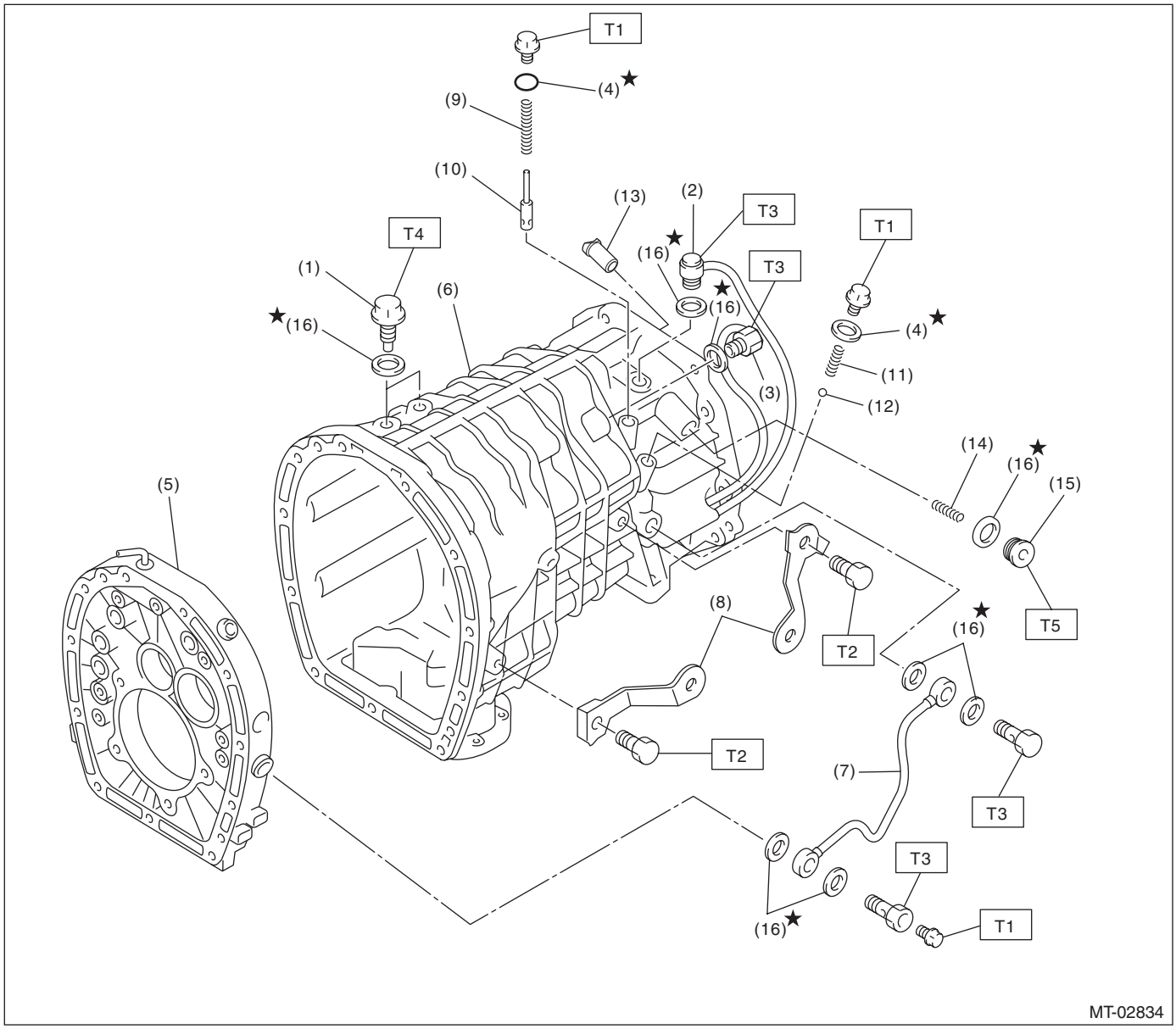
- **Transmission serial No. 144576 or earlier**



(1)	Pilot bolt	(9)	Relief valve spring
(2)	Neutral switch	(10)	Relief valve
(3)	Back-up light switch	(11)	Valve spring
(4)	Bolt assembly seal	(12)	Ball
(5)	Adapter plate	(13)	Plunger
(6)	Transmission case	(14)	Spring
(7)	Oil pipe	(15)	Plug
(8)	Harness bracket	(16)	Gasket

Tightening torque:N·m (kgf-m, ft-lb)	
T1:	*13 (1.3, 9.6)*
T2:	*16 (1.6, 11.8)*
T3:	*32 (3.3, 23.6)*
T4:	*34 (3.5, 25.1)*
T5:	*41 (4.2, 30.2)*

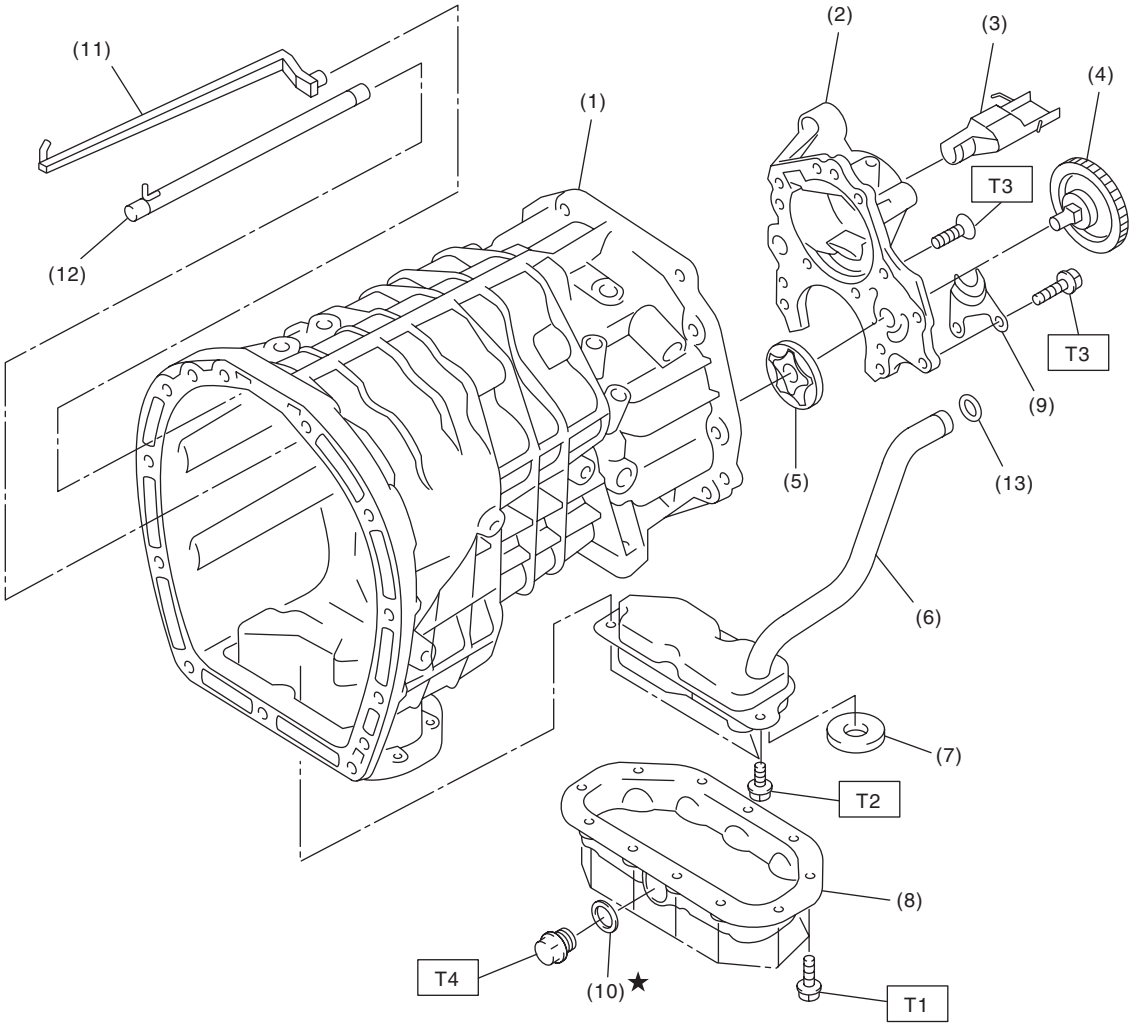
- **Transmission serial No. 144577 or later**



(1)	Pilot bolt	(9)	Relief valve spring	
(2)	Neutral switch	(10)	Relief valve	
(3)	Back-up light switch	(11)	Valve spring	
(4)	Bolt assembly seal	(12)	Ball	
(5)	Adapter plate	(13)	Selector plunger	
(6)	Transmission case	(14)	Spring	
(7)	Oil pipe	(15)	Plug	
(8)	Harness bracket	(16)	Gasket	

Tightening torque:N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.6)
T2: 16 (1.6, 11.8)
T3: 32 (3.3, 23.6)
T4: 34 (3.5, 25.1)
T5: 41 (4.2, 30.2)

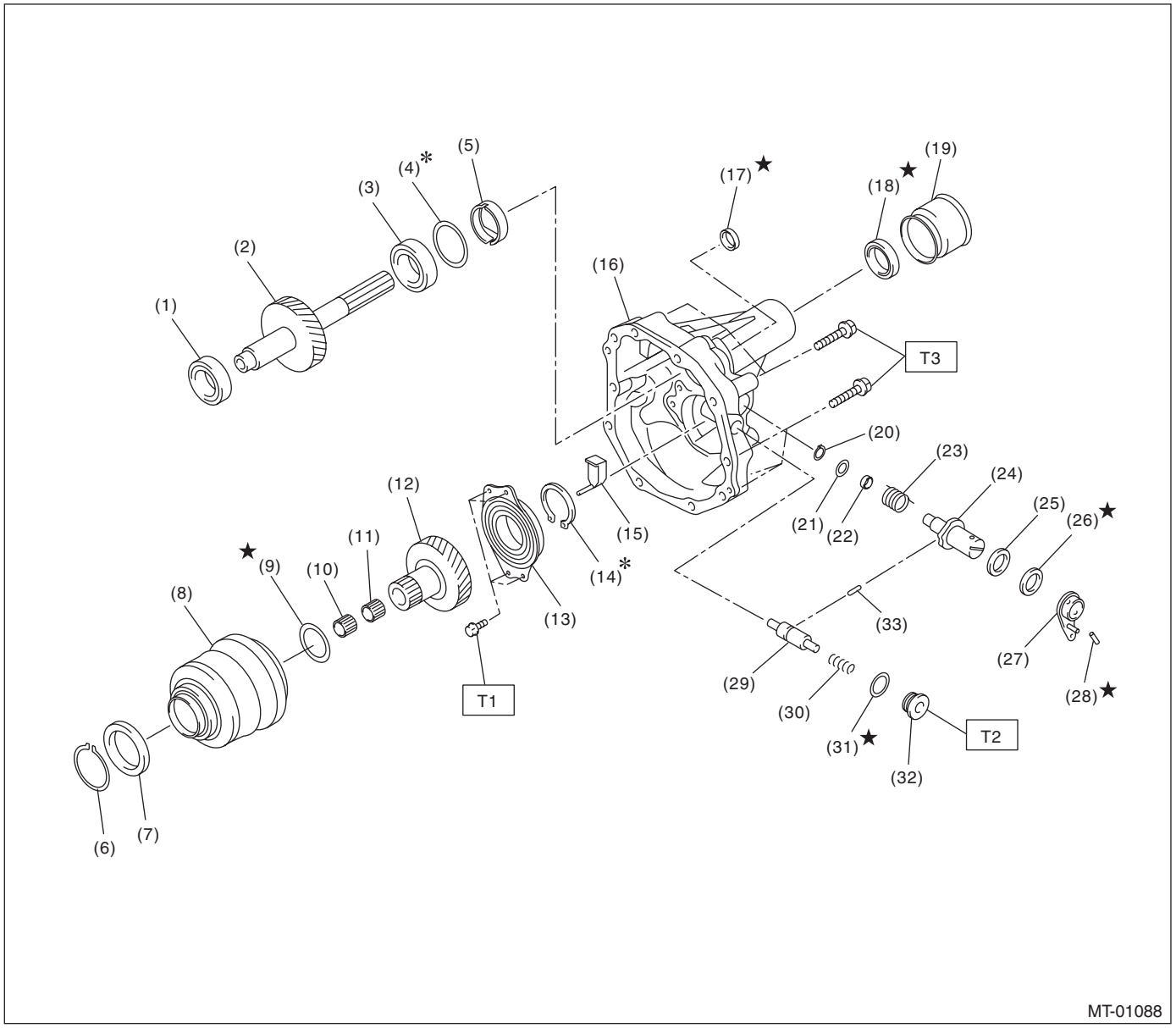
4. OIL PAN & OIL PUMP



(1) Transmission case
(2) Oil pump cover
(3) Oil guide
(4) Oil pump driven gear ASSY
(5) Oil pump rotor ASSY
(6) Strainer ASSY
(7) Magnet
(8) Oil pan
(9) Plate
(10) Gasket
(11) Oil guide
(12) Oil pipe
(13) O-ring

Tightening torque:N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.4)
T3: 25 (2.5, 18.4)
T4: 44 (4.5, 32.5)

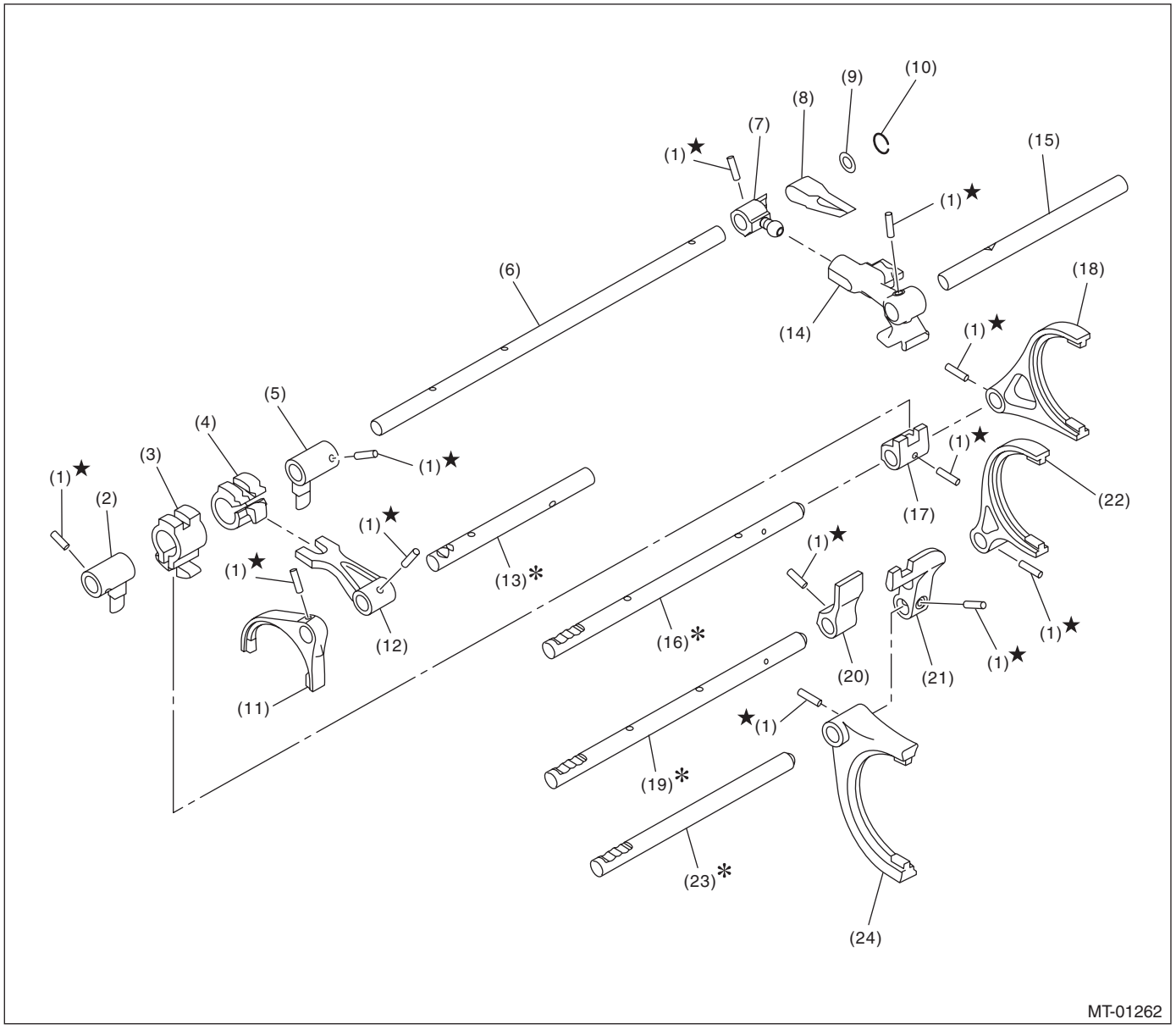
5. EXTENSION CASE AND CENTER DIFFERENTIAL



(1) Taper roller bearing
(2) Transfer driven gear
(3) Taper roller bearing
(4) Shim
(5) Oil plate
(6) Snap ring
(7) Oil pump drive gear
(8) Center differential
(9) Shim
(10) Needle bearing
(11) Needle bearing
(12) Transfer drive gear
(13) Ball bearing (with flange)
(14) Snap ring
(15) Oil guide
(16) Extension case
(17) Oil seal
(18) Oil seal
(19) Dust cover
(20) Snap ring
(21) Washer
(22) Bushing
(23) Spring
(24) Reverse check shaft
(25) Ball bearing
(26) Oil seal
(27) Reverse check lever COMPL
(28) Straight pin
(29) Reverse check plug
(30) Spring
(31) Gasket
(32) Plug
(33) Plunger

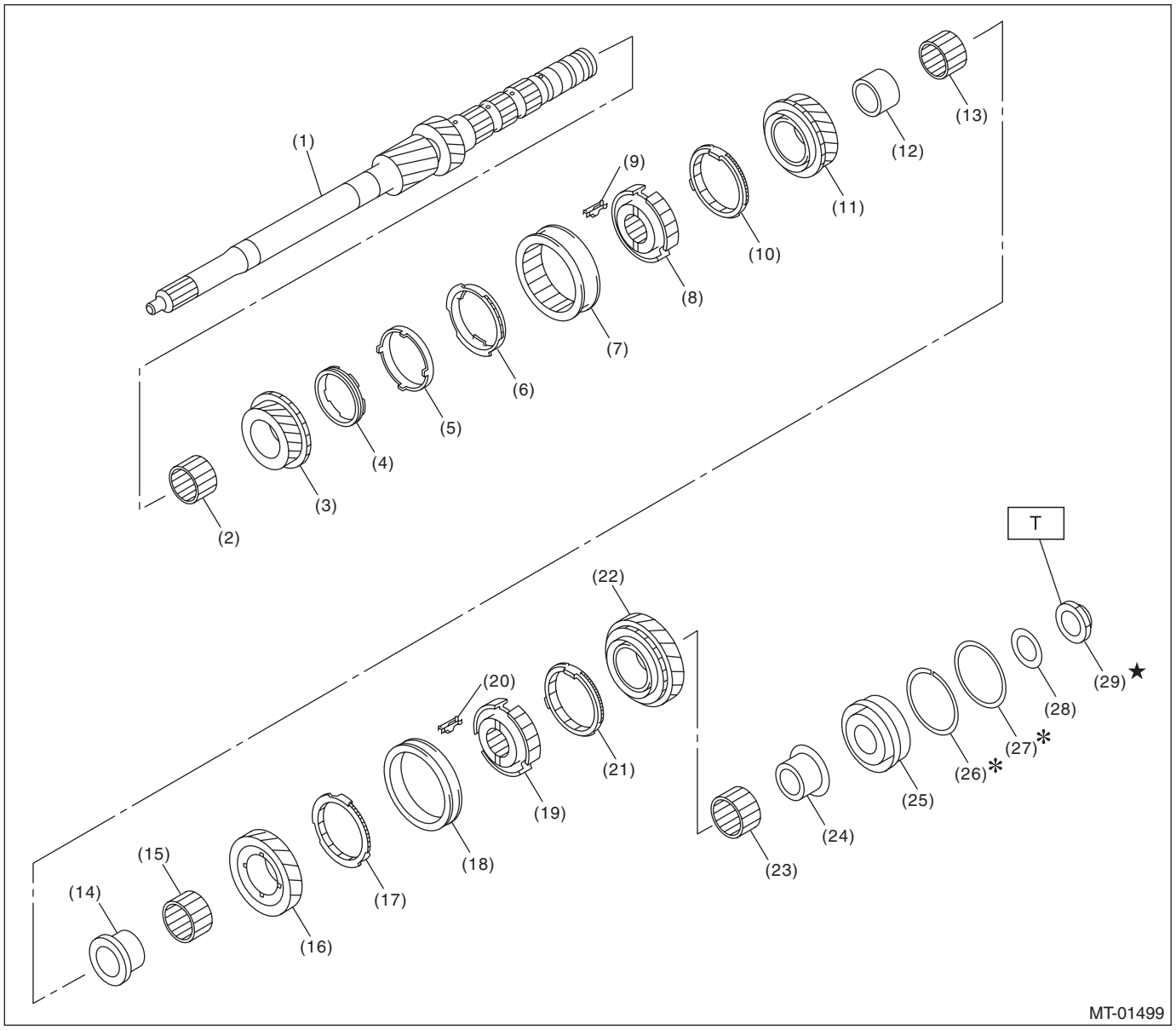
Tightening torque:N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.4)
T2: 41 (4.2, 30.2)
T3: 48 (4.9, 35.4)

6. SHIFTER FORK AND FORK ROD



(1)	Spring pin	(9)	Washer	(17)	5th-6th shifter arm
(2)	Interlock arm	(10)	Snap ring	(18)	5th-6th fork COMPL
(3)	Interlock block	(11)	Reverse fork COMPL	(19)	3rd-4th fork rod
(4)	Reverse interlock block	(12)	Reverse shifter arm	(20)	3rd-4th shifter arm
(5)	Interlock arm	(13)	Reverse fork rod	(21)	1st-2nd shifter arm
(6)	Striking rod	(14)	Selector arm	(22)	3rd-4th fork COMPL
(7)	Selector arm No. 2	(15)	Shifter arm shaft	(23)	1st-2nd fork rod
(8)	Neutral set spring	(16)	5th-6th fork rod	(24)	1st-2nd fork COMPL

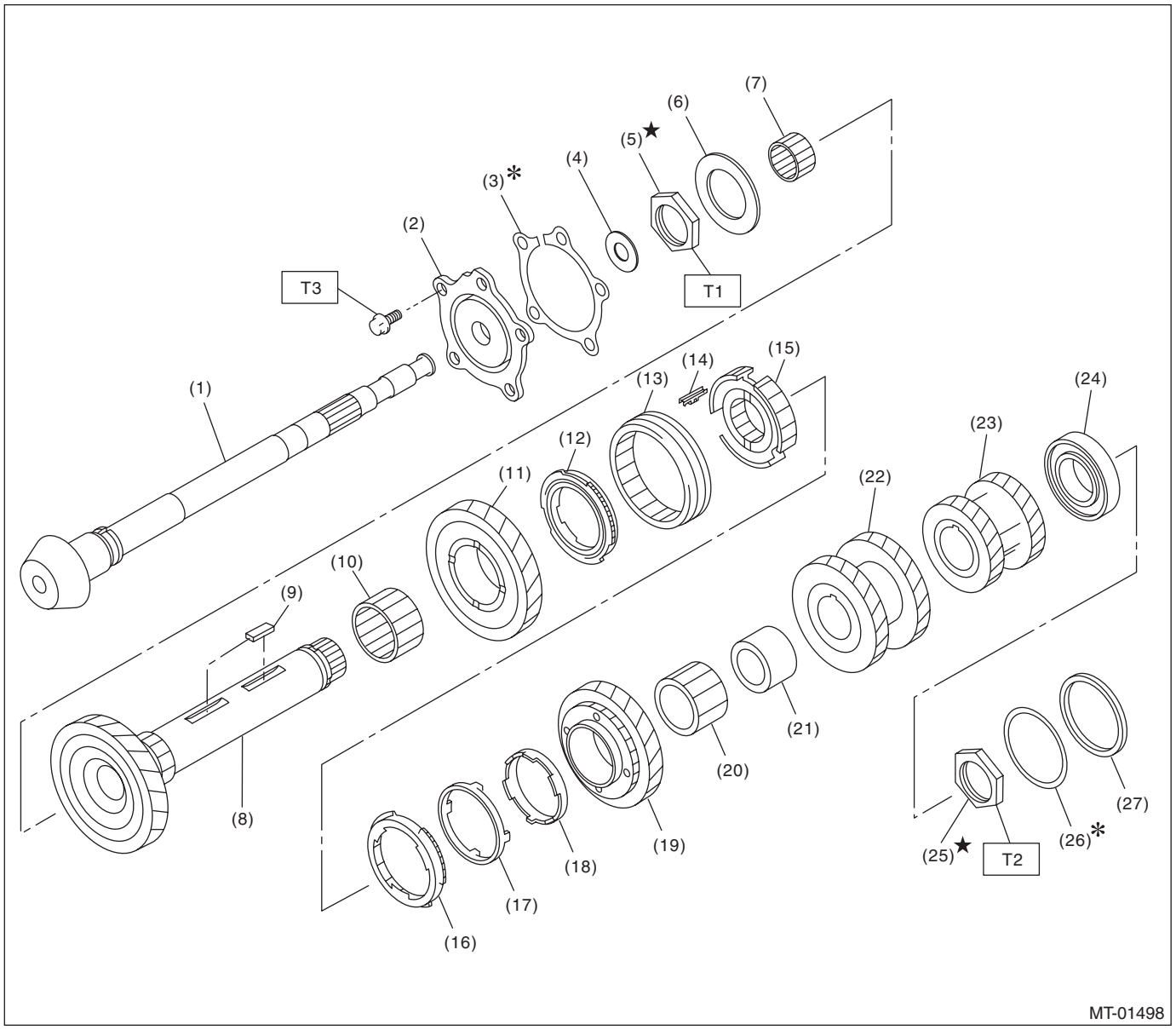
7. MAIN SHAFT ASSEMBLY



(1) Main shaft
(2) Needle bearing
(3) 3rd drive gear
(4) Inner baulk ring
(5) Synchro cone
(6) Outer baulk ring
(7) 3rd-4th sleeve
(8) 3rd-4th hub
(9) Shifting insert key
(10) 4th baulk ring
(11) 4th gear
(12) 4th bushing
(13) Needle bearing
(14) 5th bushing
(15) Needle bearing
(16) 5th drive gear
(17) 5th baulk ring
(18) 5th-6th sleeve
(19) 5th-6th hub
(20) Shifting insert key
(21) 6th baulk ring
(22) 6th drive gear
(23) Needle bearing
(24) 6th bushing
(25) Taper roller bearing
(26) Snap ring
(27) Washer
(28) Washer
(29) Lock nut

Tightening torque:N·m (kgf-m, ft-lb)
T: 392 (40, 289.1)

8. DRIVE PINION AND DRIVE SHAFT ASSEMBLY

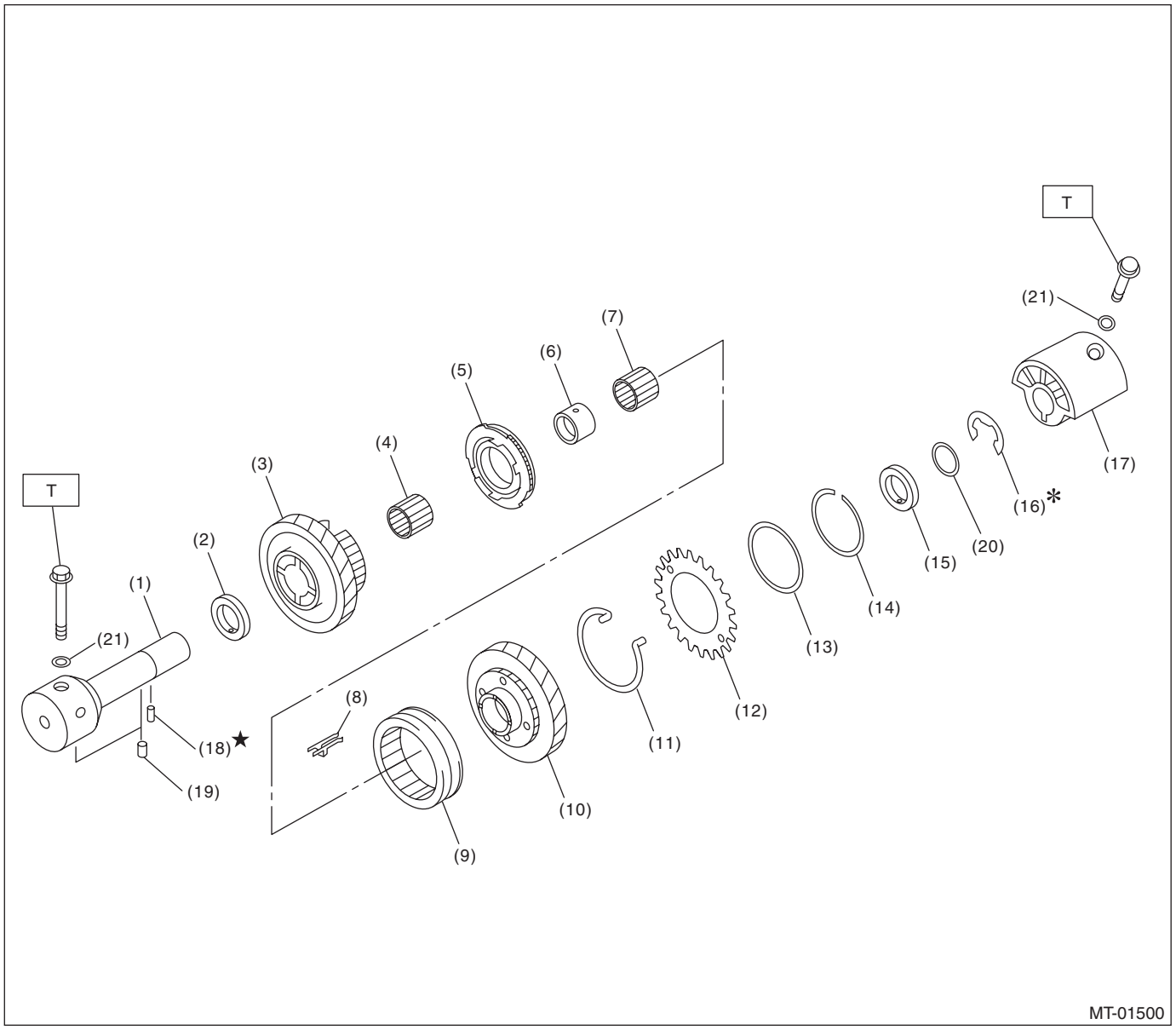


(1) Drive pinion shaft
(2) Taper roller bearing
(3) Shim
(4) Washer
(5) Lock nut
(6) Thrust bearing
(7) Needle bearing
(8) Driven shaft
(9) Key
(10) Needle bearing
(11) 1st driven gear
(12) 1st synchro ring ASSY
(13) 1st-2nd sleeve
(14) Shifting insert key
(15) 1st-2nd hub
(16) Outer baulk ring
(17) Synchro cone
(18) Inner baulk ring
(19) 2nd driven gear
(20) Needle bearing
(21) 2nd bushing
(22) 3rd-4th driven gear
(23) 5th-6th driven gear
(24) Ball bearing
(25) Lock nut
(26) Shim
(27) Collar

Tightening torque:N·m (kgf-m, ft-lb)
T1: 285 (29.1, 210)
**** 265 (27.0, 195)***
T2: 570 (58.1, 420)
**** 530 (54.0, 391)***
T3: 54 (5.5, 40)

* Tightening torque when using the ST

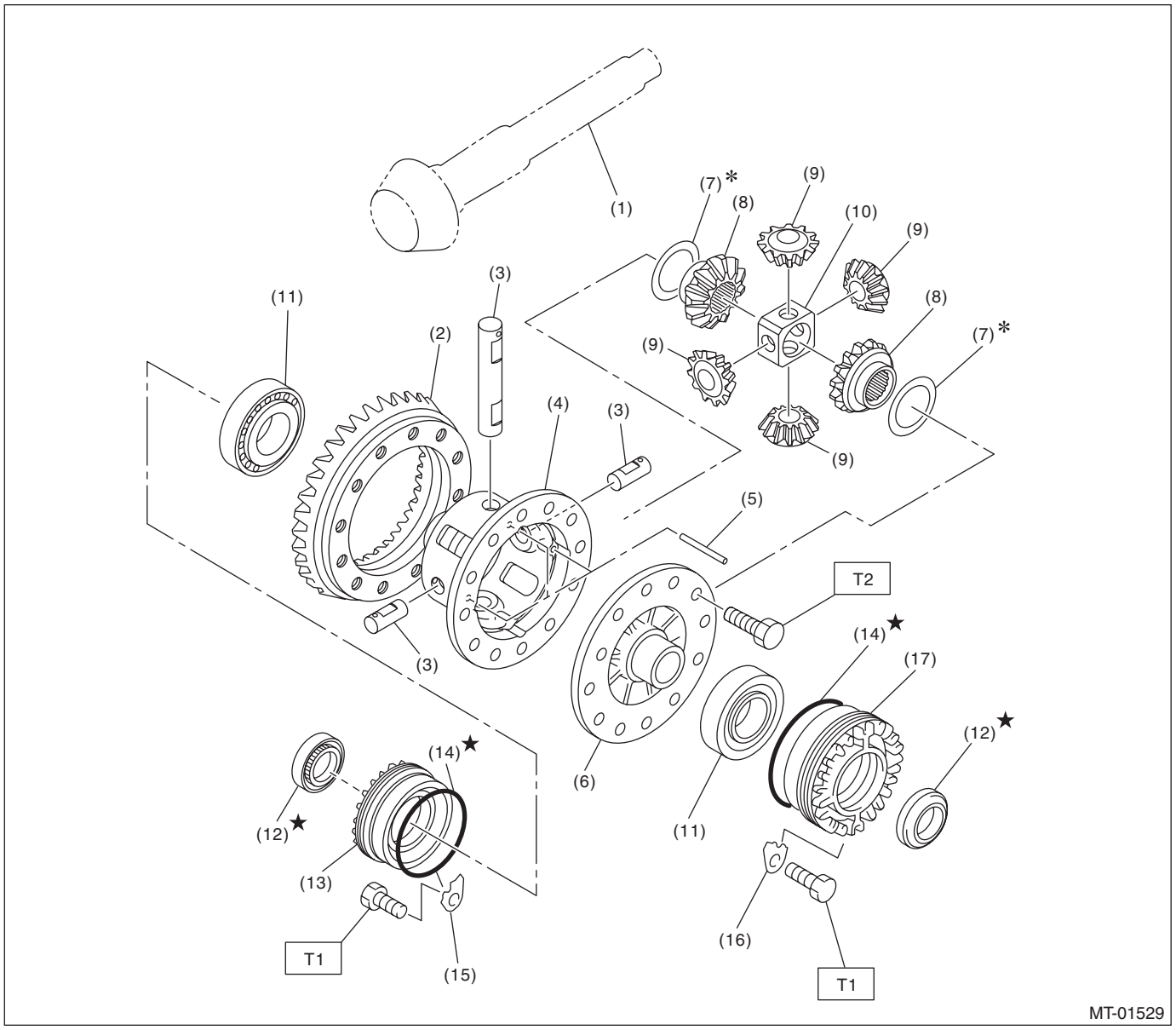
9. REVERSE IDLER GEAR ASSEMBLY



(1) Base COMPL
(2) Counter high and low washer
(3) Reverse idler gear No. 2
(4) Needle bearing
(5) Reverse idler synchro set
(6) Reverse idler gear bushing
(7) Needle bearing
(8) Shifting insert key
(9) Reverse coupling sleeve
(10) Reverse idler gear
(11) Spring
(12) Sub gear
(13) Friction plate
(14) Snap ring
(15) Counter high and low washer
(16) Snap ring
(17) Reverse idler holder
(18) Spring pin
(19) Knock pin
(20) Washer
(21) Gasket

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

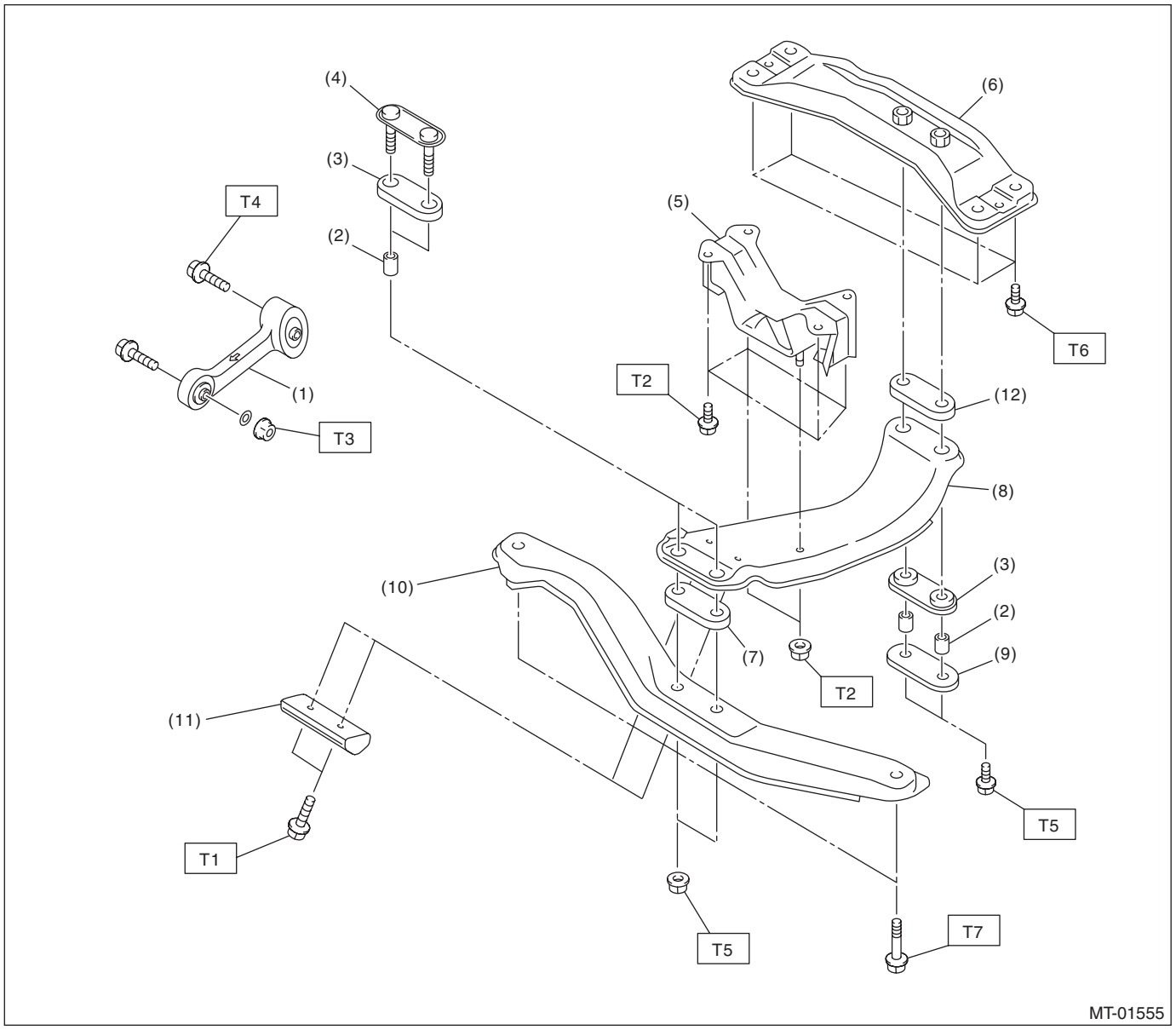
10.FRONT DIFFERENTIAL



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

Tightening torque:N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.4)
T2: 69 (7.0, 50.9)

11.TRANSMISSION MOUNTING



(1)	Pitching stopper	(7)	Upper cushion rubber
(2)	Spacer	(8)	Center crossmember
(3)	Lower cushion rubber	(9)	Rear plate
(4)	Front plate	(10)	Front crossmember
(5)	Transmission cushion rubber	(11)	Dynamic damper
(6)	Rear crossmember	(12)	Rear cushion rubber

Tightening torque:N·m (kgf-m, ft-lb)
T1: 7.5 (0.8, 5.5)
T2: 35 (3.6, 25.8)
T3: 50 (5.1, 36.9)
T4: 58 (5.9, 42.8)
T5: 70 (7.1, 51.6)
T6: 75 (7.5, 55.3)
T7: 140 (14.3, 103)

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, disassemble by using a plastic hammer. Do not pry apart with screwdrivers or other tools.
• Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
• Use SUBARU genuine gear oil, grease or the 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 parts.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plates, 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

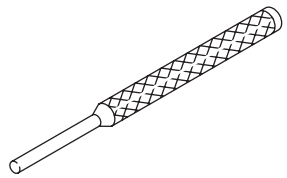
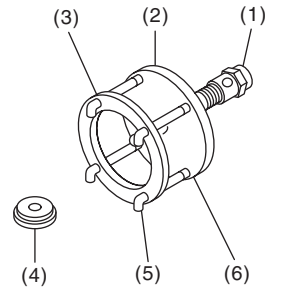
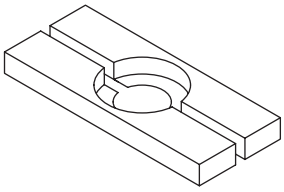
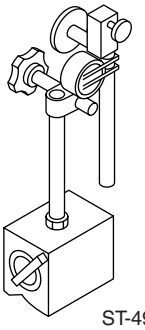
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398791700	398791700	REMOVER	Used for removing and installing the spring pin (6 mm).
 ST-399527700	399527700	PULLER SET	Used for removing and installing the roller bearing (Differential). 1. BOLT (899521412) 2. PULLER (399527702) 3. HOLDER (399527703) 4. ADAPTER (398497701) 5. BOLT (899520107) 6. NUT (021008000)
 ST-498515700	498515700	REMOVER	Used for removing the roller bearing of the drive pinion shaft.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between the side gear, pinion, and hypoid gear. • Used together with the DIAL GAUGE (498247100).

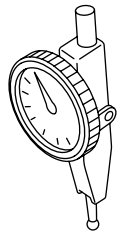
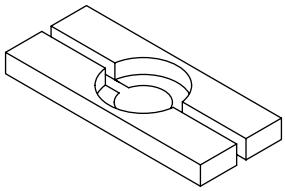
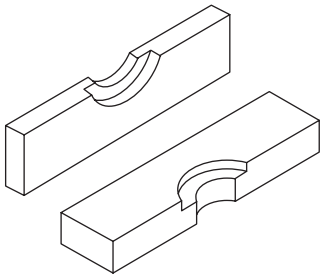
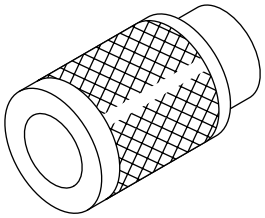
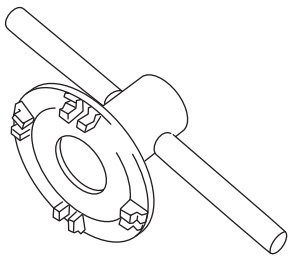
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between the side gear, pinion, and hypoid gear. • Used together with the MAGNET BASE (498247001).
 ST-498077000	498077000	REMOVER	Used for removing the differential taper roller bearing.
 ST-899858600	899858600	REMOVER	Used for removing the roller bearing.
 ST-499757002	499757002	INSTALLER	Used for installing the bearing cone of the transfer driven gear (extension core side).
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	• Used for removing and installing the differential side retainer RH. • WRENCH ASSEMBLY (499787000) can also be used.

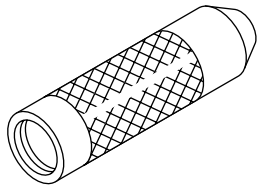
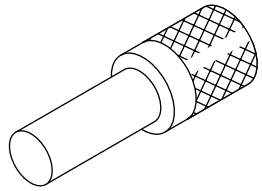
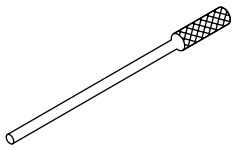
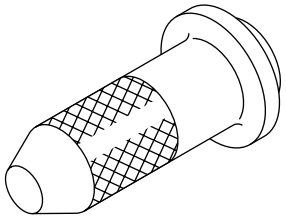
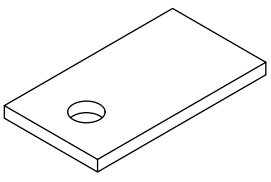
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499877000	499877000	RACE 4-5 INSTALLER	Used for disassembling the driven shaft and transfer driven gear.
 ST-899864100	899864100	REMOVER	Used for removing the transmission main shaft and drive pinion parts.
 ST-899904100	899904100	REMOVER	Used for removing and installing the straight pin.
 ST-498057300	498057300	INSTALLER	Used for installing the extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.

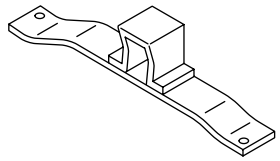
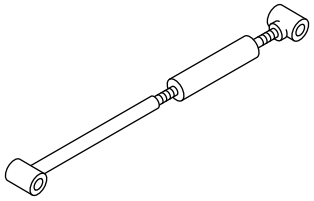
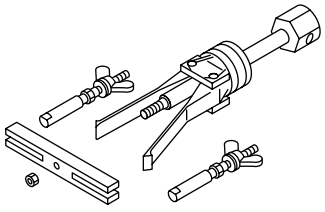
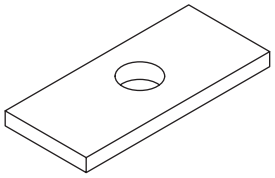
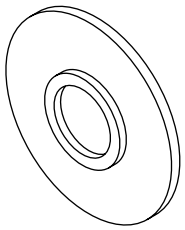
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 ST-398527700	398527700	PULLER ASSY	Used for removing the extension case oil seal and clutch housing oil seal.
 ST-499575500	499575500	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
 ST-398177700	398177700	INSTALLER	Used for assembling the main shaft.

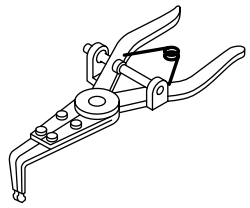
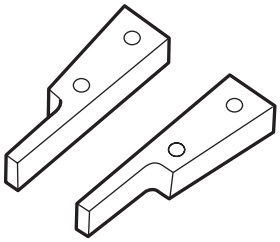
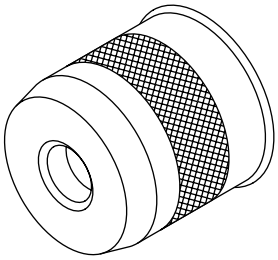
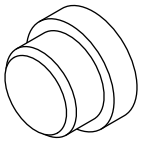
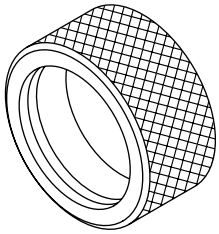
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399893600	399893600	PLIER	• Used for removing and installing the neutral set spring. • Used together with the CLAW (18756AA000).
 ST18756AA000	18756AA000	CLAW	• Used for removing and installing the neutral set spring. • Used together with the PLIER (399893600).
 ST-499247400	499247400	INSTALLER	Used for installing the ball bearing of the transfer drive gear.
 ST-398497701	398497701	SEATS	Used for installing the ball bearing of the transfer drive gear.
 ST-398437700	398437700	INSTALLER	Used for installing the front differential side bearing.

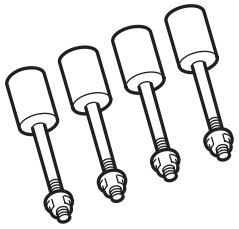
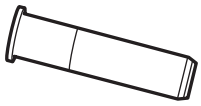
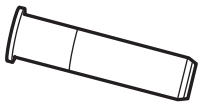
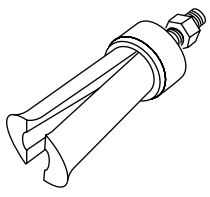
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18632AA000	18632AA000	STAND ASSY	Used for disassembling and assembling the transmission.
 ST18671AA000	18671AA000	OIL SEAL GUIDE	• Used for installing the oil seal to the reverse check. • Used together with the INSTALLER (18657AA010).
 ST18657AA010	18657AA010	INSTALLER	• Used for installing the oil seal to the reverse check. • Used together with the OILSEAL GUIDE (18671AA000).
 ST18657AA000	18657AA000	INSTALLER	Used for installing the oil seal to the shift rod.
 ST18758AA000	18758AA000	PULLER	Used for removing the extension taper roller bearing outer race.

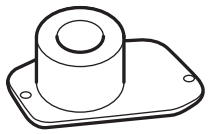
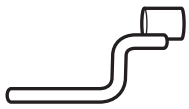
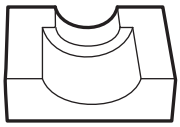
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18831AA000	18831AA000	GAUGE	Used for measuring the extension taper roller bearing.
 ST18631AA000	18631AA000	HANDLE	Used for measuring the front differential back-lash.
 ST18754AA000	18754AA000	REMOVER	Used to remove parts of the driven gear.
 ST18757AA000	18757AA000	STRAIGHT PIN REMOVER	Used for installing the reverse idler gear.
 ST18665AA000	18665AA000	HOLDER	• Used for removing and installing the main shaft lock nut. • Used together with the BASE (18664AA000).

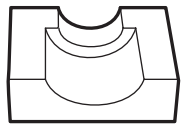
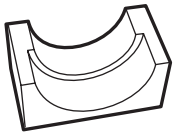
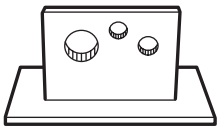
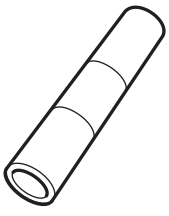
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18666AA000	18666AA000	HOLDER	• Used for removing and installing the driven shaft lock nut. • Used together with the BASE (18664AA000).
 ST18667AA000	18667AA000	HOLDER	• Used for removing and installing the drive pinion shaft lock nut. • Used together with the BASE (18664AA000).
 ST18664AA000	18664AA000	BASE	• Used for removing and installing the main shaft lock nut. • Used for removing and installing the drive pinion shaft lock nut. • Used for removing and installing the driven shaft lock nut.
 ST18722AA010	18722AA010	REMOVER	Used for disassembling the main shaft.
 ST18651AA000	18651AA000	INSTALLER	Used for assembling the main shaft.

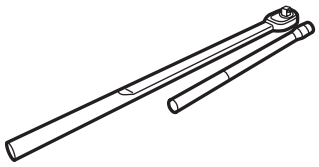
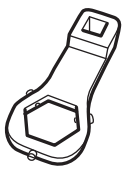
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18852AA000	18852AA000	TORQUE WRENCH	• Used to tighen the main shaft lock nut. • Used to tighen the drive pinion shaft lock nut. • Used to tighen the driven shaft lock nut.
 ST18668AA000	18668AA000	PUNCH	Used to crimp the main shaft lock nut.
 ST18669AA000	18669AA000	PUNCH	Used to crimp the driven shaft lock nut.
 ST18670AA000	18670AA000	PUNCH	Used to crimp the drive pinion shaft lock nut.
 ST18620AA000	18620AA000	ADAPTER WRENCH	Used for removing and installing the driven gear shaft lock nut.

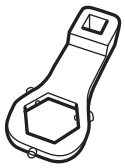
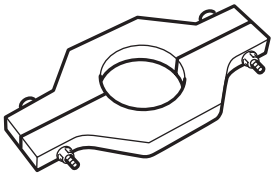
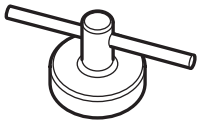
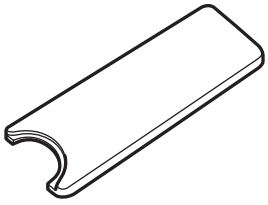
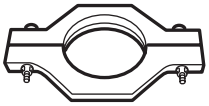
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18621AA000	18621AA000	ADAPTER WRENCH	Used for removing and installing the drive pinion shaft lock nut.
 ST18723AA000	18723AA000	REMOVER	Used for disassembling the driven shaft.
 ST18630AA000	18630AA000	WRENCH ASSY	Used for removing and installing the differential side retainer LH.
 ST18672AA000	18672AA000	GUIDE CLIP	Used for installing the reverse idler snap ring.
 ST18720AA000	18720AA000	REMOVER	Used for disassembling the main shaft.

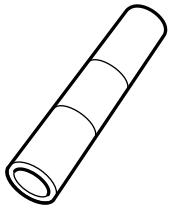
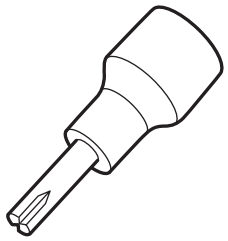
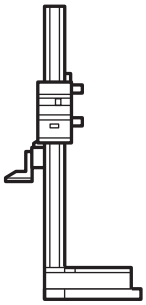
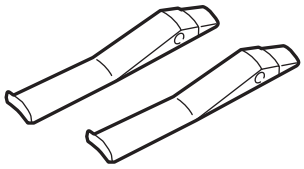
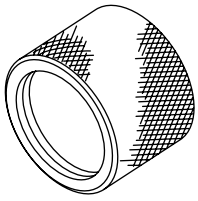
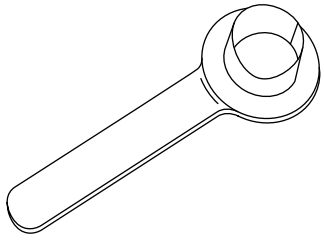
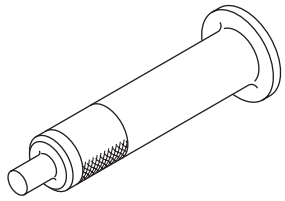
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18654AA000	18654AA000	INSTALLER	Used for assembling the driven shaft.
 ST18663AA000	18663AA000	SOCKET	Used for removing and installing the oil pump cover.
 ST18853AA000	18853AA000	HEIGHT GAUGE	Used for selecting the shift rod.
 ST18760AA000	18760AA000	CLAW	• Used for removing the front side retainer bearing outer race. • Used together with the PULLER ASSY (398527700).
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
 ST18657AA020	18657AA020	OIL SEAL INSTALLER	Used for installing the oil seal.

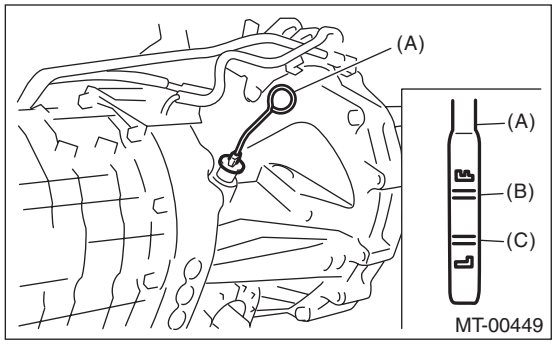
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Depth gauge	Used for measuring the transmission end play.

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 at the lower level or less, 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

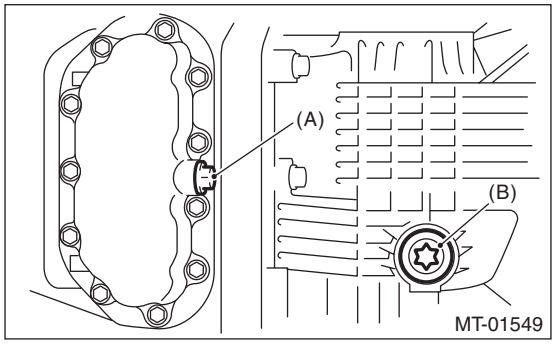
B: REPLACEMENT

1) Pull out the oil level gauge.
2) Lift the vehicle.
3) Drain transmission gear oil completely.

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

NOTE:
• Tighten the drain plug of the transmission gear oil after draining the transmission gear oil.
• Use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

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

Recommended gear oil:
GL-5 (75W-90) or equivalent

Gear oil capacity:
4.1 ℓ (4.3 US qt, 3.6 Imp qt)
6) Check the level of the transmission gear oil.

NOTE:
• When inserting the level gauge into the transmission gear, align the protrusion on the top of the level gauge with the notch in the gauge hole.
• The gear oil level is to be between the range marked on the level gauge.

3. Oil Seal

A: INSPECTION

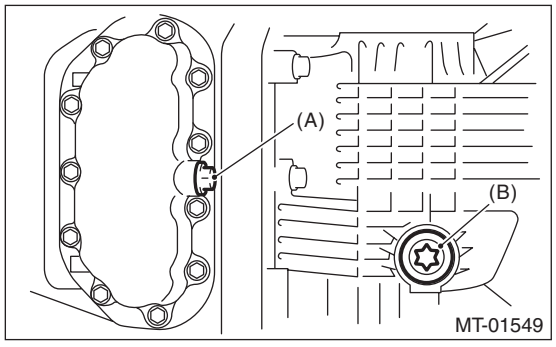
Check for leakage of gear oil from the oil seal. If there is any deformation, hardening, wear or other problems of the oil seal, perform the following:
- Replace the oil seal.
- Inspect the propeller shaft.

B: REPLACEMENT

1) Clean the transmission exterior.
2) Drain gear oil completely.

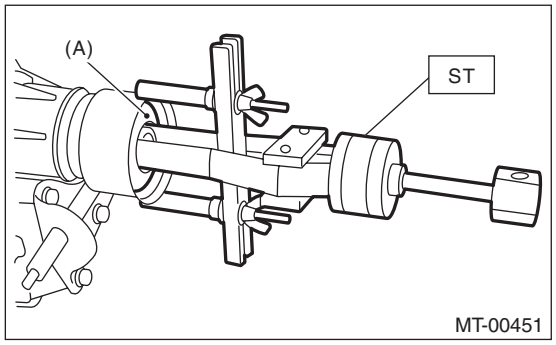
NOTE:
- Tighten the drain plug after draining the gear oil.
- Use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)



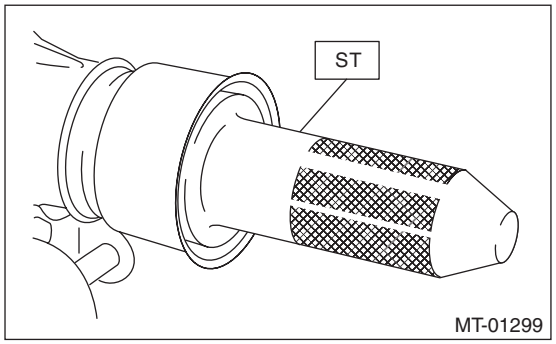
(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

3) Remove the rear exhaust pipe and muffler.
4) Remove the heat shield cover. (If equipped)
5) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
6) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

7) Using the ST, install the oil seal.
ST 498057300 INSTALLER



8) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
9) Install the heat shield cover. (If equipped)
10) Install the rear exhaust pipe and muffler.
11) Fill the gear oil and check the oil level. <Ref. to 6MT-28, REPLACEMENT, Transmission Gear Oil.>

4. Differential Side Retainer Oil Seal

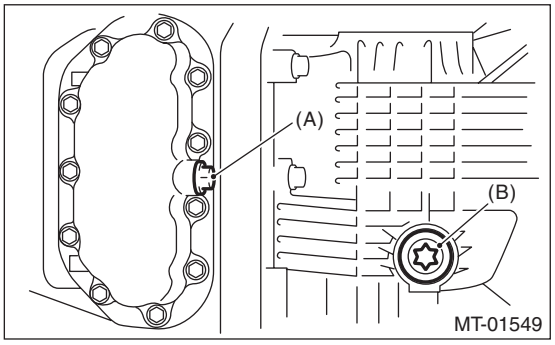
A: INSPECTION

Check that there is no oil leaking from the differential side retainer oil seal. If there is oil leakage, perform the following procedures.
- Replace the oil seal.
- Check the front drive shaft.

B: REPLACEMENT

1) Lift the vehicle.
2) Remove the front exhaust pipe and center exhaust pipe. <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.>
3) Drain the gear oil from the drain plug.

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 causing fires. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.



(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

4) Tighten the drain plug.

NOTE:
Use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)

5) Separate the front drive shaft from the transmission. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
6) Remove the differential side retainer oil seal by using a flat tip screwdriver or similar tools.
7) Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER
8) Apply gear oil to the oil seal lips.
9) Set the ST to the side retainer.
ST 28399SA010 OIL SEAL PROTECTOR
10) Install the front drive shaft into the transmission.

NOTE:
Replace the circlip of drive shaft with a new part.
11) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.
ST 28399SA010 OIL SEAL PROTECTOR
12) Install the front exhaust pipe and the center exhaust pipe. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>
13) Lower the vehicle.
14) Pour gear oil through the oil level gauge hole.

Recommended gear oil:
GL-5 (75W-90) or equivalent

Gear oil capacity:
4.1 ℓ (4.3 US qt, 3.6 Imp qt)

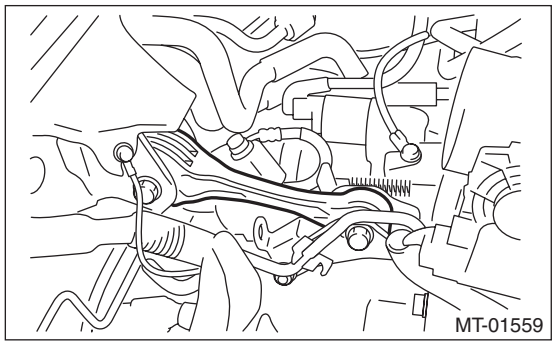
15) Check the level of the gear oil. <Ref. to 6MT-28, INSPECTION, Transmission Gear Oil.>

5. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the pitching stopper.

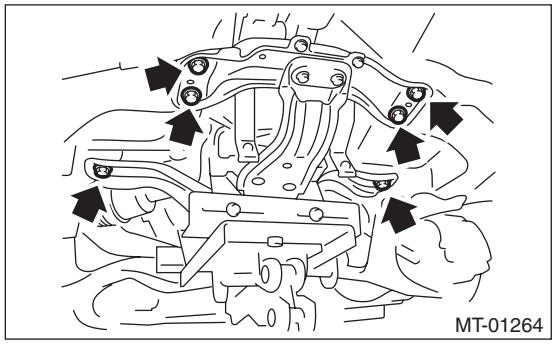


2. CROSSMEMBER AND CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Lift the vehicle.
3) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
4) Remove the rear exhaust pipe and muffler.
5) Remove the heat shield cover. (If equipped)
6) Set the transmission jack under the transmission body.

CAUTION:
Always support the transmission case with a transmission jack.

7) Remove the rear crossmember.



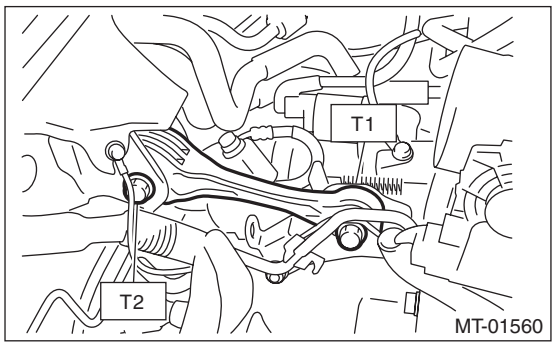
8) Remove the transmission cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

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



2) Install the intercooler.
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Connect the battery ground cable to the battery.

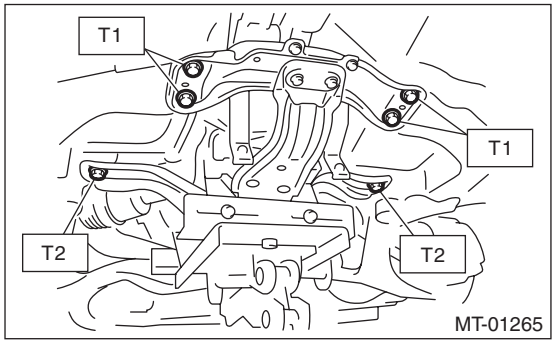
2. CROSSMEMBER AND CUSHION RUBBER

1) Install the transmission cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

2) Install the cross member.

Tightening torque:
T1: 75 N·m (7.6 kgf-m, 55.3 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
6) Install the rear exhaust pipe and muffler.

C: INSPECTION

Perform the following inspection procedures and repair or replace faulty parts.

1. PITCHING STOPPER

Check the pitching stopper for bends or damage. Check that the rubber is not stiff, cracked or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

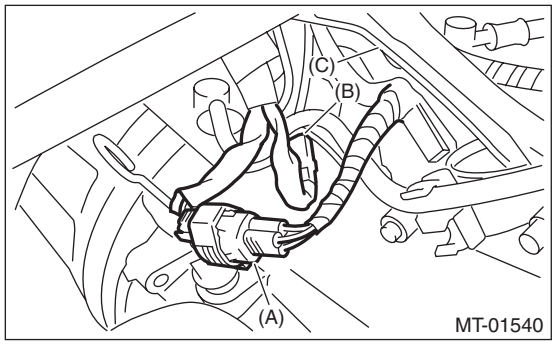
Check crossmember for bends or damage. Check that the cushion rubber is not stiff, cracked, or otherwise damaged.

6. Manual Transmission Assembly

A: REMOVAL

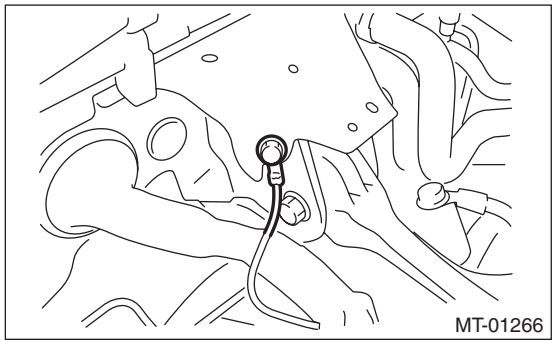
1) Set the vehicle on a lift. Open the front hood, and support it with the stay.

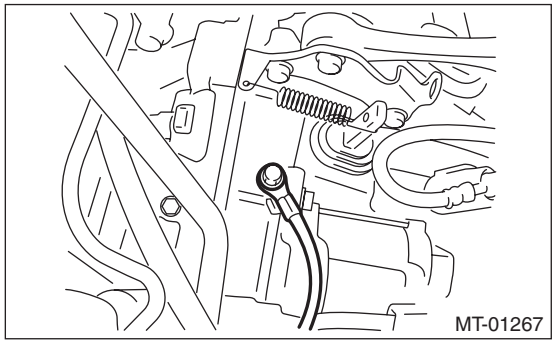
NOTE:
Set the hood stay into the specified hole.
2) Disconnect the ground cable from battery.
3) Remove the collector cover.
4) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the front wheels.
6) Disconnect the following harness connectors, and then remove the engine hanger rear.



(A) Neutral position switch backup light switch connector
(B) Rear oxygen sensor connector
(C) Pitching stopper

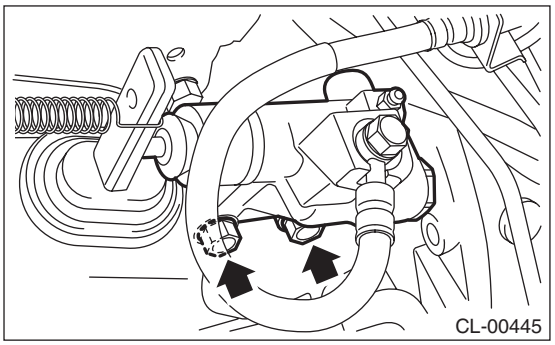
7) Disconnect the ground cable on the upper side of the transmission case and body.



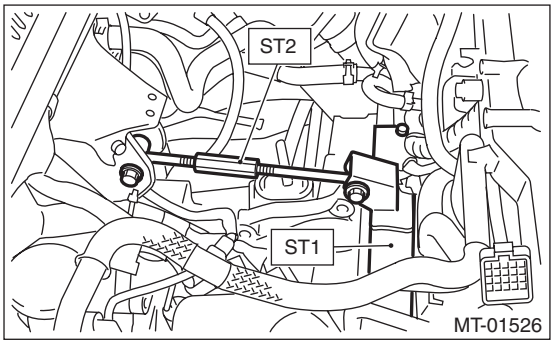


8) Remove the starter assembly. <Ref. to SC(H4SO)-6, REMOVAL, Starter.>
9) Remove the operating cylinder from the transmission.

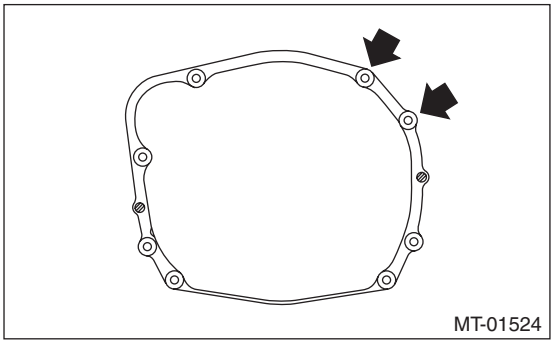
NOTE:
Hang the removed operating cylinder with a piece of wire.



10) Remove the pitching stopper and pitching stopper bracket.
11) Set the ST.
ST1 41099AA010 ENGINE SUPPORT BRACKET
ST2 41099AA020 ENGINE SUPPORT

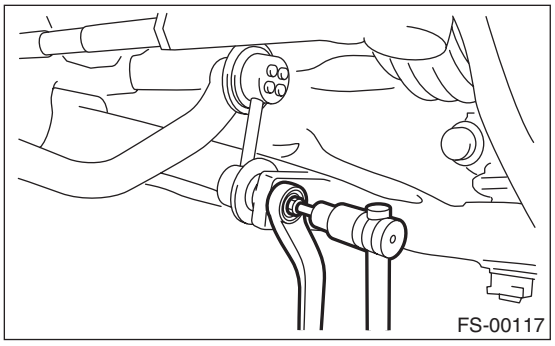


12) Remove the clutch release shaft.
(1) Remove the plug using a hexagon wrench.
(2) Attach a 6 mm (0.24 in) bolt to the release shaft, and pull out the release shaft.
(3) Lift the release fork, and remove from the claw of the release bearing. Pull the release fork to the engine side, and make it so that it moves freely.
13) Remove the bolts which hold upper side of transmission to engine.

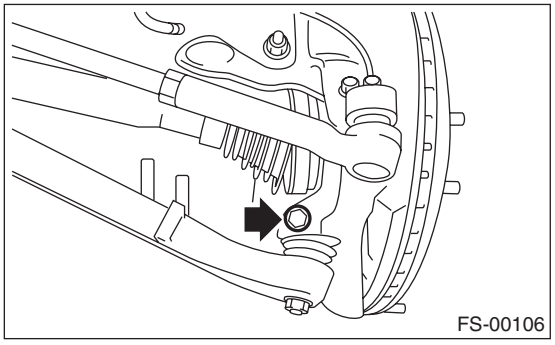


14) Lift the vehicle.
15) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
16) Remove the rear exhaust pipe and muffler.

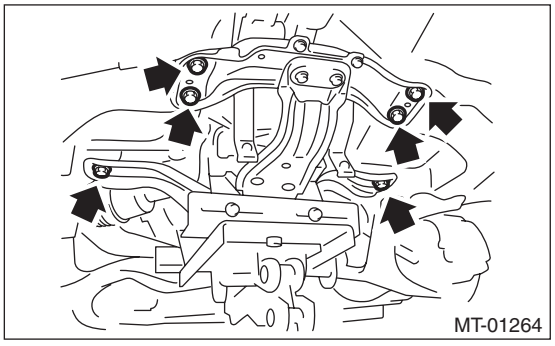
CAUTION:
When removing the exhaust pipes, be careful each exhaust pipe does not drop out.
17) Remove the heat shield cover. (If equipped)
18) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
19) Remove the front stabilizer link.


FS-00117

20) Remove the ball joint of front arm from the housing.

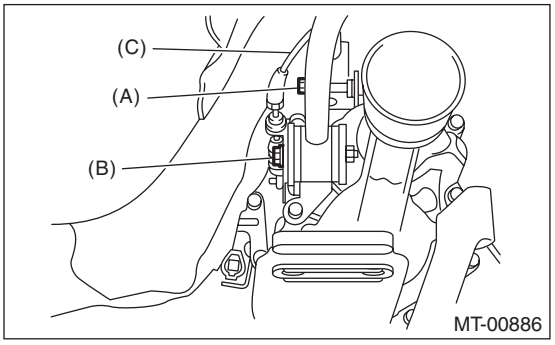

FS-00106

21) Remove the front drive shaft. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
22) Set the transmission jack under the transmission, and remove the front crossmember and rear crossmember.


MT-01264

23) Move the transmission to the right side of the vehicle, and remove the joint COMPL, stay bolts and reverse check cable.

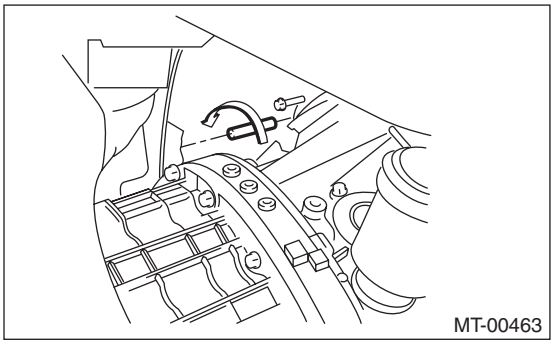
NOTE:
If the transmission is not moved aside, the joint COMPL and stay bolts may contact the body and cause damage.



MT-00886

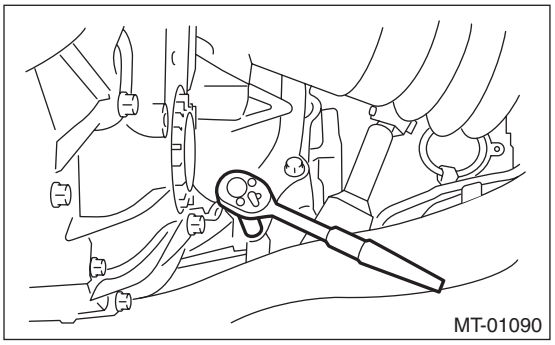
(A) Joint COMPL bolt
(B) Stay bolt
(C) Reverse check cable

24) Tighten the turnbuckle of the ST to tilt the engine assembly towards the back.


MT-00463

25) Remove the bolts holding the bottom of transmission to the engine, and remove the transmission from the vehicle.

NOTE:
• During removal, be careful not to hit the transmission against the body when pulling towards the rear.
• The clutch pipe and breather pipe may interfere with each other. Remove carefully.

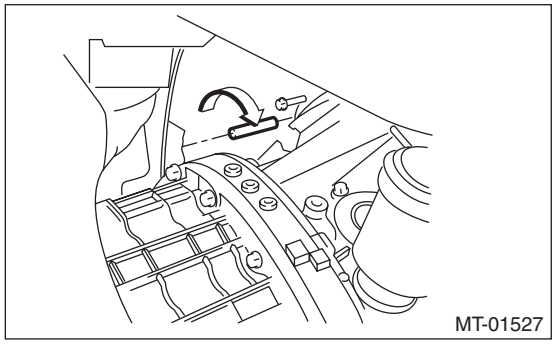

MT-01090

B: INSTALLATION

1) Set the release fork, release bearing and release shaft to the transmission. <Ref. to CL-18, INSTALLATION, Release Bearing and Lever.>
2) Replace the front differential side retainer oil seal.
(1) Remove the oil seal by using flat tip screwdriver etc.
(2) Apply gear oil to the lip of new oil seals.
(3) Install a new oil seal using ST.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

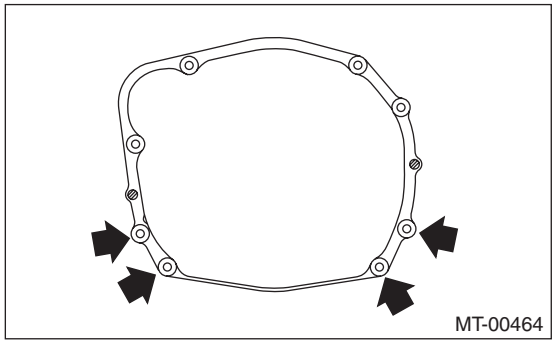
NOTE:
Be sure to replace the differential side oil seal after the procedure of removing front drive shaft from transmission.
3) Loosen the turnbuckle of ST to return the engine to its original position.


MT-01527

4) Install the transmission.
5) Tighten the bolts and nuts which hold the lower side of transmission to the engine.

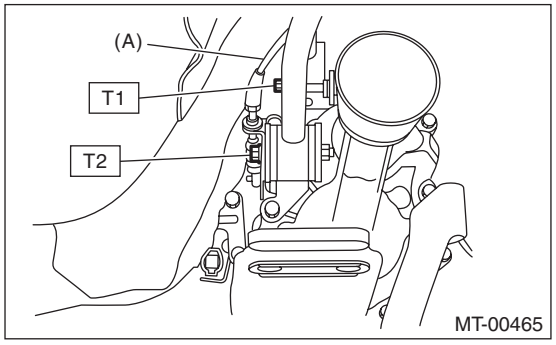
NOTE:
• Make sure that the main shaft spline is completely inserted.
• Make sure that the rear end of the engine is set low.

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


MT-00464

6) Move the transmission to the right side of the vehicle, and attach the joint COMPL, stay bolts and reverse check cable.

Tightening torque:
T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)
T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)

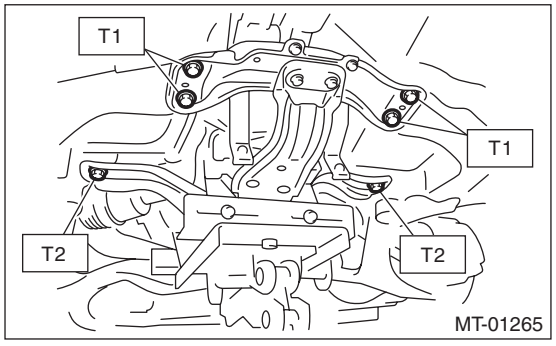


MT-00465

(A) Reverse check cable

7) Install the front crossmember and rear crossmember.

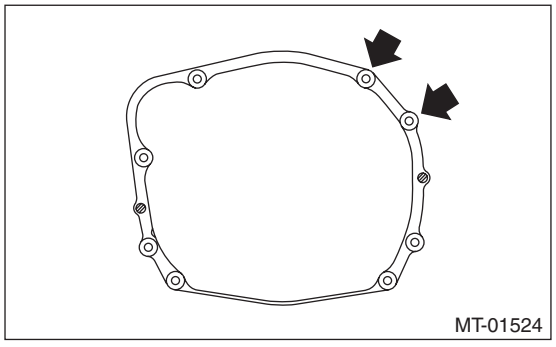
Tightening torque:
T1: 75 N·m (7.6 kgf-m, 55.3 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



MT-01265

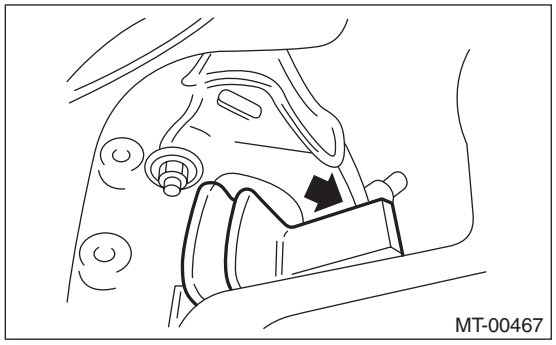
8) Tighten the bolts which hold the upper side of the transmission to the engine.

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


MT-01524

9) Make sure that the release bearing is completely inserted.

NOTE:
• Push the release fork towards the operating cylinder side until a clicking sound is heard. Pull the release fork towards the engine side. If the release fork is not in contact with the case, the setting is complete.
• Confirm that the boot cover is set securely.

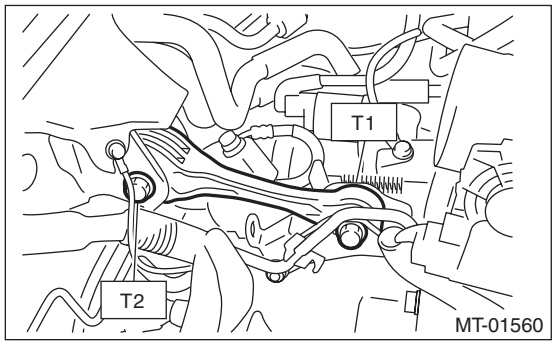


10) Install the pitching stopper bracket.

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

11) Install the pitching stopper.

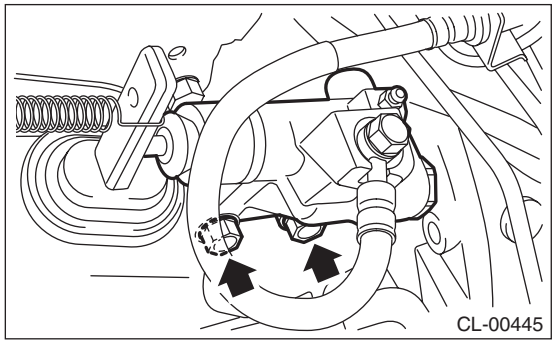
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



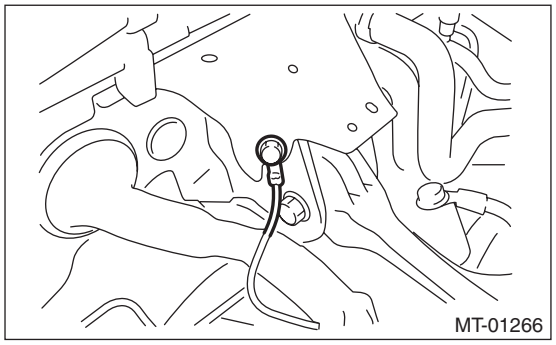
12) Install the clutch operating cylinder.

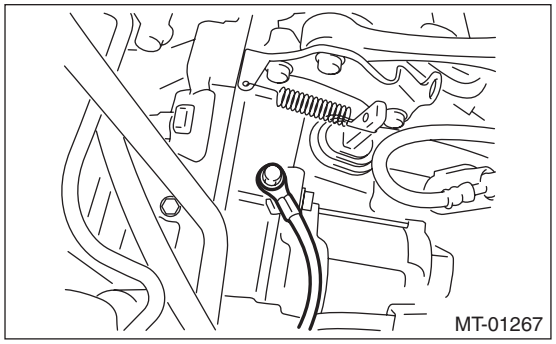
Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

NOTE:
Check that the clutch hose is routed properly.

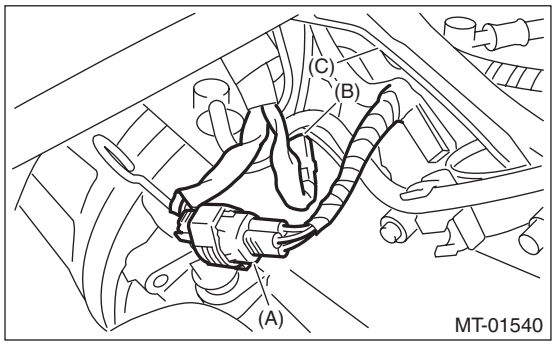


13) Install the starter assembly. <Ref. to SC(H4SO)-6, INSTALLATION, Starter.>
14) Attach the ground cable to the transmission and body.





15) Connect the following harness connectors, then attach the engine hanger rear.



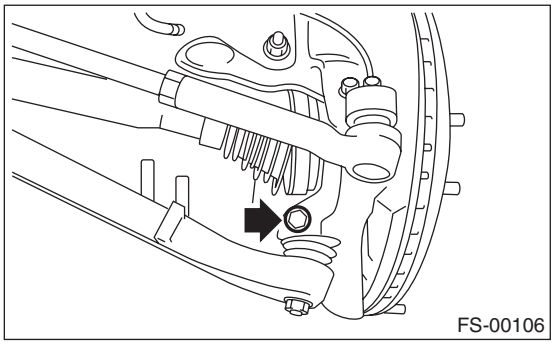
(A) Neutral position switch backup light switch connector
(B) Rear oxygen sensor connector
(C) Pitching stopper

16) Set the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR
17) Install the front drive shaft into the transmission.

NOTE:
Replace the circlip of drive shaft with a new part.
18) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.
ST 28399SA010 OIL SEAL PROTECTOR

19) Install the ball joint of the front arm.

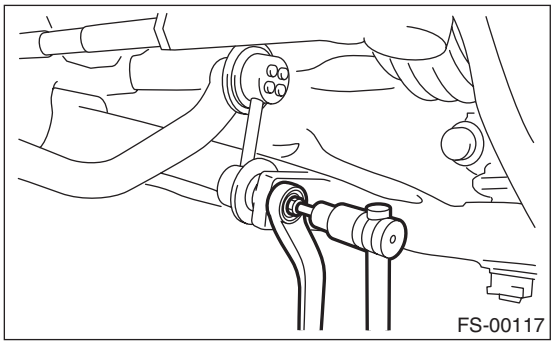
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



20) Install the front stabilizer link.

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

NOTE:
Use a new self-locking nut.

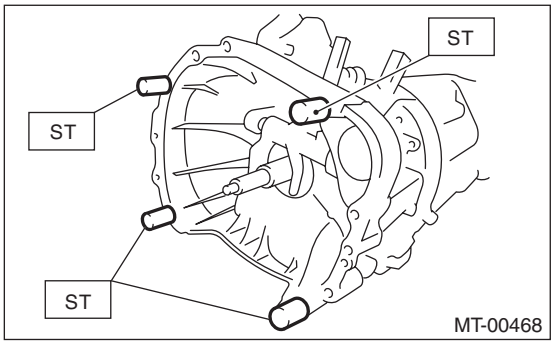


21) Install the heat shield cover. (If equipped)
22) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
23) Install the rear exhaust pipe and muffler.
24) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
25) Fill the transmission gear oil.
<Ref. to 6MT-28, REPLACEMENT, Transmission Gear Oil.>
26) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
27) Install the collector cover.
28) Connect the battery ground cable to the battery.

7. Preparation for Overhaul

A: PROCEDURE

1) Clean oil, grease, dirt and dust from the transmission.
2) Attach the transmission to the ST.
ST 18632AA000 STAND ASSY

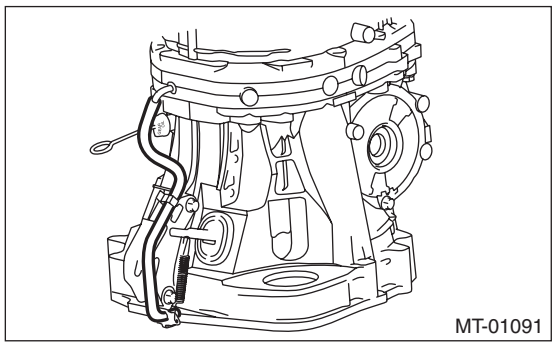


3) Apply oil to rotating parts before assembly.
4) When reusing disassembled parts, reinstall in the original positions and directions.
5) Gaskets, lock washers and lock nuts must be replaced with new parts.
6) Apply liquid gasket to the specified areas to prevent leakage.

8. Air Breather Hose

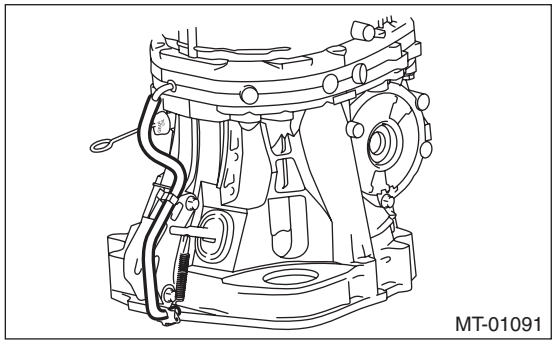
A: REMOVAL

Disconnect the air breather hose.



B: INSTALLATION

Connect the air breather hose.



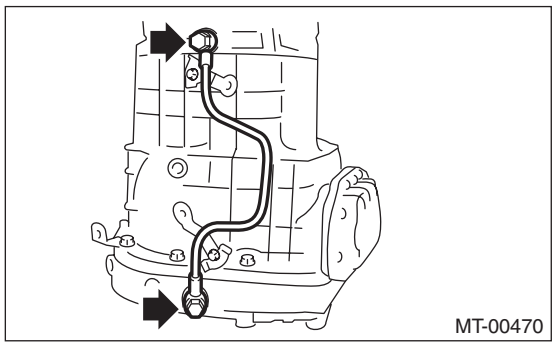
C: INSPECTION

Make sure the hose is not cracked or clogged.

9. Oil Pipe

A: REMOVAL

Remove the oil pipe.

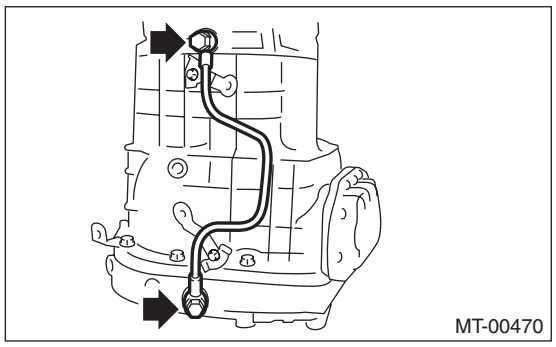


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



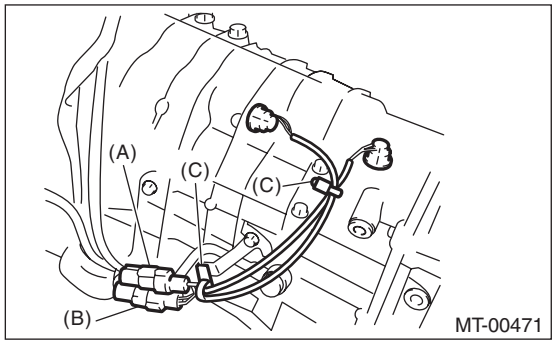
C: INSPECTION

1) Check that there is no damage on the pipe. Replace the pipe if there is damage.
2) Check the pipe connecting section for the oil leakage. If there is oil leakage, replace the gasket.

10.Back-up Light Switch

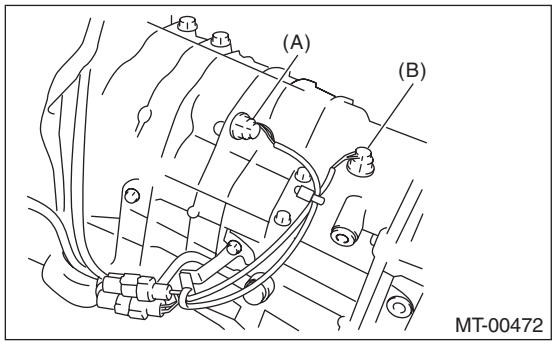
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Disconnect the back-up light switch connector.



(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Disconnect the back-up light switch.



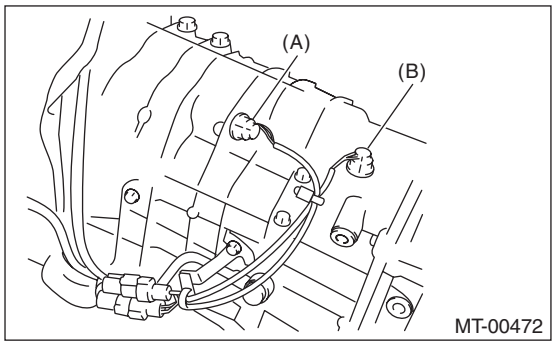
(A) Back-up light switch
(B) Neutral position switch

B: INSTALLATION

1) Install the back-up light switch.

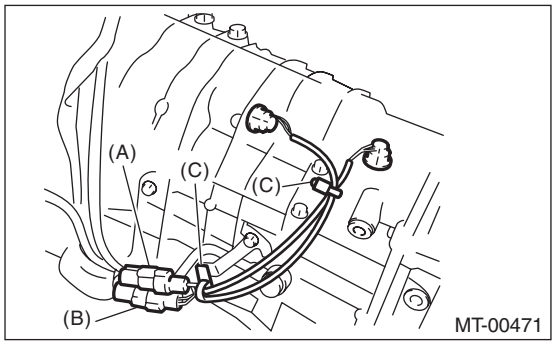
NOTE:
Use a new gasket.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Back-up light switch
(B) Neutral position switch

2) Connect the back-up light switch connector.

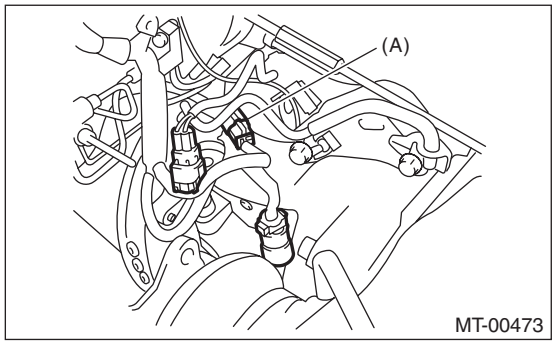


(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

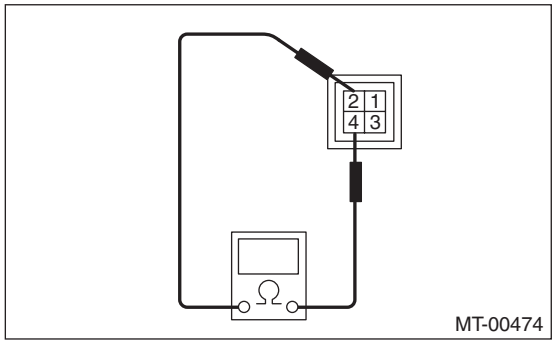
1) Disconnect the ground cable from battery.
2) Disconnect the transmission harness and chassis harness.



(A) Transmission connector

3) Measure the resistance between the back-up light switch terminals. If it is not within the specification, replace the back-up light switch.

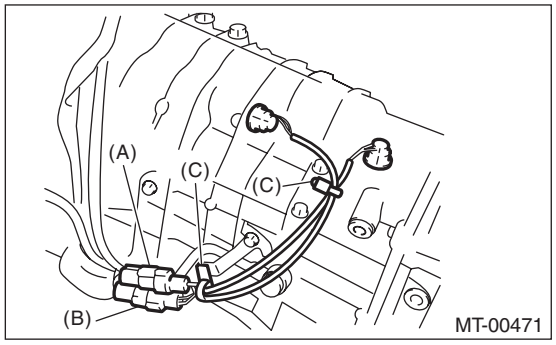
Gear shift position	Terminal No.	Standard
Back position	2 and 4	Less than 1 Ω
Other positions		1 MΩ or more



11.Neutral Position Switch

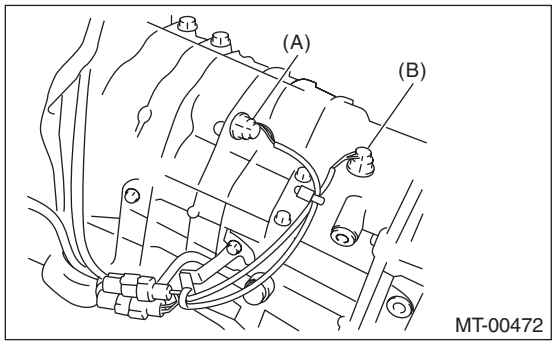
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Disconnect the connector and clip of the neutral position switch.



(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Remove the neutral position switch.



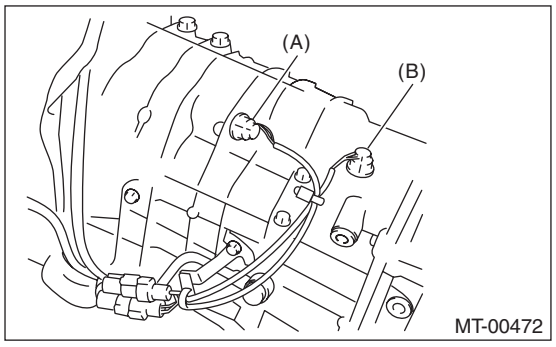
(A) Back-up light switch
(B) Neutral position switch

B: INSTALLATION

1) Install the neutral position switch.

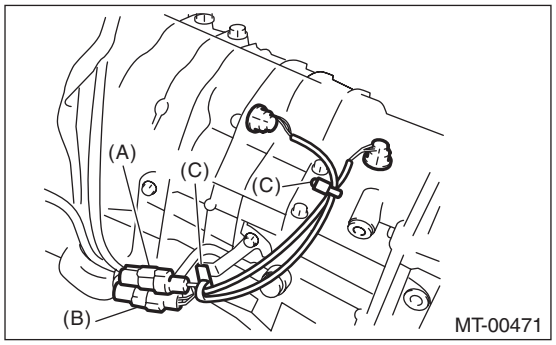
NOTE:
Use a new gasket.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Back-up light switch
(B) Neutral position switch

2) Connect the connector and clip of the neutral position switch.

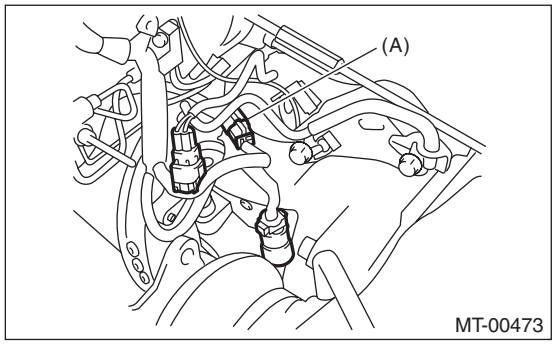


(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

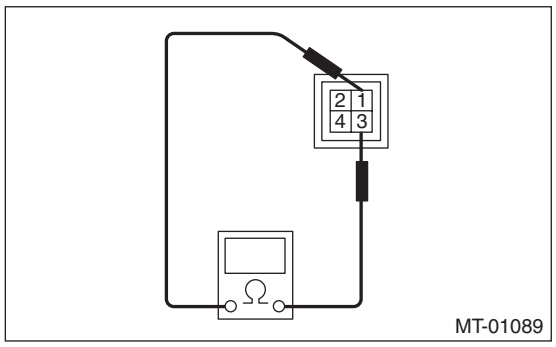
1) Disconnect the ground cable from battery.
2) Disconnect the transmission harness and chassis harness.



(A) Transmission connector

3) Measure the resistance between neutral position switch terminals. If not within the standard values, replace the neutral position switch.

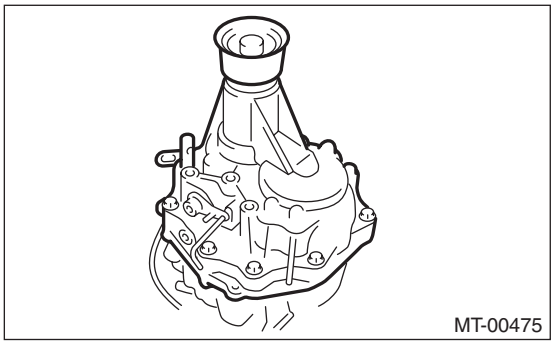
Gear shift position	Terminal No.	Standard
Neutral position	1 and 3	Less than 1 Ω
Other positions		1 MΩ or more



12.Extension Case

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the extension case.

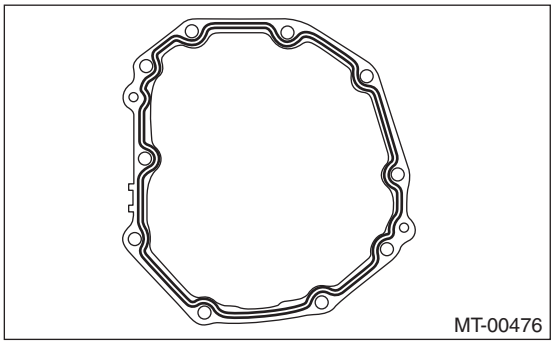


4) Remove any remaining liquid gasket from the extension case and transmission case.

B: INSTALLATION

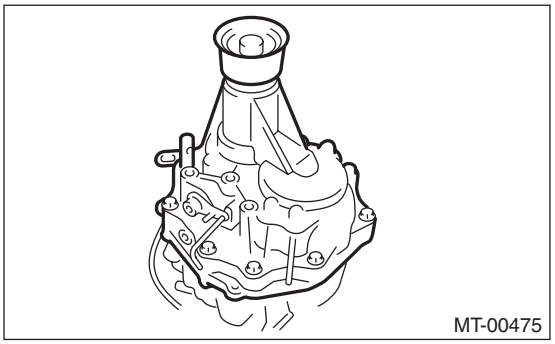
1) Select the thrust washer of the transfer driven gear, and attach to the extension case. <Ref. to 6MT-47, ADJUSTMENT, Extension Case.>
2) Apply a thin coat of oil to the outer surface of the bearing cone, and attach to the extension case.
3) Select the thrust washer of the transfer drive gear, and attach to the center differential.
4) Apply liquid gasket to the transmission case.

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

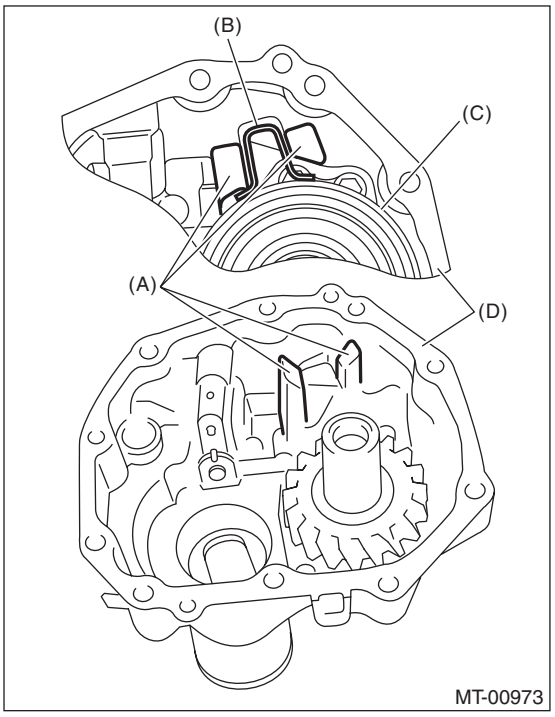


5) Install the extension case.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



NOTE:
Insert the stopper section of the center differential between the oil guide.

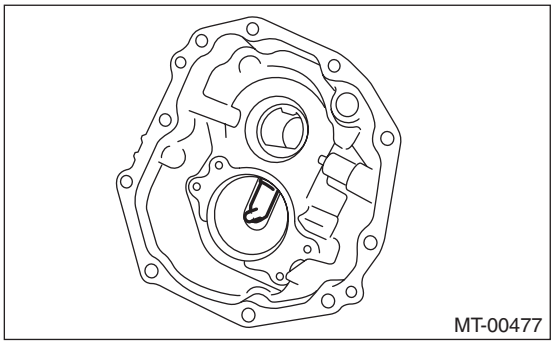


(A) Oil guide
(B) Stopper
(C) Center differential
(D) Extension case

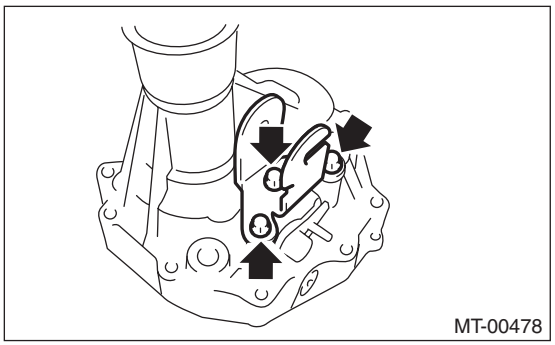
6) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

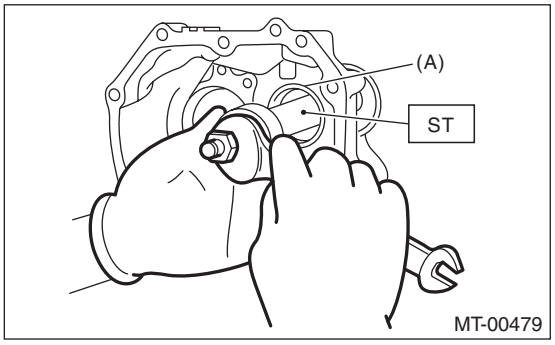
1) Remove the transfer drive gear. <Ref. to 6MT-55, REMOVAL, Transfer Drive Gear.>
2) Remove the oil guide.



3) Remove the shift bracket.

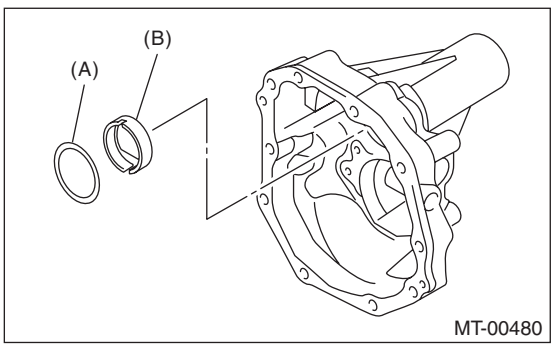


4) Remove the bearing cone using the ST.
ST 18758AA000 PULLER



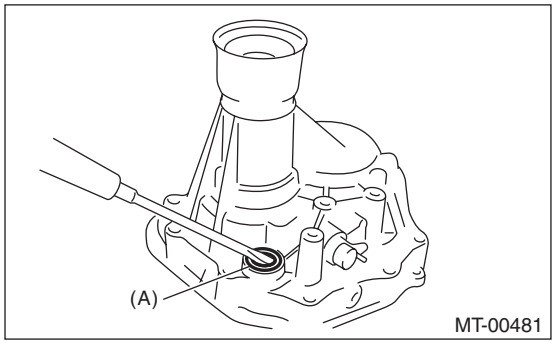
(A) Bearing cone

5) Remove the thrust washer and oil plate.



(A) Thrust washer
(B) Oil plate

6) Remove the shifter arm oil seal.

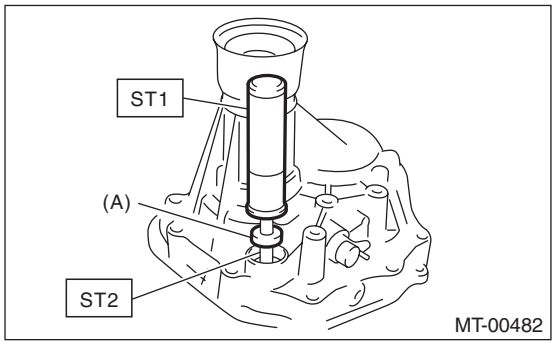


(A) Oil seal

7) Remove the reverse check system. <Ref. to 6MT-52, REMOVAL, Reverse Check System.>
8) Remove the extension case oil seal. <Ref. to 6MT-29, REPLACEMENT, Oil Seal.>

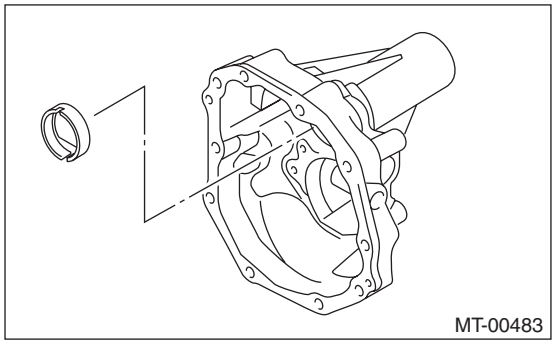
D: ASSEMBLY

1) Install the reverse check system. <Ref. to 6MT-53, INSTALLATION, Reverse Check System.>
2) Install the extension case oil seal. <Ref. to 6MT-29, REPLACEMENT, Oil Seal.>
3) Install a shifter arm oil seal using the ST.
ST1 18657AA000 INSTALLER
ST2 18671AA000 OIL SEAL GUIDE



(A) Oil seal

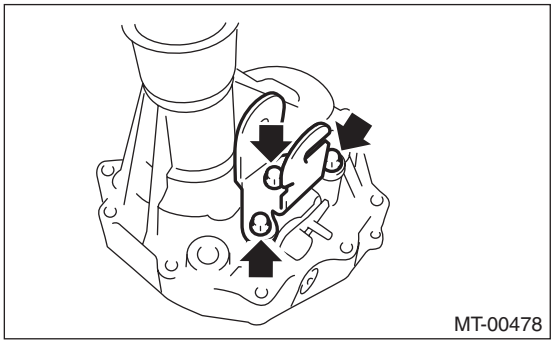
4) Install the oil plate.



5) Select the thrust washer of the bearing, and attach to the extension case. <Ref. to 6MT-47, ADJUSTMENT, Extension Case.>

6) Apply a thin coat of oil to the outer surface of the bearing cone, and attach to the extension case.
7) Install the shift bracket.

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



8) Attach the oil guide and the transfer driven gear. <Ref. to 6MT-55, INSTALLATION, Transfer Drive Gear.>

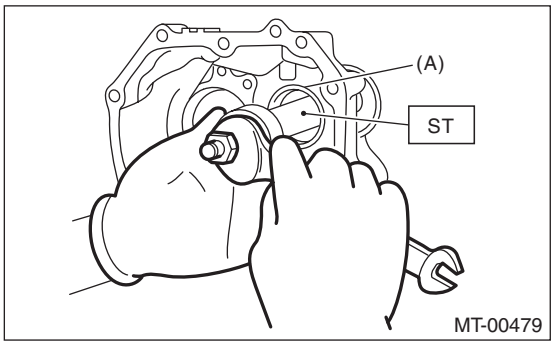
E: INSPECTION

1) Check to make sure there is no damage or cracks on the extension case. If damage or cracking is found, replace the extension case.
2) Inspect for oil leaks at the extension case and transmission case oil seals and mating surfaces. If there are oil leaks, replace the oil seal and liquid gasket.

F: ADJUSTMENT

1. TRANSFER DRIVEN GEAR BEARING THRUST WASHER ADJUSTMENT

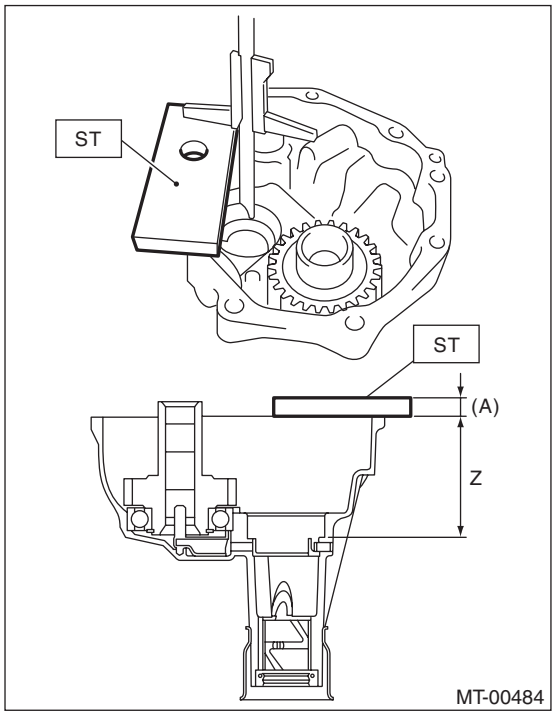
1) Remove the bearing cone using the ST.
ST 18758AA000 PULLER



(A) Bearing cone

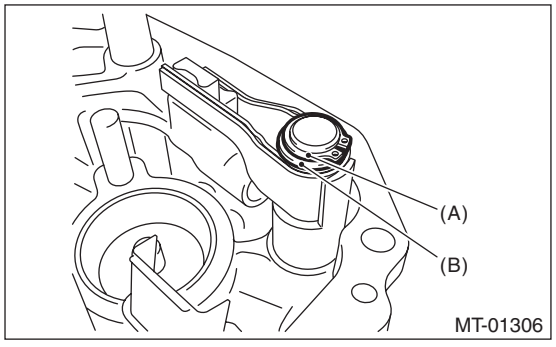
2) Remove the thrust washer.
3) Measure depth “Z” between the extension case end area and bearing cone contact area.
ST 499575500 GAUGE

NOTE:
When measuring depth “Z”, subtract the thickness of the ST [15 mm (0.59 in)] from the measured value.



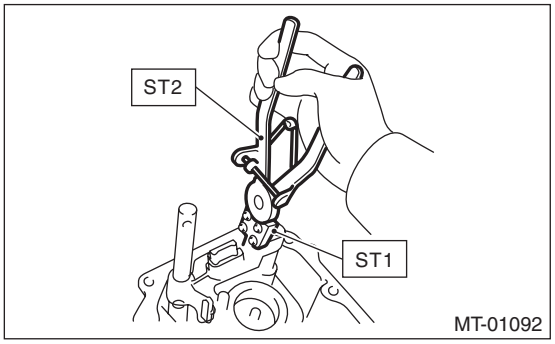
(A) 15 mm (0.59 in)

4) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
6) Remove the snap ring and flat washer from the selector arm area.

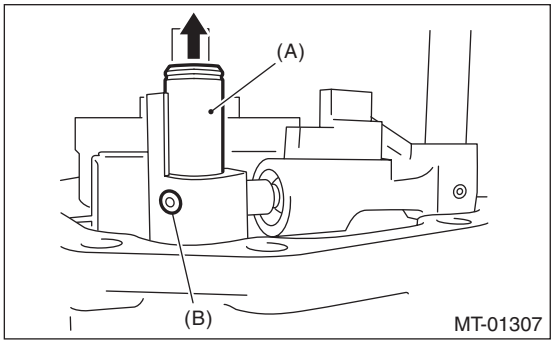


(A) Snap ring
(B) Flat washer

7) Using an ST, remove the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIER

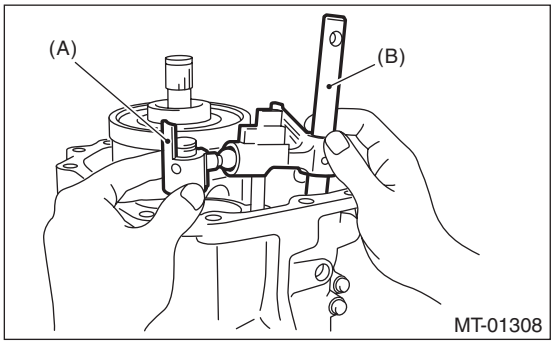


8) Lift the striking rod, and remove the spring pin.



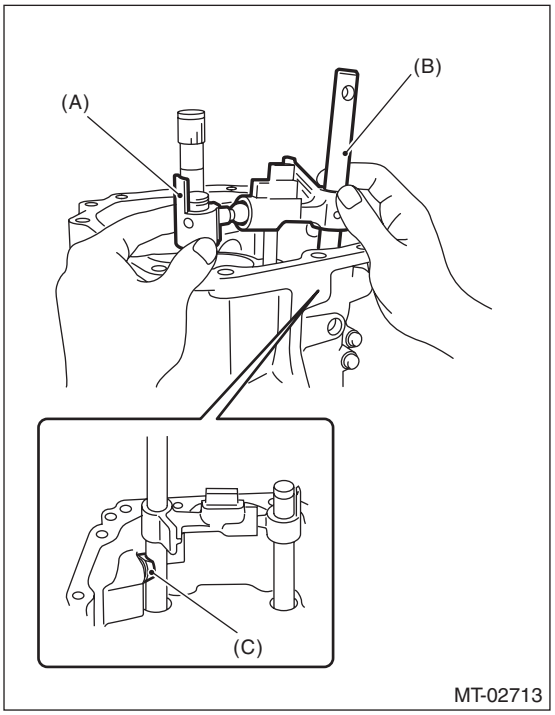
(A) Striking rod
(B) Spring pin

9) Remove the selector arm No. 2 and the shifter arm. (Transmission serial No. 144576 or earlier)



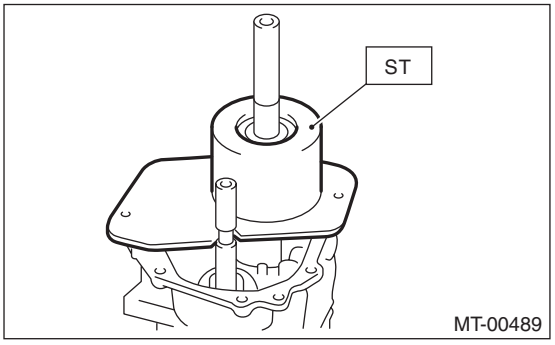
(A) Selector arm No. 2
(B) Shifter arm

10) Remove the selector arm No. 2, shifter arm, selector plunger and spring. (Transmission serial No. 144577 or later)



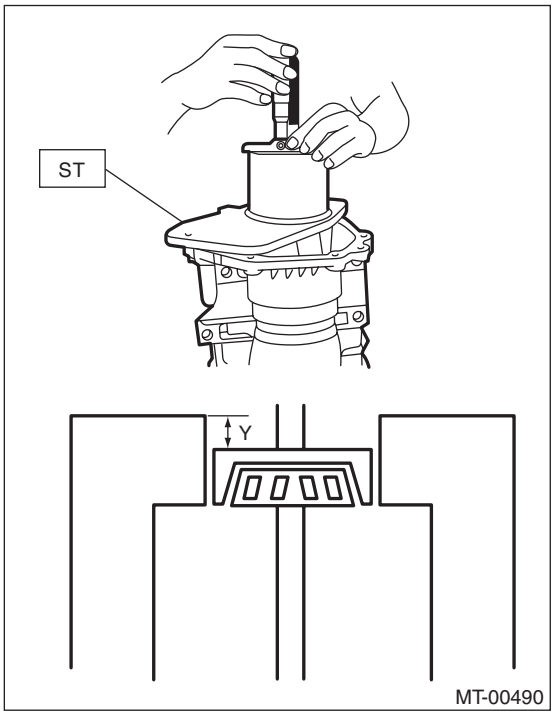
(A) Selector arm No. 2
(B) Shifter arm
(C) Selector plunger

11) Attach the bearing cone to the transfer driven gear.
12) Set the ST.
ST 18831AA000 GAUGE



13) Turn the transfer driven gear 10 or more times to seat the bearing properly.

14) Measure depth “Y” between the end of the ST and the bearing cone.
ST 18831AA000 GAUGE



15) Using the following calculation, calculate the transfer driven gear bearing thrust washer value “t”.
t = Z – (100 – Y) – {0.02 — 0.11 mm (0.0008 — 0.0043 in)}

t mm (in)	Transfer driven gear bearing thrust washer thickness
Y mm (in)	Depth between the end of the ST and the bearing cone.
Z mm (in)	Depth between the end of the extension case and the bearing cone contact area.
0.02 — 0.11 mm (0.0008 — 0.0043 in)	Standard clearance between the thrust washer and taper roller bearing
100 mm (3.94 in)	Height of ST

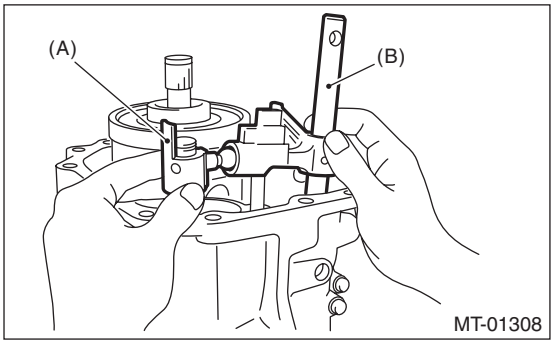
16) Refer to the calculated value “t” to select the closest thrust washer from the following table.

Standard clearance between the thrust washer and taper roller bearing:
0.02 — 0.11 mm (0.0008 — 0.0043 in)

NOTE:
Match to be within the standard clearance range.

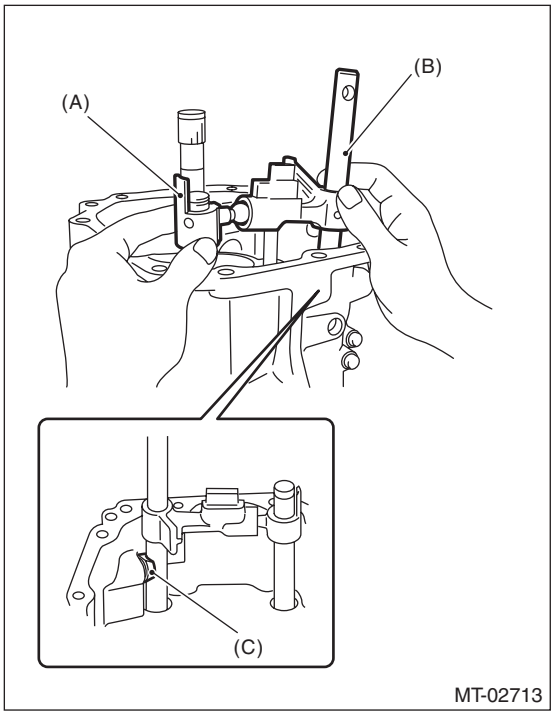
Thrust washer (50 × 61 × t)	
Part No.	Thickness t mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

17) Install the selector arm No. 2 and the shifter arm. (Transmission serial No. 144576 or earlier)



(A) Selector arm No. 2
(B) Shifter arm

18) Install the selector arm No. 2, shifter arm, selector plunger and spring. (Transmission serial No. 144577 or later)

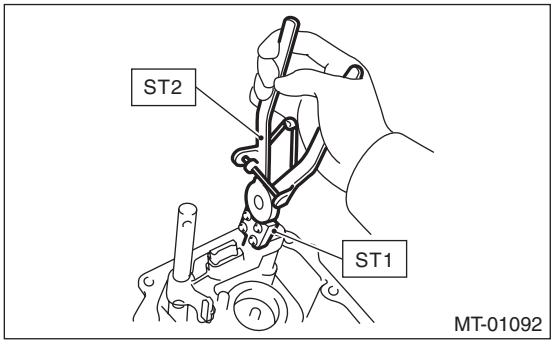


(A) Selector arm No. 2
(B) Shifter arm
(C) Selector plunger

19) Install the spring pin.

NOTE:
Use new spring pins.

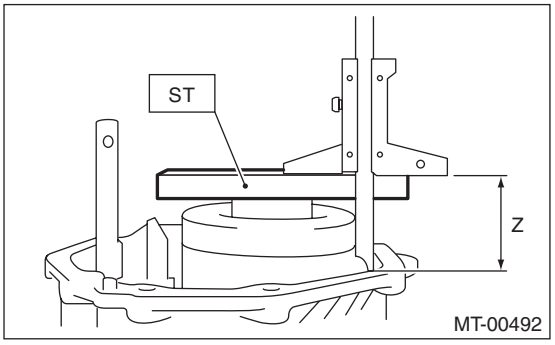
20) Using the ST, install the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIER



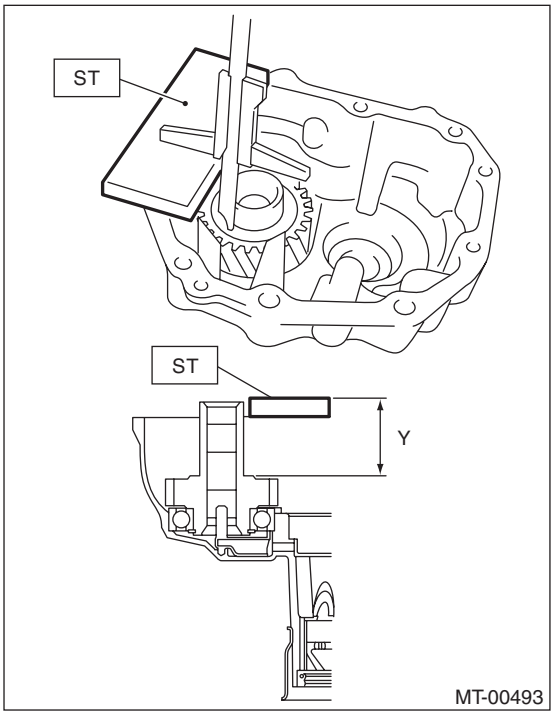
21) Install the flat washer and snap ring.
22) Install the center differential.

2. TRANSFER DRIVE GEAR THRUST WASHER SELECTION

1) Measure height "Z" between the transmission case end area and ST.
ST 499575500 GAUGE



2) Measure depth "Y" between the end of the ST and the transfer drive gear.
ST 499575500 GAUGE



3) Using the following calculation, calculate the transfer drive gear thrust washer value "t".
t = {Y – 15 mm (0.59 in)} – {Z – 15 mm (0.59 in)} – 0.45 — 0.65 mm (0.018 — 0.026 in)

t mm (in)	Transfer drive gear thrust washer thickness
Y mm (in)	Depth between the end of the ST and the transfer drive gear
Z mm (in)	Height from the end of the transmission case to the end of the ST.
0.45 — 0.65 mm (0.018 — 0.026 in)	Standard clearance between the thrust washer and transfer drive gear
15 mm (0.59 in)	Thickness of ST

4) Refer to the calculated value “t” to select the closest thrust washer from the following table.

Standard clearance between the thrust washer and transfer drive gear:
0.45 — 0.65 mm (0.018 — 0.026 in)

NOTE:
Match to be within the standard clearance range.

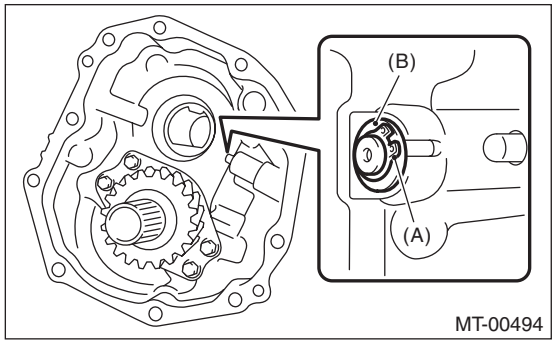
Thrust washer (36.3 × 52 × t)	
Part No.	Thickness mm (in)
803036070	0.80 (0.0315)
803036071	0.95 (0.0374)
803036072	1.10 (0.0433)
803036073	1.25 (0.0492)
803036074	1.40 (0.0551)
803036075	0.65 (0.0256)

5) Install the selected thrust washer.

13.Reverse Check System

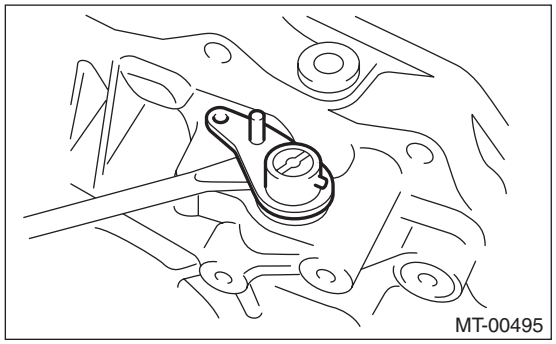
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
4) Remove the snap ring and washer from the reverse check shaft.



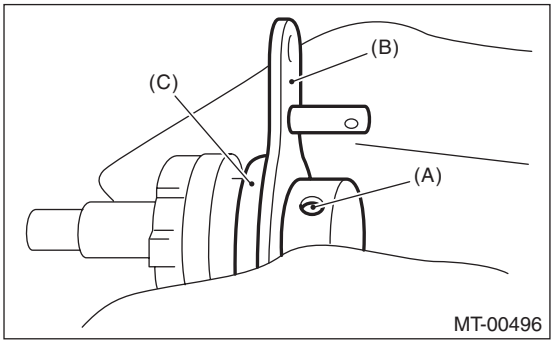
(A) Snap ring
(B) Washer

5) Remove the reverse check shaft and spring from the extension case.



6) Remove the spring pin, and remove the reverse check lever and oil seal from the reverse check shaft.

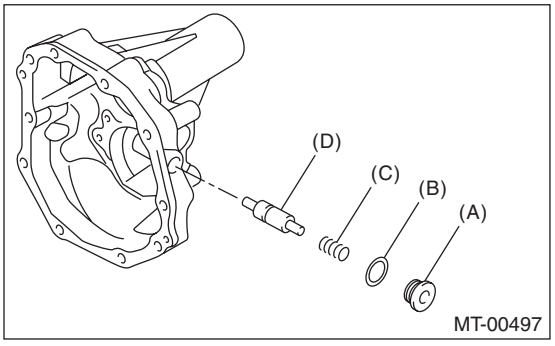
NOTE:
Use a new oil seal.



(A) Spring pin
(B) Reverse check lever
(C) Oil seal

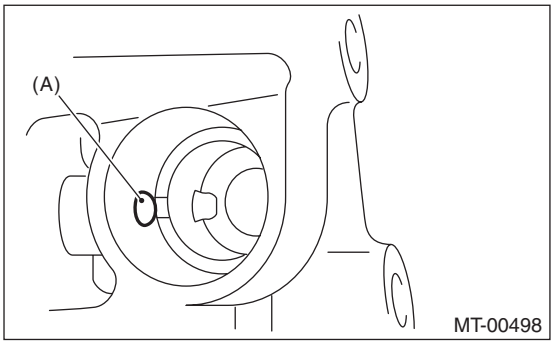
7) Remove the plug from the extension case, and remove the gasket, spring and plunger.

NOTE:
Use a new gasket.



(A) Plug
(B) Gasket
(C) Spring
(D) Plunger

8) Remove the reverse lock plunger.

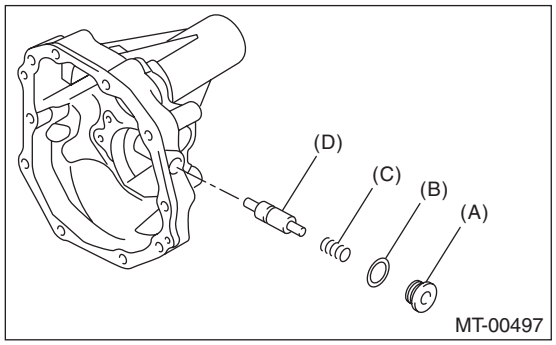


(A) Reverse lock plunger

B: INSTALLATION

1) Insert the reverse lock plunger.
2) Install the reverse check plug, spring, gasket, and plug in order.

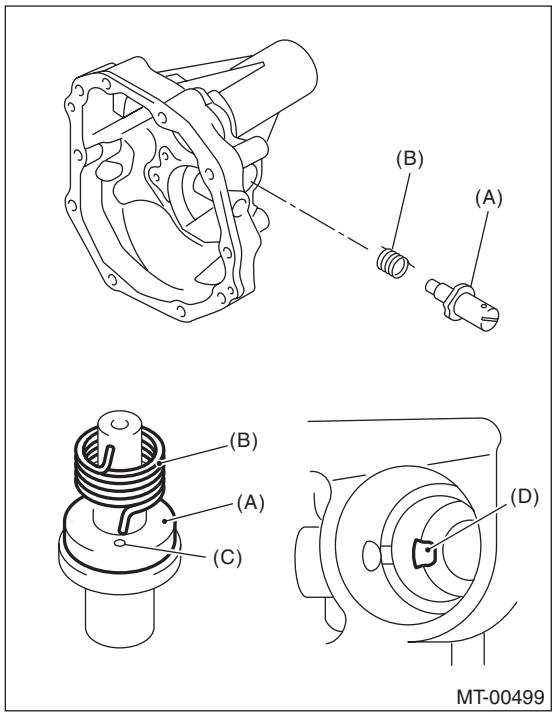
Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



(A) Plug
(B) Gasket
(C) Spring
(D) Reverse check plug

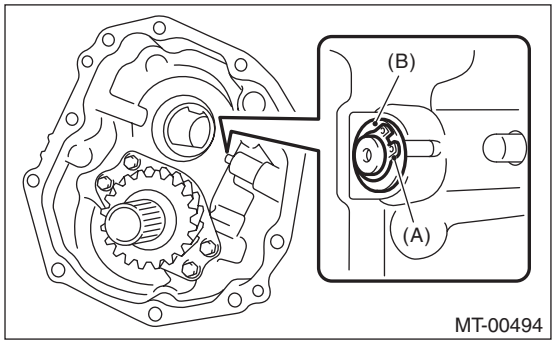
3) Install the spring and reverse check shaft to the extension case.

NOTE:
Confirm that the end of the spring matches the hole of the reverse check shaft and the cut out of the extension case.



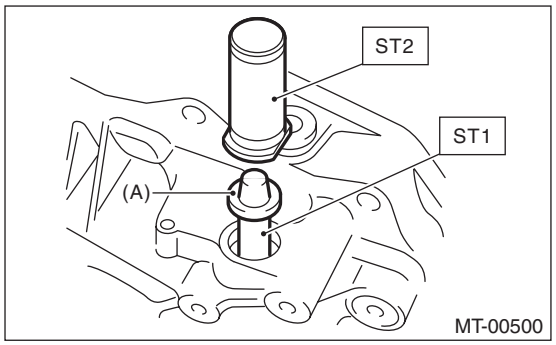
(A) Reverse check shaft
(B) Spring
(C) Hole
(D) Cut out

4) Install the washer and snap ring.



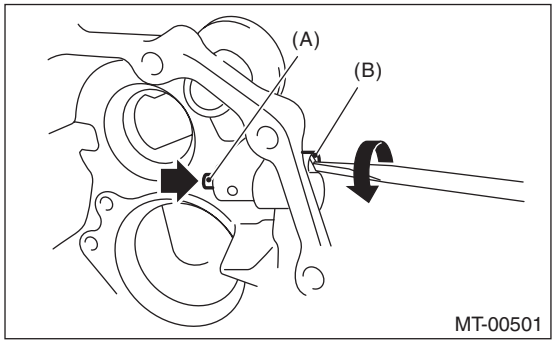
(A) Snap ring
(B) Washer

5) Attach ST1 to the reverse check shaft. Install the new oil seal, and push it in using ST2.
ST1 18671AA000 OIL SEAL GUIDE
ST2 18657AA010 INSTALLER



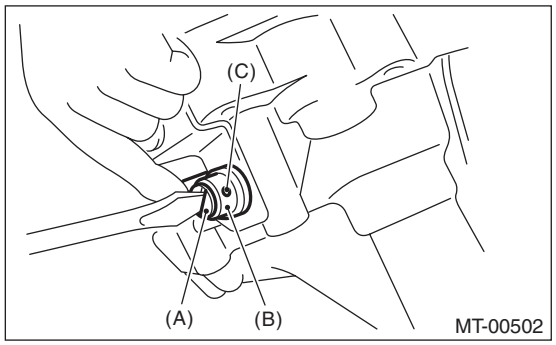
(A) Oil seal

6) Insert the reverse check lever, and turn the reverse check shaft until the plunger is pushed in.



(A) Plunger
(B) Reverse check shaft

7) Match the hole of the reverse check lever and the reverse check shaft, and attach the spring pin.

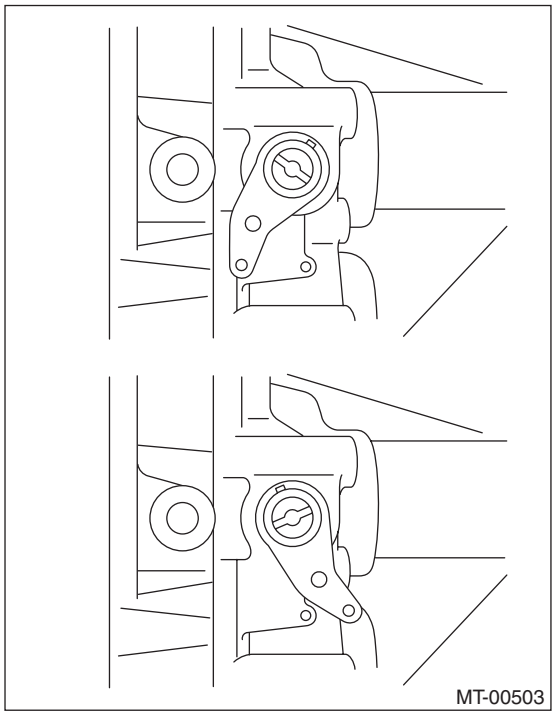


(A) Reverse check shaft
(B) Reverse check lever
(C) Hole

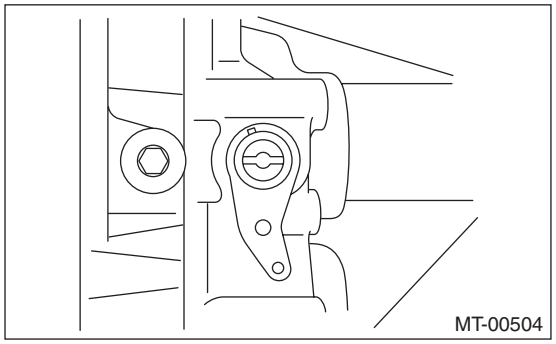
8) Check that the reverse check is operating correctly. <Ref. to 6MT-54, INSPECTION, Reverse Check System.>
9) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
10) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Check that there is no damage on any parts.
2) Check that the reverse check lever is operating smoothly.
3) Inspect that there is no oil leak at the oil seal section of the reverse check shaft. If there is oil leakage, replace the oil seal.
4) Check the operation of the reverse check.
(1) When the reverse check lever is in the following position, the plunger is pressed, or the gear can shift into reverse.



(2) When the reverse check lever is in the following position, the plunger is not pressed, or the gear cannot shift into reverse.

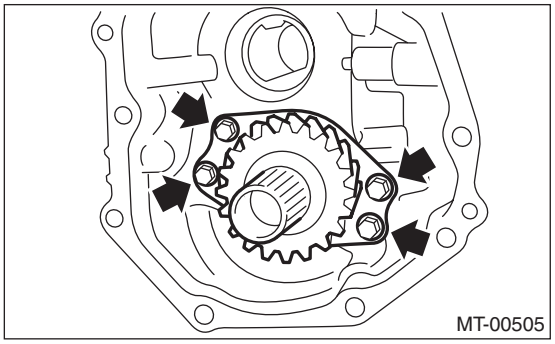


5) If it does not operate correctly, reassemble the reverse check system.

14.Transfer Drive Gear

A: REMOVAL

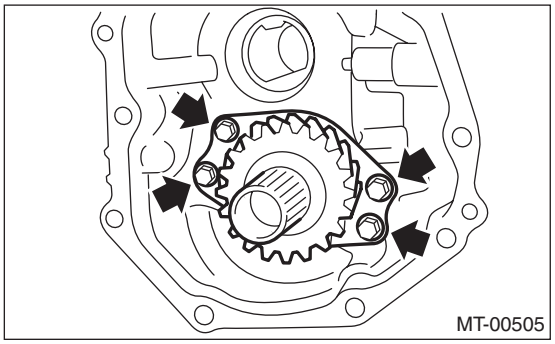
1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
4) Remove the transfer drive gear.



B: INSTALLATION

1) Install the transfer drive gear.

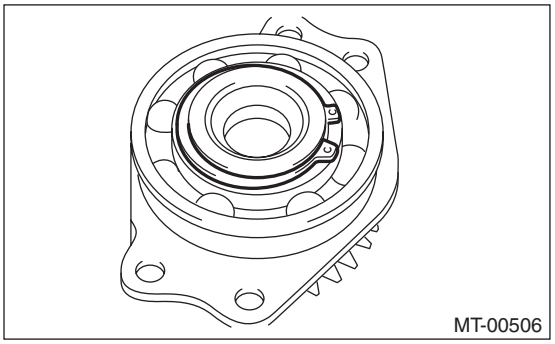
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



2) When the ball bearing, transfer drive gear or snap ring are replaced, select an appropriate thrust washer for the transfer drive gear. <Ref. to 6MT-46, ASSEMBLY, Extension Case.>
3) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
4) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

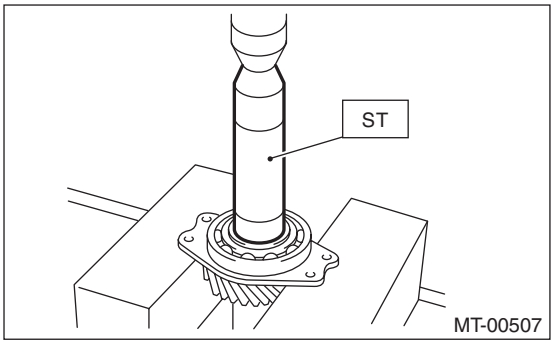
C: DISASSEMBLY

1) Remove the snap ring.



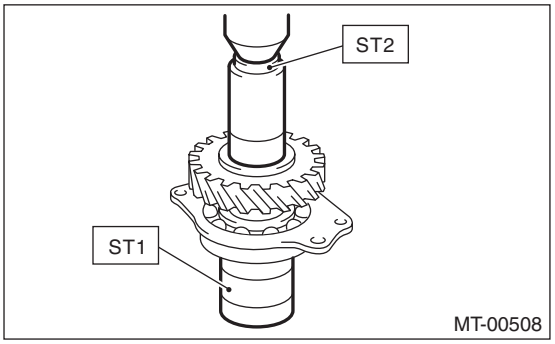
2) Remove the bearing using the ST.
ST 499877000 RACE 4-5 INSTALLER

NOTE:
Use a new ball bearing.

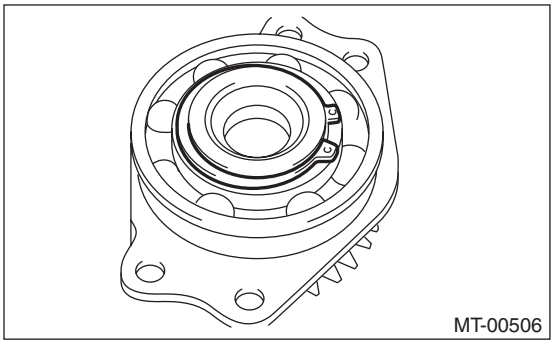


D: ASSEMBLY

1) Using the ST, install the ball bearing.
ST1 499247400 INSTALLER
ST2 398497701 SEATS



2) Install the snap ring.



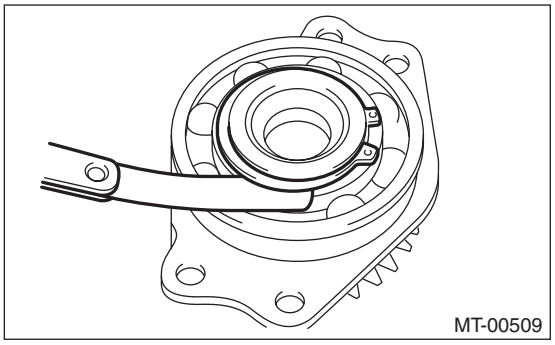
3) Inspect the clearance between the snap ring and the ball bearing. <Ref. to 6MT-56, INSPECTION, Transfer Drive Gear.>

E: INSPECTION

1) Bearing
Replace the bearings in the following cases.
- If there is damage or rusting of the bearing.
- In case of wear or damage.
- If the bearing does not rotate smoothly or an abnormal noise is emitted.

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 the snap ring and ball bearing inner race with a thickness gauge.

Standard clearance between the snap ring and inner race:
0 — 0.15 mm (0 — 0.0059 in)



4) If the measurement is out of range, select an appropriate snap ring from the following table.

NOTE:
Match to be within the standard clearance range.

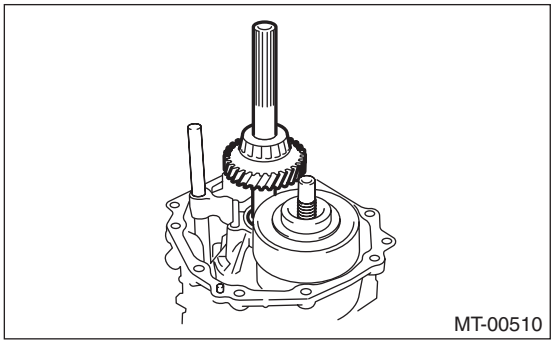
Snap ring	
Part No.	Thickness mm (in)
805045050	1.76 (0.069)
805045060	1.88 (0.074)
805045070	2.00 (0.079)

After replacing the snap ring, reinspect the clearance.

15.Transfer Driven Gear

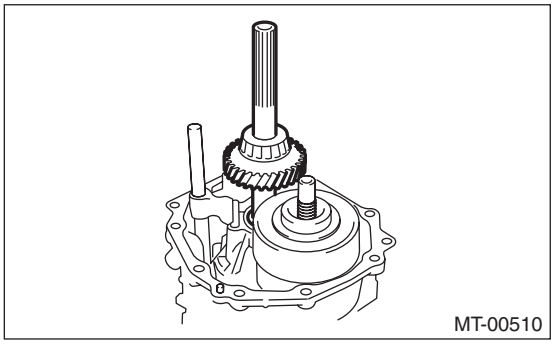
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
4) Remove the transfer driven gear.



B: INSTALLATION

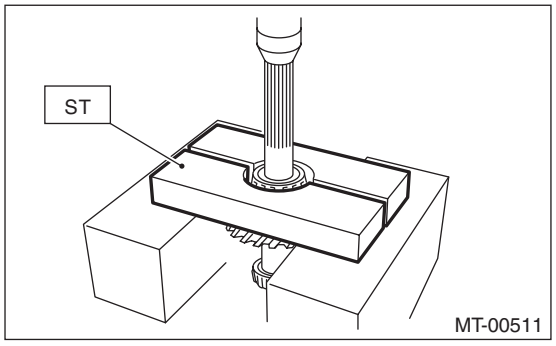
1) Install the transfer driven gear.



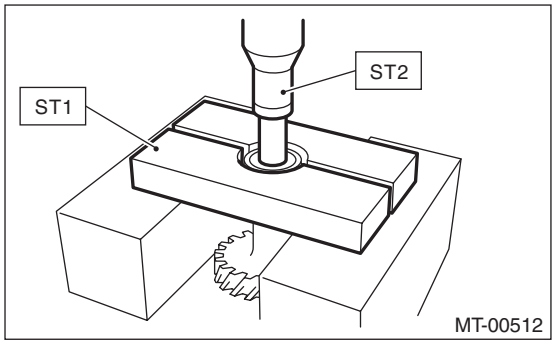
2) When the bearing or the transfer driven gear is replaced, select an appropriate thrust washer for the transfer driven gear. <Ref. to 6MT-47, ADJUSTMENT, Extension Case.>
3) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
4) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).
ST 498515700 REMOVER



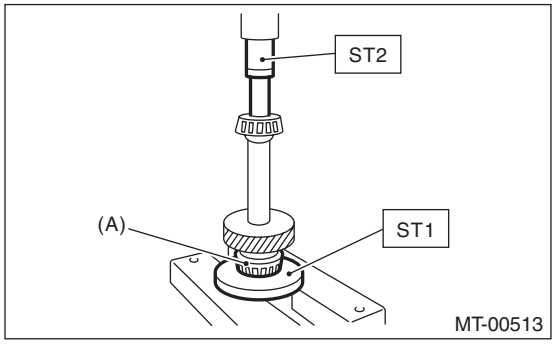
2) Using ST1 and ST2, remove the roller bearing (transmission case side).
ST1 899858600 REMOVER
ST2 899864100 REMOVER



D: ASSEMBLY

1) Using the ST, install the roller bearing (extension case side).
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

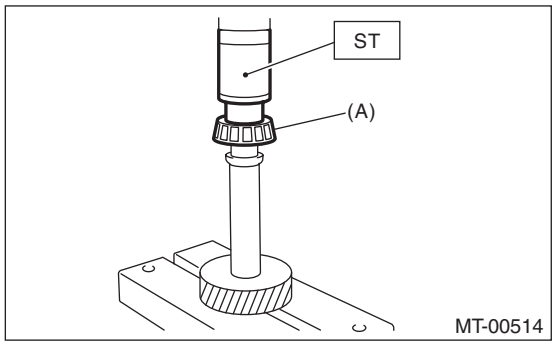
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

2) Using the ST, install the roller bearing (transmission case side).
ST 499757002 INSTALLER

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

E: INSPECTION

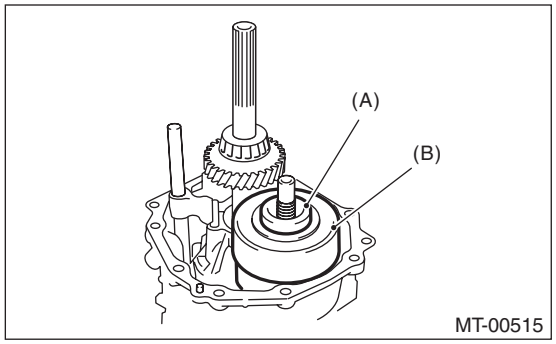
1) Bearing
Replace the bearings in the following cases.
- If there is damage or rusting of the bearing.
- In case of wear or damage.
- After applying gear oil, if the bearing does not rotate smoothly or an abnormal noise is emitted.

2) Driven gear
If the driven gear tooth surface and shaft are excessively broken or damaged, replace the driven gear.

16.Center Differential

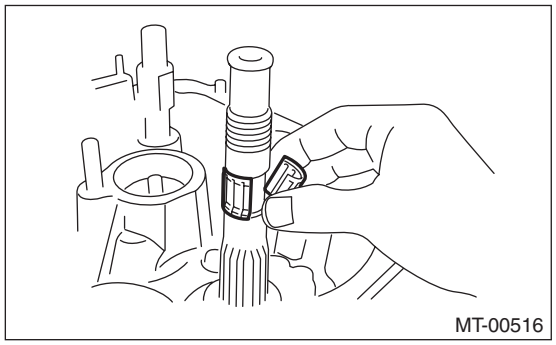
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
4) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
5) Remove the thrust washer and center differential.



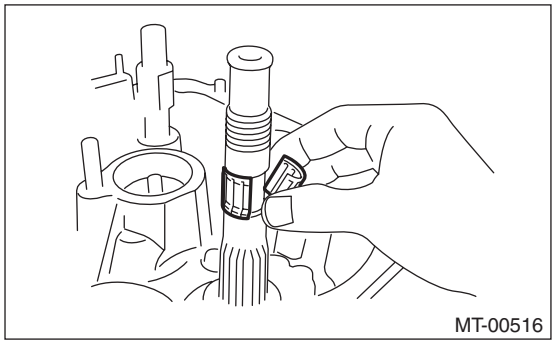
(A) Thrust washer
(B) Center differential

6) Remove the needle bearing.

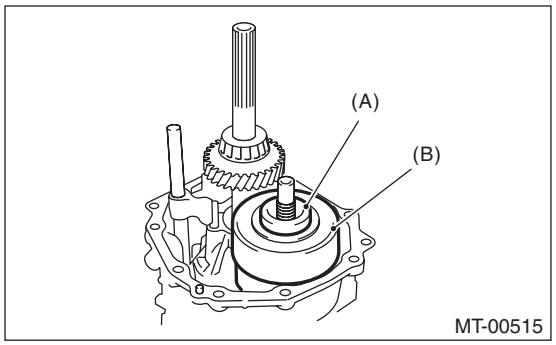


B: INSTALLATION

1) Install the needle bearing.



2) Install the thrust washer and center differential.



(A) Thrust washer
(B) Center differential

3) When replacing the center differential, select and install the appropriate transfer drive gear and thrust washer. <Ref. to 6MT-47, ADJUSTMENT, Extension Case.>
4) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
5) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
6) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

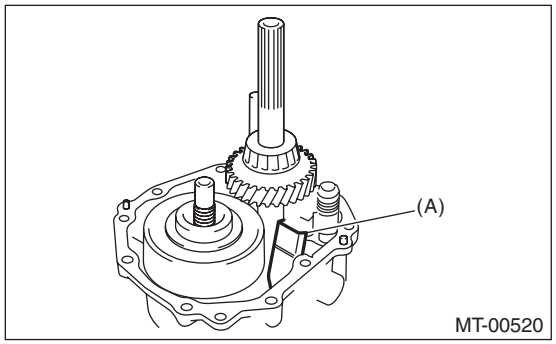
C: INSPECTION

Check that there is no damage on the center differential. Replace if damaged.

17.Oil Pump

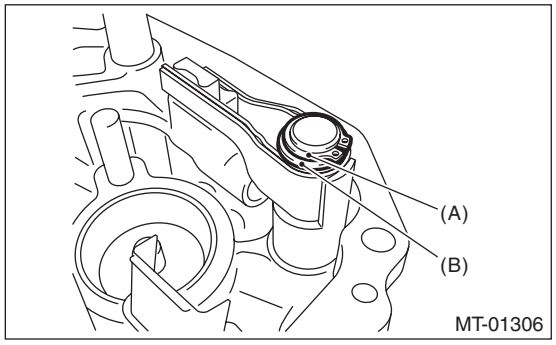
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
4) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
6) Remove the oil guide.



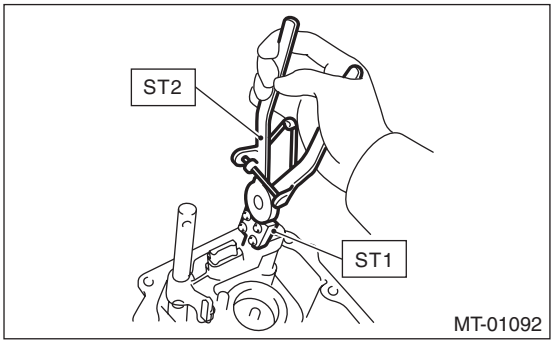
(A) Oil guide

7) Remove the snap ring and flat washer.

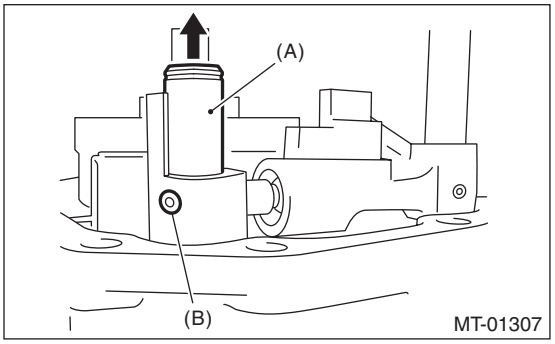


(A) Snap ring
(B) Flat washer

8) Using an ST, remove the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIER

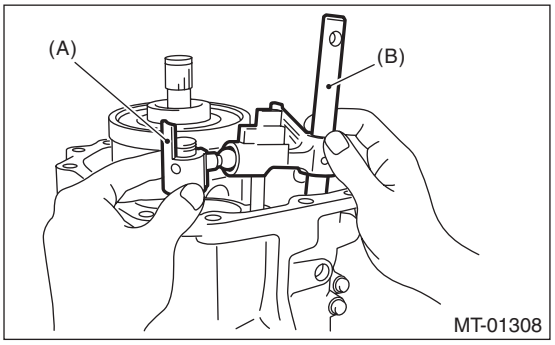


9) Lift the striking rod, and remove the spring pin.



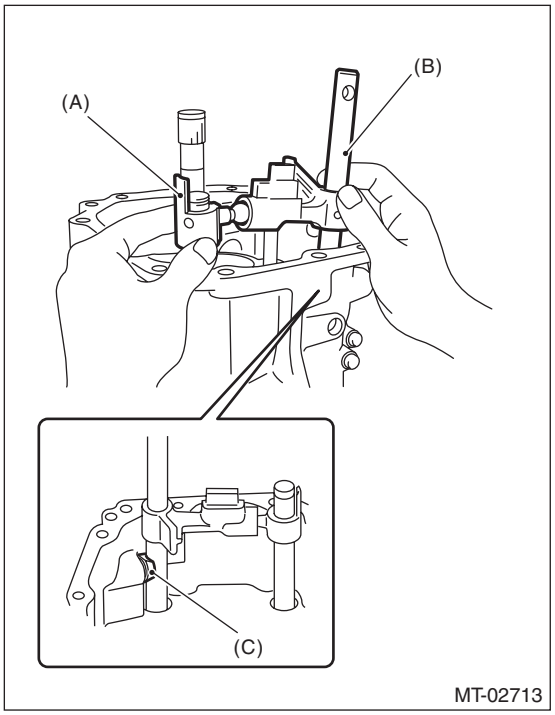
(A) Striking rod
(B) Spring pin

10) Remove the selector arm No. 2 and the shifter arm. (Transmission serial No. 144576 or earlier)



(A) Selector arm No. 2
(B) Shifter arm

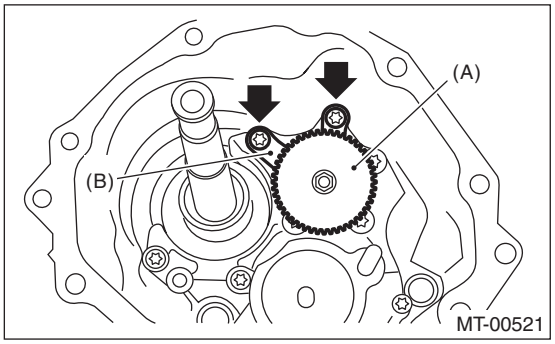
11) Remove the selector arm No. 2, shifter arm, selector plunger and spring. (Transmission serial No. 144577 or later)



(A) Selector arm No. 2
(B) Shifter arm
(C) Selector plunger

12) Using the ST, remove the oil pump shaft assembly and plate.

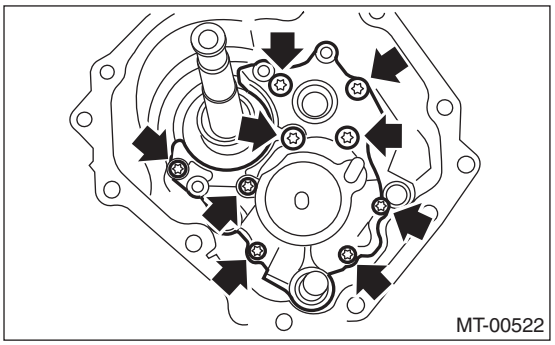
NOTE:
Using a general tool may cause damage. Remove the bolt using the ST.
ST 18663AA000 SOCKET



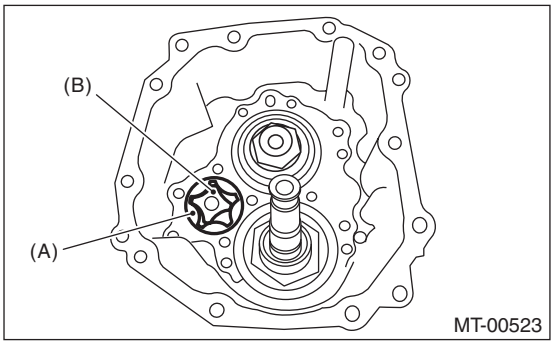
(A) Oil pump shaft ASSY
(B) Plate

13) Using the ST, remove the oil pump cover assembly.

NOTE:
Using a general tool may cause damage. Remove the bolt using the ST.
ST 18663AA000 SOCKET



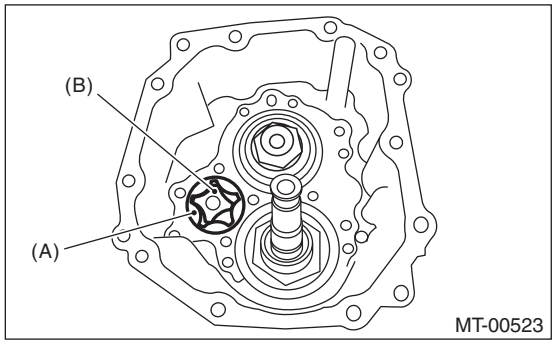
14) Remove the thrust washer on the main shaft section.
15) Remove the oil pump rotor.



(A) Outer rotor
(B) Inner rotor

B: INSTALLATION

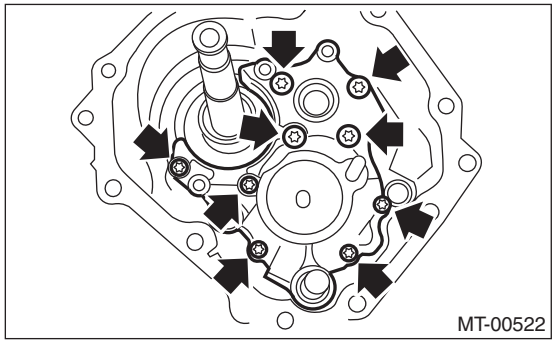
1) Apply oil to the outer rotor surface, and install to the transmission case.



(A) Outer rotor
(B) Inner rotor

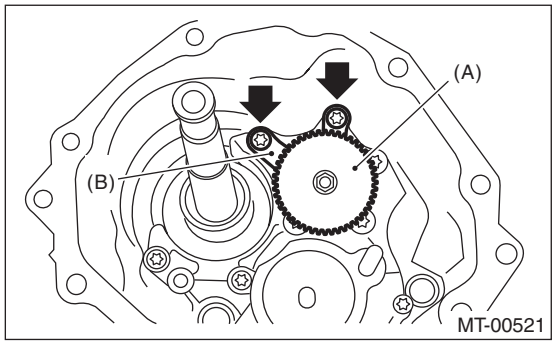
2) Attach the thrust washer to the main shaft.
3) Using the ST, install the oil pump cover assembly.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)
ST 18663AA000 SOCKET



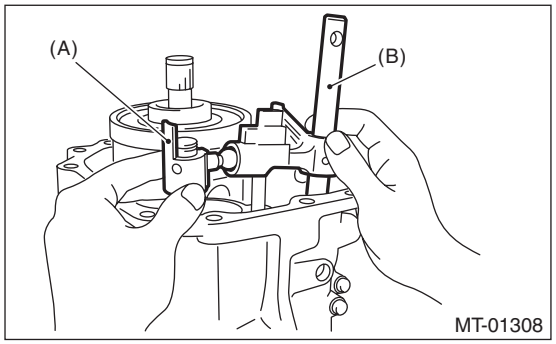
4) Using the ST, install the oil pump shaft assembly and plate.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)
ST 18663AA000 SOCKET



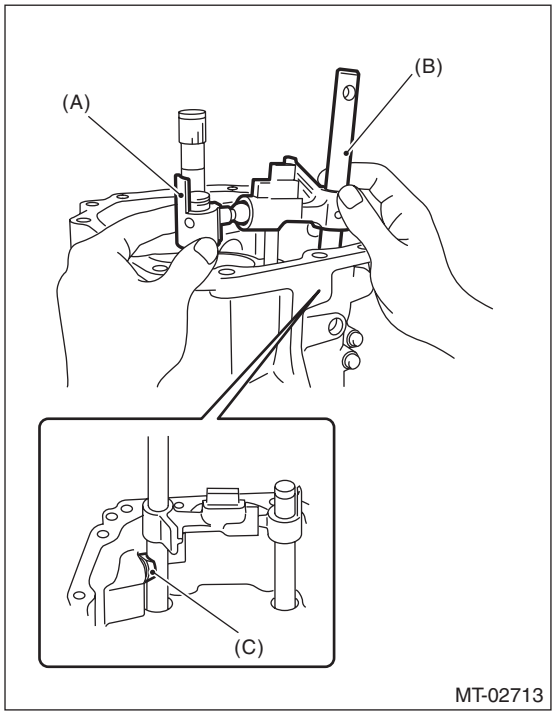
(A) Oil pump shaft ASSY
(B) Plate

5) When replacing the oil pump cover assembly, select the appropriate transfer driven gear and thrust washer, and install to the extension case. <Ref. to 6MT-47, ADJUSTMENT, Extension Case.>
6) Install the selector arm No. 2 and the shifter arm. (Transmission serial No. 144576 or earlier)



(A) Selector arm No. 2
(B) Shifter arm

7) Install the selector arm No. 2, shifter arm, selector plunger and spring. (Transmission serial No. 144577 or later)

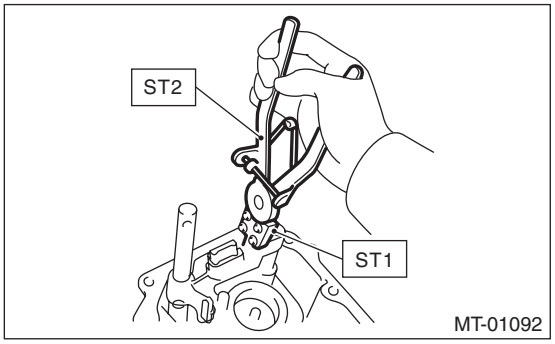


(A) Selector arm No. 2
(B) Shifter arm
(C) Selector plunger

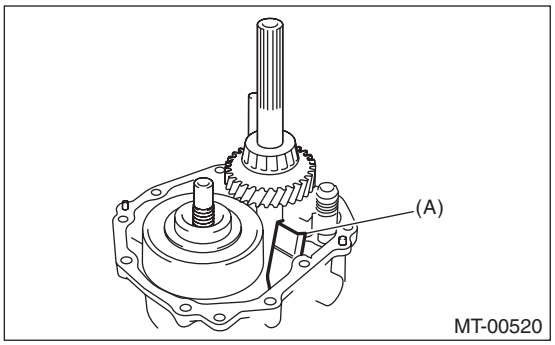
8) Install the spring pin.

NOTE:
Use new spring pins.

9) Using the ST, install the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIER



10) Install the flat washer and snap ring.
11) Install the oil guide.



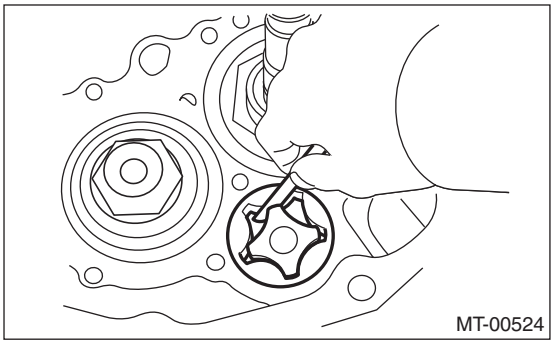
(A) Oil guide

12) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
13) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
14) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
15) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

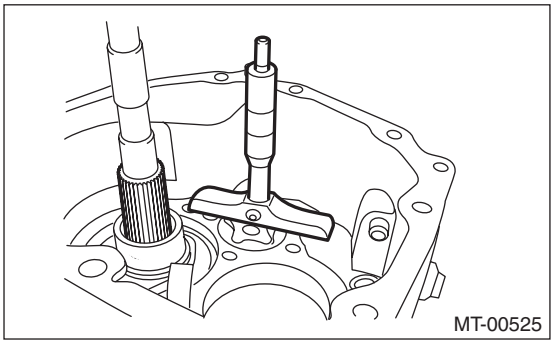
1) Check that there is no damage on the inner rotor and outer rotor. If damaged, replace the oil pump rotor assembly.
2) Tip clearance
Install the inner rotor and outer rotor to the transmission case. match the forward tip of the inner rotor and outer rotor, and measure the clearance. If the clearance exceeds standards, replace the oil pump rotor assembly.

Tip clearance specification:
Less than 0.15 mm (0.0059 in)



3) Side clearance
Measure from the transmission case to rotor. If the clearance exceeds specification, replace the inner rotor and outer rotor as a set.

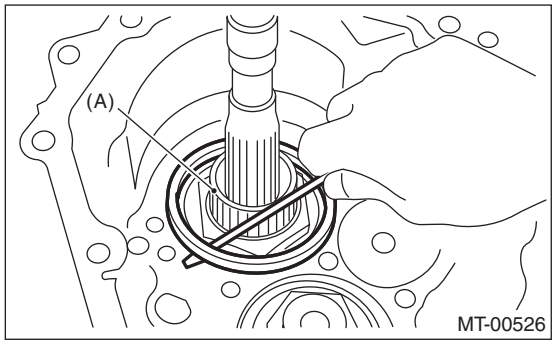
Side clearance specification:
0.03 — 0.10 mm (0.0012 — 0.0039 in)



18.Transmission Case

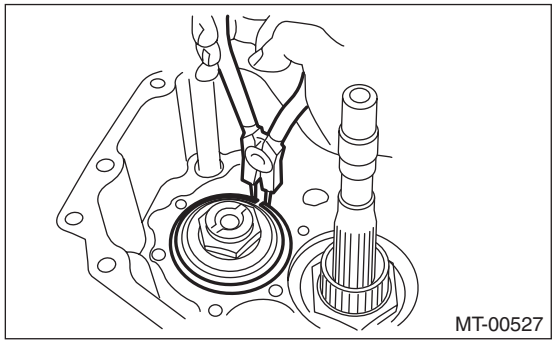
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the driven gear assembly shim and spacer.

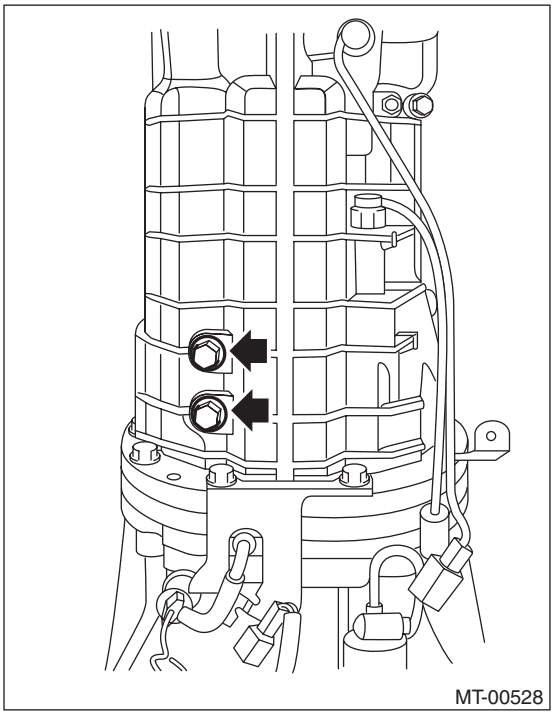


(A) Driven gear ASSY

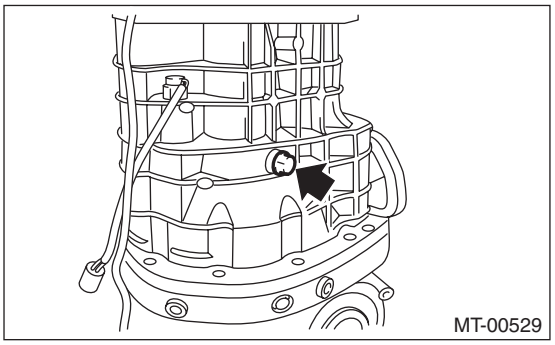
9) Remove the snap ring.



10) Remove the pilot bolt.

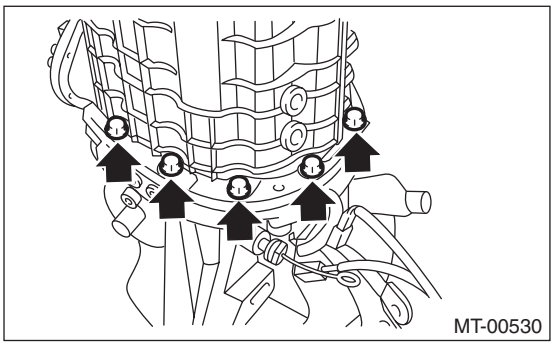


11) Remove the holder reverse bolt.



12) Remove the transmission case.

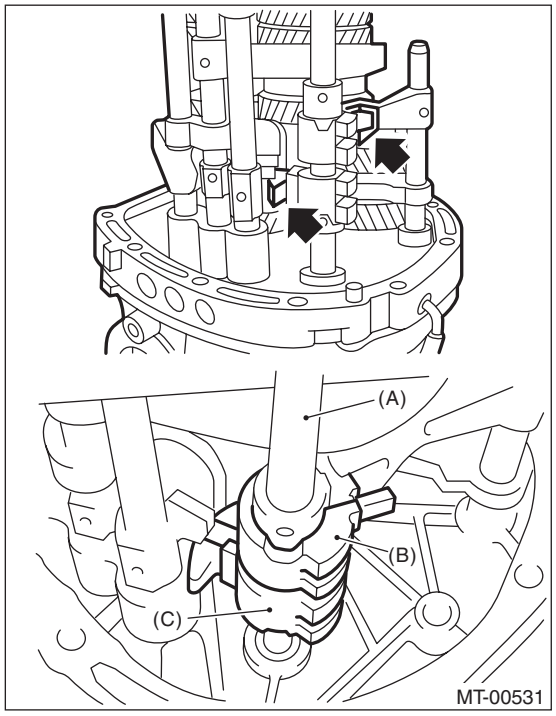
NOTE:
If the oil guide is caught between the shift fork, it may be difficult to remove the transmission case. Move the oil guide and oil pipe, then remove. Do not pull on the transmission case with excessive force.



13) Remove any remaining liquid gasket from the transmission case and adapter plate.

B: INSTALLATION

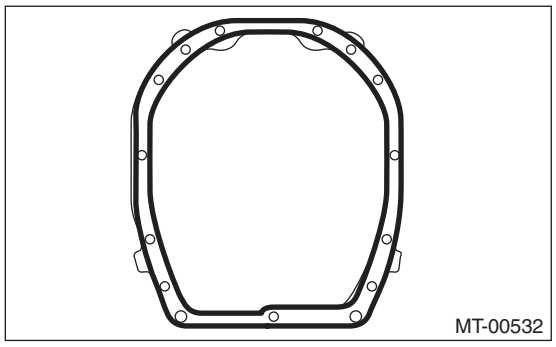
1) Check that the shifter fork and the interlock block are both shifted into the neutral position. If they are not, shift into the neutral position.



(A) Striking rod
(B) Reverse interlock block
(C) Interlock block

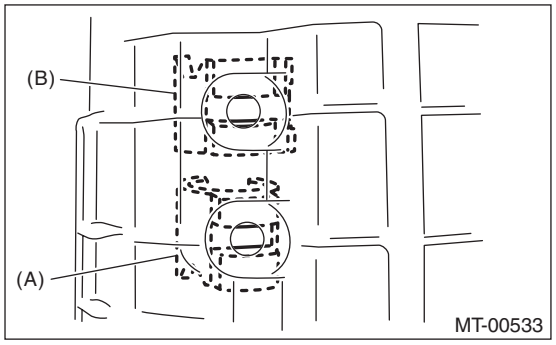
2) Apply liquid gasket to the adapter plate.

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



3) Install the transmission case.

4) By inspecting from the pilot bolt attachment hole, check that the interlock block and the reverse interlock block are in the neutral position. If not in the neutral position, remove the transmission case, and shift the shifter fork and interlock block to the neutral position.



(A) Interlock block
(B) Reverse interlock block

5) Temporarily attach the gasket and pilot bolt.

NOTE:
Use a new gasket.

6) Affix the transmission case with the bolts and nuts.

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

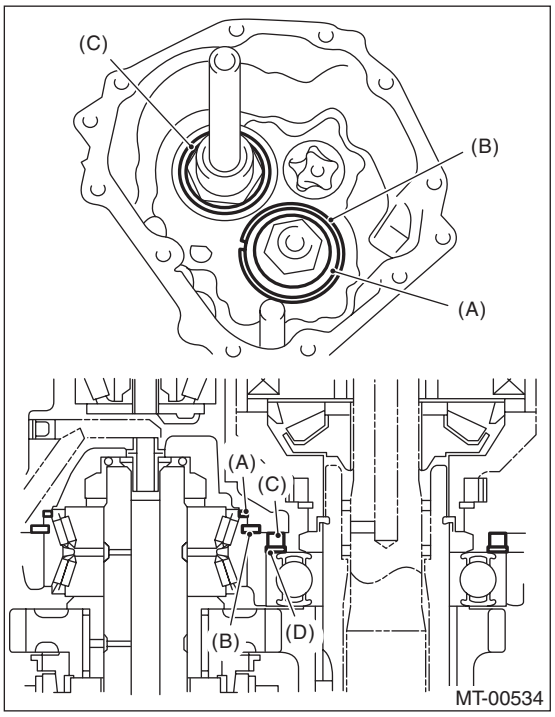
7) Tighten the pilot bolt.

Tightening torque:
34 N·m (3.5 kgf-m, 25.1 ft-lb)

8) Tighten the holder reverse bolt.

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

9) Install the snap ring, washer and collar of the driven gear assembly.

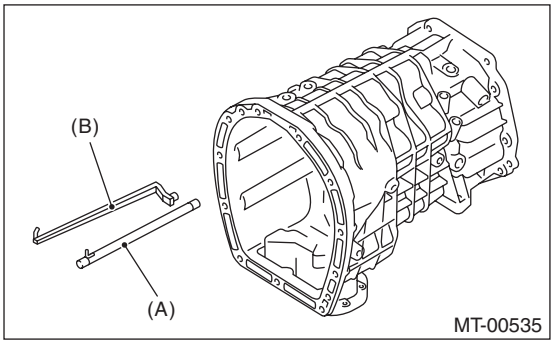


(A) Washer
(B) Snap ring
(C) Collar
(D) Washer

10) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
11) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
12) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
13) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
14) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
15) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

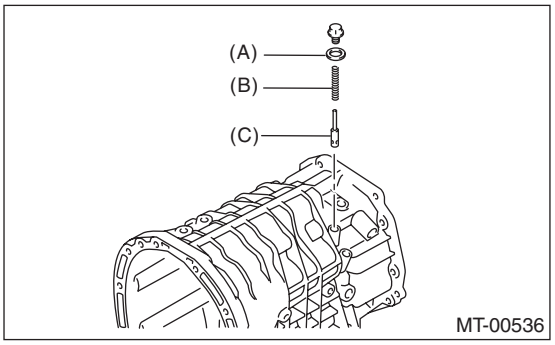
C: DISASSEMBLY

1) Remove the oil pipe and oil guide.



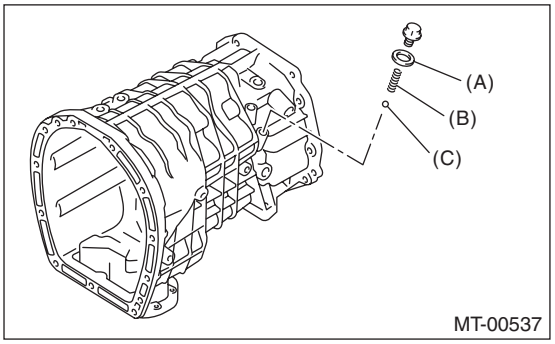
(A) Oil pipe
(B) Oil guide

2) Remove the bolt assembly seal, relief spring and relief valve.



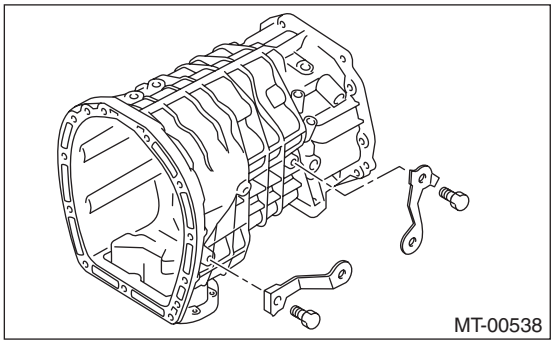
(A) Bolt assembly seal
(B) Relief valve spring
(C) Relief valve

3) Remove the bolt assembly seal, valve spring and ball.

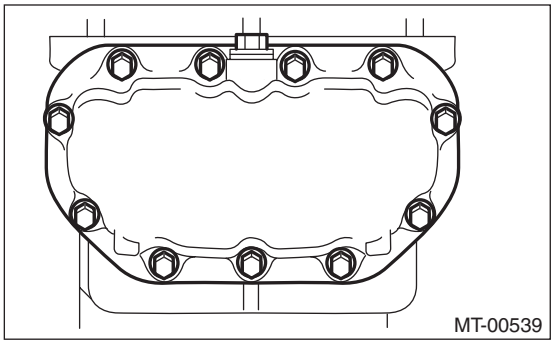


(A) Bolt assembly seal
(B) Valve spring
(C) Ball

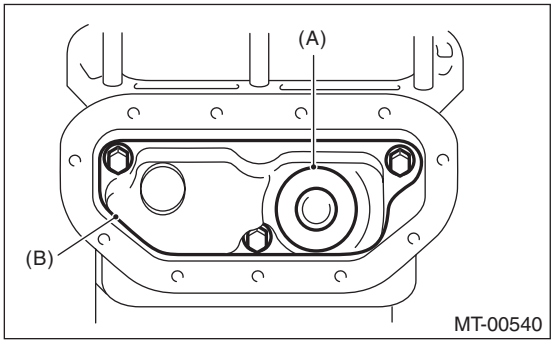
4) Remove the harness bracket.



5) Remove the oil pan.



6) Remove any remaining liquid gasket from the transmission case and oil pan.
7) Remove the oil pan magnet, and remove the oil strainer.

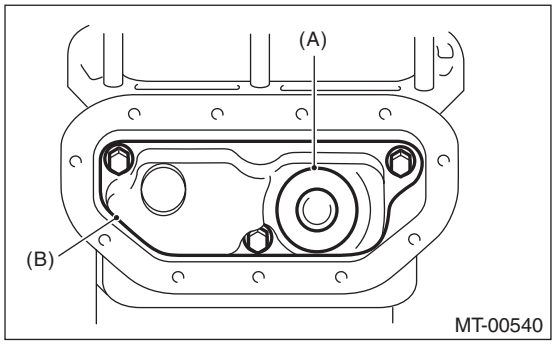


(A) Oil pan magnet
(B) Oil strainer

D: ASSEMBLY

1) Install the oil strainer and magnet.

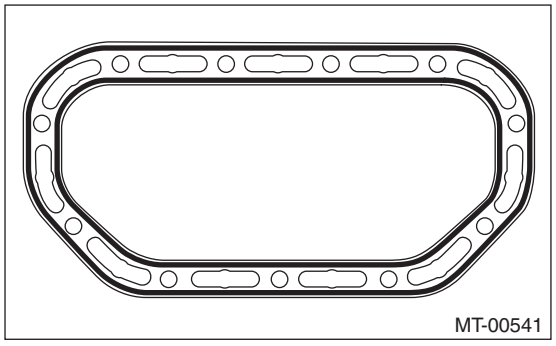
Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



(A) Oil pan magnet
(B) Oil strainer

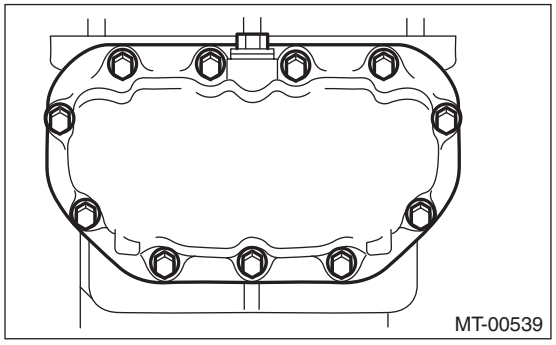
2) Apply liquid gasket to the oil pan.

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



3) Install the oil pan.

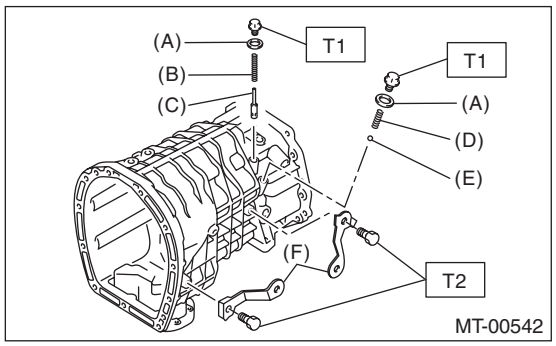
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



4) Install the relief valve, relief valve spring and a new bolt assembly seal.

5) Install the ball, valve spring and a new bolt assembly seal.

Tightening torque:
T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)
T2: 16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) Bolt assembly seal
(B) Relief valve spring
(C) Relief valve
(D) Valve spring
(E) Ball
(F) Harness bracket

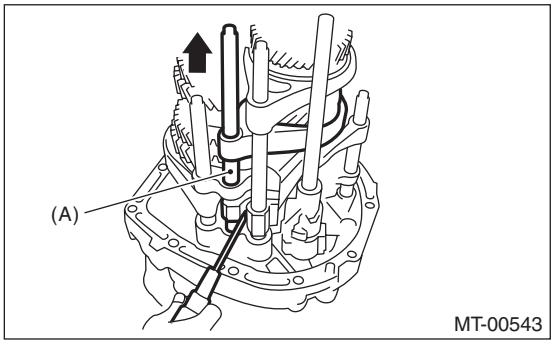
E: INSPECTION

1) If there is sludge on the oil pan magnet, use a waste cloth to wipe it off completely.
2) Inspect that the oil strainer is not clogged. If it is clogged, clean or replace the oil strainer.
3) Check that there is no damage on any parts. Replace damaged parts with new parts.

19.Main Shaft Assembly

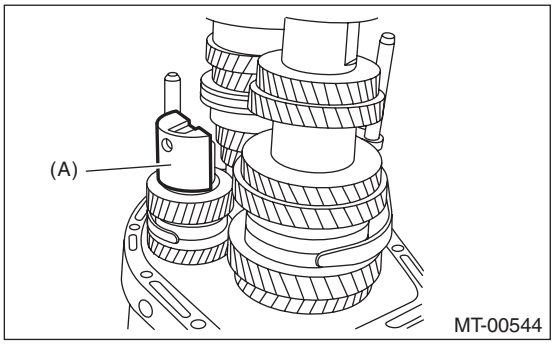
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the striking rod.
10) Use a screw driver to shift to the 4th gear position.



(A) 3rd-4th shift rod

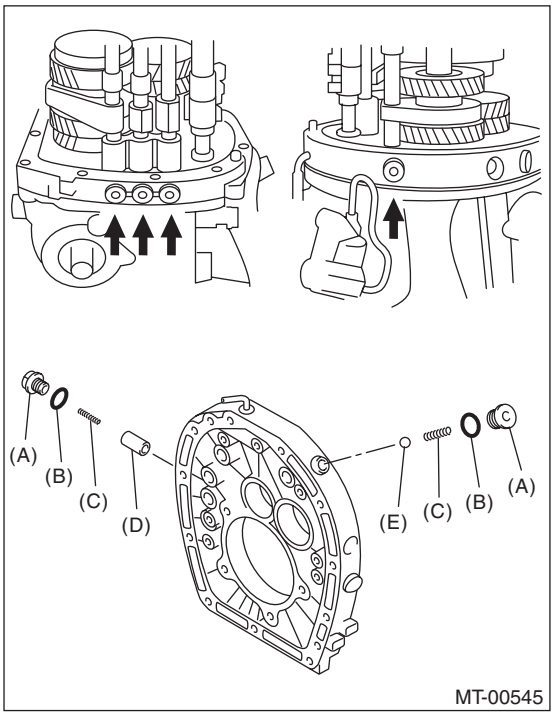
11) Remove the reverse idler holder.



(A) Reverse idler holder

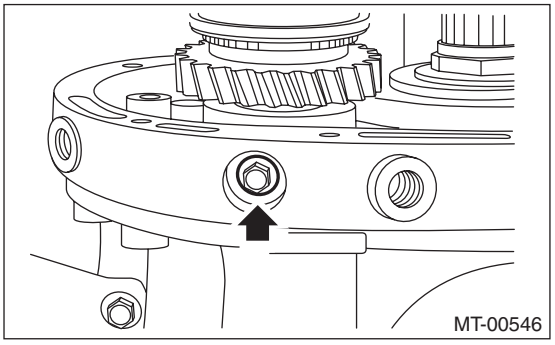
12) Remove the check ball plug, gasket, check ball spring, plunger and ball from the adapter plate.

NOTE:
Use a new gasket.



(A) Checking ball plug
(B) Gasket
(C) Checking ball spring
(D) Plunger
(E) Ball

13) Remove the bolt and gasket holding the reverse idler shaft.

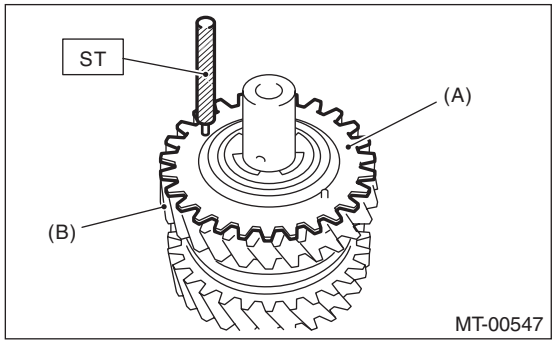


14) Push the main shaft assembly, driven gear assembly, reverse idler gear and shifter forks to remove from the adapter plate all at once.

NOTE:
A helper is required to perform this work.

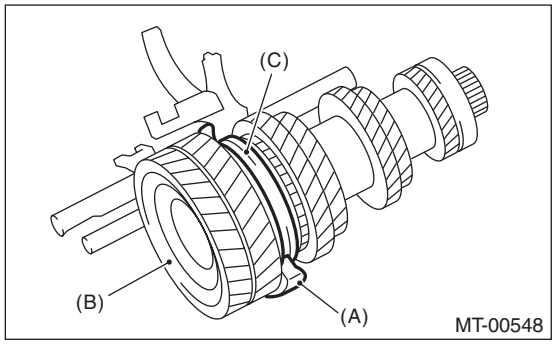
B: INSTALLATION

1) Adjust the 3rd-4th and 5th-6th shifter fork rods. <Ref. to 6MT-115, ADJUSTMENT, Shifter Fork and Rod.>
2) Turn the sub gear counterclockwise for approximately 3 teeth. Match the sub gear and reverse idler gear holes, and insert the ST.
ST 18757AA000 STRAIGHT PIN REMOVER



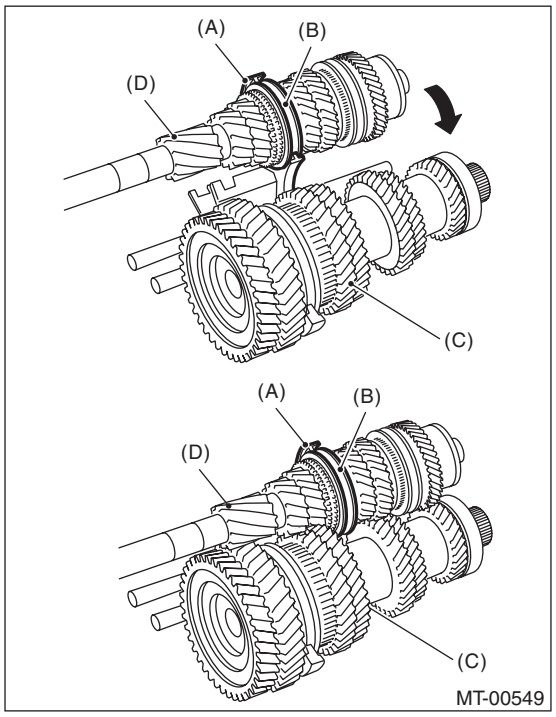
(A) Sub gear
(B) Reverse idler gear

3) Attach the driven gear assembly to the 1st-2nd shifter fork assembly.



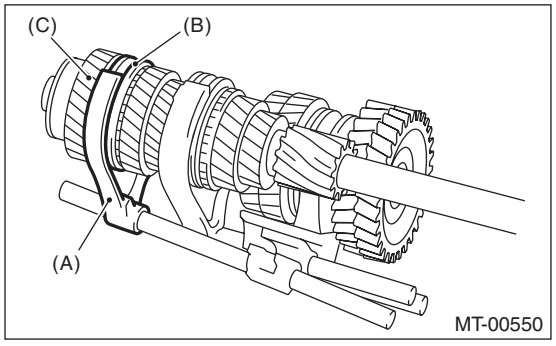
(A) 1st-2nd shifter fork
(B) Driven gear ASSY
(C) 1st-2nd sleeve

4) Attach the main shaft assembly to the 3rd-4th shifter fork, and assemble to the driven gear assembly.



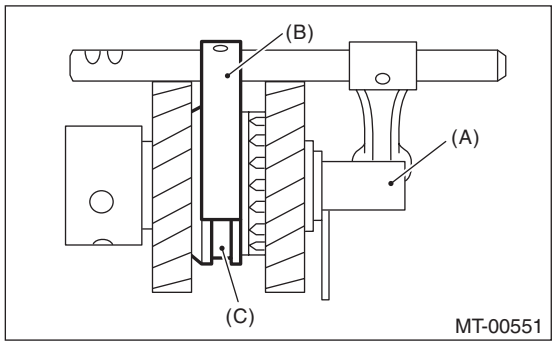
(A) 3rd-4th shifter fork
(B) 3rd-4th sleeve
(C) Driven gear ASSY
(D) Main shaft ASSY

5) Attach the 5th-6th shifter fork assembly to the main shaft assembly.



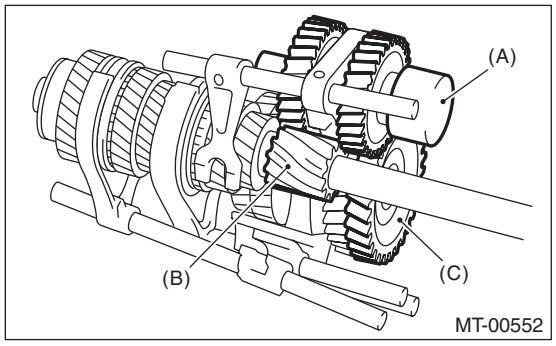
(A) 5th-6th shifter fork
(B) 5th-6th sleeve
(C) Main shaft ASSY

6) Attach the reverse shifter fork assembly to the reverse idler gear assembly.



(A) Reverse idler gear ASSY
(B) Reverse shifter fork
(C) Reverse sleeve

7) Install the reverse idler gear assembly.



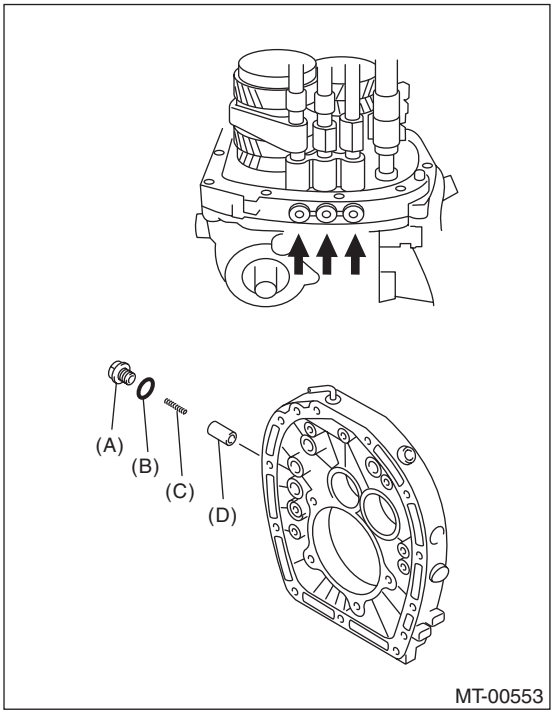
(A) Reverse idler gear ASSY
(B) 1st drive gear
(C) Reverse gear

8) Install the thrust bearing of the driven gear assembly.
9) Push on the shifter forks, main shaft assembly, driven gear assembly and reverse idler gear assemblies, to attach to the adapter plate all at once.

NOTE:
A helper is required to perform this work.

10) Install the plunger, check ball spring, new gaskets and check ball plugs.

Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)

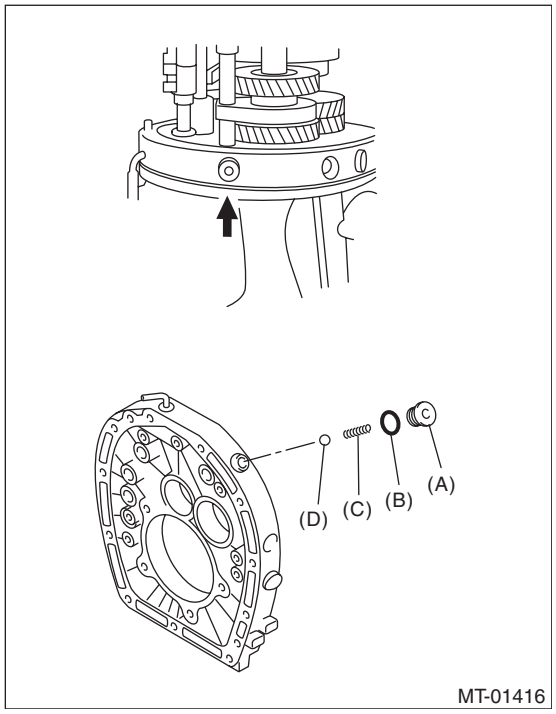


(A) Checking ball plug
(B) Gasket
(C) Checking ball spring
(D) Plunger

11) Install the ball, check ball spring, gaskets and check ball plugs.

NOTE:
Use new gaskets and check ball plugs.

Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)

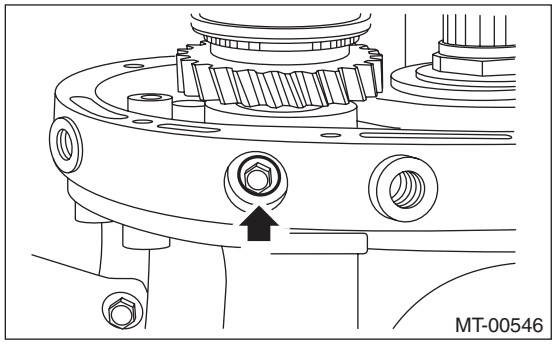


(A) Checking ball plug
(B) Gasket
(C) Checking ball spring
(D) Ball

12) Attach the bolt and gasket.

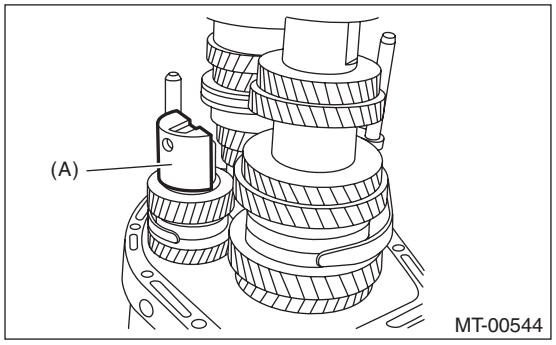
NOTE:
Use a new gasket.

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



13) Use a screw driver to shift to the 4th gear position.

14) Install the reverse idler holder.



(A) Reverse idler holder

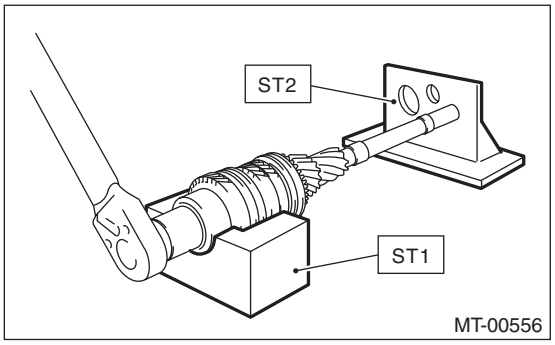
15) Install the striking rod.
16) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
17) Install the selected main shaft snap ring and washers.
18) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
19) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
20) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
21) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
23) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

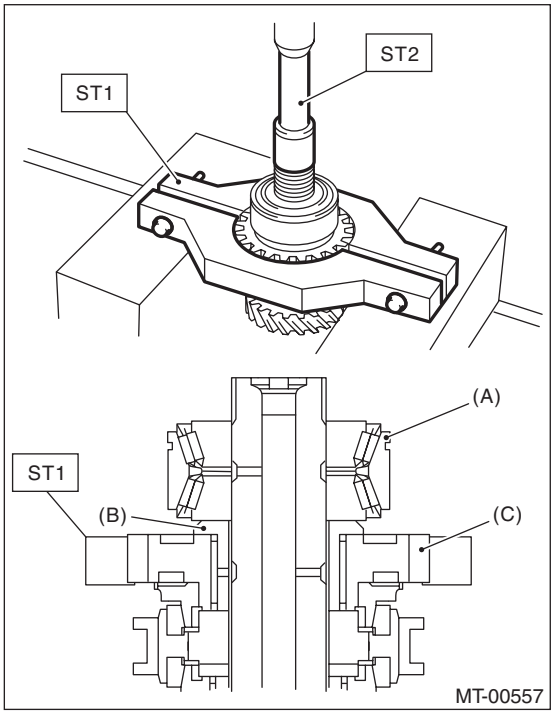
NOTE:
Individual sleeves and hubs meet at a specified position. Before disassembly, mark the meeting position of the sleeve and hub.
1) Affix the ST to the work table.
ST 18664AA000 BASE
2) Flatten the tab of the axle nut.

3) Set the main shaft assembly to the ST, and remove the lock nut and washer.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

NOTE:
Use a 38 mm socket wrench.

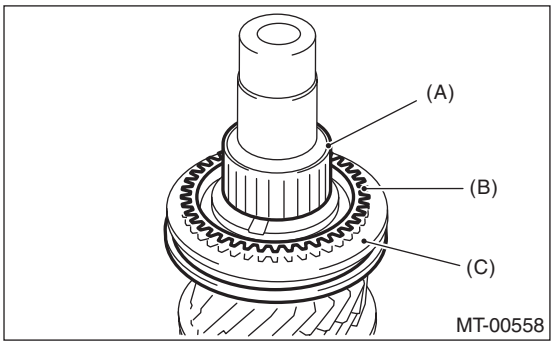


4) Remove the main shaft assembly from the ST.
5) Set the ST1 to the 6th drive gear, and use a press to remove the taper roller bearing, bushing and 6th drive gear.
ST1 18722AA010 REMOVER
ST2 899864100 REMOVER



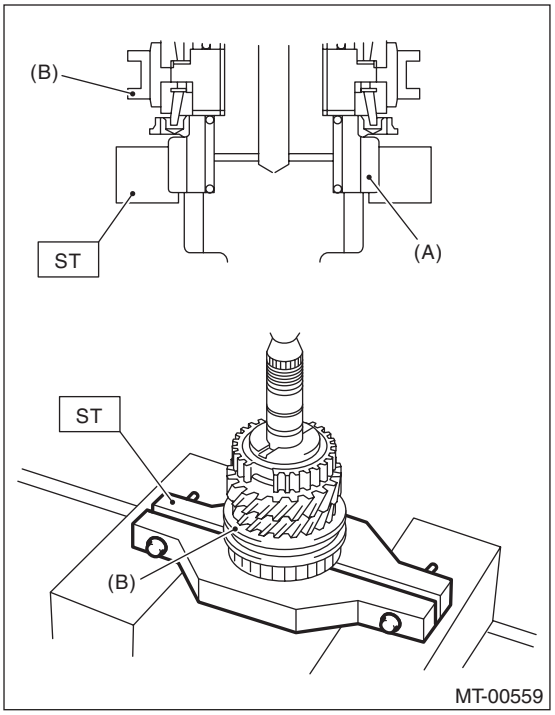
(A) Taper roller bearing
(B) Bushing
(C) 6th drive gear

6) Remove the 5th-6th sleeve, 6th needle bearing and 6th baulk ring.



(A) Needle bearing
(B) 6th baulk ring
(C) 5th-6th sleeve

7) Set the ST to the 3rd drive gear, and use a press to remove individual parts.
ST 18720AA000 REMOVER



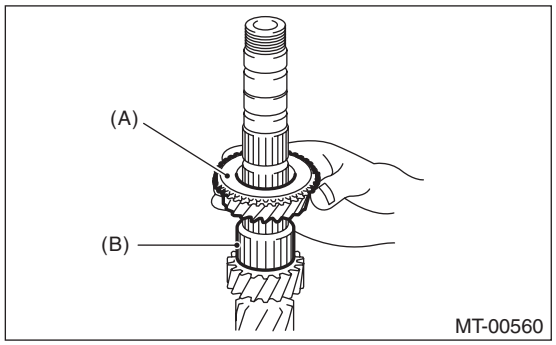
(A) 3rd drive gear
(B) 3rd-4th sleeve

D: ASSEMBLY

NOTE:
When replacing the following parts, replace as a set.
- Sleeve and hub
- Outer baulk ring, 3rd synchro cone and inner baulk ring
- Taper roller bearing

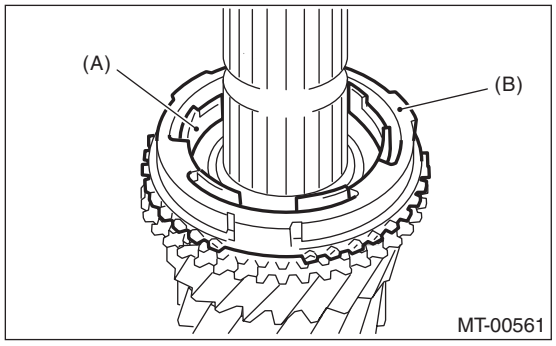
1) Apply adequate gear oil to the main shaft, 3rd needle bearing and 3rd drive gear inner surface.

2) Install the 3rd needle bearing and 3rd drive gear to the main shaft.



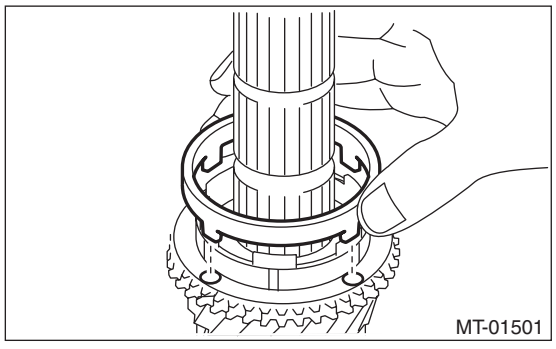
(A) 3rd drive gear
(B) 3rd needle bearing

3) Install the inner baulk ring, 3rd synchro cone and outer baulk ring.

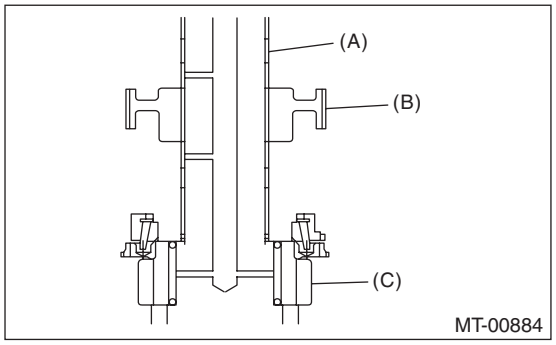


(A) Inner baulk ring
(B) Outer baulk ring

NOTE:
Install the 3rd synchro cone by aligning the protrusion of the 3rd synchro cone with the hole on the 3rd drive gear.

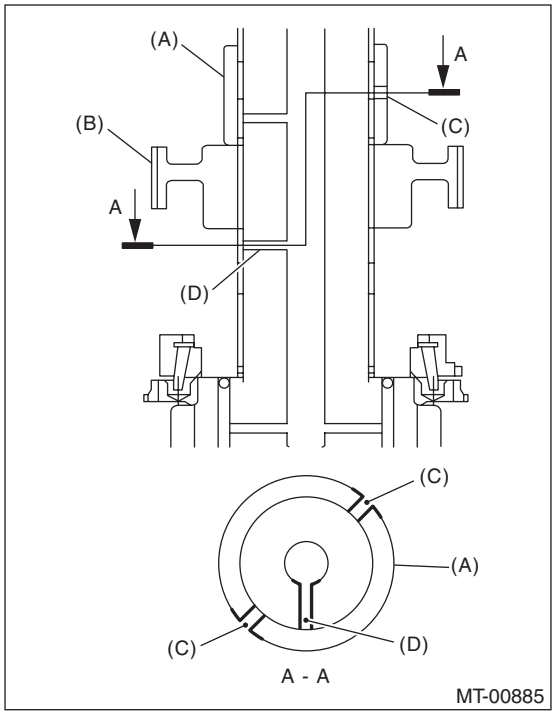


4) Install the 3rd-4th hub and 4th bushing.
(1) Being careful of the install direction of the 3rd-4th hub, set to the main shaft.



(A) Main shaft
(B) 3rd-4th hub
(C) 3rd drive gear

(2) Being careful not to cover the oil holes of the main shaft and 4th bushing, attach to the main shaft.



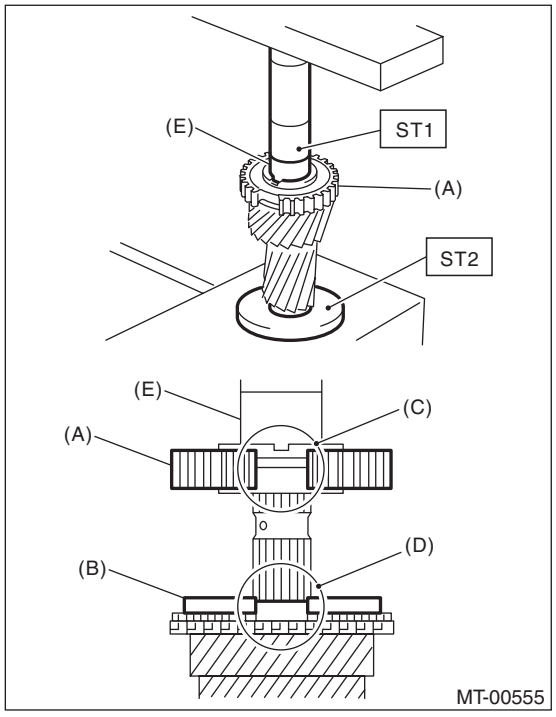
(A) 4th bushing
(B) 3rd-4th hub
(C) 4th bushing oil hole
(D) Main shaft oil hole

(3) Using the ST, push in to the 3rd-4th hub and 4th bushing all at once.

ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
When pushing into the 3rd-4th hub and 4th bushing, move the outer baulk ring to match the protrusion of the outer baulk ring and the cut out on the 3rd-4th bushing.

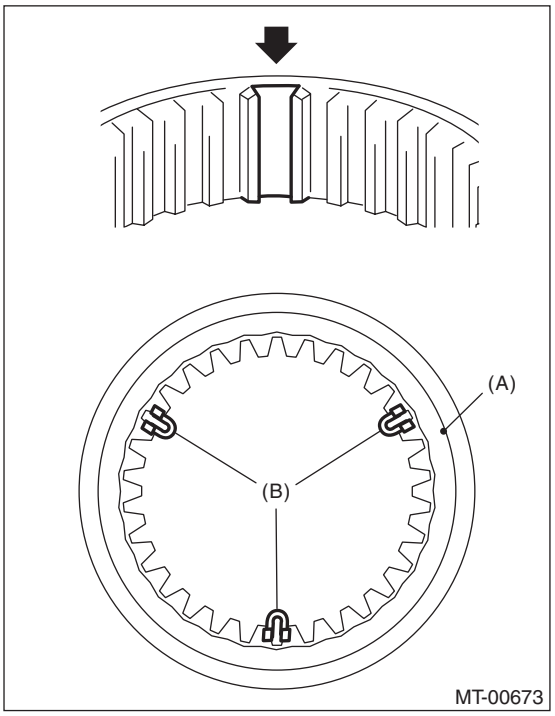


(A) 3rd-4th hub
(B) Outer baulk ring
(C) Cut out on the 3rd-4th hub
(D) Protrusion of the outer baulk ring
(E) 4th bushing

5) Make sure that the 3rd drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

6) Attach the 3rd-4th shifting insert key at the appropriate position of the 3rd-4th sleeve.

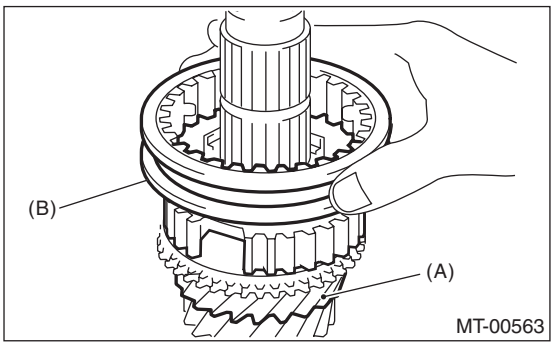
NOTE:
The angle of each shifting insert key is 120°.



(A) 3rd-4th sleeve
(B) 3rd-4th shifting insert key

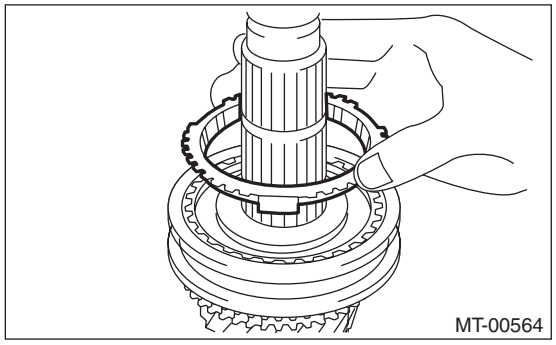
7) Attach the 3rd-4th sleeve to the 3rd-4th hub.

NOTE:
• There is an identification groove on the 3rd-4th sleeve.
• Place the groove towards the 3rd drive gear, and attach the 3rd-4th sleeve.

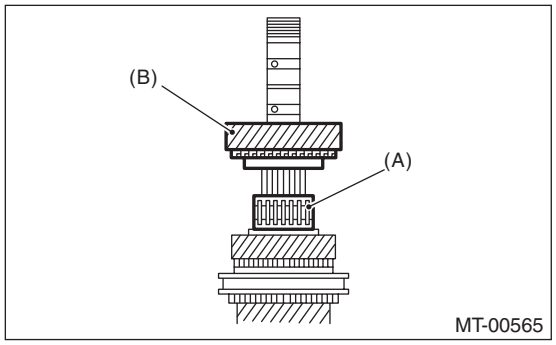


(A) 3rd drive gear
(B) 3rd-4th sleeve identification groove (1 groove)

8) Install the 4th baulk ring.

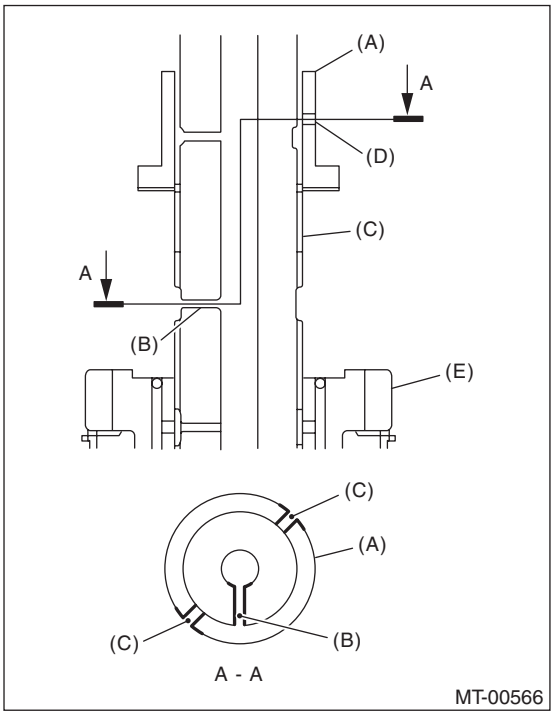


9) Apply adequate gear oil to the main shaft, 4th needle bearing and 4th drive gear inner surface.
10) Install the 4th needle bearing and 4th drive gear.



(A) 4th needle bearing
(B) 4th drive gear

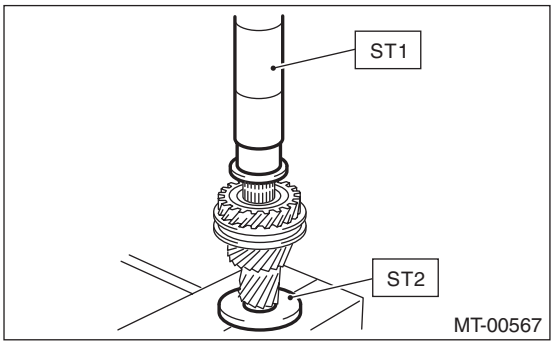
11) Install the 5th bushing.
(1) Being careful not to cover the oil holes of the main shaft and 5th bushing, attach to the main shaft.



(A) 5th bushing
(B) Main shaft oil hole
(C) Main shaft
(D) 5th bushing oil hole
(E) 4th drive gear

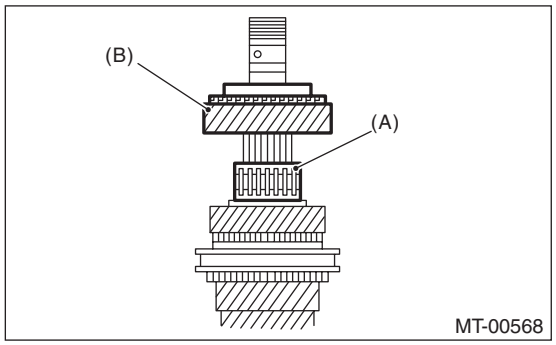
(2) Using the ST, push into the 5th bushing.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



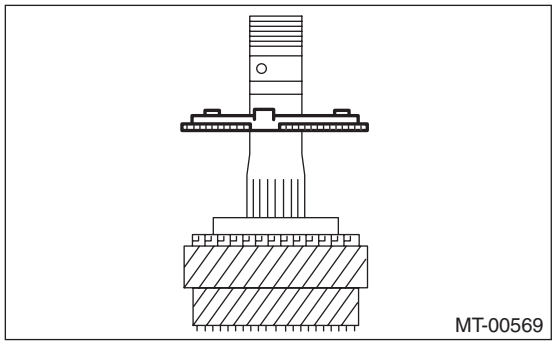
12) Make sure that the 4th drive gear can be turned smoothly by hand. If it does not turn smoothly, re-assemble.
13) Apply adequate gear oil to the main shaft, 5th needle bearing and 5th drive gear inner surface.

14) Install the 5th needle bearing and 5th drive gear.

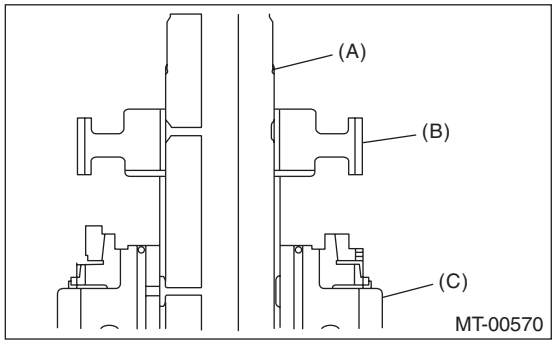


(A) 5th needle bearing
(B) 5th drive gear

15) Install the 5th baulk ring.



16) Install the 5th-6th hub.
(1) Being careful of the install direction of the 5th-6th hub, set to the main shaft.

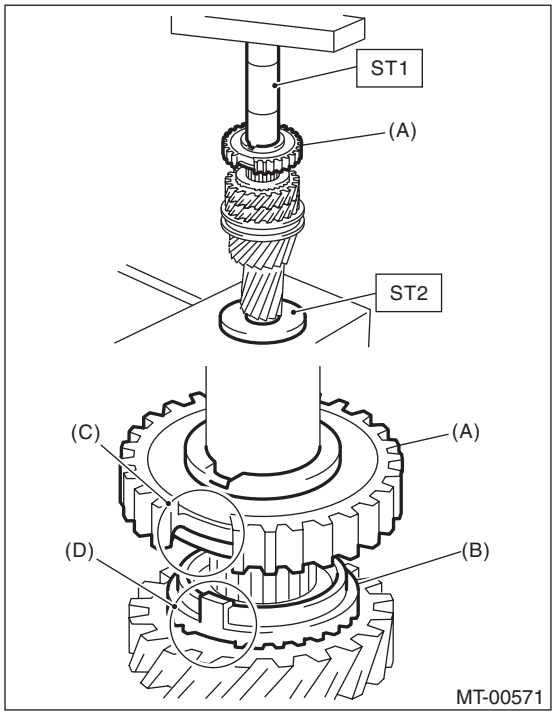


(A) Main shaft
(B) 5th-6th hub
(C) 5th drive gear

(2) Using the ST, push into the 5th-6th hub.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
When pushing into the 5th-6th hub, move the outer baulk ring to match the protrusion of the outer baulk ring and the cut out on the 5th-6th bushing.

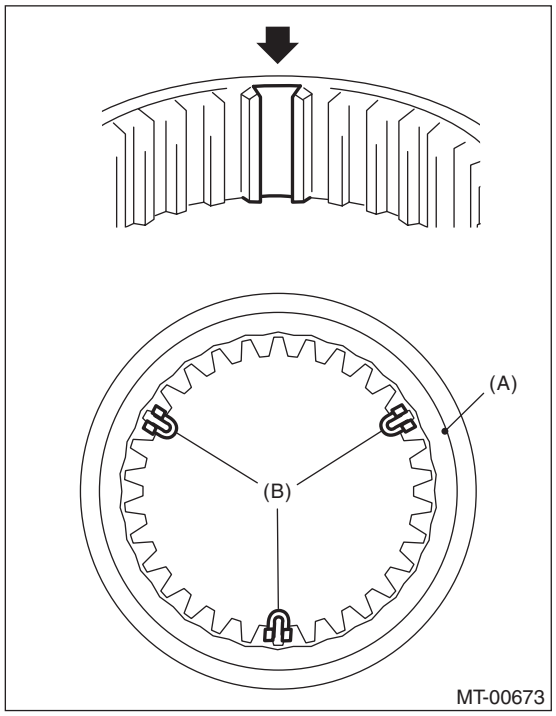


(A) 5th-6th hub
(B) Outer baulk ring
(C) Cut out on the 5th-6th hub
(D) Protrusion of the outer baulk ring

17) Make sure that the 5th drive gear can be turned smoothly by hand. If it does not turn smoothly, re-assemble.

18) Attach the 5th-6th shifting insert key at the appropriate position of the 5th-6th sleeve.

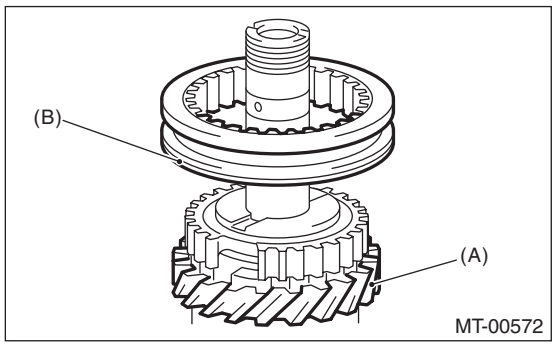
NOTE:
The angle of each shifting insert key is 120°.



(A) 5th-6th sleeve
(B) Shifting insert key

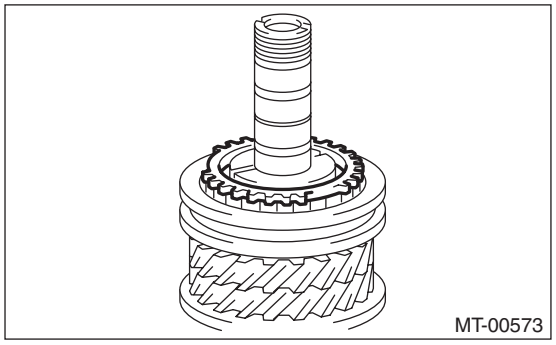
19) Attach the 5th-6th sleeve to the 5th-6th hub.

NOTE:
• There are 2 identification grooves on the 5th-6th sleeve.
• Place the grooves towards the 5th drive gear, and attach the 5th-6th sleeve.

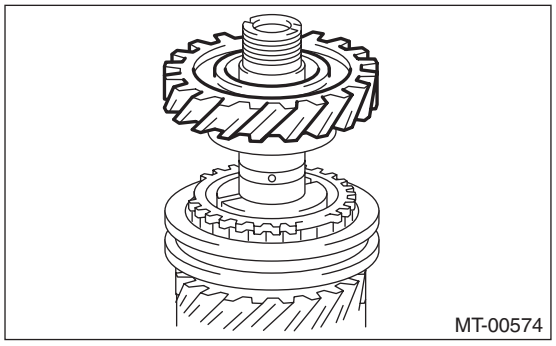


(A) 5th drive gear
(B) 5th-6th sleeve identification groove (2 grooves)

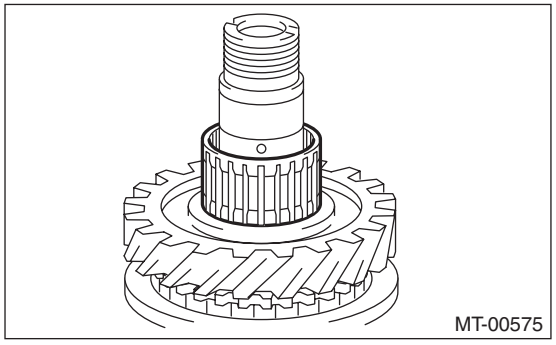
20) Install the 6th baulk ring.



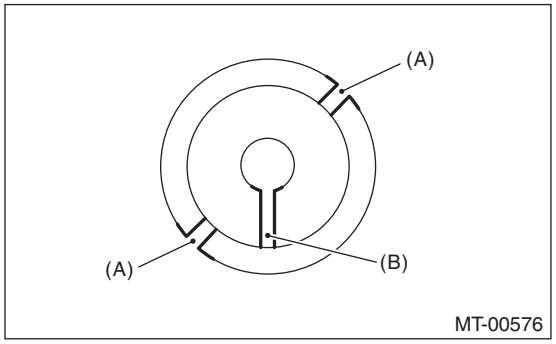
21) Apply adequate gear oil to the main shaft, 6th needle bearing and 6th drive gear inner surface.
22) Install the 6th drive gear.



23) Install the 6th needle bearing.



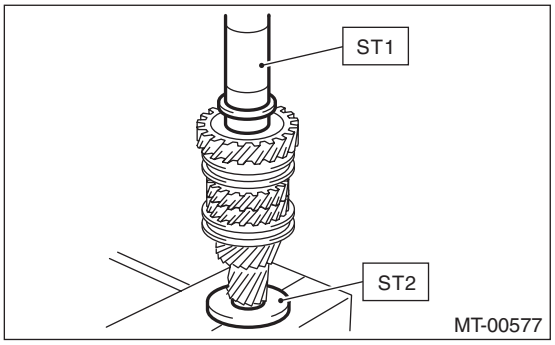
24) Being careful not to cover the oil holes of the 6th bushing and the main shaft, set the 6th bushing to the main shaft.



(A) 6th bushing oil hole
(B) Main shaft oil hole

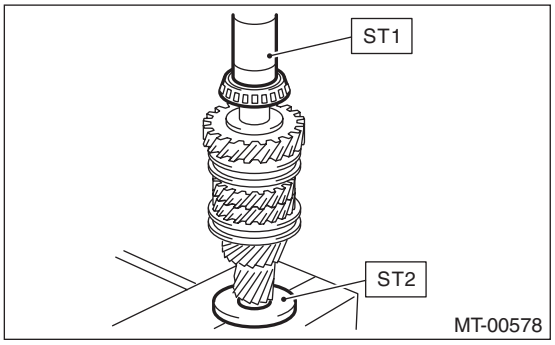
25) Using the ST, install the 6th bushing.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



26) Make sure that the 6th drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.
27) Using the ST, install the inner race of the inner bearing.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

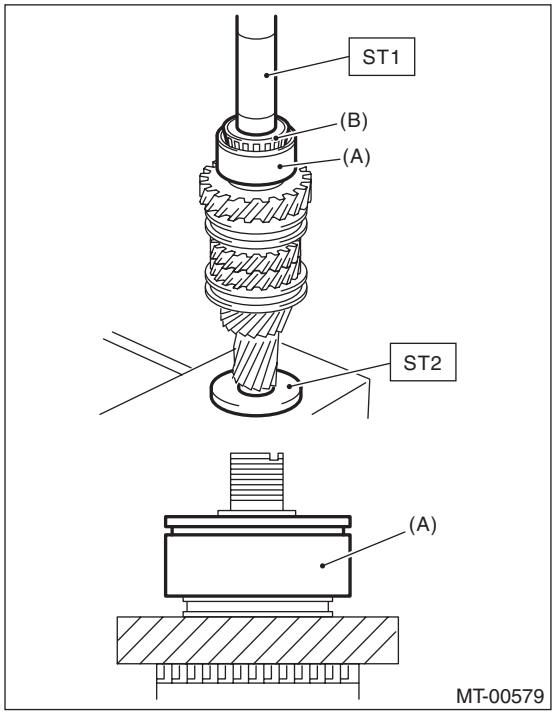
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



28) Using the ST, install the retainer and inner race of the outer bearing.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

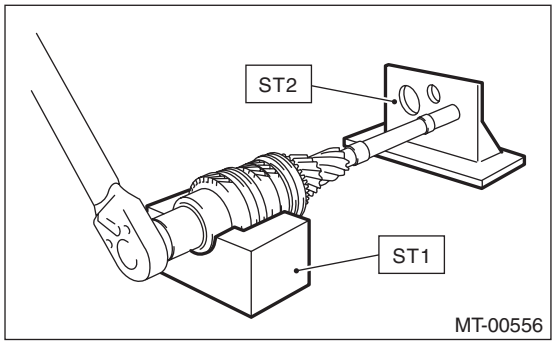
NOTE:
• Confirm that the retainer is installed in the proper direction.
• Push in until there is no backlash on the retainer, or the bearing turns smoothly by hand.



(A) Retainer
(B) Outer bearing inner race

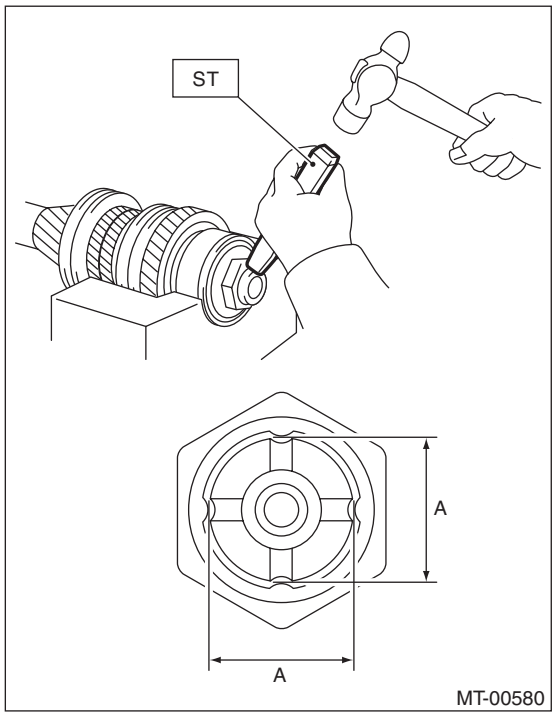
29) Make sure that the taper roller bearing turns smoothly by hand. If it does not rotate smoothly, replace the taper roller bearing as a set, and reassemble.
30) Attach the lock washer and a new lock nut.
31) Set the main shaft assembly to the ST, and tighten the lock nut.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

Tightening torque:
392 N·m (40 kgf-m, 289.1 ft-lb)



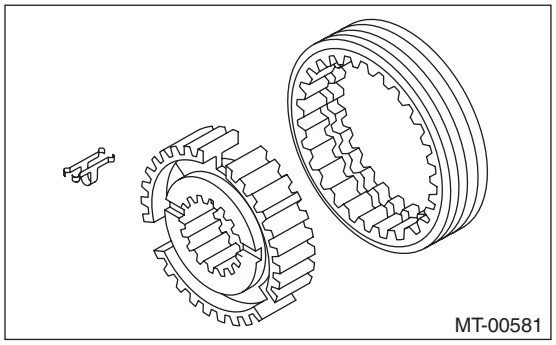
32) Using the ST, crimp the lock nut in 4 locations, with dimensions within A 27±0.3 mm (1.06±0.01 in).
ST 18668AA000 PUNCH

NOTE:
Do not damage the crimp area of the lock nut.



E: INSPECTION

Disassembled parts should be washed with unleaded gasoline first, then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• If there is wear, rusting or damage of the bearings.
• If the bearing does not rotate smoothly or an abnormal noise is emitted when turning.
• When bearing has other defects.
2) Bushing (each gear)
If the sliding surface is damaged or excessively worn, replace the bushing.
3) Gear
Replace gears in the following cases.
• When gear teeth surface is damaged or excessively worn.
• If the contact area of the baulk ring is damaged.
• If the inner face of the gear is worn.
4) Baulk ring, synchro cone
If there is wear, rusting or damage at the baulk ring, replace the baulk ring and synchro cone.
5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.

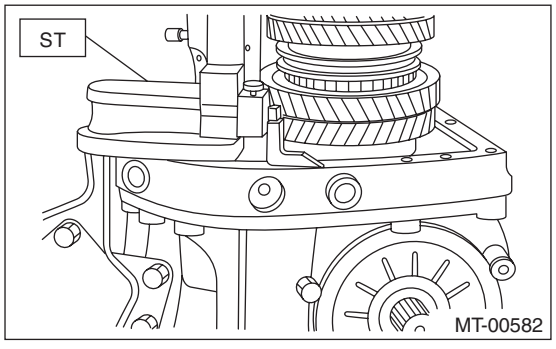


F: ADJUSTMENT

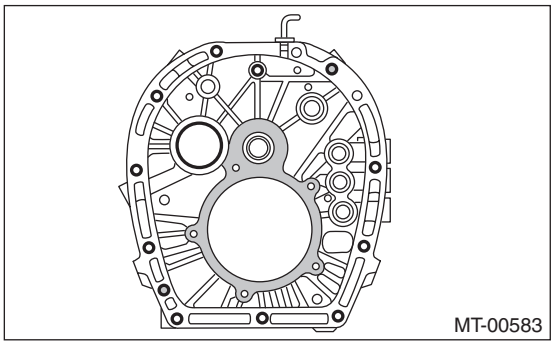
1. MAIN SHAFT SNAP RING & WASHER SELECTION

NOTE:
In the following conditions, perform adjustments according to the procedures below.
• When the driven gears from 1st to 6th have been replaced.
• When the 1st and 2nd synchro ring assembly are replaced.
• When the ball bearing is replaced.
• When the adapter plate is replaced.
• When the driven shaft is replaced.
1) Insert the drive pinion assembly into the adapter plate.

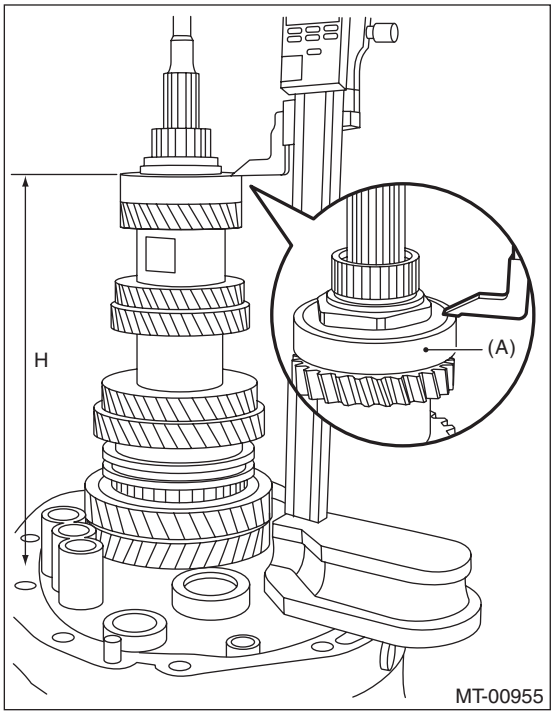
NOTE:
Confirm that the thrust bearing outer race has not been removed and the drive pinion is not lifted.
2) Set the height gauge to the adapter plate. Lower the height gauge indicator to the mating surface of the adapter plate and case, and set to 0 points.
ST 18853AA000 HEIGHT GAUGE



NOTE:
• The adapter plate will be the base point for the measurement. Use a scraper to remove any gasket material remaining on the end face.
• During measurement, do not place the height gauge in the shaded area shown in the figure.

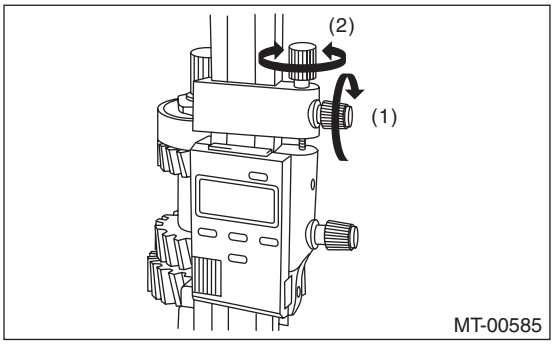


3) Measure the height to the ball bearing end face (height H).



(A) Ball bearing

NOTE:
• Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the end face of the bearing.



• Turn approximately 120° at a time, and measure the ball bearing in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.
4) According to the measurement value, select the snap ring and washer from the following table.
• Snap ring

H: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	805072010	1.65 (0.065)
271.41 — 271.98 (10.69 — 10.71)	805072011	1.95 (0.077)
271.99 — 272.56 (10.71 — 10.73)	805072012	2.25 (0.089)

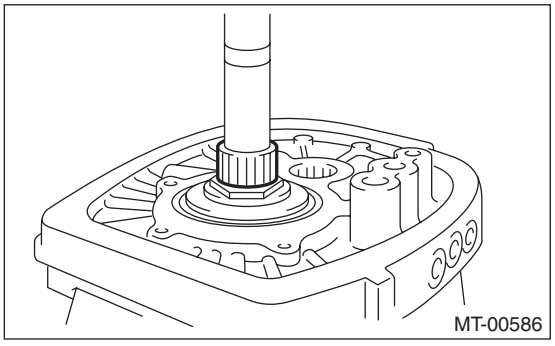
• Washer

H: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	803067012	1.6 (0.063)
271.41 — 271.98 (10.69 — 10.71)	803067011	1.3 (0.051)
271.99 — 272.56 (10.71 — 10.73)	803067010	1.0 (0.039)

20.Driven Gear Assembly

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the driven gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
10) Remove the 1st needle bearing.

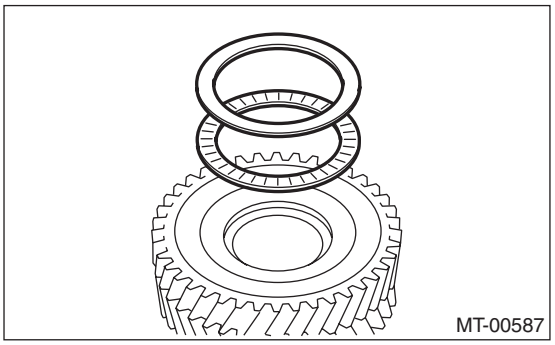

MT-00586

11) Remove the thrust needle bearing.

B: INSTALLATION

1) Adjust the main shaft snap ring. <Ref. to 6MT-80, ADJUSTMENT, Main Shaft Assembly.>
2) Adjust the 1st-2nd shifter rod. <Ref. to 6MT-115, ADJUSTMENT, Shifter Fork and Rod.>
3) Install the thrust needle bearing.

NOTE:
Confirm that the thrust needle bearing is installed in the proper direction.

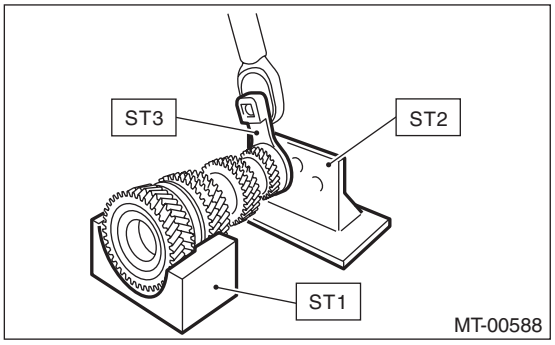

MT-00587

4) Install the 1st needle bearing.
5) Install the driven gear assembly. <Ref. to 6MT-70, INSTALLATION, Main Shaft Assembly.>
6) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
7) Adjust the backlash of the driven gear assembly in the axial direction. <Ref. to 6MT-89, ADJUSTMENT, Driven Gear Assembly.>
8) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
9) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
10) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
11) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
13) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

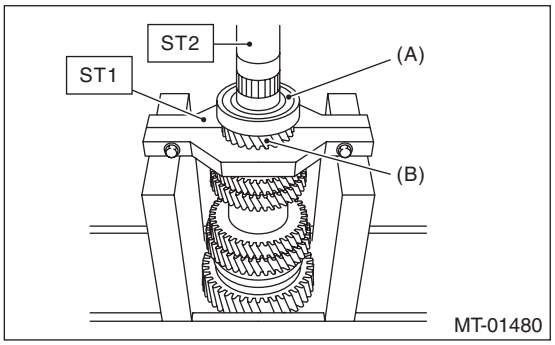
C: DISASSEMBLY

NOTE:
Individual sleeves and hubs meet at a specified position. Before disassembly, mark the meeting position of the sleeve and hub.
1) Affix the ST to the work table.
ST 18664AA000 BASE
2) Lift the crimped tab of the lock nut.

3) Attach ST3 to the lock nut, set the driven gear assembly to the ST, and remove the lock nut and washer.
ST1 18666AA000 HOLDER
ST2 18664AA000 BASE
ST3 18620AA000 ADAPTER WRENCH

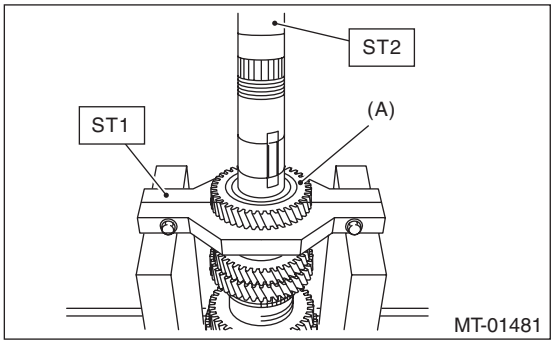


4) Attach ST1 to the 6th gear, then remove the ball bearing and 5th-6th driven gear.
ST1 18723AA000 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



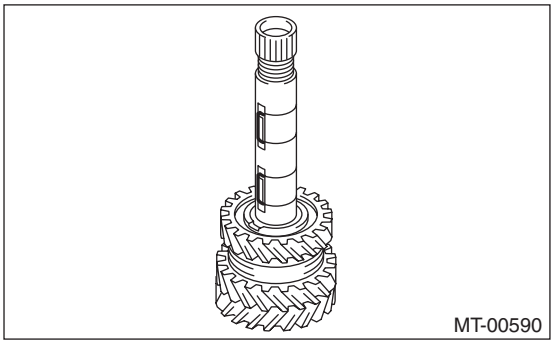
(A) Ball bearing
(B) 5th-6th driven gear

5) Attach ST1 to the 4th gear, then remove the 3rd-4th driven gear.
ST1 18723AA000 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

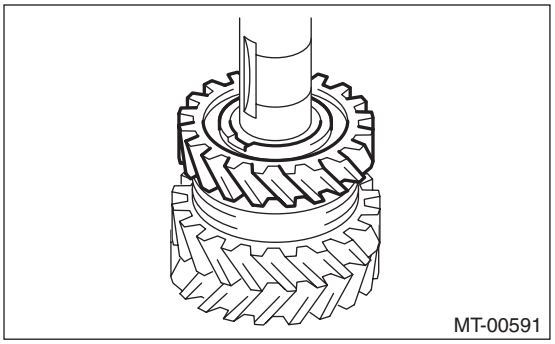


(A) 3rd-4th driven gear

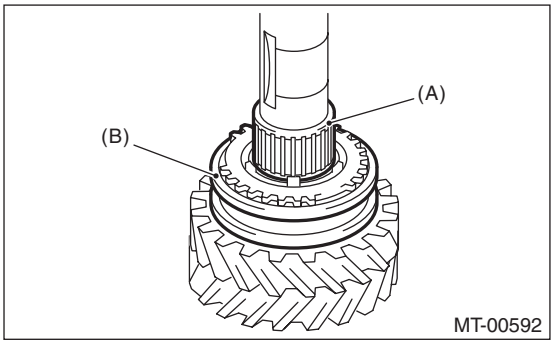
6) Remove the driven gear key.



7) Remove the 2nd gear.

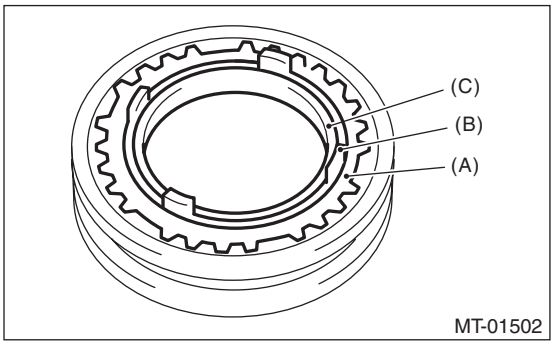


8) Remove the needle bearing and 1st-2nd sleeve.



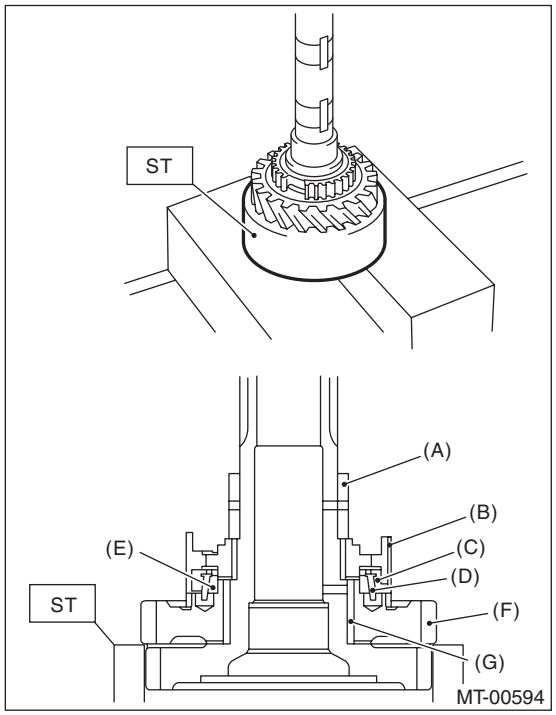
(A) Needle bearing
(B) 1st-2nd sleeve

9) Remove the outer baulk ring, 2nd synchro cone and inner baulk ring.



(A) Outer baulk ring
(B) 2nd synchro cone
(C) Inner baulk ring

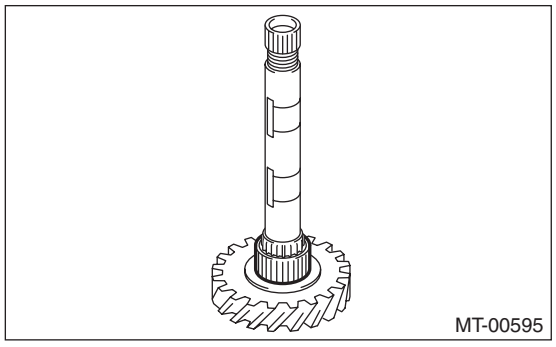
10) Using the ST, remove individual parts.
ST 18754AA000 REMOVER



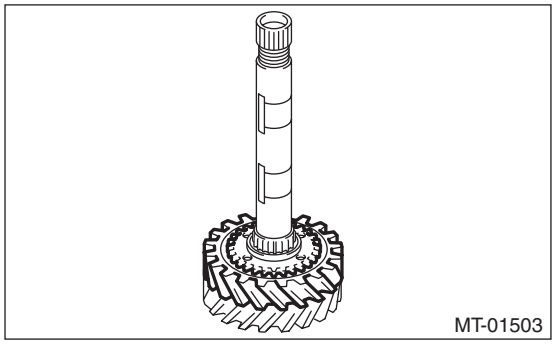
(A) 2nd bushing
(B) 1st-2nd hub
(C) Outer baulk ring
(D) 1st synchro cone
(E) Inner baulk ring
(F) 1st driven gear
(G) 1st needle bearing

D: ASSEMBLY

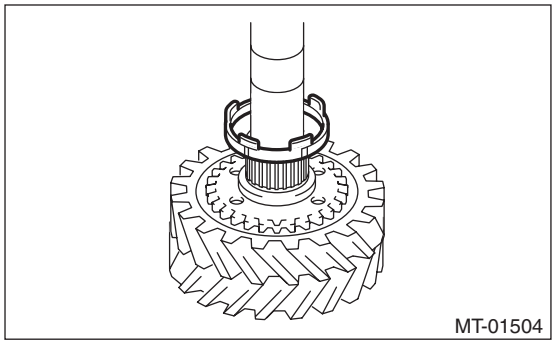
NOTE:
When replacing the following parts, replace as a set.
• Sleeve and hub
• Outer baulk ring, 1st synchro cone and inner baulk ring
• Outer baulk ring, 2nd synchro cone and inner baulk ring
1) Apply adequate gear oil to the main shaft, 1st needle bearing and 1st drive gear inner surface.
2) Install the 1st needle bearing.



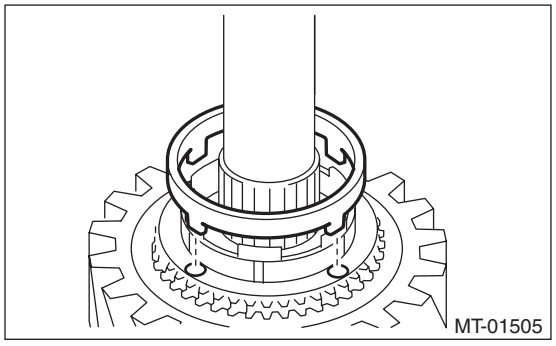
3) Attach the 1st driven gear to the driven shaft.



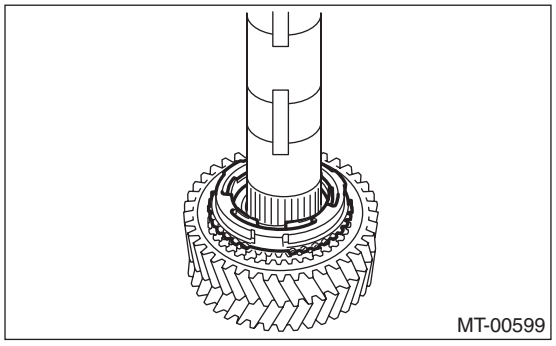
4) Install the inner baulk ring.



5) Match the protrusion of the 1st synchro cone to the hole of the 1st drive gear, then install.

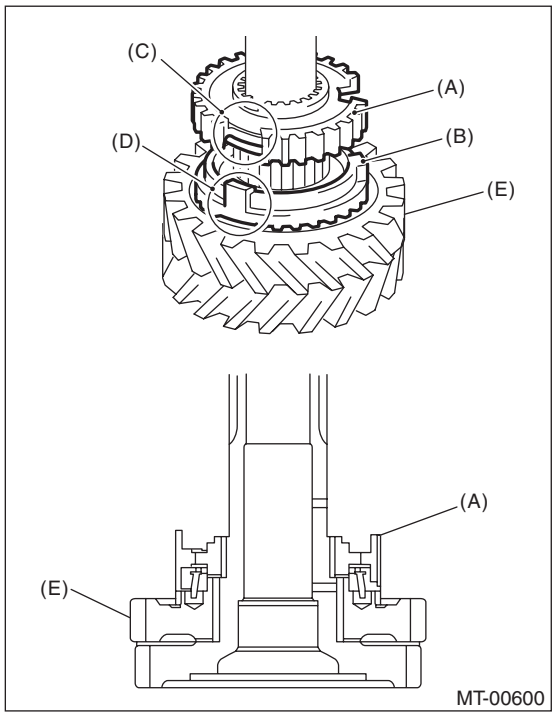


6) Install the outer baulk ring.



7) Install the 1st-2nd hub.

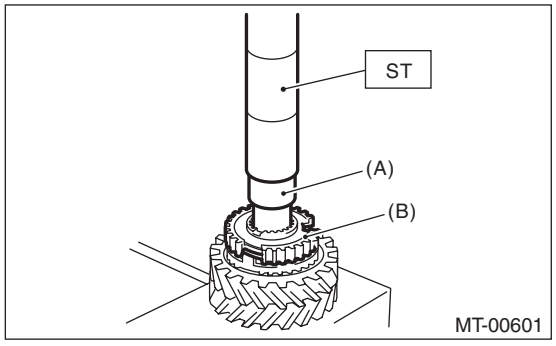
NOTE:
• Match the cut out of the 1st-2nd hub with the protrusion on the outer baulk ring, then install.
• Make sure that the 1st-2nd hub is installed in the correct direction.



(A) 1st-2nd hub
(B) Outer baulk ring
(C) 1st-2nd hub cut out section
(D) Protrusion of the outer baulk ring
(E) 1st driven gear

8) Using the ST, install the 2nd hub.
ST 18654AA000 INSTALLER

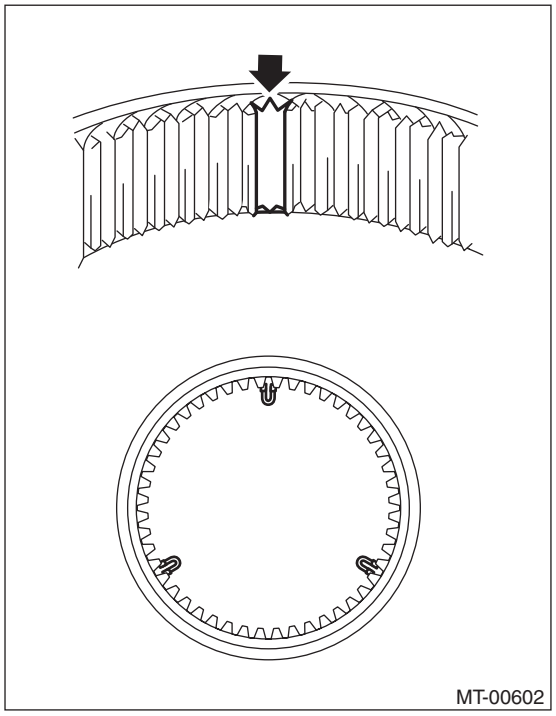
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



(A) 2nd bushing
(B) 1st-2nd hub

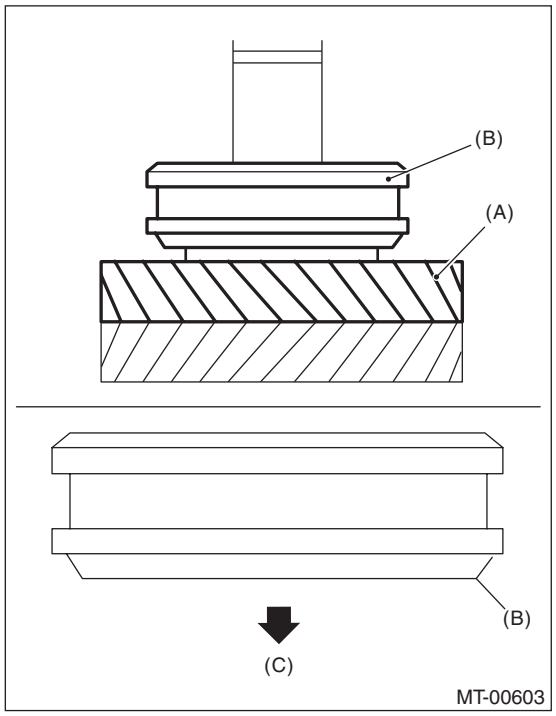
9) Make sure that the 1st drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.
10) Attach the shifting insert key to the appropriate position of the 1st-2nd sleeve.

NOTE:
The angle of each shifting insert key is 120°.



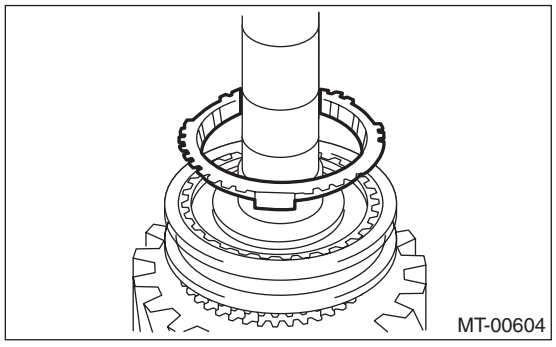
11) Attach the 1st-2nd sleeve to the 1st-2nd hub.

NOTE:
Make sure that the 1st-2nd sleeve is installed in the correct direction.

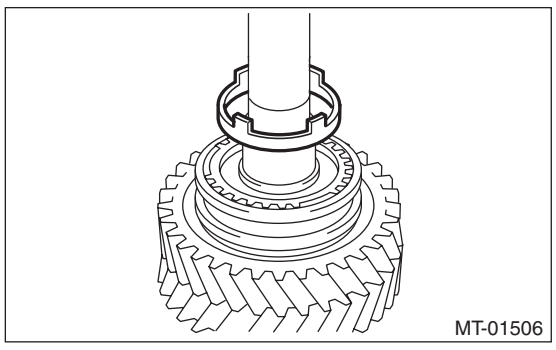


(A) 1st driven gear
(B) 1st-2nd sleeve
(C) 1st driven gear side

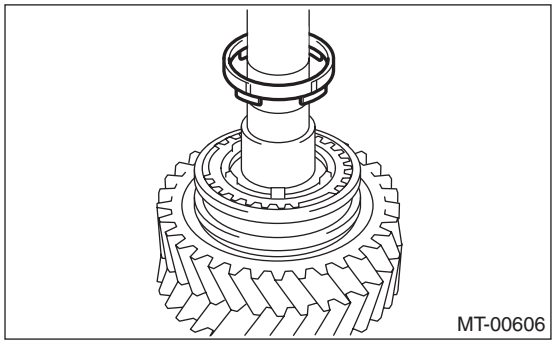
12) Install the outer baulk ring.



13) Install the 2nd synchro cone.

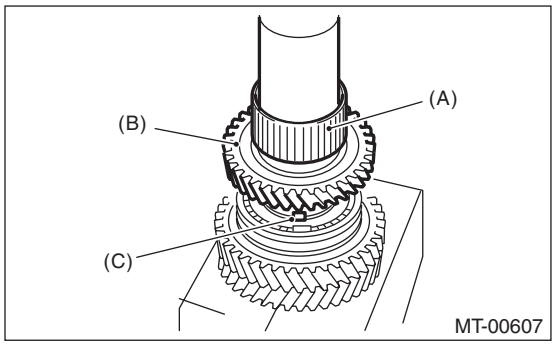


14) Install the inner baulk ring.



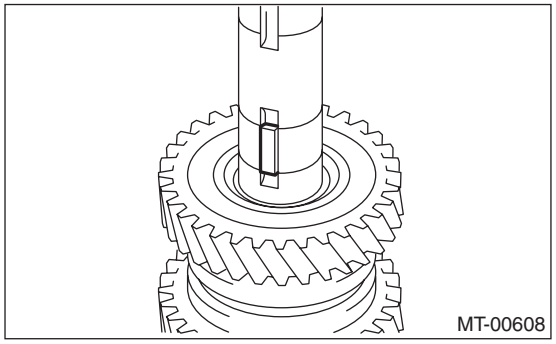
15) Apply adequate gear oil to the bushing, 2nd needle bearing and 2nd drive gear inner surface.
16) Install the 2nd needle bearing and 2nd driven gear.

NOTE:
Match the protrusion of the 2nd synchro cone to the hole of the 2nd driven gear, then install.



(A) 2nd needle bearing
(B) 2nd driven gear
(C) Protrusion of the 2nd synchro cone

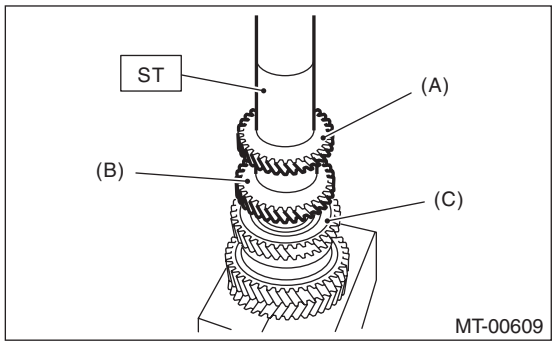
17) Attach the key.



18) Using the ST, install the 3rd-4th driven gear.
ST 18654AA000 INSTALLER

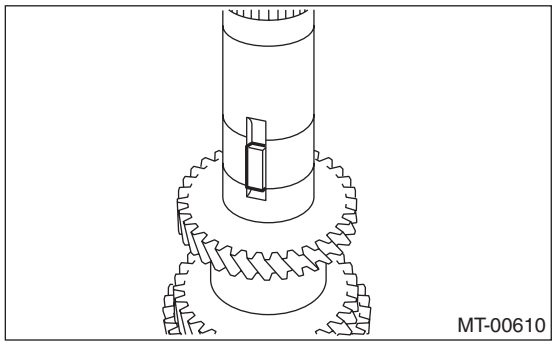
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
• Make sure that the 3rd-4th driven gear is installed in the correct direction.
• Match the groove on the 3rd-4th driven gear to the key.



(A) 4th gear
(B) 3rd gear
(C) 2nd gear

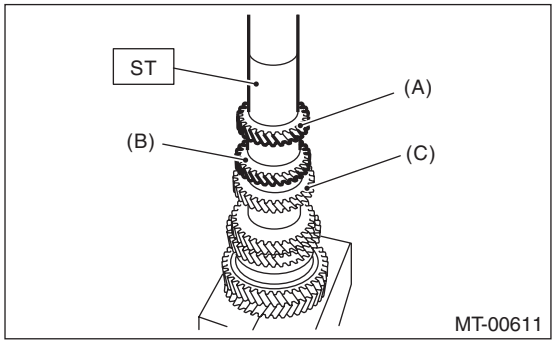
19) Make sure that the 2nd driven gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.
20) Attach the key.



21) Using the ST, install the 5th-6th driven gear.
ST 18654AA000 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
• Make sure that the 5th-6th driven gear is installed in the correct direction.
• Match the groove on the 5th-6th driven gear to the key.

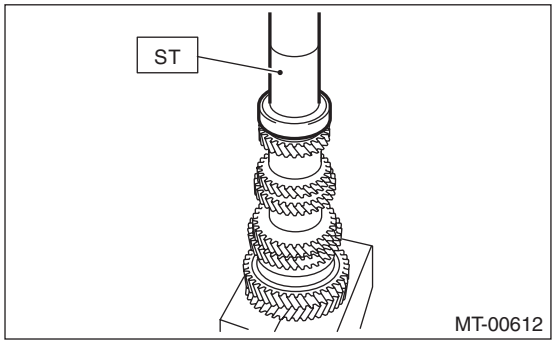


(A) 6th gear
(B) 5th gear
(C) 4th gear

22) Using the ST, install the ball bearing.
ST 18654AA000 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

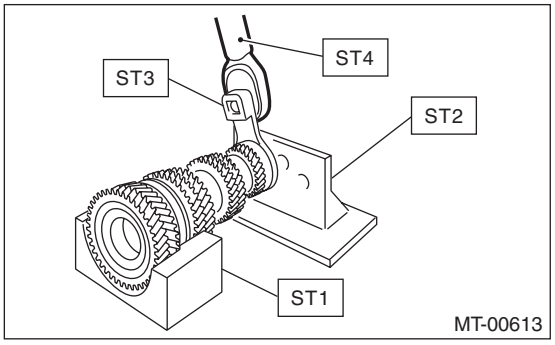
NOTE:
Confirm that the ball bearing is installed in the proper direction.



23) Make sure that the ball bearing turns smoothly by hand. If it does not turn smoothly, reassemble.
24) Install a new lock nut.

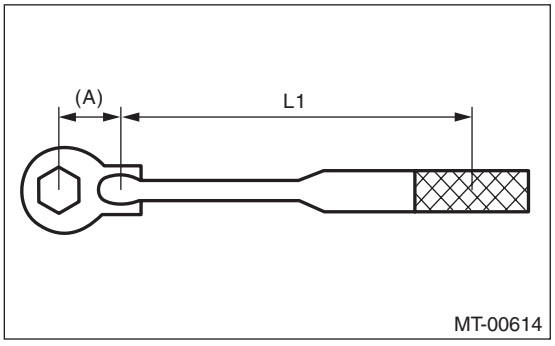
25) Attach ST3 to the lock nut, attach ST1 and ST2 to the driven gear assembly, and tighten the lock nut.
ST1 18666AA000 HOLDER
ST2 18664AA000 BASE
ST3 18620AA000 ADAPTER WRENCH
ST4 18852AA000 TORQUE WRENCH

Tightening torque:
530 N·m (54.0 kgf-m, 391 ft-lb)



NOTE:
When using a torque wrench other than ST4, use the calculation below to calculate and tighten the lock nut.
T = L1 / (0.1 + L1) × 570

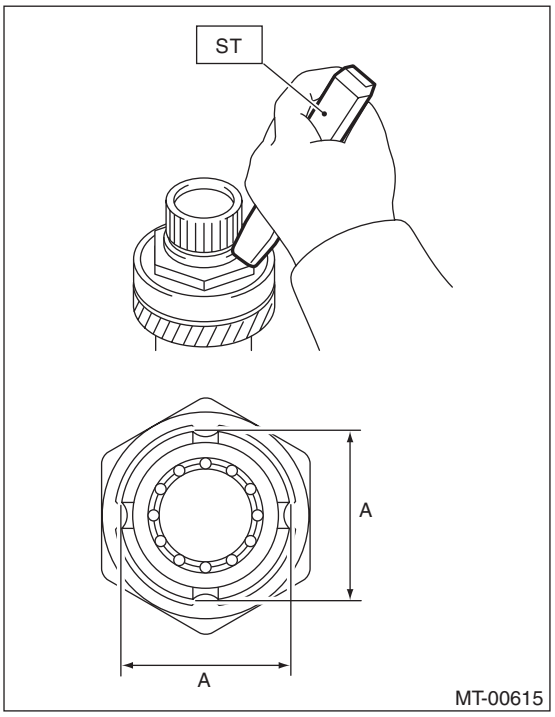
T N·m (kgf-m, ft-lb)	Torque wrench setting
L1 m (in)	Torque wrench length
0.1 m (3.94 in)	Length of ST
570 N·m (58.1 kgf-m, 420 ft-lb)	Tightening torque (lock nut):



(A) 0.1 m (3.94 in)

26) Using the ST, crimp the lock nut in 4 locations, with dimensions within A 44±0.5 mm (1.73±0.02 in).
ST 18669AA000 PUNCH

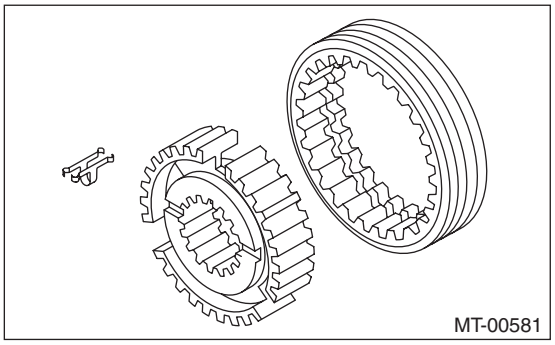
NOTE:
Do not damage the crimp area of the lock nut.



E: INSPECTION

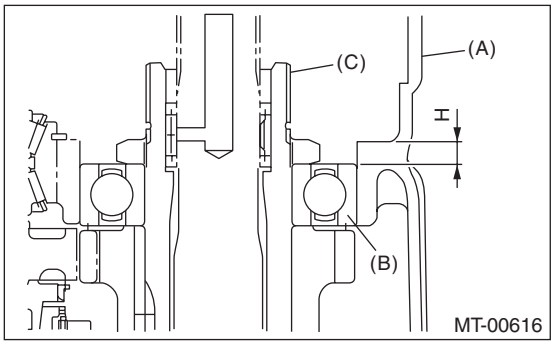
Disassembled parts should be washed with unleaded gasoline first, then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• If there is wear, rusting or damage of the bearings.
• If the bearing does not rotate smoothly or an abnormal noise is emitted when turning.
• When bearing has other defects.
2) Bushing (each gear)
If the sliding surface is damaged or excessively worn, replace the bushing.
3) Gear
Replace gears in the following cases.
• When gear teeth surface is damaged or excessively worn.
• If the contact area of the baulk ring is damaged.
• If the inner face of the gear is worn.
4) Baulk ring, synchro cone
If there is wear, rusting or damage at the baulk ring, replace the baulk ring and synchro cone.

5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



F: ADJUSTMENT

1) Measure the length “H” from the transmission case and oil pump cover mating surface, to the end face of the ball bearing.



(A) Transmission case
(B) Ball bearing
(C) Driven gear ASSY

2) Using the following calculation, calculate the thickness of the driven gear assembly washer.
T = H – {5.8±0.05 mm (0.23±0.002 in)} – {0.1 — 0.3 mm (0.0039 — 0.0118 in)}

t	Washer thickness
H	Length from the transmission case and oil pump cover mating surface to the end face of the ball bearing
5.8±0.05 mm (0.23±0.002 in)	Collar thickness
0.1 — 0.3 mm (0.0039 — 0.0118 in)	Driven gear assembly axial direction backlash standard

3) Select 0 to 3 washers from the following table, and adjust to the backlash that is closest to the standard value.

Driven gear assembly axial direction backlash standard:
0.1 — 0.3 mm (0.0039 — 0.0118 in)

Washer	
Part No.	Thickness t mm (in)
803072030	0.15 (0.0059)
803072031	0.30 (0.0118)
803072032	0.45 (0.0177)
803072033	0.60 (0.0236)

21.Reverse Idler Gear

A: REMOVAL

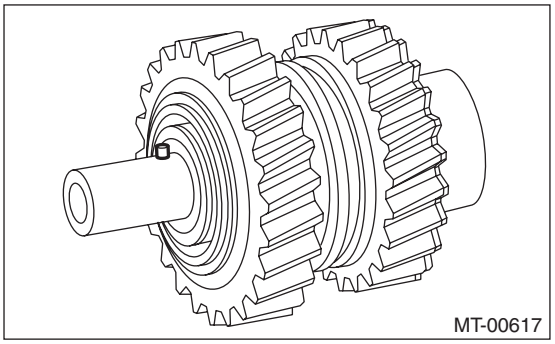
1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the reverse idler gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>

B: INSTALLATION

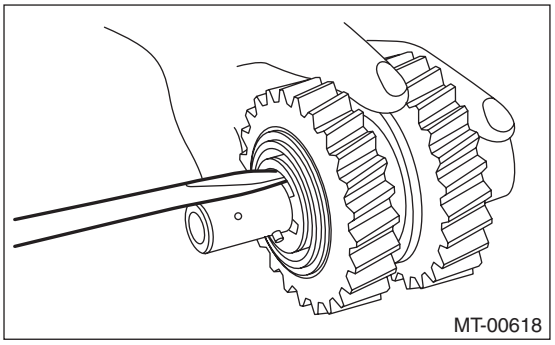
1) Select the reverse fork rod. <Ref. to 6MT-115, ADJUSTMENT, Shifter Fork and Rod.>
2) Install the reverse idler gear assembly. <Ref. to 6MT-70, INSTALLATION, Main Shaft Assembly.>
3) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
4) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
5) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
6) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
7) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
8) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
9) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

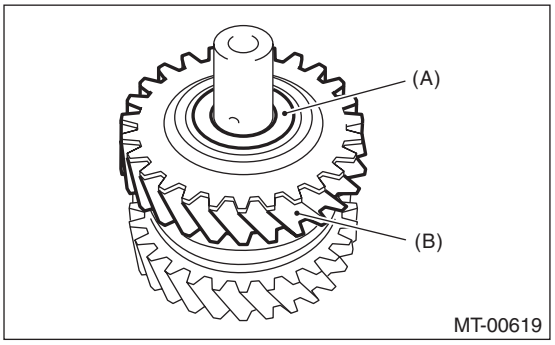
NOTE:
Sleeves and reverse gears meet at a specified position. Before disassembly, mark the meeting position of the sleeve and hub.
1) Remove the spring pin.



2) Remove the snap ring and washer.

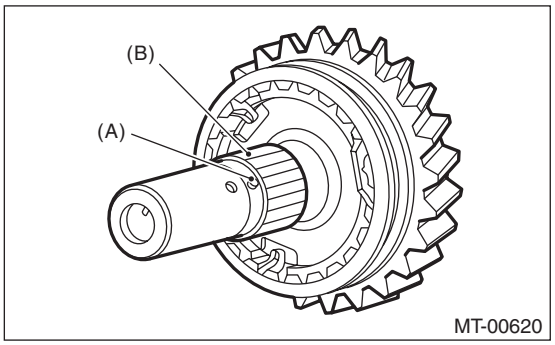


3) Remove the counter high & low washer and reverse idler gear.



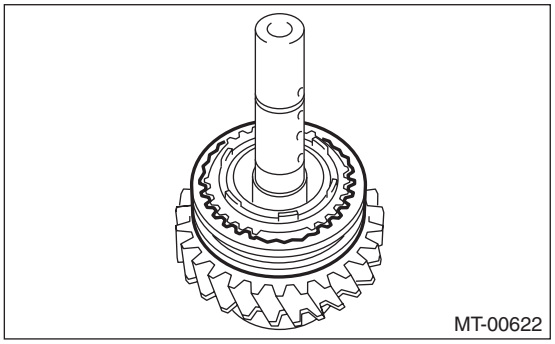
(A) Counter high and low washer
(B) Reverse idler gear

4) Remove the knock pin and reverse idler gear needle bearing.

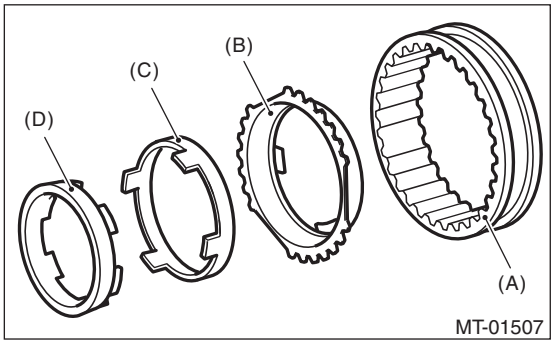


(A) Knock pin
(B) Reverse idler gear needle bearing

5) Remove the collar.
6) Remove the reverse sleeve.

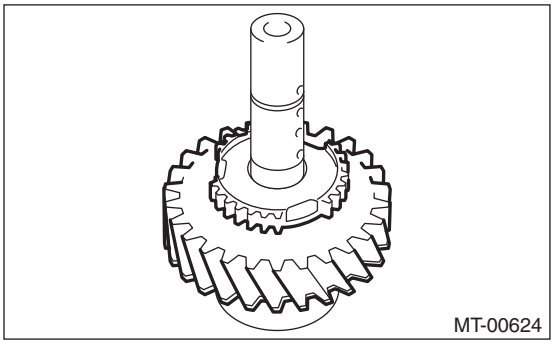


7) Remove the outer baulk ring, reverse synchro cone and inner baulk ring from the reverse sleeve.

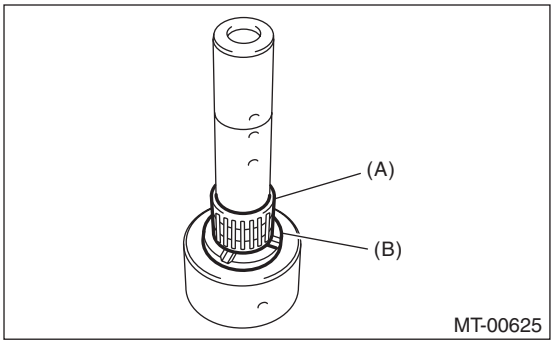


(A) Reverse sleeve
(B) Outer baulk ring
(C) Reverse synchro cone
(D) Inner baulk ring

8) Remove reverse idler gear No. 2.

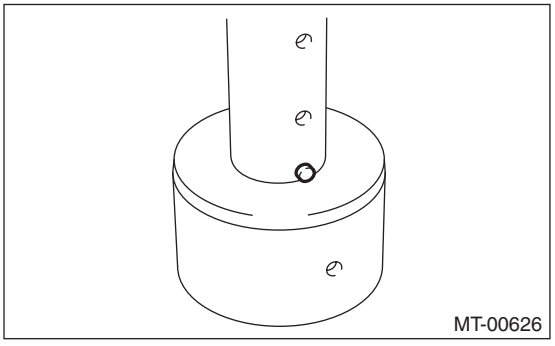


9) Remove the counter high & low washer and needle bearing.

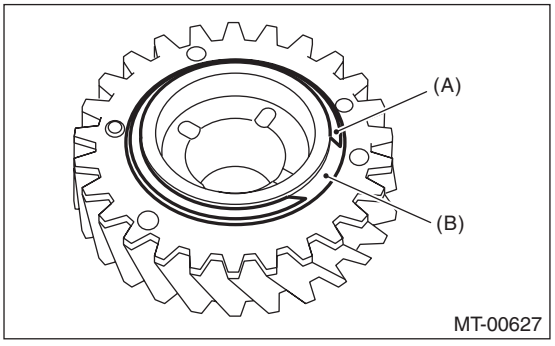


(A) Needle bearing
(B) Counter high and low washer

10) Remove the knock pin.

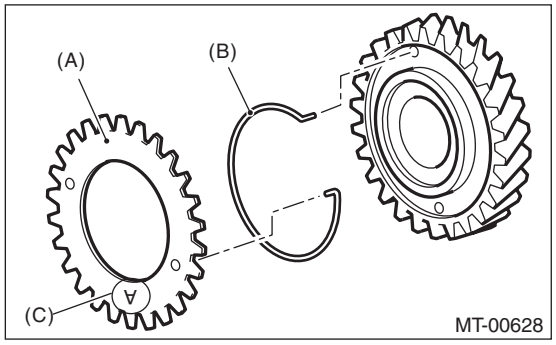


11) Remove the snap ring and friction plate from reverse gear.



(A) Snap ring
(B) Friction plate

12) Remove the sub gear and spring.

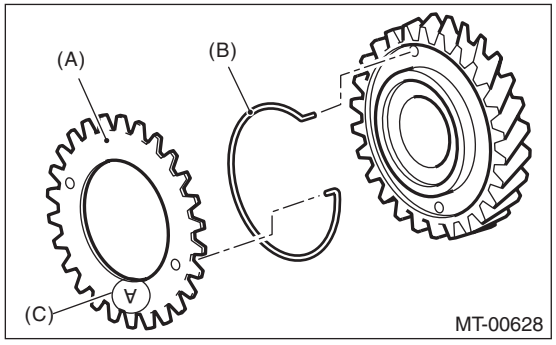


(A) Sub gear
(B) Spring
(C) Stamp (Marking A)

D: ASSEMBLY

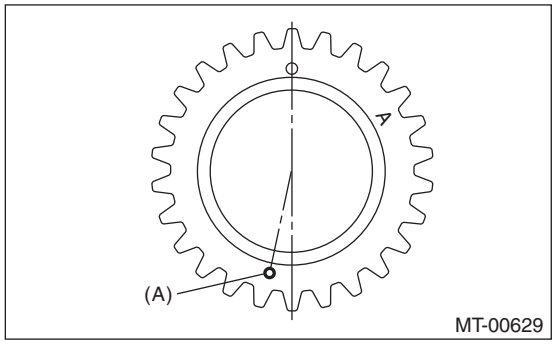
1) Attach the sub gear and spring.

NOTE:
• Turn the white marking on the hook section towards the sub gear side, and attach the spring.
• Point the stamp (marking A) towards the outside, and install the sub gear.



(A) Sub gear
(B) Spring
(C) Stamp (Marking A)

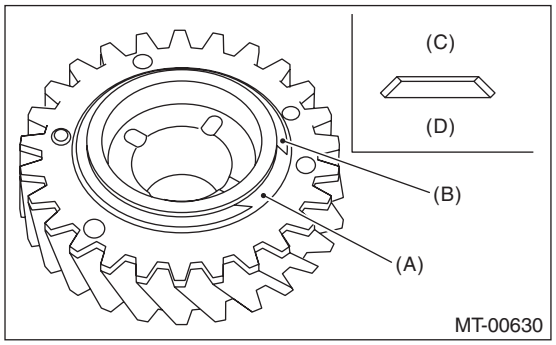
• While paying attention to the direction of the sub gear attachment hole, attach the spring and sub gear.



(A) Attachment hole

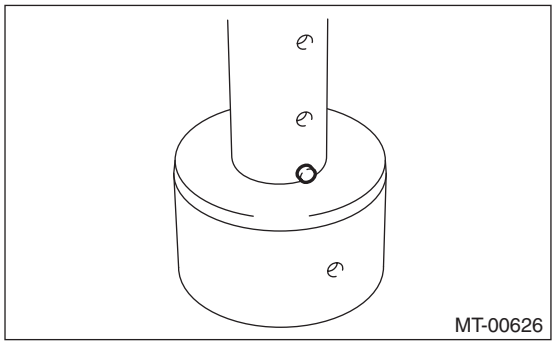
2) Install the friction plate and snap ring.

NOTE:
Confirm that the friction plate is installed in the proper direction.



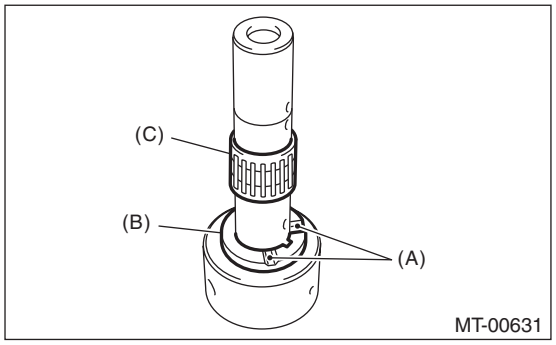
(A) Friction plate
(B) Snap ring
(C) Snap ring side
(D) Sub gear side

3) Apply adequate gear oil to the shaft, needle bearing and reverse drive gear inner surface.
4) Install the knock pin.



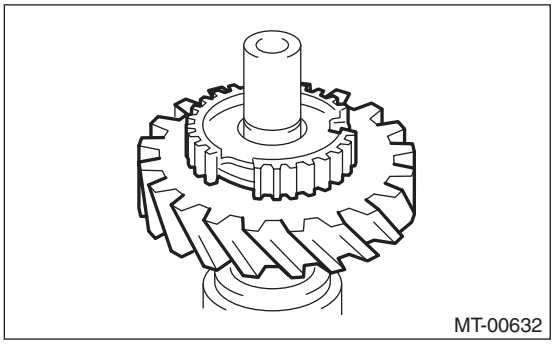
5) Install the counter high & low washer and needle bearing.

NOTE:
Point the groove towards the reverse idler gear, and attach the washer.



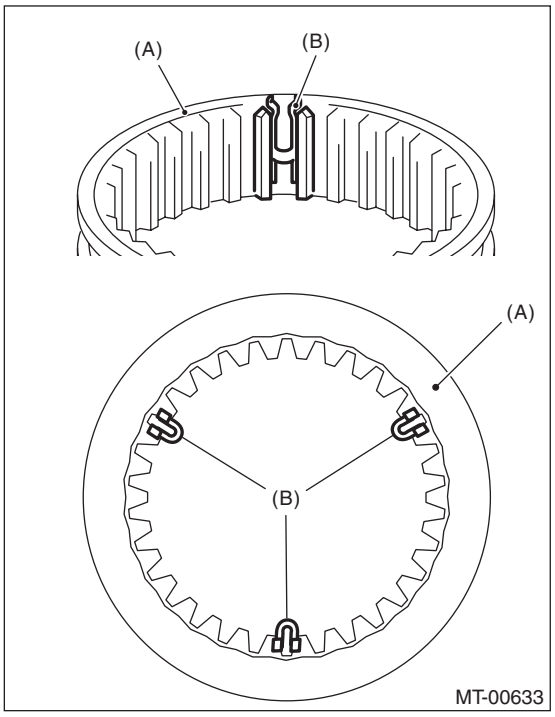
(A) Groove
(B) Counter high and low washer
(C) Needle bearing

6) Install the reverse idler gear No. 2.



7) Attach the shifting insert key to the appropriate location of the reverse sleeve.

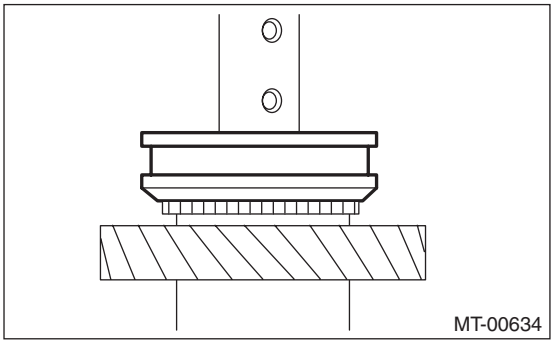
NOTE:
The angle of each shifting insert key is 120°.



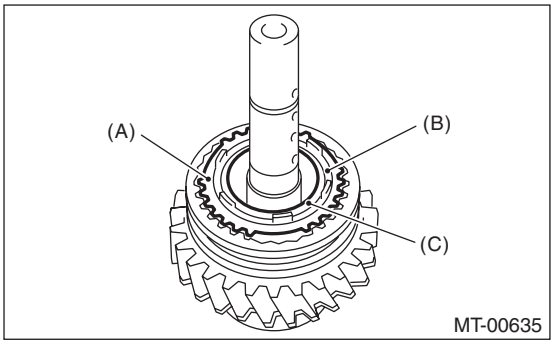
(A) Reverse sleeve
(B) Shifting insert key

8) Attach the reverse sleeve to the reverse idler gear No. 2.

NOTE:
Confirm that the reverse sleeve is installed in the proper direction.

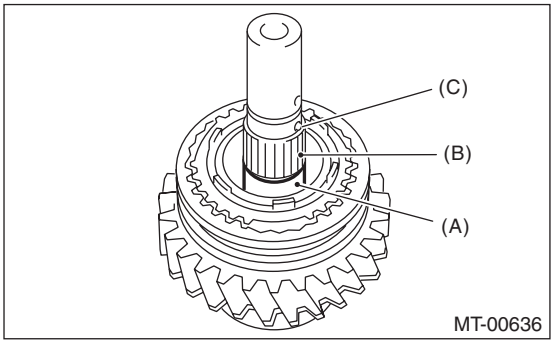


9) Apply adequate gear oil to the collar, needle bearing and reverse drive gear inner surface.
10) Install the outer baulk ring, reverse synchro cone and inner baulk ring.



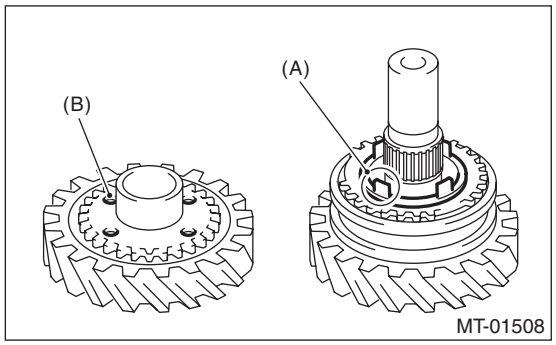
(A) Outer baulk ring
(B) Reverse synchro cone
(C) Inner baulk ring

11) Install the collar and needle bearing, then the knock pin.



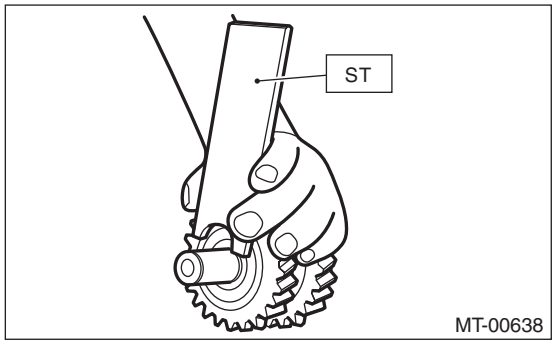
(A) Collar
(B) Needle bearing
(C) Knock pin

12) Match the protrusion of the reverse synchro cone to the hole on the reverse idler gear, and install the reverse idler gear.



(A) Protrusion on the reverse synchro cone
(B) Hole of the reverse idler gear

13) Point the groove towards the reverse idler gear, and attach the counter high & low washer and the washer.
14) Using the ST, install the snap ring.
ST 18672AA000 GUIDE CLIP

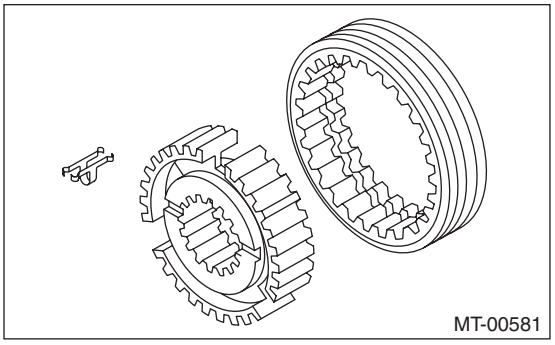


15) Inspect and adjust the clearance between the snap ring and the washer. <Ref. to 6MT-94, INSPECTION, Reverse Idler Gear.>
16) Install the spring pin.

NOTE:
Use new spring pins.

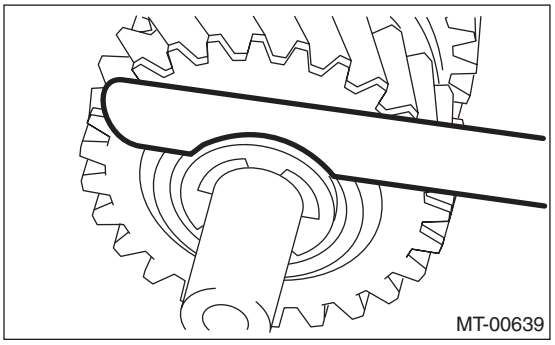
E: INSPECTION

Disassembled parts should be washed with unleaded gasoline first, then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• If there is wear, rusting or damage of the bearings.
• If the bearing does not rotate smoothly or an abnormal noise is emitted when turning.
• When bearing has other defects.
2) Bushing (each gear)
If the sliding surface is damaged or excessively worn, replace the bushing.
3) Gear
Replace gears in the following cases.
• When gear teeth surface is damaged or excessively worn.
• If the contact area of the baulk ring is damaged.
• If the inner face of the gear is worn.
4) Baulk ring, synchro cone
If there is wear, rusting or damage at the baulk ring, replace the baulk ring and synchro cone.
5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



6) Check clearance between the snap ring and washer.

Clearance specification:
0.1 — 0.3 mm (0.0039 — 0.0118 in)



If the clearance is out of the specification, select a snap ring from the following table.

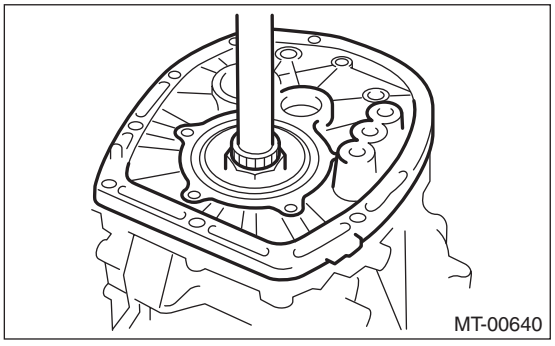
Snap ring	
Part No.	Thickness mm (in)
031319000	1.50 (0.059)
805019030	1.60 (0.062)
805019010	1.72 (0.068)

After replacing the snap ring, inspect the clearance.

22.Drive Pinion Shaft Assembly

A: REMOVAL

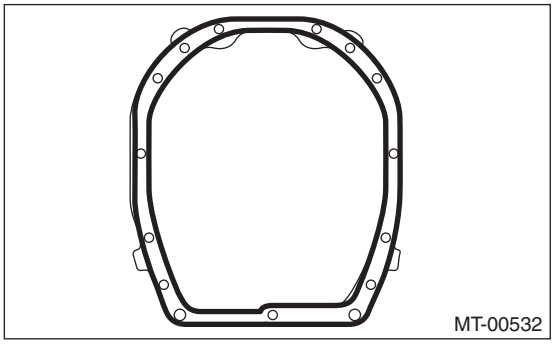
1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the individual gear assemblies. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly.



B: INSTALLATION

1) Remove any remaining gasket material from the drive plate and clutch housing.
2) Apply liquid gasket to the clutch housing.

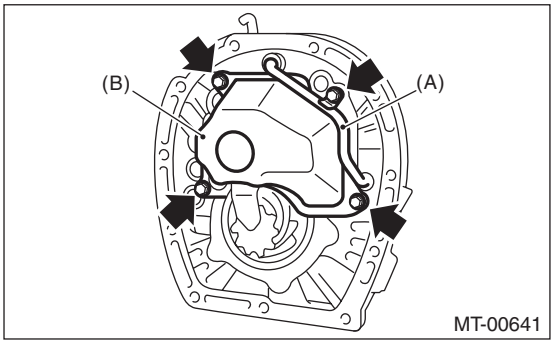
Liquid gasket:
THREE BOND 1215 (Part No. 004403007)



3) Install the individual gear assemblies. <Ref. to 6MT-70, INSTALLATION, Main Shaft Assembly.>
4) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
5) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
6) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
7) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
8) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
9) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
10) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

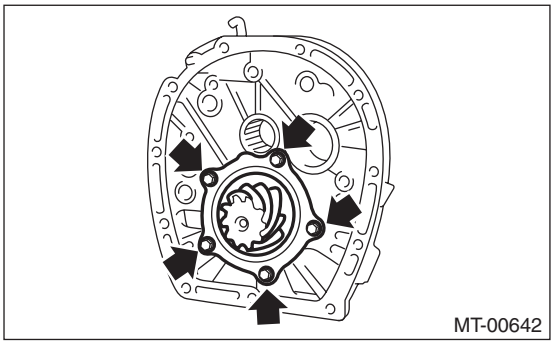
C: DISASSEMBLY

NOTE:
When replacing the drive pinion shaft and hypoid driven gear, replace as a set.
1) Remove the pipe and oil chamber.



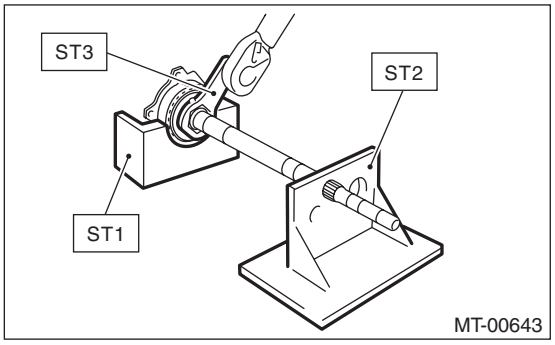
(A) Pipe
(B) Oil chamber

2) Remove the drive pinion shaft and shim from the adapter plate.

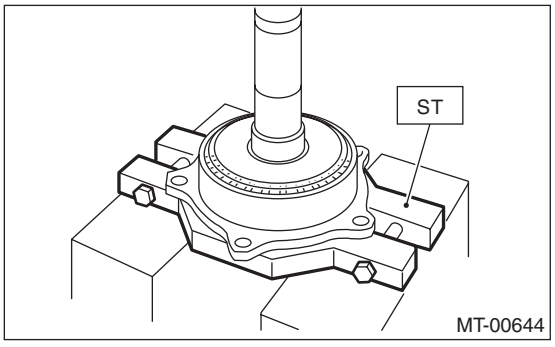


3) Affix the ST to the work table.
ST 18664AA000 BASE
4) Flatten the tab of the axle nut.

5) Attach ST3 to the lock nut, and set the drive pinion shaft to ST1 and ST2. Remove the lock nut and washer.
ST1 18667AA000 HOLDER
ST2 18664AA000 BASE
ST3 18621AA000 ADAPTER WRENCH



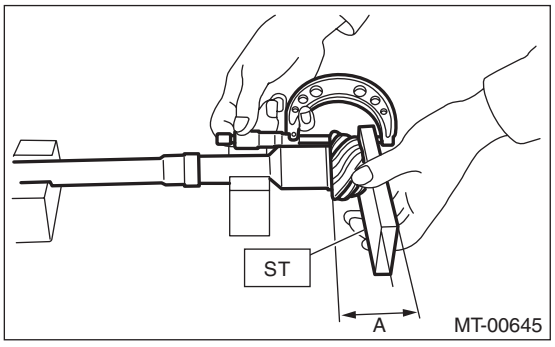
6) Using the ST, remove the taper roller bearing assembly.
ST 18723AA000 REMOVER



D: ASSEMBLY

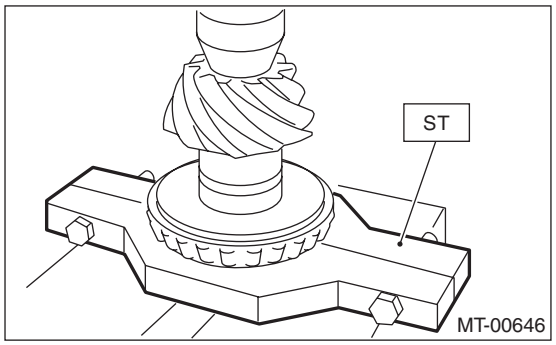
1) Using the ST, measure drive pinion measurement A.

NOTE:
When selecting the drive pinion shim, refer to measurement A.
ST 499575500 GAUGE



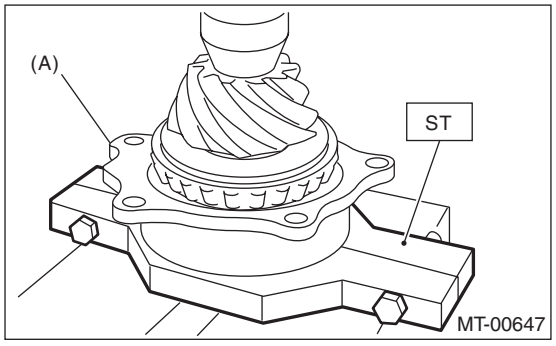
2) Using the ST and a press, attach the inner bearing inner race to the drive pinion shaft.
ST 18723AA000 REMOVER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



3) Using the ST and a press, attach the retainer and outer bearing inner race to the drive pinion shaft.
ST 18723AA000 REMOVER

NOTE:
Push in to a position where the bearing rotates smoothly.



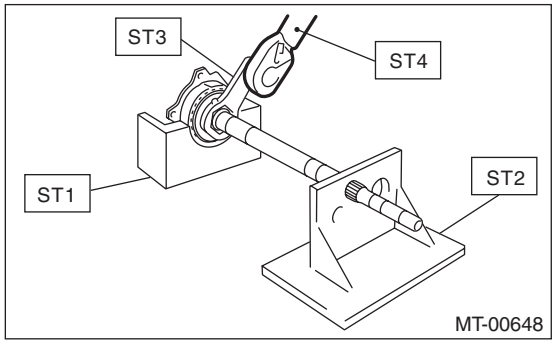
(A) Retainer

4) Install the washer and lock nut.

NOTE:
Be sure to use a new lock nut.

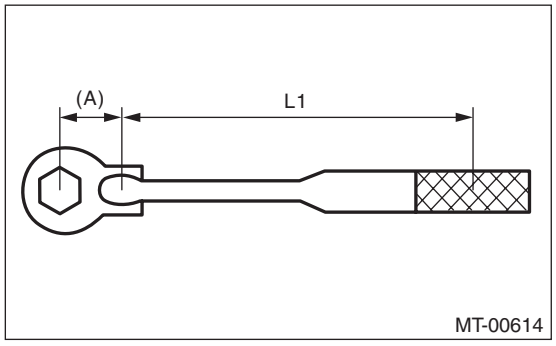
5) Set the ST to the drive pinion, and tighten the lock nut.
ST1 18667AA000 HOLDER
ST2 18664AA000 BASE
ST3 18621AA000 ADAPTER WRENCH
ST4 18852AA000 TORQUE WRENCH

Tightening torque:
265 N·m (27.0 kgf-m, 195 ft-lb)



NOTE:
When using a torque wrench other than ST4, use the calculation below to calculate and tighten the lock nut.
Tighten using the ST and the straight line torque wrench.
T = L1 / (0.1 + L1) × 285

T N·m (kgf-m, ft-lb)	Torque wrench setting
L1 m (in)	Torque wrench length
0.1 m (3.94 in)	Length of ST
285 N·m (29.0 kgf-m, 210 ft-lb)	Tightening torque (lock nut):

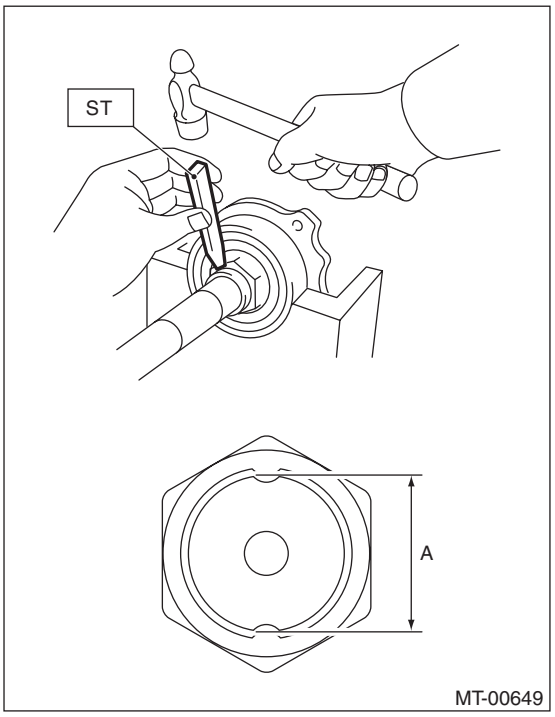


(A) 0.1 m (3.94 in)

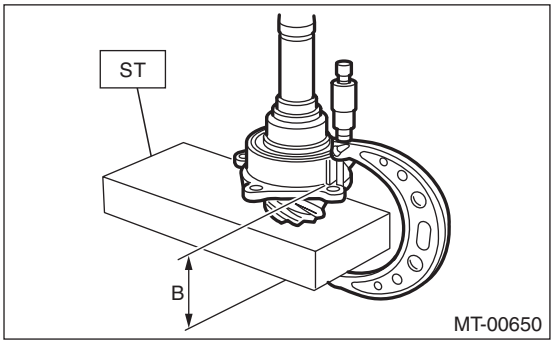
6) Measure the starting torque. <Ref. to 6MT-98, INSPECTION, Drive Pinion Shaft Assembly.>

7) Using the ST, crimp the lock nut in 2 locations, with dimensions within A 37±0.5 mm (1.46±0.02 in).
ST 18670AA000 PUNCH

NOTE:
Do not damage the crimp area of the lock nut.



8) Using the ST, measure drive pinion measurement B.
ST 499575500 GAUGE



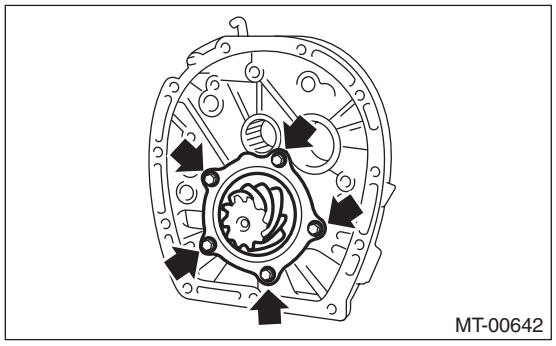
9) Calculate from the calculation below to select 1 or 2 drive pinion shims from the following table.
6.5±0.0625 mm – (B – A) [0.26±0.0025 in – (B – A)]

NOTE:
A: Measurement value in step 1)
B: Measurement value in step 8)

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA270	0.15 (0.0059)
32295AA280	0.175 (0.0069)
32295AA290	0.20 (0.0079)
32295AA300	0.225 (0.0089)
32295AA310	0.25 (0.0098)
32295AA320	0.275 (0.0108)

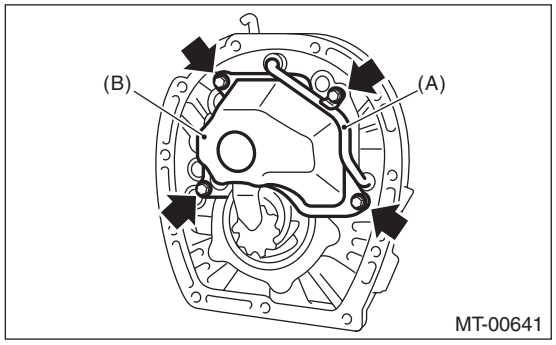
10) Apply gear oil to the side face of the taper roller bearing, and attach the drive pinion shaft and the selected shims to the adapter plate.

Tightening torque:
54 N·m (5.5 kgf-m, 40 ft-lb)


MT-00642

11) Install the oil chamber and pipe.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



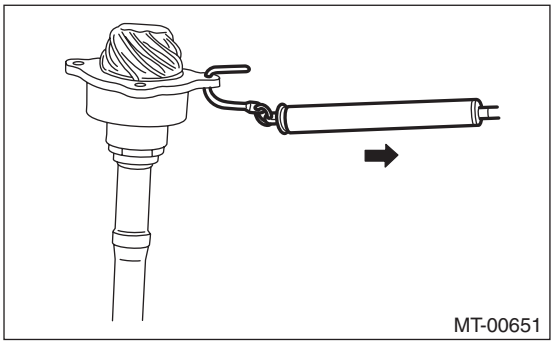
MT-00641

(A) Pipe
(B) Oil chamber

E: INSPECTION

1) Using a spring scale, measure the starting torque. If the starting torque is outside the specification range, replace the taper roller bearing.

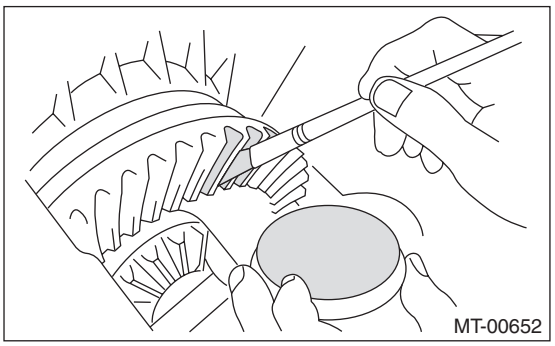
Starting torque:
0 — 0.95 N (0 — 0.097 kgf, 0 — 0.21 lbf)


MT-00651

2) Gear
If the gear teeth are damaged or excessively worn, replace the gear.
3) Bearing
Replace the bearings in the following cases.
• If there is wear, rusting or damage of the bearings.
• If the bearing does not rotate smoothly or an abnormal noise is emitted when turning.
4) Adapter plate
Replace the adapter plate in the following cases:
• If there is wear, rusting or damage of the bearings
• If the adapter plate is damaged.
5) Check that the pipes and pipe chambers are not damaged or clogged. Repair or replace if damaged or clogged.

F: ADJUSTMENT

1) Inspect and adjust the hypoid driven gear-to-drive pinion backlash. <Ref. to 6MT-108, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>
2) Apply a thin uniform coat of red lead on the surfaces of 3 or 4 hypoid driven gear teeth.

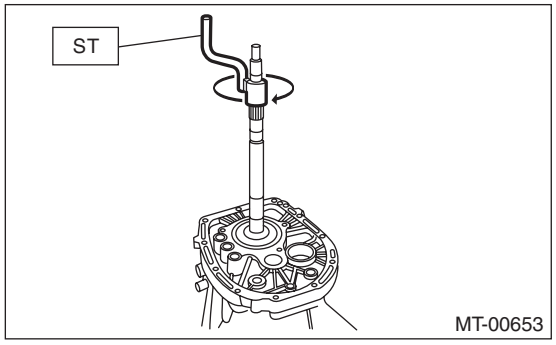

MT-00652

3) Install the drive pinion shaft assembly to the clutch housing, and tighten at least 4 bolts.

NOTE:
Install with the remaining liquid gasket, so that the clutch housing and the adapter plate will not be damaged.

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

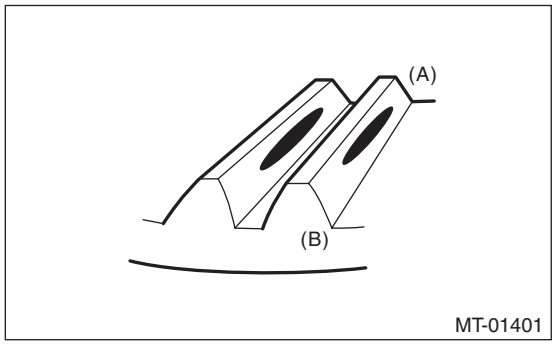
4) Turn a few times using the ST.
ST 18631AA000 HANDLE



5) Remove the drive pinion shaft assembly, and inspect the mating condition of the teeth. If the mating is not correct, change shim thickness to adjust backlash.

- Tooth contact

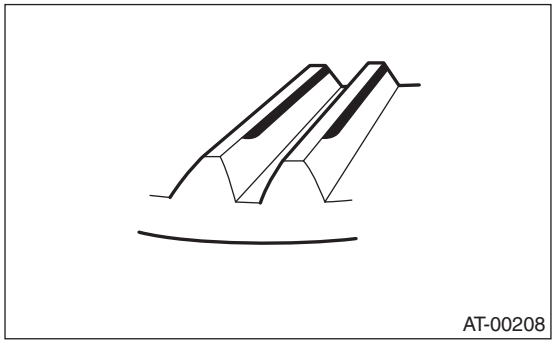
Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)



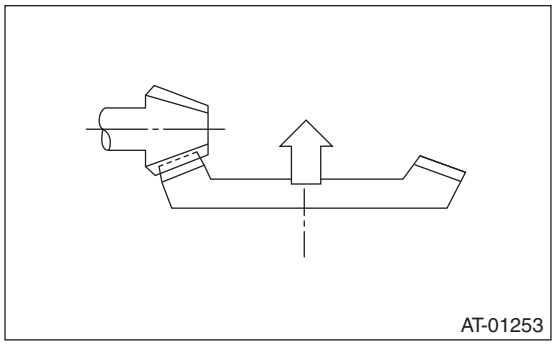
(A) Toe side
(B) Heel side

- Face contact

Check item: Backlash is too large.
Contact pattern

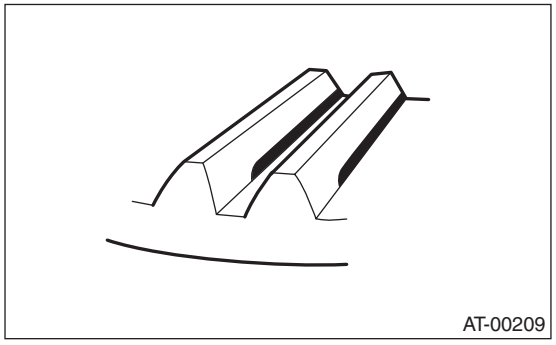


Adjustment: Reconfirm and adjust backlash.

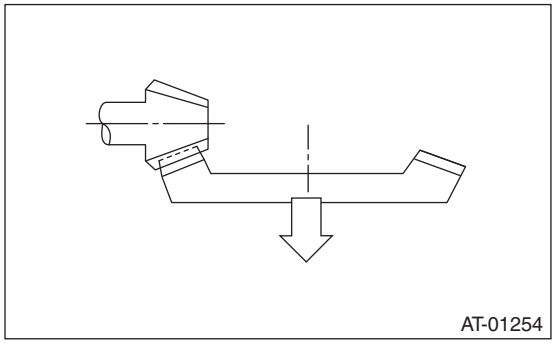


- Flank contact

Check item: Backlash is too small.
Contact pattern



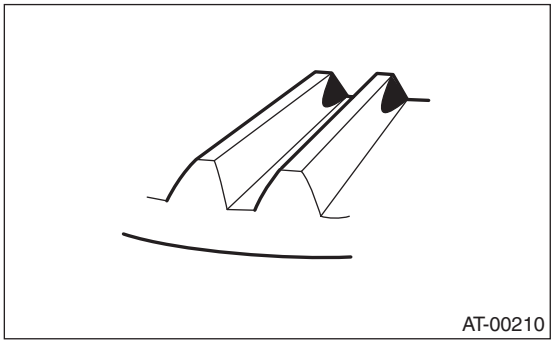
Adjustment: Reconfirm and adjust backlash.



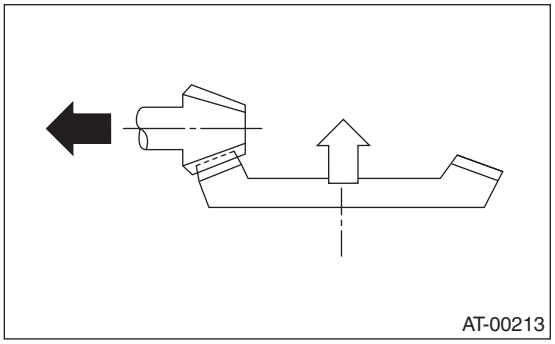
- Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



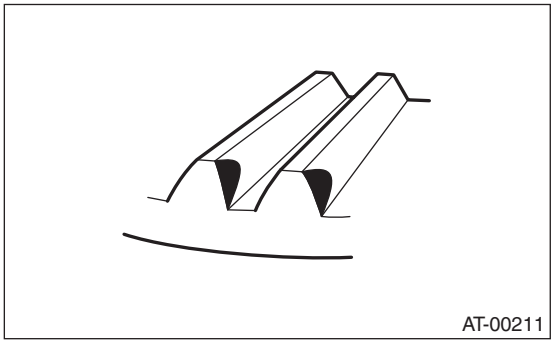
Adjustment: Reduce the thickness of the drive pinion shim according to the procedure for moving the drive pinion away from the driven gear.



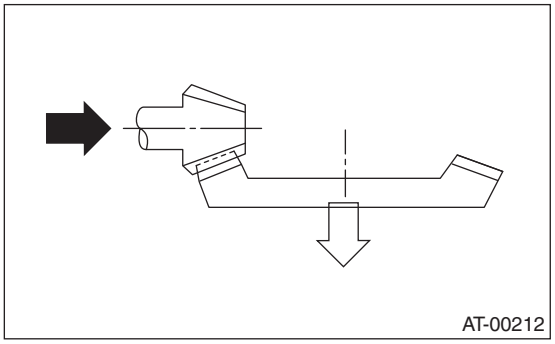
- Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern



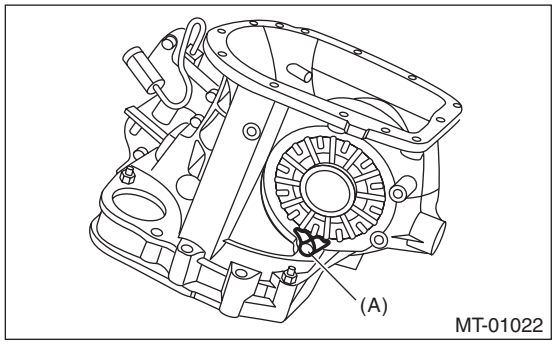
Adjustment: Increase thickness of the drive pinion shim according to the procedures for moving the drive pinion closer to the driven gear.



23.Front Differential Assembly

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the individual gear assemblies. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-95, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the lock plates on both sides.

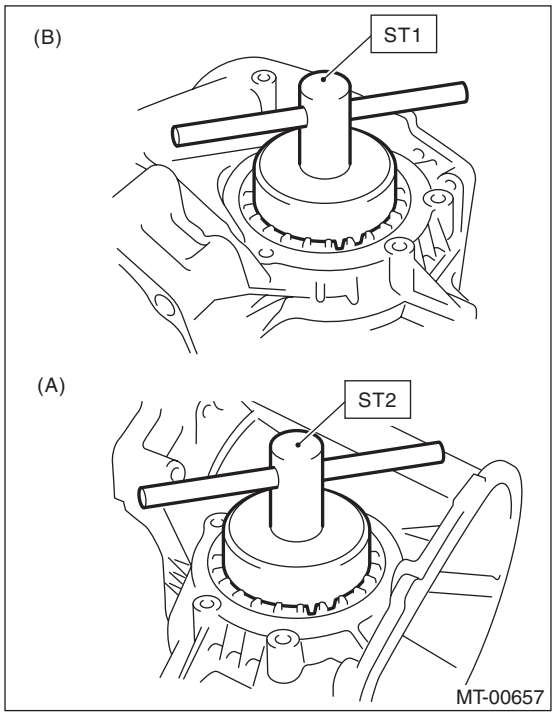


(A) Lock plate

12) Remove the differential side retainers on both sides using the ST.

ST1	18630AA010	WRENCH COMPL RETAINER (RH SIDE)
ST2	18630AA000	WRENCH ASSY (LH SIDE)

NOTE:
- Be careful not to damage the section where the clutch case retainer will be attached.
- WRENCH ASSY (499787000) can also be used.



(A) LH side
(B) RH side

13) Remove the front differential.

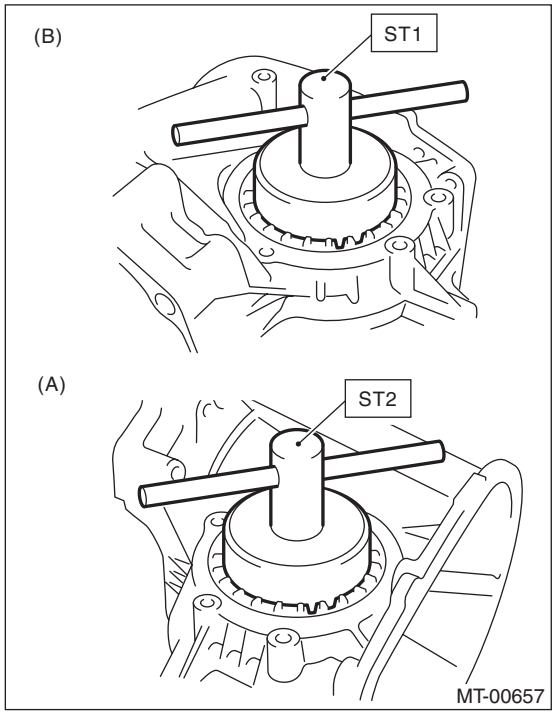
B: INSTALLATION

1) Install the differential assembly to the clutch housing.
2) Apply gear oil to the screw threads of the side retainer.
3) Remove the O-rings on both sides of the side retainer.

4) Install the differential side retainers to both sides, using the ST.

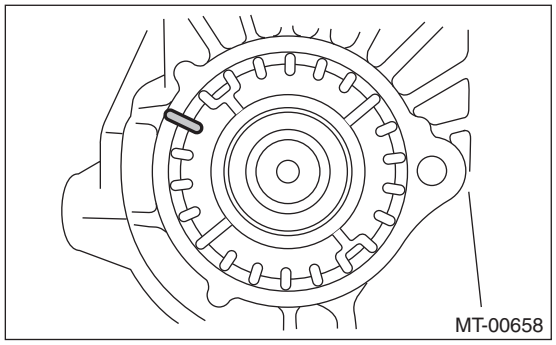
ST1 18630AA010 WRENCH COMPL RETAINER (RH SIDE)
ST2 18630AA000 WRENCH ASSY (LH SIDE)

NOTE:
- Be careful not to damage the oil seal.
- WRENCH ASSY (499787000) can also be used.



(A) LH side
(B) RH side

5) Inspect and adjust the hypoid gear backlash. <Ref. to 6MT-107, HYPOID GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
6) Inspect and adjust the tooth contact. <Ref. to 6MT-98, ADJUSTMENT, Drive Pinion Shaft Assembly.>
7) Mark the mating positions of the left and right side retainers and the clutch housing.



8) Remove the differential side retainers from both sides.

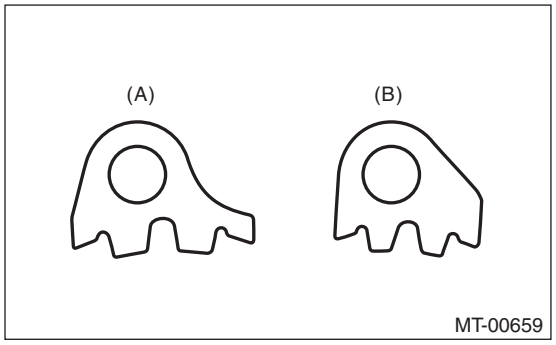
NOTE:
When removing the side retainer, record how many times it was turned to remove.
9) Install the O-ring to the side retainers on both sides.

NOTE:
Always use a new O-ring.
10) Attach the differential side retainers to both sides.

NOTE:
When attaching, turn the side retainer the same number of turns it took to remove, and align the marks.
11) Install the lock plate.

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

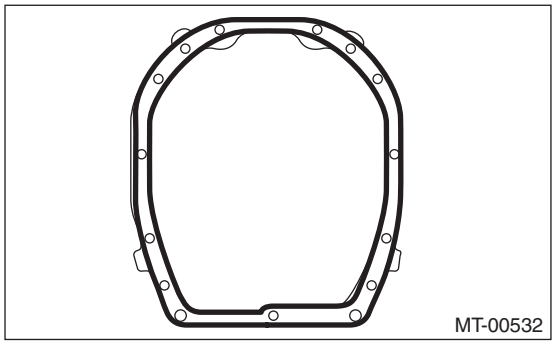
NOTE:
Be careful not to confuse the left and right side lock plates.



(A) LH
(B) RH

12) Remove any remaining liquid gasket from the clutch housing and adapter plate.
13) Apply liquid gasket to the clutch housing.

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



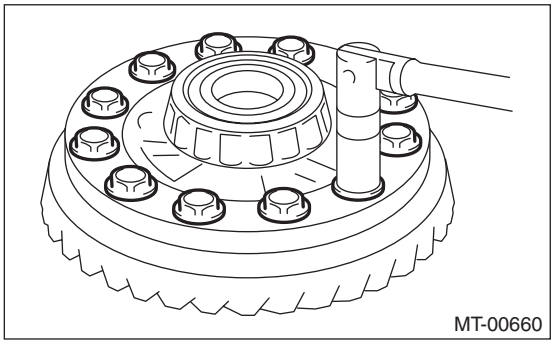
14) Install the drive pinion shaft assembly. <Ref. to 6MT-95, INSTALLATION, Drive Pinion Shaft Assembly.>

15) Install the individual gear assemblies all at once. <Ref. to 6MT-70, INSTALLATION, Main Shaft Assembly.>
16) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
17) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
18) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
19) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
20) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
21) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
22) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

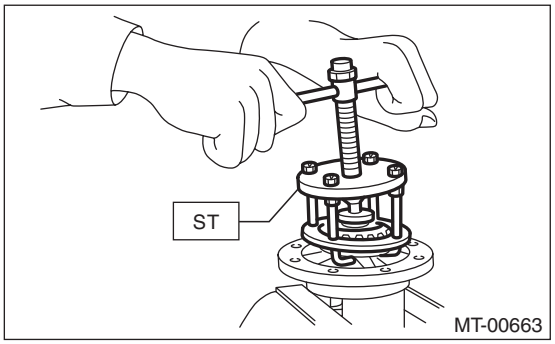
C: DISASSEMBLY

1. DIFFERENTIAL CASE

1) Fix the differential assembly on a vice, and remove the hypoid driven gear.

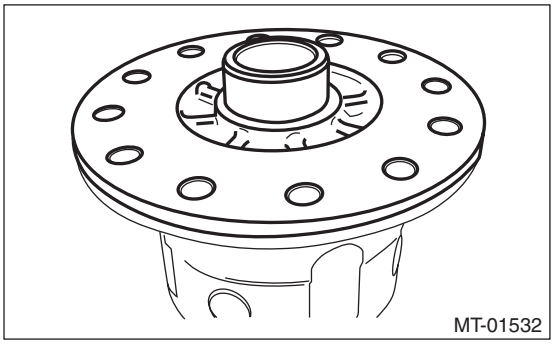

MT-00660

2) Remove the side bearing of the hypoid driven gear using the ST.
ST 399527700 PULLER SET

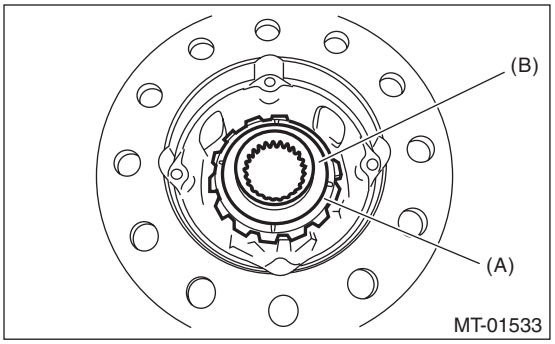


MT-00663

3) Remove the differential case LH.


MT-01532

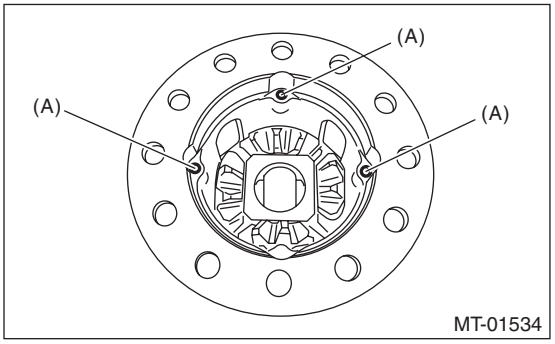
4) Remove the differential bevel gear and washer.



MT-01533

(A) Differential bevel gear
(B) Washer

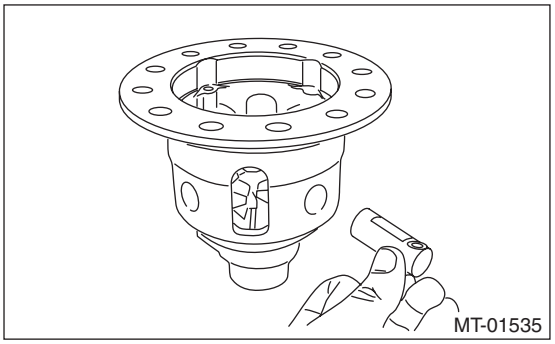
5) Using a manet tool, etc., remove 3 straight pins.



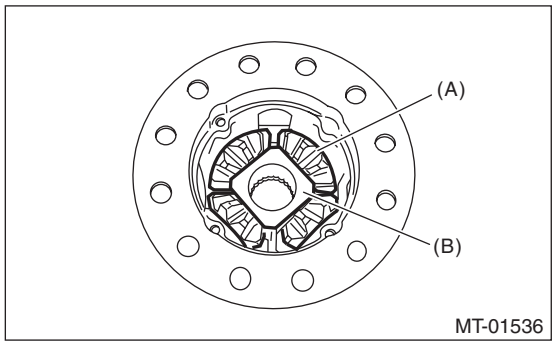
MT-01534

(A) Straight pin

6) Remove 3 pinion shafts.


MT-01535

7) Remove differential bevel pinion and pinion shaft joint.

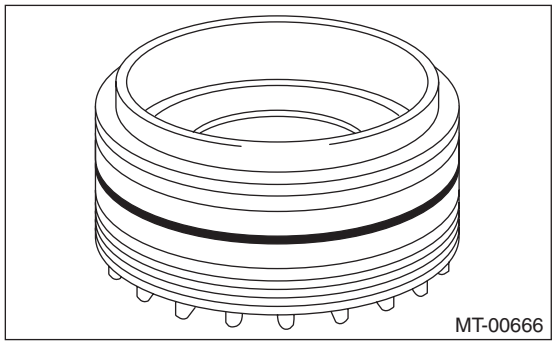


(A) Differential bevel pinion
(B) Pinion shaft joint

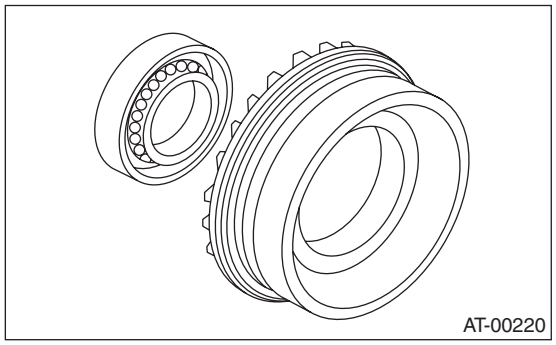
8) Remove the differential bevel gear and washer.

2. SIDE RETAINER

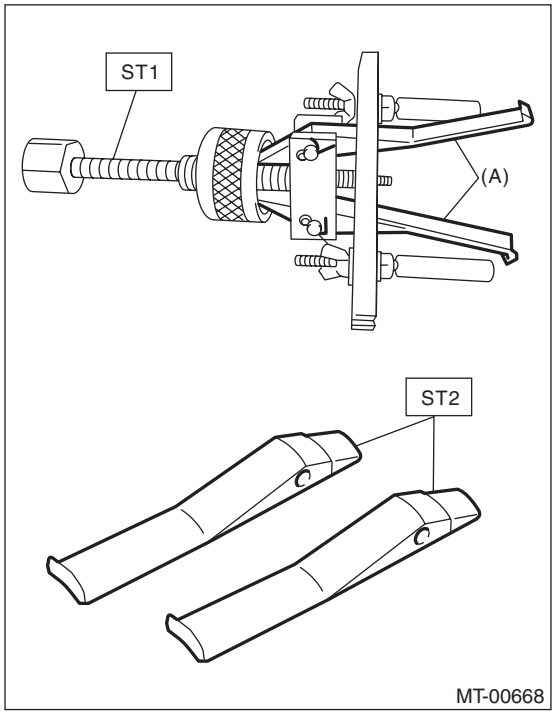
1) Remove the O-ring.



2) Remove the oil seal.

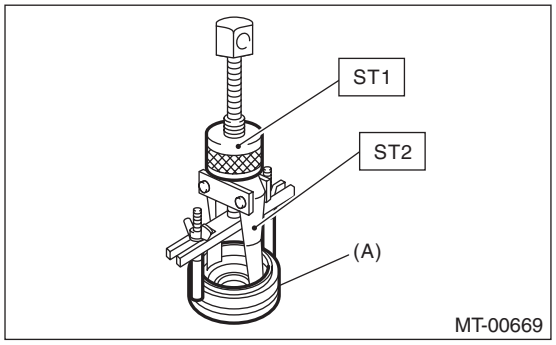


3) Remove the claw of ST1, and attach the claw of ST2.
ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



(A) CLAW

4) Remove the bearing outer race from the side retainer, using the ST.
ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



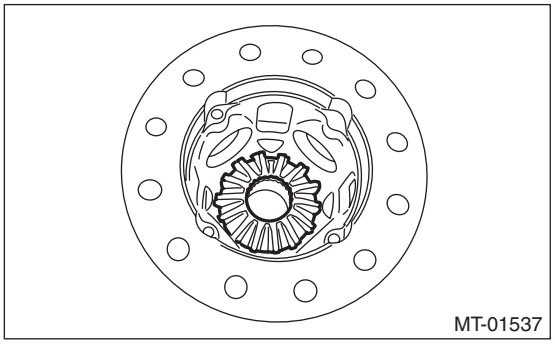
(A) Side retainer

D: ASSEMBLY

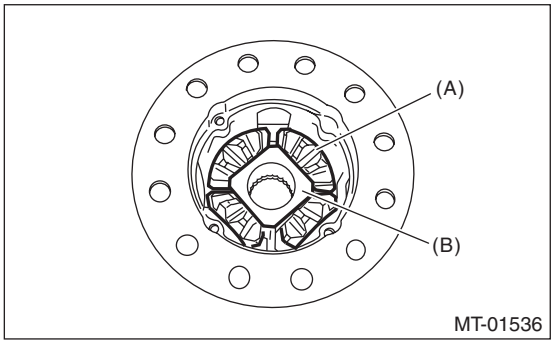
1. DIFFERENTIAL CASE

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

NOTE:
Face the chamfered side of washer toward gear.

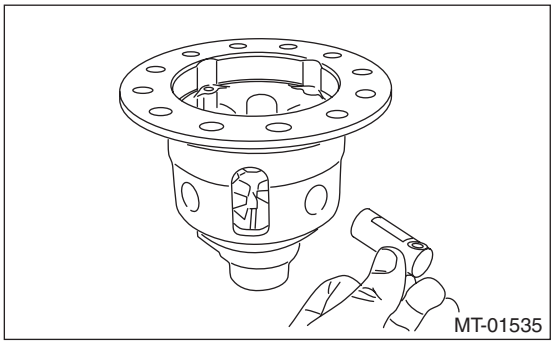


2) Install differential bevel pinion and pinion shaft joint.



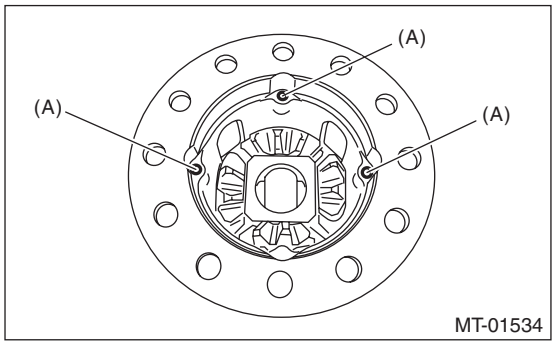
(A) Differential bevel pinion
(B) Pinion shaft joint

3) Install 3 pinion shafts.



4) Install 3 straight pins.

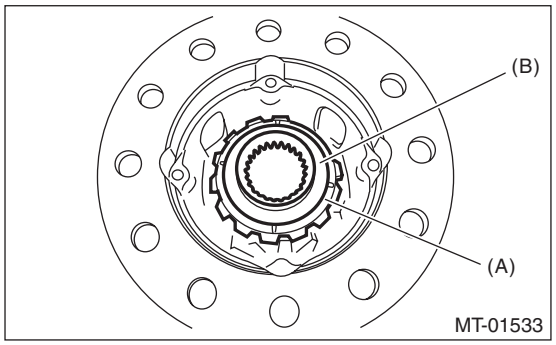
NOTE:
Make sure the straight pins are inserted completely.



(A) Straight pin

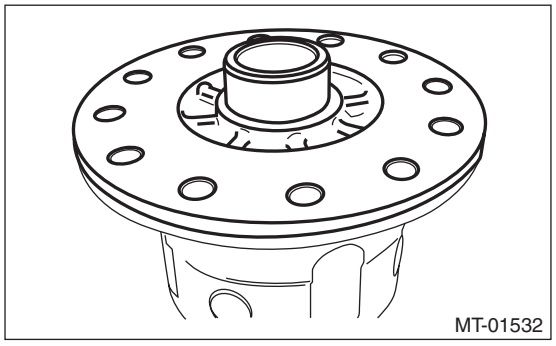
5) Attach the differential bevel gear and washer.

NOTE:
Face the chamfered side of washer toward gear.



(A) Differential bevel gear
(B) Washer

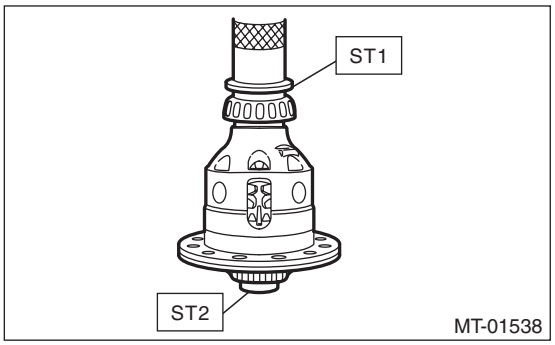
6) Install the differential case LH.



7) Use the ST to attach bearing inner laces of differential cases RH and LH.
ST1 398437700 INSTALLER
ST2 398497701 SEATS

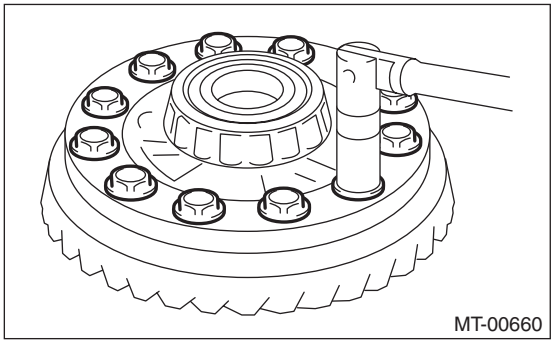
CAUTION:
Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).

NOTE:
Always replace inner races and outer races as a set.



8) Attach the hypoid driven gear to the differential case.

Tightening torque:
69 N·m (7.0 kgf-m, 50.9 ft-lb)

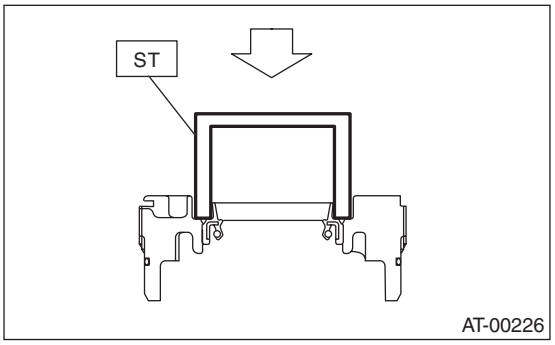


9) Inspect the backlash of the bevel pinion gear. <Ref. to 6MT-107, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

2. SIDE RETAINER

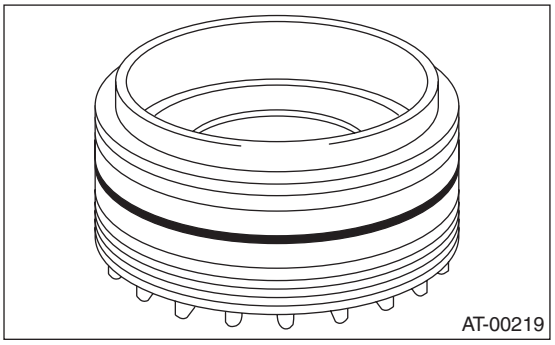
NOTE:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.
1) Install the bearing outer race to side retainer.
2) Using the ST, install the oil seal.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
- Use a new oil seal.
- Apply oil to the oil seal lips.



3) Install the O-ring.

NOTE:
Use new O-rings.



E: INSPECTION

Repair or replace the differential in the following cases:
- If gears are damaged, seized, or are excessively worn.
- If differential case sliding surfaces are damaged, seized, or are excessively worn.
- If there is damage, rust or wear in the bearings or bearing locations.
- If the bearing does not rotate smoothly or an abnormal noise is emitted when turning.

1. BEVEL PINION GEAR BACKLASH

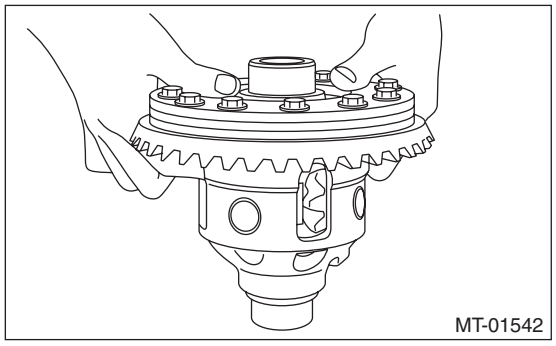
Measure the backlash of the differential bevel pinion. If backlash is not within standard value, install a suitable washer to adjust. <Ref. to 6MT-108, ADJUSTMENT, Front Differential Assembly.>

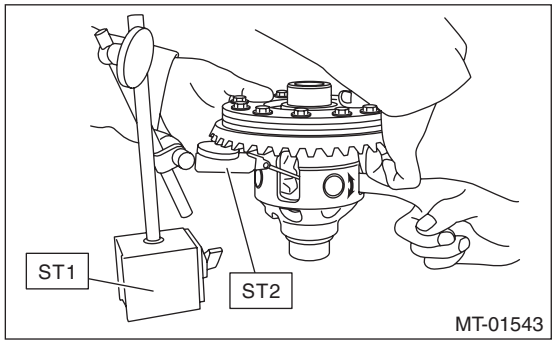
CAUTION:
When measuring the backlash, hold the differential assembly in upright position.

NOTE:
• It is recommended that backlash be measured by 2 people. One person should push the differential bevel gear upward (differential case LH side), and the other person measure the backlash.
• Before measuring backlash, turn so that the gears will settle in their individual locations.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)


MT-01542



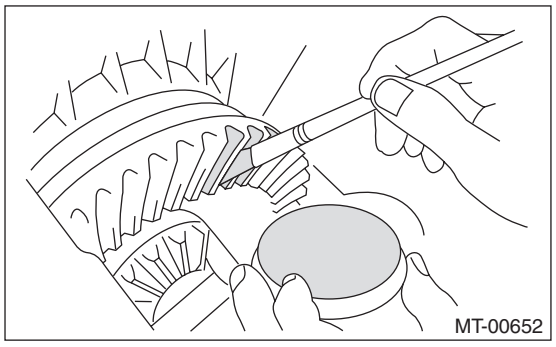
MT-01543

2. HYPOID GEAR BACKLASH

Inspect the hypoid gear backlash. Adjust if out of standard. <Ref. to 6MT-108, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>

3. TOOTH CONTACT OF HYPOID GEAR

1) Check that the hypoid gear backlash is within the standard value. Adjust if out of standard. <Ref. to 6MT-108, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>
2) Apply a thin uniform coat of red lead on the surfaces of 3 or 4 hypoid driven gear teeth.


MT-00652

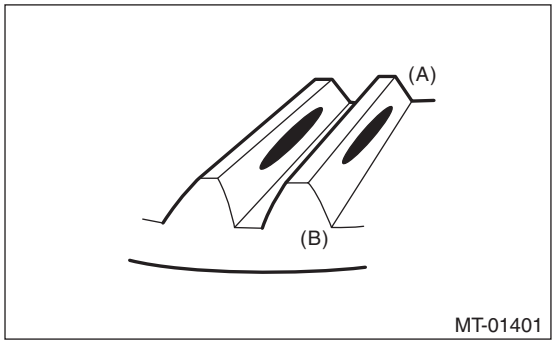
3) Attach the drive pinion shaft assembly, and affix with 4 bolts.

NOTE:
Use old gaskets and washers to prevent the mating surfaces of the housing from becoming damaged.

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

4) Turn the drive pinion shaft to the left and right for several turns.
5) Remove the drive pinion shaft assembly, and inspect the mating condition of the teeth. If tooth contact is not correct, perform adjustment. <Ref. to 6MT-98, ADJUSTMENT, Drive Pinion Shaft Assembly.>
• Correct tooth contact

NOTE:
In a no load condition, the tooth contact from the center to the toe side is 50-60% (While driving, the tooth contact will shift towards the heel side.).



MT-01401

(A) Toe side
(B) Heel side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

1) Measure the backlash of the bevel pinion gear. <Ref. to 6MT-107, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
2) Disassemble the differential case. <Ref. to 6MT-103, DIFFERENTIAL CASE, DISASSEMBLY, Front Differential Assembly.>
3) Select a washer from the following table, and assemble the differential case. <Ref. to 6MT-105, DIFFERENTIAL CASE, ASSEMBLY, Front Differential Assembly.>

NOTE:
If the backlash is excessive, select a thicker washer. If the backlash is too small, select a thinner washer.

Washer	
Part No.	Thickness mm (in)
803038021	0.950 (0.0374)
803038022	1.000 (0.0394)
803038023	1.050 (0.0413)
803038024	0.900 (0.0354)
803038025	1.100 (0.0433)

2. HYPOID GEAR BACKLASH

1) Attach the RH and LH side retainers.
ST1 18630AA010 WRENCH COMPL RETAINER (RH SIDE)
ST2 18630AA000 WRENCH ASSY (LH SIDE)

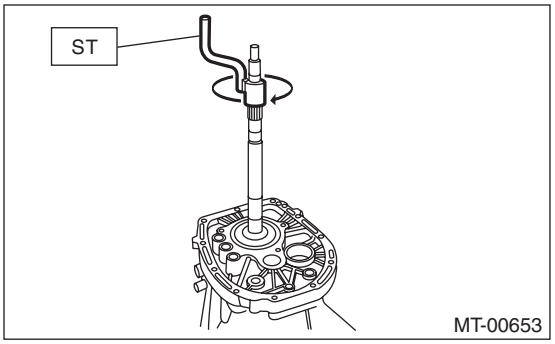
NOTE:
• Twist in the RH side retainer a little further than the LH side.
• WRENCH ASSY (499787000) can also be used.
2) Attach the drive pinion shaft assembly, and affix with 4 bolts.

NOTE:
Use old gaskets and washers to prevent the mating surfaces of the housing from becoming damaged.

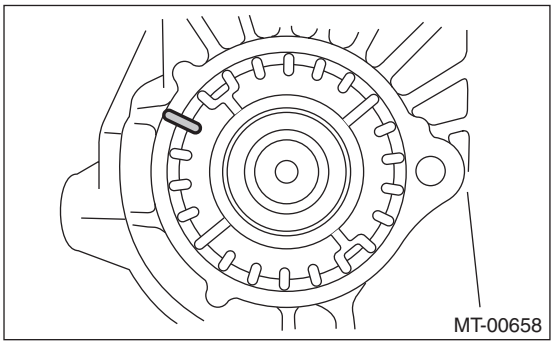
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

3) Using the ST, twist in the side retainer LH until it just contacts the drive pinion and hypoid driven gear. Loosen side retainer RH.
ST1 18630AA010 WRENCH COMPL RETAINER (RH SIDE)
ST2 18630AA000 WRENCH ASSY (LH SIDE)

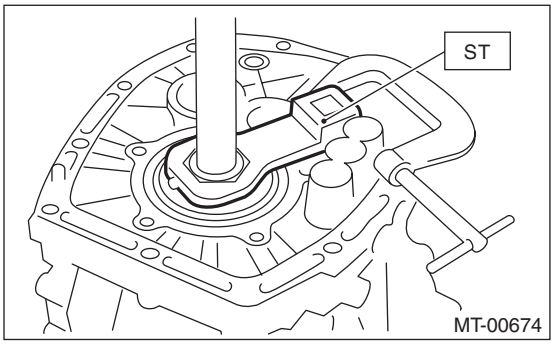
NOTE:
WRENCH ASSEMBLY (499787000) can also be used.
4) Use the ST to turn the drive pinion shaft a few times.
ST 18631AA000 HANDLE



5) Repeat steps 3) and 4) until side retainer LH does not turn anymore. For side retainer RH, twist in until the inner race and outer race just comes into contact. This is the “zero” backlash state.
6) Mark the mating positions of the left and right side retainers and the clutch housing.

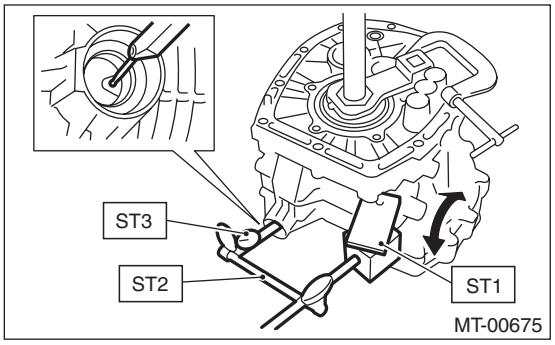


7) Turn the back side retainer LH by 3 notches, and screw in the side retainer RH by 3 notches.
8) Use the ST to fix the drive pinion shaft in place.
ST 18621AA000 ADAPTER WRENCH



9) Install the SUBARU genuine axle shaft to the front differential left and right sides.
Part No. 38415AA000AXLE SHAFT
10) After turning the drive pinion shaft several turns, use the ST to measure the hypoid gear backlash.
ST1 498255400 PLATE
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE

Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



11) If the backlash is out of specified range, turn the right and left side retainers to adjust.
12) Turn the RH side retainer by 1.75 notches or more.

3. TOOTH CONTACT OF HYPOID GEAR

Regarding teeth contact conditions, refer to the drive pinion section. <Ref. to 6MT-107, TOOTH CONTACT OF HYPOID GEAR, INSPECTION, Front Differential Assembly.>

24.Shifter Fork and Rod

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the individual gear assemblies. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>

B: INSTALLATION

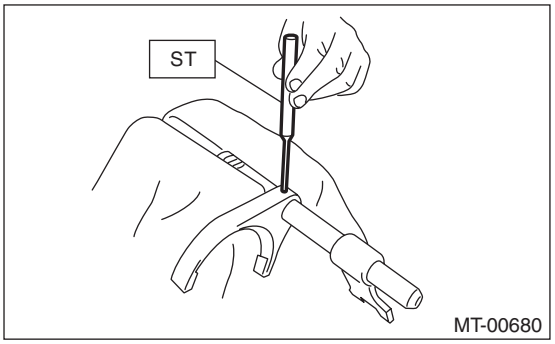
1) Install the individual gear assemblies all at once. <Ref. to 6MT-70, INSTALLATION, Main Shaft Assembly.>
2) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
3) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
4) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
5) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
6) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
7) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
8) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

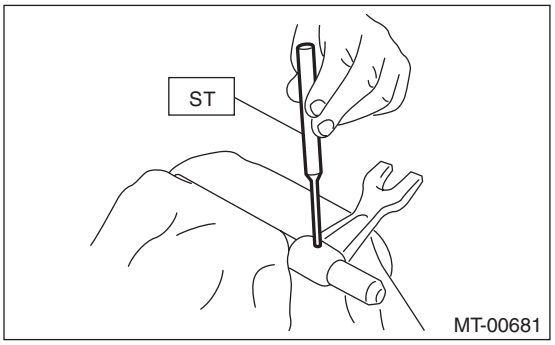
NOTE:
Discard the removed spring pin, and replace with a new part.

1. REVERSE SHIFTER FORK

1) Remove the reverse fork using the ST.
ST 398791700 REMOVER

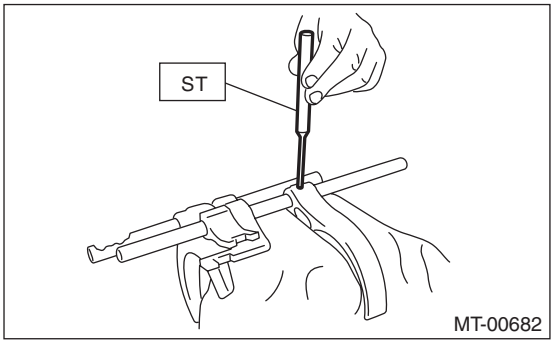


2) Remove the reverse shifter arm using the ST.
ST 398791700 REMOVER

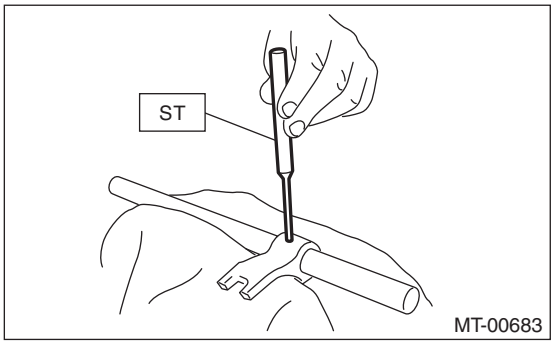


2. 1ST-2ND, 3RD-4TH SHIFTER FORK

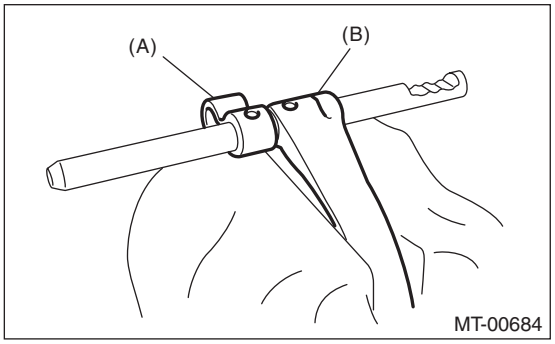
1) Using the ST, remove the 3rd-4th shifter fork.
ST 398791700 REMOVER



2) Using the ST, remove the 3rd-4th shifter arm.
ST 398791700 REMOVER



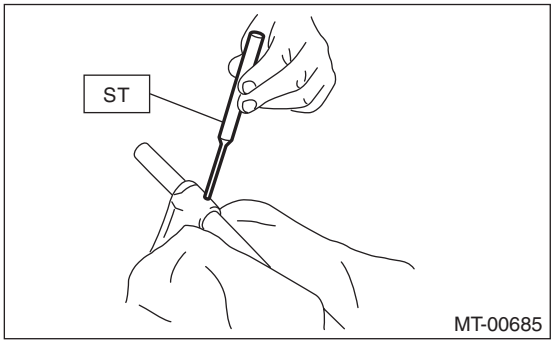
3) Using the ST, remove the 1st-2nd shifter arm and 1st-2nd shifter fork.
ST 398791700 REMOVER



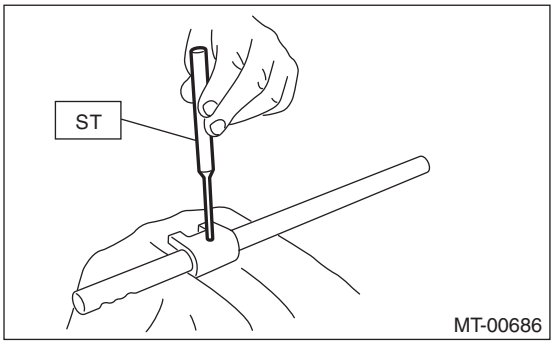
(A) 1st-2nd shifter arm
(B) 1st-2nd shifter fork

3. 5TH-6TH SHIFTER FORK

1) Using the ST, remove the 5th-6th shifter fork.
ST 398791700 REMOVER

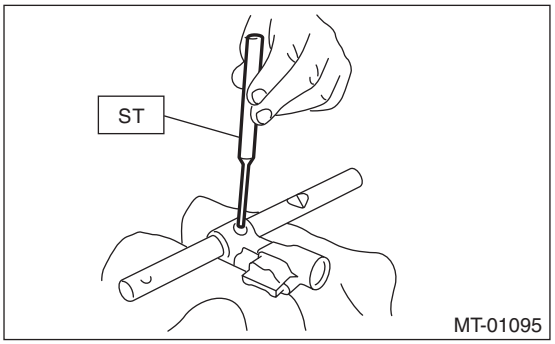


2) Using the ST, remove the 5th-6th shifter arm.
ST 398791700 REMOVER



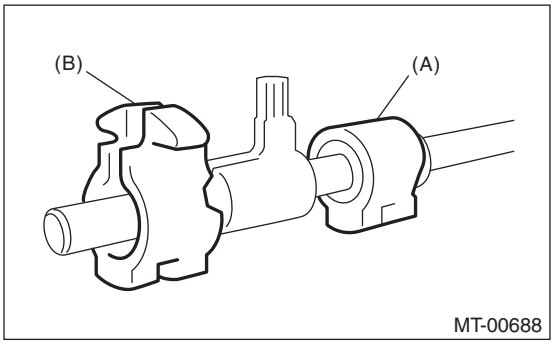
4. SHIFTER ARM SHAFT

Remove the selector arm using the ST.
ST 398791700 REMOVER



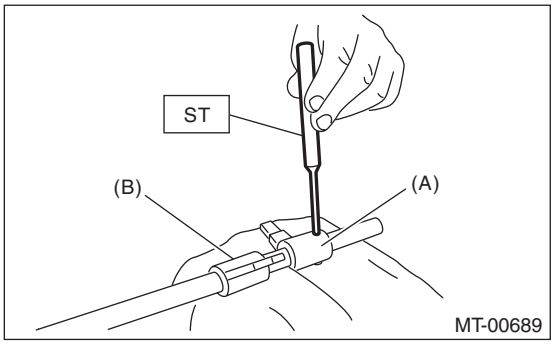
5. STRIKING ROD

1) Remove the reverse interlock block and the interlock block from the striking rod.



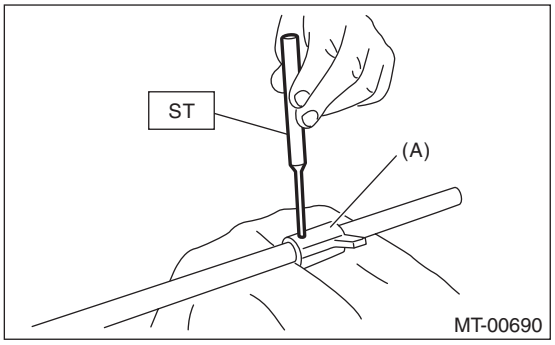
(A) Reverse interlock block
(B) Interlock block

2) Remove the reverse interlock arm using the ST.
ST 398791700 REMOVER



(A) Reverse interlock arm
(B) Interlock arm

3) Remove the interlock arm using the ST.
ST 398791700 REMOVER



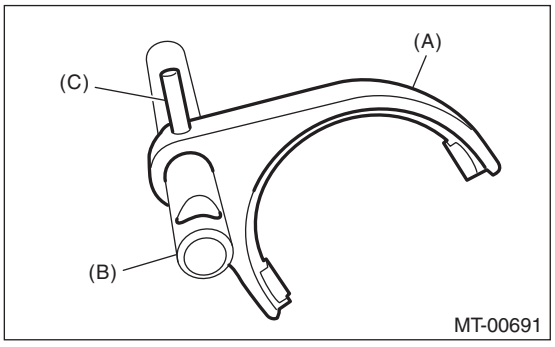
(A) Interlock arm

D: ASSEMBLY

1. REVERSE SHIFTER FORK

1) Using the ST, install the reverse fork.
ST 398791700 REMOVER

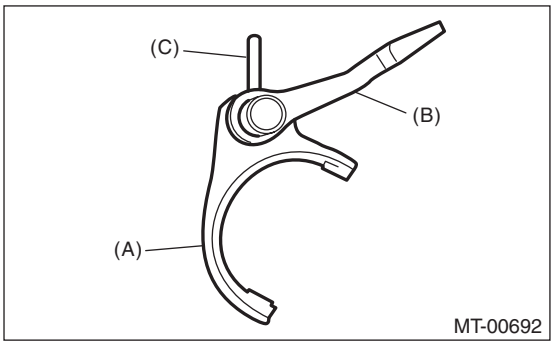
NOTE:
Confirm that the reverse fork and rod are installed in the proper direction.



(A) Reverse fork
(B) Reverse fork rod
(C) Spring pin

2) Using the ST, install the reverse arm.
ST 398791700 REMOVER

NOTE:
Confirm that the reverse arm and rod are installed in the proper direction.

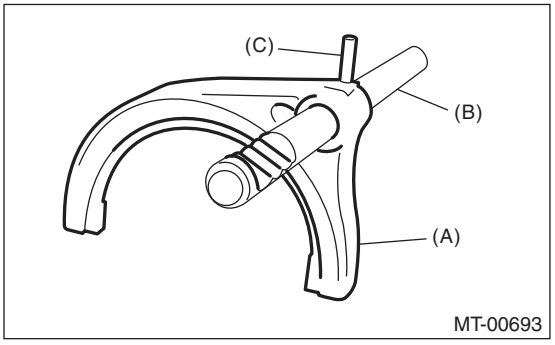


(A) Reverse fork
(B) Reverse shifter arm
(C) Spring pin

2. 1ST-2ND, 3RD-4TH SHIFTER FORK

1) Using the ST, install the 1st-2nd shifter fork.
ST 398791700 REMOVER

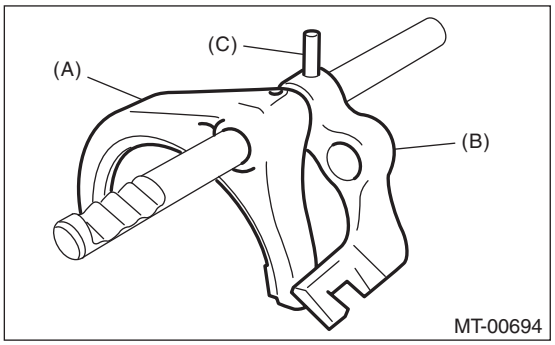
NOTE:
Make sure that the 1st-2nd shifter fork and rod are installed in the correct direction.



(A) 1st-2nd shifter fork
(B) 1st-2nd shifter rod
(C) Spring pin

2) Using the ST, install the 1st-2nd shifter arm.
ST 398791700 REMOVER

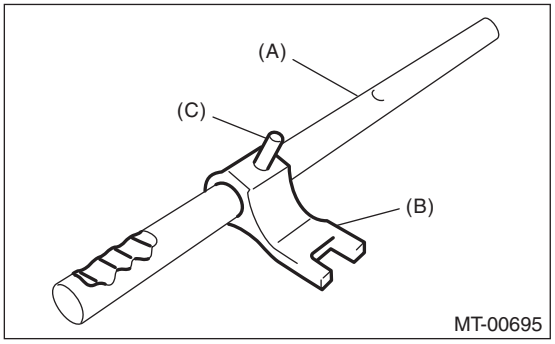
NOTE:
Make sure that the 1st-2nd shifter arm and fork are installed in the correct direction.



(A) 1st-2nd shifter fork
(B) 1st-2nd shifter arm
(C) Spring pin

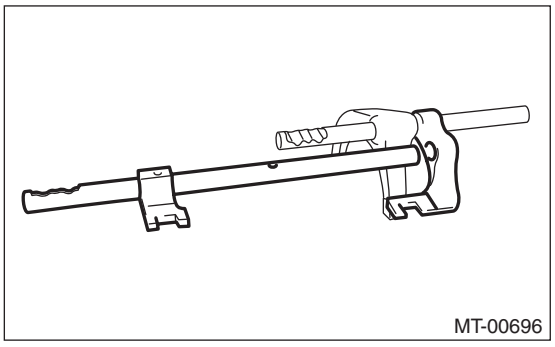
3) Using the ST, install the 3rd-4th shifter arm.
ST 398791700 REMOVER

NOTE:
Make sure that the 3rd-4th shifter arm and rod are installed in the correct direction.



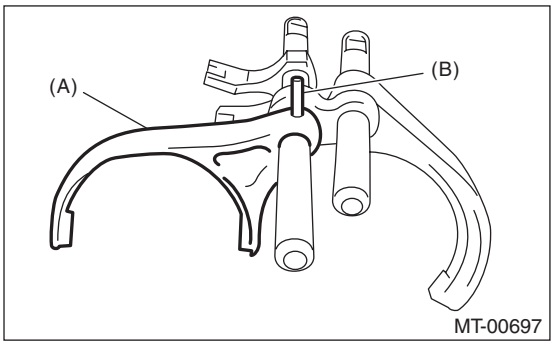
(A) 3rd-4th shifter rod
(B) 3rd-4th shifter arm
(C) Spring pin

4) Attach the 3rd-4th fork rod to the 1st-2nd shifter arm.



5) Using the ST, install the 3rd-4th shifter fork.
ST 398791700 REMOVER

NOTE:
Make sure that the 3rd-4th shifter fork is installed in the correct direction.

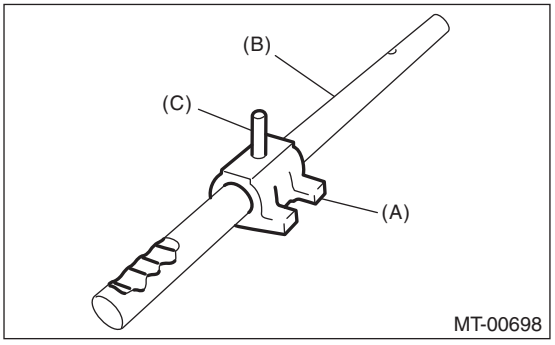


(A) 3rd-4th shifter fork
(B) Spring pin

3. 5TH-6TH SHIFTER FORK

1) Using the ST, install the 5th-6th shifter arm.
ST 398791700 REMOVER

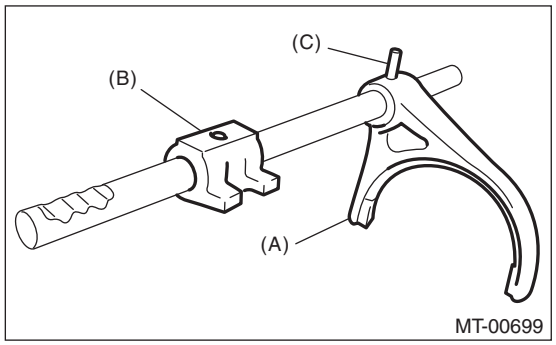
NOTE:
Make sure that the 5th-6th shifter arm and rod are installed in the correct direction.



(A) 5th-6th shifter arm
(B) 5th-6th shifter rod
(C) Spring pin

2) Using the ST, install the 5th-6th shifter fork.
ST 398791700 REMOVER

NOTE:
Check that the 5th-6th shifter fork and arm are installed.

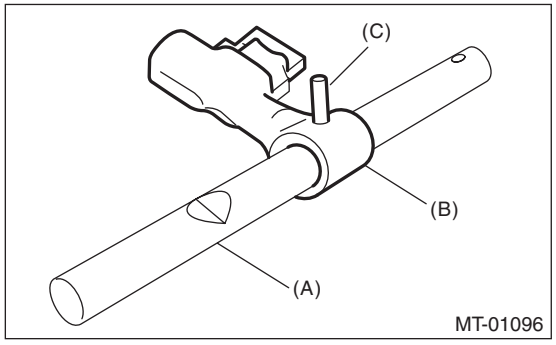


(A) 5th-6th shifter fork
(B) 5th-6th shifter arm
(C) Spring pin

4. SHIFTER ARM SHAFT

Using the ST, install the selector arm.
ST 398791700 REMOVER

NOTE:
Confirm that the selector arm and rod are installed in the proper direction.

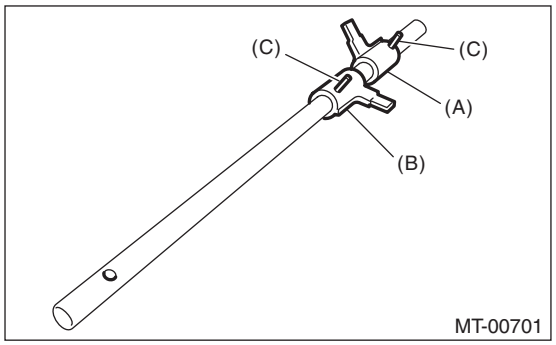


(A) Selector rod
(B) Selector arm
(C) Spring pin

5. STRIKING ROD

1) Using the ST, install the reverse interlock arm and interlock arm.
ST 398791700 REMOVER

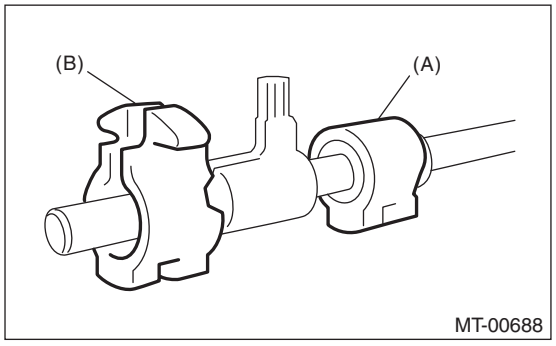
NOTE:
• Confirm that the reverse interlock arm and rod are installed in the proper direction.
• Confirm that the interlock arm and rod are installed in the proper direction.



(A) Reverse interlock arm
(B) Interlock arm
(C) Spring pin

2) Attach the reverse interlock block and interlock block to the striking rod.

NOTE:
Confirm that the reverse interlock block and interlock block are installed in the proper direction.



(A) Reverse interlock block
(B) Interlock block

E: INSPECTION

1) Check the shift shaft and shift rod for damage. Replace if damaged.
2) Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

F: ADJUSTMENT

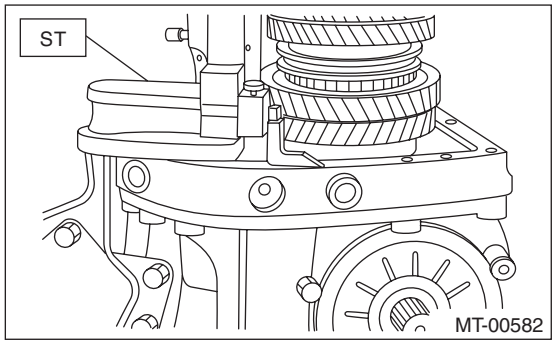
1. 1ST-2ND FORK ROD SELECTION

NOTE:
In the following conditions, perform the procedures below.
- When the 1st and 2nd driven gear are replaced.
- When the 1st and 2nd synchro ring assembly are replaced.
- When the adapter plate is replaced.
- When the driven shaft is replaced.
- When the 1st-2nd hub and sleeve assemblies are replaced.

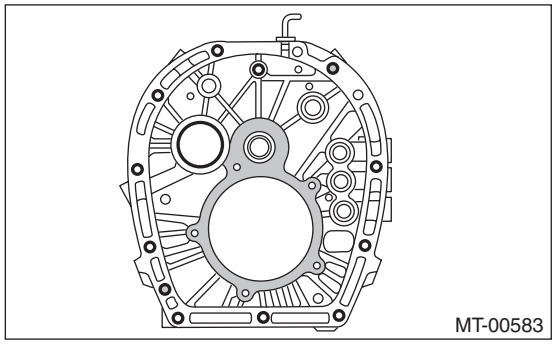
1) Insert the drive pinion assembly into the adapter plate.

NOTE:
Confirm that the thrust bearing outer race has not been removed and the drive pinion is not lifted.

2) Set the height gauge to the adapter plate. Lower the height gauge indicator to the mating surface of the adapter plate and case, and set to 0 points.
ST 18853AA000 HEIGHT GAUGE

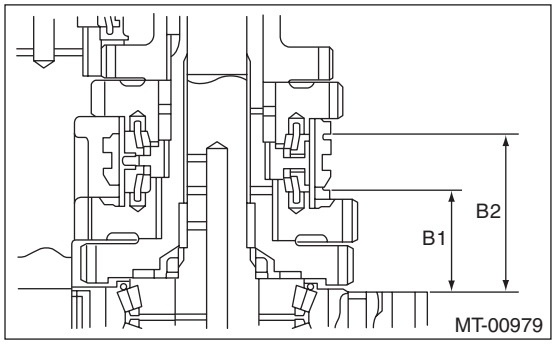


NOTE:
- The adapter plate will be the base point for the measurement. Use a scraper to remove any gasket material remaining on the end face.
- During measurement, do not place the height gauge in the shaded area shown in the figure.

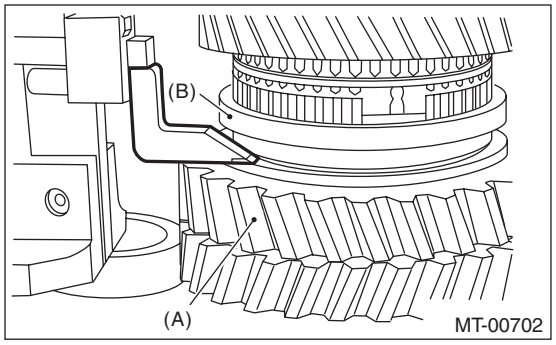


3) Select the main shaft snap ring. <Ref. to 6MT-80, ADJUSTMENT, Main Shaft Assembly.>

4) Measure “B1” and “B2” as shown in the figure.

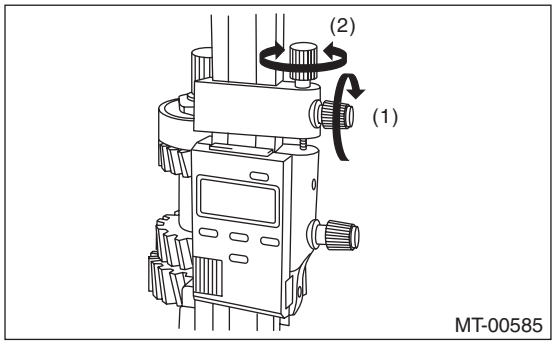


(1) Shift the 1st-2nd sleeve to the 1st driven gear side, push down to the stopper, and measure “B1”.

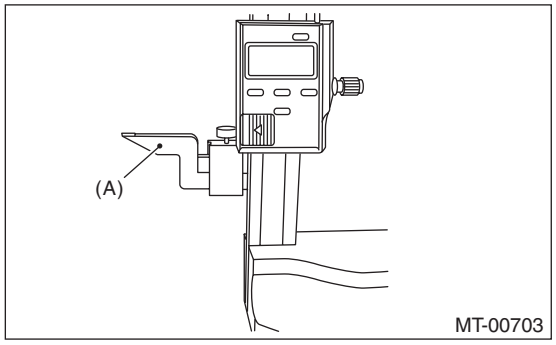


(A) 1st driven gear
(B) 1st-2nd sleeve

NOTE:
- Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 1st side end surface of the sleeve.
- Turn approximately 72° at a time, and measure the sleeve in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.

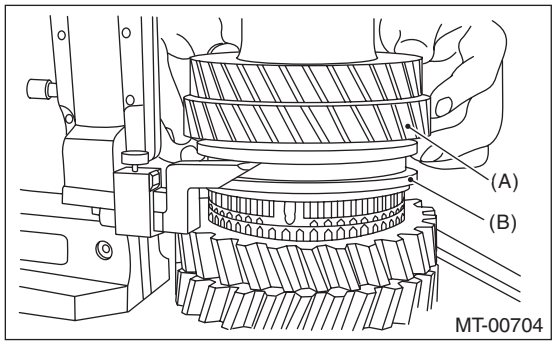


(2) Set the height gauge indicator upside down.



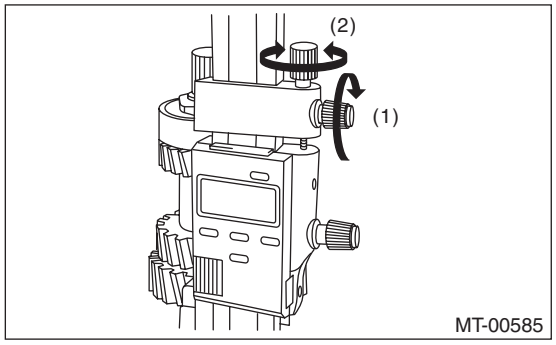
(A) Indicator

(3) Shift the 1st-2nd sleeve to the 2nd driven gear side, push up on the stopper, and measure "B2".



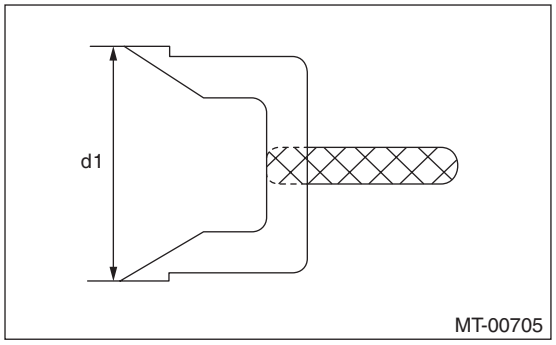
(A) 2nd driven gear
(B) 1st-2nd sleeve

NOTE:
• Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 2nd side end surface of the sleeve.
• The measurement is to be performed with 2 persons, while holding the sleeve straight.
• Turn approximately 72° at a time, and measure the sleeve in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.



(4) According to both of the measurements, calculate the neutral position of the 1st-2nd sleeve. From the following calculation, select a fork rod which matches the calculated value.
Calculation: T = (B1 + B2) / 2
T: 1st-2nd sleeve center position
B1: Height from the adapter plate end to the sleeve end, when shifted to 1st gear
B2: Measured height from the adapter plate end to the sleeve end, when shifted to 2nd gear: +55 mm (2.17 in)

NOTE:
Attach the indicator upside down in comparison to the setting procedures for the 0 point. Add d1 [Numerical value: 55 mm (2.17 in)] from the figure below to "B2", and measure "B2".

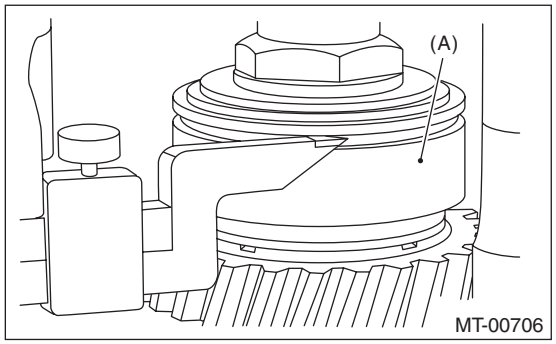


T mm (in)	Lot No. (marking)
62.93 — 63.23 (2.4776 — 2.4894)	32801AA111 (1)
63.23 — 63.53 (2.4894 — 2.5012)	32801AA131 (none)
63.53 — 63.83 (2.5012 — 2.5130)	32801AA141 (2)

2. 3RD-4TH FORK ROD SELECTION

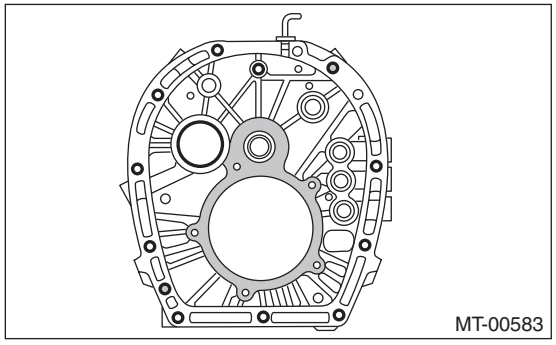
NOTE:
In the following conditions, perform the procedures below.
• When the main shaft is replaced.
• When the 3rd, and 3rd to 6th drive gear and bushing are replaced.
• When the 3rd, and 3rd to 6th synchro assemblies are replaced.
• When the 3rd-4th hub and sleeve assemblies are replaced.
1) Insert the main shaft assembly into the adapter plate.

2) Set the height gauge to the adapter plate. Lower the height gauge indicator to the top surface of the snap ring groove, and set to the 0 point on the upper side of the main rear bearing.
ST 18853AA000 HEIGHT GAUGE

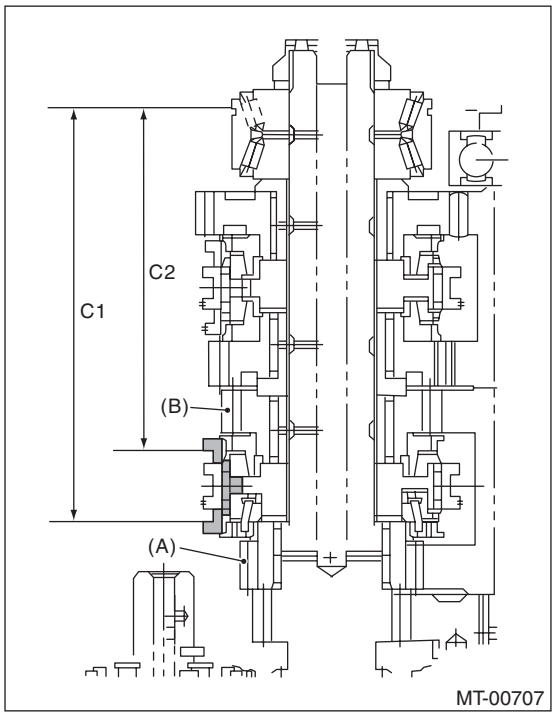


(A) Roller bearing

NOTE:
• The height gauge will be set on the adapter plate during the measurement. Use a scraper to remove any gasket material remaining on the end face.
• During measurement, do not place the height gauge in the shaded area shown in the figure.

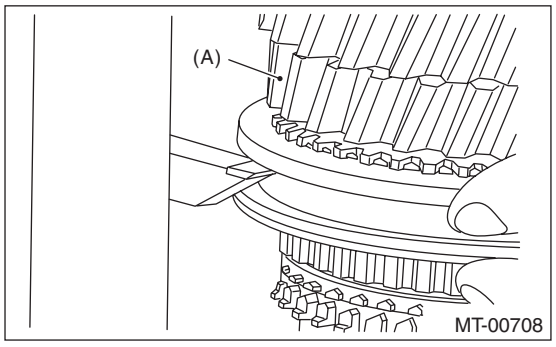


3) Use a height gauge to measure “C1” and “C2” as shown in the figure.



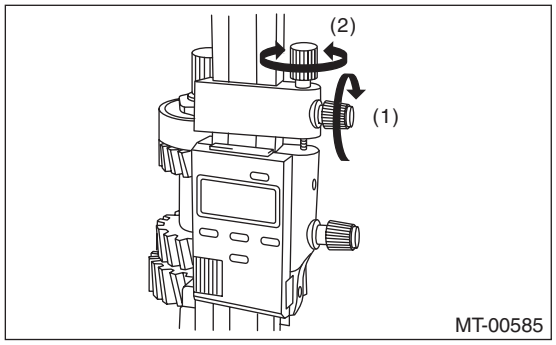
(A) 3rd drive gear
(B) 4th drive gear

(1) Shift the 3rd-4th sleeve to the 4th gear side, push up on the stopper, and measure “C2”.

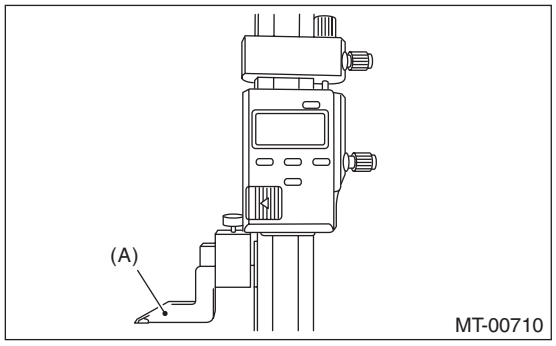


(A) 4th drive gear

NOTE:
• Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure.
• Turn dial (2), and set the indicator to the 4th side end surface of the sleeve.
• The measurement is to be performed with 2 persons, while holding the sleeve straight.
• Turn approximately 72° at a time, and measure the sleeve in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.

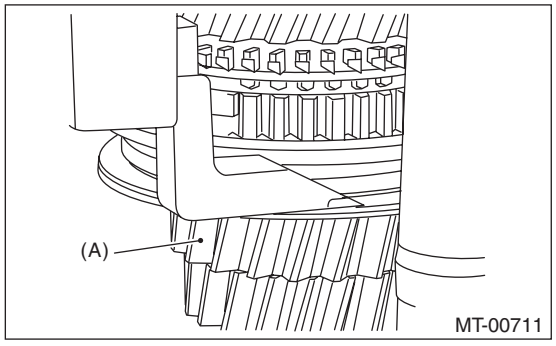


(2) Set the height gauge indicator upside down.



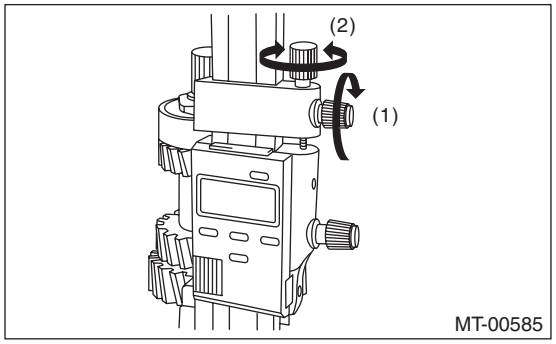
(A) Indicator

(3) Shift the 3rd-4th sleeve to the 3rd drive gear side, push down to the stopper, and measure “C1”.



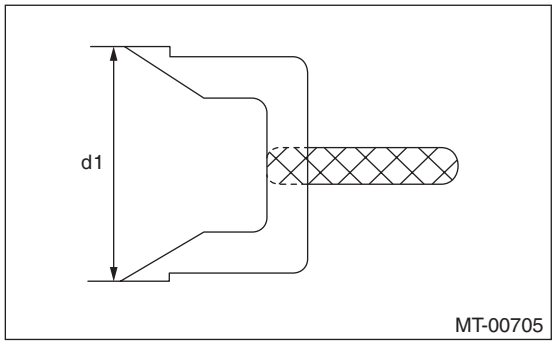
(A) 3rd drive gear

NOTE:
• Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 3rd side end surface of the sleeve.
• Turn approximately 72° at a time, and measure the sleeve in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.



4) According to both of the measurements, calculate the neutral position of the 3rd-4th sleeve. From the following calculation, select a fork rod which matches the calculated value.
Calculation: T = (C1 + C2) / 2
T: 3rd-4th sleeve center position
C1: Measured depth from the main shaft rear bearing snap ring groove to the sleeve end, when shifted to 3rd gear: +55 mm (2.17 in)
C2: Measured depth from the main shaft rear bearing snap ring groove to the sleeve end, when shifted to 4th gear

NOTE:
Attach the indicator upside down in comparison to the setting procedures for the 0 point. Add d1 [Numerical value: 55 mm (2.17 in)] from the figure below to “C1”, and measure “C1”.



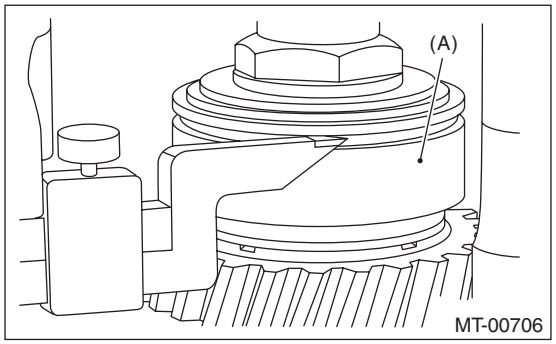
T mm (in)	Lot No. (marking)		
	M.SFT Snap ring 805072010 [t = 1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t = 1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t = 2.25 mm (0.089 in)]
137.22 — 137.52 (5.4024 — 5.4142)	32809AA171 (none)	32809AA181 (2)	32809AA191 (4)
137.52 — 137.82 (5.4142 — 5.4260)	32809AA161 (1)	32809AA171 (none)	32809AA181 (2)
137.82 — 138.12 (5.4260 — 5.4378)	32809AA141 (3)	32809AA161 (1)	32809AA171 (none)

T = Thickness

3. 5TH-6TH FORK ROD SELECTION

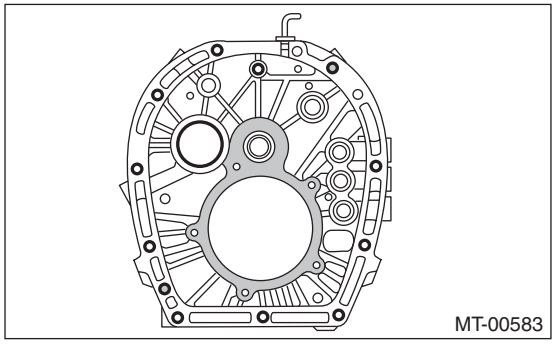
NOTE:
In the following conditions, perform the procedures below.
- When the main shaft is replaced.
- When the 3rd to 6th drive gear and bushing are replaced.
- When the 3rd to 6th synchro ring assemblies are replaced.
- When the 3rd-4th hub and sleeve assemblies are replaced.
- When the 5th-6th hub and sleeve assemblies are replaced.

1) Insert the main shaft assembly into the adapter plate.
2) Set the height gauge to the adapter plate. Lower the height gauge indicator to the upper face of the snap ring groove or the upper side of the main rear bearing. Set to 0 point.
ST 18853AA000 HEIGHT GAUGE

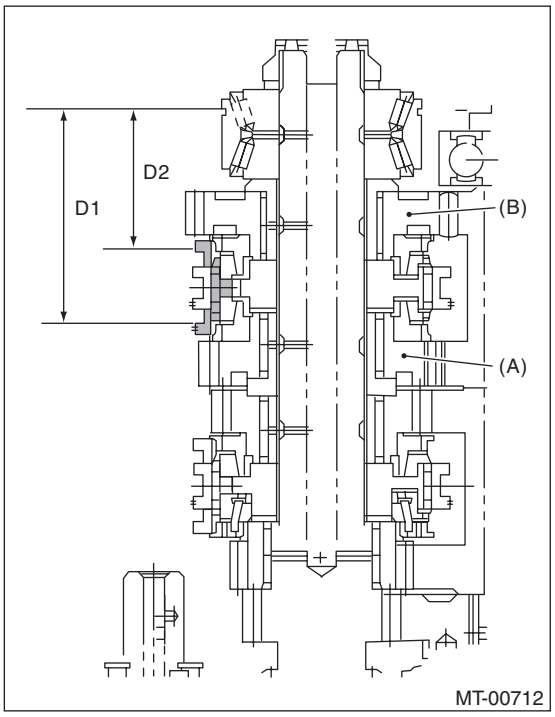


(A) Ball bearing

NOTE:
- The height gauge will be set on the adapter plate during the measurement. Use a scraper to remove any gasket material remaining on the end face.
- During measurement, do not place the height gauge in the shaded area shown in the figure.

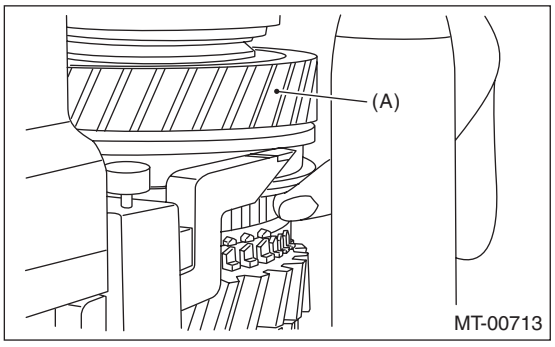


3) Use a height gauge to measure “D1” and “D2” as shown in the figure.



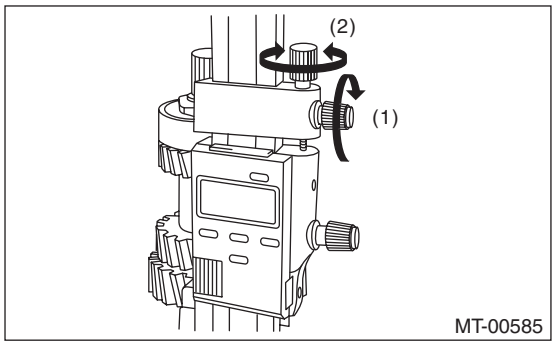
(A) 5th main gear
(B) 6th main gear

(1) Shift the 5th-6th sleeve to the 6th main gear side, push up on the stopper, and measure “D2”.

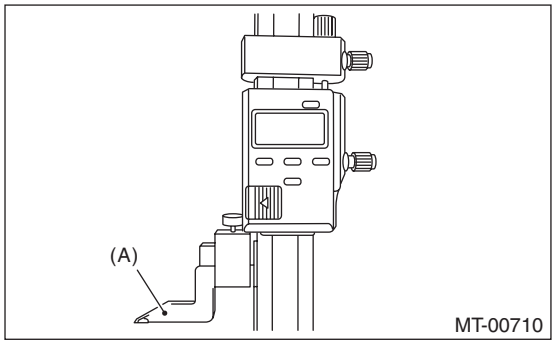


(A) 6th main gear

NOTE:
• Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 6th side end surface of the sleeve.
• The measurement is to be performed with 2 persons, while holding the sleeve straight.
• Turn approximately 72° at a time, and measure the sleeve in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.

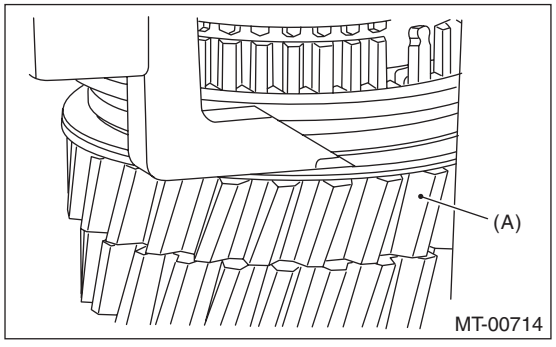


(2) Set the height gauge indicator upside down.



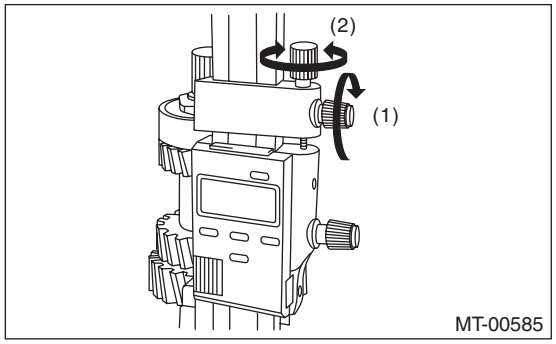
(A) Indicator

(3) Shift the 5th-6th sleeve to the 5th main gear side, push down to the stopper, and measure “D1”.



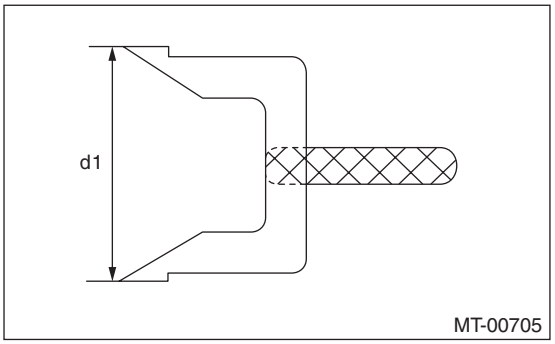
(A) 5th main gear

NOTE:
• Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 5th side end surface of the sleeve.
• Turn approximately 72° at a time, and measure the sleeve in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.



4) According to both of the measurements, calculate the neutral position of the 5th-6th sleeve. From the following calculation, select a fork rod which matches the calculated value.
Calculation: T = (D1 + D2) / 2
T: 5th-6th sleeve center position
C1: Measured length from the shaft rear bearing snap ring groove to the sleeve groove end, when shifted to 5th gear [Measured value +55 mm (2.17 in)]
D2: Measured length from the main shaft rear bearing snap ring groove to the sleeve groove end, when shifted to 6th gear

NOTE:
Attach the indicator upside down in comparison to the setting procedures for the 0 point. Add d1 [Numerical value: 55 mm (2.17 in) from the figure below to “D1”, and measure “D1”.



T mm (in)	Lot No. (marking)		
	M.SFT Snap ring 805072010 [t = 1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t = 1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t = 2.25 mm (0.089 in)]
64.12 — 64.42 (2.5244 — 2.5362)	32945AA021 (none)	32945AA031 (2)	32945AA041 (4)
64.42 — 64.72 (2.5362 — 2.5480)	32945AA011 (1)	32945AA021 (none)	32945AA031 (2)
64.72 — 65.02 (2.5480 — 2.5598)	32945AA001 (3)	32945AA011 (1)	32945AA021 (none)

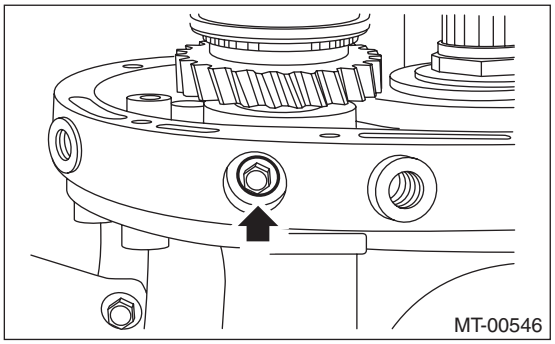
T = Thickness

4. REVERSE FORK ROD SELECTION

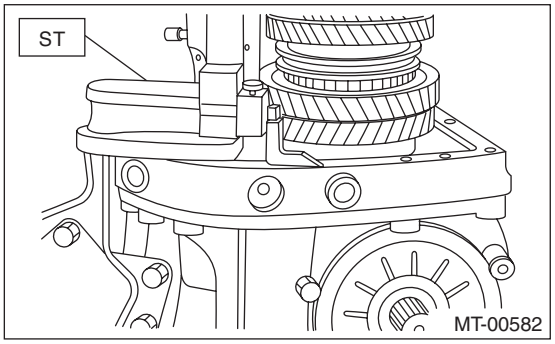
NOTE:
In the following conditions, perform the procedures below.
• When the reverse idler gear is replaced.
• When the reverse idler gear No. 2 is replaced.
• When the adapter plate is replaced.
• When the base is replaced.
1) Insert the reverse idler gear assembly into the adapter plate.

2) Tighten the base COMPL attachment bolts.

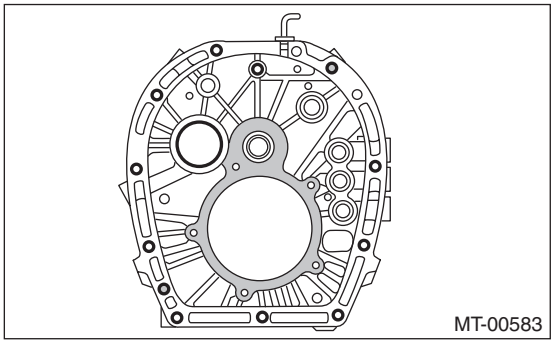
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



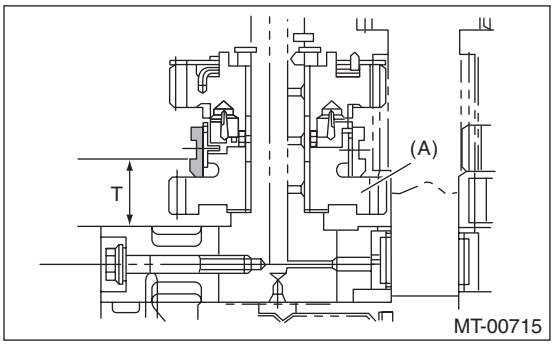
3) Set the height gauge to the adapter plate. Lower the height gauge indicator to the mating surface of the adapter plate and case, and set to 0 points.
ST 18853AA000 HEIGHT GAUGE



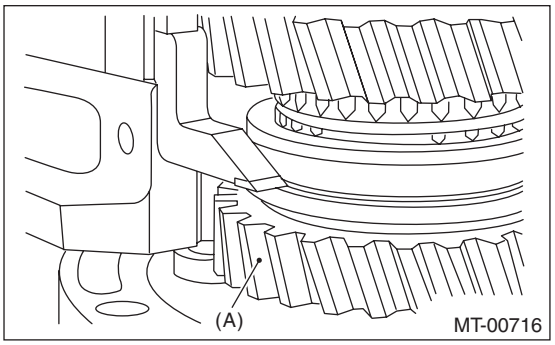
NOTE:
• The adapter plate will be the base point for the measurement. Use a scraper to remove any gasket material remaining on the end face.
• During measurement, do not place the height gauge in the shaded area shown in the figure.



4) Press fit the reverse sleeve to the reverse idler gear No. 2, and measure “T”.

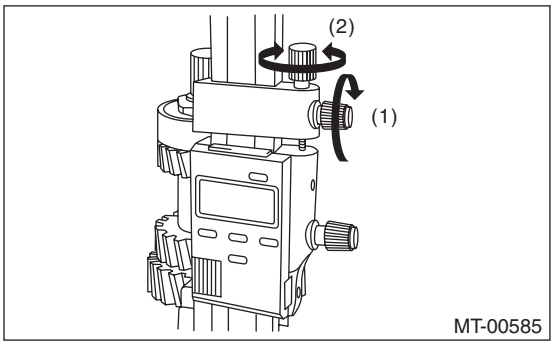


(A) Reverse idler gear No. 2



(A) Reverse idler gear No. 2

NOTE:
• Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the end face of the reverse sleeve side.
• Turn approximately 72° at a time, and measure the sleeve in 5 locations. Round off the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.



5) Calculate the neutral position of the reverse sleeve according to the measurement. From the following calculation, select a fork rod which matches the calculated value.
Calculation: T + 4.8 mm (0.189 in)

T + 4.8 mm (0.189 in) mm (in)	Lot No. (marking)
33.50 — 33.80 (1.3189 — 1.3307)	32816AA110 (1)
33.80 — 34.10 (1.3307 — 1.3425)	32816AA130 (none)
34.10 — 34.40 (1.3425 — 1.3543)	32816AA140 (2)

T = Thickness

25.Clutch Housing

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the individual gear assemblies. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-95, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the front differential assembly. <Ref. to 6MT-101, REMOVAL, Front Differential Assembly.>

B: INSTALLATION

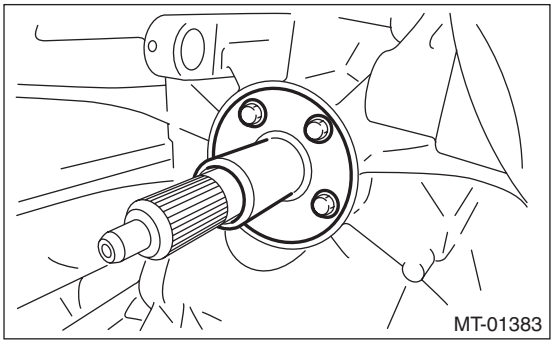
1) Install the pitching stopper bracket.

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

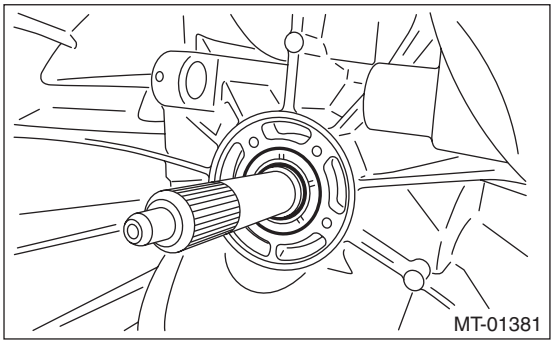
2) Install the front differential assembly. <Ref. to 6MT-101, INSTALLATION, Front Differential Assembly.>
3) Install the drive pinion shaft assembly. <Ref. to 6MT-95, INSTALLATION, Drive Pinion Shaft Assembly.>
4) Install the individual gear assemblies all at once. <Ref. to 6MT-70, INSTALLATION, Main Shaft Assembly.>
5) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
6) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
7) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
8) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
9) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
10) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
11) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the clutch release bearing guide.

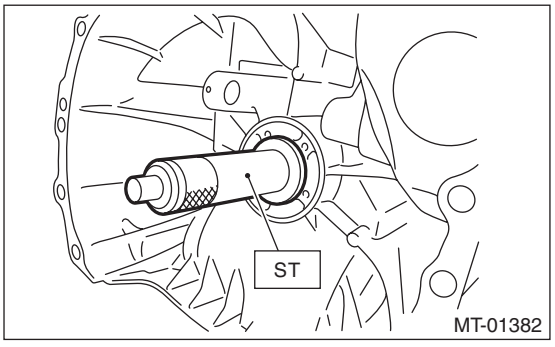


2) Remove the oil seal.



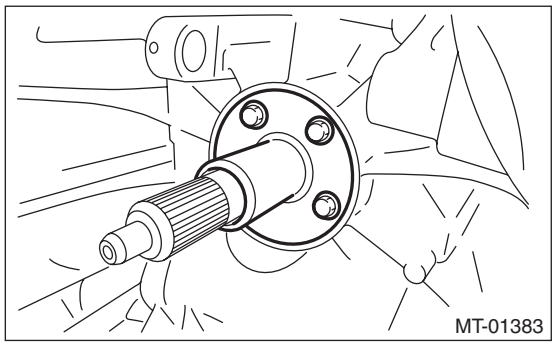
D: ASSEMBLY

1) Attach the oil seal to the clutch housing, being careful not to damage the seal.
ST 18657AA020 OIL SEAL INSTALLER



2) Install the clutch release bearing guide.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



E: INSPECTION

1) Check to make sure there is no damage or cracks on the clutch housing. If there is excessive damage, replace the clutch housing.
2) Inspect the clutch housing for gear oil leakage. If any oil leaks are found, repair or replace the applicable part.

26.General Diagnostic Table

A: INSPECTION

1. MANUAL TRANSMISSION

Symptom	Possible cause	Corrective action
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: 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 and reverse driven gear	Replace.
	(b) Gear spline wear, damage, dents	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact or wear between synchronizer ring and gear cone	Correct or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (caused by slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn 5th drive gear and bushing	Replace.
	(l) Worn 6th drive gear and bushing	Replace.
	(m) Worn reverse idler gear and bushing	Replace.
3. Noise emitted from transmission NOTE: If a noise is heard when the vehicle is parked with its engine idling and if a noise ceases when the clutch is disengaged, it may be considered that the noise is coming from the transmission.	(a) Insufficient or improper lubrication	Lubricate with specified oil or replace.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the gear teeth surfaces, only a high whirring noise will occur at high speeds, but if any part is broken, rhythmical clicking sounds will be heard even at low speeds.	Replace.

2. DIFFERENTIAL

Symptom	Possible cause	Corrective action
1. Broken differential (case, gear, bearing, etc.) NOTE: Noise will occur, and eventually the differential will not be able to operate due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble the differential and replace broken components. At the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of the clutch	Readjust the preload and backlash of the bearing, and the contact surface of gear.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of the drive pinion and the hypoid driven gear	Adjust.
	(e) Loose hypoid driven gear tightening 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	Lubricate.
	(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.

CLUTCH SYSTEM

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