

General Description

AUTOMATIC TRANSMISSION

1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

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

2. OIL PUMP

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

3. TRANSMISSION CONTROL ELEMENT

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

4. TRANSMISSION GEAR RATIO

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

5. PLANETARY GEAR AND PLATE

Model	Non-turbo	Turbo
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	5
Number of low clutch drive plates	5	7
Number of reverse clutch drive plates	2	
Number of drive plates for the 2-4 brake	3	4
Number of drive plates for low & reverse brake	5	7

6. SELECTOR POSITION

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

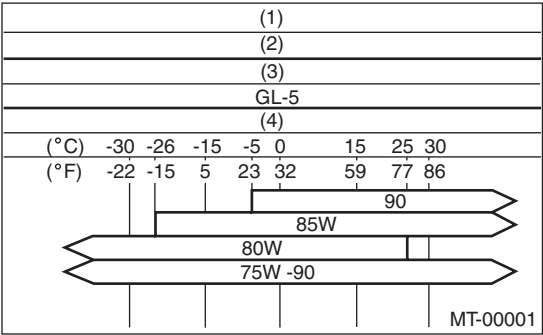
7. HYDRAULIC CONTROL AND LUBRICATION

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

8. COOLING AND HARNESS

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

11.RECOMMENDED GEAR OIL

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

9. TRANSFER

Model	Non-turbo	Turbo	
Transfer type	Multi-plate transfer (MP-T)		Variable torque distribution (VTD)
Number of transfer clutch drives & driven plates	5	6	3
Control method	Electronic, hydraulic type		
Lubricant	Same automatic transmission fluid as used in the automatic transmission		
Reduction gear ratio	1.000 (53/53)		

10.FINAL REDUCTION GEAR

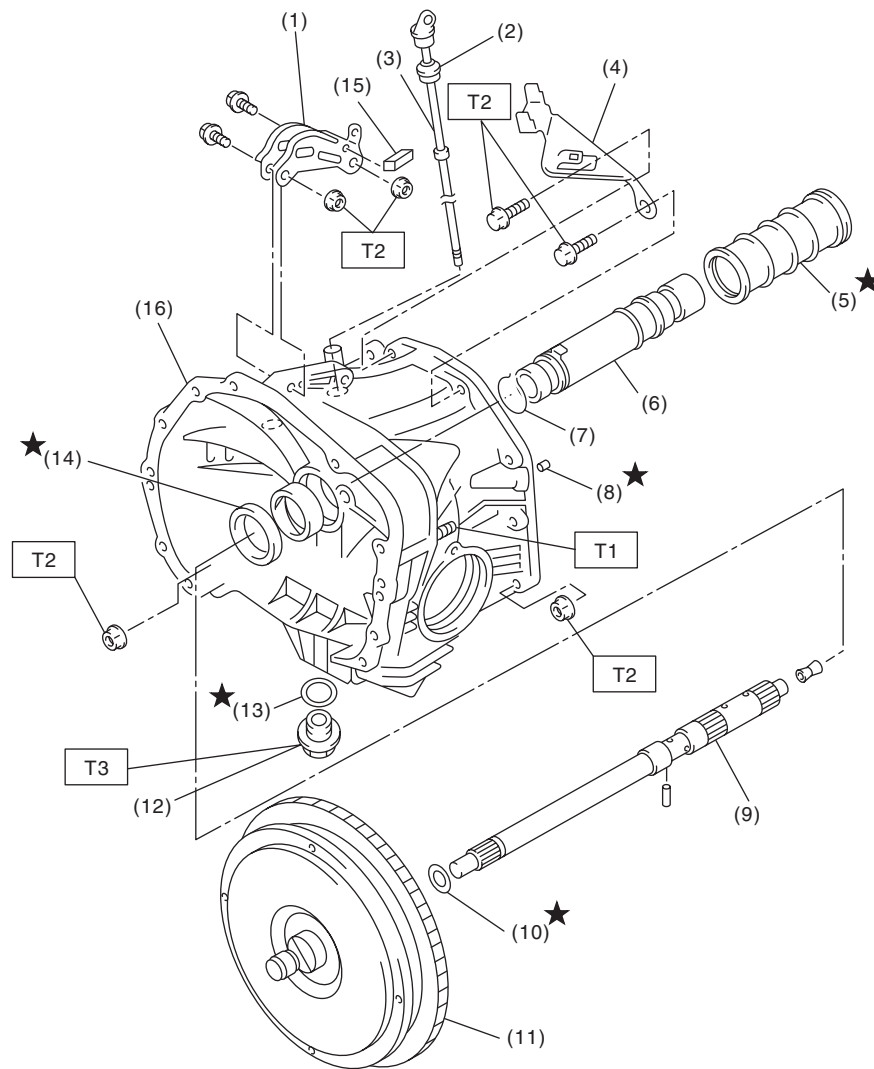
	Non-turbo	Turbo
Front final reduction gear ratio	4.444 (40/9)	4.111 (37/9)

General Description

AUTOMATIC TRANSMISSION

B: COMPONENT

1. TORQUE CONVERTER CLUTCH AND CASE



AT-00002

- | | |
|----------------------------------|---------------------------------------|
| (1) Pitching stopper bracket | (9) Input shaft |
| (2) O-ring | (10) O-ring |
| (3) Differential oil level gauge | (11) Torque converter clutch ASSY |
| (4) Stay | (12) Differential gear oil drain plug |
| (5) Seal pipe | (13) Gasket |
| (6) Oil pump shaft | (14) Oil seal |
| (7) Clip | (15) Clip (Turbo model) |
| (8) Rubber seal | |

- (16) Converter case

Tightening torque: N·m (kgf-m, ft-lb)

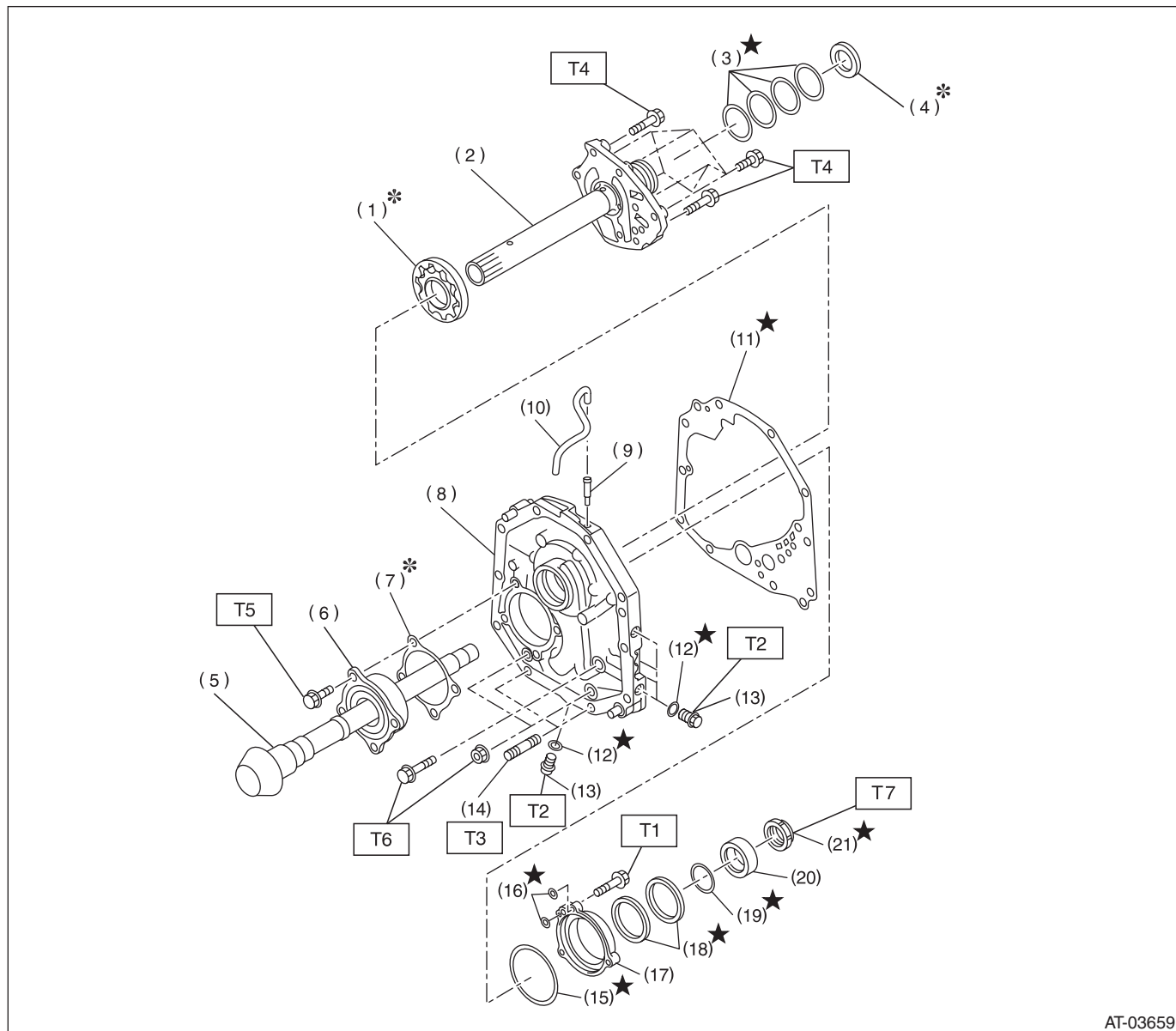
T1: 18 (1.8, 13.3)

T2: 41 (4.2, 30.2)

T3: 44 (4.5, 32.5) (Aluminum gasket)

70 (7.2, 51.6) (Copper gasket)

2. OIL PUMP



AT-03659

- (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, 5.1)

T2: 13 (1.3, 9.6)

T3: 18 (1.8, 13.3)

T4: 25 (2.5, 18.4)

T5: 40 (4.1, 29.5)

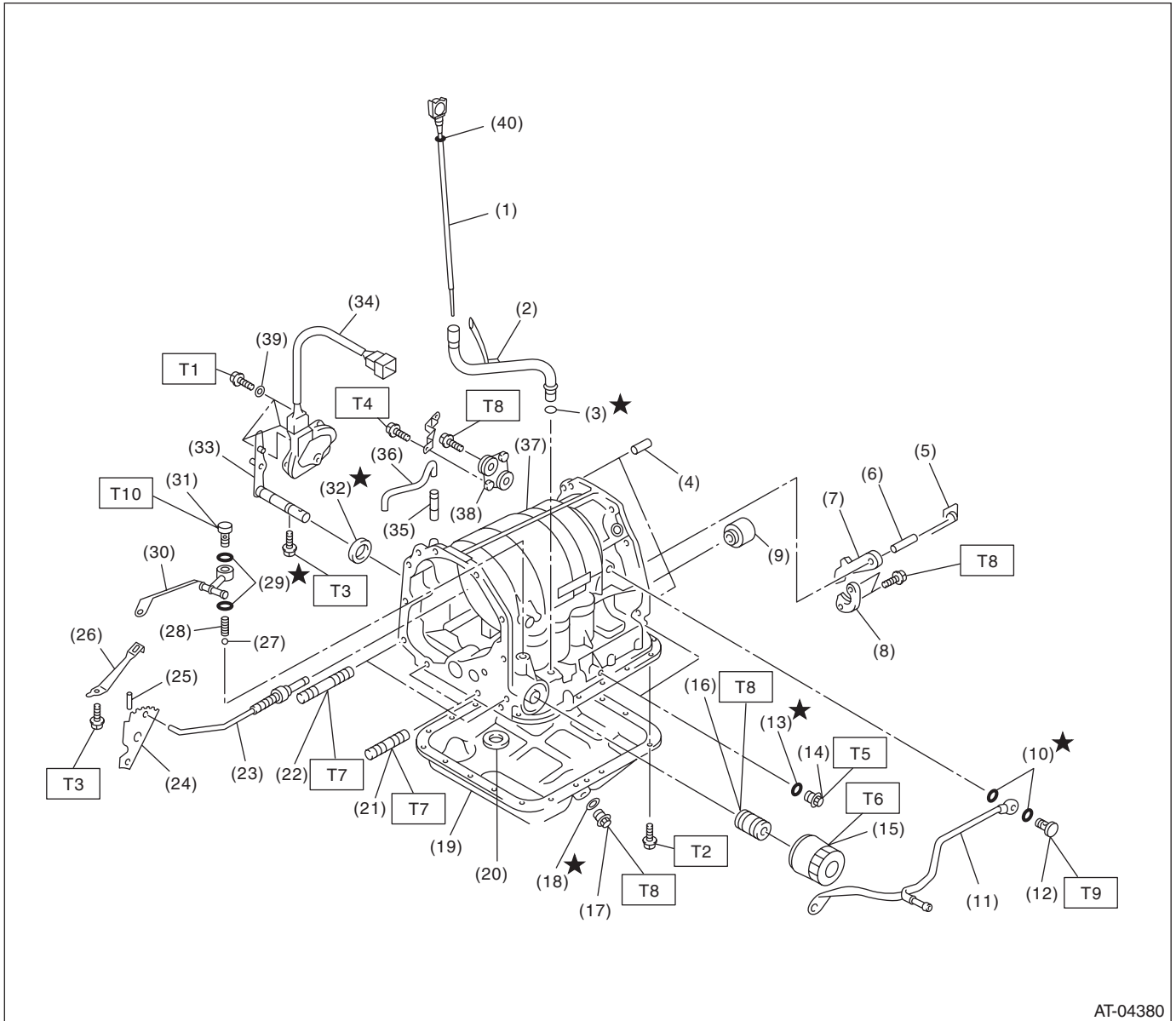
T6: 42 (4.3, 31)

T7: 116 (11.8, 85)

General Description

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3. TRANSMISSION CASE AND CONTROL DEVICE



General Description

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(1) ATF level gauge	(19) Oil pan	(36) Air breather hose
(2) Oil charge pipe	(20) Magnet	(37) Transmission case
(3) O-ring	(21) Stud bolt (short)	(38) Plate ASSY
(4) Straight pin	(22) Stud bolt (long)	(39) Washer
(5) Return spring	(23) Parking rod	(40) O-ring
(6) Shaft	(24) Manual plate	
(7) Parking pawl	(25) Spring pin	
(8) Parking support	(26) Detention spring	
(9) Transfer clutch seal	(27) Ball	
(10) Gasket	(28) Spring	
(11) ATF inlet pipe	(29) Gasket	
(12) Union screw	(30) ATF outlet pipe	
(13) O-ring	(31) Union screw	
(14) Test plug	(32) Oil seal	
(15) Oil filter	(33) Range select lever	
(16) Oil filter stud bolt	(34) Inhibitor switch ASSY	
(17) Drain plug (ATF)	(35) Nipple	
(18) Gasket		

Tightening torque:N·m (kgf-m, ft-lb)

T1: 3.4 (0.35, 2.6)

T2: 5 (0.5, 3.6)

T3: 6 (0.6, 4.4)

T4: 12 (1.2, 8.7)

T5: 13 (1.3, 9.6)

T6: 14 (1.4, 10.3)

T7: 18 (1.8, 13.3)

T8: 25 (2.5, 18.4)

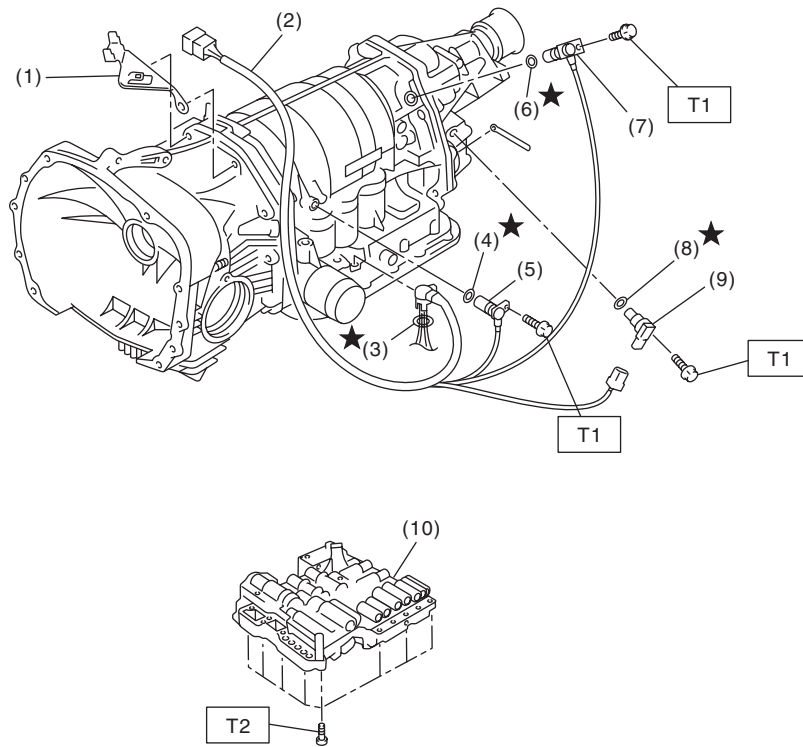
T9: 40 (4.1, 29.5)

T10: 45 (4.6, 33.2)

General Description

AUTOMATIC TRANSMISSION

4. CONTROL VALVE AND HARNESS ROUTING



AT-01322

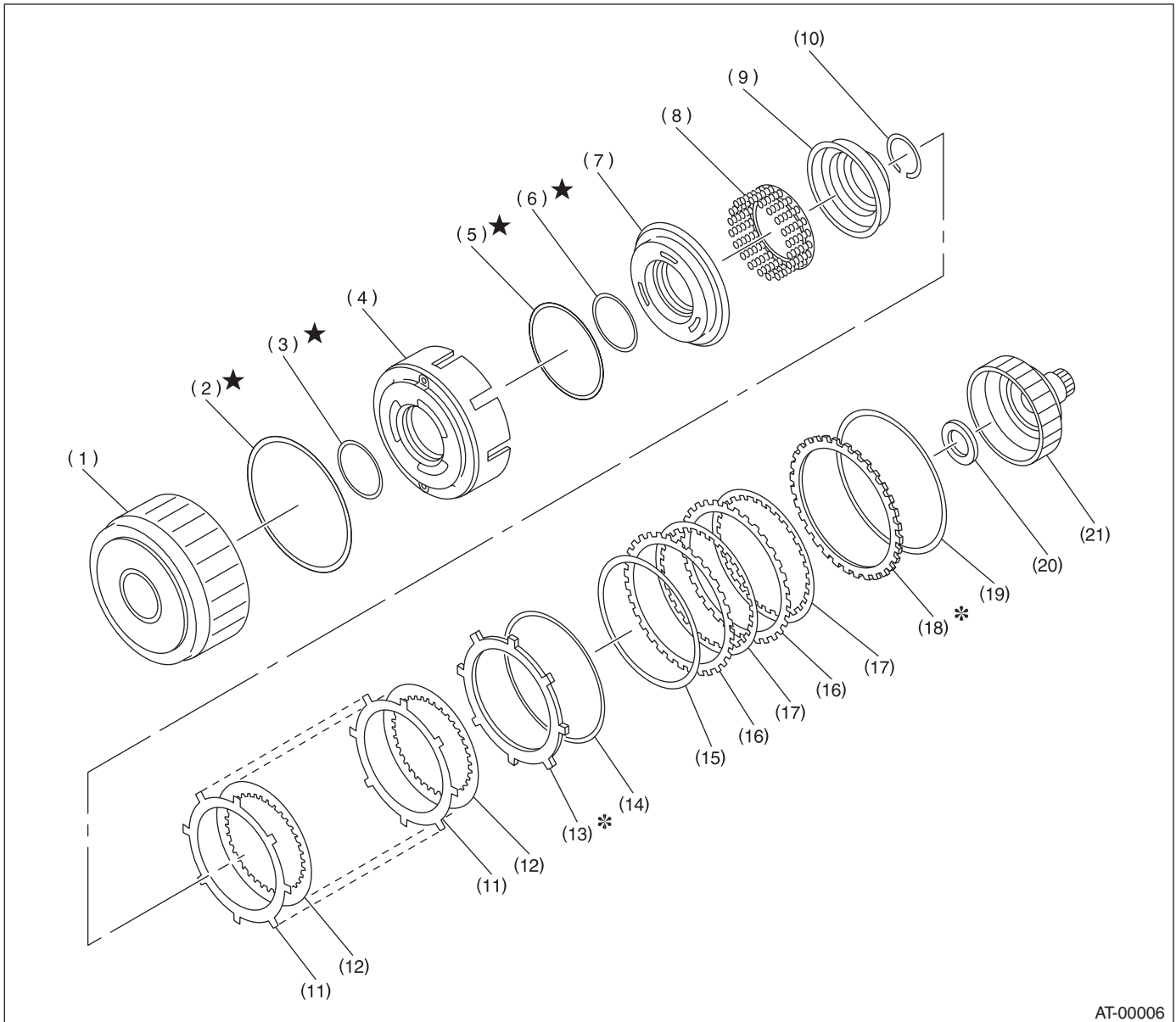
- | | |
|---|--------------------------------|
| (1) Stay | (6) O-ring |
| (2) Transmission harness ASSY | (7) Front vehicle speed sensor |
| (3) O-ring | (8) O-ring |
| (4) O-ring | (9) Rear vehicle speed sensor |
| (5) Torque converter turbine speed sensor | (10) Control valve body |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7 (0.7, 5.1)

T2: 8 (0.8, 5.8)

5. HIGH CLUTCH AND REVERSE CLUTCH



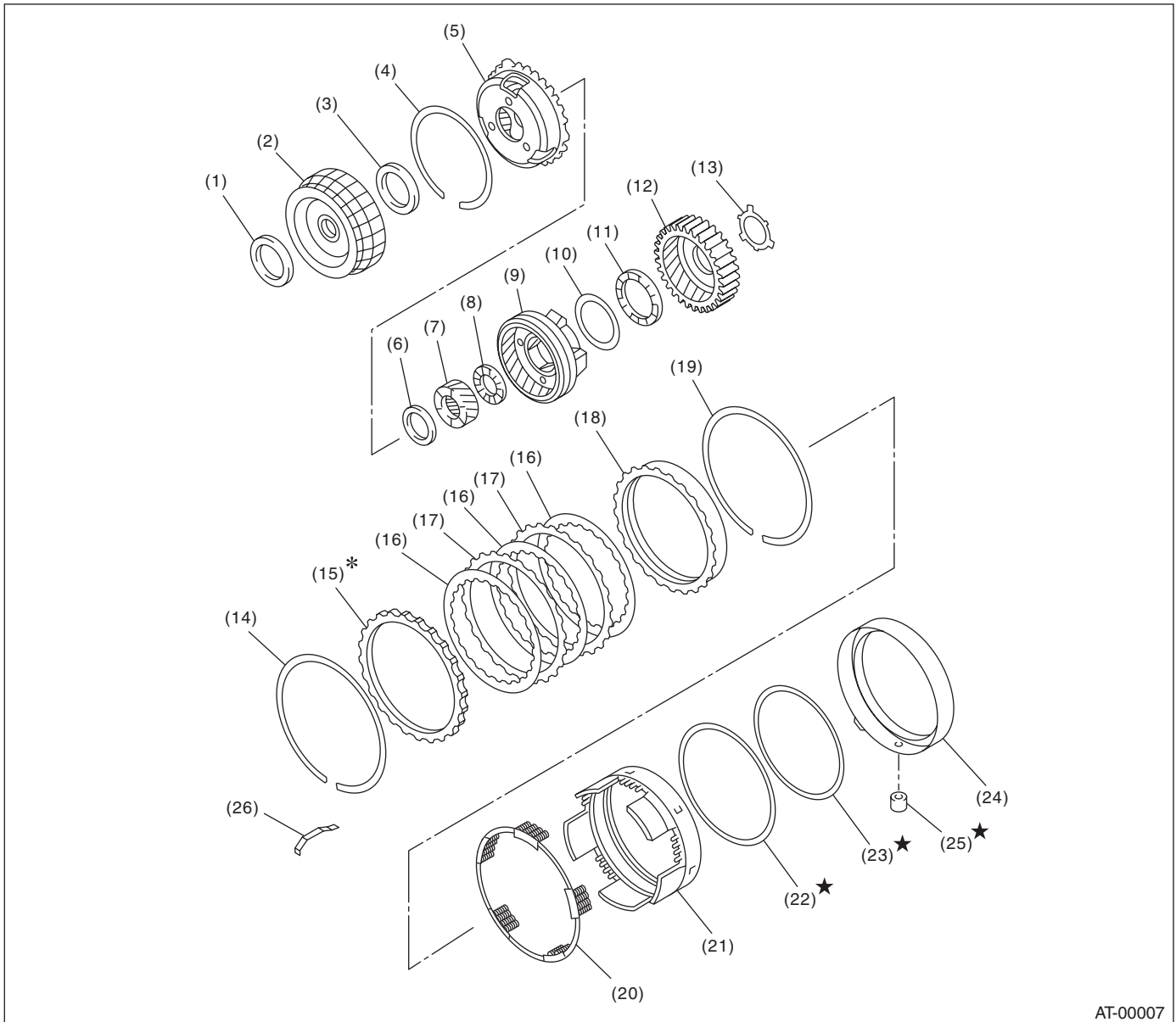
AT-00006

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

General Description

AUTOMATIC TRANSMISSION

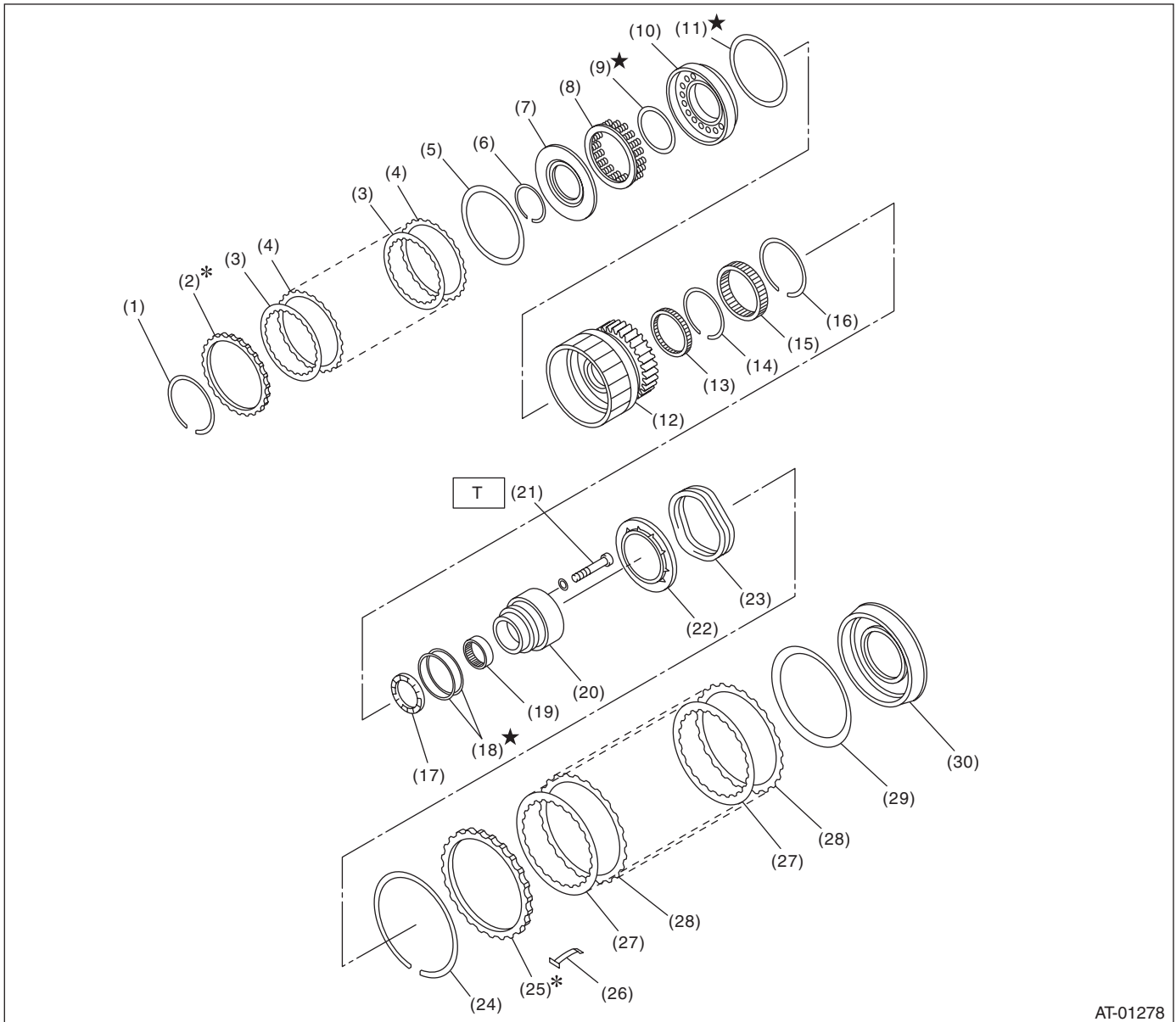
6. PLANETARY GEAR AND 2-4 BRAKE



AT-00007

- | | | |
|-----------------------------|----------------------------|--------------------------------|
| (1) Thrust needle bearing | (10) Washer | (19) Snap ring |
| (2) Front sun gear | (11) Thrust needle bearing | (20) 2-4 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 | (26) Leaf spring |
| (9) Rear planetary carrier | (18) Pressure rear plate | |

7. LOW CLUTCH AND LOW & REVERSE BRAKE



AT-01278

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

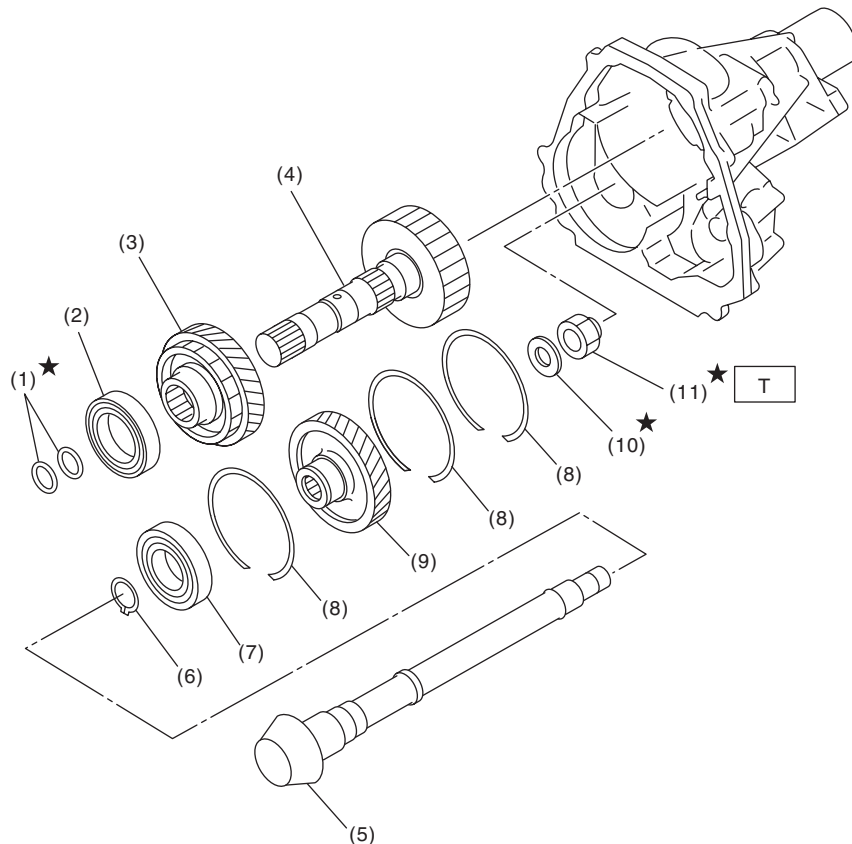
T: 25 (2.5, 18.4)

General Description

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8. REDUCTION GEAR

MP-T MODEL



AT-02740

- (1) Seal ring
- (2) Ball bearing
- (3) Reduction drive gear
- (4) Reduction drive shaft
- (5) Drive pinion shaft

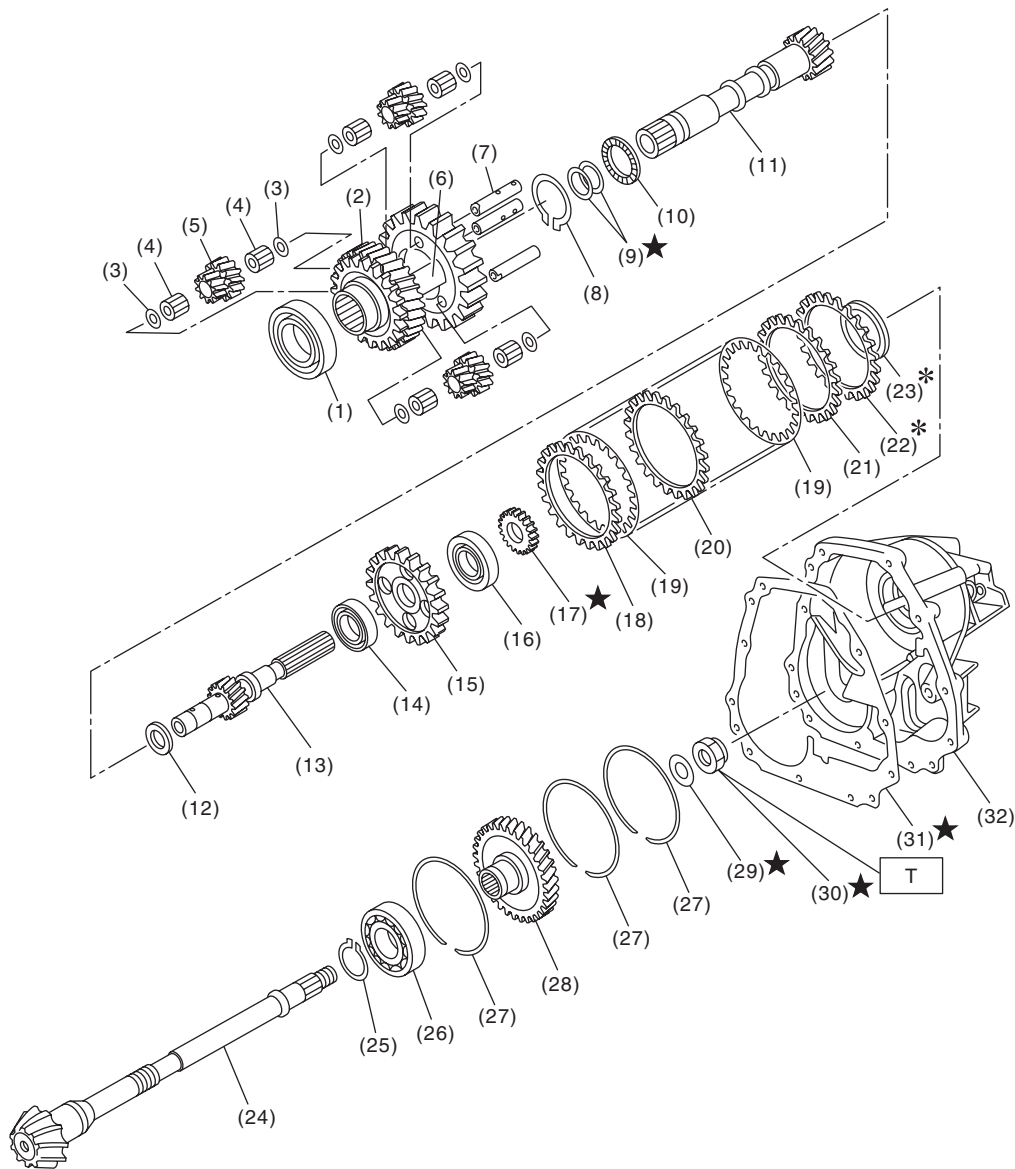
- (6) Snap ring
- (7) Ball bearing
- (8) Snap ring
- (9) Reduction driven gear
- (10) Washer

- (11) Lock nut

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

AUTOMATIC TRANSMISSION

VTD MODEL



AT-02203

- | | | |
|----------------------------|-----------------------------------|----------------------------|
| (1) Ball bearing | (13) Rear drive shaft | (25) Snap ring |
| (2) Reduction drive gear | (14) Ball bearing | (26) Ball bearing |
| (3) Washer | (15) Multi-plate clutch (LSD) hub | (27) Snap ring |
| (4) Needle bearing | (16) Ball bearing | (28) Reduction driven gear |
| (5) Pinion gear | (17) Revolution gear | (29) Lock washer |
| (6) Carrier | (18) Driven plate (Thick) | (30) Lock nut |
| (7) Planetary pinion shaft | (19) Drive plate | (31) Gasket |
| (8) Snap ring | (20) Driven plate (Thin) | (32) Extension case |
| (9) Seal ring | (21) Driven plate (Thick) | |
| (10) Thrust needle bearing | (22) Pressure plate | |
| (11) Intermediate shaft | (23) Rear drive shaft shim | |
| (12) Thrust washer | (24) Drive pinion shaft | |
-
- Tightening torque:N·m (kgf-
T: 100 (10.2, 73.8)**

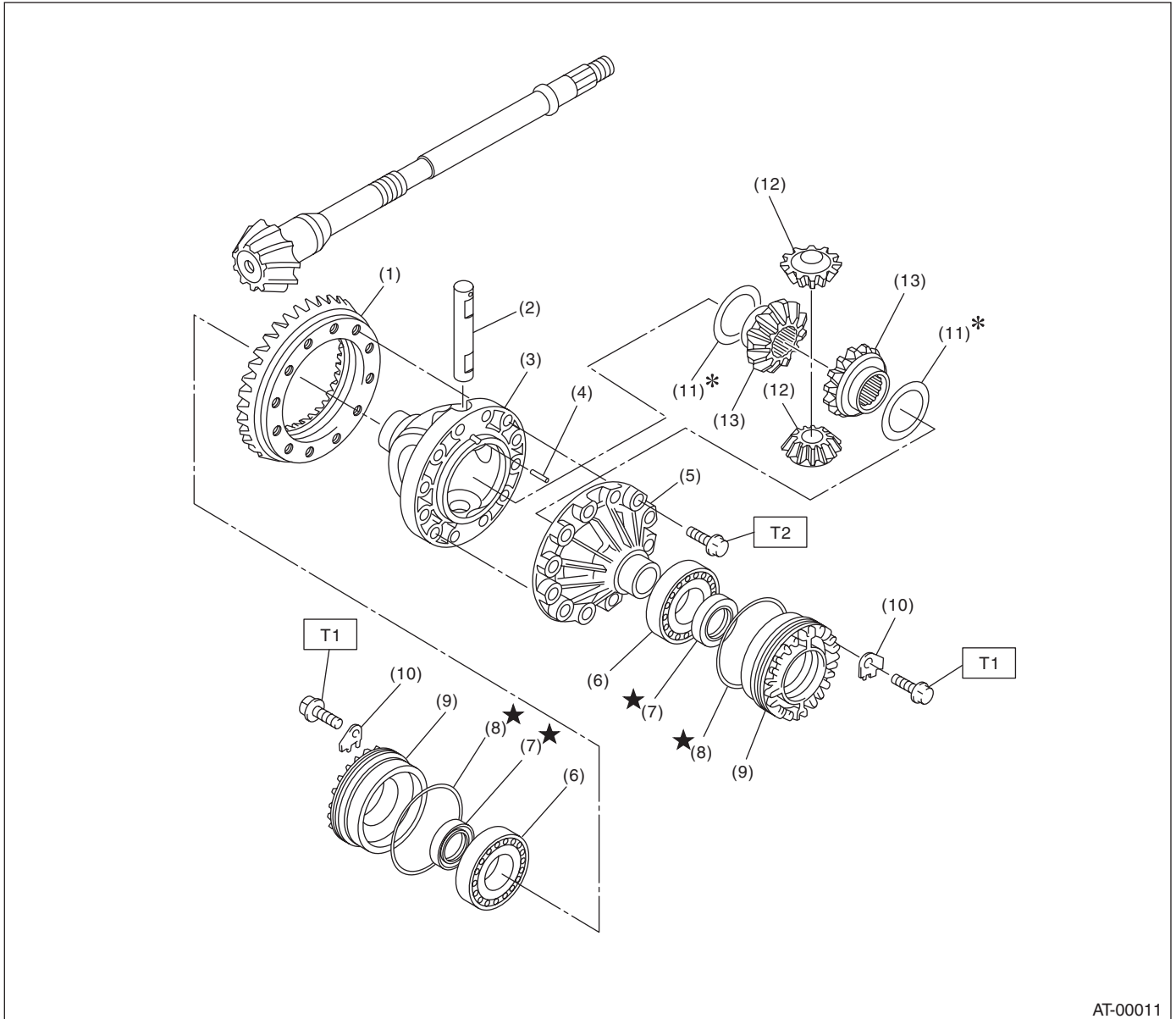
Tightening torque: N·m (kgf-m, ft-lb)

T: 100 (10.2, 73.8)

General Description

AUTOMATIC TRANSMISSION

9. DIFFERENTIAL GEAR



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

- (13) Differential bevel gear

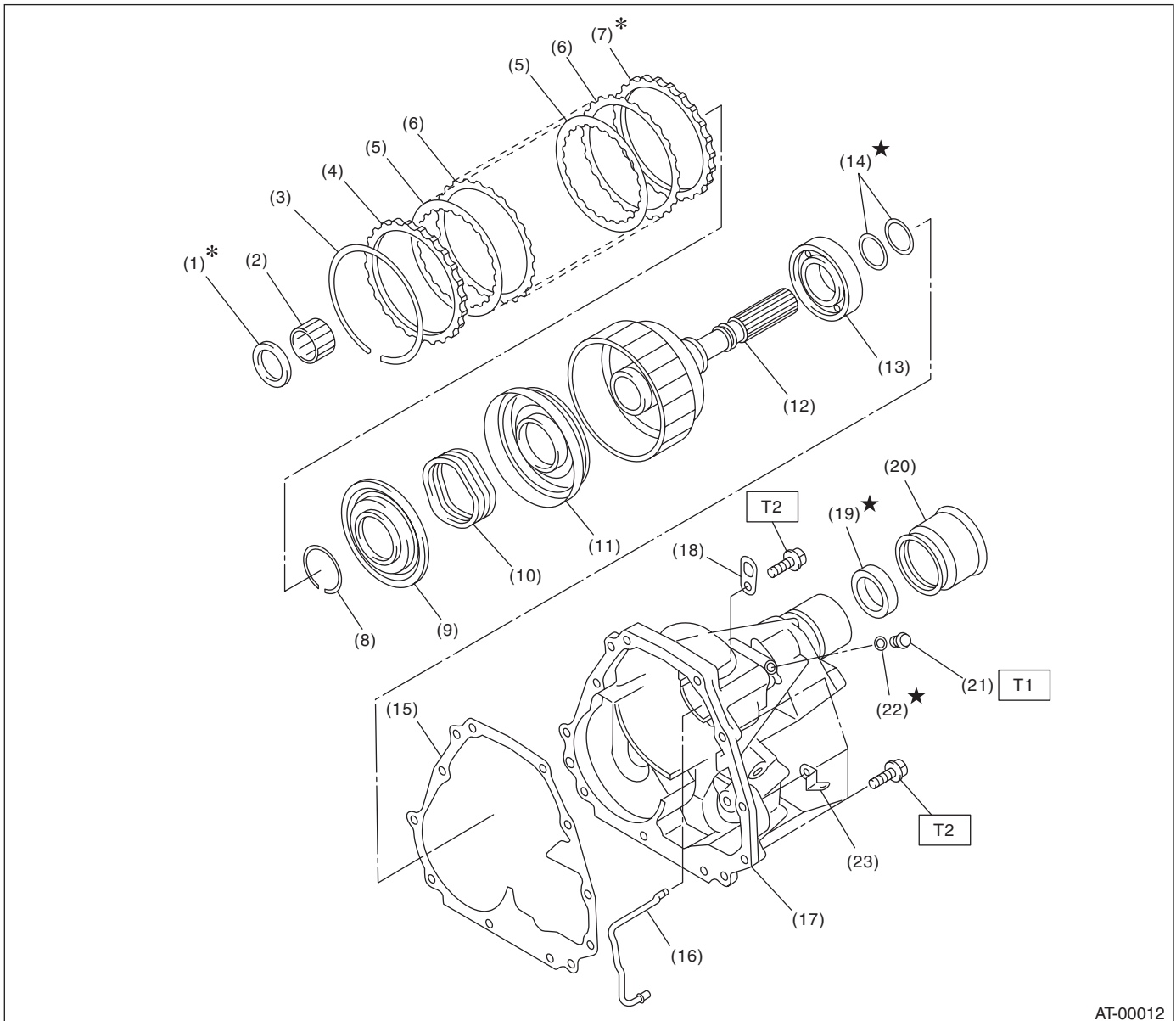
Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.4)

T2: 62 (6.3, 45.7)

10. TRANSFER AND EXTENSION CASE

MP-T MODEL



AT-00012

- | | | |
|---------------------------------|-----------------------------|-------------------------|
| (1) Thrust needle bearing | (10) Return spring | (19) Oil seal |
| (2) Needle bearing | (11) Transfer clutch piston | (20) Dust cover |
| (3) Snap ring | (12) Rear drive shaft | (21) Test plug |
| (4) Pressure plate | (13) Ball bearing | (22) O-ring |
| (5) Drive plate | (14) Seal ring | (23) Clip (Turbo model) |
| (6) Driven plate | (15) Gasket | |
| (7) Pressure plate | (16) Transfer clutch pipe | |
| (8) Snap ring | (17) Extension case | |
| (9) Transfer clutch piston seal | (18) Transmission hanger | |

Tightening torque: N·m (kgf-m, ft-lb)

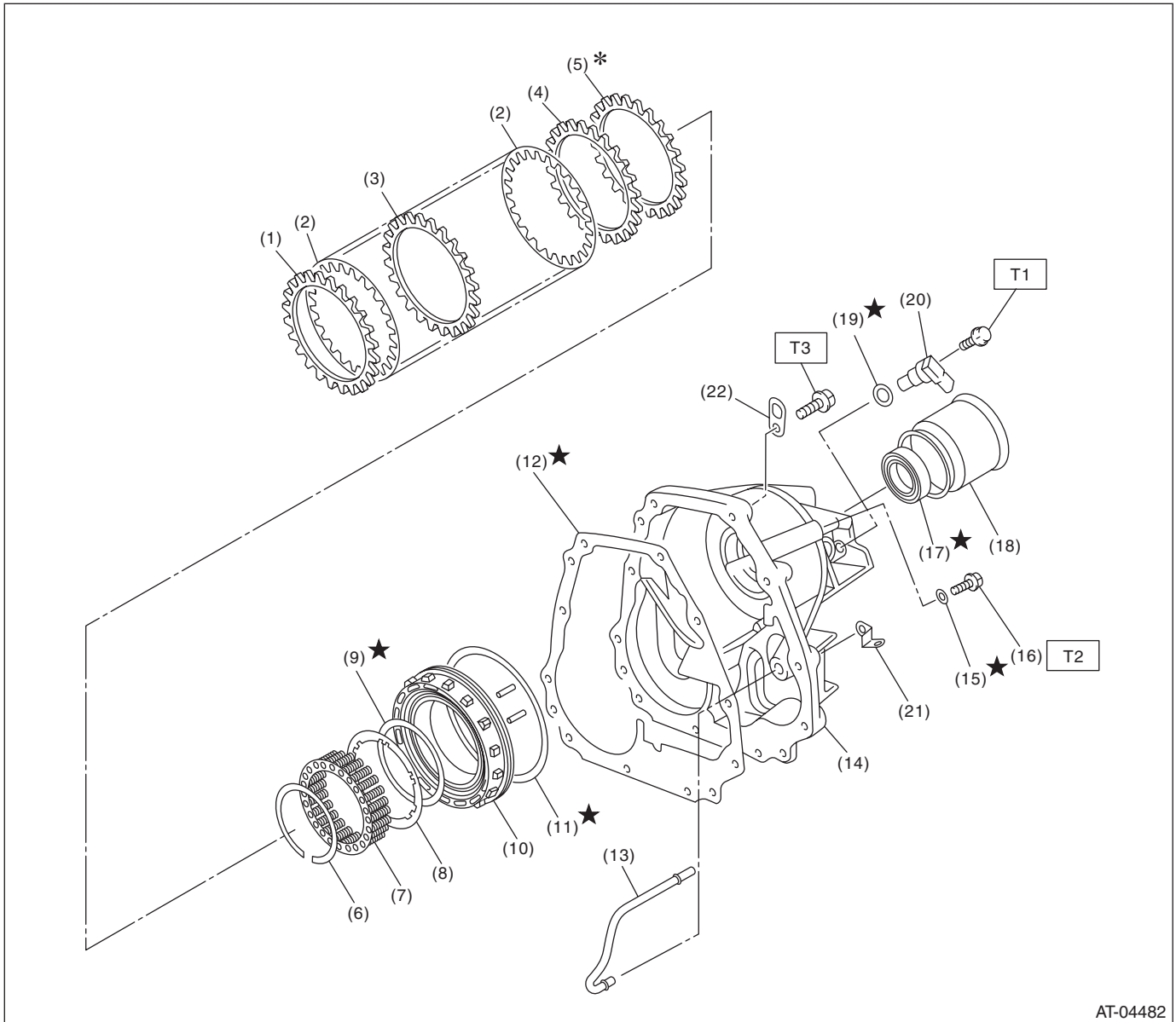
T1: 13 (1.3, 9.6)

T2: 25 (2.5, 18.4)

General Description

AUTOMATIC TRANSMISSION

VTD MODEL



AT-04482

- | | | |
|---|------------------------------------|--------------------------------|
| (1) Driven plate (Thick) | (11) O-ring | (20) Rear vehicle speed sensor |
| (2) Drive plate | (12) Gasket | (21) Clip (Turbo model) |
| (3) Driven plate (Thin) | (13) Multi-plate clutch (LSD) pipe | (22) Transmission hanger |
| (4) Driven plate (Thick) | (14) Extension case | |
| (5) Retaining plate | (15) O-ring | |
| (6) Snap ring | (16) Test plug | |
| (7) Spring retainer | (17) Oil seal | |
| (8) Plate | (18) Dust cover | |
| (9) O-ring | (19) O-ring | |
| (10) Multi-plate clutch (LSD) piston ASSY | | |

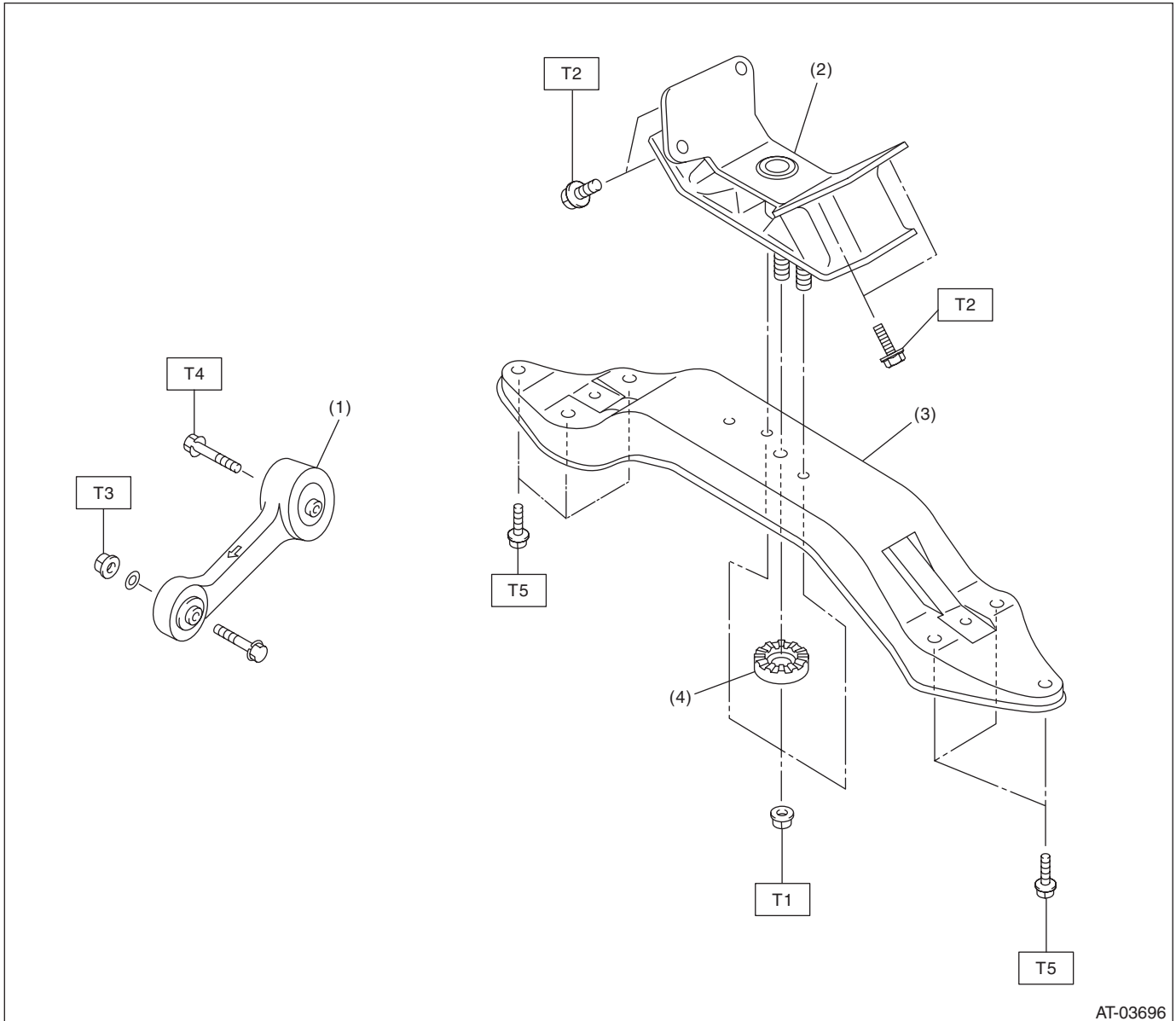
Tightening torque: N·m (kgf-m, ft-lb)

T1: 7 (0.7, 5.1)

T2: 13 (1.3, 9.6)

T3: 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: 39 (4.0, 28.8)

T3: 50 (5.1, 36.9)

T4: 58 (5.9, 42.8)

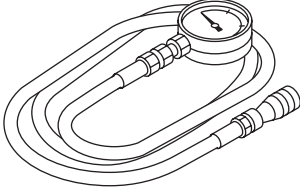
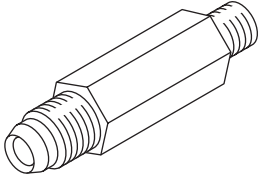
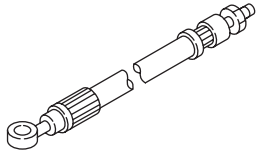
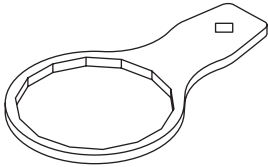
T5: 70 (7.1, 51.6)

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 separate the case. 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 etc. or equivalent. Do not mix gear oil, grease, etc. with those of different grades or from other 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 or ATF onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old sealant.
- When disassembling the AT, be sure to use nylon gloves and paper towels. Do not use cloth gloves or waste cloth.

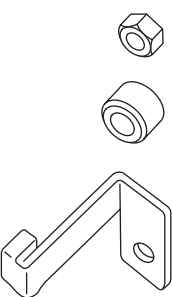
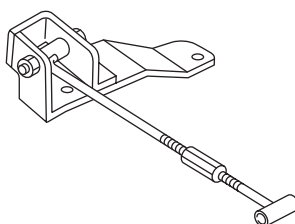
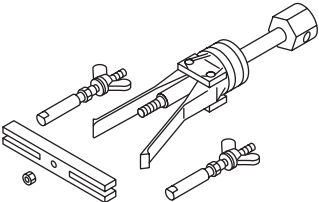
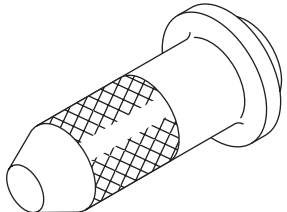
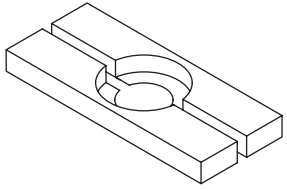
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	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 the transfer clutch pressure.
 ST-498545400	498545400	OIL FILTER WRENCH	Used for removing and installing the ATF filter.

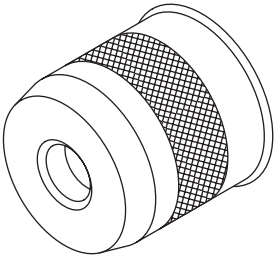
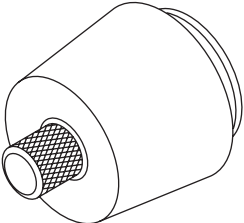
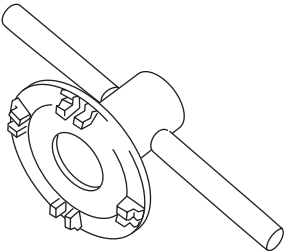
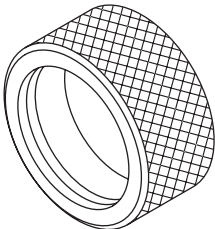
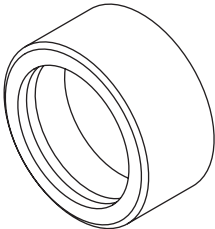
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for removing and installing the automatic transmission assembly.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting the engine.
 ST-398527700	398527700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

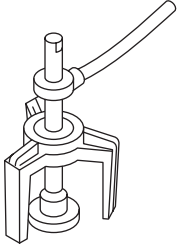
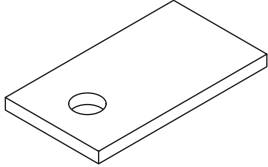
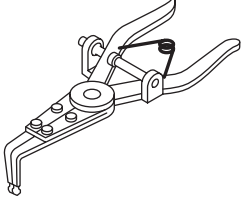
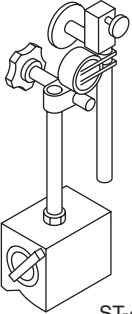
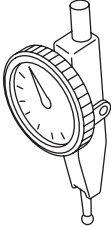
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499247400	499247400	INSTALLER	- Used for installing the transfer outer snap ring. - Used with GUIDE (499257300).
 ST-499257300	499257300	SNAP RING OUTER GUIDE	- Used for installing the transfer outer snap ring. - Used 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 torque converter case oil seal.
 ST-398487700	398487700	INSTALLER	Used for installing the front differential taper roller bearing.

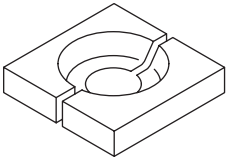
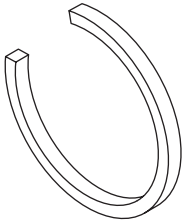
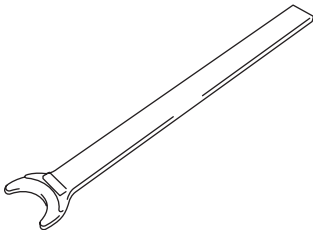
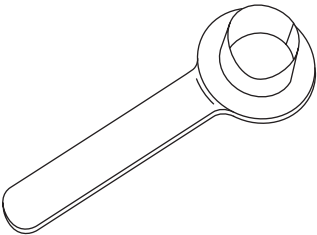
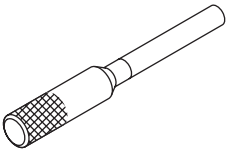
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing the clutch spring.
 ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 ST-399893600	399893600	PLIERS	Used for removing and installing the clutch spring.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring the gear backlash. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring the gear backlash. • Used with MAGNET BASE (498247001).

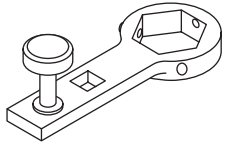
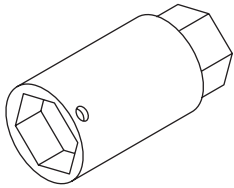
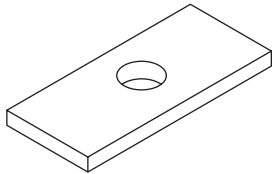
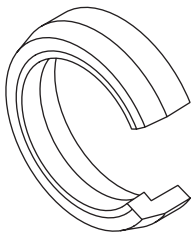
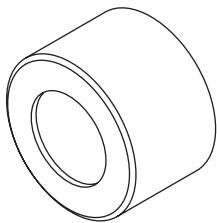
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498517000	498517000	REPLACER	Used for removing the front roller bearing.
 ST-398623600	398623600	SEAT	Used for removing the spring of the transfer clutch piston.
 ST28399SA000	28399SA000	DRIVE SHAFT REMOVER	Used for removing the axle shaft.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for installing the axle shaft.
 ST-499267300	499267300	STOPPER PIN	Used for installing the inhibitor switch.

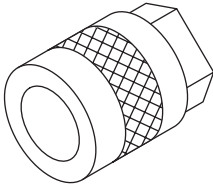
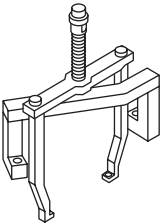
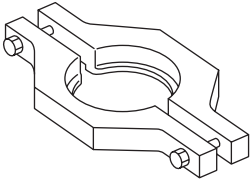
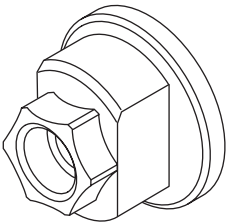
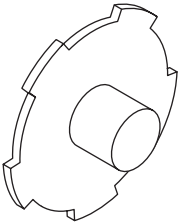
General Description

AUTOMATIC TRANSMISSION

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

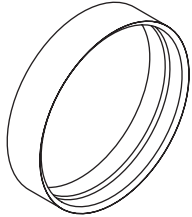
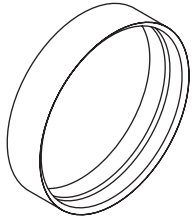
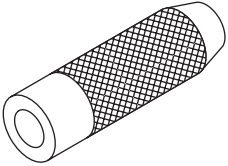
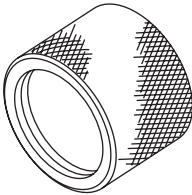
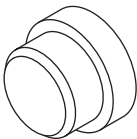
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 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.

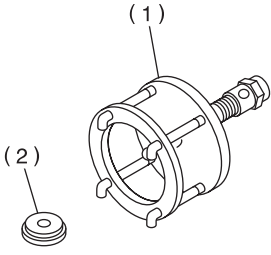
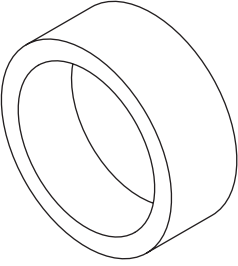
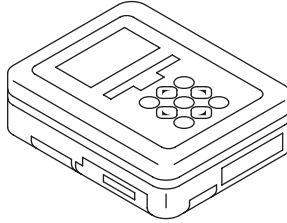
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST-398497701	398497701	SEAT	Used for installing the needle bearing.

General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899524100	899524100	PULLER SET	Used for bolt only. - Used with 499737100 PULLEY SET. - Used with 499737000 PULLER. (1) Puller (2) Cap
 ST-398744300	398744300	PISTON GUIDE	- Used for measuring the mating surface of the transmission to the end face of the multi-plate clutch. - For VTD model.
 ST1B021XU0	1B021XU0	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 installing and removing the differential gear oil drain plug.
Push/pull gauge	Used for measuring each piston stroke.

2. Automatic Transmission Fluid

A: INSPECTION

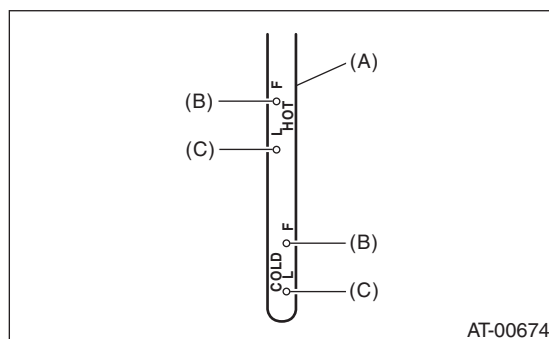
NOTE:

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 — 10 km (3 — 6 mile). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 4AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>

2) Park the vehicle on a level surface.

3) After slowly selecting all positions (P, R, N, D, 3, 2, 1), set the select lever in the “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 between the upper level and lower level on the HOT side.

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

5) If the ATF level is below the mid level between upper and lower marks, add the recommended ATF until the fluid level is above mid level.

CAUTION:

- Be careful not to exceed the upper level.
- Adding ATF up to the upper level when the transmission is cold will overfill the ATF. Do not fill beyond the upper level as overfilling can cause problems.

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

B: REPLACEMENT

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

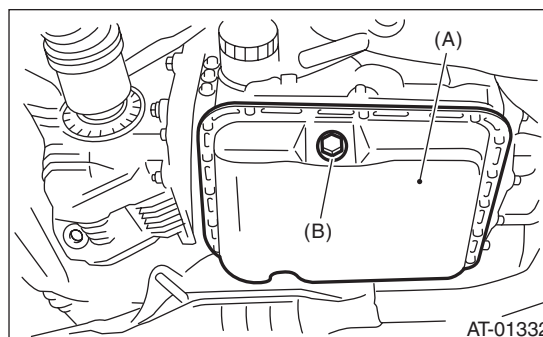
CAUTION:

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

3) Replace the gasket with new part, and then 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)

- 4) Lower the vehicle.
- 5) Fill ATF from the oil charger pipe.

Recommended fluid:

SUBARU ATF HP

Substitute fluid:

IDEMITSU: ATF HP

CASTROL: TRANSMAX J

Capacity:

Fill with the same amount of ATF 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)

- 6) Bleed the air of control valve.
<Ref. to 4AT-61, Air Bleeding of Control Valve.>
- 7) Check the level and leaks of ATF.
<Ref. to 4AT-28, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

NOTE:

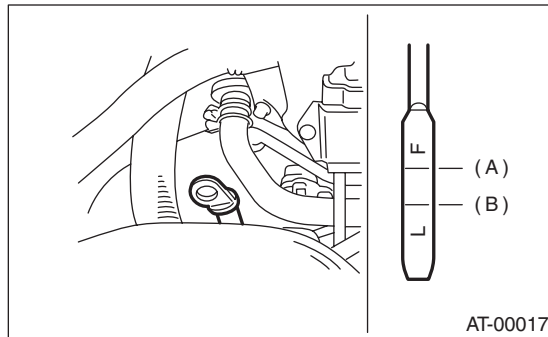
When replacing ATF, check the inside condition of the transmission body by inspecting the drained ATF.

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 and etc.	Replace ATF and check AT itself and vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water mixed in fluid.	Replace ATF and check the water entering point.

3. Differential Gear Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Remove the oil level gauge and wipe it clean.
- 3) Reinsert the level gauge all the way. Make sure the level gauge is inserted correctly and in the proper orientation.
- 4) Remove the level gauge again and 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.
- 5) To prevent overfilling the differential gear oil, do not fill oil above the "F" line.



- (A) Upper level
(B) Lower level

B: REPLACEMENT

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

CAUTION:

- Immediately after the vehicle has been running, the differential gear oil is very hot. Be careful not to burn yourself.
 - Be careful not to spill differential gear oil on the exhaust pipe to prevent it from emitting smoke or causing a fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
- 3) Replace the gasket with a new part and tighten the differential oil drain plug using the TORX® bit T70.

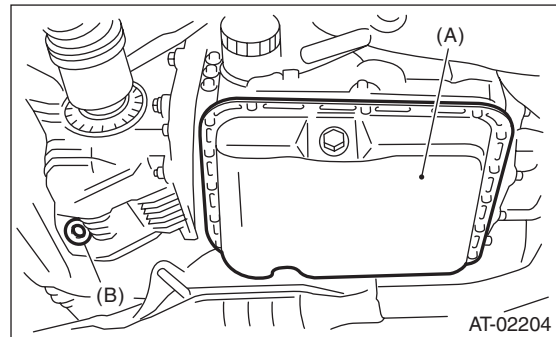
Tightening torque:

Aluminum gasket

44 N·m (4.5 kgf-m, 32.5 ft-lb)

Copper gasket

70 N·m (7.2 kgf-m, 51.6 ft-lb)



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

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

Recommended gear oil:

<Ref. to 4AT-3, 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-30, INSPECTION, Differential Gear Oil.>

4. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

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

NOTE:

When performing the test, do not exceed the 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

- Drive in 4th gear of D range [50 — 60 km/h (31 — 37 MPH)], and shift down to D ↔ 3rd range to check the engine brake in 3rd gear.
- Drive in 3rd gear of 3 range [40 — 50 km/h (25 — 31 MPH)], and shift down from 3rd ↔ to 2nd range to check the engine brake in 2nd gear.
- Drive in 2nd gear of 2nd range [20 — 30 km/h (12 — 19 MPH)], and shift down from 2nd ↔ to 1st range to check the 1st gear engine brake.

6. LOCK-UP FUNCTION

- Check that rpm does not change sharply when the accelerator pedal is lightly depressed while driving in “D” range on flat roads at 60 km/h (37 MPH).
- 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, and perform the check after reconfirming that there is no DTC.

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.
 - Even when checking on the free roller, the driving resistance will be slightly inadequate. It will be easier to check if the foot brake is stepped on lightly while performing the judgment.
- 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 the lock-up duty can be read on the data display of the Subaru Select Monitor.
- 5) Drive the vehicle at a constant speed of 35 — 40 km/h (22 — 25 MPH).
- 6) Read the lock-up duty while vehicle is running.

Specification:
25 — 45%

NOTE:

- The reading may be slightly lower on a free roller.
- Slip lock-up control is not operating when the lock-up duty is less than 5%, 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. CLIMBING CONTROL FUNCTION

- Check that the gear remains in 3rd when going uphill.
- Check that the gear remains in 3rd when applying the brakes while going downhill.

10. TRANSFER CLUTCH

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

11. OIL LEAKS

After the driving test, inspect for oil leaks.

5. Stall Test

A: INSPECTION

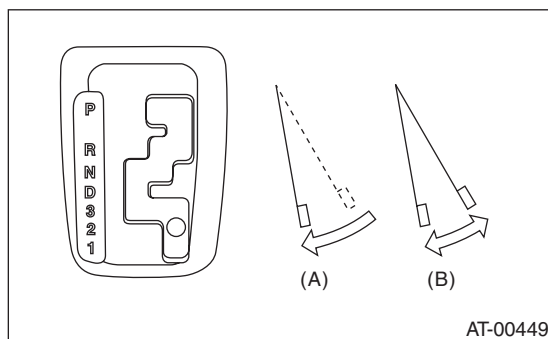
NOTE:

The stall test is extremely important in diagnosing the condition of an automatic transmission and engine. It should be conducted to measure the engine stall speeds in the “R” and “2” ranges.

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 — 80°C (158 — 176°F) by idling the engine for approximately 30 minutes (with select lever set to “N” or “P”).
- 7) Place wheel chocks at the front and rear of all wheels and apply the parking brake.
- 8) Move the manual linkage to ensure it operates properly, and shift the select lever to the “2” range.
- 9) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



(A) Brake pedal

(B) Accelerator pedal

10) When the engine speed stabilizes, quickly record the engine speed and release accelerator pedal.

11) Shift the select lever to “N” range, and cool down the engine by idling it for more than one minute.

12) If the stall speed in “2” range is higher than specifications, low clutch and 2-4 brake maybe slipping. To identify this, conduct the same test as above in “R” range.

13) Perform the stall tests with the select lever in “D” range.

NOTE:

- Do not continue the stall test for more than 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 lower than 1,200 rpm.
- 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):

Non-turbo model

2,200 — 2,700 rpm

Turbo model

2,700 — 3,200 rpm

Stall speed (at sea level)	Range	Cause
Below specified value	2, 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
	2	• Line pressure too low • Low clutch slipping • 2-4 brake slipping

6. Time Lag Test

A: INSPECTION

NOTE:

When the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before shock is felt. This is used for checking the condition of the low clutch, reverse clutch, low & reverse brake and one-way clutch.

- Perform the test at normal operation fluid temperature of 70 — 80°C (158 — 176°F).
- Be sure to allow a one minute 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: Less than 1.2 seconds

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: Less than 1.5 seconds

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 or if shifting takes place at a higher point than for normal conditions, this may be due to the line pressure being too high.

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

1) Line pressure measurement (under no load):

(1) Before measuring line pressure, jack-up all the wheels.

(2) Maintain the ATF temperature at approx. 70 — 80°C (158 — 176°F) during measurement.

(ATF will reach the temperature above after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)

2) Line pressure measurement (under heavy load):

(1) Before measuring line pressure, apply both the foot and parking brakes with all wheels chocked (same as for “stall” test conditions).

(2) Measure the line pressure when the select lever is in “R” and “2” with engine under stall conditions.

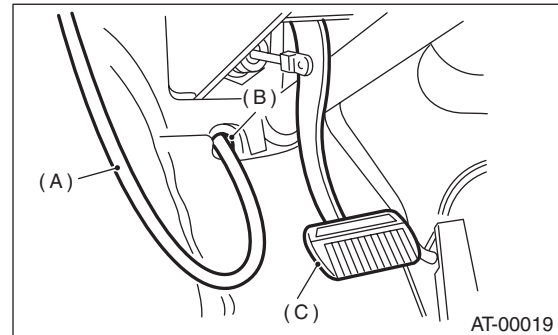
(3) Measure the line pressure within 5 seconds after shifting the select lever to each position. (If the line pressure needs to be measured again, allow the engine to idle and cool it down for more than 1 minute.)

(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) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to the engine compartment.

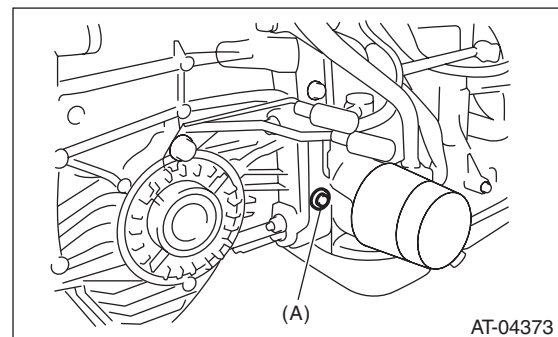
ST 498575400 OIL PRESSURE GAUGE ASSY



- (A) Pressure gauge hose
(B) Hole in toe board (blank cap hole)
(C) Brake pedal

4) Remove the test plug and install the ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



- (A) Test plug

5) Connect the ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

ST2 498575400 OIL PRESSURE GAUGE ASSY

6) Adjust the throttle position, and check for changes in duty ratio using the Subaru Select Monitor.

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position (%)	Line pressure kPa (kg/cm ² , psi)
2	25 — 35	100 (Full open)	1,000 — 1,300 (10.2 — 13.3, 145 — 189)
R	15 — 25	100 (Full open)	1,500 — 1,850 (15.3 — 18.9, 217 — 268)
D	35 — 43	0 (Fully closed)	500 — 800 (5.1 — 8.2, 73 — 116)

7) Remove the ST and attach the test plug.

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)

Transfer Clutch Pressure Test

AUTOMATIC TRANSMISSION

8. Transfer Clutch Pressure Test

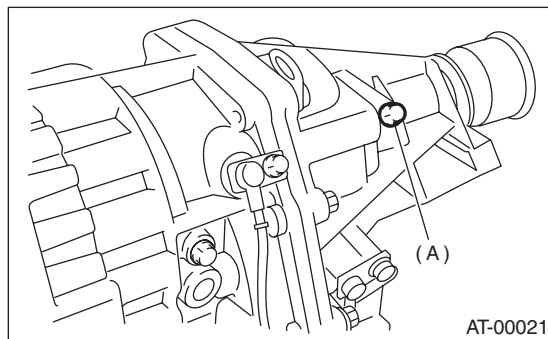
A: INSPECTION

Check the transfer clutch pressure in accordance with the following procedures, in the same manner as with line pressure. <Ref. to 4AT-34, Line Pressure Test.>

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

NOTE:

Before setting in FWD mode test, install the spare fuse on FWD mode switch. (Only models with MP-T)



(A) Test plug

NOTE:

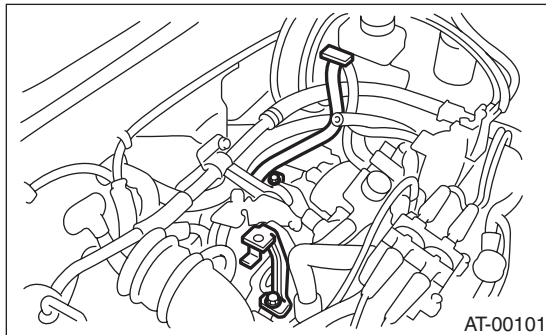
- If no oil pressure is produced or if it does not change in AWD mode, the transfer duty solenoid or the control valve body may be malfunctioning.
- If oil pressure is produced in FWD mode, there is the same problem as the AWD mode. (Only models with MP-T)

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

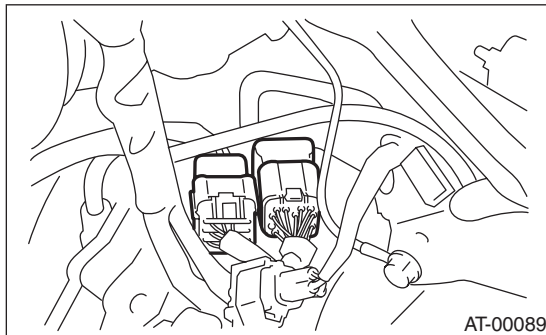
9. Automatic Transmission Assembly

A: REMOVAL

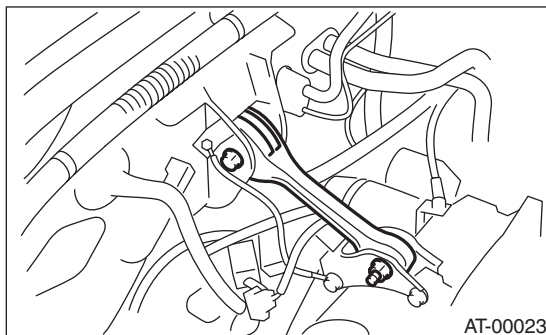
- 1) Set the vehicle on a lift.
- 2) Open the front hood and support with the hood stay.
- 3) Disconnect the ground cable from the battery.
- 4) Remove the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 5) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 6) Remove the air intake chamber stay. (Non-turbo model)



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



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

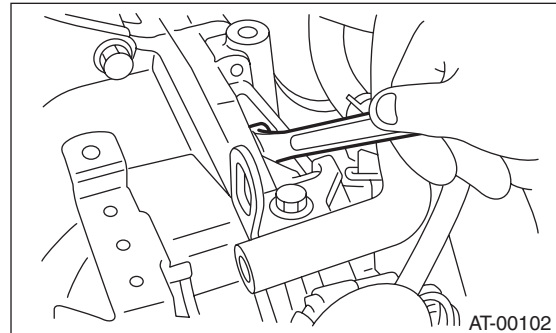


- 10) Separate the torque converter clutch assembly from the drive plate.

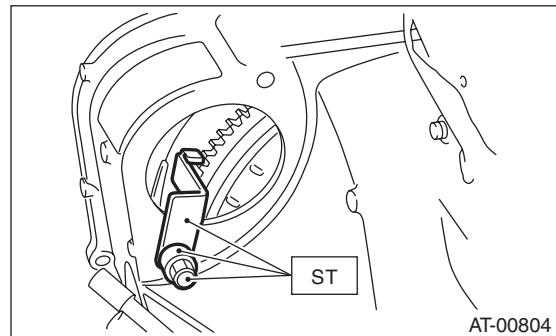
CAUTION:

- Be careful not to damage the attachment bolt.
- Be careful not to drop the removed bolt 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) Remove all the bolts by gradually rotating the crank sprocket to the same direction as the engine rotates.



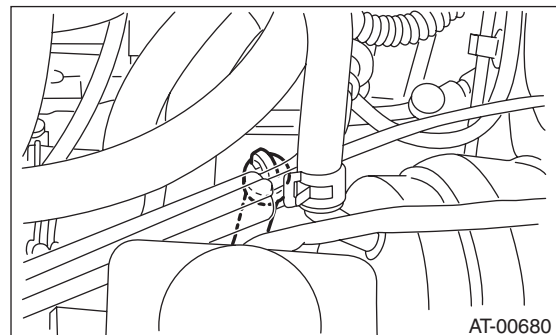
- 11) Attach the ST to the converter case.
ST 498277200 STOPPER SET



- 12) Remove the ATF level gauge.

CAUTION:

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

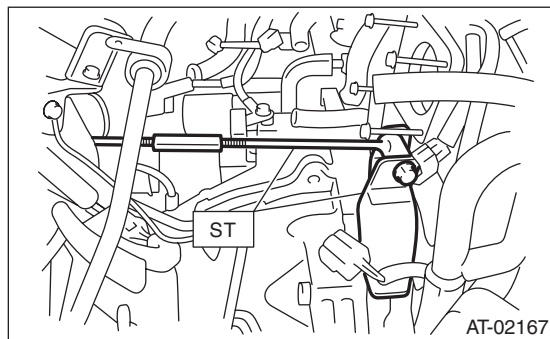


- 13) Remove the throttle body.
<Ref. to FU(H4SO)-12, REMOVAL, Throttle Body.>
- 14) Remove the pitching stopper bracket.

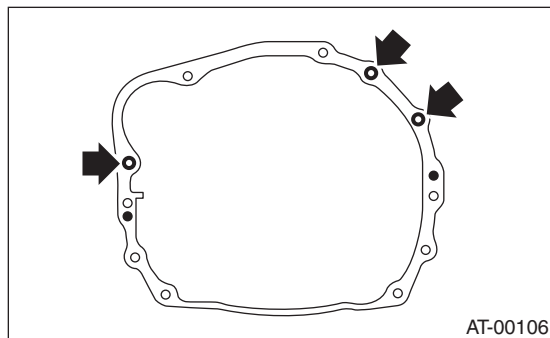
Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

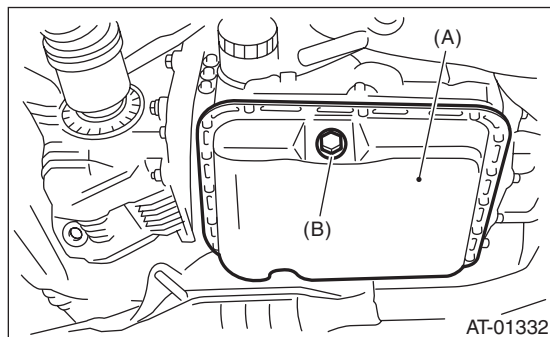
- 15) Set the ST.
ST 41099AC000 ENGINE SUPPORT ASSY



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

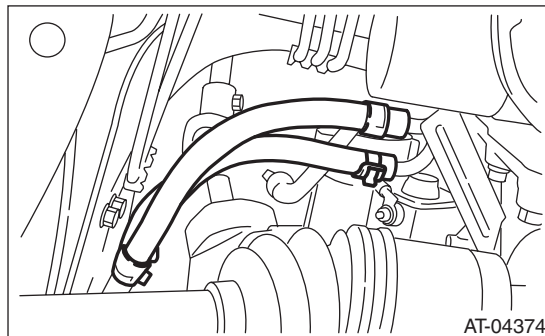


- 17) Lift up the vehicle.
18) Remove the under cover.
19) Remove the front, center and rear exhaust pipes and the muffler. (Non-turbo model)
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
20) Remove the center and rear exhaust pipes and the muffler. (Turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
21) Remove the drain plug (ATF) to drain ATF.

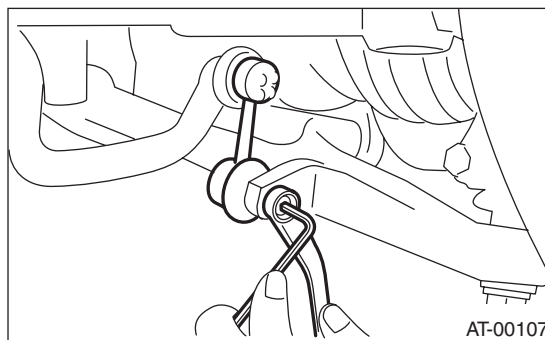


- (A) Oil pan
(B) Drain plug (ATF)

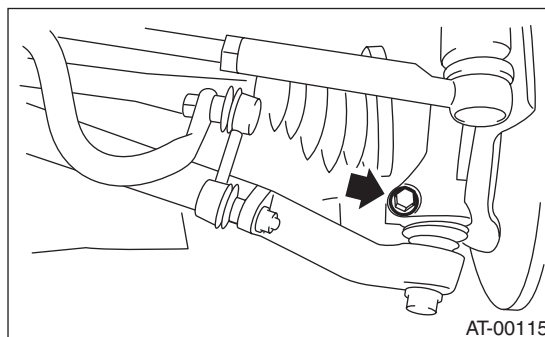
- 22) Disconnect the ATF cooler hoses from the pipes of transmission side, and remove the ATF level gauge guide.



- 23) Remove the propeller shaft.
<Ref. to DS-13, REMOVAL, Propeller Shaft.>
24) Remove the shift select cable.
<Ref. to CS-25, REMOVAL, Select Cable.>
25) Disconnect the stabilizer link from the transverse link.



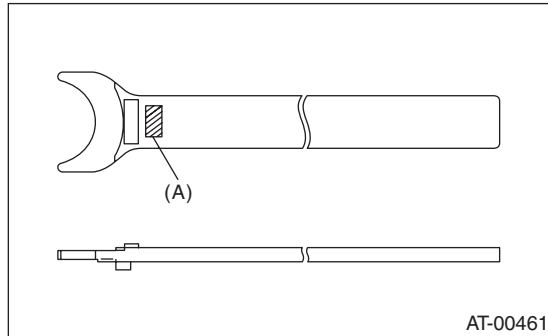
- 26) Remove the bolt securing the ball joint of the transverse link to the housing.



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

(1) Face the letters "AT" on the ST to the transmission side.

ST 28399SA000 DRIVE SHAFT REMOVER



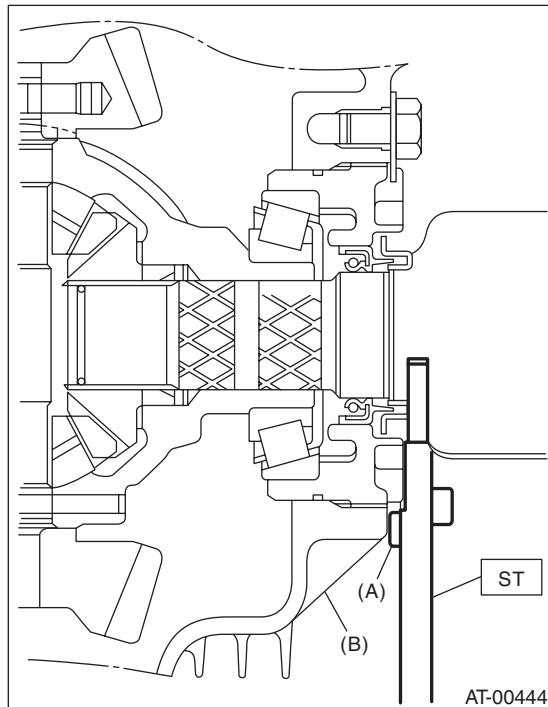
(A) Letters "AT"

(2) Insert the ST between the transmission and front drive shaft.

NOTE:

Set the protrusion of the ST to the torque converter clutch housing.

ST 28399SA000 DRIVE SHAFT REMOVER



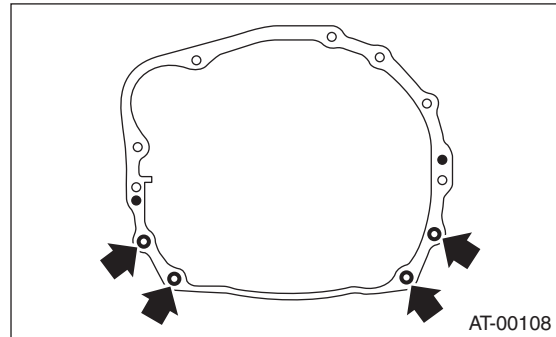
(A) Protrusion of the ST

(B) Converter case

(3) Hold the joint portion (AARi) of the front drive shaft by hand and extract the housing from the transmission by pressing it outside.

28) Remove the bolts which secure the housing cover.

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

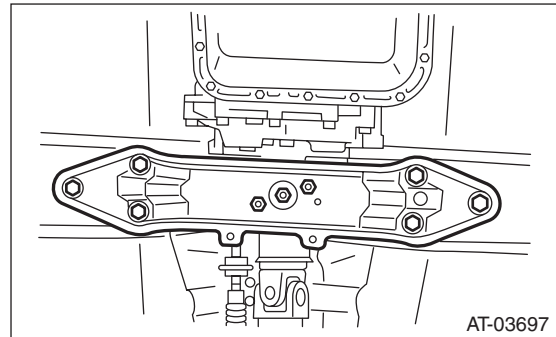


30) Place a transmission jack below the transmission.

NOTE:

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

31) Remove the transmission rear crossmember from the vehicle.

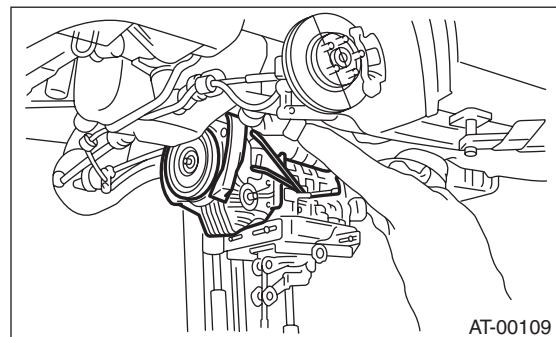


32) While lowering the transmission jack gradually, fully retract the engine support, and then tilt the engine rearward.

33) Remove the transmission.

CAUTION:

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



34) Remove the rear cushion rubber from transmission.

Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

B: INSTALLATION

1) Replace the differential side oil seal with a new part. <Ref. to 4AT-46, REPLACEMENT, Differential Side Retainer Oil Seal.>

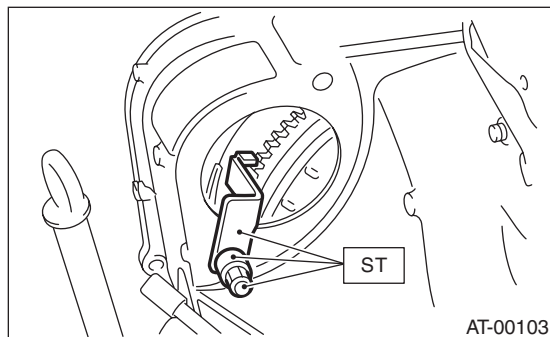
2) Install the rear cushion rubber to the transmission.

Tightening torque:

39 N·m (4.0 kgf-m, 28.8 ft-lb)

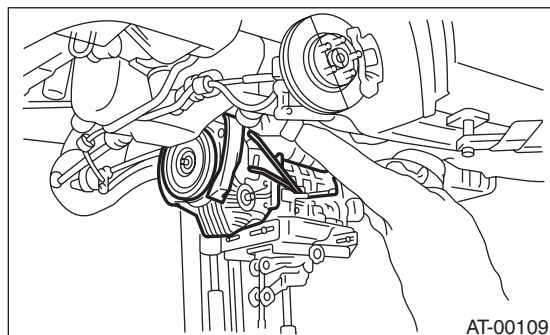
3) Attach the ST to the converter case.

ST 498277200 STOPPER SET



4) Install the transmission onto the engine.

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



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

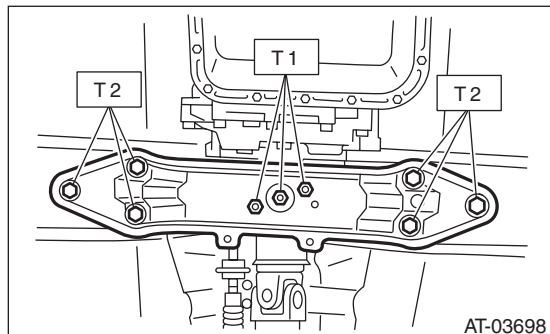
(3) While lifting up the transmission jack gradually, turn the screw of engine support, and then tilt the engine forward to joint them together.

5) 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)

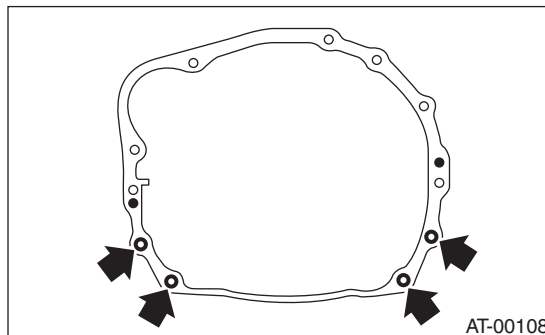


6) Remove the transmission jack.

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

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



8) Tighten the bolt of the housing cover.

9) Lower the lift.

10) Connect the engine and transmission.

(1) Remove the ST from converter case.

NOTE:

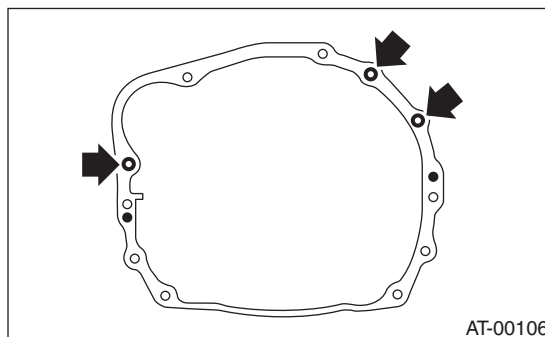
When removing the ST, be careful not to drop it into converter case.

ST 498277200 STOPPER SET

(2) 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) Install the torque converter clutch assembly to the drive plate.

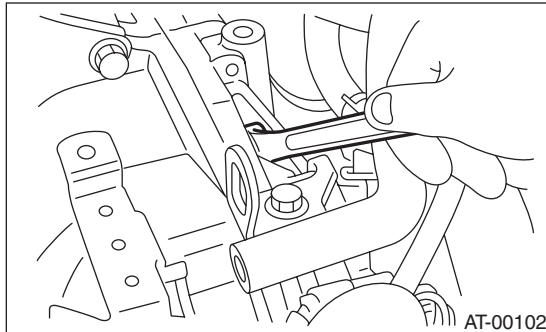
CAUTION:

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

- (1) Tighten the bolts which hold torque converter clutch assembly to the drive plate.
- (2) Tighten all the bolts by gradually rotating the crank sprocket to the same direction as the engine rotates.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

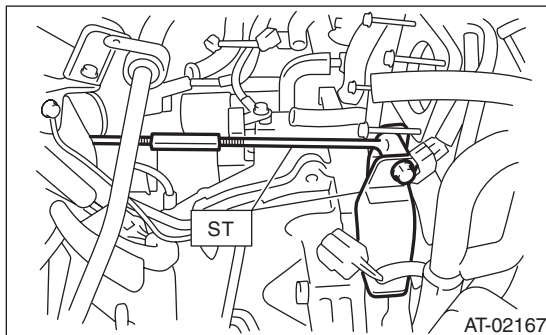


- (3) Fit the plug to service hole.

12) Install the starter.

<Ref. to SC(H4SO)-6, INSTALLATION, Starter.>

13) Remove the ST.



14) Install the pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

15) Install the throttle body.

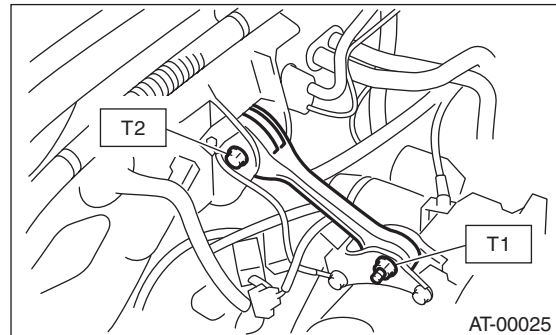
<Ref. to FU(H4SO)-12, INSTALLATION, Throttle Body.>

16) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



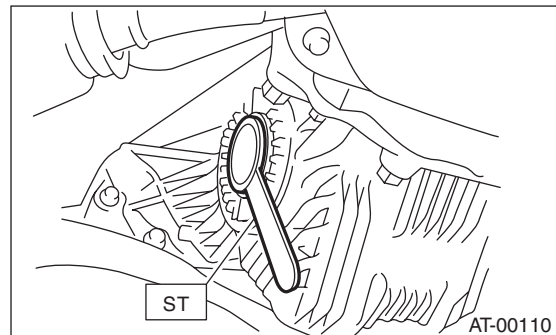
17) Lift up the vehicle.

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

19) Apply grease to the oil seal lip.

20) Attach the ST to side retainer.

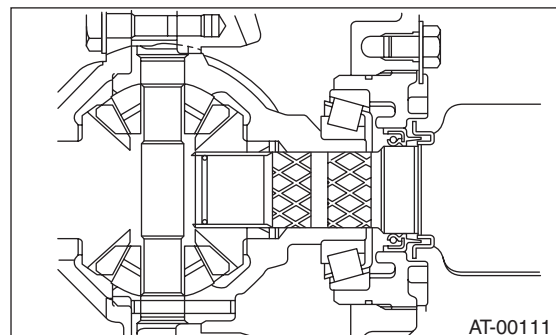
ST 28399SA010 OIL SEAL PROTECTOR



21) Align the spline portion of front drive shaft with the serration of the differential bevel gear to insert, and remove the ST.

ST 28399SA010 OIL SEAL PROTECTOR

22) Insert the front drive shaft into transmission securely by pressing the front housing.



23) Connect the ball joint to the front housing.

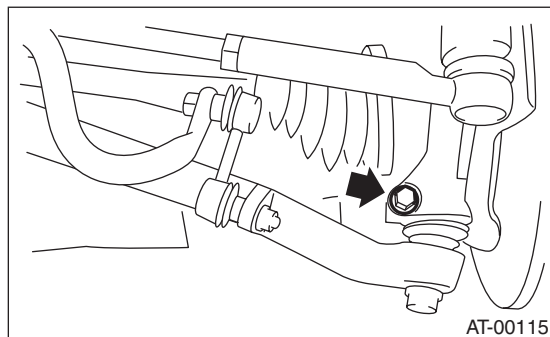
Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

24) Tighten the attachment bolts.

Tightening torque:

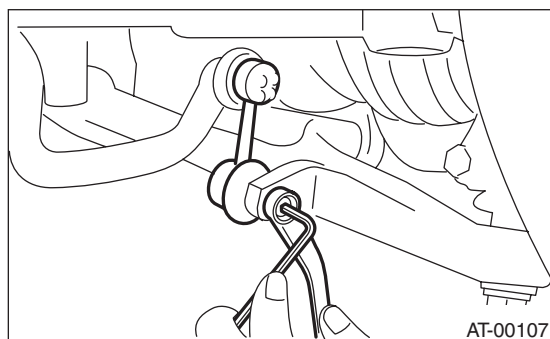
49 N·m (5.0 kgf-m, 36 ft-lb)



25) Attach the stabilizer link to the transverse link.

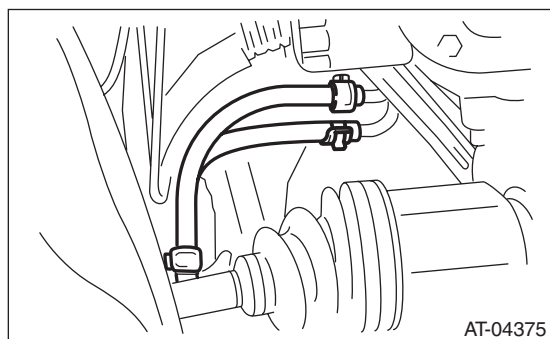
Tightening torque:

45 N·m (4.6 kgf-m, 33.2 ft-lb)



26) Install the shift select cable onto select lever.
<Ref. to CS-26, INSTALLATION, Select Cable.>

27) Connect the ATF cooler hoses to the pipe.



28) Install the oil charge pipe.

29) Install the propeller shaft.

<Ref. to DS-14, INSTALLATION, Propeller Shaft.>

30) Install the rear exhaust pipe and muffler.

- Non-turbo model

<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

- Turbo model

<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

31) Install the front and center exhaust pipe. (Non-turbo model)

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>

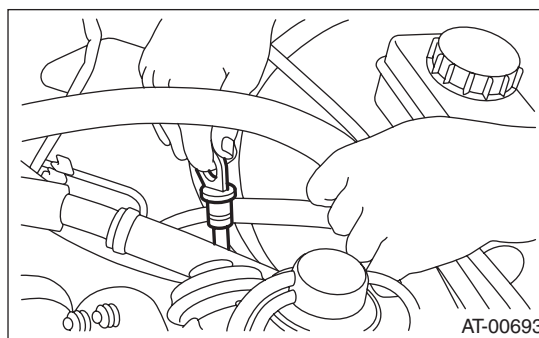
32) Install the center exhaust pipe. (Turbo model)

<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

33) Install the under cover.

34) Lower the lift.

35) Install the ATF level gauge.



36) Connect the following connectors.

- (1) Transmission harness connectors

- (2) Transmission ground terminal

37) Install the air intake chamber stay. (Non-turbo model)

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

38) Install the air intake chamber. (Non-turbo model)

<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

39) Install the intercooler. (Turbo model)

<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

40) Connect the ground cable to the battery.

41) Fill ATF from the oil charge pipe. <Ref. to 4AT-28, Automatic Transmission Fluid.>

42) Check the ATF level. <Ref. to 4AT-28, Automatic Transmission Fluid.>

43) Lower the vehicle from lift.

44) Check the select lever operation.

<Ref. to 4AT-47, INSPECTION, Inhibitor Switch.>

45) Bleed the air of control valve. <Ref. to 4AT-61, Air Bleeding of Control Valve.>

46) Execute the learning control promotion.

<Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

47) Perform the road test.

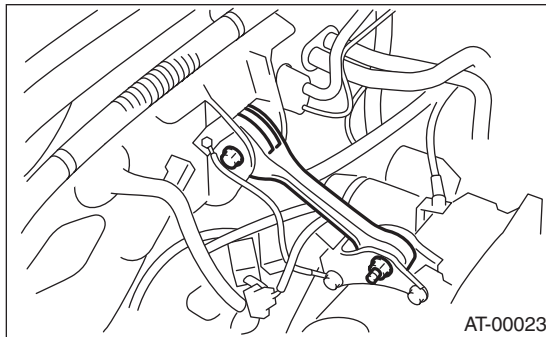
<Ref. to 4AT-31, Road Test.>

10. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

- 1) Disconnect the ground cable from the battery.
- 2) Remove the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 3) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 4) Remove the pitching stopper.



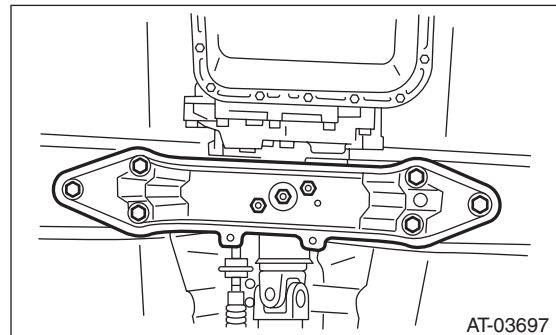
2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

- 1) Disconnect the ground cable from the battery.
- 2) Jack-up the vehicle and support it with rigid racks.
- 3) Remove the front, center and rear exhaust pipes and the muffler. (Non-turbo model)
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
- 4) Remove the center and rear exhaust pipes and the muffler. (Turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 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.

Transmission Mounting System

AUTOMATIC TRANSMISSION

B: INSTALLATION

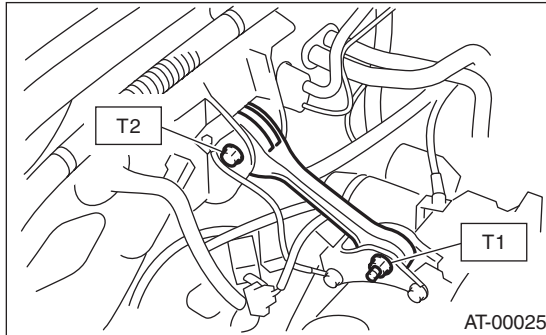
1. PITCHING STOPPER

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



- 2) Install the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>
- 3) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

- 1) Install the rear cushion rubber.

Tightening torque:

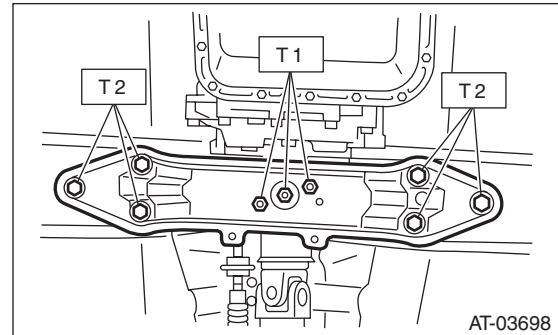
39 N·m (4.0 kgf-m, 28.8 ft-lb)

- 2) Install the transmission rear crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)



- 3) Remove the transmission jack.
- 4) Install the front, center and rear exhaust pipes, and the muffler. (Non-turbo model)
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
- 5) Install the center, rear exhaust pipes and the muffler. (Turbo model)
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

C: INSPECTION

Perform the following inspection procedures and repair or replace defective parts.

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 cross member is not bent or damaged. Check the cushion rubber for cracks, hardening or damage.

11.Extension Case Oil Seal

A: INSPECTION

Make sure that the ATF is not leaking from the transmission and propeller shaft joint. If there is leakage, replace the oil seal and check the propeller shaft. <Ref. to 4AT-45, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

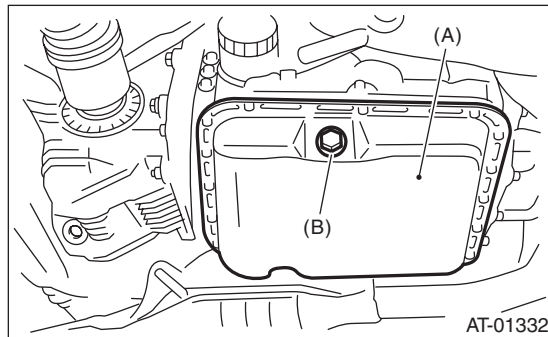
- 1) Clean the transmission exterior.
- 2) Drain the ATF completely.

NOTE:

Tighten the drain plug (ATF) after draining the ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



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

- 3) Remove the rear exhaust pipe and muffler.
 - Non-turbo model
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 - Turbo model
<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 4) Remove the propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>
- 5) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
- 6) Using the ST, install the oil seal.
ST 498057300 INSTALLER
- 7) Install the propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

- 8) Install the rear exhaust pipe and muffler.

- Non-turbo model
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

- Turbo model
<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

- 9) Pour in ATF. <Ref. to 4AT-28, Automatic Transmission Fluid.>

- 10) Bleed the air of control valve. <Ref. to 4AT-61, Air Bleeding of Control Valve.>

- 11) Check the level and leaks of the ATF. <Ref. to 4AT-28, Automatic Transmission Fluid.>

Differential Side Retainer Oil Seal

AUTOMATIC TRANSMISSION

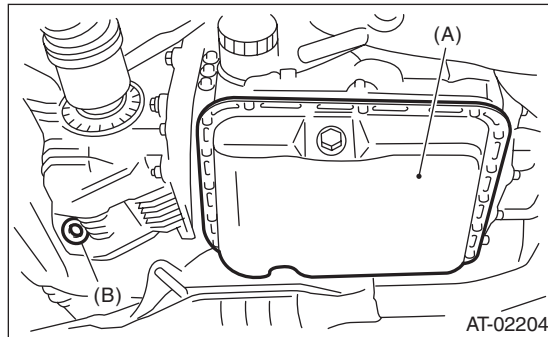
12. Differential Side Retainer Oil Seal

A: INSPECTION

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

B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Remove the front exhaust pipe and center exhaust pipe.
 - Non-turbo model
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
 - Turbo model
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 3) Remove the differential gear oil drain plug, and drain the differential gear oil.



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

- 4) Replace the gasket with a new part and tighten the differential gear oil drain plug.

Tightening torque:

Aluminum gasket

44 N·m (4.5 kgf-m, 32.5 ft-lb)

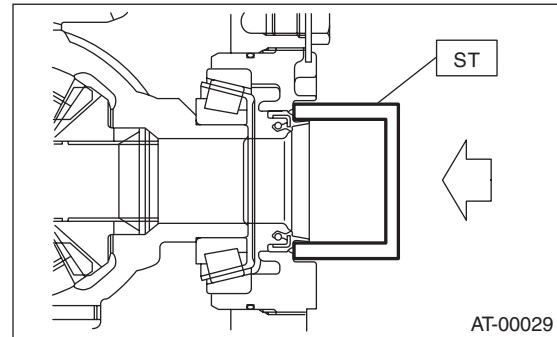
Copper gasket

70 N·m (7.2 kgf-m, 51.6 ft-lb)

- 5) Separate the front drive shaft from the transmission. <Ref. to DS-30, REMOVAL, Front Drive Shaft.>
- 6) Remove the differential side retainer oil seal using a screw driver wrapped with vinyl tape etc.

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

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



- 8) Apply oil to the oil seal lips.
- 9) Install the front drive shaft using the ST. <Ref. to DS-31, INSTALLATION, Front Drive Shaft.>
ST 28399SA010 OIL SEAL PROTECTOR
- 10) Install the front exhaust pipe and the center exhaust pipe.
 - Non-turbo model
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
 - Turbo model
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
- 11) Lower the vehicle.
- 12) Pour differential gear oil through the oil level gauge hole.

Recommended gear oil:

<Ref. to 4AT-3, SPECIFICATION, General Description.>

Gear oil capacity:

1.1 — 1.3 ℓ (1.3 — 1.4 US qt, 1.0 — 1.1 Imp qt)

- 13) Check the gear oil level. <Ref. to 4AT-30, INSPECTION, Differential Gear Oil.>

13. Inhibitor Switch

A: INSPECTION

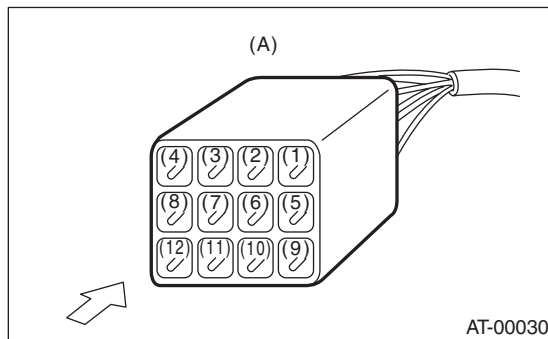
When the driving condition or starter motor operation is improper, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

- 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 ignition circuit when the select lever is in the “R”, “D”, “3”, “2” and “1” ranges.
- If the inhibitor switch does not operate, check for poor contact of the connector on transmission side.

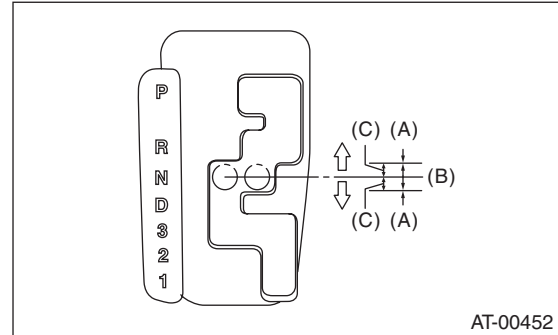
	Range	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



(A) Inhibitor switch connector

- 3) Check if there is continuity at equal points when the select lever is turned 1.5° to the “R” and “D” ranges from the “N” range.

If there is continuity in only one direction or in other points, adjust the inhibitor switch. <Ref. to 4AT-47, ADJUSTMENT, Inhibitor Switch.>



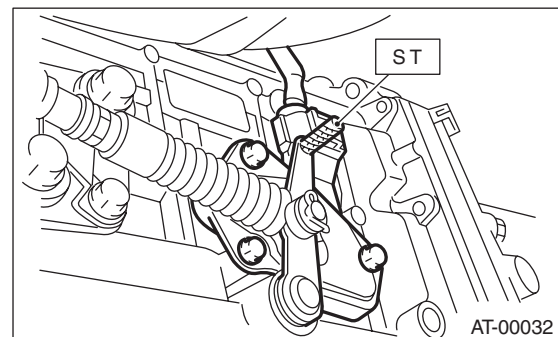
- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°

- 4) Repeat the above checks for the other ranges. If there are abnormalities, adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>

B: ADJUSTMENT

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

ST 499267300 STOPPER PIN



- 4) Tighten the three inhibitor switch assembly securing bolts.

Tightening torque:

3.4 N·m (0.35 kgf·m, 2.6 ft·lb)

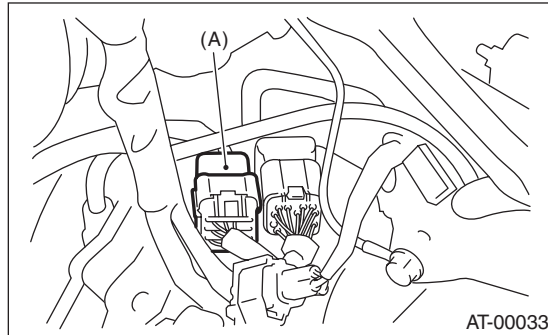
- 5) Repeat the inspections of the inhibitor switch. If the inhibitor switch is determined to be faulty, replace it. <Ref. to 4AT-47, INSPECTION, Inhibitor Switch.>

Inhibitor Switch

AUTOMATIC TRANSMISSION

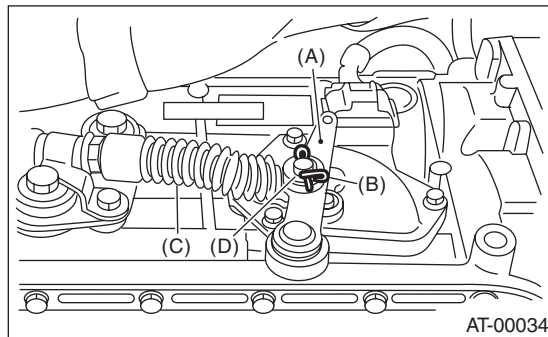
C: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Move the select lever to "N".
- 3) Remove the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 5) Disconnect the inhibitor switch connector.



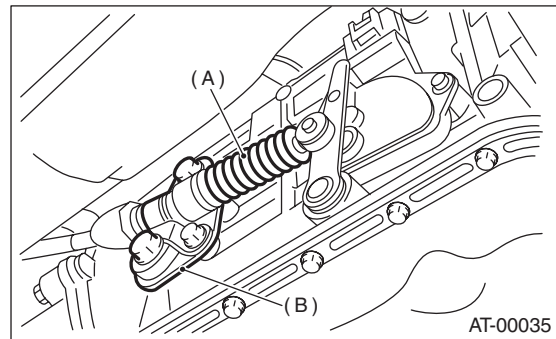
(A) Inhibitor switch connector

- 6) Remove the inhibitor switch connector from the stay.
- 7) Lift up the vehicle.
- 8) Remove the front and center exhaust pipes.
 - Non-turbo model
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
 - Turbo model
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 9) Remove the snap pin and washer from the range select lever.



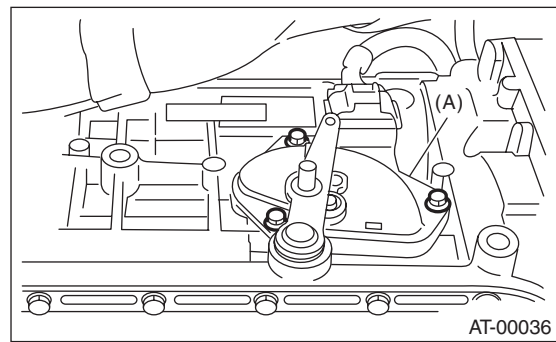
- (A) Range select lever
(B) Snap pin
(C) Select cable
(D) Washer

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



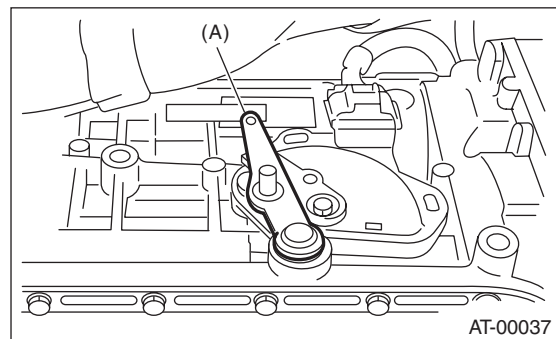
- (A) Select cable
(B) Plate ASSY

- 11) Remove the bolt.



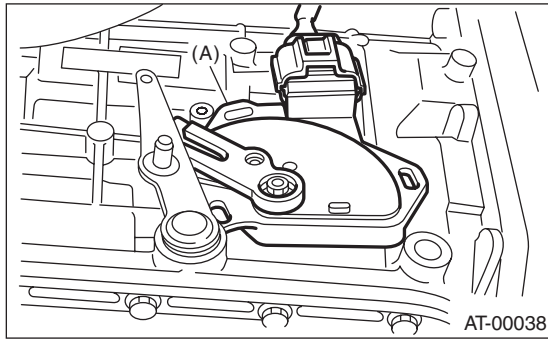
(A) Inhibitor switch ASSY

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



(A) Range select lever

- 13) Remove the inhibitor switch assembly from the transmission.

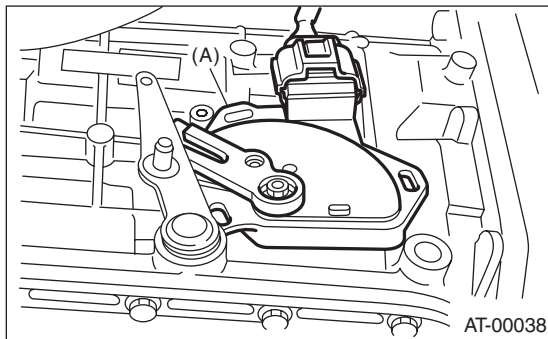


(A) Inhibitor switch ASSY

- 14) 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 assembly to the transmission case.



(A) Inhibitor switch ASSY

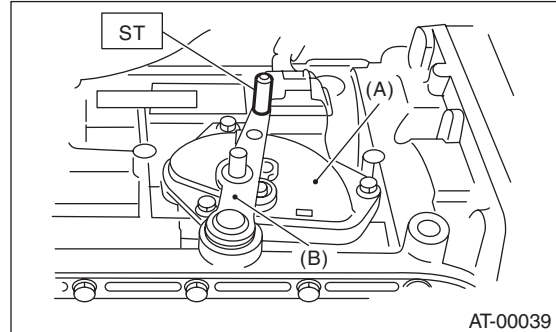
- 3) Move the range select lever to the neutral position.

- 4) Using the ST, tighten the bolts of the inhibitor switch.

ST 499267300 STOPPER PIN

Tightening torque:

3.4 N·m (0.36 kgf-m, 2.6 ft-lb)



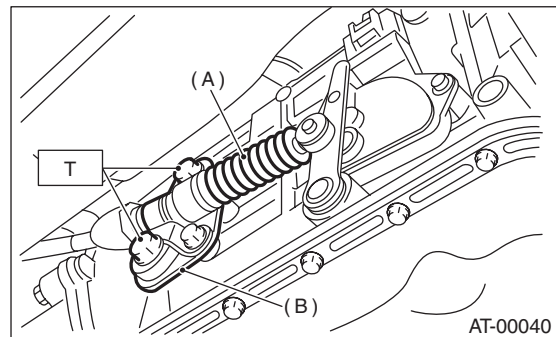
(A) Inhibitor switch ASSY

(B) Range select lever

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

Tightening torque:

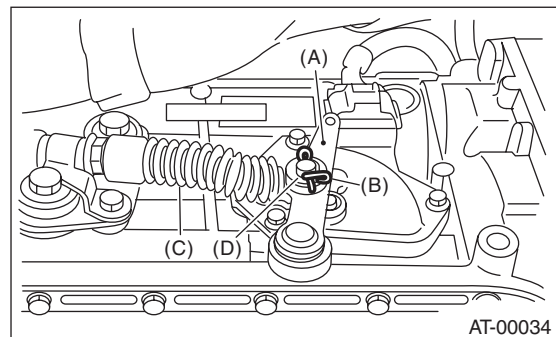
T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Select cable

(B) Plate ASSY

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



(A) Range select lever

(B) Snap pin

(C) Select cable

(D) Washer

Inhibitor Switch

AUTOMATIC TRANSMISSION

8) Install the front and center exhaust pipe.

- Non-turbo model

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>

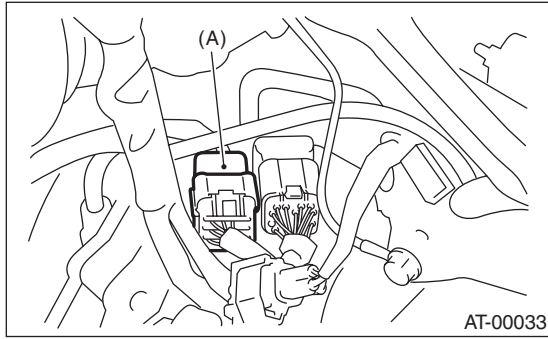
- Turbo model

<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

9) Lower the vehicle.

10) Install the inhibitor switch connector to the stay.

11) Connect the inhibitor switch connector.



(A) Inhibitor switch connector

12) Install the air intake chamber. (Non-turbo model)

<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

13) Install the intercooler. (Turbo model)

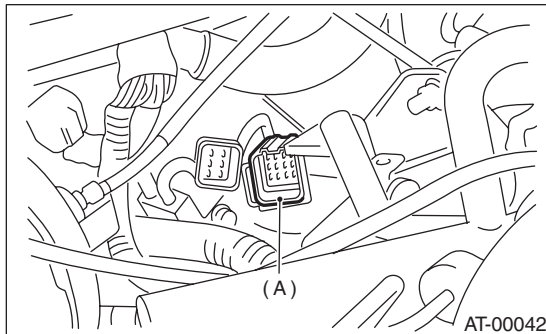
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

14) Inspect the inhibitor switch. <Ref. to 4AT-47, INSPECTION, Inhibitor Switch.>

14. Front Vehicle Speed Sensor

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.
- 3) Remove the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 5) Disconnect the transmission harness connector.



(A) Transmission harness ASSY connector

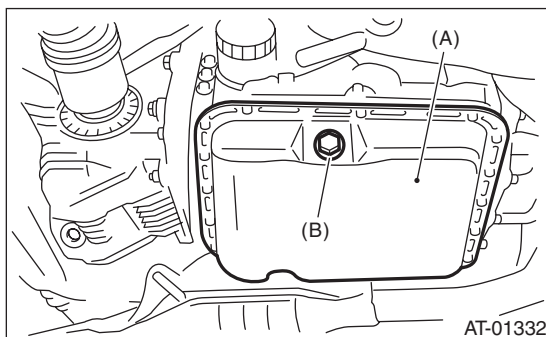
- 6) Remove the pitching stopper. <Ref. to 4AT-43, REMOVAL, Transmission Mounting System.>
- 7) Remove the transmission harness connector from stay.
- 8) Lift up the vehicle.
- 9) Clean the transmission exterior.
- 10) Drain the ATF completely.

NOTE:

Tighten the drain plug (ATF) after draining the 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. (Non-turbo model)
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>

- 12) Remove the center and rear exhaust pipes and the muffler. (Turbo model)

<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>

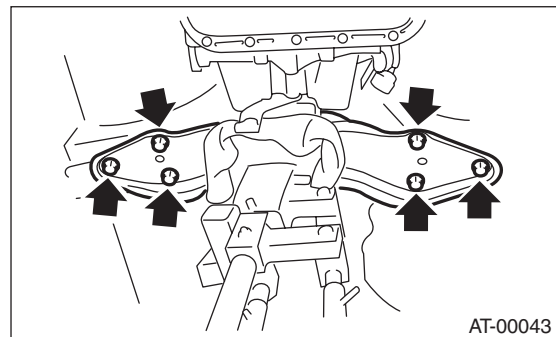
- 13) Remove the propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>

- 14) Place the transmission jack under the transmission.

NOTE:

Make sure that the support plate of transmission jack does not touch the oil pan.

- 15) Remove the transmission rear crossmember bolt.



- 16) Lower the transmission jack.

NOTE:

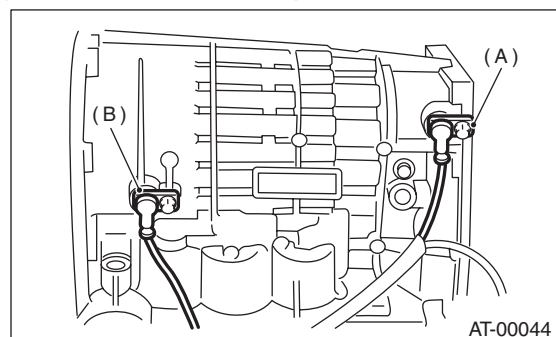
Do not separate the transmission jack and transmission.

- 17) Remove the ATF inlet and outlet pipes.

NOTE:

When removing the outlet pipe, do not lose the ball and spring used with the retaining screw.

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

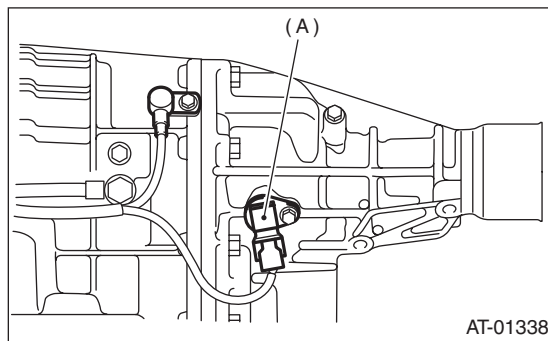


(A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

Front Vehicle Speed Sensor

AUTOMATIC TRANSMISSION

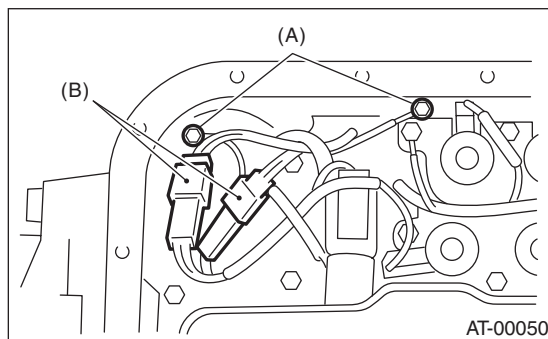
- 19) Disconnect the connector from the rear vehicle speed sensor.



(A) Rear vehicle speed sensor

- 20) Remove the oil pan.

- 21) Disconnect the control valve connector and the grounding cable.

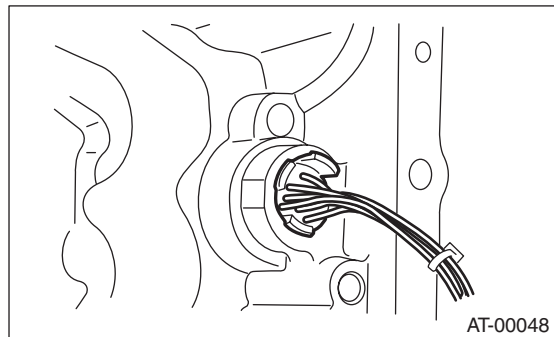


(A) Transmission ground cable
(B) Control valve connector

- 22) Remove the transmission harness assembly.

B: INSTALLATION

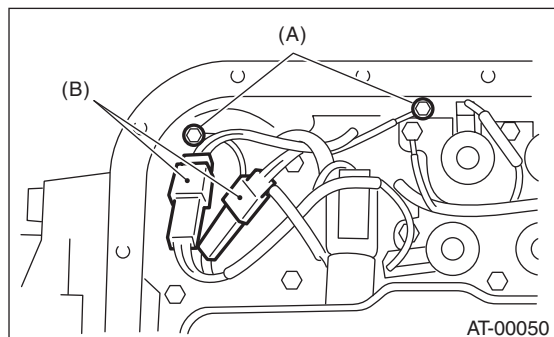
- 1) Pass the transmission harness assembly through the hole in transmission case.



- 2) Connect the control valve connector and the grounding cable.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

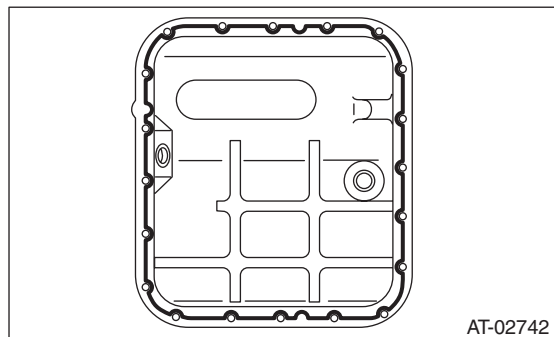


(A) Transmission ground cable
(B) Control valve connector

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

Liquid gasket:

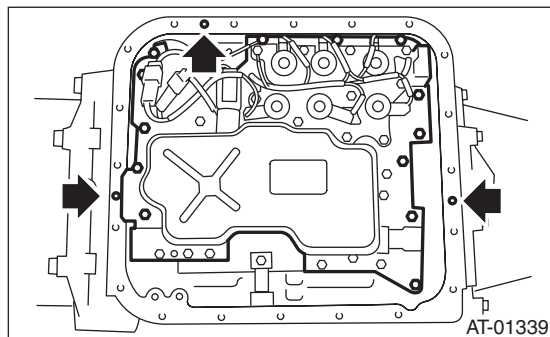
**THREE BOND 1217B (Part No. K0877YA020)
or equivalent**



4) 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**



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, 5.1 ft-lb)

7) Connect the connector to the rear vehicle speed sensor.

8) Install the ATF inlet and outlet pipes.

NOTE:

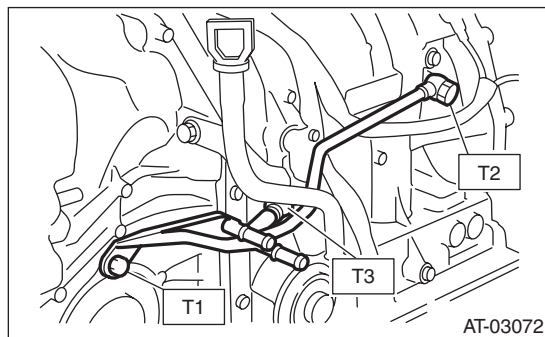
Use a new copper washer.

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)



9) Install the transmission rear crossmember bolt.

Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)

10) Install the propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

11) Install the front, center and rear exhaust pipes, and the muffler. (Non-turbo model)

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

12) Install the center, rear exhaust pipes and the muffler. (Turbo model)

<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

13) Lower the vehicle.

14) Attach the transmission harness connector to the stay.

15) Install the pitching stopper. <Ref. to 4AT-44, INSTALLATION, Transmission Mounting System.>

16) Install the air intake chamber. (Non-turbo model)

<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

17) Install the intercooler. (Turbo model)

<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

18) Pour in ATF.

<Ref. to 4AT-28, Automatic Transmission Fluid.>

19) Bleed the air of control valve.

<Ref. to 4AT-61, Air Bleeding of Control Valve.>

20) Check the level and leaks of the ATF.

<Ref. to 4AT-28, Automatic Transmission Fluid.>

21) Execute the learning control promotion.

<Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

Rear Vehicle Speed Sensor

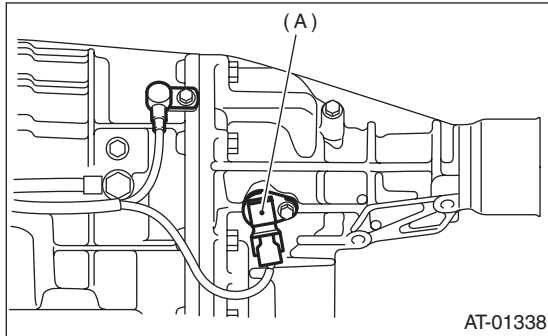
AUTOMATIC TRANSMISSION

15.Rear Vehicle Speed Sensor

A: REMOVAL

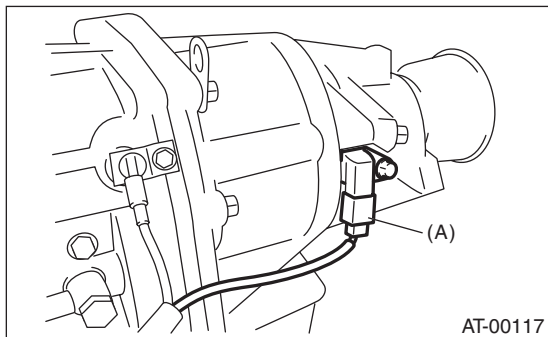
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.
- 3) Lift up the vehicle.
- 4) Disconnect the connector from the rear vehicle speed sensor.

• MP-T MODEL



(A) Rear vehicle speed sensor

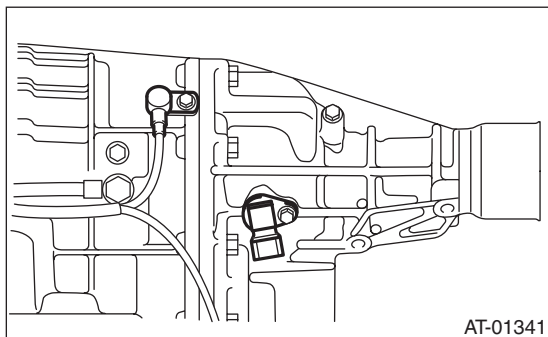
• VTD MODEL



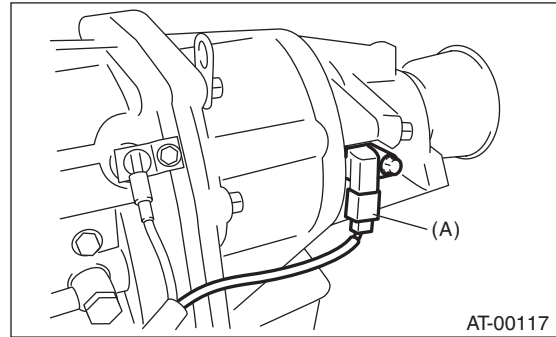
(A) Rear vehicle speed sensor

- 5) Remove the rear vehicle speed sensor.

• MP-T MODEL



• VTD MODEL



(A) Rear vehicle speed sensor

B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Replace O-ring with a new part.

Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)

16. Torque Converter Turbine Speed Sensor

A: REMOVAL

When removing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor".
<Ref. to 4AT-51, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor".
<Ref. to 4AT-52, INSTALLATION, Front Vehicle Speed Sensor.>

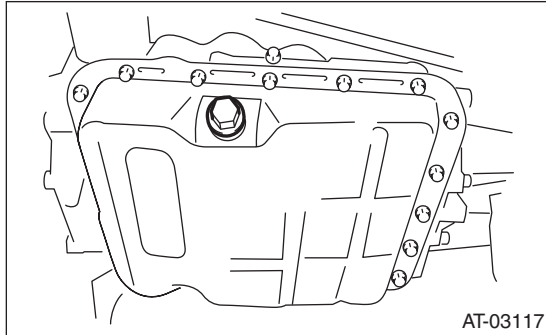
17. Control Valve Strainer

A: REMOVAL

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

CAUTION:

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



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

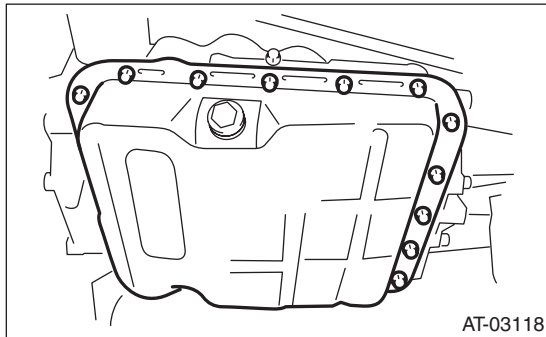
Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

- 7) Remove the oil pan.

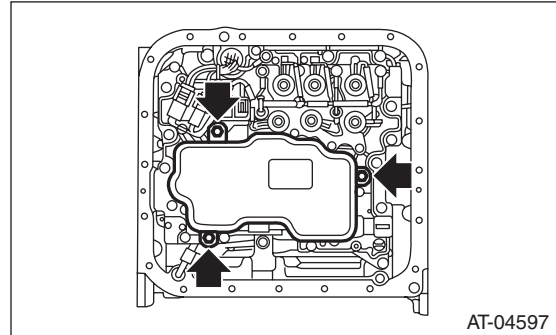
CAUTION:

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



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

- 11) Remove the control valve strainer tightening bolt, and remove control valve strainer from the control valve body.



B: INSTALLATION

- 1) Check the control valve body for dust and other foreign matter.
- 2) Mount new control valve strainer to the control valve body.

- (1) Apply ATF to the entire perimeter of the O-ring on the control valve strainer.

CAUTION:

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

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

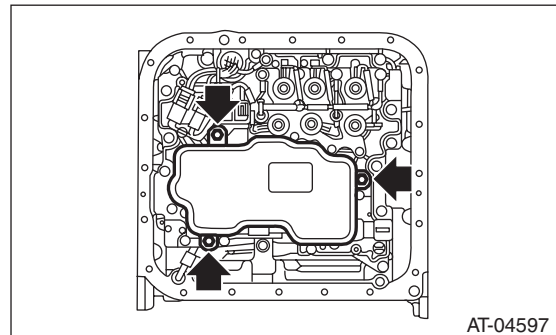
CAUTION:

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

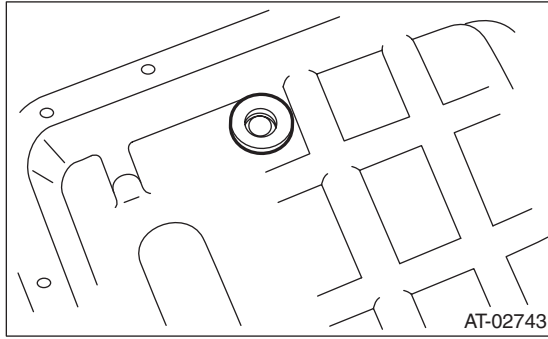
- (3) Tighten the three bolts.

Tightening torque:

10 N·m (1.0 kgf-m, 7.4 ft-lb)



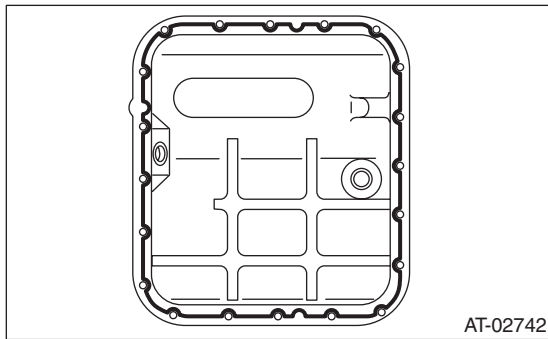
- 3) Attach the magnet at the specified position of the oil pan.



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

Liquid gasket:

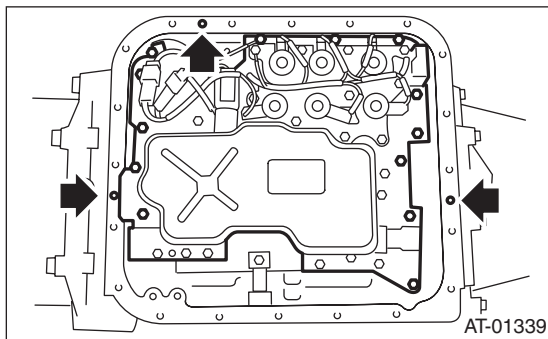
**THREE BOND 1217B (Part No. K0877YA020)
or equivalent**



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

Liquid gasket:

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



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

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

- 7) Fill ATF from the oil charge pipe.

Recommended fluid:

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

Capacity:

Fill with the same amount of ATF as drained.

- 8) Bleed the air of control valve. <Ref. to 4AT-61, Air Bleeding of Control Valve.>

- 9) Check the ATF level. <Ref. to 4AT-28, Automatic Transmission Fluid.>

C: INSPECTION

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

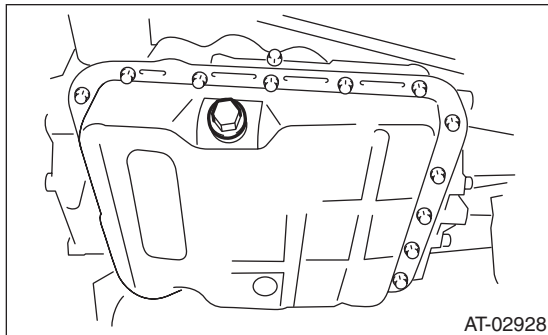
18. Control Valve Body

A: REMOVAL

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

CAUTION:

Immediately after the vehicle has been running, the ATF is very hot. Be careful not to burn yourself.



- 6) Replace the gasket with new part, and then tighten the drain plug (ATF).

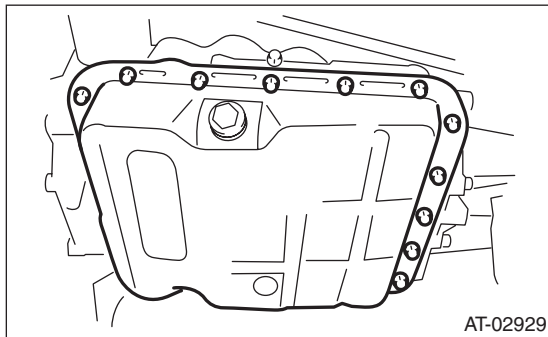
Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

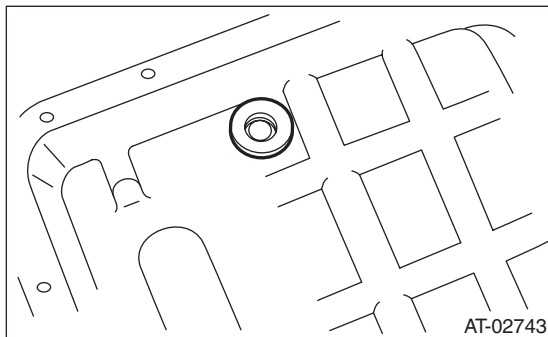
- 7) Remove the oil pan.

CAUTION:

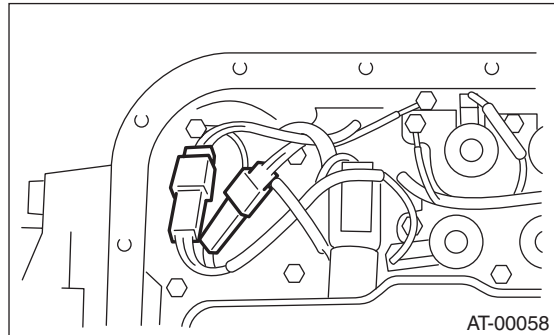
Be careful not to allow foreign matter such as dust or dirt to enter the oil pan.



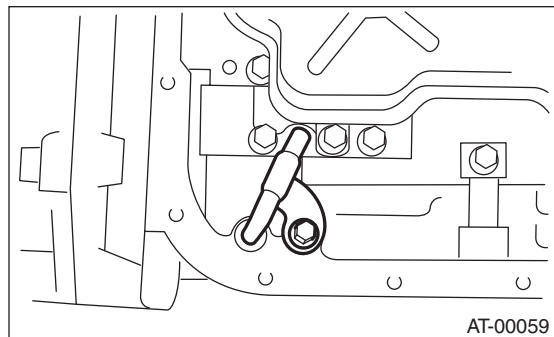
- 8) Remove the magnet.



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



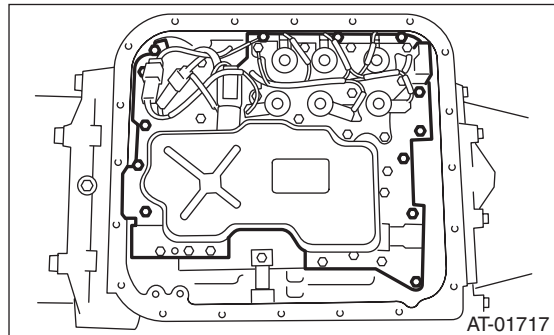
- 12) Remove the ATF cooler pipe.



- 13) Remove the control valve body.

NOTE:

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

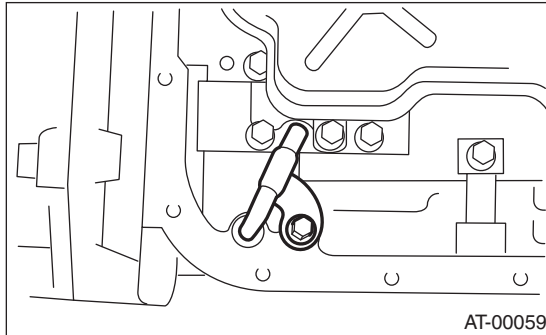


B: INSTALLATION

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

Tightening torque:

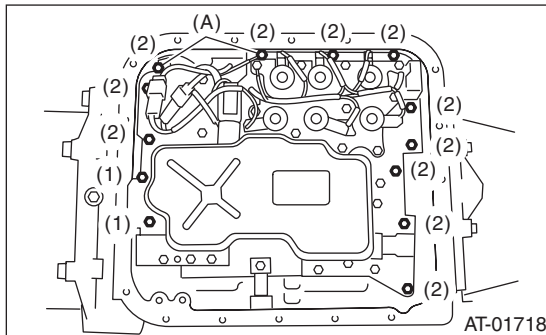
8 N·m (0.8 kgf-m, 5.8 ft-lb)



- 3) Tighten the bolts equally.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

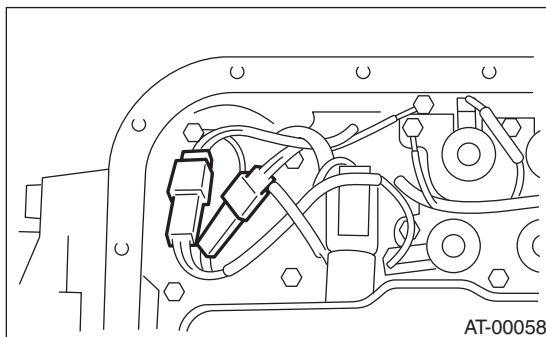


(A) Transmission ground
Bolt length mm (in)

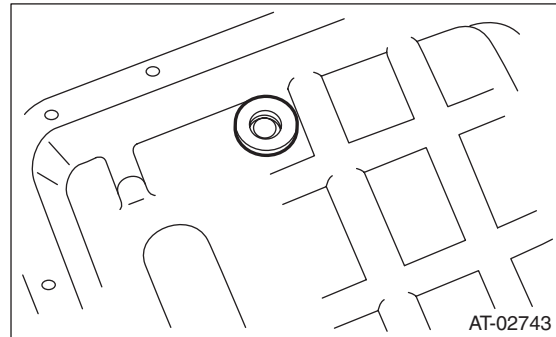
(1) 35 (1.38)

(2) 30 (1.18)

- 4) Connect the control valve connector.



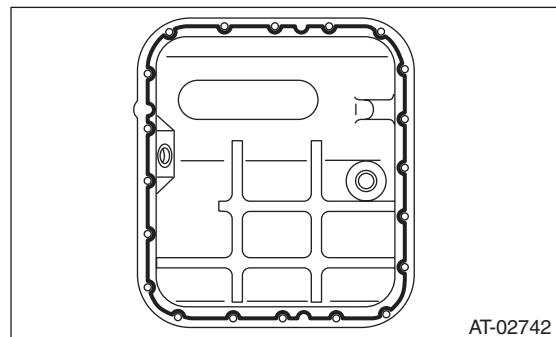
- 5) Attach the magnet at the specified position of the oil pan.



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

Liquid gasket:

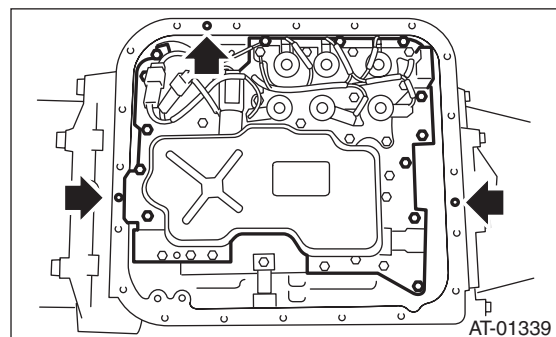
**THREE BOND 1217B (Part No. K0877YA020)
or equivalent**



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

Liquid gasket:

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



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

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

Control Valve Body

AUTOMATIC TRANSMISSION

9) Fill ATF from the oil charge pipe.

Recommended fluid:

SUBARU ATF HP

Substitute fluid:

IDEMITSU: ATF HP

CASTROL: TRANSMAX J

Capacity:

Fill with the same amount of fluid that was drained from the drain plug hole.

10) Bleed out air from the control valve body. <Ref. to 4AT-61, Air Bleeding of Control Valve.>

11) Check the ATF level. <Ref. to 4AT-28, Automatic Transmission Fluid.>

12) Execute the learning control promotion. <Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

C: INSPECTION

Make sure there are no holes, bending damage or other foreign materials on each parts.

19. 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.
- Perform the procedures according to the message displayed on the Subaru Select Monitor.

B: PROCEDURE

1. PREPARATION FOR AIR BLEEDING

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

CAUTION:

Be sure to keep the lowest edge of the tires 30 cm or more off the ground because the vehicle vibrates during the work.

- 5) Connect the Subaru Select Monitor to the data link connector.
- 6) Turn the ignition switch to ON.
- 7) Turn OFF all switches, which produce an electrical load, including headlight, air conditioner, seat heater, rear defogger, etc.

2. AIR BLEEDING

CAUTION:

Do not turn the power of the Subaru Select Monitor to OFF or disconnect the data link connector during the operation.

- 1) Select {Learning and inspection mode related to AT} on the «Transmission Diagnosis» display screen of Subaru Select Monitor.
- 2) Select {AT air bleeding mode} on the «Learning and inspection mode related to AT» display screen of Subaru Select Monitor.
- 3) Perform the procedures according to the message displayed on the Subaru Select Monitor.

NOTE:

During air bleeding in progress, AT OIL TEMP light in the combination meter starts flashing at a cycle of 2 Hz and air bleeding starts. The following message is displayed on the screen when the indicator light turns off.

Air Bleeding of Control Valve

AUTOMATIC TRANSMISSION

4) When “AT air bleeding normally ended.” is displayed, air bleeding is completed.

NOTE:

- If communication error occurs during air bleeding, retry AT air bleeding from the beginning.
- If “Execute AT learning again after fixing troubles of the vehicle” is displayed during air bleeding, select [OK] to display the “List of Diagnostics Trouble Code”. Retry AT air bleeding from the beginning after repairing the DTC detecting portion.
- If “AT air bleeding ended abnormally.” is displayed, retry AT air bleeding from the beginning.

Message	Primary cause of abnormal end
“AT air bleeding ended abnormally.”	• Fault is detected during AT air bleeding. • The accelerator pedal is depressed during AT air bleeding. • Operation which is not directed is performed during AT air bleeding. • The brake pedal is not depressed fully. • The parking brake is not applied fully. • Abnormal idle rise occurs. Other similar causes are probable.

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

20.ATF Filter

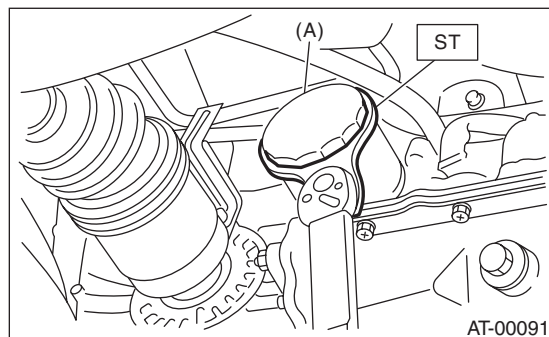
A: REMOVAL

NOTE:

The ATF filter is maintenance free.

- 1) Lift up the vehicle.
- 2) Using the ST, remove the ATF filter.

ST 498545400 OIL FILTER WRENCH



(A) ATF filter

B: INSTALLATION

- 1) Apply a thin coat of ATF to the oil seal part of new ATF filter.

- 2) Install the ATF filter. Turn it by hand, being careful not to damage oil seal.

- 3) Tighten the ATF filter using ST.

Calculate the ATF filter tightening torque using following formula.

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

T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 78 mm (3.07 in)

L2: Torque wrench length

Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	9.8 (1.0, 7.2)

NOTE:

Align the ST with the torque wrench while tightening the ATF filter.

ST 498545400 OIL FILTER WRENCH

- 4) Fill ATF.

- 5) Inspect the level of ATF. <Ref. to 4AT-28, Automatic Transmission Fluid.>

C: INSPECTION

- Replace the part if any damage is found in the inspection.
- Check for rust, holes, ATF leaks or other damage.

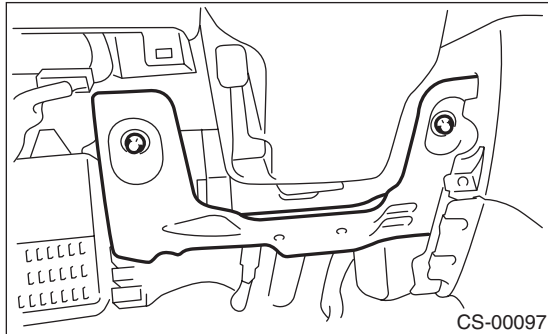
Transmission Control Module (TCM)

AUTOMATIC TRANSMISSION

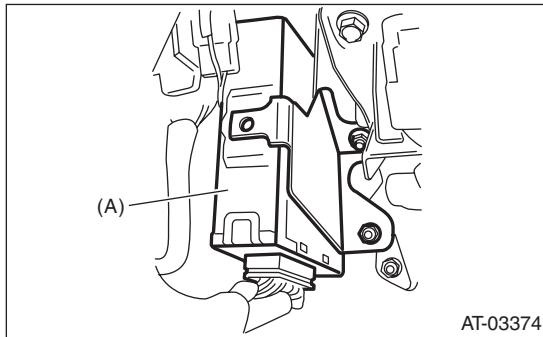
21. Transmission Control Module (TCM)

A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the lower cover and then disconnect the connector.
- 3) Remove the knee bolster.



- 4) Disconnect the connector from TCM.



(A) Transmission control module (TCM)

- 5) Remove the TCM.

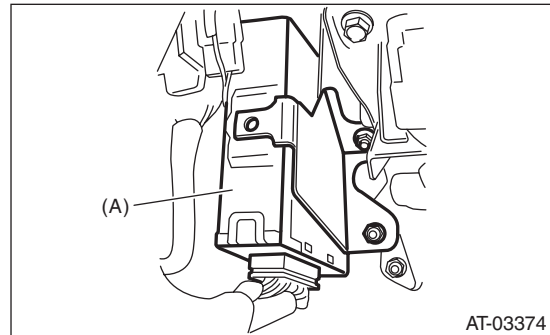
B: INSTALLATION

- 1) Install the TCM.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

- 2) Connect the connector to TCM.



(A) Transmission control module (TCM)

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

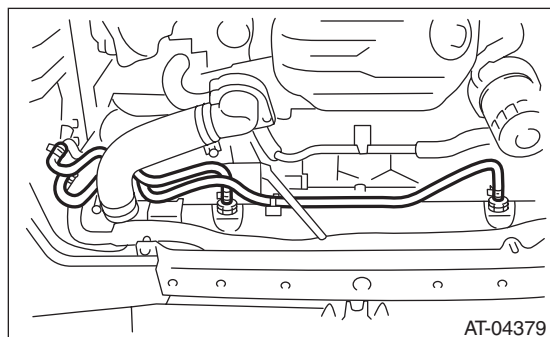
22.ATF Cooler Pipe and Hose

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Remove the battery and washer tank.
- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Disconnect the ATF cooler hose from the radiator. (Turbo model) <Ref. to CO(H4SO)-26, TURBO MODEL, REMOVAL, Radiator.>
- 6) Disconnect the ATF cooler hose from the radiator. (Non-turbo model)

NOTE:

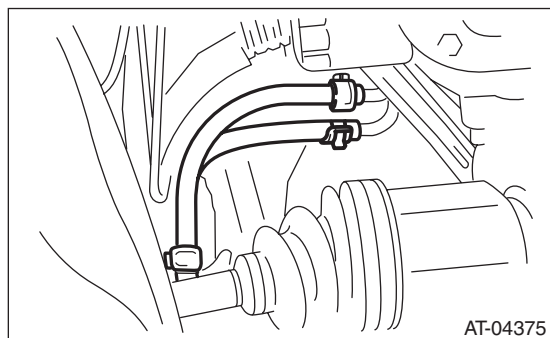
- Do not use a screwdriver or other pointed tools.
- If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.



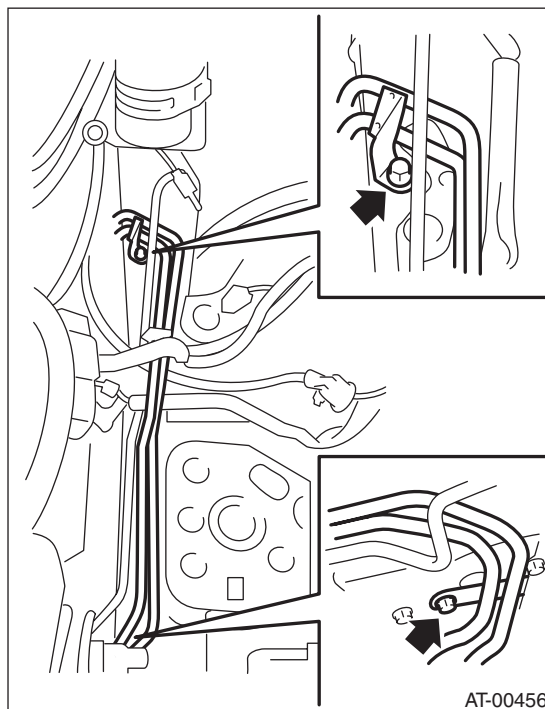
- 7) Disconnect the ATF cooler hoses from the pipes.

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.



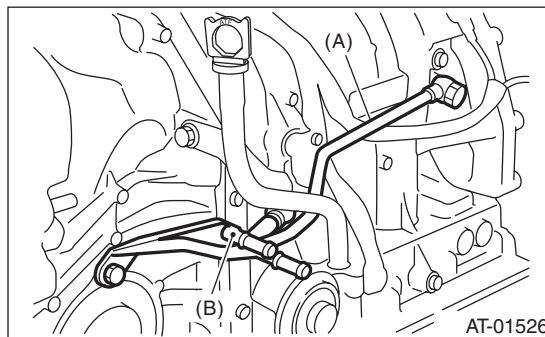
- 8) Disconnect the ATF cooler pipe from frame.



- 9) Remove the ATF inlet and outlet pipes.

NOTE:

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



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

ATF Cooler Pipe and Hose

AUTOMATIC TRANSMISSION

B: INSTALLATION

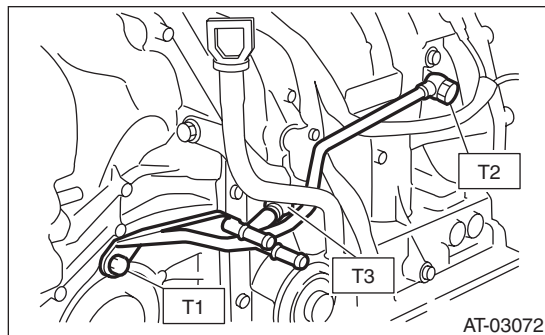
1) Install the ATF inlet and outlet pipes with the new washer.

Tightening torque:

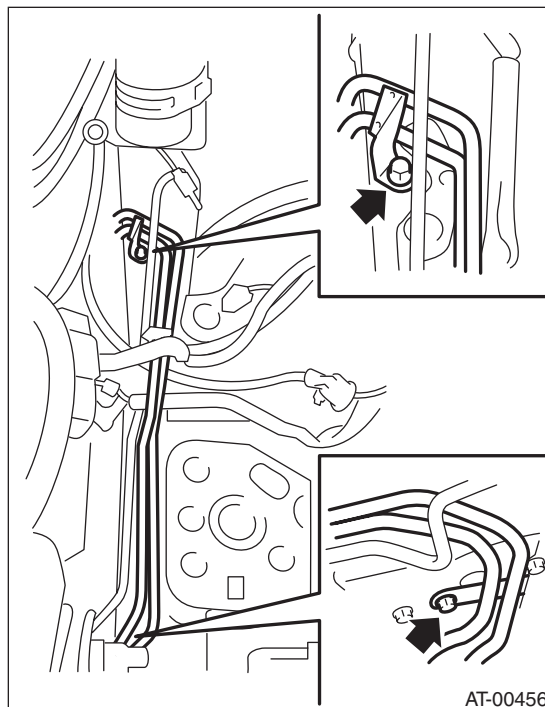
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)

T3: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



2) Install the ATF cooler pipe to frame.

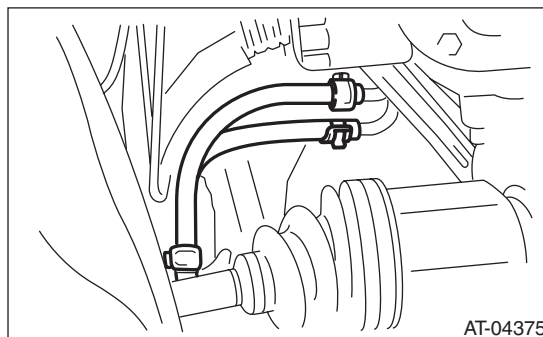


3) Connect the ATF cooler hose to the pipe on the transmission side.

NOTE:

- Install so that the hose is not folded over, excessively bent or twisted.

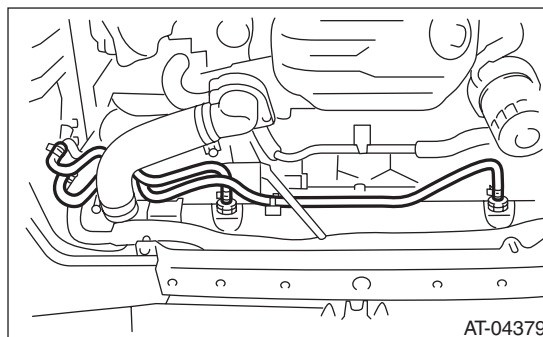
- Insert the hose to the specified position.



4) Connect the ATF cooler hose to the pipe on the radiator side. (Non-turbo model)

NOTE:

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



5) Connect the ATF cooler hose to the pipe on the radiator side. (Turbo model) <Ref. to CO(H4SO)-29, TURBO MODEL, INSTALLATION, Radiator.>

6) Install the under cover.

7) Install the battery and washer tank.

8) Fill ATF. <Ref. to 4AT-28, Automatic Transmission Fluid.>

NOTE:

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

C: INSPECTION

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

- 1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
- 2) Check the clamp for deformation.
- 3) Lightly bend the hose and check for cracks in the surface and other damage.
- 4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
- 5) Check for peeling, cracks, and deformation at the tip of the hose.

23. Air Breather Hose

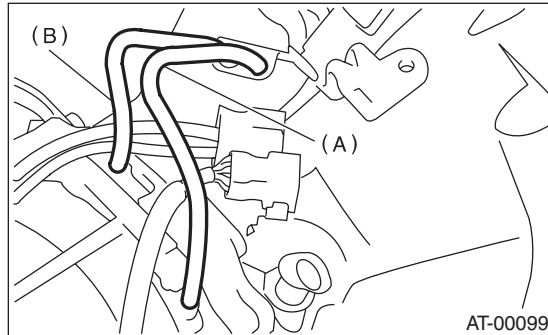
A: REMOVAL

1) Remove the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>

2) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>

3) Disconnect the air breather hose.

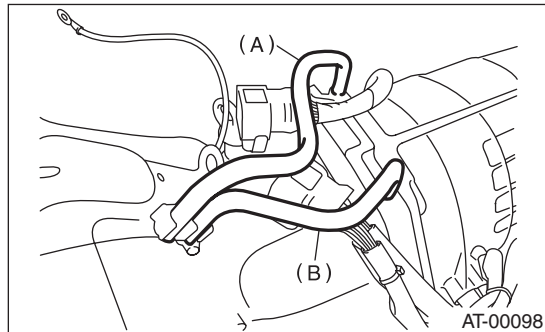
- Non-turbo model



(A) Air breather hose (Transmission case)

(B) Air breather hose (Oil pump housing)

- Turbo model



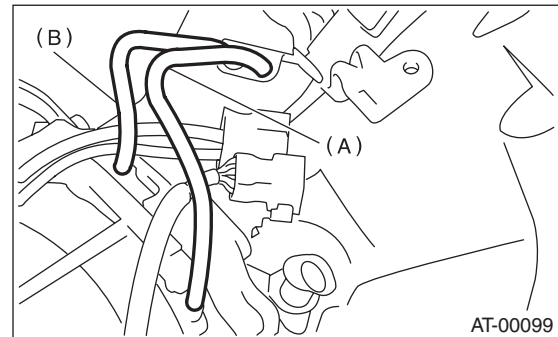
(A) Air breather hose (Transmission case)

(B) Air breather hose (Oil pump housing)

B: INSTALLATION

1) Install the air breather hose.

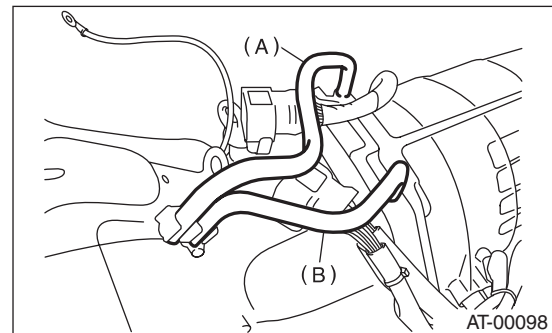
- Non-turbo model



(A) Air breather hose (Transmission case)

(B) Air breather hose (Oil pump housing)

- Turbo model



(A) Air breather hose (Transmission case)

(B) Air breather hose (Oil pump housing)

2) Install the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

3) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

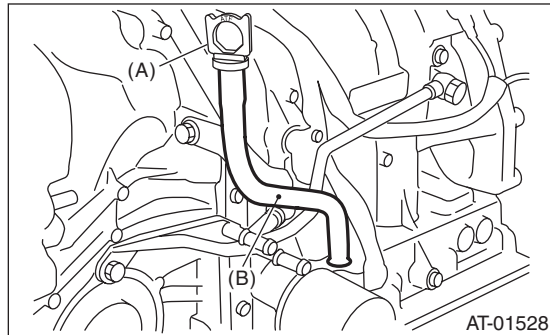
C: INSPECTION

Make sure the hose is not cracked or clogged.

24.Oil Charge Pipe

A: REMOVAL

- 1) Remove the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 2) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 3) Remove the oil charge pipe, then remove the O-ring from the flange side.



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

B: INSTALLATION

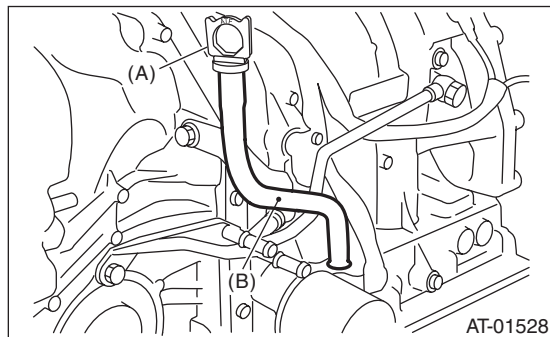
- 1) Install the oil charger pipe with a new O-ring.

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. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>
- 3) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

C: INSPECTION

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

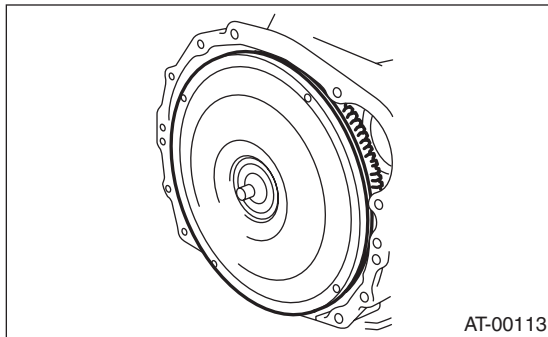
25. Torque Converter Clutch Assembly

A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter assembly and oil pump shaft horizontally.

NOTE:

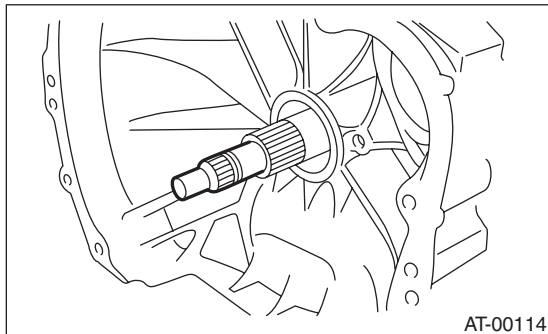
Do not scratch the inner surface of the bushing in oil pump shaft.



- 3) Remove the input shaft.

NOTE:

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



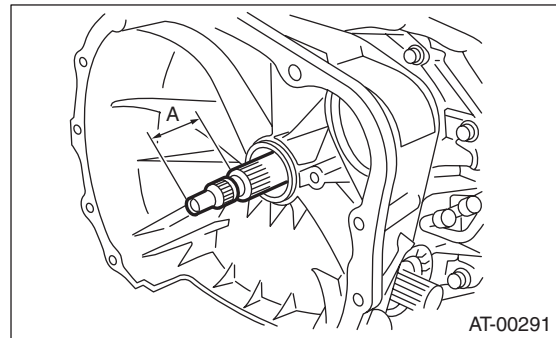
- 4) Remove the clip from torque converter clutch assembly.

B: INSTALLATION

- 1) Install the clip to the converter case.
- 2) Install the oil pump shaft to the torque converter clutch assembly, and then make sure the clip is secured on the groove.
- 3) Insert the input shaft while rotating it lightly by hand, and then check the amount of protrusion.

Normal protrusion A:

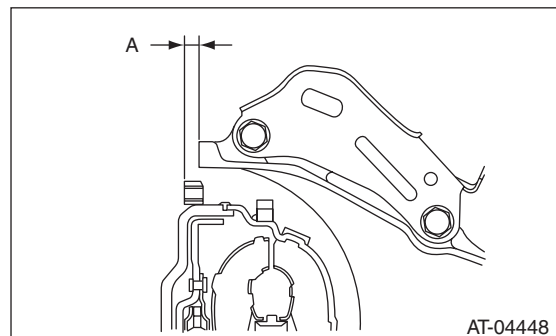
50 — 55 mm (1.97 — 2.17 in)



- 4) Hold the torque converter clutch assembly by hand and carefully install it to the converter case. Be careful not to damage the bushing. Do not allow the oil pump shaft bushing to touch the stator shaft part of the oil pump cover inappropriately.
- 5) Turn the oil pump shaft lightly by hand to engage the spline securely, and then check the converter case and torque converter clutch assembly dimension A.

Dimension A:

2.7 — 2.9 mm (0.106 — 0.114 in)



- 6) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

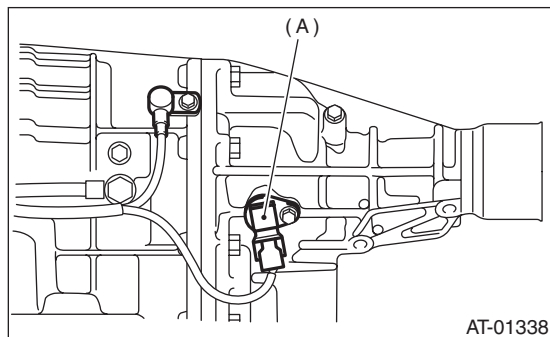
26.Extension Case

A: REMOVAL

1) Remove the transmission assembly.
<Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>

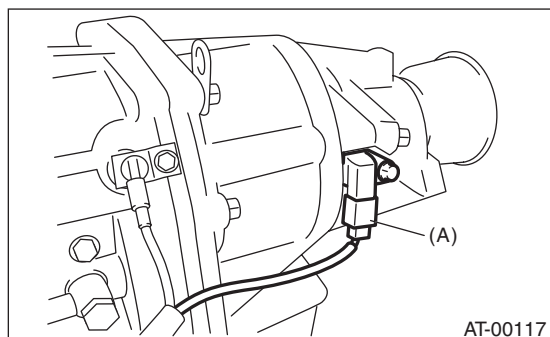
2) Remove the rear vehicle speed sensor.

• MP-T MODEL



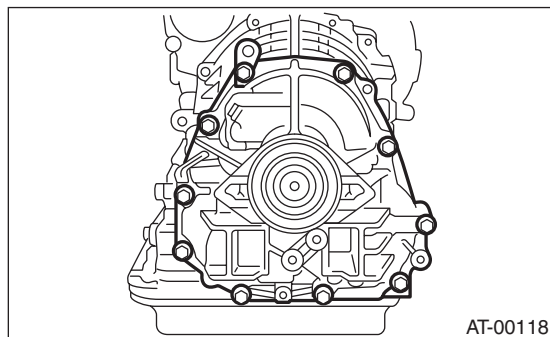
(A) Rear vehicle speed sensor

• VTD MODEL



(A) Rear vehicle speed sensor

3) Separate the transmission case and extension case section.



B: INSTALLATION

1) Apply vaseline to the selected thrust needle bearing, and install to the reduction drive gear end surface. <Ref. to 4AT-78, ADJUSTMENT, Transfer Clutch.>

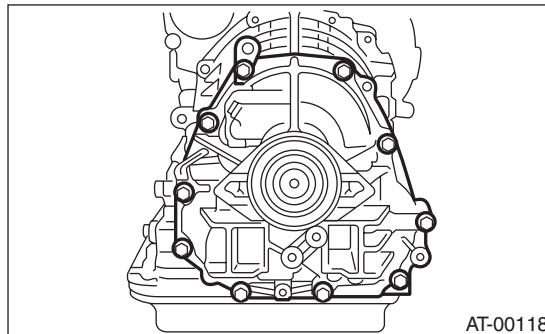
NOTE:

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)

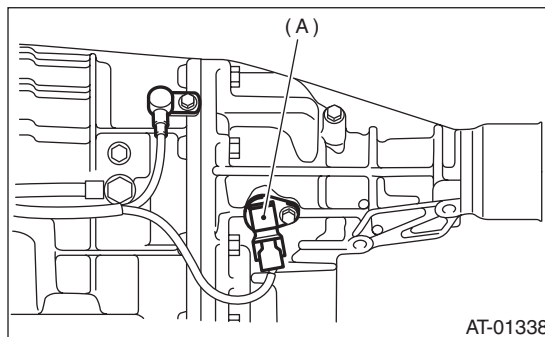


5) Install the rear vehicle speed sensor.

Tightening torque:

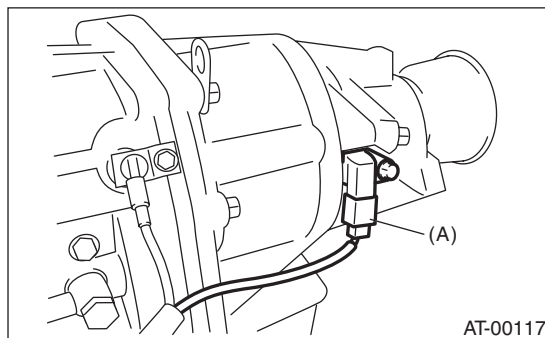
7 N·m (0.7 kgf-m, 5.1 ft-lb)

• MP-T MODEL



(A) Rear vehicle speed sensor

• VTD MODEL



(A) Rear vehicle speed sensor

6) Install the transmission assembly. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

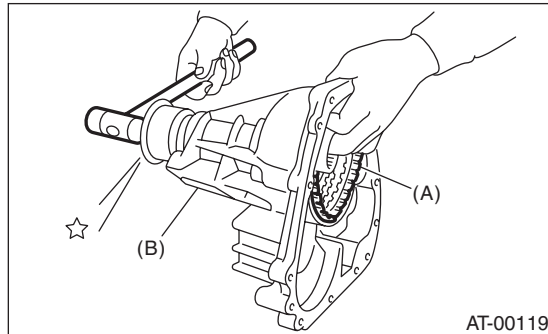
C: DISASSEMBLY

1. MP-T MODEL

1) Take out the transfer clutch assembly by lightly tapping the end of rear drive shaft with a plastic hammer.

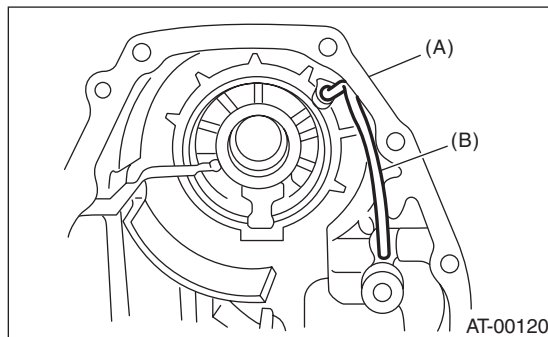
NOTE:

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



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

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



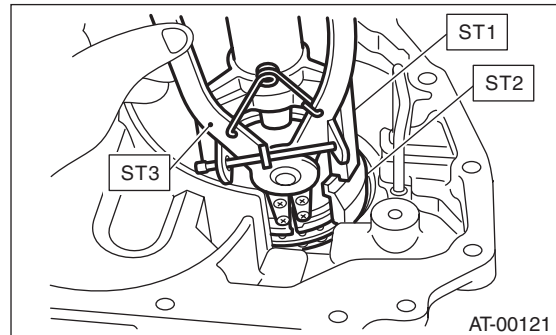
- (A) Extension case
- (B) Transfer clutch pipe

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

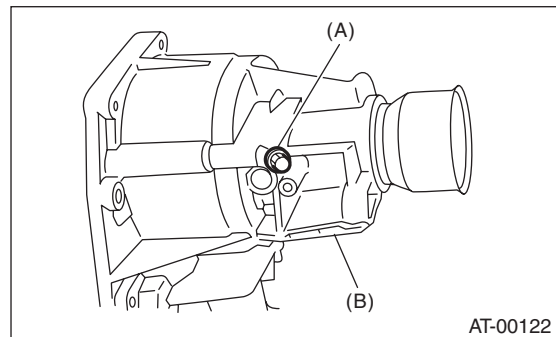
2. VTD MODEL

1) Remove the snap ring using ST1, ST2, ST3 and a press.

- ST1 398673600 COMPRESSOR
- ST2 498627100 SEAT
- ST3 398663600 PLIERS

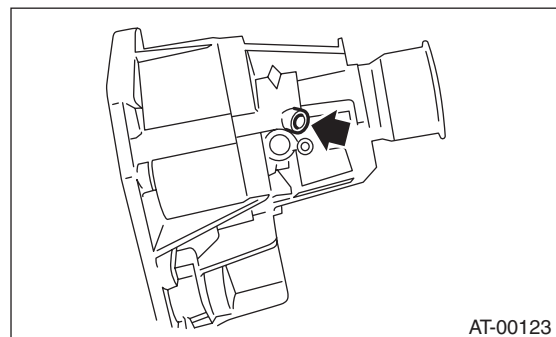


2) Remove the test plug.



- (A) Test plug
- (B) Extension case

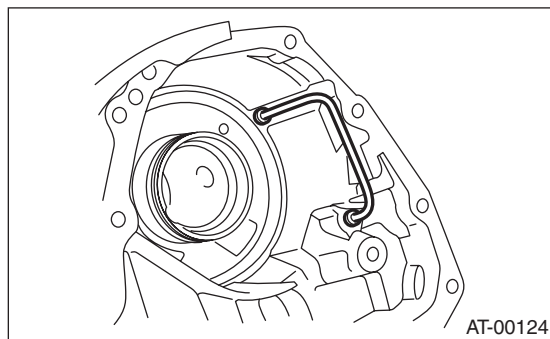
3) Remove the clutch piston using compressed air.



Extension Case

AUTOMATIC TRANSMISSION

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

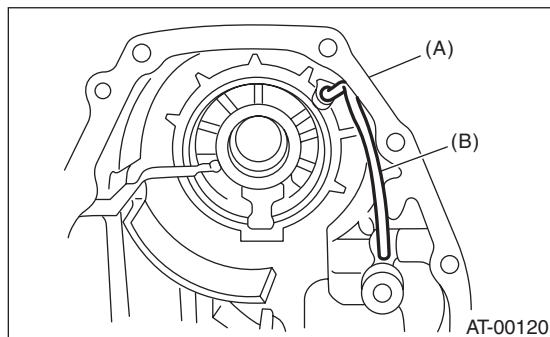


- 5) Remove the dust cover from extension case.
6) Remove the oil seal from the extension case.

D: ASSEMBLY

1. MP-T MODEL

- 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.

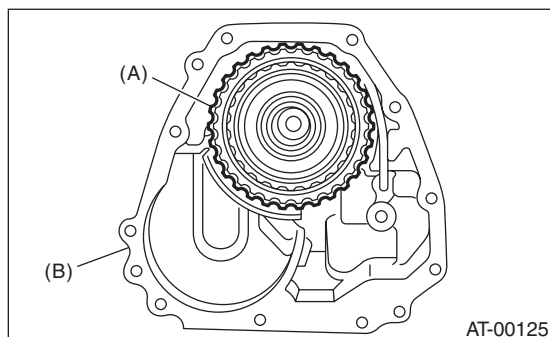


- (A) Extension case
(B) Transfer clutch pipe

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

NOTE:

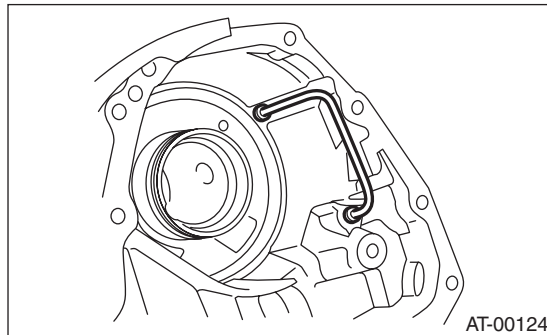
- Be careful not to damage the seal ring.
- Press-fit the transfer clutch assembly to bottom of bearing shoulder completely.



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

2. VTD MODEL

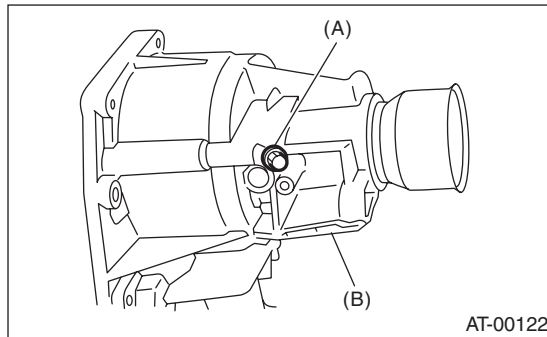
- 1) Press-fit the new oil seal using ST and the press.
ST 498057300 INSTALLER
2) Press-fit the dust cover.
3) Install the transfer clutch pipe to the extension case while being careful not to deform the pipe.



- 4) Install the test plug.

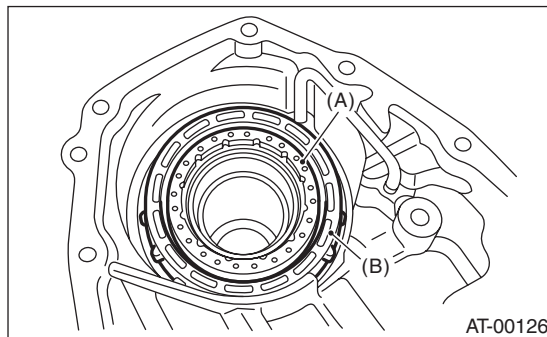
Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)



- (A) Test plug
(B) Extension case

- 5) Insert the multi-plate clutch, drive plate, driven plate and spring retainer.



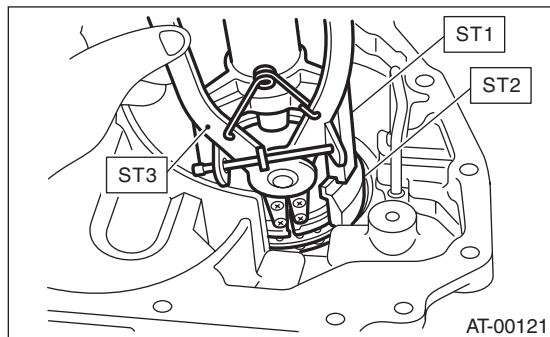
- (A) Spring retainer
(B) Multi-plate clutch (LSD) piston ASSY

6) Install the snap ring using ST1, ST2 and ST3.

ST1 398673600 COMPRESSOR

ST2 498627100 SEAT

ST3 398663600 PLIERS



E: INSPECTION

- Use an air compressor to check that the transfer pipe and extension case routes are not clogged and are not leaking.
- Inspect the extension end play, and adjust it to be within the standard value. <Ref. to 4AT-78, ADJUSTMENT, Transfer Clutch.>

MP-T MODEL

<Ref. to 4AT-78, MP-T MODEL, ADJUSTMENT, Transfer Clutch.>

VTD MODEL

<Ref. to 4AT-78, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

Transfer Clutch

AUTOMATIC TRANSMISSION

27. Transfer Clutch

A: REMOVAL

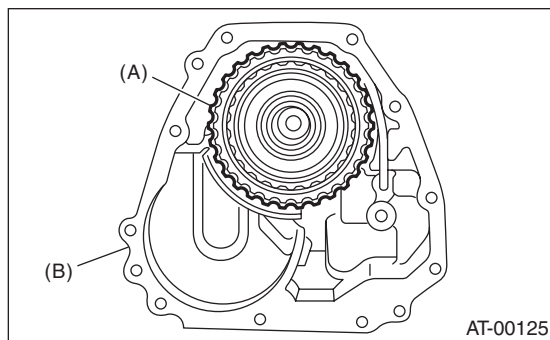
1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>

2) Remove the extension case, and take out the transfer clutch assembly. <Ref. to 4AT-70, REMOVAL, Extension Case.> <Ref. to 4AT-71, DISASSEMBLY, Extension Case.>

B: INSTALLATION

1) Select the thrust needle bearing. <Ref. to 4AT-78, ADJUSTMENT, Transfer Clutch.>

2) Install the transfer clutch assembly to the case.

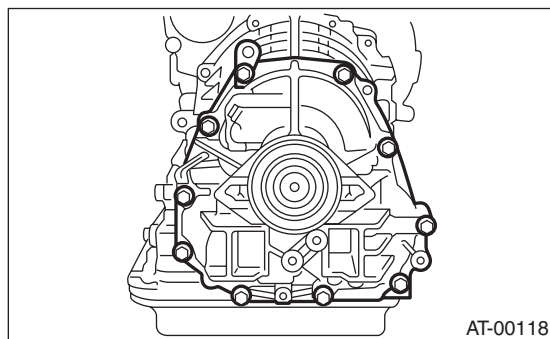


(A) Transfer clutch ASSY
(B) Extension case

3) Tighten the bolts to secure the case.

Tightening torque:

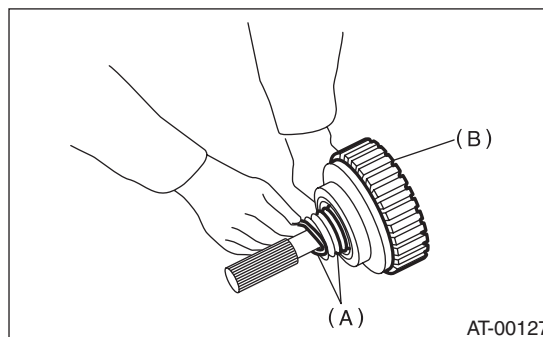
25 N·m (2.5 kgf-m, 18.4 ft-lb)



4) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

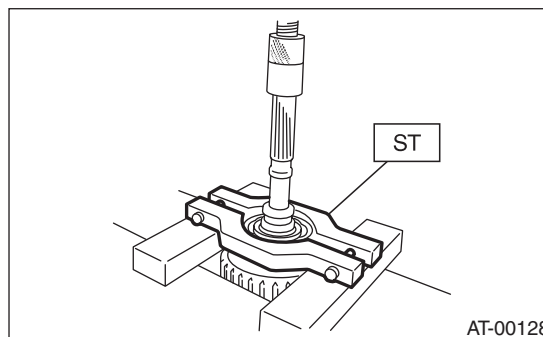
1) Remove the seal ring.



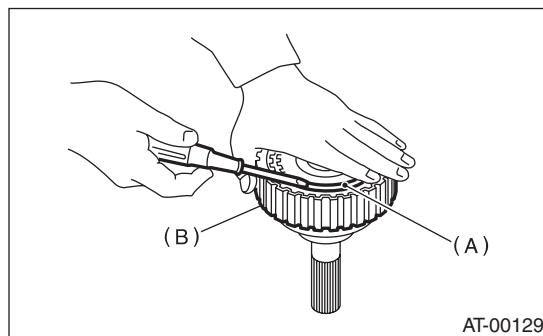
(A) Seal ring
(B) Rear drive shaft

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

ST 498077600 REMOVER



3) Use a flat tip screwdriver to remove the snap ring, and then take out the pressure plate, retaining plate, drive plate and driven plate.



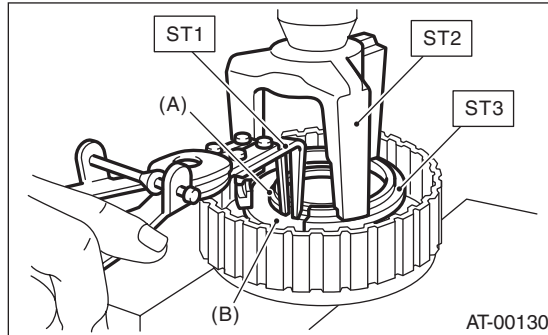
(A) Snap ring
(B) Rear drive shaft

Transfer Clutch

AUTOMATIC TRANSMISSION

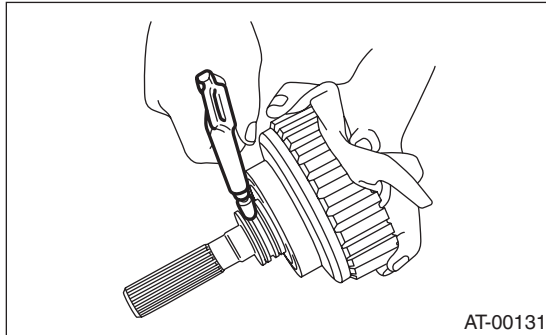
4) Using the ST1, ST2 and ST3, remove the snap ring, then take out the return spring and transfer clutch piston seal.

ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



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

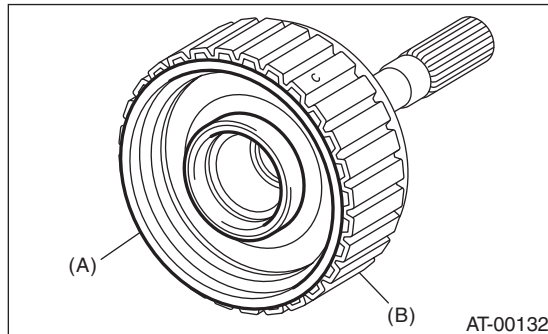
5) Use an air compressor to blow compressed air from the rear drive shaft to remove the transfer clutch piston.



AT-00131

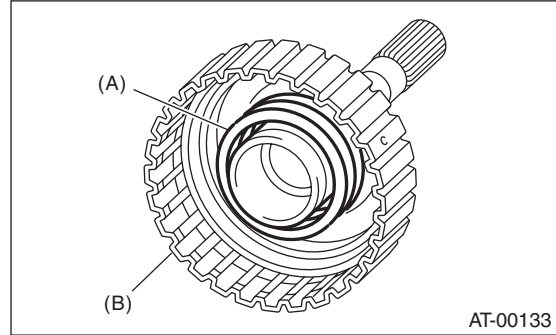
D: ASSEMBLY

1) Install the transfer clutch piston.



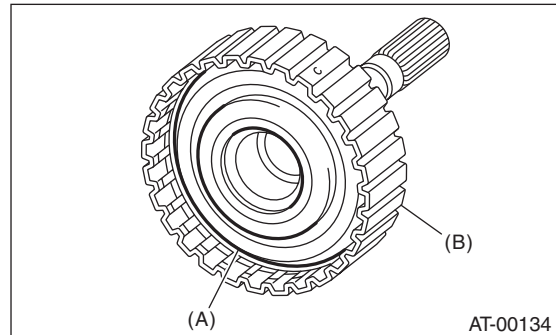
- (A) Transfer clutch piston
- (B) Rear drive shaft

2) Install the return spring to transfer clutch piston.



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

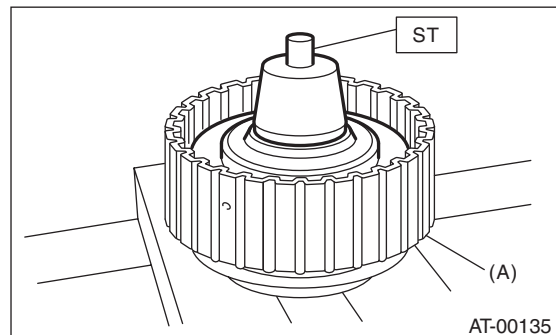
3) Install the transfer clutch piston seal.



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

4) Attach the ST to the rear drive shaft.

ST 499257300 SNAP RING OUTER GUIDE



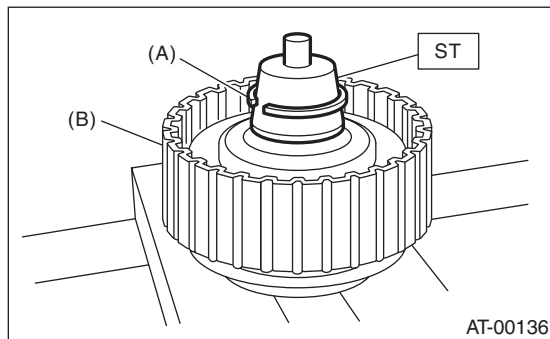
- (A) Rear drive shaft

Transfer Clutch

AUTOMATIC TRANSMISSION

5) Install the snap ring to the ST.

ST 499257300 SNAP RING OUTER GUIDE

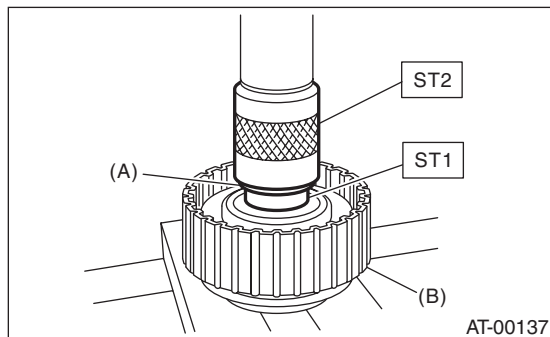


- (A) Snap ring
(B) Transfer clutch

6) Install the snap ring to the rear drive shaft using ST1 and ST2.

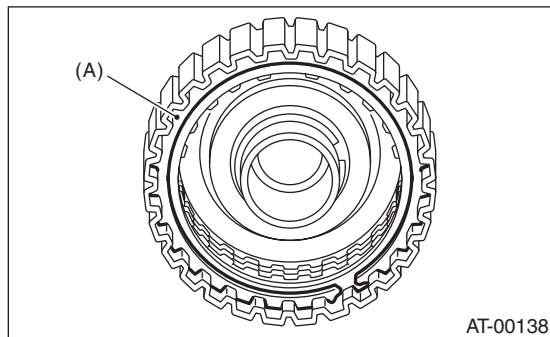
ST1 499257300 SNAP RING OUTER GUIDE

ST2 499247400 INSTALLER



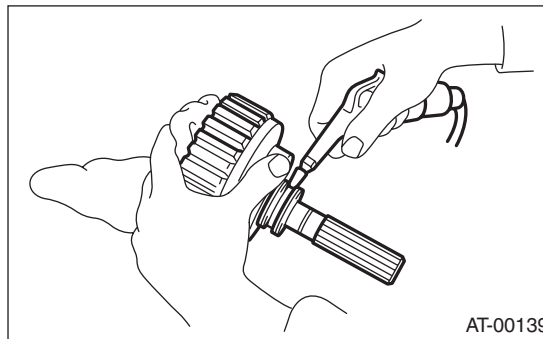
- (A) Snap ring
(B) Transfer clutch

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



- (A) Snap ring

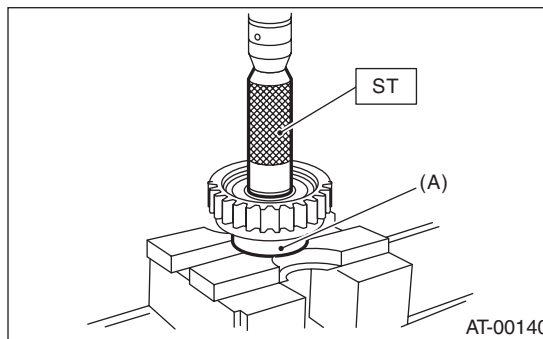
8) Use an air compressor to apply compressed air to see if the assembled parts move smoothly.



9) Check clearance between the snap ring and pressure plate. <Ref. to 4AT-77, INSPECTION, Transfer Clutch.>

10) Press-fit new ball bearing using ST.

ST 899580100 INSTALLER

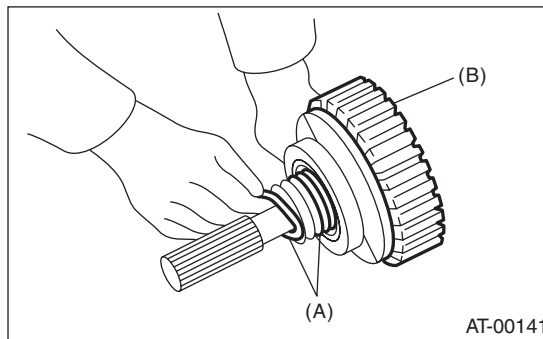


- (A) Ball bearing

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

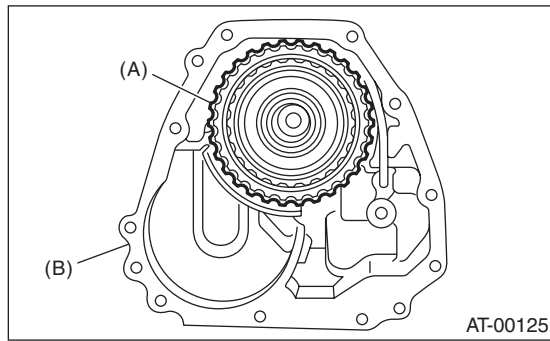
NOTE:

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



- (A) Seal ring
(B) Rear drive shaft

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 surface 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 be within the standard value.

MP-T model:

<Ref. to 4AT-78, MP-T MODEL, ADJUSTMENT, Transfer Clutch.>

VTD model:

<Ref. to 4AT-78, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

- 1) Check clearance between the snap ring and pressure plate.
- 2) Before measuring clearance, place same thickness shims on both sides to prevent the pressure plate from tilting.

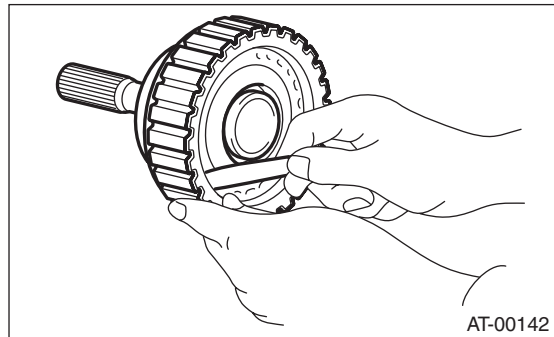
3) If the clearance exceeds the service limits, replace the driven plate and select and adjust the retaining plate to be within the initial standard value.

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:

1.6 mm (0.063 in)



Retaining plate	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

4) Check for tight corner braking phenomenon when the vehicle is moved forward with the steering fully turned. If tight corner braking occurs, perform the following procedures.

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

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

Transfer Clutch

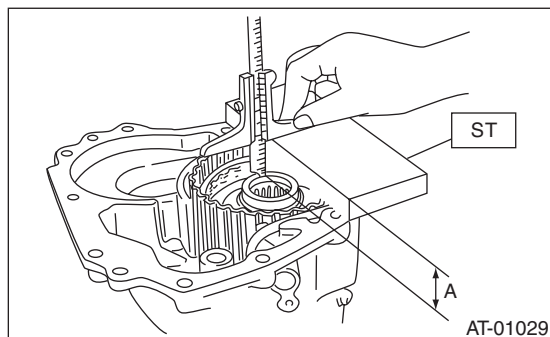
AUTOMATIC TRANSMISSION

F: ADJUSTMENT

1. MP-T MODEL

1) Measure the distance "A" from the end of ST to the rear drive shaft using ST.

ST 398643600 GAUGE

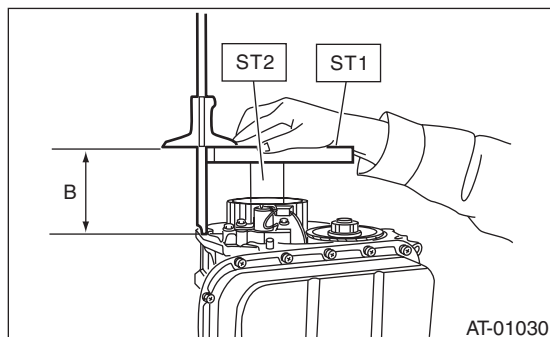


A Measured value

2) Measure the distance "B" from the transmission case end to the end of 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

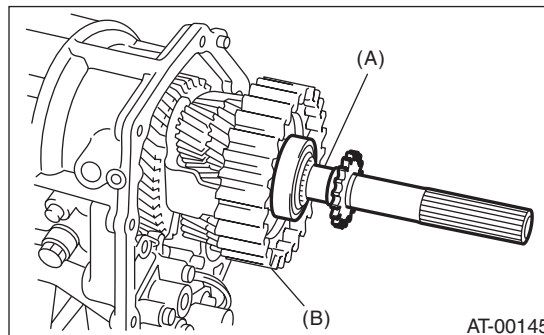
A: Distance from the end of the ST to end of rear drive shaft

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

Thrust needle bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

2. VTD MODEL

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

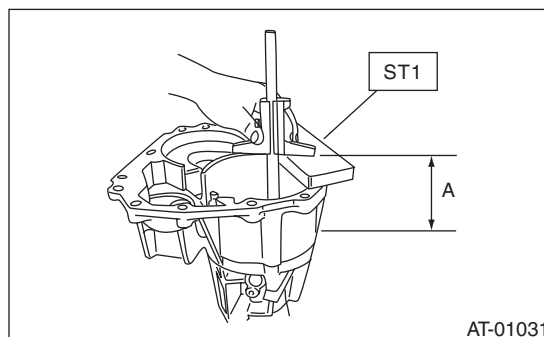


(A) Rear drive shaft

(B) Center differential carrier

2) Using the ST, measure the distance "A" from the end of the ST to the rear drive shaft ball bearing outer ring contact surface.

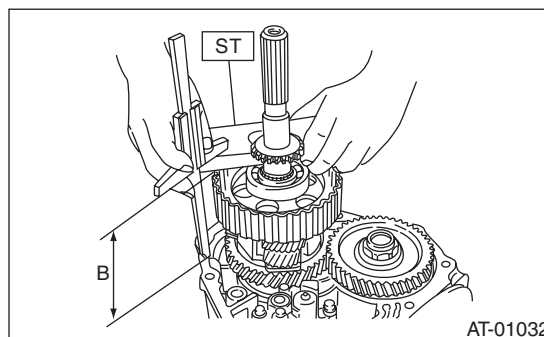
ST 398643600 GAUGE



A Measured value

3) Using the ST, measure the distance "B" from the transmission case mating surface to the end surface of the ST.

ST 398643600 GAUGE



B Measured value

4) Calculation formula:

Calculate "T":

When the clearance is 0.05 mm (0.0020 in), select up to four adjusting shims from the table, according to the clearance value.

When clearance is 0.05 mm (0.0020 in):

$$T = A - B + 0.40 \text{ mm}$$

$$[T = A - B + 0.0157 \text{ in}]$$

When clearance is 0.25 mm (0.0098 in):

$$T = A - B + 0.20 \text{ mm}$$

$$[T = A - B + 0.0079 \text{ in}]$$

T: Shim clearance

A: Distance from the end of extension case to the rear drive shaft ball bearing outer ring contact surface

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

T: Shim thickness

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Adjustment shim	
Part No.	Thickness mm (in)
33281AA001	0.2 (0.008)
33281AA011	0.5 (0.020)

Multi-plate Clutch

AUTOMATIC TRANSMISSION

28.Multi-plate Clutch

A: REMOVAL

Remove the multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-70, REMOVAL, Extension Case.>

B: INSTALLATION

Install the multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-70, INSTALLATION, Extension Case.>

C: INSPECTION

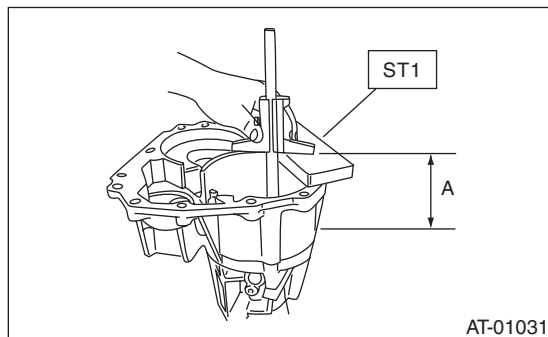
- Inspect the drive plate facing for wear and damage.
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Inspect the D-ring for damage.
- Measure the clearance of the multi-plate clutch and check if it does not exceed the limit thickness. <Ref. to 4AT-80, ADJUSTMENT, Multi-plate Clutch.>

D: ADJUSTMENT

1) Install the drive plate and driven plate to the center differential carrier.

2) Using the ST, measure the distance “A” from the end of ST to the multi plate clutch piston.

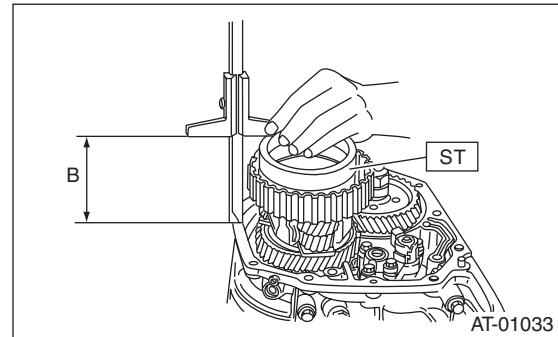
ST 398643600 GAUGE



A Measured value

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

ST 398744300 PISTON GUIDE



B Measured value

4) Calculation formula:

$$T = A - B + 0.45 \text{ mm}$$

$$[T = A - B + 0.0177 \text{ in}]$$

Initial standard:

$$0.2 - 0.6 \text{ mm } (0.008 - 0.024 \text{ in})$$

Limit thickness:

$$1.6 \text{ mm } (0.063 \text{ in})$$

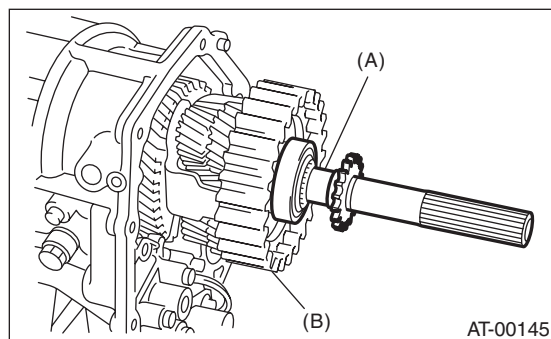
If the clearance exceeds the limit thickness, replace the plate set (drive and driven plates). Select a multi-plate clutch piston driven plate that will bring clearance within the default standard value.

Driven plate	
Part No.	Thickness mm (in)
31589AA041	1.6 (0.063)
31589AA050	2.0 (0.079)
31589AA060	2.4 (0.094)
31589AA070	2.8 (0.110)

29.Rear Drive Shaft

A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-70, REMOVAL, Extension Case.>
- 3) Pull out the rear drive shaft from center differential assembly.



- (A) Rear drive shaft
(B) Center differential carrier

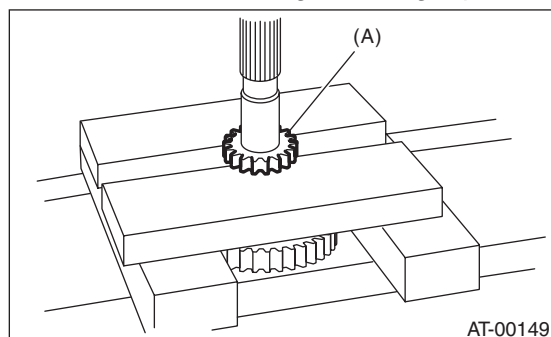
- 4) Remove the drive plate and driven plate.

B: INSTALLATION

- 1) Select the shim. <Ref. to 4AT-78, VTD MODEL, ADJUSTMENT, Transfer Clutch.>
- 2) Install the drive plate and driven plate.
- 3) Insert the rear drive shaft into the center differential assembly.
- 4) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-70, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

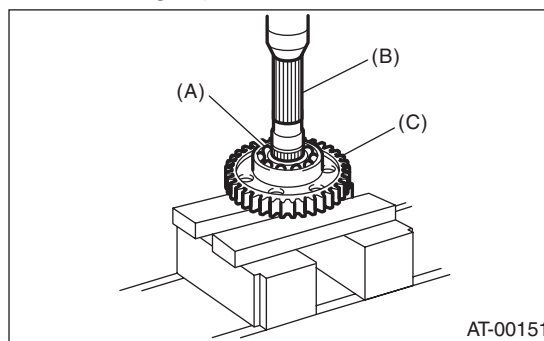
C: DISASSEMBLY

- 1) Remove the revolution gear using a press.



- (A) Revolution gear

- 2) Remove the front and rear side ball bearings and clutch hub using a press.



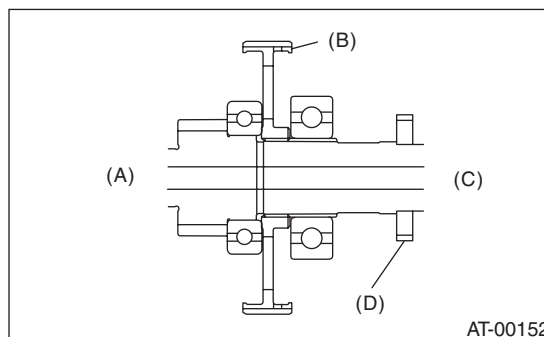
- (A) Rear ball bearing
(B) Rear drive shaft
(C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:

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



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

E: INSPECTION

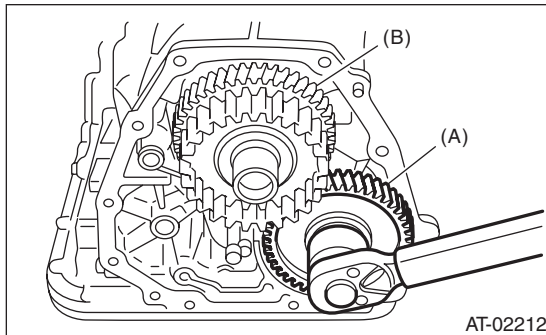
- Make sure there are no holes, cutting damage or other foreign materials on each parts.
- Inspect the extension end play, and adjust it to be within the standard value. <Ref. to 4AT-78, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

30.Reduction Driven Gear

A: REMOVAL

1. MP-T MODEL

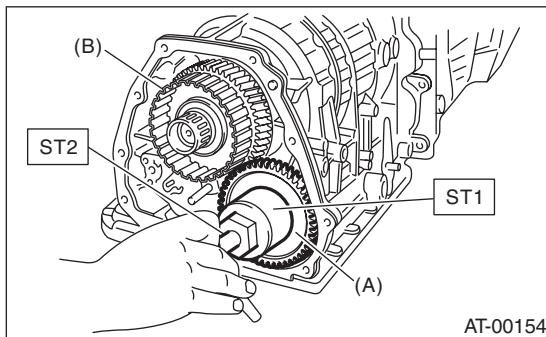
- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-70, REMOVAL, Extension Case.>
- 3) Set the select lever to "P" range.
- 4) 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 assembly.

ST1 499737000 PULLER
ST2 899524100 PULLER SET

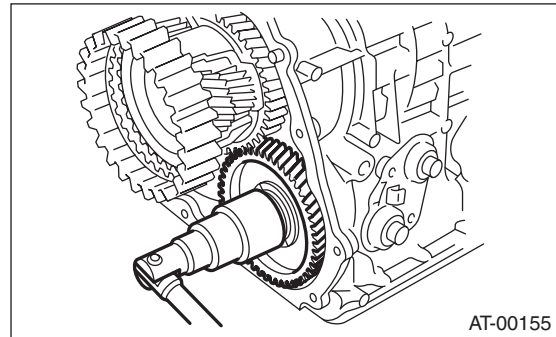


- (A) Reduction driven gear ASSY
(B) Reduction drive gear ASSY

2. VTD MODEL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-70, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft. <Ref. to 4AT-81, REMOVAL, Rear Drive Shaft.>
- 4) Set the select lever to "P" range.

- 5) Lift the crimped section, and then remove the lock nut.



- 6) Using the ST1 and ST2, extract the reduction driven gear.

ST1 499737000 PULLER
ST2 899524100 PULLER SET

- 7) Pull out the center differential assembly. <Ref. to 4AT-86, REMOVAL, Center Differential Carrier.>

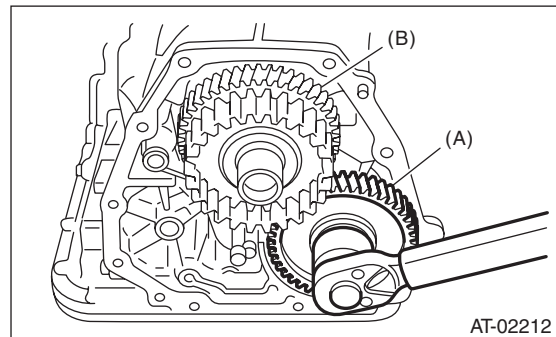
B: INSTALLATION

1. MP-T MODEL

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

Tightening torque:

100 N·m (10.2 kgf-m, 73.8 ft-lb)



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

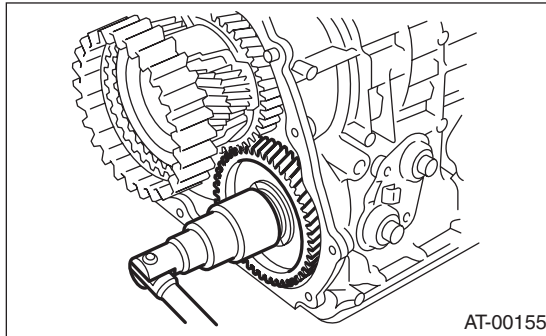
- 3) After tightening, stake the lock nut securely.
- 4) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-70, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

2. VTD MODEL

- 1) Set the select lever to "P" range.
- 2) Using a plastic hammer, install the reduction driven gear assembly.
- 3) Using a plastic hammer, install the center differential.
- 4) Install new self-locking nut and the washer.

Tightening torque:

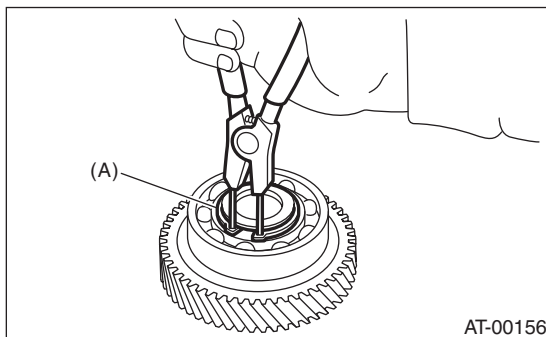
100 N·m (10.2 kgf-m, 73.8 ft-lb)



- 5) After tightening, stake the lock nut securely.
- 6) Insert the rear drive shaft assembly. <Ref. to 4AT-81, INSTALLATION, Rear Drive Shaft.>
- 7) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-70, INSTALLATION, Extension Case.>
- 8) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

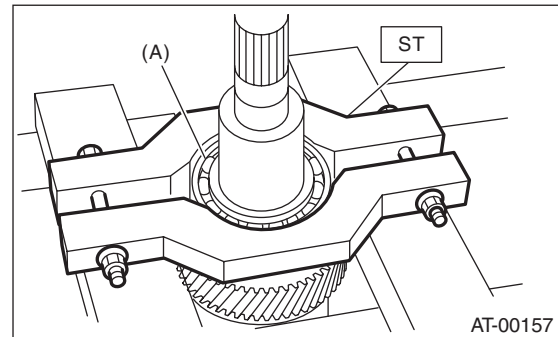
- 1) Remove the snap ring from reduction driven gear.



(A) Snap ring

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

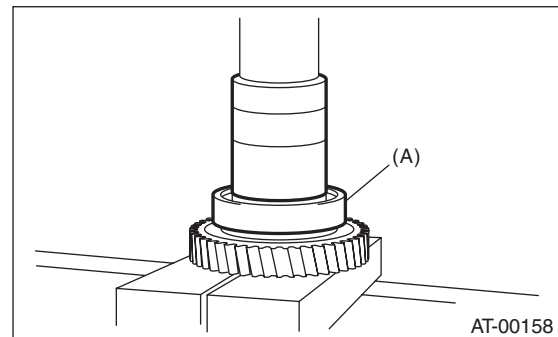
ST 498077600 REMOVER



(A) Ball bearing

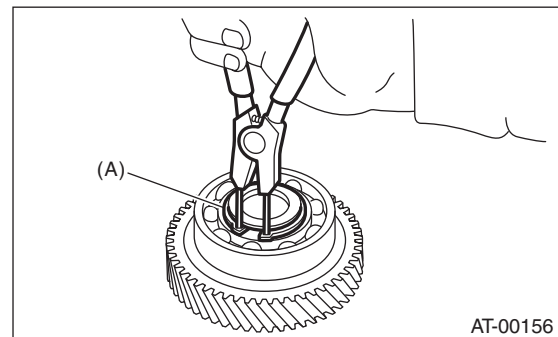
D: ASSEMBLY

- 1) Install the new ball bearing to reduction driven gear using press.



(A) Ball bearing

- 2) 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

31.Reduction Drive Gear

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>

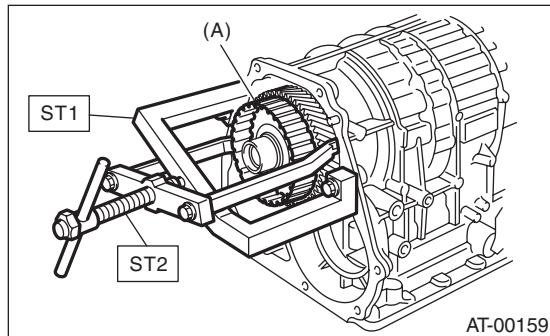
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-70, REMOVAL, Extension Case.>

3) Remove the reduction driven gear. <Ref. to 4AT-82, REMOVAL, Reduction Driven Gear.>

4) Using the ST, extract the reduction drive gear assembly.

ST1 499737100 PULLER SET

ST2 899524100 PULLER SET



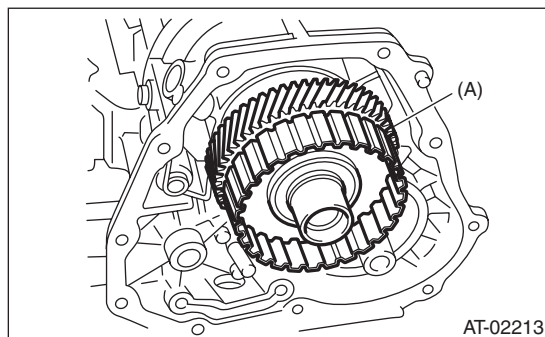
(A) Reduction drive gear ASSY

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

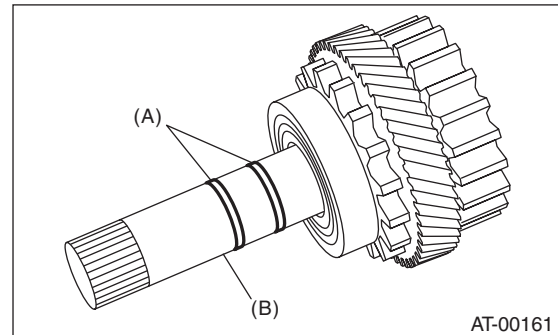
2) Install the reduction driven gear. <Ref. to 4AT-82, INSTALLATION, Reduction Driven Gear.>

3) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-70, INSTALLATION, Extension Case.>

4) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1) Take out the seal ring.

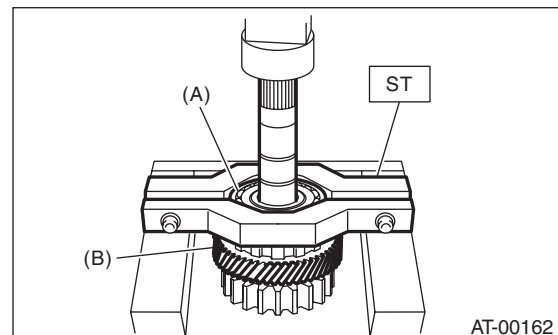


(A) Seal ring

(B) Reduction drive shaft

2) Remove the ball bearing using ST.

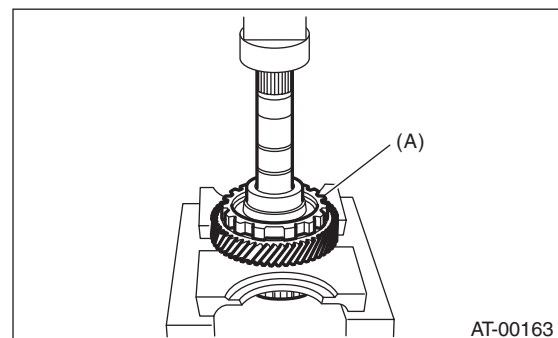
ST 498077600 REMOVER



(A) Ball bearing

(B) Reduction drive gear

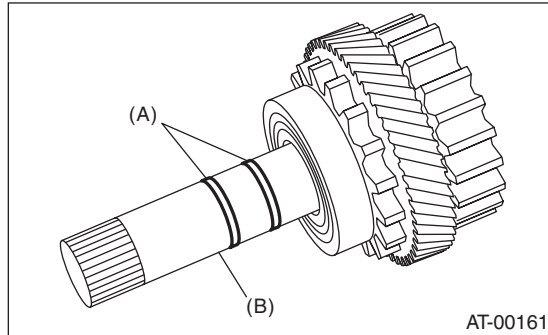
3) Remove the reduction drive gear using the press.



(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 to the outer surface of the seal ring and shaft groove.
- 4) Apply ATF to the new seal ring and install the seal ring.



(A) Seal ring

(B) Reduction drive shaft

E: INSPECTION

- Rotate the bearing by hand, make sure it rotates smoothly.
- Make sure there are no holes, bending damage or other foreign materials on each parts.
- Inspect the extension end play, and adjust it to the standard value. <Ref. to 4AT-78, ADJUSTMENT, Transfer Clutch.>

Center Differential Carrier

AUTOMATIC TRANSMISSION

32.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>

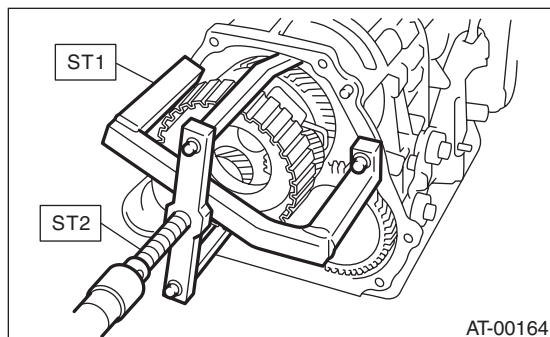
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-70, REMOVAL, Extension Case.>

3) Pull out the rear drive shaft. <Ref. to 4AT-81, REMOVAL, Rear Drive Shaft.>

4) Pull out the center differential carrier using ST.

ST1 499737100 PULLER

ST2 899524100 PULLER SET



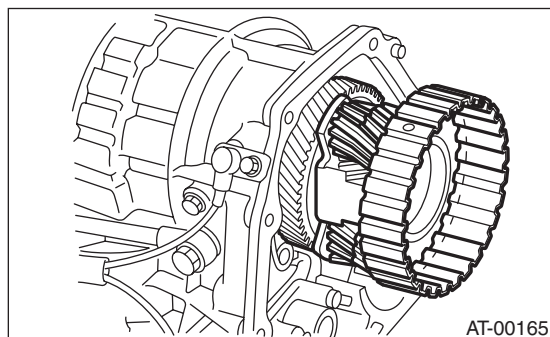
5) Pull out the shims from the transmission case.

B: INSTALLATION

1) Install the center differential assembly with shim.

NOTE:

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



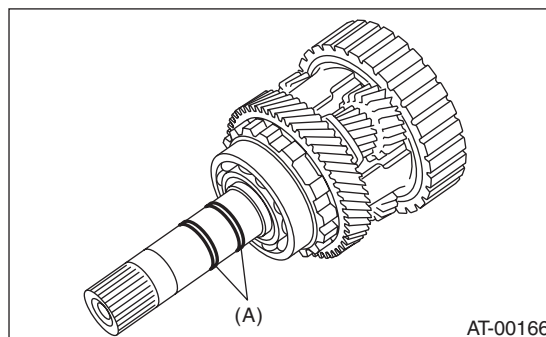
2) Insert the rear drive shaft. <Ref. to 4AT-81, INSTALLATION, Rear Drive Shaft.>

3) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-70, INSTALLATION, Extension Case.>

4) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

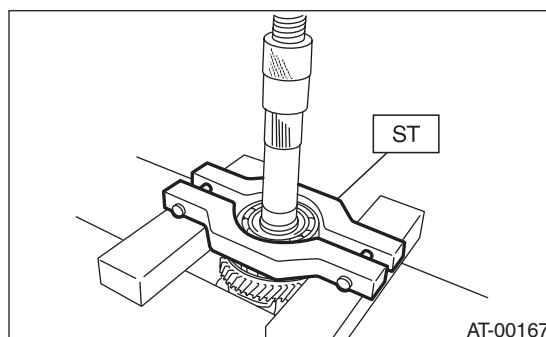
1) Remove the seal ring.



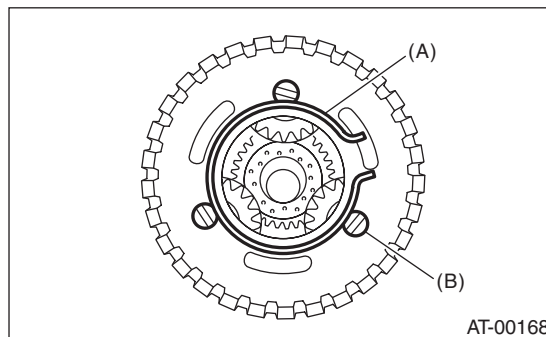
(A) Seal ring

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

ST 498077600 REMOVER



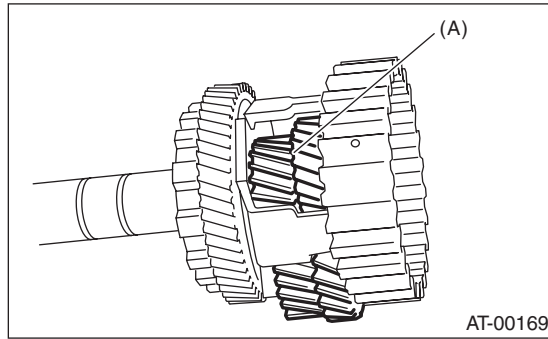
3) Remove the snap ring, and pull out the shaft from center differential assembly.



(A) Snap ring

(B) Shaft

- 4) Remove the thrust washers, pinion gears and washers from the center differential assembly.



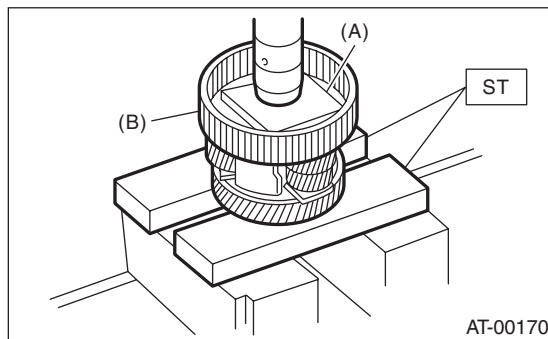
(A) Pinion gear

- 5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

- 1) Install the thrust washer onto intermediate shaft.
- 2) Install the thrust bearing onto intermediate shaft.
- 3) Install the pinion gears and washers.
- 4) Insert the shaft into the center differential assembly.
- 5) Install the snap ring.
- 6) Using a press, press-fit a new ball bearing into the center differential assembly.

ST 498077000 REMOVER



(A) Plate

(B) Center differential carrier

- 7) Apply vaseline to the outer surface of the seal ring and shaft groove.
- 8) Install a new seal ring.

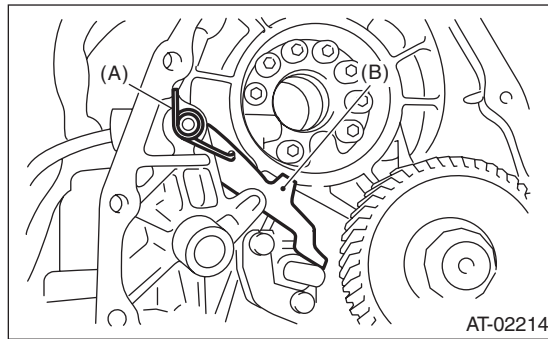
E: INSPECTION

- Make sure there are no holes, cutting damage or other foreign materials on each parts.
- Inspect the extension end play, and adjust it to be within the standard value. <Ref. to 4AT-78, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

33. Parking Pawl

A: REMOVAL

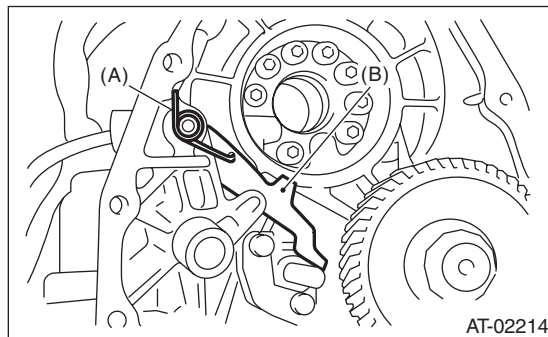
- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-70, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. (MP-T model) <Ref. to 4AT-84, REMOVAL, Reduction Drive Gear.>
- 4) Remove the center differential carrier. (VTD model) <Ref. to 4AT-86, REMOVAL, Center Differential Carrier.>
- 5) 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. (MP-T model) <Ref. to 4AT-84, INSTALLATION, Reduction Drive Gear.>
- 3) Install the center differential carrier. (VTD model) <Ref. to 4AT-86, INSTALLATION, Center Differential Carrier.>

- 4) Install the rear vehicle speed sensor and extension case. <Ref. to 4AT-70, INSTALLATION, Extension Case.>

- 5) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

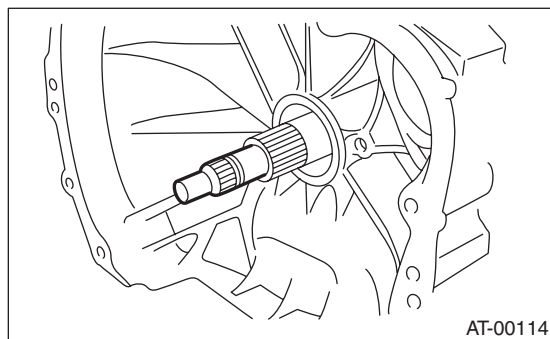
C: INSPECTION

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

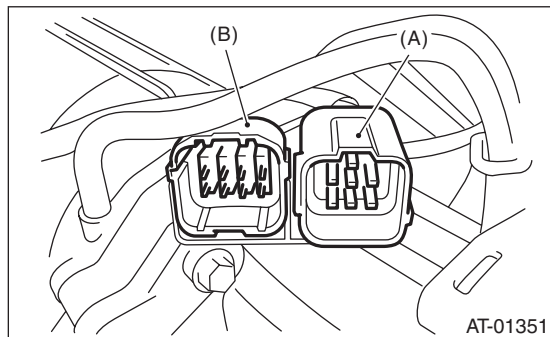
34. Converter Case

A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-69, 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.



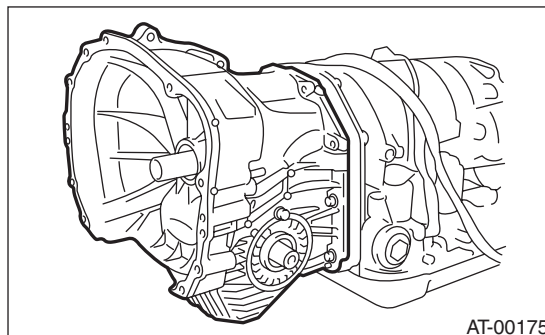
- (A) Transmission harness ASSY connector
(B) Inhibitor switch harness connector

- 6) Remove the air breather hose. <Ref. to 4AT-67, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to 4AT-68, REMOVAL, Oil Charge Pipe.>
- 8) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-65, REMOVAL, ATF Cooler Pipe and Hose.>

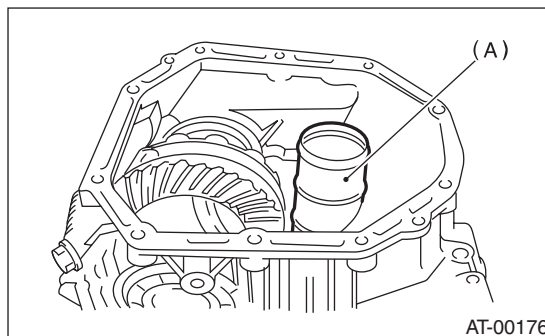
- 9) Remove the converter case alignment bolt, and then separate the transmission case and converter case by lightly tapping with a plastic hammer.

NOTE:

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



- 10) Remove the seal pipe.

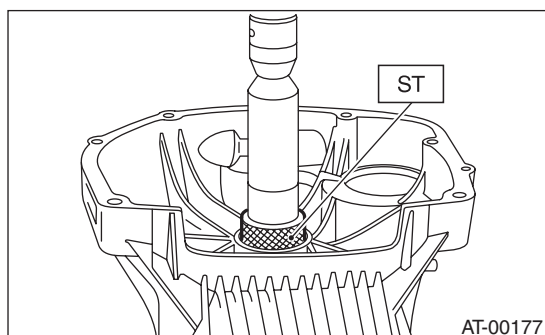


- (A) Seal pipe

- 11) Remove the front differential assembly. <Ref. to 4AT-103, 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



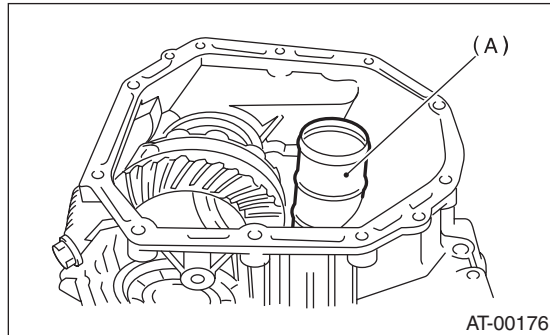
Converter Case

AUTOMATIC TRANSMISSION

3) Install the front differential assembly to the case. <Ref. to 4AT-103, INSTALLATION, Front Differential Assembly.>

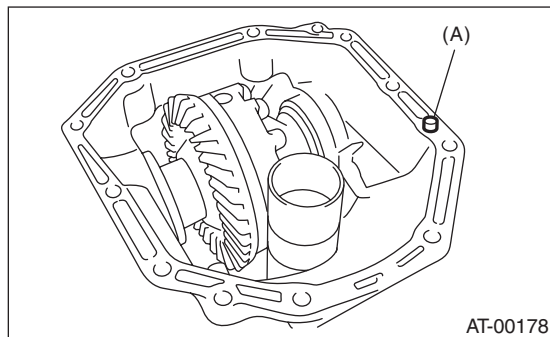
4) Install the right and left side retainers. <Ref. to 4AT-107, ADJUSTMENT, Front Differential Assembly.>

5) Install new seal pipe to converter case.



(A) Seal pipe

6) Install new rubber pipe to converter case.

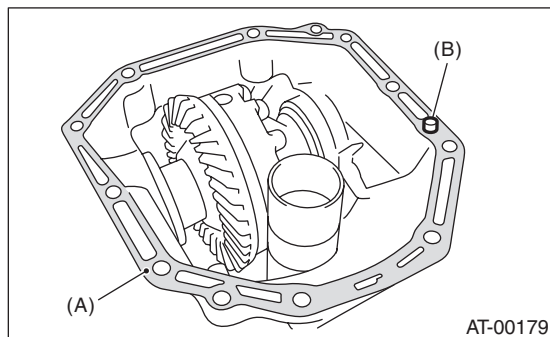


(A) Rubber seal

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 assembly without damaging the bushing and oil seal.

NOTE:

Use new bolts to the oil charge pipe.

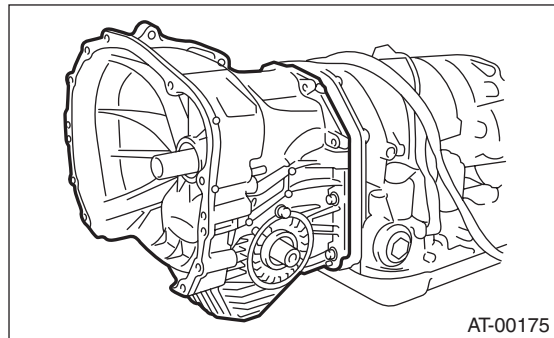
Tightening torque:

Oil charge pipe

38 N·m (3.9 kgf-m, 28.0 ft-lb)

Parts other than the oil charge pipe

41 N·m (4.2 kgf-m, 30.2 ft-lb)



AT-00175

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

10) Install the air breather hose. <Ref. to 4AT-67, INSTALLATION, Air Breather Hose.>

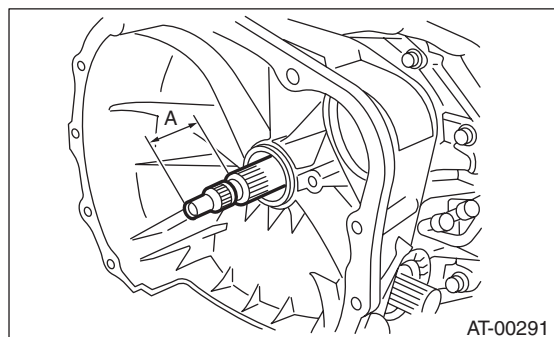
11) Install the ATF cooler pipe. <Ref. to 4AT-66, INSTALLATION, ATF Cooler Pipe and Hose.>

12) Install the oil charger pipe along with the O-ring. <Ref. to 4AT-68, 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)



AT-00291

14) Install the torque converter clutch assembly. <Ref. to 4AT-69, INSTALLATION, Torque Converter Clutch Assembly.>

15) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

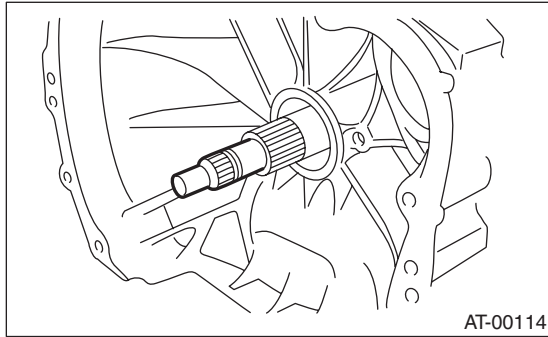
C: INSPECTION

Measure the backlash, and then adjust it within standard values. <Ref. to 4AT-100, ADJUSTMENT, Drive Pinion Shaft Assembly.>

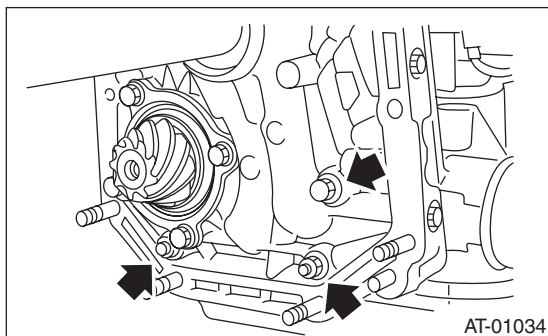
35.Oil Pump Housing

A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-69, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



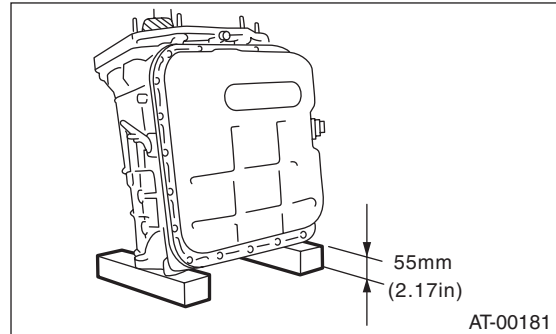
- 4) Lift up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
- 5) Disconnect the inhibitor switch connector from the stay.
- 6) Remove the oil charger pipe. <Ref. to 4AT-68, REMOVAL, Oil Charge Pipe.>
- 7) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-65, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separate the converter case and transmission case. <Ref. to 4AT-89, REMOVAL, Converter Case.>
- 9) Separate the transmission case and extension case section. <Ref. to 4AT-70, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. (MP-T model) <Ref. to 4AT-84, REMOVAL, Reduction Drive Gear.>
- 11) Remove the center differential carrier. (VTD model) <Ref. to 4AT-86, REMOVAL, Center Differential Carrier.>
- 12) Remove the reduction driven gear. <Ref. to 4AT-82, REMOVAL, Reduction Driven Gear.>
- 13) Loosen the oil pump housing mounting bolts.



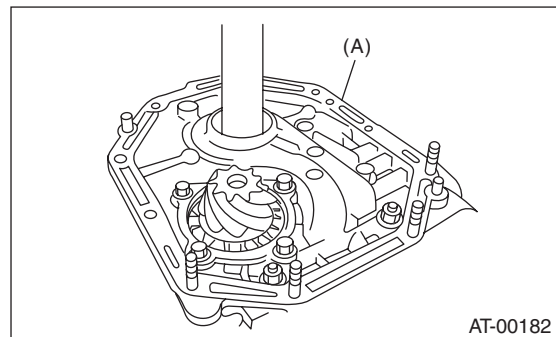
- 14) Place two wooden blocks on the workbench, and stand the transmission case with the rear end facing down.

NOTE:

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



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



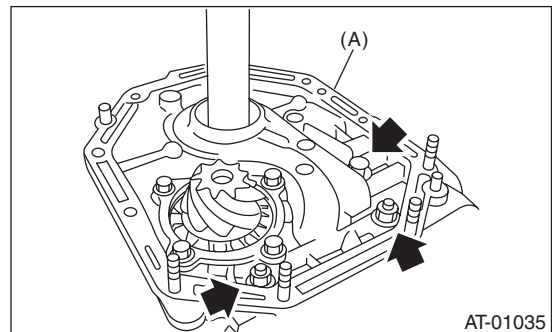
(A) Oil pump housing

B: INSTALLATION

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

Tightening torque:

42 N·m (4.3 kgf-m, 31 ft-lb)

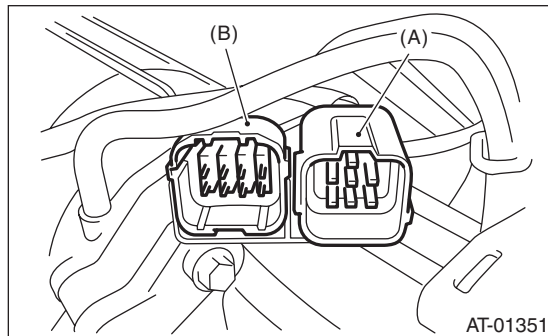


(A) Oil pump housing

Oil Pump Housing

AUTOMATIC TRANSMISSION

- 2) Install the converter case to the transmission case. <Ref. to 4AT-89, INSTALLATION, Converter Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-82, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. (MP-T model)
<Ref. to 4AT-84, INSTALLATION, Reduction Drive Gear.>
- 5) Install the center differential carrier. (VTD model)
<Ref. to 4AT-86, INSTALLATION, Center Differential Carrier.>
- 6) Join the transmission case and the extension case. <Ref. to 4AT-70, INSTALLATION, Extension Case.>
- 7) Insert the inhibitor switch and transmission harness connector onto the stay.

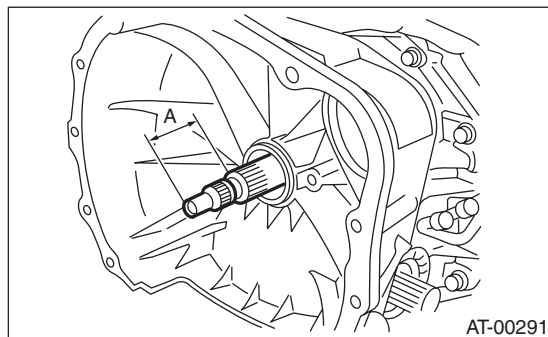


- (A) Transmission harness ASSY connector
(B) Inhibitor switch harness connector

- 8) Install the ATF cooler pipe. <Ref. to 4AT-66, INSTALLATION, ATF Cooler Pipe and Hose.>
- 9) Install the oil charger pipe along with the O-ring. <Ref. to 4AT-68, INSTALLATION, Oil Charge Pipe.>
- 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)

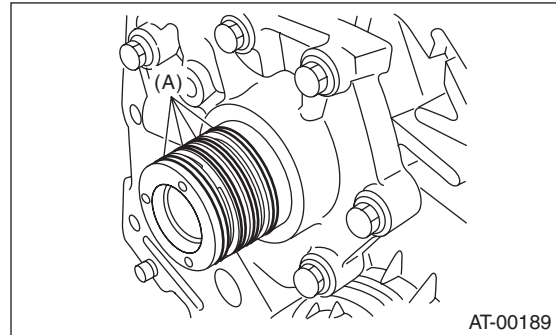


- 11) Install the torque converter clutch assembly. <Ref. to 4AT-69, INSTALLATION, Torque Converter Clutch Assembly.>
- 12) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

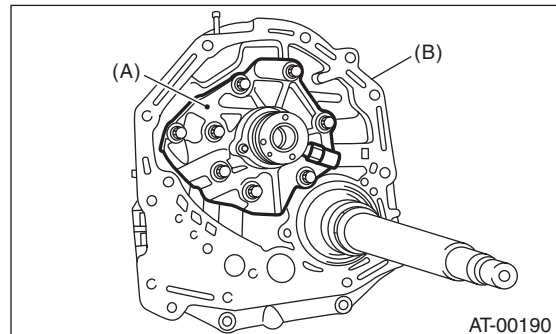
1. OIL PUMP COVER

- 1) Remove the four seal rings.



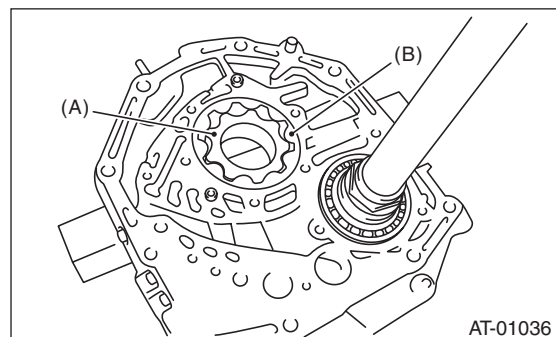
- (A) Seal ring

- 2) Remove the installation bolt. Then remove the cover by lightly tapping the end of stator shaft.



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

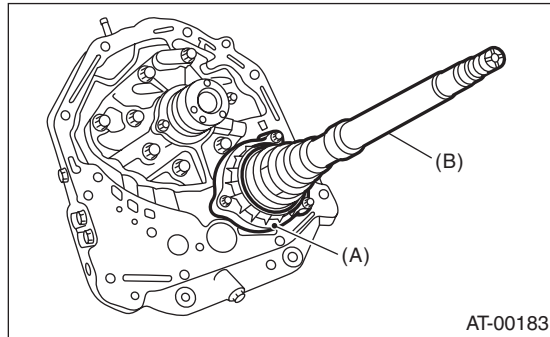
- 3) Remove the oil pump inner and outer rotors.



- (A) Oil pump inner rotor
(B) Oil pump outer rotor

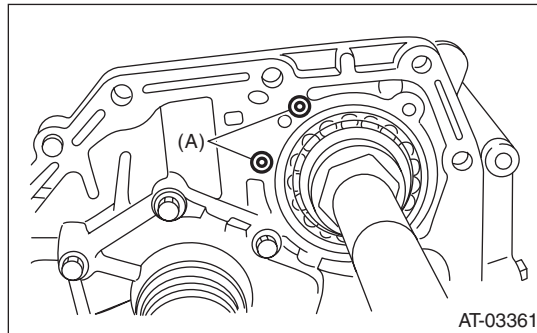
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



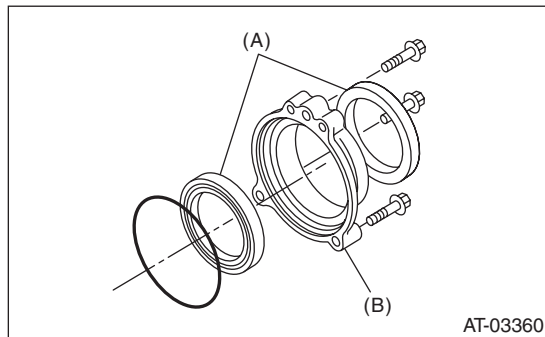
- (A) Oil seal retainer
- (B) Drive pinion shaft

2) Remove the O-ring.



- (A) O-ring

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

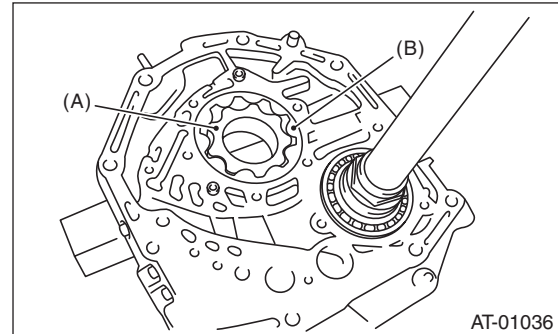


- (A) Oil seal
- (B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

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

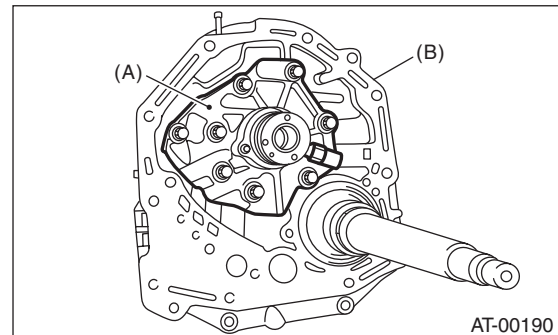


- (A) Oil pump inner rotor
- (B) Oil pump outer rotor

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.

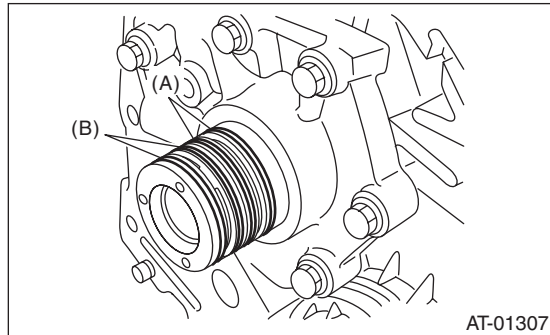
Oil Pump Housing

AUTOMATIC TRANSMISSION

4) Install the oil seal retainer and new seal rings. After installing, adjust the tooth contact with the drive pinion backlash. <Ref. to 4AT-95, ADJUSTMENT, Oil Pump Housing.>

NOTE:

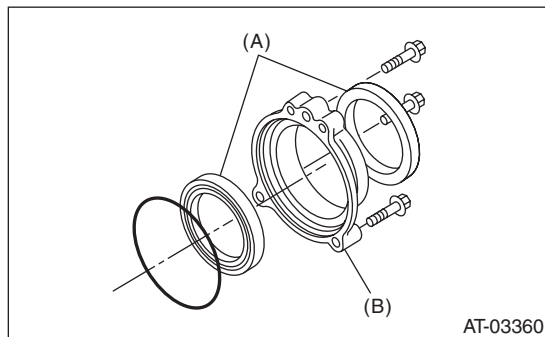
There are two types of seals. They are identified by color. Install at the proper positions by referring to the figure.



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

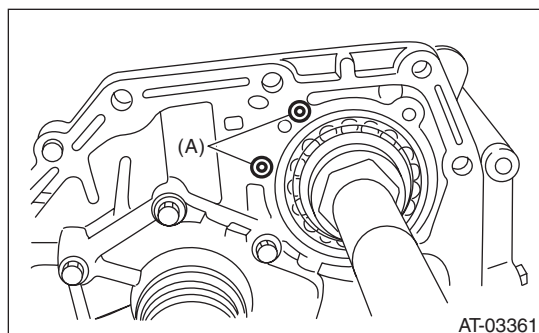
2. OIL SEAL RETAINER

1) Install two new oil seals 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 the new O-ring, and attach to the oil seal retainer.

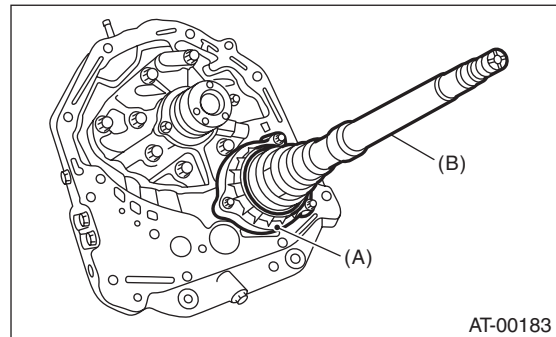


- (A) O-ring

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

Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)



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

E: INSPECTION

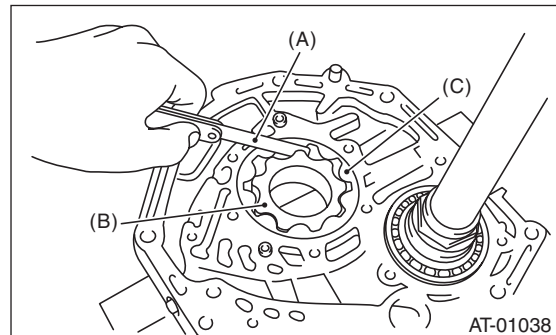
- 1) Check the seal ring and oil seal for breaks and damage.
- 2) Check other parts for dents or faults.
- 3) Oil pump rotor assembly selection

(1) Tip clearance

Install the oil pump 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)



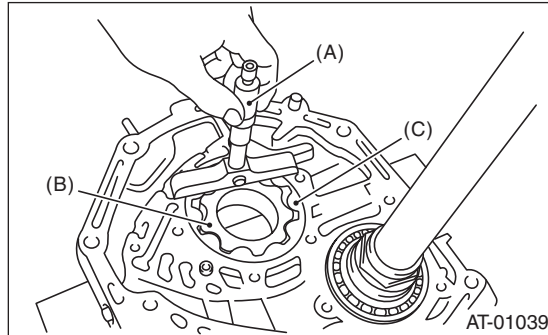
- (A) Thickness gauge
- (B) Oil pump inner rotor
- (C) Oil pump outer rotor

(2) Side clearance

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

Side clearance:

0.02 — 0.04 mm (0.0008 — 0.0016 in)



- (A) Depth gauge
- (B) Oil pump inner rotor
- (C) Oil pump outer rotor

(3) If the depth and side clearance are out of specification, replace the oil pump rotor assembly.

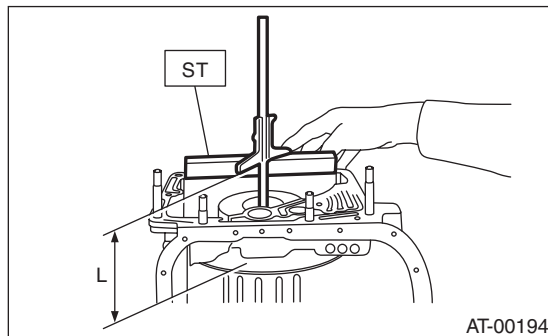
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

Inspect the total end play, and adjust it to be within the standard value. <Ref. to 4AT-95, ADJUSTMENT, Oil Pump Housing.>

F: ADJUSTMENT

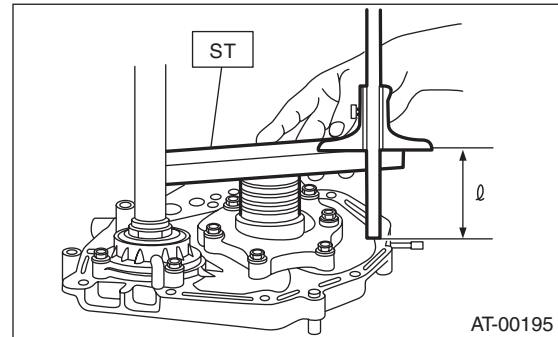
1) Measure the distance “L” from the end of ST to the high clutch drum concave section using the ST.

ST 398643600 GAUGE



2) Measure the distance from the oil pump housing mating surface to the end surface of the ST using the ST.

ST 398643600 GAUGE

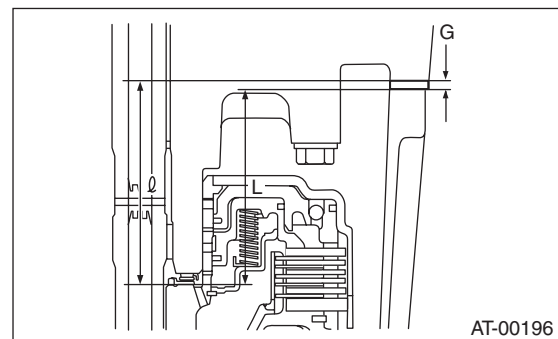


3) Calculation of total end play

Select the suitable thrust needle bearing from the table below so that clearance C will be within 0.25 to 0.55 mm (0.0098 to 0.0217 in).

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

C	Clearance between concave section of high clutch and end of clutch drum support
L	Distance from the transmission case mating surface to concave portion of high clutch
G	Gasket thickness [0.28 mm (0.0110 in)]
$\varnothing$	Height from the oil pump housing mating surface to the upper surface of the cover for the oil pump having the thrust needle bearing.



Thrust needle bearing	
Part No.	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

4) After completing the end play adjustment, insert the bearing race in the high clutch race. Apply vaseline to install the thrust needle bearing to oil pump cover.

Oil Pump Housing

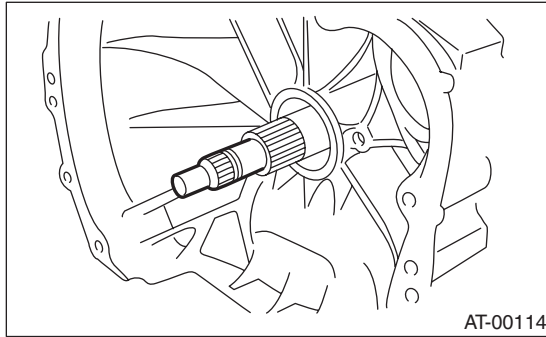
AUTOMATIC TRANSMISSION

- 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.

36. Drive Pinion Shaft Assembly

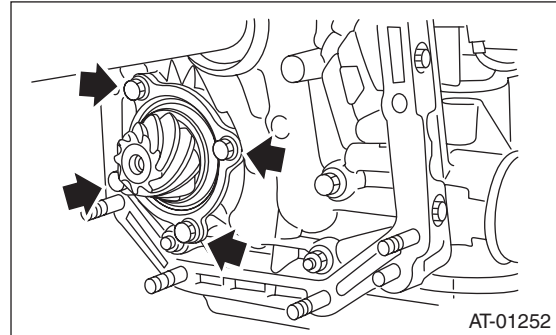
A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-69, 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-67, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to 4AT-68, REMOVAL, Oil Charge Pipe.>
- 8) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-65, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the converter case and transmission case. <Ref. to 4AT-89, REMOVAL, Converter Case.>
- 10) Separate the transmission case and extension case section. <Ref. to 4AT-70, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MP-T model) <Ref. to 4AT-84, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to 4AT-86, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to 4AT-82, REMOVAL, Reduction Driven Gear.>

- 14) Remove the drive pinion shaft mounting bolt and remove the drive shaft assembly from oil pump housing.



B: INSTALLATION

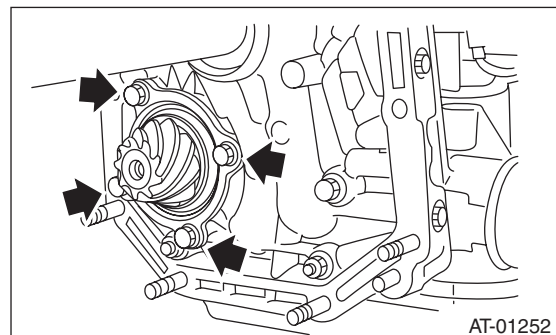
- 1) Assemble the drive pinion shaft assembly to the oil pump housing.

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-89, INSTALLATION, Converter Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-82, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. (MP-T model) <Ref. to 4AT-84, INSTALLATION, Reduction Drive Gear.>
- 5) Install the center differential carrier. (VTD model) <Ref. to 4AT-86, INSTALLATION, Center Differential Carrier.>
- 6) Join the transmission case and the extension case. <Ref. to 4AT-70, INSTALLATION, Extension Case.>
- 7) Insert the inhibitor switch and transmission harness connector onto the stay.
- 8) Install the air breather hose. <Ref. to 4AT-67, INSTALLATION, Air Breather Hose.>
- 9) Install the ATF inlet and outlet pipes. <Ref. to 4AT-66, INSTALLATION, ATF Cooler Pipe and Hose.>

Drive Pinion Shaft Assembly

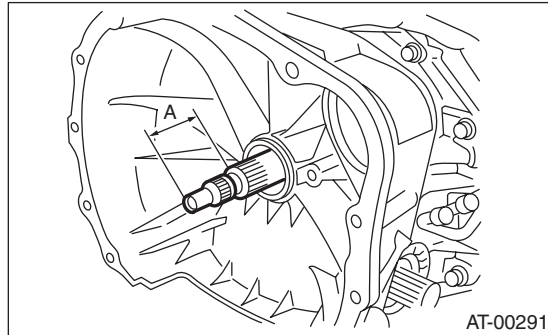
AUTOMATIC TRANSMISSION

10) Install the oil charger pipe along with the O-ring.

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

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



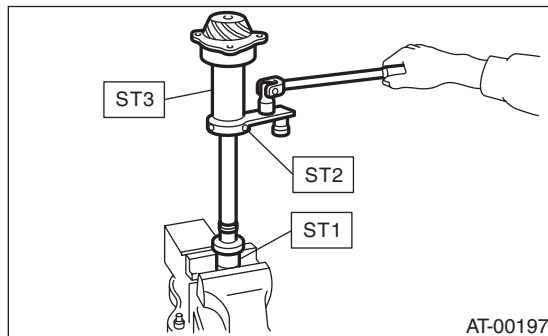
12) Install the torque converter clutch assembly. <Ref. to 4AT-69, INSTALLATION, Torque Converter Clutch Assembly.>

13) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

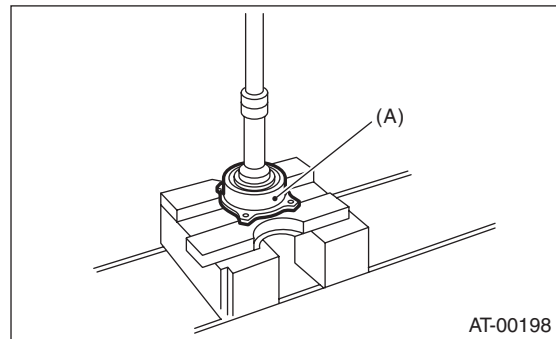
1) Lift the crimped part of the locknut, and then remove the lock nut while holding the rear spline part of the drive pinion shaft using ST1 and ST2. Pull out the drive pinion collar.

ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER



2) Remove the O-ring.

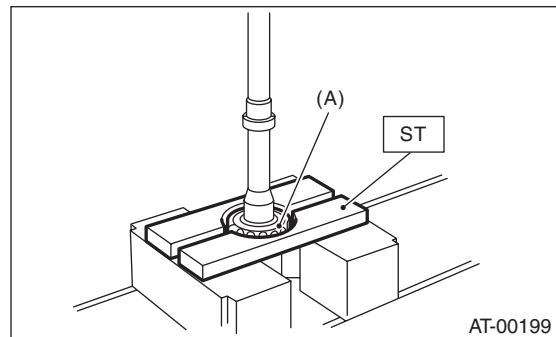
3) Separate the roller bearing and outer race from the drive pinion shaft using a press.



(A) Outer race

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

ST 498517000 REPLACER

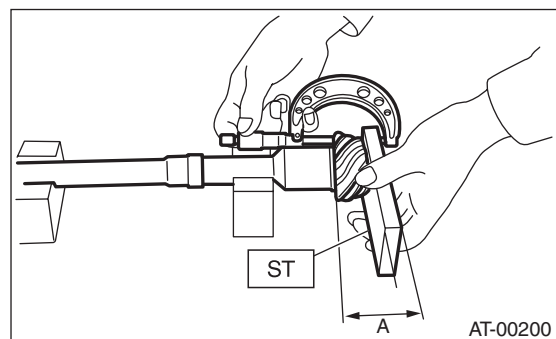


(A) Front roller bearing

D: ASSEMBLY

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

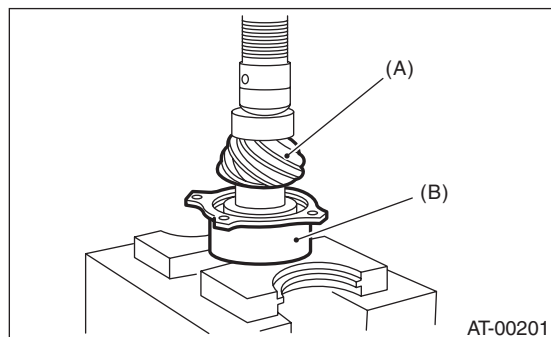
ST 398643600 GAUGE



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

CAUTION:

If excessive force is applied to roller bearing, it will damage the roller bearing.



(A) Drive pinion shaft

(B) Roller bearing

3) Apply ATF fluid to a new O-ring, fit it to the drive pinion shaft, then 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 the new lock nuts using 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, 85.3 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST2 length 0.072 m (2.83 in)

L2: Torque wrench length

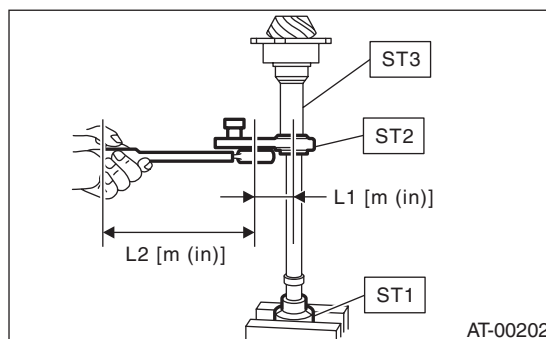
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf·m, ft·lb)
0.4 (15.75)	98 (10.0, 72.3)
0.45 (17.72)	100 (10.2, 73.5)
0.5 (19.69)	101 (10.3, 74.6)
0.55 (21.65)	102 (10.4, 75.4)

ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:

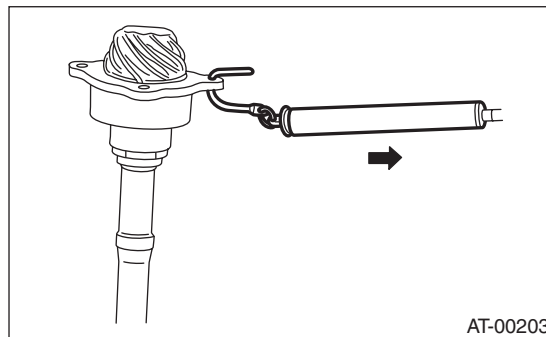
Attach ST2 to torque wrench as straight as possible.



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

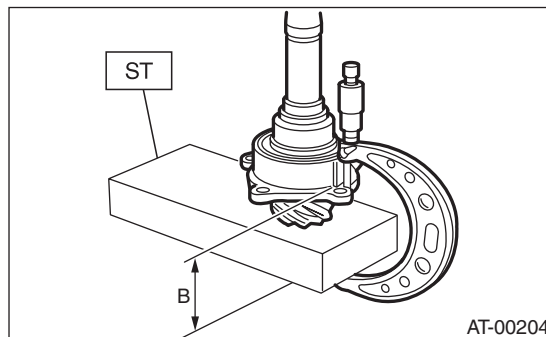
Starting torque:

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



7) Crimp the locknut in 2 locations.

8) Measure dimension "B" of drive pinion shaft
ST 398643600 GAUGE



Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

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

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

10) Select three or less shims from following table.

Drive pinion shim	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

E: INSPECTION

- Make sure that all component parts are free of scratches, holes and other faults.
- Adjust the tooth alignment. <Ref. to 4AT-100, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

1) Remove the liquid gasket from the mating surface completely.

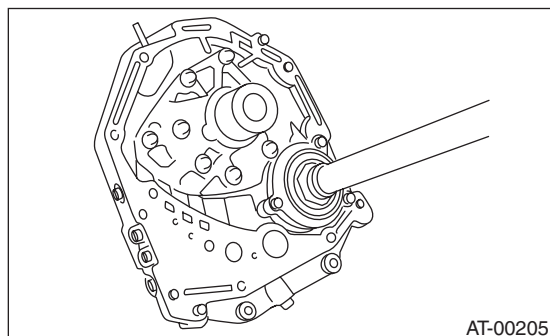
2) Install the oil pump housing assembly to the converter case, and secure them by tightening the four bolts evenly.

NOTE:

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

Tightening torque:

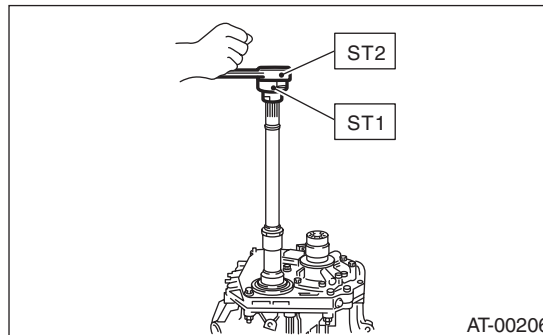
41 N·m (4.2 kgf-m, 30.2 ft-lb)



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

ST1 498937110 HOLDER

ST2 499787700 WRENCH



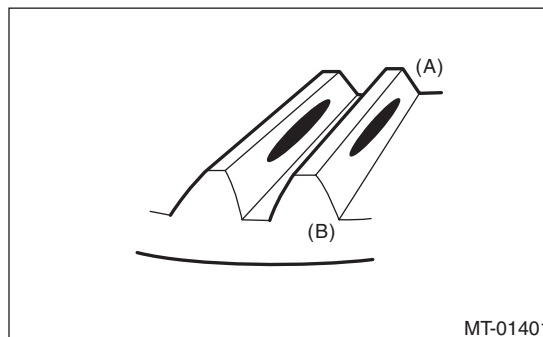
4) Adjust the drive pinion and hypoid driven gear backlash. <Ref. to 4AT-107, ADJUSTMENT, Front Differential Assembly.>

5) Apply red lead evenly to the surfaces of three or four teeth on hypoid driven gear. Rotate the drive pinion 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-107, 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.)



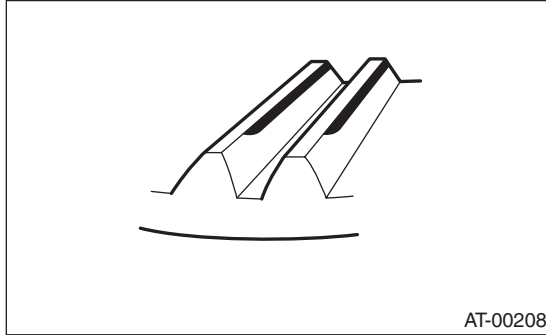
(A) Toe side

(B) Heel side

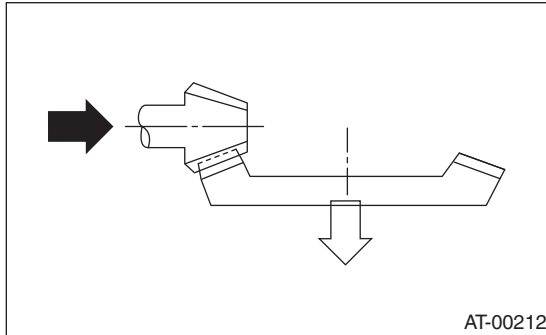
- Face contact

Checking item: Backlash is too large.

Contact pattern



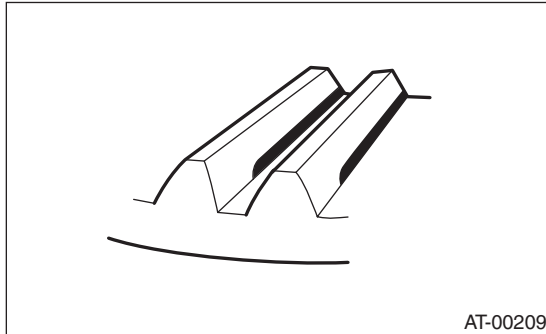
Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring the drive pinion shaft closer to the hypoid driven gear.



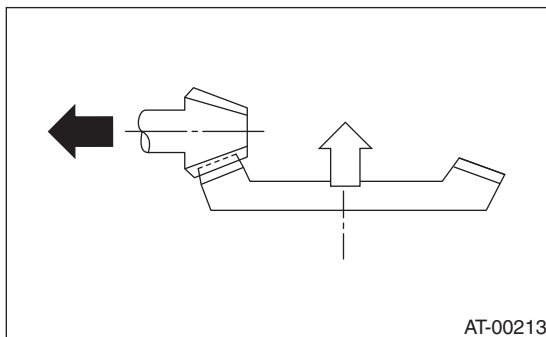
- Flank contact

Inspection item: Backlash is too small.

Contact pattern



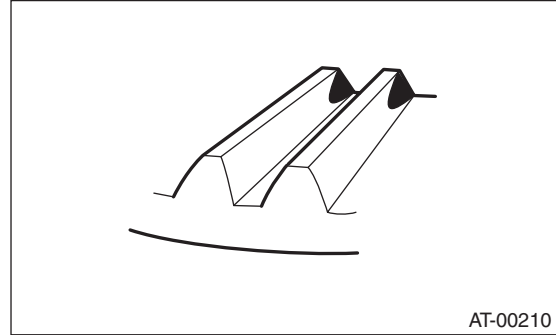
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure to move the drive pinion shaft away from the hypoid driven gear.



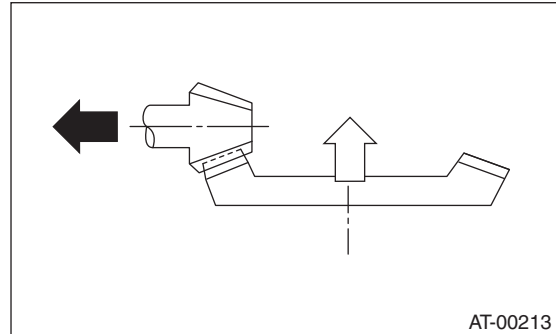
- Toe contact (inside contact)

Inspection item: Contact area is too small.

Contact pattern



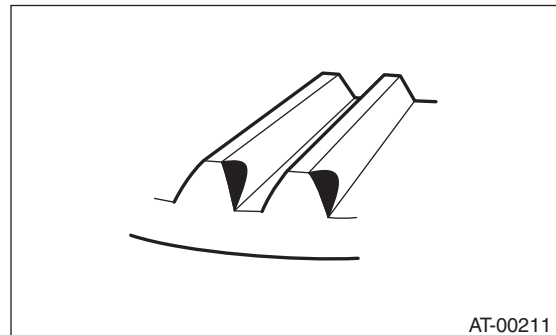
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for moving the drive pinion shaft away from the hypoid driven gear.



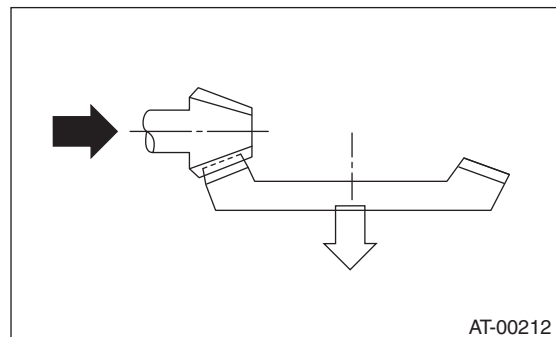
- Heel contact (outside end contact)

Inspection item: Contact area is too small.

Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring the drive pinion shaft closer to the hypoid driven gear.



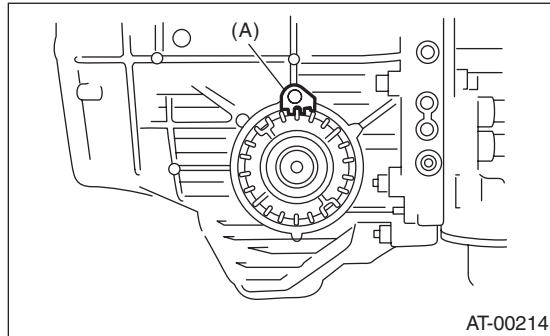
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

6) If tooth contact is correct, mark the differential side retainer position and loosen it. 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)

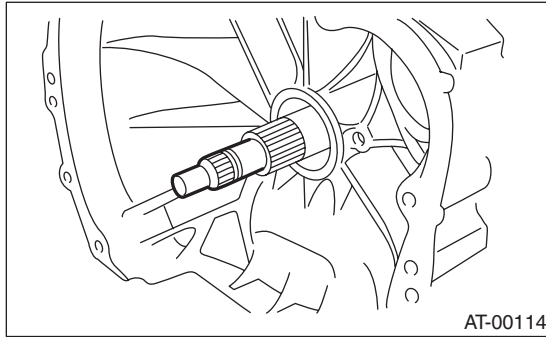


(A) Lock plate

37.Front Differential Assembly

A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-69, 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 from the stay.
 - 6) Remove the oil charger pipe. <Ref. to 4AT-68, REMOVAL, Oil Charge Pipe.>
 - 7) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-65, REMOVAL, ATF Cooler Pipe and Hose.>
 - 8) Separate the converter case from the transmission case. <Ref. to 4AT-89, REMOVAL, Converter Case.>
 - 9) Remove the seal pipe.
 - 10) Remove the differential side retainers using ST.
- ST 18630AA010 WRENCH COMPL RETAINER

NOTE:

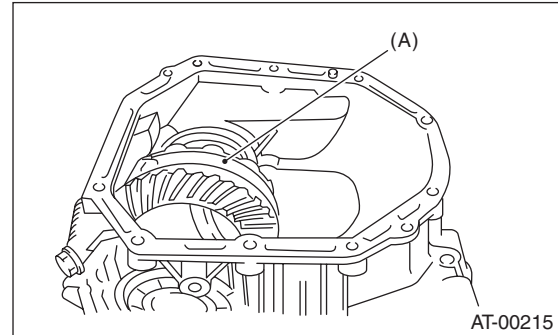
- WRENCH ASSY (499787000) can also be used.
 - Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.
- 11) Remove the front differential assembly while being careful not to damage the attachment part of retainer.

B: INSTALLATION

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

NOTE:

Do not damage the inside of the converter case (particularly the mating surface of the differential side retainer).



(A) Front differential ASSY

- 2) Install the O-ring to the left and right side differential side retainer.
- 3) Using the ST, install the side retainer. <Ref. to 4AT-107, ADJUSTMENT, Front Differential Assembly.>

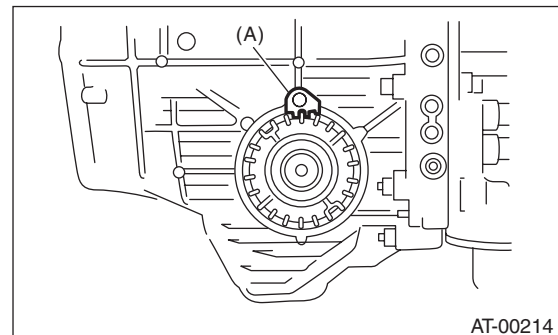
ST 18630AA010 WRENCH COMPL RETAINER

NOTE:

- WRENCH ASSY (499787000) can also be used.
- 4) Adjust the backlash of the front differential. <Ref. to 4AT-107, ADJUSTMENT, Front Differential Assembly.>
 - 5) Install the lock plate.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

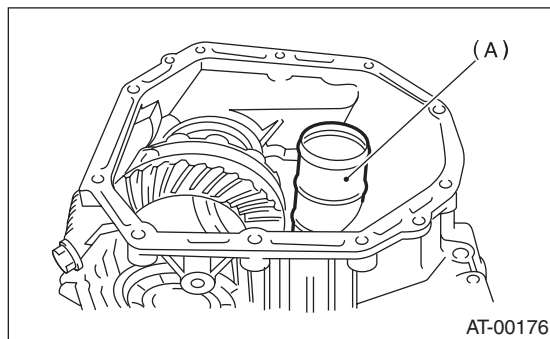


(A) Lock plate

Front Differential Assembly

AUTOMATIC TRANSMISSION

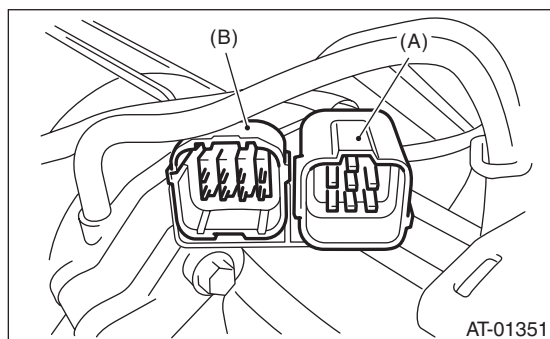
6) Install new seal pipe to converter case.



(A) Seal pipe

7) Install the converter case to the transmission case. <Ref. to 4AT-89, INSTALLATION, Converter Case.>

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



(A) Transmission harness ASSY connector

(B) Inhibitor switch harness connector

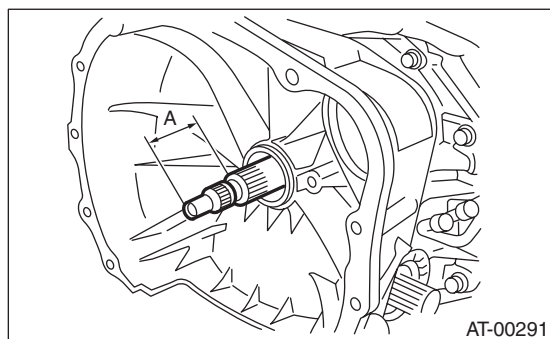
9) Install the ATF cooler pipe. <Ref. to 4AT-66, INSTALLATION, ATF Cooler Pipe and Hose.>

10) Install the oil charger pipe along with the O-ring. <Ref. to 4AT-68, INSTALLATION, Oil Charge Pipe.>

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

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-69, INSTALLATION, Torque Converter Clutch Assembly.>

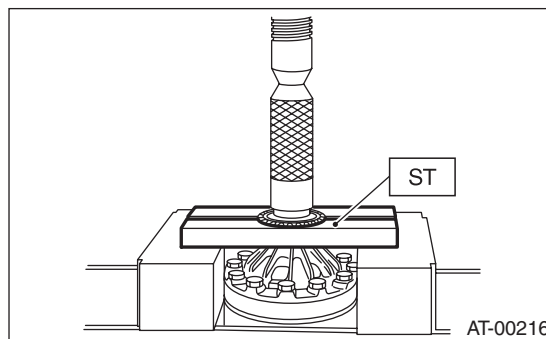
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

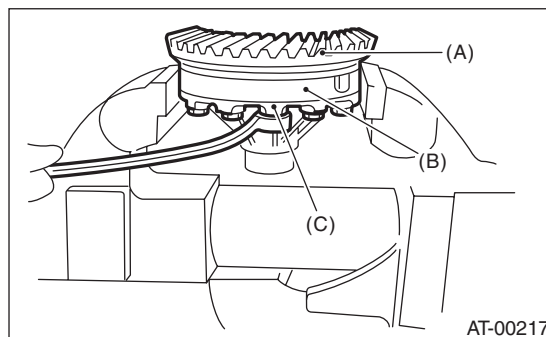
1. DIFFERENTIAL CASE ASSEMBLY

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

ST 498077000 REMOVER



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

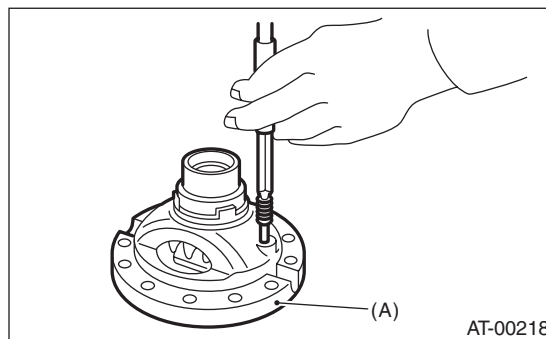


(A) Hypoid driven gear

(B) Differential case (RH)

(C) Differential case (LH)

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



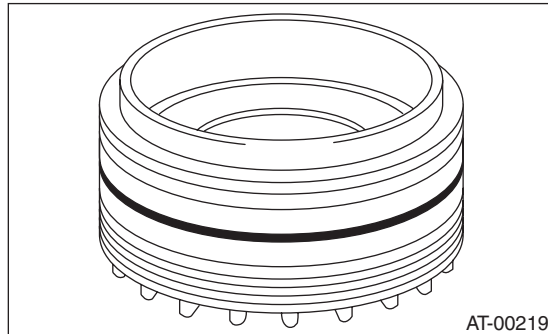
(A) Differential case (RH)

2. DIFFERENTIAL SIDE RETAINER

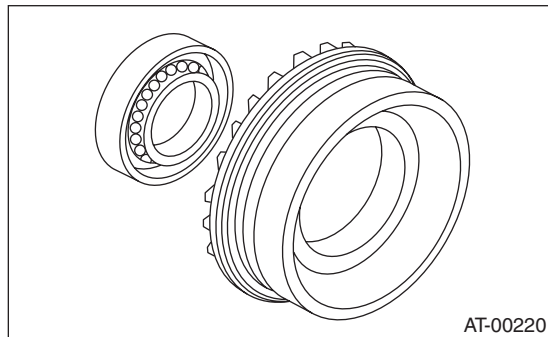
NOTE:

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

1) Remove the O-ring.

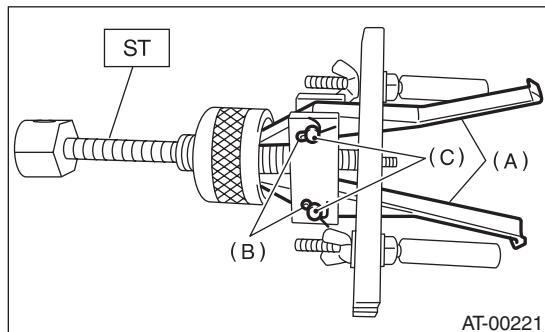


2) Remove the oil seal.



3) Remove the split pin, and then remove the claw.

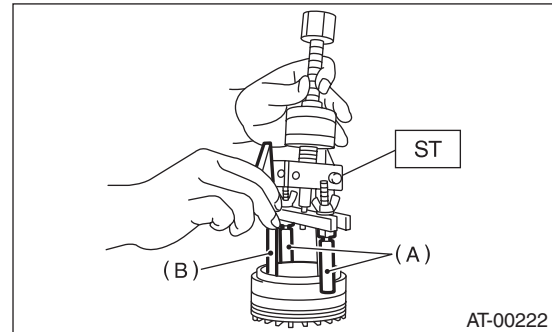
ST 398527700 PULLER ASSY



- (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

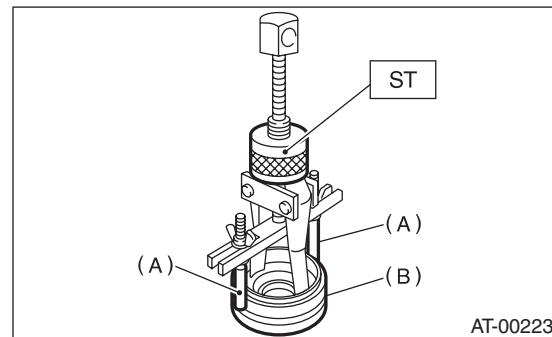
5) Restore the removed claws to original position, and install the pin and split pin.

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

ST 398527700 PULLER ASSY

NOTE:

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



- (A) Shaft
- (B) Differential side retainer

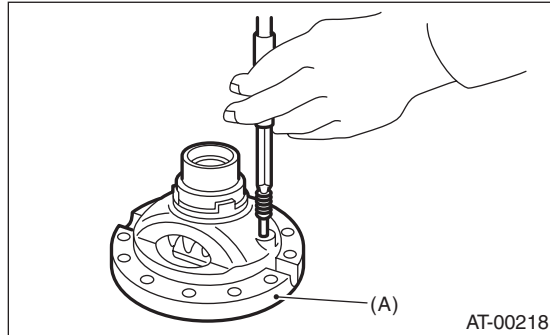
Front Differential Assembly

AUTOMATIC TRANSMISSION

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

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

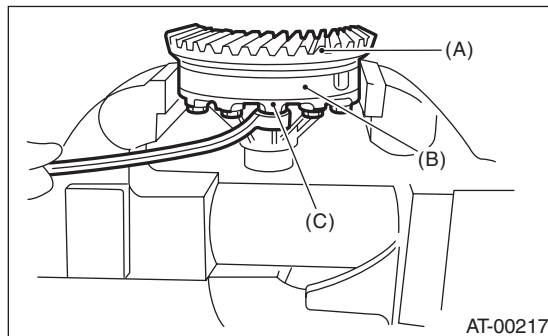


(A) Differential case (RH)

- 3) Install the washer and differential bevel gear to differential case (LH). Put the differential case (RH) on the case, and then assemble the 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 ST2 from the access window of the case.

ST1 498247001 MAGNET BASE

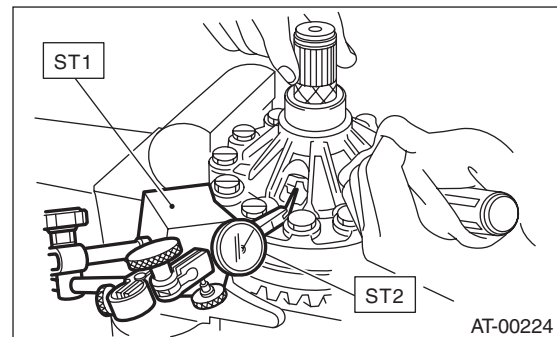
ST2 498247100 DIAL GAUGE

NOTE:

- Measure the backlash by placing the differential bevel pinion tooth against two differential bevel gear teeth.
- Fix the differential bevel pinion gear in place with a screwdriver covered with cloth or similar tool when measuring.

Standard:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

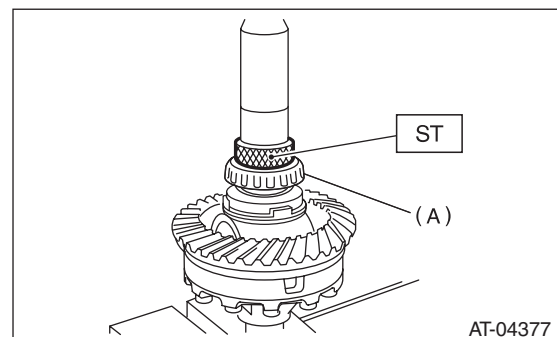


- (3) If the backlash is out of specification, select a washer from the table below.

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

- 6) Using the ST, install the taper roller bearing.

ST 398487700 INSTALLER

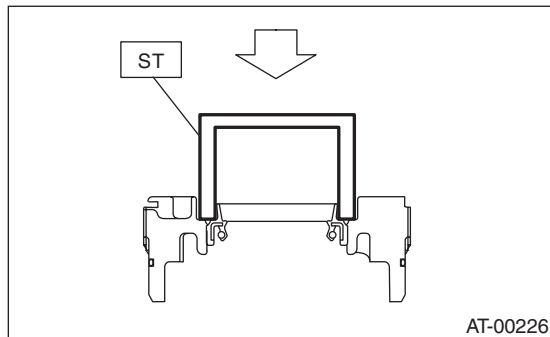


(A) Taper roller bearing

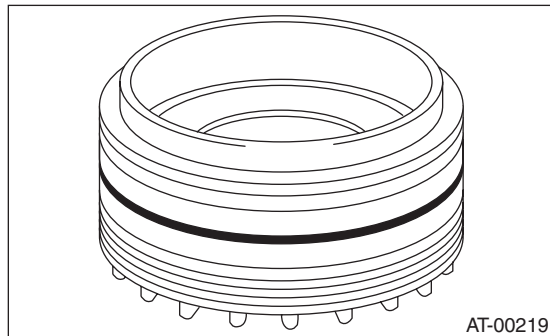
2. DIFFERENTIAL SIDE RETAINER

- 1) Install the bearing outer race to the differential side retainer.
- 2) Install a new oil seal using the ST and a plastic hammer.

ST 18675AA000 DIFFERENTIAL OIL SEAL INSTALLER



- 3) Install a new O-ring.



E: INSPECTION

- Check each component for scratches, damage or other faults.
 - Measure the backlash, and then adjust it to be within specification.
- <Ref. to 4AT-107, ADJUSTMENT, Front Differential Assembly.>

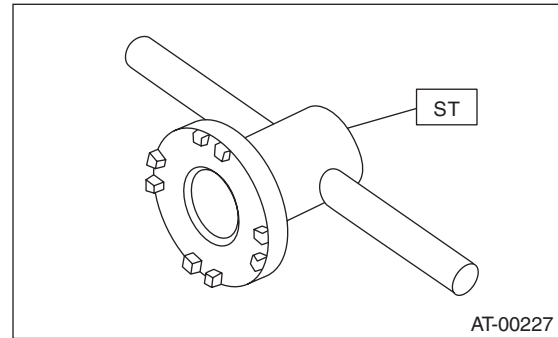
F: ADJUSTMENT

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

ST 18630AA010 WRENCH COMPL
RETAINER

NOTE:

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



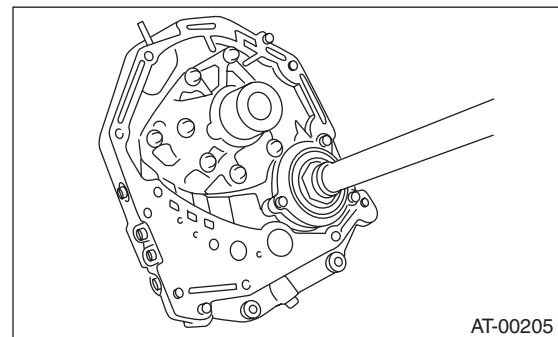
- 2) Remove the oil pump housing.
- 3) Remove the liquid gasket from the mating surface completely.
- 4) Install the oil pump housing assembly to the converter case, and secure them by tightening the four bolts evenly.

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)



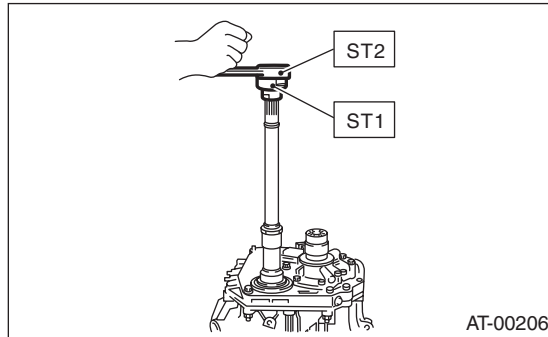
Front Differential Assembly

AUTOMATIC TRANSMISSION

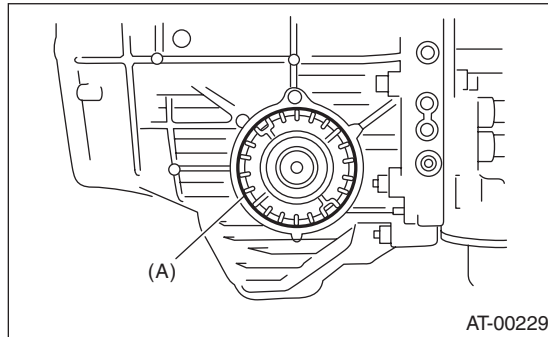
5) Rotate the drive pinion a few times using ST1 and ST2.

ST1 498937110 HOLDER

ST2 499787700 WRENCH

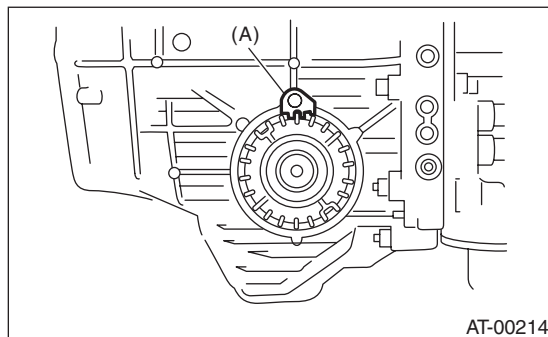


6) Tighten the differential side retainer LH until contact is felt while rotating the shaft. Then loosen the differential side retainer RH. Keep tightening the differential side retainer LH, and loosening the retainer RH until the pinion shaft no longer turns. This is the “zero” state.



(A) Differential side retainer

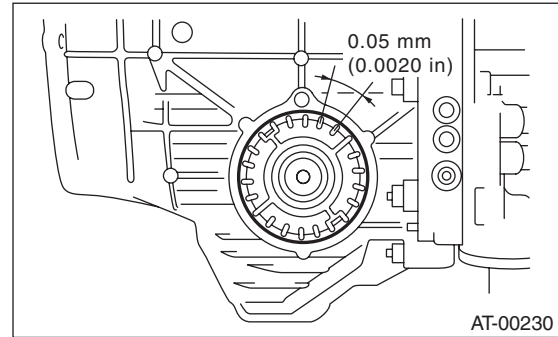
7) After the “zero” state is established, back off the differential side retainer LH 3 notches and secure it with the lock plate. Then back off the differential side retainer RH and retighten until it stops. Rotate the drive pinion 2 or 3 times. Tighten the differential side retainer RH 1-3/4 notches further. 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 about 0.05 mm (0.0020 in).



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

ST1 499787700 WRENCH

ST2 498247001 MAGNET BASE

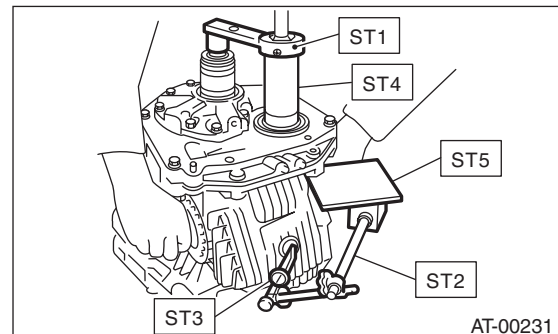
ST3 498247100 DIAL GAUGE

ST4 499787500 ADAPTER

ST5 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

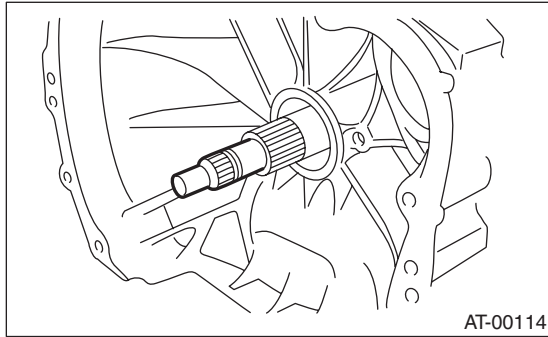


9) Adjust the teeth contact of the front differential and drive shaft. <Ref. to 4AT-100, ADJUSTMENT, Drive Pinion Shaft Assembly.>

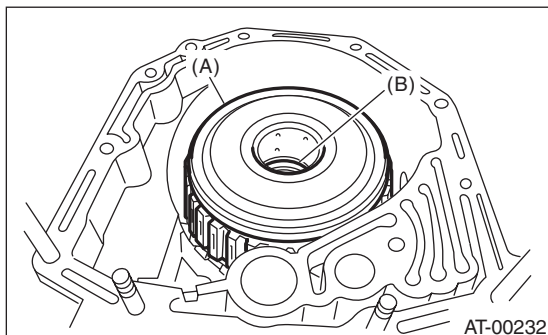
38.AT Main Case

A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-69, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

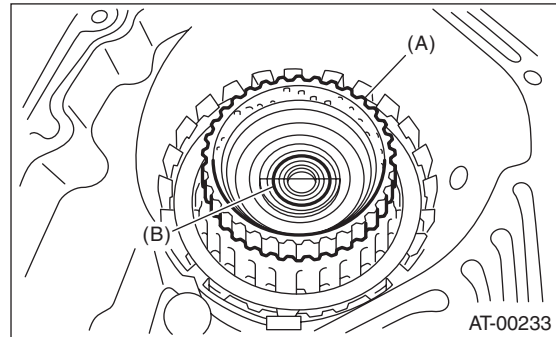


- 4) Lift up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
- 5) Disconnect the inhibitor switch connector from the stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charger pipe. <Ref. to 4AT-68, REMOVAL, Oil Charge Pipe.>
- 8) Remove the ATF inlet and outlet pipes. <Ref. to 4AT-65, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the converter case from the transmission case. <Ref. to 4AT-89, REMOVAL, Converter Case.>
- 10) Remove the oil pump housing. <Ref. to 4AT-91, REMOVAL, Oil Pump Housing.>
- 11) Take out the high clutch and reverse clutch assembly and thrust needle bearing.



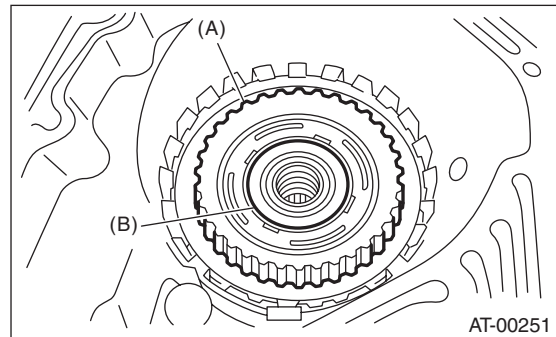
- (A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing

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



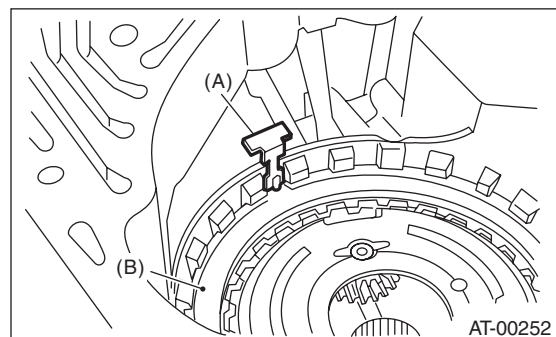
- (A) High clutch hub
(B) Thrust needle bearing

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



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

- 14) Pull out the leaf spring of the 2-4 brake while taking care not to bend the spring.

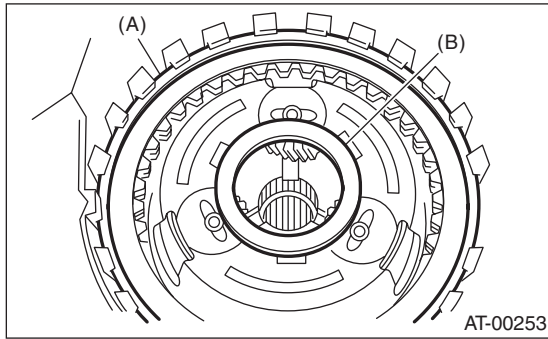


- (A) Leaf spring
(B) Retaining plate

AT Main Case

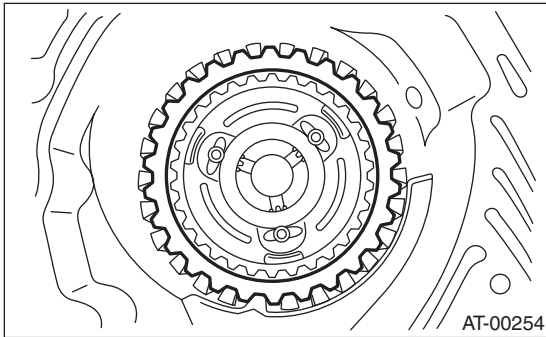
AUTOMATIC TRANSMISSION

15) Remove the snap ring and thrust needle bearing.

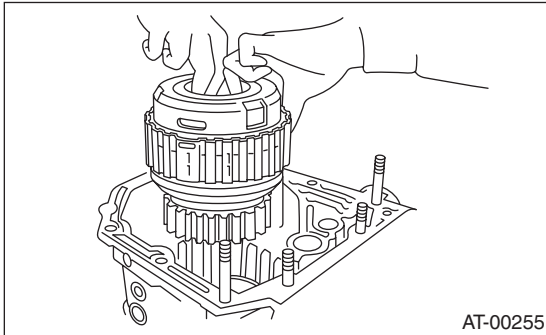


- (A) Snap ring
- (B) Thrust needle bearing

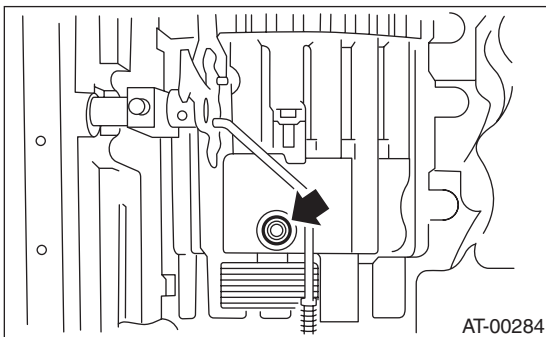
16) Take out the retaining plate of the 2-4 brake, drive plate and driven plate.



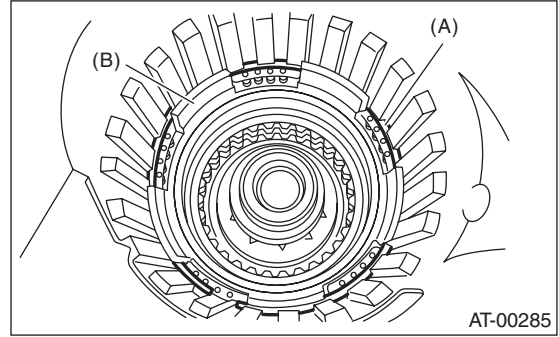
17) Take out the thrust needle bearing, planetary gear assembly and low clutch assembly.



18) Remove the 2-4 brake seal.

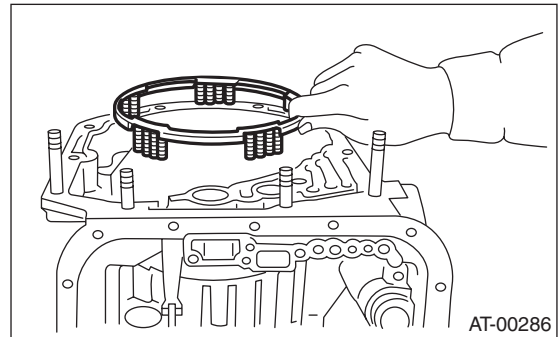


19) Remove the snap ring.

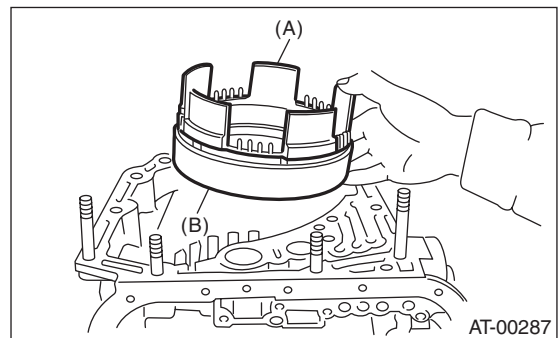


- (A) Snap ring
- (B) 2-4 brake piston

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

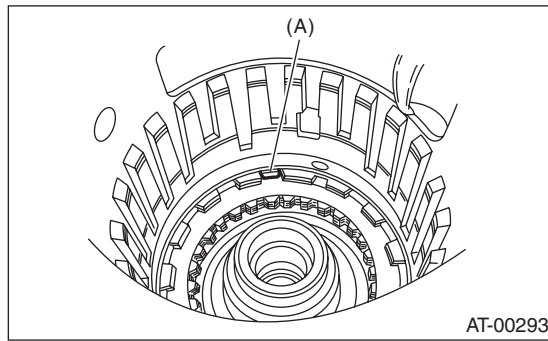


21) Remove the 2-4 brake piston and 2-4 brake piston retainer while taking care not to damage them.



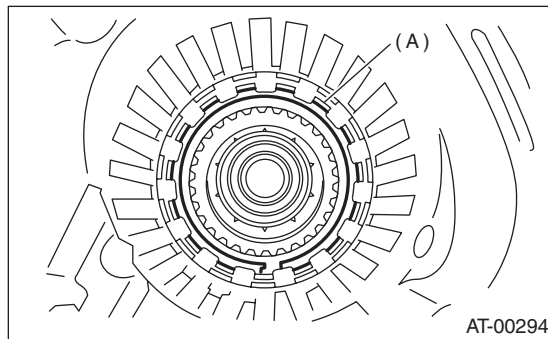
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

22) Pull out the low & reverse brake leaf spring without bending it.



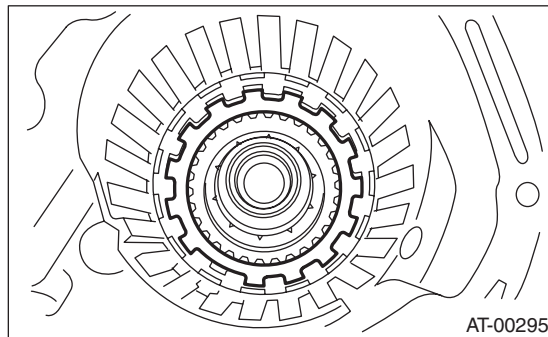
(A) Leaf spring

23) Remove the snap ring.

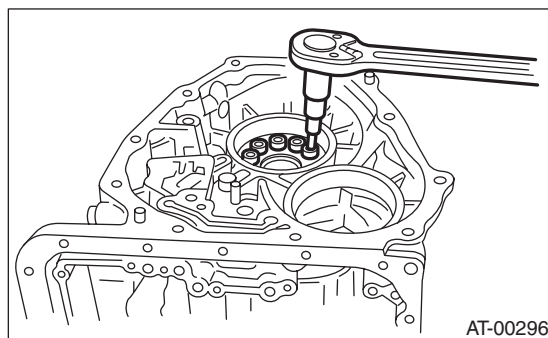


(A) Snap ring

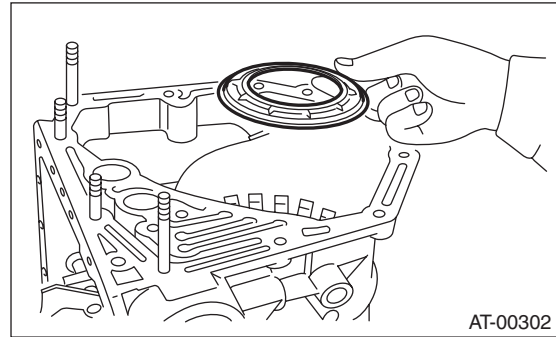
24) Take out the low & reverse brake retaining plate, drive plate, driven plate and dish plate.



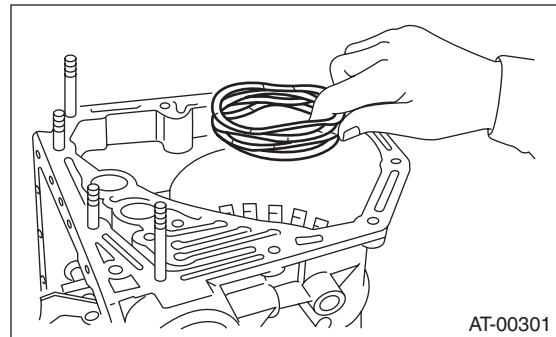
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race by hand.



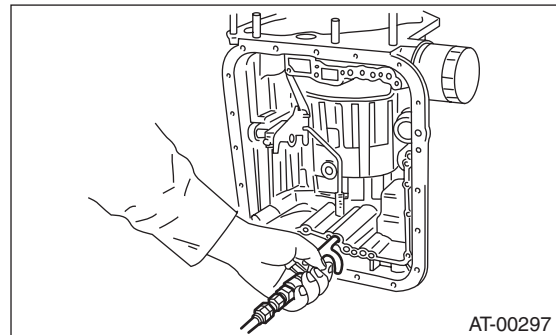
26) Remove the spring retainer.



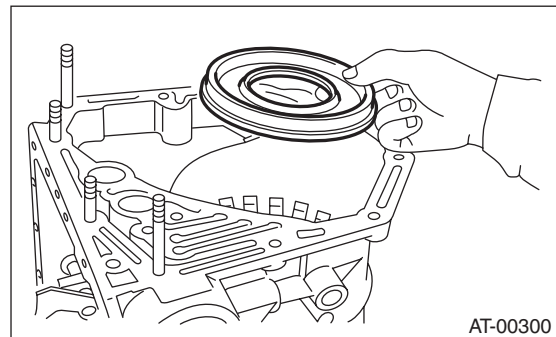
27) Take out the return spring.



28) Apply compressed air.



29) Take out the low & reverse brake piston.

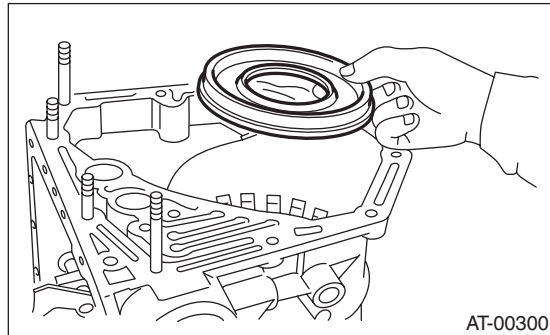


B: INSTALLATION

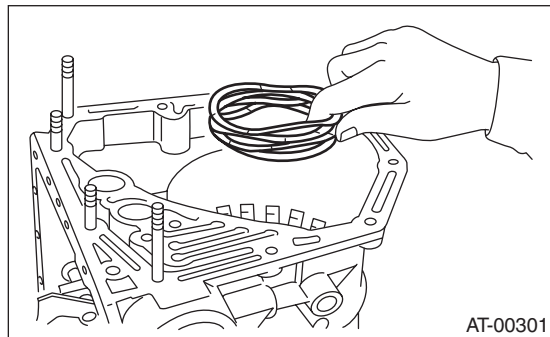
1) Apply ATF fluid to the lip, then attach the low & reverse brake piston.

NOTE:

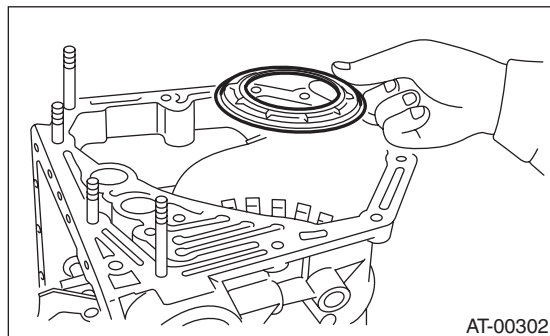
Do not damage the lip seal.



2) Install the return spring.



3) Install the spring retainer.

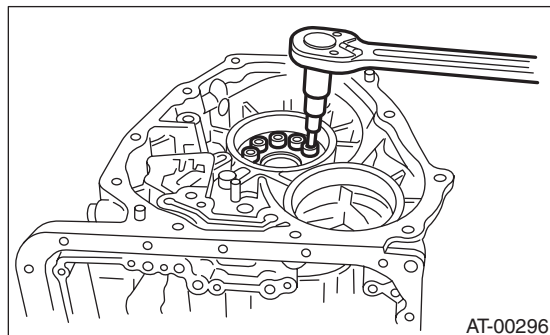


4) Install the one-way clutch inner race.

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 micro gauge to clutch, and read its scale.

NOTE:

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

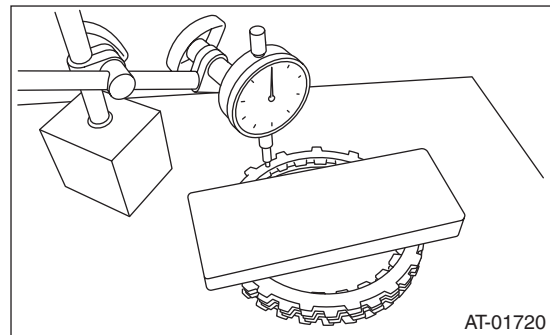
10) Scale and record the weight "Z" of a flat board which will be put on retaining plate.

NOTE:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.

- Use a flat board weighing less than 8.5 kg (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

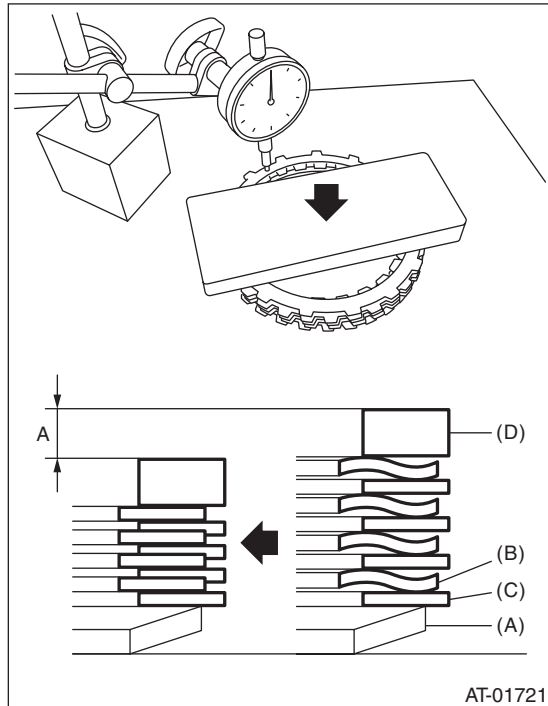
83 N (8.5 kgf, 18.7 lb) : Load applied to clutch plate

Z: Flat board weight

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

NOTE:

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



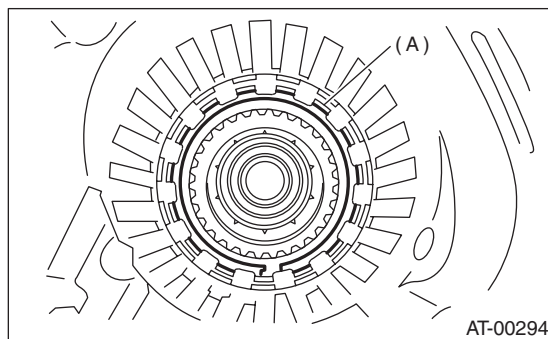
- (A) Dish plate
- (B) Driven plate
- (C) Drive plate
- (D) Retaining plate

14) Installation of the low & reverse brake:

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

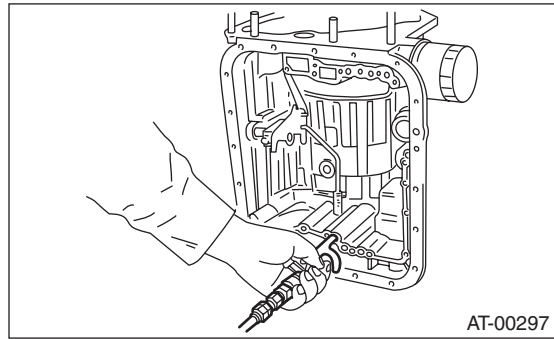
NOTE:

Pay attention to the orientation of the dish plate.



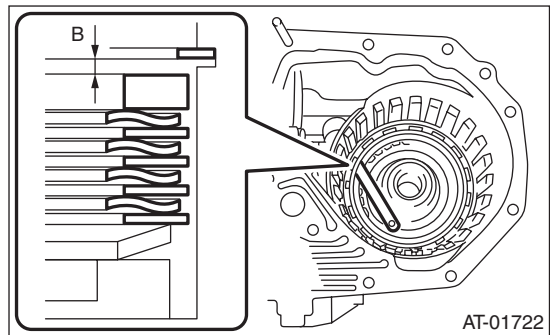
- (A) Snap ring

15) Apply compressed air intermittently to check for operation.



16) Measure the clearance.

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



AT Main Case

AUTOMATIC TRANSMISSION

(2) Piston stroke calculation

Calculate with A and B dimensions recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new part and select and adjust the retaining plate to be within the default specification values.

$$T = A + B$$

T: Piston stroke

A: Amount of drive plate compression

B: Clearance between retaining plate and snap ring

Turbo model

Initial standard:

2.7 — 3.2 mm (0.106 — 0.126 in)

Limit thickness:

3.9 mm (0.153 in)

Non-turbo model

Initial standard:

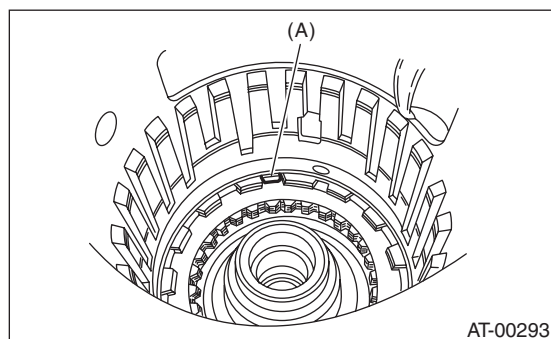
2.15 — 2.65 mm (0.085 — 0.104 in)

Limit thickness:

2.95 mm (0.116 in)

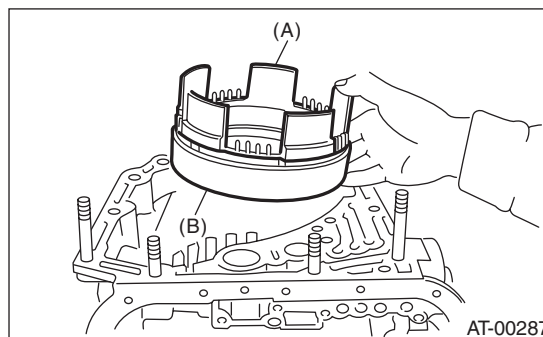
Retaining plate	
Part No.	Thickness mm (in)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

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



(A) Leaf spring

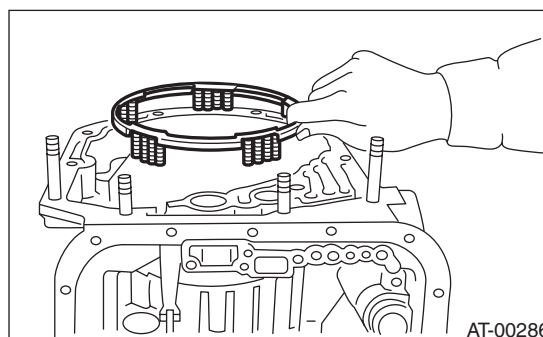
18) Install the 2-4 brake piston and 2-4 brake retainer by aligning the hole of the 2-4 brake retainer with the hole on the transmission case.



(A) 2-4 brake piston

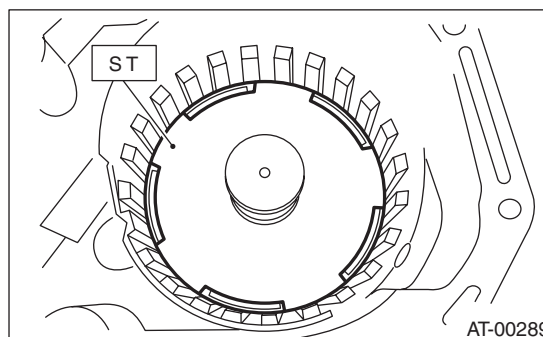
(B) 2-4 brake piston retainer

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



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

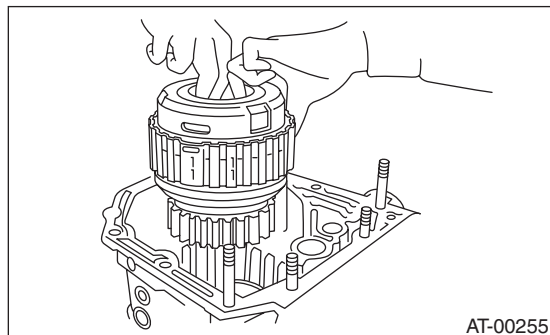
ST 498677100 COMPRESSOR



21) 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, paying special attention not to damage the seal ring.



22) Measure the amount of drive plate compression and record that value. (Non-turbo model)

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

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

NOTE:

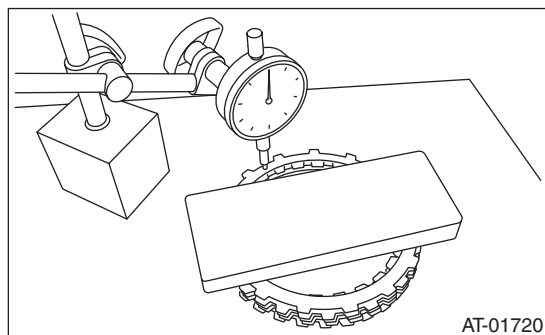
The value, which is read in the gauge at this time, is zero point.

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

NOTE:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 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

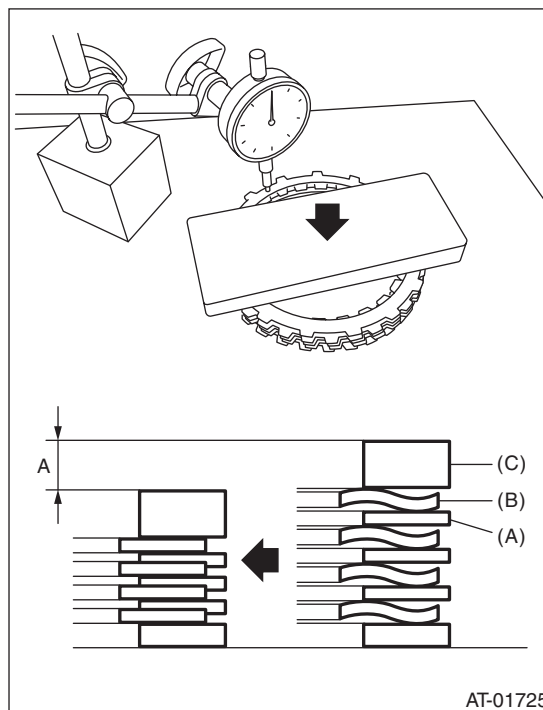
100 N (10.2 kgf, 22.5 lb) : Load applied to clutch plate

Z: Flat board weight

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

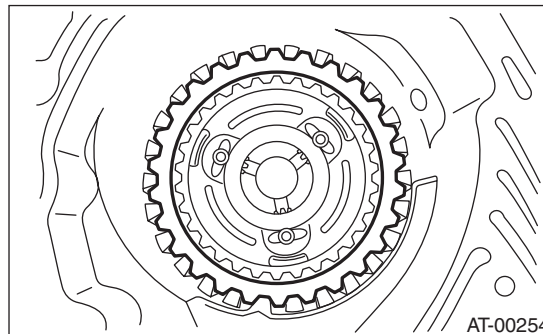
NOTE:

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



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

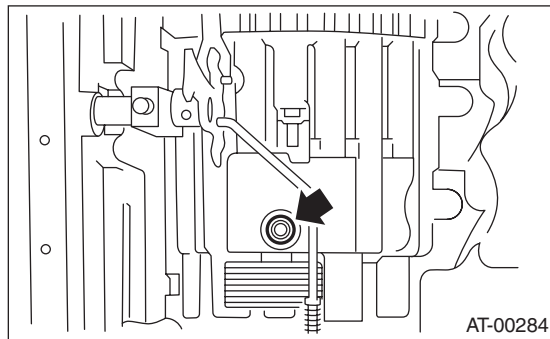
23) Install the pressure rear plate, 2-4 brake drive plate, driven plate, retaining plate and snap ring.



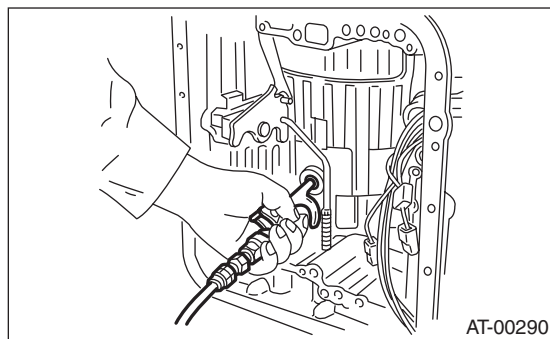
AT Main Case

AUTOMATIC TRANSMISSION

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

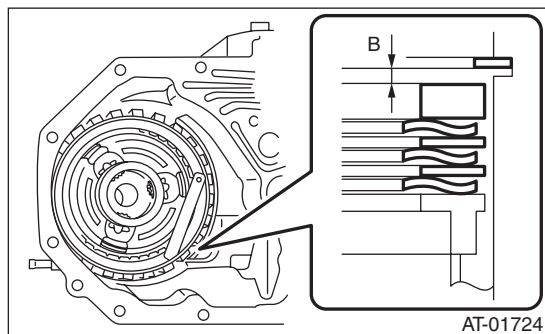


25) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of brake.



26) Check the piston stroke. (Non-turbo model)

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



(2) Piston stroke calculation

Calculate with A and B dimensions recorded before. If the service limits from the calculation formula are exceeded, 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.	Thickness mm (in)
31567AA991	5.6 (0.220)
31567AB001	5.8 (0.228)
31567AB011	6.0 (0.236)
31567AB021	6.2 (0.244)
31567AB031	6.4 (0.252)
31567AB041	6.6 (0.260)

27) Measure the clearance between the retaining plate and snap ring. (Turbo model)

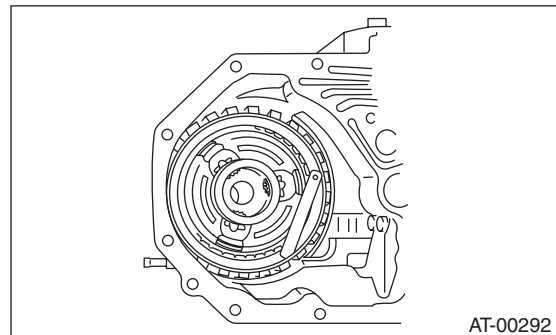
If the clearance exceeds the service limits, replace the driven plate and select and adjust the retaining plate so that the clearance is within default standard values.

Initial standard:

0.8 — 1.2 mm (0.031 — 0.047 in)

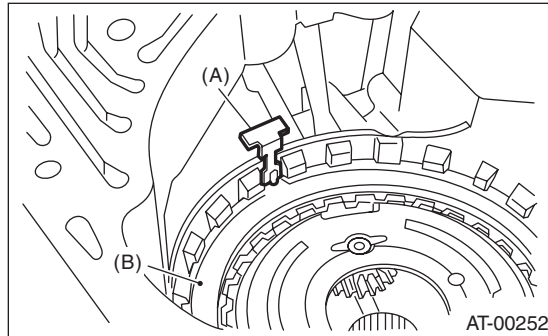
Limit thickness:

1.5 mm (0.059 in)



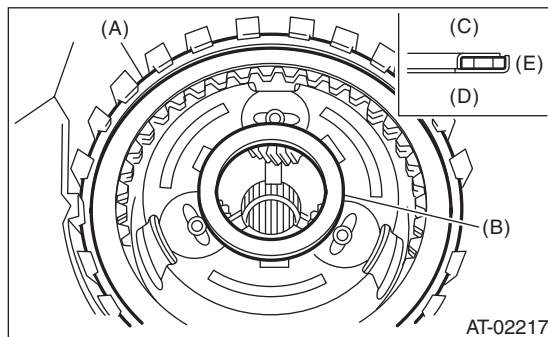
Retaining plate	
Part No.	Thickness mm (in)
31567AA991	5.6 (0.220)
31567AB001	5.8 (0.228)
31567AB011	6.0 (0.236)
31567AB021	6.2 (0.244)
31567AB031	6.4 (0.252)
31567AB041	6.6 (0.260)

28) Attach while making sure that the position of the leaf spring is correct.



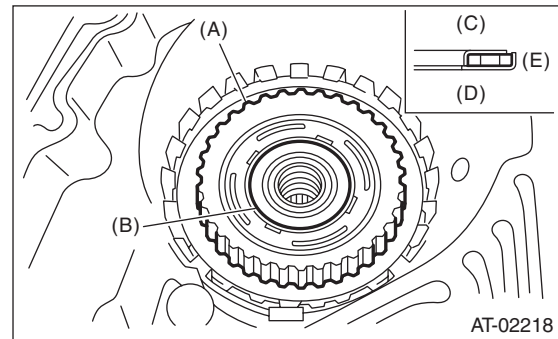
- (A) Leaf spring
- (B) Retaining plate

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



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

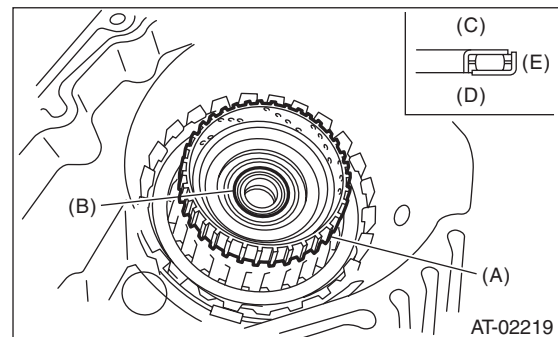
30) Install the front sun gear and the thrust needle bearing.



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

31) Apply vaseline, then attach the thrust needle bearing to the high clutch hub. Install the high clutch hub by correctly engaging the splines of the front planetary carrier.

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

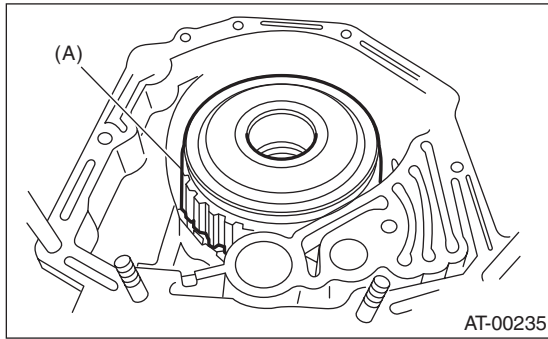


- (A) High clutch hub
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

AT Main Case

AUTOMATIC TRANSMISSION

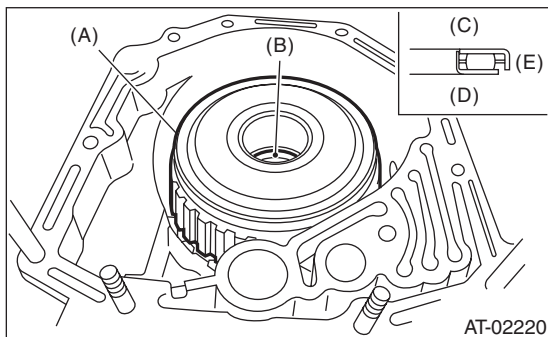
33) Install the high clutch assembly and reverse clutch assembly.



(A) High clutch and reverse clutch ASSY

34) Adjust the total end play. <Ref. to 4AT-95, ADJUSTMENT, Oil Pump Housing.>

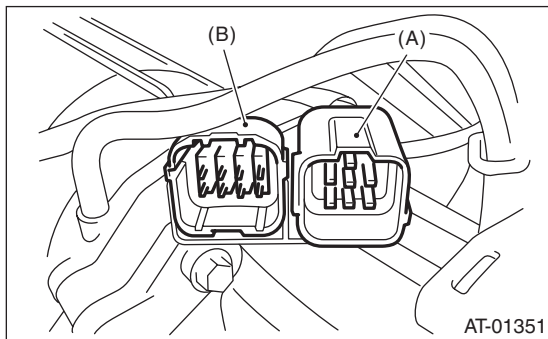
35) Install the thrust needle bearing in the correct direction.



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

36) Install the converter case assembly to the transmission case assembly. <Ref. to 4AT-89, INSTALLATION, Converter Case.>

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



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

38) Install the air breather hose. <Ref. to 4AT-67, INSTALLATION, Air Breather Hose.>

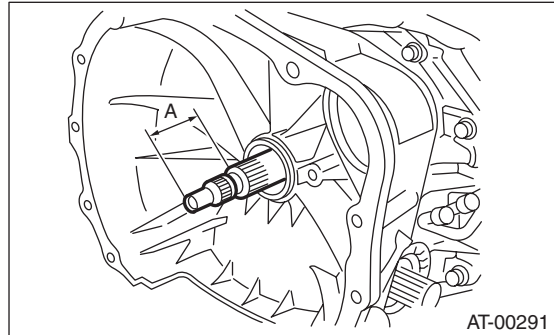
39) Install the ATF cooler pipe. <Ref. to 4AT-66, INSTALLATION, ATF Cooler Pipe and Hose.>

40) Install the oil charger pipe along with the O-ring. <Ref. to 4AT-68, 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)



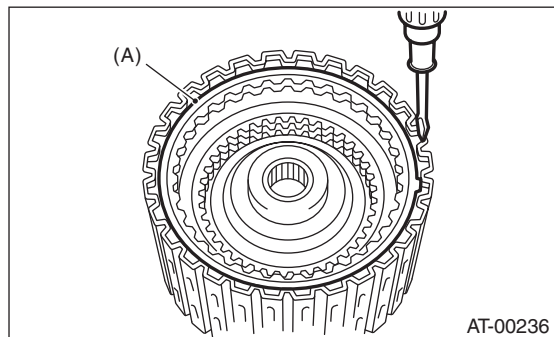
42) Install the torque converter clutch assembly. <Ref. to 4AT-69, INSTALLATION, Torque Converter Clutch Assembly.>

43) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

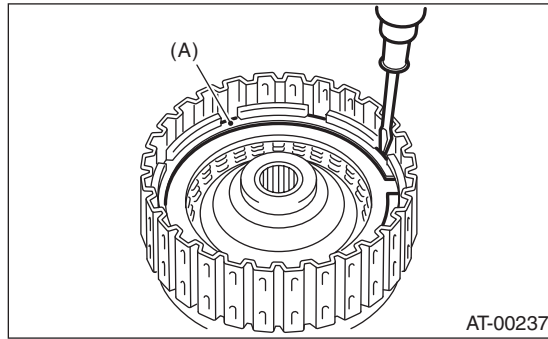
1. HIGH CLUTCH AND REVERSE CLUTCH

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



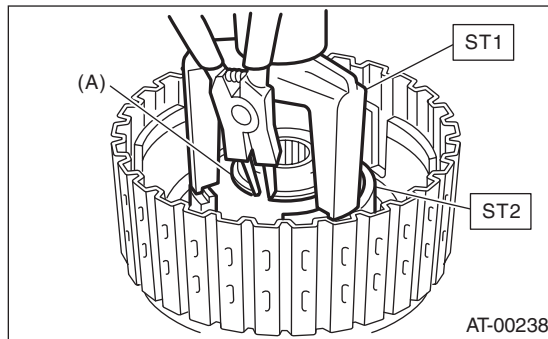
(A) Snap ring

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



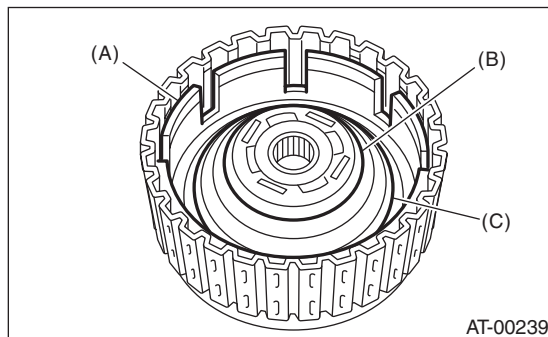
(A) Snap ring

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



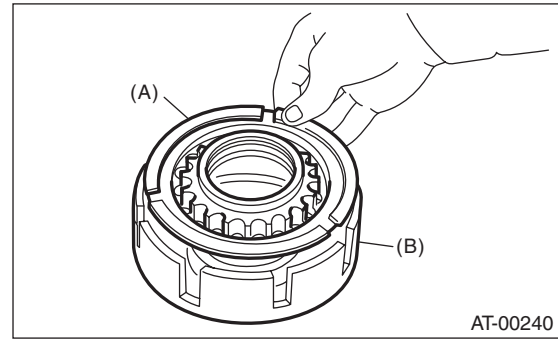
(A) Snap ring

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

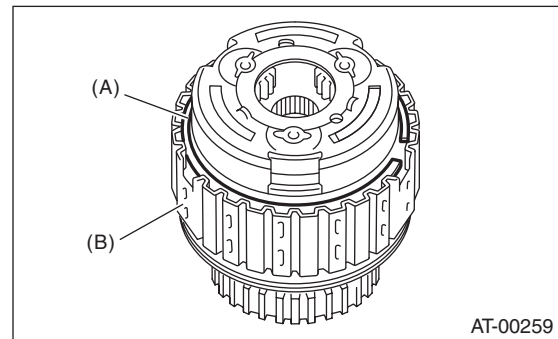
5) Remove the D-ring and lip seal from the high clutch piston and reverse clutch piston.



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

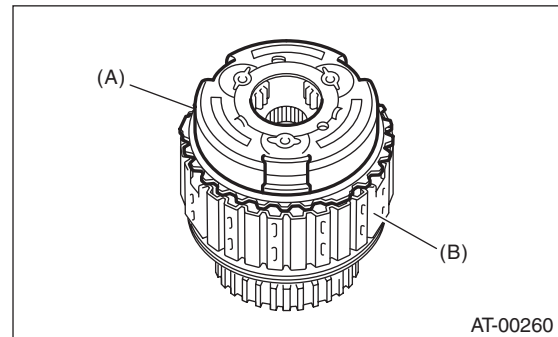
2. PLANETARY GEAR AND LOW CLUTCH

1) Remove the snap ring from low clutch drum.



(A) Snap ring
 (B) Low clutch drum

2) Take out the front planetary carrier.

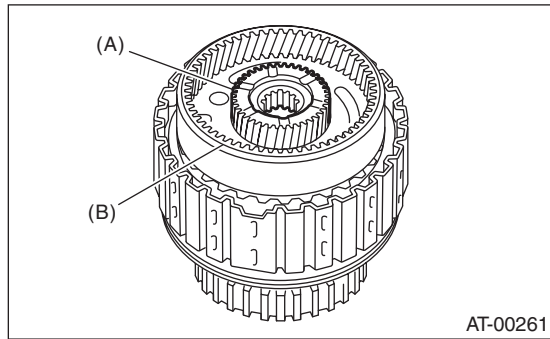


(A) Front planetary carrier
 (B) Low clutch drum

AT Main Case

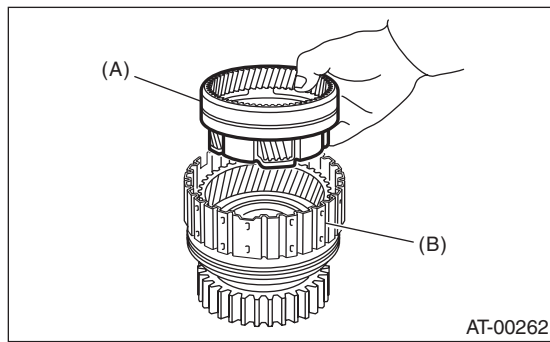
AUTOMATIC TRANSMISSION

3) Take out the rear sun gear.



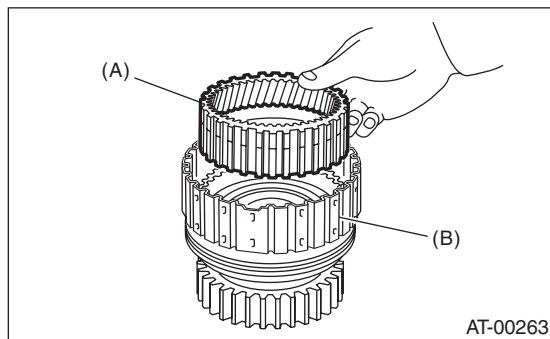
- (A) Rear sun gear
- (B) Rear planetary carrier

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



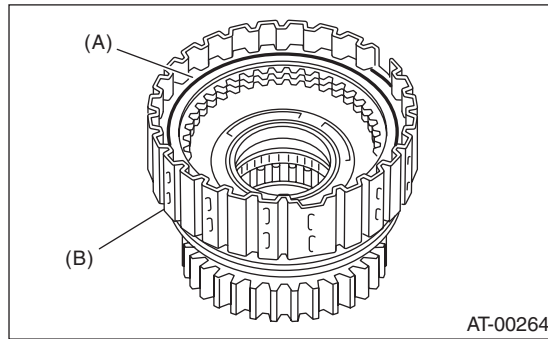
- (A) Rear planetary carrier
- (B) Low clutch drum

5) Take out the rear internal gear.



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

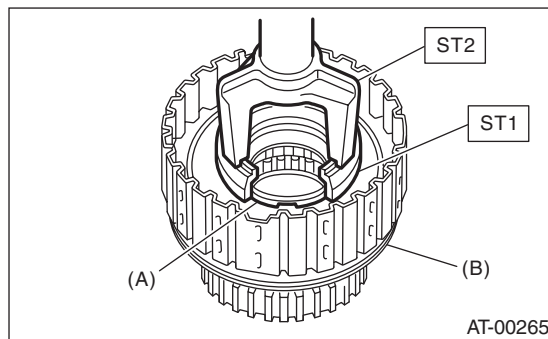
6) Remove the snap ring from low clutch drum.



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

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

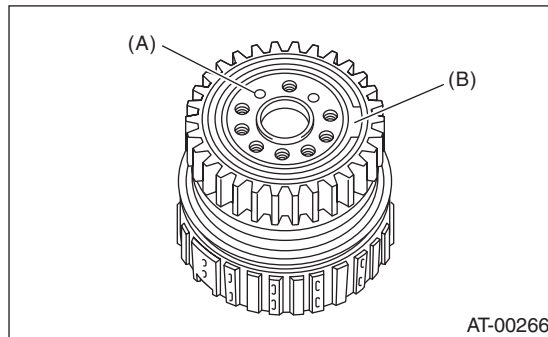
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



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

8) Remove the one-way clutch. <Ref. to 4AT-109, REMOVAL, AT Main Case.>

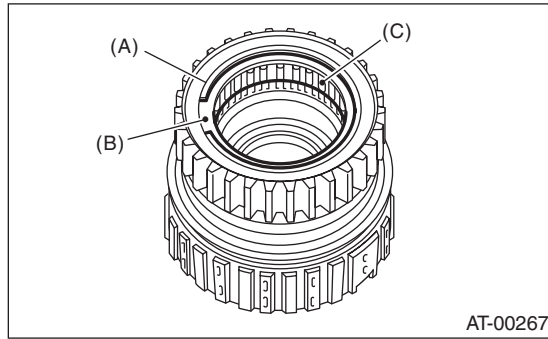
9) Install the one-way clutch inner race to the low clutch drum, and then apply compressed air to remove the low clutch piston.



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

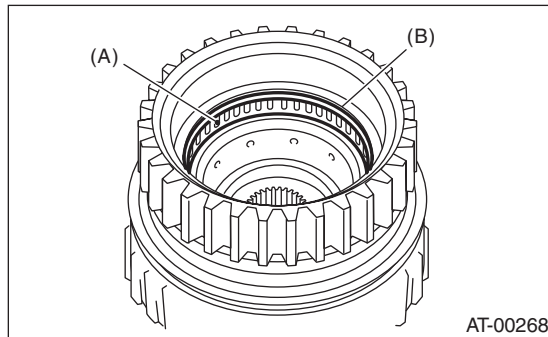
10) Remove the one-way clutch inner race.

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



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

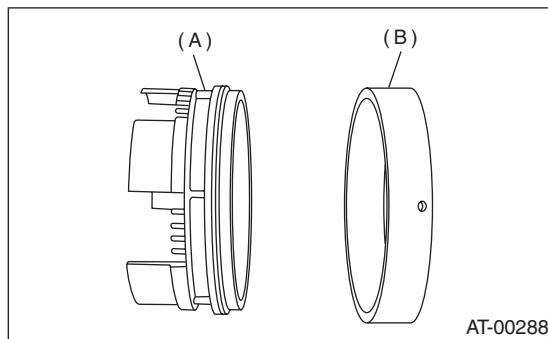
12) Remove the needle bearing after taking out the snap ring.



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

3. 2-4 BRAKE

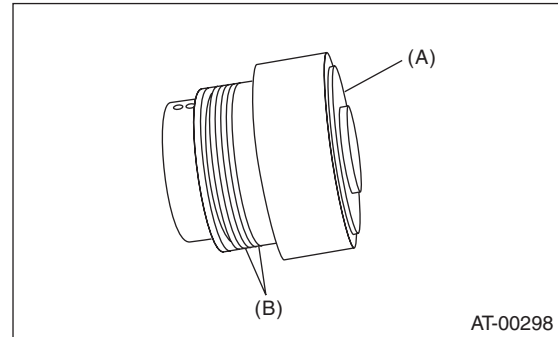
Separate the 2-4 brake piston and piston retainer.



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

4. ONE-WAY CLUTCH INNER RACE

1) Remove the seal ring.

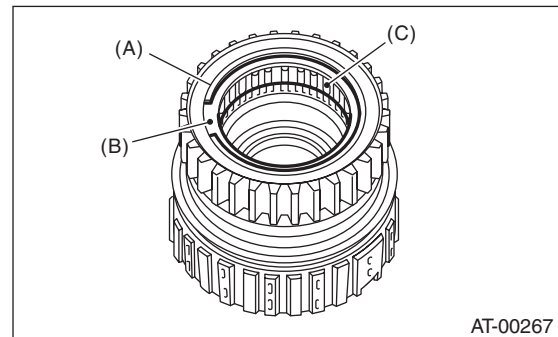


- (A) One-way clutch inner race
- (B) Seal ring

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

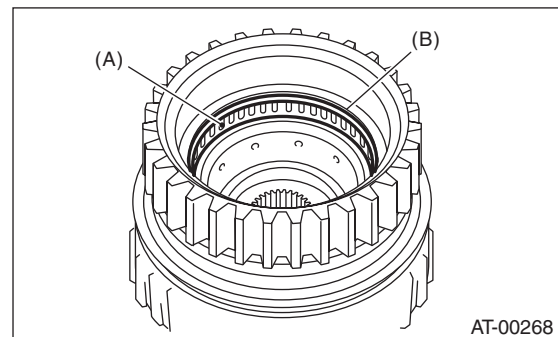
5. ONE-WAY CLUTCH OUTER RACE

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



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

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



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

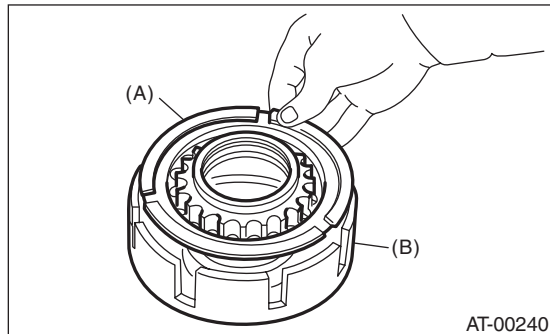
D: ASSEMBLY

1. HIGH CLUTCH AND REVERSE CLUTCH

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

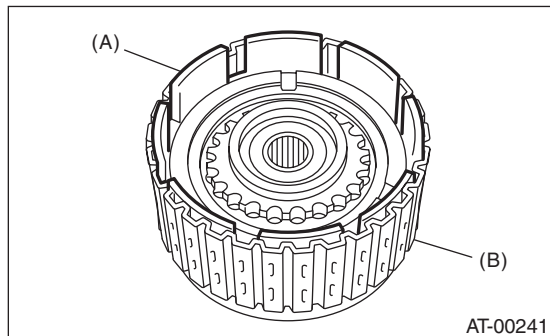
NOTE:

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



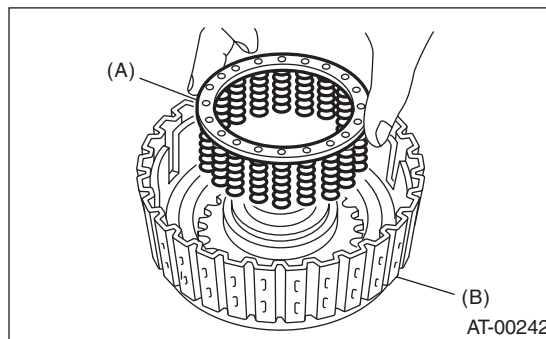
- (A) High clutch piston
- (B) Reverse clutch piston

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



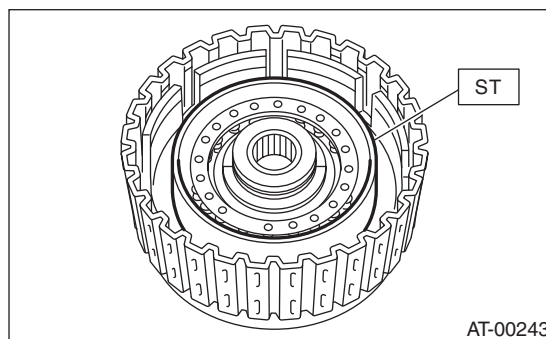
- (A) Reverse clutch piston
- (B) High clutch drum

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



- (A) Return spring
- (B) High clutch drum

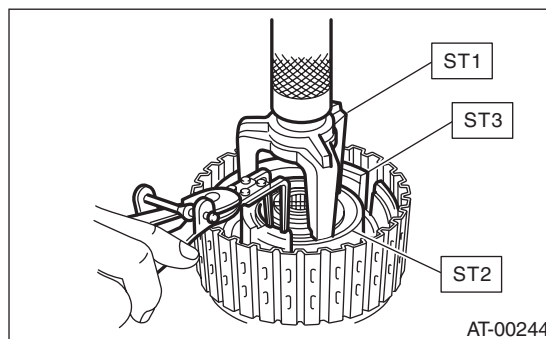
- 5) Attach the ST to the high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GUIDE



- 6) Install the cover to the high clutch piston without bending the high clutch piston seal.

- 7) Install the snap ring using ST1 and ST2.

- ST1 398673600 COMPRESSOR
- ST2 498627100 SEAT
- ST3 498437000 HIGH CLUTCH PISTON GAUGE



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 micro gauge to clutch, and read its scale.

NOTE:

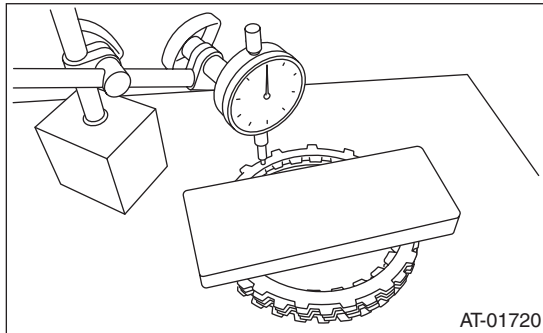
The value, which is read in the gauge at this time, is zero point.

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

NOTE:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 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

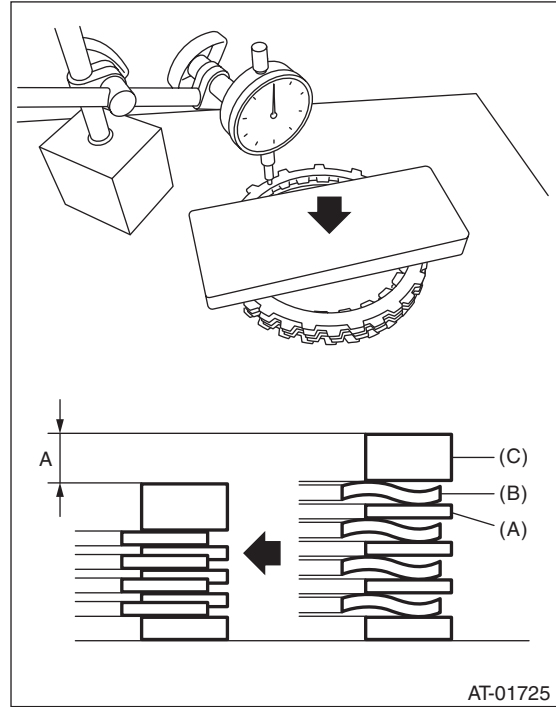
250 N (25.5 kgf, 56.2 lb) : Load applied to clutch plate

Z: Flat board weight

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

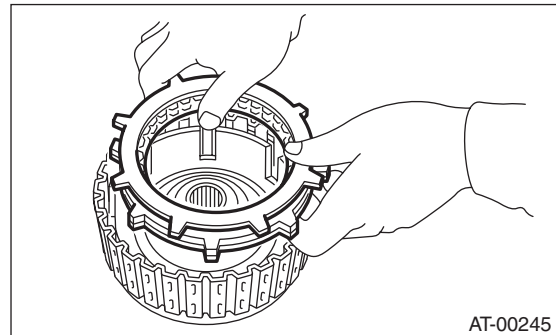
NOTE:

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



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

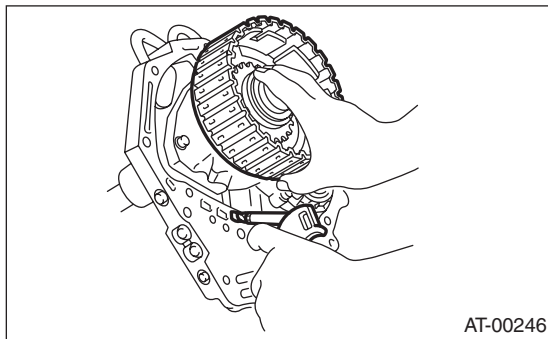


10) Install the snap ring to high clutch drum.

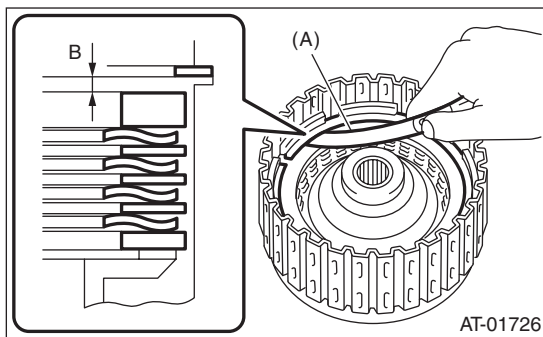
AT Main Case

AUTOMATIC TRANSMISSION

- 11) Apply compressed air intermittently to check for operation.



- 12) Check the piston stroke. (Non-turbo model)
(1) Measure the clearance B between the retaining plate and snap ring. (High clutch)



(A) Thickness gauge

- (2) Piston stroke calculation

Calculate with A and B dimensions recorded before. If the service limits from the calculation formula are exceeded, replace the drive plate and select and adjust the retaining plate to within default 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)

High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

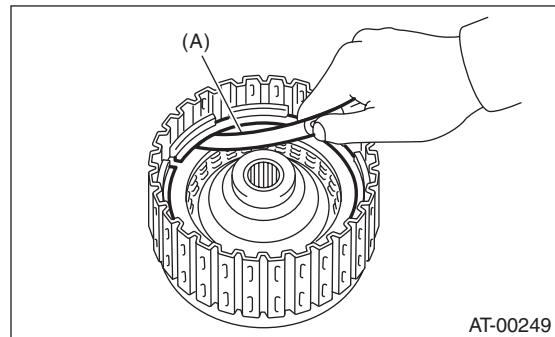
- 13) Measure the clearance between the high clutch retaining plate and snap ring. (Turbo model)
At this time, do not press down the retaining plate.

Initial standard:

0.8 — 1.1 mm (0.031 — 0.043 in)

Limit thickness:

1.5 mm (0.059 in)



(A) Thickness gauge

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

- 14) 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 micro gauge to clutch, and read its scale.

NOTE:

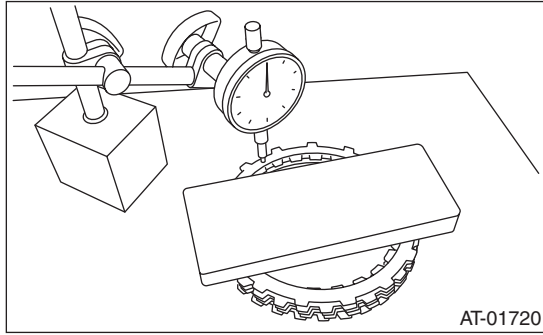
The value, which is read in the gauge at this time, is zero point.

(3) Scale and record the weight “Z” of a flat board which will be put on retaining plate.

NOTE:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 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".

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

N: Value indicated on push/pull gauge

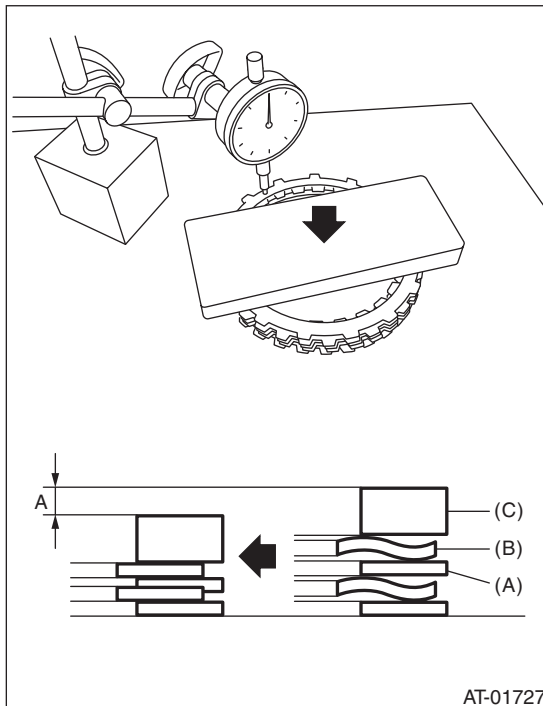
150 N (15.3 kgf, 33.7 lb) : Load applied to clutch plate

Z: Flat board weight

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

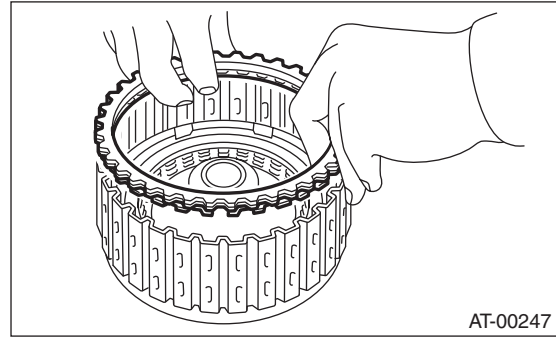
NOTE:

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

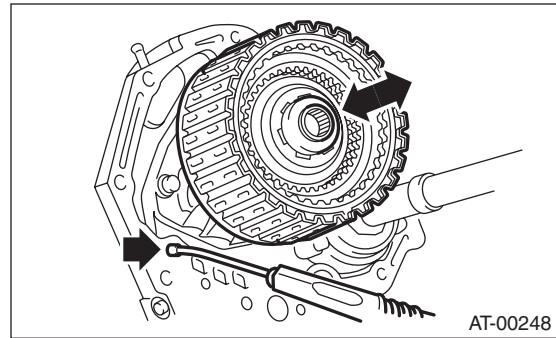


- (A) Drive plate
- (B) Driven plate
- (C) Retaining plate

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

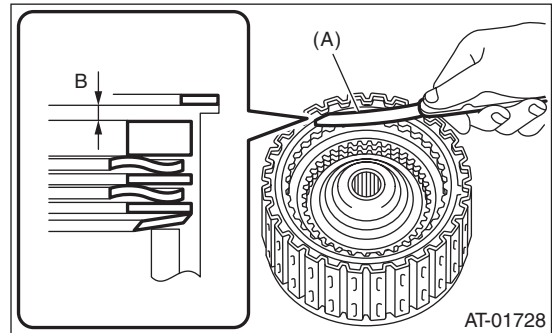


16) Apply compressed air intermittently to check for operation.



17) Check the piston stroke.

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



(A) Thickness gauge

AT Main Case

AUTOMATIC TRANSMISSION

(2) Piston stroke calculation

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

$$T = A + B$$

T: Piston stroke

A: Amount of drive plate compression

B: Clearance between retaining plate and snap ring

Initial standard:

1.1 — 1.4 mm (0.043 — 0.055 in)

Limit thickness:

1.6 mm (0.063 in)

Reverse clutch retaining plate	
Part No.	Thickness mm (in)
31567AA910	4.0 (0.157)
31567AA920	4.2 (0.165)
31567AA930	4.4 (0.173)
31567AA940	4.6 (0.181)
31567AA950	4.8 (0.189)
31567AA960	5.0 (0.197)
31567AA970	5.2 (0.205)
31567AA980	5.4 (0.213)

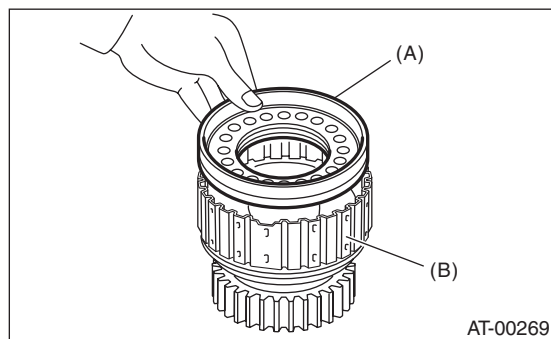
2. PLANETARY GEAR AND LOW CLUTCH

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

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

NOTE:

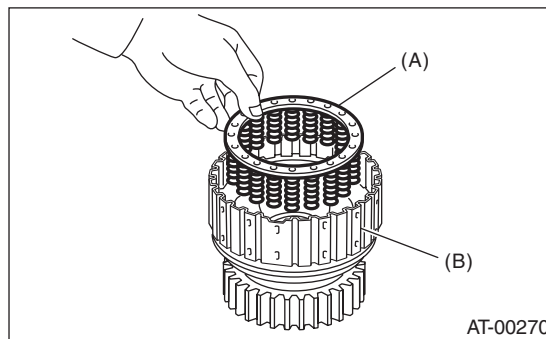
Be careful not to damage the D-ring.



(A) Low clutch piston

(B) Low clutch drum

3) Install the spring retainer to low clutch piston.

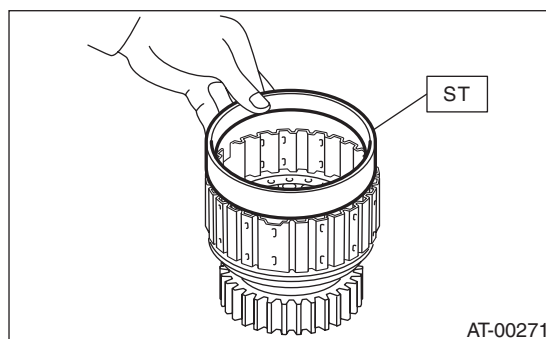


(A) Spring retainer

(B) Low clutch drum

4) Attach the ST to the low clutch drum.

ST 498437100 LOW CLUTCH PISTON GUIDE

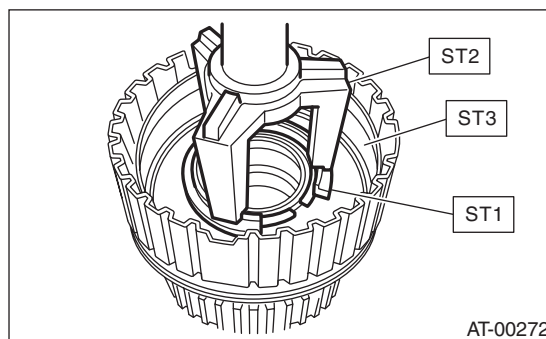


5) Using ST1 and ST2, set the cover on the piston and press against it, and attach the snap ring. At this time, be careful not to bend the cover seal.

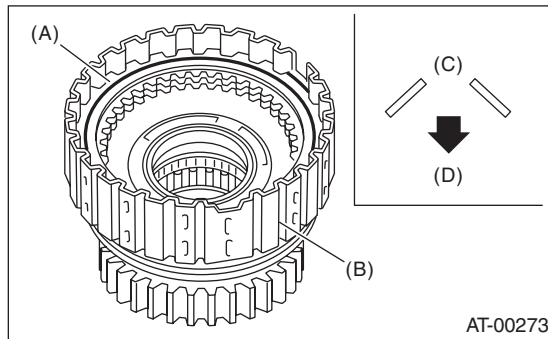
ST1 498627100 SEAT

ST2 398673600 COMPRESSOR

ST3 498437100 LOW CLUTCH PISTON GUIDE



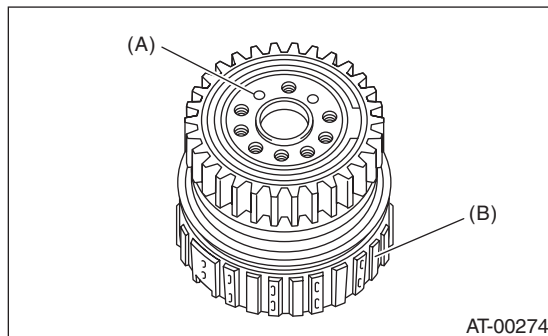
6) Install the dish plate, driven plate, drive plate and retaining plate, and then secure them with a snap ring.



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

7) Check the low clutch for operation.

- (1) Remove the one-way clutch. <Ref. to 4AT-109, 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.

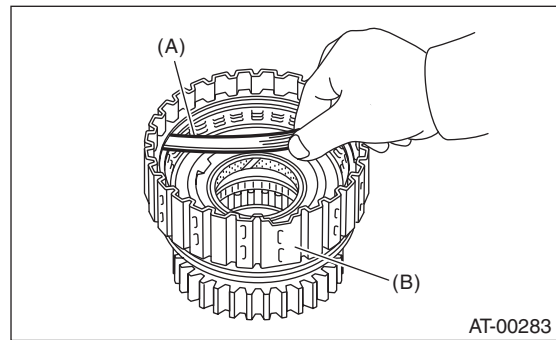
- (1) Place same thickness shims on both sides to prevent plate from tilting.
- (2) Check the clearance between retaining plate and low clutch operation.

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:

1.6 mm (0.063 in)

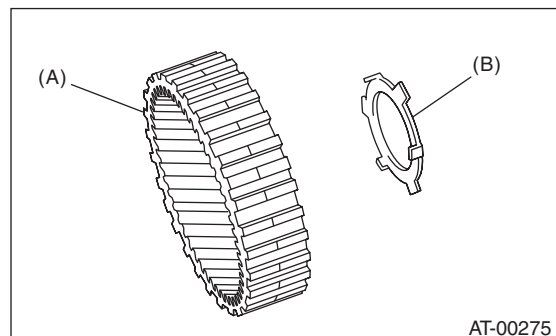


- (A) Thickness gauge
- (B) Low clutch drum

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

9) Install the washer to the rear internal gear.

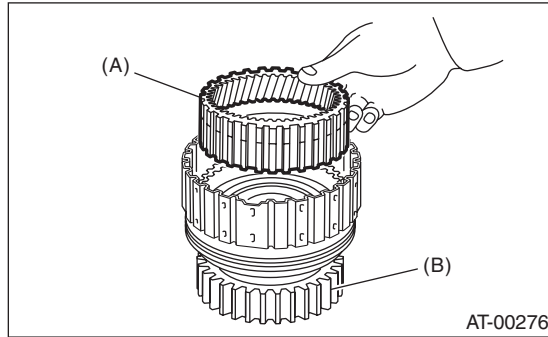


- (A) Rear internal gear
- (B) Washer

AT Main Case

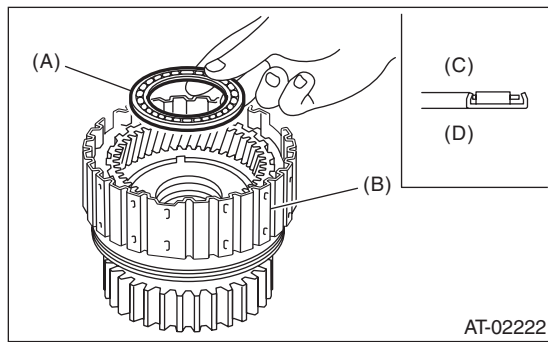
AUTOMATIC TRANSMISSION

10) Install the rear internal gear.



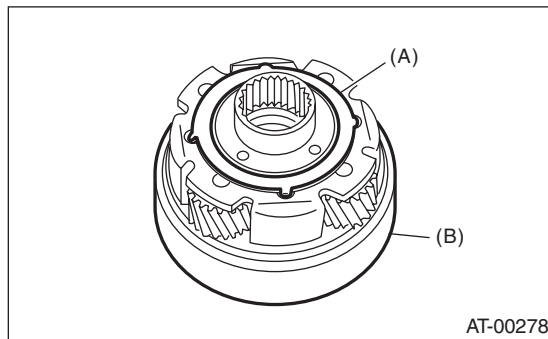
- (A) Rear internal gear
- (B) Low clutch drum

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



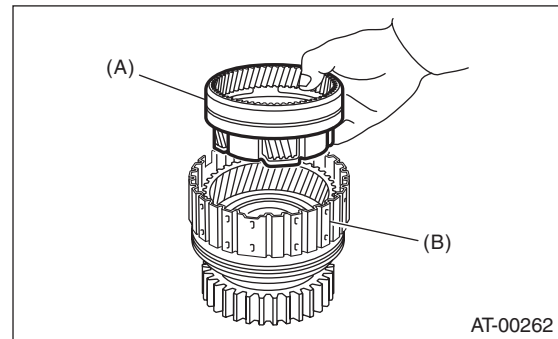
- (A) Thrust needle bearing
- (B) Low clutch drum
- (C) Rear planetary carrier side
- (D) Low clutch piston side

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



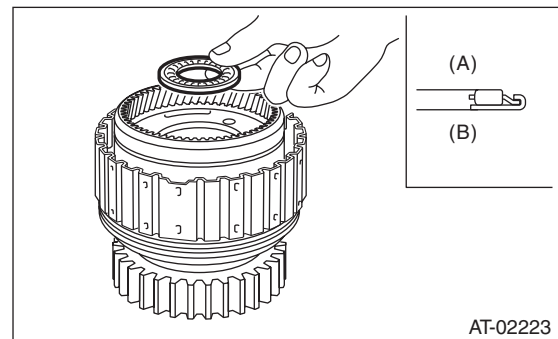
- (A) Washer
- (B) Rear planetary carrier

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



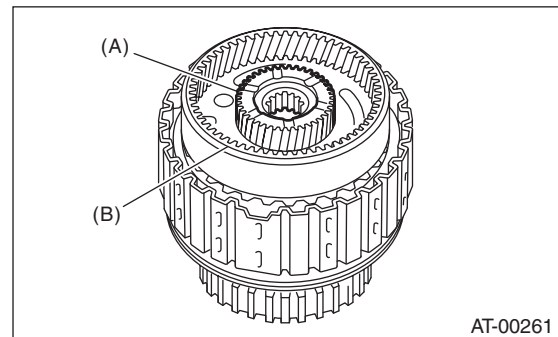
- (A) Rear planetary carrier
- (B) Low clutch drum

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



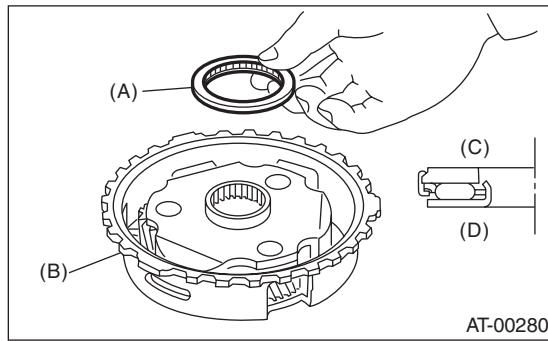
- (A) Rear sun gear side
- (B) Rear planetary carrier side

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



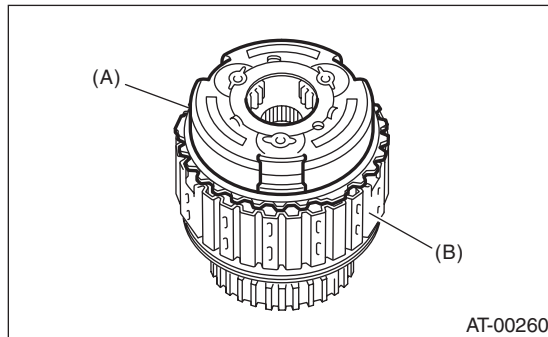
- (A) Rear sun gear
- (B) Rear planetary carrier

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



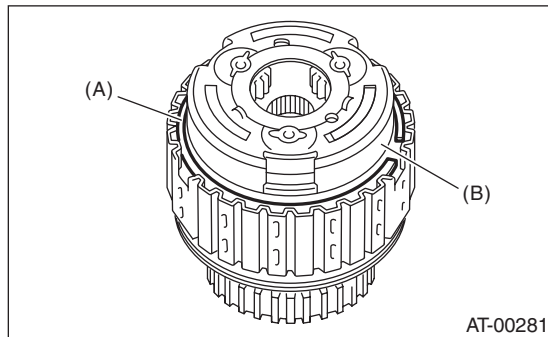
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

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



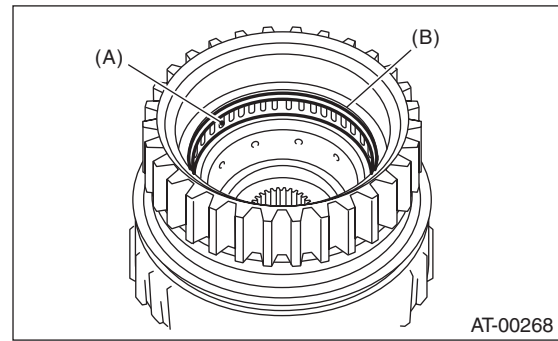
- (A) Front planetary carrier
- (B) Low clutch drum

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



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

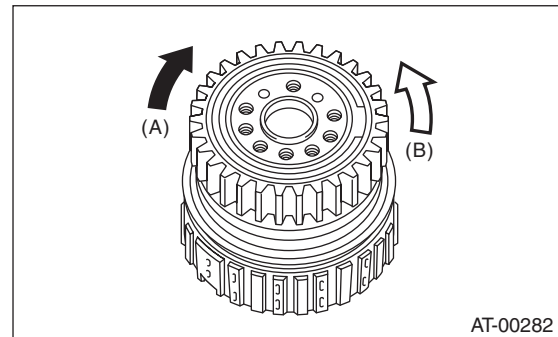
19) Install the needle bearing, and then secure with the snap ring.



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

20) Install the one-way clutch, and then secure with the snap ring.

21) Set the one-way clutch inner race to the D clutch drum. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



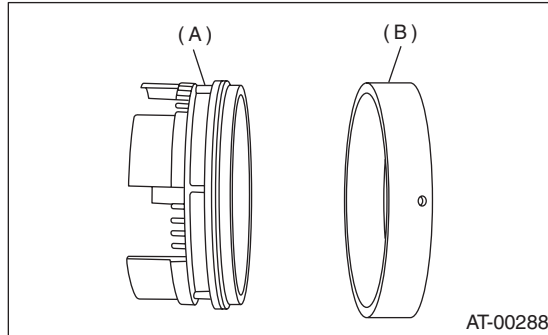
- (A) Locked
- (B) Free

3. 2-4 BRAKE

- 1) Apply ATF to the D-ring, and attach 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.

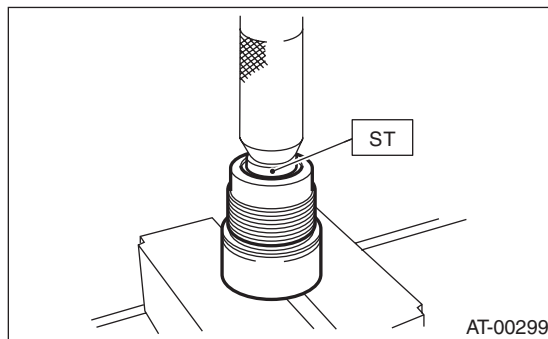


- (A) 2-4 brake piston
(B) 2-4 brake piston retainer

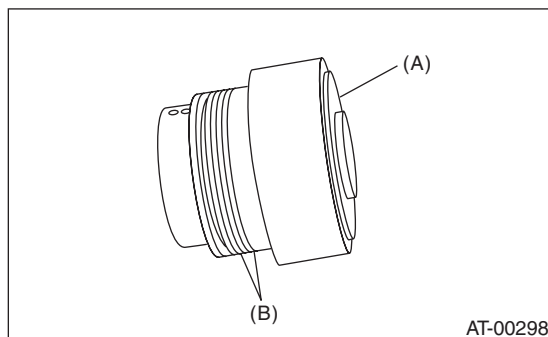
4. ONE-WAY CLUTCH INNER RACE

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

ST 398497701 SEAT



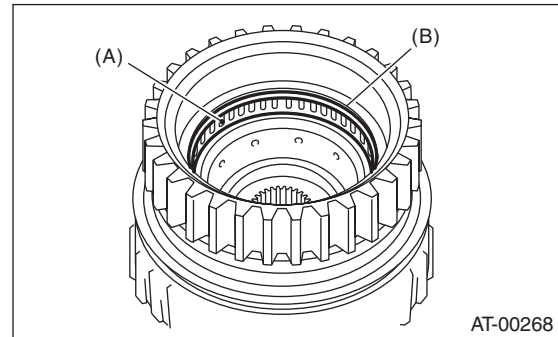
- 2) Apply vaseline to the groove of inner race and to the new seal ring.
- 3) Install two seal rings to the one-way clutch inner race.



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

5. ONE-WAY CLUTCH OUTER RACE

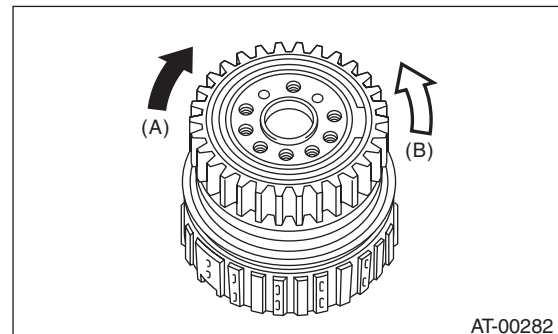
- 1) Install the needle bearing, and then secure with the snap ring.



- (A) Needle bearing
(B) Snap ring

- 2) Install the one-way clutch, and then secure with the snap ring.

- 3) Set the one-way clutch inner race to the low clutch drum. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



- (A) Locked
(B) Free

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Check the following items.

- Drive plate surface wear and damage
- Discoloration of the driven plate (burnt color)
- Snap ring wear and spring retainer deformation
- Lip seal and D-ring wear and damage
- Piston and piston check ball operation
- Adjust the total end play. <Ref. to 4AT-95, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Check the following items.

- Drive plate surface wear and damage
- Discoloration of the driven plate (burnt color)
- Snap ring wear and spring retainer deformation
- Lip seal and D-ring wear and damage
- Inspect the total end play, and adjust it to be within the standard value. <Ref. to 4AT-95, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Check the following items.

- Drive plate surface wear and damage
- Discoloration of the driven plate (burnt color)
- Snap ring wear, leaf spring setting and breakage, and spring retainer deformation
- Lip seal and D-ring wear and damage
- Inspect the total end play, and adjust it to be within the standard value. <Ref. to 4AT-95, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- Check that the snap ring is not damaged and the seal ring is not deformed.
- Inspect the total end play, and adjust it to be within the standard value. <Ref. to 4AT-95, ADJUSTMENT, Oil Pump Housing.>

5. LOW & REVERSE BRAKE

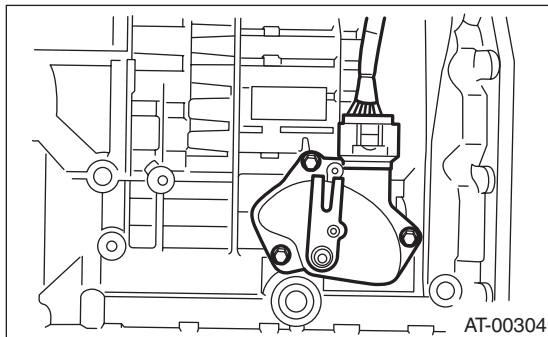
Check the following:

- Drive plate surface wear and damage
- Discoloration of the driven plate (burnt color)
- Snap ring wear, leaf spring setting and breakage, and spring retainer deformation
- Lip seal wear and damage

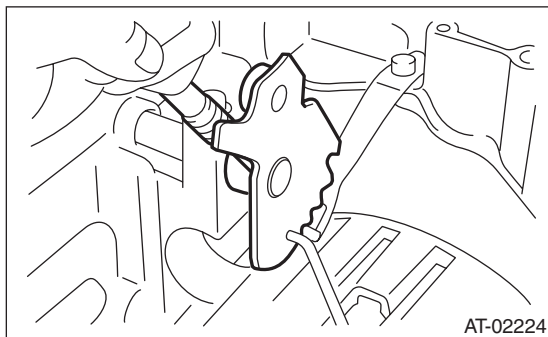
39. Transmission Control Device

A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 4AT-37, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-69, 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 air breather hose. <Ref. to 4AT-67, REMOVAL, Air Breather Hose.>
- 6) Disconnect the inhibitor switch connector from the stay.
- 7) Wrap vinyl tape around the nipple attached to the air breather hose.
- 8) Remove the pitching stopper bracket.
- 9) Remove the inhibitor switch.



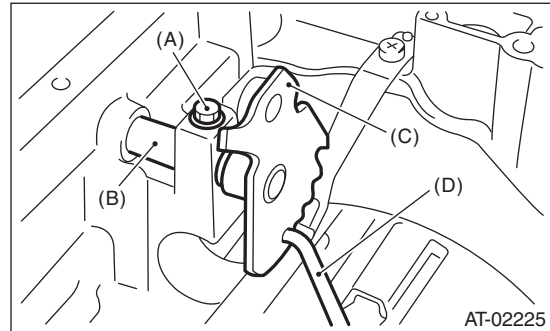
- 10) Remove the control valve body assembly. <Ref. to 4AT-58, REMOVAL, Control Valve Body.>
- 11) Pull out the manual plate spring pin.



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

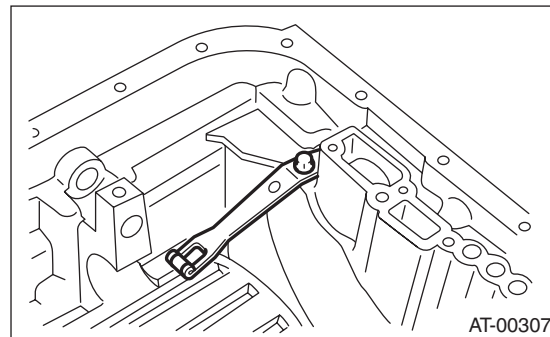
NOTE:

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



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

- 13) Remove the detention spring.

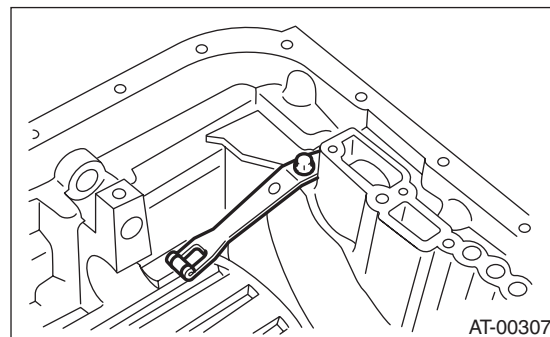


B: INSTALLATION

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

Tightening torque:

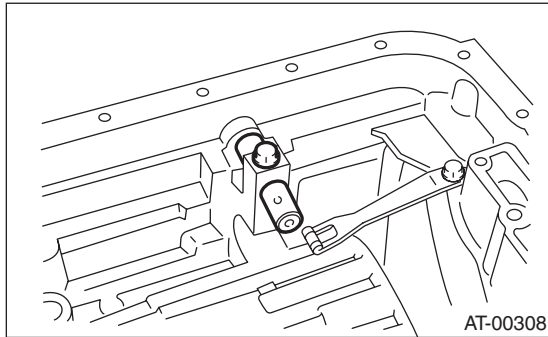
6 N·m (0.6 kgf-m, 4.4 ft-lb)



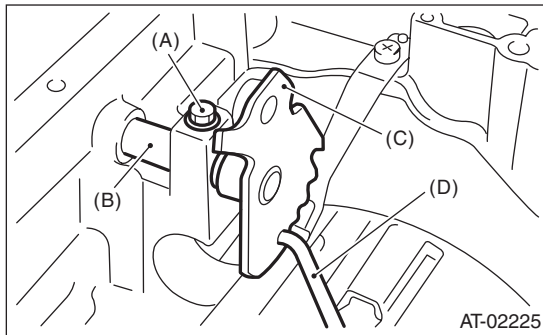
2) Insert the range select lever, and then tighten the bolt.

Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)

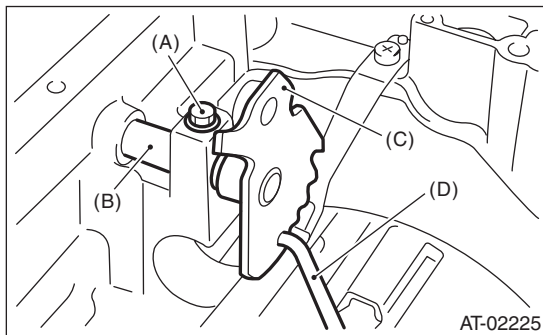


3) Insert the manual plate and parking rod.



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

4) Insert the spring pin to the manual plate.



5) Install the oil pan and the control valve body assembly. <Ref. to 4AT-59, INSTALLATION, Control Valve Body.>

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

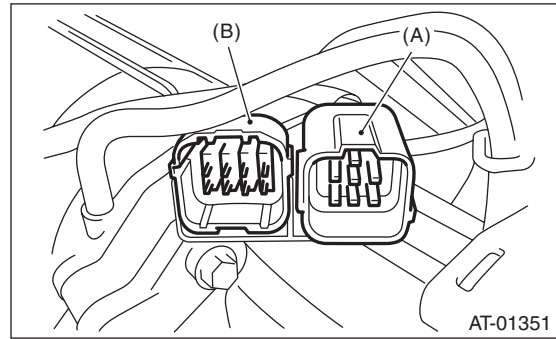
7) Install the pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

8) Install and adjust the inhibitor switch. <Ref. to 4AT-47, Inhibitor Switch.>

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



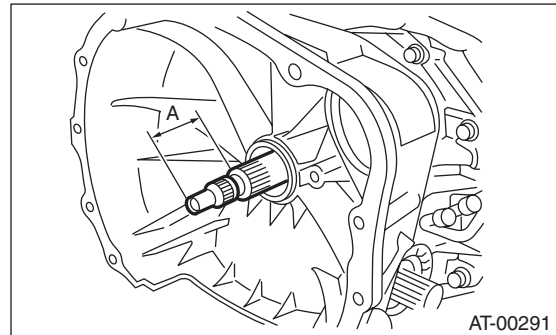
- (A) Transmission harness ASSY connector
- (B) Inhibitor switch harness connector

10) Install the air breather hose. <Ref. to 4AT-67, INSTALLATION, Air Breather Hose.>

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

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-69, INSTALLATION, Torque Converter Clutch Assembly.>

13) Install the transmission assembly to the vehicle. <Ref. to 4AT-40, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

Transmission Control Device

AUTOMATIC TRANSMISSION

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) Before performing diagnosis, inspect the following items which may influence AT problems. • General Inspection <Ref. to 4AT(diag)-5, INSPECTION, General Description.> • Disconnection of harness connector • Visual check for harness damage • Oil leakage • Stall speed test <Ref. to 4AT-32, Stall Test.> • Line pressure test <Ref. to 4AT-34, Line Pressure Test.> • Transfer clutch pressure test <Ref. to 4AT-36, Transfer Clutch Pressure Test.> • Time lag test <Ref. to 4AT-33, Time Lag Test.> • Road test <Ref. to 4AT-31, Road Test.> • Inhibitor switch <Ref. to 4AT-47, Inhibitor Switch.>	Is the unit that is thought to influence the AT problem working properly?	Go to step 2.	Repair or replace each item.
2 CHECK AT OIL TEMP WARNING LIGHT. Turn the ignition switch to ON.	Does the AT OIL TEMP warning light illuminate?	Go to step 4.	Go to step 3.
3 CHECK AT OIL TEMP WARNING LIGHT. 1) Turn the ignition switch to OFF. 2) Repair the AT OIL TEMP warning light circuit or power supply and ground line circuit. <Ref. to 4AT(diag)-22, AT Oil Temp Warning Light Display.> 3) Turn the ignition switch to ON.	Is the AT OIL TEMP warning light flashing?	Go to step 4.	Go to step 5.
4 CHECK INDICATION OF DTC. Display the DTC. NOTE: If the communication function of Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to 4AT(diag)-27, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed?	Go to step 6. NOTE: Record all DTC.	Go to step 5.
5 PERFORM GENERAL DIAGNOSTICS. 1) Inspect using "Diagnostic Procedure without Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-83, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using "General Diagnostic Table". <Ref. to 4AT(diag)-86, General Diagnostic Table.> 3) Perform the Clear Memory Mode. 4) Perform the Inspection Mode. <Ref. to 4AT(diag)-20, Inspection Mode.> 5) Display the DTC.	Is DTC displayed?	Go to step 6.	Finish the diagnosis.

Basic Diagnostic Procedure

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 PERFORM DIAGNOSIS. 1) Inspect using the "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-33, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-31, 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)-20, Inspection Mode.> 5) Display the DTC.	Is DTC displayed?	Inspect using the "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-33, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Use copies of this page for interviewing customers.

4AT(diag)-4

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The airbag system wiring harness is routed near the TCM.

CAUTION:

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

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

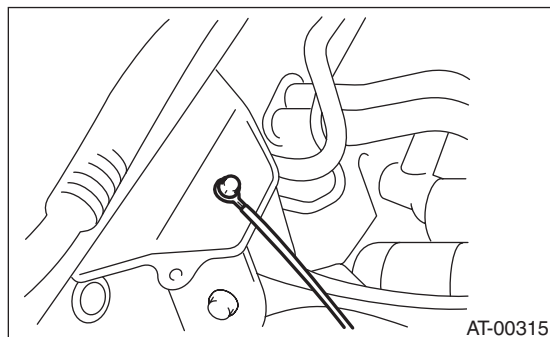
2. TRANSMISSION GROUND

Check that the ground terminal bolt is tightened securely.

Chassis side

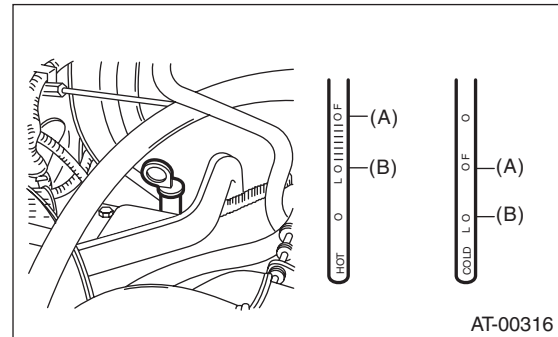
Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

Check that the ATF level is at the specified amount. <Ref. to 4AT-28, INSPECTION, Automatic Transmission Fluid.>

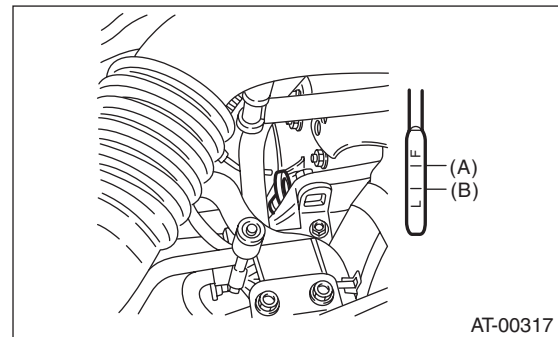


(A) Upper level

(B) Lower level

4. FRONT DIFFERENTIAL OIL LEVEL

Check the front differential oil level is the specified amount. <Ref. to 4AT-30, INSPECTION, Differential Gear Oil.>



(A) Upper level

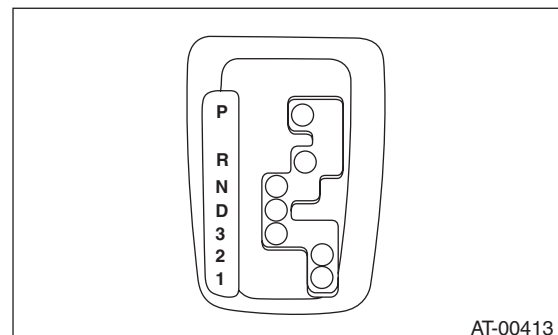
(B) Lower level

5. OPERATION OF SELECT LEVER

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

WARNING:

Stop the engine while checking operation of the select lever.

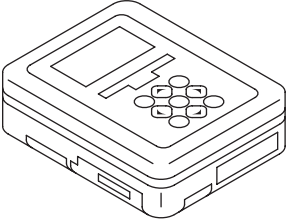


General Description

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B021XU0	1B021XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

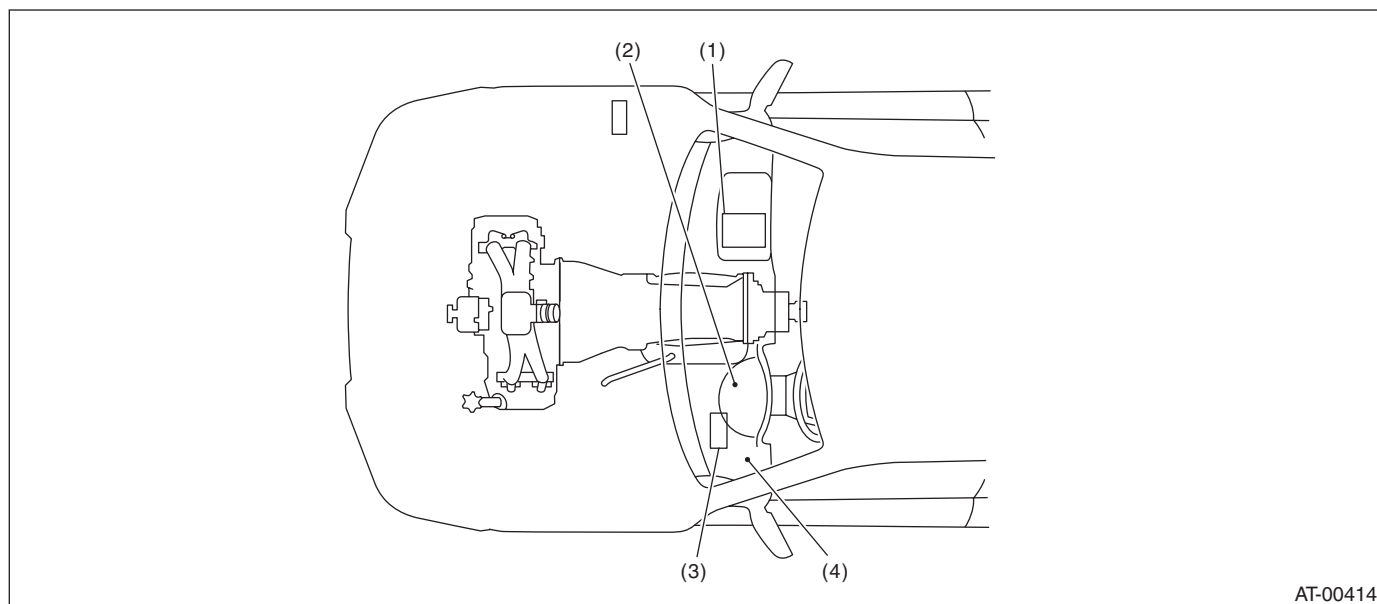
2. GENERAL TOOL

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

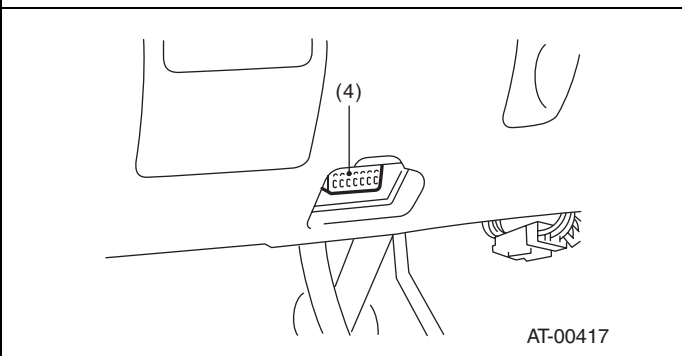
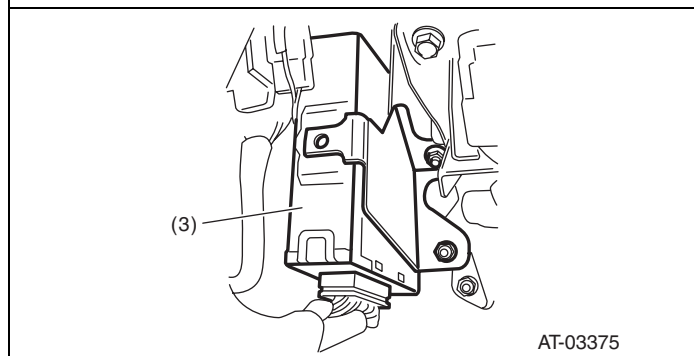
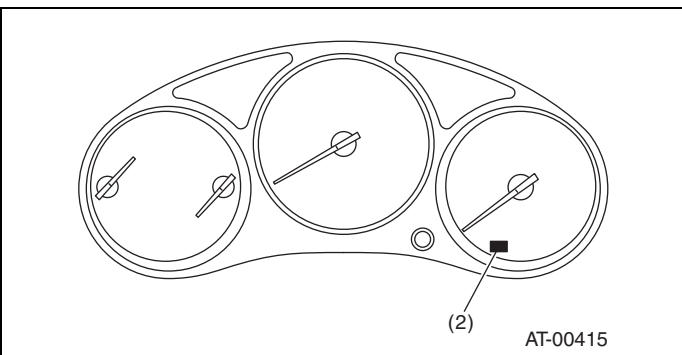
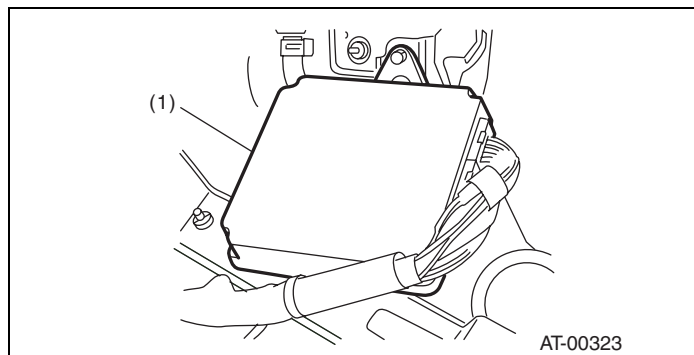
4. Electrical Component Location

A: LOCATION

1. CONTROL MODULE



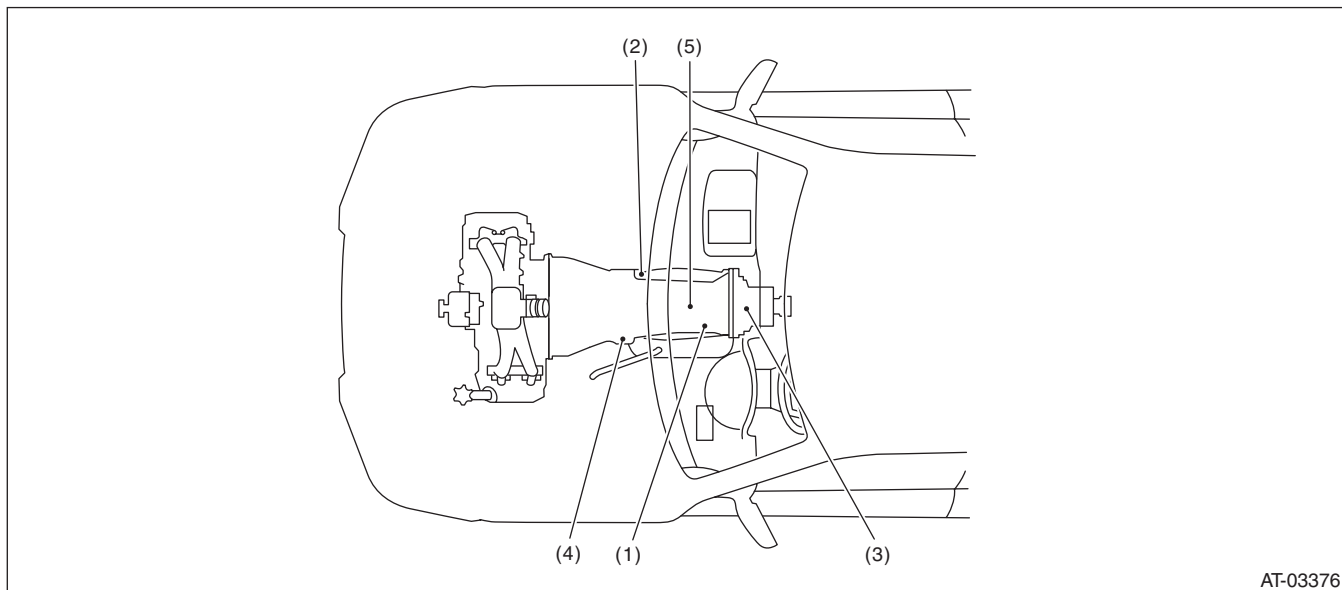
- | | | |
|---|---------------------------------------|-------------------------|
| (1) Engine control module (ECM) | (3) Transmission control module (TCM) | (4) Data link connector |
| (2) AT OIL TEMP warning light (AT diagnostic indicator light) | | |



Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. SENSOR



(1) Front vehicle speed sensor

(2) Inhibitor switch

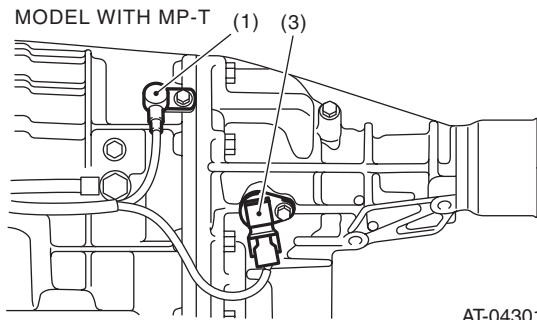
(3) Rear vehicle speed sensor

(4) Torque converter turbine speed sensor

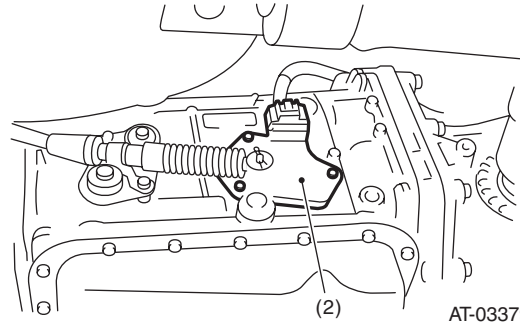
(5) ATF temperature sensor

Electrical Component Location

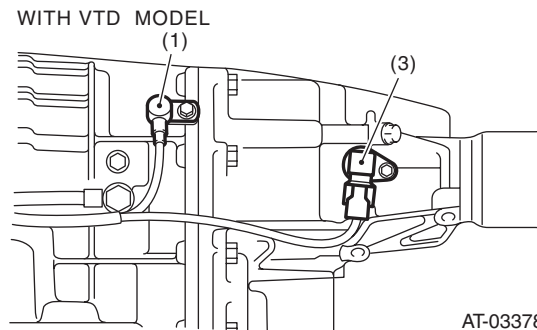
AUTOMATIC TRANSMISSION (DIAGNOSTICS)



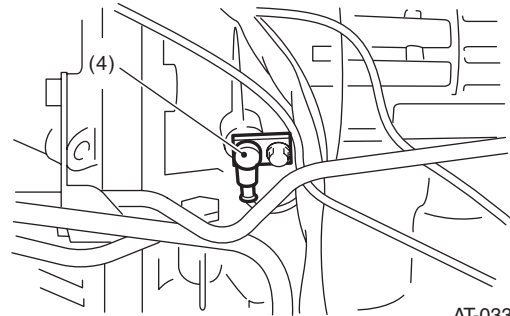
AT-04301



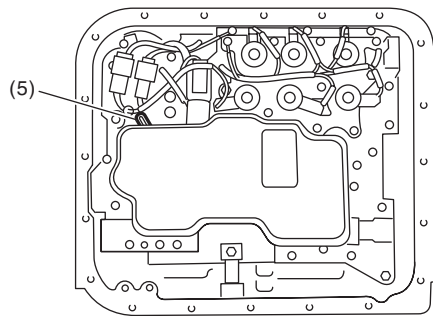
AT-03379



AT-03378



AT-03380



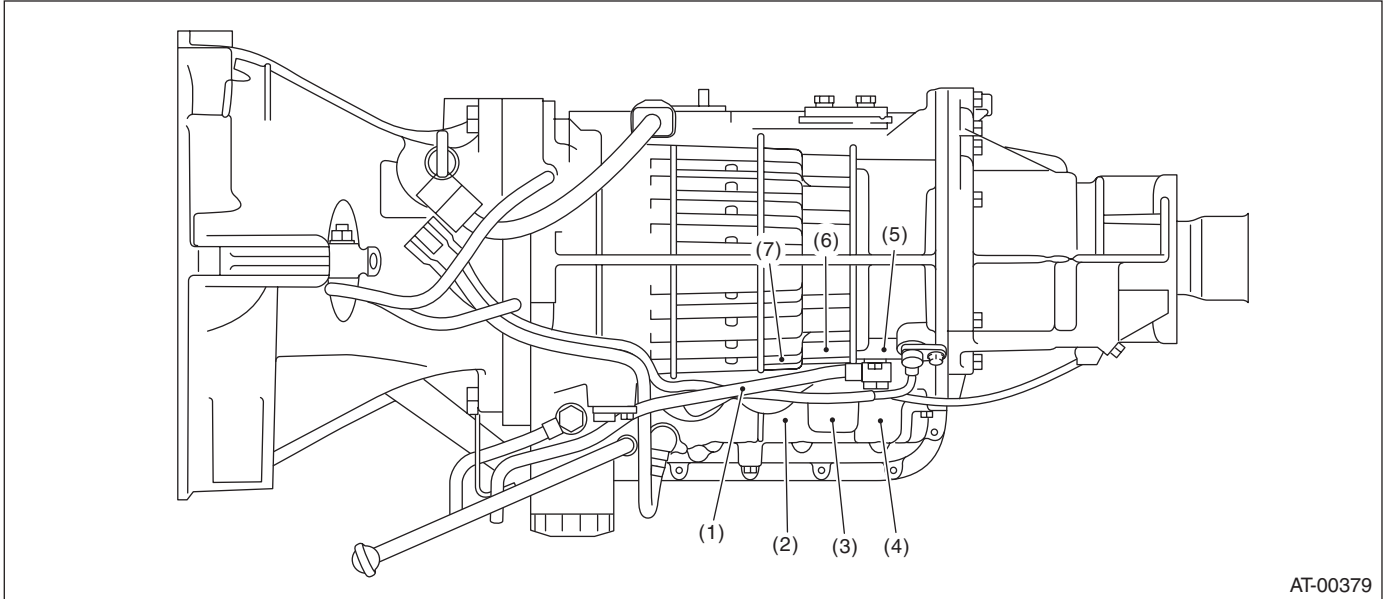
AT-03381

SUBARU

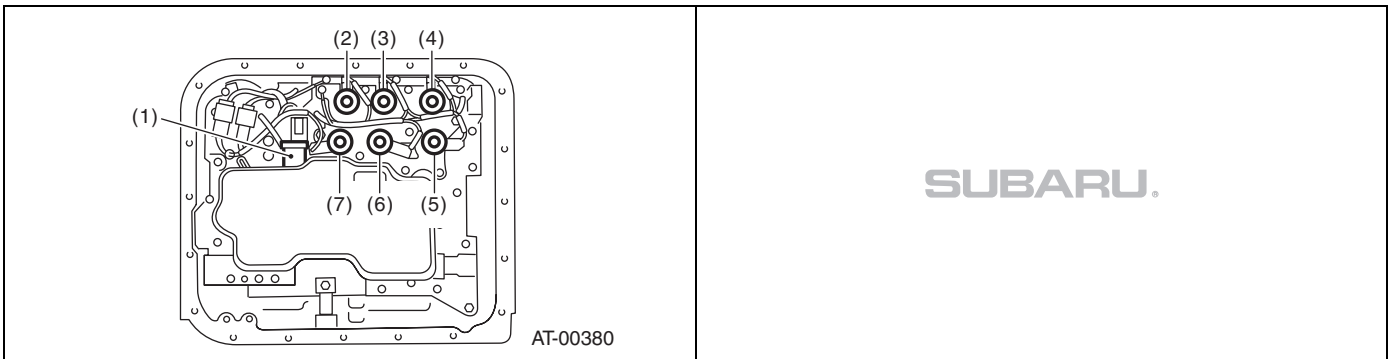
Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. SOLENOID



- | | | |
|-----------------------------------|---------------------------------|----------------------------|
| (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 | | |



Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

A: ELECTRICAL SPECIFICATION

TO **B54**

7	6	5	4	3					2	1	
19	18	17	16	15	14	13	12	11	10	9	8
27	26			25	24			23	22	21	20
35	34			33	32			31	30	29	28

TO **B55**

6	5			4	3	2	1			
16	15	14	13	12	11	10	9	8	7	
27	26	25	24	23	22	21	20	19	18	17
35	34	33	32	31				30	29	28

AT-04404

Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON						
Contents		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				
ACC power supply		(B54) No. 12	Chassis ground	Ignition switch ACC	10 — 13	—
Ignition power supply		(B54) No. 1	Chassis ground	Ignition switch ON (engine OFF)	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	8 or more	
	“R” range switch	(B55) No. 13	Chassis ground	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	8 or more	
	“N” range switch	(B55) No. 11	Chassis ground	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range	8 or more	
	“D” range switch	(B55) No. 10	Chassis ground	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	8 or more	
	“3” range switch	(B55) No. 8	Chassis ground	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	8 or more	
	“2” range switch	(B55) No. 7	Chassis ground	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	8 or more	
	“1” range switch	(B55) No. 19	Chassis ground	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	8 or more	
Brake switch		(B55) No. 20	Chassis ground	When brake pedal is depressed.	10.5 or more	—
				When brake pedal is released.	Less than 1	
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

Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON					
Contents	Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
	Positive terminal	Ground terminal			
Rear vehicle speed sensor	(B55) No. 26	(B55) No. 15	Vehicle stopped	0	—
			Vehicle speed at least 20 km/h (12 MPH)	2 or more (AC range)	
Rear vehicle speed sensor ground	(B55) No. 15	Chassis ground	—	0	Less than 1
Front vehicle speed sensor	(B55) No. 27	(B55) No. 16	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	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	—	—	—
Vehicle speed output signal	(B55) No. 21	Chassis ground	Vehicle speed at least 10 km/h (6 MPH)	Less than 1 ← → 4 or more	—
Engine speed signal	(B54) No. 11	Chassis ground	Ignition switch ON (engine OFF)	Less than 1	—
			Ignition switch ON (engine ON)	5 or more (AC range)	
Line pressure linear solenoid	(B55) No. 4	(B55) No. 3	Ignition switch ON (engine OFF) "R" range throttle fully closed after engine warm-up.	3.7 — 7.7	4.0 — 6.0
			Ignition switch ON (engine OFF) "R" range throttle 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 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 (Model with MP-T)	(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	
Transfer duty solenoid (Model with VTD)	(B55) No. 5	Chassis ground	"P" or "N" range	Less than 1	2.0 — 4.5
			Throttle fully opened	5.0 or more	
2-4 brake duty solenoid	(B54) No. 4	Chassis ground	"P" or "N" range	5.0 or more	2.0 — 4.5
			2nd or 4th gear	Less than 1	
High clutch duty solenoid	(B54) No. 6	Chassis ground	3rd or 4th 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					
Contents	Measured terminal (Connector & Terminal No.)		Measuring condition	Voltage (V)	Resistance (Ω)
	Positive terminal	Ground terminal			
Low clutch duty solenoid	(B54) No. 7	Chassis ground	1st or 2nd gear “P” or “N” range	Less than 1 5.0 or more	2.0 — 4.5
Low & reverse duty solenoid	(B54) No. 5	Chassis ground	Except “1” range “1” range	5.0 or more 2.5 — 5.0	2.0 — 4.5
FWD switch (Model with MP-T)	(B54) No. 10	Chassis ground	Fuse removed Fuse installed	10.5 or more Less than 1	—
AWD indicator light	(B54) No. 13	Chassis ground	Ignition switch ON (engine OFF) Ignition switch ON (engine ON)	Less than 1 9 or more	—
ATF temperature warning	(B54) No. 15	Chassis ground	When light is ON When light is OFF	Less than 1 9 or more	—
ABS, E/G ECM communication signal (+)	(B55) No. 18	Chassis ground	Ignition switch ON	Pulse signal	—
ABS, E/G ECM communication signal (–)	(B55) No. 17	Chassis ground		Pulse signal	
Combination meter	(B55) No. 22	Chassis ground	Ignition switch ON	Pulse signal	—
System ground	(B54) No. 20	Chassis ground	—	0	Less than 1
	(B54) No. 21	Chassis ground			
	(B54) No. 22	Chassis ground			
	(B54) No. 23	Chassis ground			
Range lock signal	(B54) No. 3	Chassis ground	“D” range vehicle speed 0 km/h (0 MPH)	10.5 or more	7 — 18
			“D” range vehicle speed 20 km/h (12 MPH)	Less than 1	
Data link signal (Subaru Select Monitor)	(B54) No. 8	Chassis ground	—	—	—

6. Subaru Select Monitor

A: OPERATION

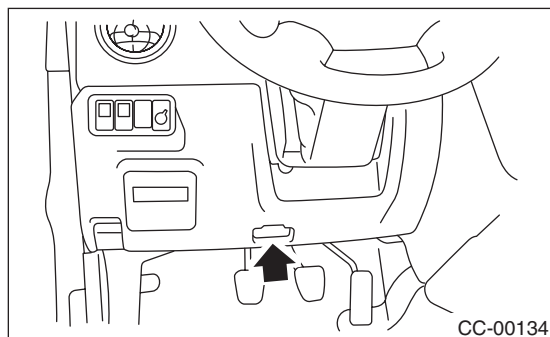
1. READ DIAGNOSTIC TROUBLE CODE (DTC)

- 1) Prepare the Subaru Select Monitor kit. <Ref. to 4AT(diag)-6, PREPARATION TOOL, General Description.>
- 2) Prepare PC with Subaru Select Monitor installed.
- 3) Connect the SDI (Subaru Diagnostic Interface) to the PC USB port (exclusively for Subaru Selector Monitor) using a USB cable.

NOTE:

Port exclusively for Subaru Select Monitor refers to the USB port used when installing Subaru Select Monitor.

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



CAUTION:

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

- 6) Start the PC.
- 7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".
- 8) On the «Main Menu», select {Each System Check}.
- 9) On the «System Selection Menu», select {Transmission}.
- 10) After transmission type information pops up, select [OK].
- 11) On the «Transmission Diagnosis», select {DTC Display}.

- 12) On the «DTC Display», select {Temporary Diagnostic Code(s)} or {Memorized Diagnostic Code(s)}.

NOTE:

- For details concerning the operation procedure, refer to the «help on PC application for Subaru Select Monitor».
- For details concerning DTC, refer to List of Diagnostic Trouble Code (DTC). <Ref. to 4AT(diag)-31, List of Diagnostic Trouble Code (DTC).>

Subaru Select Monitor

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. READ CURRENT DATA

- 1) On the «Main Menu», select {Each System Check}.
 - 2) On the «System Selection Menu», select {Transmission}.
 - 3) After transmission type information pops up, select [OK].
 - 4) On the «Transmission Diagnosis», select {Current Data Display & Save}.
 - 5) On the «Current Data Display & Save», select {Normal sampling}.
 - 6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
ATF temperature	ATF Temp.	°C or °F
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch duty ratio	Lock Up Duty Ratio	%
Transfer clutch duty ratio	Transfer Duty Ratio	%
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake duty ratio	Brake Clutch Duty Ratio	%
Low clutch duty ratio	L/C Duty	%
High clutch duty ratio	H/C Duty	%
Low & reverse brake duty ratio	L&R/B Duty	%
Accelerator position	Accel. Opening Angle	%
ATF temperature light	ATF Temperature Lamp	ON or OFF
Stop light switch signal	Stop Light Switch Signal	ON or OFF
Parking range signal	P Range Signal	ON or OFF
Neutral range signal	N Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
AT diagnosis light output signal	Diagnosis Lamp	ON or OFF
FWD switch signal	FWD SW	ON or OFF
Shift lock solenoid signal	Shift Lock Solenoid	ON or OFF
Cruise control signal	Cruise Control Signal	ON or OFF

NOTE:

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

3. CLEAR MEMORY MODE

- 1) Check that the select lever is in “P” range.
- 2) On the «Main Menu», select {Each System Check}.
- 3) On the «System Selection Menu», select {Transmission}.
- 4) After transmission type information pops up, select [OK].
- 5) On the «Transmission Diagnosis», select {Clear Memory}.
- 6) When “Done. Turn ignition switch to OFF” pops up, select [OK].
- 7) Turn Subaru Select Monitor and ignition switch to OFF. To turn the ignition switch to ON again, wait for 10 seconds or more.

NOTE:

- If {Clear Memories 2} is selected and performed, DTC and learned control memory are cleared. If {Clear Memories 2} is performed, execute the advance operation of learning control. <Ref. to 4AT(diag)-17, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>
- For details concerning the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

4. FACILITATION OF LEARNING CONTROL

NOTE:

- After performing the following services, perform the transmission learning operation.
Replacement of TCM/Replacement or disassembly of transmission assembly/Replacement of control valve body/Performing “Clear Memories 2”.
- Perform the procedures according to the message displayed on the Subaru Select Monitor.
 - 1) Warm-up or cool down until the ATF temperature displayed on the Subaru Select Monitor reaches 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:

Be sure to keep the lowest edge of the tires 30 cm or more off the ground because the vehicle vibrates during the work.

- 5) Connect the Subaru Select Monitor to the data link connector.
- 6) Turn the ignition switch to ON.
- 7) Turn OFF all switches, which produce an electrical load, including headlight, air conditioner, seat heater, rear defogger, etc.
- 8) Turn the ECO switch to ON for model with ECO switch. Turn the SPORT mode switch to OFF for model with SPORT mode. Turn the POWER/HOLD switch to OFF for model with POWER/HOLD switch. Set to I mode for model with SI-DRIVE.

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.

CAUTION:

Do not turn the power of the Subaru Select Monitor to OFF or disconnect the data link connector during the operation.

- 9) Select {Learning and inspection mode related to AT} on the «Transmission Diagnosis» display screen of Subaru Select Monitor.
- 10) Select {AT learning mode} on the «Learning and inspection mode related to AT» display screen of Subaru Select Monitor.

Subaru Select Monitor

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

11) Perform the procedures according to the message displayed on the Subaru Select Monitor.

NOTE:

During AT learning in progress, AT OIL TEMP light in the combination meter starts flashing at 2 Hz and the learning operation starts. The following message is displayed on the screen when the AT OIL TEMP light changes from flashing at 2 Hz to 0.5 Hz.

12) "AT learning normally ended." is displayed, simple AT learning is completed.

NOTE:

- If communication error occurs during learning, retry "AT learning mode" from the beginning.
- If "Execute AT learning again after fixing troubles of the vehicle" is displayed during learning, select [OK] to display the List of Diagnostics Trouble Code. Retry "AT learning mode" from the beginning after repairing the DTC detecting portion.
- If "AT learning ended abnormally." is displayed, retry "AT learning mode" from the beginning.

Message	Primary cause of abnormal end
"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. • The brake pedal is not depressed fully. • The parking brake is not applied fully. • Abnormal idle rise occurs. Other similar causes are probable.

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

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR

Refer to Subaru Select Monitor for information on how to display a DTC. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>

8. Inspection Mode

A: PROCEDURE

WARNING:

Observe the traffic law when driving on public roads.

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

9. Clear Memory Mode

A: OPERATION

Refer to “Subaru Select Monitor” for information about how to clear a DTC.

<Ref. to 4AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

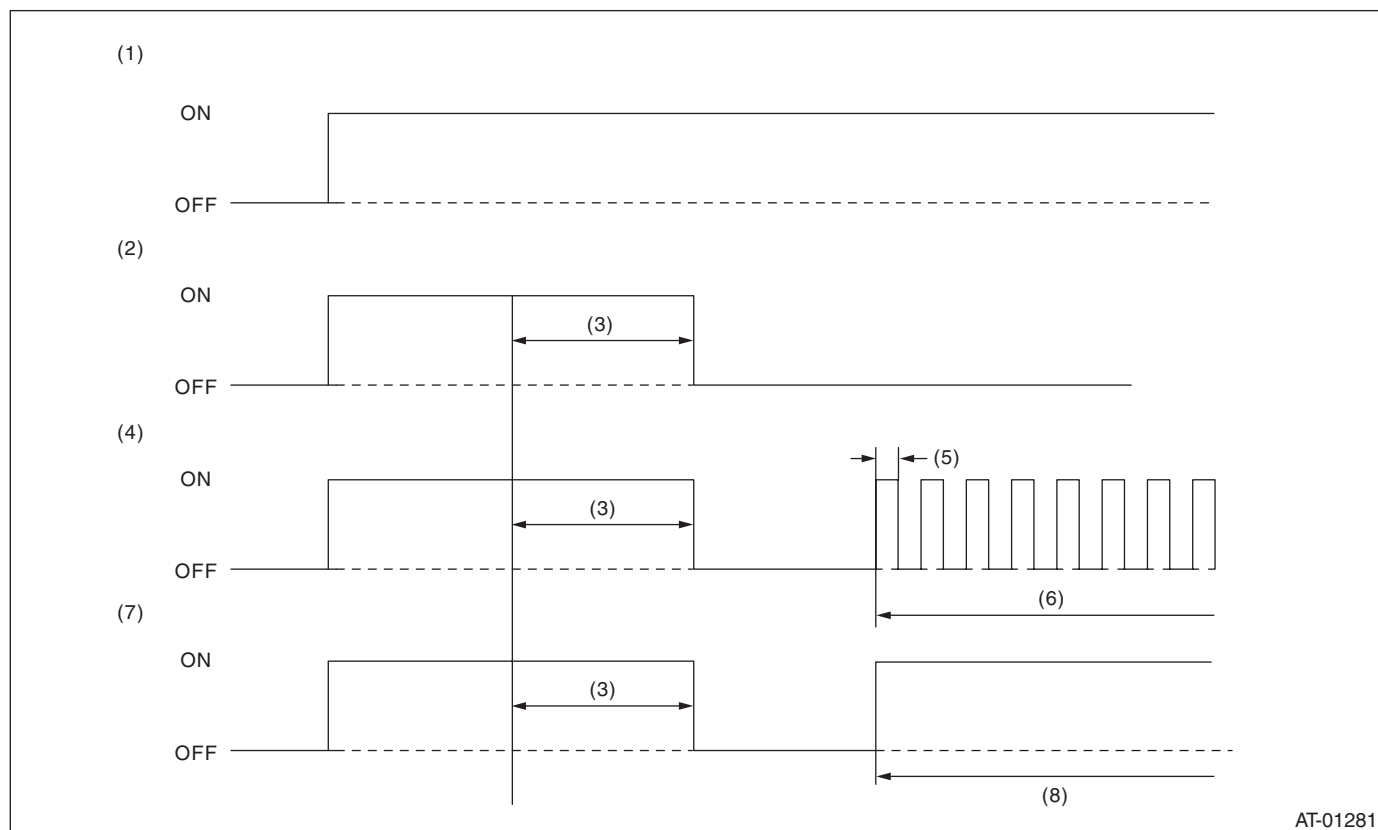
AT Oil Temp Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

10.AT Oil Temp Warning Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, AT OIL TEMP warning light blinks from the time malfunction is detected after starting the engine until ignition switch is turned to OFF. The malfunctioning part or unit can be determined by a DTC during the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP warning light does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using Subaru Select Monitor. Indicator light signal patterns are as shown in the figure.



(1) Ignition switch (Engine OFF)

(2) Normal

(3) 2 seconds

(4) Abnormal (Trouble occurs)

(5) 0.25 seconds

(6) Blink

(7) Normal (ATF temperature is high)

(8) ATF temperature is high

AT Oil Temp Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: INSPECTION

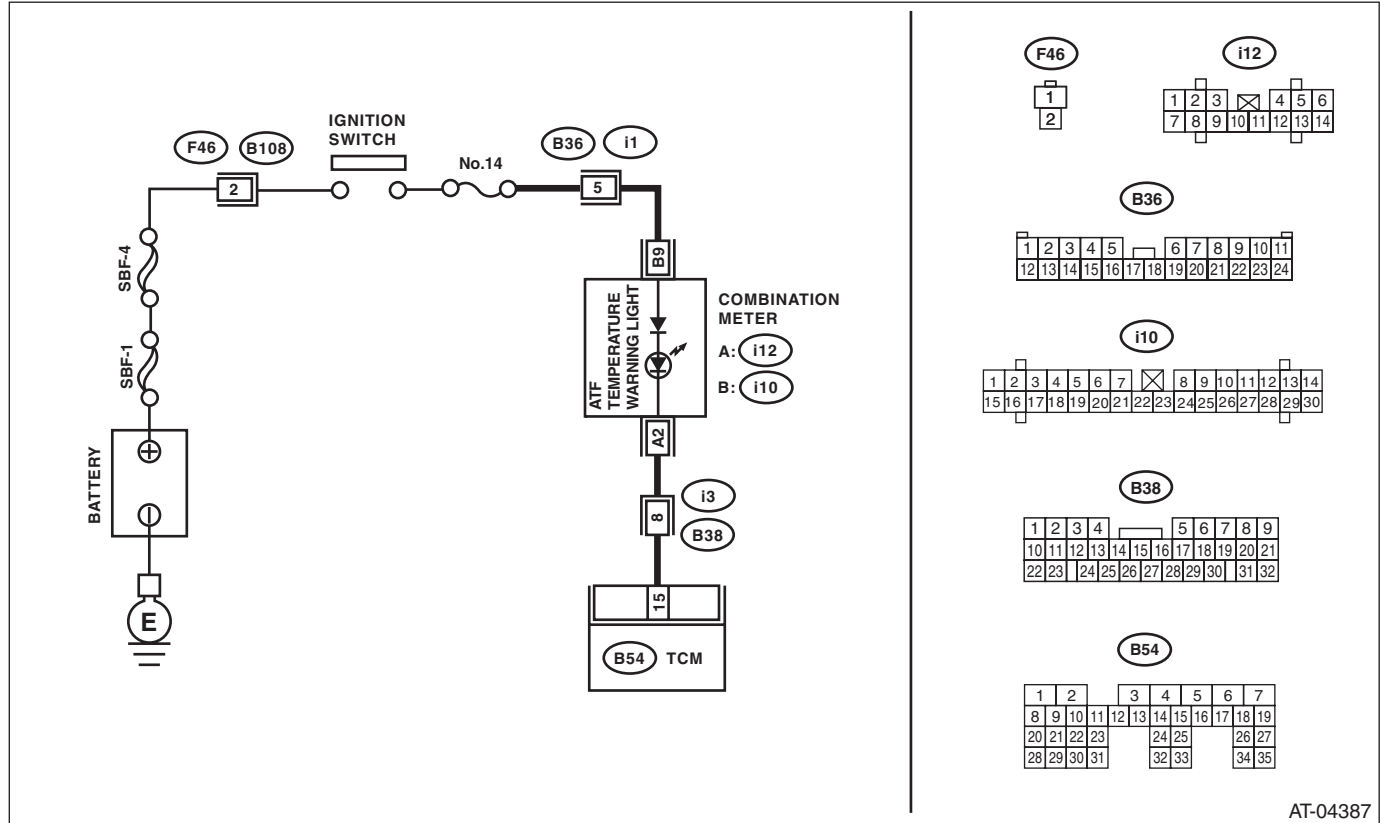
DIAGNOSIS:

The AT OIL TEMP warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When the ignition switch is turned ON (engine OFF), AT OIL TEMP warning light does not illuminate.
- When the on-board diagnostics is performed, the AT OIL TEMP warning light remains illuminated.

WIRING DIAGRAM:



AT-04387

Step	Check	Yes	No
1	CHECK FUSE (NO. 14). Remove the fuse (No. 14).	Is the fuse (No. 14) blown out?	Replace the fuse (No. 14). If the replaced fuse (No. 14) is blown out easily, repair the short circuit of the harness between fuse (No. 14) and the combination meter.
2	CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Turn the ignition switch to ON (engine OFF). 4) Measure the voltage between combination meter connector and chassis ground. Connector & terminal (i10) No. 9 (+) — Chassis ground (-):	Is the voltage 9 V or more?	Go to step 3.
			Repair open or short circuit of harness between the combination meter and battery.

AT Oil Temp Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

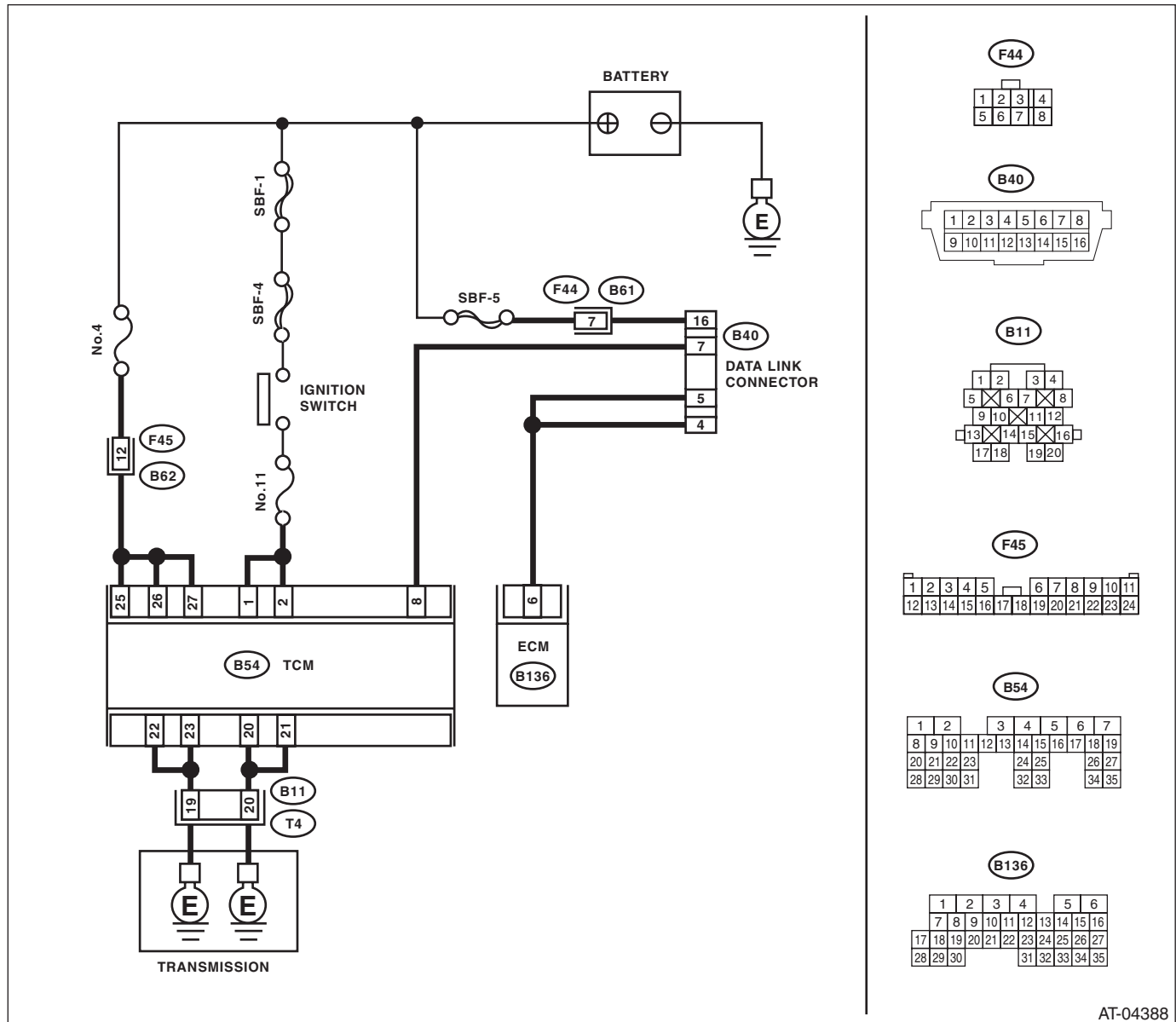
Step	Check	Yes	No
3 CHECK AT OIL TEMP WARNING LIGHT. 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B55) from TCM. 3) Turn the ignition switch to ON (engine OFF). 4) Short between the combination meter connector and chassis ground. CAUTION: When shorting, be sure to short through the fuse.	Does the warning light illuminate?	Go to step 4.	Check the combination meter.
4 CHECK OPEN CIRCUIT OF HARNESS. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the combination meter. 3) Measure the resistance between the combination meter connector and TCM connector. Connector & terminal (B54) No. 15 — (i12) No. 2:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit of harness between TCM and combination meter, and the poor contact of the connector.
5 CHECK COMBINATION METER. Measure the resistance between combination meter connector and chassis ground. Connector & terminal (i12) No. 2 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 6.	Repair the short circuit of harness between TCM and combination meter connector.
6 CHECK INPUT SIGNAL FOR TCM. 1) Connect all the connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 7.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
7 CHECK POOR CONTACT.	Is there poor contact of the AT OIL TEMP warning light circuit?	Repair the poor contact.	Check the power supply and ground circuit. <Ref. to 4AT(diag)-25, CHECK POWER SUPPLY AND GROUND LINE, AT Oil Temp Warning Light Display.>

AT Oil Temp Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: CHECK POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:



AT-04388

	Step	Check	Yes	No
1	CHECK BATTERY TERMINAL. Turn the ignition switch to OFF.	Is there poor contact at the battery terminal?	Repair or tighten the battery terminal.	Go to step 2.
2	CHECK POWER SUPPLY OF TCM. 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 25 (+) — Chassis ground (–): (B54) No. 26 (+) — Chassis ground (–): (B54) No. 27 (+) — Chassis ground (–):	Is the voltage 10 — 13 V?	Go to step 4.	Go to step 3.

AT Oil Temp Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK FUSE (NO. 4). 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace the fuse (No. 4). If the replaced fuse (No. 4) has blown out easily, repair short circuit of harness between fuse (No. 4) and TCM.	Repair the open circuit of harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact of the connector.
4 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 1 (+) — Chassis ground (–): (B54) No. 2 (+) — Chassis ground (–):	Is the voltage 10 — 13 V?	Go to step 6.	Go to step 5.
5 CHECK FUSE (NO. 11). Remove the fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace the fuse (No. 11). If the replaced fuse (No. 11) has blown out easily, repair short circuit of harness between fuse (No. 11) and TCM.	Repair the open circuit of harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact of the connector.
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 22 — (B11) No. 19: (B54) No. 23 — (B11) No. 19: (B54) No. 20 — (B11) No. 20: (B54) No. 21 — (B11) No. 20:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the open circuit of harness between TCM and transmission harness connector, and poor contact of connector.
7 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND. Measure the resistance of the harness between transmission and transmission ground. Connector & terminal (T4) No. 19 — Transmission ground: (T4) No. 20 — Transmission ground:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair the open circuit of the harness between transmission and transmission ground.
8 CHECK POOR CONTACT OF CONNECTORS.	Is there poor contact in TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

11. Diagnostic Procedure for Subaru Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

NOTE:

If the AT OIL TEMP warning light turns on when the Subaru Select Monitor or general scan tool is connected, perform the following procedures.

1. Disconnect the Subaru Select Monitor or general scan tool from the vehicle.
2. Repeat the ignition switch ON-OFF cycle three times.
3. Turn the ignition switch to ON.

If the AT OIL TEMP warning light turns off, the Subaru Select Monitor or general scan tool may be faulty. Connect a different Subaru Select Monitor or general scan tool, and if AT OIL TEMP warning light remains off, delete the DTC.

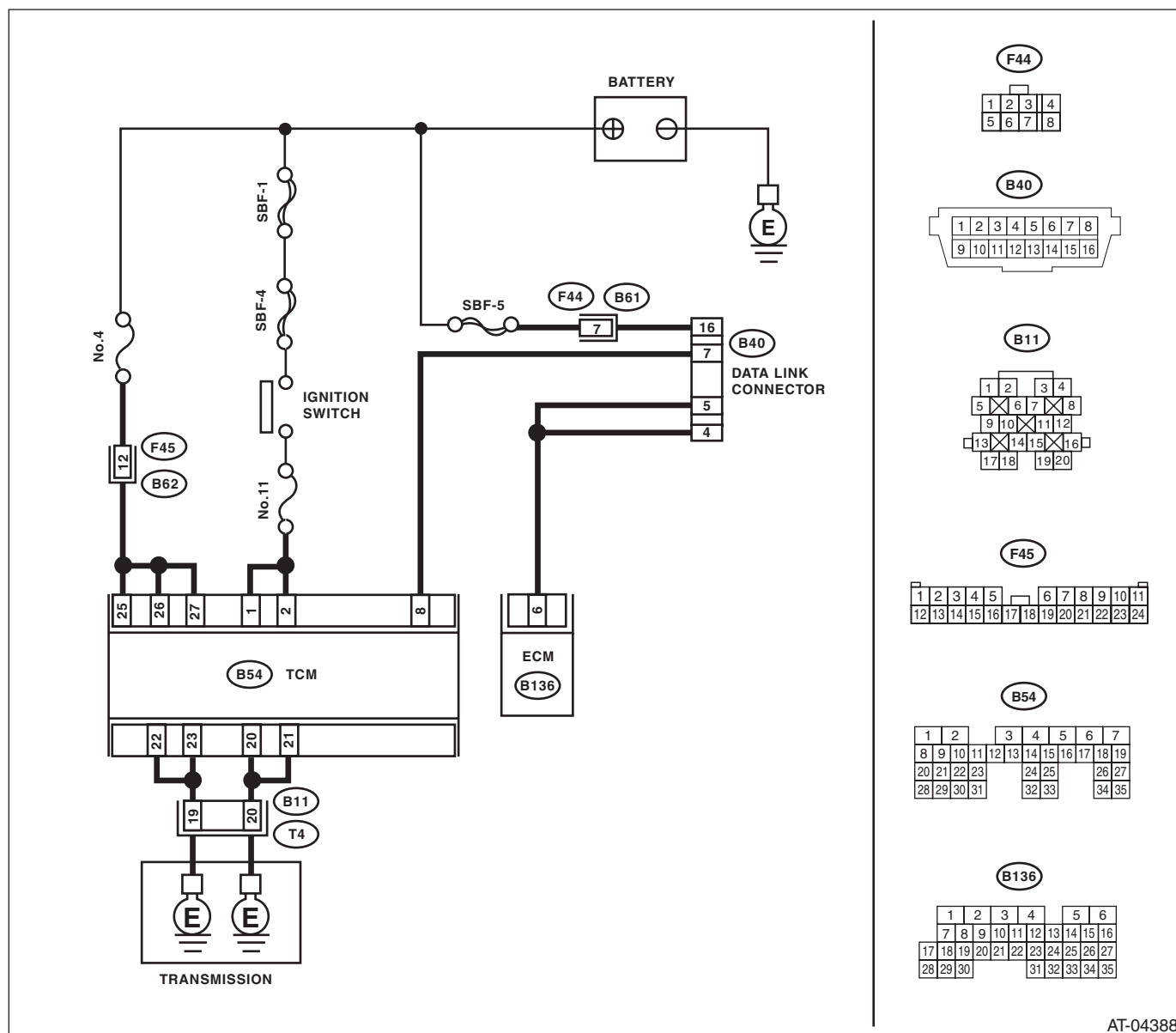
DIAGNOSIS:

Defective harness connector

TROUBLE SYMPTOM:

Subaru Select Monitor communication failure

WIRING DIAGRAM:



AT-04388

Diagnostic Procedure for Subaru Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

	Step	Check	Yes	No
1	CHECK INSTALLATION OF TCM CONNECTOR. Turn the ignition switch to OFF.	Is the TCM connector connected correctly?	Go to step 2.	Connect the TCM connector securely.
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 the data link connector and ECM or the chassis ground. Connector & terminal (B40) No. 4 — (B136) No. 6: (B40) No. 5 — (B136) No. 6:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit of harness between data link connector and chassis ground or ECM, and poor contact of connector.
4	CHECK ENGINE GROUND CIRCUIT. Check the engine ground circuit.	Is the engine ground circuit normal?	Go to step 5.	Repair ground circuit of ECM.
5	CHECK COMMUNICATION OF SUBARU SELECT MONITOR. 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Using the Subaru Select Monitor, check whether communication to the transmission system can be executed normally.	Is the name of the system displayed on Subaru Select Monitor?	Go to step 11.	Go to step 6.
6	CHECK COMMUNICATION OF SUBARU SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Check whether communication to the engine, ABS, VDC and airbag system can be executed normally.	Is the name of the system displayed on Subaru Select Monitor?	Go to step 7.	Go to step 9.
7	CHECK COMMUNICATION OF SUBARU SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ABS, VDC and airbag connector. CAUTION: Observe the safety precautions before disconnecting the airbag connectors. <Ref. to AB(diag)-4, CAUTION, General Description.> 4) Check whether communication to transmission system can be executed normally.	Is the name of the system displayed on Subaru Select Monitor?	Inspect the ABS, VDC and airbag module.	Go to step 8.
8	CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the following TCM connectors. 3) Check whether communication to ECM can be executed normally.	Is the name of the system displayed on Subaru Select Monitor?	Go to step 9.	Inspect the ECM.

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 connector of ECM. 3) Measure the resistance between data link connector and chassis ground. Connector & terminal (B40) No. 7 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 10.	Check harness and connector between each control module and data link connector.
10 CHECK OUTPUT SIGNAL OF TCM. 1) Turn the ignition switch to ON. 2) Measure the voltage between data link connector 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 (B54) No. 8 — (B40) No. 7:	Is the resistance less than 1 Ω?	Go to step 12.	Repair the harness and connector between TCM and data link connector.
12 CHECK FOR IMPROPER CONNECTION OF TRANSMISSION HARNESS CONNECTOR.	Is the transmission harness connector connected to bulk-head harness connector correctly?	Go to step 13.	Connect the bulk-head harness connector to transmission harness connector.
13 CHECK POOR CONTACT OF CONNECTORS.	Is there poor contact in control module power supply and data link connector?	Repair the poor contact.	Go to step 14.
14 CHECK POWER SUPPLY OF TCM. 1) Disconnect the connector from TCM. 2) 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 FUSE (NO. 4). Remove the fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace the fuse (No. 4). If the replaced fuse (No. 4) has blown out easily, repair short circuit of harness between fuse (No. 4) and TCM.	Repair the open circuit of harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact of the connector.
16 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. Connector & terminal (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 FUSE (NO. 11). Remove the fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace the fuse (No. 11). If the replaced fuse (No. 11) has blown out easily, repair short circuit of harness between fuse (No. 11) and TCM.	Repair the open circuit of harness between fuse (No. 11) and TCM, or fuse (No. 11) and battery, and poor contact of the connector.
18 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 22 — (B11) No. 19: (B54) No. 23 — (B11) No. 19: (B54) No. 20 — (B11) No. 20: (B54) No. 21 — (B11) No. 20:	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 the harness between transmission 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 in TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

12.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Diagnosis content	Reference
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction, open or short circuit	<Ref. to 4AT(diag)-33, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor 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)-44, 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)-46, 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)-48, 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).>
P0725	Engine Speed Input Circuit	Open or shorted engine speed output signal circuit	<Ref. to 4AT(diag)-53, DTC P0725 ENGINE SPEED INPUT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor or control valve malfunction	<Ref. to 4AT(diag)-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)-55, 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)-56, 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)-57, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

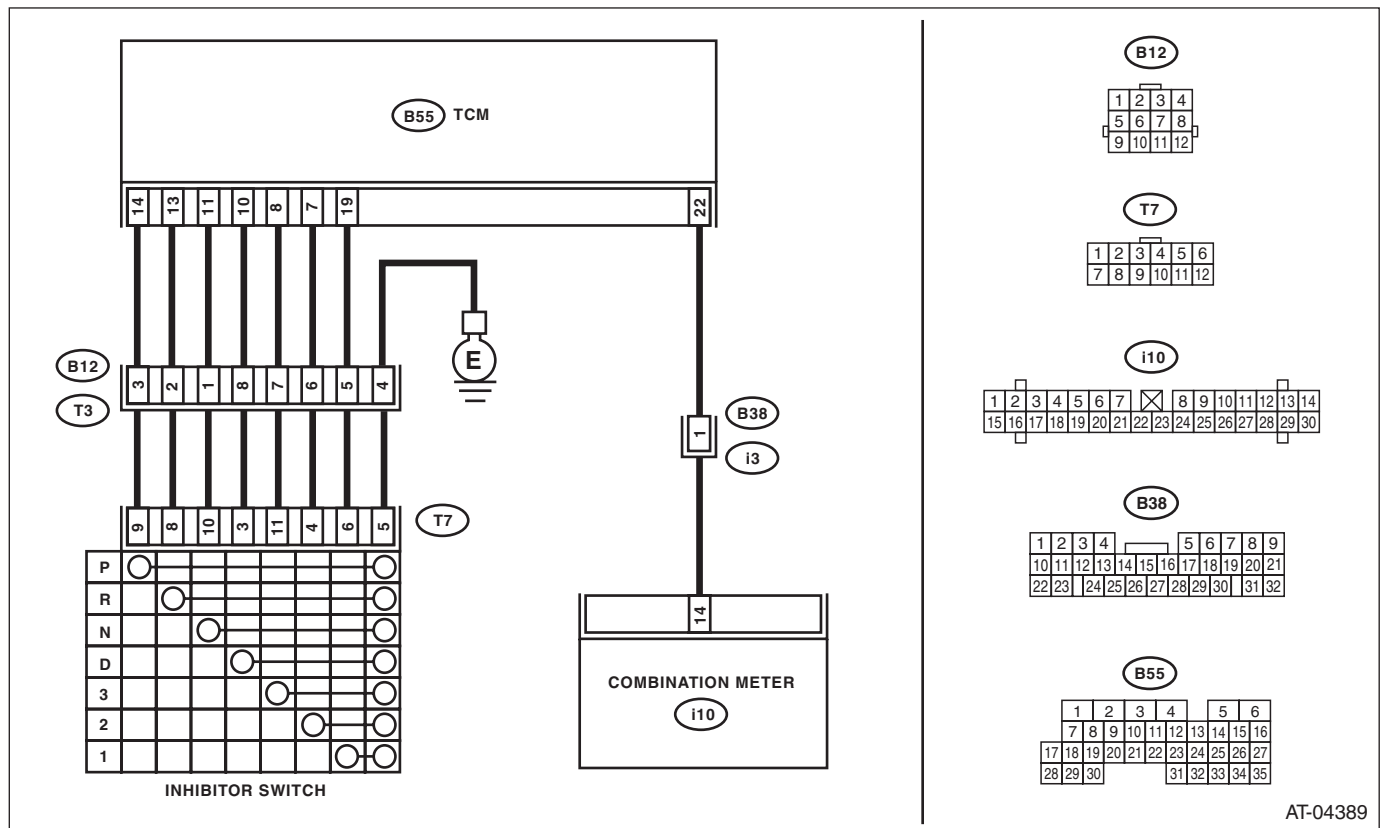
List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DTC	Item	Diagnosis content	Reference
P0748	Pressure Control Solenoid "A" Electrical	Line pressure linear solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-60, DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid "A" Electrical	Low clutch duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-62, 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)-65, 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)-68, 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)-71, 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)-74, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (rear wheel)	Rear vehicle speed sensor is faulty or input signal circuit is open or shorted.	<Ref. to 4AT(diag)-76, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1707	AT AWD Solenoid Valve Circuit Malfunction	Transfer duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-78, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	CAN Communication Circuit	CAN communication circuit is open or shorted.	<Ref. to 4AT(diag)-81, DTC P1718 CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step		Check	Yes	No
1	CHECK “P” RANGE SWITCH. Connect the Subaru Select Monitor to data link connector, and then check the LED display screen.	When the “P” range is selected, does the LED illuminate?	Go to step 2.	Go to step 22.
2	CHECK INDICATOR LIGHT.	Does the combination meter “P” range indicator light illuminate?	Go to step 3.	Go to step 26.
3	CHECK “P” RANGE SWITCH.	When the “R” range is selected, does the “P” range LED light up?	Go to step 27.	Go to step 4.
4	CHECK “R” RANGE SWITCH.	When the “R” range is selected, does the LED illuminate?	Go to step 5.	Go to step 28.
5	CHECK INDICATOR LIGHT.	Does the combination meter “R” range indicator light illuminate?	Go to step 6.	Go to step 31.
6	CHECK “R” RANGE SWITCH.	When the “N” range is selected, does the “R” range LED light up?	Go to step 32.	Go to step 7.
7	CHECK “N” RANGE SWITCH.	When the “N” range is selected, does the LED illuminate?	Go to step 8.	Go to step 33.
8	CHECK INDICATOR LIGHT.	Does the combination meter “N” range indicator light illuminate?	Go to step 9.	Go to step 36.
9	CHECK “N” RANGE SWITCH.	When the “D” range is selected, does the “N” range LED light up?	Go to step 37.	Go to step 10.
10	CHECK “D” RANGE SWITCH.	When the “D” range is selected, does the LED illuminate?	Go to step 11.	Go to step 38.
11	CHECK INDICATOR LIGHT.	Does the combination meter “D” range indicator light illuminate?	Go to step 12.	Go to step 41.
12	CHECK “D” RANGE SWITCH.	When the “3” range is selected, does the “D” range LED light up?	Go to step 42.	Go to step 13.
13	CHECK “3” RANGE SWITCH.	When the “3” range is selected, does the LED illuminate?	Go to step 14.	Go to step 43.
14	CHECK INDICATOR LIGHT.	Does the combination meter “3” range indicator light illuminate?	Go to step 15.	Go to step 46.
15	CHECK “3” RANGE SWITCH.	When the “2” range is selected, does the “3” range LED light up?	Go to step 47.	Go to step 16.
16	CHECK “2” RANGE SWITCH.	When the “2” range is selected, does the LED illuminate?	Go to step 17.	Go to step 48.
17	CHECK INDICATOR LIGHT.	Does the combination meter “2” range indicator light illuminate?	Go to step 18.	Go to step 51.
18	CHECK “2” RANGE SWITCH.	When the “1” range is selected, does the “2” range LED light up?	Go to step 52.	Go to step 19.
19	CHECK “1” RANGE SWITCH.	When the “1” range is selected, does the LED illuminate?	Go to step 20.	Go to step 53.
20	CHECK INDICATOR LIGHT.	Does the combination meter “1” range indicator light illuminate?	Go to step 21.	Go to step 56.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
21 CHECK "1" RANGE SWITCH.	When the "2" range is selected, does the "1" range LED light up?	Go to step 57.	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness.
22 CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between inhibitor switch and chassis ground. Connector & terminal (T7) No. 5 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 23.	Repair the open circuit of harness between inhibitor switch and chassis ground, and poor contact of the connector.
23 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. Connector & terminal (B55) No. 22 — (i10) No. 14:	Is the resistance less than 1 Ω ?	Go to step 24.	Repair open circuit of harness between TCM connector and combination meter, and poor contact in connector.
24 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 14 — (T7) No. 9:	Is the resistance less than 1 Ω ?	Go to step 25.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
25 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 26.	Go to step 59.
26 CHECK INPUT SIGNAL FOR TCM. 1) Shift the select lever to any range other than "P". 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage 8 V or more?	Go to step 59.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
27 CHECK "P" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "P" range indicator light bulb from the combination meter.	Is the "P" range indicator light bulb OK?	Go to step 59.	Replace the "P" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
28 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 14 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 29.	Repair ground short circuit in "P" range circuit.
29 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 13 — (T7) No. 8:	Is the resistance less than 1 Ω?	Go to step 30.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
30 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) Move the select lever to "R" 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 31.	Go to step 59.
31 CHECK INPUT SIGNAL FOR TCM. 1) Position the select lever to any 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 59.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
32 CHECK "R" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "R" range indicator light bulb from combination meter.	Is the "R" range indicator light bulb OK?	Go to step 59.	Replace the "R" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
33 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 13 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 34.	Repair ground short circuit in "R" range circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
34 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 11 — (T7) No. 10:	Is the resistance less than 1 Ω ?	Go to step 35.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
35 CHECK INPUT SIGNAL FOR TCM. 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move 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 36.	Go to step 59.
36 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever to any 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 59.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
37 CHECK "N" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "N" range indicator light bulb from the combination meter.	Is the "N" range indicator light bulb OK?	Go to step 59.	Replace the "N" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
38 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 11 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 39.	Repair the ground short circuit in "N" range circuit.
39 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of the harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 10 — (T7) No. 3:	Is the resistance less than 1 Ω ?	Go to step 40.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
40 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) Move the select lever to the "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 41.	Go to step 59.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
41 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever to any 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 59.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
42 CHECK "D" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "D" range indicator light bulb from combination meter.	Is the "D" range indicator light bulb OK?	Go to step 59.	Replace the "D" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
43 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 8 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 44.	Repair ground short circuit in "D" range circuit.
44 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. 8 — (T7) No. 11:	Is the resistance less than 1 Ω?	Go to step 45.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
45 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) Move the select lever to the "3" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 8 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 46.	Go to step 59.
46 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever out of the "3" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 8 (+) — Chassis ground (-):	Is the voltage 8 V or more?	Go to step 59.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
47 CHECK "3" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "3" range indicator light bulb from combination meter.	Is the "3" range indicator light bulb OK?	Go to step 59.	Replace the "3" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
48 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 8 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 49.	Repair ground short circuit in "3" range circuit.
49 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. 7 — (T7) No. 4:	Is the resistance less than 1 Ω ?	Go to step 50.	Repair the open circuit of harness between TCM and inhibitor switch connector, and poor contact of the connector.
50 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) Move the select lever to the "2" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 7 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 51.	Go to step 59.
51 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever out of the "2" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 7 (+) — Chassis ground (-):	Is the voltage 8 V or more?	Go to step 59.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
52 CHECK "2" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "2" range indicator light bulb from combination meter.	Is the "2" range indicator light bulb OK?	Go to step 59.	Replace the "2" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
53 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 7 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 54.	Repair ground short circuit in "2" range circuit.
54 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. 19 — (T7) No. 6:	Is the resistance less than 1 Ω ?	Go to step 55.	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
55 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) Move the select lever to the "1" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 19 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 56.	Go to step 59.
56 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever out of the "1" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 19 (+) — Chassis ground (-):	Is the voltage 8 V or more?	Go to step 59.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
57 CHECK "1" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "1" range indicator light bulb from combination meter.	Is the "1" range indicator light bulb OK?	Go to step 59.	Replace the "1" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
58 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 19 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 59.	Repair ground short circuit in "1" range circuit.
59 CHECK POOR CONTACT.	Is there poor contact in the inhibitor switch circuit?	Repair the poor contact.	Go to step 60.
60 CHECK INHIBITOR SWITCH.	Is the inhibitor switch in the normal position?	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to 4AT-47, Inhibitor Switch.> <Ref. to CS-25, Select Cable.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

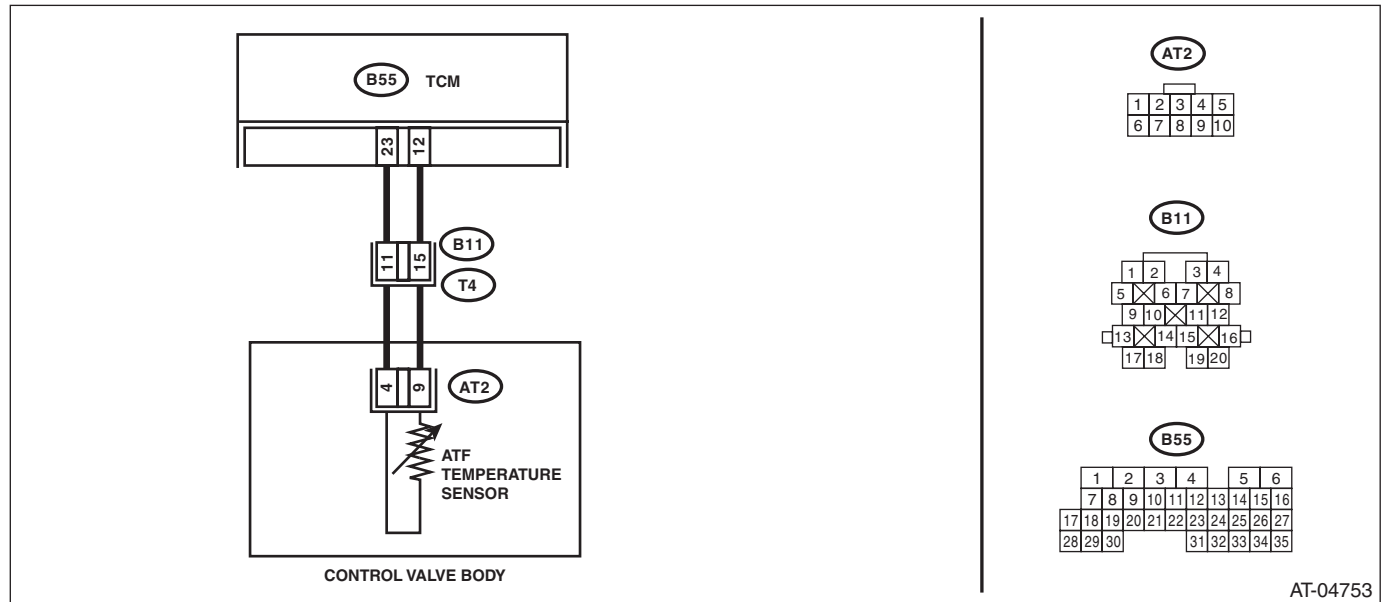
DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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 of harness between TCM and transmission connector. Connector & terminal (B55) No. 23 — No. 11:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 12 — (B11) No. 15:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector.
3 CHECK ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 15:	Is the resistance between 300 — 800 Ω ?	Go to step 4.	Go to step 7.
4 CHECK ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 15:	Does the resistance value increase while the ATF temperature decreases?	Go to step 5.	Go to step 7.
5 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connector to transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Read the data of ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness and poor contact of ATF temperature sensor and transmission connector.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 5) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 6) Remove the oil pan, and disconnect the connector from ATF temperature sensor connector. 7) Measure the resistance of harness between ATF temperature sensor and transmission connector. 8) Measure the resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 11 — (AT2) No. 4:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair the open circuit of harness between ATF temperature sensor and transmission connector.
8 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between ATF temperature sensor and transmission connector. Connector & terminal (T4) No. 15 — (AT2) No. 9:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit of harness between ATF temperature sensor and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 11 — Transmission ground:	Is the resistance 1 M Ω or more?	Go to step 10.	Repair the short circuit of harness between ATF temperature sensor and transmission connector.
10 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 15 — Transmission ground:	Is the resistance 1 M Ω or more?	Replace the control valve body. <Ref. to 4AT-58, Control Valve Body.>	Repair the short circuit of harness between ATF temperature sensor and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

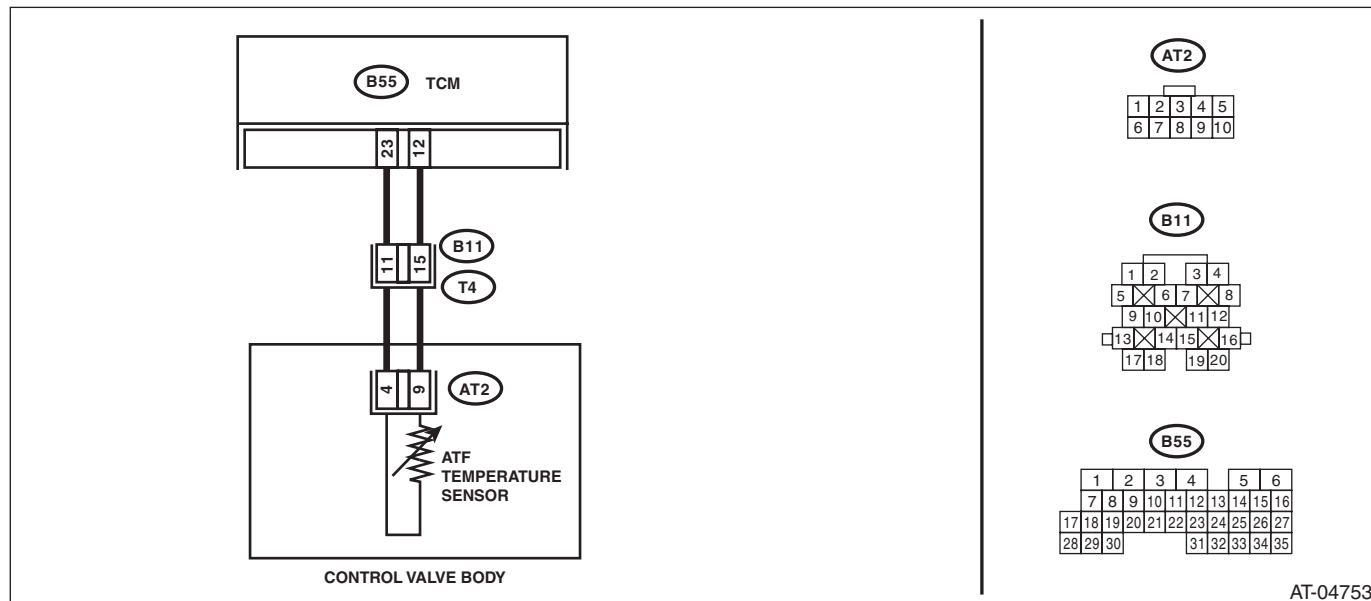
DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from 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 the 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-64, 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 the 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 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 HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure the resistance of the harness between TCM connector and chassis ground. <i>Connector & terminal</i> <i>(B55) No. 12 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 6.	Repair the short circuit of harness between TCM and transmission harness.
6 CHECK ATF TEMPERATURE SENSOR. Measure the resistance between transmission connector terminals. <i>Connector & terminal</i> <i>(T4) No. 11 — No. 15:</i>	Is the resistance 500 Ω or more?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Go to step 7.
7 CHECK TRANSMISSION HARNESS. 1) Lift up the vehicle and place it on rigid racks. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan. 4) Disconnect the harness connector from control valve. 5) Measure the resistance between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 11 — Transmission ground:</i>	Is the resistance 1 MΩ or more?	Go to step 8.	Replace the transmission harness.
8 CHECK TRANSMISSION HARNESS. Measure the resistance between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 15 — Transmission ground:</i>	Is the resistance 1 MΩ or more?	Go to step 9.	Replace the transmission harness.
9 CHECK ATF TEMPERATURE SENSOR. Measure the resistance between control valve connector terminals. <i>Connector & terminal</i> <i>(AT2) No. 4 — No. 9:</i>	Is the resistance 500 Ω or more?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Replace the control valve body. <Ref. to 4AT-58, Control Valve Body.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

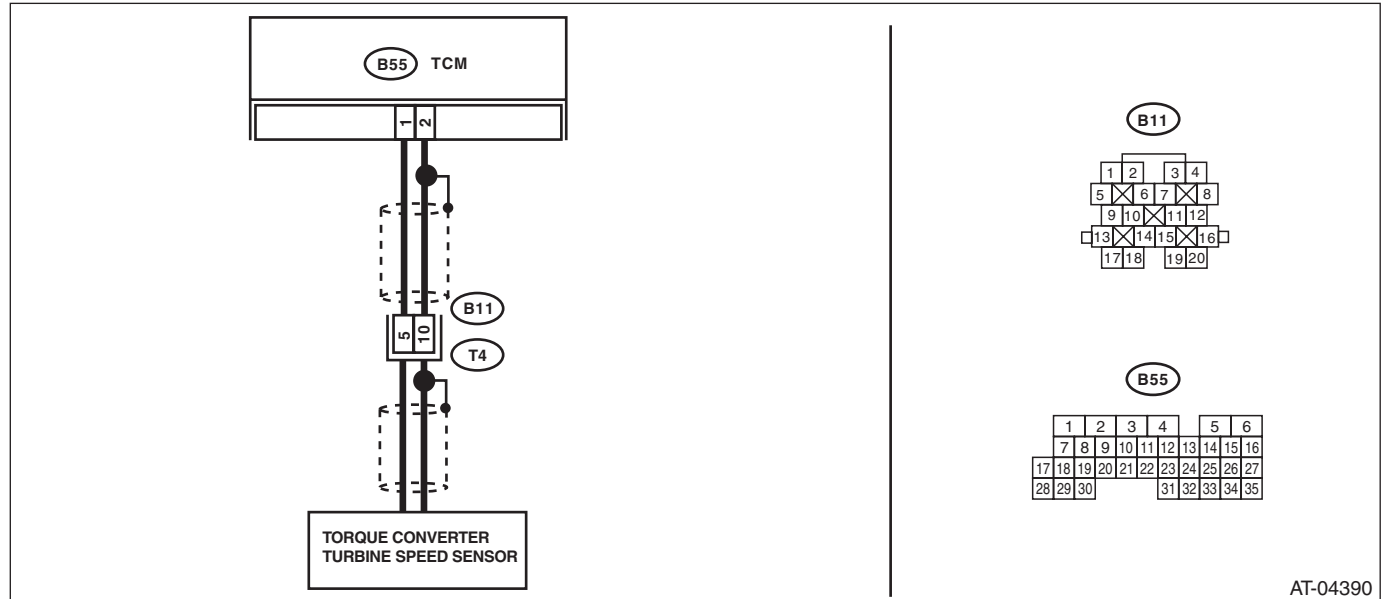
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



AT-04390

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 5 — No. 10:	Is the resistance between 450 — 650 Ω ?	Go to step 2.	Replace the torque converter turbine speed sensor. <Ref. to 4AT-55, Torque Converter Turbine Speed Sensor.>
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect the connector from TCM. 2) Measure the resistance of the harness between TCM connector and transmission connector. Connector & terminal (B55) No. 1 — (B11) No. 5:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and transmission connector. Connector & terminal (B55) No. 2 — (B11) No. 10:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit of harness between TCM and transmission connector, and poor contact of the connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 2 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 5.	Repair the short circuit of harness between TCM and transmission connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 1 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 6.	Repair the short circuit of the harness between TCM and transmission connector, and poor contact of connector.
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON and the Subaru Select Monitor power switch to ON. 4) Start the engine. 5) Shift the select lever to "P" or "N" range. 6) Read the data of turbine speed using Subaru Select Monitor. • Compare the tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

E: DTC P0719 BRAKE SWITCH CIRCUIT LOW

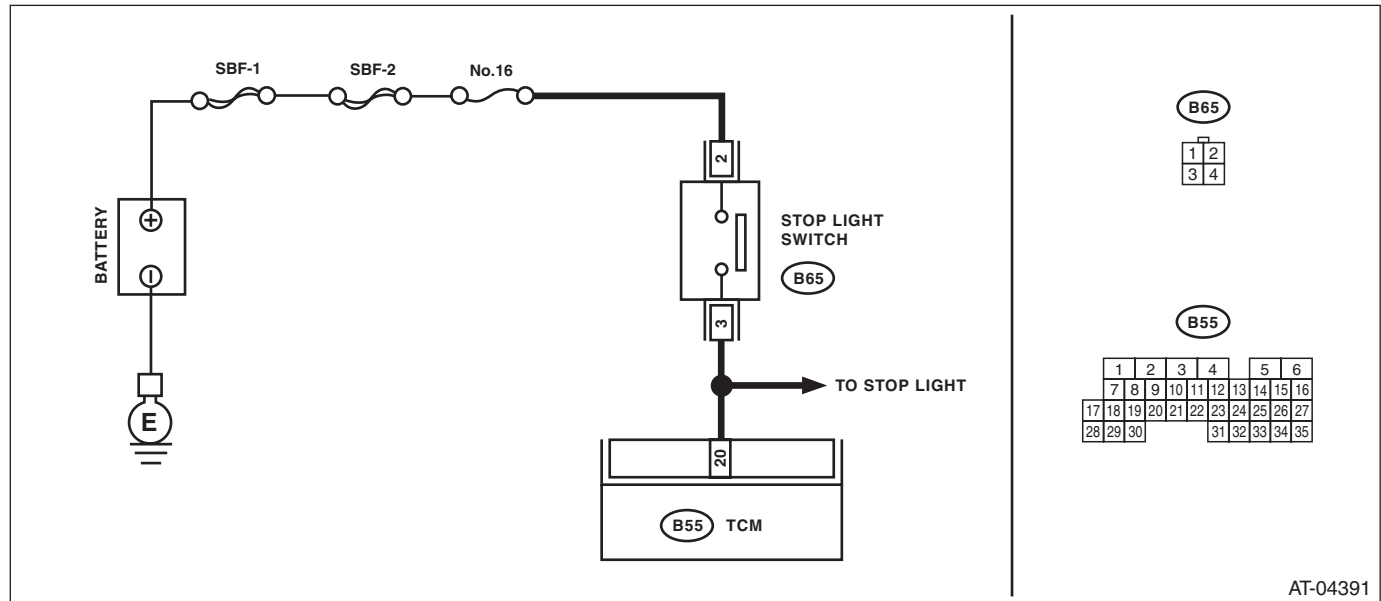
DTC DETECTING CONDITION:

Stop light switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

Gear is not shifted down when climbing a hill.

WIRING DIAGRAM:



AT-04391

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK FUSE (NO. 16). Remove the fuse (No. 16).	Is the fuse (No. 16) blown out?	Replace the fuse (No. 16). If the replaced fuse (No. 16) is blown out easily, repair the short circuit of the harness between fuse (No. 16) and stop light switch.	Go to step 2.
2 CHECK OPERATION OF BRAKE LIGHT. Depress the brake pedal.	Does the brake light illuminate?	Go to step 3.	Check the brake light circuit.
3 CHECK INPUT SIGNAL FROM TCM. 1) Depress the brake pedal. 2) Measure the voltage of the harness between TCM and stop light switch. Connector & terminal (B55) No. 20 (+) — Chassis ground (–):	Is the voltage 10.5 V or more?	Go to step 6.	Go to step 4.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND STOP LIGHT SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the TCM and stop light switch. 3) Measure the resistance of harness between the TCM and stop light switch. Connector & terminal (B55) No. 20 — (B65) No. 3:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit of the harness between the TCM and the stop light switch.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND STOP LIGHT SWITCH. Measure the resistance of the harness between TCM and chassis ground. Connector & terminal (B55) No. 20 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 6.	Repair the short circuit of the harness between the TCM and the stop light switch.
6 CHECK POOR CONTACT.	Is there poor contact in input signal circuit of the stop light switch?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

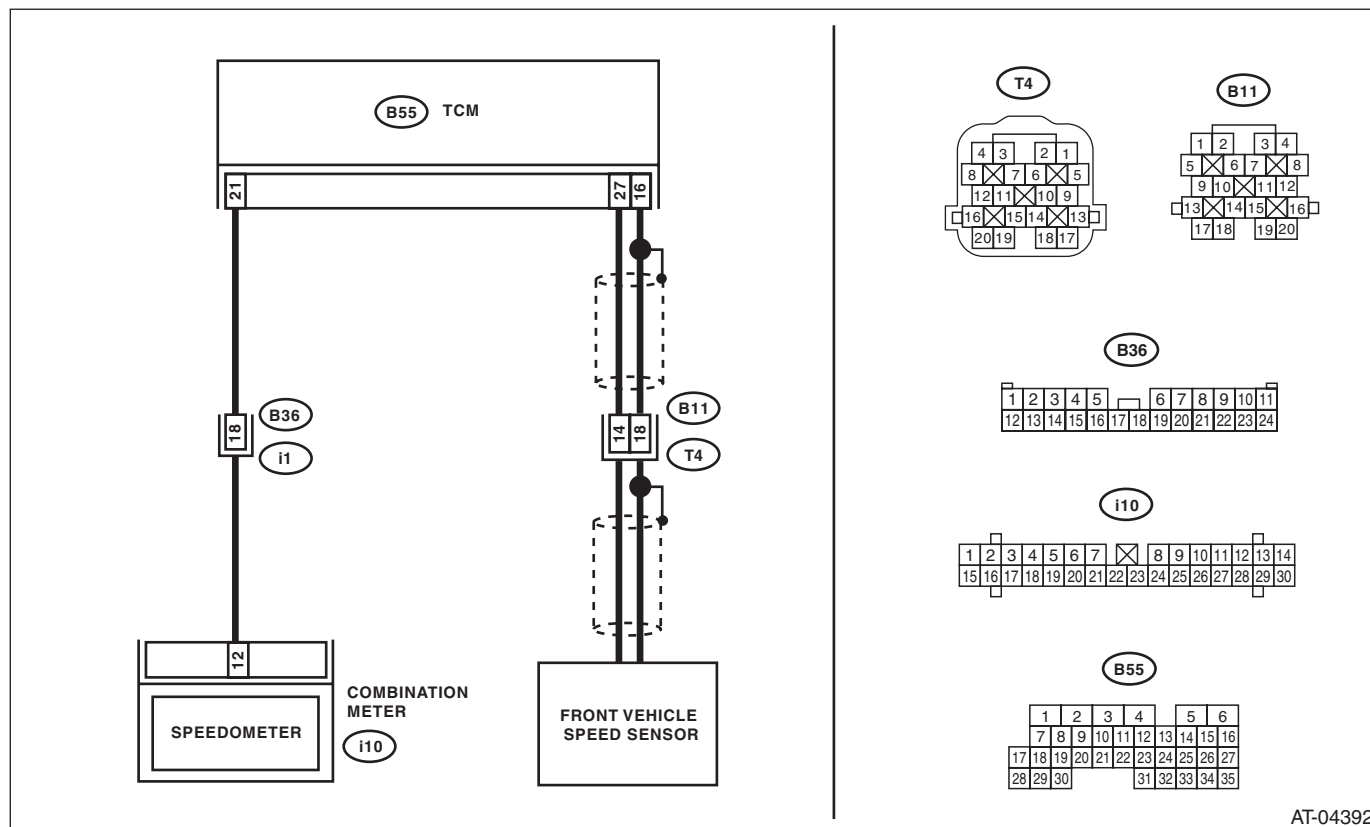
DTC DETECTING CONDITION:

- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and front vehicle speed sensor is shorted or open.

TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Driving performance is poor.

WIRING DIAGRAM:



AT-04392

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 the harness between TCM connector and transmission connector. Connector & terminal (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.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and transmission connector. Connector & terminal (B55) No. 16 — (B11) No. 18:	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.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and transmission connector. Connector & terminal (B55) No. 27 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and transmission connector. Connector & terminal (B55) No. 16 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 5.	Repair the short circuit of the harness between TCM and transmission connector, and poor contact of connector.
5 CHECK FRONT VEHICLE SPEED SENSOR. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 14 — No. 18:	Is the resistance between 450 — 650 Ω?	Go to step 6.	Replace the front vehicle speed sensor. <Ref. to 4AT-51, Front Vehicle Speed Sensor.>
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to the data link connector. 3) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 4) Turn the ignition switch to ON and the Subaru Select Monitor power switch to ON. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. • Compare the speedometer with Subaru Select Monitor indications. • Vehicle speed is indicated in "km/h" or "MPH" 7) Slowly increase the vehicle speed to 60 km/h (37 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS diagnostics clear memory. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness in of front vehicle speed sensor circuit.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

G: DTC P0724 BRAKE SWITCH CIRCUIT HIGH

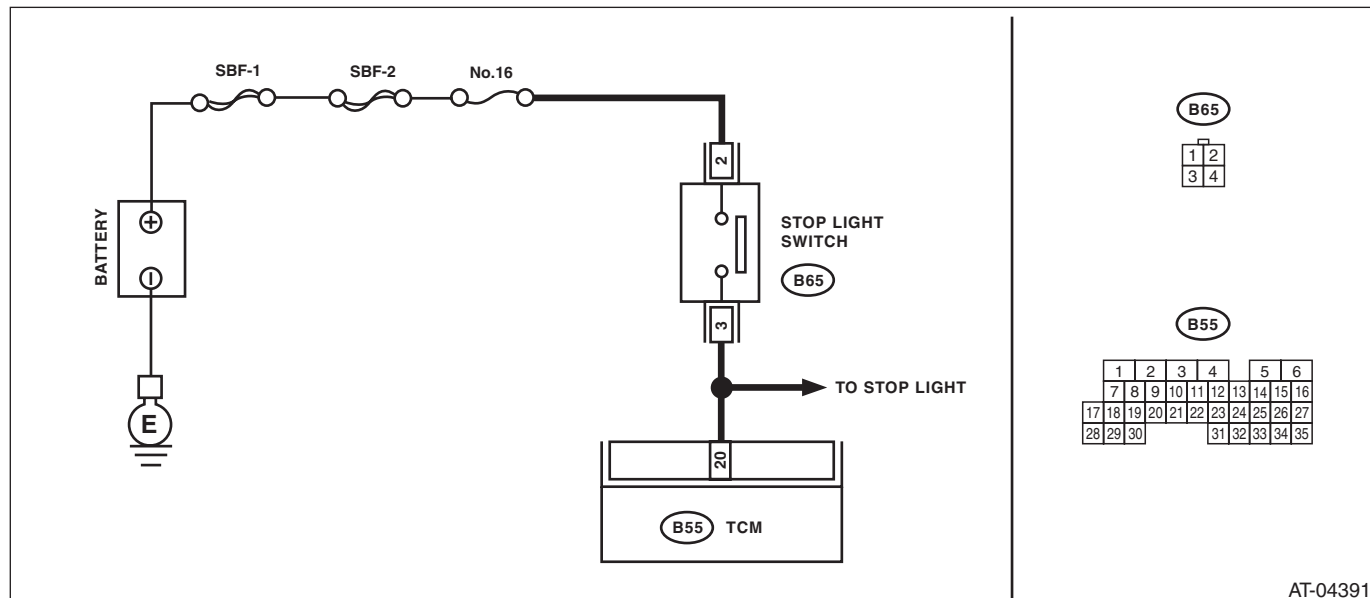
DTC DETECTING CONDITION:

Stop light switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

Gear is not shifted down when climbing a hill.

WIRING DIAGRAM:



AT-04391

Step	Check	Yes	No
1 CHECK OPERATION OF BRAKE LIGHT. Depress the brake pedal.	The brake light illuminates.	Go to step 2.	Check the brake light circuit.
2 CHECK INPUT SIGNAL FROM TCM. 1) Depress the brake pedal. 2) Measure the voltage of the harness between TCM and stop light switch. Connector & terminal (B55) No. 20 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 5.	Go to step 3.
3 CHECK STOP LIGHT SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between stop light switch connectors. Connector & terminal (B65) No. 2 — No. 3:	Is the resistance 1 MΩ or more?	Go to step 4.	Replace the stop light switch. <Ref. to BR-52, Stop Light Switch.>
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND STOP LIGHT SWITCH. 1) Turn the ignition switch to ON. 2) Measure the voltage of harness between TCM and chassis ground. Connector & terminal (B55) No. 20 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 5.	Repair the short circuit of harness between TCM and stop light switch.
5 CHECK POOR CONTACT.	Is there poor contact in input signal circuit of the stop light switch?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

H: DTC P0725 ENGINE SPEED INPUT CIRCUIT

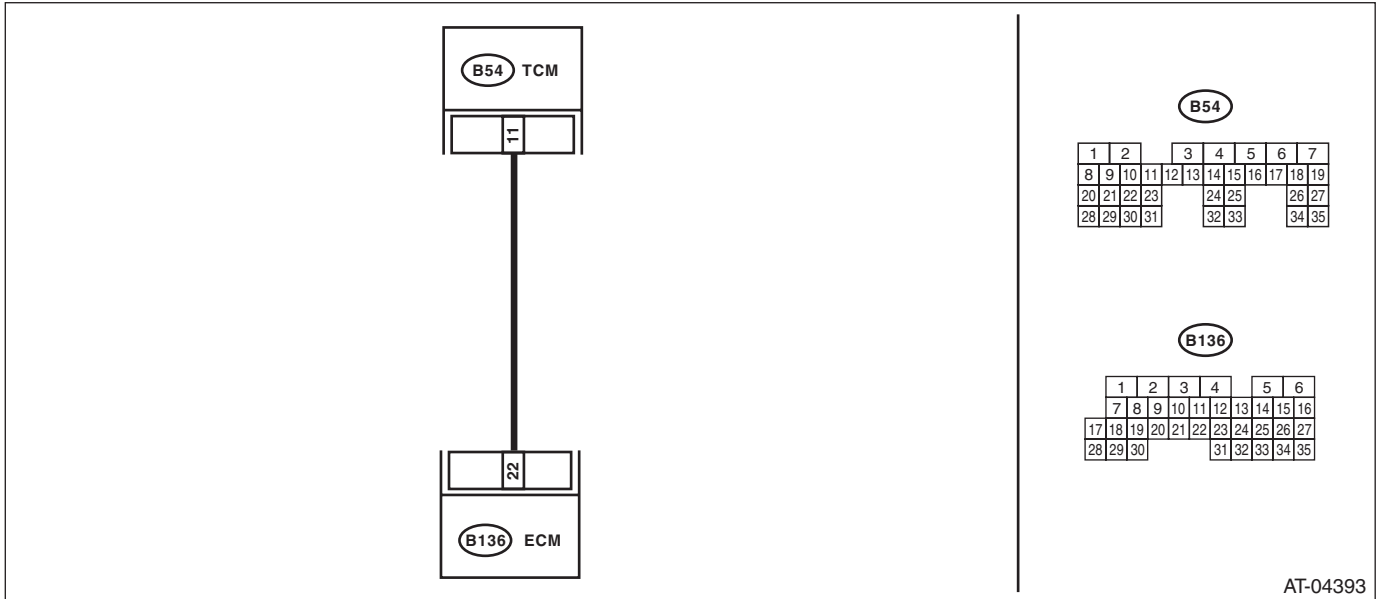
DTC DETECTING CONDITION:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up occurs. (After engine is warmed-up)
- AT OIL TEMP warning light remains on when the vehicle speed is 0.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM. Connector & terminal (B54) No. 11 — (B136) No. 22:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and ECM connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B54) No. 11 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and ECM connector.
3 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Run the engine at idle. 5) Read the data of engine speed using Subaru Select Monitor. • Display shows engine speed signal value sent from ECM.	Is the revolution value almost same as the tachometer reading shown on the combination meter?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in the TCM and ECM.	Go to step 4.
4 CHECK POOR CONTACT.	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step 5.
5 CONFIRM DTC P0725. Replace the ECM with a new part.	Does the DTC appear again, after the memory has been cleared?	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>	Replace the ECM. <Ref. to FU(H4SO)-41, Engine Control Module (ECM).>

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-55, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-55, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-55, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC P0734 GEAR 4 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-55, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

M: DTC P0736 REVERSE INCORRECT RATIO

DTC DETECTING CONDITION:

Vehicle sensor, torque converter turbine speed sensor or control valve malfunction

TROUBLE SYMPTOM:

- Shift point is too high or too low.
- Excessive shift shock
- Tight corner braking phenomenon occurs.
- Gear is not shifted to reverse.
- Gear position is held by fail safe function.

Step	Check	Yes	No
1 CHECK ACCELERATOR PEDAL POSITION SENSOR. 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. 3) Read the value of accelerator pedal position sensor on Subaru Select Monitor display.	Does the value of accelerator pedal position sensor change from 0% to 100% smoothly when throttle is operated from fully closed to fully open?	Go to step 2.	Check the accelerator pedal position sensor circuit.
2 CHECK FRONT VEHICLE SPEED SENSOR. 1) Lift up the vehicle and support with rigid racks. 2) Start the engine. 3) Shift the select lever to "D" range and slowly increase vehicle speed. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS clear memory of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Does the vehicle speed displayed by Subaru Select Monitor roughly correspond with vehicle speed indicated by the combination meter?	Go to step 3.	Check the front vehicle speed sensor circuit.
3 CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Move the select lever to "P" or "N" range. 2) Idle the engine.	Does the value of torque converter turbine speed sensor displayed by Subaru Select Monitor roughly correspond with the value of tachometer in combination meter?	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.	Check the torque converter turbine speed sensor circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

DTC DETECTING CONDITION:

- Lock up clutch malfunction
- Sticky valve

TROUBLE SYMPTOM:

No lock-up occurs.

Step	Check	Yes	No
1 CHECK LOCK-UP DUTY SOLENOID CIRCUIT. Diagnose according to DTC P0743 procedure.	Is there any trouble?	Repair or replace the lock up duty solenoid circuit.	Go to step 2.
2 CHECK INHIBITOR SWITCH CIRCUIT. Diagnose according to DTC P0705 procedure.	Is there any trouble?	Repair or replace the inhibitor switch circuit.	Go to step 3.
3 CHECK STOP LIGHT SWITCH CIRCUIT. Diagnose according to DTC P0719 and P0724 procedures.	Is there any trouble?	Repair or replace the stop light switch circuit.	Go to step 4.
4 CHECK ATF TEMPERATURE SENSOR CIRCUIT. Diagnose according to DTC P0712 AND P0713 procedure.	Is there any trouble?	Repair or replace the ATF temperature sensor circuit.	Go to step 5.
5 CHECK ACCELERATOR PEDAL POSITION SENSOR. 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. 3) Read the value of accelerator pedal position sensor on Subaru Select Monitor display.	Does the value of accelerator pedal position sensor change from 0% to 100% smoothly when throttle is operated from fully closed to fully open?	Go to step 6.	Check the accelerator pedal position sensor circuit.
6 CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Move the select lever to "P" or "N" range. 2) Idle the engine.	Does the value of turbine speed displayed by Subaru Select Monitor almost correspond with the value of the tachometer?	Go to step 7.	Check the torque converter turbine speed sensor circuit.
7 CHECK ENGINE SPEED SIGNAL. Idle the engine.	Does the value of turbine speed displayed by Subaru Select Monitor almost correspond with the value of tachometer?	There is transmission assembly mechanical malfunction.	Check the engine speed signal circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

O: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

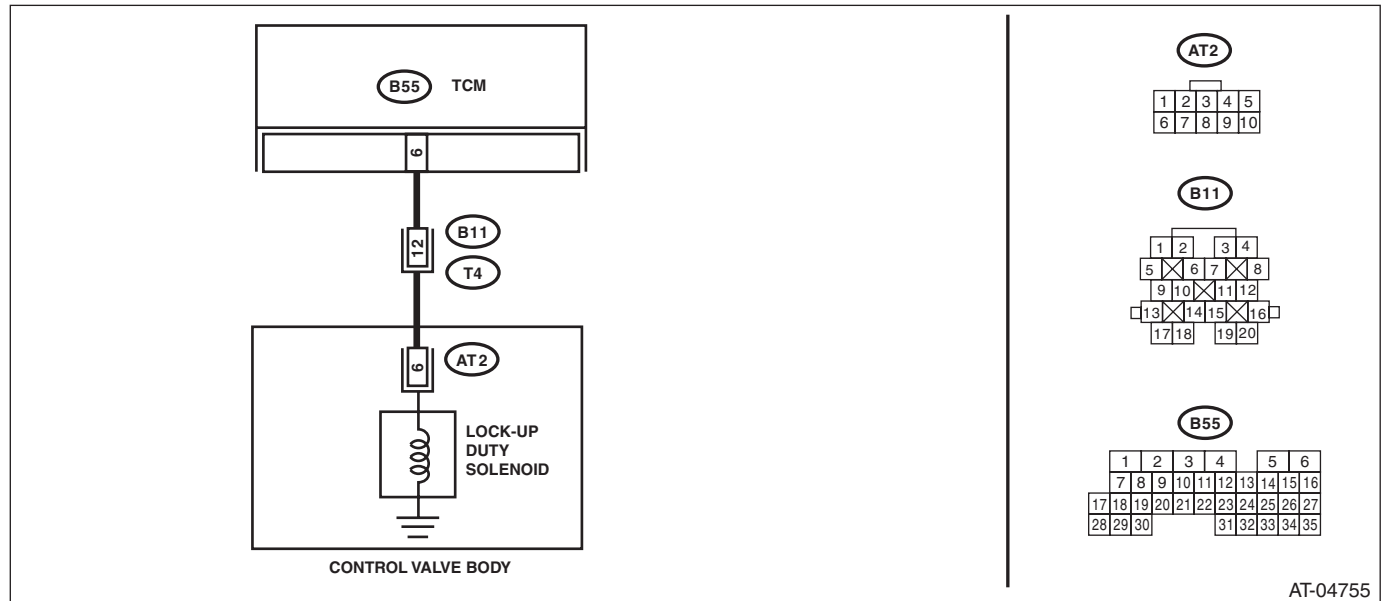
DTC DETECTING CONDITION:

Output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of the 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.	Repair the open circuit of harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness connector between TCM connector and chassis ground. Connector & terminal (B55) No. 6 — 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.
4 CHECK LOCK-UP DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 12 — No. 19:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 5.	Go to step 8.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 3) Connect the Subaru Select Monitor to the data link connector. 4) Start the engine, and run the Subaru Select Monitor. 5) Start the engine and warm-up the engine until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read the data of lock-up duty solenoid using the Subaru Select Monitor. • Lock-up duty solenoid is indicated in "%". 7) Shift the select lever to "D," and slowly increase vehicle speed to 60 km/h (37 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS diagnostics clear memory. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Is the measured value 95%?	Go to step 6.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. Return the engine to idling speed, shift the select lever to "N" range and read the data.	Is the measured value 0%?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in lock-up duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
8 CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION). 1) Disconnect the transmission connector. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan, and disconnect the connector from lock-up duty solenoid. 4) Measure the resistance between lock-up duty solenoid and transmission ground. Connector & terminal (AT2) No. 6 — Transmission ground:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 9.	Replace the control valve body. <Ref. to 4AT-58, Control Valve Body.>
9 CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between lock-up duty solenoid and transmission connector. Connector & terminal (T4) No. 12 — (AT2) No. 6:	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. Connector & terminal (T4) No. 12 — Transmission ground:	Is the resistance 1 M Ω or more?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in lock-up duty solenoid and transmission.	Repair the short circuit of harness between lock-up duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

P: DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL

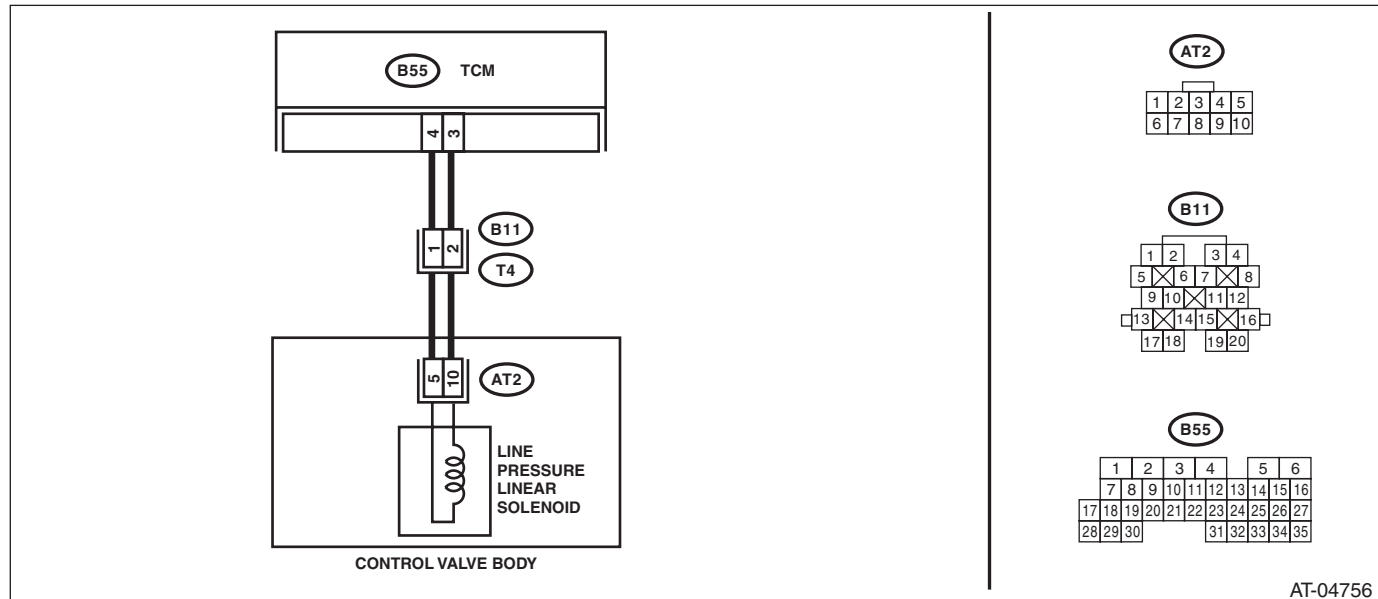
DTC DETECTING CONDITION:

Output signal circuit of line pressure linear solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of the 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 the 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 between 4 — 6 Ω?	Go to step 4.	Go to step 5.
4 CHECK POOR CONTACT.	Is there poor contact in line pressure linear solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 CHECK LINE PRESSURE LINEAR SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan, and disconnect the connector from line pressure linear solenoid. 4) Measure the resistance between line pressure linear solenoid connector and transmission ground. Connector & terminal (AT2) No. 5 — No. 10:	Is the resistance between 4 — 8 Ω ?	Go to step 6.	Replace the control valve body. <Ref. to 4AT-58, Control Valve Body.>
6 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 7.	Repair the open circuit of harness between line pressure linear solenoid and transmission connector.
7 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?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in line pressure linear solenoid and transmission.	Repair the short circuit of harness between line pressure linear solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Q: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

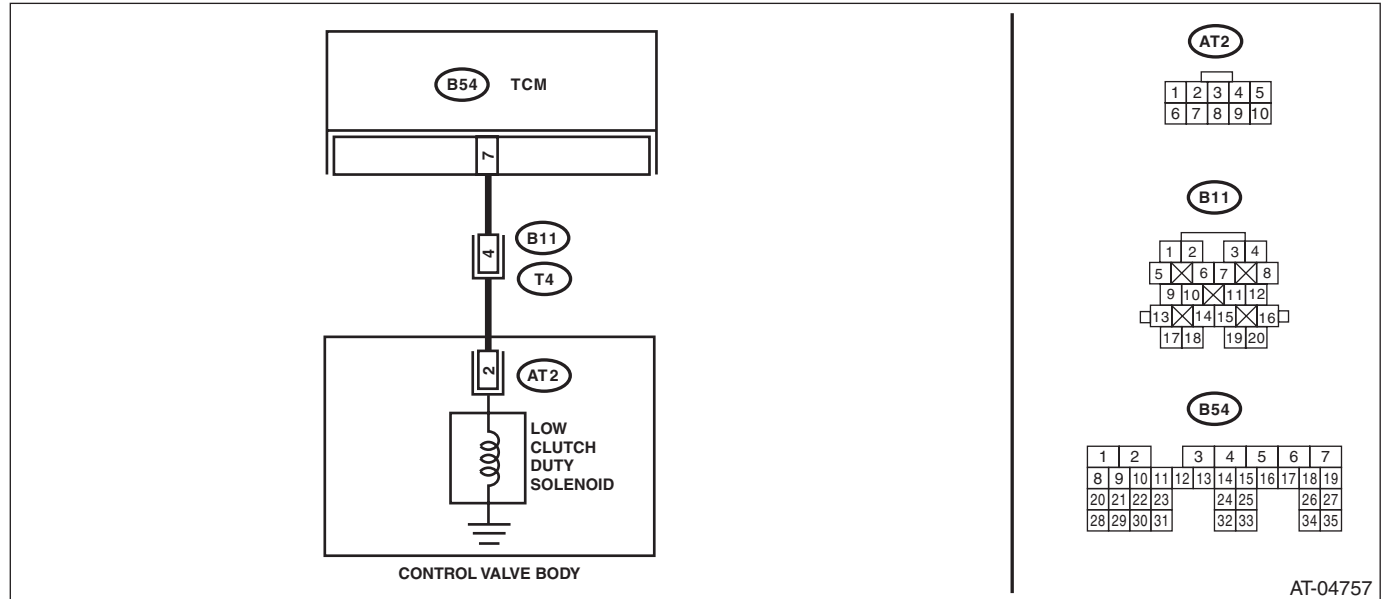
DTC DETECTING CONDITION:

Output signal circuit of low clutch duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 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 M Ω or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
3 CHECK LOW CLUTCH DUTY SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 4 — No. 20:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 5.	Go to step 4.
4 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Warm-up the transmission until the ATF temperature reaches approximately 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON. (engine OFF) 6) Shift the select lever to "P" or "N" range. 7) Read the data of low clutch duty solenoid using Subaru Select Monitor. • Low clutch duty solenoid is indicated in "%".	Is the measured value 100%?	Go to step 5.	Go to step 7.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Turn the ignition switch to ON. (engine OFF) 2) Shift the select lever to "D" range. 3) Read the data of low clutch duty solenoid.	Is the measured value 0%?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in low clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK LOW CLUTCH DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan, and disconnect the connector from low clutch duty solenoid. 4) Measure the resistance between low clutch duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 2 — Transmission ground:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-58, 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 M Ω or more?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector of the low clutch duty solenoid and transmission.	Repair the short circuit of harness between low clutch duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

R: DTC P0758 SHIFT SOLENOID “B” ELECTRICAL

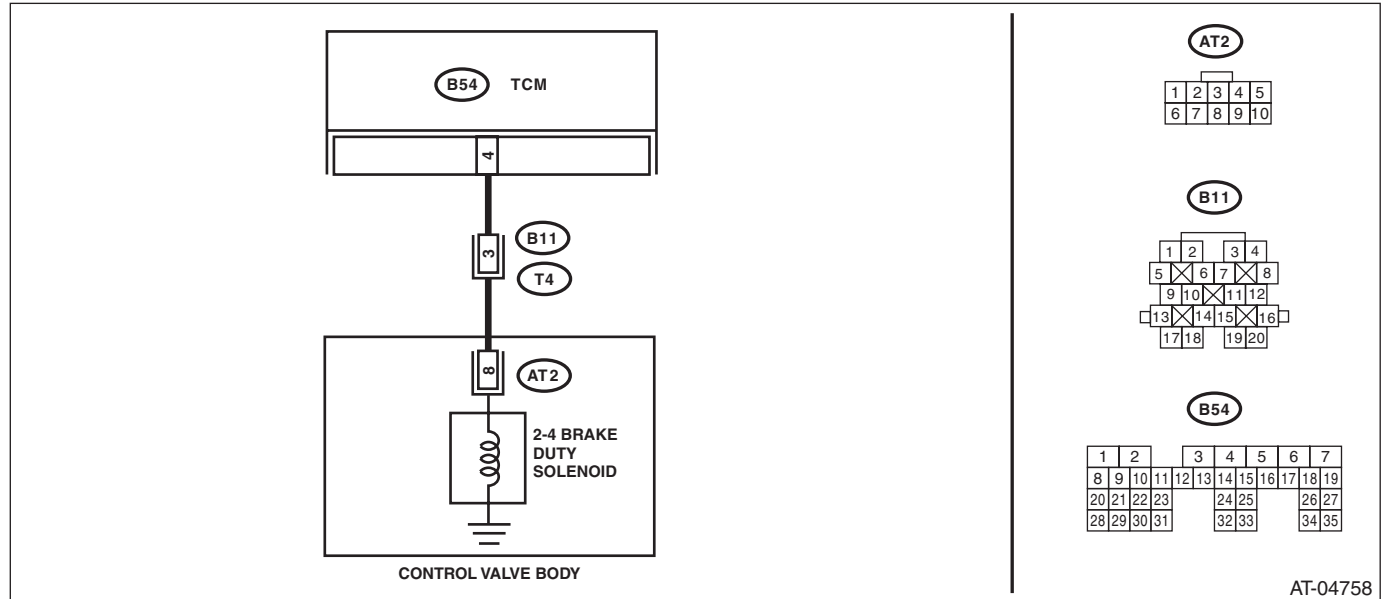
DTC DETECTING CONDITION:

Output signal circuit of 2-4 brake duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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 the 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 TRANSMISSION. Measure the resistance of harness between TCM connector and transmission ground. Connector & terminal (B54) No. 4 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
3 CHECK 2-4 BRAKE DUTY SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 3 — No. 20:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Warm-up the transmission until the ATF temperature reaches approximately 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON. (engine OFF) 6) Shift the select lever to “N” range. 7) While depressing the accelerator pedal, read the data of 2-4 brake duty solenoid using Subaru Select Monitor. • 2-4 brake duty solenoid is indicated in “%”.	Is the measured value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. Shift the select lever to “2” range.	Is the measured value 0%?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan, and disconnect the connector from 2-4 brake duty solenoid. 4) Measure the resistance of harness between 2-4 brake duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 8 — Transmission ground:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-58, 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 M Ω or more?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in 2-4 brake duty solenoid and transmission.	Repair the short circuit of harness between 2-4 brake duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

S: DTC P0763 SHIFT SOLENOID “C” ELECTRICAL

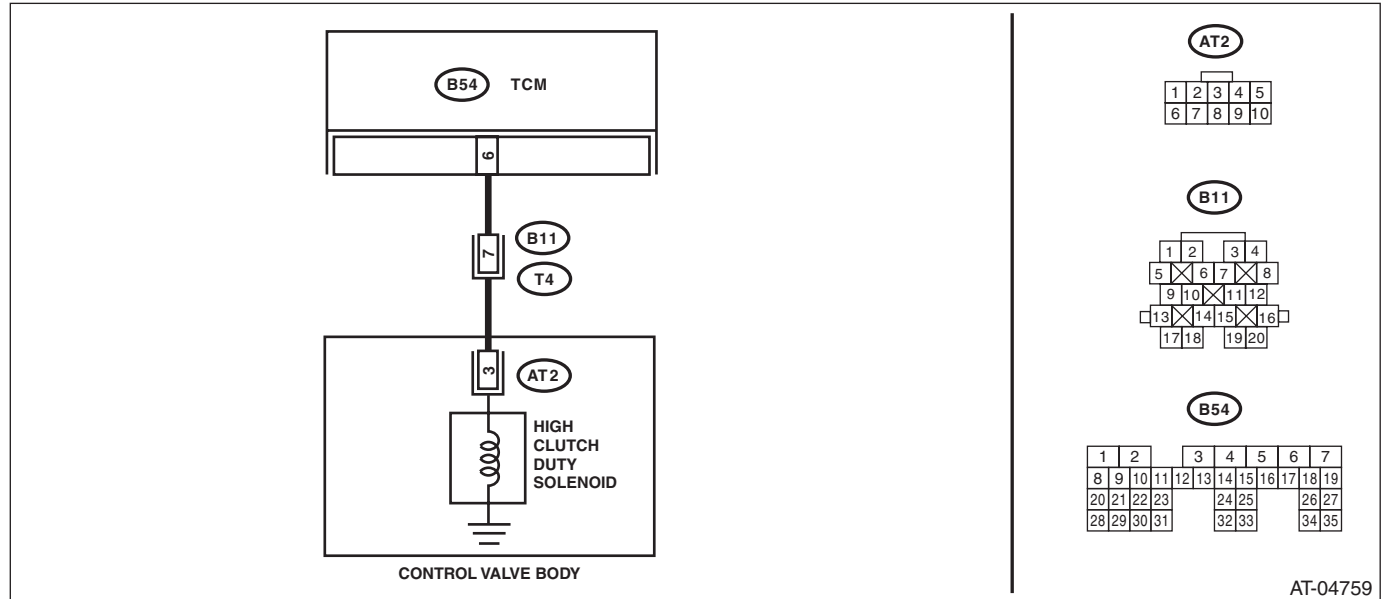
DTC DETECTING CONDITION:

Output signal circuit of high clutch duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



AT-04759

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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 the 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 M Ω or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
3 CHECK HIGH CLUTCH DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 7 — No. 20:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 3) Connect the Subaru Select Monitor to the data link connector. 4) Start the engine, and run the Subaru Select Monitor. 5) Start the engine and warm-up the engine until the ATF temperature exceeds 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read the data of high clutch duty solenoid using Subaru Select Monitor. • High clutch duty solenoid is indicated in "%". 7) Shift the select lever to "D," and slowly increase vehicle speed to measure at 3rd or 4th. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS diagnostics clear memory. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Is the measured value 0%?	Go to step 5.	Go to step 6.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. Return the engine to idling speed and shift the select lever to "N" range. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS diagnostics Clear Memory Mode. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Is the measured value 100%?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in high clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
7 CHECK HIGH CLUTCH DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan, and disconnect the connector from high clutch duty solenoid. 4) Measure the resistance between high clutch duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 3 — Transmission ground:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-58, Control Valve Body.>
8 CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between high clutch duty solenoid and transmission connector. Connector & terminal (T4) No. 7 — (AT2) No. 3:	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. Connector & terminal (T4) No. 7 — Transmission ground:	Is the resistance 1 M Ω or more?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in high clutch duty solenoid and transmission.	Repair the short circuit of harness between high clutch duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

T: DTC P0768 SHIFT SOLENOID “D” ELECTRICAL

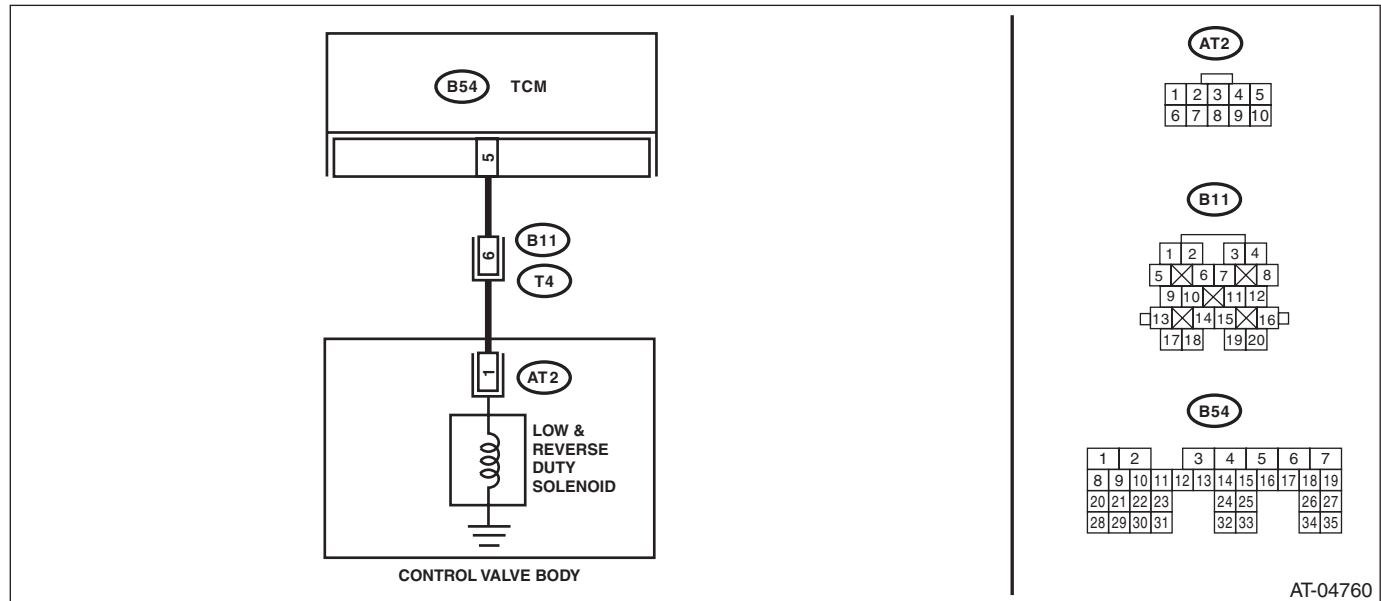
DTC DETECTING CONDITION:

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

TROUBLE SYMPTOM:

Gear is not changed.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of the 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 the harness between TCM connector and chassis ground. Connector & terminal (B54) No. 5 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
3 CHECK LOW & REVERSE BRAKE DUTY SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 6 — No. 20:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to the data link connector. 3) Start the engine, and run the Subaru Select Monitor. 4) Warm-up the transmission until the ATF temperature reaches approximately 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON. (engine OFF) 6) Move the select lever to "N". 7) Read the data of low & reverse brake duty solenoid using Subaru Select Monitor. • Low & reverse brake duty solenoid is indicated in "%".	Is the measured value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Lift up the vehicle and support with rigid racks. NOTE: Raise all wheels off the floor. 2) Shift the select lever to "1" range. Slowly increase the vehicle speed up to 15 km/h (9 MPH), and then return the accelerator pedal. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS diagnostics clear memory procedure. <Ref. to ABS(diag)-26, Clear Memory Mode.> 3) Read the data of the low & reverse duty solenoid.	Is the measured value 55%?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step 6.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK POOR CONTACT.	Is there poor contact in the low & reverse duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
7 CHECK LOW & REVERSE BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the oil pan, and disconnect the connector from low & reverse brake duty solenoid. 4) Measure the resistance between low & reverse brake duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 1 — Transmission ground:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-58, Control Valve Body.>
8 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE BRAKE 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 brake duty solenoid and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE BRAKE 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?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in low & reverse brake duty solenoid and transmission.	Repair the short circuit of the harness between the low & reverse brake duty solenoid and the transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

U: DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

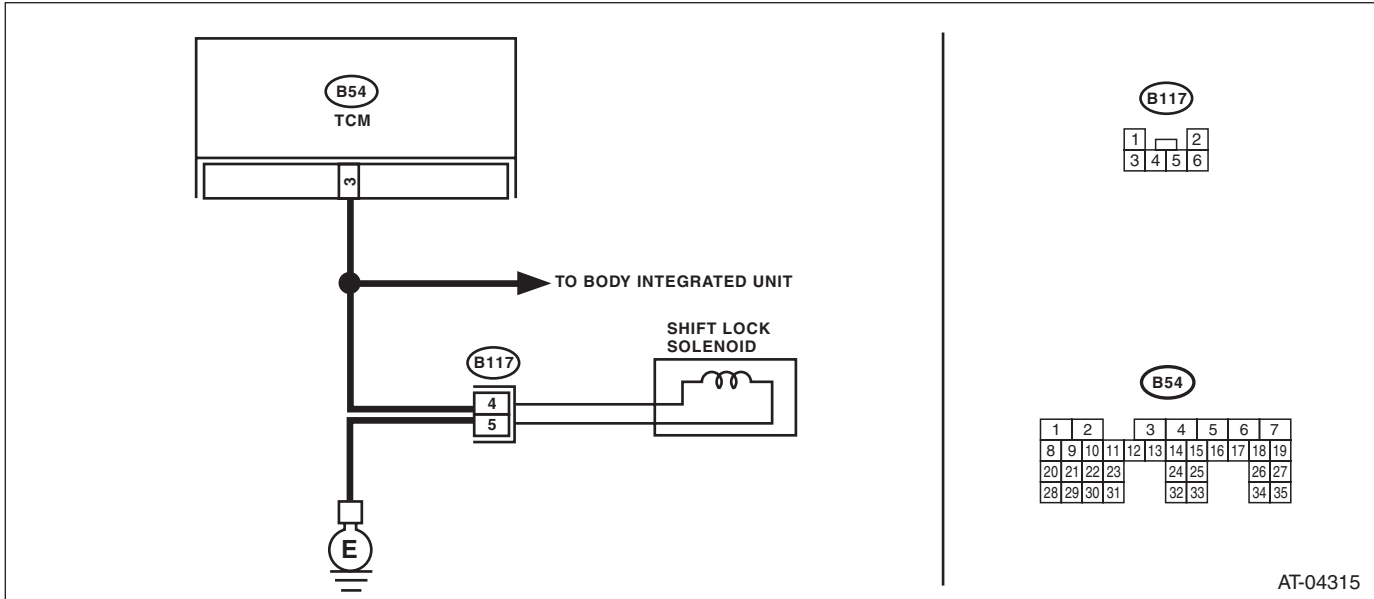
DTC DETECTING CONDITION:

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

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and shift lock solenoid. 3) Measure the resistance of harness between TCM and shift lock solenoid connector. Connector & terminal (B54) No. 3 — (B117) No. 4:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit of harness between TCM and shift lock solenoid connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. Measure the resistance of the harness between TCM and chassis ground. Connector & terminal (B54) No. 3 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 3.	Repair the short circuit of harness between TCM and shift lock solenoid connector.
3 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B117) No. 5 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit of harness between chassis ground and shift lock solenoid connector.
4 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid terminals. Connector & terminal (B117) No. 5 — No. 4:	Is the resistance between 7 — 18 Ω ?	Go to step 5.	Replace the shift lock solenoid. <Ref. to CS-28, AT Shift Lock Solenoid and "P" Range Switch.>
5 CHECK OUTPUT SIGNAL OF TCM. 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Shift the select lever to "D" range. 4) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 3 (+) — Chassis ground (-):	Is the voltage 10.5 V or more?	Go to step 6.	Go to step 7.
6 CHECK OUTPUT SIGNAL OF TCM. 1) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 2) Start the engine. 3) Shift the select lever to "D" range and slowly increase vehicle speed to 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS diagnostics clear memory. <Ref. to ABS(diag)-26, Clear Memory Mode.> 4) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 3 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in the reverse inhibitor control circuit.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in the reverse inhibitor control circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

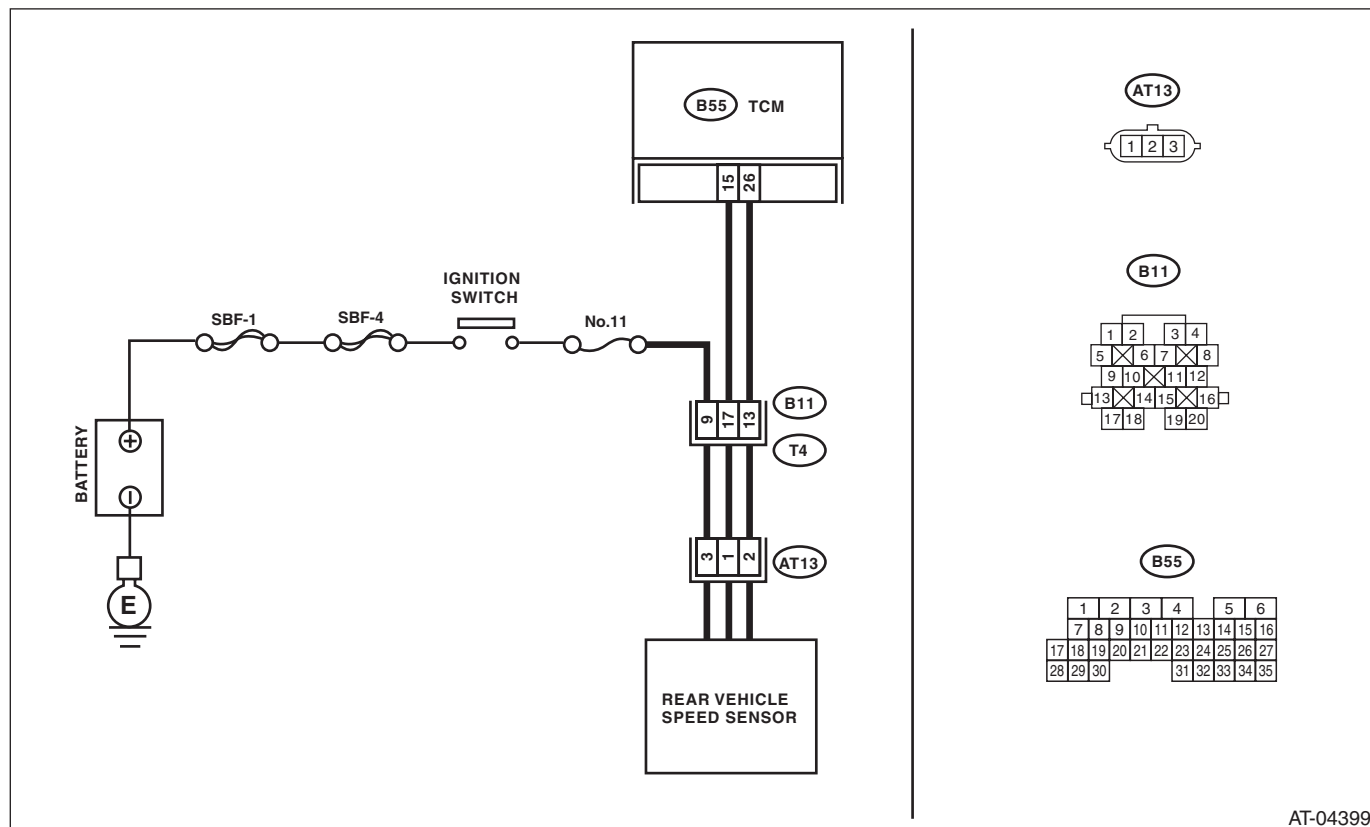
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock up or tight corner braking.

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear vehicle speed sensor. 3) Turn the ignition switch to ON. 4) Measure the ignition power supply voltage between rear vehicle speed sensor connector and transmission ground. Connector & terminal (AT13) No. 3 (+) — Transmission ground (-):	Is the voltage 10 V or more?	Go to step 2.	Check harness between rear vehicle speed sensor and battery for open circuit, short or poor contact. Repair the harness if required.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Measure the resistance of the harness between TCM connector and transmission connector. Connector & terminal (B55) No. 15 — (AT13) No. 1:	Is the resistance less than 1 Ω?	Go to step 3.	Repair the open circuit or poor contact of the connector in harness between TCM and rear vehicle speed sensor connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and transmission connector. Connector & terminal (B55) No. 26 — (AT13) No. 2:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit or poor contact of the connector in harness between TCM and rear vehicle speed sensor connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 15 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 5.	Repair the short circuit of harness between TCM and rear vehicle speed sensor connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of the harness between TCM connector and chassis ground. Connector & terminal (B55) No. 26 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 6.	Repair the short circuit of harness between TCM and rear vehicle speed sensor connector.
6 CHECK INPUT SIGNAL FOR TCM. 1) Connect the connectors to TCM and transmission. 2) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this does not indicate a malfunction. When AT control diagnosis is finished, perform the ABS diagnostics clear memory. <Ref. to ABS(diag)-26, Clear Memory Mode.> 4) Measure the AC voltage between TCM connector terminals. Connector & terminal (B55) No. 26 (+) — No. 15 (-):	Is the voltage approx. 2 V or more?	Go to step 7.	Replace the rear vehicle speed sensor. <Ref. to 4AT-54, Rear Vehicle Speed Sensor.>
7 CHECK POOR CONTACT.	Is there poor contact in rear vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

W: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

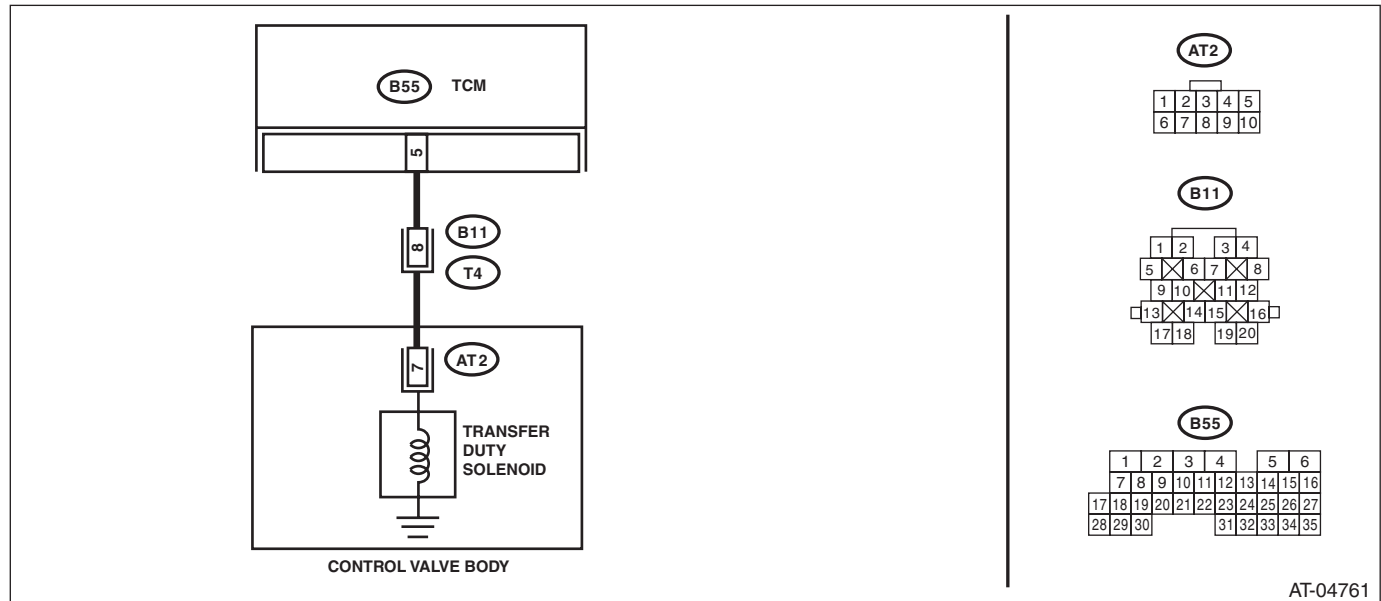
DTC DETECTING CONDITION:

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

TROUBLE SYMPTOM:

Tight corner braking phenomenon occurs.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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 the 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 harness connector between TCM and chassis ground. Connector & terminal (B55) No. 5 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
3 CHECK TRANSFER DUTY SOLENOID. Measure the resistance between transmission connector and transmission terminals. Connector & terminal (T4) No. 8 — No. 20:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch to ON (engine OFF), and run the Subaru Select Monitor. 4) Shift the select lever to the "N" range, and fully close the throttle pedal. (Vehicle speed is 0 km/h (0 MPH)) 5) Read the data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%".	Is the measured value 5%?	Go to step 5.	Go to step 8.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Shift the select lever to "D" range. 2) Read the data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%."	Is the measured value approximately 18 — 35%?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in transfer duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift up the vehicle and place it on rigid racks. NOTE: Raise all wheels off the floor. 2) Drain the automatic transmission fluid. CAUTION: Do not drain ATF until it cools down. 3) Remove the extension case, and disconnect the connector from transfer duty solenoid. 4) Measure the resistance between transfer duty solenoid connector and transmission ground. Connector & terminal (AT2) No. 7 — Transmission ground:	Is the resistance between 2.0 — 4.5 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-58, 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?	Even if the AT OIL TEMP warning light turns on, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or poor contact in the transfer duty solenoid and transmission.	Repair short circuit of the harness between the transfer duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

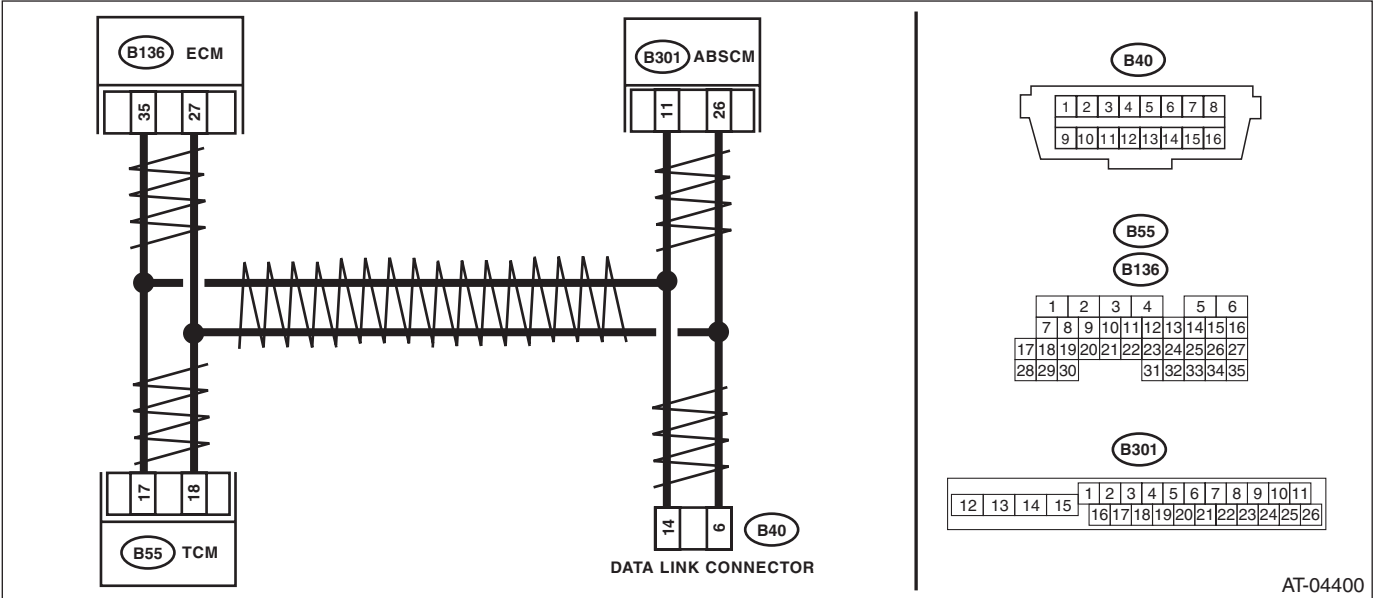
X: DTC P1718 CAN COMMUNICATION CIRCUIT

DTC DETECTING CONDITION:

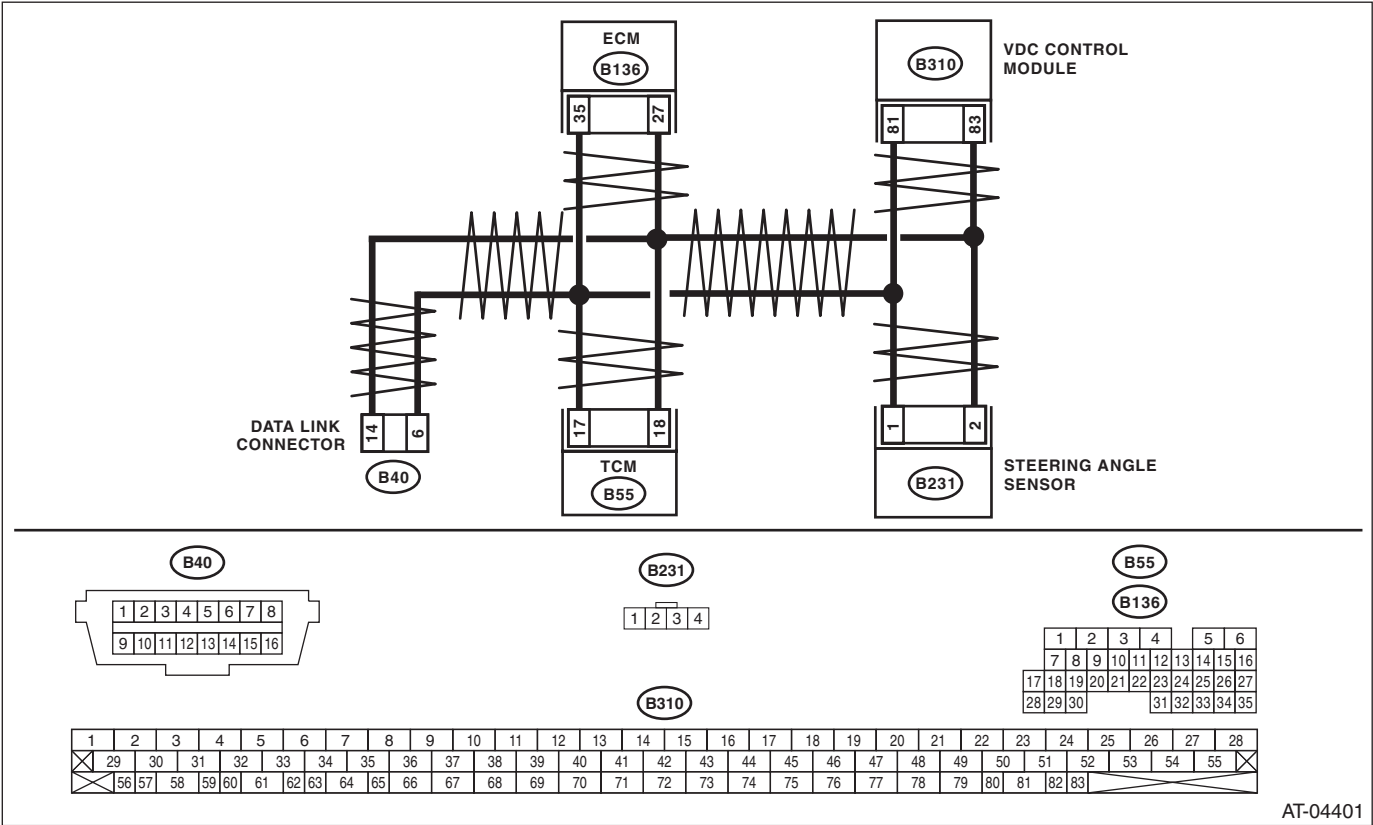
Input signal circuit of TCM is open or shorted.

WIRING DIAGRAM:

- Model without VDC



- Model with VDC



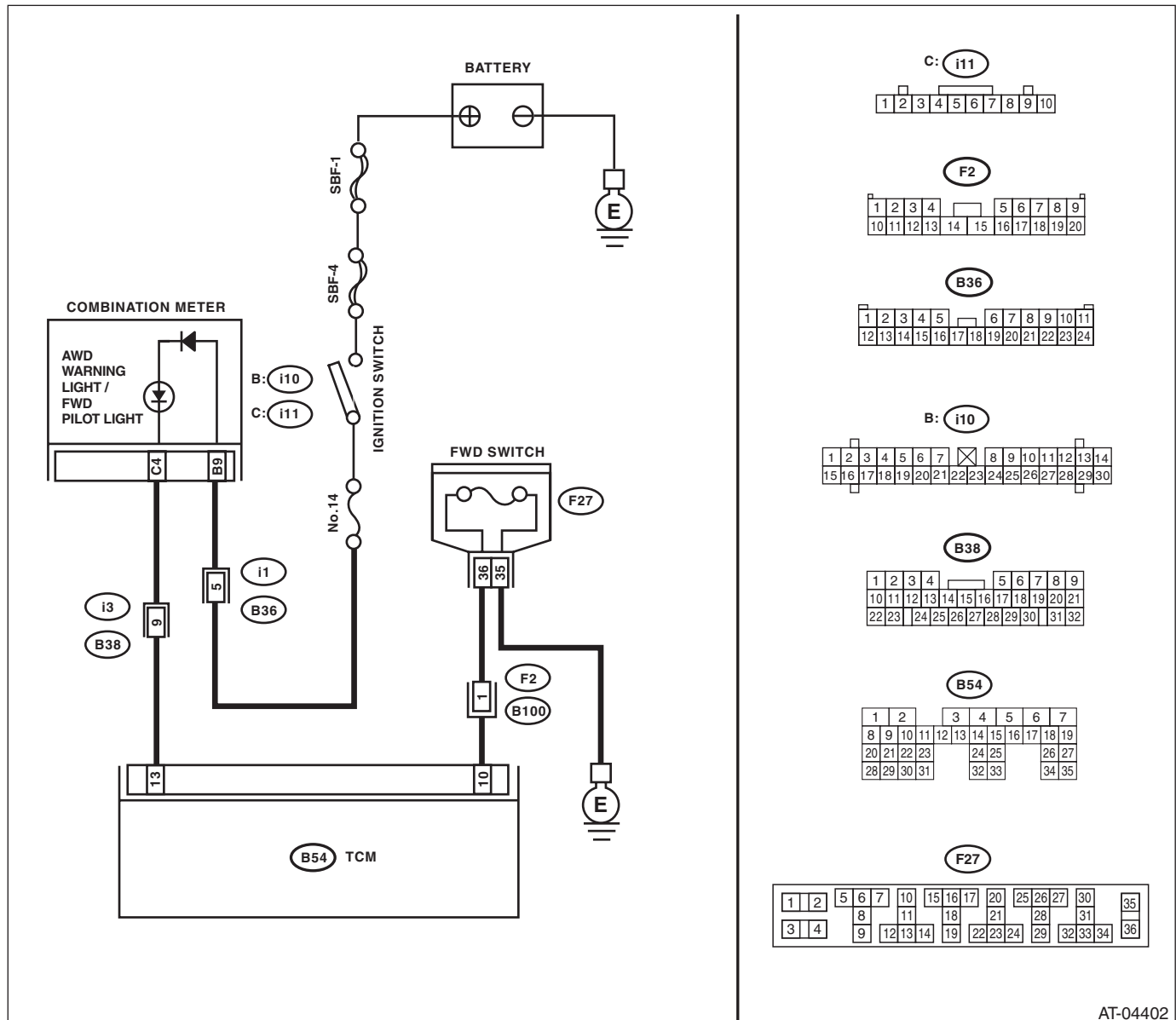
Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM OR ABSCM&H/U. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM, ECM, VDCCM or ABSCM&H/U. 3) Measure the resistance of the harness between TCM and VDCCM or ABSCM&H/U connector. Connector & terminal Model without VDC (B55) No. 17 — (B301) No. 11: Model with VDC (B55) No. 17 — (B310) No. 81:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit of the harness between the TCM and the VDCCM, or the poor contact in the connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM OR ABSCM&H/U. Measure the resistance of the harness between TCM and VDCCM or ABSCM&H/U connector. Connector & terminal Model without VDC (B55) No. 18 — (B301) No. 26: Model with VDC (B55) No. 18 — (B310) No. 83:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit of the harness between the TCM and the VDCCM, or the poor contact in the connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. Connector & terminal (B55) No. 17 — (B136) No. 35:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit of the harness between the TCM and the ECM, or the poor contact in the connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM and ECM connector. Connector & terminal (B55) No. 18 — (B136) No. 27:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit of the harness between the TCM and the ECM, or the poor contact in the connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM, ECM, VDCCM OR ABSCM&H/U. Measure the resistance of the harness between TCM and chassis ground. Connector & terminal (B55) No. 17 — Chassis ground: (B55) No. 18 — Chassis ground:	Is the resistance 1 M Ω or more?	It is possible that the TCM, ECM, VDCCM or ABSCM&H/U are defected (replace and recheck).	Repair the short circuit of the harness between TCM, ECM, VDCCM or ABSCM&H/U.

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK FWD SWITCH. Connect the Subaru Select Monitor to data link connector, and then check the LED screen.	When the fuse is inserted to FWD switch, does the LED illuminate?	Go to step CHECK SYMPTOM RELATED DIAGNOSTIC. <Ref. to 4AT(diag)-86, INSPECTION, General Diagnostic Table.>	Go to step 2.
2 CHECK AWD INDICATOR LIGHT. 1) Turn the ignition switch to OFF. 2) Disconnect the ECM and TCM connector. 3) Turn the ignition switch to ON. 4) Short between the combination meter connector and chassis ground. CAUTION: When shorting, be sure to short through the fuse. Connector & terminal (i10) No. 4 — Chassis ground:	Does the AWD indicator light illuminate?	Go to step 3.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the TCM and FWD switches. 3) Measure the resistance of harness between TCM and FWD switch connector. Connector & terminal (B54) No. 10 — (F27) No. 36:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit of harness between TCM and FWD switch connectors.
4 CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND. Measure the resistance of harness between FWD switch and chassis ground. Connector & terminal (F27) No. 35 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit of harness between FWD switch connector and chassis ground.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. Measure the resistance of harness connector between TCM and body to make sure that circuit does not short. Connector & terminal (B54) No. 10 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 6.	Repair the short circuit of harness between TCM and FWD switch connectors.
6 CHECK INPUT SIGNAL FOR TCM. 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and FWD switch. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing the fuse to FWD switch connector. Connector & terminal (B54) No. 10 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 7.	Go to step 11.
7 CHECK INPUT SIGNAL FOR TCM. Measure the signal voltage for TCM with the fuse removed from FWD switch connector. Connector & terminal (B54) No. 10 (+) — Chassis ground (-):	Is the voltage 10.5 V or more?	Go to step 8.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and combination meter. 3) Measure the resistance of the harness between TCM and the combination meter connector. <i>Connector & terminal</i> <i>(B54) No. 13 — (i11) No. 4:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit of harness between TCM and combination meter, and the poor contact of the connector.
9 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure the resistance of the harness connector between TCM and chassis ground to make sure that circuit is not shorted. <i>Connector & terminal</i> <i>(B54) No. 13 — Chassis ground:</i>	Is the resistance 1 M Ω or more?	Go to step 10.	Repair short circuit of harness between TCM and combination meter connector.
10 CHECK OUTPUT SIGNAL OF TCM. 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and combination meter. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing and removing the fuse to FWD switch connector. <i>Connector & terminal</i> <i>(B54) No. 13 (+) — Chassis ground (-):</i>	Is the voltage less than 1 V?	Go to step 11.	Go to step 12.
11 CHECK OUTPUT SIGNAL OF TCM. Measure the signal voltage for TCM with the fuse removed from FWD switch connector. <i>Connector & terminal</i> <i>(B54) No. 13 (+) — Chassis ground (-):</i>	Is the voltage 10.5 V or more?	Go to step 12.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>
12 CHECK POOR CONTACT.	Is there poor contact in FWD switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-64, Transmission Control Module (TCM).>

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

15.General Diagnostic Table

A: INSPECTION

Symptoms	Problem parts
Starter does not operate when select lever is in "P" or "N" range. Starter rotates when select lever is in "R", "D", "3" or "2" 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
Engine stalls while shifting from "1" range to another.	• Control valve • Lock-up damper • Engine performance • Input shaft
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 duty 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 duty solenoid • Seal ring • Front gasket of transmission case
Shock occurs when the select lever is moved from "N" to "R" range.	• Accelerator pedal position sensor • ATF temperature sensor • Line pressure duty solenoid • TCM • Harness • Control valve • ATF deterioration

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Problem parts
Excessive time lag occurs when the select lever is moved from "N" to "R" range.	• Control valve • Low & reverse clutch • Reverse clutch • Line pressure duty solenoid • Seal ring • Front gasket of transmission case
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 duty 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 duty 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 only when in the "D", "3" range. (Engine operates)	• Low clutch • One-way clutch
Vehicle does not start in only in the "D", "3" or "2" range. (Engine operates)	Low clutch
Vehicle does not start in only in the "D", "3" or "2" 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 the "D", "3" or "2" 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

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Problem parts
No shift occurs from 1st to 2nd gear.	• TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Accelerator pedal position sensor • Control valve • 2-4 brake
No shift occurs from 2nd to 3rd gear.	• TCM • Control valve • High clutch
No shift occurs from 3rd to 4th gear.	• TCM • ATF temperature sensor • Control valve • 2-4 brake
Engine brake does not come into effect when the select lever is shifted to "3" range.	• Inhibitor switch • TCM • Accelerator pedal position sensor • Control valve
Engine brake is not effected when the select lever is in "3" or "2" range.	Control valve
Engine brake does not come into effect when the select lever is shifted to "1" range.	• Control valve • Low & reverse brake
Shift characteristics are erroneous.	• Inhibitor switch • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Accelerator pedal position sensor • Control valve • Ground
No lock-up occurs.	• TCM • Accelerator pedal position sensor • ATF temperature sensor • Control valve • Lock-up facing • Engine speed signal
Parking brake does not function.	• Select cable • Select lever • Parking mechanism
Shift lever cannot be moved or is hard to move from "P" range.	
ATF spurts out.	ATF level too high
Differential oil spurts out.	Differential gear oil level too high
Differential oil level changes excessively.	• Seal pipe • Double oil seal
Odor is produced from ATF supply pipe.	• High clutch • 2-4 brake • Low & reverse clutch • Reverse clutch • Lock-up facing • ATF deterioration
Shock occurs when shifting from 1st to 2nd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • Low & reverse duty solenoid

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Problem parts
Slippage occurs when shifting from 1st to 2nd gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake
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 duty 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 duty 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 duty 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 duty solenoid • Control valve • 2-4 brake
Shock occurs when select lever is shifted from the "3" range to the "2" range.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • High clutch duty solenoid

General Diagnostic Table

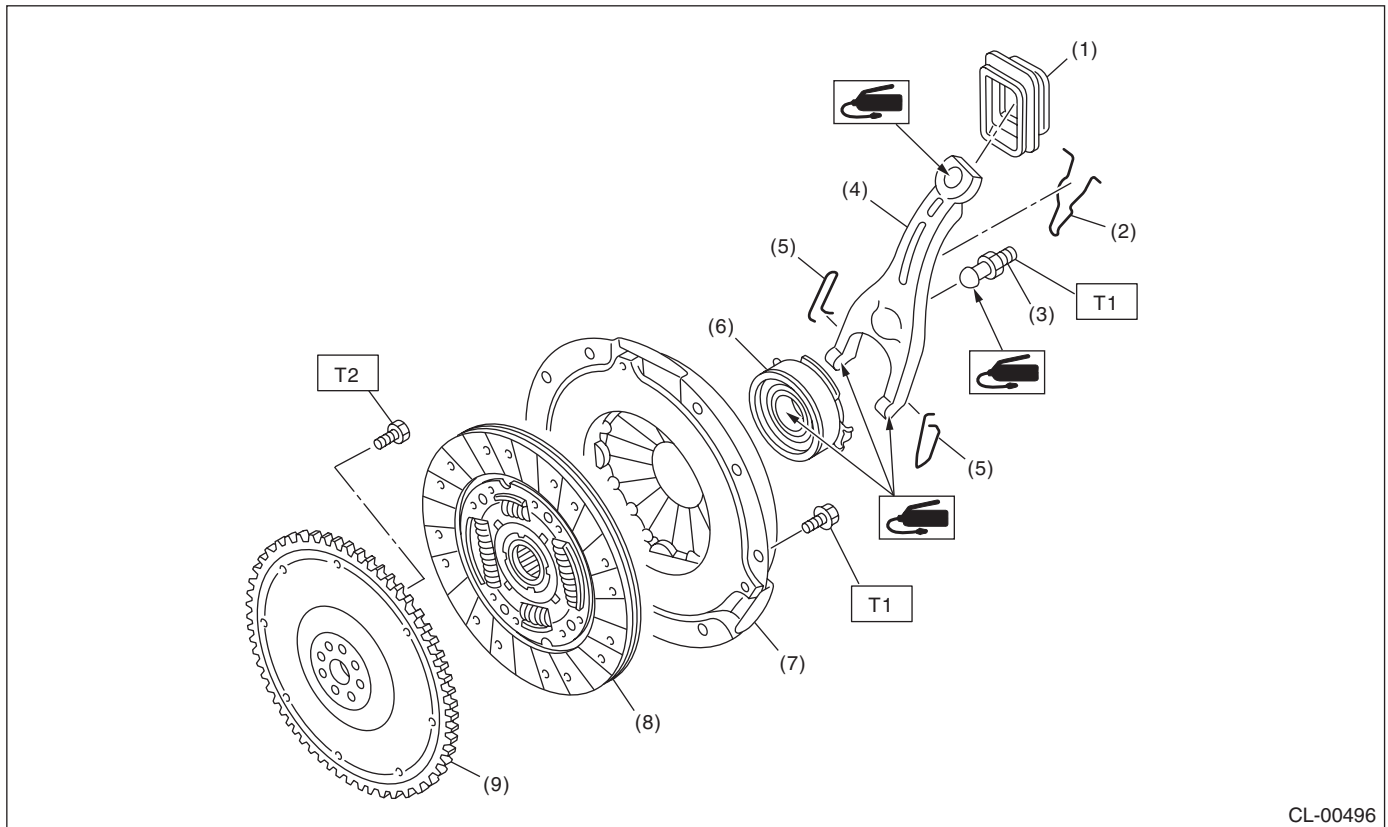
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Problem parts
Shock occurs when select lever is shifted from the "2" range to the "1" range.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • Low & reverse brake duty solenoid
Shock occurs when accelerator pedal is released from medium speed.	• TCM • Accelerator pedal position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Lock-up damper • Engine performance
Vibration occurs during straight-forward operation.	• TCM • Lock-up duty solenoid • Lock-up facing • Lock-up damper
Vibration occurs during turns. (Tight corner braking phenomenon)	• TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Transfer clutch • Transfer valve • Transfer duty solenoid • ATF deterioration • Harness
Front wheel slippage occurs during standing starts.	• TCM • Front vehicle speed sensor • FWD switch • Accelerator pedal position sensor • ATF temperature sensor • Control valve • Transfer clutch • Transfer valve • Transfer pipe • Transfer duty solenoid
It is not set in FWD mode.	• TCM • FWD switch • Transfer clutch • Transfer valve • Transfer duty solenoid
Select lever is hard to move.	• Select cable • Select lever • Detent spring • Manual plate
Select lever is excessively hard to move. (Unreasonable resistance)	• Detent spring • Manual plate
Select lever slips out of selected shift position during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detent spring • Manual plate

1. General Description

A: SPECIFICATION

Model			Non-turbo	Turbo
Clutch cover	Type		Push type	
	Diaphragm set load kgf (lbf)		580 (1,276)	800 (1,760)
Clutch disc	Facing material		Woven (Non asbestos)	
	O.D. × I.D. × thickness mm (in)	Flywheel side	225 × 150 × 3.5 (8.86 × 5.9 × 0.138)	230 × 155 × 3.2 (9.06 × 6.10 × 0.126)
		Pressure plate side		230 × 155 × 3.5 (9.06 × 6.10 × 0.138)
	Spline outer diameter mm (in)		25.2 (0.992), (Number of teeth: 24)	
Clutch release lever ratio			1.6	1.6
Release bearing			Grease-packed self-aligning	
Clutch pedal	Full stroke mm (in)		130 — 135 (5.12 — 5.32)	
	Free play mm (in)		4.35 — 11.1 (0.17 — 0.44)	
Clutch disc	Depth of rivet head mm (in)	Standard	Flywheel side: 1.35 — 1.95 (0.053 — 0.077) Clutch cover side: 1.65 — 2.25 (0.065 — 0.089)	
		Limit of sinking	0.3 (0.012)	
	Limit of runout mm (in)		0.7 (0.028) at R = 107.5 (4.23)	0.7 (0.028) at R = 110.0 (4.33)

B: COMPONENT**1. CLUTCH ASSEMBLY****Non-turbo model**

CL-00496

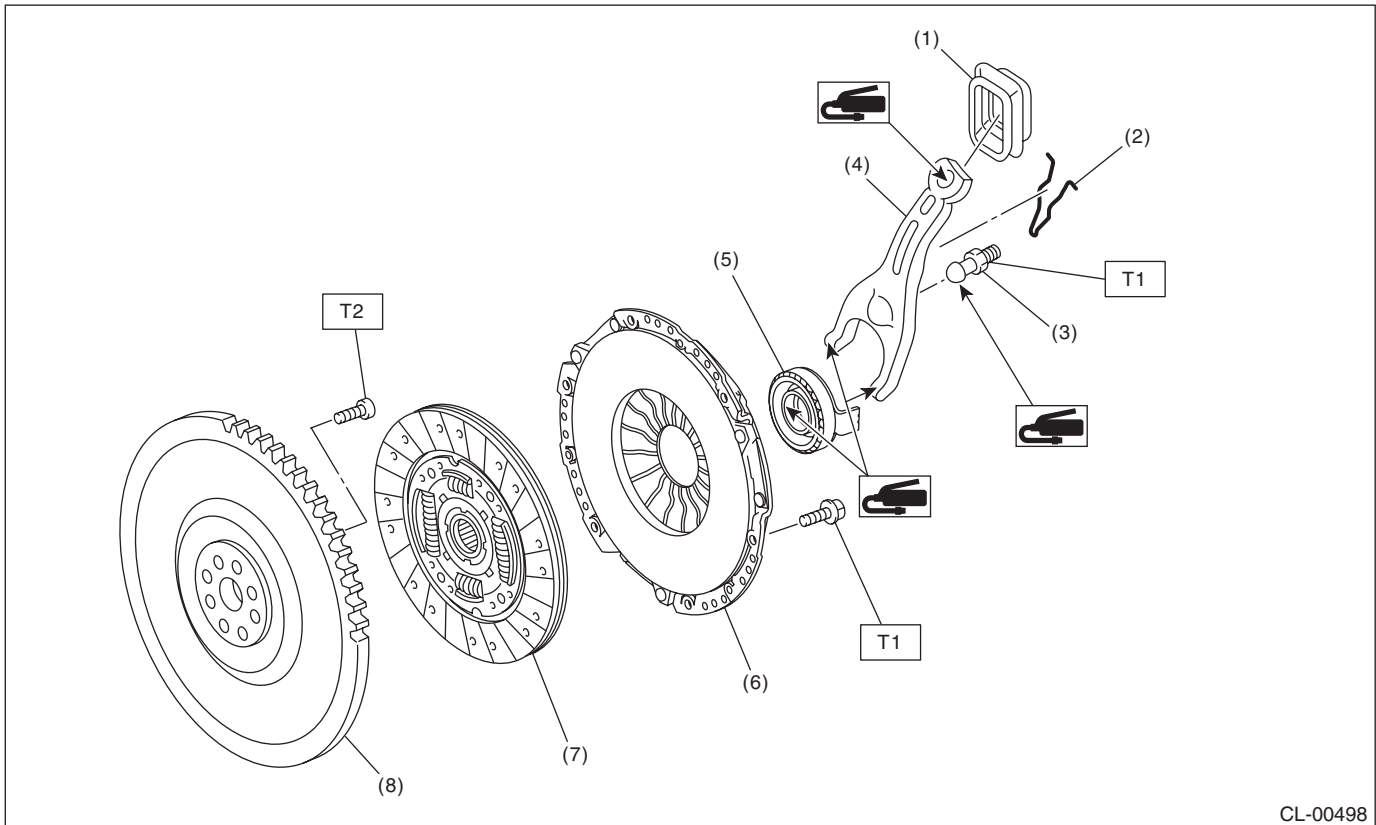
- | | |
|------------------------------|---------------------|
| (1) Release lever dust cover | (6) Release bearing |
| (2) Lever spring | (7) Clutch cover |
| (3) Pivot | (8) Clutch disc |
| (4) Release lever | (9) Flywheel |
| (5) Clip | |

Tightening torque: N·m (kgf-m, ft-lb)***T1: 16 (1.6, 11.6)******T2: 72 (7.3, 52.8)***

General Description

CLUTCH SYSTEM

Turbo model



CL-00498

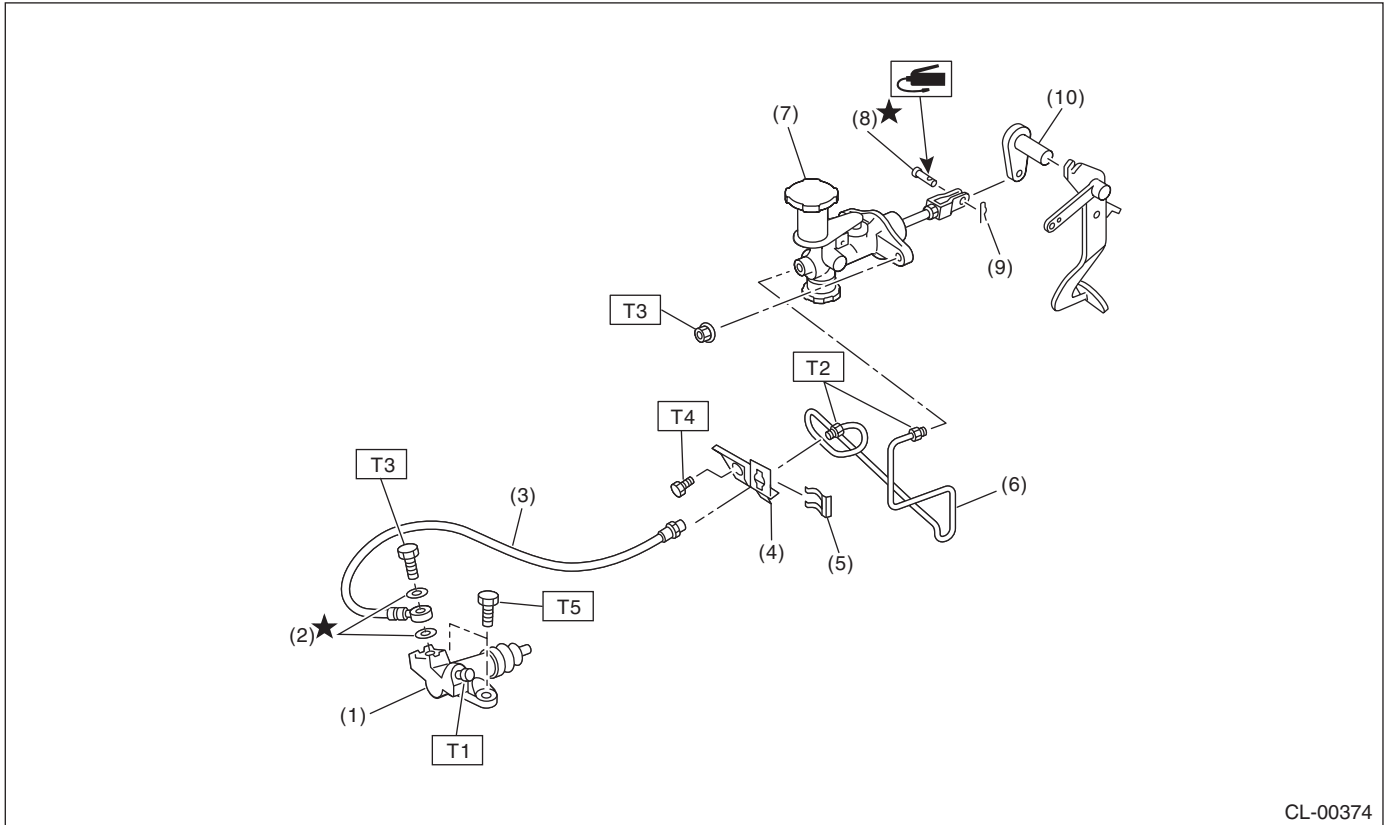
- | | |
|------------------------------|---------------------|
| (1) Release lever dust cover | (5) Release bearing |
| (2) Lever spring | (6) Clutch cover |
| (3) Pivot | (7) Clutch disc |
| (4) Release lever | (8) Flywheel |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 16 (1.6, 11.6)

T2: 72 (7.3, 52.8)

2. CLUTCH PIPE AND HOSE (NON-TURBO MODEL)



- | | |
|------------------------|--------------------------|
| (1) Operating cylinder | (6) Clutch pipe |
| (2) Washer | (7) Master cylinder ASSY |
| (3) Clutch hose | (8) Clevis pin |
| (4) Bracket | (9) Snap pin |
| (5) Clip | (10) Lever |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.8 (0.8, 5.8)

T2: 15 (1.5, 10.8)

T3: 18 (1.8, 13.0)

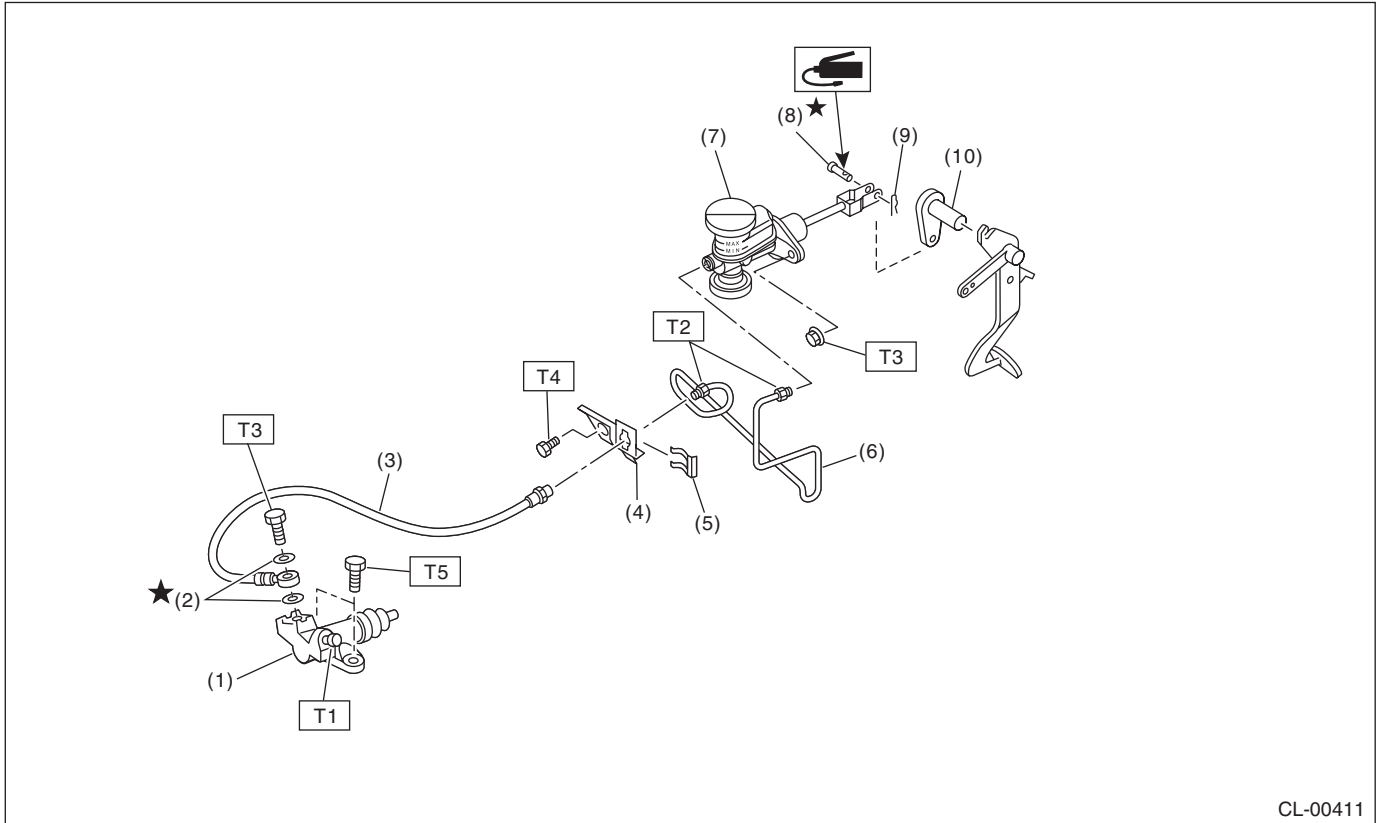
T4: 25 (2.5, 18.1)

T5: 37 (3.8, 27.5)

General Description

CLUTCH SYSTEM

3. CLUTCH PIPE AND HOSE (TURBO MODEL)



CL-00411

- | | |
|------------------------|--------------------------|
| (1) Operating cylinder | (6) Clutch pipe |
| (2) Washer | (7) Master cylinder ASSY |
| (3) Clutch hose | (8) Clevis pin |
| (4) Bracket | (9) Snap pin |
| (5) Clip | (10) Lever |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.8 (0.8, 5.8)

T2: 15 (1.5, 10.8)

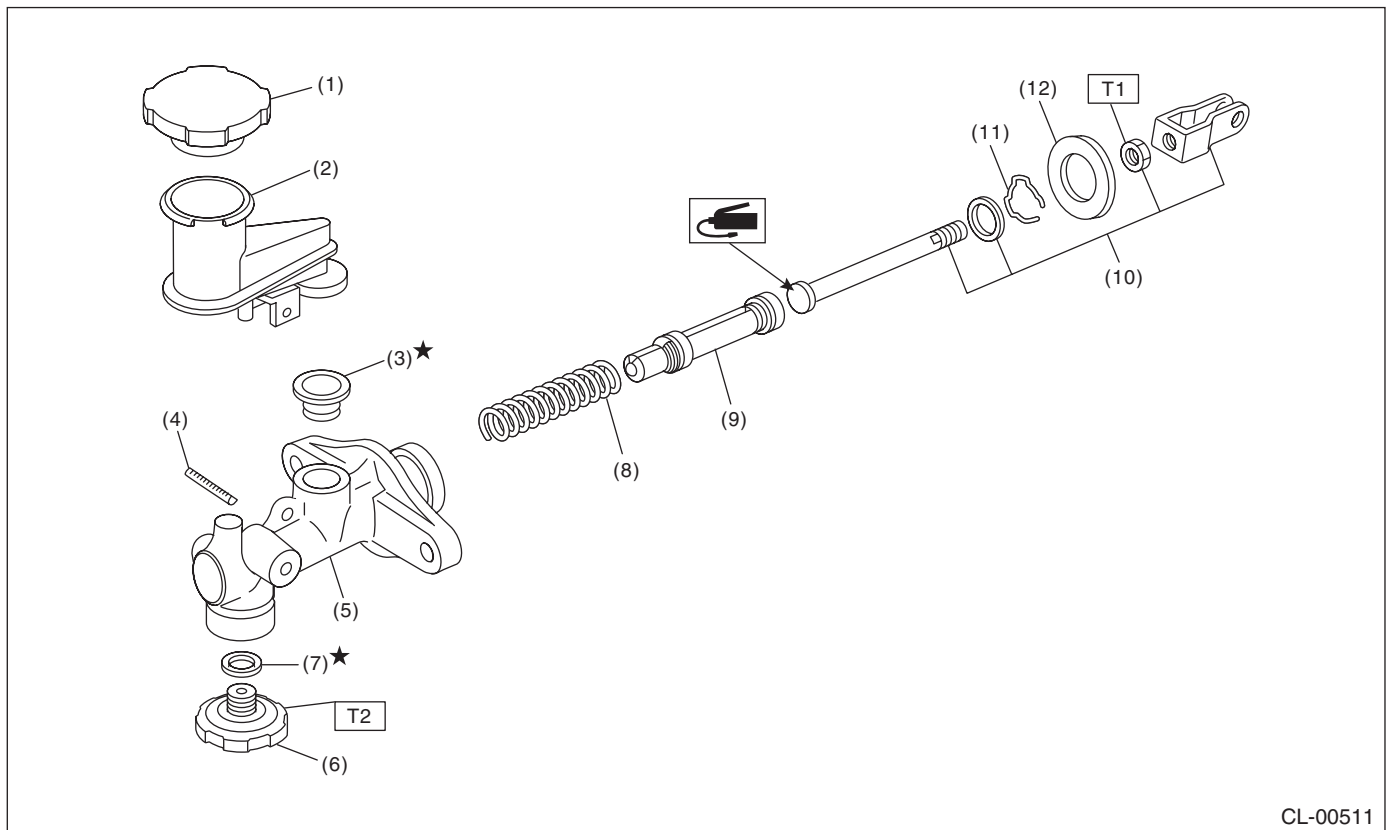
T3: 18 (1.8, 13.0)

T4: 25 (2.5, 18.1)

T5: 37 (3.8, 27.5)

4. MASTER CYLINDER

Non-turbo model



CL-00511

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

- (7) Gasket
- (8) Return spring
- (9) Piston
- (10) Push rod ASSY
- (11) Piston stop ring

- (12) Seat

Tightening torque: N·m (kgf-m, ft-lb)

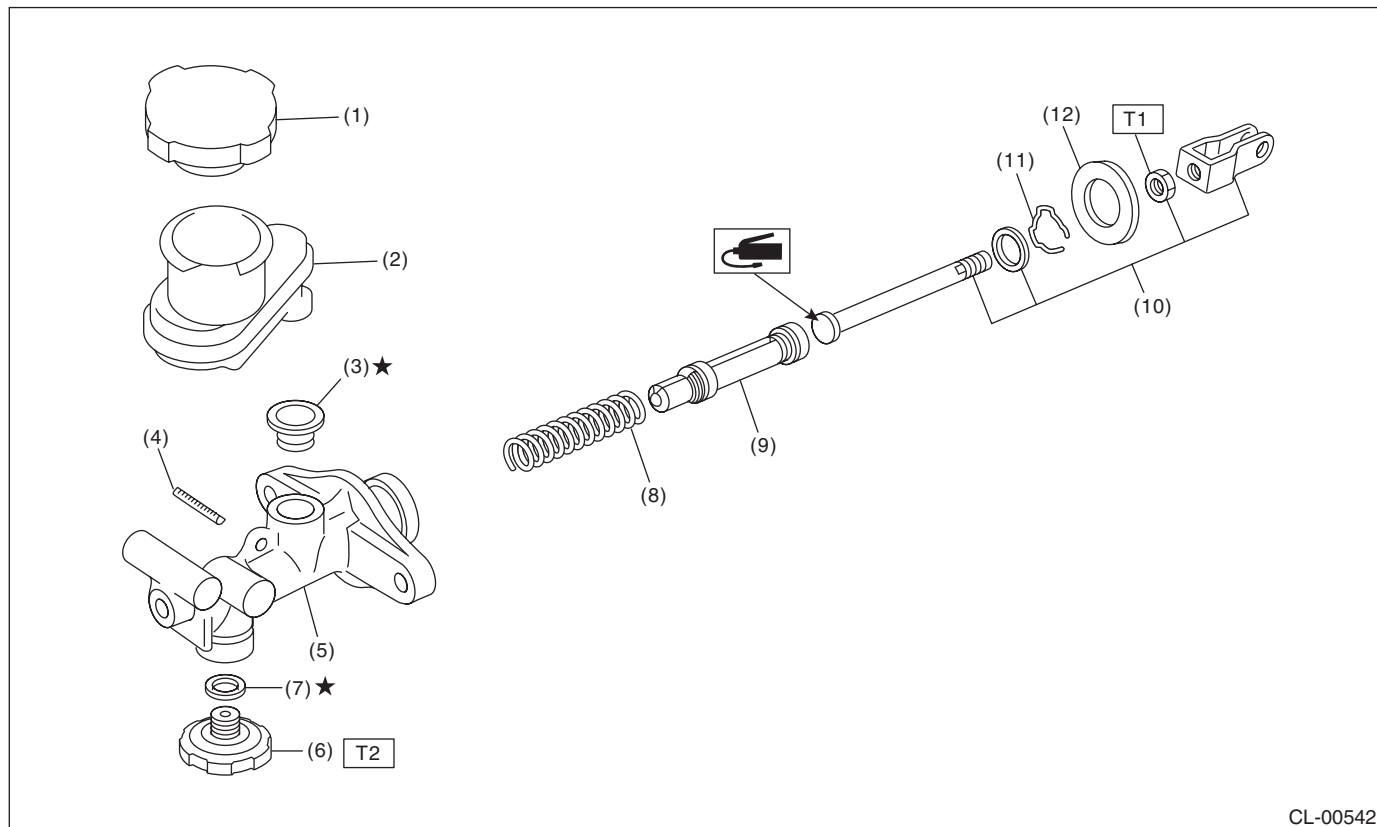
T1: 10 (1.0, 7)

T2: 46.6 (4.75, 34.4)

General Description

CLUTCH SYSTEM

Turbo model



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

- (7) Gasket
- (8) Return spring
- (9) Piston
- (10) Push rod ASSY
- (11) Piston stop ring

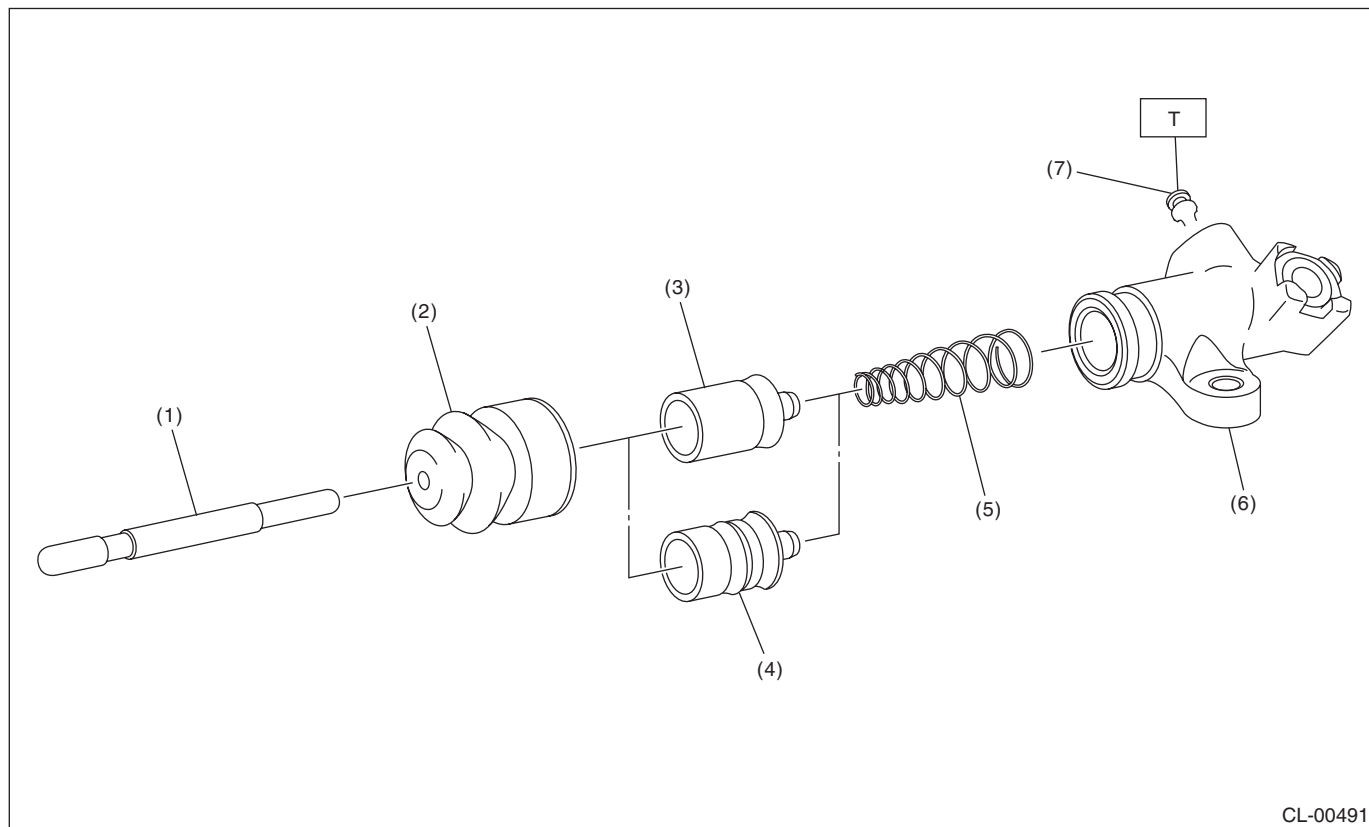
- (12) Seat

Tightening torque: N·m (kgf-m, ft-lb)

T1: 10 (1.0, 7.2)

T2: 46.6 (4.75, 34.4)

5. OPERATING CYLINDER



CL-00491

- | | |
|------------------------------|------------------------|
| (1) Push rod | (5) Piston spring |
| (2) Boot | (6) Operating cylinder |
| (3) Piston (Non-turbo model) | (7) Bleeder screw |
| (4) Piston (Turbo model) | |

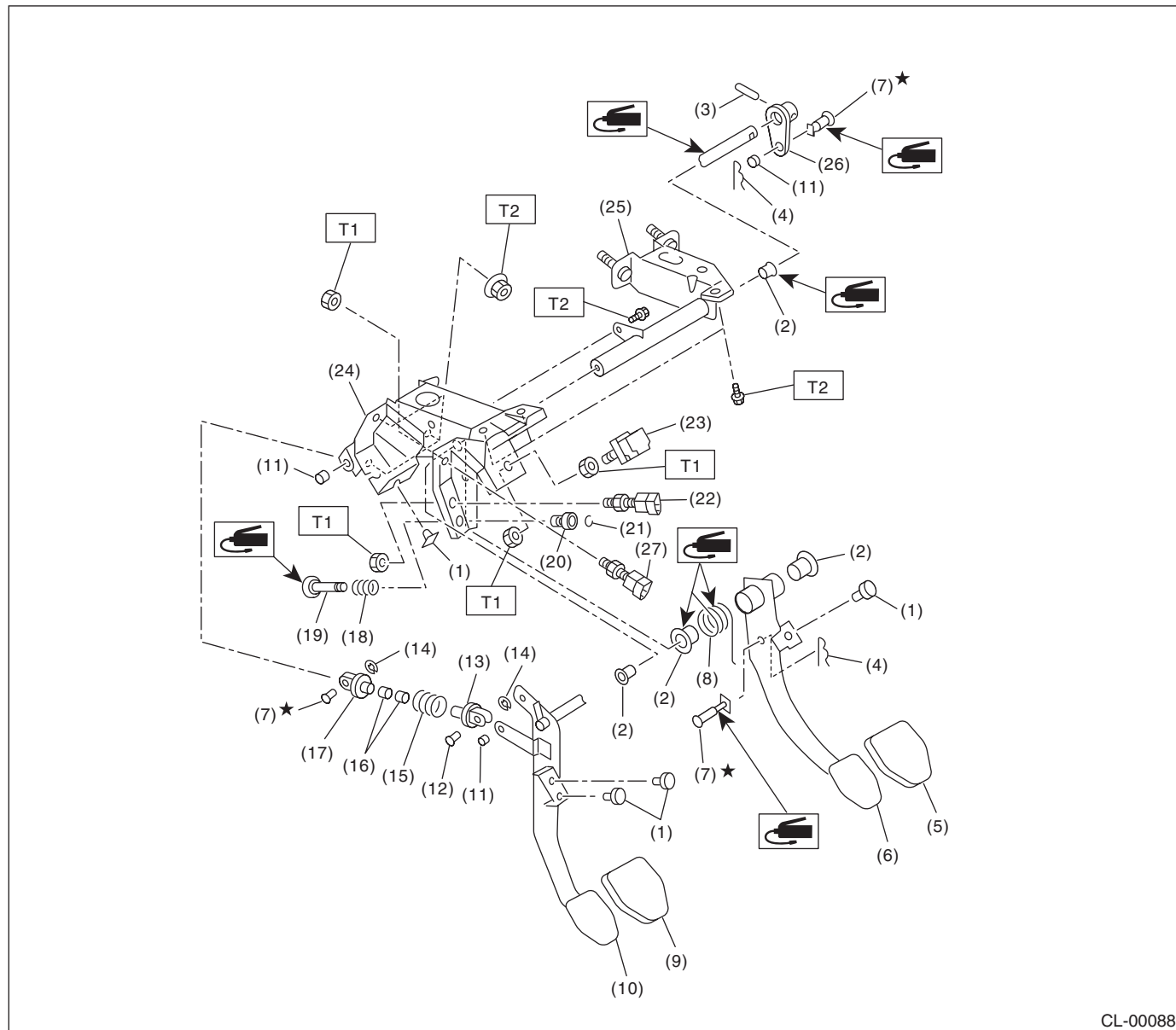
Tightening torque: N·m (kgf-m, ft-lb)

T: 7.8 (0.8, 5.8)

General Description

CLUTCH SYSTEM

6. CLUTCH PEDAL



CL-00088

(1) Stopper	(12) Clutch clevis pin	(22) Clutch switch
(2) Bushing	(13) Assist rod A	(23) Stop light switch
(3) Spring pin	(14) Clip	(24) Pedal bracket
(4) Snap pin	(15) Assist spring	(25) Clutch master cylinder bracket
(5) Brake pedal pad	(16) Assist bushing	(26) Lever
(6) Brake pedal	(17) Assist rod B	(27) Clutch switch (Clutch start)
(7) Clevis pin	(18) Spring S	
(8) Brake pedal spring	(19) Rod S	
(9) Clutch pedal pad	(20) Bushing S	
(10) Clutch pedal	(21) Clip	
(11) Bushing C		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.8)

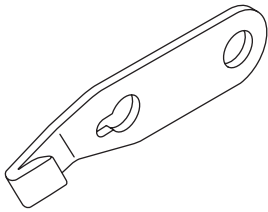
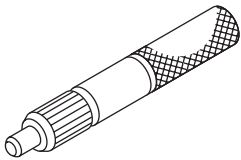
T2: 18 (1.8, 13.0)

C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the problem. 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 on a vise, set cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Keep fluids away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: PREPARATION TOOL**1. SPECIAL TOOL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of the flywheel when loosening/tightening bolts, etc.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used when 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.

Clutch Disc and Cover

CLUTCH SYSTEM

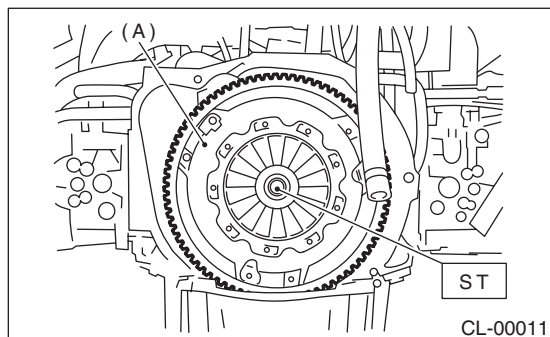
2. Clutch Disc and Cover

A: REMOVAL

1) Remove the transmission assembly from the vehicle body. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>

2) Attach the ST on the flywheel.

ST 499747100 CRANKSHAFT STOPPER



(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.
- Be sure to mark alignment marks on the flywheel and clutch cover before removing the clutch cover.

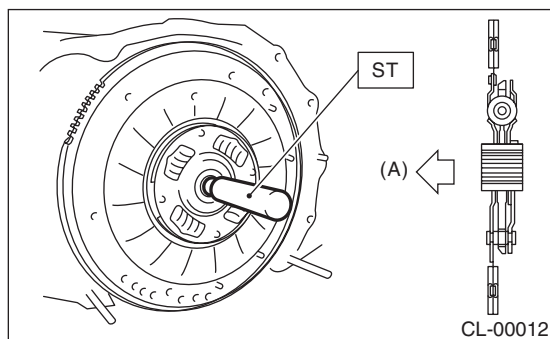
B: INSTALLATION

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

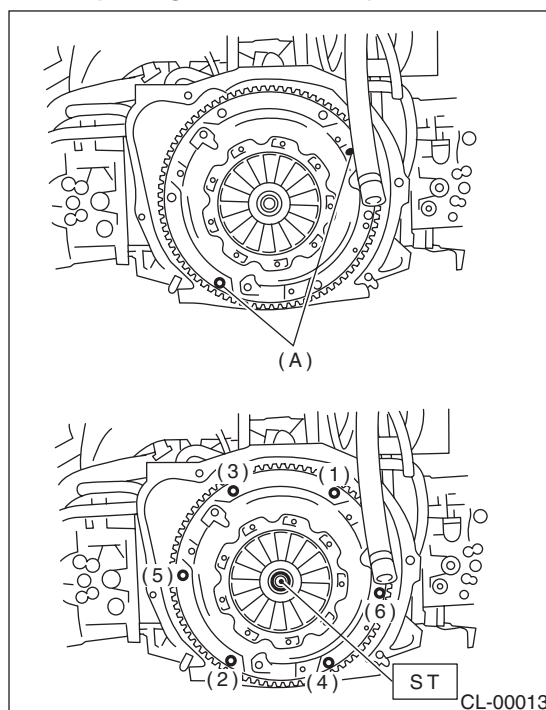
2) Install the clutch cover to the flywheel, and tighten the bolts to the specified torque.

NOTE:

- When installing the clutch cover to the flywheel, position the clutch cover in order to make the gap between unbalance marks (● paint mark) of flywheel and clutch cover 120° or more. (The unbalance marks ● indicate the directions 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, 11.6 ft-lb)



(A) Unbalance mark (paint)

3) Remove the ST.

ST 499747100 CLUTCH DISC GUIDE

4) Install the transmission assembly. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. CLUTCH DISC

1) Facing wear

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

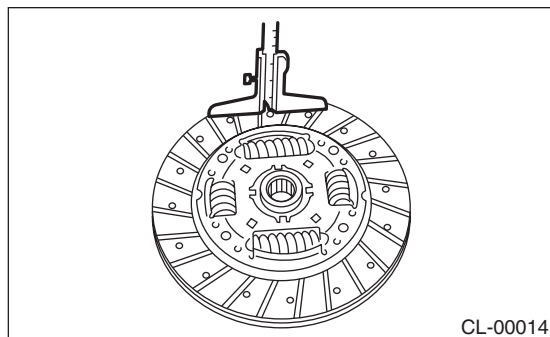
Depth of rivet head:

Limit of sinking

0.3 mm (0.012 in)

NOTE:

Do not wash the clutch disc with any cleaning fluid.

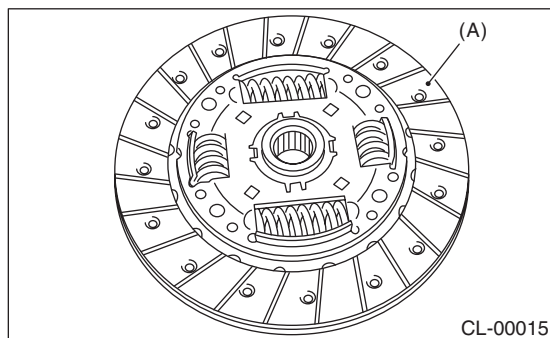


2) Hardened facing

Correct by using emery paper, or replace.

3) Oil soakage on facing

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



(A) Clutch facing

4) Facing runout

If runout exceeds the specified value at the outer circumference of facing, repair or replace.

ST 499747100 CLUTCH DISC GUIDE

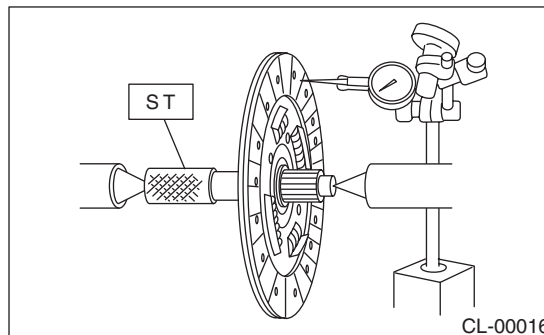
Limit of runout:

Non-turbo model

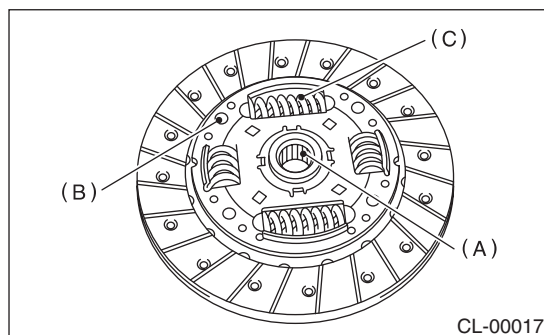
0.7 mm (0.028 in) at R = 107.5 mm (4.23 in)

2.0 L Turbo model

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



5) Replace parts that have problems such as worn splines, loose rivets and torsion spring failure.



(A) Spline

(B) Rivet

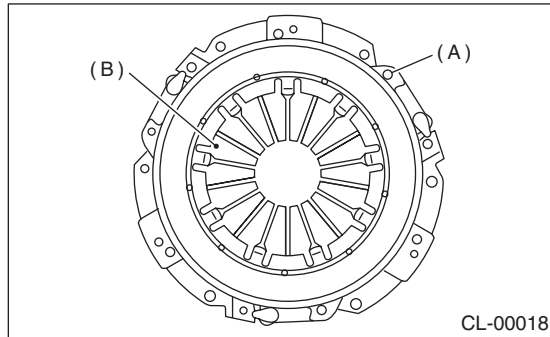
(C) Torsion spring

2. CLUTCH COVER

NOTE:

Visually check the following items without disassembling, and replace or repair if there is a problem.

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



- (A) Thrust rivet
(B) Diaphragm spring

3. Flywheel

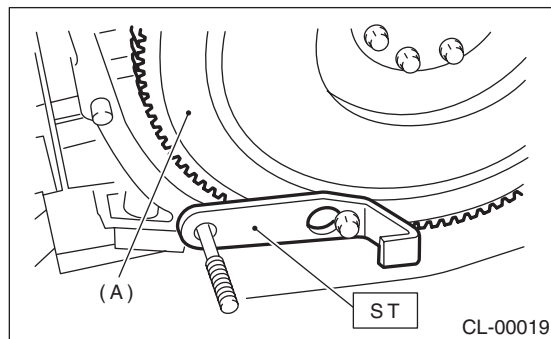
A: REMOVAL

1) Remove the transmission assembly. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>

2) Remove the clutch cover and clutch disc. <Ref. to CL-12, REMOVAL, Clutch Disc and Cover.>

3) Using the ST, remove the flywheel.

ST 498497100 CRANKSHAFT STOPPER

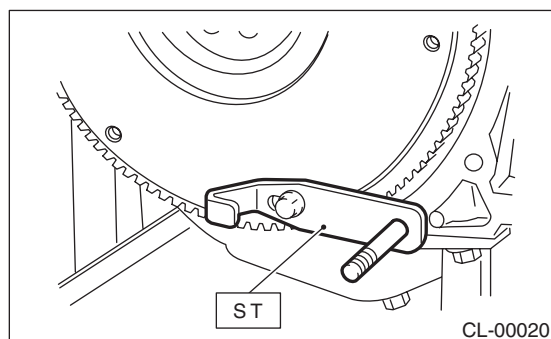


(A) Flywheel

B: INSTALLATION

1) Install the flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



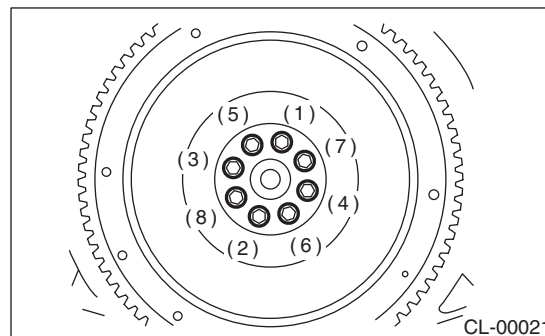
2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:

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

Tightening torque:

72 N·m (7.3 kgf-m, 52.8 ft-lb)



3) Install the clutch disc and cover. <Ref. to CL-12, INSTALLATION, Clutch Disc and Cover.>

4) Install the transmission assembly. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

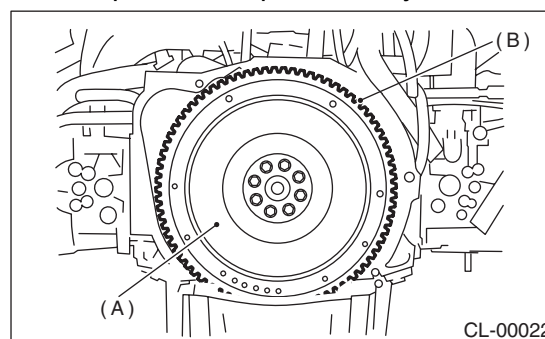
C: INSPECTION

CAUTION:

Since this bearing is grease-sealed and is a non-lubrication type, do not wash with gasoline or any solvents.

1) Damage of facing and ring gear

If there is a problem, replace the flywheel.



(A) Flywheel

(B) Ring gear

2) Smoothness of rotation

Rotate the ball bearing while applying pressure in 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 vehicle body.

<Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>

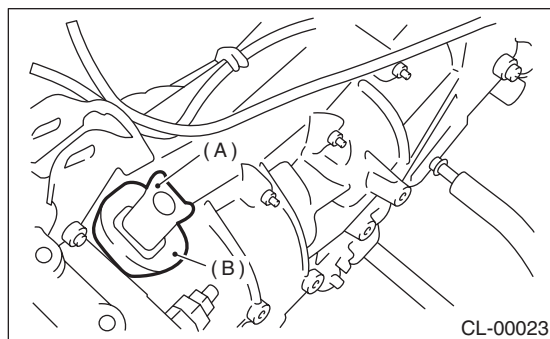
2) Remove the two clips from the release lever and remove the release bearing. (Non-turbo model)

3) Remove the release bearing from release lever. (Turbo model)

CAUTION:

Be careful not to deform the clips.

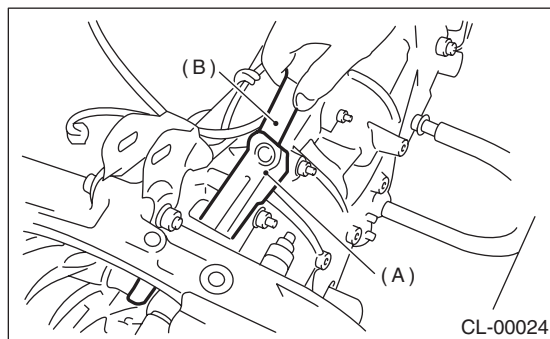
4) Remove the release lever dust cover.



(A) Release lever

(B) Release lever dust cover

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



(A) Release lever

(B) Screwdriver

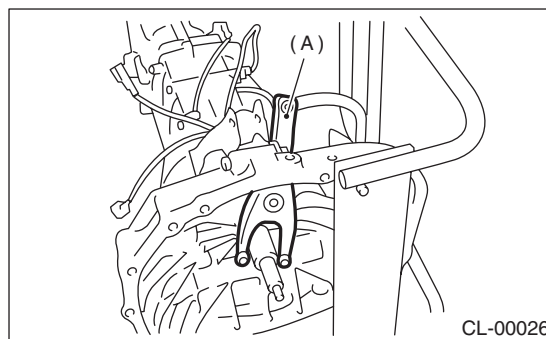
B: INSTALLATION

1) Lubricate the following points with the specified grease prior to assembly.

- Contact surface of release lever and pivot
- Contact surface of release lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)
- Contact surface of release lever and operating cylinder

2) While pushing the release lever against the pivot and twisting left and right, fit the spring onto the stepped portion of pivot. Apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of the release lever and the operating cylinder.

3) Confirm that the lever spring is securely fitted by observing it through the main case hole.

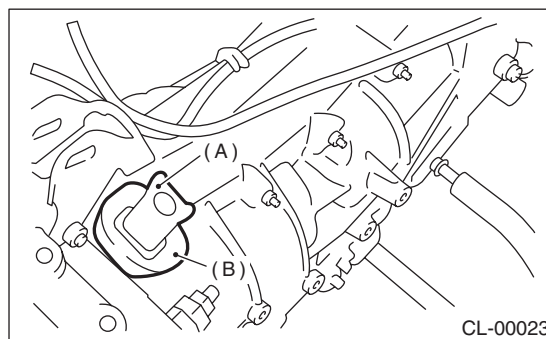


(A) Release lever

4) Install the release bearing and fasten it with two clips. (Non-turbo model)

5) Install the release bearing. (Turbo model)

6) Install the release lever dust cover.



(A) Release lever

(B) Release lever dust cover

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

8) Install the transmission assembly.

<Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. RELEASE BEARING

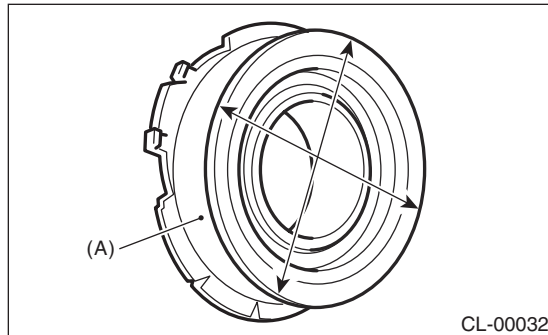
CAUTION:

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

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

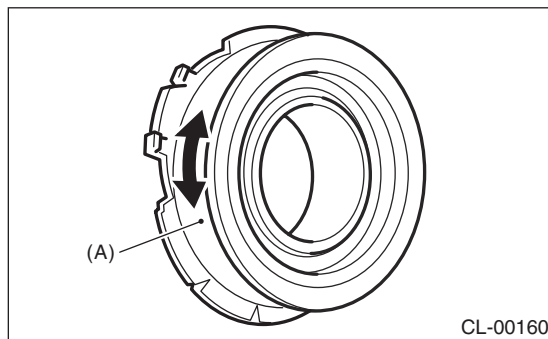
Radial direction stroke:

1.6 mm (0.063 in)



(A) Bearing case

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

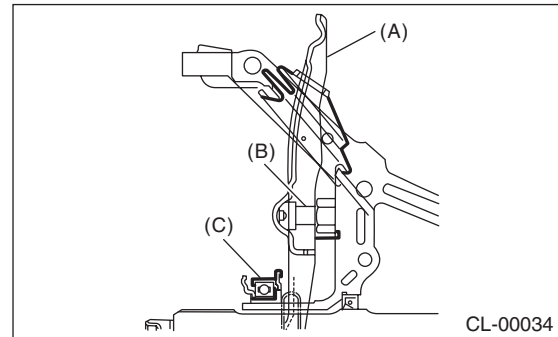


(A) Bearing case

3) Check wear and damage of 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

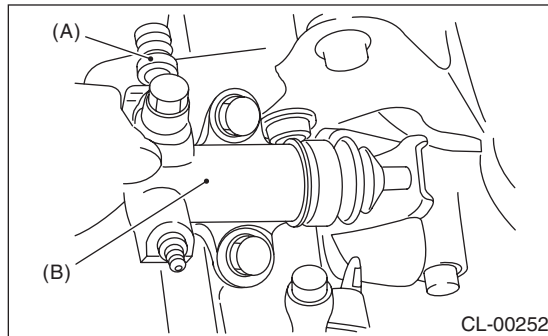
5. Operating Cylinder

A: REMOVAL

- 1) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 3) Remove the clutch hose from operating cylinder.

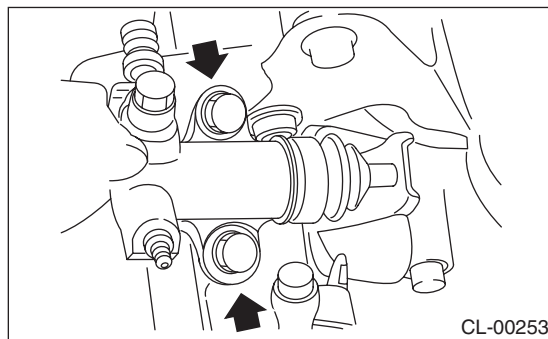
NOTE:

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



- (A) Clutch hose
(B) Operating cylinder

- 4) Remove the operating cylinder from the transmission.



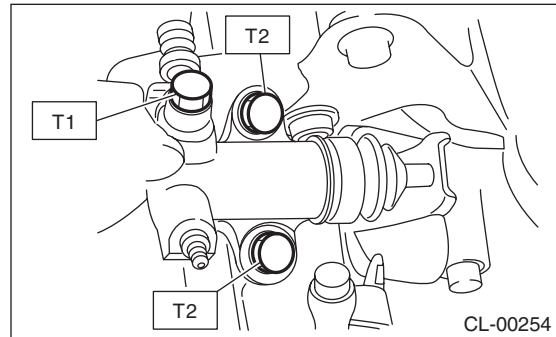
B: INSTALLATION

- 1) Apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of the release lever and the operating cylinder.
 - 2) Install in the reverse order of removal.
- Before installing the operating cylinder, apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of the release lever and operating cylinder.

Tightening torque:

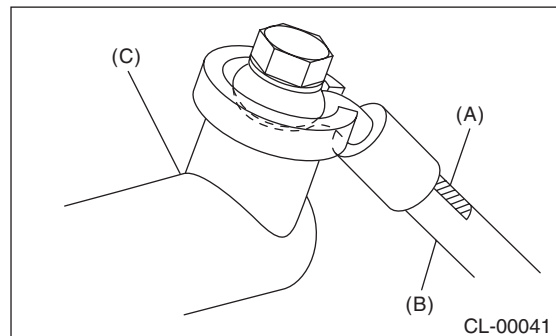
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



NOTE:

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

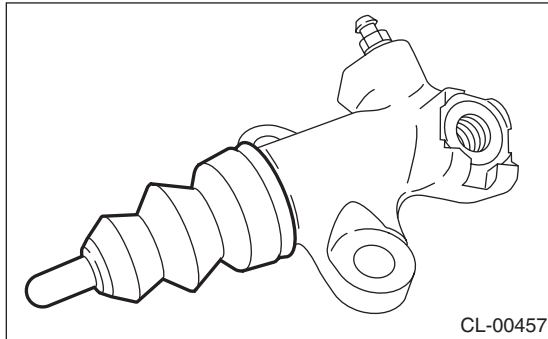


- (A) Mark
(B) Clutch hose
(C) Operating cylinder

- 3) After bleeding air from the operating cylinder, ensure that the clutch operates properly. <Ref. to CL-24, Clutch Fluid Air Bleeding.>

C: DISASSEMBLY

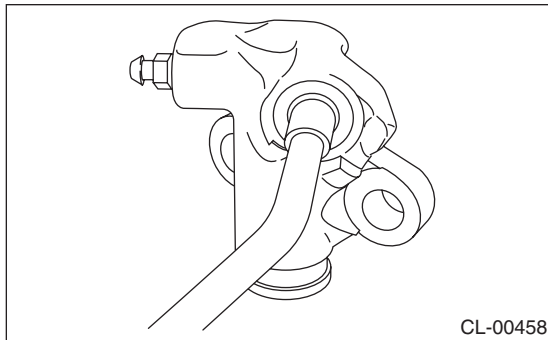
- 1) Remove the boot and push rod.



- 2) Blow in compressed air from the clutch hose attachment hole.

NOTE:

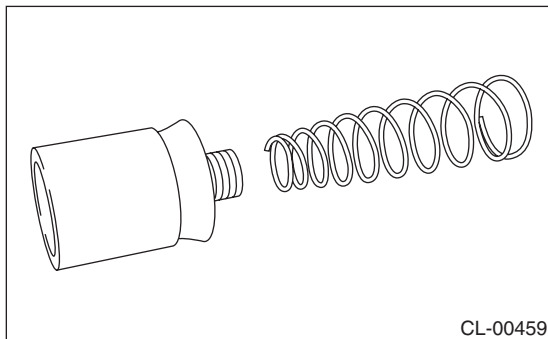
To prevent the piston from shooting out, face the piston hole towards the ground, and place a wooden block to prevent damage.



- 3) Separate the piston and piston spring.

NOTE:

The illustration below is for a non-turbo model.



D: ASSEMBLY

NOTE:

When assembling, apply operating oil on all parts while performing work.

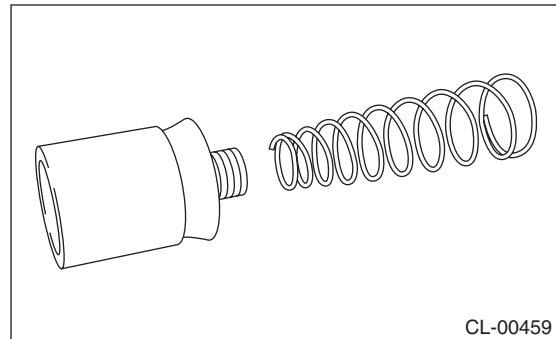
Recommended brake fluid

FMVSS No. 116, new DOT3 or DOT4 brake fluid

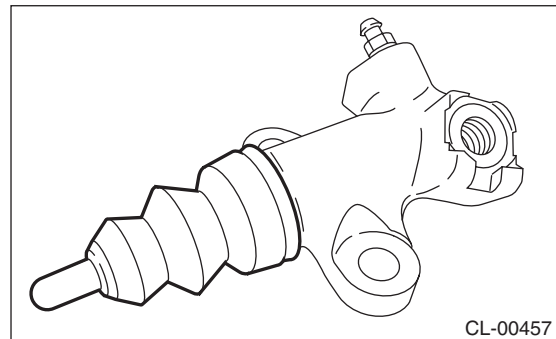
- 1) Attach the piston spring onto the piston.

NOTE:

The illustration below is for a non-turbo model.



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



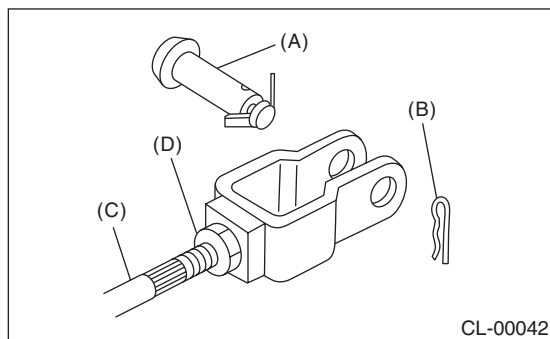
E: INSPECTION

- 1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
- 2) Check the operating cylinder for fluid leakage or damage on the boot. If any leakage or damage is found, replace the operating cylinder.

6. Master Cylinder

A: REMOVAL

- 1) Thoroughly drain the brake fluid from the reservoir tank.
- 2) Remove the snap pin and clevis pin, and then separate the push rod of the master cylinder from clutch pedal.

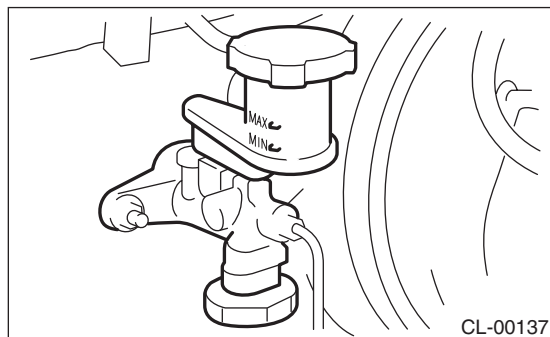


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Push rod lock nut

- 3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 5) Remove the clutch pipe from master cylinder.
- 6) Remove the master cylinder together with the reservoir tank.

CAUTION:

Be careful not to spill the brake fluid. Immediately wash off with water and wipe clean any brake fluid spilled on the vehicle body, as brake fluid will damage the painted surface.



B: INSTALLATION

- 1) Install the master cylinder to the body, and attach the clutch pipe to the master cylinder.

NOTE:

Check that the pipe is routed properly.

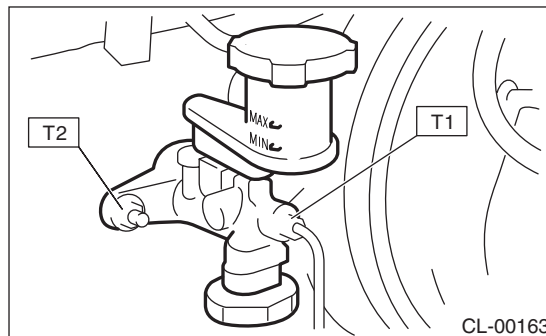
Tightening torque:

Clutch pipe

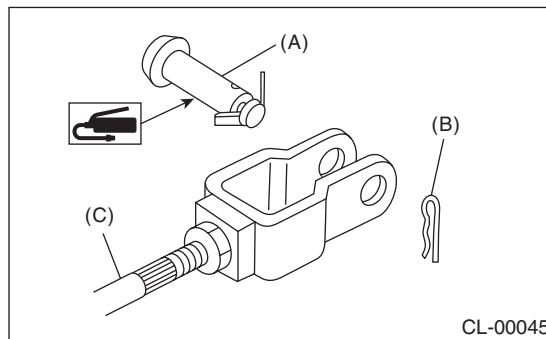
15 N·m (1.5 kgf-m, 10.8 ft-lb)

Master cylinder

18 N·m (1.8 kgf-m, 13.0 ft-lb)



- 2) Apply grease to the clevis pin.
- 3) Connect the push rod of master cylinder to clutch pedal, and install the new clevis pin and snap pin.

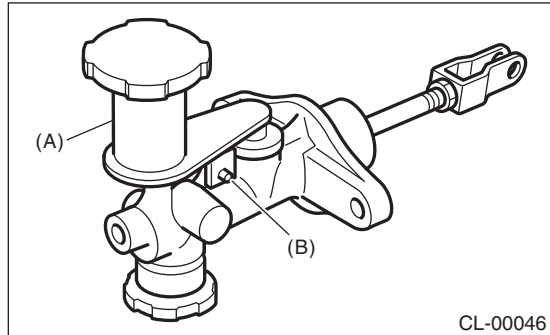


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

- 4) After bleeding air from system, ensure that the clutch operates properly. <Ref. to CL-24, Clutch Fluid Air Bleeding.>
- 5) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>
- 6) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

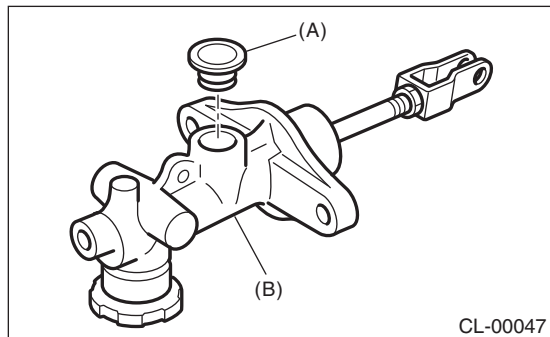
C: DISASSEMBLY

- 1) Remove the straight pin and reservoir tank.



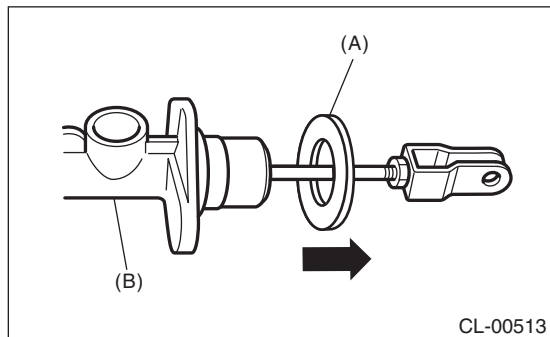
- (A) Reservoir tank
- (B) Straight pin

- 2) Remove the oil seal.



- (A) Oil seal
- (B) Master cylinder

- 3) Move the seat towards the rear.



- (A) Seat
- (B) Master cylinder

- 4) Remove the snap ring.

CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

D: ASSEMBLY

- 1) Install the clutch damper.

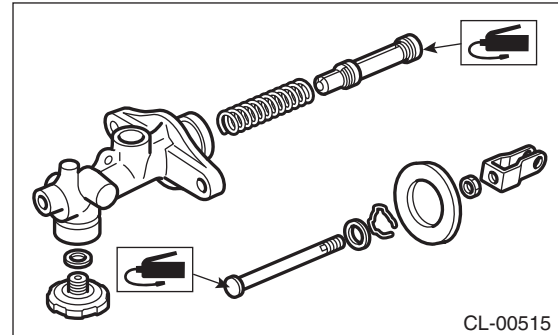
Tightening torque:

46.6 N·m (4.75 kgf-m, 34.4 ft-lb)

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

Grease:

SILICONE GREASE G40M (Part No. 004404003)



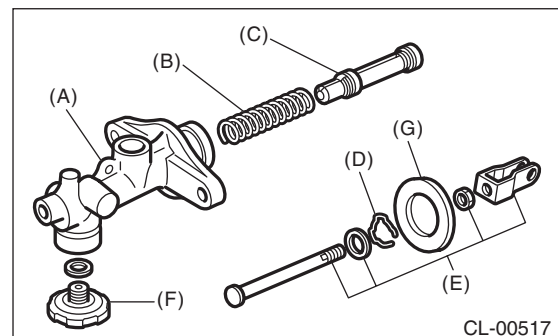
- 3) Assemble in the reverse order of disassembly.

Tightening torque:

10 N·m (1.0 kgf-m, 7 ft-lb)

E: INSPECTION

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

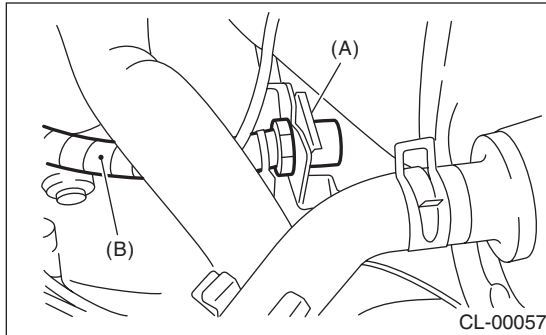


- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Stop ring
- (E) Rod ASSY
- (F) Clutch damper
- (G) Seat

7. Clutch Pipe and Hose

A: REMOVAL

- 1) Remove the air cleaner chamber and the air intake duct. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 3) Drain the clutch fluid. <Ref. to CL-23, Clutch Fluid.>
- 4) Remove the clutch pipe from the clutch hose and master cylinder.
- 5) Pull out the clamp, then remove the clutch hose from the bracket.



- (A) Clamp
(B) Clutch hose

- 6) Remove the hose from operating cylinder.
- 7) Remove the bracket.

B: INSTALLATION

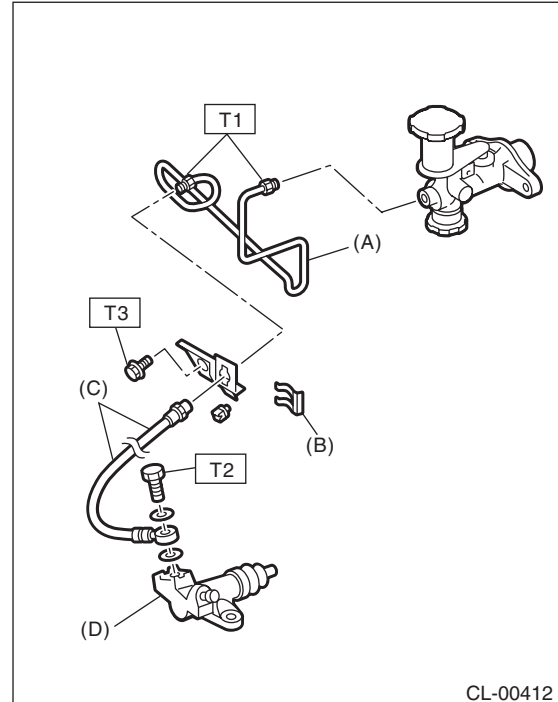
Install in the reverse order of removal.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

T3: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Clutch pipe
(B) Clip
(C) Clutch hose
(D) Operating cylinder

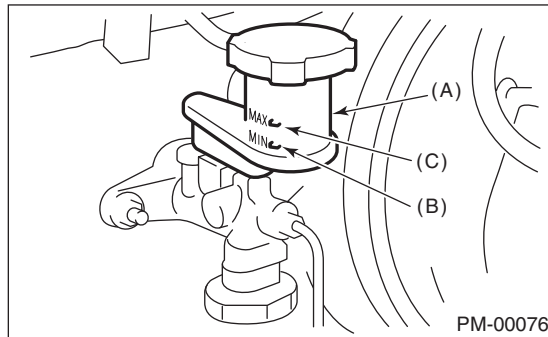
C: INSPECTION

Check pipes and hoses for cracks, breakage or damage. Check joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace the abnormal pipe or hose.

8. Clutch Fluid

A: INSPECTION

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



(A) Reservoir tank

B: REPLACEMENT

CAUTION:

- Use new SUBARU genuine brake fluid.
- Cover the bleeder with cloth to prevent brake fluid from being splashed on surrounding parts when loosening the bleeder.
- Avoid mixing different brands of brake fluid to prevent the quality of fluid from degrading.
- Be careful not to allow dirt or dust to get into 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 m l (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.
- 1) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
 - 2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
 - 3) Drain the brake fluid from the reservoir tank.
 - 4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, new DOT3 or DOT4 brake fluid

- 5) Drain all contaminated fluid using the same method as for air bleeding.

NOTE:

Keep the clutch reservoir tank filled with brake fluid to prevent entry of air.

9. Clutch Fluid Air Bleeding

A: PROCEDURE

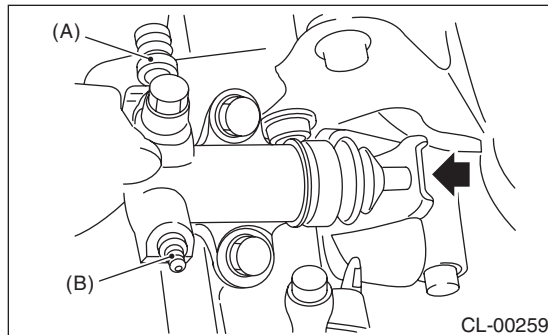
NOTE:

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

1) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>

2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>

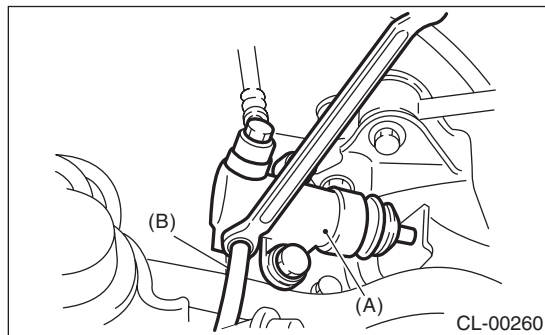
3) Fit one end of a vinyl tube into the air bleeder of the operating cylinder, and put the other end into a brake fluid container.



(A) Clutch hose

(B) Air bleeder

4) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid. Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.



(A) Operating cylinder

(B) Vinyl tube

5) Repeat these steps until there are no more air bubbles in the vinyl tube.

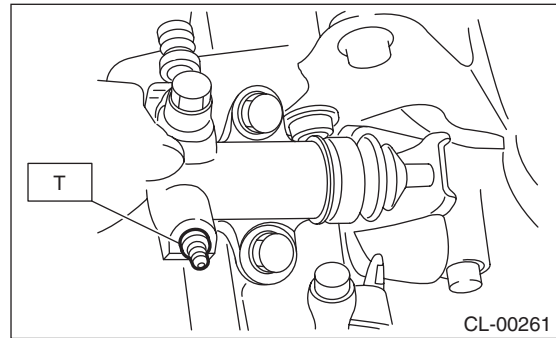
CAUTION:

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

6) Tighten the air bleeder.

Tightening torque:

T: 7.8 N·m (0.8 kgf-m, 5.8 ft-lb)



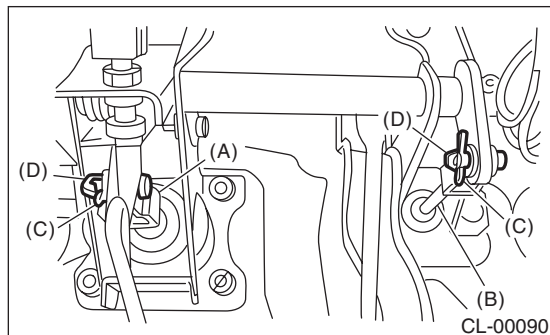
7) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.

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

10. Clutch Pedal

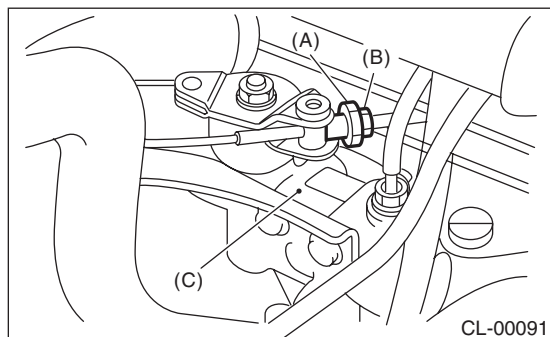
A: REMOVAL

- 1) Remove the steering column. <Ref. to PS-16, REMOVAL, Tilt Steering Column.>
- 2) Disconnect the connector from the stop light switch and clutch switch.
- 3) Remove the snap pin that fastens the lever and push rod to the operating rod.
- 4) Remove the clevis pin that fastens the lever and push rod to the operating rod.



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

- 5) Remove the accelerator pedal. <Ref. to SP(H4SO)-3, REMOVAL, Accelerator Pedal.>
- 6) Remove the air cleaner case and intake duct. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
- 7) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 8) Remove the PHV adjustment nut and lock nut.

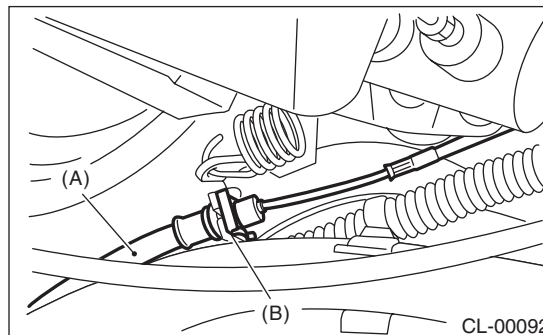


- (A) Adjustment nut
- (B) Lock nut
- (C) PHV

- 9) Remove the cable clamp and disconnect the PHV cable from the PHV.

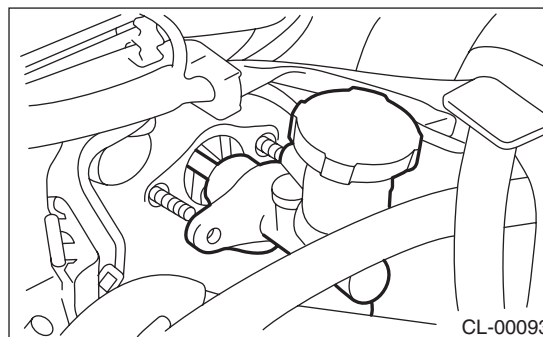
CAUTION:

When disconnecting the PHV cable, carefully protect the boot and inner cable so that they do not get damaged.



- (A) PHV cable
- (B) Clamp

- 10) Remove the nut that fastens the clutch master cylinder.



- 11) Remove the bolt and nut that fastens the brake pedal and clutch pedal and remove the pedal assembly.

B: INSTALLATION

- 1) Install in the reverse order of removal.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

NOTE:

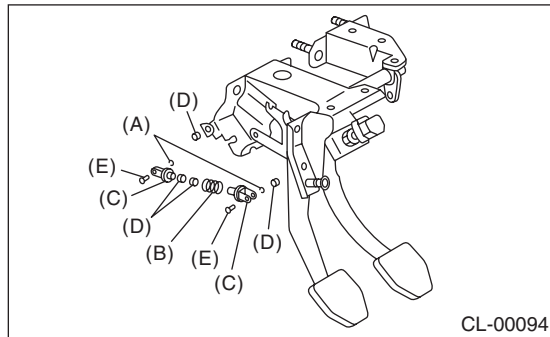
- If the cable clamp is damaged, replace it with a new part.
 - Always cover the outer cable end with the boot.
 - Be careful not to twist the accelerator cable.
 - Always use a new clevis pin.
- 2) Adjust the clutch pedal after installation. <Ref. to CL-27, ADJUSTMENT, Clutch Pedal.>
 - 3) Adjust the clutch switch (clutch start). <Ref. to CL-30, ADJUSTMENT, Clutch Switch.>
 - 4) Adjust the hill holder. (Model with hill holder) <Ref. to BR-56, ADJUSTMENT, Hill Holder.>

Clutch Pedal

CLUTCH SYSTEM

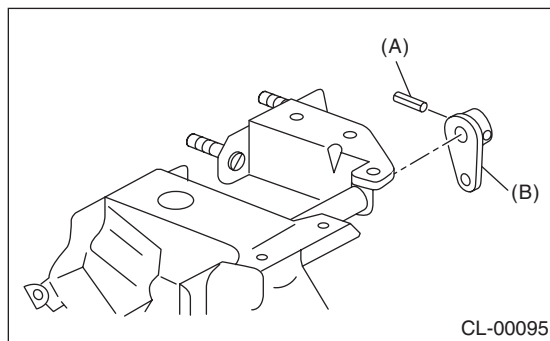
C: DISASSEMBLY

1) Remove the clip, assist spring, rod and bushing.



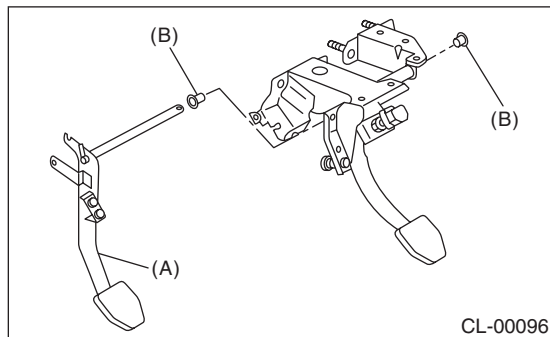
- (A) Clip
- (B) Assist spring
- (C) Assist rod
- (D) Bushing
- (E) Clevis pin

2) Remove the spring pin and lever.



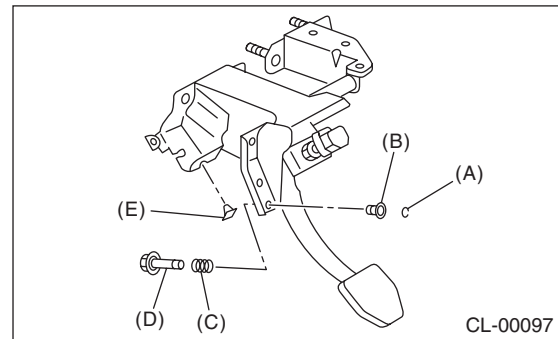
- (A) Pin
- (B) Lever

3) Remove the clutch pedal and bushing.



- (A) Clutch pedal
- (B) Bushing

4) Remove the stopper, clip, O-ring and rod S, and remove the spring S and bushing S.



- (A) Clip
- (B) Bushing S
- (C) Spring S
- (D) Rod S
- (E) Stopper

5) Remove the stopper from the clutch pedal.

6) Remove the clutch pedal pad.

D: ASSEMBLY

1) Install the stopper, etc., temporarily to the pedal bracket.

2) Clean the clutch pedal and inside the brake pedal bore, apply grease and set the bushing inside the bore.

Grease:

KOPR-KOTE (Part No. 003603001) or equivalent

3) Align the pedal bracket, clutch pedal and brake pedal bore, 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.

4) Install the hill holder cable to the clutch pedal.

E: INSPECTION

1. CLUTCH PEDAL

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

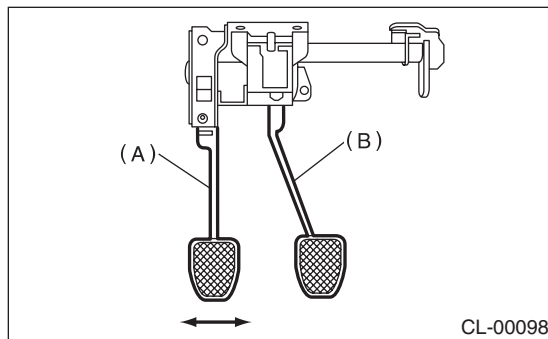
NOTE:

If excessive deflection is found, replace the bushing with new part.

Deflection of clutch pedal:

Service limit:

5.0 mm (0.197 in) or less



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

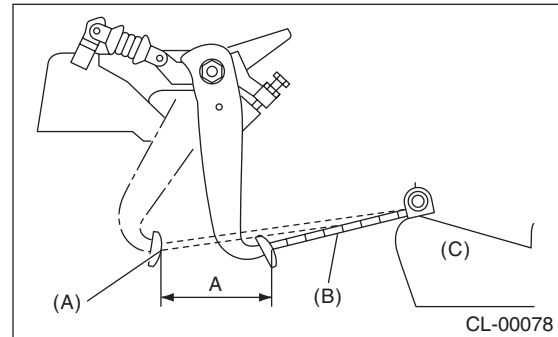
F: ADJUSTMENT

1) Measure the full stroke amount of the clutch pedal.

NOTE:

- Measure the leading end of the seat cushion and center of the pedal.
- Align the seat with the seventh notch position from the position at the very front.

Clutch pedal standard full stroke: A
130 — 135 mm (5.12 — 5.31 in)



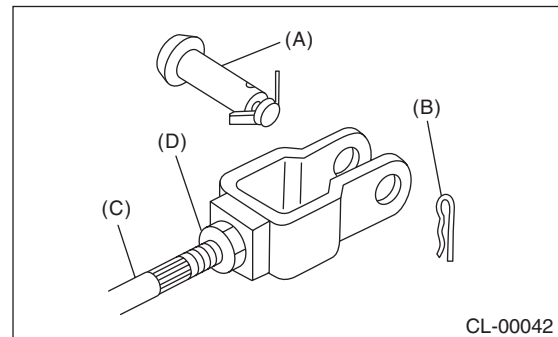
- (A) Clutch pedal (Full stroke condition)
- (B) Scale
- (C) Seats

2) If the full stroke is not within the specified value, loosen the clutch stopper nut to adjust.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

3) Loosen the push rod lock nuts.



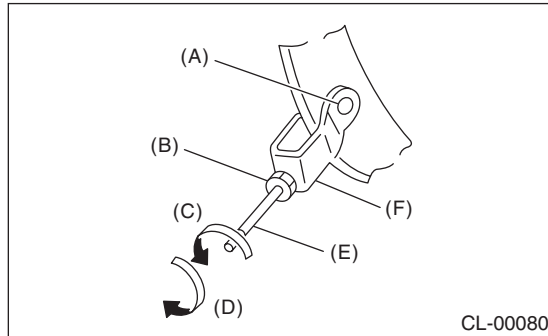
- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Push rod lock nut

Clutch Pedal

CLUTCH SYSTEM

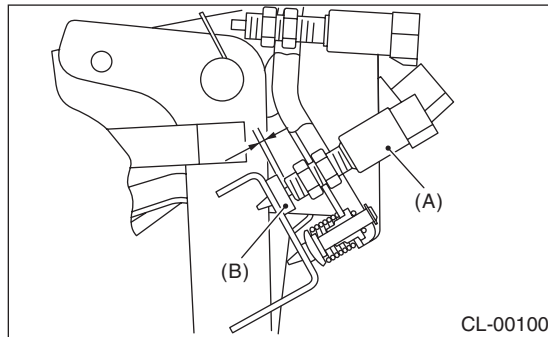
4) Rotate the push rod to adjust.

- (1) Make sure that the clutch pedal hits the stopper bolt side when returning the clutch pedal.
- (2) Check that the clutch pedal hits the clutch pedal bracket stopper at full stroke.



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

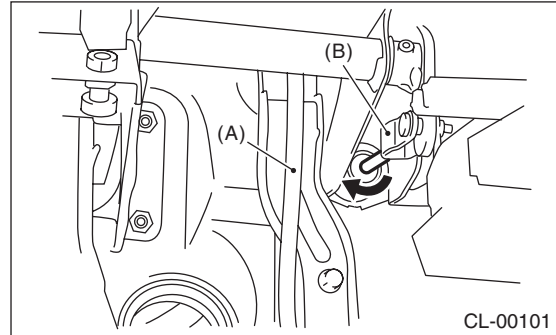
5) Rotate the push rod in the shorter direction to create clearance in the stopper bolt or the clutch switch side.



- (A) Clutch switch
- (B) Stopper

6) Rotate the push rod in the shorter direction until the clutch pedal hits the stopper bolt.

7) Rotate the push rod further in the longer direction 270° (in the direction of the arrow in the drawing).



- (A) Accelerator pedal
- (B) Clevis

8) Check that the clevis pin moves smoothly by moving it in the left and right directions.
9) Tighten the push rod lock nut.

Tightening torque:

10 N·m (1.0 kgf-m, 7.2 ft-lb)

10) Measure the full stroke amount of the clutch pedal again.

Clutch pedal standard full stroke: A

130 — 135 mm (5.12 — 5.31 in)

11) Install the clutch switch. <Ref. to CL-29, INSTALLATION, Clutch Switch.>

11. Clutch Switch

A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the instrument panel lower cover.
- 3) Disconnect the connector from the clutch switch.
- 4) Remove the clutch switches.

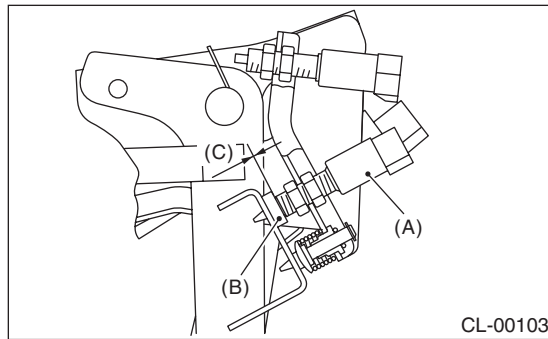
B: INSTALLATION

1. CLUTCH SWITCH

- 1) Install so that the gap between the clutch switch and clutch pedal stopper is 0 mm (0 in).

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

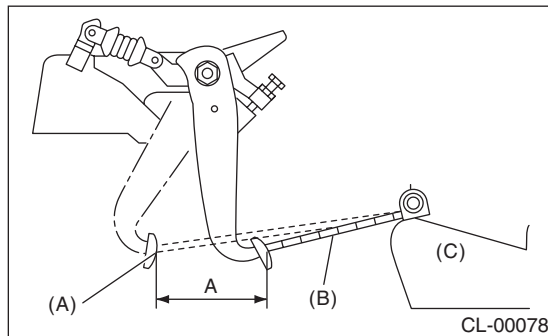


- (A) Clutch switch
- (B) Stopper
- (C) 0 mm (0 in)

- 2) Measure the stroke of the clutch pedal.

Clutch pedal standard full stroke: A

130 — 135 mm (5.12 — 5.31 in)



- (A) Clutch pedal (Full stroke condition)
- (B) Scale
- (C) Seat

- 3) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-27, ADJUSTMENT, Clutch Pedal.>

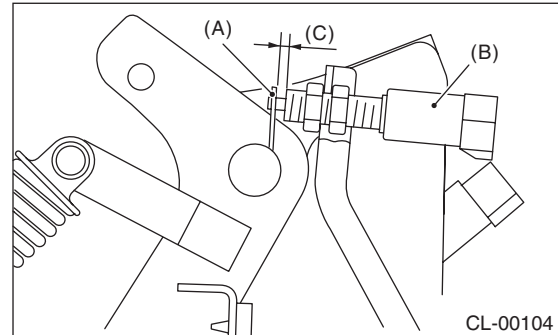
- 4) Connect the clutch switch connector.

2. CLUTCH SWITCH (CLUTCH START)

- 1) Fully depress the clutch and hold it.
- 2) Set the clearance of clutch pedal plate and clutch switch to 3 — 3.5 mm (0.12 — 0.14 in) and tighten the lock nut.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 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.

Clutch Switch

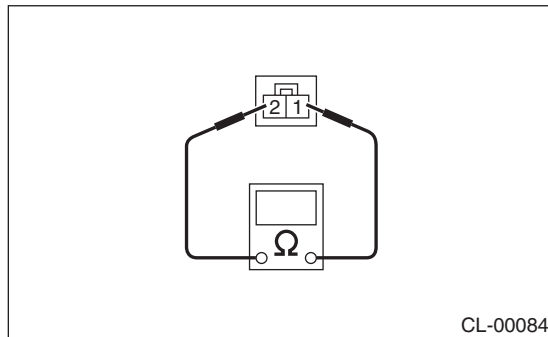
CLUTCH SYSTEM

C: INSPECTION

- 1) Make sure that engine does not start with clutch pedal not depressed. Inspect the adjustment of clutch switch and check the clutch start circuit when the engine starts.
- 2) Make sure that engine starts with clutch pedal fully depressed. Inspect the adjustment of clutch switch and check the clutch start circuit when the engine does not start.
- 3) Check the clutch switch for continuity. If the resistance is not at the standard value, replace the switch.

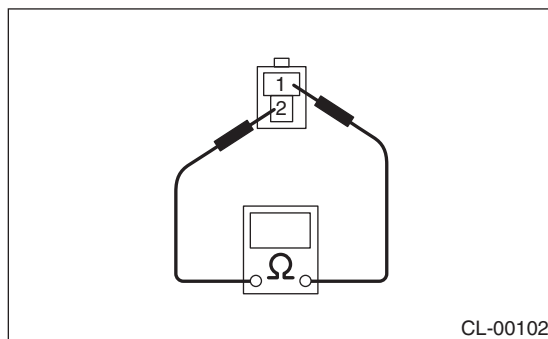
- (1) Disconnect the clutch switch connector.
- (2) Measure the resistance between terminal 1 and 2 of the switch.
 - Clutch switch

Condition	Terminal No.	Specified resistance
When clutch pedal is depressed	No. 1 — No. 2	1 M Ω or more
When the clutch pedal is not depressed	No. 1 — No. 2	Less than 1 Ω



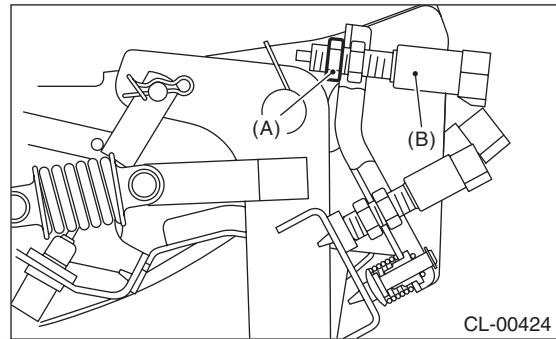
- Clutch switch (Clutch start)

Condition	Terminal No.	Specified resistance
When clutch pedal is depressed	No. 1 — No. 2	Less than 1 Ω
When the clutch pedal is not depressed	No. 1 — No. 2	1 M Ω or more



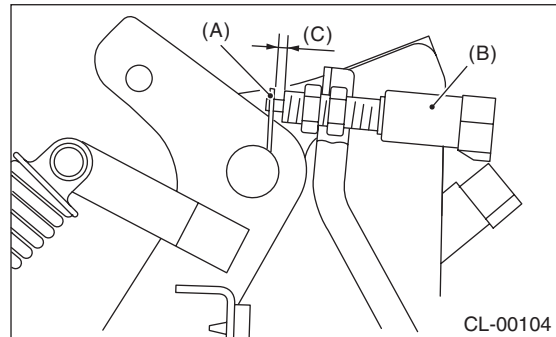
D: ADJUSTMENT

- 1) Loosen the lock nut of clutch switch (clutch start).



- (A) Lock nut
- (B) Clutch switch (Clutch start)

- 2) Fully depress the clutch and hold it.
- 3) Adjust the gap of the clutch pedal plate and the clutch switch to be 3 — 3.5 mm (0.12 — 0.14 in).



- (A) Plate
- (B) Clutch switch (Clutch start)
- (C) 3 — 3.5 mm (0.12 — 0.14 in)

- 4) Tighten the lock nut.

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

12. General Diagnostic Table

A: INSPECTION

1. CLUTCH

Symptoms	Possible cause	Corrective action
1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms. • Engine speeds up when shifting. • High-speed driving is not possible; especially rapid acceleration is not possible and vehicle speed does not increase in proportion to the increase in engine speed. • Power drops particularly when ascending a slope, and there is a burning smell of the clutch plate. • Method of testing: Park the vehicle and fully apply the parking brake. Disengage the clutch and shift the transmission gear into the 1st. Gradually increase the engine speed while gradually allowing the clutch to engage. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not move forward and the engine does not stall.	(a) Oil on the clutch face	Replace.
	(b) Worn clutch face	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Warped pressure plate or flywheel	Replace.
	(e) Defective release bearing holder	Replace.
2. Clutch drags. As a symptom of this problem, 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-32, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> The problem is caused by insufficient disengagement of the clutch if a noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace the clutch disc.
	(b) Excessive deflection of clutch disc face	Replace.
	(c) Seized crankshaft pilot bearing	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 torsion spring	Replace the clutch disc.
	(c) Poor contact of the disc surface or excessively worn disc	Replace the problem clutch disc.
	(d) Deformed pressure plate or flywheel	Replace.
	(e) Loose disc rivets	Replace the clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Improper adjustment of the pitching stopper	Adjust.

General Diagnostic Table

CLUTCH SYSTEM

Symptoms	Possible cause	Corrective action
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or insufficiently lubricated release bearing	Replace the release bearing.
	(b) Insufficient lubrication of the pilot bearing	Replace the pilot bearing.
	(c) Loose clutch disc hub	Replace the clutch disc.
	(d) Loose torsion spring retainer	Replace the clutch disc.
	(e) Deteriorated or broken torsion spring	Replace the clutch disc.
5. Clutch grabs suddenly. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace the clutch disc.
	(b) Deteriorated cushioning spring	Replace the clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace clutch disc or main shaft.
	(d) Deteriorated or broken torsion 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 pedal play	Adjust the free play of the pedal.
Insufficient clutch pedal free play	Adjust the free play of the pedal.
Excessively worn and damaged pedal shaft and/or bushing	Replace with new bushing or shaft.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

Step	Check	Yes	No
1 CHECK GEAR NOISE. 1) Start the engine. 2) Quickly shift from neutral to reverse when idling.	Is there any abnormal noise from the transmission gear?	Go to step 2.	Clutch is normal.
2 CHECK GEAR NOISE. Depress the clutch pedal when idling and shift from neutral to reverse within 0.5 — 1.0 second.	Is there any abnormal noise from the transmission gear?	Go to step 3.	Defective transmission or excessive clutch drag torque. Inspect Pilot bearing, clutch disc, transmission and clutch disc hub spline.
3 CHECK GEAR NOISE. 1) Depress the clutch pedal when idling and shift from neutral to reverse within 0.5 — 1.0 second. 2) With the clutch pedal depressed, 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, release lever, and clutch pedal free play.	Clutch and fly-wheel seizure. Inspect the clutch disc and the spline of the clutch disc hub.

General Description

CONTROL SYSTEMS

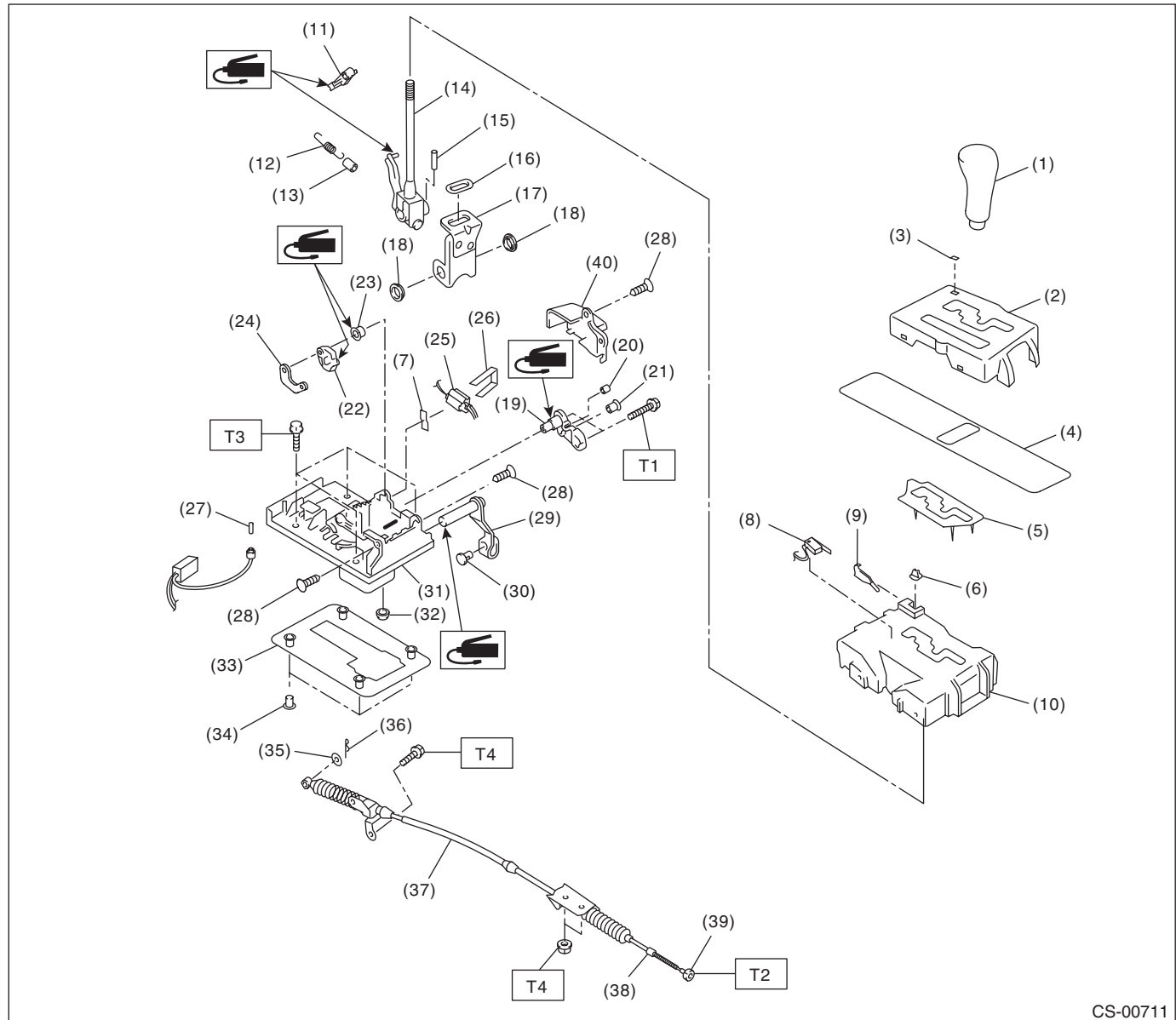
1. General Description

A: SPECIFICATION

Item	Specification
Swing torque of rod against lever	N (kgf, lb) 3.7 (0.38, 0.84) or less

B: COMPONENT

1. AT SELECT LEVER



CS-00711

General Description

CONTROL SYSTEMS

(1) Grip	(17) Bracket	(32) Grommet
(2) Indicator cover	(18) Bushing	(33) Packing
(3) Cover	(19) Lock plate B	(34) Spacer
(4) Blind	(20) Bushing	(35) Washer
(5) Cushion plate	(21) Bushing	(36) Snap pin
(6) Button	(22) Lock plate A	(37) Select cable
(7) Cushion	(23) Bushing	(38) Adjusting nut B
(8) P range switch	(24) Lock plate C	(39) Adjusting nut A
(9) Spring	(25) Shift lock solenoid	(40) Cover
(10) Guide plate	(26) Clamp	
(11) Detent arm	(27) Indicator bulb	
(12) Detent spring	(28) Clip	
(13) Tube	(29) Select lever arm	
(14) Selector lever COMPL	(30) Bushing COMPL	
(15) Spring pin	(31) Base plate	
(16) Bushing		

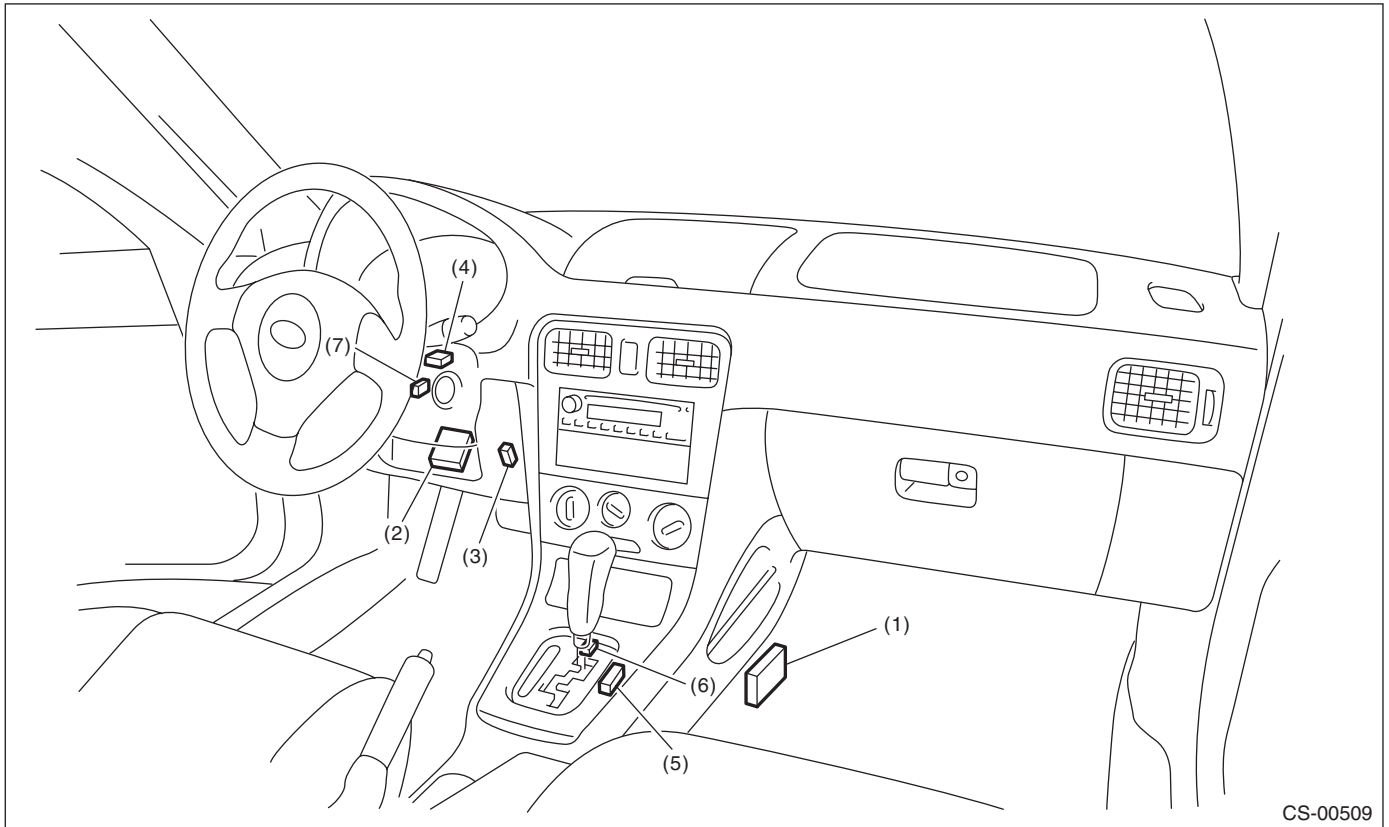
Tightening torque:N·m (kgf-m, ft-lb)**T1: 2.0 (0.2, 1.4)****T2: 7.5 (0.76, 5.5)****T3: 13 (1.3, 9.4)****T4: 18 (1.8, 13.3)**

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.
- 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 grease to avoid damage and deformation.
- Before securing a part on a vise, set cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Before disconnecting electrical connectors, be sure to disconnect the negative terminal from battery.

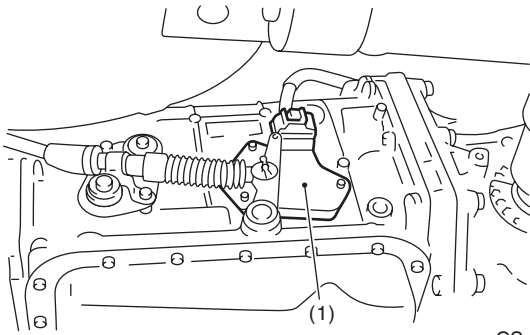
2. Electrical Component Location

A: LOCATION

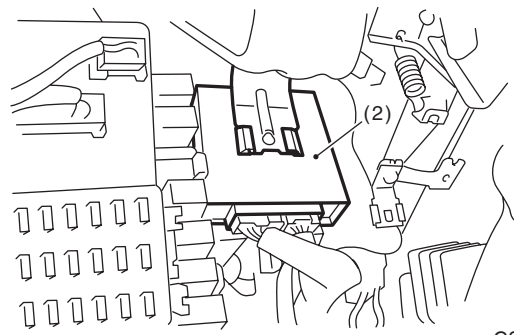


CS-00509

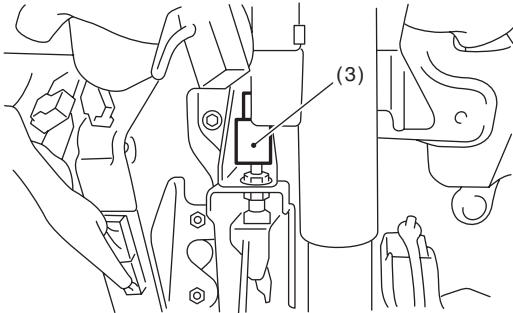
- | | | |
|--------------------------|-------------------------|-----------------------|
| (1) Inhibitor switch | (4) Key warning switch | (7) Key lock solenoid |
| (2) Body integrated unit | (5) Shift lock solenoid | |
| (3) Stop light switch | (6) "P" range switch | |



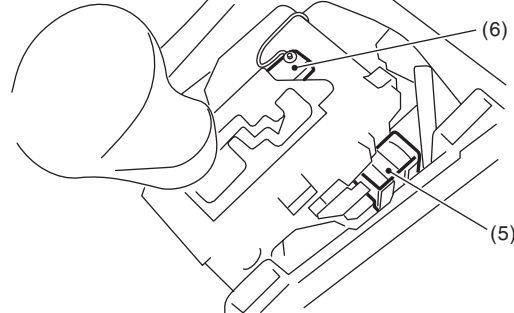
CS-00006



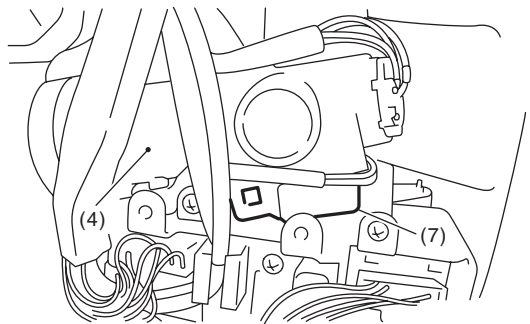
CS-00083



CS-00084



CS-00085



CS-00008

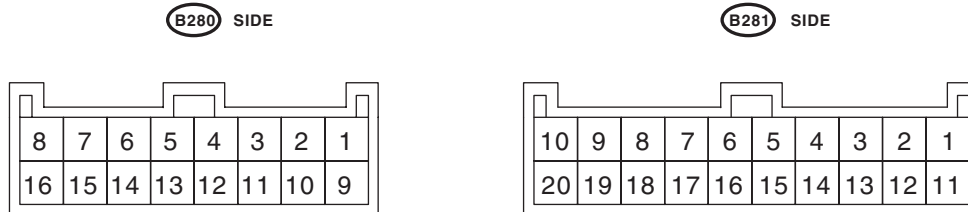
SUBARU

AT Shift Lock Control System

CONTROL SYSTEMS

3. AT Shift Lock Control System

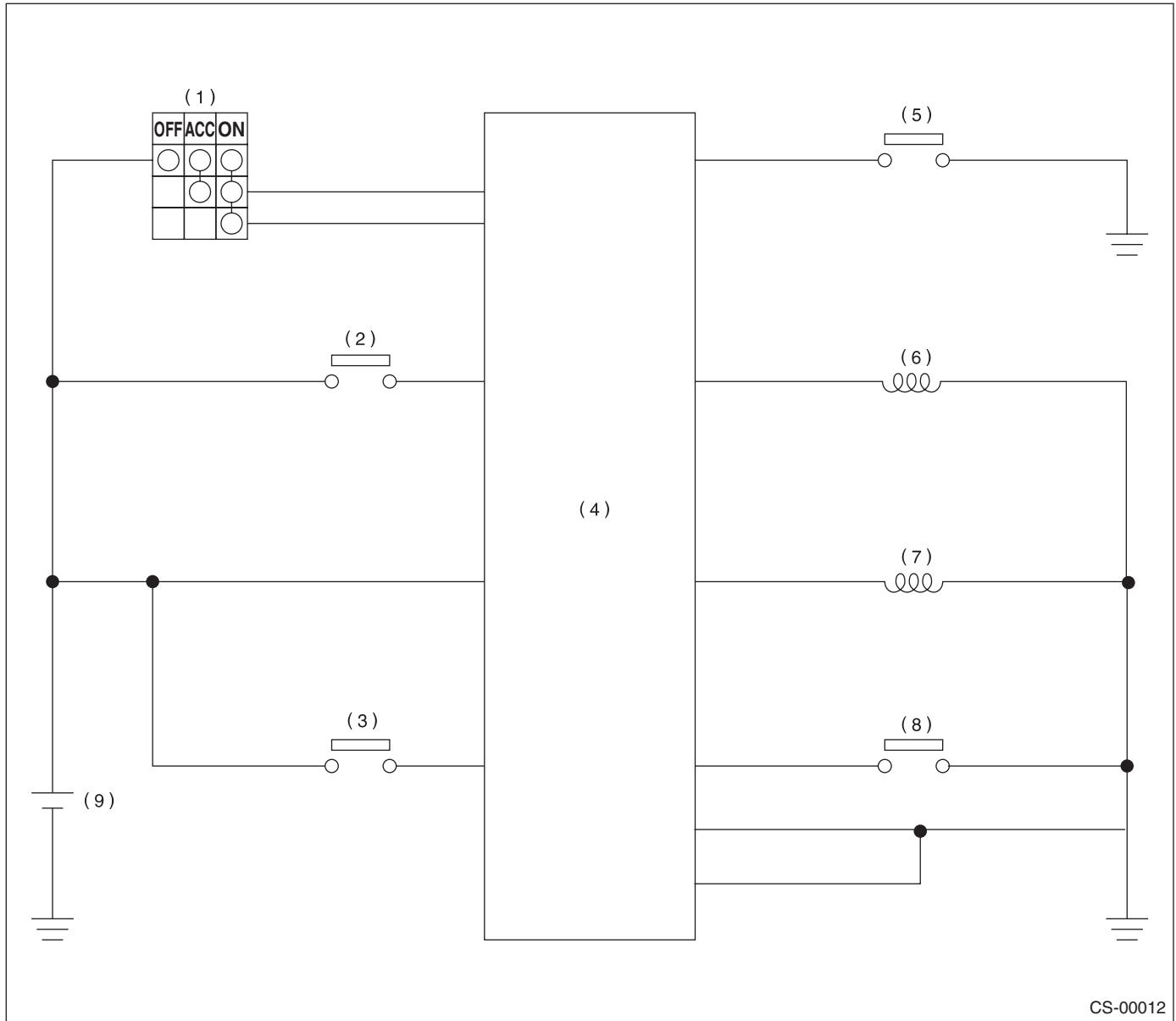
A: ELECTRICAL SPECIFICATION



CS-00011

Contents	Connector No.	Terminal No.	Input/Output signal
			Measured value and measuring conditions
Battery power supply	B280	2	9 — 16 V
Ignition power supply	B281	19	10 — 15 V when ignition switch is at ON or START.
Ignition power supply	B281	10	10 — 15 V when ignition switch is at ACC or ON.
Inhibitor switch ("P" range)	B281	5	0 V when select lever is in "P" range. 9 — 16 V when select lever is in other ranges than "P" range.
Stop light switch	B281	9	9 — 16 V when stop light switch is ON. 0 V when stop light switch is OFF.
"P" range switch	B281	6	0 V when select lever is in "P" range. 9 — 16 V when select lever is in other ranges than "P" range.
Shift lock solenoid signal	B280	9	8.5 — 16 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	B281	20	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B280	3	Pulse is output when switching key lock between locked and unlocked. 0 V at other conditions than above.
Ground	B280	4	—
Ground	B280	13	—

B: WIRING DIAGRAM



AT Shift Lock Control System

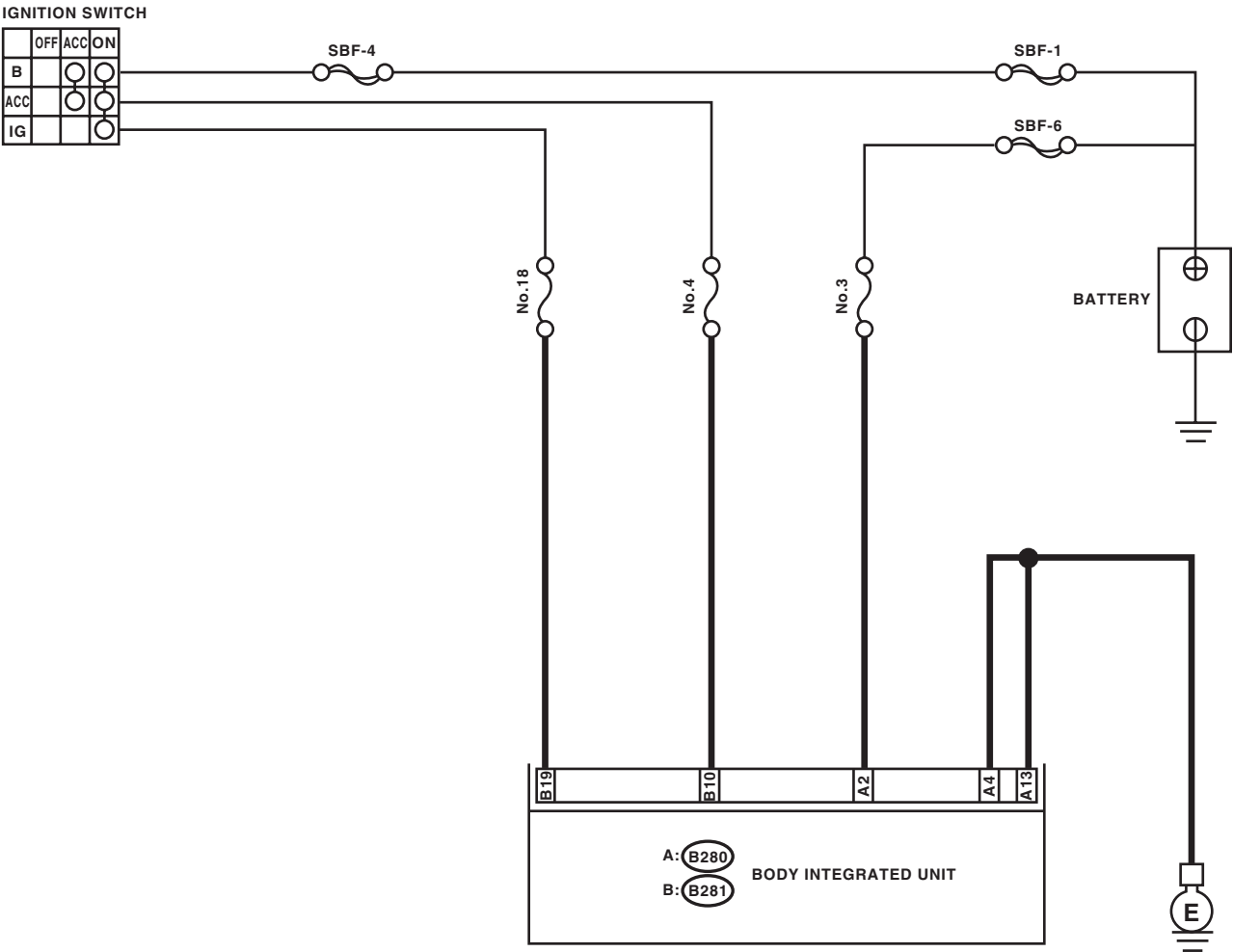
CONTROL SYSTEMS

C: INSPECTION

1. SHIFT LOCK OPERATION

Step	Check	Yes	No
1 CHECK SHIFT LOCK. 1) Turn the ignition switch to ON. 2) Move the select lever to "P" range.	While brake pedal is not depressed, can the select lever move from "P" range to other ranges?	Inspect "SELECT LEVER CANNOT BE SHIFT LOCKED". <Ref. to CS-15, SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock Control System.>	Go to step 2.
2 CHECK SHIFT LOCK.	While brake pedal is depressed, can select lever move from "P" range to other ranges?	Go to step 3.	Inspect "SELECT LEVER CANNOT BE SHIFTED". <Ref. to CS-13, SELECT LEVER CANNOT BE SHIFTED, INSPECTION, AT Shift Lock Control System.>
3 CHECK KEY INTERLOCK.	Is the ignition switch turned to the "LOCK" position when the select lever is set to other than "P" range?	Inspect "KEY INTERLOCK DOES NOT BE LOCK OR UNLOCK". <Ref. to CS-18, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>	Go to step 4.
4 CHECK KEY INTERLOCK.	Is the ignition switch turned to the "LOCK" position when the select lever is set to the "P" range?	AT shift lock control system is normal.	Inspect "KEY INTERLOCK DOES NOT BE LOCK OR UNLOCK". <Ref. to CS-18, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>

2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT
WIRING DIAGRAM:



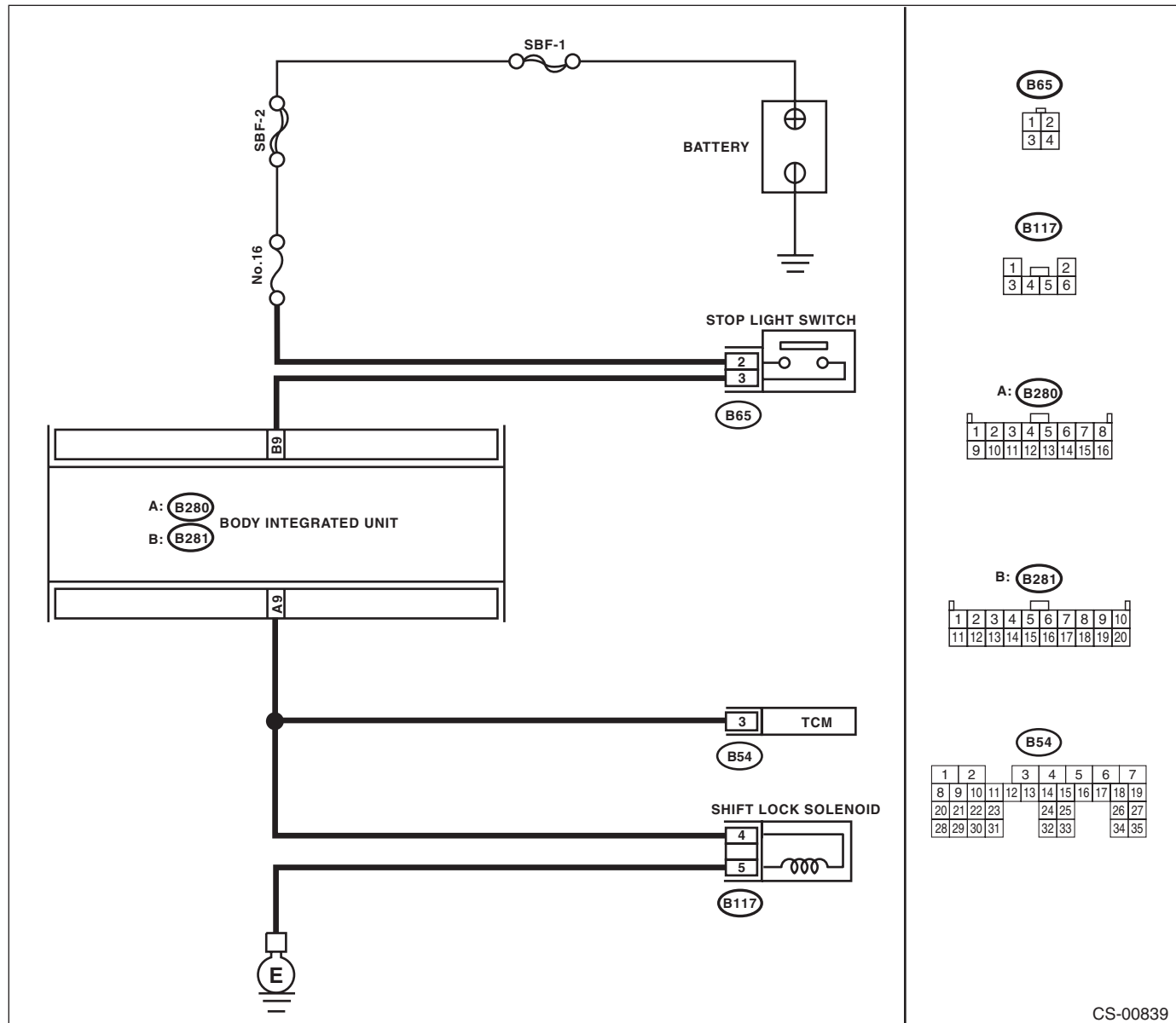
AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
1	CHECK FUSE. Remove the fuses No. 3, 4 and 18.	Are the fuses No. 3, 4 and 18 blown?	Replace the fuses No. 3, 4 and 18. If the replaced fuse No. 3, 4 or 18 blows easily, repair the short circuit of harness between the fuse and body integrated unit.
2	CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND. 1) Turn the ignition switch to OFF. 2) Measure the harness resistance between the body integrated unit and chassis ground. Connector & terminal (B280) No. 4 — Chassis ground: (B280) No. 13 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 3.
3	CHECK BATTERY POWER SUPPLY. 1) Turn the ignition switch to ON. (engine OFF) 2) Check the voltage between body integrated unit and chassis ground. Connector & terminal (B280) No. 2 (+) — Chassis ground (-):	Is the voltage 9 V or more?	Go to step 4.
4	CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ACC. 2) Check the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 10 (+) — Chassis ground (-):	Is the voltage 9 V or more?	Go to step 5.
5	CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 19 (+) — Chassis ground (-):	Is the voltage 9 V or more?	Go to step 6.
6	CHECK POOR CONTACT.	Is there poor contact in the connector?	Repair the poor contact.

3. SELECT LEVER CANNOT BE SHIFTED

WIRING DIAGRAM:



Step	Check	Yes	No
1	CHECK STOP LIGHT SWITCH. Depress the brake pedal.	Does the stop light illuminate?	Go to step 2.
2	CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND BODY INTEGRATED UNIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors of body integrated unit and stop light switch. 3) Measure the resistance of harness between stop light switch and body integrated unit. Connector & terminal (B65) No. 3 — (B281) No. 9:	Is the resistance 1 MΩ or more?	Repair the open circuit of harness between the body integrated unit and stop light switch.
			Go to step 3.

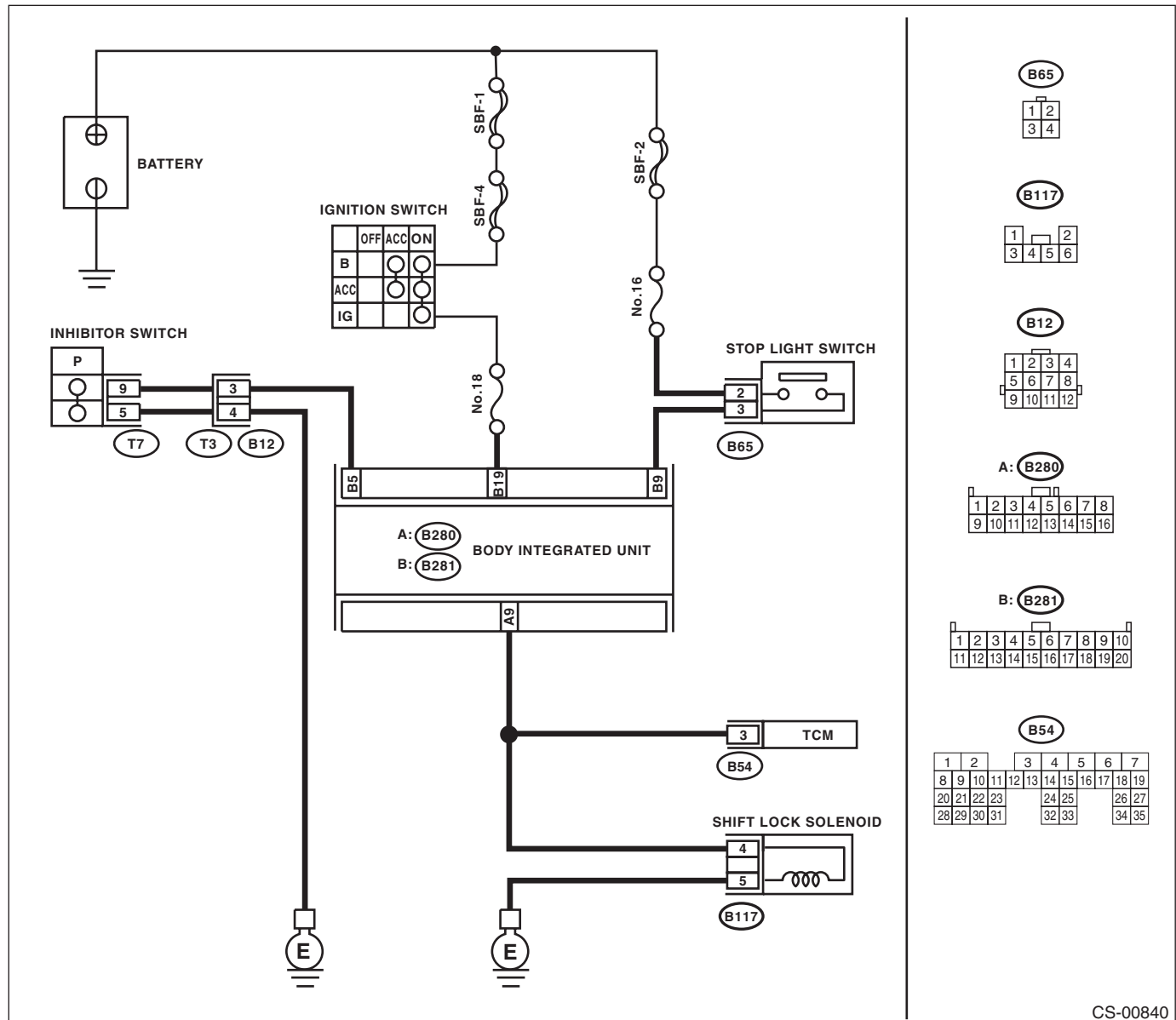
AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
3 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND BODY INTEGRATED UNIT. Measure the resistance of harness between stop light switch and chassis ground. Connector & terminal (B65) No. 3 — Chassis ground:	Is the resistance less than 1 Ω ?	Repair the short circuit of harness between the body integrated unit and stop light switch.	Go to step 4.
4 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. 1) Disconnect the connector of shift lock solenoid. 2) Measure the harness resistance between body integrated unit and the shift lock solenoid. Connector & terminal (B117) No. 4 — (B280) No. 9:	Is the resistance 1 M Ω or more?	Repair the open circuit of harness between body integrated unit and shift lock solenoid.	Go to step 5.
5 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. 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 ?	Repair the short circuit of harness between the body integrated unit and shift lock solenoid.	Go to step 6.
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. 1) Disconnect the connector of shift lock solenoid. 2) Measure the resistance of harness between TCM and shift lock solenoid. Connector & terminal (B117) No. 4 — (B54) No. 3:	Is the resistance 1 M Ω or more?	Repair open circuit of harness between TCM and shift lock solenoid.	Go to step 7.
7 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B117) No. 4 — Chassis ground:	Is resistance less than 1 Ω ?	Repair short circuit of harness between TCM and shift lock solenoid.	Go to step 8.
8 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B117) No. 5 — Chassis ground:	Is the resistance 1 M Ω or more?	Repair open circuit of harness between shift lock solenoid and chassis ground.	Go to step 9.
9 CHECK SHIFT LOCK SOLENOID. Measure the resistance of the shift lock solenoid connector terminals. Terminals No. 4 — No. 5:	Is the resistance 20 — 40 Ω ?	Go to step 10.	Replace the shift lock solenoid.
10 CHECK SHIFT LOCK SOLENOID. Connect the battery to connector terminal of shift lock solenoid, and operate the solenoid. Terminals No. 4 (+) — No. 5 (-):	Is the shift lock solenoid operating properly?	Go to step 11.	Replace the shift lock solenoid.
11 CHECK POOR CONTACT.	Is there poor contact in the connector?	Repair the poor contact.	Replace the body integrated unit.

4. SELECT LEVER CANNOT BE SHIFT LOCKED

WIRING DIAGRAM:



AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
1 CHECK INHIBITOR SWITCH. 1) Turn the ignition switch to ON. (engine OFF) 2) Move the select lever from "P" to "1" range.	Combination meter indicator light and select lever "P", "R", "N", "3", "2" and "1" are correctly matched?	Go to step 2.	Adjust inhibitor switch and select cable.
2 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 19 (+) — Chassis ground (-):	Is the voltage 9 V or more?	Go to step 3.	Repair the open circuit harness between battery and body integrated unit, and poor contact in connector.
3 CHECK HARNESS BETWEEN THE INHIBITOR SWITCH AND THE BODY INTEGRATED UNIT. 1) Turn the ignition switch to OFF. 2) Disconnect the transmission harness and body integrated unit connector. 3) Measure the harness resistance between the body integrated unit and chassis ground. Connector & terminal (B280) No. 5 — Chassis ground:	Is the resistance less than 1 Ω ?	Repair the short circuit of harness between the body integrated unit and transmission connector.	Go to step 4.
4 CHECK HARNESS BETWEEN THE INHIBITOR SWITCH AND THE BODY INTEGRATED UNIT. Measure the resistance of harness between body integrated unit and inhibitor switch. Connector & terminal (B12) No. 3 — (B281) No. 5:	Is the resistance 1 M Ω or more?	Repair the open wire of harness between the body integrated unit and transmission connector.	Go to step 5.
5 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. Measure the harness resistance between the body integrated unit and chassis ground. Connector & terminal (B12) No. 4 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 6.	Repair the open circuit of harness between the body integrated unit and chassis ground.
6 CHECK INHIBITOR SWITCH. 1) Move the select lever to "P" range. 2) Measure the resistance between transmission harness connector terminals. Connector & terminal (T3) No. 3 — No. 4:	Is the resistance 1 M Ω or more?	Repair or replace inhibitor switch.	Go to step 7.
7 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT. 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 5 (+) — Chassis ground (-):	Is the voltage 9 — 16 V?	Go to step 8.	Go to step 18.
8 CHECK STOP LIGHT SWITCH. Depress the brake pedal.	Does the stop light illuminate?	Go to step 9.	Check the stop light system.
9 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE. 1) Depress the brake pedal. 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 9 (+) — Chassis ground (-):	Is the voltage 9 V or more?	Go to step 10.	Repair the open or short circuit of harness between the body integrated unit and stop light switch.

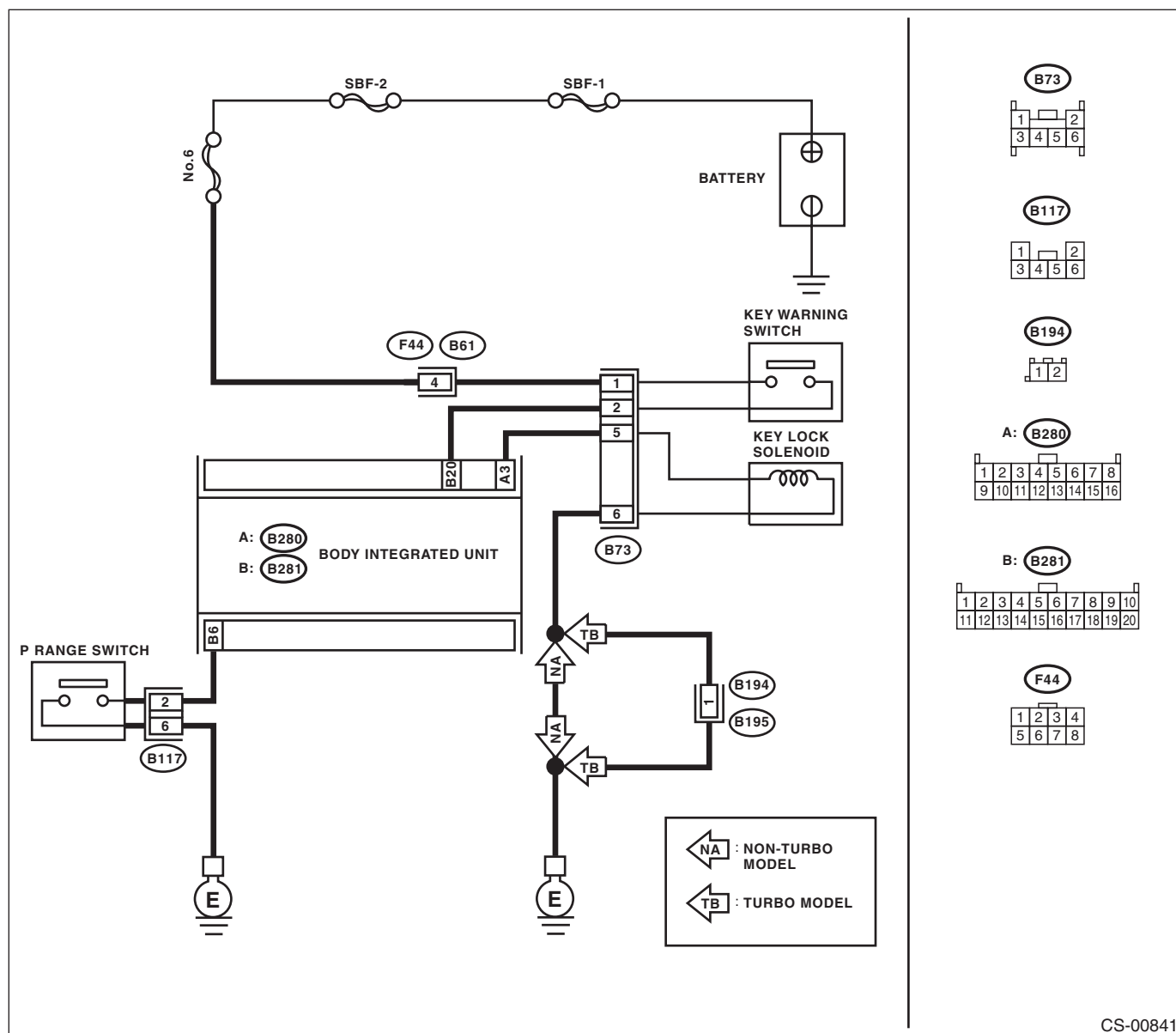
AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
10 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. 1) Turn the ignition switch to OFF. 2) Disconnect the shift lock solenoid and body integrated unit connector. 3) Measure the harness resistance between body integrated unit and the shift lock solenoid. Connector & terminal (B280) No. 9 — (B117) No. 4:	Is the resistance 1 M Ω or more?	Repair the open circuit of harness between body integrated unit and shift lock solenoid.	Go to step 11.
11 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B280) No. 9 — Chassis ground:	Is the resistance less than 10 Ω ?	Go to step 12.	Repair the short circuit of harness between the body integrated unit and shift lock solenoid.
12 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. 1) Turn the ignition switch to OFF. 2) Disconnect the connector of shift lock solenoid and TCM. 3) Measure the resistance of harness between TCM and shift lock solenoid. Connector & terminal (B54) No. 3 — (B117) No. 4:	Is the resistance 1 M Ω or more?	Repair open circuit of harness between TCM and shift lock solenoid.	Go to step 13.
13 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B54) No. 3 — Chassis ground:	Is resistance less than 10 Ω ?	Go to step 14.	Repair short circuit of harness between TCM and shift lock solenoid.
14 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B117) No. 5 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 15.	Repair open circuit of harness between shift lock solenoid and chassis ground.
15 CHECK SHIFT LOCK SOLENOID. Measure the resistance of the shift lock solenoid connector terminals. Terminals No. 4 — No. 5:	Is the resistance 20 — 40 Ω ?	Go to step 16.	Replace the shift lock solenoid.
16 CHECK SHIFT LOCK SOLENOID. Connect the battery to connector terminal of shift lock solenoid, and operate the solenoid. Terminals No. 4 (+) — No. 5 (-):	Is the shift lock solenoid operating properly?	Go to step 17.	Replace the shift lock solenoid.
17 CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE. 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B280) No. 9 (+) — Chassis ground (-):	Is the voltage 8.5 V or more?	Go to step 18.	Replace the body integrated unit.
18 CHECK POOR CONTACT.	Is there poor contact in the connector?	Repair the poor contact.	Replace the body integrated unit.

5. KEY INTERLOCK DOES NOT LOCK OR RELEASE

WIRING DIAGRAM:



AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
1 CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH. 1) Disconnect the connector of key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. Connector & terminal (B73) No. 1 (+) — Chassis ground (-):	Is the voltage 9 — 16 V?	Go to step 2.	Repair the open or short circuit of harness between battery and key warning switch.
2 CHECK KEY WARNING SWITCH. Measure the resistance between connector terminals of key warning switch. Terminals No. 1 — No. 2:	Is the resistance 1 M Ω or more?	Replace the key warning switch.	Go to step 3.
3 CHECK KEY WARNING SWITCH. 1) Remove the key. 2) Measure the resistance between connector terminals of key warning switch. Terminals No. 1 — No. 2:	Is the resistance 1 M Ω or more?	Go to step 4.	Replace the key warning switch.
4 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH. 1) Disconnect the body integrated unit connector. 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 20 (+) — Chassis ground (-):	Is the voltage 9 V or more?	Go to step 5.	Repair the open circuit of harness between body integrated unit and key warning switch.
5 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND KEY LOCK SOLENOID. 1) Disconnect the connector key lock solenoid. 2) Measure the harness resistance between body integrated unit and the key lock solenoid. Connector & terminal (B73) No. 5 — (B280) No. 3:	Is the resistance 1 M Ω or more?	Repair the open circuit of harness between body integrated unit and key lock solenoid.	Go to step 6.
6 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND KEY LOCK SOLENOID. Measure the harness resistance between the body integrated unit and chassis ground. Connector & terminal (B280) No. 3 — Chassis ground:	Is the resistance 1 Ω or more?	Go to step 7.	Repair the short of the harness between body integrated unit and key lock solenoid.
7 CHECK HARNESS BETWEEN KEY LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between key lock solenoid and chassis ground. Connector & terminal (B73) No. 6 — Chassis ground:	Is the resistance less than 10 Ω ?	Go to step 8.	Repair open circuit or the poor contact of the harness between key lock solenoid and chassis ground.
8 CHECK KEY LOCK SOLENOID. Measure the resistance of key lock solenoid connector terminals. Terminals No. 5 — No. 6:	Is the resistance 4 — 8 Ω ?	Go to step 9.	Replace the key lock solenoid.
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 the resistance less than 1 Ω ?	Go to step 10.	Repair the short circuit of harness between “P” range switch and body integrated unit.

AT Shift Lock Control System

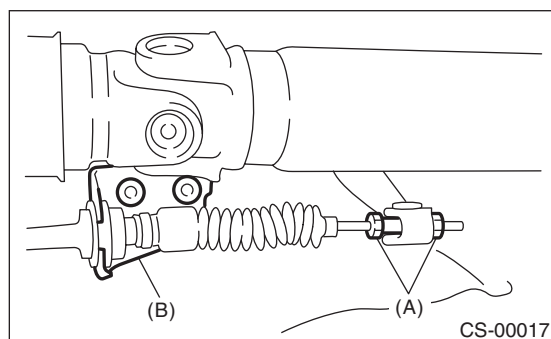
CONTROL SYSTEMS

Step	Check	Yes	No
10 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” RANGE SWITCH. 1) Disconnect the connector of “P” range switch. 2) Measure the resistance of harness between body integrated unit and “P” range switch. Connector & terminal (B117) No. 2 — (B281) No. 6:	Is the resistance 1 MΩ or more?	Repair the open circuit of harness between body integrated unit and “P” range switch.	Go to step 11.
11 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. 6 — Chassis ground:	Is the resistance 1 MΩ or more?	Repair the open circuit of harness between “P” range switch and chassis ground.	Go to step 12.
12 CHECK “P” RANGE SWITCH. 1) Move the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals. Terminals No. 2 — No. 6:	Is the resistance less than 1 Ω?	Go to step 13.	Replace the “P” range switch.
13 CHECK “P” RANGE SWITCH. 1) Set the select lever to other than “P” range. 2) Measure the resistance between “P” range switch connector terminals. Terminals No. 2 — No. 6:	Is the resistance 1 MΩ or more?	Go to step 14.	Replace the “P” range switch.
14 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT. 1) Disconnect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Move the select lever to “P” range. 4) Depress the brake pedal. 5) Measure the voltage between body integrated unit connector and chassis ground. Connector & terminal (B280) No. 3 (+) — Chassis ground (-):	Is the voltage 7.5 — 16 V?	Go to step 15.	Replace the body integrated unit.
15 CHECK POOR CONTACT.	Is there poor contact of the connector?	Repair the poor contact.	Replace the body integrated unit.

4. Select Lever

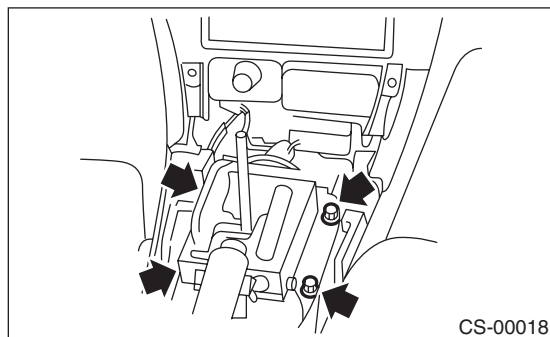
A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.
- 3) Set the select lever to "N" range.
- 4) Lift up the vehicle.
- 5) Remove the rear exhaust pipe and muffler.
 - Non-turbo model
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 - Turbo model
<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 6) Disconnect the cable from range select lever and then remove the cable bracket.



(A) Adjusting nut
(B) Cable bracket

- 7) Lower the vehicle.
- 8) Remove the console box. <Ref. to EI-37, REMOVAL, Console Box.>
- 9) Disconnect the connectors, and then remove the four bolts to take out the select lever assembly from vehicle body.

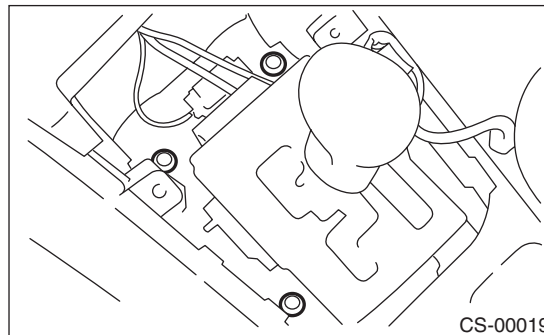


B: INSTALLATION

- 1) Mount the select lever onto the vehicle body.
- 2) Tighten the four bolts at the prescribed torque, then connect the connector.

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)



- 3) Install the console box. <Ref. to EI-35, INSTALLATION, Glove Box.>
- 4) Set the select lever to "N" range.
- 5) Lift up the vehicle.
- 6) Set the select lever to "N" range.
- 7) Insert the thread portion of the other inner cable and into connector hole of the select lever, and fix the other outer cable end to bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 8) Adjust the select cable position. <Ref. to CS-27, ADJUSTMENT, Select Cable.>
- 9) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
- 10) Install the rear exhaust pipe and muffler.
 - Non-turbo model
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
 - Turbo model
<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
- 11) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-27, ADJUSTMENT, Select Cable.> <Ref. to 4AT-47, ADJUSTMENT, Inhibitor Switch.>

- (1) Engine starts when the select lever is in "P" and "N" range, but not in other range.
- (2) Back-up light illuminates when the select lever is in the "R" range, but not in other range.
- (3) Select lever and indicator positions are matched.

Select Lever

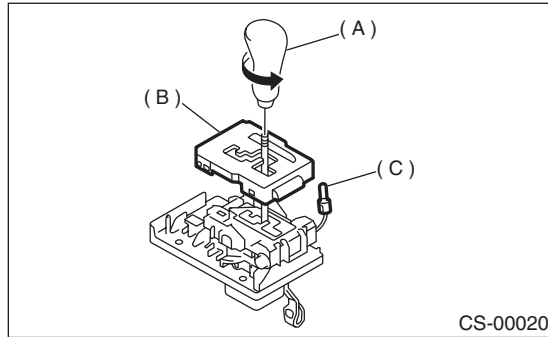
CONTROL SYSTEMS

C: DISASSEMBLY

- 1) Remove the packing.
- 2) Remove the grip.
- 3) Remove the indicator light, and then remove the indicator cover.

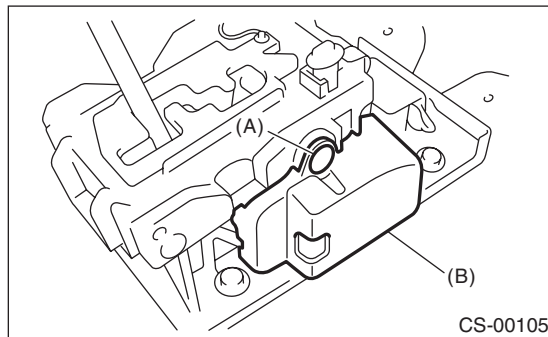
NOTE:

Be careful not to damage the indicator light during removal.



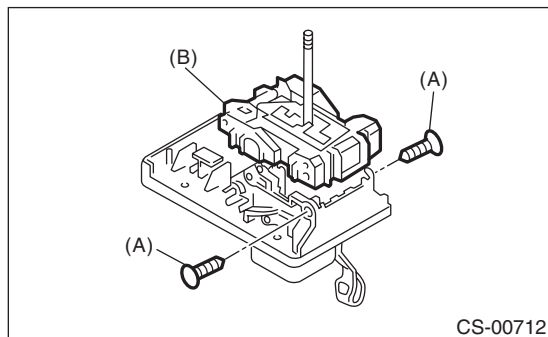
- (A) Grip
- (B) Indicator cover
- (C) Indicator light

- 4) Remove the blind.
- 5) Remove the cover.



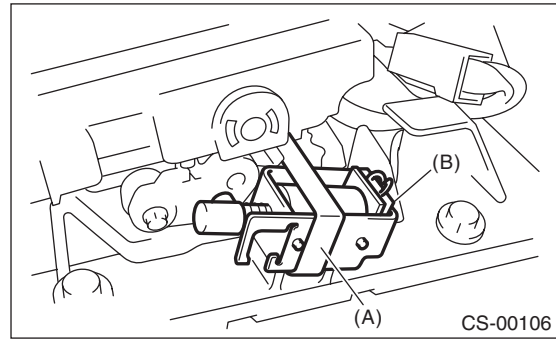
- (A) Clip
- (B) Cover

- 6) Remove the clips and then remove the guide plate.



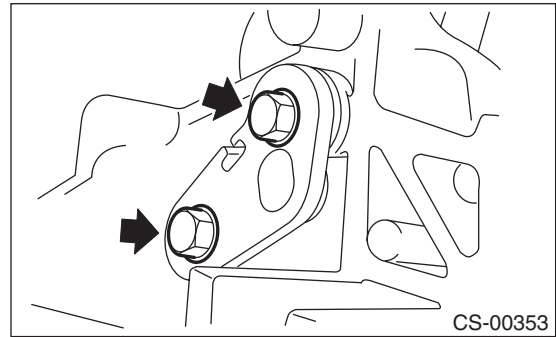
- (A) Clip
- (B) Guide plate

- 7) Remove the clamp and remove the shift lock solenoid.

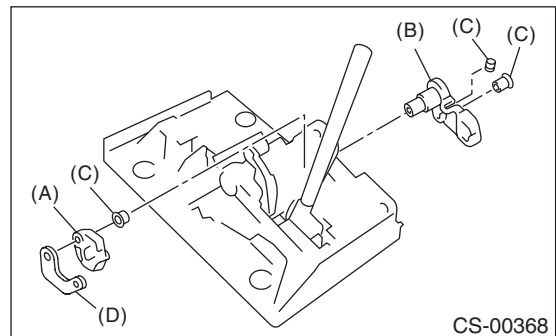


- (A) Clamp
- (B) Shift lock solenoid

- 8) Remove the bolts which secure the lock plate B.

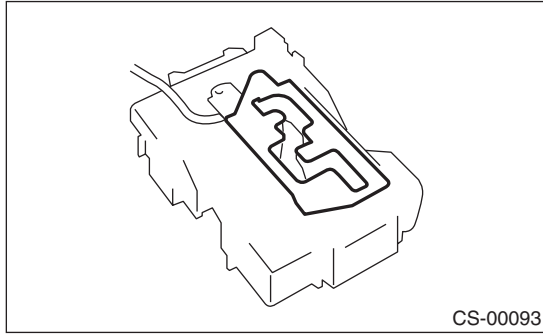


- 9) Remove the lock plates A, B, and C and the bushing.

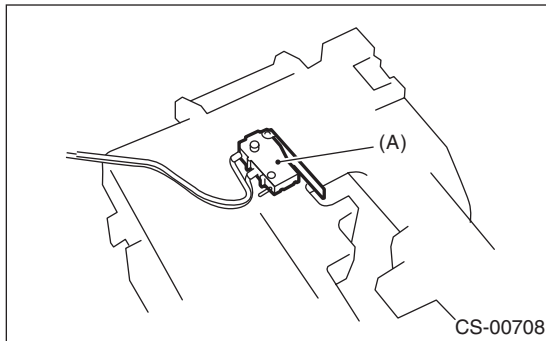


- (A) Lock plate A
- (B) Lock plate B
- (C) Bushing
- (D) Lock plate C

10) Remove the cushion plate.

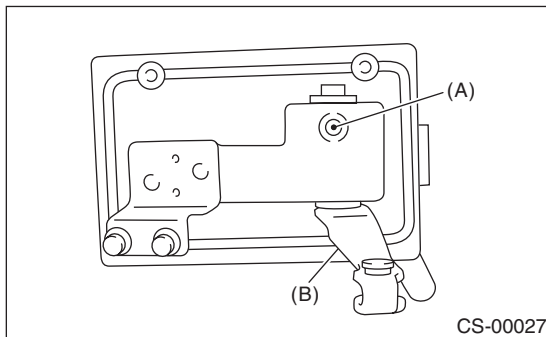


11) Remove the “P” range switch.



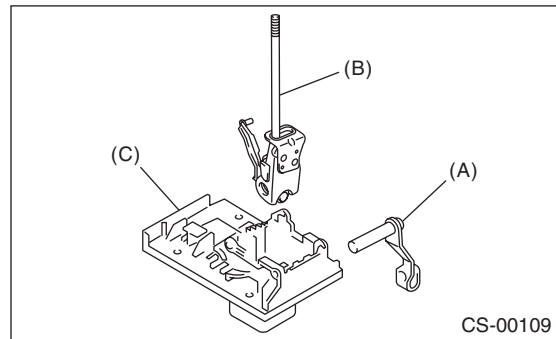
(A) “P” range switch

12) Remove the grommet and then extract the spring pin.



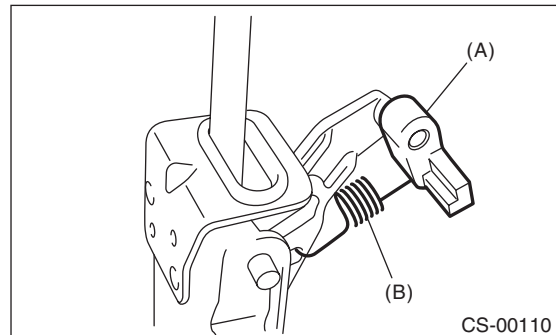
(A) Spring pin
(B) Select lever arm

13) Remove the select lever arm and then remove the select lever COMPL from the plate.



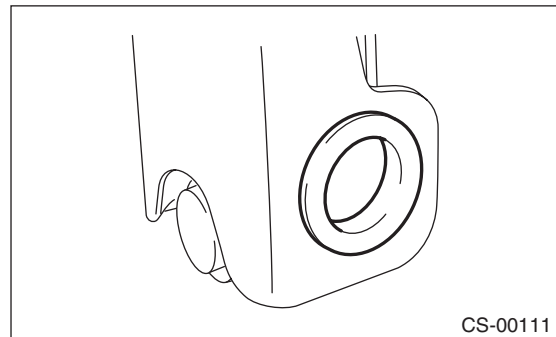
(A) Select lever arm
(B) Selector lever COMPL
(C) Plate

14) Remove the detent spring and remove the detent arm.

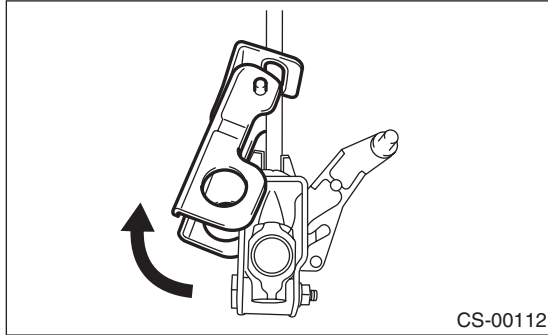


(A) Detent arm
(B) Detent spring

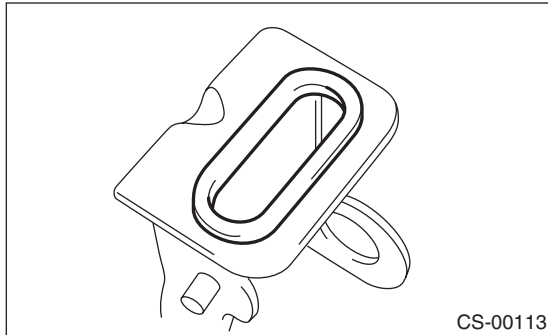
15) Remove the select lever COMPL bushing from bracket.



16) Remove the bracket from select lever COMPL.



17) Remove the bushing from the bracket.



D: ASSEMBLY

- 1) Clean all the parts before assembly.
- 2) Apply NIGTIGHT LYW NO. 2 grease or the equivalent to each part. <Ref. to CS-2, AT SELECT LEVER, COMPONENT, General Description.>

CAUTION:

Apply grease [SUNCALL GLO-244] to the axle of lock plate.

- 3) Assemble in the reverse order of disassembly.
- 4) After completion of fitting, transfer the select lever to the “1” range from “P” range, then check whether the select indicator and select lever match, and whether the pointer and position mark match and check the operating force.

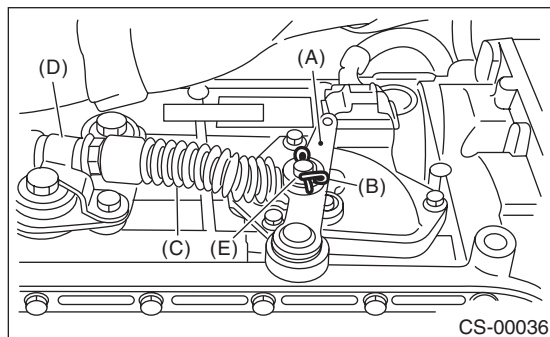
E: INSPECTION

- 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 COMPL operating condition before assembling. Normal if it operates smoothly.

5. Select Cable

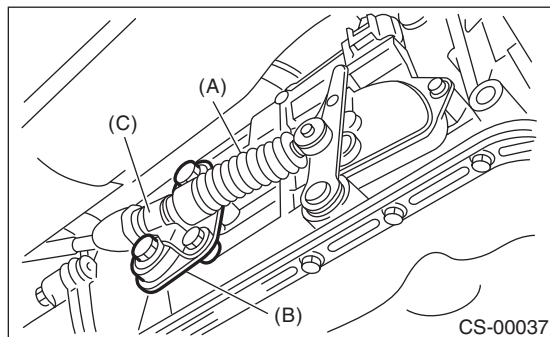
A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.
- 3) Prior to removal, set the lever to "N" range.
- 4) Lift up the vehicle.
- 5) Remove the front and center exhaust pipes.
 - Non-turbo model
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
 - Turbo model
<Ref. to EX(H4DOTC)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 6) Remove the snap pin and washer from the range select lever.



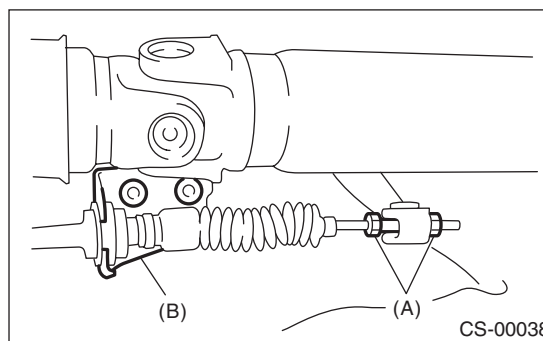
- (A) Select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp
- (E) Washer

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



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

- 8) Disconnect the select cable from range select lever and then remove the cable bracket.



- (A) Adjusting nut
- (B) Cable bracket

- 9) Remove the select cable from plate assembly.

Select Cable

CONTROL SYSTEMS

B: INSTALLATION

1) Install the select cable to plate assembly.

Tightening torque:

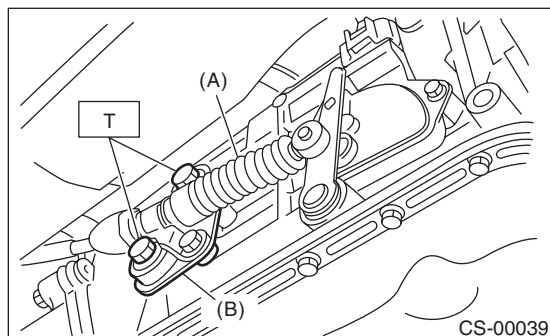
18 N·m (1.8 kgf-m, 13.3 ft-lb)

2) Install the select cable to the range select lever.

3) Install the plate assembly to the transmission.

Tightening torque:

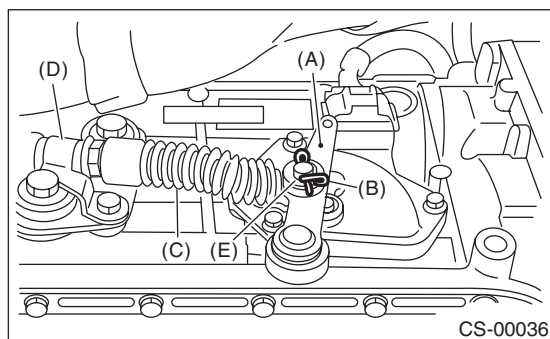
T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Select cable

(B) Plate ASSY

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



(A) Select lever

(B) Snap pin

(C) Select cable

(D) Clamp

(E) Washer

5) Move the select lever to the "N" range, then adjust the select cable position. <Ref. to CS-27, ADJUSTMENT, Select Cable.>

6) Install the front and center exhaust pipe.

- Non-turbo model

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>

- Turbo model

<Ref. to EX(H4DOTC)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

Check the removed cable and replace if damaged, rusty or having problems.

1) Check the cable for smooth operation.

2) Check the inner cable for damage and rust.

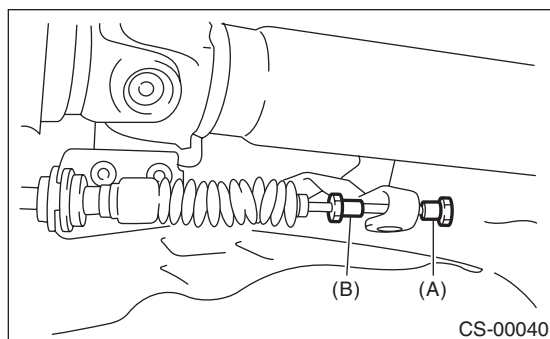
3) Check the outer cable for damage, bends and cracks.

4) Check the boot for damage, cracks and deterioration.

5) Move the select lever from "P" to "1" range. In each range, check that the contact of the detent is felt. If the detentes is not felt or the position pointer is improperly aligned, adjust the cable.

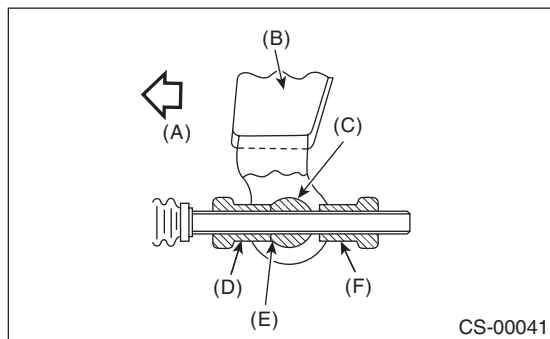
D: ADJUSTMENT

- 1) Set the vehicle on a lift.
- 2) Set the select lever to "N" range.
- 3) Lift up the vehicle.
- 4) Remove the rear exhaust pipe and muffler.
 - Non-turbo model
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 - Turbo model
<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 5) Loosen the adjusting nuts on both sides.



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

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

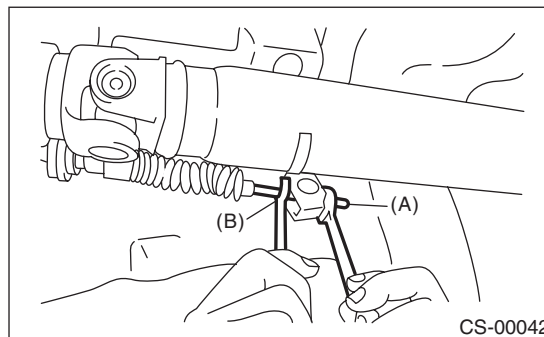


- (A) Front side
- (B) Select lever
- (C) Connector
- (D) Adjusting nut B
- (E) Contact point
- (F) Adjusting nut A

- 7) Set a spanner wrench to adjusting nut B so that it does not rotate, and then tighten the adjusting nut A.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



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

- 8) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.

- 9) Install in the reverse order of removal.

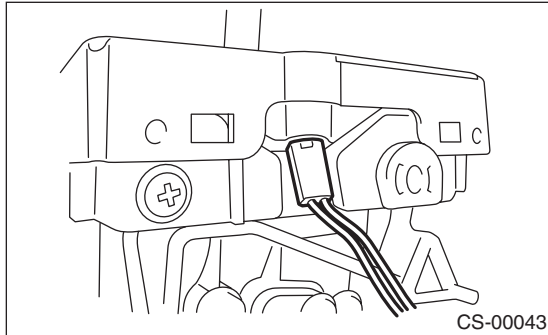
AT Shift Lock Solenoid and “P” Range Switch

CONTROL SYSTEMS

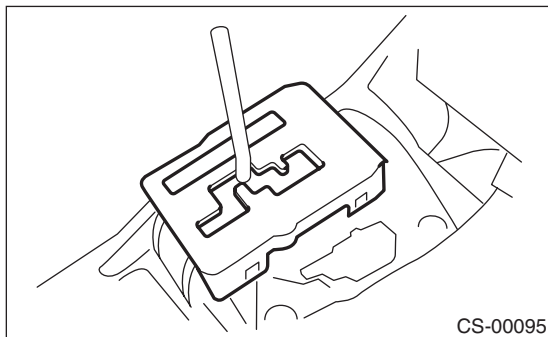
6. AT Shift Lock Solenoid and “P” Range Switch

A: REMOVAL

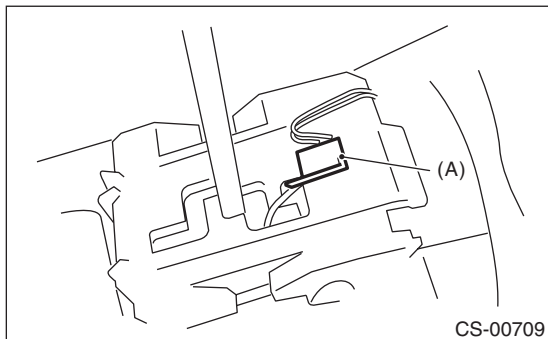
- 1) Disconnect the ground cable from the battery.
- 2) Remove the console box. <Ref. to EI-37, REMOVAL, Console Box.>
- 3) Disconnect the connector.
- 4) Remove the grip.
- 5) Remove the indicator valve from the indicator cover.



- 6) Remove the indicator cover.

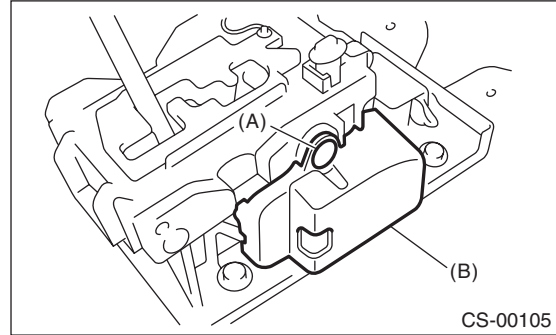


- 7) Remove the blind.
- 8) Remove the cushion plate.
- 9) Remove the “P” range switch.



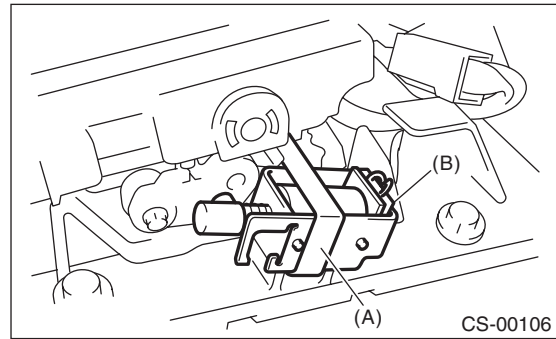
(A) “P” range switch

- 10) Remove the cover.



(A) Clip
(B) Cover

- 11) Remove the clamp and remove the shift lock solenoid.



(A) Clamp
(B) Shift lock solenoid

B: INSTALLATION

Install in the reverse order of removal.

AT Shift Lock Solenoid and “P” Range Switch

CONTROL SYSTEMS

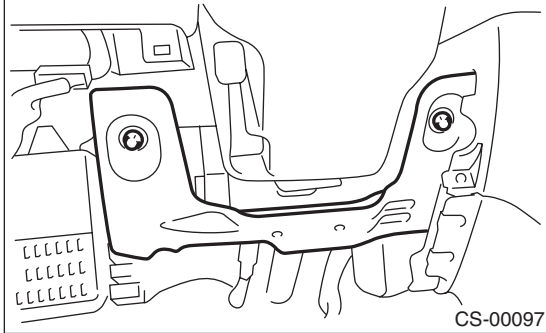
C: INSPECTION

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. 5:</i>	Is the resistance 20 — 40 Ω ?	Go to step 2.	Replace the shift lock solenoid and “P” range switch assembly.
2 CHECK SHIFT LOCK SOLENOID. Connect the battery to shift lock solenoid connector terminal, and then operate the solenoid. <i>Terminals</i> <i>No. 4 (+) — No. 5 (-):</i>	Does the shift lock solenoid operate normally?	Go to step 3.	Replace the shift lock solenoid and “P” range switch assembly.
3 CHECK “P” RANGE SWITCH. 1) Move the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals.	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.	Is the resistance 1 M Ω or more?	Normal operation	Replace the “P” range switch.

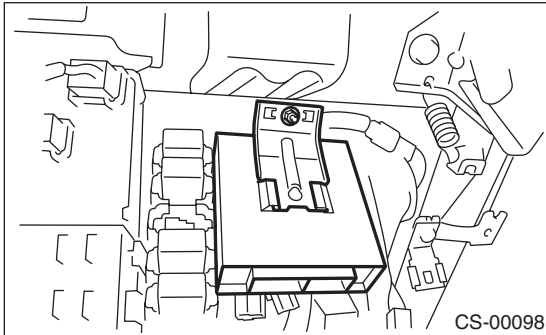
7. Body Integrated Unit

A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the lower cover.
- 3) Remove the knee bolster.



- 4) Disconnect the connector from body integrated unit.
- 5) Remove the body integrated unit.



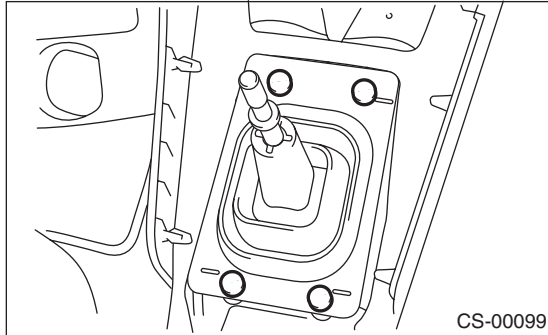
B: INSTALLATION

Install in the reverse order of removal.

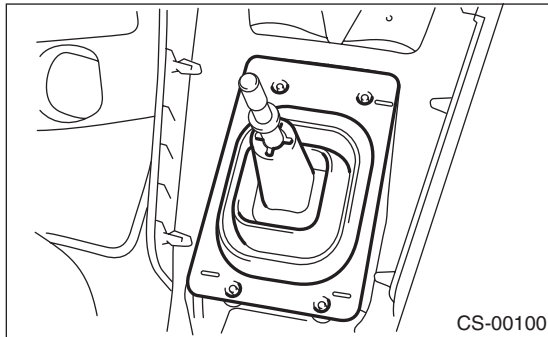
8. MT Gear Shift Lever

A: REMOVAL

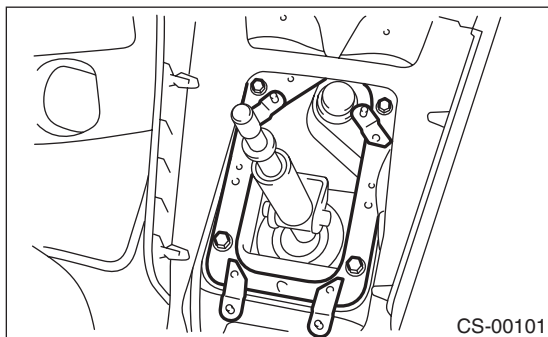
- 1) Set the vehicle on a lift.
- 2) Remove the gear shift knob.
- 3) Disconnect the ground cable from the battery.
- 4) Remove the console box. <Ref. to EI-37, REMOVAL, Console Box.>
- 5) Remove the clamp.



- 6) Remove the bushing and insulator assembly.

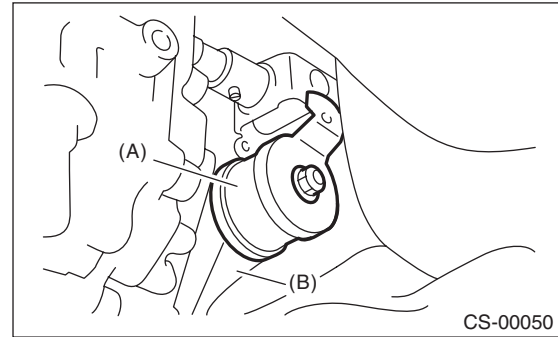


- 7) Remove the plate assembly from the vehicle body.



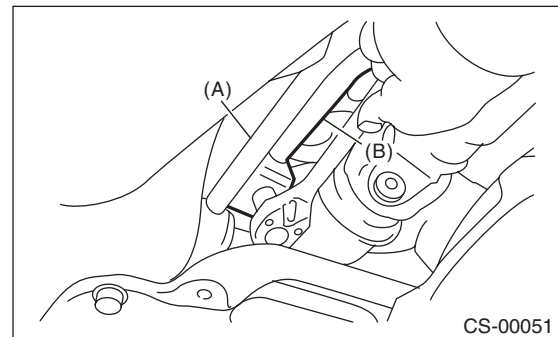
- 8) Lift up the vehicle.
- 9) Remove the rear exhaust pipe and muffler.
 - Non-turbo model
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 - Turbo model
<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>

- 10) Remove the stay from transmission bracket.



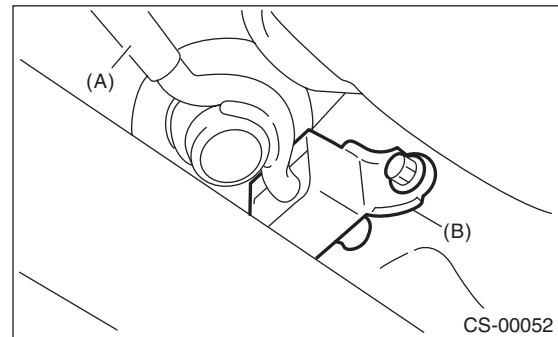
- (A) Stay
(B) Transmission bracket

- 11) Remove the rod from joint.



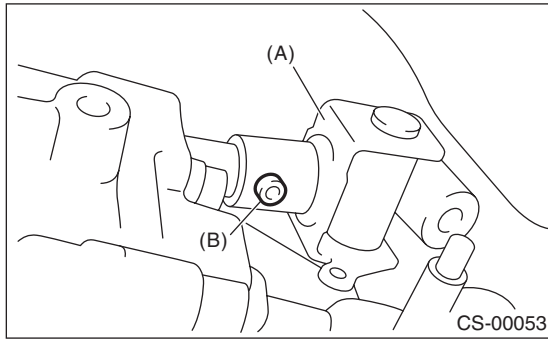
- (A) Stay
(B) Rod

- 12) Remove the cushion rubber from vehicle body.



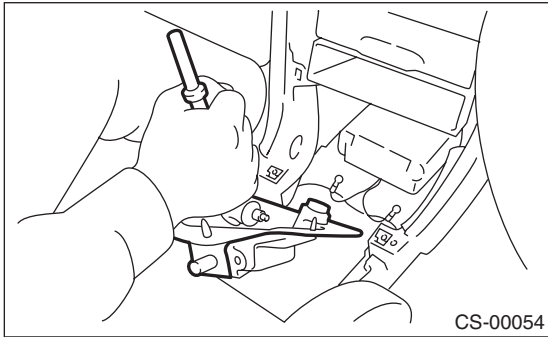
- (A) Stay
(B) Cushion rubber

- 13) Remove the spring pin, and then extract the joint.



- (A) Joint
(B) Spring pin

- 14) Lower the vehicle.
15) Remove the lever COMPL.

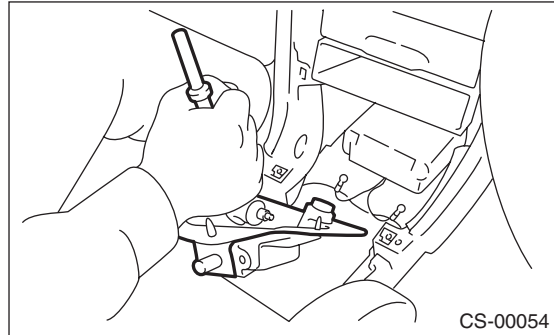


B: INSTALLATION

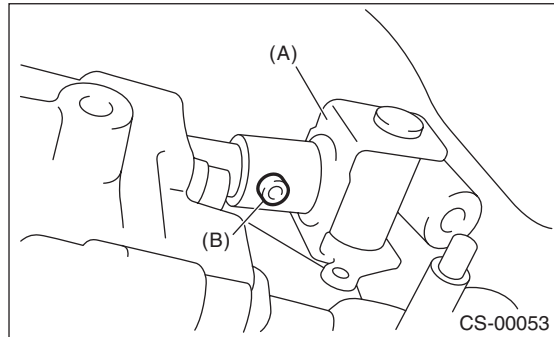
- 1) Install the joint to the transmission and secure with spring pin.
2) Insert the lever COMPL from room side.

NOTE:

After inserting the rod and stay, temporarily put them onto transmission mount.



- 3) Lift up the vehicle.
4) Install the joint to the shifter arm.
5) Insert the spring pin.

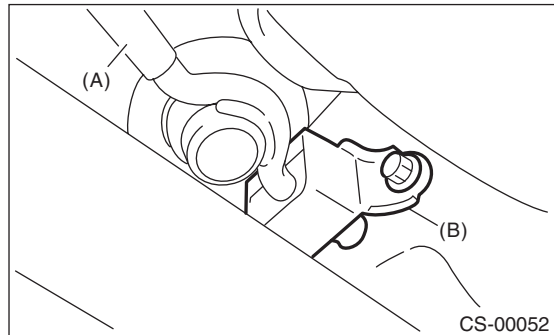


- (A) Joint
(B) Spring pin

- 6) Mount the cushion rubber on the body.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

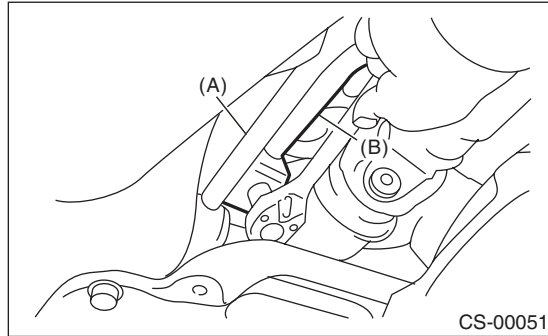


- (A) Stay
(B) Cushion rubber

7) Connect the rod to the joint.

Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)



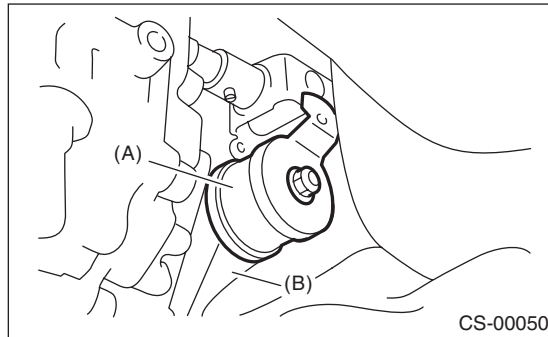
(A) Stay

(B) Rod

8) Connect the stay to the transmission bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay

(B) Transmission bracket

9) Install the rear exhaust pipe and muffler.

- Non-turbo model

<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

- Turbo model

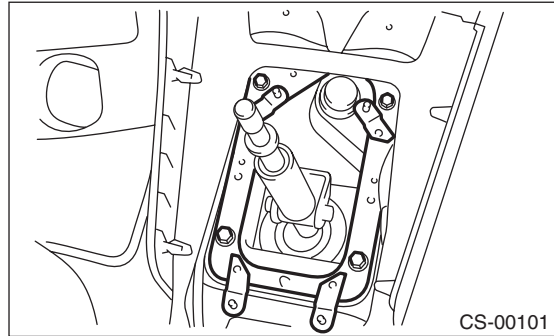
<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

10) Lower the vehicle.

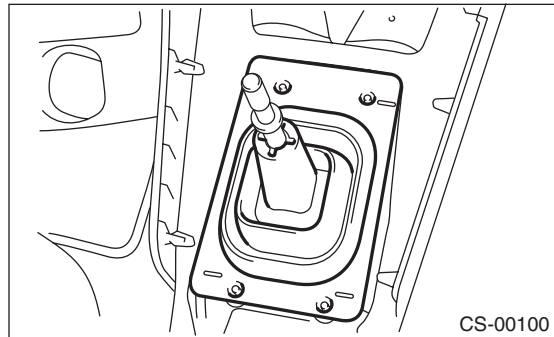
11) Install the plate assembly to the vehicle body.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



12) Install the boot and insulator assembly to vehicle in the proper direction.



13) Install the clamp.

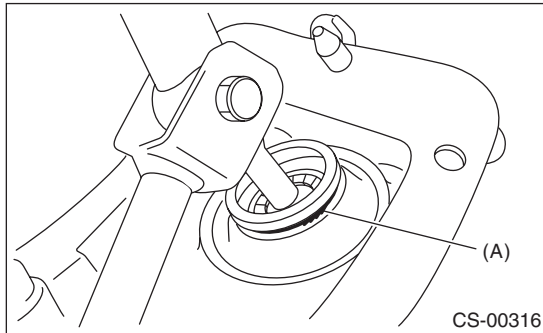
14) Install the console box. <Ref. to EI-37, INSTALLATION, Console Box.>

MT Gear Shift Lever

CONTROL SYSTEMS

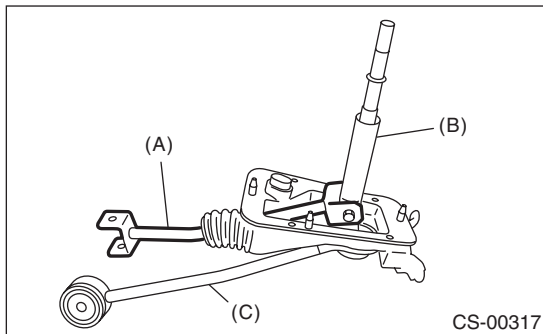
C: DISASSEMBLY

1) Remove the lock wires.



(A) Lock wire

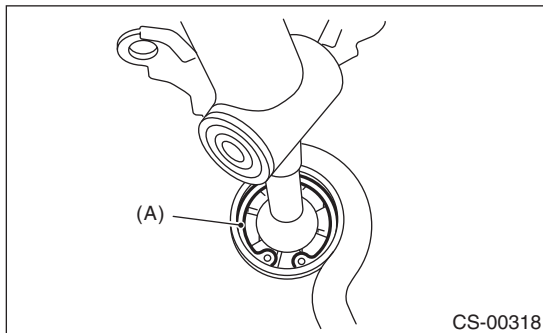
2) Remove the rod from lever.



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

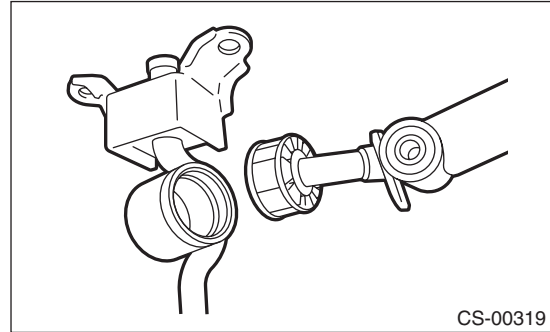
3) Separate the rod and inner boot.

4) Remove the snap ring from the stay.

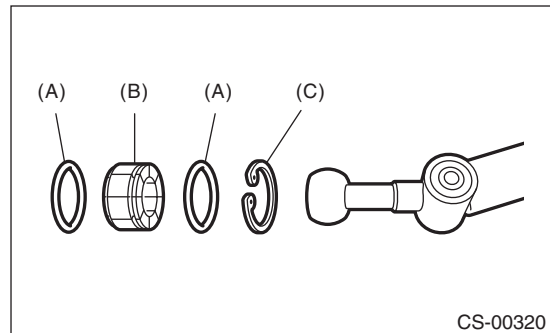


(A) Snap ring

5) Separate the gear shift lever and the stay.

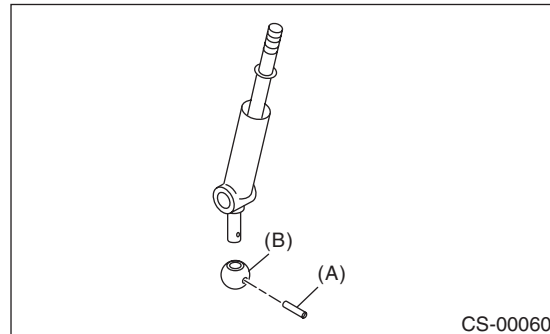


6) Remove the boot, bushing and snap ring from gear shift lever.



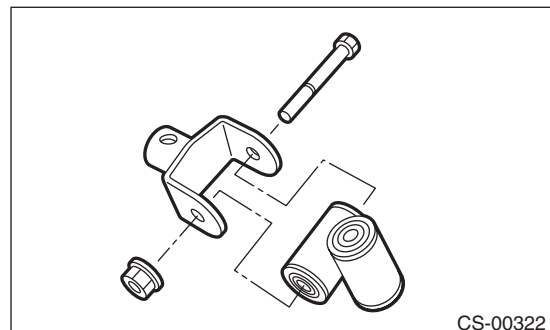
(A) O-ring
(B) Bushing
(C) Snap ring

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



(A) Spring pin
(B) Bushing

8) Remove the boss from the joint.

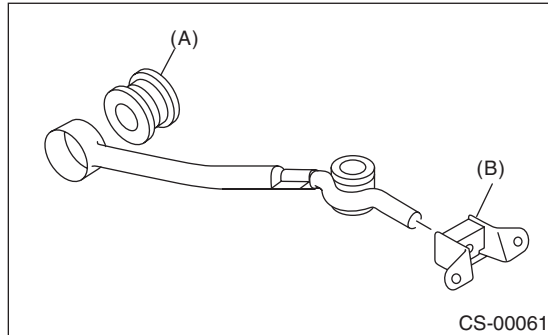


D: ASSEMBLY

NOTE:

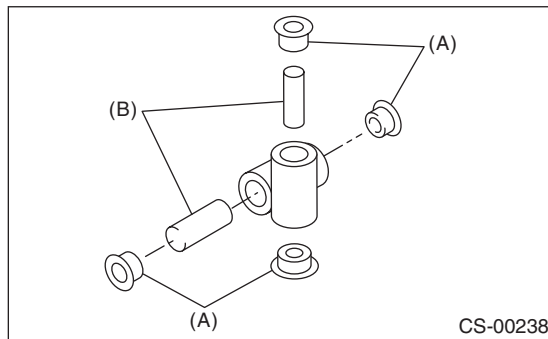
- Clean all the parts before assembly.
- Apply NIGTIGHT LYW NO. 2 grease or the equivalent to each part.

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



- (A) Bushing
(B) Cushion rubber

2) Install the bushing and spacer to boss.

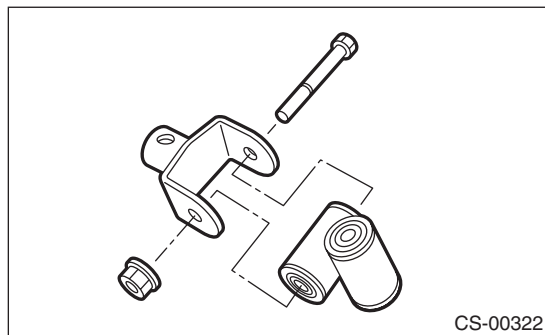


- (A) Bushing
(B) Spacer

3) Using new self-locking nuts, install the boss to the joint.

Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)



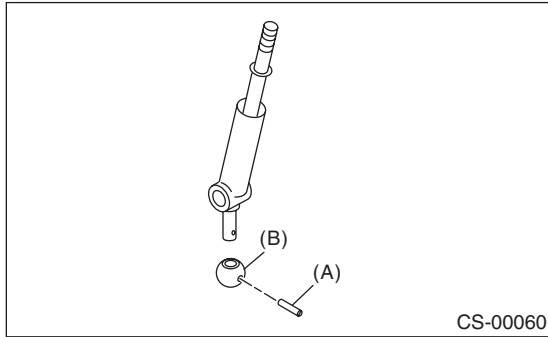
MT Gear Shift Lever

CONTROL SYSTEMS

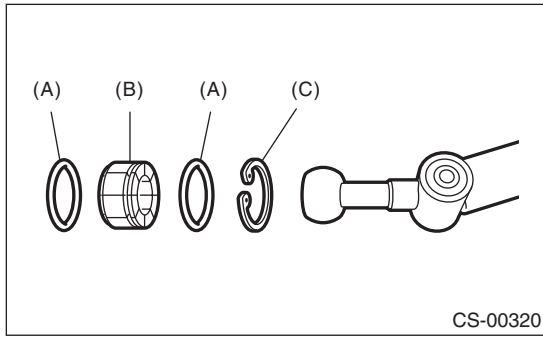
4) Install the snap ring to gear shift lever and install the bushing.

NOTE:

Apply grease to the bushing.

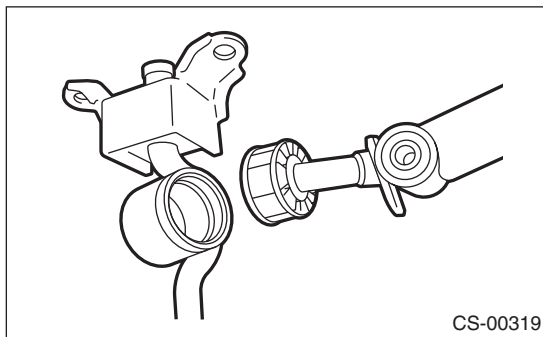


5) Apply grease to the bushing and O-ring, and then install to gear shift lever.

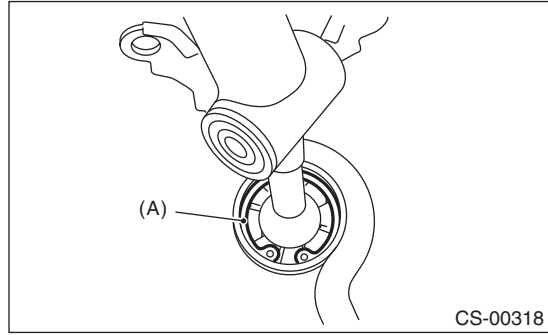


- (A) O-ring
- (B) Bushing
- (C) Snap ring

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



7) Install the washer and snap ring.



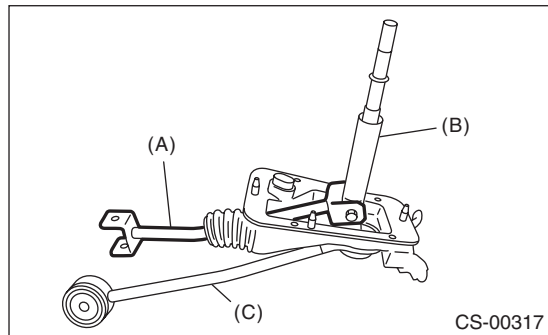
- (A) Snap ring

8) Insert the gear shift lever and rod into boot hole.

9) Install the rod.

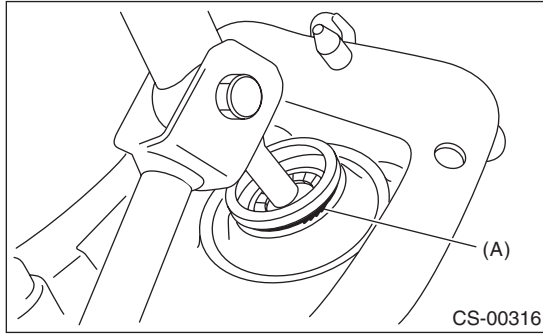
Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)



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

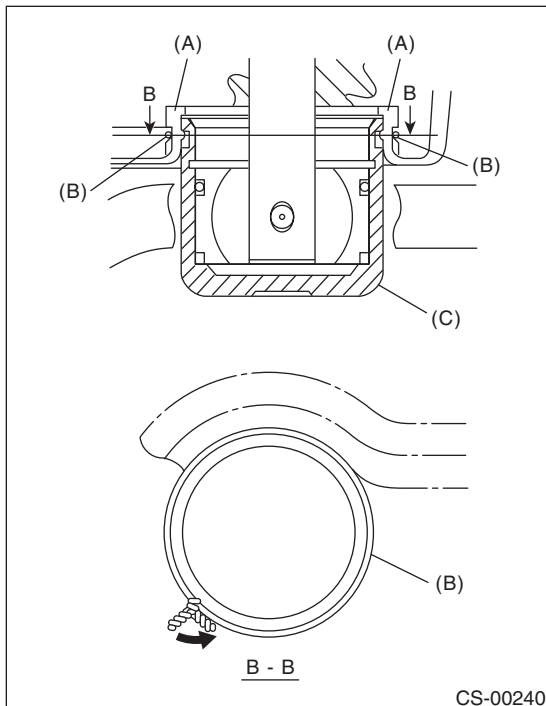
10) Install a new lock wire.



(A) Rod

NOTE:

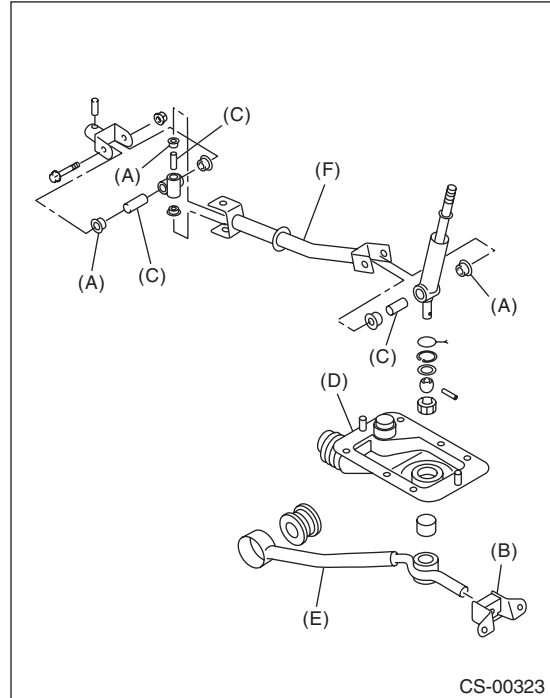
- Install the lock wire to the stay groove.
- Bend the extra wire to the same direction of lock wire winding.



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

E: INSPECTION

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

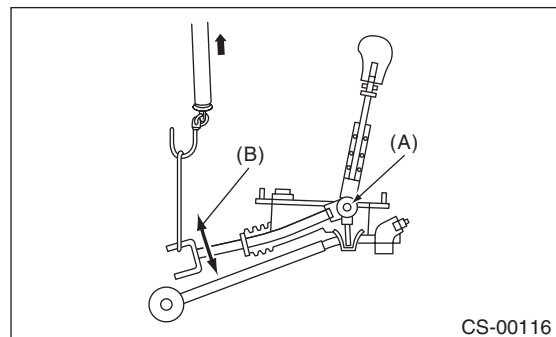


(A) Bushing
(B) Cushion rubber
(C) Spacer
(D) Boot
(E) Stay
(F) Rod

2) Check the swing torque of rod linked with the gear shift lever. If the torque exceeds the specifications, replace the bushing or retighten nuts.

Swing torque:

3.7 N (0.38 kgf, 0.84 lb) or less



(A) Pivot
(B) Swing torque

General Diagnostic Table

CONTROL SYSTEMS

9. General Diagnostic Table

A: INSPECTION

Symptoms	Problem parts
Shift lock does not function.	• Stop light switch • Shift lock solenoid • Body integrated unit
Shift lock cannot be released.	• Stop light switch • Shift lock solenoid • Body integrated unit • Inhibitor switch
Key interlock does not function.	• Key warning switch • "P" range switch • Key lock solenoid • Body integrated unit
Key interlock cannot be released.	• Key warning switch • "P" range switch • Key lock solenoid • Body integrated unit
Starter does not run.	• Inhibitor switch • Select cable • Starter circuit
Back-up light does not illuminate.	• Inhibitor switch • Select cable • Back-up light circuit
Gear can be shifted from "N" to "R" during driving.	• Shift lock solenoid • TCM

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

1. General Description

A: SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Model		Non-turbo		Turbo		
Type		5-forward speeds with synchromesh and 1-reverse				
Transmission gear ratio		1st	3.454			
		2nd	2.062		1.947	
		3rd	1.448		1.366	
		4th	1.088		0.972	
		5th	0.780		0.738	
		Rev.	3.333			
Front reduction gear	Final	Type of gear	Hypoid			
		Gear ratio	4.111		4.444	
Rear reduction gear	Transfer	Type of gear	Helical			
		Gear ratio	1.000			
	Final	Type of gear	Hypoid			
		Gear ratio	4.111		4.444	
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)			
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, bevel gear: 2 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

3. TRANSMISSION CASE ASSEMBLY

Drive pinion shim adjustment

Hypoid gear backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

Drive pinion shim			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension "A" mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 4.00 (0.1524 — 0.1575)	32294AA051	2

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

4. DRIVE PINION ASSEMBLY

Preload adjustment of thrust bearing

Starting torque:

0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

5. REVERSE IDLER GEAR

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance:

6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust the clearance using washers.

Reverse idler gear to transmission case wall clearance

0 — 0.5 mm (0 — 0.020 in)

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

6. SHIFTER FORK AND ROD

Select a suitable shifter fork so that both the coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

Rod end clearance

A: 3rd — 4th — 5th

0.5 — 1.3 mm (0.020 — 0.051 in)

B: 1st — 2nd — 3rd — 4th

0.4 — 1.4 mm (0.016 — 0.055 in)

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approaches 1st gear by 0.2 mm (0.008 in).
32804AA070	No mark	Standard
32804AA080	3	Approaches 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approaches 4th gear by 0.2 mm (0.008 in).
32810AA071	No mark	Standard
32810AA101	3	Approaches 3rd gear by 0.2 mm (0.008 in)

5th shifter fork (non-turbo) / Identifying paint (pink)		
Part No.	Mark	Remarks
32812AA201	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA211	No mark	Standard
32812AA221	9	Moves away from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (turbo) / Identifying paint (blue)		
Part No.	Mark	Remarks
32812AA231	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA241	No mark	Standard
32812AA251	9	Moves away from 5th gear by 0.2 mm (0.008 in).

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

7. TRANSFER CASE

Neutral position adjustment

Adjusting shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
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.

8. EXTENSION ASSEMBLY

Tapered roller bearing preload (amount of standard protrusion):

0.15 — 0.20 mm (0.006 — 0.008 in)

NOTE:

Make sure to set between the preload range.

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

Thrust washer to center differential side clearance:

0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

9. FRONT DIFFERENTIAL

Bevel gear to pinion backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

10. TRANSFER DRIVE GEAR

Snap ring (Outer-30) to ball bearing clearance:

0.01 — 0.15 mm (0.0004 — 0.0059 in)

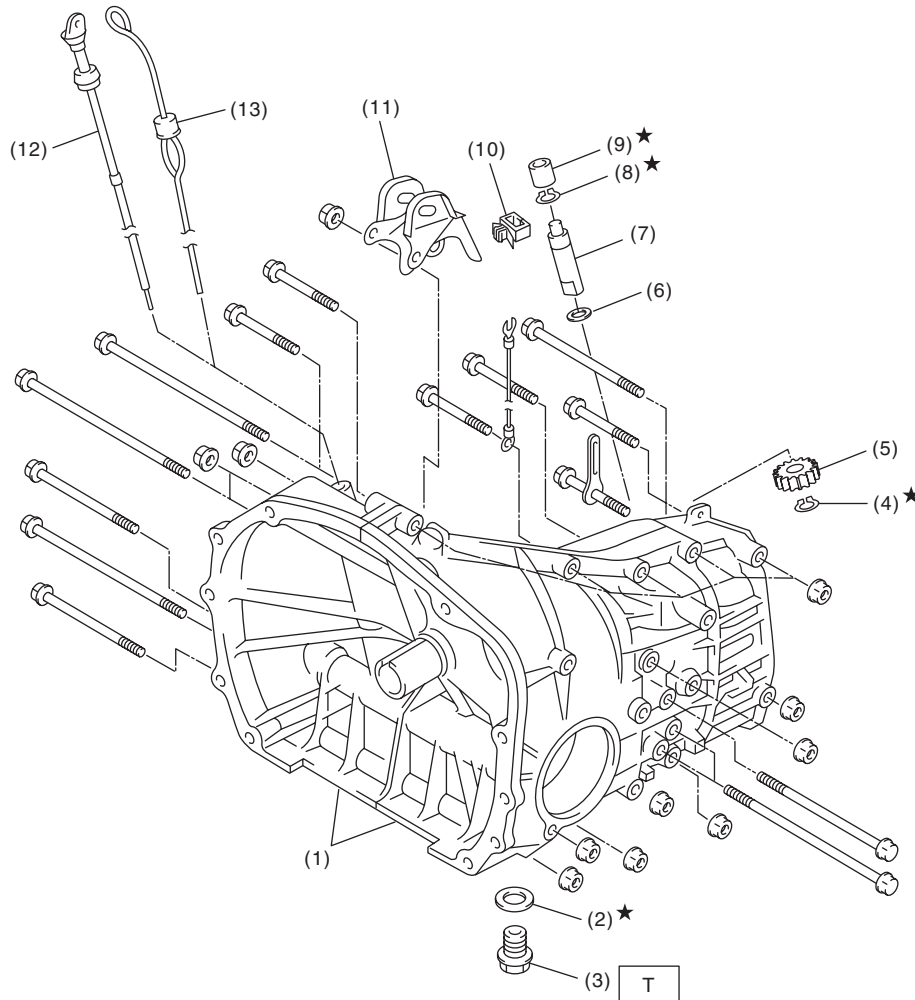
Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

B: COMPONENT

1. TRANSMISSION CASE



MT-01395

- (1) Transmission case ASSY
- (2) Gasket
- (3) Drain plug
- (4) Snap ring (Outer)
- (5) Speedometer driven gear
- (6) Washer

- (7) Speedometer shaft
- (8) Snap ring (Outer)
- (9) Oil seal
- (10) Clamp
- (11) Pitching stopper bracket
- (12) Oil level gauge (Non-turbo model)

- (13) Oil level gauge (Turbo model)

Tightening torque: N·m (kgf-m, ft-lb)

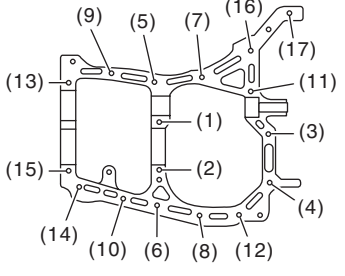
T: 44 (4.5, 32.5) (Aluminum gasket)

70 (7.1, 51.6) (Copper gasket)

General Description

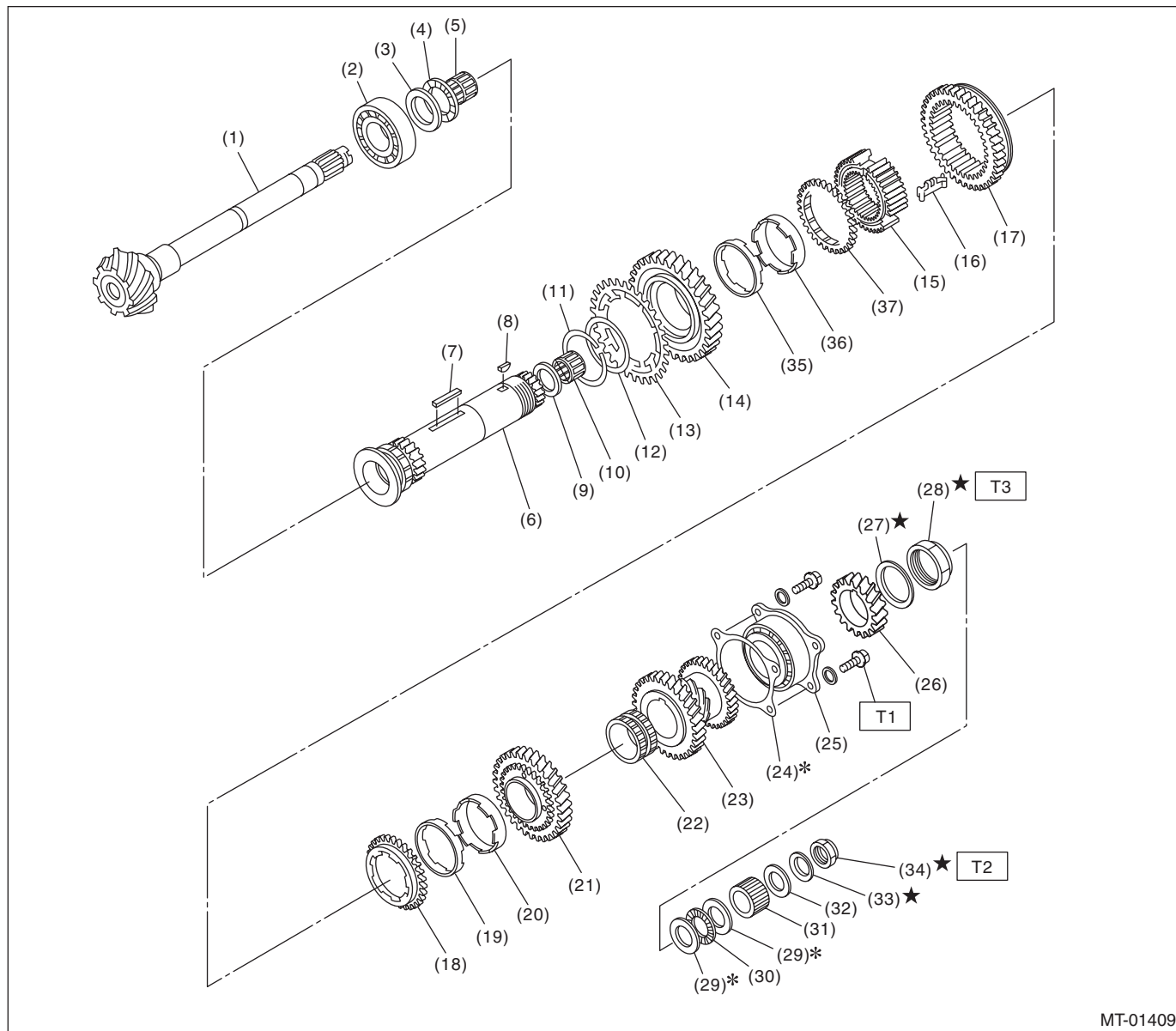
MANUAL TRANSMISSION AND DIFFERENTIAL

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, 28.9)

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DRIVE PINION ASSEMBLY



- | | | |
|---|-------------------------------|---|
| (1) Drive pinion shaft | (15) 1st-2nd synchronizer hub | (29) Washer |
| (2) Roller bearing | (16) Insert key | (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)
(Non-turbo model) | (25) Roller bearing | Tightening torque:N.m (kgf-m, ft-lb) |
| | (26) 5th driven gear | T1: 30 (3.1, 22.1) |
| (12) Washer (Non-turbo model) | (27) Lock washer | T2: 120 (12.2, 88.5) |
| (13) Sub-gear (Non-turbo model) | (28) Lock nut | T3: 260 (26.5, 191.8) |
| (14) 1st driven gear | | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 30 (3.1, 22.1)

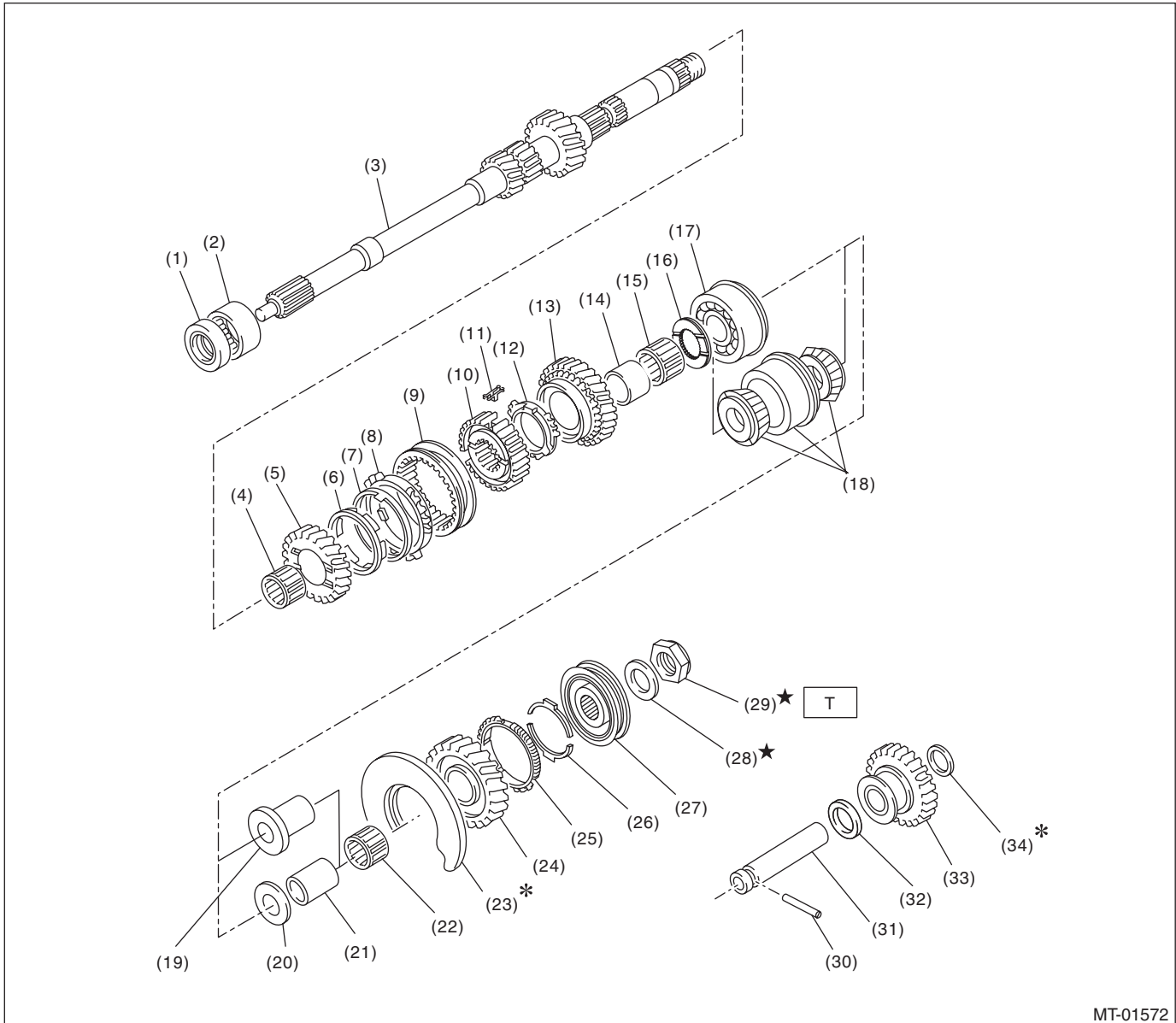
T2: 120 (12.2, 88.5)

T3: 260 (26.5, 191.8)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

3. MAIN SHAFT ASSEMBLY (SINGLE-RANGE)



MT-01572

- | | | |
|----------------------------------|--|-------------------------------|
| (1) Oil seal | (15) Needle bearing | (25) 5th baulk ring |
| (2) Needle bearing | (16) 4th gear thrust washer | (26) Baulk lever |
| (3) Transmission main shaft | (17) Ball bearing (Non-turbo model) | (27) 5th hub & sleeve No. 2 |
| (4) Needle bearing | (18) Taper roller bearing (Turbo model) | (28) Lock washer |
| (5) 3rd drive gear | (19) 5th needle bearing race (Turbo model) | (29) Lock nut |
| (6) Inner baulk ring | (20) 5th gear thrust washer (Non-turbo model) | (30) Straight pin |
| (7) 3rd synchro cone | (21) 5th needle bearing race (Non-turbo model) | (31) Reverse idler gear shaft |
| (8) Outer baulk ring | (22) Needle bearing | (32) Washer |
| (9) 3rd-4th coupling sleeve | (23) Main shaft rear plate | (33) Reverse idler gear |
| (10) 3rd-4th synchronizer hub | (24) 5th drive gear | (34) Washer |
| (11) 3rd-4th shifting insert key | | |
| (12) 4th baulk ring | | |
| (13) 4th drive gear | | |
| (14) 4th needle bearing race | | |

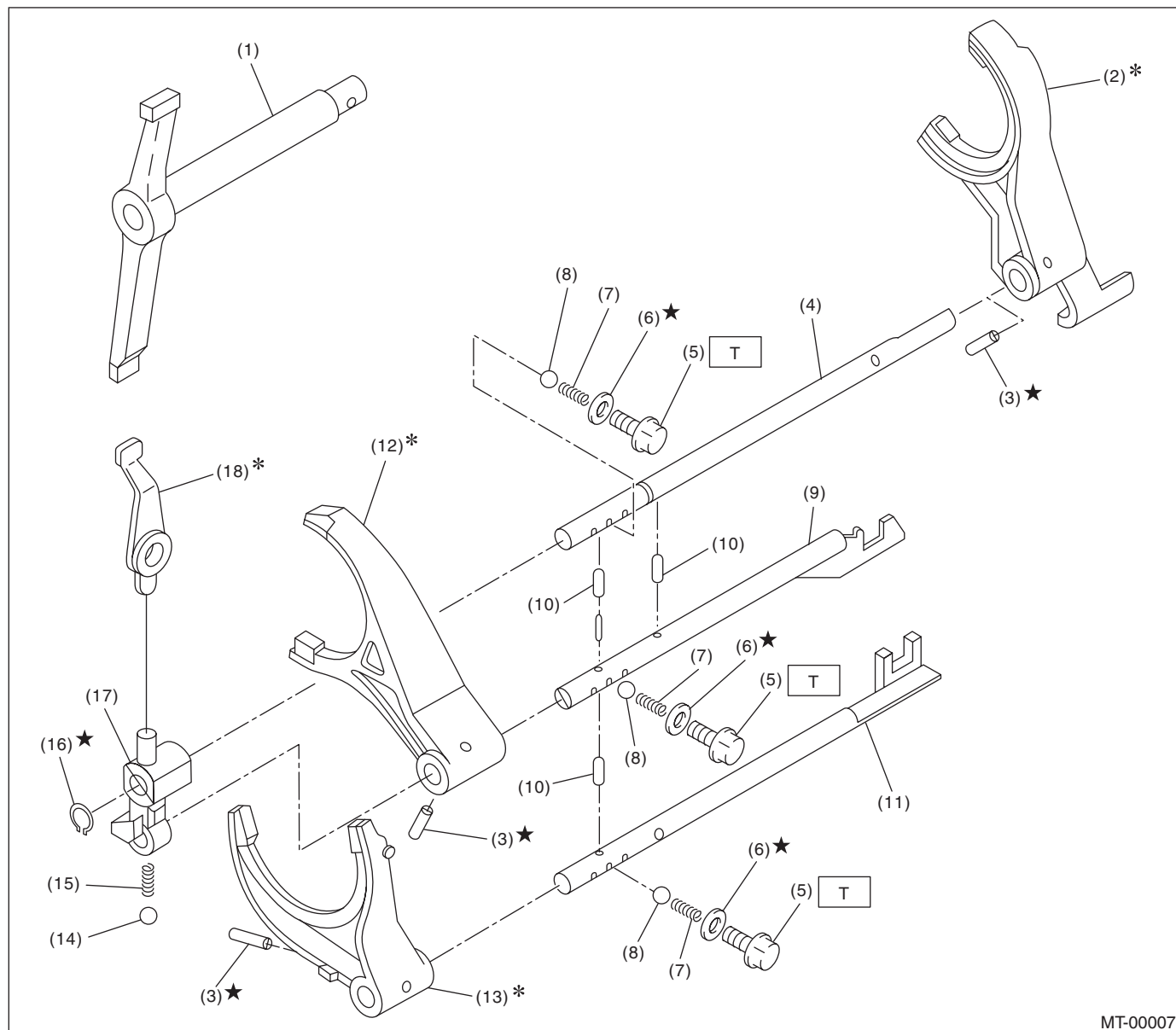
Tightening torque: N·m (kgf-m, ft-lb)

T: 120 (12.2, 88.5)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

4. SHIFTER FORK AND SHIFTER ROD



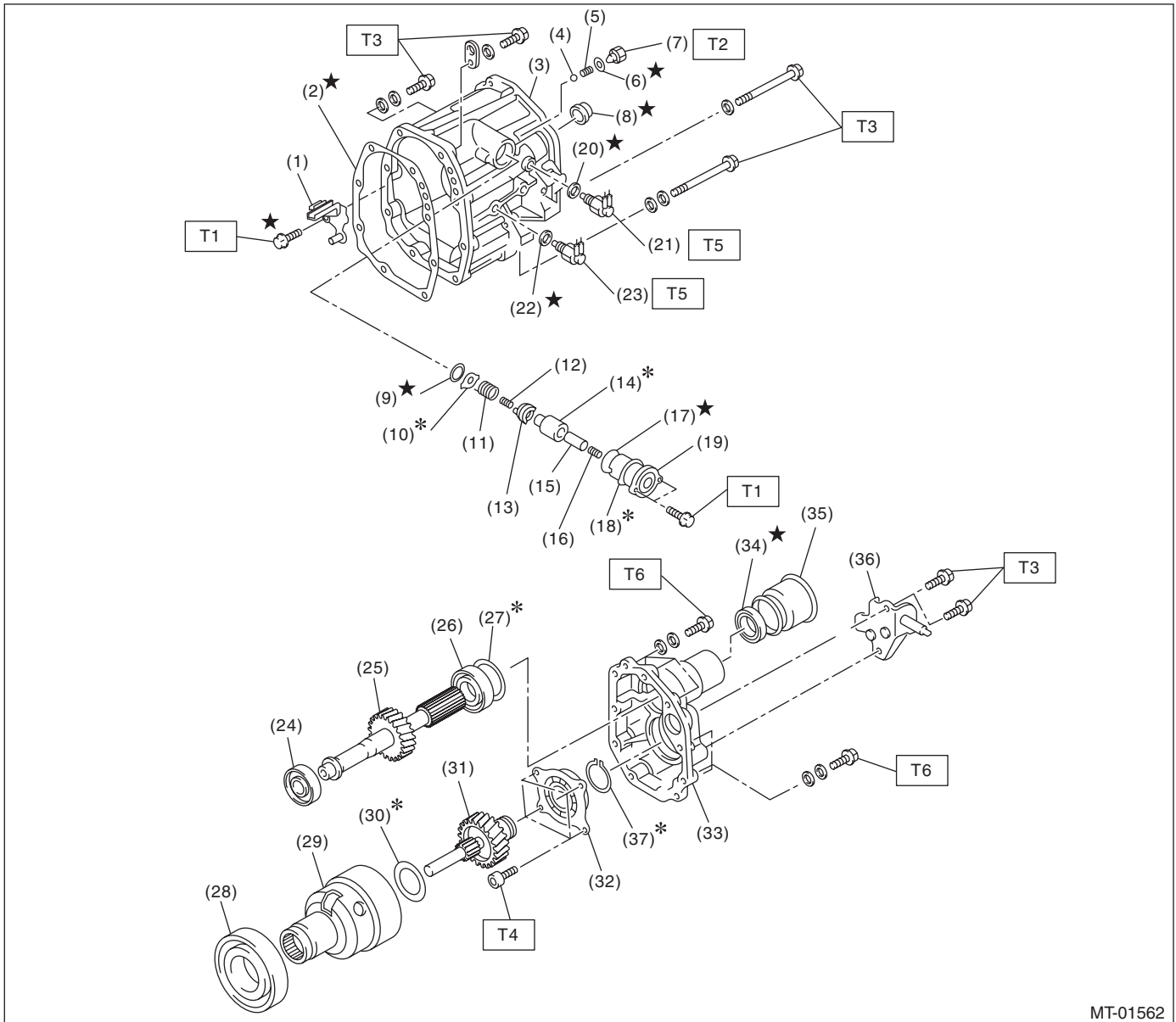
- | | | |
|--------------------------|---------------------------|----------------------------|
| (1) Shifter arm | (8) Ball | (15) Spring |
| (2) 5th shifter fork | (9) 3rd-4th fork rod | (16) Snap ring (Outer) |
| (3) Straight pin | (10) Interlock plunger | (17) Reverse fork rod arm |
| (4) Reverse 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)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

5. TRANSFER CASE AND EXTENSION



MT-01562

(1) Oil guide	(16) Return spring	(31) Transfer drive gear
(2) Gasket	(17) O-ring	(32) Ball bearing
(3) Transfer case	(18) Adjusting select shim	(33) Extension case
(4) Ball	(19) Reverse check sleeve	(34) Oil seal
(5) Reverse accent spring	(20) Gasket	(35) Dust cover
(6) Gasket	(21) Neutral position switch	(36) Shift bracket
(7) Plug	(22) Gasket	(37) Snap ring
(8) Oil seal	(23) Back-up light switch	
(9) Snap ring (Inner)	(24) Roller bearing	
(10) Reverse check plate	(25) Transfer driven gear	
(11) Reverse check spring	(26) Roller bearing	
(12) Reverse return spring	(27) Adjusting washer	
(13) Reverse check cam	(28) Ball bearing	
(14) Reverse accent shaft	(29) Center differential	
(15) Return spring cap	(30) Adjusting washer	

Tightening torque:N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 9.75 (1.0, 7.2)

T3: 24.5 (2.5, 18.1)

T4: 26 (2.7, 19.2)

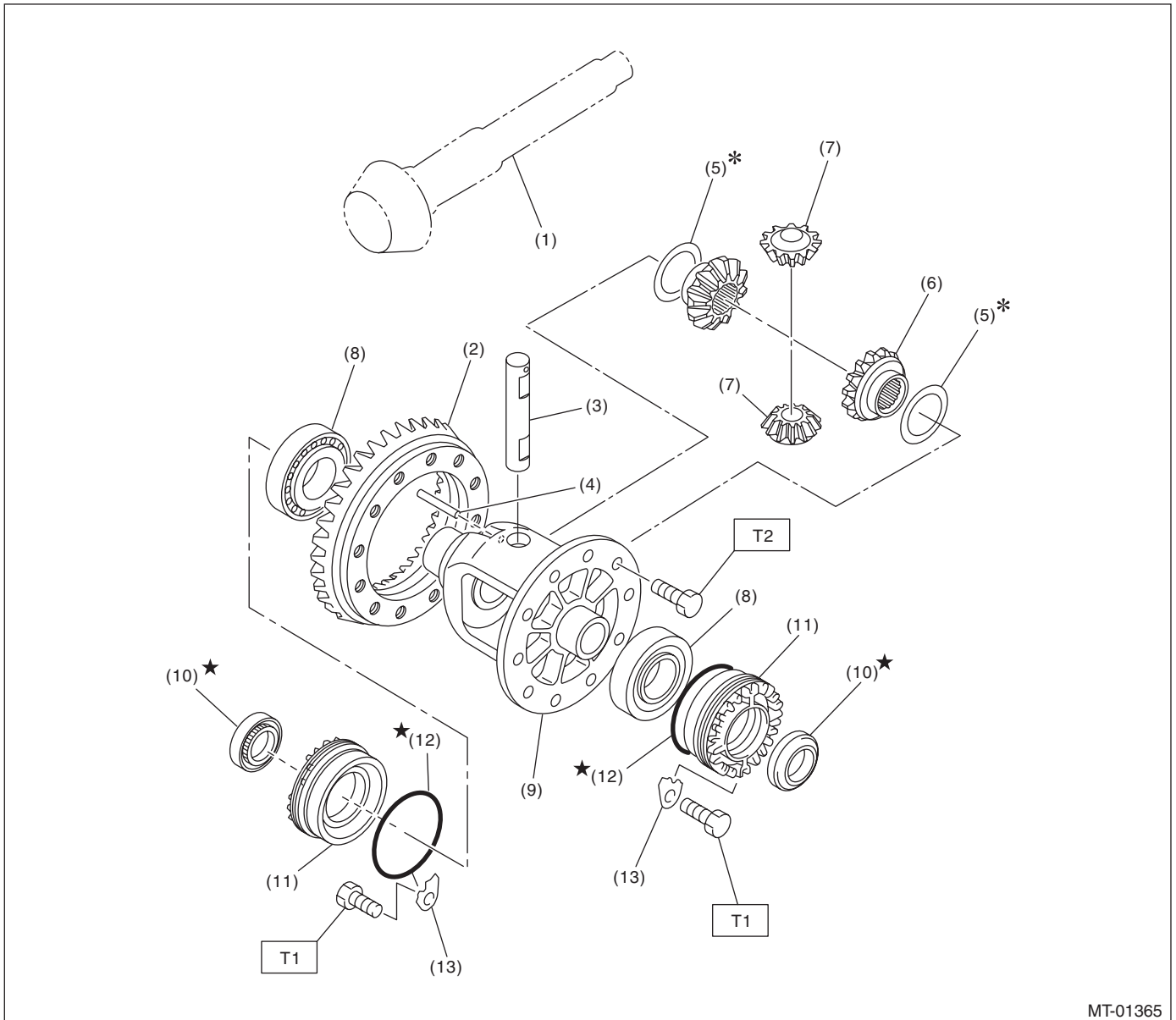
T5: 32.3 (3.3, 23.8)

T6: 40 (4.1, 29.5)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

6. FRONT DIFFERENTIAL



MT-01365

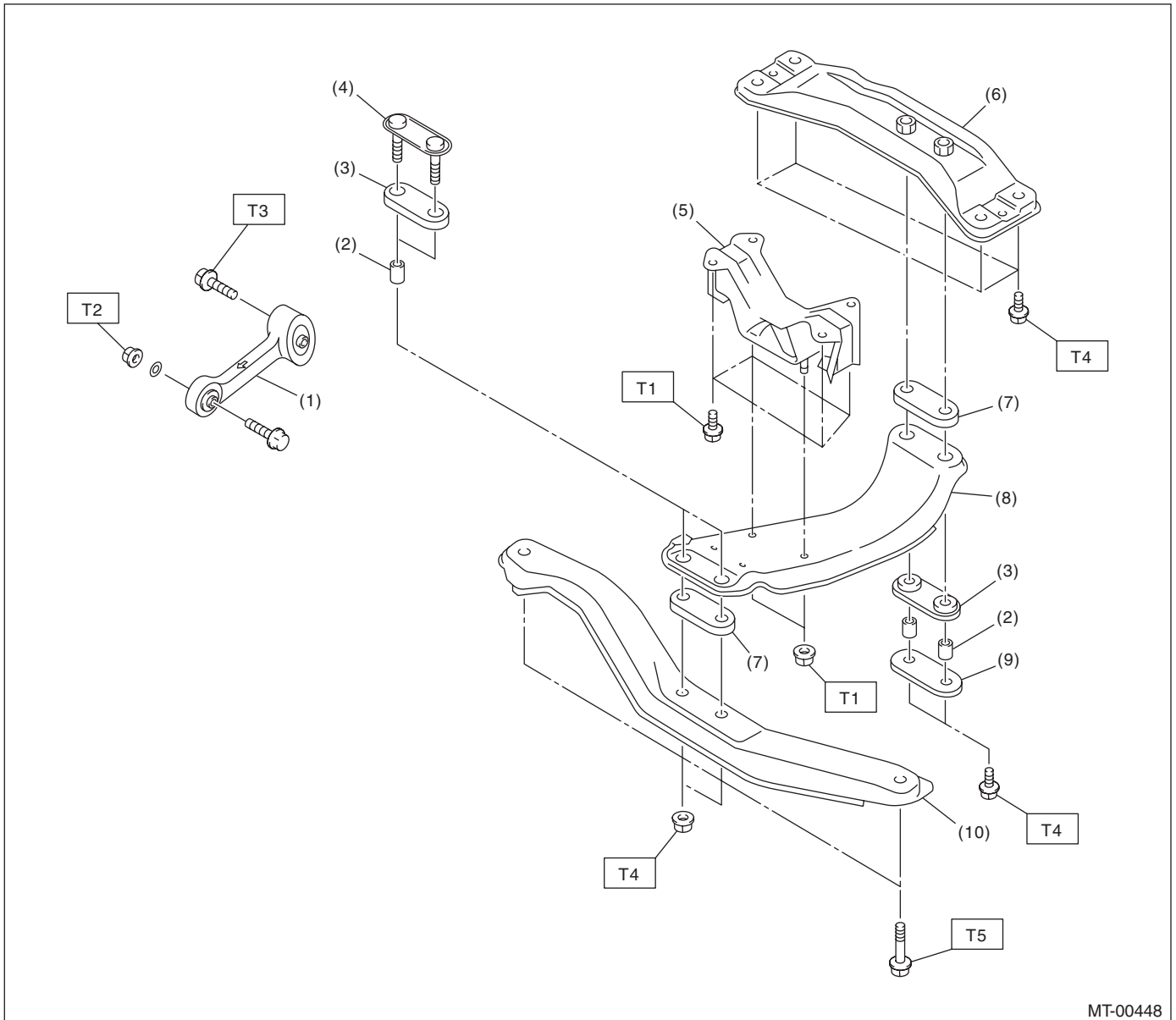
- | | | |
|-----------------------------|---------------------------------|--------------------------|
| (1) Drive pinion shaft | (7) Differential bevel pinion | (13) Retainer lock plate |
| (2) Hypoid driven gear | (8) Roller bearing | |
| (3) Pinion shaft | (9) Differential case | |
| (4) Straight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

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.4)

T2: 62 (6.3, 45.6)

7. TRANSMISSION MOUNTING



MT-00448

- | | |
|---------------------------------|--------------------------|
| (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 | |
| (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

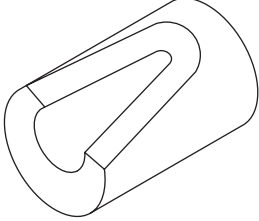
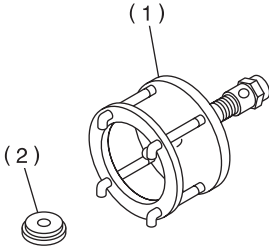
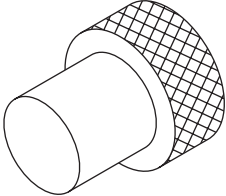
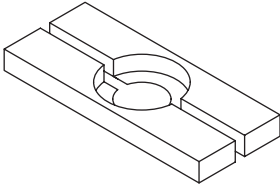
- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the problem. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine gear oil, grease or the equivalent. Do not mix gear oil, grease, etc. with those of different grades or from other 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 shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the liquid gasket.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

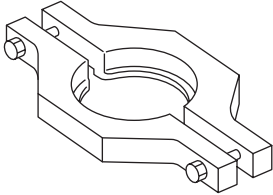
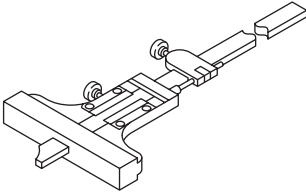
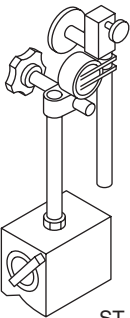
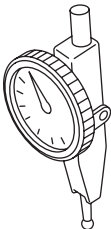
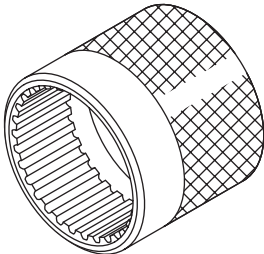
D: PREPARATION TOOL

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.

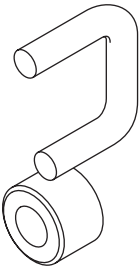
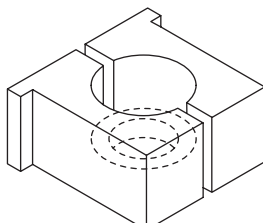
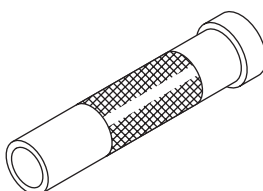
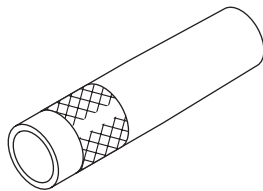
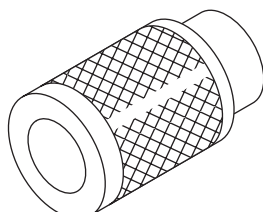
General Description

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-498147000	498147000	DEPTH GAUGE	Used for adjusting the main shaft axial end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between the side gear and pinion, and the hypoid gear. • Used together with 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-498247400	498427400	STOPPER	Used for securing the drive pinion shaft assembly and the driven gear assembly when removing the drive pinion shaft assembly lock nut.

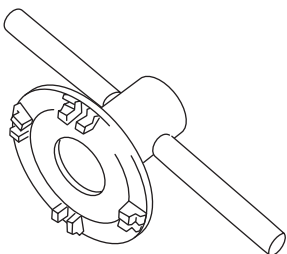
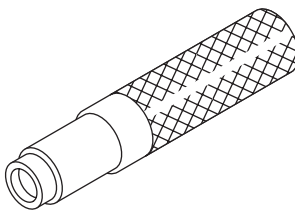
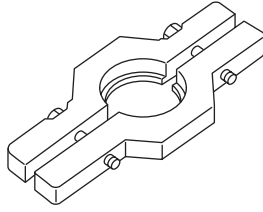
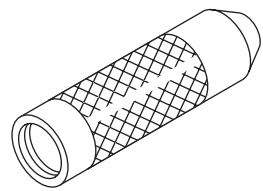
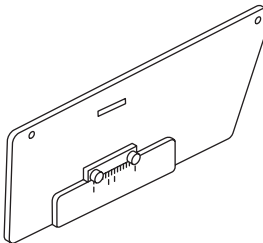
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498787100	498787100	MAIN SHAFT STOPPER	Used for removing and installing the lock nut of the transmission main shaft.
 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).

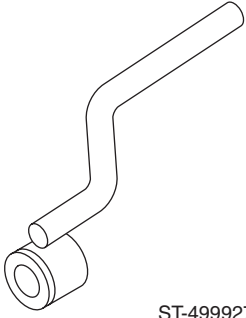
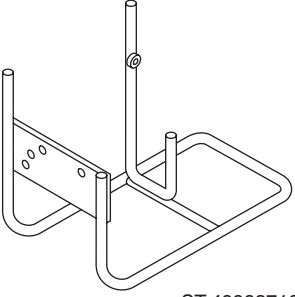
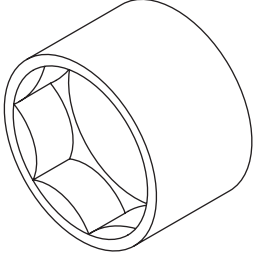
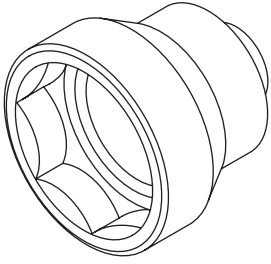
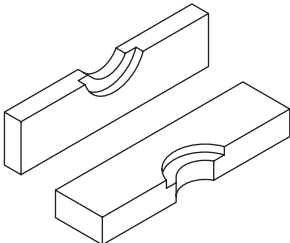
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	- Used for removing and installing the differential side retainer. - WRENCH ASSEMBLY (499787000) can also be used.
 ST-499827000	499827000	PRESS	Used for installing the speedometer oil seal when attaching the speedometer cable to the transmission.
 ST-499857000	499857000	5TH DRIVEN GEAR REMOVER	Used for removing the 5th driven gear.
 ST-499877000	499877000	RACE 4-5 INSTALLER	- Used for installing the 4th needle bearing race and ball bearing onto the transmission main shaft. - Used together with REMOVER (899714110).
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting the drive pinion shim.

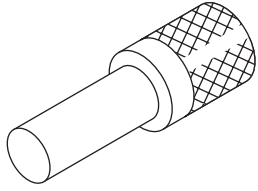
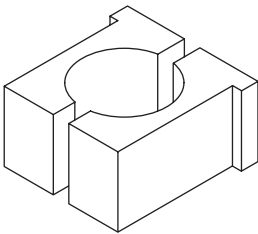
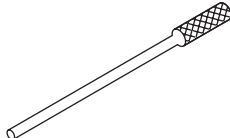
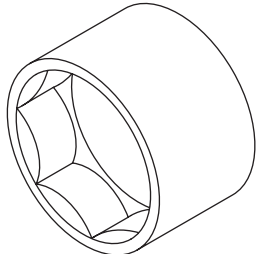
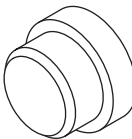
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499927100	499927100	HANDLE	Used for fitting the transmission main shaft.
 ST-499937100	499937100	TRANSMISSION STAND	Used for disassembling and assembling the transmission.
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing the driven pinion lock nut and main shaft lock nut.
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing the driven gear assembly lock nut.
 ST-899714110	899714110	REMOVER	Used for fixing the transmission main shaft, drive pinion, rear drive shaft.

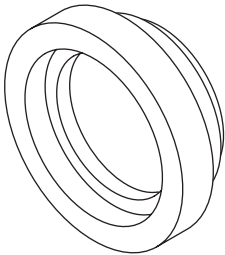
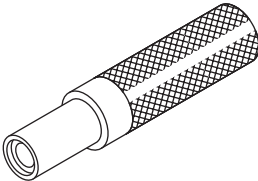
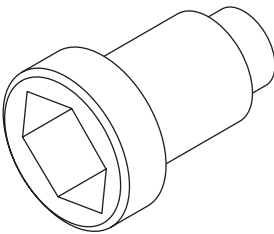
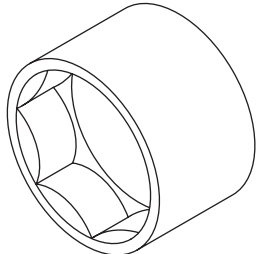
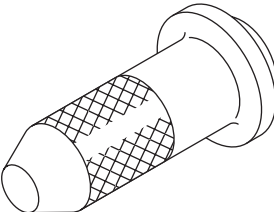
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899864100	899864100	REMOVER	Used for removing transmission main shaft and drive pinion parts.
 ST-899884100	899884100	HOLDER	Used for tightening the lock nut on the sleeve.
 ST-899904100	899904100	REMOVER	Used for removing and installing the straight pin.
 ST-899988608	899988608	SOCKET WRENCH (27)	Used for removing and installing the drive pinion lock nut.
 ST-398497701	398497701	ADAPTER	- Used for installing roller bearing onto the differential case. - Used together with INSTALLER (499277100).

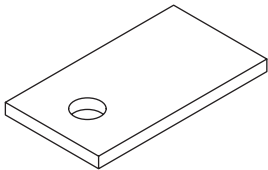
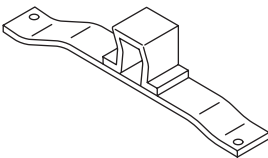
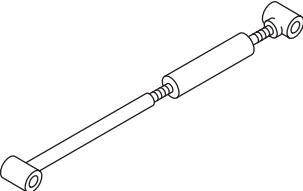
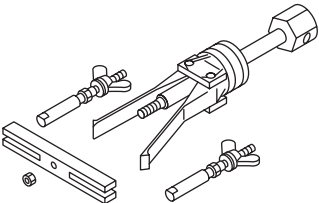
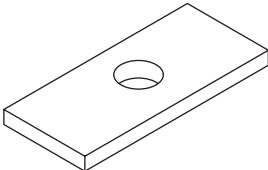
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587000	499587000	INSTALLER	Used for installing the driven gears to the driven shaft.
 ST-899824100	899824100	PRESS	Used for installing the speedometer shaft oil seal.
 ST-499987100	499987100	SOCKET WRENCH (35)	Used for removing and installing the drive pinion lock nut.
 ST-899984103	899984103	SOCKET WRENCH (35)	Used for removing and installing the drive pinion lock nut.
 ST-498057300	498057300	INSTALLER	Used for installing the extension oil seal.

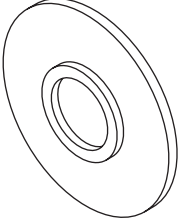
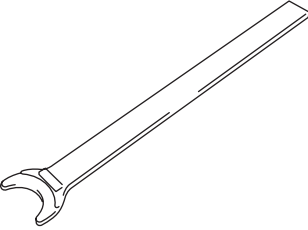
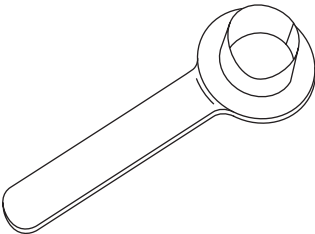
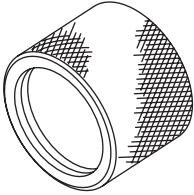
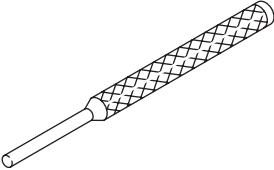
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498255400	498255400	PLATE	Used for measuring backlash.
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting the engine.
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting the engine.
 ST-398527700	398527700	PULLER ASSY	• Used for removing the extension case roller bearing. • Used for removing the front differential side retainer bearing outer race. • Used for removing the front differential side retainer oil seal.
 ST-398643600	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST28399SA000	28399SA000	FRONT DRIVE SHAFT REMOVER	Used for removing the front drive shaft. (Common for the MT model, and the AT model)
 ST28399SA010	28399SA010	FRONT DRIVE SHAFT 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	Used for removing and installing the straight pin.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

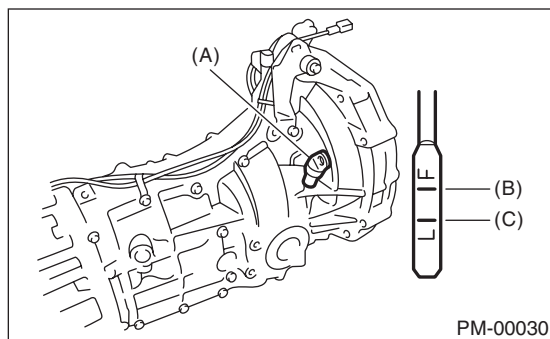
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
TORX® bit T70	Used for installing and removing the transmission gear oil drain plug.

2. Transmission Gear Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Turn the ignition switch to OFF, and wait until the engine cools.
- 3) Remove the oil level gauge and wipe it clean.
- 4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and 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:

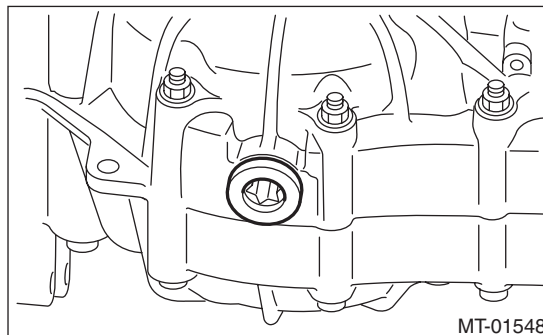
- Immediately after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.
 - Be careful not to spill the transmission gear oil on exhaust pipe, to prevent emitting smoke or causing a fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
- 4) Using the TORX[®] bit T70, tighten the transmission gear oil drain plug.

NOTE:

- Tighten the drain plug of the transmission gear oil after draining the transmission gear oil.
- Use a new gasket.

Tightening torque:

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



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

RECOMMENDED GEAR OIL

GL-5 (75W-90) or equivalent

Gear oil capacity

3.5 ℓ (3.7 US qt, 3.1 Imp qt)

- 7) Measure the transmission gear oil level to check that it is within specifications.

CAUTION:

When inserting the level gauge into the transmission, align the protrusion on the top part of the level gauge with the notch in the gauge hole.

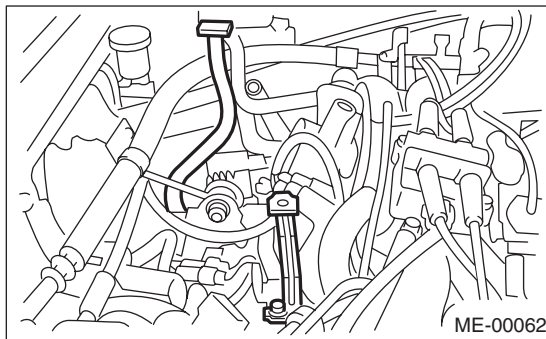
Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

3. Manual Transmission Assembly

A: REMOVAL

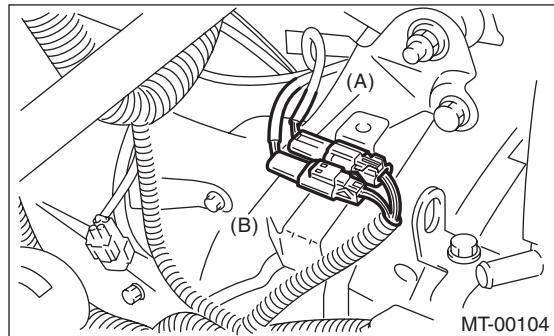
- 1) Set the vehicle on a lift.
- 2) Open the front hood fully, and support with stay.
- 3) Disconnect the ground cable from the battery.
- 4) Drain transmission gear oil completely.
<Ref. to 5MT-25, REPLACEMENT, Transmission Gear Oil.>
- 5) Remove the intake boot and air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 6) Remove the air intake chamber stay. (Non-turbo model)



- 7) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>

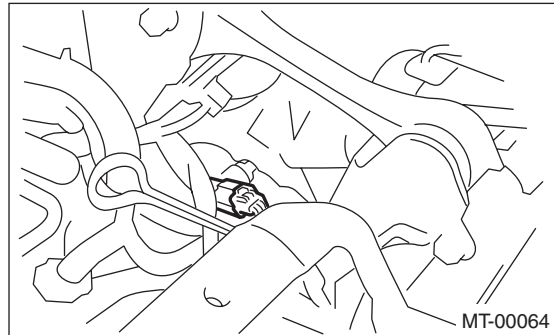
- 8) Disconnect the following connectors and transmission cables.

- (1) Neutral position switch connector
 - (2) Back-up light switch connector
- Non-turbo model

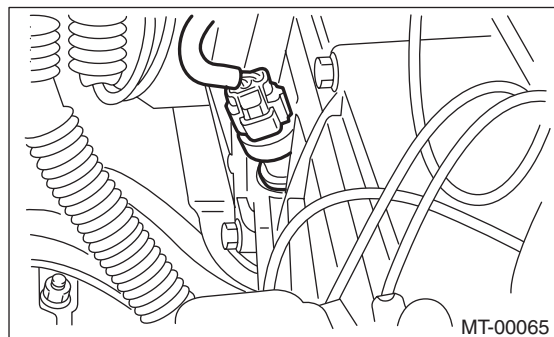


- (A) Neutral position switch connector
(B) Back-up light switch connector

- Turbo model



- (3) Vehicle speed sensor connector

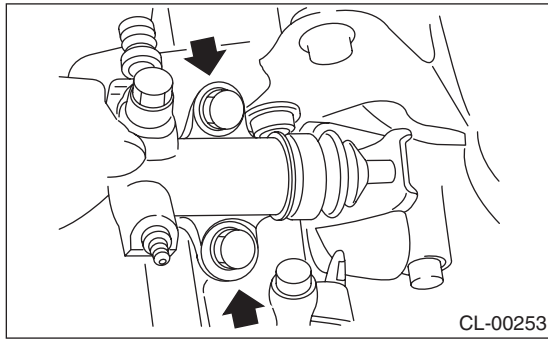


- 9) Remove the starter. <Ref. to SC(H4SO)-6, REMOVAL, Starter.>

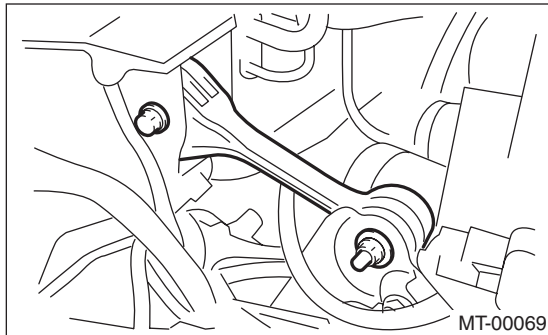
Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

- 10) Remove the operating cylinder from transmission, and suspend on a wire.



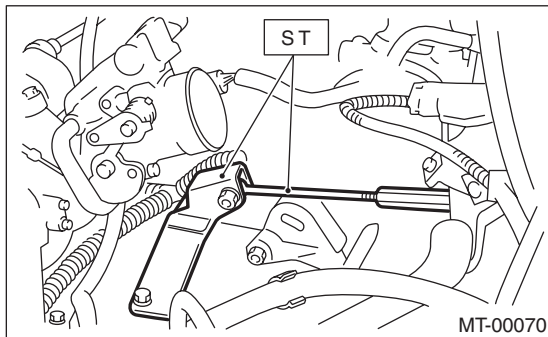
- 11) Remove the pitching stopper.



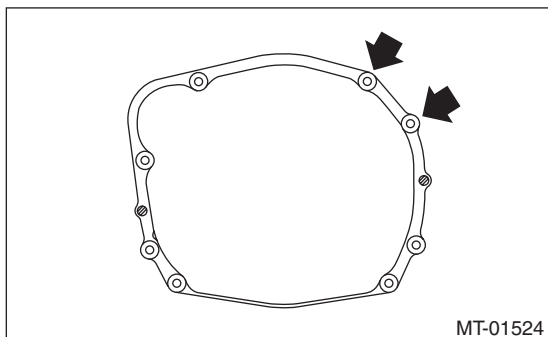
- 12) Set the ST.

ST 41099AA010 ENGINE SUPPORT BRACKET

ST 41099AA020 ENGINE SUPPORT



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



- 14) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>

- 15) Remove the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>

- 16) Remove the rear exhaust pipe and muffler.

• Non-turbo model

<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>

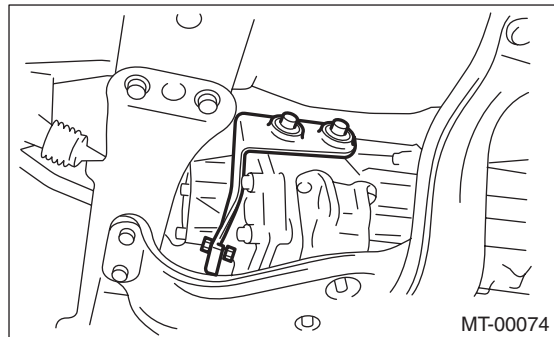
• Turbo model

<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>

CAUTION:

When removing the exhaust pipes, be careful each exhaust pipe does not drop out.

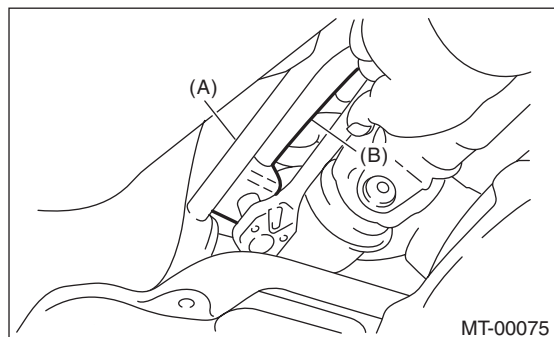
- 17) Remove the hanger bracket from the right side of transmission.



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

- 19) Remove the gear shift rod and the stay from the transmission.

- (1) Disconnect the stay from the transmission.
(2) Remove the gear shift rod from the transmission.



(A) Stay

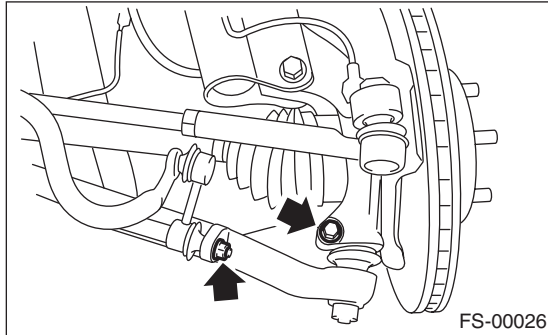
(B) Gear shift rod

- 20) Separate the stabilizer link from the transverse link.

Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

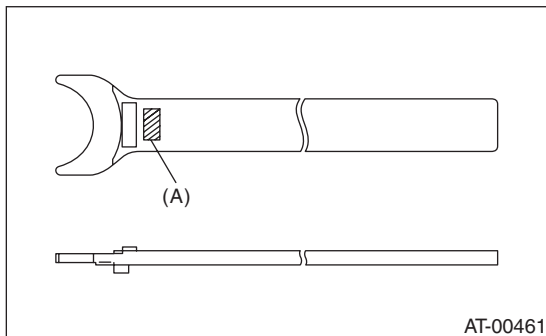
21) Remove the bolt securing the ball joint of the transverse link to the housing, then separate the transvers link and the housing.



22) Using the ST, remove the front drive shaft from the transmission side.

NOTE:

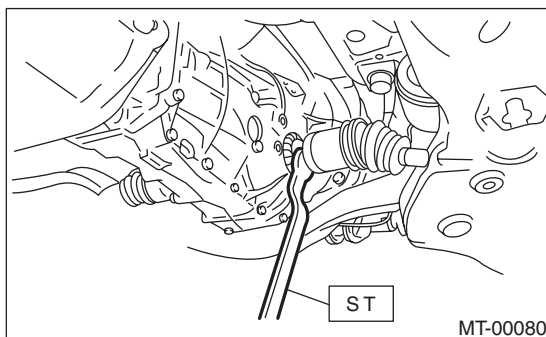
- Face letters "MT" on the handle of the ST to the transmission side.



(A) Letter "MT"

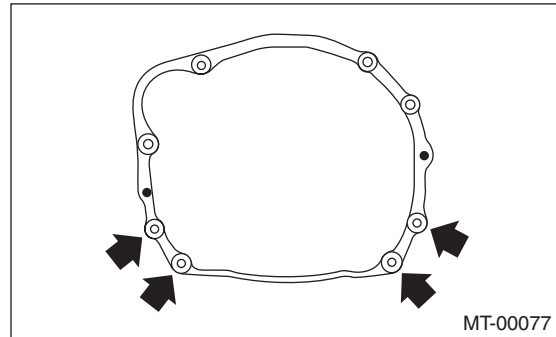
- Keep an angle so that the protrusion of the ST touches the transmission case during the operation.

ST 28399SA000 FRONT DRIVE SHAFT REMOVER



23) Hold the transmission side joint (AARi) of front drive shaft by hand and extract the housing from the transmission by pressing it outside so as not to stretch the boot on the AARi side.

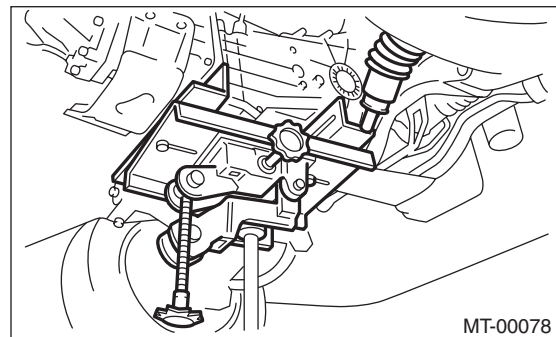
24) Remove the bolts and nuts which hold lower side of transmission to engine.



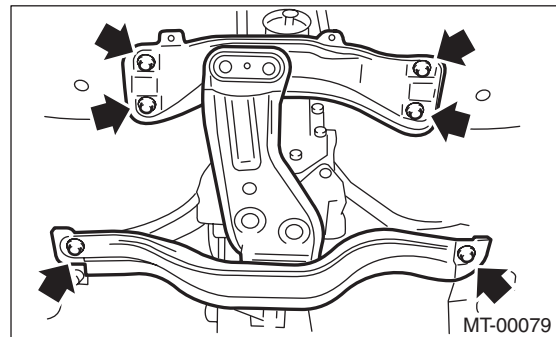
25) Place the transmission jack under the transmission.

CAUTION:

Always support the transmission case with a transmission jack.



26) Remove the front crossmember and rear crossmember from the vehicle.



27) Tighten the turnbuckle of the ST while lowering the transmission jack to tilt the engine assembly towards the back.

28) Remove the transmission.

NOTE:

Move the transmission jack towards the rear until main shaft is withdrawn from the clutch cover.

29) Separate the transmission assembly from the transmission cushion rubber.

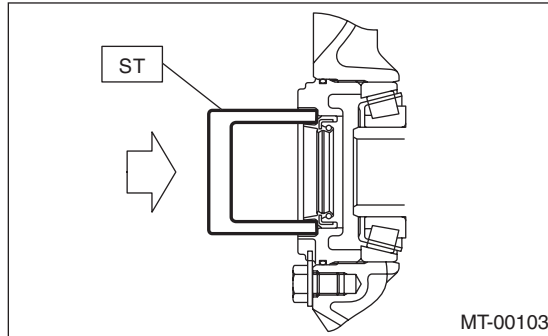
B: INSTALLATION

1) Replace the differential side retainer oil seal with a new part. <Ref. to 5MT-35, REPLACEMENT, Differential Side Retainer Oil Seal.>

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:

Be sure to replace the differential side retainer oil seal after the removing the front drive shaft.



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

Tightening torque:

35 N·m (3.6 kgf-m, 25.8 ft-lb)

3) Install the transmission onto the engine.

- (1) Gradually raise the transmission with the transmission jack.
- (2) Engage at the spline section.

NOTE:

Be careful not to hit the main shaft against the clutch cover.

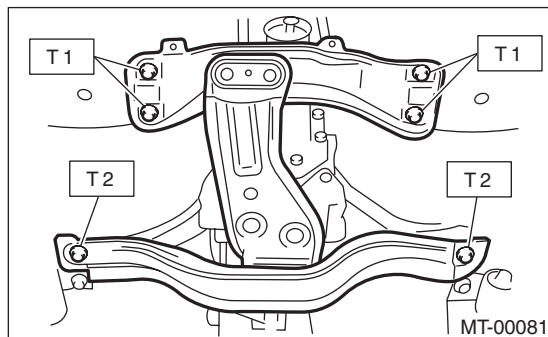
4) Loosen the turnbuckle of the ST while raising the transmission jack to return the engine to its original position.

5) 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)

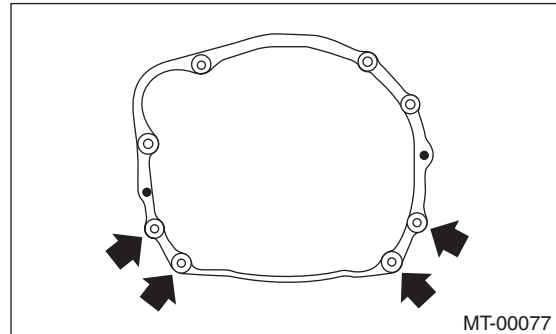


6) Take out the transmission jack.

7) Tighten the nuts and bolts which holds the lower side of the transmission to the engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



8) Connect the engine and transmission.

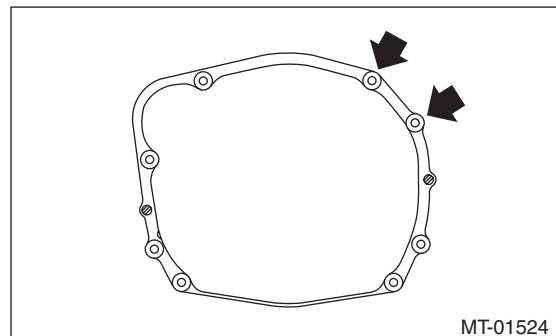
(1) Install the starter.

<Ref. to SC(H4SO)-6, INSTALLATION, Starter.>

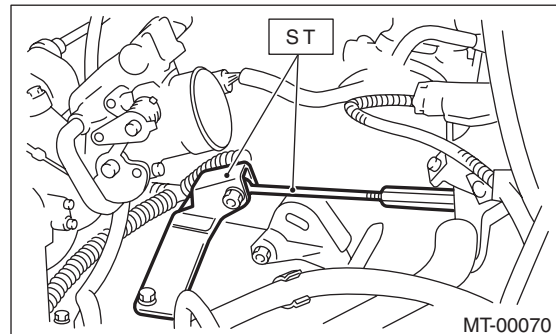
(2) Tighten the bolts which holds the upper side of the transmission to the engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



9) Remove the ST.



Manual Transmission Assembly

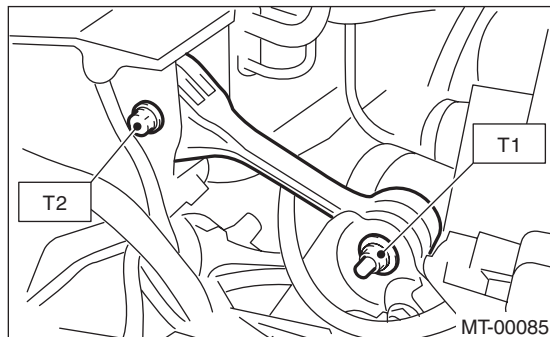
MANUAL TRANSMISSION AND DIFFERENTIAL

10) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



11) Lift up the vehicle.

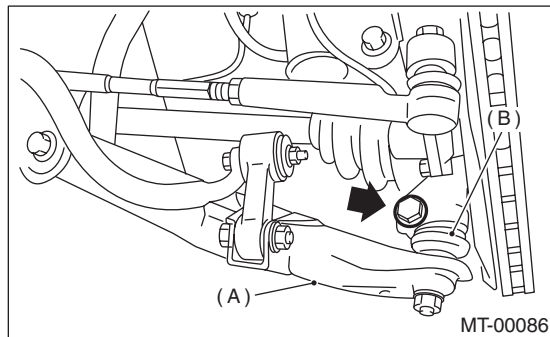
12) Install the front drive shaft into the transmission. <Ref. to DS-31, INSTALLATION, Front Drive Shaft.>

ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR

13) Insert the ball joints of the transverse link into the housing, then tighten the installing bolts.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



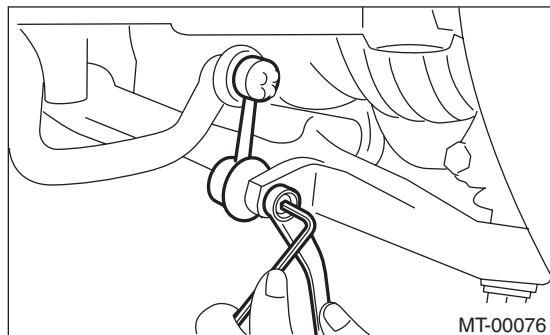
(A) Transverse link

(B) Ball joint

14) Attach the stabilizer link to the transverse link.

Tightening torque:

45 N·m (4.6 kgf-m, 33.2 ft-lb)

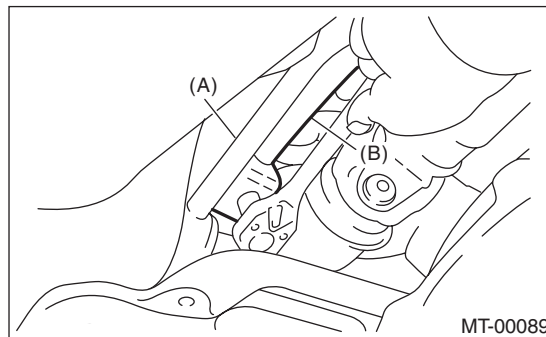


15) Attach the gear shift rod and stay.

(1) Attach the gear shift rod to the transmission.

Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)



(A) Stay

(B) Gear shift rod

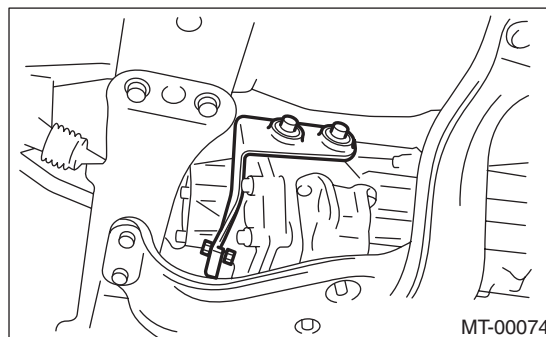
(2) Attach the stay to the transmission.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

16) Install the propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

17) Install the hanger bracket on the right side of the transmission.



18) Install the rear exhaust pipe and muffler.

- Non-turbo model

<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

- Turbo model

<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

19) Install the front exhaust pipe and the center exhaust pipe. (Non-turbo model)

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>

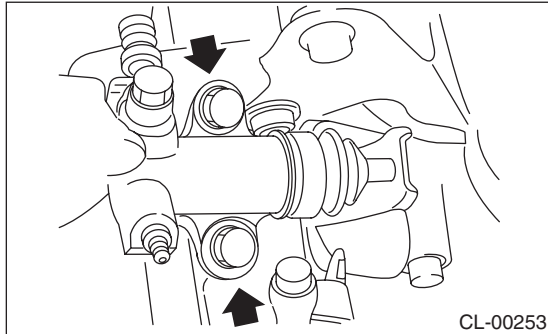
20) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

21) Install the under cover.

22) Install the operating cylinder.

Tightening torque:

37 N·m (3.8 kgf-m, 27.5 ft-lb)



23) Connect the following connectors.

- (1) Transmission ground cable

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)

- (2) Vehicle speed sensor connector
- (3) Neutral position switch connector
- (4) Back-up light switch connector

24) Install the air intake chamber stay.

25) Install the intake boot and air intake chamber.
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

26) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

27) Pour transmission gear oil through the gauge hole. <Ref. to 5MT-25, REPLACEMENT, Transmission Gear Oil.>

28) Connect the ground cable to the battery.

Transmission Mounting System

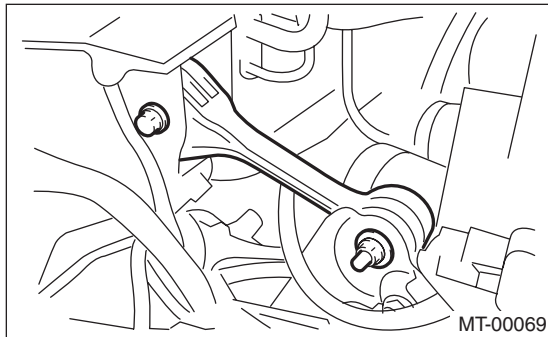
MANUAL TRANSMISSION AND DIFFERENTIAL

4. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

- 1) Disconnect the ground cable from the battery.
- 2) Remove the intake boot and air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 4) Remove the pitching stopper.



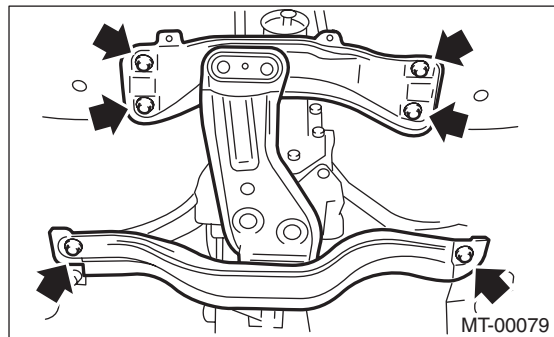
2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the ground cable from the battery.
- 2) Jack-up the vehicle and support it with rigid racks.
- 3) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
- 4) Remove the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 5) Remove the rear exhaust pipe and muffler.
 - Non-turbo model <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 - Turbo model <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 6) Set the transmission jack under the transmission body.

CAUTION:

Always support the transmission case with a transmission jack.

- 7) Remove the front crossmember and the rear crossmember.



- 8) Remove the transmission cushion rubber.

B: INSTALLATION

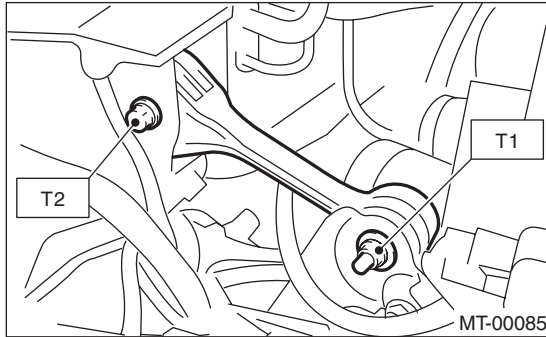
1. PITCHING STOPPER

- 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 intake boot and air intake chamber. (Non-turbo model)

<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

- 3) Install the intercooler. (Turbo model)

<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

- 4) Connect the ground cable to the battery.

2. CROSSMEMBER AND CUSHION RUBBER

- 1) Install the transmission cushion rubber.

Tightening torque:

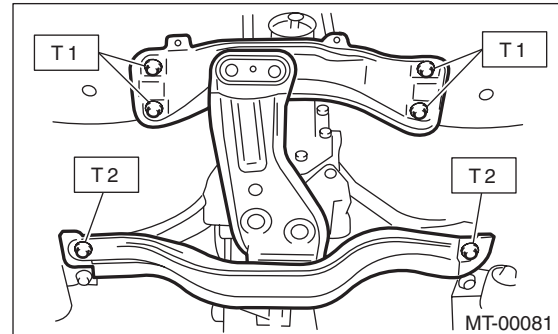
35 N·m (3.6 kgf-m, 25.8 ft-lb)

- 2) Install the 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)



- 3) Remove the transmission jack.

- 4) Install the front and center exhaust pipe. (Non-turbo model)

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>

- 5) Install the center exhaust pipe. (Turbo model)

<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

- 6) Install the rear exhaust pipe and muffler.

- Non-turbo model

<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

- Turbo model

<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

C: INSPECTION

Perform the following inspection procedures, and repair or replace faulty parts.

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Check that the rubber is not stiff, cracked or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. Check that the cushion rubber is not stiff, cracked, or otherwise damaged.

5. Oil Seal

A: INSPECTION

Check the oil seals for leaks. If there is 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.

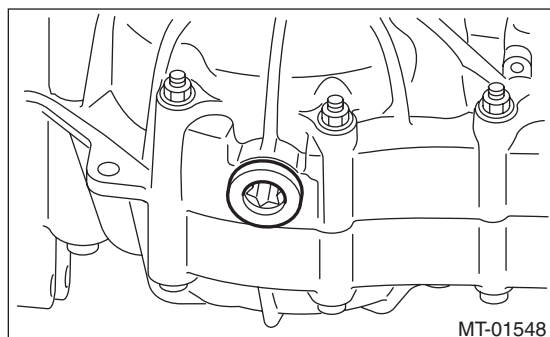
NOTE:

Use a new gasket.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket)



- 4) Remove the rear exhaust pipe and muffler.

- Non-turbo model

<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>

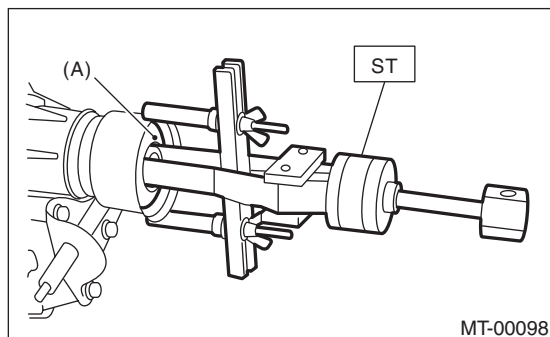
- Turbo model

<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>

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

- 6) Using the ST, remove the oil seal.

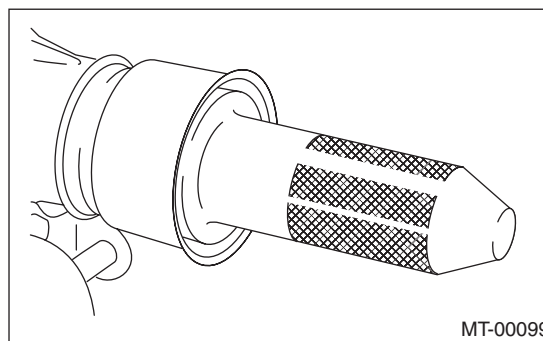
ST 398527700 PULLER ASSY



(A) Oil seal

- 7) Using the ST, install the oil seal.

ST 498057300 INSTALLER



- 8) Install the propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

- 9) Install the rear exhaust pipe and muffler.

- Non-turbo model

<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

- Turbo model

<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

- 10) Pour in gear oil and check the oil level. <Ref. to 5MT-25, REPLACEMENT, Transmission Gear Oil.>

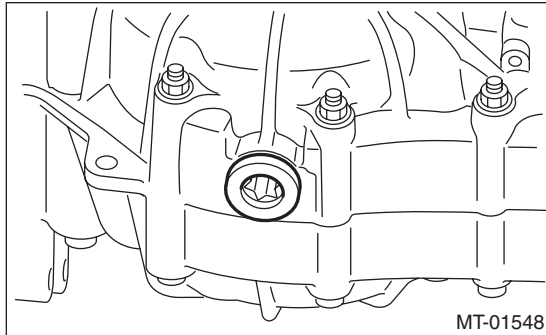
6. Differential Side Retainer Oil Seal

A: INSPECTION

Check for oil leakage from the differential side retainer oil seal part. If there is oil leakage, replace the oil seal and check the drive shaft.

B: REPLACEMENT

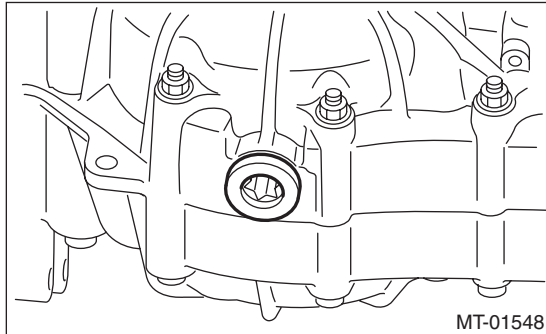
- 1) Lift up the vehicle.
- 2) Remove the differential gear oil drain plug using TORX® bit T70, and drain the differential gear oil completely.



- 3) Replace the gasket with a new part and tighten the differential gear oil drain plug using the TORX® bit T70.

Tightening torque:

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



- 4) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
- 5) Separate the front drive shaft from the transmission. <Ref. to DS-30, REMOVAL, Front Drive Shaft.>

- 6) Remove the differential side retainer oil seal using ST.

ST 398527700 PULLER ASSY

NOTE:

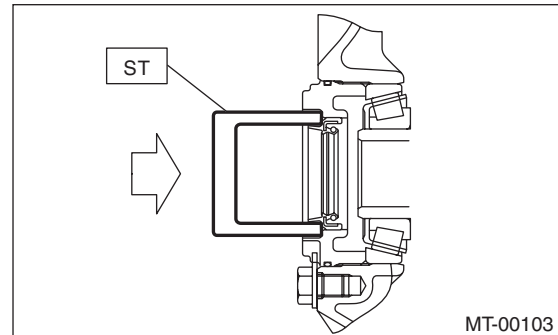
- Be sure to replace the differential side retainer oil seal after the procedure of removing front drive shaft from transmission.
- When removing the part by using a flat tip screwdriver, be careful not to scratch the differential side retainer.

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

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:

Apply oil to the oil seal lips.



- 8) Install the front drive shaft. <Ref. to DS-31, INSTALLATION, Front Drive Shaft.>

- 9) Install the front and center exhaust pipe. (Non-turbo model) <Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>

- 10) Lower the vehicle.

- 11) Pour gear oil through the gauge hole. <Ref. to 5MT-25, REPLACEMENT, Transmission Gear Oil.>

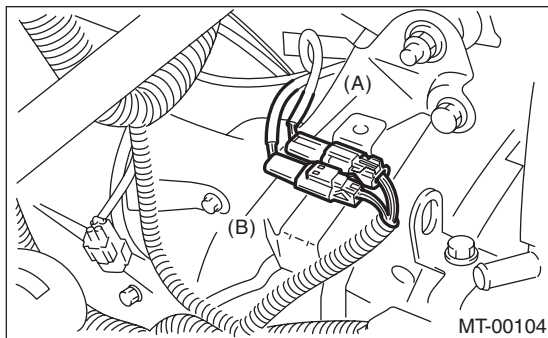
7. Switches and Harness

A: REMOVAL

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

- 1) Disconnect the ground cable from the battery.
- 2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 4) Disconnect the connector back-up light switch and neutral position switch.

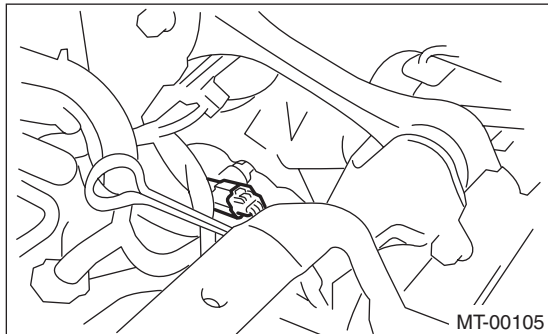
- Non-turbo model



(A) Neutral position switch connector

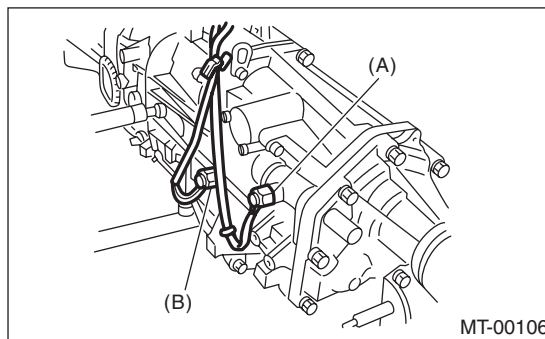
(B) Back-up light switch connector

- Turbo model



- 5) Lift up the vehicle.

- 6) Remove the back-up light switch and neutral position switch with the harness.



(A) Neutral position switch

(B) Back-up light switch

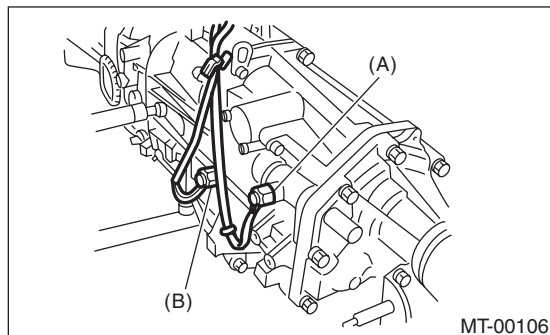
B: INSTALLATION

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

1) Install the back-up light switch and neutral position switch with the harness.

Tightening torque:

32.3 N·m (3.3 kgf-m, 23.8 ft-lb)



(A) Neutral position switch (Brown)

(B) Back-up light switch (Gray)

2) Connect the connectors of back-up light switch and neutral position switch.

3) Install the air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

4) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

5) Connect the ground cable to the battery.

C: INSPECTION

1. BACK-UP LIGHT SWITCH

Check the back-up light switch. <Ref. to LI-6, INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH

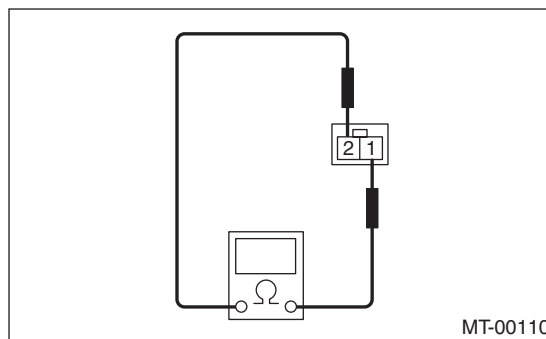
1) Turn the ignition switch to OFF.

2) Disconnect the connector of neutral position switch.

3) Measure the resistance between neutral position switch terminals.

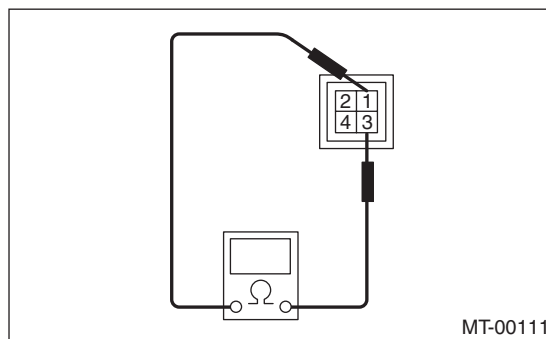
Non-turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		1 M Ω or more



Turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 Ω
Other positions		1 M Ω or more



4) Replace faulty parts.

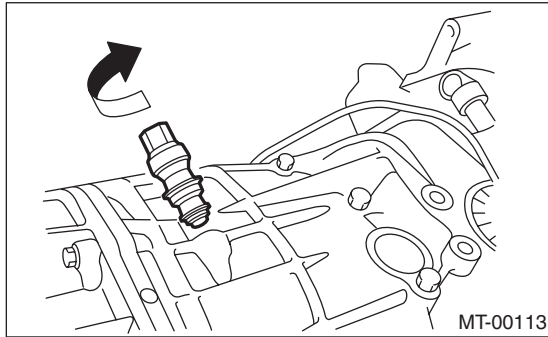
Vehicle Speed Sensor

MANUAL TRANSMISSION AND DIFFERENTIAL

8. Vehicle Speed Sensor

A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Lift up the vehicle.
- 3) Remove the front, center, rear exhaust pipes and muffler.
 - Non-turbo model
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 - Turbo model
<Ref. to EX(H4DOTC)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 4) Disconnect the connector from vehicle speed sensor.
- 5) Turn and remove the vehicle speed sensor.



B: INSTALLATION

NOTE:

- Discard the old vehicle speed sensor after removal, use a new sensor for the installation.
 - Make sure that there is no foreign matter on the sensor mounting.
 - Align the tip end of the key with the key groove on the end of speedometer shaft during installation.
- 1) Hand tighten the vehicle speed sensor.
 - 2) Tighten the vehicle speed sensor using suitable tools.

Tightening torque:

5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

- 3) Connect the connector to the vehicle speed sensor.
- 4) Install the front, center and rear exhaust pipes, and the muffler.
 - Non-turbo model
<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
 - Turbo model
<Ref. to EX(H4DOTC)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
- 5) Lower the vehicle.
- 6) Connect the ground cable to the battery.

C: INSPECTION

Inspect the vehicle speed sensor.

<Ref. to IDI-5, CHECK VEHICLE SPEED SENSOR, INSPECTION, Combination Meter System.>

9. Preparation for Overhaul

A: PROCEDURE

- 1) Clean oil, grease, dirt and dust from the transmission.
- 2) Using the TORX® bit T70, remove the drain plug, and drain the transmission gear oil completely.
- 3) Using the TORX® bit T70, tighten the transmission gear oil drain plug.

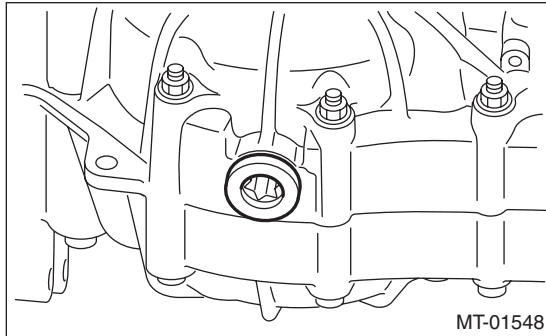
NOTE:

Use a new gasket.

Tightening torque:

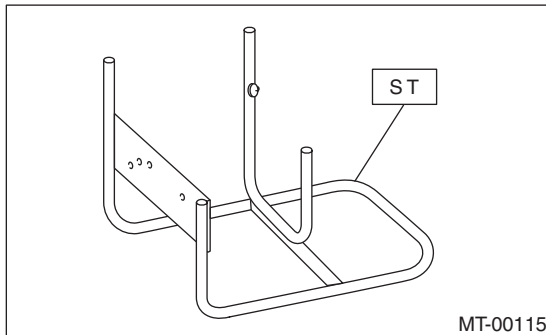
44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket)



- 4) Attach the transmission to ST.

ST 499937100 TRANSMISSION STAND



- 5) Apply oil to rotating parts before assembly.
- 6) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 7) Gaskets, lock washers and lock nuts must be replaced with new parts.
- 8) Use liquid gasket to the specified areas to prevent leakage.

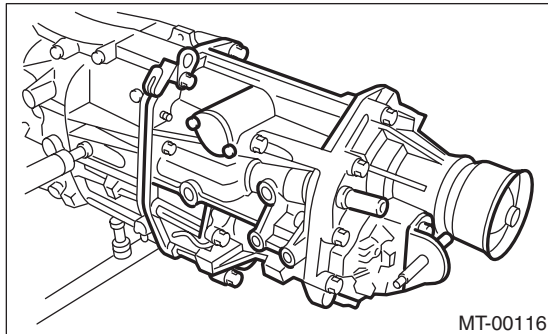
Transfer Case and Extension Case Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

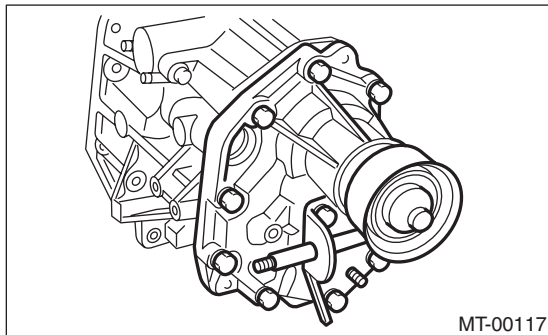
10. Transfer Case and Extension Case Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case together with the extension case assembly.

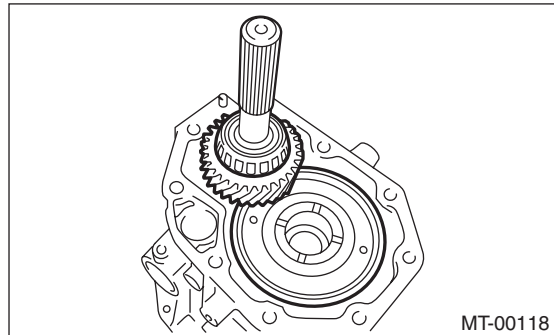


- 4) Remove the shifter arm.
- 5) Remove the extension case assembly.

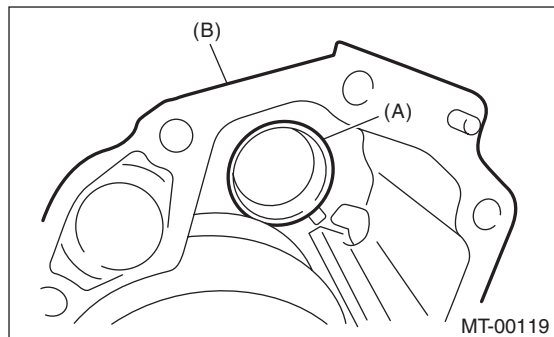


B: INSTALLATION

- 1) Install the center differential and transfer driven gear into the transfer case.

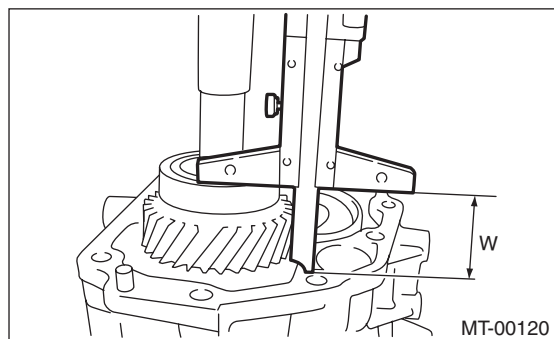


- 2) Remove the bearing outer race from the extension case.



- (A) Bearing outer race
(B) Extension case

- 3) While holding the bearing outer race horizontal, rotate the driven shaft for ten turns.
- 4) Measure the height "W" between transfer case and taper roller bearing on the transfer driven gear.



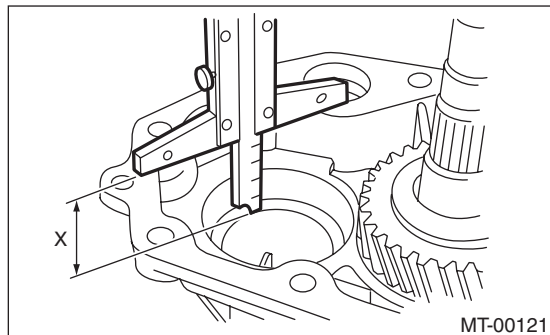
Transfer Case and Extension Case Assembly

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.

$$t = X - W + (0.15 - 0.20 \text{ mm}) (0.006 - 0.008 \text{ in})$$

7) Select the washer with the nearest value in the following table.

Tapered roller bearing preload (amount of standard protrusion):

0.15 — 0.20 mm (0.006 — 0.008 in)

NOTE:

Make sure to set between the preload range.

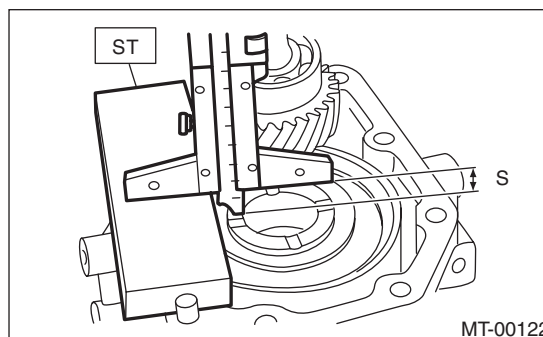
Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

8) Fit the thrust washers on the transfer drive shaft.

9) Install the bearing outer race into the extension case.

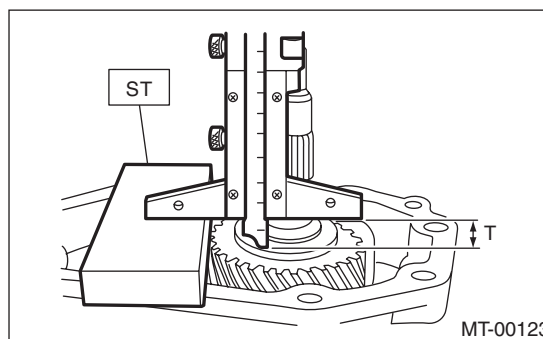
10) Measure the depth "S" between transfer case and center differential.

ST 398643600 GAUGE



11) Measure the depth "T" between extension case and transfer drive gear.

ST 398643600 GAUGE



NOTE:

ST thickness [15 mm (0.59 in)]

12) Calculate the thrust washer "U" using the following equation: $U = S + T - 30 \text{ mm (1.18 in)}$ [Thickness of ST]

13) Select a suitable washer in the following table.

Standard clearance

0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

14) Fit the thrust washer onto the center differential.

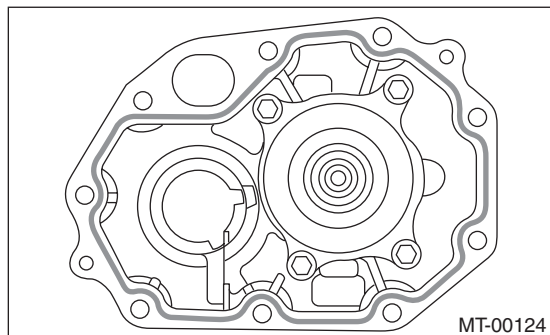
Transfer Case and Extension Case Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

15) Apply a proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket

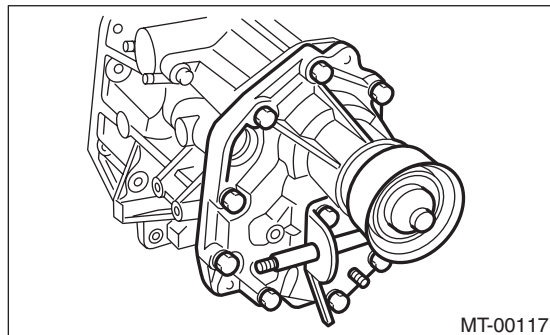
THREE BOND 1215 (Part No. 004403007) or equivalent



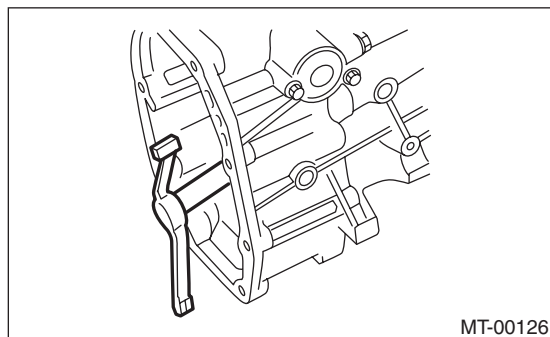
16) Install the extension assembly into the transfer case.

Tightening torque:

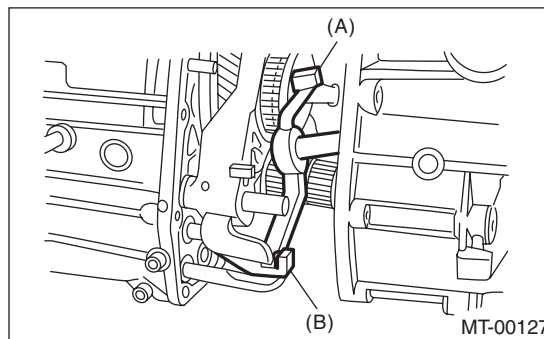
40 N·m (4.1 kgf-m, 29.5 ft-lb)



17) Attach the shifter arm to transfer case.



18) Hang the shifter arm on 3rd-4th fork rod.



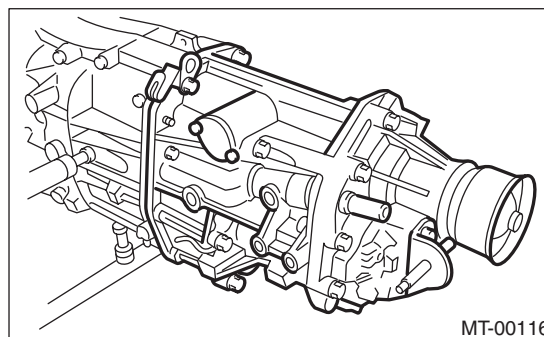
(A) Shifter arm

(B) 3rd-4th fork rod

19) Install the extension case assembly along with the transfer case to the transmission case.

Tightening torque:

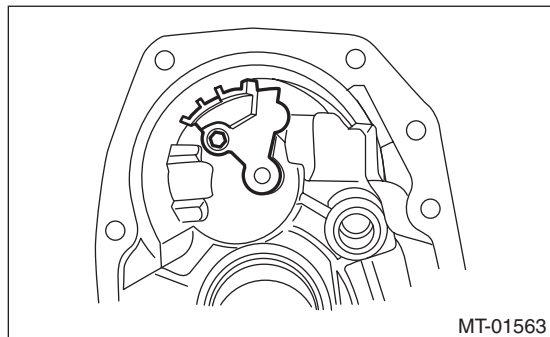
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



C: DISASSEMBLY

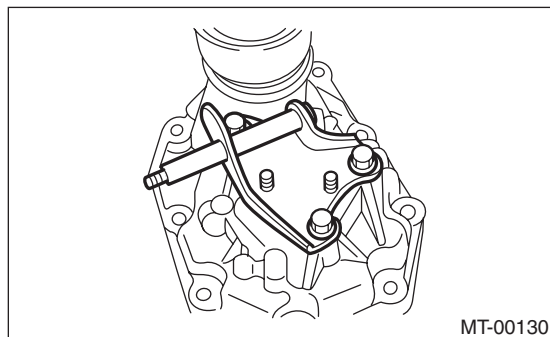
1. TRANSFER CASE

- 1) Remove the reverse check assembly. <Ref. to 5MT-49, REMOVAL, Reverse Check Sleeve.>
- 2) Remove the oil guide.



2. EXTENSION CASE

- 1) Remove the transfer drive gear assembly. <Ref. to 5MT-44, REMOVAL, Transfer Drive Gear.>
- 2) Remove the shift bracket.



- 3) Remove the oil seal from the extension case. <Ref. to 5MT-34, REPLACEMENT, Oil Seal.>

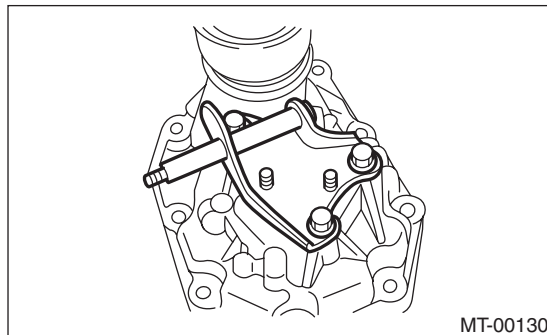
D: ASSEMBLY

1. EXTENSION CASE

- 1) Install the new oil seal to the extension case using ST. <Ref. to 5MT-34, REPLACEMENT, 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-44, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE

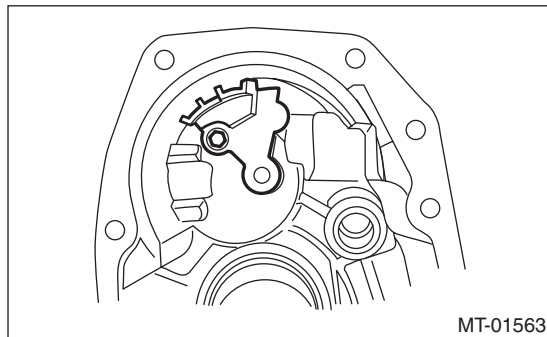
- 1) Install the oil guide to the transfer case.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

NOTE:

Use a new installing bolt.



- 2) Install the reverse check sleeve assembly to the transfer case. <Ref. to 5MT-49, INSTALLATION, Reverse Check Sleeve.>

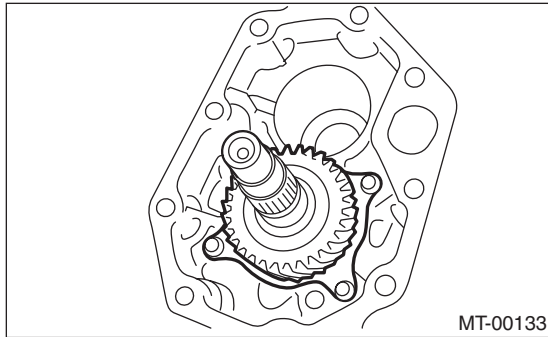
Transfer Drive Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

11. Transfer Drive Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, 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.

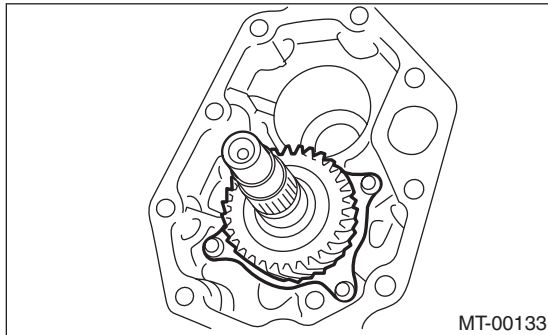


B: INSTALLATION

- 1) Attach the transfer drive gear.

Tightening torque:

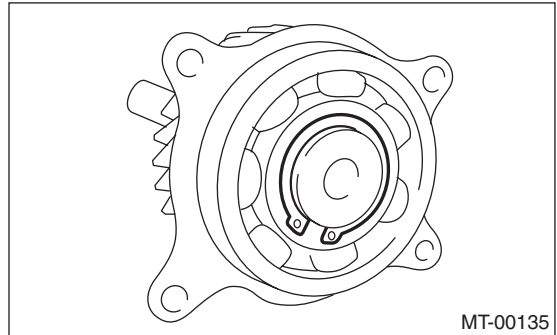
26 N·m (2.7 kgf-m, 19.2 ft-lb)



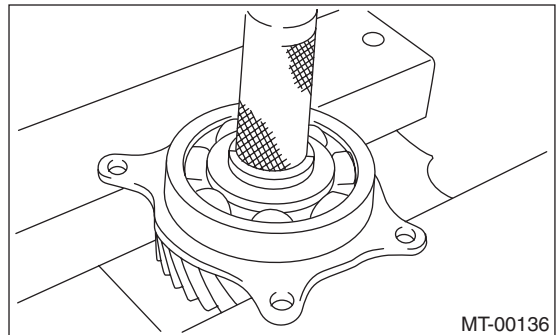
- 2) Install the transfer driven gear.
- 3) Install the extension case assembly.
- 4) Install the transfer case and the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-37, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Remove the snap ring.



- 2) Remove the ball bearing.



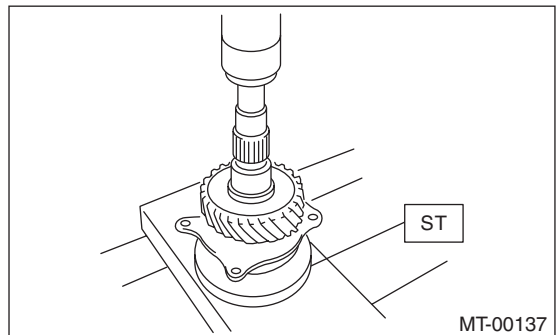
D: ASSEMBLY

- 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-45, INSPECTION, Transfer Drive Gear.>

E: INSPECTION**1) Bearing**

Replace the bearings in the following cases.

- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.

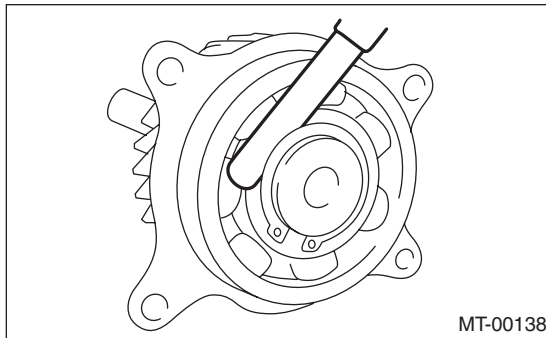
2) Drive gear

If the drive gear tooth surface and shaft are excessively broken or damaged, replace the drive gear.

3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:

0.01 — 0.15 mm (0.0004 — 0.0059 in)



If the measurement is not within specification, select a suitable snap ring and replace it.

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

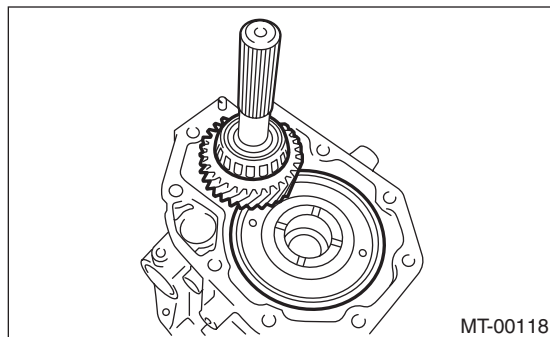
Transfer Driven Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

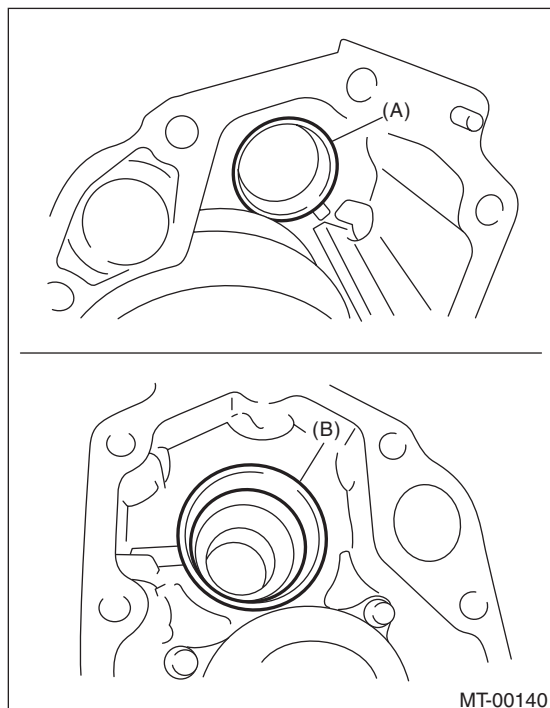
12. Transfer Driven Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly.
- 5) Remove the transfer driven gear.



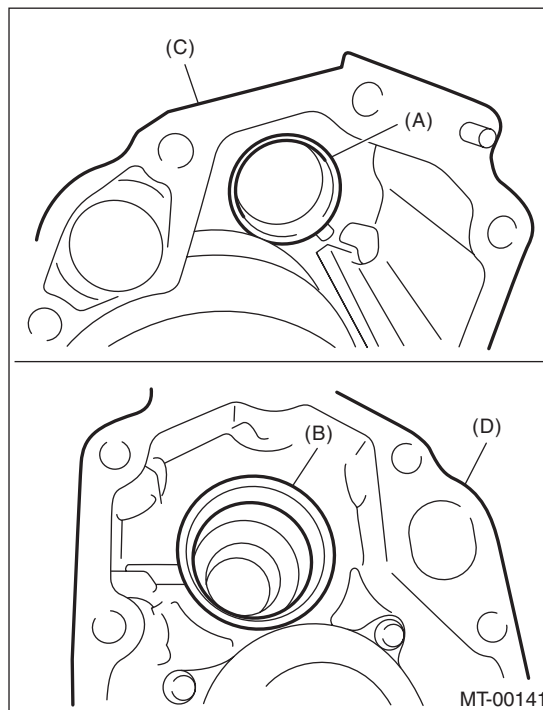
- 6) Remove bearing outer races from the extension case and transfer case.



- (A) Bearing outer race (Transfer case side)
(B) Bearing outer race (Extension case side)

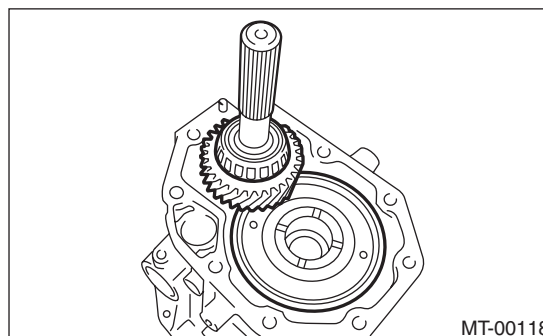
B: INSTALLATION

- 1) Install the bearing outer races to extension case and transfer case.



- (A) Bearing outer race
(B) Bearing outer race
(C) Transfer case
(D) Extension case

- 2) Install the transfer driven gear.

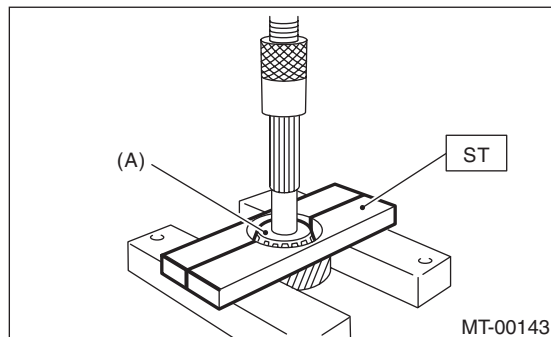


- 3) Install the transfer case and the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the back-up light switch and the neutral position switch. <Ref. to 5MT-37, INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).

ST 498077000 REMOVER

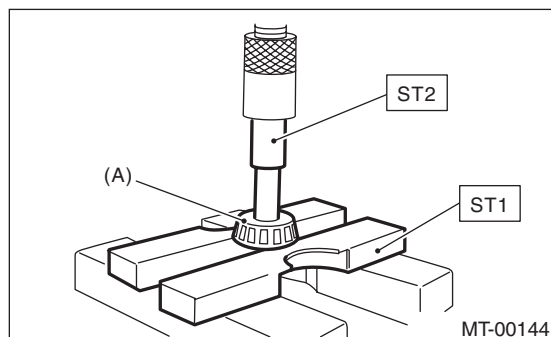


(A) Roller bearing

2) Using ST1 and ST2, remove the roller bearing (transfer case side).

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Roller bearing

D: ASSEMBLY

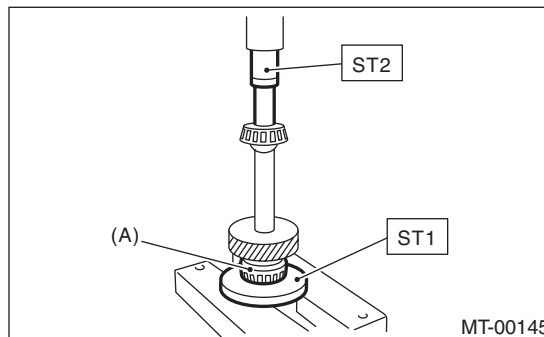
1) Using the ST, install the roller bearing (extension case side).

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



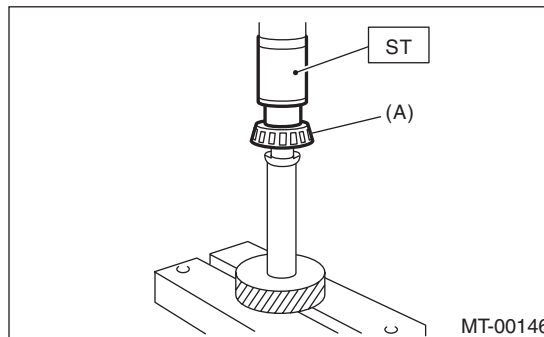
(A) Roller bearing

2) Using ST, install the roller bearing (transfer case side).

ST 499757002 INSTALLER

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

E: INSPECTION

1) Bearing

Replace the bearings in the following cases.

- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.

2) Driven gear

If the driven gear tooth surface and shaft are excessively broken or damaged, replace the driven gear.

Center Differential

MANUAL TRANSMISSION AND DIFFERENTIAL

13.Center Differential

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to 5MT-46, REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential.

B: INSTALLATION

- 1) Install the center differential into transfer case.
- 2) Install the transfer driven gear. <Ref. to 5MT-46, INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-37, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

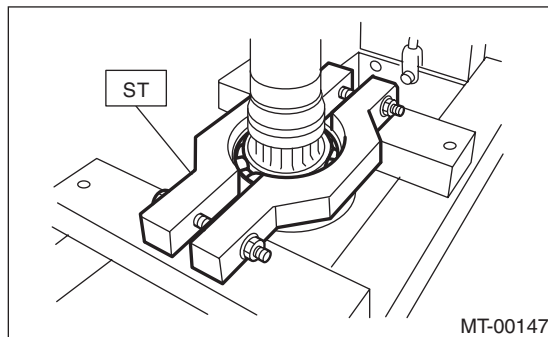
C: DISASSEMBLY

Remove the ball bearing using ST.

NOTE:

- Do not reuse the ball bearing.
- Aside from the ball bearings, the center differential is a non-disassembly part and must not be disassembled.

ST 498077300 CENTER DIFFERENTIAL
BEARING REMOVER

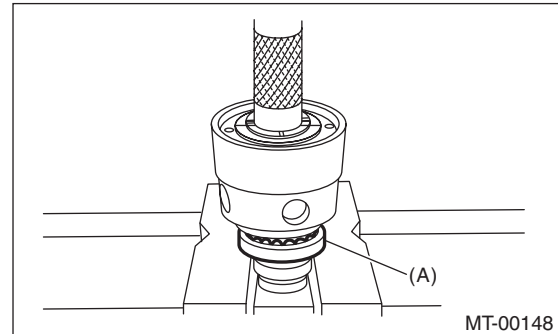


D: ASSEMBLY

Install the ball bearing into the center differential assembly.

CAUTION:

**Do not apply a load in excess of 10 kN
(1 ton, 1.1 US ton, 1.0 Imp ton).**



(A) Ball bearing

E: INSPECTION

1) Bearing

Replace the bearings in the following cases.

- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When the bearing has other problems.

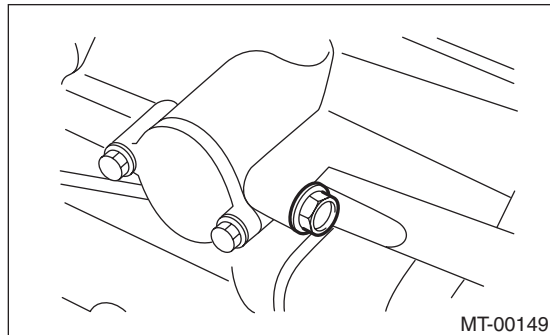
2) Center differential

Replace the center differential case assembly if worn or damaged.

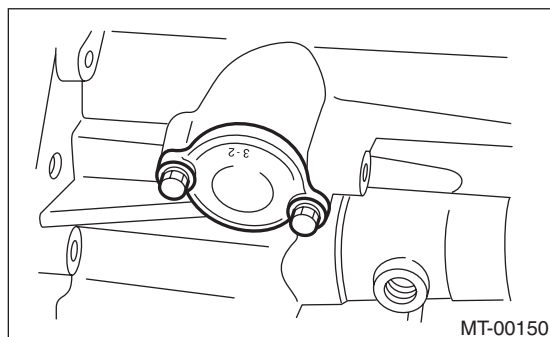
14. Reverse Check Sleeve

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, 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.

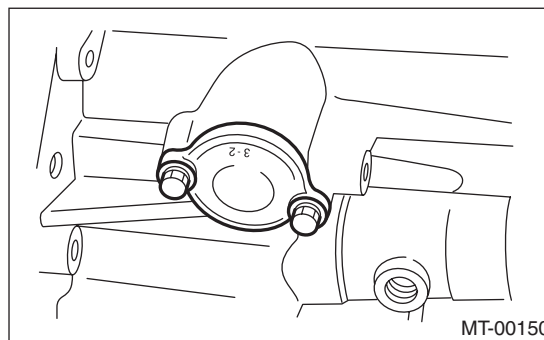


B: INSTALLATION

- 1) Install the reverse check sleeve.

Tightening torque:

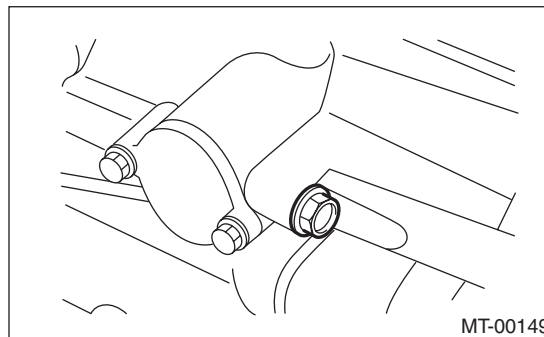
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 2) Install the reverse check ball, reverse accent spring, gasket and plug to 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-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

Reverse Check Sleeve

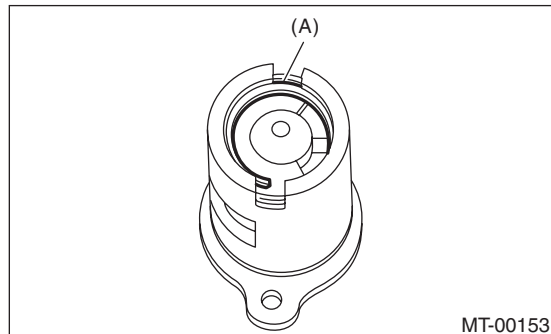
MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1) Cover the reverse check sleeve with a rag, and remove the snap ring using a screwdriver.

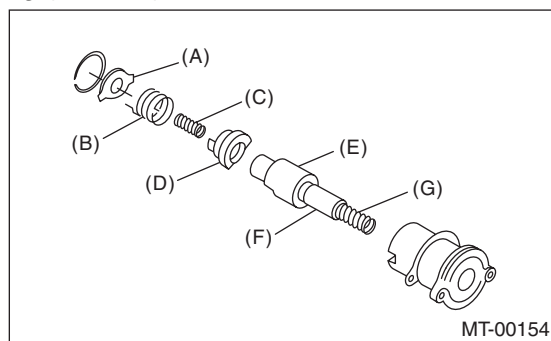
NOTE:

Replace the snap ring with a new part if it is deformed or spring force is weakened.



(A) Snap ring

2) Remove the reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Rev)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

3) Remove the O-ring.

NOTE:

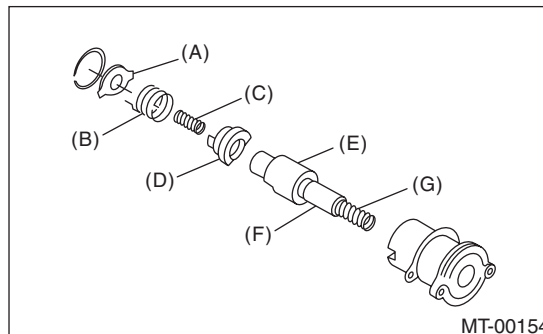
- Visually check the O-ring. Replace if faulty.
- Be careful not to damage the adjusting shim between reverse check sleeve assembly and the case.

D: ASSEMBLY

1) Install the return spring (1st – 2nd), return spring cap, reverse accent shaft, reverse check cam, return spring (5th – Rev) and check spring to the reverse check sleeve.

NOTE:

Be sure to position the bent section of reverse check spring to fit in the groove of the check cam.



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Rev)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

2) Hook the bent section of reverse check spring over reverse check plate.

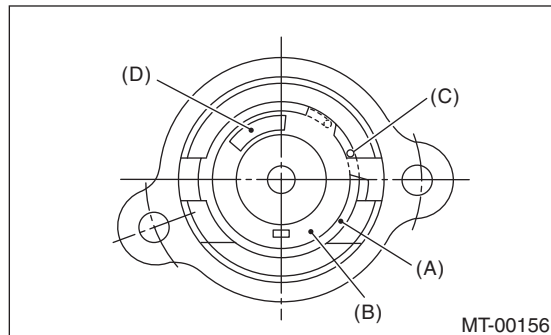
3) Rotate the cam so that the protrusion of the reverse check cam comes to the opening of the plate.

4) With cam held in that position, install the reverse check plate onto the reverse check sleeve and hold in place with the snap ring.

5) Position the new O-ring in the groove of sleeve.

E: INSPECTION

- Make sure the cutout of the reverse accent shaft is aligned with the opening in the reverse check sleeve.
 - Turn the cam by hand to check for smooth rotation.
 - Move the cam and shaft all the way toward the plate, and make sure it releases.
- If the cam does not return properly, replace the reverse check spring. If the shaft does not return, check for scratches on the inner surface of sleeve. If the sleeve is in good order, replace the spring.



- (A) Snap ring
(B) Reverse check plate
(C) Checking spring
(D) Check cam

- Select a suitable reverse accent shaft and reverse check plate. <Ref. to 5MT-51, 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.
- 5) Be careful not to damage the O-ring when placing shims.

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.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st gear.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

Reverse Check Sleeve

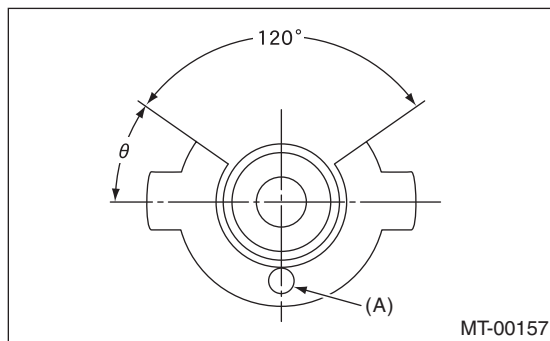
MANUAL TRANSMISSION AND DIFFERENTIAL

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.

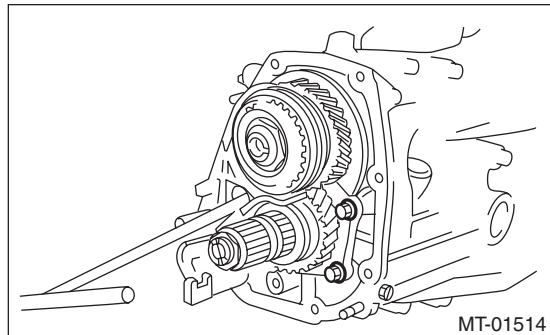
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA001	0	28°	Arm stops closer to 5th gear.
32189AA011	1	31°	Arm stops closer to 5th gear.
32189AA021	2	34°	Arm stops in the center.
32189AA031	3	37°	Arm stops closer to reverse gear.
32189AA041	4	40°	Arm stops closer to reverse gear.



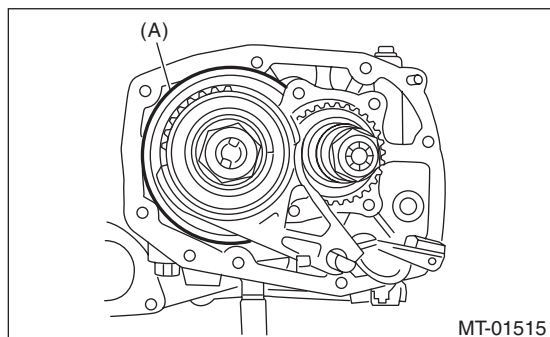
15. Transmission Case

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the clutch release lever. <Ref. to CL-16, REMOVAL, Release Bearing and Lever.>
- 3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the bearing mounting bolts.

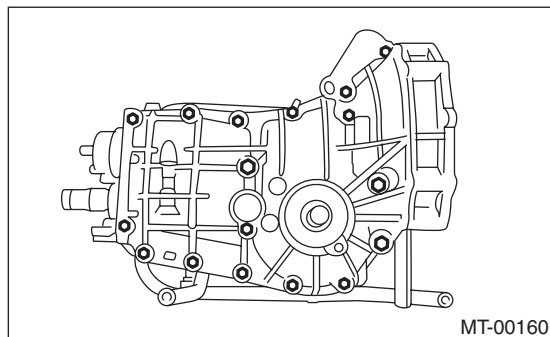


- 5) Remove the main shaft rear plate.



(A) Main shaft rear plate

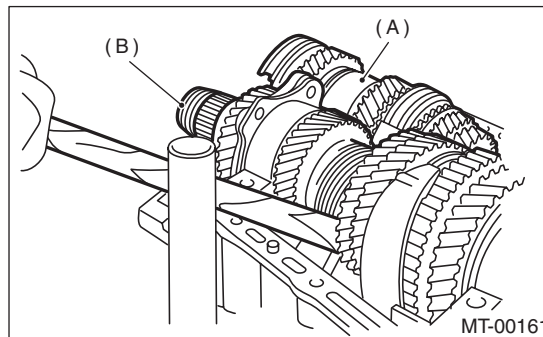
- 6) Separate the transmission case into the right and left cases by loosening the coupling bolts and nuts.



- 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.



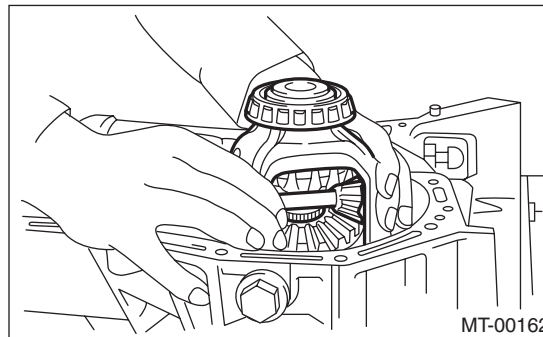
(A) Main Shaft ASSY

(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.



Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

B: INSTALLATION

- 1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with a cleaning solution.
- 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, and then join the right side and left side of the case together.

Liquid gasket

THREE BOND 1215 (Part No. 004403007) or equivalent

- 6) Tighten 17 bolts together with the bracket and the clip, as shown in the figure.

NOTE:

- Insert the bolts from the bottom and tighten the nuts at the top.
- Put the cases together so that the drive pinion shim and input shaft holder shims are not caught in between.
- Check that the speedometer gear is engaged.

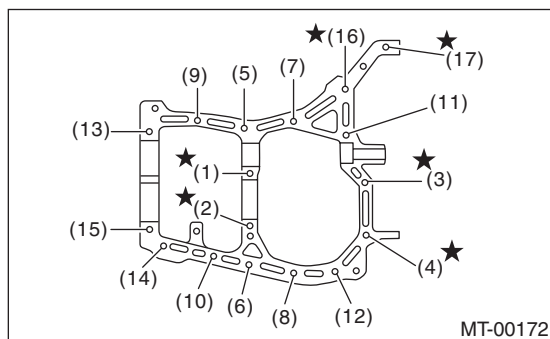
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.4 ft-lb)

★ **10 mm bolt**

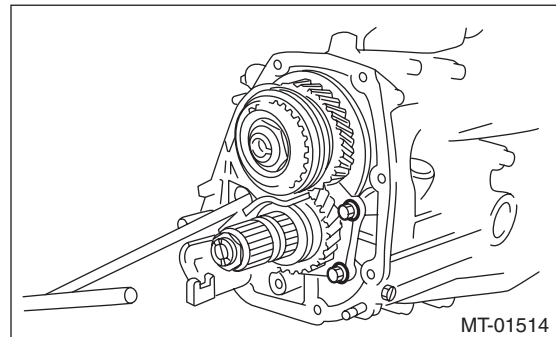
39 N·m (4.0 kgf-m, 28.9 ft-lb)



- 7) Tighten the bearing mounting bolts.

Tightening torque:

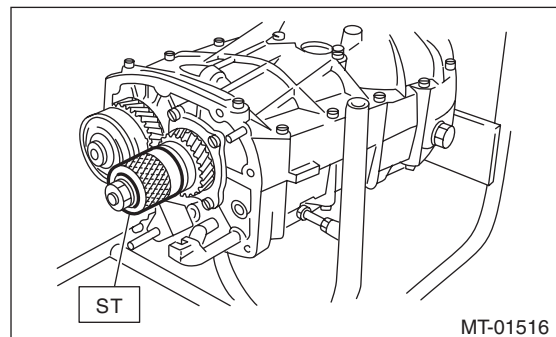
30 N·m (3.1 kgf-m, 22.1 ft-lb)



- 8) Perform backlash adjustment of the hypoid gear and preload measurement of the roller bearing:

NOTE:

Support the drive pinion assembly with the ST.
ST 498427100 STOPPER

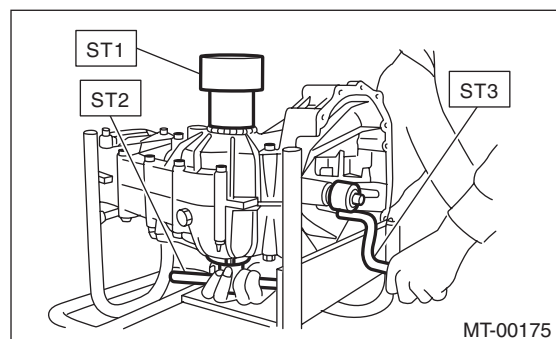


- 9) Place the transmission with the left side of case facing downward, and put ST1 on bearing cup.

- 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



Transmission Case

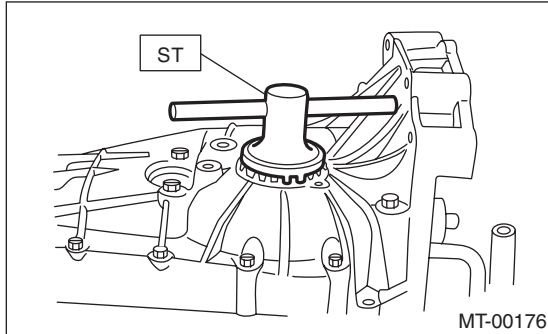
MANUAL TRANSMISSION AND DIFFERENTIAL

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:

At this point, 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 holder and lock plate for later readjustment.

NOTE:

If it is hard to attach the lock plate, attach with the front and back reversed.

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-74, INSPECTION, Front Differential Assembly.>

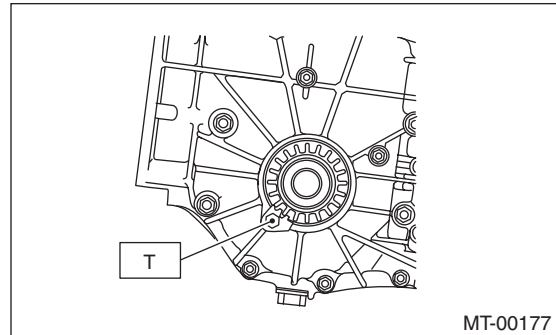
17) After checking the tooth contact of the hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit the O-ring into the groove and then tighten the retainer up to its original position before it was loosened. Install the lock plate.

NOTE:

- When loosening the retainer, record the turns it took before the retainer was loosened.
- Perform this for both upper and lower retainers.

Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



18) Select the main shaft rear plate. <Ref. to 5MT-60, ADJUSTMENT, Main Shaft Assembly for Single-range.>

19) Install the clutch release lever and bearing. <Ref. to CL-16, INSTALLATION, Release Bearing and Lever.>

20) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, 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

16. Main Shaft Assembly for Single-range

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-61, 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 main shaft assembly for single range.

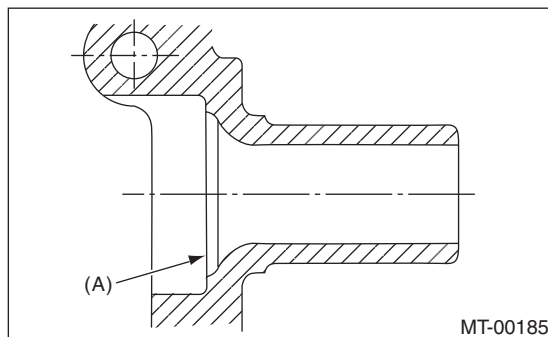
NOTE:

- Wrap the clutch splined section with vinyl tape to prevent damage to the oil seal.
- Apply UNILUBE #2 (or equivalent) to the sealing lip of the oil seal.
- Use a new oil seal.

- 2) Install the transmission case knock pin into the knock pin hole of the needle bearing outer race.

NOTE:

Align the end face of the seal with surface (A) when installing the oil seal.



- 3) Install the drive pinion shaft assembly. <Ref. to 5MT-61, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install the transmission case. <Ref. to 5MT-54, INSTALLATION, Transmission Case.>
- 5) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

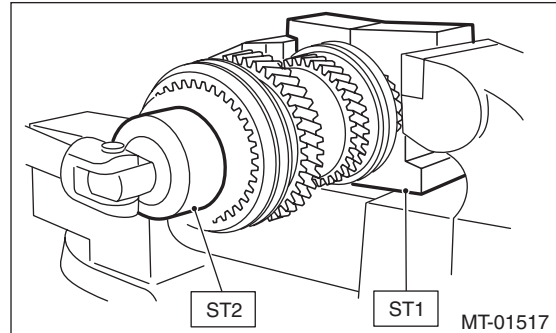
- 1) Apply vinyl tape around the main shaft splines to protect the oil seal from damage. Then pull out the oil seal and needle bearing by hand.
- 2) Remove the lock nut from transmission main shaft assembly for single range.

NOTE:

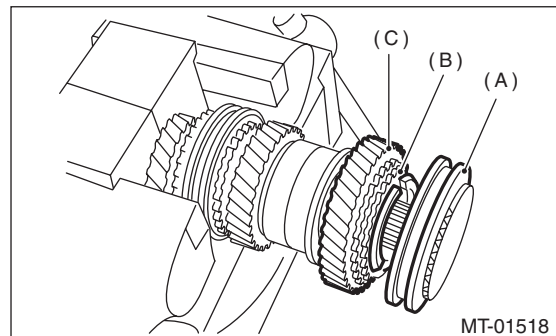
Straighten the crimp before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER

ST2 499987003 SOCKET WRENCH (35)



- 3) Remove the 5th hub and sleeve No. 2, baulk lever, baulk ring, 5th drive gear and 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

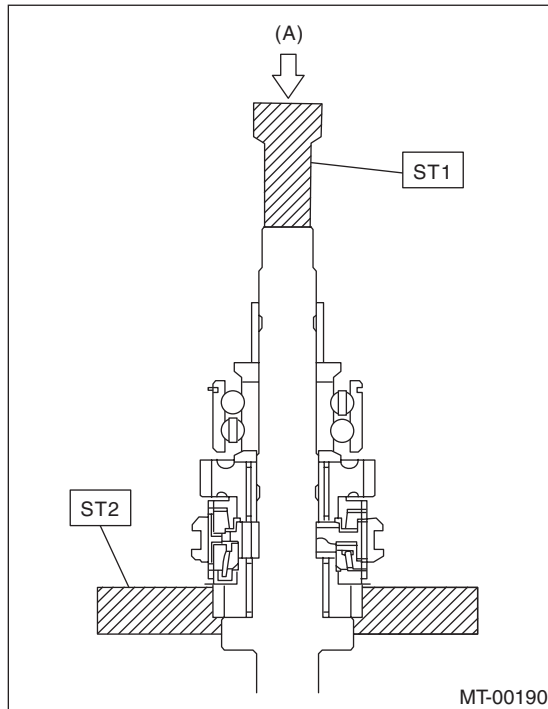
4) Using ST1 and ST2, remove the rest of parts.

NOTE:

- When replacing the sleeve and hub, replace them as a set.
- Do not disassemble the sleeve and 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



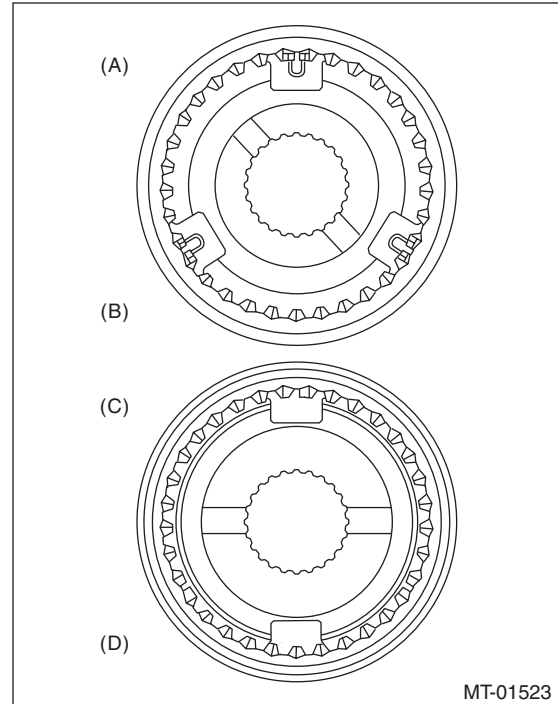
(A) Press

D: ASSEMBLY

1) When the sleeve and hub assemblies have been disassembled, reassemble by aligning the alignment marks.

NOTE:

Position the open ends of the spring 120° apart.



- (A) 3rd-4th hub ASSY
- (B) 3rd gear side
- (C) 5th hub & sleeve No. 2
- (D) 5th gear side

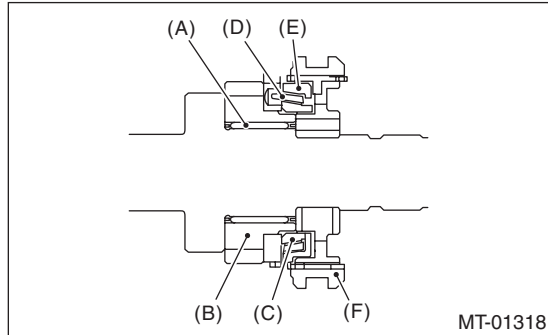
Main Shaft Assembly for Single-range

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for the 3rd needle bearing, on the transmission main shaft.

NOTE:

Align the groove in baulk ring with the shifting insert.



- (A) 3rd needle bearing
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve & hub ASSY

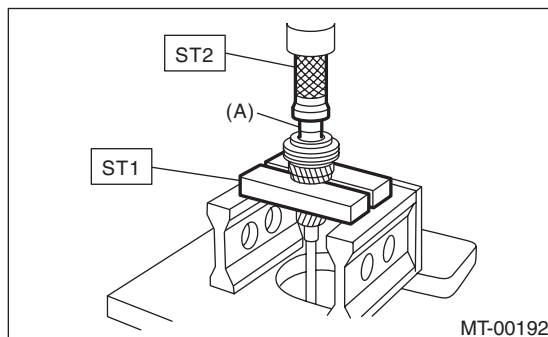
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and press.

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

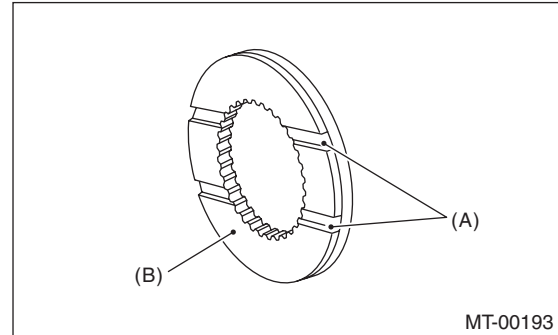


- (A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to the transmission main shaft.

NOTE:

- Align the baulk ring and gear and hub assembly with the key groove.



- (A) Groove
- (B) Face this surface to the 4th gear side.

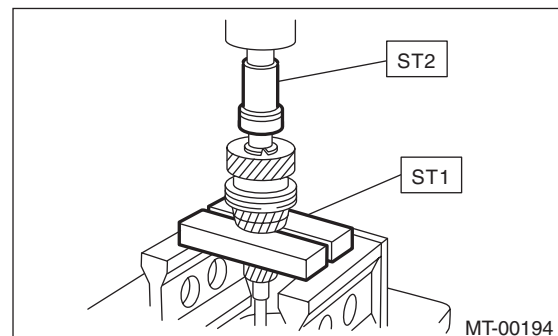
5) Press-fit the ball bearing into the rear section of transmission main shaft using ST1, ST2 and a press.

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



Main Shaft Assembly for Single-range

MANUAL TRANSMISSION AND DIFFERENTIAL

6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

CAUTION:

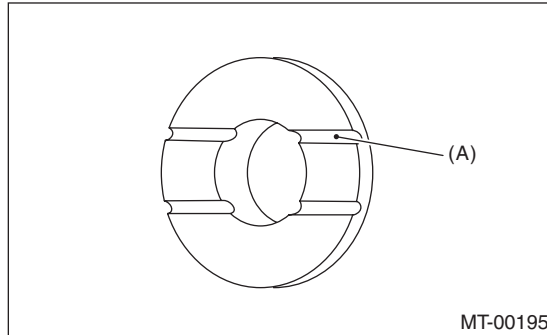
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Make sure the thrust washer is oriented in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

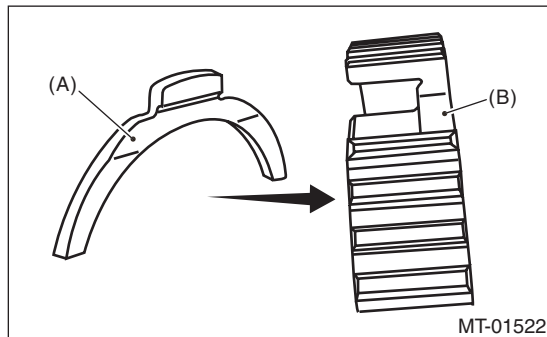


(A) Face this surface to the 5th gear side.

7) Install rest of the parts to the rear section of the transmission main shaft.

CAUTION:

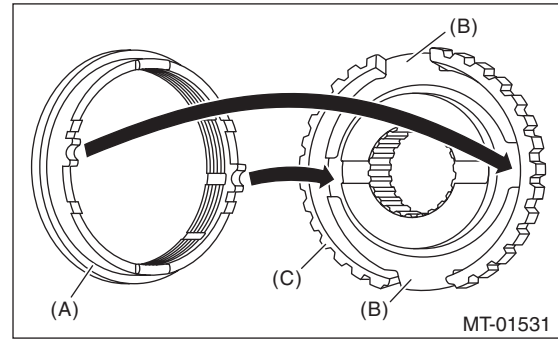
• **Install the baulk lever so that the concave side faces toward the 5th hub.**



(A) Baulk lever

(B) 5th hub

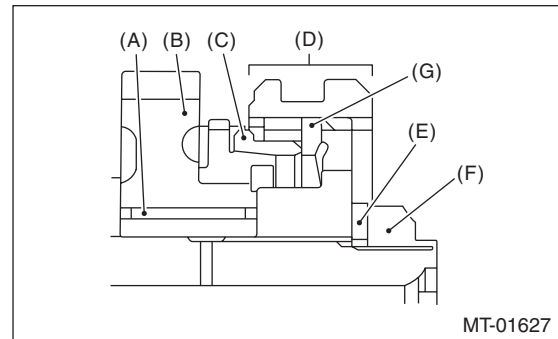
• **Fit the convex portions of baulk ring with the gaps between baulk levers.**



(A) Baulk ring

(B) Baulk lever

(C) 5th hub



(A) Needle bearing

(B) 5th drive gear

(C) Baulk ring

(D) 5th hub & sleeve No. 2

(E) Lock washer

(F) Lock nut

(G) Baulk lever

8) Tighten new lock nuts to the specified torque using ST1 and ST2.

9) Crimp lock nuts in two locations after tightening.

ST1 499987003 SOCKET WRENCH

ST2 498937000 TRANSMISSION HOLDER

Tightening torque:

120 N·m (12.2 kgf-m, 88.5 ft-lb)

Main Shaft Assembly for Single-range

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

Disassembled parts should be washed clean first with cleaning solvent and then inspected carefully.

1) Bearing

Replace the bearings in the following cases.

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When the bearing has other problems.

2) Bushing (each gear)

Replace the bushing in following cases.

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is excessively 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.

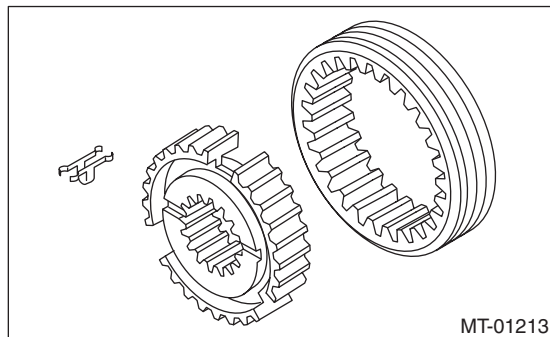
4) Baulk ring

Replace the baulk ring in 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 synchronizer ring insert is cracked or abnormally worn.

5) Shifting insert key

Replace the insert key if deformed, abnormally 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:

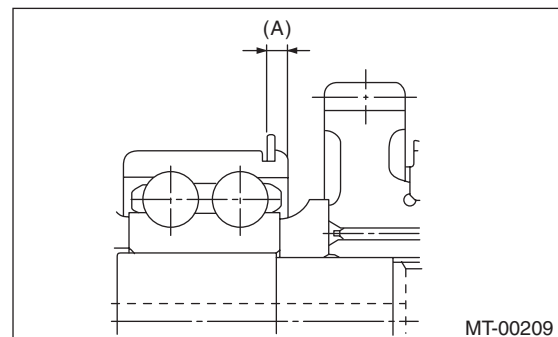
Using the ST, measure the protrusion amount (A) of ball bearing from transmission main case surface, and select a suitable plate in the following table.

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.

ST 498147000 DEPTH GAUGE

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



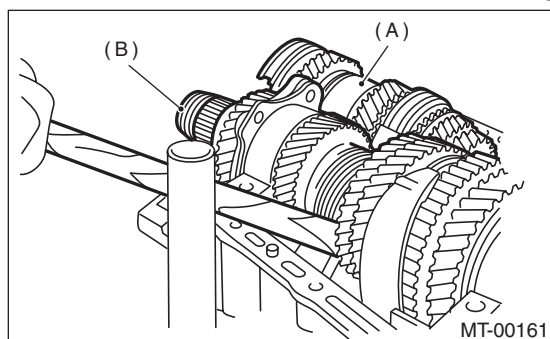
17. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly.

NOTE:

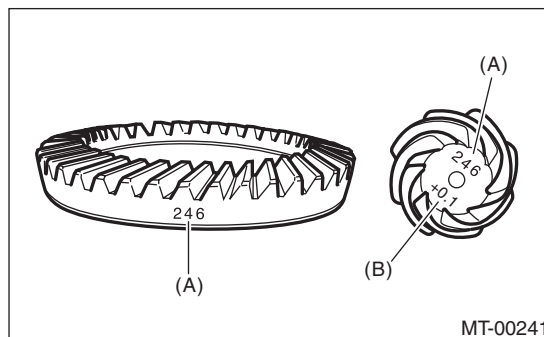
Use a hammer handle, etc. to remove if too tight.



- (A) Main shaft ASSY for single range
(B) Drive pinion shaft ASSY

B: INSTALLATION

- 1) Remove the front differential assembly.
- 2) Alignment marks/numbers on hypoid gear set:
The number (A) on top of the drive pinion, and the number on the hypoid driven gear are set numbers for the two gears. Use a pair having the same numbers. The figure (B) below shows a number for shim adjustment. If no number is shown, the value is zero.



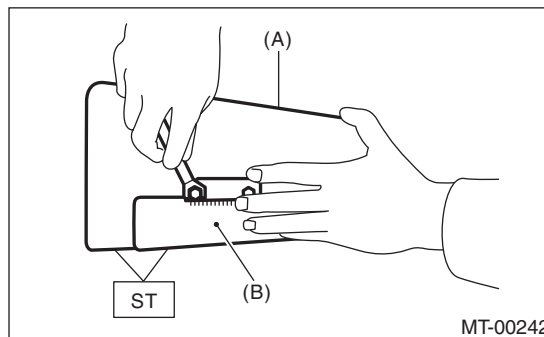
- (A) Set number
(B) Number for shim adjustment

- 3) Place the drive pinion shaft assembly on transmission main case RH without shim and tighten the bearing mounting bolts.
- 4) Perform inspection and adjustment of ST.

NOTE:

- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
- Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



- (A) Plate
(B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole of transmission case.

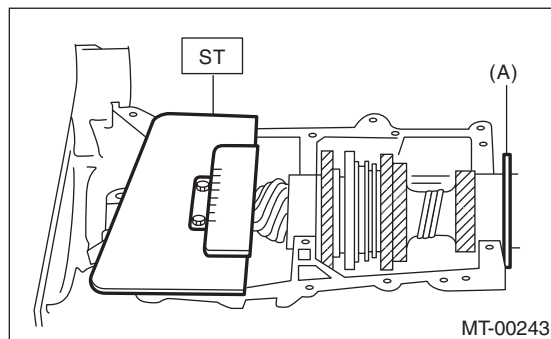
ST 499917500 DRIVE PINION GAUGE ASSY

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust the clearance to zero without shim.

7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by +, and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

8) Select one to three shims in the following table for the value determined as described above, and take the shim(s) which thickness is closest to the said value.

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

9) Install the front differential assembly. <Ref. to 5MT-70, INSTALLATION, Front Differential Assembly.>

10) Set the transmission main shaft assembly for single range and drive pinion assembly in the install location. (So there is no clearance between the two when moved all the way to the front). Inspect the suitable 1st – 2nd shifter fork, 3rd – 4th shifter fork and 5th shifter fork so that the coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to 5MT-67, INSPECTION, Drive Pinion Shaft Assembly.>

11) Install the transmission case. <Ref. to 5MT-54, INSTALLATION, Transmission Case.>

12) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

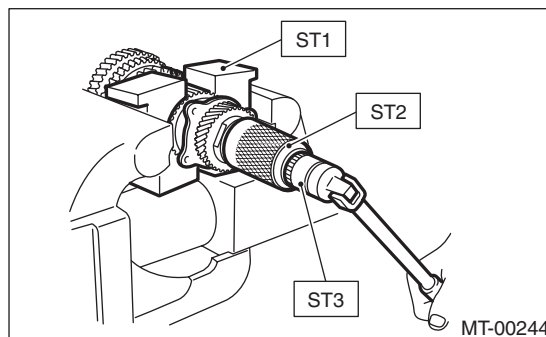
Attach a cloth to the end of driven shaft (on the frictional side of the thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Unlock the crimping of lock nut. Remove the lock nut with ST1, ST2 and ST3.

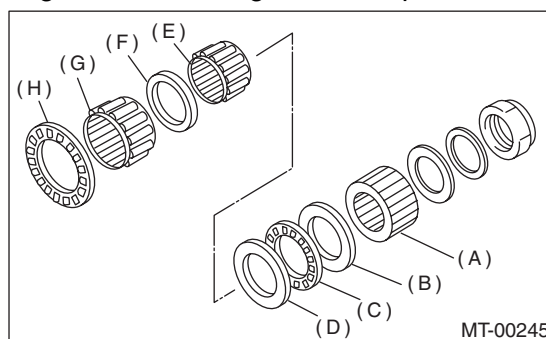
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)



2) Draw out the drive pinion 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 × 4)
- (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

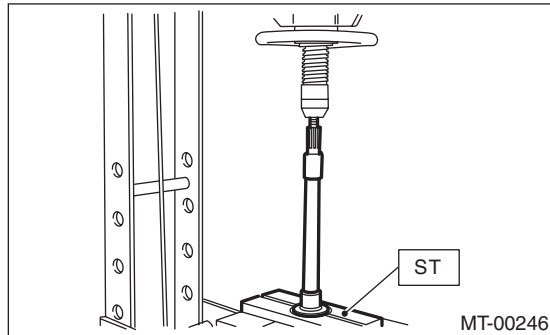
MANUAL TRANSMISSION AND DIFFERENTIAL

3) Remove the roller bearing and washer using ST and a press.

NOTE:

Do not reuse the roller bearing.

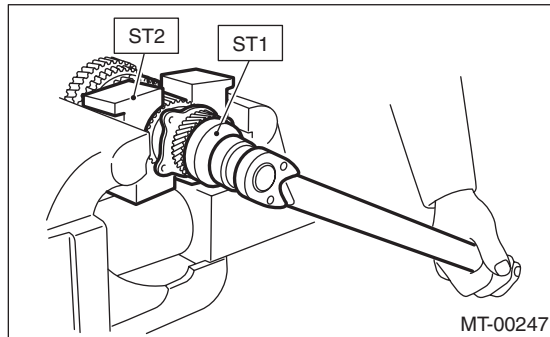
ST 498077000 REMOVER



4) Unlock the crimping of lock nut. Remove the lock nut using ST1 and ST2.

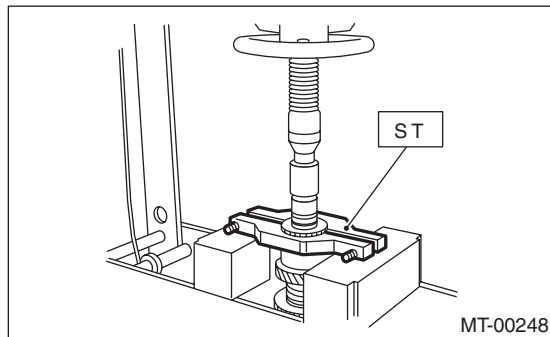
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



5) Remove the 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

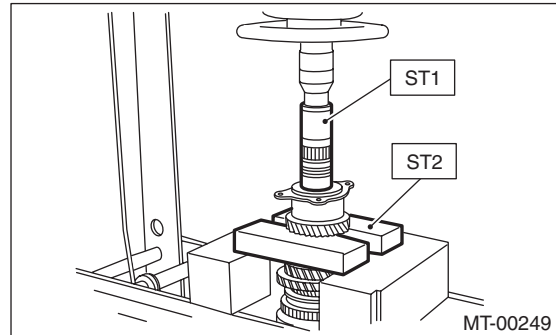


6) Remove the woodruff key.

7) Remove the roller bearing, 3rd-4th driven gear using ST1 and ST2.

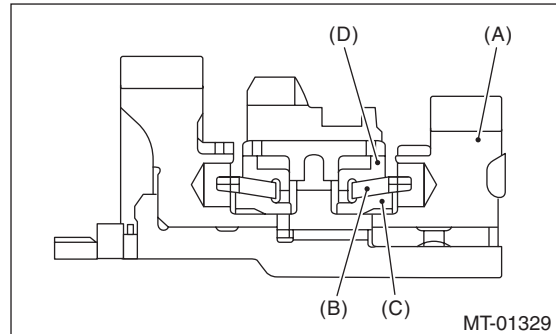
ST1 499757002 INSTALLER

ST2 899714110 REMOVER



8) Remove the key.

9) Remove the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



(A) 2nd driven gear

(B) Inner baulk ring

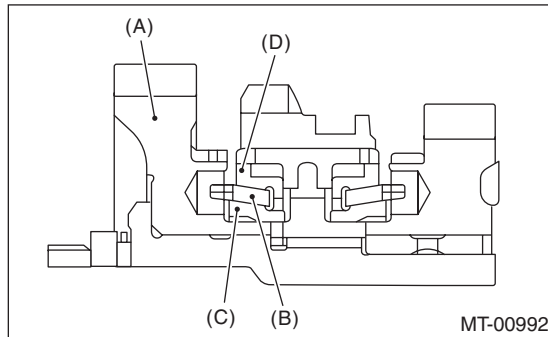
(C) Synchro cone

(D) Outer baulk ring

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

10) Remove the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, 2nd driven gear bushing, gear and hub assembly using ST1 and ST2.



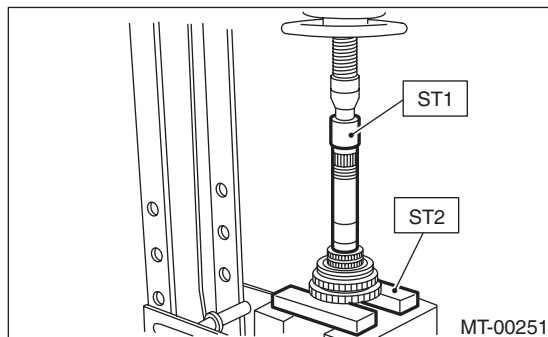
- (A) 1st driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

NOTE:

If necessary, use the new gear and hub assembly, when replacing the gear or hub assembly. Do not attempt to disassemble as they must engage at a specific point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 INSTALLER

ST2 899714110 REMOVER



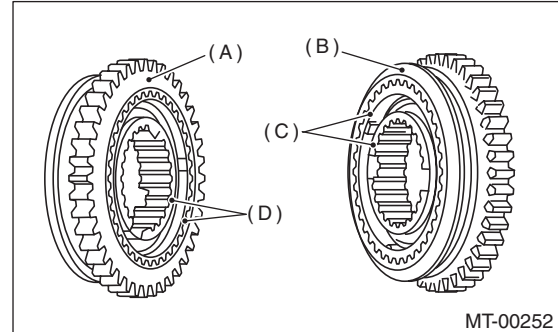
11) Remove the sub gear, washer, and snap ring (outer) for the 1st driven gear. (Non-turbo model)

D: ASSEMBLY

1) Install the sleeve and gear and hub assembly by matching alignment marks.

NOTE:

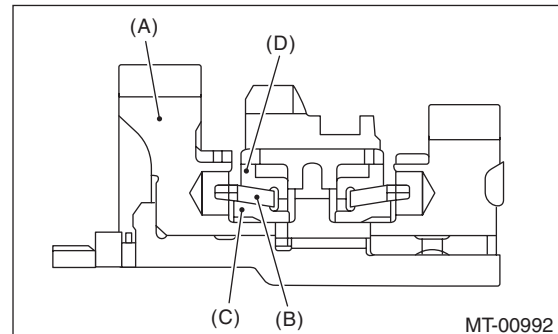
Use the new gear and hub assembly, if the gear & hub have been replaced.



- (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. (Non-turbo model)

3) Install the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, gear & hub assembly onto driven shaft.



- (A) 1st driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

NOTE:

- Take care to install the gear and hub assembly in proper direction.
- Align the baulk ring and gear and 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:

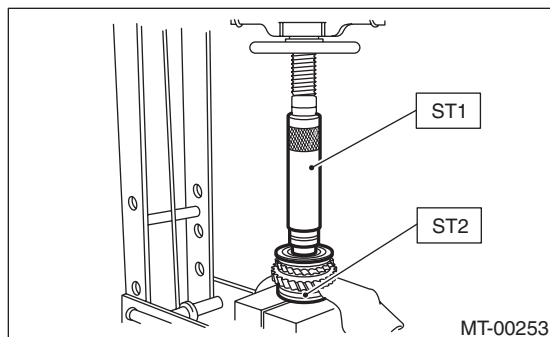
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

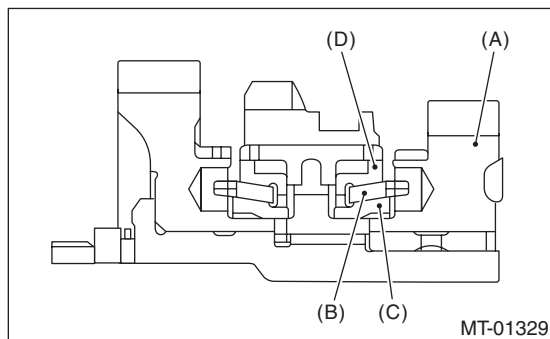
- Attach a cloth to the end of driven shaft to prevent damage.
- When press fitting, align the oil holes of shaft and bush.

ST1 499277200 INSTALLER

ST2 499587000 INSTALLER



5) Install the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring, and insert them onto driven shaft.



(A) 2nd driven gear

(B) Inner baulk ring

(C) Synchro cone

(D) Outer baulk ring

6) After installing key on driven shaft, install the 3rd-4th driven gear using ST and a press.

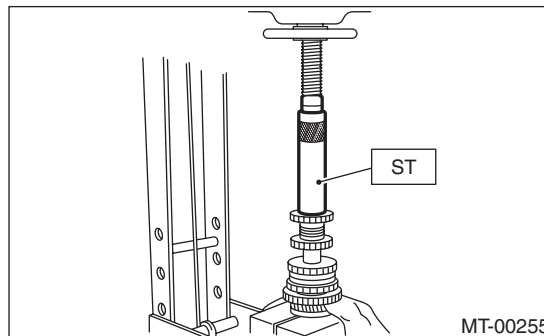
CAUTION:

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

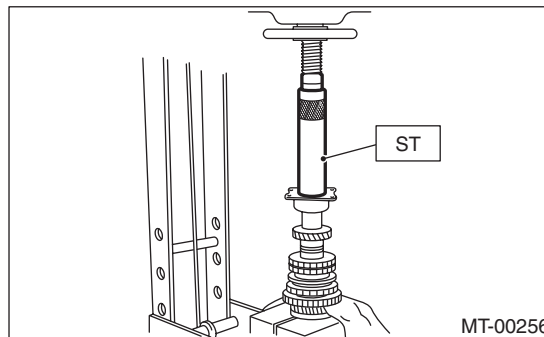


7) Install a set of roller bearings onto the driven shaft using ST and a press.

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

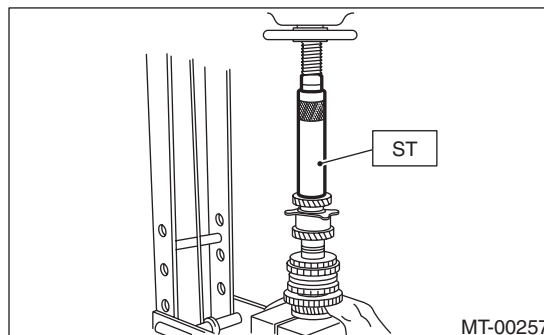


8) Position the woodruff key in groove of the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and a press.

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER



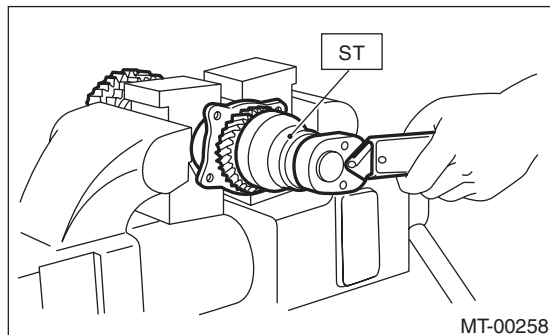
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

9) Install the lock washer. Install the lock nut and tighten to the specified torque using ST.
ST 499987300 SOCKET WRENCH (50)

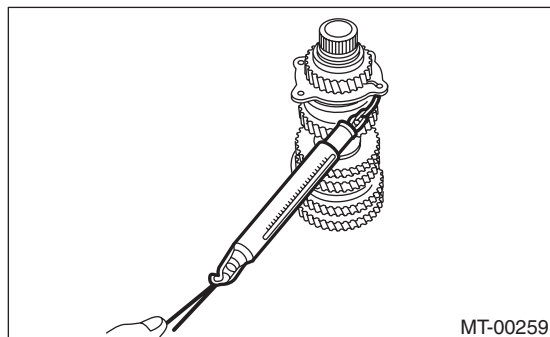
Tightening torque:

260 N·m (26.5 kgf-m, 191.8 ft-lb)



NOTE:

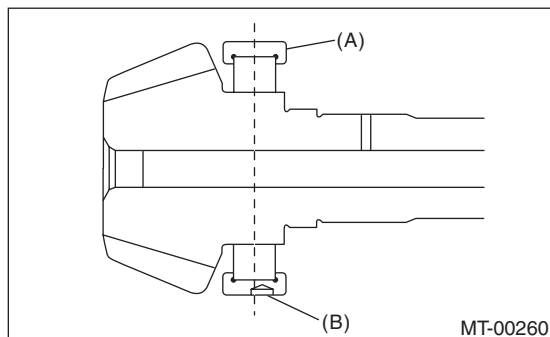
- Crimp the locknut in 2 locations.
- Using a spring scale, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33 ft).



10) Install the roller bearing onto drive pinion.

NOTE:

When installing the roller bearing, note its directions (front and rear) because the knock pin hole of outer race is offset.



- (A) Roller bearing
(B) Knock pin hole

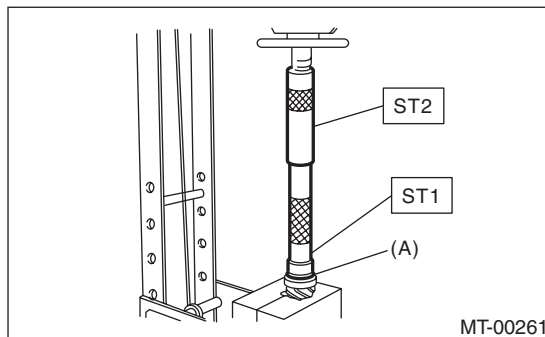
11) Install the washer using ST1, ST2 and a press.

CAUTION:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

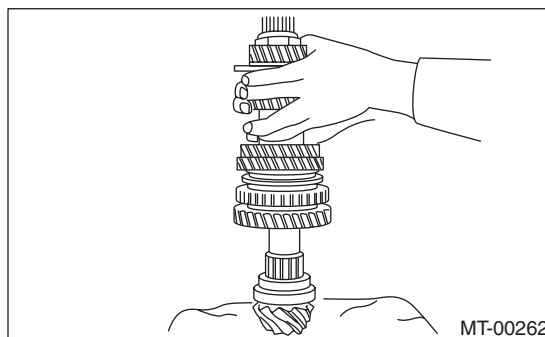
ST1 499277100 BUSHING 1-2 INSTALLER

ST2 499277200 INSTALLER



(A) Washer

12) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



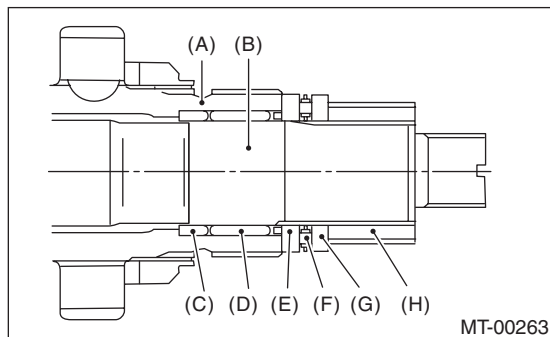
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

13) Install the drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in this order.

NOTE:

Be careful to install the spacer in the proper direction.



- (A) Driven shaft
- (B) Drive pinion shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Adjusting washer No. 2 (25 × 36 × 4)
- (F) Thrust bearing (25 × 37.5 × 3)
- (G) Adjusting washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

14) Adjust the thrust bearing preload. <Ref. to 5MT-68, THRUST BEARING PRELOAD, ADJUSTMENT, Drive Pinion Shaft Assembly.>

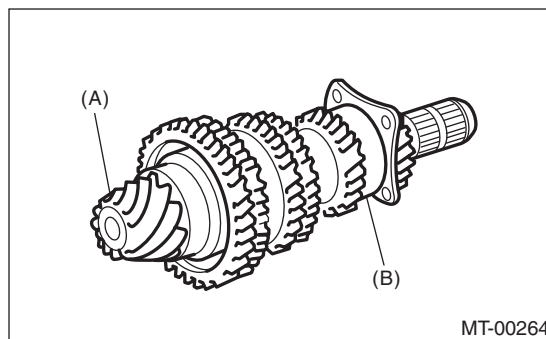
E: INSPECTION

Disassembled parts should be washed clean first with cleaning solvent and then inspected carefully.

1) Bearing

Replace the bearings in the following cases.

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- The roller 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) Roller bearing

- When the bearing has other problems.

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 a new part if its tooth surfaces are broken, damaged or abnormally 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.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

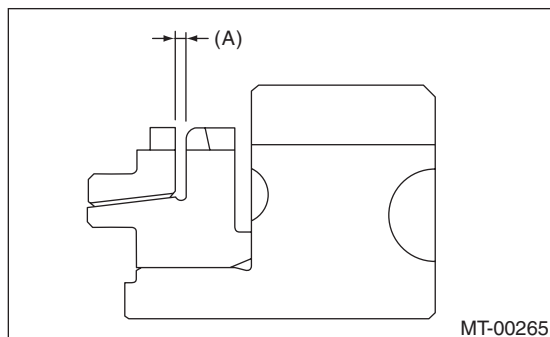
4) Baulk ring

Replace the ring in following cases.

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- If the gap between the end faces of the ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

Clearance (A):

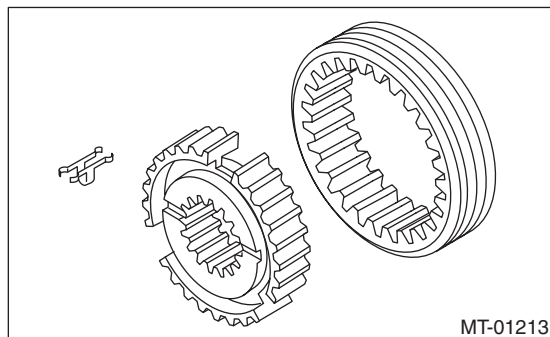
0.5 — 1.0 mm (0.020 — 0.040 in)



- When the contact surface of synchronizer ring insert is scratched or abnormally worn.

5) Shifting insert key

Replace the insert key if deformed, abnormally 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.

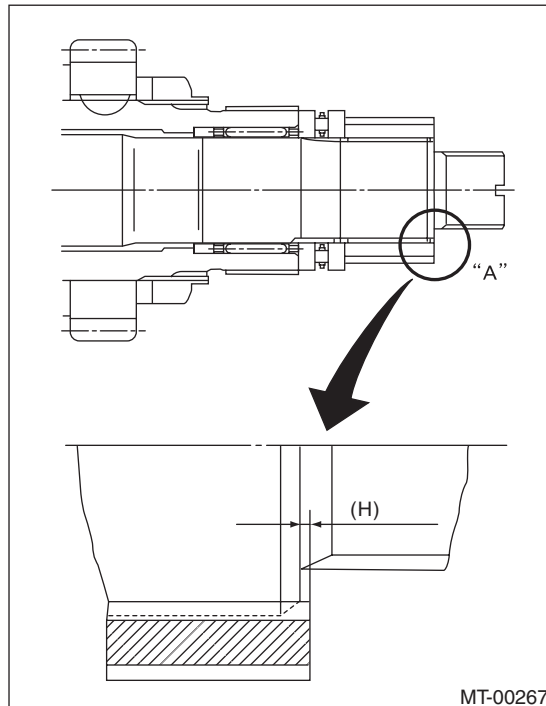
7) O-ring

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 washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).

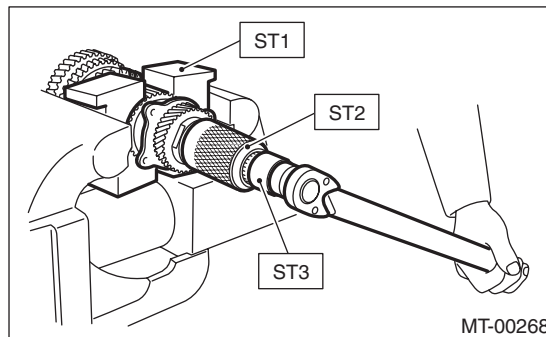


2) Using the ST1, ST2 and ST3, tighten the lock nut to the specified torque.

ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

120 N·m (12.2 kgf-m, 88.5 ft-lb)



Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

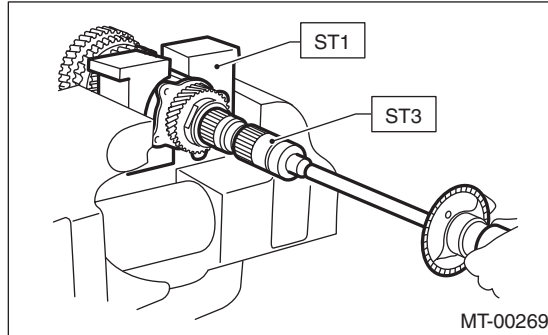
3) After removing the ST2, measure the starting torque using torque driver.

ST1 899884100 HOLDER

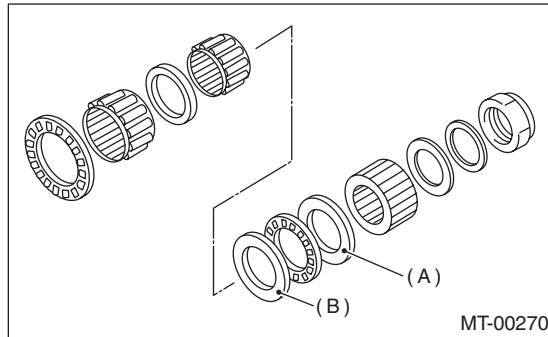
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)



4) If the starting torque is not within the specified limit, select new adjusting washer No. 1 and re-check starting torque.

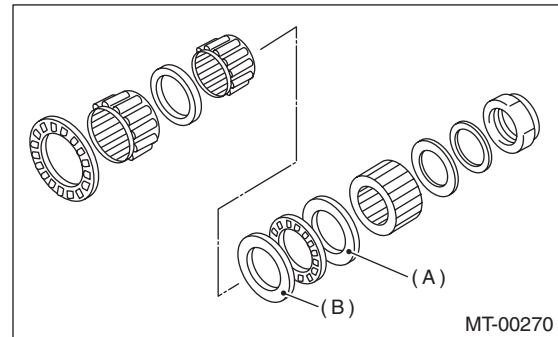


(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) When the specified starting torque cannot be obtained by adjusting washer No. 1, select adjusting washer No. 2 from the following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Starting torque	Dimension H	Adjusting washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
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.

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

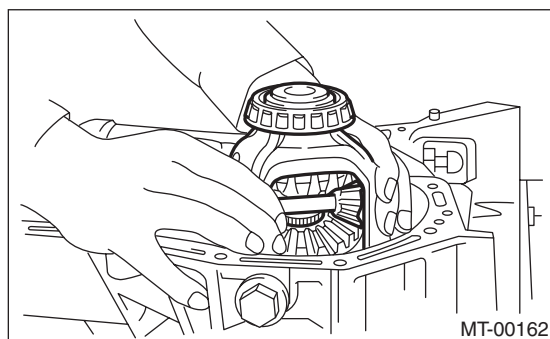
18.Front Differential Assembly

A: REMOVAL

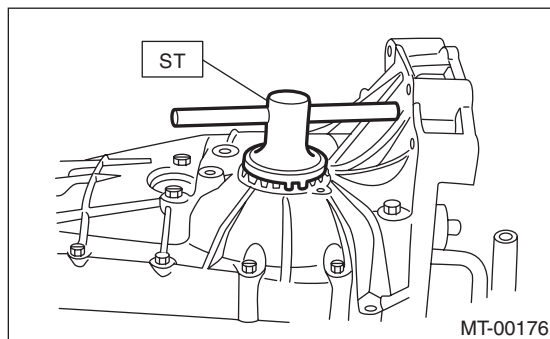
- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-61, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly for single-range. <Ref. to 5MT-56, 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



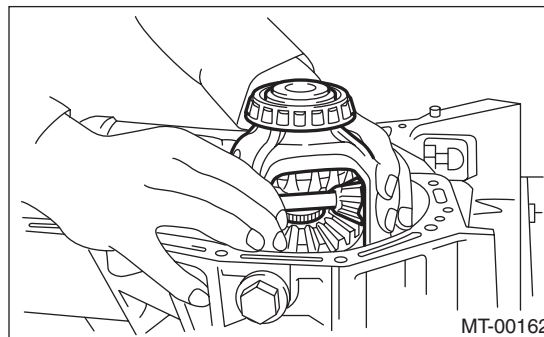
- 8) Remove the bearing outer race from the transmission case. ST 398527700 PULLER ASSY

B: INSTALLATION

- 1) Install the differential side retainers using ST. ST 18630AA010 WRENCH COMPL RETAINER
- 2) Insert the bearing outer race into the transmission case.
- 3) Install the front differential assembly.

NOTE:

Be careful not to fold the sealing lip of oil seal.



- 4) Install the main shaft assembly for single-range. <Ref. to 5MT-56, INSTALLATION, Main Shaft Assembly for Single-range.>
- 5) Install the drive pinion shaft assembly. <Ref. to 5MT-61, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 5MT-54, INSTALLATION, Transmission Case.>
- 7) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 8) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

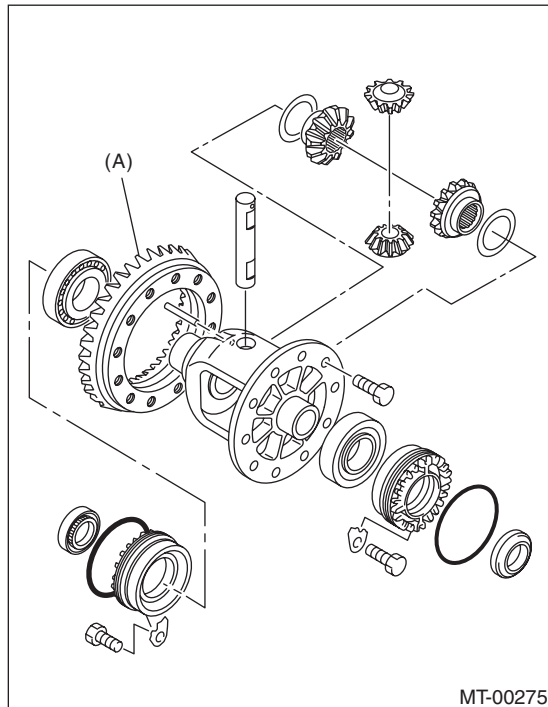
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

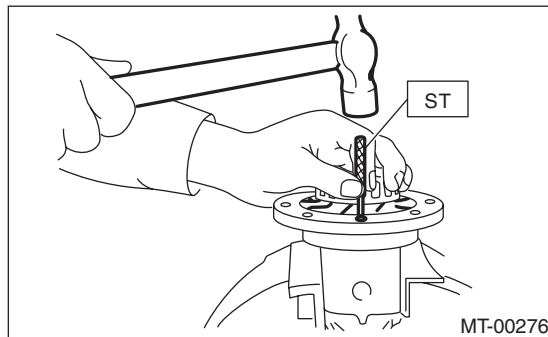
1) Loosen the twelve bolts and remove hypoid driven gear.



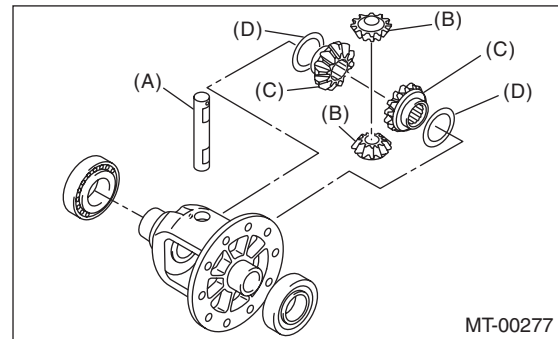
(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear side.

ST 899904100 REMOVER



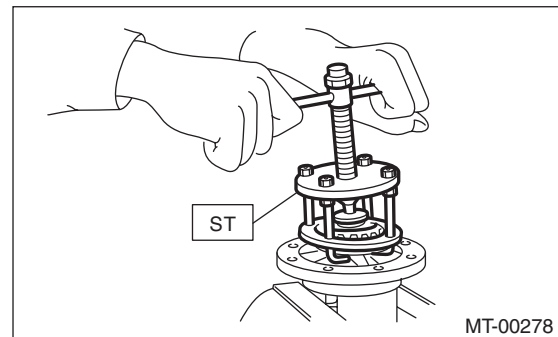
3) Pull out the pinion shaft, and remove the differential bevel pinion, differential bevel gear and washer.



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

4) Using the ST, remove the roller bearing.

ST 899524100 PULLER SET

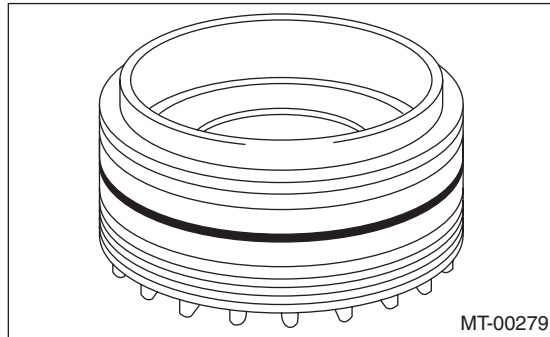


Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

2. SIDE RETAINER

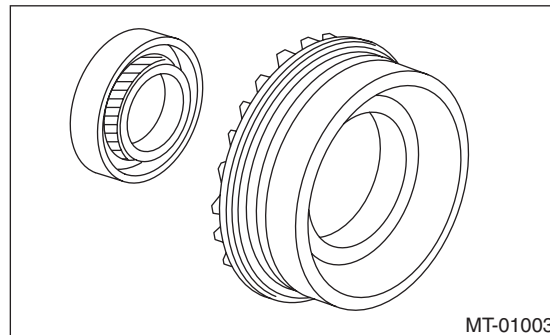
1) Remove the O-ring.



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.



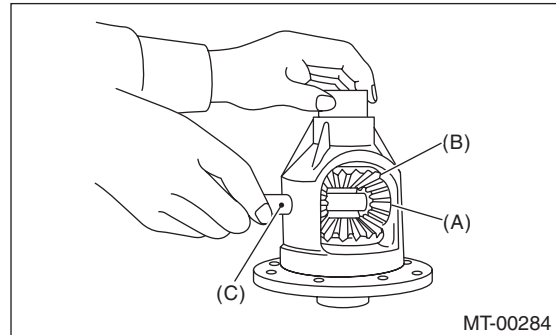
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the differential bevel gear and differential bevel pinion with the washer, and then 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 bevel pinion. If backlash is not within specified values, install a suitable washer to adjust. <Ref. to 5MT-75, ADJUSTMENT, Front Differential Assembly.>

NOTE:

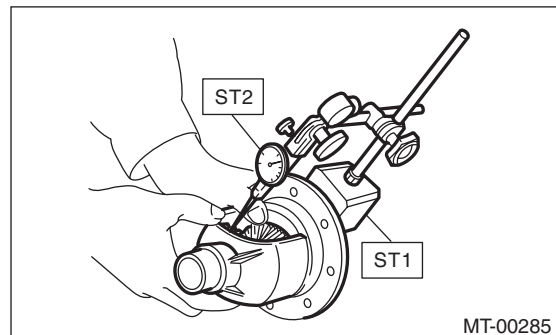
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)



Front Differential Assembly

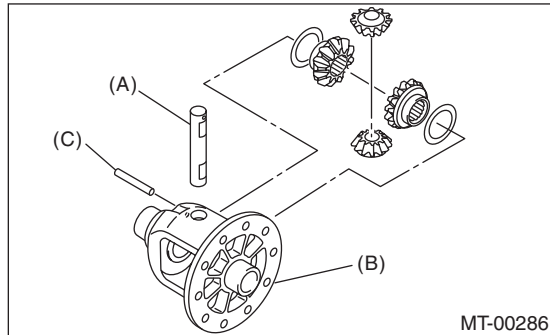
MANUAL TRANSMISSION AND DIFFERENTIAL

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 ST.

NOTE:

Lock the straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

4) Install the roller bearing to differential case.

CAUTION:

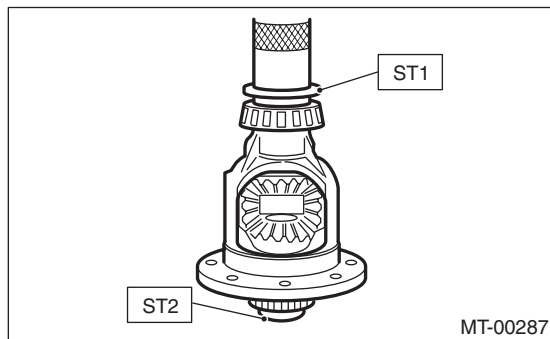
Do not apply a load in excess of 10 kN
(1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER

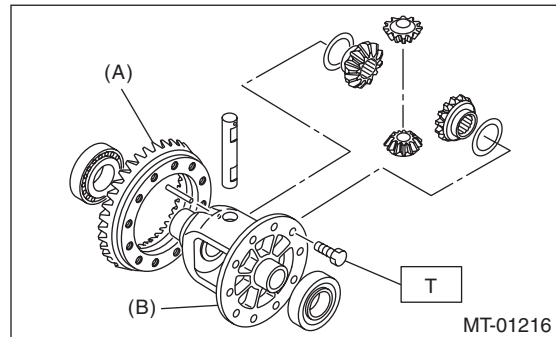
ST2 398497701 ADAPTER



5) Install the hypoid driven gear to the differential case using twelve bolts.

Tightening torque:

T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)



- (A) Hypoid driven gear
- (B) Differential case

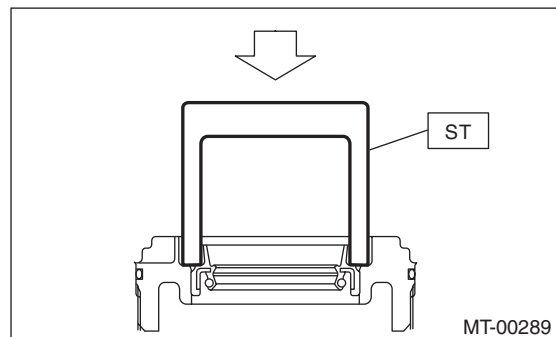
2. SIDE RETAINER

1) Install a new oil seal.

CAUTION:

- When press-fitting the oil seal to the side retainer, tap with a plastic hammer etc. to press in.
- Never use a press.

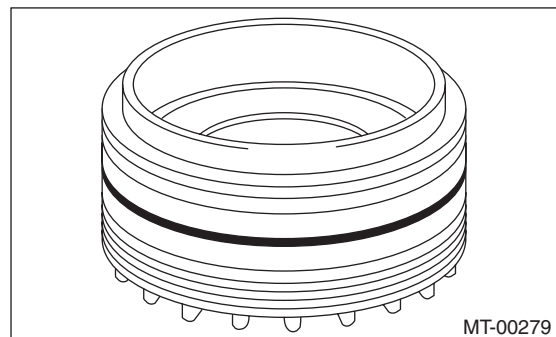
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2) Install a new O-ring.

NOTE:

Do not stretch or damage the O-ring.



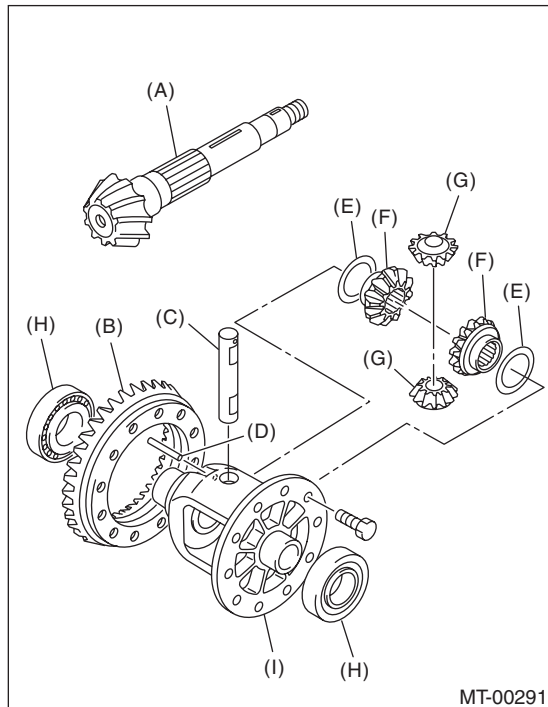
Front Differential Assembly

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 surface 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 has worn or damaged sliding surfaces.



MT-00291

- (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. DIFFERENTIAL BEVEL PINION GEAR BACKLASH

Measure the backlash between differential bevel gear and differential bevel pinion. If backlash is not within specified value, install a suitable washer to adjust.

NOTE:

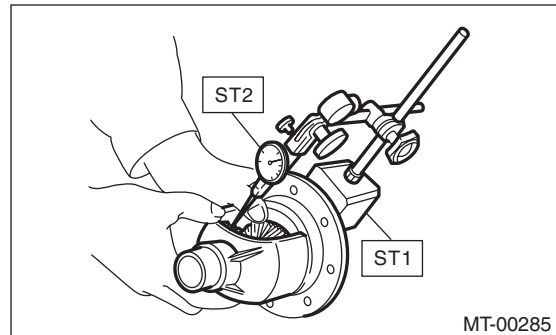
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.

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

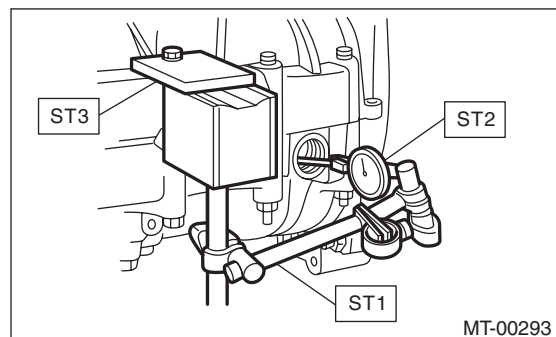
ST3 498255400 PLATE

2) Install the SUBARU genuine axle shafts to both sides, rotate in the right direction and the reverse direction so that the gauge contacts with the tooth surface, and read the dial gauge.

Part No. 38415AA100AXLE SHAFT

Backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)



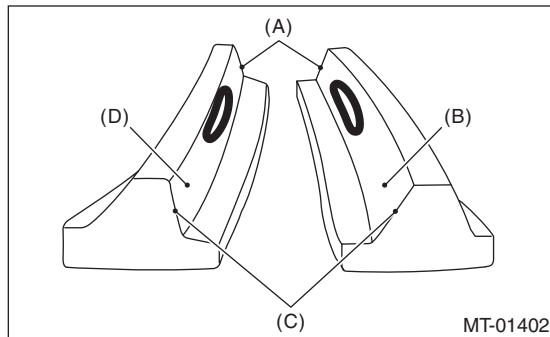
NOTE:

If the backlash is not within specifications, adjust it by turning the holder in the RH side case.

3. TOOTH CONTACT OF HYPOID GEAR

Check tooth contact of hypoid gear as follows. Apply a thin uniform coat of red lead on both teeth surfaces on 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on the hypoid gear, and judge whether face contact is correct. When the contact pattern is not correct, adjust the tooth contact. <Ref. to 5MT-75, 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-71, DISASSEMBLY, Front Differential Assembly.>

2) Select a different washer from the table and install.

Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the specified value is obtained.

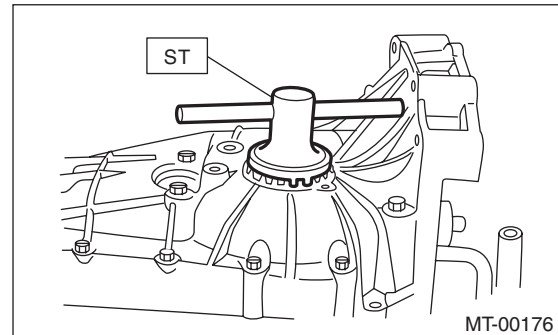
Standard backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

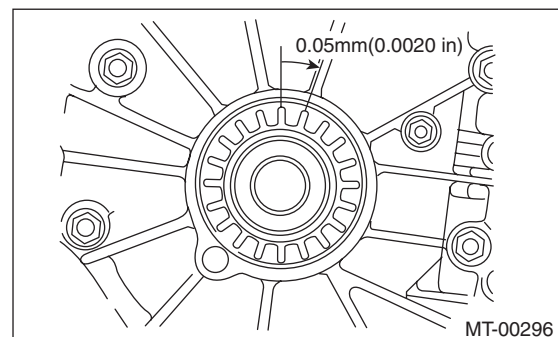
Adjust the backlash by turning the holder in the RH side case.

ST 18630AA010 WRENCH COMPL RETAINER



NOTE:

Each time side retainer rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



Front Differential Assembly

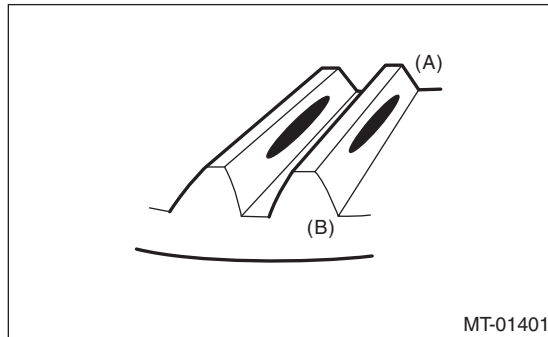
MANUAL TRANSMISSION AND DIFFERENTIAL

3. TOOTH CONTACT OF HYPOID GEAR

- 1) Adjust until correct teeth contact is obtained.
- 2) Check tooth contact, and perform the adjustment as follows.

- Correct tooth contact

Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)

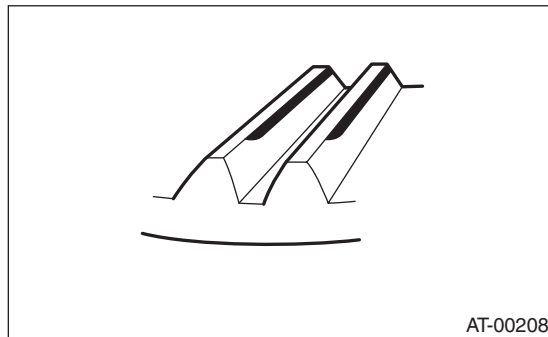


- (A) Toe side
(B) Heel side

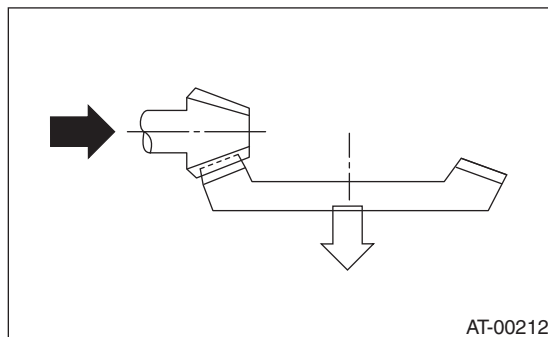
- Face contact

Check item: Backlash is too large.

Contact pattern



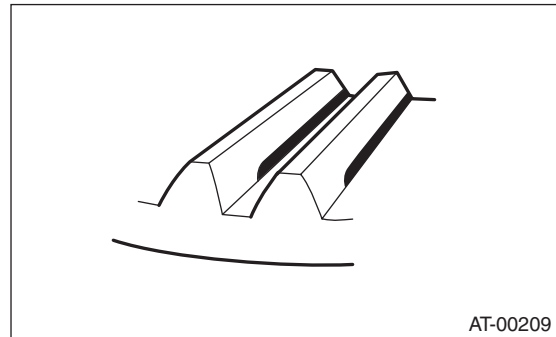
Corrective action: Reduce thickness of the pinion height adjusting washer in order to bring the drive pinion closer to the driven gear.



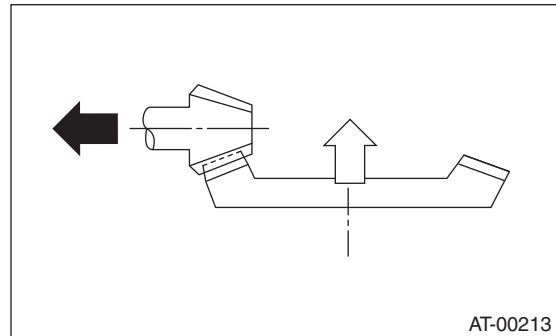
- Flank contact

Check item: Backlash is too small.

Contact pattern



Adjustment: Increase the thickness of the pinion height adjusting washer according to the procedure for moving the drive pinion away from the driven gear.



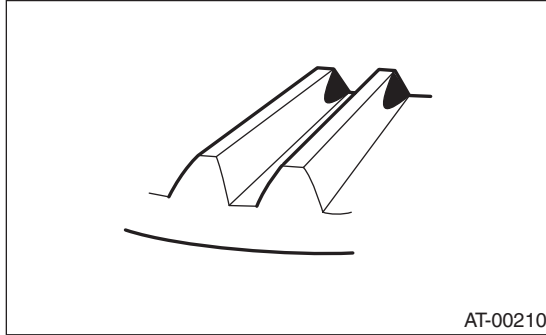
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

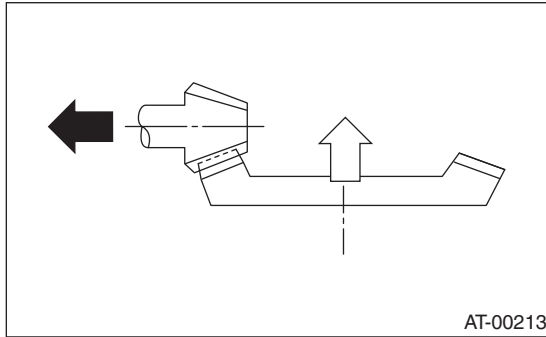
- Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



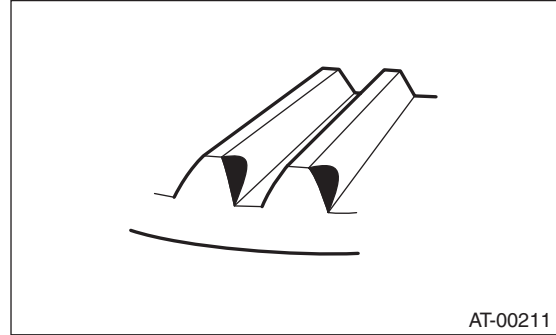
Corrective action: Increase the thickness of pinion height adjusting washer according to the procedure for bringing the drive pinion closer to the hypoid driven gear.



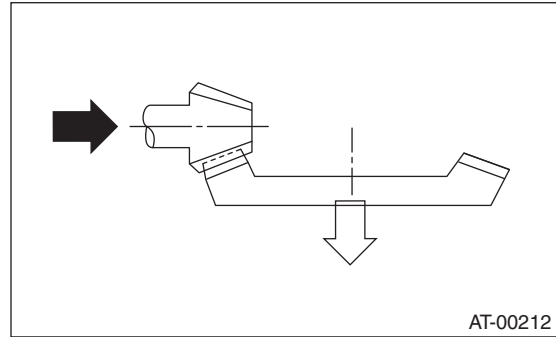
- Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern



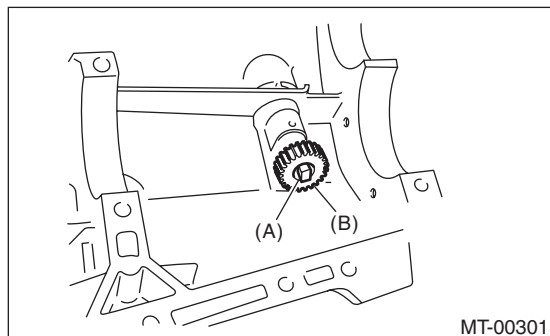
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for moving the drive pinion away from hypoid driven gear.



19.Speedometer Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and the neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transmission Case.>
- 5) Remove the vehicle speed sensor. <Ref. to 5MT-38, REMOVAL, Vehicle Speed Sensor.>
- 6) Remove the snap ring (outer) and pull out the speedometer driven gear. Next, remove the oil seal, speedometer shaft and washer.



- (A) Snap ring (Outer)
(B) Speedometer driven gear

B: INSTALLATION

- 1) Install the washer and speedometer shaft, and press-fit the oil seal with ST.

NOTE:

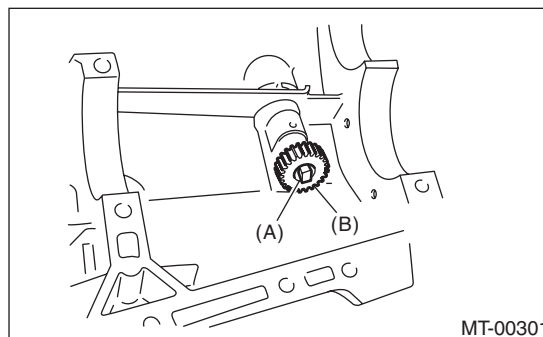
If it is removed, use a new oil seal.

ST 899824100 or 499827000 PRESS

- 2) Install the vehicle speed sensor. <Ref. to 5MT-38, INSTALLATION, Vehicle Speed Sensor.>
- 3) Install the speedometer driven gear and snap ring (outer).

NOTE:

If it is removed, use a new snap ring.



- (A) Snap ring (Outer)
(B) Speedometer driven gear

- 4) Install the transmission case. <Ref. to 5MT-54, INSTALLATION, Transmission Case.>
- 5) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the back-up light switch and neutral position switch. <Ref. to 5MT-37, INSTALLATION, Switches and Harness.>
- 7) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

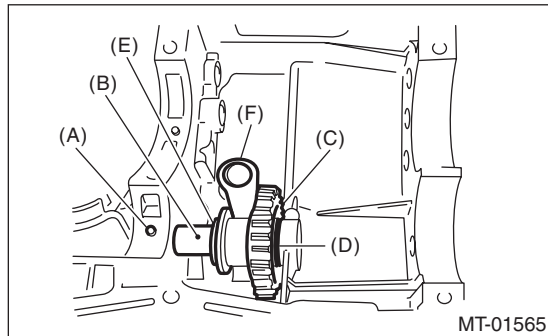
C: INSPECTION

Check the speedometer driven gear, oil seal and speedometer shaft for damage. Replace if it is damaged.

20.Reverse Idler Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and the neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transmission Case.>
- 5) Remove the drive pinion shaft assembly. <Ref. to 5MT-61, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly for single-range. <Ref. to 5MT-56, REMOVAL, Main Shaft Assembly for Single-range.>
- 7) Remove the front differential assembly. <Ref. to 5MT-70, REMOVAL, Front Differential Assembly.>
- 8) Remove the shifter forks and rods. <Ref. to 5MT-81, REMOVAL, Shifter Fork and Rod.>
- 9) Pull out the straight pin, and remove the reverse idler gear shaft, washer, reverse idler gear and washer.



- (A) Straight pin
- (B) Reverse idler gear shaft
- (C) Reverse idler gear
- (D) Washer
- (E) Washer
- (F) Reverse shifter lever

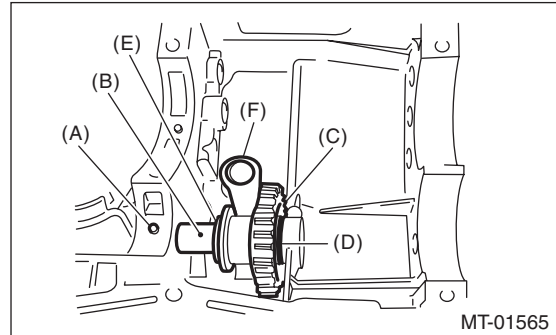
- 10) Remove the reverse shifter lever.

B: INSTALLATION

- 1) Install the reverse shifter lever, washer, reverse idler gear, washer and reverse idler gear shaft, and secure them with the straight pin.

NOTE:

Be sure to install the reverse idler gear shaft from rear side.



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin
- (E) Washer
- (F) Reverse shifter lever

- 2) Check and adjust clearance between the reverse idler gear and the transmission case wall surface. <Ref. to 5MT-80, INSPECTION, Reverse Idler Gear.> <Ref. to 5MT-80, ADJUSTMENT, Reverse Idler Gear.>
- 3) Install the shifter forks and rods. <Ref. to 5MT-82, INSTALLATION, Shifter Fork and Rod.>
- 4) Install the front differential assembly. <Ref. to 5MT-70, INSTALLATION, Front Differential Assembly.>
- 5) Install the main shaft assembly for single-range. <Ref. to 5MT-56, INSTALLATION, Main Shaft Assembly for Single-range.>
- 6) Install the drive pinion shaft assembly. <Ref. to 5MT-61, INSTALLATION, Drive Pinion Shaft Assembly.>
- 7) Install the transmission case. <Ref. to 5MT-54, INSTALLATION, Transmission Case.>
- 8) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install the back-up light switch and neutral position switch. <Ref. to 5MT-37, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

Reverse Idler Gear

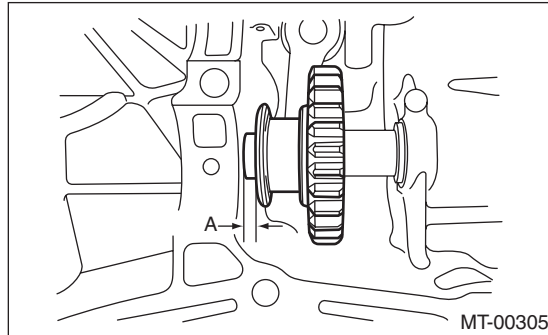
MANUAL TRANSMISSION AND DIFFERENTIAL

C: INSPECTION

1) Move the reverse shifter rod toward the reverse side. Check and adjust clearance between the reverse idler gear and the timing 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)

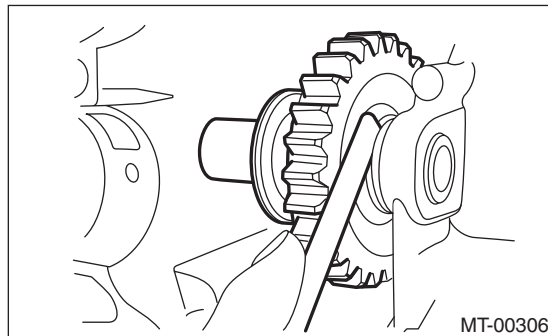


2) After installing a suitable reverse shifter lever, shift into neutral. Check and adjust clearance between the reverse idler gear and the timing case wall surface.

If out of specification, select the appropriate washer and adjust.

Clearance:

0 — 0.5 mm (0 — 0.020 in)



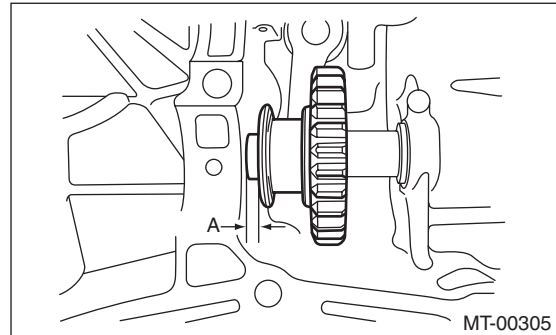
3) Check the reverse idler gear and shaft for damage. Replace if it is damaged.

D: ADJUSTMENT

1) Select the appropriate reverse shifter lever from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

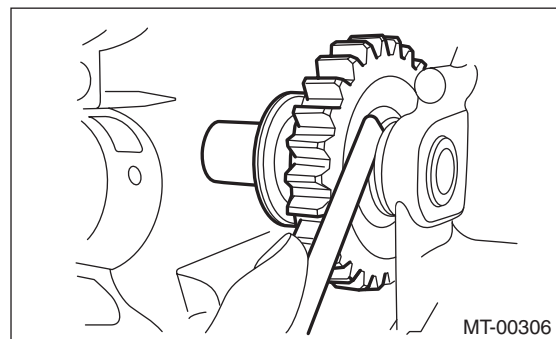


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Far from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select the appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance:

0 — 0.5 mm (0 — 0.020 in)

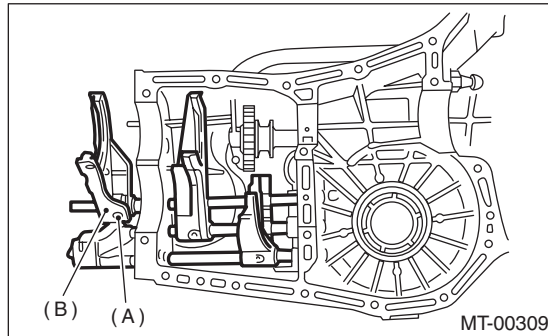


Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

21.Shifter Fork and Rod

A: REMOVAL

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to 5MT-26, REMOVAL, Manual Transmission Assembly.>
 - 2) Remove the back-up light switch and the neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
 - 3) Remove the transfer case together with the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
 - 4) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transmission Case.>
 - 5) Remove the drive pinion shaft assembly. <Ref. to 5MT-61, REMOVAL, Drive Pinion Shaft Assembly.>
 - 6) Remove the main shaft assembly for single-range. <Ref. to 5MT-56, REMOVAL, Main Shaft Assembly for Single-range.>
 - 7) Remove the front differential assembly. <Ref. to 5MT-70, REMOVAL, Front Differential Assembly.>
 - 8) Drive out the straight pin by tapping with the ST, and pull out the 5th shifter fork.
- ST 398791700 STRAIGHT PIN REMOVER



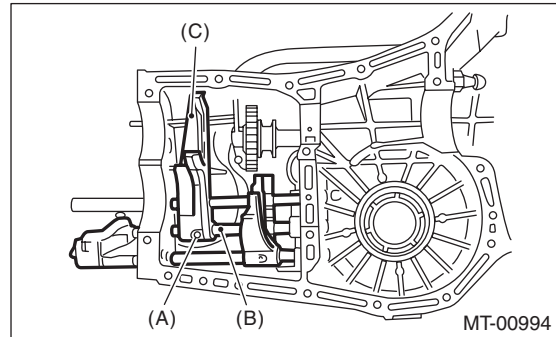
- (A) Straight pin
(B) 5th shifter fork

- 9) Remove the plugs, springs and check balls.

- 10) Drive out the straight pin, 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, take out the pin toward the inside of case so that it does not hit against the case.



- (A) Straight pin
(B) 3rd-4th fork rod
(C) Shifter fork

- 11) Drive out the straight pin, and pull out the 1st-2nd fork rod and shifter fork.

- 12) Remove the snap ring (outer), and pull out the reverse fork rod from reverse fork rod arm. Then take out the ball, spring and interlock plunger from the rod.

And then remove the rod.

NOTE:

When pulling out the reverse fork rod arm, be careful not to let the ball pop out of arm.

- 13) Remove the reverse shifter lever.

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 new gasket in the reverse fork rod hole on the left side of transmission case, and tighten the checking ball plug.

3) Install the 1st-2nd fork rod into 1st-2nd shifter fork through the hole on the rear of transmission case.

4) Align the holes in the rod and the fork, and drive the new straight pin into these holes using the ST.

NOTE:

- Set other rods to neutral.
- Make sure the interlock plunger is on the 3rd-4th fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

5) Attach the interlock plunger on 3rd-4th fork rod.

NOTE:

Apply grease to plunger to prevent it from falling.

6) Attach the 3rd-4th fork rod into 3rd-4th shifter fork through the hole on the rear of transmission case.

7) Align the holes in the rod and the fork, and drive the new straight pin into these holes.

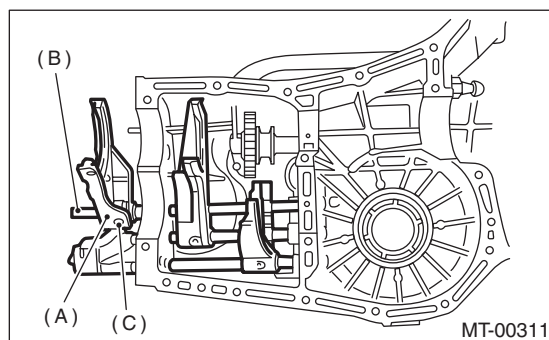
NOTE:

- Set the reverse fork rod to neutral.
- Make sure the interlock plunger (before installation) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

8) Install the 5th shifter fork onto the rear of reverse fork rod. Align the holes in the two parts and drive new straight pin into the specified place.

ST 398791700 STRAIGHT PIN REMOVER

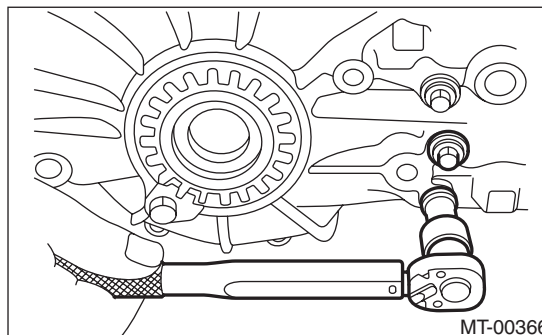


- (A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

9) Position the balls, checking ball springs and new gaskets into 3rd-4th fork rods and 1st-2nd fork rod holes, and install plugs.

Tightening torque:

20 N·m (2.0 kgf-m, 14.8 ft-lb)



10) Install the front differential assembly. <Ref. to 5MT-70, INSTALLATION, Front Differential Assembly.>

11) Install the main shaft assembly for single-range.

<Ref. to 5MT-56, INSTALLATION, Main Shaft Assembly for Single-range.>

12) Install the drive pinion shaft assembly. <Ref. to 5MT-61, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install the transmission case. <Ref. to 5MT-54, INSTALLATION, Transmission Case.>

14) Install the transfer case together with the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch and neutral position switch. <Ref. to 5MT-37, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

C: INSPECTION

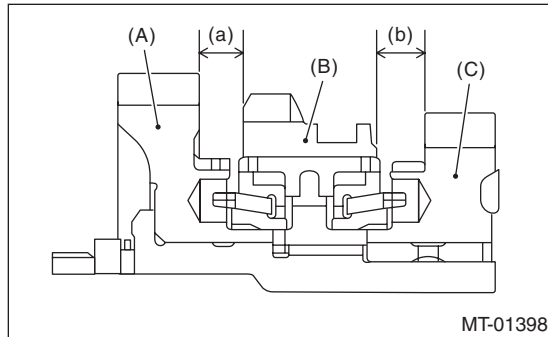
1) Check the fork and rod for damage. Replace if it is damaged.

2) Gearshift mechanism

Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

3) Inspect the clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
9.5 mm (0.374 in)

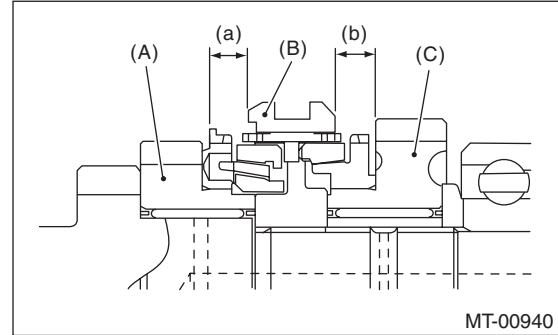


- (A) 1st driven gear
- (B) Reverse driven gear
- (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	0.2 mm on 1st gear Near (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	0.2 mm on 2nd gear Near (0.008 in)

4) Inspect the clearance between the 3rd, 4th drive gear and the coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
7.3 mm (0.287 in)



- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

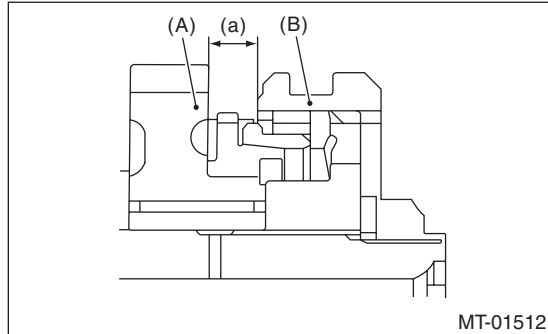
3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	0.2 mm on 4th gear Near (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	0.2 mm on 3rd gear Near (0.008 in)

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Inspect the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



- (A) 5th drive gear
 (B) Coupling sleeve

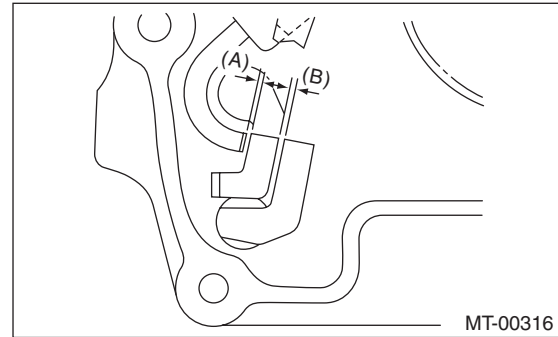
5th shifter fork (non-turbo) • Identification paint (pink)		
Part No.	Mark	Remarks
32812AA201	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA211	No mark	Standard
32812AA221	9	Moves away from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (turbo) • Identification paint (blue)		
Part No.	Mark	Remarks
32812AA231	7	Approaches 5th gear by 0.2 mm (0.008 in).
32812AA241	No mark	Standard
32812AA251	9	Moves away from 5th gear by 0.2 mm (0.008 in).

6) Inspect the rod end clearances (A) and (B). If any clearance is not within specifications, replace the rod or fork as required.

Clearance (A):
3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)

Clearance (B):
1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)



General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL

22. General Diagnostic Table

A: INSPECTION

1. MANUAL TRANSMISSION

Symptoms	Possible cause	Corrective action
1. The gears are not mating well. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: One is a abnormal gear shift system and the other is abnormal 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 sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of gear spline	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact or wear between synchronizer ring and gear cone	Correct or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Abnormal pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (caused by slip of 3rd gear)	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and 2nd bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 4th drive gear and needle bearing	Replace.
3. Unusual noise comes 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 Problems in the differential and hypoid gear always appear as noise problems. Therefore, the generation of noise is the first indication of a problem. 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.