

General Description

AUTOMATIC TRANSMISSION

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	Inscribed gear 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 is in reverse.
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

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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
	Alternative	Idemitsu "ATF HP" CAUTION: Be sure to use the recommended or equivalent ATF. Using material except recommended one or substitute would cause trouble.
Fluid capacity	ℓ (US qt, Imp qt)	9.3 — 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

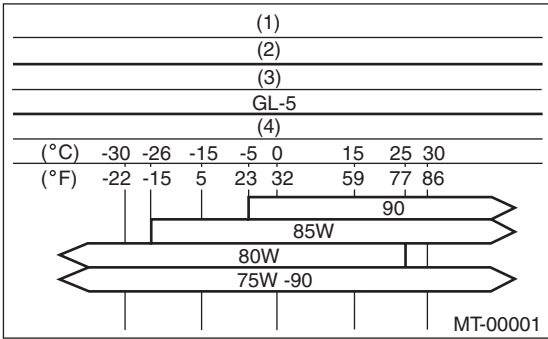
9. TRANSFER

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

10.FINAL REDUCTION GEAR

Front final reduction gear ratio	4.111 (37/9)

11.RECOMMENDED GEAR OIL

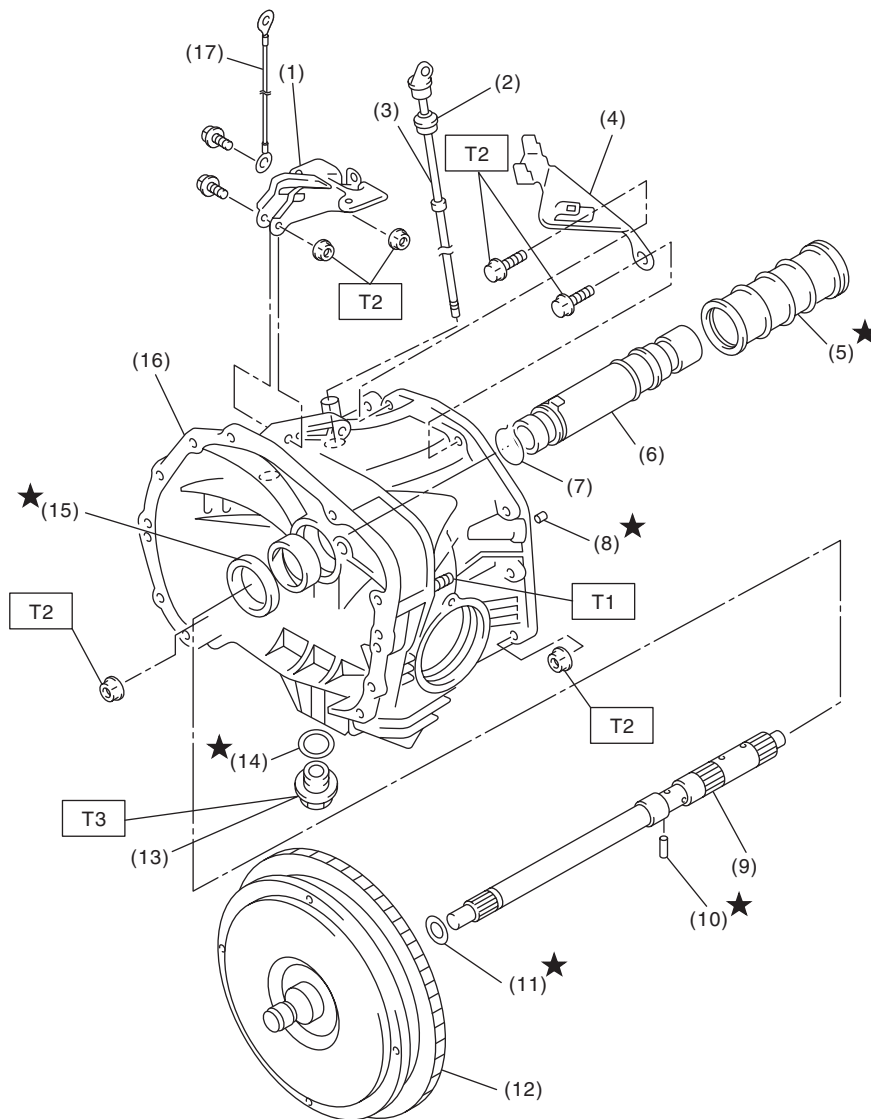
Lubrication oil	 (1) Item (2) Front differential gear oil (3) API standard (4) SAE viscosity No. and applicable temperature	
Front differential oil capacity ℓ (US qt, Imp qt)	1.1 — 1.3 (1.2 — 1.4, 1.0 — 1.1)	

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B: COMPONENT

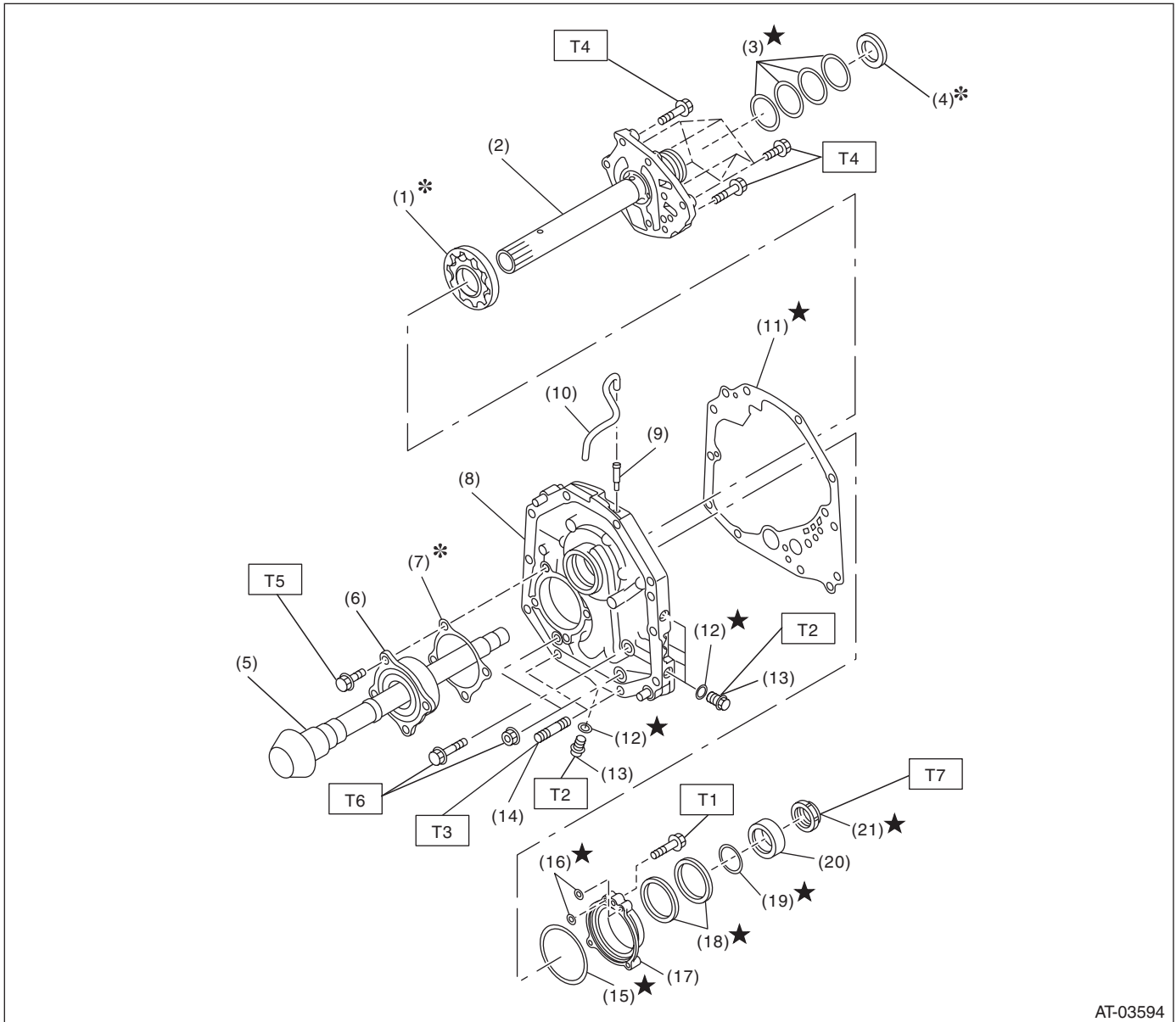
1. TORQUE CONVERTER AND CASE



AT-06145

(1) Pitching stopper bracket	(9) Input shaft	(17) Transmission radio ground cord
(2) O-ring	(10) Spring pin	
(3) Differential oil level gauge	(11) O-ring	Tightening torque:N·m (kgf-m, ft-lb)
(4) Stay	(12) Torque converter clutch ASSY	T1: 18 (1.8, 13.3)
(5) Seal pipe	(13) Differential gear oil drain plug	T2: 41 (4.2, 30.2)
(6) Oil pump shaft	(14) Gasket	T3: 44 (4.5, 32.5) (Aluminum gasket, silver)
(7) Clip	(15) Oil seal	70 (7.1, 51.6) (Copper gasket, brown)
(8) Oil drain pipe	(16) Converter case	70 (7.1, 51.6) (Metal gasket, black)

2. OIL PUMP



AT-03594

- (1) Oil pump rotor
- (2) Oil pump cover
- (3) Seal ring
- (4) Thrust needle bearing
- (5) Drive pinion shaft
- (6) Roller bearing
- (7) Drive pinion shim
- (8) Oil pump housing
- (9) Nipple
- (10) Air breather hose

- (11) Gasket
- (12) O-ring
- (13) Test plug
- (14) Stud bolt
- (15) O-ring
- (16) O-ring
- (17) Oil seal retainer
- (18) Oil seal
- (19) O-ring
- (20) Drive pinion collar

- (21) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7 (0.7, 5.2)

T2: 13 (1.3, 9.6)

T3: 18 (1.8, 13.3)

T4: 25 (2.5, 18.4)

T5: 40 (4.1, 29.5)

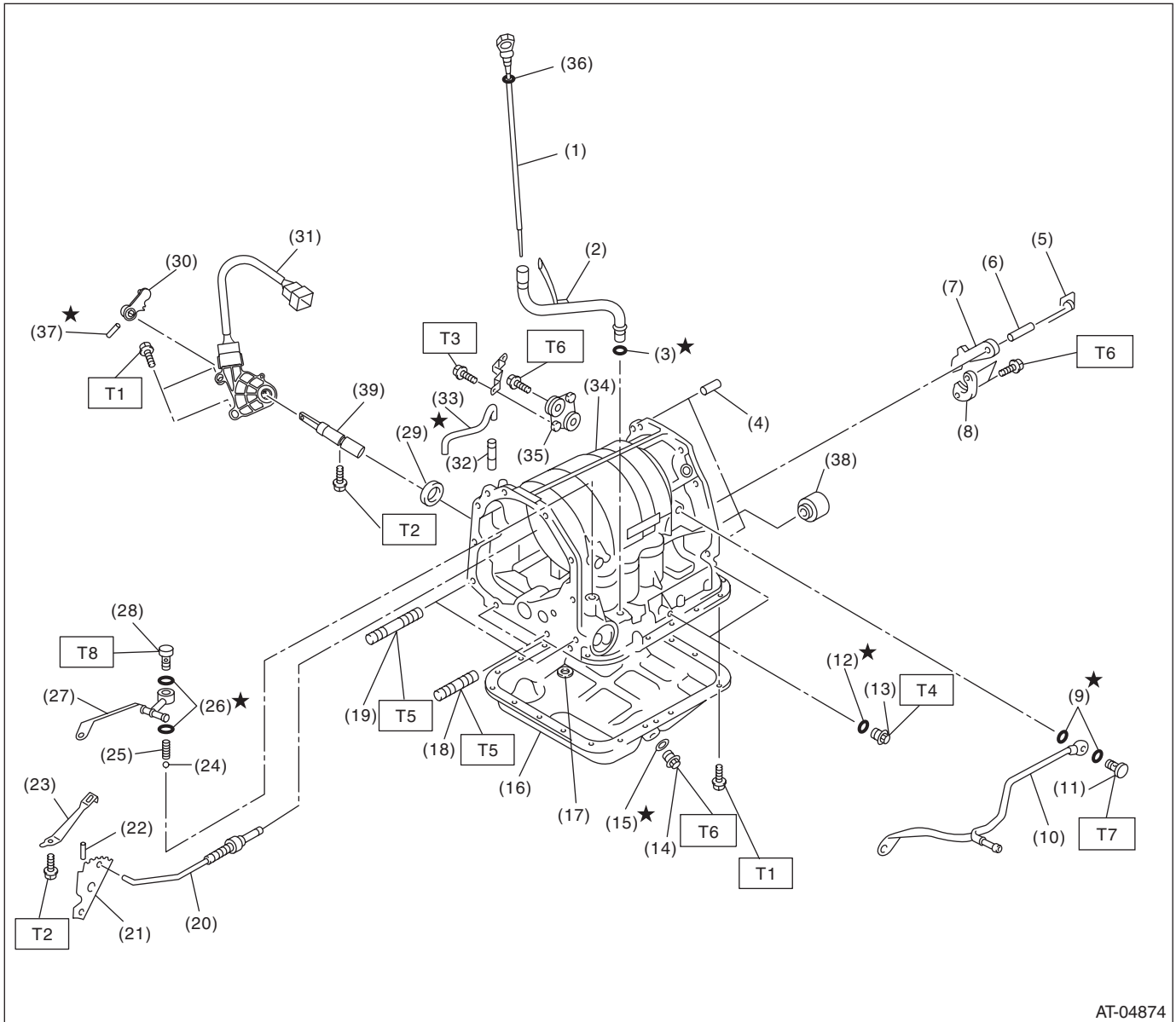
T6: 42 (4.3, 31.0)

T7: 116 (11.8, 85.6)

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3. TRANSMISSION CASE AND CONTROL DEVICE



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

Tightening torque:N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.7)

T2: 6 (0.6, 4.4)

T3: 12 (1.2, 8.9)

T4: 13 (1.3, 9.6)

T5: 18 (1.8, 13.3)

T6: 25 (2.5, 18.4)

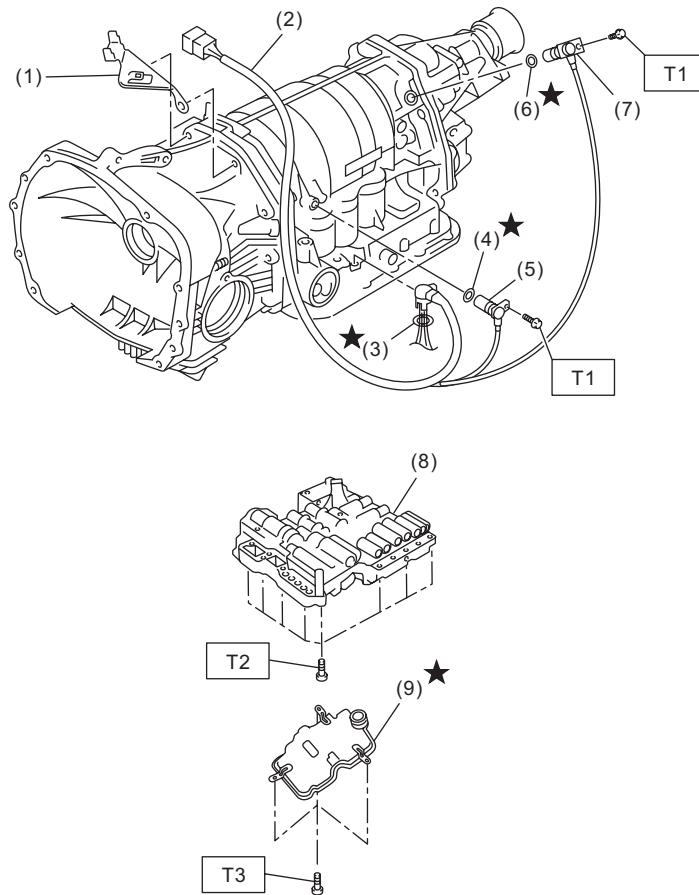
T7: 40 (4.1, 29.5)

T8: 45 (4.6, 33.2)

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4. CONTROL VALVE AND HARNESS ROUTING



AT-06094

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

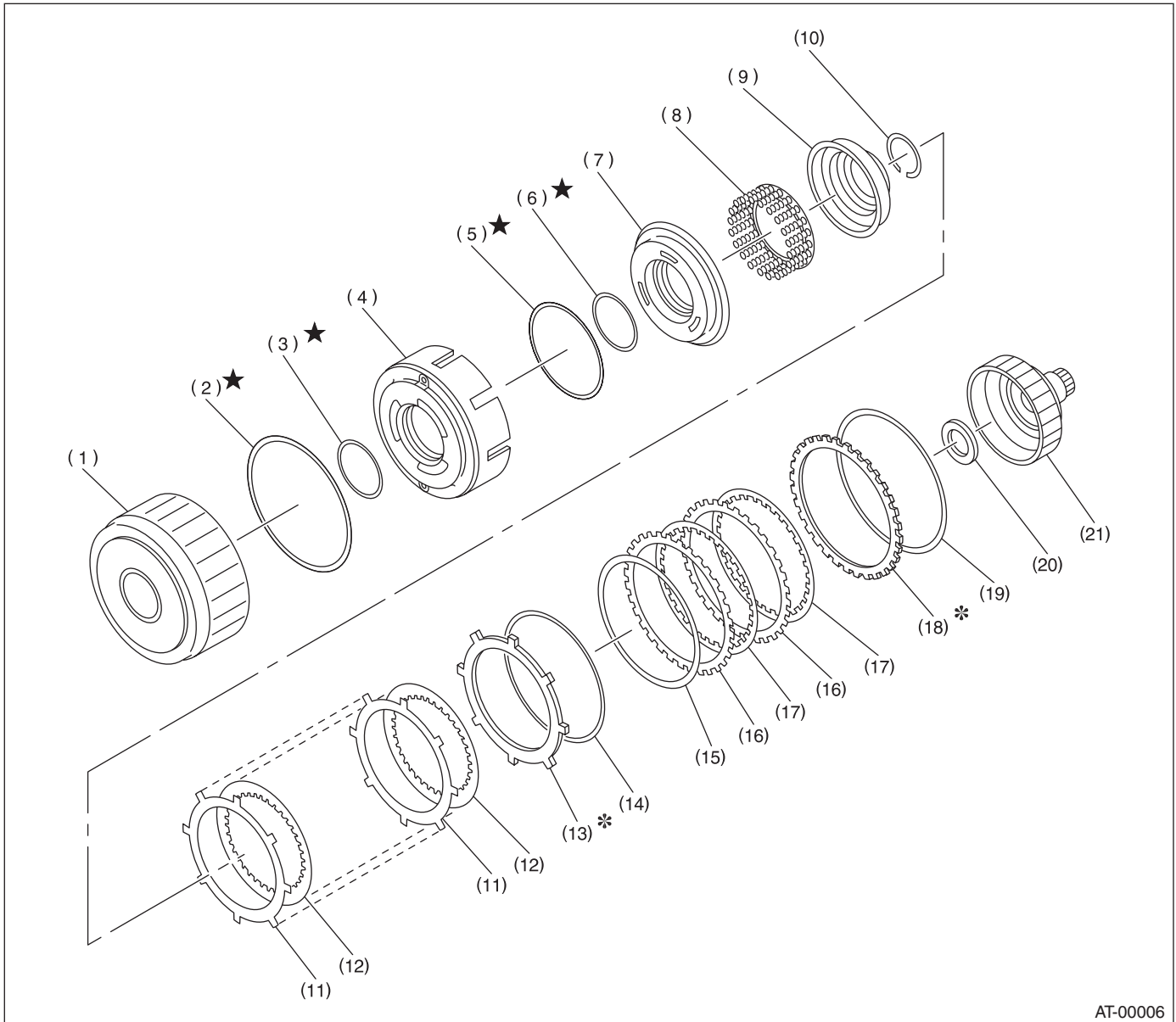
Tightening torque: N·m (kgf-m, ft-lb)

T1: 7 (0.7, 5.2)

T2: 8 (0.8, 5.9)

T3: 10 (1.0, 7.4)

5. HIGH CLUTCH AND REVERSE CLUTCH



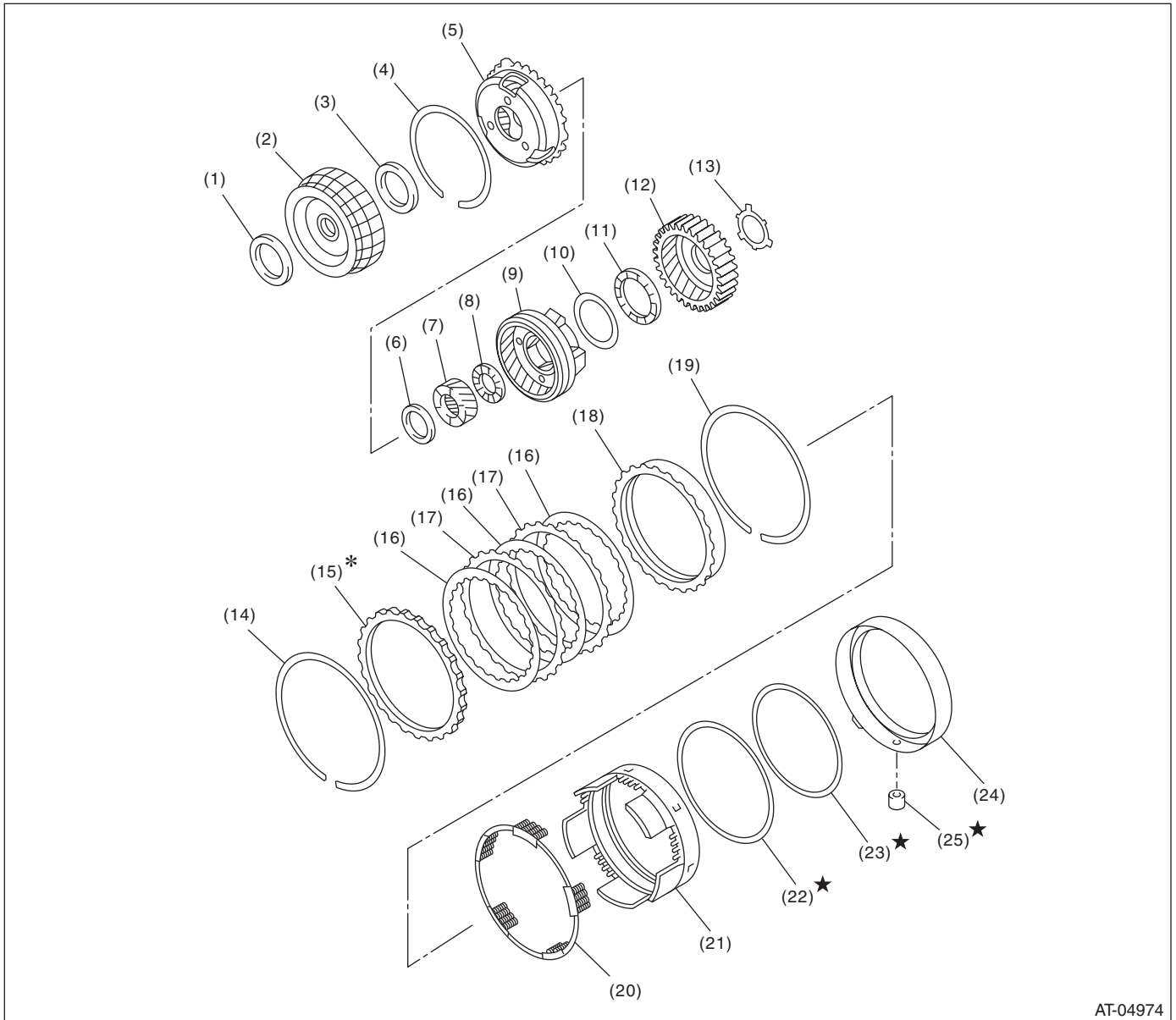
AT-00006

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

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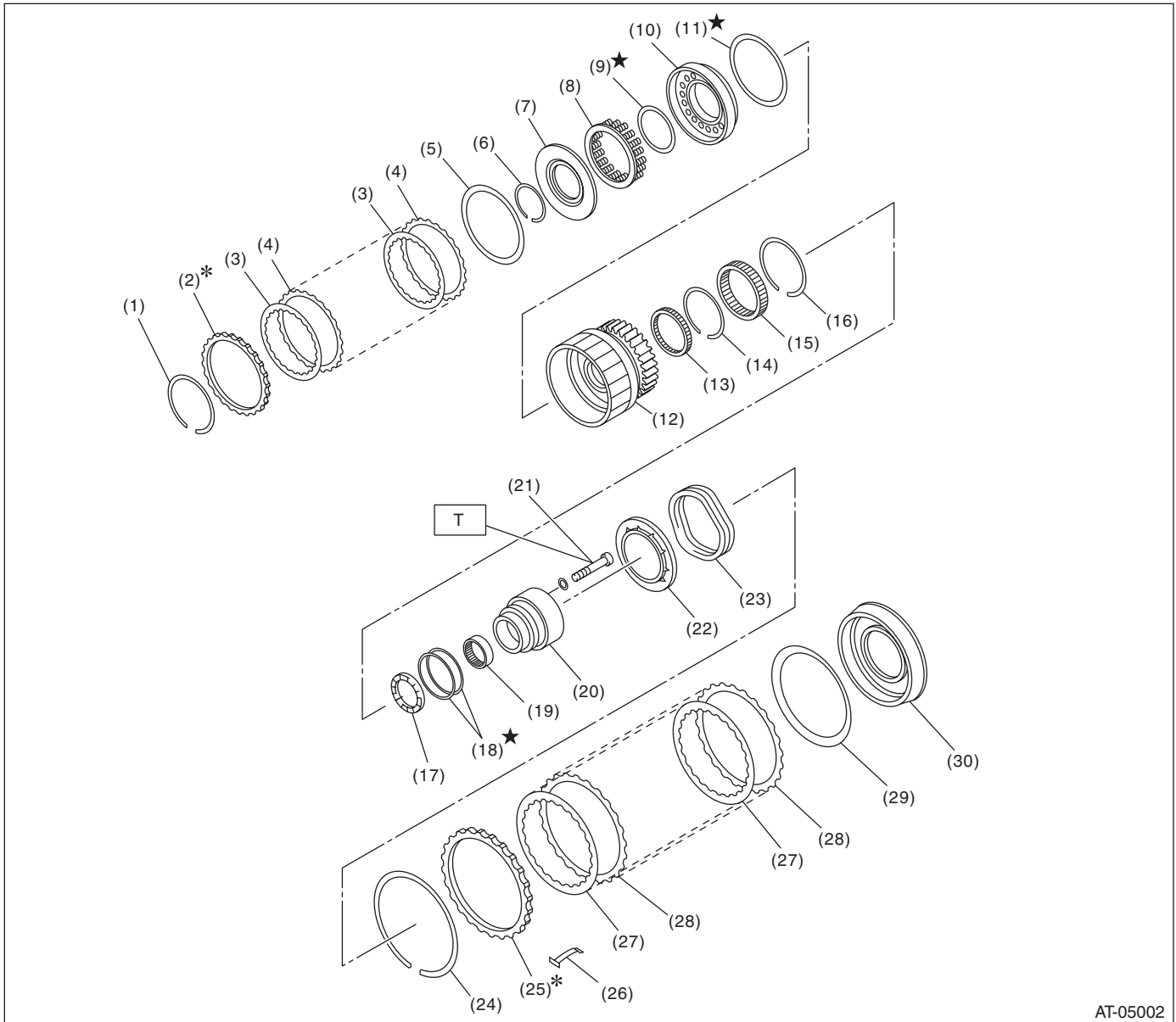
6. PLANETARY GEAR AND 2-4 BRAKE



AT-04974

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

7. LOW CLUTCH AND LOW & REVERSE BRAKE



AT-05002

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

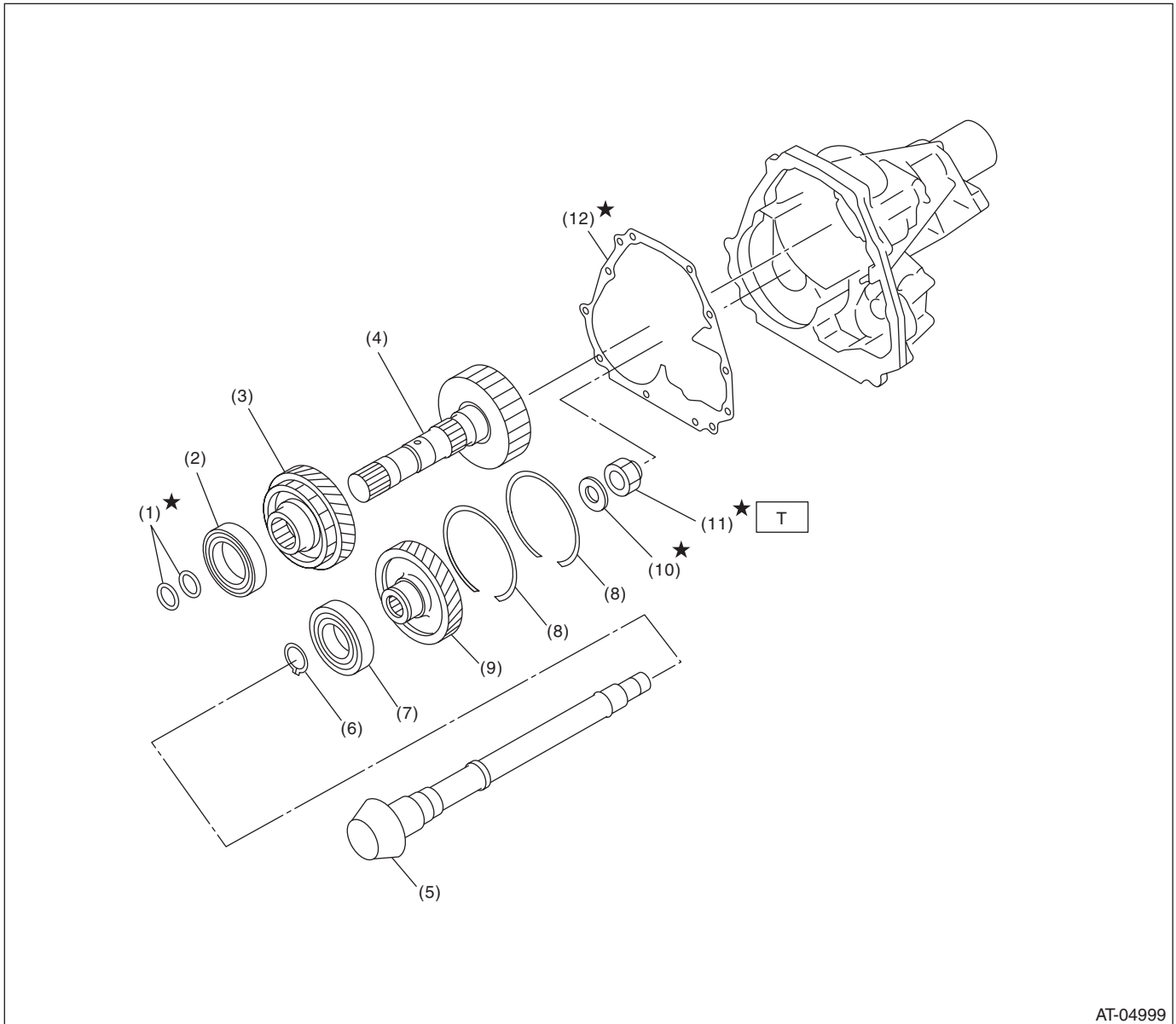
Tightening torque: N·m (kgf-m, ft-lb)

T: 25 (2.5, 18.4)

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8. REDUCTION GEAR



AT-04999

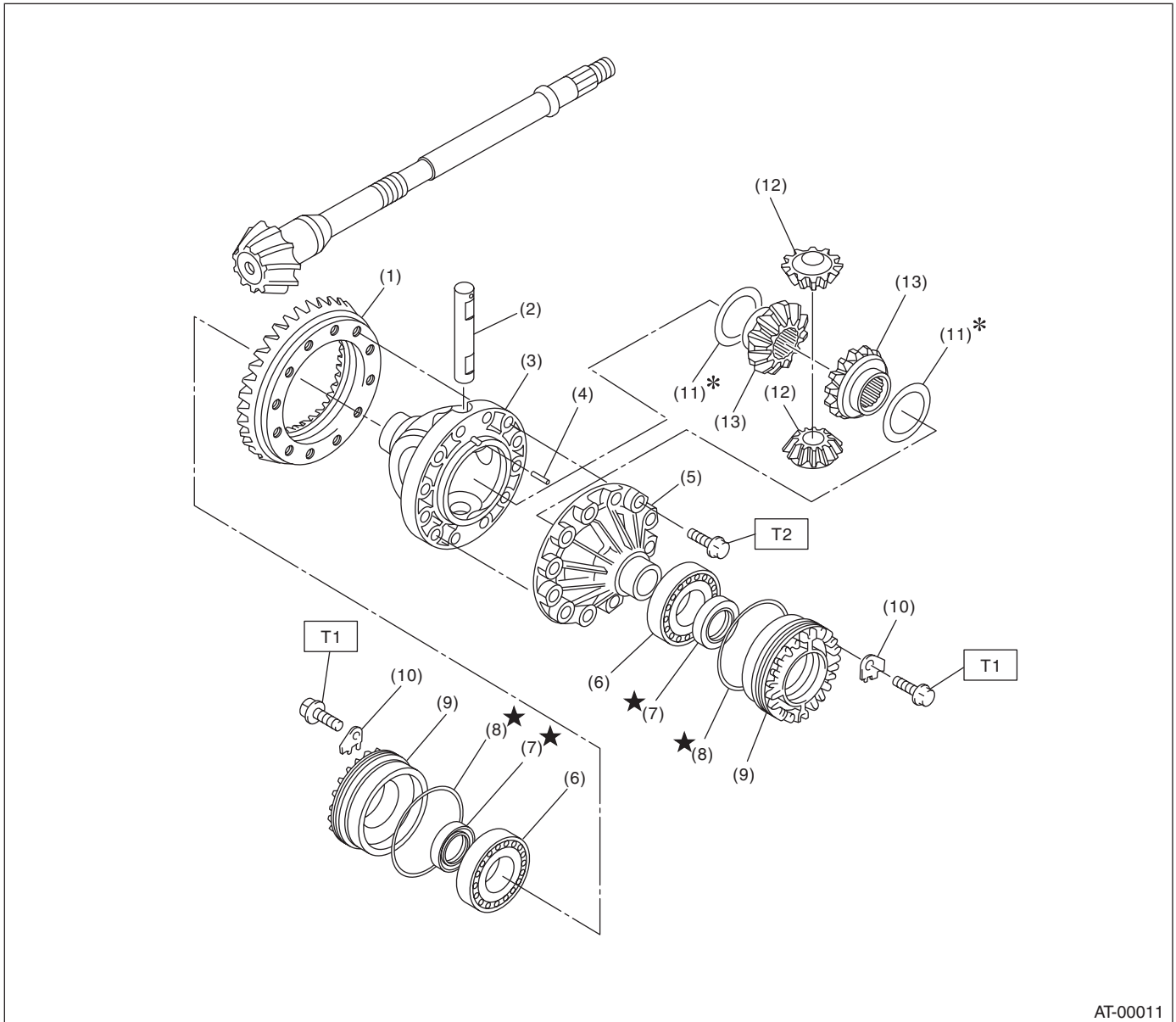
(1) Seal ring	(6) Snap ring
(2) Ball bearing	(7) Ball bearing
(3) Reduction drive gear	(8) Snap ring
(4) Reduction drive shaft	(9) Reduction driven gear
(5) Drive pinion shaft	(10) Washer

- | |
|---------------|
| (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)

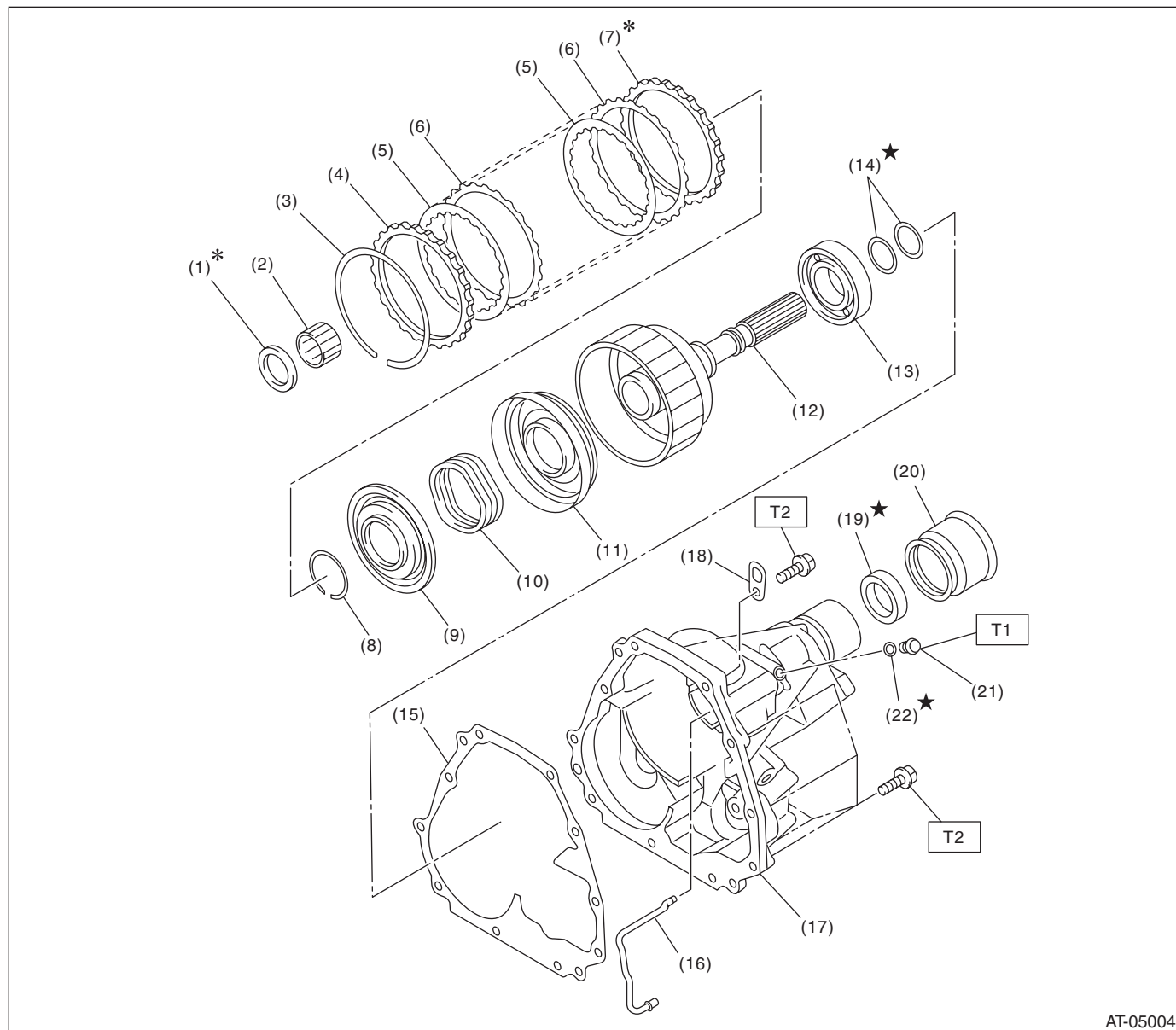
T1: 25 (2.5, 18.4)

T2: 62 (6.3, 45.7)

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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 clutch 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

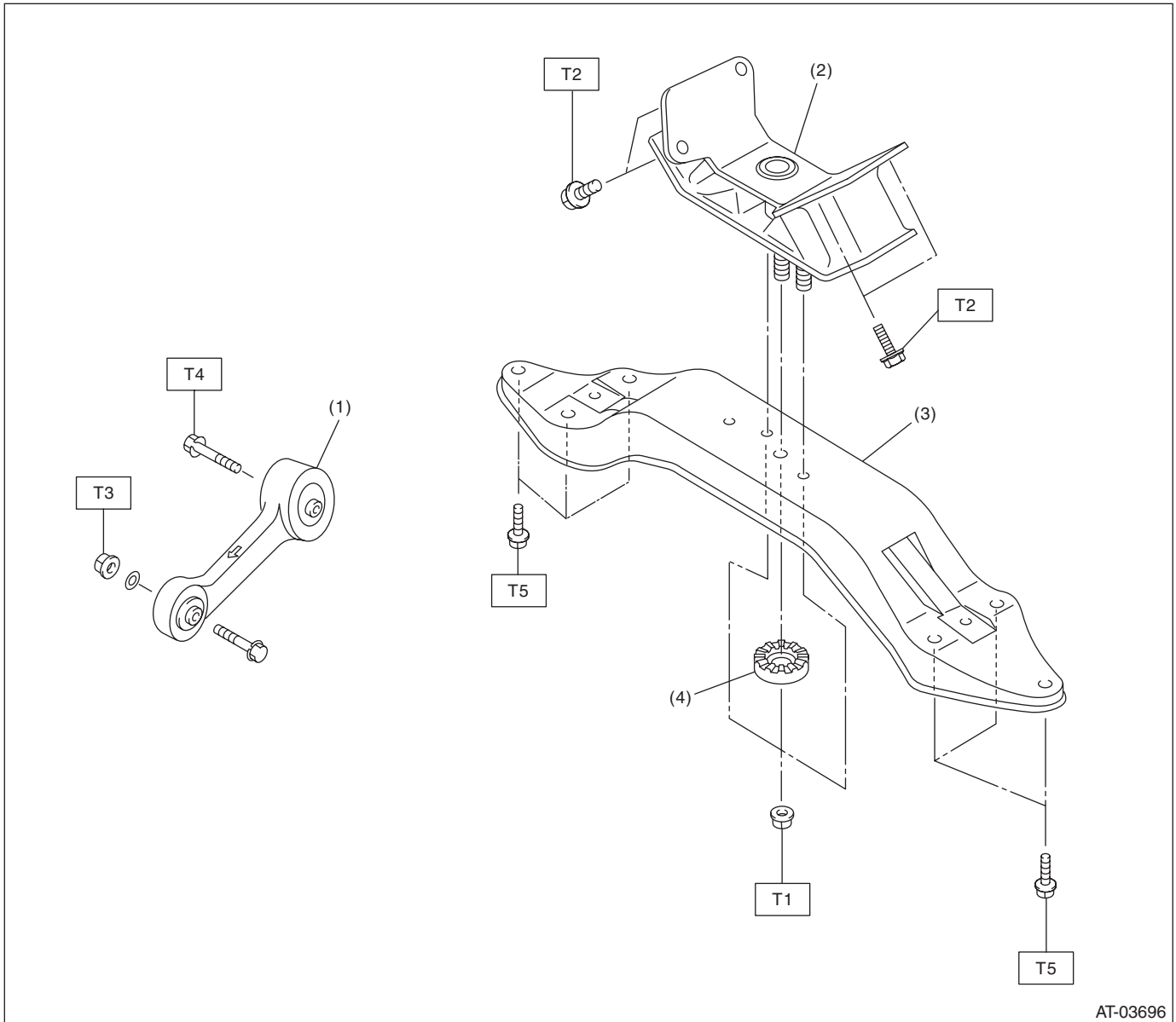
(22) O-ring

Tightening torque:N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.6)

T2: 25 (2.5, 18.4)

11.TRANSMISSION MOUNTING



AT-03696

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

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 25.8)

T2: 40 (4.1, 29.5)

T3: 50 (5.1, 36.9)

T4: 58 (5.9, 42.8)

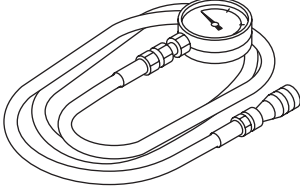
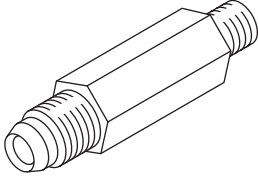
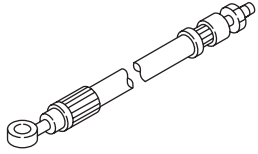
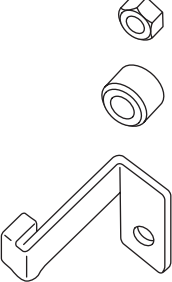
T5: 70 (7.1, 51.6)

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, SUBARU genuine ATF, and specified grease or 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 specified locations.
- 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 liquid gasket.
- When disassembling or assembling the AT, be sure to use nylon gloves and paper towels. Do not use cloth gloves or waste cloth.

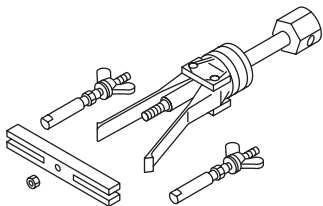
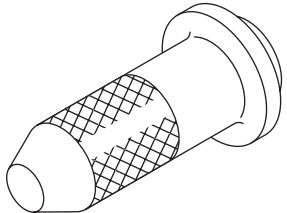
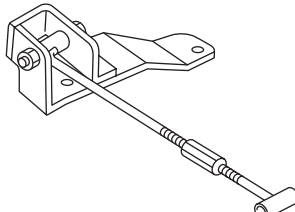
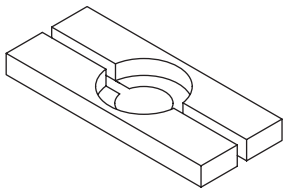
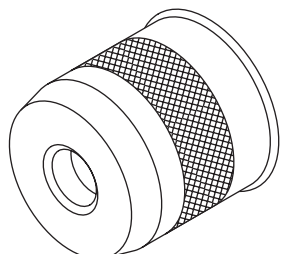
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	OIL PRESSURE GAUGE ADAPTER	Used at the oil pump housing when measuring reverse clutch pressure and line pressure.
 ST-498897700	498897700	OIL PRESSURE ADAPTER SET	Used for measuring transfer clutch pressure.
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.

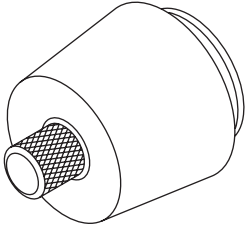
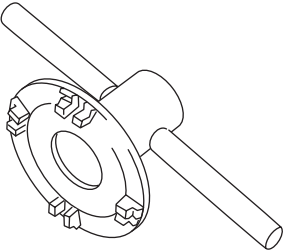
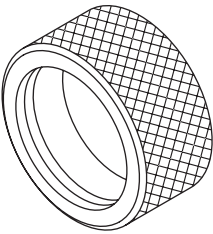
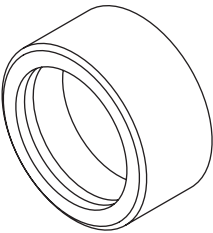
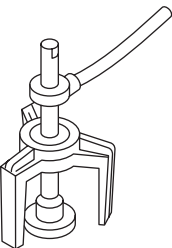
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398527700	398527700	PULLER ASSY	- Used for removing the extension case roller bearing. - Used for removing the extension oil seal. - Used for removing the front differential side retainer bearing outer 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.
 ST-499247400	499247400	INSTALLER	- Used for installing the transfer outer snap ring. - Used together with GUIDE (499257300).

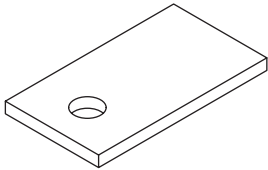
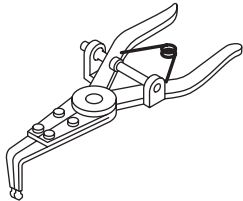
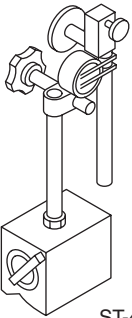
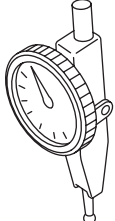
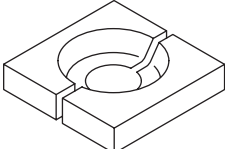
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499257300	499257300	SNAP RING OUTER GUIDE	- Used for installing the transfer outer snap ring. - Used together with INSTALLER (499247400).
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	- Used for removing 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.
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing the clutch spring.

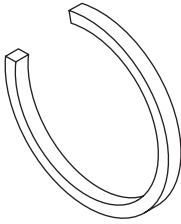
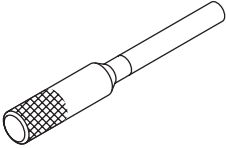
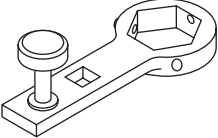
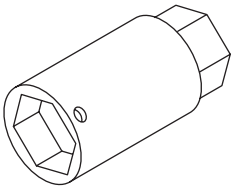
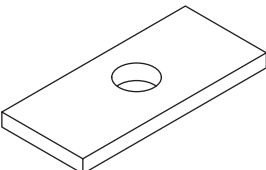
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 ST-399893600	399893600	PLIER	Used for removing and installing the clutch spring.
 ST-498247001	498247001	MAGNET BASE	- Used 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).
 ST-498517000	498517000	REPLACER	Used for removing the front roller bearing.

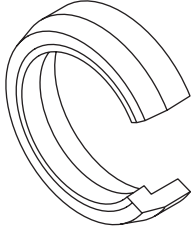
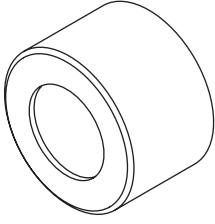
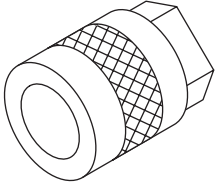
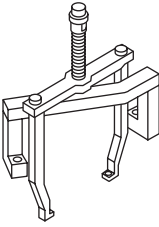
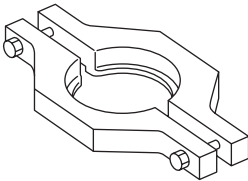
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

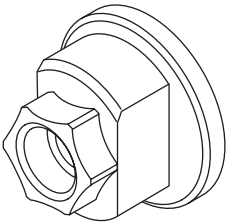
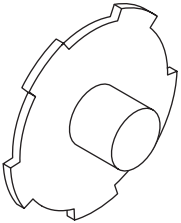
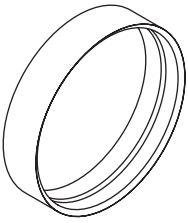
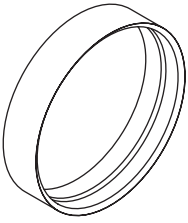
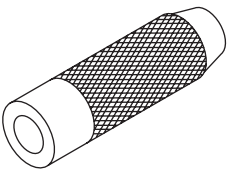
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-498077600	498077600	REMOVER	Used for removing the ball bearing.

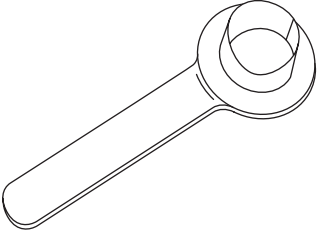
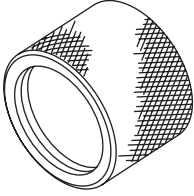
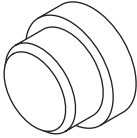
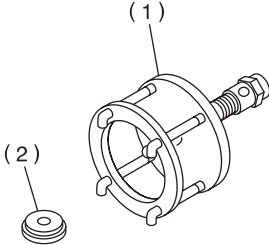
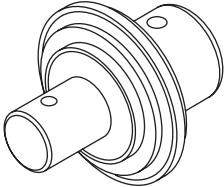
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-899580100	899580100	INSTALLER	Used for press-fitting the ball bearing of the transfer clutch.

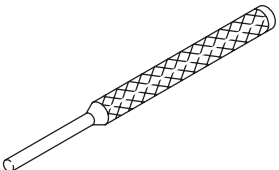
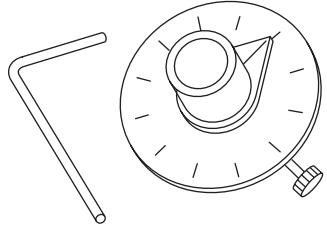
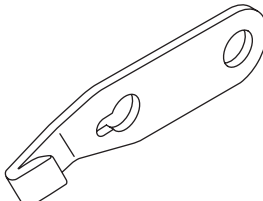
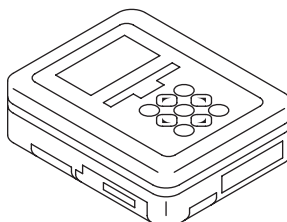
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for installing the axle shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST-398497701	398497701	INSTALLER	Used for installing the needle bearing.
 ST-899524100	899524100	PULLER SET	Use only the bolt. • Used together with PULLER SET (499737100). • Used together with PULLER (499737000). 1. PULLER 2. CAP
 ST-499247300	499247300	INSTALLER	Used for installing the oil pump housing retainer oil seal.

General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398791600	398791600	REMOVER	Used for removing the shifter arm spring pin.
 ST18854AA000	18854AA000	ANGLE GAUGE	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.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the 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

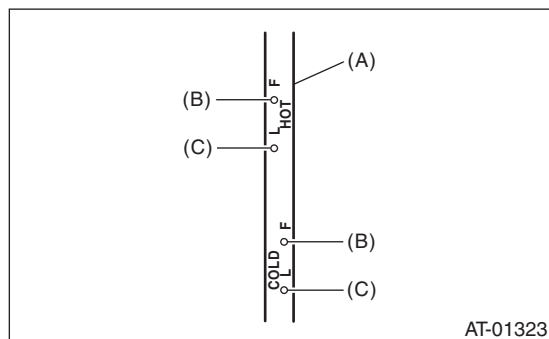
NOTE:

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, OPERATION, Read Current Data.>

2) Park the vehicle on a level surface.

3) After selecting all positions (P, R, N, D), set the select lever in “P” range. Idle the engine for 1 or 2 minutes, and measure the ATF level.



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

4) Make sure that ATF level is above the center of upper and lower level at “HOT” side.

If the ATF level is below the lower level, check the transmission for leaks. If there are leaks, it is necessary to repair or replace gaskets, oil seals, plugs or other parts.

5) If the ATF level is below the center of upper and lower level, add recommended ATF until the fluid level is above the center of upper and lower level.

CAUTION:

- Be careful not to exceed the upper level.
- Addition of ATF to the upper level when the transmission is cold will result in overfilling of ATF, causing the oil to spill out.

6) Check ATF level after raising ATF temperature to 70 — 80°C (158 — 176°F) by running the vehicle again or by idling the engine.

B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Remove the drain plug (ATF) and completely drain the ATF.

CAUTION:

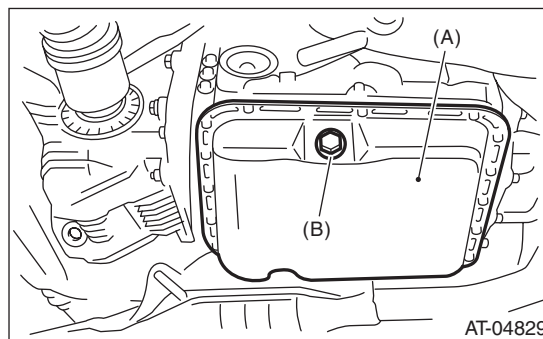
Immediately after the vehicle has been running or after idling for a long time, the ATF will be hot. Be careful not to receive burns.

3) Check the ATF condition. <Ref. to 4AT-27, CONDITION CHECK, Automatic Transmission Fluid.>

4) 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)



- (A) Oil pan
- (B) Drain plug (ATF)

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

Recommended fluid:

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

CAUTION:

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

Capacity:

Refill with the same amount of ATF that was drained from drain plug hole.

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-57, PROCEDURE, 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.

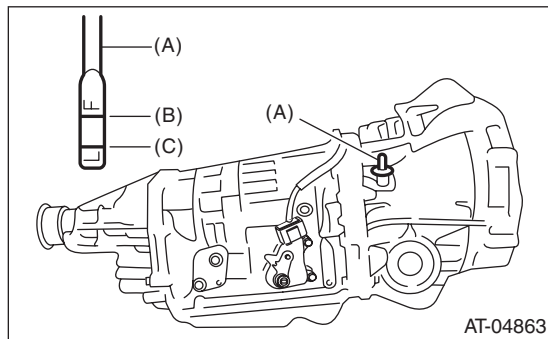
3. Differential Gear Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Remove the differential 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 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 fill oil above the "F" line.



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

B: REPLACEMENT

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

CAUTION:

- Immediately after driving the vehicle or after idling for a long time, the differential gear oil will be hot. Be careful not to receive burns.
 - 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) Replace the gasket with a new part and tighten the differential gear oil drain plug using the TORX® bit T70.

Tightening torque:

Aluminum gasket (silver)

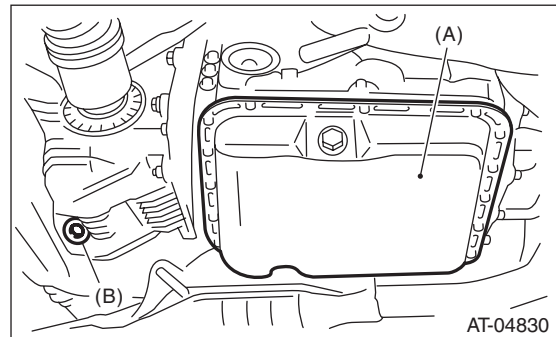
44 N·m (4.5 kgf-m, 32.5 ft-lb)

Copper gasket (brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb)

Metal gasket (black)

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) Fill the differential with differential gear oil from the level 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

The road test is important in accurately diagnosing the condition of an 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, so that 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.

Specification

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 gear of manual mode".

Purposes of the stall test:

- Operational check of the automatic transmission clutch
- Operational check of the torque converter clutch
- Engine performance check
- 1) Check that the throttle valve fully opens.
- 2) Check that the engine oil level is correct.
- 3) Check that the coolant level is correct.
- 4) Check that the ATF level is correct.
- 5) Check that the differential gear oil level is correct.
- 6) 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 select lever to ensure it operates properly, then set to "2nd gear of manual mode".
- 9) While stepping hard on the brake pedal, slowly depress the accelerator pedal to full throttle.
- 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) 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 perform a stall test for over 5 seconds at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction will cause the engine oil and 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 of 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 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

Measurement value: 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

Measurement value: 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

Line Pressure Test

AUTOMATIC TRANSMISSION

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 may be due to the line pressure being too high.
- Slippage or inability to operate the vehicle may, in most cases, be due to insufficient oil pressure for the operation of clutch, brake or control valve.

1) Line pressure measurement (under no load):

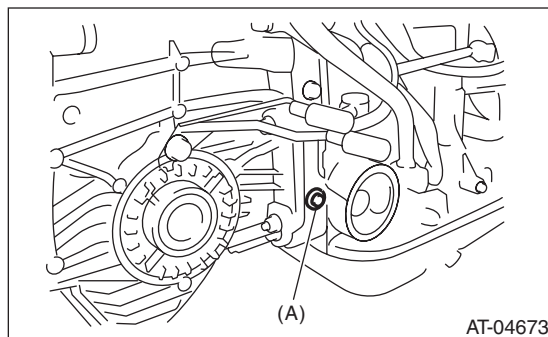
- (1) Before measuring line pressure, lift up the vehicle.
- (2) Maintain the ATF temperature at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the temperature above after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)

2) Line pressure measurement (under heavy load)

- (1) Before measuring line pressure, place wheel chocks at the front and rear of all wheels, then apply both the foot and parking brakes (same as for stall test conditions).
- (2) Measure the line pressure when the select lever is in “R” or 2nd gear 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 temperature above 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 opening angle	Line pressure kPa (kg/cm ² , psi)
Manual mode (2nd)	25 — 35	Full open	1,000 — 1,300 (10.2 — 13.3, 145 — 188)
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, 72 — 116)

6) Remove the ST and install the test plug.

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)

8. Transfer Clutch Pressure Test

A: INSPECTION

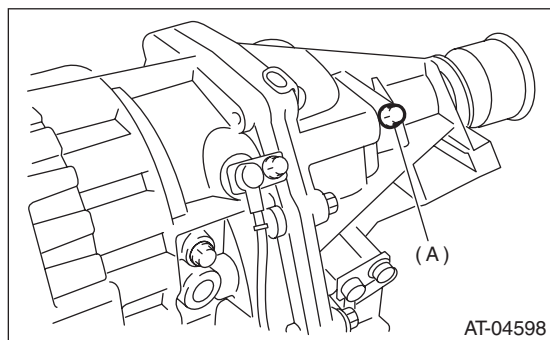
Check the transfer clutch pressure in accordance with the following chart in the same manner as line pressure. <Ref. to 4AT-32, Line Pressure Test.>

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

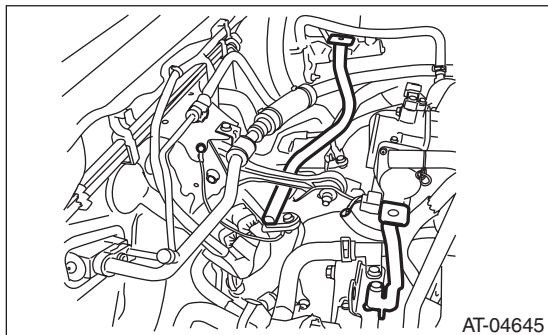
- If no oil pressure is produced or if it does not change in AWD mode, there may be a problem in the transfer duty solenoid or control valve body.
- If oil pressure is produced in FWD mode, there is the same problem as the AWD mode.

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, 72 — 101)	—
	5	Fully closed (0)	—	0 (0, 0)
N or P	5	Fully closed (0)	0	—

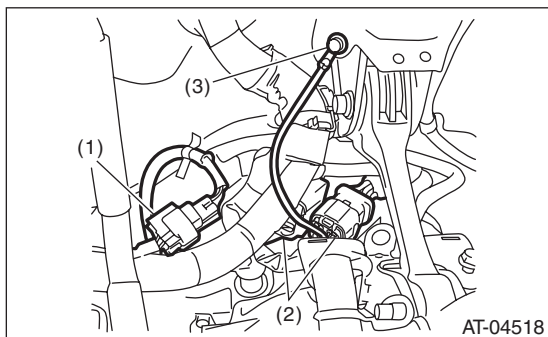
9. Automatic Transmission Assembly

A: REMOVAL

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

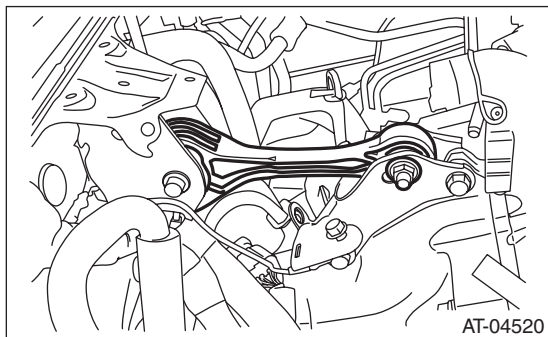


- 6) Disconnect the following connectors and terminals.



- (1) Rear oxygen sensor connector
- (2) Transmission harness connectors
- (3) Transmission radio ground cord terminal

- 7) Remove the starter. <Ref. to SC(H4SO)-7, REMOVAL, Starter.>
- 8) Remove the pitching stopper.



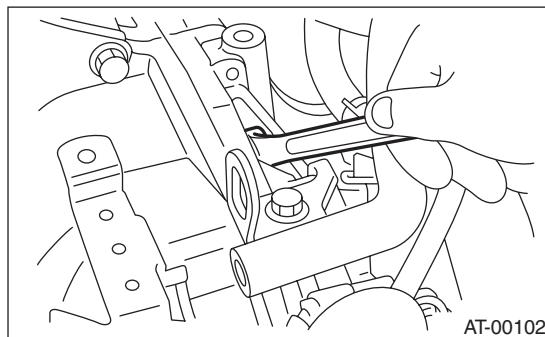
- 9) Remove the throttle body. <Ref. to FU(H4SO)-14, REMOVAL, Throttle Body.>

- 10) Separate the torque converter clutch from the drive plate.

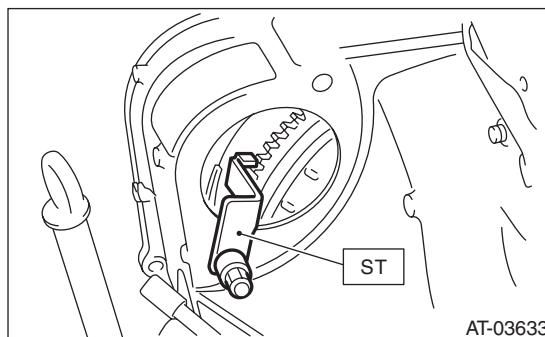
CAUTION:

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



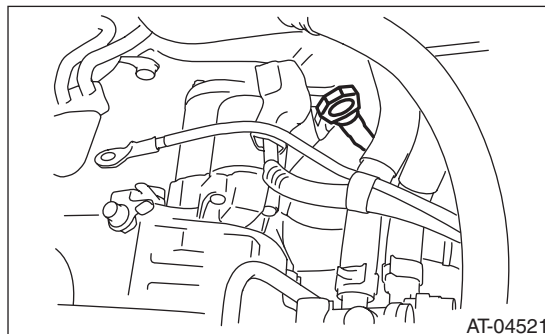
- 11) Attach the ST to the converter case.
ST 498277200 STOPPER SET



- 12) Remove the ATF level gauge.

NOTE:

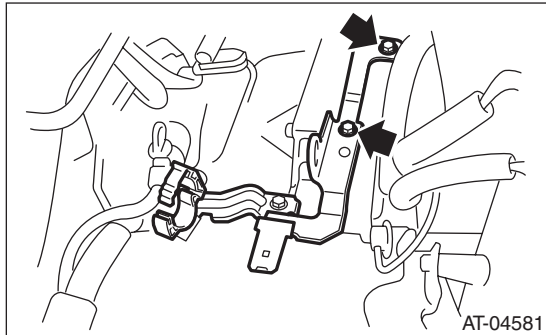
Plug the opening to prevent entry of foreign particles into the transmission fluid.



13) Remove the pitching stopper bracket and transmission radio ground cord.

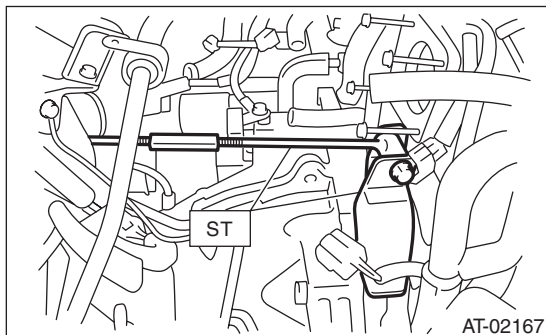
14) Disconnect the engine harness, then remove the harness connector from the engine harness bracket.

15) Remove the engine harness bracket.



16) Set the ST.

ST 41099AC000 ENGINE SUPPORT ASSY



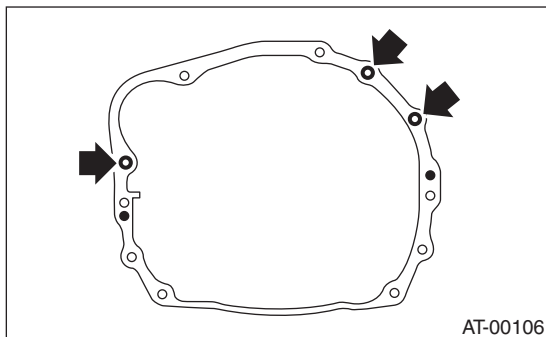
17) Lift up the vehicle.

18) Remove the under cover.

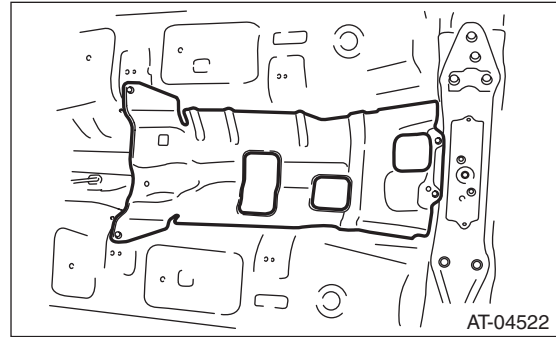
19) Remove the front, center and rear exhaust pipes and the muffler.

<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

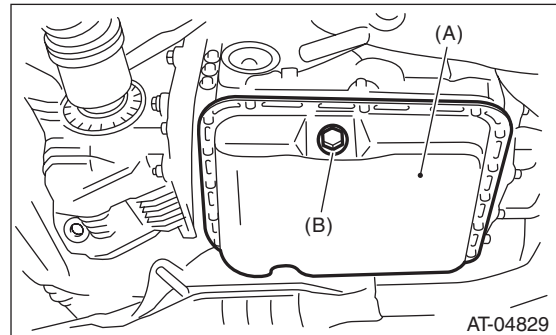
20) Remove the bolts which hold upper side of transmission to engine.



21) Remove the heat shield cover.



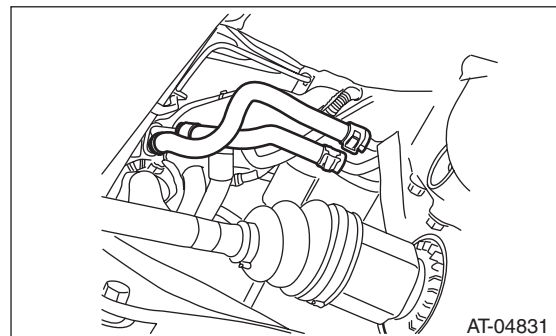
22) Remove the drain plug (ATF) to drain ATF.



(A) Oil pan

(B) Drain plug (ATF)

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



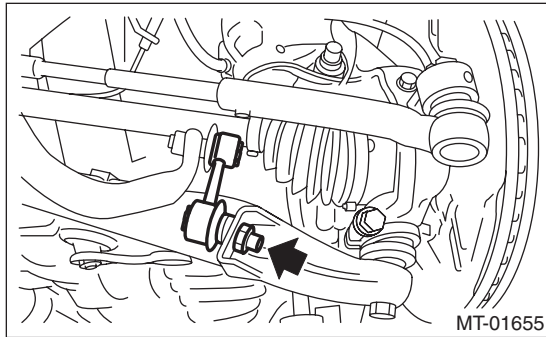
24) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

25) Remove the shift select cable from the inhibitor switch and the transmission. <Ref. to CS-24, REMOVAL, Select Cable.>

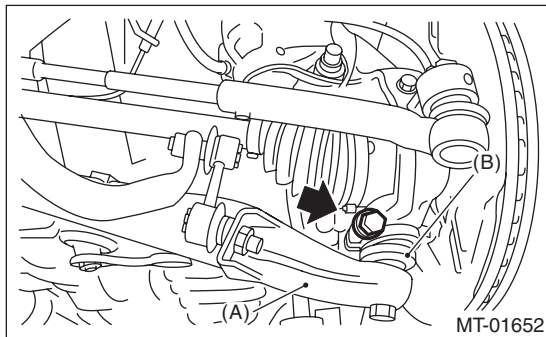
Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

26) Disconnect the stabilizer link from the front arm.



27) Remove the bolts which secure the front arm ball joint to the front housing, and separate the front arm and housing.



- (A) Front arm
- (B) Ball joint

28) 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.

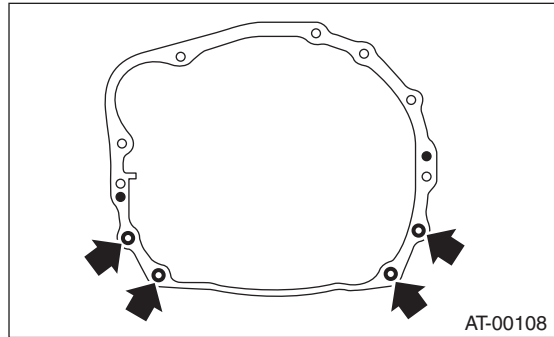
NOTE:

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.

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

30) Remove the bolts and nuts which hold lower side of transmission to engine.

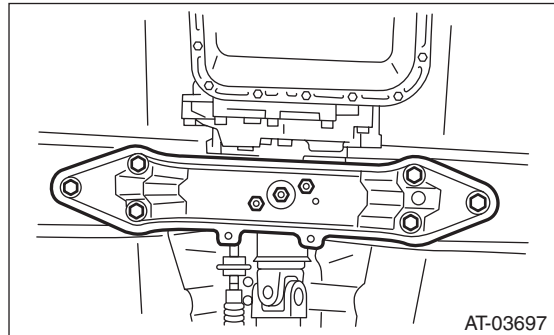


31) Place a transmission jack below the transmission.

NOTE:

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

32) Remove the transmission rear crossmember from the vehicle.

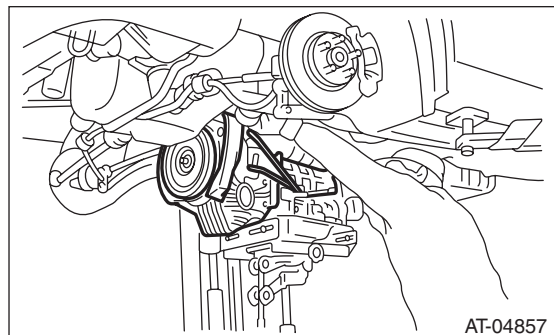


33) While lowering the transmission jack gradually, fully retract the engine support, and then tilt the engine rearward.

34) Remove the transmission.

NOTE:

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



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

B: INSTALLATION

1) Replace the differential side oil seal with a new part. <Ref. to 4AT-44, Differential Side Retainer Oil Seal.>

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, 29.5 ft-lb)

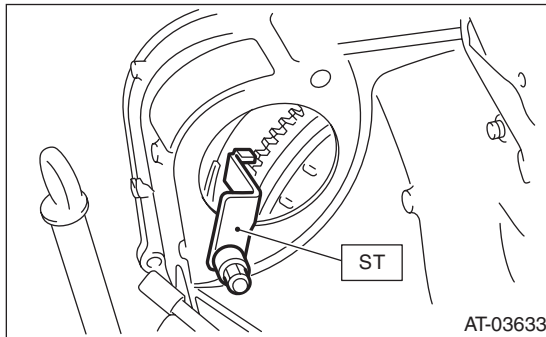
3) Strike and bend the transmission hanger of transmission rear with a rubber hammer etc. so that it gets in contact with the transmission case.

CAUTION:

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

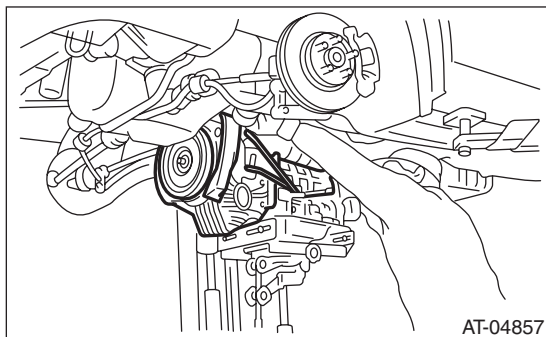
4) Attach the ST to the converter case.

ST 498277200 STOPPER SET



5) Install the transmission onto the engine.

(1) Lift up the transmission gradually using transmission jack.



(2) Insert the engine side stud bolt into the transmission bolt hole.

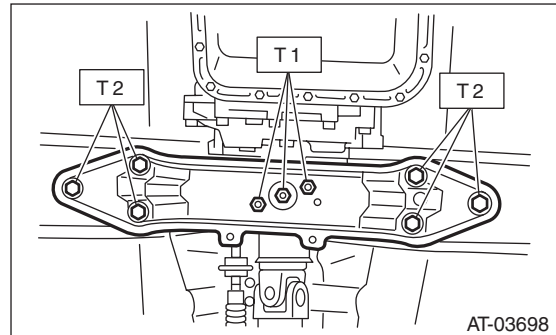
(3) While raising the transmission jack gradually, turn the screw of engine support, then tilt the engine forward and connect.

6) Install the transmission rear crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

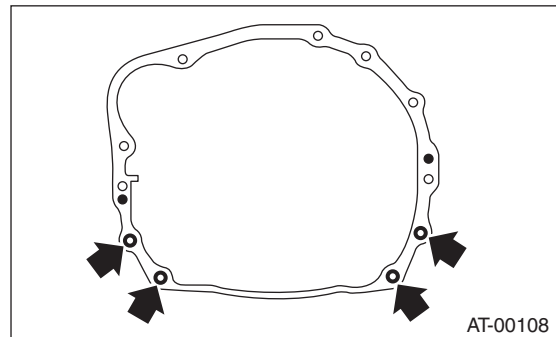


7) Remove the transmission jack.

8) 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)



9) Install the clutch housing cover bolts.

10) Lower the vehicle.

11) Connect the engine and transmission.

(1) Remove the ST from converter case.

NOTE:

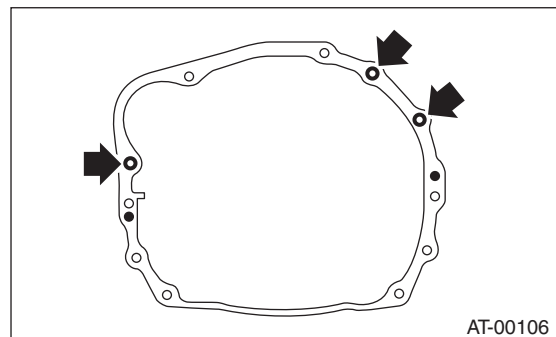
When removing the ST, be careful not to drop it into converter case.

(2) Install the starter. <Ref. to SC(H4SO)-7, INSTALLATION, Starter.>

(3) 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)



Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

12) Install the torque converter clutch assembly to the drive plate.

CAUTION:

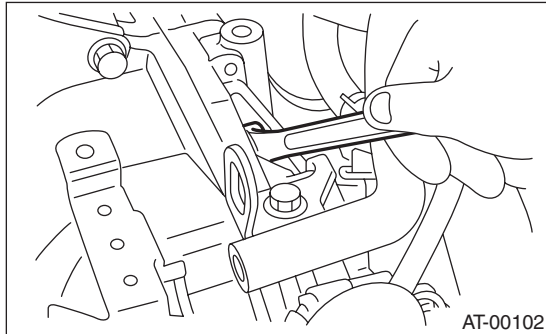
- Be careful not to damage the mounting bolts.
- Be careful not to drop bolts into the converter case.

(1) Tighten the bolts which hold the torque converter clutch 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:

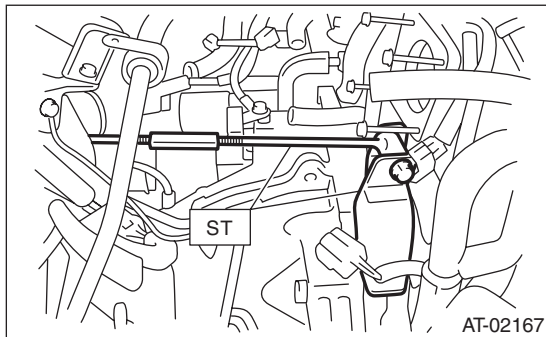
25 N·m (2.5 kgf-m, 18.4 ft-lb)



(3) Fit the plug to service hole.

(4) Install the V-belt cover.

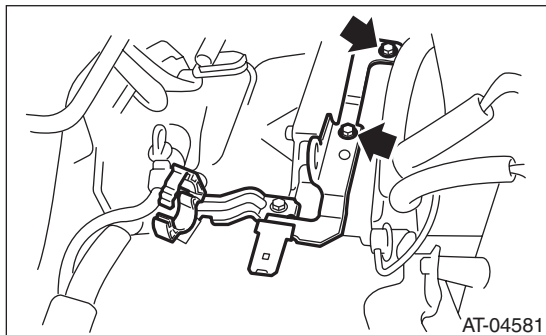
13) Remove the ST.



14) Install the engine harness bracket.

Tightening torque:

T: 16 N·m (1.6 kgf-m, 11.8 ft-lb)

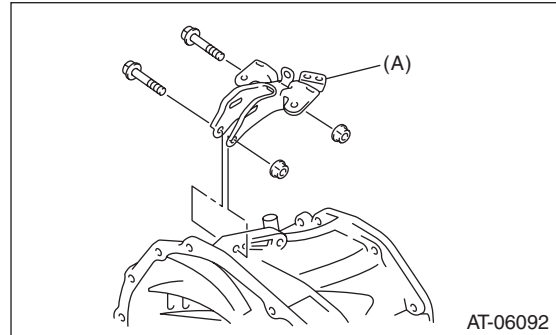


15) Install the harness connector to engine harness bracket, then connect the harness.

16) Install the pitching stopper bracket (A) and transmission radio ground cord.

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)



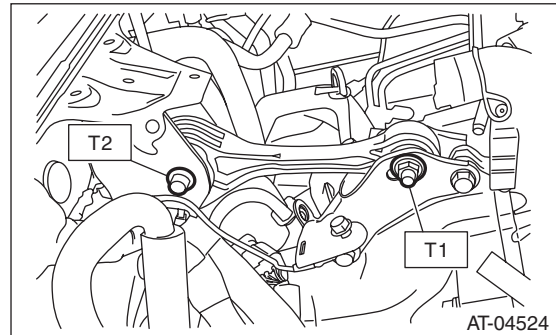
17) Install the throttle body. <Ref. to FU(H4SO)-14, INSTALLATION, Throttle Body.>

18) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



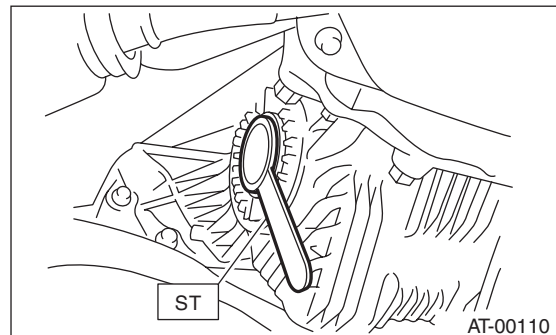
19) Lift up the vehicle.

20) Replace the circlip of the front drive shaft with a new part.

21) Apply grease to the oil seal lip.

22) Attach the ST to side retainer.

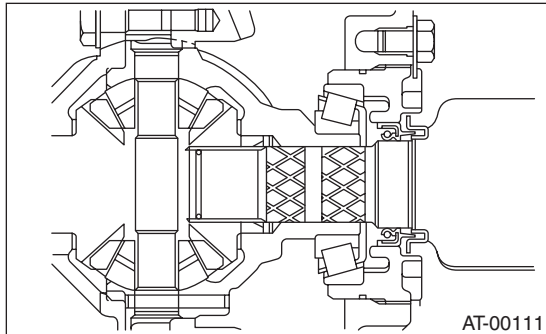
ST 28399SA010 OIL SEAL PROTECTOR



23) 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

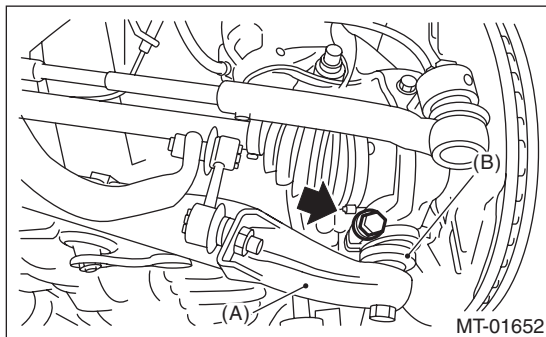
- 24) Insert the front drive shaft into the transmission securely by pressing the front housing from the outside.



- 25) Install the ball joint into the front housing.
26) Tighten the attachment bolts.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

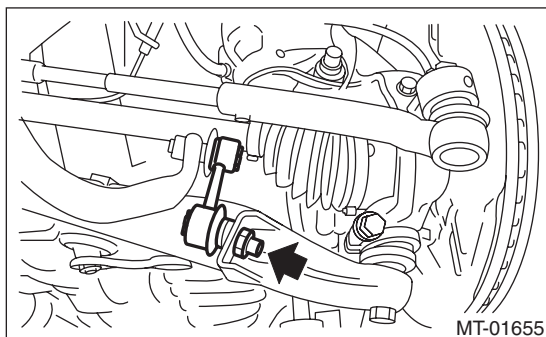


- (A) Front arm
(B) Ball joint

- 27) Attach the stabilizer link to the front arm.

Tightening torque:

45 N·m (4.6 kgf-m, 33.2 ft-lb)

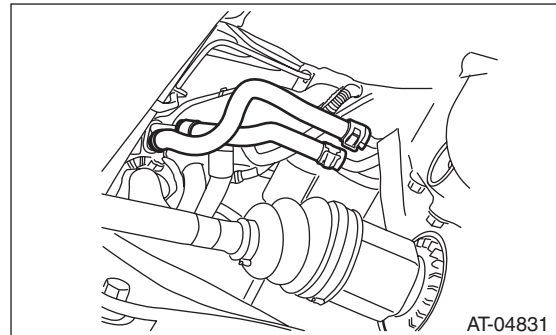


- 28) Install the shift select cable onto the select lever. <Ref. to CS-25, INSTALLATION, Select Cable.>

- 29) Install the oil charge pipe, and connect the ATF cooler hoses to the pipe.

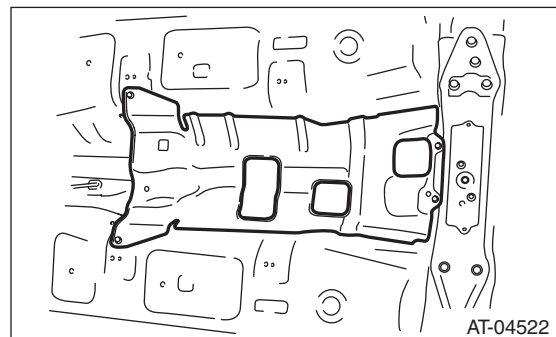
NOTE:

Use a new ATF cooler hose.



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

- 31) Install the heat shield cover.



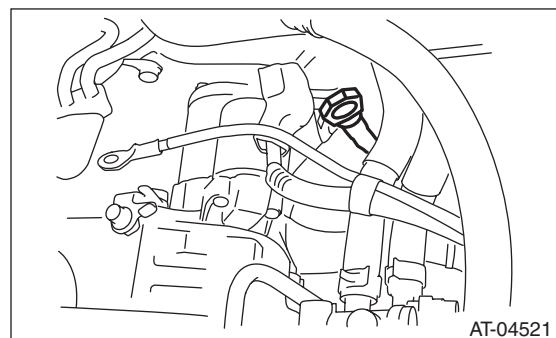
- 32) Install the rear exhaust pipe and muffler assembly. <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>

- 33) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>

- 34) Install the under cover.

- 35) Lower the vehicle.

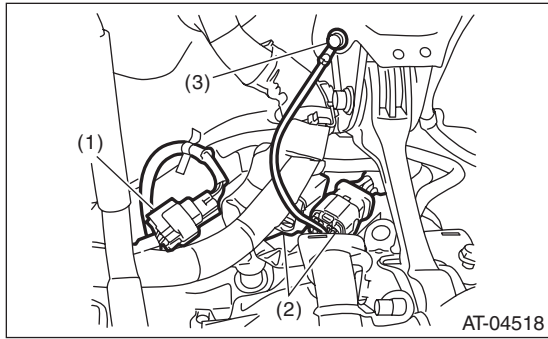
- 36) Install the ATF level gauge.



Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

37) Connect the following connectors and terminals.



- (1) Rear oxygen sensor connector
- (2) Transmission harness connectors
- (3) Transmission radio ground cord terminal

38) Install the air intake chamber stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)

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

40) Connect the battery ground terminal.

41) Fill transmission with ATF through the oil charge pipe 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 lift.

43) Check the differential gear oil level. <Ref. to 4AT-28, INSPECTION, 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-57, PROCEDURE, Air Bleeding of Control Valve.>

46) Check the ATF level. <Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>

47) Perform learning control promotion. <Ref. to 4AT(diag)-20, Learning Control.>

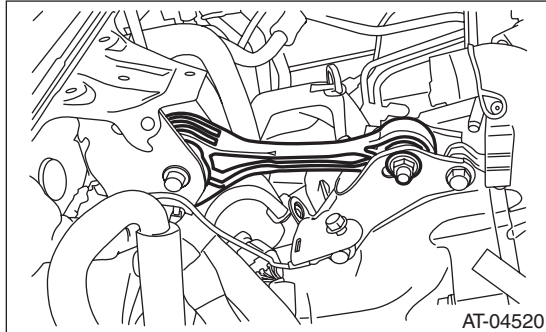
48) Perform the road test. <Ref. to 4AT-29, Road Test.>

10. Transmission Mounting System

A: REMOVAL

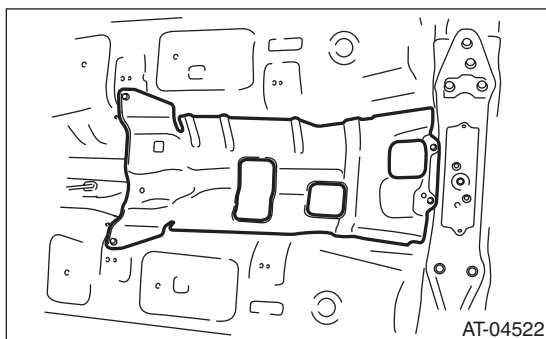
1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake chamber and intake boot.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 3) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the front, center and rear exhaust pipes and the muffler.
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
- 4) Remove the heat shield cover.

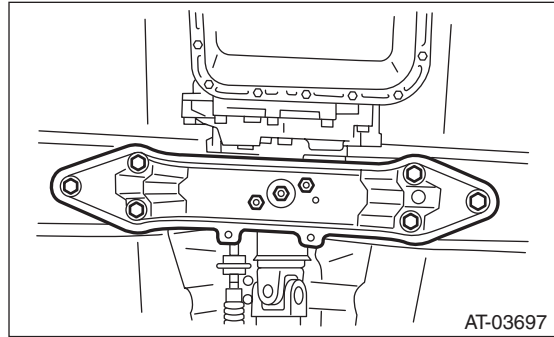


- 5) Set the transmission jack under transmission.

NOTE:

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

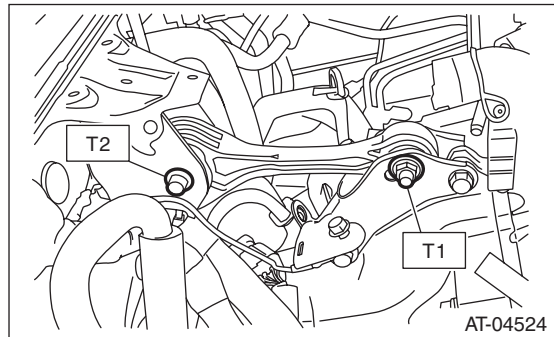
1. PITCHING STOPPER

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



- 2) Install the air intake chamber and intake boot.
<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:

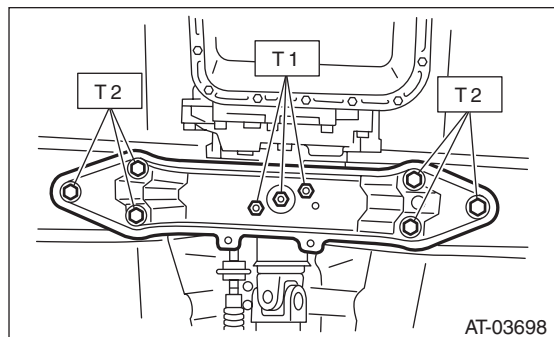
40 N·m (4.1 kgf-m, 29.5 ft-lb)

- 2) Install the transmission rear crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)

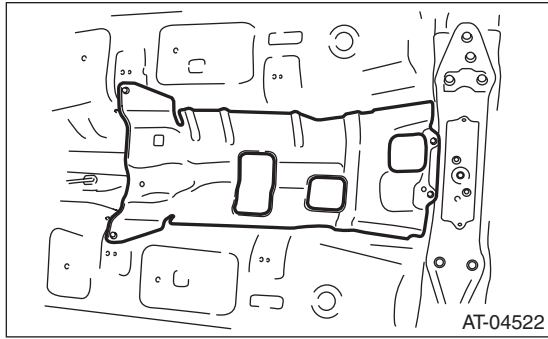
T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)



Transmission Mounting System

AUTOMATIC TRANSMISSION

- 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)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
- 6) Lower the vehicle.
- 7) Connect the battery ground terminal.

C: INSPECTION

If problems are found in the following inspection, repair or replace the part.

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 and inspect the propeller shaft. <Ref. to 4AT-43, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

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

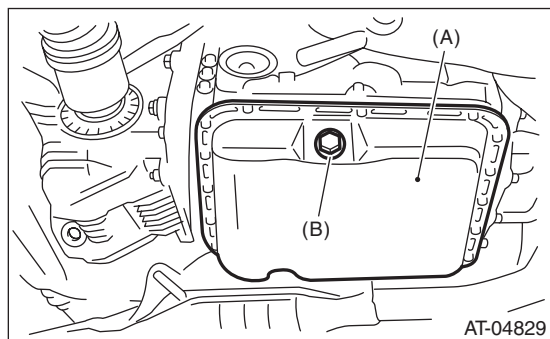
CAUTION:

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.

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

Tightening torque:

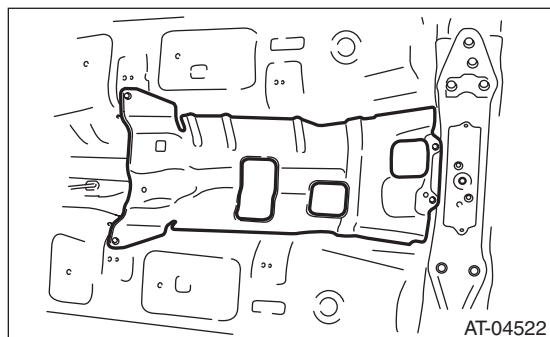
25 N·m (2.5 kgf-m, 18.4 ft-lb)



- (A) Oil pan
(B) Drain plug (ATF)

- 5) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

- 6) Remove the heat shield cover.



- 7) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

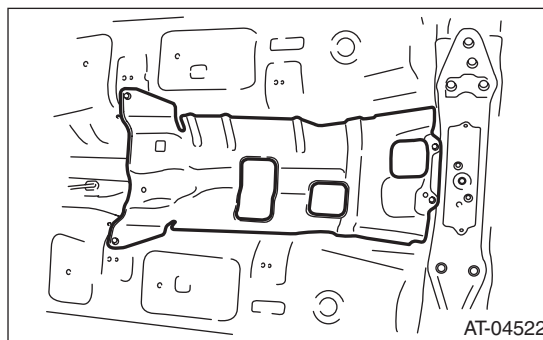
- 8) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY

- 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)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>

- 13) Fill with ATF. <Ref. to 4AT-26, Automatic Transmission Fluid.>

- 14) Bleed the air of control valve.

<Ref. to 4AT-57, PROCEDURE, Air Bleeding of Control Valve.>

- 15) Check the level and leaks of the ATF. <Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

A: INSPECTION

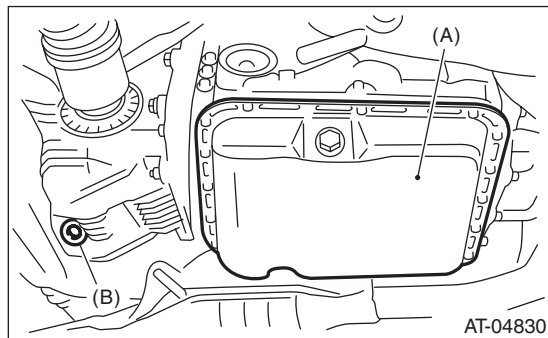
Check for leakage of gear oil from differential side retainer oil seal part. If there is an oil leak, replace the oil seal and inspect the drive shaft.

B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Remove the front and center exhaust pipes. <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>
- 3) Remove the differential gear oil drain plug using TORX® bit T70, and then drain differential gear oil.

CAUTION:

- The differential gear oil will be extremely hot after driving. Be careful not to receive burns.
- 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) Perform replacement with a new gasket, and tighten the differential gear oil drain plug.

Tightening torque:

Aluminum gasket (silver)

44 N·m (4.5 kgf-m, 32.5 ft-lb)

Copper gasket (brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb)

Metal gasket (black)

70 N·m (7.1 kgf-m, 51.6 ft-lb)

- 5) Separate the front drive shaft from the transmission. <Ref. to DS-26, REMOVAL, Front Drive Shaft.>

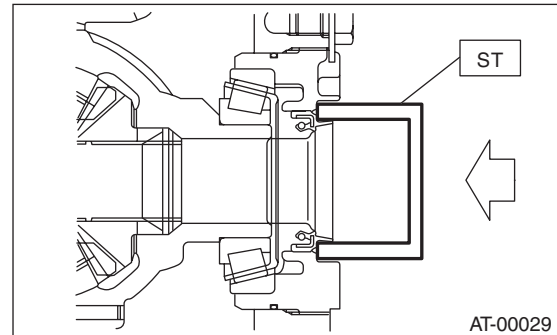
- 6) Remove the differential side retainer oil seal using a screwdriver wrapped with vinyl tape etc.

- 7) Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.

CAUTION:

When setting the oil seal to the ST, apply differential gear oil to the oil seal lips so that the lip is not deformed.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



- 8) Apply gear oil to the oil seal lips.
- 9) Using the ST, install the front drive shaft. <Ref. to DS-26, INSTALLATION, Front Drive Shaft.>
- ST 28399SA010 OIL SEAL PROTECTOR
- 10) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>
- 11) Lower the vehicle.
- 12) Fill with differential gear oil through the oil level gauge hole. <Ref. to 4AT-28, Differential Gear Oil.>
- 13) Check the level of differential gear oil. <Ref. to 4AT-28, INSPECTION, Differential Gear Oil.>

13. Inhibitor Switch

A: INSPECTION

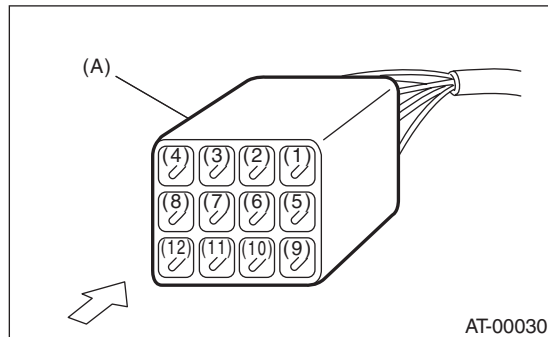
When the driving condition or starter motor operation is improper, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

- 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.

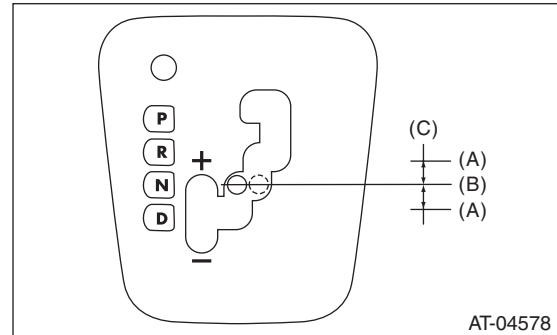
Signal sent to TCM	Range	Pin No.
	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



(A) Inhibitor switch connector

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

If there is continuity in only one direction or in other points, adjust the inhibitor switch. <Ref. to 4AT-45, ADJUSTMENT, Inhibitor Switch.>

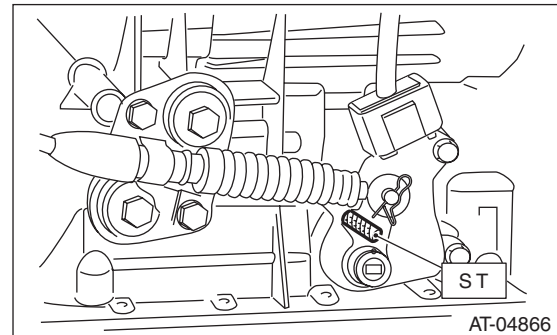


- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°

- 4) Repeat the above inspection in other gear ranges. If there are faults, adjust the select cable. <Ref. to CS-26, ADJUSTMENT, Select Cable.>

B: ADJUSTMENT

- 1) Set the select lever to "N" range.
 - 2) Loosen the two bolts holding the inhibitor switch.
 - 3) Insert the ST as vertical as possible into the holes of the shifter arm and switch body.
- ST 499267300 STOPPER PIN



- 4) Tighten the two bolts holding the inhibitor switch.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

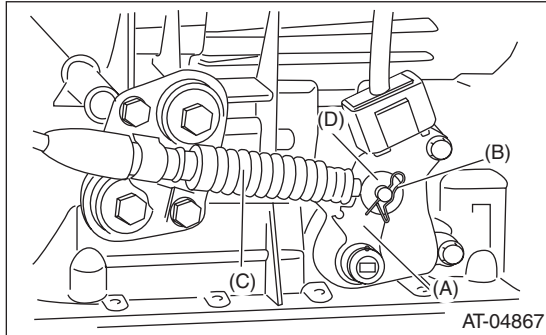
- 5) Repeat the inspection of the inhibitor switch. If the inhibitor switch is determined to be "faulty", replace it.

Inhibitor Switch

AUTOMATIC TRANSMISSION

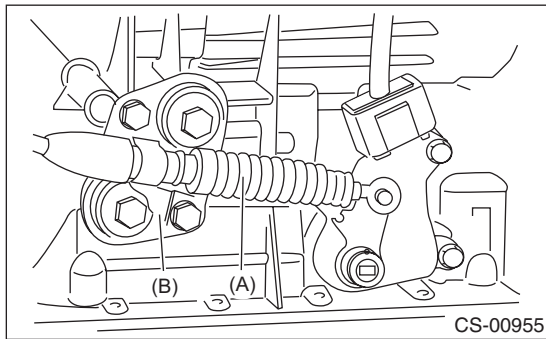
C: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Set the select lever to "N" range.
- 3) Lift up the vehicle.
- 4) Remove the front and center exhaust pipes.
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>
- 5) Remove the snap pin and washer from the shifter arm.



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

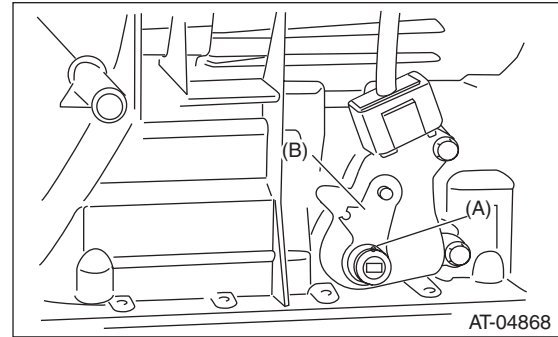
- 6) Remove the plate assembly from the transmission case.



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

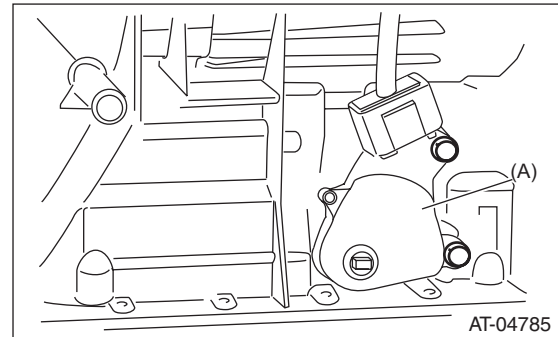
- 7) Using the ST, remove the spring pin and remove the shifter arm.

ST 398791600 REMOVER



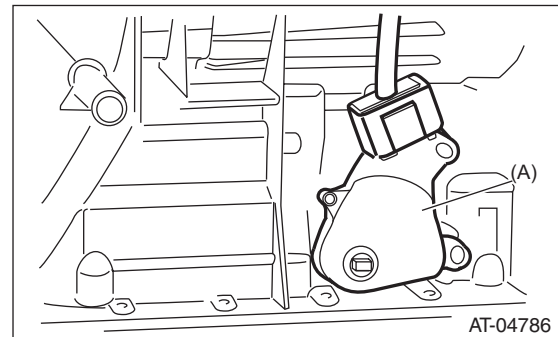
- (A) Spring pin
- (B) Shifter arm

- 8) Remove the two inhibitor switch securing bolts.



- (A) Inhibitor switch

- 9) Remove the inhibitor switch from the transmission.

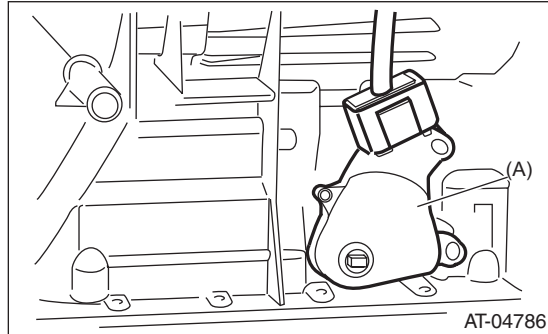


- (A) Inhibitor switch

- 10) Disconnect the inhibitor switch harness connector from the inhibitor switch.

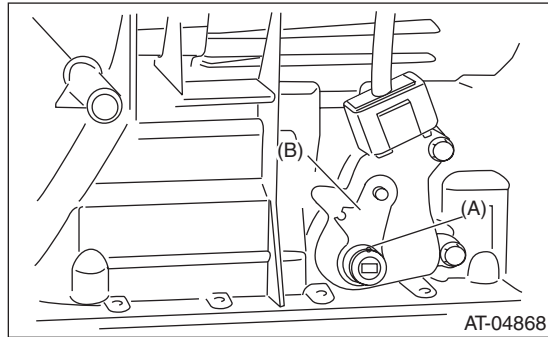
D: INSTALLATION

- 1) Connect the inhibitor switch harness connector to the inhibitor switch.
- 2) Install the inhibitor switch to the transmission case.



(A) Inhibitor switch

- 3) Install the shifter arm and fix with a new spring pin.



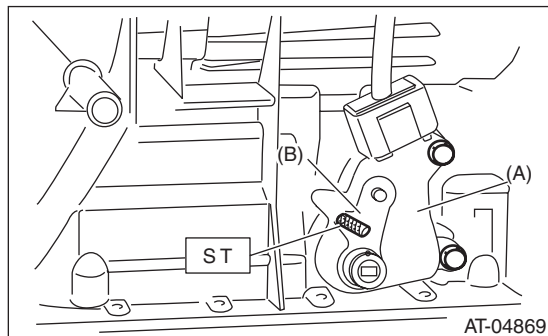
(A) Spring pin
(B) Shifter arm

- 4) Move the shifter arm to the neutral position.
- 5) Using the ST, tighten the two bolts holding the inhibitor switch.

ST 499267300 STOPPER PIN

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)



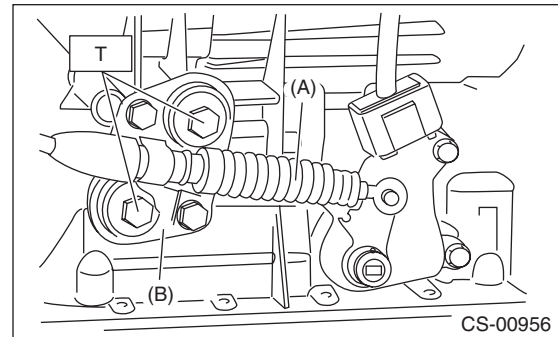
(A) Inhibitor switch
(B) Shifter arm

- 6) Install the select cable to the shifter arm.

- 7) Install the plate assembly to the transmission.

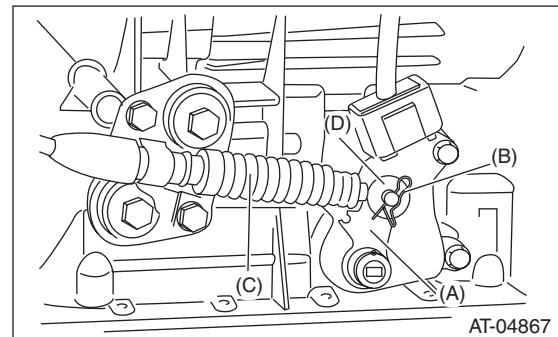
Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Select cable
(B) Plate ASSY

- 8) Install the washer and snap pin to the shifter arm.



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

- 9) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>

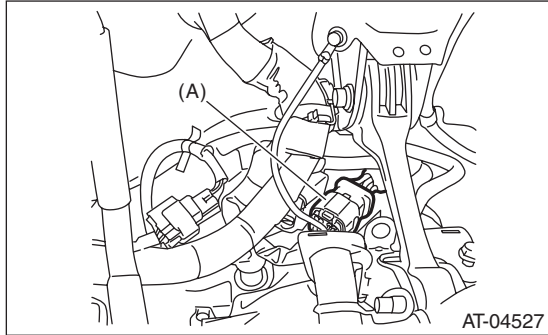
- 10) Lower the vehicle.

- 11) Check 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 battery.
- 3) Remove the air intake chamber. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 4) Disconnect the transmission harness connector.



(A) Transmission harness connectors

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

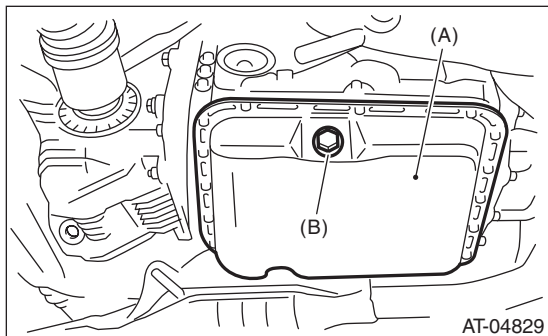
CAUTION:

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.

- 10) 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)

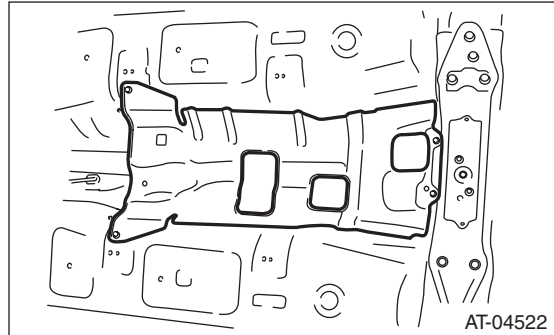


(A) Oil pan
(B) Drain plug (ATF)

- 11) Remove the front, center and rear exhaust pipes and the muffler.

<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

- 12) Remove the heat shield cover.



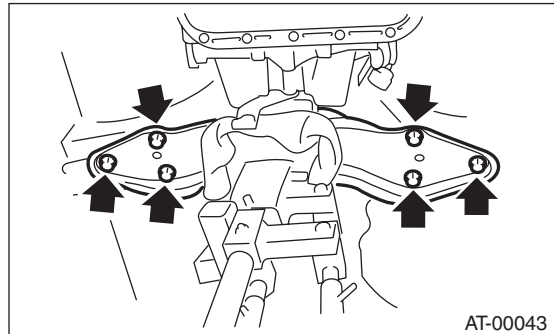
- 13) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

- 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:

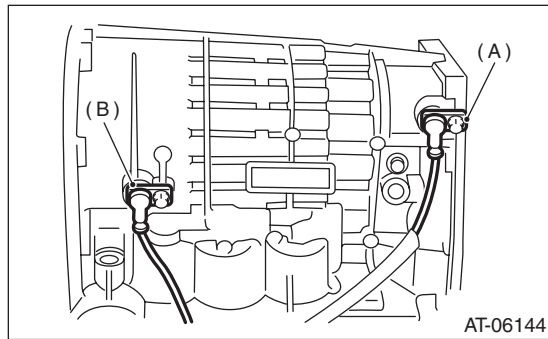
Do not separate the transmission jack and transmission.

- 17) Remove the ATF inlet and outlet pipes.

CAUTION:

When removing the outlet pipe, be careful not to lose the ball and spring used together with the retaining screw.

18) Remove the front vehicle speed sensor and torque converter turbine speed sensor.



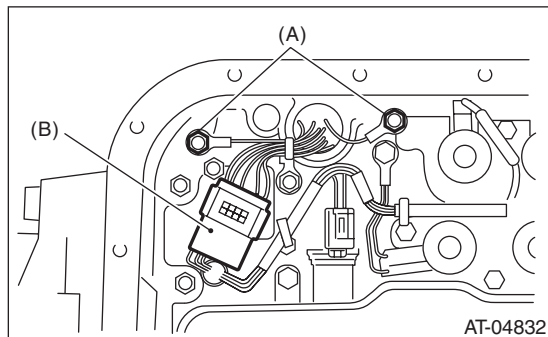
- (A) Front vehicle speed sensor
- (B) Torque converter turbine speed sensor

19) Remove the oil pan.

CAUTION:

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

20) Disconnect the control valve connector and transmission ground terminal.

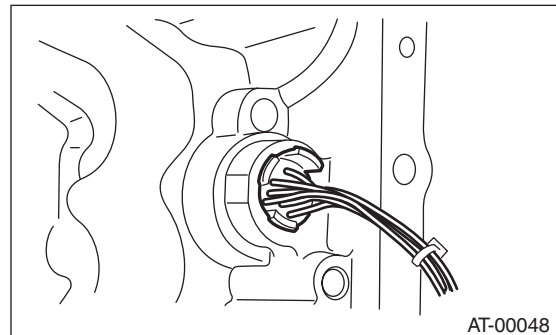


- (A) Transmission ground terminal
- (B) Control valve connector

21) Remove the transmission harness assembly.

B: INSTALLATION

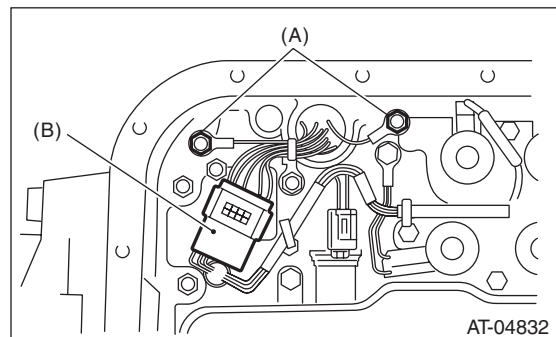
1) Pass the transmission harness assembly through the hole of the transmission case.



2) Connect the control valve connector and transmission ground.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

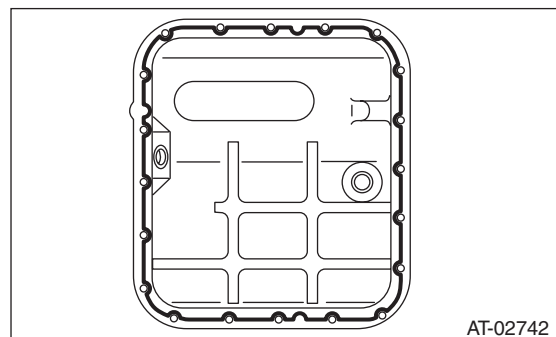


- (A) Transmission ground terminal
- (B) Control valve connector

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

Liquid gasket:

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



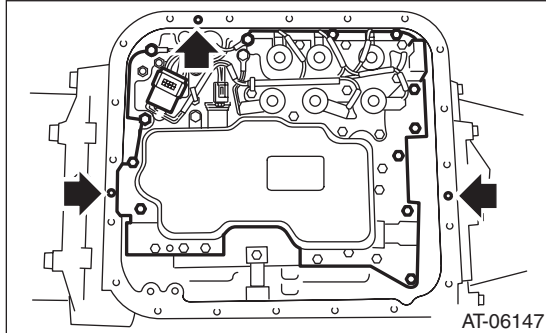
Front Vehicle Speed Sensor

AUTOMATIC TRANSMISSION

- 4) Fill the 3 locations of the transmission case excluding the bolt holes with an ample amount of liquid gasket.

Liquid gasket:

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



- 5) Install the oil pan by equally tightening the bolts.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

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

Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)

- 7) Install the ATF inlet and outlet pipes.

NOTE:

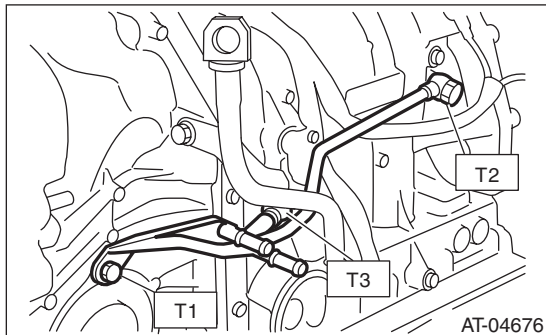
Use a new copper washer.

Tightening torque:

T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)

T3: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



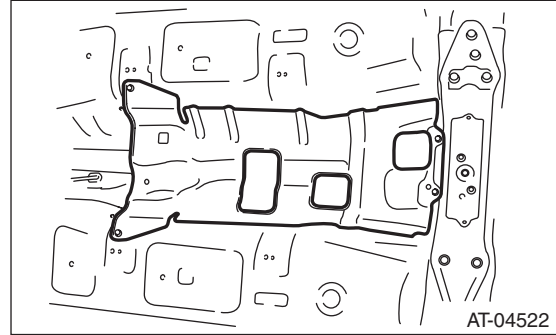
- 8) Install the transmission rear crossmember bolt.

Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)

- 9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

- 10) Install the heat shield cover.



- 11) Install the front, center and rear exhaust pipes, and the muffler.

<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>

- 12) Lower the vehicle.

- 13) Install the transmission harness connector to the stay.

- 14) Install the pitching stopper. <Ref. to 4AT-41, INSTALLATION, Transmission Mounting System.>

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

- 16) Fill with the same amount of ATF as drained. <Ref. to 4AT-26, Automatic Transmission Fluid.>

- 17) Bleed the air of control valve.

<Ref. to 4AT-57, PROCEDURE, Air Bleeding of Control Valve.>

- 18) Inspect the level of ATF. <Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>

- 19) Perform learning control promotion. <Ref. to 4AT(diag)-20, Learning Control.>

15. Torque Converter Turbine Speed Sensor

A: REMOVAL

When removing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor".
<Ref. to 4AT-48, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor".
<Ref. to 4AT-49, INSTALLATION, Front Vehicle Speed Sensor.>

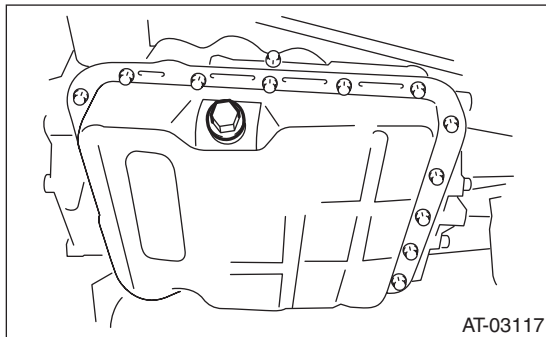
16. Control Valve Strainer

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 drain plug (ATF) 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.



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

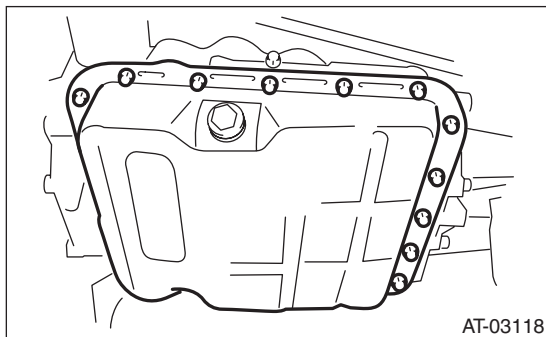
Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

- 7) Remove the oil pan.

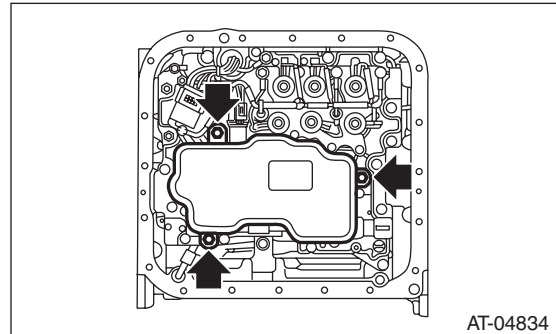
CAUTION:

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) Attach a 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:

When applying ATF, avoid adhesion of dust and foreign matter on the O-ring.

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

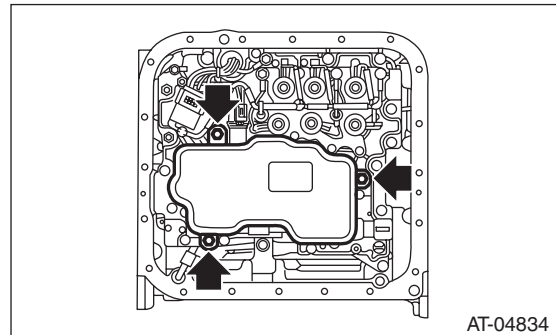
CAUTION:

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.

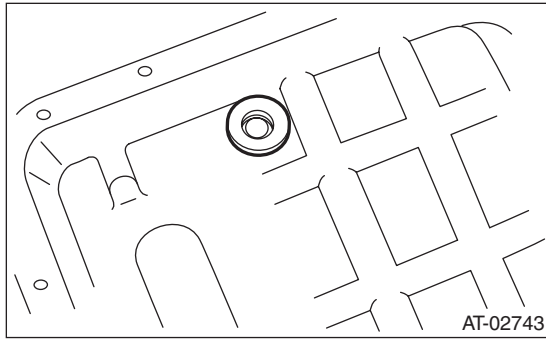
- (3) Tighten the three bolts.

Tightening torque:

10 N·m (1.0 kgf-m, 7.4 ft-lb)



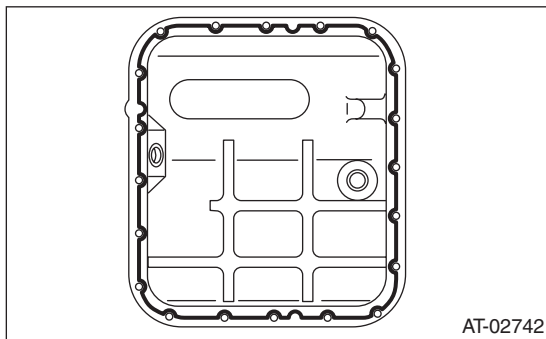
- 3) Attach the magnet at the specified position of the oil pan.



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

Liquid gasket:

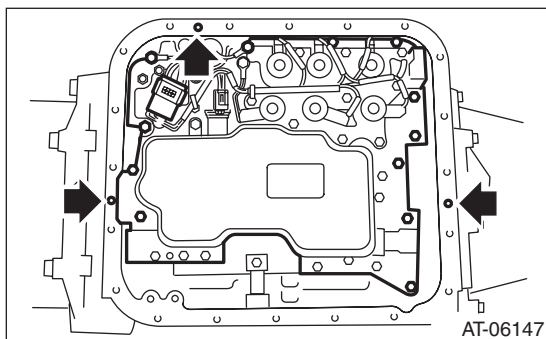
**THREE BOND 1217B (Part No. K0877YA020)
or equivalent**



- 5) Fill the 3 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. <Ref. to 4AT-26, Automatic Transmission Fluid.>
8) Bleed the air of control valve. <Ref. to 4AT-57, PROCEDURE, Air Bleeding of Control Valve.>
9) Check the ATF level. <Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>

C: INSPECTION

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

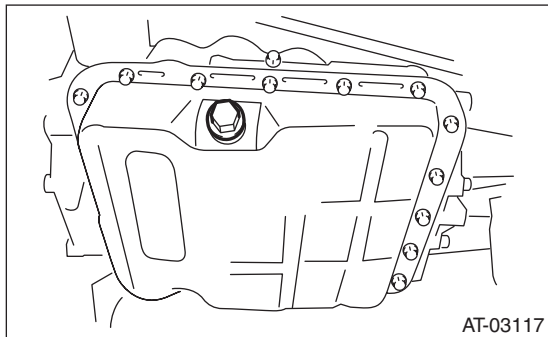
17. Control Valve Body

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 drain plug (ATF) 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.



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

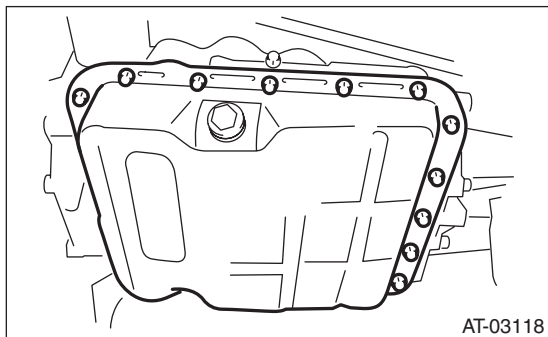
Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

- 7) Remove the oil pan.

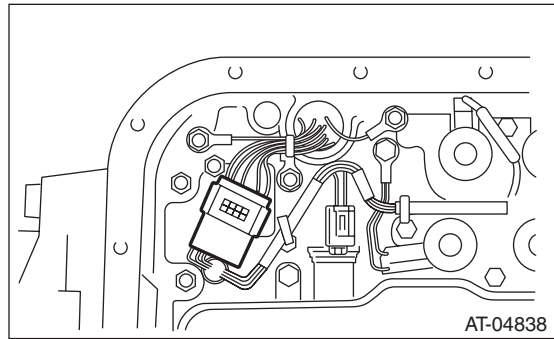
CAUTION:

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

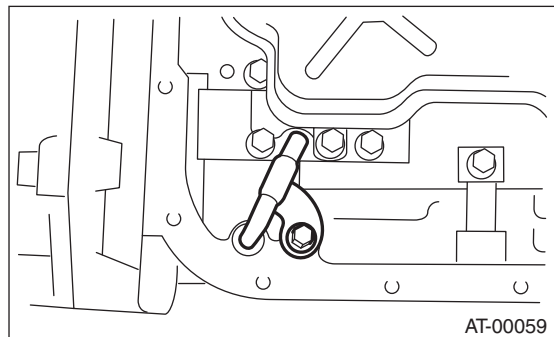


- 8) Remove the magnet.
- 9) Clean the magnet.
- 10) Completely remove the remaining liquid gasket on the transmission case and oil pan.

- 11) Disconnect the control valve connector.



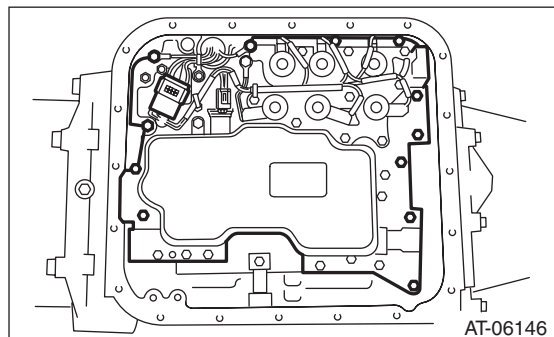
- 12) Remove the oil cooler pipe.



- 13) Remove the control valve body.

NOTE:

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

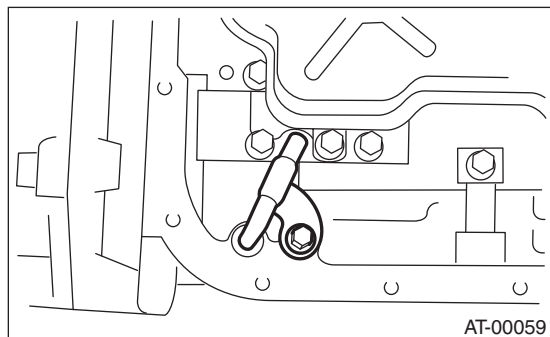


B: INSTALLATION

- 1) Check the control valve body for dust and other foreign matter.
- 2) Temporarily attach the control valve body to the transmission.
- 3) Install the oil cooler pipe.

Tightening torque:

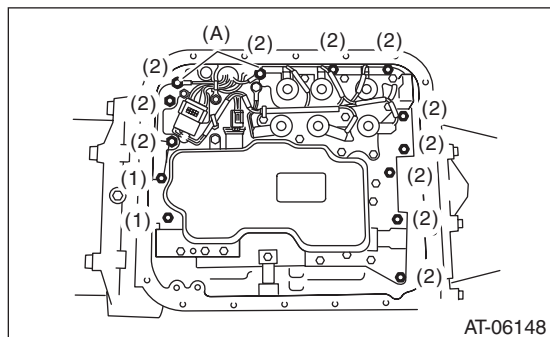
8 N·m (0.8 kgf-m, 5.9 ft-lb)



- 4) Tighten the bolts equally.

Tightening torque:

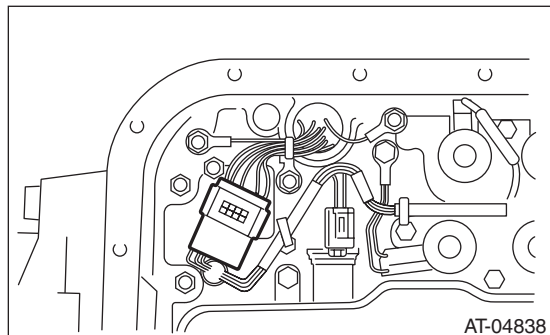
8 N·m (0.8 kgf-m, 5.9 ft-lb)



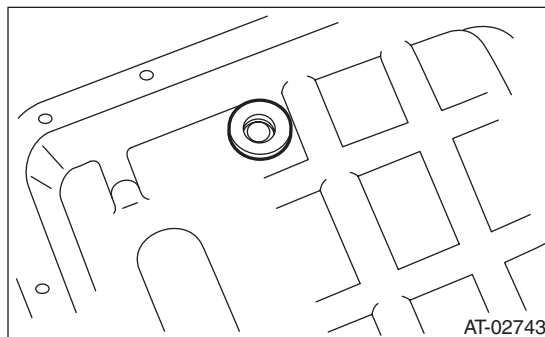
(A) Transmission ground
Bolt length mm (in)

- (1) 35 (1.38)
- (2) 30 (1.18)

- 5) Connect the control valve connector.



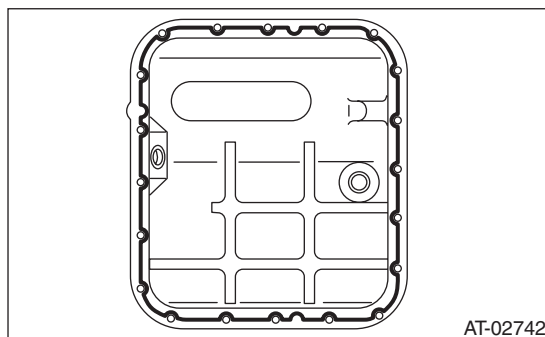
- 6) Attach the magnet at the specified position of the oil pan.



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

Liquid gasket:

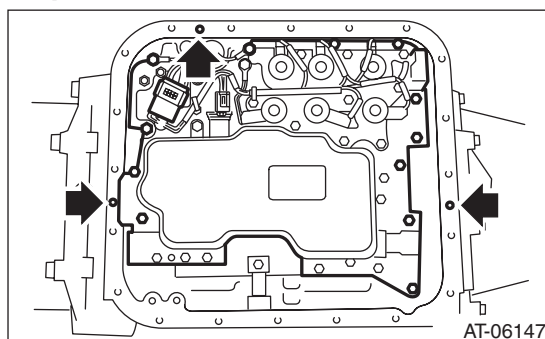
**THREE BOND 1217B (Part No. K0877YA020)
or equivalent**



- 8) 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**



- 9) Install the oil pan by equally tightening the bolts.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

- 10) Fill ATF from the oil charge pipe. <Ref. to 4AT-26, Automatic Transmission Fluid.>
- 11) Bleed the air of control valve. <Ref. to 4AT-57, PROCEDURE, Air Bleeding of Control Valve.>
- 12) Check the ATF level. <Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>

AUTOMATIC TRANSMISSION

13) Perform learning control promotion. <Ref. to 4AT(diag)-20, Learning Control.>

C: INSPECTION

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

18. Air Bleeding of Control Valve

A: GENERAL DESCRIPTION

- When ATF is drained from the automatic transmission, make sure to bleed air from the control valve after filling with the specified amount of ATF.
- Follow the messages displayed on the Subaru Select Monitor when working.

B: PROCEDURE

1. PREPARATION FOR AIR BLEEDING

- 1) Cool down until the ATF temperature displayed on the Subaru Select Monitor is 60°C (140°F) or less.
- 2) Shift the select lever to "P" range.
- 3) Fully apply the parking brake.
- 4) Lift up the vehicle.

CAUTION:

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

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

2. AIR BLEEDING

CAUTION:

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

- 1) Select {Learning and inspection mode related to AT} in the «Transmission Diagnosis» display screen of the Subaru Select Monitor.
- 2) Select {AT air bleeding mode} in the «Learning and inspection mode related to AT» display screen of the Subaru Select Monitor.
- 3) Follow the messages displayed on the Subaru Select Monitor screen when working.

NOTE:

When "AT air bleeding in progress", the "AT OIL TEMP" light in the combination meter will flash at 2 Hz, and air bleed will start. When the indicator light flashing at 2 Hz turns off, the following message will appear on the screen.

- 4) Air bleed is complete when a message "AT air bleeding normally ended." is displayed.

NOTE:

- If a communication error occurs during air bleed, start the "AT air bleeding" over from the beginning.
- If the message "Execute AT learning again after fixing troubles of the vehicle" appears during air bleed, select [OK] and display the DTC list. After repairing the locations indicated by the DTC, start the "AT air bleeding" over from the beginning.
- If the message "AT air bleeding ended abnormally" is displayed, start the "AT air bleeding" over from the beginning.
- When communication error occurs during air bleeding, select lever does not shift occasionally. If select lever does not shift, turn the ignition switch to OFF before operating the select lever.

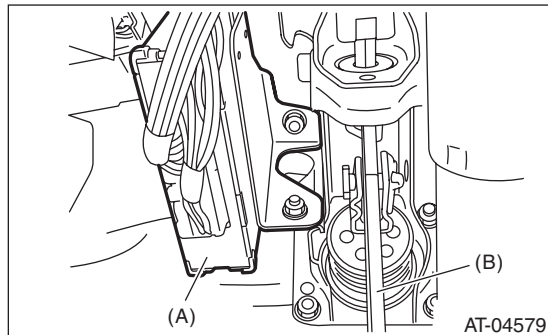
Message	Main reasons for abnormal termination
"AT air bleeding ended abnormally."	• A failure was detected during AT air bleeding • The accelerator pedal is depressed during AT air bleeding. • An unspecified operation was performed during AT air bleeding • Brake pedal is not depressed fully. • Parking brake not applied strongly enough. • Abnormal idle speed increase, etc.

- For details concerning the operation procedure, refer to "PC application help for Subaru Select Monitor".

19. Transmission Control Module (TCM)

A: REMOVAL

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



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

- 4) Remove the TCM.

NOTE:

Replace the TCM and bracket as a set.

B: INSTALLATION

- 1) Install the TCM to the bracket.

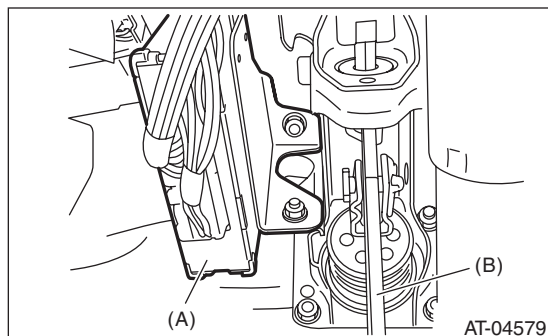
CAUTION:

To avoid the damage to bracket and TCM, do not remove after installing TCM to bracket. If installed by mistake, the part must be replaced with a new part.

- 2) Install the TCM.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



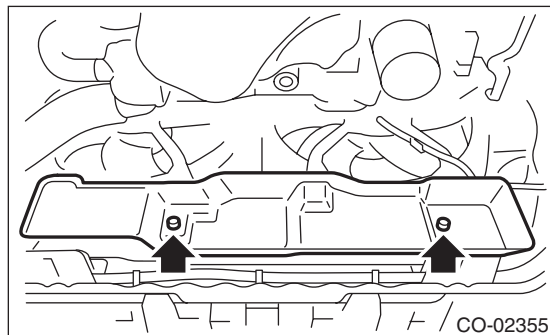
- (A) Transmission control module (TCM)
(B) Brake pedal

- 3) Connect the connector to TCM.
- 4) Install in the reverse order of removal.
- 5) Perform learning control promotion. <Ref. to 4AT(diag)-20, Learning Control.>

20.ATF Cooler Pipe and Hose

A: REMOVAL

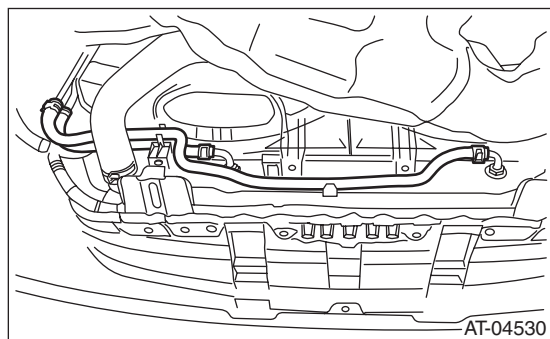
- 1) Set the vehicle on a lift.
- 2) Remove the battery.
- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Remove the heat shield cover.



- 6) Disconnect the ATF cooler hose from the radiator.

NOTE:

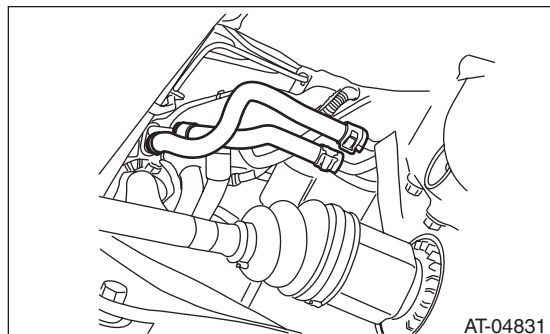
- Do not use a screwdriver or other pointed tools.
- If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.



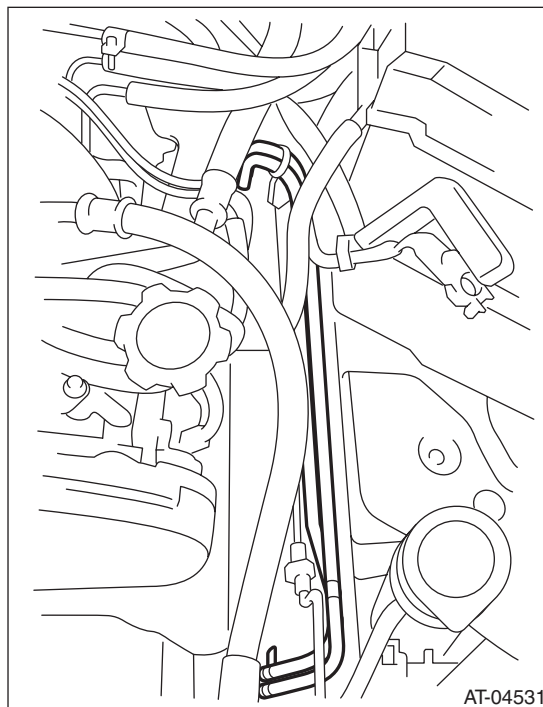
- 7) Disconnect the ATF cooler hoses from the pipes.

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.



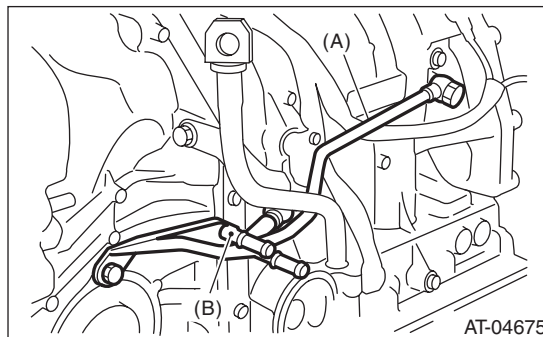
- 8) Disconnect the ATF cooler pipe from frame.



- 9) Remove the ATF inlet pipe and outlet pipe.

CAUTION:

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



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

B: INSTALLATION

- 1) Install the ATF inlet pipe and outlet pipe along with new washers.

ATF Cooler Pipe and Hose

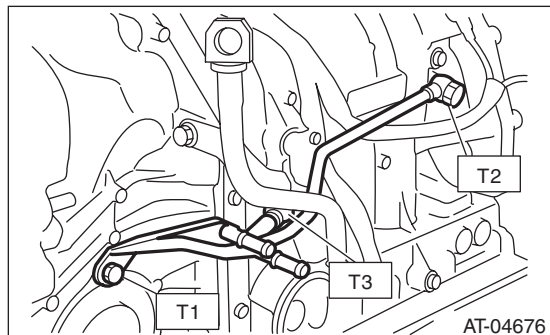
AUTOMATIC TRANSMISSION

Tightening torque:

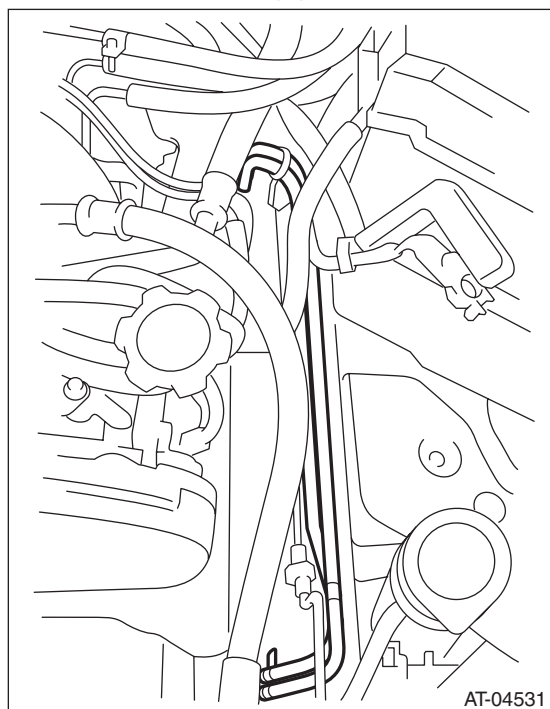
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)

T3: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



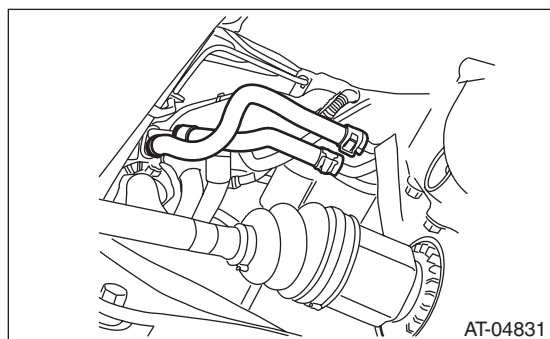
2) Install the ATF cooler pipe to frame.



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

NOTE:

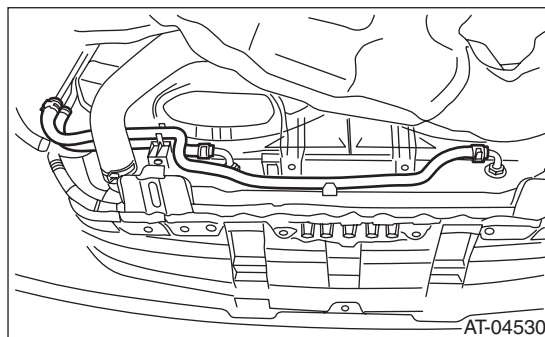
- Install so that the hose is not folded over, excessively bent or twisted.
- Insert the hose to the specified position.
- Use a new ATF cooler hose.



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

NOTE:

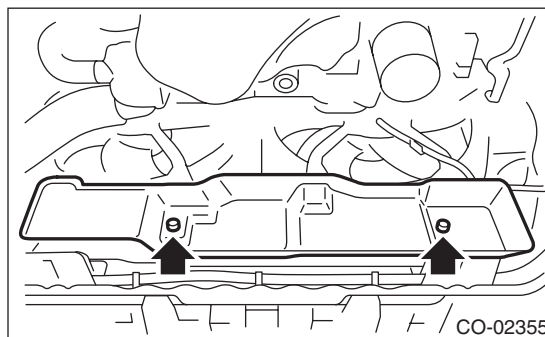
- Install so that the hose is not folded over, excessively bent or twisted.
- Insert the hose to the specified position.
- Use a new ATF cooler hose.



5) Install the heat shield cover.

Tightening torque:

3 N·m (0.3 kgf-m, 2.2 ft-lb)



6) Install the under cover.

7) Install the battery.

8) Refill ATF, and check the level. <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

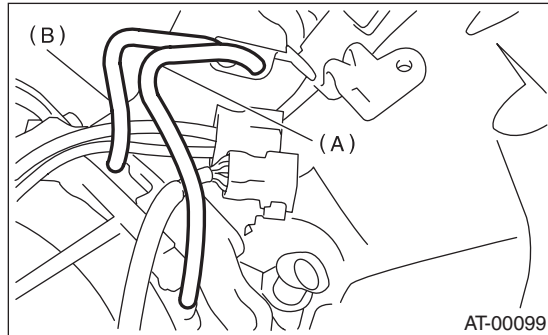
Repair or replace any faulty hoses, pipes, clamps, and washers found in the inspection below.

- 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.

21. Air Breather Hose

A: REMOVAL

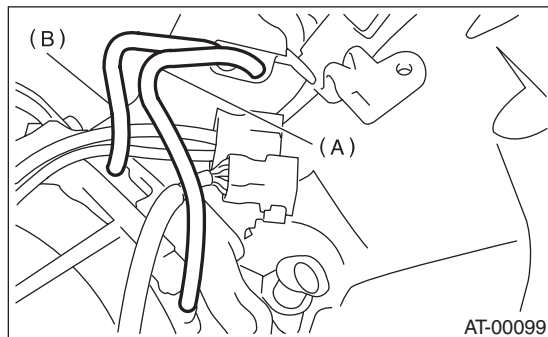
- 1) Remove the air intake chamber. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 2) Disconnect the air breather hose.



- (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.>

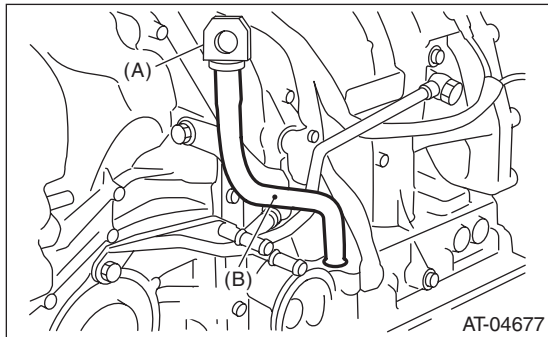
C: INSPECTION

Make sure the hose is not cracked or clogged.

22.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) ATF level gauge

(B) Oil charge pipe

B: INSTALLATION

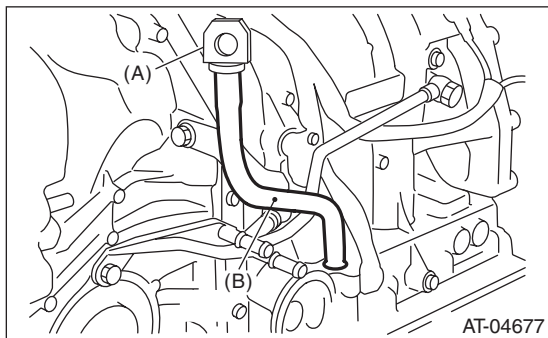
- 1) Apply ATF on a new O-ring and install together with the oil charge pipe.

NOTE:

Use a new bolt.

Tightening torque:

38 N·m (3.9 kgf-m, 28.0 ft-lb)



(A) ATF 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.

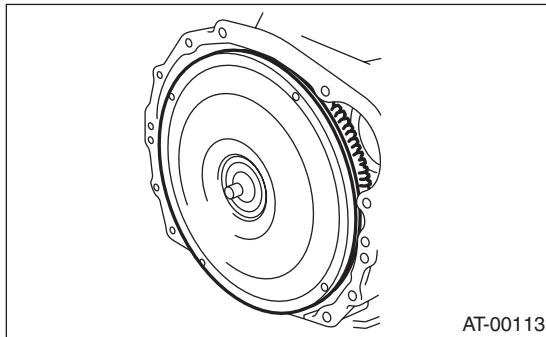
23. Torque Converter Clutch Assembly

A: REMOVAL

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

NOTE:

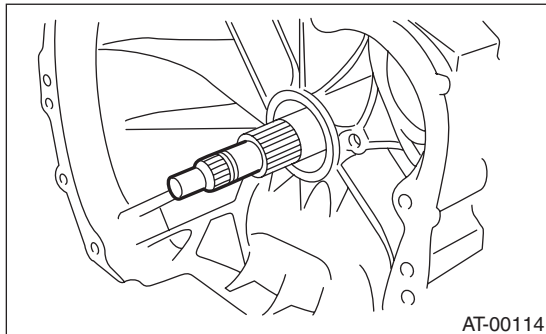
Be sure not to scratch the inside of bushing in oil pump shaft.



- 3) Remove the input shaft.

NOTE:

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



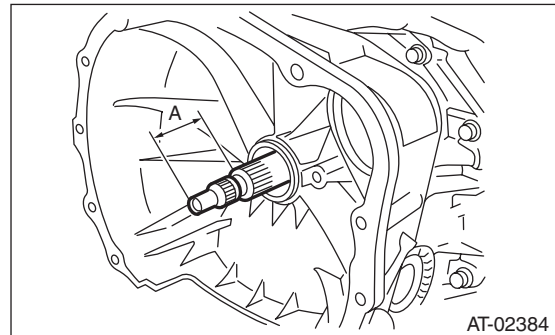
- 4) Remove the oil pump shaft from torque converter clutch assembly as necessary.

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 clutch assembly, and make sure the clip is secured on the groove.
- 3) Apply ATF to the O-ring and insert onto the input shaft while rotating the shaft slowly by hand. Check the amount of protrusion.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

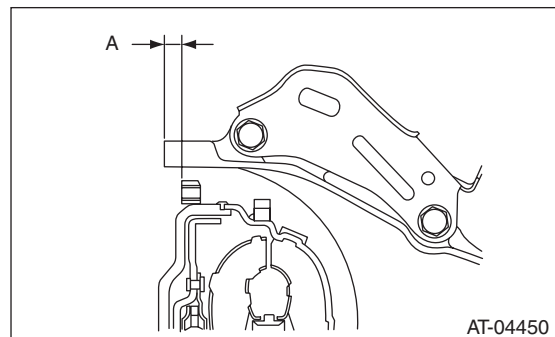


A Measured value

- 4) While holding the torque converter clutch assembly by hand, carefully install it to the torque converter case. Take care not to damage the bushing. Do not allow the oil pump shaft bushing to touch the stator shaft section 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:

1.1 — 1.3 mm (0.043 — 0.051 in)



- 6) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Check the ring gear and the protrusion of torque converter clutch assembly end for deformation and damage.

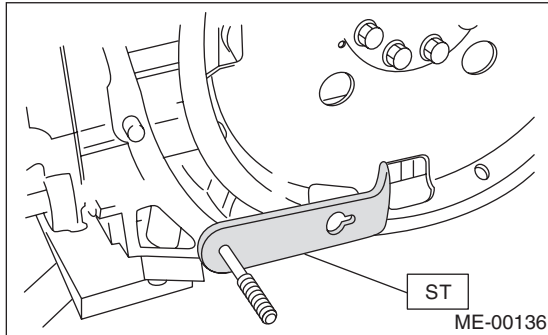
24. Drive Plate

A: REMOVAL

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

2) Use the ST to lock the crankshaft, and remove the drive plate.

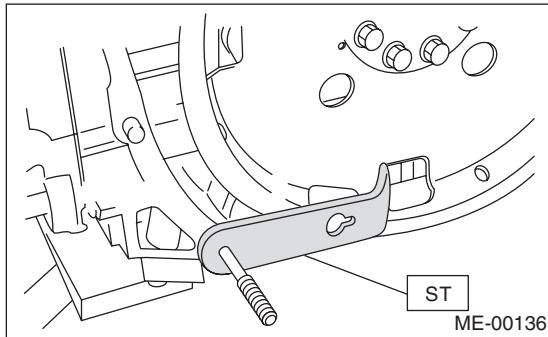
ST 498497100 CRANKSHAFT STOPPER



B: INSTALLATION

1) Using the ST, lock the crankshaft.

ST 498497100 CRANKSHAFT STOPPER



2) Tighten the drive plate in three stages.

(1) Temporarily tighten the drive plate.

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°

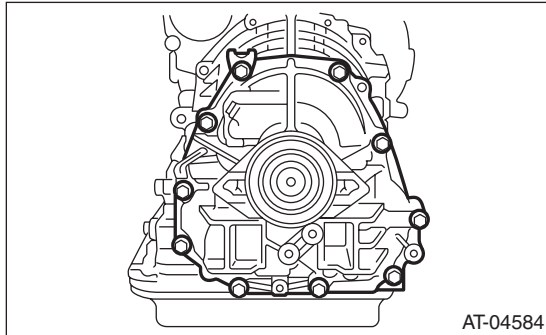
ST 1854AA000 ANGLE GAUGE

3) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

25.Extension Case

A: REMOVAL

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

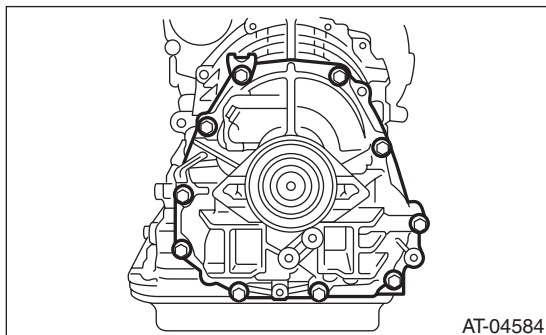
NOTE:

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, 18.4 ft-lb)



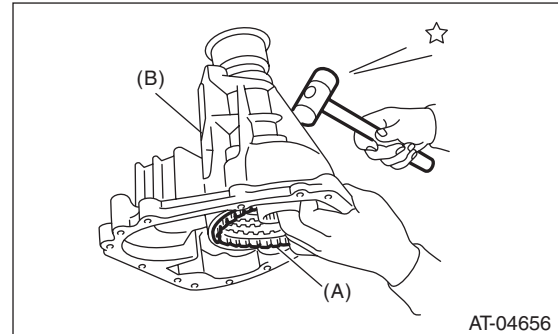
- 5) Install the transmission assembly. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

- 1) Hit the extension case lightly with a plastic hammer, and take out the transfer clutch.

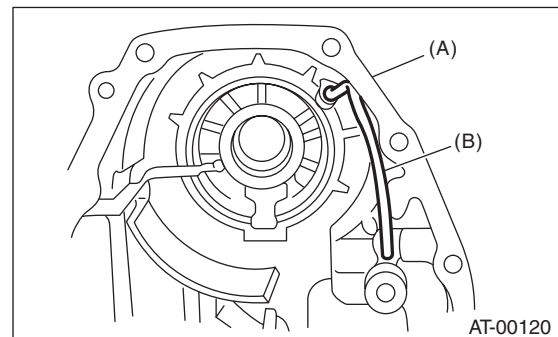
NOTE:

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



- (A) Transfer clutch
(B) Extension case

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

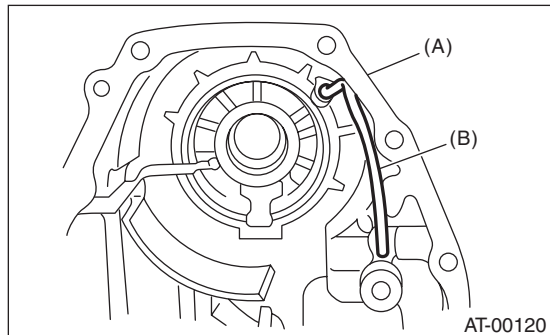


- (A) Extension case
(B) Transfer clutch pipe

- 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.

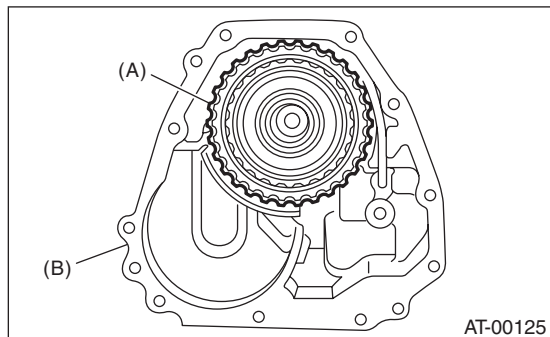


- (A) Extension case
(B) Transfer clutch pipe

- 4) Install the transfer clutch assembly to the case.

NOTE:

- Be careful not to damage the seal ring.
- Insert the transfer clutch assembly all the way to the bottom of the bearing shoulder.



- (A) Transfer clutch ASSY
(B) Extension case

E: INSPECTION

- Blow with compressed air to make sure the transfer clutch 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-70, ADJUSTMENT, Transfer Clutch.>

26. Transfer Clutch

A: REMOVAL

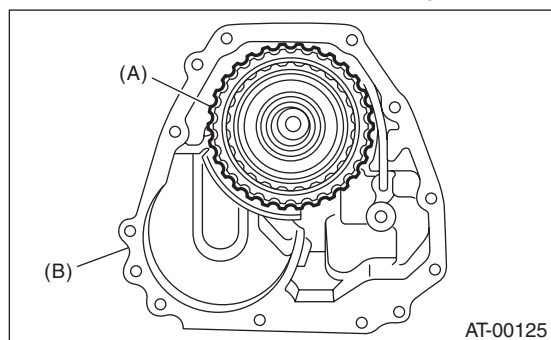
1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>

2) Remove the extension case, and then remove the transfer clutch. <Ref. to 4AT-65, REMOVAL, Extension Case.> <Ref. to 4AT-65, DISASSEMBLY, Extension Case.>

B: INSTALLATION

1) Select the thrust needle bearing. <Ref. to 4AT-70, ADJUSTMENT, Transfer Clutch.>

2) Install the transfer clutch assembly to the case.

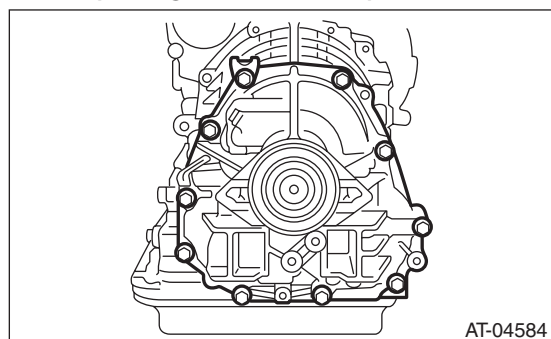


(A) Transfer clutch ASSY
(B) Extension case

3) Tighten the bolts to secure the case.

Tightening torque:

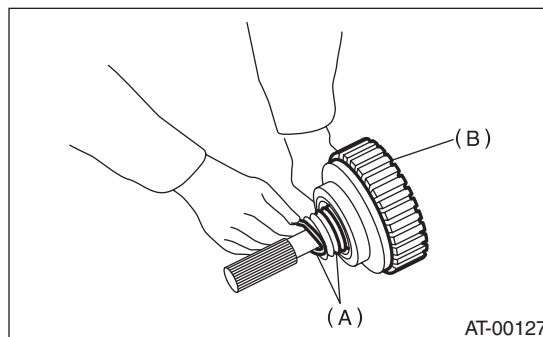
25 N·m (2.5 kgf-m, 18.4 ft-lb)



4) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

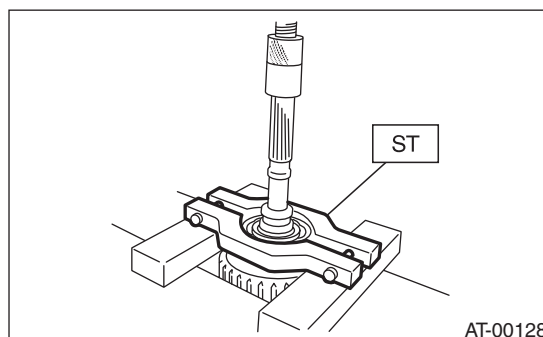
1) Remove the seal ring.



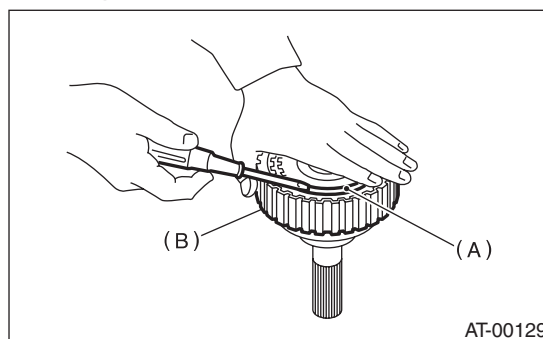
(A) Seal ring
(B) Rear drive shaft

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

ST 498077600 REMOVER



3) Using a flat tip screwdriver, etc. remove the snap ring, and take out the retaining plate, drive plate and driven plate.



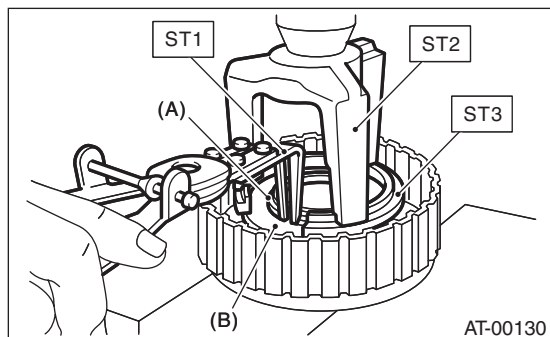
(A) Snap ring
(B) Rear drive shaft

Transfer Clutch

AUTOMATIC TRANSMISSION

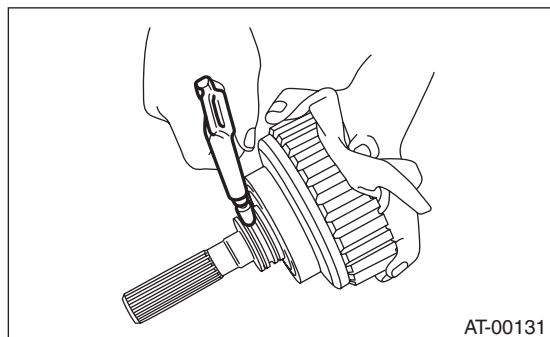
4) Using the ST1, ST2 and ST3, remove the snap ring, then take out the return spring and transfer clutch piston seal.

ST1 399893600 PLIER
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



- (A) Snap ring
- (B) Transfer clutch piston seal

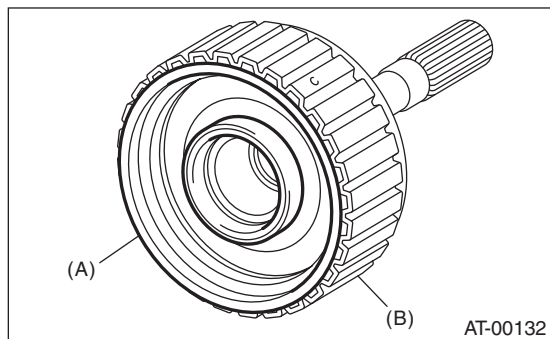
5) Apply compressed air to the rear drive shaft, to remove the transfer clutch piston.



AT-00131

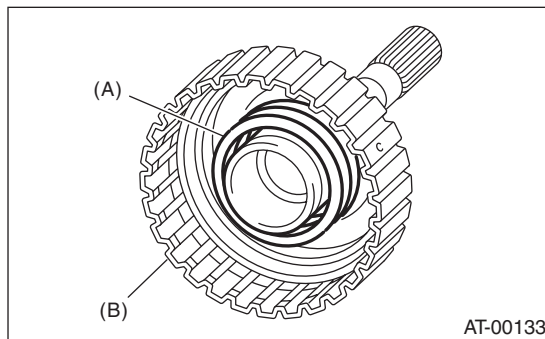
D: ASSEMBLY

1) Install the transfer clutch piston.



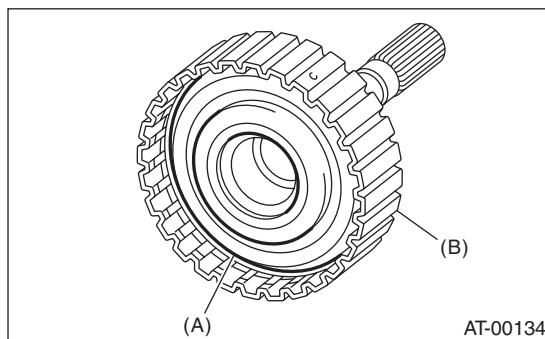
- (A) Transfer clutch piston
- (B) Rear drive shaft

2) Install the return spring to transfer clutch piston.



- (A) Return spring
- (B) Rear drive shaft

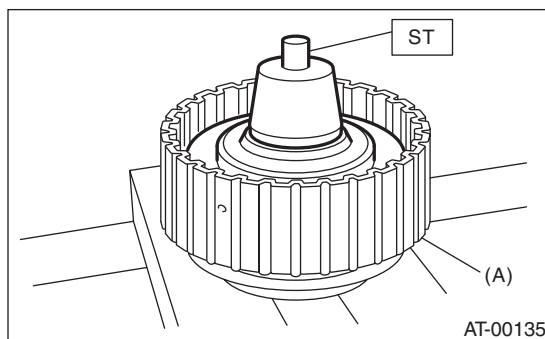
3) Apply ATF to the lip of transfer clutch piston seal, then install.



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

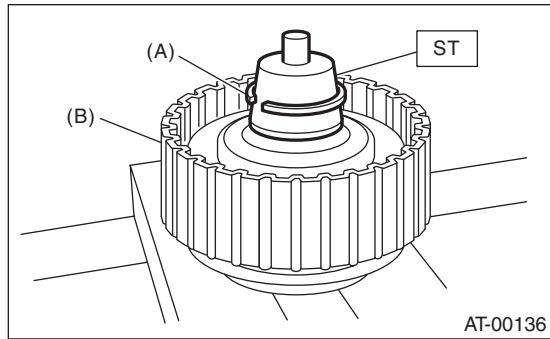
4) Attach the ST to the rear drive shaft.

ST 499257300 SNAP RING OUTER GUIDE



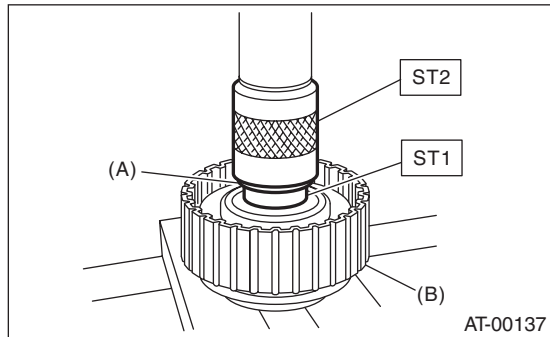
- (A) Rear drive shaft

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



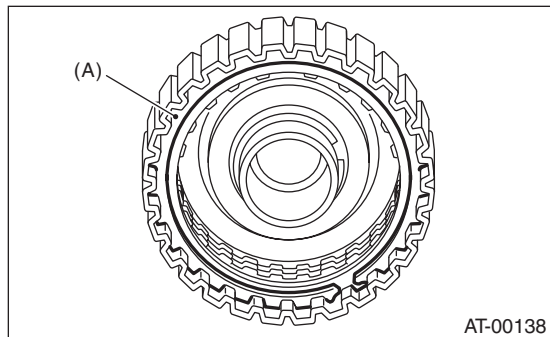
(A) Snap ring
(B) Rear drive shaft

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



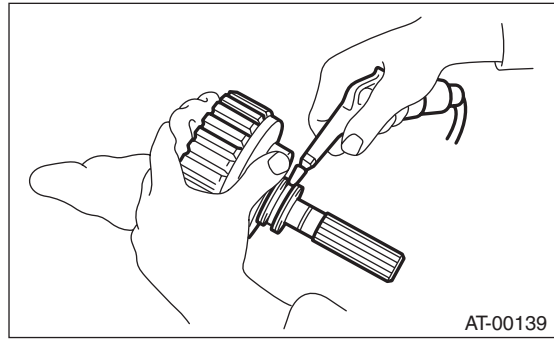
(A) Snap ring
(B) Rear drive shaft

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



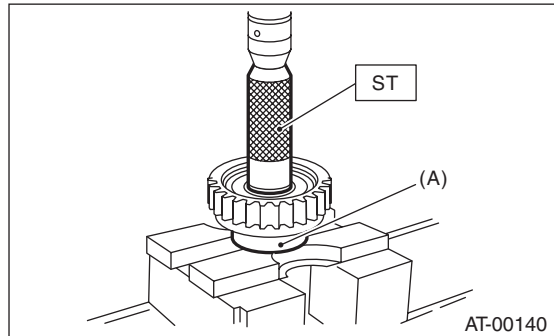
(A) Snap ring

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



- 9) Check the clearance between the snap ring and retaining plate. <Ref. to 4AT-70, INSPECTION, Transfer Clutch.>

- 10) Press-fit new ball bearing using ST.
ST 899580100 INSTALLER

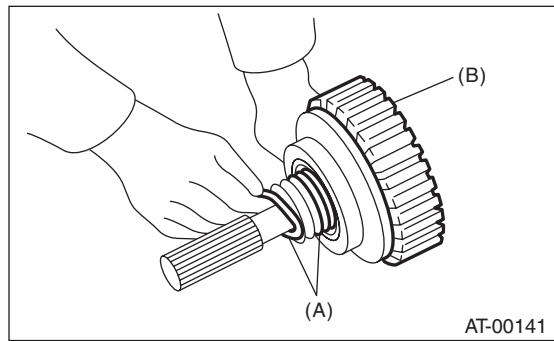


(A) Ball bearing

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

NOTE:

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

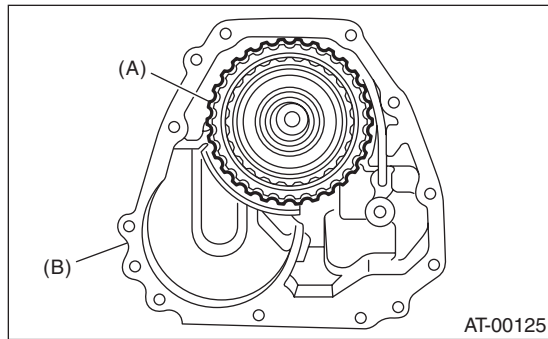


(A) Seal ring
(B) Rear drive shaft

Transfer Clutch

AUTOMATIC TRANSMISSION

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



(A) Transfer clutch ASSY
(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-70, ADJUSTMENT, Transfer Clutch.>

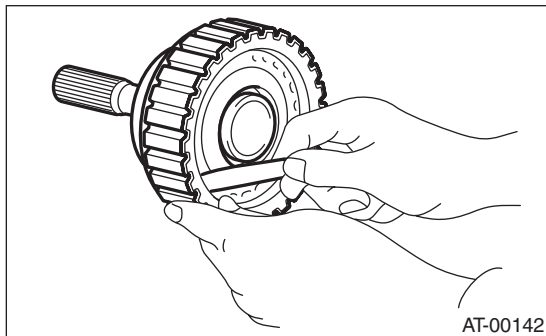
- 1) Check the clearance between the snap ring and retaining plate.
- 2) Before measuring clearance, place same thickness shims on both sides to prevent the retaining plate from tilting.
- 3) If the clearance exceeds the service limits, replace the plate set (drive plate and driven plate), and select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



Retaining plate	
Part No.	Length 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.

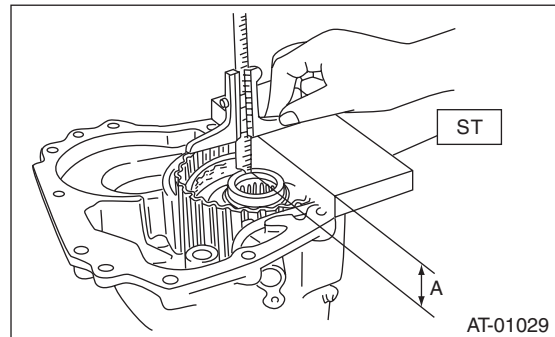
(1) With the steering wheel held at fully turned position, drive the vehicle in "D" range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.

(2) If the tight corner braking phenomenon still persists, drive the vehicle again in a circle for several laps.

F: ADJUSTMENT

1) Using the ST, measure the distance "A" from the end face of ST to the rear drive shaft.

ST 398643600 GAUGE

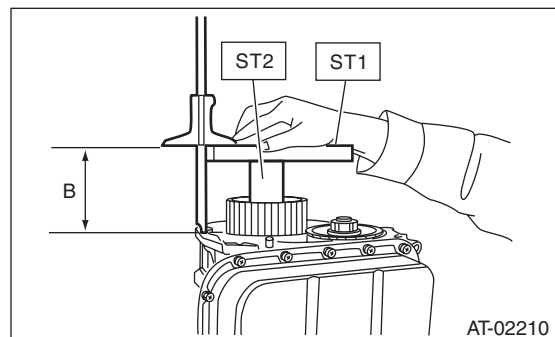


A Measured value

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



B Measured value

3) Calculation formula:

$$T = A - B + 35.4 \text{ mm}$$

$$[T = A - B + 1.3937 \text{ in}]$$

T: Thrust needle bearing thickness

A: Distance from the end face of ST to the rear drive shaft end

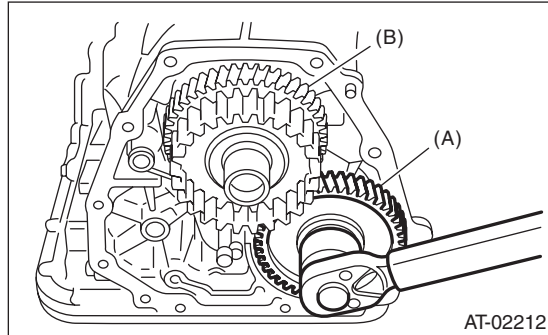
B: Distance from the mating surface of the transmission case to the end of the ST

Thrust needle bearing	
Part No.	Length 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)

27.Reduction Driven Gear

A: REMOVAL

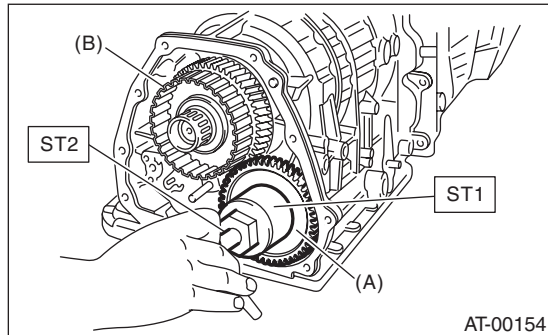
- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Separate the extension case from the transmission case. <Ref. to 4AT-65, REMOVAL, Extension Case.>
- 3) Set the range select lever to the "P" range.
- 4) Lift the crimped section, 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



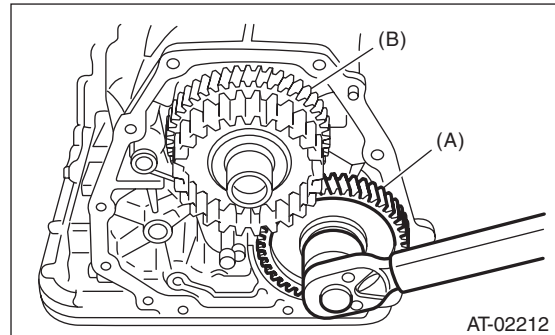
- (A) Reduction driven gear
(B) Reduction drive gear

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)

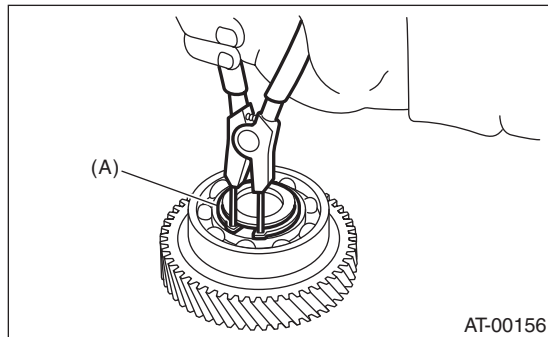


- (A) Reduction driven gear
(B) Reduction drive gear

- 3) After tightening, stake the lock nut securely.
- 4) Connect the transmission case with the extension case. <Ref. to 4AT-65, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

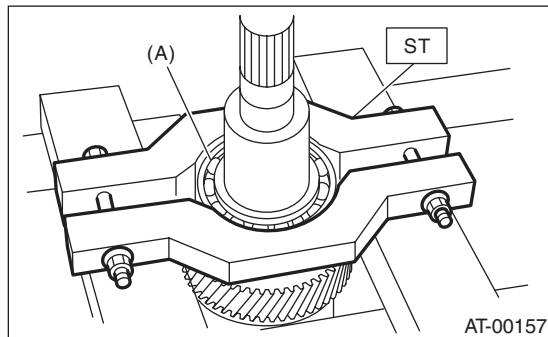
1) Remove the snap ring from reduction driven gear.



(A) Snap ring

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

ST 498077600 REMOVER



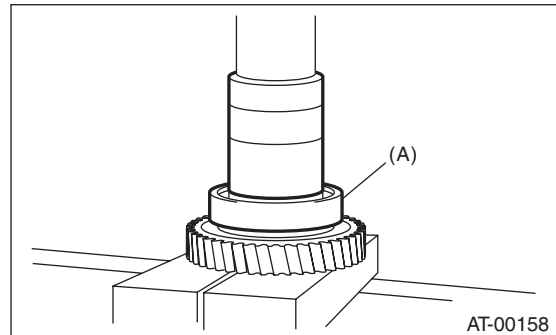
(A) Ball bearing

3) Remove the gear inner groove snap ring from the reduction driven gear.

D: ASSEMBLY

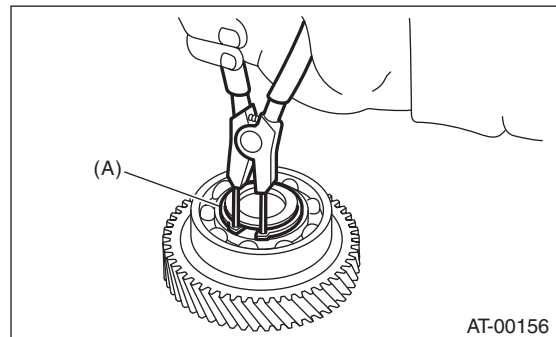
1) Install the snap ring to the gear inner groove on the reduction driven gear.

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.

Reduction Drive Gear

AUTOMATIC TRANSMISSION

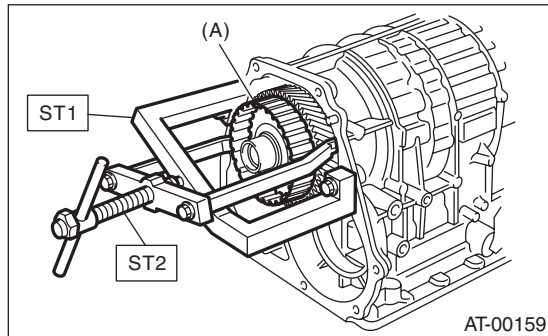
28.Reduction Drive Gear

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Separate the extension case from the transmission case. <Ref. to 4AT-65, REMOVAL, Extension Case.>
- 3) Remove the reduction driven gear. <Ref. to 4AT-72, REMOVAL, Reduction Driven Gear.>
- 4) Using the ST, extract the reduction drive gear assembly.

ST1 499737100 PULLER SET

ST2 899524100 PULLER SET



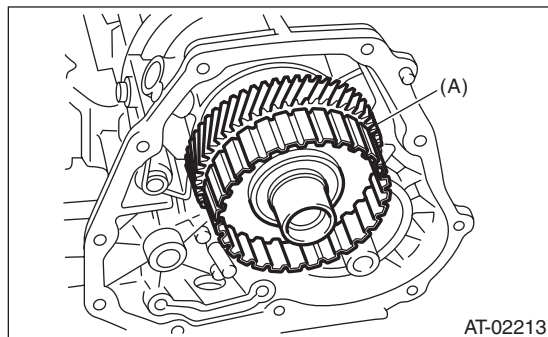
(A) Reduction drive gear ASSY

B: INSTALLATION

- 1) Install the reduction drive gear assembly.

NOTE:

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

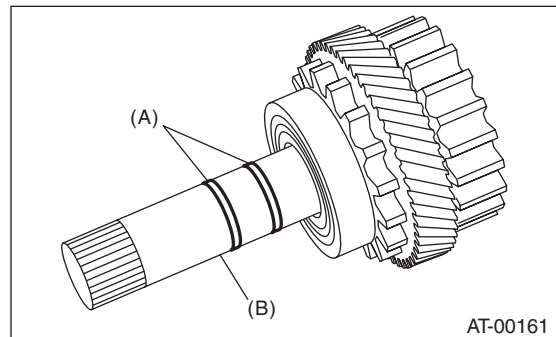


(A) Reduction drive gear ASSY

- 2) Install the reduction driven gear. <Ref. to 4AT-72, INSTALLATION, Reduction Driven Gear.>
- 3) Connect the transmission case with the extension case. <Ref. to 4AT-65, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

- 1) Take out the seal ring.

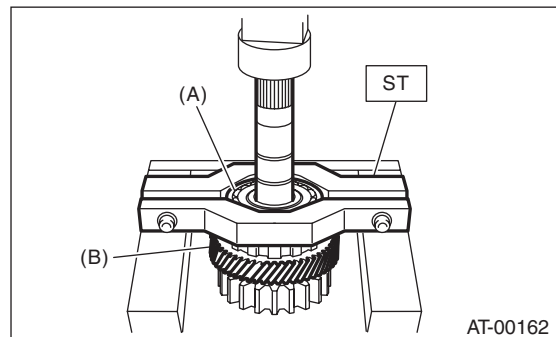


(A) Seal ring

(B) Reduction drive shaft

- 2) Remove the ball bearing using ST.

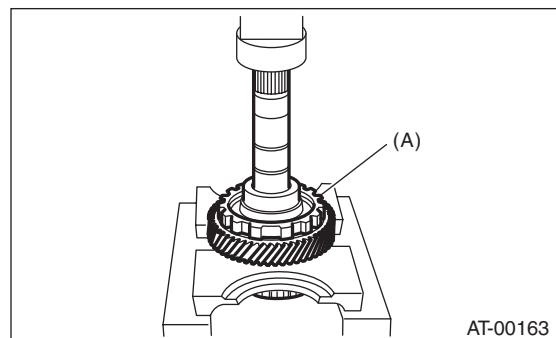
ST 498077600 REMOVER



(A) Ball bearing

(B) Reduction drive gear

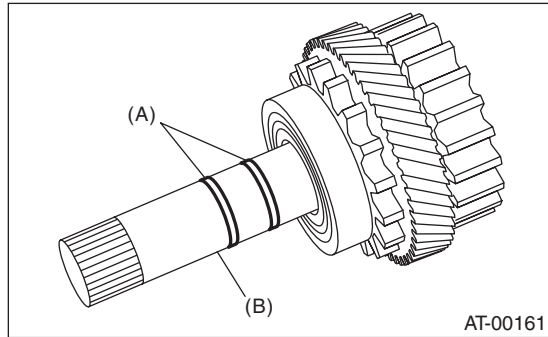
- 3) Apply vaseline to the outer surface of seal ring and shaft groove.



(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, then install.



(A) Seal ring

(B) Reduction drive shaft

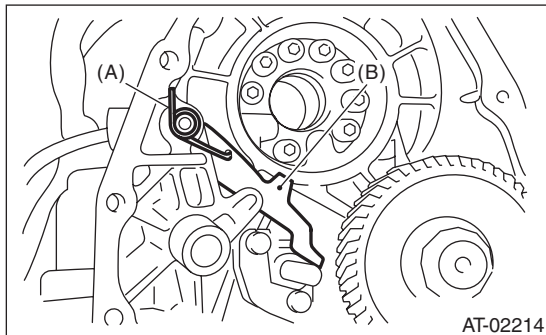
E: INSPECTION

- 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-70, ADJUSTMENT, Transfer Clutch.>

29. Parking Pawl

A: REMOVAL

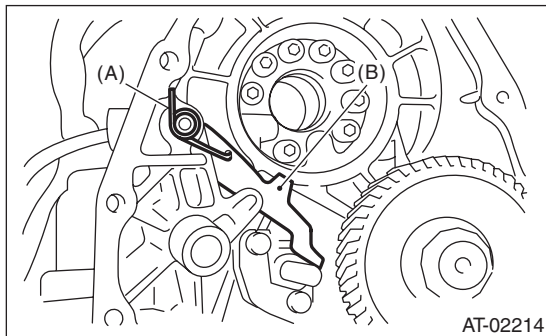
- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Separate the extension case from the transmission case. <Ref. to 4AT-65, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. <Ref. to 4AT-74, REMOVAL, Reduction Drive Gear.>
- 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-74, INSTALLATION, Reduction Drive Gear.>
- 3) Install the extension case. <Ref. to 4AT-65, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

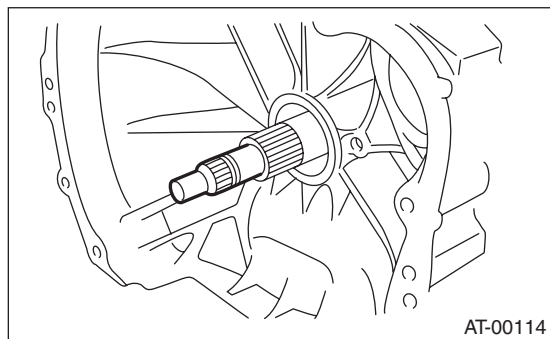
C: INSPECTION

Check that the parking pawl tab on the reduction gear is not worn or otherwise damaged.

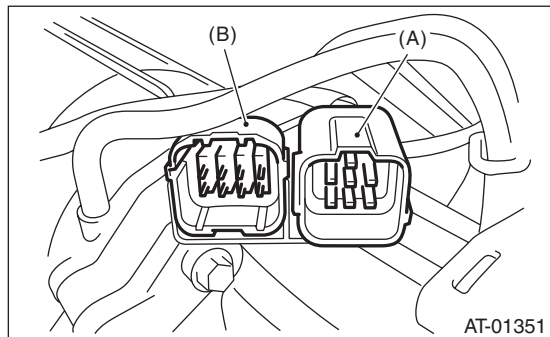
30. Converter Case

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-63, REMOVAL, Torque Converter Clutch 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.

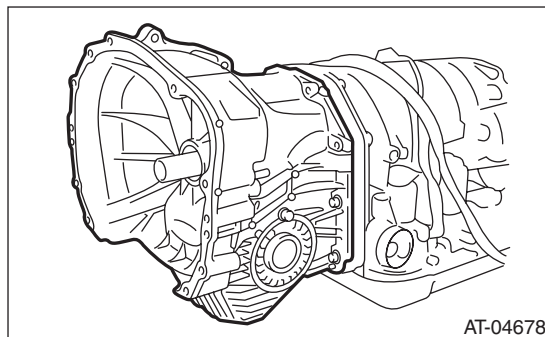


- (A) Transmission harness connectors
(B) Inhibitor switch connector

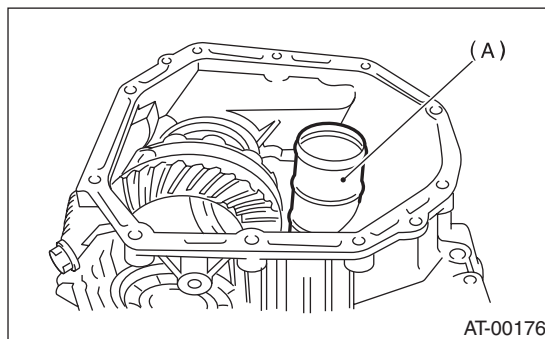
- 6) Remove the air breather hose. <Ref. to 4AT-61, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charge pipe. <Ref. to 4AT-62, REMOVAL, Oil Charge Pipe.>
- 8) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-59, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Remove the converter case alignment bolt, 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.
- Be careful not to loosen the rubber seal.



- 10) Remove the seal pipe.



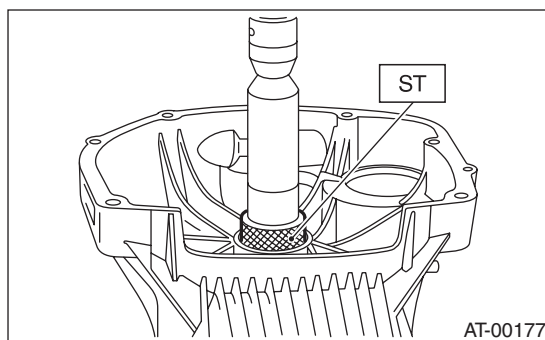
- (A) Seal pipe

- 11) Remove the front differential assembly. <Ref. to 4AT-91, 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 new oil seal to converter case using ST.

ST 398437700 DRIFT

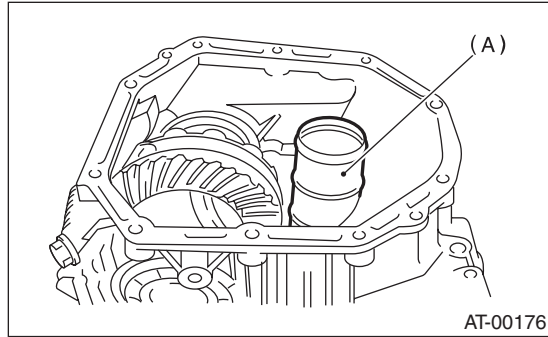


- 3) Install the front differential assembly to the case. <Ref. to 4AT-91, INSTALLATION, Front Differential Assembly.>
- 4) Install the right and left side retainers. <Ref. to 4AT-95, ADJUSTMENT, Front Differential Assembly.>

Converter Case

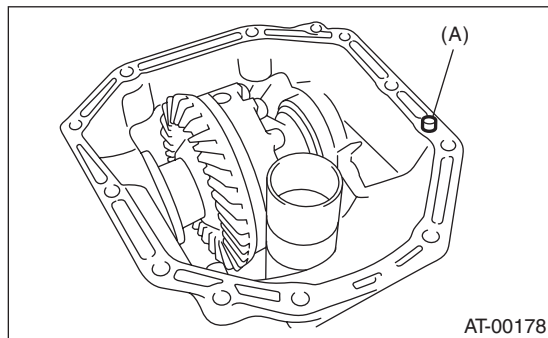
AUTOMATIC TRANSMISSION

5) Install new seal pipe to converter case.



(A) Seal pipe

6) Install new rubber seal to converter case.

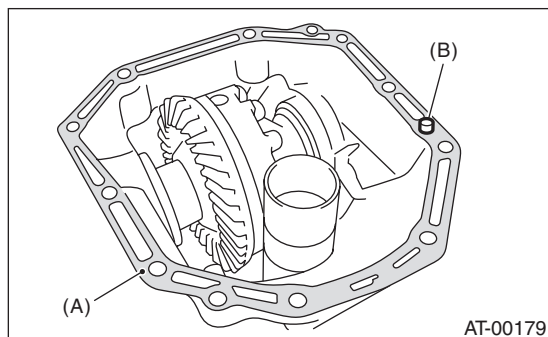


(A) Rubber seal

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, being careful not to damage the bushing and oil seal.

NOTE:

Use new bolts for the oil charge pipe.

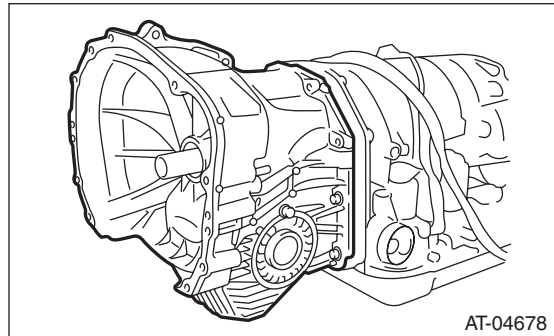
Tightening torque:

Oil charge pipe section

38 N·m (3.9 kgf-m, 28.0 ft-lb)

Excluding the oil charge pipe section

41 N·m (4.2 kgf-m, 30.2 ft-lb)



9) Insert the inhibitor switch connector and transmission harness connector onto the stay.

10) Install the air breather hose. <Ref. to 4AT-61, INSTALLATION, Air Breather Hose.>

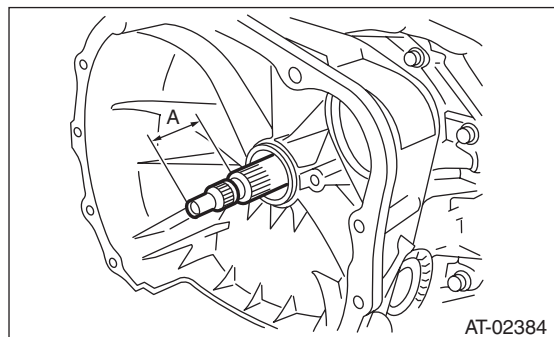
11) Install the ATF cooler pipe. <Ref. to 4AT-59, INSTALLATION, ATF Cooler Pipe and Hose.>

12) Install the oil charge pipe with O-ring. <Ref. to 4AT-62, 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)



A Measured value

14) Install the torque converter clutch assembly. <Ref. to 4AT-63, INSTALLATION, Torque Converter Clutch Assembly.>

15) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

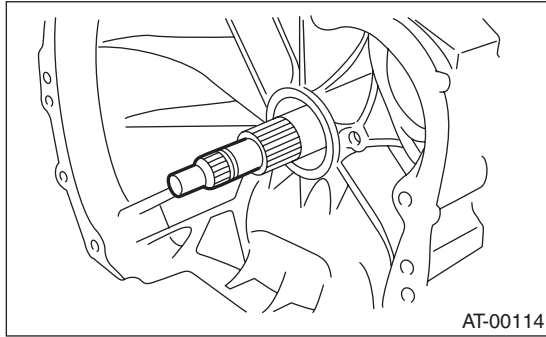
C: INSPECTION

Measure the backlash, and then adjust it to be within standard values. <Ref. to 4AT-88, ADJUSTMENT, Drive Pinion Shaft Assembly.>

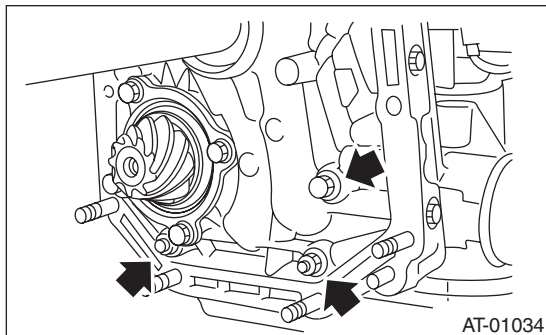
31.Oil Pump Housing

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-63, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



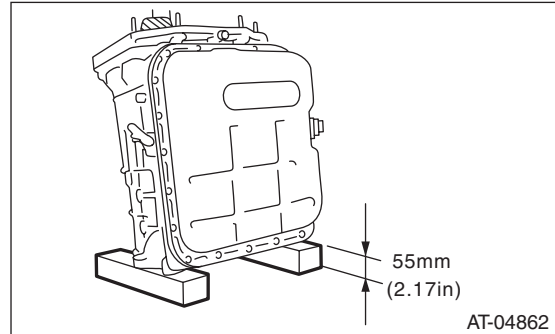
- 4) Lift up the lever on the rear side of transmission harness connector, and then remove it from the stay.
- 5) Remove the inhibitor switch connector from the stay.
- 6) Remove the oil charge pipe. <Ref. to 4AT-62, REMOVAL, Oil Charge Pipe.>
- 7) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-59, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separate the converter case and transmission case. <Ref. to 4AT-77, REMOVAL, Converter Case.>
- 9) Separate the transmission case and extension case section. <Ref. to 4AT-65, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. <Ref. to 4AT-74, REMOVAL, Reduction Drive Gear.>
- 11) Remove the reduction driven gear. <Ref. to 4AT-72, REMOVAL, Reduction Driven Gear.>
- 12) Loosen the oil pump housing mounting bolts.



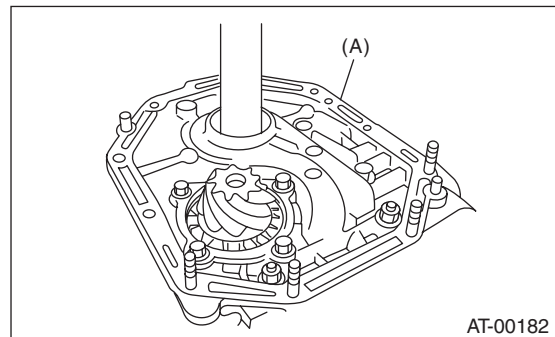
- 13) Place two wooden blocks on the workbench, and stand the transmission case with the rear end facing down.

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 and the drive pinion protruding from the mating surface.



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



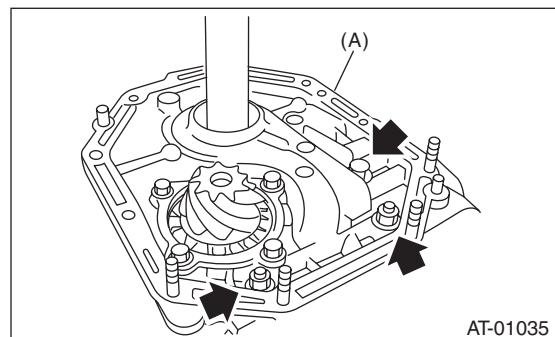
(A) Oil pump housing

B: INSTALLATION

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

Tightening torque:

42 N·m (4.3 kgf-m, 31.0 ft-lb)

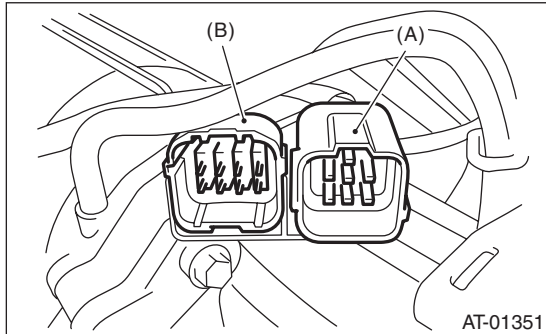


(A) Oil pump housing

Oil Pump Housing

AUTOMATIC TRANSMISSION

- 2) Install the converter case to the transmission case assembly. <Ref. to 4AT-77, INSTALLATION, Converter Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-72, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. <Ref. to 4AT-74, INSTALLATION, Reduction Drive Gear.>
- 5) Connect the transmission case with the extension case. <Ref. to 4AT-65, INSTALLATION, Extension Case.>
- 6) Insert the inhibitor switch connector and transmission harness connector onto the stay.

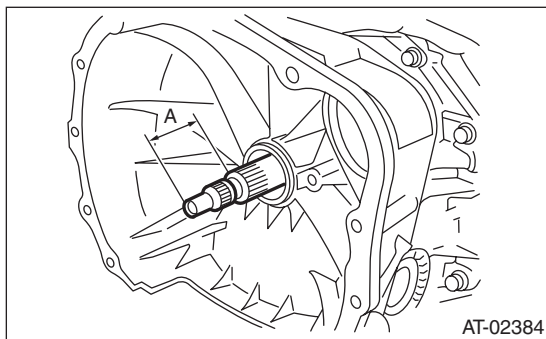


- (A) Transmission harness connectors
(B) Inhibitor switch connector

- 7) Install the ATF cooler pipe. <Ref. to 4AT-59, INSTALLATION, ATF Cooler Pipe and Hose.>
- 8) Install the oil charge pipe together with an O-ring. <Ref. to 4AT-62, 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)



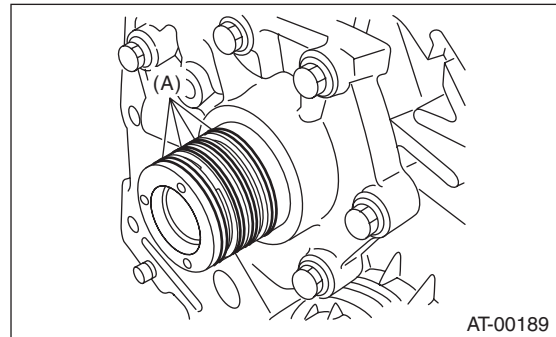
- A Measured value

- 10) Install the torque converter clutch assembly. <Ref. to 4AT-63, INSTALLATION, Torque Converter Clutch Assembly.>
- 11) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

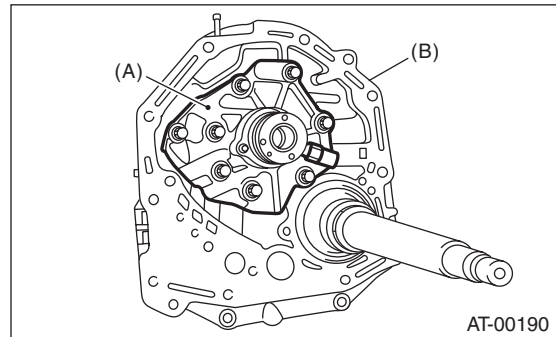
1. OIL PUMP COVER

- 1) Remove the four seal rings.



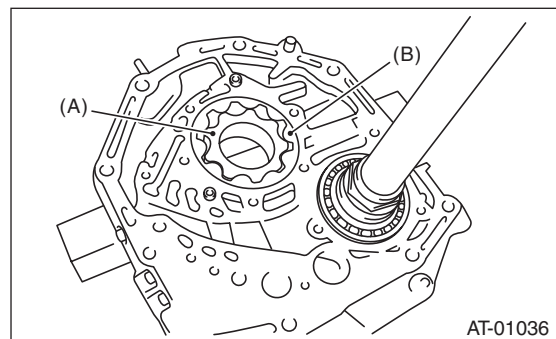
- (A) Seal ring

- 2) Remove attachment bolts, then remove the oil pump cover by lightly tapping the end of the stator shaft.



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

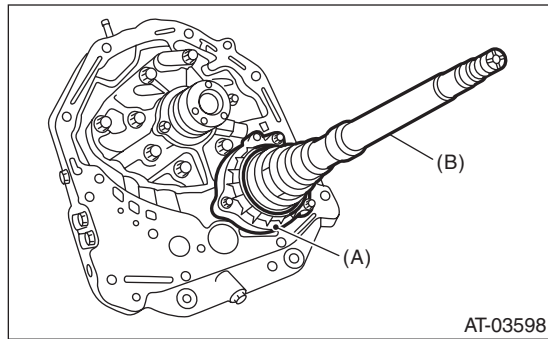
- 3) Remove the oil pump inner rotor and outer rotor.



- (A) Inner rotor
(B) Outer rotor

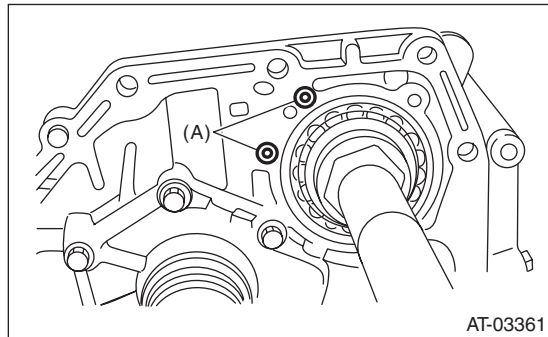
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



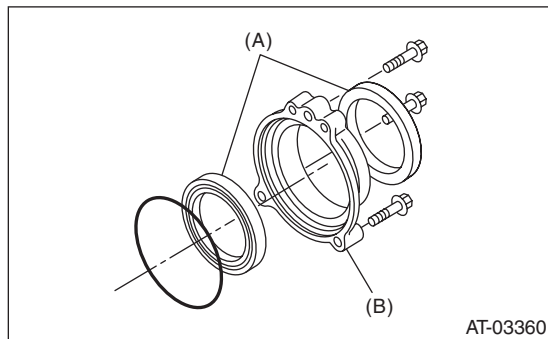
- (A) Oil seal retainer
- (B) Drive pinion shaft

2) Remove the O-ring.



- (A) O-ring

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

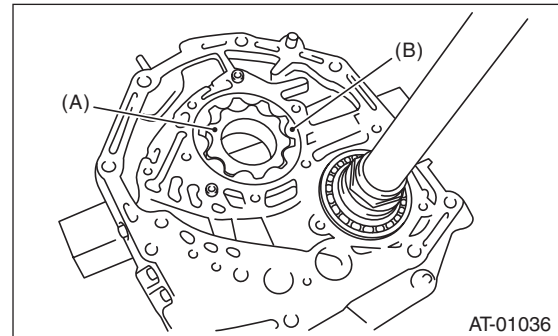


- (A) Oil seal
- (B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

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

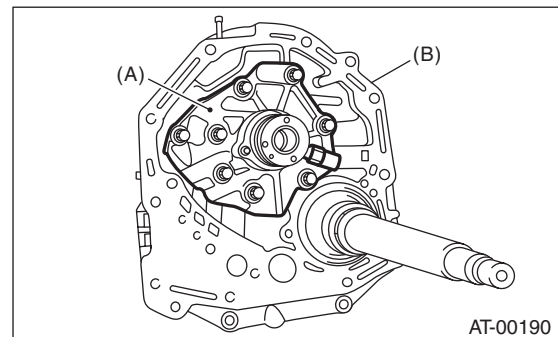


- (A) Inner rotor
- (B) Outer rotor

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, 18.4 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.

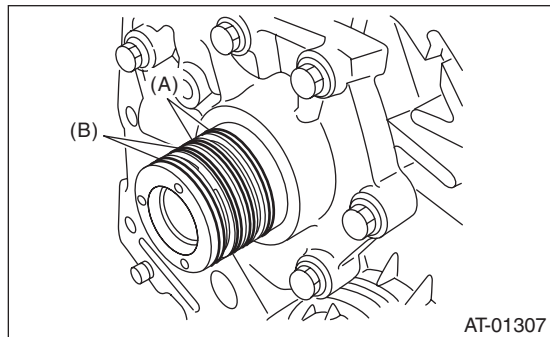
4) Apply vaseline to the oil seal retainer and new seal rings, and install them. After installing, adjust the tooth contact with the drive pinion backlash. <Ref. to 4AT-83, ADJUSTMENT, Oil Pump Housing.>

Oil Pump Housing

AUTOMATIC TRANSMISSION

NOTE:

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

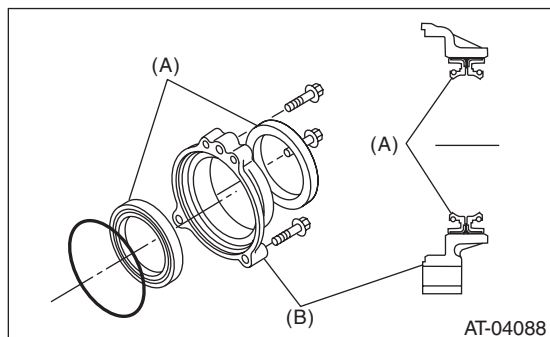


- (A) Seal ring (Black)
- (B) Seal ring (Brown)

2. OIL SEAL RETAINER

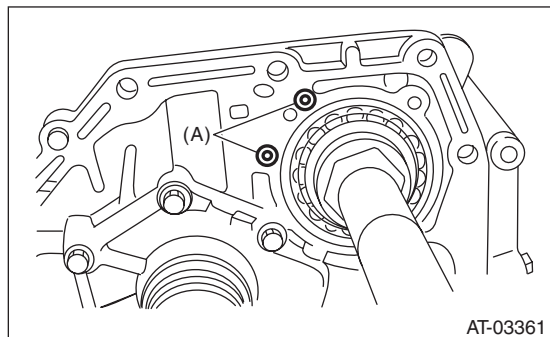
1) Apply ATF to two new oil seals and install them to the oil seal retainer in the proper direction using the ST.

ST 499247300 INSTALLER



- (A) Oil seal
- (B) Oil seal retainer

2) Apply ATF to a new O-ring and attach to the oil seal retainer. Install the seal to the oil pump housing bore.

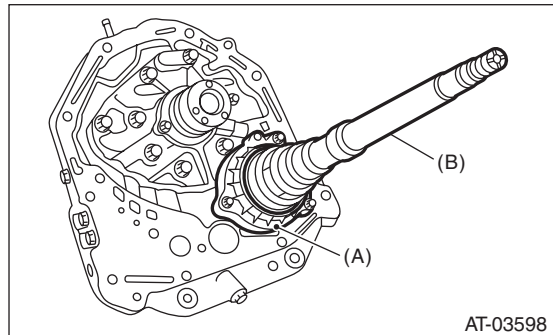


- (A) O-ring

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, 5.2 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.

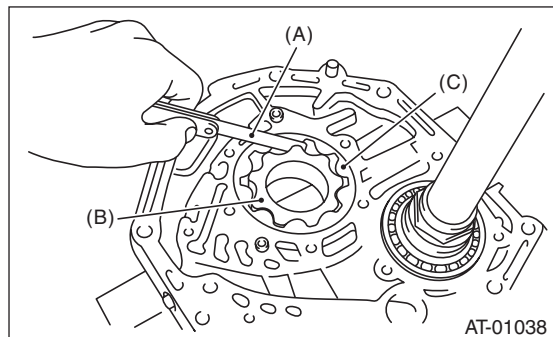
3) Oil pump rotor assembly selection

(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)



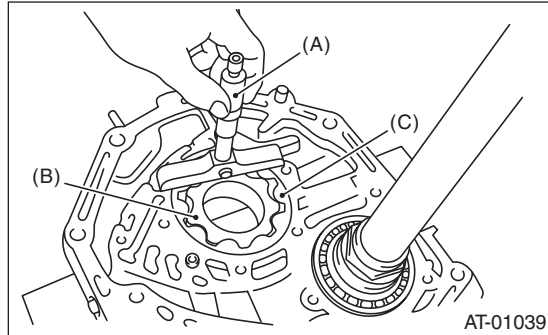
- (A) Thickness gauge
- (B) Inner rotor
- (C) Outer rotor

(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 side clearance are out of specification, replace the oil pump rotor assembly.

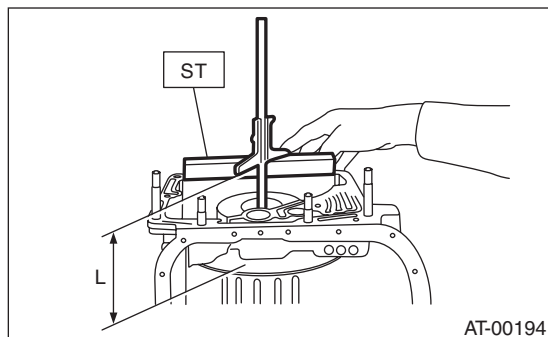
Oil pump rotor assembly	
Part No.	Length mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

Check the total end play and adjust it to be within specifications. <Ref. to 4AT-83, 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.

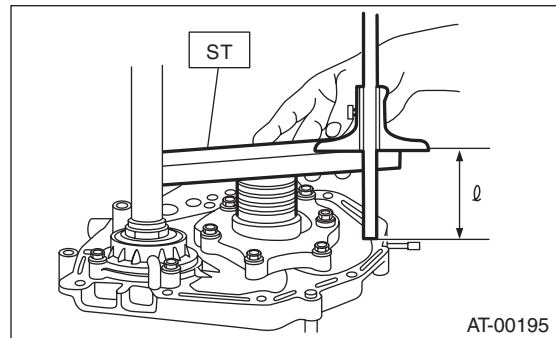
ST 398643600 GAUGE



L Measured value

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

ST 398643600 GAUGE



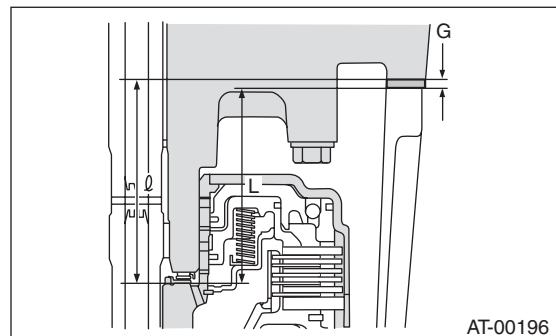
ℓ Measured value

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).

$$C = (L + G) - \ell$$

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 oil pump housing mating surface to the upper surface of the oil pump cover with the thrust needle bearing.



Thrust needle bearing	
Part No.	Length 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)

Oil Pump Housing

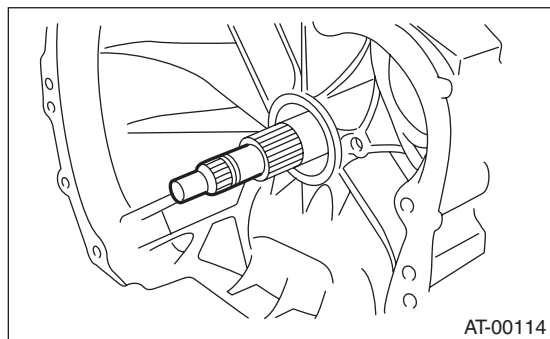
AUTOMATIC TRANSMISSION

- 4) After completing the total end play adjustment, insert the bearing race into the high clutch race. Apply vaseline, and 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.

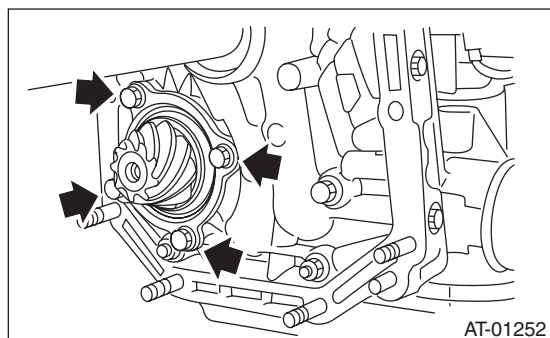
32. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-63, REMOVAL, Torque Converter Clutch 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. <Ref. to 4AT-61, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charge pipe. <Ref. to 4AT-62, REMOVAL, Oil Charge Pipe.>
- 8) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-59, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the converter case and transmission case. <Ref. to 4AT-77, REMOVAL, Converter Case.>
- 10) Separate the transmission case and extension case section. <Ref. to 4AT-65, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. <Ref. to 4AT-74, REMOVAL, Reduction Drive Gear.>
- 12) Remove the reduction driven gear. <Ref. to 4AT-72, REMOVAL, Reduction Driven Gear.>
- 13) Remove the drive pinion shaft mounting bolt and remove the drive shaft assembly from oil pump housing.



B: INSTALLATION

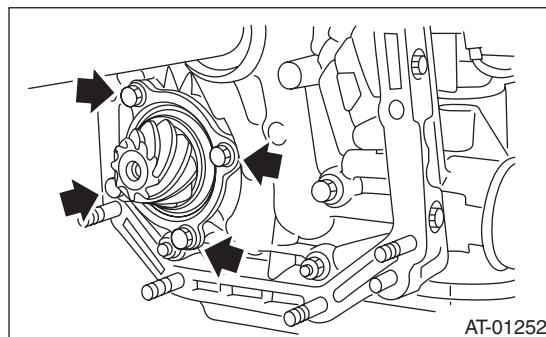
- 1) Assemble the drive pinion shaft assembly to the oil pump housing.

NOTE:

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

Tightening torque:

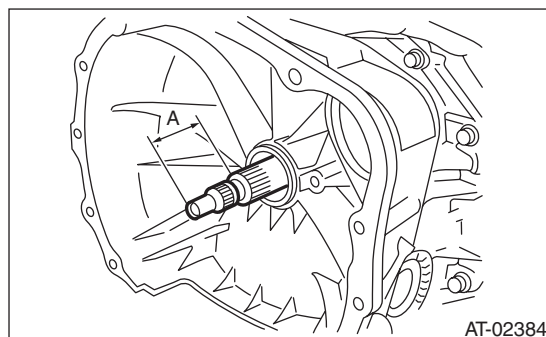
40 N·m (4.1 kgf-m, 29.5 ft-lb)



- 2) Join the converter case with the transmission case. <Ref. to 4AT-77, INSTALLATION, Converter Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-72, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. <Ref. to 4AT-74, INSTALLATION, Reduction Drive Gear.>
- 5) Connect the transmission case with the extension case. <Ref. to 4AT-65, INSTALLATION, Extension Case.>
- 6) Insert the inhibitor switch connector and transmission harness connector onto the stay.
- 7) Install the air breather hose. <Ref. to 4AT-61, INSTALLATION, Air Breather Hose.>
- 8) Install the ATF inlet and outlet pipes. <Ref. to 4AT-59, INSTALLATION, ATF Cooler Pipe and Hose.>
- 9) Install the oil charge pipe with O-ring.
- 10) 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)



A Measured value

Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

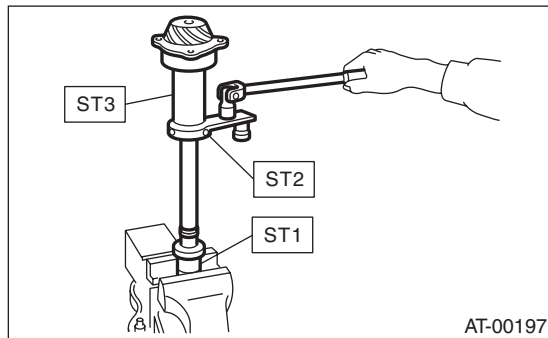
11) Install the torque converter clutch assembly.
<Ref. to 4AT-63, INSTALLATION, Torque Converter Clutch Assembly.>

12) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

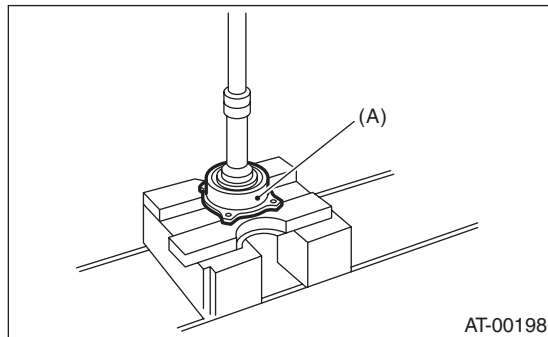
1) Flatten the lock nut tab, and then remove the lock nut while holding the rear spline part of the drive pinion shaft using ST1 and ST2. Pull out the drive pinion collar.

ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER



2) Remove the O-ring.

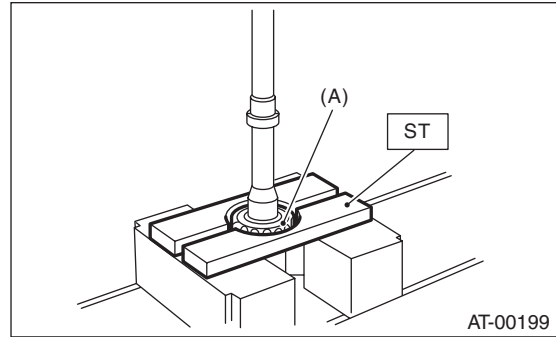
3) Separate the rear roller bearing and outer race from the drive pinion shaft using a press.



(A) Outer race

4) Separate the front roller bearing from the drive pinion shaft using a press and the ST.

ST 498517000 REPLACER

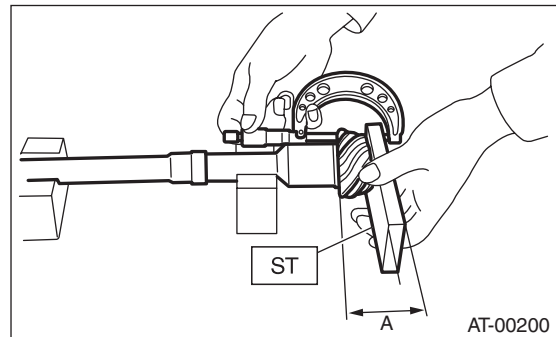


(A) Front roller bearing

D: ASSEMBLY

1) Measure the dimension "A" of drive pinion shaft.

ST 398643600 GAUGE

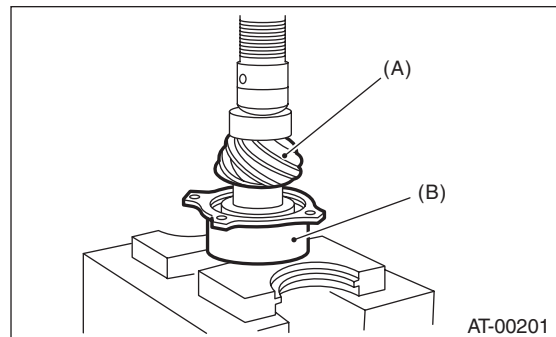


A Measured value

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

CAUTION:

Damage may result if too much force is applied to the roller bearing.



(A) Drive pinion shaft

(B) Roller bearing

3) After applying ATF to a new O-ring and attaching it to the drive pinion shaft, attach the drive pinion collar to the drive pinion shaft.

4) Install the lock washer to drive pinion shaft in the proper direction.

5) Tighten a new lock nut using the ST.
Calculate the lock washer and lock nut specifications using following formula.

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

T1: 116 N·m (11.8 kgf·m, 85.6 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST2 length 0.072 m (2.83 in)

L2: Torque wrench length

Example:

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

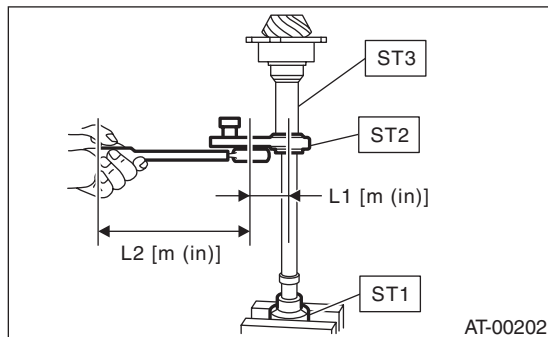
ST1 498937110 HOLDER

ST2 499787700 WRENCH

ST3 499787500 ADAPTER

NOTE:

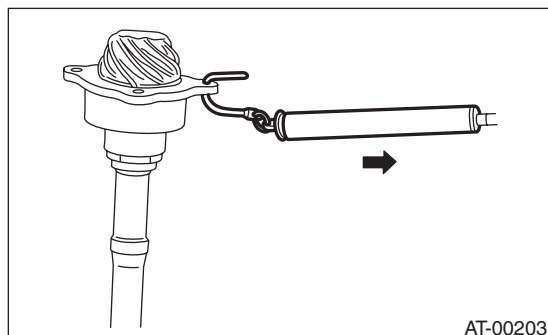
Attach ST2 to torque wrench as straight as possible.



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:

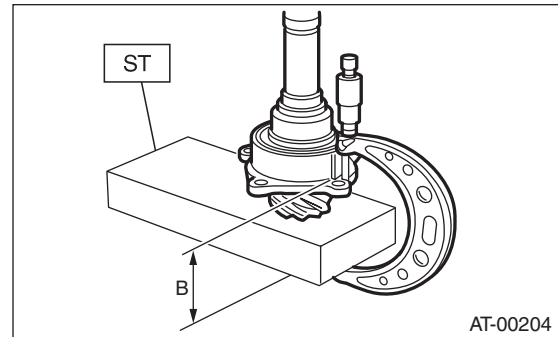
7.6 — 38.1 N (0.775 — 3.88 kgf, 1.7 — 8.6 lb)



7) Crimp the locknut in 2 locations.

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

ST 398643600 GAUGE



B Measured value

9) Calculate the thickness “t” mm (in) of the drive pinion shim.

$$t = 6.5 \pm 0.0625 (0.256 \pm 0.0025) - (B - A)$$

10) Select three or less shims from following table.

Drive pinion shim	
Part No.	Length 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-88, ADJUSTMENT, Drive Pinion Shaft Assembly.>

Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

F: ADJUSTMENT

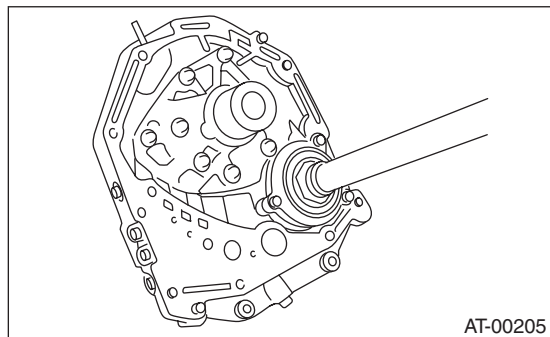
- 1) Remove the liquid gasket from the mating surface completely.
- 2) Install the oil pump housing assembly to the converter case, and secure them by tightening the four bolts evenly.

NOTE:

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

Tightening torque:

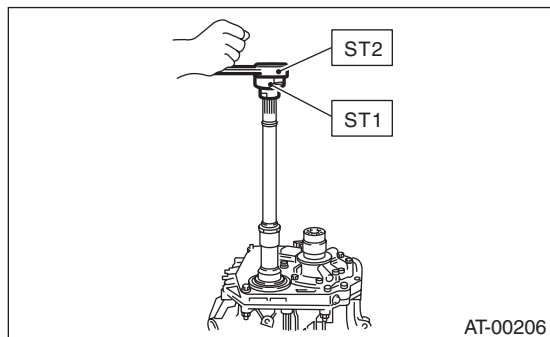
41 N·m (4.2 kgf-m, 30.2 ft-lb)



- 3) Rotate the drive pinion a few times using ST1 and ST2.

ST1 498937110 HOLDER

ST2 499787700 WRENCH



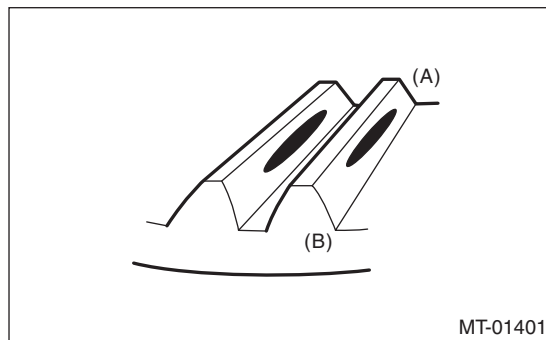
- 4) Adjust the drive pinion and hypoid driven gear backlash. <Ref. to 4AT-95, ADJUSTMENT, Front Differential Assembly.>

- 5) Apply lead-free red dye evenly on the surface of three to four teeth of the hypoid 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-95, 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.)



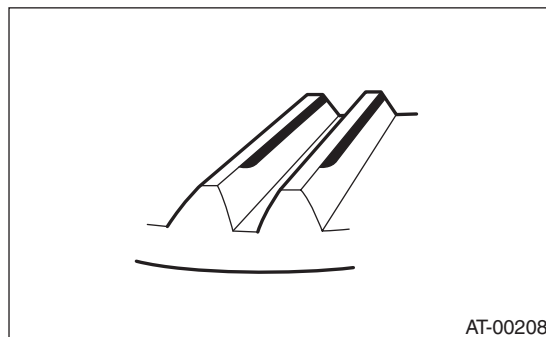
(A) Toe side

(B) Heel side

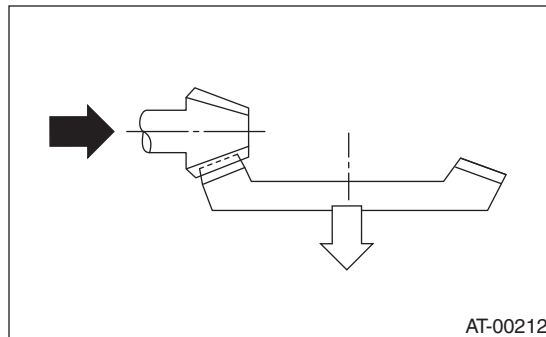
- Face contact

Check item: Backlash is too large.

Contact pattern



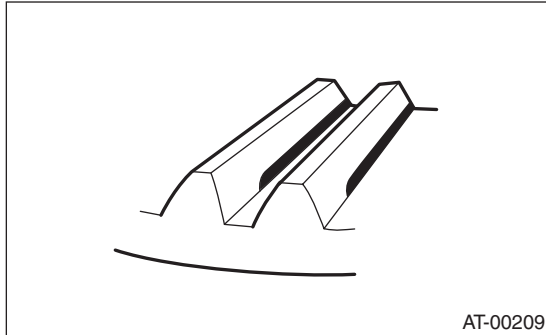
Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



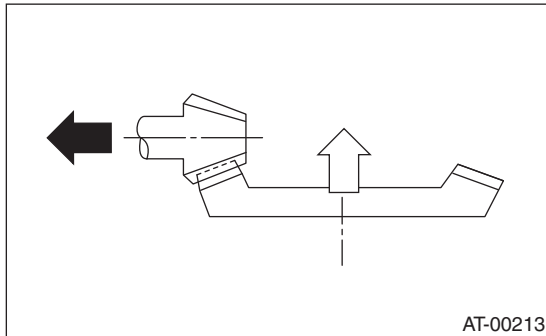
- Flank contact

Check item: Backlash is too small.

Contact pattern



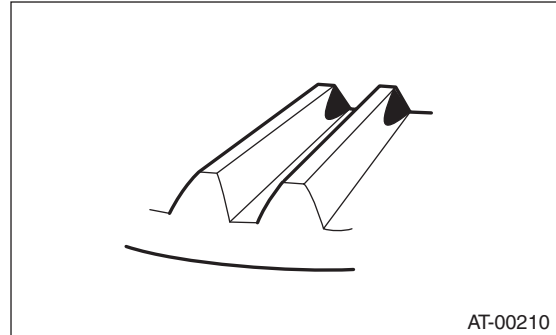
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



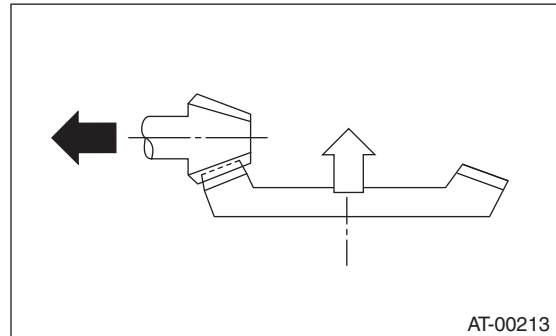
- Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



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



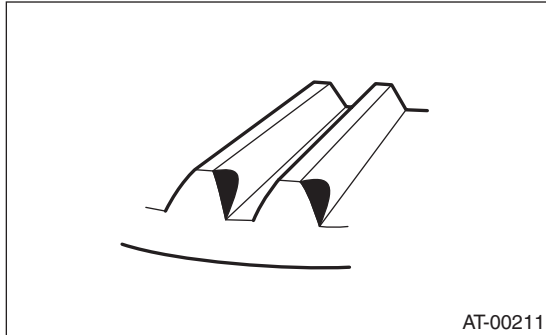
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

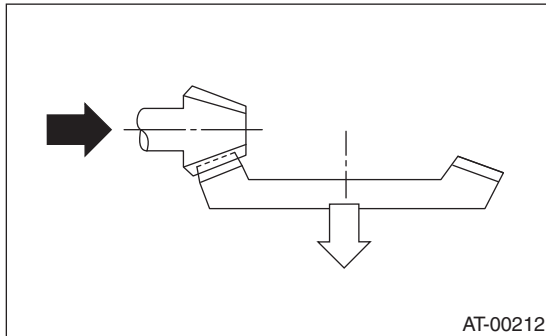
- Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern



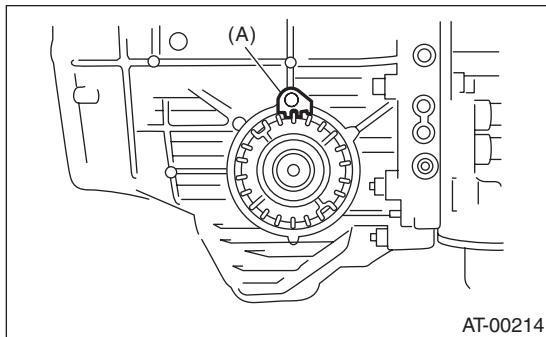
Corrective action: Increase the thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion closer to the hypoid driven gear.



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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

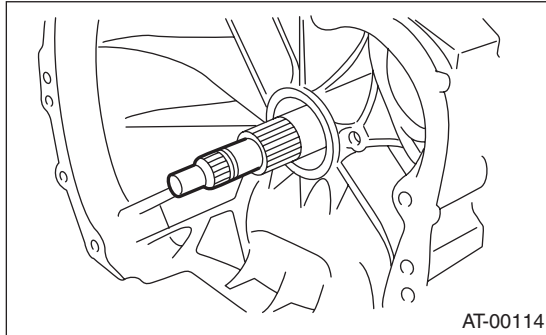


(A) Lock plate

33.Front Differential Assembly

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-63, REMOVAL, Torque Converter Clutch 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-62, REMOVAL, Oil Charge Pipe.>
 - 7) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-59, REMOVAL, ATF Cooler Pipe and Hose.>
 - 8) Separate the converter case from the transmission case. <Ref. to 4AT-77, REMOVAL, Converter Case.>
 - 9) Remove the seal pipe.
 - 10) Remove the differential side retainers using ST.
- ST 18630AA010 WRENCH COMPL RETAINER

NOTE:

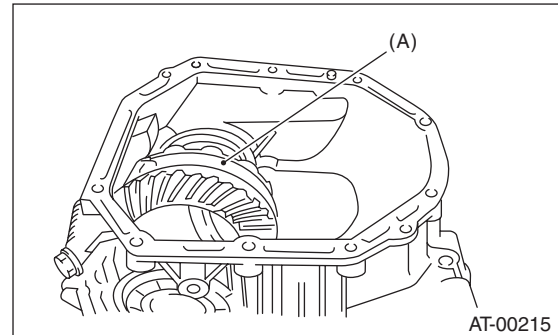
- ST WRENCH ASSY (499787000) can also be used.
 - Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.
- 11) Remove the front differential assembly while being careful not to damage the attachment part of the retainer.

B: INSTALLATION

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

NOTE:

Be careful not to damage the inside of the converter case (especially the mating surface of the differential side retainer).



(A) Front differential ASSY

- 2) Install the O-ring to left and right side differential retainers.
- 3) Install the differential side retainers using ST.

<Ref. to 4AT-95, ADJUSTMENT, Front Differential Assembly.>

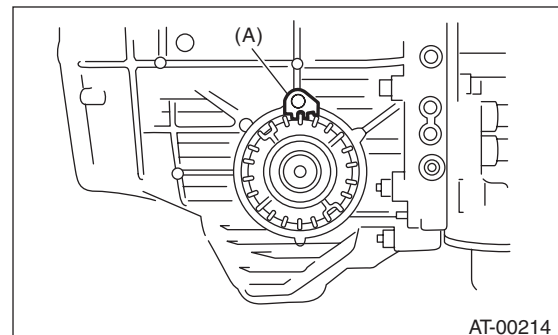
ST 18630AA010 WRENCH COMPL RETAINER

NOTE:

- ST WRENCH ASSY (499787000) can also be used.
- 4) Adjust the backlash of the front differential. <Ref. to 4AT-95, ADJUSTMENT, Front Differential Assembly.>
 - 5) Install the lock plate.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

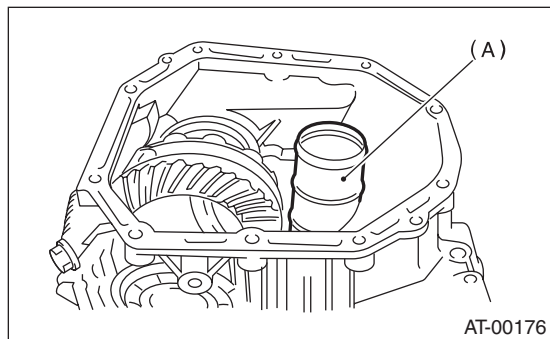


(A) Lock plate

Front Differential Assembly

AUTOMATIC TRANSMISSION

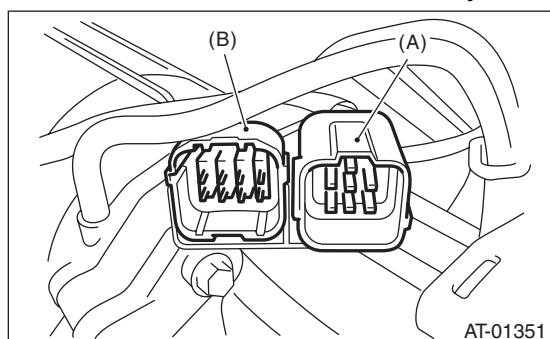
6) Install new seal pipe to converter case.



(A) Seal pipe

7) Install the converter case to the transmission case. <Ref. to 4AT-77, INSTALLATION, Converter Case.>

8) Insert the inhibitor switch connector and transmission harness connector onto the stay.



(A) Transmission harness connectors

(B) Inhibitor switch connector

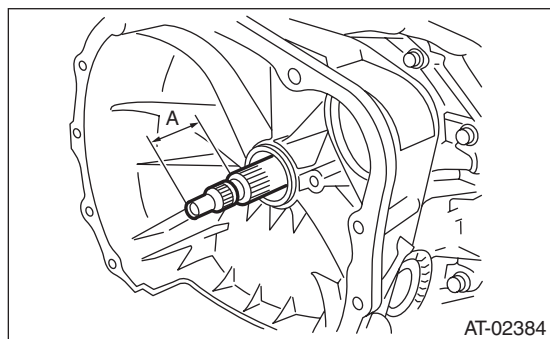
9) Install the ATF cooler pipe. <Ref. to 4AT-59, INSTALLATION, ATF Cooler Pipe and Hose.>

10) Install the oil charge pipe together with an O-ring. <Ref. to 4AT-62, 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)



A Measured value

12) Install the torque converter clutch assembly. <Ref. to 4AT-63, INSTALLATION, Torque Converter Clutch Assembly.>

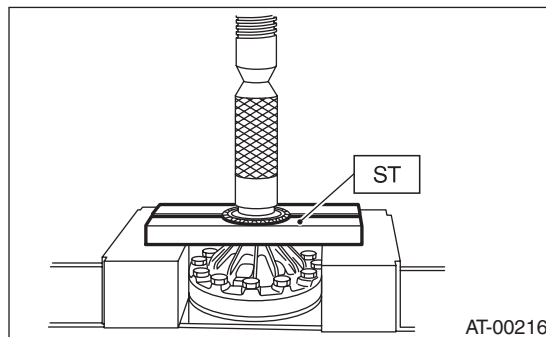
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

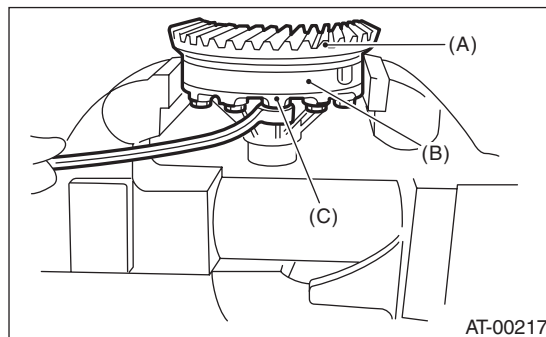
1. DIFFERENTIAL CASE ASSEMBLY

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

ST 498077000 REMOVER



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

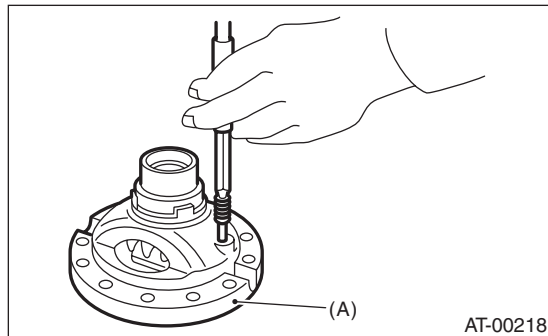


(A) Hypoid driven gear

(B) Differential case (RH)

(C) Differential case (LH)

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



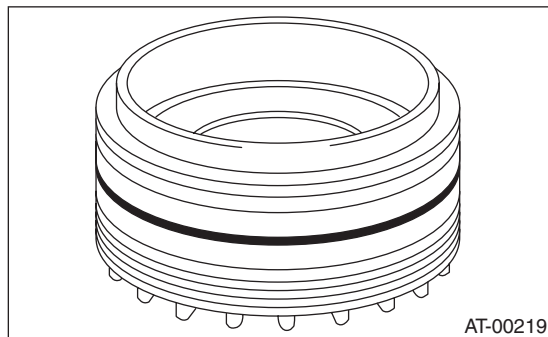
(A) Differential case (RH)

2. SIDE RETAINER

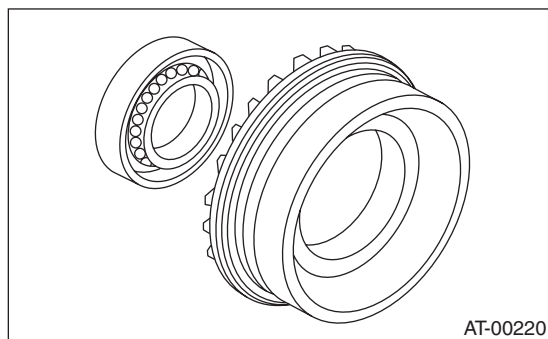
NOTE:

After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

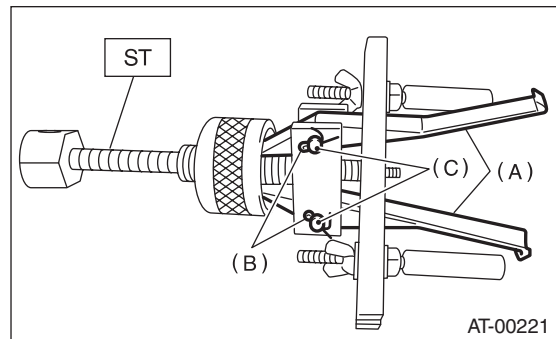
1) Remove the O-ring.



2) Remove the oil seal.



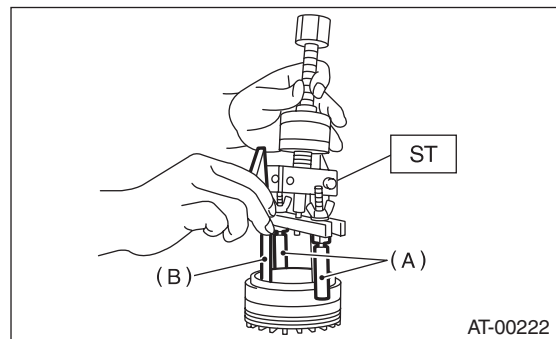
3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER ASSY



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

4) Attach two claws to the outer race, and set the ST to the differential 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.

Front Differential Assembly

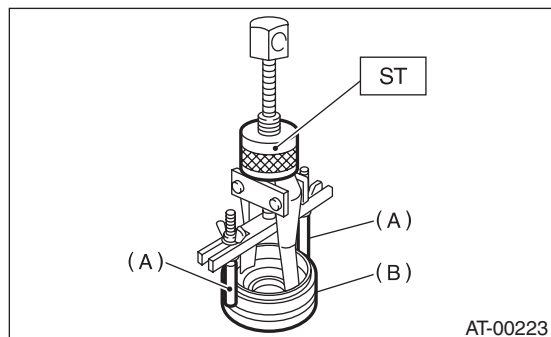
AUTOMATIC TRANSMISSION

6) Hold the shaft of ST to avoid detachment from the differential side retainer, and remove the bearing outer race.

ST 398527700 PULLER ASSY

NOTE:

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

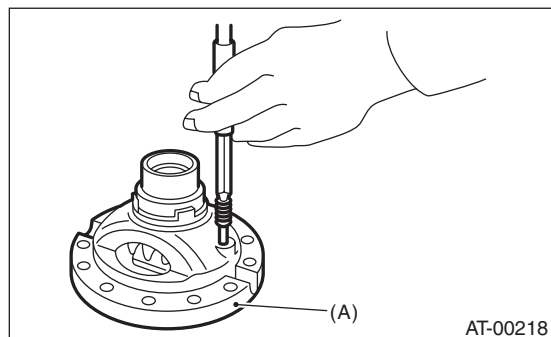


- (A) Shaft
(B) Side retainer

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.

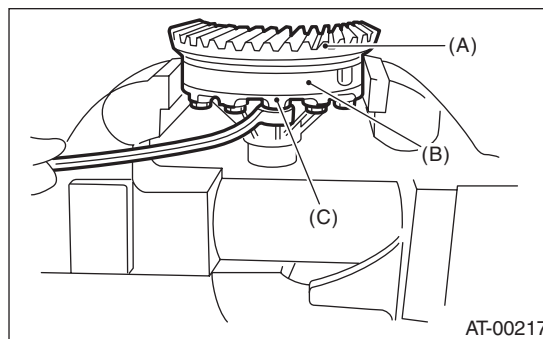


- (A) Differential case (RH)

- 3) Install the washer and differential bevel gear to differential case (LH). Put the case on the differential case (RH), 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, 45.7 ft-lb)



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

- 5) Measurement of backlash (Selection of washer)
 - (1) Install the SUBARU genuine axle shaft to differential case.

Part No. 38415AA070 AXLE SHAFT

- (2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 through the access window of case.

ST1 498247001 MAGNET BASE

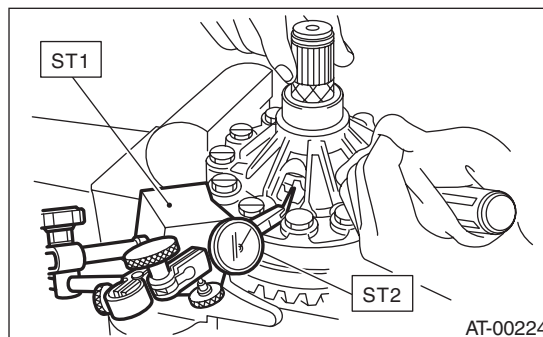
ST2 498247100 DIAL GAUGE

NOTE:

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

Specification:

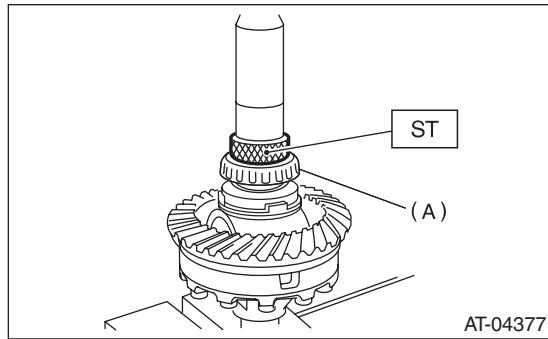
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

Washer	
Part No.	Length 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 INSTALLER



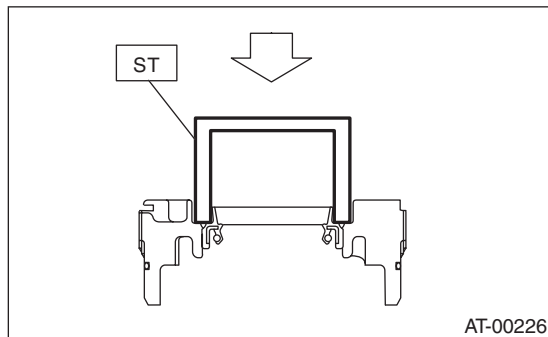
(A) Taper roller bearing

2. SIDE RETAINER

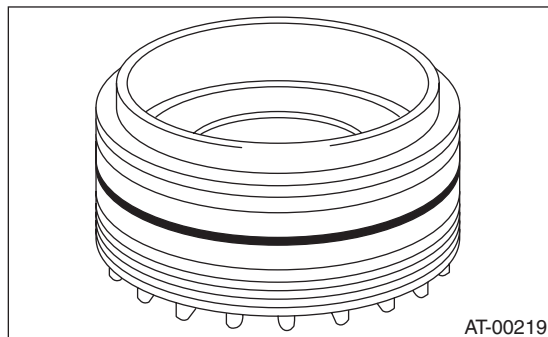
- 1) Install the bearing outer race to the differential side retainer.

- 2) Install a new oil seal using the ST and a hammer.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



- 3) Apply differential 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-95, ADJUSTMENT, Front Differential Assembly.>

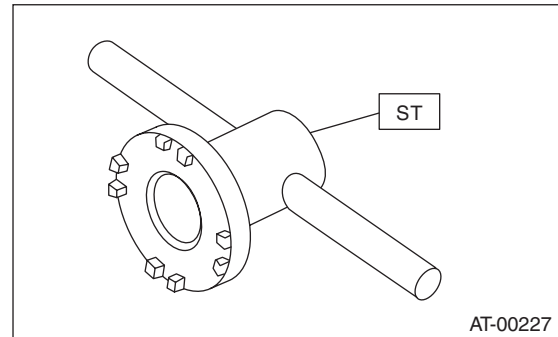
F: ADJUSTMENT

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

ST 18630AA010 WRENCH COMPL RETAINER

NOTE:

- Screw-in the RH side slightly deeper than the LH side.
- ST WRENCH ASSY (499787000) can also be used.



- 2) Remove the oil pump housing.

- 3) Remove the liquid gasket from the mating surface completely.

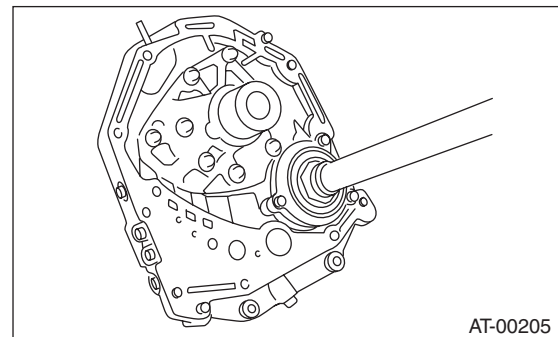
- 4) Install the oil pump housing assembly to the converter case, and secure them by tightening the four bolts evenly.

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, 30.2 ft-lb)



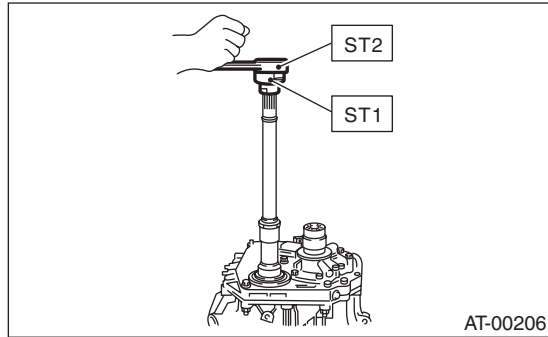
Front Differential Assembly

AUTOMATIC TRANSMISSION

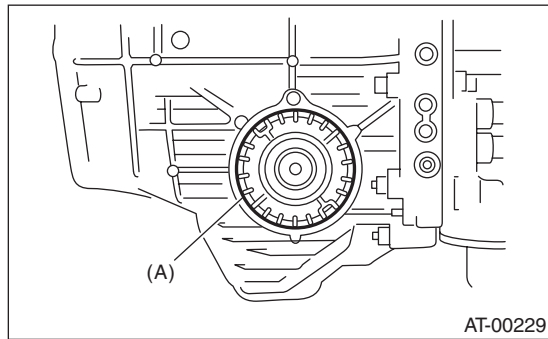
5) Rotate the drive pinion a few times using ST1 and ST2.

ST1 498937110 HOLDER

ST2 499787700 WRENCH

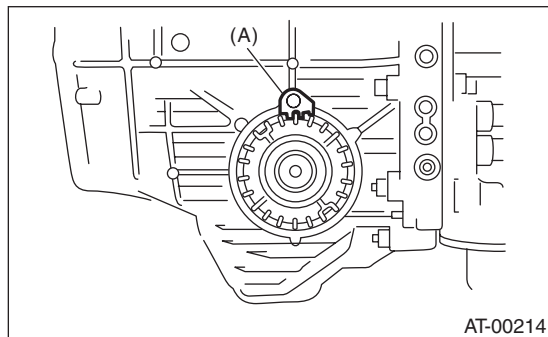


6) Tighten the LH differential side retainer by rotating the shaft until resistance is felt. Then loosen the RH side differential side retainer. Tighten the LH differential side retainer until the pinion shaft no longer turns, and continue to loosen the RH side. This is the “zero” state.



(A) Differential side retainer

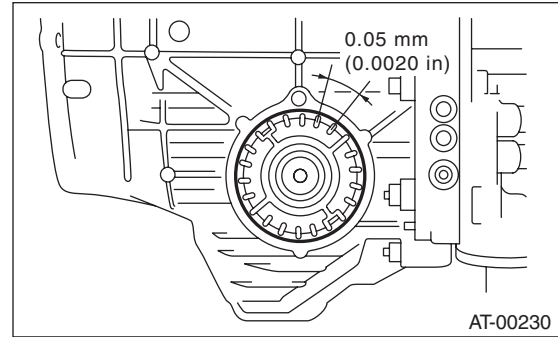
7) After reaching the “zero” state, loosen the LH differential side retainer by 3 notches and secure it with the lock plate. Then after returning the RH differential side retainer, retighten until it stops. Rotate the drive pinion 2 or 3 times. Tighten the RH differential side retainer further by 1-3/4 notches. This sets the preload. Finally, secure the differential side retainer with the lock plate.



(A) Lock plate

NOTE:

Turning the differential side retainer by one notch changes the backlash approx. 0.05 mm (0.0020 in).



8) Install the Subaru genuine axle shafts to the right and left sides of the front differential.

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

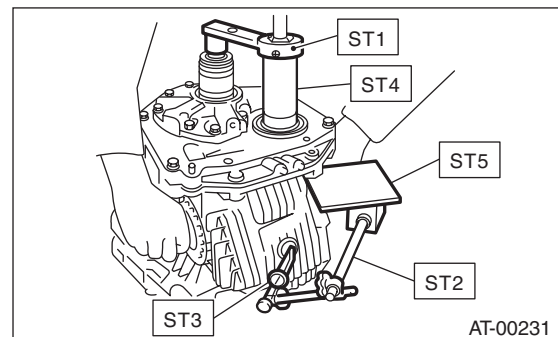
ST3 498247100 DIAL GAUGE

ST4 499787500 ADAPTER

ST5 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

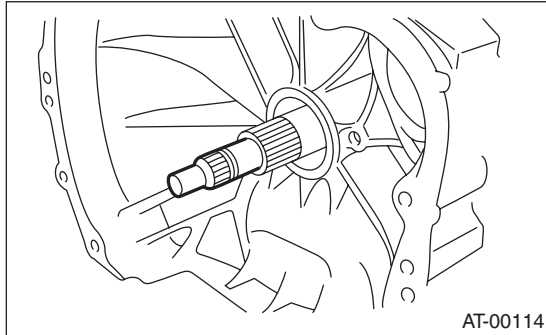


10) Adjust the teeth contact of the front differential and drive pinion shaft. <Ref. to 4AT-88, ADJUSTMENT, Drive Pinion Shaft Assembly.>

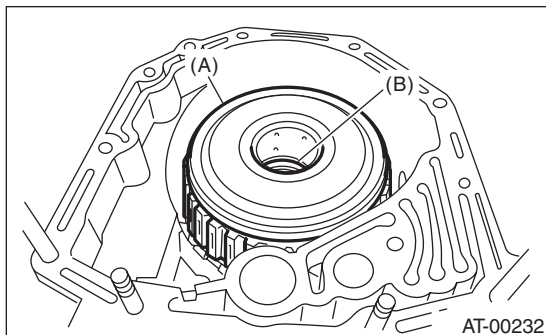
34.AT Main Case

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-63, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

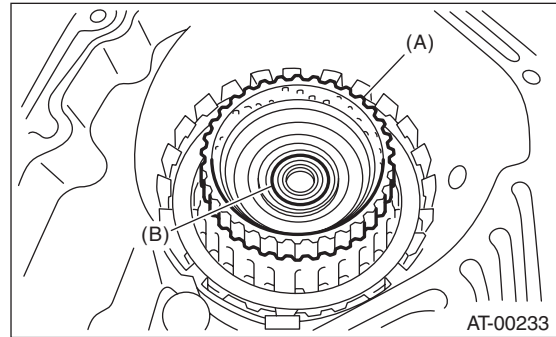


- 4) Lift up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
- 5) Disconnect the inhibitor switch connector from the stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charge pipe. <Ref. to 4AT-62, REMOVAL, Oil Charge Pipe.>
- 8) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-59, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the converter case from the transmission case. <Ref. to 4AT-77, REMOVAL, Converter Case.>
- 10) Remove the oil pump housing. <Ref. to 4AT-79, REMOVAL, Oil Pump Housing.>
- 11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



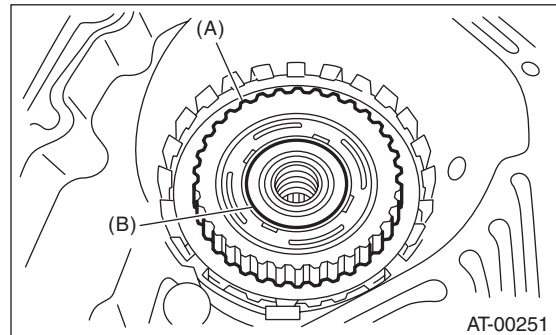
- (A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing

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



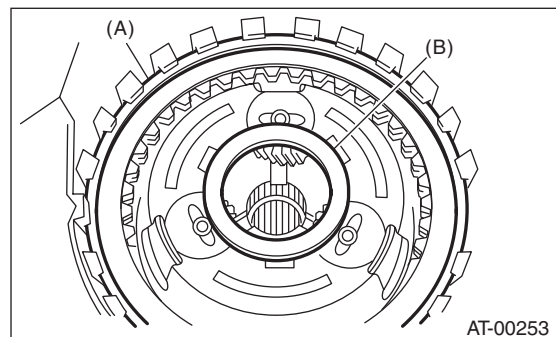
- (A) High clutch hub
(B) Thrust needle bearing

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



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

- 14) Remove the snap ring and thrust needle bearing.

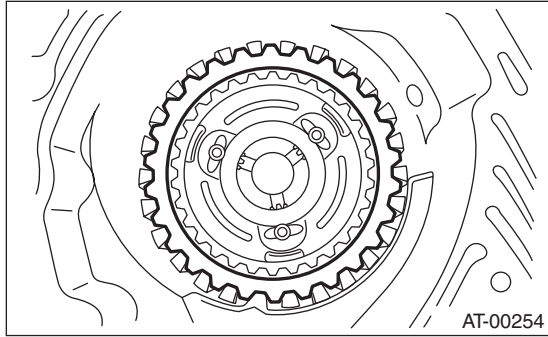


- (A) Snap ring
(B) Thrust needle bearing

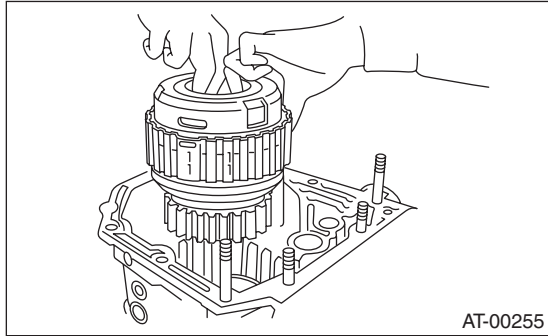
AT Main Case

AUTOMATIC TRANSMISSION

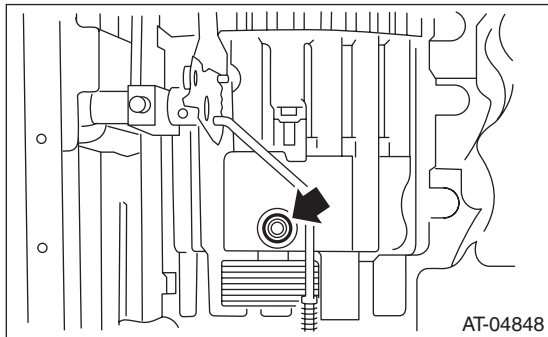
15) Take out the retaining plate, drive plate and driven plate of the 2-4 brake.



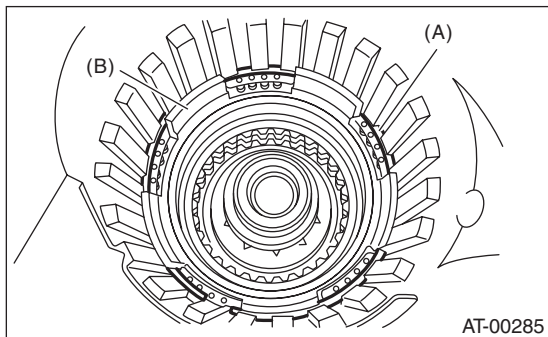
16) Take out the thrust needle bearing, planetary gear assembly and low clutch assembly.



17) Remove the 2-4 brake seal.

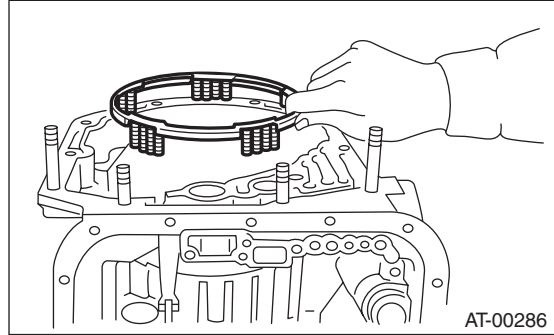


18) Remove the snap ring.

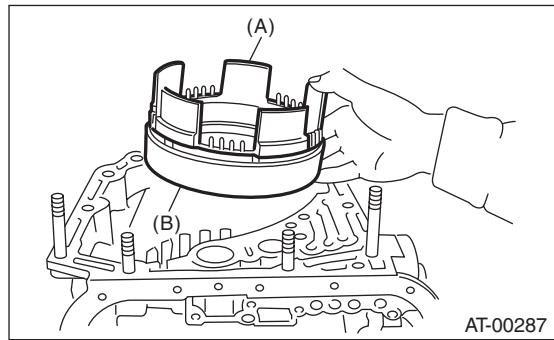


- (A) Snap ring
- (B) 2-4 brake piston

19) Take out the 2-4 brake spring retainer.

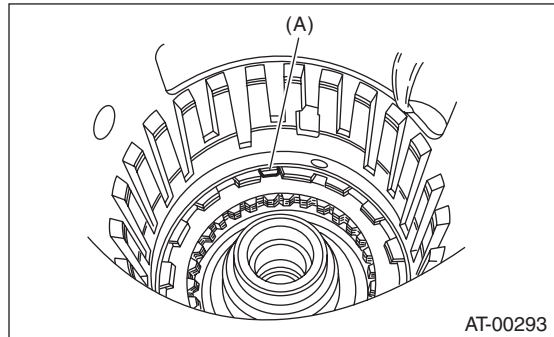


20) Remove the 2-4 brake piston and 2-4 brake piston retainer while taking care not to damage them.



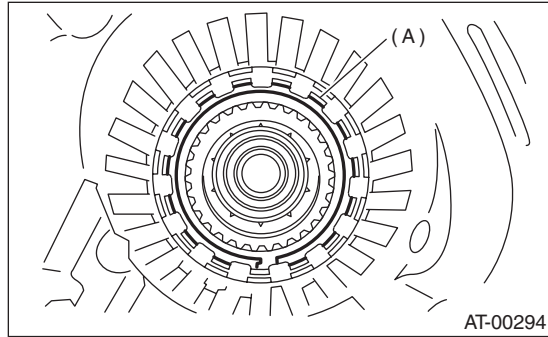
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

21) Pull out the leaf spring of the low & reverse brake while being careful not to bend it.



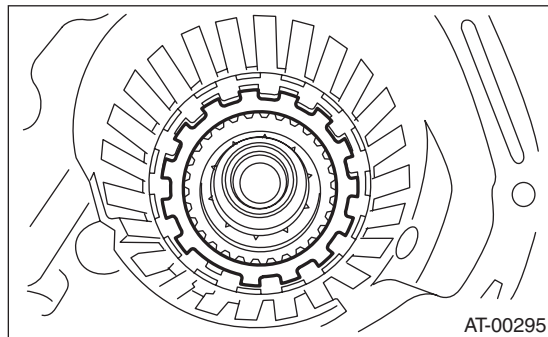
- (A) Leaf spring

22) Remove the snap ring.

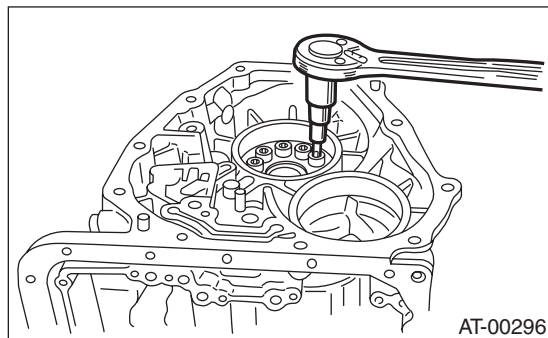


(A) Snap ring

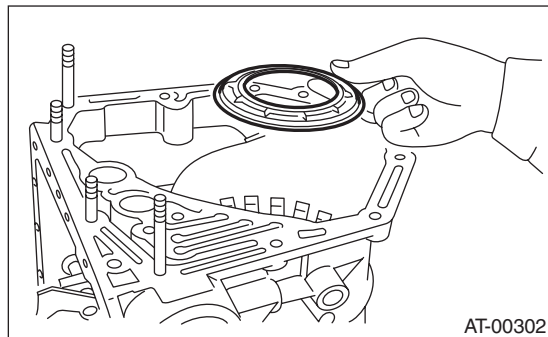
23) Take out the retaining plate, drive plate, driven plate and dish plate of the low & reverse brake.



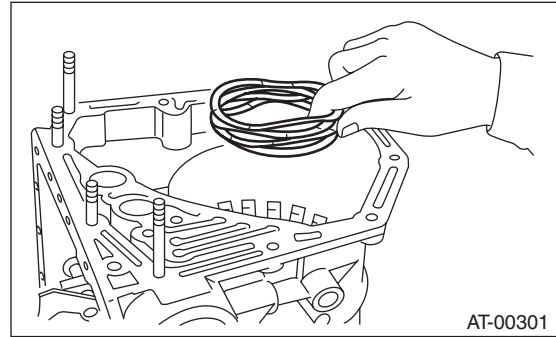
24) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race by hand.



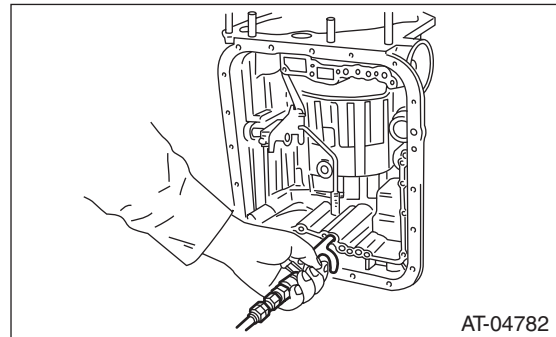
25) Remove the spring retainer.



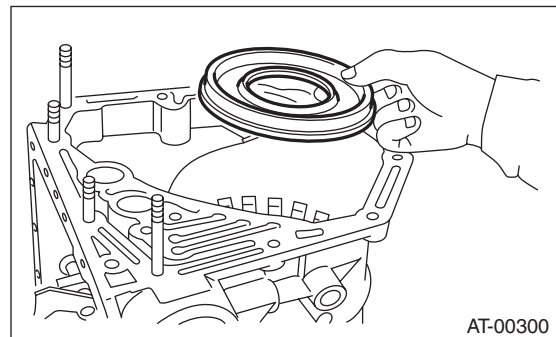
26) Take out the return spring.



27) Apply compressed air.



28) Take out the low & reverse brake piston.

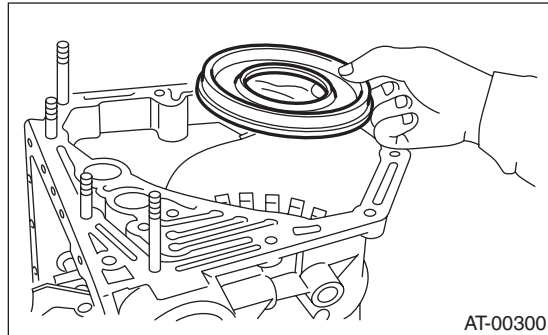


B: INSTALLATION

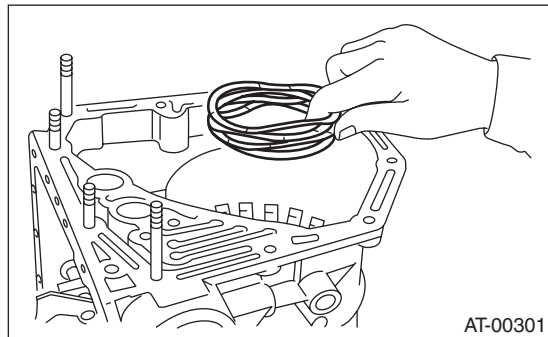
- 1) Apply ATF to the lip, and install the low & reverse brake piston.

NOTE:

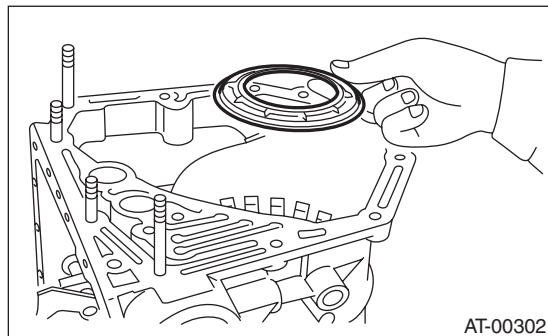
Take care not to damage the lip seal.



- 2) Install the return spring.



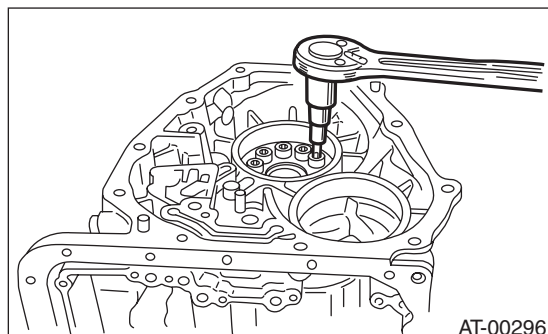
- 3) Install the spring retainer.



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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 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 dial gauge to retaining plate, and read its scale.

NOTE:

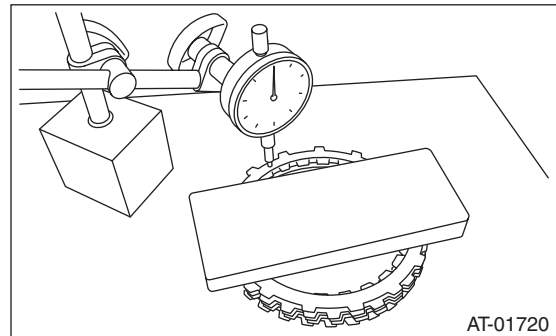
The value, which is read in the gauge at this time, is zero point.

- 10) Scale and record the weight "Z" of the flat board that will be placed on the 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 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".

$$N = 83 \text{ N (8.5 kgf, 18.7 lb)} - Z$$

N: Value indicated on push/pull gauge

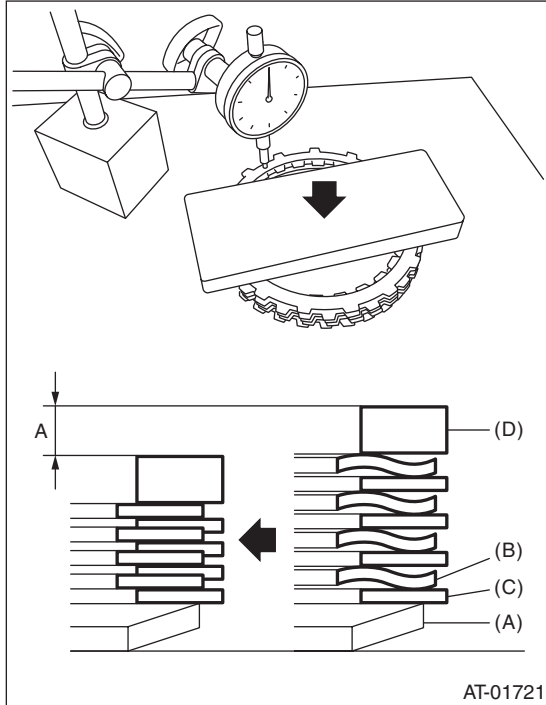
83 N (8.5 kgf, 18.7 lb) : Load applied to clutch plate

Z: Flat board weight

13) Press the center of retaining plate with a force of N using a push/pull gauge, and measure and record 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°.



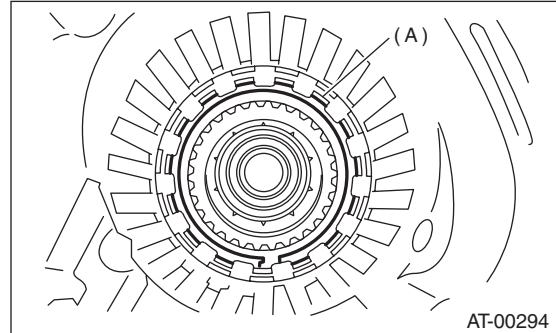
A Measured value

- (A) Dish plate
- (B) Drive plate
- (C) Driven 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.

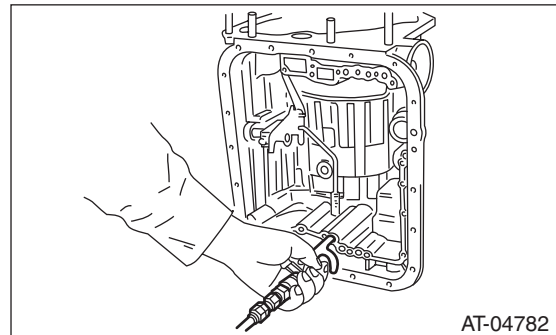
NOTE:

Pay attention to the orientation of the dish plate.



(A) Snap ring

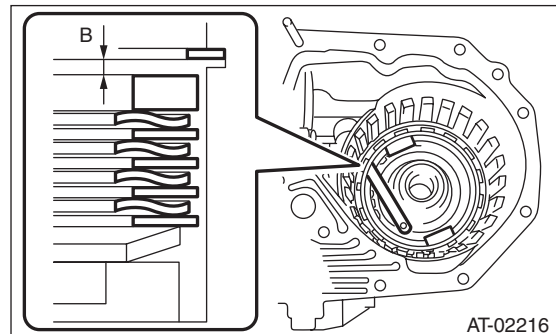
15) Apply compressed air intermittently to check for operation.



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.



B Measured value

AT Main Case

AUTOMATIC TRANSMISSION

17) Piston stroke calculation

Calculate from the recorded dimension A and B, and if the service limit is exceeded, replace the drive plate with a new part, and select a retaining plate to make an adjustment so that it is within standard.

$$T = A + B$$

T: Piston stroke

A: Amount of drive plate compression

B: Clearance between retaining plate and snap ring

Initial standard:

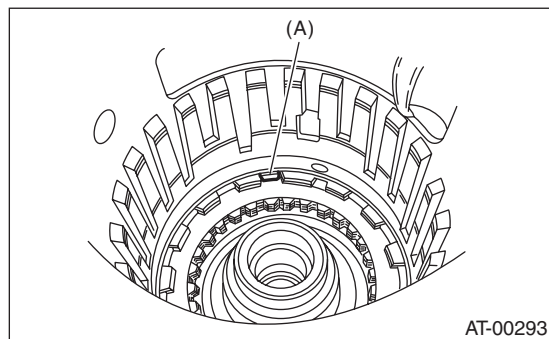
2.15 — 2.65 mm (0.085 — 0.104 in)

Limit thickness:

2.95 mm (0.116 in)

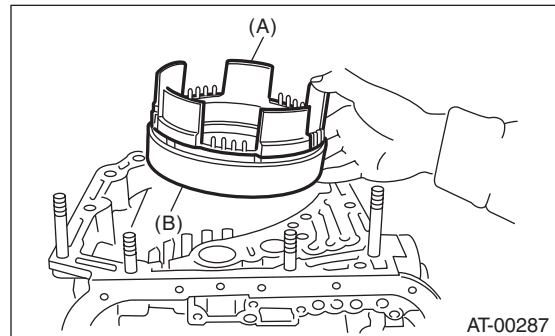
Retaining plate	
Part No.	Length mm (in)
31667AA420	3.8 (0.150)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

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



(A) Leaf spring

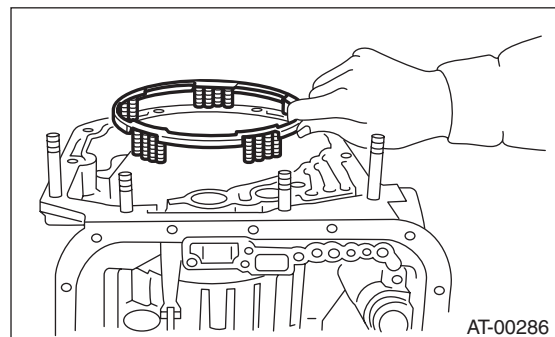
19) Install the 2-4 brake piston and 2-4 brake retainer by aligning the hole of the 2-4 brake retainer with the hole on the transmission case.



(A) 2-4 brake piston

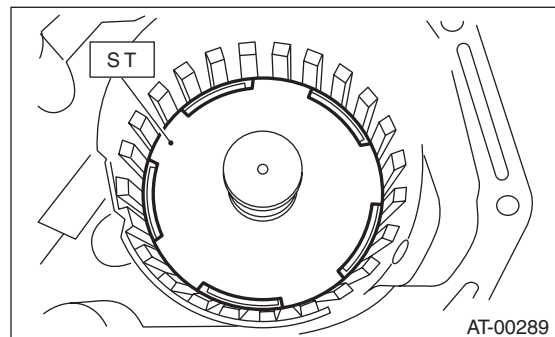
(B) 2-4 brake piston retainer

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



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

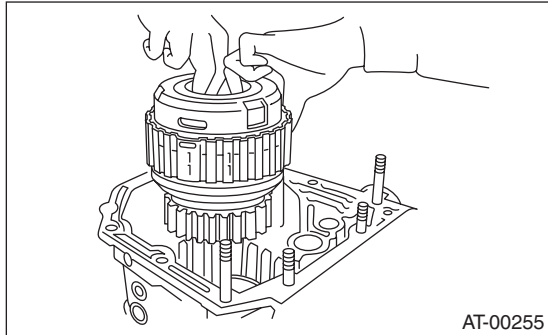
ST 498677100 COMPRESSOR



22) Install the planetary gear and low clutch assembly to the transmission case.

NOTE:

Install carefully while rotating the low clutch and planetary gear assembly slowly, being careful not to damage the seal ring.



23) Measure the amount of drive plate compression and record that value.

(1) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.

(2) Set the dial gauge to the clutch, and read its scale.

NOTE:

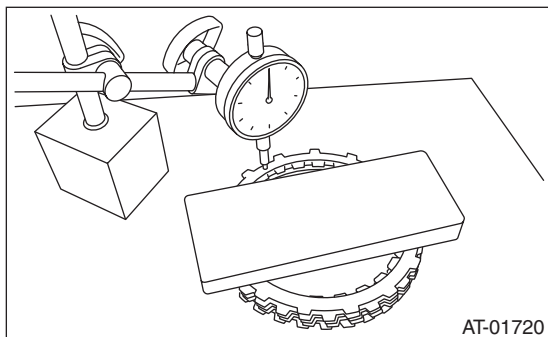
The value, which is read in the gauge at this time, is zero point.

(3) Scale and record the weight "Z" of the flat board that will be placed on the 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 10.2 kg (22.5 lb).

(4) Put the flat board on retaining plate.



(5) Using the following formula, read the push/pull gauge, and calculate "N".

$$N = 100 \text{ N (10.2 kgf, 22.5 lb)} - Z$$

N: Value indicated on push/pull gauge

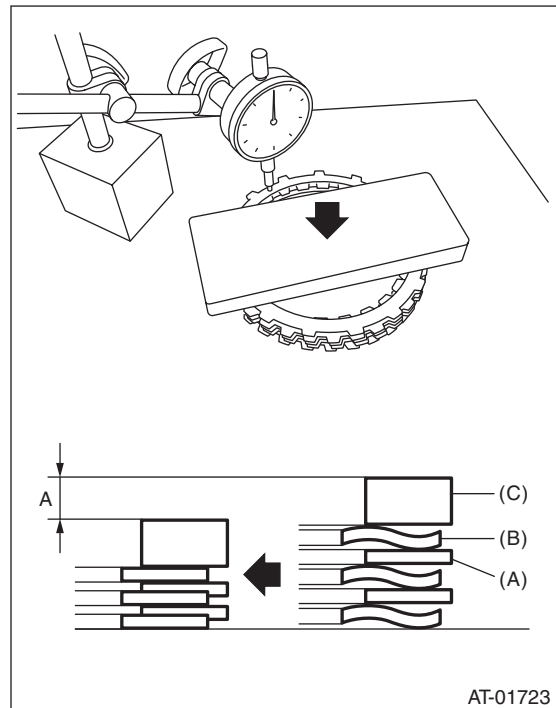
100 N (10.2 kgf, 22.5 lb) : Load applied to clutch plate

Z: Flat board weight

(6) Press the center of retaining plate with a force of N using a push/pull gauge, and measure and record 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°.



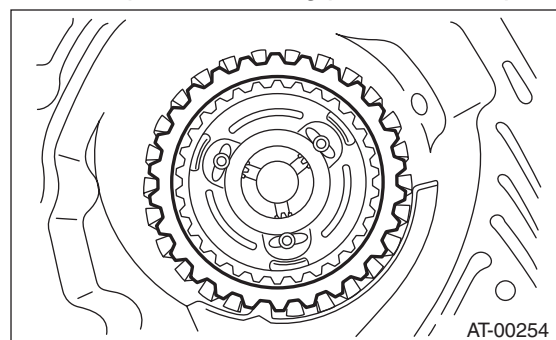
A Measured value

(A) Driven plate

(B) Drive plate

(C) Retaining plate

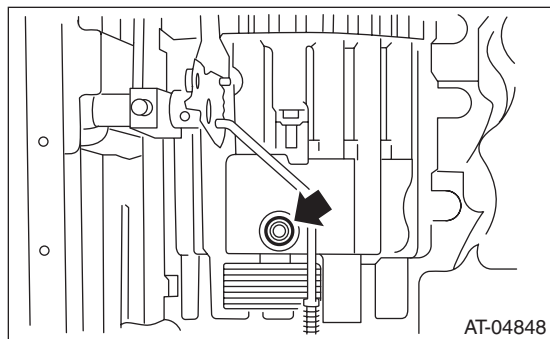
24) Install the pressure rear plate, 2-4 brake drive plate, driven plate, retaining plate and snap ring.



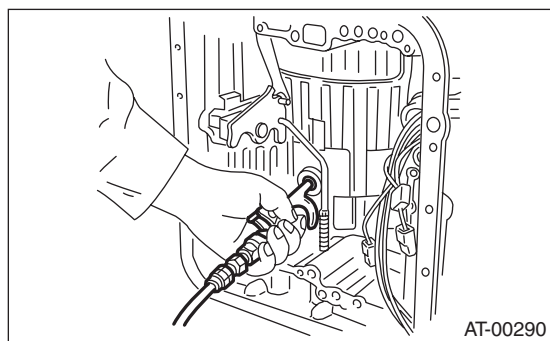
AT Main Case

AUTOMATIC TRANSMISSION

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



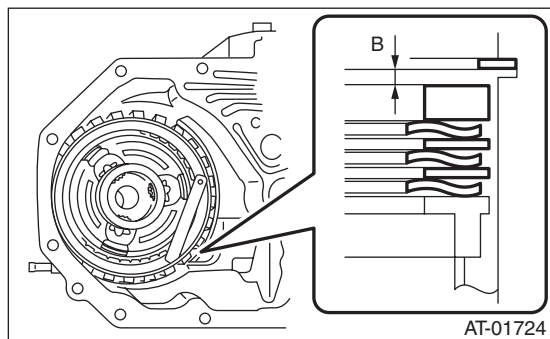
26) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.



27) Check the piston stroke.

(1) Measure clearance "B" between the retaining plate and snap ring.

At this time, do not press down the retaining plate.



B Measured value

(2) Piston stroke calculation

Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limits, replace the drive plate and select and adjust the retaining plate to be within standard values.

$$T = A + B$$

T: Piston stroke

A: Amount of drive plate compression

B: Clearance between retaining plate and snap ring

Initial standard:

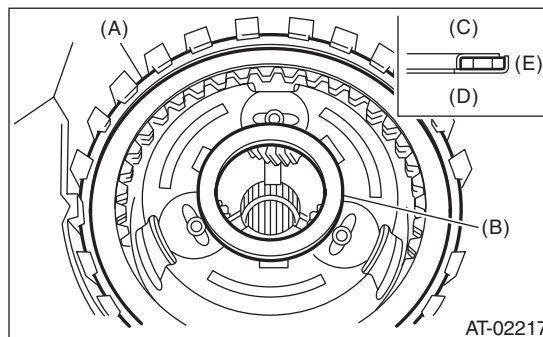
1.7 — 2.1 mm (0.067 — 0.083 in)

Limit thickness:

2.3 mm (0.091 in)

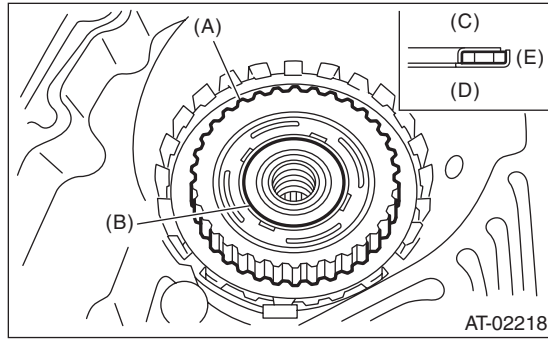
Retaining plate	
Part No.	Length mm (in)
31567AA991	5.6 (0.220)
31567AB001	5.8 (0.228)
31567AB011	6.0 (0.236)
31567AB021	6.2 (0.244)
31567AB031	6.4 (0.252)
31567AB041	6.6 (0.260)

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



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

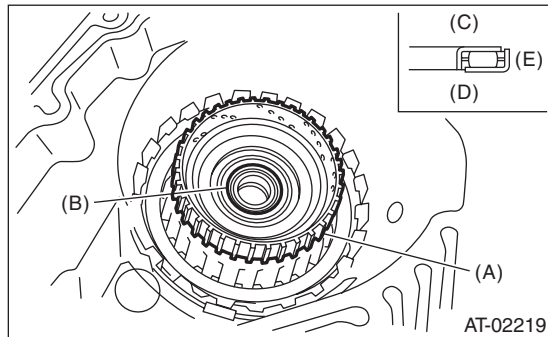
29) Install the front sun gear and the thrust needle bearing.



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

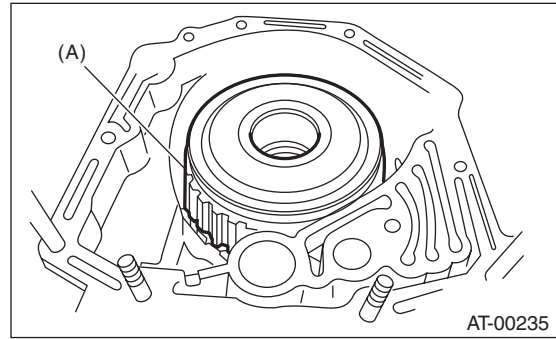
30) Apply vaseline, and attach the thrust needle bearing to the high clutch hub, then engage the splines of the front planetary carrier correctly to install the high clutch hub.

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



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

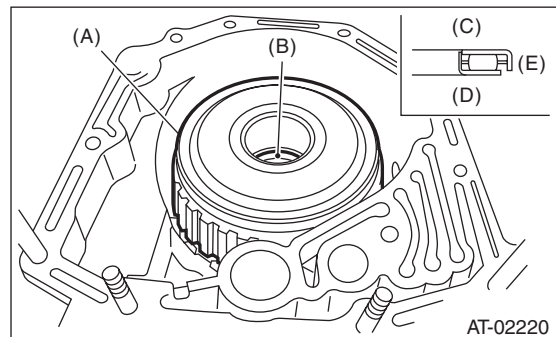
32) Install the high clutch assembly and reverse clutch assembly.



- (A) High clutch ASSY and reverse clutch ASSY

33) Adjust the total end play. <Ref. to 4AT-83, ADJUSTMENT, Oil Pump Housing.>

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

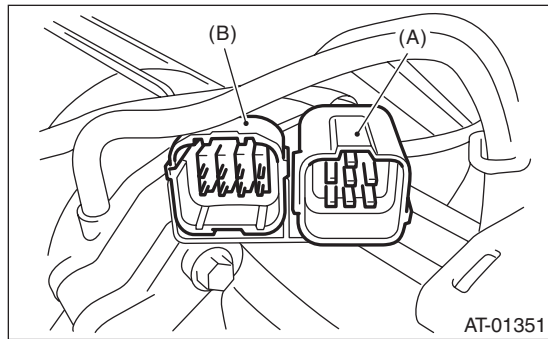


- (A) High clutch ASSY and reverse clutch ASSY
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

35) Install a new gasket along with the oil pump housing assembly. <Ref. to 4AT-79, INSTALLATION, Oil Pump Housing.>

36) Install the converter case to the transmission case assembly. <Ref. to 4AT-77, INSTALLATION, Converter Case.>

37) Insert the inhibitor switch connector and transmission harness connector onto the stay.



(A) Transmission harness connectors
(B) Inhibitor switch connector

38) Install the air breather hose. <Ref. to 4AT-61, INSTALLATION, Air Breather Hose.>

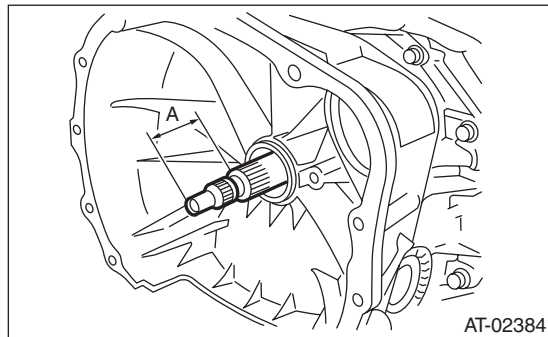
39) Install the ATF cooler pipe. <Ref. to 4AT-59, INSTALLATION, ATF Cooler Pipe and Hose.>

40) Install the oil charge pipe together with an O-ring. <Ref. to 4AT-62, INSTALLATION, Oil Charge Pipe.>

41) 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)



A Measured value

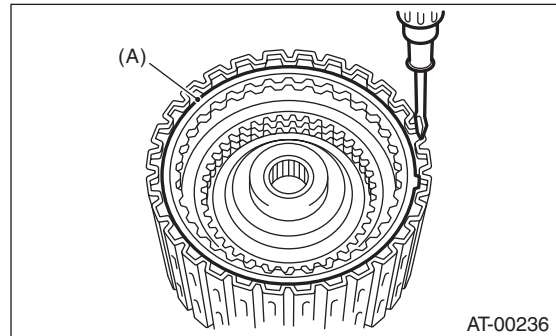
42) Install the torque converter clutch assembly. <Ref. to 4AT-63, INSTALLATION, Torque Converter Clutch Assembly.>

43) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

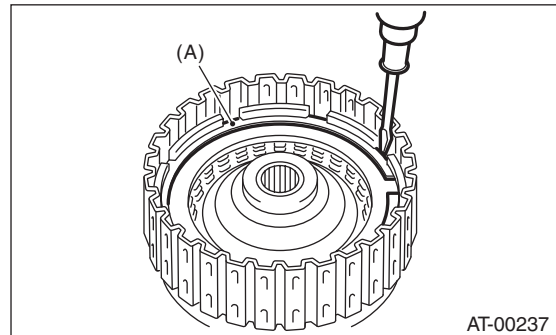
1. HIGH CLUTCH AND REVERSE CLUTCH

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.

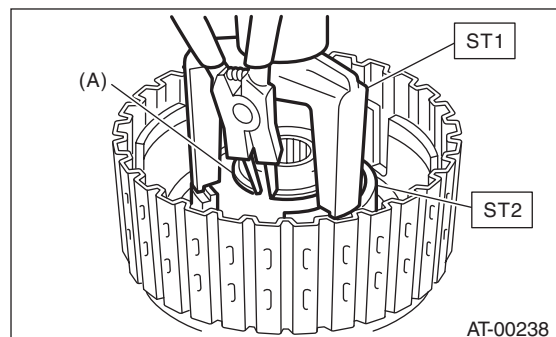


(A) Snap ring

3) Using the ST1 and ST2, remove the snap ring.

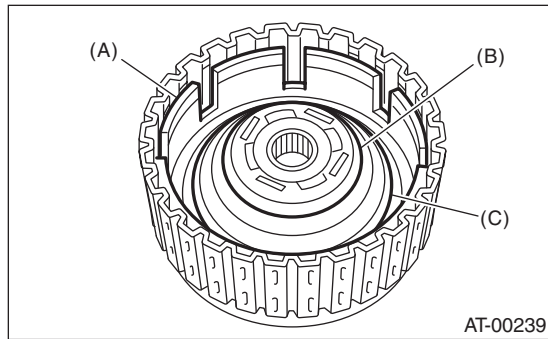
ST1 398673600 COMPRESSOR

ST2 498627100 SEAT



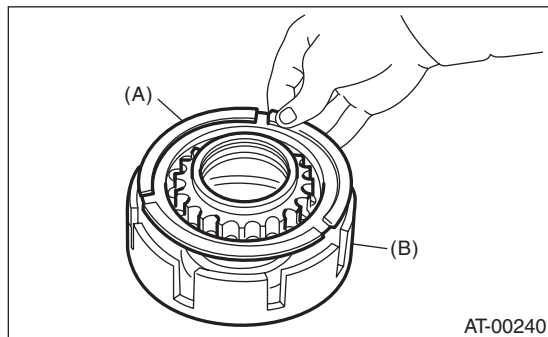
(A) Snap ring

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



- (A) Reverse clutch piston
- (B) Clutch cover
- (C) Return spring

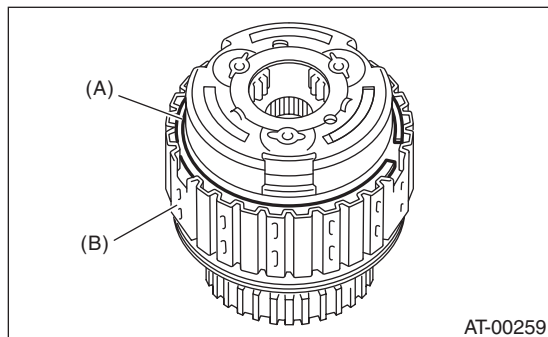
5) Remove the seal ring and lip seal from the high clutch piston and reverse clutch piston.



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

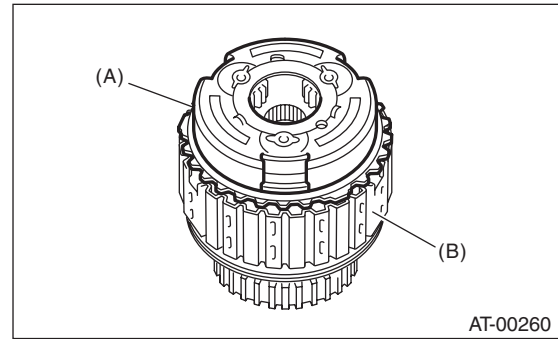
2. PLANETARY GEAR AND LOW CLUTCH

1) Remove the snap ring from low clutch drum.



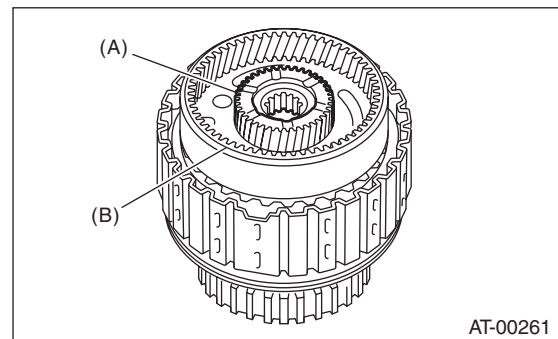
- (A) Snap ring
- (B) Low clutch drum

2) Take out the front planetary carrier.



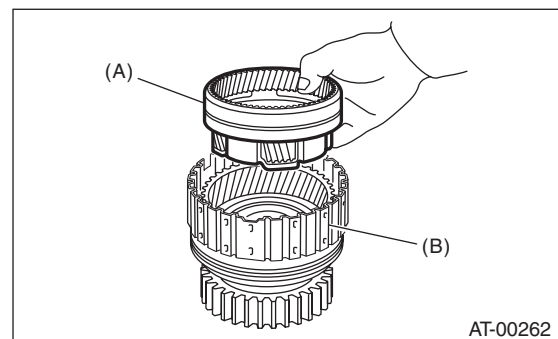
- (A) Front planetary carrier
- (B) Low clutch drum

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.

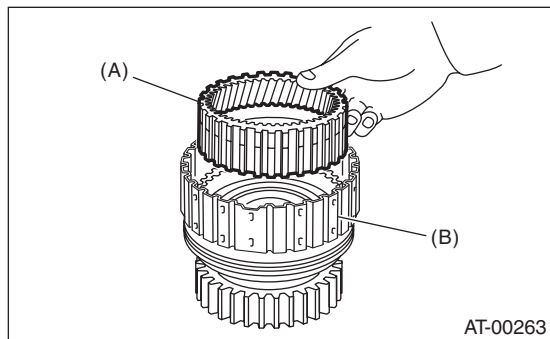


- (A) Rear planetary carrier
- (B) Low clutch drum

AT Main Case

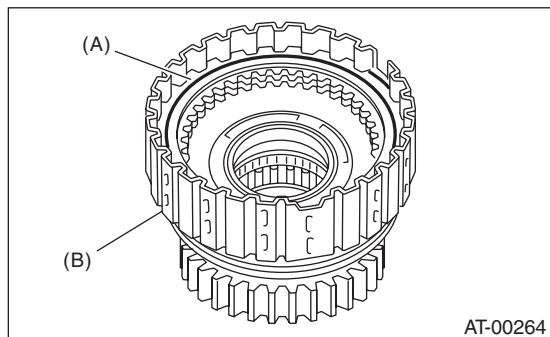
AUTOMATIC TRANSMISSION

5) Take out the rear internal gear.



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

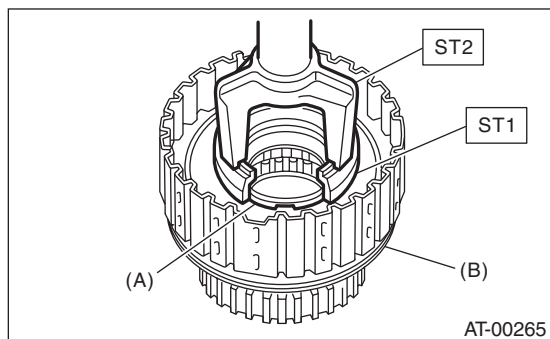
6) Remove the snap ring from low clutch drum.



- (A) Snap ring
- (B) Low clutch drum

7) Compress the spring retainer of the low & reverse brake, and remove the snap ring from the low clutch drum using ST1 and ST2.

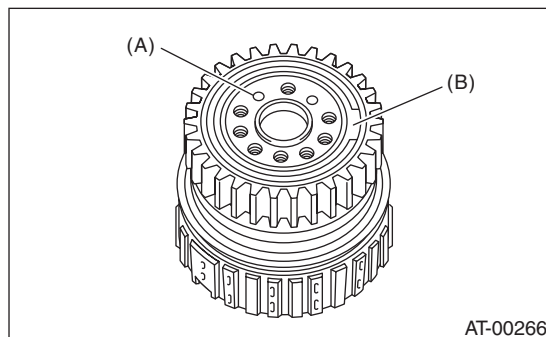
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



- (A) Snap ring
- (B) Low clutch drum

8) Remove the one-way clutch. <Ref. to 4AT-97, REMOVAL, AT Main Case.>

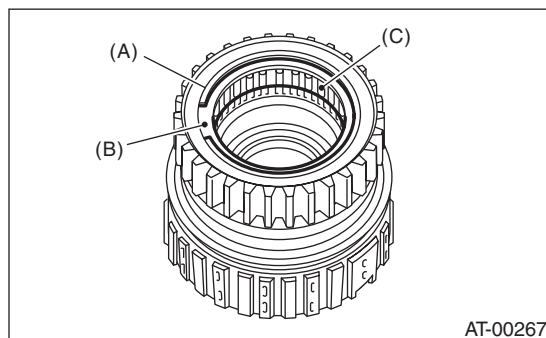
9) Install the one-way clutch inner race to the low clutch drum, and then apply compressed air to remove the low clutch piston.



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

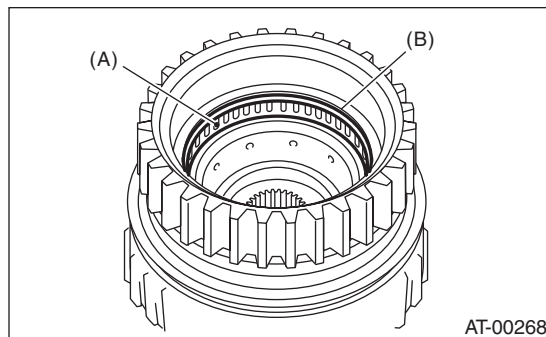
10) Remove the one-way clutch inner race.

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



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

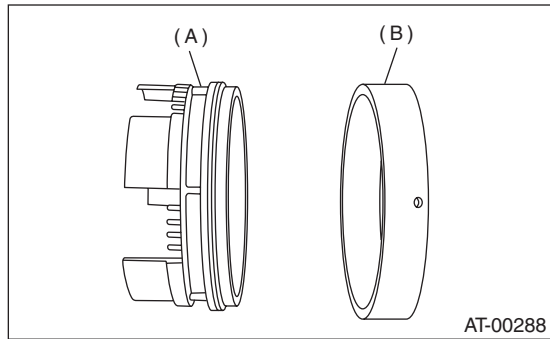
12) Remove the needle bearing after taking out the snap ring.



- (A) Needle bearing
- (B) Snap ring

3. 2-4 BRAKE

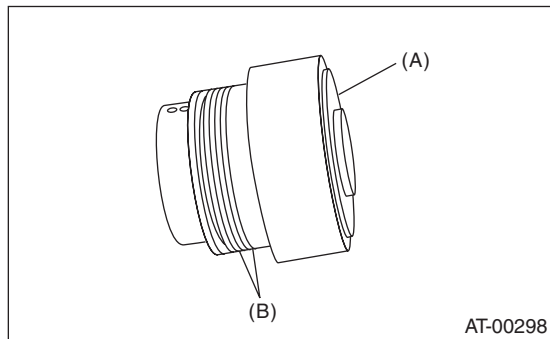
Separate the 2-4 brake piston and piston retainer.



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

4. ONE-WAY CLUTCH INNER RACE

1) Remove the seal ring.

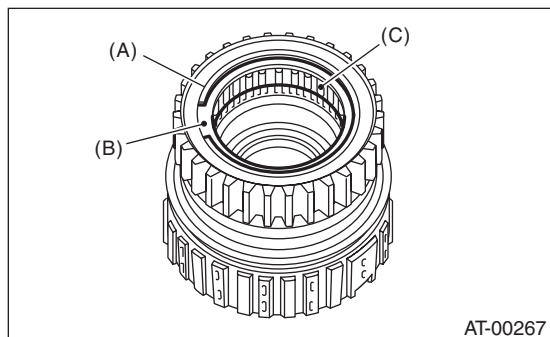


- (A) One-way clutch inner race
- (B) Seal ring

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

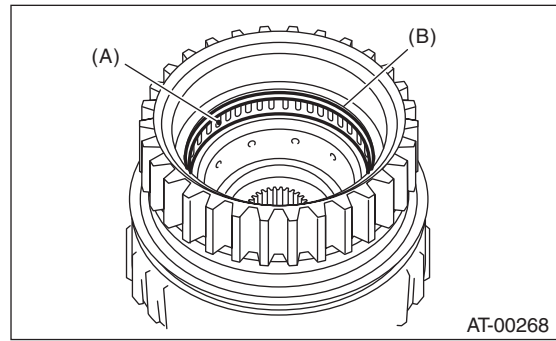
5. ONE-WAY CLUTCH OUTER RACE

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

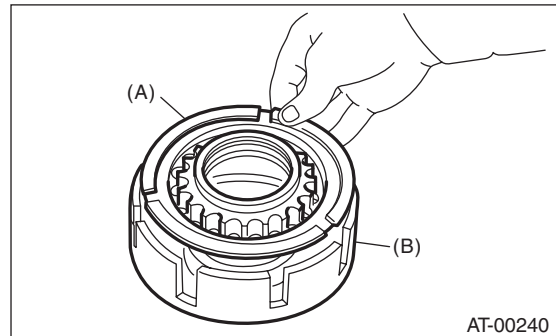
D: ASSEMBLY

1. HIGH CLUTCH AND REVERSE CLUTCH

- 1) Install a new 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.

NOTE:

Be careful not to damage the seal ring and lip seal.

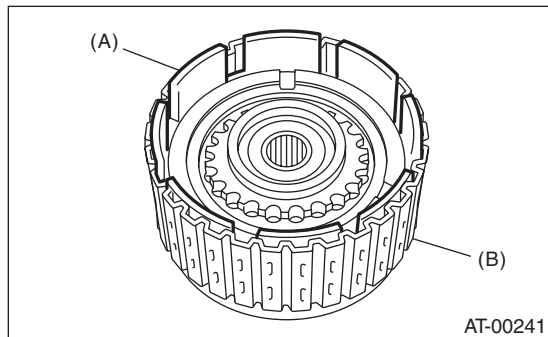


- (A) High clutch piston
- (B) Reverse clutch piston

AT Main Case

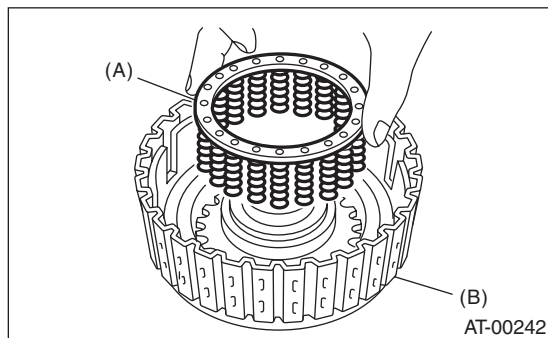
AUTOMATIC TRANSMISSION

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.



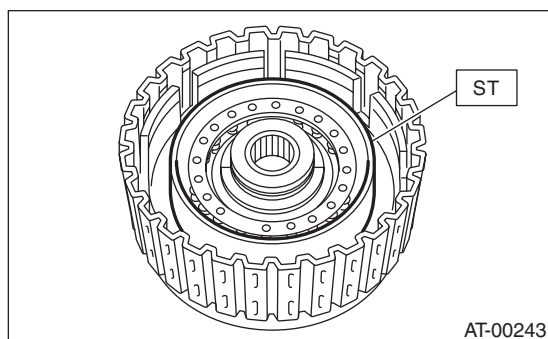
(A) Reverse clutch piston
(B) High clutch drum

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



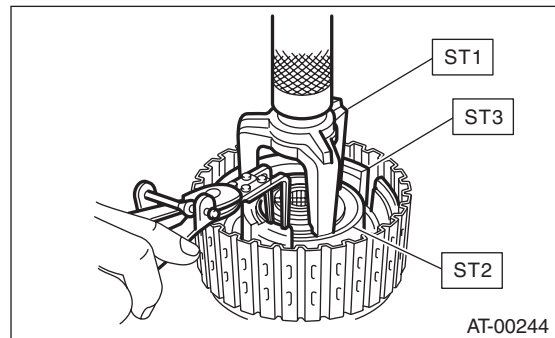
(A) Spring retainer
(B) High clutch drum

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 by using ST1, ST2 and ST3.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT
ST3 498437000 HIGH CLUTCH PISTON GUIDE



8) Measure the amount of drive plate compression and record that value.

- (1) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
- (2) Set the dial gauge to the clutch, and read its scale.

NOTE:

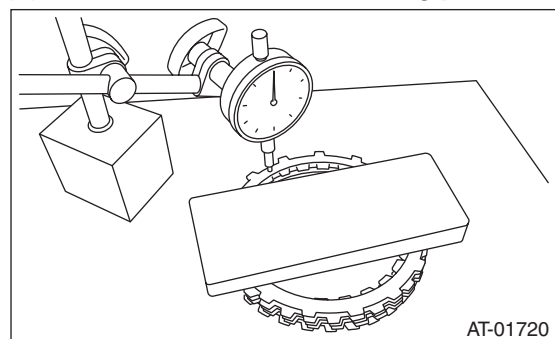
The value, which is read in the gauge at this time, is zero point.

- (3) Scale and record the weight "Z" of the flat board that will be placed on the 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 25.5 kg (56.2 lb).

- (4) Put the flat board on retaining plate.



(5) Using the following formula, read the push/pull gauge, and calculate "N".

$$N = 250 \text{ N (25.5 kgf, 56.2 lb)} - Z$$

N: Value indicated on push/pull gauge

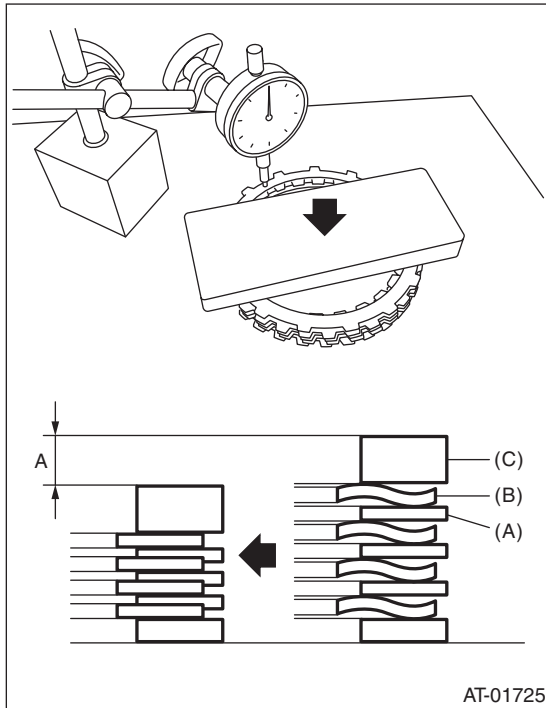
250 N (25.5 kgf, 56.2 lb) : Load applied to clutch plate

Z: Flat board weight

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

NOTE:

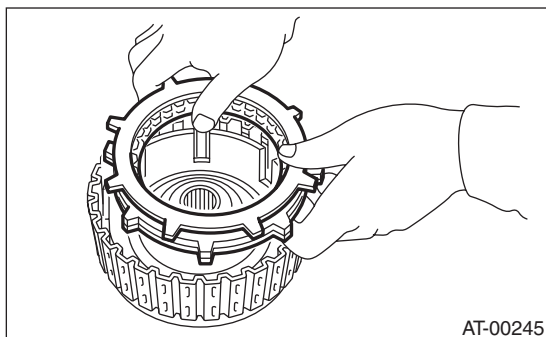
If measuring in three locations, measure every 120°. If measuring in four locations, measure every 90°.



A Measured value

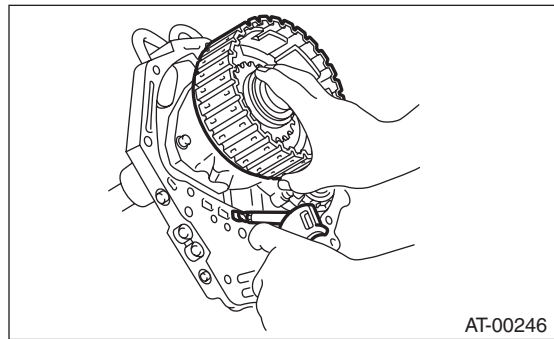
- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate

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



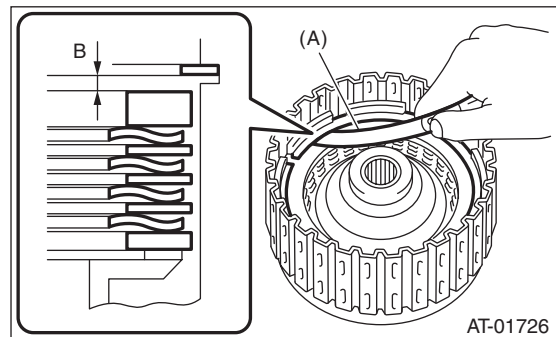
10) Install the snap ring to high clutch drum.

11) Apply compressed air intermittently to check for operation.



12) Check the piston stroke.

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



B Measured value

(A) Thickness gauge

(2) Piston stroke calculation

Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limits, replace the drive plate and select and adjust the retaining plate to be within initial standard values.

$$T = A + B$$

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)

AT Main Case

AUTOMATIC TRANSMISSION

Retaining plate	
Part No.	Length 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)

- 13) Selection of the reverse clutch retaining plate
- (1) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
 - (2) Set the dial gauge to retaining plate, and read its scale.

NOTE:

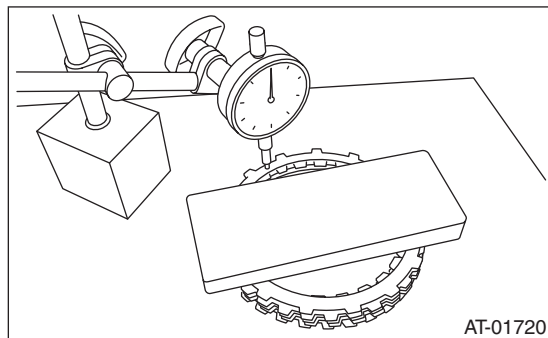
The value, which is read in the gauge at this time, is zero point.

- (3) Scale and record the weight "Z" of the flat board that will be placed on the 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 15.3 kg (33.7 lb).

- (4) Put the flat board on retaining plate.



- (5) Using the following formula, read the push/pull gauge, and calculate "N".

$$N = 150 \text{ N (15.3 kgf, 33.7 lbf)} - Z$$

N: Value indicated on push/pull gauge

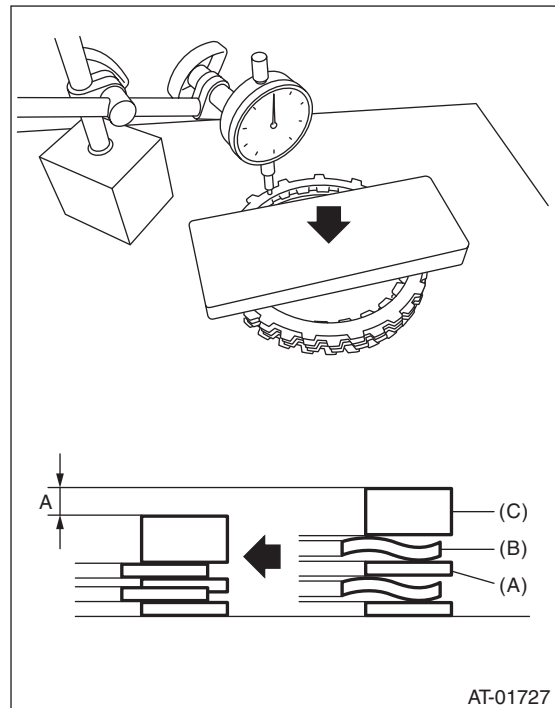
150 N (15.3 kgf, 33.7 lbf): Load applied to the clutch plate

Z: Flat board weight

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

NOTE:

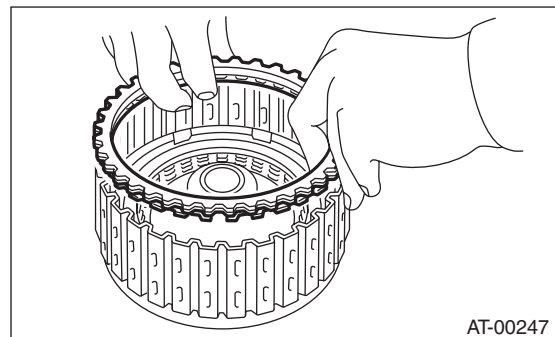
If measuring in three locations, measure every 120°. If measuring in four locations, measure every 90°.



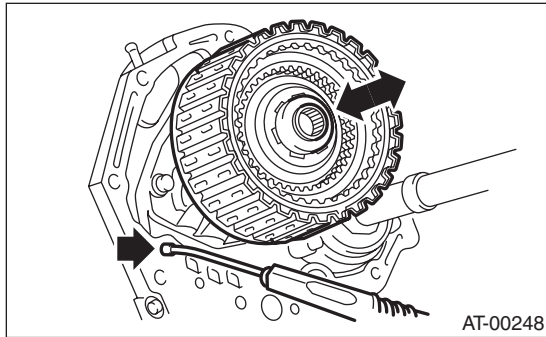
A Measured value

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

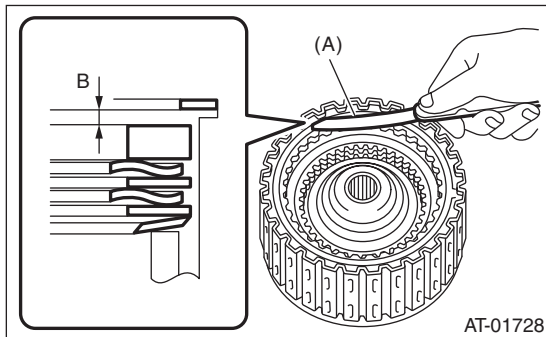
- (7) Install the driven plate, drive plate, retaining plate and snap ring.



(8) Apply compressed air intermittently to check for operation.



(9) 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.



B Measured value

(A) Thickness gauge

(10) Piston stroke calculation

Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limits, replace the drive plate and select and adjust the retaining plate to be within initial standard values.

$$T = A + B$$

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)

Retaining plate	
Part No.	Length 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)

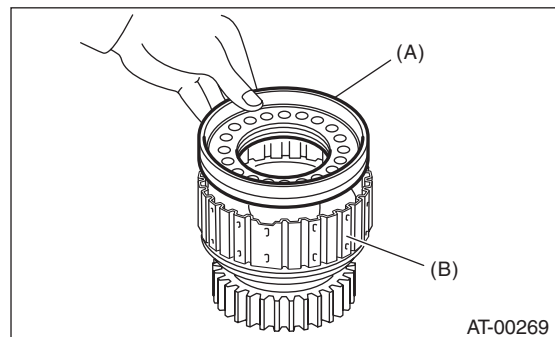
2. PLANETARY GEAR AND LOW CLUTCH

1) Apply ATF to a new D-ring, and install it to the low clutch piston.

2) Install the low clutch piston to low clutch drum.

NOTE:

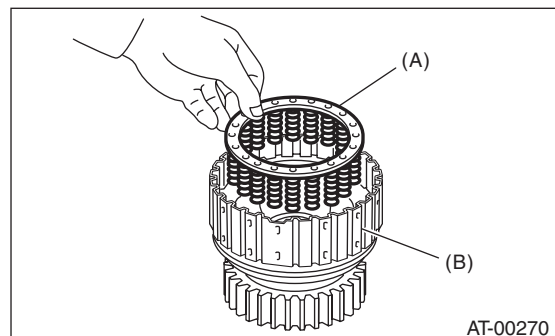
Be careful not to damage the D-ring.



(A) Low clutch piston

(B) Low clutch drum

3) Install the spring retainer to low clutch piston.



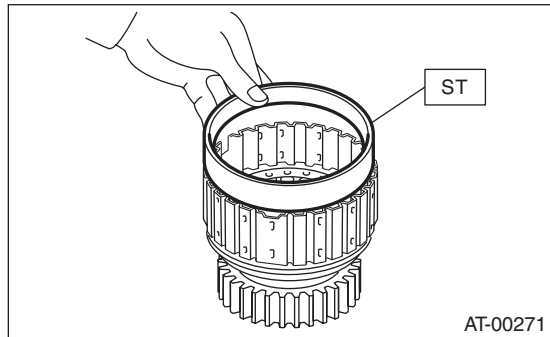
(A) Spring retainer

(B) Low clutch drum

AT Main Case

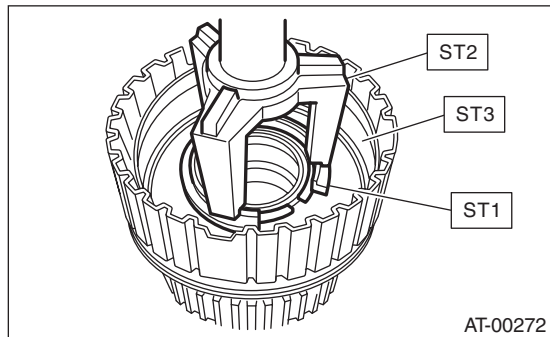
AUTOMATIC TRANSMISSION

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

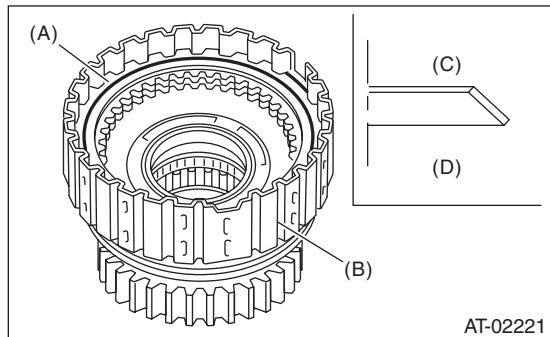


- 5) Using ST1, ST2 and ST3, set the cover on the piston and press against it, and attach the snap ring. At this time, be careful not to bend the cover seal.

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



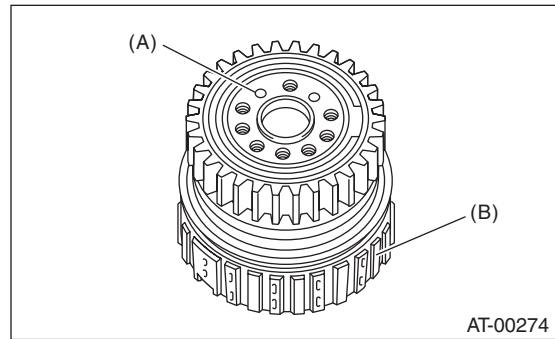
- 6) Install the dish plate, driven plate, drive plate and retaining plate, and then secure them with a snap ring.



- (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-97, 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

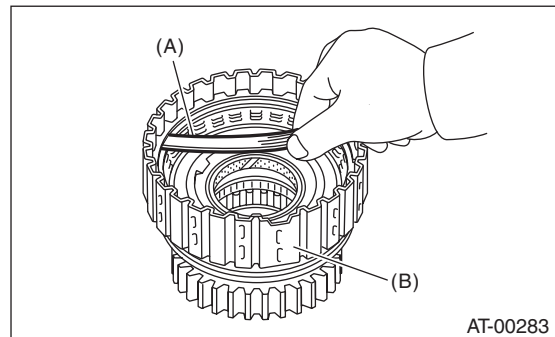
- 8) Check the low clutch clearance.
(1) Place same thickness shims on both sides to prevent plate from tilting.
(2) Check the clearance between retaining plate and low clutch operation.

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:

1.6 mm (0.063 in)

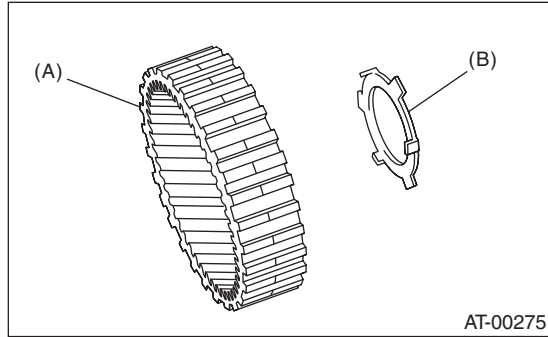


- (A) Thickness gauge
(B) Low clutch drum

If the clearance exceeds the service limits, replace the drive plate, then select and adjust the retaining plate so that the clearance is within default standard values.

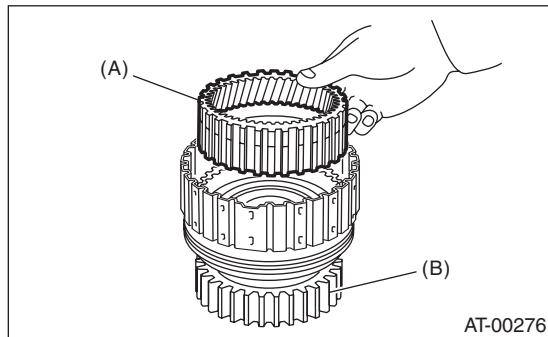
Retaining plate	
Part No.	Length mm (in)
31567AB050	3.8 (0.150)
31567AB060	4.0 (0.157)
31567AB070	4.2 (0.165)
31567AB080	4.4 (0.173)
31567AB090	4.6 (0.181)

9) Install the washer to the rear internal gear.



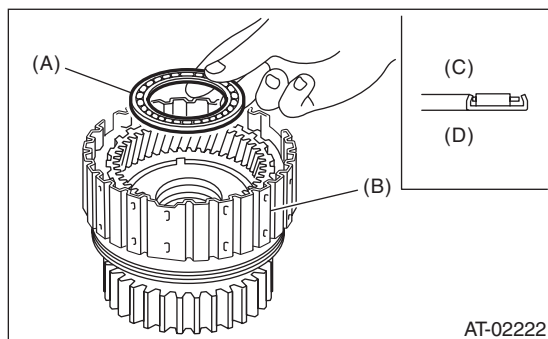
- (A) Rear internal gear
- (B) Washer

10) Install the rear internal gear.



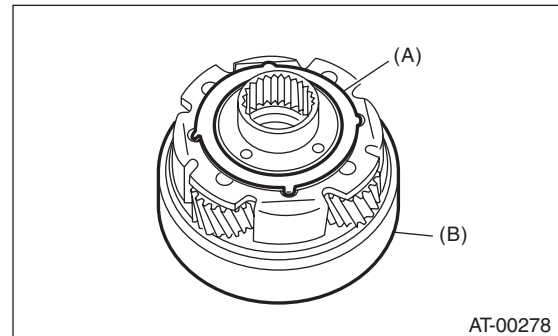
- (A) Rear internal gear
- (B) Low clutch drum

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



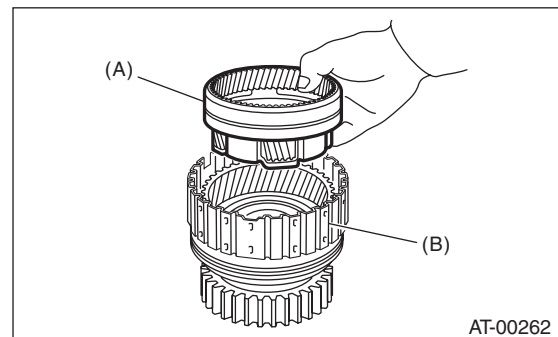
- (A) Thrust needle bearing
- (B) Low clutch drum
- (C) Rear planetary carrier side
- (D) Low clutch drum side

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



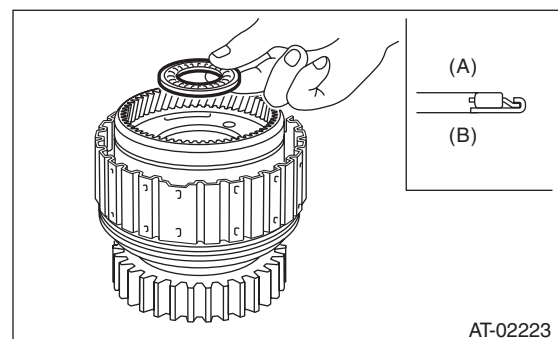
- (A) Washer
- (B) Rear planetary carrier

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.

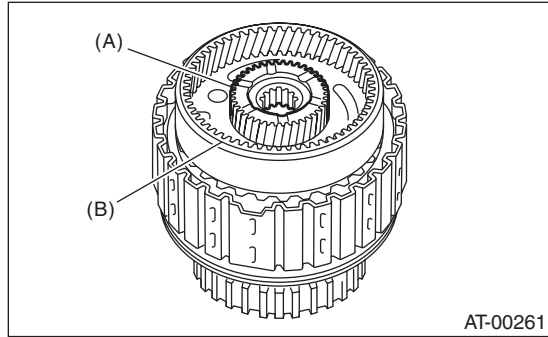


- (A) Rear sun gear side
- (B) Low clutch drum side

AT Main Case

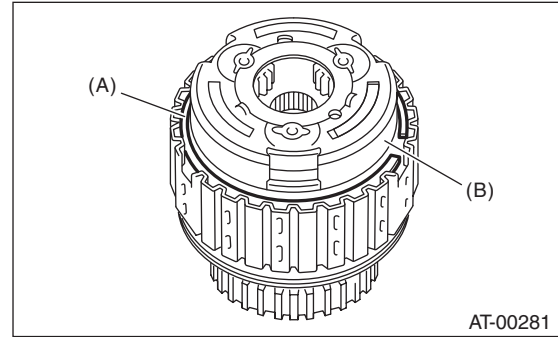
AUTOMATIC TRANSMISSION

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



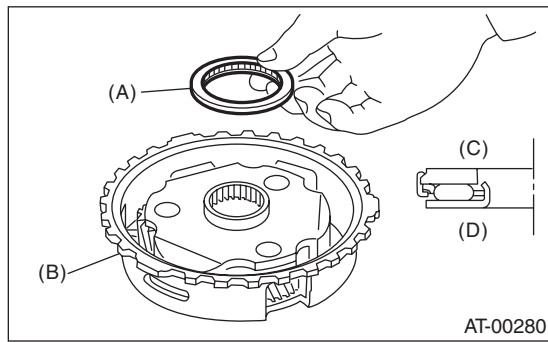
- (A) Rear sun gear
- (B) Rear planetary carrier

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



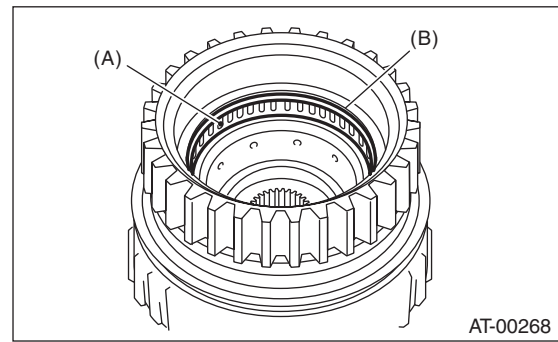
- (A) Snap ring
- (B) Front planetary carrier

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



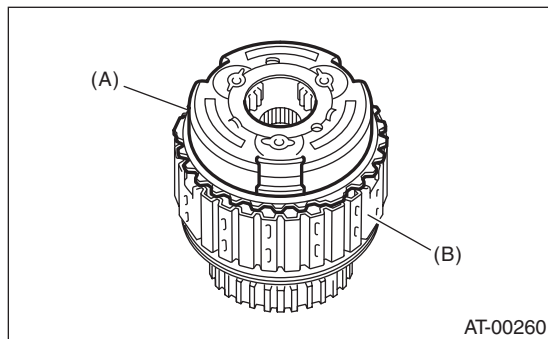
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

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



- (A) Needle bearing
- (B) Snap ring

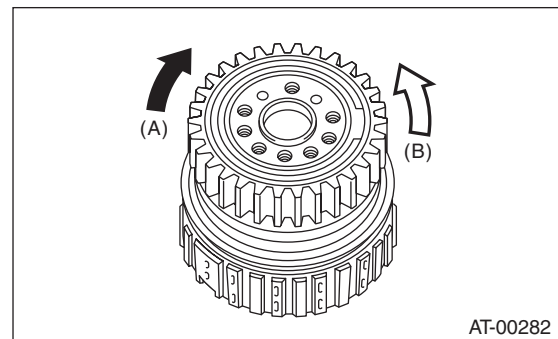
17) Install the front planetary carrier to the low clutch drum.



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

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.



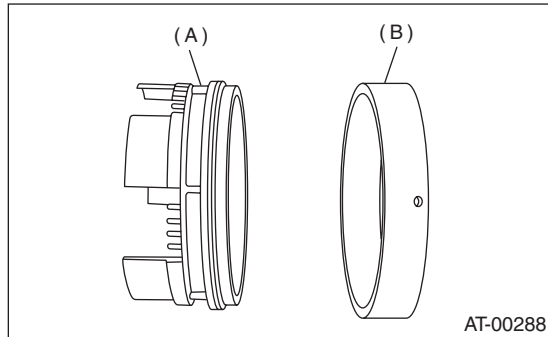
- (A) Locked
- (B) Rotates freely

3. 2-4 BRAKE

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

NOTE:

Be careful not to damage the D-ring.

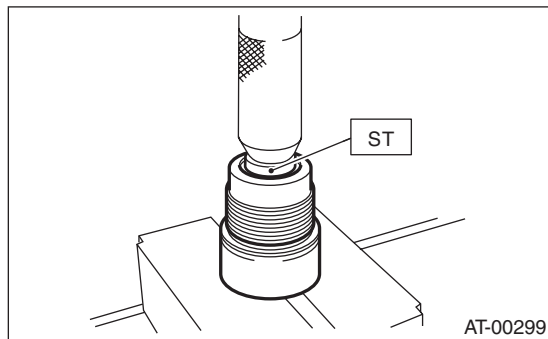


- (A) 2-4 brake piston
(B) 2-4 brake piston retainer

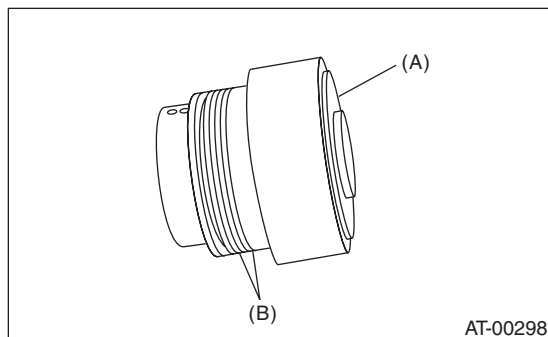
4. ONE-WAY CLUTCH INNER RACE

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

ST 398497701 INSTALLER



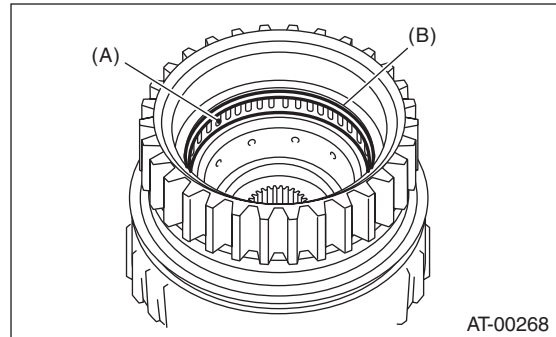
- 2) Apply vaseline to the groove of inner race and to the new seal ring.
- 3) Install two seal rings to the one-way clutch inner race.



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

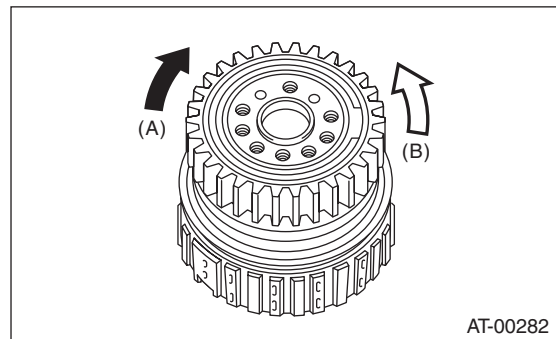
5. ONE-WAY CLUTCH OUTER RACE

- 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 one-way clutch inner race, 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) Locked
(B) Rotates freely

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 and spring retainer deformation
- Wear and damage of the lip seal and D-ring
- Piston and piston check ball operation
- Adjust the total end play. <Ref. to 4AT-83, 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 and spring retainer deformation
- Wear and damage of the lip seal and D-ring
- Check the total end play and adjust it to be within specifications. <Ref. to 4AT-83, 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, leaf spring setting and breakage, and spring retainer deformation
- Wear and damage of the lip seal and D-ring
- Check the total end play and adjust it to be within specifications. <Ref. to 4AT-83, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- Check that the snap ring is not damaged and the seal ring is not deformed.
- Check the total end play and adjust it to be within specifications. <Ref. to 4AT-83, ADJUSTMENT, Oil Pump Housing.>

5. LOW & REVERSE BRAKE

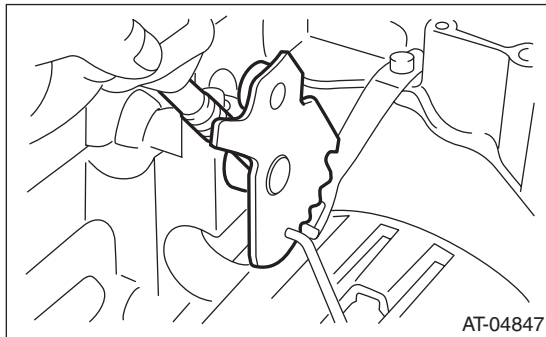
Check the following items.

- Drive plate facing for wear or damage
- Driven plate for discoloration (burned color)
- Snap ring wear, leaf spring setting and breakage, and spring retainer deformation
- Lip seal wear and damage

35. Transmission Control Device

A: REMOVAL

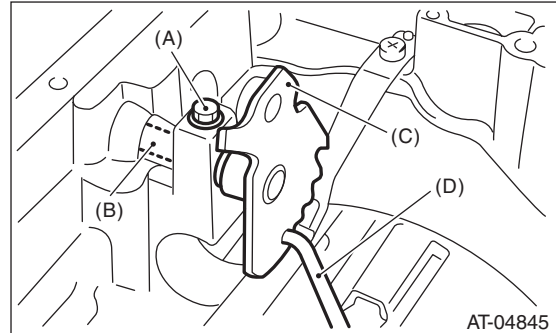
- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-34, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-63, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Lift up the lever on the rear side of transmission harness connector, and then remove it from the stay.
- 5) Remove the inhibitor switch connector from the stay.
- 6) Disconnect the air breather hose. <Ref. to 4AT-61, REMOVAL, Air Breather Hose.>
- 7) Wrap vinyl tape around the nipple attached to the air breather hose.
- 8) Remove the pitching stopper bracket.
- 9) Remove the inhibitor switch. <Ref. to 4AT-46, REMOVAL, Inhibitor Switch.>
- 10) Remove the control valve body assembly. <Ref. to 4AT-54, REMOVAL, Control Valve Body.>
- 11) Pull out the manual plate spring pin.



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

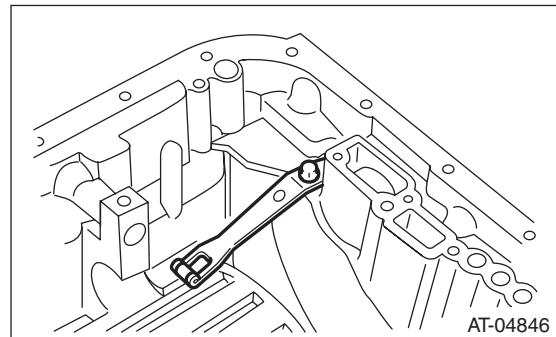
NOTE:

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 detent spring.

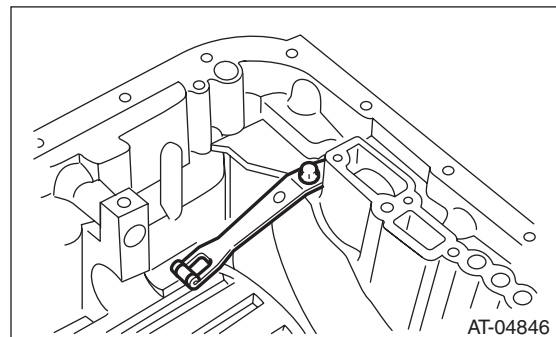


B: INSTALLATION

- 1) Install the detent spring to the transmission case.

Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)



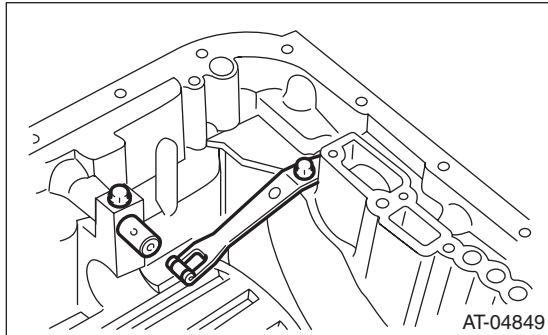
Transmission Control Device

AUTOMATIC TRANSMISSION

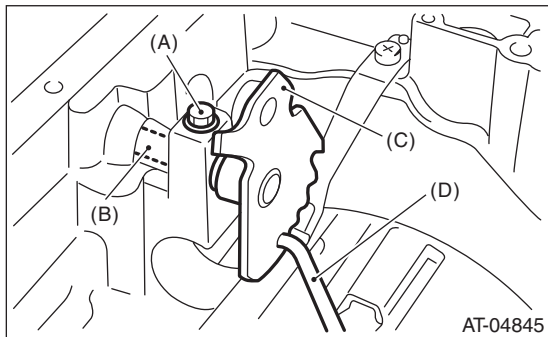
2) Insert the range select lever, and tighten the bolts.

Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)

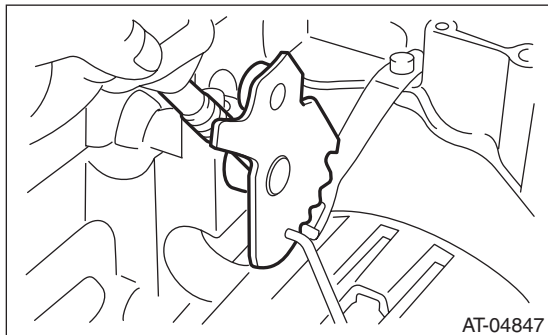


3) Insert the manual plate and parking rod.



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

4) Insert a new spring pin into the manual plate.



5) Install the oil pan and the control valve assembly. <Ref. to 4AT-55, INSTALLATION, Control Valve Body.>

6) Turn over the transmission case to its original position.

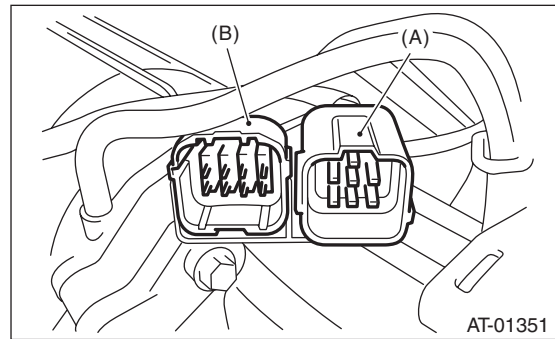
7) Install the pitching stopper bracket and transmission radio ground cord.

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

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

9) Insert the inhibitor switch connector and transmission harness connector onto the stay.



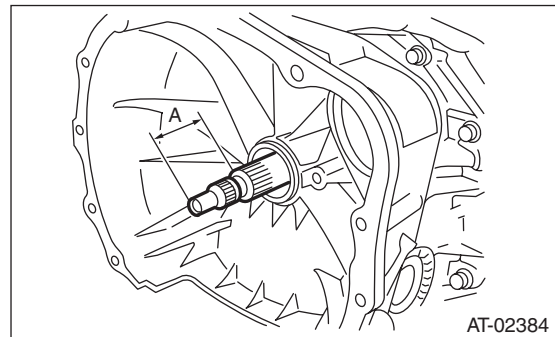
- (A) Transmission harness connectors
- (B) Inhibitor switch connector

10) Install the air breather hose. <Ref. to 4AT-61, 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)



A Measured value

12) Install the torque converter clutch assembly. <Ref. to 4AT-63, INSTALLATION, Torque Converter Clutch Assembly.>

13) Install the transmission assembly to the vehicle. <Ref. to 4AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

4AT(diag)

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18. Diagnostics with Phenomenon	85

Basic Diagnostic Procedure

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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) Check the following items which may be affecting the AT trouble. • 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 item that might influence the AT problem normal?	Go to step 2.	Repair or replace items which might affect the AT problem.
2 CHECK AT OIL TEMP LIGHT. Turn the ignition switch to ON and wait for at least 2 seconds.	Does the AT OIL TEMP light illuminate?	Go to step 3.	Check the AT OIL TEMP light.
3 CHECK AT OIL TEMP LIGHT. Start the engine and wait for 2 seconds or more.	Does the AT OIL TEMP light blink?	Go to step 4.	Go to step 6.
4 CHECK DTC. Read the DTC. <Ref. to 4AT(diag)-17, 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 4AT(diag)-28, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed on Subaru Select Monitor?	Record all DTC. Go to step 5.	Go to step 6.
5 CHECK FREEZE FRAME DATA. Using the Subaru Select Monitor, check the Freeze Frame Data.	Are freeze frame data recorded?	Record the freeze frame data. Go to step 7.	Go to step 7.
6 PERFORM GENERAL DIAGNOSTICS. 1) Inspect using "Diagnostic Procedure without Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-77, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using "Diagnostics with Phenomenon". <Ref. to 4AT(diag)-85, Diagnostics with Phenomenon.> 3) Perform the Inspection Mode. <Ref. to 4AT(diag)-19, Inspection Mode.> 4) Read the DTC.	Is DTC displayed on Subaru Select Monitor?	Go to step 7.	Finish the diagnosis.

Basic Diagnostic Procedure

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 PERFORM DIAGNOSIS. 1) Inspect by referring to “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: Refer to “List of Diagnostic Trouble Code (DTC)” for DTC. <Ref. to 4AT(diag)-32, 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) Read the DTC.	Is DTC displayed on Subaru Select Monitor?	Inspect by referring to “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Use copies of this page for interviewing customers.

4AT(diag)-4

General Description

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. General Description

A: CAUTION

1. SRS AIRBAG SYSTEM

The airbag system wiring harness is routed near the TCM.

CAUTION:

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

2. MEASUREMENT

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

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of the electrolyte.

Standard voltage:
12 V or more

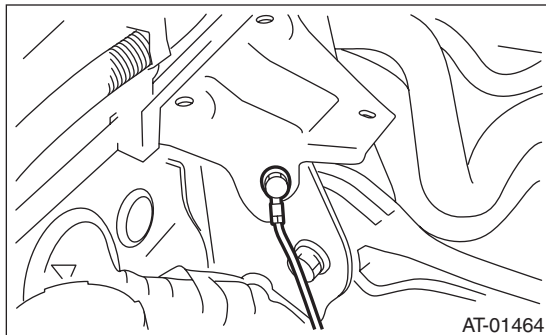
Specific gravity:
1.260 or more

2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

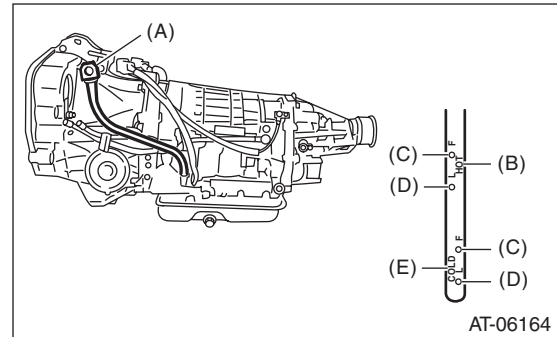
- Chassis side

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



3. ATF LEVEL

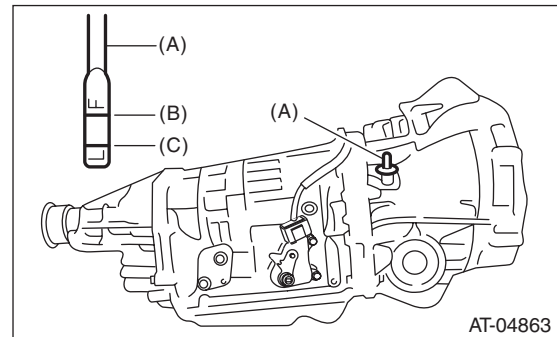
Make sure that ATF level is the specified amount. <Ref. to 4AT-26, INSPECTION, Automatic Transmission Fluid.>



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

5. OPERATION OF SELECT LEVER

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

WARNING:

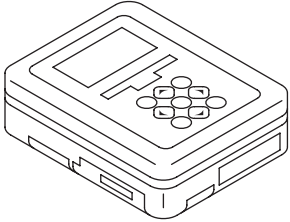
Stop the engine while checking operation of the select lever.

General Description

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: PREPARATION TOOL

1. SPECIAL TOOL

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

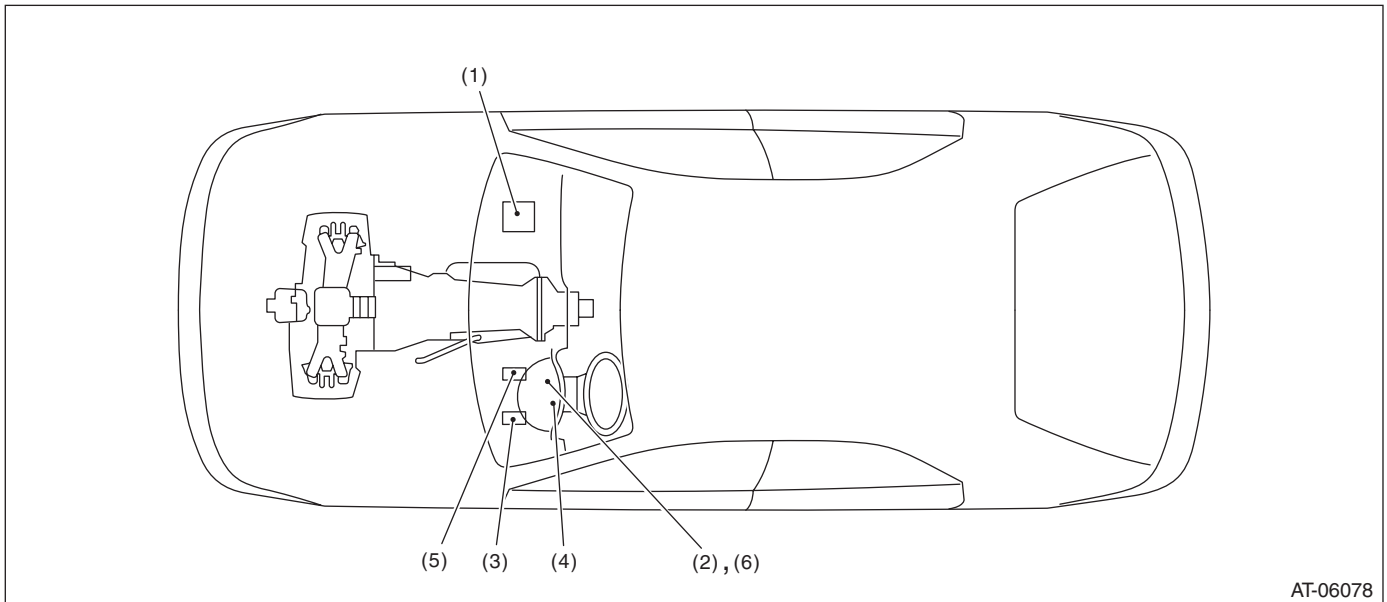
2. GENERAL TOOL

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

4. Electrical Component Location

A: LOCATION

1. CONTROL MODULE



(1) Engine control module (ECM)

(3) Transmission control module (TCM)

(5) Body integrated unit

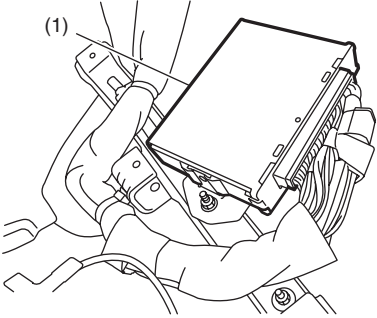
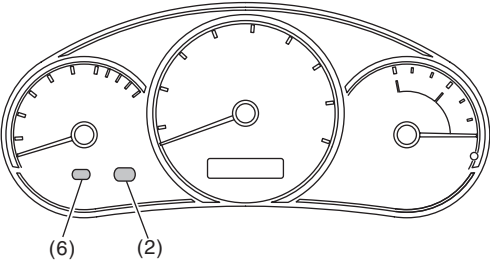
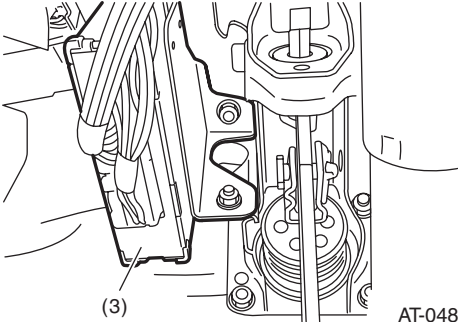
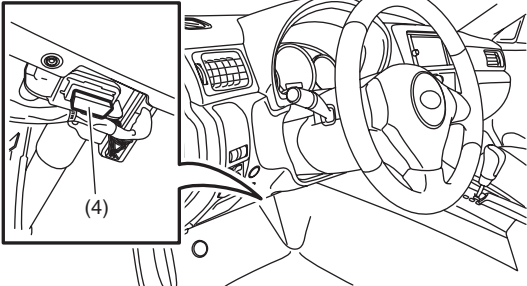
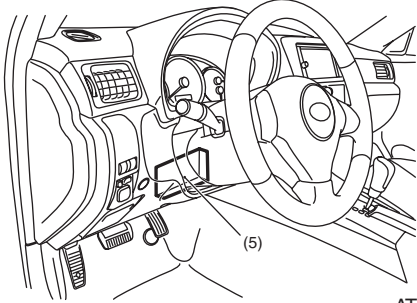
(2) AT OIL TEMP light

(4) Data link connector

(6) AWD light

Electrical Component Location

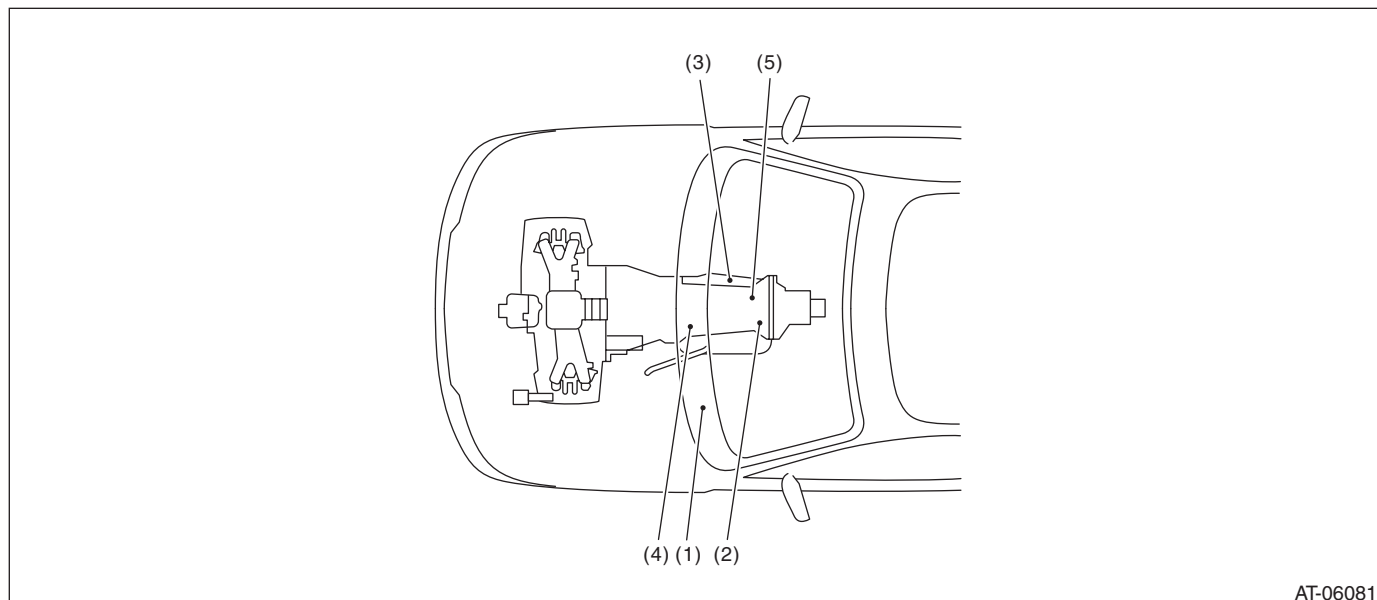
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

 AT-06137	 AT-06079
 AT-04854	 EN-06147
 AT-04851	

Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. SENSOR

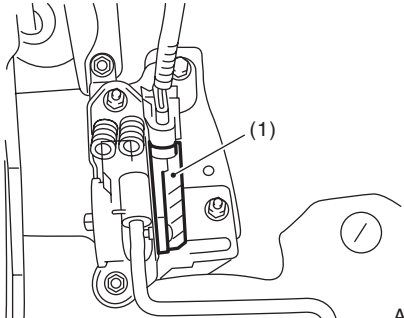
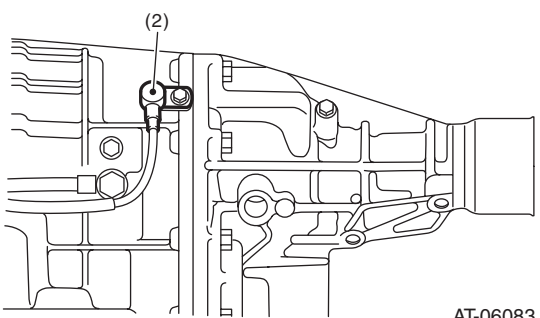
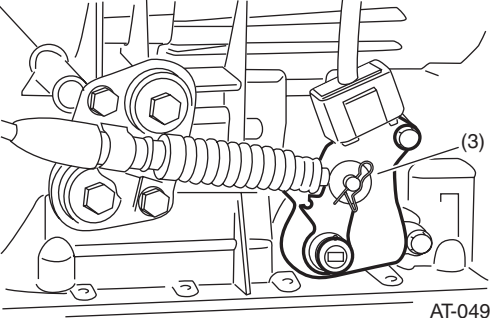
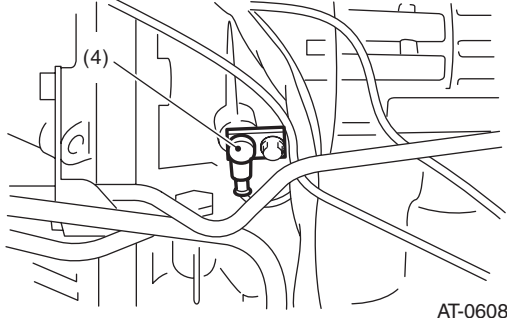
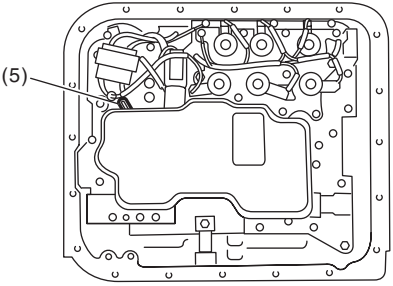


AT-06081

(1) Accelerator pedal position sensor	(3) Inhibitor switch	(5) ATF temperature sensor
(2) Front vehicle speed sensor	(4) Torque converter turbine speed sensor	

Electrical Component Location

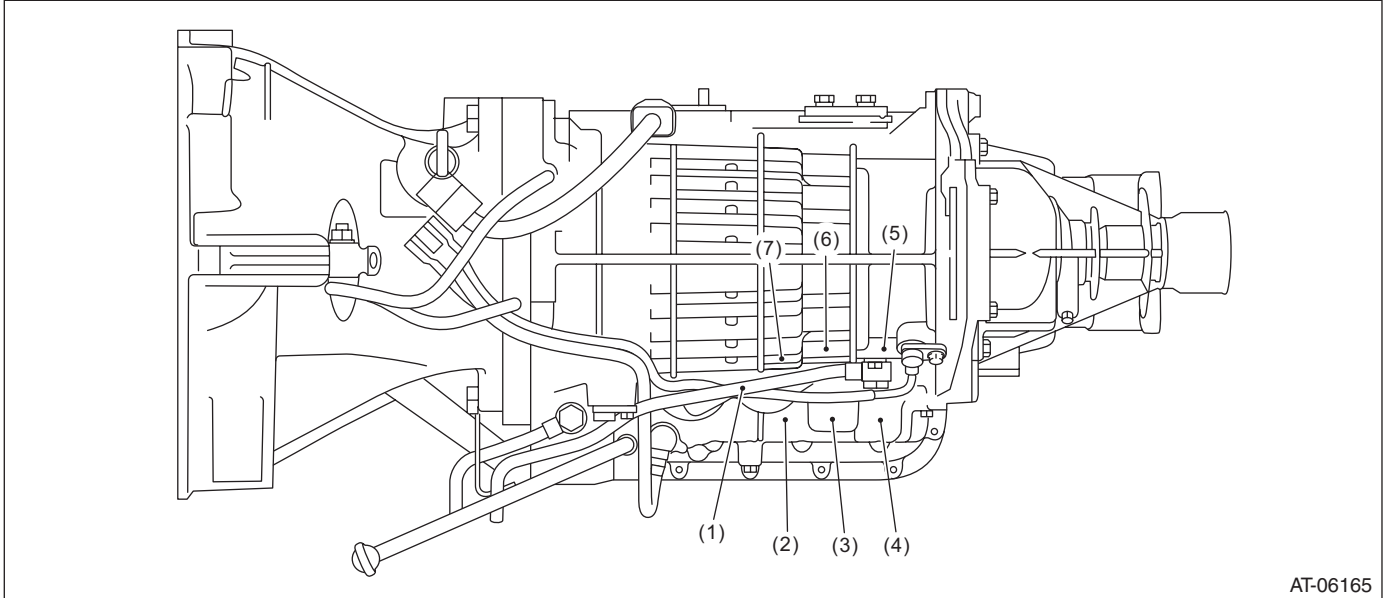
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

 AT-00375	 AT-06083
 AT-04909	 AT-06084
 AT-06085	

Electrical Component Location

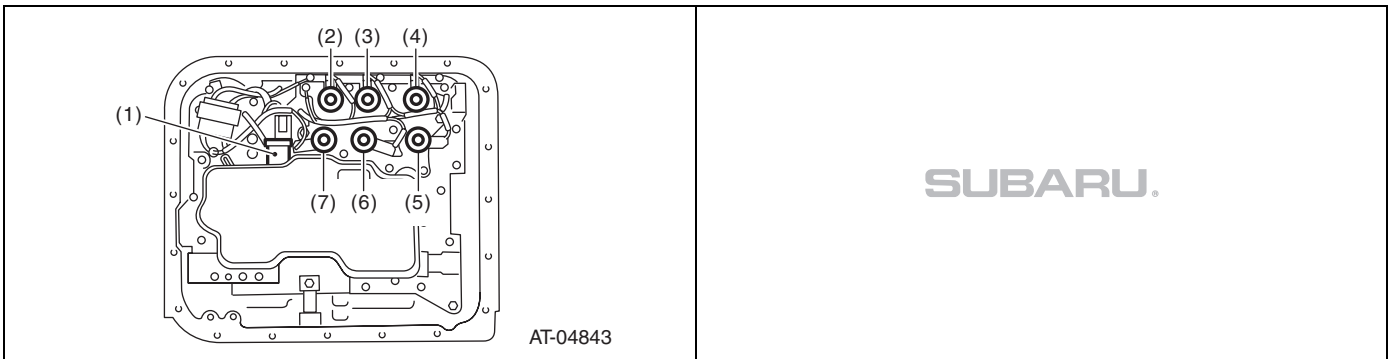
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. SOLENOID



AT-06165

(1) Line pressure linear solenoid	(4) Low & reverse duty solenoid	(6) Transfer duty solenoid
(2) High clutch duty solenoid	(5) Low clutch duty solenoid	(7) Lock-up duty solenoid
(3) 2-4 brake duty solenoid		



AT-04843

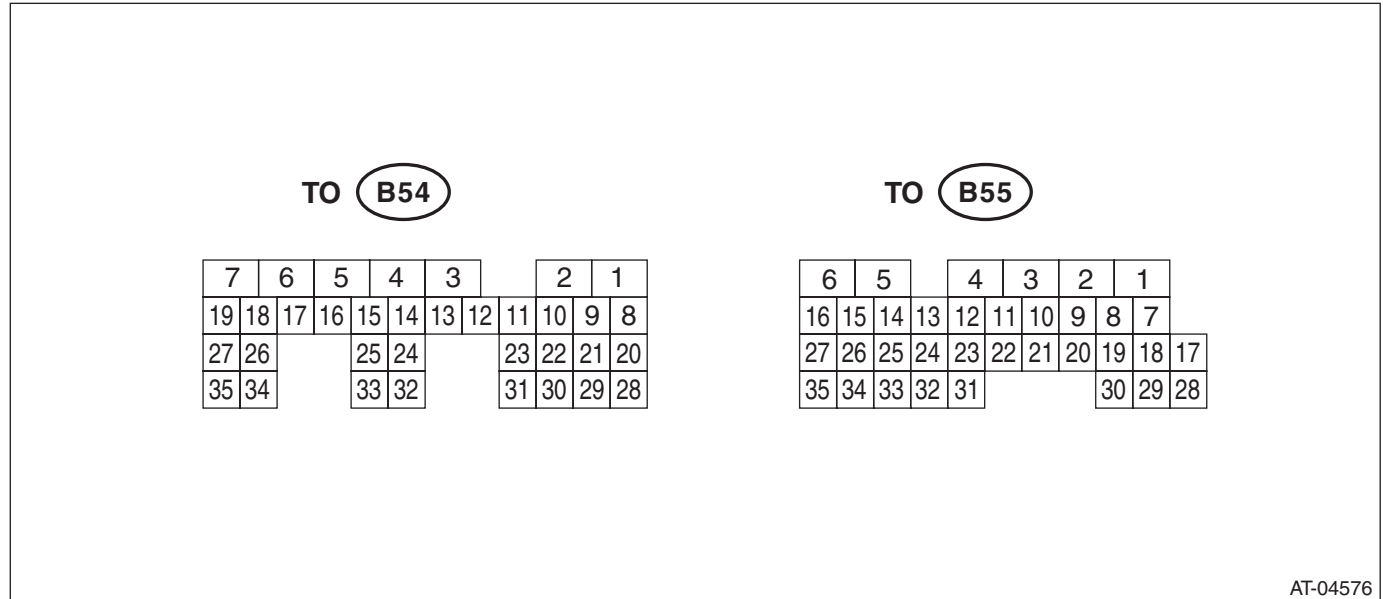
SUBARU®

Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

A: ELECTRICAL SPECIFICATION



AT-04576

Check with ignition switch ON.					
Item	Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
	Positive terminal	Ground terminal			
Backup power supply	(B54) No. 25	Chassis ground	Ignition switch OFF	10 — 13	—
	(B54) No. 26				
	(B54) No. 27				
Ignition power supply	(B54) No. 1	Chassis ground	Ignition switch ON	10 — 13	—
	(B54) No. 2				
Inhibitor switch	“P” range Switch	(B55) No. 14	Chassis ground	Select lever in “P” range	Less than 1
				Select lever in any other than “P” range	
	“R” range switch	(B55) No. 13	Chassis ground	Select lever in “R” range	8 or more
				Select lever in any other than “R” range	
	“N” range switch	(B55) No. 11	Chassis ground	Select lever in “N” range	Less than 1
				Select lever in any other than “N” range	
	“D” range switch	(B55) No. 10	Chassis ground	Select lever in “D” range	8 or more
				Select lever in any other than “D” range	

Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.					
Item	Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
	Positive terminal	Ground terminal			
ATF temperature sensor	(B55) No. 23	(B55) No. 12	ATF temperature 20°C (68°F)	3.5 — 4.3	2.5 k — 7 k
			ATF temperature 80°C (176°F)	1.0 — 2.2	300 — 800
ATF temperature sensor ground	(B55) No. 12	Chassis ground	—	0	Less than 1
Front vehicle speed sensor	(B55) No. 27	(B55) No. 16	Vehicle stopped	0	450 — 650
			Vehicle speed 20 km/h (12 MPH) or more	1 or more (AC range)	
Front vehicle speed sensor ground	(B55) No. 16	Chassis ground	—	—	—
Torque converter turbine speed sensor	(B55) No. 1	(B55) 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	(B55) No. 2	Chassis ground	—	—	—
Line pressure linear solenoid	(B55) No. 4	(B55) No. 3	Ignition switch ON "R" range throt- tle fully closed after engine warm up.	3.7 — 7.7	4.0 — 6.0
			Ignition switch ON "R" range throt- tle fully open after engine warm up.	1.1 — 5.1	
Line pressure linear solenoid ground	(B55) No. 3	Chassis ground	—	Less than 1	Less than 1
Lock-up duty solenoid	(B55) 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	(B55) 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	(B54) No. 4	Chassis ground	2nd or 4th gear	Less than 1	2.0 — 4.5
			"P" or "N" range	5.0 or more	
High clutch duty solenoid	(B54) 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	(B54) No. 7	Chassis ground	1st or 2nd gear	Less than 1	2.0 — 4.5
			"P" or "N" range	5.0 or more	

Transmission Control Module (TCM) I/O Signal

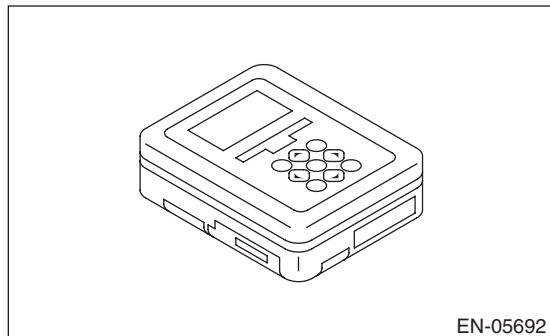
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.					
Item	Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
	Positive terminal	Ground terminal			
Low & reverse duty solenoid	(B54) No. 5	Chassis ground	Driving in manual mode in any gear except 1st gear (15 km/h (9.3 MPH) or more)	5.0 or more	2.0 — 4.5
			Driving in 1st gear of manual mode (15 km/h (9.3 MPH) or more)	2.5 — 5.0	
FWD switch	(B54) No. 10	Chassis ground	Fuse removed	10.5 or more	—
			Fuse installed	Less than 1	
CAN communication signal (+)	(B55) No. 18	Chassis ground	Ignition switch ON	Pulse signal	—
CAN communication signal (–)	(B55) No. 17	Chassis ground		Pulse signal	
Power GND2	(B54) No. 20	Chassis ground	—	0	Less than 1
Power GND1	(B54) No. 21	Chassis ground			
Control GND2	(B54) No. 22	Chassis ground			
Control GND1	(B54) No. 23	Chassis ground			
Data link signal (Subaru Select Monitor)	(B54) No. 8	Chassis ground	—	—	—
SPORT shift switch	(B54) No. 17	Chassis ground	Ignition switch ON SPORT shift mode switch is ON	Less than 1	—
			Ignition switch ON SPORT switch shift mode switch is OFF	8 or more	—
SPORT shift UP switch	(B54) No. 19	Chassis ground	Ignition switch ON When SPORT shift UP switch is ON	Less than 1	—
			Ignition switch ON When SPORT shift UP switch is OFF	8 or more	—
SPORT shift DOWN switch	(B54) No. 18	Chassis ground	Ignition switch ON SPORT shift down switch is ON	Less than 1	—
			Ignition switch ON When SPORT shift DOWN switch is OFF	8 or more	—

6. Subaru Select Monitor

A: OPERATION

- 1) Prepare the Subaru Select Monitor kit.



- 2) Prepare PC with Subaru Select Monitor installed.

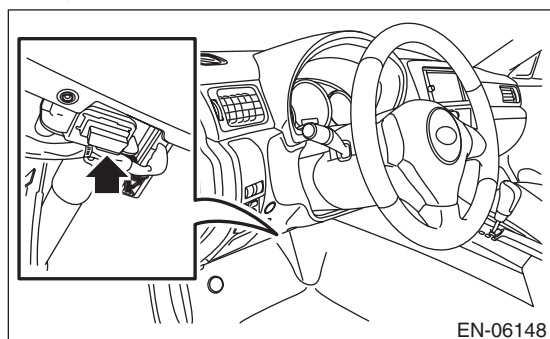
- 3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

NOTE:

The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

- 4) Connect the diagnosis cable to SDI.

- 5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:

Do not connect the scan tools other than the Subaru Select Monitor.

- 6) Start the PC.
- 7) Turn the ignition switch to ON.
- 8) Run the "PC application for Subaru Select Monitor".

Read Current Data

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

7. Read Current Data

A: OPERATION

- 1) Using the Subaru Select Monitor, on the «Main Menu» display, select {Each System Check}.
 - 2) On «System Selection Menu» display, select {Transmission Control System}.
 - 3) After transmission type information is displayed, select [OK].
 - 4) On «Transmission Diagnosis» display, select {Current Data Display & Save}.
 - 5) On «Current Data Display & Save» display, select {Normal sampling}.
 - 6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
- The list of support data is as shown below.

Item	Display	Unit of measure
Battery voltage	Battery Voltage	V
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
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	%
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	Low Clutch Duty	%
High clutch duty ratio	High Clutch Duty	%
Low & reverse brake duty ratio	L&R B Duty	%
Accelerator position	Accel. Opening Angle	%
FWD switch signal	FWD Switch	ON or OFF
Stop light switch signal	Stop Light Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Parking range signal	P Range	ON or OFF
Neutral range signal	N Range	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 Lamp	ON or OFF
ATF temperature light signal	ATF Temperature Lamp	ON or OFF
Up shift signal	Up Switch	ON or OFF
Down shift signal	Down Switch	ON or OFF
SPORT mode signal	Tiptronic Mode Switch	ON or OFF
Cruise control signal	Cruise Control Signal	ON or OFF

NOTE:

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

8. Read Diagnostic Trouble Code (DTC)

A: OPERATION

- 1) Using the Subaru Select Monitor, on the «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Transmission Control System}.
- 3) After transmission type information is displayed, select [OK].
- 4) On «Transmission Diagnosis» display, select {Diagnostic Code(s) Display}.
- 5) On «Diagnostic Code(s) Display» display, select {Temporary Diagnostic Code(s)} or {Memorized Diagnostic Code(s)}.

NOTE:

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-32, List of Diagnostic Trouble Code (DTC).>

9. Clear Memory Mode

A: OPERATION

- 1) Shift the select lever to "P" range.
- 2) Using the Subaru Select Monitor, on the «Main Menu» display, select {Each System Check}.
- 3) On «System Selection Menu» display, select {Transmission Control System}.
- 4) After transmission type information is displayed, select [OK].
- 5) On «Transmission Diagnosis» display, select {Clear Memory}.
- 6) When "Done. Turn off the ignition switch." is displayed, select [OK].
- 7) Turn the ignition switch to OFF. To turn the ignition switch to ON again, wait for 10 seconds or more.
- 8) Turn the Subaru Select Monitor to OFF.

NOTE:

- If {Clear Memories 2} is executed, DTCs and learned control memory are cleared.
- If {Clear Memories 2} is executed, perform learning. <Ref. to 4AT(diag)-20, Learning Control.>

10. Inspection Mode

A: PROCEDURE

CAUTION:

Observe the traffic law when driving on public roads.

- 1) Shift the select lever to “D” range, and then drive the vehicle at 60 km/h (37 MPH) for at least 10 seconds.
- 2) Drive the vehicle with manual mode.

11. Learning Control

A: GENERAL DESCRIPTION

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

Replacement of TCM/Replacement or disassembly of transmission assembly/Replacement of control valve body/Performing "Clear Memories 2" is executed.

B: PROCEDURE

1. PREPARATION FOR LEARNING

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

CAUTION:

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

- 5) Connect the Subaru Select Monitor to data link connector.
- 6) Turn the ignition switch to ON. (For model with push button start, press the push button ignition switch twice without depressing brake pedal.)
- 7) Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger, etc.
- 8) On vehicles equipped with an ECO switch, turn the ECO switch to ON. On vehicles equipped with an SPORT mode, turn the SPORT mode to OFF. On vehicles equipped with an POWER/HOLD switch, turn the POWER/HOLD switch to OFF. On vehicles equipped with SI-DRIVE, set to I mode.

NOTE:

Error message is not displayed even when an incorrect mode is set. While the operation is continued, "AT learning promoting" is displayed, but it cannot end normally. If the message does not change after 2 minutes have passed, retry "AT learning mode" from the beginning.

2. SIMPLE LEARNING

NOTE:

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

CAUTION:

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

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

NOTE:

During AT learning in progress, SPORT indicator light in the combination meter starts flashing at 2 Hz and the learning operation starts. The following message is displayed on the screen when the SPORT indicator light turns off.

- 4) When "AT learning normally ended." is displayed, simple AT learning is completed.

Learning Control

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

NOTE:

- If communication error occurs during learning, retry the “AT learning mode” from the beginning.
- If the message “Execute AT learning again after fixing troubles of the vehicle” is displayed during learning, select [OK] to display the List of Diagnostics Trouble Code. After repairing the locations indicated by the DTC, start the “AT learning mode” over from the beginning.
- When communication error occurs during learning, select lever does not shift occasionally. If select lever does not shift, turn the ignition switch to OFF before operating the select lever.
- If the message “AT learning ended abnormally” is displayed, start the “AT learning mode” over from the beginning.

Message	Main reasons for abnormal termination
AT learning ended abnormally.	• Fault is detected during AT learning. • The accelerator pedal is depressed during AT learning. • Operation which is not directed is performed during AT learning. • Brake pedal not stepped on firmly enough. • Parking brake not applied strongly enough. • Abnormal idle speed increase, etc.

- For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

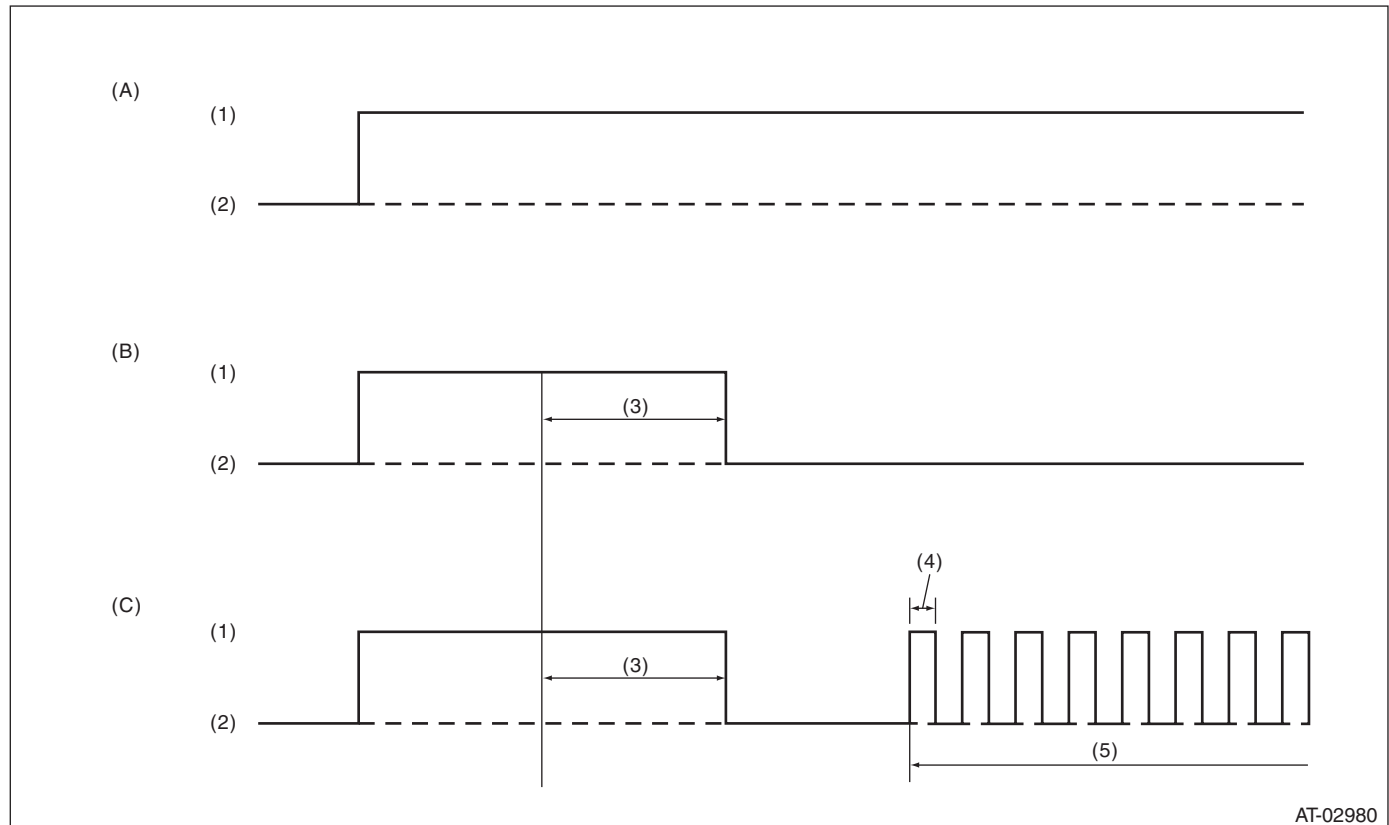
AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

12.AT OIL TEMP Warning Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, the AT OIL TEMP light blinks. The light keeps blinking from when the malfunction is detected after starting the engine, until the ignition switch is turned OFF. The faulty parts or unit can be identified by reading DTCs. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP light does not blink although a problem is occurring, the problem can be determined by checking the performance characteristics of each sensor using the Subaru Select Monitor. Indicator light signal patterns are as shown in the figure.



(A) Ignition switch (engine OFF)

(B) Normal (engine ON)

(C) Faulty (engine ON)

(1) ON

(3) 2 seconds

(5) Blink

(2) OFF

(4) 0.25 seconds

When the AT OIL TEMP light does not operate normally, check the AT OIL TEMP light circuit. <Ref. to 4AT(diag)-23, INSPECTION, AT OIL TEMP Warning Light Display.>

AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: INSPECTION

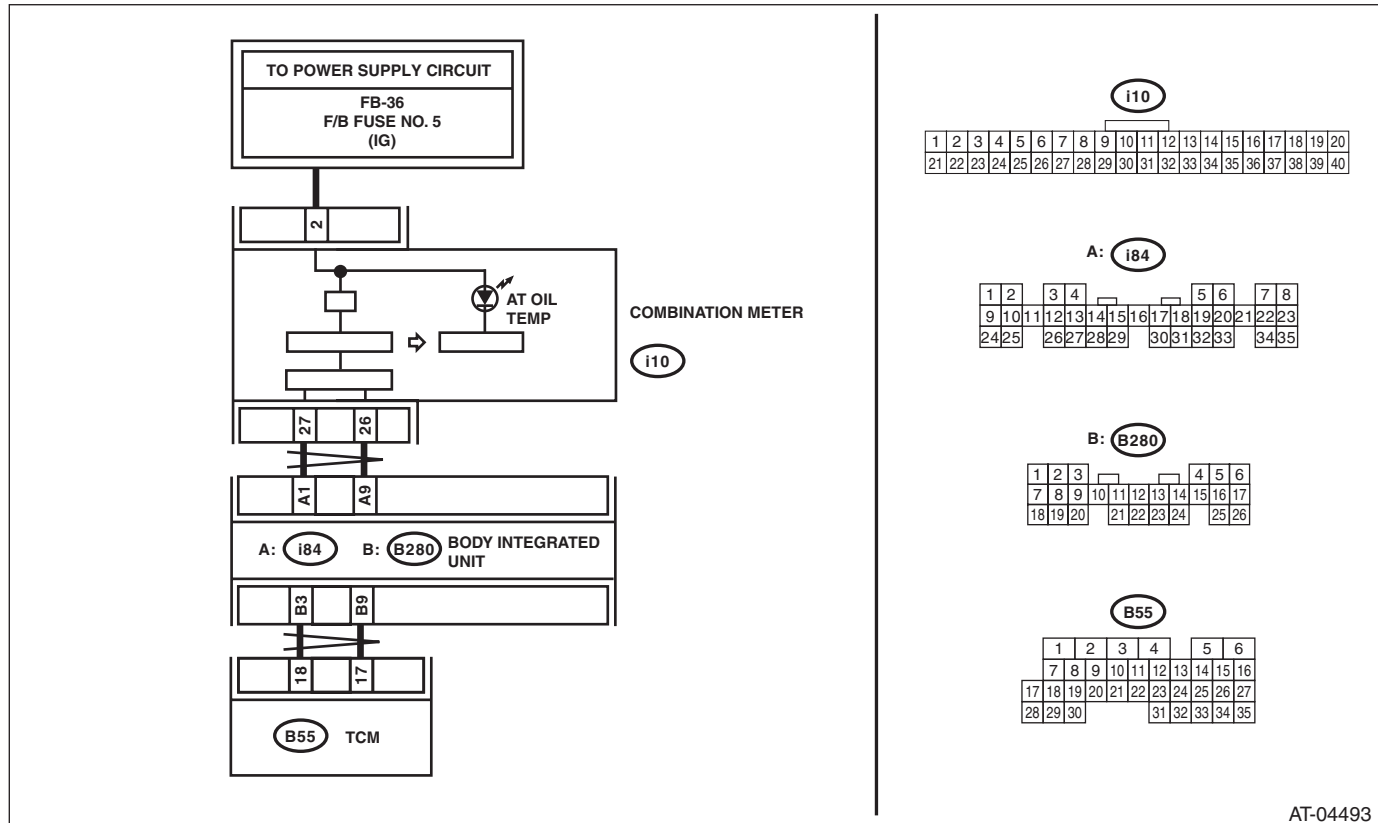
DIAGNOSIS:

AT OIL TEMP light circuit is open or shorted.

TROUBLE SYMPTOM:

When the ignition switch is turned to ON, the AT OIL TEMP light does not illuminate.

WIRING DIAGRAM:



AT-04493

Step	Check	Yes	No	
1	CHECK AT OIL TEMP LIGHT. Turn the ignition switch to ON.	Does the AT OIL TEMP light illuminate?	Go to step 2.	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>
2	CHECK AT OIL TEMP LIGHT. Turn the ignition switch to ON and wait for at least 2 seconds.	Does the AT OIL TEMP light illuminate?	Go to step 3.	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 4AT(diag)-2, Basic Diagnostic Procedure.>	Go to step 7.

AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK SUBARU SELECT MONITOR COMMUNICATION. Connect the Subaru Select Monitor to data link connector.	Is the communication between Subaru Select Monitor and TCM normal?	Go to step 5.	Check the power supply ground circuit of TCM and Subaru Select Monitor communication. <Ref. to 4AT(diag)-28, Diagnostic Procedure for Subaru Select Monitor Communication.>
5 CHECK TCM. 1) Display the current data of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-16, OPERATION, Read Current Data.> 2) Read the data of "Diagnosis Lamp" using Subaru Select Monitor.	Is "ON" displayed?	Go to step 6.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
6 CHECK BODY INTEGRATED UNIT. 1) Connect the Subaru Select Monitor, and display the current data of the body integrated unit. <Ref. to LAN(diag)-33, OPERATION, Read Current Data.> 2) Read the data of "ATF Temperature Lamp" using the Subaru Select Monitor.	Is "ON" displayed?	Replace the combination meter assembly. <Ref. to IDI-14, Combination Meter.>	Check DTC of body integrated unit. <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>
7 CHECK TCM. NOTE: If the ATF temperature is 138°C or more, cool down till the temperature is 137°C or less. 1) Display the current data of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-16, OPERATION, Read Current Data.> 2) Read the data of "Diagnosis Lamp" using Subaru Select Monitor.	Is "ON" displayed?	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>	Go to step 8.
8 CHECK BODY INTEGRATED UNIT. 1) Connect the Subaru Select Monitor, and display the current data of the body integrated unit. <Ref. to LAN(diag)-33, OPERATION, Read Current Data.> 2) Read the data of "ATF Temperature Lamp" using the Subaru Select Monitor.	Is "ON" displayed?	Check DTC of body integrated unit. Perform the diagnosis according to DTC. <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>

13.AWD Warning Light Display

A: OPERATION

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

- If normal

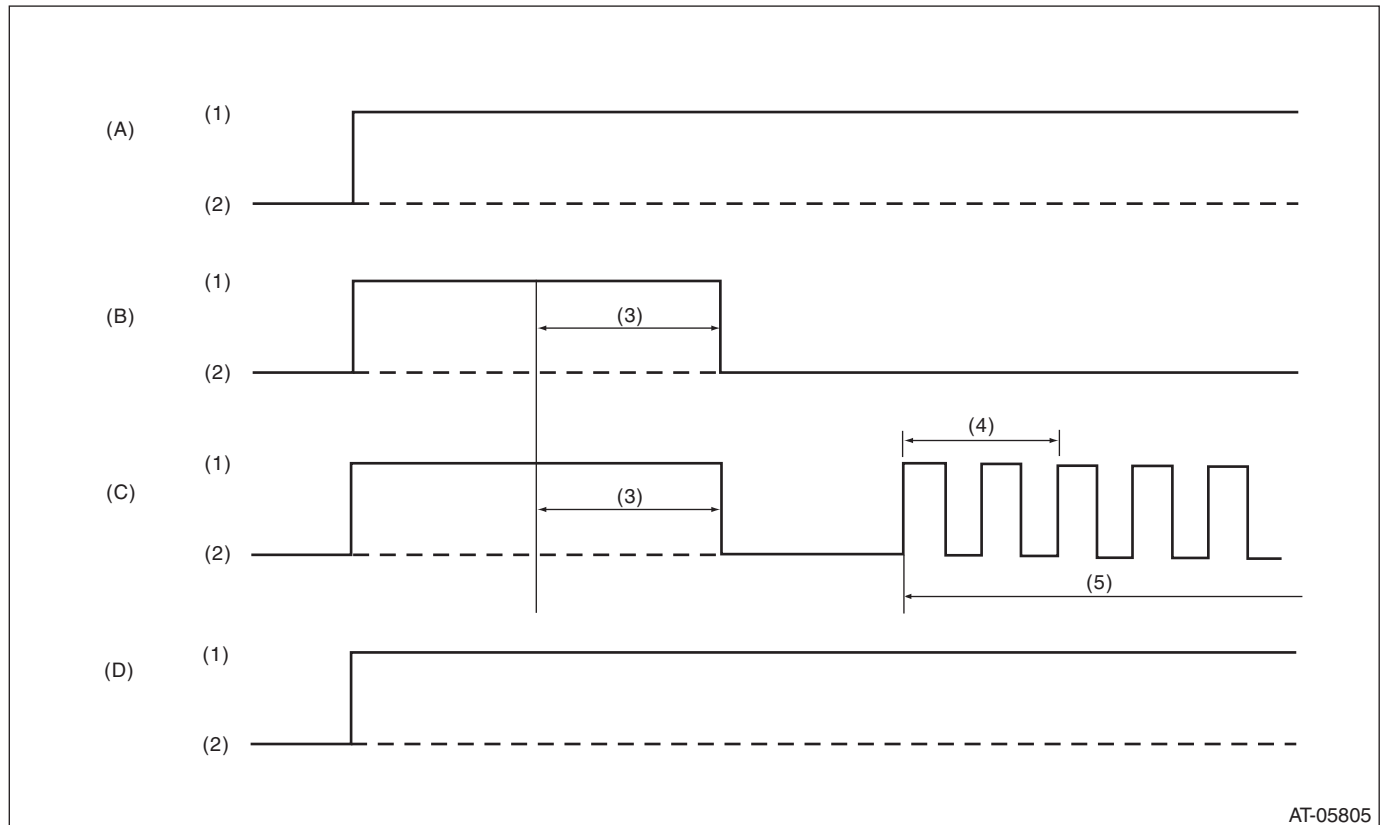
AWD light always illuminates when the ignition switch is ON (engine OFF). Light goes off after two seconds from engine ON.

- Faulty

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

- When AWD is released

AWD warning light always illuminates when the fuse is installed on the FWD fuse holder and the AWD is released.



AT-05805

(A) Ignition switch (engine OFF)

(C) Faulty (engine ON)

(D) When AWD is released (engine ON)

(B) Normal (engine ON)

(1) ON

(3) 2 seconds

(5) Blink

(2) OFF

(4) 1 second

If the AWD light does not illuminate, or illumination patterns are not as above, check the AWD light circuit.
<Ref. to 4AT(diag)-26, INSPECTION, AWD Warning Light Display.>

AWD Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: INSPECTION

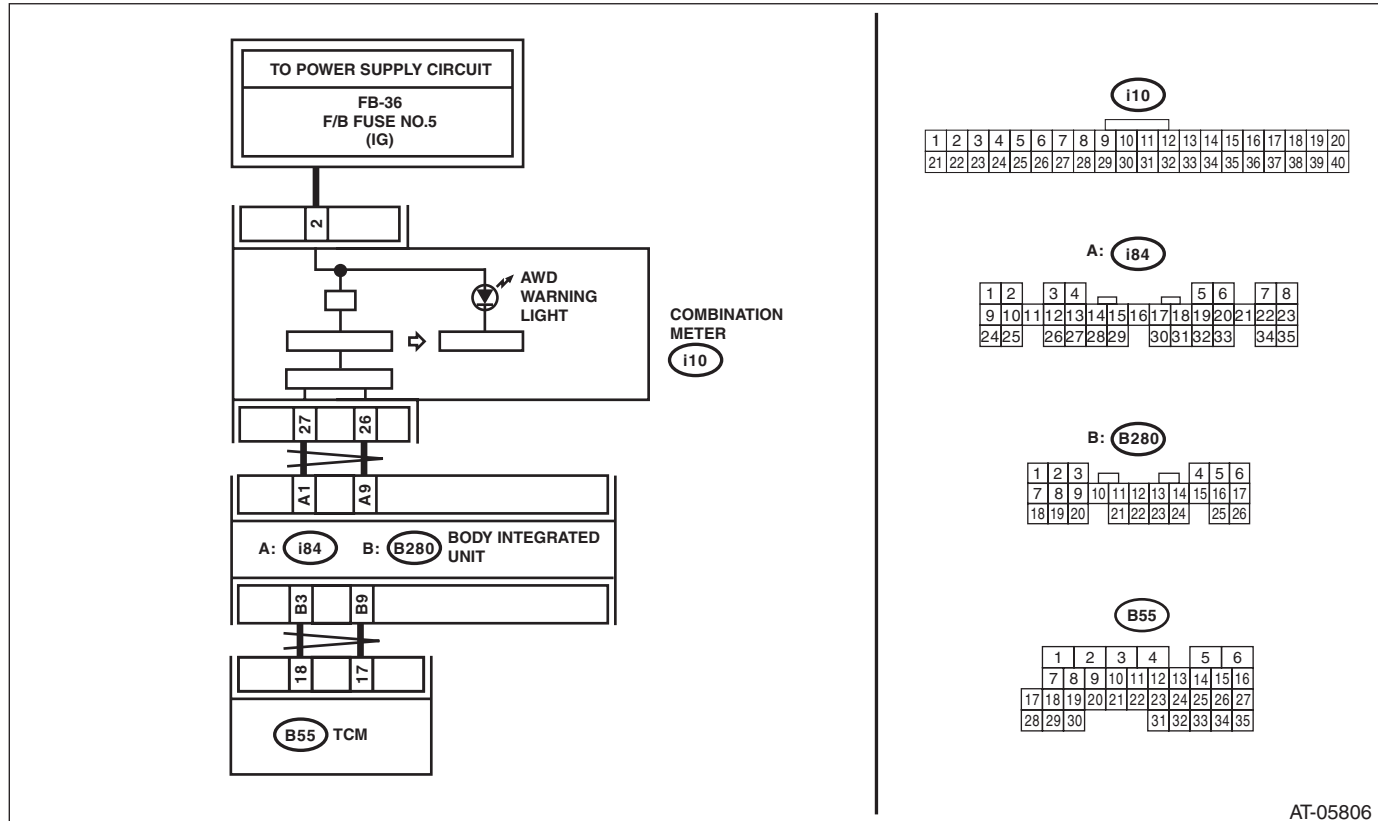
DIAGNOSIS:

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

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



AT-05806

Step	Check	Yes	No
1 CHECK AWD LIGHT. Turn the ignition switch to ON.	Does the AWD light illuminate?	Go to step 2.	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>
2 CHECK AWD LIGHT. Start the engine.	Does AWD light go off after two seconds from engine start?	Current condition is normal. Go back to Basic Diagnostic Procedure. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>	Go to step 3.
3 CHECK DTC.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step 4.

AWD Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK COMBINATION METER. Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is there any trouble with the combination meter?	Repair the combination meter.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>

Diagnostic Procedure for Subaru Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

14. Diagnostic Procedure for Subaru Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

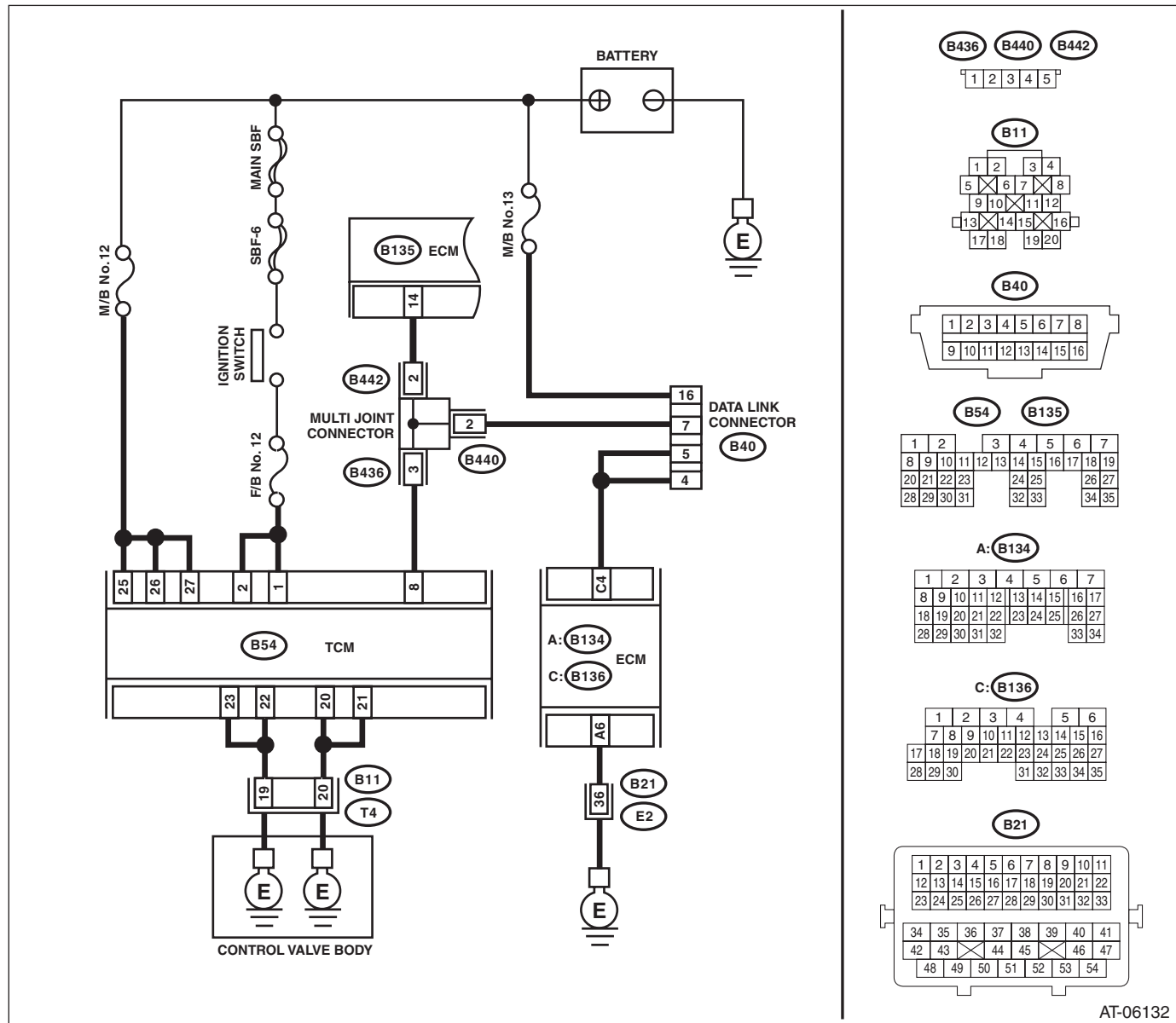
DIAGNOSIS:

Defective harness connector

TROUBLE SYMPTOM:

Subaru Select Monitor communication failure

WIRING DIAGRAM:



AT-06132

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.

Diagnostic Procedure for Subaru Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT. Measure the voltage between data link connector and chassis ground. Connector & terminal (B40) No. 16 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 3.	Repair harness connector between the battery and data link connector, and poor contact of the connector.
3 CHECK SUBARU SELECT MONITOR GROUND CIRCUIT. 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between data link connector and ECM. Connector & terminal (B40) No. 4 — (B136) No. 4: (B40) No. 5 — (B136) No. 4:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit 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. 16 — Chassis ground:	Is the resistance 1 M Ω 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) Check communication with the transmission.	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) Turn the ignition switch to ON. 4) Check communication with the engine system.	Is the name of system displayed on Subaru Select Monitor?	Go to step 9.	Go to step 8.
8 CHECK OUTPUT SIGNAL OF TCM. 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM. 3) Disconnect the connectors from control modules connected to the data link connector (B40) No. 7, excluding TCM and ECM. CAUTION: When disconnecting the connector from airbag control module, always follow the precautions on AB section. <Ref. to AB-5, CAUTION, General Description.> 4) Turn the ignition switch to ON. 5) Check communication with the transmission system.	Is the name of system displayed on Subaru Select Monitor?	Check each control module.	Go to step 9.

Diagnostic Procedure for Subaru Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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 all control modules connected to the data link connector (B40) No. 7. 3) Measure the resistance between TCM connector and chassis ground. Connector & terminal (B40) No. 7 — Chassis ground:	Is the resistance 1 M Ω 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. 7 (+) — Chassis ground (-):	Is the voltage 1 V or more?	Check harness and connector between each control module and data link connector.	Go to step 11.
11 CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure the resistance between TCM connector and data link connector. Connector & terminal (B40) No. 7 — (B54) No. 8:	Is the resistance less than 1 Ω ?	Go to step 12.	Check the harness and connector between TCM and data link connector.
12 CHECK INSTALLATION OF TRANSMISSION HARNESS CONNECTOR.	Is the transmission harness connector connected to bulk-head harness connector?	Go to step 13.	Connect the bulk-head harness connector to transmission harness connector.
13 CHECK POOR CONTACT OF CONNECTORS.	Is there poor contact of control module power supply and data link connector?	Repair the poor contact.	Go to step 14.
14 CHECK TCM POWER SUPPLY. 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. 25 (+) — Chassis ground (-): (B54) No. 26 (+) — Chassis ground (-): (B54) No. 27 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 16.	Go to step 15.
15 CHECK M/B 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. If the replaced fuse has blown out easily, repair short circuit of harness between fuse and TCM.	Repair the open circuit of harness between fuse and TCM, or fuse and battery, and poor contact of the connector.
16 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON. 2) Measure the ignition power supply voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 1 (+) — Chassis ground (-): (B54) No. 2 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 18.	Go to step 17.

Diagnostic Procedure for Subaru Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
17 CHECK F/B FUSE (NO. 12). Remove the fuse (No. 12).	Is the fuse (No. 12) blown out?	Replace the fuse. If the replaced fuse has blown out easily, repair short circuit of harness between fuse and TCM.	Repair the open circuit of harness between fuse and TCM, or fuse 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 connector and transmission connector. Connector & terminal (B54) No. 20 — (B11) No. 20: (B54) No. 21 — (B11) No. 20: (B54) No. 22 — (B11) No. 19: (B54) No. 23 — (B11) No. 19:	Is the 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 harness between transmission connector and transmission ground. Connector & terminal (T4) No. 19 — Transmission ground: (T4) No. 20 — Transmission ground:	Is the 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 OF CONNECTORS.	Is there poor contact of TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>

List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

15. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction or short circuit	<Ref. to 4AT(diag)-34, 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)-41, 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)-43, 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)-45, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Brake Switch Circuit Low	Brake switch malfunction, open input signal circuit	<Ref. to 4AT(diag)-47, 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)-50, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Brake Switch Circuit High	Brake switch malfunction, shorted input signal circuit	<Ref. to 4AT(diag)-52, DTC P0724 BRAKE SWITCH CIRCUIT HIGH, 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)-54, 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)-54, 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)-54, 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)-54, 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).>

List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DTC	Item	Content of diagnosis	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)-63, 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)-65, 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)-68, 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)-71, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, 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)-73, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	AT CAN Communication Circuit	CAN communication circuit is open or shorted.	<Ref. to 4AT(diag)-74, DTC P1718 AT CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	Sports Mode Switch Circuit (Manual Switch)	SPORT shift switch is faulty or input signal circuit is open or shorted.	<Ref. to 4AT(diag)-75, DTC P1817 SPORTS MODE SWITCH CIRCUIT (MANUAL SWITCH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

16.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

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

DTC DETECTING CONDITION:

- Inhibitor switch is faulty.
- Multiple range signals are input at a time.
- No range signal is input.

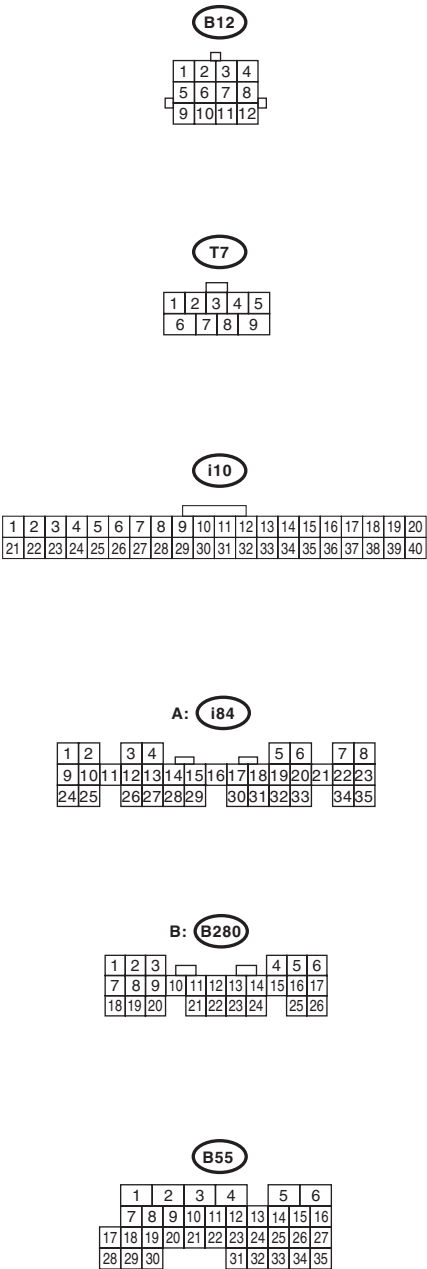
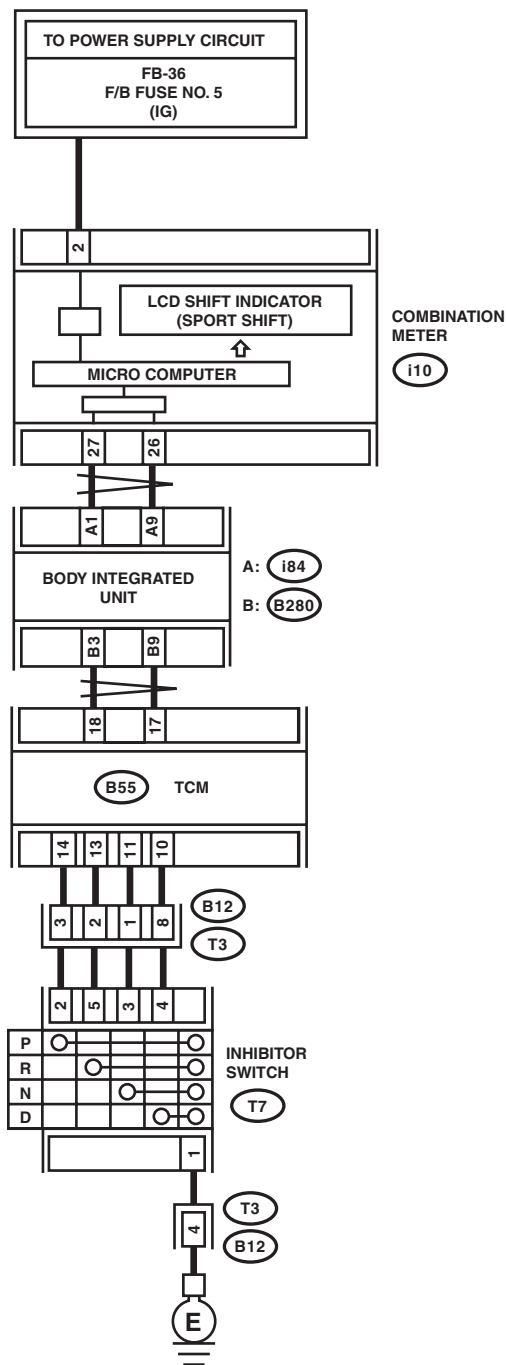
TROUBLE SYMPTOM:

The range position of the select lever and the select indicator light on the combination meter do not match.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



AT-04752

Step	Check	Yes	No
1	CHECK INDICATOR LIGHT. 1) Turn the ignition switch to ON. 2) Shift the select lever to "P" range.	Go to step 2.	Go to step 6.
2	CHECK INDICATOR LIGHT. Set the select lever to "R" range.	Go to step 20.	Go to step 3.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK INDICATOR LIGHT. Shift the select lever to "P" range.	Does the combination meter "R" range indicator light illuminate?	Go to step 27.	Go to step 4.
4 CHECK INDICATOR LIGHT.	Does the combination meter "N" range indicator light illuminate?	Go to step 34.	Go to step 5.
5 CHECK INDICATOR LIGHT.	Does the combination meter "D" range indicator light illuminate?	Go to step 41.	Go to step 7.
6 CHECK "P" RANGE SWITCH. Read the data of "P range" using Subaru Select Monitor.	Is "ON" displayed?	Go to step 17.	Go to step 13.
7 CHECK INDICATOR LIGHT. Set the select lever to "R" range.	Does the combination meter "R" range indicator light illuminate?	Go to step 9.	Go to step 8.
8 CHECK "R" RANGE SWITCH. Read the data of "R range" using Subaru Select Monitor.	Is "ON" displayed?	Go to step 24.	Go to step 21.
9 CHECK INDICATOR LIGHT. Set the select lever to "N" range.	Does the combination meter "N" range indicator light illuminate?	Go to step 11.	Go to step 10.
10 CHECK "N" RANGE SWITCH. Read the data of "N range" using Subaru Select Monitor.	Is "ON" displayed?	Go to step 31.	Go to step 28.
11 CHECK INDICATOR LIGHT. Set the select lever to "D" range.	Does the combination meter "D" range indicator light illuminate?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 12.
12 CHECK "D" RANGE SWITCH. Read the data of "D range" using Subaru Select Monitor.	Is "ON" displayed?	Go to step 38.	Go to step 35.
13 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. 1 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 14.	Repair the open circuit of harness between inhibitor switch and chassis ground, and poor contact of the connector.
14 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. 2:	Is the resistance less than 1 Ω ?	Go to step 15.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
15 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 16.	Go to step 42.
16 CHECK INPUT SIGNAL FOR TCM. 1) Set the select lever to other than "P" range. 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 42.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
17 CHECK BODY INTEGRATED UNIT. Read the data of "Shift Position" using Subaru Select Monitor. <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is "7" displayed?	Go to step 18.	Check body integrated unit.
18 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 19.
19 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 42.	Replace the combination meter assembly. <Ref. to IDI-14, Combination Meter.>
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 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.
21 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. 5:	Is the resistance less than 1 Ω?	Go to step 22.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
22 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) Set 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 23.	Go to step 42.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
23 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 42.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
24 CHECK BODY INTEGRATED UNIT. Read the data of "Shift Position" using Subaru Select Monitor. <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is "6" displayed?	Go to step 25.	Check body integrated unit.
25 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 26.
26 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 42.	Replace the combination meter assembly. <Ref. to IDI-14, Combination Meter.>
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 harness between TCM connector and chassis ground. Connector & terminal (B55) No. 13 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 42.	Repair ground short circuit in "R" range circuit.
28 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. 3:	Is the resistance less than 1 Ω?	Go to step 29.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
29 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) Set 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 30.	Go to step 42.
30 CHECK INPUT SIGNAL FOR TCM. 1) Shift the select lever to 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 42.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
31 CHECK BODY INTEGRATED UNIT. Read the data of "Shift Position" using Subaru Select Monitor. <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is "5" displayed?	Go to step 32.	Check body integrated unit.
32 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 33.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
33 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 42.	Replace the combination meter assembly. <Ref. to IDI-14, Combination Meter.>
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 harness between TCM connector and chassis ground. Connector & terminal (B55) No. 11 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 42.	Repair the ground short circuit in "N" range circuit.
35 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. 4:	Is the resistance less than 1 Ω?	Go to step 36.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
36 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) Set 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 37.	Go to step 42.
37 CHECK INPUT SIGNAL FOR TCM. 1) Shift the select lever to 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 42.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
38 CHECK BODY INTEGRATED UNIT. Read the data of "Shift Position" using Subaru Select Monitor. <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is "4" displayed?	Go to step 39.	Check body integrated unit.
39 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 40.
40 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 42.	Replace the combination meter assembly. <Ref. to IDI-14, Combination Meter.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
41 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 harness between TCM connector and chassis ground. Connector & terminal (B55) No. 10 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 42 .	Repair ground short circuit in "D" range circuit.
42 CHECK FOR POOR CONTACT.	Is there poor contact of the inhibitor switch circuit?	Repair the poor contact.	Go to step 43 .
43 CHECK INHIBITOR SWITCH.	Is the inhibitor switch in the normal position?	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to 4AT-45, Inhibitor Switch.> <Ref. to CS-24, Select Cable.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

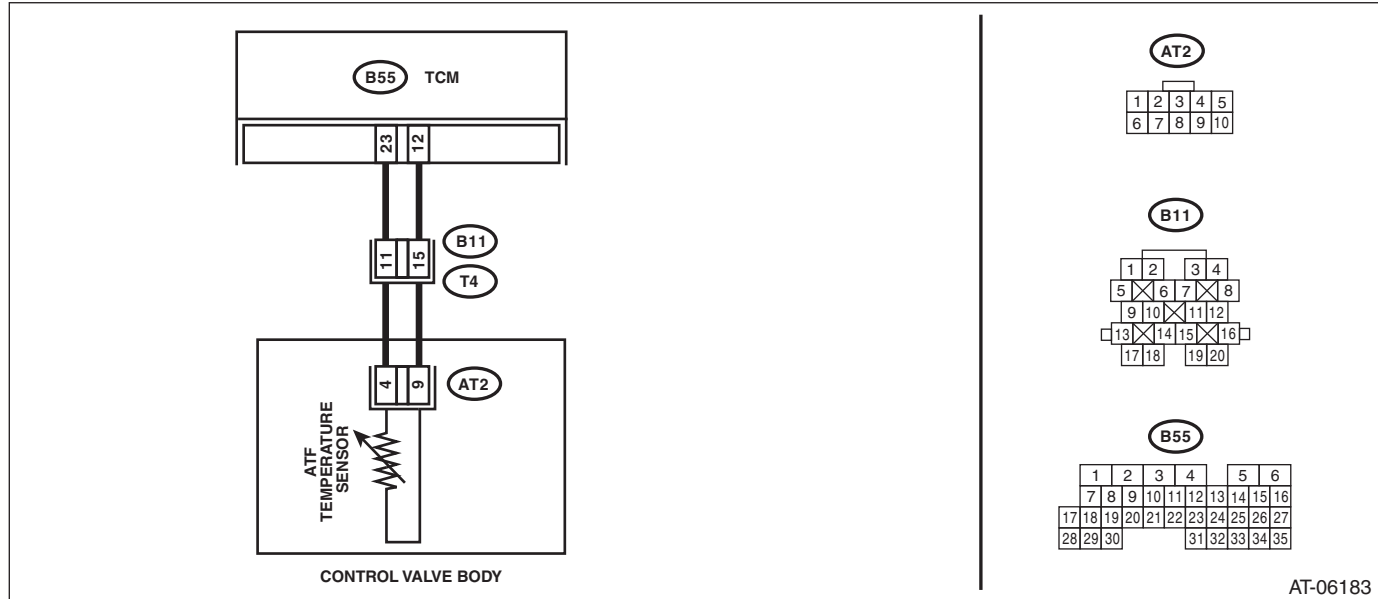
DTC DETECTING CONDITION:

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 connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. Connector & terminal (B55) No. 12 — (B11) No. 15: (B55) No. 23 — (B11) No. 11:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
2 CHECK ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Connect the connectors to TCM and transmission. 3) Start the engine. 4) Warm up the transmission until the ATF temperature exceeds 80°C (176°F). 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 15:	Is the resistance 300 — 800 Ω ?	Go to step 3.	Go to step 5.
3 CHECK ATF TEMPERATURE SENSOR. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 15:	Does the resistance value increase gradually while the ATF temperature decreases?	Go to step 4.	Go to step 5.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK INPUT SIGNAL FOR TCM. 1) Connect the connector to transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Read the data of "ATF Temp." using the Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Check for poor contact of the ATF temperature sensor and transmission connector harness, and repair the fault location.	Go to step 6.
5 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. 5) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance of harness between ATF temperature sensor and transmission connector. Connector & terminal (T4) No. 11 — (AT2) No. 4: (T4) No. 15 — (AT2) No. 9:	Is the resistance less than 1 Ω ?	Replace the control valve body. <Ref. to 4AT-54, Control Valve Body.>	Repair the open circuit of harness between ATF temperature sensor and transmission connector.
6 CHECK FOR POOR CONTACT.	Is there poor contact of ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

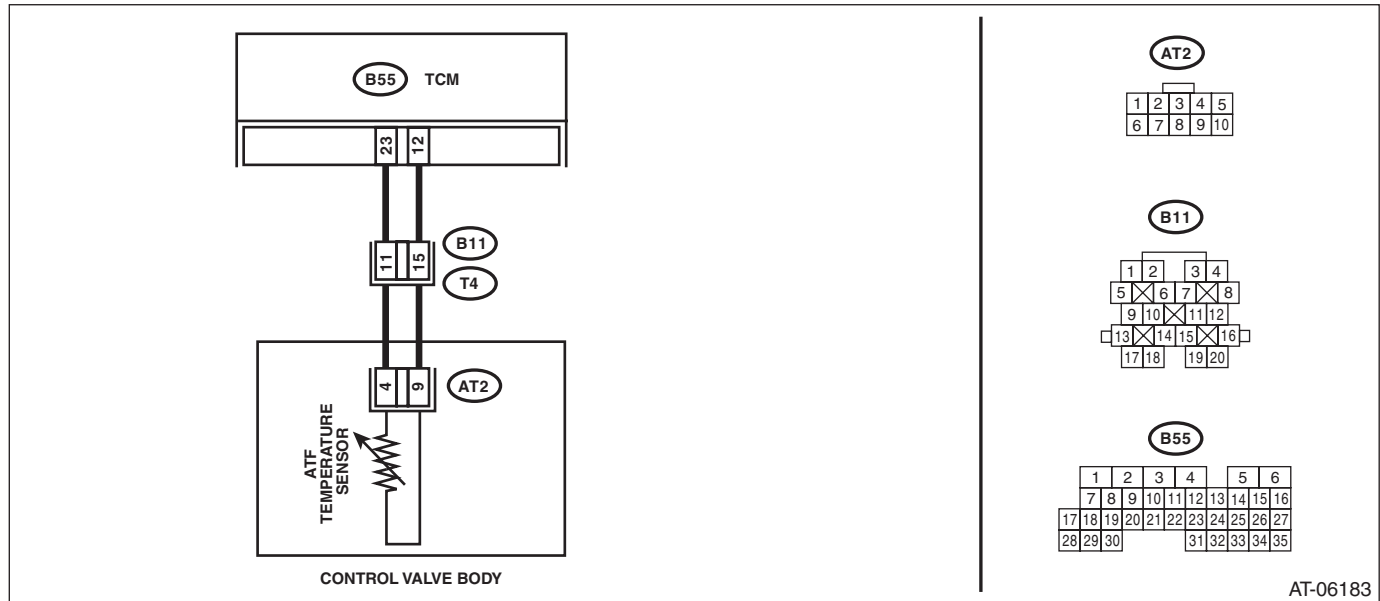
DTC DETECTING CONDITION:

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 (B55) 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 (B55) No. 23 — Chassis ground:	Is the resistance 1 M Ω 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 (B55) No. 23 — No. 12:	Does the resistance change?	Go to step 4.	Replace the TCM. <Ref. to 4AT-58, 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 (B55) No. 12 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 5.	Repair the short circuit of harness between TCM and transmission harness.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 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?	Check short circuits in harnesses or connectors, and repair the defective part.	Go to step 6.
6 CHECK TRANSMISSION HARNESS. 1) Lift up the vehicle. 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 the control valve body. 5) Measure the resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 11 — Transmission ground: (T4) No. 15 — Transmission ground:	Is the resistance 1 M Ω or more?	Go to step 7.	Replace the transmission harness.
7 CHECK ATF TEMPERATURE SENSOR. Measure the resistance between control valve connector terminals. Connector & terminal (AT2) No. 4 — No. 9:	Is the resistance 500 Ω or more?	Check short circuits in harnesses or connectors, and repair the defective part.	Replace the control valve body. <Ref. to 4AT-54, Control Valve Body.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

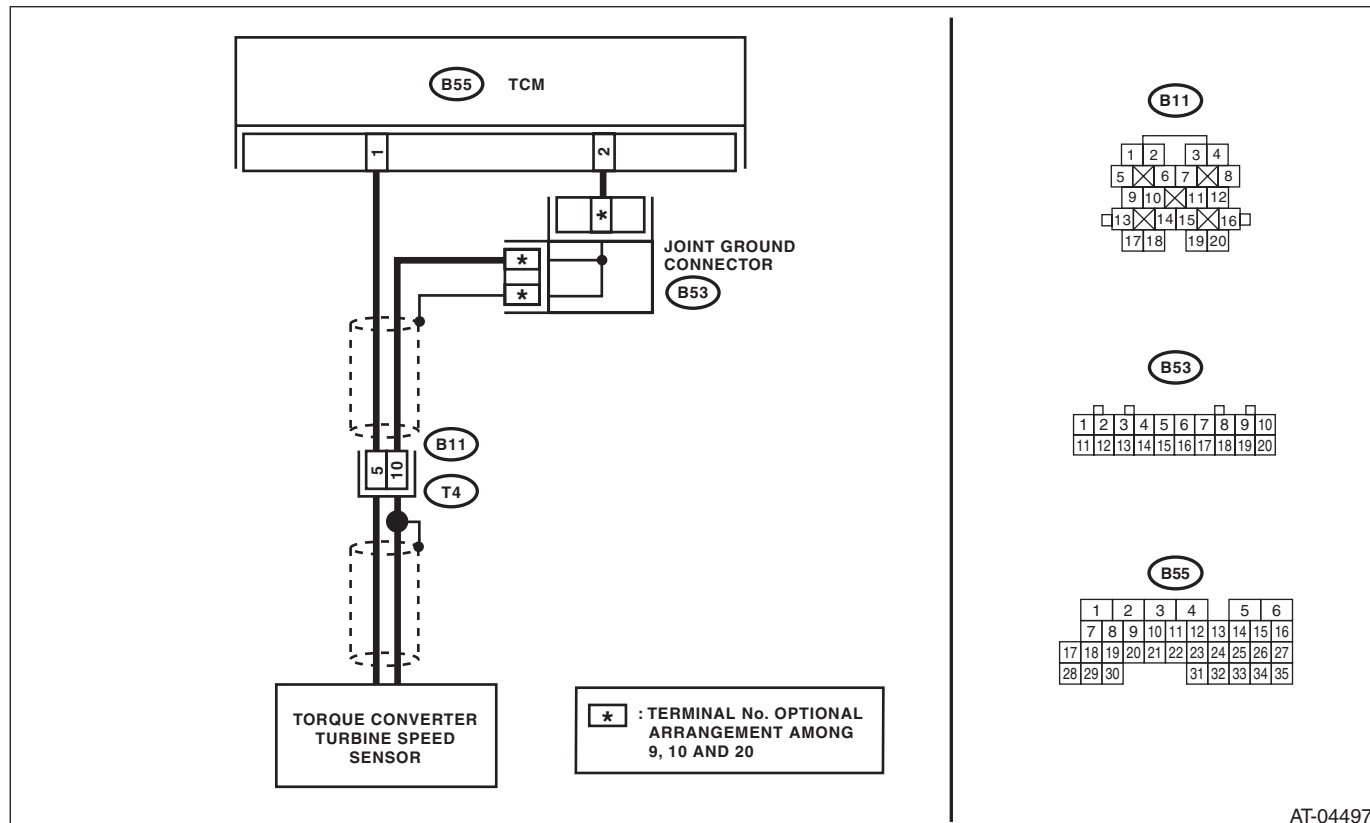
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



AT-04497

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 450 — 650 Ω ?	Go to step 2.	Replace the torque converter turbine speed sensor. <Ref. to 4AT-51, 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 (B55) No. 1 — (B11) No. 5: (B55) No. 2 — (B11) No. 10:	Is the 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 chassis ground. Connector & terminal (B55) No. 1 — Chassis ground: (B55) No. 2 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK INPUT SIGNAL FOR TCM. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Start the engine. 6) Move the select lever to "P" or "N" range. 7) Read the data of "Turbine Revolution Speed" and "Engine Speed" using Subaru Select Monitor.	Are the "Turbine Revolution Speed" and "Engine Speed" almost the same?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 5.
5 CHECK FOR POOR CONTACT.	Is there poor contact of torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

E: DTC P0719 BRAKE SWITCH CIRCUIT LOW

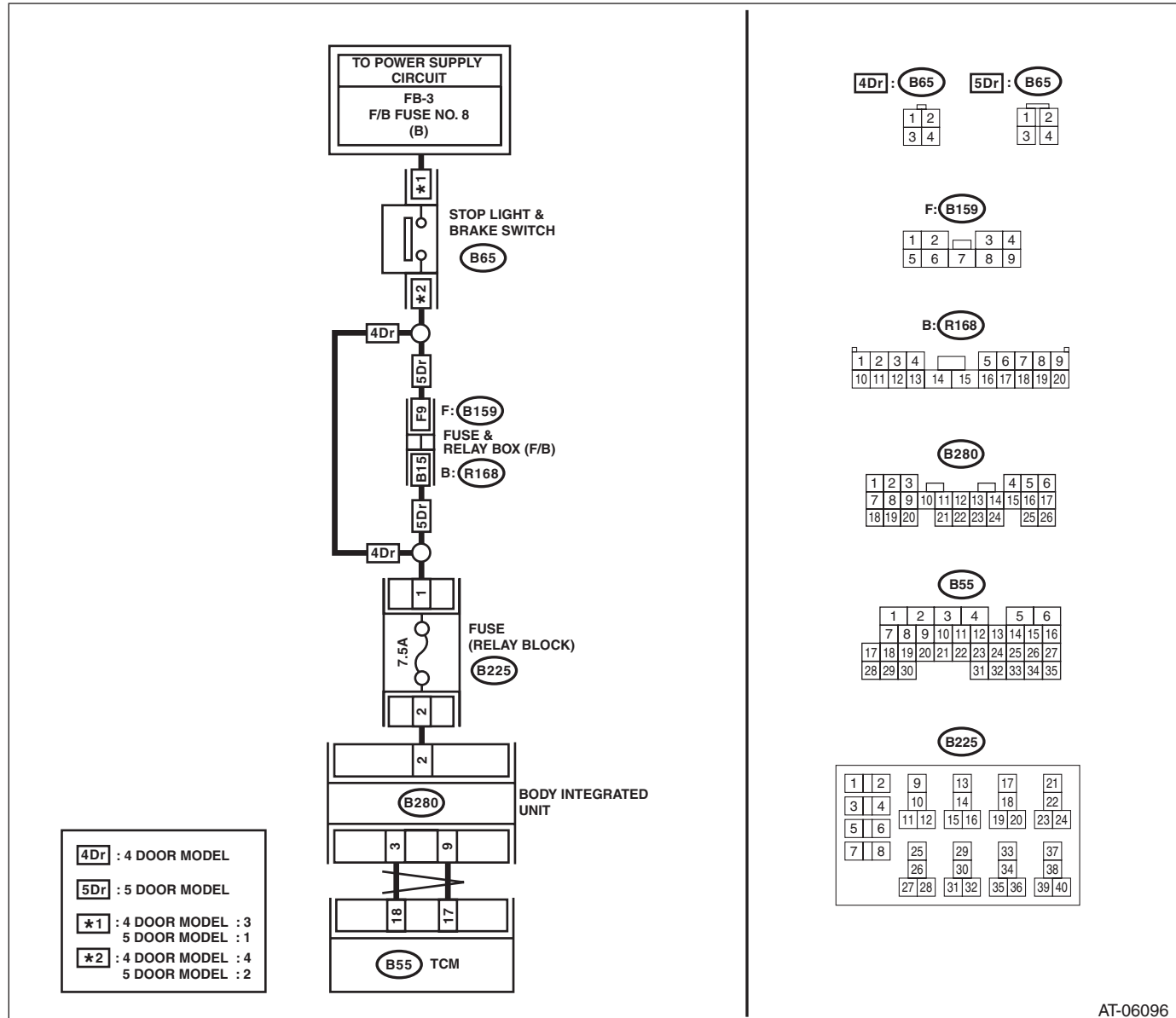
DTC DETECTING CONDITION:

Brake switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

- Gear is not shifted down when driving a down hill.
- Neutral control does not operate.

WIRING DIAGRAM:



Step	Check	Yes	No
1	CHECK DTC.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.
			Go to step 2.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 new fuse (No. 8) has blown out easily, repair the short circuit of harness between fuse (No. 8) and stop light switch.	Go to step 3.
3 CHECK FUSE (RELAY BLOCK). 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) blows out easily, repair the short circuit in the harness between the fuse (7.5A) and body integrated unit.	Go to step 4.
4 CHECK BODY INTEGRATED UNIT. 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Depress the brake pedal. 6) Read the data of "Stop Light Switch" using Subaru Select Monitor. <Ref. to LAN(diag)-15, 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?	Check for poor contact in connectors or harnesses, and repair the defective part.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
6 CHECK BODY INTEGRATED UNIT INPUT SIGNAL. 1) Disconnect the connector from body integrated unit. 2) Depress the brake pedal. 3) Measure the voltage of harness between the body integrated unit and chassis ground. Connector & terminal (B280) No. 2 (+) — Chassis ground (-):	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 4 door model (B280) No. 2 — (B65) No. 4: 5 door model (B280) No. 2 — (B65) No. 2:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair the open circuit of harness between body integrated unit and stop light switch.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH. Measure the harness resistance between the body integrated unit and chassis ground. Connector & terminal (B280) No. 2 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 9.	Repair the short circuit of harness between body integrated unit and stop light switch.
9 CHECK FOR POOR CONTACT.	Is there poor contact of input signal of brake switch?	Repair the poor contact.	Check body integrated unit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

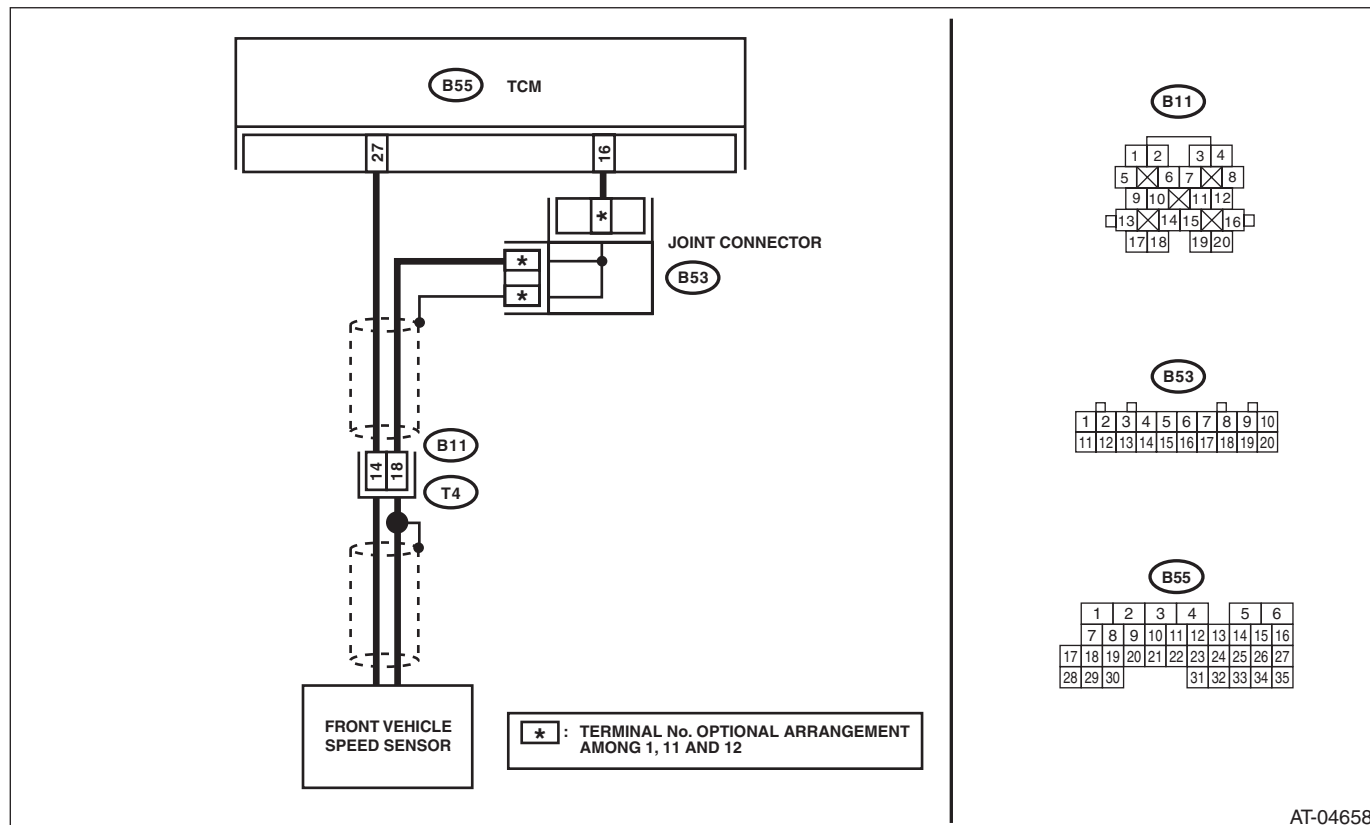
DTC DETECTING CONDITION:

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

TROUBLE SYMPTOM:

- Neutral control does not operate.
- Slip lock-up control does not operate.
- Driving performance is poor.

WIRING DIAGRAM:



AT-04658

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. 16 — (B11) No. 18: (B55) No. 27 — (B11) No. 14:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector, and poor contact of the connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 16 — Chassis ground: (B55) No. 27 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and chassis ground, and poor contact of connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK FRONT VEHICLE SPEED SENSOR. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 14 — No. 18:	Is the resistance 450 — 650 Ω ?	Go to step 4.	Replace the front vehicle speed sensor. <Ref. to 4AT-48, Front Vehicle Speed Sensor.>
4 CHECK INPUT SIGNAL FOR TCM. 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Lift up the vehicle. 4) Turn the ignition switch to ON. 5) Run the Subaru Select Monitor. 6) Start the engine. 7) Slowly increase the vehicle speed to 60 km/h (37 MPH). 8) Read the data of "front wheel speed" using Subaru Select Monitor. (Compare the speedometer with Subaru Select Monitor indications.) NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Check the harness of the front vehicle speed sensor circuit, and repair the defective part.	Go to step 5.
5 CHECK FOR POOR CONTACT.	Is there poor contact of front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

G: DTC P0724 BRAKE SWITCH CIRCUIT HIGH

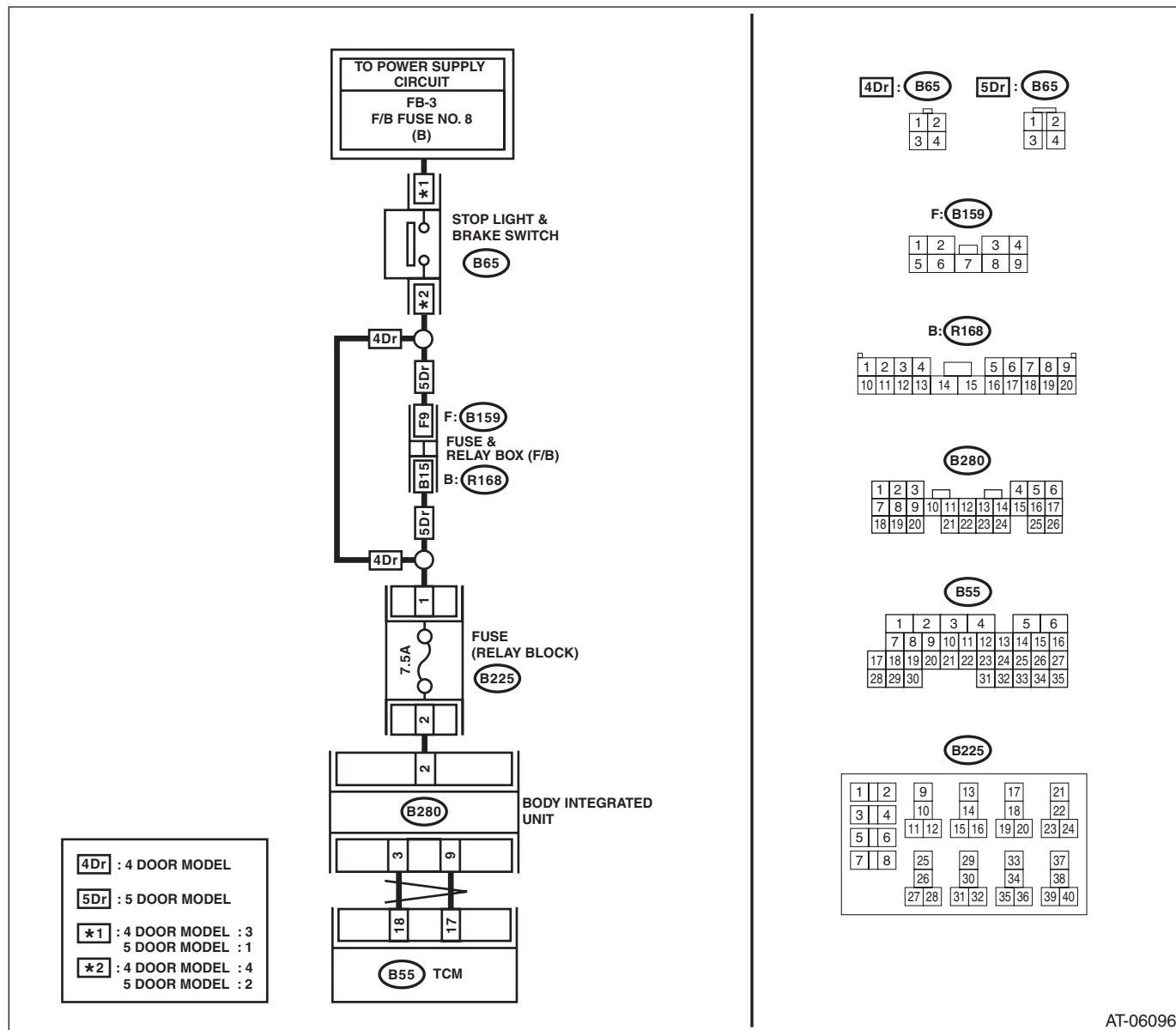
DTC DETECTING CONDITION:

Brake switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

- Gear is not shifted down when driving a down hill.
- Neutral control does not operate.

WIRING DIAGRAM:



Step	Check	Yes	No
1	CHECK DTC.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.
		Go to step 2.	

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK BODY INTEGRATED UNIT. 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Read the data of "Stop Light Switch" using Subaru Select Monitor. <Ref. to LAN(diag)-15, 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?	Check for poor contact in connectors or harnesses, and repair the defective part.	Replace the TCM. <Ref. to 4AT-58, 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 (B280) No. 2 (+) — 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 4 door model: (B65) No. 3 — No. 4: 5 door model: (B65) No. 1 — No. 2:	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 (B280) No. 2 (+) — 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 FOR POOR CONTACT.	Is there poor contact of input signal of brake switch?	Repair the poor contact.	Check body integrated unit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

H: 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).>

I: 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).>

J: 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).>

K: 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).>

L: 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 THROTTLE OPENING ANGLE SENSOR. Read the diagnostic trouble code (DTC) of engine using Subaru Select Monitor. <Ref. to EN(H4SO)(diag)-86, List of Diagnostic Trouble Code (DTC).>	Is DTC P0122, P0123, P0222, P0223, P2109 and P2135 displayed?	Perform the diagnosis according to DTC.	Go to step 2.
2 CHECK DTC.	Is DTC P1718 displayed?	Perform the diagnosis according to DTC.	Go to step 3.
3 CHECK AT VEHICLE SPEED SENSOR CIRCUIT. Perform the diagnosis according to DTC P0720. <Ref. to 4AT(diag)-50, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the harness of the front vehicle speed sensor circuit, and repair the defective part.	Go to step 4.
4 CHECK AT TURBINE REVOLUTION SPEED SENSOR CIRCUIT. Perform the diagnosis according to DTC P0715. <Ref. to 4AT(diag)-45, DTC P0715 INPUT/ TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the torque converter turbine speed sensor circuit.	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

M: 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 ENGINE SPEED SIGNAL. 1) Idle the engine. 2) Read the data of "Engine Speed" using Subaru Select Monitor.	Does the value of "Engine Speed" almost match the value of the tachometer located in the combination meter?	Go to step 2.	Check the engine speed signal circuit.
2	CHECK AT TURBINE REVOLUTION SPEED SENSOR CIRCUIT. Perform the diagnosis according to DTC P0715. <Ref. to 4AT(diag)-45, DTC P0715 INPUT/ TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the torque converter turbine speed sensor circuit.	Go to step 3.
3	CHECK AT VEHICLE SPEED SENSOR CIRCUIT. Perform the diagnosis according to DTC P0720. <Ref. to 4AT(diag)-50, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the harness of the front vehicle speed sensor circuit, and repair the defective part.	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

N: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

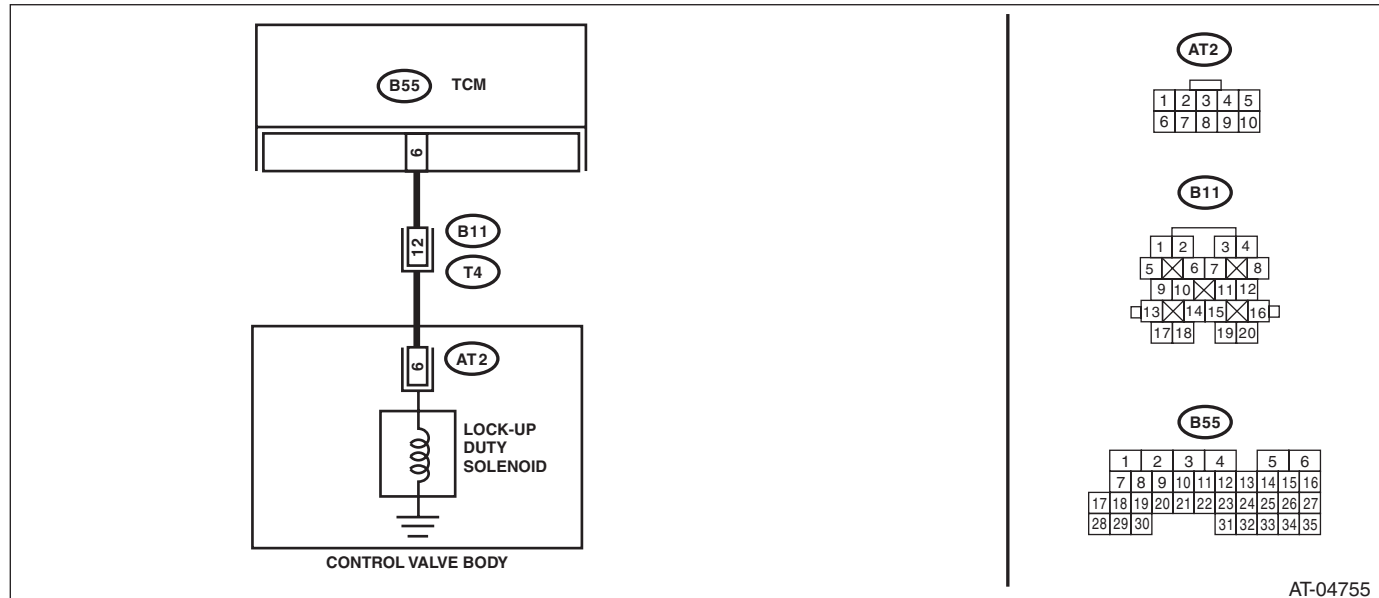
DTC DETECTING CONDITION:

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.	Are DTCs other than P0743 displayed?	Perform the diagnosis according to DTC.
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 (B55) No. 6 — (B11) No. 12:	Is the resistance less than 1 Ω?	Go to step 3.
3	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?	Repair the open 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 2.0 — 6.0 Ω?	Repair the short circuit of harness between TCM and transmission connector.
		Go to step 5.	Go to step 8.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 CHECK OUTPUT SIGNAL OF TCM. 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle. 3) Run the Subaru Select Monitor. 4) Start the engine. NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Shift the select lever to "D" range, and slowly increase vehicle speed to 60 km/h (37 MPH). 6) Read the data of "Lock Up Duty Ratio" using Subaru Select Monitor. NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Is the measured value 95%?	Go to step 6.	Go to step 7.
6 CHECK OUTPUT SIGNAL OF TCM. 1) Return the engine speed to idle. 2) Set the select lever to "N" range. 3) Read the data of "Lock Up Duty Ratio" using Subaru Select Monitor. NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Is the measured value 0%?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 7.
7 CHECK FOR POOR CONTACT.	Is there poor contact of lock-up duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, 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. 4) Disconnect the connector from the control valve body. 5) Measure the resistance between lock-up duty solenoid and transmission ground. Connector & terminal (AT2) No. 6 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω?	Go to step 9.	Replace the control valve body. <Ref. to 4AT-54, Control Valve Body.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between lock-up duty solenoid and transmission connector. <i>Connector & terminal</i> <i>(T4) No. 12 — (AT2) No. 6:</i>	Is the 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. <i>Connector & terminal</i> <i>(T4) No. 12 — Transmission ground:</i>	Is the resistance 1 M Ω or more?	Check the harnesses or connectors between lock-up duty solenoid and transmission, and repair the defective part.	Repair the short circuit of harness between lock-up duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

O: DTC P0748 PRESSURE CONTROL SOLENOID “A” ELECTRICAL

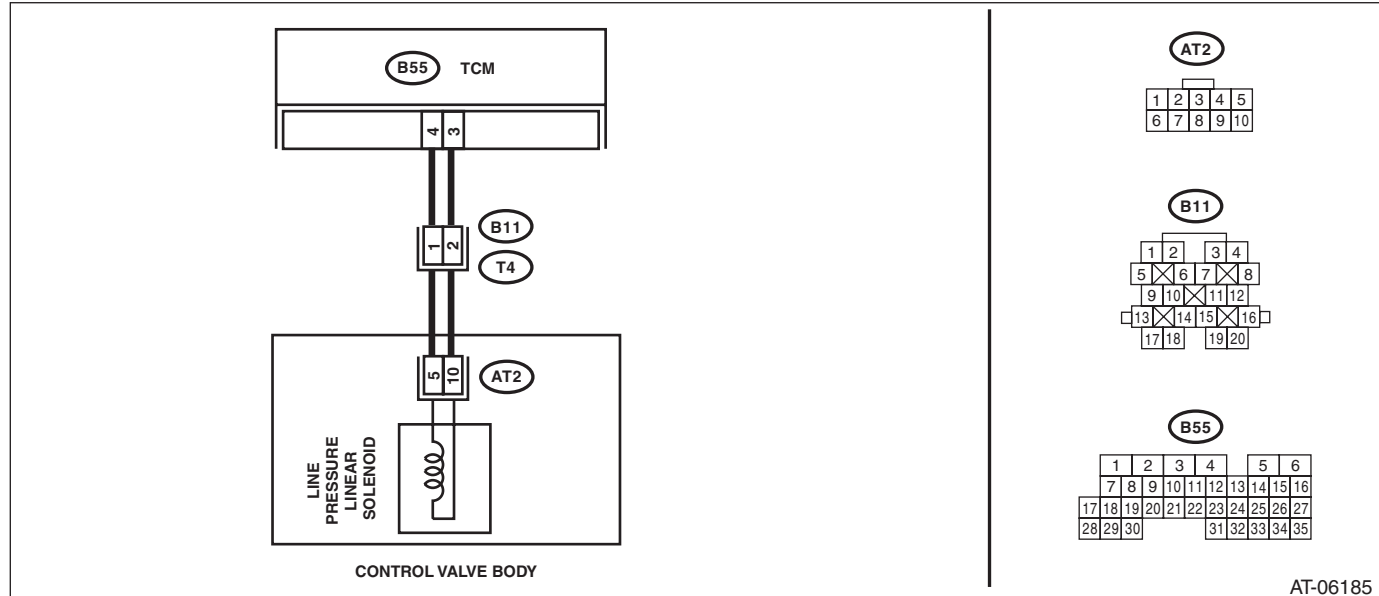
DTC DETECTING CONDITION:

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 connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. Connector & terminal (B55) No. 3 — (B11) No. 2: (B55) No. 4 — (B11) No. 1:	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. 3 — Chassis ground: (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 LINE PRESSURE LINEAR SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 1 — No. 2:	Is the resistance 4.0 — 8.0 Ω?	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>	Go to step 4.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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. 4) Disconnect the connector from the control valve body. 5) Measure the resistance of line pressure linear solenoid connector terminals. Connector & terminal (AT2) No. 5 — No. 10:	Is the resistance 4.0 — 8.0 Ω ?	Go to step 5.	Replace the control valve body. <Ref. to 4AT-54, 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. 1 — (AT2) No. 5: (T4) No. 2 — (AT2) No. 10:	Is the 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 M Ω or more?	Check the harnesses or connectors between line pressure linear solenoid and transmission, and repair the defective part.	Repair the short circuit of harness between line pressure linear solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

P: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

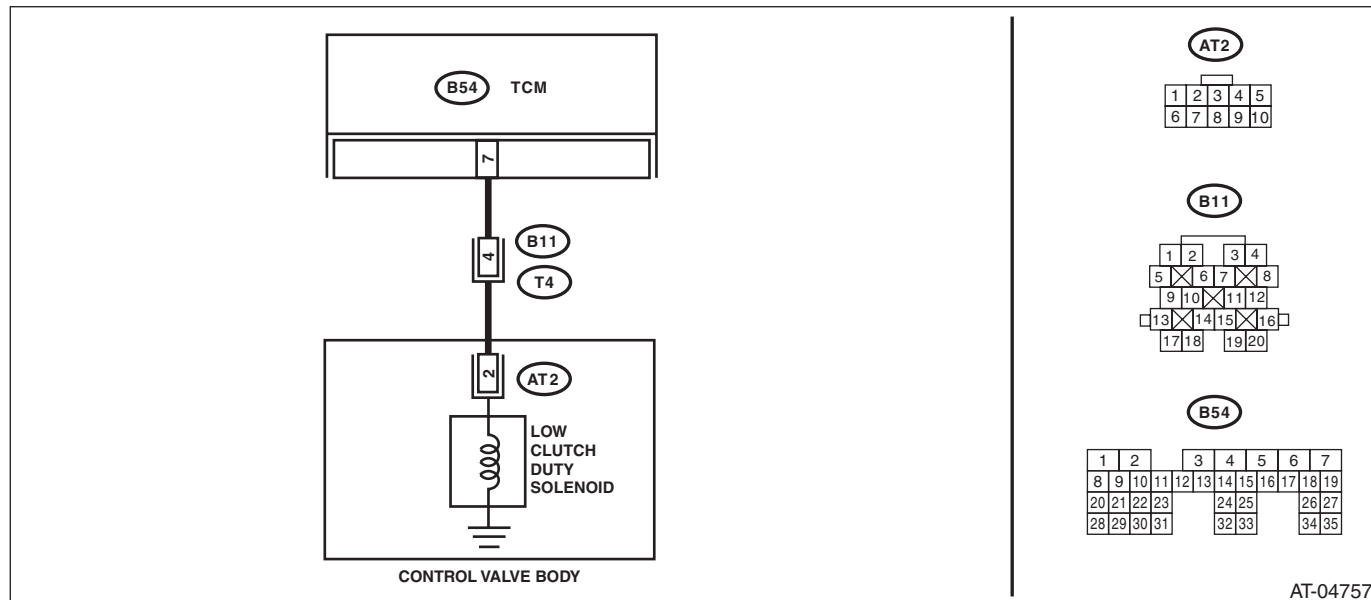
DTC DETECTING CONDITION:

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 connector and transmission connector. Connector & terminal (B54) No. 7 — (B11) No. 4:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and transmission ground. Connector & terminal (B54) 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 2.0 — 6.0 Ω?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL OF TCM. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine. 4) Run the Subaru Select Monitor. 5) Warm up the transmission until the ATF temperature exceeds approximately 80°C (176°F). 6) Stop the engine. 7) Turn the ignition switch to ON. 8) Shift the select lever to "P" or "N" range, and depress the accelerator pedal. 9) Read the data of "Low Clutch Duty" using Subaru Select Monitor.	Is the measured value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL OF TCM. 1) Turn the ignition switch to ON. 2) Set the select lever to "D" range. 3) Read the data of "Low Clutch Duty" using Subaru Select Monitor.	Is the measured value 0%?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 6.
6 CHECK FOR POOR CONTACT.	Is there poor contact of low clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
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. 4) Disconnect the connector from the control valve body. 5) Measure the resistance between low clutch duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 2 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-54, 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 — (AT2) No. 2:	Is the 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?	Check the harnesses or connectors between low clutch duty solenoid and transmission, and repair the defective part.	Repair the short circuit of harness between low clutch duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Q: DTC P0758 SHIFT SOLENOID “B” ELECTRICAL

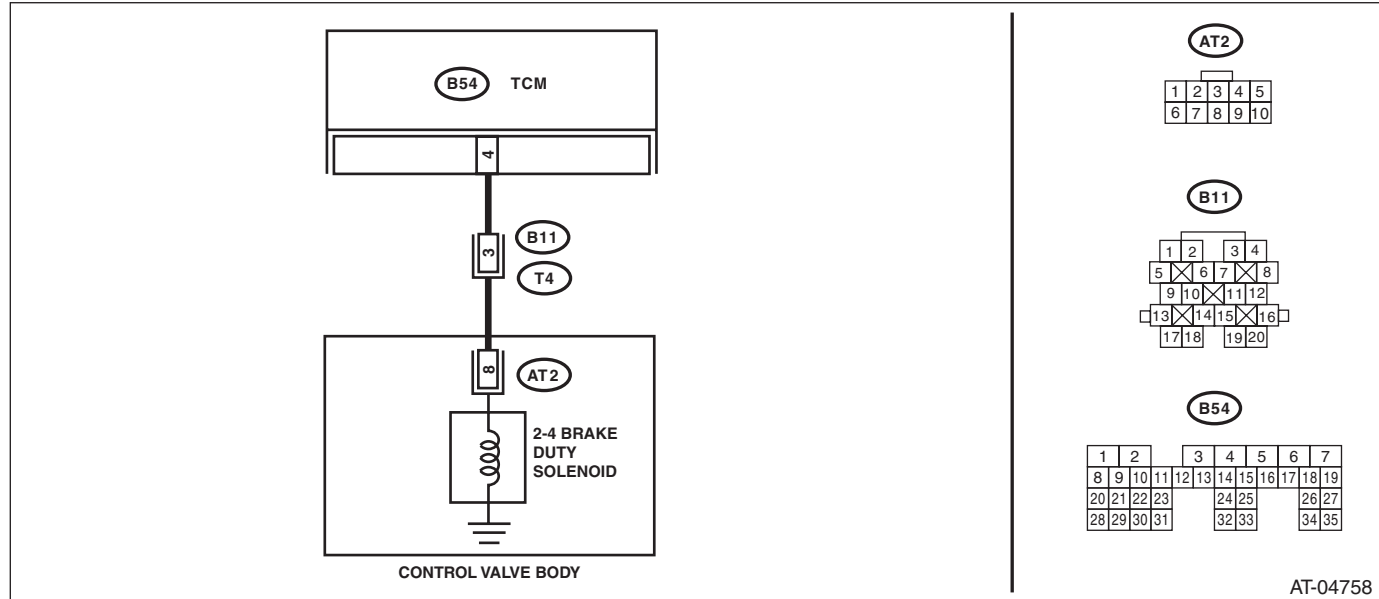
DTC DETECTING CONDITION:

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 (B54) No. 4 — (B11) No. 3:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (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 2-4 BRAKE DUTY SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 3 — No. 20:	Is the resistance 2.0 — 6.0 Ω?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL OF TCM. 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine. 4) Run the Subaru Select Monitor. 5) Warm up the transmission until the ATF temperature exceeds approximately 80°C (176°F). 6) Stop the engine. 7) Turn the ignition switch to ON. 8) Shift the select lever to "N", and depress the accelerator pedal. 9) Read the data of "Brake Clutch Duty Ratio" using Subaru Select Monitor.	Is the measured value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL OF TCM. 1) Shift the select lever to "D" range. (2nd gear in manual mode). 2) Read the data of "Brake Clutch Duty Ratio" using Subaru Select Monitor.	Is the measured value 0%?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 6.
6 CHECK FOR POOR CONTACT.	Is there poor contact of 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
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. 4) Disconnect the connector from the control valve body. 5) Measure the resistance of harness between 2-4 brake duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 8 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-54, 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 — (AT2) No. 8:	Is the 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?	Check the harnesses or connectors between 2-4 brake duty solenoid and transmission, and repair the defective part.	Repair the short circuit of harness between 2-4 brake duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

R: DTC P0763 SHIFT SOLENOID “C” ELECTRICAL

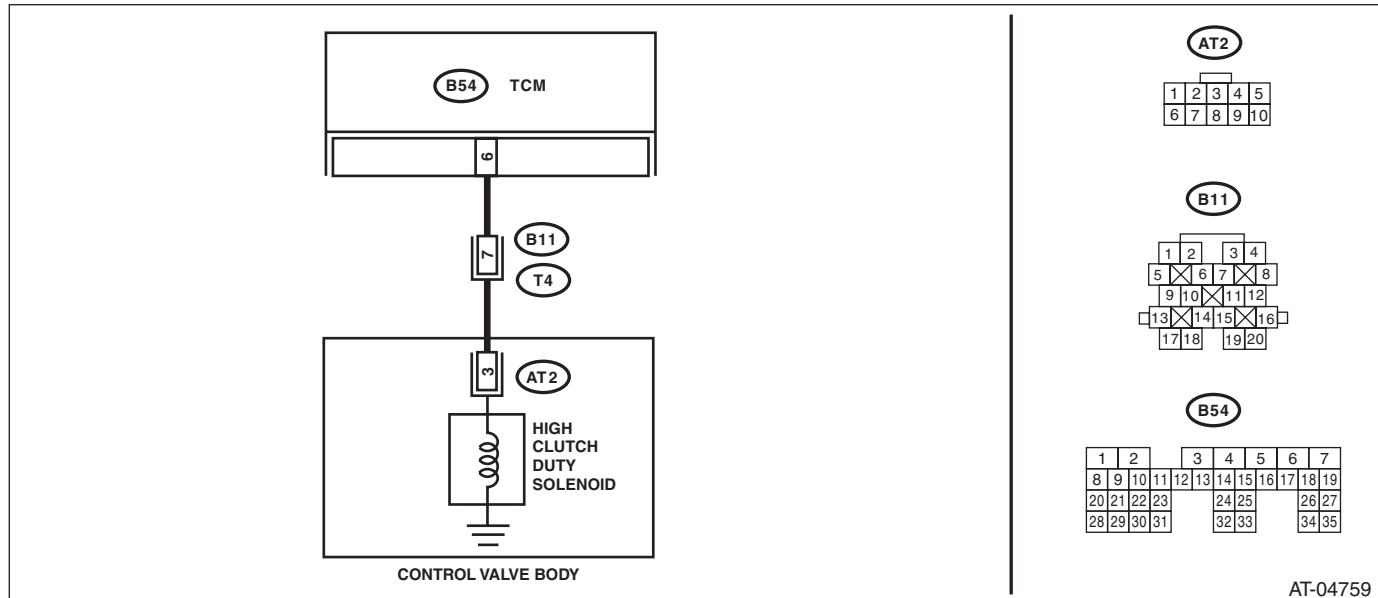
DTC DETECTING CONDITION:

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 (B54) No. 6 — (B11) No. 7:	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 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 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 2.0 — 6.0 Ω?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL OF TCM. 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle. 3) Connect the Subaru Select Monitor to data link connector. 4) Start the engine. 5) Run the Subaru Select Monitor. 6) Warm up the engine until the ATF temperature exceeds 80°C (176°F). 7) Shift the select lever to "D" range, and slowly increase vehicle speed to 3rd or 4th. 8) Read the data of "High Clutch Duty" using Subaru Select Monitor. NOTE: The speed difference between front and rear wheels lights the ABS warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Is the measured value 0%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL OF TCM. 1) Return the engine speed to idle. 2) Set the select lever to "N" range. 3) Read the data of "High Clutch Duty" using Subaru Select Monitor. NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Is the measured value 100%?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 6.
6 CHECK FOR POOR CONTACT.	Is there poor contact of high clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, 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. 4) Disconnect the connector from the control valve body. 5) Measure the resistance between high clutch duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 3 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-54, Control Valve Body.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between high clutch duty solenoid and transmission connector. <i>Connector & terminal</i> <i>(T4) No. 7 — (AT2) No. 3:</i>	Is the 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. <i>Connector & terminal</i> <i>(T4) No. 7 — Transmission ground:</i>	Is the resistance 1 M Ω or more?	Check the harnesses or connectors between high clutch duty solenoid and transmission, and repair the defective part.	Repair the short circuit of harness between high clutch duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

S: DTC P0768 SHIFT SOLENOID “D” ELECTRICAL

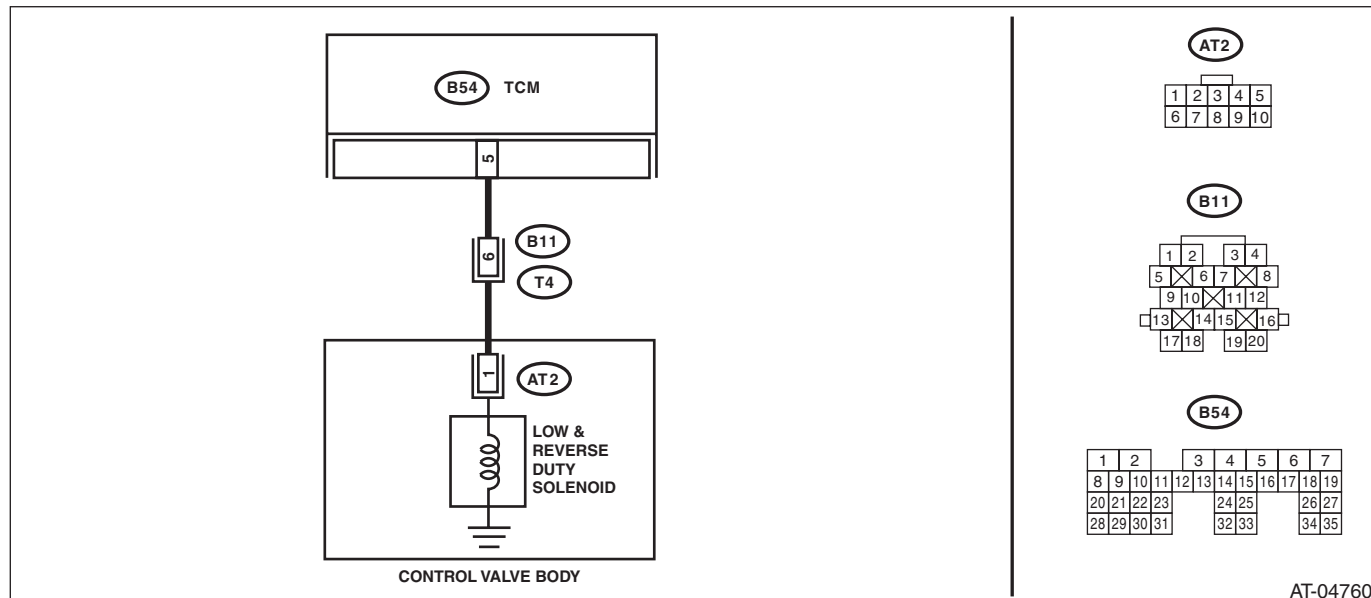
DTC DETECTING CONDITION:

The output signal circuit of low & reverse duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Gear is not changed.

WIRING DIAGRAM:



AT-04760

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. 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 HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM connector 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 LOW & REVERSE DUTY SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 6 — No. 20:	Is the resistance 2.0 — 6.0 Ω?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL OF TCM. 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine. 4) Run the Subaru Select Monitor. 5) Warm up the transmission until the ATF temperature exceeds approximately 80°C (176°F). 6) Stop the engine. 7) Turn the ignition switch to ON. 8) Set the select lever to "N" range. 9) Read the data of "L&R B Duty" using Subaru Select Monitor.	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. 2) Set the select lever to manual mode, and then hold it in 1st gear. 3) Slowly increase the vehicle speed up to 15 km/h (9 MPH), and then return the accelerator pedal. 4) Read the data of "L&R B Duty" using Subaru Select Monitor. NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Is the measured value 55%?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 6.
6 CHECK FOR POOR CONTACT.	Is there poor contact of the low & reverse duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, 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. 4) Disconnect the connector from the control valve body. 5) Measure the resistance between low & reverse duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 1 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-54, 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 — (AT2) No. 1:	Is the resistance less than 1 Ω?	Go to step 9.	Repair open circuit of harness between low & reverse duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 M Ω or more?	Check the harnesses or connectors between low & reverse duty solenoid and transmission, and repair the defective part.	Repair the short circuit of the harness between the low & reverse duty solenoid and the transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

T: DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

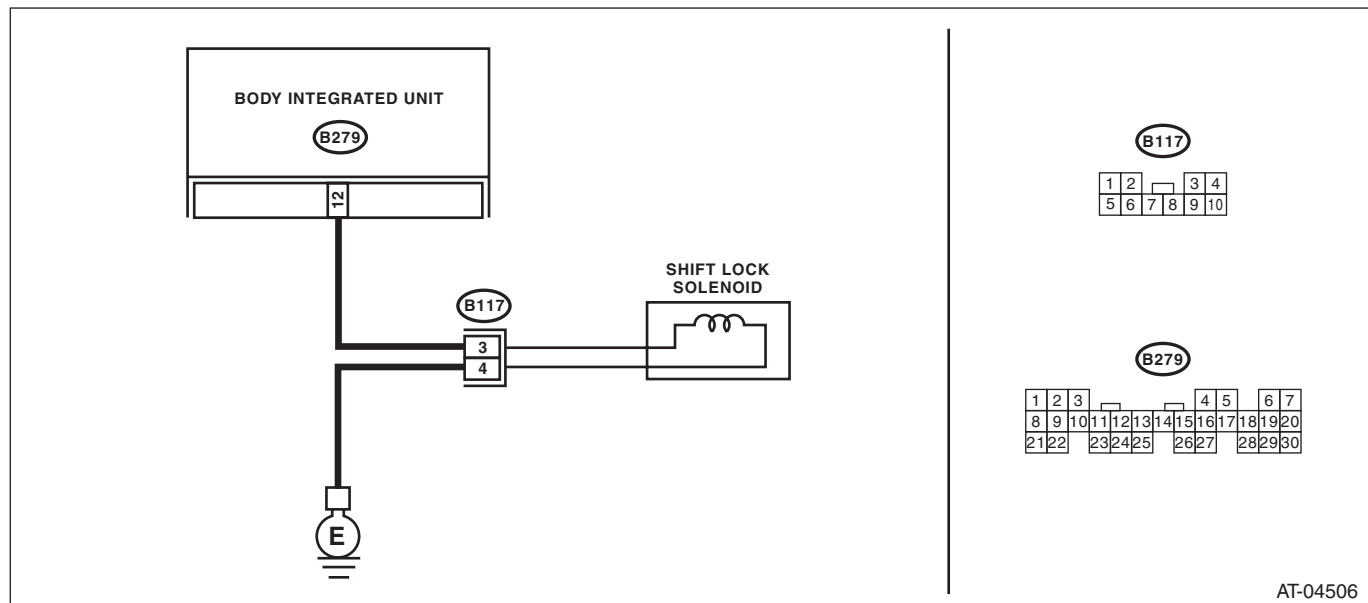
DTC DETECTING CONDITION:

Shift lock solenoid malfunction, open or short reverse inhibitor control circuit

TROUBLE SYMPTOM:

- Gear is shifted from “N” range to “R” range during driving at 20 km/h (12 MPH) or more.
- Gear cannot be shifted from “N” range to “R” range.

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK SHIFT LOCK SOLENOID. 1) Forcibly activate the body integrated unit to check the operation of shift lock solenoid. <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.> 2) Move the select lever without depressing the brake pedal.	Does the select lever shift?	Go to step 2.	Go to step 3.
2 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT. 1) Display the following items using Subaru Select Monitor. <Ref. to LAN(diag)-33, Read Current Data.> • Key-lock warning SW • Shift position • P SW • Stop light switch 2) Set the select lever to the “P” range while stepping on the brake pedal.	Do the units of measure of items displayed change?	Go to step 3.	Check the circuits of the items whose values do not change.
3 CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. Measure the harness resistance between the body integrated unit and chassis ground. Connector & terminal (B279) No. 12 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the short circuit of harness between body integrated unit and shift lock solenoid connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B117) No. 4 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit of harness between chassis ground and shift lock solenoid connector.
5 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid terminals. Connector & terminal (B117) No. 3 — No. 4:	Is the resistance 7.0 — 21.0 Ω ?	Go to step 6.	Replace the shift lock solenoid.
6 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT. 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) With the brake pedal depressed, shift the select lever to "D" range. 4) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B279) No. 12 (+) — Chassis ground (-):	Is the voltage 10.5 V or more?	Go to step 7.	Go to step 8.
7 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT. 1) Lift up the vehicle. 2) Start the engine. 3) Set the select lever to the "D" range and slowly increase vehicle speed to above 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.> 4) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B279) No. 12 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Check the harnesses or connectors in reverse inhibitor control circuit, and repair the defective part.	Go to step 8.
8 CHECK FOR POOR CONTACT.	Is there poor contact of the reverse inhibitor control circuit?	Repair the poor contact.	Replace the body integrated unit. <Ref. to SL-47, Body Integrated Unit.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

U: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

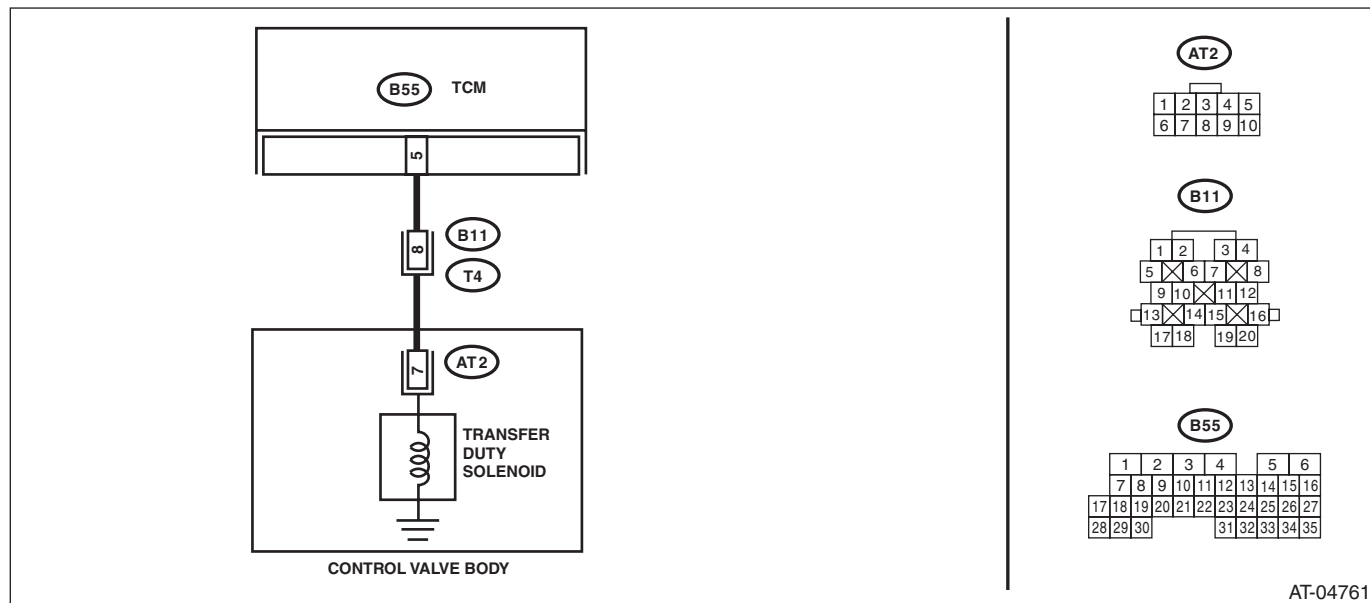
DTC DETECTING CONDITION:

Output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

- Tight corner braking phenomenon occurs.
- 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 (B55) No. 5 — (B11) No. 8:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness connector 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 TRANSFER DUTY SOLENOID. Measure the resistance between transmission connector and transmission terminals. Connector & terminal (T4) No. 8 — No. 20:	Is the resistance 2.0 — 6.0 Ω?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL OF TCM. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Shift the select lever to the "N" range, and fully close the throttle pedal. (Vehicle speed is 0 km/h (0 MPH)) 6) Read the data of "Transfer Duty Ratio" using Subaru Select Monitor.	Is the value approx. 5%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL OF TCM. 1) Set the select lever to "D" range. 2) Read the data of "Transfer Duty Ratio" using Subaru Select Monitor.	Is the measured value approx. 18 — 35%?	Check the harnesses or connectors between TCM and transmission, and repair the defective part.	Go to step 6.
6 CHECK FOR POOR CONTACT.	Is there poor contact of transfer duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
7 CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift up the vehicle. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan. 4) Disconnect the connector from the control valve body. 5) Measure the resistance between transfer duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 7 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-54, 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 — (AT2) No. 7:	Is the 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 M Ω or more?	Check the harnesses or connectors between transfer solenoid and transmission, and repair the defective part.	Repair short circuit of the harness between the transfer duty solenoid and transmission connector.

V: DTC P1718 AT CAN COMMUNICATION CIRCUIT

NOTE:

Refer to "Body Integrated Unit" for diagnosis of P1718. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

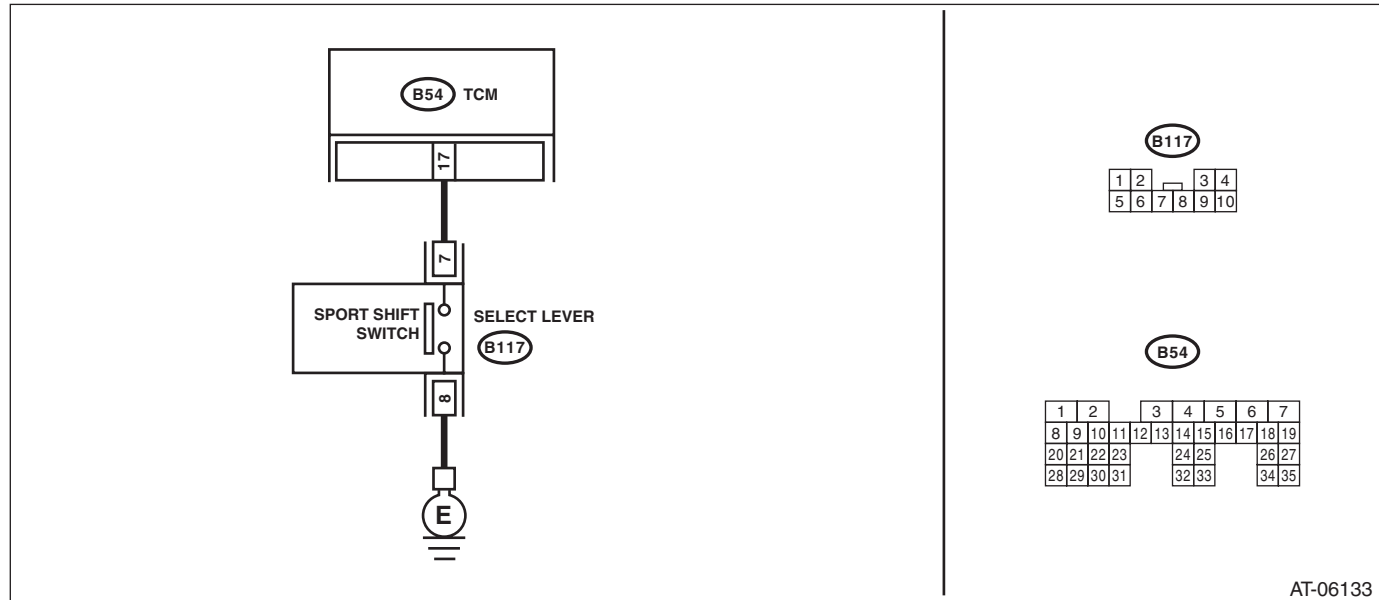
DTC DETECTING CONDITION:

Input signal circuit of SPORT shift switch is shorted.

TROUBLE SYMPTOM:

- Manual mode can not be set.
- The AT OIL TEMP light does not illuminate.
- No SPORT mode occurs.

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK SPORT SHIFT SWITCH GROUND CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the SPORT shift switch. 3) Measure the resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B117) No. 8 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between the SPORT shift switch and chassis ground.
2 CHECK SPORT SHIFT SWITCH. Measure the resistance between SPORT shift switch terminals. Connector & terminal (B117) No. 7 — No. 8:	Is the resistance 1 MΩ or more?	Go to step 3.	Replace the select lever assembly. <Ref. to CS-20, Select Lever.>
3 CHECK SPORT SHIFT SWITCH. 1) Shift the select lever to SPORT mode. 2) Measure the resistance between SPORT shift switch terminals. Connector & terminal (B117) No. 7 — No. 8:	Is the resistance less than 1 Ω?	Go to step 4.	Replace the select lever assembly. <Ref. to CS-20, Select Lever.>
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and SPORT shift switch connector. Connector & terminal (B117) No. 7 — (B54) No. 17:	Is the resistance less than 1 Ω?	Go to step 5.	Repair the open circuit of the harness between the SPORT shift switch connector and TCM connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B117) No. 7 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 6.	Repair the short circuit of harness between SPORT shift switch connector and TCM connector.
6 CHECK INPUT SIGNAL FOR TCM. 1) Connect the connector to TCM and SPORT shift switch. 2) Turn the ignition switch to ON. 3) Shift the select lever to normal mode. 4) Measure the voltage of signal to TCM. Connector & terminal (B54) No. 17 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 7.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
7 CHECK FOR POOR CONTACT.	Is there poor contact of the SPORT shift switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

17.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK FWD SWITCH

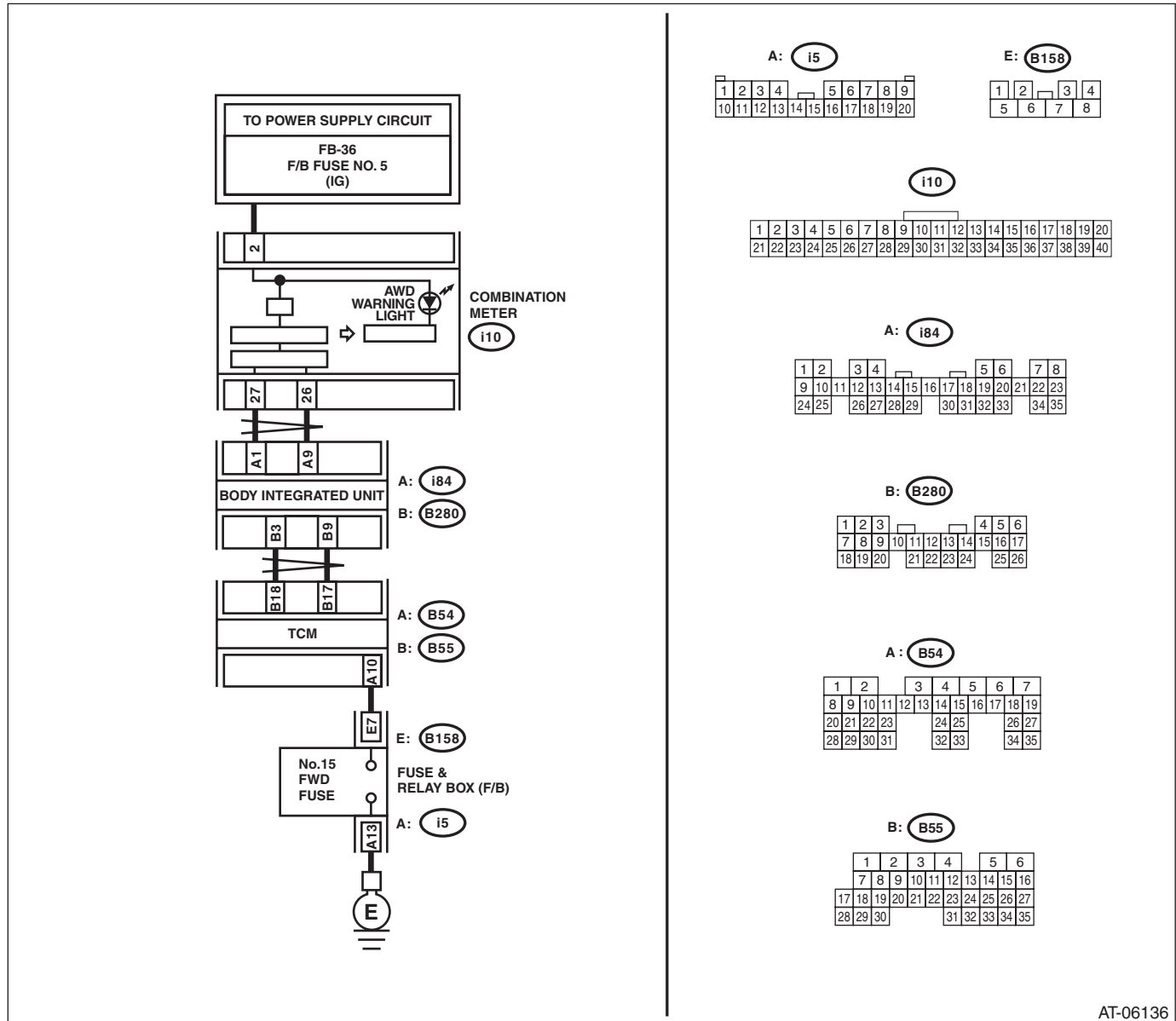
DIAGNOSIS:

FWD signal circuit is open or shorted.

TROUBLE SYMPTOM:

LED does not illuminate even if FWD switch is ON.

WIRING DIAGRAM:



AT-06136

Step		Check	Yes	No
1	CHECK INDICATOR. Turn the ignition switch to ON.	Is the AWD warning light illuminated?	Go to step 2.	Perform the self-diagnosis of combination meter.
2	CHECK INDICATOR. Turn the ignition switch to ON and wait for at least 2 seconds.	Is the AWD warning light illuminated?	Go to step 3.	Go to step 6.
3	CHECK INDICATOR. Start the engine and wait for 2 seconds or more.	Does the AWD warning light go off?	Go to step 4.	Go to step 11.
4	CHECK SPARE FUSE.	Is the spare fuse OK?	Go to step 5.	Replace the fuse.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 CHECK INDICATOR. 1) Turn the ignition switch to OFF. 2) Install a fuse to the FWD fuse holder. 3) Start the engine and wait for 2 seconds or more.	Is the AWD warning light illuminated?	Normal. Finish the diagnosis.	Go to step 6.
6 CHECK BODY INTEGRATED UNIT.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step 7.
7 CHECK TCM. 1) Turn the ignition switch to OFF. 2) Install a fuse to the FWD fuse holder. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. 5) Read the data of "FWD Switch" using Subaru Select Monitor.	Is "ON" displayed?	Perform the self-diagnosis of combination meter.	Go to step 8.
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND FUSE BOX. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and fuse box. 3) Measure the resistance of the harness between TCM and fuse box. Connector & terminal (B54) No. 10 — (B158) No. 7:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit of harness between TCM and fuse box.
9 CHECK HARNESS CONNECTOR BETWEEN FUSE BOX AND CHASSIS GROUND. Measure the resistance of the harness between fuse box and chassis ground. Connector & terminal (i5) No. 13 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair the open circuit of harness between fuse box and chassis ground.
10 CHECK FOR POOR CONTACT. Check poor contact of FWD switch circuit.	Is there poor contact of FWD switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
11 CHECK TCM. 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine. 4) Read the data of "Engine Speed" using Subaru Select Monitor.	Is the measured value 400 rpm or more?	Go to step 12.	Inspect the ECM.
12 CHECK TCM. Read the data of "FWD Switch" using Subaru Select Monitor.	Is "OFF" displayed?	Perform the self-diagnosis of combination meter.	Go to step 13.
13 CHECK HARNESS CONNECTOR BETWEEN TCM AND FUSE BOX. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and fuse box. 3) Measure the resistance of harness connector between TCM and chassis ground. Connector & terminal (B54) No. 10 — Chassis ground:	Is the resistance 1 M Ω or more?	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>	Repair the short circuit of harness between TCM and fuse box.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: CHECK SPORT SHIFT SWITCH

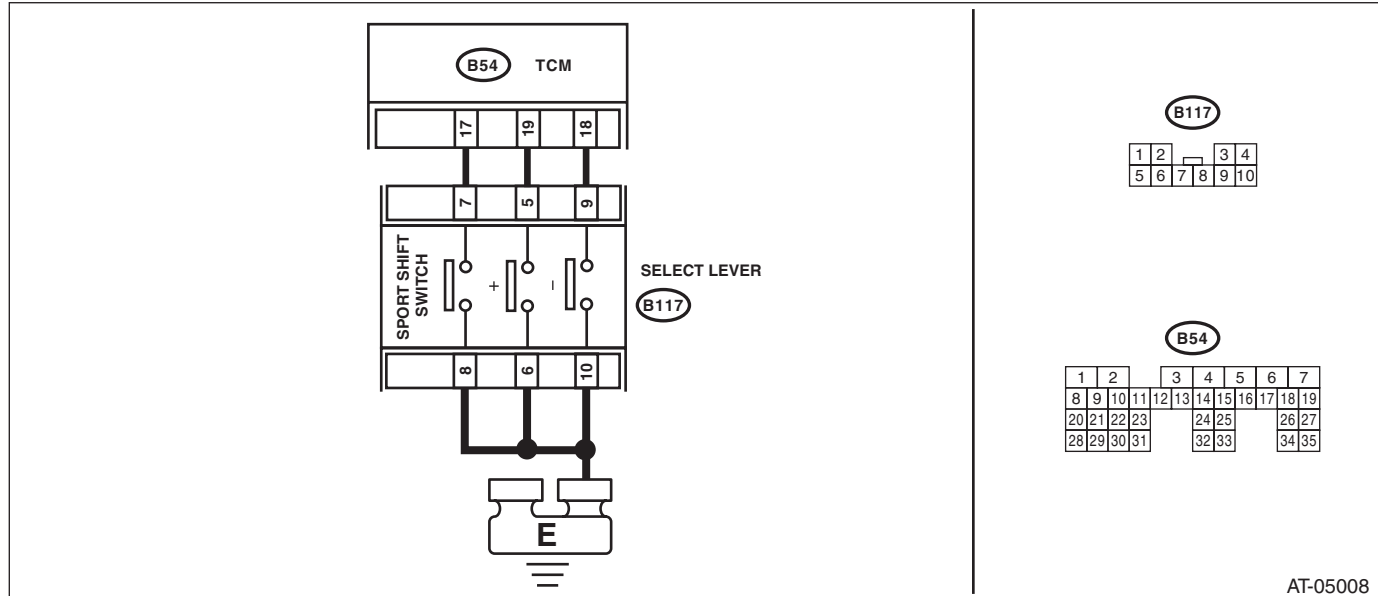
DIAGNOSIS:

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 INDICATOR. 1) Turn the ignition switch to ON. 2) Shift the select lever to SPORT mode. 3) Set the select lever to + side. 4) Read the SPORT shift indicator display in combination meter.	Is the gear position displayed?	Go to step 2.	Go to step 3.
2 CHECK SPORT SHIFT INDICATOR. Read the SPORT shift indicator display in combination meter.	Is "2" displayed?	Go to step 17.	Go to step 9.
3 CHECK BODY INTEGRATED UNIT.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step 4.
4 CHECK TCM. Read the "Tiptronic Mode Switch" data using the Subaru Select Monitor.	Is "ON" displayed?	Go to step 9.	Go to step 5.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and SPORT shift switch. 3) Measure the resistance of harness between TCM and SPORT shift switch. <i>Connector & terminal</i> <i>(B54) No. 17 — (B117) No. 7:</i>	Is the resistance less than 1 Ω ?	Go to step 6.	Repair the open circuit of harness between TCM and SPORT shift switch.
6 CHECK SPORT SHIFT SWITCH. Measure the resistance between SPORT shift switch terminals. <i>Connector & terminal</i> <i>(B117) No. 7 — No. 8:</i>	Is the resistance less than 1 Ω ?	Go to step 7.	Replace the guide plate assembly.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN SPORT SHIFT SWITCH AND CHASSIS GROUND. Measure the resistance of harness between SPORT shift switch and chassis ground. Connector & terminal (B117) No. 8 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair the open circuit of harness between the SPORT shift switch and chassis ground.
8 CHECK FOR POOR CONTACT. Check poor contact of SPORT shift switch circuit.	Is there poor contact of the SPORT shift switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
9 CHECK TCM. 1) Shift and hold the select lever to + side. 2) Read the "Up Switch" data using Subaru Select Monitor.	Is "ON" displayed?	Go to step 14.	Go to step 10.
10 CHECK HARNESS CONNECTOR BETWEEN TCM AND + SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and + switch. 3) Measure the resistance of harness between TCM and + switch. Connector & terminal (B54) No. 19 — (B117) No. 5:	Is the resistance less than 1 Ω ?	Go to step 11.	Repair the open circuit of harness between TCM and + switch.
11 CHECK + SWITCH. 1) Shift and hold the select lever to + side. 2) Measure the resistance between + switch terminals. Connector & terminal (B117) No. 5 — No. 6:	Is the resistance less than 1 Ω ?	Go to step 12.	Replace the guide plate assembly.
12 CHECK HARNESS CONNECTOR BETWEEN + SWITCH AND CHASSIS GROUND. Measure the resistance of harness between + switch and chassis ground. Connector & terminal (B117) No. 6 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 13.	Repair the open circuit of harness between + switch and chassis ground.
13 CHECK FOR POOR CONTACT. Check poor contact of + switch circuit.	Is there poor contact of + switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
14 CHECK TCM. 1) Set the select lever to the center position. (Tilt the select lever to SPORT mode, and release the hold.) 2) Read the "Up Switch" data using Subaru Select Monitor.	Is "OFF" displayed?	Perform the self-diagnosis of combination meter.	Go to step 15.
15 CHECK HARNESS CONNECTOR BETWEEN TCM AND + SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and + switch. 3) Measure the resistance of harness between TCM and + switch. Connector & terminal (B54) No. 19 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 16.	Repair the short circuit of harness between TCM and + switch.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
16 CHECK + SWITCH. Measure the resistance between + switch terminals. <i>Connector & terminal (B117) No. 5 — No. 6:</i>	Is the resistance 1 M Ω or more?	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>	Replace the guide plate assembly.
17 CHECK SPORT SHIFT INDICATOR. 1) Set the select lever to – side. 2) Read the SPORT shift indicator display in combination meter.	Is “1” displayed?	Normal. Finish the diagnosis.	Go to step 18.
18 CHECK TCM. 1) Shift and hold the select lever to – side. 2) Read the “Down Switch” data using Subaru Select Monitor.	Is “ON” displayed?	Go to step 23.	Go to step 19.
19 CHECK HARNESS CONNECTOR BETWEEN TCM AND – SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and – switch. 3) Measure the resistance of harness between TCM and – switch. <i>Connector & terminal (B54) No. 18 — (B117) No. 9:</i>	Is the resistance less than 1 Ω ?	Go to step 20.	Repair the open circuit of harness between TCM and – switch.
20 CHECK – SWITCH. 1) Shift and hold the select lever to – side. 2) Measure the resistance between – switch terminals. <i>Connector & terminal (B117) No. 9 — No. 10:</i>	Is the resistance less than 1 Ω ?	Go to step 21.	Replace the guide plate assembly.
21 CHECK HARNESS CONNECTOR BETWEEN – SWITCH AND CHASSIS GROUND. Measure the resistance of harness between – switch and chassis ground. <i>Connector & terminal (B117) No. 10 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Go to step 22.	Repair the open circuit of harness between – switch and chassis ground.
22 CHECK FOR POOR CONTACT. Check poor contact of – switch circuit.	Is there poor contact of – switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
23 CHECK TCM. 1) Set the select lever to the center position. (Tilt the select lever to SPORT mode, and release the hold.) 2) Read the “Down Switch” data using Subaru Select Monitor.	Is “OFF” displayed?	Perform the self-diagnosis of combination meter.	Go to step 24.
24 CHECK HARNESS CONNECTOR BETWEEN TCM AND – SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and – switch. 3) Measure the resistance of harness between TCM and – switch. <i>Connector & terminal (B54) No. 18 — Chassis ground:</i>	Is the resistance 1 M Ω or more?	Go to step 25.	Repair the short circuit of harness between TCM and – switch.
25 CHECK – SWITCH. Measure the resistance between – switch terminals. <i>Connector & terminal (B117) No. 9 — No. 10:</i>	Is the resistance 1 M Ω or more?	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>	Replace the guide plate assembly.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: CHECK SPORT SHIFT INDICATOR

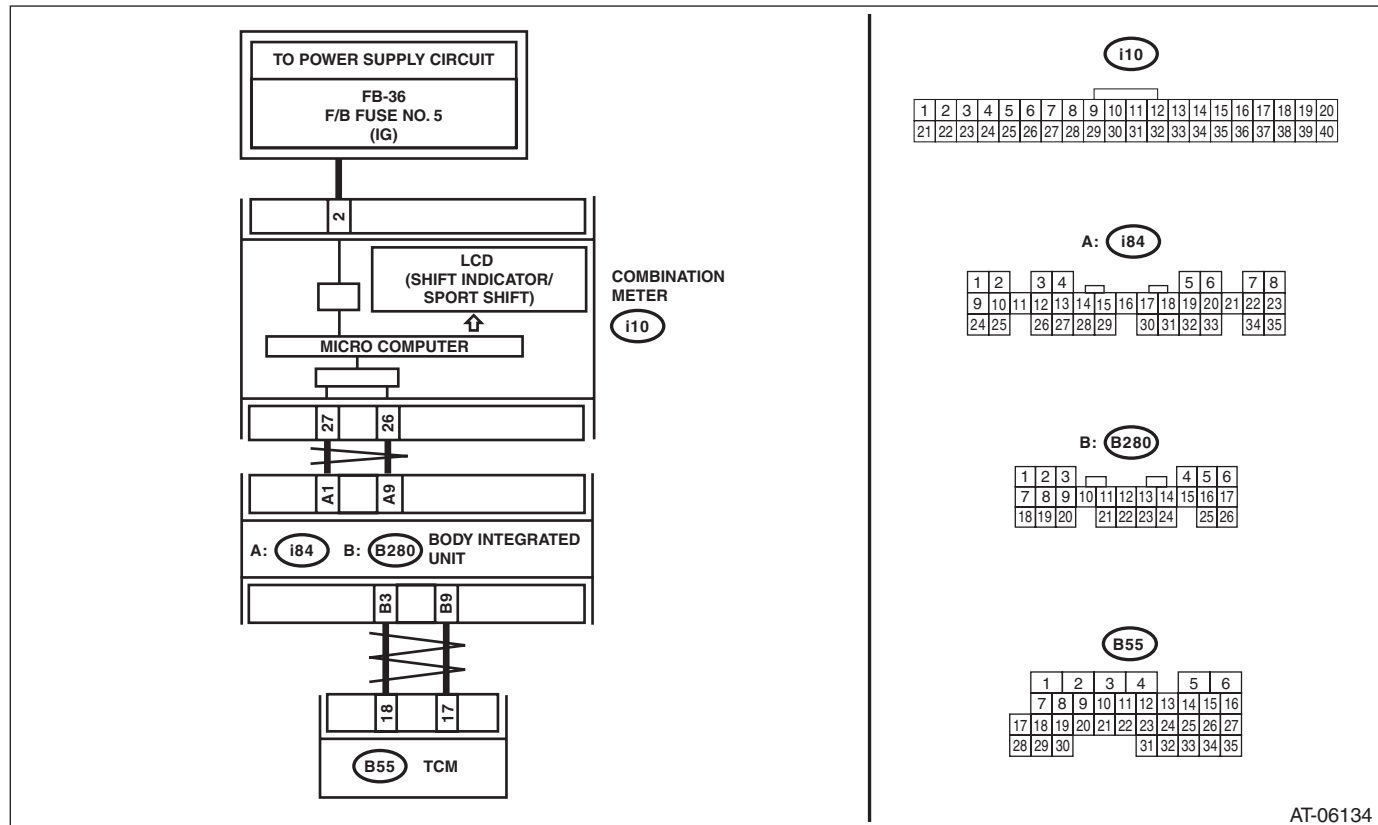
DIAGNOSIS:

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:



AT-06134

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 data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Shift the select lever to SPORT mode. 6) Read the "Gear Position" data of TCM using Subaru Select Monitor.	Is "1" displayed?	Go to step 3.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
3	CHECK TCM. 1) Shift up the select lever. 2) Read the "Gear Position" data of TCM using Subaru Select Monitor.	Is "2" displayed?	Go to step 4.	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>
4	CHECK BODY INTEGRATED UNIT. Read the data of "Shift Position" using Subaru Select Monitor.	Is "2" displayed?	Go to step 5.	Check body integrated unit.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 CHECK COMBINATION METER. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the SPORT shift indicator OK?	Check the buzzer. <Ref. to 4AT(diag)-84, CHECK BUZZER, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Replace the combination meter assembly. <Ref. to IDI-14, Combination Meter.>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: CHECK BUZZER

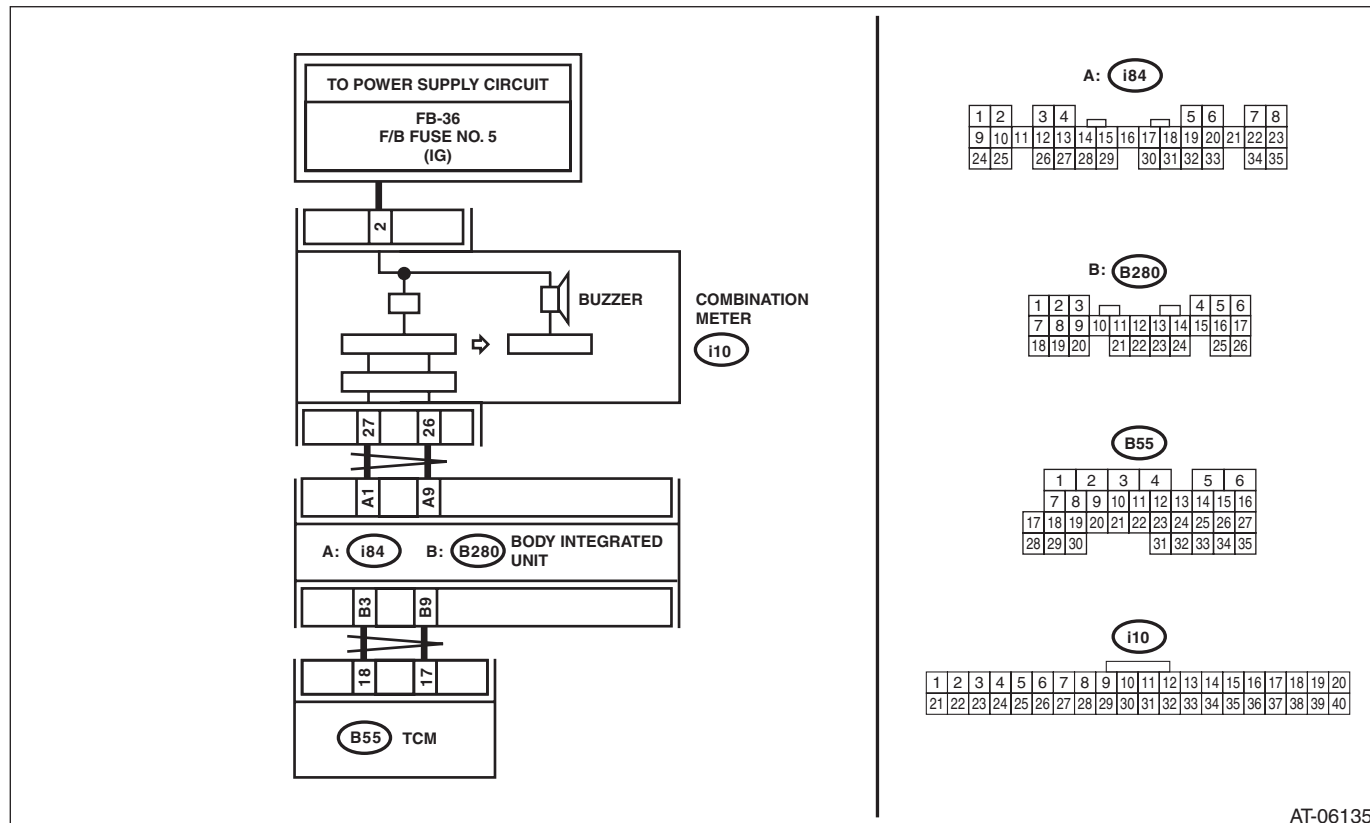
DIAGNOSIS:

Output signal circuit of buzzer is open or shorted.

TROUBLE SYMPTOM:

Buzzer remains beeping.

WIRING DIAGRAM:



AT-06135

Step	Check	Yes	No
1 CHECK BODY INTEGRATED UNIT. 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Read the "SPORT shift (buzzer 1)" and "SPORT shift (buzzer 2)" data using Subaru Select Monitor.	Is "ON" displayed?	Replace the TCM. <Ref. to 4AT-58, Transmission Control Module (TCM).>	Go to step 2.
2 CHECK COMBINATION METER. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is the buzzer OK?	Refer to "Diagnostics with Phenomenon". <Ref. to 4AT(diag)-85, Diagnostics with Phenomenon.>	Replace the combination meter assembly. <Ref. to IDI-14, Combination Meter.>

18. Diagnostics with Phenomenon

A: INSPECTION

Symptoms	Faulty 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 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

Diagnostics with Phenomenon

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty 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
Will not shift from 1st to 2nd gear.	• TCM • Front vehicle speed sensor • Accelerator pedal position sensor • Control valve • 2-4 brake
Will not shift from 2nd to 3rd gear.	• TCM • Control valve • High clutch

Diagnostics with Phenomenon

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
Will not shift 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 • 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

Diagnostics with Phenomenon

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty 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

Diagnostics with Phenomenon

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty 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 • Accelerator pedal position sensor • ATF temperature sensor • Transfer clutch • Control 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 • Control valve • Transfer pipe • Transfer duty solenoid
It is not set in FWD mode.	• TCM • Transfer clutch • Control valve • Transfer duty solenoid
Select lever does not shift smoothly.	• 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

Diagnostics with Phenomenon

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MANUAL TRANSMISSION AND DIFFERENTIAL

5MT

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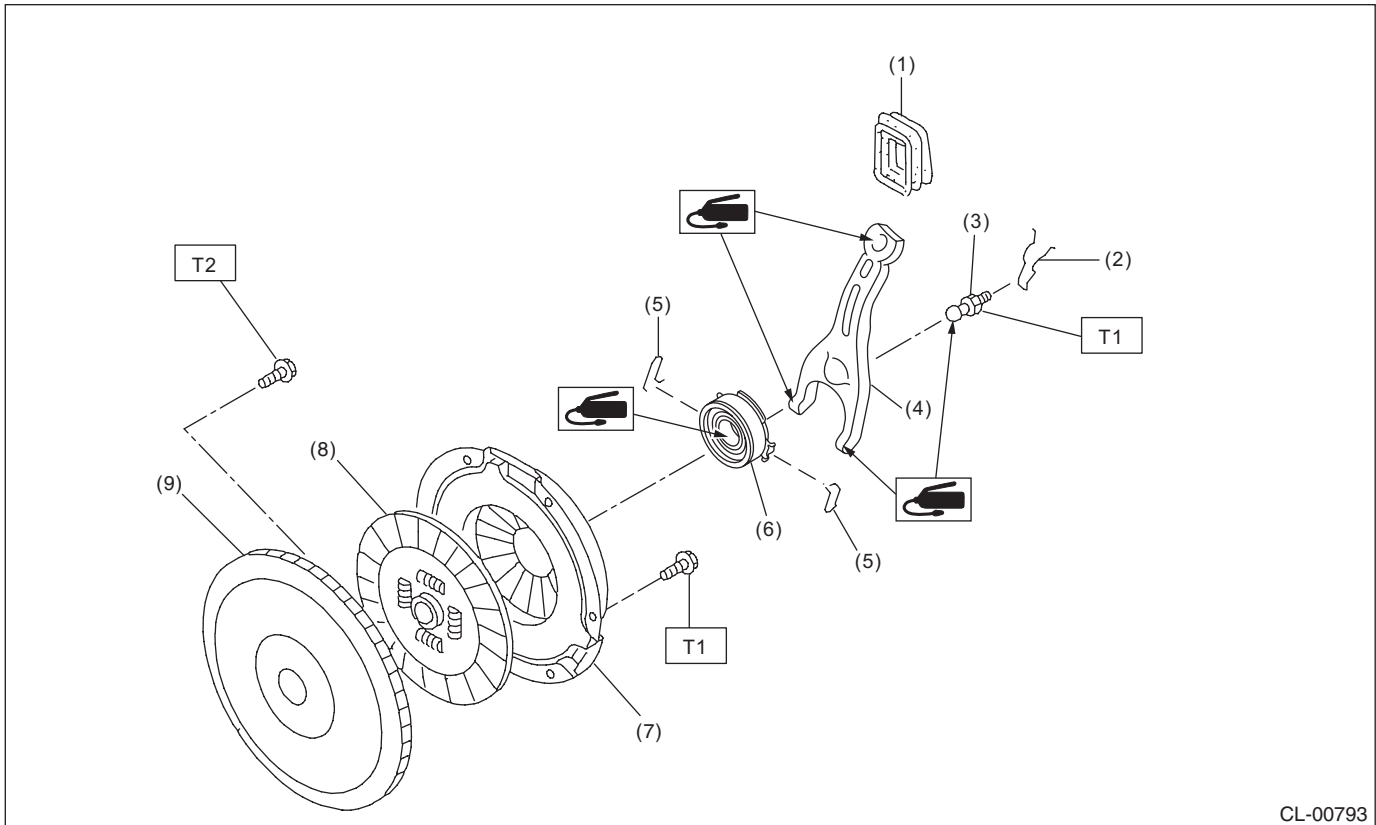
General Description

CLUTCH SYSTEM

1. General Description

A: SPECIFICATION

Model			2.5 L
Transmission type			5MT
Clutch cover	Type		Push type
	Diaphragm set load N (kgf, lbf)		5,688 (580, 1,279)
Clutch disc	Facing material		Woven (Non-asbestos)
	O.D. × I.D. × thickness mm (in)	Clutch cover side	225 × 150 × 3.5 (8.86 × 5.9 × 0.138)
		Flywheel side	
	Spline outer diameter mm (in)		25.2 (0.992), (Number of teeth: 24)
	Depth of rivet head mm (in)	Clutch cover side	1.65 — 2.25 (0.065 — 0.089)
		Flywheel side	1.35 — 1.95 (0.053 — 0.077)
		Limit of sinking	0.3 (0.012)
Deflection limit mm (in)		0.7 (0.028) at R = 110 (4.33)	
Clutch release lever ratio			1.6
Release bearing			Grease-packed self-aligning
Clutch pedal	Full stroke mm (in)	130 — 135 (5.12 — 5.31)	
	Free play mm (in)	4 — 10 (0.16 — 0.39)	
Flywheel	Type		Flexible

B: COMPONENT**1. CLUTCH ASSEMBLY**

CL-00793

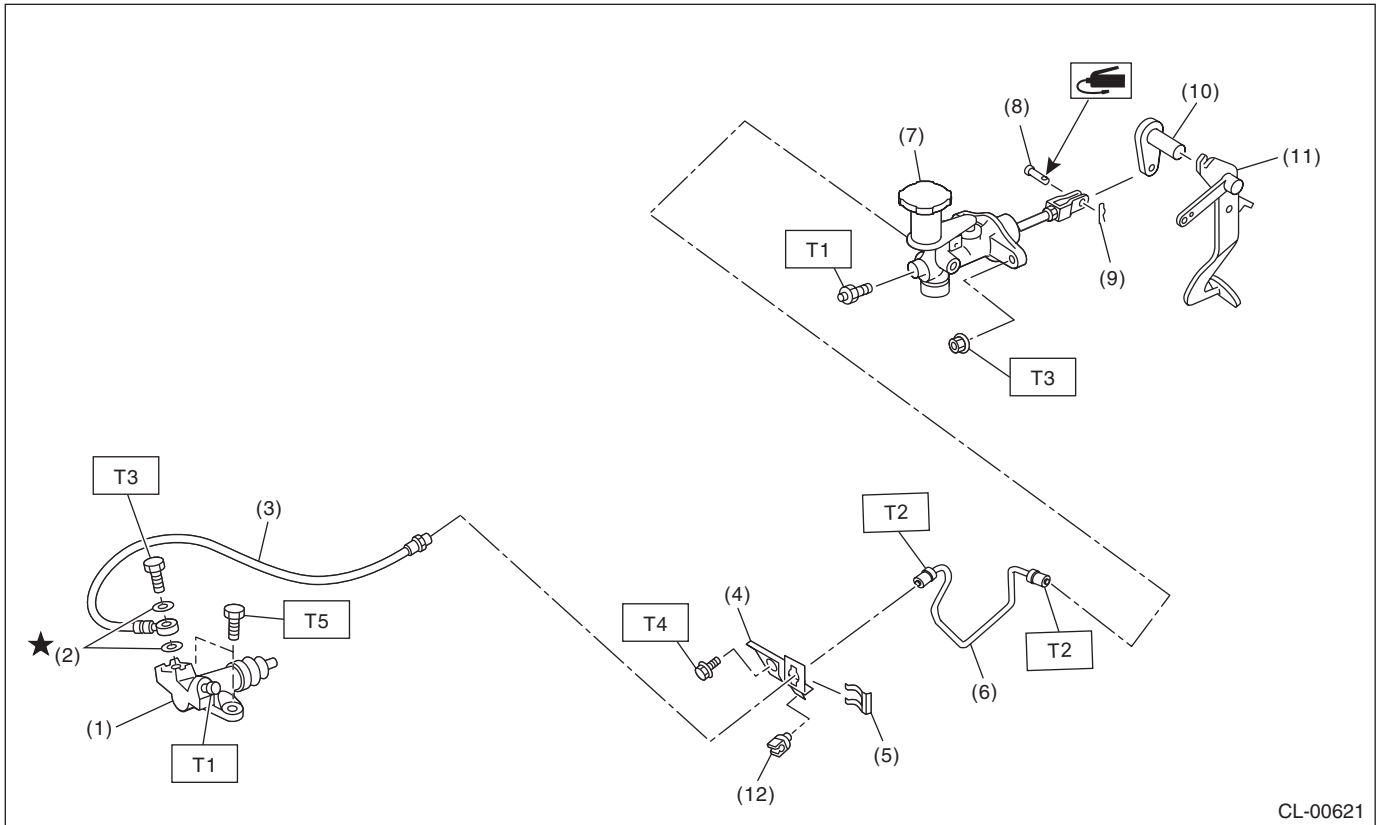
(1) Dust cover	(6) Release bearing
(2) Lever spring	(7) Clutch cover
(3) Pivot	(8) Clutch disc
(4) Release lever	(9) Flywheel
(5) Clip	

Tightening torque: N·m (kgf-m, ft-lb)***T1: 16 (1.6, 11.8)******T2: 75 (7.6, 55.3)***

General Description

CLUTCH SYSTEM

2. CLUTCH PIPE AND HOSE



- (1) Operating cylinder
- (2) Washer
- (3) Clutch hose
- (4) Bracket
- (5) Clip
- (6) Clutch pipe

- (7) Master cylinder ASSY
- (8) Clevis pin
- (9) Snap pin
- (10) Lever
- (11) Pedal
- (12) Clip

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.8 (0.8, 5.8)

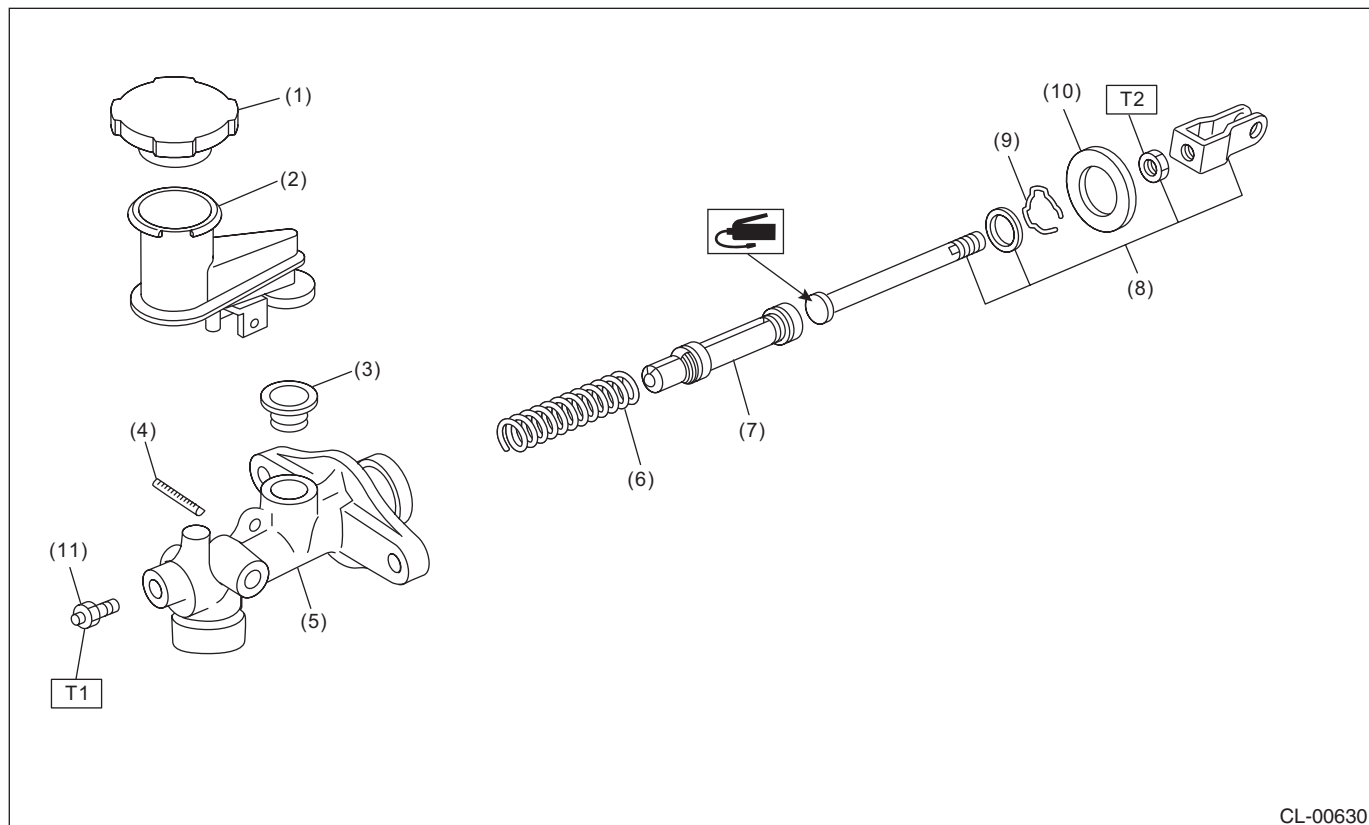
T2: 15 (1.5, 11.1)

T3: 18 (1.8, 13.3)

T4: 25 (2.5, 18.4)

T5: 37 (3.8, 27.3)

3. MASTER CYLINDER



CL-00630

- (1) Reservoir cap
- (2) Reservoir tank
- (3) Oil seal
- (4) Straight pin
- (5) Master cylinder

- (6) Return spring
- (7) Piston
- (8) Push rod ASSY
- (9) Piston stop ring
- (10) Seat

- (11) Bleeder screw

Tightening torque: N·m (kgf-m, ft-lb)

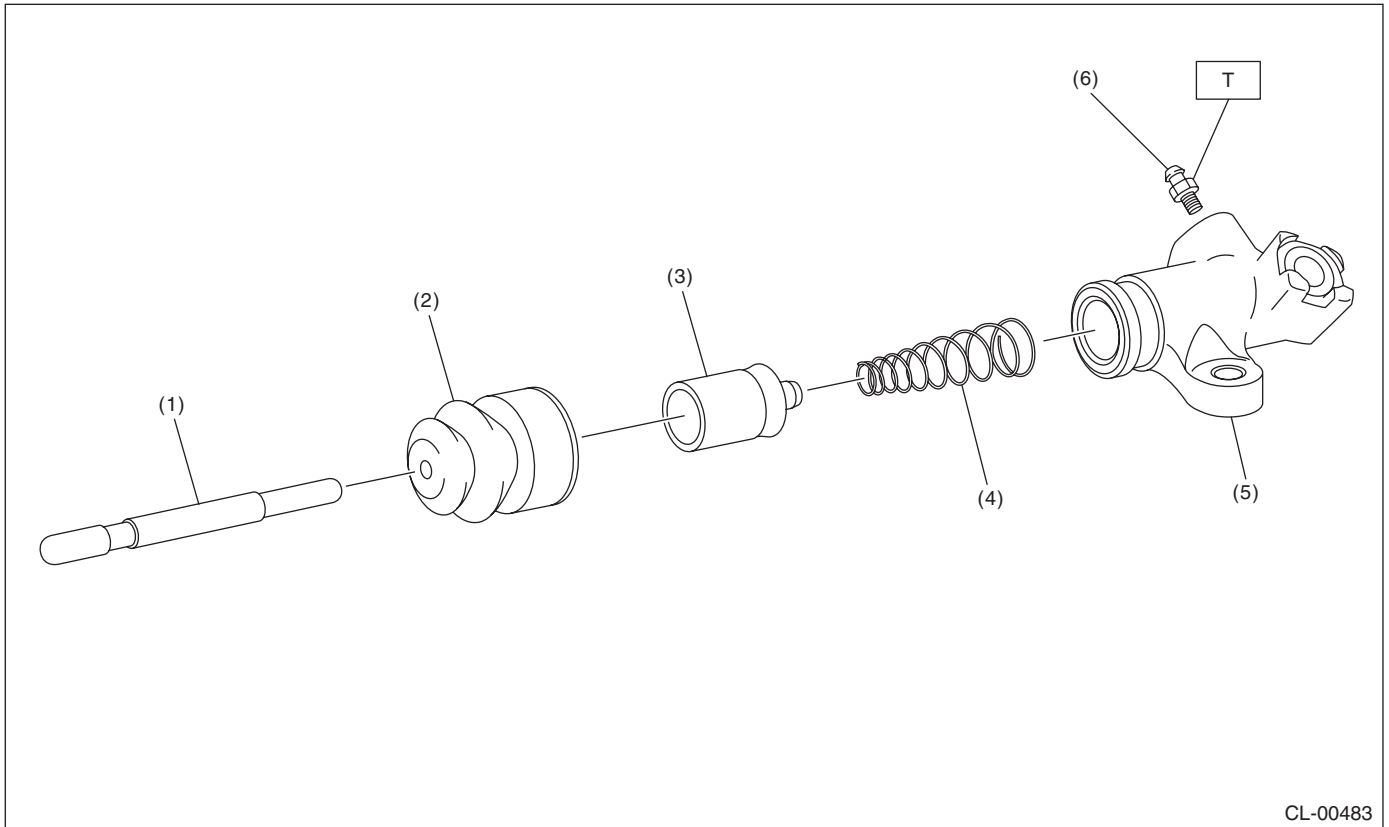
T1: 7.8 (0.8, 5.8)

T2: 10 (1.0, 7.4)

General Description

CLUTCH SYSTEM

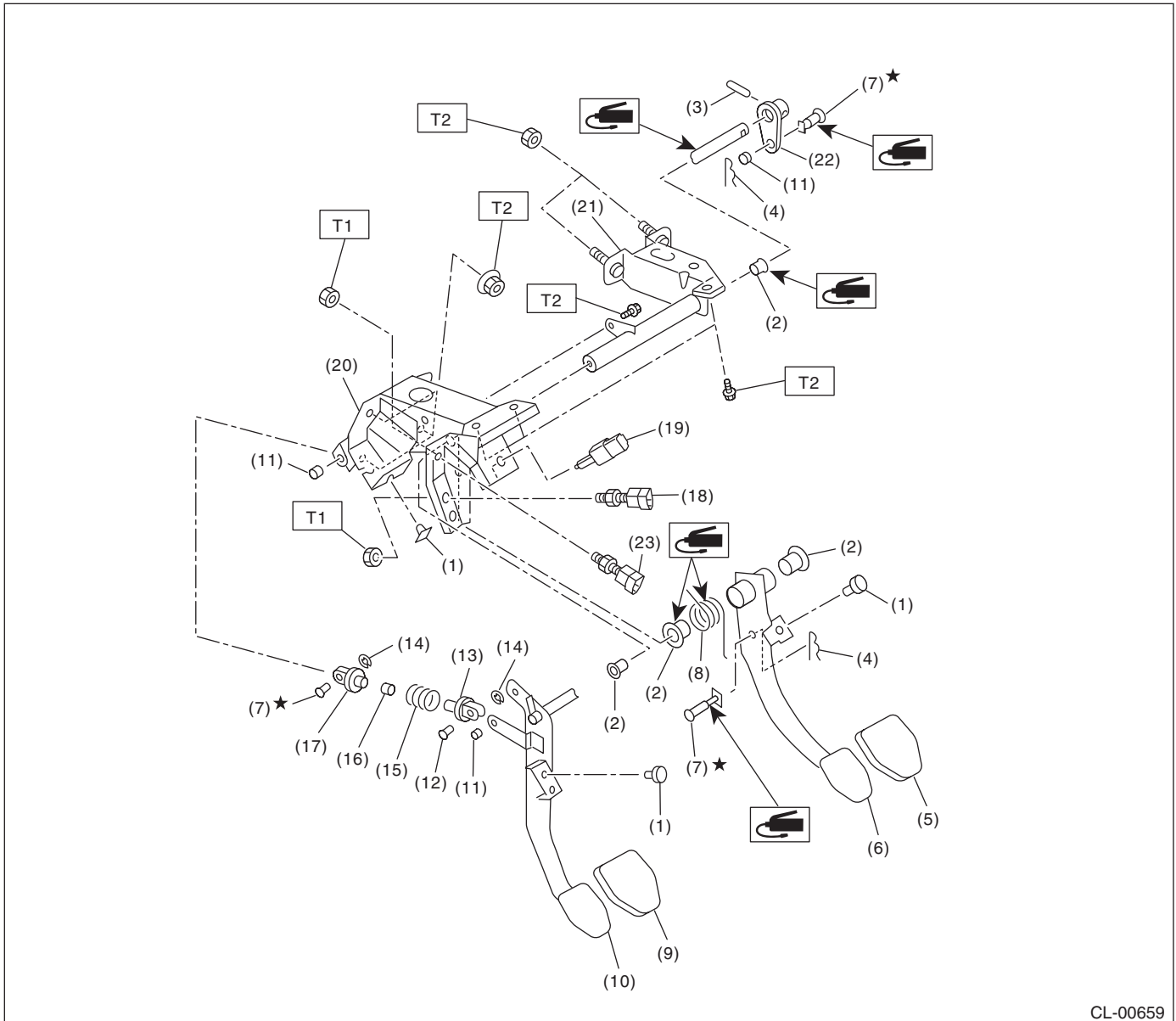
4. OPERATING CYLINDER



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

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

5. CLUTCH PEDAL



CL-00659

(1) Stopper	(10) Clutch pedal	(19) Stop light switch
(2) Bushing	(11) Bushing C	(20) Pedal bracket
(3) Spring pin	(12) Clutch clevis pin	(21) Clutch master cylinder bracket
(4) Snap pin	(13) Assist rod A	(22) Lever
(5) Brake pedal pad	(14) Clip	(23) Clutch start switch
(6) Brake pedal	(15) Assist spring	
(7) Clevis pin	(16) Assist bushing	
(8) Brake pedal spring	(17) Assist rod B	
(9) Clutch pedal pad	(18) Clutch switch	

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

General Description

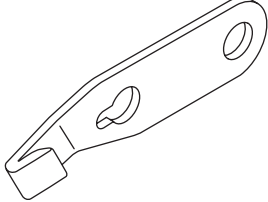
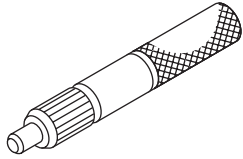
CLUTCH SYSTEM

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 fluid 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.

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

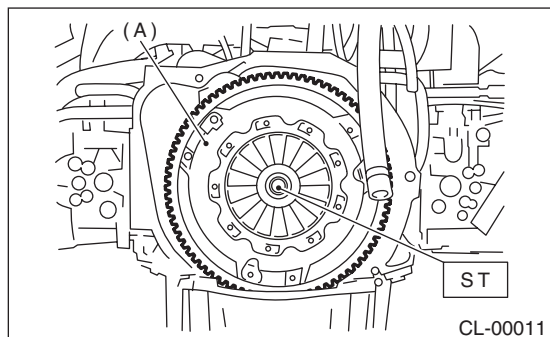
A: REMOVAL

1) Remove the transmission assembly from the vehicle.

<Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>

2) Attach the ST on the flywheel.

ST 499747100 CLUTCH DISC GUIDE



(A) Clutch cover

3) Remove the clutch cover and clutch disc.

NOTE:

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

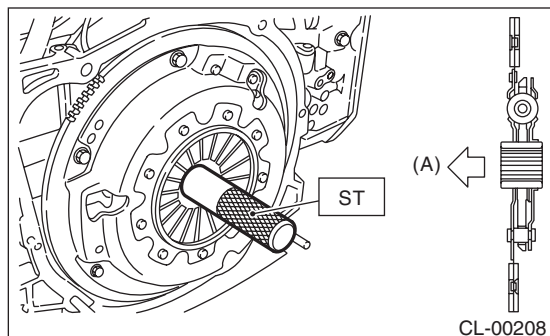
B: INSTALLATION

1) Insert the ST into the clutch disc and attach to the flywheel by inserting the ST end into pilot bearing.

NOTE:

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

ST 499747100 CLUTCH DISC GUIDE



(A) Flywheel side

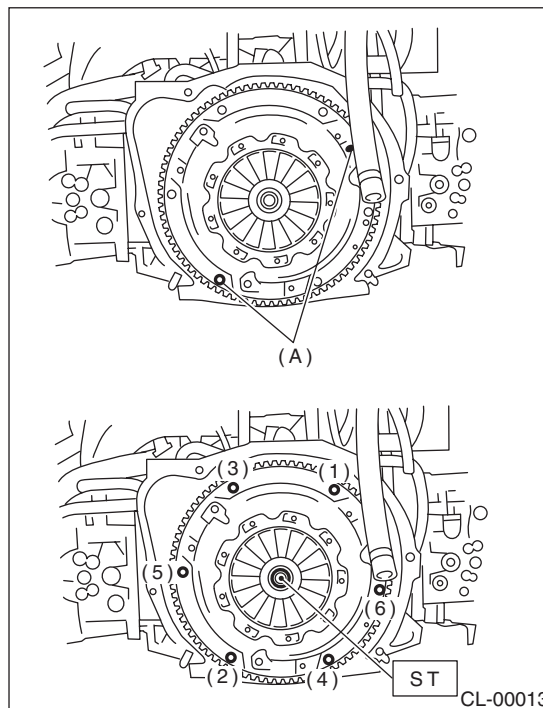
2) Install the clutch cover to the flywheel and tighten the bolts to the specified torque.

NOTE:

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

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) Unbalance mark (paint)

3) Remove the ST.

ST 499747100 CLUTCH DISC GUIDE

4) Install the transmission assembly. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. CLUTCH DISC

1) Facing wear

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

Depth to rivet head:

Limit of sinking

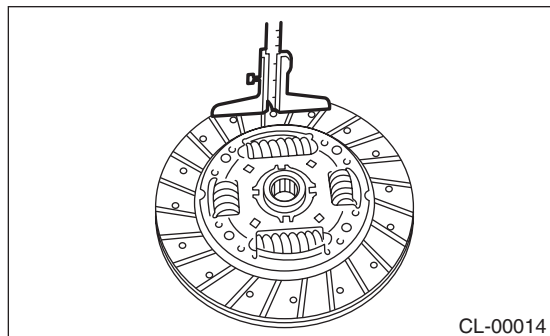
0.3 mm (0.012 in)

Clutch Disc and Cover

CLUTCH SYSTEM

NOTE:

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

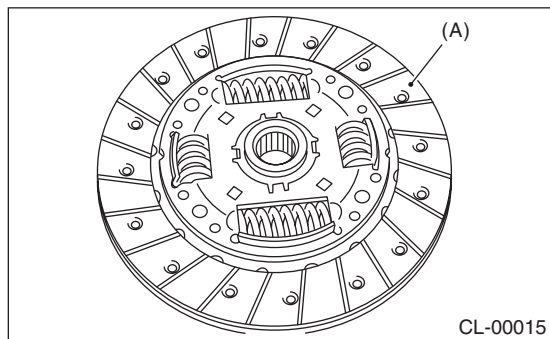


2) Hardened facing

Replace the clutch disc.

3) Oil soakage on facing

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



(A) Clutch facing

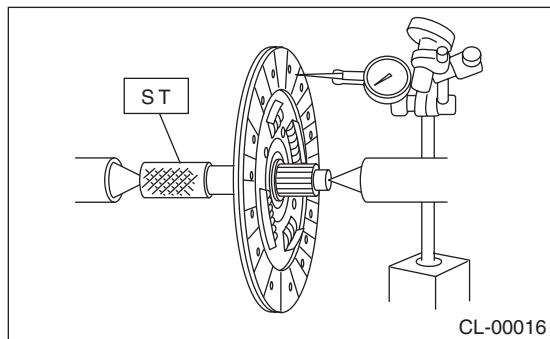
4) Deflection on facing

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

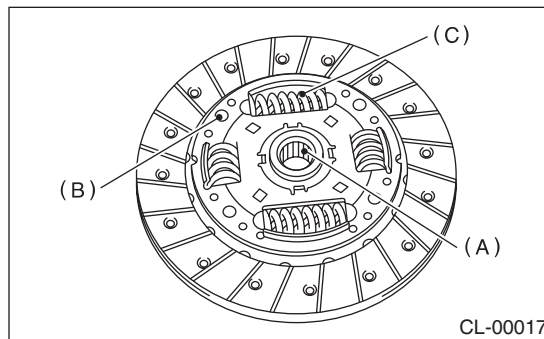
ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:

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



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



(A) Spline

(B) Rivet

(C) Damper spring

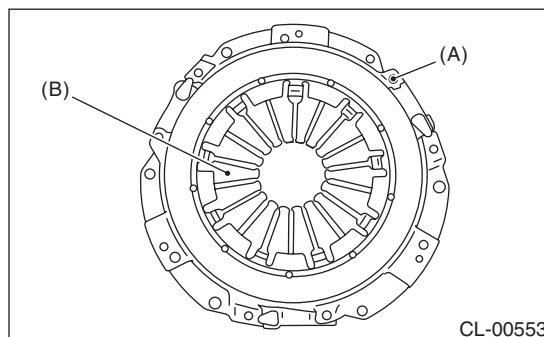
2. CLUTCH COVER

NOTE:

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

1) Loose thrust rivet

2) Damaged or worn bearing contact area at the center of diaphragm spring



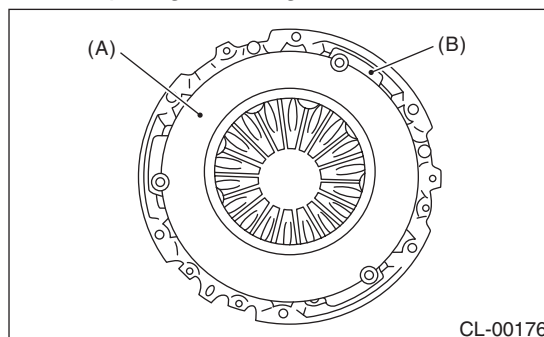
(A) Thrust rivet

(B) Diaphragm spring

3) Damaged or worn disc contact surface of the pressure plate

4) Loose strap plate installation area

5) Worn diaphragm sliding area



(A) Pressure plate

(B) Strap plate

3. Flywheel

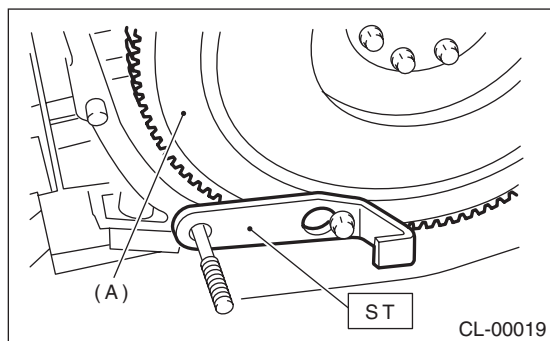
A: REMOVAL

1) Remove the transmission assembly. <Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>

2) Remove the clutch cover and clutch disc. <Ref. to CL-9, REMOVAL, Clutch Disc and Cover.>

3) Attach the ST to remove the flywheel.

ST 498497100 CRANKSHAFT STOPPER

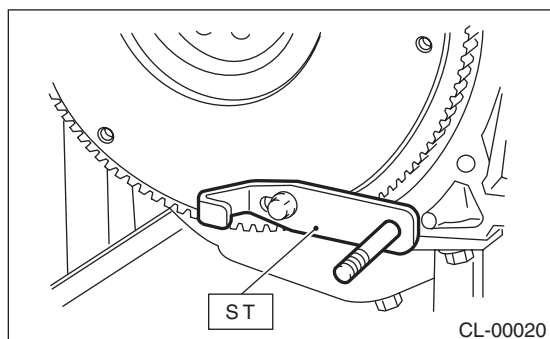


(A) Flywheel

B: INSTALLATION

1) Install the flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



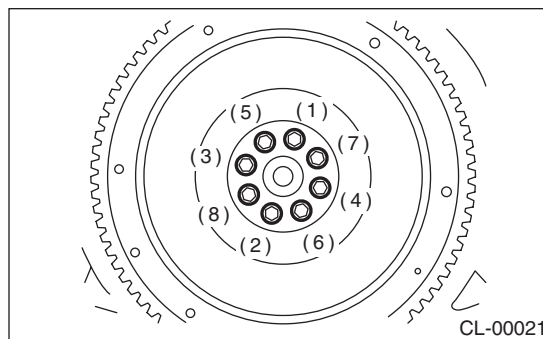
2) Tighten the flywheel mounting bolts to the specified torque.

NOTE:

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

Tightening torque:

75 N·m (7.6 kgf-m, 55.3 ft-lb)



3) Install the clutch disc and cover. <Ref. to CL-9, INSTALLATION, Clutch Disc and Cover.>

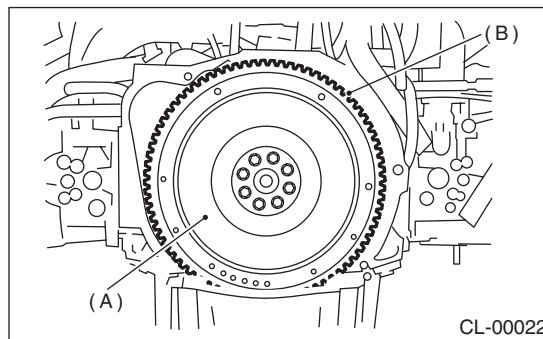
4) Install the transmission assembly. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

CAUTION:

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

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



(A) Flywheel

(B) Ring gear

2) Smoothness of rotation

Rotate the ball bearing while applying pressure in the thrust direction.

3) If noise or excessive play is noted, replace the flywheel.

4. Release Bearing and Lever

A: REMOVAL

1) Remove the transmission assembly from the vehicle.

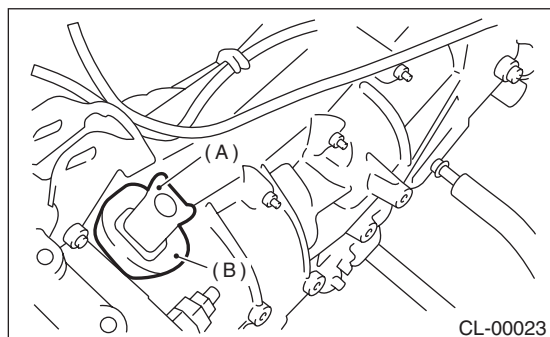
<Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>

2) Remove the two clips from the release lever and remove the release bearing.

CAUTION:

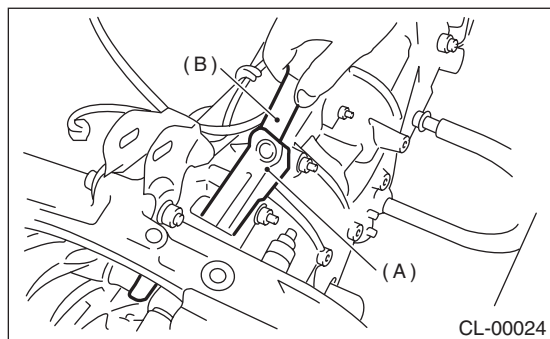
Be careful not to deform the clips.

3) Remove the dust cover.



(A) Release lever
(B) Dust cover

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



(A) Release lever
(B) Screwdriver

B: INSTALLATION

NOTE:

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

- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline

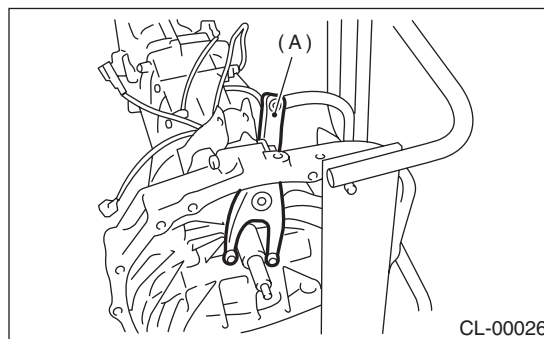
Grease

NICHIMOLY N-130 (Part No. K0879Y0501) or equivalent

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

NOTE:

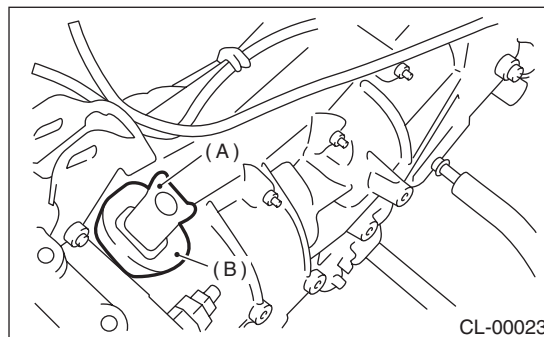
Observing from the main case hole, check that the lever spring is installed securely.



(A) Release lever

2) Install the release bearing and fasten it with two clips.

3) Install the dust cover.



(A) Release lever
(B) Dust cover

4) Check the bearing for smooth movement by operating the release lever.

5) Apply grease to the contact point of the release lever and operating cylinder.

Grease

NICHIMOLY N-130 (Part No. K0879Y0501) or equivalent

6) Install the transmission assembly. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. RELEASE BEARING

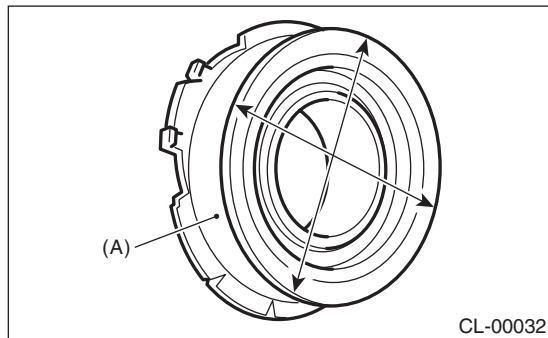
CAUTION:

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

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

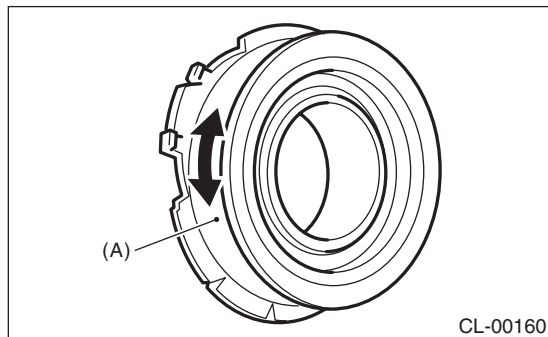
Radial direction stroke:

1.6 mm (0.063 in)



(A) Bearing case

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

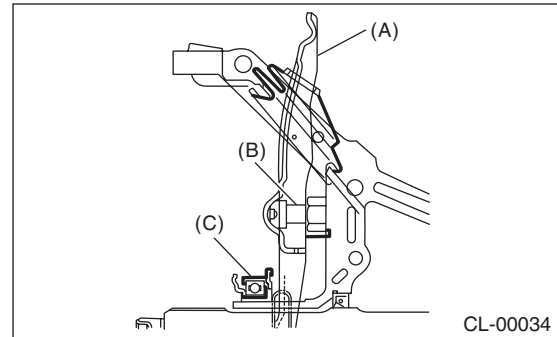


(A) Bearing case

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

2. RELEASE LEVER

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



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

5. Operating Cylinder

A: REMOVAL

CAUTION:

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

NOTE:

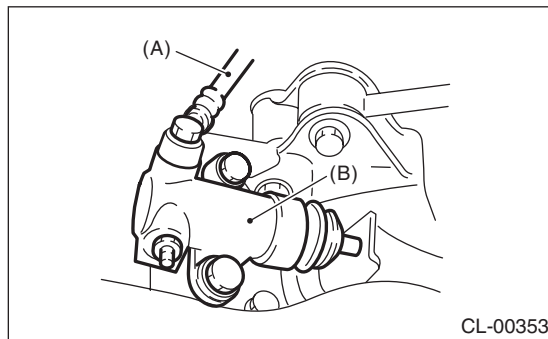
The illustration below is suitable for every model. Perform the same procedures for the other models.

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

2) Disconnect the clutch hose from the operating cylinder.

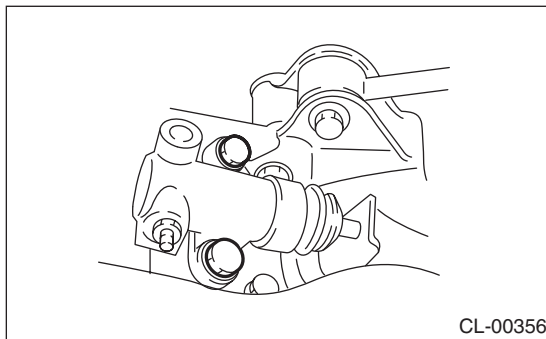
CAUTION:

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



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

3) Remove the operating cylinder from the transmission.



CL-00356

B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:

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

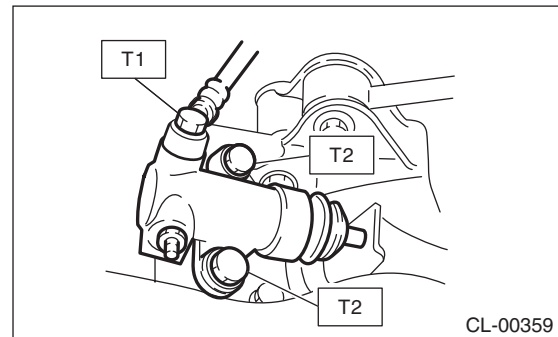
Grease

NICHIMOLY N-130 (Part No. K0879Y0501) or equivalent

Tightening torque:

T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

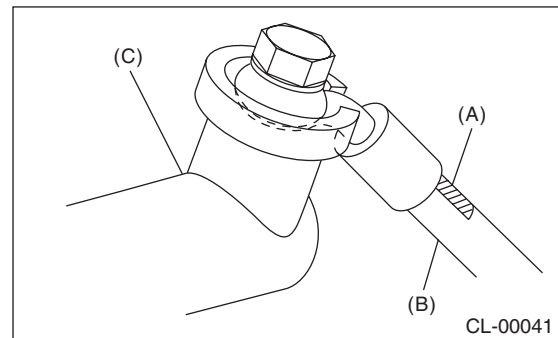
T2: 37 N·m (3.8 kgf-m, 27.3 ft-lb)



CL-00359

NOTE:

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



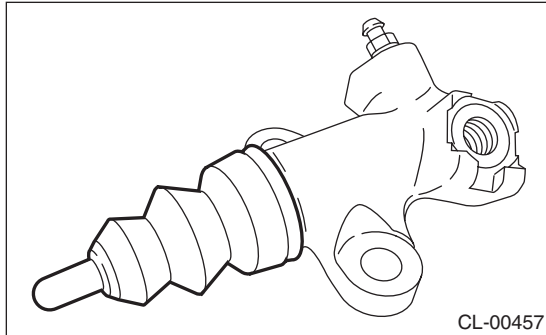
CL-00041

- (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-20, Clutch Fluid Air Bleeding.>

C: DISASSEMBLY

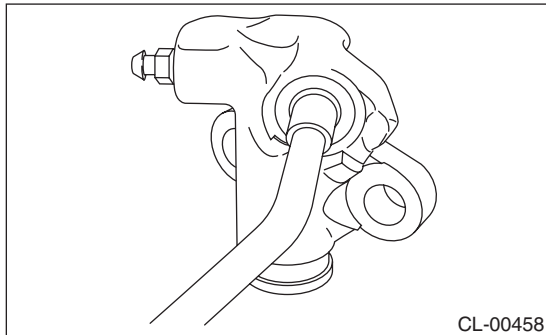
- 1) Remove the boot and push rod.



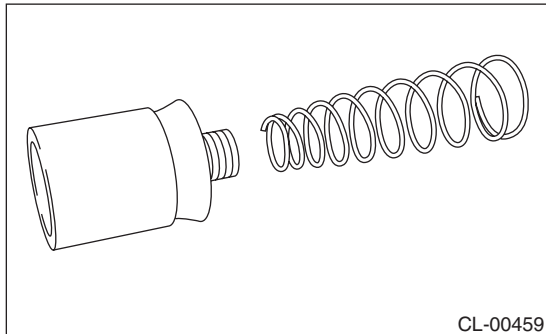
- 2) Apply compressed air through clutch hose attachment hole.

NOTE:

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



- 3) Separate the piston and piston spring.



D: ASSEMBLY

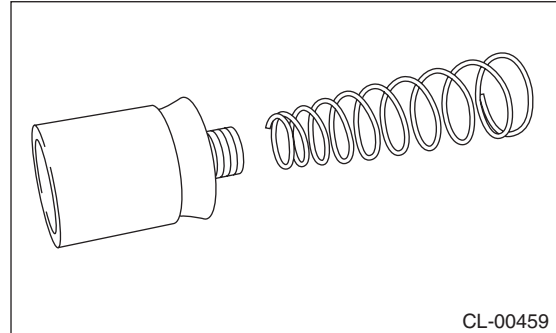
NOTE:

During assembly, apply clutch fluid to all parts.

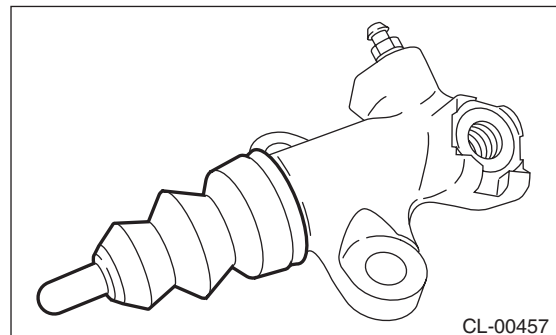
Recommended clutch fluid:

New FMVSS No. 116 DOT3 or DOT4

- 1) Install the piston spring onto the piston.



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



E: INSPECTION

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

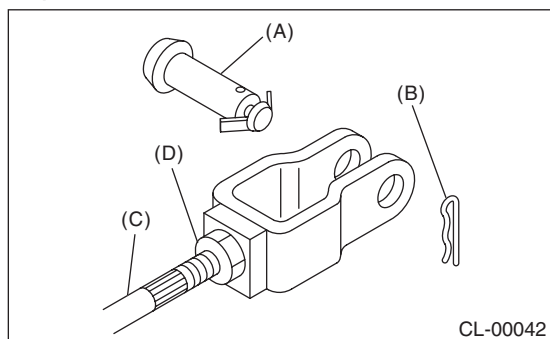
6. Master Cylinder

A: REMOVAL

CAUTION:

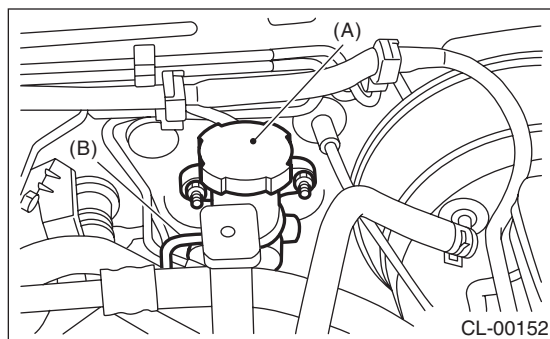
Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.

- 1) Thoroughly drain the brake fluid from the reservoir tank.
- 2) Remove the instrument panel lower cover. <Ref. to EI-44, REMOVAL, Instrument Panel Lower Cover.>
- 3) 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

- 4) Remove the air intake chamber. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 5) Remove the clutch pipe from the master cylinder.
- 6) Remove the master cylinder and reservoir tank as a unit.



- (A) Master cylinder
- (B) Clutch pipe

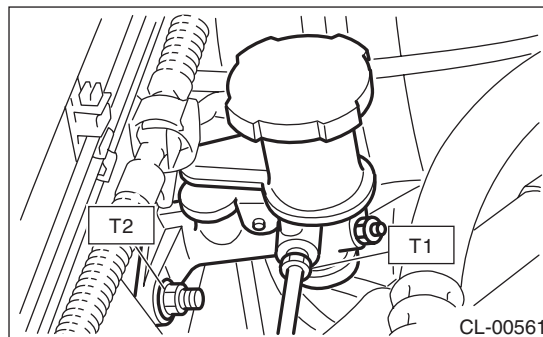
B: INSTALLATION

- 1) Install the master cylinder to the vehicle body, and connect the clutch pipe to the master cylinder.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 11.1 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



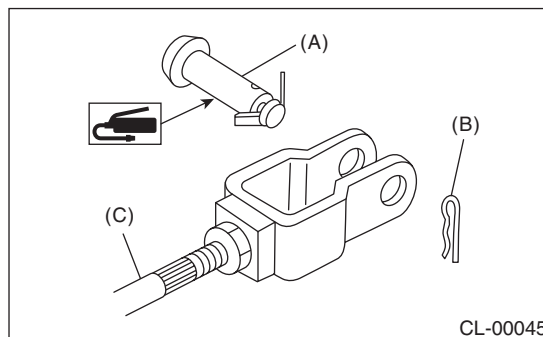
- 2) Connect the push rod of the master cylinder to the clutch pedal, and install the clevis pin and snap pin.

CAUTION:

Always use a new clevis pin.

NOTE:

Apply grease to the clevis pin.

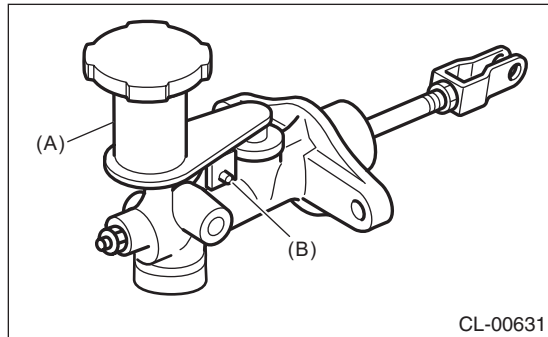


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

- 3) Install the instrument panel lower cover.
- 4) After bleeding air from the clutch system, ensure that the clutch operates properly. <Ref. to CL-20, Clutch Fluid Air Bleeding.>
- 5) Install the air intake chamber. <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>

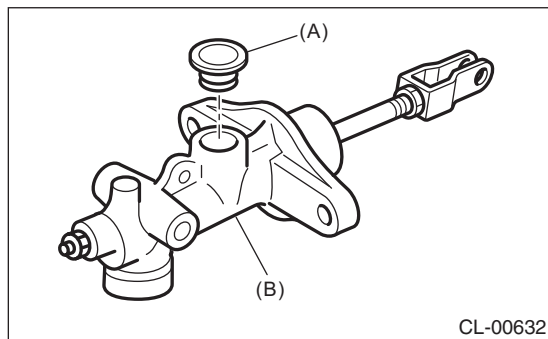
C: DISASSEMBLY

1) Remove the straight pin and reservoir tank.



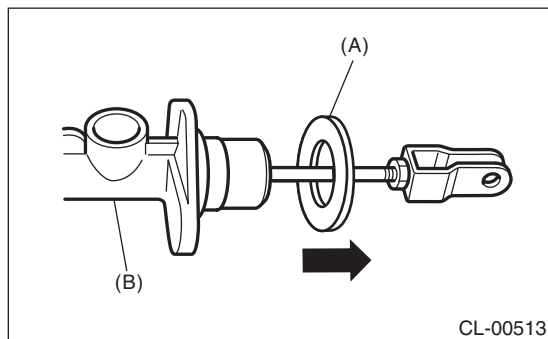
- (A) Reservoir tank
- (B) Straight pin

2) Remove the oil seal.



- (A) Oil seal
- (B) Master cylinder

3) Move the seat towards the rear.



- (A) Seat
- (B) Master cylinder

4) Remove the piston stop ring.

CAUTION:

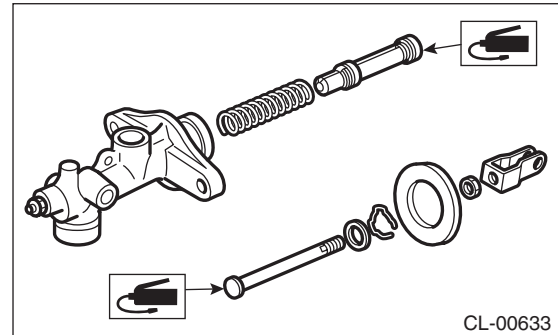
When removing the piston stop ring, be careful to prevent the rod, washer, piston and return spring from popping out.

D: ASSEMBLY

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

Grease:

SILICONE GREASE G-40M (Part No. 004404003) or equivalent



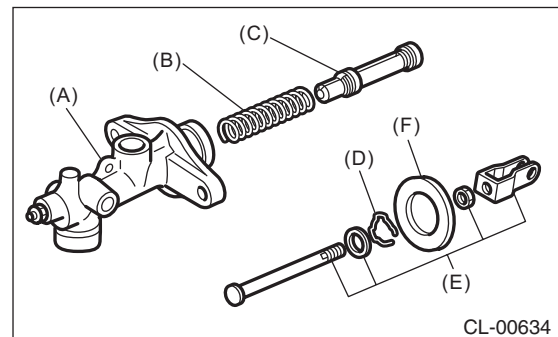
2) Assemble in the reverse order of disassembly.

Tightening torque:

10 N·m (1.0 kgf-m, 7.4 ft-lb)

E: INSPECTION

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

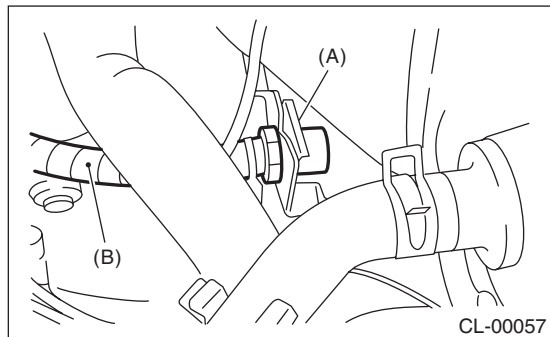


- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Piston stop ring
- (E) Push rod ASSY
- (F) Seat

7. Clutch Pipe and Hose

A: REMOVAL

- 1) Remove the air intake chamber. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 2) Drain the clutch fluid. <Ref. to CL-19, Clutch Fluid.>
- 3) Disconnect the clutch pipe from the clutch hose and master cylinder.
- 4) Pull out the clamp, then disconnect the clutch hose from the bracket.



- (A) Clamp
(B) Clutch hose

- 5) Remove the hose from operating cylinder.
- 6) Remove the bracket.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:

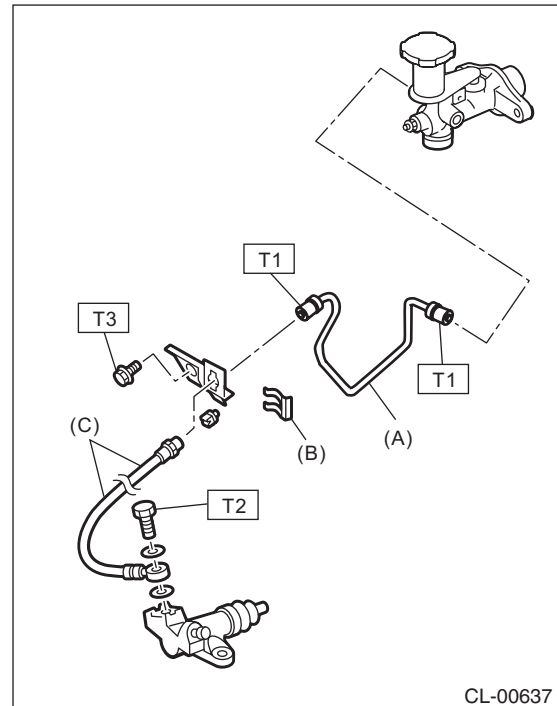
Bleed air from the clutch fluid. <Ref. to CL-20, Clutch Fluid Air Bleeding.>

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 11.1 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

T3: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



- (A) Clutch pipe
(B) Clip
(C) Clutch hose

C: INSPECTION

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

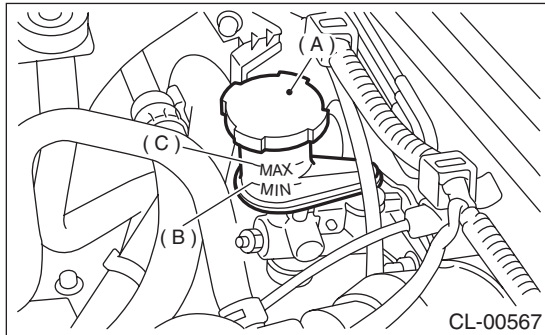
8. Clutch Fluid

A: INSPECTION

CAUTION:

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

- 1) Park the vehicle on a level surface.
- 2) 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) MIN. level
- (C) MAX. level

B: REPLACEMENT

CAUTION:

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

NOTE:

- During bleeding operation, keep the clutch reservoir tank filled with brake fluid to prevent entry of air.
 - Clutch pedal must be operated very slowly.
 - Bleed air from the oil line with help of a co-worker.
 - The amount of brake fluid required is approximately 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.
- 1) Remove the air intake chamber. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
 - 2) Drain the brake fluid from the reservoir tank.
 - 3) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:

New FMVSS No. 116 DOT3 or DOT4

- 4) If necessary, bleed air from the clutch fluid. <Ref. to CL-20, Clutch Fluid Air Bleeding.>
- 5) Install the air intake chamber. <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>

9. Clutch Fluid Air Bleeding

A: PROCEDURE

CAUTION:

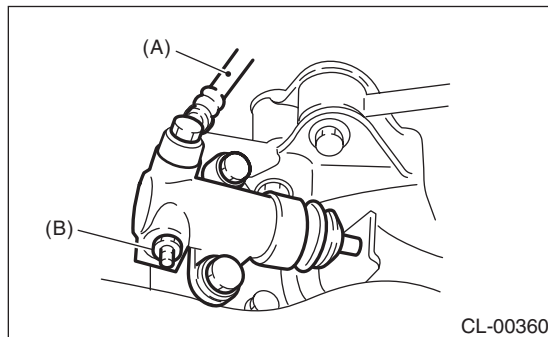
Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.

NOTE:

- The illustration below is suitable for every model. Perform the same procedures for the other models.
- Bleed air from the oil line with help of a co-worker.

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

2) Fit one end of a vinyl tube into the air breather of the operating cylinder, and put the other end into a container.



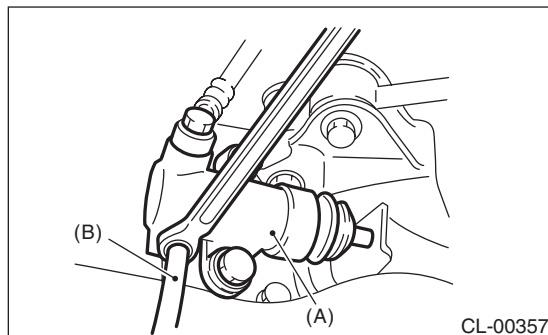
- (A) Clutch hose
(B) Air breather

3) Slowly depress the clutch pedal and keep it depressed. Then open the air breather to discharge air together with the fluid.

Release the air breather 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.



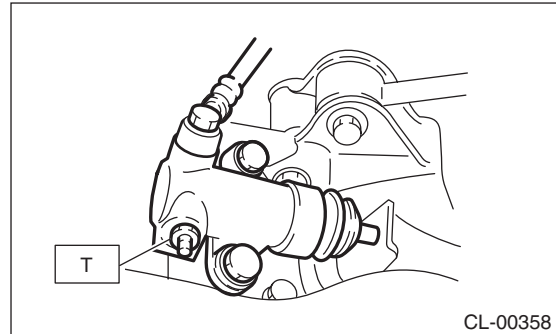
- (A) Operating cylinder
(B) Vinyl tube

4) Repeat procedure 3), until there are no more air bubbles appearing from the air breather.

5) Tighten the air breather.

Tightening torque:

T: 7.8 N·m (0.8 kgf-m, 5.8 ft-lb)



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

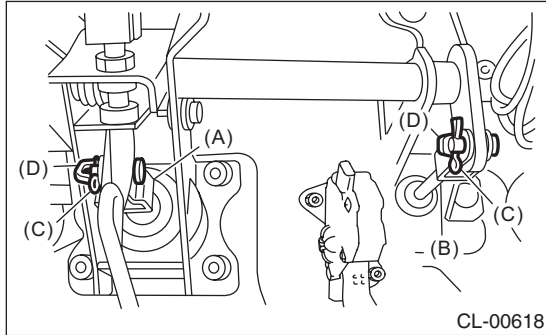
7) After bleeding the air from clutch system, ensure that the clutch operates properly.

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

10. Clutch Pedal

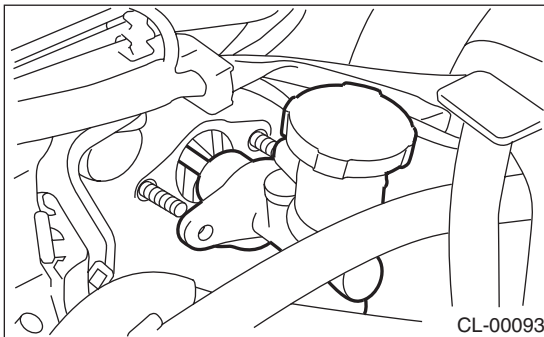
A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the steering column. <Ref. to PS-15, REMOVAL, Tilt Steering Column.>
- 3) Disconnect the connector from 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 air intake chamber. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 7) Remove the nut which secures the clutch master cylinder.



- 8) Remove the bolts and nuts which secure the brake pedal and clutch pedal, and remove the pedal assembly.

NOTE:

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

B: INSTALLATION

- 1) Install in the reverse order of removal.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

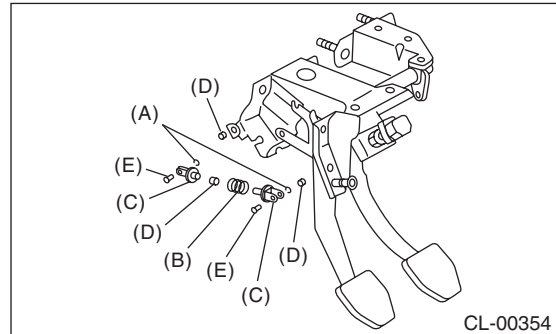
CAUTION:

Always use a new clevis pin.

- 2) Adjust the clutch pedal after installation. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>

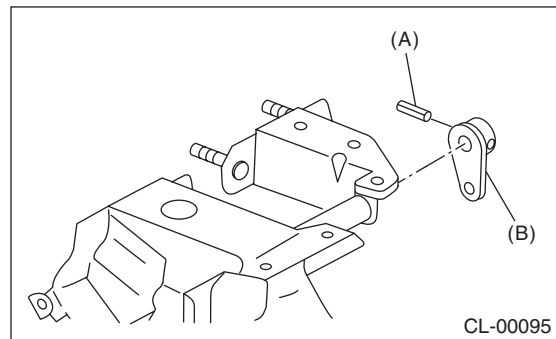
C: DISASSEMBLY

- 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) Remove the spring pin and lever.

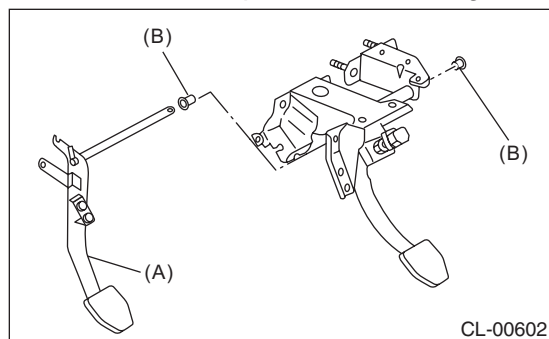


- (A) Pin
- (B) Lever

Clutch Pedal

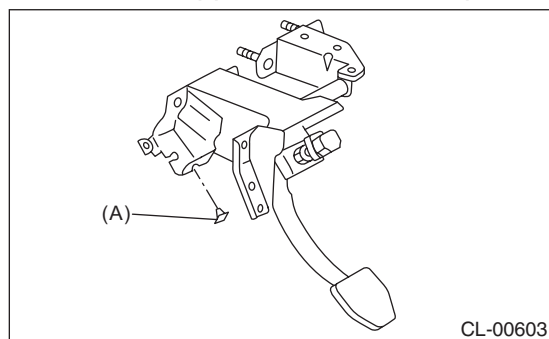
CLUTCH SYSTEM

4) Remove the clutch pedal and bushings.



- (A) Clutch pedal
(B) Bushing

5) Remove the stopper from the clutch pedal.



- (A) Stopper

6) 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 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 the bushings and apply grease before installing the spacer.

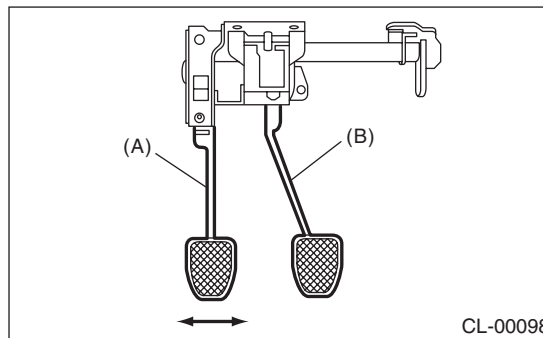
E: INSPECTION

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

Deflection of the clutch pedal:

Service limit

4.0 mm (0.157 in) or less



- (A) Clutch pedal
(B) Brake pedal

F: ADJUSTMENT

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

CAUTION:

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

NOTE:

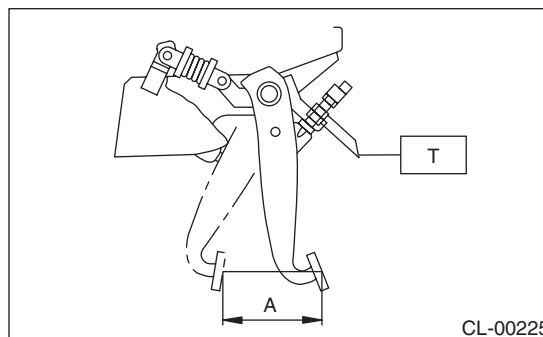
If the lock nut cannot adjust the full stroke of clutch pedal to the specified value, adjust it by turning the master cylinder push rod.

Clutch pedal full stroke A:

130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):

T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)

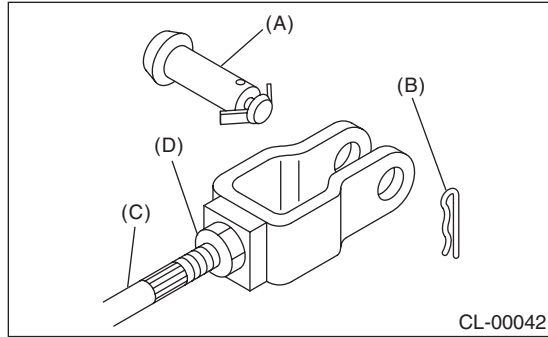


- 2) If the full stroke is not within the specified value, loosen the clutch switch lock nut to adjust.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

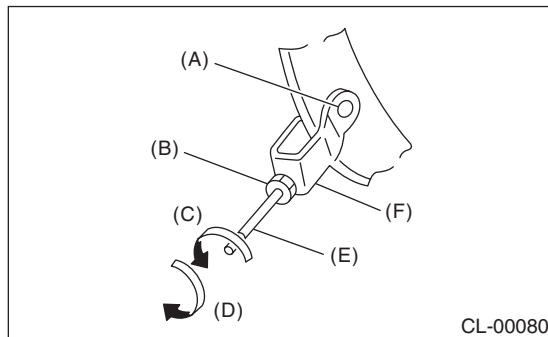
3) Loosen the push rod lock nuts.



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

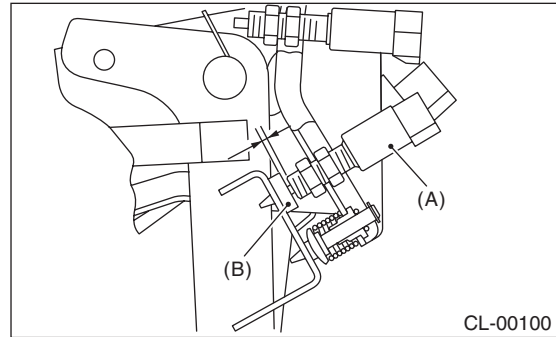
4) Rotate the push rod to adjust.

- (1) Make sure that the clutch pedal contacts the clutch switch side when the pedal is released.
- (2) Make sure that the clutch pedal contacts the clutch pedal bracket stopper when the clutch pedal is at the maximum stroke position.



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

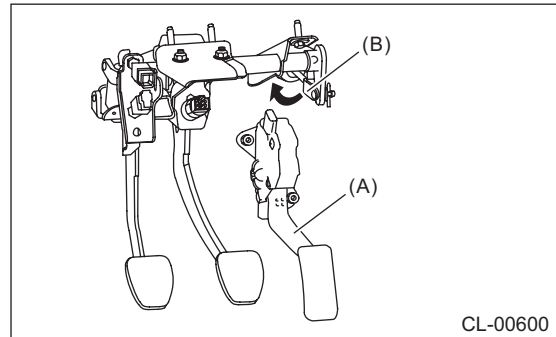
5) Turn the push rod to shorten until a clearance is gained on the clutch switch side.



- (A) Clutch switch
- (B) Stopper

6) Turn the push rod to lengthen until clutch pedal contacts the clutch switch.

7) Turn further in the direction that will shorten the push rod (arrow direction shown in figure) by 270°.



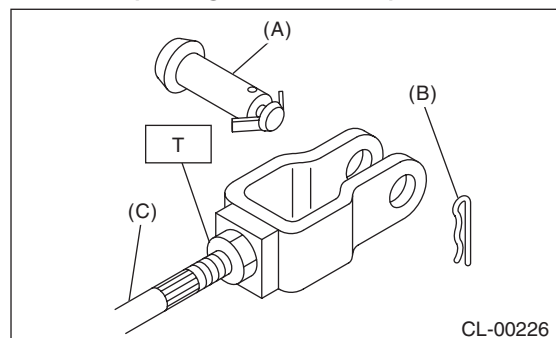
- (A) Accelerator pedal
- (B) Clevis

8) Check that the clevis pin moves smoothly by moving it in the left and right directions.

9) Tighten the push rod lock nut.

Tightening torque (Push rod lock nut):

T: 10 N·m (1.0 kgf-m, 7.4 ft-lb)



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

Clutch Pedal

CLUTCH SYSTEM

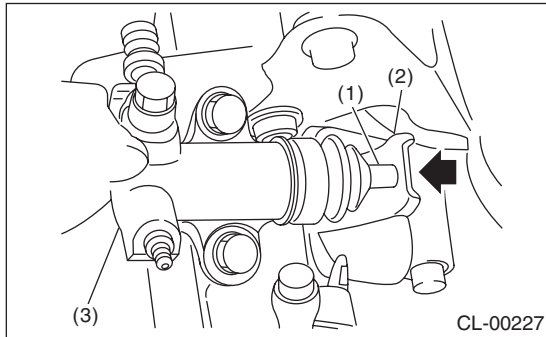
10) Depress and release the clutch pedal two or three times to ensure that the clutch pedal and release lever operate smoothly. If the clutch pedal and release lever do not operate smoothly, bleed air from the clutch hydraulic system. <Ref. to CL-20, Clutch Fluid Air Bleeding.>

11) Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not within specifications, repeat adjustment procedures again from the beginning.

Clutch pedal full stroke:

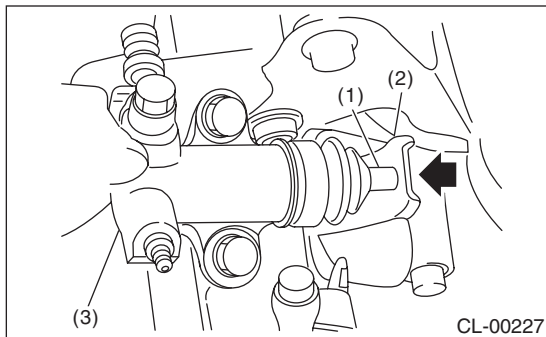
130 — 135 mm (5.12 — 5.31 in)

12) 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 with a new part. <Ref. to CL-16, Master Cylinder.>



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

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



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

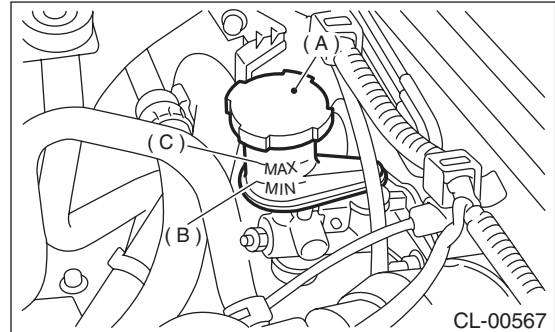
14) If the clutch fluid level increases, hydraulic clutch is correct.

15) If the clutch fluid level does not increase or push rod does not retract, readjust the clutch pedal.

16) 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:

New FMVSS No. 116 DOT3 or DOT4



- (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 of clutch switch.
- 4) Remove the clutch switches.

B: INSTALLATION

1. CLUTCH SWITCH

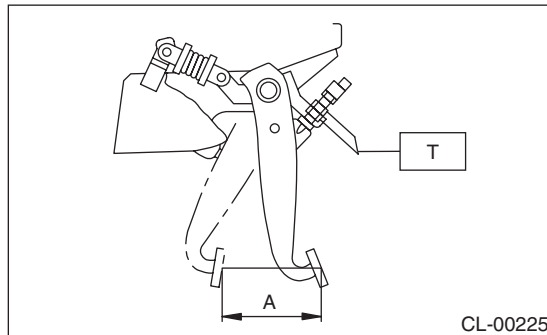
- 1) Move the clevis pin of push rod to left and right, retain it at the position where it moves smoothly, and measure the clutch pedal stroke.

Clutch pedal full stroke A:

130 — 135 mm (5.12 — 5.31 in)

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)



- 2) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>

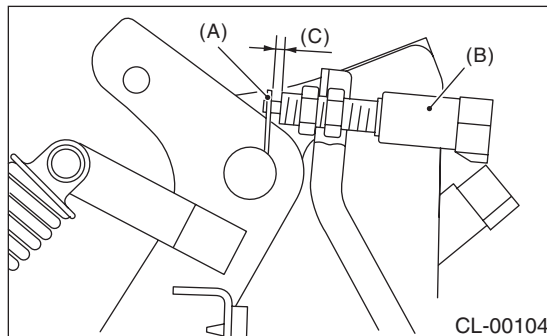
- 3) Connect the clutch switch connector.

2. CLUTCH START SWITCH

- 1) Fully depress the clutch pedal and hold it.
- 2) Install the clutch pedal plate and clutch switch so that the gap between them is 3 — 3.5 mm (0.12 — 0.14 in), and then tighten the lock nut.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)



- (A) Plate
(B) Clutch switch
(C) 3 — 3.5 mm (0.12 — 0.14 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. CLUTCH START SWITCH

- 1) Inspect the following items, and if the operation is not normal, adjust the clutch start switch and inspect again. <Ref. to CL-27, ADJUSTMENT, Clutch Switch.>

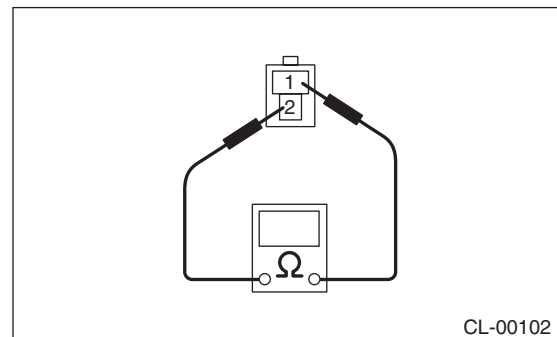
- Make sure that engine does not start with clutch pedal not depressed.
- Make sure that engine starts with clutch pedal fully depressed.

- 2) If the operation is not normal even after adjusting the clutch start switch, check the continuity of the clutch start switch.

- (1) Remove the clutch start switch. <Ref. to CL-25, REMOVAL, Clutch Switch.>

- (2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not at the standard value, replace the switch.

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



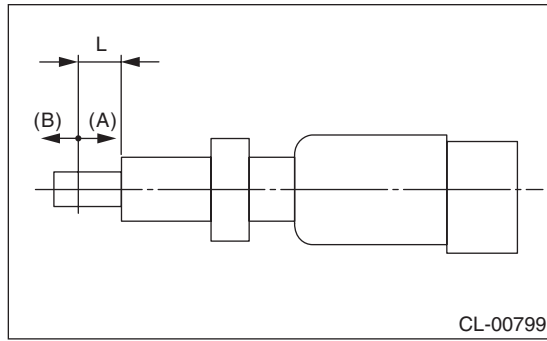
- (3) Check that the switch changes between ON/OFF within L dimension.

Clutch Switch

CLUTCH SYSTEM

L dimension:

4 — 5.5 mm (0.16 — 0.22 in)



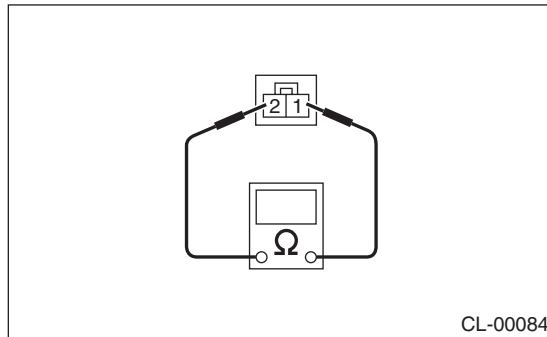
- (A) ON
- (B) OFF

2. CLUTCH SWITCH

1) Check the clutch switch for continuity.

- (1) Disconnect the connector of clutch switch.
- (2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not within the specification, inspect the clutch stroke and its installing condition, and check again.

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

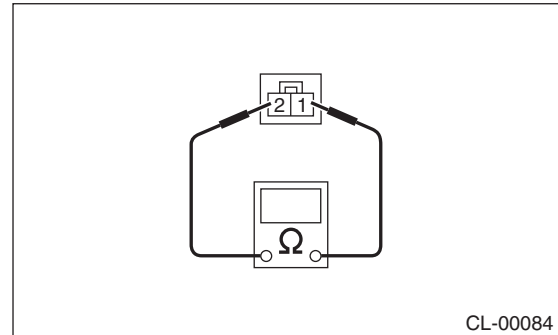


2) If the operation is not normal even when the clutch stroke and its installing condition is normal, check the continuity of the clutch switch.

- (1) Remove the clutch switches. <Ref. to CL-25, REMOVAL, Clutch Switch.>

- (2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not at the standard value, replace the switch.

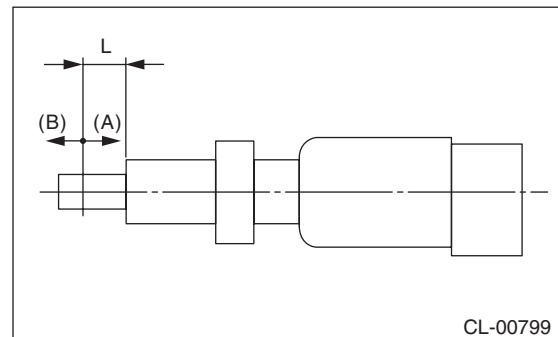
Condition	Terminal No.	Specified resistance
ON	No. 1 — No. 2	Less than 1 Ω
OFF	No. 1 — No. 2	1 MΩ or more



- (3) Check that the switch changes between ON/OFF within L dimension.

L dimension:

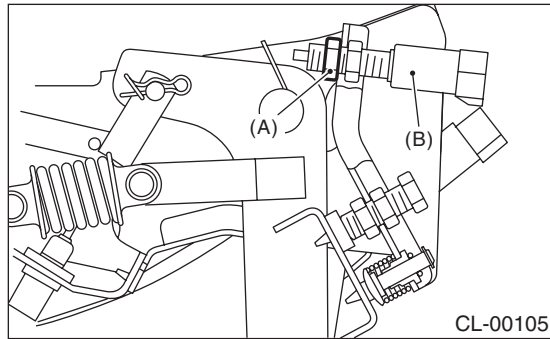
5 — 6.5 mm (0.2 — 0.26 in)



- (A) ON
- (B) OFF

D: ADJUSTMENT

1) Loosen the lock nut of clutch start switch.

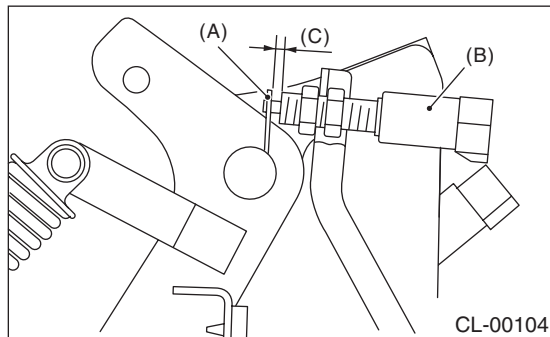


(A) Lock nut

(B) Clutch start switch

2) Fully depress the clutch pedal and hold it.

3) Adjust the gap of the clutch pedal plate and the clutch switch to be 3 — 3.5 mm (0.12 — 0.14 in).



(A) Plate

(B) Clutch start switch

(C) 3 — 3.5 mm (0.12 — 0.14 in)

4) Tighten the lock nut.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

General Diagnostic Table

CLUTCH SYSTEM

12.General Diagnostic Table

A: INSPECTION

1. CLUTCH

Symptoms	Possible cause	Corrective action
1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms. • Engine speeds up when shifting. • High-speed driving is not possible; especially rapid acceleration is not possible and vehicle speed does not increase in proportion to the increase in engine speed. • Power drops particularly when ascending a slope, and there is a burning smell of the clutch plate. • Method of testing: Park the vehicle and fully apply the parking brake. Disengage the clutch and shift the transmission gear into the 1st. Gradually increase the engine speed while gradually allowing the clutch to engage. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not move forward and the engine does not stall.	(a) Oil on the clutch face	Replace.
	(b) Worn clutch face	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Warped pressure plate or flywheel	Repair or replace.
	(e) Defective release bearing holder	Repair or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise occurs and control becomes difficult when shifting gears. The symptom becomes more apparent when shifting into the 1st gear. However, because most trouble of this sort is due to a defective synchronization mechanism, perform the following tests. • Method of testing: <Ref. to CL-29, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> The problem is caused by insufficient disengagement of the clutch if an abnormal noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace the clutch disc.
	(b) Excessive deflection of clutch disc face	Repair or replace.
	(c) Crankshaft pilot needle bearing sticking	Replace.
	(d) Cracked clutch disc face	Replace.
	(e) Stuck clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole vehicle when the vehicle is just started with clutch partially engaged.	(a) Adhesion of oil on the clutch face	Replace the clutch disc.
	(b) Weak or broken damper spring	Replace the clutch disc.
	(c) Poor contact of the disc surface or excessively worn disc	Replace the faulty clutch disc.
	(d) Warped pressure plate or flywheel	Repair or replace.
	(e) Loose disc rivets	Replace the clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
4. Noisy clutch Noise occurs 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.

General Diagnostic Table

CLUTCH SYSTEM

Symptoms	Possible cause	Corrective action
5. Clutch grabs suddenly. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace the clutch disc.
	(b) Deteriorated cushioning spring	Replace the clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace clutch disc or main shaft.
	(d) Deteriorated or broken damper spring	Replace the clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

2. CLUTCH PEDAL

Symptoms	Corrective action
Insufficient clutch pedal 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.	Inspect defective transmission or excessive clutch drag torque, 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 fly-wheel seizure. Inspect the clutch disc and the spline of the clutch disc hub.

General Diagnostic Table

CLUTCH SYSTEM

CHASSIS SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FRONT SUSPENSION

FS

REAR SUSPENSION

RS

WHEEL AND TIRE SYSTEM

WT

TIRE PRESSURE MONITORING SYSTEM
(DIAGNOSTICS)

TPM(diag)

DIFFERENTIALS

DI

TRANSFER CASE

TC

DRIVE SHAFT SYSTEM

DS

VEHICLE DYNAMICS CONTROL (VDC)

VDC

VEHICLE DYNAMICS CONTROL (VDC)
(DIAGNOSTICS)

VDC(diag)

BRAKE

BR

PARKING BRAKE

PB

POWER ASSISTED SYSTEM
(POWER STEERING)

PS

FRONT SUSPENSION

FS

	Page
1. General Description	2
2. Wheel Alignment	7
3. Front Crossmember Support Plate	15
4. Front Stabilizer	16
5. Front Ball Joint	17
6. Front Arm	19
7. Front Strut	22
8. Front Crossmember	25
9. General Diagnostic Table	26

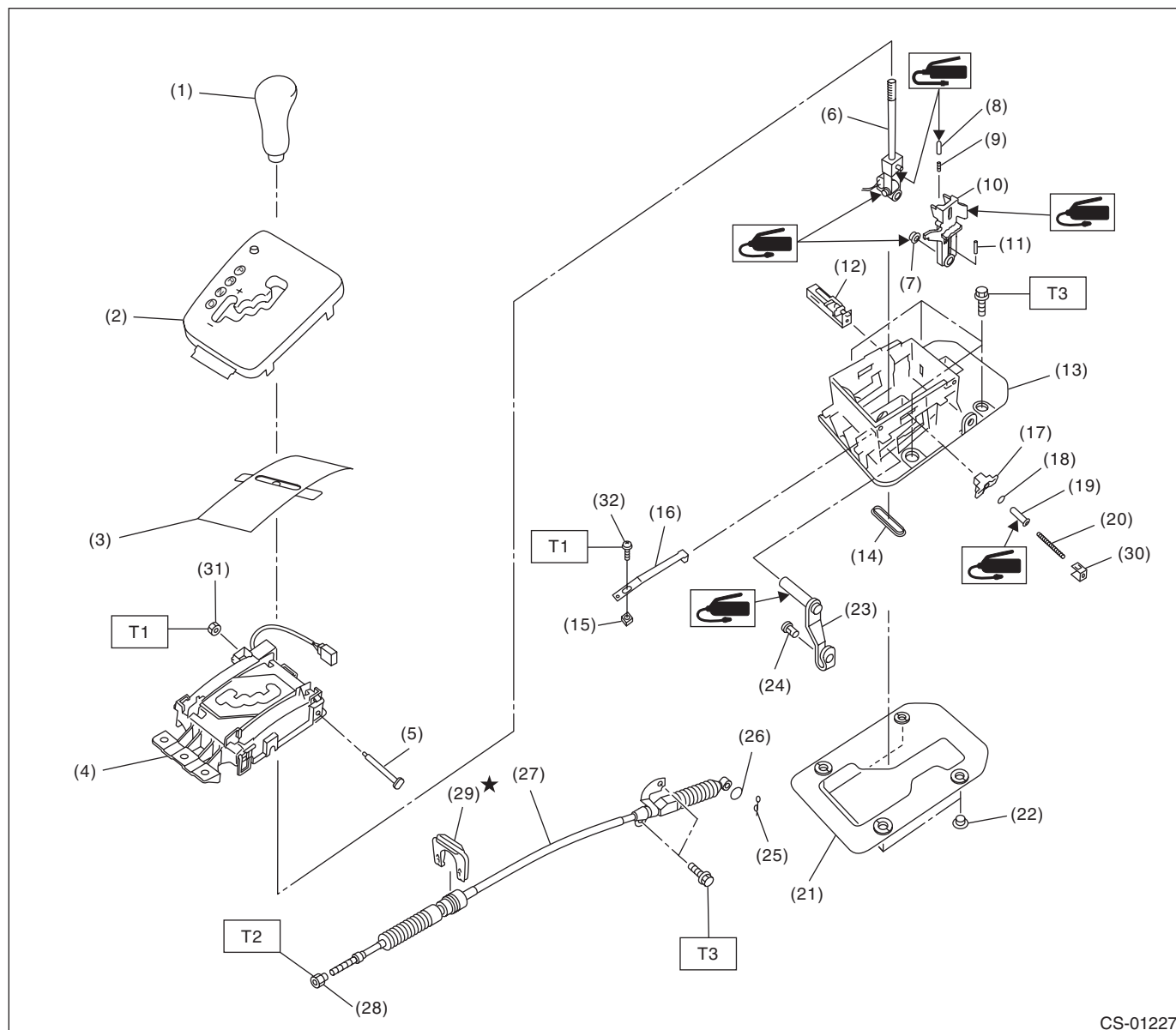
General Description

CONTROL SYSTEMS

1. General Description

A: SPECIFICATION

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

B: COMPONENT**1. AT SELECT LEVER**

CS-01227

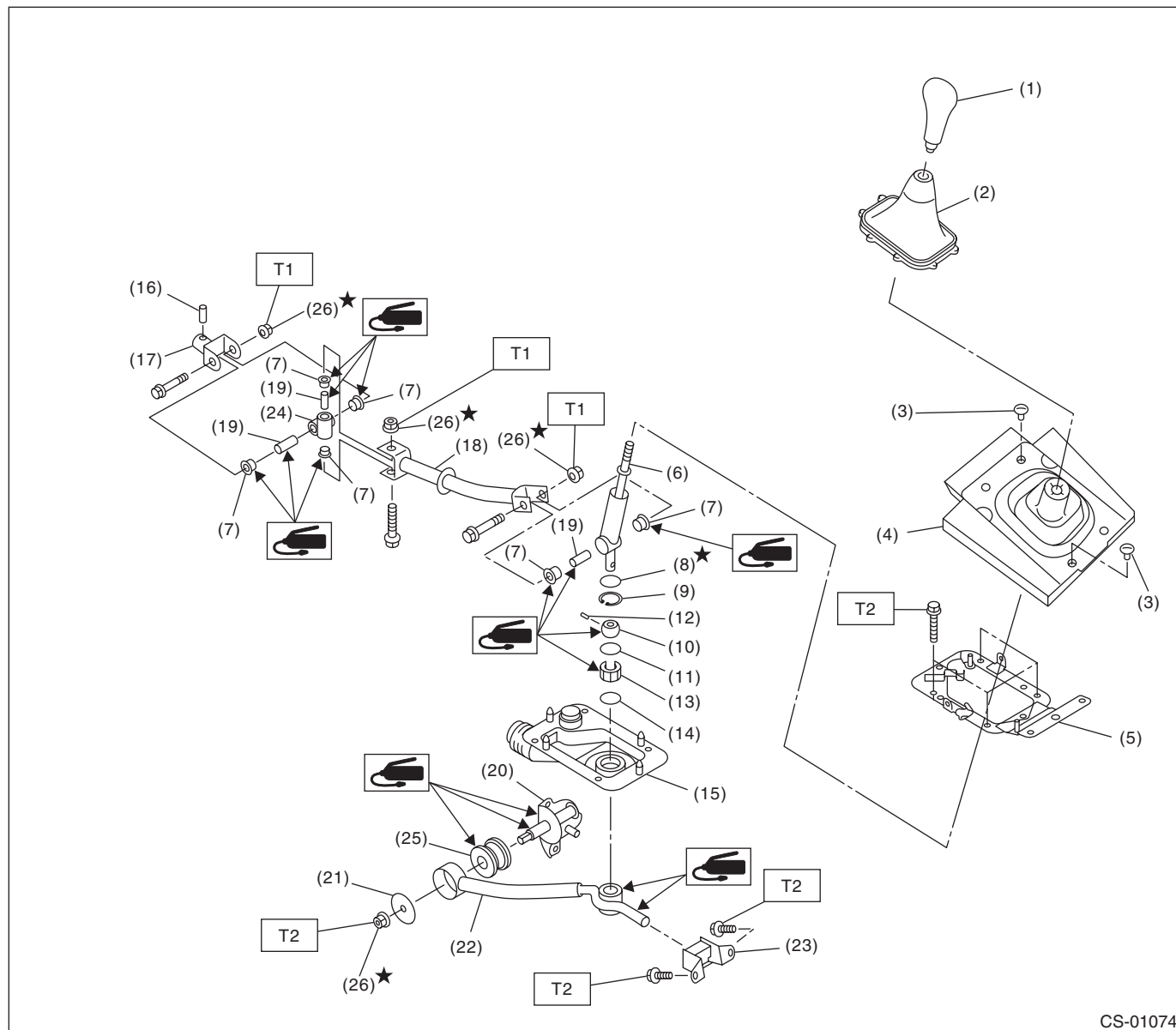
(1) Grip ASSY	(14) Grommet	(27) Select cable
(2) Indicator ASSY	(15) Plate nut	(28) Nut A
(3) Blind	(16) Detent spring	(29) Clamp
(4) Plate guide COMPL	(17) Bushing	(30) Shift lock clamp
(5) Spacer bolt	(18) Lock plate cushion	(31) Nut
(6) Selector lever COMPL	(19) Select lever rod	(32) Flange screw
(7) Bushing	(20) Spring A	
(8) Rod detent	(21) Gasket	
(9) Spring detent	(22) Spacer	
(10) Bracket arm detent	(23) Arm ASSY	
(11) Spring pin	(24) Connector pin	
(12) Shift lock solenoid unit	(25) Snap pin	
(13) Plate COMPL	(26) Washer	

Tightening torque: N·m (kgf·m, ft·lb)**T1: 2.2 (0.2, 1.6)****T2: 7.5 (0.8, 5.5)****T3: 18 (1.8, 13.3)**

General Description

CONTROL SYSTEMS

2. 5MT GEAR SHIFT LEVER



CS-01074

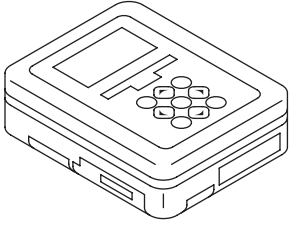
(1) Gear shift knob	(11) O-ring	(21) Plate
(2) Console boot	(12) Spring pin	(22) Stay
(3) Clamp	(13) Bushing B	(23) Cushion rubber
(4) Boot and insulator ASSY	(14) O-ring	(24) Boss
(5) Plate COMPL	(15) Boot	(25) Bushing
(6) Lever	(16) Spring pin	(26) Self-locking nut
(7) Bushing	(17) Joint	
(8) Lock wire	(18) Rod	
(9) Snap ring	(19) Spacer	
(10) Bushing	(20) Bracket	

Tightening torque: N·m (kgf·m, ft·lb)

T1: 12 (1.2, 8.9)

T2: 18 (1.8, 13.3)

C: PREPARATION TOOL**1. SPECIAL TOOL**

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

2. GENERAL TOOL

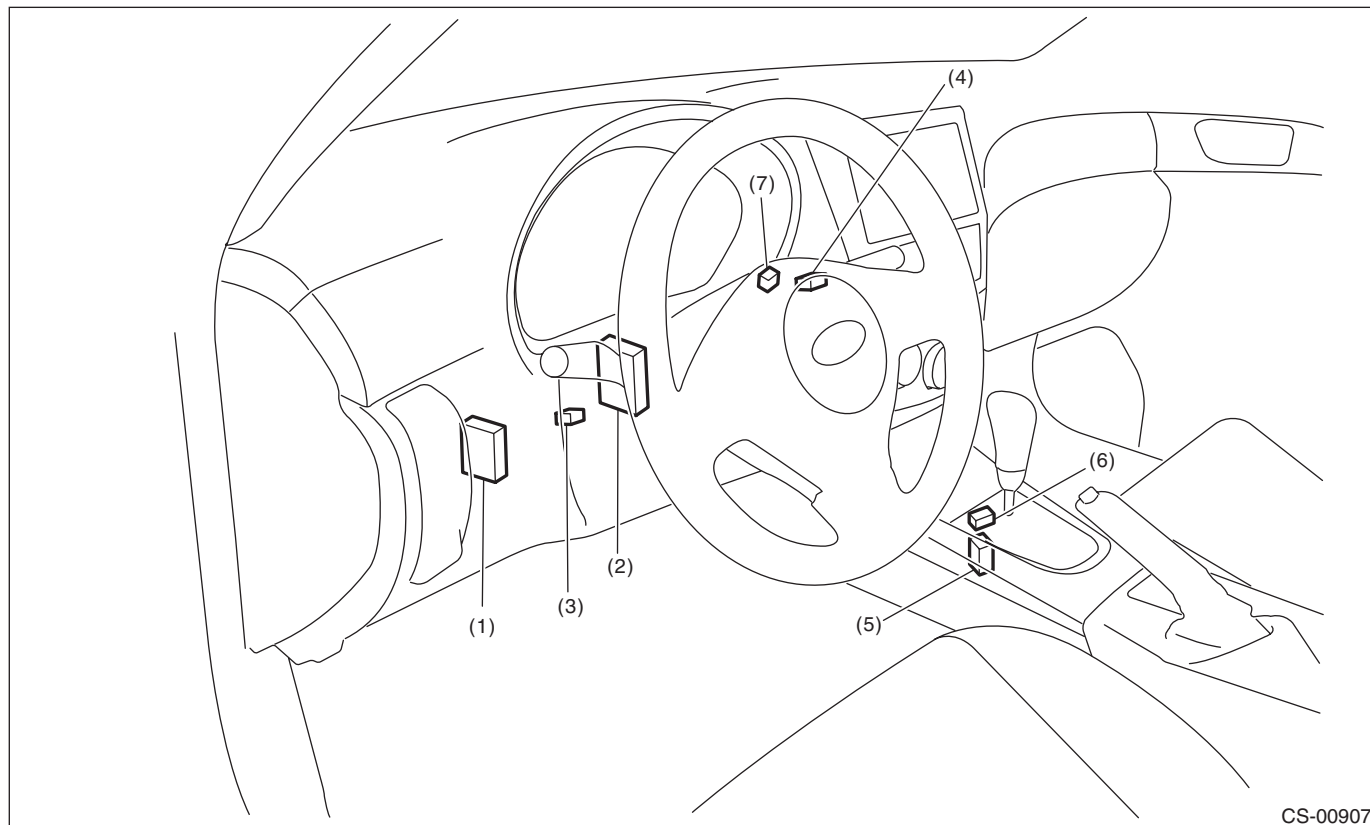
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

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

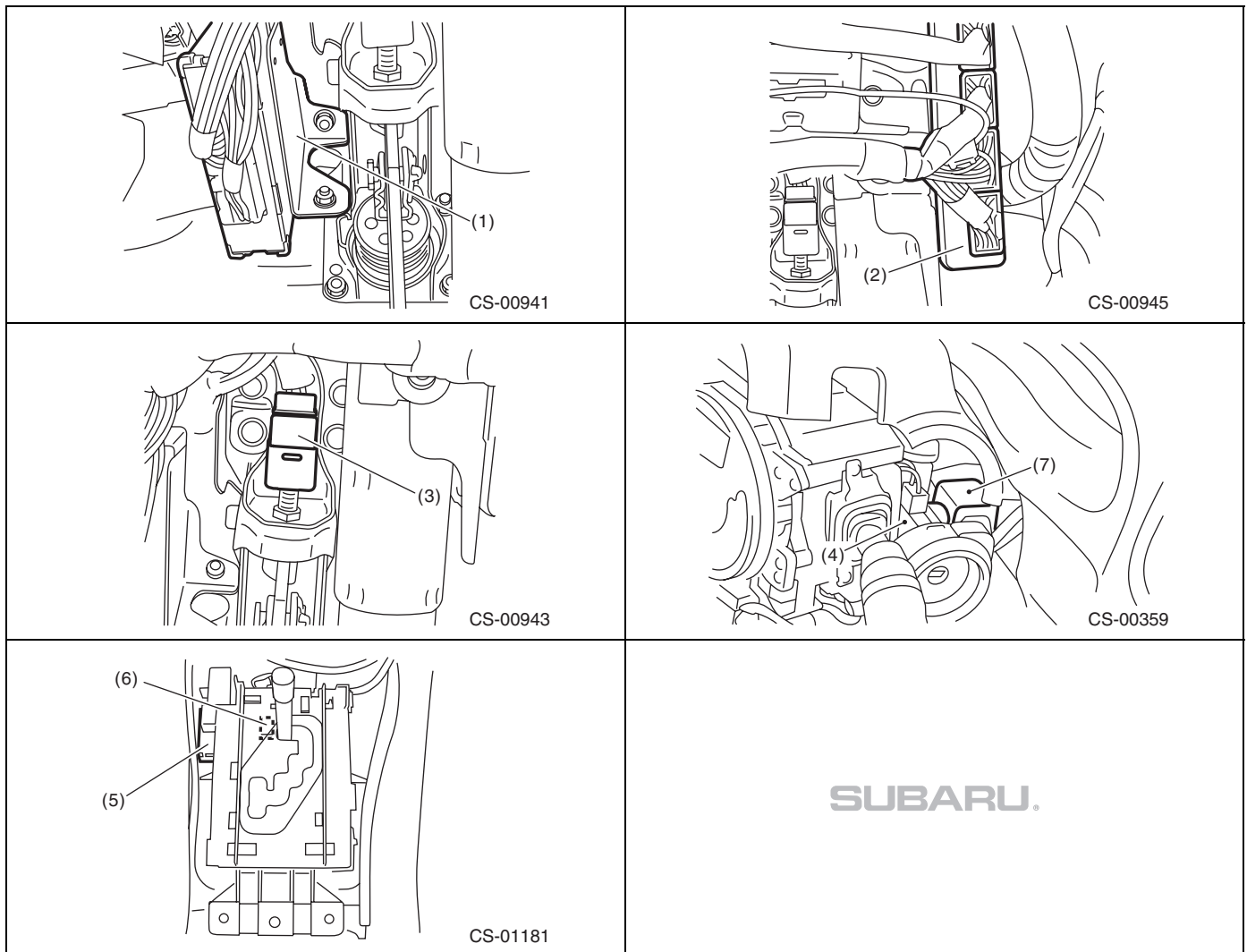
(3) Stop light and brake switch

(4) Key cylinder (with built-in key warning switch)

(5) Shift lock solenoid ASSY

(6) "P" range switch

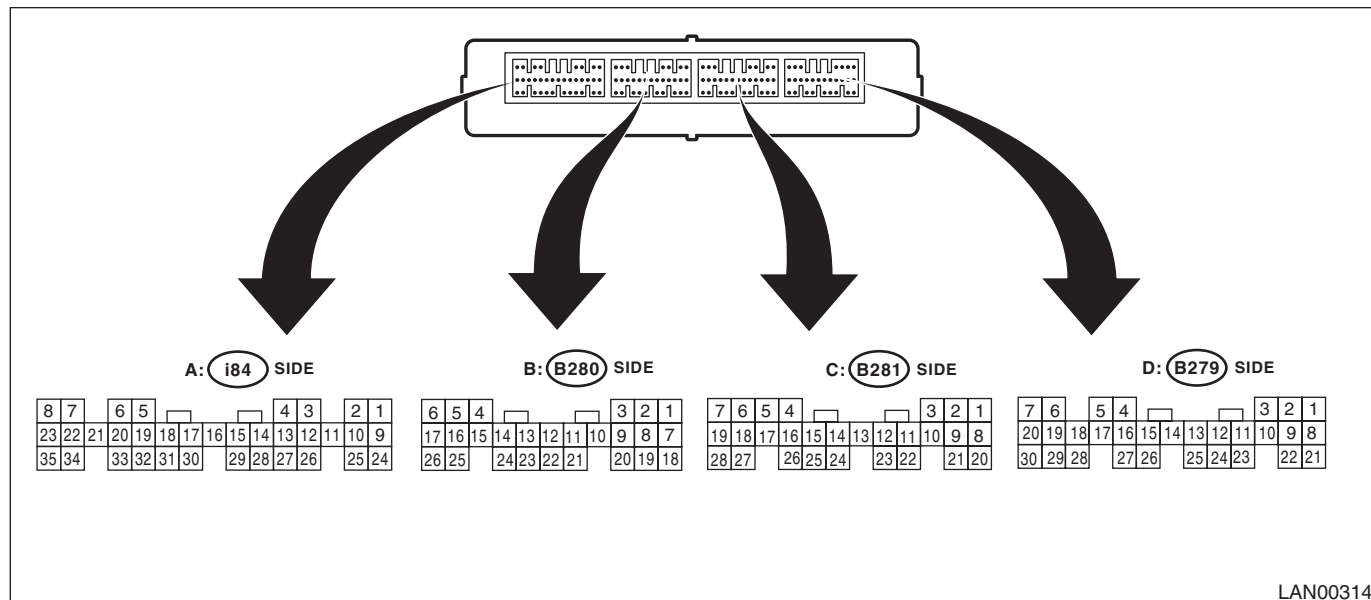
(7) Key lock solenoid



AT Shift Lock Control System

CONTROL SYSTEMS

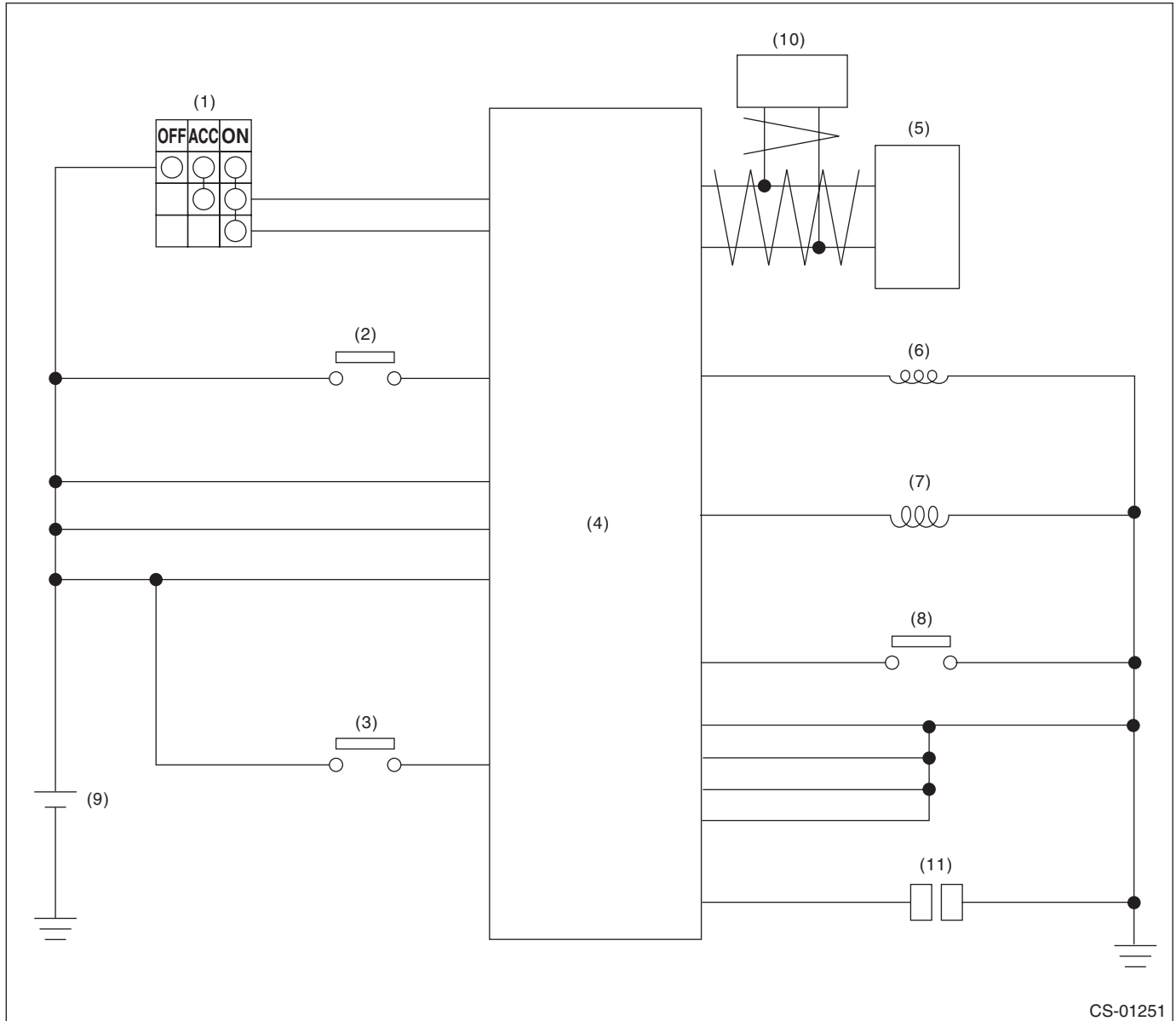
B: ELECTRICAL SPECIFICATION



LAN00314

Item	Connector No.	Terminal No.	Input/Output signal
			Measured value and measuring conditions
Battery power supply	B279	22	9 — 16 V
	B280	6	
	B281	2	
Ignition power supply	B280	1	10 — 15 V when ignition switch is at ON or START.
		7	10 — 15 V when ignition switch is at ACC.
TCM ("P" range)	B280	3	Pulse signal
		9	
Stop light and brake switch	B280	2	9 — 16 V when the stop light & brake switch is ON. 0 V when the stop light & brake switch is OFF.
"P" range switch	B281	4	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	B279	12	8.5 — 16 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	B279	2	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B279	11	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	i84	28	—
	B280	17	
	B281	20	
	B279	27	
Delivery (test) mode connector	i84	17	When the delivery (test) mode connector is disconnected: 9 — 16 V When the delivery (test) mode connector is connected: 0 V

C: WIRING DIAGRAM



(1) Ignition switch	(5) TCM (shift range information)	(9) Battery
(2) Stop light and brake switch	(6) Key lock solenoid	(10) VDC/ABS CM&H/U (vehicle speed information)
(3) Key warning switch	(7) Shift lock solenoid	(11) Delivery (test) mode connector
(4) Body integrated unit	(8) "P" range switch	

AT Shift Lock Control System

CONTROL SYSTEMS

D: INSPECTION

1. SHIFT LOCK OPERATION

Step	Check	Yes	No
1 CHECK COMMUNICATION OF SUBARU SELECT MONITOR. 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to all systems can be executed normally.	Is the system name displayed?	Go to step 2.	Perform the inspection following the diagnostic procedure in the LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
2 CHECK SHIFT LOCK. 1) Turn the ignition switch to ON. 2) Shift the select lever to "P" range.	While brake pedal is not depressed, is it possible to move the select lever from the "P" range to other ranges?	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-14, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>	Go to step 3.
3 CHECK SHIFT LOCK.	While brake pedal is depressed, is it possible to move the select lever from the "P" range to other ranges?	Go to step 4.	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-14, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
4 CHECK SHIFT LOCK. Shift the select lever to "N" range.	Is it possible to move the select lever from the "N" range to the "P" range?	Go to step 5.	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-14, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>

AT Shift Lock Control System

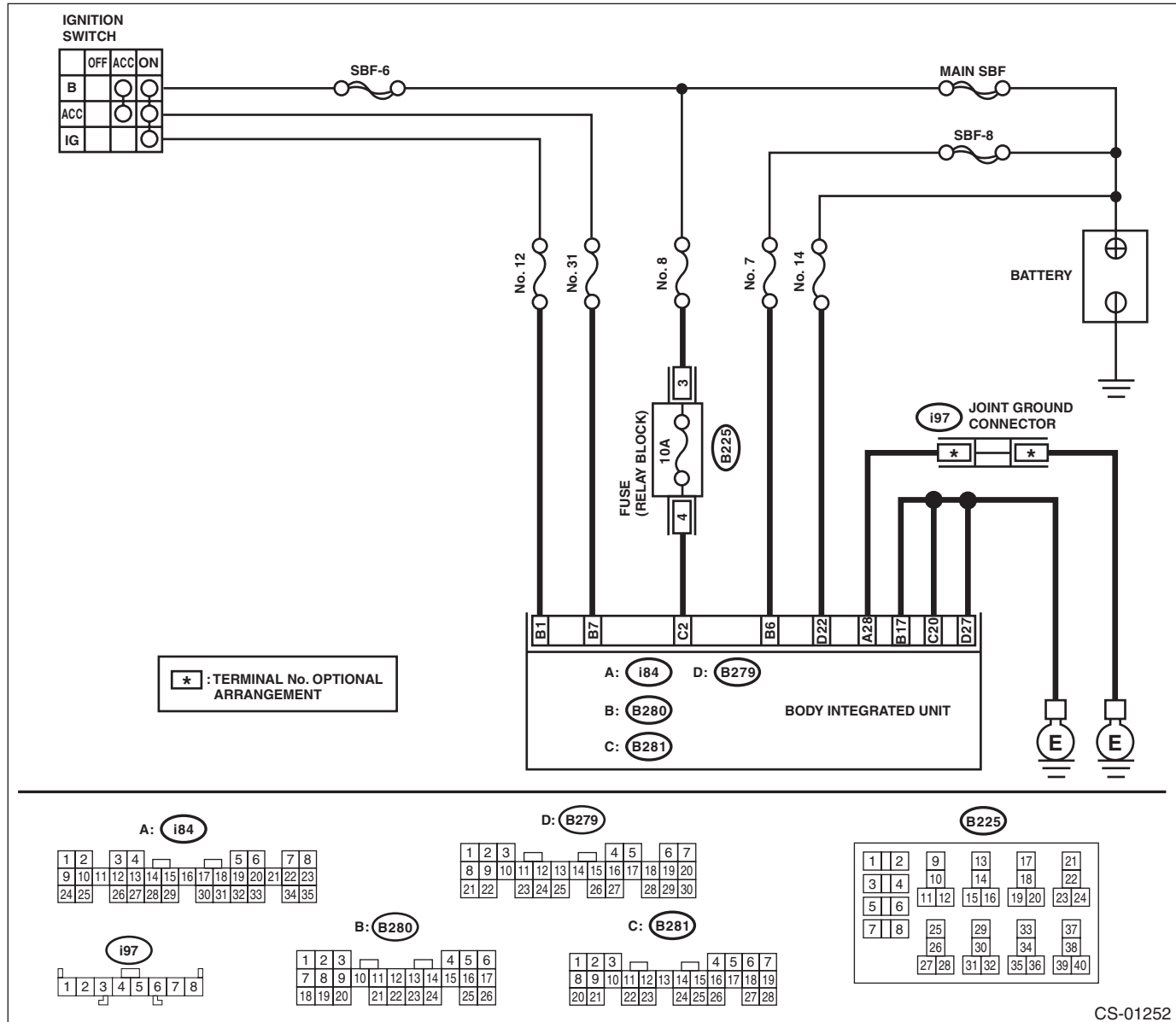
CONTROL SYSTEMS

Step	Check	Yes	No
5 CHECK SHIFT LOCK. 1) Shift the select lever to "N" range. 2) Turn the ignition switch to OFF.	While brake pedal is depressed, is it possible to move the select lever from the "N" range to the "P" range?	Go to step 6.	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-14, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
6 CHECK KEY INTERLOCK. 1) Turn the ignition switch to OFF. 2) Shift the select lever to other than "P" range.	Can the ignition key be removed?	Perform the inspection of "KEY INTERLOCK CANNOT BE LOCKED OR RELEASED". <Ref. to CS-17, KEY INTERLOCK CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>	Go to step 7.
7 CHECK KEY INTERLOCK. Shift the select lever to "P" range.	Can the ignition key be removed?	AT shift lock system is normal.	Perform the inspection of "KEY INTERLOCK CANNOT BE LOCKED OR RELEASED". <Ref. to CS-17, KEY INTERLOCK CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>

AT Shift Lock Control System

CONTROL SYSTEMS

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)-15, OPERATION, Subaru Select Monitor.>	Is the DTC of power line displayed on body integrated unit?	Repair or replace it according to the DTC.
2	CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND. 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B280) No. 1 (+) — Chassis ground (-): (B280) No. 6 (+) — Chassis ground (-): (B280) No. 7 (+) — Chassis ground (-): (B279) No. 22 (+) — Chassis ground (-): (B281) No. 2 (+) — Chassis ground (-):	Is the voltage 9 — 16 V?	Go to step 3.
			Check harness for open circuit between the body integrated unit and the battery or a blown fuse.

AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
3 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 <i>(i84) No. 28 — Chassis ground:</i> <i>(B279) No. 27 — Chassis ground:</i> <i>(B280) No. 17 — Chassis ground:</i> <i>(B281) No. 20 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit of harness between the body integrated unit and chassis ground.
4 CHECK FOR POOR CONTACT.	Is there poor contact of connector?	Repair the poor contact.	Check body integrated unit.

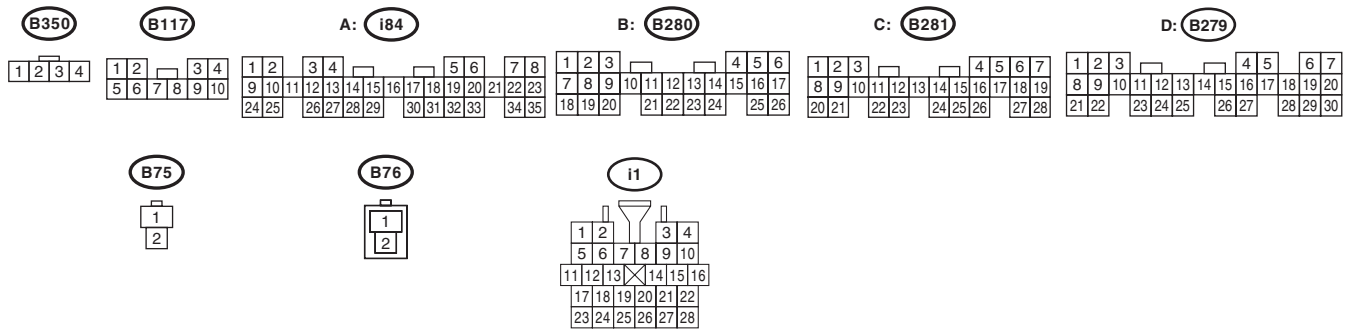
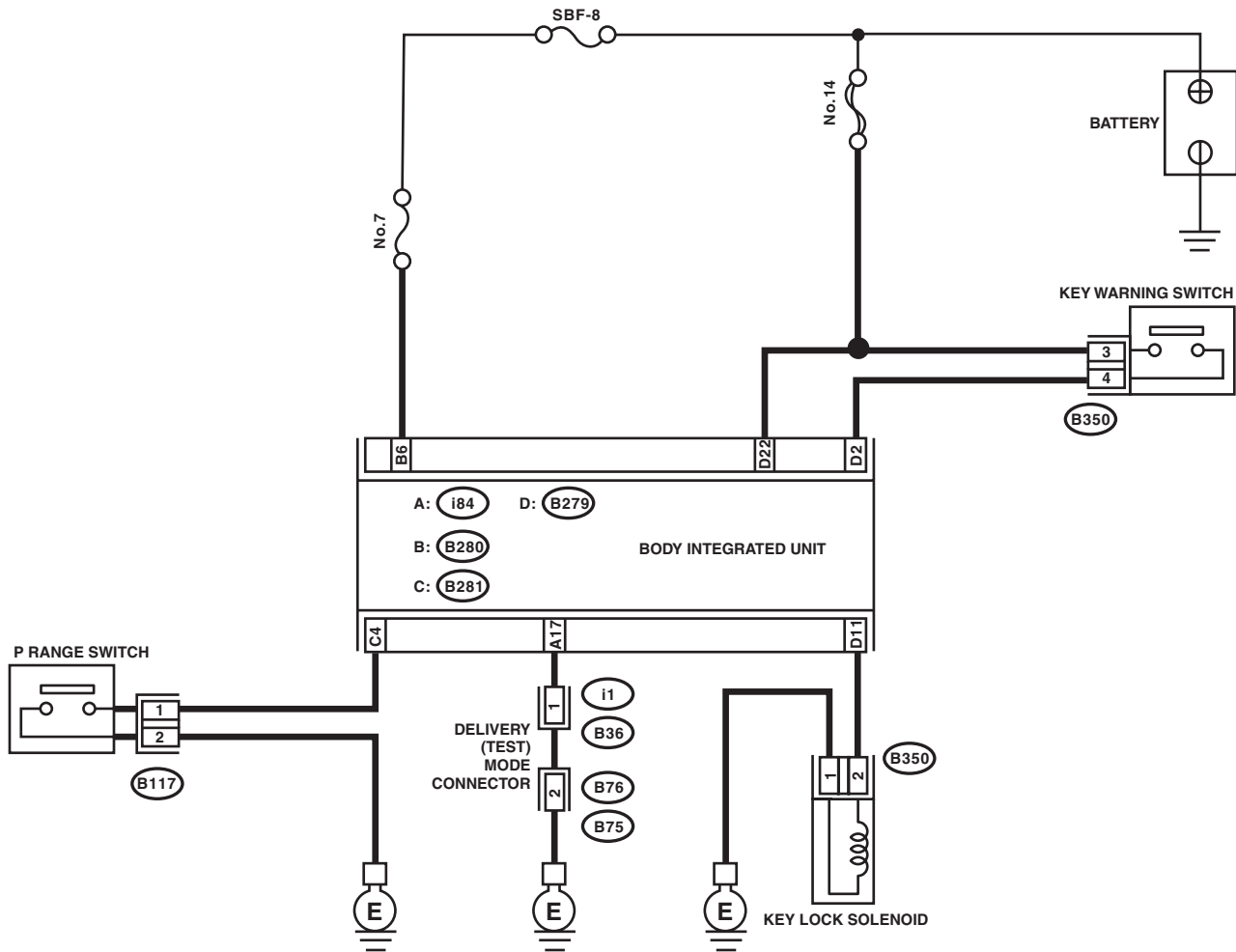
Step	Check	Yes	No
2 CHECK CURRENT DATA. 1) Connect the Subaru Select Monitor. 2) Shift the select lever to "P" range. 3) Turn the ignition switch to ON. 4) Select the current data display and display «P SW». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is the display "ON" in the "P" range and "OFF" in ranges other than "P"?	Go to step 3.	Go to step 8.
3 CHECK CURRENT DATA. Select the current data display and display «Stop Light Switch». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is "ON" displayed when the brake pedal is depressed and "OFF" displayed when the brake pedal is released?	Go to step 4.	Go to step 11.
4 CHECK BODY INTEGRATED UNIT DTC. Check the DTC of the body integrated unit when the brake pedal is pressed and when it is released. (Hold each condition for 5 seconds or more.)	Is there a DTC of a current malfunction?	Follow the DTC to perform inspection and repair.	Go to step 5.
5 CHECK CURRENT DATA. Select the current data display and display «Shift Lock Solenoid». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is "ON" displayed when the brake pedal is depressed and "OFF" displayed when the brake pedal is released?	Go to step 6.	Replace the body integrated unit.
6 CHECK CURRENT DATA. Select the current data display and display «Shift Position». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is the display "7" in the "P" range and other than "7" in ranges other than "P"?	Go to step 7.	Check the following items. • Inhibitor switch • Harness between inhibitor switch and TCM • TCM input signal • TCM CAN communication • Body integrated unit CAN receive
7 CHECK CURRENT DATA. 1) Select the current data display and display «Front Wheel Speed». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.> 2) Start the engine. 3) Raise vehicle speed gradually up to approximately 20 km/h.	Is a figure equivalent to the speedometer being indicated?	Go to step 12.	Check the following items. • Wheel speed sensor • VDC/ABS CAN communication • Body integrated unit CAN receive Replace the wheel speed sensor, VDC/ABS, or body integrated unit, or both.
8 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH. 1) Disconnect the connector from body integrated unit. 2) Disconnect the connector of "P" range switch. 3) Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and "P" range switch. Connector & terminal (B281) No. 4 — (B117) No. 1:	Is the harness normal?	Repair or replace the harness between the body integrated unit and the "P" range switch.	Go to step 9.

AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
9 CHECK HARNESS BETWEEN “P” RANGE SWITCH AND CHASSIS GROUND. Measure the resistance of harness between “P” range switch and chassis ground. Connector & terminal (B117) No. 2 — Chassis ground:	Is it less than 10 Ω ?	Go to step 10.	Repair the harness between the “P” range switch and chassis ground.
10 CHECK “P” RANGE SWITCH. Measure the resistance between “P” range switch connector terminals. Terminals No. 2 — No. 1:	Is it less than 10 Ω in the “P” range, and 1 M Ω or more in ranges other than “P”?	Replace the body integrated unit.	Replace the “P” range switch.
11 CHECK STOP LIGHT SWITCH INPUT SIGNAL. 1) Disconnect the connector from body integrated unit. 2) Measure the voltage between the body integrated unit connector terminal and chassis ground. Connector & terminal (B280) No. 2 (+) — Chassis ground (-):	Is the voltage 9 V to 16 V when the brake pedal is depressed, and approx. 0 V when not depressed?	Replace the body integrated unit.	Check the stop light system.
12 CHECK SHIFT LOCK SOLENOID OPERATION. Connect the battery to the shift lock solenoid unit connector terminal, and operate the solenoid. Terminals No. 3 (+) — No. 4 (-):	Does the shift lock solenoid operate normally?	Check the lock mechanism of the select lever body.	Replace the shift lock solenoid.

4. KEY INTERLOCK CANNOT BE LOCKED OR RELEASED



CS-01028

Step	Check	Yes	No
1	CHECK DELIVERY (TEST) MODE CONNECTOR. Check that the delivery (test) mode connector is disconnected.	Go to step 2.	Disconnect the delivery (test) mode connector.

AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
2	CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT. <Ref. to CS-12, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is there any fault? Follow the procedures to inspect and repair.	Go to step 3.
3	CHECK CURRENT DATA. 1) Connect the Subaru Select Monitor. 2) Shift the select lever to "P" range. 3) Turn the ignition switch to ON. 4) Select the current data display and display «P SW». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is the display "ON" in the "P" range and "OFF" in ranges other than "P"? Go to step 4.	Go to step 7.
4	CHECK CURRENT DATA. 1) Select the current data display and display the «Key-lock warning SW». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.> 2) Turn the ignition switch to OFF.	Does the display change from "ON" to "OFF" when the key is inserted and removed? Go to step 5.	Go to step 10.
5	CHECK CURRENT DATA. 1) Turn the ignition switch to ON. 2) Select the current data display and display «Key locking output». <Ref. to LAN(diag)-15, OPERATION, Subaru Select Monitor.>	Is the display "ON" in the "P" range and "OFF" in ranges other than "P"? Go to step 12.	Go to step 6.
6	CHECK DTC OF BODY INTEGRATED UNIT. 1) Set the select lever to other than "P" range. 2) Check DTC of body integrated unit.	Is B1105 (key interlock circuit malfunction) a current malfunction? Follow the DTC to perform inspection and repair.	Go to step 12.
7	CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH. 1) Disconnect the connector from body integrated unit. 2) Disconnect the connector of "P" range switch. 3) Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and "P" range switch. Connector & terminal (B281) No. 4 — (B117) No. 1:	Is the harness normal? Repair or replace the harness between the body integrated unit and the "P" range switch.	Go to step 8.
8	CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND. Measure the resistance of harness between "P" range switch and chassis ground. Connector & terminal (B117) No. 2 — Chassis ground:	Is it less than 10 Ω? Go to step 9.	Repair the harness between the "P" range switch and chassis ground.
9	CHECK "P" RANGE SWITCH. Measure the resistance between "P" range switch connector terminals. Terminals No. 2 — No. 1:	Is it less than 10 Ω in the "P" range, and 1 MΩ or more in ranges other than "P"? Replace the body integrated unit.	Replace the "P" range switch.
10	CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH AND BODY INTEGRATED UNIT. 1) Disconnect the connector from body integrated unit. 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B279) No. 2 (+) — Chassis ground (-):	Is the display 9 V or more when the key is inserted, and less than 1.5 V with the key removed? Replace the body integrated unit.	Check the following items. • Key warning switch • Harness/fuse • Ignition circuit

AT Shift Lock Control System

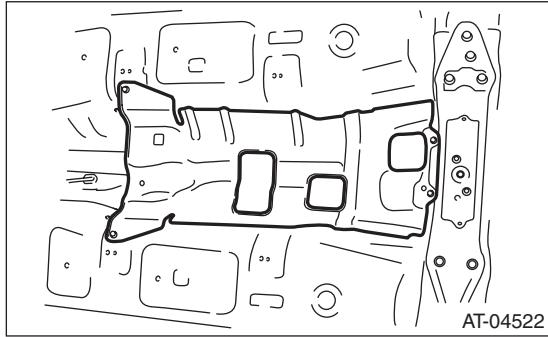
CONTROL SYSTEMS

Step	Check	Yes	No
11 CHECK DELIVERY (TEST) MODE CONNECTOR HARNESS. 1) Disconnect the connector of body integrated unit. 2) Measure the resistance between body integrated unit connector and the delivery (test) mode connector. Connector & terminal (i84) No. 17 — (i1) No. 1:	Is it less than 10 Ω ?	Go to step 12.	Repair or replace the harness between the body integrated unit and delivery (test) mode connector.
12 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND KEY LOCK SOLENOID. 1) Disconnect the connector from body integrated unit. 2) Disconnect the connector of key lock solenoid. 3) Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and key lock solenoid. Connector & terminal (B279) No. 11 — (B350) No. 2:	Is the harness normal?	Repair or replace the harness between the body integrated unit and the key lock solenoid.	Go to step 13.
13 CHECK HARNESS BETWEEN KEY LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between key lock solenoid and chassis ground. Connector & terminal (B350) No. 1 — Chassis ground:	Is it less than 10 Ω ?	Go to step 14.	Repair or replace the harness between the key lock solenoid and chassis ground.
14 CHECK KEY LOCK SOLENOID OPERATION. Connect the battery to the key lock solenoid connector terminal, and operate the solenoid. Terminals No. 2 (+) — No. 1 (-):	Does the key lock solenoid operate normally?	Go to step 15.	Replace the key lock solenoid.
15 CHECK OUTPUT OF BODY INTEGRATED UNIT. 1) Connect all connectors. 2) Insert the key. 3) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B279) No. 11 — Chassis ground:	Is it 7.5 V to 16 V in ranges other than "P", and 0 V in the "P" range?	Check the lock mechanism of the steering lock body.	Replace the body integrated unit.

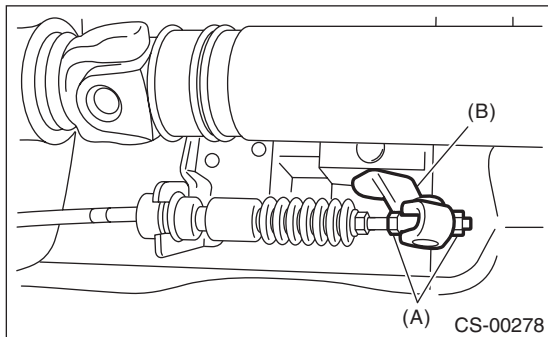
3. Select Lever

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Shift the select lever to "N" range.
- 3) Disconnect the ground cable from battery.
- 4) Lift up the vehicle.
- 5) Remove the rear exhaust pipe. <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.>
- 6) Remove the heat shield cover.

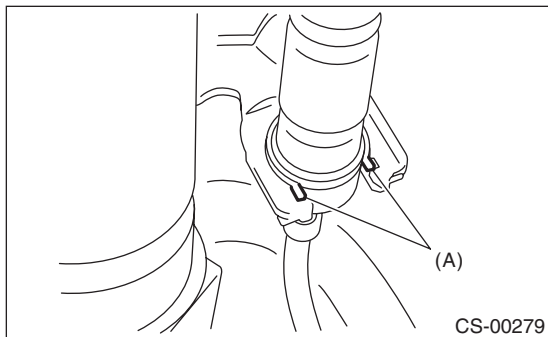


- 7) Remove the cable from arm assembly.



- (A) Adjusting nut
(B) Arm ASSY

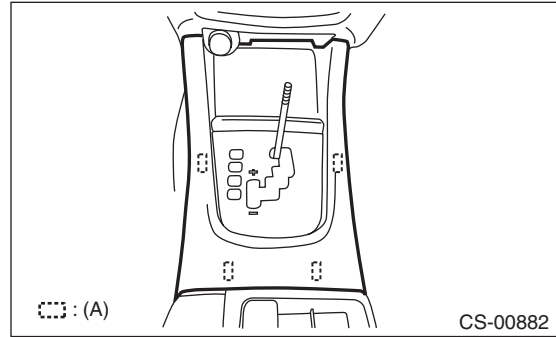
- 8) Raise the claw of clamp and remove the cable.



- (A) Claw

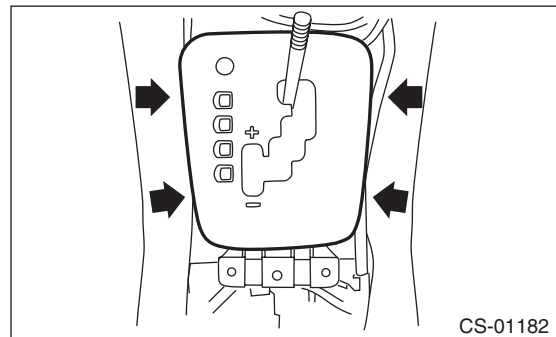
- 9) Lower the vehicle.
- 10) Remove the grip.
- 11) Remove the parking brake lever boot.

- 12) Remove the console front panel.

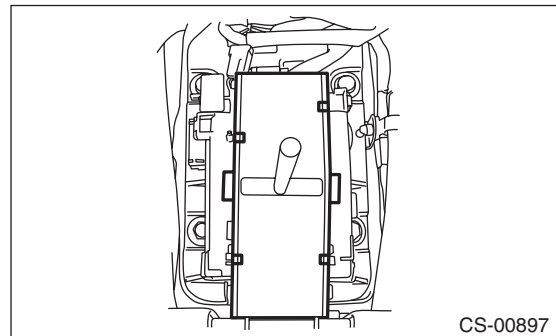


- (A) Hook

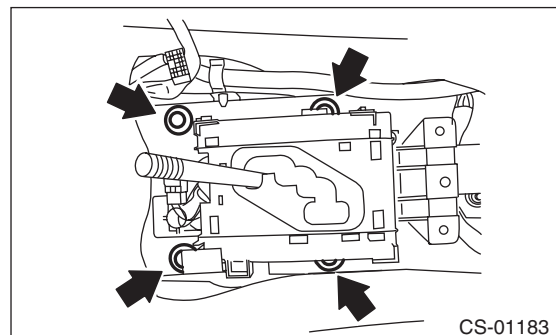
- 13) Remove the console cover and console box. <Ref. to EI-46, REMOVAL, Console Box.>
- 14) Remove the indicator assembly.



- 15) Remove the harness clips from the bracket.
- 16) Remove the blind.



- 17) Disconnect the connectors, and then remove the four bolts to take out the select lever assembly from vehicle body.



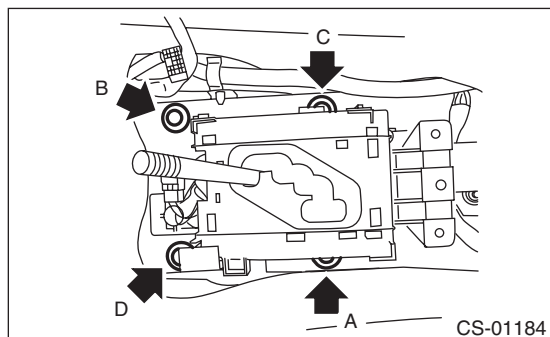
B: INSTALLATION

- 1) Set the select lever to the vehicle body.
- 2) Tighten the four bolts to install the select lever assembly to vehicle body, and 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:

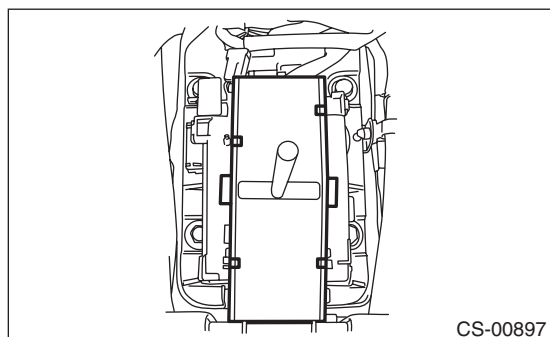
18 N·m (1.8 kgf-m, 13.3 ft-lb)



- 3) Install the harness clips to the bracket.
- 4) Install the console cover and console box. <Ref. to EI-46, INSTALLATION, Console Box.>
- 5) Shift the select lever to "N" range.
- 6) Install the blind.

CAUTION:

The blind should be installed so that it is securely caught by tabs of the plate guide COMPL.



- 7) Install the indicator assembly.
- 8) Install the console front panel.
- 9) Install the parking brake lever boot.
- 10) Install the grip.
- 11) Lift up the vehicle.
- 12) Shift the range select lever to "N" range.
- 13) Secure the cable to the bracket. <Ref. to CS-25, INSTALLATION, Select Cable.>
- 14) Adjust the select cable position. <Ref. to CS-26, ADJUSTMENT, Select Cable.>
- 15) After the completion of adjustment, confirm that the select lever operates properly at all range positions.

- 16) Install the heat shield cover. <Ref. to EI-70, INSTALLATION, Heat Shield Cover.>

- 17) Install the rear exhaust pipe. <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.>

- 18) Lower the vehicle.

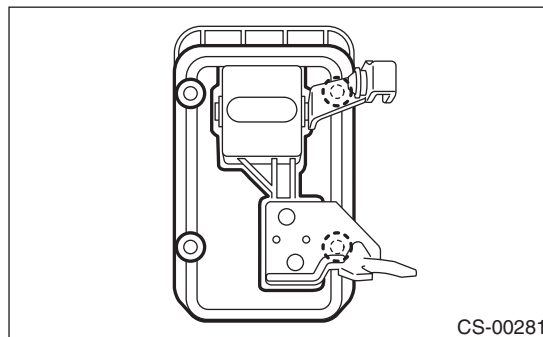
- 19) Connect the battery ground terminal.

- 20) Inspect the following items. When a malfunction is found in the inspection, adjust the select cable and inhibitor switch. <Ref. to CS-26, ADJUSTMENT, Select Cable.> <Ref. to 4AT-45, ADJUSTMENT, Inhibitor Switch.>

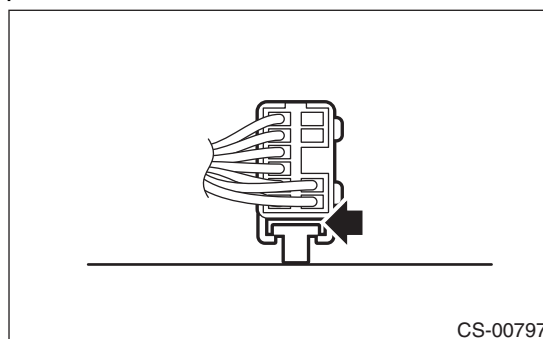
- (1) Engine starts when the select lever is in "P" and "N" range, but not in other ranges.
- (2) Back-up light illuminates when the select lever is in the "R" range, but not in other ranges.
- (3) Select lever and indicator positions are matched.

C: DISASSEMBLY

- 1) Remove the gasket and plate COMPL.



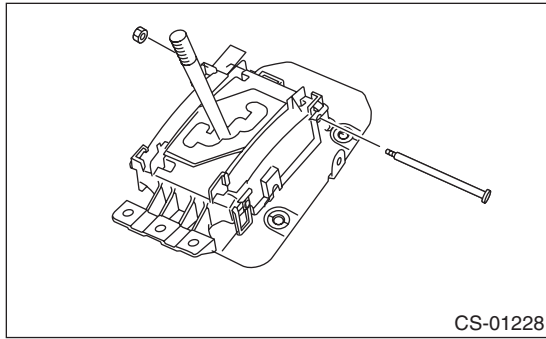
- 2) Insert a flat tip screwdriver with a thin tip under the connector and disconnect each connector from the plate COMPL.



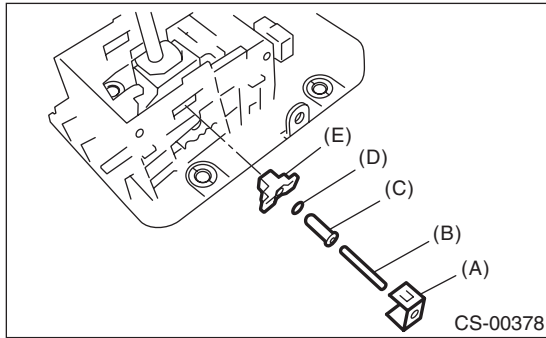
Select Lever

CONTROL SYSTEMS

3) Remove the spacer bolt and remove the plate guide COMPL.

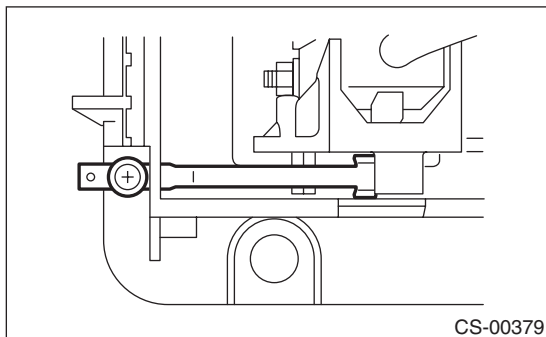


4) Remove the shift lock clamp, spring A, select lever rod, lock plate cushion, and bushing.

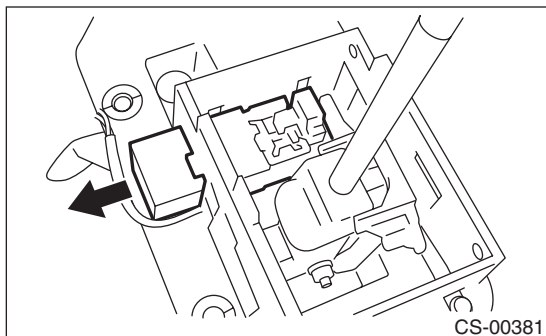


- (A) Shift lock clamp
- (B) Spring A
- (C) Select lever rod
- (D) Lock plate cushion
- (E) Bushing

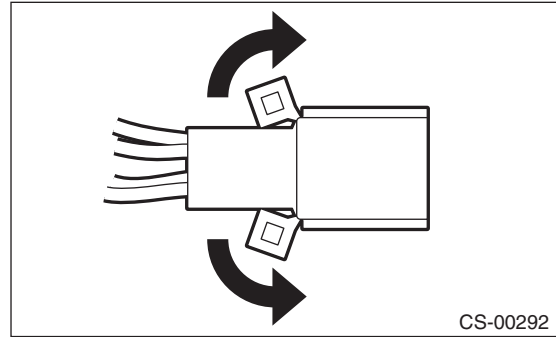
5) Remove the detent spring.



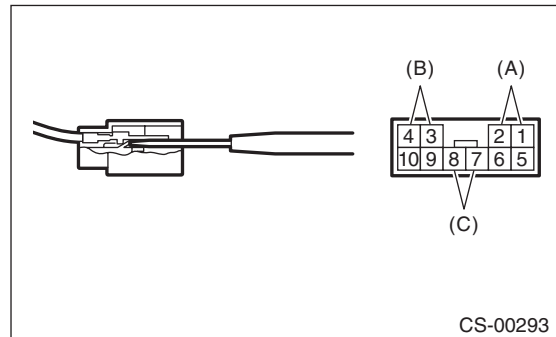
6) Remove the shift lock solenoid unit.



7) Raise the claw of connector.

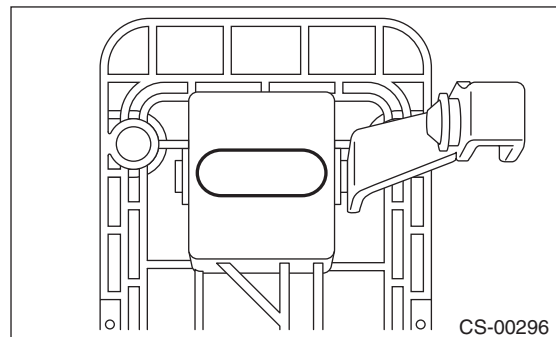


8) Disconnect the terminals of the SPORT mode switch, "P" range switch, and shift lock solenoid from the connector, using a flat tip screwdriver with a thin tip.

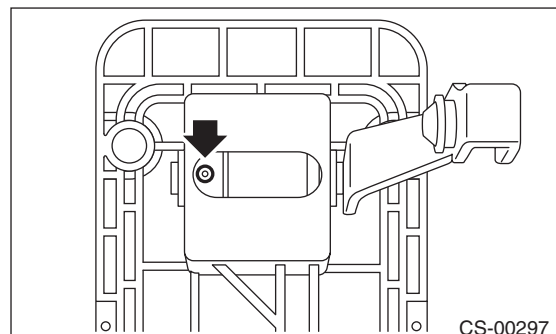


- (A) "P" range switch terminal
- (B) Shift lock solenoid terminal
- (C) SPORT mode switch terminal

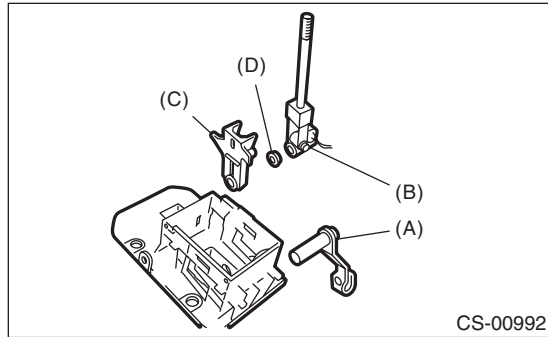
9) Remove the grommet.



10) Pull out the spring pin.

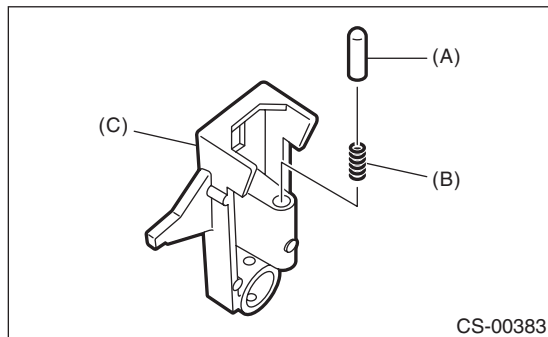


11) Pull out the arm assembly, remove select lever COMPL, and remove bracket arm detent and bushing.



- (A) Arm ASSY
- (B) Selector lever COMPL
- (C) Bracket arm detent
- (D) Bushing

12) Remove the rod detent and spring detent from the bracket arm detent.



- (A) Rod detent
- (B) Spring detent
- (C) Bracket arm detent

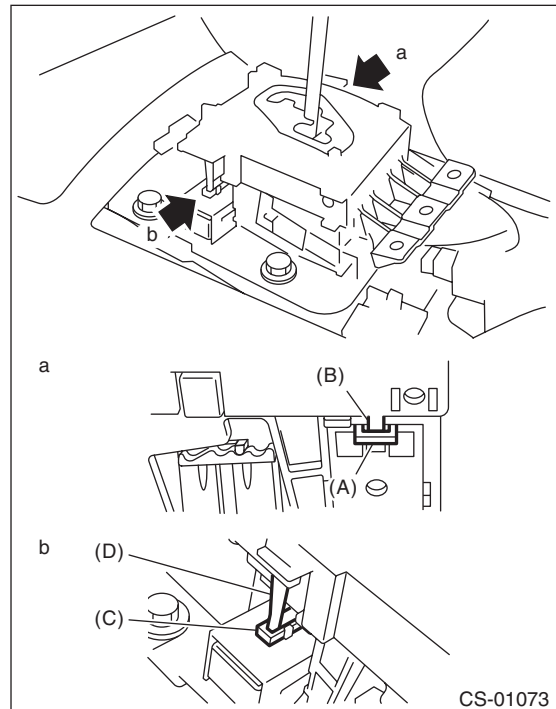
D: ASSEMBLY

- 1) Clean all the parts before assembly.
- 2) Apply NIGTIGHT LYW No. 2 grease or equivalent to each part. <Ref. to CS-3, AT SELECT LEVER, COMPONENT, General Description.>
- 3) Assemble in the reverse order of disassembly.

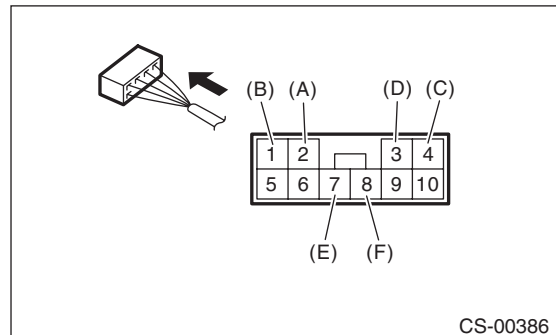
NOTE:

- Set the select lever to "D" range (normal mode position) when installing the guide plate and be careful of the following.
 - Insert the protrusion (B) of the guide plate into the hole on shift lock solenoid unit (A).

- Insert link (D) of the shift lock release into link (C) of the shift lock solenoid unit.



- Connect the switch and solenoid terminals to the connector.



- (A) "P" range switch (color code: red)
- (B) "P" range switch (color code: red)
- (C) Shift lock solenoid (color code: black)
- (D) Shift lock solenoid (color code: blue/red)
- (E) SPORT mode switch (color code: white)
- (F) SPORT mode switch (color code: black)

- 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 whether the operating force occurs.

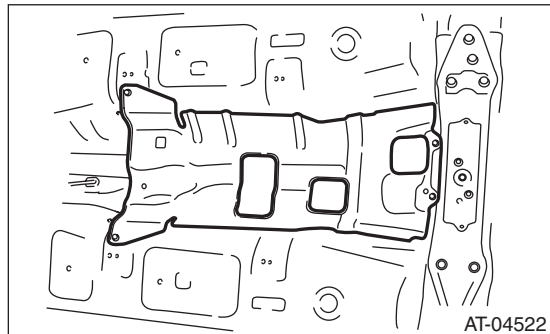
E: INSPECTION

- 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.

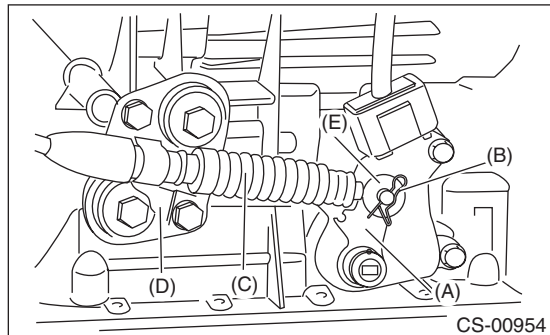
4. Select Cable

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Shift the select lever to "N" range.
- 3) Disconnect the ground cable from battery.
- 4) Lift up the vehicle.
- 5) Remove the front, center and rear exhaust pipes. <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.>
- 6) Remove the heat shield cover.

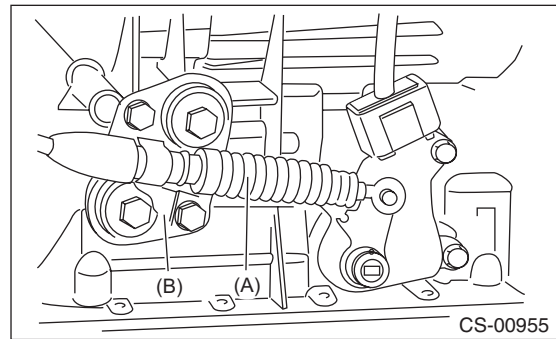


- 7) Remove the snap pin and washer from the shifter arm.



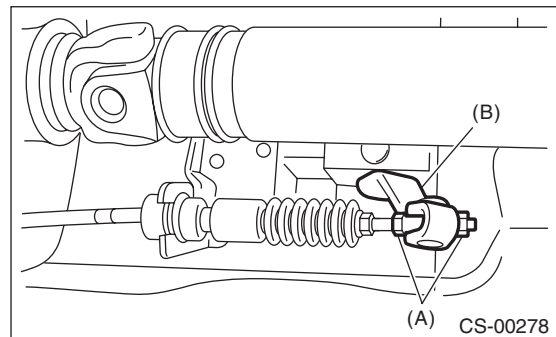
- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Plate ASSY
- (E) Washer

- 8) Remove the plate assembly from the transmission case.



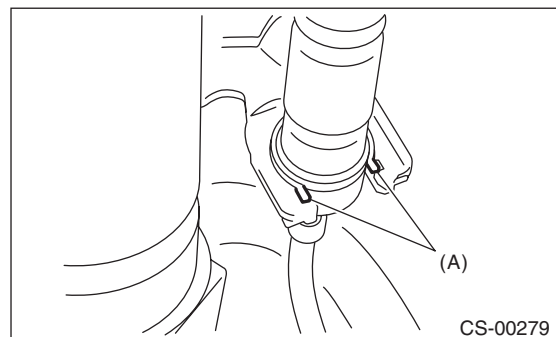
- (A) Select cable
- (B) Plate ASSY

- 9) Disconnect the cable from arm assembly.



- (A) Adjusting nut
- (B) Arm ASSY

- 10) Raise the claw of clamp to remove the cable from bracket.



- (A) Claw

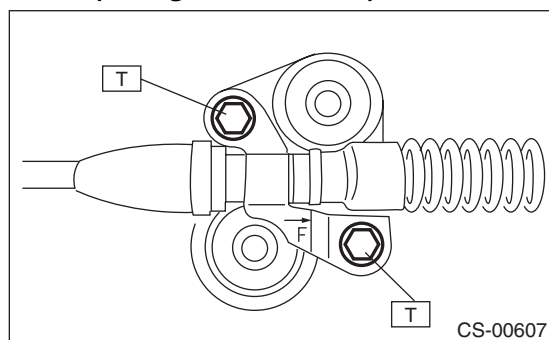
- 11) Remove the select cable from plate assembly.

B: INSTALLATION

1) Install the select cable to plate assembly.

Tightening torque:

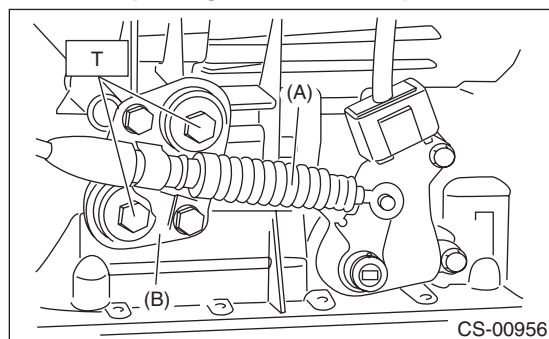
18 N·m (1.8 kgf-m, 13.3 ft-lb)



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

Tightening torque:

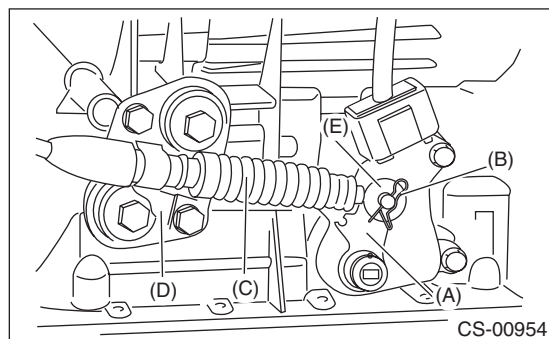
T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Select cable

(B) Plate ASSY

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



(A) Shifter arm

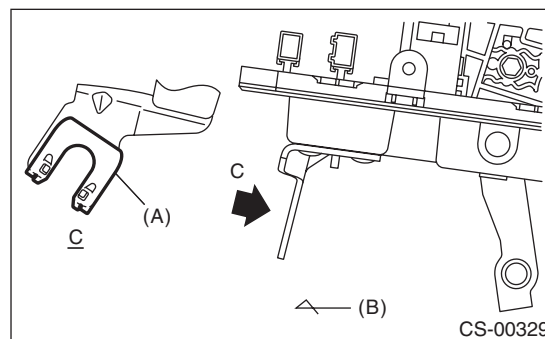
(B) Snap pin

(C) Select cable

(D) Plate ASSY

(E) Washer

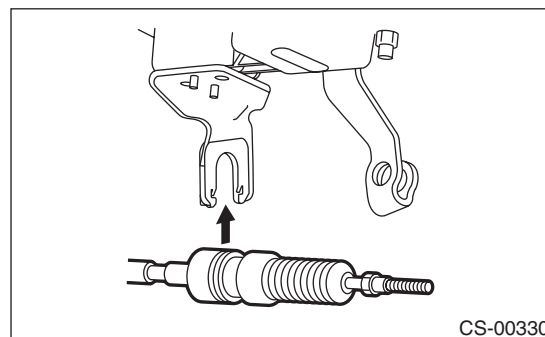
5) Install new clamp paying attention to the installing direction.



(A) Clamp

(B) Forward

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



7) Shift the select lever to the "N" range, and then adjust the select cable position. <Ref. to CS-26, ADJUSTMENT, Select Cable.>

8) Install the heat shield cover. <Ref. to EI-70, INSTALLATION, Heat Shield Cover.>

9) Install the front, center and rear exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.>

Select Cable

CONTROL SYSTEMS

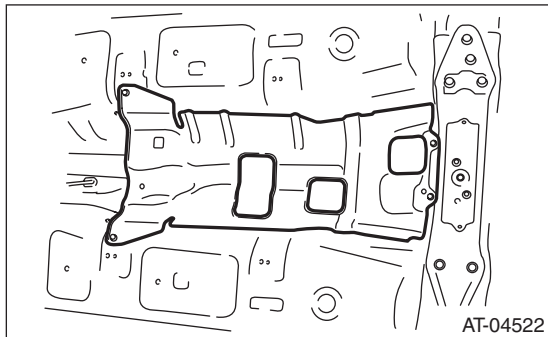
C: INSPECTION

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

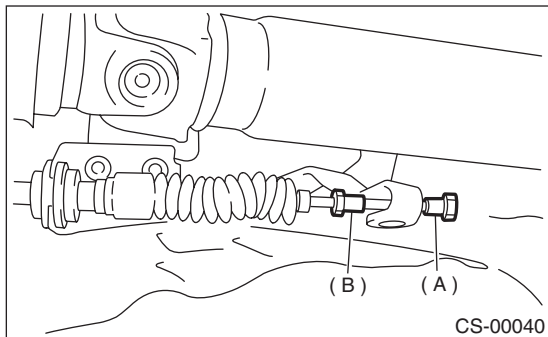
- 1) Check the cable for smooth operation.
- 2) Check the inner cable for damage and rust.
- 3) Check the outer cable for damage, bends and cracks.
- 4) Check the boot for damage, cracks and deterioration.
- 5) Move the select lever from "P" to "D" range. Check the existence of feel to contact the detents 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) Set the vehicle on a lift.
- 2) Shift the select lever to "N" range.
- 3) Lift up the vehicle.
- 4) Remove the rear exhaust pipe. <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.>
- 5) Remove the heat shield cover.

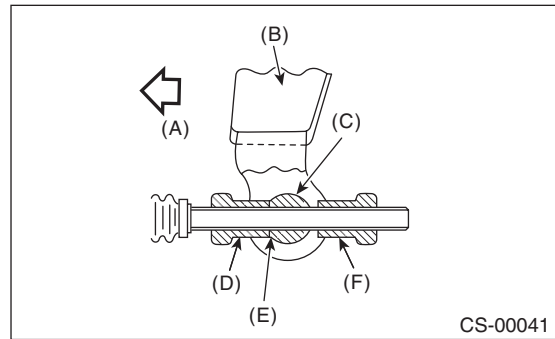


- 6) Loosen the adjusting nuts on both sides.



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

- 7) Turn adjusting nut B until it lightly touches the connector.

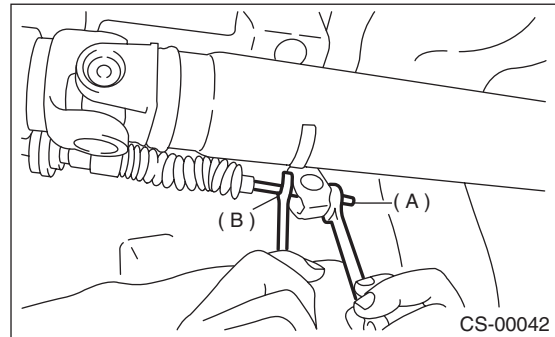


- (A) Forward side
(B) Select lever
(C) Connector
(D) Adjusting nut B
(E) Contact point
(F) Adjusting nut A

- 8) Set a spanner wrench to adjusting nut B so that it does not rotate, and then tighten the adjusting nut A.

Tightening torque:

7.5 N·m (0.76 kgf·m, 5.5 ft·lb)



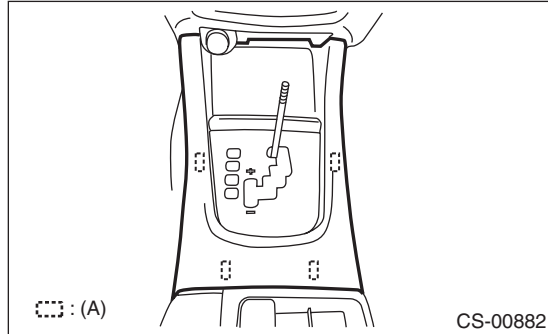
- (A) Adjusting nut A
(B) Adjusting nut B

- 9) After the completion of adjustment, confirm that the select lever operates normally at all ranges.
- 10) Install in the reverse order of removal.

5. AT Shift Lock Solenoid and “P” Range Switch

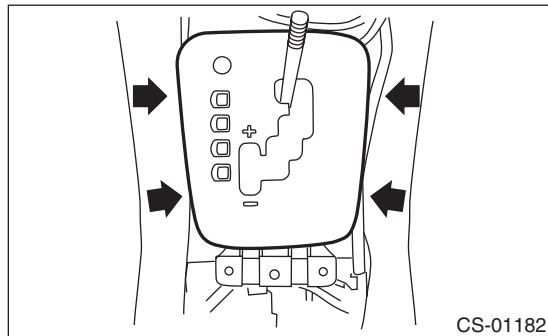
A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the grip.
- 3) Remove the parking brake lever boot.
- 4) Remove the console front panel.

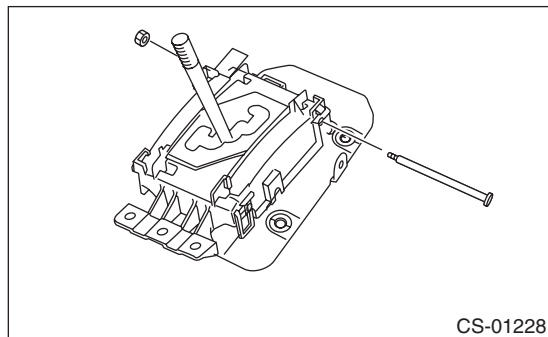


(A) Hook

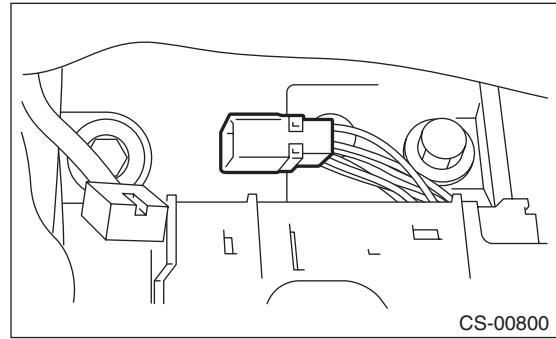
- 5) Remove the console cover and console box.
<Ref. to EI-46, REMOVAL, Console Box.>
- 6) Remove the indicator assembly.



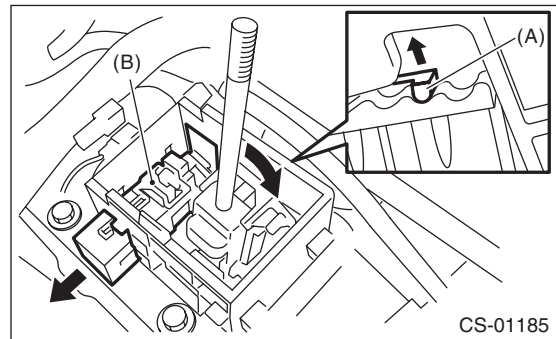
- 7) While pressing the shift lock release button, shift the select lever to the “N” range.
- 8) Remove the spacer bolt and remove the plate guide COMPL.



- 9) Using a flat tip screwdriver with a thin tip, remove the connector from the plate COMPL.

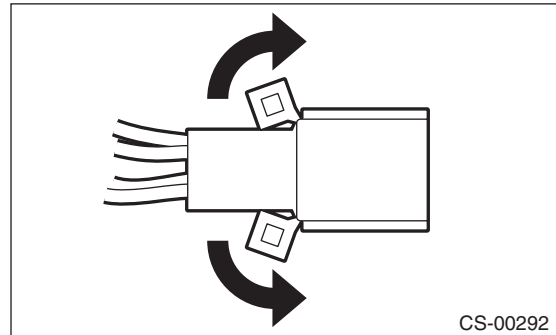


- 10) With detent spring lifted up, push the select lever backward and remove the shift lock solenoid unit.



- (A) Detent spring
(B) Shift lock solenoid unit

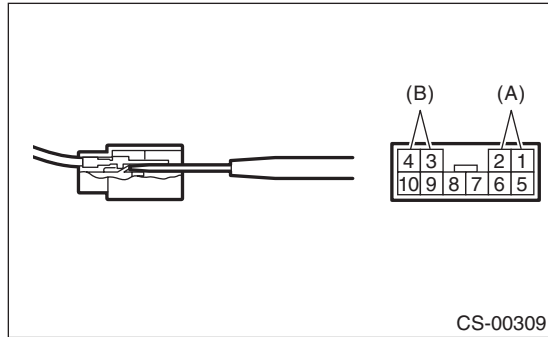
- 11) Raise the claw of connector.



AT Shift Lock Solenoid and “P” Range Switch

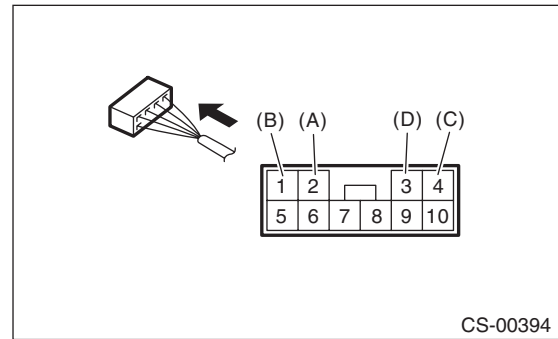
CONTROL SYSTEMS

12) Using a flat tip screwdriver with a thin tip, disconnect the terminals of “P” range switch and shift lock solenoid unit from the connector.



- (A) “P” range switch terminal
- (B) Shift lock solenoid terminal

- Connect the switch and solenoid terminals to the connector.



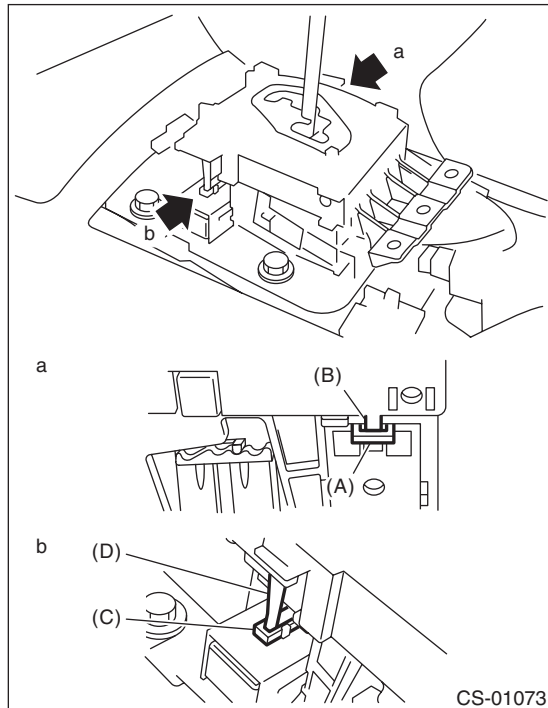
- (A) “P” range switch (color code: red)
- (B) “P” range switch (color code: red)
- (C) Shift lock solenoid (color code: black)
- (D) Shift lock solenoid (color code: blue/red)

B: INSTALLATION

Install in the reverse order of removal.

NOTE:

- Refer to “COMPONENT” for each tightening torque. <Ref. to CS-3, COMPONENT, General Description.>
- When installing the plate guide COMPL, set the select lever to the “D” range (normal mode position), and be careful for the following points.
 - Insert protrusion (B) of the plate guide COMPL into the hole on the shift lock solenoid unit (A).
 - Insert link (D) of the shift lock release into link (C) of the shift lock solenoid unit.



AT Shift Lock Solenoid and “P” Range Switch

CONTROL SYSTEMS

C: INSPECTION

	Step	Check	Yes	No
1	CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. <i>Terminals</i> <i>No. 4 — No. 3:</i>	Is the resistance 19.8 — 24.2 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. <i>Terminals</i> <i>No. 3 (+) — No. 4 (-):</i>	Does the shift lock solenoid operate normally?	Go to step 3.	Replace the shift lock solenoid.
3	CHECK P RANGE SWITCH. 1) Shift the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals. <i>Terminals</i> <i>No. 1 — No. 2:</i>	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. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 1 M Ω or more?	Normal	Replace the P range switch.

6. Body Integrated Unit

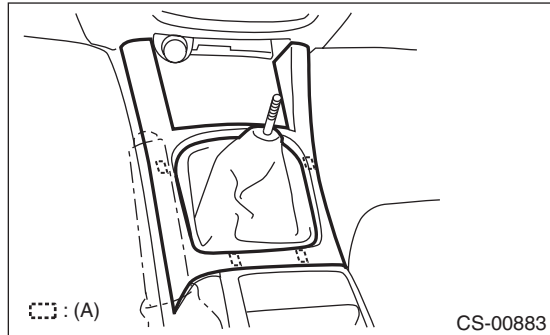
A: NOTE

Refer to “Body Integrated Unit” for removal and installation procedure. <Ref. to SL-47, Body Integrated Unit.>

7. MT Gear Shift Lever

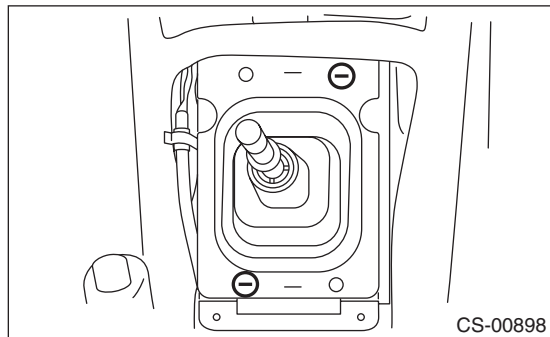
A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the gear shift knob.
- 4) Remove the console front panel and shift boot.

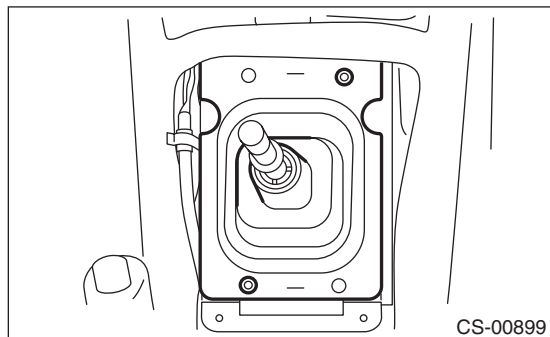


(A) Hook

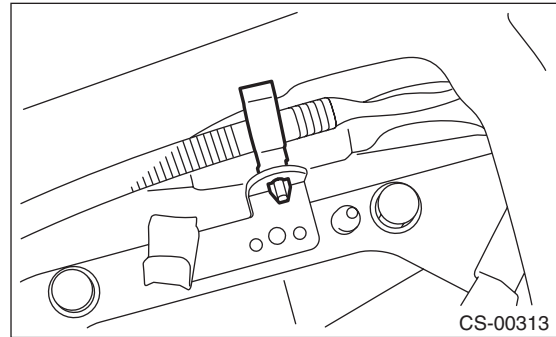
- 5) Remove the console cover and console box.
<Ref. to EI-46, REMOVAL, Console Box.>
- 6) Remove the clamp.



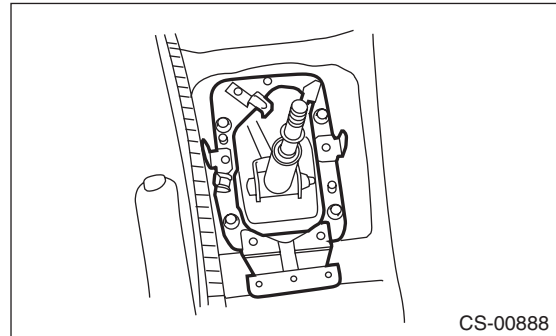
- 7) Remove the boot and insulator assembly.



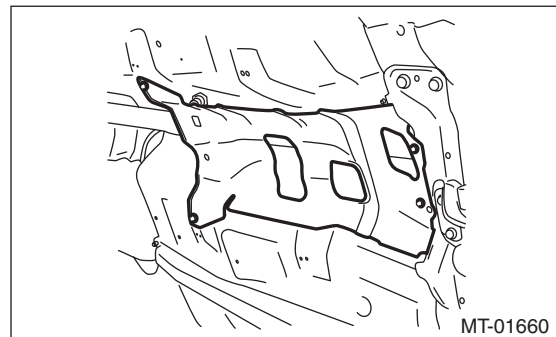
- 8) Remove the harness clamp from the plate COMPL.



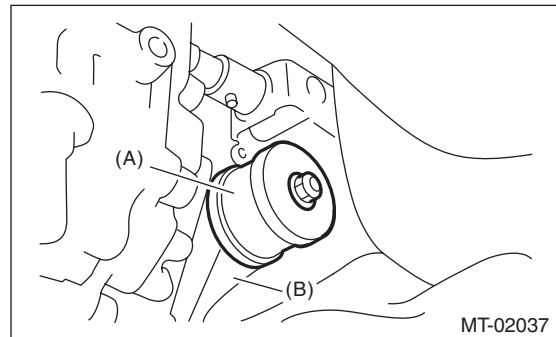
- 9) Remove the plate COMPL from the vehicle body.



- 10) Lift up the vehicle.
- 11) Remove the rear exhaust pipe. <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.>
- 12) Remove the heat shield cover.



- 13) Remove the stay from transmission bracket.

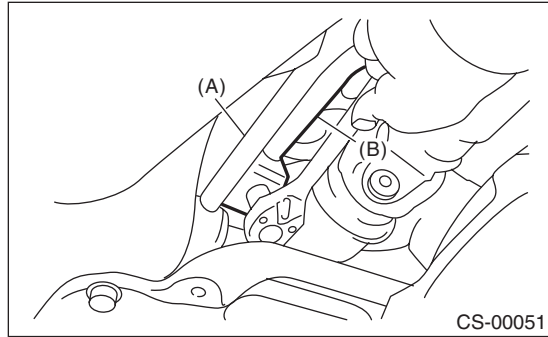


- (A) Stay
(B) Transmission bracket

MT Gear Shift Lever

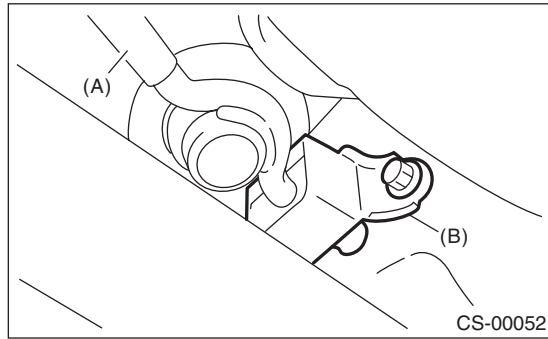
CONTROL SYSTEMS

14) Remove the rod from joint.



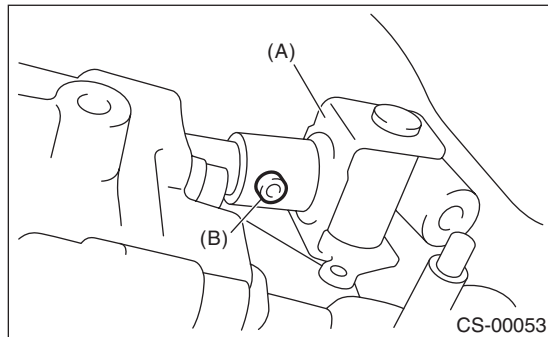
- (A) Stay
- (B) Rod

15) Remove the cushion rubber from the vehicle body.



- (A) Stay
- (B) Cushion rubber

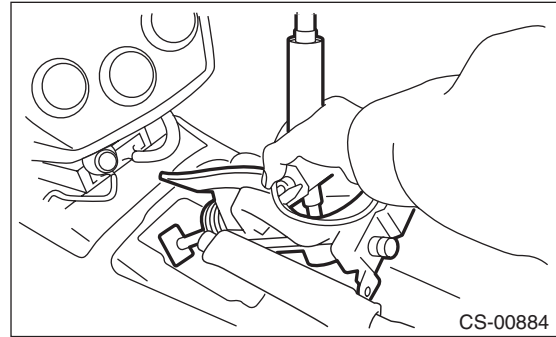
16) Extract the spring pin and remove the joint.



- (A) Joint
- (B) Spring pin

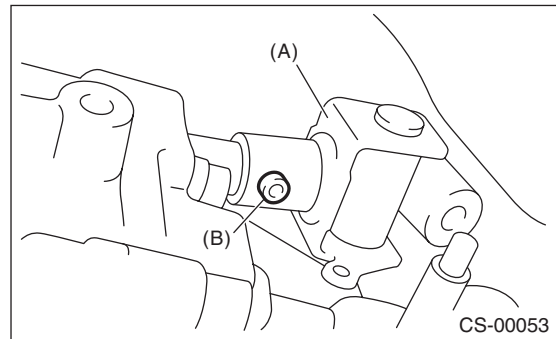
17) Lower the vehicle.

18) Remove the gear shift lever.



B: INSTALLATION

1) Install the joint to the transmission and secure with a spring pin.

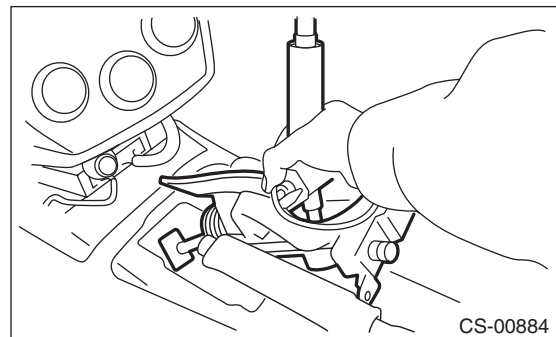


- (A) Joint
- (B) Spring pin

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.

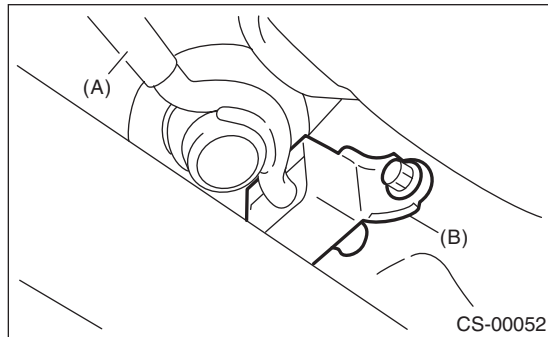


3) Lift up the vehicle.

4) Mount the cushion rubber on the vehicle body.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

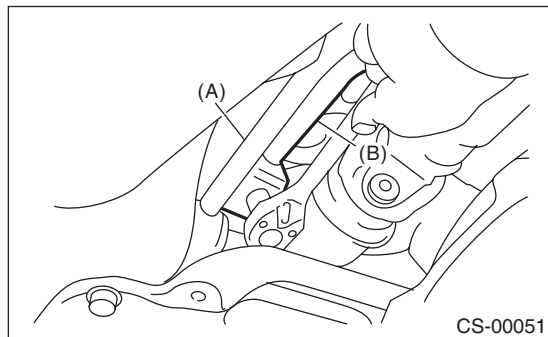


- (A) Stay
- (B) Cushion rubber

5) Using new self-locking nuts, connect the rod to the joint.

Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)

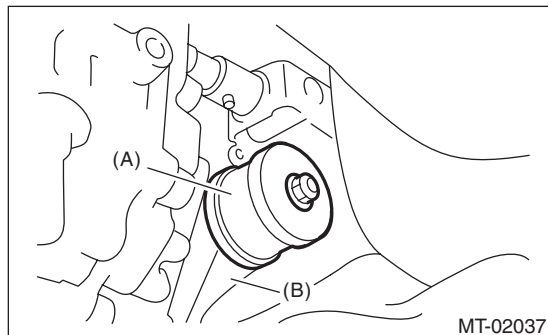


- (A) Stay
- (B) Rod

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. <Ref. to EI-70, INSTALLATION, Heat Shield Cover.>

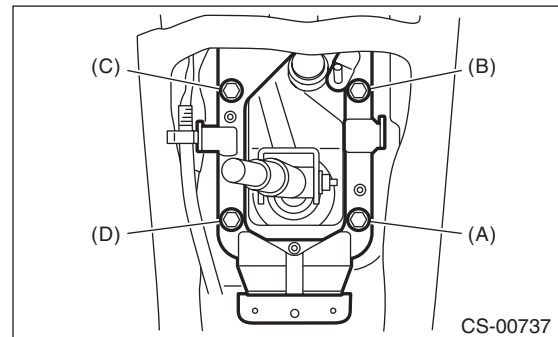
8) Install the rear exhaust pipe. <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.>

9) Install the plate COMPL to the body.

Tightening torque:

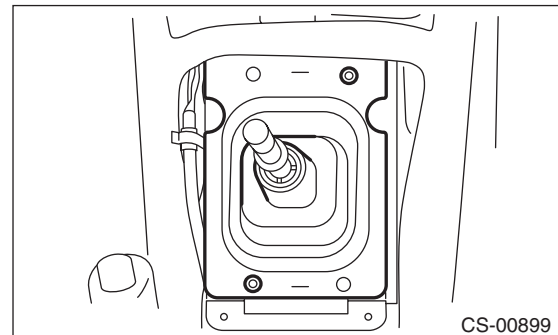
18 N·m (1.8 kgf-m, 13.3 ft-lb)

- (1) Set the plate COMPL to the vehicle.
- (2) Temporarily tighten the bolt (A).
- (3) Tighten the bolt (B).
- (4) Tighten the bolt (A).
- (5) Tighten the bolts (C) and (D).



10) Install the harness clamp to the plate.

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



12) Install the console cover and console box. <Ref. to EI-46, INSTALLATION, Console Box.>

13) Install the console front panel and console boot.

14) Install the gear shift knob.

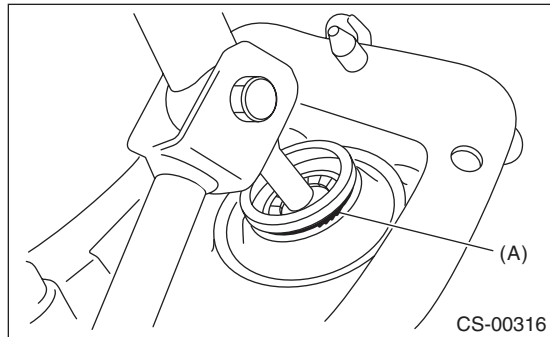
15) Make sure the gears can be shifted accurately into each gear.

MT Gear Shift Lever

CONTROL SYSTEMS

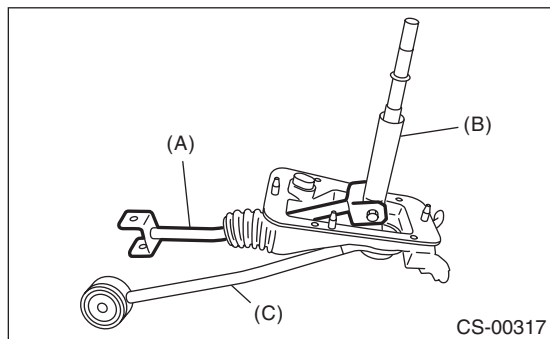
C: DISASSEMBLY

1) Remove the lock wires.



(A) Lock wire

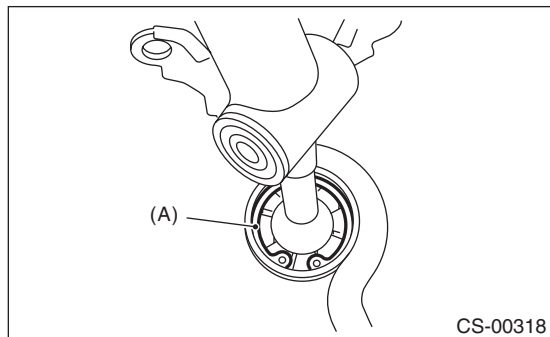
2) Remove the rod from lever.



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

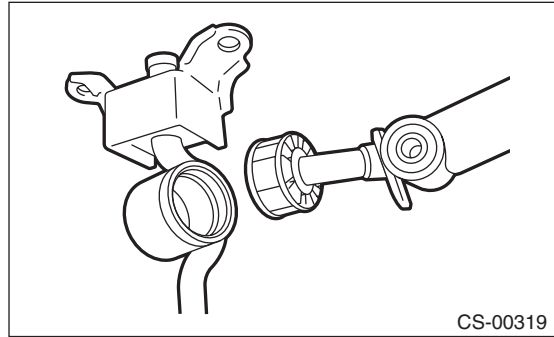
3) Separate the rod and inner boot.

4) Remove the snap ring from the stay.



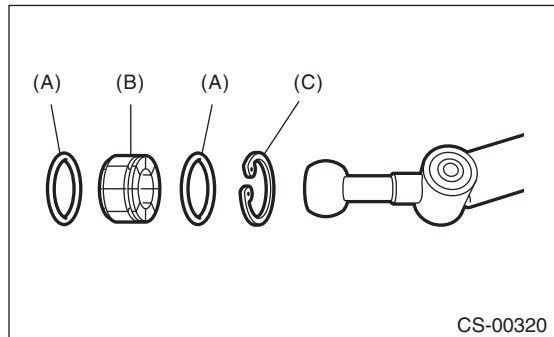
(A) Snap ring

5) Separate the gear shift lever and the stay.



CS-00319

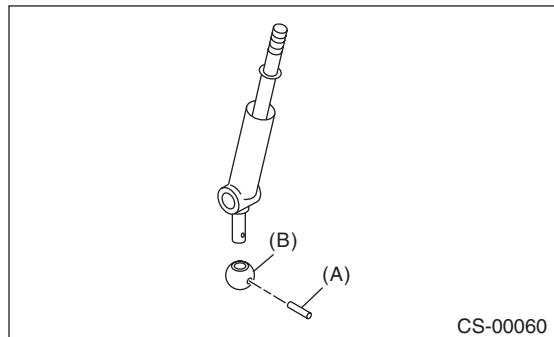
6) Remove the boot, bushing and snap ring from gear shift lever.



CS-00320

(A) O-ring
(B) Bushing
(C) Snap ring

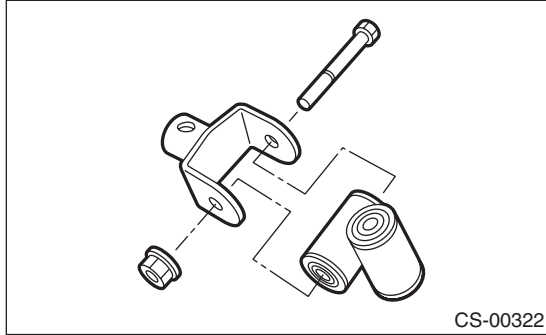
7) Remove the spring pin, and then remove the bushing and snap ring.



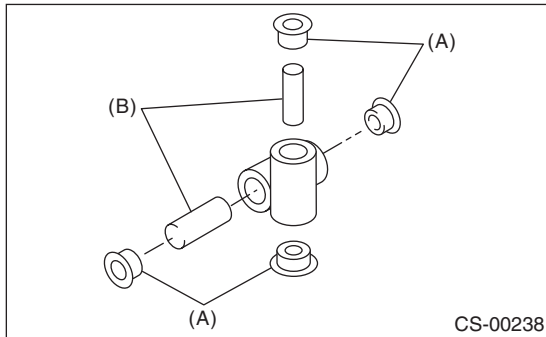
CS-00060

(A) Spring pin
(B) Bushing

8) Remove the boss from the joint.

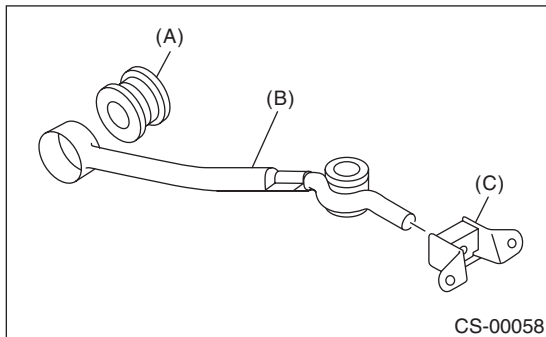


9) Remove the bushing and spacer from the boss.



- (A) Bushing
- (B) Spacer

10) Remove the bushing and cushion rubber from the stay.



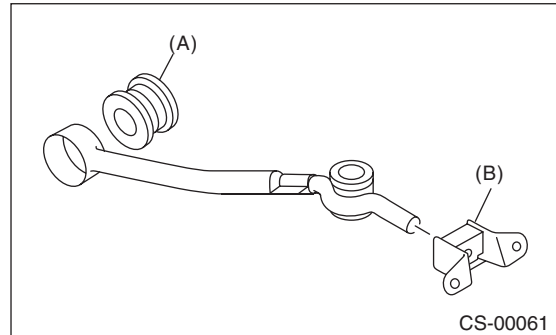
- (A) Bushing B
- (B) Stay
- (C) Cushion rubber

D: ASSEMBLY

NOTE:

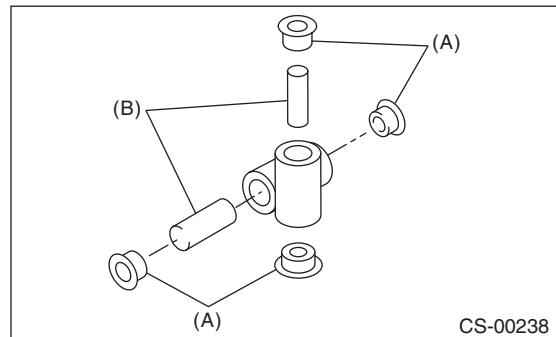
- Clean all the parts before assembly.
- Apply NIGTIGHT LYW No. 2 grease or equivalent to each part. <Ref. to CS-4, 5MT GEAR SHIFT LEVER, COMPONENT, General Description.>

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



- (A) Bushing
- (B) Cushion rubber

2) Install the bushing and spacer to boss.

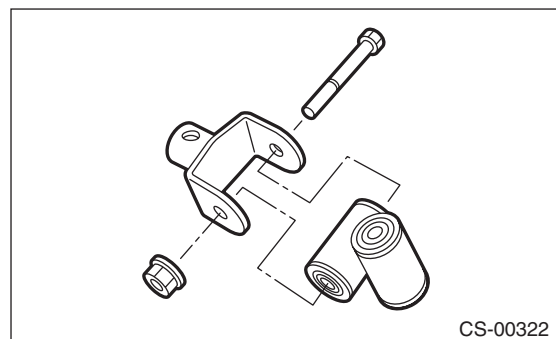


- (A) Bushing
- (B) Spacer

3) Using new self-locking nuts, install the boss to the joint.

Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)



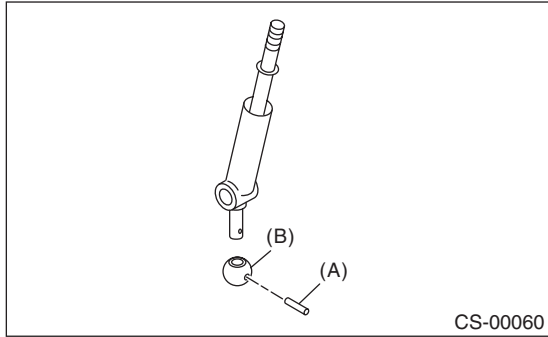
MT Gear Shift Lever

CONTROL SYSTEMS

4) Install the snap ring to gear shift lever and install the bushing.

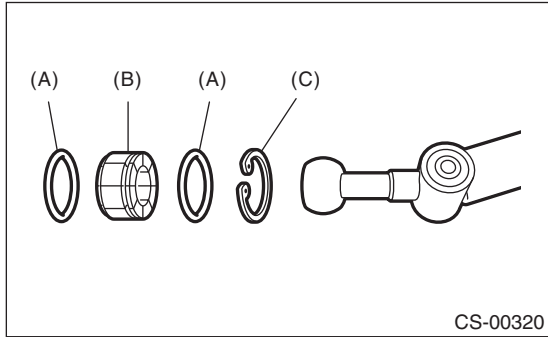
NOTE:

Apply grease to the bushing.



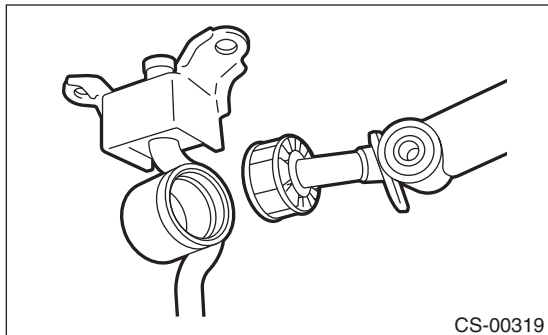
- (A) Spring pin
- (B) Bushing

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

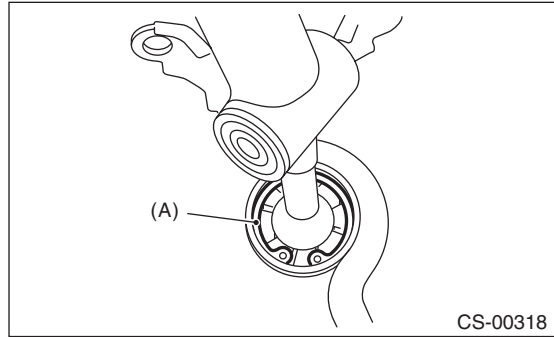


- (A) O-ring
- (B) Bushing
- (C) Snap ring

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



7) Install the washer and snap ring.



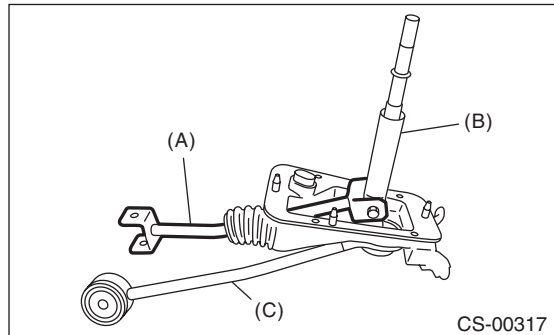
- (A) Snap ring

8) Insert the gear shift lever and rod into boot hole.

9) Install the rod.

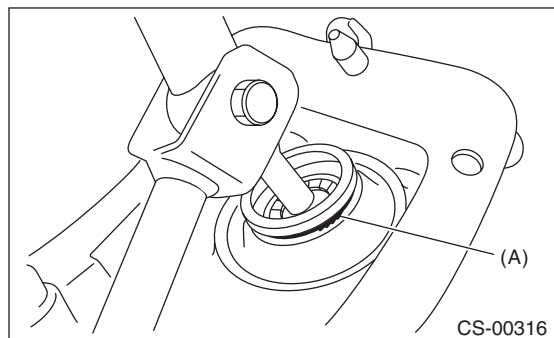
Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)



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

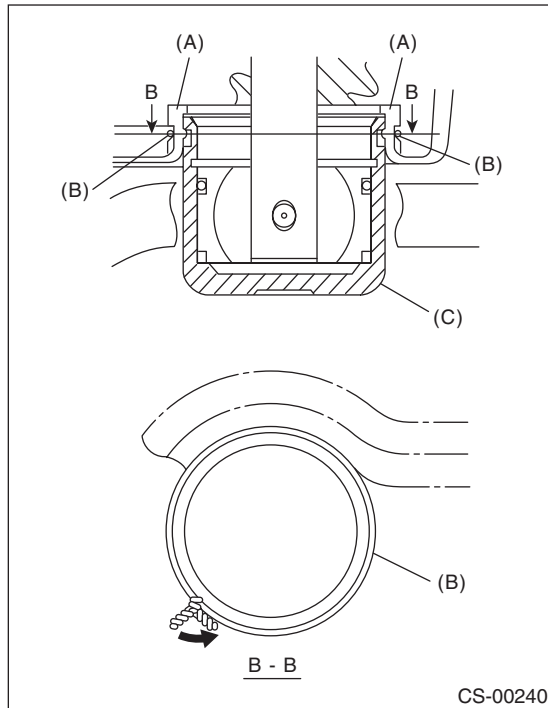
10) Install a new lock wire.



- (A) Lock wire

NOTE:

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

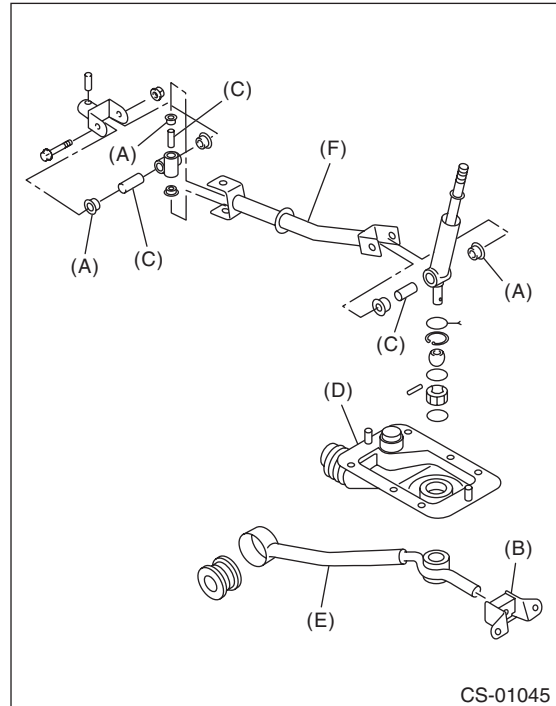


- (A) Inner boot
(B) Lock wire
(C) Stay

CS-00240

E: INSPECTION

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.



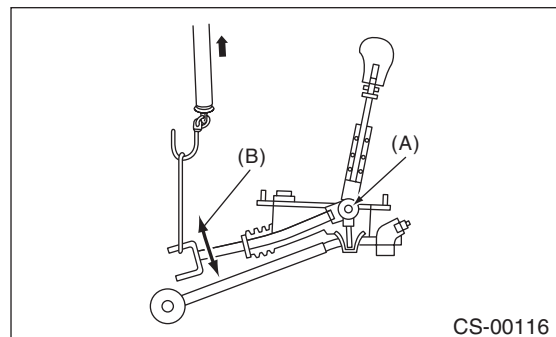
- (A) Bushing
(B) Cushion rubber
(C) Spacer
(D) Boot
(E) Stay
(F) Rod

CS-01045

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

CS-00116

General Diagnostic Table

CONTROL SYSTEMS

8. 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.	Inspect the mode switch and select lever, or inspect the circuit.
	Up-shift is not engaged at manual mode.	Check the shift-up switch and circuit.
	Down-shift is not engaged at manual mode.	Check the shift-down switch and circuit.

AUTOMATIC TRANSMISSION

4AT

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General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

1. General Description

A: SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Type		5-forward speeds and 1-reverse (all stage with synchromesh)	
Transmission gear ratio	1st		3.454
	2nd		2.062
	3rd		1.448
	4th		1.088
	5th		0.780
	Reverse		3.333
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	3.900
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	3.900
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		3.5 ℓ (3.7 US qt, 3.1 Imp qt)	

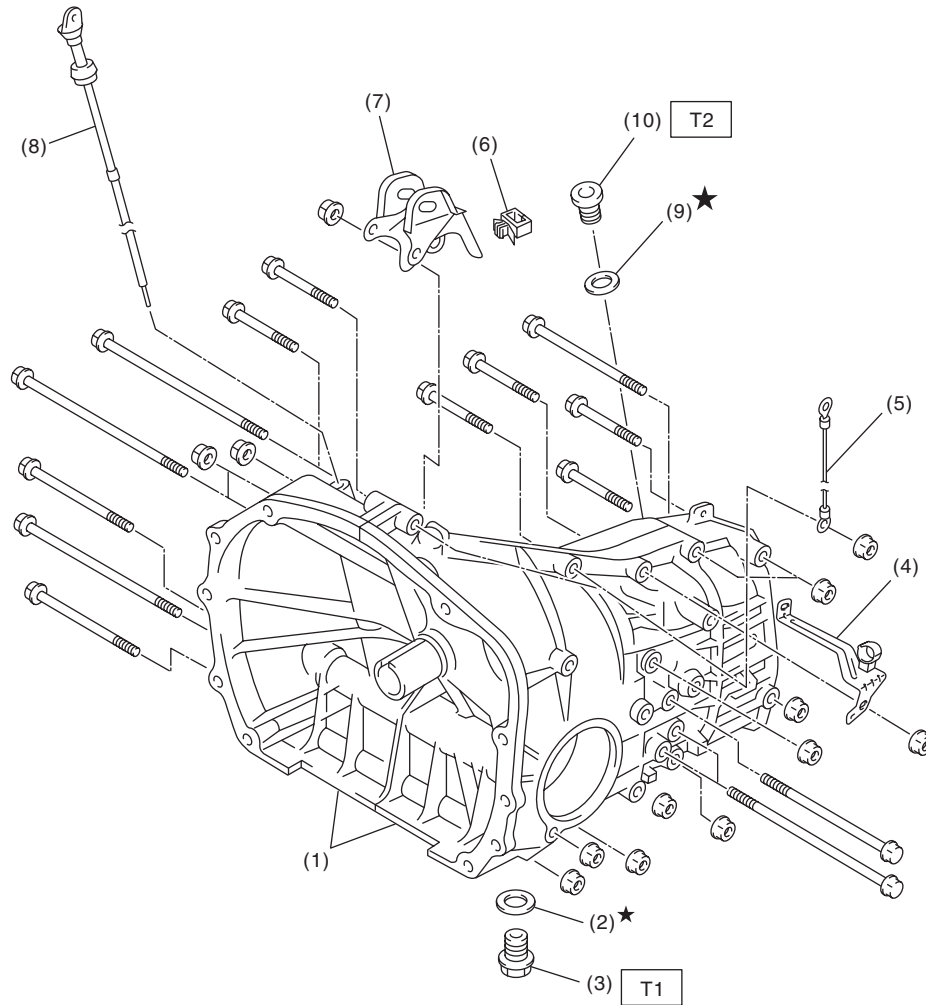
2. TRANSMISSION GEAR OIL

Recommended oil:

GL-5 (75W-90) or equivalent

B: COMPONENT

1. TRANSMISSION CASE



MT-02288

(1) Transmission case ASSY	(6) Clamp
(2) Gasket	(7) Pitching stopper bracket
(3) Drain plug	(8) Oil level gauge
(4) Harness bracket	(9) Gasket
(5) Transmission radio ground cord	(10) Plug

Tightening torque:N·m (kgf-m, ft-lb)

T1: 44 (4.5, 32.5) (Aluminum gasket, silver)

70 (7.1, 51.6) (Copper gasket, brown)

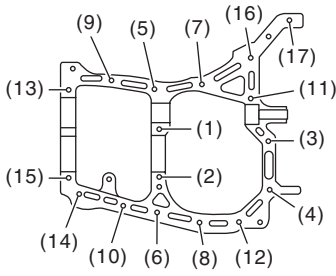
70 (7.1, 51.6) (Metal gasket, black)

T2: 60 (6.1, 44.3)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

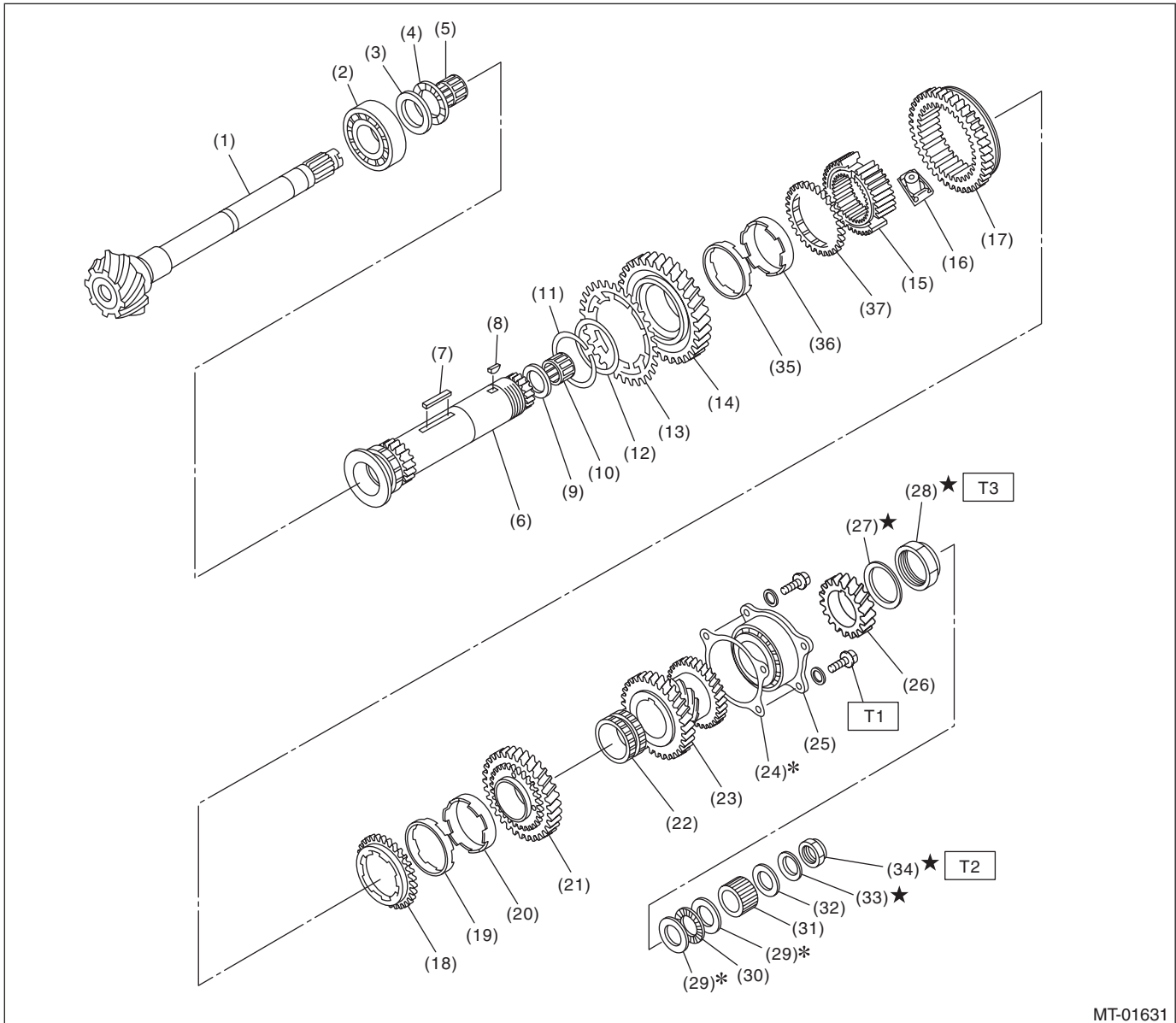
Transmission case tightening torque

 MT-00003	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, 28.8)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DRIVE PINION ASSEMBLY



MT-01631

(1) Drive pinion shaft	(15) 1st-2nd synchronizer hub	(29) Adjusting washer
(2) Roller bearing	(16) Ball detent	(30) Thrust bearing
(3) Washer	(17) Reverse driven gear	(31) Differential bevel gear sleeve
(4) Thrust bearing	(18) Outer baulk ring	(32) Washer
(5) Needle bearing	(19) Synchro cone	(33) Lock washer
(6) Driven shaft	(20) Inner baulk ring	(34) Lock nut
(7) Key	(21) 2nd driven gear	(35) Inner baulk ring
(8) Woodruff key	(22) 2nd driven gear bushing	(36) Synchro cone
(9) Drive pinion collar	(23) 3rd-4th driven gear	(37) Outer baulk ring
(10) Needle bearing	(24) Driven pinion shim	
(11) Snap ring (Outer)	(25) Roller bearing	
(12) Washer	(26) 5th driven gear	
(13) Sub gear	(27) Lock washer	
(14) 1st driven gear	(28) Lock nut	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 30 (3.1, 22.1)

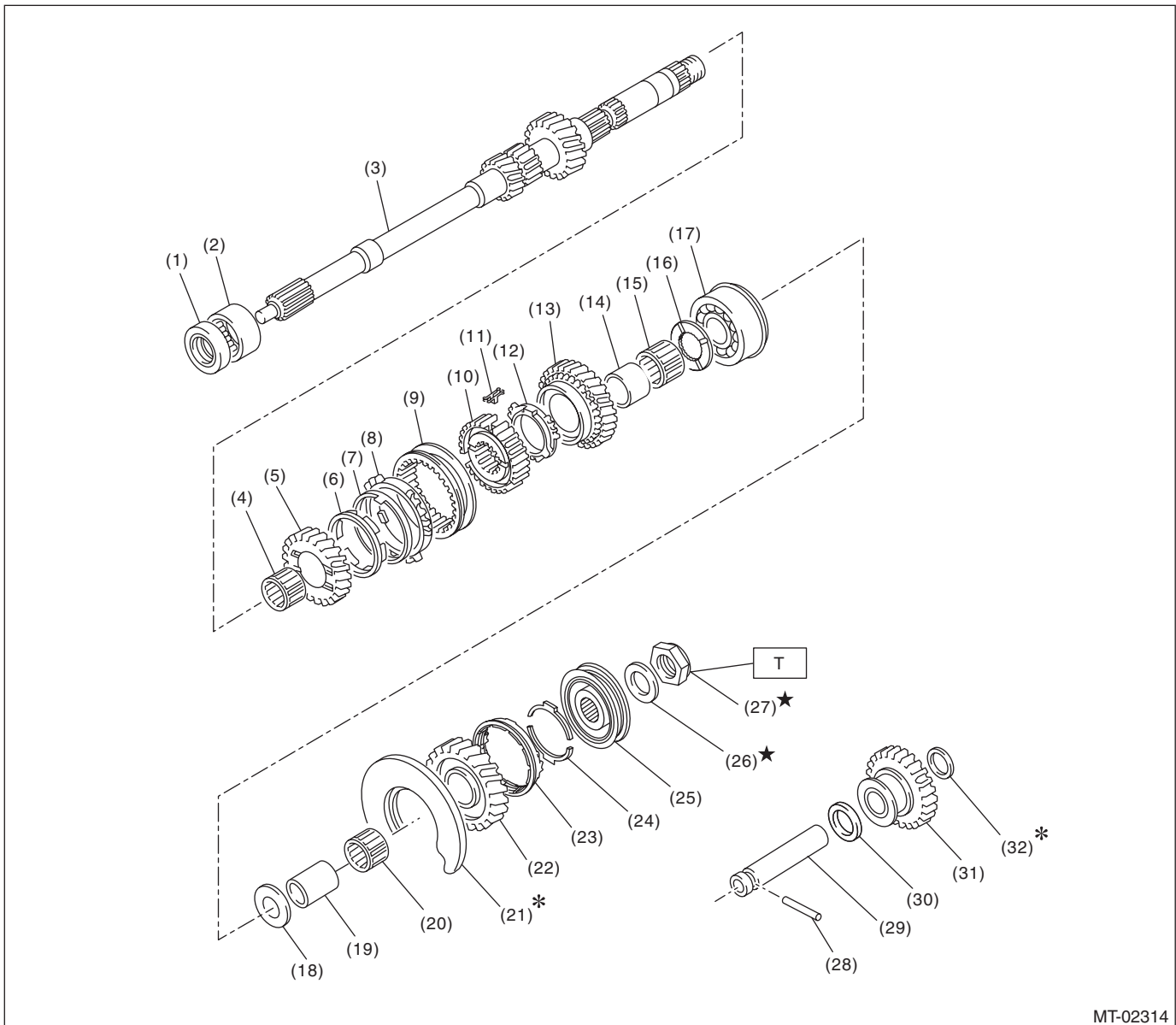
T2: 120 (12.2, 88.5)

T3: 260 (26.5, 191.8)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

3. MAIN SHAFT FOR SINGLE-RANGE



MT-02314

(1) Oil seal	(13) 4th drive gear	(25) 5th hub & sleeve No. 2
(2) Needle bearing	(14) 4th needle bearing race	(26) Lock washer
(3) Transmission main shaft	(15) Needle bearing	(27) Lock nut
(4) Needle bearing	(16) 4th gear thrust washer	(28) Straight pin
(5) 3rd drive gear	(17) Ball bearing	(29) Reverse idler gear shaft
(6) Inner baulk ring	(18) 5th gear thrust washer	(30) Washer
(7) 3rd synchro cone	(19) 5th needle bearing race	(31) Reverse idler gear
(8) Outer baulk ring	(20) Needle bearing	(32) Washer
(9) 3rd-4th coupling sleeve	(21) Main shaft rear plate	
(10) 3rd-4th synchronizer hub	(22) 5th drive gear	
(11) 3rd-4th shifting insert key	(23) 5th baulk ring	
(12) 4th baulk ring	(24) Baulk lever	

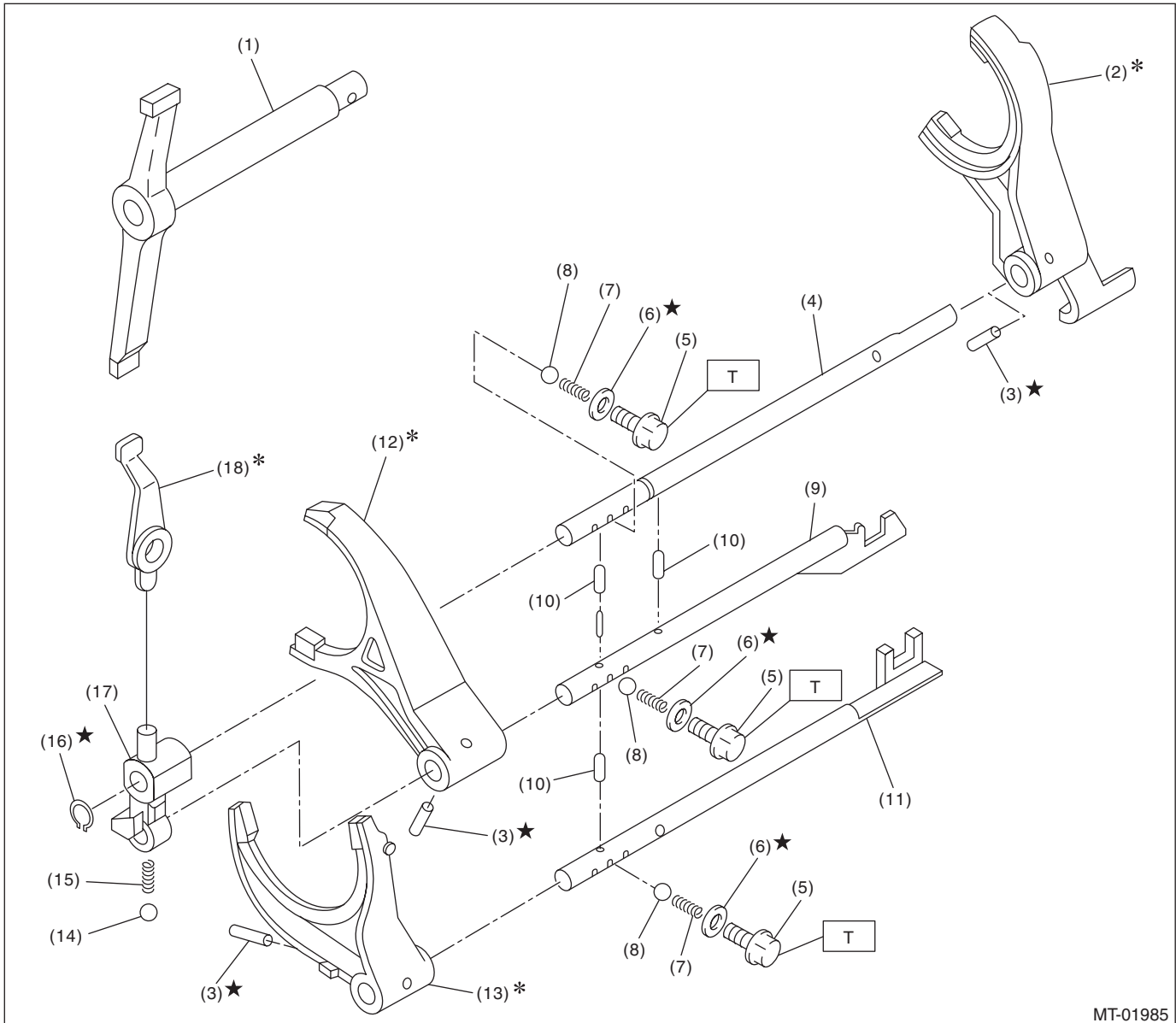
Tightening torque: N·m (kgf-m, ft-lb)

T: 120 (12.2, 88.5)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

4. SHIFTER FORK AND SHIFTER ROD



MT-01985

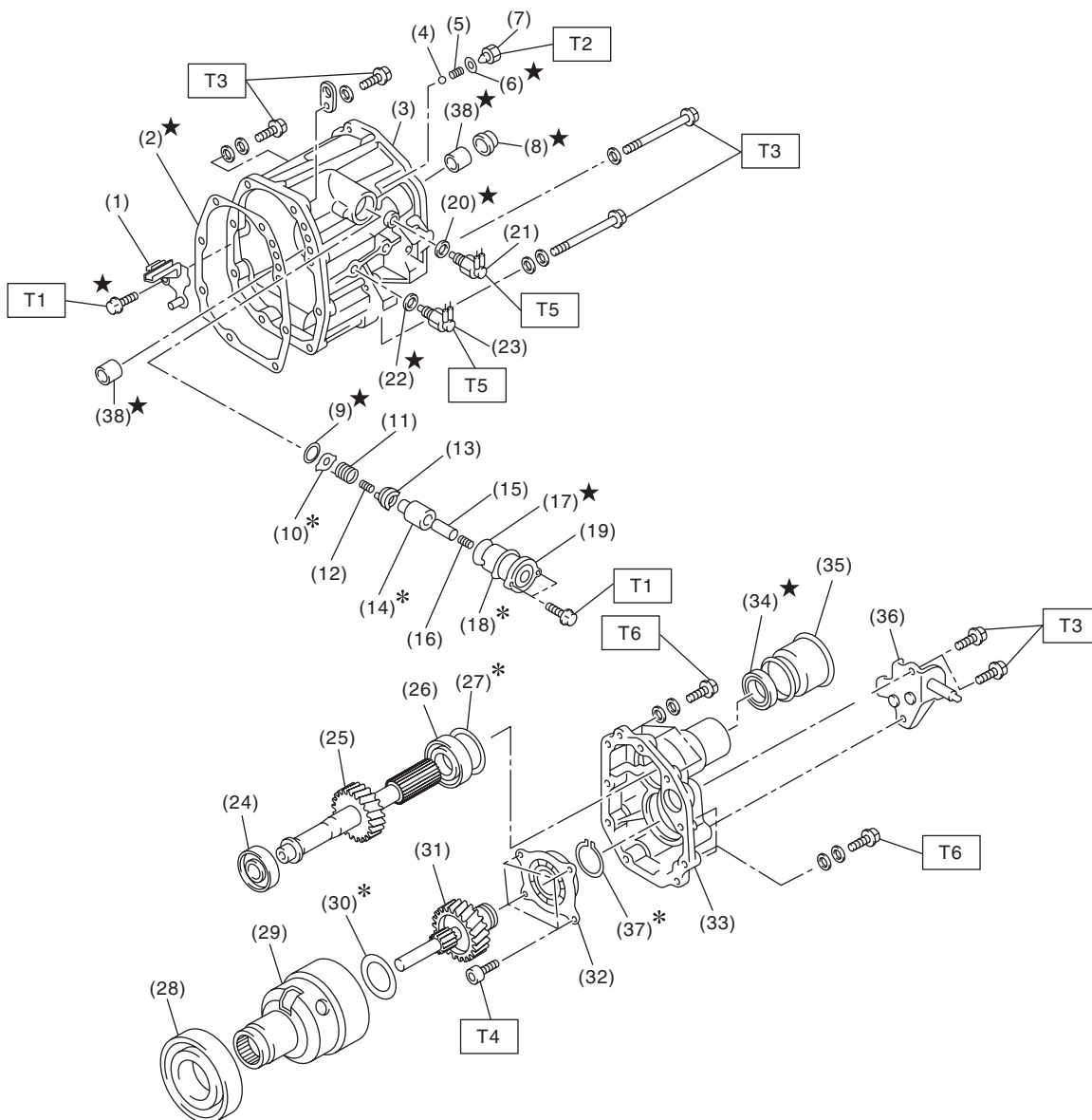
(1) Shifter arm	(8) Ball	(15) Spring
(2) 5th shifter fork	(9) 3rd-4th fork rod	(16) Snap ring (Outer)
(3) Straight pin	(10) Interlock plunger	(17) Reverse fork rod arm
(4) Reverse fork rod	(11) 1st-2nd fork rod	(18) Reverse shifter lever
(5) Checking ball plug	(12) 3rd-4th shifter fork	
(6) Gasket	(13) 1st-2nd shifter fork	
(7) Checking ball spring	(14) Ball	

Tightening torque: N·m (kgf·m, ft·lb)

T: 20 (2.0, 14.8)

MANUAL TRANSMISSION AND DIFFERENTIAL

5. TRANSFER CASE AND EXTENSION



MT-02137

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

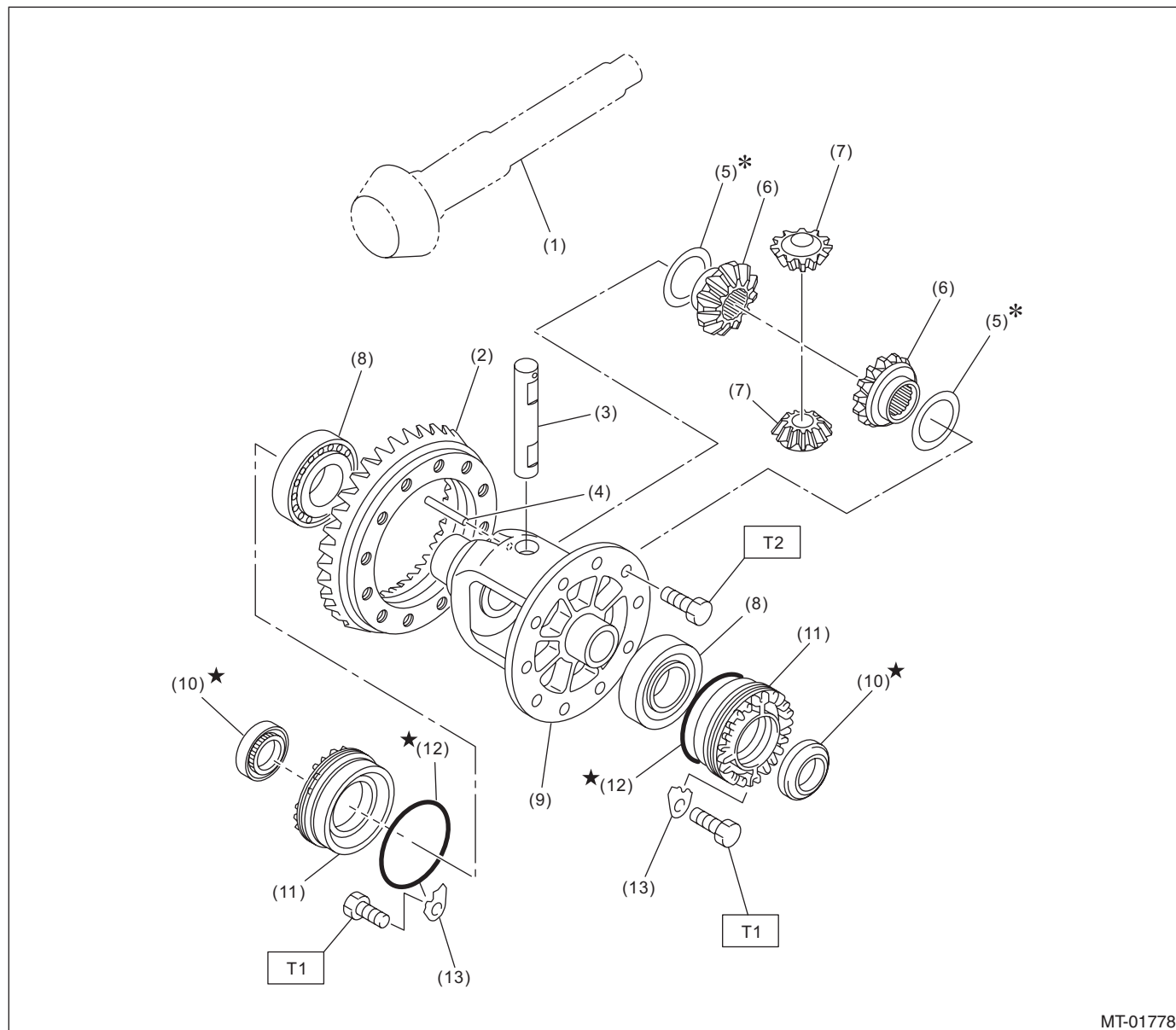
(1) Oil guide	(17) O-ring	(32) Ball bearing
(2) Gasket	(18) Adjusting select shim	(33) Extension case
(3) Transfer case	(19) Reverse check sleeve	(34) Oil seal
(4) Ball	(20) Gasket	(35) Dust cover
(5) Reverse accent spring	(21) Neutral position switch	(36) Shift bracket
(6) Gasket	(22) Gasket	(37) Snap ring
(7) Plug	(23) Back-up light switch	(38) Roller bearing
(8) Oil seal	(24) Roller bearing	
(9) Snap ring (inner)	(25) Transfer driven gear	
(10) Reverse check plate	(26) Roller bearing	
(11) Reverse check spring	(27) Adjusting washer	
(12) Reverse return spring	(28) Ball bearing	
(13) Reverse check cam	(29) Center differential	
(14) Reverse accent shaft	(30) Adjusting washer	
(15) Return spring cap	(31) Transfer drive gear	
(16) Return spring		

Tightening torque:N·m (kgf-m, ft-lb)**T1: 6.4 (0.7, 4.7)****T2: 9.75 (1.0, 7.2)****T3: 24.5 (2.5, 18.1)****T4: 26 (2.7, 19.2)****T5: 32.3 (3.3, 23.8)****T6: 40 (4.1, 29.5)**

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

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)

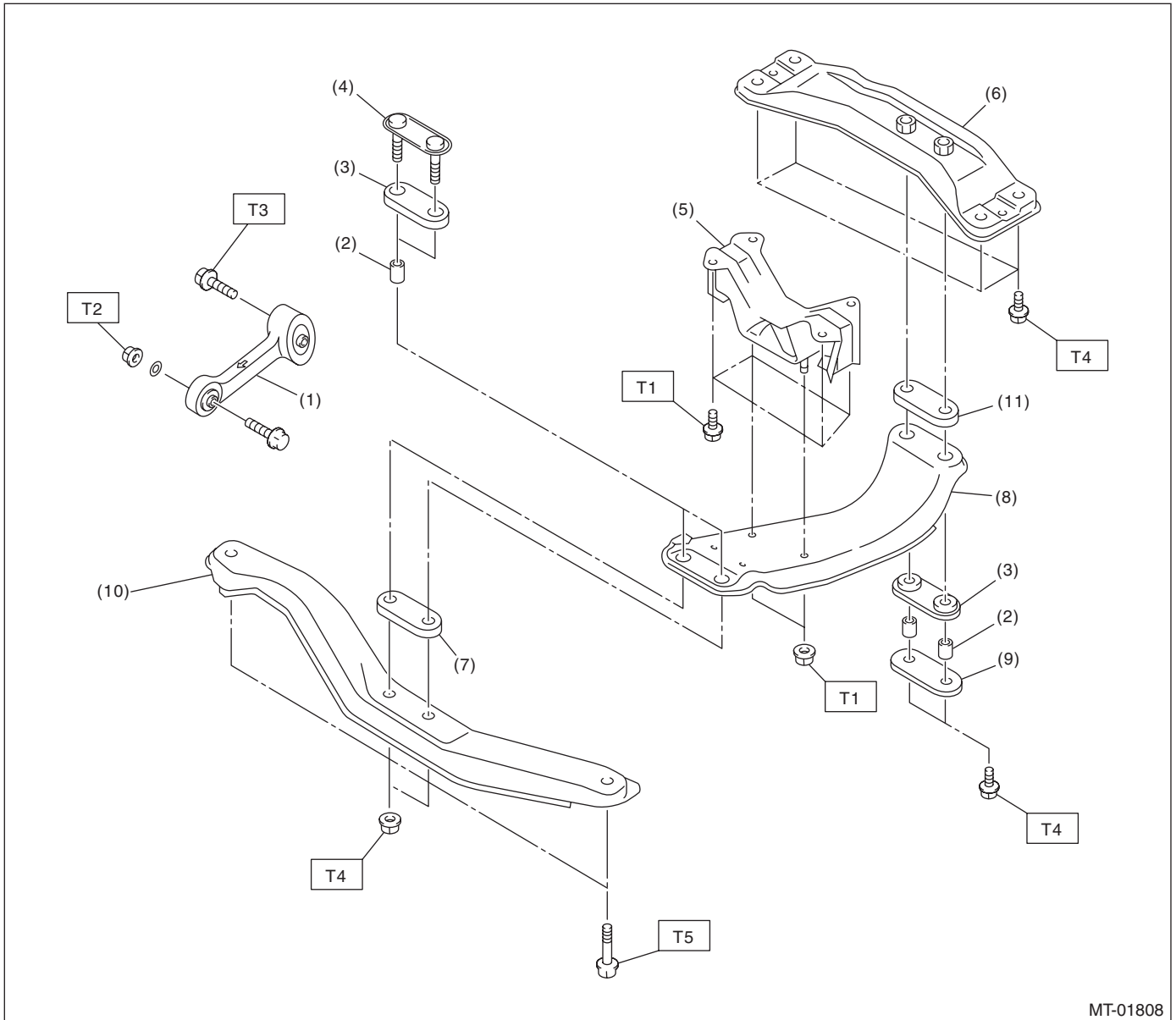
T1: 25 (2.5, 18.4)

T2: 62 (6.3, 45.7)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

7. TRANSMISSION MOUNTING



MT-01808

(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) Rear cushion rubber
(6) Rear crossmember	

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

T1: 35 (3.6, 25.8)

T2: 50 (5.1, 36.9)

T3: 58 (5.9, 42.8)

T4: 70 (7.1, 51.6)

T5: 140 (14.3, 103.3)

C: CAUTION

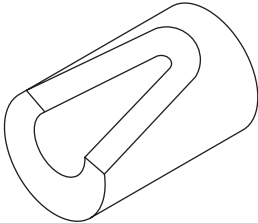
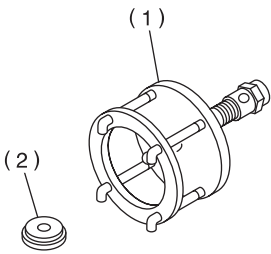
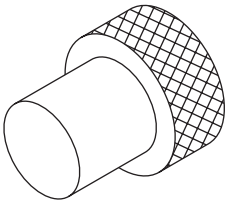
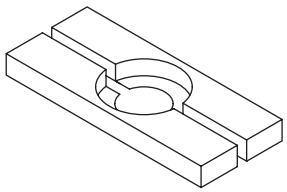
- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine gear oil, grease or equivalent. Do not mix gear oil, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old liquid gasket.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

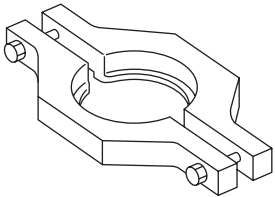
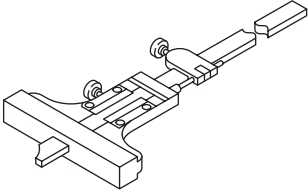
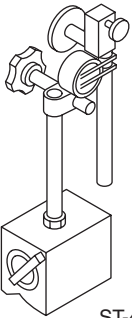
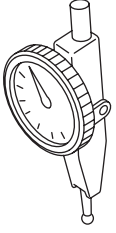
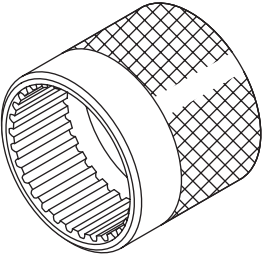
D: PREPARATION TOOL

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
 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. - Used for removing the ball bearing of the input shaft. - Used for removing the roller bearing of the transfer driven gear.

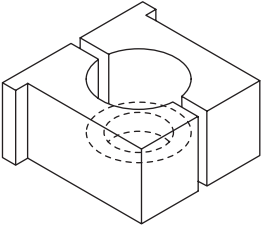
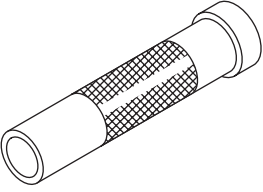
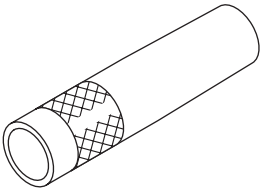
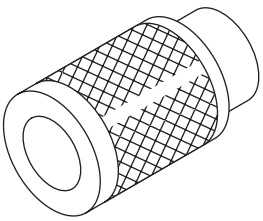
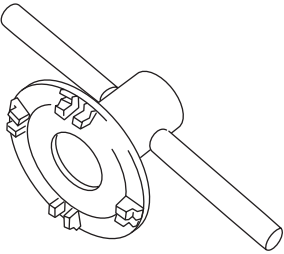
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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 play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between the side gear and pinion, and the hypoid gear. • Used together with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between the side gear and pinion, and the hypoid gear. • Used together with 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.

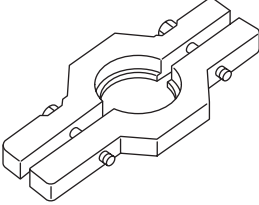
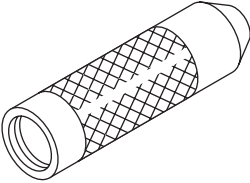
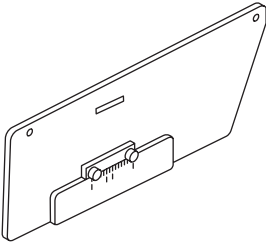
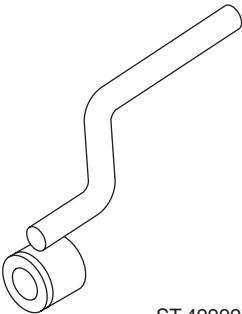
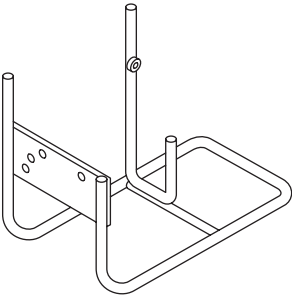
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 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 ASSY (499787000) can also be used.

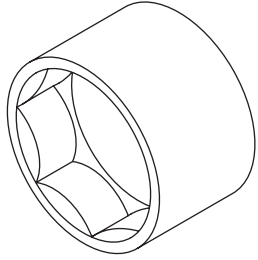
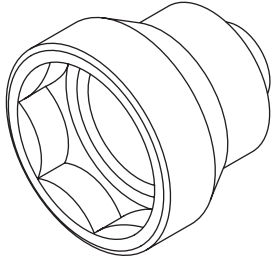
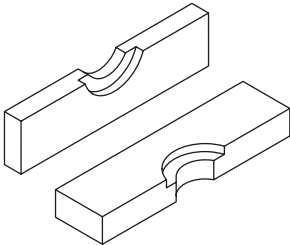
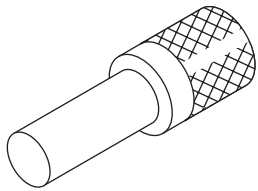
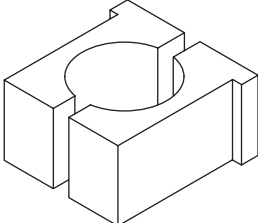
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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 REMOVER (899714110).
 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.

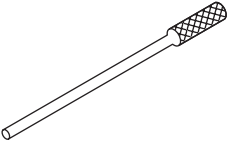
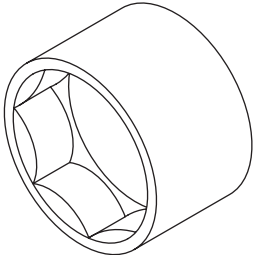
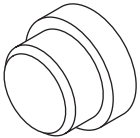
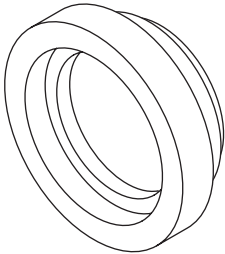
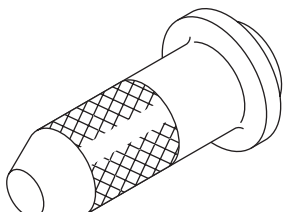
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 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.

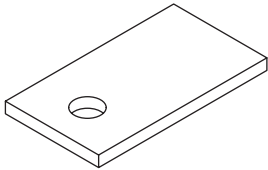
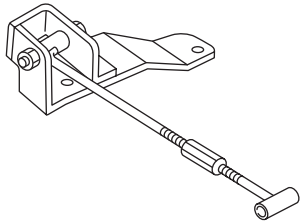
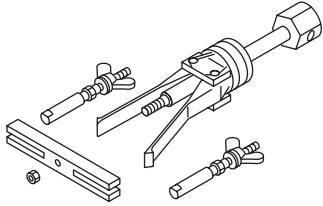
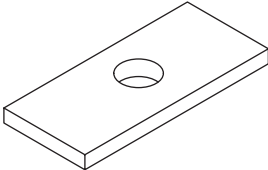
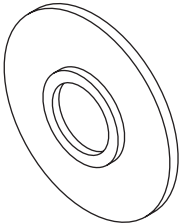
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899904100	899904100	STRAIGHT PIN 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.
 ST-398497701	398497701	ADAPTER	• Used for installing roller bearing onto the differential case. • Used together with 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.

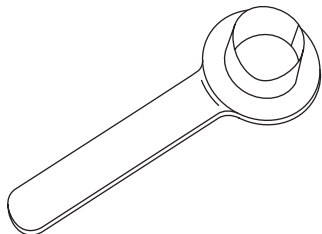
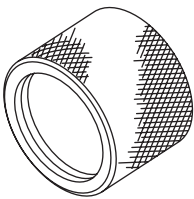
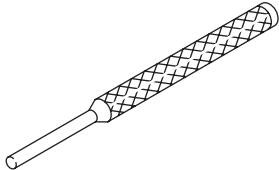
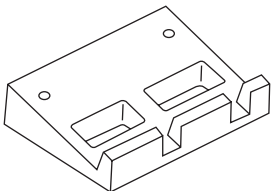
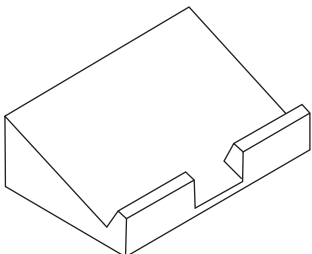
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498255400	498255400	PLATE	Used for measuring backlash.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	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 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.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting the oil seal from damage when inserting the front drive shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST-398791700	398791700	STRAIGHT PIN REMOVER 2	Used for installing and removing the straight pin.
 ST-498267200	498267200	CYLINDER HEAD TABLE	Used for installing and removing the roller bearing of the transfer case.
 ST-498267300	498267300	CYLINDER HEAD TABLE	Used for installing and removing the roller bearing of the transfer case.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

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.

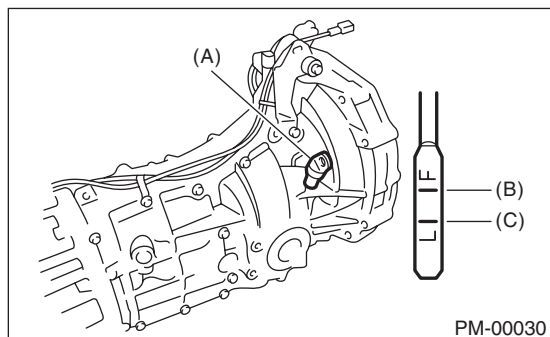
Transmission Gear Oil

MANUAL TRANSMISSION AND DIFFERENTIAL

2. Transmission Gear Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Turn the ignition switch to OFF, and wait until the engine cools.
- 3) Remove the oil level gauge and wipe it clean.
- 4) Reinsert the oil level gauge all the way. Be sure that the oil level gauge is correctly inserted in the proper direction.
- 5) Pull out the oil level gauge again, and check the oil level. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



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

B: REPLACEMENT

- 1) Pull out the oil level gauge.
- 2) Lift up the vehicle.
- 3) Using the TORX® bit T70, remove the drain plug, and drain the transmission gear oil completely.

CAUTION:

- Immediately after driving the vehicle or after idling for a long time, the transmission gear oil will be hot. Be careful not to receive burns.
 - Be careful not to spill the transmission gear oil on the exhaust pipe, to prevent emission of smoke or causing a fire. If gear oil is spilled, wipe it off completely.
- 4) Using the TORX® bit T70, tighten the transmission gear oil drain plug.

NOTE:

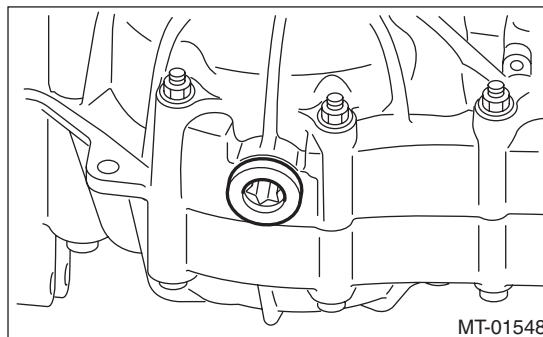
- Tighten the drain plug of the transmission gear oil after draining the transmission gear oil.
- Use a new gasket.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket silver)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Metal gasket black)



- 5) Lower the vehicle.
- 6) Pour gear oil through the oil level gauge hole.

Recommended gear oil:

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 amount, and check that it is within the specification.

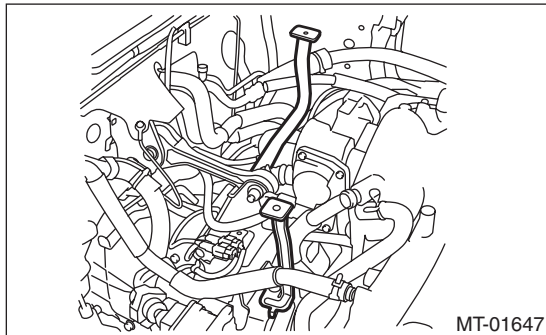
CAUTION:

When inserting the oil level gauge into transmission, align the protrusion on the top part of the oil level gauge with the notch in the oil level gauge hole.

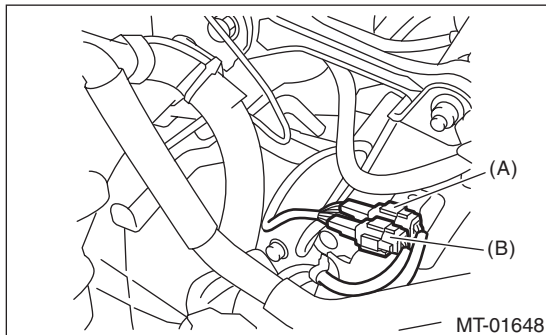
3. Manual Transmission Assembly

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Open the front hood.
- 3) Disconnect the ground cable from battery.
- 4) Drain transmission gear oil completely. <Ref. to 5MT-22, REPLACEMENT, Transmission Gear Oil.>
- 5) Remove the air intake chamber and intake boot. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 6) Remove the air intake chamber stay.

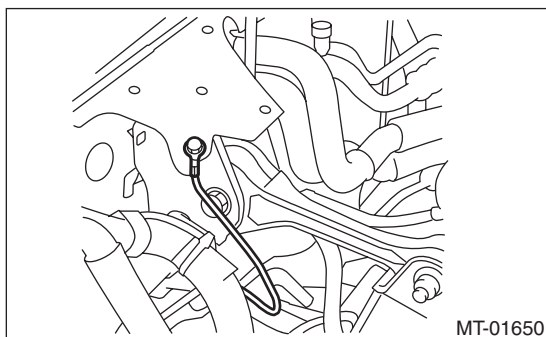


- 7) Disconnect the following connector.

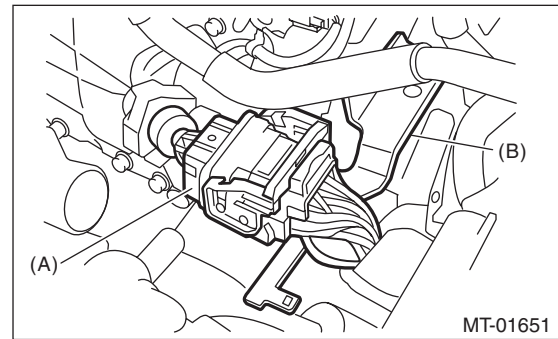


- (A) Neutral position switch connector (Brown)
- (B) Back-up light switch connector (Gray)

- 8) Disconnect the transmission radio ground terminal.



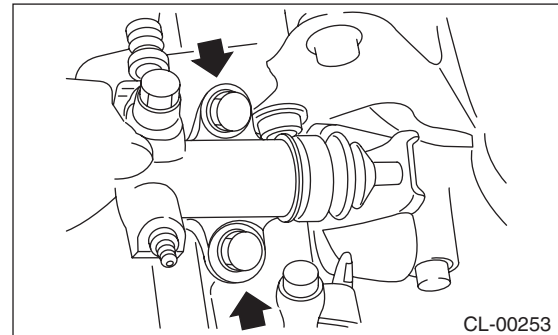
- 9) Disconnect the engine harness connectors, and then remove the engine hanger rear.



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

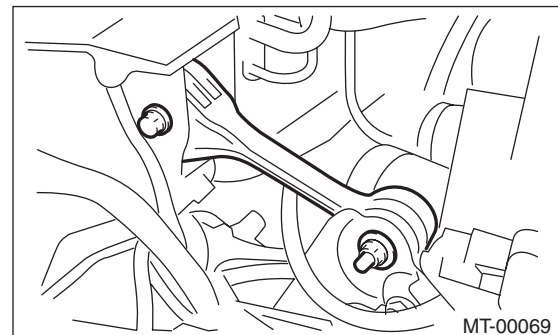
- 10) Remove the starter. <Ref. to SC(H4SO)-7, REMOVAL, Starter.>

- 11) Remove the operating cylinder from the transmission, and suspend on a wire.



- 12) Remove the throttle body. <Ref. to FU(H4SO)-14, REMOVAL, Throttle Body.>

- 13) Remove the pitching stopper.

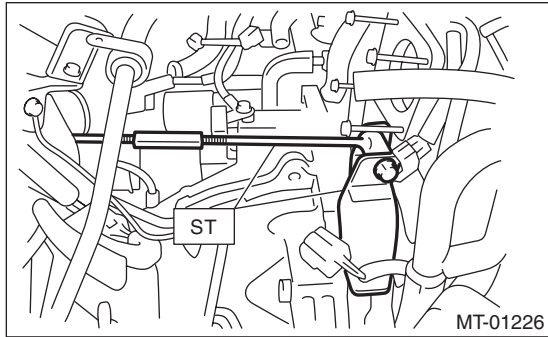


Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

14) Set the ST.

ST 41099AC000 ENGINE SUPPORT ASSY



15) Lift up the vehicle.

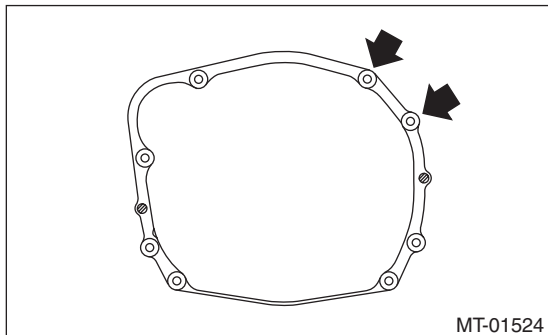
16) Remove the front and center exhaust pipes.
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>

17) Remove the rear exhaust pipe and muffler.
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

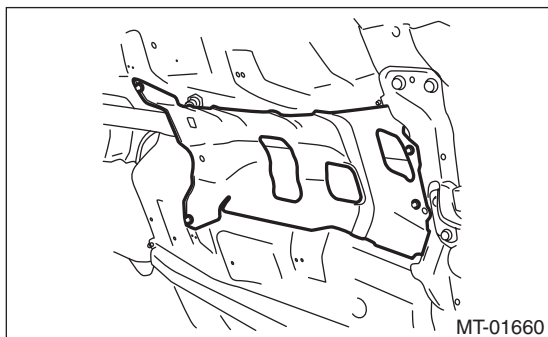
CAUTION:

When removing the exhaust pipes, make sure that each exhaust pipe does not drop off.

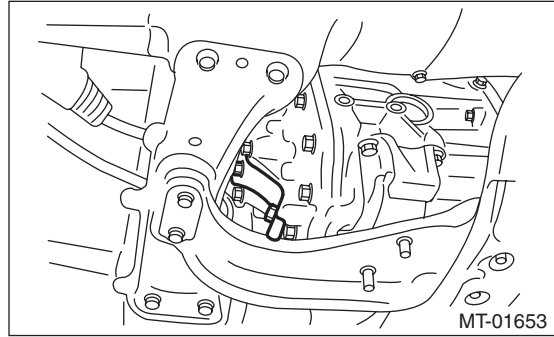
18) Remove the bolts which hold upper side of transmission to engine.



19) Remove the heat shield cover.



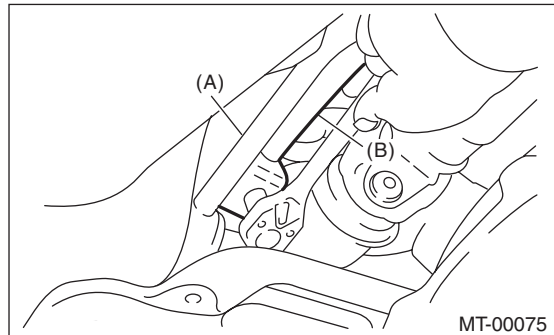
20) Remove the hanger bracket from the right side of transmission.



21) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

22) Remove the gear shift rod and the stay from the transmission.

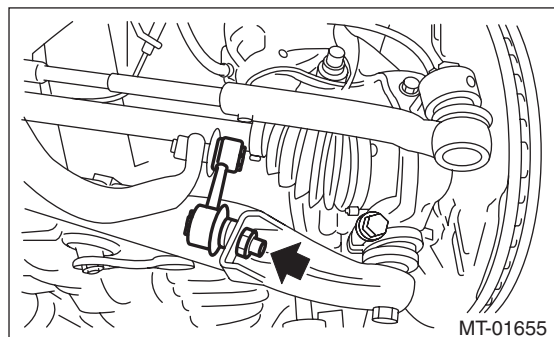
- (1) Disconnect the stay from the transmission.
- (2) Disconnect the gear shift rod from the transmission.



(A) Stay

(B) Gear shift rod

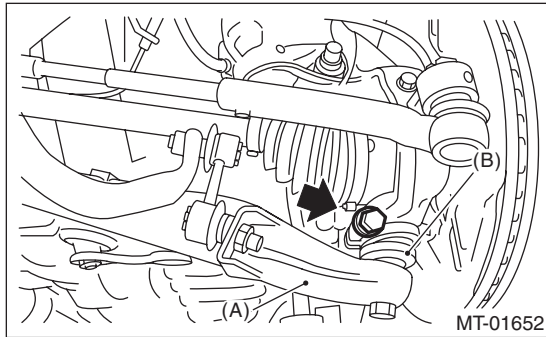
23) Disconnect the stabilizer link from the front arm.



Manual Transmission Assembly

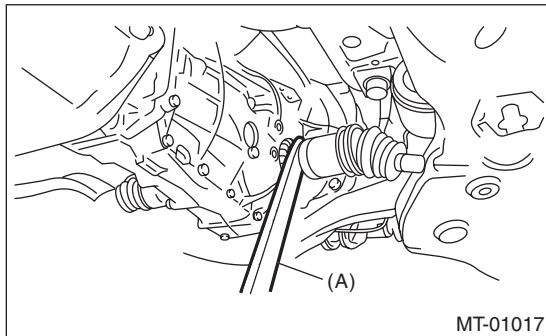
MANUAL TRANSMISSION AND DIFFERENTIAL

24) Remove the bolt securing the ball joint of the front arm to the housing, then separate the front arms and the housing.



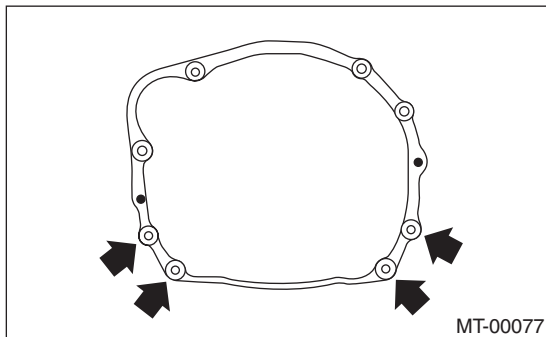
(A) Front arm
(B) Ball joint

25) Using a crowbar, remove the left and right front drive shaft from the transmission.



(A) Crowbar

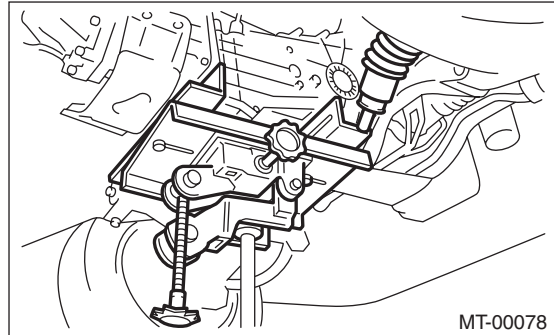
26) Remove the bolts and nuts which hold lower side of transmission to engine.



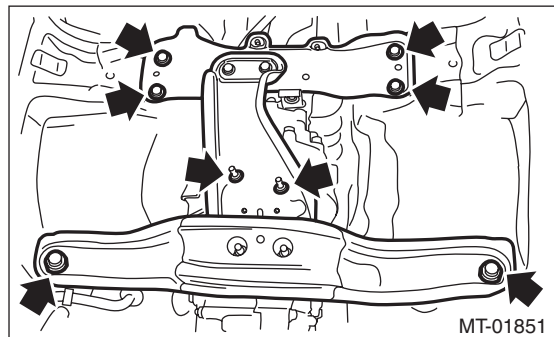
27) Place the transmission jack under the transmission.

CAUTION:

Always support the transmission case with a transmission jack.



28) Remove the front crossmember and rear crossmember from the vehicle.



29) While lowering the transmission jack, tighten the turnbuckle of the ST, and incline the engine unit rearward.

30) Remove the transmission.

NOTE:

Move the transmission jack towards the rear until the main shaft is withdrawn from the clutch disc.

31) Separate the transmission assembly from the transmission cushion rubber.

B: INSTALLATION

1) Replace the differential side retainer oil seal. <Ref. to 5MT-32, REPLACEMENT, Differential Side Retainer Oil Seal.>

NOTE:

Be sure to replace the differential side retainer oil seal after removing the front drive shaft.

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

CAUTION:

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

3) Install the transmission cushion rubber to the transmission, and tighten the bolt (A).

Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

- 4) Install the transmission cushion rubber to the center crossmember, and tighten the nut (B).

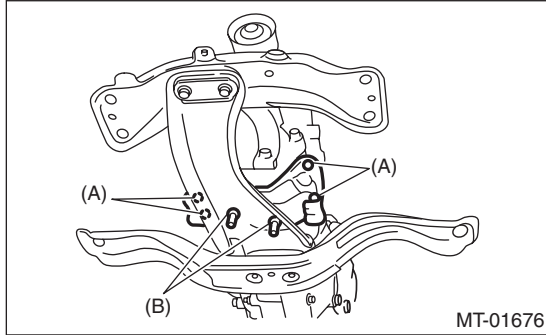
Tightening torque:

Bolt (A)

35 N·m (3.6 kgf-m, 25.8 ft-lb)

Nut (B)

35 N·m (3.6 kgf-m, 25.8 ft-lb)



- 5) 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 cover.

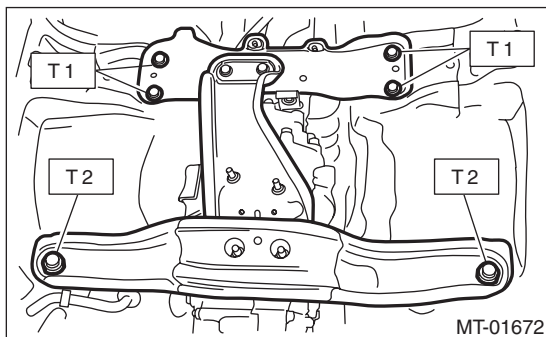
- 6) While raising the transmission jack, loosen the turnbuckle of the ST, and set the engine unit to the original position.

- 7) Install the front crossmember and rear crossmember.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)

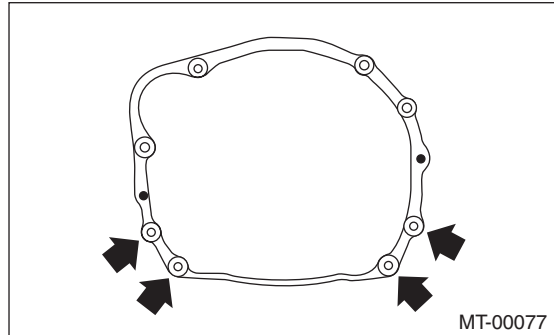


- 8) Take out the transmission jack.

- 9) Tighten the bolts and nuts which hold the lower side of transmission to the engine.

Tightening torque:

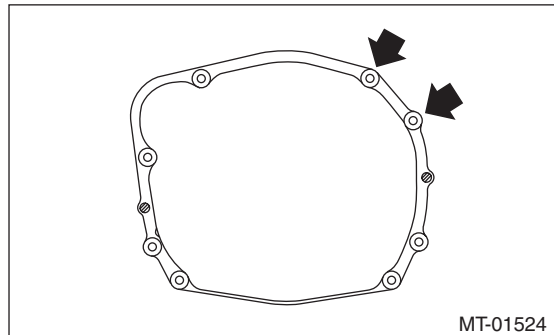
50 N·m (5.1 kgf-m, 36.9 ft-lb)



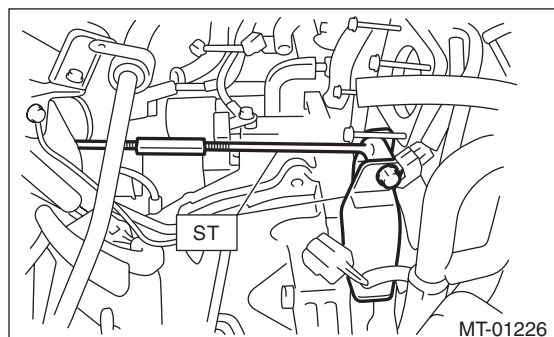
- 10) Connect the transmission to the engine.
(1) Install the starter. <Ref. to SC(H4SO)-7, INSTALLATION, Starter.>
(2) Tighten the bolts which hold the upper side of the transmission to the engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 11) Remove the ST.



Manual Transmission Assembly

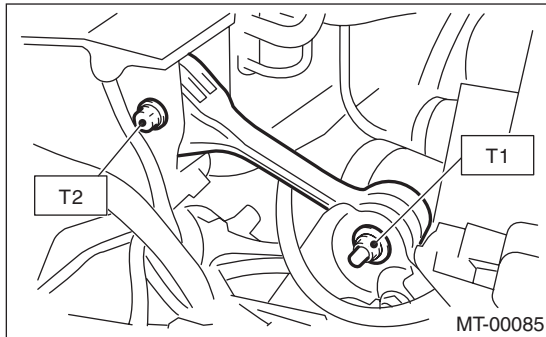
MANUAL TRANSMISSION AND DIFFERENTIAL

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)

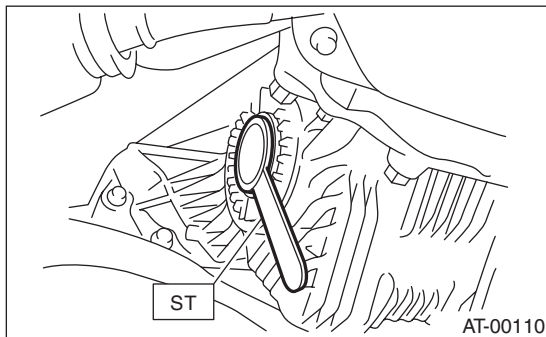


13) Install the throttle body. <Ref. to FU(H4SO)-14, INSTALLATION, Throttle Body.>

14) Lift up the vehicle.

15) Install the front drive shaft into the transmission.

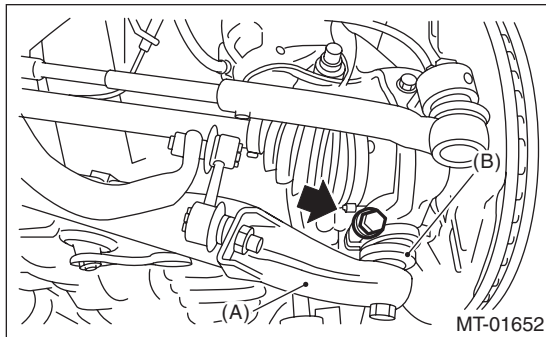
ST 28399SA010 OIL SEAL PROTECTOR



16) Insert the front arm ball joint into the housing lower part, and tighten the mounting bolt.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



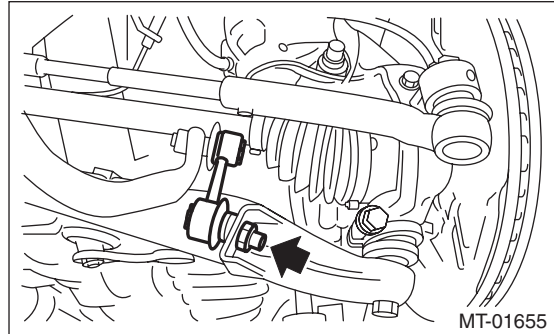
(A) Front arm

(B) Ball joint

17) Attach the stabilizer link to the front arm.

Tightening torque:

30 N·m (3.1 kgf-m, 22.1 ft-lb)

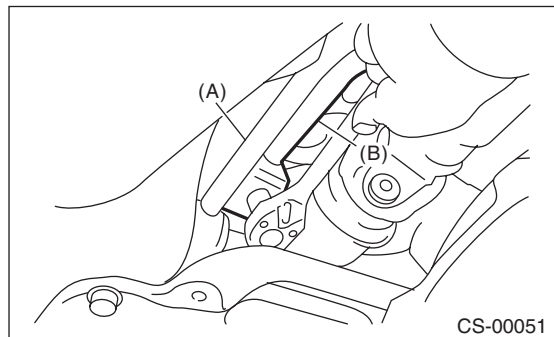


18) Attach the gear shift rod and stay.

(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

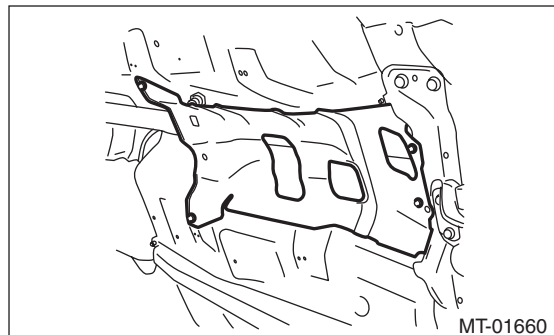
(2) Install the stay to the transmission bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

19) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

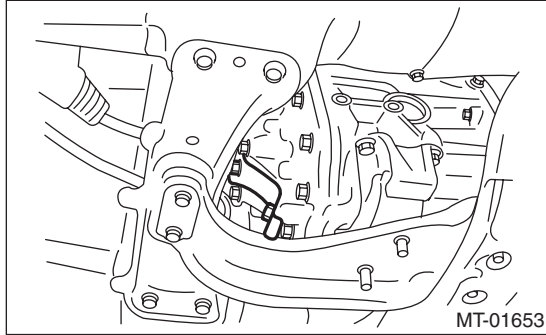
20) Install the heat shield cover.



Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

21) Install the hanger bracket to the transmission.



22) Install the rear exhaust pipe and muffler. <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>

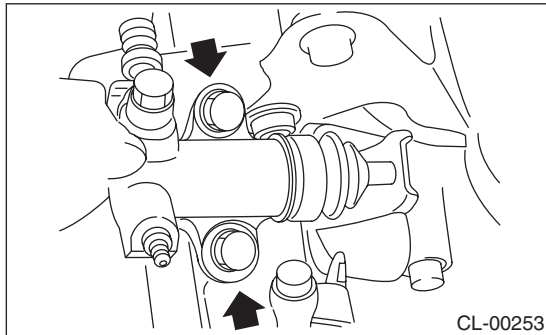
23) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>

24) Install the under cover. <Ref. to EI-24, INSTALLATION, Front Under Cover.>

25) Install the operating cylinder.

Tightening torque:

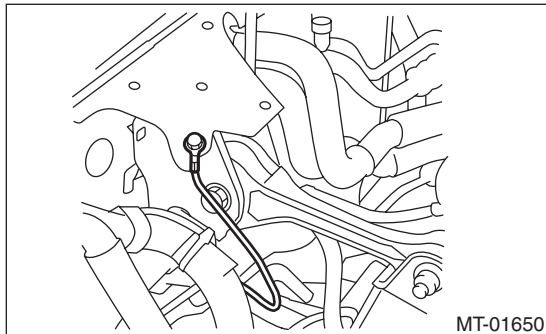
37 N·m (3.8 kgf-m, 27.3 ft-lb)



26) Install the transmission radio ground cable terminal.

Tightening torque:

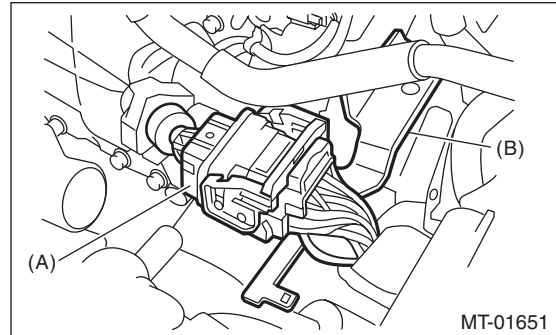
13 N·m (1.3 kgf-m, 9.6 ft-lb)



27) Install the engine hanger rear, and then connect the engine harness connector.

Tightening torque:

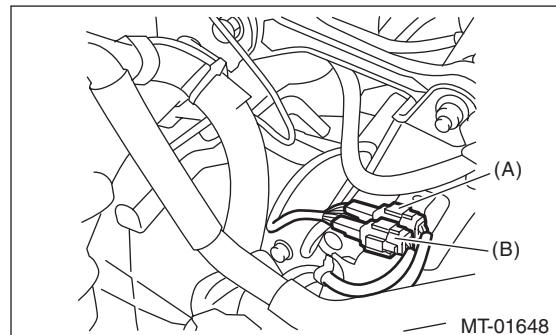
16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) Engine harness connectors

(B) Engine hanger rear

28) Connect the following connectors.



(A) Neutral position switch connector (Brown)

(B) Back-up light switch connector (Gray)

29) Install the air intake chamber stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)

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

31) Connect the battery ground terminal.

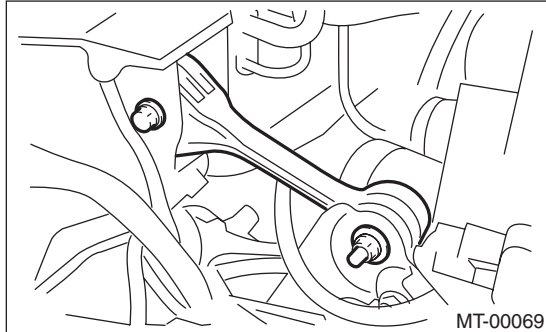
32) Remove the lift arm from vehicle.

4. Transmission Mounting System

A: REMOVAL

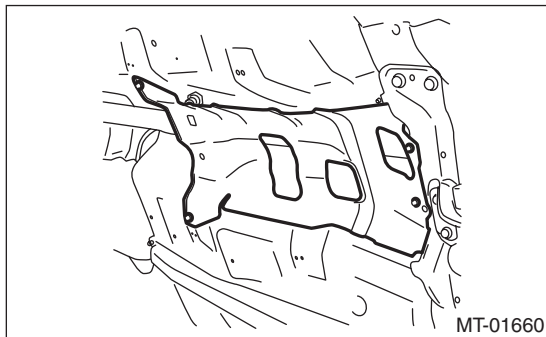
1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake chamber and intake boot.
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 3) Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the front and center exhaust pipes.
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>
- 4) Remove the heat shield cover.

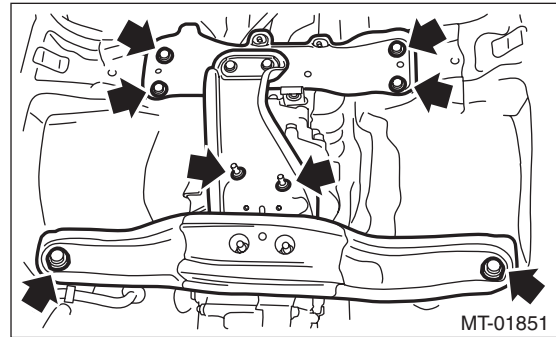


- 5) Set the transmission jack under the transmission body.

CAUTION:

Always support the transmission case with a transmission jack.

- 6) Remove the front crossmember and the rear crossmember.



- 7) Remove the transmission cushion rubber.

B: INSTALLATION

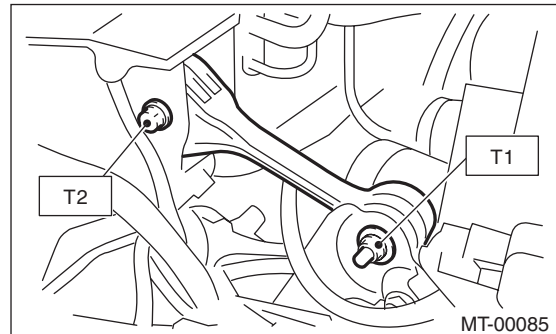
1. PITCHING STOPPER

- 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 intake boot.
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
- 3) Connect the battery ground terminal.

Transmission Mounting System

MANUAL TRANSMISSION AND DIFFERENTIAL

2. CROSSMEMBER AND CUSHION RUBBER

- 1) Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
- 2) Install the transmission cushion rubber to the center crossmember, and tighten the nut (B).

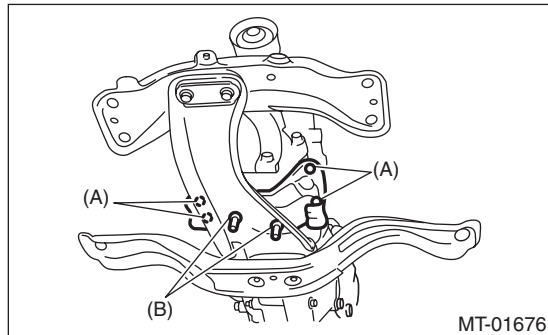
Tightening torque:

Bolt (A)

35 N·m (3.6 kgf-m, 25.8 ft-lb)

Nut (B)

35 N·m (3.6 kgf-m, 25.8 ft-lb)

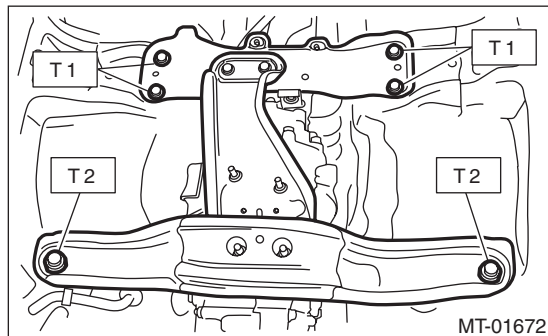


- 3) Install the front crossmember and rear crossmember.

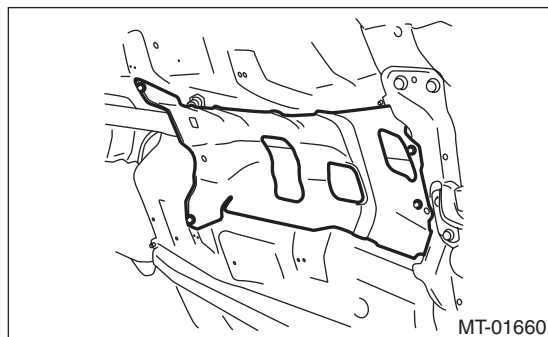
Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)



- 4) Remove the transmission jack.
- 5) Install the heat shield cover.



- 6) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>

- 7) Lower the vehicle.

- 8) Connect the battery ground terminal.

C: INSPECTION

Check the following; repair or replace the faulty parts.

1. PITCHING STOPPER

Check the pitching stopper for bends or damage. Check that the rubber is not stiff, cracked or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

Check the crossmember for bending or damage. Check that the cushion rubber does not have hardening, cracks or other damages.

5. Oil Seal

A: INSPECTION

Check for leakage of transmission gear oil from the oil seal. If there is oil leakage, replace the oil seal with the new part and check the propeller shaft.

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:

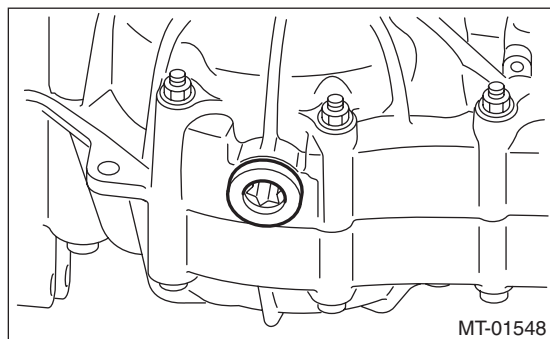
Use a new gasket.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket silver)

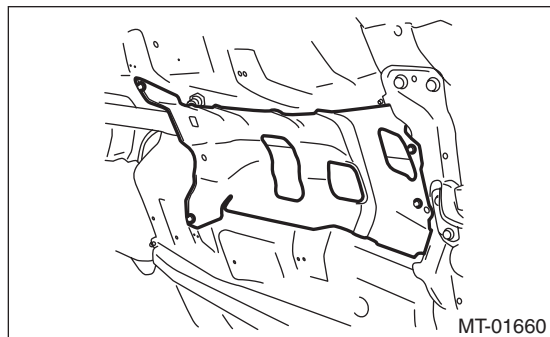
70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Metal gasket black)



- 4) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

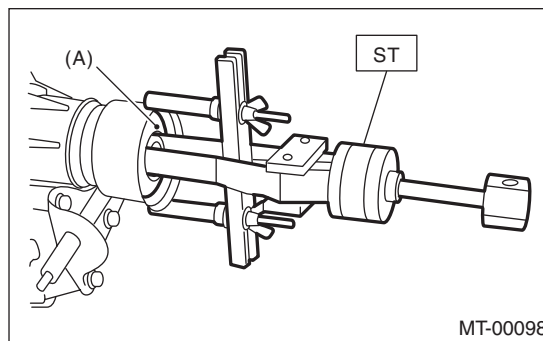
- 5) Remove the heat shield cover.



- 6) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

- 7) Using the ST, remove the oil seal.

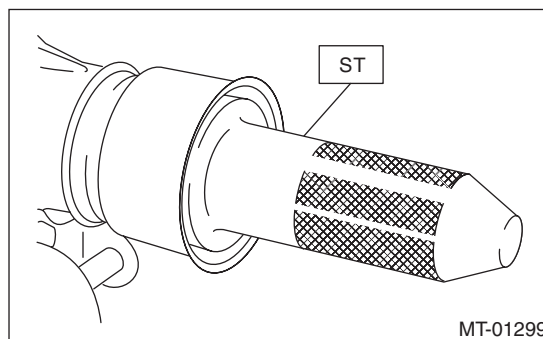
ST 398527700 PULLER ASSY



(A) Oil seal

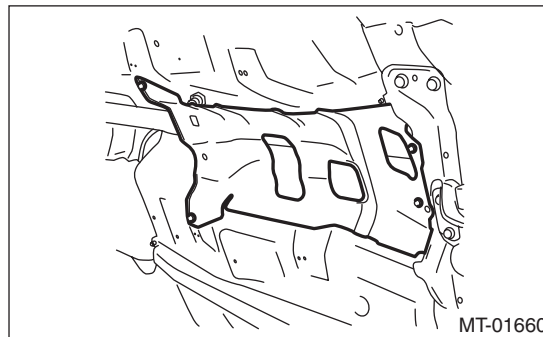
- 8) Using the ST, install the oil seal.

ST 498057300 INSTALLER



- 9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

- 10) Install the heat shield cover.



- 11) Install the rear exhaust pipe and muffler. <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>

- 12) Pour in transmission gear oil and check the oil level. <Ref. to 5MT-22, Transmission Gear Oil.>

Differential Side Retainer Oil Seal

MANUAL TRANSMISSION AND DIFFERENTIAL

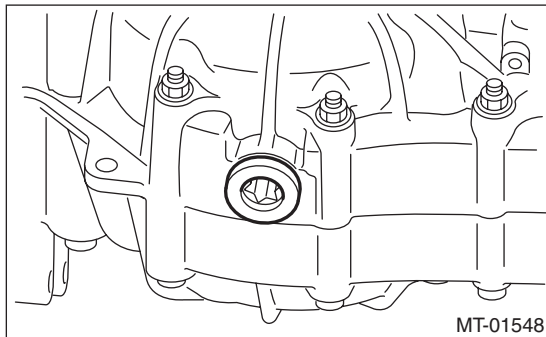
6. Differential Side Retainer Oil Seal

A: INSPECTION

Check for leakage of gear oil from differential side retainer oil seal part. If there is oil leakage, replace the oil seal with the new part and check the drive shaft.

B: REPLACEMENT

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



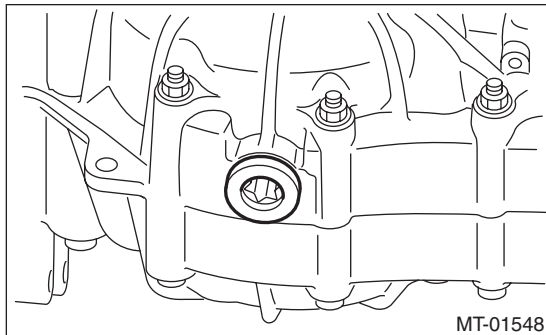
- 3) Replace the gasket with a new part and tighten the transmission gear oil drain plug using the TORX® bit T70.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket silver)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Metal gasket black)



- 4) Remove the front and center exhaust pipes. <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>
- 5) Separate the front drive shaft from the transmission. <Ref. to DS-26, REMOVAL, Front Drive Shaft.>

- 6) Remove the differential side retainer oil seal.

NOTE:

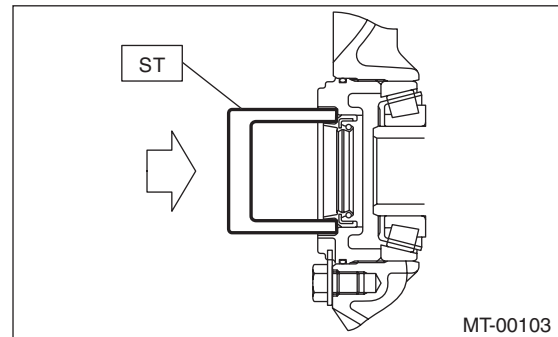
- Be sure to replace the differential side retainer oil seal whenever the front drive shaft is removed from the transmission.
- Use the ST 398527700 PULLER ASSY to remove the oil seal. If removing the oil seal with a flat tip screwdriver, be careful not to scratch the differential side retainer.

- 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

CAUTION:

Apply transmission gear oil to the oil seal lips, and install the oil seal while being careful not to deform the lip.



- 8) Install the front drive shaft. <Ref. to DS-26, INSTALLATION, Front Drive Shaft.>

ST 28399SA010 OIL SEAL PROTECTOR

- 9) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>

- 10) Lower the vehicle.

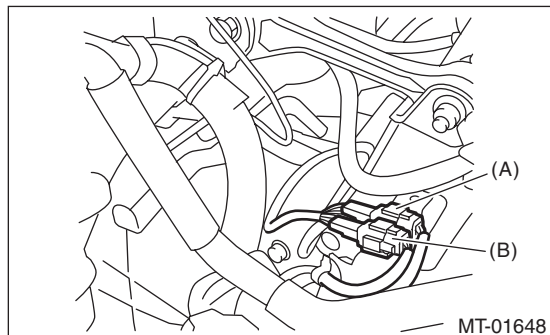
- 11) Add the transmission gear oil through the oil level gauge hole. <Ref. to 5MT-22, REPLACEMENT, Transmission Gear Oil.>

7. Switches and Harness

A: REMOVAL

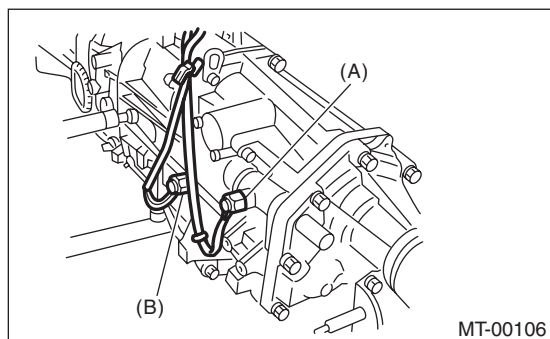
1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake chamber and intake boot. <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Chamber.>
- 3) Disconnect the connector back-up light switch & neutral position switch.



- (A) Neutral position switch connector (Brown)
(B) Back-up light switch connector (Gray)

- 4) Lift up the vehicle.
- 5) Remove the back-up light switch & neutral position switch with the harness.



- (A) Neutral position switch
(B) Back-up light switch

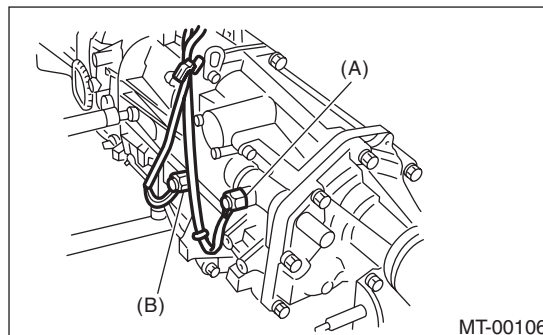
B: INSTALLATION

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

- 1) Install the back-up light switch & neutral position switch with the harness.

Tightening torque:

32.3 N·m (3.3 kgf-m, 23.8 ft-lb)



- (A) Neutral position switch
(B) Back-up light switch

- 2) Connect the connectors of back-up light switch & neutral position switch.
- 3) Install the air intake chamber and intake boot. <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Chamber.>
- 4) Connect the battery ground terminal.

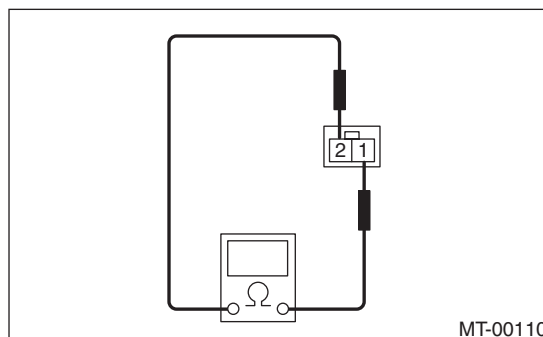
C: INSPECTION

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.



Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		1 MΩ or more

- 4) Replace faulty parts.

8. Preparation for Overhaul

A: PROCEDURE

- 1) Clean oil, grease, dirt and dust from the transmission.
- 2) When gear oil remains in the transmission, using the TORX® bit T70, remove the transmission gear oil drain plug, and drain the transmission gear oil completely.
- 3) Using the TORX® bit T70, tighten the transmission gear oil drain plug.

NOTE:

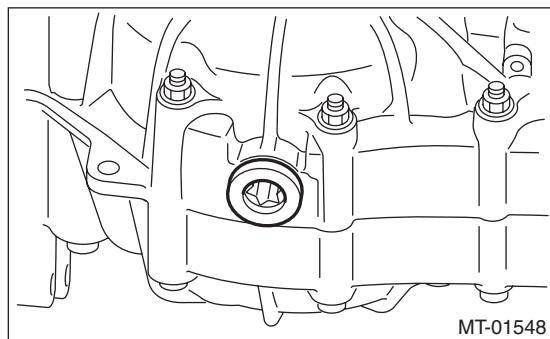
Use a new gasket.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket silver)

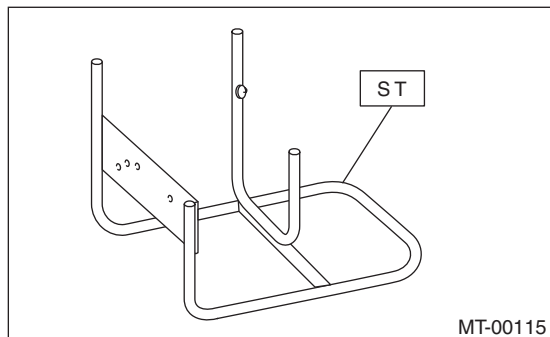
70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Metal gasket black)



- 4) Attach the transmission to the ST.

ST 499937100 TRANSMISSION STAND

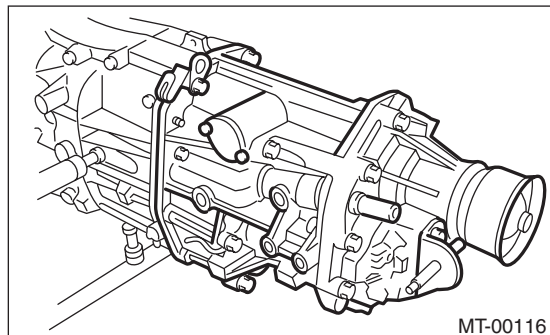


- 5) Apply oil to rotating parts before assembly.
- 6) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 7) Gaskets, lock washers and lock nuts must be replaced with new ones.
- 8) Apply liquid gasket to the specified areas to prevent leakage.

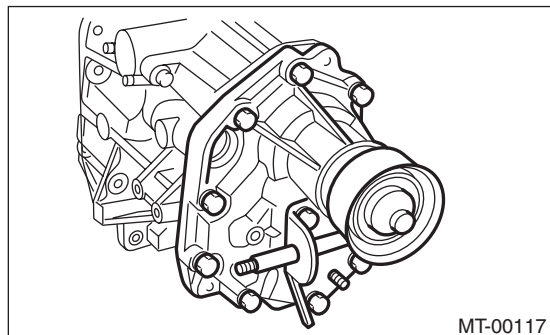
9. Transfer Case and Extension Case Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, 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.

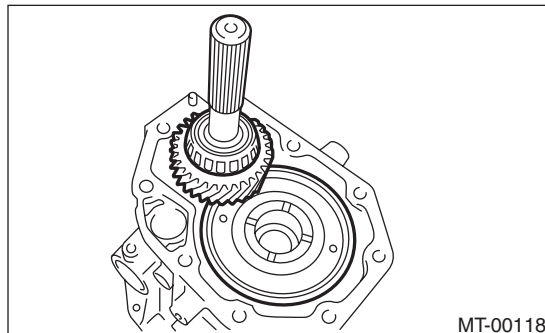


- 4) Remove the shifter arm.
- 5) Remove the extension case assembly.

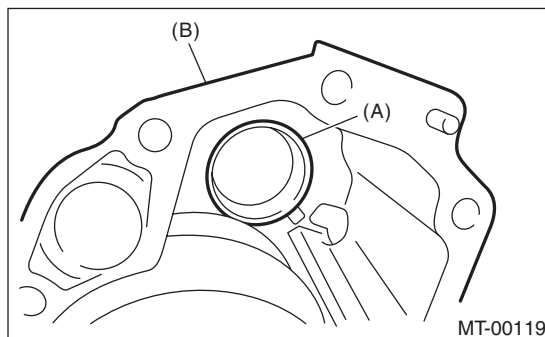


B: INSTALLATION

- 1) Install the center differential and transfer driven gear into the transfer case.

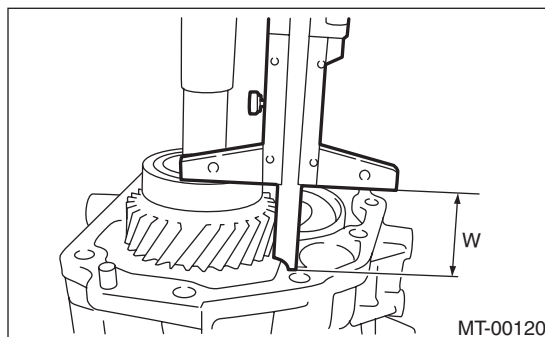


- 2) Remove the bearing outer race from the extension case.



- (A) Bearing outer race
(B) Extension case

- 3) While pressing 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.



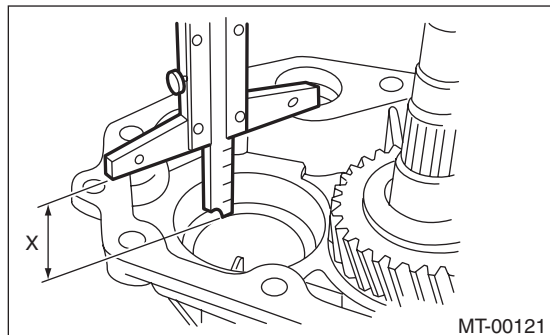
Transfer Case and Extension Case Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Measure depth "X" on bearing insertion part of the extension case.

NOTE:

Measure with bearing outer race and thrust washer removed.



6) Calculate the thrust washer thickness "t" using the following calculation.

$$t = X - W + (0.15 - 0.20 \text{ mm (0.006 - 0.008 in)})$$

7) Select the washer with the nearest value in the following table.

Preload of the taper roller bearing (amount of standard protrusion):

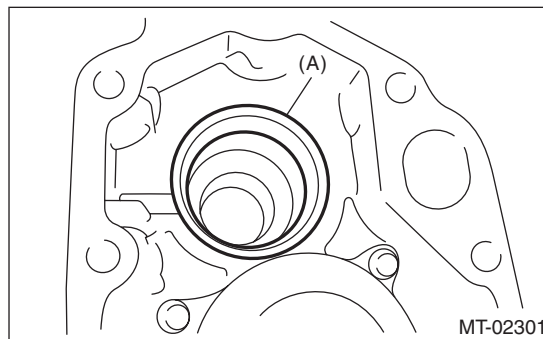
0.15 — 0.20 mm (0.006 — 0.008 in)

NOTE:

Be sure that it is always within the preload.

Thrust washer (50 × 61 × t)	
Part No.	Length 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)

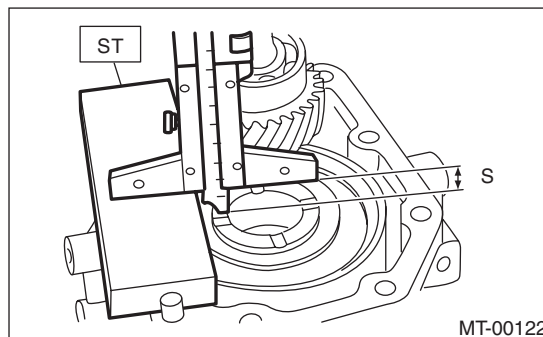
8) Install the selected thrust washer and bearing outer race into the extension case.



(A) Bearing outer race

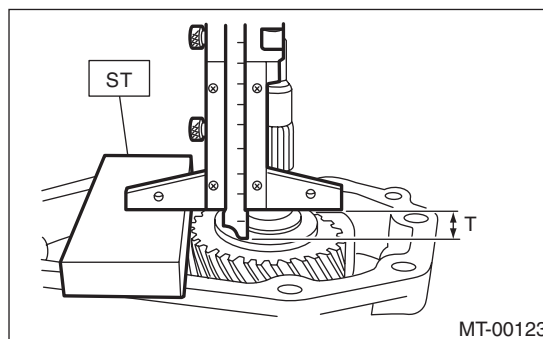
9) Measure the depth "S" between transfer case and center differential.

ST 398643600 GAUGE



10) Measure the height "T" between the extension case and transfer drive gear.

ST 398643600 GAUGE



NOTE:

Thickness of ST: 15 mm (0.59 in)

11) Calculate the thrust washer thickness "U" using the following calculation.

$$U = S + T - 30 \text{ mm (1.18 in) [Thickness of ST]}$$

Transfer Case and Extension Case Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

12) Select a suitable washer in the following table.

Standard clearance:

0.15 — 0.35 mm (0.0059 — 0.0138 in)

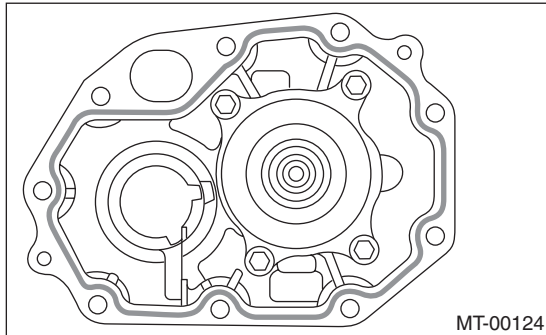
Thrust washer	
Part No.	Length mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)
803036080	1.8 (0.071)
803036081	1.9 (0.075)

13) Install the selected thrust washer to center differential.

14) Apply a proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:

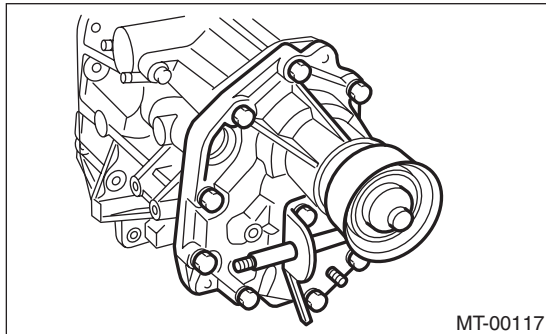
THREE BOND 1215 (Part No. 004403007) or equivalent



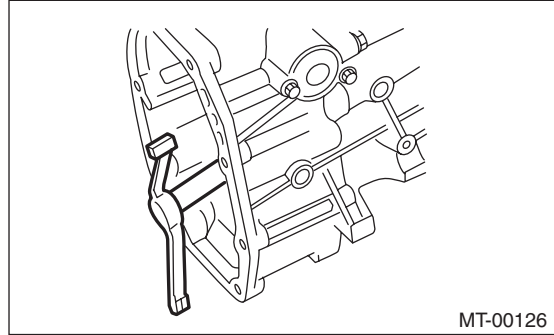
15) Attach the extension assembly to the transfer case.

Tightening torque:

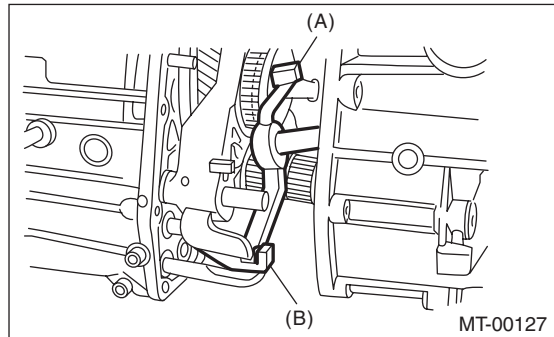
40 N·m (4.1 kgf-m, 29.5 ft-lb)



16) Attach the shifter arm to transfer case.



17) Hang the shifter arm on 3rd-4th fork rod.



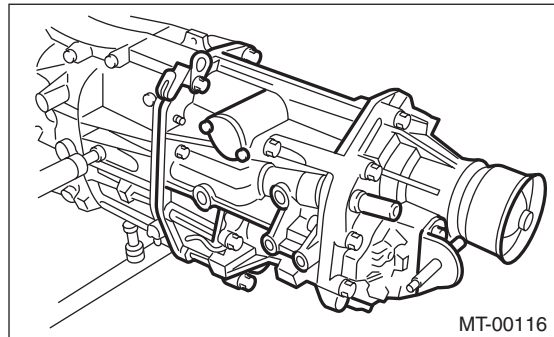
(A) Shifter arm

(B) 3rd-4th fork rod

18) 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)



Transfer Case and Extension Case Assembly

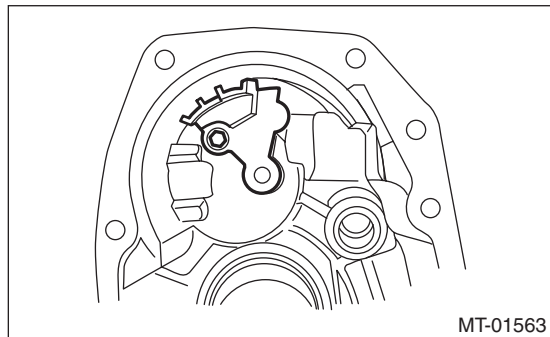
MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1. TRANSFER CASE

1) Remove the reverse check sleeve assembly.
<Ref. to 5MT-46, REMOVAL, Reverse Check Sleeve.>

2) Remove the oil guide.



3) Remove the oil seal.

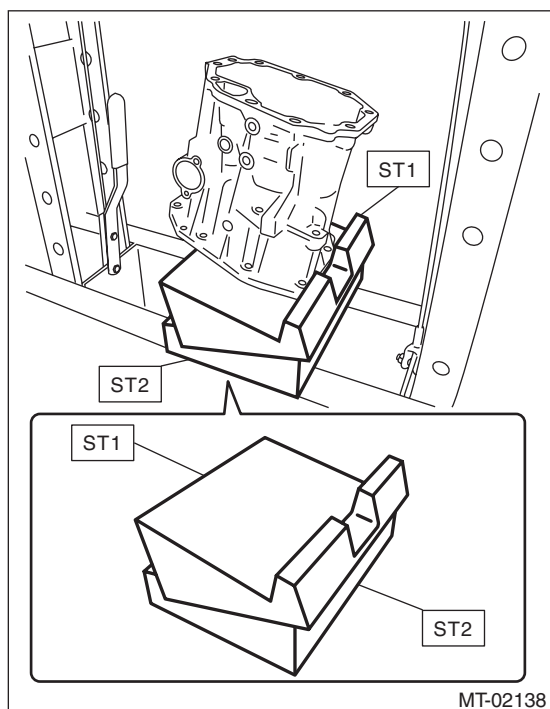
4) Set ST1, ST2 and transfer case to a press.

NOTE:

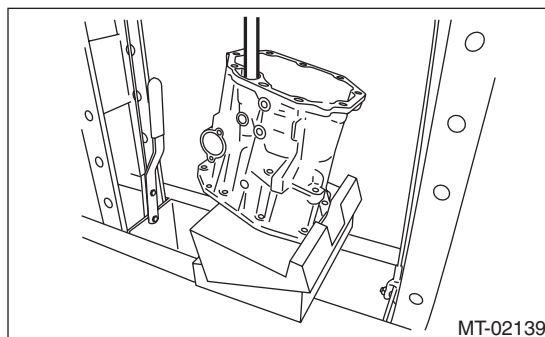
- Set the ST2 under ST1.
- Set the transfer case so that the hole for shifter arm is positioned vertically.

ST1 498267300 CYLINDER HEAD TABLE

ST2 498267200 CYLINDER HEAD TABLE



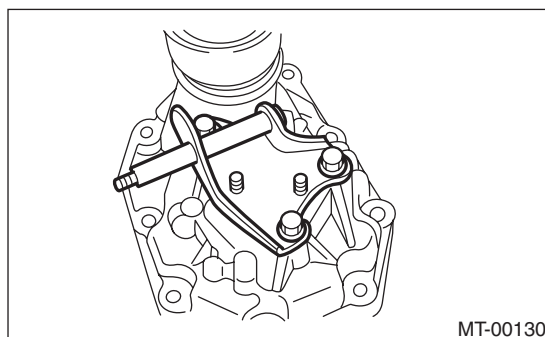
5) Using the round bar with diameter of 22 mm (0.87 in) or 23 mm (0.91 in), remove the roller bearing.



2. EXTENSION CASE

1) Remove the transfer drive gear assembly. <Ref. to 5MT-41, REMOVAL, Transfer Drive Gear.>

2) Remove the shift bracket.



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.>

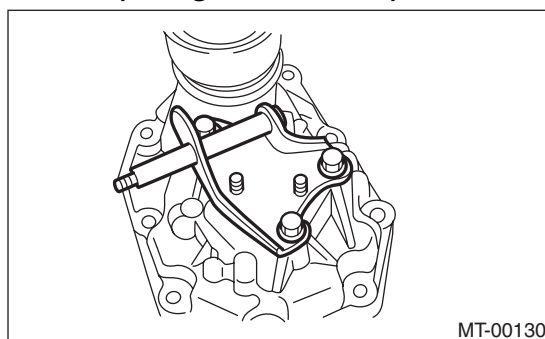
NOTE:

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-41, INSTALLATION, Transfer Drive Gear.>

Transfer Case and Extension Case Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

2. TRANSFER CASE

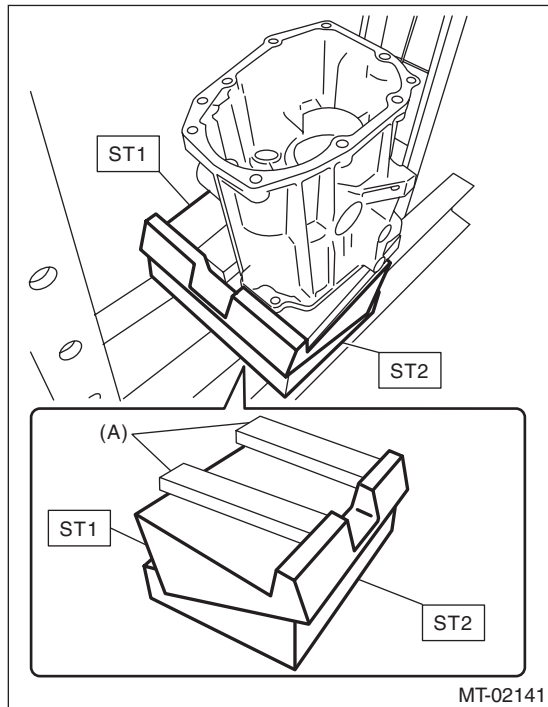
1) Set the ST1, ST2, iron plate and the transfer case to the press.

NOTE:

- Set the ST2 under ST1.
- Set the transfer case so that the hole for shifter arm is positioned vertically.
- Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between the ST and transfer case.
- Set the iron plate so that the transfer case knock pin does not ride on the iron plate.

ST1 498267300 CYLINDER HEAD TABLE

ST2 498267200 CYLINDER HEAD TABLE



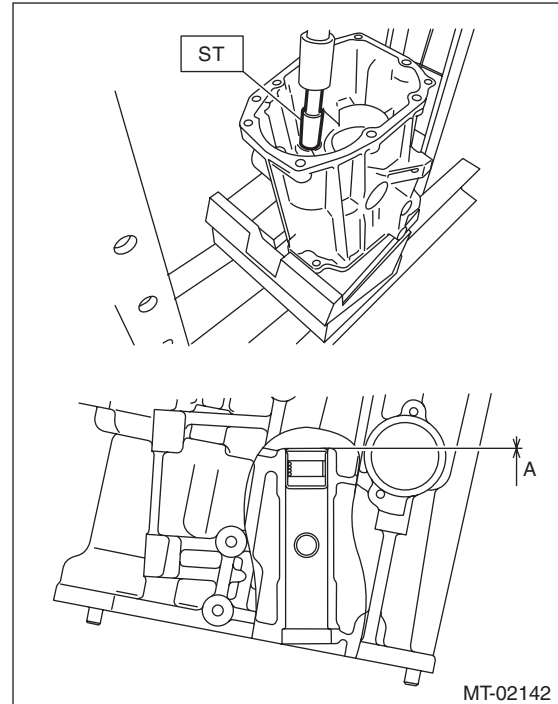
(A) Iron plate

2) Press-fit the roller bearing using the ST.

Press-fit depth of needle bearing:

A: 0 ± 0.2 mm (0 ± 0.01 in) from the end of transfer case

ST 899864100 REMOVER



3) Remove the iron plate, and turn over the transfer case.

NOTE:

Set the transfer case so that the hole for shifter arm is positioned vertically.

Transfer Case and Extension Case Assembly

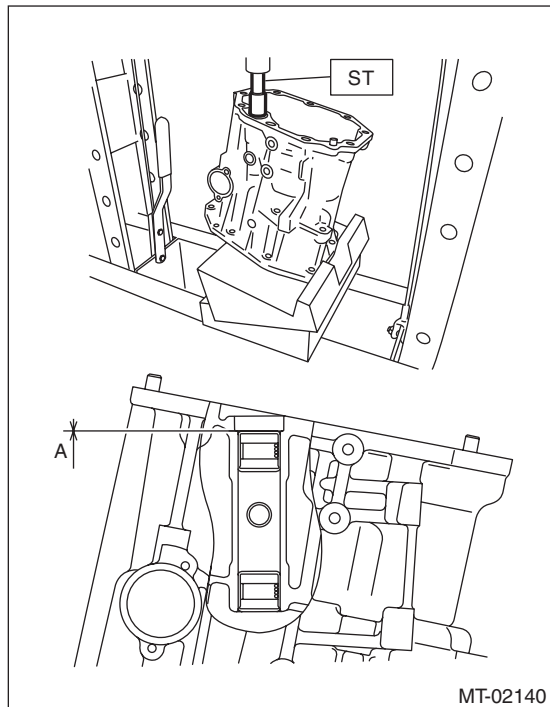
MANUAL TRANSMISSION AND DIFFERENTIAL

4) Press-fit the roller bearing using the ST.

Press-fit depth of needle bearing:

A: 0 ± 0.2 mm (0 ± 0.01 in) from the end of transfer case

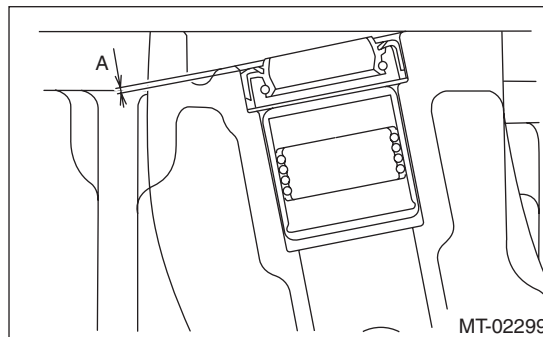
ST 899864100 REMOVER



8) Install the oil seal.

Press-fit depth of oil seal:

A: 1 ± 0.2 mm (0.04 ± 0.01 in) from the end of transfer case



5) Install the shifter arm to the transfer case, and make sure that the shift arm moves smoothly.

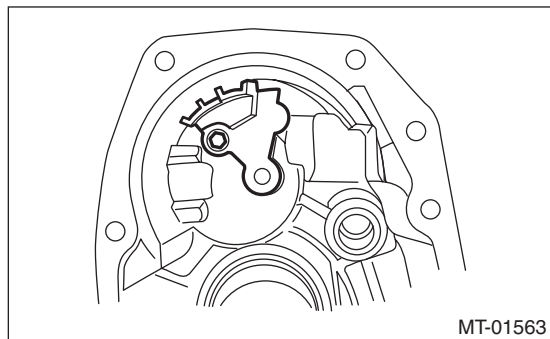
6) Install the oil guide to the transfer case.

NOTE:

Use a new installing bolt.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

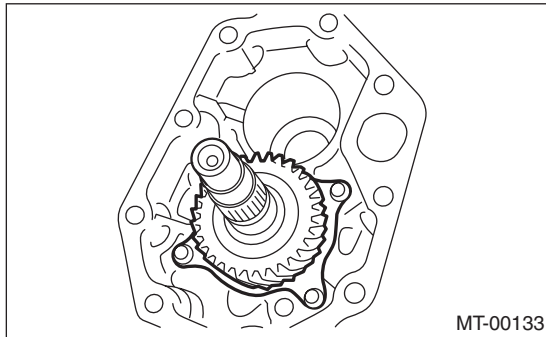


7) Install the reverse check sleeve assembly to the transfer case. <Ref. to 5MT-46, INSTALLATION, Reverse Check Sleeve.>

10. Transfer Drive Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, 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-35, 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.

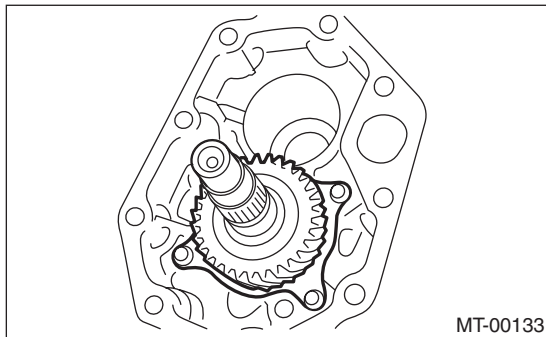


B: INSTALLATION

- 1) Install the transfer drive gear.

Tightening torque:

26 N·m (2.7 kgf-m, 19.2 ft-lb)

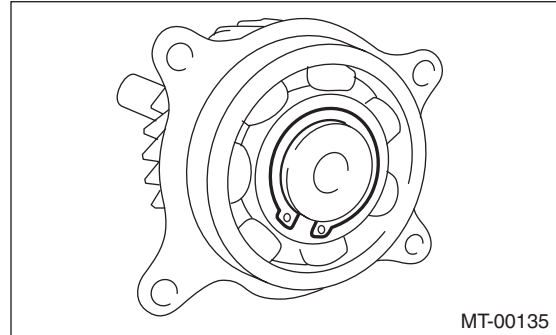


- 2) Install the transfer driven gear.
- 3) Select a thrust washer. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the transfer case and the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>

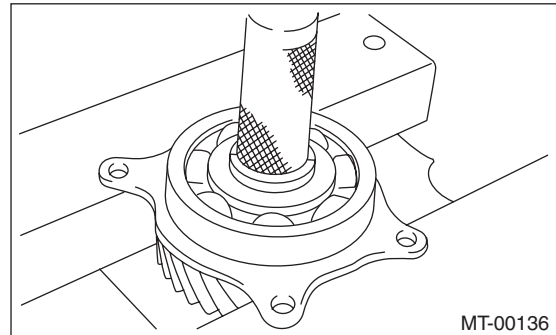
- 7) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Remove the snap ring.



- 2) Remove the ball bearing.



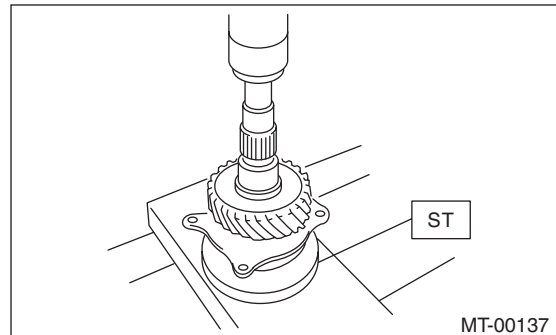
D: ASSEMBLY

- 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).



- 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-42, INSPECTION, Transfer Drive Gear.>

Transfer Drive Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

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.

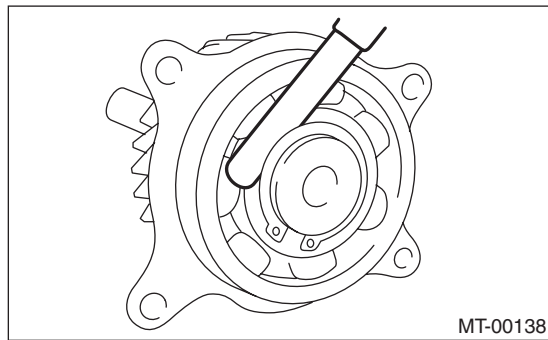
2) Drive gear

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)



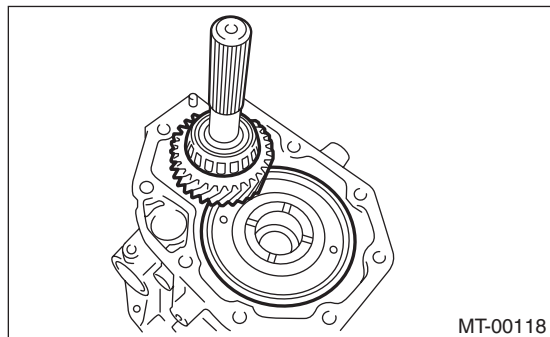
If the measurement is not within specification, select a suitable snap ring and replace it.

Snap ring (Outer-30)	
Part No.	Length mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

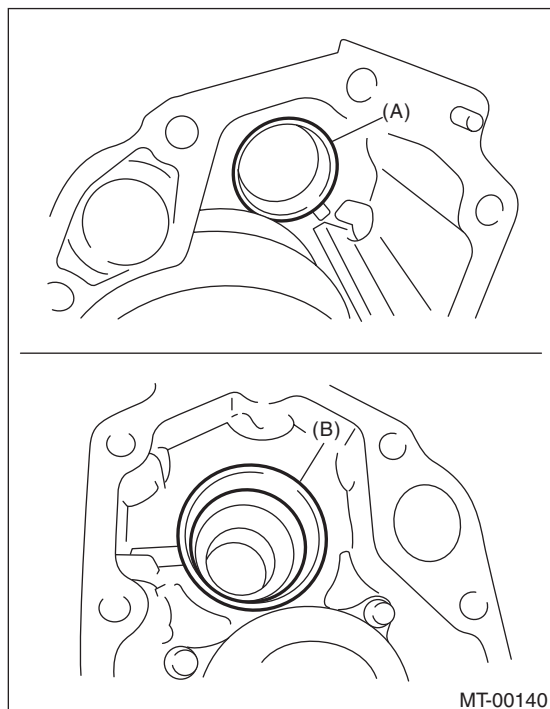
11. Transfer Driven Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, 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-35, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly.
- 5) Remove the transfer driven gear.



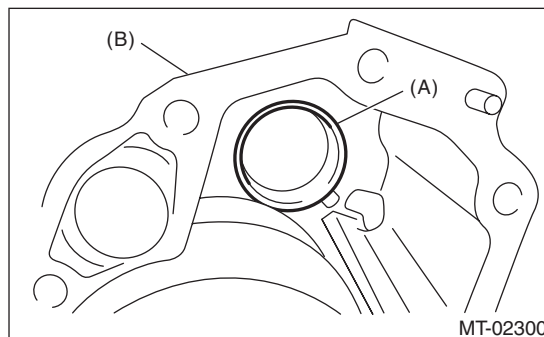
- 6) Remove bearing outer races from the extension case and transfer case.



- (A) Bearing outer race (Transfer case side)
(B) Bearing outer race (Extension case side)

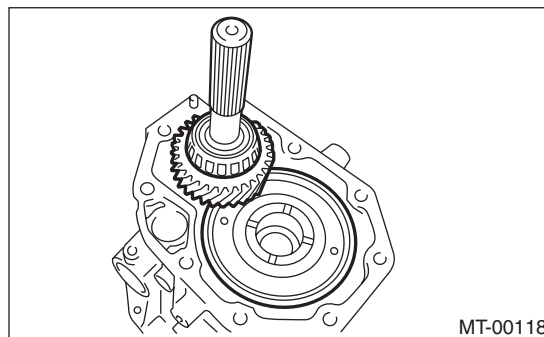
B: INSTALLATION

- 1) Install the bearing outer race to transfer case.



- (A) Bearing outer race
(B) Transfer case

- 2) Install the transfer driven gear.



- 3) Select a thrust washer. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case and the extension case assembly. <Ref. to 5MT-35, 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-25, INSTALLATION, Manual Transmission Assembly.>

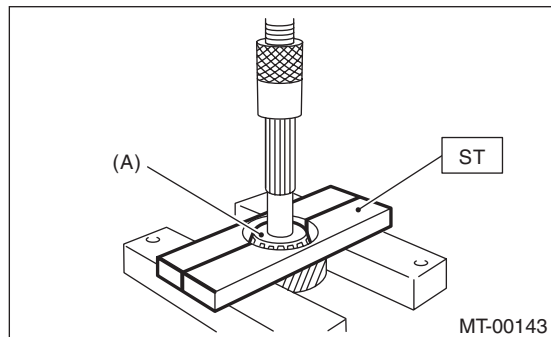
Transfer Driven Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).

ST 498077000 REMOVER

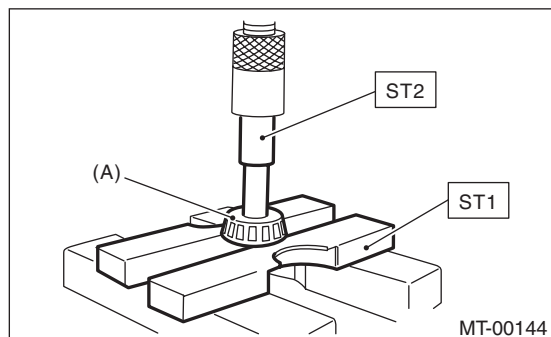


(A) Roller bearing

2) Using ST1 and ST2, remove the roller bearing (transfer case side).

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Roller bearing

D: ASSEMBLY

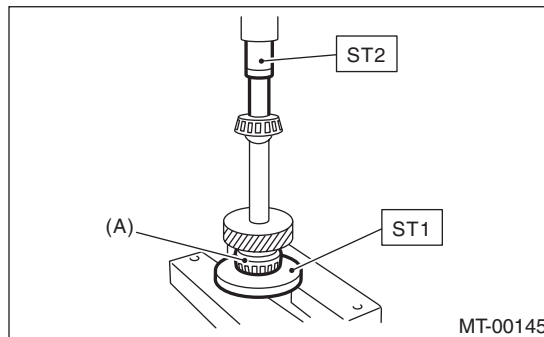
1) Using the ST, install the roller bearing (extension case side).

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).



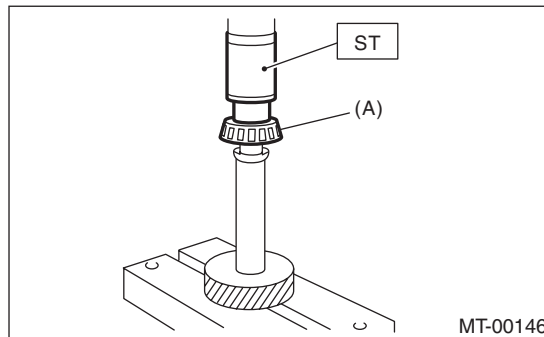
(A) Roller bearing

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 tooth face of driven gear and the shaft are excessively broken or damaged, replace the driven gear.

12.Center Differential

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, 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-35, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly. <Ref. to 5MT-35, REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Remove the transfer driven gear. <Ref. to 5MT-43, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential.

B: INSTALLATION

- 1) Attach the center differential to transfer case.
- 2) Install the transfer driven gear. <Ref. to 5MT-43, INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, 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-25, INSTALLATION, Manual Transmission Assembly.>

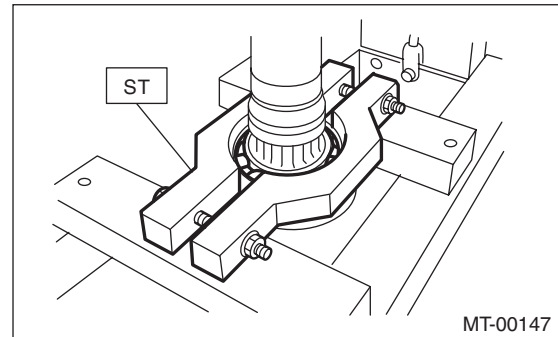
C: DISASSEMBLY

Remove the ball bearing using ST.

NOTE:

- Center differential is a non-disassembled part which should not be disassembled.
- Do not reuse the ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER

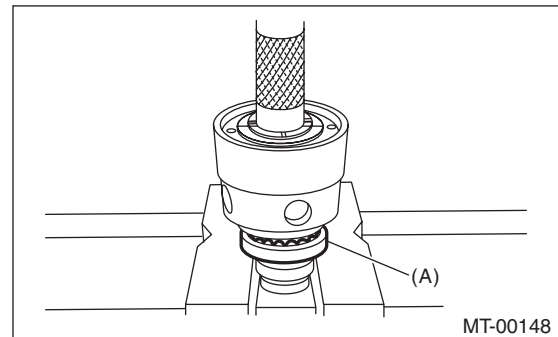


D: ASSEMBLY

Install the ball bearing to the center differential assembly.

CAUTION:

- Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use a new ball bearing.



(A) Ball bearing

E: INSPECTION

1) Bearing

Replace the bearings in the following cases.

- In case of broken or rusty bearings
- In case of 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

If there is wear or damage, replace the center differential case assembly.

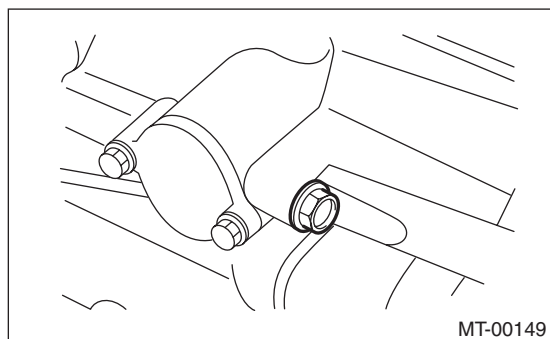
Reverse Check Sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL

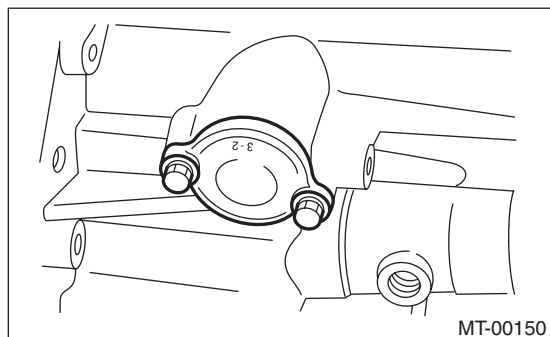
13.Reverse Check Sleeve

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-35, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the shifter arm.
- 4) Remove the plug, gasket, reverse accent spring, and reverse check ball.



- 5) Remove the reverse check sleeve.

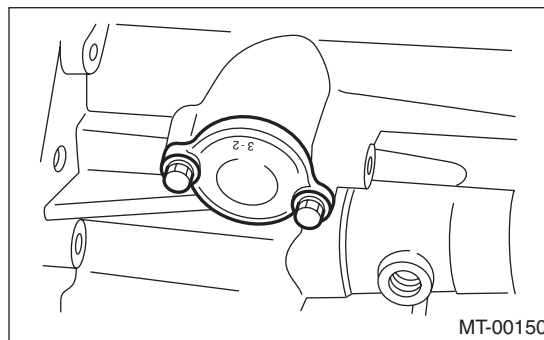


B: INSTALLATION

- 1) Install the reverse check sleeve.

Tightening torque:

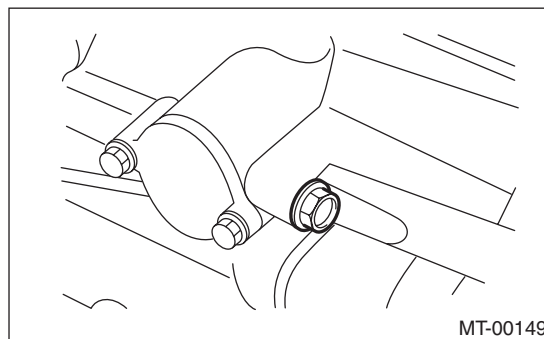
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



- 2) Install the reverse check 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)



- 3) Attach the shifter arm to the transfer case assembly.
- 4) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

Reverse Check Sleeve

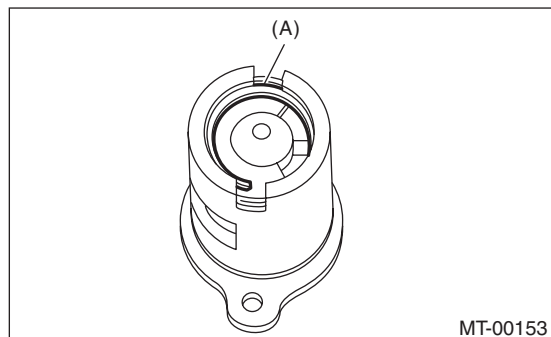
MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1) Cover the reverse check sleeve with cloth, and remove the snap ring by using screwdriver.

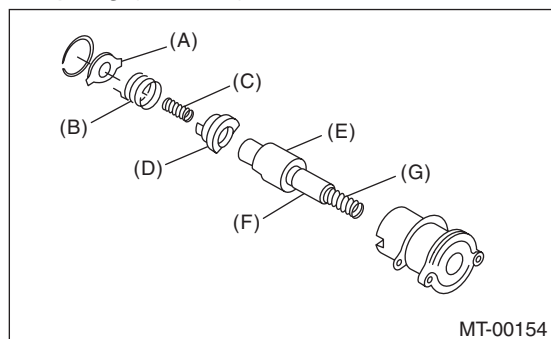
NOTE:

If the snap ring is deformed or the spring repulsive force is not enough, replace with a new snap ring.



(A) Snap ring

2) Remove the reverse check plate, reverse check spring, reverse check cam, return spring (5th-Reverse), reverse accent shaft, return spring cap, and return spring (1st-2nd).



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Reverse)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

3) Remove the O-ring.

NOTE:

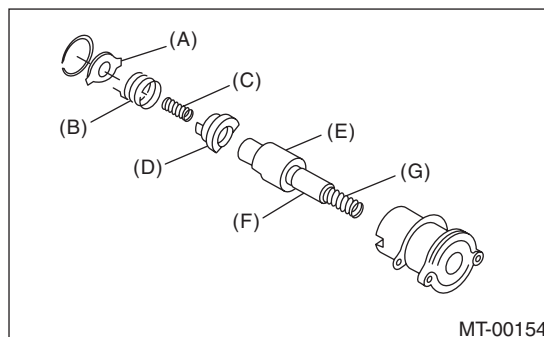
- Do not reuse the O-ring.
- Be careful not to damage the adjusting shim between reverse check sleeve assembly and case.

D: ASSEMBLY

1) Install the return spring (1st-2nd), return spring cap, reverse accent shaft, reverse check cam, return spring (5th-Reverse) and reverse check spring to the reverse check sleeve.

NOTE:

Be sure to insert the curved part of reverse check spring into the check cam groove.



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Reverse)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

2) Hook the curved part of reverse check spring onto the reverse check plate.

3) Rotate the cam so that the protrusion on the reverse check cam is located at the plate opening.

4) While fixing the cam to that position, attach the reverse check plate to the reverse check sleeve, and secure with snap ring.

5) Insert the O-ring into the sleeve groove.

NOTE:

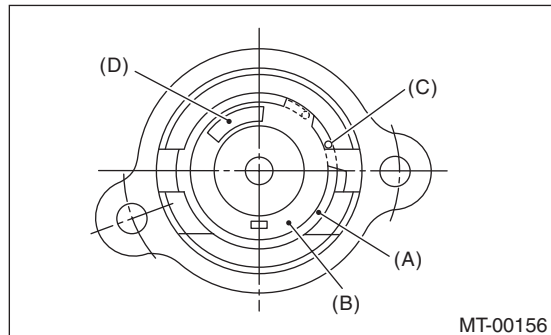
Use new O-rings.

Reverse Check Sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL

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) Reverse check spring
- (D) Reverse check cam

- Select a suitable reverse accent shaft and reverse check plate. <Ref. to 5MT-48, 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.

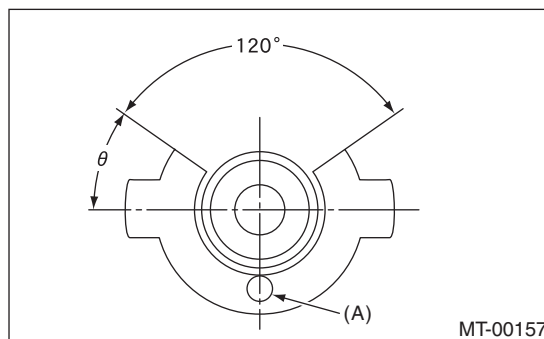
Adjusting shim	
Part No.	Length mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Content
32188AA130	S	Neutral position is closer to 1st gear.
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.

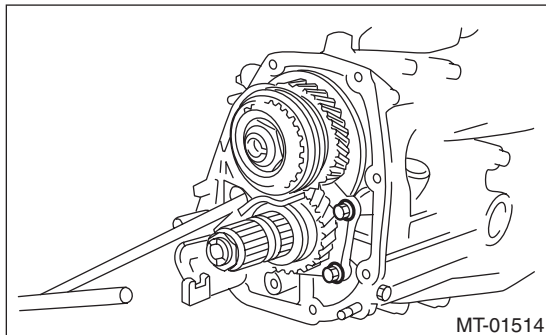
Reverse check plate			
Part No.	(A): No.	Angle θ	Content
32189AA001	0	28°	Arm stops closer to 5th gear.
32189AA011	1	31°	Arm stops closer to 5th gear.
32189AA021	2	34°	Arm stops in the center.
32189AA031	3	37°	Arm stops closer to reverse gear.
32189AA041	4	40°	Arm stops closer to reverse gear.



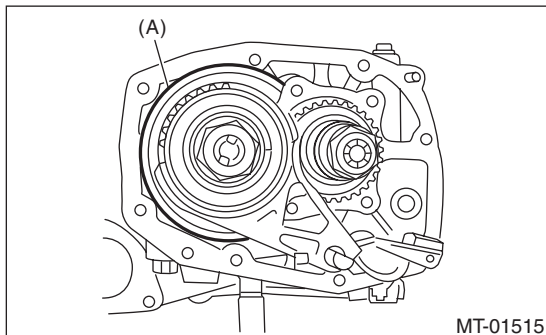
14. Transmission Case

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the clutch release lever. <Ref. to CL-12, REMOVAL, Release Bearing and Lever.>
- 3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-35, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the bearing mounting bolt.

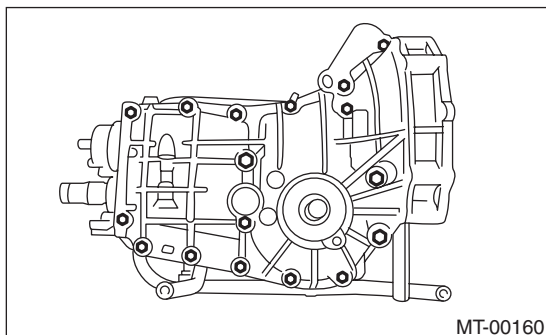


- 5) Remove the main shaft rear plate.



(A) Main shaft rear plate

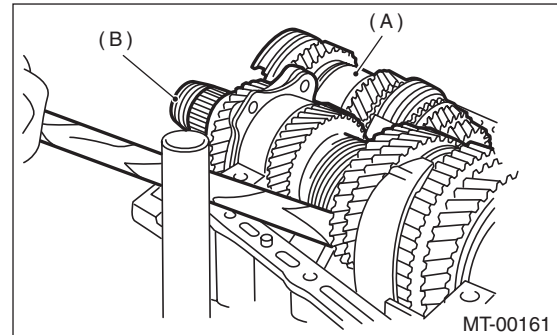
- 6) Remove the coupling bolts and nuts, and separate the transmission case into the right and left case.



- 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.

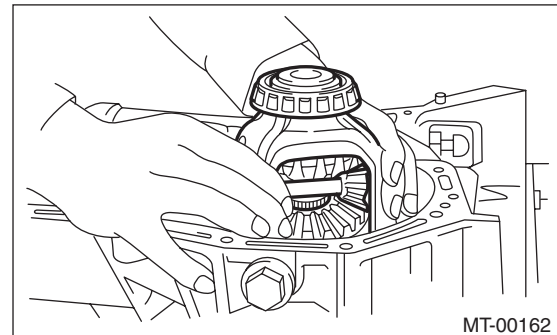


(A) Main shaft ASSY for single-range
(B) Drive pinion shaft ASSY

- 8) Remove the main shaft assembly for single-range.
- 9) Remove the front differential assembly.

NOTE:

- Do not confuse the right and left roller bearing outer races.
- Be careful not to damage the oil seal of retainer.



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

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

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.
- Match the cases together so that the drive pinion shim and input shaft holder shims are not caught between the cases.

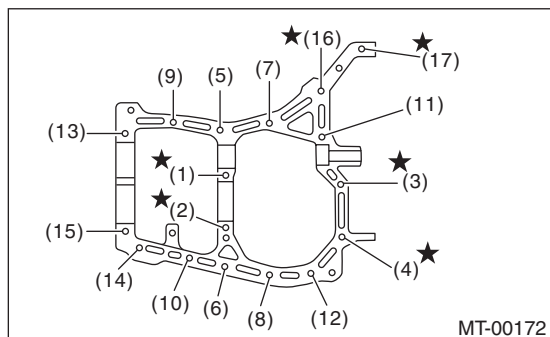
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf·m, 18.4 ft-lb)

★ **10 mm bolt**

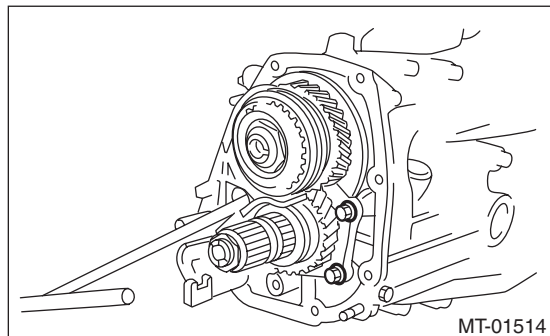
39 N·m (4.0 kgf·m, 28.8 ft-lb)



7) Tighten the ball bearing mounting bolts.

Tightening torque:

30 N·m (3.1 kgf·m, 22.1 ft-lb)

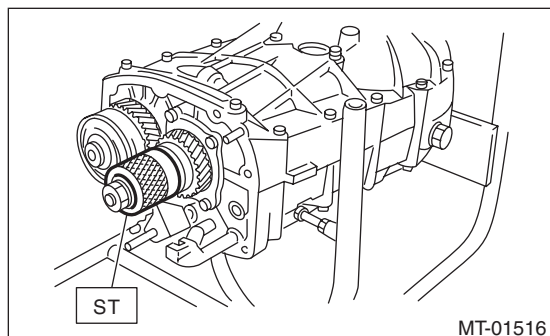


8) Perform backlash adjustment of the hypoid gear and preload measurement of the roller bearing.

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.

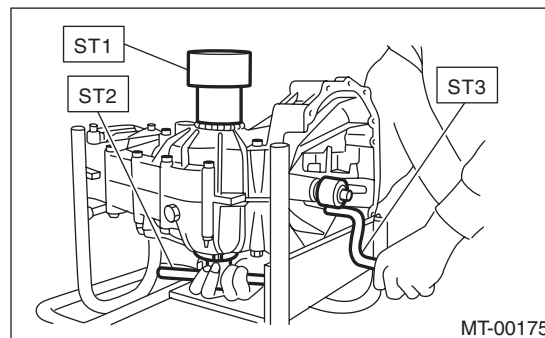
10) Screw the retainer assembly from the bottom into left case using ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th, and turn the shaft several times. Screw in the retainer while rotating the ST3 until a slight resistance is felt on ST2.

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

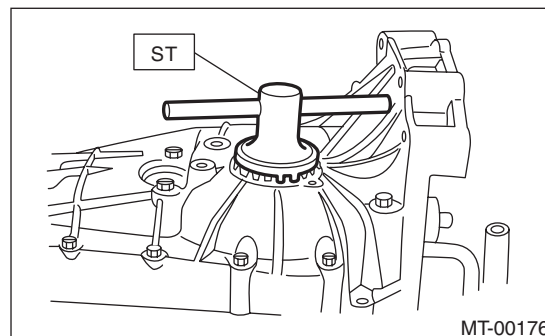


11) Remove the weight, and screw in the retainer without the O-ring on the upper side, and stop at the point where a slight resistance is felt.

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) Temporarily attach both the upper and lower lock plates, and put marks both the retainer 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 before it was loosened.

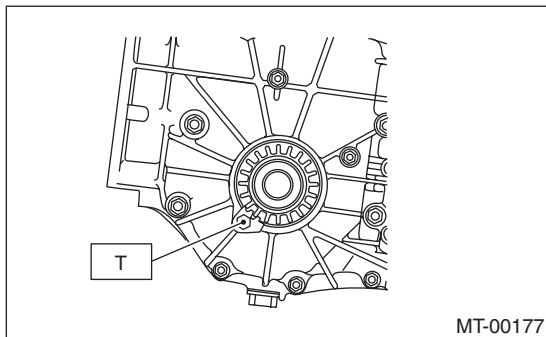
Install the lock plate.

NOTE:

- When loosening the retainer, record the number of the turns made.
- Perform this operation for both upper and lower retainers.
- Use new O-rings.

Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



18) Select a 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-12, INSTALLATION, Release Bearing and Lever.>

20) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, or oil leaks.

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

15. Main Shaft Assembly for Single-Range

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-35, 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.

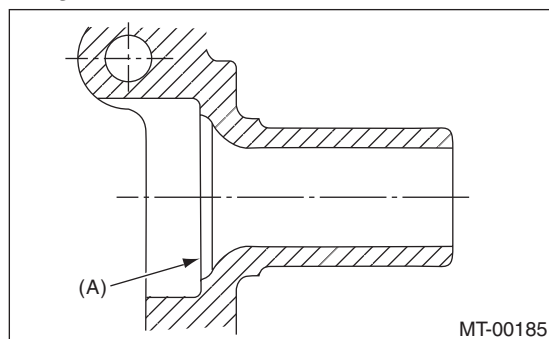
NOTE:

- Wrap the clutch splined section with vinyl tape to prevent damage to the oil seal.
- Apply KOPR-KOTE (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 shaft assembly. <Ref. to 5MT-57, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install the transmission case. <Ref. to 5MT-49, INSTALLATION, Transmission Case.>
- 5) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>

- 6) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

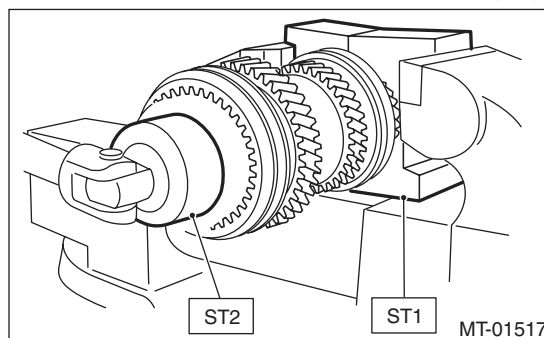
C: DISASSEMBLY

- 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.

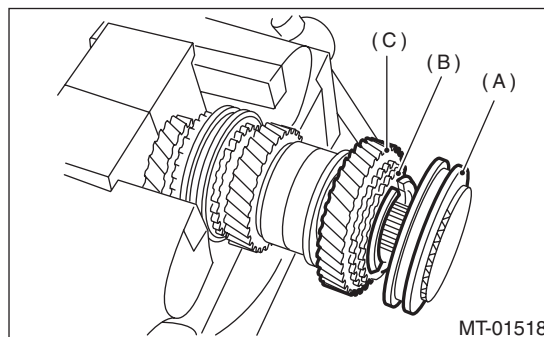
NOTE:

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, and 5th drive gear & needle bearing.



(A)	5th hub & sleeve No. 2
(B)	Baulk ring
(C)	5th drive gear

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

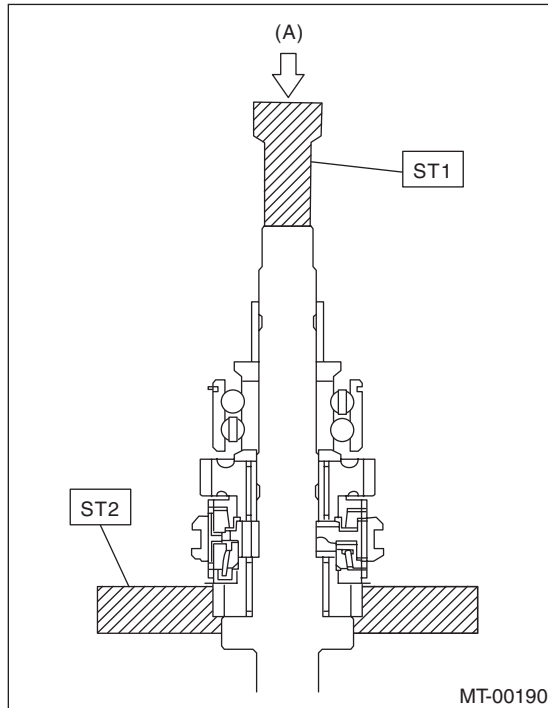
4) Using ST1 and ST2, remove the rest of the parts.

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



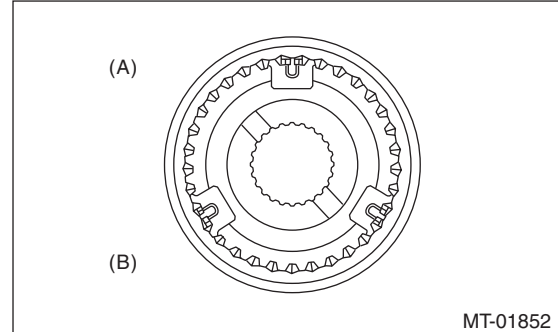
(A) Press

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.



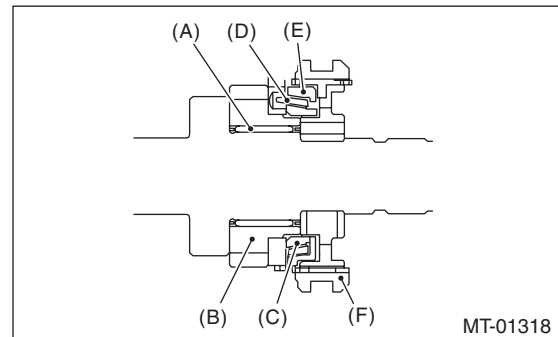
(A) 3rd-4th sleeve & hub ASSY

(B) 3rd 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

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

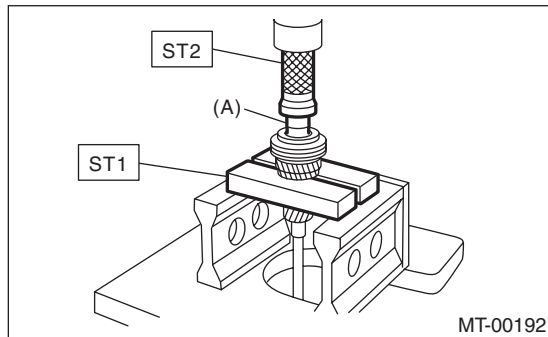
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and press.

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

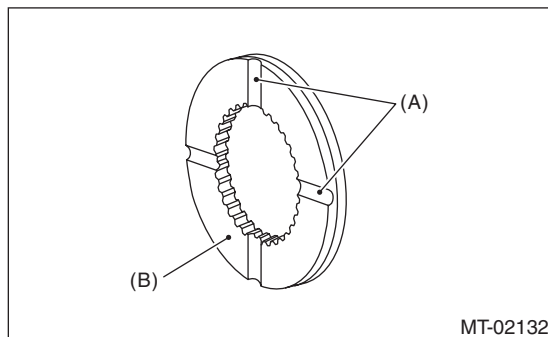


(A) 4th needle bearing race

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 hub & sleeve assembly with the key groove.



(A) Groove

(B) Face this surface to the 4th gear side.

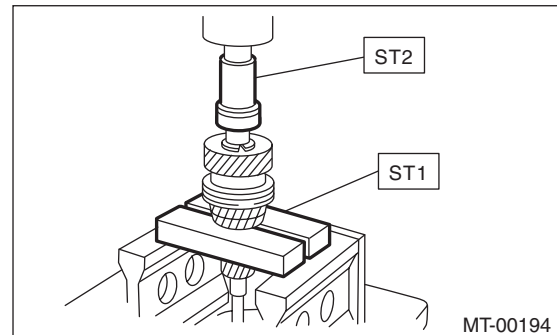
5) Press-fit the ball bearing into the rear section of transmission main shaft using ST1, ST2 and a press.

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:

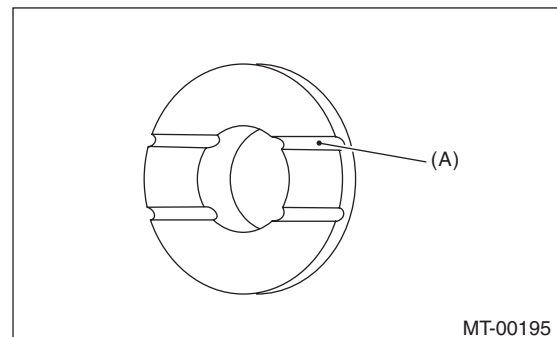
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Make sure the thrust washer is facing the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to the 5th gear side.

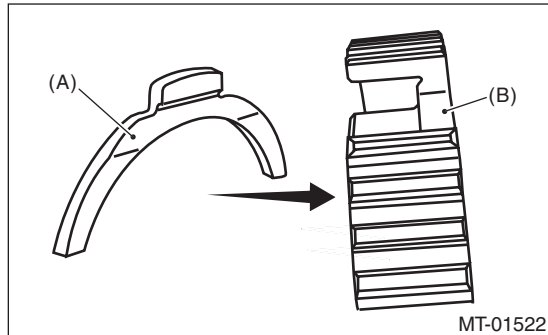
Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

7) Install rest of the parts to the rear section of the transmission main shaft.

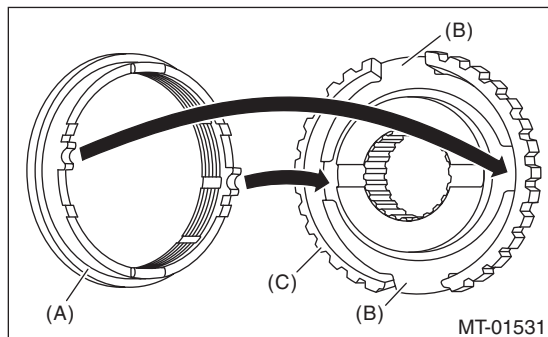
CAUTION:

- Install the baulk lever so that the concave side faces toward the 5th hub.

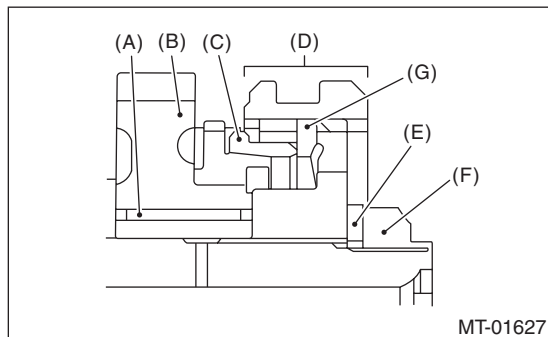


- (A) Baulk lever
(B) 5th hub

- Align the protruded section of baulk ring between the 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
(G) Baulk lever

8) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE:

Use new lock nuts and lock washers.

ST1 499987003 SOCKET WRENCH (35)

ST2 498937000 TRANSMISSION HOLDER

Tightening torque:

120 N·m (12.2 kgf-m, 88.5 ft-lb)

9) Crimp lock nuts in two locations after tightening.

E: INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

1) Bearing

Replace the bearings in the following cases.

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When bearing has other defects.

2) Bushing (each gear)

Replace the bushing in following cases.

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gear

Replace gears in the following cases.

- Replace the gear with new part if its tooth surfaces are broken, damaged or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

4) Baulk ring

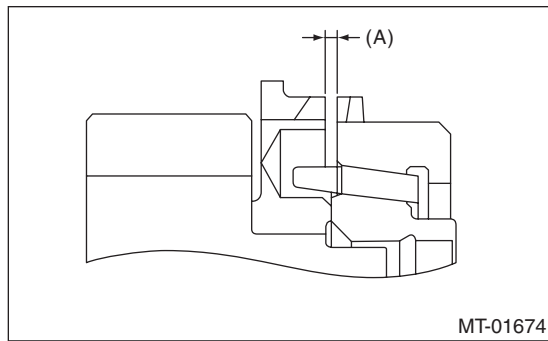
Replace the baulk ring in the following cases.

- When the inner surface 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 section is cracked or abnormally worn.
- If the gap between the end faces of the ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

Main Shaft Assembly for Single-Range

MANUAL TRANSMISSION AND DIFFERENTIAL

Clearance (A):
0.5 mm (0.020 in) or more



5) Shifting insert key

Replace the insert key if deformed, excessively worn or defective in any way.

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

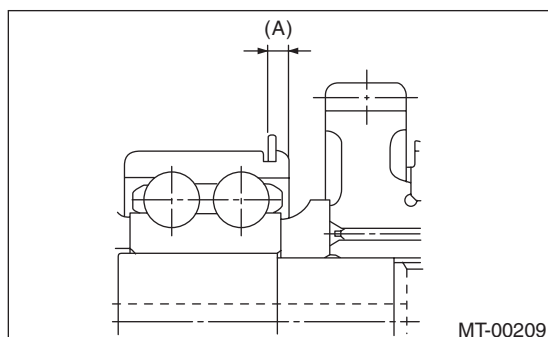
Selection of main shaft rear plate:

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.

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 4.00 (0.1524 — 0.1575)	32294AA051	2



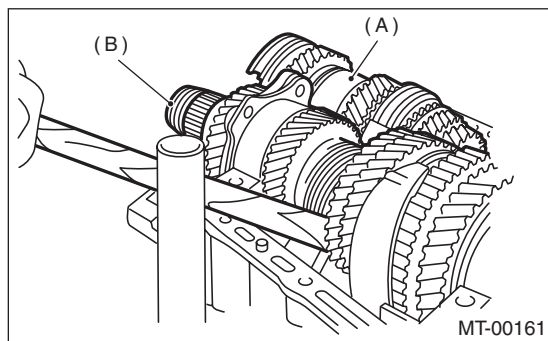
16. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-35, 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:

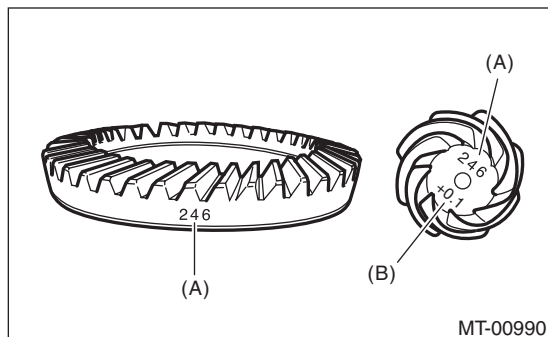
Use a hammer handle, etc. to remove if too tight.



- (A) Main shaft ASSY for single-range
(B) Drive pinion shaft ASSY

B: INSTALLATION

- 1) Remove the front differential assembly.
- 2) Hypoid gear set match mark/No.: The number (A) on top of the drive pinion, and the number on the hypoid driven gear are set numbers for the two gears. Use a pair having the same numbers. The figure (B) below shows a number for shim adjustment. If no number is shown, the value is zero.



- (A) Set number
(B) Number for shim adjustment

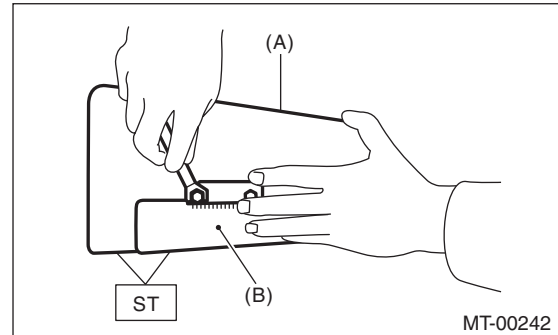
- 3) Place the drive pinion shaft assembly on transmission main case RH without shim and tighten the bearing mounting bolts.

- 4) Check and adjust the 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



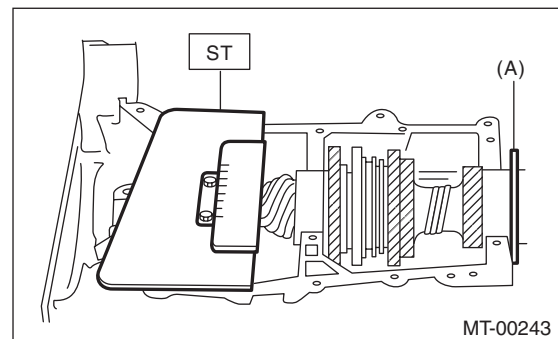
- (A) Plate
(B) Scale

- 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

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

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 No.	Length 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-65, INSTALLATION, Front Differential Assembly.>

10) Set the transmission main shaft assembly for single-range and drive pinion shaft assembly in position. 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-77, INSPECTION, Shifter Fork and Rod.>

11) Install the transmission case. <Ref. to 5MT-49, INSTALLATION, Transmission Case.>

12) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

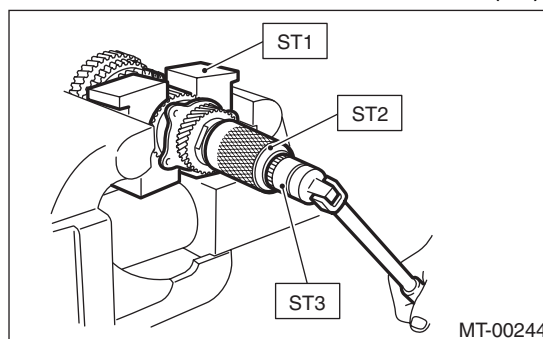
Attach a cloth to the end of driven shaft (on the frictional side of the thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Flatten the tab of the lock nut. Remove the lock nut with ST1, ST2 and ST3.

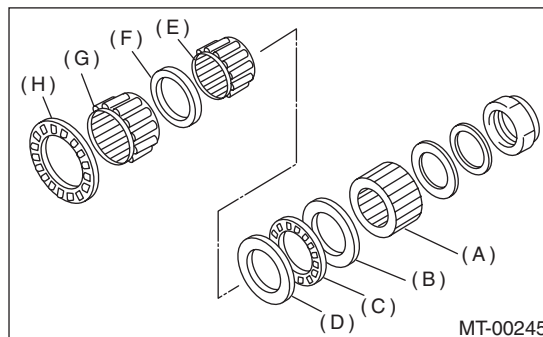
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)



2) Draw out the drive pinion shaft 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) Adjusting washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Adjusting washer No. 2 (25 × 37.5 × t)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

Drive Pinion Shaft Assembly

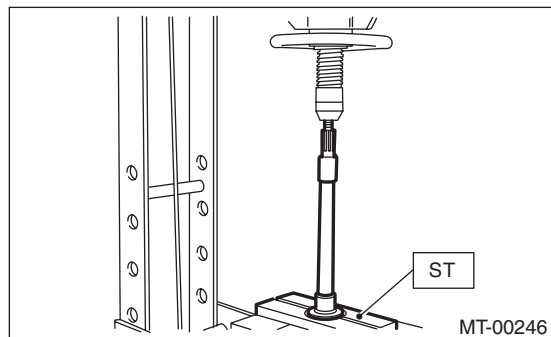
MANUAL TRANSMISSION AND DIFFERENTIAL

3) Remove the roller bearing and washer using ST and a press.

NOTE:

Do not reuse the roller bearing.

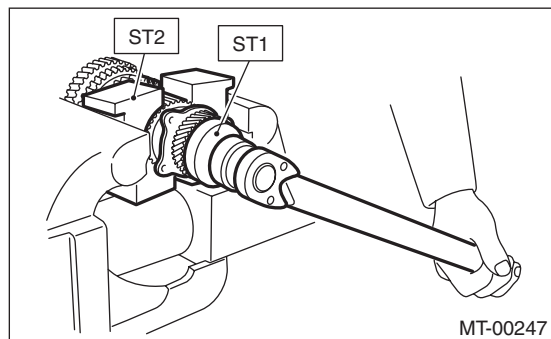
ST 498077000 REMOVER



4) Flatten the tab of the lock nut. Remove the lock nut using ST1 and ST2.

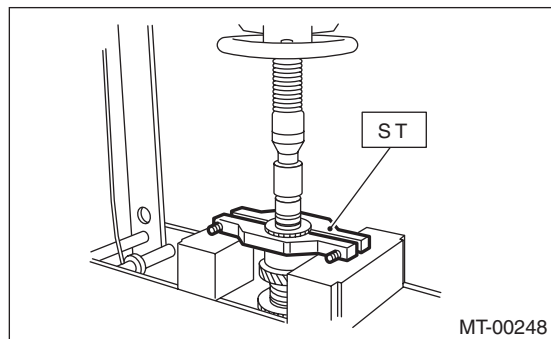
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



5) Remove the 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

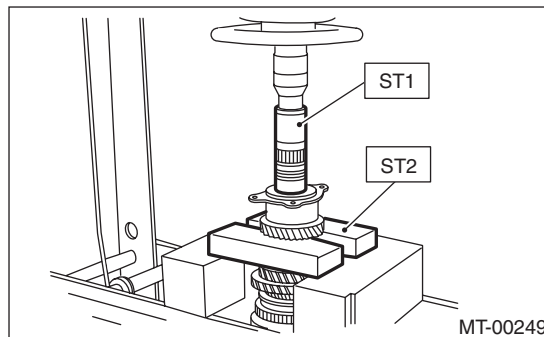


6) Remove the woodruff key.

7) Remove the roller bearing and 3rd-4th driven gear using ST1 and ST2.

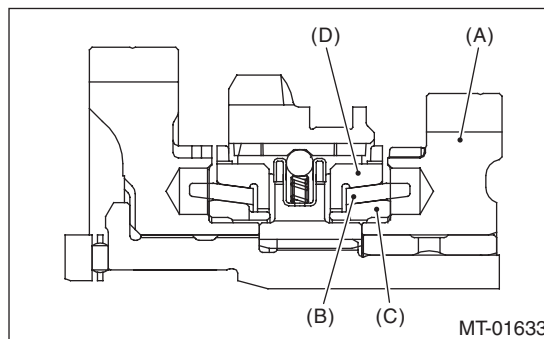
ST1 499757002 INSTALLER

ST2 899714110 REMOVER



8) Remove the key.

9) Remove the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



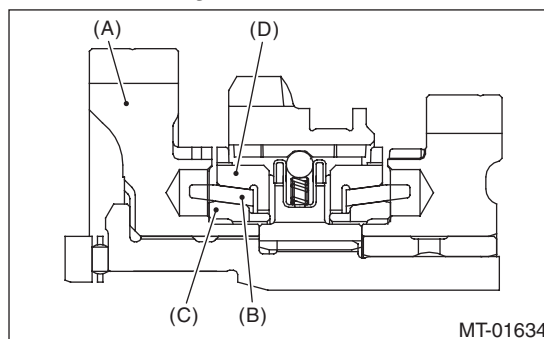
(A) 2nd driven gear

(B) Synchro cone

(C) Inner baulk ring

(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) Synchro cone

(C) Inner baulk ring

(D) Outer baulk ring

Drive Pinion Shaft Assembly

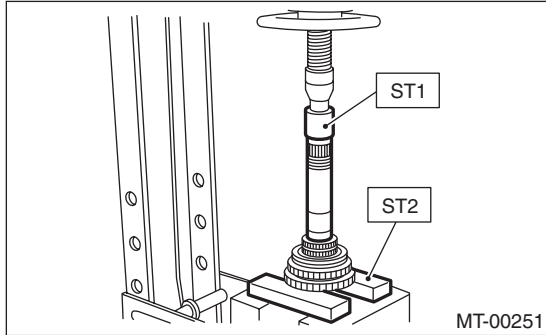
MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

If necessary, use a new gear and hub assembly as a set, when replacing the gear or hub. 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



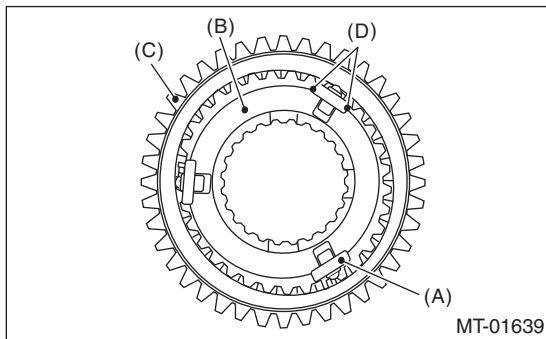
11) Remove the sub gear, washer and snap ring (outer) of the 1st driven gear.

D: ASSEMBLY

1) Install the sleeve and the gear and hub assembly by matching the alignment marks.

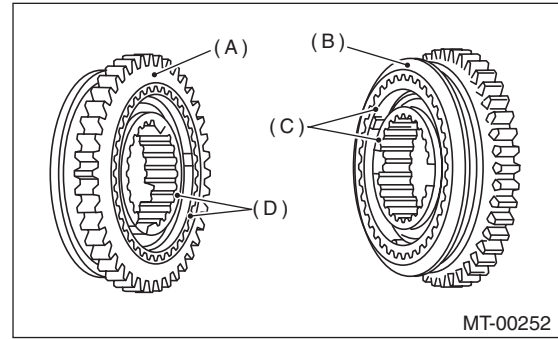
NOTE:

- Make sure that there is no large clearance at both sides of ball detent after assembly.



- (A) Ball detent
- (B) 1st-2nd synchronizer hub
- (C) Reverse driven gear
- (D) There is no large clearance at this part.

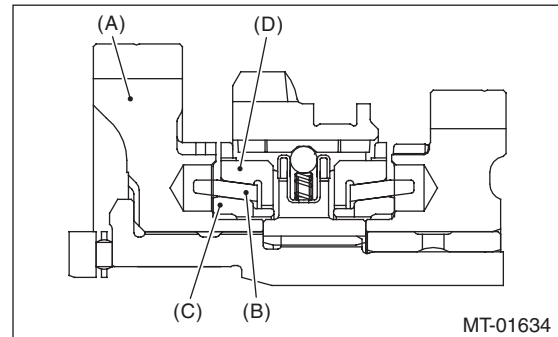
- Use the new gear & hub assembly, if replacing the gear or hub.



- (A) 1st gear side
- (B) 2nd gear side
- (C) Flush surface
- (D) Stepped surface

2) Install the washer, snap ring (outer) and sub gear onto the 1st driven gear.

3) Install the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, and gear & hub assembly onto driven shaft.



- (A) 1st driven gear
- (B) Synchro cone
- (C) Inner baulk ring
- (D) Outer baulk ring

NOTE:

- Take care to install the gear and hub assembly in proper direction.
- Align the baulk ring and gear & hub assembly with the key groove.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and a press.

CAUTION:

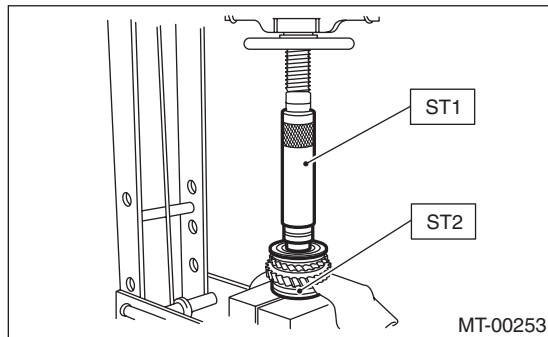
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

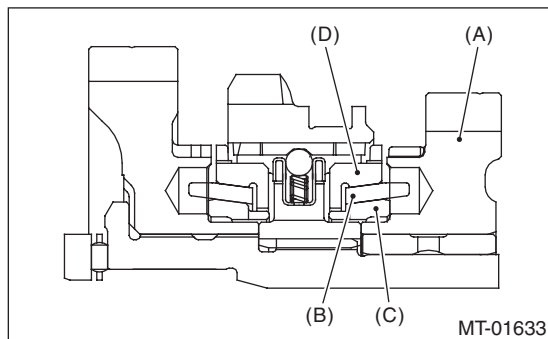
- Attach a cloth to the end of the driven shaft to prevent damage.
- When press fitting, align the oil holes of the shaft and bushing

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) Synchro cone

(C) Inner baulk ring

(D) Outer baulk ring

6) After installing key on driven shaft, install the 3rd-4th driven gear using an ST and a press.

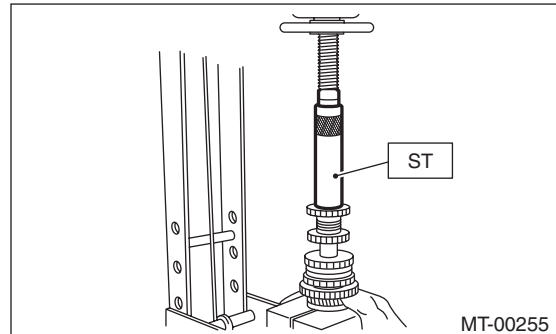
CAUTION:

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

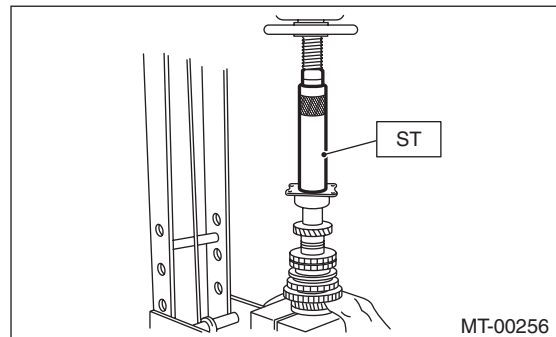


7) Install a set of roller bearings onto the driven shaft using ST and a press.

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

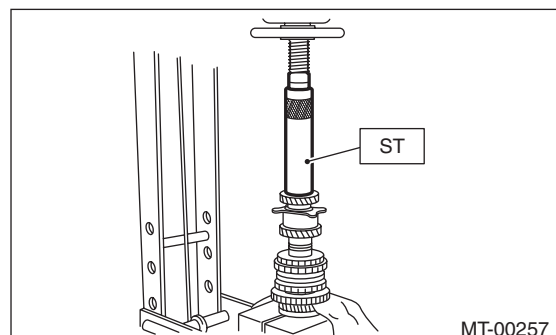


8) Position the woodruff key in groove of the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and a press.

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER



Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

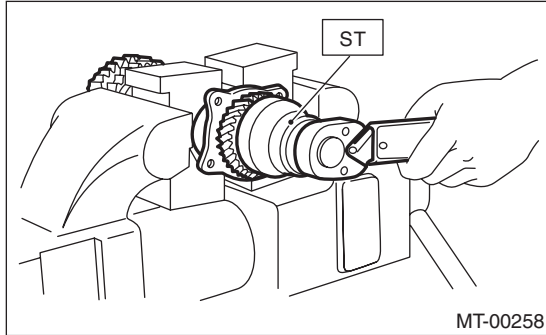
9) Install the lock washer. Tighten the lock nuts to the specified torque using ST1 and ST2.

ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER

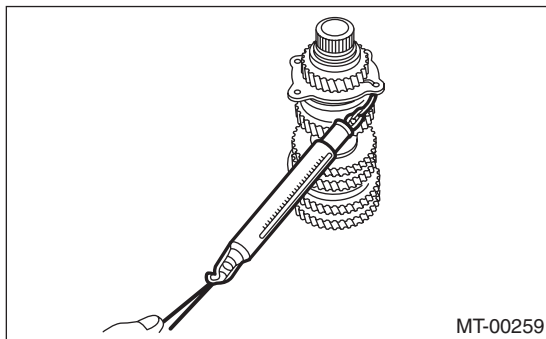
Tightening torque:

260 N·m (26.5 kgf·m, 191.8 ft·lb)



NOTE:

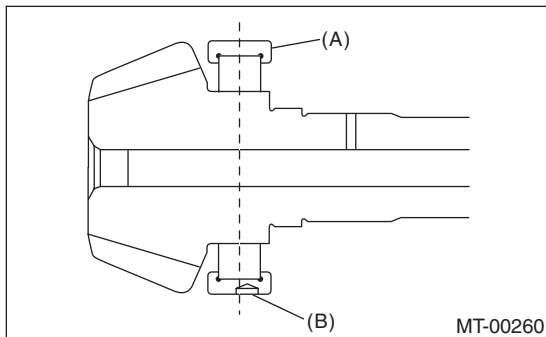
- Crimp the locknut in 2 locations.
- Use new lock nuts and lock washers.
- Using a spring scale, check that starting torque of the roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.34 lbf).



10) Install the roller bearing onto the drive pinion shaft.

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

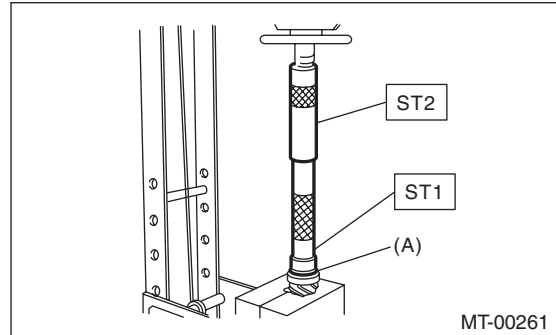
11) Install the washer using ST1, ST2 and a press.

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

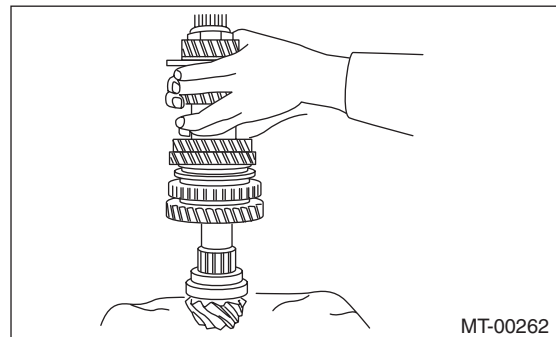
ST1 499277100 BUSHING 1-2 INSTALLER

ST2 499277200 INSTALLER

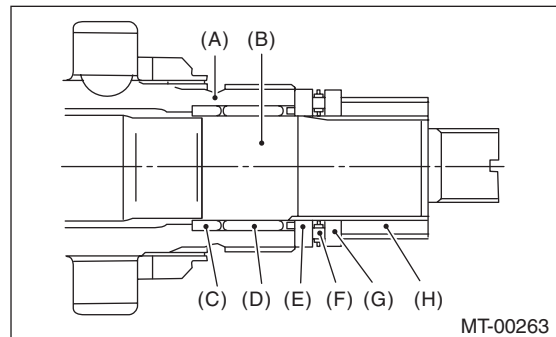


(A) Washer

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.



(A) Driven shaft

(B) Drive shaft

(C) Drive pinion collar

(D) Needle bearing (25 × 30 × 20)

(E) Adjusting washer No. 2 (25 × 36 × t)

(F) Thrust bearing (25 × 37.5 × 3)

(G) Adjusting washer No. 1 (25 × 36 × t)

(H) Differential bevel gear sleeve

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

14) Adjust the thrust bearing preload. <Ref. to 5MT-63, THRUST BEARING PRELOAD, ADJUSTMENT, Drive Pinion Shaft Assembly.>

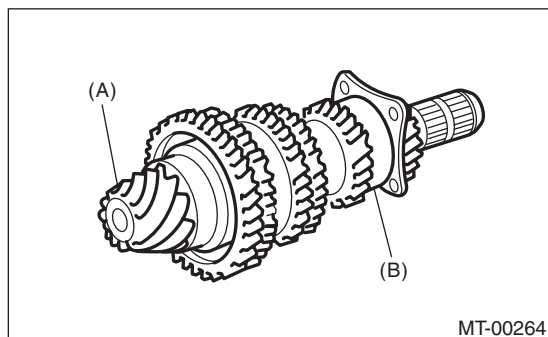
E: INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

1) Bearing

Replace the bearings in the following cases.

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion shaft assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike other bearings.



(A) Drive pinion shaft
(B) Ball bearing

- When bearing has other defects.

2) Bushing (each gear)

Replace the bushing in following cases.

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gear

Replace gears in the following cases.

- Replace the gear with new part if its tooth surfaces are broken, damaged or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

4) Baulk ring

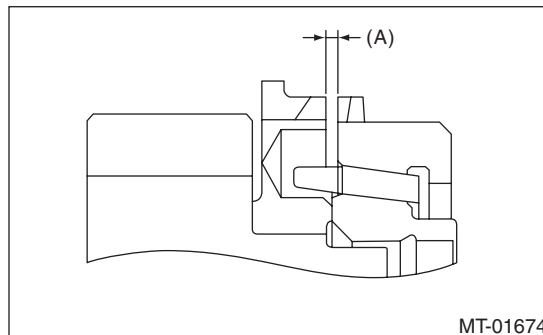
Replace the baulk ring in the following cases.

- When the inner surface and end face are damaged.
- When the baulk ring inner surface is abnormally or partially worn down.
- When the contact surface of synchronizer ring insert is cracked or abnormally worn.

- If the gap between the end faces of the baulk ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

Clearance (A):

0.5 mm (0.020 in) or more



5) Ball detent

Replace the ball detent if deformed, excessively worn or defective in any way.

6) Oil seal

Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.

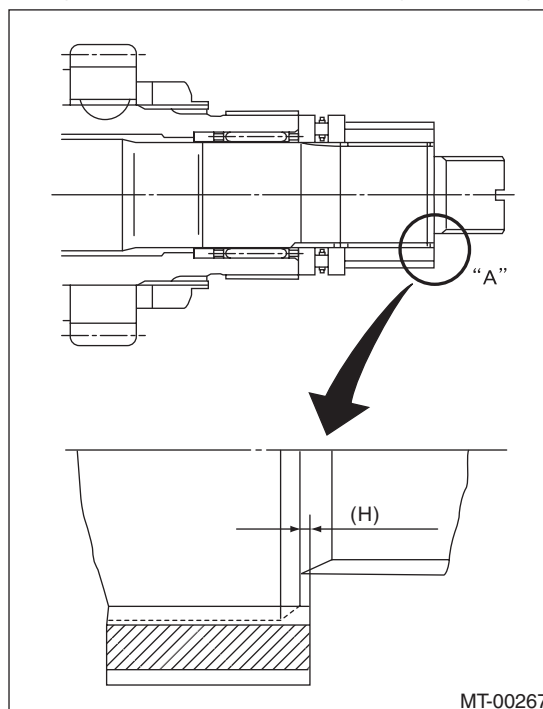
7) O-ring

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 so that dimension (H) will be zero in a visual check. Position the washer (18.3 × 30 × t) and lock washer (18 × 30 × 2) and attach the lock nut. (18 × 13.5)



Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Using the ST1, ST2 and ST3, tighten the new lock nut to the specified torque.

NOTE:

Use new lock nuts and lock washers.

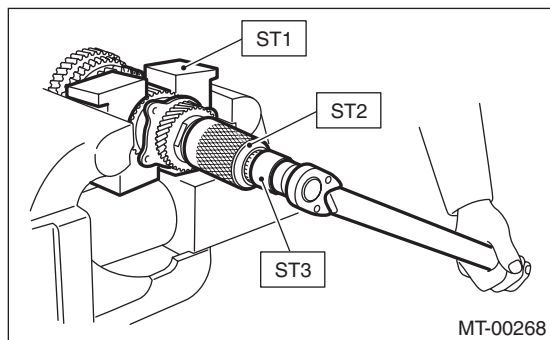
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

120 N·m (12.2 kgf·m, 88.5 ft-lb)



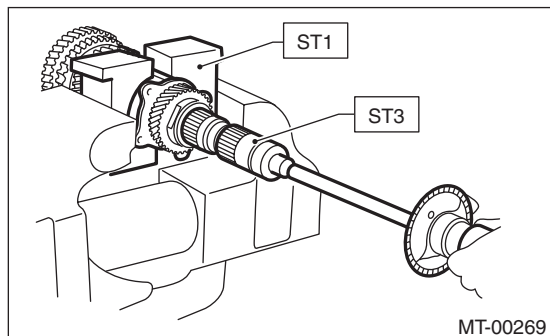
3) After removing the ST2, measure the starting torque using torque driver.

ST1 899884100 HOLDER

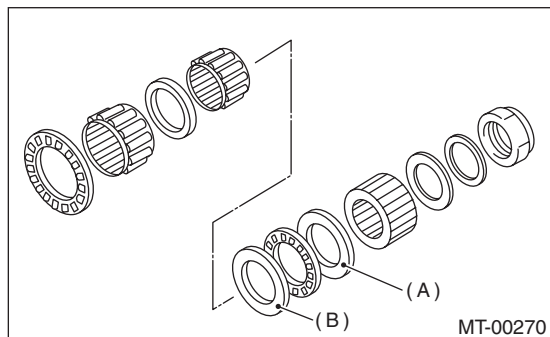
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

0.3 — 0.8 N·m (0.03 — 0.08 kgf·m, 0.22 — 0.59 ft-lb)



4) If the starting torque is not within the specified limit, select new adjusting washer No. 1 and re-check starting torque.



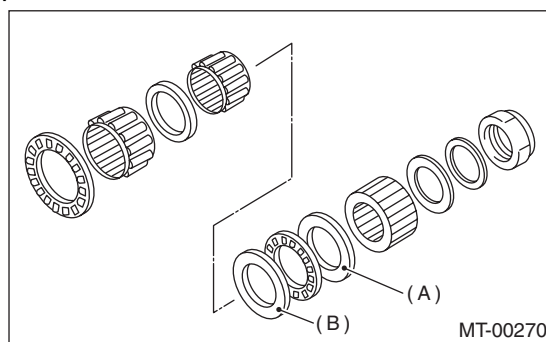
(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Adjusting washer No. 1

Part No.	Length 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) If the specified starting torque cannot be obtained by the selection of adjusting washer No. 1, select adjusting washer No. 2 from the list below. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Starting torque	Dimension H	Adjusting washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2

Part No.	Length 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.

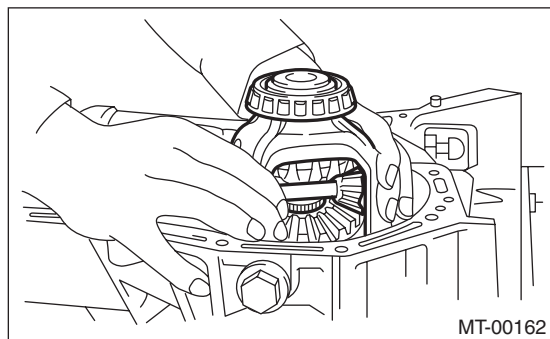
17.Front Differential Assembly

A: REMOVAL

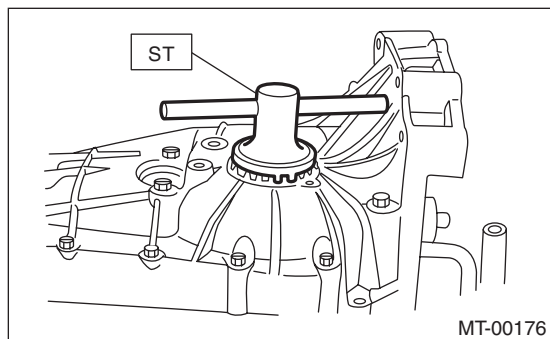
- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-35, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. 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



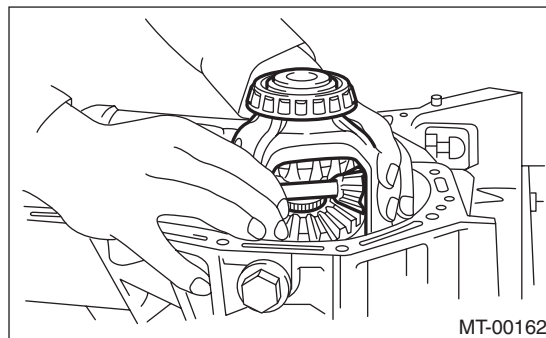
- 8) Remove the bearing outer race from the transmission case. ST 398527700 PULLER ASSY

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 bend the seal lips 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 shaft assembly. <Ref. to 5MT-57, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 5MT-49, INSTALLATION, Transmission Case.>
- 7) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 8) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

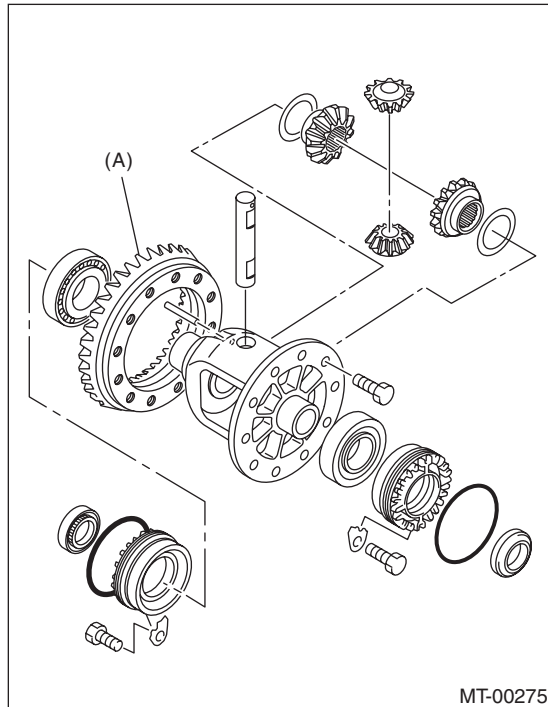
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

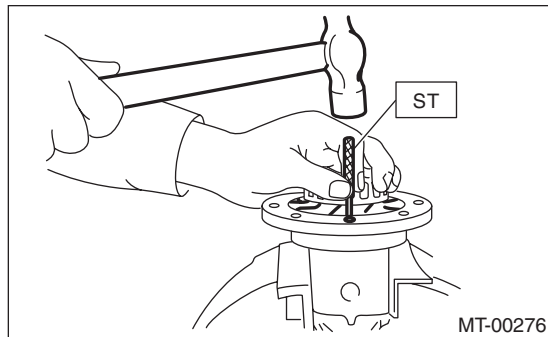
1) Remove the twelve bolts and remove hypoid driven gear.



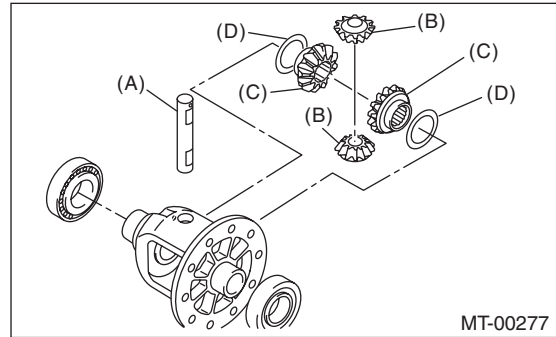
(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear side.

ST 899904100 STRAIGHT PIN REMOVER



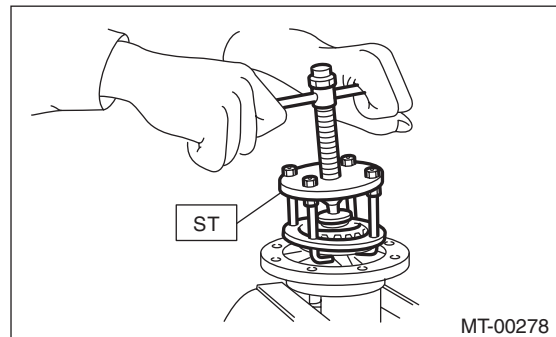
3) Pull out the pinion shaft, and remove the differential bevel pinion, differential bevel gear and washer.



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

4) Using the ST, remove the roller bearing.

ST 899524100 PULLER SET

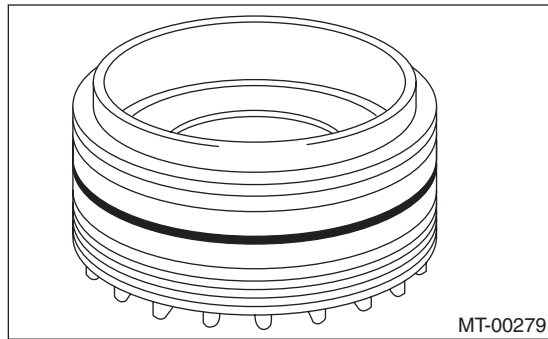


Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

2. SIDE RETAINER

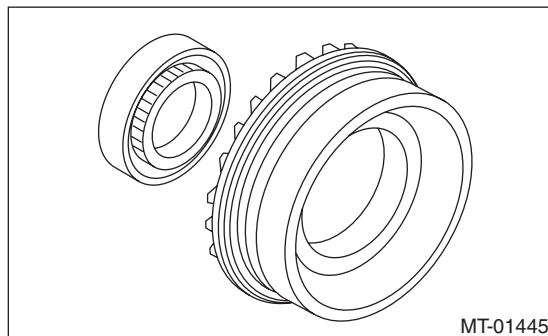
1) Remove the O-ring.



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.



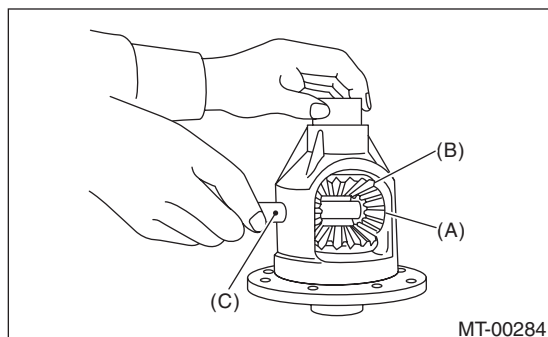
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the differential bevel gear and differential bevel pinion together with washer, 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-69, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

NOTE:

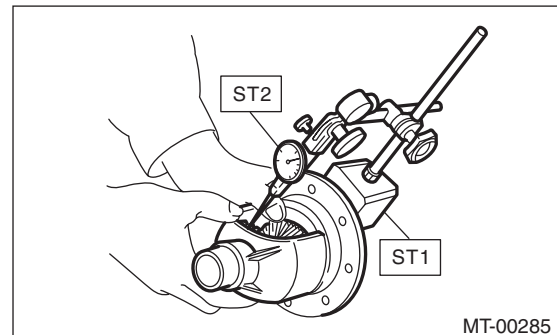
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

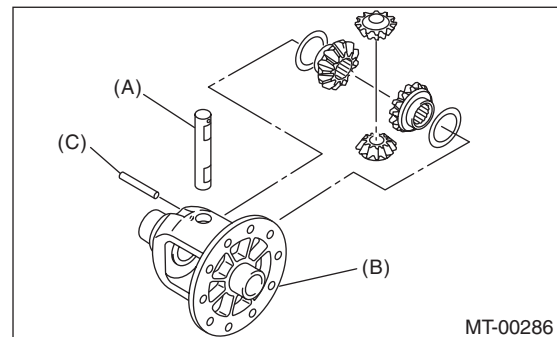


3) Align the pinion shaft and differential case with each hole, and drive the straight pin into the holes from the hypoid driven gear using the ST.

NOTE:

Lock the straight pin after installing.

ST 899904100 STRAIGHT PIN REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Install the roller bearing to differential case.

CAUTION:

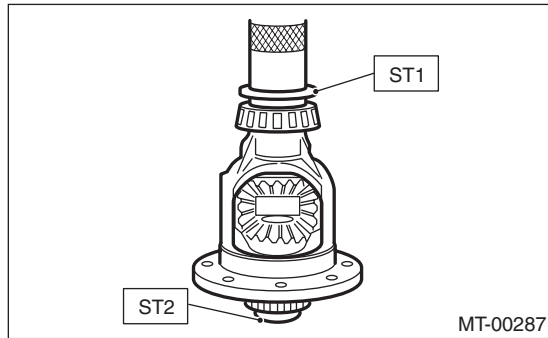
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER

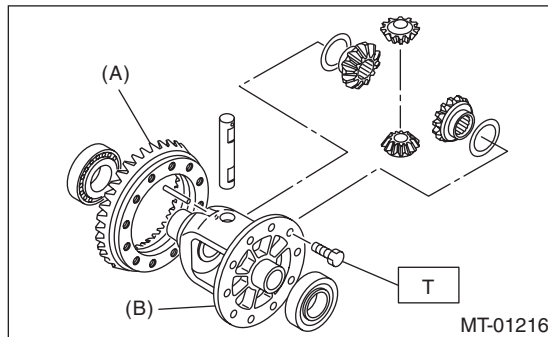
ST2 398497701 ADAPTER



5) Install the hypoid driven gear to the differential case using twelve bolts.

Tightening torque:

T: 62 N·m (6.3 kgf-m, 45.7 ft-lb)



(A) Hypoid driven gear

(B) Differential case

2. SIDE RETAINER

1) Install the oil seal.

CAUTION:

- Apply transmission gear oil to the oil seal lips, and install the oil seal while being careful not to deform the lip.

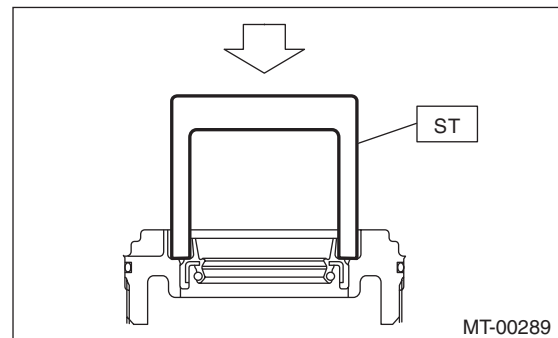
- When press-fitting the oil seal to the side retainer, tap with a plastic hammer etc. to press in.

- Never use a press.

NOTE:

Use a new oil seal.

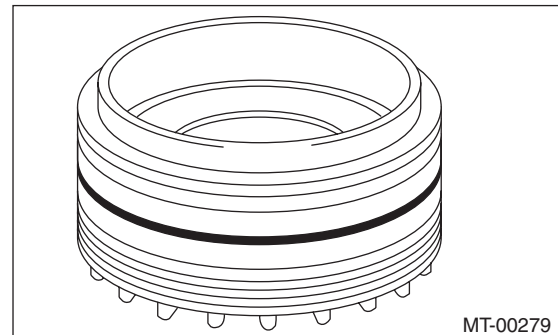
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2) Install the O-ring.

NOTE:

- Use new O-rings.
- Do not stretch or damage the O-ring.



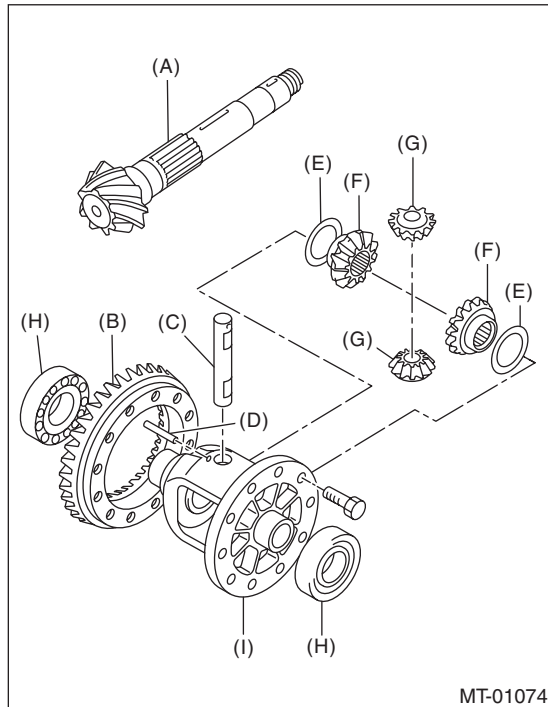
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

Repair or replace the differential gear in the following cases:

- When the hypoid drive gear and drive pinion shaft tooth surfaces are damaged, excessively worn, or seized.
- When the roller bearing on the drive pinion shaft has a worn or damaged roller path.
- When there is damage, wear or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft or straight pin.
- When the differential case sliding surfaces are worn or damaged.



- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Roller bearing
- (I) Differential case

1. BEVEL PINION GEAR BACKLASH

Measure the backlash between the differential bevel gear and differential bevel pinion. If backlash is not within specified value, install a suitable washer to adjust. <Ref. to 5MT-70, ADJUSTMENT, Front Differential Assembly.>

NOTE:

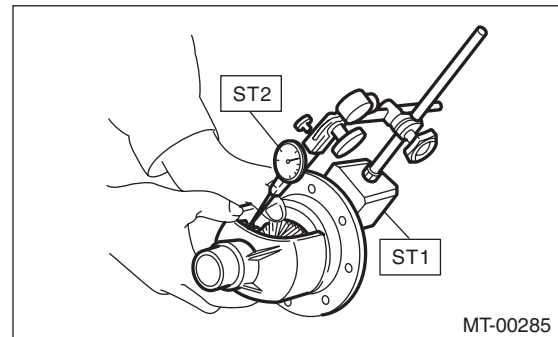
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.

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

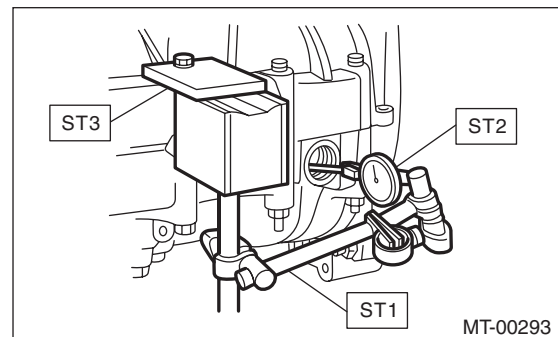
ST3 498255400 PLATE

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. 38415AA100 AXLE 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.

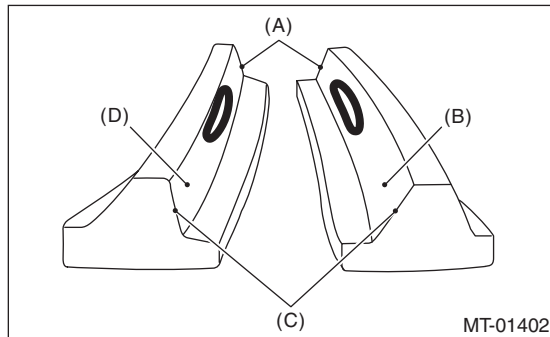
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

3. TOOTH CONTACT OF HYPOID GEAR

Check tooth contact of hypoid gear as follows: Apply a thin uniform coat of red lead on both teeth surfaces on 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on the hypoid gear, and judge whether face contact is correct. When the contact pattern is not correct, adjust. <Ref. to 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-66, DISASSEMBLY, Front Differential Assembly.>

2) Select a different washer from the table and install.

Washer	
Part No.	Length mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the standard value is obtained.

Backlash:

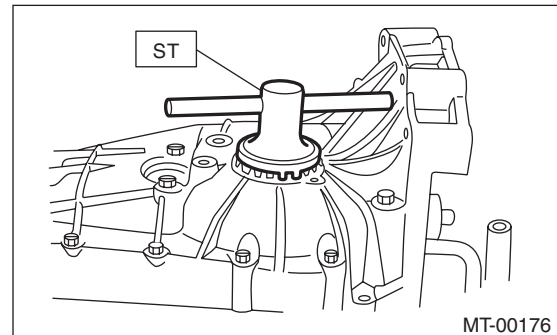
Standard

0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

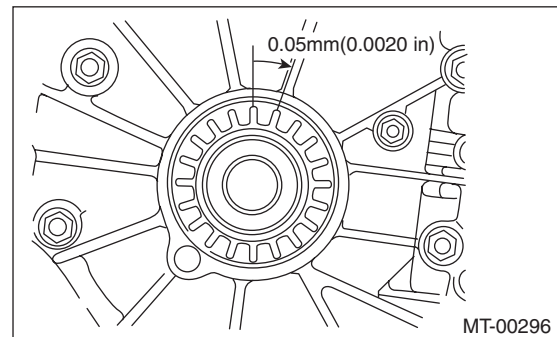
Adjust the backlash by turning the side retainer in the RH side case.

ST 18630AA010 WRENCH COMPL RETAINER



NOTE:

Each time side retainer rotates one tooth, backlash changes by 0.05 mm (0.020 in).

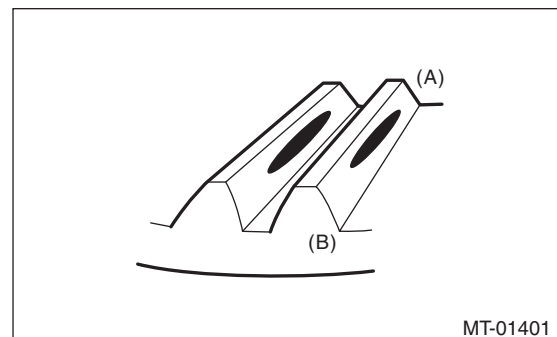


3. TOOTH CONTACT OF HYPOID GEAR

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

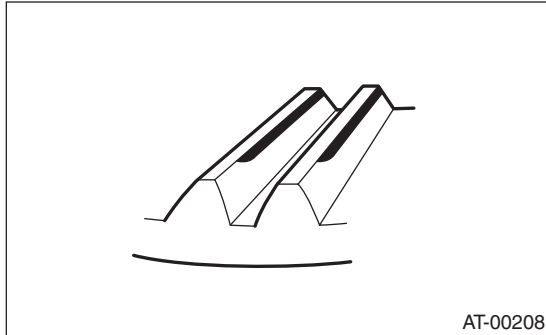
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

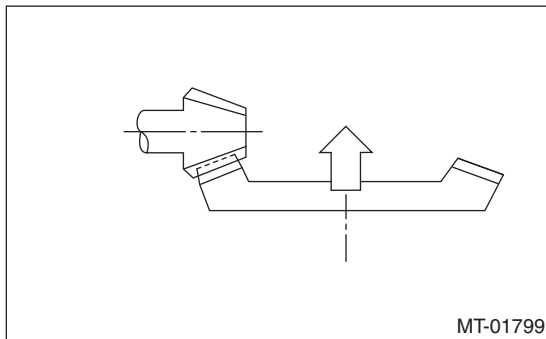
- Face contact

Check item: Backlash is too large.

Contact pattern



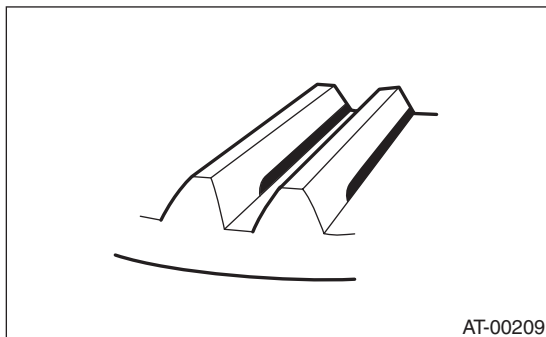
Corrective action: Tighten the side retainer to move the driven gear closer to the drive pinion shaft.



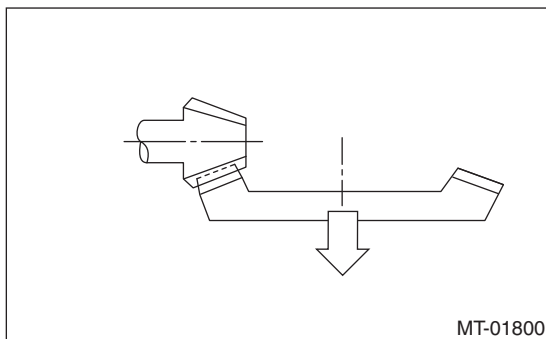
- Flank contact

Check item: Backlash is too small.

Contact pattern



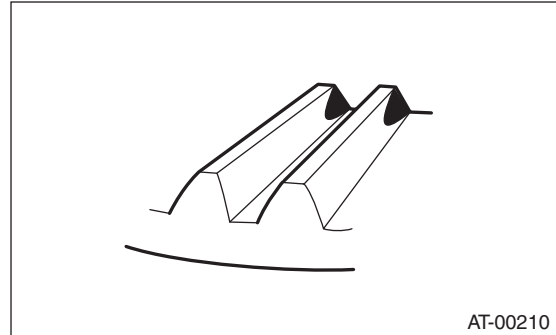
Corrective action: Loosen the side retainer to move the driven gear away from the drive pinion shaft.



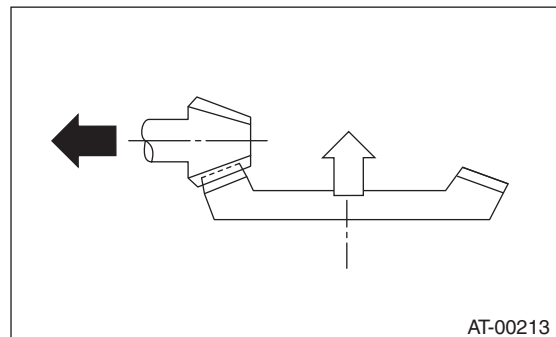
- Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



Corrective action: Increase the thickness of drive pinion shim and tighten the side retainer to move the driven gear closer to the drive pinion shaft according to the procedure for bringing drive pinion shaft away from driven gear.



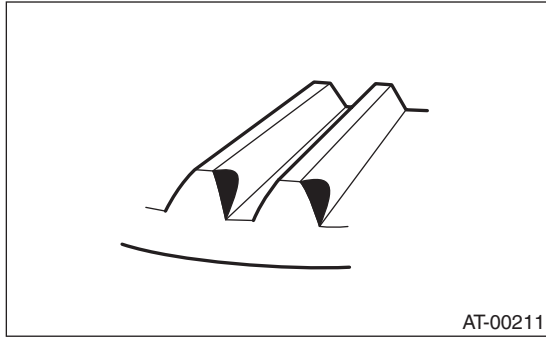
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

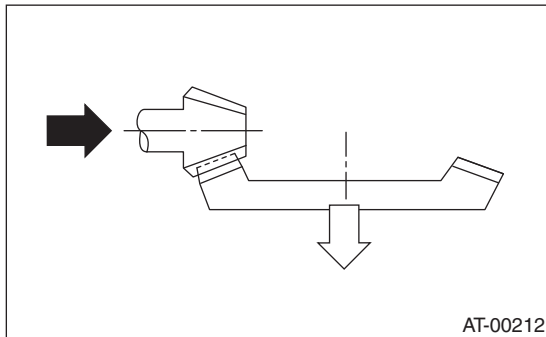
- Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern



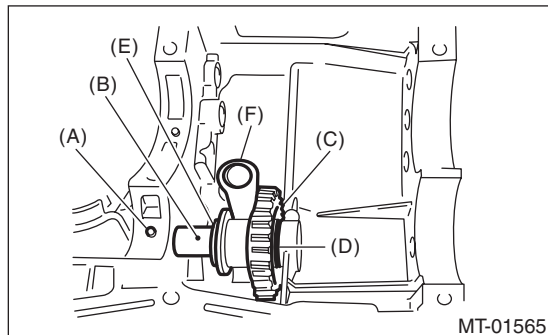
Corrective action: Reduce the thickness of drive pinion shim and loosen the side retainer to move the driven gear away from the drive pinion according to the procedure for moving drive pinion shaft closer to the driven gear.



18.Reverse Idler Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, 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-35, 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-65, 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

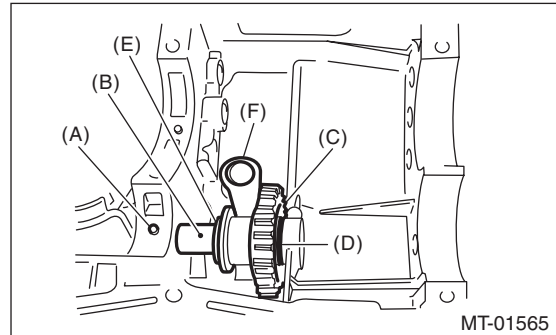
- 10) Remove the reverse shifter lever.

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.
- Use a new straight pin.



- (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-76, INSTALLATION, Shifter Fork and Rod.>
- 4) Install the front differential assembly. <Ref. to 5MT-65, 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-49, INSTALLATION, Transmission Case.>
- 8) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

Reverse Idler Gear

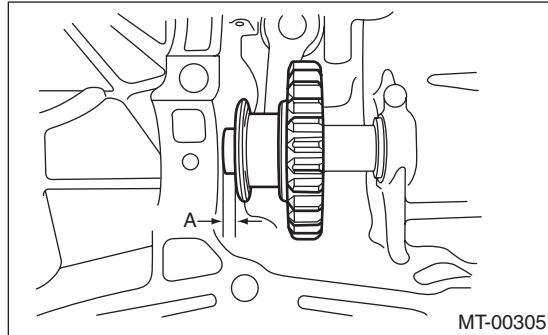
MANUAL TRANSMISSION AND DIFFERENTIAL

C: INSPECTION

1) Move the reverse shifter rod toward the reverse side. Check the clearance between the reverse idler gear and the transmission case wall surface. If out of specification, select the appropriate reverse shifter lever and adjust.

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

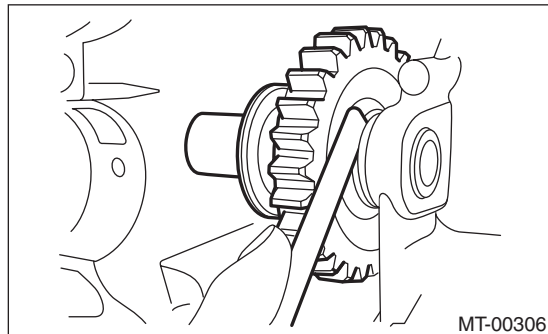


2) After installing a suitable reverse shifter lever, shift into neutral. Check the clearance between the reverse idler gear and the transmission case wall surfaces.

If out of specification, select the appropriate washer and adjust.

Clearance:

0 — 0.5 mm (0 — 0.020 in)



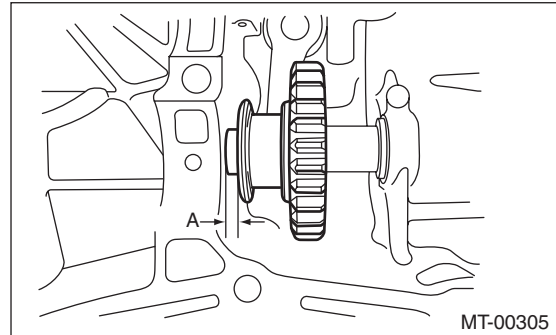
3) Check the reverse idler gear and shaft for damage. Replace if it is damaged.

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)

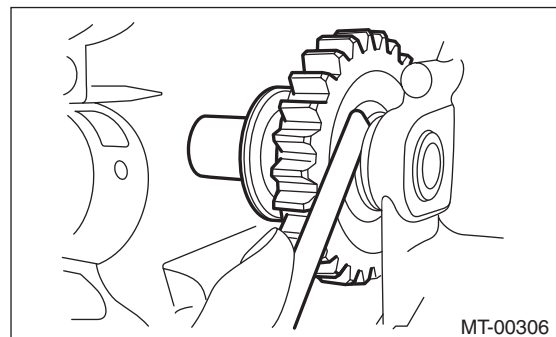


Reverse shifter lever		
Part No.	Mark	Content
32820AA070	7	Far from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

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)



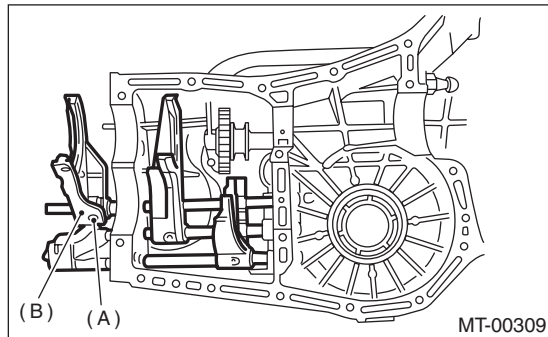
Washer	
Part No.	Length mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

19.Shifter Fork and Rod

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-23, 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-35, 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-65, 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 2



- (A) Straight pin
- (B) 5th shifter fork

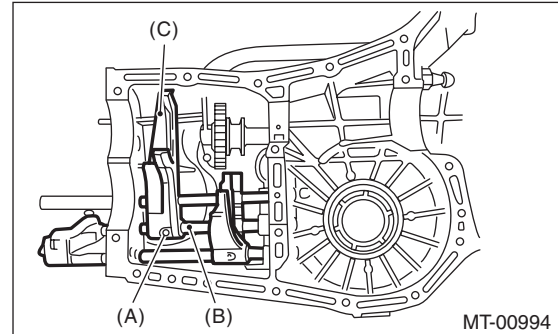
- 9) Remove the plugs, springs and check balls.

- 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 2



- (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 2

- 12) Remove the snap ring (outer), and pull out the reverse fork rod from the 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.

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

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 gasket in the reverse fork rod hole on the left side of transmission case, and tighten the checking ball plug.

NOTE:

Use a new gasket.

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 2

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.

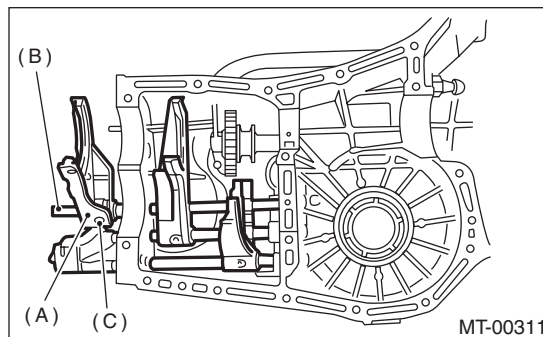
NOTE:

- 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 2

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 2



(A) 5th shifter fork

(B) Reverse fork rod

(C) Straight pin

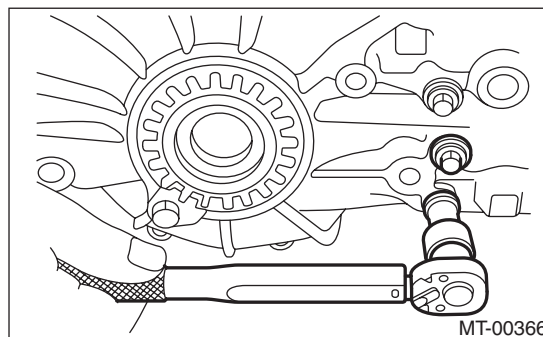
9) Position the balls, checking ball springs and gaskets to the 3rd – 4th fork rod and 1st – 2nd fork rod holes, and install plugs.

NOTE:

Use a new gasket.

Tightening torque:

20 N·m (2.0 kgf-m, 14.8 ft-lb)



10) Install the front differential assembly. <Ref. to 5MT-65, 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-49, INSTALLATION, Transmission Case.>

14) Install the transfer case together with the extension case assembly. <Ref. to 5MT-35, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-33, INSTALLATION, Switches and Harness.>

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

16) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-25, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

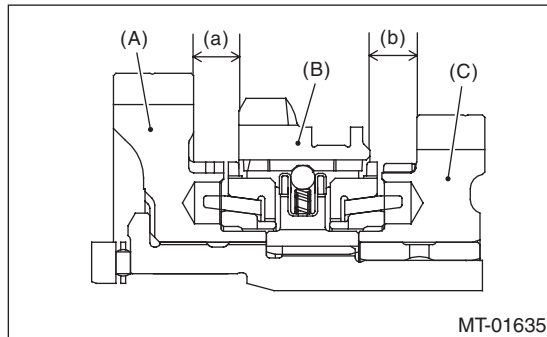
1) Check the fork and rod for damage. Replace if it is damaged.

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)



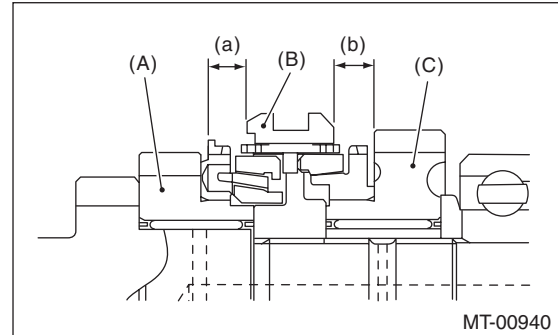
(a), (b) Measured value

- (A) 1st driven gear
- (B) Reverse driven gear
- (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Content
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)

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):
9.3 mm (0.366 in)



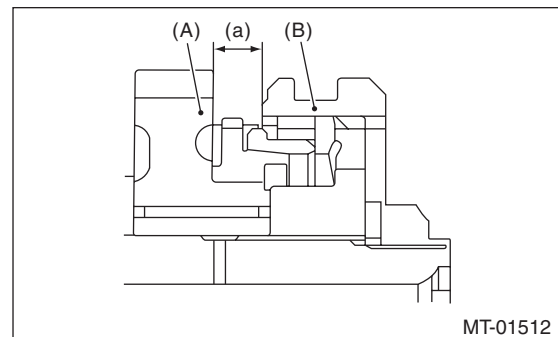
(a), (b) Measured value

- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Content
32810AA061	1	Approaches 4th gear by 0.2 mm (0.008 in).
32810AA071	No mark	Standard
32810AA101	3	Approaches 3rd gear by 0.2 mm (0.008 in)

5) Inspect the clearance between 5th 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

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

5th shifter fork		
Part No.	Mark	Content
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).

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):

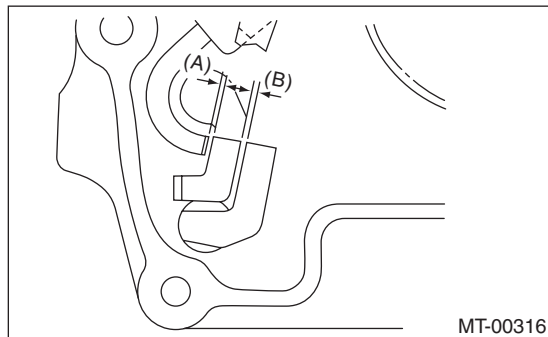
3rd-4th — 5th

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

Symptoms	Possible cause	Corrective action
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two types: One is a defective gear shift system and the other is defective transmission. However, if the operation is heavy and engagement of the gears is difficult, a defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer at internal spline of the sleeve 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	Repair or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Replace.
	(b) Loose engine mounting bolts	Tighten.
	(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 4th 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 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.

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL

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 clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of trouble. However, noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. • Gear noise when driving: If noise increases as the vehicle speed increases, it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to misadjusted bearings and incorrect shim adjustment. • Bearing noise when driving or coasting: Cracked, broken or damaged bearings • Noise mainly when turning: Noise from differential side gear, differential pinion or differential pinion shaft, etc.	(a) Insufficient oil	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.

CLUTCH SYSTEM

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