

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

1. General Description

A: SPECIFICATIONS

1. TORQUE CONVERTER CLUTCH

Model	Non-turbo	Turbo
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	1.85 — 2.15	2.05 — 2.35
Nominal diameter	246 mm (9.69 in)	
Stall speed (at sea level)	2,100 — 2,600 rpm	2,600 — 3,400 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 set

4. TRANSMISSION GEAR RATIO

Model	Sedan (non-turbo)	Except sedan (non-turbo)
1st	3.027	2.785
2nd	1.619	1.545
3rd	1.000	
4th	0.694	
Rev	2.272	

5. PLANETARY GEAR AND PLATE

Model	Non-turbo		Turbo
	Sedan	Wagon	
Front sun gear, number of teeth	33		
Front pinion, number of teeth	21		
Front internal gear, number of teeth	75		
Rear sun gear, number of teeth	37	42	
Rear pinion, number of teeth	19	17	
Rear internal gear, number of teeth	75		
Drive plate number of high clutch	4		5
Drive plate number of low clutch	6		7
Drive plate number of reverse clutch	2		
Drive plate number of 2-4 brake	3		4
Drive plate number of low & reverse brake	6		7

6. SELECTOR POSITION

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing up
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	Automatic gear change 1st $\leftarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th
3 (3rd)	Automatic gear change 1st $\leftarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th
2 (2nd)	2nd gear locked (deceleration possible 2nd $\leftarrow$ 3rd $\leftarrow$ 4th)
1 (1st)	1st gear locked (deceleration possible 1st $\leftarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th)
Control method	Wire cable

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7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic-hydraulic control [four forward speeds change by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	Dexron III type automatic transmission fluid
Fluid capacity:	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 7.4 — 7.7 Imp qt)
Lubrication system	Forced feed lubrication with oil pump
Oil	Automatic transmission fluid (above mentioned)

8. COOLING AND HARNESS

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

9. TRANSFER

Model	Non-turbo	Turbo
Transfer type	Multi-plate transfer (MPT)	Variable torque distribution (VTD)
Number of drive & driven plates in transfer clutch	5	3
Control method	Electronic, hydraulic type	
Lubricant	The same automatic transmission fluid as used in automatic transmission	
1st reduction gear ratio	1.000 (53/53)	

10.FINAL REDUCTION

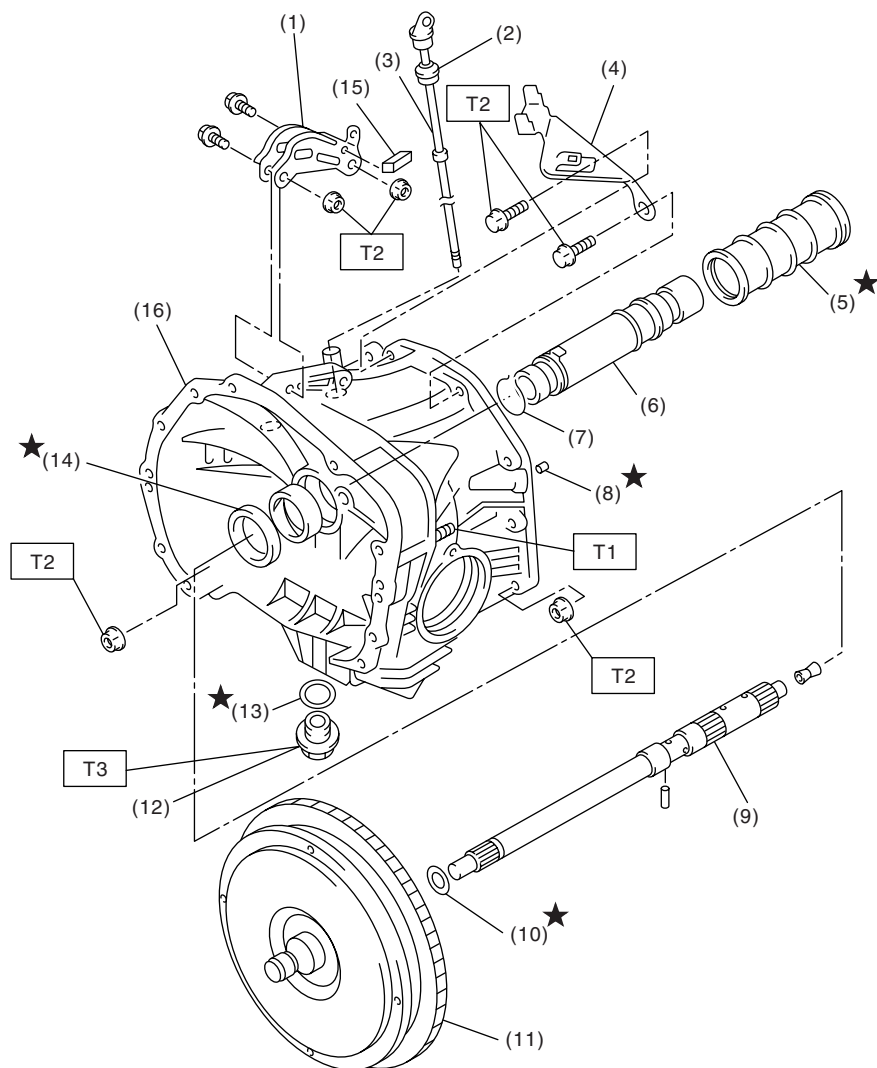
Model	Sedan (non-turbo)	Except sedan (non-turbo)																		
Front final gear ratio	4.444 (40/9)	4.111 (37/9)																		
Lubrication oil	ITEM • Front differential gear oil API Classification GL-5 SAE Viscosity No. and Applicable Temperature <table><tr><td>(°C)</td><td>-30</td><td>-26</td><td>-15</td><td>-5</td><td>0</td><td>15</td><td>25</td><td>30</td></tr><tr><td>(°F)</td><td>-22</td><td>-15</td><td>5</td><td>23</td><td>32</td><td>59</td><td>77</td><td>86</td></tr></table> 90 85W 80W 75W-90 AT-00001		(°C)	-30	-26	-15	-5	0	15	25	30	(°F)	-22	-15	5	23	32	59	77	86
(°C)	-30	-26	-15	-5	0	15	25	30												
(°F)	-22	-15	5	23	32	59	77	86												
Front differential oil capacity	1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)																			

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B: COMPONENT

1. TORQUE CONVERTER CLUTCH AND CASE



AT-00002

- (1) Pitching stopper bracket
- (2) O-ring
- (3) Differential oil level gauge
- (4) Stay
- (5) Seal pipe
- (6) Oil pump shaft
- (7) Clip

- (8) Oil drain pipe
- (9) Input shaft
- (10) O-ring
- (11) Torque converter clutch assembly
- (12) Drain plug
- (13) Gasket
- (14) Oil seal

- (15) Clip (turbo model)
- (16) Torque converter clutch case

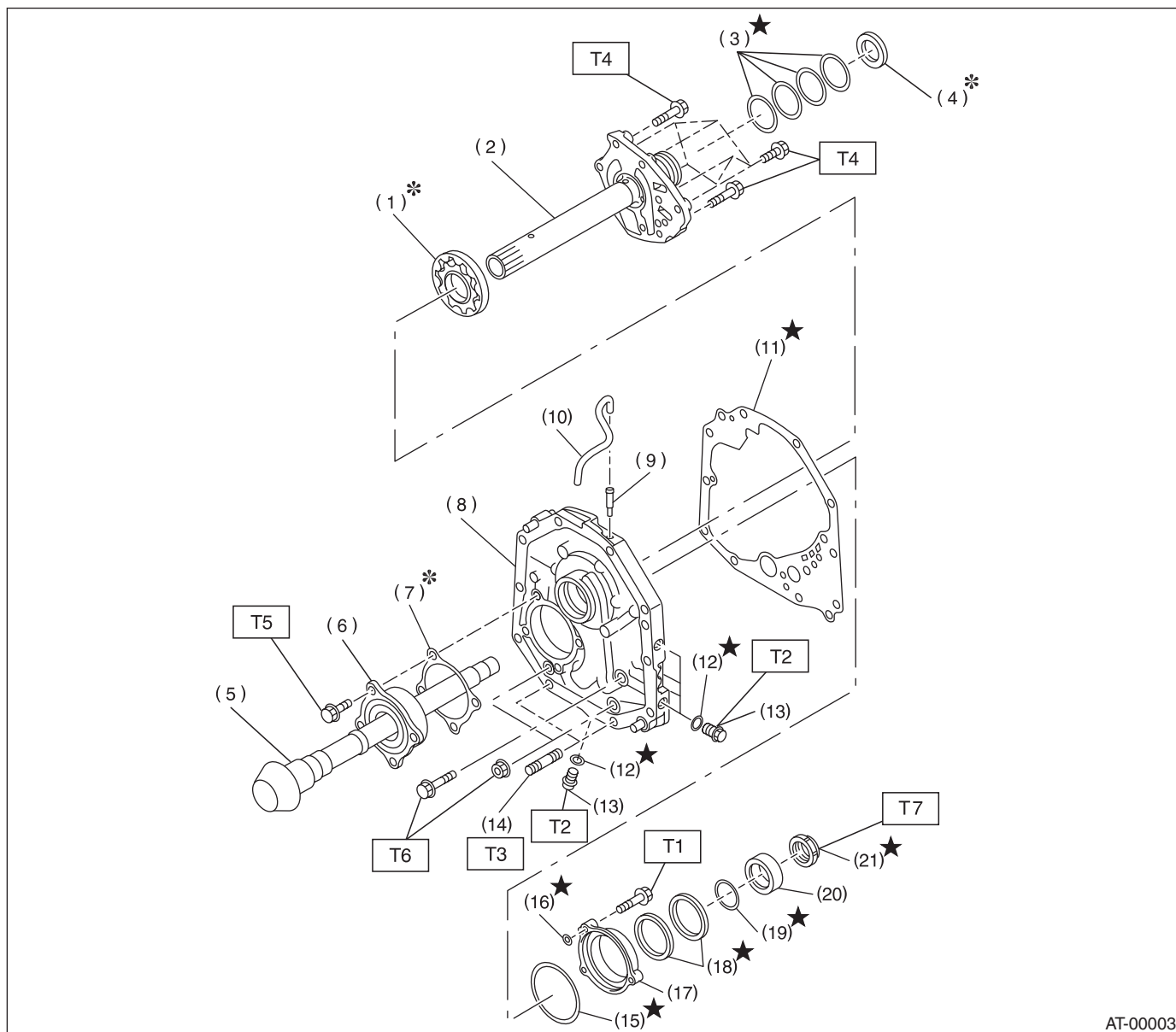
Tightening torque: N·m (kgf-m, ft-lb)

T1: 18 (1.8, 13.0)

T2: 41 (4.2, 30.4)

T3: 44 (4.5, 32.5)

2. OIL PUMP



AT-00003

- (1) Oil pump rotor
- (2) Oil pump cover
- (3) Seal ring
- (4) Thrust needle bearing
- (5) Drive pinion shaft
- (6) Roller bearing
- (7) 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

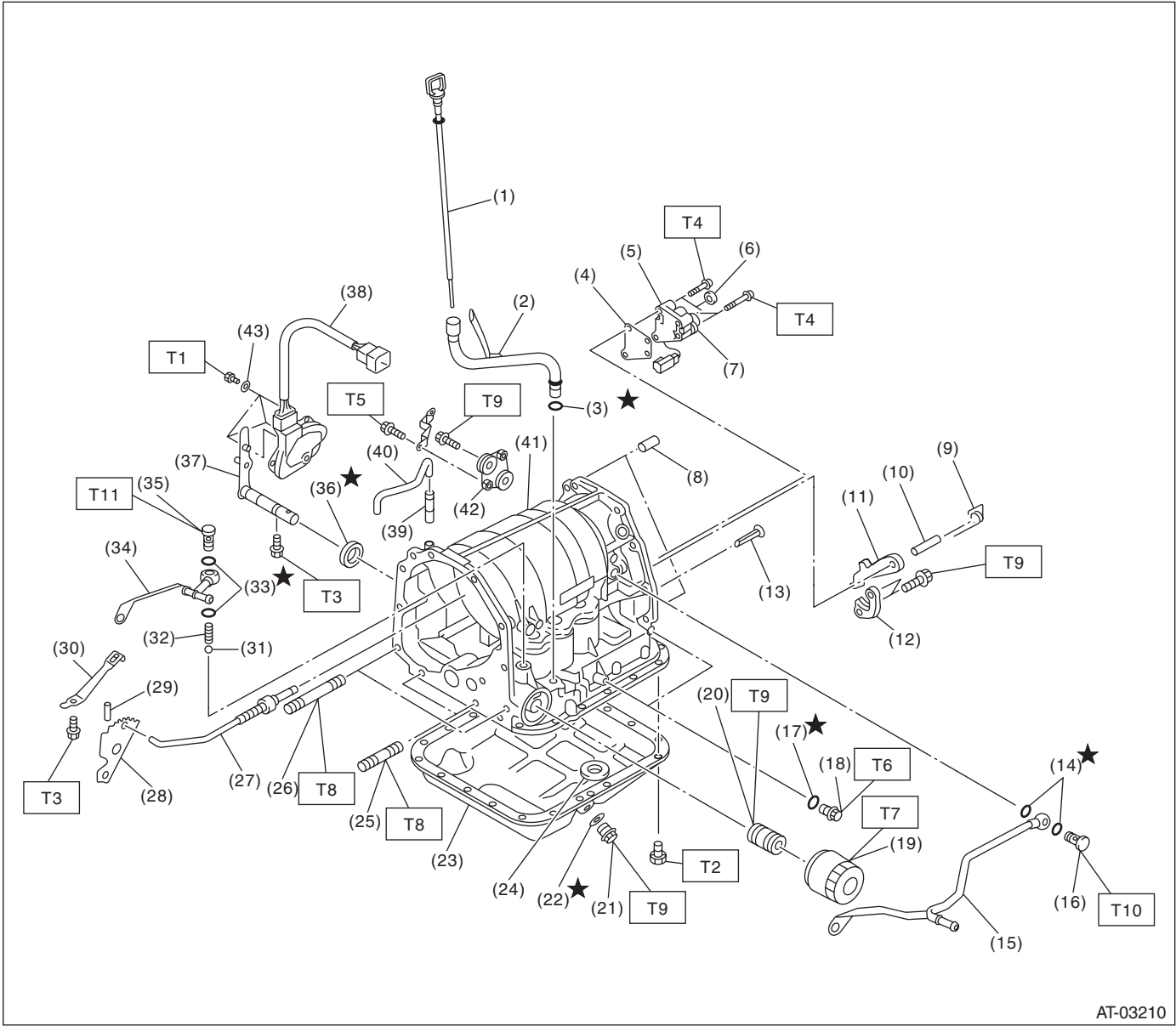
Tightening torque: N·m (kgf-m, ft-lb)

- T1: 7 (0.7, 5.1)**
- T2: 13 (1.3, 9.4)**
- T3: 18 (1.8, 13.0)**
- T4: 25 (2.5, 18.1)**
- T5: 40 (4.1, 30)**
- T6: 42 (4.3, 31)**
- T7: 116 (11.8, 85)**

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3. TRANSMISSION CASE AND CONTROL DEVICE



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

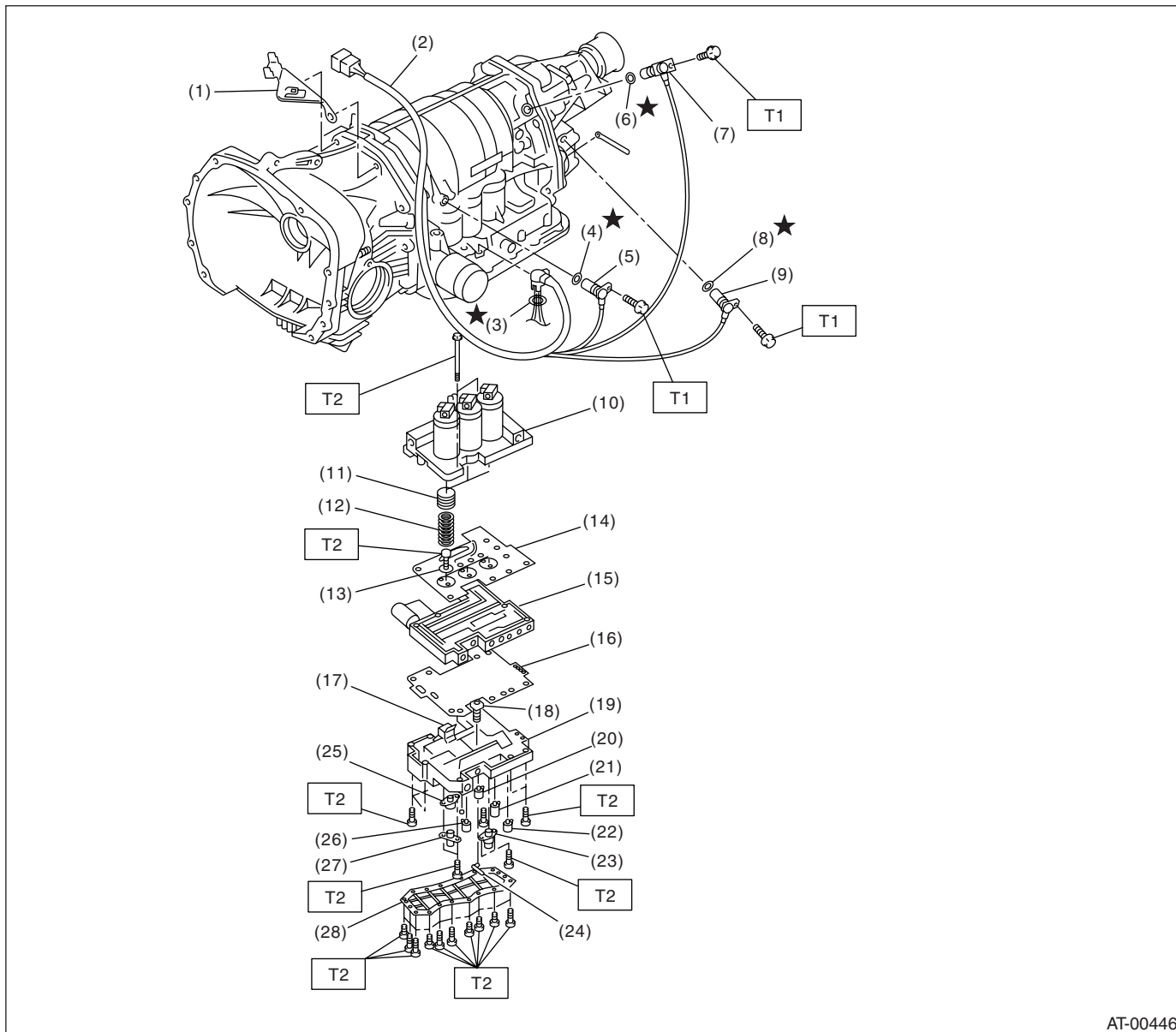
(39) Nipple
(40) Air breather hose
(41) Transmission case
(42) Plate assembly
(43) Washer

Tightening torque: N·m (kgf-m, ft-lb)***T1: 3.4 (0.35, 2.5)******T2: 5 (0.5, 3.6)******T3: 6 (0.6, 4)******T4: 8 (0.8, 6)******T5: 12 (1.2, 8.7)******T6: 13 (1.3, 10)******T7: 14 (1.4, 10)******T8: 18 (1.8, 13)******T9: 25 (2.6, 18)******T10: 40 (4.1, 30)******T11: 44 (4.5, 32)***

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4. CONTROL VALVE AND HARNESS ROUTING



- | | |
|---|--------------------------------|
| (1) Stay | (12) Accumulator spring |
| (2) Transmission harness | (13) Side plate |
| (3) O-ring | (14) Separate plate |
| (4) O-ring | (15) Middle valve body |
| (5) Torque converter turbine speed sensor | (16) Separate plate |
| (6) O-ring | (17) Fluid filter |
| (7) Front vehicle speed sensor | (18) Fluid filter |
| (8) O-ring | (19) Lower valve body |
| (9) Rear vehicle speed sensor | (20) Shift solenoid 2 |
| (10) Upper valve body | (21) Shift solenoid 1 |
| (11) Accumulator spring | (22) 2-4 brake timing solenoid |
| | (23) 2-4 brake duty solenoid |

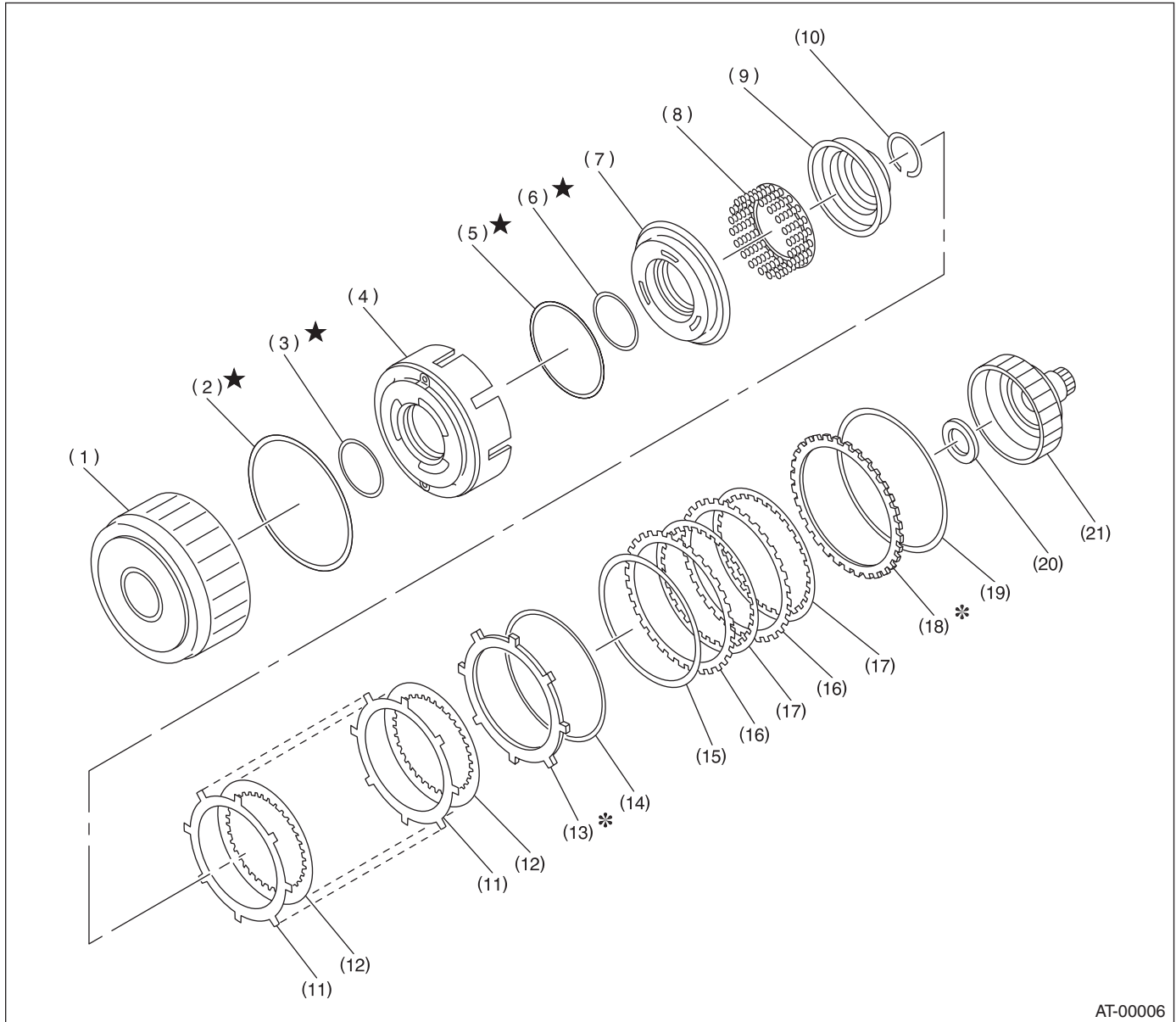
- | |
|----------------------------------|
| (24) ATF temperature sensor |
| (25) Line pressure duty solenoid |
| (26) Low clutch timing solenoid |
| (27) Lock-up duty solenoid |
| (28) Oil strainer |

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



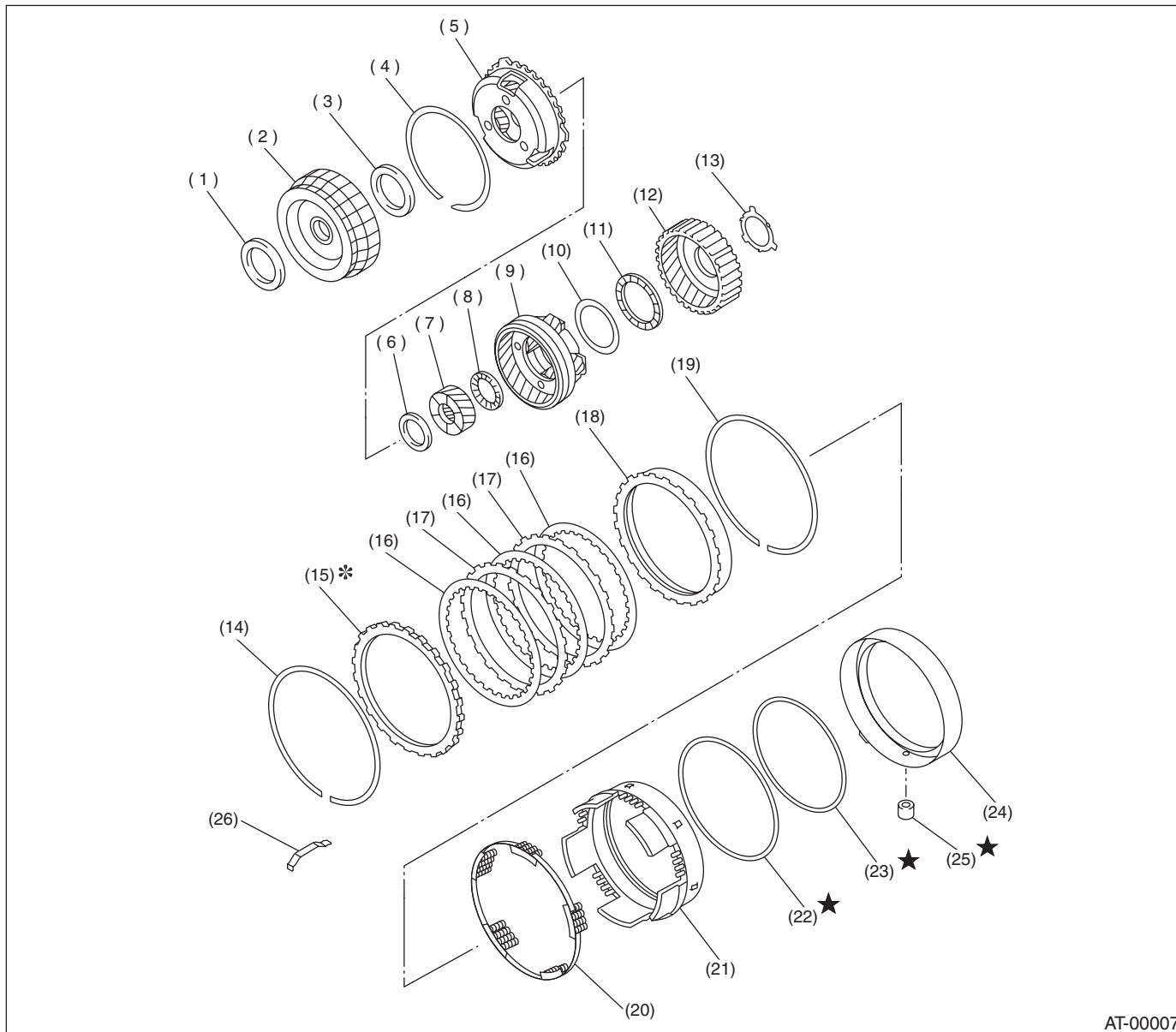
AT-00006

- | | | |
|---------------------------|----------------------|----------------------------|
| (1) High clutch drum | (8) Spring retainer | (15) Dish plate |
| (2) Lip seal | (9) 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 |

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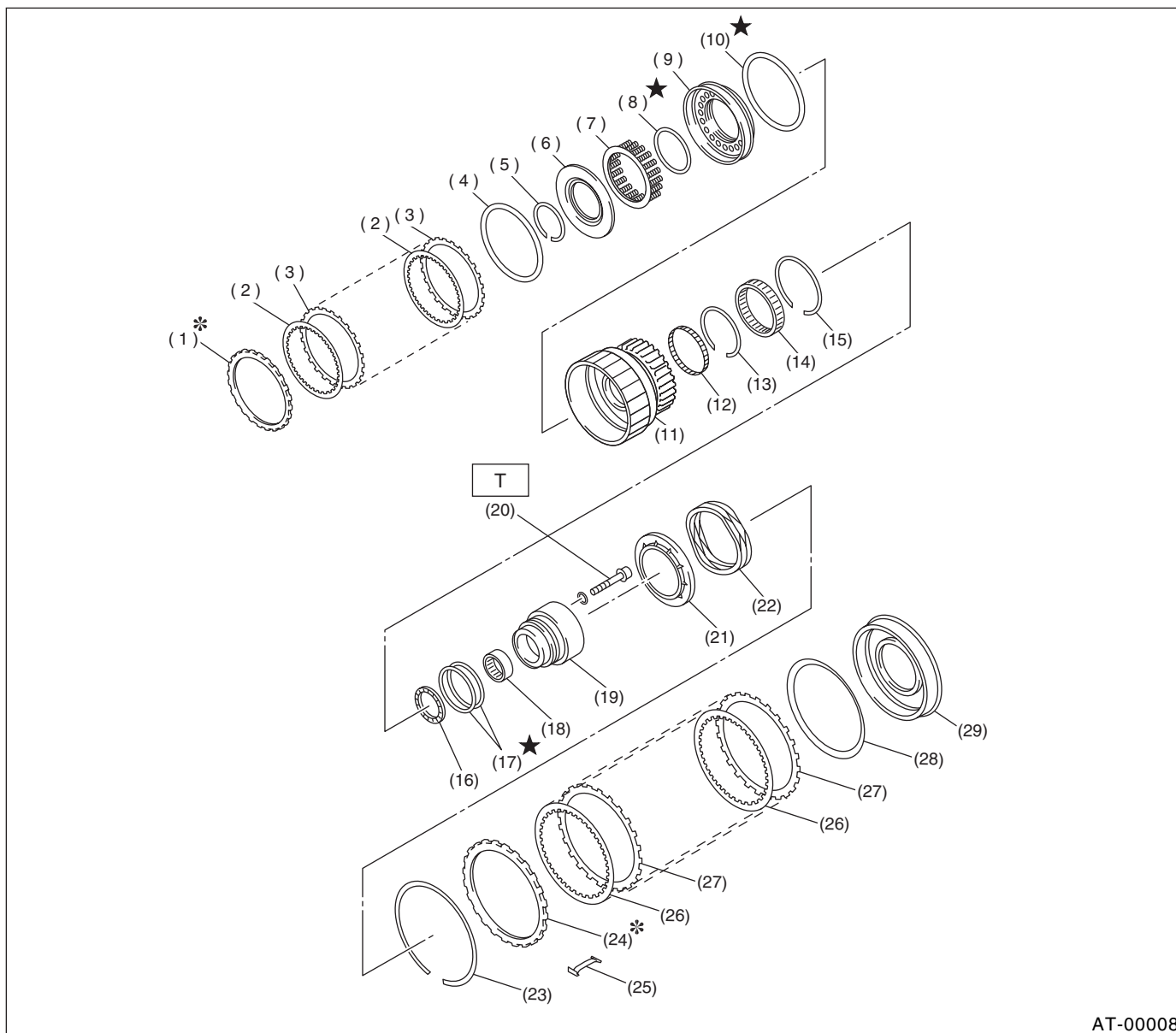
6. PLANETARY GEAR AND 2-4 BRAKE



AT-00007

- | | | |
|-----------------------------|----------------------------|--------------------------------|
| (1) Thrust needle bearing | (10) Washer | (19) Snap ring |
| (2) Front sun gear | (11) Thrust needle bearing | (20) 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-00008

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

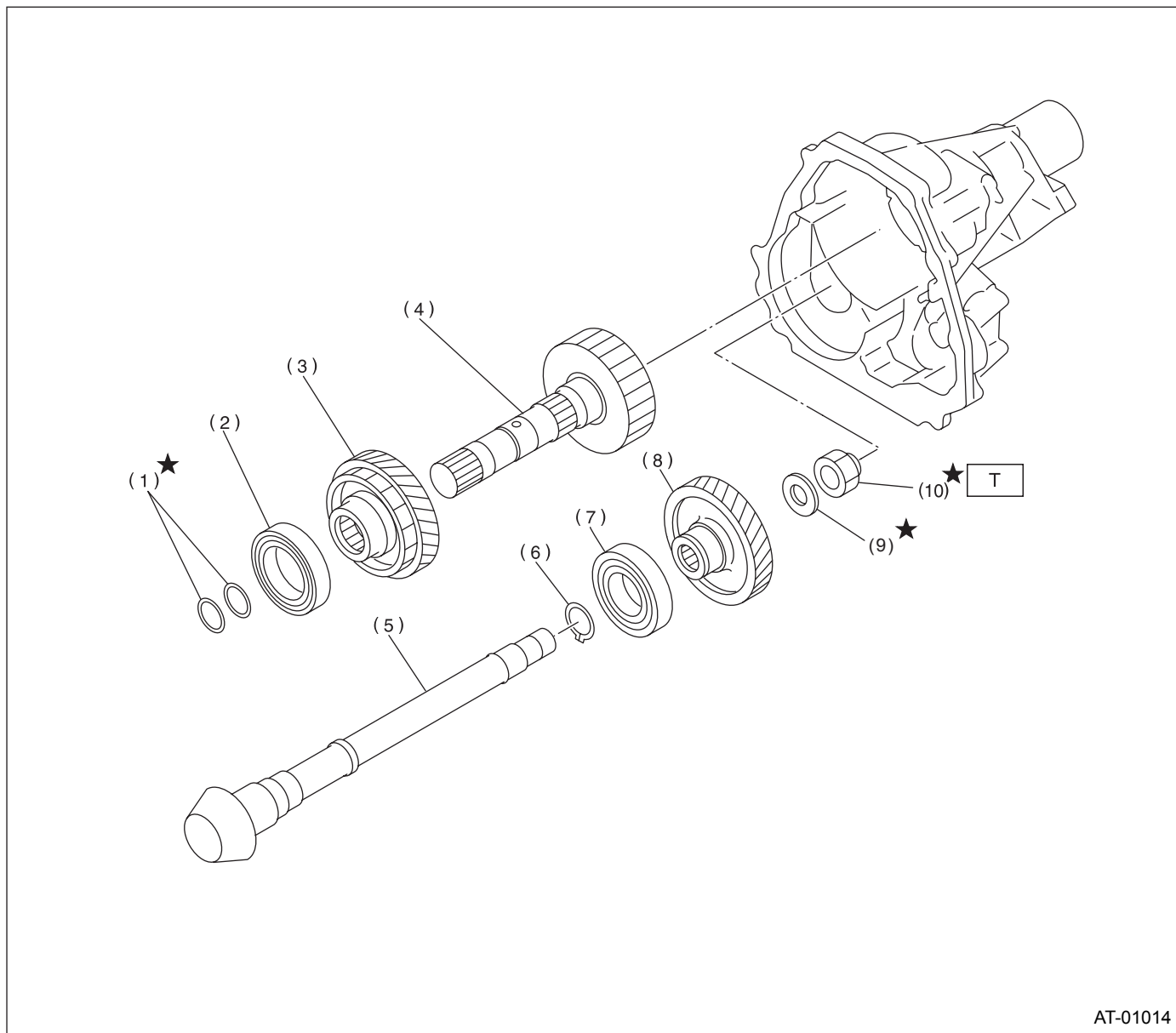
Tightening torque: N·m (kgf-m, ft-lb)

T: 25 (2.5, 18.1)

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8. REDUCTION GEAR (MPT)



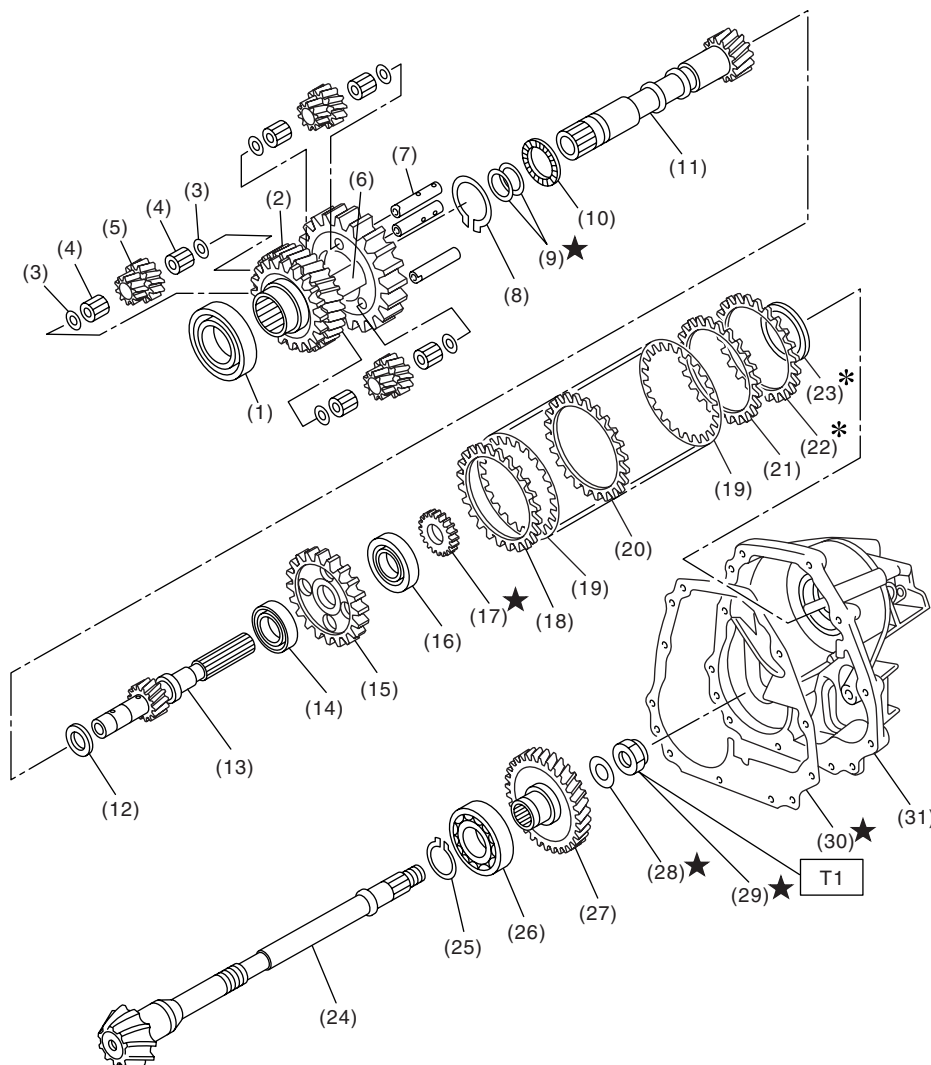
AT-01014

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

Tightening torque: N·m (kgf-m, ft-lb)

T: 100 (10.2, 73.8)

9. REDUCTION GEAR (VTD)



AT-00010

- | | | |
|----------------------------|-----------------------------------|----------------------------|
| (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) Reduction driven gear |
| (4) Needle bearing | (16) Ball bearing | (28) Lock washer |
| (5) Pinion gear | (17) Revolution gear | (29) Lock nut |
| (6) Carrier | (18) Driven plate (thick) | (30) Gasket |
| (7) Planetary pinion shaft | (19) Drive plate | (31) Extension case |
| (8) Snap ring | (20) Driven plate (thin) | |
| (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 | |

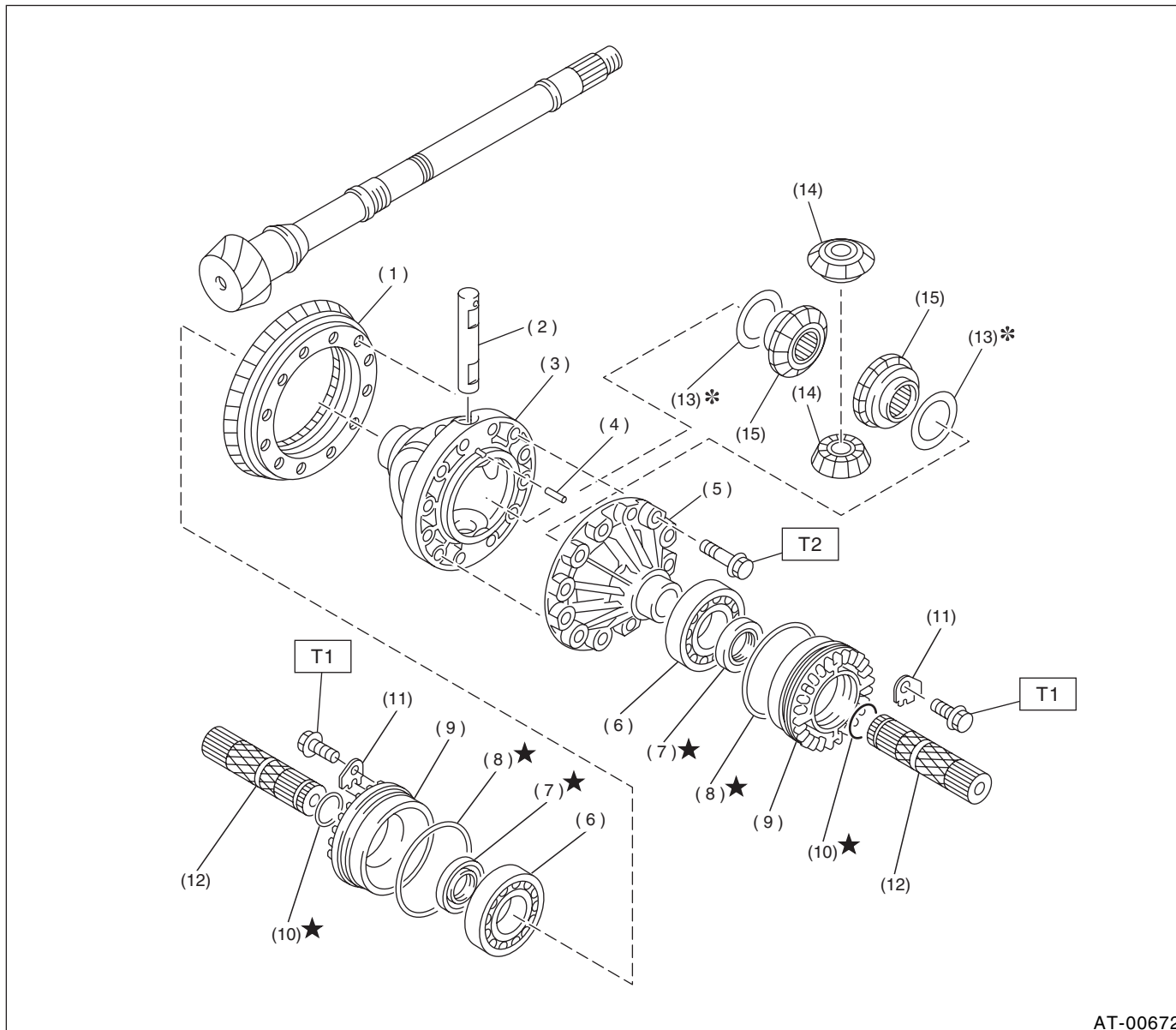
Tightening torque: N·m (kgf-m, ft-lb)

T1: 100 (10.2, 73.8)

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10.DIFFERENTIAL GEAR



AT-00672

- | | |
|----------------------------|--------------------------------|
| (1) Crown gear | (8) O-ring |
| (2) Pinion shaft | (9) Differential side retainer |
| (3) Differential case (RH) | (10) Snap ring |
| (4) Straight pin | (11) Lock plate |
| (5) Differential case (LH) | (12) Axle shaft |
| (6) Taper roller bearing | (13) Washer |
| (7) Oil seal | (14) Differential bevel pinion |

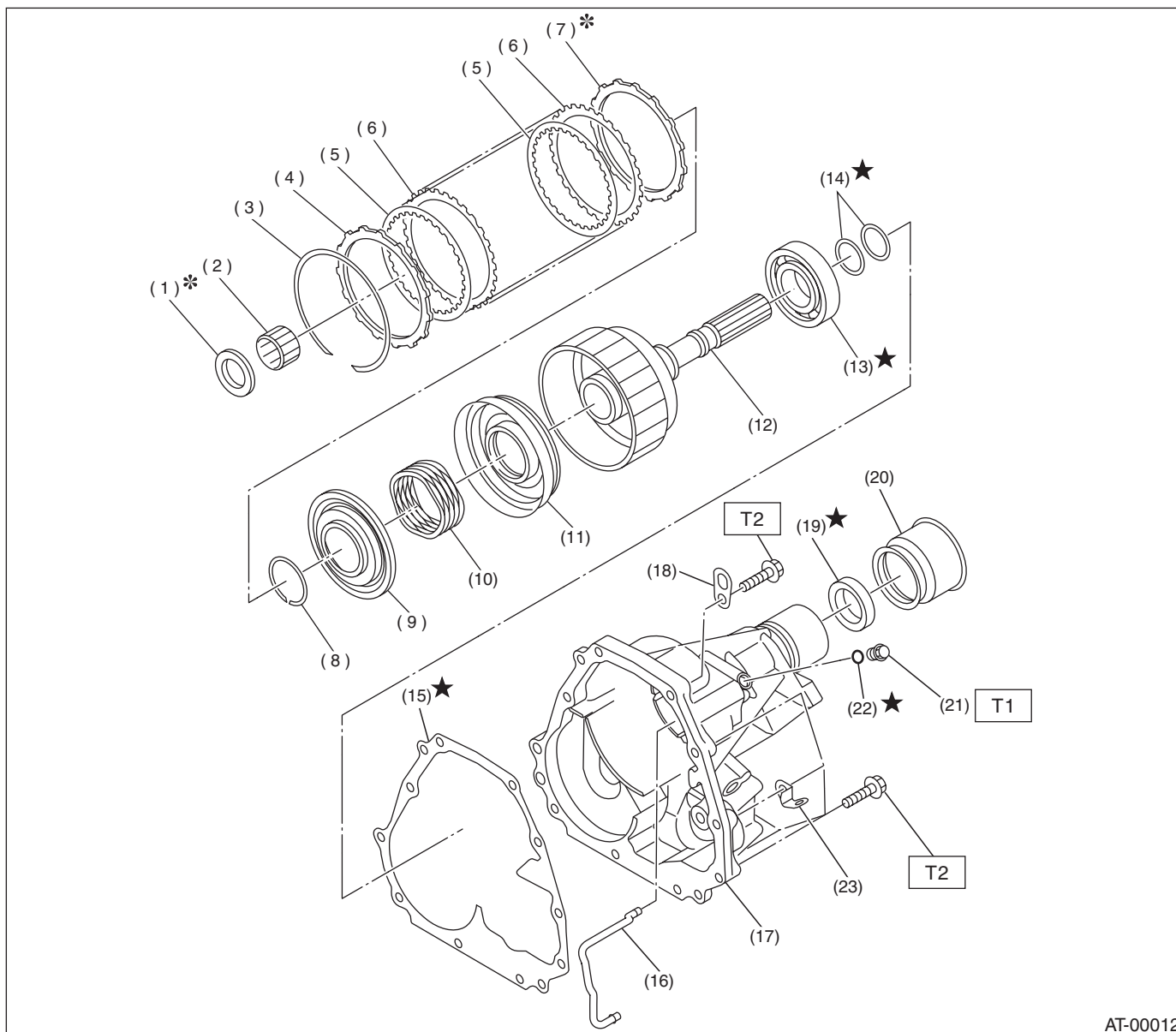
- (15) Differential bevel gear

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.1)

T2: 62 (6.3, 45.6)

11. TRANSFER AND EXTENSION CASE (MPT)



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 |
| (6) Driven plate | (15) Gasket | |
| (7) Pressure plate | (16) Transfer clutch pipe | |
| (8) Snap ring | (17) Extension case | |
| (9) Transfer piston seal | (18) Transmission hanger | |

Tightening torque: N·m (kgf-m, ft-lb)

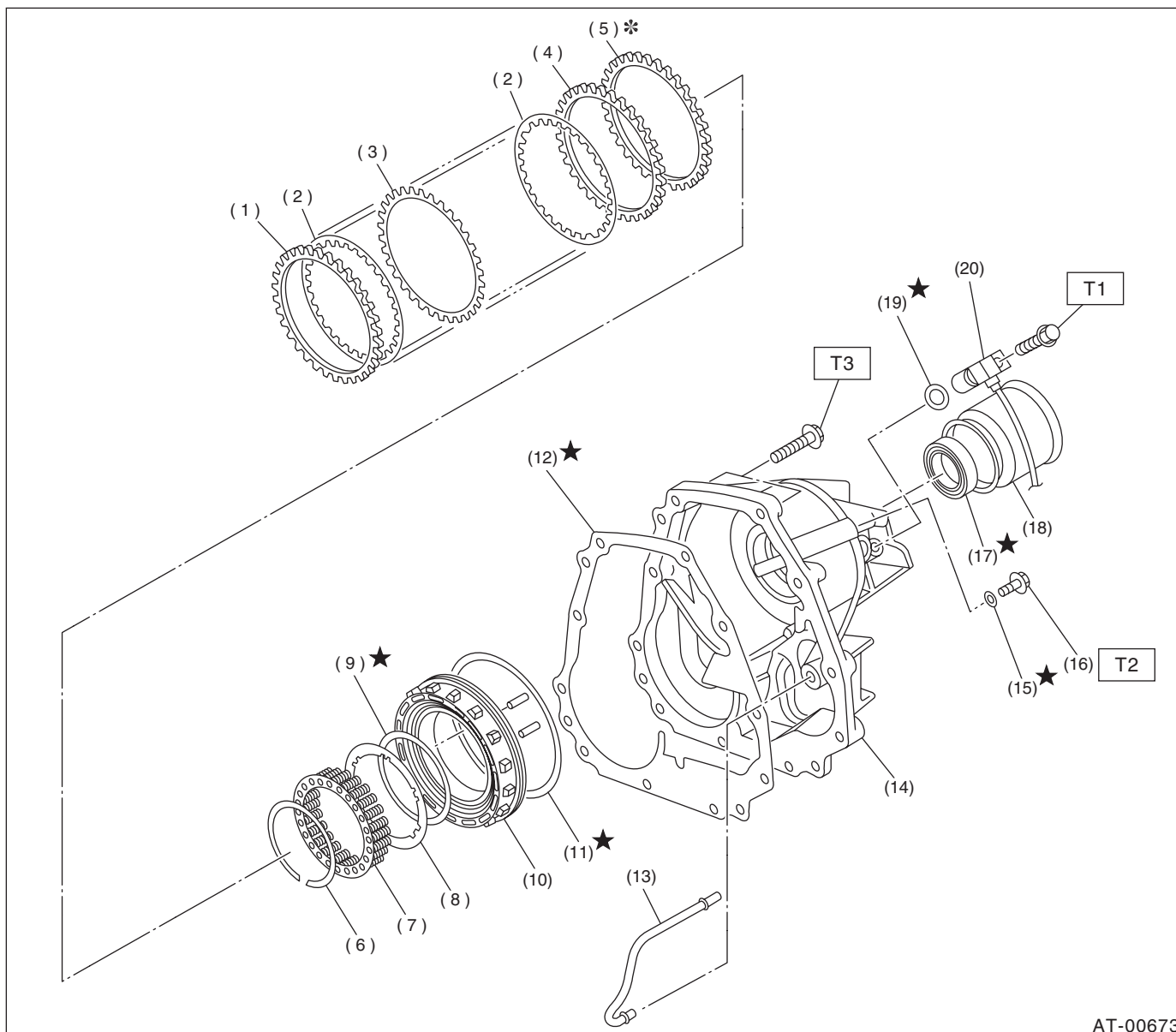
T1: 13 (1.3, 9.4)

T2: 25 (2.5, 18.1)

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12. TRANSFER AND EXTENSION CASE (VTD)



AT-00673

- (1) Driven plate (thick)
- (2) Drive plate
- (3) Driven plate (thin)
- (4) Driven plate (thick)
- (5) Adjusting plate
- (6) Snap ring
- (7) Spring retainer
- (8) Plate
- (9) O ring

- (10) Multi-plate clutch (LSD) piston assembly
- (11) D ring
- (12) Gasket
- (13) Multi-plate clutch (LSD) pipe
- (14) Extension case
- (15) O-ring
- (16) Test plug
- (17) Oil seal

- (18) Dust cover
- (19) O-ring
- (20) Rear wheel speed sensor

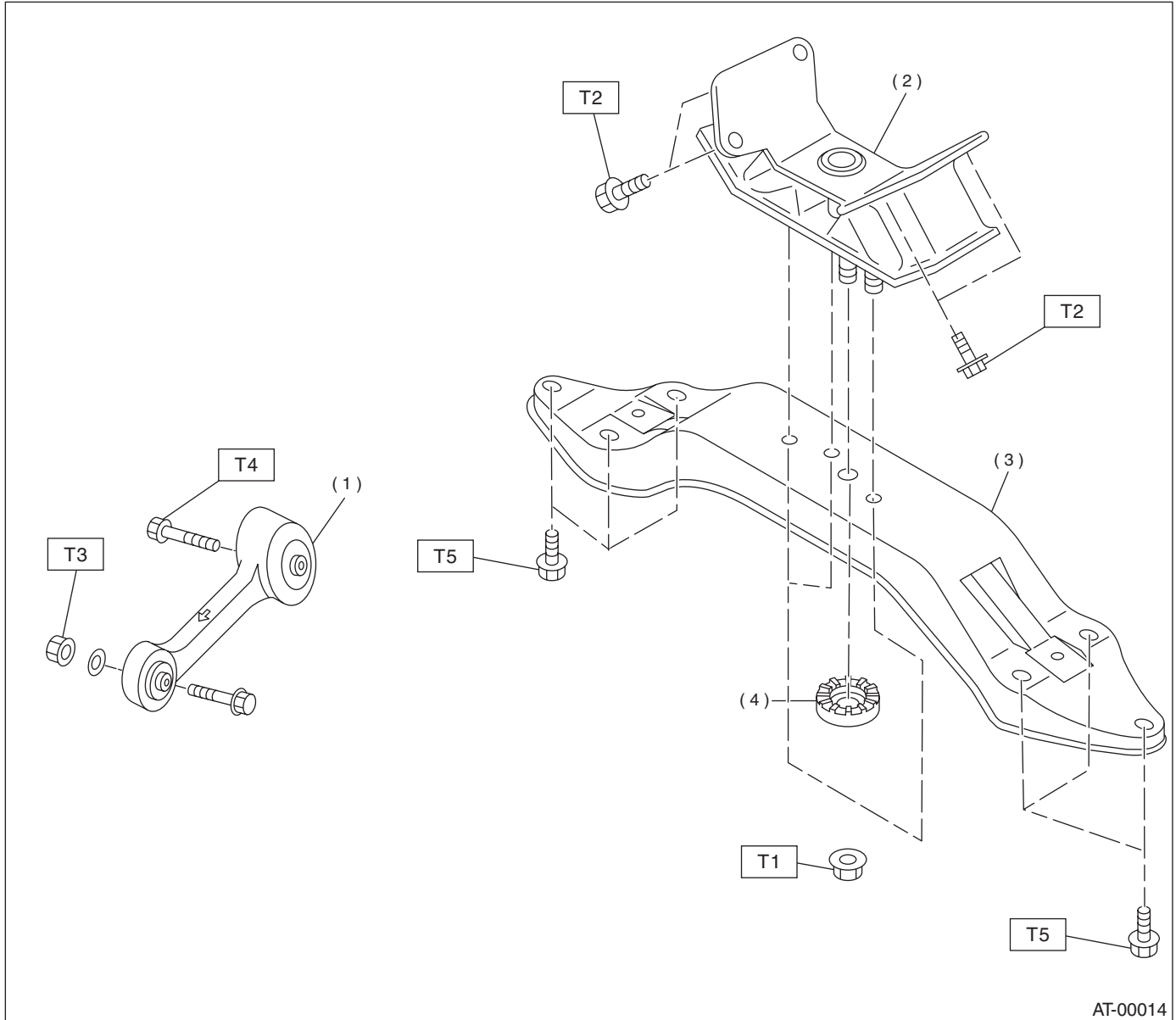
Tightening torque: N·m (kgf-m, ft-lb)

T1: 7 (0.7, 5.1)

T2: 13 (1.3, 9.4)

T3: 25 (2.5, 18.1)

13.TRANSMISSION MOUNTING



AT-00014

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

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 26)

T2: 39 (4.0, 29)

T3: 50 (5.1, 37)

T4: 58 (5.9, 43)

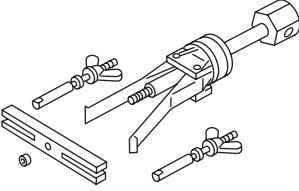
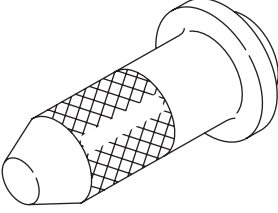
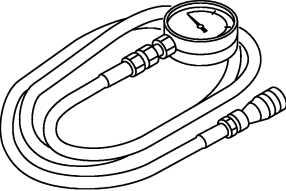
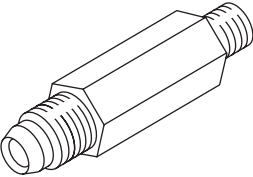
T5: 70 (7.1, 51)

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Until the oil pan is removed, do not place with the oil pan side facing up to prevent foreign matter from entering the valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use Subaru genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- 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 wooden blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

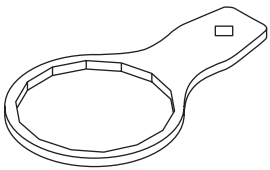
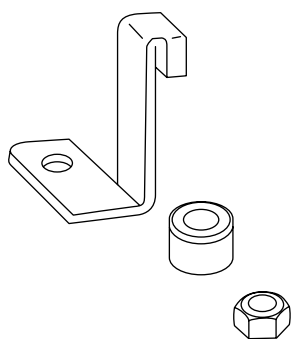
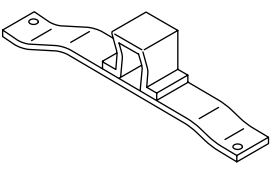
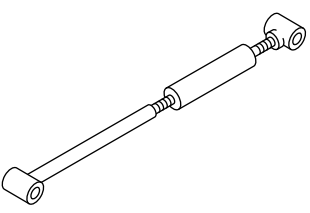
D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398527700	398527700	PULLER ASSY	Used for removing and installing extension case roller bearings.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used on oil pump housing when measuring reverse clutch pressure and line pressure.

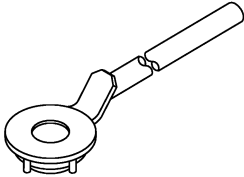
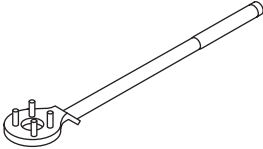
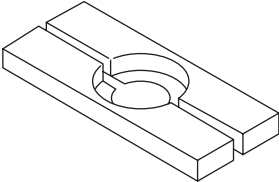
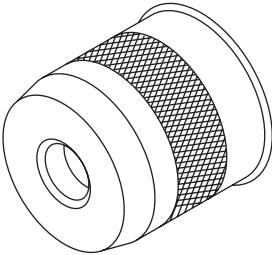
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 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing ATF filter.
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	• Used for supporting engine. • Used with ENGINE SUPPORT (41099AA020).
 ST41099AA020	41099AA020	ENGINE SUPPORT	• Used for supporting engine. • Used with ENGINE SUPPORT BRACKET (41099AA010).

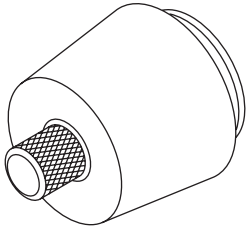
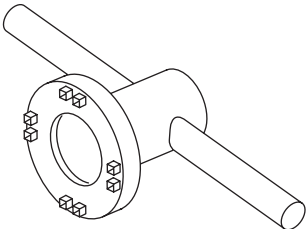
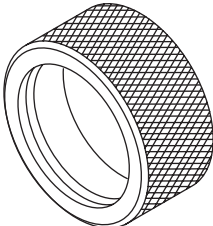
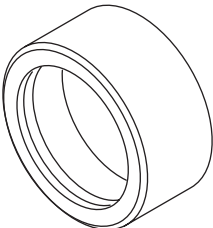
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANKSHAFT PULLEY WRENCH	- Used for rotating crankshaft. - Used on turbo models.
 ST-499977100	499977100	CRANKSHAFT PULLEY WRENCH	- Used for rotating crankshaft. - Used on non-turbo models.
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.
 ST-499247400	499247400	INSTALLER	- Used for installing transfer outer snap ring. - Used with GUIDE (499257300).

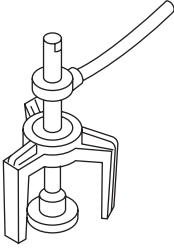
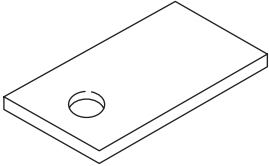
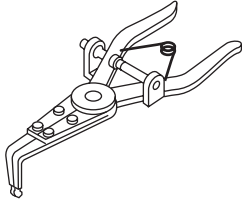
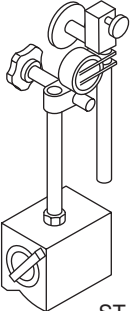
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499257300	499257300	SNAP RING OUTER GUIDE	- Used for installing transfer outer snap ring. - Used with INSTALLER (499247400).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 ST-398437700	398437700	DRIFT	Used for installing converter case oil seal.
 ST-398487700	398487700	INSTALLER	Used for installing taper roller bearing of front differential.

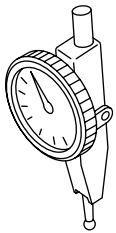
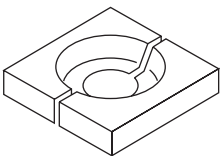
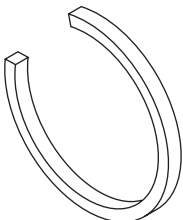
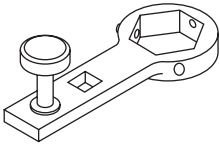
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

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

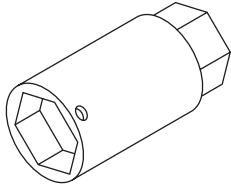
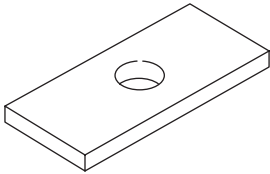
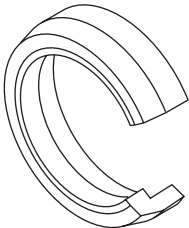
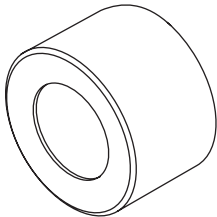
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247100	498247100	Dial gauge	- Used for measuring gear backlash. - Used with MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing front roller bearing.
 ST-398623600	398623600	Seat	Used for removing spring of transfer clutch piston.
 ST-499787700	499787700	WRENCH	Used for removing and installing drive pinion lock nut.

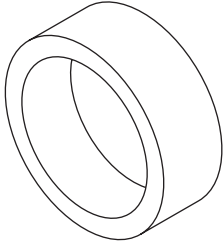
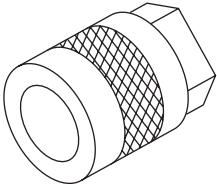
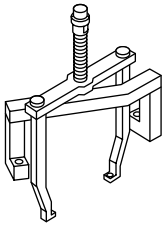
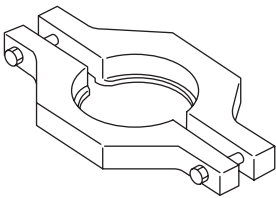
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499787500	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-498627100	498627100	Seat	Used for holding low clutch piston retainer spring when installing snap ring.
 ST-499577000	499577000	GAUGE	- Used for measuring the transmission case mating surface to the reduction gear end surface. - For MPT model

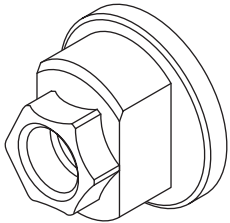
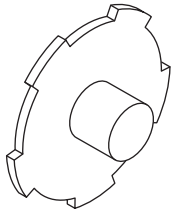
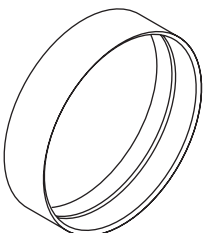
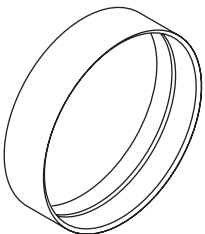
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398744300	398744300	GAUGE	- Used for measuring the transmission case mating surface to the multi-plate clutch end surface. - For VTD model
 ST-499737000	499737000	PULLER	Used for removing reduction driven gear assembly.
 ST-499737100	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing ball bearing.

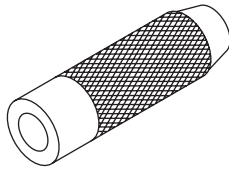
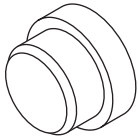
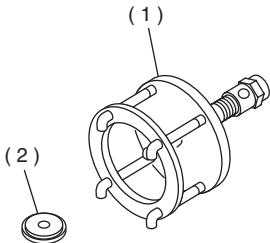
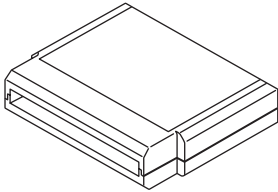
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

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

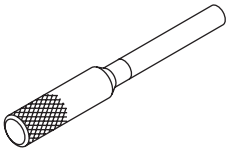
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899580100	899580100	INSTALLER	Used for press-fitting the ball bearing for transfer clutch.
 ST-398497701	398497701	ADAPTER	Used for installing needle bearing.
 ST-899524100	899524100	PULLER SET	• Using the bolt only. (1) Bolt • Used with PULLER SET (499737100). • Used with PULLER (499737000). (1) Puller (2) Cap
 ST24082AA210	24082AA210 (newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST22771AA030	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. - English: 22771AA030 (without printer) - German: 22771AA070 (without printer) - French: 22771AA080 (without printer) - Spanish: 22771AA090 (without printer)
 ST-499267300	499267300	STOPPER PIN	Used for installing and adjusting inhibitor switch.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Depth gauge	Used for measuring transmission end play.
Thickness gauge	Used for measuring clearances of clutch, brake and oil pump.
Micrometer	Used for measuring thickness of drive pinion.
Spring balance	Used for measuring starting torque of drive pinion.

2. ATF

A: INSPECTION

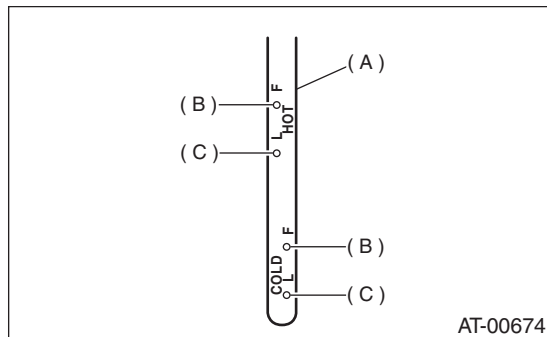
CAUTION:

The level of ATF varies with its temperature. Pay attention to the fluid temperature when checking ATF level.

1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80 °C (158 — 176 °F) on Subaru Select Monitor. <Ref. to AT-22, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>

2) Make sure the vehicle is level.

3) After selecting all positions (P, R, N, D, 3, 2, 1), set the select lever in “P” range. Measure the ATF level with the engine idling for one or two minutes.



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

4) Make sure that ATF level is above the center of upper and lower marks.

NOTE:

When the transmission is hot, the level should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

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

CAUTION:

- Use care not to exceed the upper limit level.
- Remember that the addition of ATF to the upper limit mark when the transmission is cold will result in overfilling of ATF, causing a transmission failure.

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

7) Check for ATF leaks.

Check for leaks in the transmission. If there are leaks, it is necessary to repair or replace gasket, oil seals, plugs or other parts.

B: REPLACEMENT

1) Lift up the vehicle.

2) Drain the ATF completely.

CAUTION:

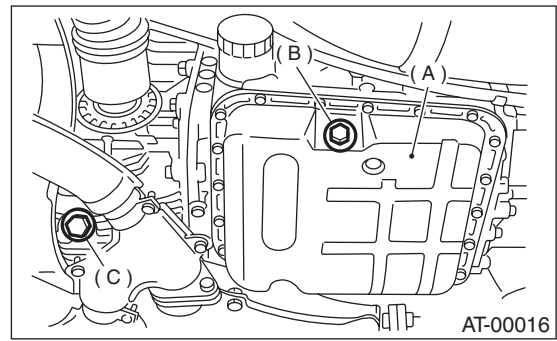
Directly after the vehicle has been running or the engine has been idling for long time, the ATF is hot. Be careful not to burn yourself.

NOTE:

Tighten the ATF drain plug after draining the ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

3) Lower the vehicle.

4) Pour ATF into the oil charge pipe.

Recommended fluid:

Dexron III type Automatic transmission fluid

Capacity:

Fill the same amount of fluid 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)

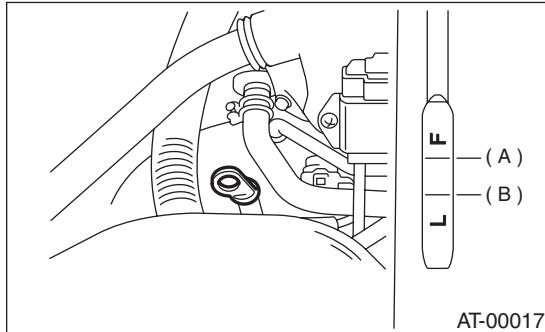
5) Check the level and leaks of ATF.

<Ref. to AT-30, INSPECTION, ATF.>

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. Be sure that the level gauge is correctly inserted and in the proper orientation.
- 4) Remove it again and note the reading. If the differential gear oil level is below the "L" line, add oil to bring the level up to the "F" line.
- 5) To prevent overfilling the differential gear oil, do not add oil above the "F" line.



- (A) Upper level
(B) Lower level

B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Drain the differential gear oil completely.

CAUTION:

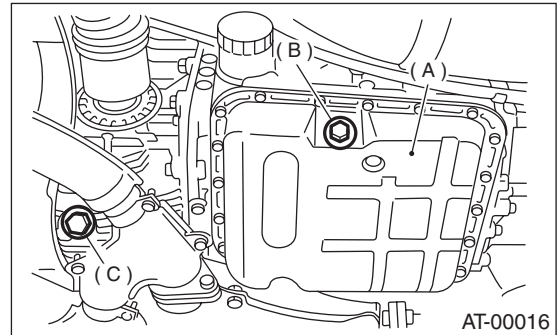
Directly after the vehicle has been running or the engine has been long idling running, the differential gear oil is hot. Be careful not to burn yourself.

NOTE:

Tighten the differential gear oil drain plug after draining the differential gear oil.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)



- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

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

Recommended fluid:

GL-5 (SAE: 80W-90) or equivalent.

Gear oil capacity:

1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

- 5) Check the level of differential gear oil.

<Ref. to AT-31, INSPECTION, Differential Gear Oil.>

4. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

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

CAUTION:

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

2. D RANGE SHIFT FUNCTION

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

3. D RANGE SHIFT SHOCK

Check the shock level when shifting up during normal driving.

4. KICK-DOWN FUNCTION

Check kick-down for each gear. Also check the kick-down shock level.

5. ENGINE BRAKE OPERATION

- Check the engine braking effect in 3rd gear by shifting between D ⇔ 3 range while driving in 4th gear of D range [50 to 60 km/h (31 to 37 MPH)].
- Check the engine braking effect in 2nd gear by shifting between 3 ⇔ 2 range while driving in 3rd gear of 3 range [40 to 50 km/h (25 to 31 MPH)].
- Check the engine braking effect in 1st gear by shifting between 2 ⇔ 1 range while driving in 2nd gear of 2 range [20 to 30 km/h (12 to 19 MPH)].

6. LOCK-UP FUNCTION

Check that the engine speed does not change sharply when the accelerator pedal is lightly depressed when driving on flat roads at normal speed in the D range.

7. P RANGE OPERATION

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

8. UNUSUAL SOUNDS AND VIBRATION

Check for unusual sounds and vibration while driving and during shifting.

9. CLIMBING CONTROL FUNCTION

- Check that the gear remains in 3rd when going up a grade.
- Check that the gear remains in 3rd when applying the brakes while going down a grade.

10. TRANSFER CLUTCH

Check if tight corner braking occurs when the vehicle is started with steering wheel held at a fully turned position. (MPT model)

11. OIL LEAK

After the driving test, inspect for oil leaks.

5. Stall Test

A: INSPECTION

1. GENERAL DESCRIPTION

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

Purposes of the stall test:

- 1) To check the operation of the automatic transmission clutch.
- 2) To check the operation of the torque converter clutch.
- 3) To check engine performance.

2. TEST METHODS

1) Preparations before test:

- (1) Check that throttle valve is wide open.
- (2) Check that engine oil level is correct.
- (3) Check that coolant level is correct.
- (4) Check that ATF level is correct.
- (5) Check that differential gear oil level is correct.
- (6) Increase ATF temperature to 70 to 80°C (158 to 176°F) by idling the engine for approx. 30 minutes (with select lever set to "N" or "P").

- 2) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
- 3) Move the manual linkage to ensure it operates properly, and shift the select lever to the "2" range.
- 4) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.

8) 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, wide open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.

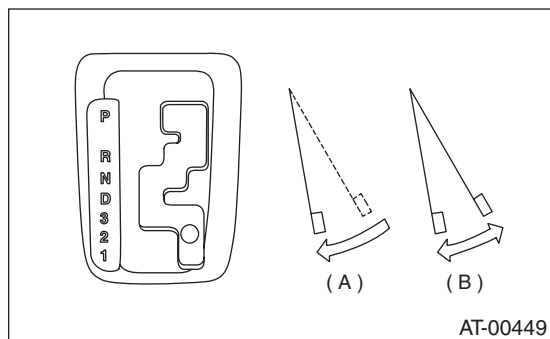
Be sure to cool down the engine for at least 1 minute after each stall test with the select lever set in the "P" or "N" range and with the idle speed lower than 1,200 rpm.

- If the stall speed is higher than the specified range, attempt to finish the stall test in as a short time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):

Non-turbo model: 2,100 — 2,600 rpm

Turbo model: 2,600 — 3,400 rpm



(A) Brake pedal

(B) Accelerator pedal

- 5) As soon as the engine speed stabilizes, record the speed and release the accelerator pedal.
- 6) Shift the select lever to "N" range, and cool down the engine by idling it for more than one minute.
- 7) If the stall speed in 2 range is higher than specified, low clutch slipping and 2-4 brake slipping may occur. To identify this, conduct the same test as above in "R" range.

STALL TEST

AUTOMATIC TRANSMISSION

3. EVALUATION

Stall speed (at sea level)	Location	Cause
Less than standard value	2, R	• Throttle valve not wide open • Erroneous engine operation • Torque converter clutch's one-way clutch slipping
Greater than standard 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

1. GENERAL DESCRIPTION

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

CAUTION:

- Perform the test at normal operating fluid temperature 70 to 80°C (158 to 176°F).
- Be sure to allow a 1 minute interval between tests.
- Make three measurements and take the average value.

2. TEST METHODS

- 1) Fully apply the parking brake.
- 2) Start the engine.
- 3) Check the idling speed (A/C OFF).
- 4) Shift the select lever from "N" to "D" range.
Using a stop watch, measure the time it takes from shifting the lever until a shock is felt.

Time lag: Less than 1.2 seconds

- 5) In the same manner, measure the time lag for "N" → "R".

Time lag: Less than 1.5 seconds

3. EVALUATION

- 1) If "N" → "D" time lag is longer than specified:
 - Line pressure too low
 - Low clutch is worn
 - One-way clutch not operating properly
 - D-ring worn
- 2) If "N" → "R" time lag is longer than specified:
 - Line pressure too low
 - Reverse clutch is worn
 - Low & reverse brake worn
 - D-ring worn

LINE PRESSURE TEST

AUTOMATIC TRANSMISSION

7. Line Pressure Test

A: MEASUREMENT

1. GENERAL DESCRIPTION

If the clutch or the brake shows a sign of slippage or shift feel is not correct, the line pressure should be checked.

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

1) Line pressure measurement (under no load)

CAUTION:

- Before measuring the line pressure, jack-up all wheels.
- Maintain the temperature of ATF at approx. 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approx. 30 minutes with select lever in "N" or "P".)

2) Line pressure measurement (under heavy load)

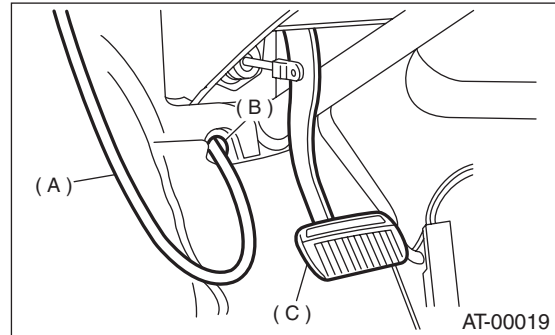
CAUTION:

- Before measuring the line pressure, apply both foot and parking brakes with all wheels chocked (same as for stall test conditions).
- Measure the line pressure when select lever is in "R", "2" with engine under stall conditions.
- Measure the line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle, and then stop it. Wait at least 1 minute before taking measurements.)
- Maintain the temperature of ATF at approx. 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approx. 30 minutes with select lever in "N" or "P".)

2. TEST METHODS

1) 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 engine compartment.

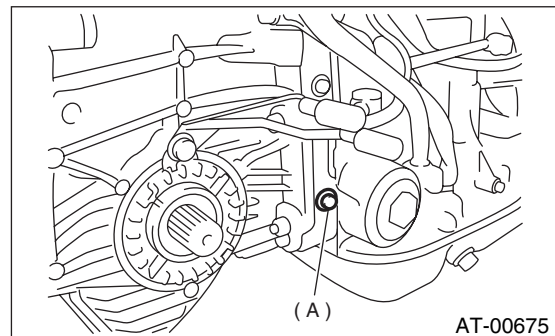
ST 498575400 OIL PRESSURE GAUGE ASSY



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

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

ST 498897200 OIL PRESSURE GAUGE ADAPTER



- (A) Test plug

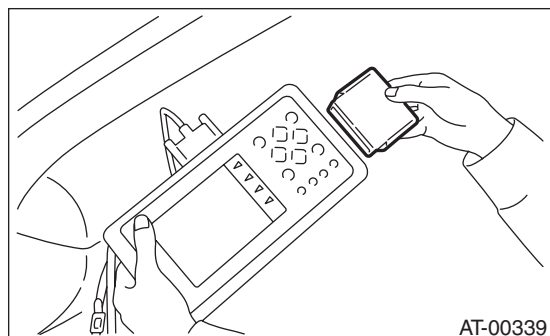
3) Connect the ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

ST2 498575400 OIL PRESSURE GAUGE ASSY

4) Check for duty ratio changes by opening and closing the throttle valve using Subaru Select Monitor.

(1) Insert the cartridge into Subaru Select Monitor. <Ref. to AT-19, PREPARATION TOOL, General Description.>



(2) Connect the Subaru Select Monitor to data link connector.

5) Check the line pressure in accordance with the following chart.

3. EVALUATION

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm ² , psi)
2	5	Wide open	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	Wide open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	Full closed	304 — 412 (3.1 — 4.2, 44 — 60)

TRANSFER CLUTCH PRESSURE TEST

AUTOMATIC TRANSMISSION

8. Transfer Clutch Pressure Test

A: INSPECTION

1. TEST METHODS

• MPT model

Check the transfer clutch pressure in accordance with the following chart in the same manner as with line pressure. <Ref. to AT-36, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET

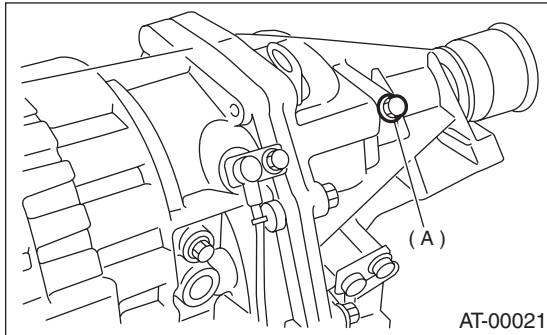
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

FWD mode: "P" range, engine speed 2,000 rpm

CAUTION:

Before setting in FWD mode, install the spare fuse on FWD mode switch.



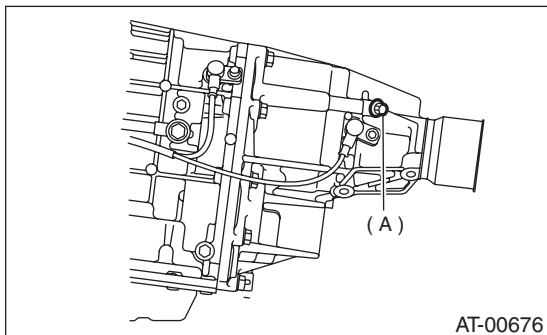
(A) Test plug

• VTD model

Check the transfer clutch pressure in accordance with the following chart in the same manner as with line pressure.

ST 498897700 OIL PRESSURE ADAPTER SET

ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Test plug

2. EVALUATION

• MPT model

NOTE:

If oil pressure is not produced or if it does not change in the AWD mode, the AWD duty solenoid or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

Standard transfer clutch pressure kPa (kg/cm ² , psi)			
ON duty ratio (%)	Throttle position	AWD mode	FWD mode
5	Wide open	951 — 1,089 (9.7 — 11.1, 138 — 158)	—
60	2/3 throttle	226 — 294 (2.3 — 3.0, 38 — 43)	—
95	Fully closed	—	0 (0, 0)

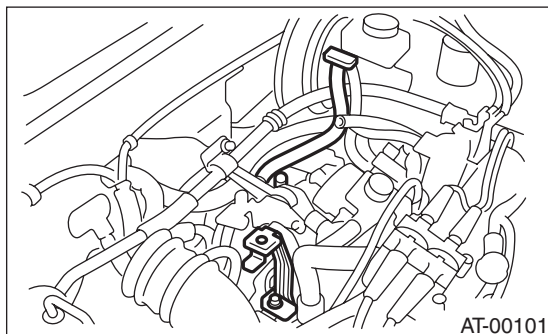
• VTD model

OFF duty ratio (%)	Throttle position	Standard transfer clutch pressure kPa (kg/cm ² , psi)
95	Wide open	951 — 1,089 (9.7 — 11.1, 138 — 158)
40	2/3 throttle	226 — 294 (2.3 — 3.0, 38 — 43)

9. Automatic Transmission Assembly

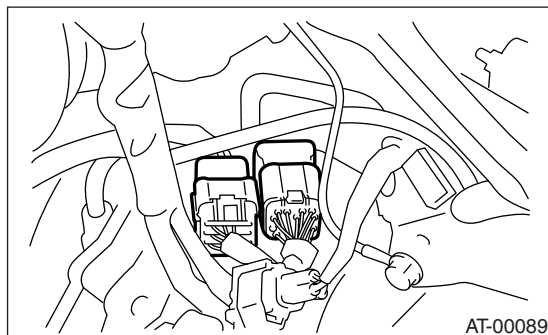
A: REMOVAL

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



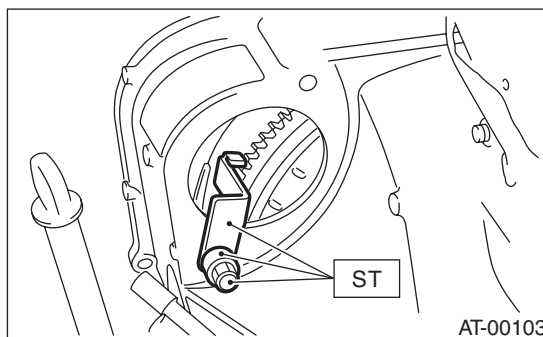
- 7) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 8) Remove the front, center, rear exhaust pipes and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
- 9) 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.>

- 10) Disconnect the following connectors.
 - (1) Transmission harness connector

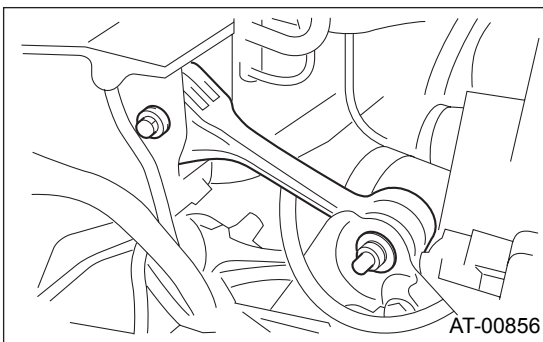


- (2) Transmission ground terminal
- 11) Remove the starter. <Ref. to SC(H4SO)-7, REMOVAL, Starter.>

- 12) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET



- 13) Remove the pitching stopper.



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

- (1) Remove the service hole plug.
 - (2) Remove the bolts which hold torque converter clutch to drive plate.
 - (3) Rotate the engine using ST and remove other bolts.

CAUTION:

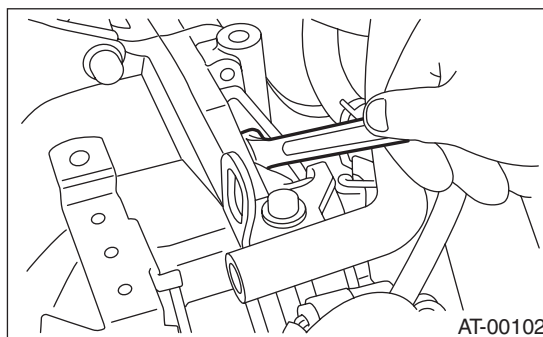
Be careful not to drop the bolts into torque converter clutch housing.

Turbo model

ST 499977300 CRANKSHAFT PULLEY WRENCH

Non-turbo model

ST 499977100 CRANKSHAFT PULLEY WRENCH



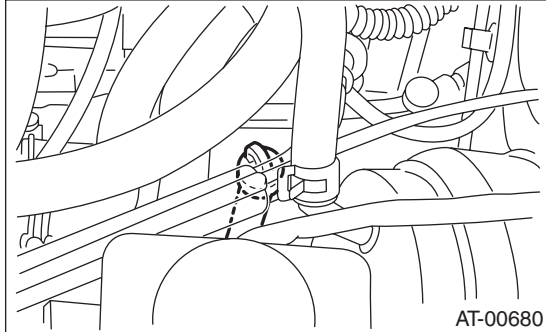
- 15) Remove the ATF level gauge.

AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

NOTE:

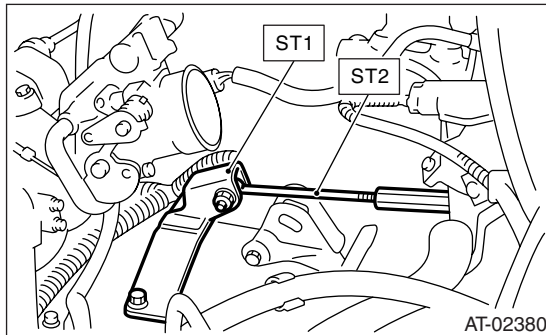
Plug the opening to prevent entry of foreign particles into transmission fluid.



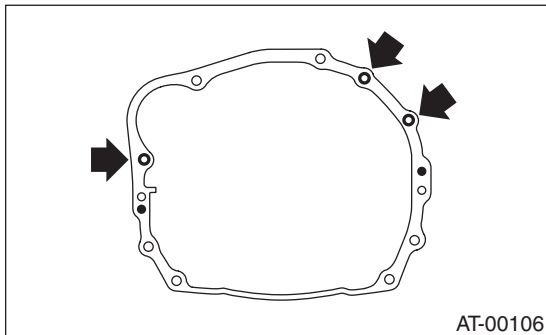
16) Set the ST.

ST1 41099AA010 ENGINE SUPPORT BRACKET

ST2 41099AA020 ENGINE SUPPORT



17) Remove the bolt which holds right upper side of transmission to engine.

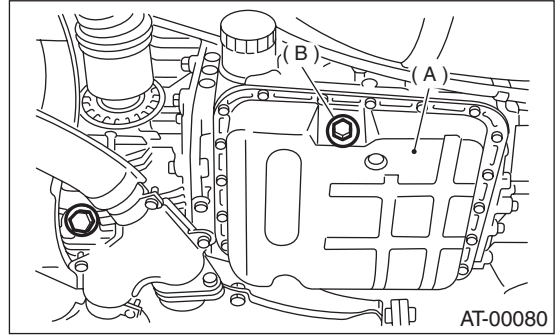


18) Lift up the vehicle.

19) Remove the under cover.

20) Remove the heat shield cover. (if equipped)

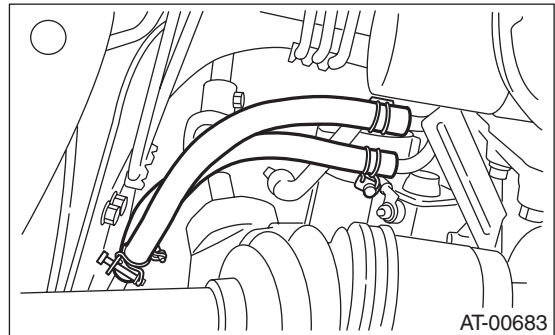
21) Drain the ATF to remove the ATF drain plug.



(A) Oil pan

(B) Drain plug

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



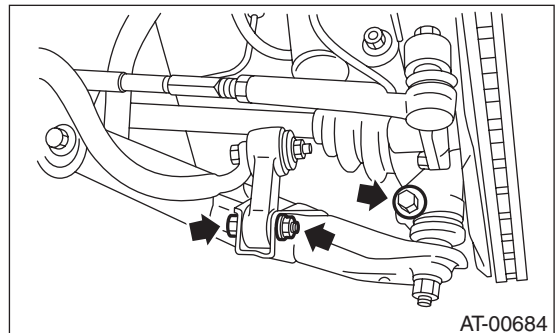
23) Remove the propeller shaft.

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

24) Remove the shift select cable. <Ref. to CS-29, REMOVAL, Select Cable.>

25) Disconnect the stabilizer link from transverse link.

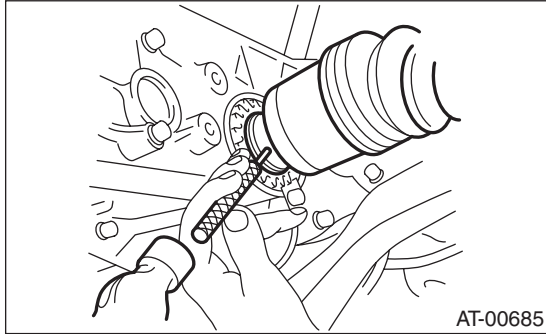
26) Remove the bolt securing ball joint of transverse link to housing.



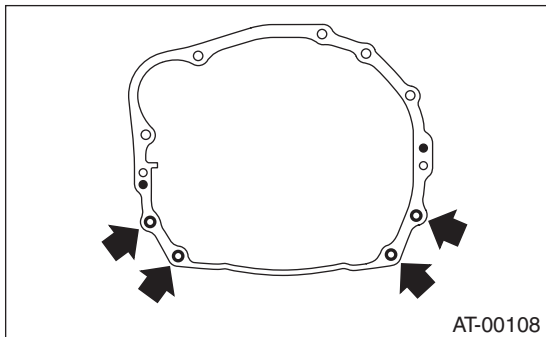
AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

27) Remove the spring pins and separate front drive shafts from each side of the transmission.



28) Remove the nuts which hold lower side of transmission to engine.

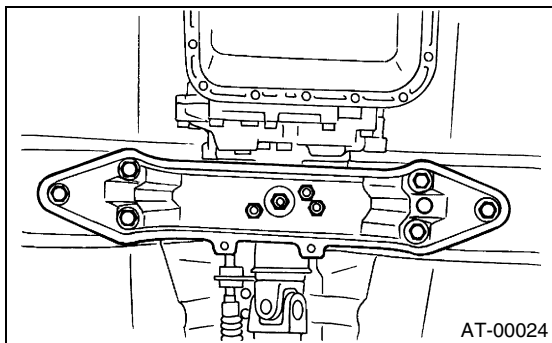


29) Place the transmission jack under transmission.

CAUTION:

Make sure that the support plates of transmission jack don't touch the oil pan.

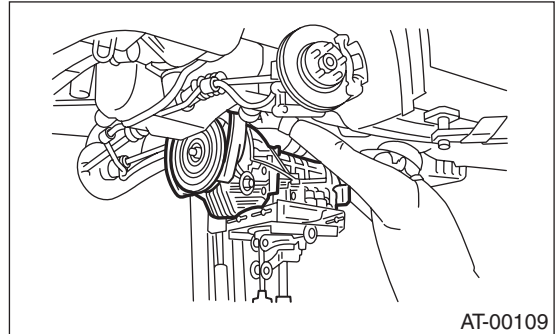
30) Remove the transmission rear crossmember from vehicle.



31) Remove the transmission.

CAUTION:

Move the transmission and torque converter as a unit away from engine.



32) Separate the transmission assembly and rear cushion rubber.

B: INSTALLATION

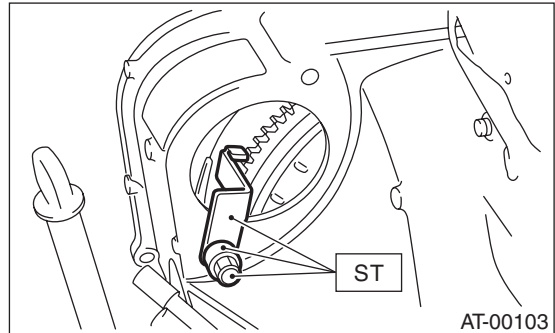
1) Install the rear cushion rubber to transmission assembly.

Tightening torque:

39 N·m (4.0 kgf-m, 29 ft-lb)

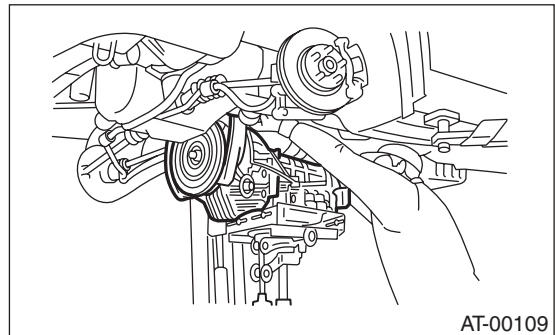
2) Install ST to torque converter clutch case.

ST 498277200 STOPPER SET



3) Install the transmission onto engine.

(1) Gradually raise the transmission using a transmission jack.



(2) Engage them at splines.

4) Install the transmission rear crossmember.

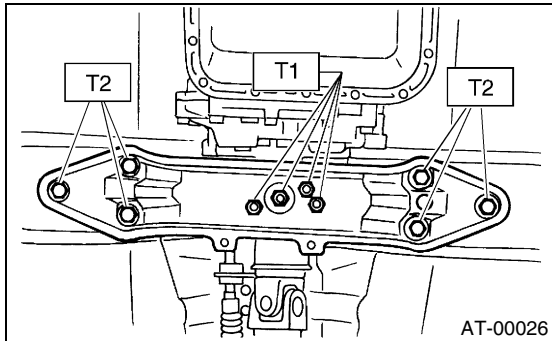
AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51.4 ft-lb)

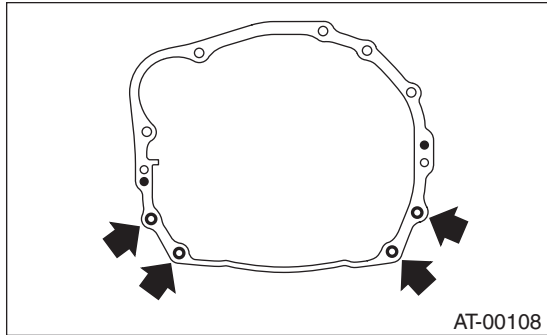


5) Take off the transmission jack.

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

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



7) Lower the vehicle.

8) Connect the engine and transmission.

(1) Remove the ST from torque converter clutch case.

NOTE:

Be careful not to drop the ST into torque converter clutch case when removing ST.

ST 498277200 STOPPER SET

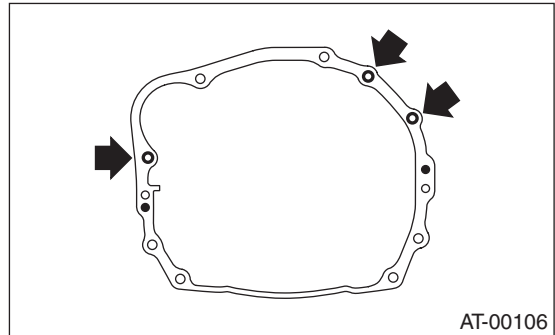
(2) Install the starter.

<Ref. to SC(H4SO)-7, INSTALLATION, Starter.>

(3) Tighten the bolt which holds upper right side of transmission to engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



9) Install the torque converter clutch onto drive plate.

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

(2) Rotate the engine using ST and tighten other bolts.

CAUTION:

Be careful not to drop the bolts into torque converter clutch housing.

Turbo model

ST 499977400

CRANKSHAFT PULLEY
WRENCH

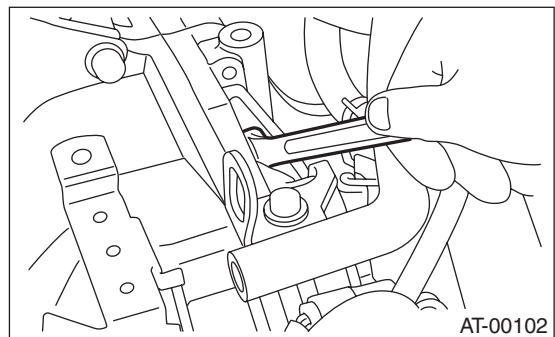
Non-turbo model

ST 499977100

CRANKSHAFT PULLEY
WRENCH

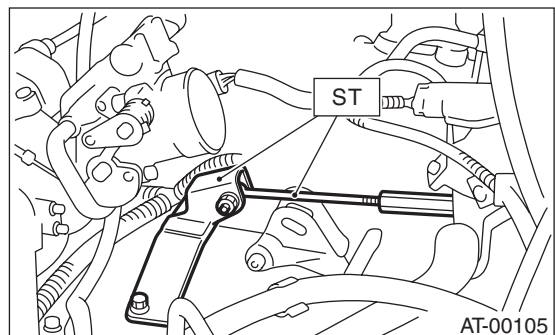
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



(3) Clog the service hole with a plug.

10) Remove the ST.

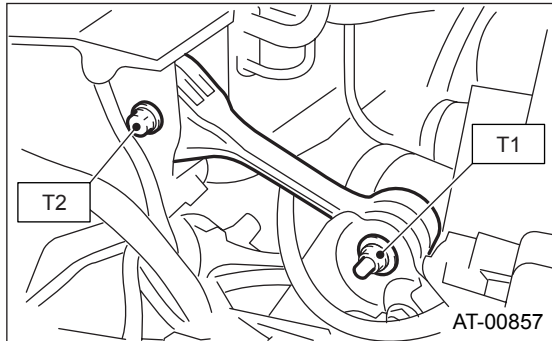


11) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

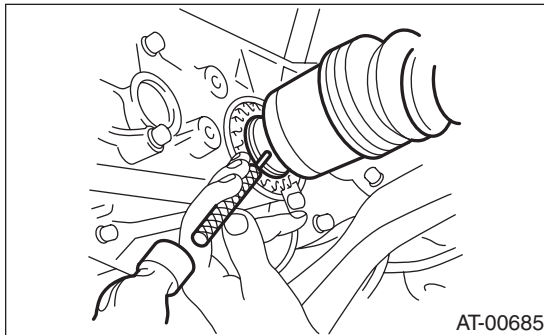
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



12) Lift up the vehicle.

Install the front drive shafts into transmission.

- (1) Lift up the vehicle.
- (2) Install the front drive shafts into transmission.
- (3) Drive the spring pin into chamfered hole of drive shaft.



13) Install the ball joint into housing.

14) Connect the stabilizer to transverse link and tighten the bolts.

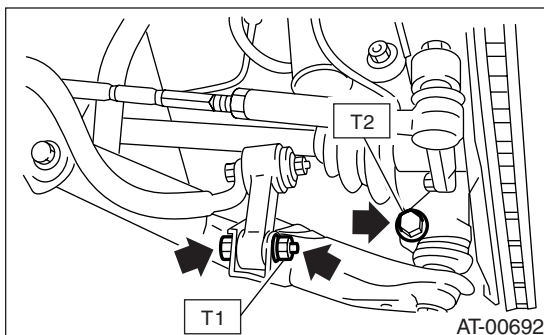
NOTE:

Discard the removed self-locking nut and replace with a new one.

Tightening torque:

T1: 30 N·m (3.1 kgf-m, 22.4 ft-lb)

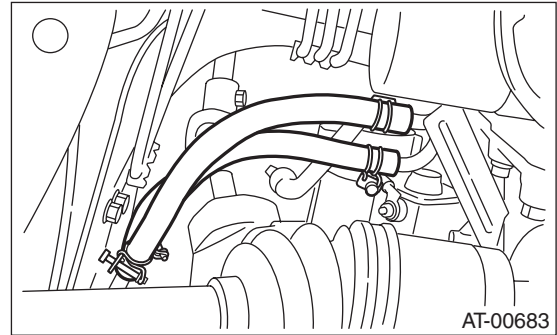
T2: 50 N·m (5.1 kgf-m, 37 ft-lb)



15) Install the shift select cable onto select lever.

<Ref. to CS-30, INSTALLATION, Select Cable.>

16) Install the ATF level gauge guide and connect the ATF cooler hoses to pipe.



17) Install the propeller shaft.

<Ref. to DS-15, INSTALLATION, Propeller Shaft.>

18) Install the heat shield cover.(if equipped)

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

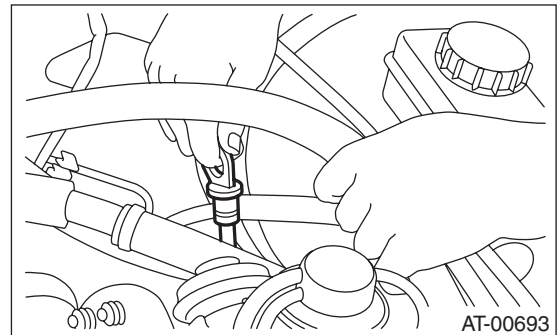
<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

20) Install the center and 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.>

21) Install the under cover.

22) Lower the vehicle.

23) Install the ATF level gauge.



24) Connect the following connectors.

- (1) Transmission harness connector
- (2) Transmission ground terminal

AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

25) Install the air cleaner case stay. (Non-turbo model)

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

26) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.>

27) Install the air intake duct. (Non-turbo model)
<Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.>

28) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

29) Connect the battery ground cable to battery.

30) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

Recommended fluid:

Dexron III type automatic transmission fluid

Fluid capacity:

9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 7.4 — 7.7 Imp qt)

31) Take off the vehicle from lift arms.

32) Check the select lever operation.

<Ref. to AT-48, INSPECTION, Inhibitor Switch.>

33) Check the ATF level.<Ref. to AT-30, ATF.>

34) Test the vehicle on the road.

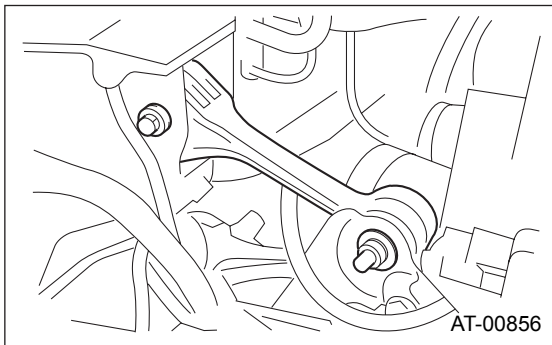
<Ref. to AT-32, Road Test.>

10. Transmission Mounting System

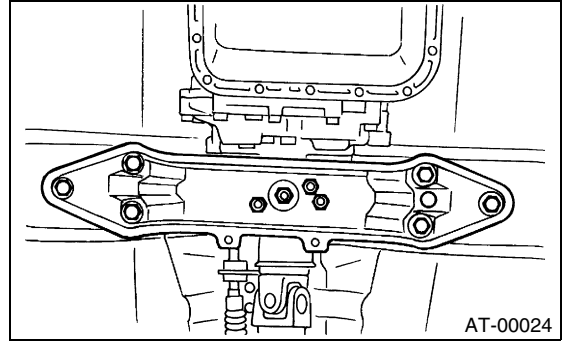
A: REMOVAL

1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct. (Non-turbo model)
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
- 3) Remove the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 5) Remove the pitching stopper.



- 7) Remove the crossmember.



- 8) Remove the rear cushion rubber.

2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Jack-up the vehicle and support with rigid racks.
- 3) Remove the front, center, rear exhaust pipes and the muffler. (Non-turbo model)
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, 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.>

CAUTION:

When removing the exhaust pipes, be careful each exhaust pipe does not drop out.

- 5) Remove the heat shield cover. (if equipped)
- 6) Set the transmission jack under the transmission.

CAUTION:

Make sure that the support plates of transmission jack don't touch the oil pan.

TRANSMISSION MOUNTING SYSTEM

AUTOMATIC TRANSMISSION

B: INSTALLATION

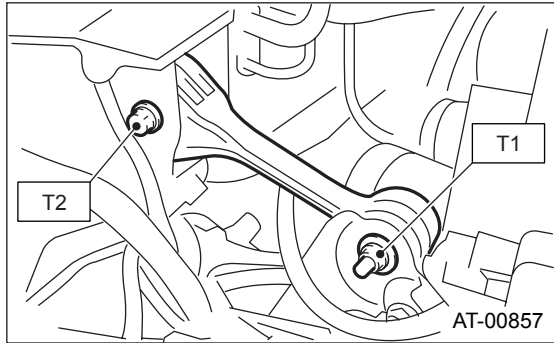
1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



2) Install the air intake duct and air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>, <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>

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

2. CROSSMEMBER AND CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:

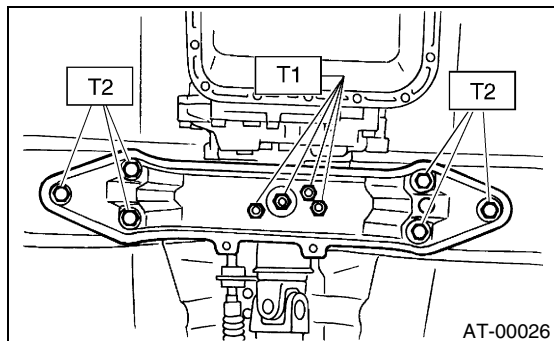
39 N·m (4.0 kgf-m, 29 ft-lb)

2) Install the crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51.4 ft-lb)



3) Remove the transmission jack.

4) Install the heat shield cover. (if equipped)

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

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

6) Install the center, rear exhaust pipes and the muffler. (Turbo model) <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>, <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

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

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Make sure 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. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

11.Extension Case Oil Seal

A: INSPECTION

Make sure ATF does not leak from the joint of transmission and propeller shaft. If a leak occurs, replace the oil seal. <Ref. to AT-47, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

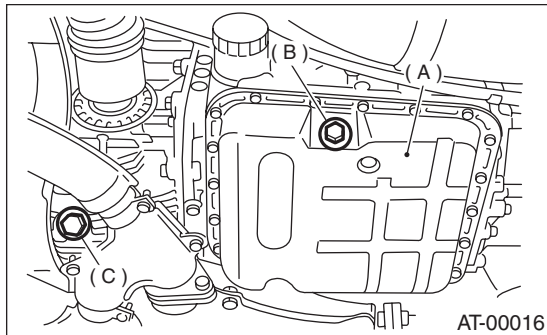
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Clean the transmission exterior.
- 5) Drain the ATF completely.

NOTE:

Tighten the ATF drain plug after draining the ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 6) Remove the rear exhaust pipe and muffler.

Non-turbo model

<Ref. to EX(H4SO)-9, 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.>

- 7) Remove the heat shield cover. (if equipped)
- 8) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
- 9) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
- 10) Using the ST, install the oil seal.
ST 498057300 INSTALLER
- 11) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
- 12) Install the heat shield cover. (if equipped)

- 13) Install the rear exhaust pipe and muffler.

Non-turbo model

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

Turbo model

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

- 14) Pour ATF and check the ATF level. <Ref. to AT-30, ATF.>

12. Inhibitor Switch

A: INSPECTION

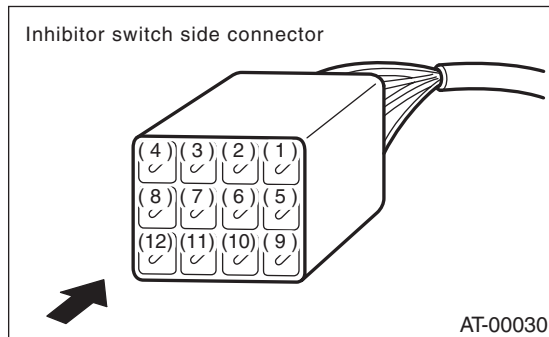
When the driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

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

Also check that continuity in ignition circuit does not exist when the select lever is in R, D, 3, 2 and 1 ranges.

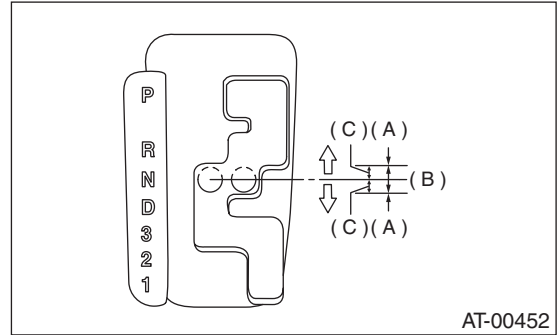
If the inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Location	Pin No.	Standard
Signal sent to TCM	P	4 — 3	Less than 1Ω
	R	4 — 2	
	N	4 — 1	
	D	4 — 8	
	3	4 — 7	
	2	4 — 6	
	1	4 — 5	
Starter Circuit	P/N	12 — 11	
Back-up light circuit	R	10 — 9	



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

If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch. <Ref. to AT-48, ADJUSTMENT, Inhibitor Switch.>

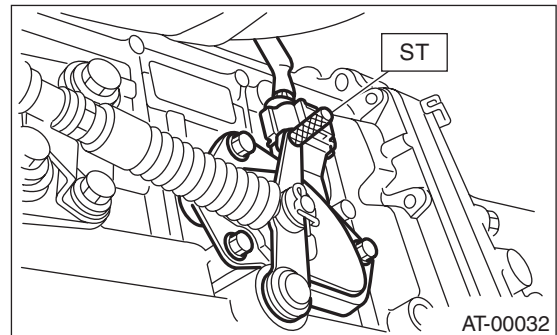


- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°

- 4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-30, ADJUSTMENT, Select Cable.>

B: ADJUSTMENT

- 1) Shift the select lever to "N" range.
- 2) Loosen the three inhibitor switch securing bolts.
- 3) Insert the ST as straight as possible into the holes in inhibitor switch lever and switch body.
ST 499267300 STOPPER PIN



- 4) Tighten the three inhibitor switch bolts.

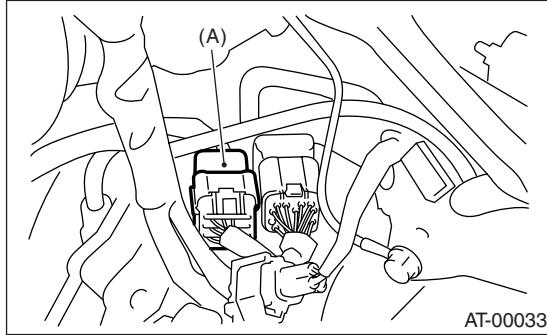
Tightening torque:

3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

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

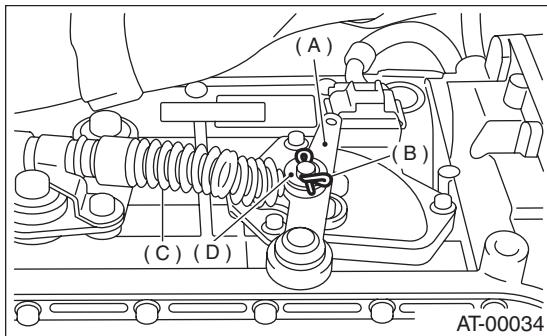
C: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Move the range select lever to neutral position.
- 3) Remove the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 5) Disconnect the inhibitor switch connector.



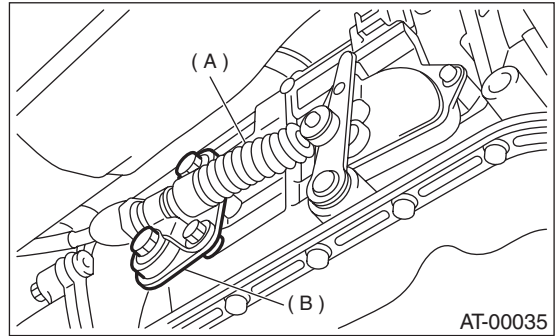
(A) Inhibitor switch

- 6) Remove the inhibitor switch connector from stay.
- 7) Lift up the vehicle.
- 8) Remove the front exhaust pipe together with the center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>
- 9) Remove the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 10) Remove the snap pin and washer from range select lever.



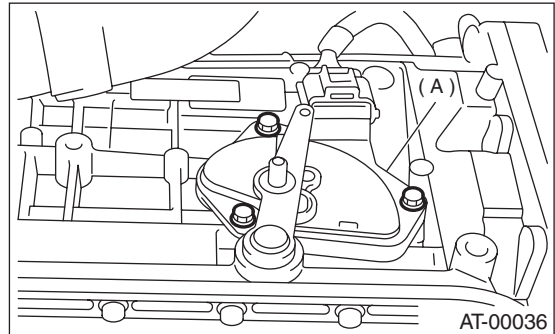
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Washer

- 11) Remove the plate assembly from transmission case.



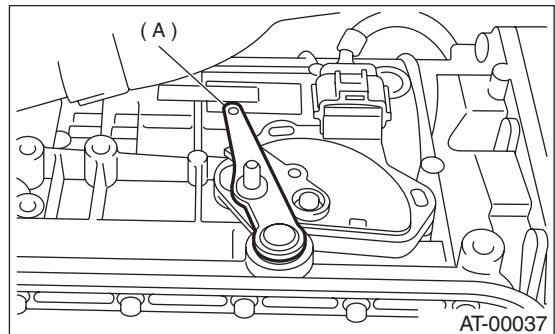
- (A) Select cable
- (B) Plate assembly

- 12) Remove the bolts.



(A) Inhibitor switch

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

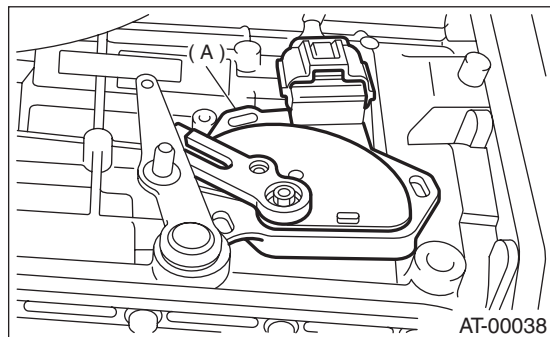


(A) Range select lever

INHIBITOR SWITCH

AUTOMATIC TRANSMISSION

14) Remove the inhibitor switch from transmission.



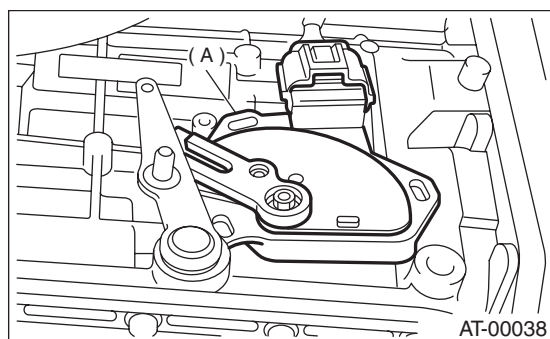
(A) Inhibitor switch

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

D: INSTALLATION

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

2) Install the inhibitor switch to transmission case.



(A) Inhibitor switch

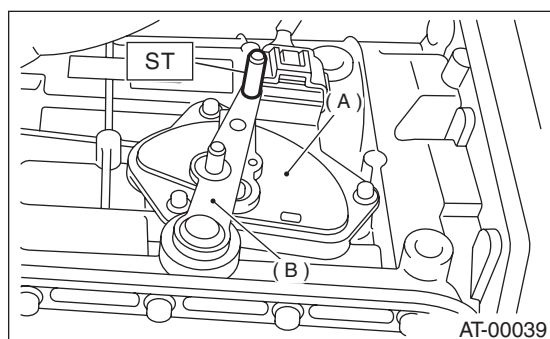
3) Move the range select lever to neutral position.

4) Tighten inhibitor switch bolts using the ST.

ST 499267300 STOPPER PIN

Tightening torque:

3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



(A) Inhibitor switch

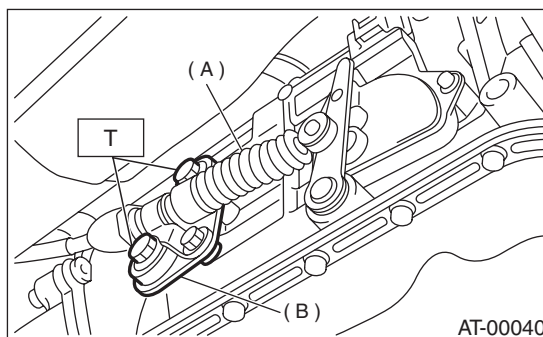
(B) Range select lever

5) Install the select cable to range select lever.

6) Install the plate assembly to transmission.

Tightening torque:

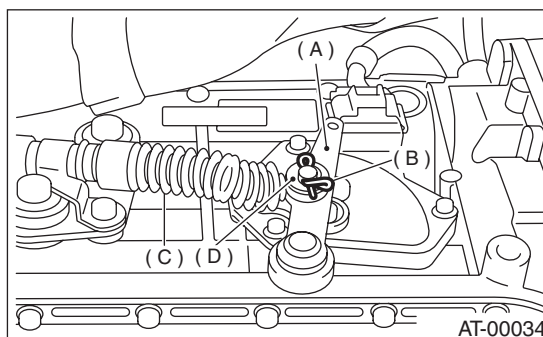
T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Select cable

(B) Plate assembly

7) Install the snap pin to range select lever.



(A) Snap ring

(B) Select cable

(C) Range select lever

8) Install the front exhaust pipe together with the center exhaust pipe. (Non-turbo model)

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>

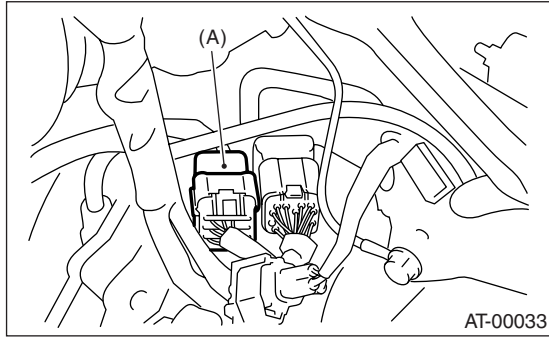
9) Install the center exhaust pipe. (Turbo model)

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

10) Lower the vehicle.

11) Install the inhibitor switch connector to stay.

12) Connect the inhibitor switch connector.



(A) Inhibitor switch

13) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.>

14) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

15) Inspect the inhibitor switch. <Ref. to AT-48, INSPECTION, Inhibitor Switch.>

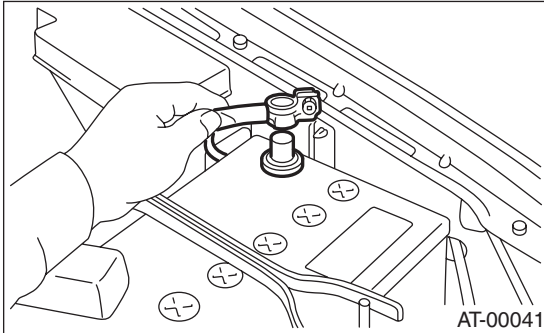
FRONT VEHICLE SPEED SENSOR

AUTOMATIC TRANSMISSION

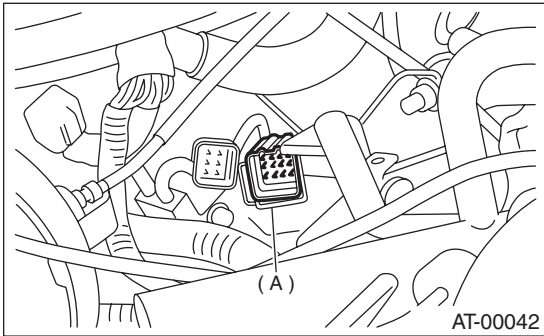
13. Front Vehicle Speed Sensor

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground terminal from battery.



- 3) Remove the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 4) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 5) Disconnect the transmission connector.



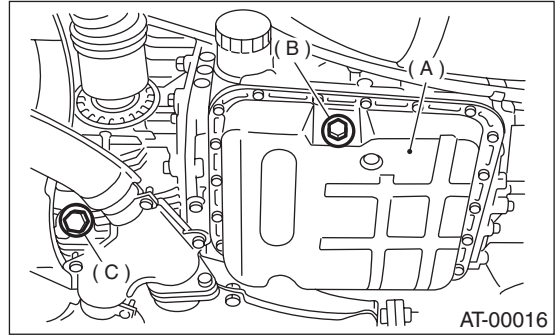
(A) Transmission connector

- 6) Remove the transmission connector from stay.
- 7) Lift up the vehicle.
- 8) Clean the transmission exterior.
- 9) Drain the ATF completely.

NOTE:

Tighten the ATF drain plug after draining the ATF.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



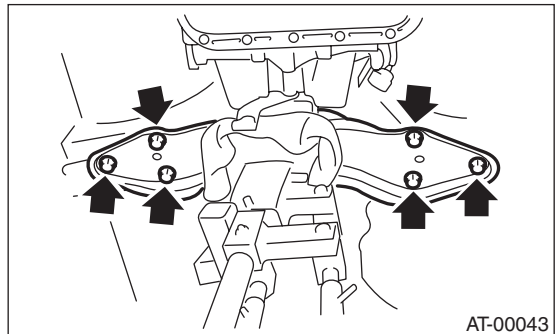
- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

- 10) Remove the front, center, rear exhaust pipes and the muffler.
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
- 11) 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.>
- 12) Remove the shield cover. (if equipped)
- 13) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
- 14) Place the transmission jack under crossmember.

NOTE:

Place a cloth or other cushioning material between the crossmember and transmission.

- 15) Remove the transmission rear crossmember bolts.



FRONT VEHICLE SPEED SENSOR

AUTOMATIC TRANSMISSION

16) Lower the AT jack.

NOTE:

Do not separate the AT jack and transmission.

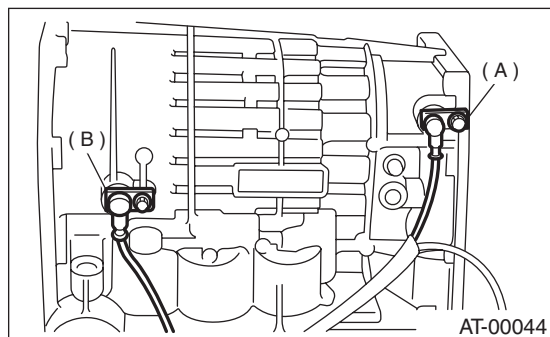
17) Remove the oil cooler outlet pipe.

CAUTION:

When removing the outlet pipe, be careful not to lose balls and springs used with retaining screws.

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

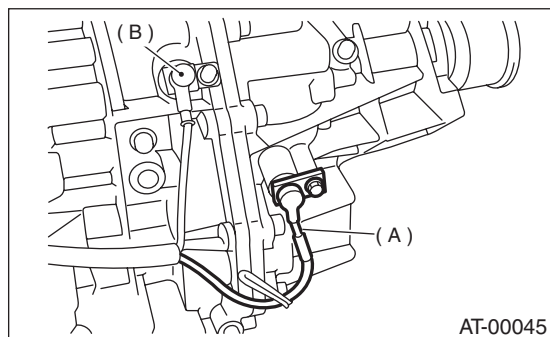
• Front vehicle speed sensor and torque converter turbine speed sensor



(A) Front vehicle speed sensor

(B) Torque converter turbine speed sensor

• Rear vehicle speed sensor

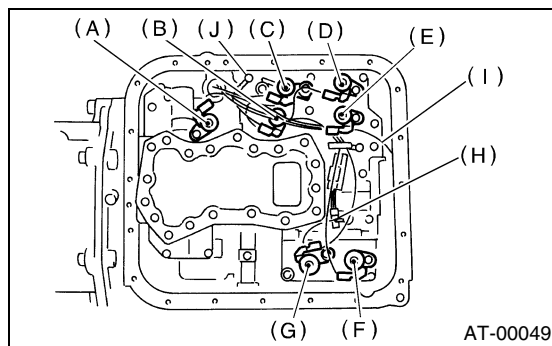


(A) Rear vehicle speed sensor

(B) Front vehicle speed sensor

19) Remove the oil pan.

20) Disconnect the duty solenoid connectors and remove the ATF temperature sensor. Remove the connectors from clip and disconnect the connectors.



(A) Lock-up duty solenoid (blue)

(B) Low clutch timing solenoid (gray)

(C) Line pressure duty solenoid (red)

(D) Shift solenoid 2 (yellow)

(E) Shift solenoid 1 (green)

(F) 2-4 brake timing solenoid (black)

(G) 2-4 brake duty solenoid (red)

(H) ATF temperature sensor

(I) Transfer duty solenoid (brown)

(J) Transmission ground

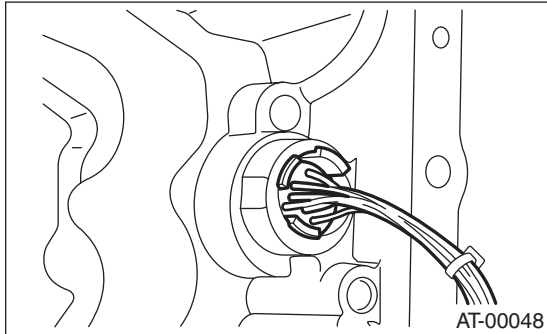
21) Remove the harness assembly.

FRONT VEHICLE SPEED SENSOR

AUTOMATIC TRANSMISSION

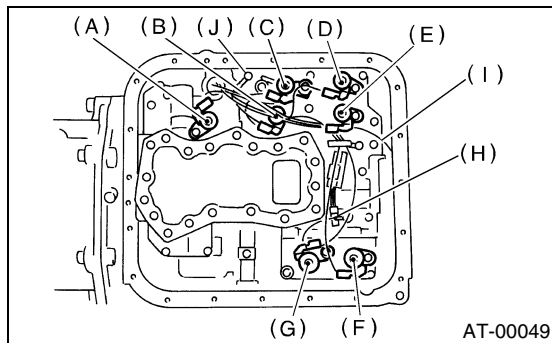
B: INSTALLATION

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



2) Connect the harness connectors. Connect the connectors of same color, and secure the connectors to valve body using clips.

Tightening torque: (Transmission ground terminal and ATF temperature sensor)
8 N·m (0.8 kgf-m, 5.8 ft-lb)

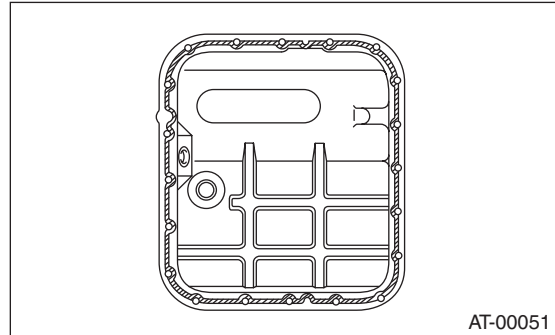


- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 2 (yellow)
- (E) Shift solenoid 1 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (brown)
- (J) Transmission ground

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

Liquid gasket:

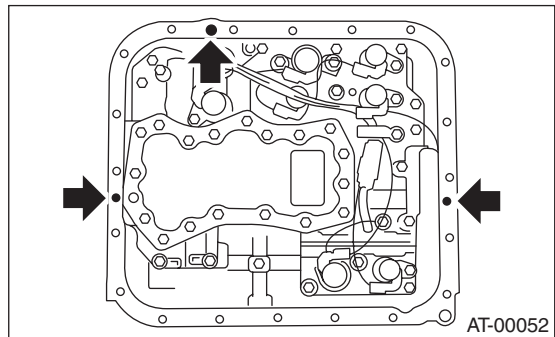
ThreeBond 1217B (Part No. K0877YA020)



4) Apply a plenty amount of liquid gasket to three holes other than screw holes on transmission case.

Liquid gasket:

ThreeBond 1217B (Part No. K0877YA020)



5) Install the oil pan.

Tightening torque:

5 N·m (0.5 kgf-m, 3.6 ft-lb)

6) Install front and rear vehicle speed sensors and the torque converter turbine speed sensor, and then fasten the harness.

Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)

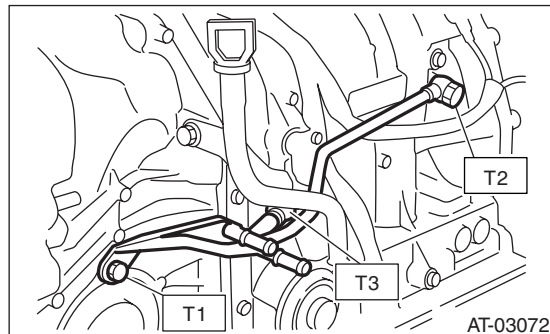
7) Install a new aluminum washer and oil cooler outlet pipe.

Tightening torque:

T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

T2: 40 N·m (4.1 kgf-m, 30 ft-lb)

T3: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



8) Install the transmission rear crossmember bolts.

Tightening torque:

75 N·m (7.6 kgf-m, 55 ft-lb)

9) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

10) Install the shield cover. (if equipped)

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

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>and<Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.>and<Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

12) Install the center and rear exhaust pipes and the muffler. (Turbo model) <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>, <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

13) Lower the vehicle.

14) Install the transmission connector to the stay.

15) Install the air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.>

16) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

14.Rear Vehicle Speed Sensor

A: REMOVAL

When removing the rear vehicle speed sensor, refer to Front Vehicle Speed Sensor. <Ref. to AT-52, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the rear vehicle speed sensor, refer to Front Vehicle Speed Sensor. <Ref. to AT-54, INSTALLATION, Front Vehicle Speed Sensor.>

15. Torque Converter Turbine Speed Sensor

A: REMOVAL

When removing the torque converter turbine speed sensor, refer to Front Vehicle Speed Sensor. <Ref. to AT-52, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the torque converter turbine speed sensor, refer to Front Vehicle Speed Sensor. <Ref. to AT-54, INSTALLATION, Front Vehicle Speed Sensor.>

16. Control Valve Body

A: REMOVAL

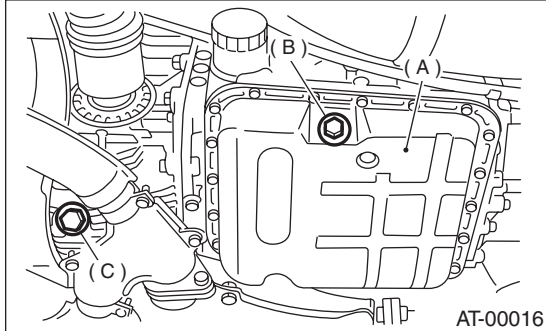
- 1) Lift up the vehicle.
- 2) Clean the transmission exterior.
- 3) Drain the ATF completely.

NOTE:

Tighten the ATF drain plug after draining the ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



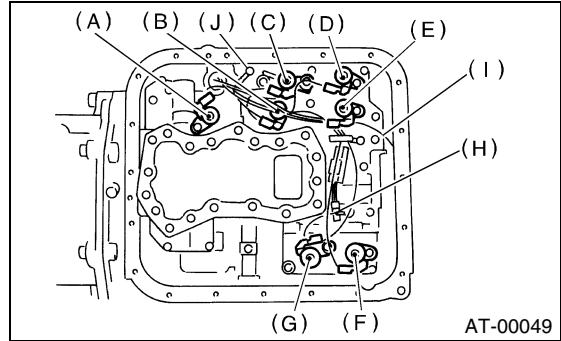
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 4) Remove the oil pan.

NOTE:

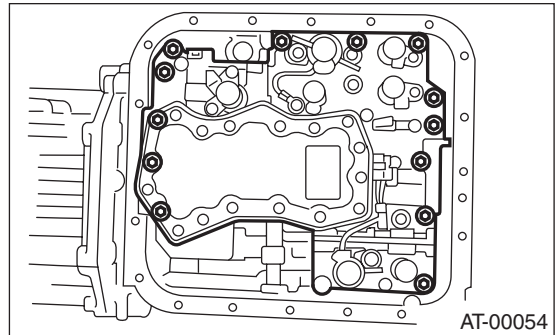
- Remove and clean the magnet.
- Remove the old gasket on the oil pan and transmission case completely.

- 5) Disconnect solenoid connectors and remove the ATF temperature sensor. Remove the connectors from clip and disconnect the connectors.



- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 2 (yellow)
- (E) Shift solenoid 1 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (brown)
- (J) Transmission ground

- 6) Remove the control valve. When removing the control valve body, be careful not to interfere with transfer duty solenoid wiring.

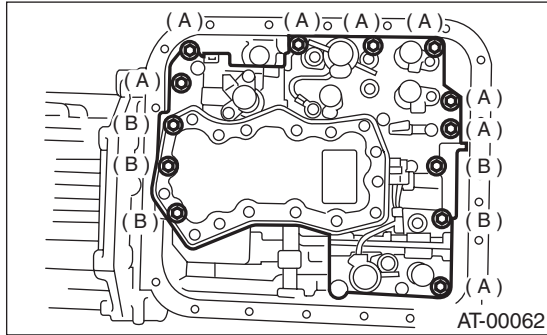


B: INSTALLATION

- 1) Set the range select lever in "N" range.
- 2) Install the control valve, ATF temperature sensor and ground connectors.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

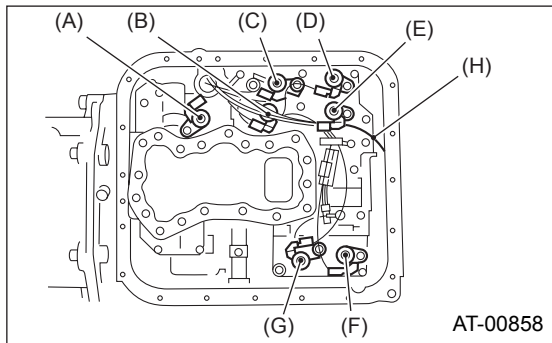


Bolt length mm (in)

(A) 30 (1.18)

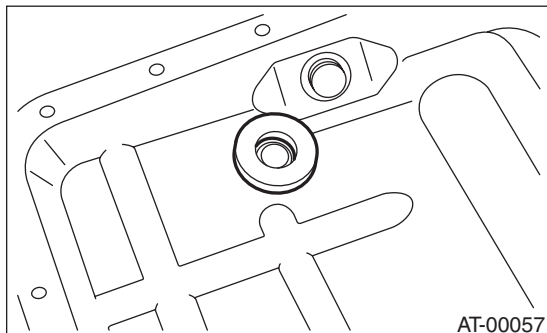
(B) 55 (2.17)

- 3) Connect all connectors.



- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 2 (yellow)
- (E) Shift solenoid 1 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)
- (H) Transfer duty solenoid (brown)

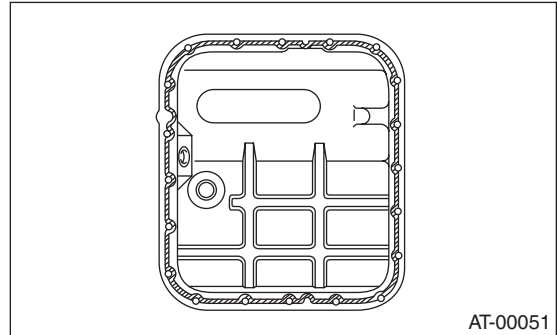
- 4) Attach the magnet at specified position.



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

Liquid gasket:

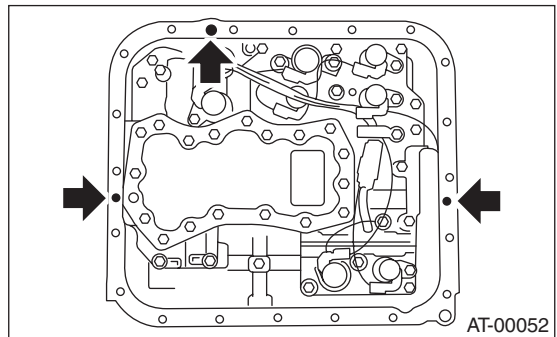
ThreeBond 1217B (Part No. K0877YA020)



- 6) Apply a plenty amount of liquid gasket to three holes other than screw holes on transmission case.

Liquid gasket:

ThreeBond 1217B (Part No. K0877YA020)



- 7) Install the oil pan.

Tightening torque:

5 N·m (0.5 kgf-m, 3.6 ft-lb)

- 8) Pour ATF into the oil charge pipe. <Ref. to AT-30, ATF.>

- 9) Check the level of ATF. <Ref. to AT-30, ATF.>

CONTROL VALVE BODY

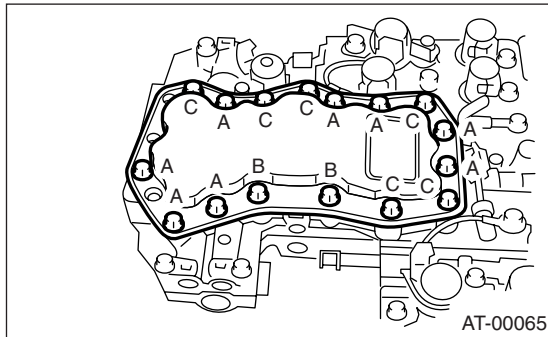
AUTOMATIC TRANSMISSION

C: DISASSEMBLY

1) Remove oil strainer from lower control valve body.

NOTE:

Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.

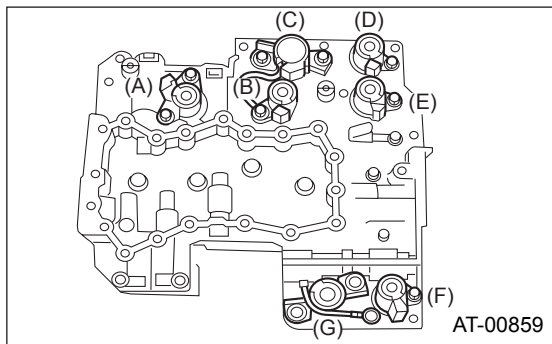


- (A) Short bolt
- (B) Mid-length bolt
- (C) Long bolt

2) Remove the duty solenoids and solenoids from the lower valve body.

NOTE:

Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.

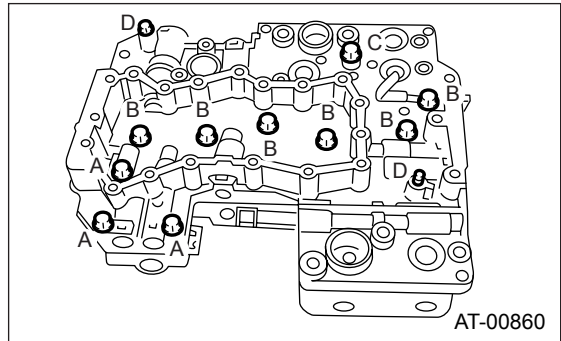


- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 1 (yellow)
- (E) Shift solenoid 2 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)

3) Remove the upper and lower valve body tightening bolts.

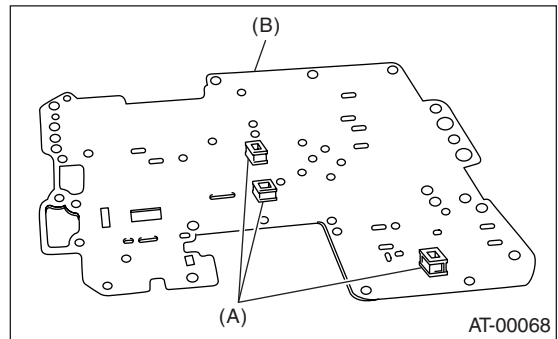
NOTE:

Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



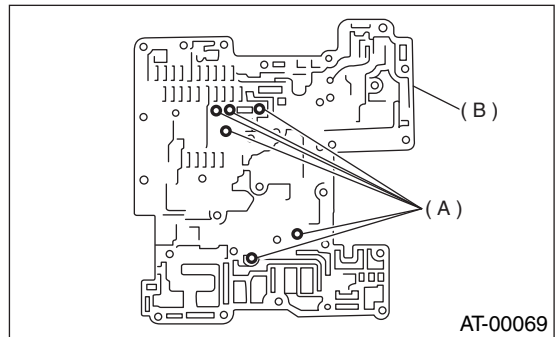
4) Remove the lower valve body.

5) Remove the oil filter and plate.



- (A) Oil filter
- (B) Plate

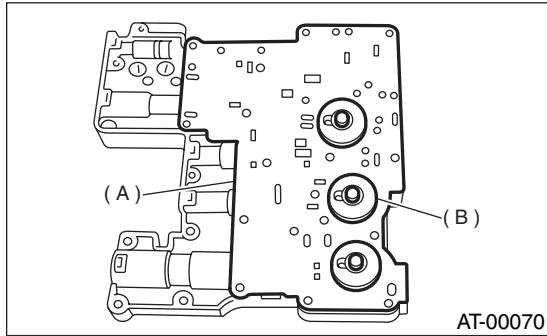
6) Remove six steel balls from middle valve body.



- (A) Steel ball
- (B) Middle valve body

7) Remove the middle valve body.

8) Remove upper separator plate from middle valve body.

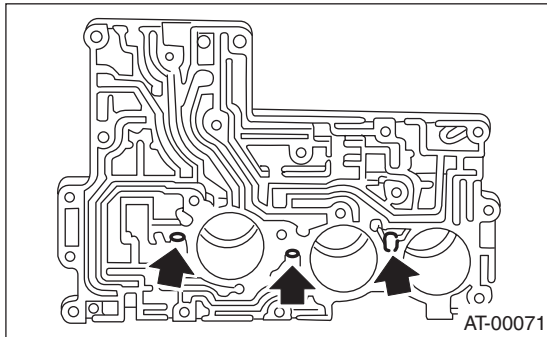


- (A) Upper separator plate
- (B) Side plate

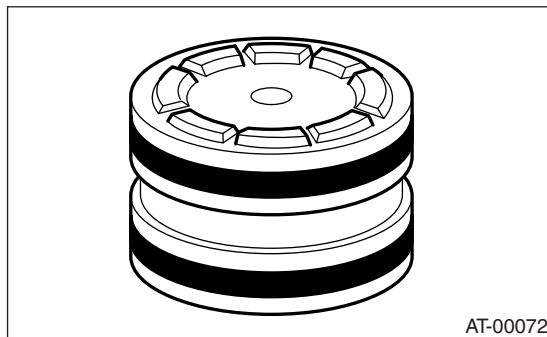
9) Remove valve springs and four steel balls from upper valve body.

10) Place a shop cloth etc. to the piston removal hole.

11) Using an air compressor, apply air slowly to each piston hole and remove the pistons.

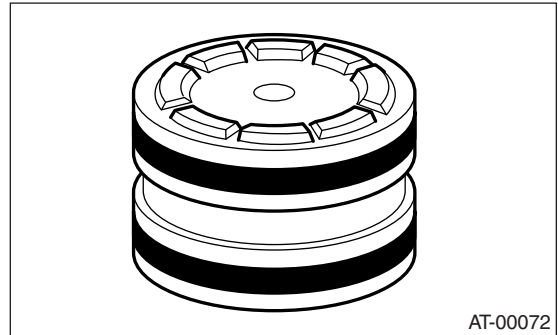


12) Remove the seal ring from piston.



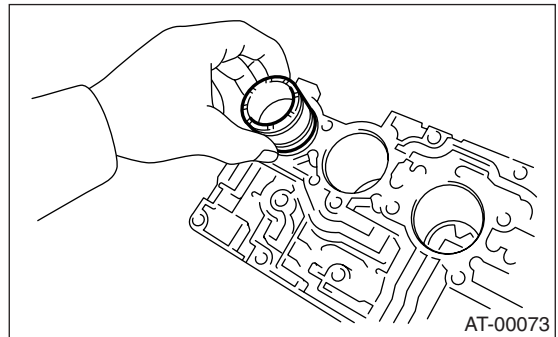
D: ASSEMBLY

1) Install a new seal ring to piston.

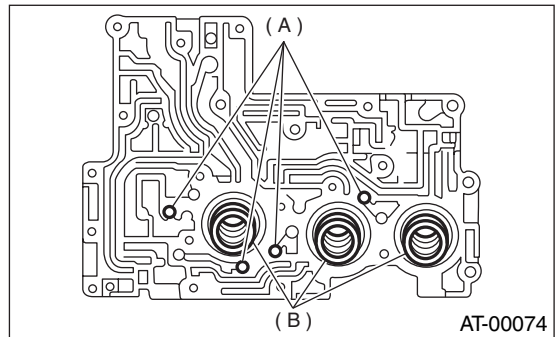


2) Apply ATF to the seal ring.

3) Insert the piston fully into upper valve body.



4) Install the spring and four steel balls to specified positions of upper valve body.



- (A) Steel ball
- (B) Spring

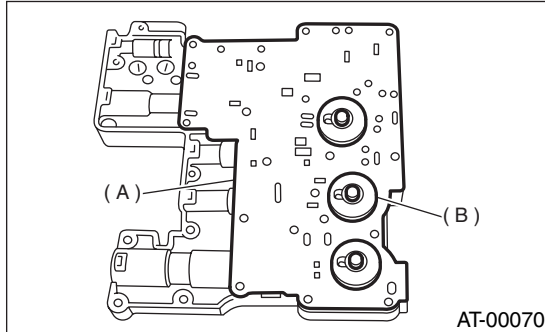
CONTROL VALVE BODY

AUTOMATIC TRANSMISSION

5) Align the hole in side plate with the hole in separator plate, and then install support plate and upper separator plate to middle valve body.

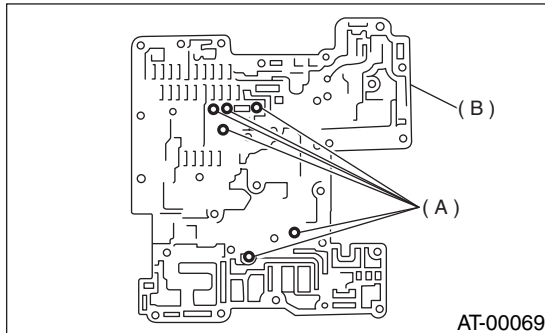
Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



- (A) Upper separator plate
- (B) Side plate

6) Insert six steel balls in their proper positions to middle valve body.

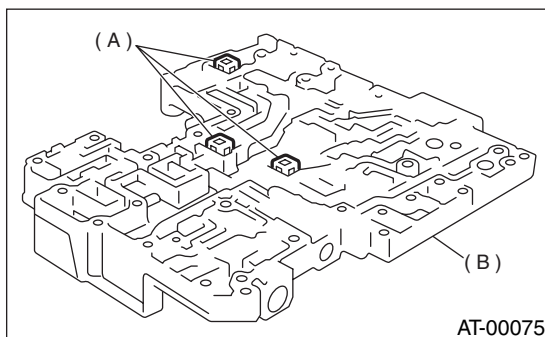


- (A) Steel ball
- (B) Middle valve body

7) Install three filters to lower valve body.

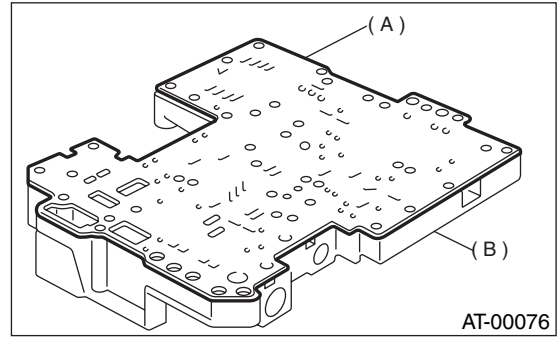
NOTE:

Pay attention to the location of filters.



- (A) Strainer
- (B) Lower valve body

8) Install lower separator plate to lower valve body.

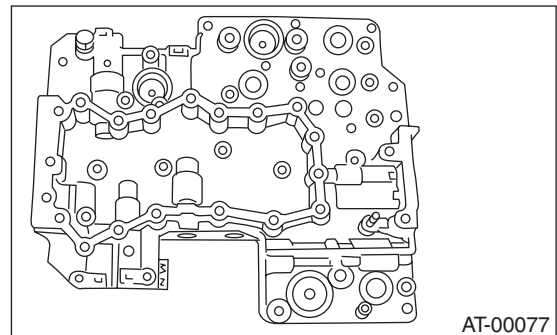


- (A) Lower separator plate
- (B) Lower valve body

9) Temporarily assemble valve body.

NOTE:

Be careful not to drop the middle valve body and upper body interior steel ball, or the lower body filter.



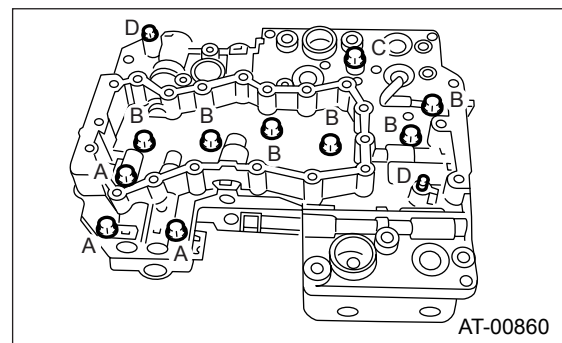
10) Tighten bolts.

NOTE:

Install the bolts (D) from upper valve body side.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



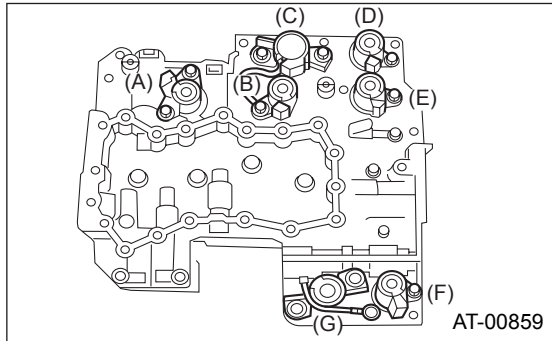
Bolt length mm (in)

- (A) 40 (1.57)
- (B) 62 (2.44)
- (C) 73 (2.87)
- (D) 79 (3.11)

11) Install the solenoids and duty solenoids to specified positions.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

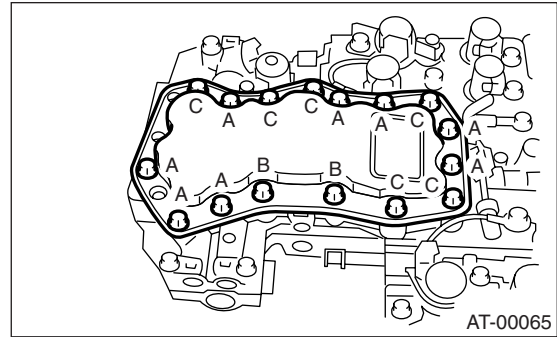


- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 1 (yellow)
- (E) Shift solenoid 2 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)

13) Install oil strainer to lower valve body.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)

- (A) 12 (0.47)
- (B) 62 (2.44)
- (C) 81 (3.19)

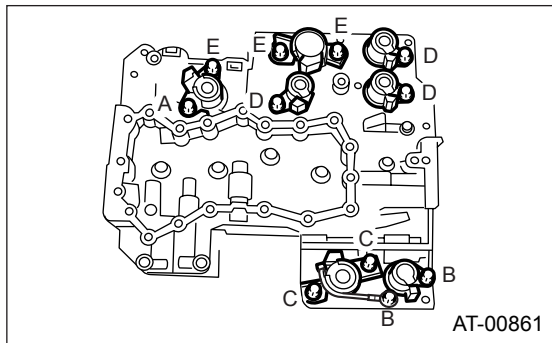
E: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

12) Tighten bolts.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)

- (A) 12 (0.47)
- (B) 40 (1.57)
- (C) 45 (1.77)
- (D) 62 (2.44)
- (E) 73 (2.87)

17. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

A: REMOVAL

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

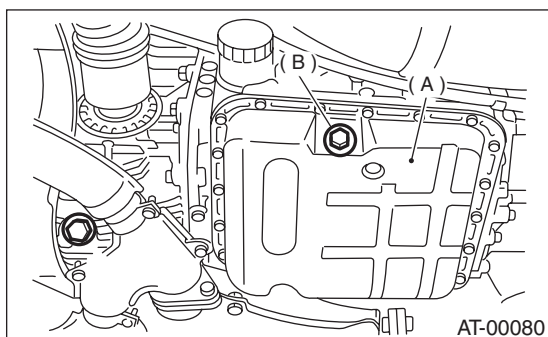
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Clean the transmission exterior.
- 5) Drain the ATF completely.

NOTE:

Tighten the ATF drain plug after draining the ATF.

Tightening torque:

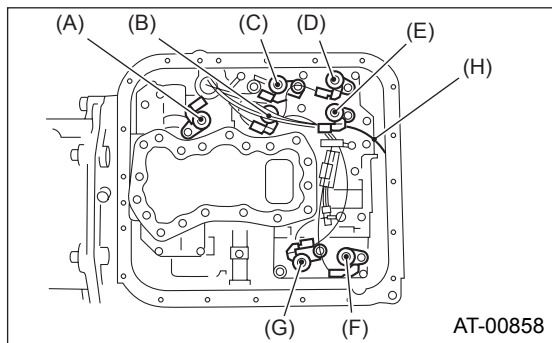
25 N·m (2.5 kgf-m, 18.1 ft-lb)



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

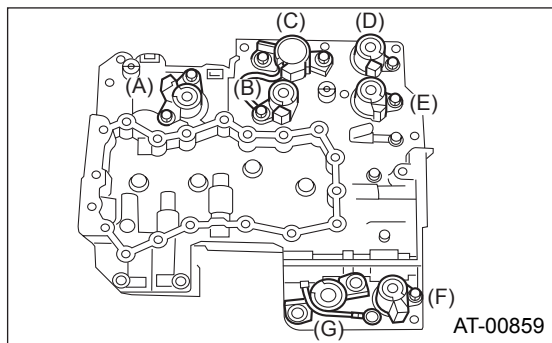
- 6) Remove the oil pan.

- 7) Disconnect each solenoid connectors. Remove the connectors from clip and disconnect the connectors.



- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 2 (yellow)
- (E) Shift solenoid 1 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)
- (H) Transfer duty solenoid (brown)

- 8) Remove the solenoids and duty solenoids.



- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 2 (yellow)
- (E) Shift solenoid 1 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)

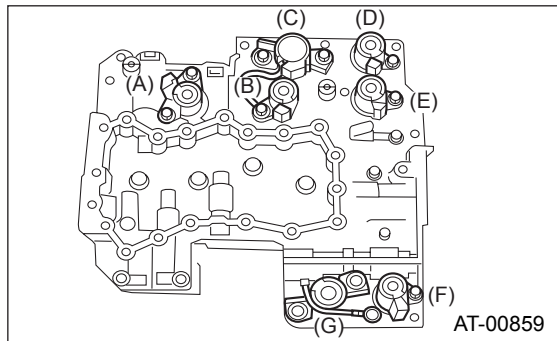
2. ATF TEMPERATURE SENSOR

When removing the ATF temperature sensor, refer to Front Vehicle Speed Sensor. <Ref. to AT-52, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

1) Install the solenoids and duty solenoids to specified positions.

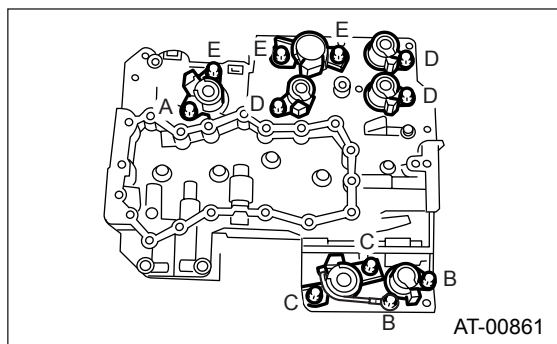


- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 2 (yellow)
- (E) Shift solenoid 1 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)

2) Tighten bolts.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

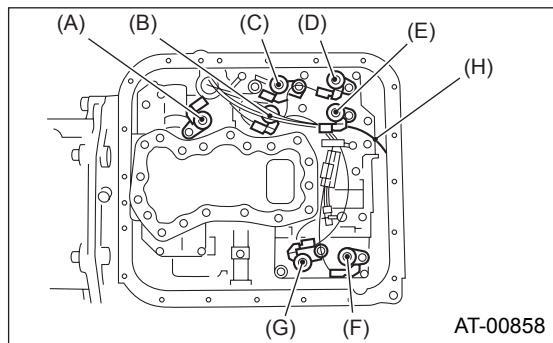


Bolt length mm (in)

- (A) 12 (0.47)
- (B) 40 (1.57)
- (C) 45 (1.77)
- (D) 62 (2.44)
- (E) 73 (2.87)

3) Connect the harness connectors.

Connect the connectors of same color, and secure the connectors to valve body using clips.

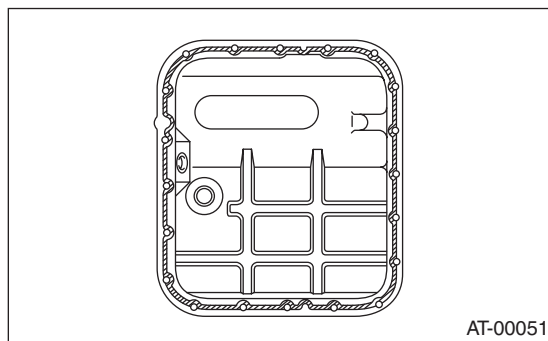


- (A) Lock-up duty solenoid (blue)
- (B) Low clutch timing solenoid (gray)
- (C) Line pressure duty solenoid (red)
- (D) Shift solenoid 2 (yellow)
- (E) Shift solenoid 1 (green)
- (F) 2-4 brake timing solenoid (black)
- (G) 2-4 brake duty solenoid (red)
- (H) Transfer duty solenoid (brown)

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

Liquid gasket:

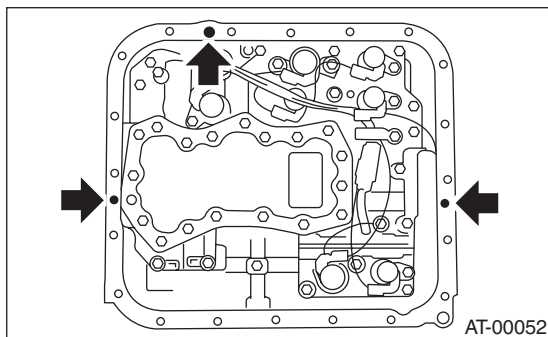
ThreeBond 1217B (Part No. K0877YA020)



5) Apply a plenty amount of liquid gasket to three holes other than screw holes on transmission case.

Liquid gasket:

ThreeBond 1217B (Part No. K0877YA020)



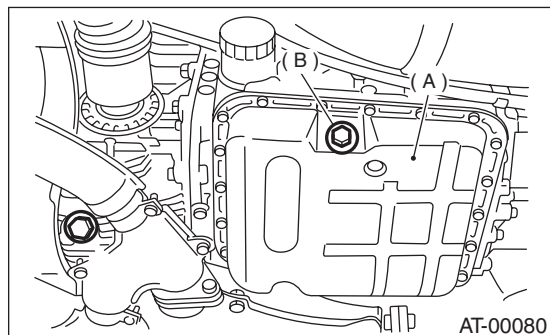
SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

AUTOMATIC TRANSMISSION

6) Install the oil pan.

Tightening torque:

5 N·m (0.50 kgf-m, 3.6 ft-lb)



(A) Oil pan

(B) Drain plug

7) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to AT-30, ATF.>

8) Check the ATF level. <Ref. to AT-30, ATF.>

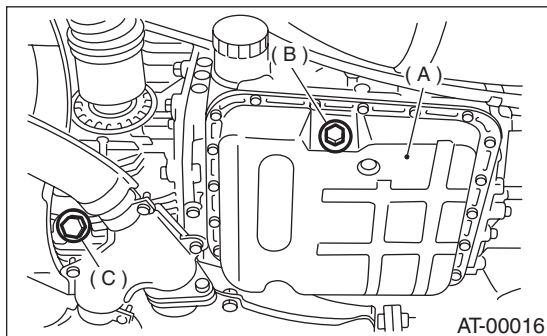
2. ATF TEMPERATURE SENSOR

When installing the ATF temperature sensor, refer to Front Vehicle Speed Sensor. <Ref. to AT-54, INSTALLATION, Front Vehicle Speed Sensor.>

18. Transfer Duty Solenoid and Valve Body

A: REMOVAL

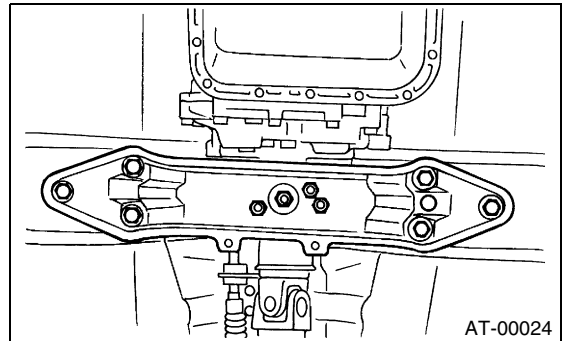
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 4) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 5) Remove the pitching stopper. <Ref. to AT-45, PITCHING STOPPER, REMOVAL, Transmission Mounting System.>
- 6) Remove the front exhaust pipe with center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>
- 7) Remove the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 8) Remove the rear exhaust pipe and muffler.
Non-turbo model
<Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 9) Raise the vehicle and drain the ATF.



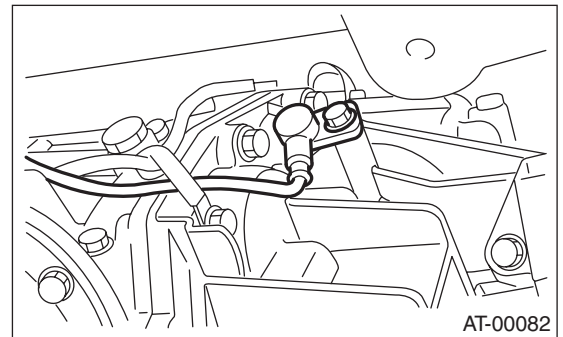
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 10) Remove the heat shield cover. (if equipped)
- 11) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>

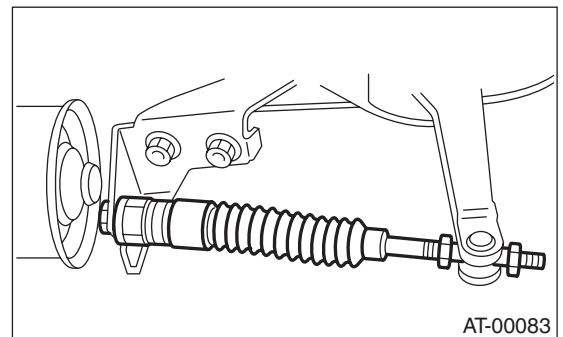
- 12) Remove the transmission rear crossmember.
 - (1) Support the transmission using a transmission jack and raise slightly.
 - (2) Remove the bolts and nuts as shown in the figure.



- 13) Remove the rear vehicle speed sensor.



- 14) Remove the select cable nut.



- 15) Move the gear select cable so that extension bolts can be removed.
- 16) Remove the bolts.

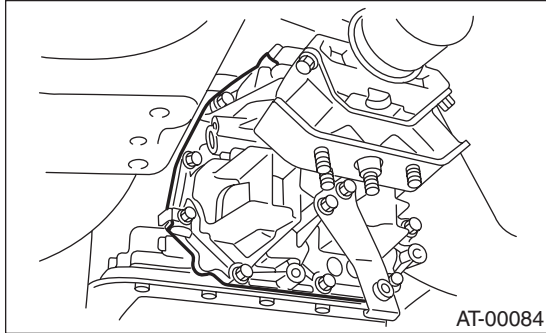
TRANSFER DUTY SOLENOID AND VALVE BODY

AUTOMATIC TRANSMISSION

17) Remove the extension case.

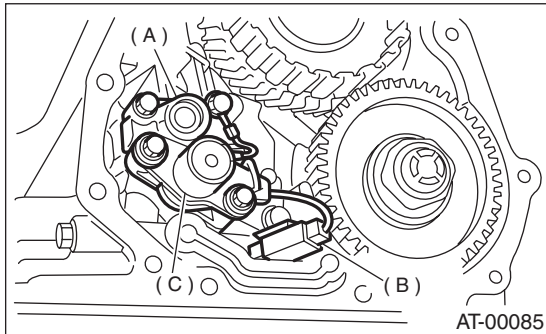
NOTE:

Use a container to catch oil flowing from extension.



18) Disconnect the transfer duty solenoid connector.

19) Remove the transfer duty solenoid and transfer valve body.



- (A) Transfer valve body
- (B) Transfer duty solenoid connector
- (C) Transfer duty solenoid

B: INSTALLATION

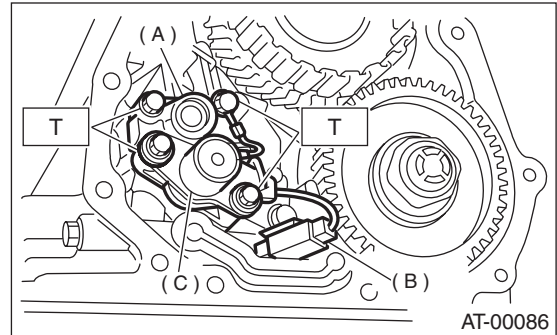
1) Install the transfer duty solenoid and transfer valve body.

(1) Install the transfer duty solenoid and transfer valve body.

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

(2) Connect the transfer duty solenoid connector.



- (A) Transfer valve body
- (B) Transfer duty solenoid connector
- (C) Transfer duty solenoid

2) Install a new gasket and the extension case to transmission case.

(1) Tighten eleven bolts.

Tightening torque:

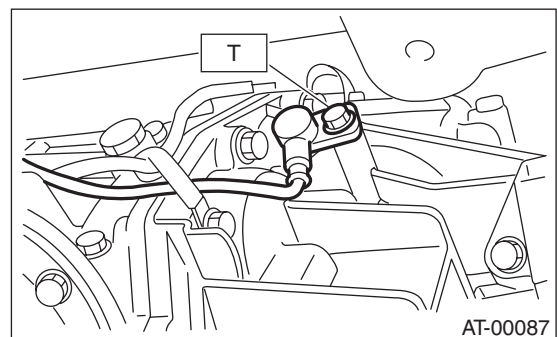
25 N·m (2.5 kgf-m, 18.1 ft-lb)

(2) Adjust the select cable. <Ref. to CS-30, ADJUSTMENT, Select Cable.>

3) Install the rear vehicle speed sensor.

Tightening torque:

T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)



TRANSFER DUTY SOLENOID AND VALVE BODY

AUTOMATIC TRANSMISSION

4) Install the transmission rear crossmember.

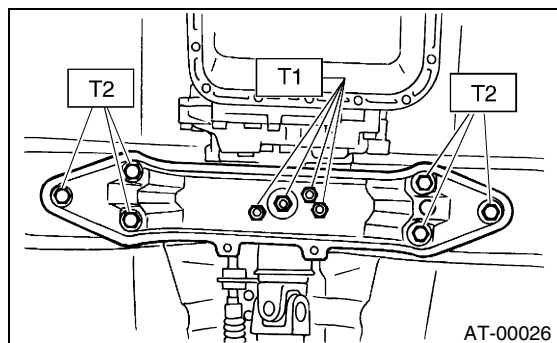
(1) Tighten bolts.

13) Check the ATF level. <Ref. to AT-30, ATF.>

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



(2) Remove the transmission jack.

5) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

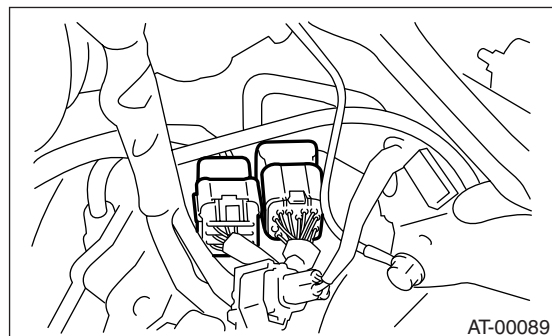
6) Install the front, center, rear exhaust pipes and the muffler. (Non-turbo model)

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>A <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

7) Install the center and 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.> and <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

8) Connect the transmission harness connector.



9) Install the pitching stopper. <Ref. to AT-46, PITCHING STOPPER, INSTALLATION, Transmission Mounting System.>

10) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.>

11) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

12) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole. <Ref. to AT-30, ATF.>

19.ATF Filter

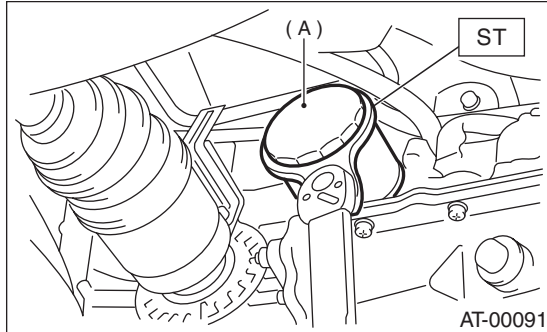
A: REMOVAL

NOTE:

ATF filter is a maintenance free part.

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

ST 498545400 OIL FILTER WRENCH



(A) ATF Filter

- 3) Use a new ATF filter and apply a thin coat of ATF to the oil seal.

B: INSTALLATION

- 1) Install the ATF filter. Turn it by hand, being careful not to damage the oil seal.
- 2) Using the ST, tighten the ATF filter to transmission case.

Calculate the tightening torque for the ATF filter using the 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 0.078 m (3.07 in)

L2: Torque wrench length

Example:

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

CAUTION:

Align the ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH

- 3) Add ATF.
- 4) Check the level of ATF. <Ref. to AT-30, ATF.>

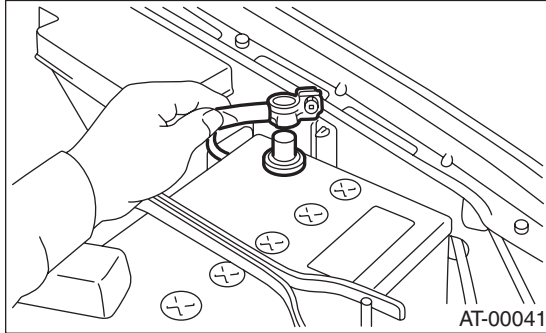
C: INSPECTION

If abnormality is found during inspection, replace it. Check for rust, gouges, ATF leak and other damage.

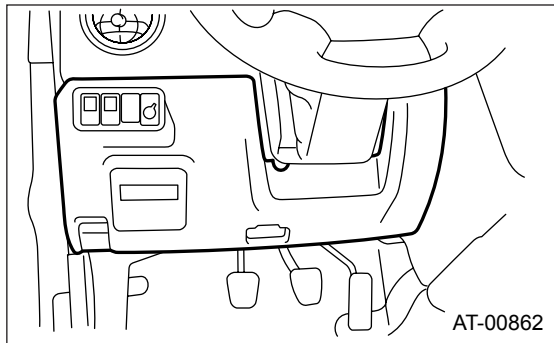
20. Transmission Control Module (TCM)

A: REMOVAL

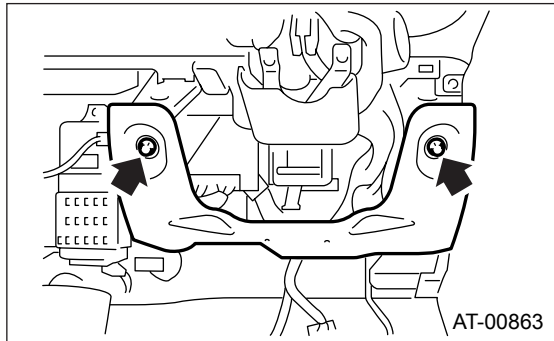
- 1) Disconnect the ground cable from battery.



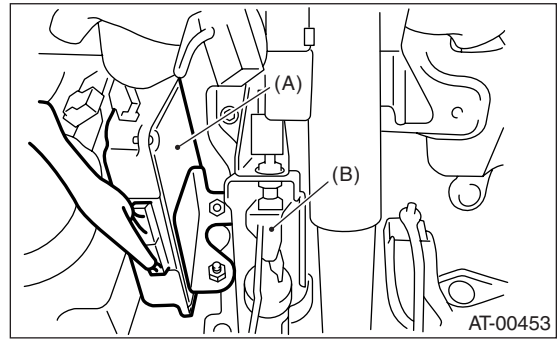
- 2) Remove the lower cover and then disconnect the connector.



- 3) Remove the knee bolster.



- 4) Disconnect the connectors from transmission control module.



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

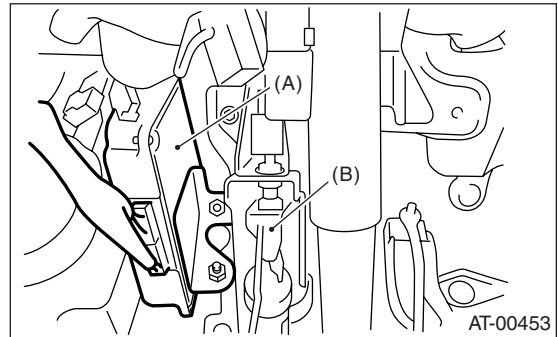
- 5) Remove the transmission control module.

B: INSTALLATION

- 1) Install the transmission control module.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



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

- 2) Connect the connectors to transmission control module.
- 3) Install in the reverse order of removal.

DROPPING RESISTOR

AUTOMATIC TRANSMISSION

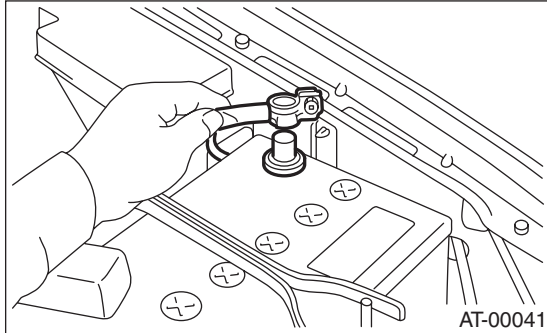
21. Dropping Resistor

A: REMOVAL

NOTE:

Dropping resistor is installed on non-turbo models only.

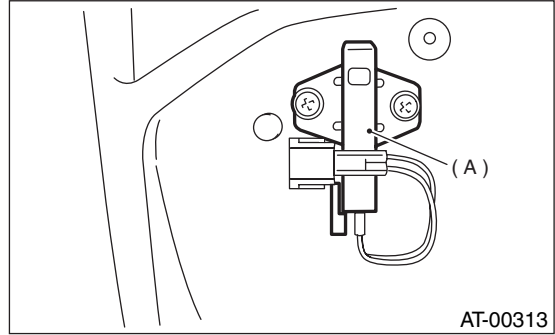
1) Disconnect the ground cable from battery.



2) Remove the air intake duct. <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>

3) Disconnect the connector from dropping resistor.

4) Remove the dropping resistor.



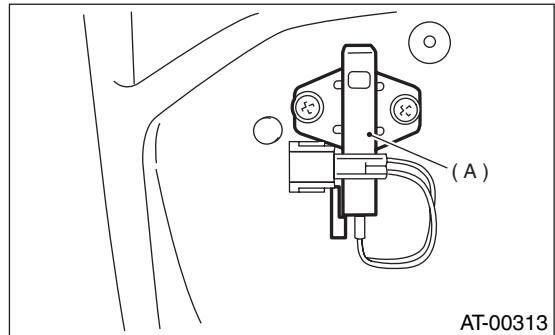
(A) Dropping resistor

B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



(A) Dropping resistor

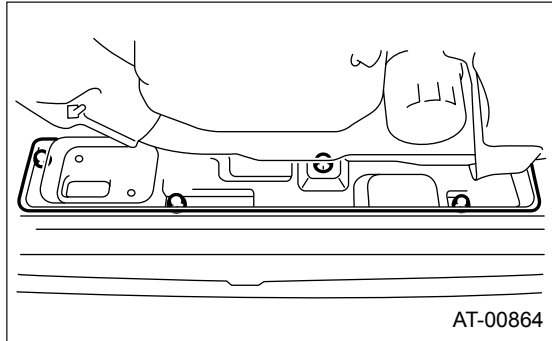
C: INSPECTION

Step	Check	Yes	No
1 CHECK RESISTOR. 1) Turn ignition switch to OFF. 2) Disconnect the connector from dropping resistor. 3) Measure the resistance between dropping resistor terminals. Terminal No. 1 — No. 2: Is the measured value within the specified range?	9 — 15 Ω	Go to step 2.	Replace the dropping resistor. <Ref. to AT-72, Dropping Resistor.>
2 CHECK RESISTOR. Measure the resistance between dropping resistor terminals. Terminal No. 3 — No. 4: Is the measured value within the specified range?	9 — 15 Ω	Dropping resistor is normal.	Replace the dropping resistor. <Ref. to AT-72, Dropping Resistor.>

22.ATF Cooler Pipe and Hose

A: REMOVAL

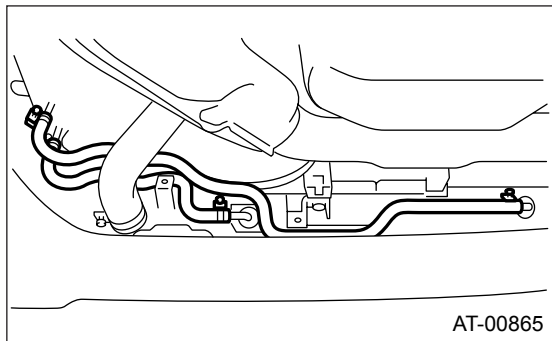
- 1) Set the vehicle on a lift.
- 2) Remove the battery and washer tank.
- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Remove the radiator under cover. (Turbo model)



- 6) Disconnect the ATF cooler hoses from radiator.

NOTE:

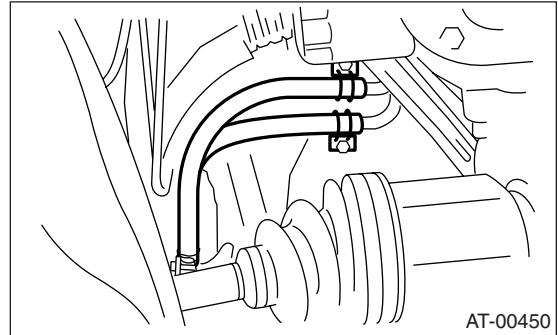
- Do not remove with a screwdriver or other pointed tools.
- If the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



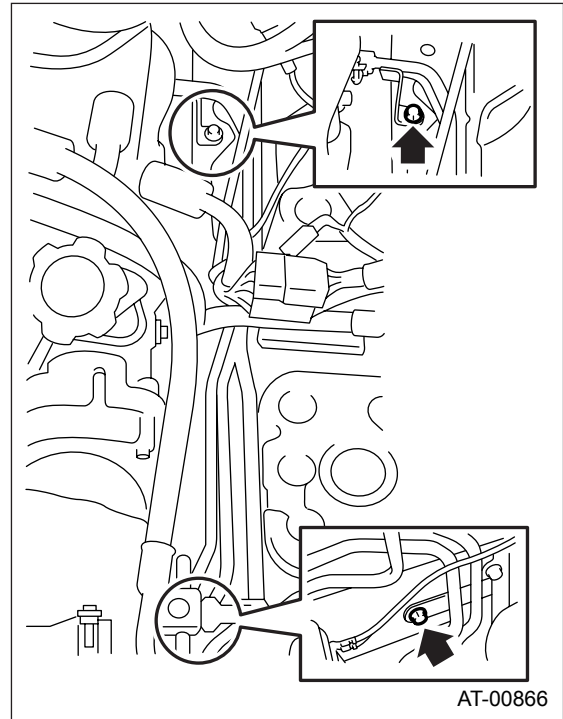
- 7) Disconnect the ATF cooler hoses from pipes.

NOTE:

- Do not remove with a screwdriver or other pointed tools.
- If the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



- 8) Remove the ATF cooler pipe from frame.



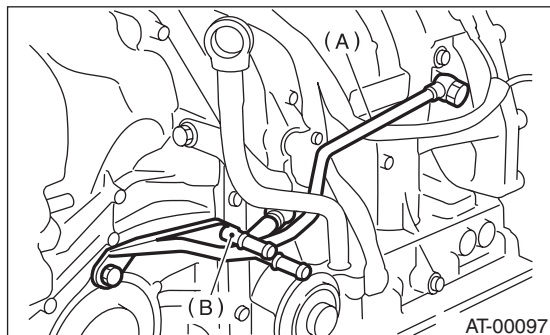
ATF COOLER PIPE AND HOSE

AUTOMATIC TRANSMISSION

9) Remove the oil cooler inlet and outlet pipes.

CAUTION:

When removing the outlet pipe, be careful not to lose balls and springs used with retaining screws.



- (A) Inlet pipe
(B) Outlet pipe

B: INSTALLATION

1) Install the oil cooler outlet and inlet pipes.

CAUTION:

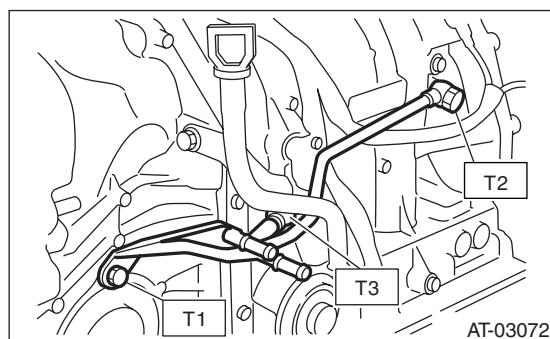
Be sure to use a new aluminum washer.

Tightening torque:

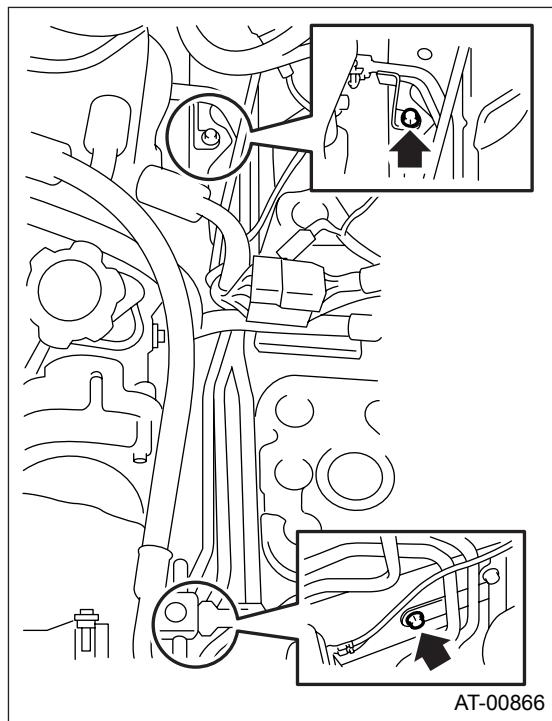
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

T2: 40 N·m (4.1 kgf-m, 30 ft-lb)

T3: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



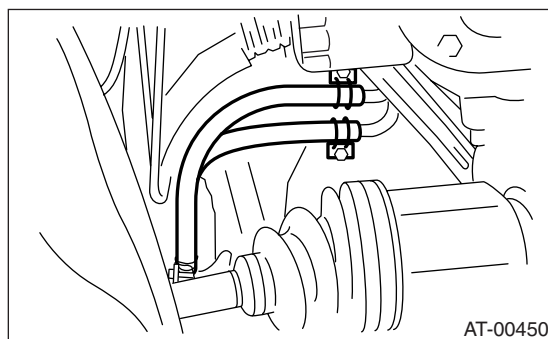
2) Install the ATF cooler pipe to frame.



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

NOTE:

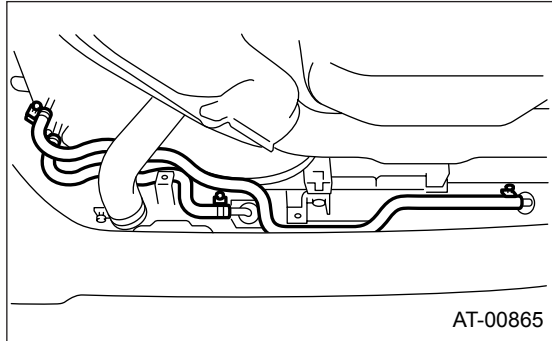
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



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

NOTE:

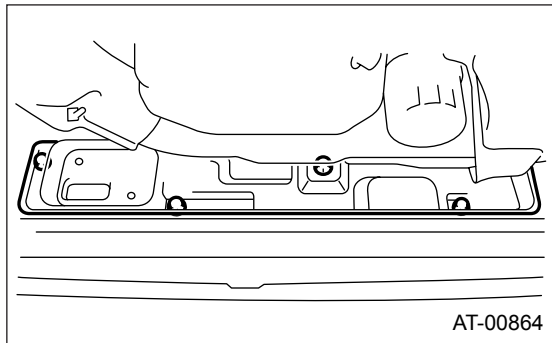
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



5) Install the radiator under cover. (Turbo model)

Tightening torque:

4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



6) Install the under cover.

7) Install the battery and washer tank.

8) Fill ATF. <Ref. to AT-30, ATF.>

NOTE:

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

C: INSPECTION

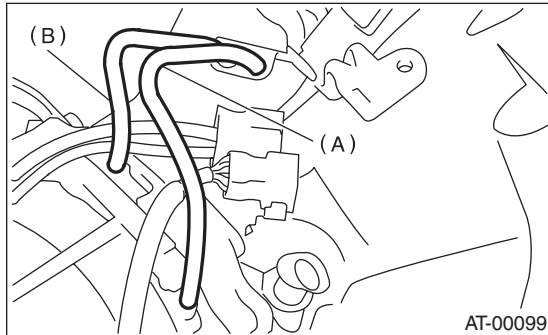
Repair or replace any defective hoses, pipes, clamps, and washers found from the inspection below.

- 1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
- 2) Check for deformed clamps.
- 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

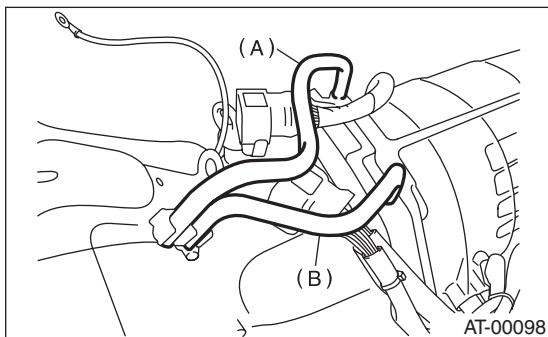
A: REMOVAL

- 1) Remove the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 2) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 3) Disconnect the air breather hose.
 - Non-turbo



- (A) Air breather hose (transmission case)
(B) Air breather hose (oil pump housing)

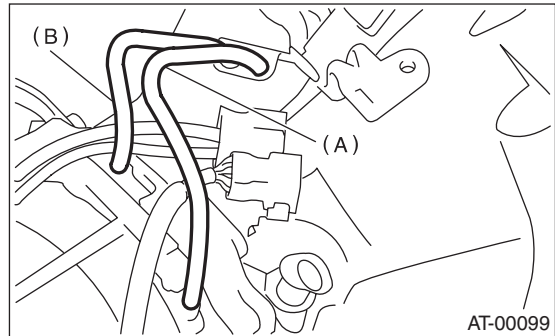
- Turbo model



- (A) Air breather hose (transmission case)
(B) Air breather hose (oil pump housing)

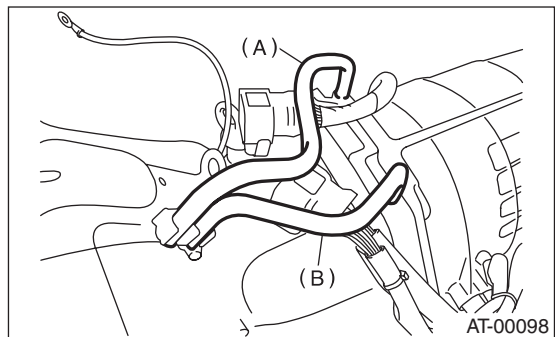
B: INSTALLATION

- 1) Install air breather hose.
 - Non-turbo



- (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 cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.>

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

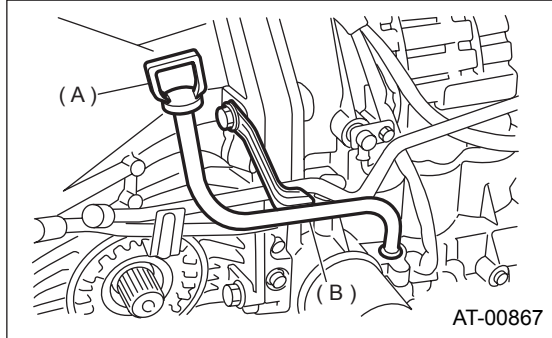
C: INSPECTION

Make sure the hose is not cracked or clogged.

24.Oil Charger Pipe

A: REMOVAL

- 1) Remove the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 2) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 3) Remove the oil charger pipe, and remove the O-ring from the flange face.



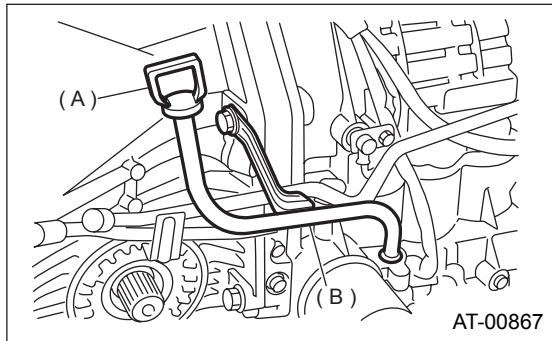
- (A) Oil level gauge
(B) Oil charger pipe

B: INSTALLATION

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

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)



- (A) Oil level gauge
(B) Oil charger pipe

- 2) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.>
- 3) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

C: INSPECTION

Make sure the oil charger pipe is not deformed or otherwise damaged.

TORQUE CONVERTER CLUTCH ASSEMBLY

AUTOMATIC TRANSMISSION

25. Torque Converter Clutch Assembly

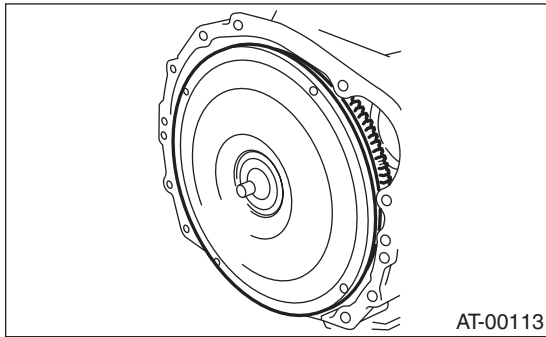
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>

2) Extract the torque converter clutch horizontally.

NOTE:

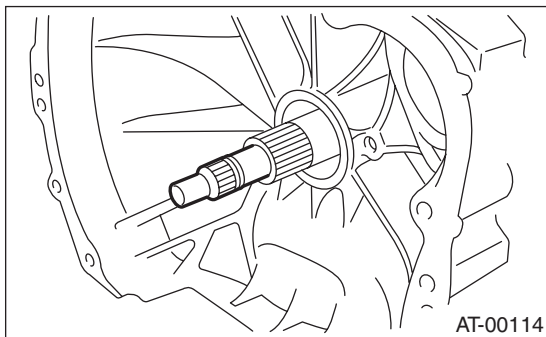
- Be careful not to scratch the bushing inside the oil pump shaft.
- Note that oil pump shaft also comes out.



3) Remove the input shaft.

NOTE:

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



4) Extract the oil pump shaft from torque converter clutch.

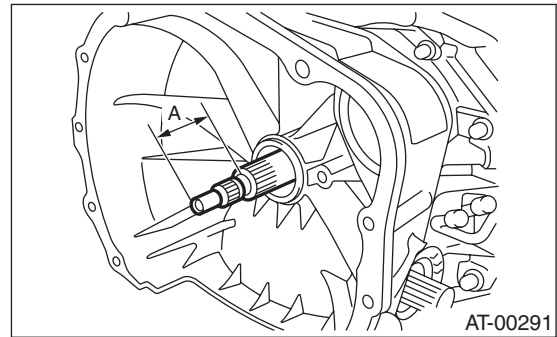
5) Remove the clip from torque converter clutch.

B: INSTALLATION

- 1) Install the clip to torque converter clutch case.
- 2) Install the oil pump shaft to the torque converter clutch, and then check the clip fits securely in its groove.
- 3) Insert the input shaft while turning lightly by hand.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

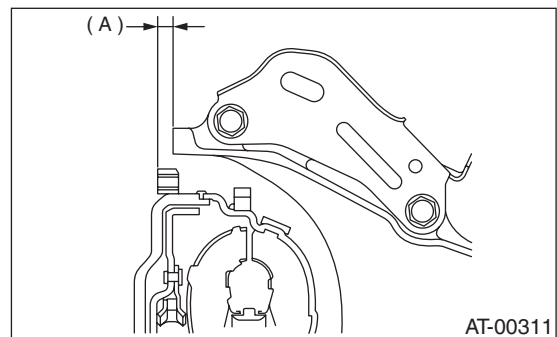


4) Holding the torque converter clutch assembly by hand, carefully install it to the torque converter clutch case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.

5) Rotate the shaft lightly by hand to engage the splines securely.

Dimension A:

2.7 — 2.9 mm (0.106 — 0.114 in)



(A) Dimension A

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

C: INSPECTION

Make sure the ring gear is not damaged and that the protrusion on the edge of the torque converter clutch is not deformed or otherwise damaged.

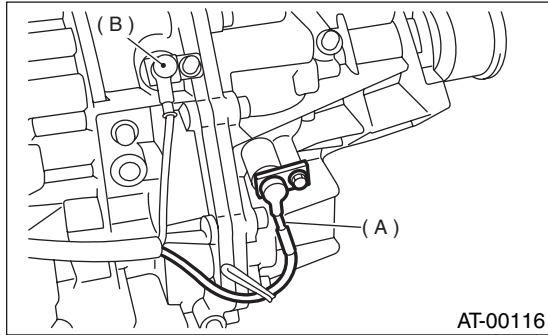
26.Extension Case

A: REMOVAL

1) Remove the transmission assembly.
<Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>

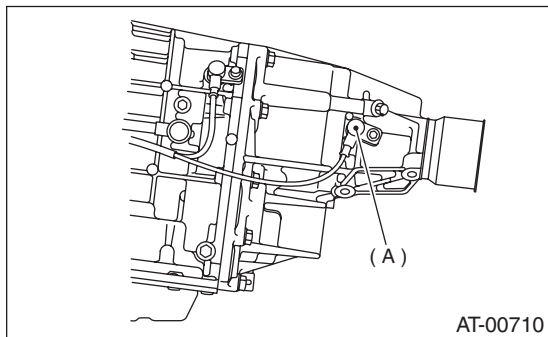
2) Remove the rear wheel speed sensor.

- MPT model



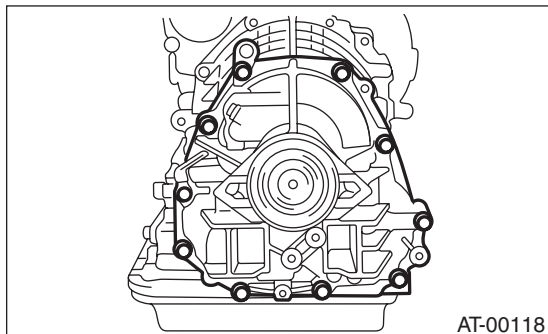
- (A) Rear wheel speed sensor
(B) Front wheel speed sensor

- VTD model



- (A) Rear wheel speed sensor

3) Separate transmission case and extension case sections.



B: INSTALLATION

1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with petrolatum.

NOTE:

Install thrust needle bearing in the correct direction.

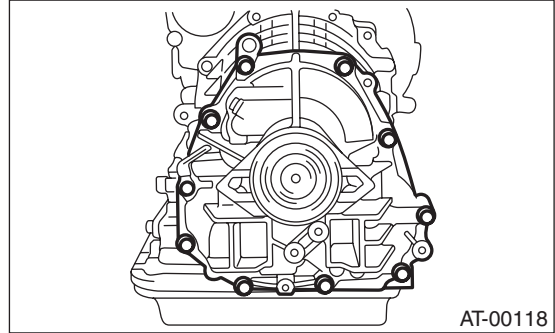
2) Install new gasket.

3) Install the extension case to the transmission case.

4) Tighten bolts to secure the case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

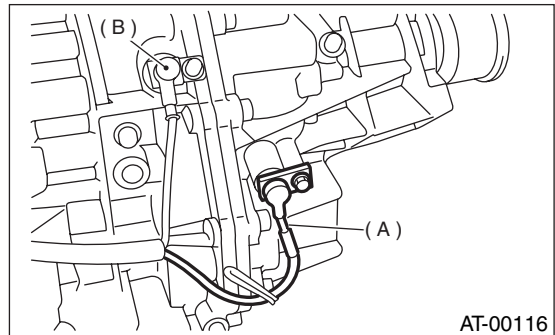


5) Install the rear wheel speed sensor.

Tightening torque:

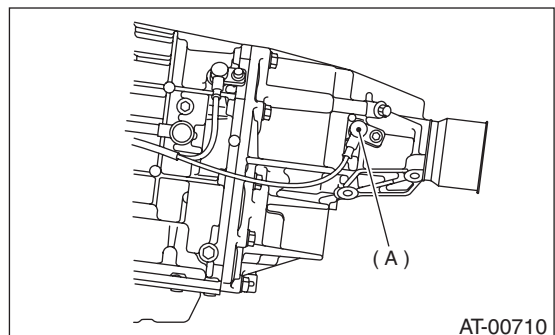
7 N·m (0.7 kgf-m, 5.1 ft-lb)

- MPT model



- (A) Rear wheel speed sensor
(B) Front wheel speed sensor

- VTD model



- (A) Rear wheel speed sensor

6) Install the transmission assembly.

<Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

EXTENSION CASE

AUTOMATIC TRANSMISSION

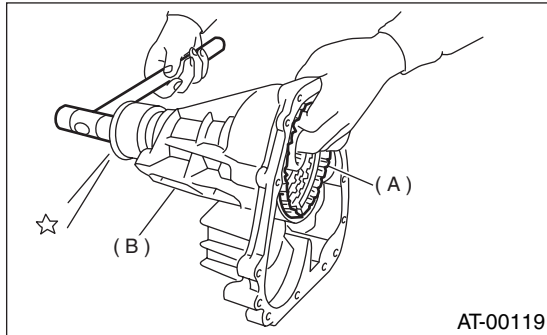
C: DISASSEMBLY

1. MPT MODEL

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

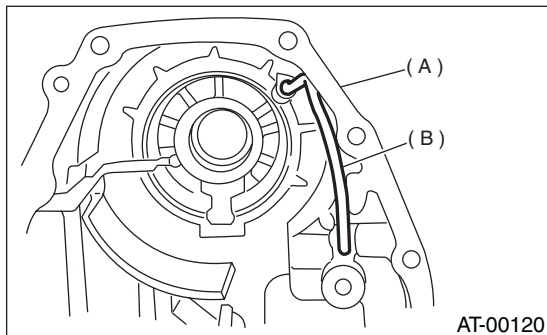
NOTE:

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



- (A) Extension case
(B) Transfer clutch

2) Remove the transmission clutch pipe without bending it.



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

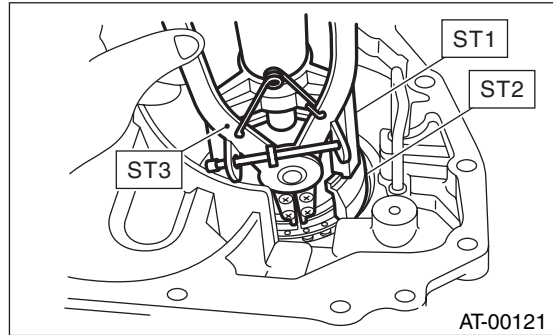
3) Remove the dust cover from the extension case.
4) Remove the oil seal from the extension case.

2. VTD MODEL

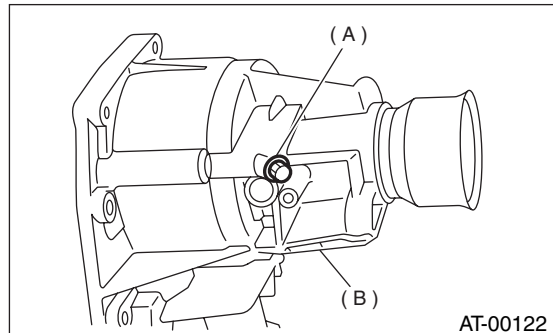
1) Using ST1, ST2, ST3 and a press, remove snap ring.

ST1 398673600 COMPRESSOR
ST2 498627100 Seat

ST3 398663600 PLIERS

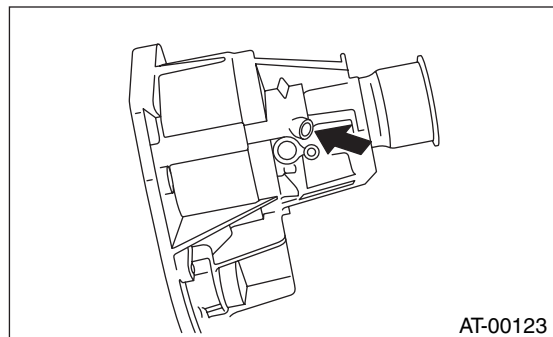


2) Remove the test plug.

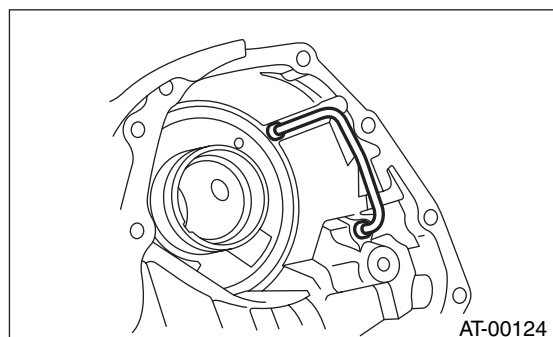


- (A) Extension case
(B) Test plug

3) Remove clutch piston using compressed air.



4) Remove the transmission clutch pipe without bending pipe.



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

D: ASSEMBLY

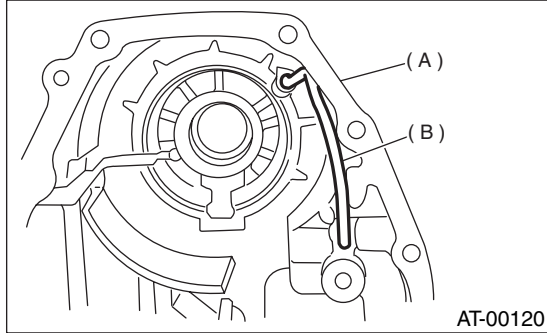
1. MPT MODEL

1) Using the ST and a press, press in a new oil seal.

ST 498057300 INSTALLER

2) Press in the dust cover.

3) Install the transfer clutch pipe to extension case without bending pipe.



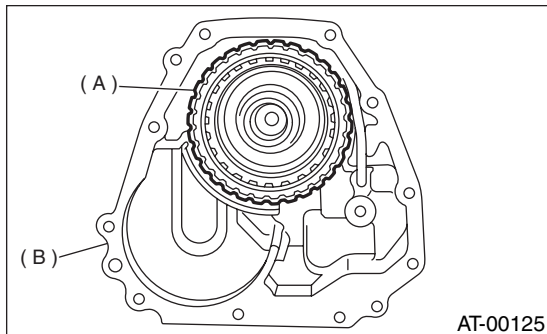
(A) Extension case

(B) Transfer pipe

4) Install the transfer clutch assembly to the case.

NOTE:

- Be careful not to damage the seal rings.
- Insert the clutch assembly fully into position until the bearing shoulder bottoms.



(A) Transfer clutch

(B) Extension case

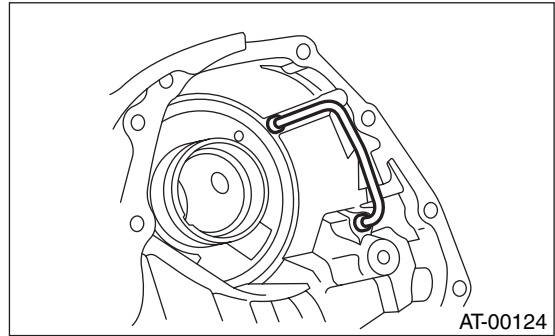
2. VTD MODEL

1) Using the ST and a press, press in a new oil seal.

ST 498057300 INSTALLER

2) Press in the dust cover.

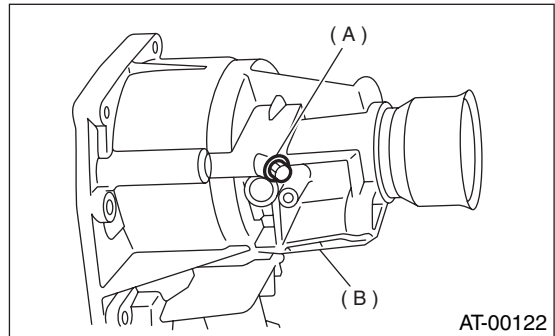
3) Install the transfer clutch pipe to extension case without bending pipe.



4) Install the test plug.

Tightening torque:

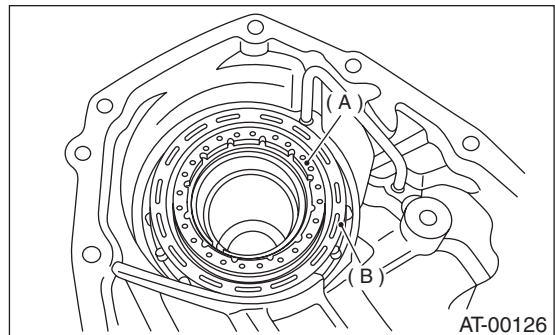
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(A) Test plug

(B) Extension case

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



(A) Spring retainer

(B) Multi-plate clutch (LSD) piston assembly

EXTENSION CASE

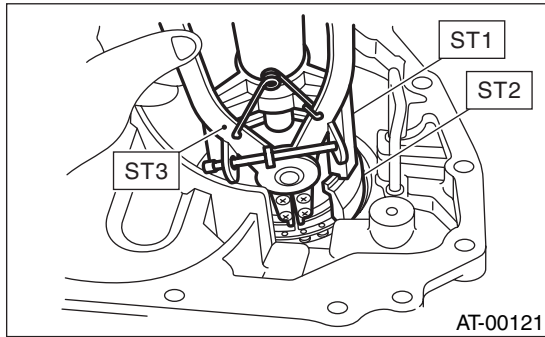
AUTOMATIC TRANSMISSION

6) Using ST1, ST2 and ST3, install snap ring.

ST1 398673600 COMPRESSOR

ST2 498627100 SEAT

ST3 398663600 PLIERS



E: INSPECTION

- Use forced air to make sure the transfer pipe and extension case routes are not clogged and do not leak.
- Measure the extension end play and adjust it to within specifications.

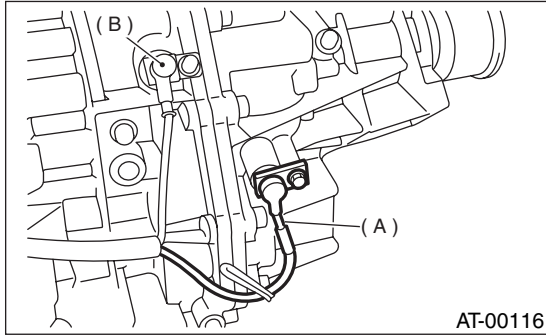
MPT model <Ref. to AT-87, MPT MODEL, ADJUSTMENT, Transfer Clutch.>

VTD model <Ref. to AT-88, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

27. Transfer Clutch

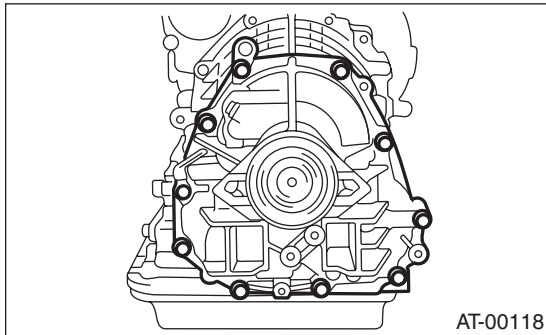
A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor.

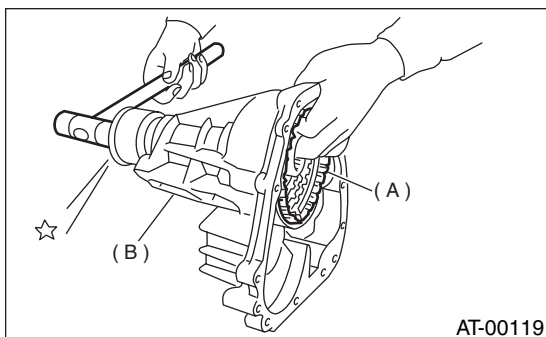


- (A) Rear vehicle speed sensor
(B) Front vehicle speed sensor

- 3) Separate transmission case and extension case sections.



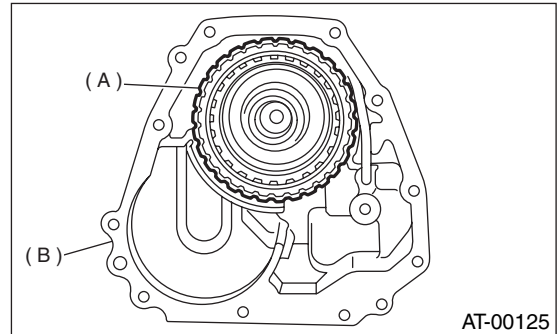
- 4) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.



- (A) Transfer clutch
(B) Extension case

B: INSTALLATION

- 1) Select the thrust needle bearing.
- 2) Install the transfer clutch assembly to the case.

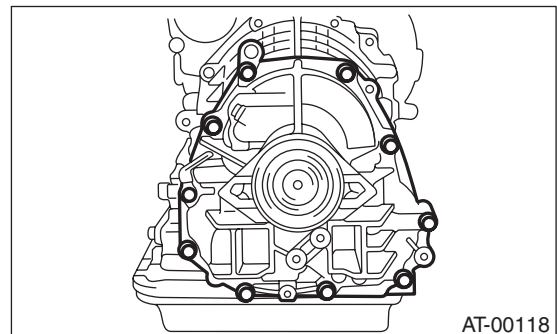


- (A) Transfer clutch
(B) Extension case

- 3) Tighten bolts to secure the case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



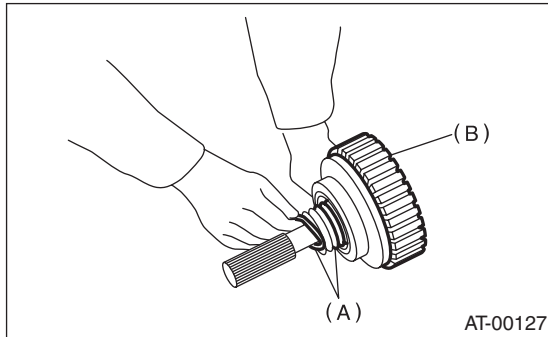
- 4) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

C: DISASSEMBLY

1) Remove the seal ring.

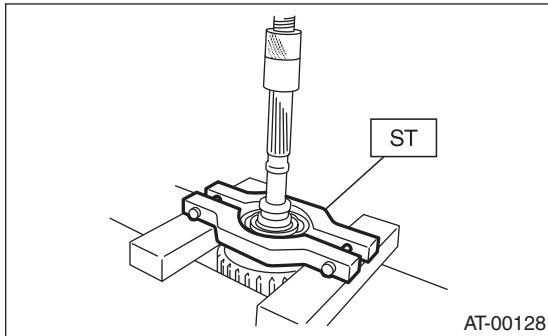


(A) Seal ring

(B) Transfer clutch

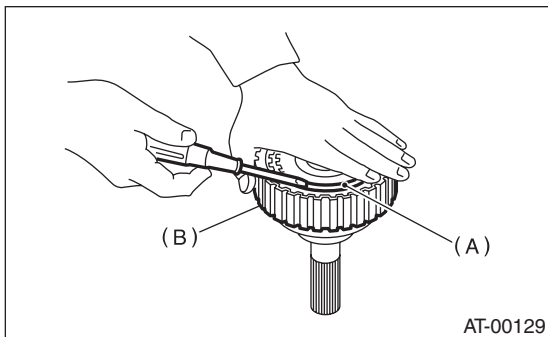
2) Using a press and ST, remove the ball bearing.

ST 498077600 REMOVER



AT-00128

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



AT-00129

(A) Snap ring

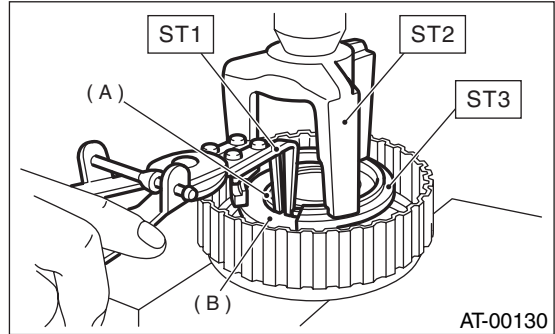
(B) Transfer clutch

4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.

ST1 399893600 PLIERS

ST2 398673600 COMPRESSOR

ST3 398623600 SEAT

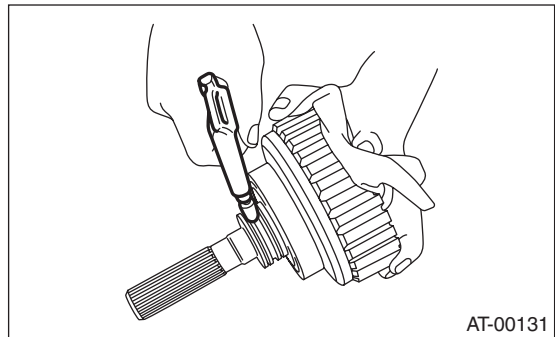


AT-00130

(A) Snap ring

(B) Transfer piston seal

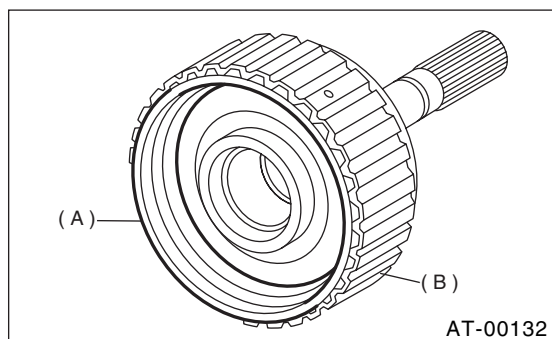
5) Apply compressed air to the rear drive shaft to remove the piston.



AT-00131

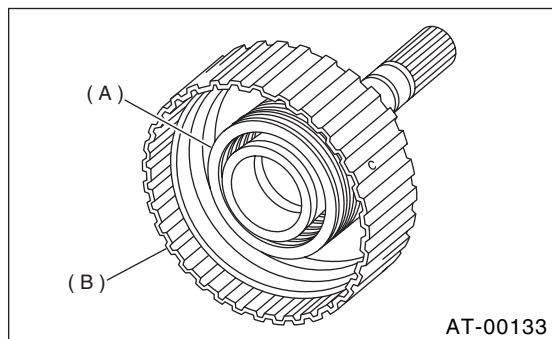
D: ASSEMBLY

1) Install the transfer clutch piston.



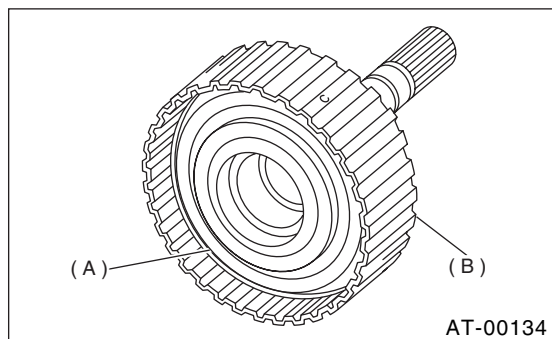
- (A) Transfer clutch piston
- (B) Rear drive shaft

2) Install return spring to transfer piston.



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

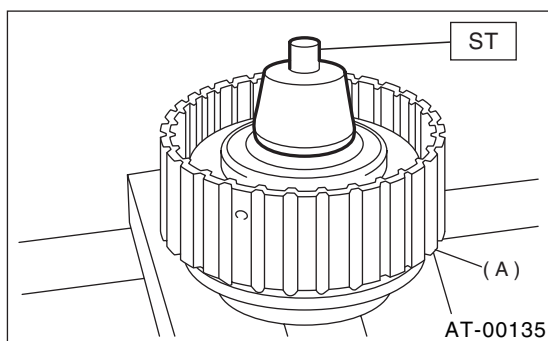
3) Install transfer clutch piston seal.



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

4) Install ST to rear drive shaft.

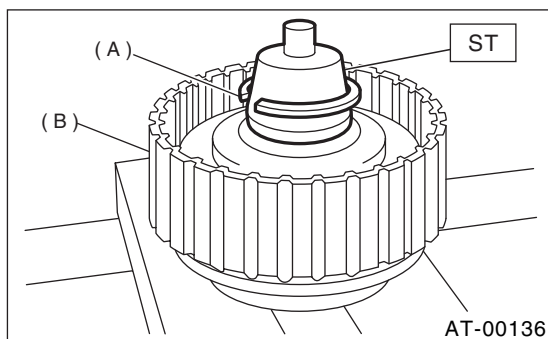
ST 499257300 SNAP RING OUTER GUIDE



- (A) Transfer clutch

5) Install snap ring to ST.

ST 499257300 SNAP RING OUTER GUIDE

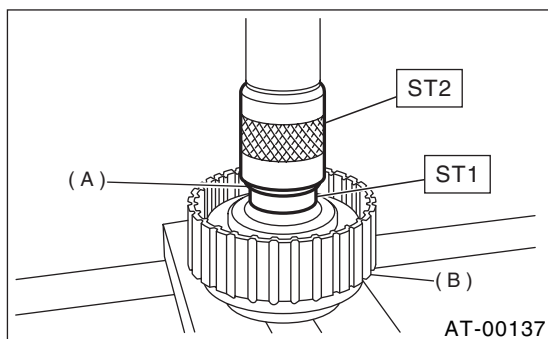


- (A) Snap ring
- (B) Transfer clutch

6) Using ST1 and ST2, install snap ring to rear drive shaft.

ST1 499257300 SNAP RING OUTER GUIDE

ST2 499247400 INSTALLER

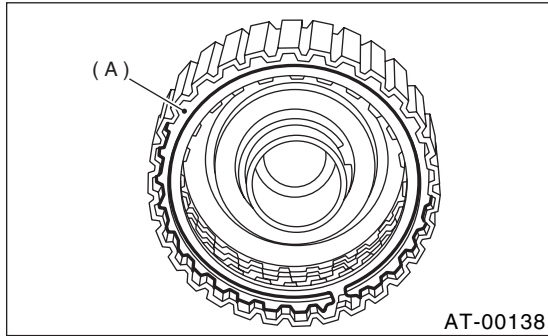


- (A) Snap ring
- (B) Transfer clutch

TRANSFER CLUTCH

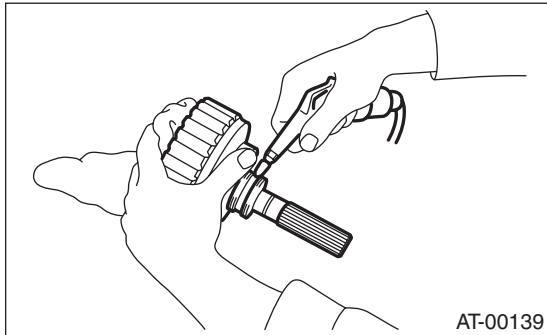
AUTOMATIC TRANSMISSION

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



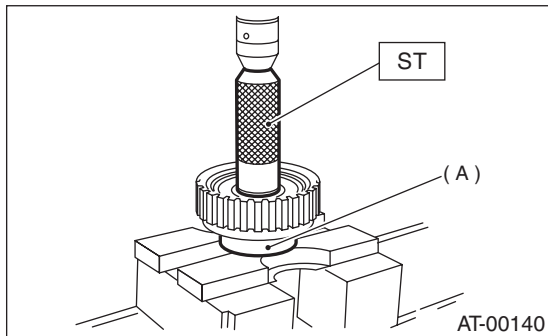
(A) Snap ring

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



9) Inspect clearance between snap ring and pressure plate. <Ref. to AT-87, INSPECTION, Transfer Clutch.>

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

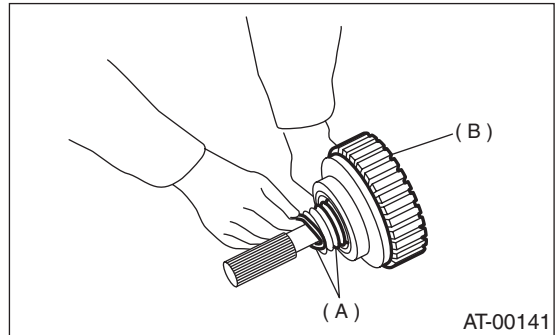


(A) Ball bearing

11) Coat a new seal ring with petrolatum, and install it in the seal ring groove of the shaft.

NOTE:

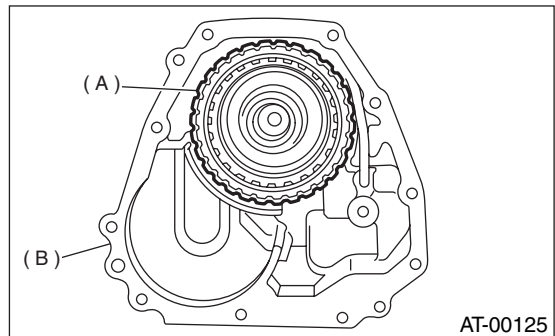
Do not expand the seal ring excessively when installing.



(A) Seal ring

(B) Transfer clutch

12) Install the transfer clutch assembly without damaging seal ring.



(A) Transfer clutch

(B) Extension case

E: INSPECTION

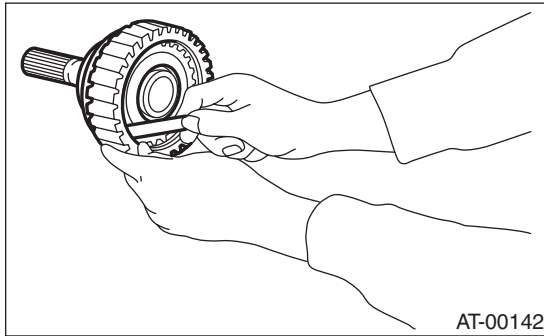
- Check the drive plate facing for wear and damage.
 - Check the snap ring for wear, and the return spring for permanent set, breakage and deformation.
 - Check the D ring for damage.
 - Measure the extension end play and adjust it to within specifications. <Ref. to AT-87, ADJUSTMENT, Transfer Clutch.>
- 1) Inspect clearance between snap ring and pressure plate.
 - 2) Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.
 - 3) If the clearance is not within specification, adjust it by selecting a suitable pressure plate on the transfer clutch piston side.

Standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Service limit:

1.6 mm (0.063 in)



Available pressure plates	
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 if tight corner braking does not occur when the vehicle is started with steering wheel held at fully turned position. 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 still persists, drive the vehicle again in a circle for several laps.

F: ADJUSTMENT

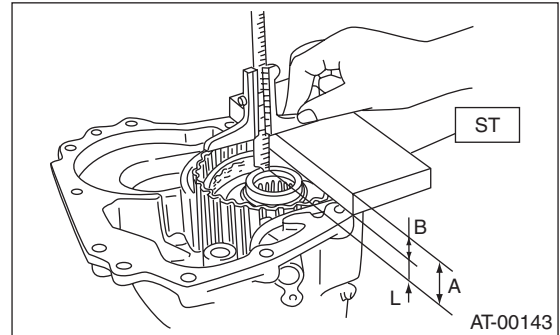
1. MPT MODEL

- 1) Measure distance "L" from end of extension case and rear drive shaft with ST.

ST 398643600 GAUGE

L = Measured value – 15 mm

(L = Measured value – 0.59 in)



A: Measured value

B: ST thickness [15 mm (0.59 in)]

L: Distance from end of extension case to end of rear drive shaft

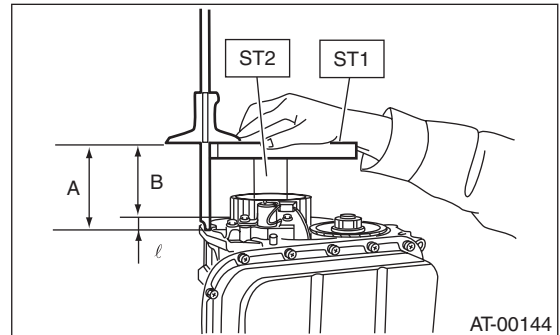
- 2) Measure the distance "ℓ" from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.

ℓ = Measured value – 50 mm

(ℓ = Measured value – 1.97 in)

ST1 398643600 GAUGE

ST2 499577000 GAUGE



A: Measured value

B: ST thickness [50 mm (1.97 in)]

ℓ: Distance from end of transmission case to end of reduction drive gear

- 3) Calculation equation:

NOTE:

Calculating H:

When clearance is at 0.05 mm (0.0020 in) and 0.25 mm (0.0098 in), then select a suitable thrust needle bearing from the table.

$H = (L + 0.45 \text{ mm}) - \ell - T$

$[H = (L + 0.0177 \text{ in}) - \ell - T]$

T: Thrust needle bearing thickness

TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

L: Distance from end of extension case to end of rear drive shaft

0.45 mm (0.0177 in): Gasket thickness

$\varnothing$: Distance from end of transmission case to end of reduction drive gear

H: Shim clearance

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Example:

When, L = 18.60 mm (0.7323 in), $\varnothing$ = 15.05 mm (0.5925 in)

Calculation when clearance is 0.05 mm

(0.0020 in)

$$H = (18.60 + 0.45) - 15.05 - 0.05 = 3.95$$

$$[H = (0.7323 + 0.0177) - 0.5925 - 0.0020 = 0.1555]$$

Calculation when clearance is 0.25 mm

(0.0098 in)

$$H = (18.60 + 0.45) - 15.05 - 0.25 = 3.75$$

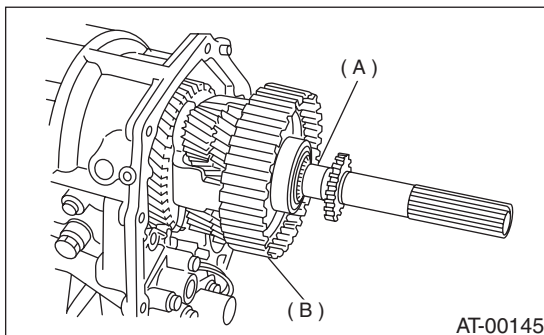
$$[H = (0.7323 + 0.0177) - 0.5925 - 0.0098 = 0.1476]$$

After calculation, the value of H becomes between 3.75 and 3.95, therefore select bearing thickness of 3.8.

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 plate

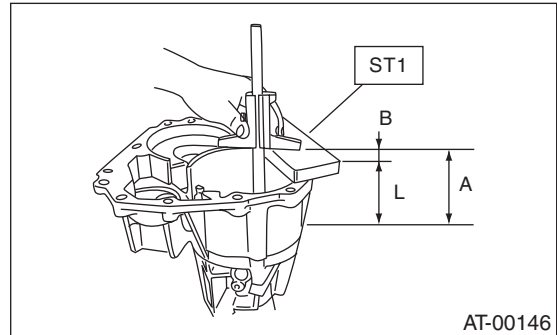
(B) Center differential carrier

2) Measure distance L from extension case mating surface to multi-plate clutch (LSD) piston with ST.

ST 398643600 GAUGE

L = Measured value – 15 mm

(L = Measured value – 0.59 in)



A: Measured value

B: ST thickness [15 mm (0.59 in)]

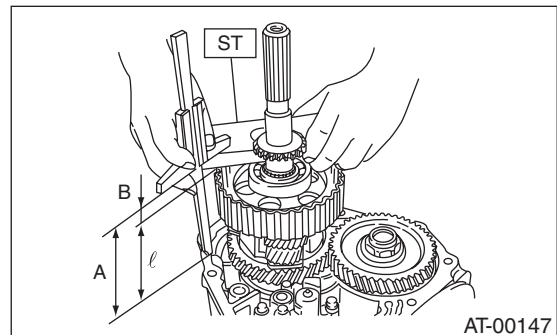
L: Distance from end of extension case to end of rear drive shaft

3) Measure the distance “ $\varnothing$ ” from the transmission case mating surface to the reduction drive gear end surface with ST.

$\varnothing$ = Measured value – 15 mm

($\varnothing$ = Measured value – 0.59 in)

ST 398643600 GAUGE



A: Measured value

B: ST thickness [15 mm (0.59 in)]

$\varnothing$: Distance from end of extension case to end of reduction drive gear

4) Calculation equation:

NOTE:

Calculating H:

When clearance is at 0.05 mm (0.0020 in) and 0.25 mm (0.0098 in), then select up to 4 shims from the table so that their total thickness matches the clearance.

$$H = (L + 0.45 \text{ mm}) - \varnothing - T$$

$$[H = (L + 0.0177 \text{ in}) - \varnothing - T]$$

T: Shim clearance

L: Distance from end of extension case to end of rear drive shaft

0.45 mm (0.0177 in): Gasket thickness

$\varnothing$: Distance from end of transmission case to
end of reduction drive gear

T: Shim thickness

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Example:

When, $L = 90.50$ mm (3.5360 in), $\varnothing = 90.35$ mm
(3.5571 in)

Calculation when clearance is 0.05 mm
(0.0020 in)

$$H = (90.50 + 0.45) - 90.35 - 0.05 = 0.55$$

$$[H = (3.5630 + 0.0177) - 3.5571 - 0.0020 = 0.0217]$$

Calculation when clearance is 0.25 mm
(0.0098 in)

$$H = (90.50 + 0.45) - 90.35 - 0.25 = 0.35$$

$$[H = (3.5630 + 0.0177) - 3.5571 - 0.0098 = 0.0138]$$

After calculation, the value of H becomes between
0.35 mm (0.0138 in) — 0.55 mm (0.0217 in), there-
fore select either 2 shims of a thickness 0.2 mm
(0.010 in) each, or 1 shim 0.5 mm (0.020 in) thick.

Shims for adjustment	
Part No.	Thickness mm (in)
33281AA001	0.2 (0.008)
33281AA011	0.5 (0.020)

28. Multi-plate Clutch

A: REMOVAL

Remove the multi-plate clutch in the same manner as with the extension case. <Ref. to AT-79, REMOVAL, Extension Case.>

B: INSTALLATION

Install the multi-plate clutch in the same manner as with the extension case. <Ref. to AT-79, INSTALLATION, Extension Case.>

C: INSPECTION

- Check the drive plate facing for wear and damage.
- Check the snap ring for wear, and the return spring for permanent set, breakage and deformation.
- Check the D ring for damage.
- Measure the multi-plate clutch clearance and adjust to within specifications. <Ref. to AT-90, ADJUSTMENT, Multi-plate Clutch.>

D: ADJUSTMENT

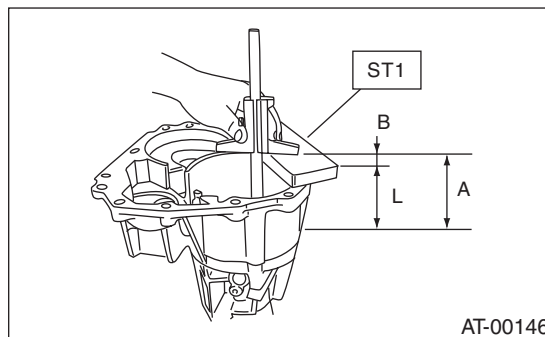
1) Remove drive plates and driven plates from the center differential carrier.

2) Measure distance L from extension case mating surface to multi-plate clutch (LSD) piston with ST.

ST 398643600 GAUGE

L = Measured value – 15 mm

(L = Measured value – 0.59 in)



A: Measured value

B: ST thickness [15 mm (0.59 in)]

L: Distance from end of extension case to end of rear drive shaft

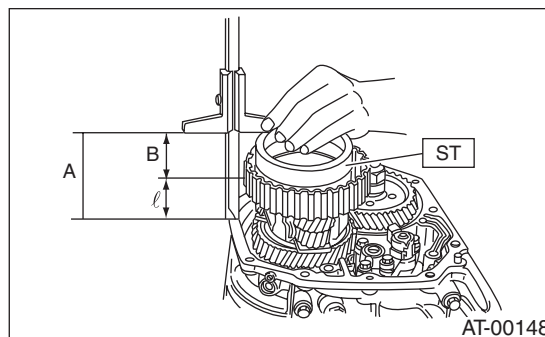
3) Measure the distance “ $\varnothing$ ” from the transmission case mating surface to the center differential clutch drum end surface with ST.

ST 398744300 GAUGE

$\varnothing$ = Measured value – 50 mm

($\varnothing$ = Measured value – 1.97 in)

ST 398744300 GAUGE



A: Measured value

B: ST thickness [50 mm (1.97 in)]

$\varnothing$: Measure distance from transmission case mating surface to multi-plate clutch (LSD) piston.

4) Calculation equation:

$T = (L + 0.45 \text{ mm}) - \varnothing$

$[T = (L + 0.0177 \text{ in}) - \varnothing]$

T: Distance from clutch drum to multi-plate clutch (LSD) piston

L: Distance from extension case mating surface to multi-plate clutch (LSD) piston

0.45: Gasket thickness

$\varnothing$: Distance from transmission case mating surface to center differential clutch drum

NOTE:

Measure the thickness of drive and driven plates of the multi-plate clutch (LSD) and obtain the clearance between the measured value and “T”.

Standard:

0.2 — 0.6 mm (0.008 — 0.024 in)

Service limit:

1.6 mm (0.063 in)

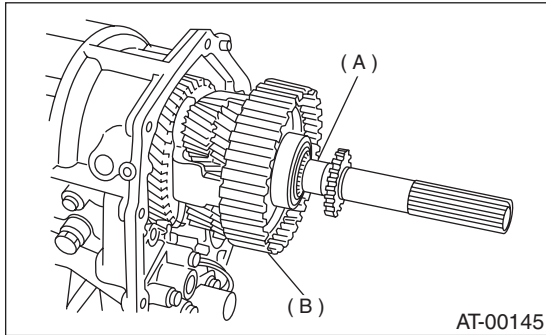
If out of specification, replace the plate set (drive and driven plates), and then select a side adjustment plate for the multi-plate clutch (LSD) piston so that the value becomes within specification.

Available driven plates	
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 the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft from the center differential assembly.



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

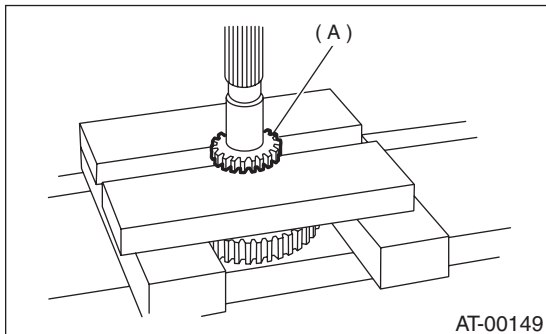
- 4) Remove drive and driven plates.

B: INSTALLATION

- 1) Select shims. <Ref. to AT-88, VTD MODEL, ADJUSTMENT, Transfer Clutch.>
- 2) Install drive and driven plates.
- 3) Insert the rear drive shaft into the center differential assembly.
- 4) Combine the transmission case with the extension case, and install rear wheel speed sensor. <Ref. to AT-79, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

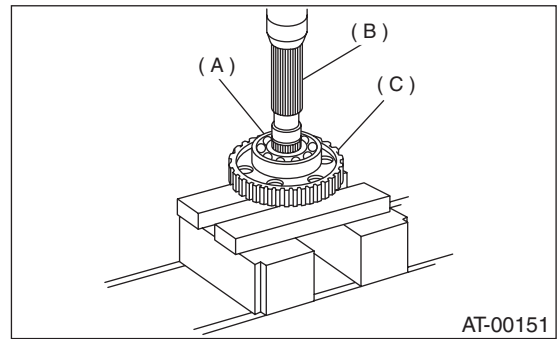
C: DISASSEMBLY

- 1) Using a press, remove the revolution gear.



- (A) Revolution gear

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



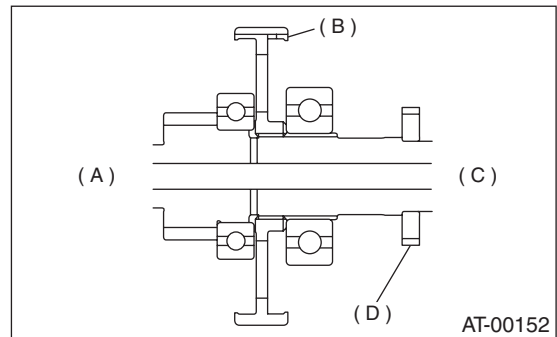
- (A) Rear ball bearing
(B) Rear drive shaft
(C) Clutch hub

D: ASSEMBLY

To assemble, reverse order of disassembly.

NOTE:

- Use new ball bearings and revolution gear.
- Pay attention to the orientation of the clutch hub.



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

E: INSPECTION

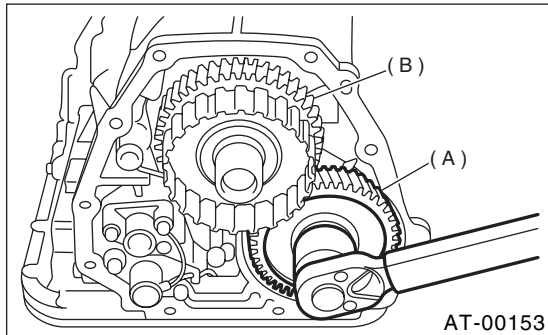
- Make sure that each component is free of harmful gouges, cuts, or dust.
- Measure the extension end play and adjust it to within specifications. <Ref. to AT-88, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

30.Reduction Driven Gear

A: REMOVAL

1. MPT MODEL

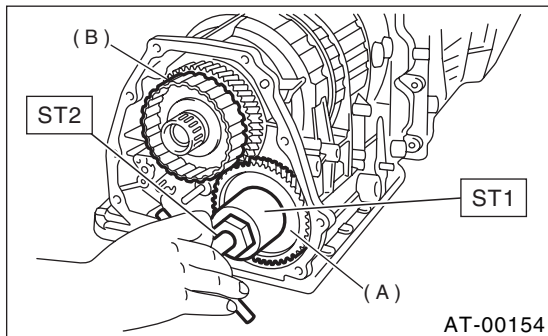
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>
- 3) Set the range select lever to "P".
- 4) Straighten the staked portion, and remove the lock nut.



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

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

ST1 499737000 PULLER
ST2 899524100 PULLER SET

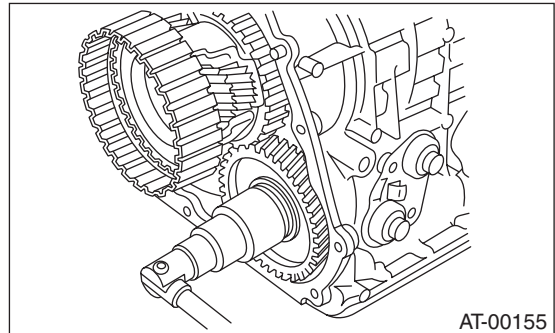


- (A) Reduction driven gear
(B) Reduction drive gear

2. VTD MODEL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>

- 3) Remove the rear drive shaft. <Ref. to AT-92, REMOVAL, Rear Drive Shaft.>
- 4) Set the range select lever to "P".
- 5) Straighten the staked portion, and remove the lock nut.



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

ST1 499737000 PULLER
ST2 899524100 PULLER SET

- 7) Extract the center differential assembly. <Ref. to AT-98, REMOVAL, Center Differential Carrier.>

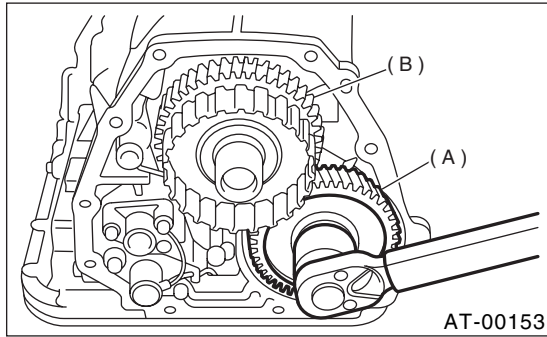
B: INSTALLATION

1. MPT MODEL

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

Tightening torque:

100 N·m (10.2 kgf-m, 73.8 ft-lb)



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

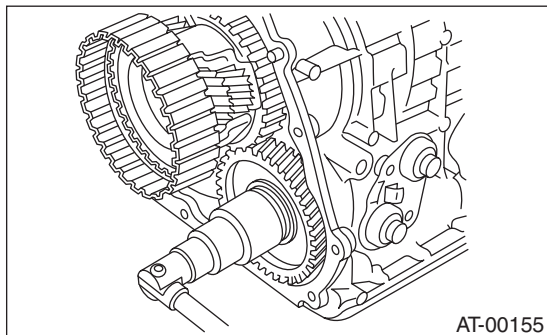
- 3) After tightening, stake the lock nut securely.
- 4) Combine the transmission case with the extension case, and install rear wheel speed sensor. <Ref. to AT-79, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

2. VTD MODEL

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

Tightening torque:

100 N·m (10.2 kgf-m, 73.8 ft-lb)

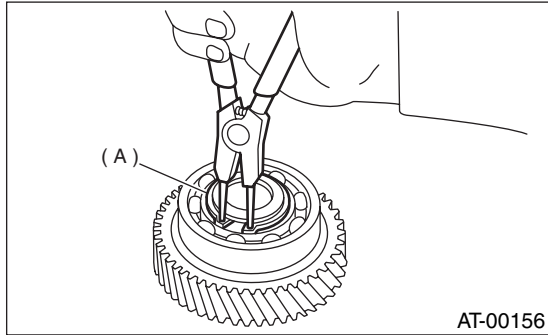


- 5) After tightening, stake the lock nut securely.
- 6) Insert the rear drive shaft assembly. <Ref. to AT-92, INSTALLATION, Rear Drive Shaft.>

- 7) Combine the transmission case with the extension case, and install rear wheel speed sensor. <Ref. to AT-79, INSTALLATION, Extension Case.>
- 8) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

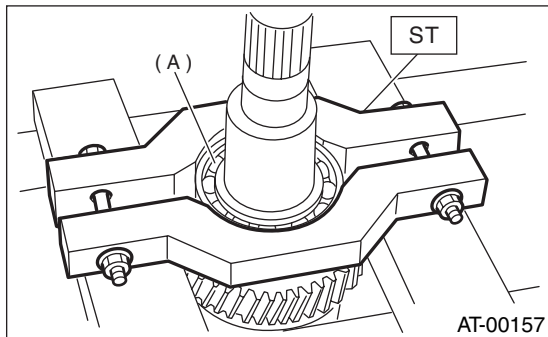
1) Remove snap ring from reduction driven gear.



(A) Snap ring

2) Using ST, remove ball bearing from reduction driven gear.

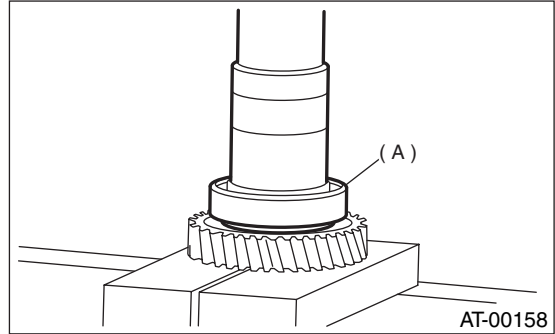
ST 498077600 REMOVER



(A) Ball bearing

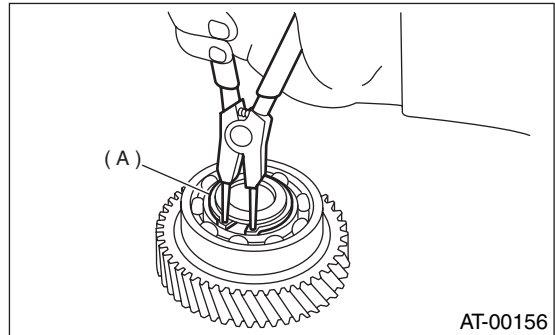
D: ASSEMBLY

1) Using a press, install a new ball bearing to reduction driven gear.



(A) Ball bearing

2) Install snap ring to reduction driven gear.



(A) Snap ring

E: INSPECTION

Check ball bearing and gear for dents or damage.

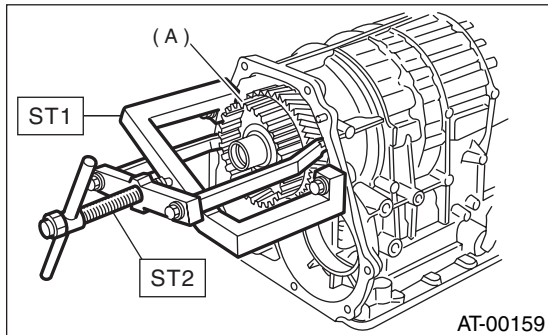
31.Reduction Drive Gear

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>
- 3) Remove the reduction driven gear. <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>
- 4) Using ST, extract the reduction drive gear.

ST1 499737100 PULLER

ST2 899524100 PULLER SET



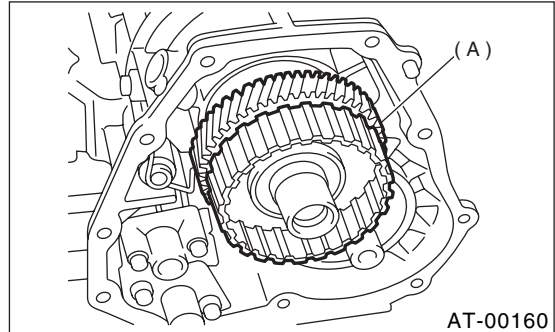
(A) Reduction drive gear

B: INSTALLATION

- 1) Install the reduction drive gear assembly.

NOTE:

Insert it fully into position until the bearing shoulder bottoms.

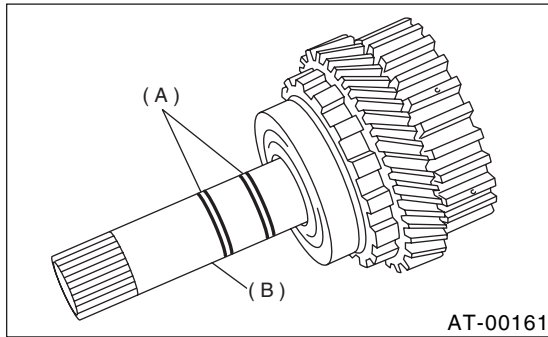


(A) Reduction drive gear

- 2) Install reduction driven gear. <Ref. to AT-94, INSTALLATION, Reduction Driven Gear.>
- 3) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to AT-79, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

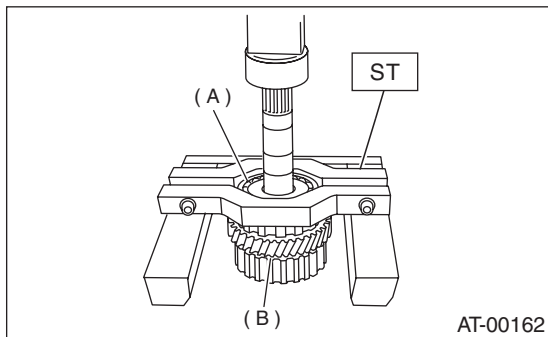
1) Take out the seal rings.



(A) Seal ring

(B) Reduction drive shaft

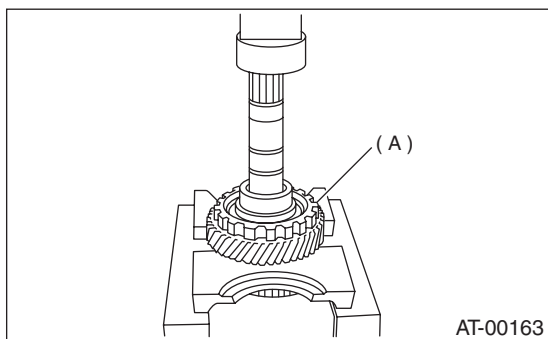
2) Using ST, remove the ball bearing.
ST 498077600 REMOVER



(A) Ball bearing

(B) Reduction drive gear

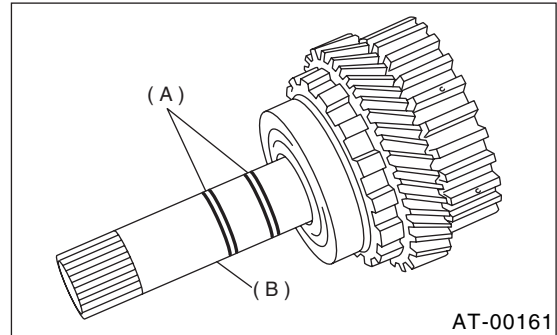
3) Using a press, remove the reduction drive gear.



(A) Reduction drive gear

D: ASSEMBLY

- 1) Press-fit the reduction drive gear to the shaft.
- 2) Press-fit the a new ball bearing to the reduction drive gear.
- 3) Apply petrolatum to outer surface of seal ring and shaft groove.
- 4) Attach new seal rings.



(A) Seal ring

(B) Reduction drive shaft

E: INSPECTION

- Rotate bearing by hand, make sure it rotates smoothly.
- Make sure that each component is free of harmful gouges, cuts, or dust.
- Measure the extension end play and adjust it to within specifications. <Ref. to AT-87, ADJUSTMENT, Transfer Clutch.>

CENTER DIFFERENTIAL CARRIER

AUTOMATIC TRANSMISSION

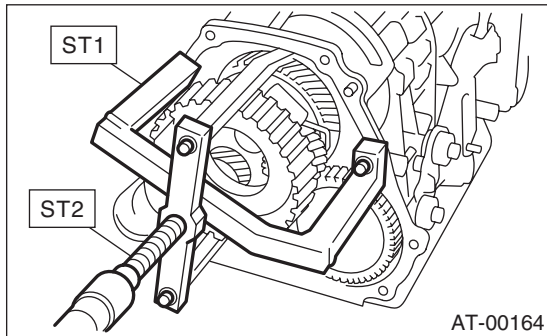
32.Center Differential Carrier

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>
- 3) Extract the rear drive shaft. <Ref. to AT-92, REMOVAL, Rear Drive Shaft.>
- 4) Extract the center differential carrier assembly with ST.

ST1 499737100 PULLER

ST2 899524100 PULLER SET



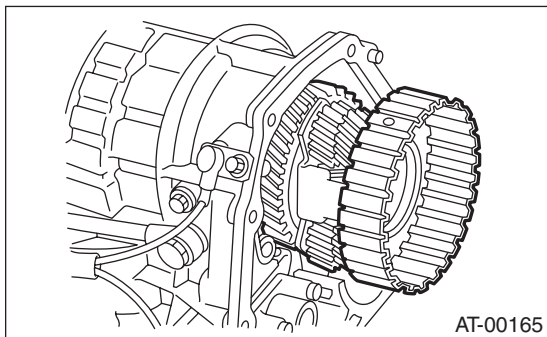
- 5) Pull out shims from the transmission case.

B: INSTALLATION

- 1) Install the center differential assembly with shims.

NOTE:

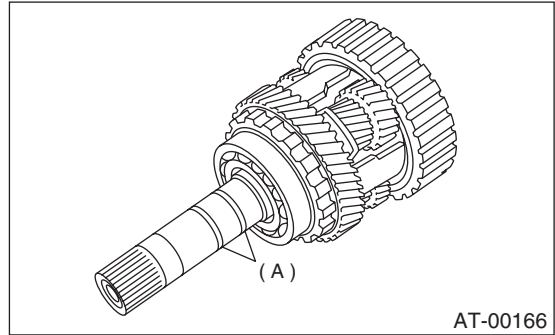
Insert it fully into position until the bearing shoulder bottoms.



- 2) Insert the rear drive shaft. <Ref. to AT-92, INSTALLATION, Rear Drive Shaft.>
- 3) Combine the transmission case with the extension case, and install rear wheel speed sensor. <Ref. to AT-79, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

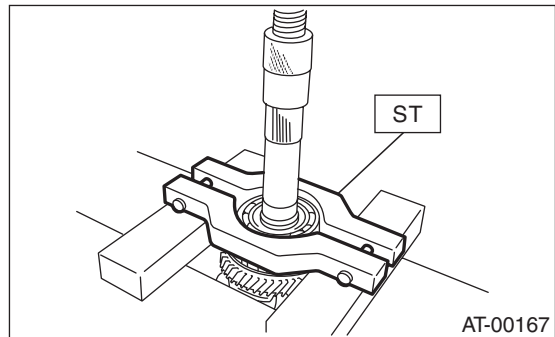
C: DISASSEMBLY

- 1) Remove the seal ring.

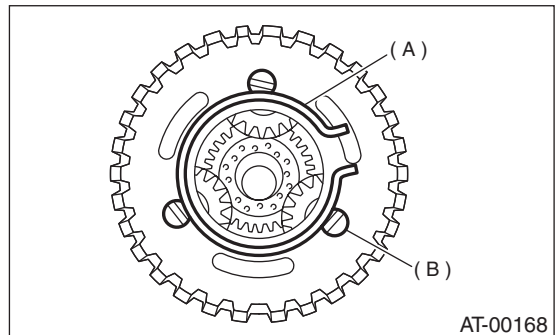


(A) Seal ring

- 2) Using a press and ST, remove the ball bearing.
ST 498077600 REMOVER



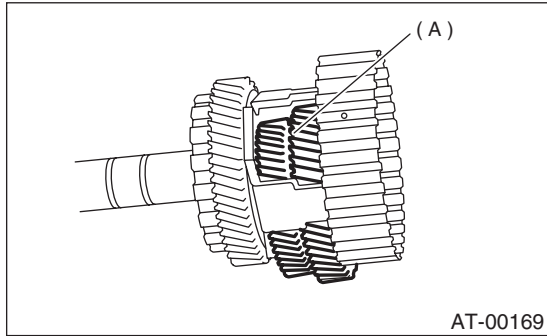
- 3) Remove the snap ring and extract the shaft from the center differential assembly.



(A) Snap ring

(B) Shaft

- 4) Remove thrust washer, pinion gear and washer from the center differential assembly.



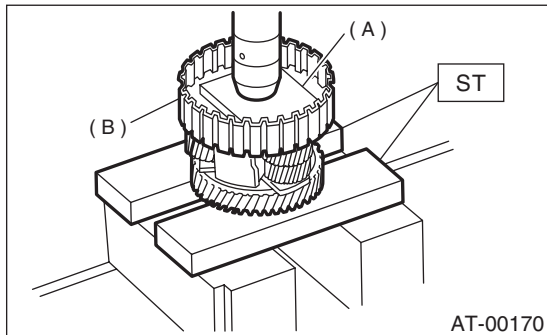
(A) Pinion gear

- 5) Extract the intermediate shaft and thrust bearing.

D: ASSEMBLY

- 1) Install thrust washer to intermediate shaft.
- 2) Install thrust bearing to intermediate shaft.
- 3) Install pinion gear and washer.
- 4) Insert the shaft into center differential assembly.
- 5) Install snap ring.
- 6) Press-fit a new ball bearing into center differential assembly using a press.

ST 498077000 REMOVER



(A) Plate

(B) Center differential carrier

- 7) Apply petrolatum to outer surface of seal ring and shaft groove.
- 8) Attach new seal rings.

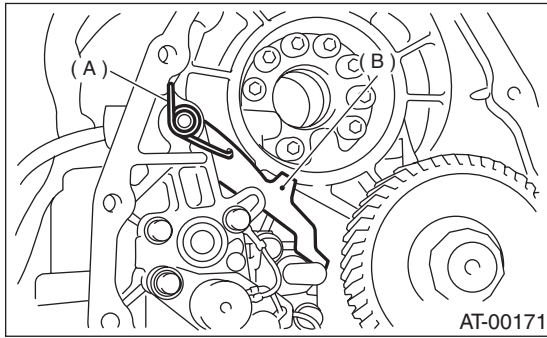
E: INSPECTION

- Make sure that each component is free of harmful gouges, cuts, or dust.
- Measure the extension end play and adjust it to within specifications. <Ref. to AT-88, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

33. Parking Pawl

A: REMOVAL

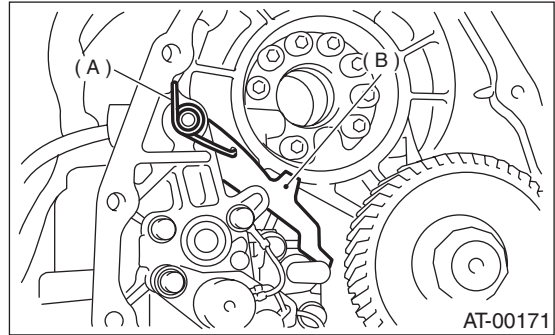
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. (MPT model) <Ref. to AT-96, REMOVAL, Reduction Drive Gear.>
- 4) Remove the center differential carrier. (VTD model) <Ref. to AT-98, 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 reduction drive gear. <Ref. to AT-96, INSTALLATION, Reduction Drive Gear.>
- 3) Install the center differential carrier. (VTD model) <Ref. to AT-98, INSTALLATION, Center Differential Carrier.>
- 4) Install the rear vehicle speed sensor and extension case. <Ref. to AT-79, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

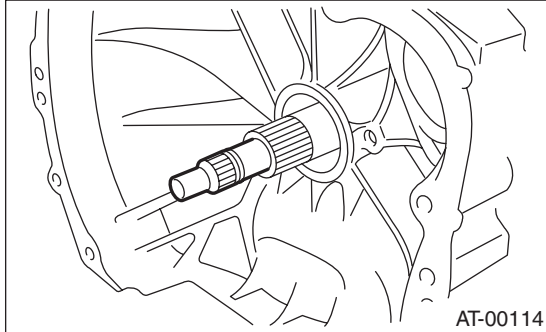
C: INSPECTION

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

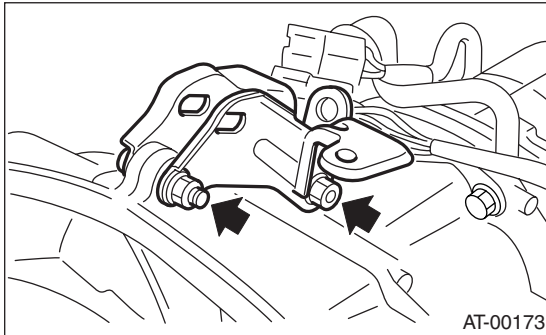
34. Torque Converter Clutch Case

A: REMOVAL

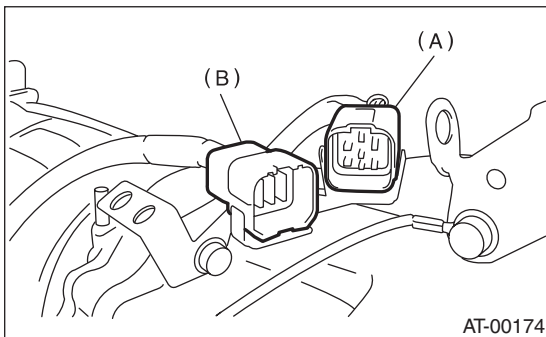
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Remove air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 5) Remove pitching stopper bracket.



- 6) Lift-up lever behind the connector and disconnect it from stay.
- 7) Disconnect inhibitor switch connector from stay.



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

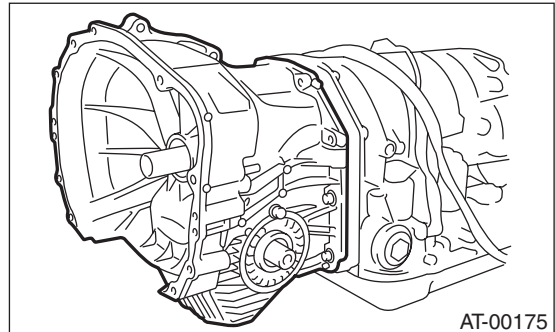
- 8) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>

- 9) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>

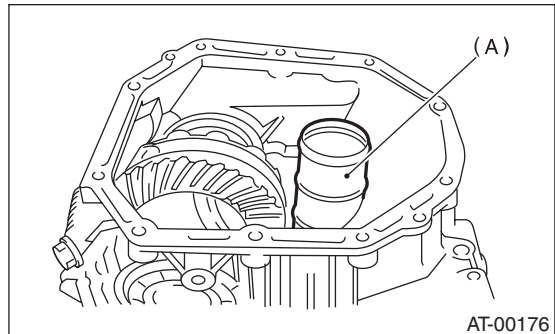
- 10) Lightly tapping the torque converter clutch case with plastic hammer, separate the transmission case and torque converter clutch case.

NOTE:

- Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.
- Be careful not to lose the rubber seal.



- 11) Remove the seal pipe if it is attached. (Reusing is not allowed.)



- (A) Seal pipe

- 12) Remove the differential assembly. <Ref. to AT-116, REMOVAL, Front Differential.>
- 13) Remove the oil seal from torque converter clutch case.

TORQUE CONVERTER CLUTCH CASE

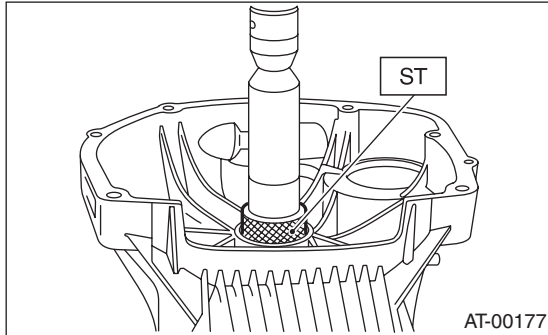
AUTOMATIC TRANSMISSION

B: INSTALLATION

1) Check the appearance of each component, and clean.

2) Force-fit the oil seal to the torque converter clutch case with ST.

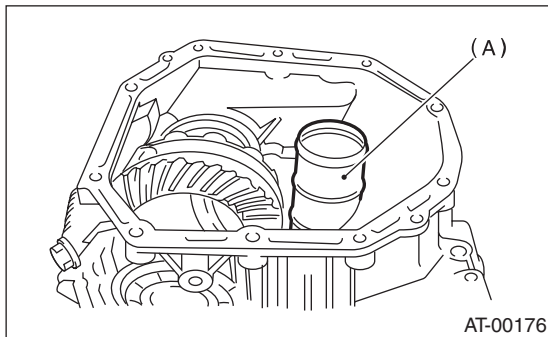
ST 398437700 DRIFT



3) Install the differential assembly to the case. <Ref. to AT-116, INSTALLATION, Front Differential.>

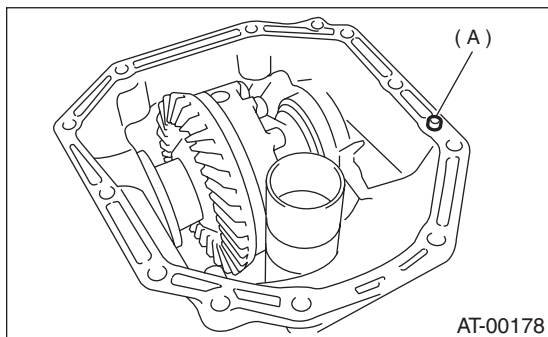
4) Install the left and right side retainers. <Ref. to AT-120, ADJUSTMENT, Front Differential.>

5) Install the new seal pipe to the torque converter clutch case.



(A) Seal pipe

6) Install the rubber seal to the torque converter clutch case.

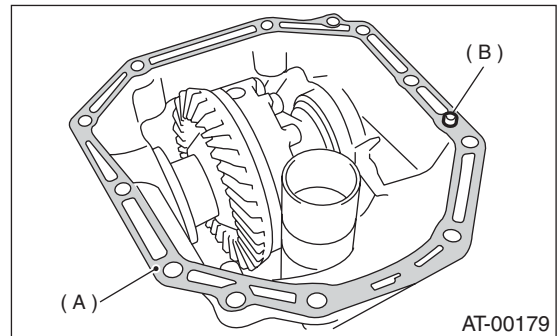


(A) Rubber seal

7) Apply proper amount of liquid gasket to the entire torque converter clutch case mating surface.

Liquid gasket:

ThreeBond 1215 (Part No. 004403007)



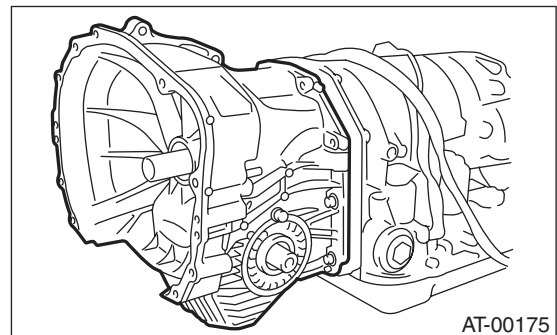
(A) ThreeBond 1215

(B) Rubber seal

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

Tightening torque:

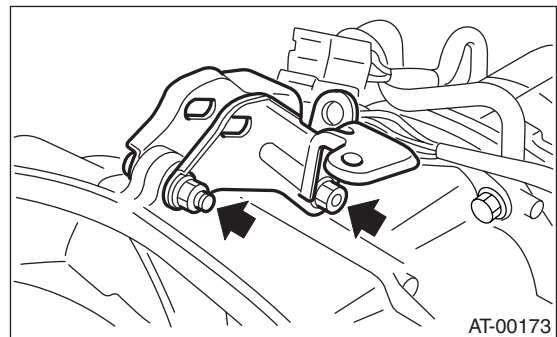
41 N·m (4.2 kgf-m, 30.4 ft-lb)



9) Install the pitching stopper bracket and transmission ground cable.

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)



10) Insert inhibitor switch and transmission connector into stay.

11) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>

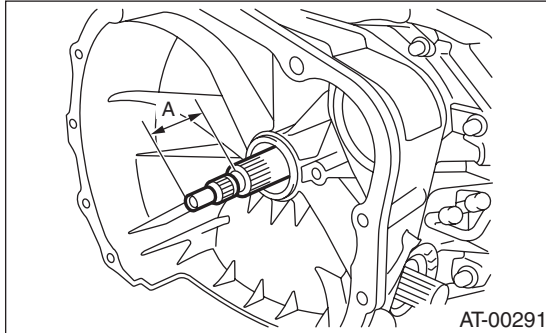
TORQUE CONVERTER CLUTCH CASE

AUTOMATIC TRANSMISSION

- 12) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>
- 13) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>
- 14) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



- 15) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>
- 16) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

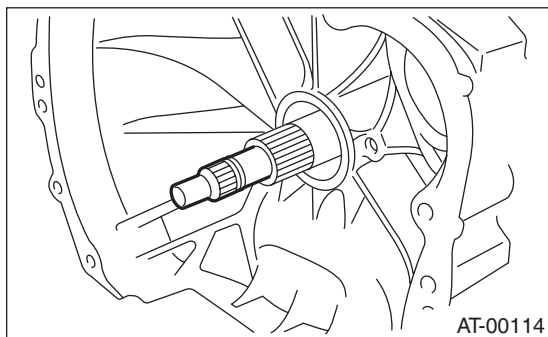
C: INSPECTION

Measure the backlash and adjust to within specifications. <Ref. to AT-113, ADJUSTMENT, Drive Pinion Shaft Assembly.>

35.Oil Pump

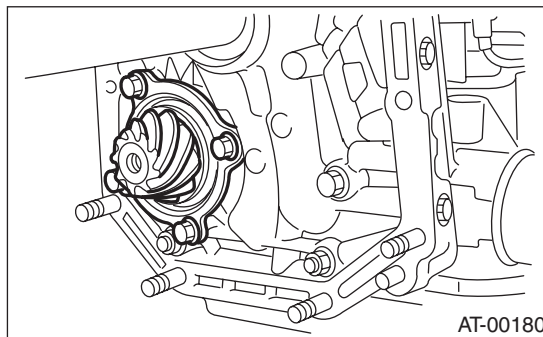
A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate torque converter clutch case and transmission case sections. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-79, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to AT-96, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-98, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>

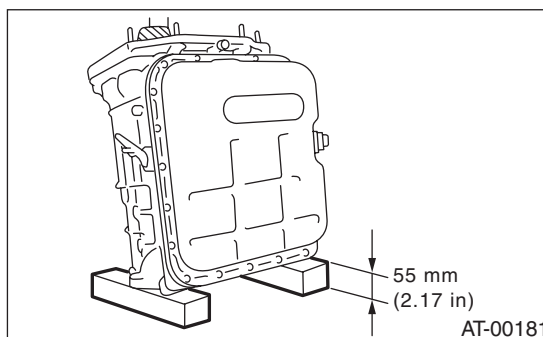
- 14) Loosen the taper roller bearing mounting bolts.



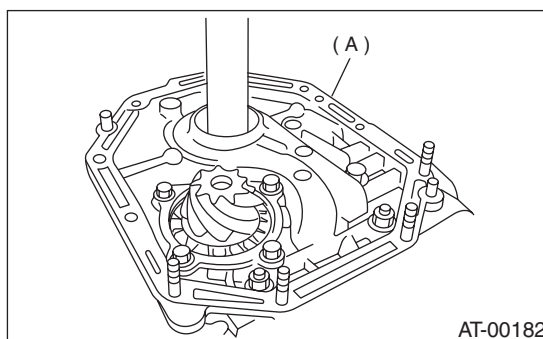
- 15) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

NOTE:

- Be careful not to scratch the rear mating surface of the transmission case.
- Note that the parking rod and drive pinion protrude from the mating surface.

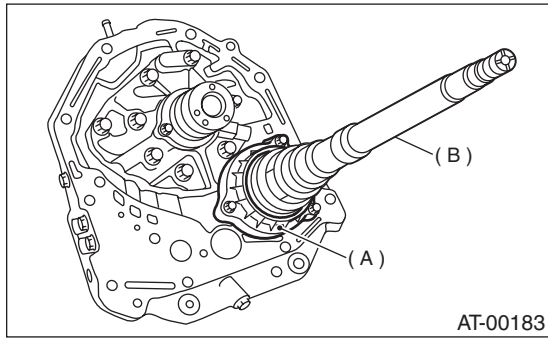


- 16) Remove the oil pump housing and adjusting thrust washer.



(A) Oil pump housing

- 17) Remove the oil seal retainer.
Also remove the O-ring and oil seal (air breather).



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

- 18) Remove O-rings from oil pump housing.
19) Remove the drive pinion assembly.

B: INSTALLATION

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

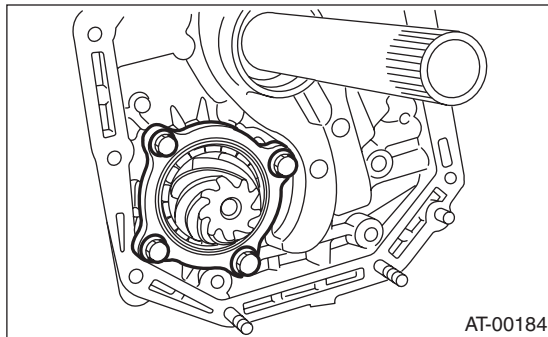
NOTE:

- Be careful not to bend the shims.
- Be careful not to force the pinion against the housing bore.

- 2) Tighten four bolts to secure the roller bearing.

Tightening torque:

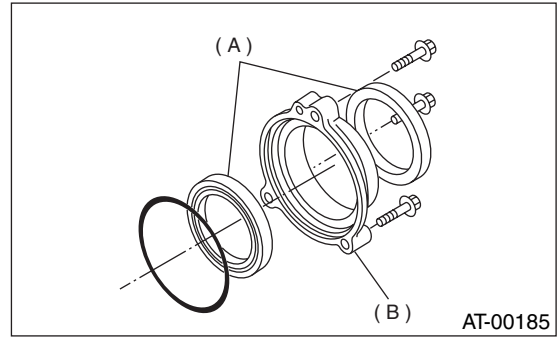
40 N·m (4.1 kgf-m, 30 ft-lb)



AT-00184

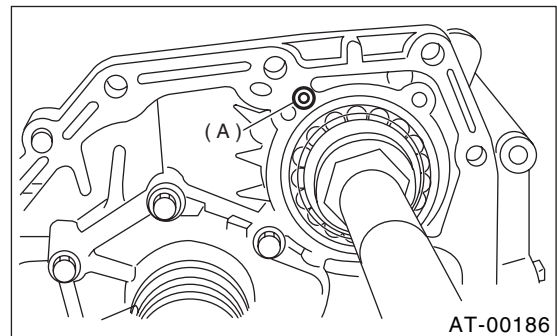
- 3) While paying attention to the orientation of the oil seals, install two new oil seals to the oil seal retainer using ST.

ST 499247300 INSTALLER



(A) Oil seal
(B) Oil seal retainer

- 4) Attach the new O-ring to the oil seal retainer with petrolatum. Install the seal to the oil pump housing bore.

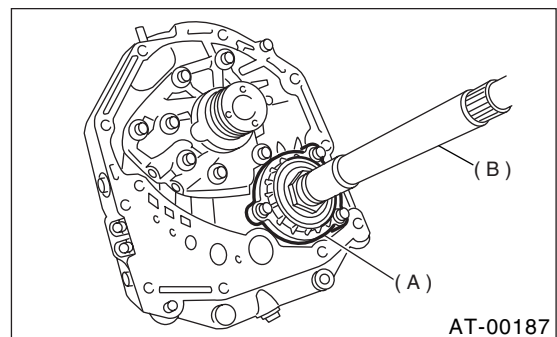


(A) O-ring

- 5) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with three bolts.

Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)



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

OIL PUMP

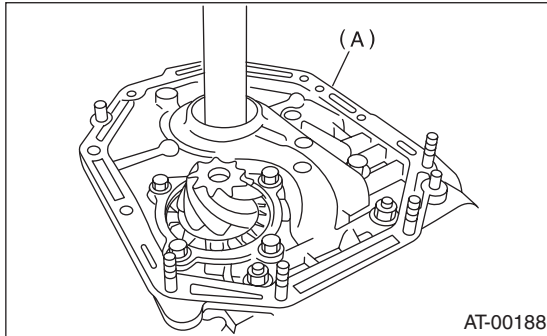
AUTOMATIC TRANSMISSION

6) Make sure the O-ring is fitted correctly in position.

7) Secure the housing with two nuts and the bolt.

Tightening torque:

42 N·m (4.3 kgf-m, 31 ft-lb)



(A) Oil pump housing

8) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>

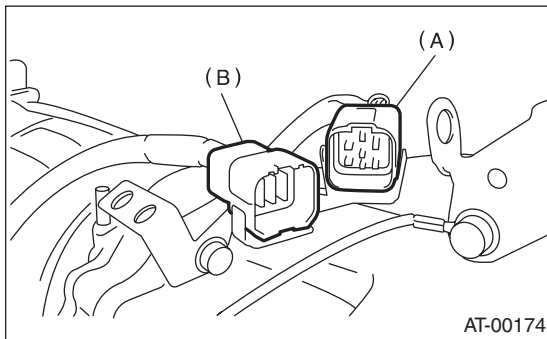
9) Install reduction driven gear. <Ref. to AT-94, INSTALLATION, Reduction Driven Gear.>

10) Install reduction drive gear. (MPT model) <Ref. to AT-96, INSTALLATION, Reduction Drive Gear.>

11) Install the center differential carrier. (VTD model) <Ref. to AT-98, INSTALLATION, Center Differential Carrier.>

12) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to AT-79, INSTALLATION, Extension Case.>

13) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness

(B) Inhibitor switch harness

14) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>

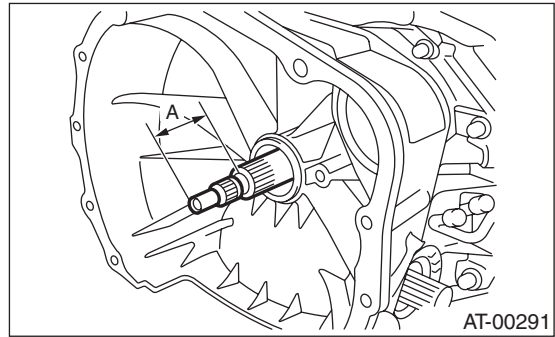
15) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>

16) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>

17) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

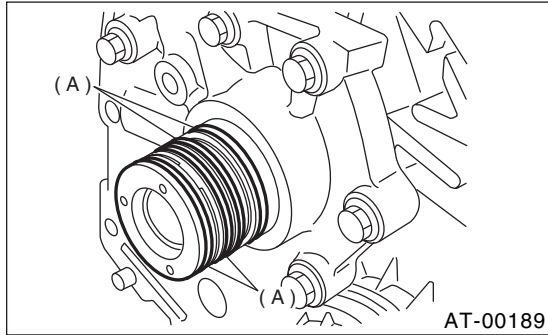


18) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>

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

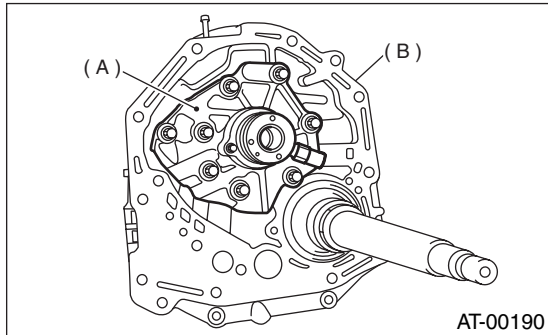
C: DISASSEMBLY

1) Remove four seal rings.



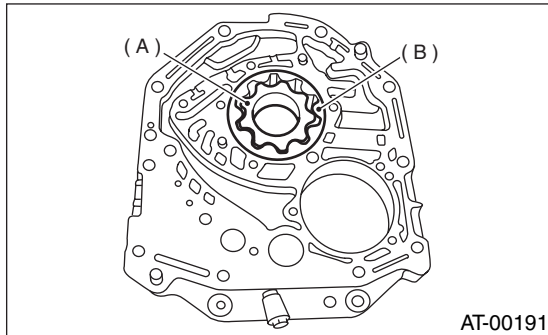
(A) Seal ring

2) Lightly tap the end of the stator shaft to remove the cover.



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

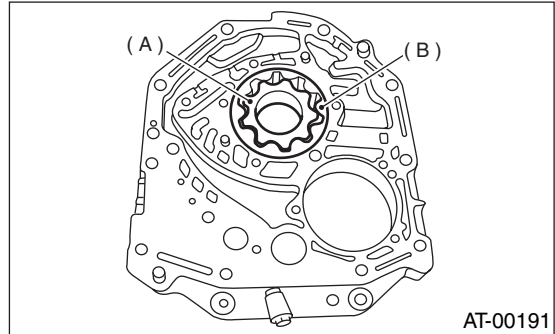
3) Remove the inner and outer rotor.



(A) Inner rotor
(B) Outer rotor

D: ASSEMBLY

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

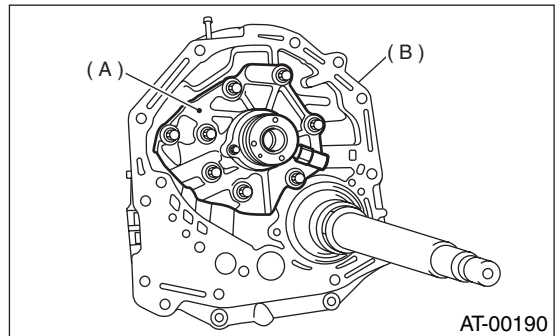


(A) Inner rotor
(B) Outer rotor

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

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



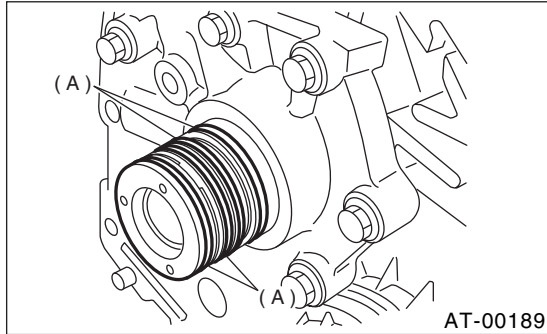
(A) Oil pump cover
(B) Oil pump housing

3) After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.

OIL PUMP

AUTOMATIC TRANSMISSION

4) Install the oil seal retainer and new seal rings. After installation, adjust the drive pinion backlash and tooth contact. <Ref. to AT-109, ADJUSTMENT, Oil Pump.>



(A) Seal ring

E: INSPECTION

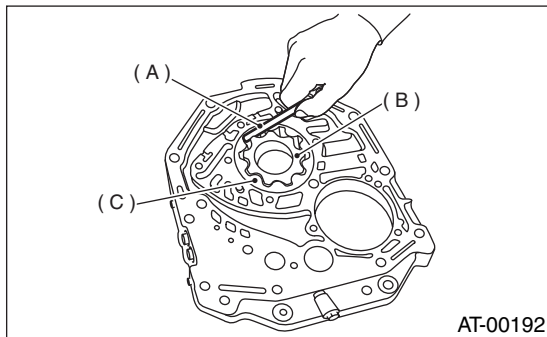
- 1) Check seal ring and oil seal for breaks or damage.
- 2) Check other parts for dents or abnormalities.
- 3) Selection of oil pump rotor assembly

(1) Tip clearance

Install inner rotor and outer rotor to oil pump. With rotor gears facing each other, measure crest-to-crest clearance.

Tip clearance:

0.02 — 0.15 mm (0.0008 — 0.0059 in)



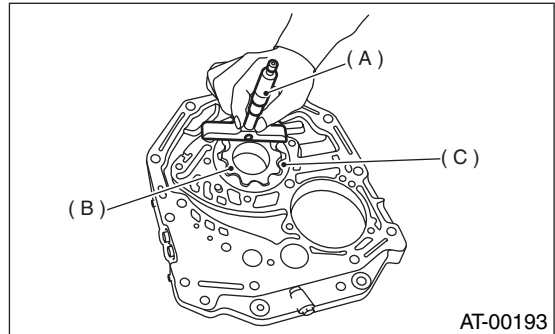
- (A) Thickness gauge
(B) Inner rotor
(C) Outer rotor

(2) Side clearance

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

Side clearance:

0.02 — 0.04 mm (0.0008 — 0.0016 in)



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

(3) If depth and/or side clearances are outside specifications, replace rotor assembly.

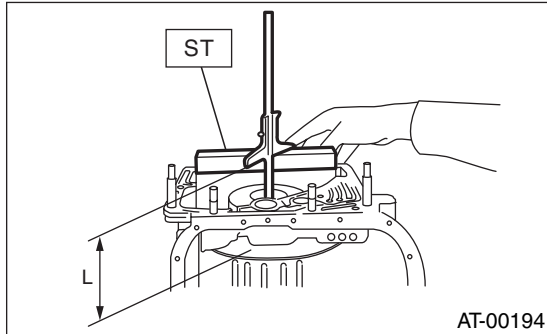
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

- Measure the total end play and adjust to within specifications. <Ref. to AT-109, ADJUSTMENT, Oil Pump.>

F: ADJUSTMENT

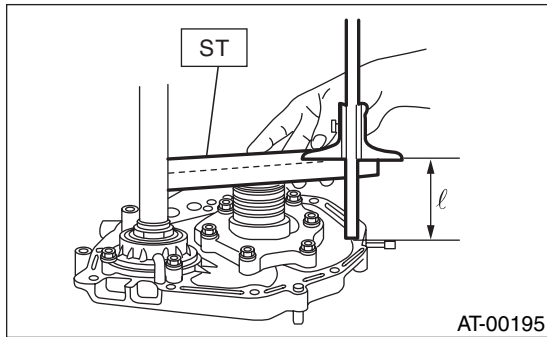
1) Using ST, measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum "L".

ST 398643600 GAUGE



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

ST 398643600 GAUGE

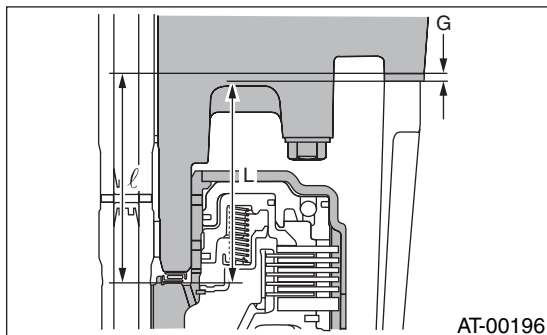


3) Calculation of total end play

Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 to 0.55 mm (0.0098 to 0.0217 in) range.

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

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



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 end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust needle bearing to the oil pump cover with petrolatum.

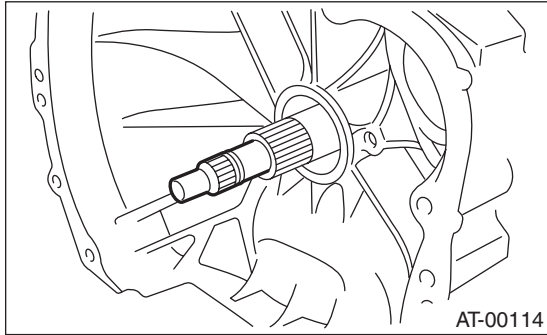
5) After correctly installing the new gasket to the case mating surface, carefully install the oil pump assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

6) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

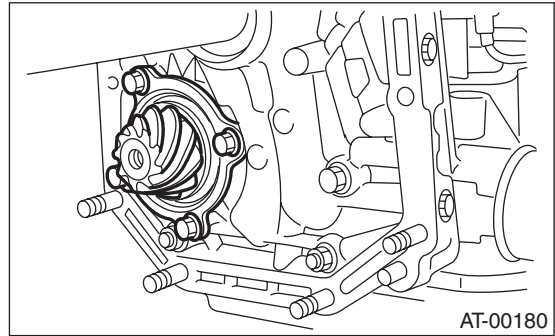
36. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 14) Separation of drive pinion shaft and oil pump housing. <Ref. to AT-104, REMOVAL, Oil Pump.>



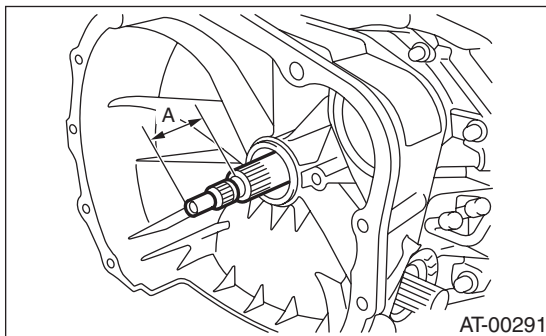
- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate torque converter clutch case and transmission case sections. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-79, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to AT-96, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-98, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>

B: INSTALLATION

- 1) Assemble the drive pinion assembly to the oil pump housing. <Ref. to AT-105, INSTALLATION, Oil Pump.>
- 2) Install oil pump housing to transmission case. <Ref. to AT-105, INSTALLATION, Oil Pump.>
- 3) Combine the torque converter case with the transmission case. <Ref. to AT-102, INSTALLATION, Torque Converter Clutch Case.>
- 4) Install reduction driven gear. <Ref. to AT-94, INSTALLATION, Reduction Driven Gear.>
- 5) Install reduction drive gear. (MPT model) <Ref. to AT-96, INSTALLATION, Reduction Drive Gear.>
- 6) Install the center differential carrier. (VTD model) <Ref. to AT-98, INSTALLATION, Center Differential Carrier.>
- 7) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to AT-79, INSTALLATION, Extension Case.>
- 8) Insert inhibitor switch and transmission connector into stay.
- 9) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>
- 10) Install the oil cooler inlet and outlet pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>
- 11) Install the oil charger pipe with O-ring.
- 12) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



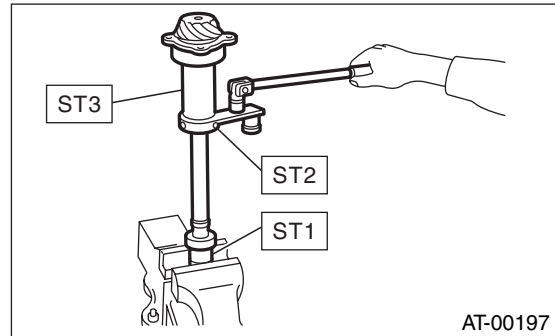
- 13) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>
- 14) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

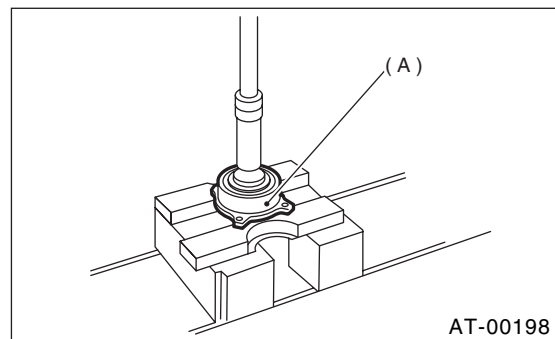
- 1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.

ST1 498937110 HOLDER

ST2 499787700 WRENCH
ST3 499787500 ADAPTER



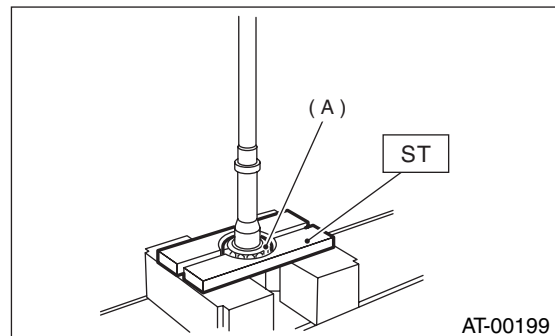
- 2) Remove the O-ring.
- 3) Using a press, separate the rear roller bearing and outer race from the shaft.



(A) Outer race

- 4) Using a press and ST, separate the front roller bearing from the shaft.

ST 498517000 REPLACER



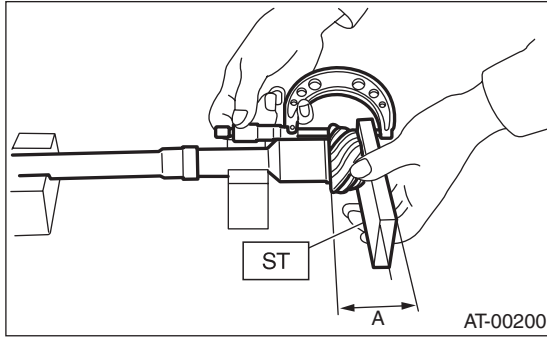
(A) Front roller bearing

DRIVE PINION SHAFT ASSEMBLY

AUTOMATIC TRANSMISSION

D: ASSEMBLY

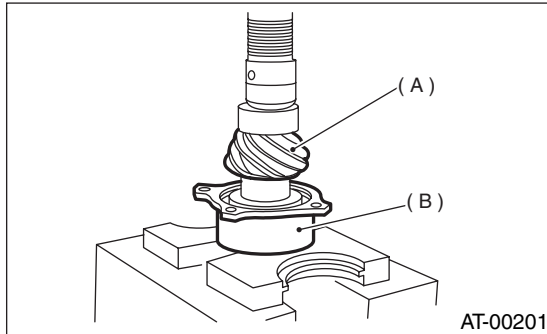
- 1) Measure dimension "A" of the drive pinion shaft.
ST 398643600 GAUGE



- 2) Using a press, force-fit a new roller bearing in position.

NOTE:

If too much pressure is applied, the roller bearing will not turn easily.



- (A) Drive pinion shaft
(B) Roller bearing

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

- 5) Tighten a new lock nut with ST1, ST2 and ST3. Calculate lock washer and lock nut specifications using the 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

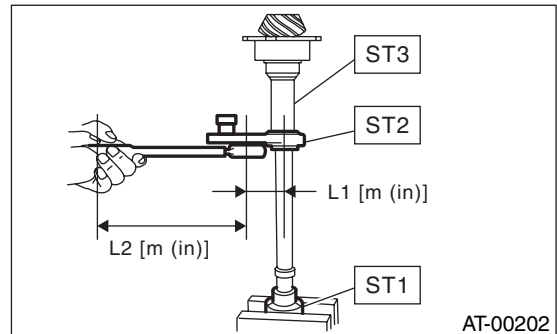
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	98 (10.0, 72)
0.45 (17.72)	100 (10.2, 73.8)
0.5 (19.69)	101 (10.3, 74.5)
0.55 (21.65)	102 (10.4, 75)

- ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:

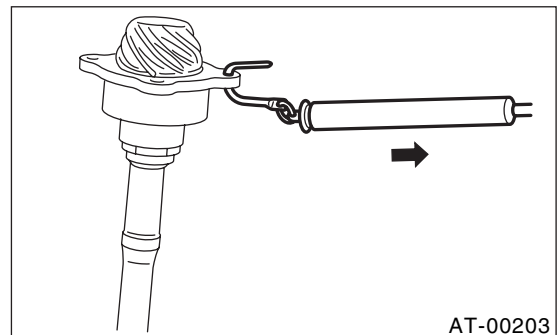
Install ST2 to torque wrench as straight as possible.



- 6) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:

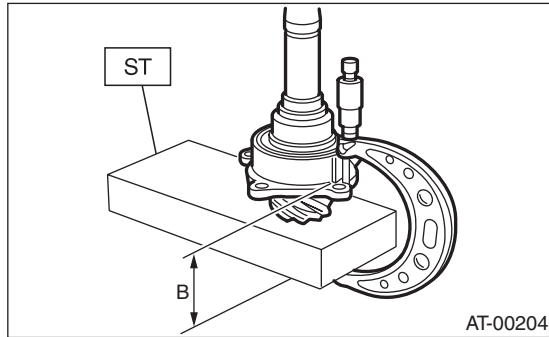
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



DRIVE PINION SHAFT ASSEMBLY

AUTOMATIC TRANSMISSION

- 7) Stake the lock nut securely at two places.
- 8) Measure dimension "B" of the drive pinion shaft.
ST 398643600 GAUGE



- 9) 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.

Available drive pinion shims	
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 components are free of harmful cuts, gouges, and other faults.
- Adjust the teeth alignment. <Ref. to AT-113, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

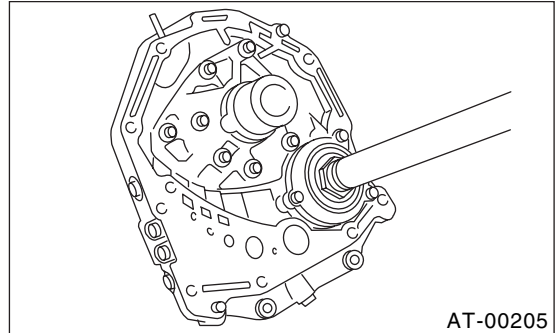
- 1) Thoroughly remove the liquid gasket from the mating surface beforehand.
- 2) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

NOTE:

Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

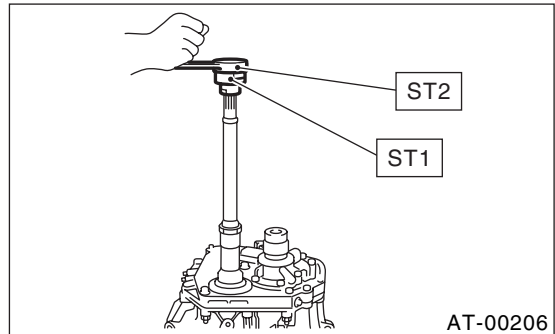
Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)



- 3) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH



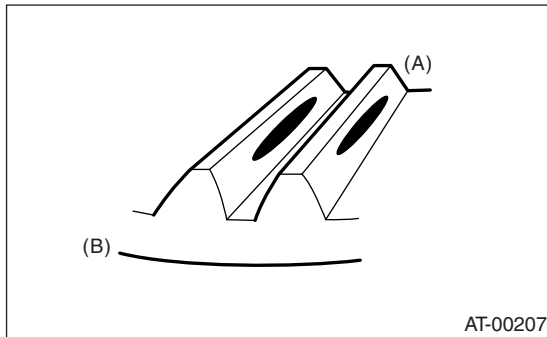
- 4) Adjust the backlash between drive pinion and crown gear. <Ref. to AT-120, ADJUSTMENT, Front Differential.>
- 5) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness. <Ref. to AT-120, ADJUSTMENT, Front Differential.>

DRIVE PINION SHAFT ASSEMBLY

AUTOMATIC TRANSMISSION

- Correct tooth contact

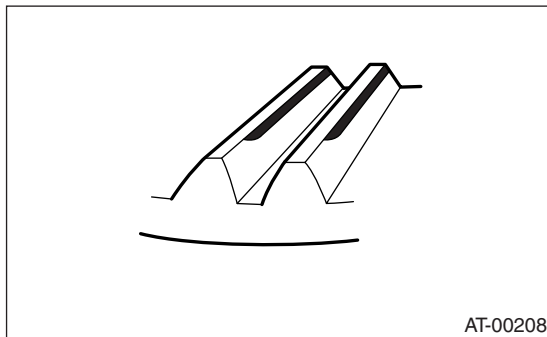
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel.)



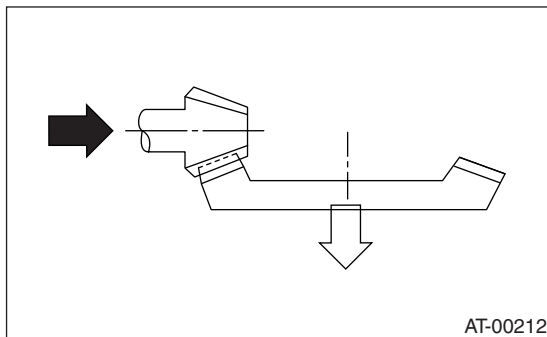
- (A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

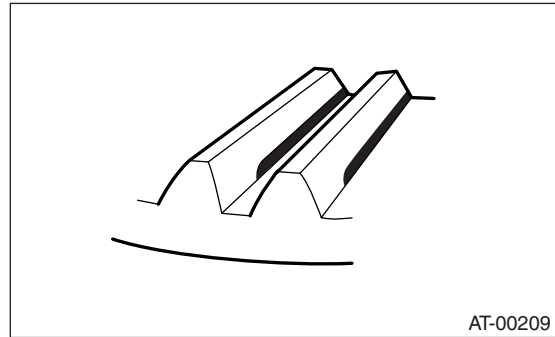


Corrective action: Increase thickness of drive pinion height adjusting washer by following the procedure for moving drive pinion toward driven gear side.

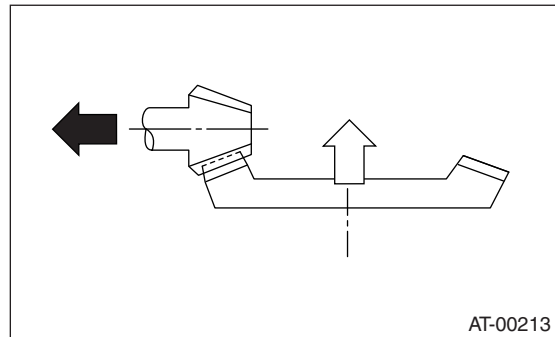


- Flank contact

Checking item: Backlash is too small.
Contact pattern

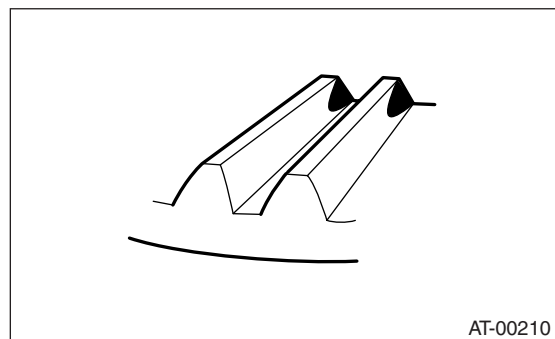


Corrective action: Reduce thickness of drive pinion height adjusting washer by following the procedure for moving drive pinion away from driven gear.



- Toe contact (inside end contact)

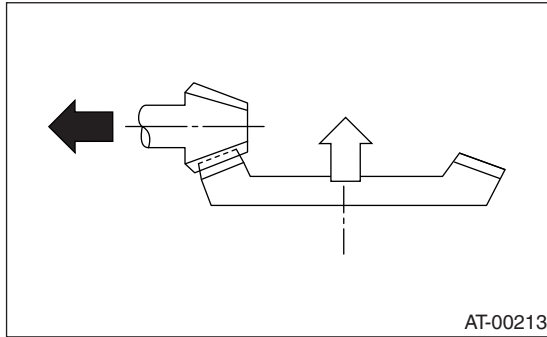
Checking item: Contact areas is small.
Contact pattern



DRIVE PINION SHAFT ASSEMBLY

AUTOMATIC TRANSMISSION

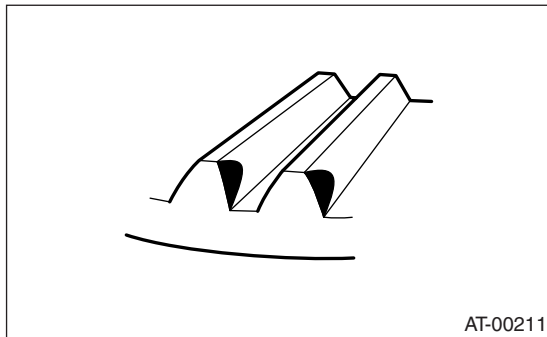
Corrective action: Reduce thickness of drive pinion height adjusting washer by following the procedure for moving drive pinion away from driven gear side.



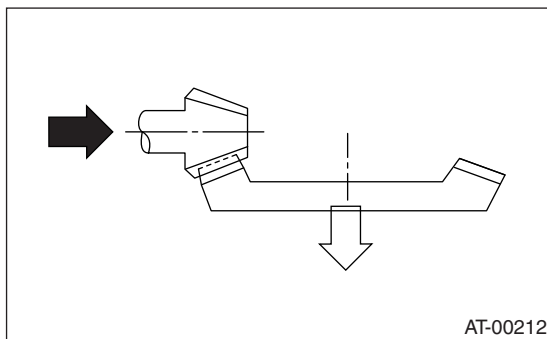
- Heel contact (outside end contact)

Checking item: Contact areas is small.

Contact pattern



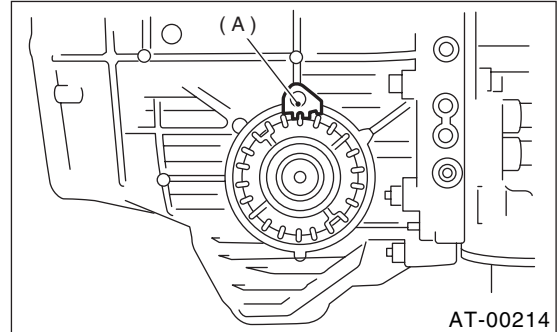
Corrective action: Increase thickness of drive pinion height adjusting washer by following the procedure for moving drive pinion toward driven gear.



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

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

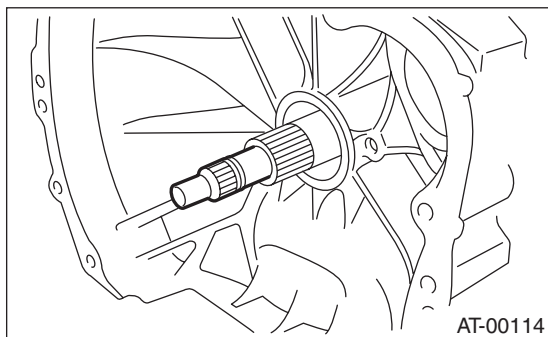


(A) Lock plate

37.Front Differential

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate torque converter clutch case and transmission case. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the seal pipe if it is attached.
- 11) Remove the differential side retainer with ST.

NOTE:

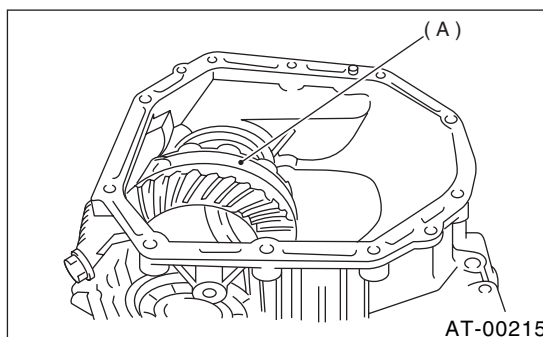
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case.

ST 499787000 WRENCH ASSY

- 12) Remove the differential assembly without damaging installation part of retainer.

B: INSTALLATION

- 1) Install the differential assembly to the case, paying special attention not to damage the inside of the case (particularly, the differential side retainer contact surface).

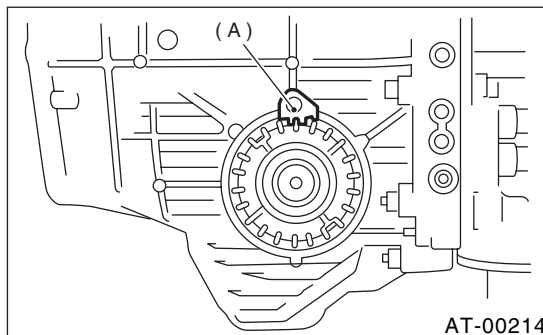


(A) Differential assembly

- 2) Remove the O-rings from left and right side retainer.
- 3) Using ST, install the side retainers. <Ref. to AT-116, INSTALLATION, Front Differential.>
ST 499787000 WRENCH ASSY
- 4) Install the lock plate.

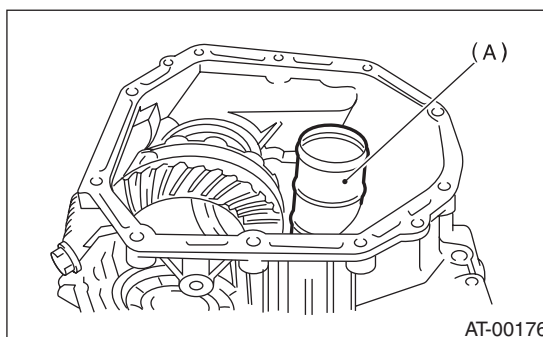
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



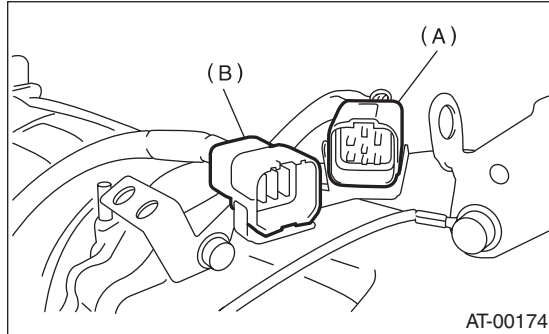
(A) Lock plate

- 5) Install the new seal pipe to the torque converter clutch case.



(A) Seal pipe

- 6) Install the torque converter clutch case to transmission case. <Ref. to AT-102, INSTALLATION, Torque Converter Clutch Case.>
- 7) Install air breather hose.
- 8) Insert inhibitor switch and transmission connector into stay.

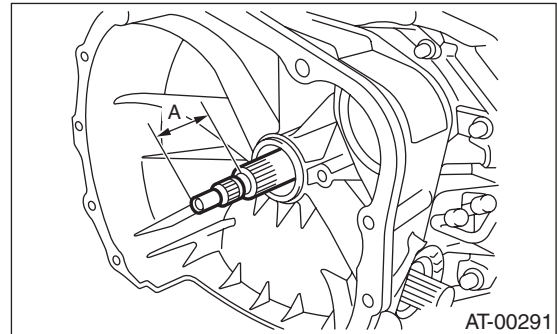


- (A) Transmission harness
(B) Inhibitor switch harness

- 9) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>
- 10) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>

- 11) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

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



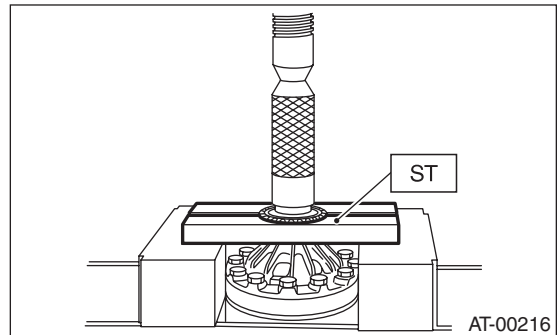
- 12) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>
- 13) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

- 1) Using a press and ST, remove the taper roller bearing.

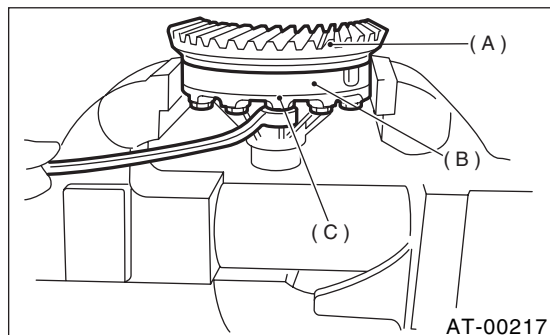
ST 498077000 REMOVER



FRONT DIFFERENTIAL

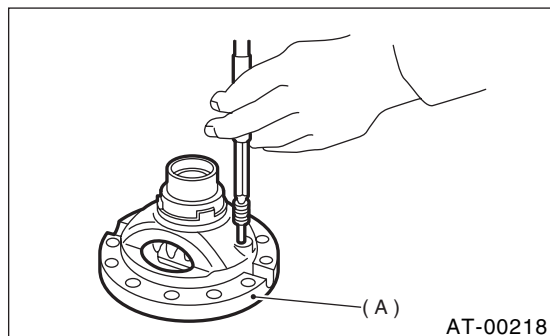
AUTOMATIC TRANSMISSION

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



- (A) Crown gear
- (B) Differential case (RH)
- (C) Differential case (LH)

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



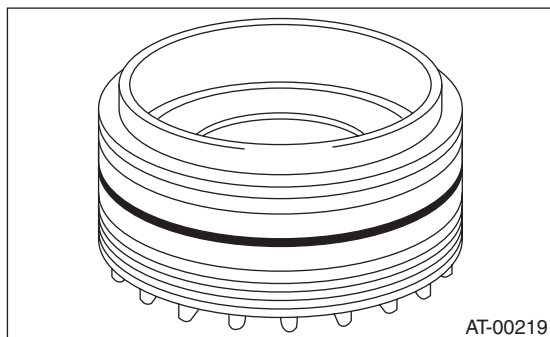
- (A) Differential case (RH)

2. SIDE RETAINER

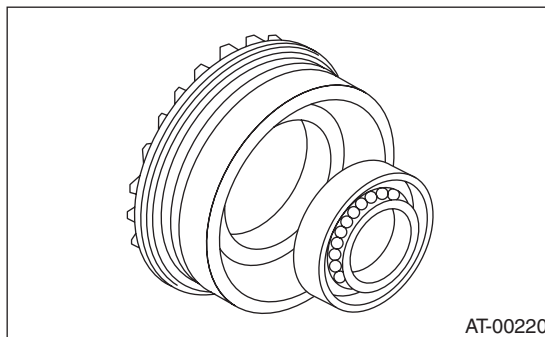
NOTE:

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

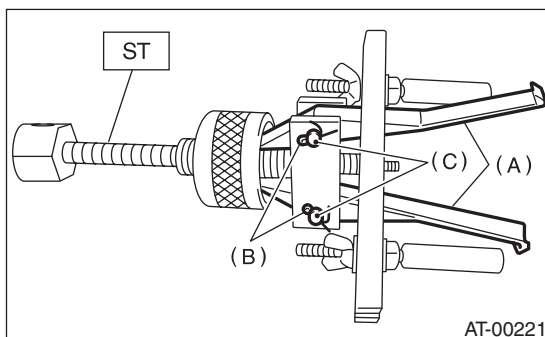
1) Remove the O-ring.



2) Remove the oil seal.



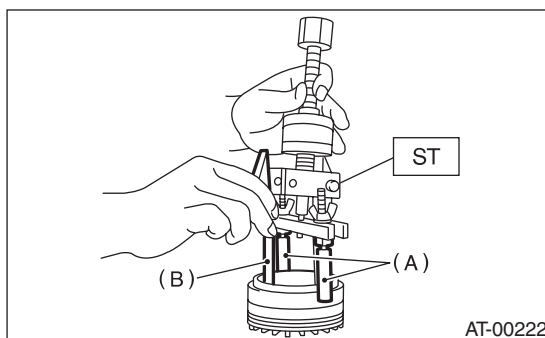
3) Take out either split pin and remove claw.
ST 398527700 PULLER ASSY



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

4) Set ST to side retainer by attaching two claws to outer race.

ST 398527700 PULLER ASSY



- (A) Shaft
- (B) Claw

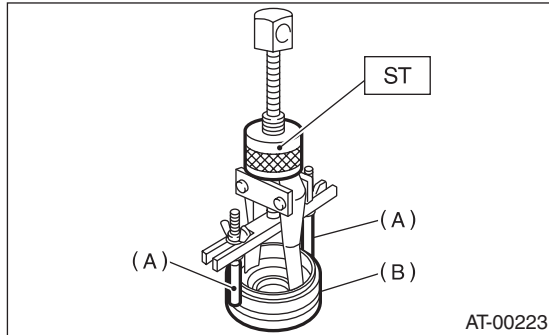
5) Return removed claw to the original position, and install pin and split pin.

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

ST 398527700 PULLER ASSY

NOTE:

Replace bearing inner and outer races as a single unit.

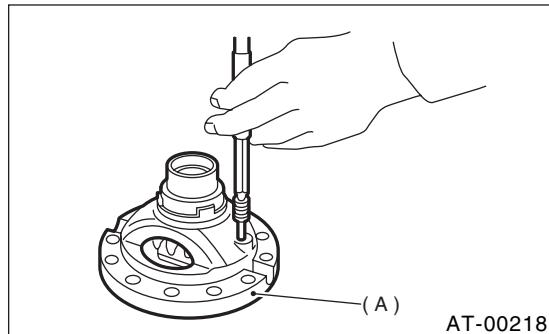


- (A) Shaft
(B) Side Retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

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



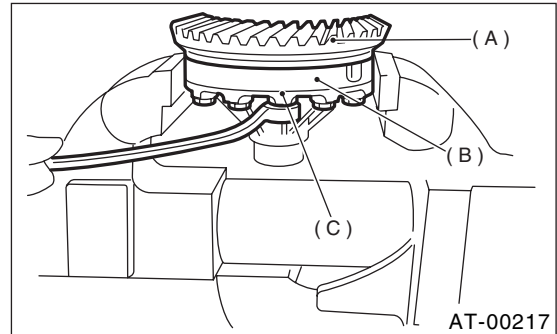
- (A) Differential case (RH)

- 3) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.

- 4) Install the crown gear and secure by tightening the bolt.

Tightening torque:

62 N·m (6.3 kgf-m, 45.6 ft-lb)



- (A) Crown gear
(B) Differential case (RH)
(C) Differential case (LH)

- 5) Measurement of backlash (selection of washer)
 - (1) Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.

ST1 498247001 MAGNET BASE

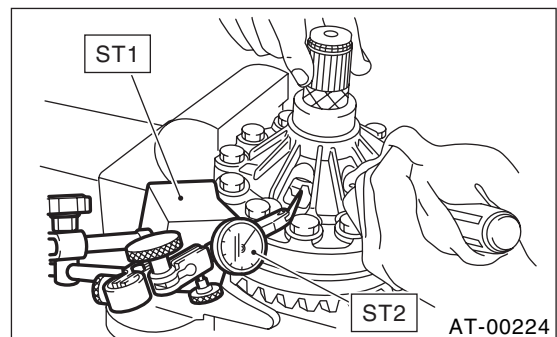
ST2 498247100 Dial gauge

NOTE:

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

Standard:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



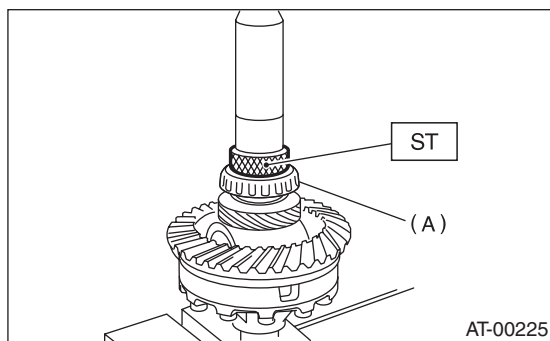
- (2) If backlash is not as specified, select a washer from the table below.

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

FRONT DIFFERENTIAL

AUTOMATIC TRANSMISSION

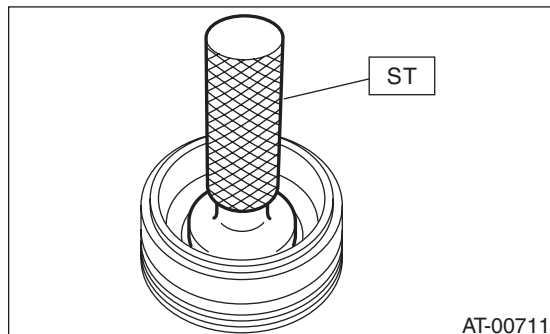
- 6) Using ST, install taper roller bearing.
ST 398437700 DRIFT



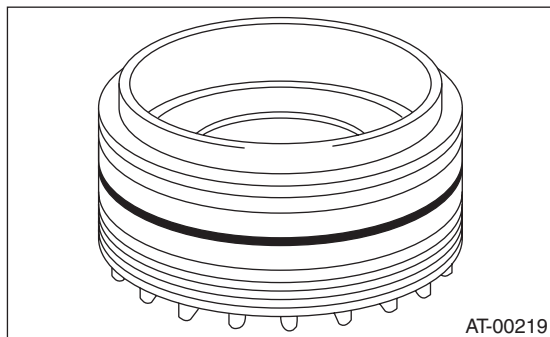
(A) Taper roller bearing

2. SIDE RETAINER

- 1) Install bearing outer race to side retainer.
2) Install a new oil seal using the ST and hammer.
ST 499797000 INSTALLER



- 3) Install new O-ring.



E: INSPECTION

- Check each component for harmful cuts, damage and other faults.
- Measure the backlash and adjust to within specifications.

<Ref. to AT-120, ADJUSTMENT, Front Differential.>

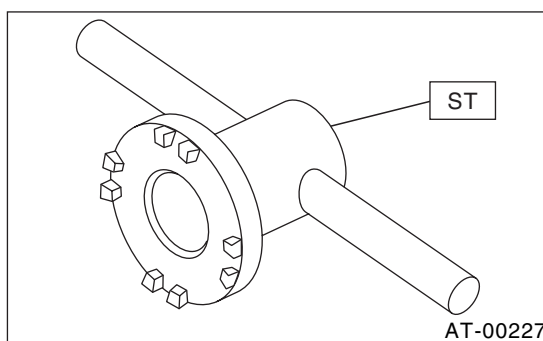
F: ADJUSTMENT

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

NOTE:

Screw in the RH side slightly deeper than the LH side.

ST 499787000 WRENCH ASSY



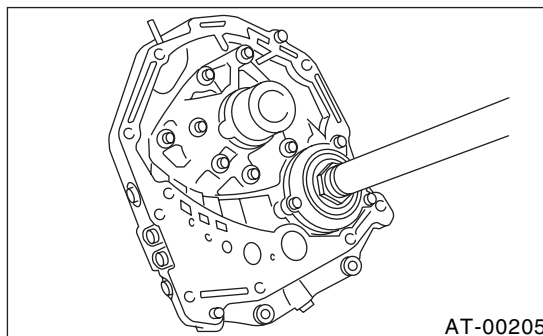
- 2) Remove the oil pump housing.
3) Thoroughly remove the liquid gasket from the mating surface.
4) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

NOTE:

Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

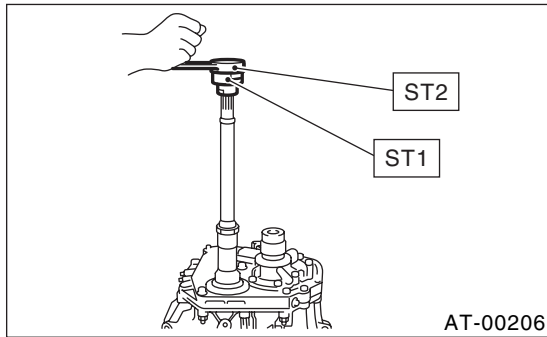
Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)

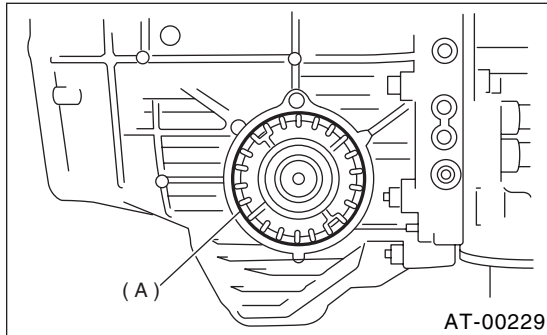


5) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH

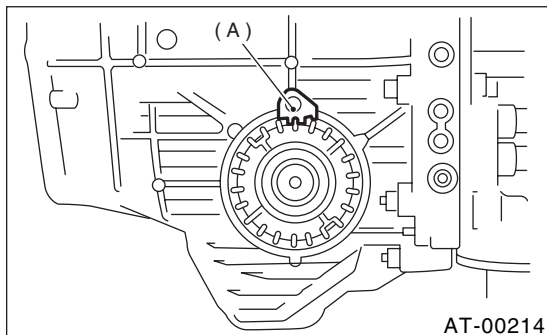


6) Tighten the LH retainer until a resistance is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the “zero” state.



(A) Retainer

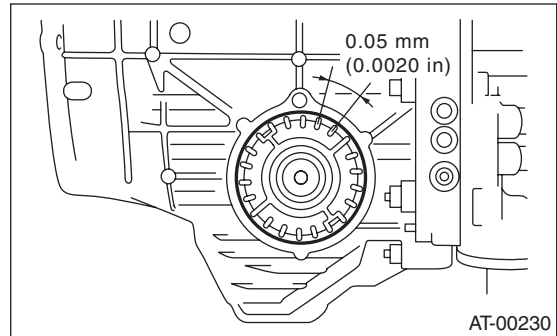
7) After the “zero” state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Rotate drive pinion a few times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

NOTE:

Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).

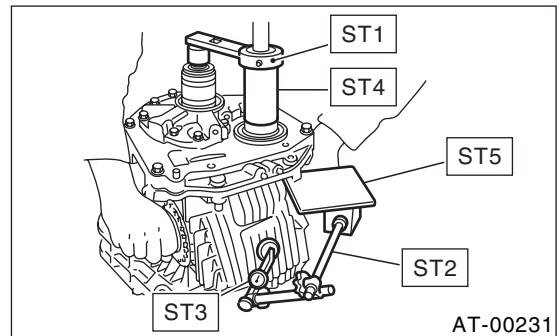


8) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

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 tooth contact between front differential and drive shaft.<Ref. to AT-113, ADJUSTMENT, Drive Pinion Shaft Assembly.>

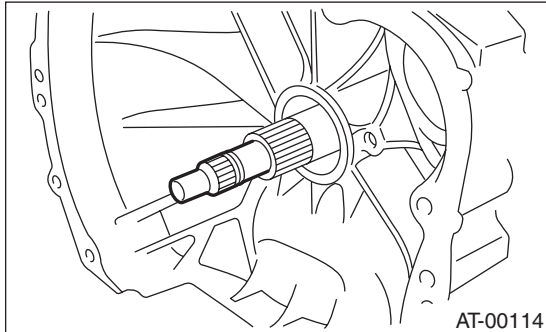
HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

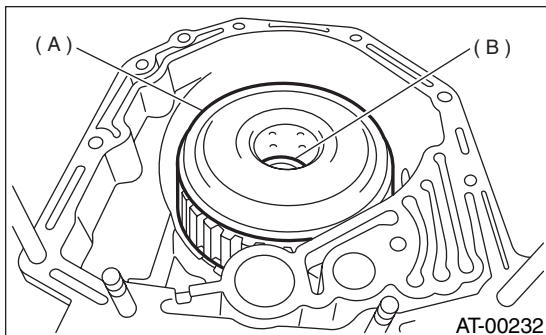
38.High Clutch and Reverse Clutch

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

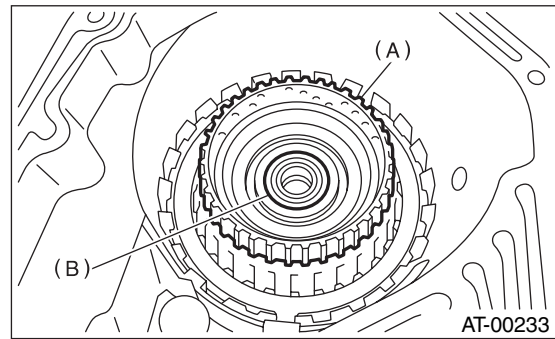


- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the oil pump housing. <Ref. to AT-104, REMOVAL, Oil Pump.>
- 11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



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

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



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

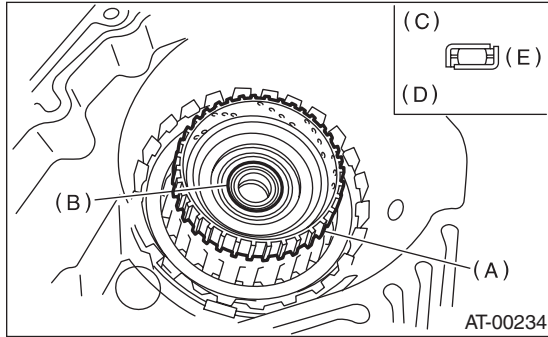
HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

B: INSTALLATION

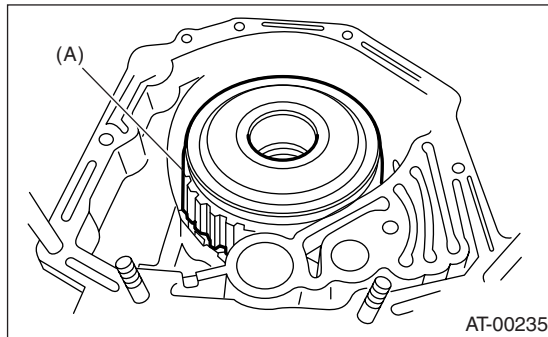
- 1) Apply petrolatum to thrust needle bearing.
- 2) Install the high clutch hub and thrust needle bearing.

Attach the thrust needle bearing to the hub with petrolatum and install the hub by correctly engaging the splines of the front planetary carrier.



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

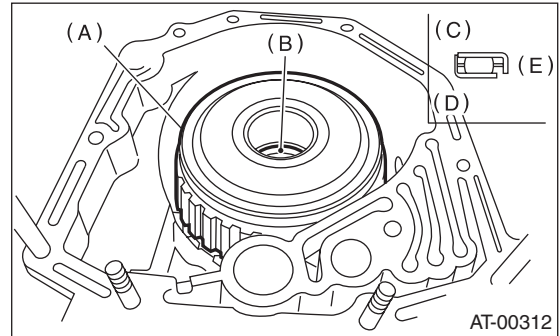
- 3) Install the high clutch assembly.



- (A) High clutch and reverse clutch assembly

- 4) Adjust total end play. <Ref. to AT-109, ADJUSTMENT, Oil Pump.>

- 5) Install the thrust needle bearing in proper direction.



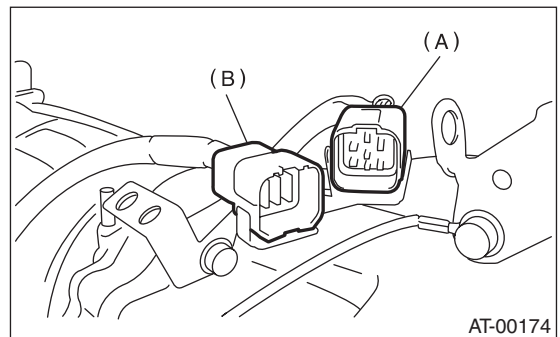
- (A) High clutch and reverse clutch assembly
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

- 6) Install the oil pump housing assembly with a new gasket.

- 7) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-102, INSTALLATION, Torque Converter Clutch Case.>

- 8) Insert inhibitor switch and transmission connector into stay.

- 9) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>



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

- 10) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>

- 11) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>

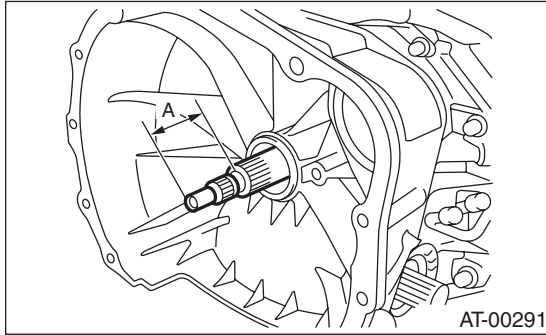
HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

12) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

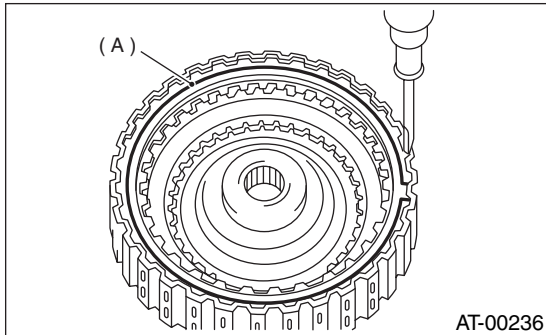


13) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>

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

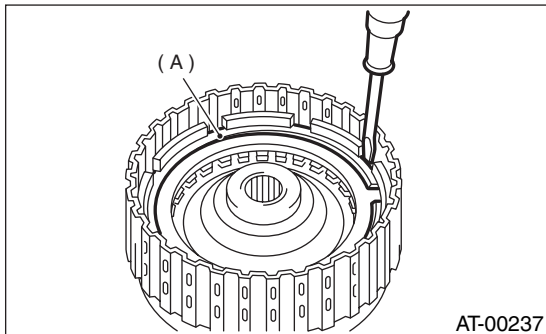
C: DISASSEMBLY

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



(A) Snap ring

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

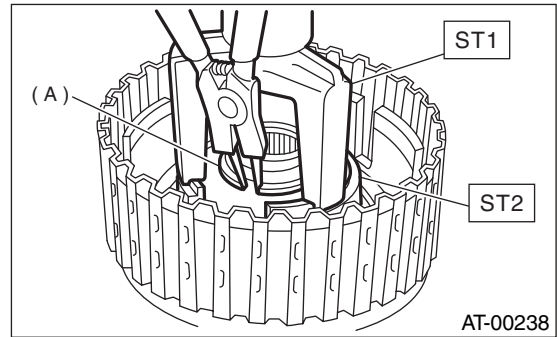


(A) Snap ring

3) Using ST1 and ST2, remove snap ring.

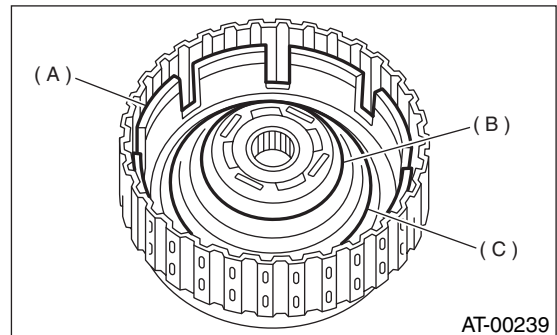
ST1 398673600 COMPRESSOR

ST2 498627100 Seat



(A) Snap ring

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

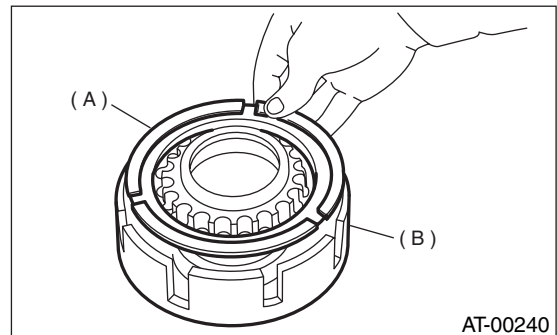


(A) Reverse clutch piston

(B) Cover

(C) Return spring

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



(A) High clutch piston

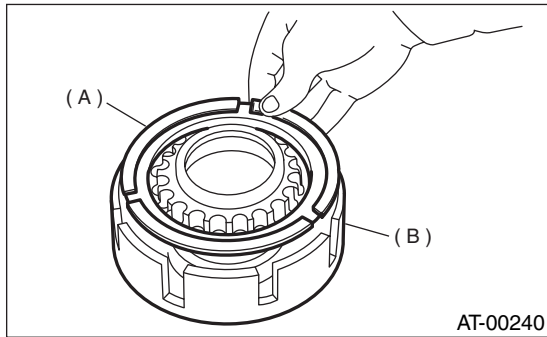
(B) Reverse clutch piston

HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

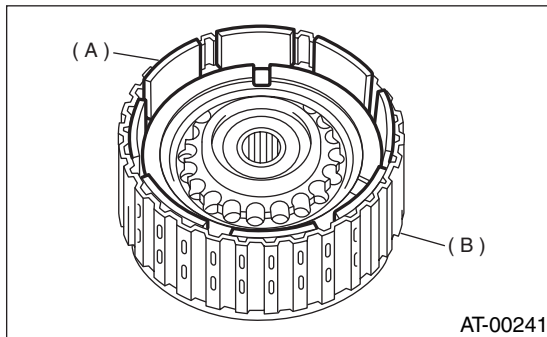
D: ASSEMBLY

- 1) Install seal rings and lip seal to high clutch piston and reverse clutch piston.
- 2) Install high clutch piston to reverse clutch piston.



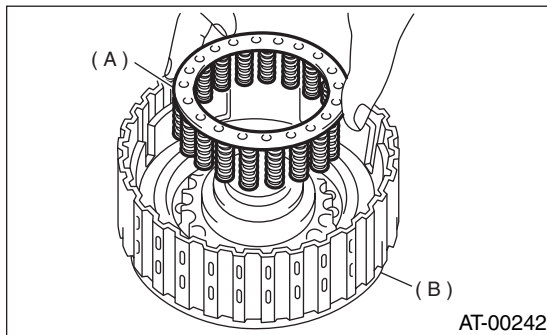
- (A) High clutch piston
(B) Reverse clutch piston

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



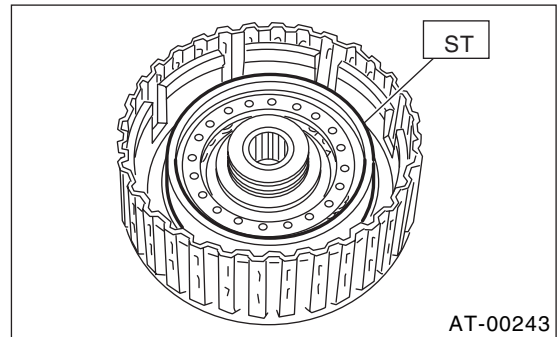
- (A) Reverse clutch piston
(B) High clutch drum

- 4) Install spring retainer to high clutch piston.



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

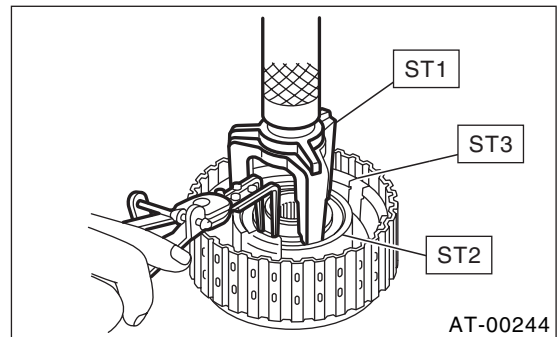
- 5) Install ST to high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GAUGE



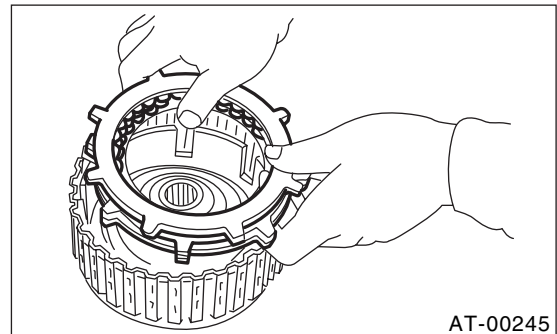
- 6) Avoid folding the high clutch piston seal, when installing the cover to high clutch piston.

- 7) Using ST1 and ST2, install snap ring.

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



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

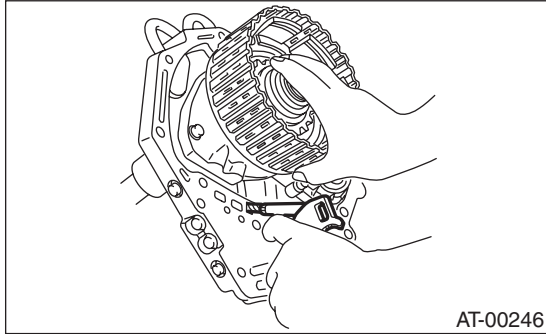


- 9) Install snap ring to high clutch drum.

HIGH CLUTCH AND REVERSE CLUTCH

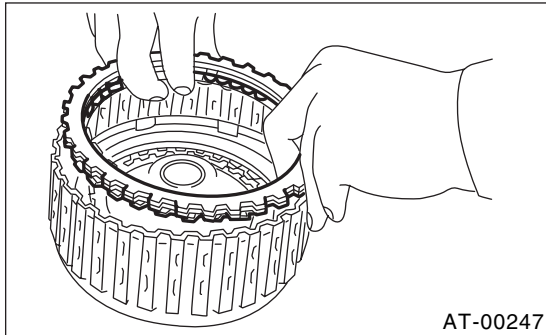
AUTOMATIC TRANSMISSION

10) Apply compressed air intermittently to check for operation.

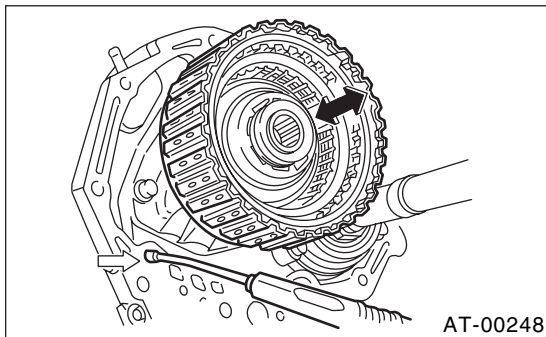


11) Measure the clearance between the retaining plate and snap ring. <Ref. to AT-126, INSPECTION, High Clutch and Reverse Clutch.>

12) Install driven plate, drive plate, retaining plate and snap ring.



13) Apply compressed air intermittently to check for operation.



14) Measure the clearance between the retaining plate and snap ring. <Ref. to AT-126, INSPECTION, High Clutch and Reverse Clutch.>

E: INSPECTION

1) Check the following items.

- Drive plate facing for wear or damage
- Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- Lip seal and D ring for damage
- Piston and drum check ball for operation
- Adjust total end play. <Ref. to AT-109, ADJUSTMENT, Oil Pump.>

2) Inspect clearance between the retaining plate and snap ring. (High clutch)

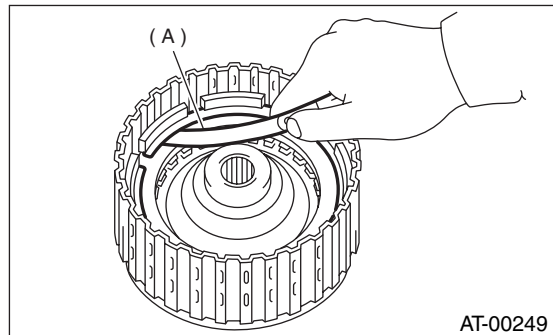
Do not push the retaining plate downwards at this time.

Standard:

0.8 — 1.1 mm (0.031 — 0.043 in)

Service limit:

1.5 mm (0.059 in)



(A) Thickness gauge

3) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

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)

HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

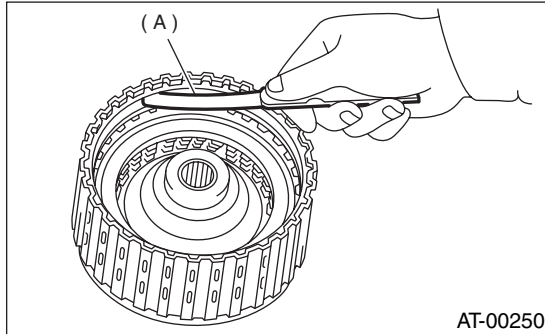
4) Inspect clearance between the retaining plate and snap ring. (Reverse clutch)
Do not push the retaining plate downwards at this time.

Standard:

0.5 — 0.8 mm (0.020 — 0.031 in)

Service limit:

1.2 mm (0.047 in)



(A) Thickness gauge

5) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

Reverse clutch retaining plates	
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)

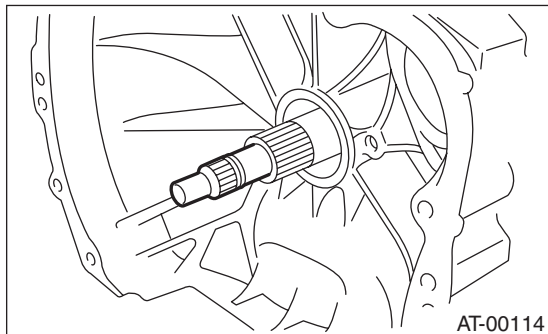
PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

39. Planetary Gear and Low Clutch

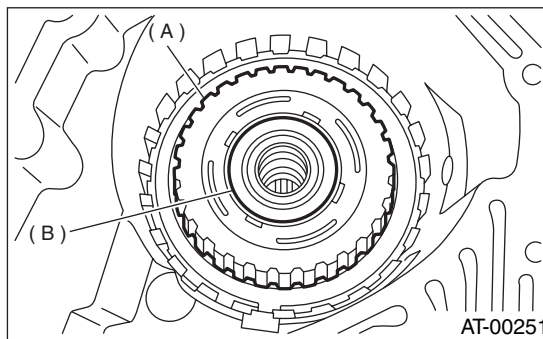
A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Remove rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>
- 10) Remove the reduction driven gear. <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>
- 11) Separate torque converter clutch case and transmission case. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 12) Remove the oil pump housing. <Ref. to AT-104, REMOVAL, Oil Pump.>
- 13) Take out the high clutch and reverse clutch assembly. <Ref. to AT-122, REMOVAL, High Clutch and Reverse Clutch.>

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

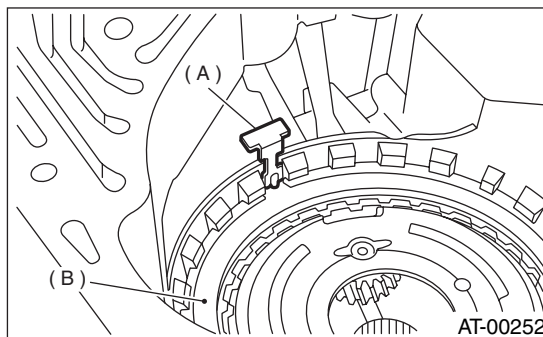


- (A) Front sun gear
(B) Thrust needle bearing

- 15) Pull out leaf spring without folding.

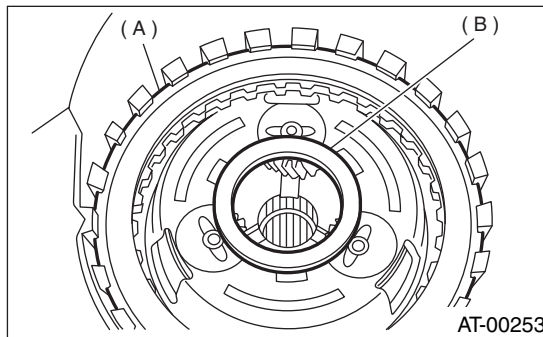
NOTE:

Remove it while pressing down on lower leaf spring.



- (A) Leaf spring
(B) Retaining plate

- 16) Remove snap ring and thrust needle bearing.

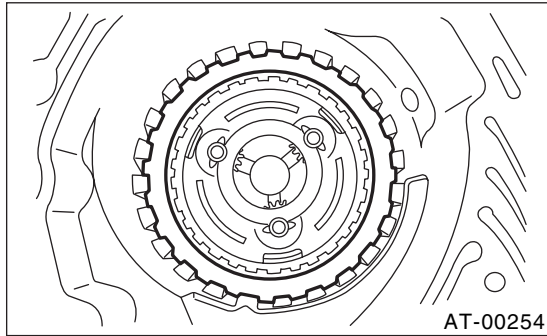


- (A) Snap ring
(B) Thrust needle bearing

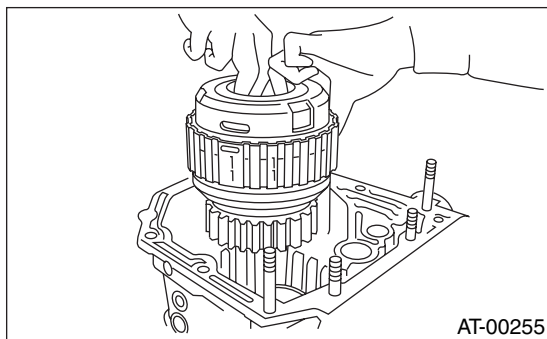
PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

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



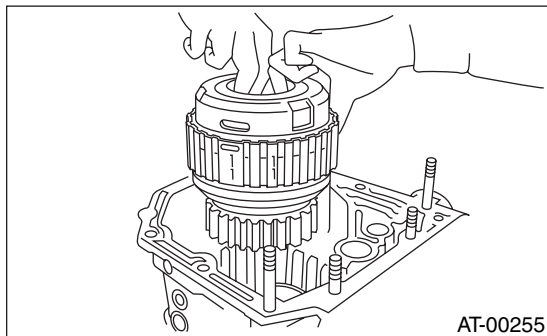
18) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



B: INSTALLATION

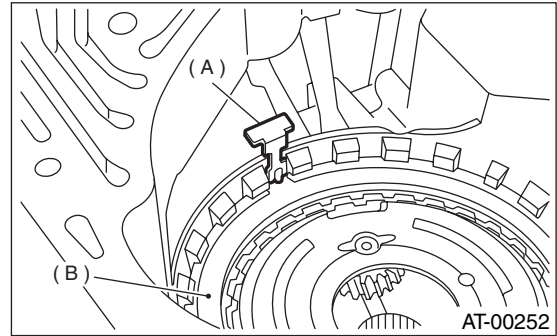
1) Install planetary gear and low clutch assembly to transmission case.

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



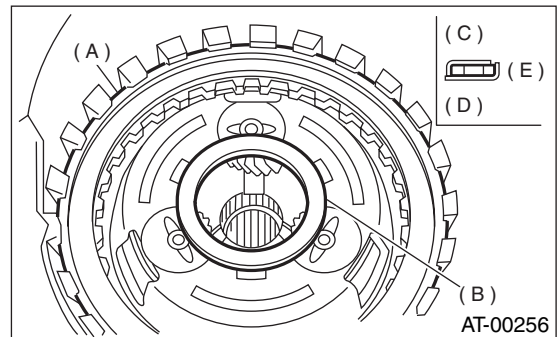
2) Install the pressure plate, driven plate, drive plate, retaining plate and snap ring.

3) Be careful not to mistake the location of the leaf spring to be inserted.



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

4) Install thrust needle bearing in the correct direction.



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

5) Install front sun gear and thrust needle bearing.

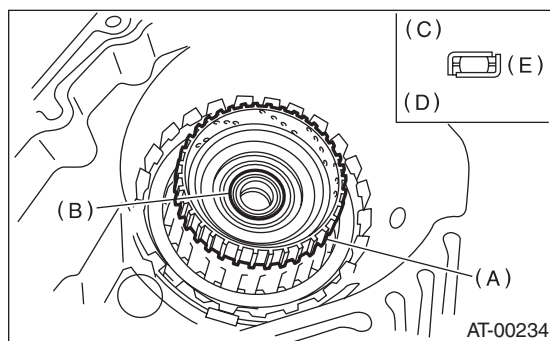
6) Install the high clutch hub.

Attach the thrust needle bearing to the hub with petrolatum and install the hub by correctly engaging the splines of the front planetary carrier.

PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

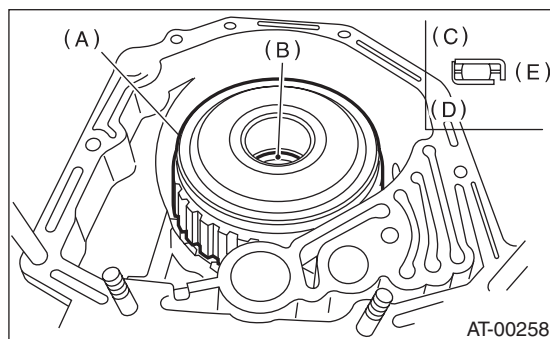
7) Install the thrust needle bearing in proper direction.



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

8) Install the high clutch assembly.

9) Install the thrust needle bearing in proper direction.



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

10) Install oil pump housing assembly with new gasket.

11) Install the torque converter clutch case. <Ref. to AT-102, INSTALLATION, Torque Converter Clutch Case.>

12) Insert inhibitor switch and transmission connector into stay.

13) Install the air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>

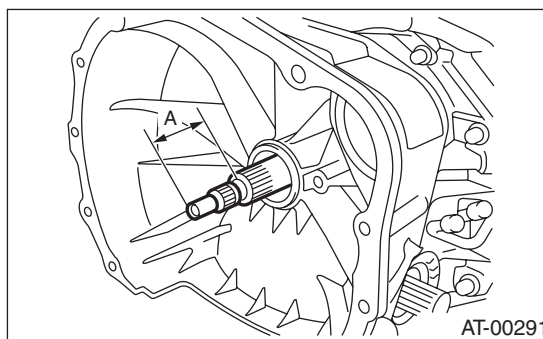
14) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>

15) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>

16) Insert the input shaft while turning lightly by hand.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

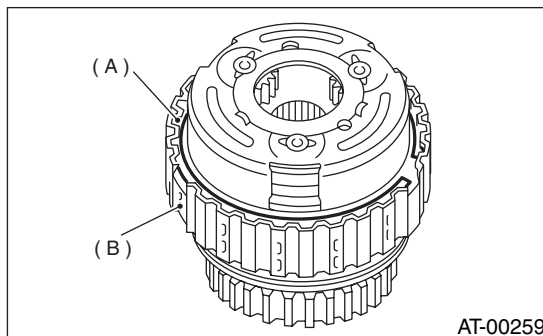


17) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>

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

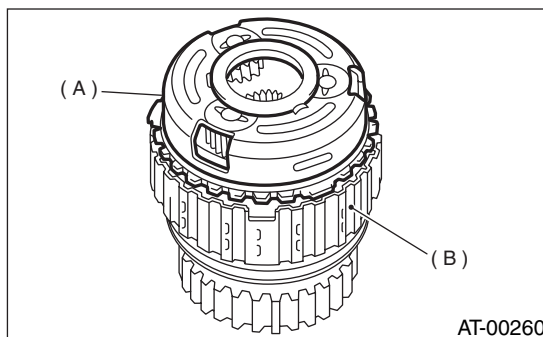
C: DISASSEMBLY

1) Remove snap ring from the low clutch drum.



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

2) Take out front planetary carrier.

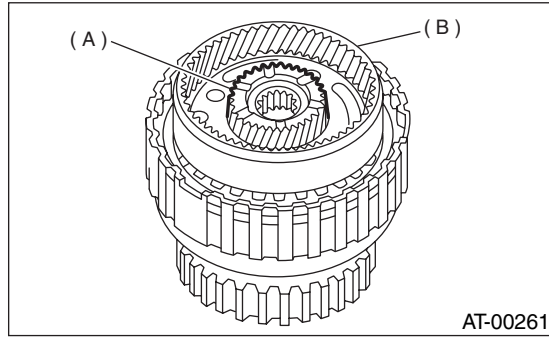


- (A) Front planetary carrier
- (B) Low clutch drum

PLANETARY GEAR AND LOW CLUTCH

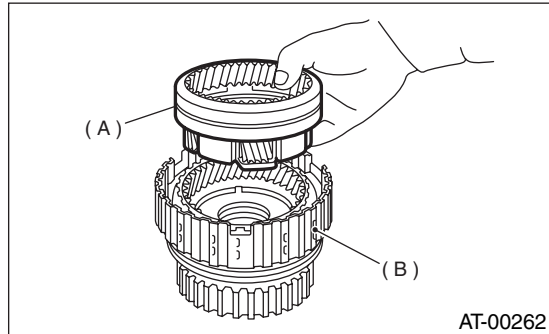
AUTOMATIC TRANSMISSION

3) Take out rear sun gear.



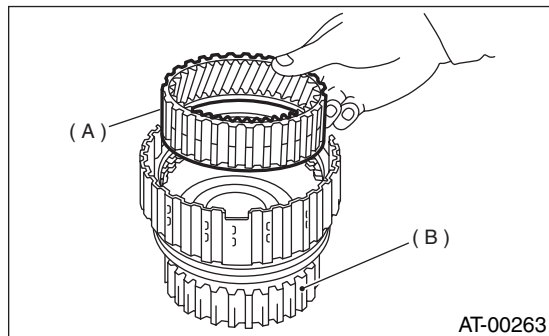
- (A) Rear sun gear
- (B) Rear planetary carrier

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



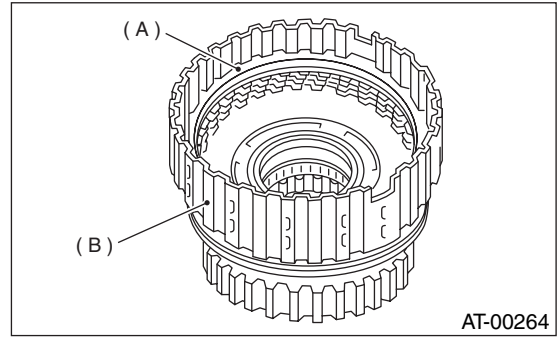
- (A) Rear planetary carrier
- (B) Low clutch drum

5) Take out rear internal gear.



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

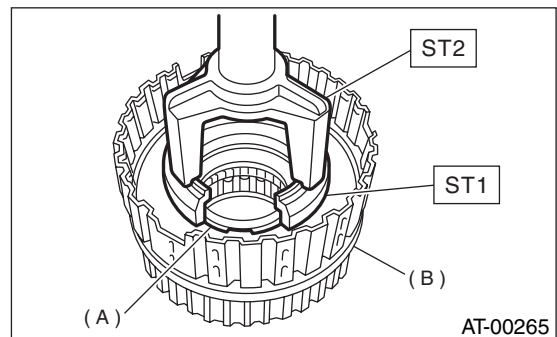
6) Remove snap ring from the low clutch drum.



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

7) Compress the spring retainer, and remove the snap ring from the low clutch drum, by using ST1 and ST2.

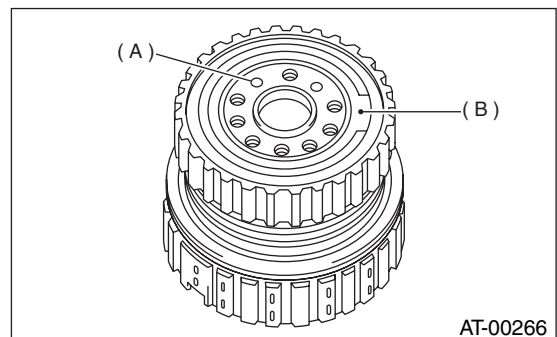
ST1 498627100 Seat
ST2 398673600 COMPRESSOR



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

8) Remove one-way clutch. <Ref. to AT-140, REMOVAL, One-way Clutch.>

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



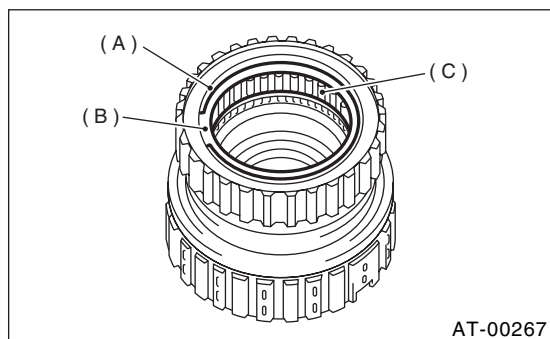
- (A) Apply compressed air
- (B) One-way clutch inner race

10) Remove one-way clutch inner race.

PLANETARY GEAR AND LOW CLUTCH

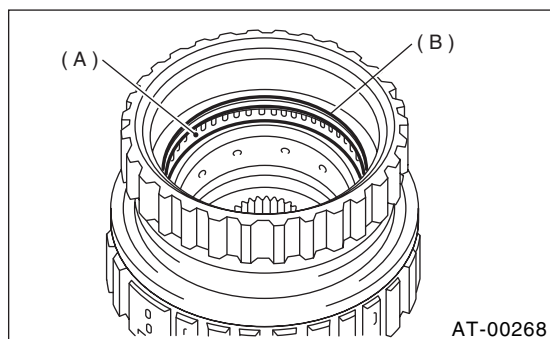
AUTOMATIC TRANSMISSION

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.

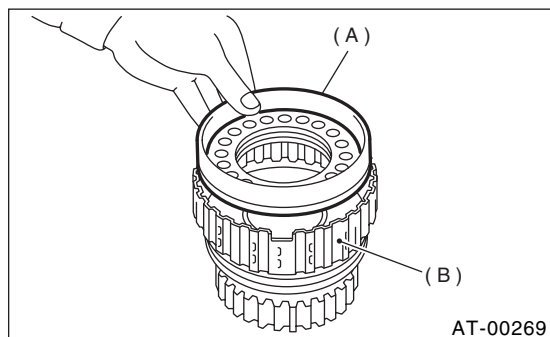


- (A) Needle bearing
- (B) Snap ring

D: ASSEMBLY

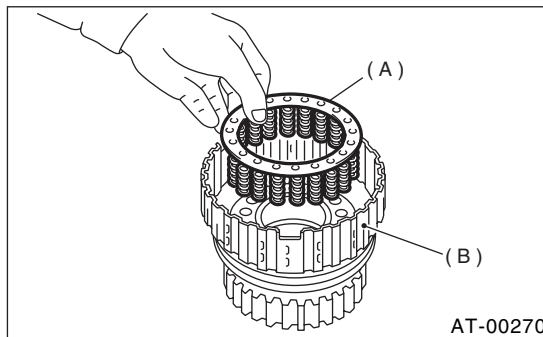
1) Install D ring to low clutch piston.

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



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

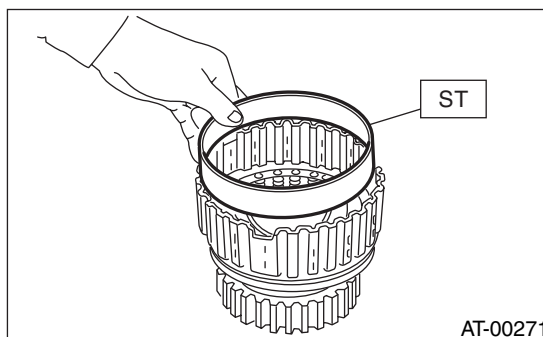
3) Install spring retainer to low clutch piston.



- (A) Spring retainer
- (B) Low clutch drum

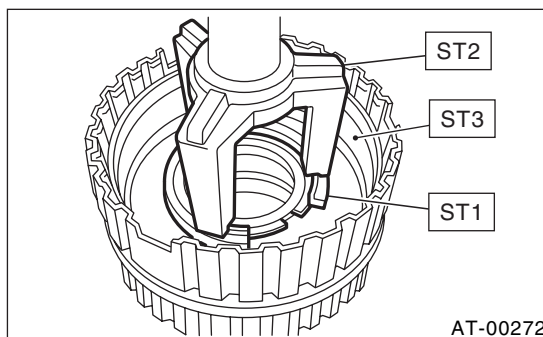
4) Install ST to low clutch drum.

ST 498437100 LOW CLUTCH PISTON GUIDE



5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold cover seal during installation.

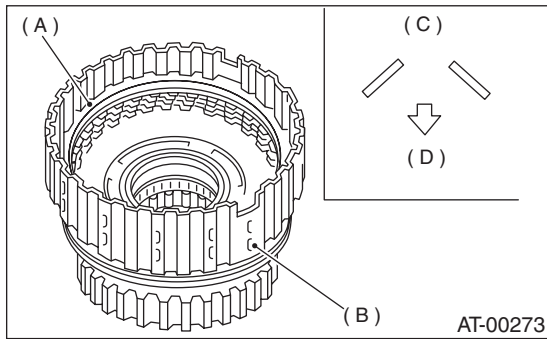
ST1 498627100 Seat
ST2 398673600 COMPRESSOR
ST3 498437100 LOW CLUTCH PISTON GUIDE



PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

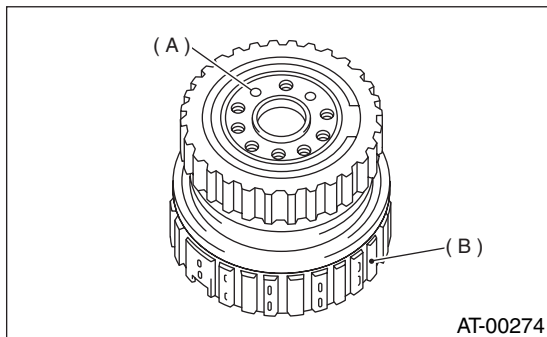
6) Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.



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

7) Check the low clutch for operation.

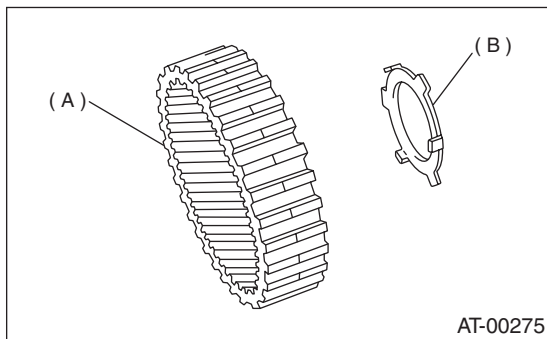
- (1) Remove one-way clutch. <Ref. to AT-140, REMOVAL, One-way Clutch.>
- (2) Set the one-way clutch inner race, and apply compressed air for checking.



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

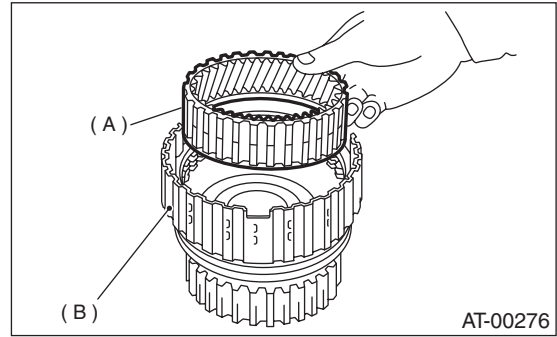
8) Check low clutch clearance. <Ref. to AT-135, INSPECTION, Planetary Gear and Low Clutch.>

9) Install washer to rear internal gear.



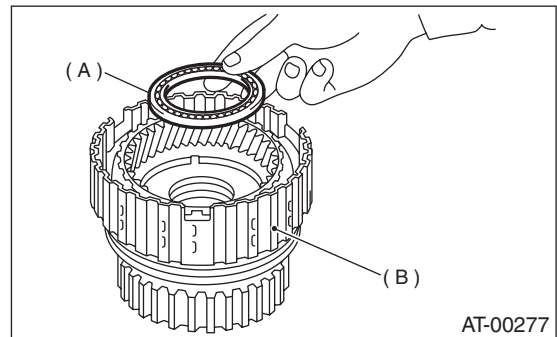
- (A) Rear internal gear
- (B) Washer

10) Install rear internal gear.



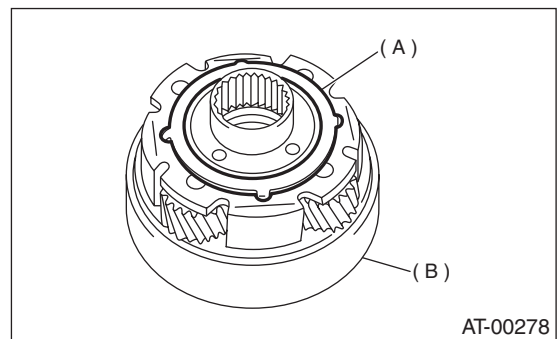
- (A) Rear internal gear
- (B) Low clutch drum

11) Install thrust needle bearing in the correct direction.



- (A) Thrust needle bearing
- (B) Low clutch drum

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

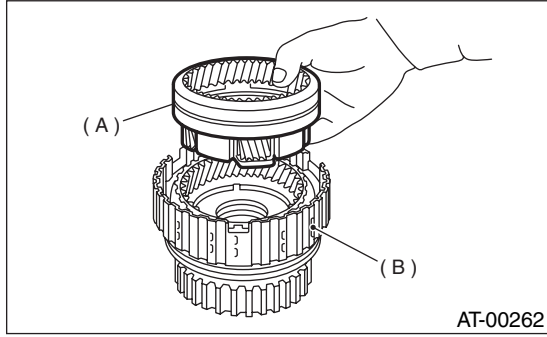


- (A) Washer
- (B) Rear planetary carrier

PLANETARY GEAR AND LOW CLUTCH

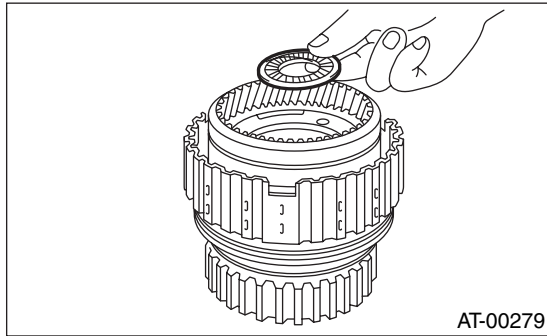
AUTOMATIC TRANSMISSION

13) Install rear planetary carrier to low clutch drum.

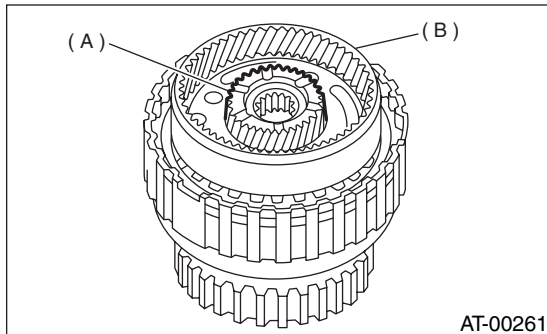


- (A) Rear planetary carrier
- (B) Low clutch drum

14) Install thrust needle bearing in the correct direction.

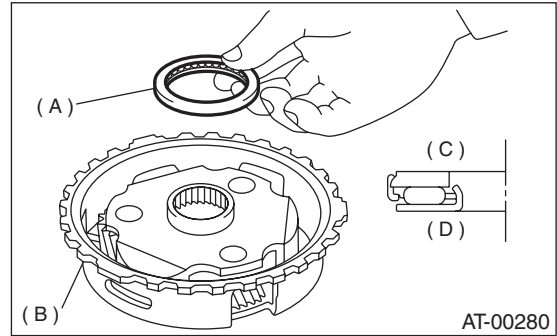


15) Install the rear sun gear in proper direction.



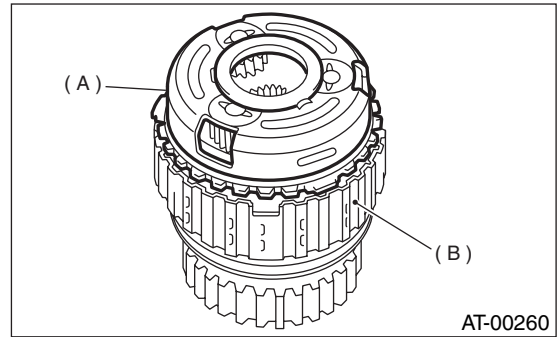
- (A) Rear sun gear
- (B) Rear planetary carrier

16) Install the thrust needle bearing in proper direction.



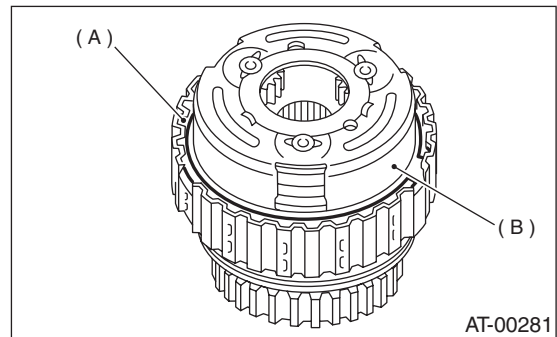
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

17) Install front planetary carrier to low clutch drum.



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

18) Install snap ring to low clutch drum.

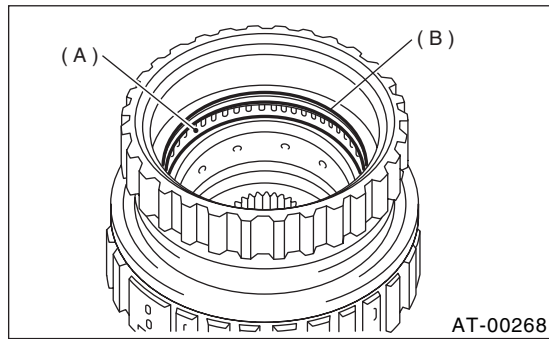


- (A) Snap ring
- (B) Front planetary carrier

PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

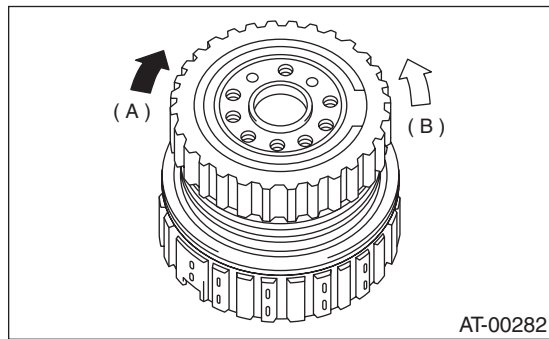
19) Install the needle bearing, and secure with the snap ring.



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

20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

21) Set the inner race. 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) Check the following items.

- Drive plate facing for wear or damage
- Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
- Lip seal and D ring for damage
- Piston check ball for operation
- Measure the total end play and adjust to within specifications.

<Ref. to AT-109, ADJUSTMENT, Oil Pump.>

2) Place the same thickness of shim on both sides to prevent retaining plate from tilting.

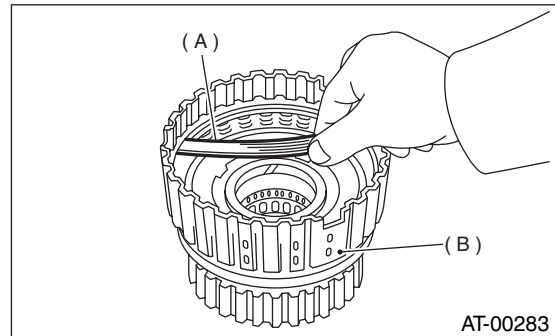
3) Inspect clearance between retaining plate and operation of the low clutch.

Standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Service limit:

1.6 mm (0.063 in)



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

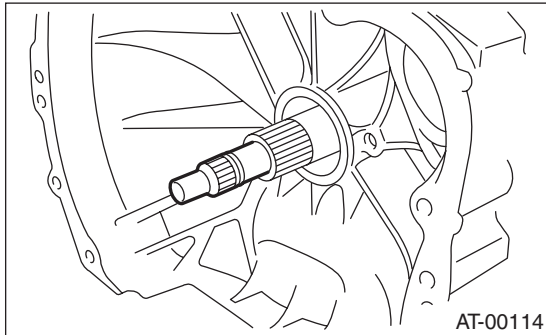
4) If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

40.2-4 brake

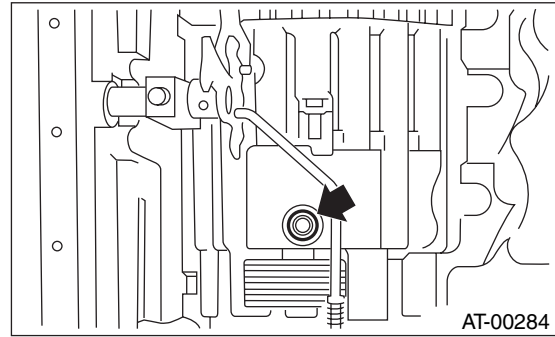
A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

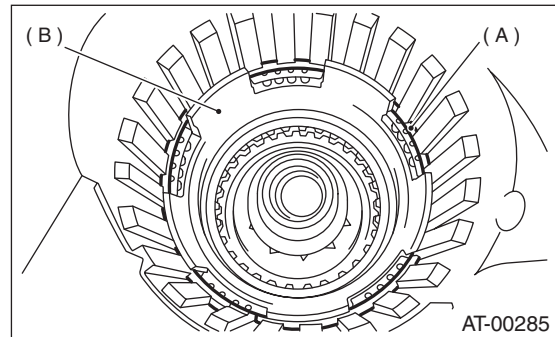


- 4) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes with washers. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Remove rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to AT-79, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. (MPT model) <Ref. to AT-96, REMOVAL, Reduction Drive Gear.>
- 11) Remove the center differential carrier. (VTD model) <Ref. to AT-98, REMOVAL, Center Differential Carrier.>
- 12) Remove the reduction driven gear. <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>
- 13) Separate torque converter clutch case and transmission case. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 14) Remove the oil pan and control valve body. <Ref. to AT-58, REMOVAL, Control Valve Body.>
- 15) Remove the oil pump housing. <Ref. to AT-104, REMOVAL, Oil Pump.>

- 16) Remove 2-4 brake seal.

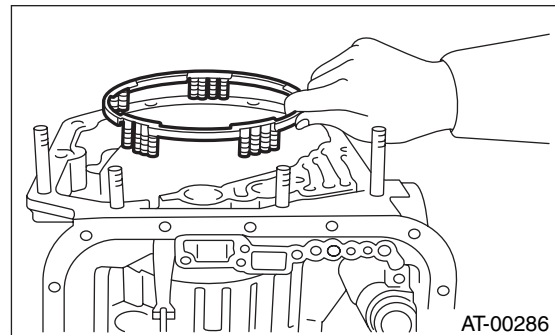


- 17) Take out the high clutch and reverse clutch assembly. <Ref. to AT-122, REMOVAL, High Clutch and Reverse Clutch.>
- 18) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly. <Ref. to AT-128, REMOVAL, Planetary Gear and Low Clutch.>
- 19) Remove snap ring.

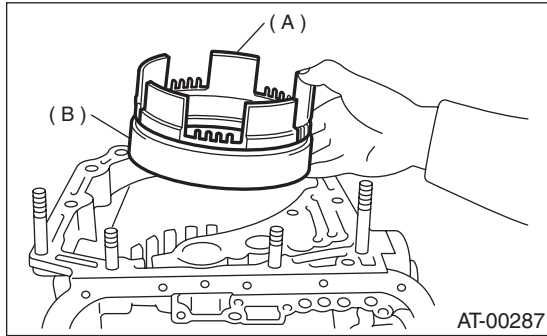


- (A) Snap ring
(B) 2-4 brake piston

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

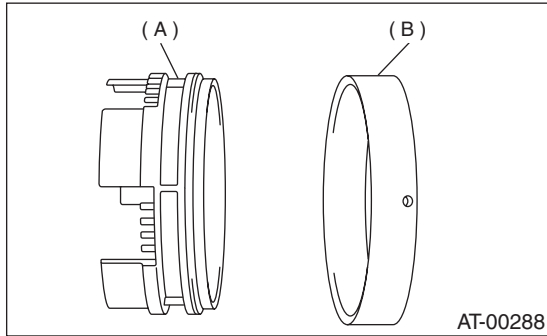


21) Remove the 2-4 brake piston and piston retainer without damaging.



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

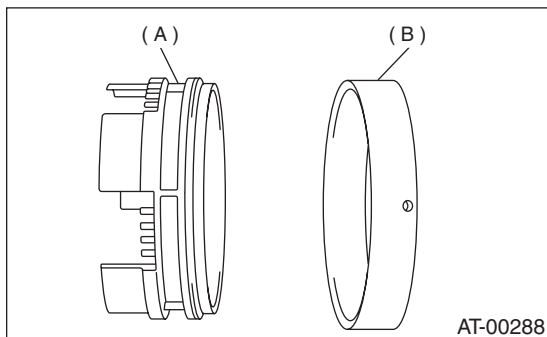
22) Separate 2-4 brake piston and piston retainer.



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

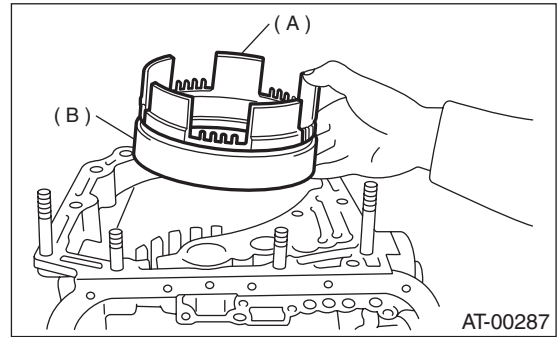
B: INSTALLATION

1) Install 2-4 brake piston to 2-4 brake piston retainer.



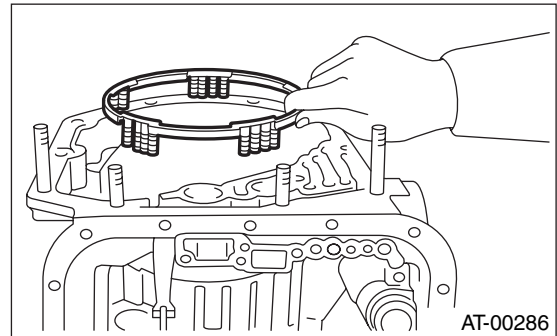
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

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

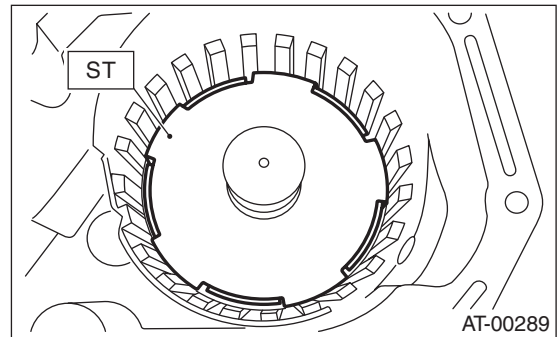


- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

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



4) Position snap ring in transmission. Using ST, press the snap ring into place.
ST 498677100 COMPRESSOR



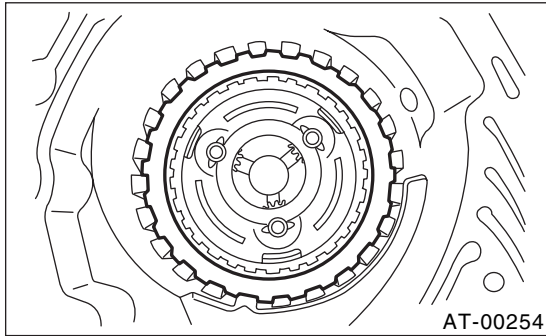
5) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-129, INSTALLATION, Planetary Gear and Low Clutch.>

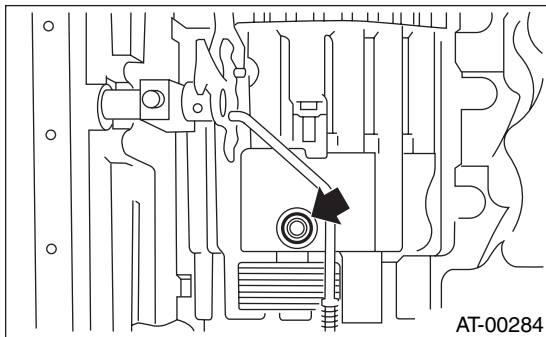
2-4 BRAKE

AUTOMATIC TRANSMISSION

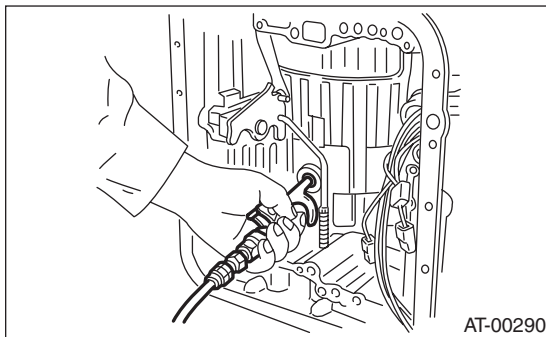
6) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



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

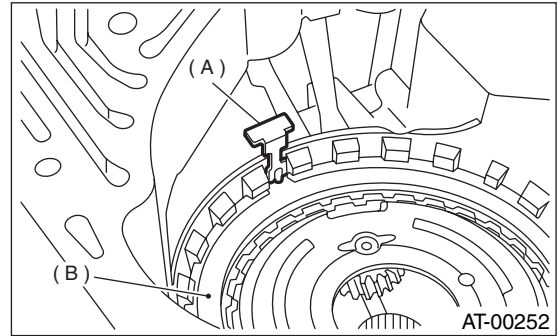


8) After all 2-4 brake components have been installed, blow in air intermittently and confirm the operation of the brake.



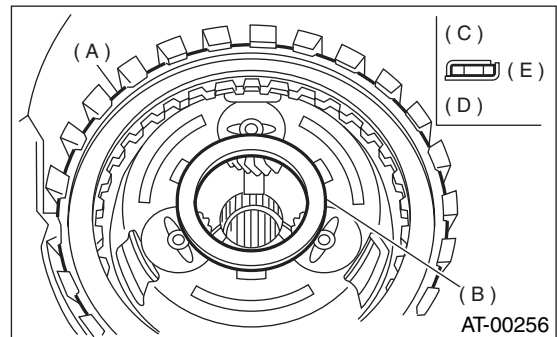
9) Inspect clearance between the retaining plate and snap ring. <Ref. to AT-139, INSPECTION, 2-4 brake.>

10) Be careful not to mistake the location of the leaf spring to be inserted.



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

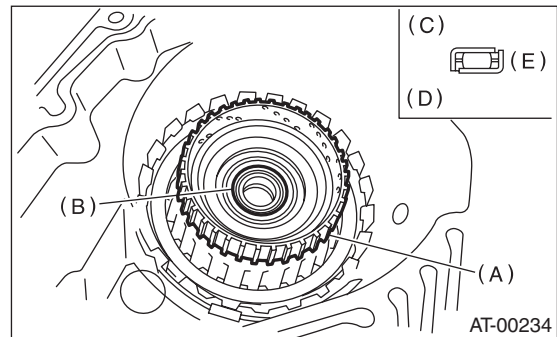
11) Install thrust needle bearing in the correct direction.



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

12) Install front sun gear.

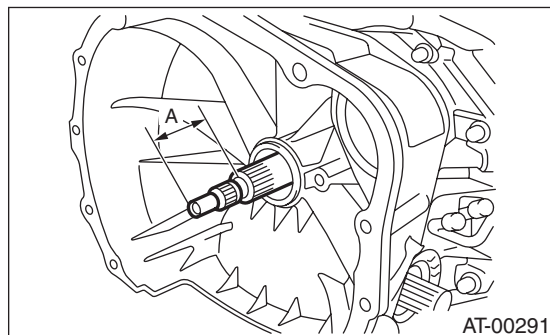
13) Install thrust needle bearing in the correct direction.



14) Install the high clutch assembly. <Ref. to AT-123, INSTALLATION, High Clutch and Reverse Clutch.>

15) Install oil pump housing to transmission case. <Ref. to AT-105, INSTALLATION, Oil Pump.>

- 16) Install the control valve body and oil pan. <Ref. to AT-59, INSTALLATION, Control Valve Body.>
- 17) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-102, INSTALLATION, Torque Converter Clutch Case.>
- 18) Install reduction driven gear. <Ref. to AT-94, INSTALLATION, Reduction Driven Gear.>
- 19) Install reduction drive gear. (MPT model) <Ref. to AT-96, INSTALLATION, Reduction Drive Gear.>
- 20) Install the center differential carrier. (VTD model) <Ref. to AT-98, INSTALLATION, Center Differential Carrier.>
- 21) Insert inhibitor switch and transmission connector into stay.
- 22) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>
- 23) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>
- 24) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>
- 25) Insert the input shaft while turning lightly by hand.

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

- 26) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>
- 27) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

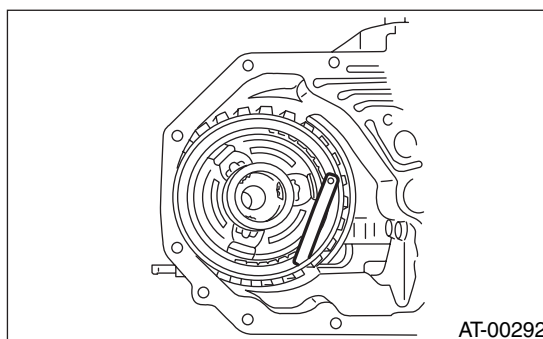
C: INSPECTION

1) Check the following items.

- Drive plate facing for wear or damage
 - Snap ring for wear and spring retainer for deformation
 - Lip seal and D ring for damage
 - Measure the total end play and adjust to within specifications. <Ref. to AT-109, ADJUSTMENT, Oil Pump.>
- 2) Inspect clearance between the retaining plate and snap ring.

NOTE:

Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.

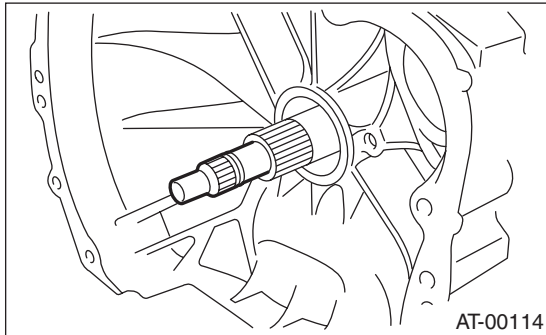
Standard:**0.8 — 1.2 mm (0.031 — 0.047 in)****Service limit:****1.5 mm (0.059 in)**

Available retaining plates	
Part No.	Thickness mm (in)
31567AA612	5.6 (0.220)
31567AA622	5.8 (0.228)
31567AA632	6.0 (0.236)
31567AA642	6.2 (0.244)
31567AA652	6.4 (0.252)
31567AA662	6.6 (0.260)

41. One-way Clutch

A: REMOVAL

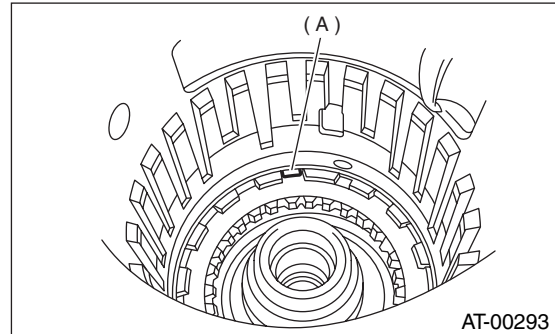
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate torque converter clutch case and transmission case. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-79, REMOVAL, Extension Case.>
- 11) Remove the reduction driven gear. <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>
- 12) Remove the reduction drive gear. (MPT model) <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>
- 13) Remove the center differential carrier. (VTD model) <Ref. to AT-98, REMOVAL, Center Differential Carrier.>
- 14) Remove control valve assembly. <Ref. to AT-58, REMOVAL, Control Valve Body.>
- 15) Remove the oil pump housing. <Ref. to AT-104, REMOVAL, Oil Pump.>
- 16) Take out the high clutch and reverse clutch assembly. <Ref. to AT-122, REMOVAL, High Clutch and Reverse Clutch.>
- 17) Take out the thrust needle bearing, planetary gear assembly. <Ref. to AT-128, REMOVAL, Planetary Gear and Low Clutch.>

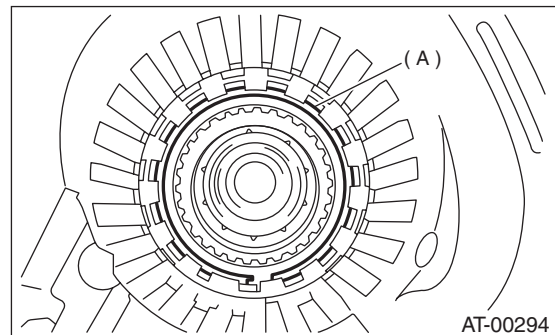
- 18) Take out 2-4 brake return spring, piston and piston retainer. <Ref. to AT-136, REMOVAL, 2-4 brake.>

- 19) Pull out the leaf spring without folding.



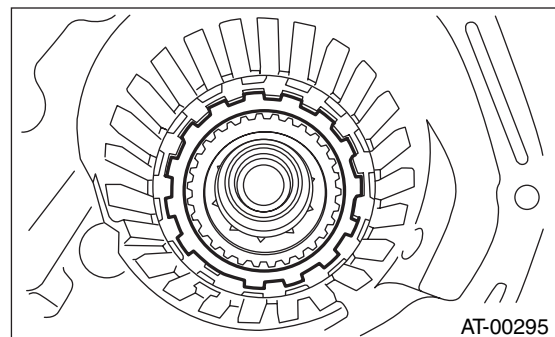
(A) Leaf spring

- 20) Remove the snap ring.

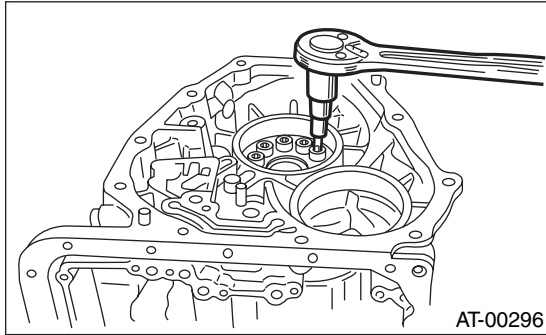


(A) Snap ring

- 21) Take out retaining plate, drive plate, driven plate and dish plate.



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

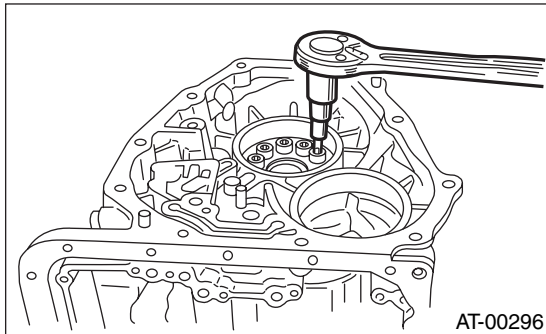


B: INSTALLATION

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

Tightening torque:

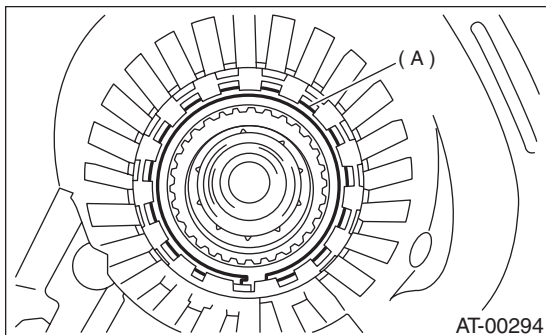
25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 3) Place transmission case with the front facing up.
- 4) Install thrust needle bearing.
- 5) Installation of the low & reverse brake: Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

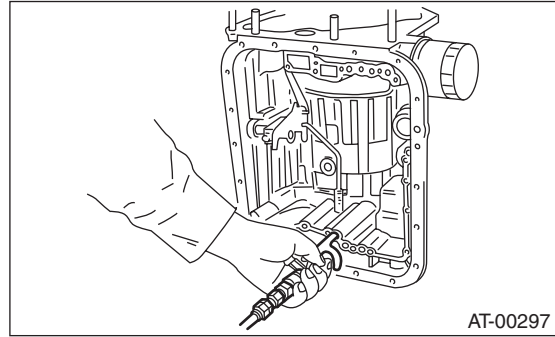
NOTE:

Pay attention to the orientation of the dish plate.



(A) Snap ring

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



- 7) Check the clearance and select retaining plate. <Ref. to AT-146, INSPECTION, Low and Reverse Brake.>
- 8) Install 2-4 brake. <Ref. to AT-137, INSTALLATION, 2-4 brake.>
- 9) Install planetary gear and low clutch assembly to transmission case.
Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-129, INSTALLATION, Planetary Gear and Low Clutch.>
- 10) Install the high clutch assembly. <Ref. to AT-123, INSTALLATION, High Clutch and Reverse Clutch.>
- 11) Install the oil pump housing assembly. <Ref. to AT-105, INSTALLATION, Oil Pump.>
- 12) Install control valve assembly and oil pan. <Ref. to AT-59, INSTALLATION, Control Valve Body.>
- 13) Install the torque converter clutch case assembly. <Ref. to AT-102, INSTALLATION, Torque Converter Clutch Case.>
- 14) Install reduction driven gear. <Ref. to AT-94, INSTALLATION, Reduction Driven Gear.>
- 15) Install reduction drive gear. (MPT model)
- 16) Install the center differential carrier. (VTD model) <Ref. to AT-98, INSTALLATION, Center Differential Carrier.>
- 17) Install the extension case to the transmission case. <Ref. to AT-79, INSTALLATION, Extension Case.>
- 18) Install the rear vehicle speed sensor.

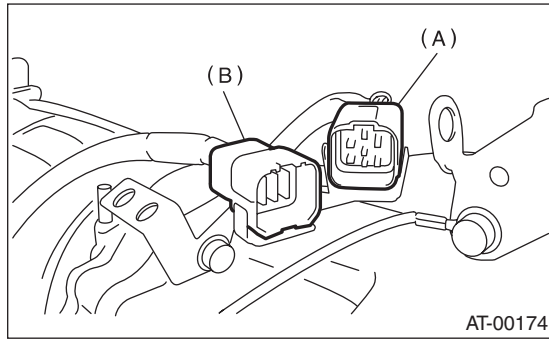
Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)

ONE-WAY CLUTCH

AUTOMATIC TRANSMISSION

19) Insert inhibitor switch and transmission connector into stay.



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

20) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>

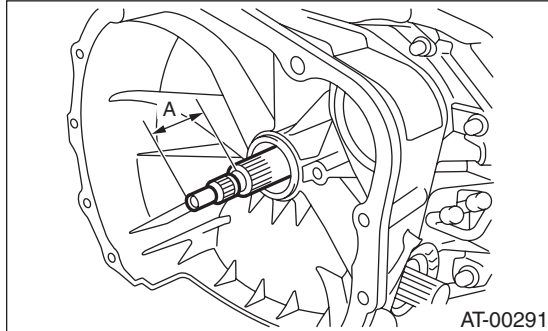
21) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>

22) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>

23) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



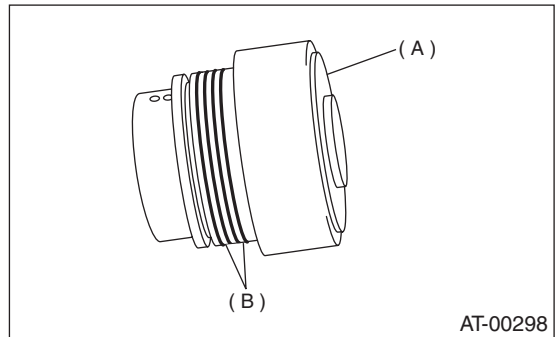
24) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>

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

C: DISASSEMBLY

1. ONE-WAY CLUTCH INNER RACE

1) Remove the seal ring.

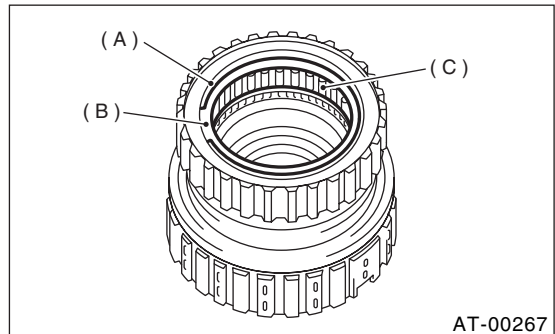


- (A) One-way clutch inner race
(B) Seal ring

2) Using ST, remove needle bearing.
ST 398527700 PULLER ASSY

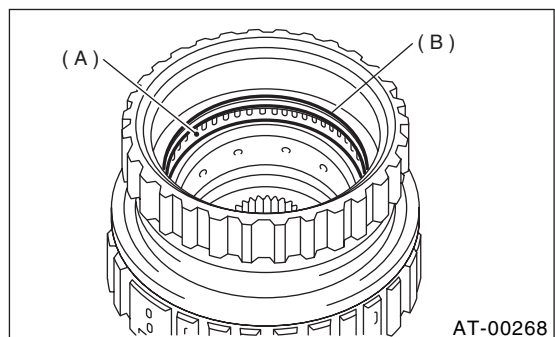
2. ONE-WAY CLUTCH OUTER RACE

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.



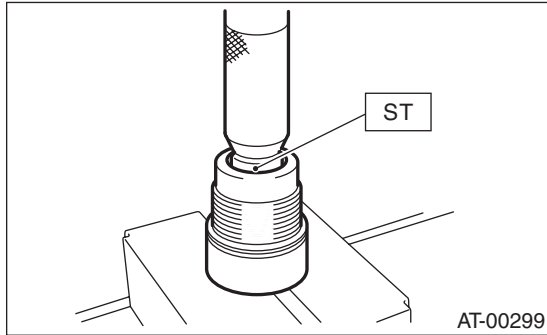
- (A) Needle bearing
(B) Snap ring

D: ASSEMBLY

1. ONE-WAY CLUTCH INNER RACE

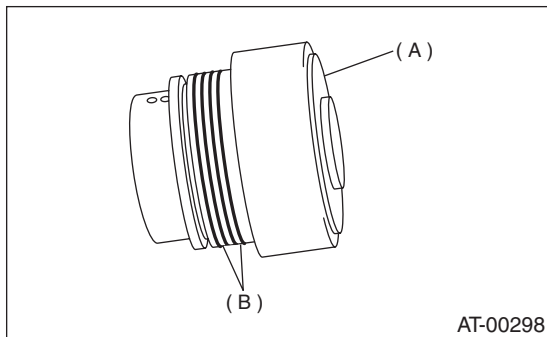
1) Using a press and ST, install the needle bearing to the inner race.

ST 398497701 INSTALLER



2) Apply petrolatum to the groove of the inner race and to the seal ring.

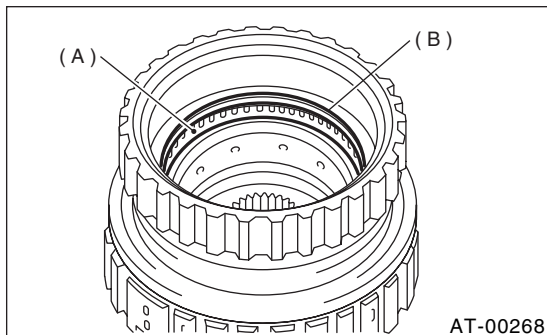
3) Install two seal rings to one-way clutch inner race.



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

2. ONE-WAY CLUTCH OUTER RACE

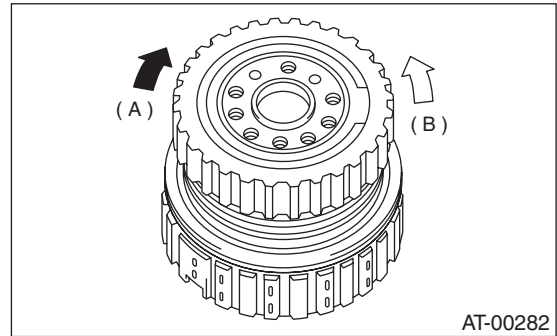
1) Install the needle bearing, and secure with the snap ring.



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

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

3) Set the inner race. 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

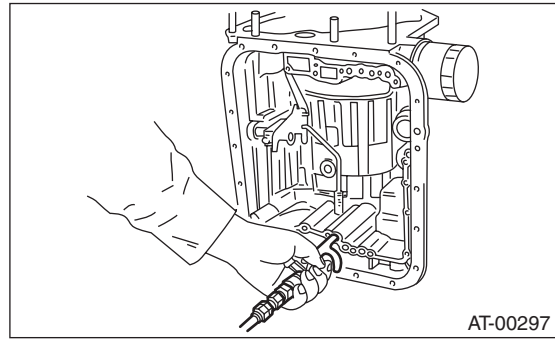
- Make sure the snap ring is not worn and the seal rings are not damaged.
- Measure the total end play and adjust to within specifications. <Ref. to AT-109, ADJUSTMENT, Oil Pump.>

42.Low and Reverse Brake

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-77, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-73, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate torque converter clutch case and transmission case. <Ref. to AT-101, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-79, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. <Ref. to AT-96, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-98, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-93, REMOVAL, Reduction Driven Gear.>
- 14) Remove the oil pump housing. <Ref. to AT-104, REMOVAL, Oil Pump.>
- 15) Remove control valve assembly. <Ref. to AT-58, REMOVAL, Control Valve Body.>
- 16) Take out the high clutch and reverse clutch assembly. <Ref. to AT-122, REMOVAL, High Clutch and Reverse Clutch.>
- 17) Take out the thrust needle bearing, planetary gear assembly. <Ref. to AT-128, REMOVAL, Planetary Gear and Low Clutch.>
- 18) Take out 2-4 brake return spring, piston and piston retainer. <Ref. to AT-136, REMOVAL, 2-4 brake.>
- 19) Remove one-way clutch inner race. <Ref. to AT-140, REMOVAL, One-way Clutch.>

- 20) Take out the low & reverse piston by applying compressed air.



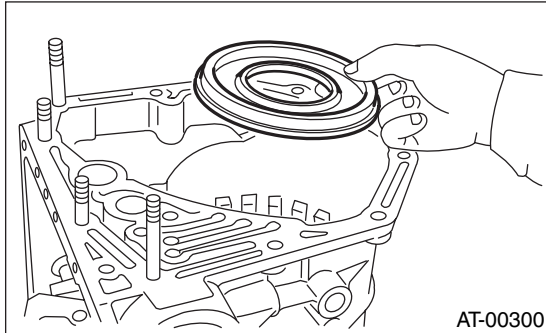
- 21) Take out the spring retainer, return spring and low & reverse piston.

B: INSTALLATION

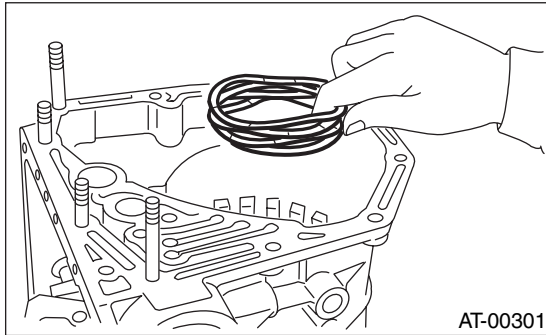
1) Install the low and reverse piston without tilting.

NOTE:

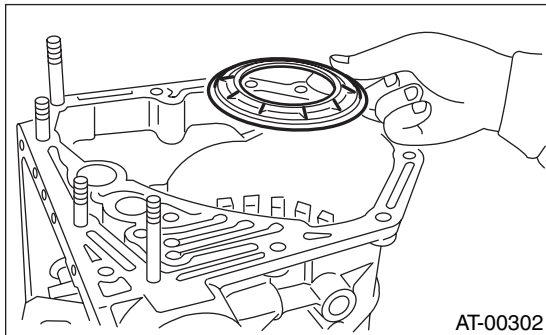
Be careful not to damage the lip seal.



2) Install return spring.



3) Install spring retainer.



4) Install the one-way clutch inner race. <Ref. to AT-141, INSTALLATION, One-way Clutch.>

5) Install thrust needle bearing.

NOTE:

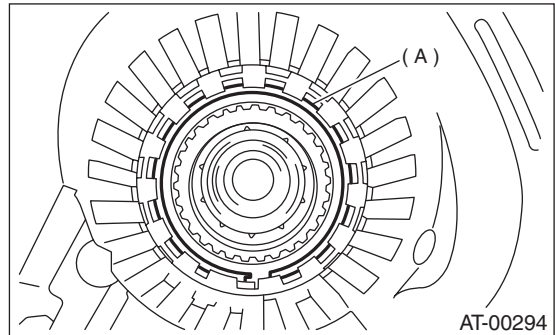
Place transmission case with the front facing up.

6) Installation of the low & reverse brake:

Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

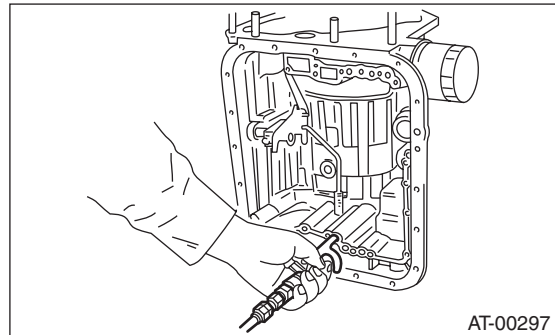
NOTE:

Pay attention to the orientation of the dish plate.



(A) Snap ring

7) Apply compressed air intermittently to check for operation.



8) Check the clearance and select retaining plate. <Ref. to AT-146, INSPECTION, Low and Reverse Brake.>

9) Install 2-4 brake piston, retainer and return spring to transmission case. <Ref. to AT-137, INSTALLATION, 2-4 brake.>

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

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-129, INSTALLATION, Planetary Gear and Low Clutch.>

11) Install the high clutch assembly. <Ref. to AT-123, INSTALLATION, High Clutch and Reverse Clutch.>

12) Install the oil pump housing assembly. <Ref. to AT-105, INSTALLATION, Oil Pump.>

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

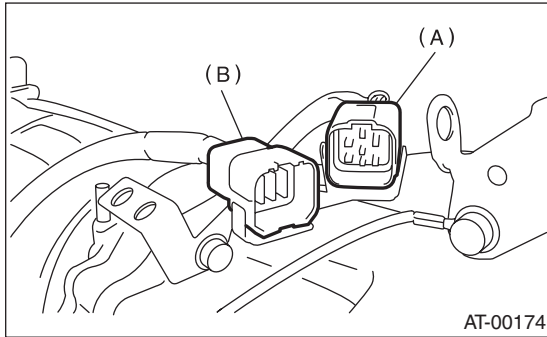
14) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-102, INSTALLATION, Torque Converter Clutch Case.>

15) Install reduction driven gear. <Ref. to AT-94, INSTALLATION, Reduction Driven Gear.>

LOW AND REVERSE BRAKE

AUTOMATIC TRANSMISSION

- 16) Install reduction drive gear. (MPT model) <Ref. to AT-96, INSTALLATION, Reduction Drive Gear.>
17) Install the center differential carrier. (VTD model) <Ref. to AT-98, INSTALLATION, Center Differential Carrier.>
18) Install the extension case and rear vehicle speed sensor to the transmission case. <Ref. to AT-79, INSTALLATION, Extension Case.>
19) Insert inhibitor switch and transmission connector into stay.

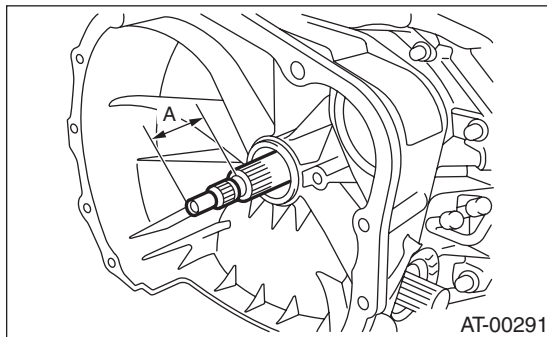


- (A) Transmission harness
(B) Inhibitor switch harness

- 20) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>
21) Install the oil cooler pipes. <Ref. to AT-74, INSTALLATION, ATF Cooler Pipe and Hose.>
22) Install the oil charger pipe with O-ring. <Ref. to AT-77, INSTALLATION, Oil Charger Pipe.>
23) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



- 24) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>
25) Install the transmission assembly to the vehicle. <Ref. to AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Check for the following.

- Drive plate facing for wear or damage

- Snap ring for wear and spring retainer for deformation

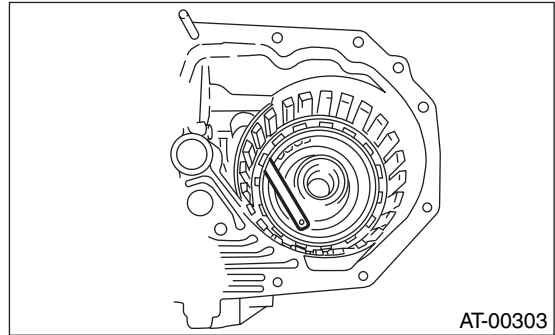
- 1) Place the same thickness of shim on both sides to prevent retaining plate from tilting.
- 2) Inspect clearance and select retaining plate.

Standard:

0.7 — 1.2 mm (0.028 — 0.047 in)

Service limit:

2.2 mm (0.087 in)

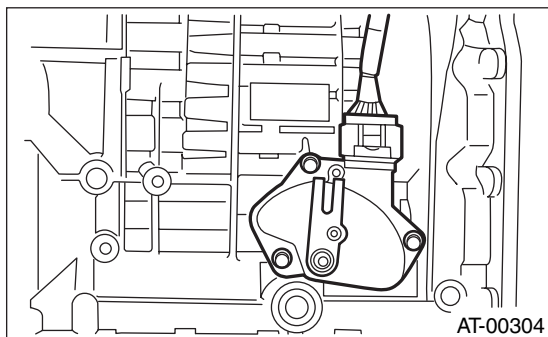


Available retaining plates	
Part No.	Thickness mm (in)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

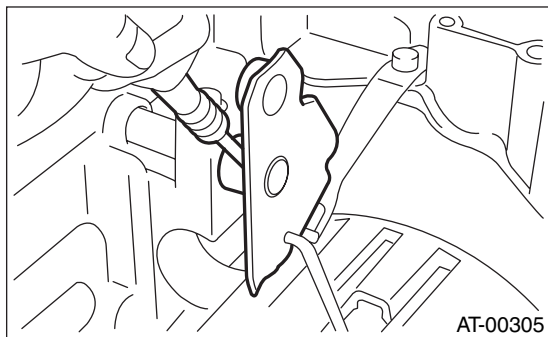
43. Transmission Control Device

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-78, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect the air breather hose. <Ref. to AT-76, REMOVAL, Air Breather Hose.>
- 6) Disconnect inhibitor switch connector from stay.
- 7) Wrap vinyl tape around the nipple attached to the air breather hose.
- 8) Remove pitching stopper bracket.
- 9) Remove the inhibitor switch.



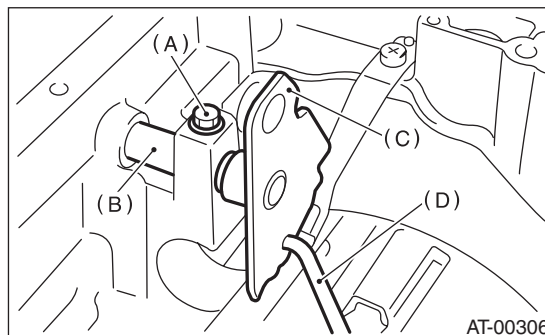
- 10) Remove control valve body assembly. <Ref. to AT-58, REMOVAL, Control Valve Body.>
- 11) Pull off the straight pin of manual plate.



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

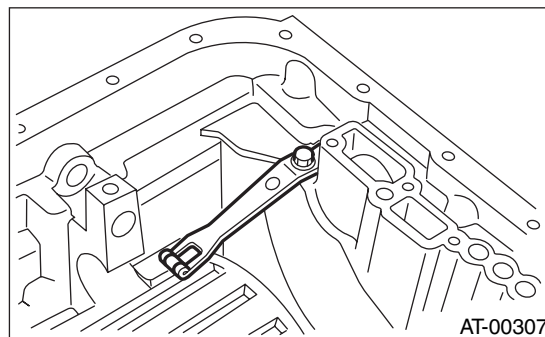
NOTE:

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



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

- 13) Remove the detention spring.

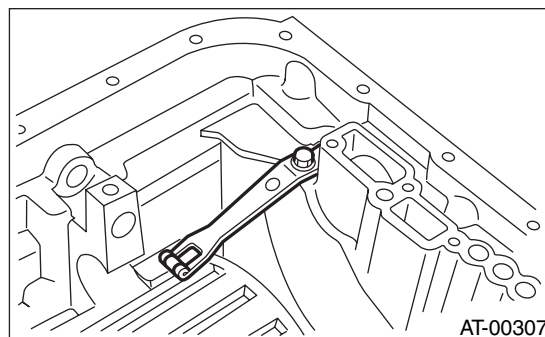


B: INSTALLATION

- 1) Install detention spring to transmission case.

Tightening torque:

6 N·m (0.6 kgf-m, 4.3 ft-lb)



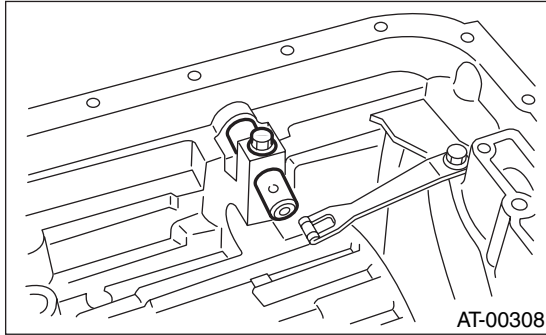
TRANSMISSION CONTROL DEVICE

AUTOMATIC TRANSMISSION

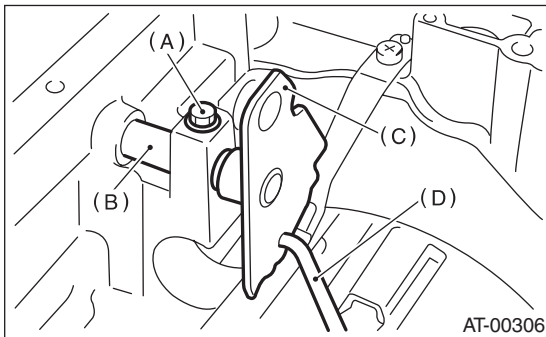
2) Insert range select lever, and tighten bolt.

Tightening torque:

6 N·m (0.6 kgf-m, 4.3 ft-lb)

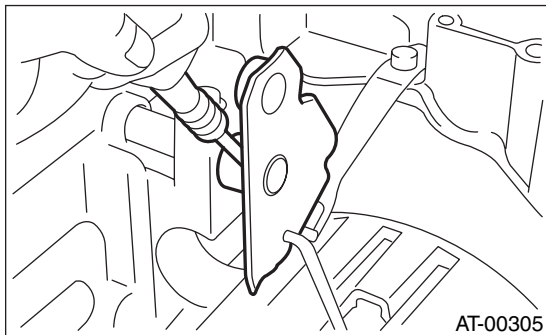


3) Insert manual plate and parking rod.



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

4) Insert spring pin to manual plate.



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

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

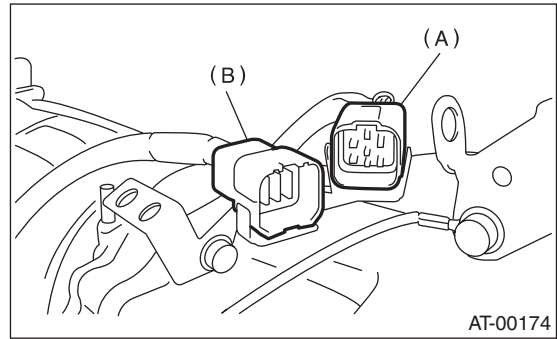
7) Install pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)

8) Install inhibitor switch and adjust the inhibitor switch. <Ref. to AT-48, Inhibitor Switch.>

9) Insert inhibitor switch and transmission connector into stay.



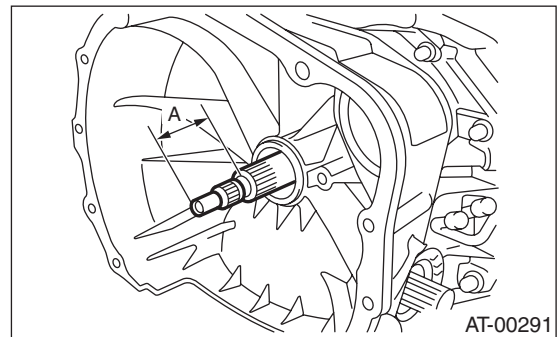
- (A) Transmission harness
- (B) Inhibitor switch harness

10) Install air breather hose. <Ref. to AT-76, INSTALLATION, Air Breather Hose.>

11) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to AT-78, INSTALLATION, Torque Converter Clutch Assembly.>

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

C: INSPECTION

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

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 checklist. <Ref. to AT-4, Check List for Interview.> 2)Before performing diagnosis, inspect the following items which might influence the AT problems. •General inspection <Ref. to AT-5, INSPECTION, General Description.> •Oil leak •Stall speed test <Ref. to AT-33, Stall Test.> •Line pressure test <Ref. to AT-36, Line Pressure Test.> •Transfer clutch pressure test <Ref. to AT-38, Transfer Clutch Pressure Test.> •Time lag test <Ref. to AT-35, Time Lag Test.> •Road test <Ref. to AT-32, Road Test.> •Inhibitor switch <Ref. to AT-48, Inhibitor Switch.> Is the unit that might influence the AT problem normal?	Units are normal.	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 turn on?	The AT OIL TEMP warning light turns on.	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 AT-31, Diagnostic Procedure for AT OIL TEMP Warning Light.> 3)Turn the ignition switch to ON. Is the AT OIL TEMP warning light flashing?	The AT OIL TEMP warning light flashes.	Go to step 4.	Go to step 5.
4 CHECK INDICATION OF DTC. Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-24, WITHOUT SUBARU SELECT MONITOR, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-25, WITH SUBARU SELECT MONITOR, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to AT-39, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.> Is the diagnostic trouble code (DTC) displayed?	The diagnostic trouble code (DTC) is displayed.	Go to step 6. NOTE: Record all diagnostic trouble code (DTC).	Go to step 5.

BASIC DIAGNOSTIC PROCEDURE

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 PERFORM THE GENERAL DIAGNOSTICS. 1)Inspect using the "Diagnostic Procedure for No-Diagnostic trouble Code".<Ref. to AT-121, Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).> 2)Inspect using the "Symptom Related Diagnostic". <Ref. to AT-141, Symptom Related Diagnostic.> 3)Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-27, WITH SUBARU SELECT MONITOR, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-27, WITHOUT SUBARU SELECT MONITOR, Clear Memory Mode.> 4)Perform the inspection mode. <Ref. to AT-26, Inspection Mode.> Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-24, WITHOUT SUBARU SELECT MONITOR, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> Is the diagnostic trouble code (DTC) displayed?	The diagnostic trouble code (DTC) is displayed.	Go to step 6.	Complete the diagnosis.
6 PERFORM THE DIAGNOSIS. 1)Inspect using the "Diagnostics Chart with Diagnostic Trouble Code".<Ref. to AT-44, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For trouble code table, refer to the "List of Diagnostic Trouble Code".<Ref. to AT-29, List of Diagnostic Trouble Code (DTC).> 2)Repair the trouble cause. 3)Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-27, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-27, WITHOUT SUBARU SELECT MONITOR, Clear Memory Mode.> 4)Perform the inspection mode. <Ref. to AT-26, Inspection Mode.> 5)Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-24, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> Is the diagnostic trouble code (DTC) displayed?	The diagnostic trouble code (DTC) is displayed.	Inspect using the "Diagnostics Chart with Diagnostic Connector". <Ref. to AT-44, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

CHECK LIST FOR INTERVIEW

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. Check List for Interview

NOTE:

Use copies of this page for interviewing customers.

A: CHECK

Check the following items when problem has occurred.

Customer's name			
Data vehicle brought in			
Data of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km/h or mile		
Frequency	☐ Continuous ☐ Intermittent (times a day)		
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others ()		
Place	☐ High ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Rough road ☐ Others ()		
Outdoor temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold		
Vehicle speed	km/h (MPH)		
Malfunction indicator lamp (MIL)	☐ Continuously lit		☐ Not lit
Select lever position	☐ P ☐ R ☐ N ☐ D ☐ 3 ☐ 2 ☐ 1		
Driving condition	☐ Not affected ☐ At racing ☐ While decelerating	☐ At starting ☐ While accelerating ☐ While turning (☐ RH/ ☐ LH)	☐ While idling ☐ While cruising
Symptoms	☐ No up-shift		
	☐ No down-shift		
	☐ No kick down		
	☐ Vehicle does not move (☐ Any position ☐ Particular position)		
	☐ Lock-up malfunction		
	☐ Noise or vibration		
	☐ Shift shock or slip		
	☐ Select lever does not move		
☐ Others ()			

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. General Description

A: CAUTION

- **Supplemental Restraint System “Airbag”**

The airbag system wiring harness is routed near the transmission control module (TCM).

CAUTION:

- All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage the airbag system wiring harness when performing diagnostics and servicing the TCM.
- **Measurement**

When measuring the voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 0.65 mm (0.0256 in).

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12V or more

Specific gravity: Above 1.260

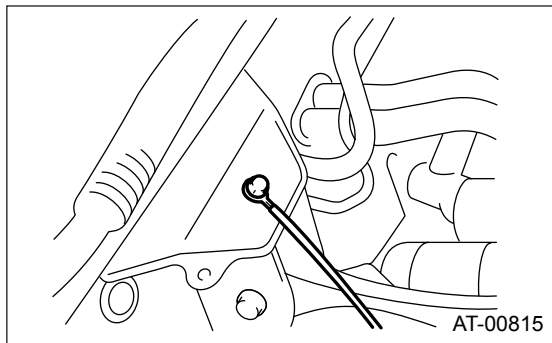
2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

- **Chassis side**

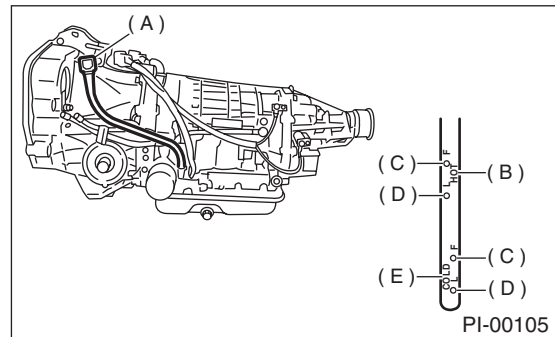
Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

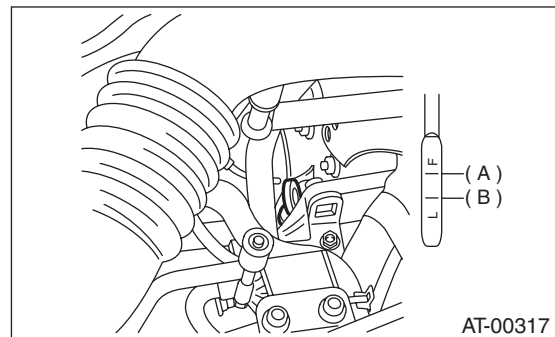
Make sure the ATF level is in the specification. <Ref. to AT-30, INSPECTION, INSPECTION, ATF.>



- (A) Level gauge
- (B) HOT side
- (C) Upper level
- (D) Lower level
- (E) COLD side

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure the front differential oil level is in the specification. <Ref. to AT-31, INSPECTION, Differential Gear Oil.>



- (A) Upper level
- (B) Lower level

GENERAL DESCRIPTION

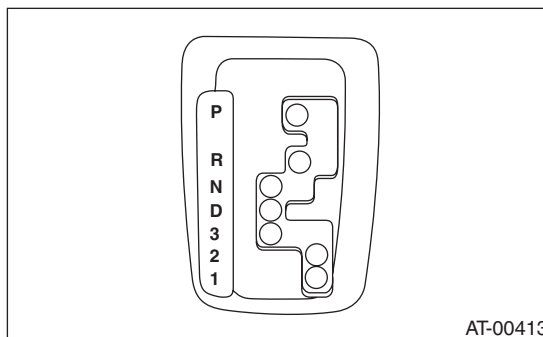
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

5. OPERATION OF SHIFT SELECT LEVER

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

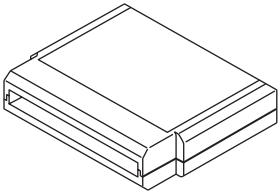
WARNING:

Stop the engine while checking operation of the selector lever.



C: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA210	24082AA210 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. - English: 22771AA030 (Without printer) - German: 22771AA070 (Without printer) - French: 22771AA080 (Without printer) - Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

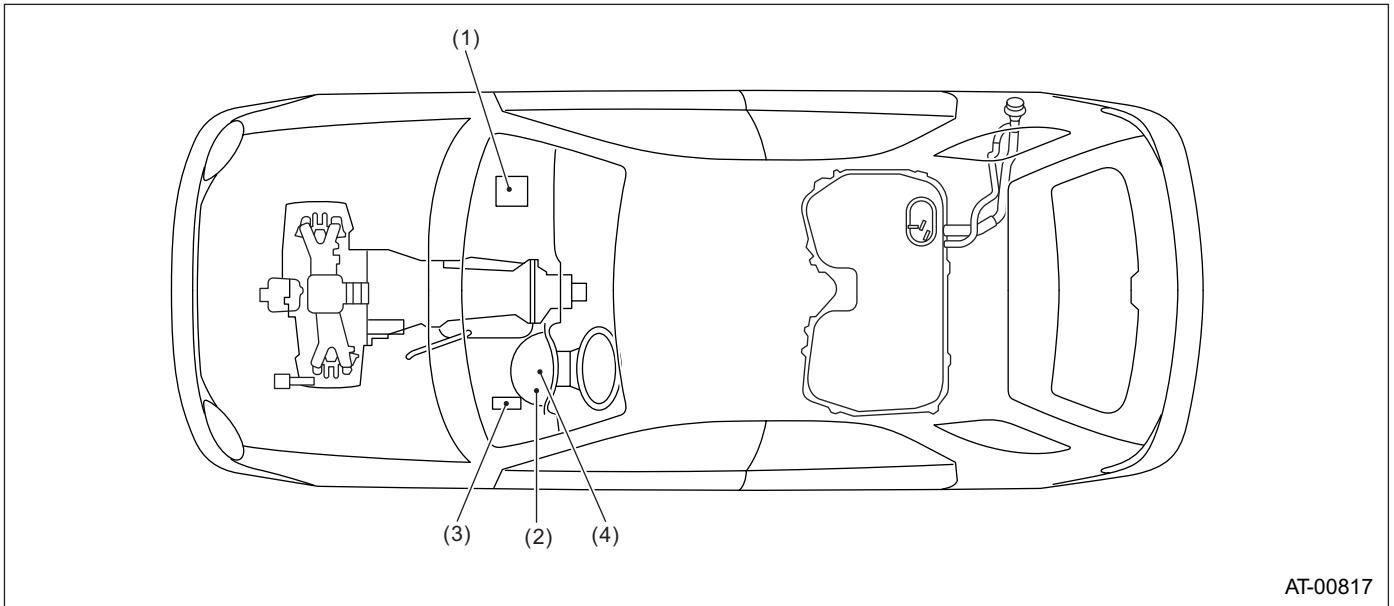
ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

4. Electrical Components Location

A: LOCATION

1. CONTROL MODULE

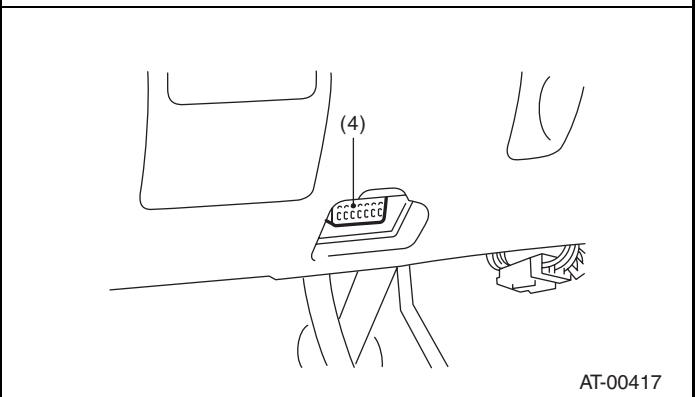
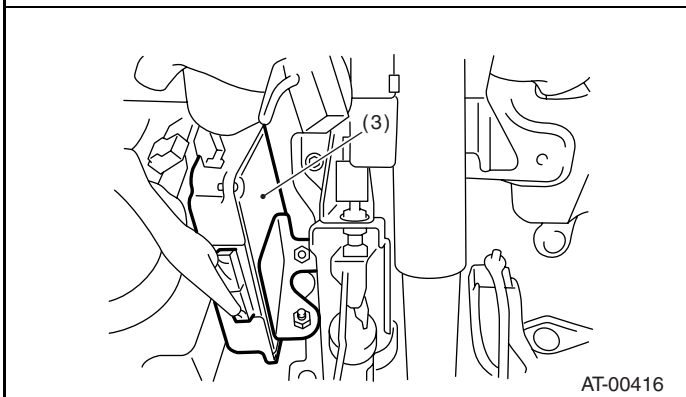
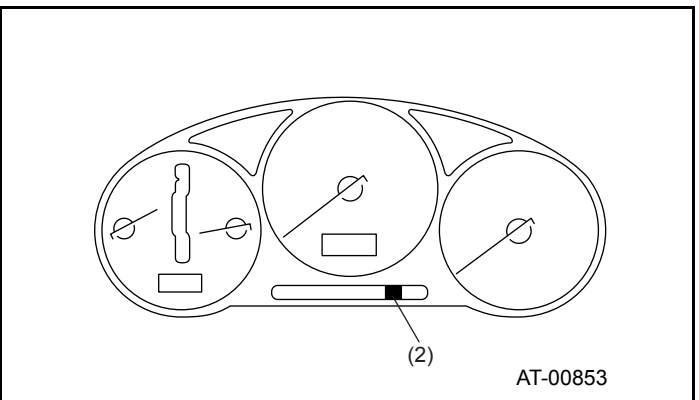
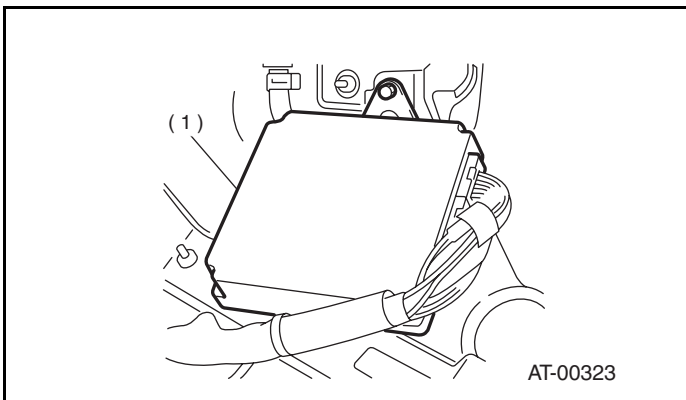


(1) Engine control module (ECM)

(2) ATF temperature warning light (AT diagnostic indicator light)

(3) Transmission control module (TCM)

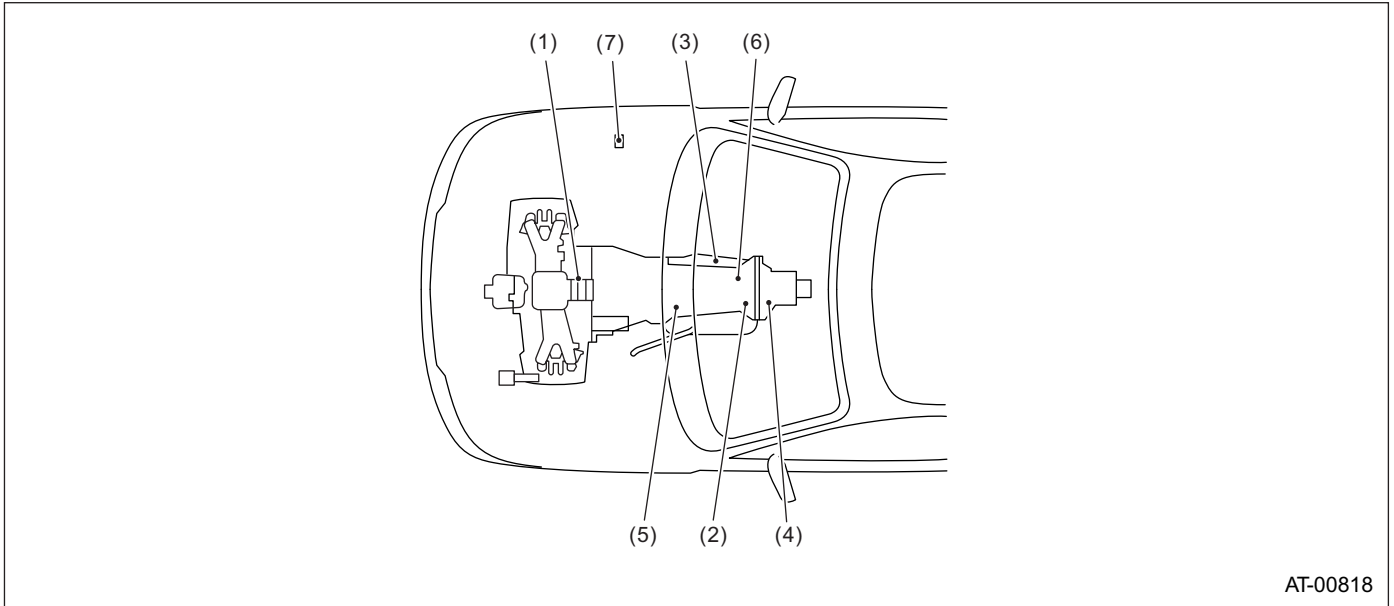
(4) Data link connector



ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. SENSOR

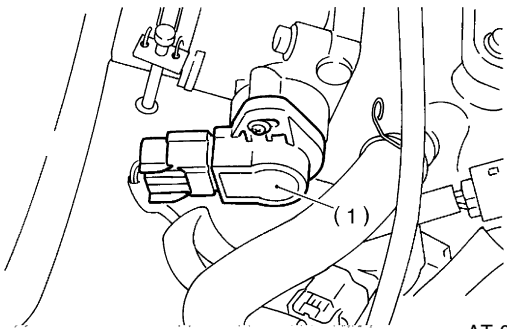
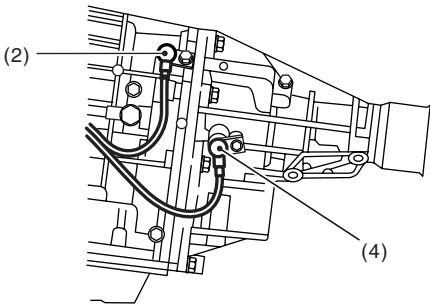
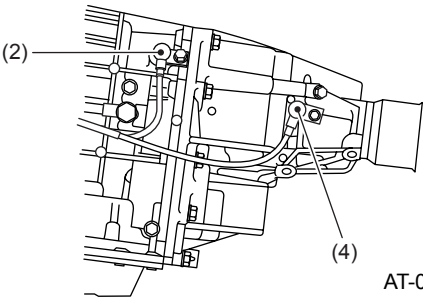
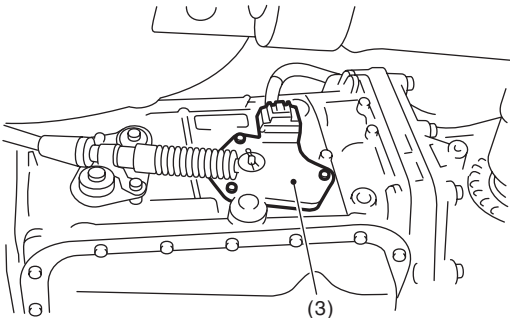
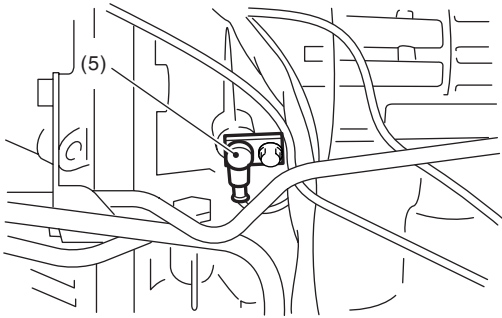
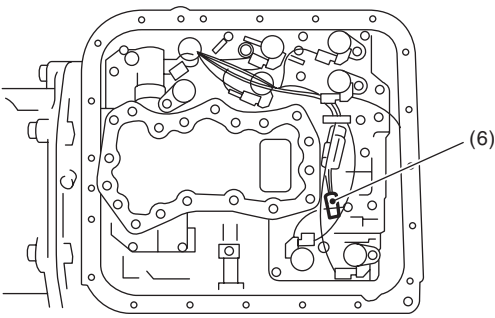
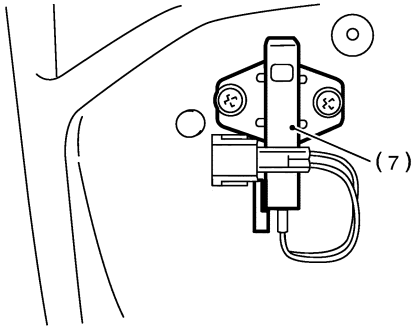


AT-00818

- | | | |
|--------------------------------|---|---|
| (1) Throttle position sensor | (4) Rear vehicle speed sensor | (6) ATF temperature sensor |
| (2) Front vehicle speed sensor | (5) Torque converter turbine speed sensor | (7) Dropping resistor (Non-turbo model) |
| (3) Inhibitor switch | | |

ELECTRICAL COMPONENTS LOCATION

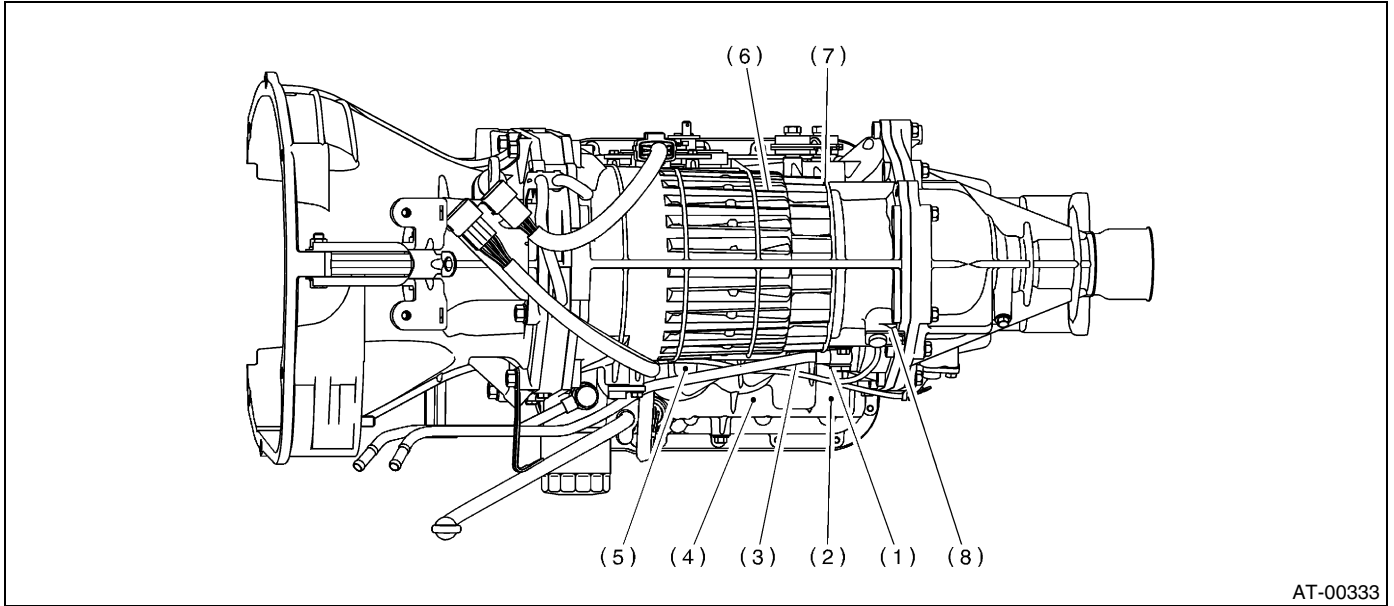
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

 AT-00328	Non-turbo model  AT-00329
Turbo model  AT-00819	 AT-00330
 AT-00331	 AT-00332
 AT-00820	SUBARU.

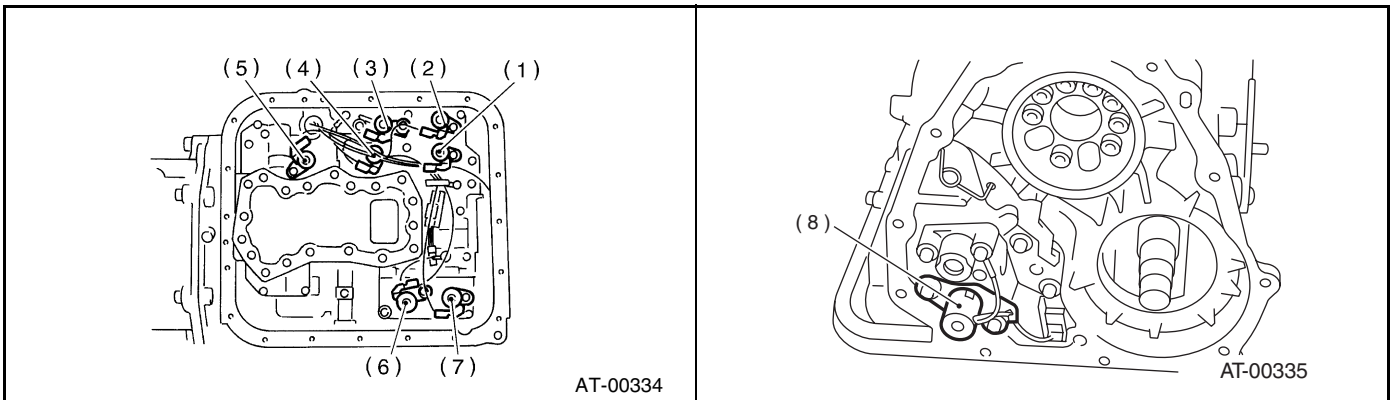
ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. SOLENOID



- | | | |
|---------------------------------|--------------------------------|-------------------------------|
| (1) Solenoid 1 | (4) Low clutch timing solenoid | (7) 2-4 brake timing solenoid |
| (2) Solenoid 2 | (5) Lock-up duty solenoid | (8) Transfer duty solenoid |
| (3) Line pressure duty solenoid | (6) 2-4 brake duty solenoid | |



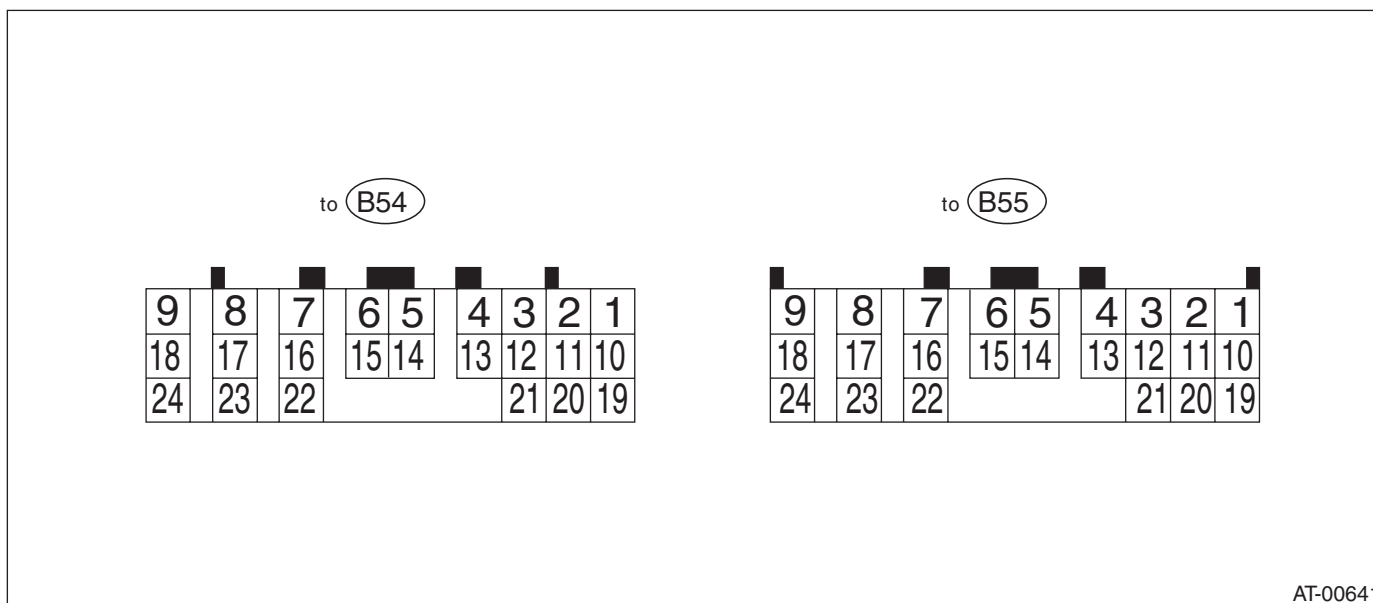
TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

A: ELECTRICAL SPECIFICATION

1. NON-TURBO MODEL



AT-00641

Check with ignition switch ON.						
Content		Con- nector No.	Termi- nal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B55	6	Ignition switch OFF	10 — 13	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 13	—
		B54	24			
Inhibitor switch	“P” range switch	B55	23	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	22	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	17	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 8	
	“D” range switch	B55	8	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 8	
	“3” range switch	B55	18	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B54	10	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B54	1	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	24	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Con- nector No.	Termi- nal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
ABS signal	B54	19	ABS switch ON	Less than 1	—
			ABS switch OFF	More than 6.5	
AT OIL TEMP light	B54	3	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	0.2 — 1.0	—
			Throttle fully open.	4.2 — 4.7	
Throttle position sensor power supply	B55	1	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	5	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor	B55	12	Engine idling after warm-up (D range)	0	450 — 650
			Engine idling after warm-up (N range)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF)	0	—
			Ignition switch ON (with engine ON)	0 — 13 or more	
Cruise set signal	B54	11	When cruise control is set (SET light ON)	Less than 1	—
			When cruise control is not set (SET light OFF)	More than 6.5	
Torque control signal 1	B54	13	Ignition switch ON (with engine ON)	More than 4.0	—
Torque control signal 2	B54	21	Ignition switch ON (with engine ON)	More than 4.0	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
Intake manifold pressure signal	B55	20	Engine idling after warm-up.	0.4 — 1.6	—
Shift solenoid 1	B54	7	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	6	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Dropping resistor	B54	18	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

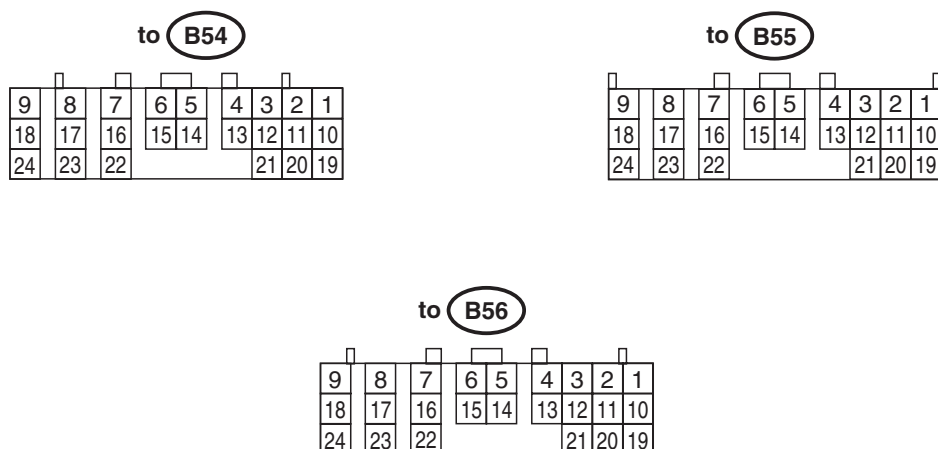
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Con- nector No.	Termi- nal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Lock-up duty solenoid	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	15	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	8	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 5.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake dropping resistor	B54	17	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	5	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B55	10	—	0	Less than 1
Sensor ground line 2	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	More than 9	—
			Fuse installed.	Less than 1	
FWD indicator light	B54	12	Fuse ONFWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
AT diagnosis signal	B54	4	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. TURBO MODEL



AT-00568

Check with ignition switch ON.					
Content	Con- nector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply	B56	1	Ignition switch OFF	10 — 13	—
Ignition power supply	B54	23	Ignition switch ON (with engine OFF)	10 — 13	—
	B54	24			

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.						
Content		Con- nector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Inhibitor switch	“P” range switch	B55	1	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	14	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	3	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 8	
	“D” range switch	B55	4	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 8	
	“3” range switch	B55	5	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B55	6	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B55	7	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
AT OIL TEMP warning light		B56	10	Light ON	Less than 1	—
				Light OFF	More than 9	
Throttle position sensor		B54	3	Throttle fully closed.	0.2 — 1.0	—
				Throttle fully open.	4.2 — 4.7	
Throttle position sensor power supply		B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor		B54	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 k — 2.9 k
				ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor		B55	24	Vehicle stopped.	0	450 — 650
				Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor		B55	18	Vehicle stopped.	0	450 — 650
				Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor		B55	8	Engine idling after warm- up. (D range)	0	450 — 650
				Engine idling after warm- up. (N range)	More than 1 (AC range)	
Vehicle speed output signal		B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal		B55	17	Ignition switch ON (with engine OFF)	0	—
				Ignition switch ON (with engine ON)	0 — 13 or more	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

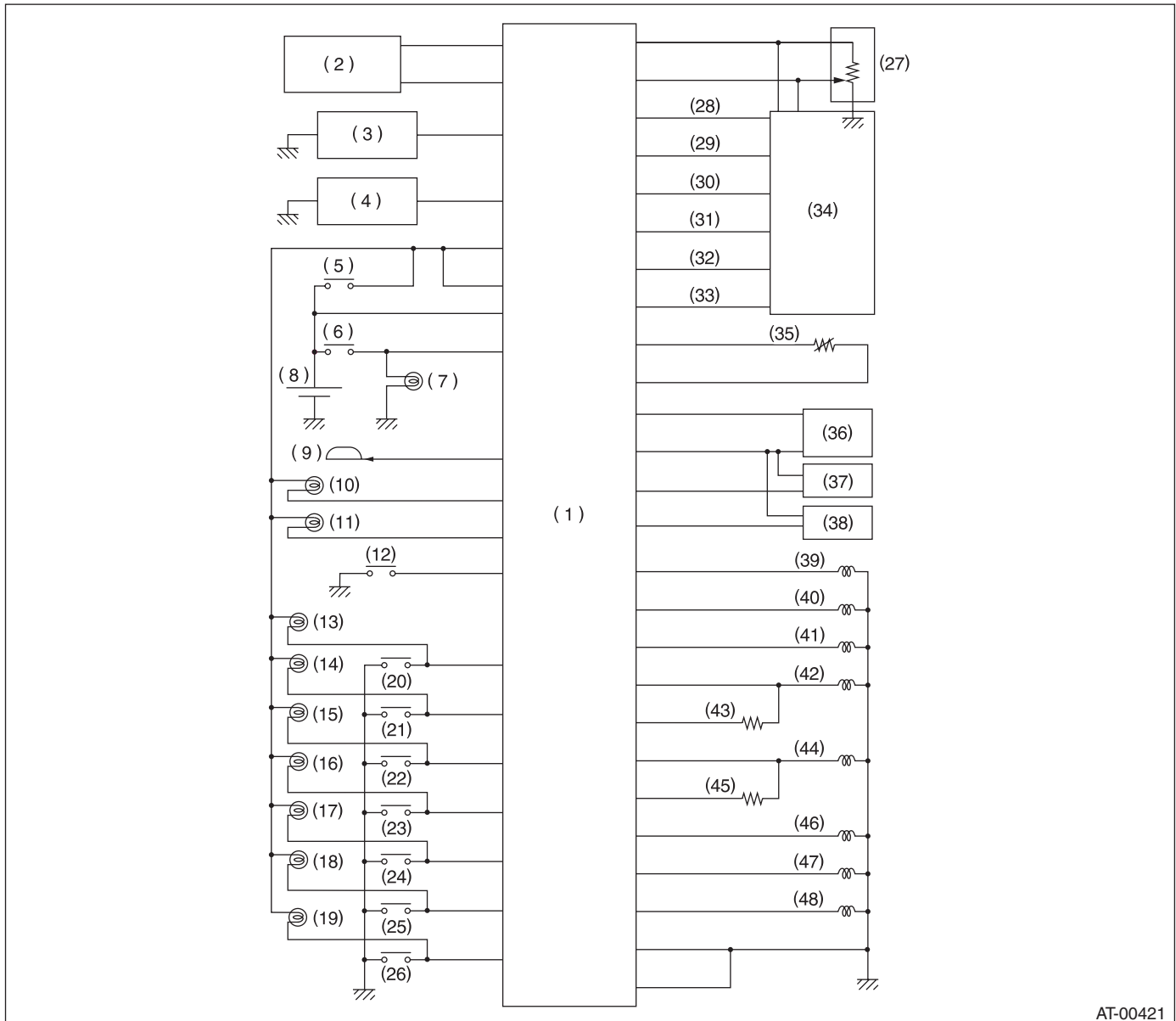
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Cruise set signal	B55	22	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B56	5	Ignition switch ON (with engine ON)	More than 4.0	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	More than 4.0	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Mass air flow signal	B54	1	Engine idling after warm-up.	0.9 — 1.4	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 5.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	6	—	More than 8.5	10 — 17
			Throttle fully open and with select lever in 1st gear.	Less than 0.5	
2-4 brake duty solenoid	B54	18	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 5.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
ABS signal	B55	21	ABS switch ON	Less than 1	—
			ABS switch OFF	More than 6.5	—
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	21			
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
AT diagnosis signal	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: SCHEMATIC

1. NON-TURBO MODEL



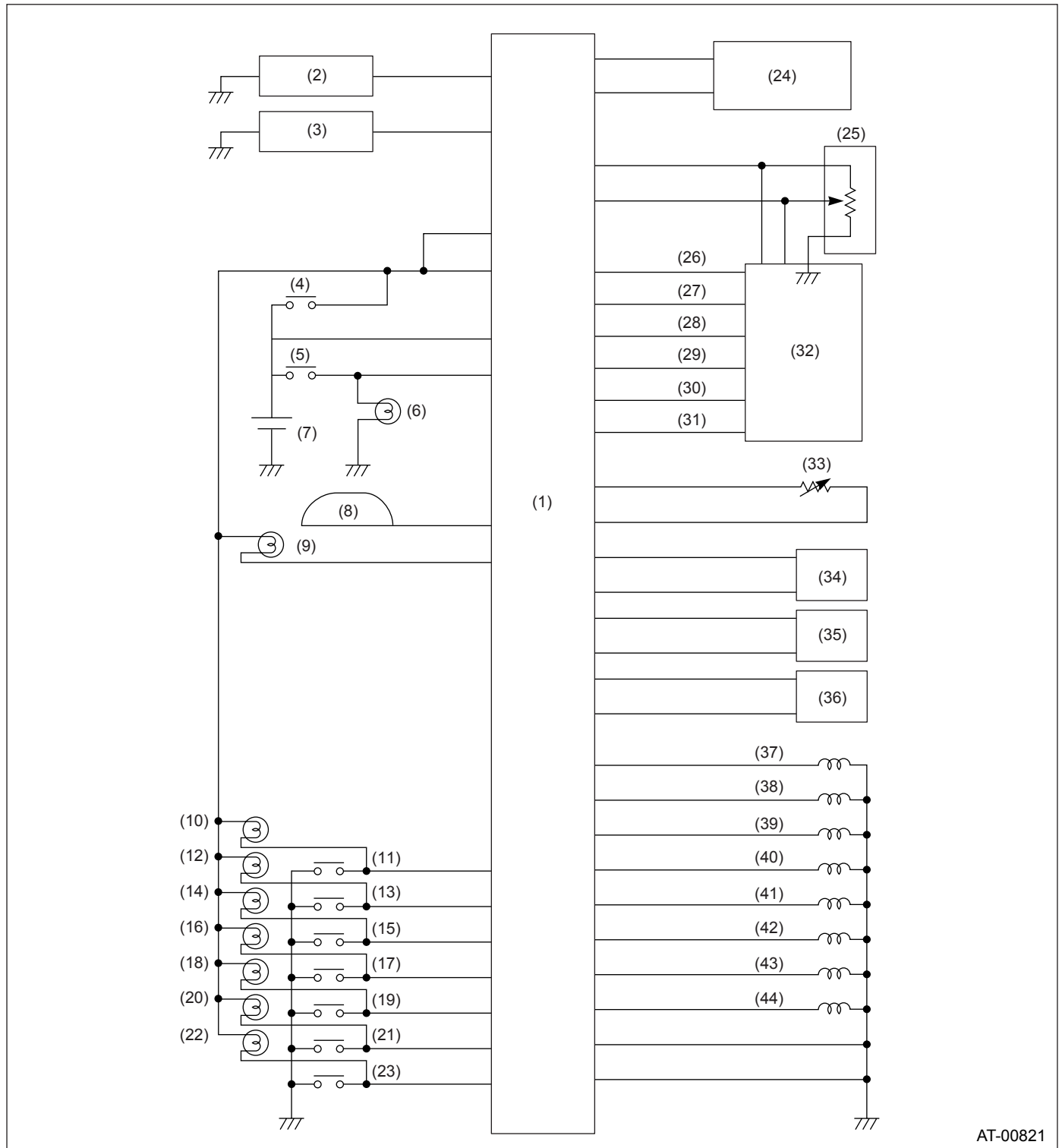
AT-00421

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

(1) Transmission control module	(18) "2" range indicator light	(35) ATF temperature sensor
(2) Data link connector	(19) "1" range indicator light	(36) Torque converter turbine speed sensor
(3) Cruise set switch	(20) "P" range switch	(37) Front vehicle speed sensor
(4) ABS control module	(21) "R" range switch	(38) Rear vehicle speed sensor
(5) Ignition switch	(22) "N" range switch	(39) Shift solenoid 1
(6) Brake switch	(23) "D" range switch	(40) Shift solenoid 2
(7) Brake light	(24) "3" range switch	(41) 2-4 brake timing solenoid
(8) Battery	(25) "2" range switch	(42) Line pressure duty solenoid
(9) Combination meter	(26) "1" range switch	(43) Line pressure dropping resistor
(10) AT OIL TEMP warning light	(27) Throttle position sensor	(44) 2-4 brake duty solenoid
(11) FWD indicator light	(28) Engine speed signal	(45) 2-4 brake dropping resistor
(12) FWD switch	(29) Torque control cut signal	(46) Lock-up duty solenoid
(13) "P" range indicator light	(30) Torque control signal 2	(47) Low clutch timing solenoid
(14) "R" range indicator light	(31) Torque control signal 1	(48) Transfer duty solenoid
(15) "N" range indicator light	(32) AT load signal	
(16) "D" range indicator light	(33) AT diagnostics signal	
(17) "3" range indicator light	(34) Engine control module	

2. TURBO MODEL



AT-00821

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

(1) Transmission control module	(16) "D" range indicator light	(32) Engine control module
(2) Cruise control module	(17) "D" range switch	(33) ATF temperature sensor
(3) ABS control module	(18) "3" range indicator light	(34) Torque converter turbine speed sensor
(4) Ignition switch	(19) "3" range switch	
(5) Brake switch	(20) "2" range indicator light	(35) Rear vehicle speed sensor
(6) Brake light	(21) "2" range switch	(36) Front vehicle speed sensor
(7) Battery	(22) "1" range indicator light	(37) Shift solenoid 1
(8) Combination meter (Speedometer circuit)	(23) "1" range switch	(38) Shift solenoid 2
(9) AT OIL TEMP light	(24) Data link connector	(39) 2-4 brake timing solenoid
(10) "P" range indicator light	(25) Throttle position sensor	(40) Line pressure duty solenoid
(11) "P" range switch	(26) Engine speed signal	(41) 2-4 brake duty solenoid
(12) "R" range indicator light	(27) Torque control cut signal	(42) Lock-up duty solenoid
(13) "R" range switch	(28) Torque control signal 2	(43) Low clutch timing solenoid
(14) "N" range indicator light	(29) Torque control signal 1	(44) Transfer duty solenoid
(15) "N" range switch	(30) Mass air flow signal	
	(31) AT diagnostics signal	

SUBARU SELECT MONITOR

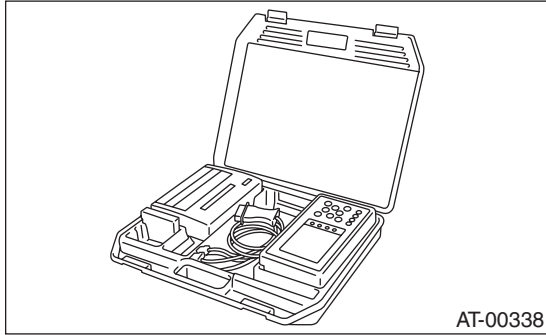
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

6. Subaru Select Monitor

A: OPERATION

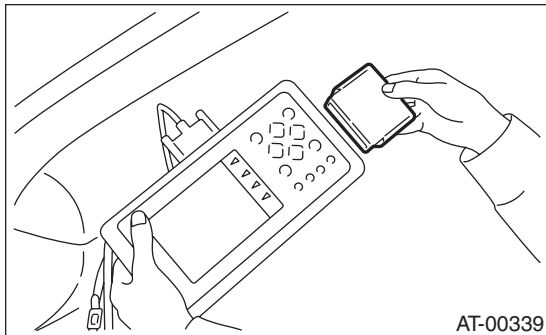
1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit.



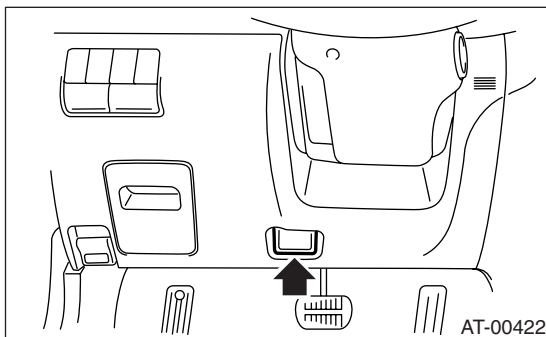
2) Connect the diagnosis cable to Subaru Select Monitor.

3) Insert the cartridge into Subaru Select Monitor.
<Ref. to AT-6, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).

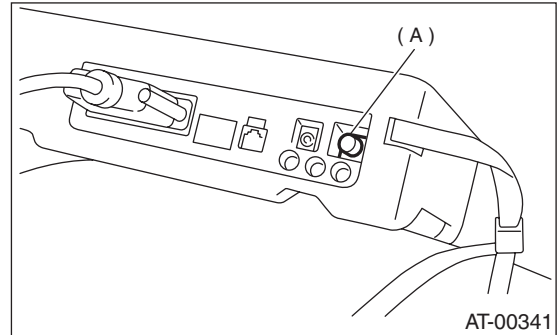


(2) Connect the diagnosis cable to data link connector.

CAUTION:

Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.

7) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.

8) Press the [YES] key after displayed the information of transmission type.

9) On the «Transmission Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

10) On the «Diagnostic Code(s) Display» display screen, select the {Latest Diagnostic Code(s)} or {Memorized Diagnostic Code(s)} and press the [YES] key.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

- For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE LIST (DTC). <Ref. to AT-29, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.

2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.

3) Press the [YES] key after displayed the information of transmission type.

4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.

SUBARU SELECT MONITOR

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

- 5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
- 6) Using the scroll key, move the display screen up or down until the desired data is shown.

- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Mass air flow sensor signal (Turbo model)	Air Flow Sensor Voltage	V
Intake manifold pressure sensor voltage (Non-turbo model)	Mani. Pressure Voltage	V
2 wheel drive switch signal (Non-turbo model)	FWD Switch	ON or OFF
Stop lamp switch signal	Stop Light Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Neutral/Parking range signal	N/P 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
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal 1	ON or OFF
Torque control output signal #2	Torque Control Signal 2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator lamp	Diagnosis Lamp	ON or OFF
AT OIL TEMP warning light	ATF Temperature Lamp	ON or OFF

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. CLEAR MEMORY MODE

- 1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
- 2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of transmission type.

- 4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.

- 5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

READ DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

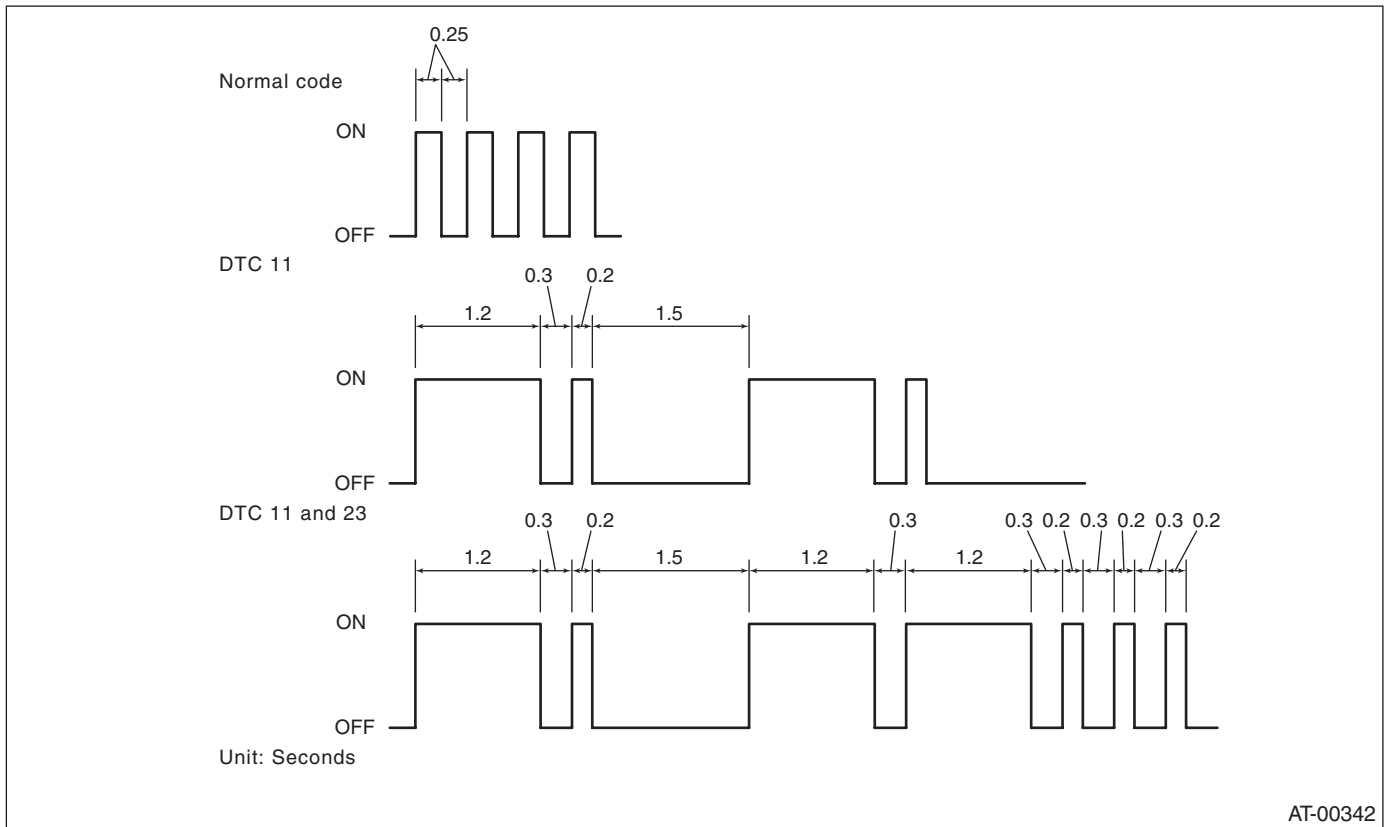
Step	Check	Yes	No
1 PERFORM READ DIAGNOSTIC TROUBLE CODE. 1)Warm-up the engine. 2)Turn the ignition switch to OFF. 3)Turn the ignition switch to ON. 4)Start the engine. 5)Drive the vehicle at speeds greater than 20 km/h (12 MPH). 6)Stop the vehicle. 7)Brake pedal depressed and move the select lever to 1 range. 8)Turn the ignition switch to OFF. 9)Turn the ignition switch to ON. 10)Move the select lever 2 range. 11)Move the select lever 1 range. 12)Move the select lever 2 range. 13)Move the select lever 3 range. 14)Move the select lever D range. Does the indicator light blink at 4-Hz intervals? NOTE: Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).	The light blinks at 4 Hz intervals.	Repair power supply and ground circuit.<Ref. to AT-36, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for AT OIL TEMP Warning Light.>	Go to step 2.
2 CHECK INDICATOR LIGHT. Does the indicator light blink at 2-Hz intervals? NOTE: Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).	The light blinks at 2 Hz intervals.	AT system is normal.	Go to step 3.
3 CHECK INDICATOR LIGHT. Is the diagnostic trouble code (DTC) displayed?	The diagnostic trouble code (DTC) is displayed.	Inspect the problem corresponding with diagnostic trouble code (DTC). NOTE: Record all diagnostic trouble code (DTC).	Go to step 4.
4 CHECK INDICATOR LIGHT. Does the indicator light remain illuminated?	The indicator light remains on.	Repair the AT OIL TEMP warning light circuit <Ref. to AT-31, Diagnostic Procedure for AT OIL TEMP Warning Light.>, or Inspect inhibitor switch, wiring, TCM, etc.	Calling up the diagnostic trouble code (DTC) again.

READ DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

The AT OIL TEMP warning light flashes the code corresponding to the faulty part.

The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



2. WITH SUBARU SELECT MONITOR

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-22, OPERATION, Subaru Select Monitor.>

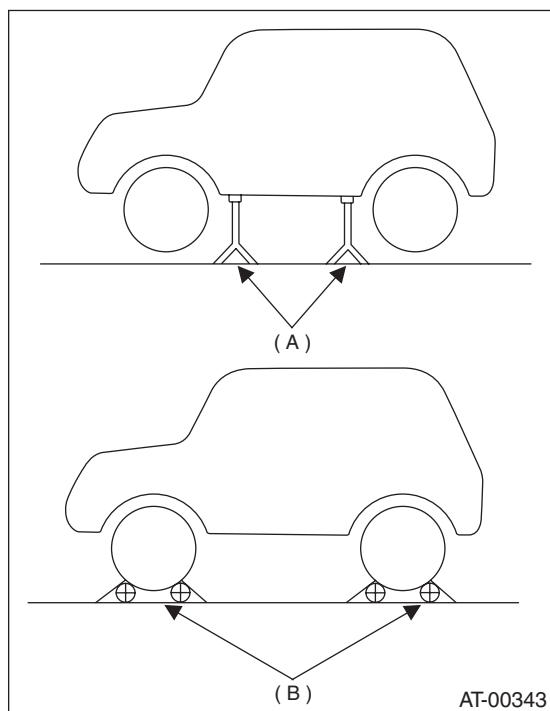
8. Inspection Mode

A: OPERATION

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

WARNING:

- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
- Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



(A) Safety stand

(B) Free rollers

9. Clear Memory Mode

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

Current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting the on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified TCM connector for at least 2 minutes.

CLEAR MEMORY:

Non-turbo model

Remove TCM connector (B55).

Turbo model

Remove TCM connector (B56).

- The TCM connector is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous trouble codes stored in the TCM memory.
- Be sure to remove the TCM connector for at least the specified length of time. Otherwise, trouble codes may not be cleared.

2. WITH SUBARU SELECT MONITOR

Refer to SUBARU SELECT MONITOR for information about how to clear trouble codes.

<Ref. to AT-23, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

AT OIL TEMP WARNING LIGHT DISPLAY

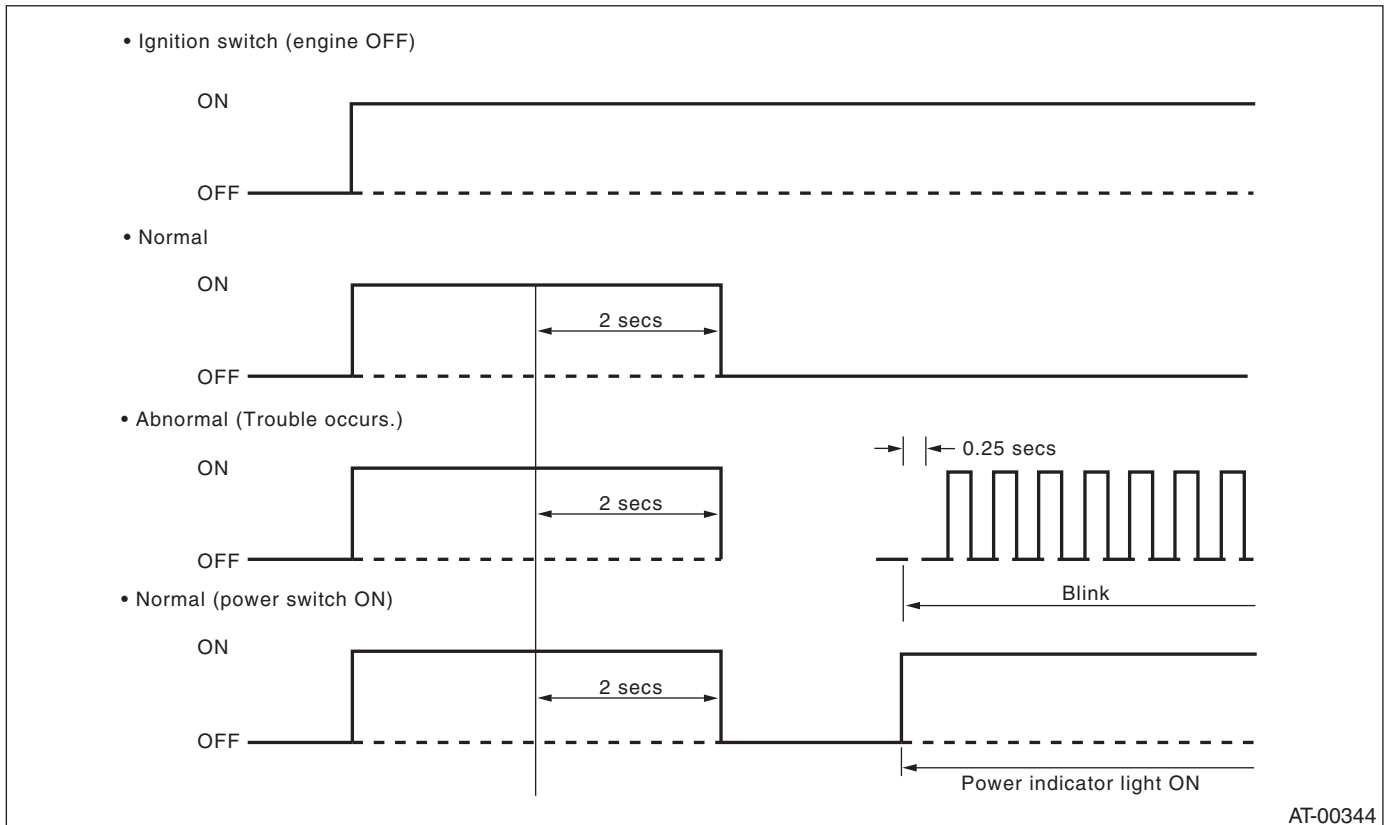
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

10. AT OIL TEMP Warning Light Display

A: INSPECTION

When any on-board diagnostics item is malfunctioning, the display on the power indicator light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be

determined by a trouble code during the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP warning does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.



LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC No.	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-44, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Mass air flow signal	Detects open or shorted input signal circuit.	<Ref. to AT-47, DTC 23 MASS AIR FLOW SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to AT-50, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to AT-54, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-61, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-66, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to AT-70, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Intake manifold pressure signal (Non-turbo model)	Detects open or shorted input signal circuit.	<Ref. to AT-73, DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to AT-76, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to AT-80, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-84, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-88, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-92, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-98, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-104, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-110, DTC 79 TRANSFER DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-116, DTC 93 REAR VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

12.Diagnostic Procedure for AT OIL TEMP Warning Light

A: AT OIL TEMP WARNING LIGHT DOES NOT COME ON OR GO OFF

DIAGNOSIS:

The AT OIL TEMP warning light circuit is open or shorted.

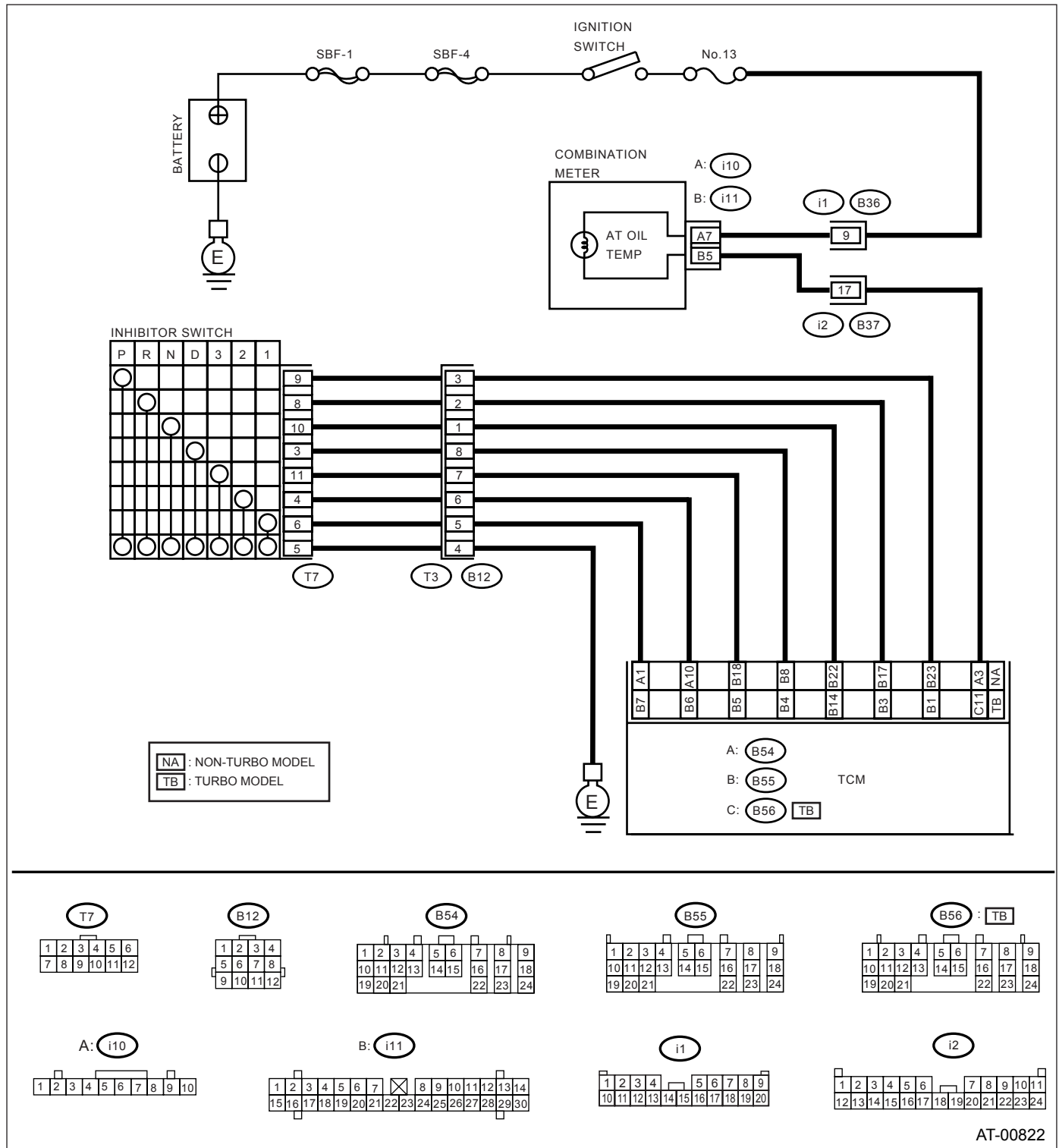
TROUBLE SYMPTOM:

- When the ignition switch is turned to ON (engine OFF), AT OIL TEMP warning light does not illuminate.
- When the on-board diagnostics is performed, AT OIL TEMP warning light remains illuminated.

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK AT OIL TEMP WARNING LIGHT. Turn the ignition switch to ON (engine OFF). Does the AT OIL TEMP warning light illuminate?	The light illuminates.	Go to step 3.	Go to step 2.
2 CHECK AT OIL TEMP WARNING LIGHT. 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the ATF temp warning light bulb from combination meter. Is the AT OIL TEMP warning light bulb OK?	The light bulb is OK.	Go to step 4.	Replace the AT OIL TEMP warning light bulb.
3 CHECK AT OIL TEMP WARNING LIGHT. Perform "Read Diagnostic Trouble Code". <Ref. to AT-24, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> Does the AT OIL TEMP warning light blink?	The light blinks.	A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM, inhibitor switch and combination meter.	Go to step 10.
4 CHECK FUSE (No. 13). Remove the fuse (No. 13). Is the fuse (No. 13) blown out?	Fuse (No. 13) is blown out.	Replace the fuse (No. 13). If the replaced fuse (No. 13) is blown out easily, repair short circuit in harness between fuse (No. 13) and combination meter.	Go to step 5.
5 CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH. 1)Turn the ignition switch to ON (engine OFF). 2)Measure the voltage between combination meter connector and chassis ground. Connector & terminal (i10) No. 7 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Go to step 6.	Repair open or short circuit in harness between combination meter and battery.
6 CHECK COMBINATION METER. Measure the voltage between combination meter connector and chassis ground. Connector & terminal (i11) No. 5 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 7.	Repair the combination meter. <Ref. to IDI-12, Combination Meter Assembly.>
7 CHECK OPEN CIRCUIT OF HARNESS. 1)Turn the ignition switch to OFF. 2)Disconnect the connector from combination meter connector. 3)Measure the resistance of harness between combination meter. Connector & terminal Non-turbo model (B54) No. 3 — (i11) No. 5: Turbo model (B56) No. 11 — (i11) No. 5: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK INPUT SIGNAL FOR TCM. 1)Connect the connector to TCM and combination meter. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 3 (+) — Chassis ground (-): Turbo model (B56) No. 11 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
9 CHECK SUBARU SELECT MONITOR. Do you have a SUBARU SELECT MONITOR?	A SUBARU SELECT MONITOR is available.	Go to step 10.	Go to step 11.
10 CHECK INHIBITOR SWITCH. 1)Connect the Subaru Select Monitor to data link connector. 2)Turn the ignition switch to ON. 3)Subaru Select Monitor to ON. 4)Read the data of range switch using Subaru Select Monitor. •Range switch is indicated in ON ⇔ OFF. When each range is selected, does the LED of Subaru Select Monitor light up?	The LED lights up.	Go to step 11.	Check the inhibitor switch circuit. <Ref. to AT-127, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>
11 CHECK SHORT CIRCUIT OF HARNESS. 1)Disconnect the connector from TCM. 2)Remove the combination meter. 3)Disconnect the connector from combination meter. 4)Measure the resistance of harness connector between TCM and chassis ground. Connector & terminal/specified resistance Non-turbo model (B54) No. 3 (+) — Chassis ground (-): Turbo model (B56) No. 11 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 MΩ	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

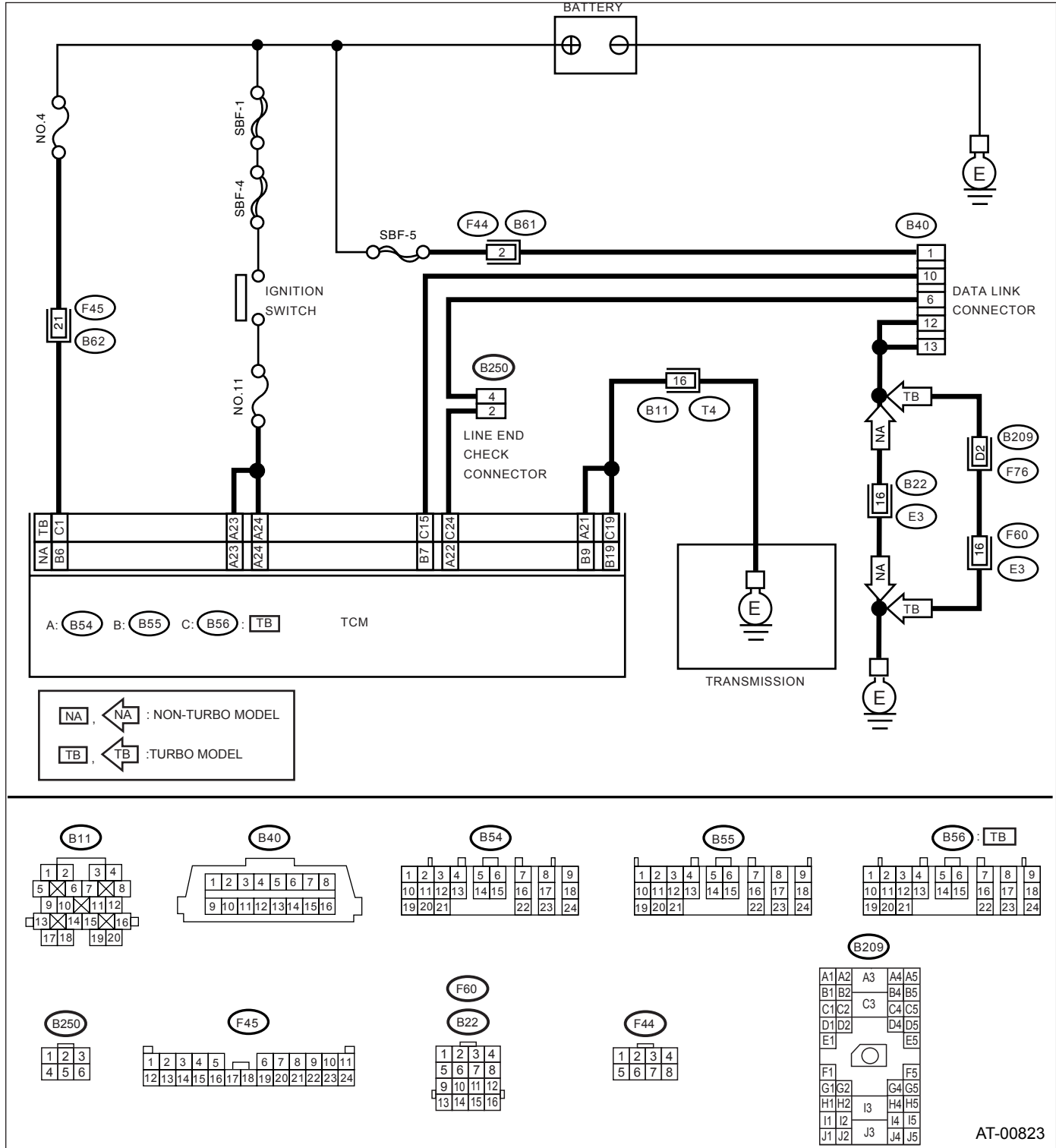
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: CHECK POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:



DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK BATTERY TERMINAL. Turn the ignition switch to OFF. Is there poor contact at battery terminal?	There is a poor contact.	Repair 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. <i>Connector & terminal</i> <i>Non-turbo model</i> <i>(B54) No. 6 (+) — Chassis ground (-):</i> <i>Turbo model</i> <i>(B56) No. 1 (+) — Chassis ground (-):</i> Is the measured value within the specified range?	10 and 13 V	Go to step 4.	Go to step 3.
3 CHECK FUSE (NO. 4). Remove fuse (No. 4). Is the fuse (No. 4) blown out?	The fuse is blown out.	Replace the fuse (No. 4). If the replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair open circuit in harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling 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. <i>Connector & terminal</i> <i>(B54) No. 23 (+) — Chassis ground (-):</i> <i>(B54) No. 24 (+) — Chassis ground (-):</i> Is the measured value more than the specified value?	10 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?	The fuse is blown out.	Replace the fuse (No. 11). If the replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair open circuit in harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling connector.
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>Non-turbo model</i> <i>(B55) No. 9 — (B11) No. 16</i> <i>(B55) No. 19 — (B11) No. 16</i> <i>Turbo model</i> <i>(B56) No. 19 — (B11) No. 16</i> <i>(B54) No. 21 — (B11) No. 16</i> Is the measured value less than the specified value?	1 Ω	Go to step 7.	Repair open circuit in harness between TCM, transmission harness connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND. Measure the resistance of harness between transmission and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between transmission and transmission ground.
8 CHECK POOR CONTACT IN CONNECTORS. Is there poor contact in control module power supply, ground line and data link connector?	There is a poor contact.	Repair the connector.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

13.Diagnostic Procedure for Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DIAGNOSIS:

- Faulty harness connector

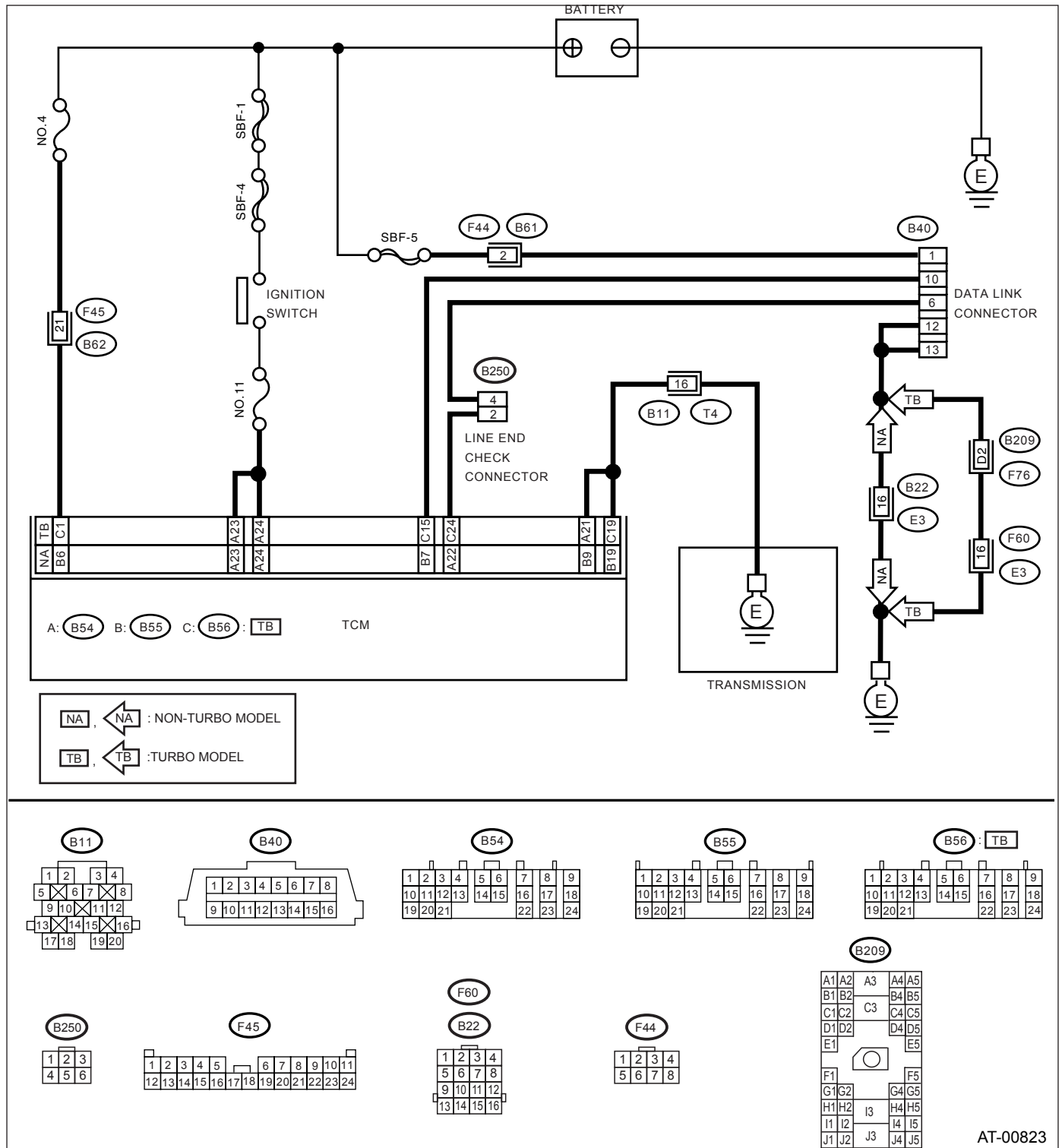
TROUBLE SYMPTOM:

- Select the monitor communication failure

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



AT-00823

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT. Measure the voltage between data link connector and chassis ground. <i>Connector & terminal</i> <i>(B40) No. 1 — Chassis ground:</i> Is the measured value more than the specified value?	10 V	Go to step 2.	Repair harness and connector between battery and data link connector, and poor contact in coupling connector.
2 CHECK SUBARU SELECT MONITOR GROUND CIRCUIT. Measure the resistance of harness between data link connector and chassis ground. <i>Connector & terminal</i> <i>(B40) No. 12 — Chassis ground:</i> <i>(B40) No. 13 — Chassis ground:</i> Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
3 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn the ignition switch to ON. 2) Using the select monitor, check whether communication to engine systems can be executed normally. Are the name and year of the system displayed on the select monitor?	The name and year are displayed.	Go to step 6.	Go to step 4.
4 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Check whether communication to the engine system can be executed normally. Are the name and year of the system displayed on the select monitor?	The name and year are displayed.	Go to step 8.	Go to step 5.
5 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ECM connector. 4) Check whether communication to the transmission system can be executed normally. Are the name and year of the system displayed on the select monitor?	The name and year are displayed.	Inspect the ECM.	Go to step 6.
6 CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM. 3) Measure the resistance between data link connector and chassis ground. <i>Connector & terminal</i> <i>(B40) No. 10 — Chassis ground:</i> <i>(B40) No. 6 — Chassis ground:</i> Is the measured value more than the specified value?	1 M Ω	Go to step 7.	Repair harness and connector between each control module and data link connector.

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK OUTPUT SIGNAL FOR TCM. 1) Turn the ignition switch to ON. 2) Measure the voltage between data link and chassis ground. Connector & terminal (B40) No. 10 — Chassis ground: (B40) No. 6 — Chassis ground: Is the measured value more than the specified value?	1 V	Repair harness and connector between each control module and data link connector.	A temporary poor contact or harness may be the case. Repair harness or connector in the select monitor communication circuit.
8 CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure the resistance between TCM connector and data link connector. Connector & terminal Non-turbo model (B55) No. 7 — (B40) No. 10: Turbo model (B56) No. 15 — (B40) No. 10: Is the measured value less than the specified value?	0.5 Ω	Go to step 9.	Repair harness and connector between TCM and data link connector.
9 CHECK HARNESS BETWEEN TCM AND DATA LINK CONNECTOR Measure the resistance between TCM connector and data link connector. Connector & terminal Non-turbo model (B54) No. 22 — (B40) No. 6: Turbo model (B56) No. 24 — (B40) No. 6: Is the measured value more than the specified value?	1 MΩ	Go to step 10.	Repair harness or connector between TCM and data link connector.
10 CHECK POOR CONTACT IN CONNECTORS. Is there poor contact in control module and data link connector?	There is a poor contact.	Repair the poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

14. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 ENGINE SPEED SIGNAL

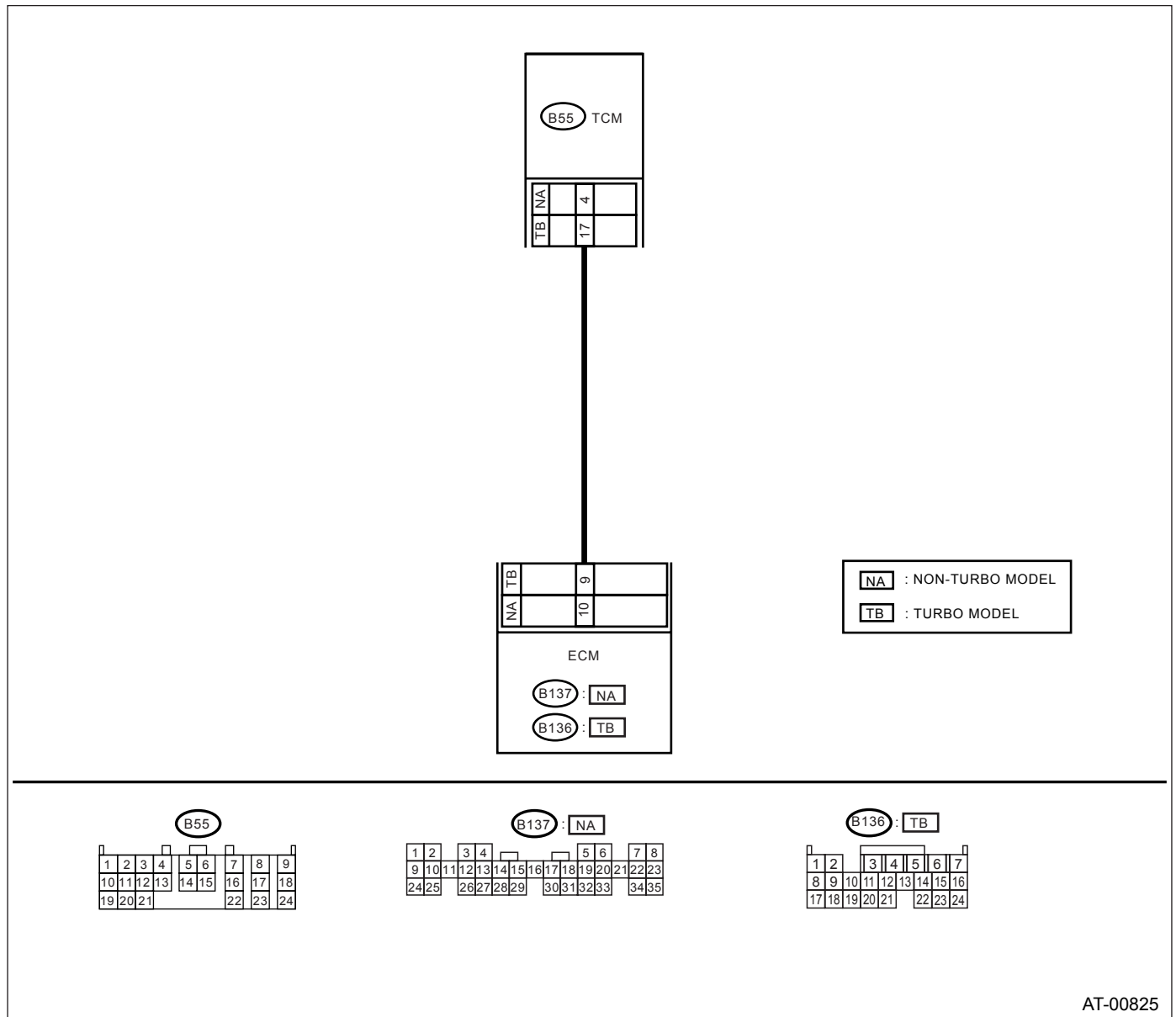
DIAGNOSIS:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- AT OIL TEMP warning light remains on when the vehicle speed is "0".

WIRING DIAGRAM:



AT-00825

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 connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. Connector & terminal Non-turbo model (B55) No. 4 — (B137) No. 10: Turbo model (B55) No. 17 — (B136) No. 9: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 4 — Chassis ground: Turbo model (B55) No. 17 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 5.	Go to step 4.
4 CHECK INPUT SIGNAL FOR TCM. 1) Connect the connectors to TCM and ECM. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 4 (+) — Chassis ground (-): Turbo model (B55) No. 17 (+) — Chassis ground (-): Is the measured value same as the specified value?	0 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 6.
5 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read the data of engine speed using the Subaru Select Monitor. • Display shows engine speed signal value sent from ECM. Is the revolution value the same as the tachometer reading shown on the combination meter?	The reading of the tachometer and select monitor are the same.	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	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 engine speed signal circuit?	There is a poor contact.	Repair poor contact.	Go to step 7.
7	CONFIRM DTC 11. Replace the ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Diagnostic trouble code (DTC) 11 is indicated.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>	Replace the ECM.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: DTC 23 MASS AIR FLOW SIGNAL

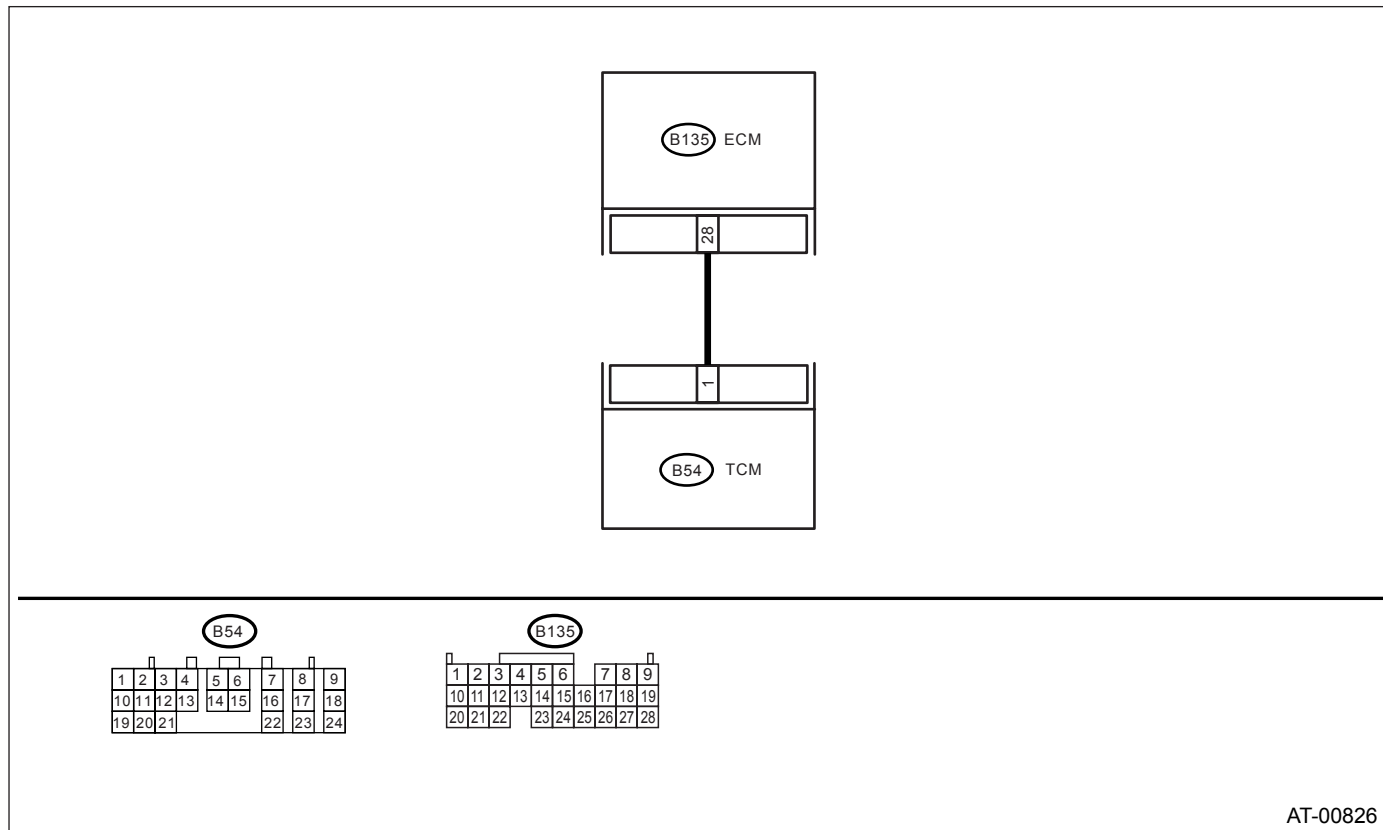
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00826

Step	Check	Yes	No
1 CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM <Ref. to AT-54, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there a problem?	There is a problem.	Repair ground terminal and/or ground circuit of ECM.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. Connector & terminal (B54) No. 1 — (B135) No. 28: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 1 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.
4 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 6.	Go to step 5.
5 CHECK INPUT SIGNAL FOR TCM. 1)Connect the connectors to TCM and ECM. 2)Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3)Engine idling. 4)Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 1 (+) — Chassis ground (-): Is the measured value within the specified range?	0.9 — 1.4 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1)Connect the connectors to TCM and ECM. 2)Connect the Subaru Select Monitor to data link connector. 3)Start the engine, and turn the Subaru Select monitor switch to ON. 4)Warm-up the engine until the engine coolant temperature is above 80°C (176°F). 5)Engine idling. 6)Read the data of intake manifold pressure signal using Subaru Select Monitor. •Display shows the intake manifold pressure signal value sent from ECM. Is the measured value within the specified range?	0.9 — 1.4 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
7 CHECK POOR CONTACT. Is there poor contact in intake manifold pressure signal circuit?	There is a poor contact.	Repair the poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

C: DTC 27 ATF TEMPERATURE SENSOR

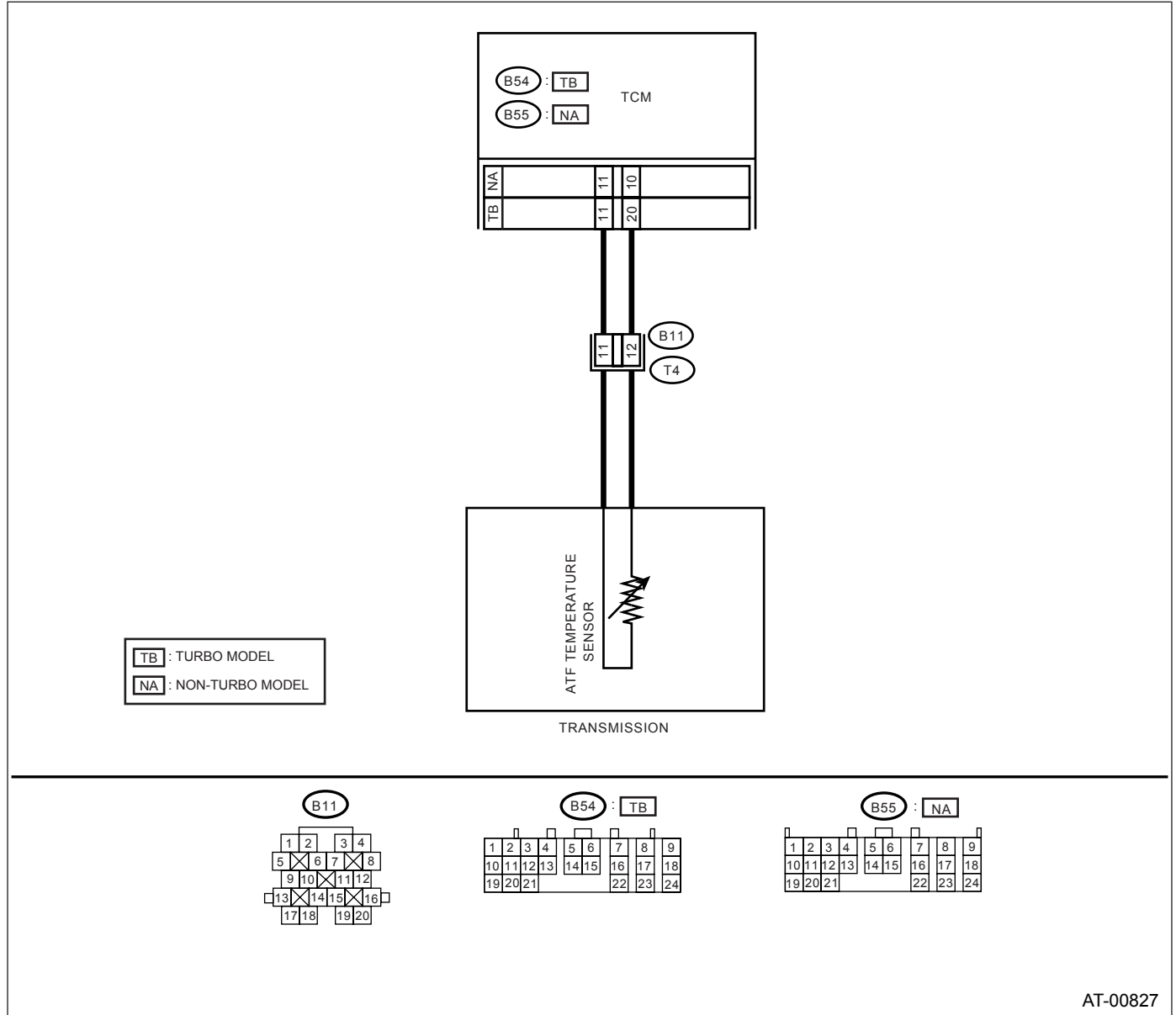
DIAGNOSIS:

Input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00827

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 transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 10 — (B11) No. 12: Turbo mode (B54) No. 20 — (B11) No. 12: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in 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 Non-turbo model (B55) No. 11 — (B11) No. 11: Turbo mode (B54) No. 11 — (B11) No. 11: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 10 — Chassis ground: Turbo mode (B54) No. 20 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 11 — Chassis ground: Turbo mode (B54) No. 11 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 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 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. 12: Is the measured value within the specified range?	275 — 375 Ω	Go to step 6.	Replace ATF Temperature Sensor.<Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
6 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. 12: Does the resistance value increase while the ATF temperature decreases?	The resistance value increases while the ATF temperature decreases.	Go to step 7.	Replace ATF Temperature Sensor.<Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 9.	Go to step 8.
8 CHECK INPUT SIGNAL FOR TCM. 1) Connect the connector to transmission. 2) Warm-up the transmission until the ATF temperature is about 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure the voltage between TCM connector terminal. Connector & terminal Non-turbo model (B55) No. 11 (+) — No. 10 (-): Turbo model (B54) No. 11 (+) — No. 20 (-): <Ref. to AT-30, INSPECTION, ATF.>	0.4 — 0.9 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1)Connect the connector to transmission. 2)Turn the ignition switch to ON (engine OFF). Does the ATF temperature gradually decrease?	The ATF temperature gradually decreases.	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.
10 CHECK POOR CONTACT. Is there poor contact in ATF temperature sensor circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: DTC 31 THROTTLE POSITION SENSOR

DIAGNOSIS:

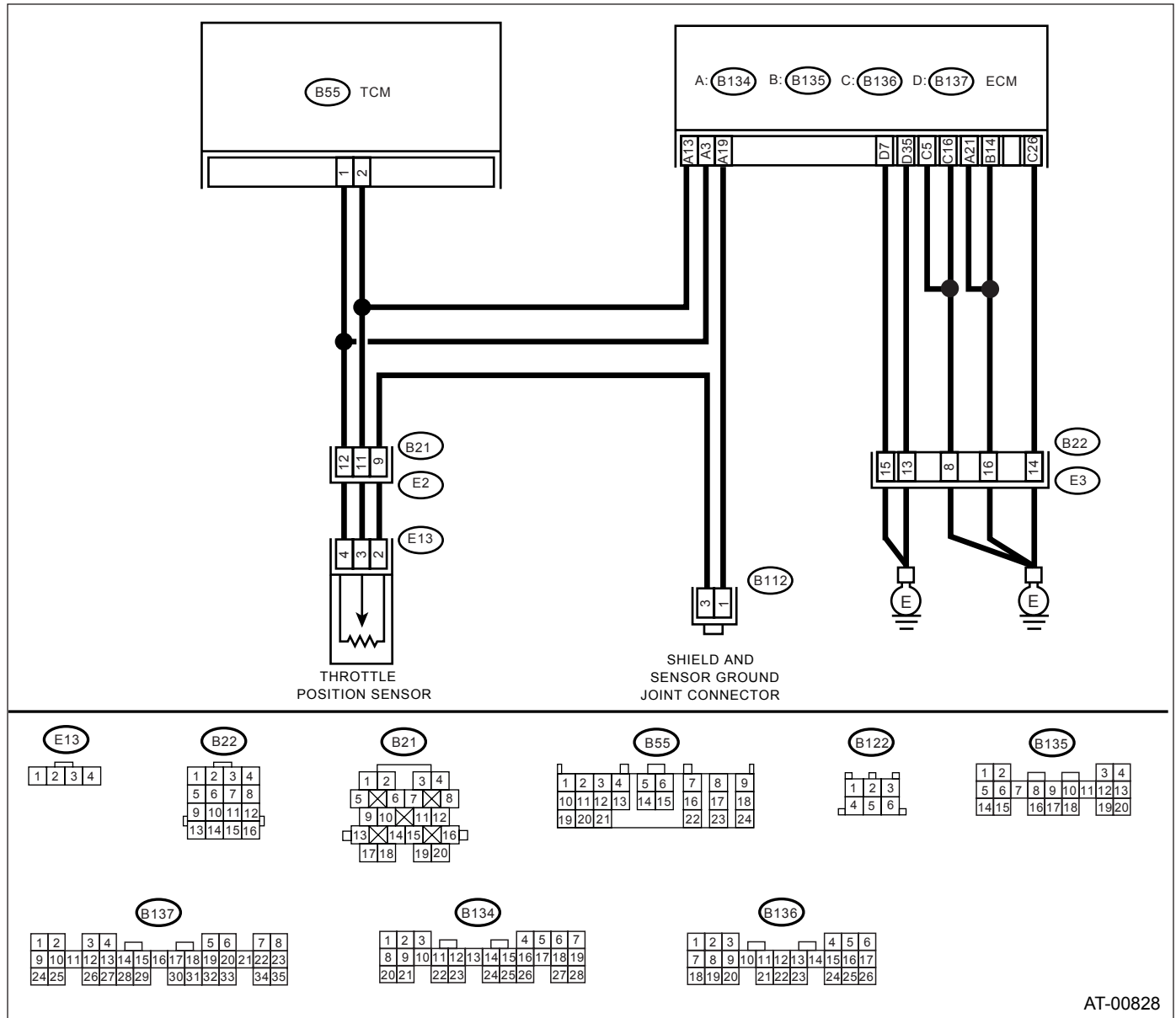
Input signal circuit of throttle position sensor is open or shorted.

TROUBLE SYMPTOM:

Shift point too high or too low; excessive shift shock; excessive tight corner "braking".

WIRING DIAGRAM:

NON-TURBO MODEL

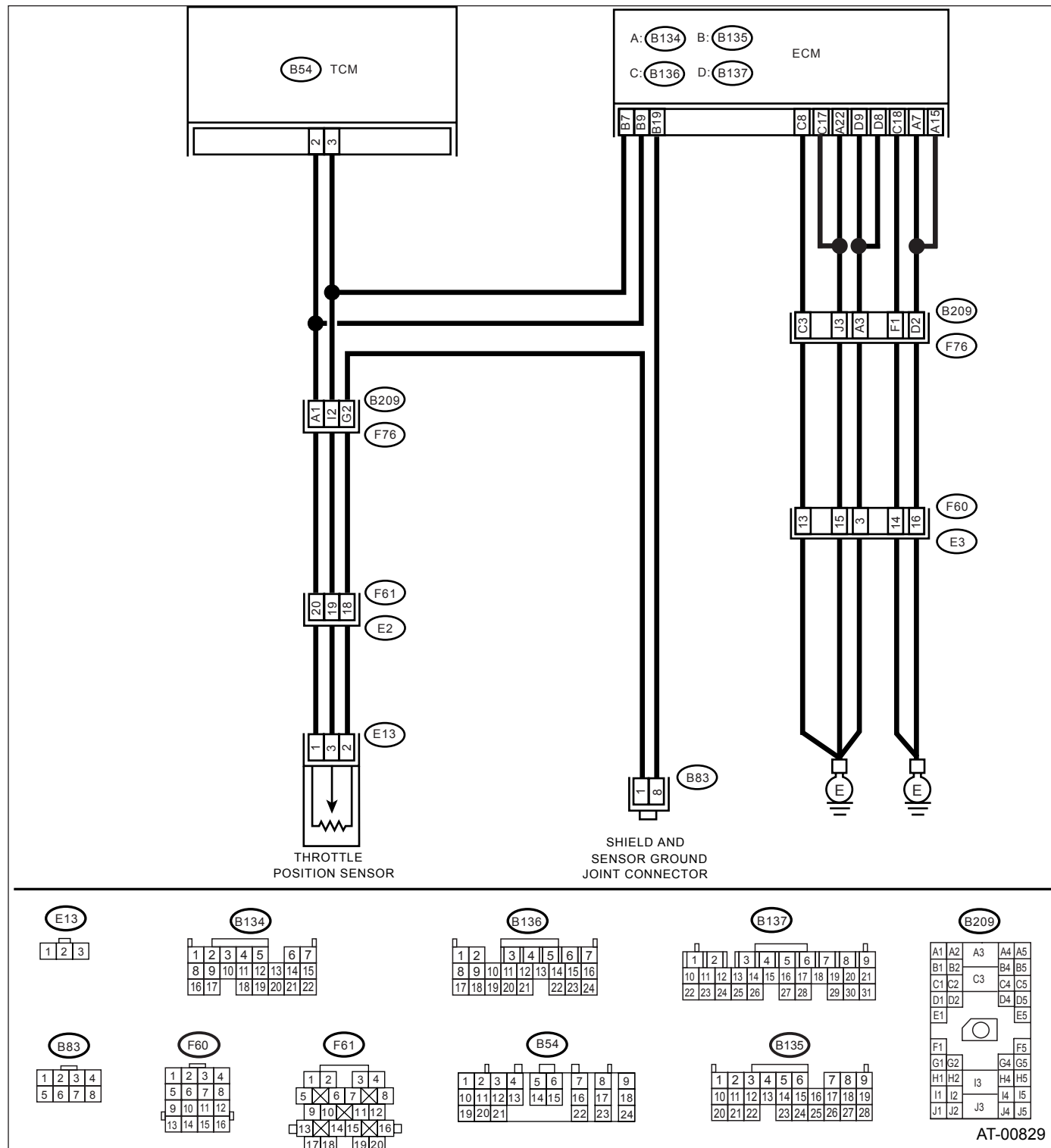


AT-00828

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

TURBO MODEL



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK ENGINE GROUND TERMINALS. Are the engine ground terminals properly tightened?	The engine ground terminals are tightened.	Go to step 2.	Tighten the engine ground terminals.
2 CHECK GROUND CIRCUIT OF ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and engine ground. Connector & terminal Non-turbo model (B134) No. 21 — Engine ground: (B135) No. 14 — Engine ground: (B136) No. 5 — Engine ground: (B136) No. 16 — Engine ground: (B136) No. 26 — Engine ground: (B137) No. 7 — Engine ground: (B137) No. 35 — Engine ground: Turbo model (B134) No. 7 — Engine ground: (B134) No. 15 — Engine ground: (B134) No. 22 — Engine ground: (B136) No. 8 — Engine ground: (B136) No. 17 — Engine ground: (B136) No. 18 — Engine ground: (B137) No. 8 — Engine ground: (B137) No. 9 — Engine ground: Is the measured value less than the specified value?	5 Ω	Go to step 3.	Repair open circuit in harness between ECM connector and engine grounding terminal.
3 CHECK THROTTLE POSITION SENSOR. 1) Disconnect the connector from throttle position sensor. 2) Measure the resistance between throttle position sensor connector receptacle's terminals. Terminals Non-turbo model No. 4 — No. 2: Turbo model No. 1 — No. 2: Is the measured value within the specified range?	3.0 — 4.2 k Ω	Go to step 4.	Replace the throttle position sensor.
4 CHECK THROTTLE POSITION SENSOR. Measure the resistance between throttle position sensor connector receptacle's terminals. Terminals No. 2 — No. 3: Is the measured value within the specified range?	0.35 — 0.5 k Ω	Go to step 5.	Replace the throttle position sensor.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and throttle position sensor connector. Connector & terminal Non-turbo model (B55) No. 2 — (E13) No. 3: Turbo model (B54) No. 3 — (E13) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure the resistance of harness between TCM and throttle position sensor connector. Connector & terminal Non-turbo model (B55) No. 1 — (E13) No. 4: Turbo model (B54) No. 2 — (E13) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 7.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
7 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 2 — Chassis ground: Turbo model (B54) No. 3 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 8.	Repair short circuit in harness between TCM and throttle position sensor connector.
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 1 — Chassis ground: Turbo model (B54) No. 2 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 9.	Repair short circuit in harness between TCM and throttle position sensor connector.
9 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM and ECM connector. Connector & terminal Non-turbo model (B55) No. 2 — (B134) No. 14: Turbo model (B54) No. 3 — (B135) No. 7: Is the measured value less than the specified value?	1 Ω	Go to step 10.	Repair open circuit in harness between TCM and ECM connector.
10 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM and ECM connector. Connector & terminal Non-turbo model (B55) No. 1 — (B134) No. 3: Turbo model (B54) No. 2 — (B135) No. 9: Is the measured value less than the specified value?	1 Ω	Go to step 11.	Repair open circuit in harness between TCM and ECM connector.
11 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 14.	Go to step 12.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
12 CHECK INPUT SIGNAL FOR TCM. 1)Connect the connectors to TCM, throttle position sensor and ECM. 2)Turn the ignition switch to ON (engine OFF). 3)Close the throttle completely. 4)Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 2 (+) — Chassis ground (-): Turbo model (B54) No. 3 (+) — Chassis ground (-): Is the measured value within the specified range?	0.2 — 1.0 V	Go to step 13.	Go to step 18.
13 CHECK INPUT SIGNAL FOR TCM. 1)Open the throttle completely. 2)Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 2 (+) — Chassis ground (-): Turbo model (B54) No. 3 (+) — Chassis ground (-): Is the measured value within the specified range?	4.2 — 4.7 V	Go to step 16.	Go to step 18.
14 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1)Connect the connectors to TCM, throttle position sensor and ECM. 2)Connect the Subaru Select Monitor to data link connector. 3)Turn the ignition switch to ON (engine OFF). 4)Turn the Subaru Select Monitor switch to ON. 5)Throttle fully closed. 6)Read the data of throttle position sensor using Subaru Select Monitor. •Throttle position sensor input signal is indicated. Is the throttle position sensor data within the specified range?	0.2 — 1.0 V	Go to step 15.	Go to step 18.
15 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. Throttle fully open. NOTE: Must be changed correspondingly with accelerator pedal operation (from “released” to “depressed” position). Is the throttle position sensor data within the specified range?	4.2 — 4.7 V	Go to step 17.	Go to step 18.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
16 CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY). Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B55) No. 1 (+) — Chassis ground (-): Turbo model (B54) No. 2 (+) — Chassis ground (-): Is the measured value within the specified range?	4.8 — 5.3 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step 18 .
17 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY). Read the data of throttle position sensor power supply using Subaru Select Monitor. •Throttle position sensor power supply voltage is indicated. Is the throttle position sensor power supply data within the specified range?	4.8 — 5.3 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step 18 .
18 CHECK POOR CONTACT. Is there poor contact in throttle position sensor circuit?	There is a poor contact.	Repair the poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

E: DTC 33 FRONT VEHICLE SPEED SENSOR

DIAGNOSIS:

- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

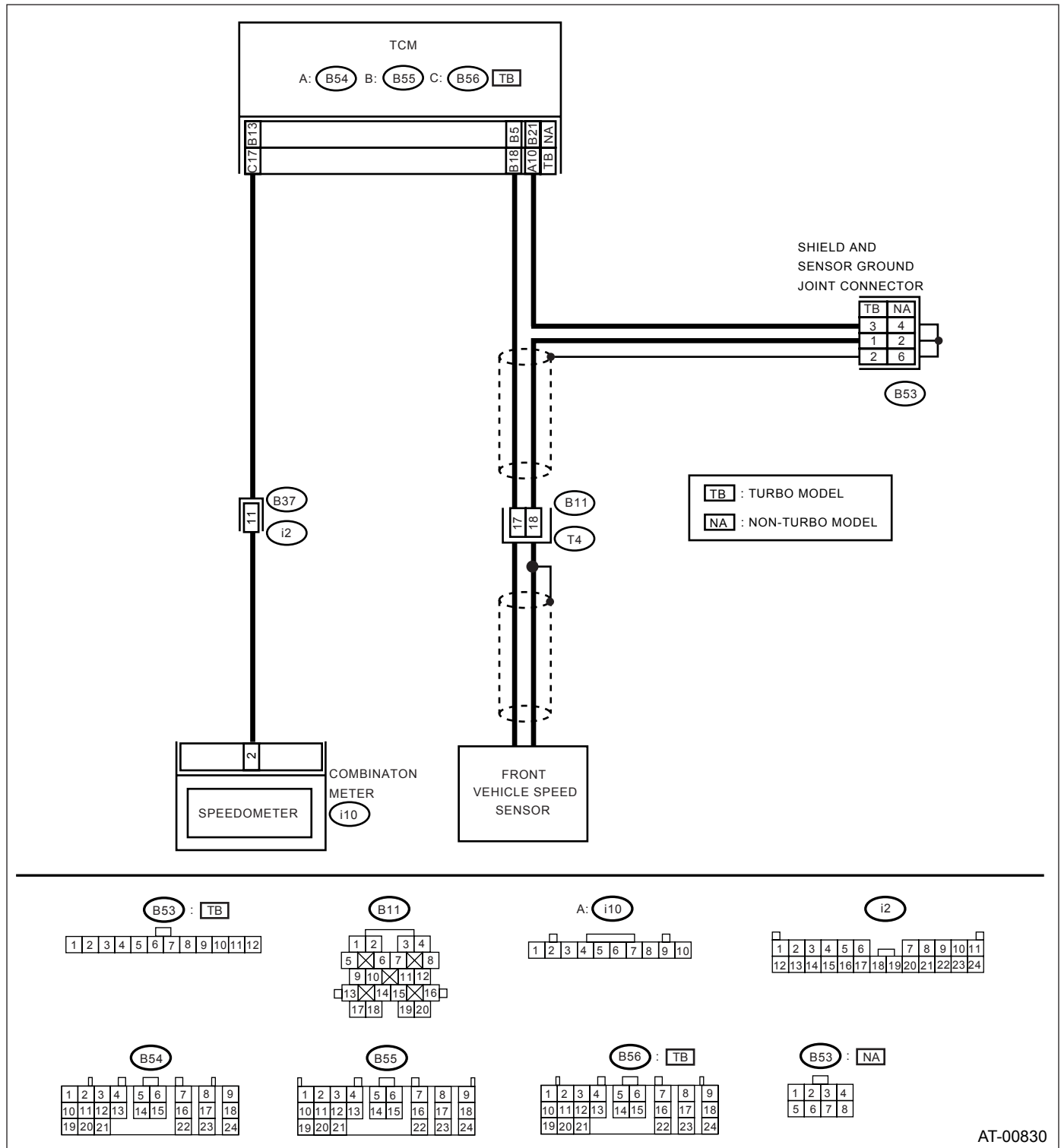
TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

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 HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 5 — (B11) No. 17: Turbo model (B55) No. 18 — (B11) No. 17: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 21 — (B11) No. 18: Turbo model (B54) No. 10 — (B11) No. 18: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 21 — Chassis ground: Turbo model (B54) No. 10 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 5 — Chassis ground: Turbo model (B55) No. 18 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5 CHECK FRONT VEHICLE SPEED SENSOR. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 17 — No. 18: Is the measured value within the specified range?	450 — 650 Ω	Go to step 6.	Replace the front vehicle speed sensor. <Ref. to AT-52, Front Vehicle Speed Sensor.>
6 PREPARE OSCILLOSCOPE. Do you have an oscilloscope?	An oscilloscope is available.	Go to step 9.	Go to step 7.
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 10.	Go to step 8.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK INPUT SIGNAL FOR TCM. 1)Connect all connectors. 2)Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off floor. 3)Start the engine and set the 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 indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 4)Measure the voltage between TCM connector terminals. Connector & terminal Non-turbo model (B55) No. 5 (+) — No. 21 (-): Turbo model (B55) No. 18 (+) — (B54) No. 10 (-): Is the measured value more than the specified value?	1 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contactor or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
9 CHECK FRONT VEHICLE SPEED SENSOR USING OSCILLOSCOPE. 1)Connect all connectors. 2)Lift-up the vehicle and place safety stands. CAUTION: Raise all wheels off ground. 3)Set the oscilloscope to TCM connector terminals. Connector & terminal Non-turbo model Positive probe; (B55) No. 5 Earth lead; (B55) No. 21 Turbo model Positive probe; (B55) No. 18 Earth lead; (B54) No. 10 4)Start the engine, and drive the wheels slowly. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to ABS-24, Clear Memory Mode.> 5)Measure the signal voltage indicated on oscilloscope. Is the measured value more than the specified value?	AC 4 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contactor or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
10 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1)Connect all connectors. 2)Connect the Subaru Select Monitor to data link connector. 3)Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off floor. 4)Turn the ignition switch to ON and turn the Subaru Select Monitor 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 or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> Does the speedometer indication increase as the Subaru Select Monitor data increases?	The speedometer indication increases.	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
11 CHECK POOR CONTACT. Is there poor contact in front vehicle speed sensor circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR

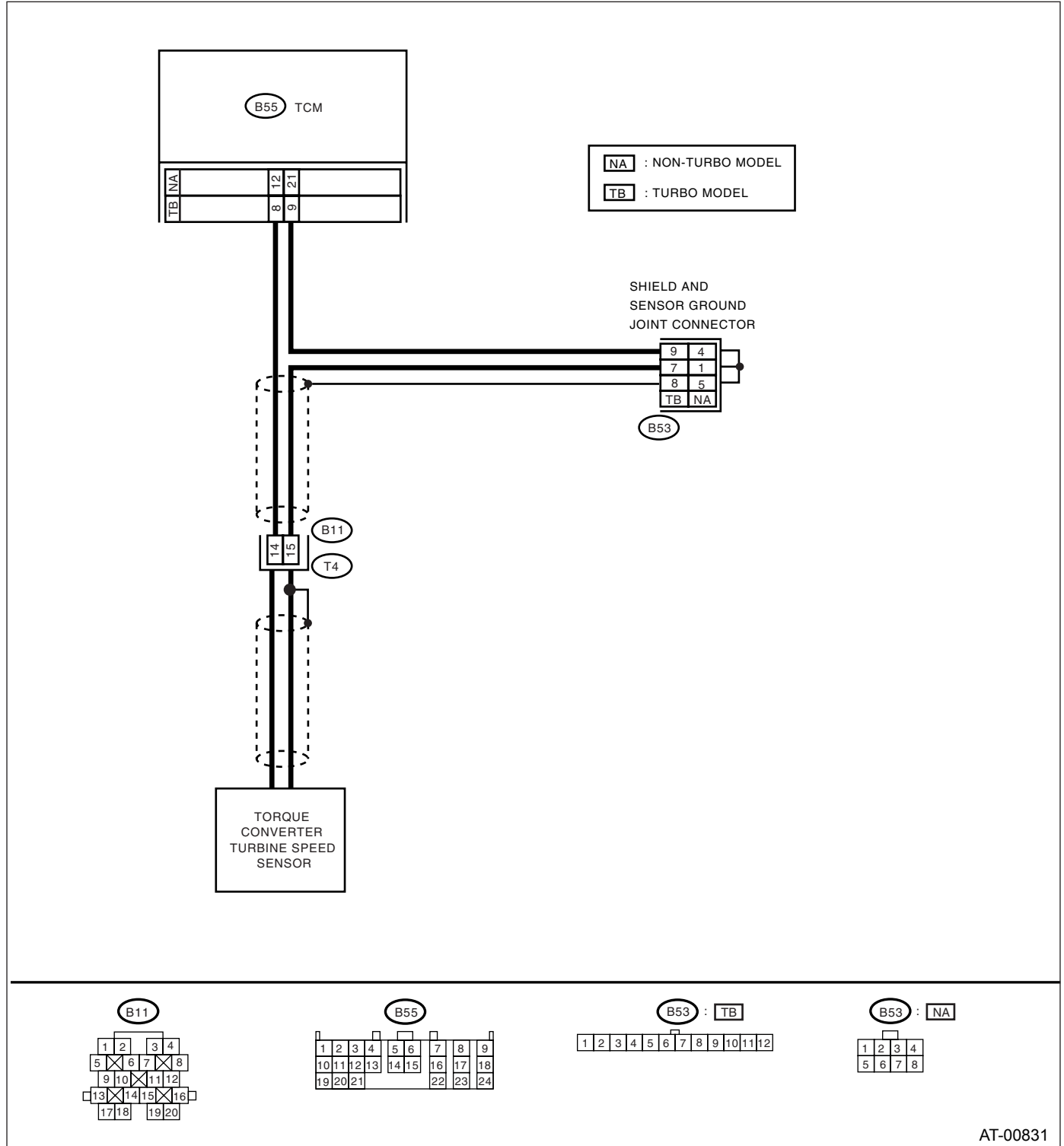
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00831

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. 14 — No. 15: Is the measured value within the specified range?	450 — 650 Ω	Go to step 1.	Replace the turbine speed sensor. <Ref. to AT-57, Torque Converter Turbine Speed Sensor.>
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 12 — (B11) No. 14: Turbo model (B55) No. 8 — (B11) No. 14: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 21 — (B11) No. 15: Turbo model (B55) No. 9 — (B11) No. 15: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 21 — Chassis ground: Turbo model (B55) No. 9 — Chassis ground: Is the measured value less than the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 12 — Chassis ground: Turbo model (B55) No. 8 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 6.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6 PREPARE OSCILLOSCOPE. Do you have an oscilloscope?	An oscilloscope is available.	Go to step 10.	Go to step 7.
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 9.	Go to step 8.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK INPUT SIGNAL FOR TCM. 1)Connect the connectors to TCM and trans- mission. 2)Move the select lever to "P" or "N" range and start the engine. 3)Measure the voltage between TCM connec- tor terminals. Connector & terminal Non-turbo model (B55) No. 12 (+) — No. 21 (-): Turbo model (B55) No. 8 (+) — No. 9 (-): Is the measured value more than the specified value?	AC 1 V	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in the TCM and trans- mission.	Go to step 11.
9 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1)Connect the connectors to TCM and trans- mission. 2)Connect the Subaru Select Monitor to data link connector. 3)Turn the ignition switch to ON and turn the Subaru Select Monitor switch to ON. 4)Start the engine. 5)Move 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?	The value is same as the tachometer reading.	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in the TCM and trans- mission.	Go to step 11.
10 CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1)Connect the connectors to TCM and trans- mission. 2)Set the oscilloscope to TCM connector ter- minals. Connector & terminal Turbo model Positive probe; (B55) No. 8 Earth lead; (B55) No. 9 Non-turbo model Positive probe; (B55) No. 12 Earth lead; (B55) No. 21 3)Move the select lever to "P" or "N" range and start the engine. Is the measured value more than the specified value?	AC 1 V	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in the TCM and trans- mission.	Go to step 11.
11 CHECK POOR CONTACT. Is there poor contact in torque converter tur- bine speed sensor circuit?	There is a poor contact.	Repair poor con- tact.	Replace the TCM. <Ref. to AT-71, Transmission Con- trol Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

G: DTC 38 TORQUE CONTROL SIGNAL

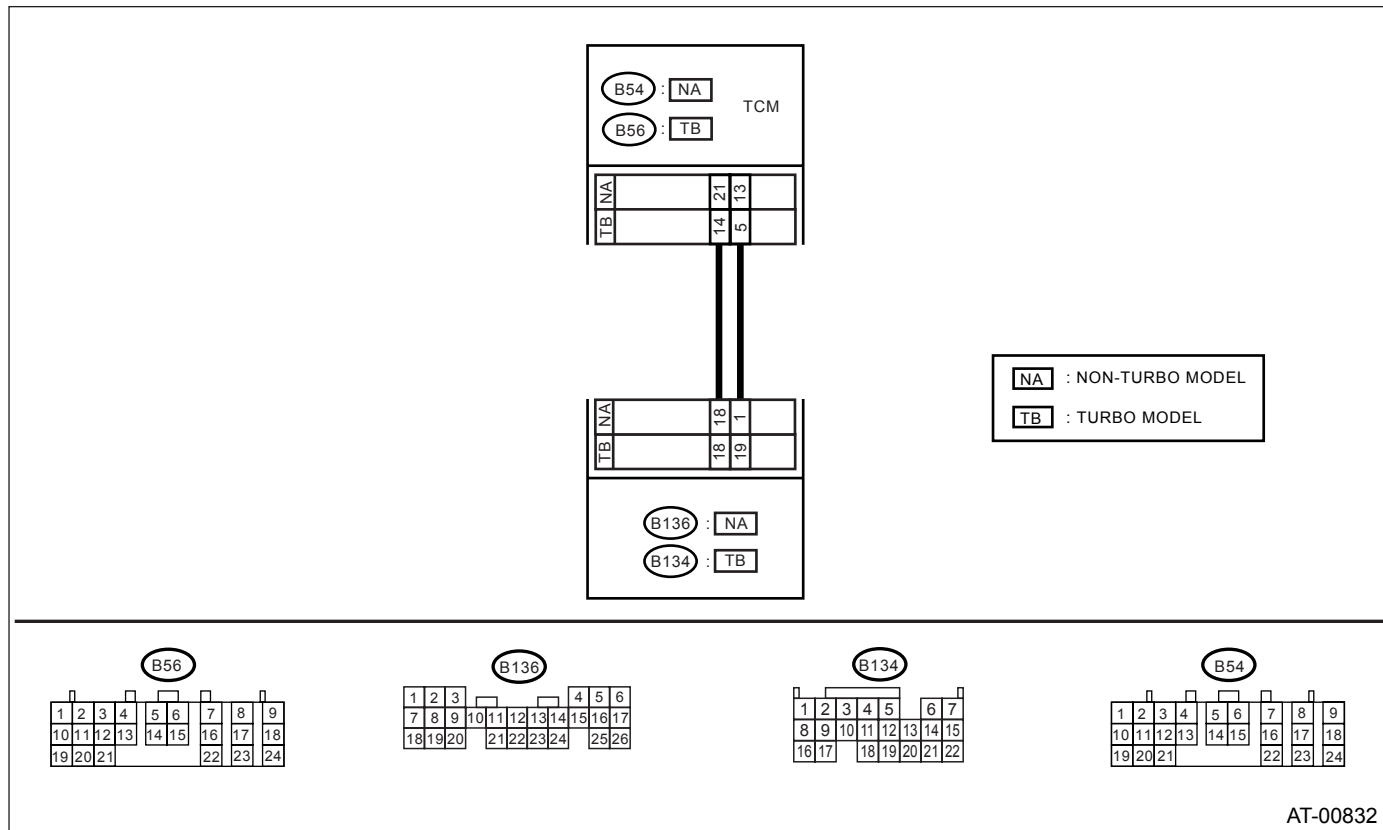
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00832

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. Connector & terminal Non-turbo model (B54) No. 21 — (B136) No. 18: (B54) No. 13 — (B136) No. 1: Turbo model (B56) No. 14 — (B135) No. 18: (B56) No. 5 — (B135) No. 19: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 21 — Chassis ground: (B54) No. 13 — Chassis ground: Turbo model (B56) No. 14 — Chassis ground: (B56) No. 5 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1)Connect the connectors to TCM and ECM. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the voltage between TCM connector terminals. Connector & terminal Non-turbo model (B54) No. 21 (+) — Chassis ground (-): (B54) No. 13 (+) — Chassis ground (-): Turbo model (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-): Is the measured value more than the specified value?	4.8 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 4.
4 CHECK POOR CONTACT. Is there poor contact in torque control signal circuit?	There is a poor contact.	Repair poor contact.	Go to step 5.
5 CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY. Check the installing condition of ground line in transmission and body. Is there any dirt or rust at ground line installing point?	Dirt or rust is found.	Remove dirt and rust.	Go to step 6.
6 CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY. Check the installing condition of ground line in transmission and body. Is the tightening torque value within specification?	10 — 16 N·m (1.0 — 1.6 kgf-m, 7.2 — 11.6 ft-lb)	Go to step 7.	Tighten to specified torque.
7 CHECK GROUND LINE INSIDE TRANSMISSION. 1)Drain the AT fluid and remove the oil pan. 2)Check the tightening torque value of ground line installing bolt. Is the tightening torque value within specification?	7 — 9 N·m (0.7 — 0.9 kgf-m, 5.1 — 6.5 ft-lb)	Go to step 9.	Tighten to specified torque.
8 CHECK GROUND CIRCUIT OF ECM. <Ref. to AT-54, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there a problem?	There is a problem.	Repair ground terminal and/or ground circuit of ECM.	Go to step 9.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 RECHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model <i>(B54) No. 21 (+) — Chassis ground (–):</i> <i>(B54) No. 13 (+) — Chassis ground (–):</i> Turbo model <i>(B56) No. 14 (+) — Chassis ground (–):</i> <i>(B56) No. 5 (+) — Chassis ground (–):</i> Is the measured value more than the specified value?	4.8 V	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>	Replace the ECM.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

H: DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL

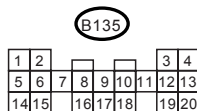
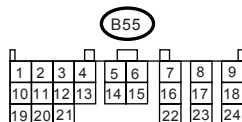
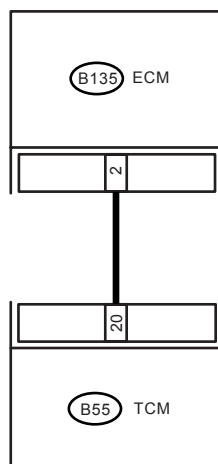
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00833

Step	Check	Yes	No
1 CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM <Ref. to AT-54, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there a problem?	There is a problem.	Repair ground terminal and/or ground circuit of ECM.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. Connector & terminal (B55) No. 20 — (B135) No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 20 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.
4 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 6.	Go to step 5.
5 CHECK INPUT SIGNAL FOR TCM. 1)Connect the connectors to TCM and ECM. 2)Start the engine, and warm-up the transmission until the ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3)Engine idling. 4)Measure the voltage between TCM connector and chassis ground. Connector & terminal (B55) No. 20 (+) — Chassis ground (-): Is the measured value within the specified range?	0.4 — 1.6 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1)Connect the connectors to TCM and ECM. 2)Connect the Subaru Select Monitor to data link connector. 3)Start the engine, and turn the Subaru Select monitor switch to ON. 4)Warm-up the engine until the engine coolant temperature is above 80°C (176°F). 5)Engine idling. 6)Read the data of intake manifold pressure signal using Subaru Select Monitor. •Display shows the intake manifold pressure signal value sent from ECM. Does the AT OIL TEMP warning light turn on?	0.4 — 1.6 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
7 CHECK POOR CONTACT. Is there poor contact in intake manifold pressure signal circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

I: DTC 71 SHIFT SOLENOID 1

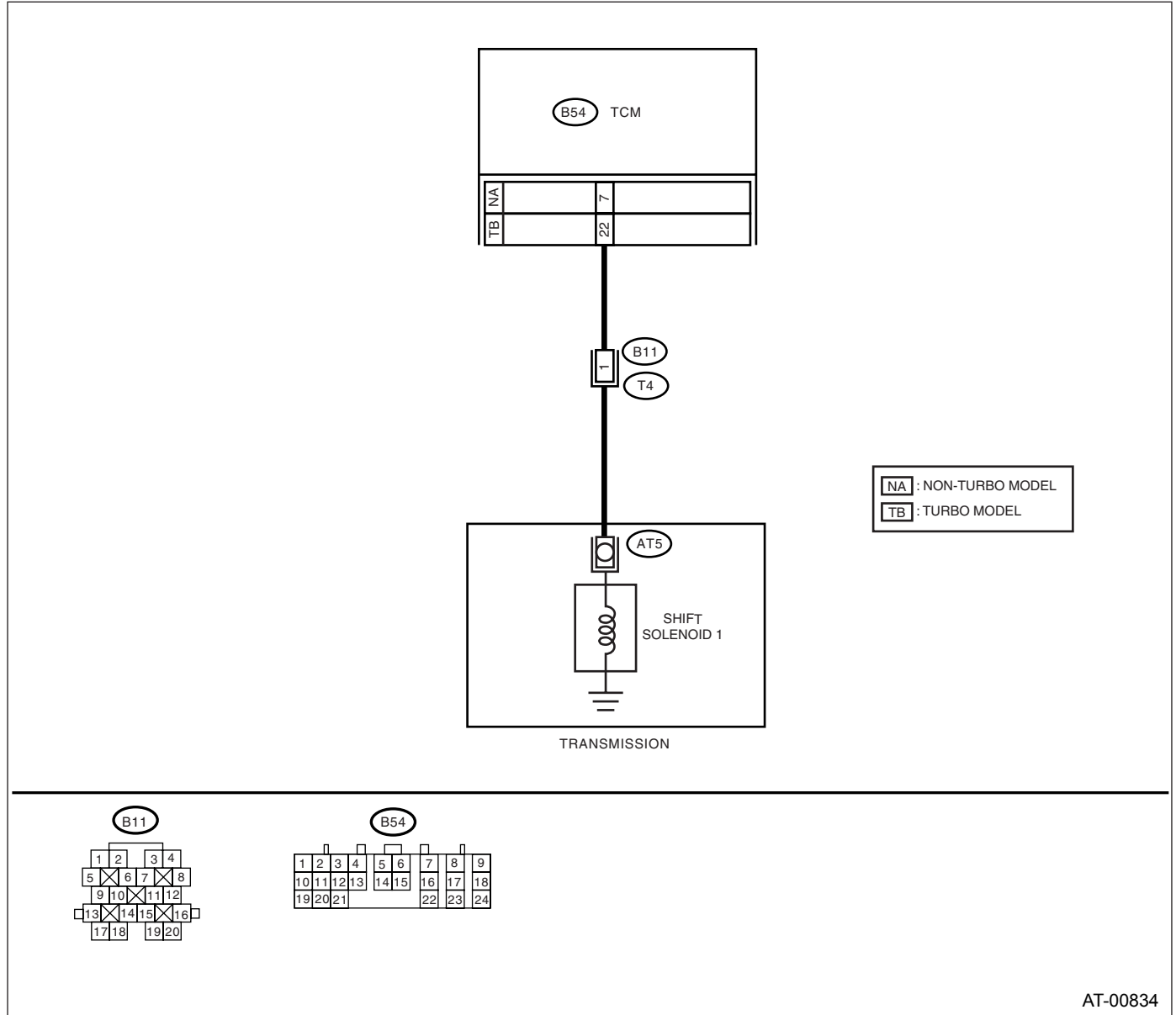
DIAGNOSIS:

Output signal circuit of shift solenoid 1 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



AT-00834

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 TCM and transmission. 3) Measure the resistance of harness between TCM and shift solenoid 1 connector. Connector & terminal Non-turbo model (B54) No. 7 — (B11) No. 1: Turbo model (B54) No. 22 — (B11) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 7 — Chassis ground: Turbo model (B54) No. 22 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK SHIFT SOLENOID 1. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 1 — No. 16: Is the measured value within the specified range?	10 — 16 Ω	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to "D" range. 4) Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 7 (+) — Chassis ground (-): Turbo model (B54) No. 22 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Go to step 5.	Go to step 6.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

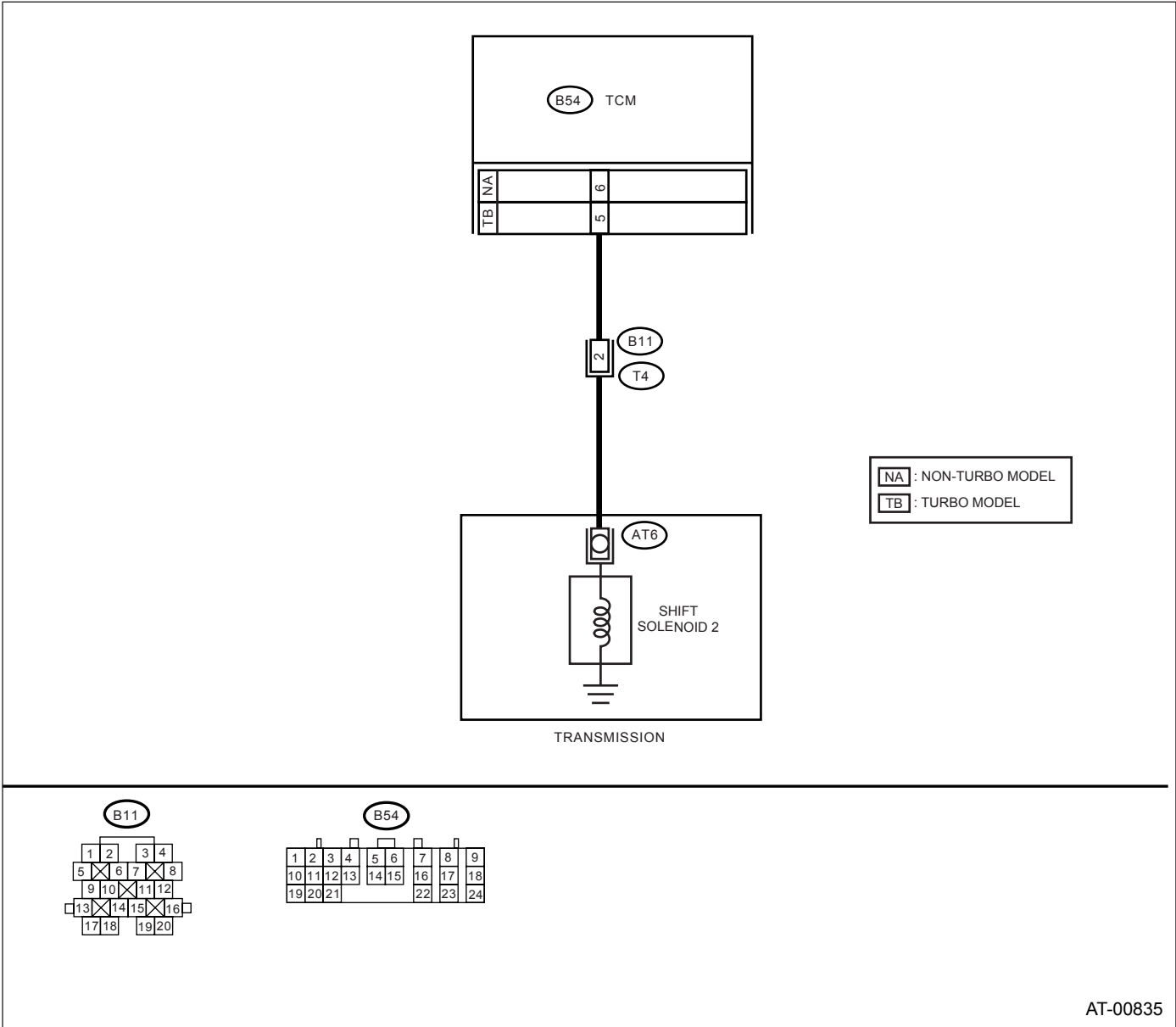
Step	Check	Yes	No
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move the select lever to "2" range. 2) Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 7 (+) — Chassis ground (-): Turbo model (B54) No. 22 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.	Go to step 6.
6 CHECK POOR CONTACT. Is there poor contact in shift solenoid 1 circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
7 CHECK SHIFT SOLENOID 1 (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. 3) Drain the automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove the oil pan, and disconnect the connector from shift solenoid 1. 5) Measure the resistance between shift solenoid 1 connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 — 16 Ω	Go to step 8.	Replace the shift solenoid 1. <Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION. Measure the resistance of harness between shift solenoid 1 and transmission connector. Connector & terminal (AT5) No. 1 — (T4) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between shift solenoid 1 and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION. Measure the resistance of harness between shift solenoid 1 connector and transmission ground. Connector & terminal (T4) No. 1 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.	Repair short circuit harness between shift solenoid 1 and transmission connector.

J: DTC 72 SHIFT SOLENOID 2

DIAGNOSIS:
Output signal circuit of shift solenoid 2 is open or shorted.

TROUBLE SYMPTOM:
Does not shift.

WIRING DIAGRAM:



AT-00835

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 TCM and transmission. 3) Measure the resistance of harness between TCM and shift solenoid 2 connector. <i>Connector & terminal</i> <i>Non-turbo model</i> <i>(B54) No. 6 — (B11) No. 2:</i> <i>Turbo model</i> <i>(B54) No. 5 — (B11) No. 2:</i> Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and chassis ground. <i>Connector & terminal</i> <i>Non-turbo model</i> <i>(B54) No. 6 — Chassis ground:</i> <i>Turbo model</i> <i>(B54) No. 5 — Chassis ground:</i> Is the measured value more than the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK SHIFT SOLENOID 2. Measure the resistance between transmission connector terminals. <i>Connector & terminal</i> <i>(T4) No. 2 — No. 16:</i> Is the measured value within the specified range?	10 — 16 Ω	Go to step 4.	Go to step 6.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1)Connect the connectors to TCM and trans- mission. 2)Lift-up or raise the vehicle and support with safety stand. CAUTION: Raise all wheels off ground. 3)Start the engine and warm-up the transmis- sion until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its oper- ating temperature. 4)Move the selector lever to "D", and slowly increase the vehicle speed to 50 km/h (31 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 5)Measure the voltage between TCM connec- tor and chassis ground. Connector & terminal Non-turbo model (B54) No. 6 (+) — Chassis ground (-): Turbo model (B54) No. 5 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in the TCM and trans- mission.	Go to step 5.
5 CHECK POOR CONTACT. Is there poor contact in shift solenoid 2 circuit?	There is a poor contact.	Repair poor con- tact.	Replace the TCM. <Ref. to AT-71, Transmission Con- trol Module (TCM).>
6 CHECK SHIFT SOLENOID 2 (IN TRANSMIS- SION). 1)Remove the transmission connector from bracket. 2)Drain the automatic transmission fluid. CAUTION: Do not drain the automatic transmission flu- id until it cools down. 3)Remove the oil pan, and disconnect the con- nector from shift solenoid 2. 4)Measure the resistance between shift sole- noid 2 connector and transmission ground. Connector & terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 — 16 Ω	Go to step 7.	Replace the shift solenoid 2 assem- bly. <Ref. to AT- 64, Shift Sole- noids, Duty Sole- noids and ATF Temperature Sen- sor.>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

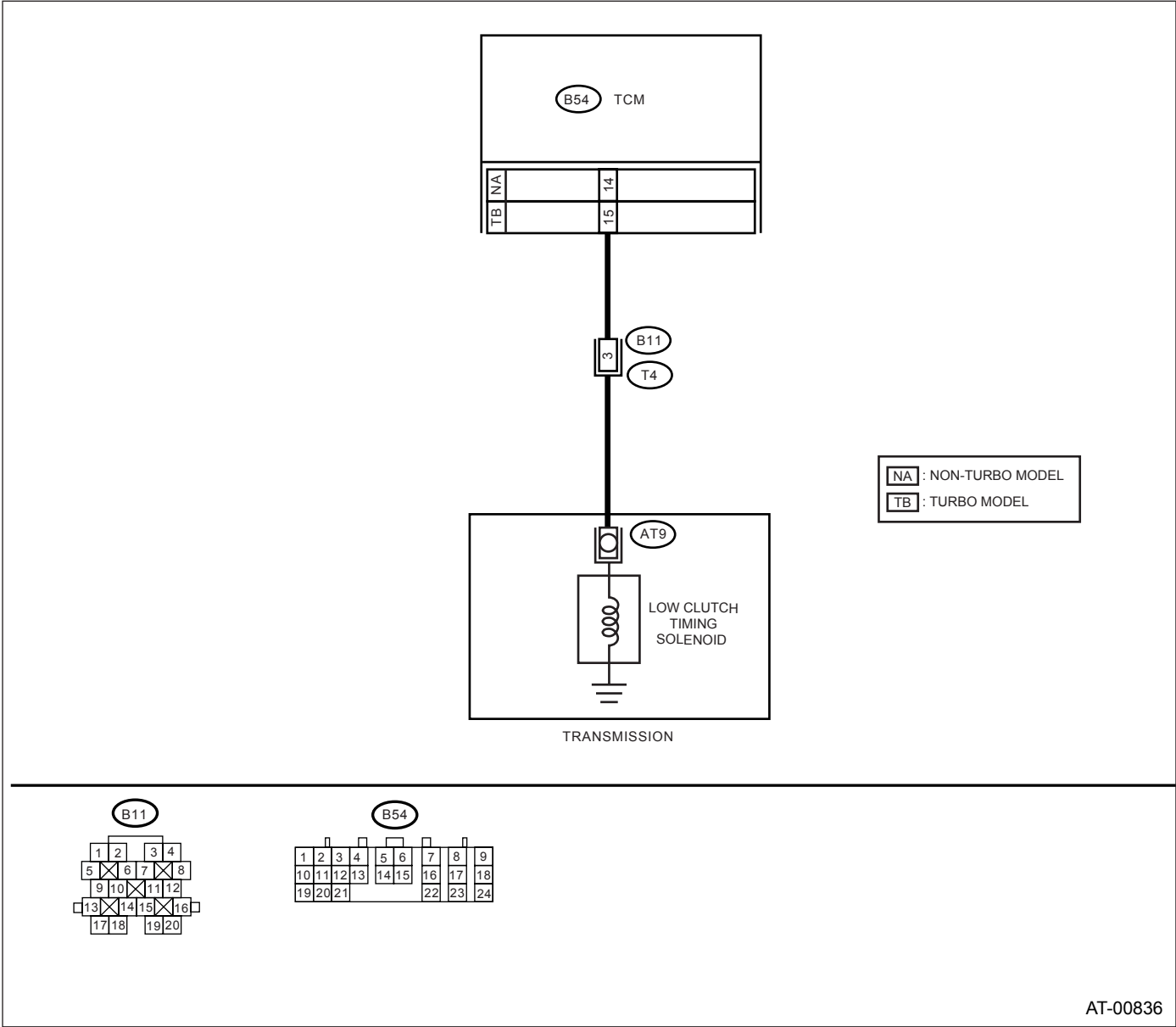
Step	Check	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure the resistance of harness between shift solenoid 2 and transmission connector. Connector & terminal (AT6) No. 1 — (T4) No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between shift solenoid 2 and transmission connector.
8 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure the resistance of harness between shift solenoid 2 connector and transmission ground. Connector & terminal (T4) No. 2 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 2 and transmission.	Repair short circuit harness between shift solenoid 2 and transmission connector.

K: DTC 73 LOW CLUTCH TIMING SOLENOID

DIAGNOSIS:
Output signal circuit of low clutch timing solenoid is open or shorted.

TROUBLE SYMPTOM:
Excessive shift shock.

WIRING DIAGRAM:



AT-00836

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 TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>Non-turbo model</i> (B54) No. 14 — (B11) No. 3: <i>Turbo model</i> (B54) No. 15 — (B11) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in 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. <i>Connector & terminal</i> <i>Non-turbo model</i> (B54) No. 14 — Chassis ground: <i>Turbo model</i> (B54) No. 15 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK LOW CLUTCH TIMING SOLENOID. Measure the resistance between transmission connector terminals. <i>Connector & terminal</i> (T4) No. 3 — No. 16: Is the measured value within the specified range?	10 — 16 Ω	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to "D" range. 4) Measure the voltage between TCM connector and chassis ground. <i>Connector & terminal</i> <i>Non-turbo model</i> (B54) No. 14 (+) — Chassis ground (-): <i>Turbo model</i> (B54) No. 15 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	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 EMITTED FROM TCM. 1) Move the select lever to "2" range. 2) Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 14 (+) — Chassis ground (-): Turbo model (B54) No. 15 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM and transmission.	Go to step 6.
6 CHECK POOR CONTACT. Is there poor contact in low clutch timing solenoid circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
7 CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stands. 3) Drain the automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove the oil pan, and disconnect the connector from low clutch timing solenoid. 5) Measure the resistance between low clutch timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	Between 10 and 16 Ω	Go to step 8.	Replace the low clutch timing solenoid. <Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION. Measure the resistance of harness between low clutch timing solenoid and transmission connector. Connector & terminal (AT9) No. 1 — (T4) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between low clutch timing solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION. Measure the resistance of harness between low clutch timing solenoid connector and transmission ground. Connector & terminal (T4) No. 3 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in low clutch timing solenoid and transmission.	Repair short circuit harness between low clutch timing solenoid and transmission connector.

L: DTC 74 2-4 BRAKE TIMING SOLENOID

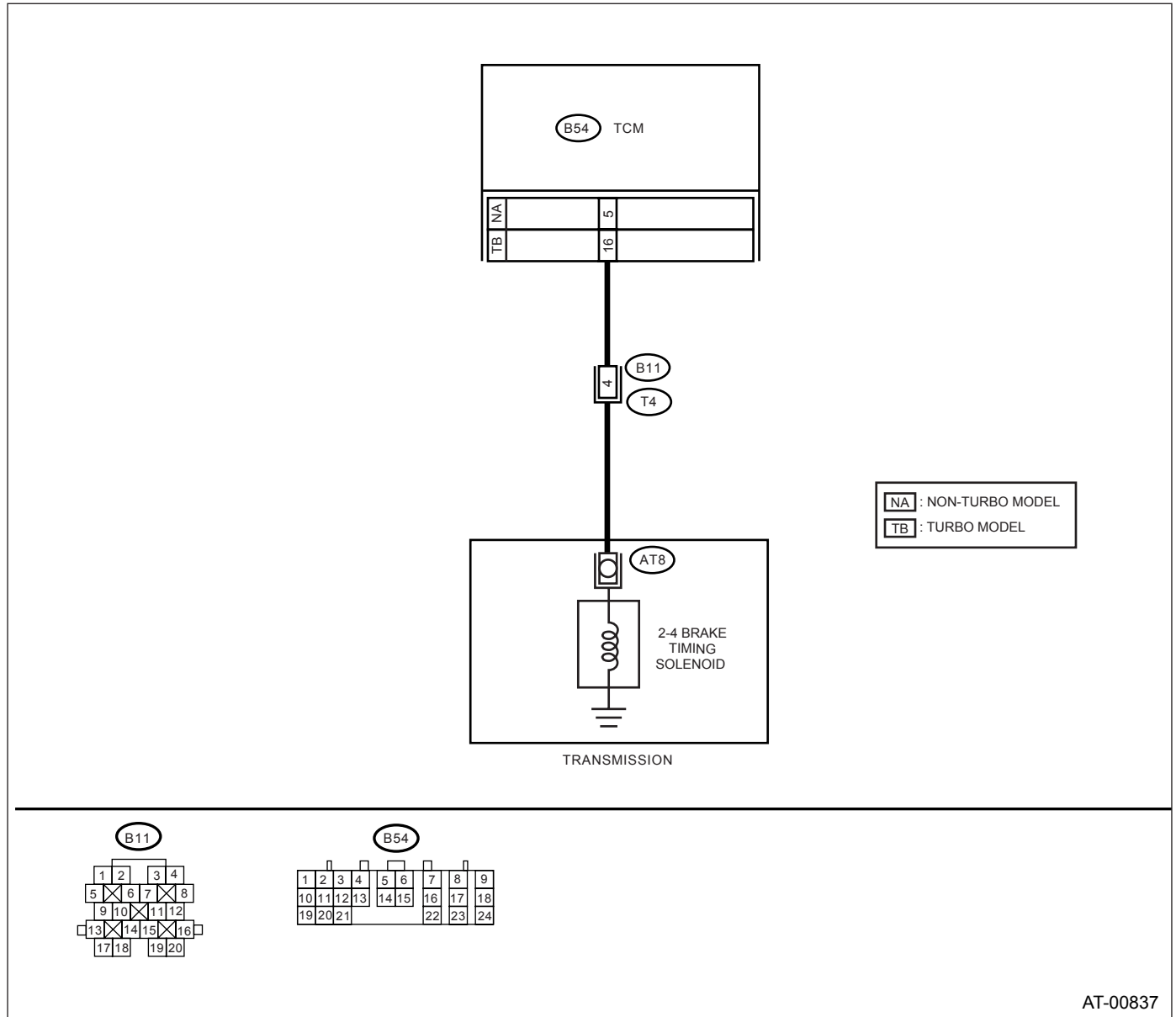
DIAGNOSIS:

Output signal circuit of 2-4 brake timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00837

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 TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B54) No. 5 — (B11) No. 4: Turbo model (B54) No. 16 — (B11) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in 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 Non-turbo model (B54) No. 5 — Chassis ground: Turbo model (B54) No. 16 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK 2-4 BRAKE TIMING SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 4 — No. 16: Is the measured value within the specified range?	10 — 16 Ω	Go to step 4.	Go to step 7.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1)Connect the connectors to TCM and trans- mission. 2)Lift-up or raise the vehicle and support with safety stands. CAUTION: Raise all wheels off ground. 3)Start the engine and warm-up the transmis- sion until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its oper- ating temperature. 4)Move the select lever to “1”, and slowly increase vehicle speed to 10 km/h (6 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 5)Measure the voltage between TCM connec- tor and chassis ground. Connector & terminal Non-turbo model (B54) No. 5 (+) — Chassis ground (-): Turbo model (B54) No. 16 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1)Move the select lever to “D”, and slowly increase vehicle speed to 65 km/h (40 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 2)Measure the voltage between TCM connec- tor and chassis ground. Connector & terminal Non-turbo model (B54) No. 5 (+) — Chassis ground (-): Turbo model (B54) No. 16 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or contact in the 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 2-4 brake timing solenoid circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
7 CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION). 1)Remove the transmission connector from bracket. 2)Lift-up or raise the vehicle and support with safety stands. CAUTION: Raise all wheels off ground. 3)Drain the automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4)Remove the oil pan, and disconnect the connector from 2-4 brake timing solenoid. 5)Measure the resistance between 2-4 brake timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 — 16 Ω	Go to step 8.	Replace the 2-4 brake timing solenoid. <Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION. Measure the resistance of harness between 2-4 brake timing solenoid and transmission connector. Connector & terminal (AT8) No. 1 — (T4) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION. Measure the resistance of harness between 2-4 brake timing solenoid connector and transmission ground. Connector & terminal (T4) No. 4 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 2-4 brake timing solenoid and transmission.	Repair short circuit harness between 2-4 brake timing solenoid and transmission connector.

M: DTC 75 LINE PRESSURE DUTY SOLENOID

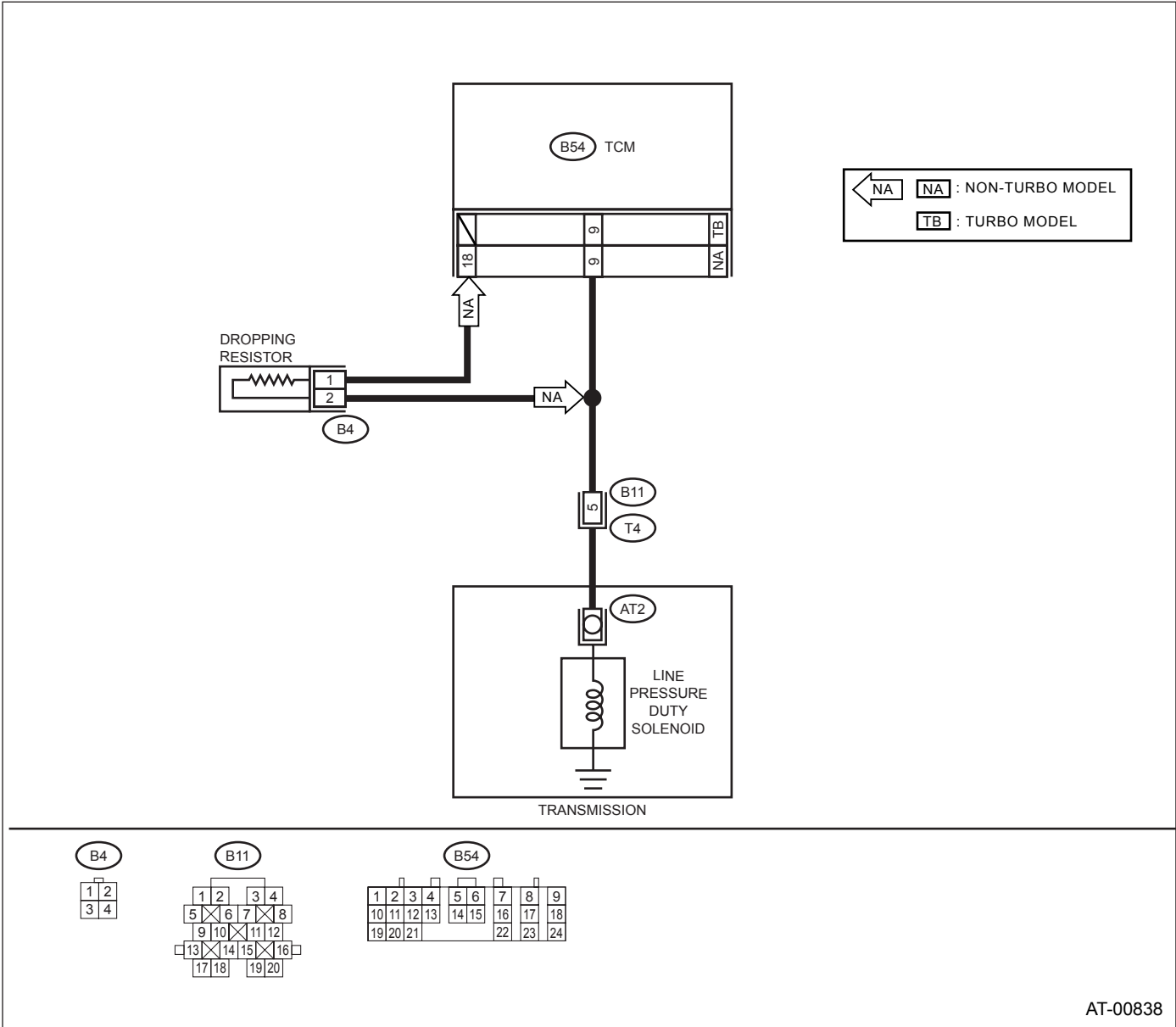
DIAGNOSIS:

Output signal circuit of line pressure duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00838

Step	Check	Yes	No
1	CHECK VEHICLE. Is the target non-turbo model?	Go to step 2.	Go to step 7.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK RESISTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from dropping resistor. 3) Measure the resistance between dropping resistor terminal. Terminals No. 1 — No. 2: Is the measured value within the specified range?	9 — 15 Ω	Go to step 3.	Replace the dropping resistor. <Ref. to AT-72, Dropping Resistor.>
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and dropping resistor connector. Connector & terminal (B54) No. 18 — (B4) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and dropping resistor connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. Measure the resistance of harness between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 1 — Chassis ground: Is the measured value within the specified range?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and dropping resistor connector.
5 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. 1) Disconnect the connector from transmission. 2) Measure the resistance of harness between transmission and dropping resistor connector. Connector & terminal (B4) No. 2 — (B11) No. 5: Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between dropping resistor and transmission connector.
6 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. Measure the resistance of harness between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 2 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 7.	Repair short circuit in harness between dropping resistor and transmission connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 9 — (B11) No. 5: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 9 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.
9 CHECK LINE PRESSURE DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Terminal (T4) No. 5 — No. 16: Is the measured value within the specified range?	2.0 — 4.5 Ω	Go to step 10.	Go to step 16.
10 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 13.	Go to step 11.
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until the ATF temperature is above 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. 3) Turn the ignition switch to ON (engine OFF). 4) Move the select lever to "N". 5) Throttle is fully closed. 6) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 9 (+) — Chassis ground (-): Is the measured value within the specified range?	1.5 — 5.0 V	Go to step 12.	Go to step 15.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
12 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Throttle is wide open. 2) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 9 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step 15.
13 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the transmission until the ATF temperature is above 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) Stop the engine and turn the ignition switch to ON (engine OFF). 6) Move the select lever to "N". 7) Read the data of line pressure duty solenoid using Subaru Select Monitor. • Line pressure duty solenoid is indicated in "%". 8) Throttle is fully closed. Is the line pressure duty solenoid data same as the specified value?	100%	Go to step 14.	Go to step 15.
14 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn the ignition switch to ON (Engine OFF). 2) Throttle is fully open. 3) Read the data of line pressure duty solenoid using Subaru Select Monitor. Is the line pressure duty solenoid data less than the specified value?	25%	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step 15.
15 CHECK POOR CONTACT. Is there poor contact in line pressure duty solenoid circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
16 CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove the oil pan, and disconnect the connector from line pressure duty solenoid. 4) Measure the resistance between line pressure duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	2.0 — 4.5 Ω	Go to step 17.	Replace the line pressure duty solenoid. <Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
17 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID. Measure the resistance of harness between line pressure duty solenoid and transmission connector. Connector & terminal (T4) No. 5 — (AT2) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 18.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
18 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 5 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between line pressure duty solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

N: DTC 76 2-4 BRAKE DUTY SOLENOID

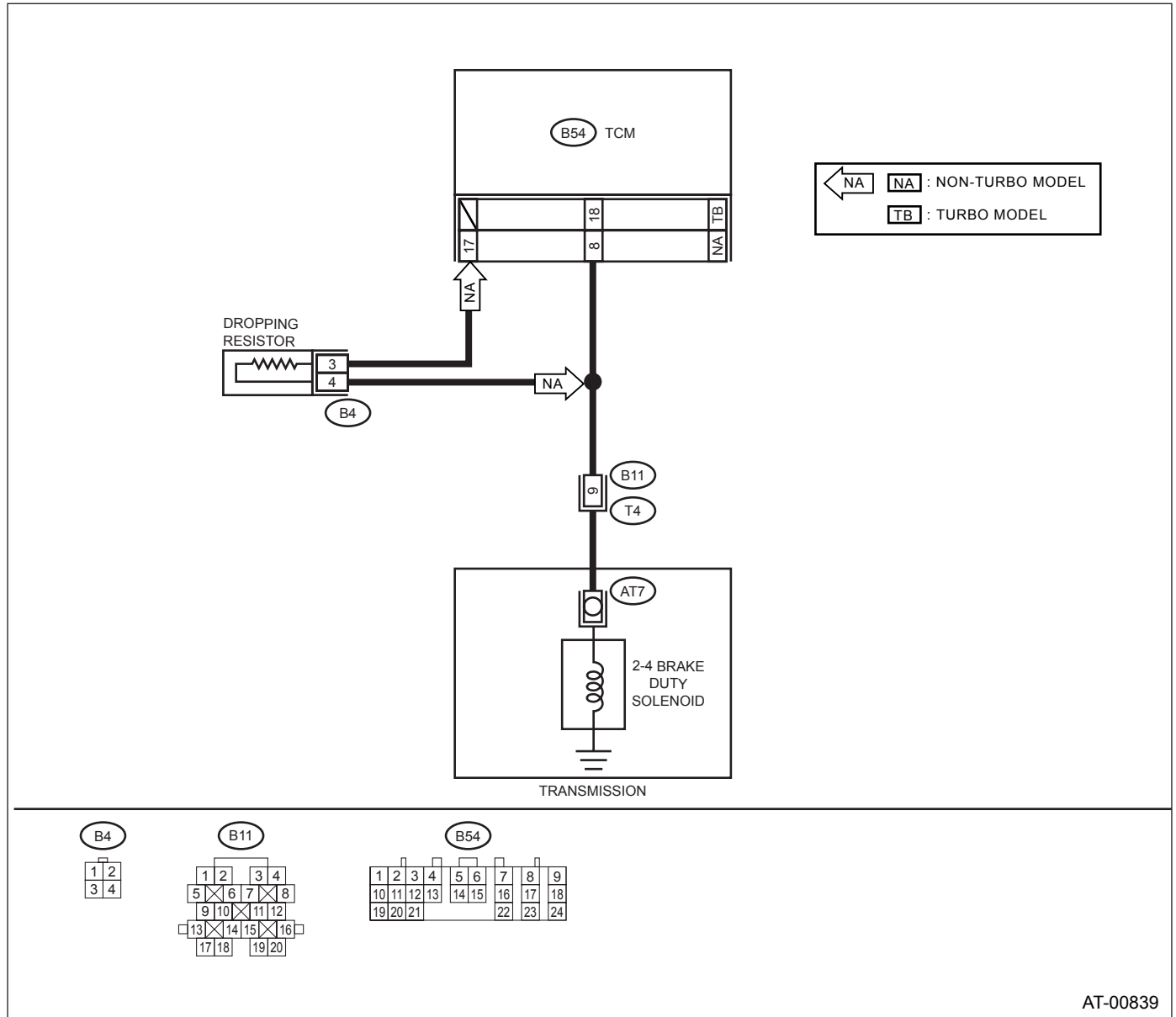
DIAGNOSIS:

Output signal circuit of 2-4 brake duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00839

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK VEHICLE. Is the target non-turbo model?	Non-turbo model.	Go to step 2.	Go to step 7.
2 CHECK RESISTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from dropping resistor. 3) Measure the resistance between dropping resistor terminal. Terminals No. 3 — No. 4: Is the measured value within the specified range?	9 — 15 Ω	Go to step 3.	Replace the dropping resistor. <Ref. to AT-72, Dropping Resistor.>
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and dropping resistor connector. Connector & terminal (B54) No. 17 — (B4) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and dropping resistor connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. Measure the resistance of harness between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 3 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and dropping resistor connector.
5 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. 1) Disconnect the connector from transmission. 2) Measure the resistance of harness between transmission and dropping resistor connector. Connector & terminal (B4) No. 4 — (B11) No. 9: Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between dropping resistor and transmission connector.
6 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. Measure the resistance of harness between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 4 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 7.	Repair short circuit in harness between dropping resistor and transmission connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B54) No. 8 — (B11) No. 9: Turbo model (B54) No. 18 — (B11) No. 9: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B54) No. 8 — Chassis ground: Turbo model (B54) No. 18 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.
9 CHECK 2-4 BRAKE DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Terminal (T4) No. 16 — No. 9: Is the measured value within the specified range?	2.0 — 4.5 Ω	Go to step 10.	Go to step 16.
10 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 13.	Go to step 11.
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until the ATF temperature is above 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. 3) Turn the ignition switch to ON (engine OFF). 4) Move the select lever to "N". 5) Throttle is fully closed. 6) Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 8 (+) — Chassis ground (-): Turbo model (B54) No. 18 (+) — Chassis ground (-): Is the measured value within the specified range?	1.5 — 5.0 V	Go to step 12.	Go to step 15.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
12 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1)Throttle is wide open. 2)Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 8 (+) — Chassis ground (-): Turbo model (B54) No. 18 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 15.
13 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1)Connect all connectors. 2)Connect the Subaru Select Monitor to data link connector. 3)Start the engine, and turn the Subaru Select Monitor switch to ON. 4)Warm-up the transmission until the ATF temperature is above 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)Stop the engine and turn the ignition switch to ON (engine OFF). 6)Move the select lever to "N". 7)Read the data of 2-4 brake duty solenoid using Subaru Select Monitor. •2-4 brake duty solenoid is indicated in "%". 8)Throttle is fully closed. Is the 2-4 brake duty solenoid data same as the specified value?	100%	Go to step 14.	Go to step 15.
14 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1)Turn the ignition switch to ON (Engine OFF). 2)Throttle is fully open. 3)Read the data of 2-4 brake duty solenoid using Subaru Select Monitor. Is the 2-4 brake duty solenoid data less than the specified value?	25%	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 15.
15 CHECK POOR CONTACT. Is there poor contact in 2-4 brake duty solenoid circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
16 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 the automatic transmission fluid until it cools down. 3)Remove the oil pan, and disconnect the connector from 2-4 brake duty solenoid. 4)Measure the resistance between 2-4 brake duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	2.0 — 4.5 Ω	Go to step 17.	Replace the 2-4 brake duty solenoid. <Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
17 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID. Measure the resistance of harness between 2-4 brake duty solenoid and transmission connector. Connector & terminal (T4) No. 9 — (AT7) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 18.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
18 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 9 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between 2-4 brake duty solenoid and transmission connector.

O: DTC 77 LOCK-UP DUTY SOLENOID

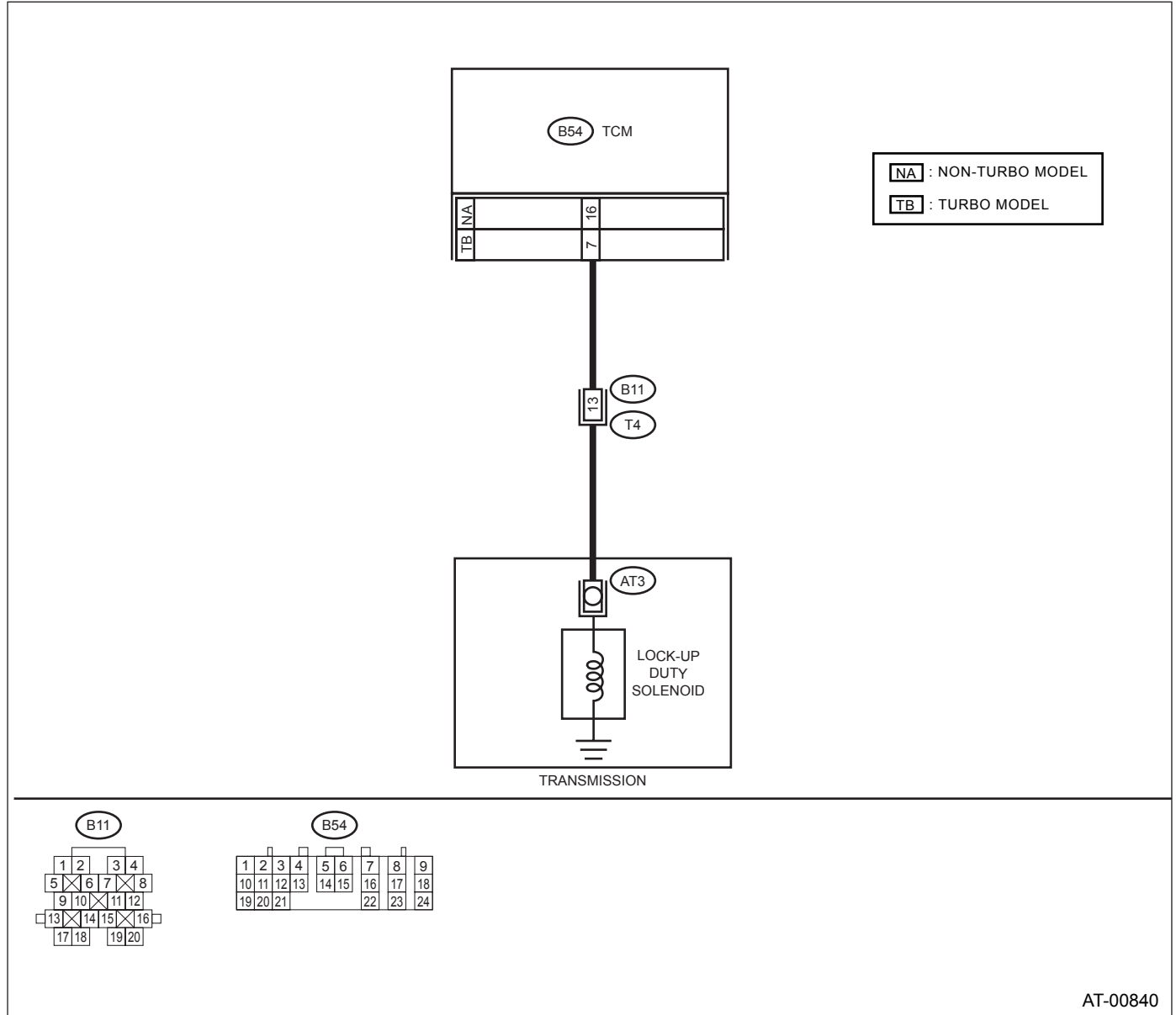
DIAGNOSIS:

Output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No "lock-up" (after engine warm-up).

WIRING DIAGRAM:



AT-00840

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK DTC. Do multiple trouble codes appear in the on-board diagnostics test mode?	Diagnostic trouble codes (DTC) are indicated.	Go to another trouble code.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>Non-turbo model</i> <i>(B54) No. 16 — (B11) No. 13:</i> <i>Turbo model</i> <i>(B54) No. 7 — (B11) No. 13:</i> Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness connector between TCM and chassis ground. <i>Connector & terminal</i> <i>Non-turbo model</i> <i>(B54) No. 16 — Chassis ground:</i> <i>Turbo model</i> <i>(B54) No. 7 — Chassis ground:</i> Is the measured value more than the specified value?	1 M Ω	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK LOCK-UP DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. <i>Connector & terminal</i> <i>(T4) No. 13 — No. 16:</i> Is the measured value within the specified range?	10 — 17 Ω	Go to step 5.	Go to step 11.
5 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 8.	Go to step 6.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1)Connect the connectors to TCM and trans- mission. 2)Lift-up the vehicle and place safety stand. CAUTION: Raise all wheels off ground. 3)Start the engine and warm-up the transmis- sion until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its oper- ating temperature. 4)Move the select lever to "D" and slowly increase the vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 5)Measure the voltage between TCM connec- tor and chassis ground. Connector & terminal Non-turbo model (B54) No. 16 (+) — Chassis ground (-): Turbo model (B54) No. 7 (+) — Chassis ground (-): Is the measured value more than the specified value?	8.5 V	Go to step 7.	Go to step 10.
7 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1)Return the engine to idling speed and move the select lever to "N". 2)Measure the voltage between TCM connec- tor and chassis ground. Connector & terminal Non-turbo model (B54) No. 16 (+) — Chassis ground (-): Turbo model (B54) No. 7 (+) — Chassis ground (-): Is the measured value less than the specified value?	0.5 V	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 10.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1)Connect the connectors to TCM and trans- mission. 2)Lift-up the vehicle and place safety stand. CAUTION: Raise all wheels off ground. 3)Connect the Subaru Select Monitor to data link connector. 4)Start the engine, and turn the Subaru Select Monitor switch to ON. 5)Start the engine and warm-up the transmis- sion until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its oper- ating temperature. 6)Read the data of lock-up duty solenoid using Subaru Select Monitor. •Lock-up duty solenoid is indicated in “%”. 7)Move the select lever to “D” and slowly increase the vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> Is the lock-up duty solenoid data same as the specified value?	95%	Go to step 9.	Go to step 10.
9 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1)Return the engine to idling speed and move the select lever to “N”. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control di- agnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 2)Read the data of lock-up duty solenoid using Subaru Select Monitor. Is the lock-up duty solenoid data same as the specified value?	5%	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 10.
10 CHECK POOR CONTACT. Is there poor contact in lock-up duty solenoid circuit?	There is a poor contact.	Repair poor con- tact.	Replace the TCM. <Ref. to AT-71, Transmission Con- trol Module (TCM).>

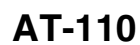
DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
11 CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid 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 connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 — 17 Ω	Go to step 12.	Replace the lock-up duty solenoid. <Ref. to AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
12 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. 13 — (AT3) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 13.	Repair open circuit in harness between TCM and transmission connector.
13 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. 13 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in lock-up duty solenoid and transmission.	Repair short circuit in harness between lock-up duty solenoid and transmission connector.

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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 TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>Non-turbo model</i> (B54) No. 15 — (B11) No. 6: <i>Turbo model</i> (B54) No. 6 — (B11) No. 6: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance harness connector between TCM and chassis ground. <i>Connector & terminal</i> <i>Non-turbo model</i> (B54) No. 15 — Chassis ground: <i>Turbo model</i> (B54) No. 6 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK TRANSFER DUTY SOLENOID. Measure the resistance between transmission connector and transmission terminals. <i>Connector & terminal</i> (T4) No. 6 — No. 16: Is the measured value within the specified range?	10 — 17 Ω	Go to step 4.	Go to step 13.
4 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 7.	Go to step 5.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Move the selector lever to "P" range. 4) Throttle is fully closed. 5) Measure the voltage between TCM connector and chassis ground. <i>Connector & terminal</i> <i>Non-turbo model</i> (B54) No. 15 (+) — Chassis ground (-): <i>Turbo model</i> (B54) No. 6 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 6.	Go to step 12.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move the selector lever to "D" range. 2) Measure the voltage between TCM connector and chassis ground. Connector & terminal Non-turbo model (B54) No. 15 (+) — Chassis ground (-): Turbo model (B54) No. 6 (+) — Chassis ground (-): Is the measured value within the specified range?	5 — 7 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 12.
7 CHECK VEHICLE Is the target non-turbo model?	Non-turbo model.	Go to step 8.	Go to step 10.
8 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON. 4) Move the select lever to "D" with wide open throttle (vehicle speed 0 km/h or 0 MPH). 5) Read the data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%". Read the data of transfer duty solenoid.	5 — 10%	Go to step 9.	Go to step 12.
9 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Move the select lever to "N" with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Read the data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%". Is the transfer duty solenoid data within the specified range?	approx. 60% — approx. 70%	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 12.
10 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4) Move the select lever to "D" with wide open throttle (vehicle speed 0 km/h or 0 MPH). 5) Read data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%". Is the transfer duty solenoid data within the specified range?	80 — 95%	Go to step 11.	Go to step 12.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Move the select lever to "N" with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Rear data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%". Is the transfer duty solenoid data same as the specified value?	Approx. 40%	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the transfer duty solenoid and TCM connector.	Go to step 12.
12 CHECK POOR CONTACT. Is there poor contact in transfer duty solenoid circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
13 CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift-up the vehicle and place safety stand. 2) Drain the automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid 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 (AT4) No. 1 — Transmission ground: Is the measured value within the specified range?	10 — 17 Ω	Go to step 14.	Replace the transfer duty solenoid.
14 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. 6 — (AT4) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 15.	Repair open circuit in harness between transfer duty solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
15 CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 6 — Transmission ground: Is the measured value more than the specified value?	1 M Ω	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transfer duty solenoid and transmission.	Repair short circuit in harness between transfer duty solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Q: DTC 93 REAR VEHICLE SPEED SENSOR

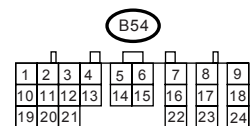
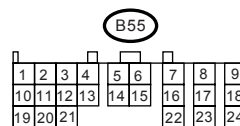
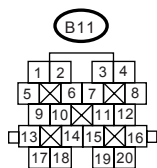
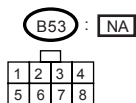
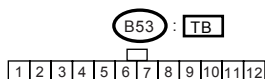
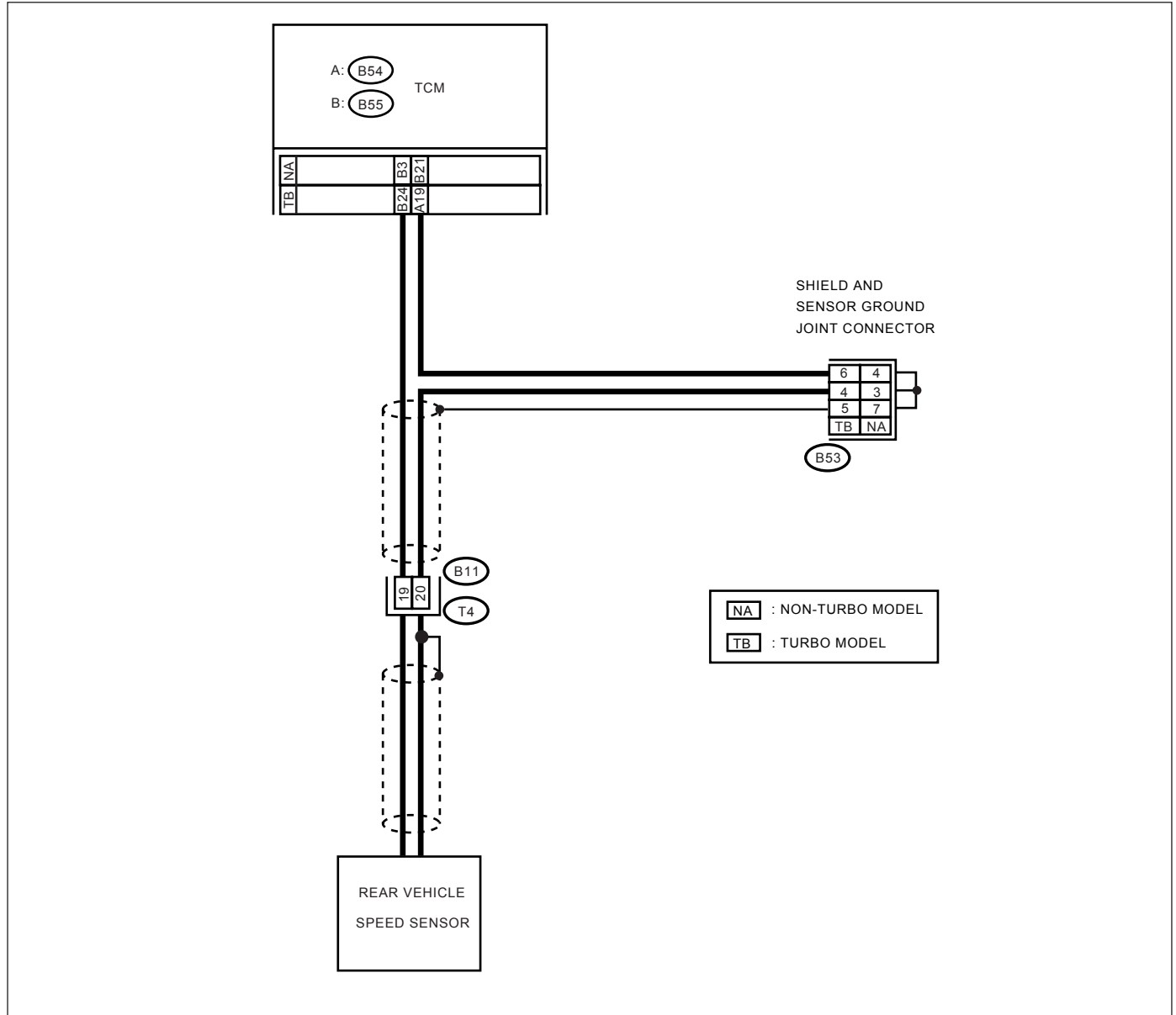
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner "braking".

WIRING DIAGRAM:



AT-00842

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 TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 3 — (B11) No. 19: Turbo model (B55) No. 24 — (B11) No. 19: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and transmission connector. Connector & terminal Non-turbo model (B55) No. 21 — (B11) No. 20: Turbo model (B54) No. 19 — (B11) No. 20: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 3 — Chassis ground: Turbo model (B55) No. 24 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 21 — Chassis ground: Turbo model (B54) No. 19 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5 CHECK REAR VEHICLE SPEED SENSOR. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 19 — No. 20: Is the measured value within the specified range?	450 — 650 Ω	Go to step 6.	Replace the rear vehicle speed sensor. <Ref. to AT-56, Rear Vehicle Speed Sensor.>
6 PREPARE OSCILLOSCOPE. Do you have an oscilloscope?	An oscilloscope is available.	Go to step 10.	Go to step 7.
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	A SUBARU SELECT MONITOR is available.	Go to step 9.	Go to step 8.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

	Step	Check	Yes	No
8	CHECK INPUT SIGNAL FOR TCM. 1)Connect the connectors to TCM and trans- mission. 2)Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off 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 indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 4)Measure the voltage between TCM connec- tor terminals. Connector & terminal Non-turbo model (B55) No. 3 (+) — (B54) No. 21 (-): Turbo model (B55) No. 24 (+) — (B54) No. 19 (-): Is the measured value more than the specified value?	AC 1 V	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in the TCM and trans- mission.	Go to step 11.
9	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1)Connect the connectors to TCM and trans- mission. 2)Connect the Subaru Select Monitor to data link connector. 3)Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off floor. 4)Turn the ignition switch to ON and turn the Subaru Select Monitor 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 or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> Does the speedometer indication increase as the Subaru Select Monitor data increases?	The speedometer indication increases.	Even if the AT OIL TEMP warning lights up, the cir- cuit has returned to a normal condi- tion at this time. A temporary poor contact of the con- nector or harness may be the cause. Repair harness or connector in the TCM and trans- mission.	Go to step 11.

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
10 CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1)Connect the connectors to TCM and transmission. 2)Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off floor. 3)Set the oscilloscope to TCM connector terminals. <i>Connector & terminal</i> <i>Turbo model</i> <i>Positive probe; (B55) No. 24</i> <i>Earth lead; (B55) No. 19</i> <i>Non-turbo model</i> <i>Positive probe; (B55) No. 3</i> <i>Earth lead; (B55) No. 21</i> 4)Start the engine and set the 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 indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> 5)Measure the signal voltage indicated on oscilloscope. Is the measured value more than the specified value?	AC 1 V	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
11 CHECK POOR CONTACT. Is there poor contact in rear vehicle speed sensor circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

15. Diagnostic Procedure for No-Diagnostic Trouble Code (DTC)

A: CHECK GEAR POSITION.

Step	Check	Yes	No
1 CHECK GEAR POSITION. 1) Lift-up the vehicle and place safety stand. CAUTION: Raise all wheels off ground. 2) Start the engine. 3) Move the select lever to "D", and drive the vehicle. 4) Read the data of gear position using Subaru Select Monitor. • Gear position is indicated. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-24, Clear Memory Mode.> Does the transmission gear correspond to the gear which is shown on display?	The gear corresponds with the display.	Go to step 2.	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-76, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> and <Ref. to AT-80, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2 CHECK VEHICLE. Is the target non-turbo model?	Non-turbo model.	Go to step CHECK FWD SWITCH. <Ref. to AT-122, CHECK FWD SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>	Go to step CHECK BRAKE SWITCH. <Ref. to AT-125, CHECK BRAKE SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

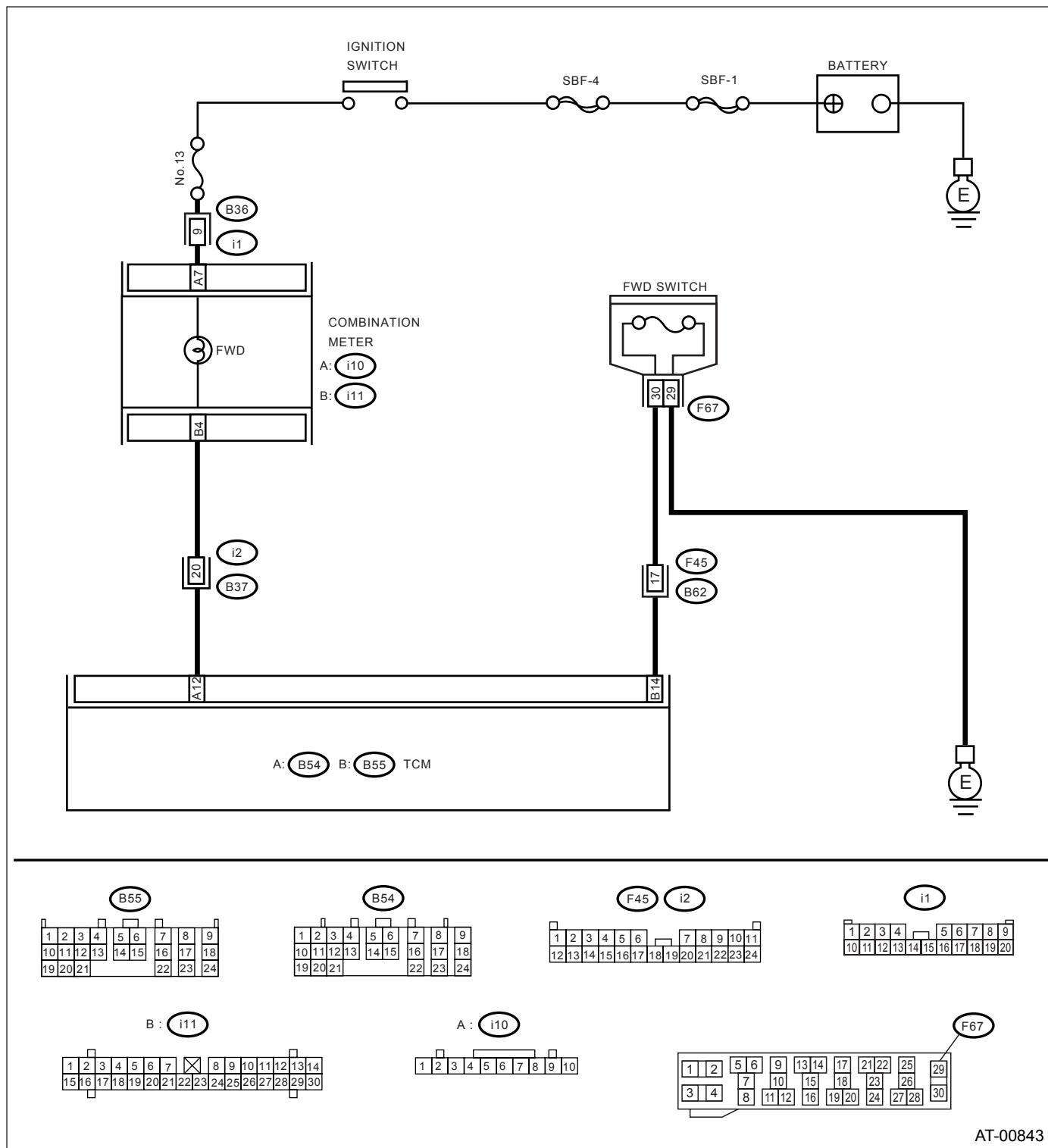
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: CHECK FWD SWITCH.

DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

WIRING DIAGRAM:



AT-00843

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK FWD SWITCH. When the fuse is inserted to FWD switch, does the LED light up?	The LED lights up.	Go to step CHECK BRAKE SWITCH.<Ref. to AT-125, CHECK BRAKE SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>	Go to step 2.
2 CHECK FWD INDICATOR LIGHT. 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the FWD indicator light bulb from combination meter. Is the FWD indicator light bulb OK?	The light bulb is OK.	Go to step 3.	Replace the FWD indicator light bulb.<Ref. to IDI-12, Combination Meter Assembly.>
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and FWD switch. 3)Measure the resistance of harness between TCM and FWD switch connector. Connector & terminal (B55) No. 14 — (F67) No. 30: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and FWD switch connector.
4 CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND. Measure the resistance of harness between FWD switch and chassis ground. Connector & terminal (F67) No. 29 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 5.	Repair open circuit in 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 (B55) No. 14 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 6.	Repair short circuit in harness between TCM and FWD switch connector.
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 (B55) No. 14 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 7.	Go to step 12.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK INPUT SIGNAL FOR TCM. Measure the signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B55) No. 14 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Go to step 8.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and combination meter. 3) Measure the resistance of harness between TCM and diagnosis connector. Connector & terminal (B54) No. 12 — (i11) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.
9 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure the resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. Connector & terminal (B54) No. 12 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Go to step 10.	Repair short circuit in harness between TCM and combination meter connector.
10 CHECK OUTPUT SIGNAL EMITTED FROM 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. Connector & terminal (B54) No. 12 (+) — Chassis ground (-) : Is the measured value less than the specified value?	1 V	Go to step 11.	Go to step 12.
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure the signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B54) No. 12 (+) — Chassis ground (-) : Is the measured value more than the specified value?	9 V	Go to step 12.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
12 CHECK POOR CONTACT. Is there poor contact in FWD switch circuit?	There is a poor contact.	Repair poor contact.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: CHECK BRAKE SWITCH.

Step	Check	Yes	No
1 CHECK BRAKE SWITCH. When the brake pedal is depressed, does the LED light up?	The LED lights up.	Go to step CHECK ABS SWITCH. <Ref. to AT-125, CHECK ABS SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>	Check the brake switch circuit.

D: CHECK ABS SWITCH.

Step	Check	Yes	No
1 CHECK ABS SWITCH. Does the LED of ABS switch light up?	The LED lights up.	Check the ABS switch circuit. <Ref. to ABS-128, DTC 44 — ABS-AT CONTROL (NON CONTROLLED) —, Diagnostic Chart with Subaru Select Monitor.> and <Ref. to ABS-130, DTC 44 — ABS-AT CONTROL (CONTROLLED) —, Diagnostic Chart with Subaru Select Monitor.>	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to AT-125, CHECK CRUISE CONTROL SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>

E: CHECK CRUISE CONTROL SWITCH.

Step	Check	Yes	No
1 CHECK CRUISE CONTROL SWITCH. When cruise control is set, does the LED light up?	The LED lights up.	Go to step CHECK INHIBITOR SWITCH. <Ref. to AT-127, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>	Check the cruise control. <Ref. to CC-30, Diagnostics Chart with Diagnostic Trouble Code.>

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: CHECK INHIBITOR SWITCH.

DIAGNOSIS:

Input signal circuit of inhibitor switch is open or shorted.

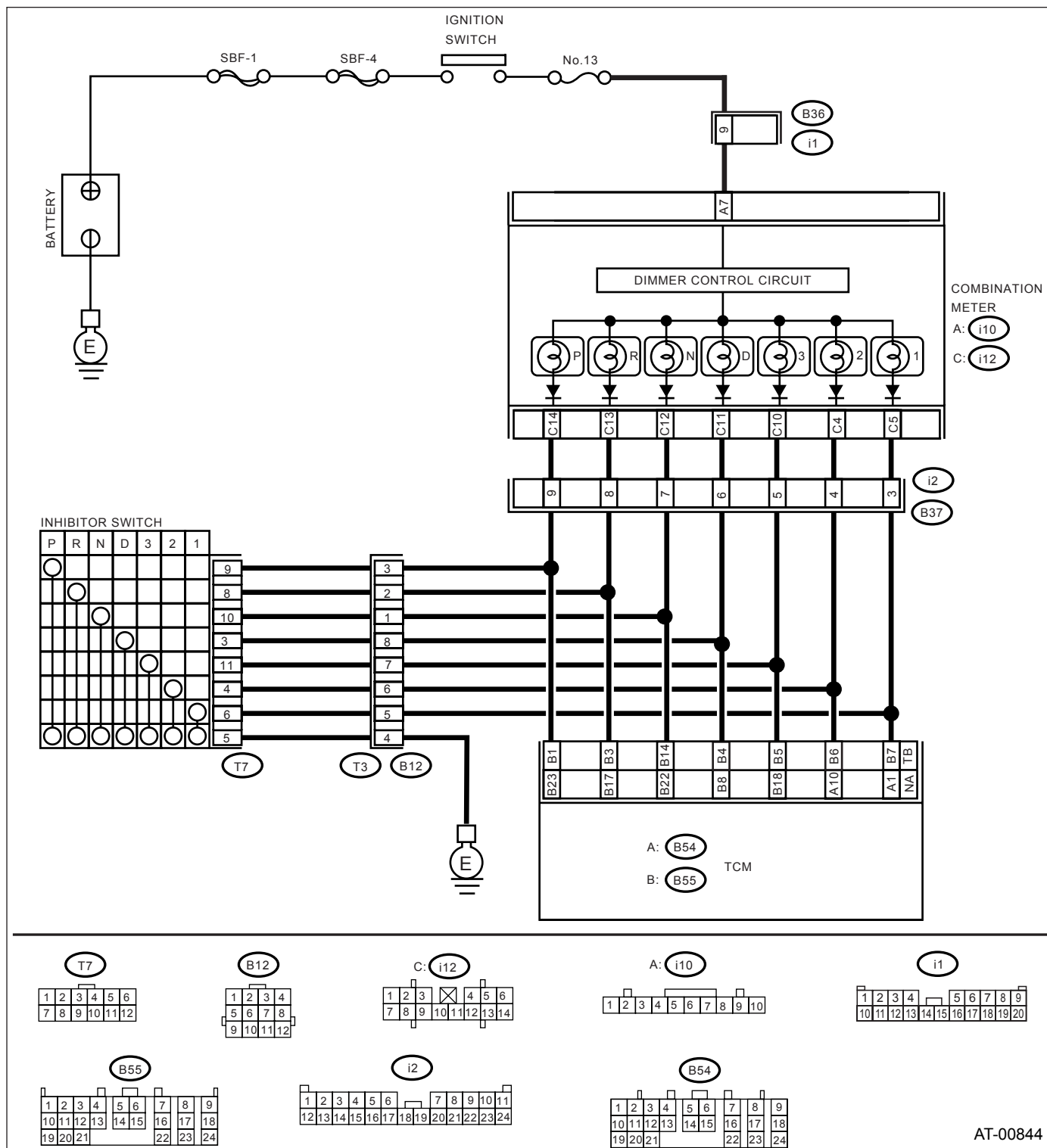
TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “3” range.
- Engine brake is not effected when selector lever is in “2” range.
- Engine brake is not effected when selector lever is in “1” range.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



AT-00844

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No	
1	CHECK “P” RANGE SWITCH. When “P” range is selected, does the LED light up?	The LED lights up.	Go to step 2.	Go to step 22.
2	CHECK INDICATOR LIGHT. Does the combination meter “P” range indicator illuminate?	The indicator illuminates.	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?	The LED lights up.	Go to step 28.	Go to step 4.
4	CHECK “R” RANGE SWITCH. When the “R” range is selected, does the LED light up?	The LED lights up.	Go to step 5.	Go to step 29.
5	CHECK INDICATOR LIGHT. Does the combination meter “R” range indicator illuminate?	The indicator illuminates.	Go to step 6.	Go to step 32.
6	CHECK “R” RANGE SWITCH. When the “N” range is selected, does the “R” range LED light up?	The LED lights up.	Go to step 34.	Go to step 7.
7	CHECK “N” RANGE SWITCH. When the “N” range is selected, does the LED light up?	The LED lights up.	Go to step 8.	Go to step 35.
8	CHECK INDICATOR LIGHT. Does the combination meter “N” range indicator illuminate?	The indicator illuminates.	Go to step 9.	Go to step 38.
9	CHECK “N” RANGE SWITCH. When the “D” range is selected, does the “N” range LED light up?	The LED lights up.	Go to step 40.	Go to step 10.
10	CHECK “D” RANGE SWITCH. When the “D” range is selected, does the LED light up?	The LED lights up.	Go to step 11.	Go to step 41.
11	CHECK INDICATOR LIGHT. Does the combination meter “D” range indicator illuminate?	The indicator illuminates.	Go to step 12.	Go to step 44.
12	CHECK “D” RANGE SWITCH. When the “3” range is selected, does the “D” range LED light up?	The LED lights up.	Go to step 46.	Go to step 13.
13	CHECK “3” RANGE SWITCH. When the “3” range is selected, does the LED light up?	The LED lights up.	Go to step 14.	Go to step 47.
14	CHECK INDICATOR LIGHT. Does the combination meter “3” range indicator illuminate?	The indicator illuminates.	Go to step 15.	Go to step 50.
15	CHECK “3” RANGE SWITCH. When the “2” range is selected, does the “3” range LED light up?	The LED lights up.	Go to step 52.	Go to step 16.
16	CHECK “2” RANGE SWITCH. When the “2” range is selected, does the LED light up?	The LED lights up.	Go to step 17.	Go to step 53.
17	CHECK INDICATOR LIGHT. Does the combination meter “2” range indicator illuminate?	The indicator illuminates.	Go to step 18.	Go to step 56.
18	CHECK “2” RANGE SWITCH. When the “1” range is selected, does the “2” range LED light up?	The LED lights up.	Go to step 58.	Go to step 19.
19	CHECK “1” RANGE SWITCH. When the “1” range is selected, does the LED light up?	The LED lights up.	Go to step 20.	Go to step 59.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
20 CHECK INDICATOR LIGHT. Does the combination meter "1" range indicator illuminate?	The indicator illuminates.	Go to step 21.	Go to step 62.
21 CHECK "1" RANGE SWITCH. When the "2" range is selected, does the "1" range LED light UP?	The LED lights up.	Go to step 64.	Go to step Symptom Related Diagnostic. <Ref. to AT-141, Symptom Related Diagnostic.>
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 measured value less than the specified value?	1 Ω	Go to step 23.	Repair open circuit in harness between inhibitor switch connector and chassis ground, and poor contact in coupling connector.
23 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. Connector & terminal Non-turbo model (B55) No. 23 — (T7) No. 9 Turbo model (B55) No. 1 — (T7) No. 9 Is the measured value less than the specified value?	1 Ω	Go to step 24.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
24 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 selector lever to "P" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 23 (+) — Chassis ground (-): Turbo model (B55) No. 1 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 25.	Go to step 65.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
25 CHECK INPUT SIGNAL FOR TCM. 1) Move the selector lever to other than "P" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 23 (+) — Chassis ground (-): Turbo model (B55) No. 1 (+) — Chassis ground (-): Is the measured value more than the specified value?	8 V	Go to step 65.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
26 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 combination meter. Is the "P" range indicator light bulb OK?	The light bulb is OK.	Go to step 27.	Replace the "P" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
27 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 Non-turbo model (B55) No. 23 — (i12) No. 14: Turbo model (B55) No. 1 — (i12) No. 14: Is the measured value more than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in coupling connector.
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 harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 23 — Chassis ground: Turbo model (B55) No. 1 — Chassis ground: Is the measured value less than the specified value?	1 M Ω	Go to step 29.	Repair ground short circuit in "P" range circuit.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
29 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <i>Connector & terminal</i> <i>Non-turbo model</i> (B55) No. 17 — (T7) No. 8: <i>Turbo model</i> (B55) No. 3 — (T7) No. 8: Is the measured value less than the specified value?	1 Ω	Go to step 30.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling 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 selector lever to "R" range. 5) Measure the voltage between TCM and chassis ground. <i>Connector & terminal</i> <i>Non-turbo model</i> (B55) No. 17 (+) — Chassis ground (-): <i>Turbo model</i> (B55) No. 3 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 31.	Go to step 65.
31 CHECK INPUT SIGNAL FOR TCM. Measure the voltage between TCM and chassis ground. <i>Connector & terminal</i> <i>Non-turbo model</i> (B55) No. 17 (+) — Chassis ground (-): <i>Turbo model</i> (B55) No. 3 (+) — Chassis ground (-): Is the measured value more than the specified value?	8 V	Go to step 65.	Replace the TCM. <Ref. to AT-71, 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?	The light bulb is OK.	Go to step 33.	Replace the "R" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
33 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. <i>Connector & terminal</i> <i>Non-turbo model</i> (B55) No. 17 — (i12) No. 13: <i>Turbo model</i> (B55) No. 3 — (i12) No. 13: Is the measured value less than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.

DIAGNOSTIC PROCEDURE FOR NO-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 connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 17 — Chassis ground: Turbo model (B55) No. 3 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 35.	Repair ground short circuit in "R" range circuit.
35 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. Connector & terminal Non-turbo model (B55) No. 22 — (T7) No. 10: Turbo model (B55) No. 14 — (T7) No. 10: Is the measured value less than the specified value?	1 Ω	Go to step 36.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
36 CHECK INPUT SIGNAL FOR TCM. 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the selector lever to "N" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 22 (+) — Chassis ground (-): Turbo model (B55) No. 14 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 37.	Go to step 65.
37 CHECK INPUT SIGNAL FOR TCM. 1) Move the selector lever to other than "N" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 22 (+) — Chassis ground (-): Turbo model (B55) No. 14 (+) — Chassis ground (-): Is the measured value more than the specified value?	8 V	Go to step 65.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
38 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 combination meter. Is the "N" range indicator light bulb OK?	The light bulb is OK.	Go to step 39.	Replace the "N" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
39 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 Non-turbo model (B55) No. 22 — (i12) No. 12: Turbo model (B55) No. 14 — (i12) No. 12: Is the measured value less than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
40 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 22 — Chassis ground: Turbo model (B55) No. 14 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Go to step 41.	Repair ground short circuit in "N" range circuit.
41 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. Connector & terminal Non-turbo model (B55) No. 8 — (T7) No. 3: Turbo model (B55) No. 4 — (T7) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 42.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
42 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 selector lever to "D" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 8 (+) — Chassis ground (-): Turbo model (B55) No. 4 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 43.	Go to step 65.
43 CHECK INPUT SIGNAL FOR TCM. 1) Move the selector lever to other than "N" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 8 (+) — Chassis ground (-): Turbo model (B55) No. 4 (+) — Chassis ground (-): Is the measured value more than the specified value?	8 V	Go to step 65.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
44 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?	The light bulb is OK.	Go to step 45.	Replace the "D" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
45 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 Non-turbo model (B55) No. 8 — (i12) No. 11: Turbo model (B55) No. 4 — (i12) No. 11: Is the measured value less than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and TCM connector.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
46 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 8 — Chassis ground: Turbo model (B55) No. 4 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 47.	Repair ground short circuit in "D" range circuit.
47 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. Connector & terminal Non-turbo model (B55) No. 18 — (T7) No. 11: Turbo model (B55) No. 5 — (T7) No. 11: Is the measured value less than the specified value?	1 Ω	Go to step 48.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
48 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 selector lever to "3" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 18 (+) — Chassis ground (-): Turbo model (B55) No. 5 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 49.	Go to step 65.
49 CHECK INPUT SIGNAL FOR TCM. 1) Move the selector lever to other than "3" range. 2) Measure the hvoltage between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 18 (+) — Chassis ground (-): Turbo model (B55) No. 5 (+) — Chassis ground (-): Is the measured value more than the specified value?	8 V	Go to step 65.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
50 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?	The light bulb is OK.	Go to step 51.	Replace the "3" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
51 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 Non-turbo model (B55) No. 18 — (i12) No. 10: Turbo model (B55) No. 5 — (i12) No. 10: Is the measured value less than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
52 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B55) No. 18 — Chassis ground: Turbo model (B55) No. 5 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Go to step 53.	Repair ground short circuit in "3" range circuit.
53 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. Connector & terminal Non-turbo model (B54) No. 10 — (T7) No. 4: Turbo model (B55) No. 6 — (T7) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 54.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
54 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 selector lever to "2" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B54) No. 10 (+) — Chassis ground (-): Turbo model (B55) No. 6 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 55.	Go to step 65.
55 CHECK INPUT SIGNAL FOR TCM. 1) Move the selector lever to other than "2" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B54) No. 10 (+) — Chassis ground (-): Turbo model (B55) No. 6 (+) — Chassis ground (-): Is the measured value more than the specified value?	8 V	Go to step 65.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>
56 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?	The light bulb is OK.	Go to step 57.	Replace the "2" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
57 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 Non-turbo model (B54) No. 10 — (i12) No. 4: Turbo model (B55) No. 6 — (i12) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between TCM and combination meter, and poor contact in TCM connector.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 harness between TCM and chassis ground. Connector & terminal Non-turbo model (B54) No. 10 — Chassis ground: Turbo model (B55) No. 6 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 59.	Repair ground short circuit in "2" range circuit.
59 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. Connector & terminal Non-turbo model (B54) No. 1 — (T7) No. 6: Turbo model (B55) No. 7 — (T7) No. 6: Is the measured value less than the specified value?	1 Ω	Go to step 60.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
60 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 selector lever to "1" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B54) No. 1 (+) — Chassis ground (-): Turbo model (B55) No. 7 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 61.	Go to step 65.
61 CHECK INPUT SIGNAL FOR TCM. 1) Move the selector lever to other than "1" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal Non-turbo model (B54) No. 1 (+) — Chassis ground (-): Turbo model (B55) No. 7 (+) — Chassis ground (-): Is the measured value less than the specified value?	8 V	Go to step 65.	Replace the TCM. <Ref. to AT-71, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
62 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?	The light bulb is OK.	Go to step 63.	Replace the "1" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
63 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 Non-turbo model (B54) No. 1 — (i12) No. 5: Turbo model (B55) No. 7 — (i12) No. 5: Is the measured value less than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between TCM and combination meter, poor contact in TCM connector.
64 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. Connector & terminal Non-turbo model (B54) No. 1 — Chassis ground: Turbo model (B55) No. 7 — Chassis ground: Is the measured value more than the specified value?	1 M Ω	Go to step 65.	Repair ground short circuit in "1" range circuit.
65 CHECK POOR CONTACT. Is there poor contact in inhibitor switch circuit?	There is a poor contact.	Repair poor contact.	Adjust the inhibitor switch and select cable. <Ref. to AT-48, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-29, Select Cable.>

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

16.Symptom Related Diagnostic

A: INSPECTION

Symptom	Problem parts
Starter does not rotate when the select lever is in "P" or "N"; starter rotates when the select lever is in "R", "D", "3" or "2".	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Abnormal noise when the 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 one range to another.	• Control valve • Lock-up damper • Engine performance • Input shaft
Vehicle moves when the select lever is in "N".	• TCM • Low clutch
Shock occurs when the select lever is moved from "N" to "D".	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when the select lever is moved from "N" to "D".	• Control valve • Low clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Shock occurs when the select lever is moved from "N" to "R".	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when the select lever is moved from "N" to "R".	• Control valve • Low & reverse clutch • Reverse clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	• Parking brake mechanism • Planetary gear

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	• 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 too low • Front gasket transmission case
Vehicle does not start in "R" range only (engine revving up).	• Select cable • Select lever • Control valve • Low & reverse clutch • Reverse clutch
Vehicle does not start in "R" range only (engine stalls).	• Low clutch • 2-4 brake • Planetary gear • Parking brake mechanism
Vehicle does not start in "D", "3" range only (engine revving up).	• Low clutch • One-way clutch
Vehicle does not start in "D", "3" or "2" range only (engine revving up).	• Low clutch
Vehicle does not start in "D", "3" or "2" range only (engine stalls).	• Reverse clutch
Vehicle starts in "R" range only (engine revving up).	• Control valve
Acceleration during standing starts is poor (high stall rpm).	• Control valve • Low clutch • Reverse clutch • ATF level too low • Front gasket transmission case • Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	• Oil pump • Torque converter one-way clutch • Engine performance
Acceleration is poor when the select lever is in "D", "3" or "2" range (normal stall rpm).	• TCM • Control valve • High clutch • 2-4 brake • Planetary gear
Acceleration is poor when the select lever is in "R" (normal stall rpm).	• Control valve • High clutch • 2-4 brake • Planetary gear
No shift occurs from 1st to 2nd gear.	• TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Throttle position sensor • Shift solenoid 1 • Control valve • 2-4 brake
No shift occurs from 2nd to 3rd gear.	• TCM • Control valve • High clutch • Shift solenoid 2

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	• TCM • Shift solenoid 1 • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when the select lever is in "3" range.	• Inhibitor switch • TCM • Throttle position sensor • Control valve
Engine brake is not effected when the select lever is in "3" or "2" range.	• Control valve
Engine brake is not effected when the select lever is in "1" range.	• Control valve • Low & reverse brake
Shift characteristics are erroneous.	• Inhibitor switch • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • Control valve • Ground earth
No lock-up occurs.	• TCM • Throttle position sensor • ATF temperature sensor • Control valve • Lock-up facing • Engine speed signal
Parking brake is not effected.	• 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 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 from 1st to 2nd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid • High clutch

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake timing solenoid • 2-4 brake • ATF deterioration • Engine performance • Low clutch timing solenoid • Low clutch
Slippage occurs from 3rd to 4th gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid
Shock occurs when the select lever is moved from "3" to "2" range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • 2-4 brake timing solenoid
Shock occurs when the select lever is moved from "D" to "1" range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Shock occurs when the select lever is moved from "2" to "1" range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
Shock occurs when the accelerator pedal is released at medium speeds.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Lock-up damper • Engine performance • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
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 • Throttle 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 • Throttle position sensor • ATF temperature sensor • Control valve • Transfer clutch • Transfer valve • Transfer pipe • Transfer duty solenoid
Vehicle is not set in FWD mode.	• TCM • Transfer clutch • Transfer valve • Transfer duty solenoid
Select lever is hard to move.	• Select cable • Select lever • Detent spring • Manual plate
Select lever is too high to move (unreasonable resistance).	• Detent spring • Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detent spring • Manual plate

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

GENERAL DESCRIPTION

CLUTCH SYSTEM

1. General Description

A: SPECIFICATIONS

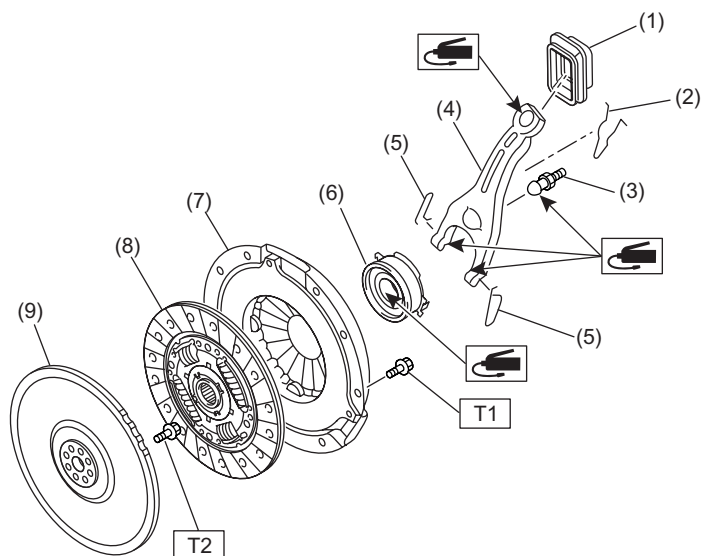
Model			NON-TURBO	TURBO
Clutch cover	Type		Push type	Pull type
	Diaphragm set load kg (lb)		580 (1,279)	830 (1,830)
Clutch disk	Facing material		Woven (Non asbestos)	
	O.D. x I.D. x thickness	mm (in)	225 x 150 x 3.5 (8.86 x 5.91 x 0.138)	230 x 155 x 3.5 (9.06 x 6.10 x 0.138)
	Spline O.D. mm (in)		25.2 (0.992), (No. of teeth: 24)	
Clutch release lever ratio			1.6	1.7
Release bearing			Grease-packed self-aligning	
Clutch pedal	Full stroke mm (in)		130 — 135 (5.12 — 5.31)	
	Free play mm (in)		10 — 20 (0.39 — 0.79)	3 — 13 (0.12 — 0.51)
Clutch disk	Stroke mm (in)		12 — 13.6 (0.473 — 0.535)	13.3 — 14.7 (0.524 — 0.579)
Clutch disk	Depth of rivet head mm (in)	Standard	1.3 — 1.9 (0.051 — 0.075)	
		Limit of sinking	0.3 (0.012)	
	Limit for deflection mm (in)		1.0 (0.039) at R = 107 (4.21)	0.8 (0.031) at R = 110 (4.33)

I.D.: Inner diameter

O.D.: Outer diameter

B: COMPONENT

1. CLUTCH ASSEMBLY FOR NON-TURBO MODEL



CL-00186

- | | |
|----------------------------------|---------------------|
| (1) Clutch release lever sealing | (6) Release bearing |
| (2) Retainer spring | (7) Clutch cover |
| (3) Pivot | (8) Clutch disc |
| (4) Release lever | (9) Flywheel |
| (5) Clip | |

Tightening torque: N·m (kgf-m, ft-lb)

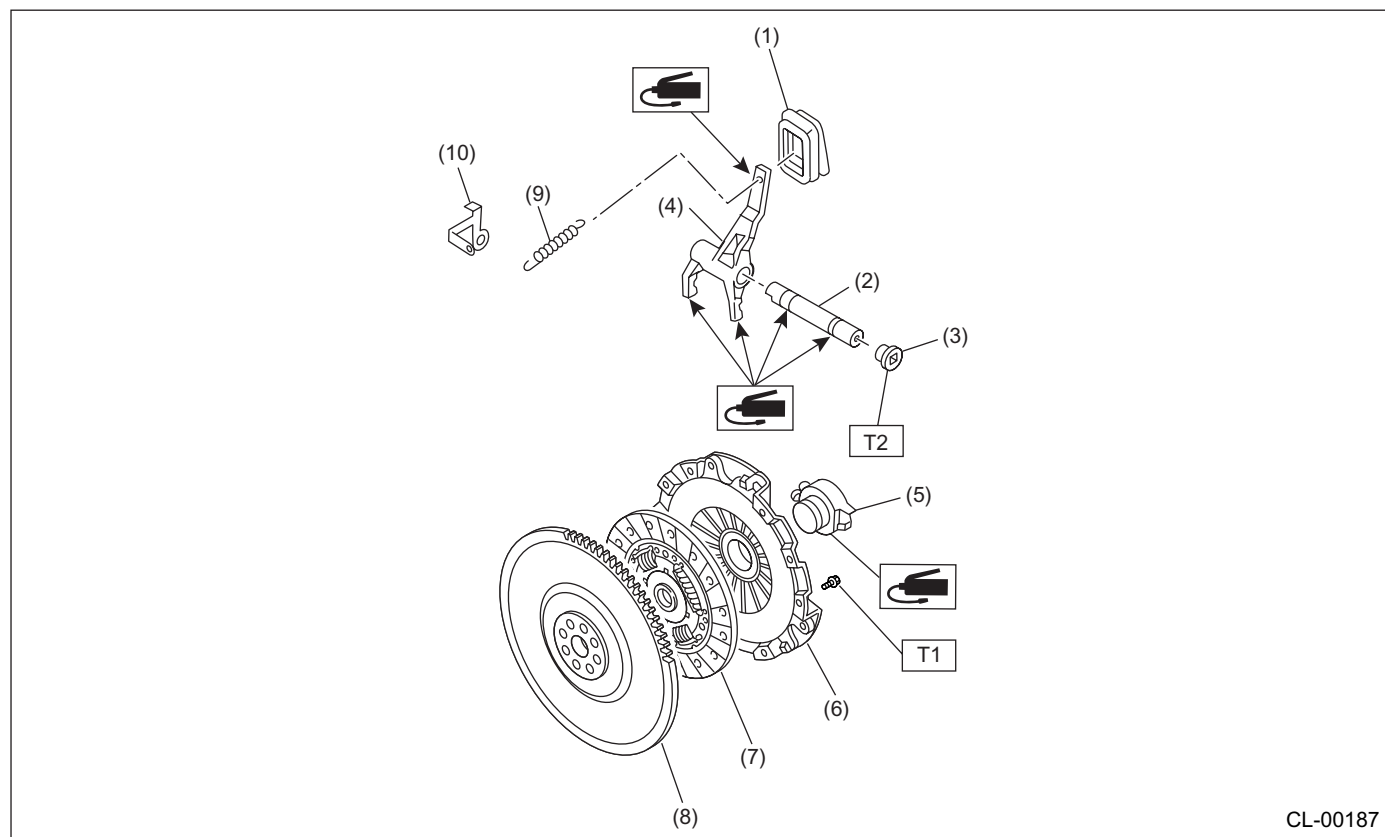
T1: 16 (1.6, 11.6)

T2: 72 (7.3, 52.8)

GENERAL DESCRIPTION

CLUTCH SYSTEM

2. CLUTCH ASSEMBLY FOR TURBO MODEL



- (1) Clutch release lever sealing
- (2) Release lever shaft
- (3) Plug
- (4) Release lever
- (5) Release bearing

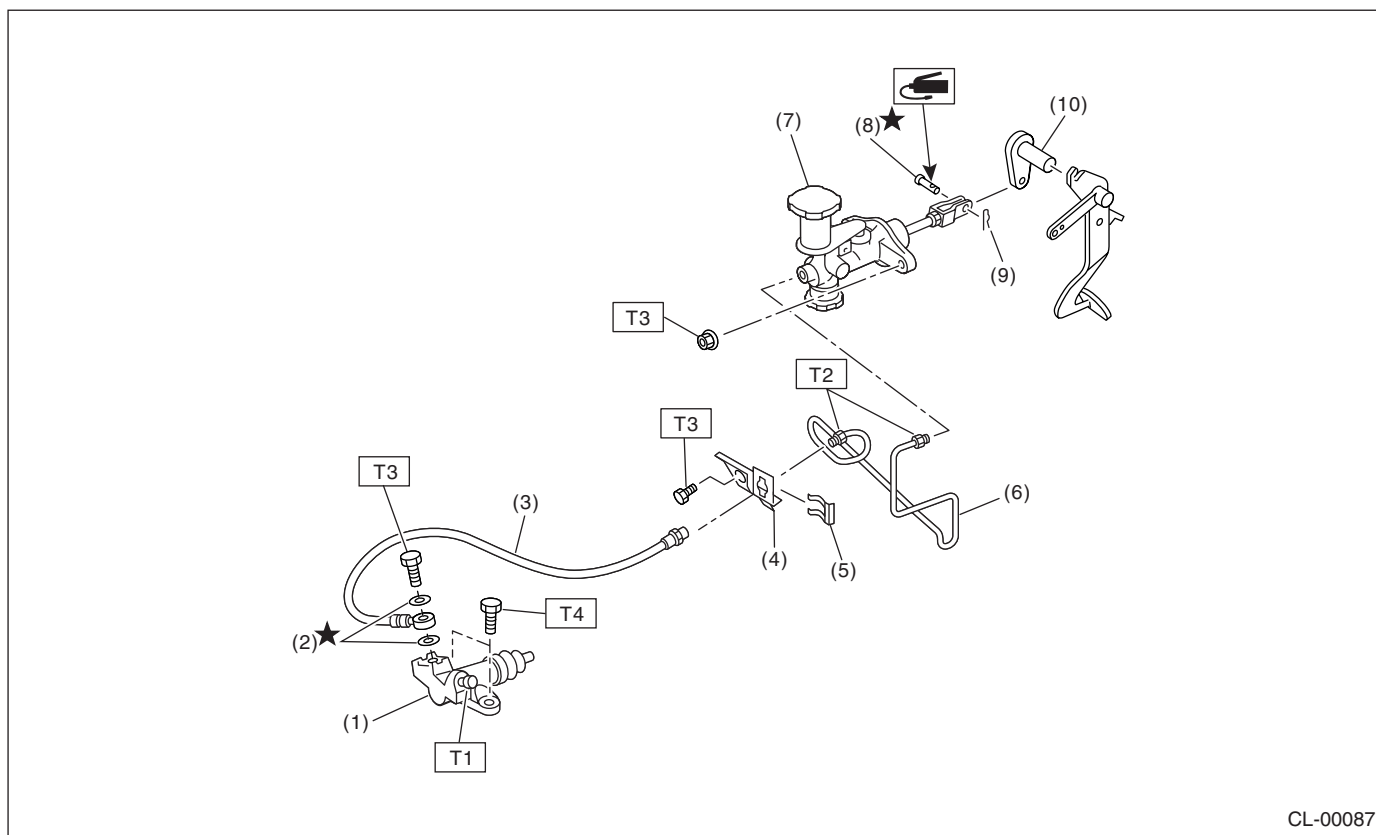
- (6) Clutch cover
- (7) Clutch disc
- (8) Flywheel
- (9) Spring
- (10) Bracket

Tightening torque: N·m (kgf-m, ft-lb)

T1: 15.7 (1.6, 11.6)

T2: 44 (4.5, 32.5)

3. CLUTCH PIPE AND HOSE FOR NON-TURBO MODEL



CL-00087

- | | |
|------------------------|--------------------------|
| (1) Operating cylinder | (6) 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: 8 (0.8, 5.8)

T2: 15 (1.5, 11)

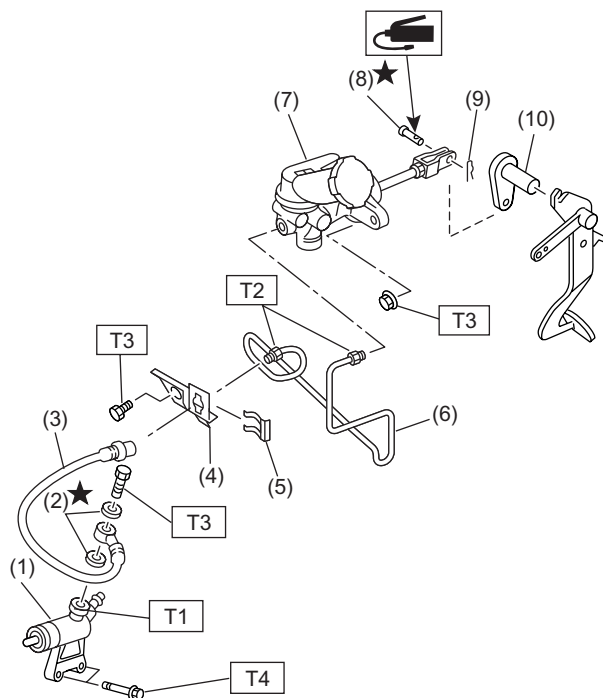
T3: 18 (1.8, 13.0)

T4: 37 (3.8, 27.5)

GENERAL DESCRIPTION

CLUTCH SYSTEM

4. CLUTCH PIPE AND HOSE FOR TURBO MODEL



CL-00188

- | | |
|------------------------|--------------------------|
| (1) Operating cylinder | (6) 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: 8 (0.8, 5.8)

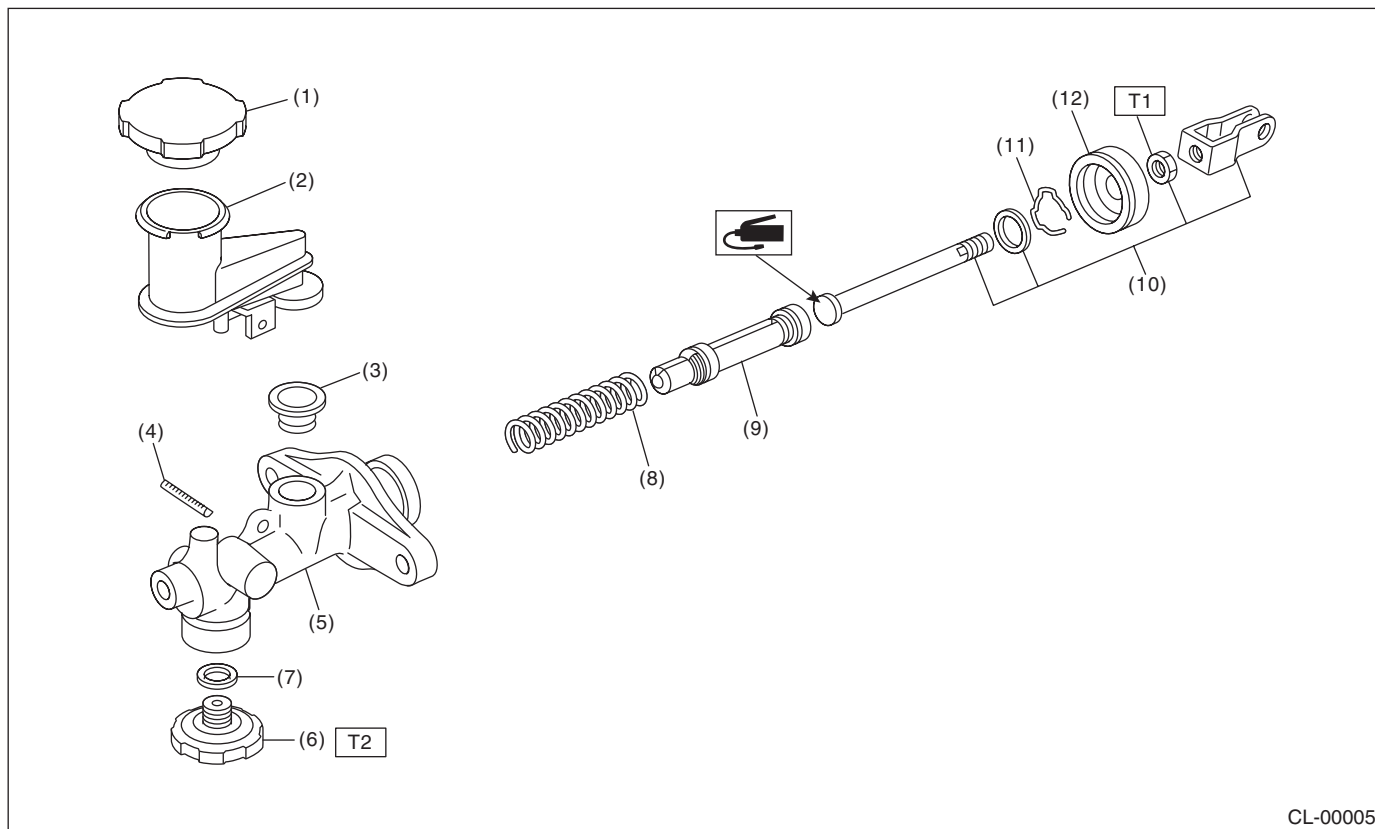
T2: 15 (1.5, 11)

T3: 18 (1.8, 13.0)

T4: 37 (3.8, 27.5)

5. MASTER CYLINDER

• NON-TURBO MODEL



- | | |
|---------------------|-----------------------|
| (1) Reservoir cap | (7) Gasket |
| (2) Reservoir tank | (8) Return spring |
| (3) Oil seal | (9) Piston |
| (4) Straight pin | (10) Push rod |
| (5) Master cylinder | (11) Piston stop ring |
| (6) Clutch damper | (12) Cylinder boot |

Tightening torque: N·m (kgf-m, ft-lb)

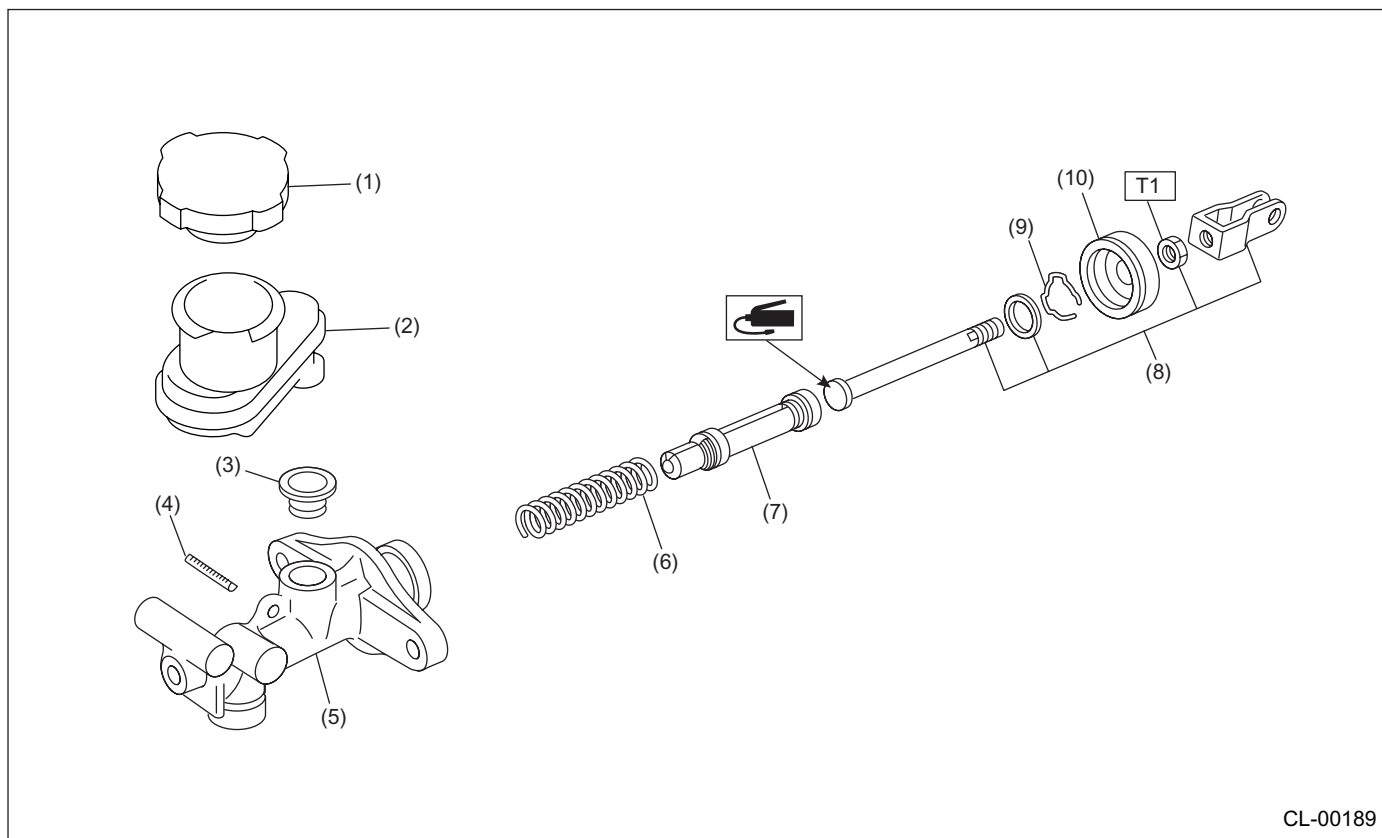
T1: 10 (1.0, 7)

T2: 46.6 (4.75, 34.4)

GENERAL DESCRIPTION

CLUTCH SYSTEM

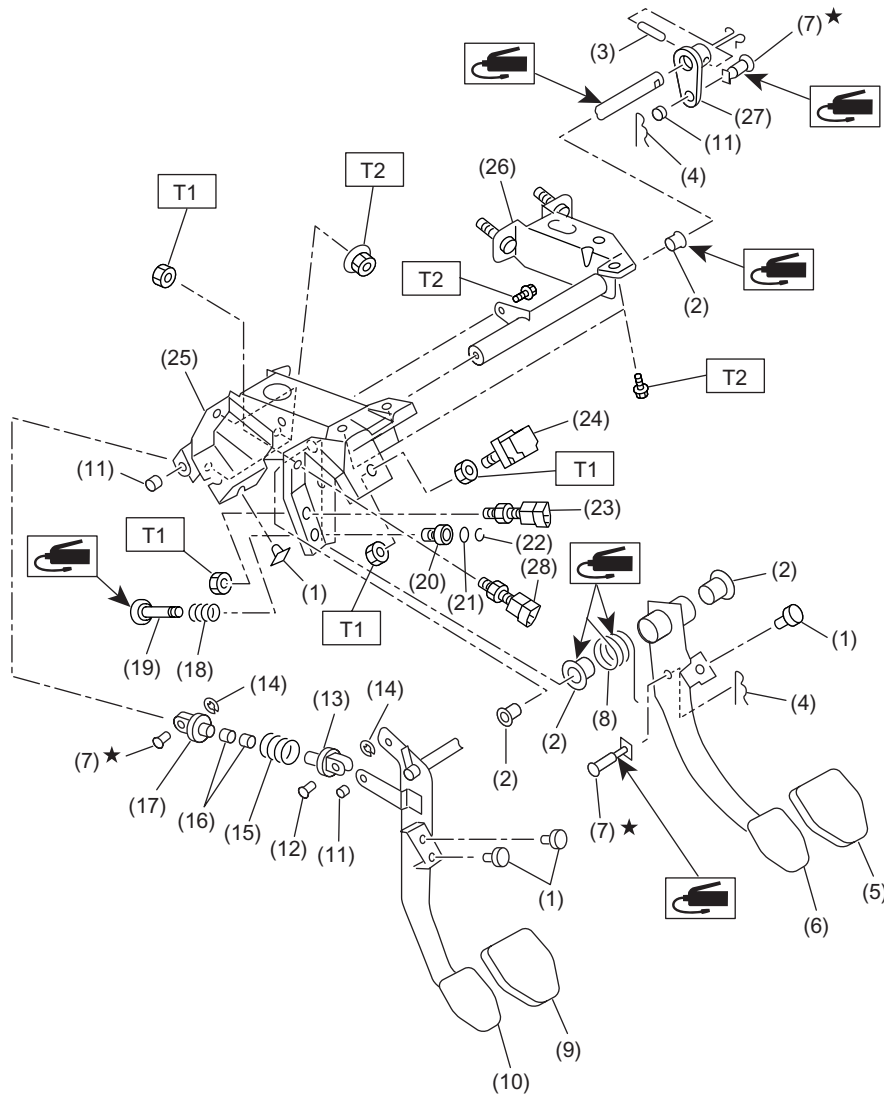
• TURBO MODEL



- | | |
|---------------------|----------------------|
| (1) Reservoir cap | (6) Return spring |
| (2) Reservoir tank | (7) Piston |
| (3) Oil seal | (8) Push rod |
| (4) Straight pin | (9) Piston stop ring |
| (5) Master cylinder | (10) Cylinder boot |

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7)

6. CLUTCH PEDAL



CL-00190

(1) Stopper	(12) Clutch clevis pin	(23) Clutch switch (With cruise control)
(2) Bushing	(13) Assist rod A	(24) Stop light switch
(3) Spring pin	(14) Clip	(25) Pedal bracket
(4) Snap pin	(15) Assist spring	(26) Clutch master cylinder bracket
(5) Brake pedal pad	(16) Assist bushing	(27) Lever
(6) Brake pedal	(17) Assist rod B	(28) Clutch switch (Starter interlock)
(7) Clevis pin	(18) Spring S	
(8) Brake pedal spring	(19) Rod S	
(9) Clutch pedal pad	(20) Bushing S	
(10) Clutch pedal	(21) O-ring	
(11) Bushing C	(22) Clip	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.8)

T2: 18 (1.8, 13.0)

T3: 30 (3.1, 22.4)

GENERAL DESCRIPTION

CLUTCH SYSTEM

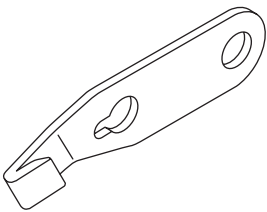
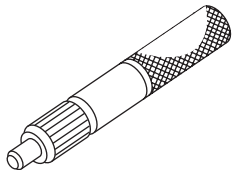
C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. with that of another grade or from other manufacturers.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution 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 vice, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vice.
- Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening/tightening bolt, etc.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Dial Gauge	Used for measuring clutch disk run-out.

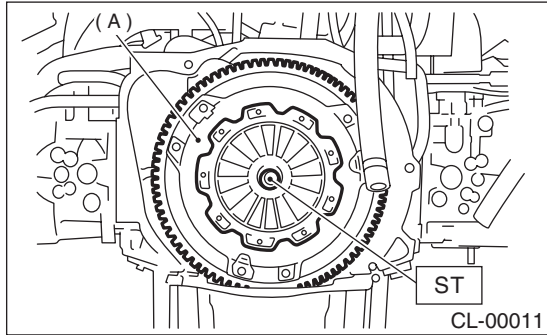
2. Clutch Disc and Cover

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>

2) Install the ST on flywheel.

ST 499747100 CLUTCH DISC GUIDE



(A) Clutch cover

3) Remove the clutch cover and clutch disc.

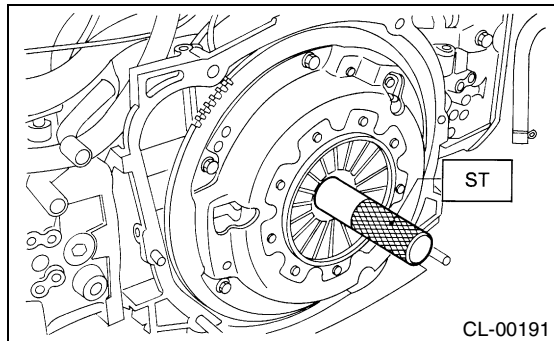
CAUTION:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either the clutch cover or clutch disc.

B: INSTALLATION

1) Insert the ST into the clutch disc and install them on the flywheel by inserting the ST end into the pilot bearing.

ST 499747100 CLUTCH DISC GUIDE



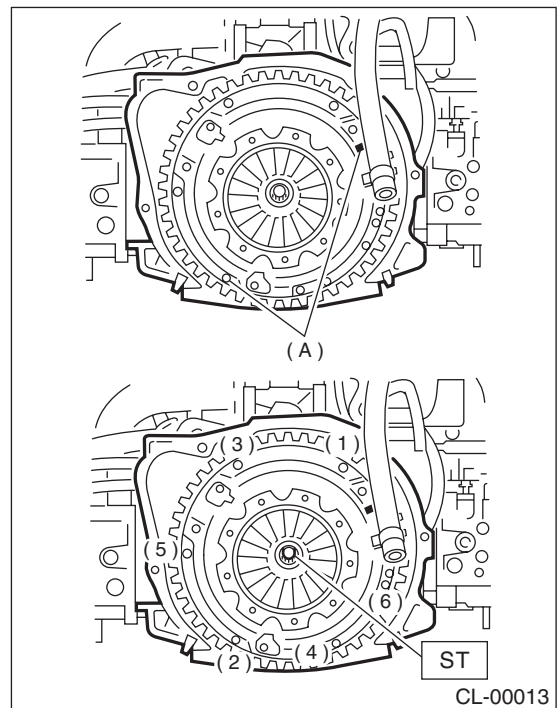
2) Install the clutch cover on flywheel and tighten bolts to the specified torque.

NOTE:

- When installing the clutch cover on the flywheel, position the clutch cover so that there is a gap of 120° or more between white paint marks on the flywheel and clutch cover. (white paint 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 method.

Tightening torque:

15.7 N·m (1.6 kgf-m, 11.6 ft-lb)



(A) white paint marks

3) Remove the ST.

ST 499747100 CLUTCH DISC GUIDE

4) Install the transmission assembly. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

CLUTCH DISC AND COVER

CLUTCH SYSTEM

C: INSPECTION

1. CLUTCH DISC

1) Facing wear:

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

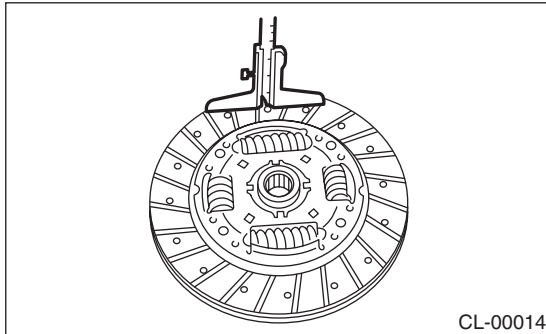
Depth of rivet head:

Limit of sinking

0.3 mm (0.012 in)

CAUTION:

Do not wash the clutch disc with any cleaning fluid.

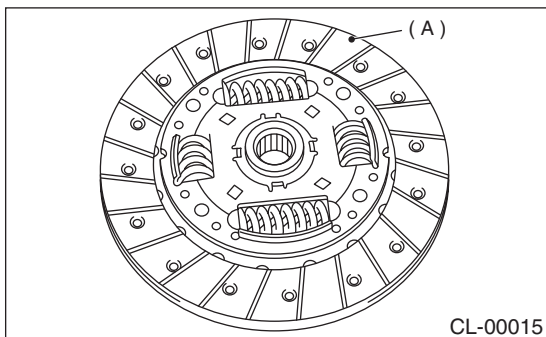


2) Hardened facing:

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) Facing

4) Deflection on facing:

If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

ST 499747100 CLUTCH DISC GUIDE

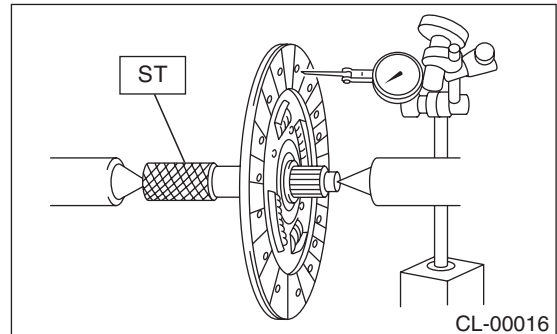
Limit for deflection:

Non-turbo model:

1.0 mm (0.039 in) at R = 107 mm (4.21 in)

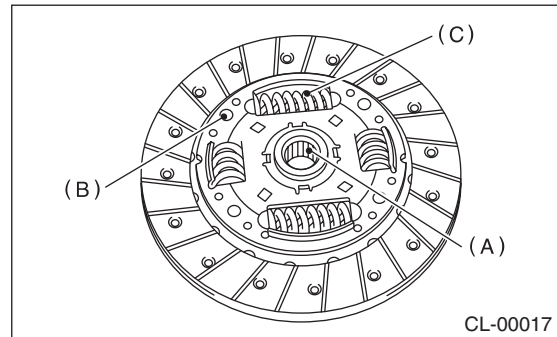
Turbo model:

0.8 mm (0.031 in) at R = 110 mm (4.33 in)



5) Worn spline, loose rivets and torsion spring failure:

Replace defective parts.



(A) Spline

(B) Rivet

(C) Torsion spring

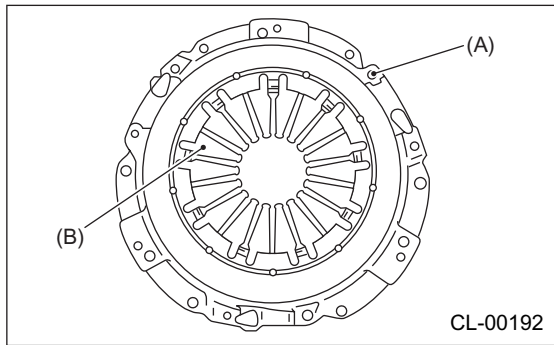
2. CLUTCH COVER

NOTE:

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

1) Loose thrust rivet.

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

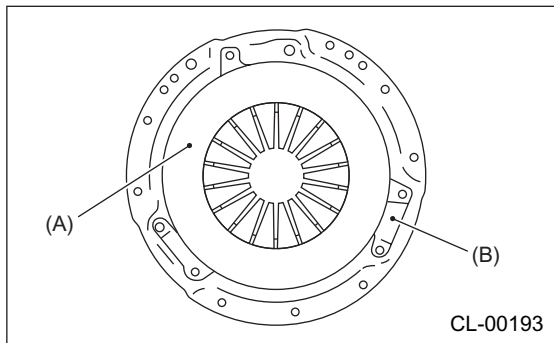


- (A) Thrust rivet
- (B) Diaphragm spring

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

4) Loose strap plate setting bolt.

5) Worn diaphragm sliding surface.



- (A) Pressure plate
- (B) Strap plate

3. Flywheel

A: REMOVAL

1) Remove the transmission assembly. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>

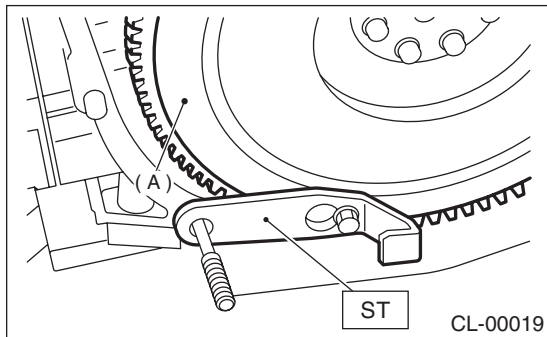
2) Remove the clutch cover and clutch disc. <Ref. to CL-11, REMOVAL, Clutch Disc and Cover.>

CAUTION:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either the clutch cover or clutch disc.

3) Using ST, remove the flywheel.

ST 498497100 CRANKSHAFT STOPPER

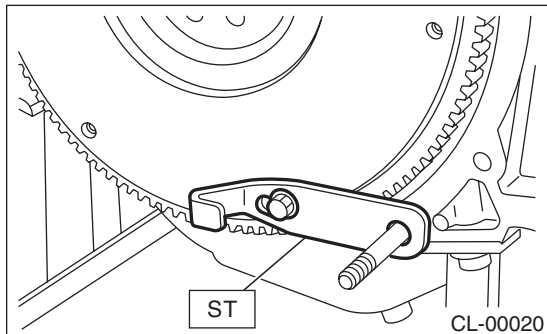


(A) Flywheel

B: INSTALLATION

1) Install the flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



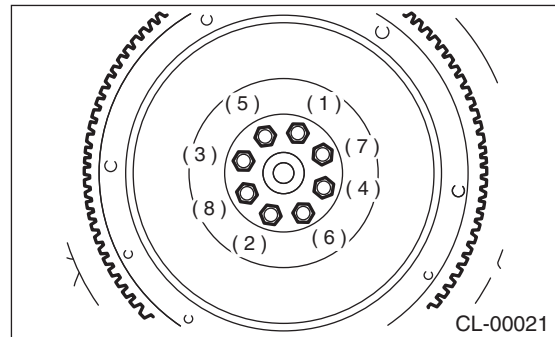
2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:

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

Tightening torque:

72 N·m (7.3 kgf-m, 52.8 ft-lb)



3) Install the clutch disc and cover. <Ref. to CL-11, INSTALLATION, INSTALLATION, Clutch Disc and Cover.>

4) Install the transmission assembly. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

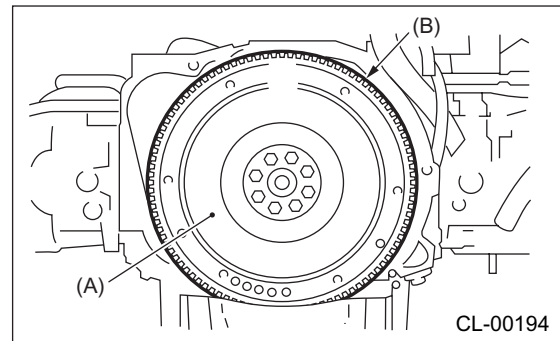
C: INSPECTION

CAUTION:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

1) Damage of facing and ring gear:

If defective, replace the flywheel.



(A) Flywheel

(B) Ring gear

2) Smoothness of rotation:

Rotate the ball bearing applying pressure in thrust direction.

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

4. Release Bearing and Lever

A: REMOVAL

1. NON-TURBO MODEL

1) Remove the transmission assembly from vehicle body.

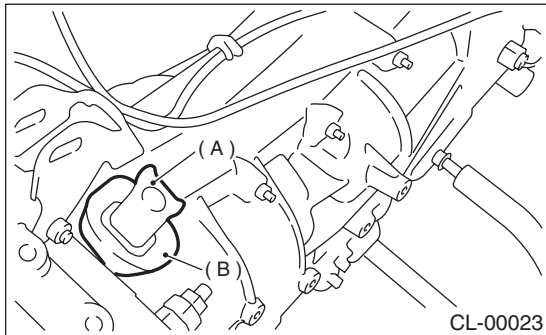
<Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>

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

CAUTION:

Be careful not to deform the clips.

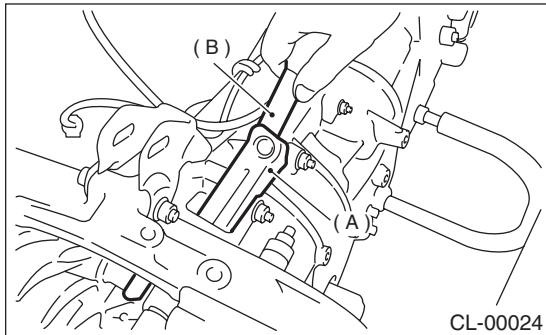
3) Remove the release lever seal.



(A) Clutch release lever

(B) Release lever seal

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



(A) Clutch release lever

(B) Screwdriver

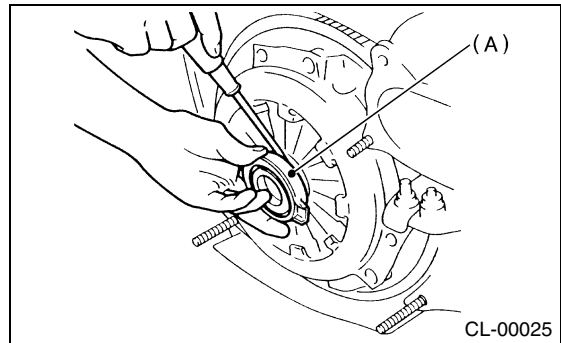
2. TURBO MODEL

1) Remove the transmission assembly from vehicle body. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>

2) Remove the clutch release lever from transmission.

3) Put the clutch release bearing in engine side.

4) Remove the clutch release bearing from clutch cover using a flat-type screwdriver.



(A) Clutch release bearing

B: INSTALLATION

1. NON-TURBO MODEL

CAUTION:

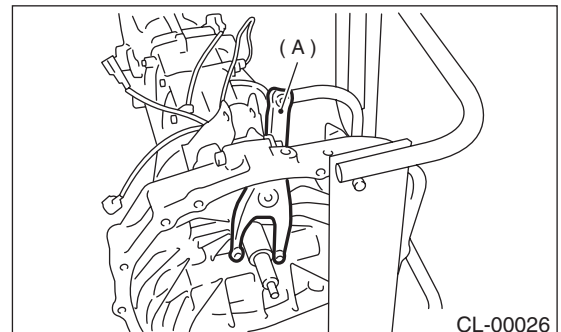
Before or during assembling, lubricate the following points with a light coat of grease.

- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)
- Contact surface of lever and operating cylinder

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

NOTE:

- Apply grease (KOPR-KOTE: P/N 003603001) to the contact point of release lever and operating cylinder.
- Confirm that the retainer spring is securely fitted by observing it through the main case hole.



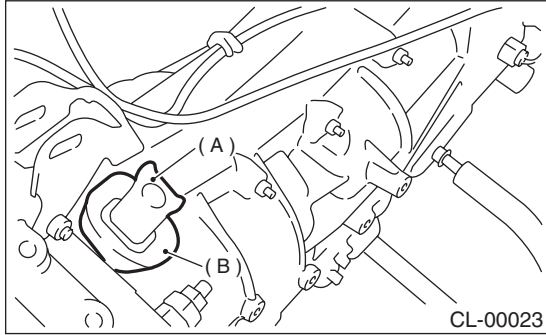
(A) Release lever

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

RELEASE BEARING AND LEVER

CLUTCH SYSTEM

3) Install the release lever seal.

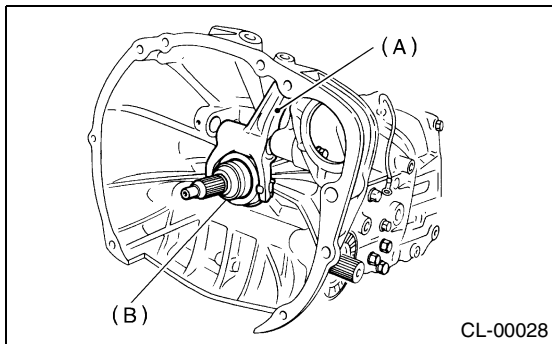


- (A) Release lever
- (B) Release lever seal

4) Install the transmission assembly.
<Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

2. TURBO MODEL

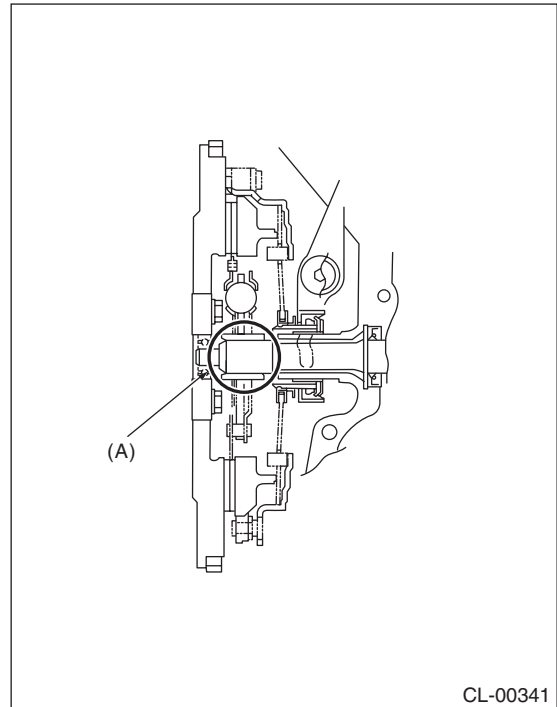
- 1) Install the release bearing on transmission.
- 2) Insert the release fork into release bearing tab.



- (A) Release fork
- (B) Release bearing

3) Apply grease to the specified points.

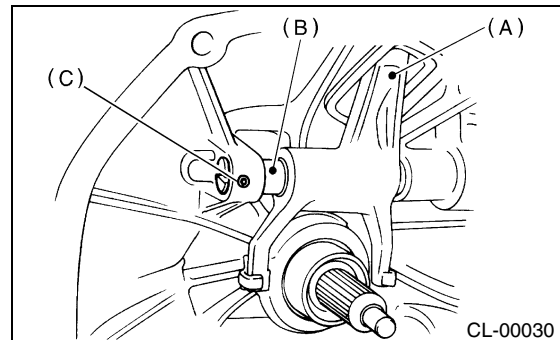
Grease:
NICHIMOLY N-130



- (A) Spline

4) Insert the release fork shaft into release fork.

CAUTION:
Make sure the cutout portion of the release fork shaft contacts spring pin.



- (A) Release fork
- (B) Release shaft
- (C) Spring pin

5) Install the transmission assembly. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. RELEASE BEARING

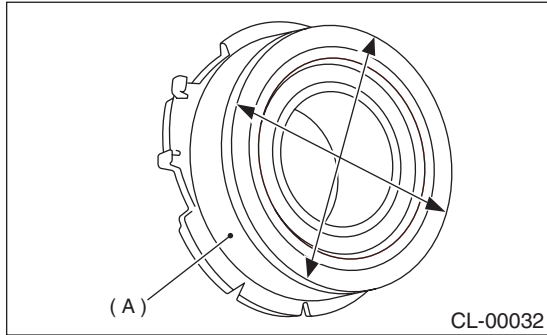
CAUTION:

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

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

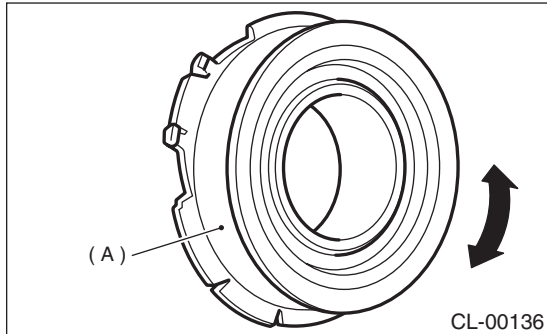
Radial direction stroke:

1.4 mm (0.055 in)



(A) Bearing case

2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

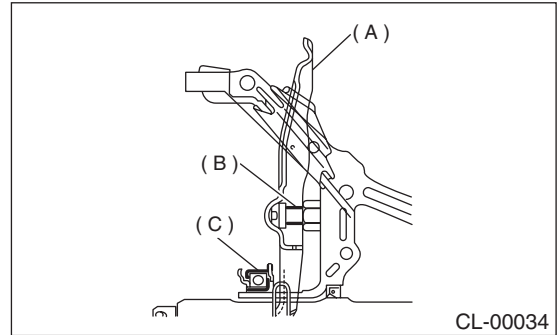


(A) Bearing case

3) Check wear and damage of bearing case surface contacting with lever.

2. RELEASE LEVER

1) Check the lever pivot portion and the point of contact with release bearing case for wear.



- (A) Clutch release lever
- (B) Pivot
- (C) Clutch release bearing

5. Operating Cylinder

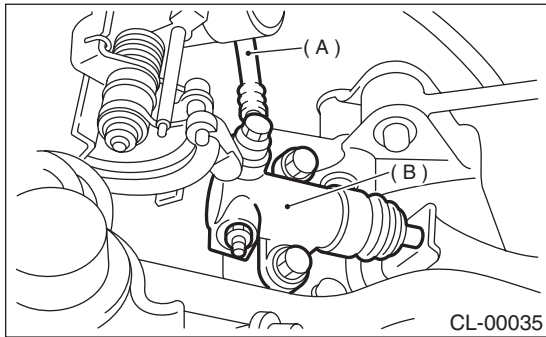
A: REMOVAL

- 1) Remove the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
- 2) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 3) Remove the clutch hose from operating cylinder.

CAUTION:

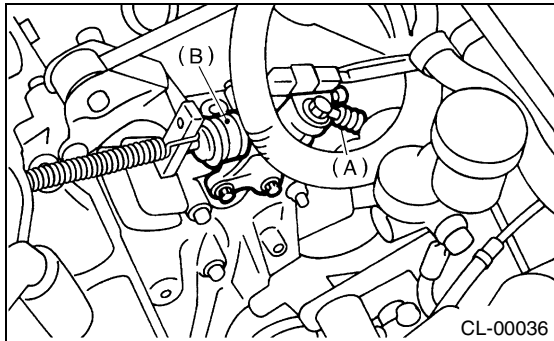
Cover the hose joint to prevent clutch fluid from flowing out.

Non-turbo model



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

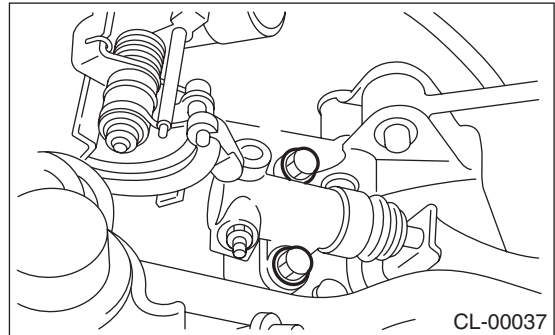
Turbo model



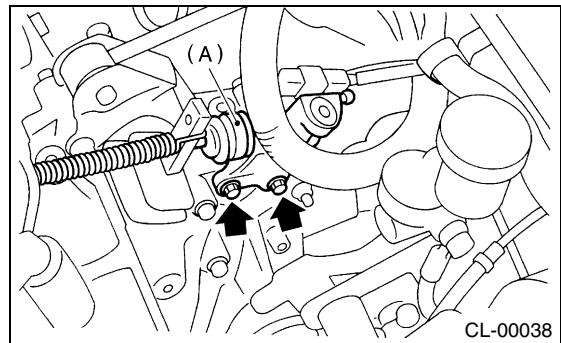
- (A) Clutch hose
- (B) Operating cylinder

- 4) Remove the operating cylinder from transmission.

Non-turbo model



Turbo model



B: INSTALLATION

- 1) Install in the reverse order of removal.

NOTE:

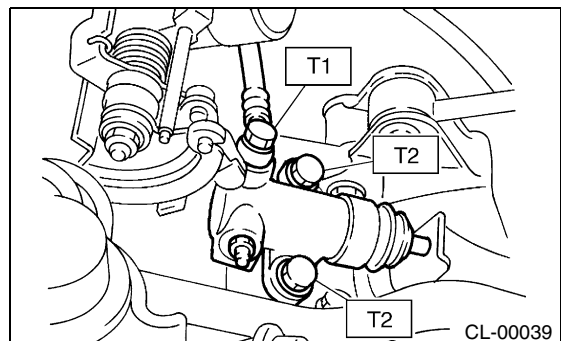
Before installing the operating cylinder, apply grease (KOPR-KOTE: P/N 003603001) to the contact point of release lever and operating cylinder.

Tightening torque:

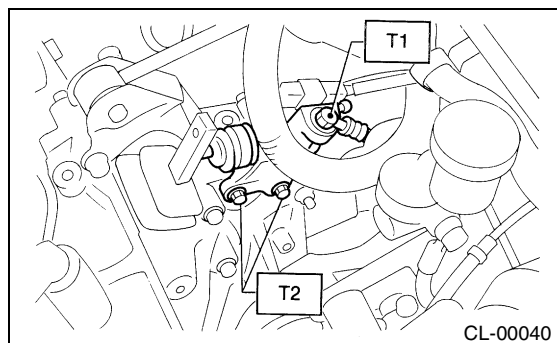
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)

Non-turbo model

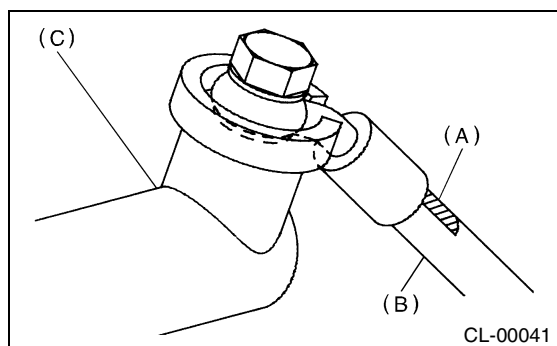


Turbo model



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) Marking
- (B) Clutch hose
- (C) Operating cylinder

2) After bleeding air from the operating cylinder, ensure that the clutch operates properly.

<Ref. to CL-24, Clutch Fluid Air Bleeding.>

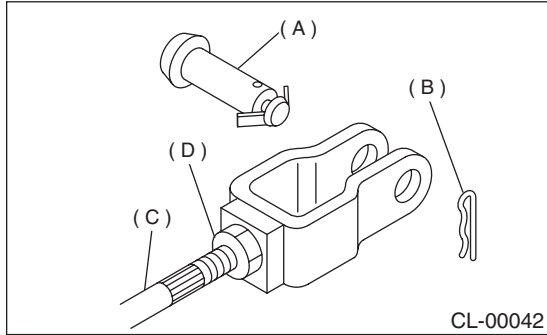
C: INSPECTION

- 1) Check the operating cylinder for damage. If the operating cylinder is damaged, replace it.
- 2) Check the operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace the operating cylinder.

6. Master Cylinder

A: REMOVAL

- 1) Thoroughly drain the brake fluid from reservoir tank.
- 2) Remove the snap pin, clevis pin and separate the push rod of master cylinder from clutch pedal.

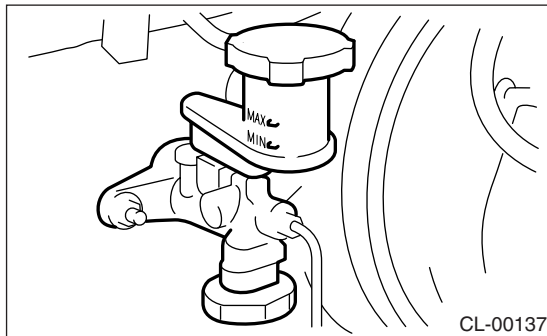


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

- 3) Remove the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
- 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 with reservoir tank.

CAUTION:

Be extremely careful not to spill the brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.



B: INSTALLATION

- 1) Install the master cylinder to body, and install the clutch pipe to master cylinder.

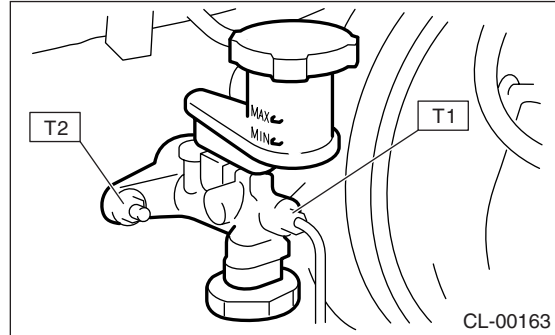
CAUTION:

Check that the pipe is routed properly.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

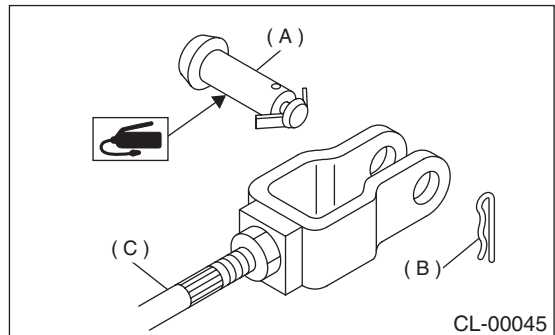
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



- 2) Connect the push rod of master cylinder to clutch pedal, and install the clevis pin and snap pin.

NOTE:

Apply grease to the clevis pin.

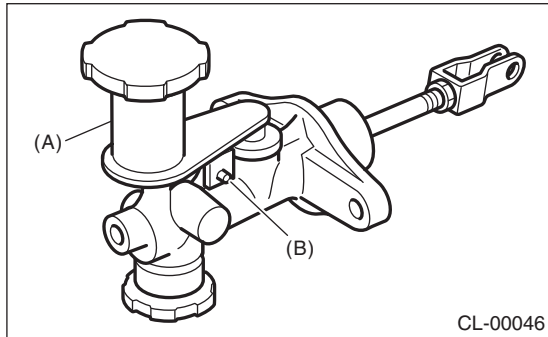


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

- 3) After bleeding air from the system, ensure that the clutch operates properly. <Ref. to CL-24, Clutch Fluid Air Bleeding.>
- 4) Install the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.>
- 5) Install the intercooler (Turbo model). <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

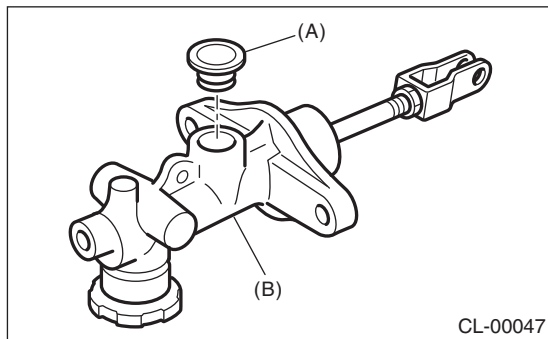
C: DISASSEMBLY

- 1) Remove the straight pin and reservoir tank.



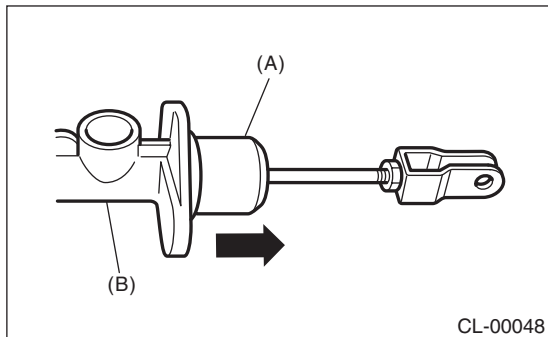
- (A) Reservoir tank
- (B) Straight pin

- 2) Remove the oil seal.



- (A) Oil seal
- (B) Master cylinder

- 3) Move the cylinder boot backward.



- (A) Cylinder boot
- (B) Master cylinder

- 4) Remove the stop ring.

CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

- 5) Remove the clutch damper. (Non-turbo model)

D: ASSEMBLY

- 1) Install the clutch damper. (Non-turbo model)

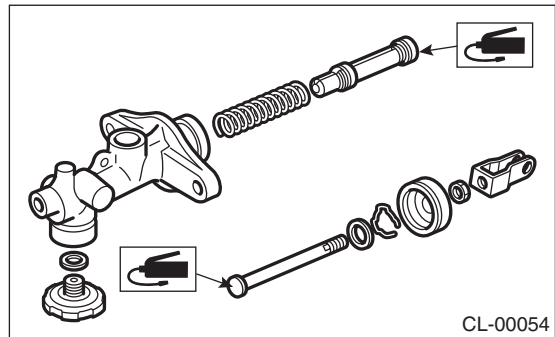
Tightening torque:

46.6 N·m (4.75 kgf-m, 34.4 ft-lb)

- 2) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

Grease:

SILICONE GREASE G40M (Part No. 004404003)



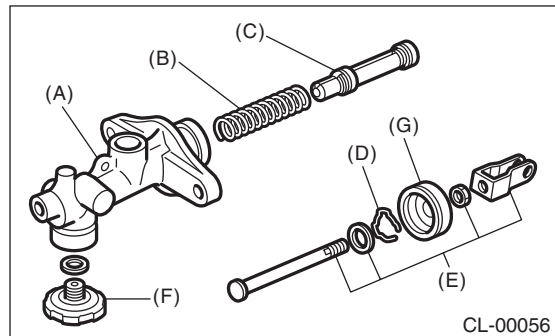
- 3) To assemble the master cylinder, reverse the sequence of disassembly procedure.

Tightening torque:

10 N·m (1.0 kgf-m, 7 ft-lb)

E: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring, gasket, clutch damper, cylinder boot and hose replace the faulty part.

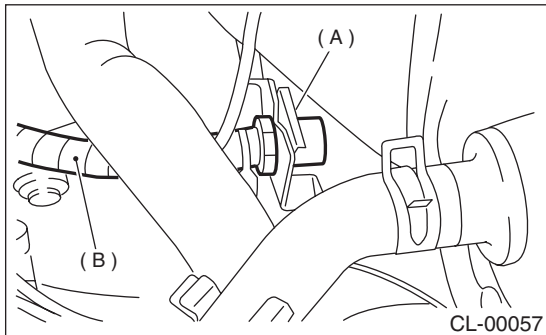


- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Stop ring
- (E) Rod ASSY
- (F) Clutch damper (Non-turbo model)
- (G) Cylinder boot

7. Clutch Pipe and Hose

A: REMOVAL

- 1) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 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 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.

NOTE:

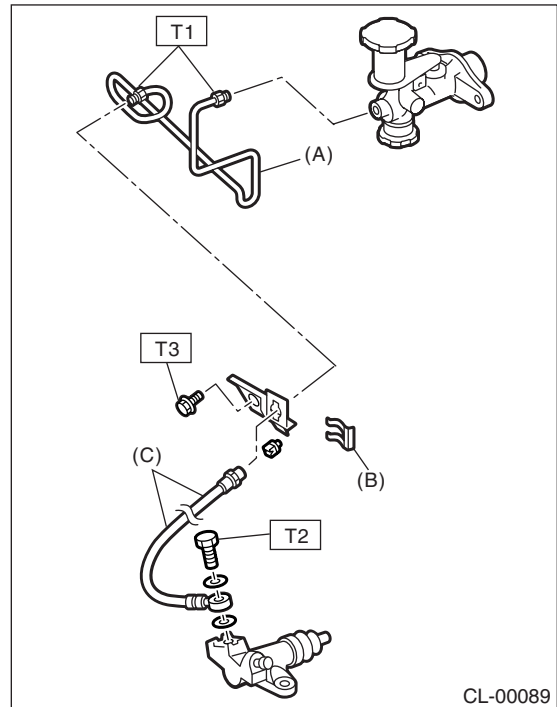
Bleed the clutch fluid. <Ref. to CL-24, Clutch Fluid Air Bleeding.>

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

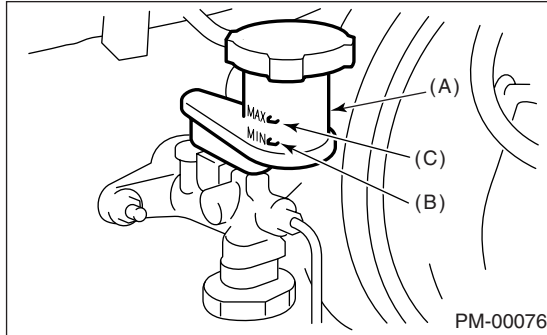
C: INSPECTION

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 applicable 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) Min. level
- (C) Max. level

B: REPLACEMENT

CAUTION:

- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- 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 eliminate entry of air.
 - Clutch pedal operating must be very slow.
 - For convenience and safety, it is advisable to have two men working.
 - The amount of brake fluid required is approximately 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.
- 1) Remove the air cleaner case and air duct.
 - 2) Either jack-up the vehicle and place a safety stand under it, or lift-up the vehicle.
 - 3) Draw out the brake fluid from reservoir tank with syringe.
 - 4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

5) Drain fluid in the same method as the air bleeding.

6) Refill the brake fluid before reservoir tank becomes empty, and drain the contaminated fluid again.

7) Repeat the above procedure until the contaminated fluid is completely drained.

9. Clutch Fluid Air Bleeding

A: PROCEDURE

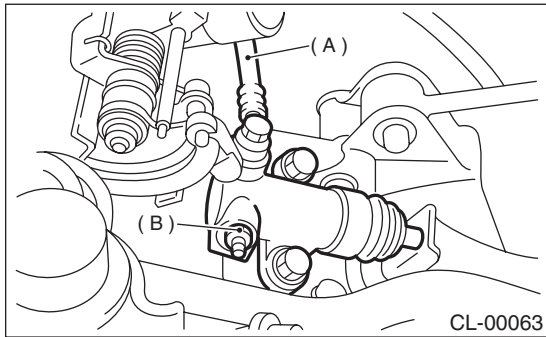
1. NON-TURBO MODEL

NOTE:

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

1) Remove the air cleaner case and air intake duct. <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>

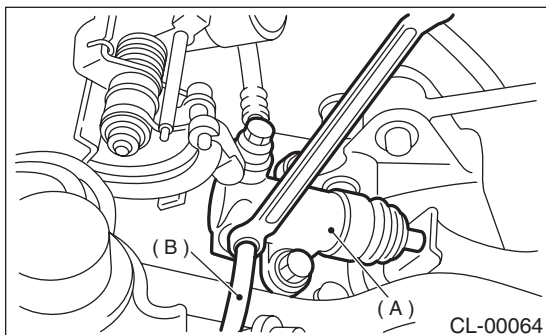
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



(A) Clutch hose
(B) Air bleeder

3) 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

4) Repeat these steps until there are no more air bubbles in the vinyl tube.

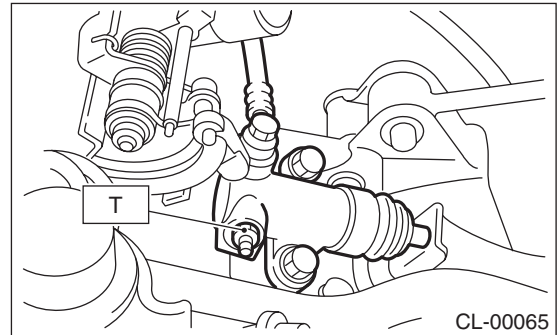
NOTE:

Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

5) Tighten the air bleeder.

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.

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

2. TURBO MODEL

NOTE:

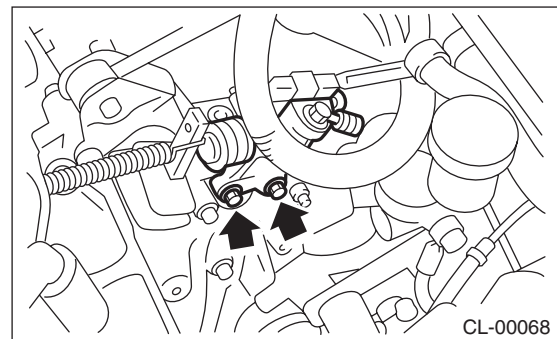
Bleed air from the oil line with help of a co-worker.

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

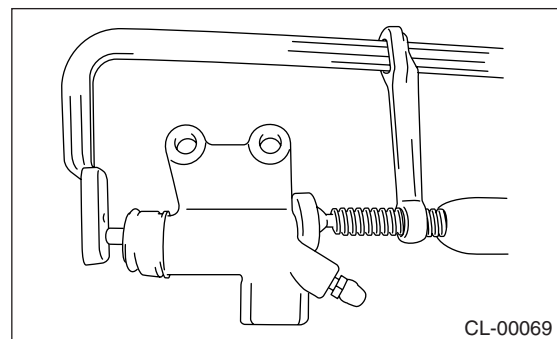
2) Remove the operating cylinder.

NOTE:

Do not remove the clutch hose.



3) Fix the piston with clamp to avoid the piston from jumping out of cylinder.



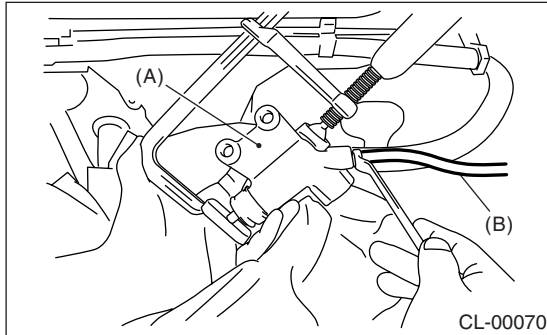
4) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.

5) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.

Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

NOTE:

Set the air breather part higher than tip of operating cylinder when performing this procedure.



(A) Operating cylinder

(B) Vinyl tube

6) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:

Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

7) Tighten the air bleeder.

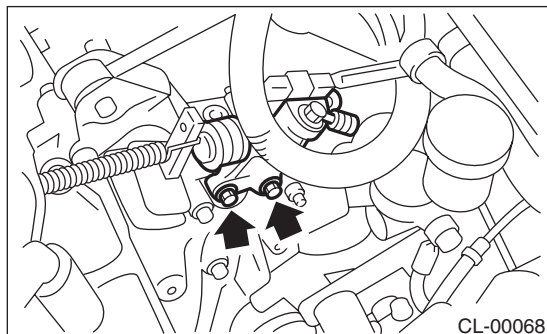
Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

8) Install the operation cylinder.

Tightening torque:

T: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



9) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.

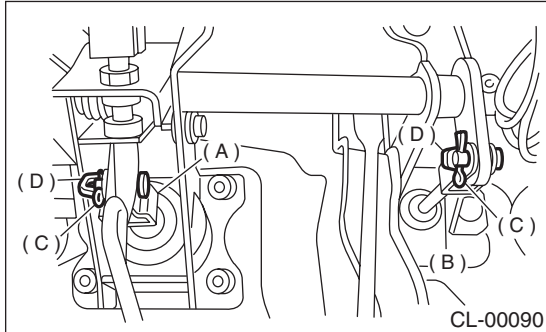
10) After bleeding air from the system, ensure that the clutch operates properly.

11) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

10. Clutch Pedal

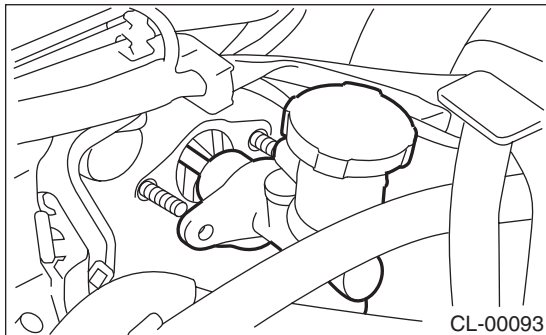
A: REMOVAL

- 1) Remove the steering column. <Ref. to PS-22, REMOVAL, Tilt Steering Column.>
- 2) Disconnect the connectors from stop light and clutch switches.
- 3) Remove the snap pins which secure lever to push rod and operating rod.
- 4) Remove the clevis pins which secure lever to push rod and operating rod.



- (A) Operating rod
- (B) Push rod
- (C) Snap pin
- (D) Clevis pin

- 5) Remove the air cleaner case and intake duct. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
- 6) Remove intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 7) Remove the nut which secures clutch master cylinder.



- 8) Remove the bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

B: INSTALLATION

- 1) Install in the reverse order of removal.

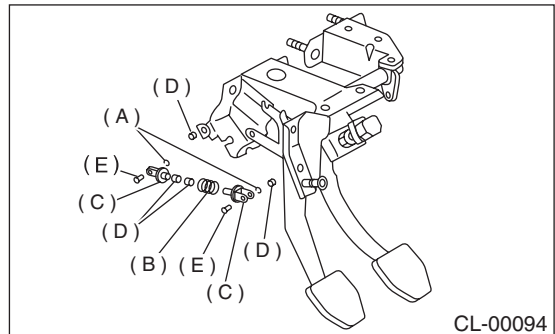
CAUTION:

- If the cable clamp is damaged, replace it with a new one.
- Never fail to cover outer cable end with boot.
- Be careful not to kink the accelerator cable.
- Always use a new clevis pins.

- 2) Adjust the clutch pedal after installation. <Ref. to CL-27, ADJUSTMENT, Clutch Pedal.>

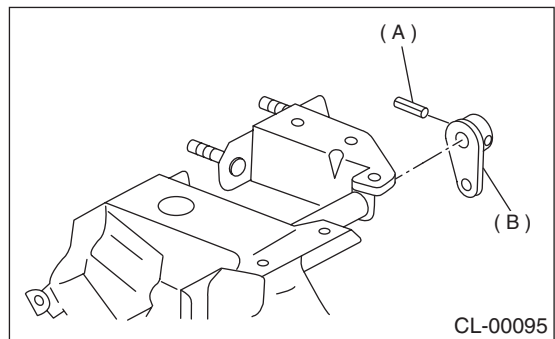
C: DISASSEMBLY

- 1) Remove the clutch switches.
- 2) Remove the clips, assist spring, rod and bushing.



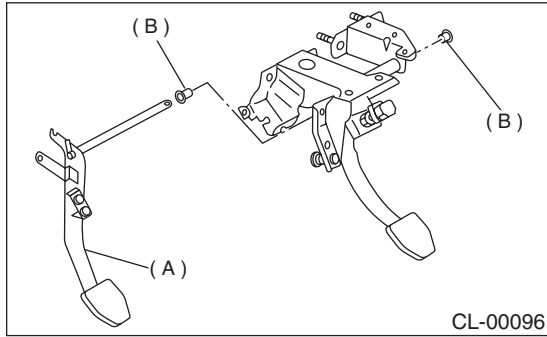
- (A) Clip
- (B) Assist spring
- (C) Assist rod
- (D) Bushing
- (E) Clevis pin

- 3) Remove the spring pin and lever.



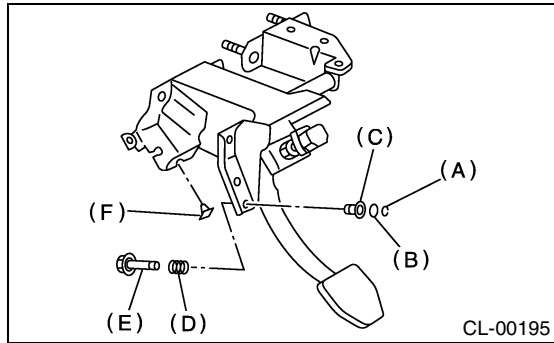
- (A) Pin
- (B) Lever

4) Remove the clutch pedal and bushings.



- (A) Clutch pedal
- (B) Bushing

5) Remove the stopper, clip, O-ring, rod S, and then remove the spring and bushing S.



- (A) Clip
- (B) O-ring
- (C) Bushing S
- (D) Spring S
- (E) Rod S
- (F) Stopper

6) Remove the stoppers from clutch pedal.

7) Remove the clutch pedal pad. (Non-turbo model)

D: ASSEMBLY

1) Attach the clutch switch, etc. to pedal bracket temporarily.

2) Clean the inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.

3) Align the bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring, assist rods, and spring, and bushing.

NOTE:

Clean up inside of bushings and apply grease before installing the spacer.

E: INSPECTION

Move the clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure the pedal deflection is in specified range.

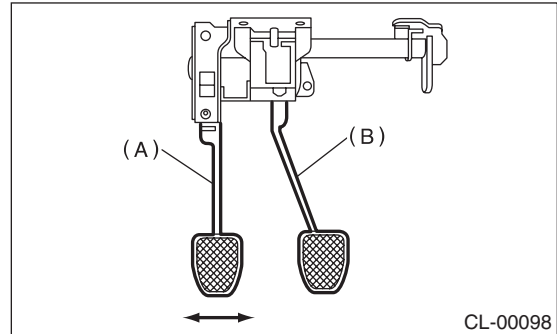
CAUTION:

If excessive deflection is noted, replace the bushings with new ones.

Deflection of clutch pedal:

Service limit

5.0 mm (0.197 in) or less



- (A) Clutch pedal
- (B) Brake pedal

F: ADJUSTMENT

1) Turn the lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:

Do not attempt to turn the clutch switch to adjust clutch pedal full stroke length.

NOTE:

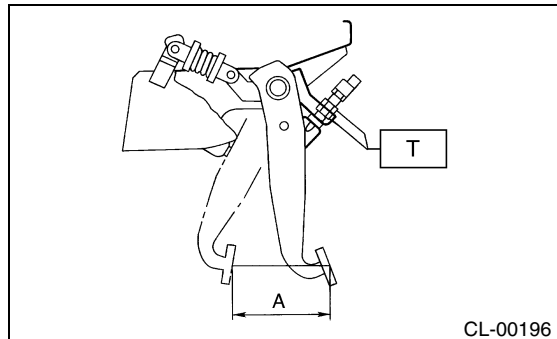
If the lock nuts cannot adjust the clutch pedal full stroke length to specifications, turn the master cylinder push rod to adjust it.

Specified clutch pedal full stroke: A

130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



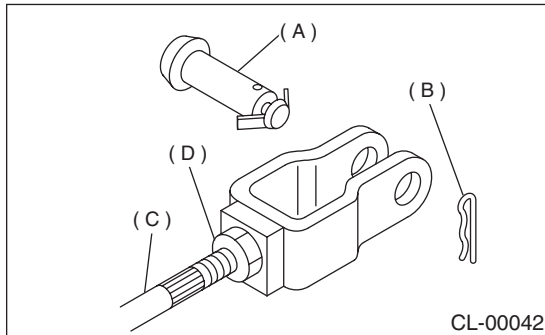
CLUTCH PEDAL

CLUTCH SYSTEM

2) Turn the master cylinder push rod so that the clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

Tightening torque (Push rod lock nut):

T: 10 N·m (1.0 kgf-m, 7 ft-lb)



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

3) Depress and release the clutch pedal 2 to 3 times to ensure that the clutch pedal and release fork operates smoothly. If the clutch pedal and release fork do not operate smoothly, bleed air from the clutch hydraulic system. <Ref. to CL-24, Clutch Fluid Air Bleeding.>

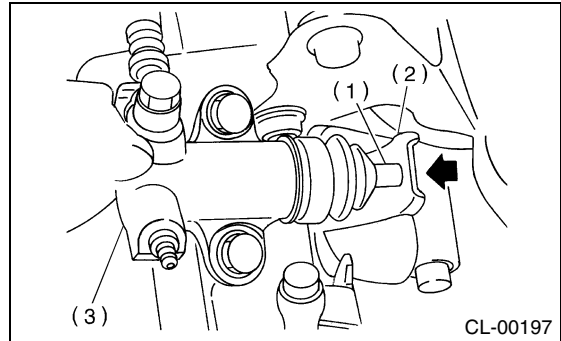
4) Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:

130 — 135 mm (5.12 — 5.31 in)

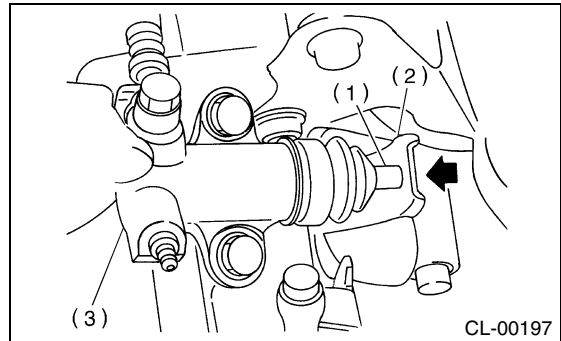
5) Move the clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

6) Push the release lever until operating cylinder push rod retracts. Ensure that the clutch fluid level in reservoir tank increases. If the clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace the master cylinder with a new one. <Ref. to CL-20, Master Cylinder.>



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

7) Push the release lever until operating cylinder push rod retracts. Check that the clutch fluid level in reservoir tank increases.



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

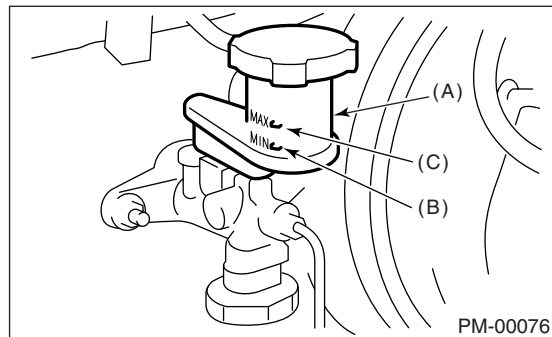
8) If the clutch fluid level increases, hydraulic clutch play is correct.

9) If the clutch fluid level does not increase or push rod does not retract, clutch pedal must be readjusted.

10) Check the fluid level on the outside of the reservoir tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

Recommended clutch fluid:

FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid



- (A) Reservoir tank
- (B) Min. level
- (C) Max. level

11.Clutch Switch

A: REMOVAL

- 1) Disconnect the ground terminal from battery.
- 2) Disconnect the connector from clutch switch.
- 3) Remove the clutch switch.

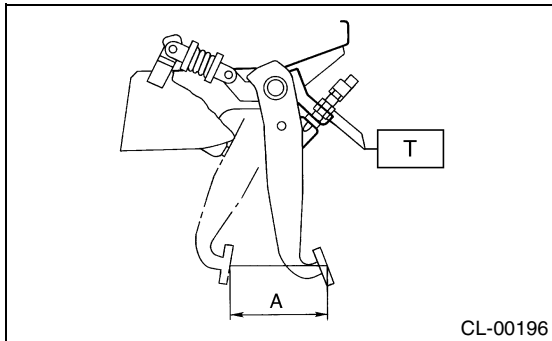
B: INSTALLATION

- 1) Move the clevis pin of the push rod right and left and hold where it moves smoothly, then measure stroke of clutch pedal.

Specified clutch pedal full stroke:A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



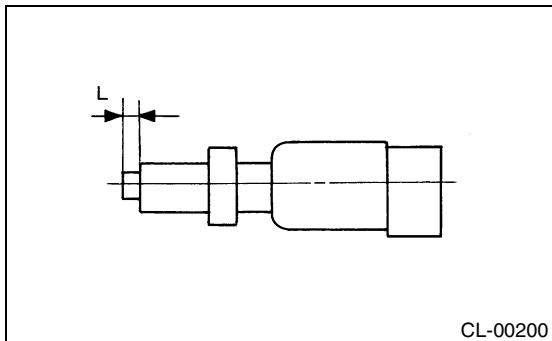
- 2) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-27, ADJUSTMENT, Clutch Pedal.>
- 3) Connect the clutch switch connector.

C: INSPECTION

- 1) If the clutch switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L

$2^{+1.5}_{-0} \text{ mm } (0.079^{+0.059}_{-0} \text{ in})$



- 2) Check the clutch switch continuity. If continuity is not as specified, replace the switch.

- (1) Disconnect the clutch switch connector. Measure the resistance between 1 and 2 of clutch switch terminal.

Terminals/Specified resistance

When clutch pedal depressed:

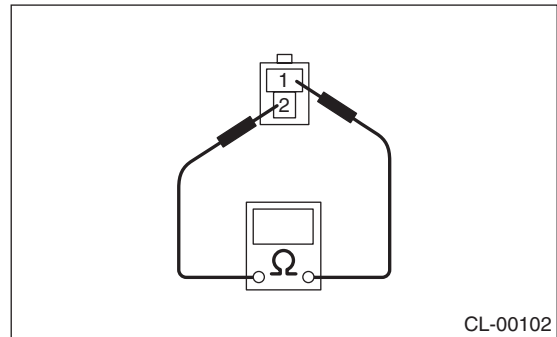
1 — 2/Less than 1Ω

Terminals/Specified resistance

When clutch pedal not depressed:

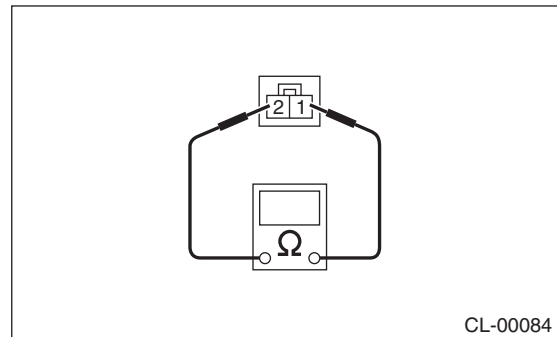
1 — 2/More than $1M\Omega$

Clutch switch (Starter interlock)



CL-00102

Clutch switch (With cruise control)



CL-00084

- (2) If not as specified, replace the clutch switch.

12.General Diagnostic Table

A: INSPECTION

1. CLUTCH

Symptom	Possible cause	Corrective
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 speeds driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. • Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. • Method of testing: Put the vehicle in a stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Correct or replace.
	(e) Defective release bearing holder	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. • Method of testing: <Ref. to CL-32, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(b) Excessive deflection of clutch disc facing	Correct or replace.
	(c) Seized crankshaft pilot needle bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) Sticked clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Adhesion of oil on the facing	Replace clutch disc.
	(b) Weak or broken torsion spring	Replace clutch disc.
	(c) Defective facing contact or excessive disc	Replace clutch disc defection.
	(d) Warped pressure plate or flywheel	Correct or replace.
	(e) Loose disc rivets	Replace clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.

GENERAL DIAGNOSTIC TABLE

CLUTCH SYSTEM

Symptom	Possible cause	Corrective
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose torsion spring retainer	Replace clutch disc.
	(e) Deteriorated or broken torsion spring	Replace clutch disc.
5. Clutch grabs. 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 clutch disc.
	(b) Deteriorated cushioning spring	Replace 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 clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

2. CLUTCH PEDAL

Trouble	Corrective action
Insufficient pedal play	Adjust pedal play.
Clutch pedal free play insufficient	Adjust pedal free play.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

Step	Check	Yes	No
1 CHECK GEAR NOISE. 1)Start the engine. 2)Disengage the clutch and shift quickly from neutral to reverse. Is there any abnormal noise from the transmission gear?	Abnormal noise from the transmission gear.	Go to step 2.	Clutch is normal.
2 CHECK GEAR NOISE. Disengage the clutch at idle and shift from neutral to reverse after 0.5 to 1.0 seconds. Is there any abnormal noise from the transmission gear?	Abnormal noise from the transmission gear.	Go to step 3.	Defective transmission or excessive clutch drag torque. Inspect Pilot bearing, clutch disc, transmission and clutch disc hub spline.
3 CHECK GEAR NOISE. 1)Disengage the clutch at idle and shift from N to R, R to N several times 0.5 to 1.0 seconds after disengaging the clutch. Is there any abnormal noise from the transmission gear?	Abnormal noise from the transmission gear.	Defect in clutch disengaging. Inspect clutch disc, clutch cover, clutch release, and clutch pedal free play.	Clutch and fly-wheel seizure. Inspect clutch disc, spline of clutch disc hub.

GENERAL DESCRIPTION

CONTROL SYSTEMS

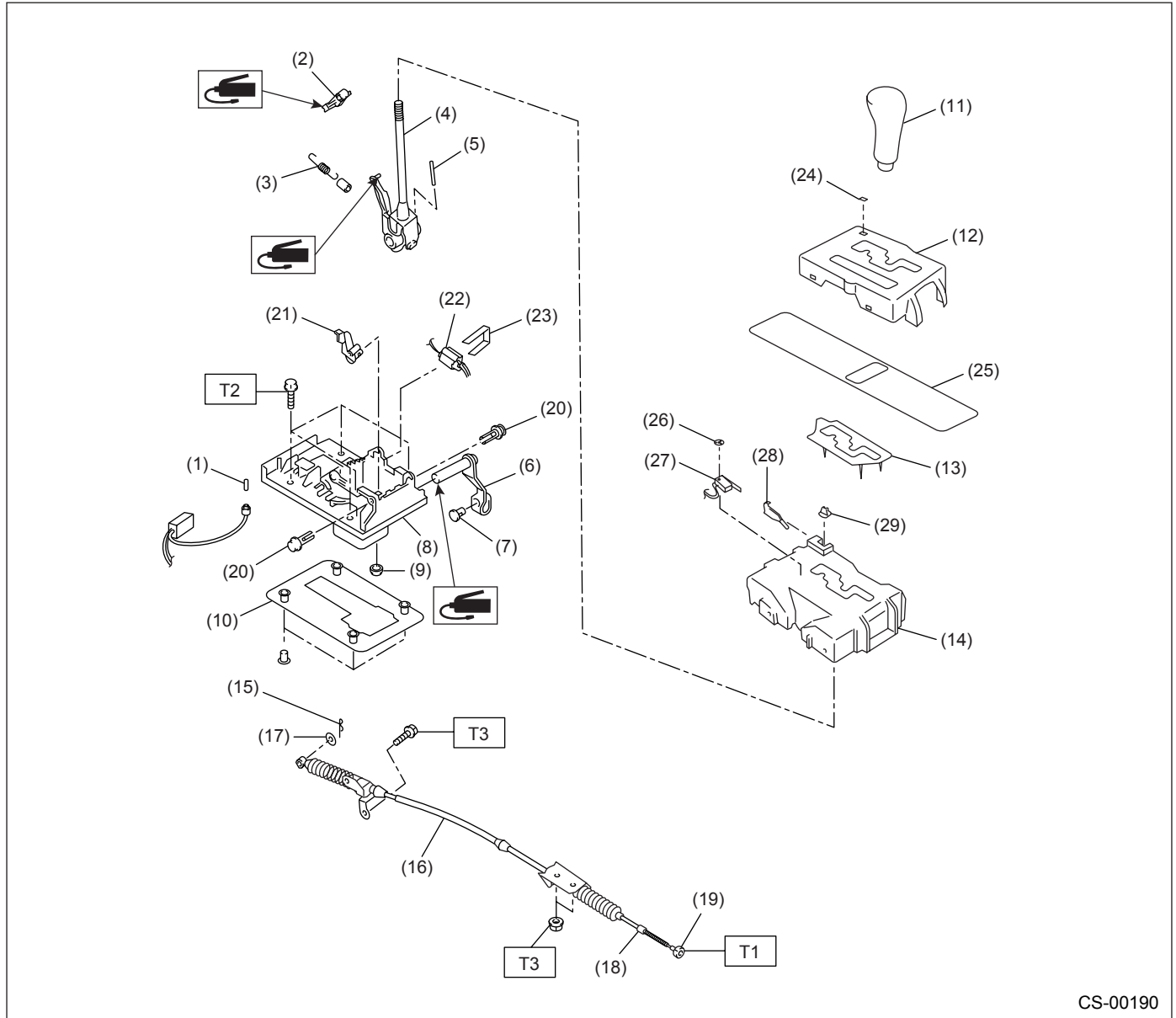
1. General Description

A: SPECIFICATIONS

Item		Specification
Swing torque of rod against MT gear shift lever	N-m (kgf-m, ft-lb)	0.7 (0.07, 0.5) or less

B: COMPONENT

1. AT SELECT LEVER



CS-00190

- | | |
|-------------------|--------------------------|
| (1) Bulb | (13) Cushion |
| (2) Detent arm | (14) Guide plate |
| (3) Detent spring | (15) Snap pin |
| (4) Lever | (16) Select cable |
| (5) Spring pin | (17) Washer |
| (6) Arm | (18) Nut B |
| (7) Pin | (19) Nut A |
| (8) Plate | (20) Clip |
| (9) Grommet | (21) Lock plate |
| (10) Packing | (22) Shift lock solenoid |
| (11) Grip | (23) Clamp |
| (12) Indicator | (24) Cover |

- | |
|--------------------------|
| (25) Blind |
| (26) Clip |
| (27) "P" position switch |
| (28) Spring |
| (29) Button |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 7.5 (0.76, 5.5)

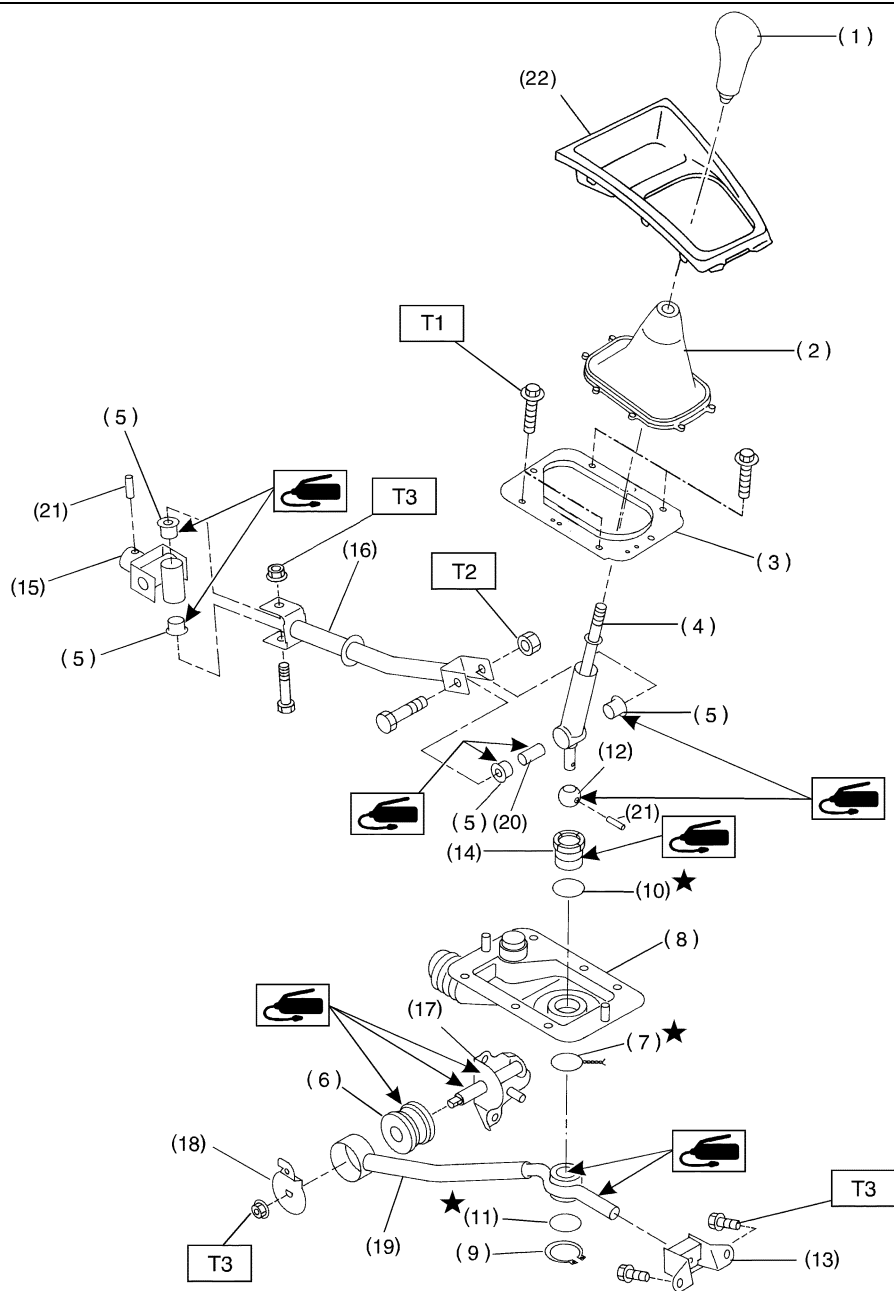
T2: 13 (1.3, 9.4)

T3: 18 (1.8, 13.0)

GENERAL DESCRIPTION

CONTROL SYSTEMS

2. MT GEAR SHIFT LEVER



CS-00191

- (1) Gear shift knob
- (2) Console boot
- (3) Plate complete
- (4) Lever
- (5) Bush
- (6) Bush
- (7) Locking wire
- (8) Boot
- (9) Snap ring

- (10) O-ring
- (11) O-ring
- (12) Bush A
- (13) Cushion rubber
- (14) Bush B
- (15) Joint
- (16) Rod
- (17) Bracket
- (18) Washer

- (19) Stay
- (20) Spacer
- (21) Spring pin
- (22) Front cover

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.76, 5.5)

T2: 12 (1.2, 8.7)

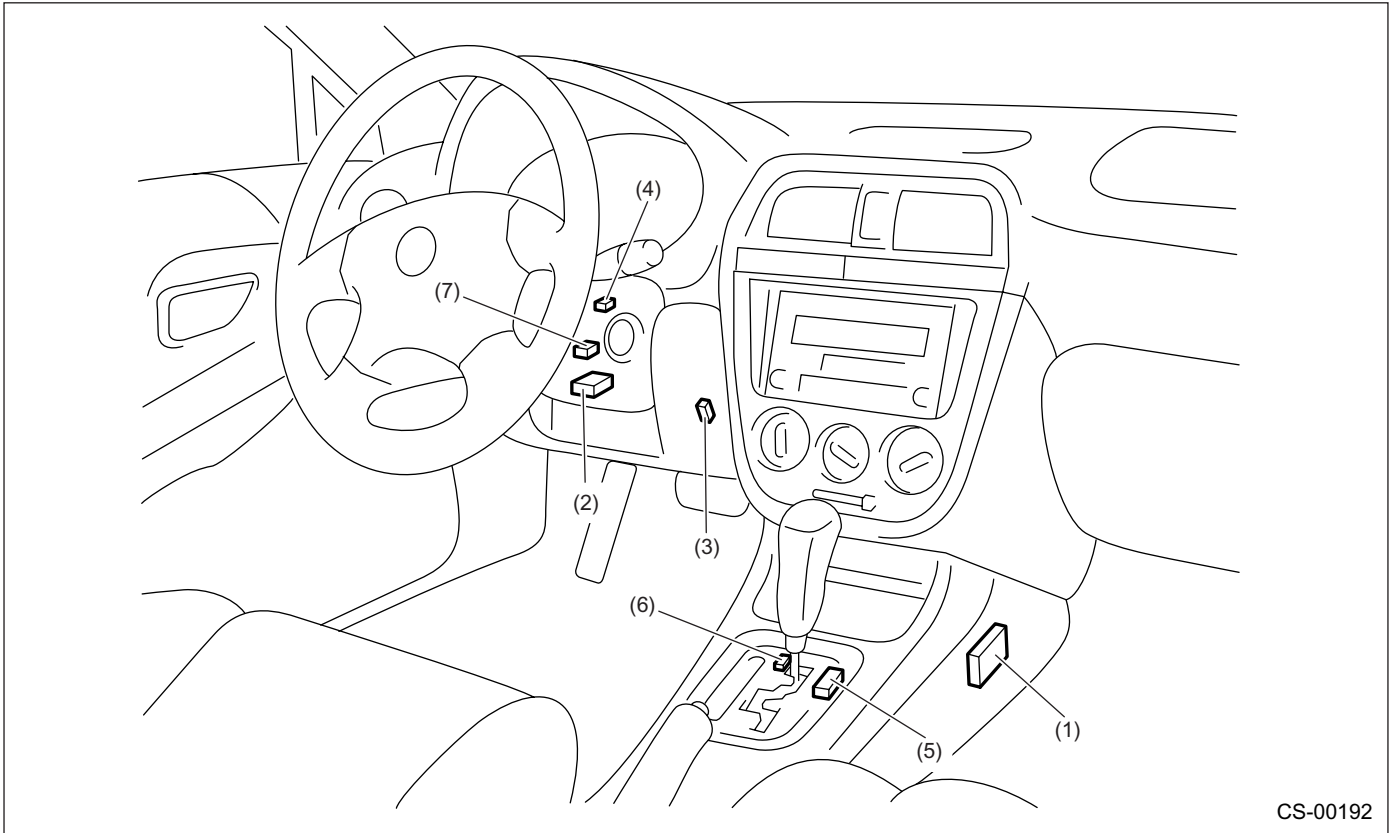
T3: 18 (1.8, 13.0)

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution 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, place 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.

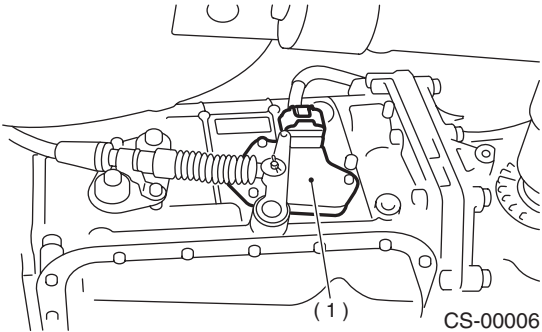
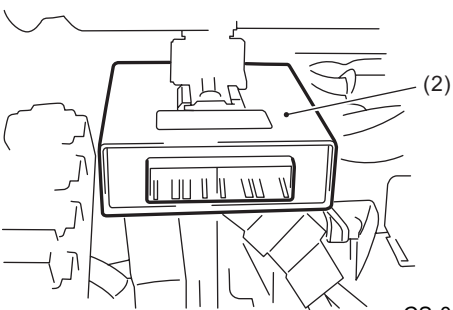
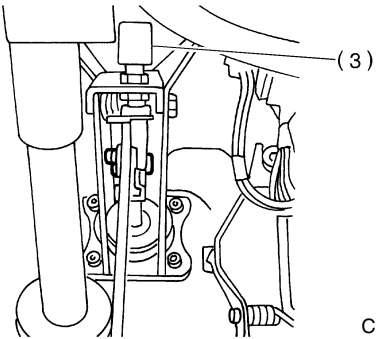
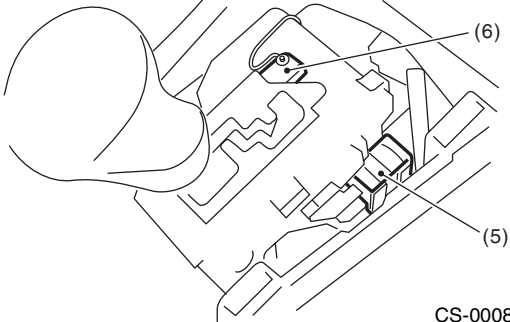
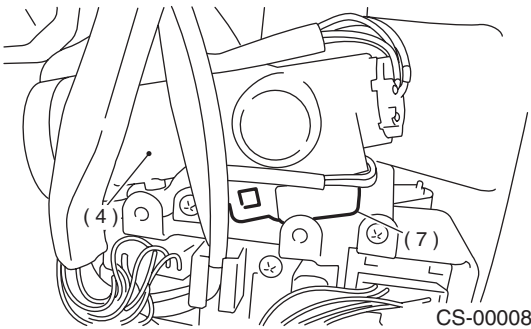
2. AT Shift Lock System

A: LOCATION



CS-00192

- | | | |
|-----------------------|-------------------------|-----------------------|
| (1) Inhibitor switch | (4) Key warning switch | (7) Key lock solenoid |
| (2) Integrated module | (5) Shift lock solenoid | |
| (3) Stop light switch | (6) "P" position switch | |

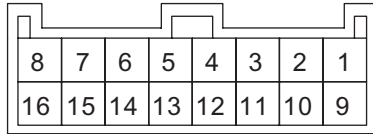
 CS-00006	 CS-00194
 CS-00193	 CS-00085
 CS-00008	SUBARU.

AT SHIFT LOCK SYSTEM

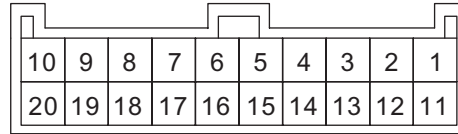
CONTROL SYSTEMS

B: ELECTRICAL SPECIFICATION

To B: **B281**



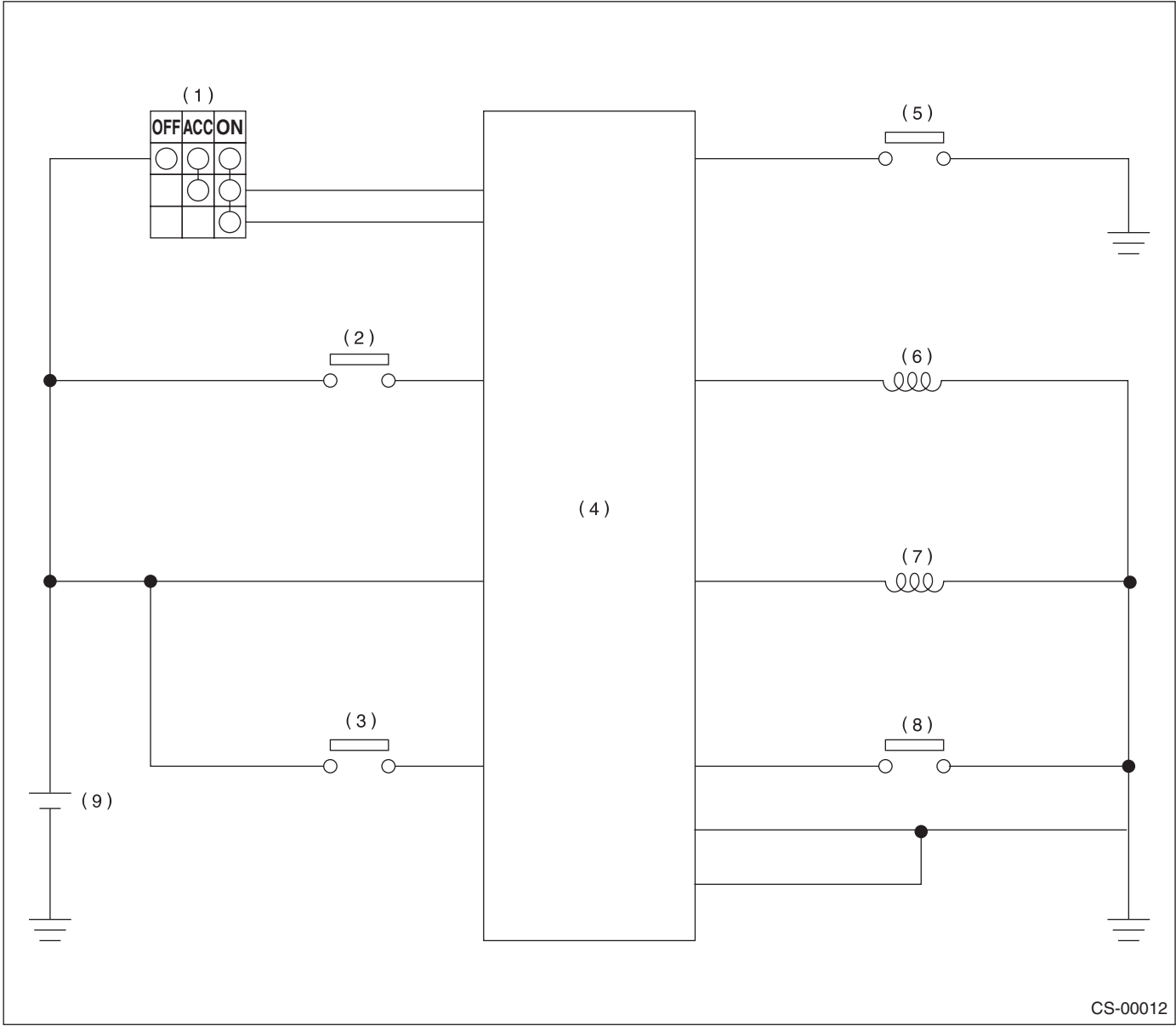
To A: **B280**



CS-00195

Contents	Connector No.	Terminal No.	Input/Output signal
			Measured value and measuring conditions
Battery power supply	B281	2	9 — 16 V
Ignition power supply	B280	19	10 — 15 V when ignition switch is at ON or START.
Ignition power supply	B280	10	10 — 15 V when ignition switch is at ACC.
Inhibitor Switch ("P" position)	B280	5	0 V when select lever is in "P" position. 9 — 16 V when select lever is in other positions than "P" position.
Stop light switch	B280	9	9 — 16 V when stop light switch is ON. 0 V when stop light switch is OFF.
"P" position switch	B280	6	0 V when select lever is in "P" position. 9 — 16 V when select lever is in other positions than "P" position.
Shift lock solenoid signal	B281	9	8.5 — 16 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	B280	20	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B281	3	7.5 — 16 V when turning ignition switch to ON, select lever is in "P" position and brake switch is ON. 0 V at other conditions than above.
Ground	B281	4	—
Ground	B281	13	—

C: SCHEMATIC



AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

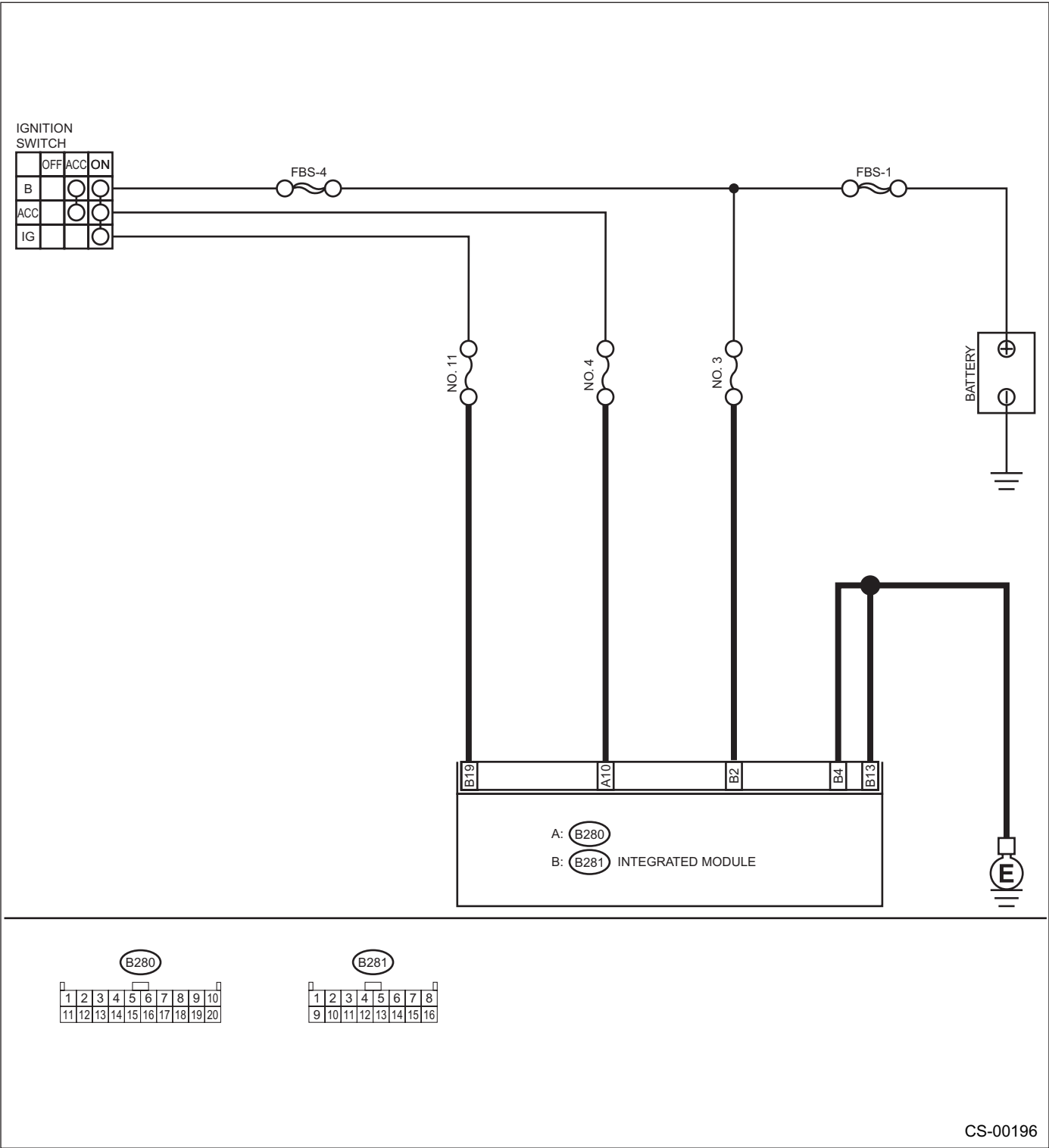
D: INSPECTION

Step	Check	Yes	No
1 CHECK SHIFT LOCK. 1) Turn the ignition switch ON. 2) Move the select lever to "P" position. While brake pedal is depressed, can select lever move from "P" range to other positions?	The select lever can be moved.	Go to step 2.	Inspect "SELECT LEVER SHIFT LOCK CANNOT BE RELEASED". <Ref. to CS-18, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock System.>
2 CHECK SHIFT LOCK. While brake pedal is not depressed, can select lever move from "P" range to other positions?	The select lever can be moved.	Inspect "SELECT LEVER CANNOT BE SHIFT LOCKED". <Ref. to CS-14, SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock System.>	Go to step 3.
3 CHECK KEY INTERLOCK. When select lever is in other than "P" position, does ignition switch turn to "LOCK" position?	The switch can be turned.	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED". <Ref. to CS-22, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock System.>	Go to step 4.
4 CHECK KEY INTERLOCK. When select lever is in "P" position, does ignition switch turn to "LOCK" position?	The switch can be turned.	AT shift lock system is normal.	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED". <Ref. to CS-22, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock System.>

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

1. INTEGRATED MODULE POWER SUPPLY AND GROUND LINE WIRING DIAGRAM:



AT SHIFT LOCK SYSTEM

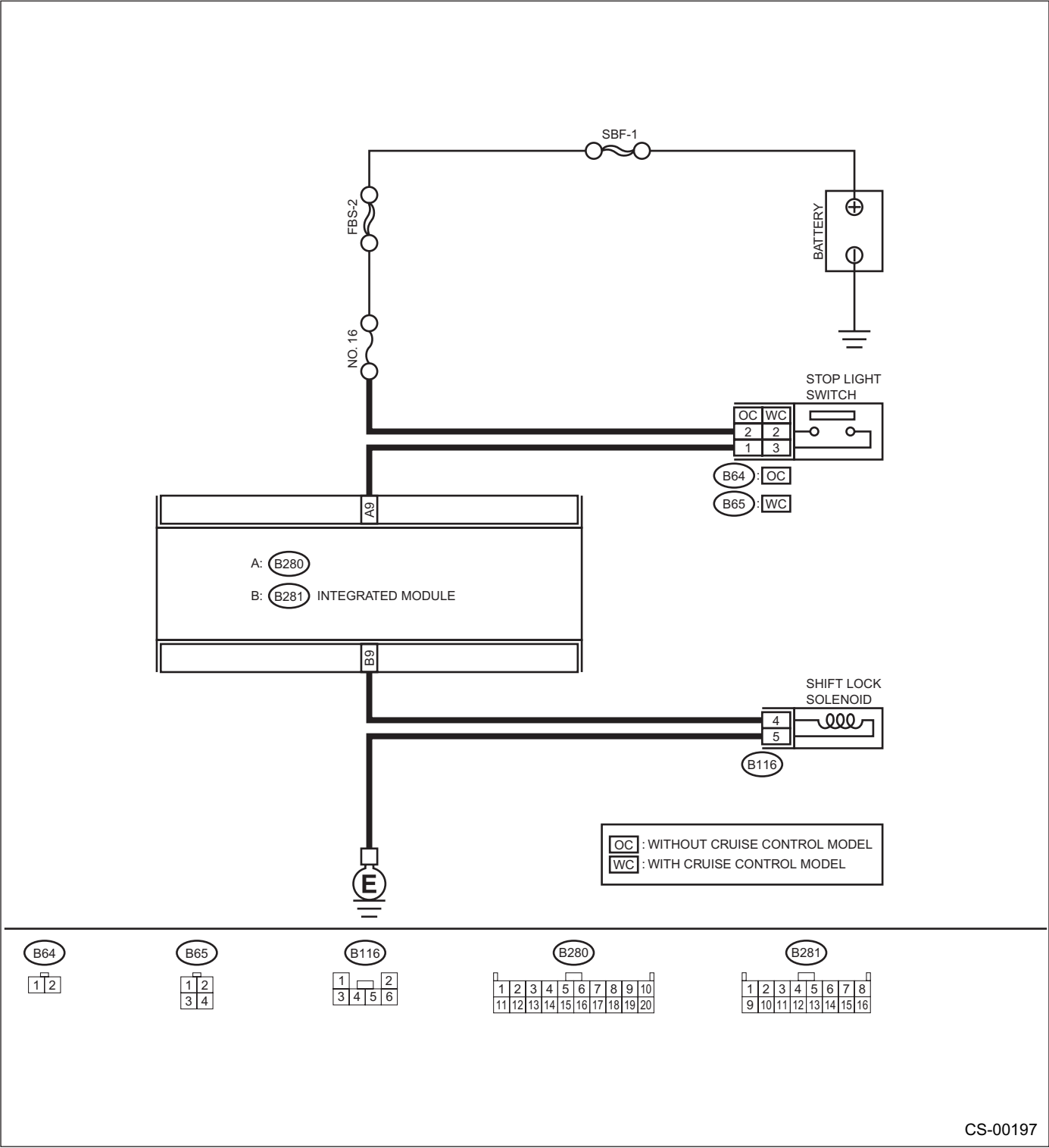
CONTROL SYSTEMS

Step	Check	Yes	No
1 CHECK FUSE (No. 3, 4 and 11). Remove the fuse (No. 3, 4 and 11). Is the fuse (No. 3, 4 or 11) blown out?	The fuse is blown out.	Replace the fuse (No. 3, 4 or 11). If the replaced fuse (No. 3, 4 or 11) has blown out easily, repair short circuit in harness between fuse and integrated module.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN INTEGRATED MODULE AND BODY GROUND. 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B281) No. 4 — Chassis ground: (B281) No. 13 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between integrated module and body ground.
3 CHECK BATTERY POWER SUPPLY. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltages between integrated module and chassis ground. Connector & terminal (B281) No. 1 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Go to step 4.	Repair open circuit harness between battery and integrated module, and poor contact in coupling connector.
4 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ACC. 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 10 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Go to step 5.	Repair open circuit harness between battery and integrated module, and poor contact in coupling connector.
5 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B281) No. 19 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Go to step 6.	Repair open circuit harness between battery and integrated module, and poor contact in coupling connector.
6 CHECK POOR CONTACT. Is there poor contact in power supply and ground line circuit?	There is a poor contact.	Repair poor contact.	Replace the integrated module.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

2. SELECT LEVER CANNOT BE SHIFT LOCKED WIRING DIAGRAM:



CS-00197

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Check	Yes	No
1 CHECK STOP LIGHT SWITCH. Depress the brake pedal. Does the stop light turn ON?	The select lever can be moved.	Go to step 2.	Inspect the stop light system.
2 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND INTEGRATED MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the integrated and stoplight switch connector. 3) Measure the resistance of harness between stop light switch and integrated module. Connector & terminal Without cruise control model (B64) No. 1 — (B280) No. 9: Without cruise control model (B65) No. 3 — (B280) No. 9: Is the measured value more than the specified value?	1 MΩ	Repair open circuit in harness between integrated module and stop light switch.	Go to step 3.
3 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND INTEGRATED MODULE. Measure the resistance of harness between stop light switch and chassis ground. Connector & terminal Without cruise control model (B64) No. 1 — Chassis ground: Without cruise control model (B65) No. 3 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Repair short circuit in harness between integrated module and stop light switch.	Go to step 4.
4 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. 1) Disconnect the shift lock solenoid connector. 2) Measure the resistance of harness between integrated module and shift lock solenoid. Connector & terminal (B116) No. 4 — (B281) No. 9: Is the measured value more than the specified value?	1 MΩ	Repair open circuit in harness between integrated module and shift lock solenoid.	Go to step 5.
5 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B116) No. 4 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Repair short circuit in harness between integrated module and shift lock solenoid.	Go to step 6.
6 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B116) No. 5 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Repair open circuit in harness between shift lock solenoid and body ground.	Go to step 7.

AT SHIFT LOCK SYSTEM

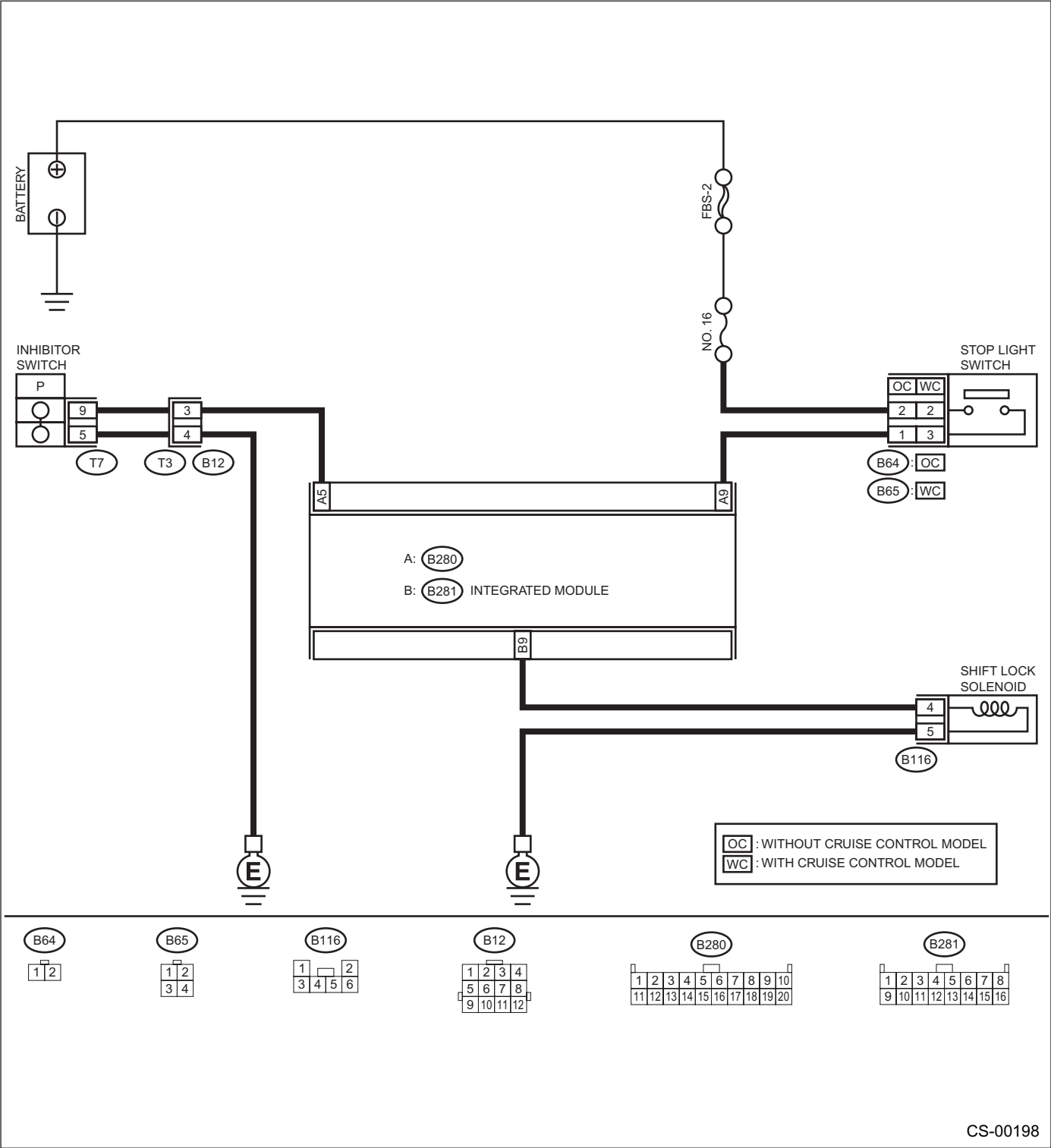
CONTROL SYSTEMS

Step	Check	Yes	No
7 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. Terminal No. 4 — No. 5: Is the measured value within the specified range?	Between 10 and 20 Ω	Go to step 8 .	Replace the shift lock solenoid.
8 CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal and operate solenoid. Terminal No. 4 (+) — No. 5 (-): Does the shift lock solenoid operate properly?	The shift lock solenoid operates properly.	Go to step 9 .	Replace the shift lock solenoid.
9 CHECK POOR CONTACT. Is there poor contact in key lock circuit?	There is a poor contact.	Repair poor contact.	Replace the integrated module.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

3. SELECT LEVER SHIFT LOCK CANNOT BE RELEASED WIRING DIAGRAM:



AT SHIFT LOCK 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 lamp and select lever "P", "R", "N", "3", "2" and "1" are correctly matched?	Correctly matched.	Go to step 2.	Adjust inhibitor switch and select cable.
2 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND INTEGRATED MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the connector transmission harness and integrated module. 3) Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B280) No. 5 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Repair short circuit in harness between integrated module and transmission connector.	Go to step 3.
3 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND INTEGRATED MODULE. Measure the resistance of harness between integrated module and inhibitor switch. Connector & terminal (B12) No. 3 — (B280) No. 5: Is the measured value more than the specified value?	1 M Ω	Repair open circuit in harness between integrated module and transmission connector	Go to step 4.
4 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B12) No. 4 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 5.	Repair open circuit in harness between integrated module and chassis ground.
5 CHECK INHIBITOR SWITCH. 1) Move the select lever to "P" position. 2) Measure the resistance of transmission harness connector terminals. Connector & terminal (T3) No. 3 — No. 4: Is the measured value more than the specified value?	1 M Ω	Repair or replace inhibitor switch.	Go to step 6.
6 CHECK OUTPUT SIGNAL FOR INTEGRATED MODULE. 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 5 (+) — Chassis ground (-): Is the measured value within the specified range?	Between 9 and 16 V	Go to step 7.	Go to step 15.
7 CHECK STOP LIGHT SWITCH. Depress the brake pedal. Does the stop light turn on?	The stop light turns on.	Go to step 8.	Inspect stop light system.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Check	Yes	No
8 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE. 1) Depress the brake pedal. 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 9 (+) — Chassis ground (-): Is the measured value more than the specified value?	9 V	Go to step 9.	Repair open or short circuit in harness between integrated module and stop light switch.
9 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from shift lock solenoid and integrated module. 3) Measure the resistance of harness between integrated module and shift lock solenoid. Connector & terminal (B281) No. 9 — (B116) No. 4: Is the measured value more than the specified value?	1 M Ω	Repair open circuit in harness between integrated module and shift lock solenoid.	Go to step 10.
10 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B281) No. 9 — Chassis ground: Is the measured value less than the specified value?	10 Ω	Go to step 11.	Repair short circuit in harness between integrated module and shift lock solenoid.
11 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B116) No. 5 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 12.	Repair open circuit in harness between shift lock solenoid and chassis ground.
12 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. Terminal No. 4 — No. 5: Is the measured value within the specified range?	Between 10 and 20 Ω	Go to step 13.	Replace the shift lock solenoid.
13 CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal and operate solenoid. Terminal No. 4 (+) — No. 5 (-): Is shift lock solenoid operating properly?	The shift lock solenoid operates properly.	Go to step 14.	Replace the shift lock solenoid.

AT SHIFT LOCK SYSTEM

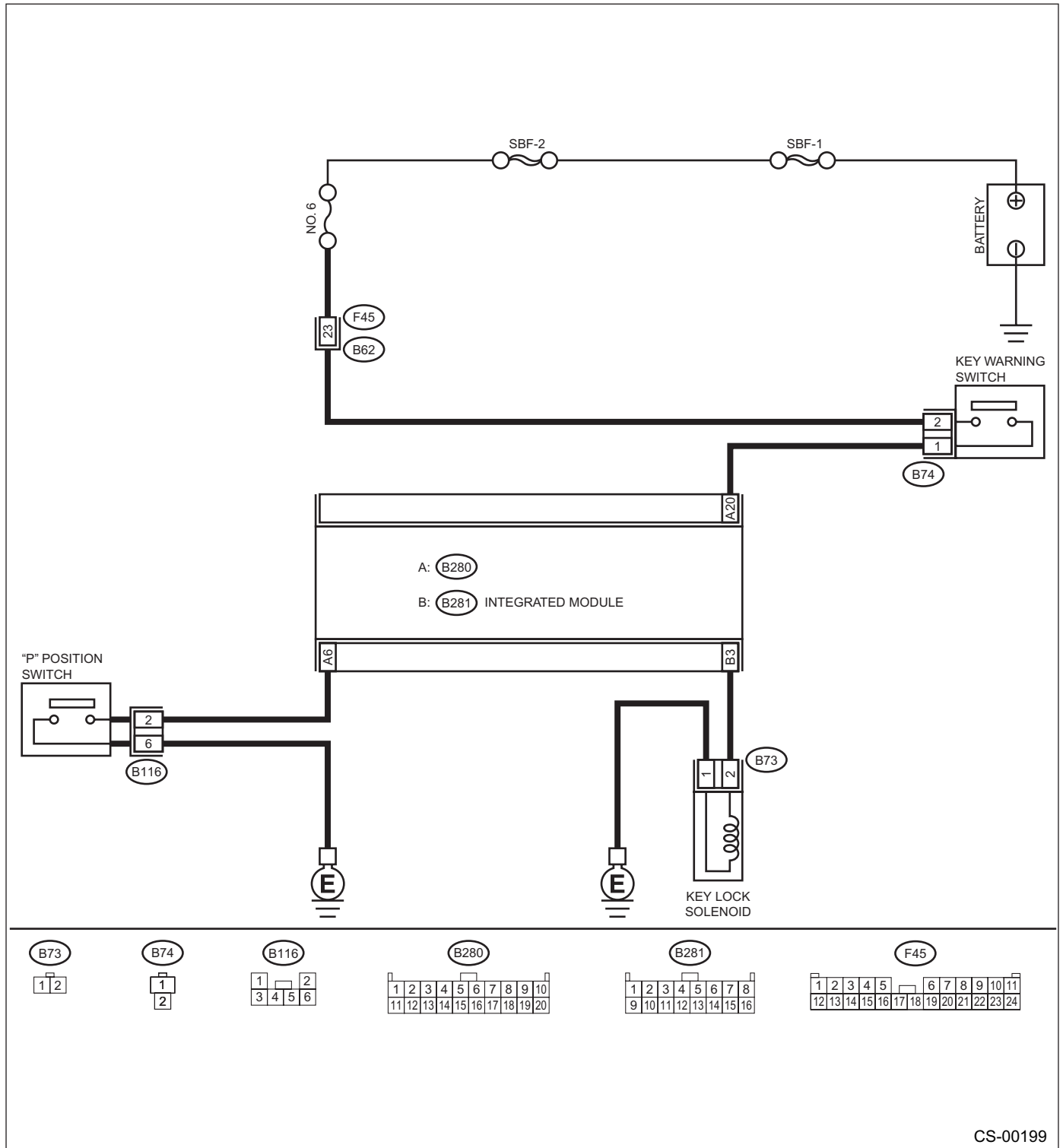
CONTROL SYSTEMS

Step	Check	Yes	No
14 CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B281) No. 9 (+) — Chassis ground (-): Is the measured value more than the specified value?	8.5 V	Go to step 15.	Replace the integrated module.
15 CHECK POOR CONTACT. Is there poor contact in key lock circuit?	There is a poor contact.	Repair poor contact.	Replace the integrated module.

CONTROL SYSTEMS

4. KEY INTERLOCK DOES NOT LOCK OR RELEASE

WIRING DIAGRAM:



AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Check	Yes	No
1 CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH. 1) Disconnect the connector key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. Connector & terminal (B74) No. 2 — Chassis ground: Is the measured value within the specified range?	Between 9 and 16 V	Go to step 2.	Repair open or short circuit in harness between battery and key warning switch.
2 CHECK KEY WARNING SWITCH. Measure the resistance of stop light switch connector terminals. Terminal No. 1 — No. 2: Is the measured value more than the specified value?	1 M Ω	Replace key warning switch.	Go to step 4.
3 CHECK KEY WARNING SWITCH. 1) Remove the key. 2) Measure the resistance of stop light switch connector terminals. Terminal No. 1 — No. 2: Is the measured value more than the specified value?	1 M Ω	Go to step 4.	Replace key warning switch.
4 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH. 1) Disconnect the integrated module connector. 2) Measure the voltage of harness integrated module and chassis ground. Connector & terminal (B280) No. 20 — Chassis ground: Is the measured value more than the specified value?	9 V	Go to step 5.	Repair open circuit in harness between integrated module and key warning switch.
5 CHECK HARNESS BETWEEN INTEGRATED MODULE AND KEY LOCK SOLENOID. 1) Disconnect the connector key lock solenoid. 2) Measure the resistance of harness between integrated module and key lock solenoid. Connector & terminal (B73) No. 2 — (B281) No. 3: Is the measured value more than the specified value?	1 M Ω	Repair open circuit in harness between integrated module and key lock solenoid.	Go to step 6.
6 CHECK HARNESS BETWEEN INTEGRATED MODULE AND KEY LOCK SOLENOID. Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B281) No. 3 — Chassis ground: Is the measured value more than the specified value?	1 Ω	Go to step 7.	Repair short circuit in harness between integrated module and key lock solenoid.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Check	Yes	No
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. 1 — Chassis ground: Is the measured value less than the specified value?	10 Ω	Go to step 8.	Repair open circuit in harness between key lock solenoid and chassis ground.
8 CHECK KEY LOCK SOLENOID. Measure the resistance of key lock solenoid connector terminals. Connector & terminal (B73) No. 1 — No. 2: Is the measured value within the specified range?	Between 4 and 8 Ω	Go to step 14.	Replace the key lock solenoid.
9 CHECK HARNESS BETWEEN “P” POSITION SWITCH AND CHASSIS GROUND. Measure the resistance of harness between “P” position switch and chassis ground. Connector & terminal (B116) No. 2 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 10.	Repair short circuit in harness between “P” position switch and integrated module.
10 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” POSITION SWITCH. 1) Disconnect the connector from “P” position switch. 2) Measure the resistance of harness between integrated module and “P” position switch. Connector & terminal (B116) No. 2 — (B280) No. 6: Is the measured value more than the specified value?	1 MΩ	Repair open circuit in harness between integrated module and “P” position switch.	Go to step 11.
11 CHECK HARNESS BETWEEN “P” POSITION SWITCH AND CHASSIS GROUND. Measure the resistance of harness “P” position switch and chassis ground. Connector & terminal (B116) No. 6 — Chassis ground: Is the measured value more than the specified value?	1 MΩ	Go to step 12.	Repair open circuit in harness between “P” position switch and chassis ground.
12 CHECK “P” POSITION SWITCH. 1) Move the select lever to “P” position. 2) Measure resistance between “P” position switch connector terminals. Terminal No. 2 — No. 6: Is the measured value less than the specified value?	1 Ω	Go to step 13.	Replace the “P” position switch.

AT SHIFT LOCK SYSTEM

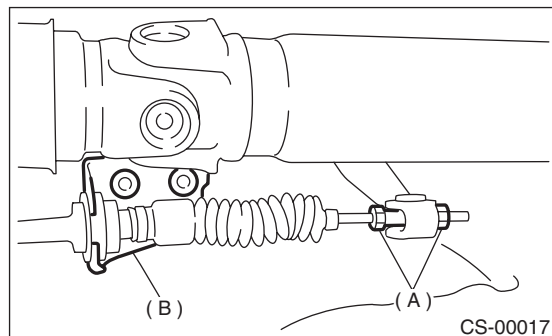
CONTROL SYSTEMS

Step	Check	Yes	No
13 CHECK "P" POSITION SWITCH. 1) Move the select lever to other than "P" position. 2) Measure resistance between "P" position switch connector terminals. Terminal No. 2 — No. 6: Is the measured value more than the specified value?	1 MΩ	Go to step 14.	Replace the "P" position switch.
14 CHECK OUTPUT SIGNAL FOR INTEGRATED MODULE. 1) Connect all connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to "P" position. 4) Press the brake pedal. 5) Measure the voltage between integrated module connector and chassis ground. Connector & terminal (B281) No. 3 (+) — Chassis ground (-): Is the measured value within the specified range?	Between 7.5 and 16 V	Go to step 15.	Replace the integrated module.
15 CHECK POOR CONTACT. Is there poor contact in AT shift lock circuit?	There is a poor contact.	Repair poor contact.	Replace the integrated module.

3. Select Lever

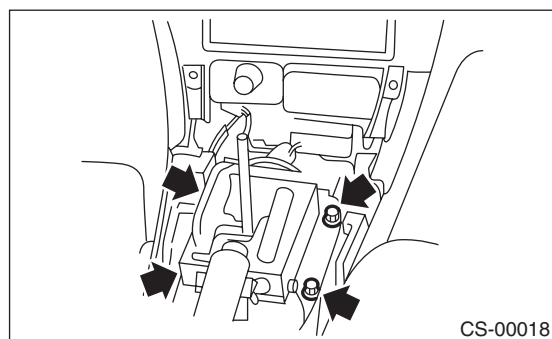
A: REMOVAL

- 1) Set the vehicle on the lift.
- 2) Disconnect the ground terminal from battery.
- 3) Move the select lever to the "N" position.
- 4) Lift-up the vehicle.
- 5) Remove the rear exhaust pipe and muffler.
- 6) Remove the heat shield cover. (If equipped)
- 7) Disconnect the cable from select lever and then remove the cable bracket.



- (A) Adjusting nuts
(B) Cable bracket

- 8) Lower the vehicle.
- 9) Remove the console box. <Ref. to EI-42, REMOVAL, Console Box.>
- 10) Disconnect the connectors, then remove the four bolts to take out the select lever assembly from the body.

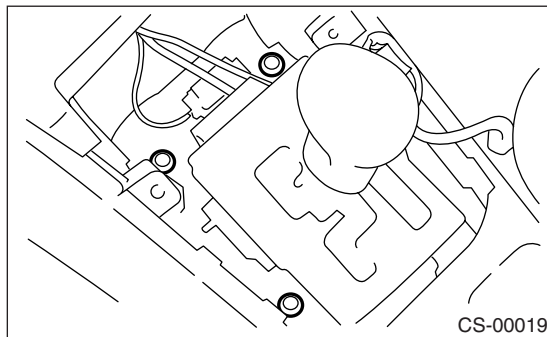


B: INSTALLATION

- 1) Mount the select lever onto the vehicle body.
- 2) Tighten the four bolts to install the select lever to the vehicle body, 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-40, INSTALLATION, Glove Box.>
- 4) Set the location of select lever at "N" position.
- 5) Lift-up the vehicle.
- 6) Set the location of range select lever to "N" position.
- 7) Insert the thread portion of the other inner cable and into the connector hole of the select lever, and fix the other outer cable end to the bracket.
- 8) Adjust the select cable position. <Ref. to CS-30, ADJUSTMENT, Select Cable.>
- 9) Install the heat shield cover. (If equipped)
- 10) Install the rear exhaust pipe and muffler.
- 11) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
- 12) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-30, ADJUSTMENT, Select Cable.> and <Ref. to AT-48, ADJUSTMENT, Inhibitor Switch.>

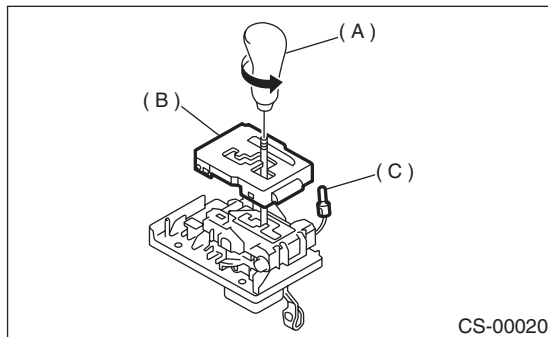
- (1) The engine starts operating when select lever is in position "P", but not in other positions.
- (2) The back-up light is lit when the select lever is in position "R", but not in other positions.
- (3) Select lever and indicator positions are matched.
- 13) Check the shift-lock system.
 - (1) Ensure the ignition switch rotates from "ACC" to "LOCK" when the select lever is set at "P". Also check that ignition key can be removed only from the "LOCK" position.
 - (2) Ensure the select lever moves from "P" to any other position when the brake pedal is depressed with ignition key set at "ON" or "START".

C: DISASSEMBLY

- 1) Remove the grip.
- 2) Remove the indicator light and then remove the indicator cover.

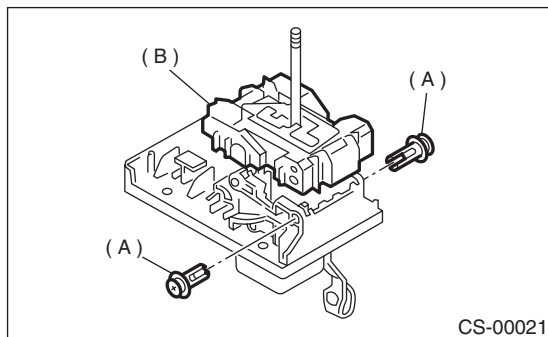
NOTE:

Be careful not to break the indicator light during removal.



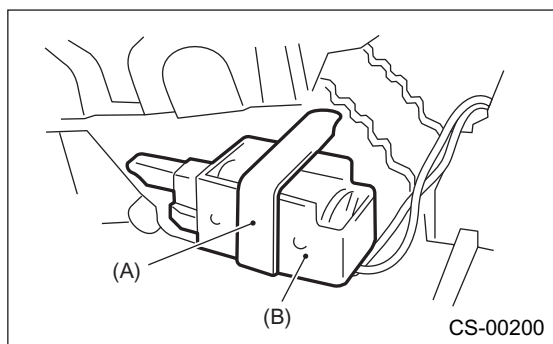
- (A) Grip
- (B) Indicator cover
- (C) Indicator light

- 3) Remove the blind.
- 4) Remove the clips and then remove the guide plate.



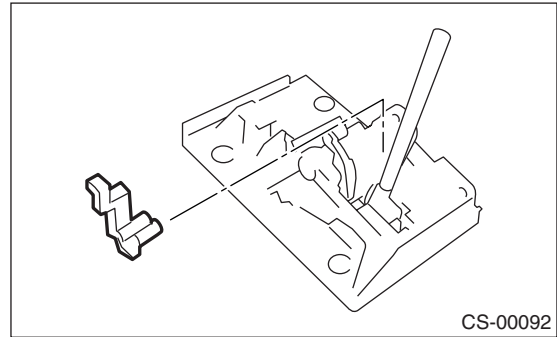
- (A) Clips
- (B) Guide plate

- 5) Remove the clamp, and shift lock solenoid.

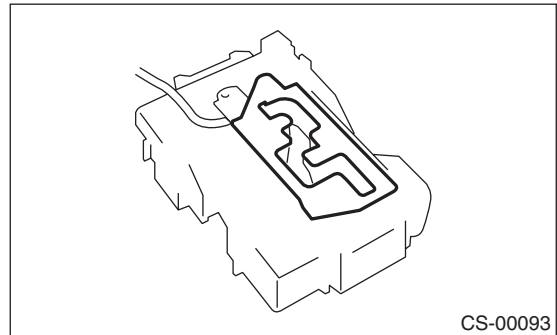


- (A) Clamp
- (B) Shift lock solenoid

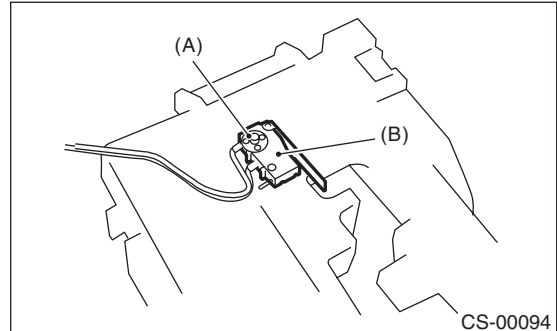
- 6) Remove the lock plate.



- 7) Remove the cushion plate.



- 8) Remove the clip and remove the "P" position switch.

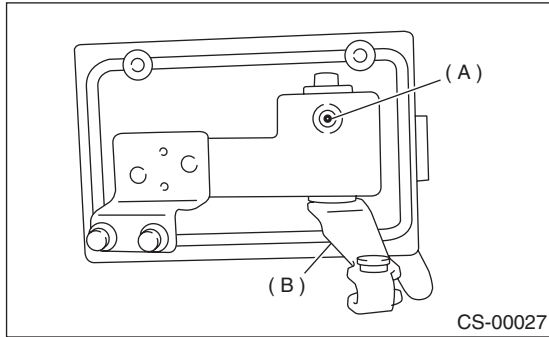


- (A) Clip
- (B) "P" position switch

SELECT LEVER

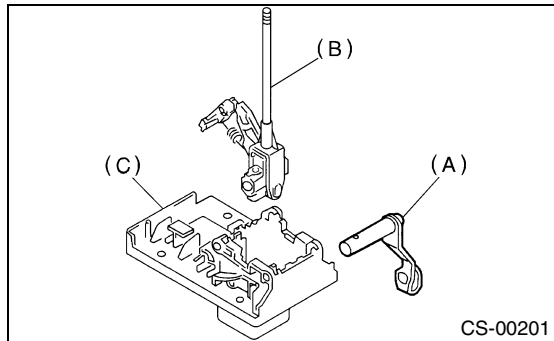
CONTROL SYSTEMS

9) Remove the cap and then extract straight pin.



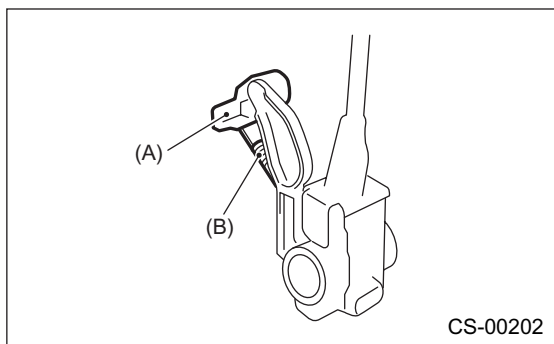
- (A) Straight pin
- (B) Select lever lower

10) Remove the select lever lower then take away the select lever upper from plate.



- (A) Select lever lower
- (B) Select lever upper
- (C) Plate

11) Remove the spring and remove the detent arm.



- (A) Detent arm
- (B) Spring

12) Remove the cushion.

D: ASSEMBLY

- 1) Clean all parts before assembly.
- 2) Apply grease [NIGTIGHT LYW No. 2 or equivalent] to each parts. <Ref. to CS-3, AT Select Lever.>
- 3) Assembly is in the reverse order of disassembly.
- 4) After completion of fitting, transfer the select lever to range "P" — "1", then check whether the indicator and select lever agree, whether the pointer and position mark agree and what the operating force is.

E: INSPECTION

- 1) Inspect the removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Confirm the following parts for operating condition before assembly. Moving condition of the selector lever upper, it should move smoothly.

4. Select Cable

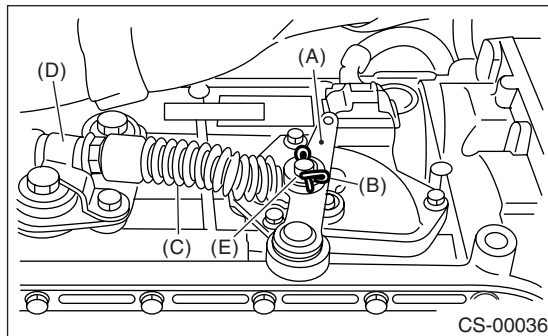
A: REMOVAL

- 1) Set the vehicle on the lift.
- 2) Disconnect the ground terminal from battery.
- 3) Prior to removal, set the lever to "N" position.
- 4) Lift-up the vehicle.
- 5) Remove the front and center exhaust pipe. (Non-turbo model) <Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>

CAUTION:

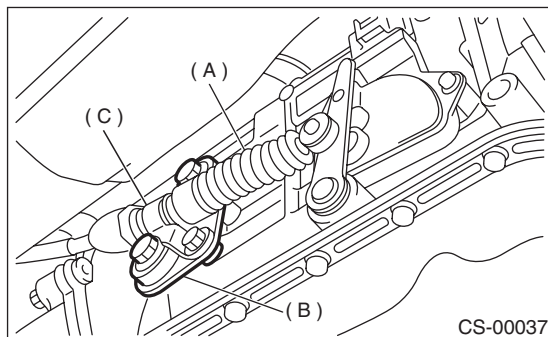
When removing the exhaust pipes, be careful each exhaust pipe does not drop out.

- 6) Remove the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 7) Remove the heat shield cover. (If equipped)
- 8) Remove the snap pin from range select lever.



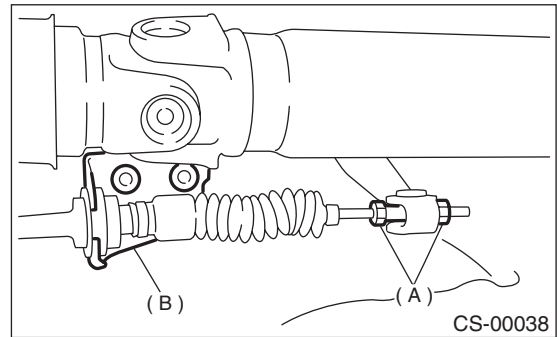
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp
- (E) Washer

- 9) Remove the plate assembly from transmission case.



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

- 10) Disconnect the cable from select lever and then remove the cable bracket.



- (A) Adjusting nuts
- (B) Cable bracket

- 11) Remove the select cable from plate assembly.

SELECT CABLE

CONTROL SYSTEMS

B: INSTALLATION

1) Install the select cable to plate assembly.

Tightening torque:

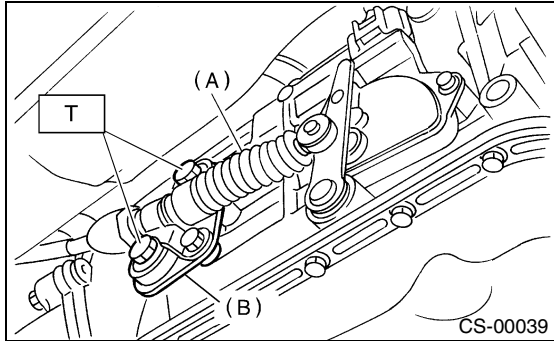
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Install the select cable to range select lever.

3) Install the plate assembly to transmission.

Tightening torque:

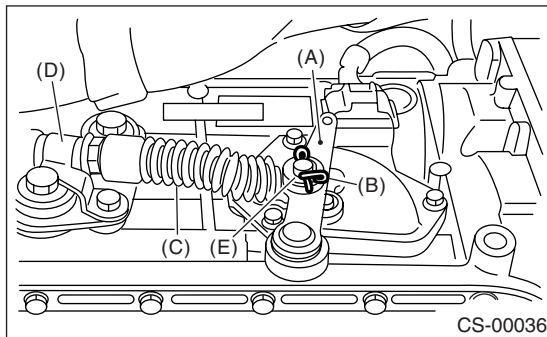
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Select cable

(B) Plate ASSY

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



(A) Range select lever

(B) Snap pin

(C) Select cable

(D) Clamp

(E) Washer

5) 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)

6) Move the select lever to the "N" position, then adjust the select cable position. <Ref. to CS-30, ADJUSTMENT, Select Cable.>

7) Install the heat shield cover. (If equipped)

8) Install the front and center exhaust pipe. (Non-turbo model) <Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>

9) Install the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

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

1) Check for smooth operation of the cable.

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" position to "1" position. You should be able to feel the detentes in each position. If the detentes cannot be felt or the position pointer is improperly aligned, adjust the cable.

D: ADJUSTMENT

1) Set the vehicle on the lift.

2) Disconnect the ground terminal from battery.

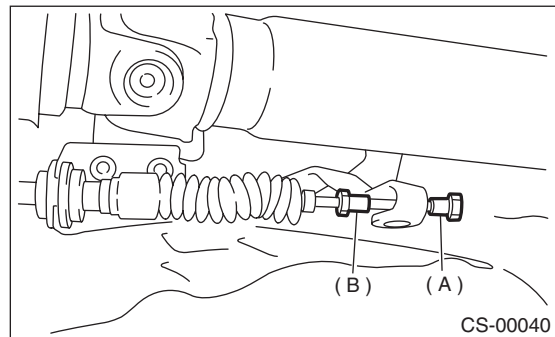
3) Set the lever to "N" position.

4) Lift-up the vehicle.

5) Remove the rear exhaust pipe and muffler.

6) Remove the heat shield cover. (If equipped)

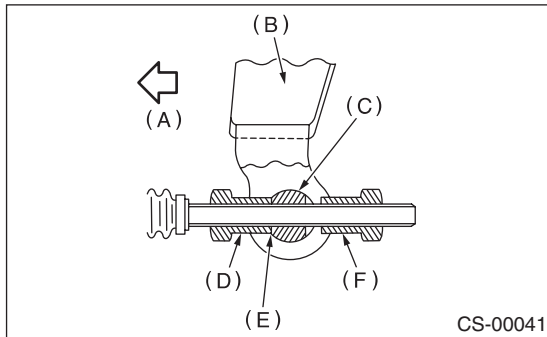
7) Loosen the adjusting nut on each side.



(A) Adjusting nut A

(B) Adjusting nut B

8) Turn the adjusting nut B until it lightly touches the connector.

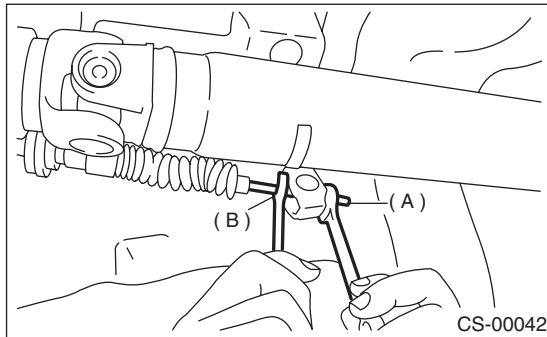


- (A) Front side
- (B) Select lever
- (C) Connector
- (D) Adjusting nut B
- (E) Contact point
- (F) Adjusting nut A

9) While preventing the adjusting nut B from moving with a wrench, tighten 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

10) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.

11) Install in the reverse order of removal.

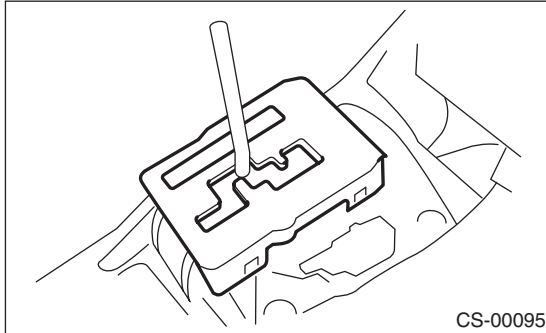
AT SHIFT LOCK SOLENOID AND “P” POSITION SWITCH

CONTROL SYSTEMS

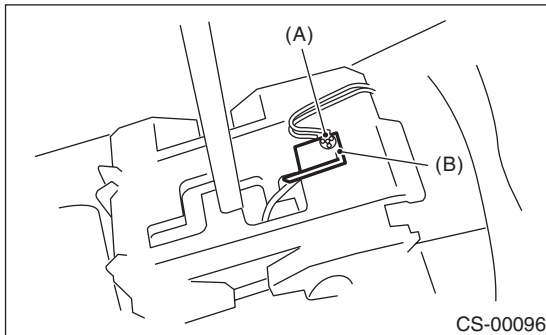
5. AT Shift Lock Solenoid and “P” Position Switch

A: REMOVAL

- 1) Disconnect the ground terminal from battery.
- 2) Remove the console box. <Ref. to EI-42, REMOVAL, Console Box.>
- 3) Disconnect the connector.
- 4) Remove the grip.
- 5) Remove the indicator cover.

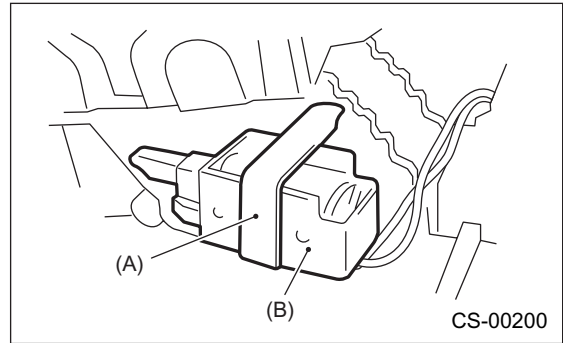


- 6) Remove the slider.
- 7) Remove the cushion.
- 8) Remove the clip and remove the “P” position switch.



- (A) Clip
(B) “P” position switch

- 9) 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” POSITION SWITCH

CONTROL SYSTEMS

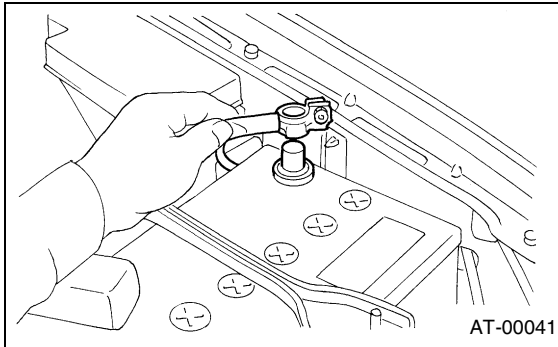
C: INSPECTION

Step	Check	Yes	No
1 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. <i>Terminal</i> <i>No. 4 — No. 5</i> Is the measured value within the specified range?	Between 10 and 20 Ω	Go to step 2.	Replace the shift lock solenoid and “P” position switch assembly.
2 CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal, operate solenoid. <i>Terminal</i> <i>No. 4 (+) — No. 5 (–)</i> Is the shift lock solenoid operating properly?	The shift lock solenoid operates properly.	Go to step 3.	Replace the shift lock solenoid and “P” position switch assembly.
3 CHECK “P” POSITION SWITCH. 1) Move the select lever to “P” position. 2) Measure resistance between “P” position switch connector terminals. Is the measured value less than the specified value?	1 Ω	Go to step 4.	Replace the “P” position switch.
4 CHECK “P” POSITION SWITCH. 1) Move the select lever to other than “P” position. 2) Measure resistance between “P” position switch connector terminals. Is the measured value more than the specified value?	1 M Ω	Normal	Replace the “P” position switch.

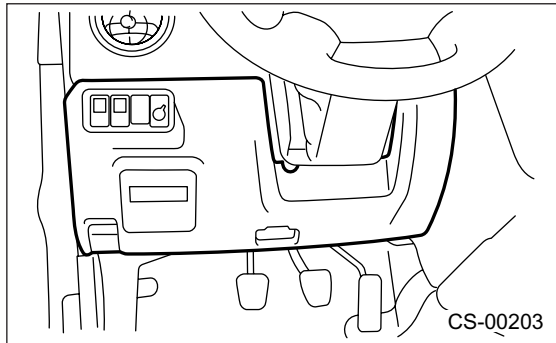
6. Integrated Module

A: REMOVAL

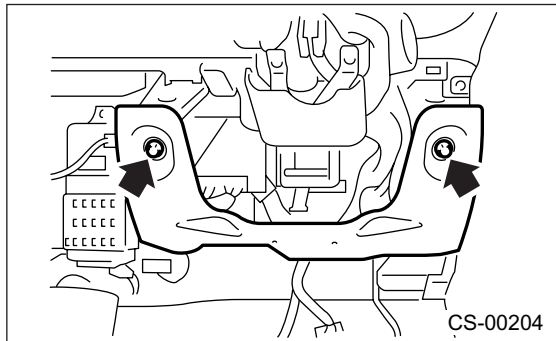
1) Disconnect the ground terminal from battery.



2) Remove the lower cover.

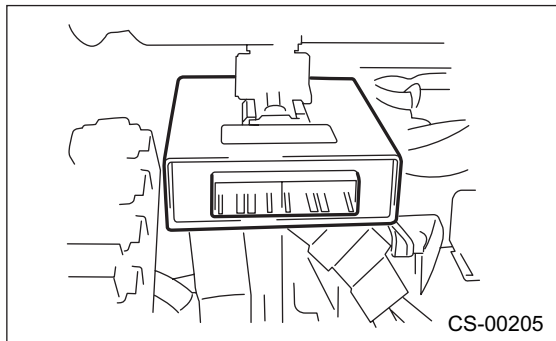


3) Remove the knee bolster.



4) Disconnect the connector from integrated module.

5) Remove the integrated module.



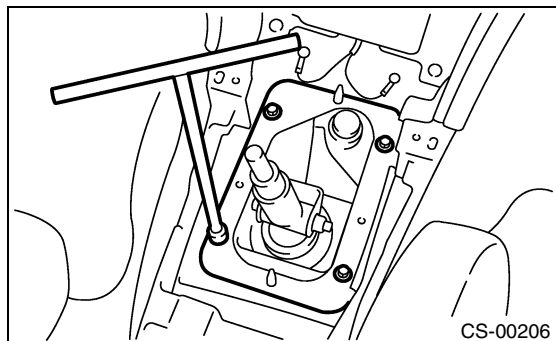
B: INSTALLATION

Install in the reverse order of removal.

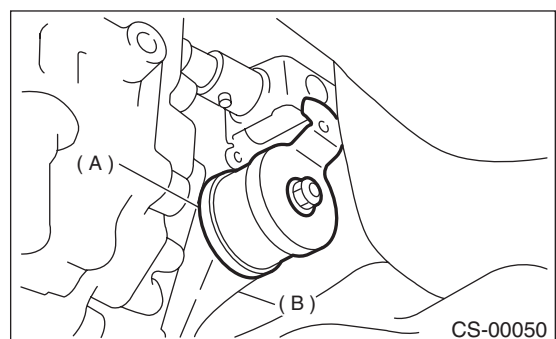
7. MT Gear Shift Lever

A: REMOVAL

- 1) Set the vehicle on the lift.
- 2) Remove the gear shift knob.
- 3) Disconnect the ground terminal from battery.
- 4) Remove the console box. <Ref. to EI-42, REMOVAL, Console Box.>
- 5) Remove the boot plate from body.

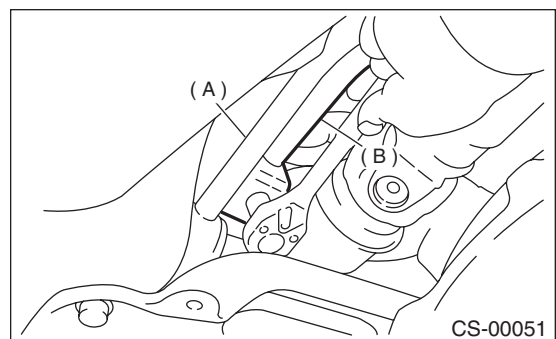


- 6) Lift-up the vehicle.
- 7) Remove the rear exhaust pipe and muffler.
- 8) Remove the heat shield cover. (If equipped)
- 9) Remove the stay from transmission bracket.



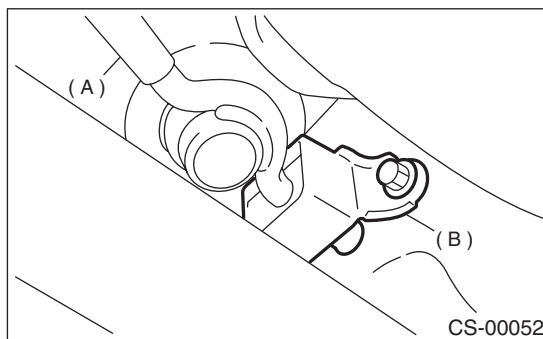
- (A) Stay
(B) Transmission bracket

- 10) Remove the rod from joint.



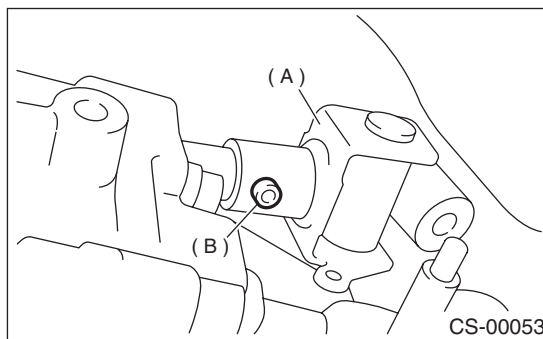
- (A) Stay
(B) Rod

- 11) Remove the cushion rubber from body.



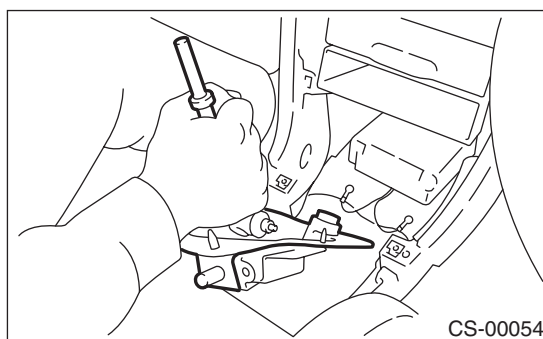
- (A) Stay
(B) Cushion rubber

- 12) Remove the joint and then extract the spring pin.



- (A) Joint
(B) Spring pin

- 13) Lower the vehicle.
- 14) Remove the gear shift lever.



MT GEAR SHIFT LEVER

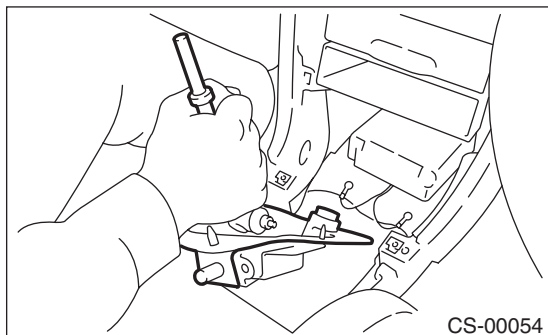
CONTROL SYSTEMS

B: INSTALLATION

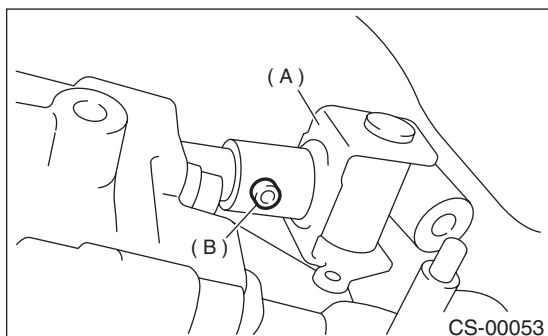
- 1) Install the joint to the transmission and secure with the spring pin.
- 2) Insert the gear shift lever from room side.

NOTE:

After inserting the rod and stay, temporarily put them onto transmission mount.



- 3) Lift-up the vehicle.
- 4) Install the joint to shifter arm.
- 5) Insert the spring pin.

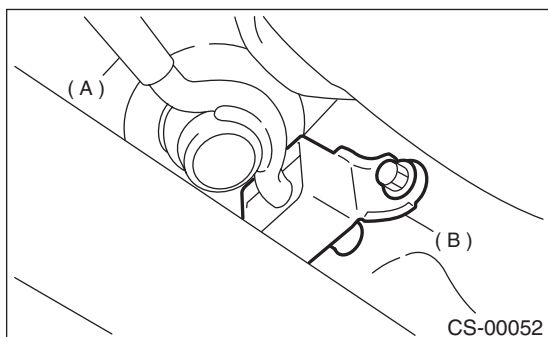


- (A) Joint
(B) Spring pin

- 6) Mount the cushion rubber on the body.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

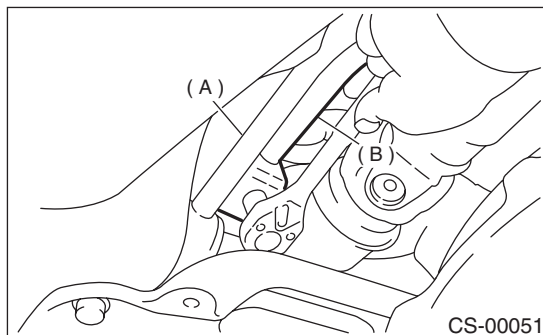


- (A) Stay
(B) Cushion rubber

- 7) Connect the rod to the joint.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

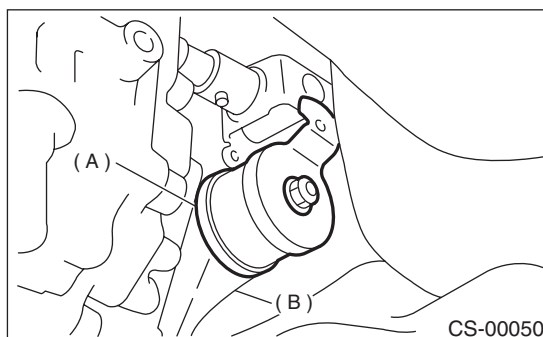


- (A) Stay
(B) Rod

- 8) Connect the stay to transmission bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Stay
(B) Transmission bracket

- 9) Install the heat shield cover. (If equipped)
- 10) Install the rear exhaust pipe and muffler.
- 11) Lower the vehicle.
- 12) Install the boot plate to body.

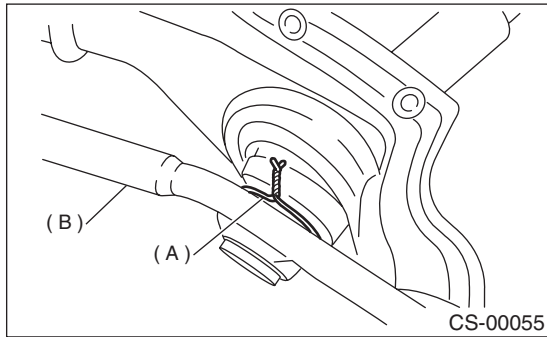
Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

- 13) Install the consol box. <Ref. to EI-42, INSTALLATION, Console Box.>

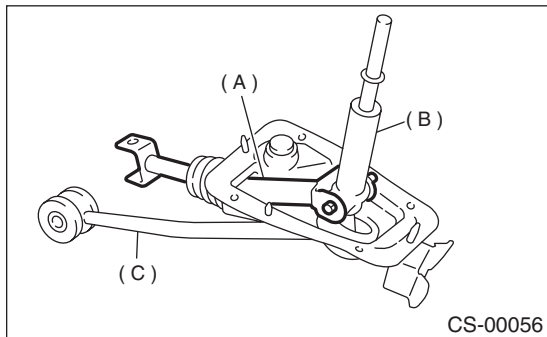
C: DISASSEMBLY

1) Disassemble the locking wire.



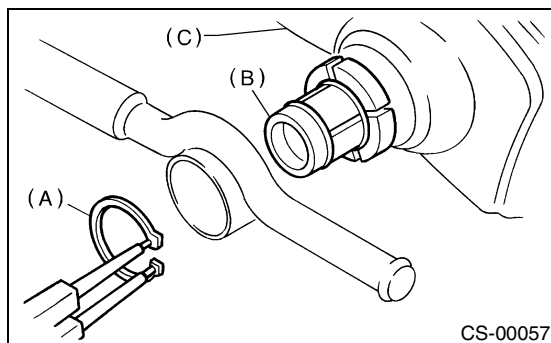
- (A) Locking wire
- (B) Stay

2) Remove the rod from gear shift lever.



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

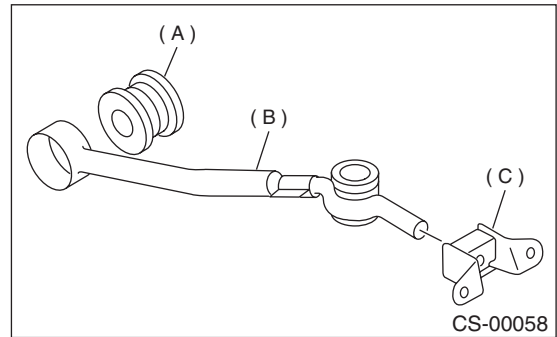
3) Remove the snap ring from bushing B, then disconnect the stay.



- (A) Snap ring
- (B) Bushing B
- (C) Boot

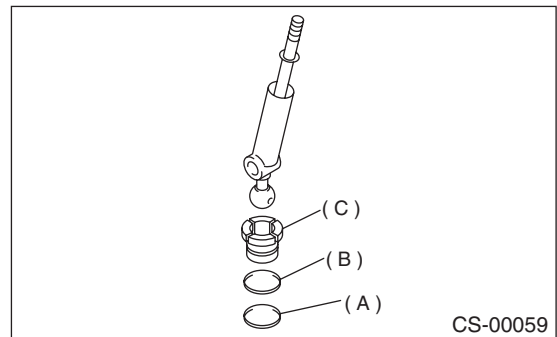
4) Remove the boot from gear shift lever.

5) Remove the bushing and cushion rubber from stay.



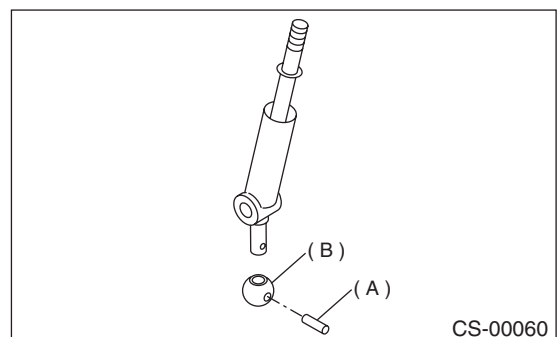
- (A) Bushing
- (B) Stay
- (C) Cushion rubber

6) Remove the O-ring, then disconnect the bushing D.



- (A) O-ring
- (B) O-ring
- (C) Bushing B

7) Draw out the spring pin, then remove the bushing A from gear shift lever.



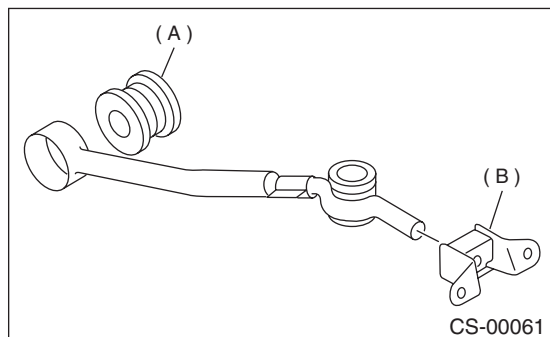
- (A) Spring pin
- (B) Bushing A

MT GEAR SHIFT LEVER

CONTROL SYSTEMS

D: ASSEMBLY

- 1) Clean all parts before assembly.
- 2) Mount the bushing and cushion rubber on the stay.

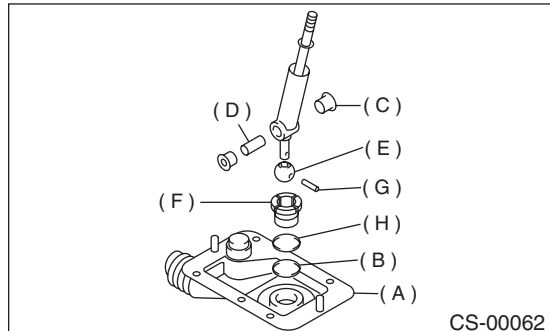


- (A) Bushing
(B) Cushion rubber

- 3) Mount each part; boot, O-ring, bushing, spacer, bush A, bush B and spring pin on the gear shift lever.

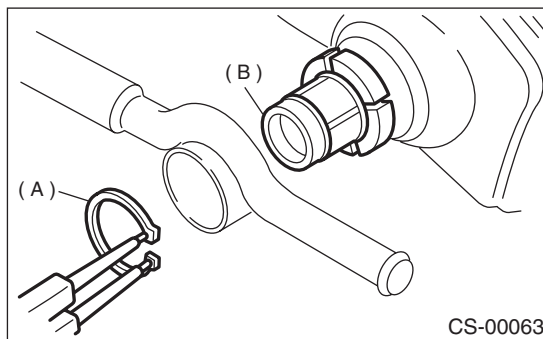
CAUTION:

- Always use new O-rings.
- Apply grease [NIGTIGHT LYW No. 2 or equivalent] to the inner and side surfaces of the bushing when installing the spacer.



- (A) Boot
(B) O-ring
(C) Bushing
(D) Spacer
(E) Bushing A
(F) Bushing B
(G) Spring pin
(H) O-ring

- 4) Insert the gear shift lever into the boot hole.
- 5) Install the snap ring and stay to the bushing.

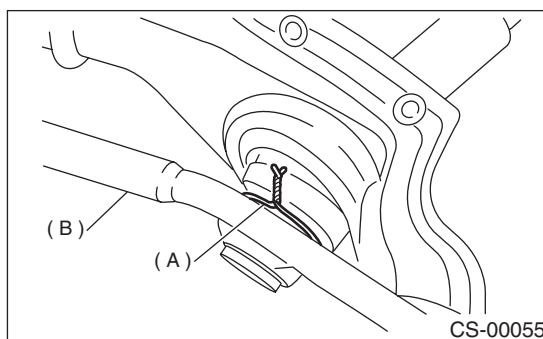


- (A) Snap ring
(B) Bushing B

- 6) Tighten with locking wire to the extent that the boot will not come off.

CAUTION:

Always use new locking wire.

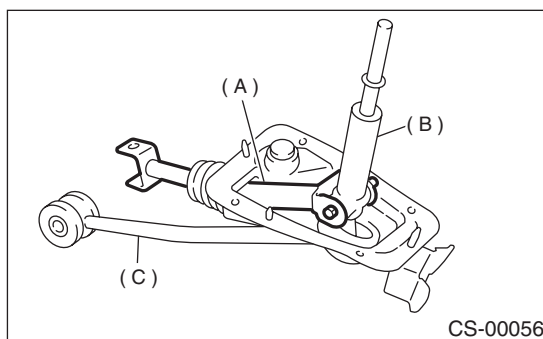


- (A) Locking wire
(B) Stay

- 7) Insert the rod into the boot hole.
- 8) Connect the rod to gear shift lever.

Tightening torque:

11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



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

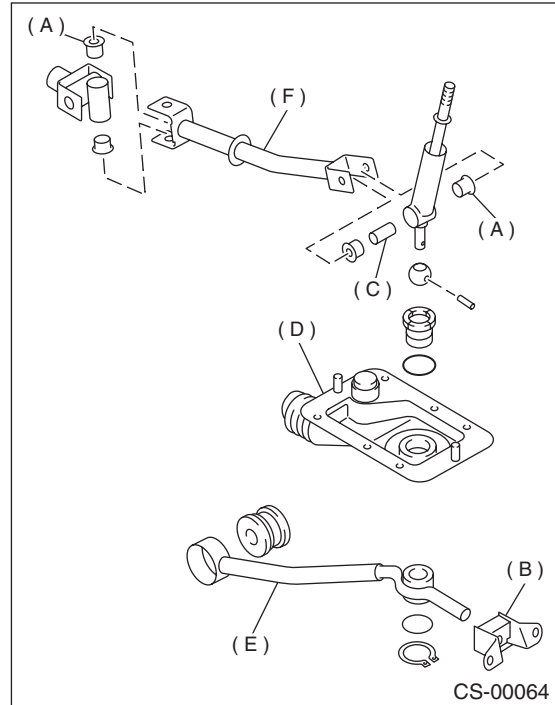
9) Check the swing torque of the rod in relation to the gear shift lever.

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

10) Check that there is no excessive play and that parts move smoothly.

E: INSPECTION

1) Check each part (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



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

MT GEAR SHIFT LEVER

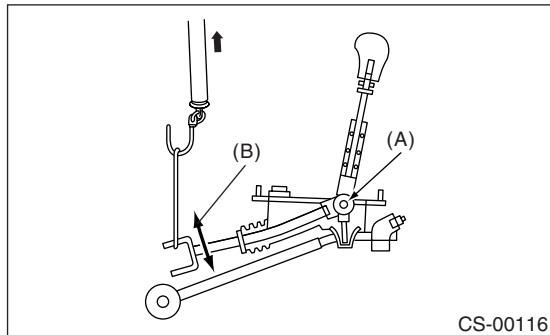
CONTROL SYSTEMS

2) Check the swing torque of the rod in relation of the gear shift lever.

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

Swing torque:

0.7 N·m (0.07 kgf-m, 0.5 ft-lb) or less



(A) Center of rotation

(B) Swing torque

8. General Diagnostic

A: INSPECTION

Symptom	Problem parts
Shift lock does not function.	• Stop light switch • Shift lock solenoid • Integrated module
Shift lock cannot be released.	• Stop light switch • Shift lock solenoid • Integrated module • Inhibitor switch
Key interlock does not function.	• Key warning switch • "P" position switch • Key lock solenoid • Integrated module
Key interlock cannot be released.	• Key warning switch • "P" position switch • Key lock solenoid • Integrated module
Starter does not run.	• Inhibitor switch • Select cable • Starter circuit
Back-up light does not light up.	• Inhibitor switch • Select cable • Back-up light circuit

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

1. General Description

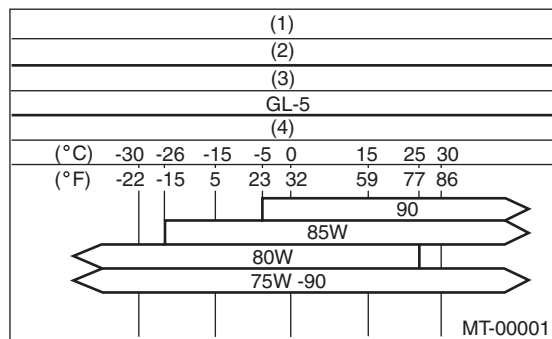
A: SPECIFICATIONS

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Item			Model		
			Non-turbo		Turbo
			Sedan	Wagon	
Type			5-forward speeds with synchromesh and 1-reverse		
Transmission gear ratio		1st	3.454		3.454
		2nd	2.062		1.947
		3rd	1.448		1.366
		4th	1.088		0.972
		5th	0.780		0.738
		Reverse	3.333		
Front reduction gear	Final	Type of gear	Hypoid		
		Gear ratio	4.111	3.900	
Rear reduction gear	Transfer	Type of gear	Helical		
		Gear ratio	1.000		1.100
	Final	Type of gear	Hypoid		
		Gear ratio	4.111	3.900	3.545
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



- (1) Item
- (2) Transmission gear oil
- (3) API Classification
- (4) SAE Viscosity No. and Applicable Temperature

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

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 — 3.99 (0.1524 — 0.1571)	32294AA051	2

4. DRIVE PINION ASSEMBLY

Preload adjustment of thrust bearing

Starting torque

0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part 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. MAIN SHAFT

Snap ring (Outer-25) to synchronizer hub clearance

0.060 — 0.100 mm (0.0024 — 0.0039 in)

Snap ring (Outer-25)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805025051	2.42 (0.0953)	805025055	2.62 (0.1031)
805025052	2.47 (0.0972)	805025056	2.67 (0.1051)
805025053	2.52 (0.0992)	805025057	2.72 (0.1071)
805025054	2.57 (0.1012)	805025058	2.37 (0.0933)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

6. 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 reverse idler gear to transmission case wall clearance to within 0 to 0.5 mm (0 to 0.020 in) using washers.

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)	—	—

7. SHIFTER FORK AND ROD

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

Rod end clearance

A: 1st-2nd — 3rd-4th

0.4 — 1.4 mm (0.016 — 0.055 in)

B: 3rd-4th — 5th

0.5 — 1.3 mm (0.020 — 0.051 in)

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 2nd gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 1st gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork (Non-turbo)		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in)

5th shifter fork (Turbo)		
Part No.	Mark	Remarks
32812AA231	7	Become distant from 5th gear by 0.2 mm (0.008 in)
32812AA241	No mark	Standard
32812AA251	9	Approach to 5th gear by 0.2 mm (0.008 in)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

8. TRANSFER CASE

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

9. EXTENSION ASSEMBLY

Preload of the taper roller bearing (amount of standard protrusion):

0.15 — 0.20 mm (0.006 — 0.008 in)

NOTE:

Be sure that the amount of preload is within the standard value.

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

10.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)	—	—

Pinion shaft to axle drive shaft clearance

0 — 0.2 mm (0 — 0.008 in)

Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

11.TRANSFER DRIVE GEAR

Snap ring (Outer-30) to ball bearing clearance

0.01 — 0.15 mm (0.0004 — 0.0059 in)

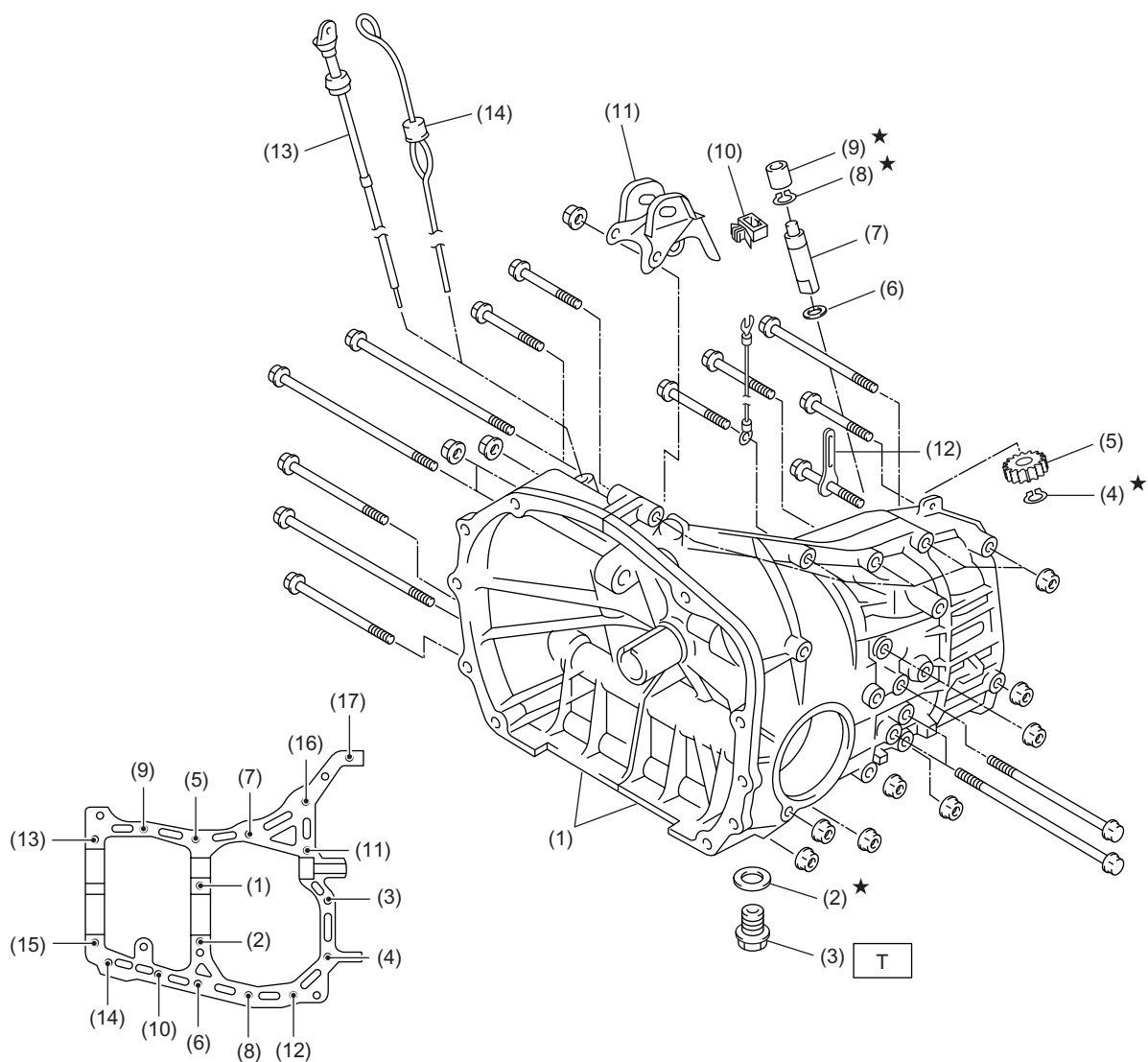
Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

B: COMPONENT

1. TRANSMISSION CASE



MT-00400

- | | |
|-----------------------------|--|
| (1) Transmission case ASSY | (8) Snap ring (Outer) |
| (2) Gasket | (9) Oil seal |
| (3) Drain plug | (10) Clamp |
| (4) Snap ring (Outer) | (11) Pitching stopper bracket |
| (5) Speedometer driven gear | (12) Clip |
| (6) Washer | (13) Oil level gauge (Non-turbo model) |
| (7) Speedometer shaft | (14) Oil level gauge (Turbo model) |

Tightening torque: N·m (kgf-m, ft-lb)

T: Gasket (2) (Part No. 803926040)
44 (4.5, 32.5)

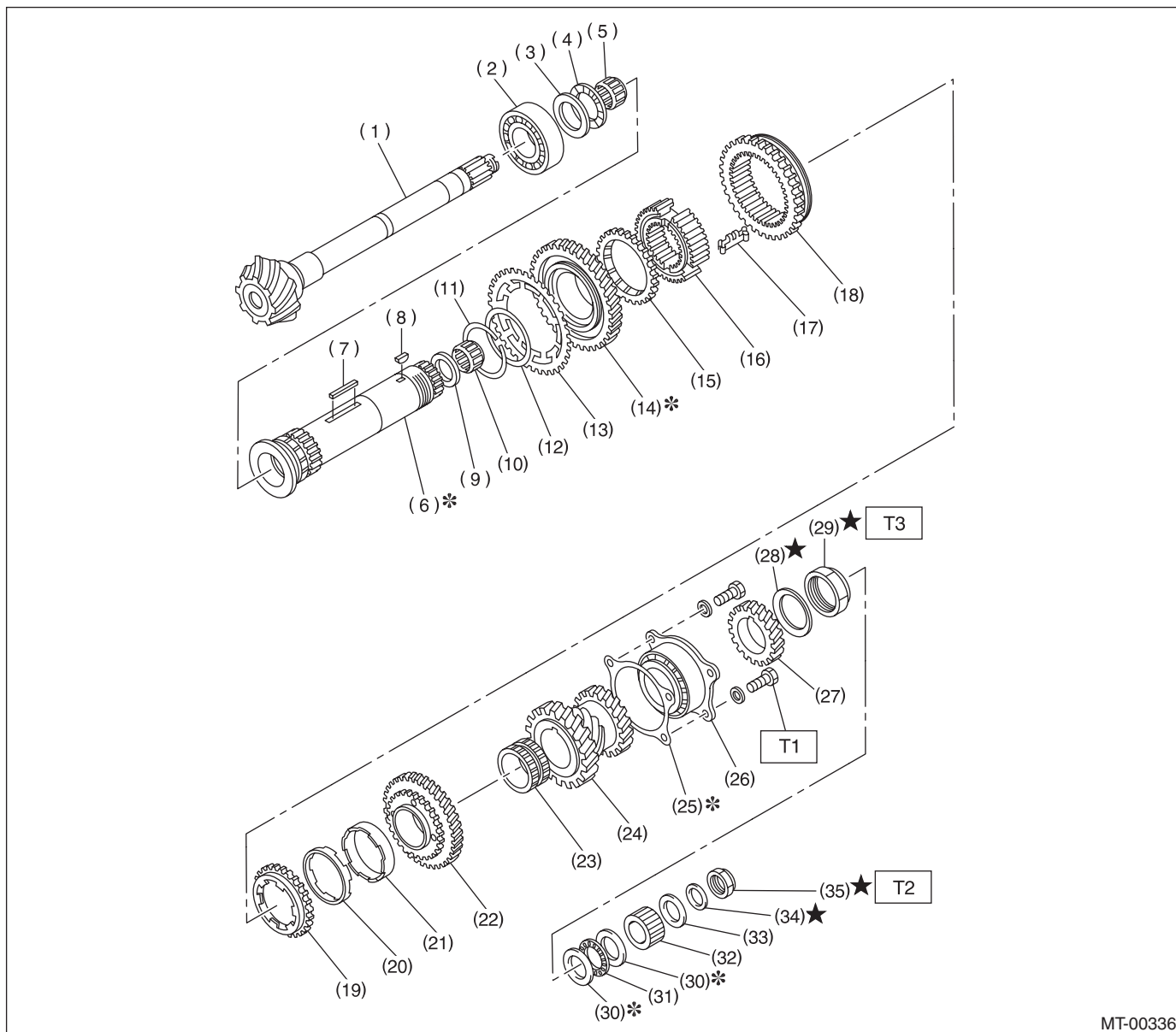
T: Gasket (2) (Part No. 803926070)
70 (7.1, 52)

Size	All models	Tightening torque: N·m (kgf-m, ft-lb)
8 mm bolt	<5> — <15>	25 (2.5, 18.1)
10 mm bolt	<1> — <4> <16> — <17>	39 (4.0, 28.9)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DRIVE PINION ASSEMBLY



MT-00336

- (1) Drive pinion shaft
- (2) Roller bearing
- (3) Washer
- (4) Thrust bearing
- (5) Needle bearing
- (6) Driven shaft
- (7) Key
- (8) Woodruff key
- (9) Drive pinion collar
- (10) Needle bearing
- (11) Snap ring (Outer)
- (12) Washer
- (13) Sub gear
- (14) 1st driven gear

- (15) Baulk ring
- (16) 1st-2nd synchronizer hub
- (17) Insert key
- (18) Reverse driven gear
- (19) Outer baulk ring
- (20) Synchro cone
- (21) Inner baulk ring
- (22) 2nd driven gear
- (23) 2nd driven gear bush
- (24) 3rd-4th driven gear
- (25) Driven pinion shim
- (26) Roller bearing
- (27) 5th driven gear
- (28) Lock washer

- (29) Lock nut
- (30) Washer
- (31) Thrust bearing
- (32) Differential bevel gear sleeve
- (33) Washer
- (34) Lock washer
- (35) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)

T1: 30 (3.1, 22.4)

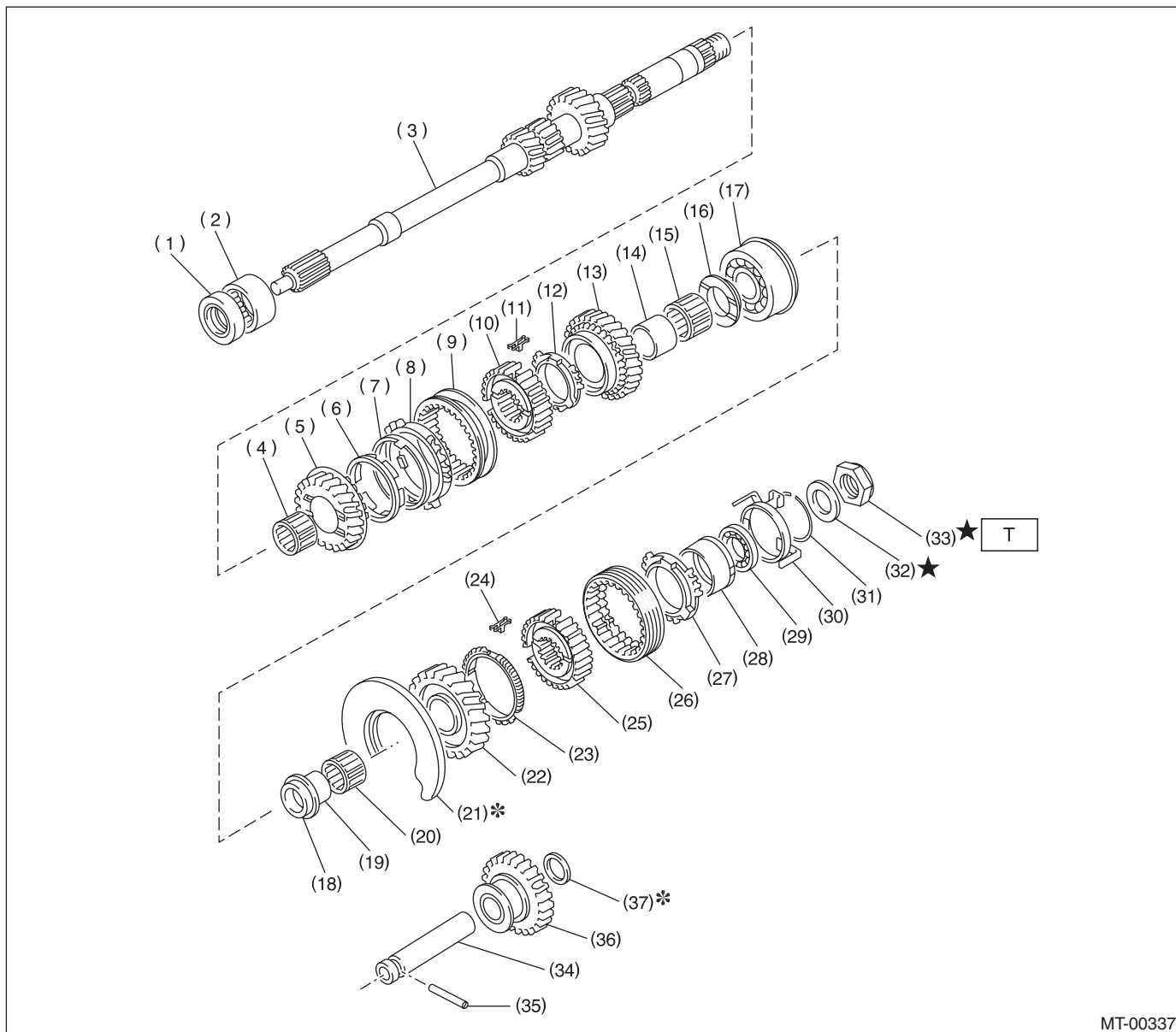
T2: 120 (12.2, 88.2)

T3: 260 (26.5, 191.7)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

3. MAIN SHAFT ASSEMBLY



MT-00337

- | | | |
|------------------------------------|------------------------------------|-------------------------------|
| (1) Oil seal | (15) Needle bearing | (29) Ball bearing |
| (2) Needle bearing | (16) 4th gear thrust washer | (30) Synchro cone stopper |
| (3) Transmission main shaft | (17) Ball bearing | (31) Snap ring |
| (4) Needle bearing | (18) 5th gear thrust washer | (32) Lock washer |
| (5) 3rd drive gear | (19) 5th needle bearing race | (33) Lock nut |
| (6) Inner baulk ring | (20) Needle bearing | (34) Reverse idler gear shaft |
| (7) Synchro cone (3rd) | (21) Main shaft rear plate | (35) Straight pin |
| (8) Outer baulk ring | (22) 5th drive gear | (36) Reverse idler gear |
| (9) Coupling sleeve (3rd-4th) | (23) 5th baulk ring | (37) Washer |
| (10) Synchronizer hub (3rd-4th) | (24) Shifting insert key (5th-Rev) | |
| (11) Shifting insert key (3rd-4th) | (25) Synchronizer hub (5th-Rev) | |
| (12) 4th baulk ring | (26) Coupling sleeve (5th-Rev) | |
| (13) 4th drive gear | (27) Rev baulk ring | |
| (14) 4th needle bearing race | (28) Synchro cone (Rev) | |

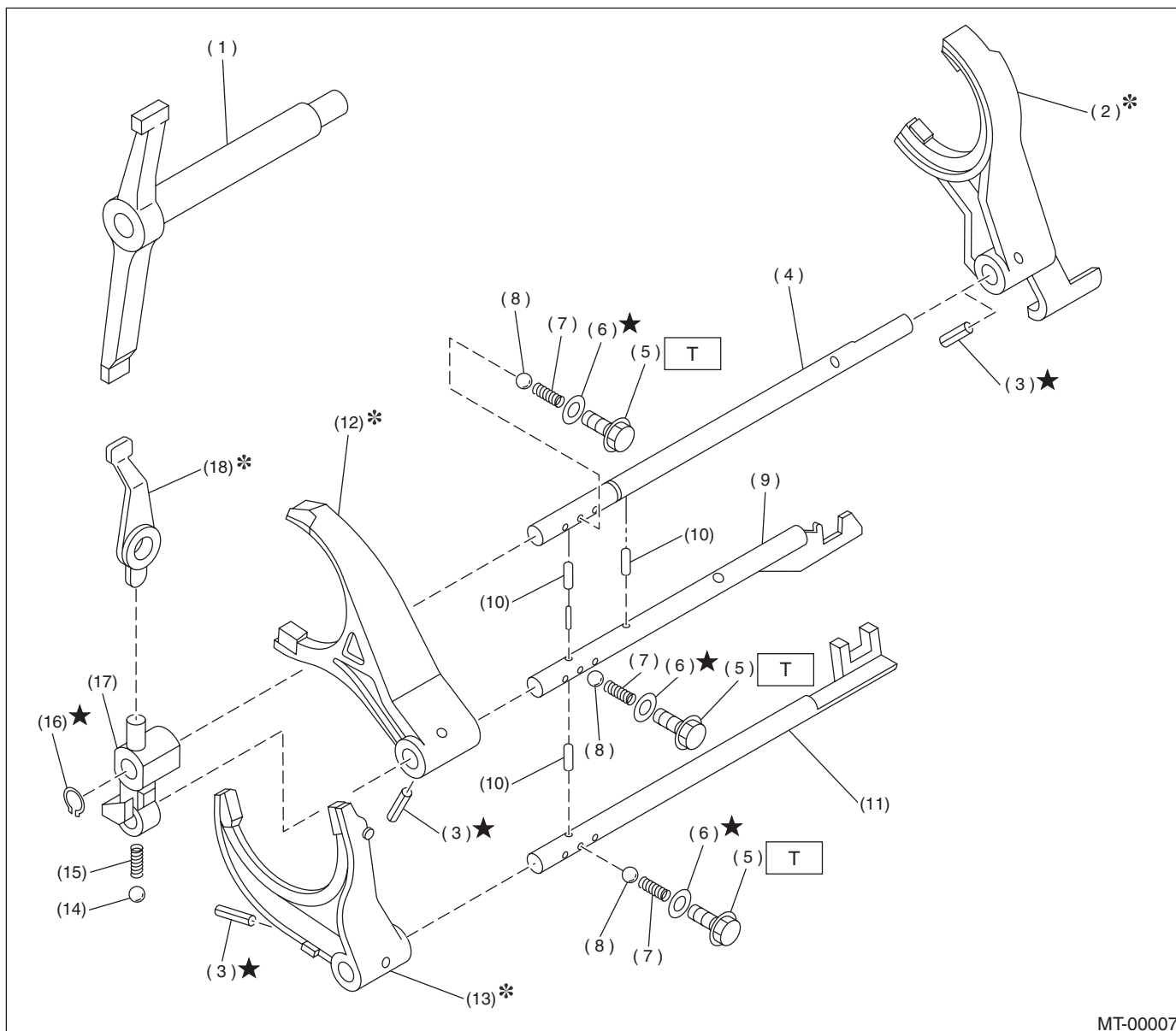
Tightening torque: N·m (kgf·m, ft·lb)

T: 120 (12.2, 88.2)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

4. SHIFTER FORK AND SHIFTER ROD



MT-00007

- | | |
|--------------------------|---------------------------|
| (1) Shifter arm | (9) 3rd-4th fork rod |
| (2) 5th shifter fork | (10) Interlock plunger |
| (3) Straight pin | (11) 1st-2nd fork rod |
| (4) Reverse fork rod | (12) 3rd-4th shifter fork |
| (5) Checking ball plug | (13) 1st-2nd shifter fork |
| (6) Gasket | (14) Ball |
| (7) Checking ball spring | (15) Spring |
| (8) Ball | (16) Snap ring (Outer) |

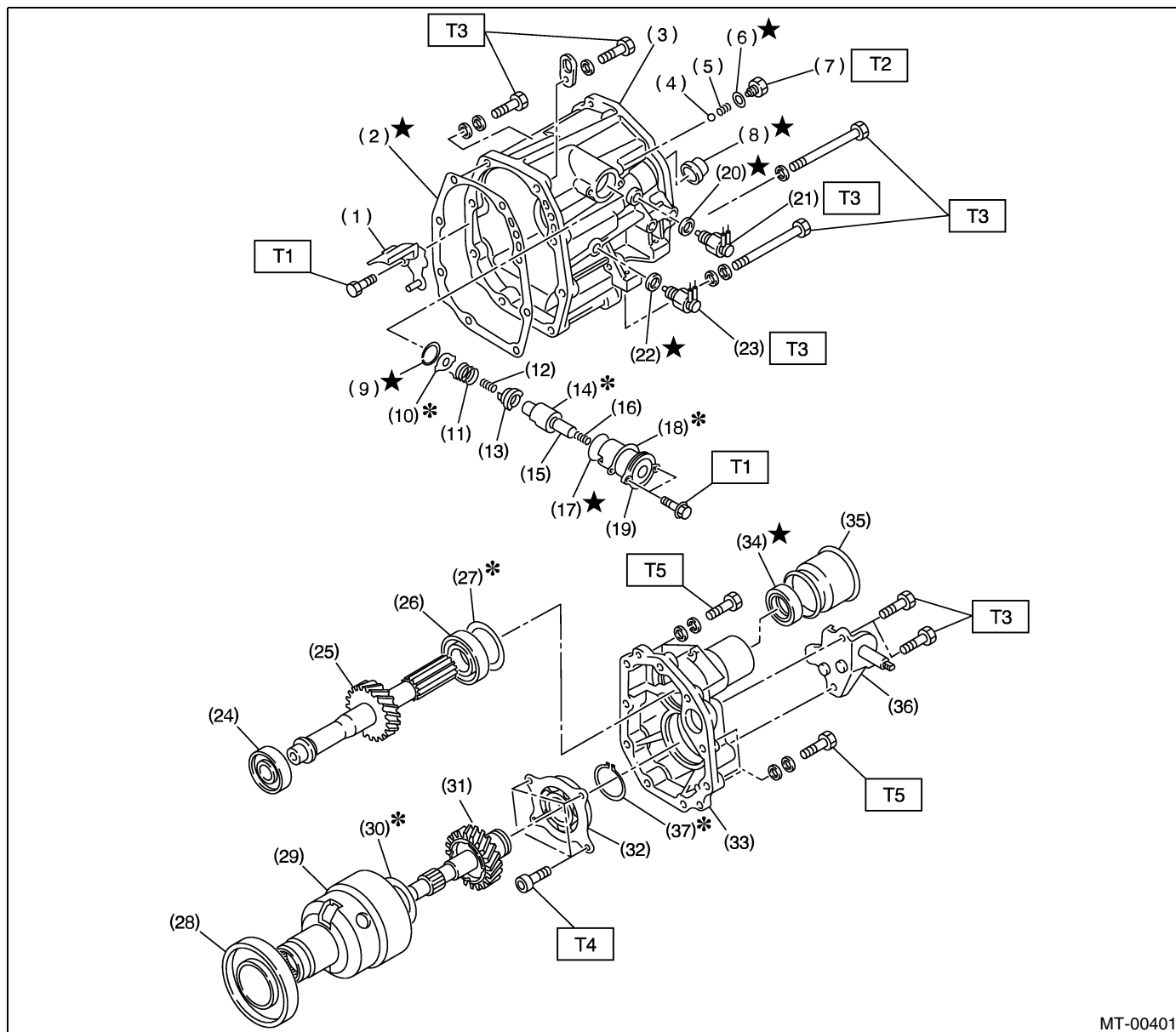
- | |
|----------------------------|
| (17) Reverse fork rod arm |
| (18) Reverse shifter lever |

Tightening torque: N·m (kgf-m, ft-lb)
T: 20 (2.0, 14.5)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

5. TRANSFER CASE AND EXTENSION



MT-00401

- | | | |
|----------------------------|----------------------------|--------------------------|
| (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 |
| (4) Ball | (19) Reverse check sleeve | (34) Oil seal |
| (5) Reverse accent spring | (20) Gasket | (35) Dust cover |
| (6) Gasket | (21) Neutral 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)

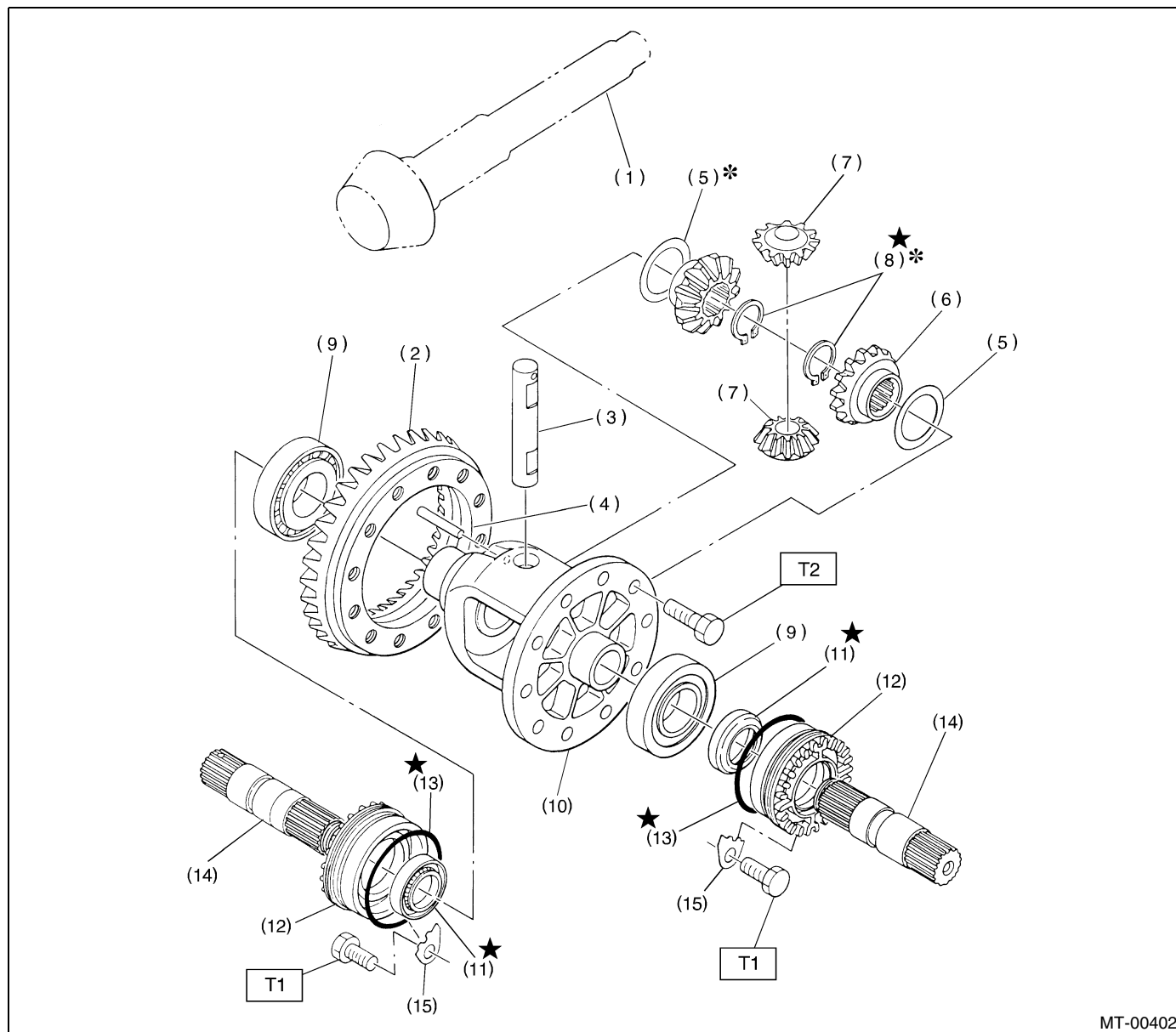
T4: 26 (2.7, 20)

T5: 40 (4.1, 29.7)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

6. FRONT DIFFERENTIAL



MT-00402

- | | |
|-------------------------------|---------------------------------|
| (1) Drive pinion shaft | (8) Snap ring (Outer) |
| (2) Hypoid driven gear | (9) Roller bearing |
| (3) Pinion shaft | (10) Differential case |
| (4) Straight pin | (11) Oil seal |
| (5) Washer | (12) Differential side retainer |
| (6) Differential bevel gear | (13) O-ring |
| (7) Differential bevel pinion | (14) Axle drive shaft |

- (15) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)

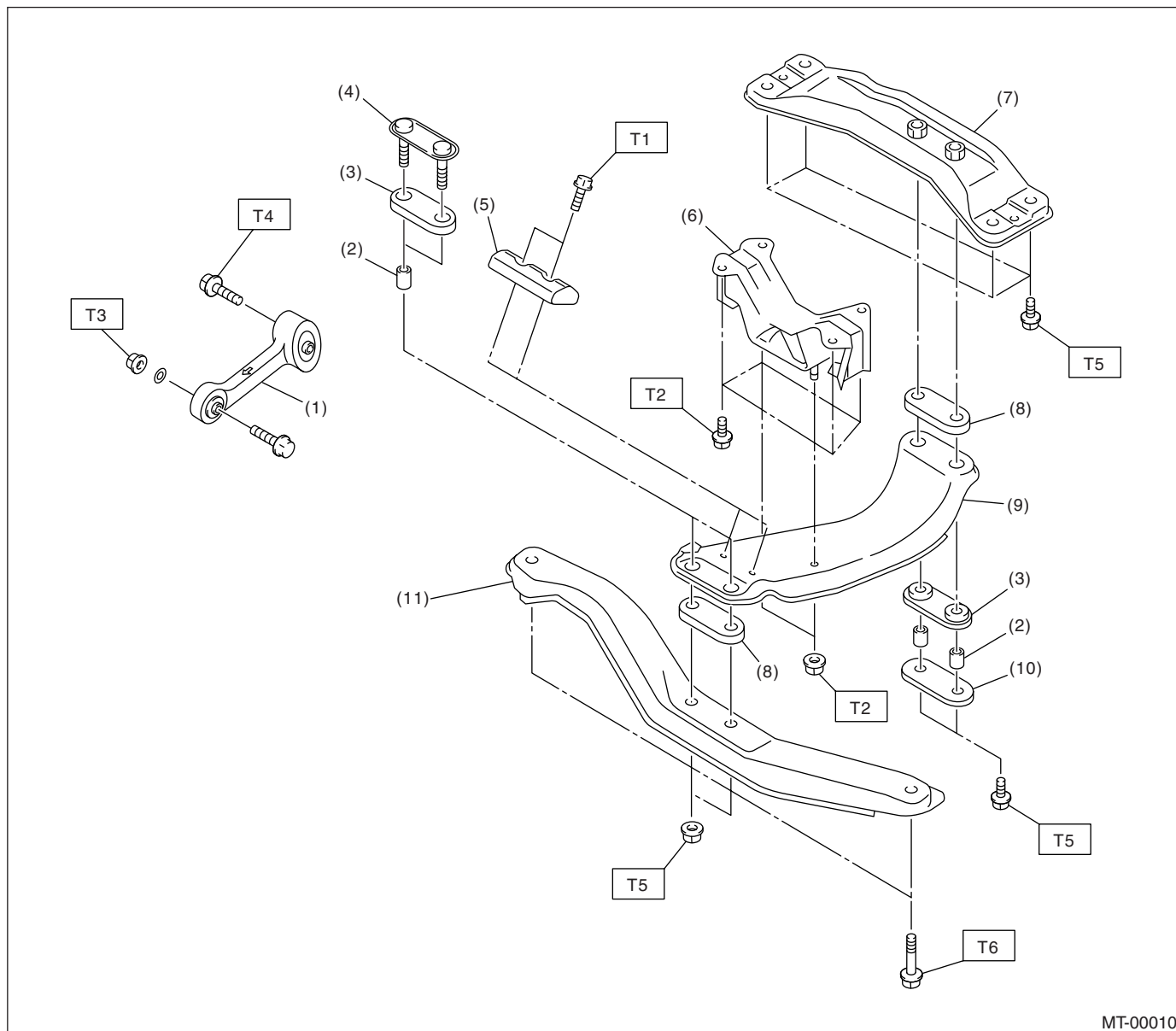
T1: 25 (2.5, 18.1)

T2: 62 (6.3, 45.6)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

7. TRANSMISSION MOUNTING



MT-00010

- | | |
|-------------------------|------------------------|
| (1) Pitching stopper | (8) Cushion D |
| (2) Spacer | (9) Center crossmember |
| (3) Cushion C | (10) Rear plate |
| (4) Front plate | (11) Front crossmember |
| (5) Dynamic damper | |
| (6) Rear cushion rubber | |
| (7) Rear crossmember | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 7.5 (0.76, 5.5)

T2: 35 (3.6, 26)

T3: 50 (5.1, 37)

T4: 58 (5.9, 43)

T5: 70 (7.1, 51)

T6: 140 (14.3, 103)

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

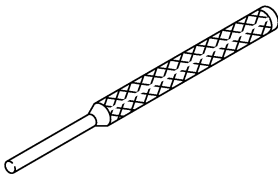
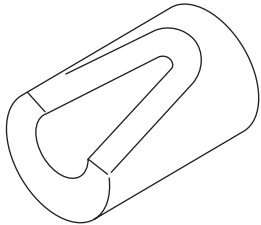
C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- 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 vice, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vice.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

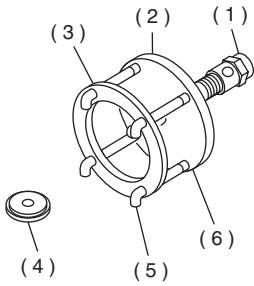
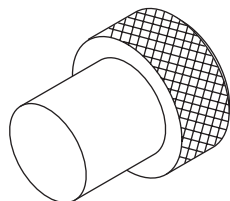
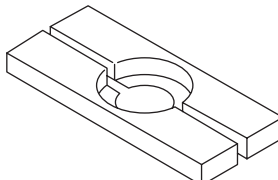
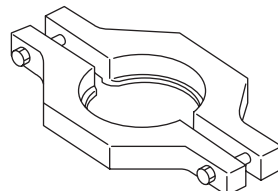
D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398791700	398791700	REMOVER	Used for removing and installing spring pin (6 mm).
 ST-399411700	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.

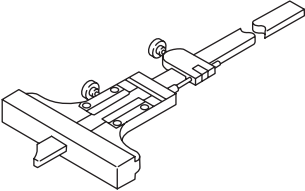
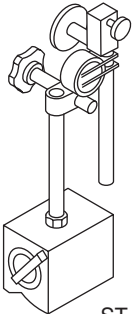
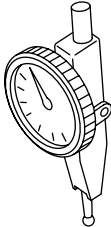
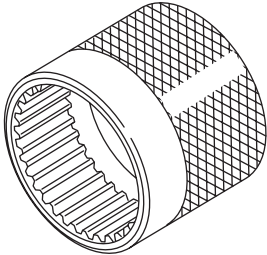
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399527700	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 ST-399780104	399780104	WEIGHT	Used for measuring preload on roller bearing.
 ST-498077000	498077000	REMOVER	Used for removing roller bearing of drive pinion shaft.
 ST-498077300	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.

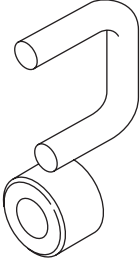
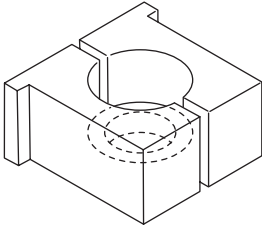
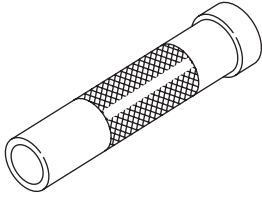
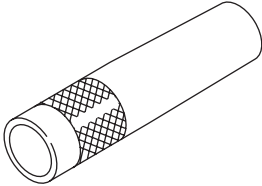
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498147000	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 ST-498427100	498427100	STOPPER	Used for securing the drive pinion shaft assembly and driven gear assembly when removing the drive pinion shaft assembly lock nut.

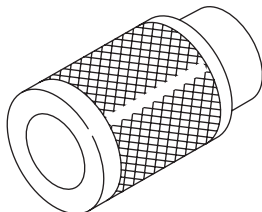
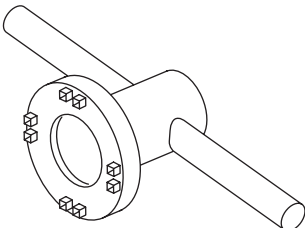
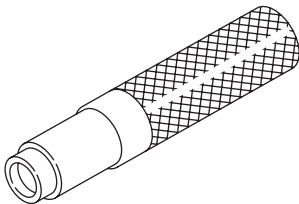
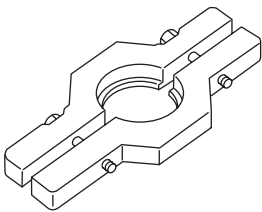
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498787100	498787100	MAIN SHAFT STOPPER	Used for removing and installing transmission main shaft lock nut.
 ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 ST-499277100	499277100	BUSH 1-2 INSTALLER	• Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush. • Used for installing roller bearing outer races to differential case.
 ST-499277200	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings, and 5th driven gear onto the driven shaft.

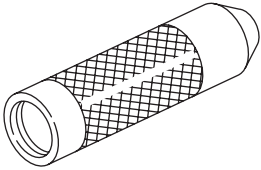
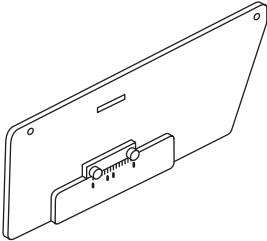
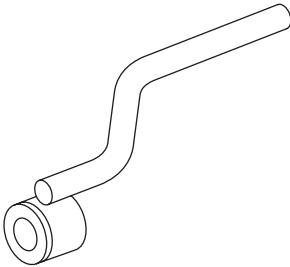
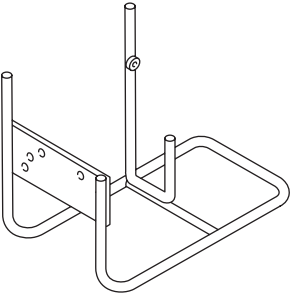
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499757002	499757002	INSTALLER	- Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17). - Used for installing bearing cone of transfer driven gear (extension core side).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 ST-499827000	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 ST-499857000	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.

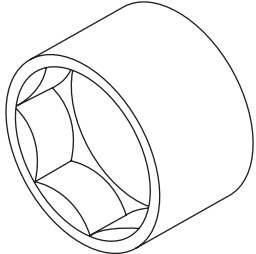
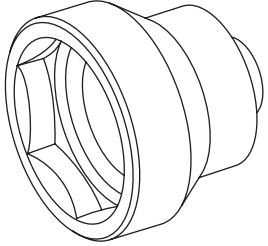
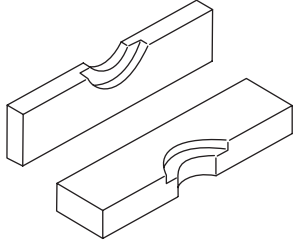
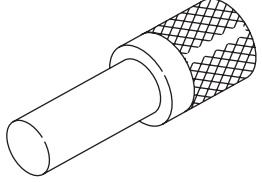
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499877000	499877000	RACE 4-5 INSTALLER	- Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. - Used with REMOVER (899714110).
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 ST-499927100	499927100	HANDLE	Used for fitting transmission main shaft.
 ST-499937100	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.

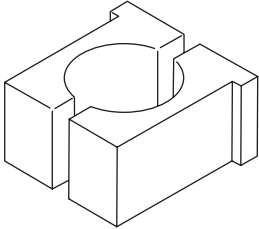
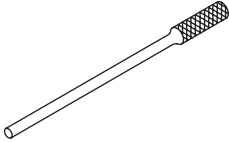
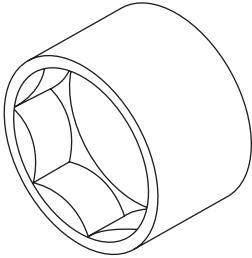
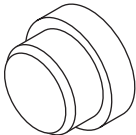
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 ST-899714110	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion, rear drive shaft.
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.

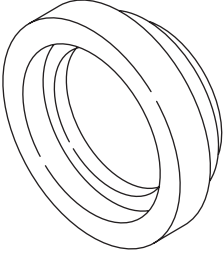
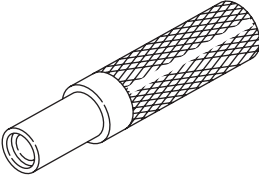
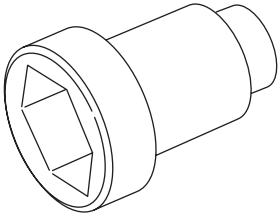
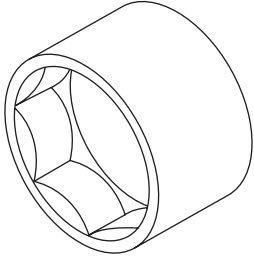
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899884100	899884100	HOLDER	Used for tightening lock nut on sleeve.
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.
 ST-899988608	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 ST-398497701	398497701	ADAPTER	- Used for installing roller bearing onto differential case. - Used with INSTALLER (499277100).

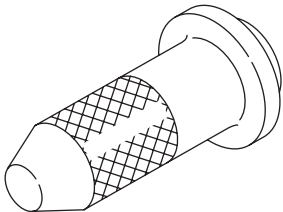
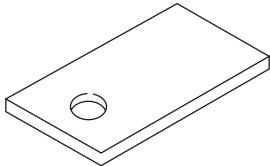
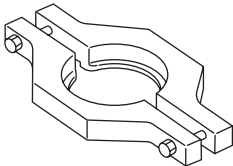
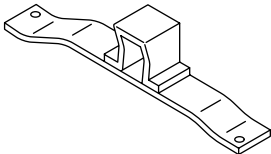
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587000	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 ST-899824100	899824100	PRESS	Used for installing speedometer shaft oil seal.
 ST-499987100	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 ST-899984103	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.

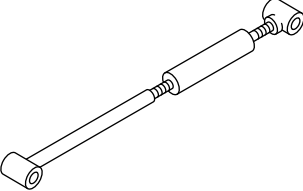
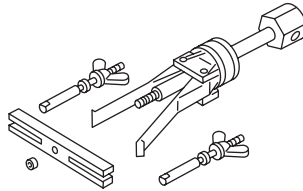
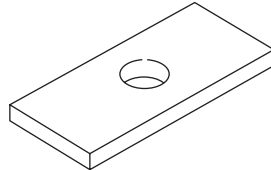
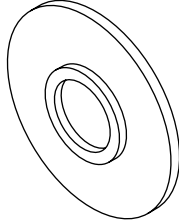
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.
 ST-498077400	498077400	REMOVER	• Used for removing synchronizer cone of main shaft. • Used for removing 5th driven gear of drive pinion shaft.
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.

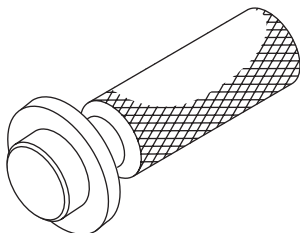
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 ST-398527700	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-398177700	38177700	INSTALLER	- Used for installing bearing cone of transfer driven gear (transfer case side). - Used for installing ball bearing of transfer drive gear.

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499797000	499797000	INSTALLER	Used for installing differential side retainer oil seal.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

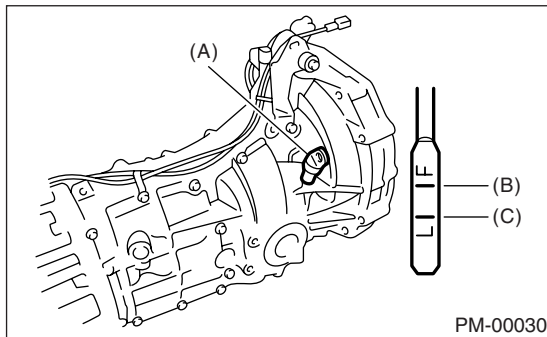
TRANSMISSION GEAR OIL

MANUAL TRANSMISSION AND DIFFERENTIAL

2. Transmission Gear Oil

A: INSPECTION

- 1) Park 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 on it. 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 oil level gauge.
- 2) Lift-up the vehicle.
- 3) Drain the transmission gear oil completely.

CAUTION:

Directly after the vehicle has been running or the engine has been long idle running, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:

Tighten the transmission gear oil drain plug after draining transmission gear oil.

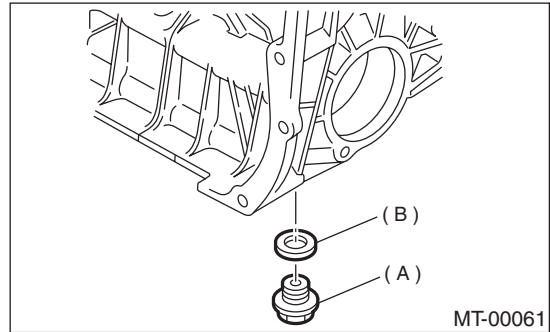
Tightening torque:

Gasket (B) (Part No. 803926040)

44 N·m (4.5 kgf-m, 32.5 ft-lb)

Gasket (B) (Part No. 803926070)

70 N·m (7.1 kgf-m, 52 ft-lb)



- (A) Drain plug
(B) Gasket

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

Recommended gear oil:

Use GL-5 (SAE: 75W-90) or equivalent.

Gear oil capacity:

3.5 ℓ (3.7 US qt, 3.1 Imp qt)

- 6) Check the level of the transmission gear oil.

CAUTION:

When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

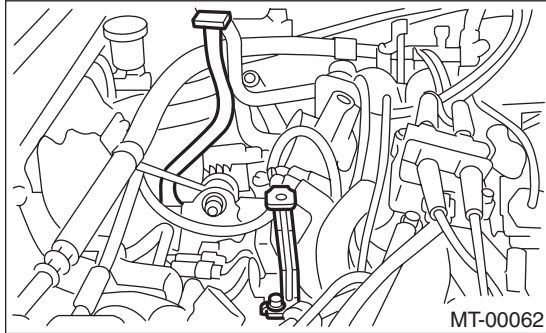
NOTE:

The level should be within the specified range marked on the gauge.

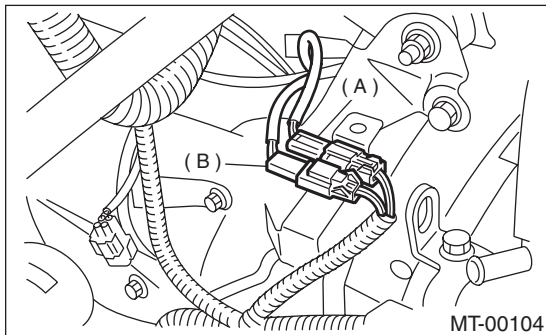
3. Manual Transmission Assembly

A: REMOVAL

- 1) Open the front hood fully, and support with stay.
- 2) Disconnect the battery ground terminal.
- 3) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 4) Remove the air cleaner case stay. (Non-turbo model)

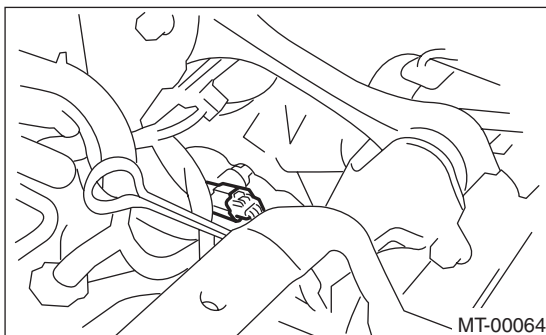


- 5) Remove the intercooler (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
 - 6) Disconnect the following connectors.
 - (1) Neutral position switch connector
 - (2) Back-up light switch connector
- Non-turbo model

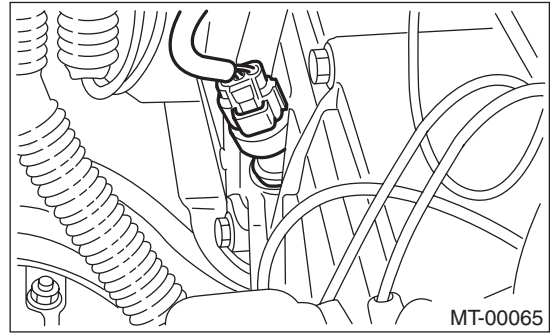


- (A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

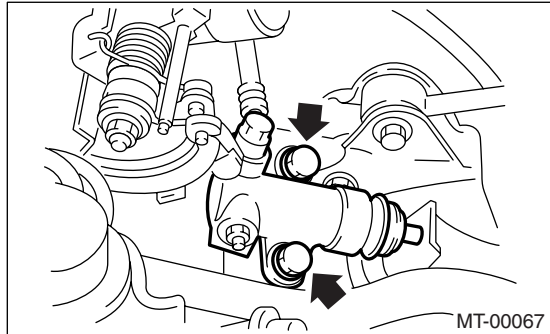
- Turbo model



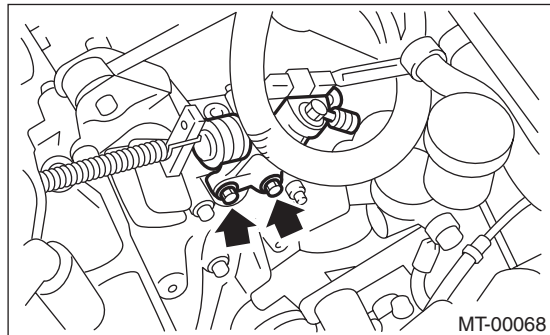
- (3) Vehicle speed sensor



- 7) Remove the starter. <Ref. to SC(H4SO)-7, REMOVAL, Starter.>
 - 8) Remove the operating cylinder from the transmission.
- Non-turbo model



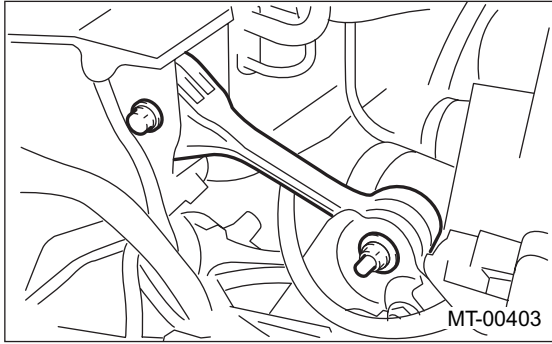
- Turbo model



MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

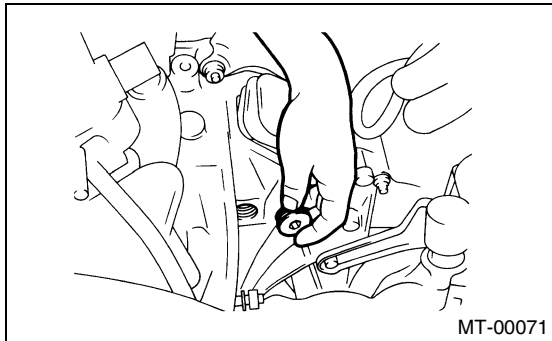
9) Remove the pitching stopper.



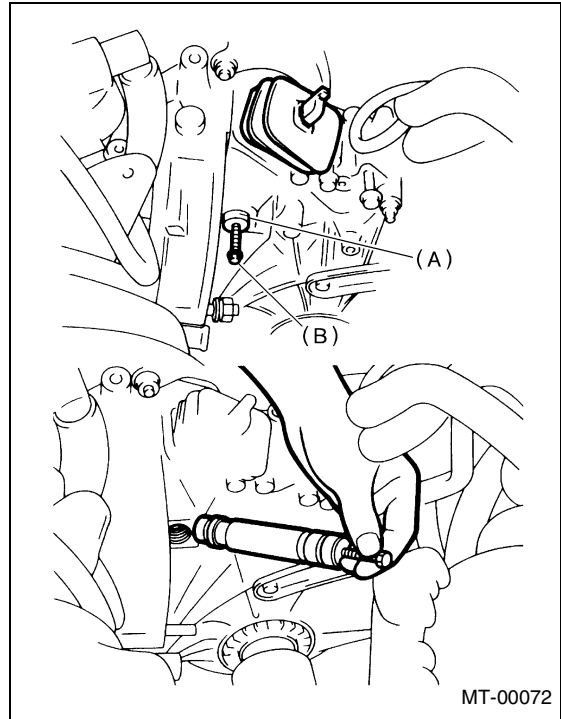
10) Separate the clutch release fork from the release bearing. (Turbo model)

(1) Remove the clutch operating cylinder from the transmission.

(2) Remove the plug using 10 mm hexagon wrench.



(3) Screw the 6 mm dia. bolt into the release fork shaft, and remove it.



(A) Shaft

(B) Bolt

(4) Raise the release fork and unfasten the release bearing tabs to free release fork.

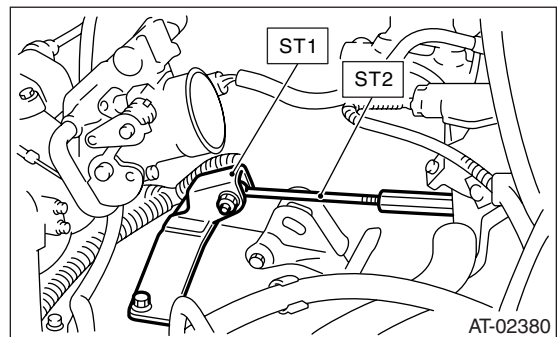
CAUTION:

Step (4) is required to prevent interference with engine when removing engine from transmission.

11) Set the ST.

ST1 41099AC010 ENGINE SUPPORT BRACKET

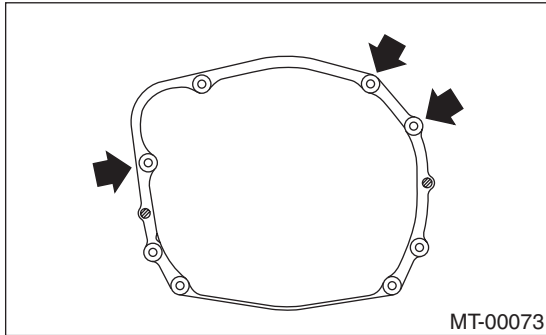
ST2 41099AC020 ENGINE SUPPORT



MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

12) Remove the bolt which holds right upper side of transmission to the engine.



13) Remove the front and center exhaust pipes. (Non-turbo model) with OBD <Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>

14) Remove the center exhaust pipe. (Turbo model). <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>

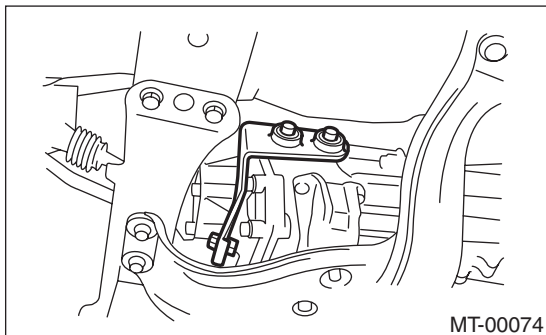
15) Remove the rear exhaust pipe and muffler.

CAUTION:

When removing exhaust pipes, be careful each exhaust pipe does not drop out.

16) Remove the heat shield cover. (If equipped)

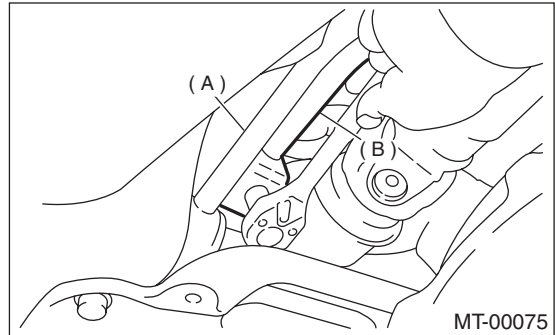
17) Remove the hanger bracket from right side of transmission.



18) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>

19) Remove the gear shift rod and stay from transmission.

- (1) Disconnect the stay from the transmission.
- (2) Disconnect the rod from the transmission.



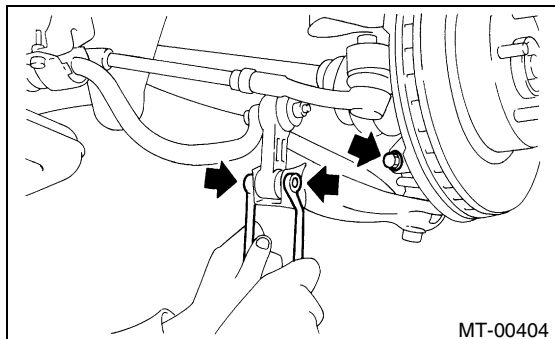
(A) Stay

(B) Rod

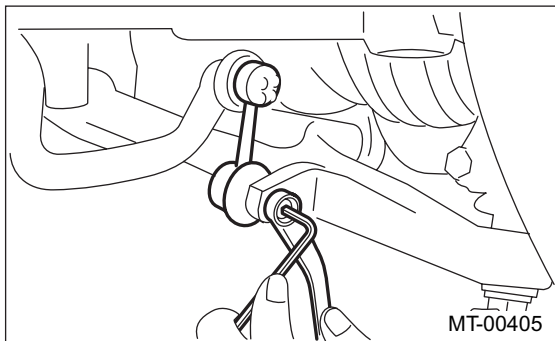
20) Disconnect the stabilizer link from the transverse link.

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

- Except sedan turbo model



- Sedan turbo model



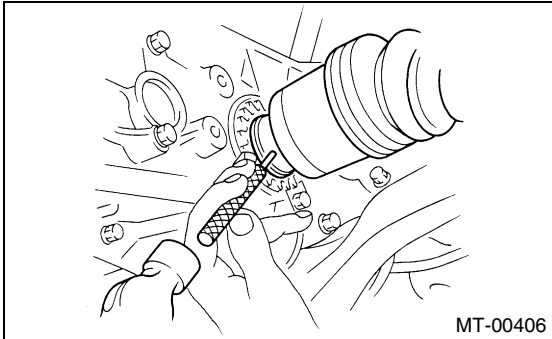
MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

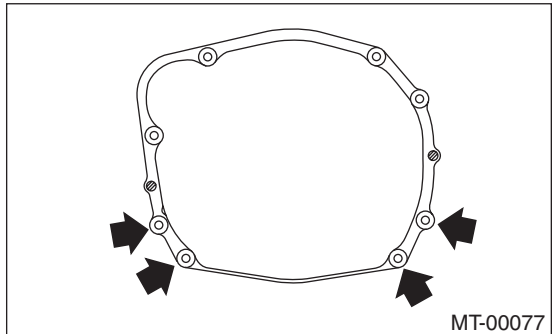
22) Remove the spring pins and separate front drive shafts from each side of the transmission.

CAUTION:

Discard removing spring pin. Replace with a new one.



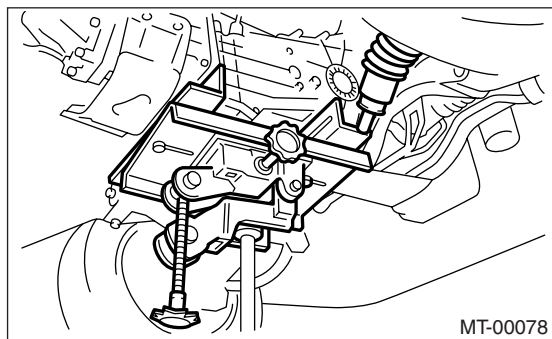
23) Remove the nuts which hold lower side of transmission to the engine.



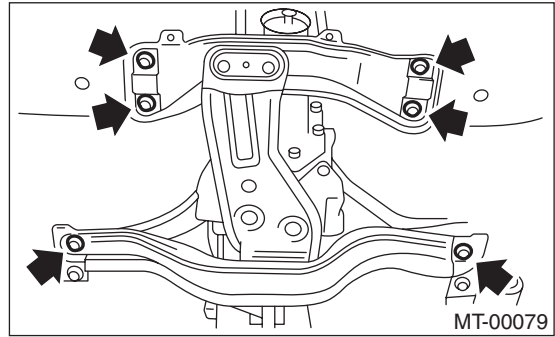
24) Place the transmission jack under transmission.

CAUTION:

Always support transmission case with a transmission jack.



25) Remove the transmission rear crossmember from the vehicle.



26) Remove the transmission.

CAUTION:

Move transmission jack toward rear until main shaft is withdrawn from clutch cover.

27) Separate the transmission assembly and rear cushion rubber.

B: INSTALLATION

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

Tightening torque:

35 N·m (3.6 kgf-m, 26.3 ft-lb)

2) Install the clutch release lever and bearing onto the transmission. (Turbo model) <Ref. to CL-15, INSTALLATION, Release Bearing and Lever.>

3) Install the transmission onto the engine.

(1) Gradually raise the transmission with transmission jack.

(2) Engage them at splines.

CAUTION:

Be careful not to strike main shaft against clutch cover.

MANUAL TRANSMISSION ASSEMBLY

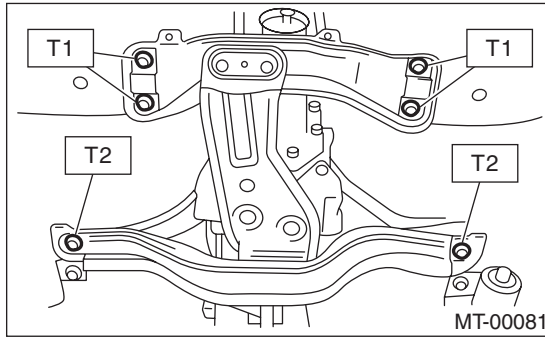
MANUAL TRANSMISSION AND DIFFERENTIAL

4) Install the transmission rear crossmember.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103 ft-lb)

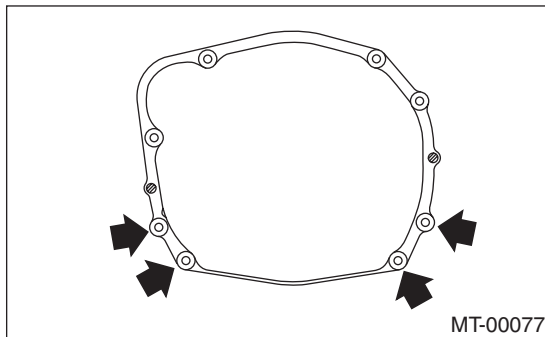


5) Take off the transmission jack.

6) Tighten the nuts which hold lower side of transmission to the engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



7) Connect the engine and transmission.

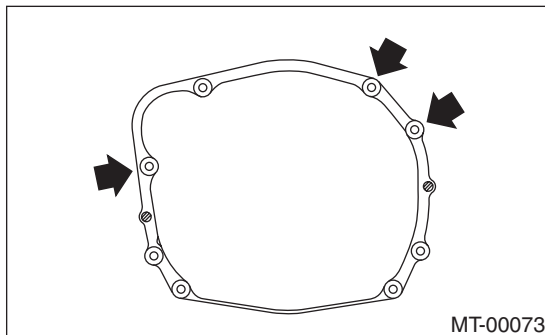
(1) Install the starter.

<Ref. to SC(H4SO)-7, INSTALLATION, Starter.>

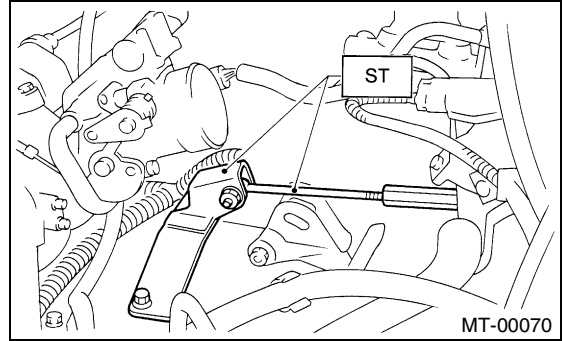
(2) Tighten the bolt which holds right upper side of transmission to the engine.

Tightening torque:

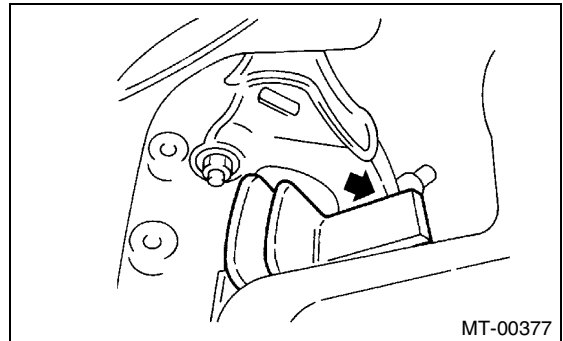
50 N·m (5.1 kgf-m, 36.9 ft-lb)



8) Remove ST.



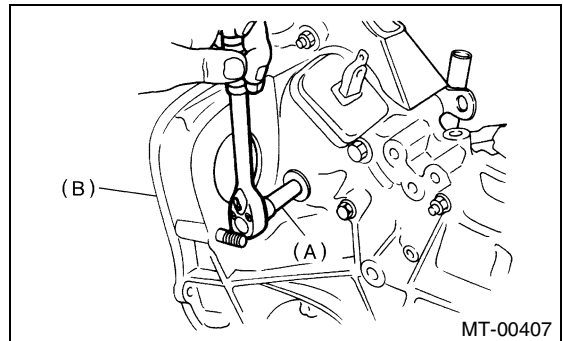
9) Push the clutch release lever to fit bearing into clutch cover.



10) Install the plug.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)



(A) Plug

(B) Transmission ASSY

MANUAL TRANSMISSION ASSEMBLY

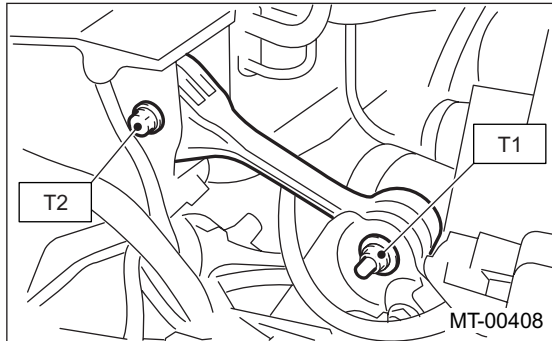
MANUAL TRANSMISSION AND DIFFERENTIAL

11) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



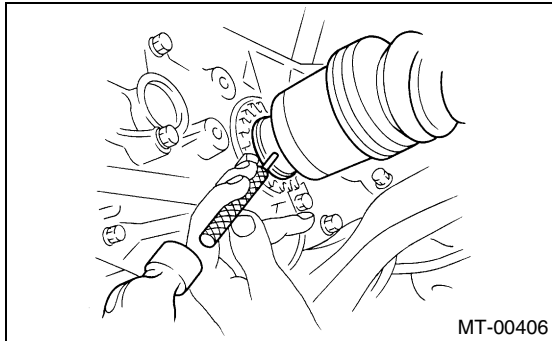
12) Lift-up the vehicle.

13) Install the front drive shaft into the transmission.

14) Drive the spring pin into the chamfered hole of drive shaft.

CAUTION:

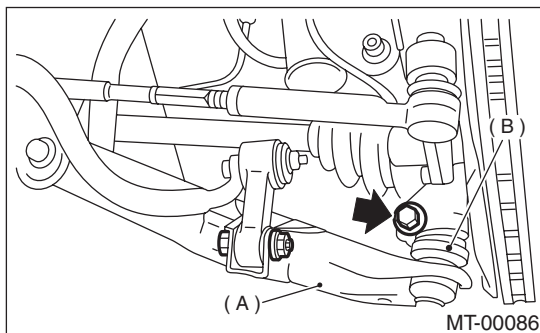
Always use a new spring pin.



15) Install the ball joints of lower arm into knuckle arm of housing, and tighten the installing bolts.

Tightening torque:

49 N·m (5.0 kgf-m, 36 ft-lb)



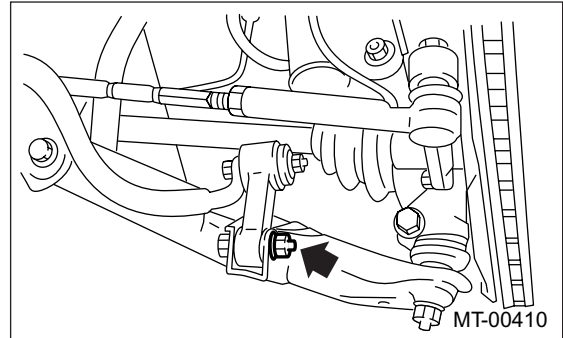
- (A) Transverse link
(B) Ball joint

16) Install the stabilizer link from the transverse link.

- Except sedan turbo model

Tightening torque:

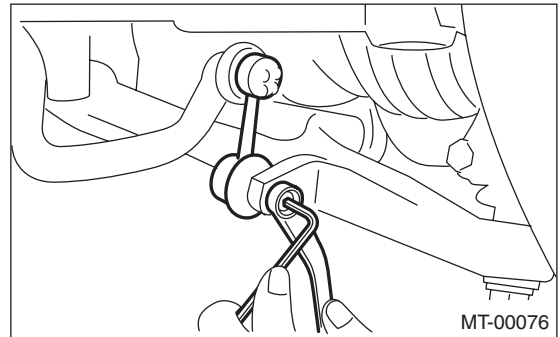
30 N·m (3.1 kgf-m, 22.1 ft-lb)



- Sedan turbo model

Tightening torque:

45 N·m (4.6 kgf-m, 33.2 ft-lb)

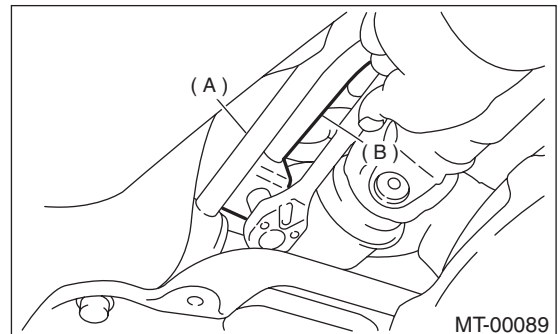


17) Install the gear shift rod and stay.

(1) Connect the rod to the joint.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Stay
(B) Rod

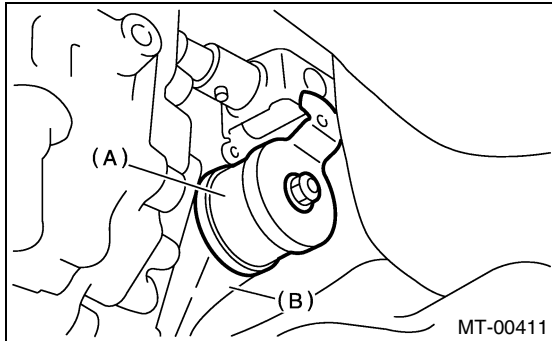
MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

- (2) Connect the stay to the transmission bracket.

Tightening torque:

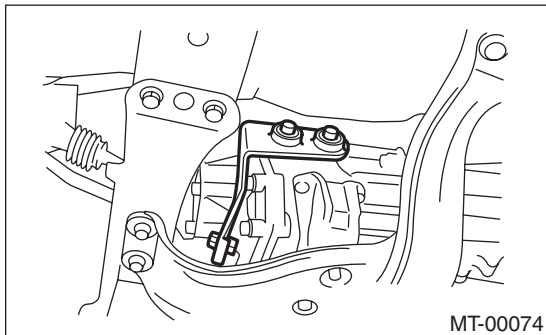
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay

(B) Transmission bracket

- 18) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
19) Install the heat shield cover. (If equipped)
20) Install the rear exhaust pipe and muffler.
21) Install the hanger bracket on the right side of transmission.



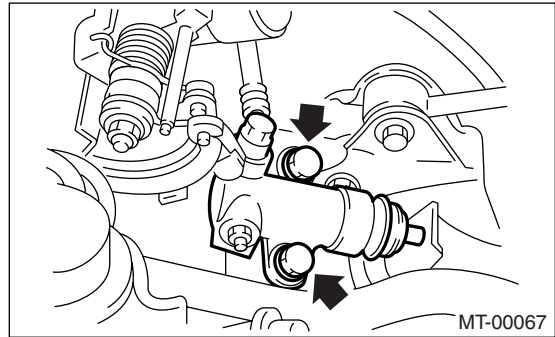
- 22) Install the front exhaust pipe and center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>
23) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
24) Install the under cover.

- 25) Install the operating cylinder.

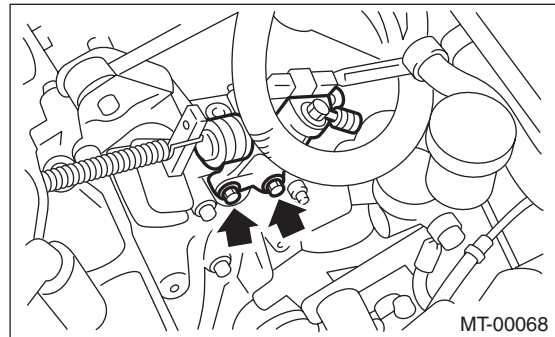
Tightening torque:

37 N·m (3.8 kgf-m, 27.5 ft-lb)

- Non-turbo model



- Turbo model



- 26) Connect the following connectors.
(1) Transmission ground terminal

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
- 27) Install the air cleaner case stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

- 28) Install the air cleaner case and intake duct. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.>
29) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
30) Connect the battery ground terminal.
31) Take off the vehicle from lift arms.

TRANSMISSION MOUNTING SYSTEM

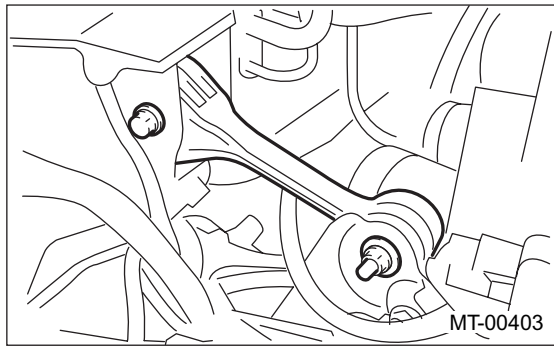
MANUAL TRANSMISSION AND DIFFERENTIAL

4. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

- 1) Disconnect the battery ground terminal.
- 2) Remove the air intake duct and cleaner case.
- 3) Remove the air intake duct (Non-turbo model).
<Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
- 4) Remove the air cleaner case (Non-turbo model).
<Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.>
- 5) Remove the inter cooler (Turbo model). <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
- 6) Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the battery ground terminal.
- 2) Jack-up the vehicle and support it with sturdy racks.
- 3) Remove the front, center exhaust pipes. (Non-turbo model)
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>

CAUTION:

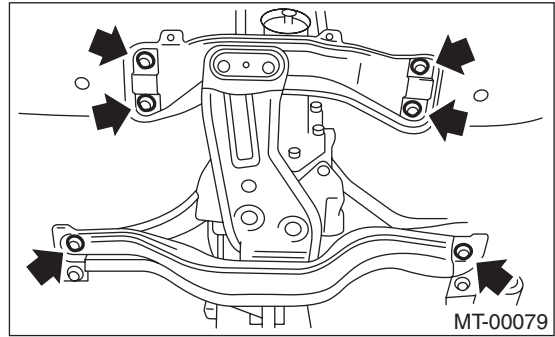
When removing exhaust pipes, be careful each exhaust pipe does not drop out.

- 4) Remove the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 5) Remove the rear exhaust pipe and muffler.
- 6) Remove the heat shield cover. (If equipped)
- 7) Set the transmission jack under the transmission body.

CAUTION:

Always support transmission case with a transmission jack.

- 8) Remove the rear crossmember.



- 9) Remove the rear cushion rubber.

B: INSTALLATION

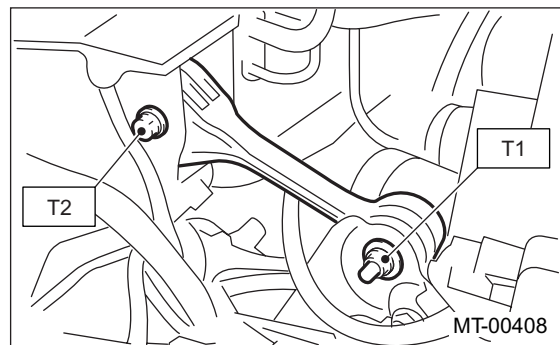
1. PITCHING STOPPER

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



- 2) Install the air intake duct and cleaner case. (Non-turbo model)

<Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.>

- 3) Install the intercooler. (Turbo model)

<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

- 4) Connect the battery ground terminal.

2. CROSSMEMBER AND CUSHION RUBBER

1) Install for rear cushion rubber.

Tightening torque:

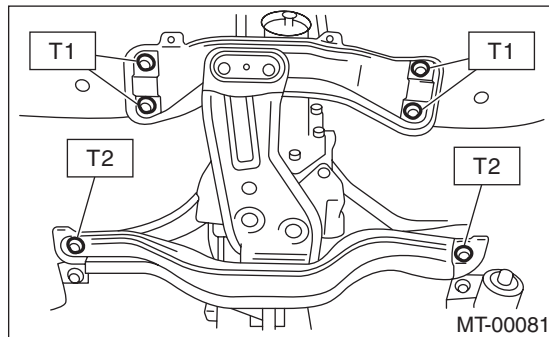
35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install the crossmember.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



3) Remove the transmission jack.

4) Install the heat shield cover. (If equipped)

5) Install the front and center exhaust pipes. (Non-turbo model)

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>

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

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

7) Install the rear exhaust pipe and muffler.

C: INSPECTION

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

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Make sure 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. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

OIL SEAL

MANUAL TRANSMISSION AND DIFFERENTIAL

5. Oil Seal

A: INSPECTION

Inspect for oil leakage from the oil seal. Replace the oil seal if the lips is deformed, hardened, damaged, worn or defective if any.

B: REPLACEMENT

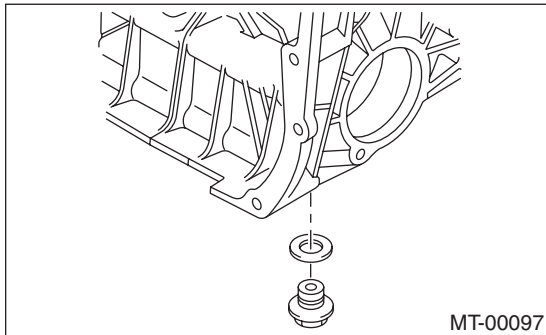
- 1) Clean the transmission exterior.
- 2) Drain the gear oil completely.

NOTE:

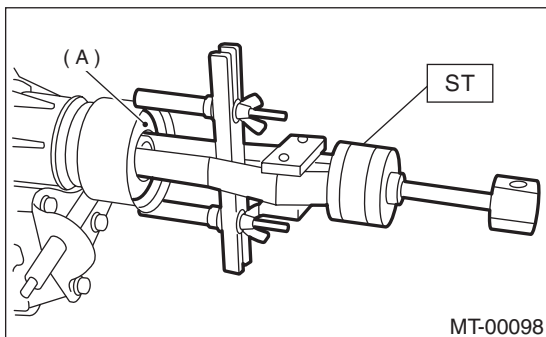
Tighten the drain plug after draining gear oil.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)

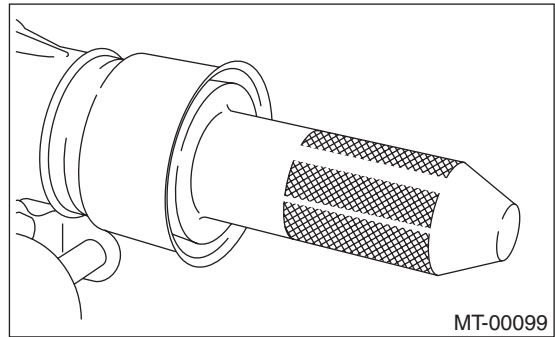


- 3) Remove the rear exhaust pipe and muffler.
 - 4) Remove the heat shield cover. (If equipped)
 - 5) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
 - 6) Using ST, remove the oil seal.
- ST 398527700 PULLER ASSY



(A) Oil seal

- 7) Using ST, install the oil seal.
- ST 498057300 INSTALLER



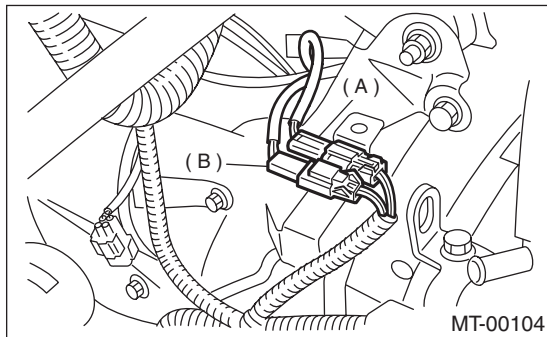
- 8) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
- 9) Install the heat shield cover. (If equipped)
- 10) Install the rear exhaust pipe and muffler.
- 11) Pour the gear oil and check the oil level. <Ref. to MT-26, Transmission Gear Oil.>

6. Switches and Harness

A: REMOVAL

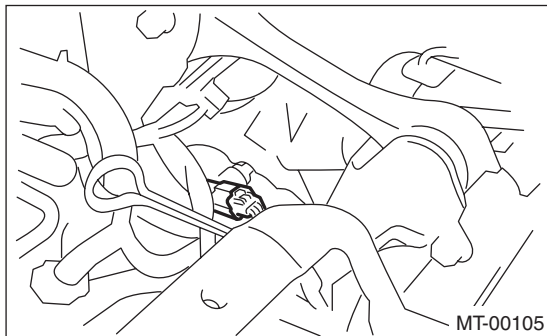
1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

- 1) Disconnect the connector battery ground terminal.
 - 2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
 - 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



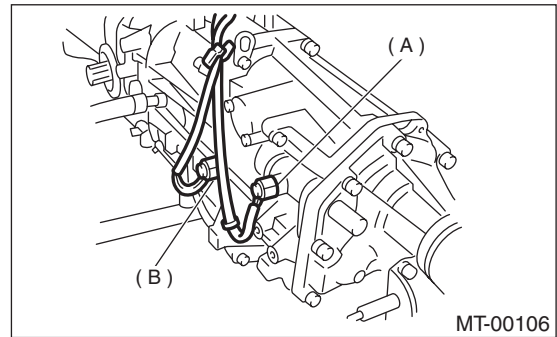
- (A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

- Turbo model



- 5) Lift-up the vehicle.

- 6) Remove the back-up light switch and neutral position switch with harness.



- (A) Neutral switch (Brown connector)
(B) Back-up light switch (Gray connector)

SWITCHES AND HARNESS

MANUAL TRANSMISSION AND DIFFERENTIAL

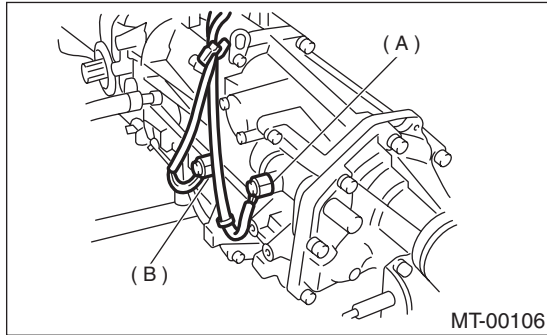
B: INSTALLATION

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

1) Install the back-up light switch and neutral position switch with harness.

Tightening torque:

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Neutral switch

(B) Back-up light switch

2) Connect the connector of back-up light switch and neutral position switch.

3) Install the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.>

4) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

5) Connect the battery ground terminal.

C: INSPECTION

1. BACK-UP LIGHT SWITCH

Inspect 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 neutral position switch.

3) Measure the resistance between neutral position switch terminal.

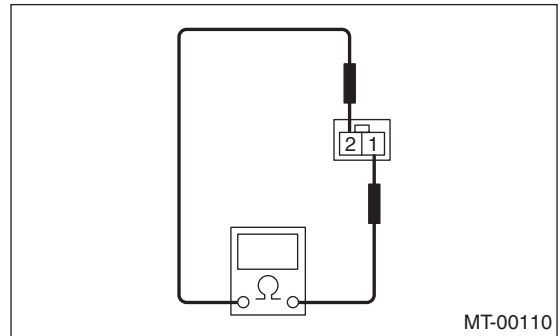
Non-turbo model

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	More than 1MΩ
Other positions		Less than 1Ω

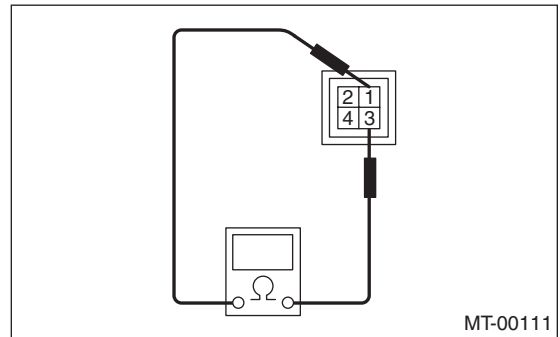
Turbo model

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	More than 1MΩ
Other positions		Less than 1Ω

• Non-turbo model



• Turbo model

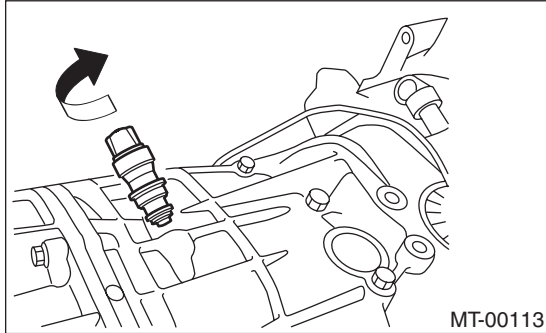


4) Replace defective parts.

7. Vehicle Speed Sensor

A: REMOVAL

- 1) Disconnect the ground terminal from battery.
- 2) Lift-up the vehicle.
- 3) Remove the front and center exhaust pipes.
- 4) Disconnect the connector from vehicle speed sensor.
- 5) Turn and remove the vehicle speed sensor.



B: INSTALLATION

NOTE:

- Discard the vehicle speed sensor and after removal, replace with a new one.
- Ensure the sensor mounting hole is clean and free of foreign matter.
- Align the tip end of key with 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 tool.

Tightening torque:

5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

- 3) Connect the connector to vehicle speed sensor.
- 4) Install the front and center exhaust pipes.
- 5) Lower the vehicle.
- 6) Connect the battery ground terminal.

C: INSPECTION

The vehicle speed sensor can not be inspected as a single unit. Check if speedometer operates normally. If it does not operate normally, inspect the combination meter system. <Ref. to IDI-4, INSPECTION, Combination Meter System.>

PREPARATION FOR OVERHAUL

MANUAL TRANSMISSION AND DIFFERENTIAL

8. Preparation for Overhaul

A: PROCEDURE

- 1) Clean the oil, grease, dirt and dust from transmission.
- 2) Remove the drain plug to drain oil. After draining, retighten it as before.

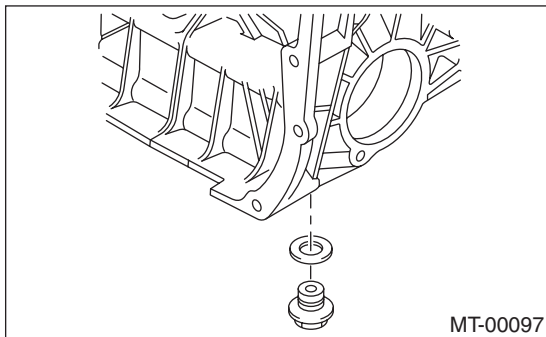
CAUTION:

Replace gasket with a new one.

Tightening torque:

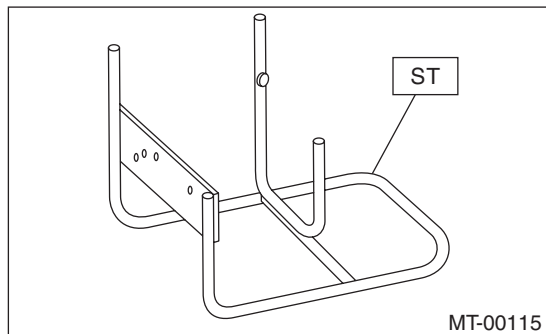
Gasket (Part No. 803926040)
44 N·m (4.5 kgf-m, 32.5 ft-lb)

Gasket (Part No. 803926070)
70 N·m (7.1 kgf-m, 52 ft-lb)



- 3) Attach the transmission to ST.

ST 499937100 TRANSMISSION STAND



- 4) Rotating parts should be coated with oil prior to assembly.
- 5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 6) Gaskets, lock washers and lock nut must be replaced with new ones.
- 7) Liquid gasket should be used where specified to prevent leakage.

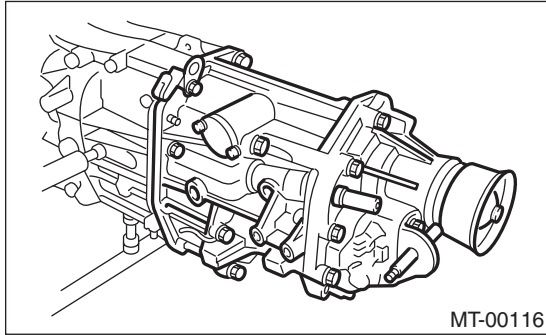
TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

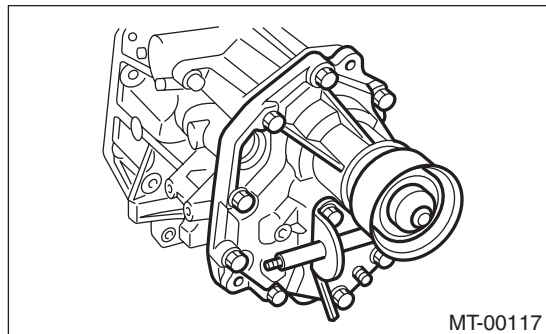
9. Transfer Case and Extension Case Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to MT-37, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly.

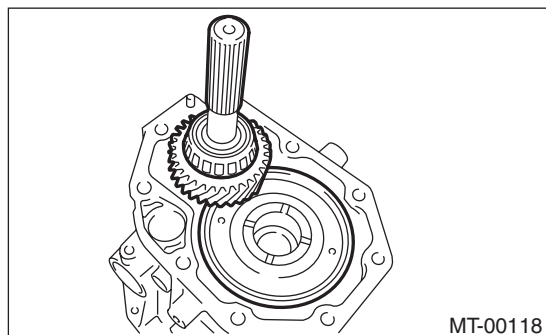


- 4) Remove the shifter arm.
- 5) Remove the extension case assembly.

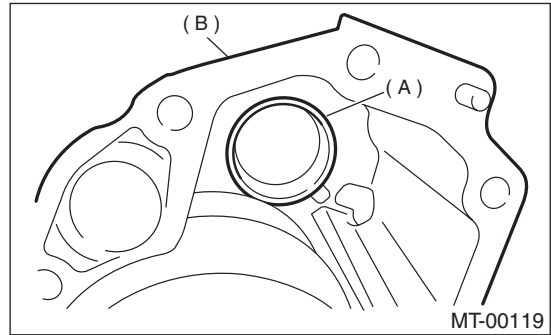


B: INSTALLATION

- 1) Install the center differential and transfer driven gear into transfer case.

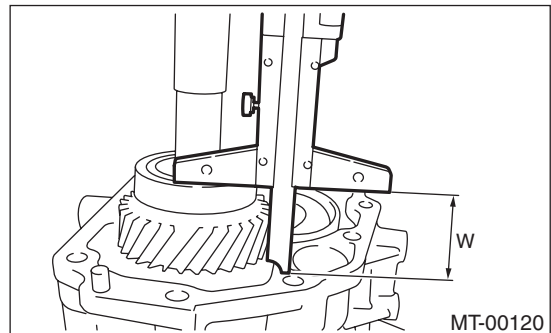


- 2) Remove the bearing outer race from the extension case assembly, and install to taper roller bearing of the transfer driven gear.



- (A) Bearing outer race
(B) Extension case

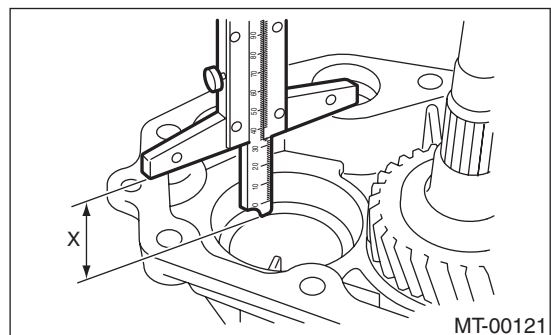
- 3) While pressing the bearing outer race horizontally, turn the driven shaft ten rotations.
- 4) Measure the height "W" between transfer case and taper roller bearing on the transfer driven gear.



- 5) Measure the depth "X".

NOTE:

Measure with bearing outer race and thrust washer removed.



- 6) Calculate the thrust washer thickness "t" using the following calculation.

$$t = X - W + 0.15 \text{ to } 0.20 \text{ mm (0.006 to 0.008 in)}$$

TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

7) Select the nearest washer in the following table:

Preload of the taper roller bearing (amount of standard protrusion):

0.15 — 0.20 mm (0.006 — 0.008 in)

NOTE:

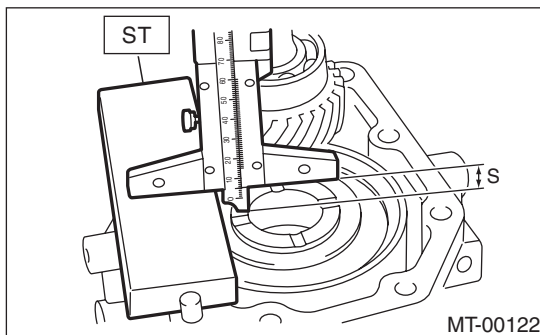
Be sure that the amount of preload is within the standard value.

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 transfer drive shaft.

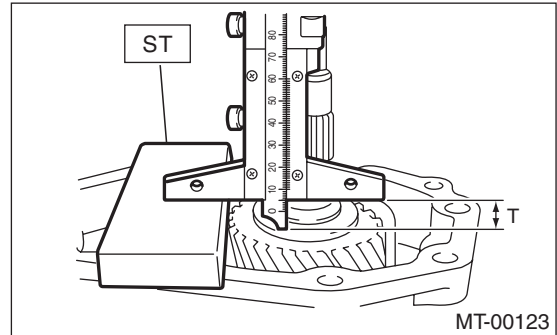
9) Measure the depth “S” between transfer case and center differential.

ST 398643600 GAUGE



10) Measure the depth “T” between extension case and transfer drive gear.

ST 398643600 GAUGE



NOTE:

Thickness of ST: 15 mm (0.59 in)

11) Calculate the space “U” using the following equation: $U = S + T - 30 \text{ mm (1.18 in)}$ [Thickness of ST]

12) Select the 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)

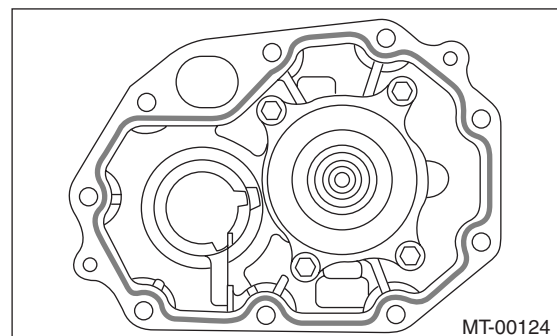
13) Fit the thrust washer on center differential.

14) Install the bearing outer race into extension case.

15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:

THREE BOND 1215



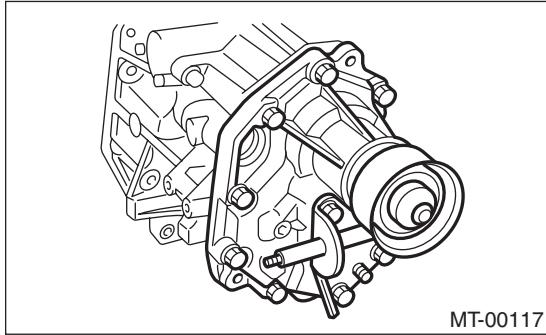
TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

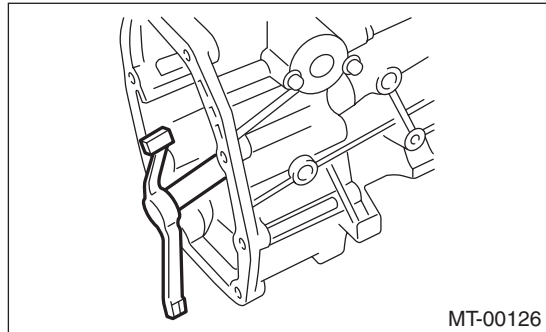
16) Install the extension assembly into the transfer case.

Tightening torque:

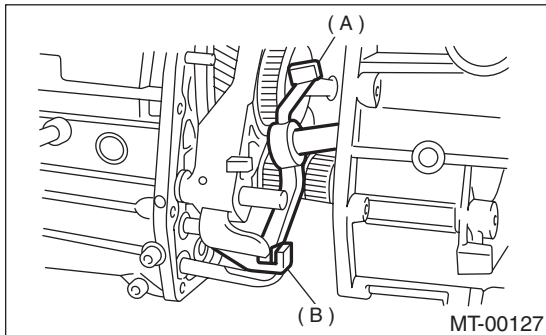
40N·m (4.1 kgf-m, 29.7 ft-lb)



17) Install the shifter arm to the transfer case.



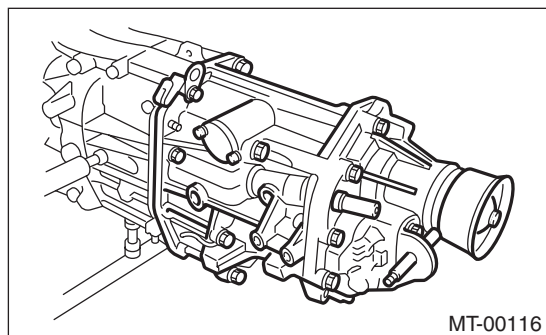
18) Hang the shifter arm on the 3rd-4th fork rod.



19) Install the transfer case with extension case assembly to the transmission case.

Tightening torque:

25N·m (2.5 kgf-m, 18.1 ft-lb)

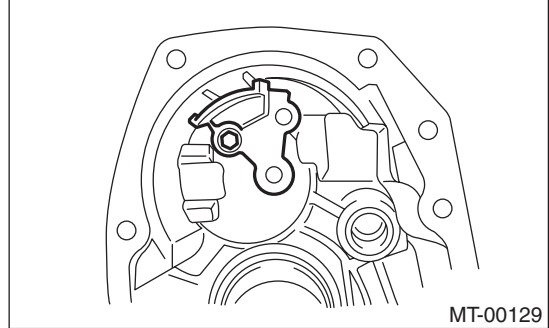


C: DISASSEMBLY

1. TRANSFER CASE

1) Remove the reverse check assembly. <Ref. to MT-50, REMOVAL, Reverse Check Sleeve.>

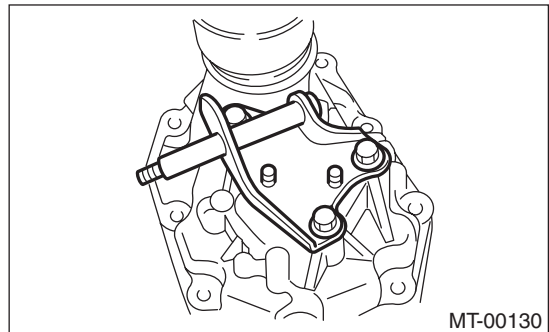
2) Remove the oil guide.



2. EXTENSION CASE

1) Remove the transfer drive gear assembly. <Ref. to MT-45, REMOVAL, Transfer Drive Gear.>

2) Remove the shift bracket.



3) Remove the oil seal from the extension case. <Ref. to MT-36, OIL SEAL, .>

TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

D: ASSEMBLY

1. EXTENSION CASE

1) Using ST, install the oil seal to the extension case. <Ref. to MT-36, Oil Seal.>

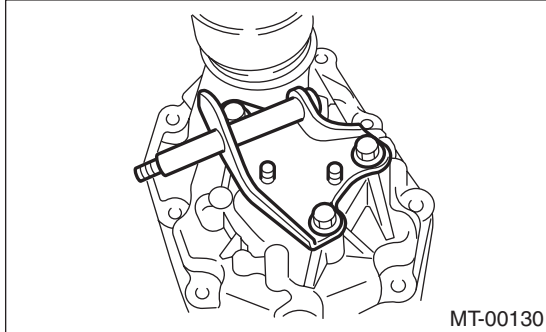
CAUTION:

Use new oil seal.

2) Install the shift bracket to the extension case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



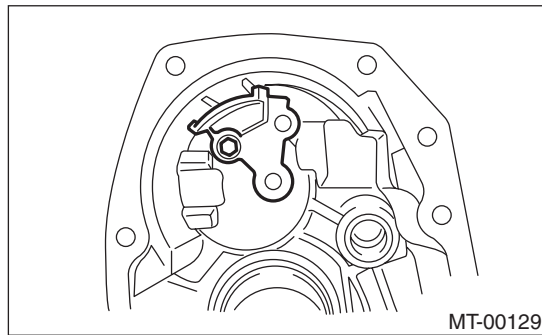
3) Install the transfer drive gear to the extension case. <Ref. to MT-45, INSTALLATION, Transfer Drive Gear.>

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)

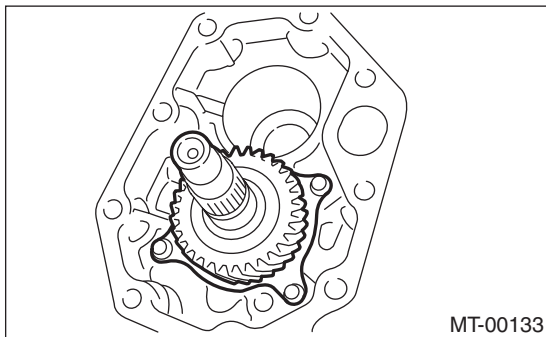


2) Install the reverse check sleeve assembly to the transfer case. <Ref. to MT-50, INSTALLATION, Reverse Check Sleeve.>

10. Transfer Drive Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to MT-37, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly.
- 5) Remove the transfer driven gear.
- 6) Remove the transfer drive gear.

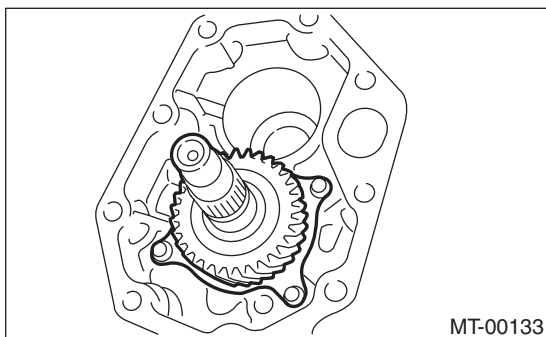


B: INSTALLATION

- 1) Install the transfer drive gear.

Tightening torque:

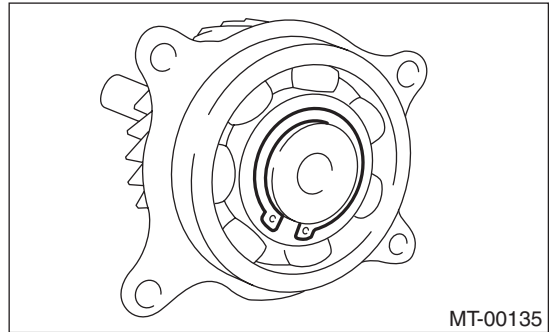
26 N·m (2.7 kgf-m, 20 ft-lb)



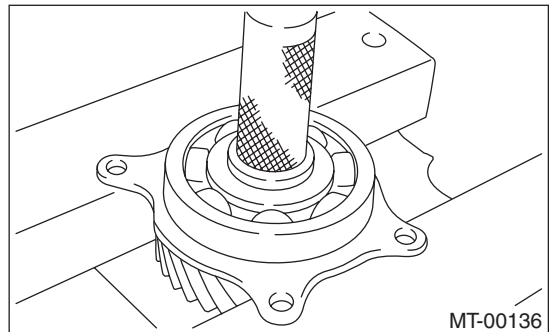
- 2) Install the transfer driven gear.
- 3) Install the extension case assembly.
- 4) Install the transfer case and extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to MT-38, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly from vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Remove the snap ring.



- 2) Remove the ball bearing.



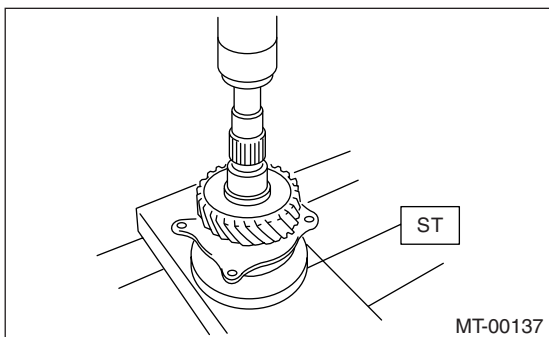
D: ASSEMBLY

- 1) Set the ST applying to inner race of bearing and instal to drive shaft.

ST 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



- 2) Install the snap ring on transfer drive shaft.
- 3) Inspect the clearance between snap ring and inner race of ball bearing. <Ref. to MT-46, INSPECTION, Transfer Drive Gear.>

TRANSFER DRIVE GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

1) Bearings

Replace bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Drive gear

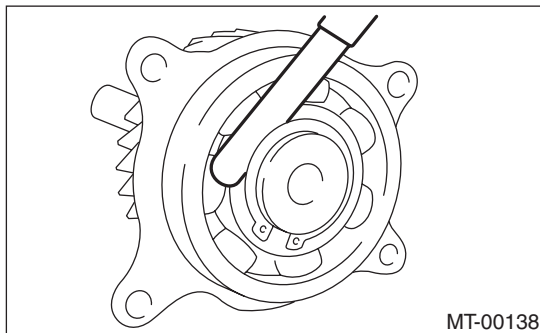
Replace drive gear in the following cases:

- If their tooth surfaces and shaft are excessively broken or damaged.

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 the specification, select suitable snap ring.

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

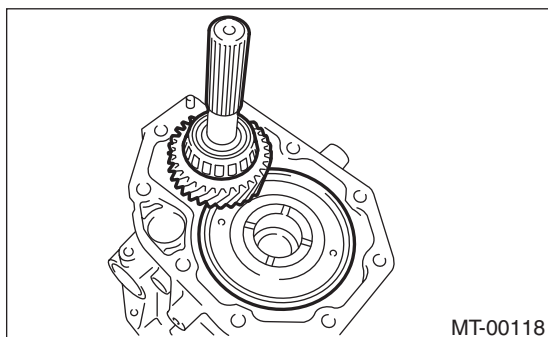
TRANSFER DRIVEN GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

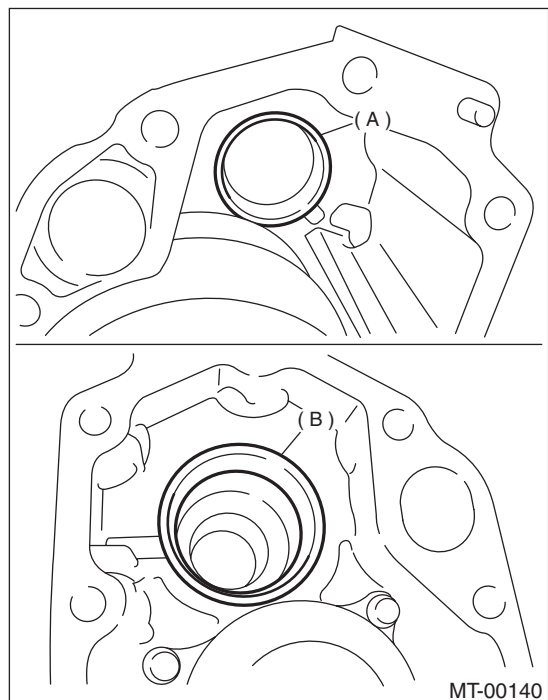
11. Transfer Driven Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to MT-37, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly.
- 5) Remove the transfer driven gear.



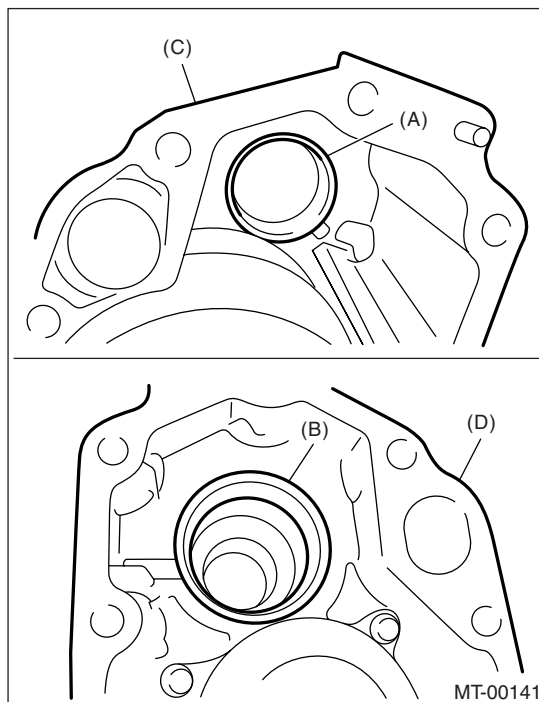
- 6) Remove the bearing cup from extension case and transfer case.



- (A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

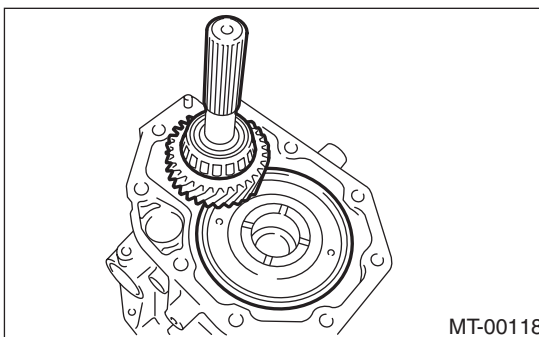
B: INSTALLATION

- 1) Install the bearing cup to extension case and transfer case.



- (A) Bearing cup
(B) Bearing cup
(C) Transfer case
(D) Extension case

- 2) Install the transfer driven gear.



- 3) Install the transfer case and extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the back-up light switch and neutral position switch. <Ref. to MT-38, INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

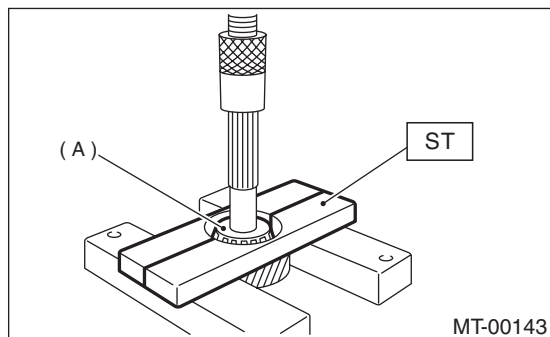
TRANSFER DRIVEN GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1) Using ST, remove the roller bearing (extension case side).

ST 498077000 REMOVER

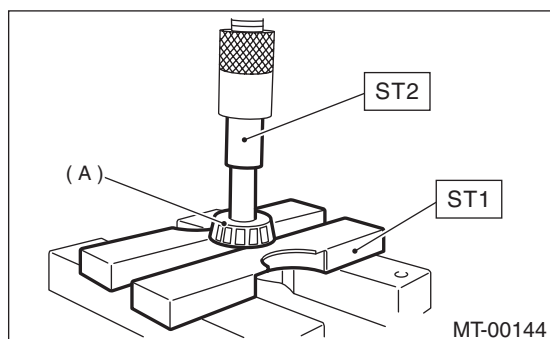


(A) Roller bearing

2) Using ST1 and ST2, remove the roller bearing (transfer case side).

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Roller bearing

D: ASSEMBLY

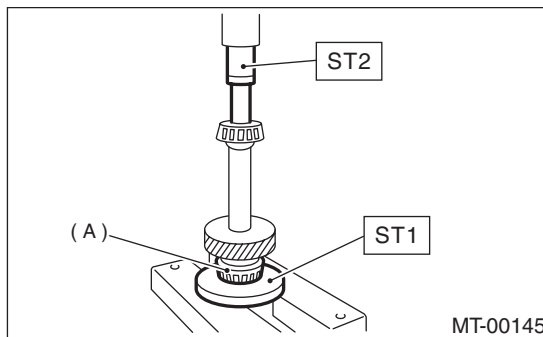
1) Using ST, install the roller bearing (extension case side).

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



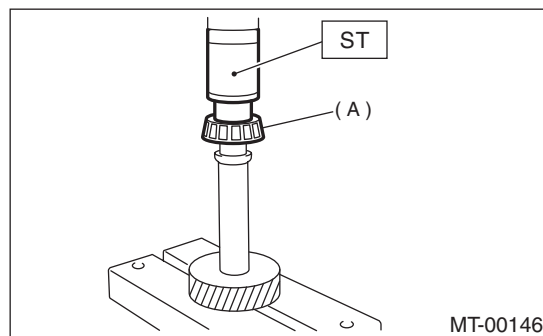
(A) Roller bearing

2) Using ST, install the roller bearing (transfer case side).

ST 499757002 INSTALLER

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



(A) Roller bearing

E: INSPECTION

1) Bearings

Replace the bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Driven gear

Replace drive gear in the following cases:

- If their tooth surfaces and shaft are excessively broken or damaged.

12.Center Differential

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly.<Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to MT-47, 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 MT-47, INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to MT-37, REMOVAL, Switches and Harness.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

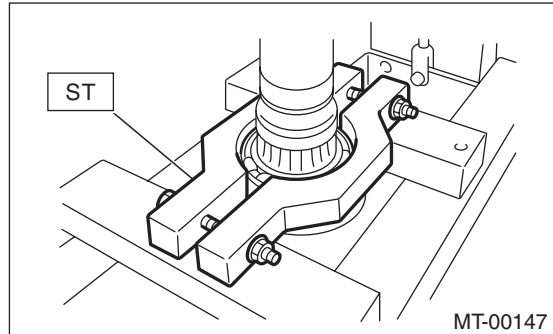
Do not disassemble center differential because it is a non-disassemble part.

Remove ball bearing using ST.

CAUTION:

Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER

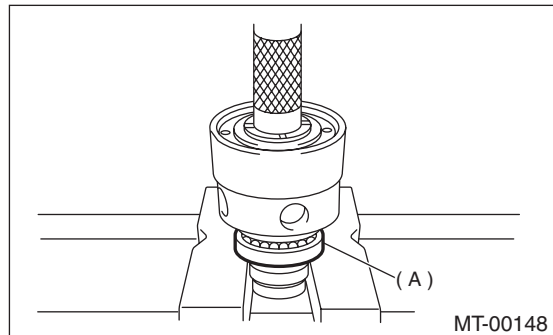


D: ASSEMBLY

Install the ball bearing to center differential assembly.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Ball bearing

E: INSPECTION

1) Bearings

Replace the bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Center differential

Replace the center differential assembly in the following case:

- Worn or damaged

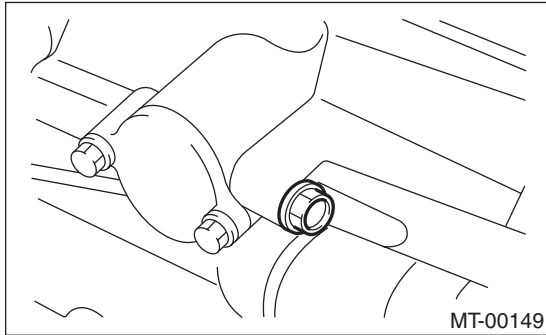
REVERSE CHECK SLEEVE

MANUAL TRANSMISSION AND DIFFERENTIAL

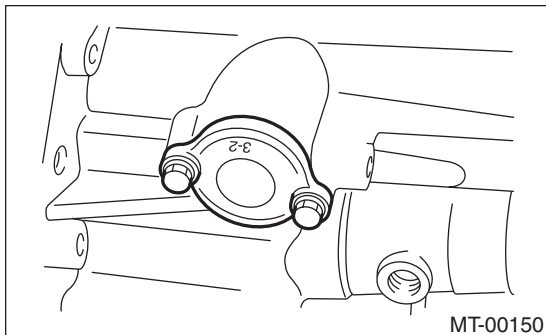
13.Reverse Check Sleeve

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the shifter arm.
- 4) Remove the plug, spring washer and reverse check ball.



- 5) Remove the reverse check sleeve.

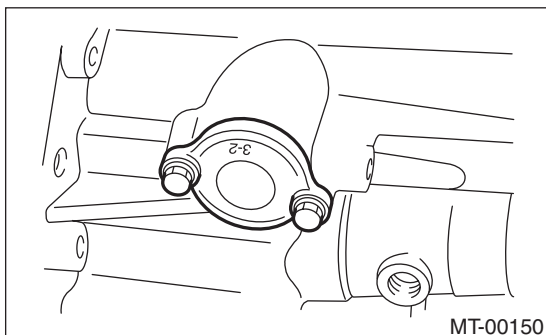


B: INSTALLATION

- 1) Install the reverse check sleeve.

Tightening torque:

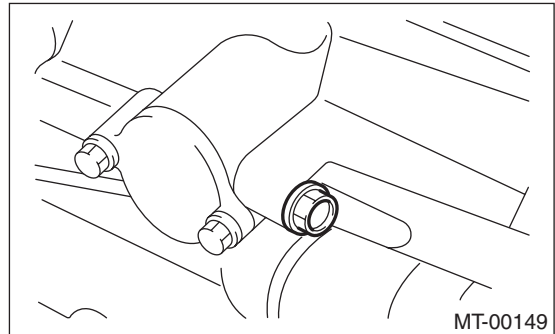
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 2) Install the ball, spring, washer and plug to transfer case.

Tightening torque:

9.75 N·m (1.0 kgf-m, 7.2 ft-lb)



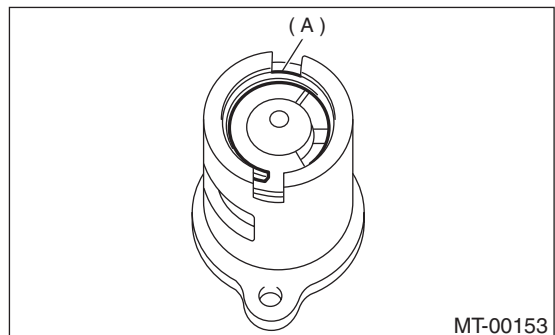
- 3) Install the shifter arm to transfer case assembly.
- 4) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Cover the reverse check sleeve with a rag, and remove snap ring using a screwdriver.

NOTE:

Replace the snap ring with a new one if deformed or weakened.

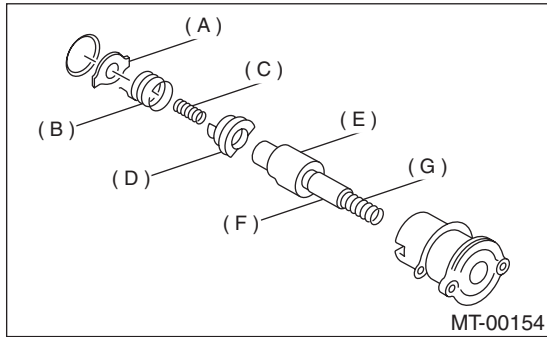


(A) Snap ring

REVERSE CHECK SLEEVE

MANUAL TRANSMISSION AND DIFFERENTIAL

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 O-ring.

NOTE:

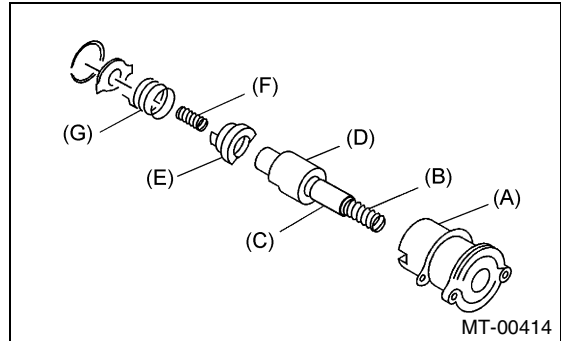
- Reverse check sleeve assembly uses an O-ring which should not be scratched.
- Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.

D: ASSEMBLY

1) Install the return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

NOTE:

Be sure the bent section of reverse check spring is positioned in the groove in check cam.



- (A) Reverse check sleeve
- (B) Return spring (1st-2nd)
- (C) Return spring cap
- (D) Reverse accent shaft
- (E) Reverse check cam
- (F) Return spring (5th-Rev)
- (G) Reverse check spring

2) Hook the bent section of reverse check spring over reverse check plate.

3) Rotate the cam so that the protrusion of reverse check cam is at the opening in plate.

4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.

5) Position O-ring in groove in sleeve.

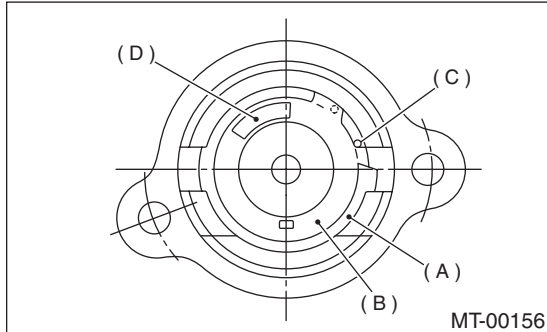
REVERSE CHECK SLEEVE

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
- Spin cam by hand for smooth rotation.
- Move cam and shaft all the way toward plate and release.

If the cam does not return properly, replace reverse check spring; if the shaft does not, check for scratches on the inner surface of sleeve. If the sleeve is in good order, replace spring.



- (A) Snap ring
- (B) Reverse check plate
- (C) Check spring
- (D) Check cam

- Select a suitable reverse accent shaft and reverse check plate.<Ref. to MT-52, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

- 1) Shift the gear into 3rd gear position.
- 2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
- 3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
- 4) To adjust, remove bolts holding reverse check sleeve assembly to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

CAUTION:

Be careful not to break O-ring when placing shim(s).

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 the shims alone cannot adjust the clearance, replace the reverse accent shaft and re-adjust.

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st gear.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

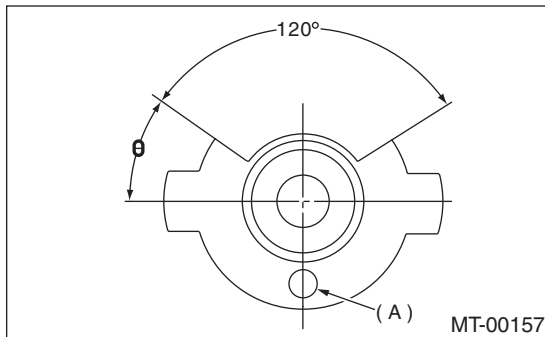
REVERSE CHECK SLEEVE

MANUAL TRANSMISSION AND DIFFERENTIAL

2. REVERSE CHECK PLATE ADJUSTMENT

- 1) Shift the shifter arm to "5th" and then to reverse to see if 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 reverse check plate.

Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



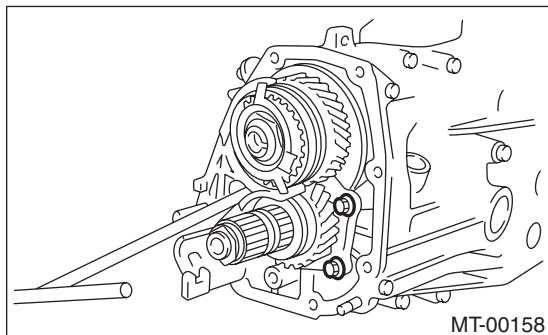
TRANSMISSION CASE

MANUAL TRANSMISSION AND DIFFERENTIAL

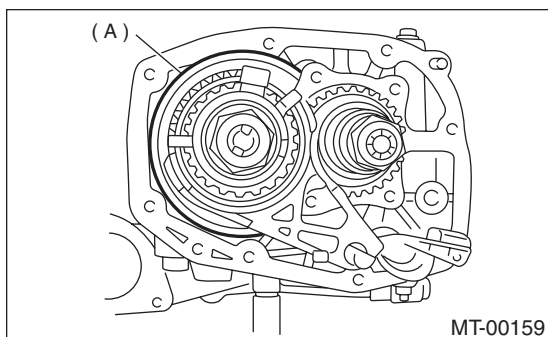
14. Transmission Case

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the clutch release lever. <Ref. to CL-15, REMOVAL, Release Bearing and Lever.>
- 3) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the bearing mounting bolts.

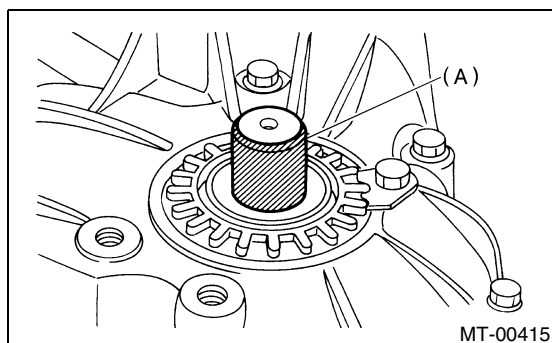


- 5) Remove the main shaft rear plate.



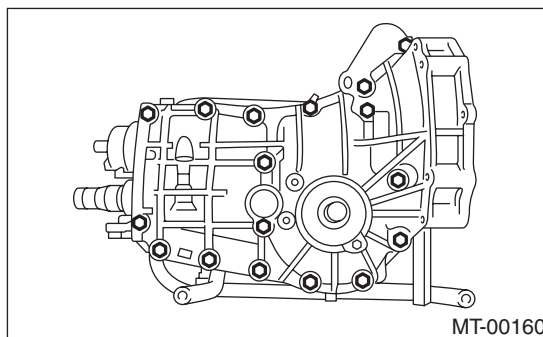
(A) Main shaft rear plate

- 6) Put the vinyl tape around splines of the right and left axle drive shafts to prevent damage to oil seal.



(A) Vinyl tape

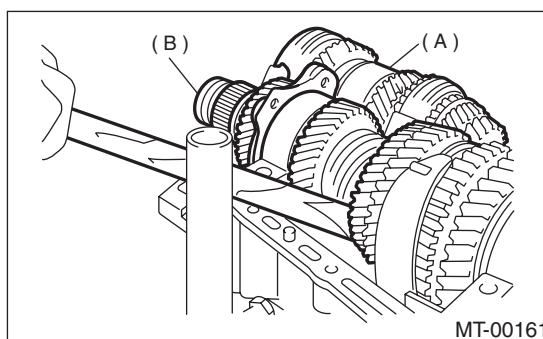
- 7) Separate the transmission case into the right and left cases by loosening coupling bolts and nuts.



- 8) Remove the drive pinion shaft assembly from left side transmission case.

NOTE:

Use a hammer handle, etc. to remove if too tight.



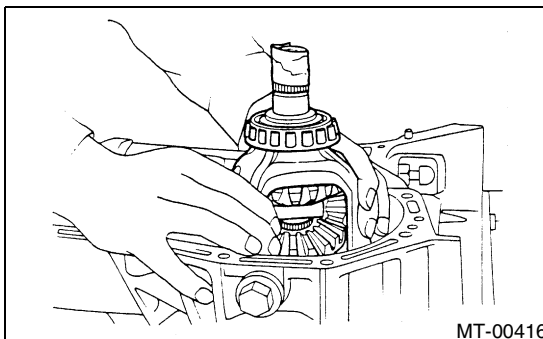
(A) Main shaft assembly

(B) Drive pinion shaft assembly

- 9) Remove the main shaft assembly.
- 10) Remove the differential assembly.

CAUTION:

- Be careful not to confuse right and left roller bearing outer races.
- Be careful not to damage retainer oil seal.



TRANSMISSION CASE

MANUAL TRANSMISSION AND DIFFERENTIAL

B: INSTALLATION

- 1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
- 2) Install the front differential assembly.
- 3) Install the main shaft assembly.

Install the needle bearing knock pin hole into transmission case knock pin.

- 4) Install the drive pinion shaft assembly.

Install the roller bearing knock pin hole into transmission case knock pin.

- 5) Apply the liquid gasket, and then put the case right side and left side together.

Liquid gasket:

THREE BOND 1215 or equivalent

- 6) Tighten seventeen bolts with bracket, clip, etc. as shown in the figure.

NOTE:

- Insert the bolts from the bottom and tighten nuts at the top.
- Put the cases together so that the drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

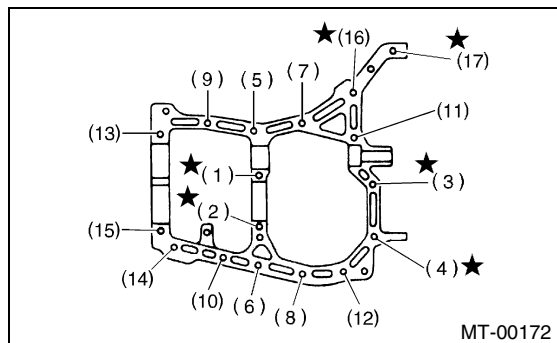
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.1 ft-lb)

★ 10 mm bolt

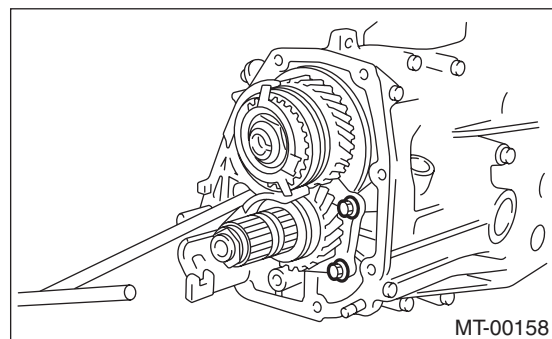
39 N·m (4.0 kgf-m, 28.9 ft-lb)



- 7) Tighten the ball bearing attachment bolts.

Tightening torque:

29 N·m (3.0 kgf-m, 21.7 ft-lb)

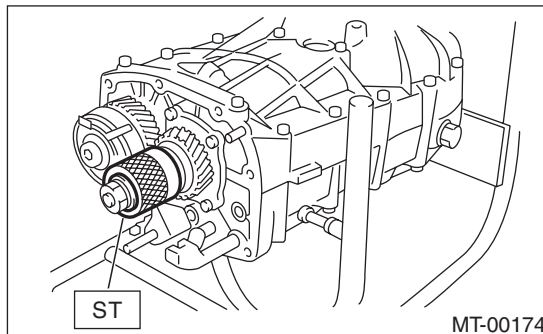


- 8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:

Support the drive pinion assembly with ST. (AWD model)

ST 498427100 STOPPER



- 9) Place the transmission with case left side facing downward and put ST1 on bearing cup.

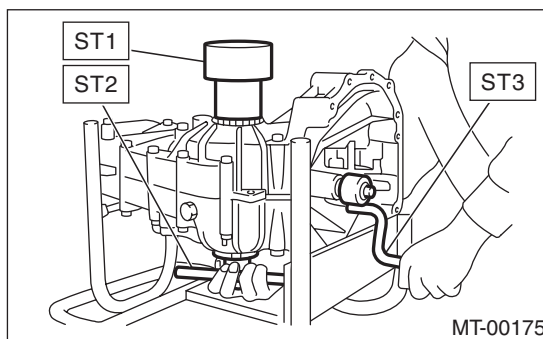
- 10) Screw the retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2.

This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

ST1 399780104 WEIGHT

ST2 499787000 WRENCH ASSY

ST3 499927100 HANDLE



TRANSMISSION CASE

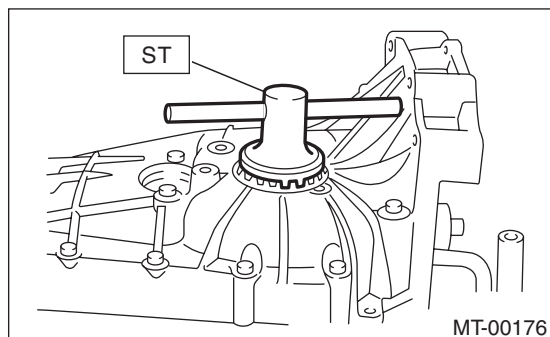
MANUAL TRANSMISSION AND DIFFERENTIAL

11) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:

At this point, the backlash between the hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



12) Loosen the retainer on the lower side by 3 notches and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

14) Install temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

NOTE:

Install the lock plate upside down if it is hard to install.

15) Turn the transmission main shaft several times while tapping around retainer lightly with plastic hammer.

16) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-76, INSPECTION, Front Differential Assembly.>

17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit O-ring into the groove and tighten the retainer to the original position.

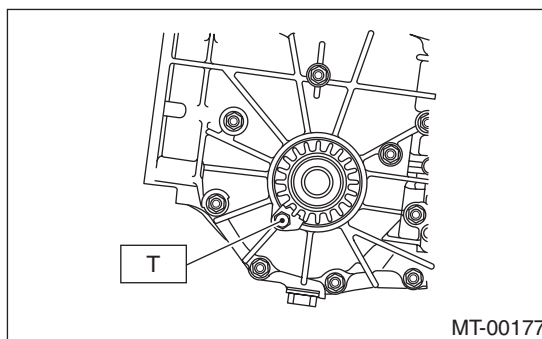
Install the lock plate.

NOTE:

- Record how many times the retainer is turned while loosening.
- Carry out this job on both upper and lower retainers.

Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



18) Selecting of main shaft rear plate <Ref. to MT-62, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

19) Install the clutch release lever and bearing. <Ref. to CL-15, INSTALLATION, Release Bearing and Lever.>

20) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly into the vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, and oil leaks.

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

15. Main Shaft Assembly for Single-Range

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the drive pinion shaft assembly. <Ref. to MT-63, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly.

B: INSTALLATION

- 1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

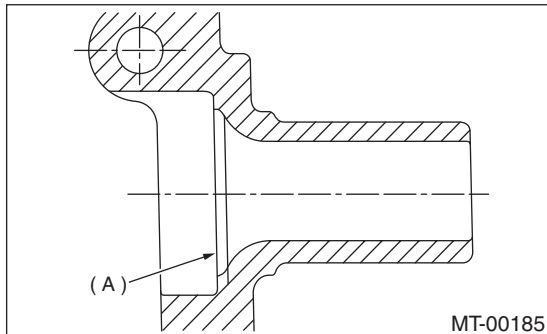
CAUTION:

- Wrap clutch splined section with vinyl tape to prevent damage to oil seal.
- Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
- Use a new one.

- 2) Install the needle bearing outer race knock pin hole into transmission case knock pin.

NOTE:

Align the end face of seal with surface (A) when installing oil seal.



- 3) Install the drive pinion assembly. <Ref. to MT-63, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install the transmission case. <Ref. to MT-55, INSTALLATION, Transmission Case.>
- 5) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

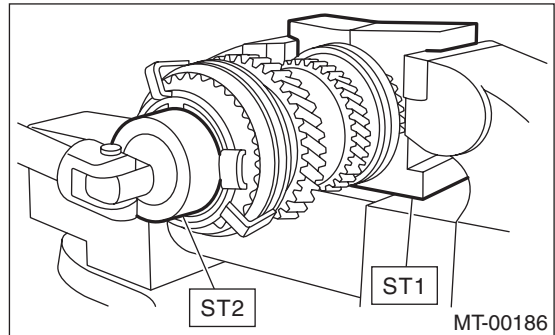
C: DISASSEMBLY

- 1) Put the vinyl tape around main shaft splines to protect 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.

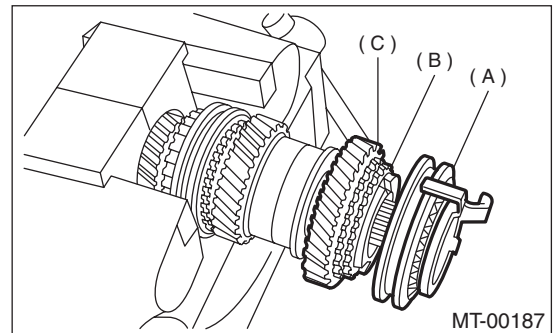
NOTE:

Remove the caulking before off lock nut.

- ST1 499987000 TRANSMISSION HOLDER
ST2 498937003 SOCKET WRENCH (35)



- 3) Remove the 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



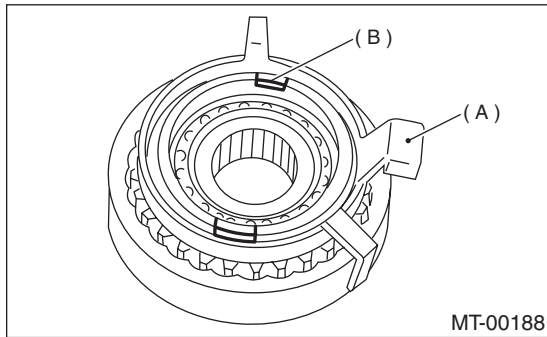
- (A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.

ST1	899864100	REMOVER
ST2	899714110	REMOVER



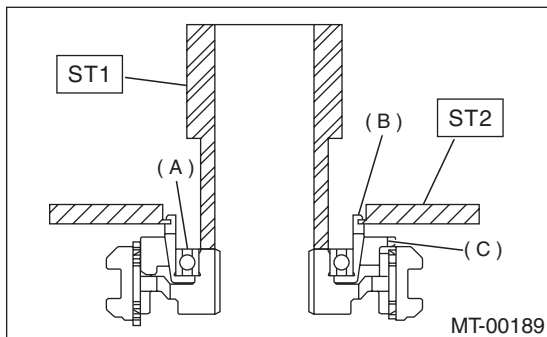
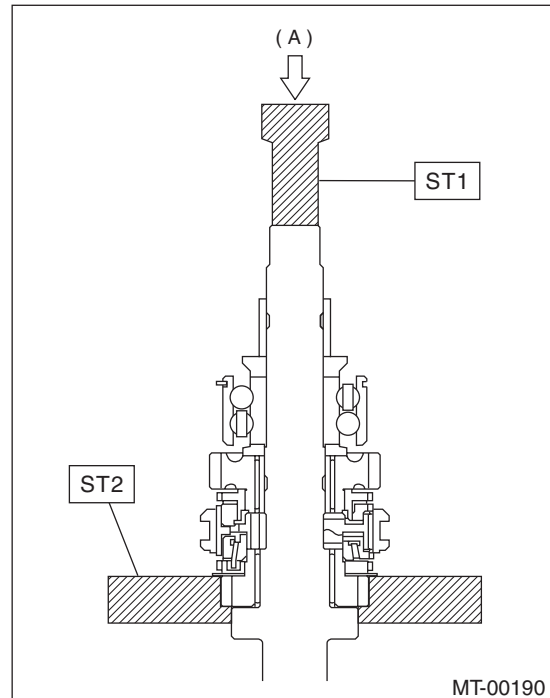
- (A) Synchro cone stopper
- (B) Snap ring

5) Using ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

NOTE:

- Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on the splines beforehand.
- Do not reuse the ball bearing.

ST1	499757002	INSTALLER
ST2	498077400	SYNCHRO CONE REMOVALER



- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

6) Using ST1 and ST2, remove the rest of parts.

NOTE:

Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

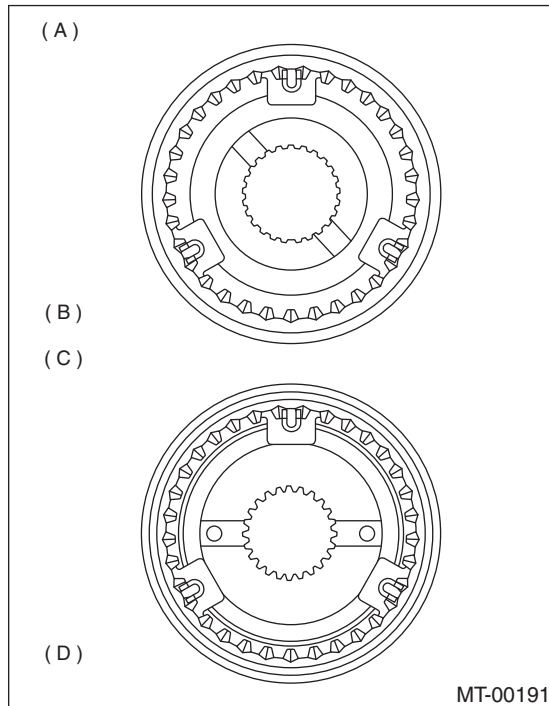
MANUAL TRANSMISSION AND DIFFERENTIAL

D: ASSEMBLY

1) Assemble each sleeve and hub assembly.

NOTE:

Position open ends of spring 120° apart.

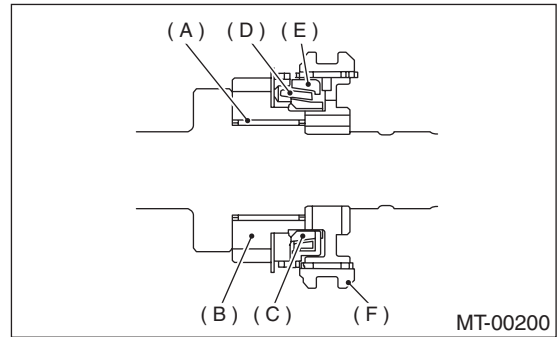


- (A) 3rd-4th hub assembly
- (B) 3rd gear side
- (C) 5th-reverse hub assembly
- (D) 5th gear side

2) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on the transmission main shaft.

NOTE:

Align the groove in baulk ring with shifting insert.



- (A) 3rd needle bearing
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve and hub ASSY

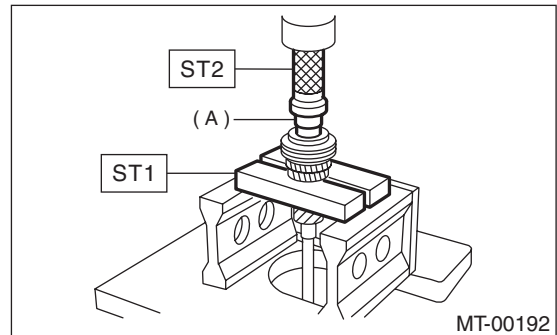
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

CAUTION:

Do not apply pressure 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

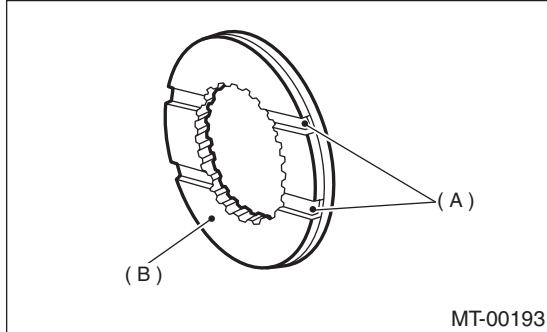
MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to the transmission main shaft.

NOTE:

Align the baulk ring and gear & hub assembly with key groove.



- (A) Groove
(B) 4th gear side

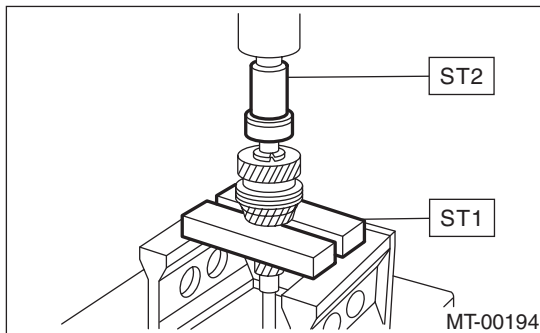
5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

CAUTION:

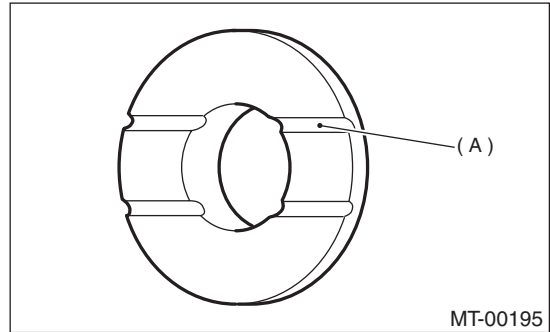
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Face the thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



- (A) Face this surface to 5th gear side.

7) Install the bearing onto synchro cone.

8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

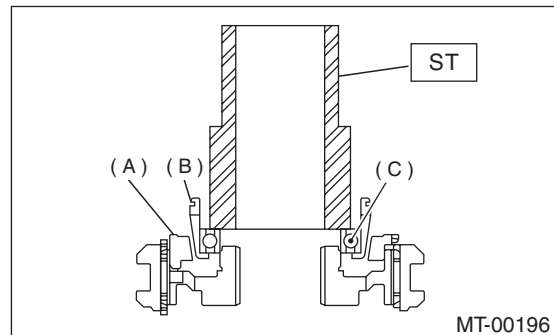
CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 INSTALLER

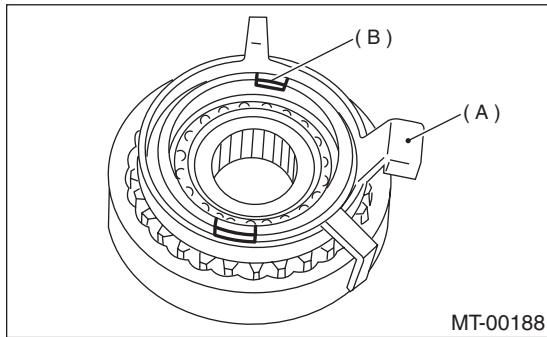


- (A) Baulk ring
(B) Synchro cone
(C) Ball bearing

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.

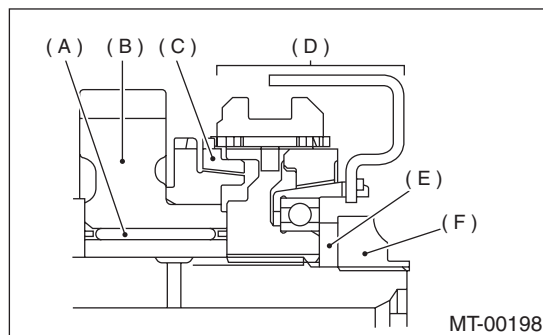


- (A) Synchro cone stopper
(B) Snap ring

10) Install the rest parts to the rear section of transmission main shaft.

NOTE:

Align the groove in baulk ring with shifting insert.



- (A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer
(F) Lock nuts

11) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE:

Secure the lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH

ST2 498937000 TRANSMISSION HOLDER

Tightening torque:

120 N·m (12.2 kgf·m, 88.2 ft·lb)

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace the bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears

- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

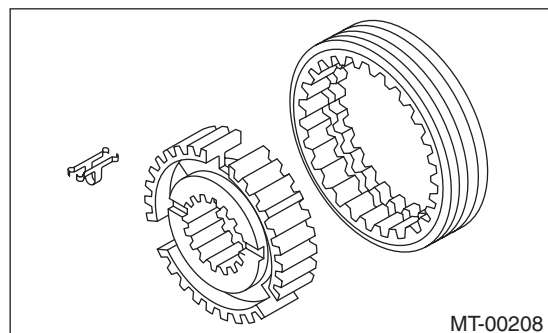
4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

5) Shifting insert key

Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, 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.

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

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

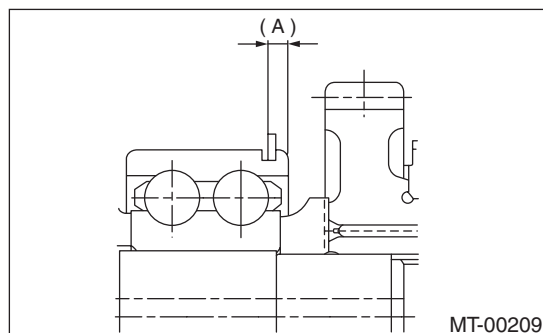
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

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 the 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 — 3.99 (0.1524 — 0.1571)	32294AA051	2



DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

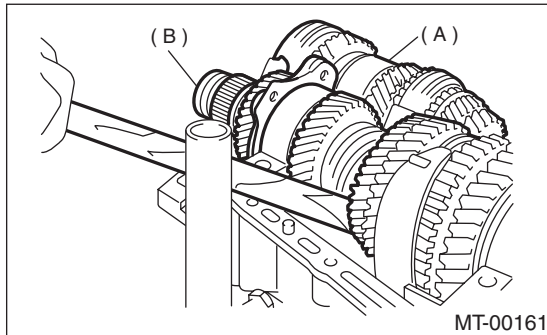
16. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-54, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly.

NOTE:

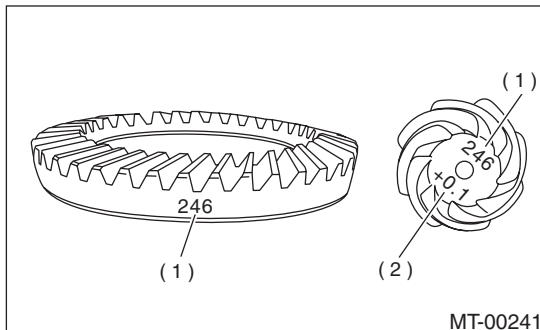
Use a hammer handle, etc. to remove if too tight.



- (A) Main shaft assembly
(B) Drive pinion shaft assembly

B: INSTALLATION

- 1) Remove the differential assembly.
- 2) Alignment marks/numbers on hypoid gear set
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for processing tolerance. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



- (1) Match number
(2) Processing tolerance

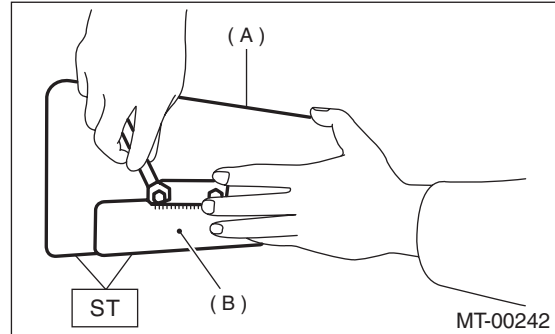
- 3) Place the drive pinion shaft assembly on right hand transmission main case without shim and tighten the bearing mounting bolts.

- 4) 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



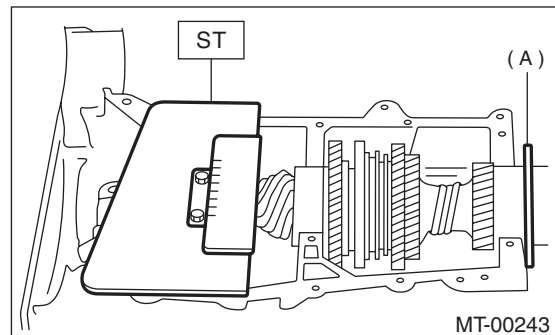
- (A) Plate
(B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

- 6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



- (A) Adjust clearance to zero without shim.

- 7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

8) Select one to three shims from the next table for the value determined as described above and take a shim thickness which 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 differential assembly. <Ref. to MT-71, INSTALLATION, Front Differential Assembly.>

10) Set the transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect the suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that the coupling sleeve and reverse driven gear are positioned in the center of their cynchronizing mechanisms. <Ref. to MT-68, INSPECTION, Drive Pinion Shaft Assembly.>

11) Install the transmission case. <Ref. to MT-55, INSTALLATION, Transmission Case.>

12) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to vehicle. <Ref. to MT-27, Manual Transmission Assembly.>

C: DISASSEMBLY

CAUTION:

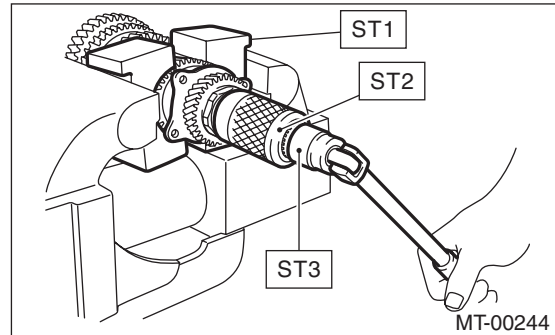
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

1) Straighten the lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.

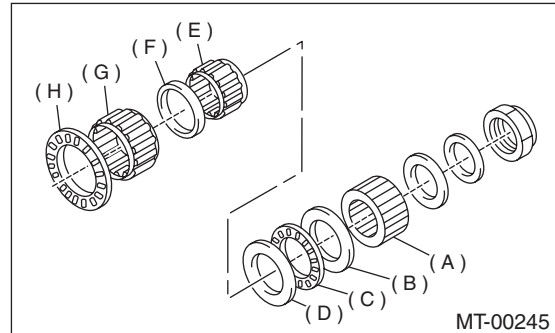
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)



2) Withdraw the drive pinion from driven shaft. Remove the differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

DRIVE PINION SHAFT ASSEMBLY

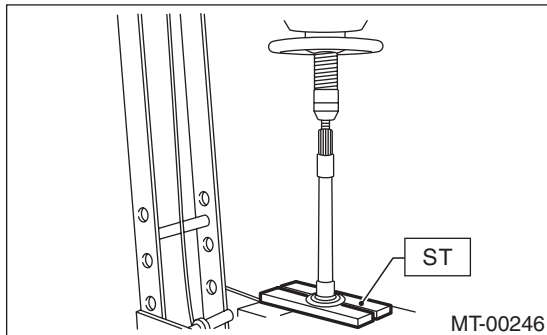
MANUAL TRANSMISSION AND DIFFERENTIAL

3) Remove the roller bearing and washer using ST and press.

CAUTION:

Do not reuse roller bearing.

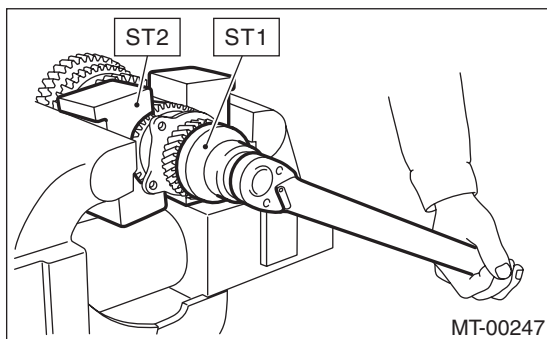
ST 498077000 REMOVER



4) Straighten the lock nut at staked portion. Remove the lock nut using ST1 and ST2.

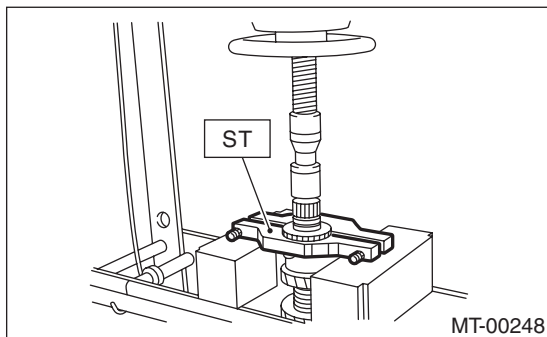
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



5) Remove the 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

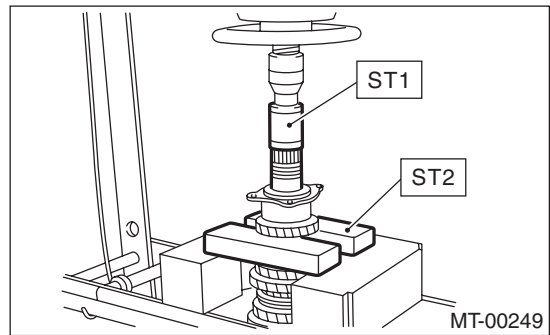


6) Remove the woodruff key.

7) Remove the roller bearing, 3rd-4th driven gear using ST1 and ST2.

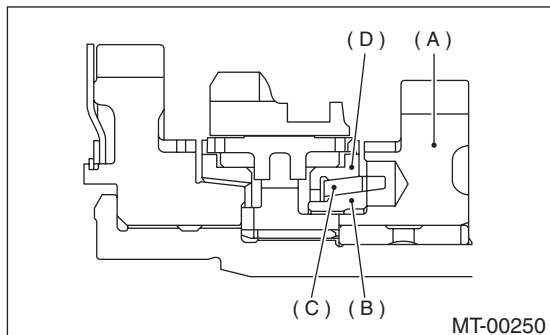
ST1 499757002 INSTALLER

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

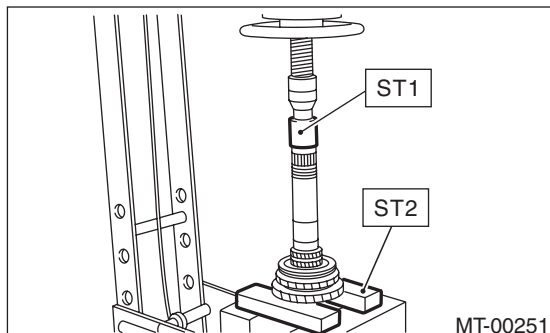
10) Remove the 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

NOTE:

Replace the gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 INSTALLER

ST2 899714110 REMOVER



DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

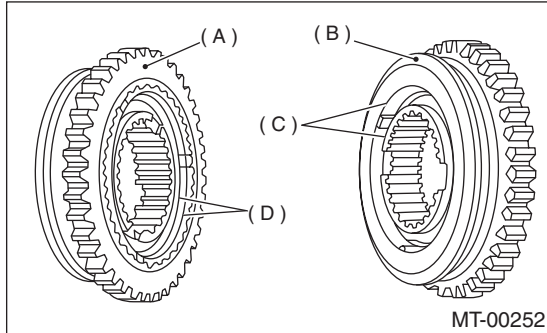
11) Remove the sub gear for 1st driven gear.

D: ASSEMBLY

1) Install the sleeve and assembly by matching alignment marks.

NOTE:

- Use the new gear and hub assembly, if the gear or hub have been replaced.



- (A) 1st gear side
- (B) 2nd gear side
- (C) Flush surface
- (D) Stepped surface

2) Install the washer, snap ring and sub gear to 1st driven gear.

3) Install the 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:

- Take care to install gear and hub assembly in proper direction.
- Align the baulk ring and gear & hub assembly with key groove.

4) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

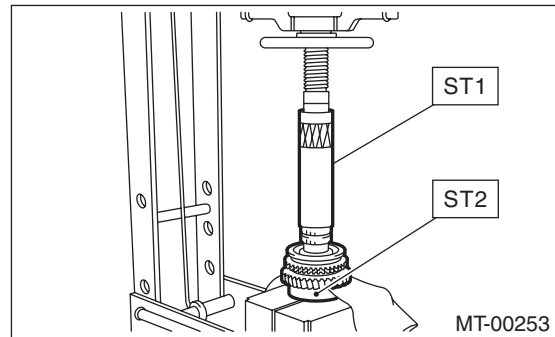
CAUTION:

- Attach a cloth to the end of driven shaft to prevent damage.
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

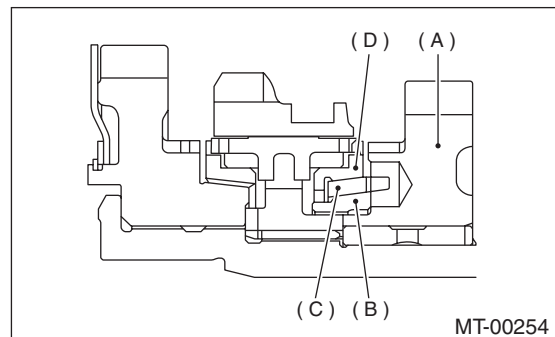
NOTE:

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, outer baulk ring and insert 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 press.

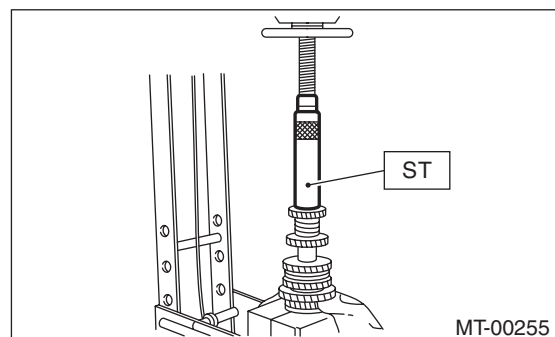
CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Align the groove in baulk ring with insert.

ST 499277200 INSTALLER



7) Install a set of roller bearings onto the driven shaft using ST and press.

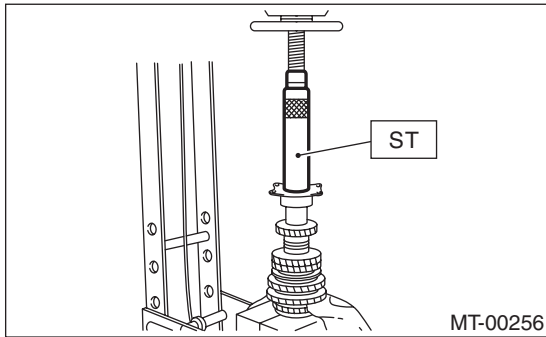
DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

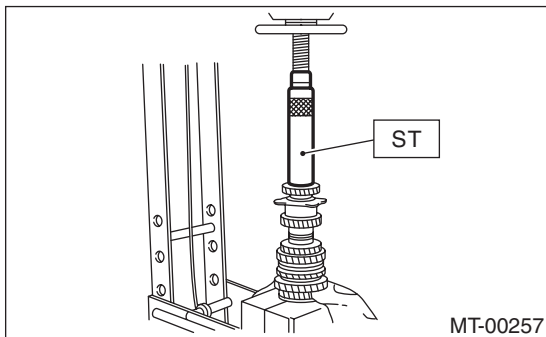


8) Position the woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

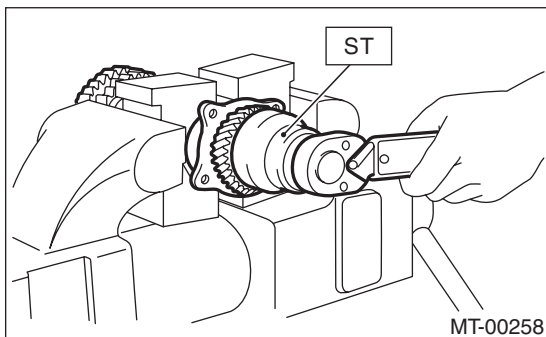


9) Install the lock washer. Install lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

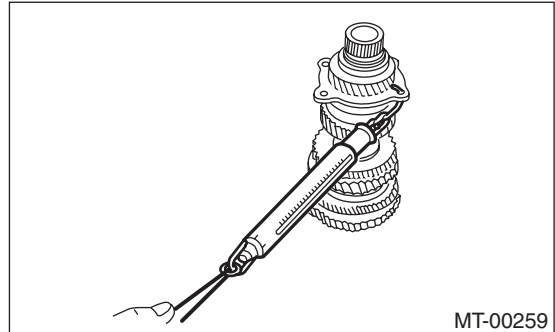
Tightening torque:

260 N·m (26.5 kgf-m, 191.7 ft-lb)



NOTE:

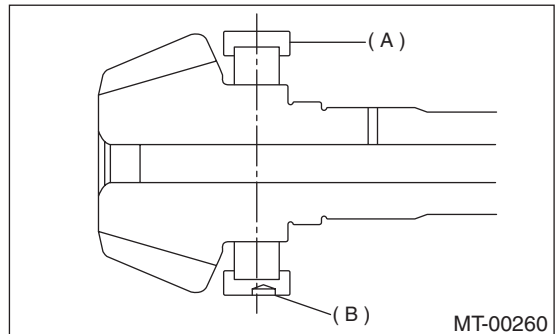
- Stake the lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33ft).



10) Install the roller bearing onto drive pinion.

NOTE:

When installing roller bearing, note its directions (front and rear) because the knock pin hole in outer race is offset.



(A) Roller bearing

(B) Knock pin hole

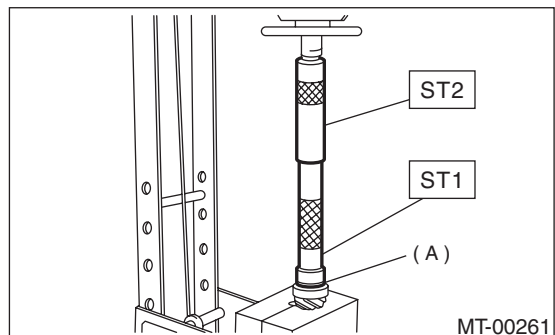
11) Install the washer using ST1, ST2 and press.

CAUTION:

- Discard old lock nuts, replace with new ones.
- Secure lock nut in four places.

ST1 499277100 BUSH 1-2 INSTALLER

ST2 499277200 INSTALLER

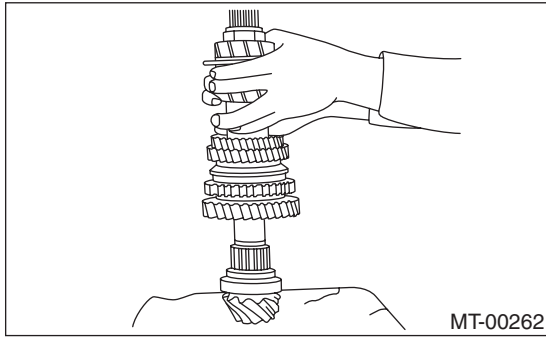


(A) Washer

DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

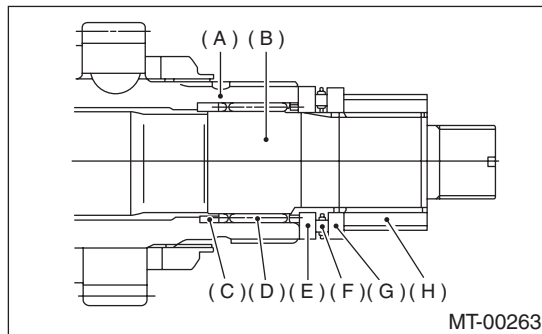
12) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



13) Install the drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:

Be careful because the spacer must be installed in proper direction.



- (A) Driven shaft
- (B) Drive shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Washer No. 2 (25 × 36 × 4)
- (F) Thrust bearing (25 × 37.5 × 3)
- (G) Washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

E: INSPECTION

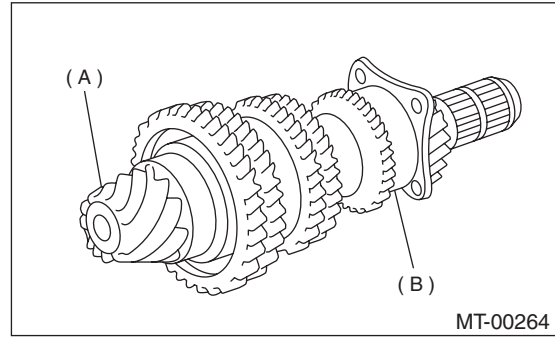
Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the

bearing, its rotation feels like it is slightly dragging unlike the other bearings.



- (A) Drive pinion shaft
- (B) Ball bearing

- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears

- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

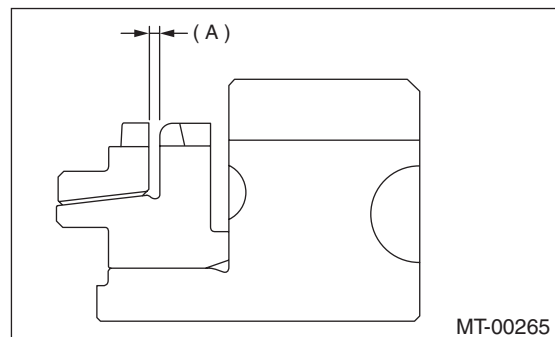
4) Baulk ring

Replace the ring in the 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 when the ring is pressed against the cone.

Clearance (A):

0.5 — 1.0 mm (0.020 — 0.040 in)



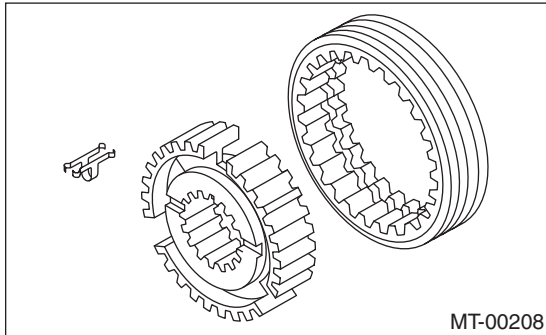
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Shifting insert key

Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

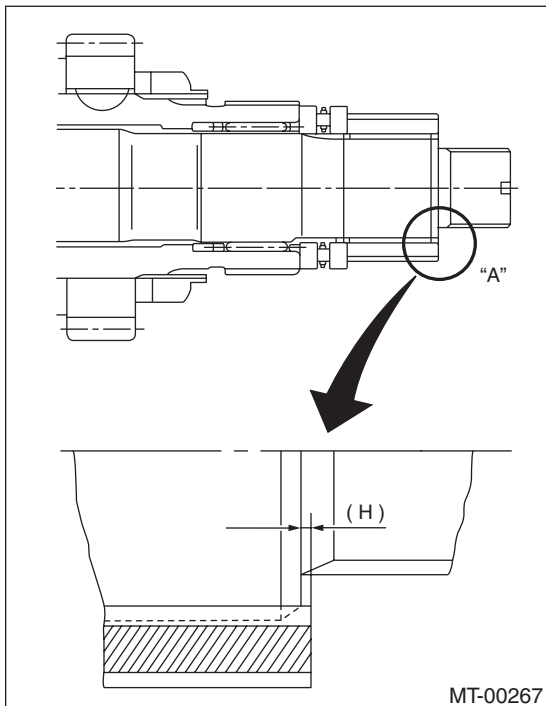
7) O-ring

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) After completing the preceding steps 1) through 3), select adjusting washer No. 1 so that the dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



2) Using ST1, ST2 and ST3, tighten the lock nut to the specified torque.

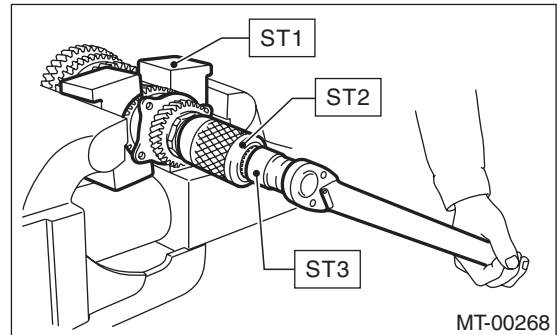
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

120 N·m (12.2 kgf-m, 88.2 ft-lb)



3) After removing ST2, measure the starting torque using torque driver.

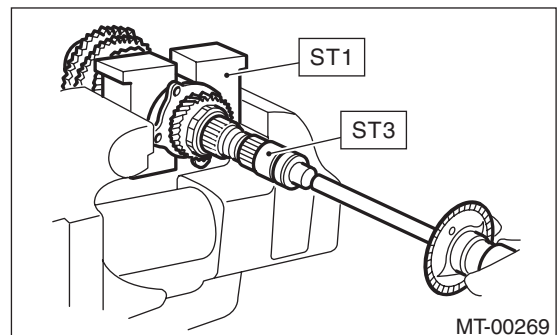
ST1 899884100 HOLDER

ST3 899988608 SOCKET WRENCH (27)

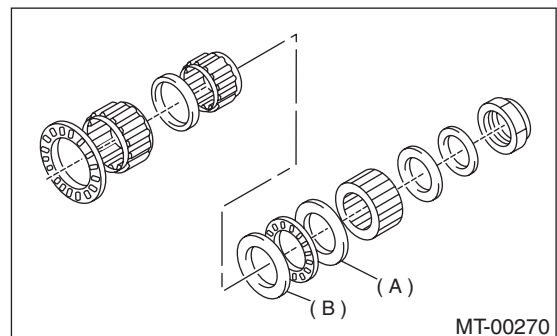
Starting torque:

0.3 — 0.8 N·m

(0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)



4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.



(A) Adjusting washer No.1

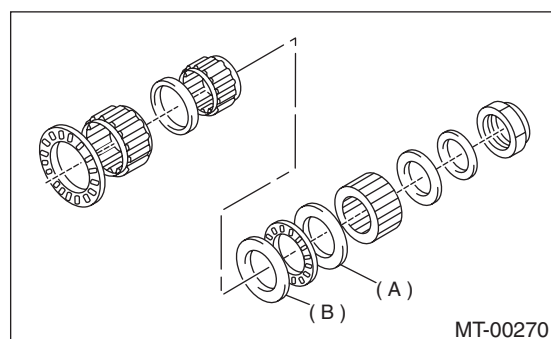
(B) Adjusting washer No.2

DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

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) If specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in 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	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 specified range, then clinch the lock nut at four positions.

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

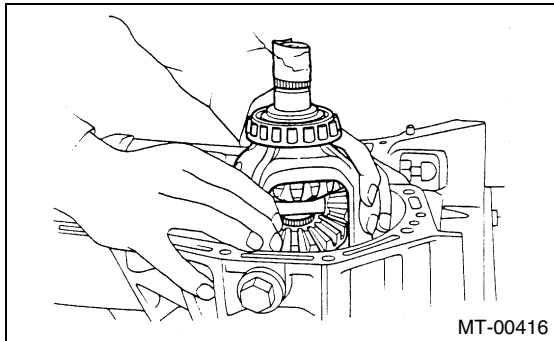
17.Front Differential Assembly

A: REMOVAL

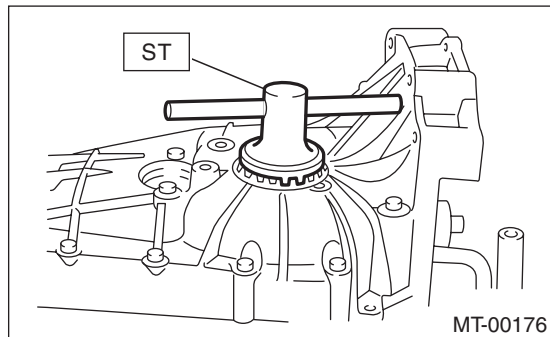
- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to MT-54, REMOVAL, Transmission Case.>
- 4) Removes the drive pinion shaft assembly. <Ref. to MT-63, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly. <Ref. to MT-57, REMOVAL, Main Shaft Assembly for Single-Range.>
- 6) Remove the differential assembly.

CAUTION:

- Be careful not to confuse right and left roller bearing outer races.
- Be careful not to damage retainer oil seal.



- 7) Remove the differential side retainers using ST. ST 499787000 WRENCH ASSY



B: INSTALLATION

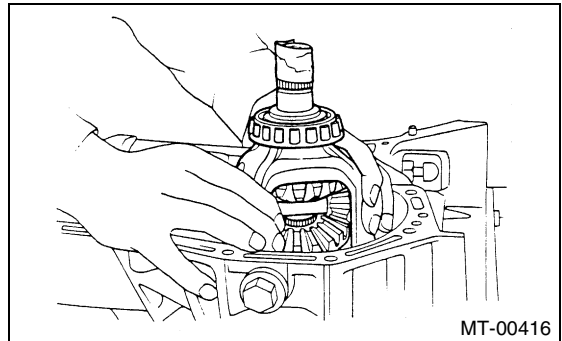
- 1) Install the differential side retainers using ST. ST 499787000 WRENCH ASSY
- 2) Install the differential assembly.

CAUTION:

Be careful not to fold the sealing lip of oil seal.

NOTE:

Wrap the left and right splines sections of axle shaft with vinyl tape to prevent scratches.



- 3) Install the main shaft assembly. <Ref. to MT-57, INSTALLATION, Main Shaft Assembly for Single-Range.>
- 4) Install the drive pinion assembly. <Ref. to MT-63, INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install the transmission case. <Ref. to MT-55, INSTALLATION, Transmission Case.>
- 6) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

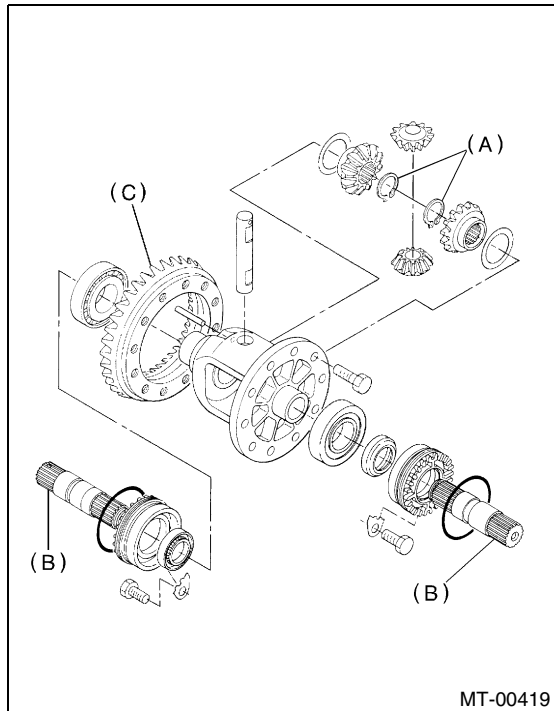
1. DIFFERENTIAL CASE ASSEMBLY

1) Remove the right and left snap rings from differential, and then remove the two axle drive shafts.

NOTE:

During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

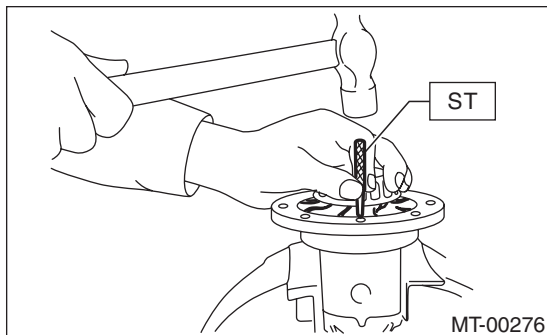
2) Loosen the twelve bolts and remove the hypoid driven gear.



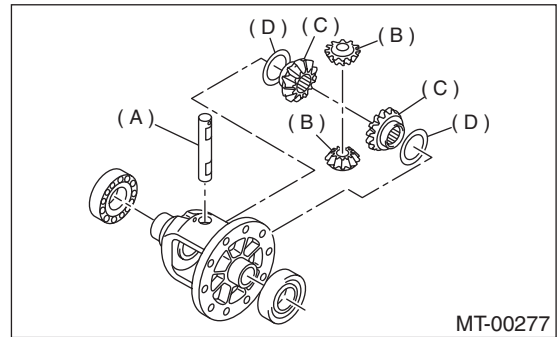
- (A) Snap ring
- (B) Axle drive shaft
- (C) Hypoid driven gear

3) Drive out the straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER

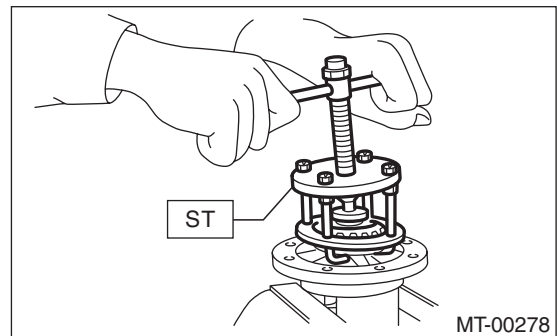


4) Pull out the pinion shaft, and remove the differential bevel pinion and gear and washer.



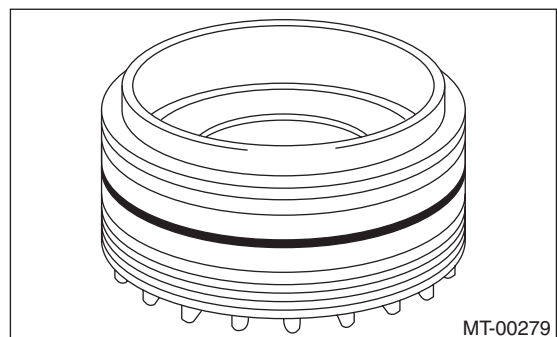
- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

5) Remove the roller bearing using ST. 399527700 PULLER SET



2. SIDE RETAINER

1) Remove the O-ring.



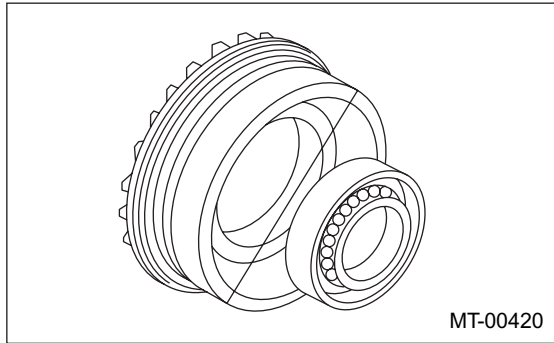
FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Remove the oil seal.

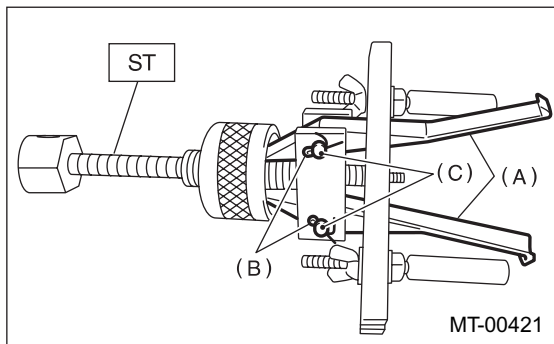
NOTE:

Do not reuse the oil seal. Prepare a new oil seal.



3) Remove either side of split pin and pin, and remove the claw.

ST 398527700 PULLER ASSY



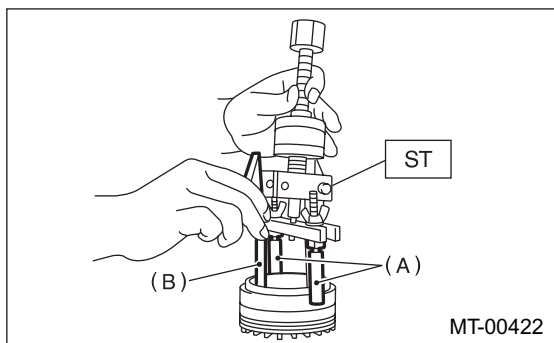
- (A) Claw
- (B) Split pin
- (C) Pin

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

ST 398527700 PULLER ASSY

NOTE:

- Attach notch portions of the two shafts securely to side retainer.
- Restore the removed claws to original position, and install the pin and split pin.



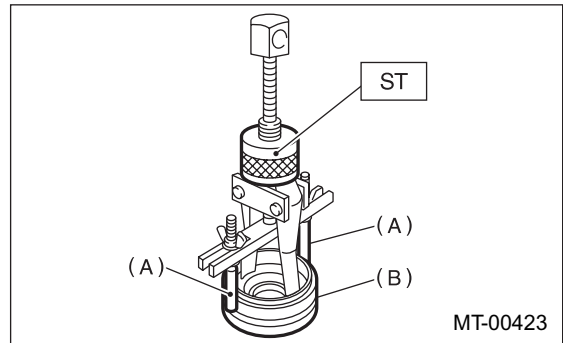
- (A) Shaft
- (B) Claw

5) Remove the bearing outer race from side retainer.

ST 398527700 PULLER ASSY

NOTE:

- Fix the shaft of ST secure enough that it will not loosen and fall from side retainer.
- When replacing the bearing outer race, replace it with inner race as a set.



- (A) Shaft
- (B) Side retainer

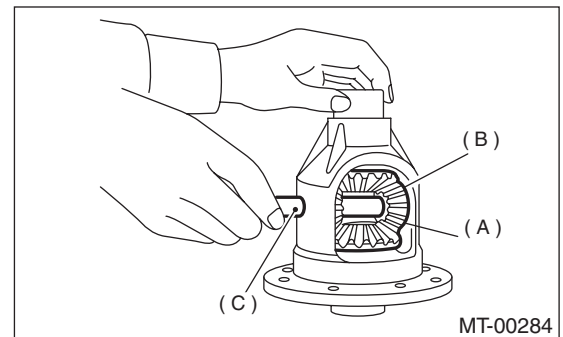
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:

Face the chamfered side of washer toward gear.



- (A) Bevel pinion
- (B) Bevel gear
- (C) Pinion shaft

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to MT-77, ADJUSTMENT, Front Differential Assembly.>

NOTE:

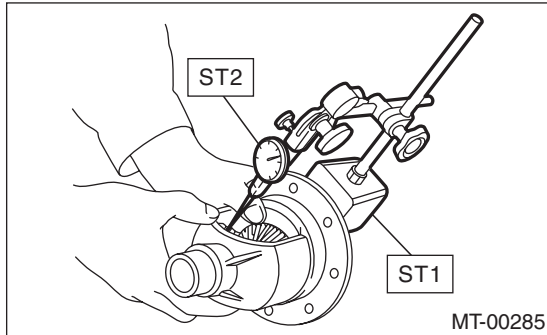
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

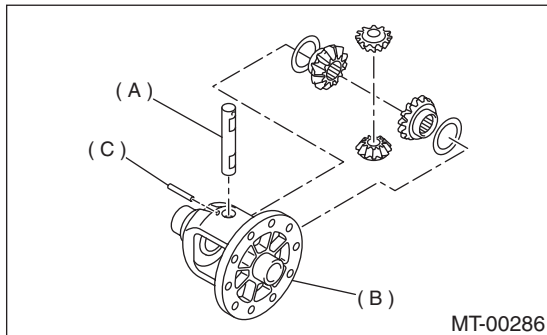


3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

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:

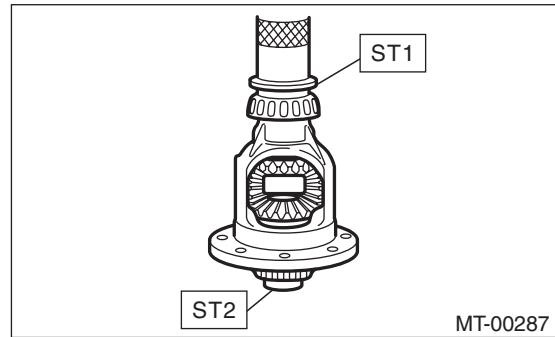
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER

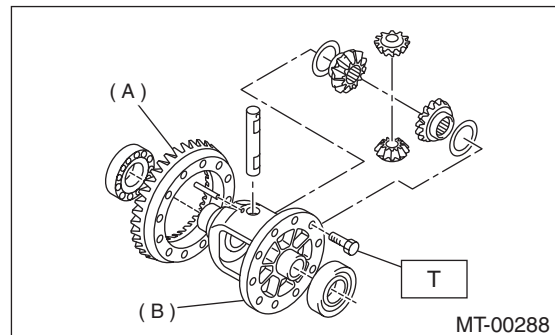
ST2 398497701 ADAPTER



5) Install the hypoid driven gear to 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

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

2. SIDE RETAINER

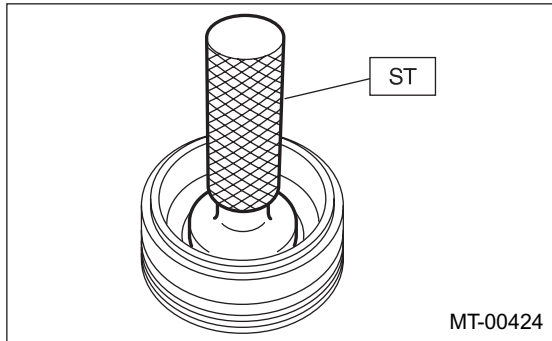
1) Install the bearing outer race to side retainer.

NOTE:

Press-in while being careful not to scratch the side retainer and bearing outer race.

2) Install a new oil seal.

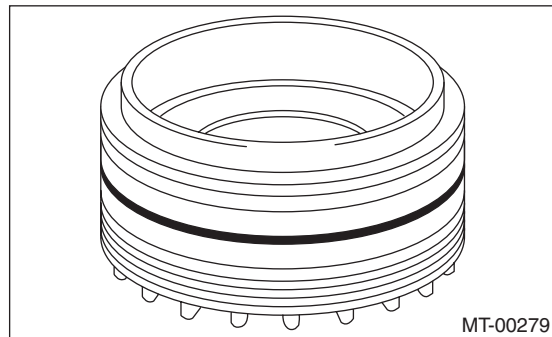
ST 49979700 INSTALLER



3) Install a new O-ring.

NOTE:

Do not stretch or damage the O-ring.



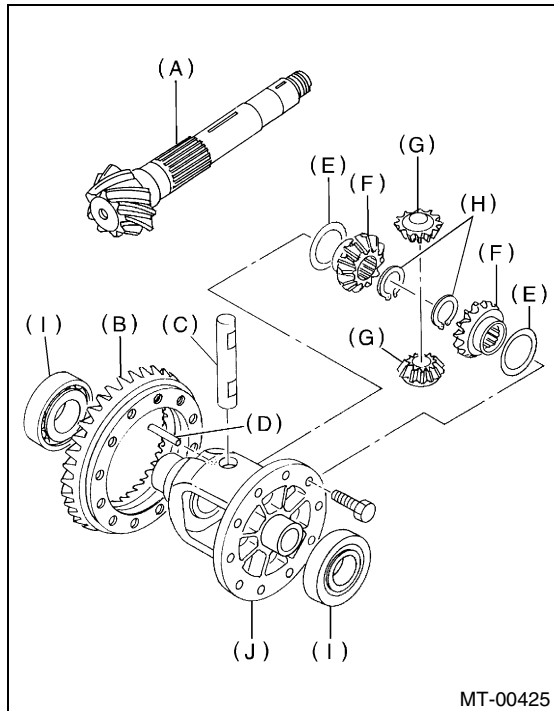
FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

Repair or replace the differential gear in the following cases:

- The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- The differential case has worn or damaged sliding surfaces.



- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Snap ring
- (I) Roller bearing
- (J) Differential case

1. BEVEL PINION GEAR BACKLASH

Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

NOTE:

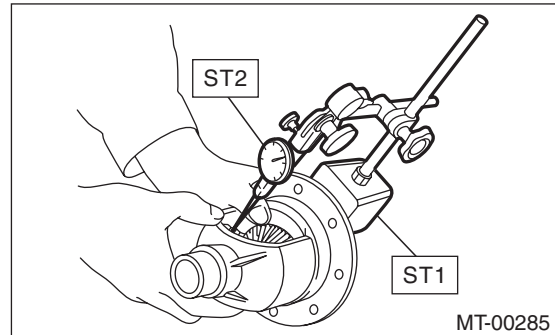
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH

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 at a right angle and check the backlash.

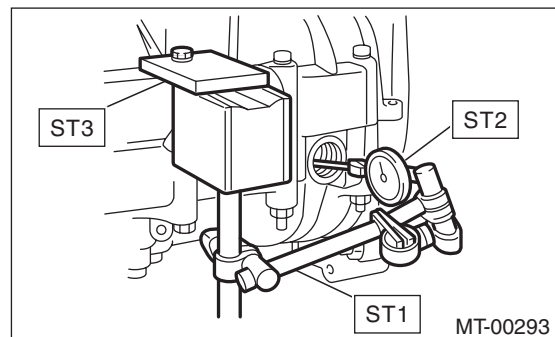
ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

ST3 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



NOTE:

If the backlash is outside specified range, adjust it by turning holder in right side case.

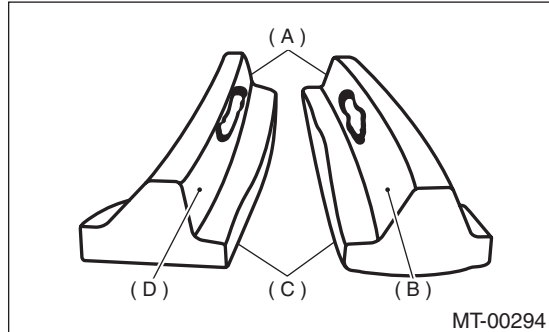
FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

3. TOOTH CONTACT OF HYPOID GEAR

Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 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 hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to MT-77, 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. <Ref. to MT-71, REMOVAL, 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.

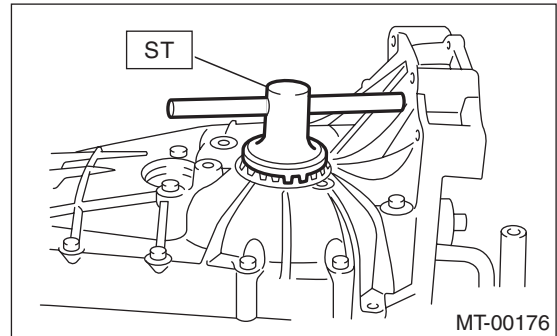
Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

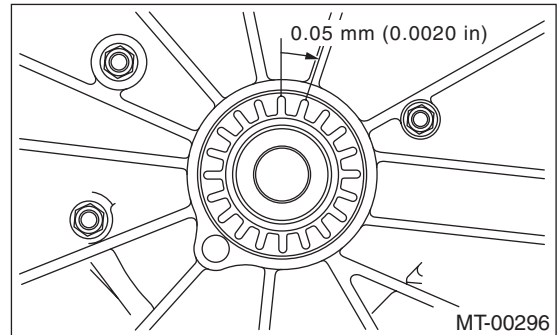
Adjust the backlash by turning holder in right side case.

ST 499787000 WRENCH ASSY



NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



FRONT DIFFERENTIAL ASSEMBLY

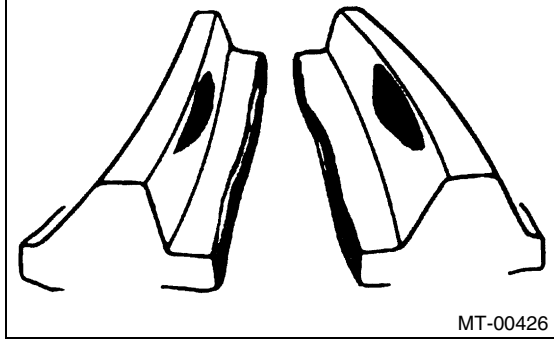
MANUAL TRANSMISSION AND DIFFERENTIAL

3. TOOTH CONTACT OF HYPOID GEAR

Adjust until the teeth contact is correct.

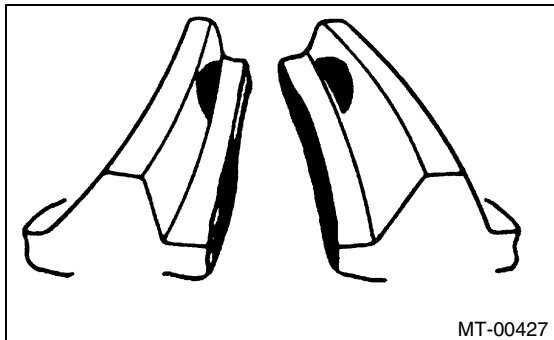
- Backlash is excessive.

To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.



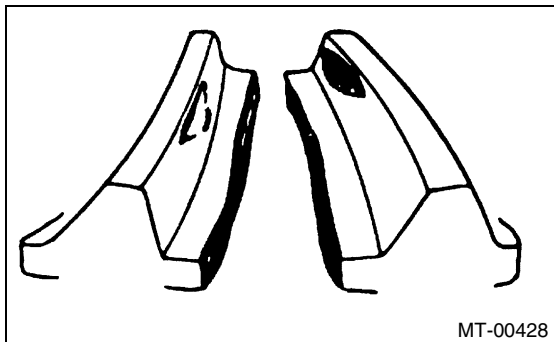
- Backlash is insufficient.

To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.

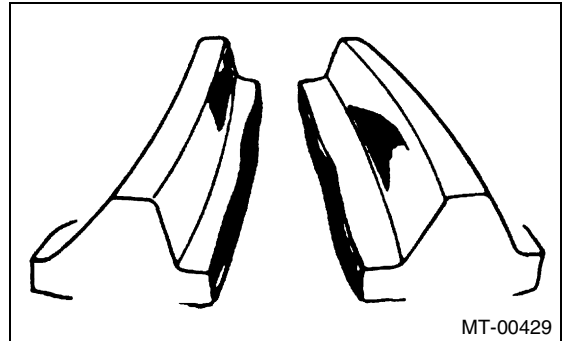


- The drive pinion shim selected before is too thick.

Reduce its thickness.



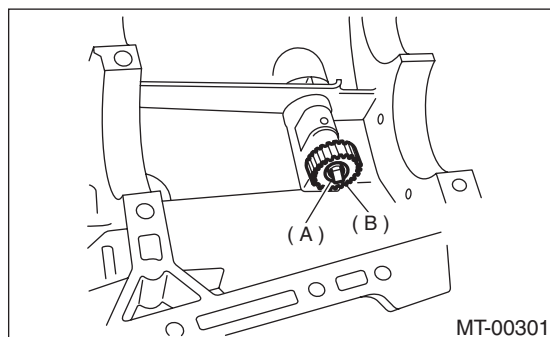
- The drive pinion shim selected before is too thin. Increase its thickness.



18.Speedometer Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to MT-37, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to MT-54, REMOVAL, Transmission Case.>
- 5) Remove the vehicle speed sensor. <Ref. to MT-39, REMOVAL, Vehicle Speed Sensor.>
- 6) Remove the outer snap ring and pull out the speedometer driven gear. Next, remove the oil seal, speedometer shaft and washer.



- (A) Outer snap ring
(B) Speedometer driven gear

B: INSTALLATION

- 1) Install the washer and speedometer shaft, and press fit oil seal with ST.

CAUTION:

Use new oil seal, if it has been removed.

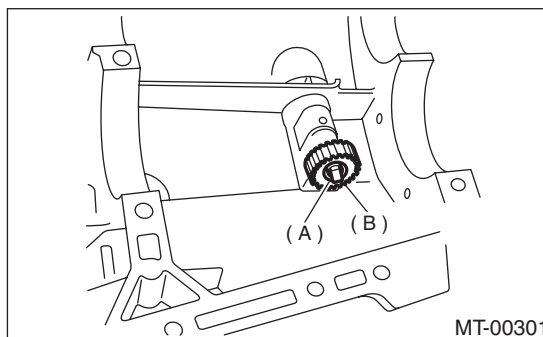
ST 899824100 or 499827000PRESS

- 2) Install the vehicle speed sensor. <Ref. to MT-39, INSTALLATION, Vehicle Speed Sensor.>

- 3) Install the speedometer driven gear and snap ring.

CAUTION:

Use new snap ring, if it has been removed.



- (A) Outer snap ring
(B) Speedometer driven gear

- 4) Install the transmission case. <Ref. to MT-55, INSTALLATION, Transmission Case.>

- 5) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>

- 6) Install the back-up light switch and neutral position switch. <Ref. to MT-38, INSTALLATION, Switches and Harness.>

- 7) Install the manual transmission assembly to vehicle.<Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

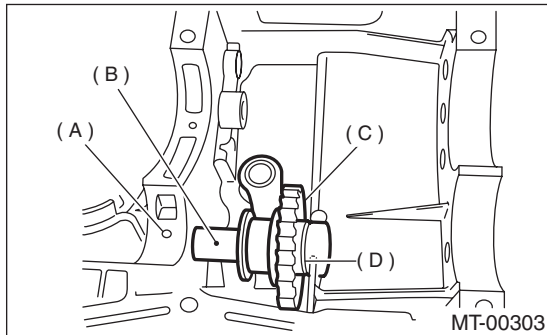
REVERSE IDLER GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

19. Reverse Idler Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to MT-37, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to MT-63, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the drive pinion shaft assembly. <Ref. to MT-63, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly. <Ref. to MT-57, REMOVAL, Main Shaft Assembly for Single-Range.>
- 7) Remove the differential assembly. <Ref. to MT-71, REMOVAL, Front Differential Assembly.>
- 8) Remove the shifter forks and rods. <Ref. to MT-82, REMOVAL, Shifter Fork and Rod.>
- 9) Pull out the straight pin, and remove the idler gear shaft, reverse idler gear and washer.



- (A) Straight pin
- (B) Idler gear shaft
- (C) Idler gear
- (D) Washer

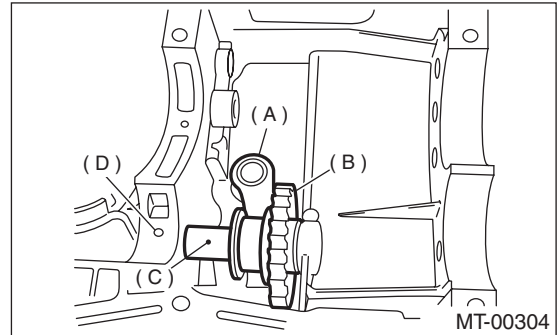
- 10) Remove the reverse shifter lever.

B: INSTALLATION

- 1) Install the reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:

Be sure to install the reverse idler shaft from the rear side.



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin

- 2) Inspect and adjust the clearance between reverse idler gear and transmission case wall. <Ref. to MT-80, INSTALLATION, Reverse Idler Gear.> and <Ref. to MT-81, ADJUSTMENT, Reverse Idler Gear.>
- 3) Install the shifter forks and rods. <Ref. to MT-82, INSTALLATION, Shifter Fork and Rod.>
- 4) Install the differential assembly. <Ref. to MT-71, INSTALLATION, Front Differential Assembly.>
- 5) Install the main shaft assembly. <Ref. to MT-57, INSTALLATION, Main Shaft Assembly for Single-Range.>
- 6) Install the drive pinion shaft assembly. <Ref. to MT-63, INSTALLATION, Drive Pinion Shaft Assembly.>
- 7) Install the transmission case. <Ref. to MT-55, INSTALLATION, Transmission Case.>
- 8) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install the back-up light switch and neutral position switch. <Ref. to MT-38, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly to vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

- 1) Move the reverse shifter rod toward the reverse side. Inspect the clearance between reverse idler gear and transmission case wall.

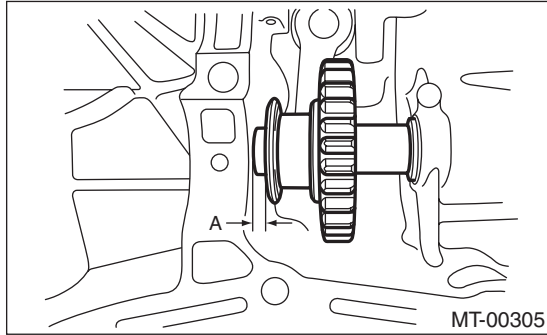
REVERSE IDLER GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

If out of specification, select the appropriate reverse shifter lever and adjust.

Clearance A:

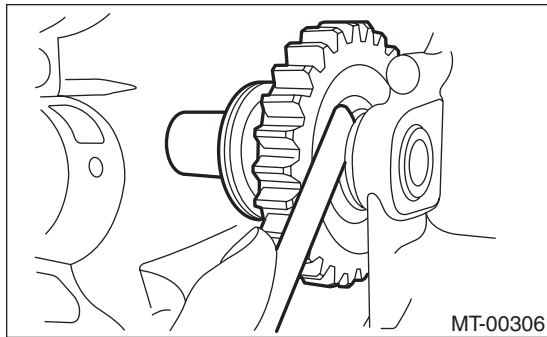
6.0 — 7.5 mm (0.236 — 0.295 in)



2) After installing a suitable reverse shifter lever, shift into neutral. Inspect the clearance between reverse idler gear and transmission case wall. If out of specification, select the appropriate washer and adjust.

Clearance:

0 — 0.5 mm (0 — 0.020 in)



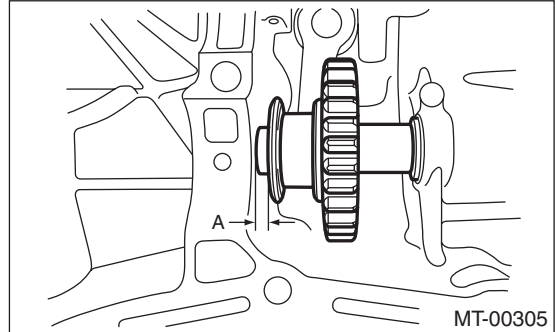
3) Check the reverse idler gear and shaft for damage. Replace if damaged.

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)

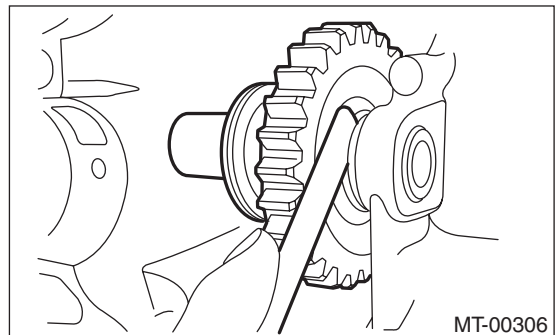


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

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)

SHIFTER FORK AND ROD

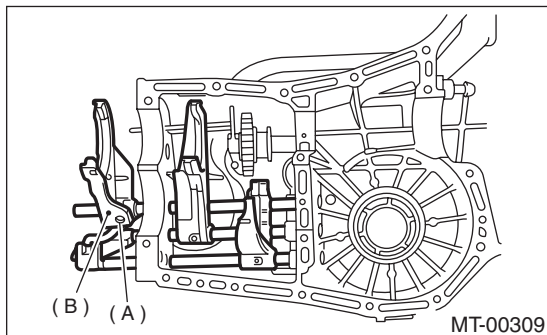
MANUAL TRANSMISSION AND DIFFERENTIAL

20. Shifter Fork and Rod

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to MT-37, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to MT-41, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to MT-54, REMOVAL, Transmission Case.>
- 5) Remove the drive pinion shaft assembly. <Ref. to MT-63, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly. <Ref. to MT-57, REMOVAL, Main Shaft Assembly for Single-Range.>
- 7) Remove the differential assembly. <Ref. to MT-71, REMOVAL, Front Differential Assembly.>
- 8) Drive out the straight pin with ST, and 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER

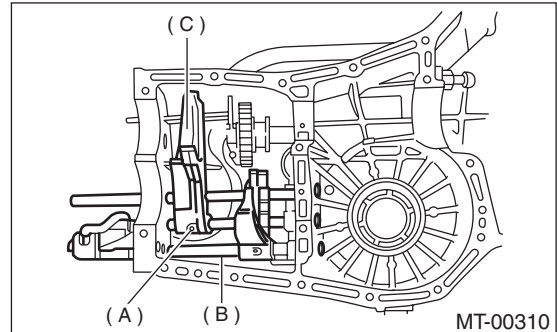


- (A) Straight pin
(B) 5th shifter fork

- 9) Remove the plugs, springs and checking balls.
- 10) Drive out the straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:

When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward the inside of the case so that it does not hit against the case.



- (A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

- 11) Drive out the straight pin, and pull out the 1-2 fork rod and shifter fork.
- 12) Remove the outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out the ball, spring and interlock plunger from rod. And then remove the rod.

NOTE:

When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

- 13) Remove the reverse shifter lever.

B: INSTALLATION

- 1) Install the reverse arm fork spring, ball and interlock plunger to reverse fork rod arm. Insert the reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

CAUTION:

Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

- 2) Position the ball, spring and gasket in reverse shifter rod hole, on left side transmission case, and tighten the checking ball plug.

CAUTION:

Replace gasket with a new one.

- 3) Install the 1-2 fork rod into 1-2 shifter fork via the hole on the rear of the transmission case.

SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Align the holes in rod and fork, and drive straight pin into these holes using ST.

CAUTION:

Replace straight pin with a new one.

NOTE:

- Set other rods to neutral.
- Make sure interlock plunger is on the 3-4 fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

5) Install the interlock plunger onto 3-4 fork rod.

CAUTION:

Apply a coat of grease to plunger to prevent it from falling.

6) Install the 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

7) Align the holes in rod and fork, and drive straight pin into these holes.

CAUTION:

Replace straight pin with a new one.

NOTE:

- Set the reverse fork rod to neutral.
- Make sure the interlock plunger (installing before) is on the reverse fork rod side.

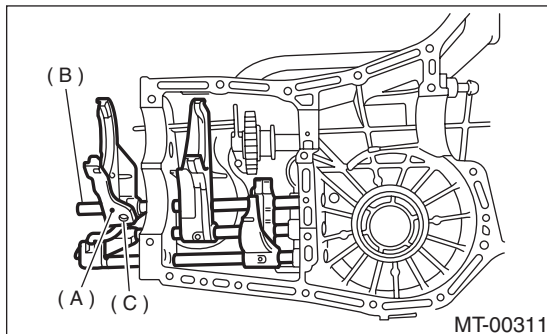
ST 398791700 STRAIGHT PIN REMOVER

8) Install the 5th shifter fork onto the rear of reverse fork rod. Align the holes in the two parts and drive straight pin into place.

CAUTION:

Replace straight pin with a new one.

ST 398791700 STRAIGHT PIN REMOVER



- (A) 5th shifter fork
- (B) Reverse fork rod
- (C) Straight pin

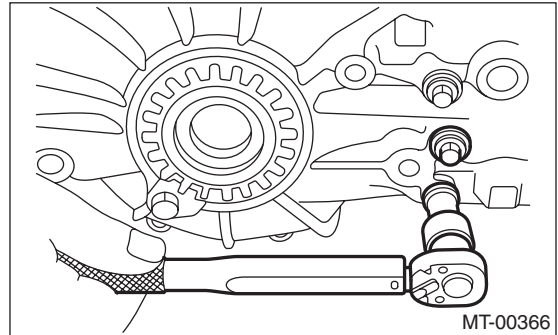
9) Position the balls, checking ball springs and gaskets into 3-4 and 1-2 rod holes, and install plugs.

CAUTION:

Replace gasket with a new one.

Tightening torque:

20 N·m (2.0 kgf-m, 14.5 ft-lb)



10) Install the differential assembly. <Ref. to MT-71, INSTALLATION, Front Differential Assembly.>

11) Install the main shaft assembly.

Single-range model:

<Ref. to MT-57, INSTALLATION, Main Shaft Assembly for Single-Range.>

12) Install the drive pinion shaft assembly. <Ref. to MT-63, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install the transmission case. <Ref. to MT-55, INSTALLATION, Transmission Case.>

14) Install the transfer case with extension case assembly. <Ref. to MT-41, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch and neutral position switch. <Ref. to MT-38, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to vehicle. <Ref. to MT-30, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Check the shift shaft and shift rod for damage. Replace if damaged.

2) Gearshift mechanism

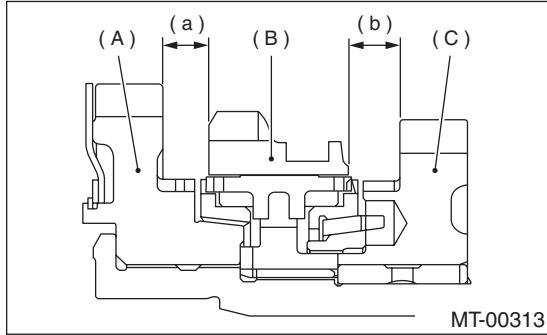
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

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)

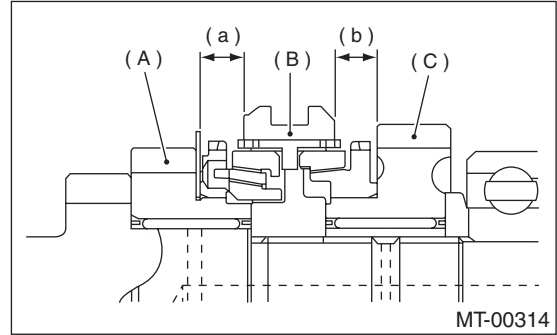


- (A) 1st driven gear
- (B) Reverse driven gear
- (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 2nd gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 1st gear by 0.2 mm (0.008 in).

4) Inspect the clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a) and (b):
9.3 mm (0.366 in)



- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

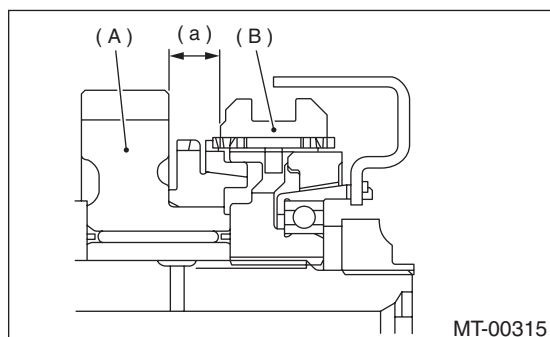
SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Inspect the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a):

9.3 mm (0.366 in)



- (A) 5th drive gear
(B) Coupling sleeve

5th shifter fork (Non-turbo)		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (Turbo)		
Part No.	Mark	Remarks
32812AA231	7	Become distant from 5th gear by 0.2 mm (0.008 in).
32812AA241	—	Standard
32812AA251	9	Approach to 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):

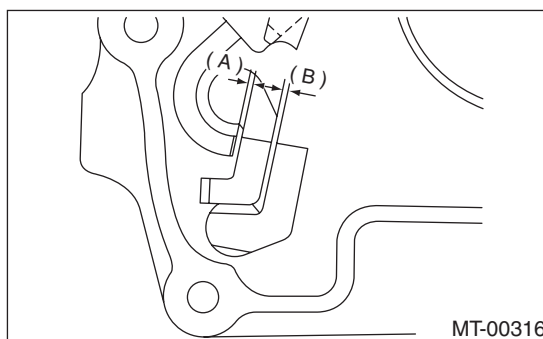
1st — 2nd to 3rd — 4th:

0.4 — 1.4 mm (0.016 — 0.055 in)

Clearance (B):

3rd — 4th to 5th:

0.5 — 1.3 mm (0.020 — 0.051 in)



GENERAL DIAGNOSTIC

MANUAL TRANSMISSION AND DIFFERENTIAL

21. General Diagnostic

A: INSPECTION

1. MANUAL TRANSMISSION

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, 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 of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

GENERAL DIAGNOSTIC

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DIFFERENTIAL

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble differential and replace broken components and 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 clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. • Gear noise when driving: If noise increases as 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 maladjusted bearings and incorrect shim adjustment • Bearing noise when driving or when coasting: Cracked, broken or damaged bearings • Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

GENERAL DIAGNOSTIC

MANUAL TRANSMISSION AND DIFFERENTIAL
