

AUTOMATIC TRANSMISSION

General Description

AUTOMATIC TRANSMISSION

1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Model	Non-turbo	Turbo
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	2.05 — 2.35	2.05 — 2.35
Nominal diameter mm (in)	246 (9.69)	
Stall speed (at sea level) rpm	2,300 — 2,800	2,600 — 3,400
One-way clutch	Sprague type one-way clutch	

2. OIL PUMP

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

3. TRANSMISSION CONTROL ELEMENT

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

4. TRANSMISSION GEAR RATIO

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

5. PLANETARY GEAR AND PLATE

Model	Non-turbo	Turbo
Tooth number of front sun gear	33	
Tooth number of front pinion	21	
Tooth number of front internal gear	75	
Tooth number of rear sun gear	42	
Tooth number of rear pinion	17	
Tooth number of rear internal gear	75	
Drive plate number of high clutch	4	5
Drive plate number of low clutch	5	7
Drive plate number of reverse clutch	2	
Drive plate number of 2-4 brake	3	4
Drive plate number of low & reverse brake	5	7

6. SELECTOR POSITION

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
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	Hydraulic remote control

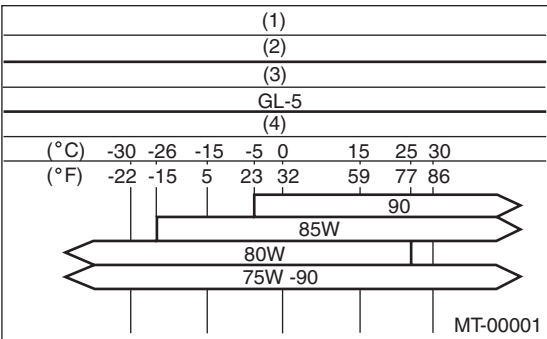
7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	Dexron III type
Fluid capacity ℓ (US qt, Imp qt)	9.3 — 9.6 (9.8 — 10.1, 8.2 — 8.4)
Lubrication system	Forced feed lubrication with oil pump
Oil	Automatic transmission fluid (above mentioned)

8. COOLING AND HARNESS

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

11.RECOMMENDED GEAR OIL

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

9. TRANSFER

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

10.FINAL REDUCTION

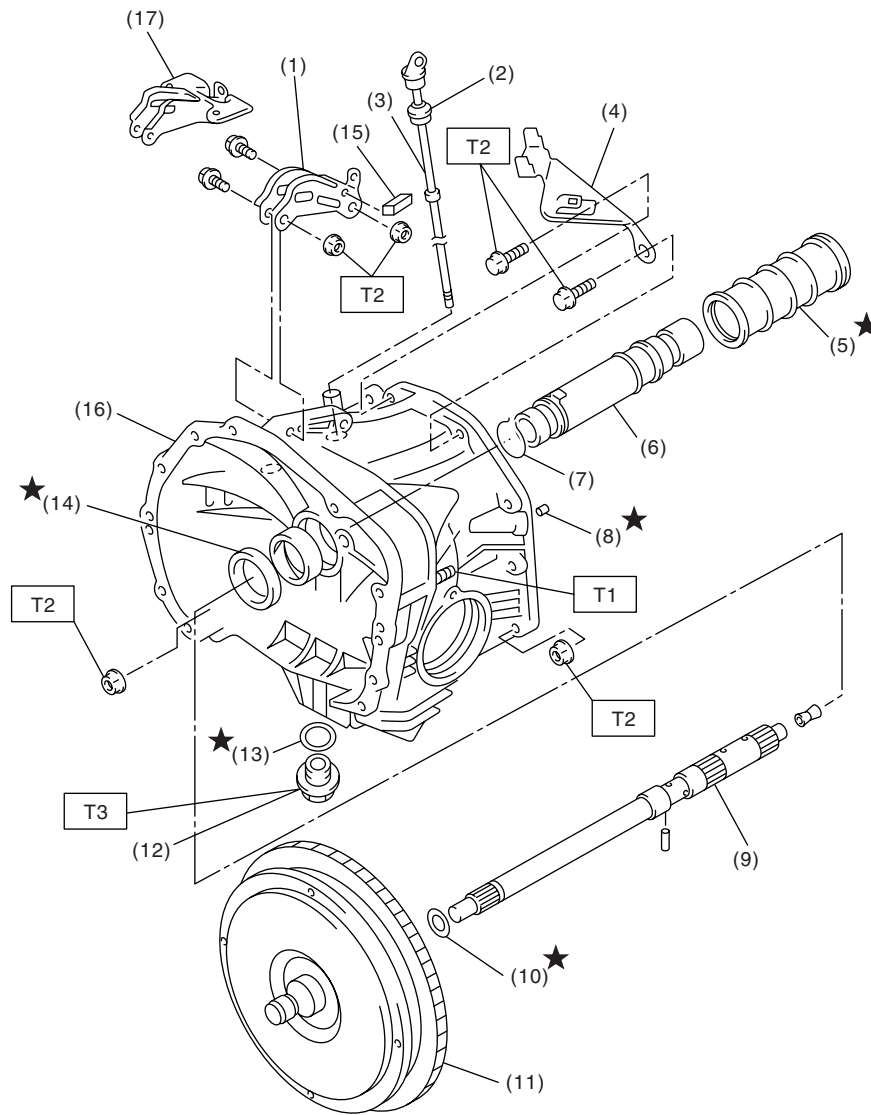
Final gear ratio	4.111 (37/9)

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B: COMPONENT

1. TORQUE CONVERTER CLUTCH AND CASE



AT-02375

- (1) Pitching stopper bracket (Turbo model)
- (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 ASSY
- (12) Drain plug
- (13) Gasket
- (14) Oil seal
- (15) Clip (Turbo model)
- (16) Converter case

- (17) Pitching stopper bracket (Non-turbo model)

Tightening torque: N·m (kgf-m, ft-lb)

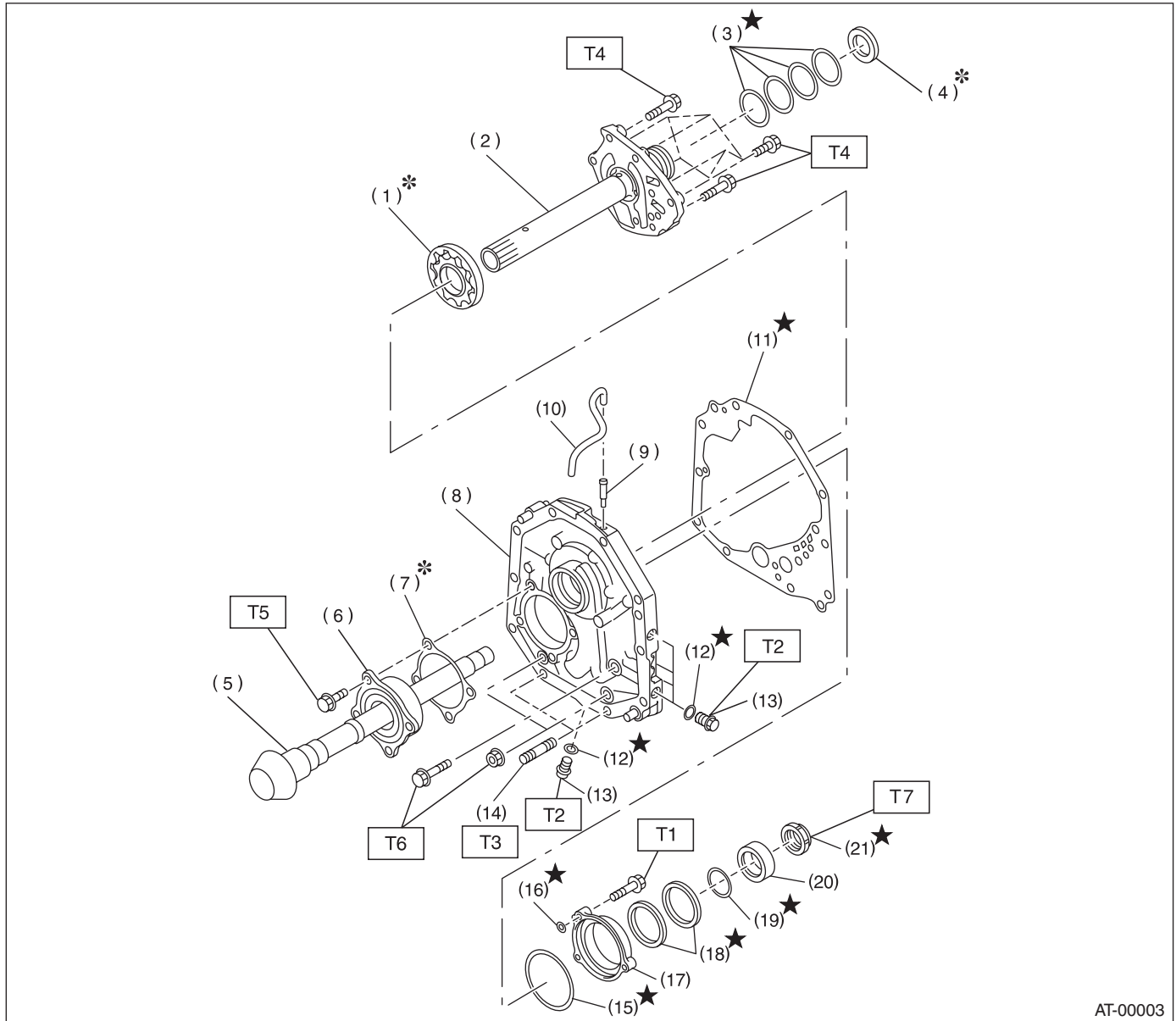
T1: 18 (1.8, 13)

T2: 41 (4.2, 30)

T3: 70 (7.1, 51) (Copper gasket)

44 (4.5, 33) (Aluminum gasket)

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

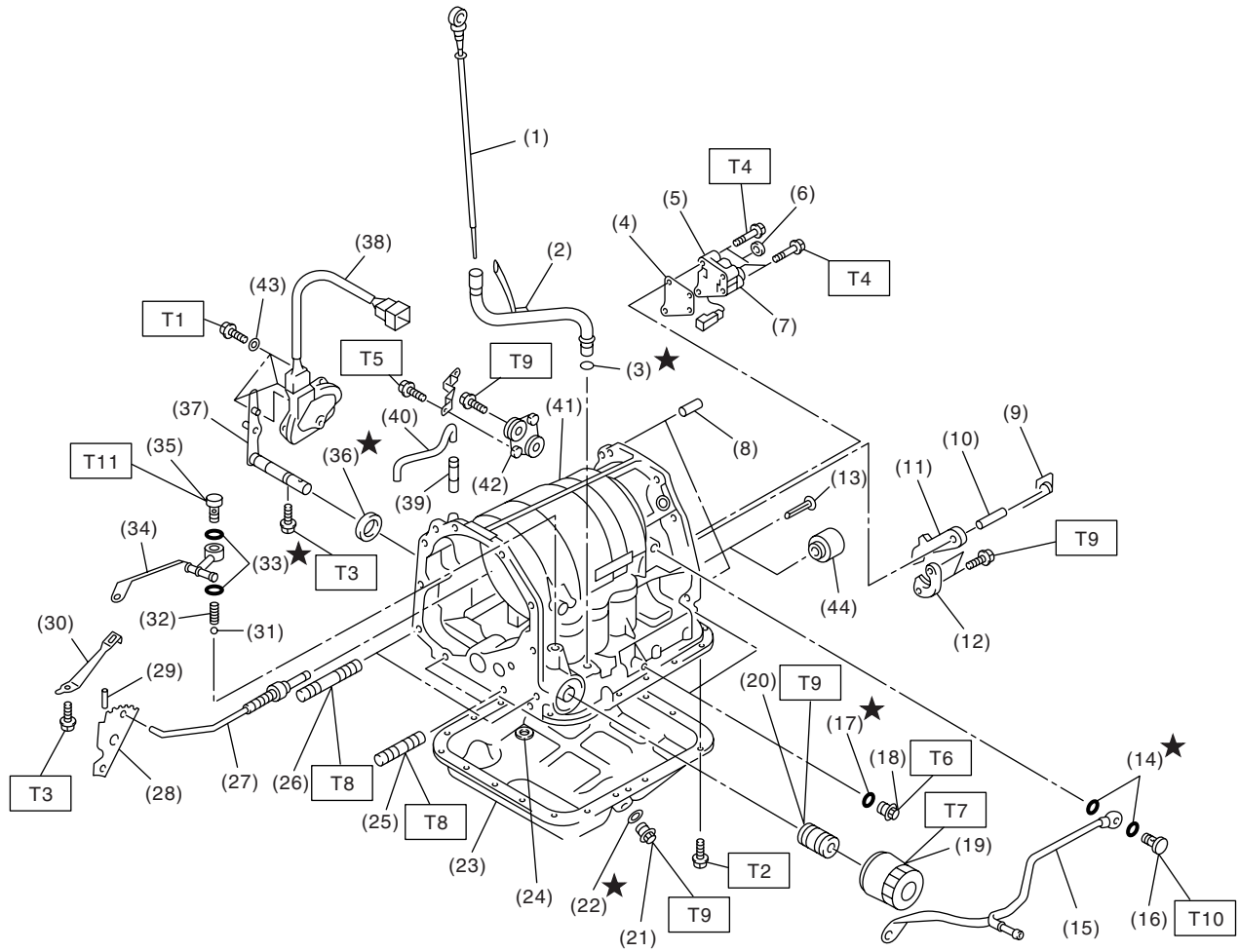
- (21) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)**T1: 7 (0.7, 5.1)****T2: 13 (1.3, 9)****T3: 18 (1.8, 13)****T4: 25 (2.5, 18)****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



AT-03011

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(1) ATF level gauge	(19) Oil filter (Turbo model)	(39) Nipple
(2) ATF charger pipe	(20) Oil filter stud bolt	(40) Air breather hose
(3) O-ring	(21) Drain plug	(41) Transmission case
(4) Transfer valve plate (Turbo model)	(22) Gasket	(42) Plate ASSY
(5) Transfer valve ASSY (Turbo model)	(23) Oil pan	(43) Washer
(6) Transfer clutch seal (Turbo model)	(24) Magnet	(44) Transfer clutch seal (Non-turbo model)
(7) Transfer duty solenoid (Turbo model)	(25) Stud bolt (Short)	
(8) Straight pin	(26) Stud bolt (Long)	
(9) Return spring	(27) Parking rod	
(10) Shaft	(28) Manual plate	
(11) Parking pawl	(29) Spring pin	
(12) Parking support	(30) Detention spring	
(13) Inlet filter (Turbo model)	(31) Ball	
(14) Gasket	(32) Spring	
(15) Inlet pipe	(33) Gasket	
(16) Union screw	(34) Outlet pipe	
(17) O-ring	(35) Union screw	
(18) Test plug	(36) Oil seal	
	(37) Select lever	
	(38) Inhibitor switch ASSY	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 3.5 (0.36, 2.6)

T2: 5 (0.5, 3.6)

T3: 6 (0.6, 4.3)

T4: 8 (0.8, 5.8)

T5: 12 (1.2, 9)

T6: 13 (1.3, 9)

T7: 14 (1.4, 10)

T8: 18 (1.8, 13)

T9: 25 (2.5, 18)

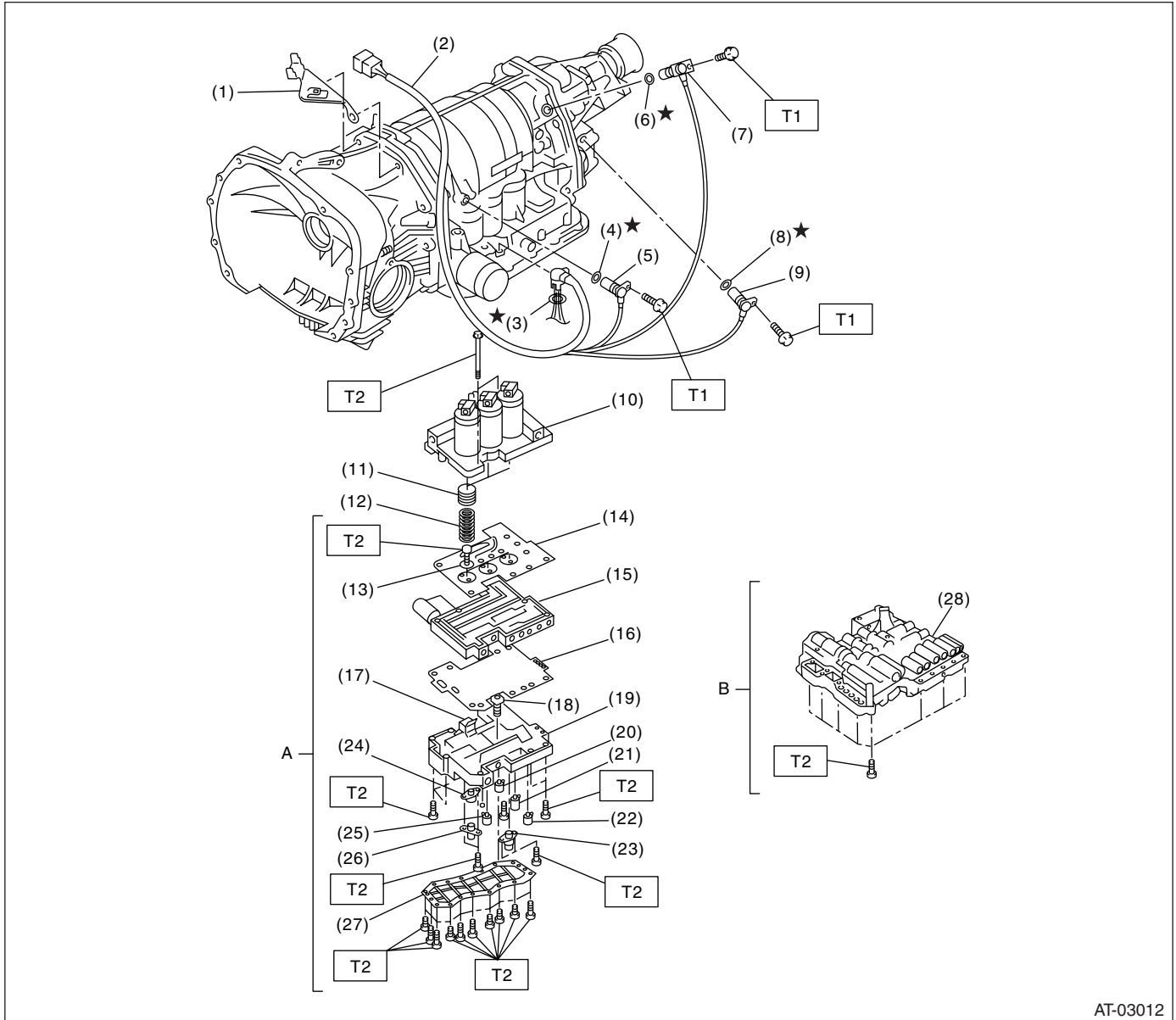
T10: 40 (4.1, 30)

T11: 45 (4.6, 33)

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4. CONTROL VALVE AND HARNESS ROUTING



AT-03012

A : Turbo model

B : Non-turbo model

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

- (11) Accumulator piston
- (12) Accumulator spring
- (13) Side plate
- (14) Separate plate
- (15) Middle valve body
- (16) Separate plate
- (17) Fluid filter
- (18) Fluid filter
- (19) Lower valve body
- (20) Shift solenoid 2
- (21) Shift solenoid 1

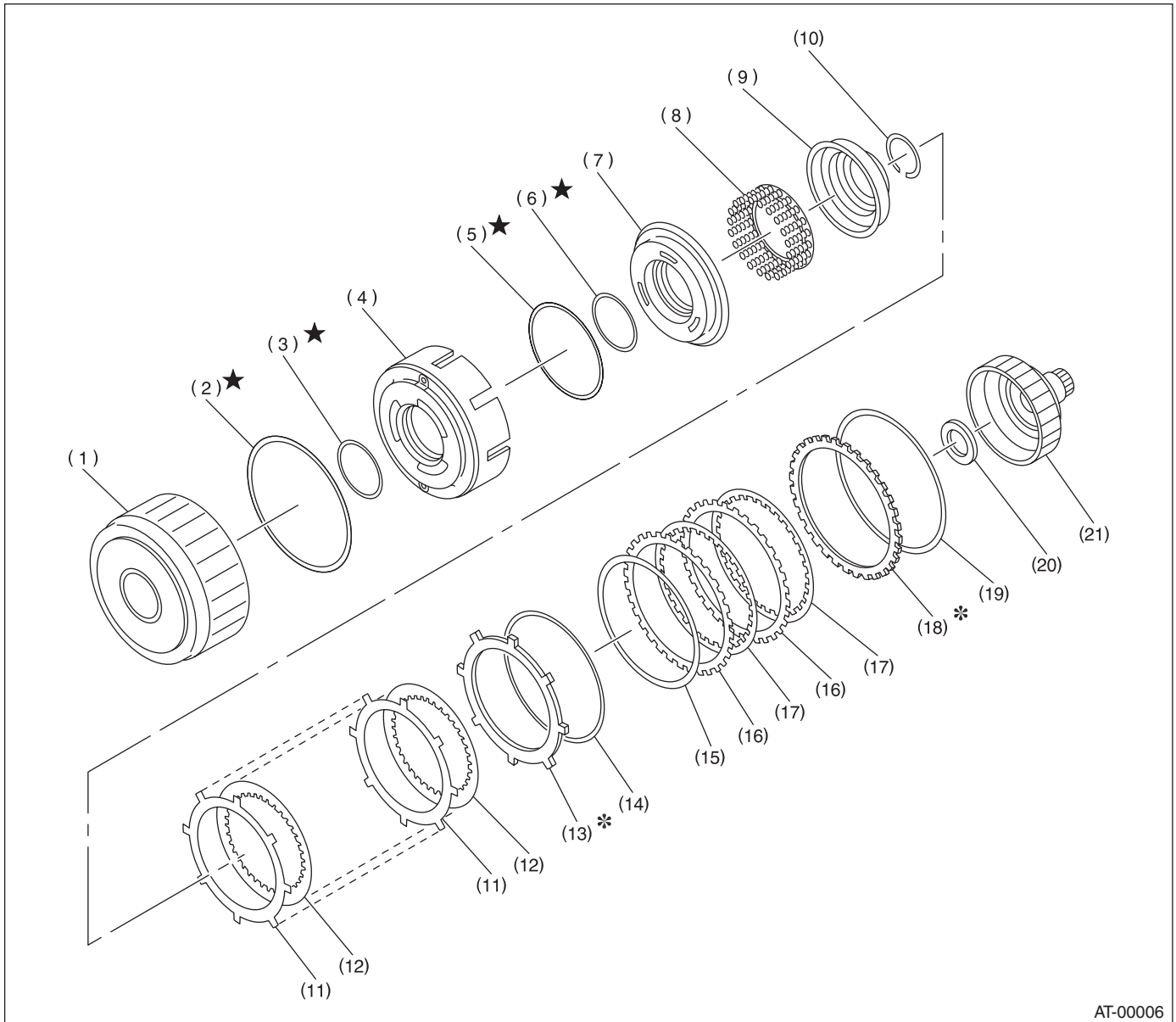
- (22) 2-4 brake timing solenoid
- (23) 2-4 brake duty solenoid
- (24) Line pressure duty solenoid
- (25) Low clutch timing solenoid
- (26) Lock-up duty solenoid
- (27) Oil strainer
- (28) Control valve ASSY

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



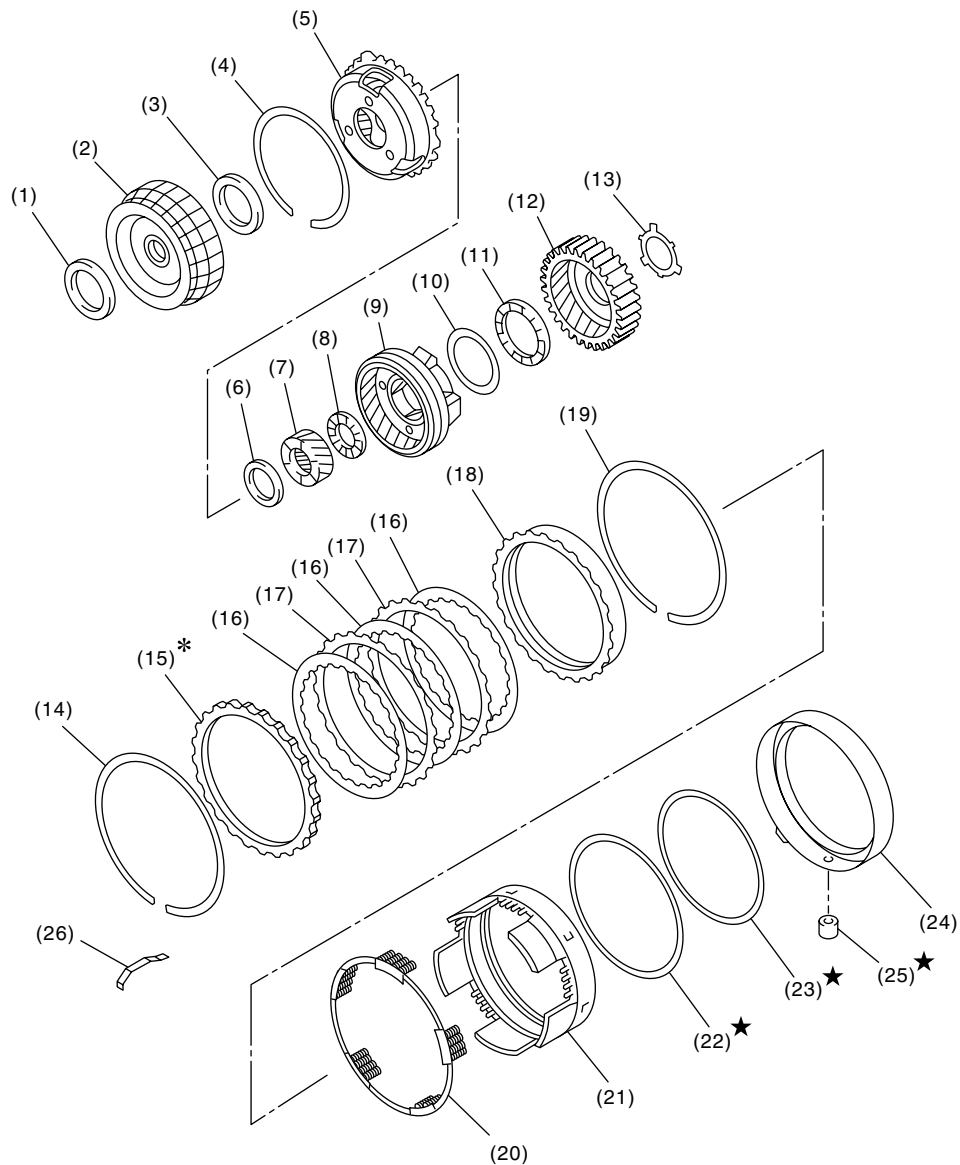
AT-00006

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

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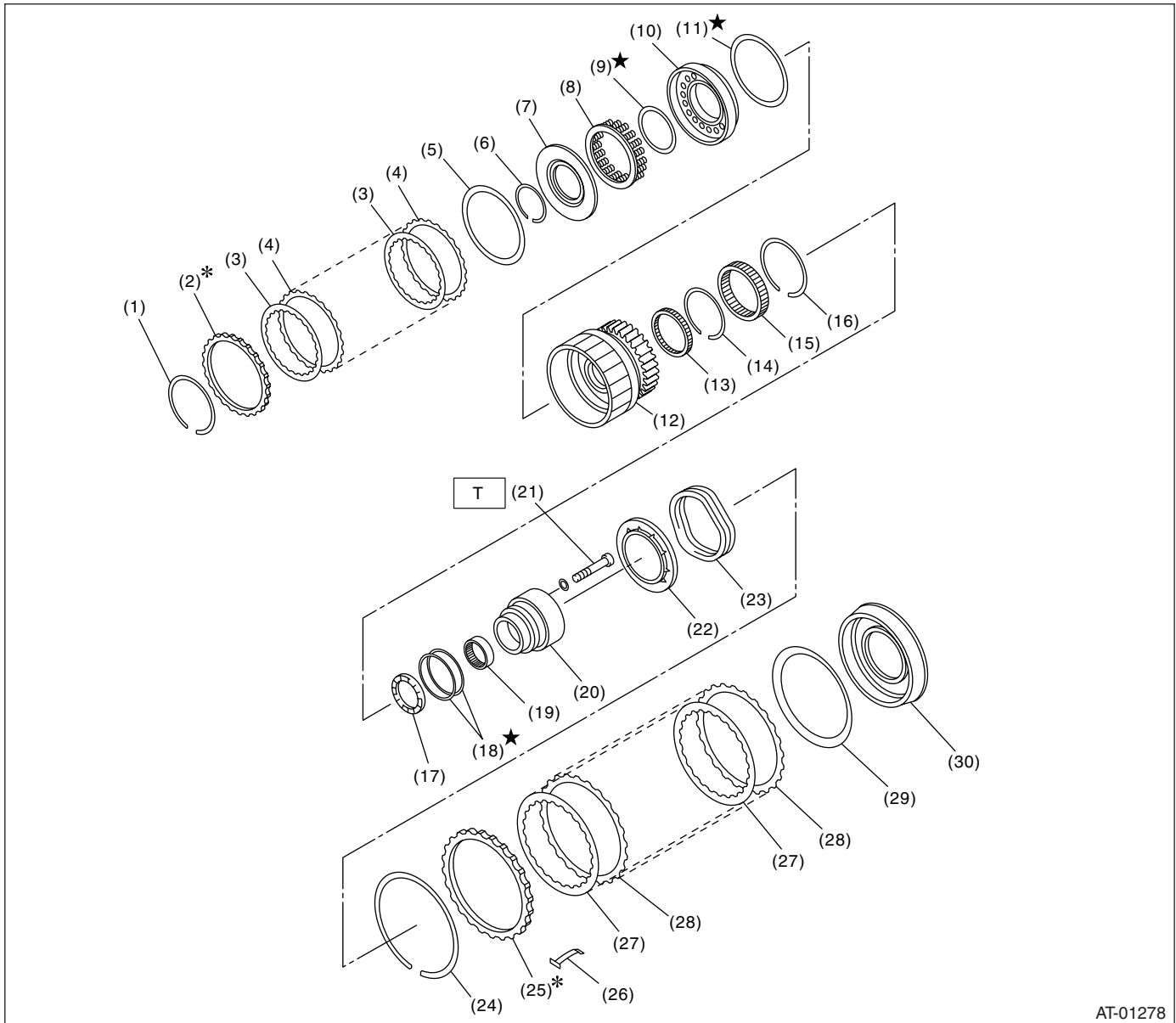
6. PLANETARY GEAR AND 2-4 BRAKE



AT-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-01278

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

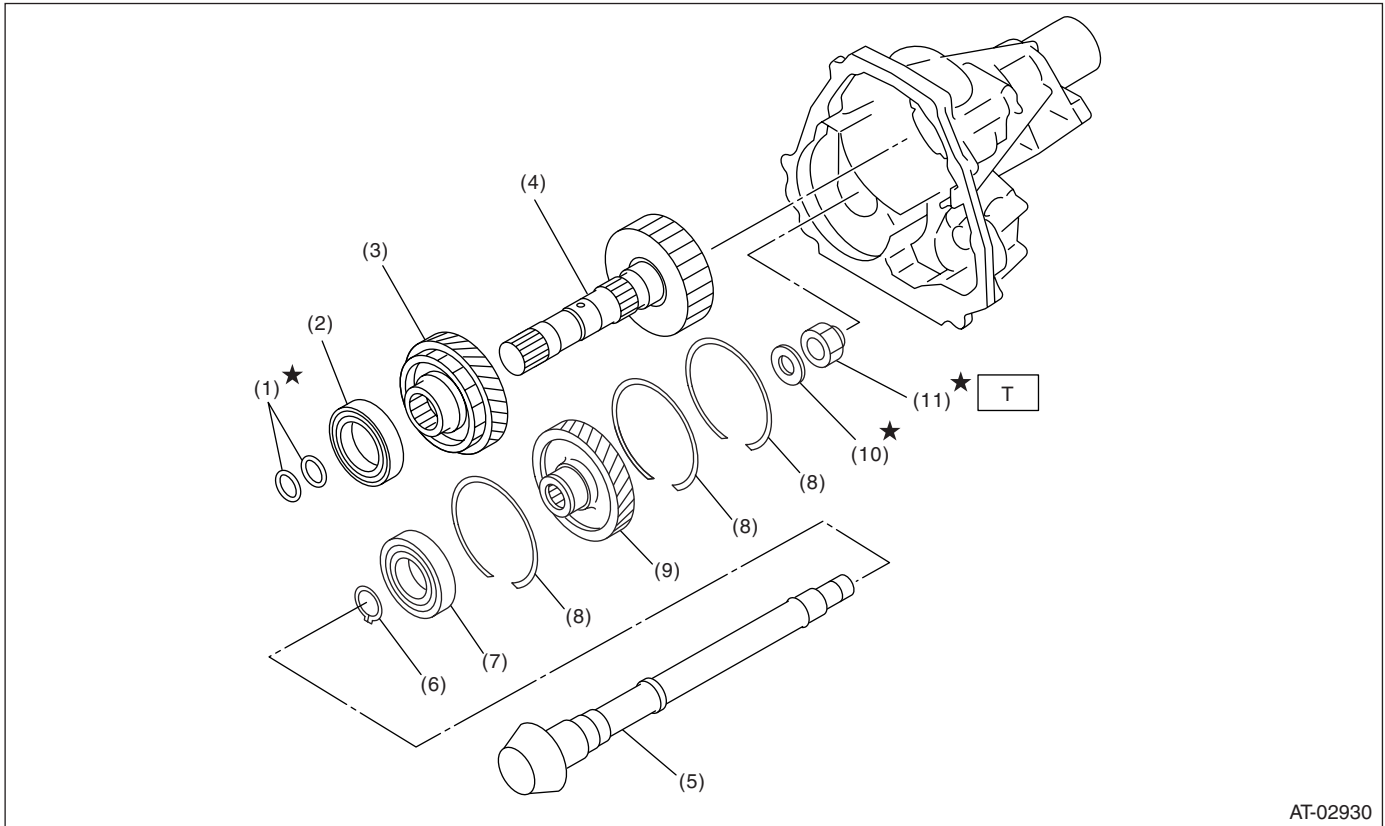
Tightening torque: N·m (kgf-m, ft-lb)

T: 25 (2.5, 18)

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8. REDUCTION GEAR WITH MPT



AT-02930

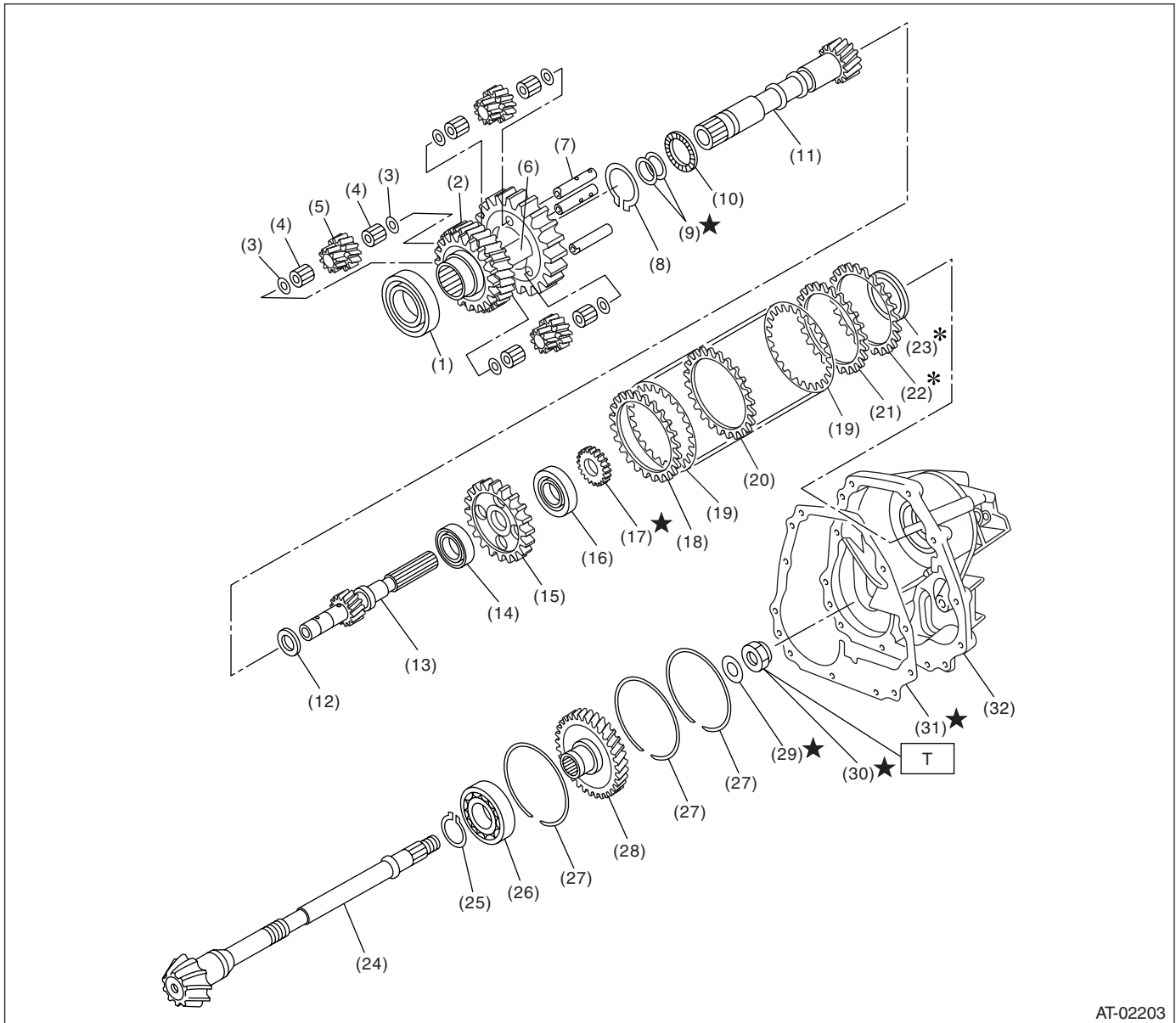
(1) Seal ring	(6) Snap ring
(2) Ball bearing	(7) Ball bearing
(3) Reduction drive gear	(8) Snap ring
(4) Reduction drive shaft	(9) Reduction driven gear
(5) Drive pinion shaft	(10) Washer

- (11) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)

T: 100 (10.2, 74)

9. REDUCTION GEAR WITH VTD

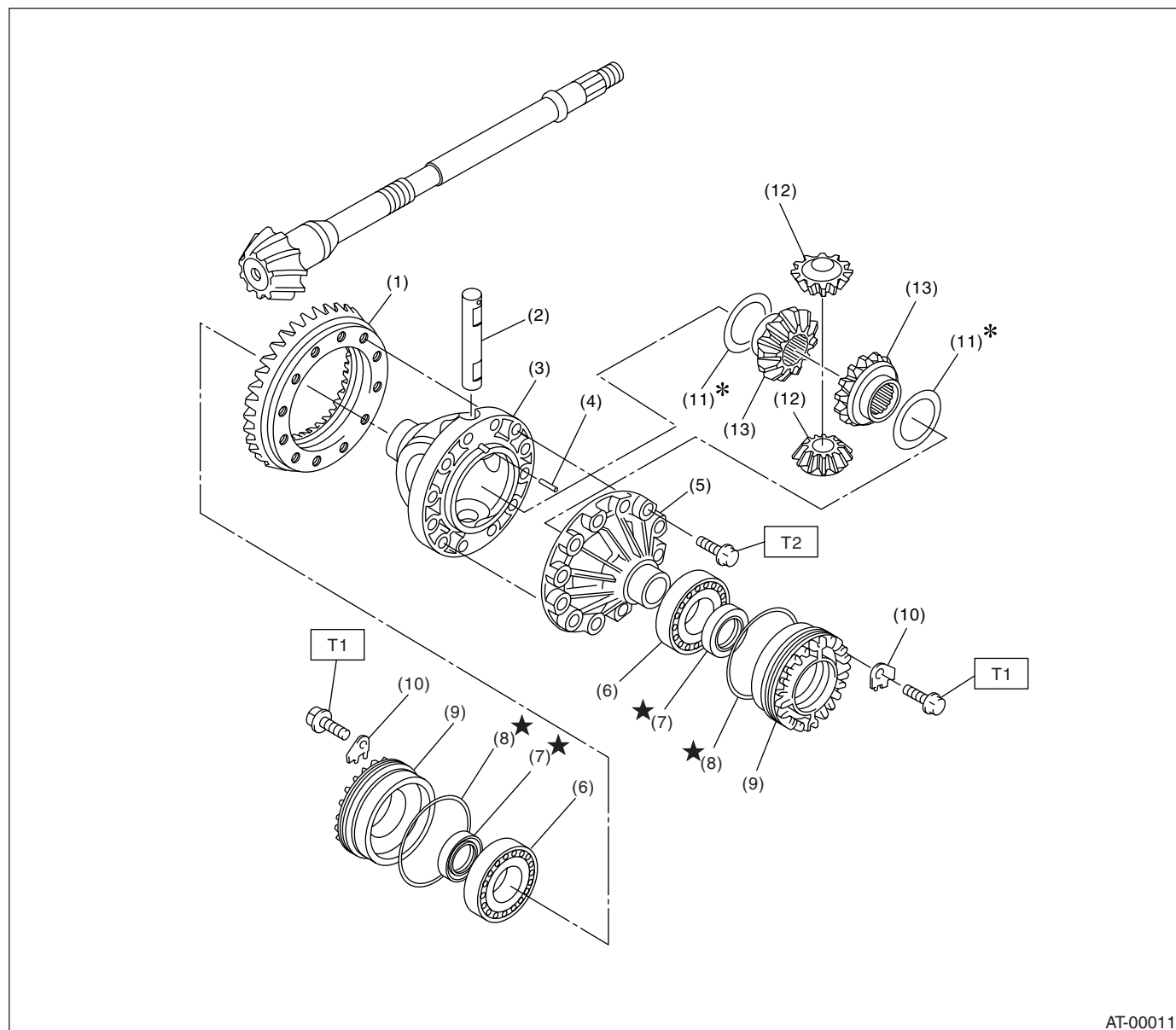


AT-02203

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

Tightening torque: N·m (kgf-m, ft-lb)
T: 100 (10.2, 74)

10.DIFFERENTIAL GEAR



AT-00011

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

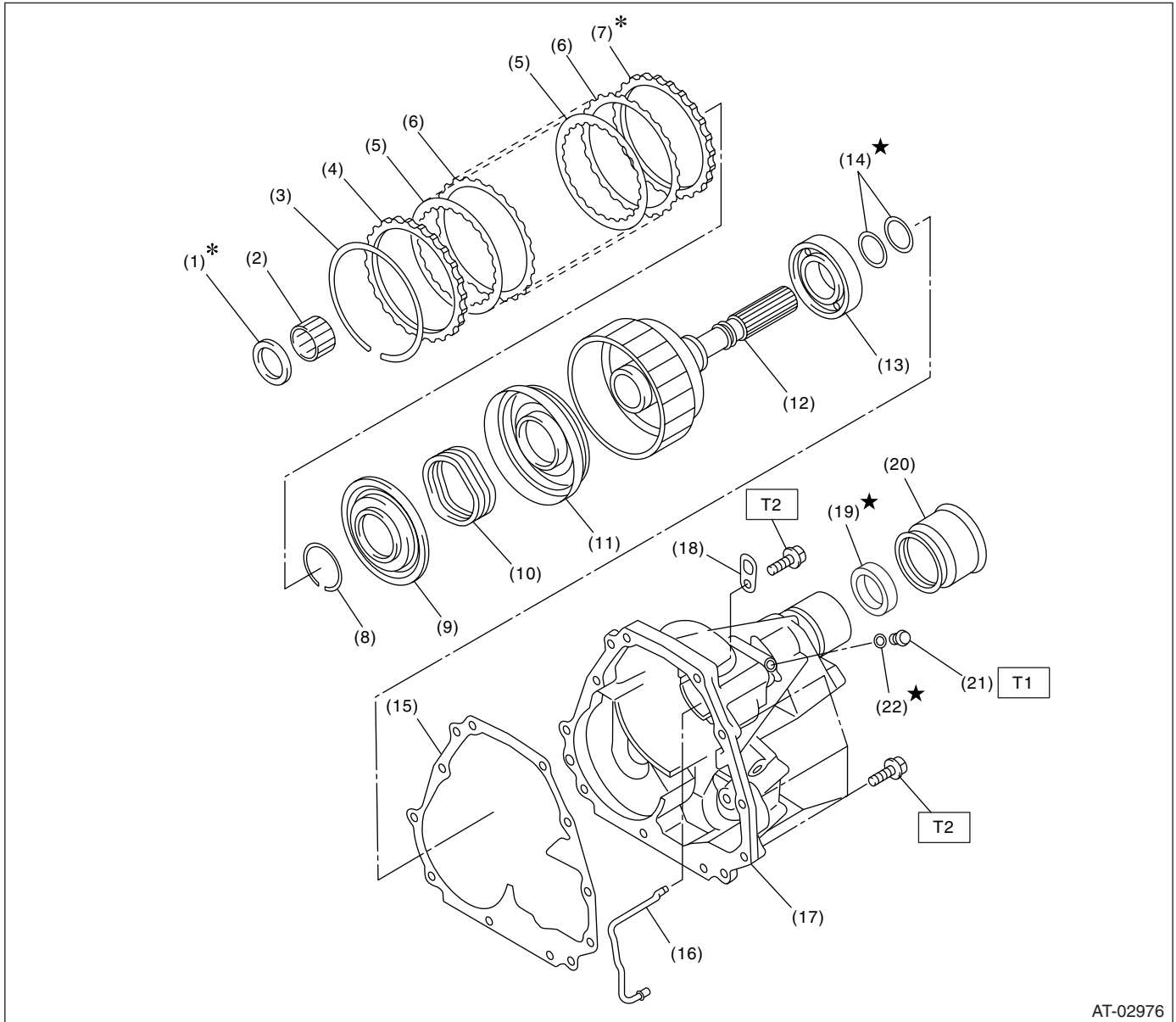
- (13) Differential bevel gear

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18)

T2: 62 (6.3, 46)

11. TRANSFER AND EXTENSION CASE WITH MPT



AT-02976

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

Tightening torque: N·m (kgf-m, ft-lb)

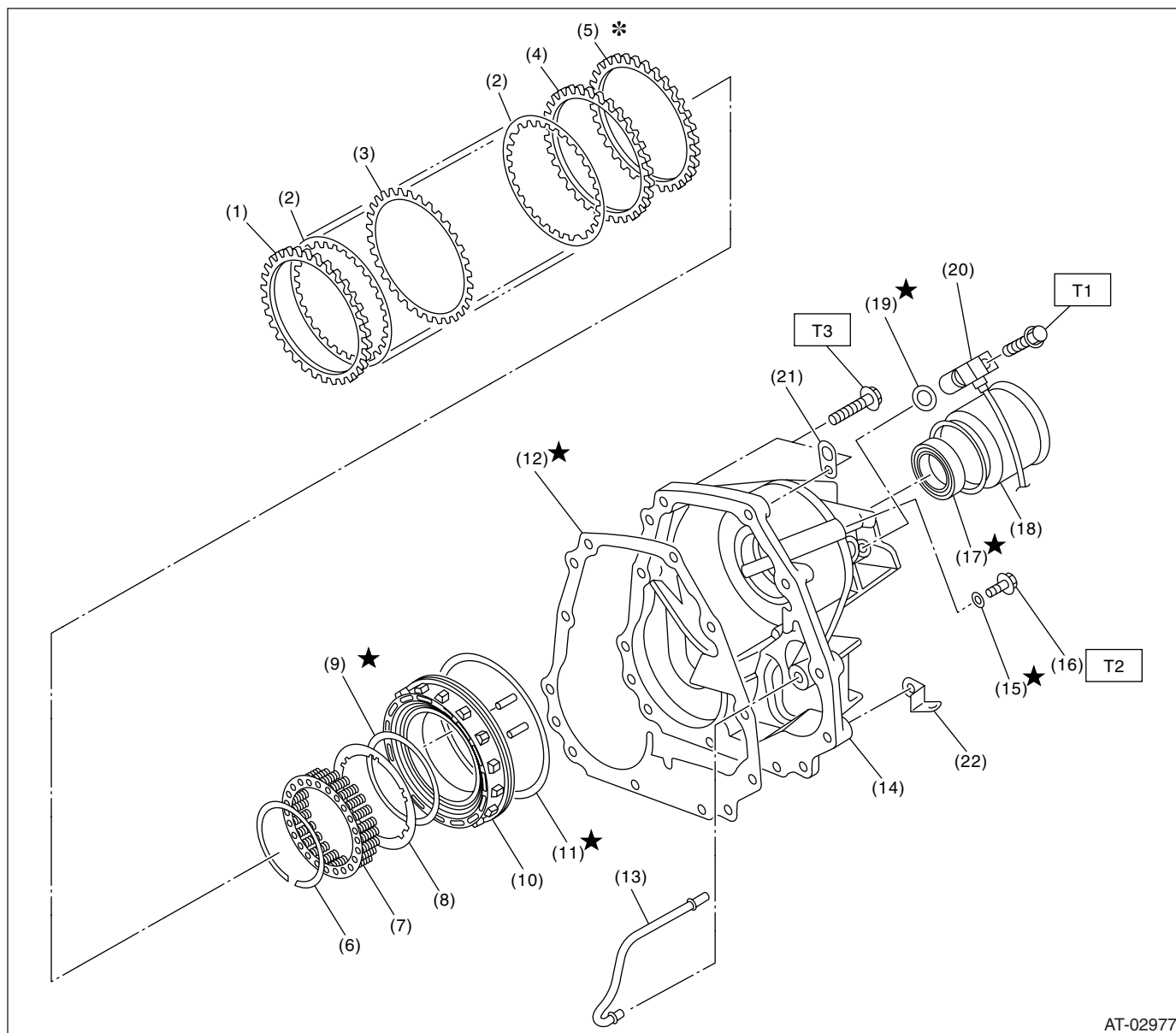
T1: 13 (1.3, 9)

T2: 25 (2.5, 18)

General Description

AUTOMATIC TRANSMISSION

12. TRANSFER AND EXTENSION CASE WITH VTD



AT-02977

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

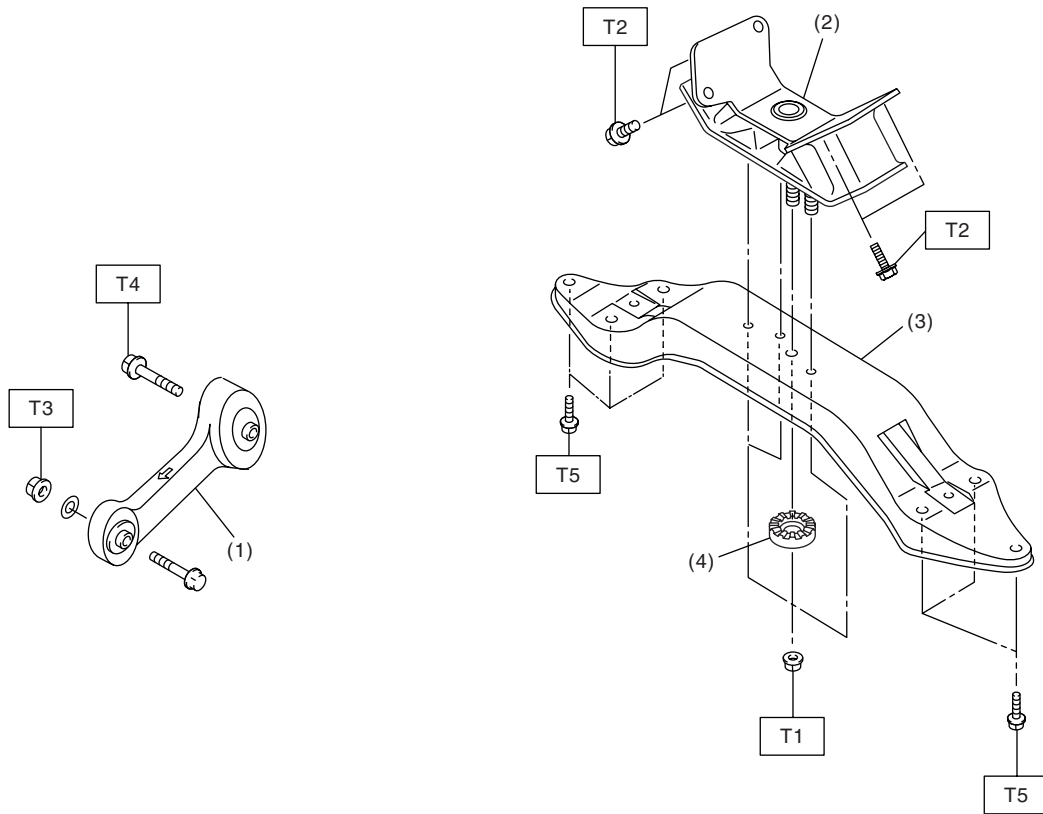
Tightening torque: N·m (kgf-m, ft-lb)

T1: 7 (0.7, 5.1)

T2: 13 (1.3, 9)

T3: 25 (2.5, 18)

13.TRANSMISSION MOUNTING



AT-01353

- (1) Pitching stopper
- (2) Rear cushion rubber
- (3) Transmission rear 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)

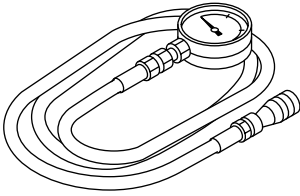
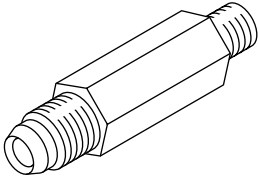
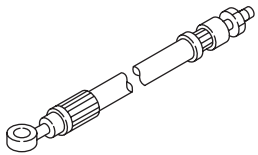
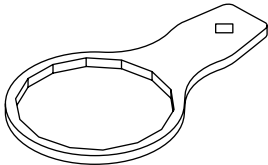
T4: 58 (5.9, 43)

T5: 70 (7.1, 51)

C: CAUTION

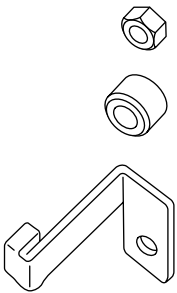
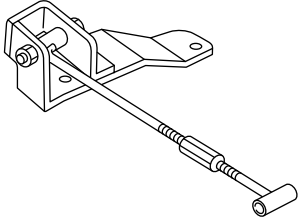
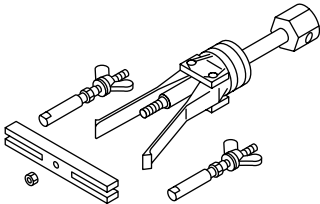
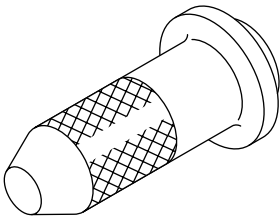
- Wear work clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Do not place the oil pan with its inner side facing upward until it is installed so as to prevent foreign matter intrusion into 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 open. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn yourself, because each part on the vehicle is hot after running.
- Use 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 rigid racks at the specified points.
- Apply ATF or gear oil onto sliding or revolution surfaces before installation in view of components usage.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of ATF to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old seal.
- When disassembling AT, be sure to use nylon or paper towel, do not use cloth glove and cloth.

D: PREPARATION TOOL**1. SPECIAL TOOL**

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

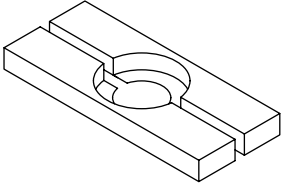
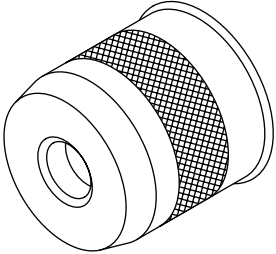
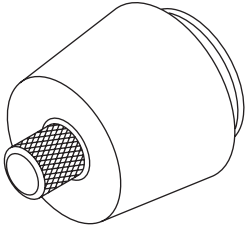
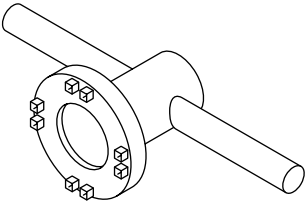
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST41099AC000	41099AC000	ENGINE SUPPORT BRACKET	Used for supporting engine.
 ST-398527700	398527700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

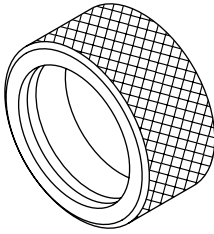
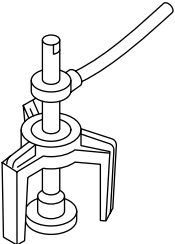
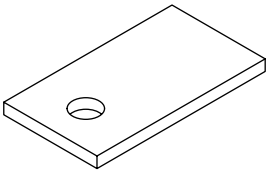
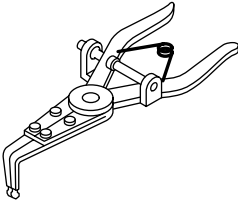
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.
 ST-499247400	499247400	INSTALLER	- Used for installing transfer outer snap ring. - Used with SNAP RING OUTER GUIDE (499257300).
 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.

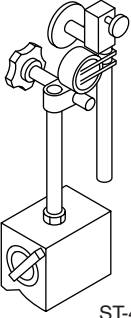
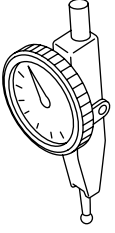
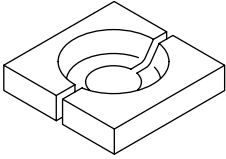
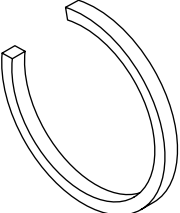
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398437700	398437700	DRIFT	- Used for installing converter case oil seal. - Used for installing taper roller bearing of front differential.
 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.

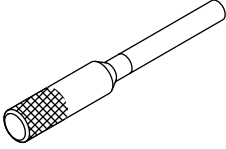
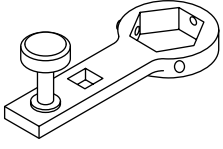
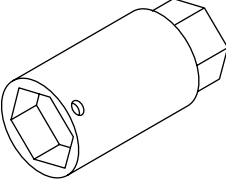
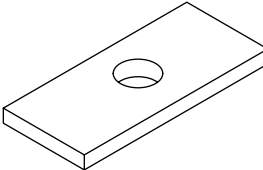
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247001	498247001	MAGNET BASE	- Used for measuring gear backlash. - Used with DIAL GAUGE (498247100).
 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.

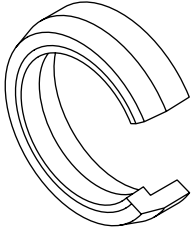
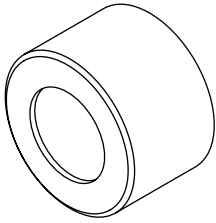
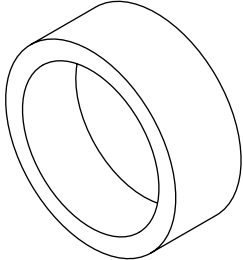
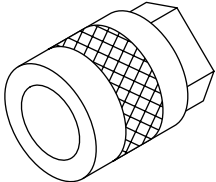
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499267300	499267300	STOPPER PIN	Used for installing inhibitor switch.
 ST-499787700	499787700	WRENCH	Used for removing and installing drive pinion lock nut.
 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.

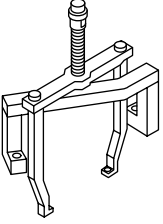
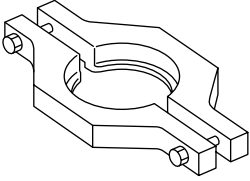
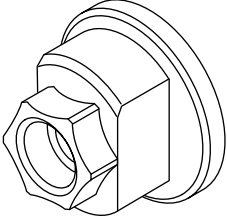
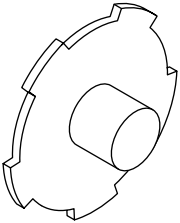
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-398744300	398744300	GAUGE	- Use for measuring contact face between multi-plate clutch end and transmission. - For VTD model.
 ST-499737000	499737000	PULLER	Used for removing reduction driven gear assembly.

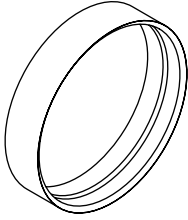
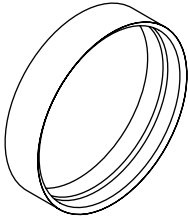
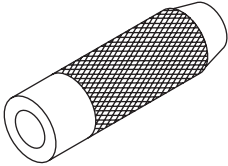
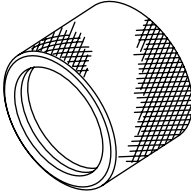
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499737100	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing ball bearing.
 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.

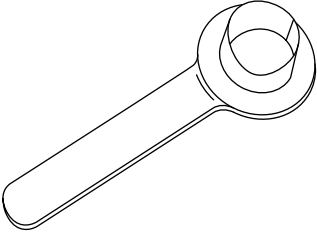
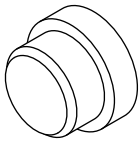
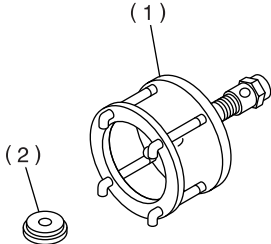
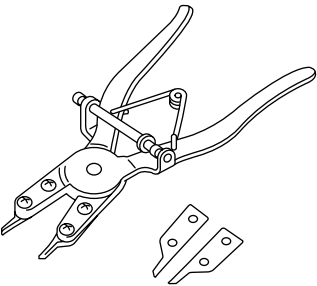
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-899580100	899580100	INSTALLER	Used for press-fitting the ball bearing for transfer clutch.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.

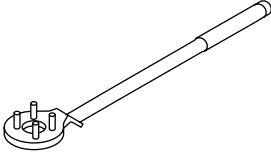
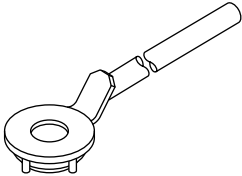
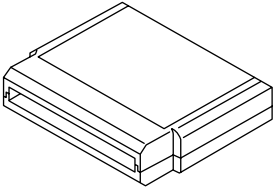
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for installing front drive shaft.
 ST-398497701	398497701	INSTALLER	Used for installing needle bearing.
 ST-899524100	899524100	PULLER SET	Used for bolt only. • Used with PULLER SET (499737100). • Used with PULLER (499737000). (1) Puller (2) Cap
 ST-398663600	398663600	PLIERS	Used for removing and installing snap ring.

General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolts. (2.5 L model)
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolt.
 ST24082AA260	24082AA260	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems.

General Description

AUTOMATIC TRANSMISSION

2. GENERAL TOOL

TOOL NAME	REMARKS
Depth gauge	Used for measuring transmission end play.
Thickness gauge	Used for measuring clearances of clutch, brake and oil pump.
Micro meter	Used for measuring thickness of drive pinion.
Spring balance	Used for measuring starting torque of drive pinion.
Circuit tester	Used for measuring resistance and voltage.
TORX® T70	Used for removing and installing differential gear oil drain plug.
Push/pull gauge	Used for measuring low & reverse and high clutch piston stroke.

2. Automatic Transmission Fluid

A: INSPECTION

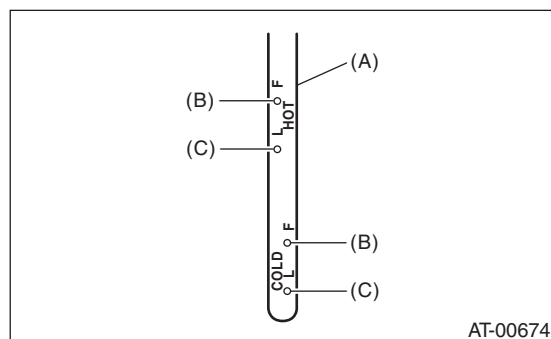
NOTE:

The level of ATF varies with fluid 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 4AT(D)(diag)-13, 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 between the upper level and lower level at HOT side.

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

CAUTION:

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

5) Check ATF level after raising ATF temperature to 70 — 80°C (158 — 176°F) by driving the distance of 5 to 10 km (3 to 6 miles) or by idling the engine.

B: REPLACEMENT

1) Lift-up the vehicle.

2) Drain the ATF completely.

3) Check the ATF for condition. <Ref. to 4AT-32, CONDITION CHECK, Automatic Transmission Fluid.>

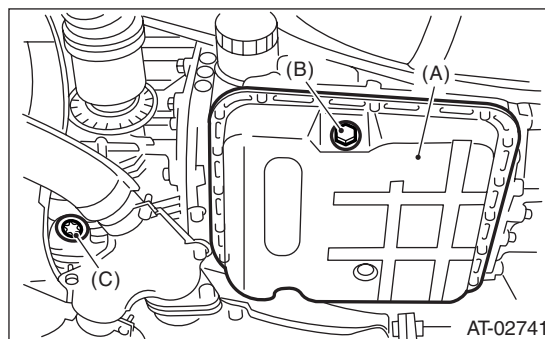
CAUTION:

Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

4) Replace with a new gasket, and then tighten the ATF drain plug.

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)



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

5) Lower the vehicle.

6) Pour ATF through the oil charge pipe.

Recommended fluid:

Dexron III type automatic transmission fluid

Capacity:

Fill the same amount of ATF drained from drain plug hole.

Capacity when transmission is overhauled:

9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

7) Check the level and leaks of ATF.

<Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

Automatic Transmission Fluid

AUTOMATIC TRANSMISSION

C: CONDITION CHECK

NOTE:

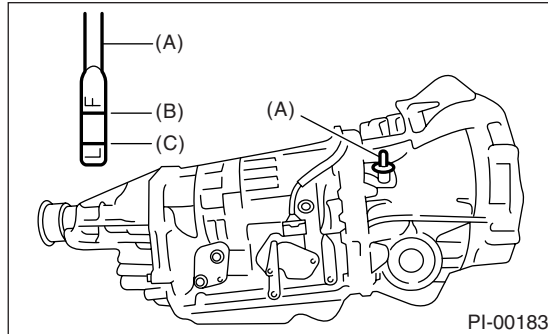
When replacing ATF, check the inside condition of the transmission body by inspecting the drained ATF.

Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Excessive wear of the internal of the transmission body.	Replace ATF and check if AT operates correctly.
Thick and varnish-form fluid.	Burned clutch and etc.	Replace ATF and check AT itself and vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water mixed in fluid.	Replace ATF and check the water entering point.

3. Differential Gear Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Remove the oil level gauge and wipe it clean.
- 3) Reinsert the level gauge all the way. 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) Oil level gauge
- (B) Upper level
- (C) Lower level

B: REPLACEMENT

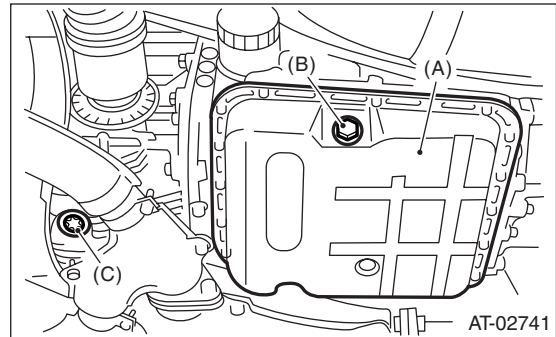
- 1) Lift-up the vehicle.
- 2) Remove the differential gear oil drain plug using TORX® T70, and then drain the differential gear oil completely.

CAUTION:

- Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.
 - Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.
- 3) Replace the gasket with a new one, and then tighten the differential gear oil drain plug using TORX® T70.

Tightening torque:

70 N·m (7.1 kgf-m, 51 ft-lb) (Copper gasket)
44 N·m (4.5 kgf-m, 33 ft-lb) (Aluminum gasket)



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

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

Recommended fluid:

<Ref. to RM-2, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

Gear oil capacity:

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

- 6) Check the level of differential gear oil.
 <Ref. to 4AT-33, 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.

NOTE:

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

2. D RANGE SHIFT FUNCTION

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

6. LOCK-UP FUNCTION

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

11. OIL LEAKS

After the driving test, inspect for oil leaks.

5. Stall Test

A: INSPECTION

NOTE:

The stall test is of extreme importance in 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:

- To check the operation of the automatic transmission clutch.
 - To check the operation of the torque converter clutch.
 - To check engine performance.
- 1) Check that throttle valve opens fully.
 - 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").
 - 7) Place the wheel chocks at the front and rear of all wheels and apply the parking brake.
 - 8) Move the manual linkage to ensure it operates properly, and shift the select lever to the "2" range. Turn hold switch ON.
 - 9) While depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.

13) Perform the stall tests with the select lever in "D" range. Turn hold switch OFF.

NOTE:

- Do not continue the stall test for MORE THAN 5 SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction 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 short a time as possible, in order to prevent the automatic transmission from sustaining damage.

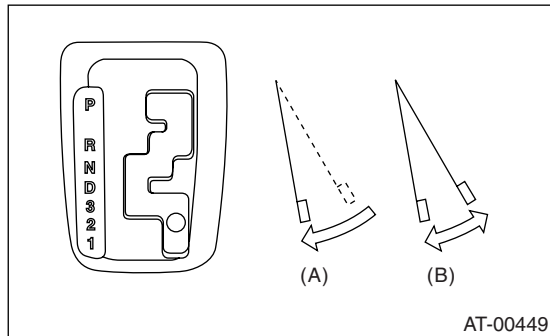
Stall speed (at sea level):

2.0 L Turbo model:

2,600 — 3,400 rpm

2.5 L Non-turbo model:

2,300 — 2,800 rpm



- (A) Brake pedal
(B) Accelerator pedal

- 10) When the engine speed is stabilized, record that speed quickly and release the accelerator pedal.
- 11) Shift the select lever to "N" range, and cool down the engine by idling it for more than one minute.
- 12) If the stall speed in "2" range is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in "R" range.

Stall Test

AUTOMATIC TRANSMISSION

Stall speed (at sea level)	Position	Cause
Less than specifications	2, R	• Throttle valve not fully open • Erroneous engine operation • Torque converter clutch's one-way clutch slipping
Greater than specifications	D	• Line pressure too low • Low clutch slipping • One-way clutch malfunction
	R	• Line pressure too low • Reverse clutch slipping • Low & reverse brake slipping
	2	• Line pressure too low • Low clutch slipping • 2-4 brake slipping

6. Time Lag Test

A: INSPECTION

NOTE:

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.

- 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.

1) Apply the parking brake.

2) Start the engine.

Check the idling speed (A/C OFF).

3) Shift the select lever from "N" to "D" range.

Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.

Time lag: Less than 1.2 seconds

If "N" → "D" time lag is longer than specified:

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

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

Time lag: Less than 1.5 seconds

If "N" → "R" time lag is longer than specified:

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

Line Pressure Test

AUTOMATIC TRANSMISSION

7. Line Pressure Test

A: MEASUREMENT

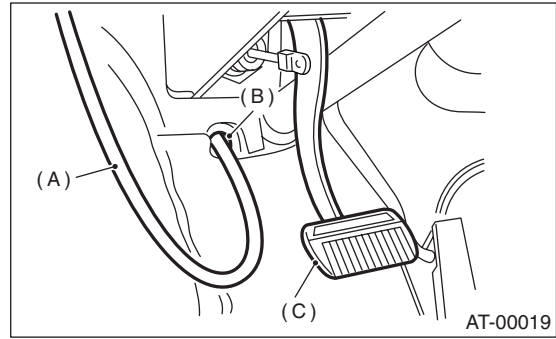
NOTE:

If the clutch or the brake shows a sign of slippage or shifting sensation 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)
 - (1) Before measuring the line pressure, lift-up the vehicle.
 - (2) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above temperature after idling the engine for approx. 30 minutes with select lever in "N" or "P".)
- 2) Line pressure measurement (under heavy load)
 - (1) Before measuring the line pressure, apply both foot and parking brakes with all wheels chocked (Same as for "stall" test conditions).
 - (2) Measure the line pressure when select lever is in "R" or "2" with engine under stall conditions.
 - (3) 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 to cool down for at least one minute.)
 - (4) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above temperature after idling the engine for approx. 30 minutes with the select lever in "N" or "P".)
- 3) 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.

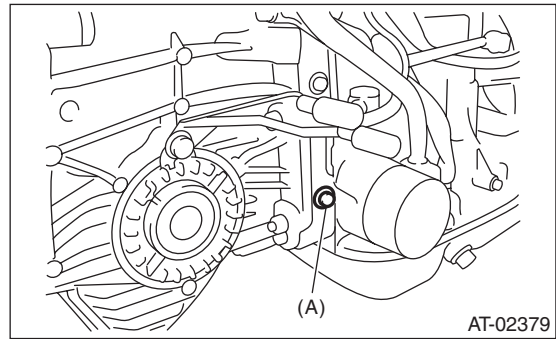
ST 498575400 OIL PRESSURE GAUGE ASSY



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

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

ST 498897200 OIL PRESSURE GAUGE ADAPTER



- (A) Test plug

- 5) Connect the ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

ST2 498575400 OIL PRESSURE GAUGE ASSY

- 6) Check for duty ratio changes by opening and closing the throttle valve using SUBARU Select Monitor.

- Non-turbo model

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm ² , psi)
2	25 — 35	Full open	1,000 — 1,300 (10.2 — 13.3, 145 — 189)
R	15 — 25	Full open	1,500 — 1,850 (15.3 — 18.9, 218 — 268)
D	35 — 43	Full closed	500 — 800 (5.1 — 8.2, 73 — 116)

- Turbo model

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm ² , psi)
2	5	Full open	1,130 — 1,275 (11.5 — 13.0, 164 — 185)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	Full closed	300 — 410 (3.1 — 4.2, 44 — 60)

Transfer Clutch Pressure Test

AUTOMATIC TRANSMISSION

8. Transfer Clutch Pressure Test

ST 498575400 OIL PRESSURE GAUGE ASSY

A: INSPECTION

- MPT model

Check the transfer clutch pressure in accordance with the following chart in the same manner as with line pressure. <Ref. to 4AT-38, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET

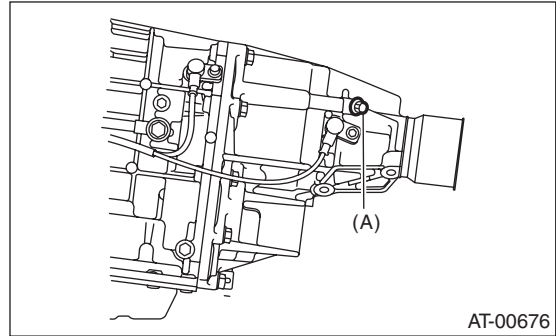
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

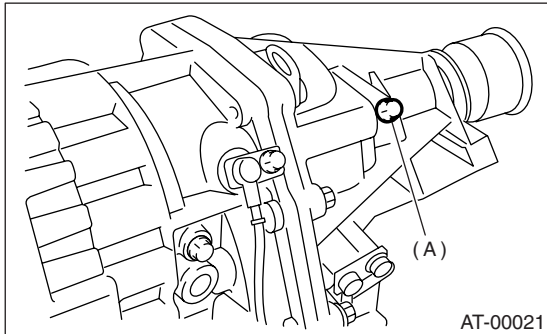
FWD mode: "P" range, engine speed 2,000 rpm

NOTE:

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



(A) Test plug



(A) Test plug

NOTE:

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

- VTD model

Check transfer clutch pressure using the following chart. <Ref. to 4AT-38, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET

Transfer Clutch Pressure Test

AUTOMATIC TRANSMISSION

STANDARD TRANSFER CLUTCH PRESSURE:

- Non-turbo model

Range position	ON Duty ratio (%)	Acceleration opening angle (%)	AWD mode Transfer clutch pressure (kPa (kg/cm ² , psi))
2	95	100 (Fully opens)	1,000 — 1,200 (10.2 — 12.2, 145 — 174)
2	60	Adjust ON Duty ratio to 60%.	500 — 700 (5.1 — 7.1, 72.5 — 102)
N or P	5	0 (Fully closed)	0

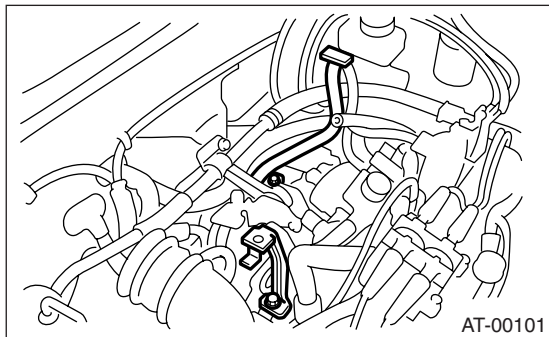
- Turbo model

Range position	ON Duty ratio (%)	Acceleration opening angle (%)	AWD mode Transfer clutch pressure (kPa (kg/cm ² , psi))	FWD mode Transfer clutch pressure (kPa (kg/cm ² , psi))
2	95	100 (Fully opens)	910 — 1,070 (9.3 — 10.9, 132 — 155)	—
2	60	Adjust ON Duty ratio to 60%.	410 — 490 (4.2 — 5.0, 59 — 71)	—
N or P	5	0 (Fully closed)	0	—
2	5	0 (Fully closed)	—	0

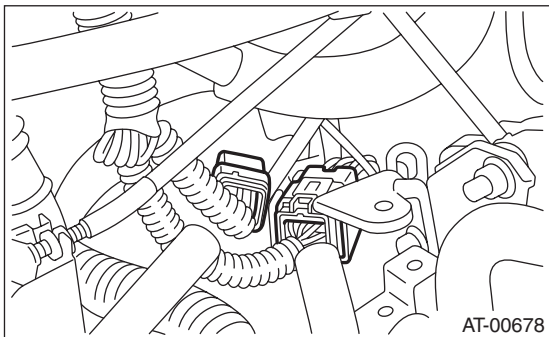
9. Automatic Transmission Assembly

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Open the front hood fully, and support it with a stay.
- 3) Disconnect the battery ground cable.
- 4) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 5) Remove the air cleaner case or air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 6) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 7) Remove the air cleaner case stay. (Non-turbo model)

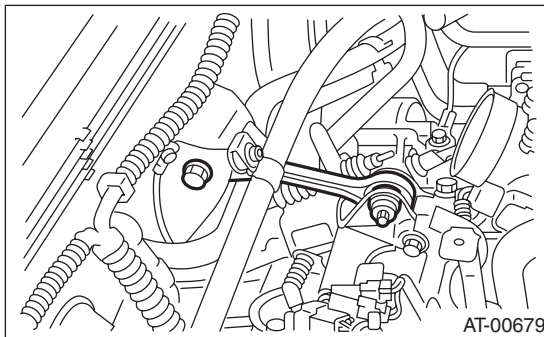


- 8) Disconnect the following connectors.
 - (1) Transmission harness connector



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

- 10) Remove the pitching stopper.



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

- (1) Install the V-belt cover.
- (2) Remove the service hole plug.
- (3) Remove the bolts which hold the torque converter clutch to drive plate.
- (4) While rotating the engine, remove the other bolts using ST.

- Non-turbo model

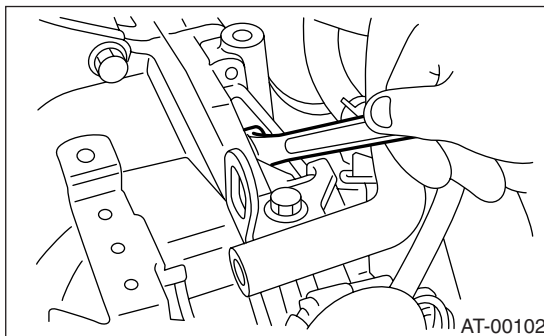
ST 499977100 CRANK PULLEY WRENCH

- Turbo model

ST 499977400 CRANK PULLEY WRENCH

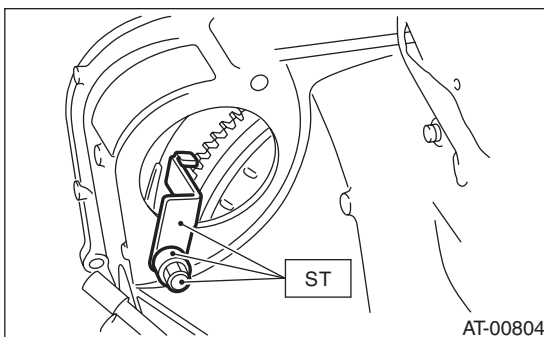
CAUTION:

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



- 12) Install the ST to converter case.

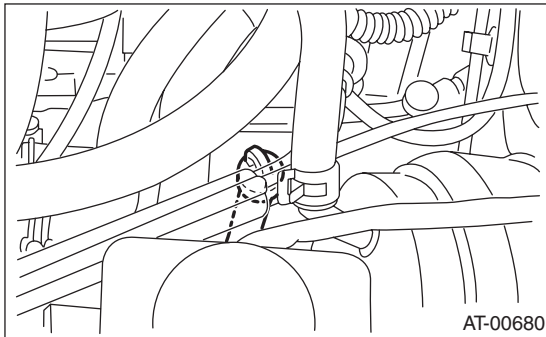
ST 498277200 STOPPER SET



13) Remove the ATF level gauge.

NOTE:

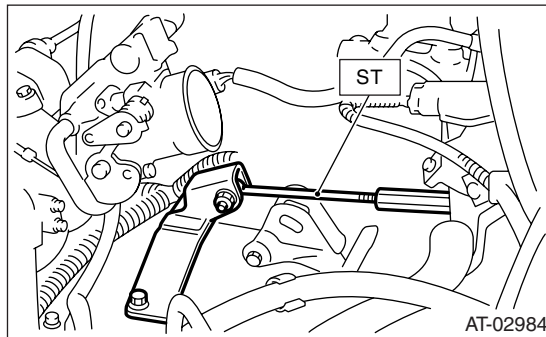
Plug the opening to prevent the entry of foreign particles into transmission fluid.



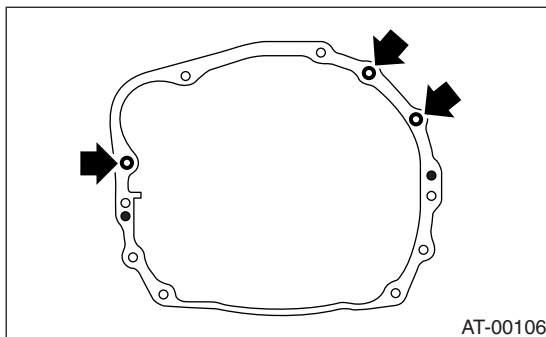
14) Remove the pitching stopper bracket.

15) Set the ST.

ST 41099AC000 ENGINE SUPPORT BRACKET



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



17) Lift-up the vehicle.

18) Remove the under cover.

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

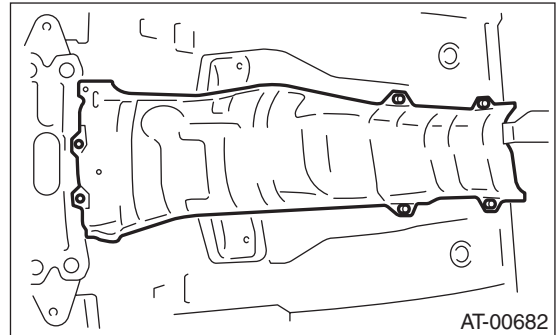
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>

20) Remove the center and rear exhaust pipes, and muffler. (Turbo model)

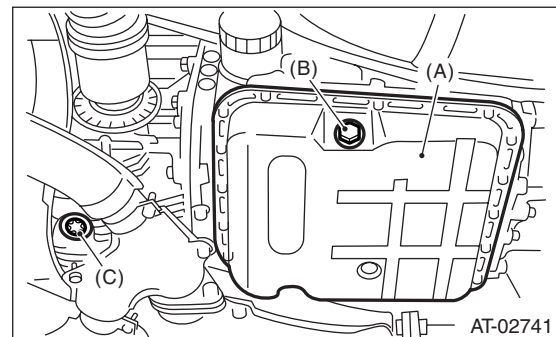
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, REMOV-

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

21) Remove the heat shield cover. (If equipped)



22) Drain ATF to remove the ATF drain plug.

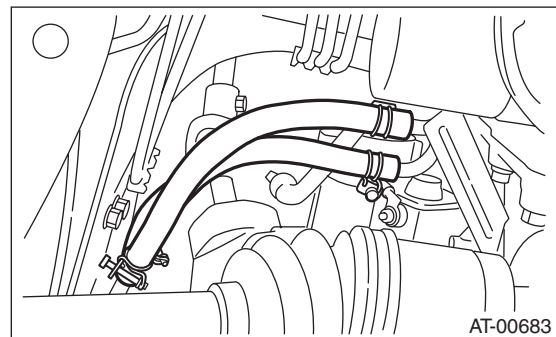


(A) Oil pan

(B) Drain plug (ATF)

(C) Differential gear oil drain plug

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



24) Remove the propeller shaft.

<Ref. to DS-16, REMOVAL, Propeller Shaft.>

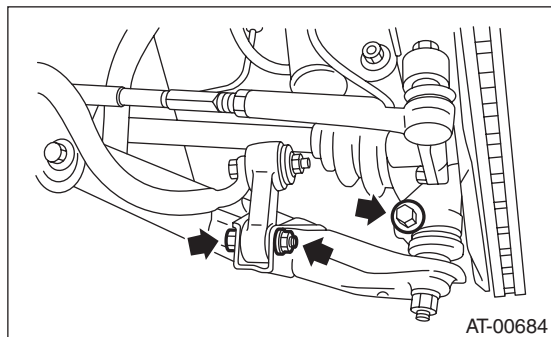
25) Remove the shift select cable. <Ref. to CS-26, REMOVAL, Select Cable.>

26) Disconnect the stabilizer link from transverse link.

Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

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



28) Pull out the front drive shaft from transmission.
(1) Using a tire lever or a pinch bar, etc., pull out the front drive shaft until its joint facing to transmission can move smoothly.

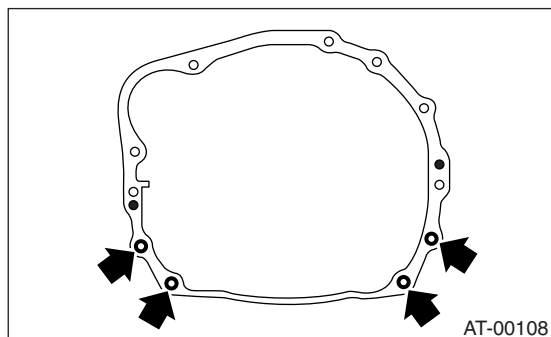
NOTE:

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

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

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

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

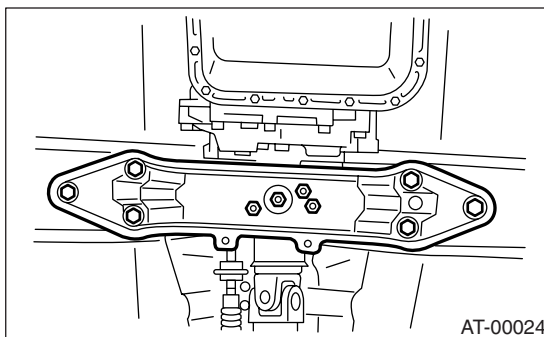


31) Place the transmission jack under transmission.

NOTE:

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

32) Remove the transmission rear crossmember from vehicle.

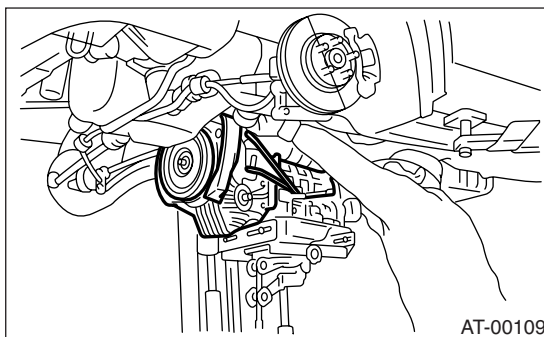


33) While gradually lowering the transmission jack, fully contact the engine support, and then tilt the engine rearward.

34) Remove the transmission.

CAUTION:

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



35) Separate the transmission assembly and rear cushion rubber.

B: INSTALLATION

1) Replace the differential side oil seal with new one. <Ref. to 4AT-51, REPLACEMENT, Differential Side Retainer Oil Seal.>

NOTE:

Replacement is not necessary when new oil seal has been installed.

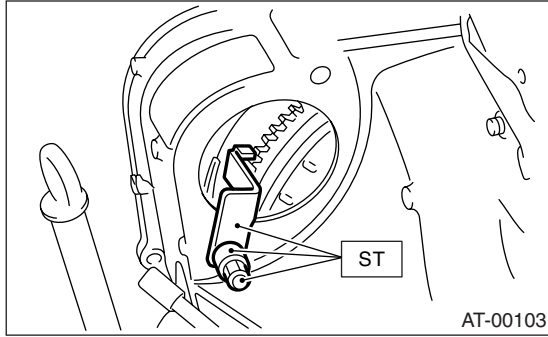
2) Install the rear cushion rubber to transmission assembly.

Tightening torque:

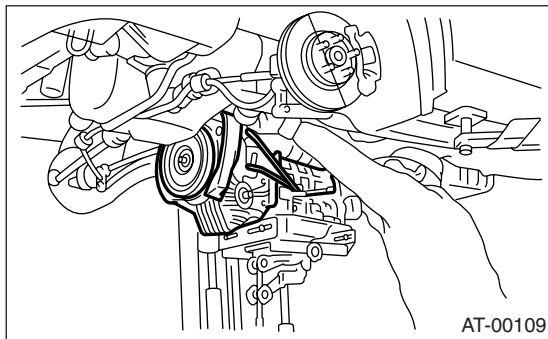
39 N·m (4.0 kgf-m, 29 ft-lb)

3) Install the ST to converter case.

ST 498277200 STOPPER SET



- 4) Install the transmission onto engine.
 (1) Gradually raise the transmission with transmission jack.

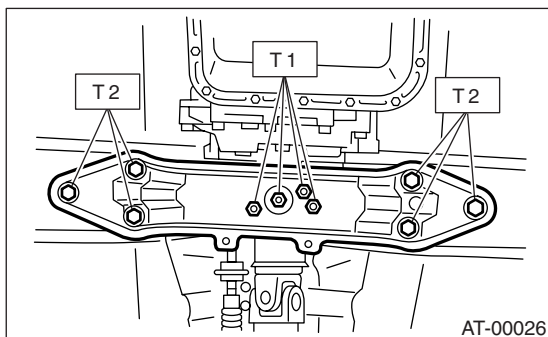


- (2) Engage them at splines.
 (3) While gradually lifting the transmission jack, turn the screw of engine support, and then tilt the engine forward.
 5) Install the transmission rear crossmember.

Tightening torque:

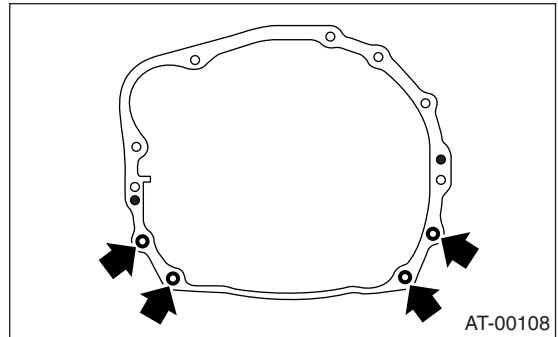
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



- 6) Take off the transmission jack.
 7) Tighten the nuts and bolts which hold the lower side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



- 8) Tighten the bolt of clutch housing cover.
 9) Lower the vehicle.
 10) Connect the engine and transmission.
 (1) Remove the ST from converter case.

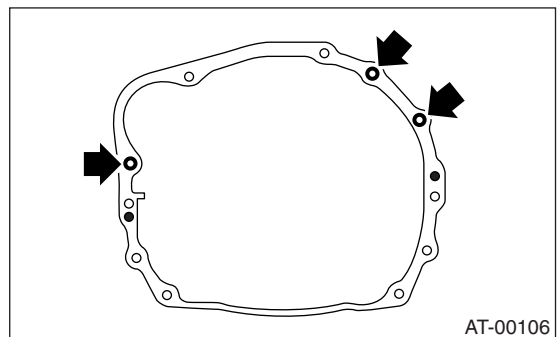
NOTE:

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

ST 498277200 STOPPER SET

- (2) Install the starter.
 <Ref. to SC(H4SO)-8, INSTALLATION, Starter.>
 (3) Tighten the bolt which holds the upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



- 11) Install the torque converter clutch to drive plate.
 (1) Tighten the bolts which hold the torque converter clutch to drive plate.
 (2) Tighten the other bolts while rotating the engine by using ST.

- Non-turbo model

ST 499977100 CRANK PULLEY WRENCH

- Turbo model

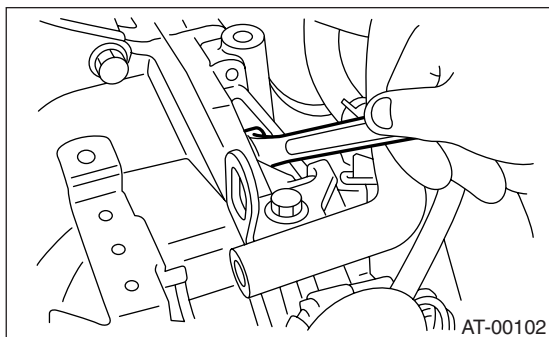
ST 499977400 CRANK PULLEY WRENCH

Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)

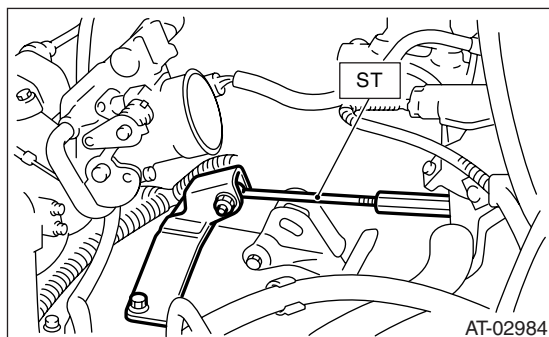


(3) Plug the plug onto service hole.

(4) Install the V-belt cover.

12) Remove the STs.

ST 41099AC000 ENGINE SUPPORT BRACKET



13) Install the pitching stopper bracket.

Tightening torque:

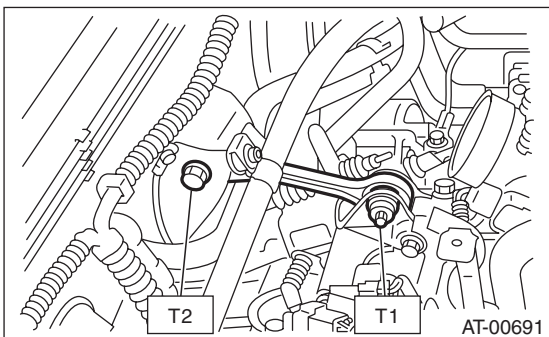
41 N·m (4.2 kgf-m, 30 ft-lb)

14) 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)



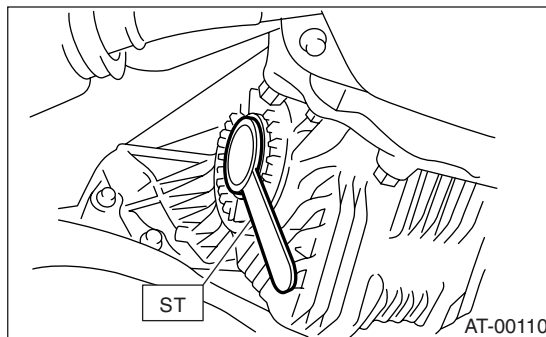
15) Lift-up the vehicle.

16) Replace the snap ring of front drive shaft with a new one.

17) Apply grease to the oil seal lips.

18) Install the ST to side retainer.

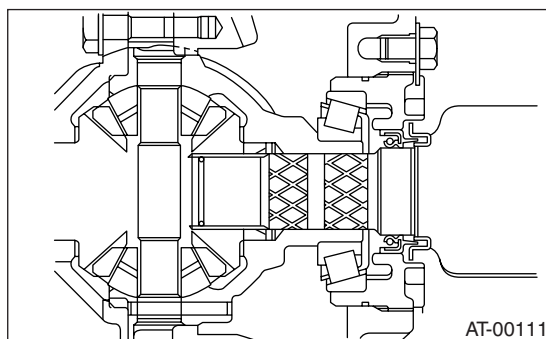
ST 28399SA010 OIL SEAL PROTECTOR



19) Align the spline of front differential shaft to that of differential bevel gear for insertion, and remove them using ST.

ST 28399SA010 OIL SEAL PROTECTOR

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



21) Install the ball joint into housing.

22) Connect the stabilizer link to transverse link, and tighten the bolts.

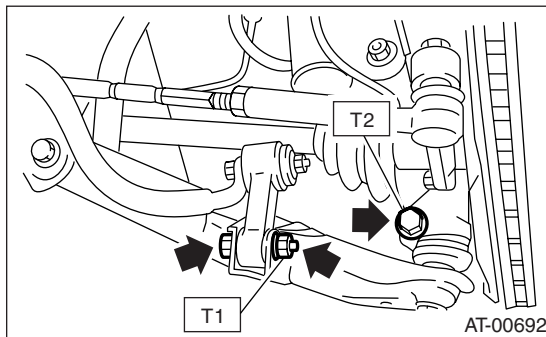
NOTE:

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

Tightening torque:

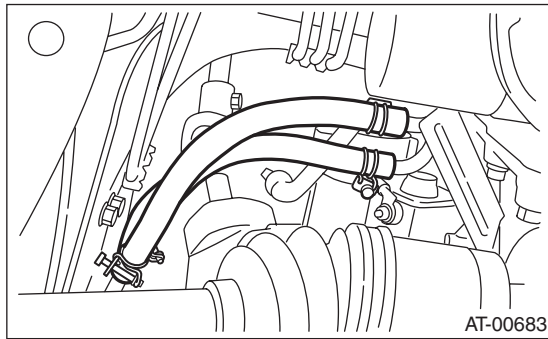
T1: 30 N·m (3.1 kgf-m, 22 ft-lb)

T2: 50 N·m (5.1 kgf-m, 37 ft-lb)

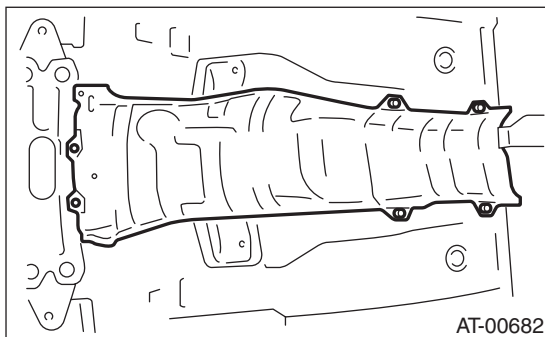


23) Install the shift select cable onto select lever.
<Ref. to CS-26, INSTALLATION, Select Cable.>

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



- 25) Install the propeller shaft.
<Ref. to DS-17, INSTALLATION, Propeller Shaft.>
26) Install the heat shield cover. (If equipped)



- 27) Install the rear exhaust pipe and muffler assembly.

Non-turbo model

<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Muffler.>

Turbo model

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

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

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

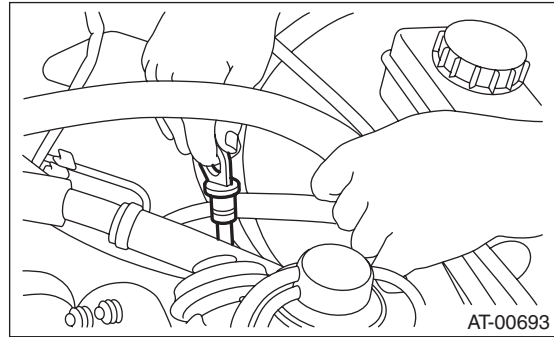
- 29) Install the center exhaust pipe. (Turbo model)

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

- 30) Install the under cover.

- 31) Lower the vehicle.

- 32) Install the ATF level gauge.



- 33) Connect the following connectors.

(1) Transmission harness connectors

(2) Transmission ground terminal

- 34) Install the air cleaner case stay.

Tightening torque:

16 N·m (1.6 kgf-m, 12 ft-lb)

- 35) Install the air cleaner case or air intake chamber. (Non-turbo model)

<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

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

- 37) Install the intercooler. (Turbo model)

<Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

- 38) Connect the battery ground cable.

- 39) Fill ATF up to the middle of the "COLD" side on level gauge by using oil charge pipe. <Ref. to 4AT-31, Automatic Transmission Fluid.>

- 40) Take off the vehicle from lift arms.

- 41) Check select lever operation.

<Ref. to 4AT-52, INSPECTION, Inhibitor Switch.>

- 42) Bleed air from control valve. (Non-turbo model)

<Ref. to 4AT-69, Air Bleeding of Control Valve.>

- 43) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>

- 44) Perform the advance operation of learning control. (Non-turbo model) <Ref. to 4AT(D)(diag)-15, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

- 45) Check the road test.

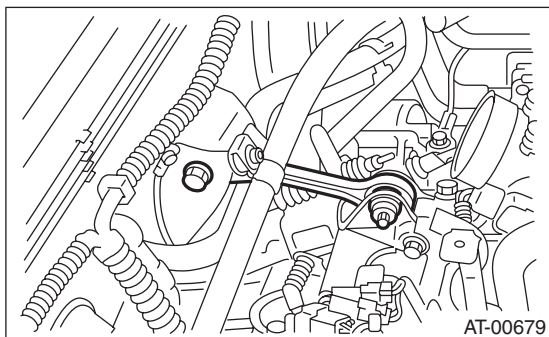
<Ref. to 4AT-34, Road Test.>

10. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

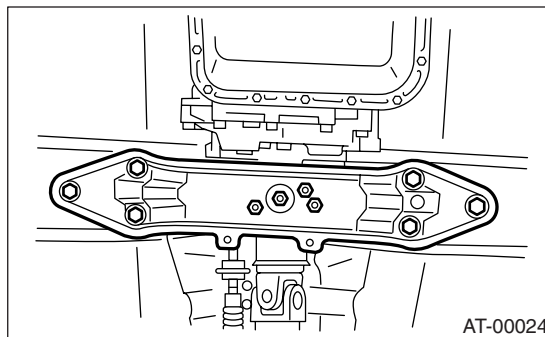
- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 3) Remove intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 4) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Jack-up the vehicle and support it with sturdy racks.
- 3) Remove the front, center, rear exhaust pipes and muffler. (Non-turbo model) <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>
- 4) Remove center and rear exhaust pipes, and muffler. (Turbo model) <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 5) Remove the heat shield cover. (If equipped)
- 6) Set the transmission jack under the transmission. Make sure that the support plates of transmission jack don't touch the oil pan.

- 7) Remove the transmission rear crossmember.



- 8) Remove the rear cushion rubber.

B: INSTALLATION

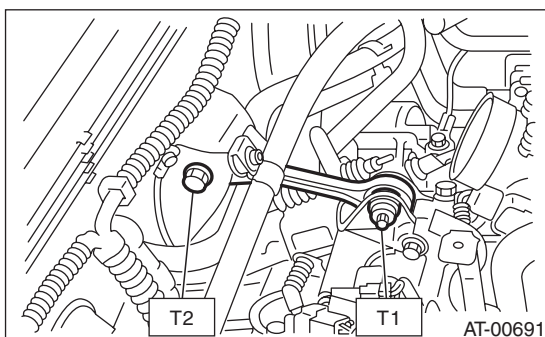
1. PITCHING STOPPER

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



- 2) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>
- 3) Remove intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:

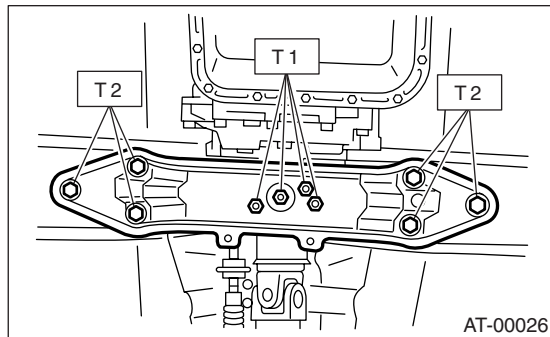
39 N·m (4.0 kgf-m, 29 ft-lb)

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 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)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Muffler.>

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

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

C: INSPECTION

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. TRANSMISSION REAR CROSSMEMBER AND REAR 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 the ATF does not leak from the joint of transmission and propeller shaft. If so, replace the oil seal. <Ref. to 4AT-50, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

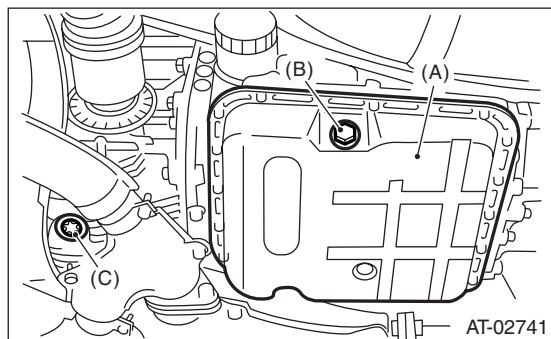
- 1) Clean the transmission exterior.
- 2) Drain the ATF completely.

NOTE:

- Tighten the ATF drain plug after draining the ATF.
- Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)



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

- 3) Remove the rear exhaust pipe and muffler.

Non-turbo model

<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>

Turbo model

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

- 4) Remove the heat shield cover. (If equipped)

- 5) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>

- 6) Using the ST, remove the oil seal.

ST 398527700 PULLER ASSY

- 7) Using the ST, install the oil seal.

ST 498057300 INSTALLER

- 8) Install the propeller shaft. <Ref. to DS-17, INSTALLATION, Propeller Shaft.>

- 9) Install the heat shield cover. (If equipped)

- 10) Install the rear exhaust pipe and muffler.

Non-turbo model

<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Muffler.>

Turbo model

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

- 11) Pour ATF and check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

A: INSPECTION

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

B: REPLACEMENT

- 1) Lift-up the vehicle.
- 2) Remove the front exhaust pipe and center exhaust pipe.

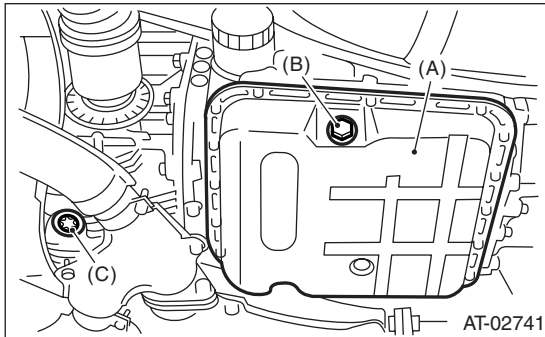
Non-turbo model

<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>

Turbo model

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

- 3) Drain the differential gear by removing differential gear oil drain plug.



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

- 4) Replace new gasket and tighten the differential oil drain plug.

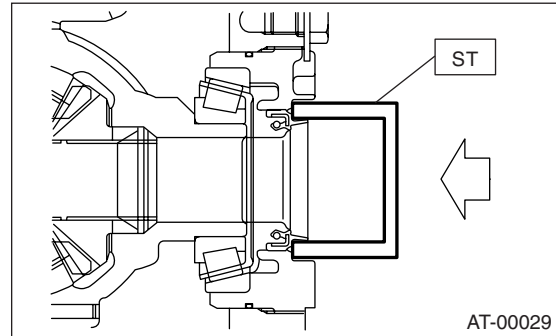
Tightening torque:

70 N·m (7.1 kgf-m, 51 ft-lb) (Copper gasket)

44 N·m (4.5 kgf-m, 33 ft-lb) (Aluminum gasket)

- 5) Separate the front drive shaft from transmission. <Ref. to DS-33, REMOVAL, Front Drive Shaft.>
- 6) Remove the differential side retainer oil seal using driver which wrapped with vinyl tape or etc.
- 7) Using ST, install the differential side retainer oil seal by slightly tapping with hammer.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



- 8) Apply oil to the oil seal lips.
- 9) Using the ST, install the front drive shaft. <Ref. to DS-33, INSTALLATION, Front Drive Shaft.>
- ST 28399SA010 OIL SEAL PROTECTOR
- 10) Install the front exhaust pipe and center exhaust pipe.
- Non-turbo model
- <Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.>
- Turbo model
- <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
- 11) Lower the vehicle.
- 12) Pour differential gear oil into the gauge hole.

Recommended gear oil:

<Ref. to RM-2, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

Differential gear oil capacity:

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

- 13) Check the gear oil amount. <Ref. to 4AT-33, INSPECTION, Differential Gear Oil.>

13. Inhibitor Switch

A: INSPECTION

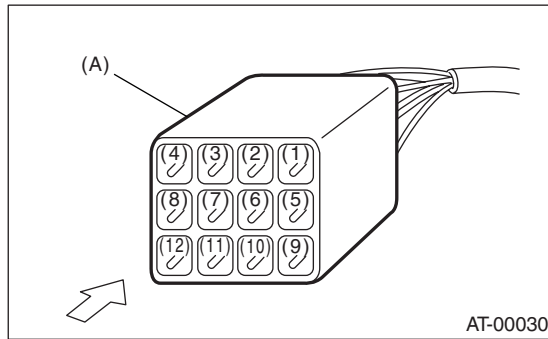
When the driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

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

NOTE:

- 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.

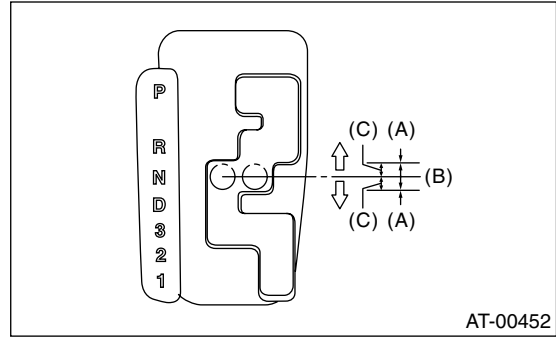
	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



(A) Inhibitor switch connector

- 3) Check if there is continuity at equal points when the select lever is turned 1.5° 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 4AT-52, ADJUSTMENT, Inhibitor Switch.>



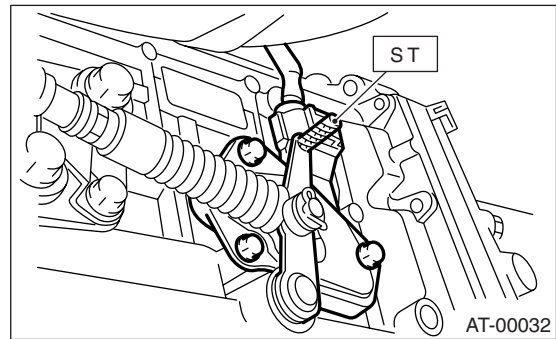
AT-00452

- (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-27, 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 vertical as possible into the holes in inhibitor switch lever and switch body.
- ST 499267300 STOPPER PIN



AT-00032

- 4) Tighten the three inhibitor switch bolts.

Tightening torque:

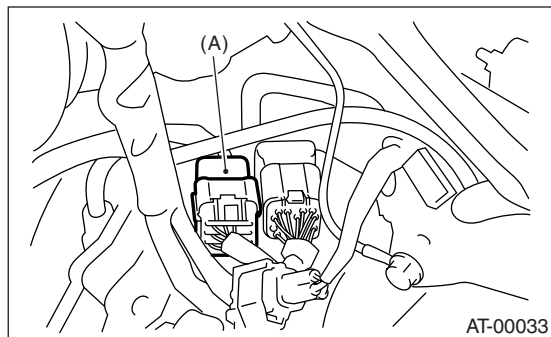
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

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

C: REMOVAL

- 1) Set up the vehicle on a lift.
- 2) Move the select lever to “N” range.
- 3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

5) Disconnect the inhibitor switch connector.



(A) Inhibitor switch

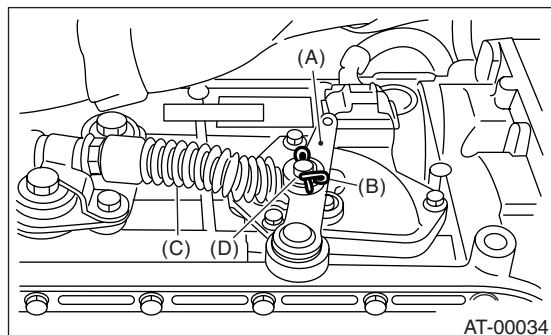
6) Remove the inhibitor switch connector from stay.

7) Lift-up the vehicle.

8) Remove the front and center exhaust pipes.

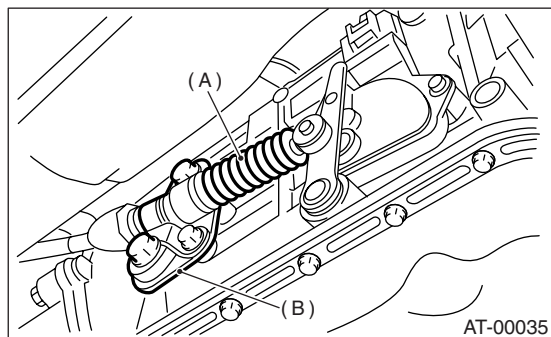
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>

9) Remove the snap pin and washer from range select lever.



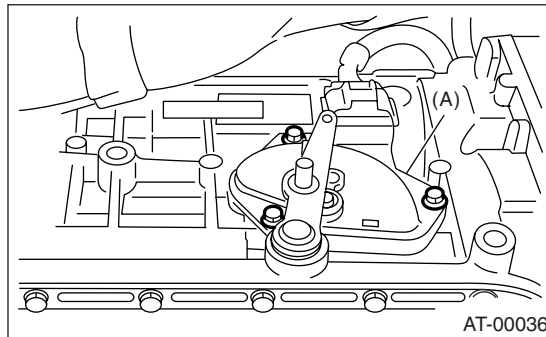
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Washer

10) Remove the plate assembly from transmission case.



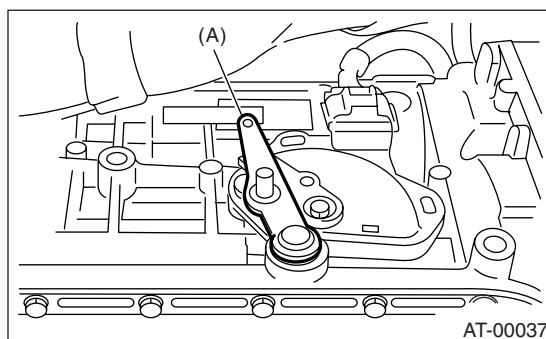
- (A) Select cable
- (B) Plate ASSY

11) Remove the bolts.



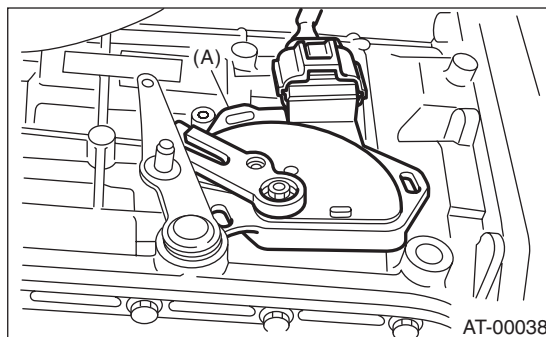
(A) Inhibitor switch

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



(A) Range select lever

13) Remove the inhibitor switch from transmission.



(A) Inhibitor switch

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

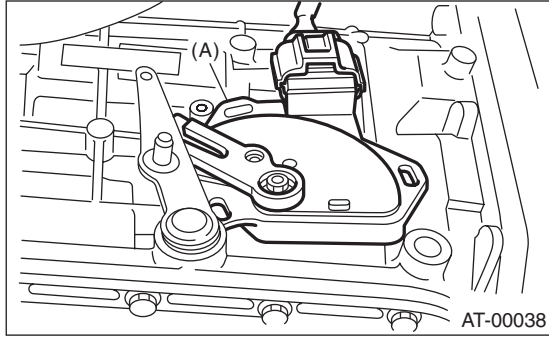
D: INSTALLATION

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

Inhibitor Switch

AUTOMATIC TRANSMISSION

2) Install the inhibitor switch to transmission case.

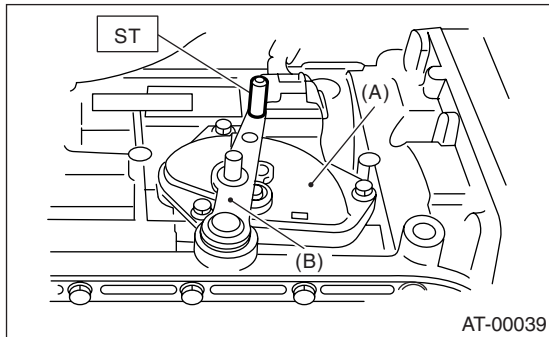


(A) Inhibitor switch

3) Move the range select lever to neutral position.
4) Using the ST, tighten the bolts of inhibitor switch.
ST 499267300 STOPPER PIN

Tightening torque:

3.5 N·m (0.36 kgf-m, 2.6 ft-lb)

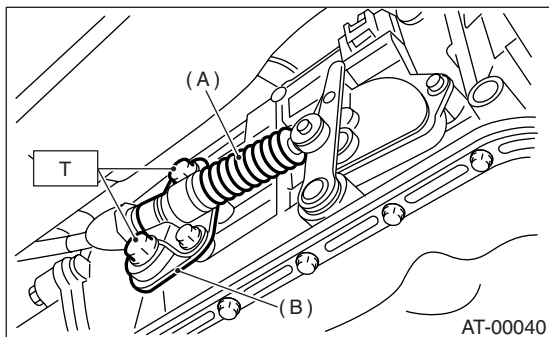


(A) Inhibitor switch
(B) Range select lever

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

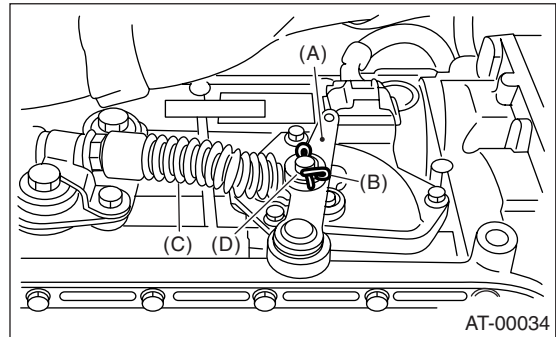
Tightening torque:

T: 25 N·m (2.5 kgf-m, 18 ft-lb)



(A) Select cable
(B) Plate ASSY

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



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

8) Install the front and center exhaust pipes. (Non-turbo model)

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

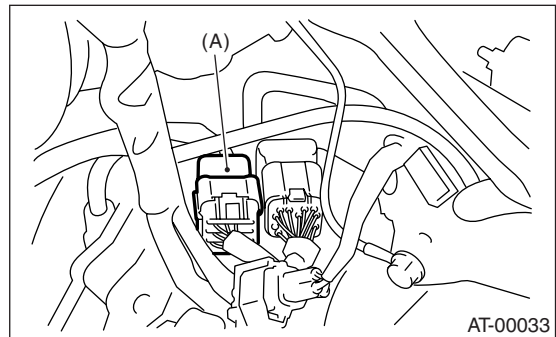
9) Install the center exhaust pipe. (Turbo model)

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

10) Lower the vehicle.

11) Install the inhibitor switch connector from stay.

12) Connect the inhibitor switch connector.



(A) Inhibitor switch

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

14) Install the intercooler. (Turbo model)

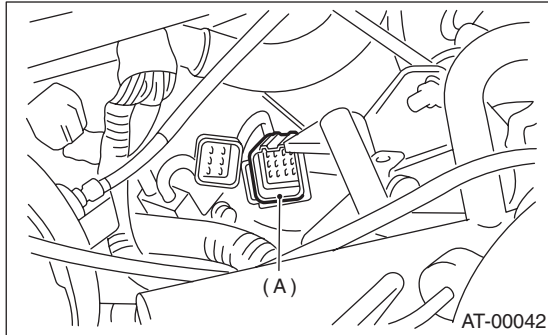
<Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

15) Inspect the inhibitor switch. <Ref. to 4AT-52, INSPECTION, Inhibitor Switch.>

14. Front Vehicle Speed Sensor

A: REMOVAL

- 1) Set up the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 5) Disconnect the transmission connector.



(A) Transmission connector

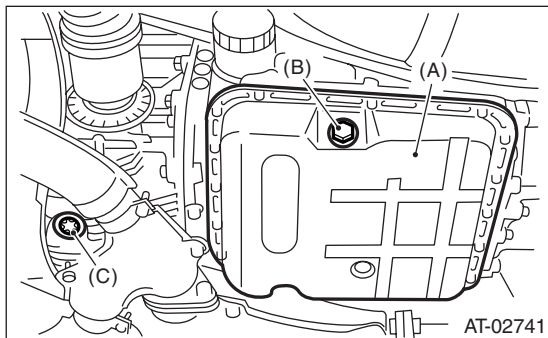
- 6) Remove the pitching stopper. <Ref. to 4AT-48, REMOVAL, Transmission Mounting System.>
- 7) Remove the transmission connector from stay.
- 8) Lift-up the vehicle.
- 9) Clean the transmission exterior.
- 10) Drain the ATF completely.

NOTE:

- Tighten the ATF drain plug after draining the ATF.
- Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)



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

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

<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>

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

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

- 13) Remove the shield cover. (If equipped)

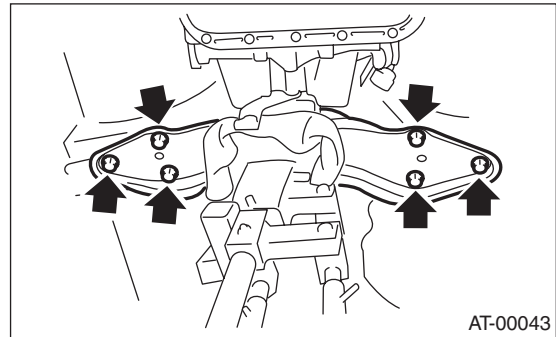
- 14) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>

- 15) Place the transmission jack under transmission.

NOTE:

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

- 16) Remove the transmission rear crossmember bolts.



- 17) Lower the AT jack.

NOTE:

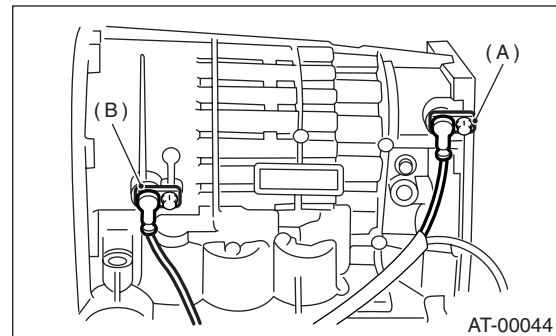
Do not separate the AT jack and transmission.

- 18) Remove the oil cooler inlet and outlet pipe.

NOTE:

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

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

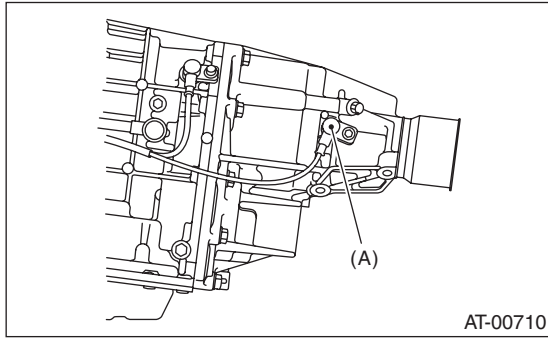


- (A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

Front Vehicle Speed Sensor

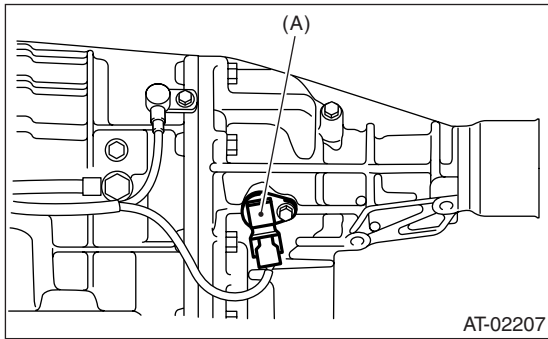
AUTOMATIC TRANSMISSION

20) Remove the rear vehicle speed sensor. (Turbo model)



(A) Rear vehicle speed sensor

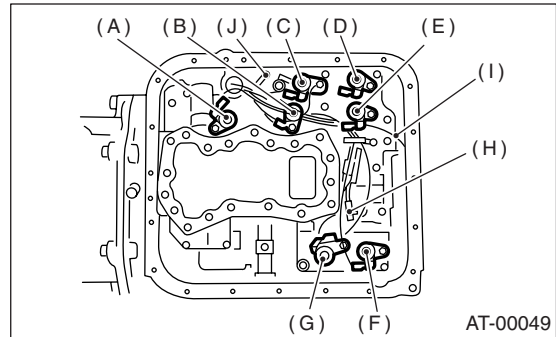
21) Disconnect the connector from rear vehicle speed sensor. (Non-turbo model)



(A) Rear vehicle speed sensor

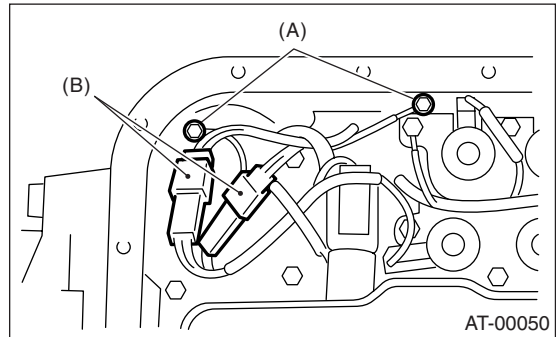
22) Remove the oil pan.

23) Remove the duty solenoids connector and ATF temperature sensor. Remove the connectors from clip and disconnect the connectors. (Turbo model)



- (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

24) Disconnect the harness connector and transmission ground terminal. (Non-turbo model)

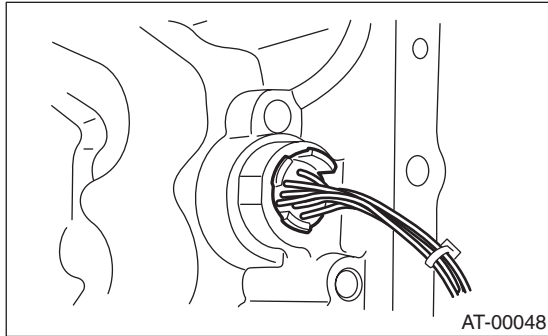


- (A) Transmission ground
- (B) Harness connector

25) Remove the harness assembly.

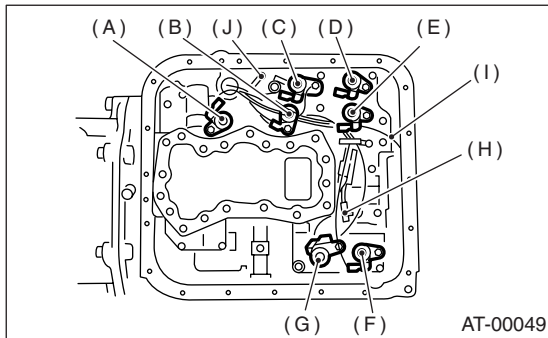
B: INSTALLATION

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. (Turbo model)

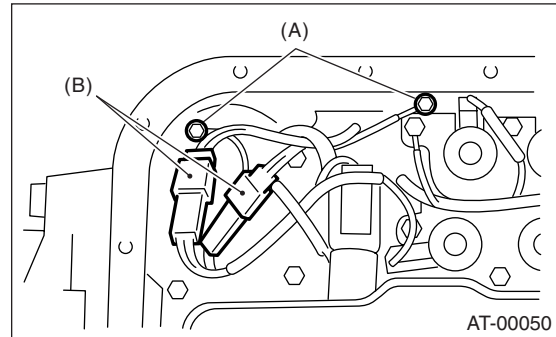
Tightening torque (Transmission ground cable and ATF temperature sensor):
8 N·m (0.8 kgf-m, 5.8 ft-lb)



- (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) Connect the harness connector and transmission ground. (Non-turbo model)

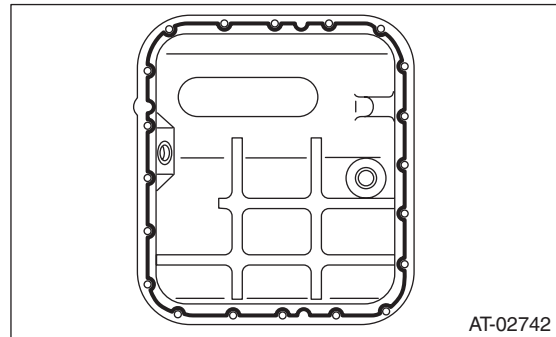
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



- (A) Transmission ground
- (B) Harness connector

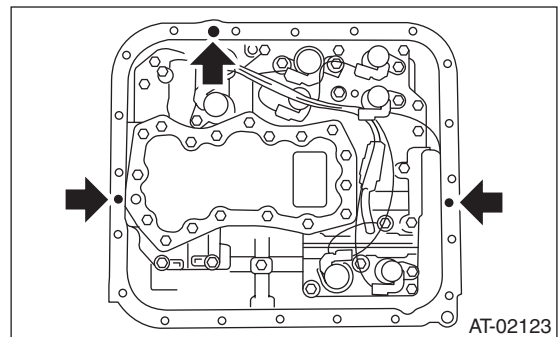
4) Apply proper amount of liquid gasket to the entire oil pan mating surface.

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



5) Apply liquid gasket fully to three holes other than screw holes on transmission case.

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



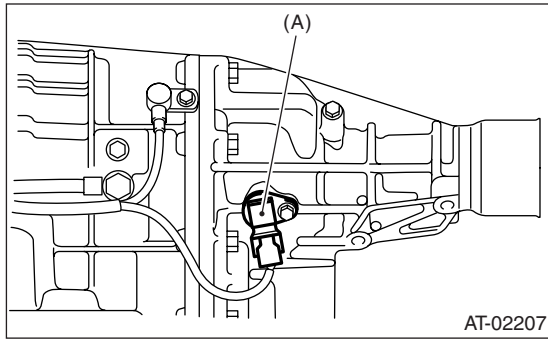
6) Install the oil pan.

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

Front Vehicle Speed Sensor

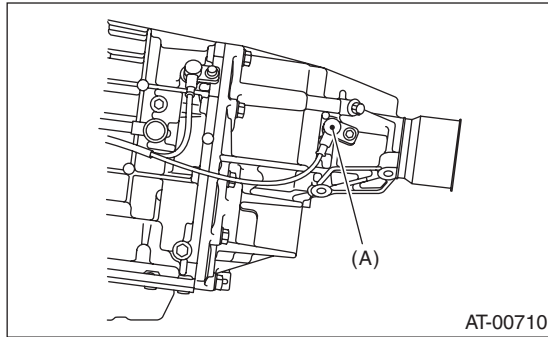
AUTOMATIC TRANSMISSION

7) Connect the connector of rear vehicle speed sensor. (Non-turbo model)



(A) Rear vehicle speed sensor

8) Install the rear vehicle speed sensor. (Turbo model)

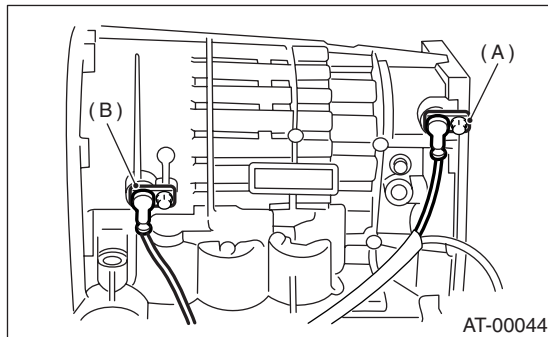


(A) Rear vehicle speed sensor

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

Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)



(A) Front vehicle speed sensor

(B) Torque converter turbine speed sensor

10) Install the oil cooler pipes.

NOTE:

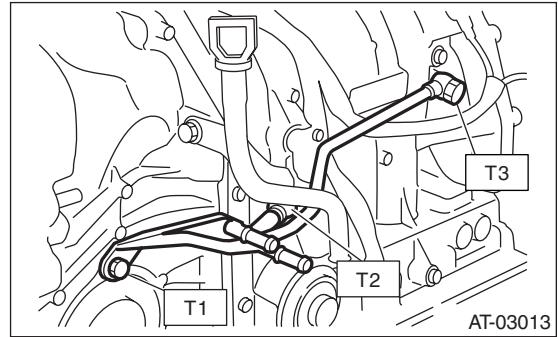
Be sure to use a new copper washer.

Tightening torque:

T1: 25 N·m (2.5 kgf-m, 18 ft-lb)

T2: 45 N·m (4.6 kgf-m, 33 ft-lb)

T3: 40 N·m (4.1 kgf-m, 30 ft-lb)



11) Install the transmission rear crossmember bolts.

Tightening torque:

70 N·m (7.1 kgf-m, 51 ft-lb)

12) Install the propeller shaft. <Ref. to DS-17, INSTALLATION, Propeller Shaft.>

13) Install the shield cover. (If equipped)

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

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Muffler.>

15) Install the center, rear exhaust pipes and 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.>

16) Lower the vehicle.

17) Install the transmission connector to the stay.

18) Install the pitching stopper. <Ref. to 4AT-48, INSTALLATION, Transmission Mounting System.>

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

20) Install the intercooler. (Turbo model)

<Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

15.Rear Vehicle Speed Sensor

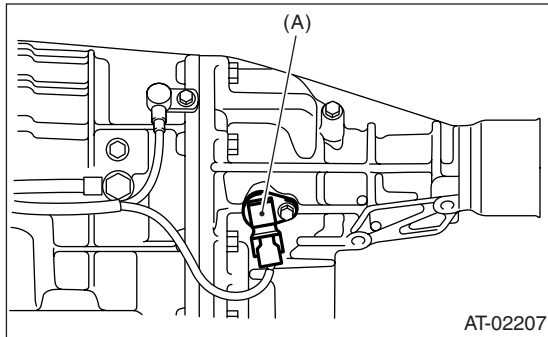
A: REMOVAL

1. VTD MODEL

When removing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-55, REMOVAL, Front Vehicle Speed Sensor.>

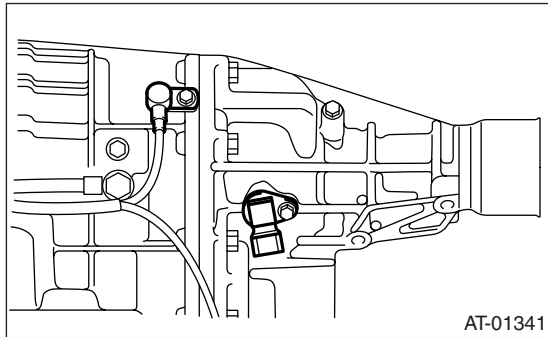
2. MPT MODEL

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



(A) Rear vehicle speed sensor

- 3) Remove the rear vehicle speed sensor.



B: INSTALLATION

1. VTD MODEL

When installing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-57, INSTALLATION, Front Vehicle Speed Sensor.>

2. MPT MODEL

Install in the reverse order of removal.

NOTE:

Replace with a new O-ring.

Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)

16.Torque Converter Turbine Speed Sensor

A: REMOVAL

When removing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor."
<Ref. to 4AT-55, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor."
<Ref. to 4AT-57, INSTALLATION, Front Vehicle Speed Sensor.>

17. Control Valve Body

A: REMOVAL

1. TURBO MODEL

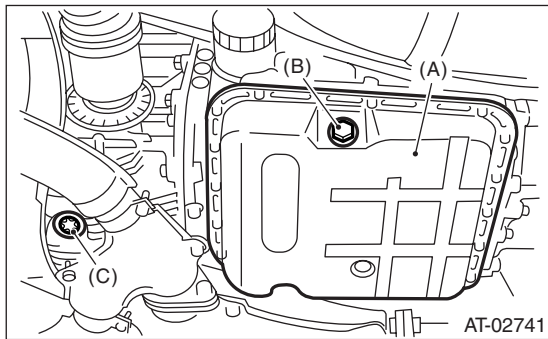
- 1) Lift-up the vehicle.
- 2) Clean the transmission exterior.
- 3) Drain the ATF completely.

NOTE:

- Tighten the ATF drain plug after draining the ATF.
- Replace the gasket with a new one.

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)



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

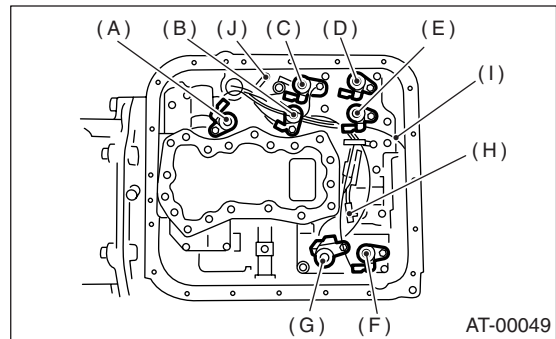
- 4) Remove the oil pan.

CAUTION:

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

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

- 7) Disconnect each solenoid connector and remove ATF temperature sensor from control valve.

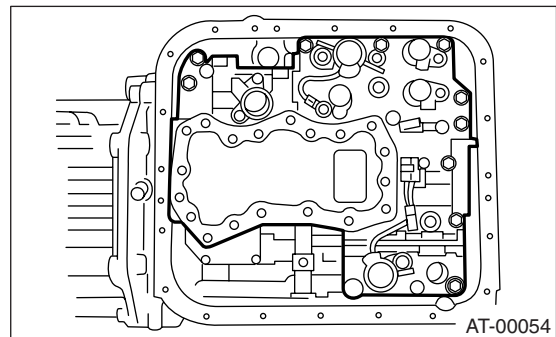


- (A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Transmission ground

- 8) Remove the control valve body.

NOTE:

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



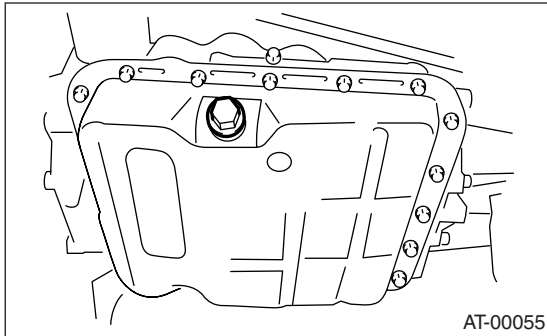
2. NON-TURBO MODEL

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

Control Valve Body

AUTOMATIC TRANSMISSION

5) Remove the drain plug and gasket, and then drain ATF.



6) Replace the gasket with a new one, and then tighten the drain plug.

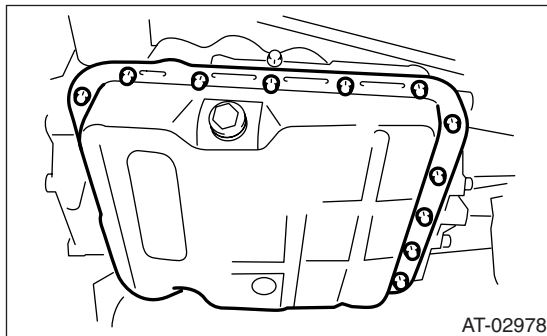
Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)

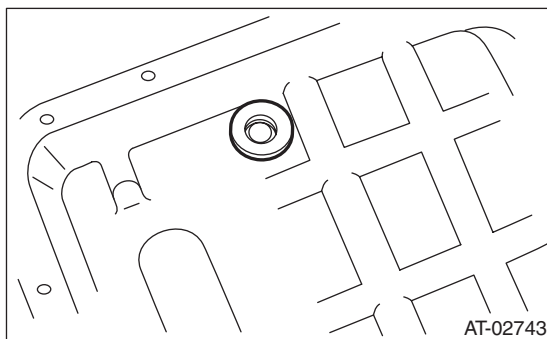
7) Remove the oil pan.

CAUTION:

Be careful not to allow dirt or dust to get into the oil pan.



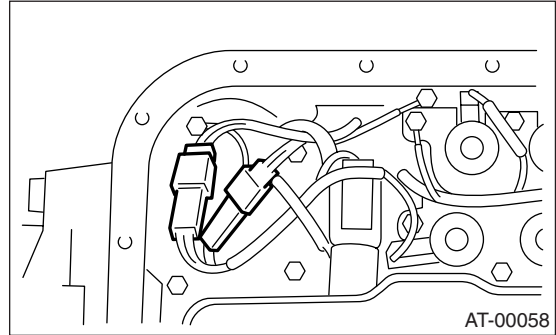
8) Remove the magnet.



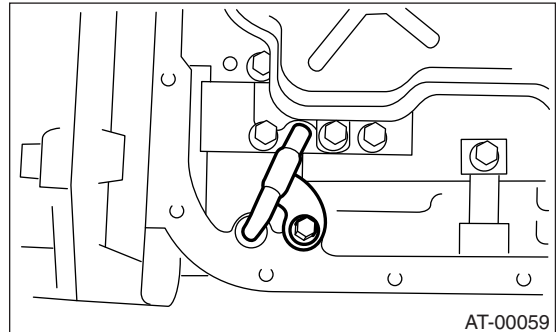
9) Clean the magnet.

10) Remove the liquid gasket completely from oil pan and transmission case.

11) Remove the control valve connector.



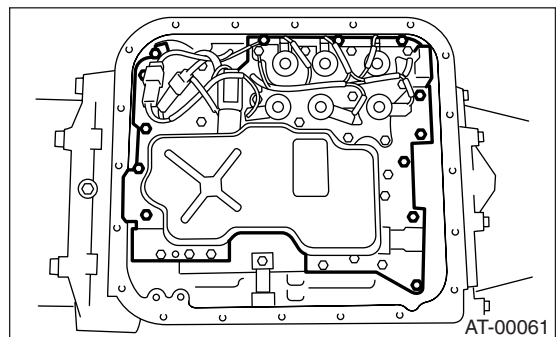
12) Remove the oil cooler pipe.



13) Remove the control valve body.

NOTE:

Replace the control valve body as assembly, because the control valve body can not be disassembled.



B: INSTALLATION

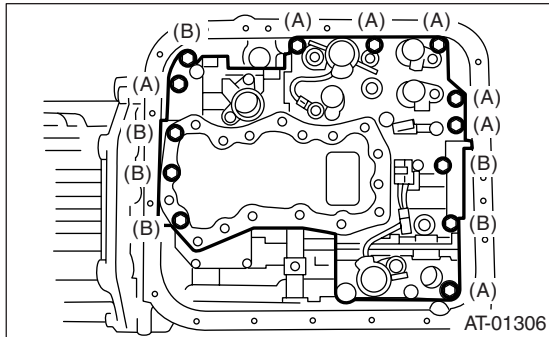
1. TURBO MODEL

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)

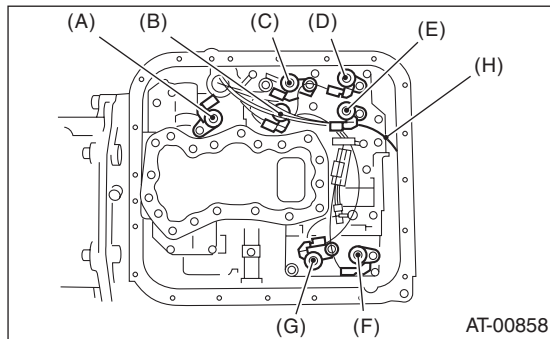


Bolt length mm (in)

(A) 30 (1.18)

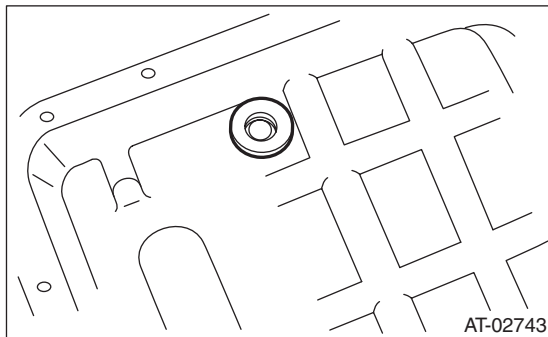
(B) 55 (2.17)

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)

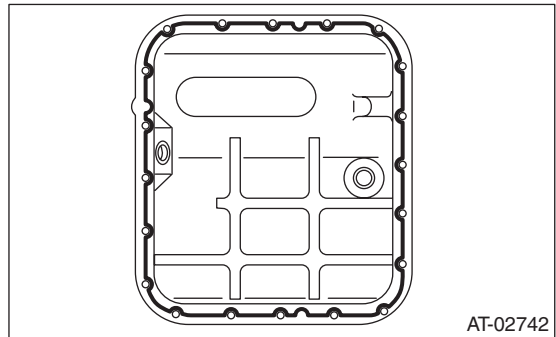
4) Attach the magnet at specified position.



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

Liquid gasket:

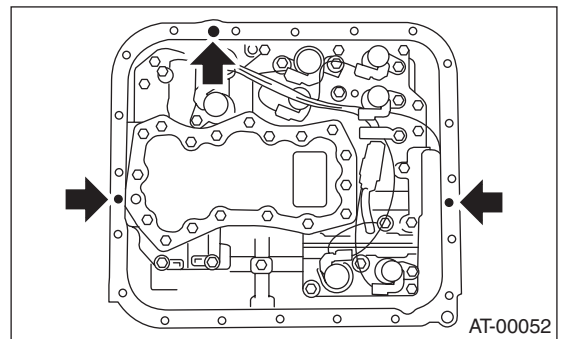
THREE BOND 1217B (Part No. K0877YA020)



6) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Liquid gasket:

THREE BOND 1217B (Part No. K0877YA020)



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

Tightening torque:

5 N·m (0.5 kgf-m, 3.6 ft-lb)

8) Pour ATF from the oil charge pipe.

Recommended fluid:

Dexron III

Fluid capacity:

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

9) Check the level of ATF.

<Ref. to 4AT-31, Automatic Transmission Fluid.>

2. NON-TURBO MODEL

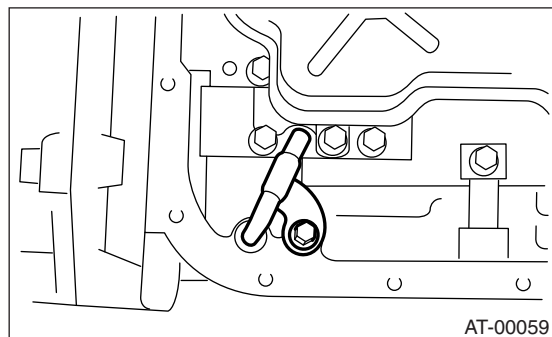
- 1) Check the control valve body for dirt and dust.
- 2) Temporarily install the control valve body to transmission.
- 3) Install the oil cooler pipe.

Control Valve Body

AUTOMATIC TRANSMISSION

Tightening torque:

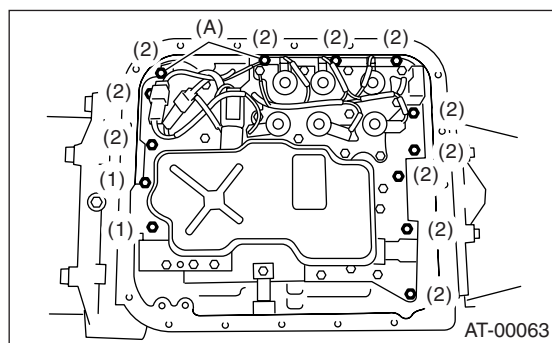
8 N·m (0.8 kgf-m, 5.8 ft-lb)



4) Tighten the bolts evenly.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



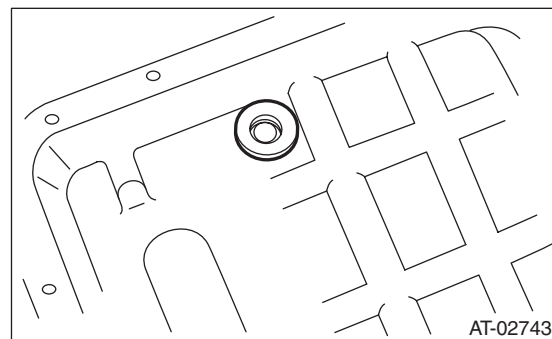
(A) Transmission ground

Bolt length mm (in)

(1) 35 (1.38)

(2) 30 (1.18)

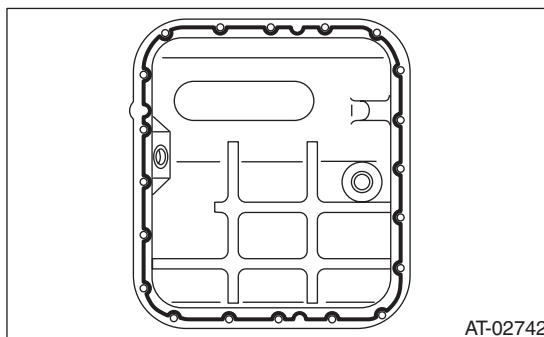
5) Attach the magnet at specified position of oil pan.



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

Liquid gasket:

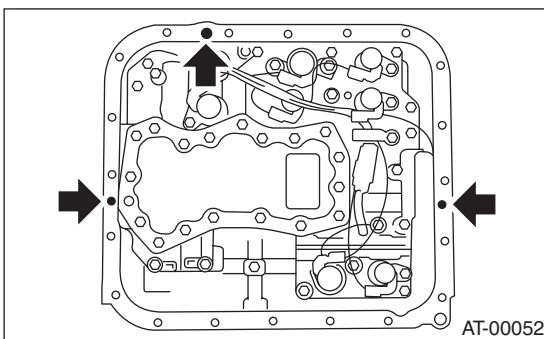
THREE BOND 1217B (Part No. K0877YA020)



7) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Liquid gasket:

THREE BOND 1217B (Part No. K0877YA020)



8) Install the oil pan with tightening bolts evenly.

Tightening torque:

5 N·m (0.5 kgf-m, 3.6 ft-lb)

9) Pour ATF into the oil charge pipe.

Recommended fluid:

Dexron III type automatic transmission fluid

Fluid capacity:

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

10) Bleed the air from control valve. <Ref. to 4AT-69, Air Bleeding of Control Valve.>

11) Check the level of ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

12) Perform the advance operation of learning control. (Non-turbo model)

<Ref. to 4AT(D)(diag)-15, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

C: DISASSEMBLY

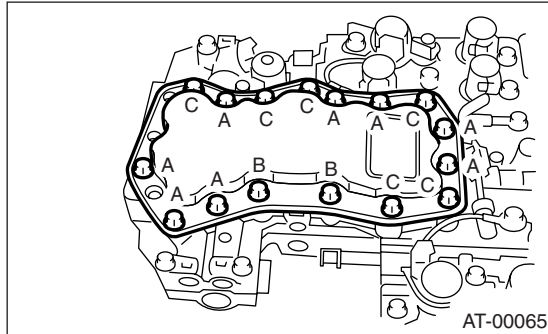
NOTE:

Do not disassembly the control valve for non-turbo model.

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 bolt lengths are different.

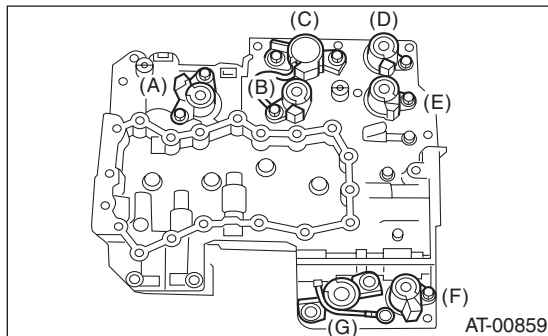


- (A) Short bolt
- (B) Middle-length bolt
- (C) Long bolt

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

NOTE:

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

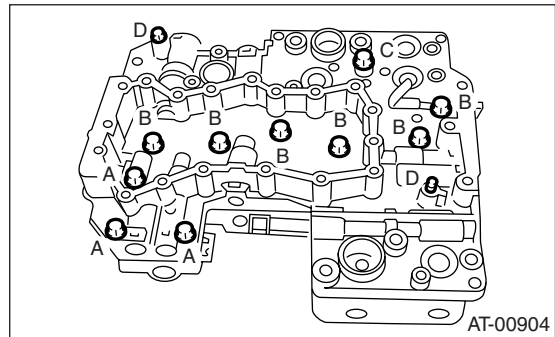


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)

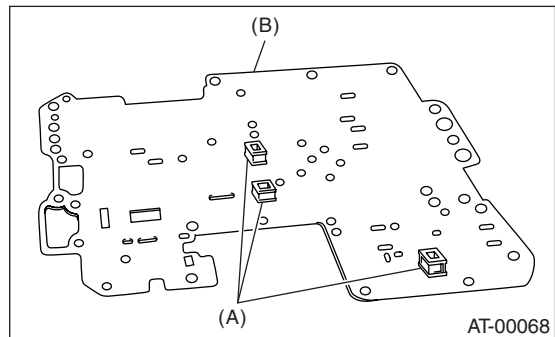
3) Remove the upper-lower valve body tightening bolts.

NOTE:

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

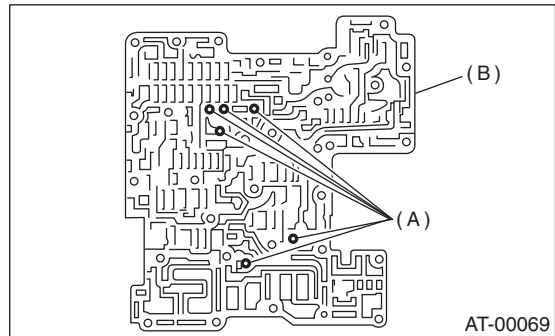


- 4) Remove the lower valve body.
- 5) Remove the oil filter and plate.



- (A) Oil filter
- (B) Plate

6) Remove six steel balls from middle valve body.



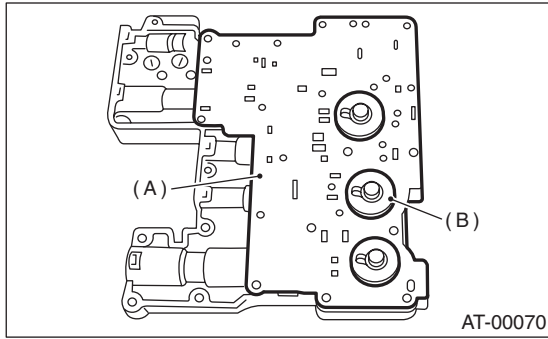
- (A) Steel ball
- (B) Middle valve body

7) Remove the middle valve body.

Control Valve Body

AUTOMATIC TRANSMISSION

8) Remove upper separator plate from middle valve body.

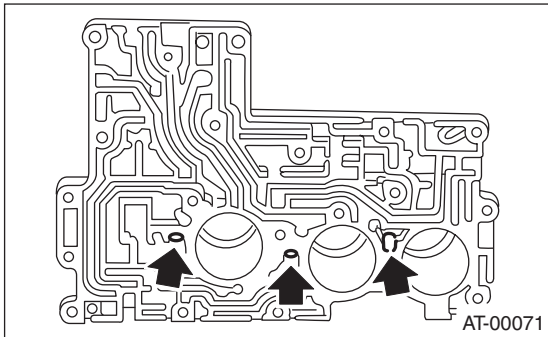


- (A) Upper separator plate
(B) Side plate

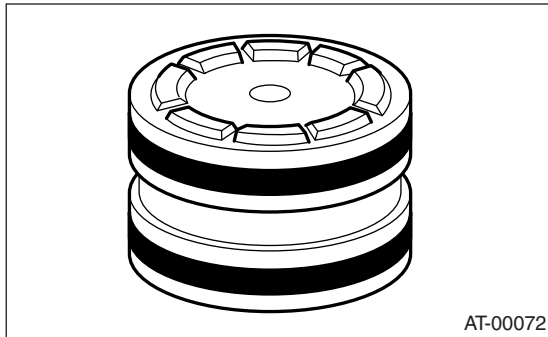
9) Remove valve springs and four steel balls from upper valve body.

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

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

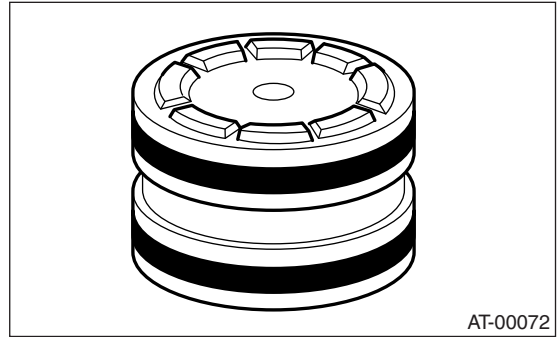


12) Remove the seal ring from piston.



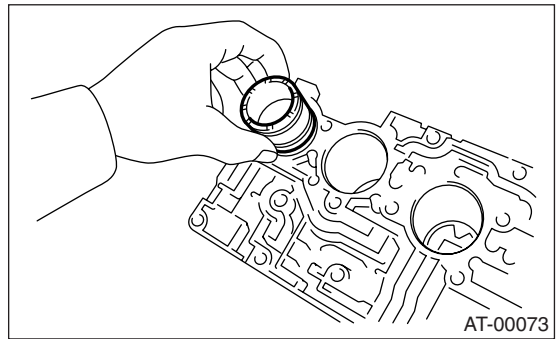
D: ASSEMBLY

1) Install a new seal ring to piston.

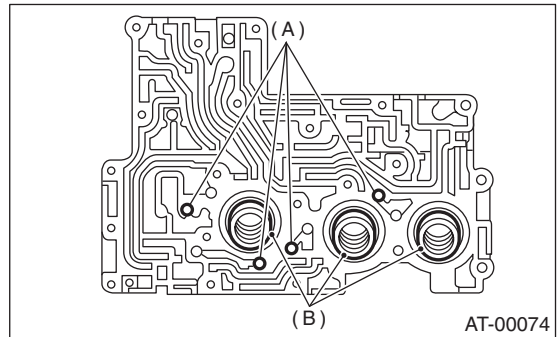


2) Apply ATF to the seal ring.

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

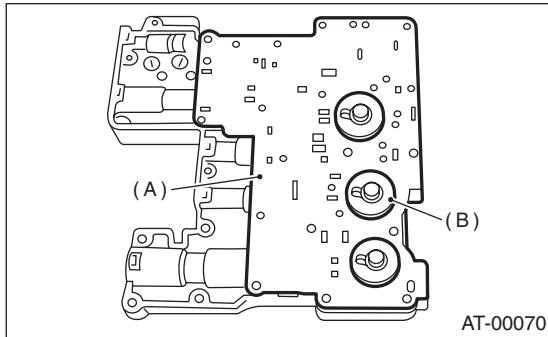
5) Align the hole in side plate with the hole in separator plate, and then install support plate and upper separator plate to middle valve body.

Control Valve Body

AUTOMATIC TRANSMISSION

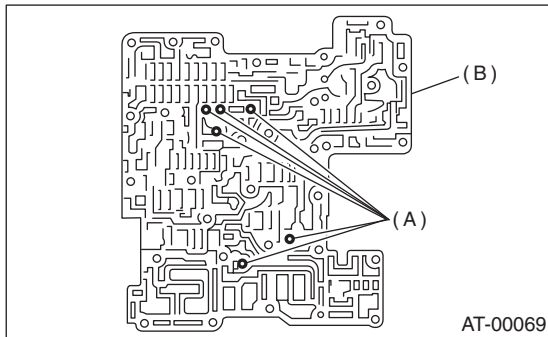
Tightening torque:

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.

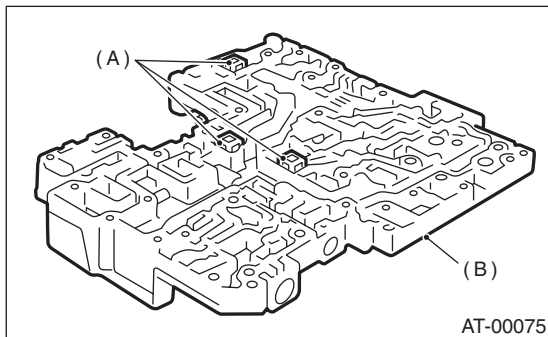


- (A) Steel ball
- (B) Middle valve body

7) Install three filters to lower valve body.

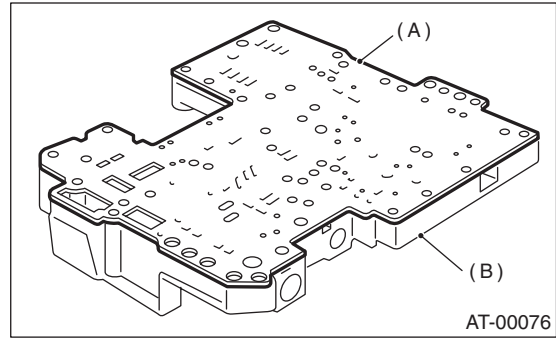
NOTE:

Pay attention to the location of filters.



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

8) Install the lower separate plate to lower valve body.

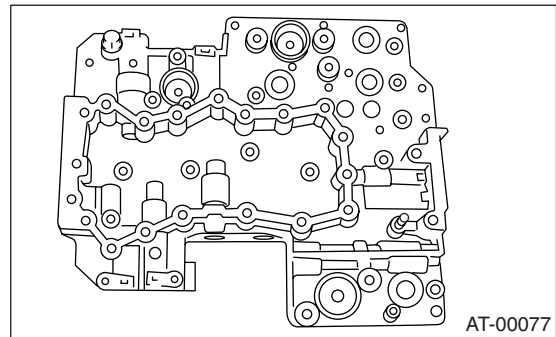


- (A) Lower separator plate
- (B) Lower valve body

9) Temporarily assemble the valve body.

NOTE:

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



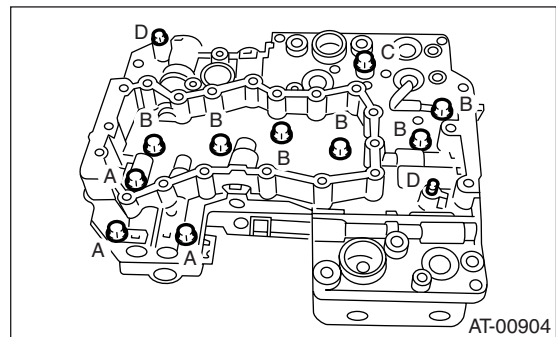
10) Tighten the bolts and nuts.

NOTE:

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

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



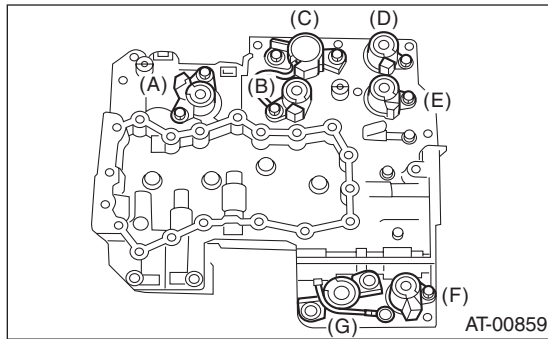
Bolt length mm (in)

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

Control Valve Body

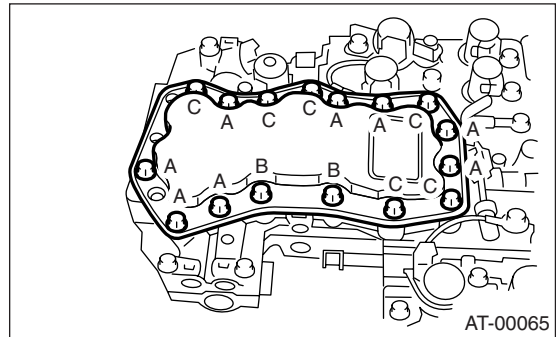
AUTOMATIC TRANSMISSION

11) Install the sensor, 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)

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



Bolt length mm (in)

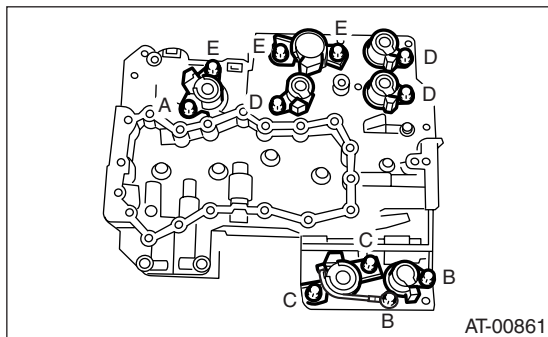
- (A) 12 (0.47)
- (B) 62 (2.44)
- (C) 81 (3.19)

E: INSPECTION

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

12) Tighten the 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)

13) Install oil strainer to lower valve body.

18. Air Bleeding of Control Valve

A: PROCEDURE

NOTE:

Do not bleed air of control valve for Turbo model.

- 1) Set the select lever to "P" range and apply parking brake, then lift-up the vehicle.
- 2) Connect the SUBARU Select Monitor to vehicle.
- 3) Using SUBARU Select Monitor, check that the DTC is not output.
- 4) Using SUBARU Select Monitor, check that ATF temperature is less than 60°C (140°F).
- 5) Set the SUBARU Select Monitor to OFF.
- 6) Turn the ignition switch to OFF.
- 7) With pressing shift lock release button, set the select lever to "R" range.
- 8) Depress the brake pedal fully with left foot until air bleeding is complete.
- 9) Turn the ignition switch to ON.
- 10) Set the select lever to "P" range, and then wait for more than three seconds.
- 11) Set the select lever to "R" range, and then wait for more than three seconds.
- 12) Set the select lever to "N" range, and then wait for more than three seconds.
- 13) Set the select lever to "D" range, and then wait for more than three seconds.
- 14) Set the select lever to "N" range, and then wait for more than three seconds.
- 15) Slightly depress the accelerator pedal to full open.
- 16) Slightly release the accelerator pedal to close.
- 17) Start the engine.
- 18) Set the select lever to "D" range.
- 19) Turn the SUBARU Select Monitor power to ON.
- 20) On the SUBARU Select Monitor, select the "individual system inspection" of main menu.
- 21) On the "individual system inspection" selection menu, select the "individual system inspection" and air bleeding of control valve will start in transmission. At this time, ATF TEMP light in the combination meter blinks at 2 Hz. If the ATF TEMP light does not blink, repeat the procedures from step 4).
- 22) Air bleeding of control valve is finished, when ATF TEMP light blink in the combination meter changes from 2 Hz to 0.5 Hz, on control valve will finish.

NOTE:

Repeat the procedure from step 4) if ATF TEMP light blink change from 2 Hz to 4 Hz during air bleeding.

- 23) Set the select lever to "N" range, and turn the ignition switch to OFF.

- 24) Set the select lever to "P" range to finish air bleeding.

19. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

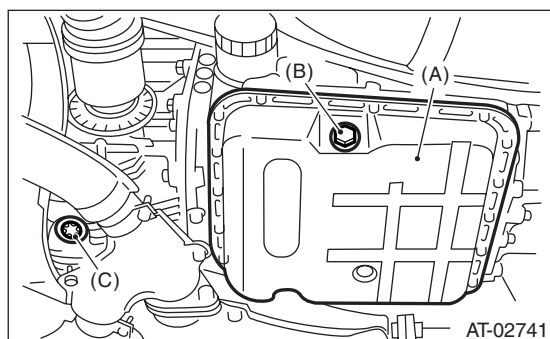
A: REMOVAL

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

- 1) Lift-up the vehicle.
- 2) Clean the transmission exterior.
- 3) Replace the gasket with a new one, and tighten the drain plug.
- 4) Drain the ATF completely.

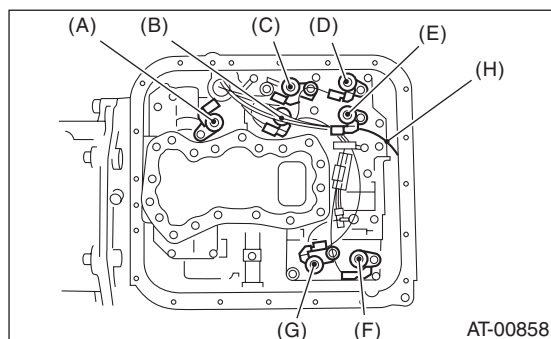
Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)



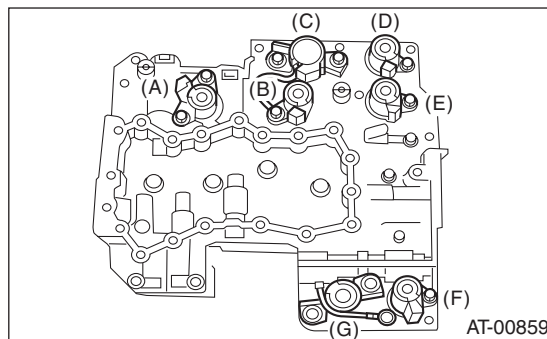
- (A) Oil pan
- (B) Drain plug (ATF)
- (C) Differential gear oil drain plug

- 5) Remove the oil pan.
- 6) Disconnect the solenoid and duty solenoid 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)

- 7) 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)

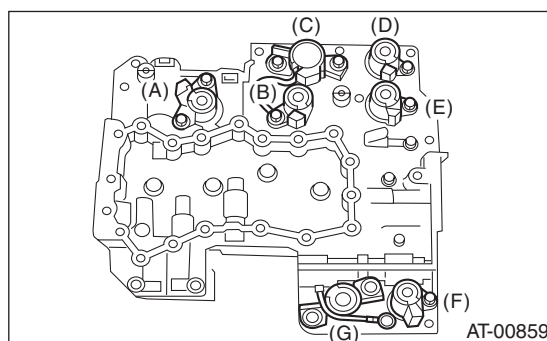
2. ATF TEMPERATURE SENSOR

For removal of ATF temperature sensor, refer to "Front Vehicle Speed Sensor." <Ref. to 4AT-55, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

- 1) Insert solenoid and duty solenoid to specified position.



- (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)

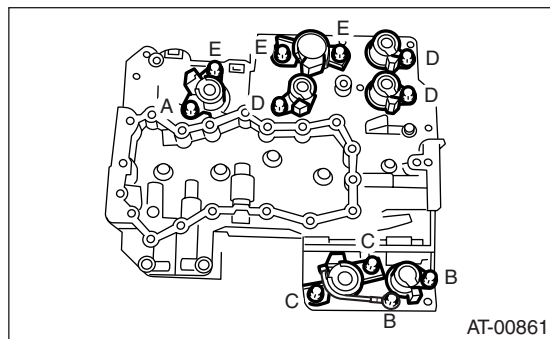
- 2) Tighten the bolts and nuts.

Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

AUTOMATIC TRANSMISSION

Tightening torque:

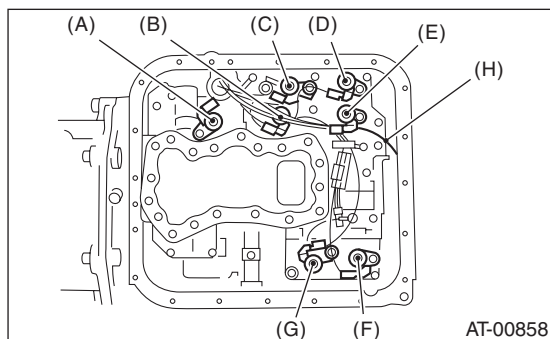
8 N·m (0.8 kgf-m, 5.8 ft-lb)



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 harness to valve body using clips.

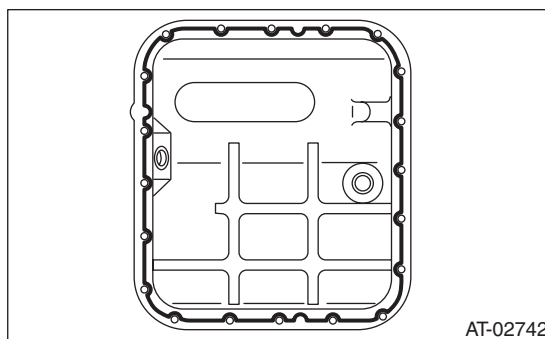


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) Transfer duty solenoid (Brown)

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

Liquid gasket:

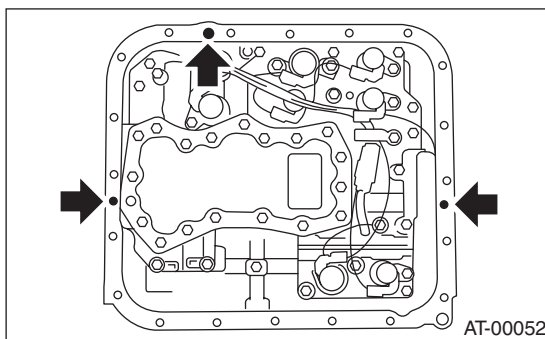
THREE BOND 1217B (Part No. K0877YA020)



5) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Liquid gasket:

THREE BOND 1217B (Part No. K0877YA020)



6) Install the oil pan.

Tightening torque:

5 N·m (0.5 kgf-m, 3.6 ft-lb)

7) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole. <Ref. to 4AT-31, Automatic Transmission Fluid.>

8) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>

2. ATF TEMPERATURE SENSOR

For installation of ATF temperature sensor, refer to "Front Vehicle Speed Sensor." <Ref. to 4AT-57, INSTALLATION, Front Vehicle Speed Sensor.>

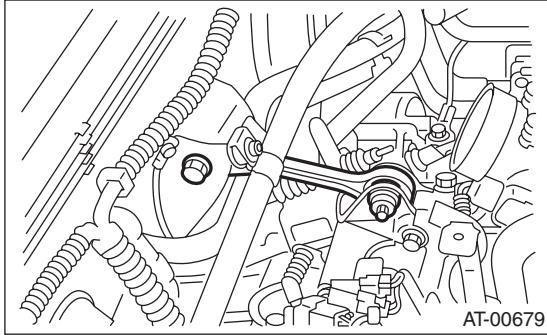
Transfer Duty Solenoid and Valve Body

AUTOMATIC TRANSMISSION

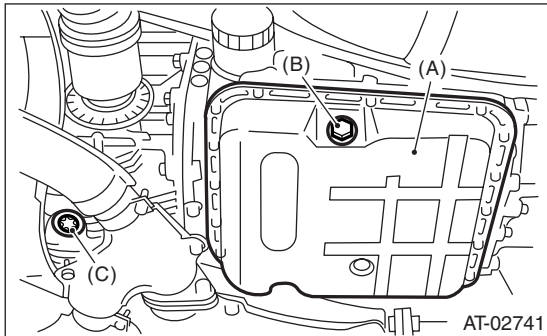
20. Transfer Duty Solenoid and Valve Body

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove intercooler. <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 4) Remove the pitching stopper.



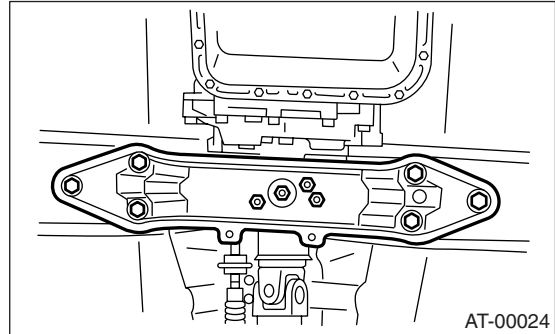
- 5) Remove center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 6) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 7) Raise the vehicle and drain the ATF.



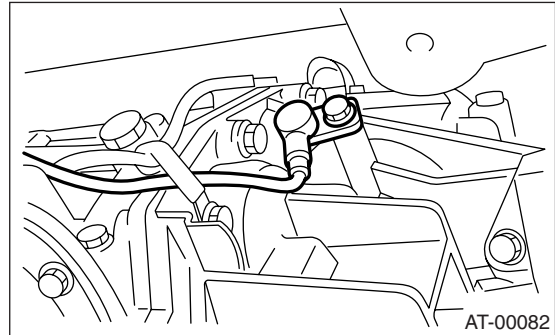
- (A) Oil pan
- (B) Drain plug (ATF)
- (C) Differential gear oil drain plug

- 8) Remove the heat shield cover. (If equipped)
- 9) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>
- 10) Remove the transmission rear crossmember.
 - (1) Support the transmission using a transmission jack and raise slightly.

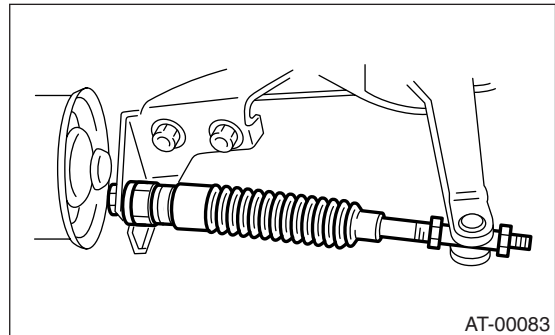
- (2) Remove the bolts and nuts as shown in the figure.



- 11) Remove the rear vehicle speed sensor.



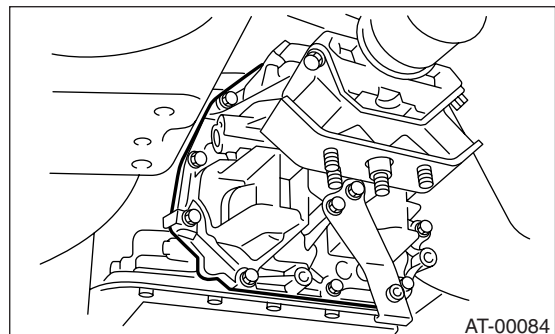
- 12) Remove the select cable nut.



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

NOTE:

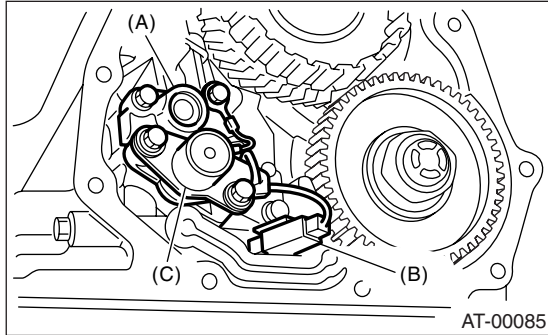
Use a container to catch oil flowing from extension.



Transfer Duty Solenoid and Valve Body

AUTOMATIC TRANSMISSION

- 16) Disconnect the transfer duty solenoid connector.
- 17) Remove the transfer duty solenoid and transfer valve body.



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

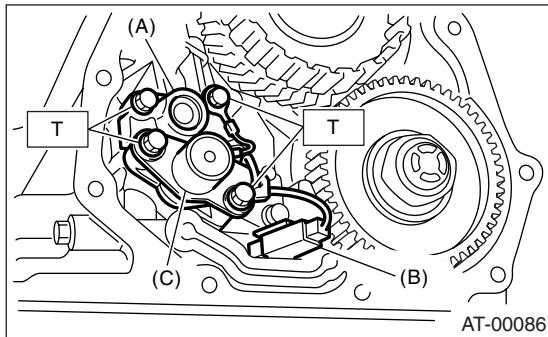
B: INSTALLATION

- 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.

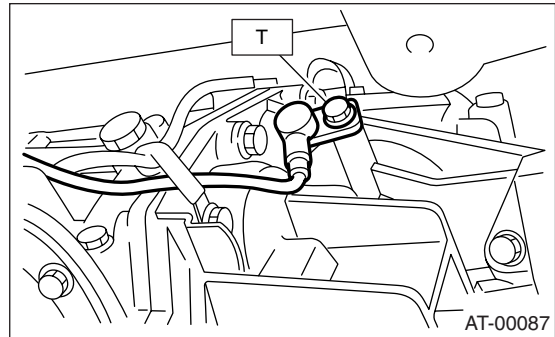
Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)

- (2) Adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>
- 3) Install the rear vehicle speed sensor.

Tightening torque:

T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)

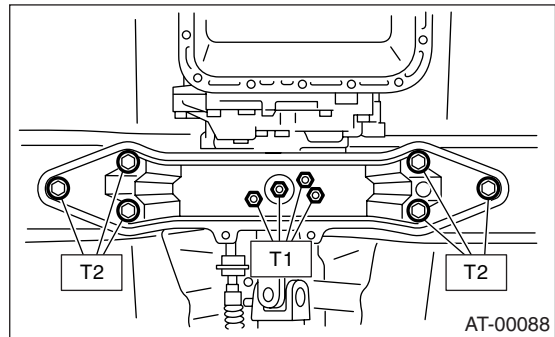


- 4) Install the transmission rear crossmember.
 - (1) Tighten the bolts.

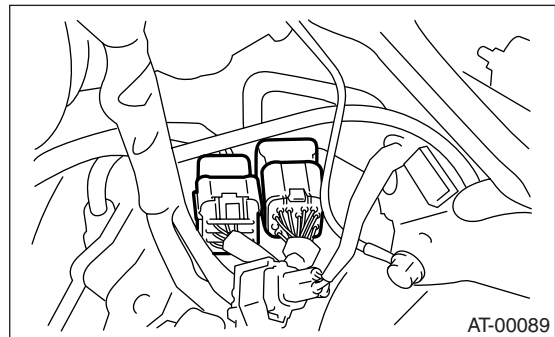
Tightening torque:

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-17, INSTALLATION, Propeller Shaft.>
- 6) Install center and rear exhaust pipes, and muffler. <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.>
- 7) Connect the transmission harness connector.



Transfer Duty Solenoid and Valve Body

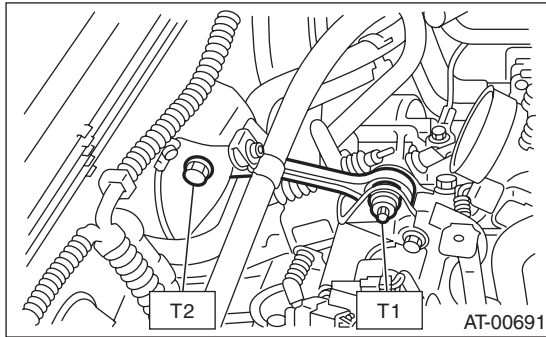
AUTOMATIC TRANSMISSION

8) 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)



9) Install intercooler. (Turbo model)

<Ref. to IN(H4DOTC)-10, INSTALLATION, Inter-cooler.>

10) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to 4AT-31, Automatic Transmission Fluid.>

11) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>

21.ATF Filter

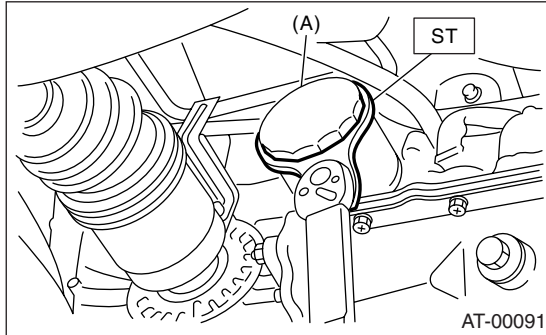
A: REMOVAL

NOTE:

The ATF filter is maintenance free.

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

ST 498545400 OIL FILTER WRENCH



(A) ATF filter

B: INSTALLATION

- 1) Get new ATF filter and apply a thin coat of ATF to the oil seal.
- 2) Install ATF filter. Turn it by hand, being careful not to damage oil seal.
- 3) Using ST, tighten ATF filter.

Calculate ATF filter torque specifications 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 78 mm (3.07 in)

L2: Torque wrench length

Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7)

NOTE:

Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH

- 4) Add ATF.
- 5) Inspect level of ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

C: INSPECTION

Replace the part if any defect is found from the inspection.

Check for rust, hole, ATF leaks, and other damage.

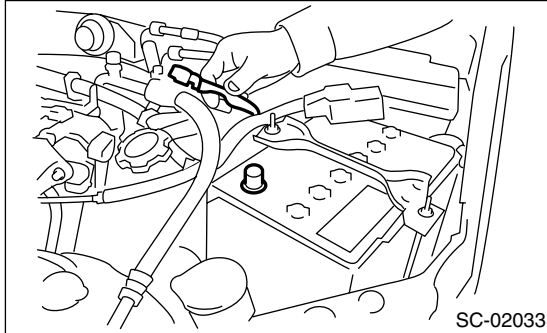
Transmission Control Module (TCM)

AUTOMATIC TRANSMISSION

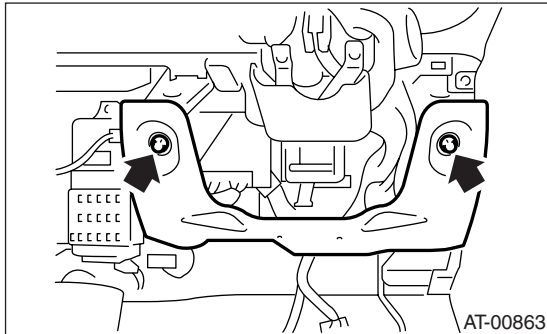
22. Transmission Control Module (TCM)

A: REMOVAL

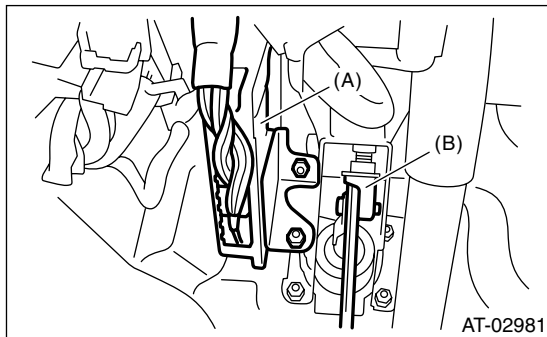
- 1) Disconnect the ground cable from battery.



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



- 4) Disconnect the connectors from TCM.



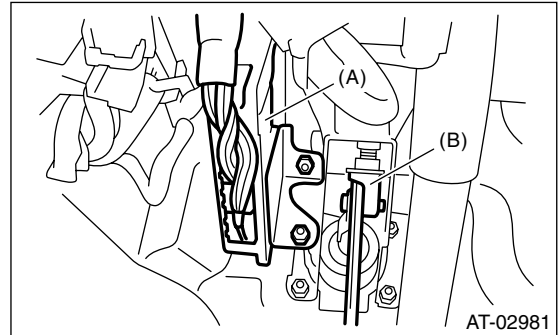
- (A) Transmission control module (TCM)
(B) Brake pedal

- 5) Remove the TCM.

B: INSTALLATION

- 1) Install the TCM.

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



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

- 2) Connect the connectors to TCM.
- 3) Install in the reverse order of removal.
- 4) If replacing the TCM, execute the advance operation of learning control promotion. (Non-turbo model) <Ref. to 4AT(D)(diag)-15, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

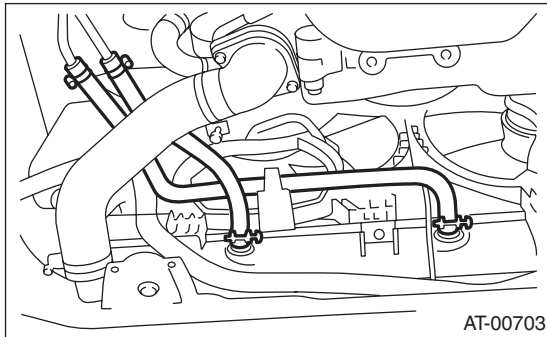
23.ATF Cooler Pipe and Hose

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Remove battery and washer tank.
- 3) Lift-up the vehicle.
- 4) Remove the under cover.
- 5) Disconnect ATF cooler hose from radiator.

NOTE:

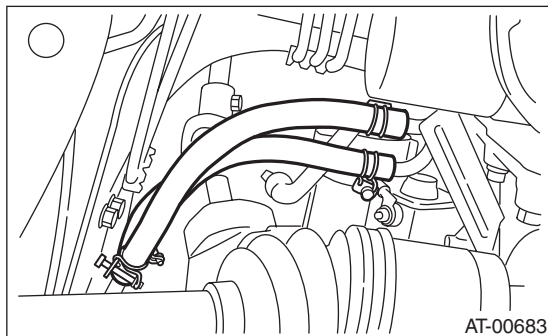
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



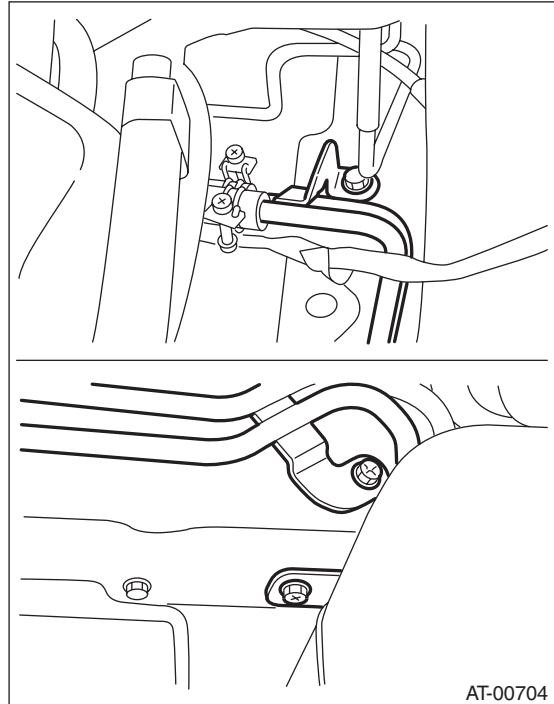
- 6) Disconnect ATF cooler hoses from pipes.

NOTE:

- Do not remove with a screwdriver or other pointed tools.
- When 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.



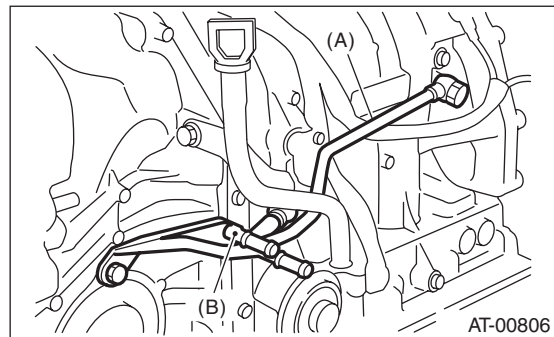
- 7) Remove ATF cooler pipe from frame.



- 8) Remove the oil cooler inlet and outlet pipes.

NOTE:

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



- (A) Inlet pipe
(B) Outlet pipe

ATF Cooler Pipe and Hose

AUTOMATIC TRANSMISSION

B: INSTALLATION

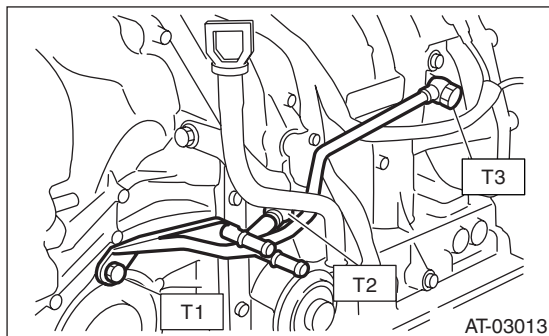
1) Install the oil cooler outlet and inlet pipes using a new aluminum washer.

Tightening torque:

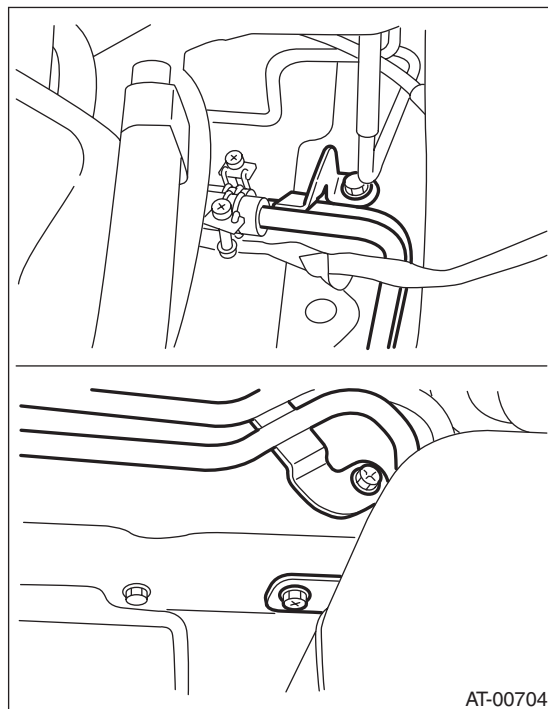
T1: 25 N·m (2.5 kgf-m, 18 ft-lb)

T2: 45 N·m (4.6 kgf-m, 33 ft-lb)

T3: 40 N·m (4.1 kgf-m, 30 ft-lb)



2) Install ATF cooler pipe to frame.

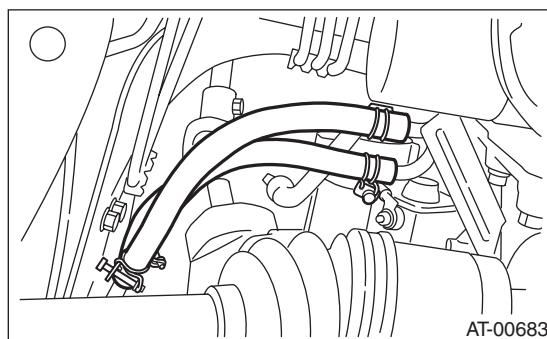


3) Connect ATF cooler hose to pipe transmission side.

NOTE:

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

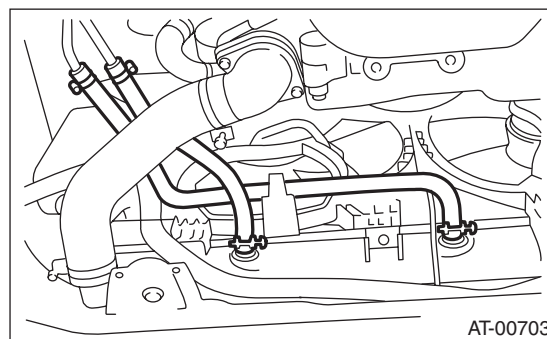
- Be careful to insert the hose to the specified position.



4) Connect ATF cooler hose to 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 under cover.

6) Install battery and washer tank.

7) Fill ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

NOTE:

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

C: INSPECTION

Repair or replace any 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 by pressing with your fingernail.
- 5) Check for peeling, cracks, and deformation at the tip of the hose.

24. Air Breather Hose

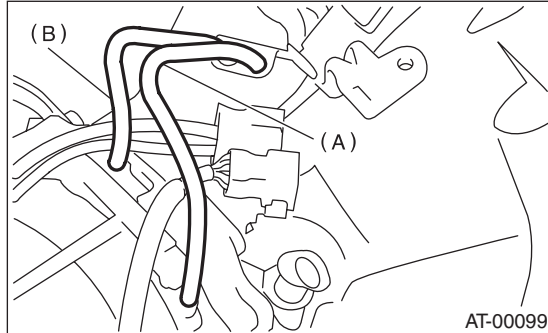
A: REMOVAL

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

2) Remove intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

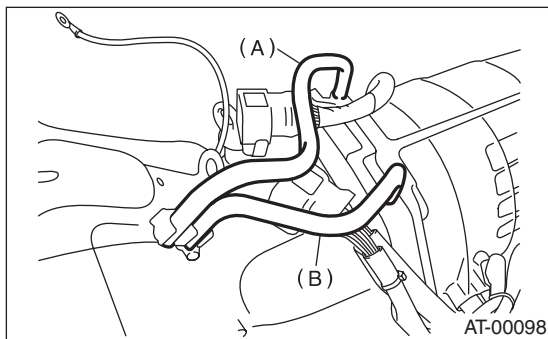
3) Disconnect the air breather hoses.

- Non-turbo model



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

- Turbo model



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

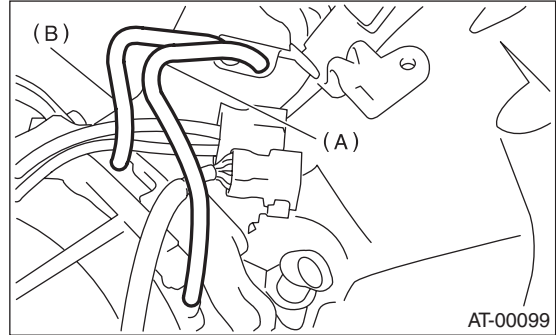
B: INSTALLATION

1) Install air breather hoses.

NOTE:

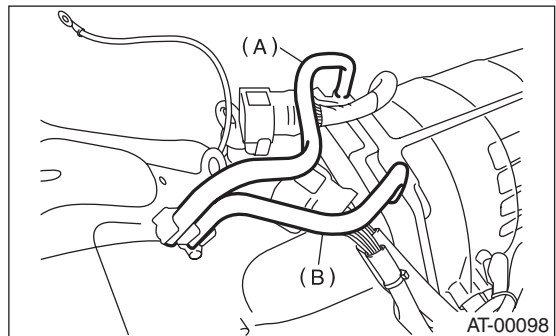
Install so that the hose is not folded over, excessively bent, or twisted.

- Non-turbo model



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

- Turbo model



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

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

3) Install intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

C: INSPECTION

Make sure the hose is not cracked or clogged.

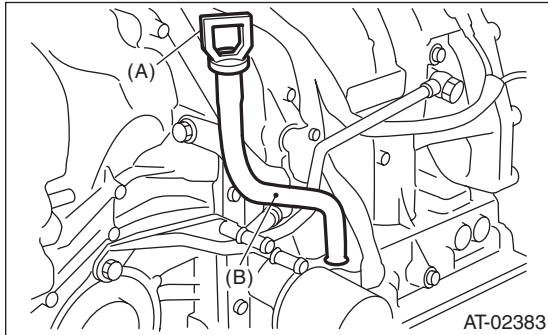
25.Oil Charge Pipe

A: REMOVAL

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

2) Remove intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

3) Remove the oil charge pipe, and remove the O-ring from the flange face.



(A) Oil level gauge

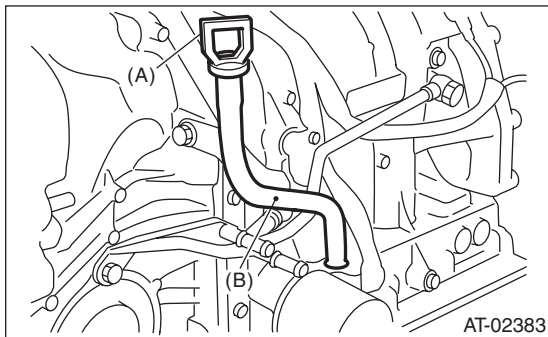
(B) Oil charge pipe

B: INSTALLATION

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

Tightening torque:

41 N·m (4.2 kgf-m, 30 ft-lb)



(A) Oil level gauge

(B) Oil charge pipe

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

3) Install intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

C: INSPECTION

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

26. Torque Converter Clutch Assembly

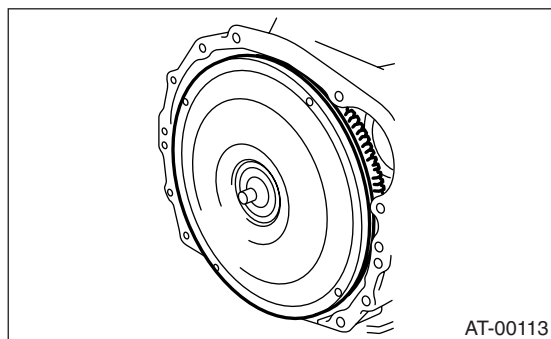
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>

2) Extract the torque converter clutch and oil pump shaft horizontally.

NOTE:

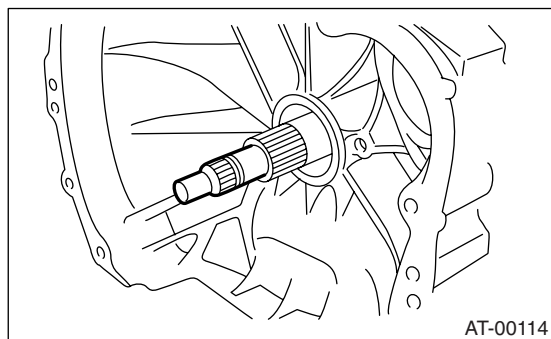
Be careful not to scratch the bushing inside the oil pump shaft.



3) Remove the input shaft.

NOTE:

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



4) Remove the clip from torque converter clutch.

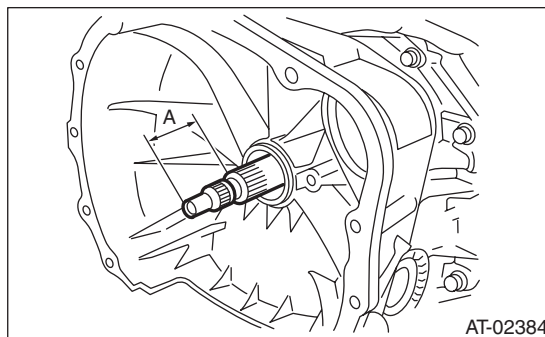
B: INSTALLATION

1) Install the clip to torque converter clutch.

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 rotating it lightly by hand, and then check the protrusion amount.

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

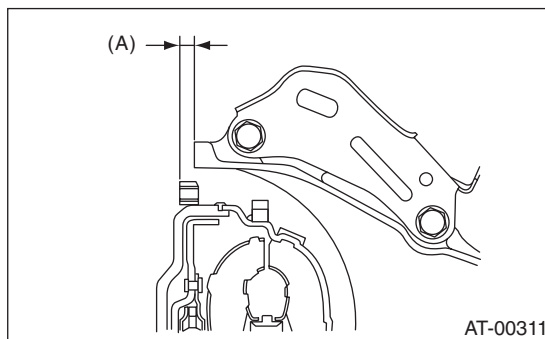


4) Holding the torque converter clutch assembly by hand, carefully install it to the converter case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.

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 vehicle. <Ref. to 4AT-44, 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.

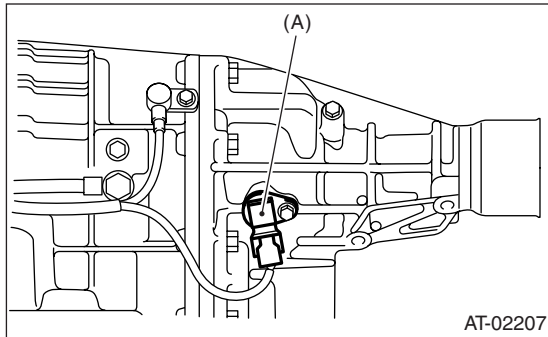
27.Extension Case

A: REMOVAL

1) Remove the transmission assembly. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>

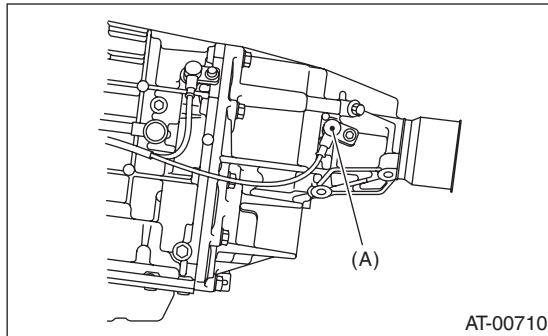
2) Remove rear vehicle speed sensor.

- MPT model



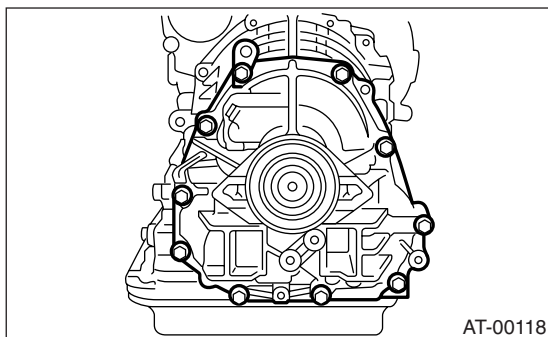
(A) Rear vehicle speed sensor

- VTD model



(A) Rear vehicle 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 vaseline.

NOTE:

Install thrust needle bearing in the correct direction.

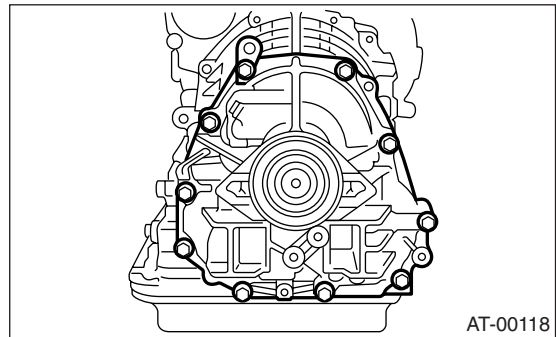
2) Install new gasket.

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 ft-lb)

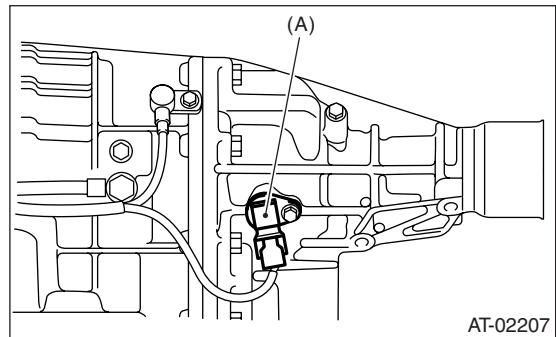


5) Install the rear vehicle speed sensor.

Tightening torque:

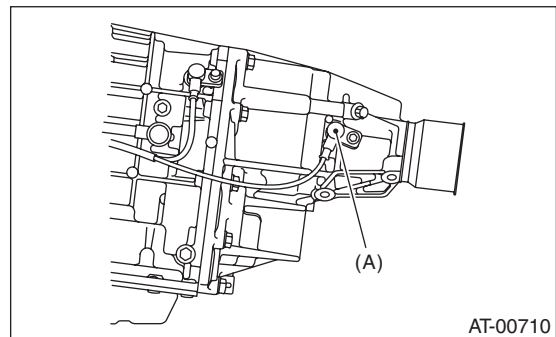
7 N·m (0.7 kgf-m, 5.1 ft-lb)

- MPT model



(A) Rear vehicle speed sensor

- VTD model



(A) Rear vehicle speed sensor

6) Install the transmission assembly. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

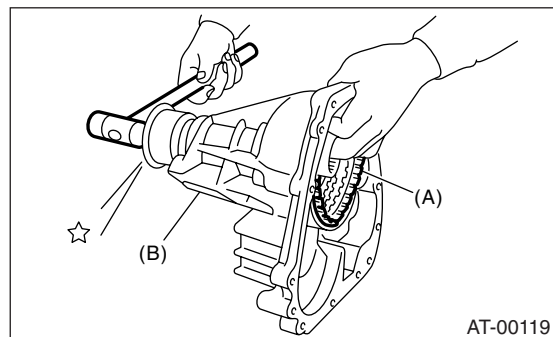
C: DISASSEMBLY

1. MPT MODEL

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

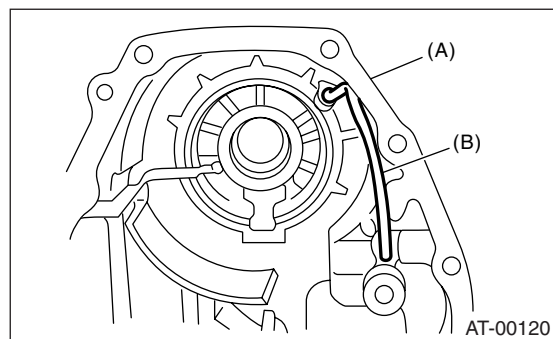
NOTE:

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



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

2) Remove the transmission clutch pipe without deforming pipe.



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

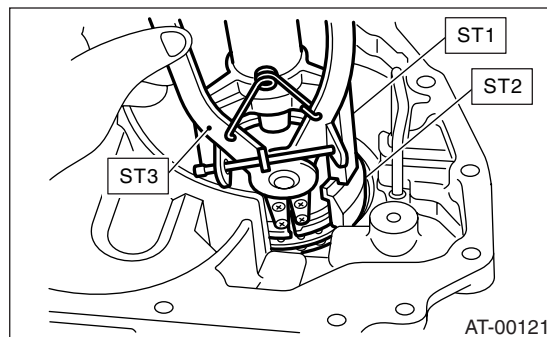
3) Remove the dust cover from extension case.

4) Remove the oil seal from extension case.

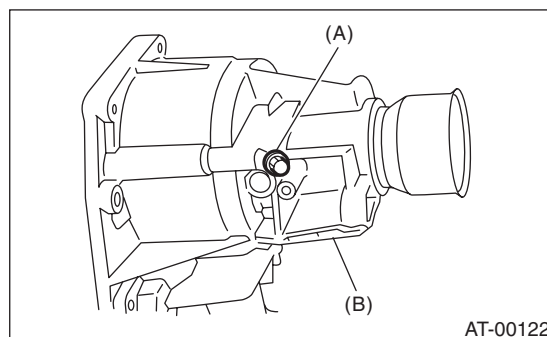
2. VTD MODEL

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

ST1	398673600	COMPRESSOR
ST2	498627100	SEAT
ST3	398663600	PLIERS

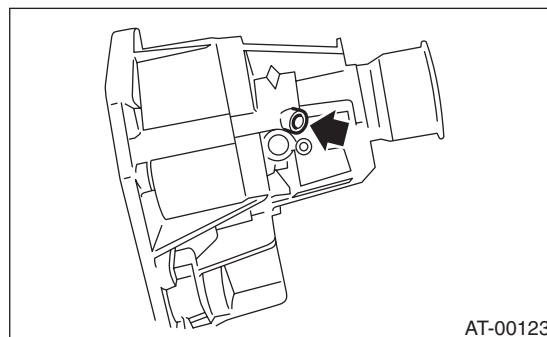


2) Remove test plug.



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

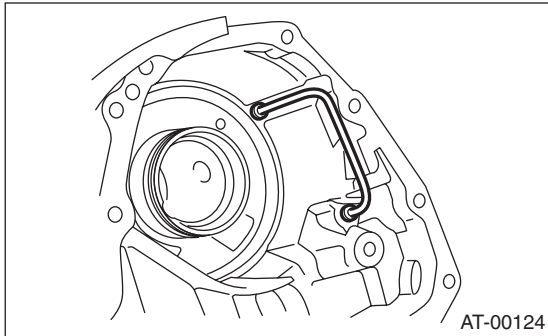
3) Remove clutch piston using compressed air.



Extension Case

AUTOMATIC TRANSMISSION

4) Pay attention, not to deform pipe, and remove transfer clutch pipe.



5) Remove the dust cover from the extension case.

6) Remove the oil seal from the extension case.

D: ASSEMBLY

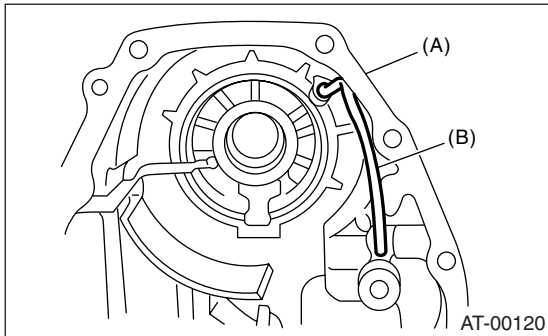
1. MPT MODEL

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 deforming pipe.



(A) Extension case

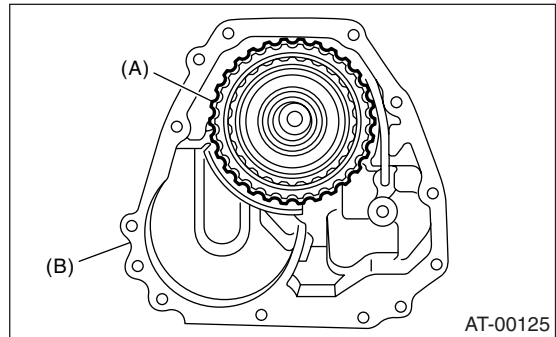
(B) Transfer clutch pipe

4) Install the transfer clutch assembly to the case.

NOTE:

- Be careful not to damage the seal rings.

- Insert the clutch assembly fully into position until the bearing shoulder bottoms.



(A) Transfer clutch

(B) Extension case

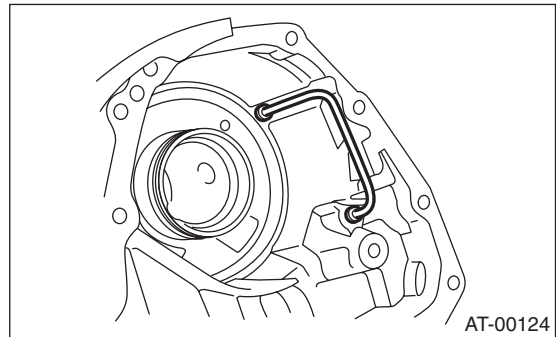
2. VTD MODEL

1) Press new oil seal using ST and a press.

ST 498057300 INSTALLER

2) Press dust cover.

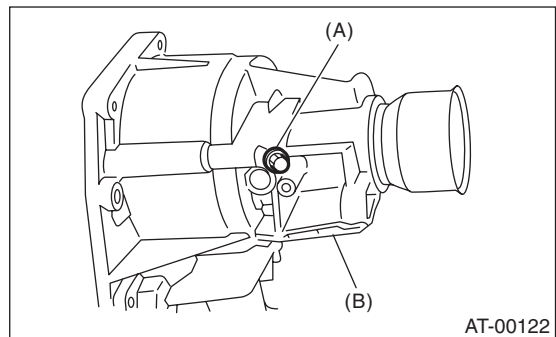
3) Install the transfer clutch pipe onto the extension case, taking care not to deform the pipe.



4) Apply ATF to new O-ring and install the test plug.

Tightening torque:

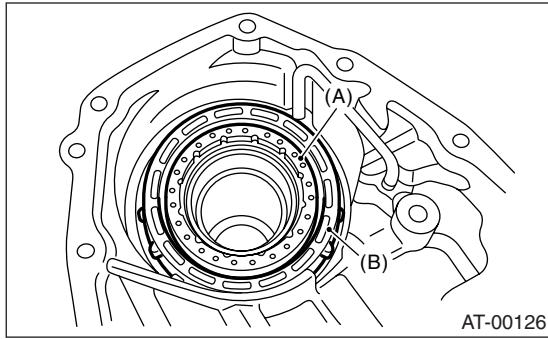
13 N·m (1.3 kgf-m, 9 ft-lb)



(A) Test plug

(B) Extension case

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



(A) Spring retainer

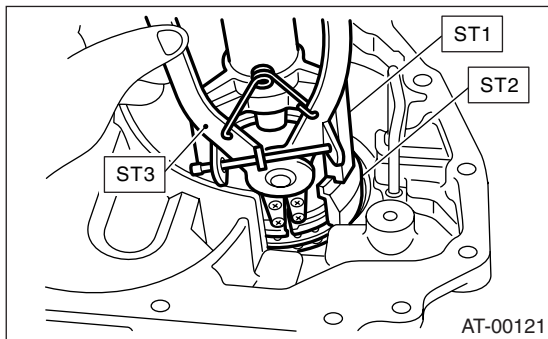
(B) Multi-plate clutch (LSD) piston ASSY

6) Install the snap ring using special tools 1, 2, and 3.

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 4AT-89, MPT MODEL, ADJUSTMENT, Transfer Clutch.>

VTD model

<Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

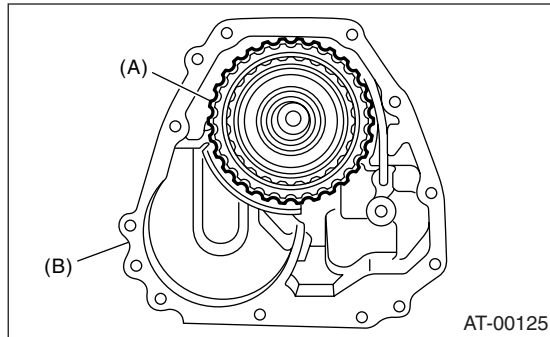
28. Transfer Clutch

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case and remove the transfer clutch. <Ref. to 4AT-82, REMOVAL, Extension Case.> <Ref. to 4AT-83, DISASSEMBLY, Extension Case.>

B: INSTALLATION

- 1) Select the thrust needle bearing. <Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>
- 2) Install the transfer clutch assembly to the case.

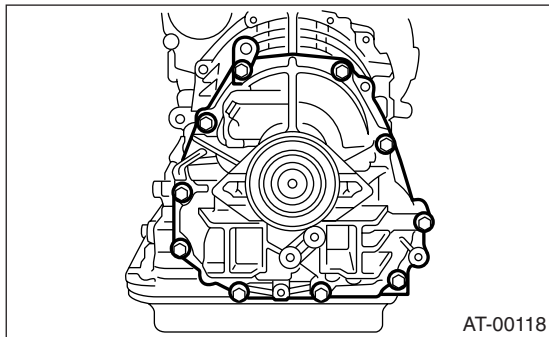


(A) Transfer clutch
(B) Extension case

- 3) Replace with new gasket, and tighten bolts to secure the case.

Tightening torque:

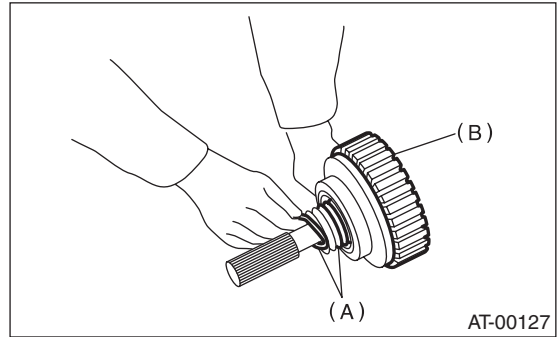
25 N·m (2.5 kgf-m, 18 ft-lb)



- 4) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

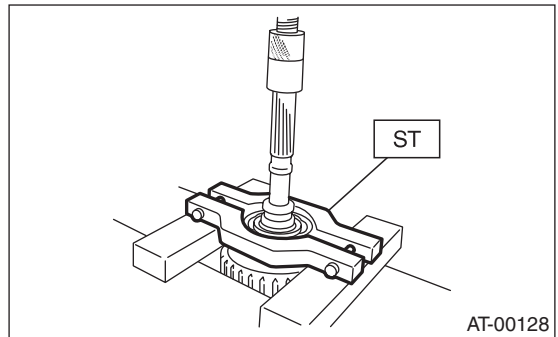
C: DISASSEMBLY

- 1) Remove the seal ring.

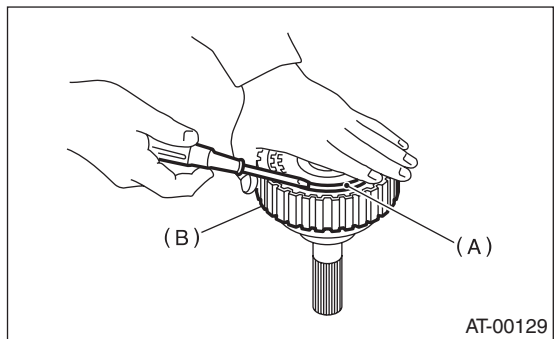


(A) Seal ring
(B) Transfer clutch

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



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



(A) Snap ring
(B) Transfer clutch

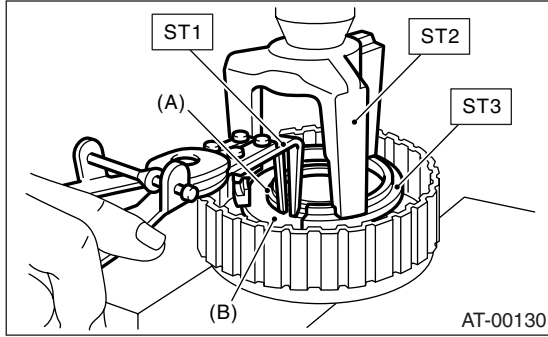
- 4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.

ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR

Transfer Clutch

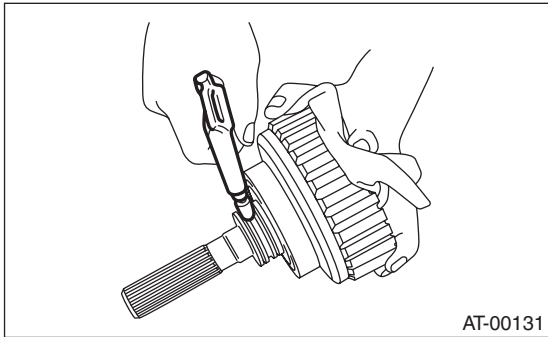
AUTOMATIC TRANSMISSION

ST3 398623600 SEAT



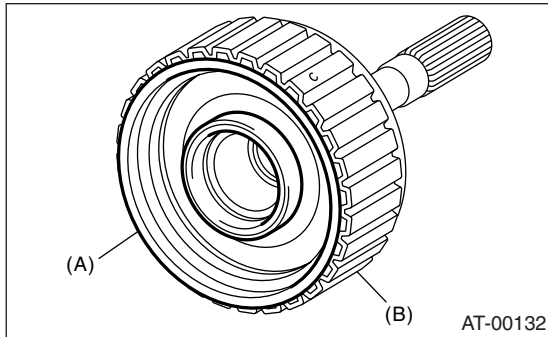
- (A) Snap ring
- (B) Transfer piston seal

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



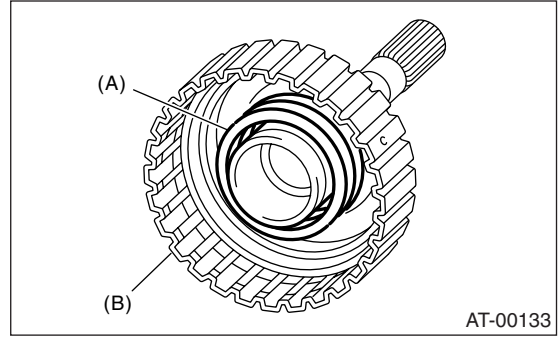
D: ASSEMBLY

1) Install the transfer clutch piston.



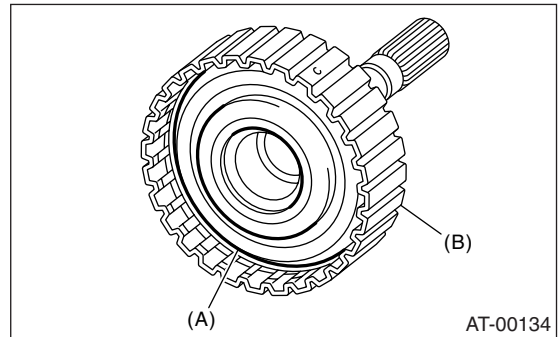
- (A) Transfer clutch piston
- (B) Rear drive shaft

2) Install return spring to transfer piston.



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

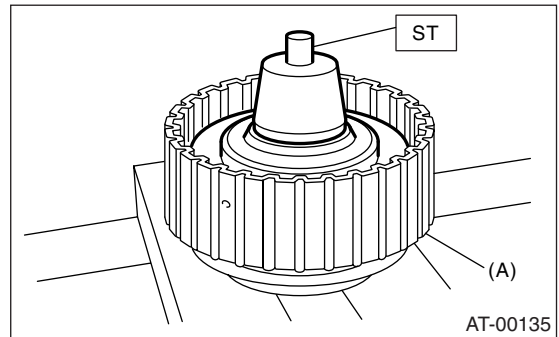
3) Apply ATF to the transfer clutch piston seal lip and install it.



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

4) Install ST to rear drive shaft.

ST 499257300 SNAP RING OUTER GUIDE



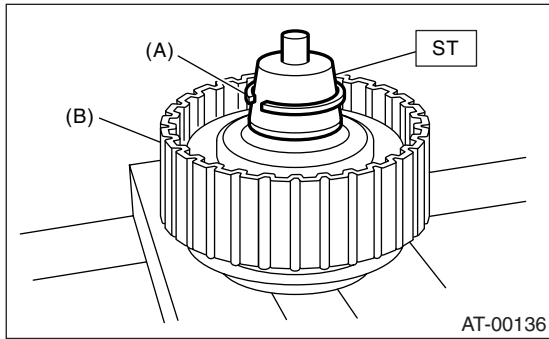
- (A) Transfer clutch

Transfer Clutch

AUTOMATIC TRANSMISSION

5) Install snap ring to ST.

ST 499257300 SNAP RING OUTER GUIDE



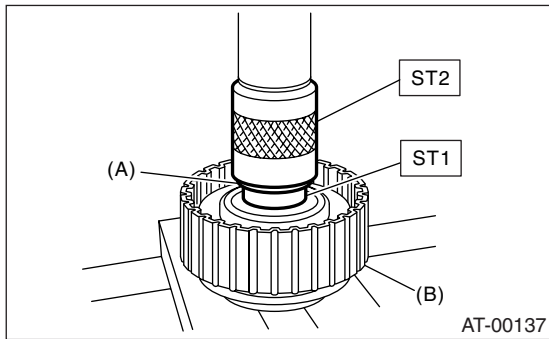
(A) Snap ring

(B) Transfer clutch

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

ST1 499257300 SNAP RING OUTER GUIDE

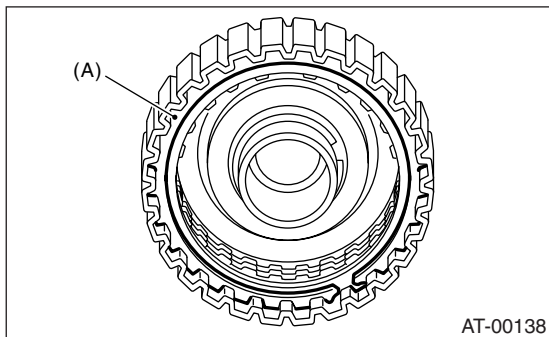
ST2 499247400 INSTALLER



(A) Snap ring

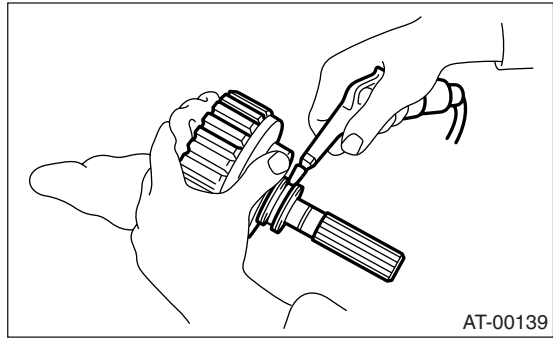
(B) Transfer clutch

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



(A) Snap ring

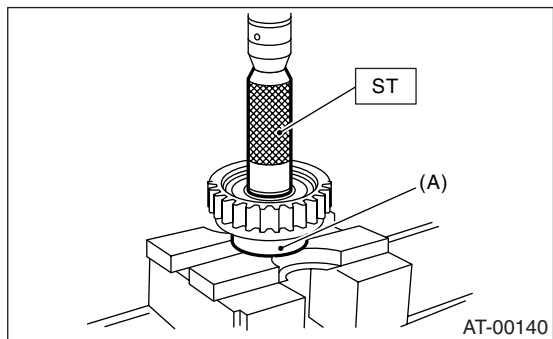
8) Apply compressed air to see if the assembled parts move smoothly.



9) Check clearance between snap ring and pressure plate. <Ref. to 4AT-89, INSPECTION, Transfer Clutch.>

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

ST 899580100 INSTALLER

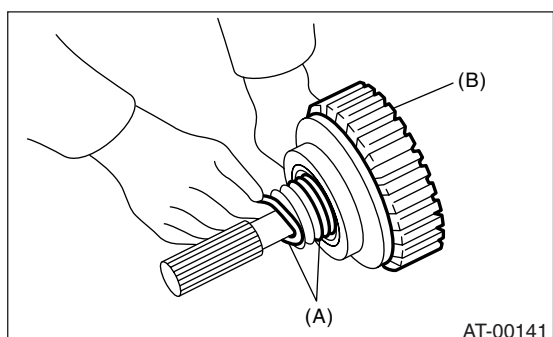


(A) Ball bearing

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

NOTE:

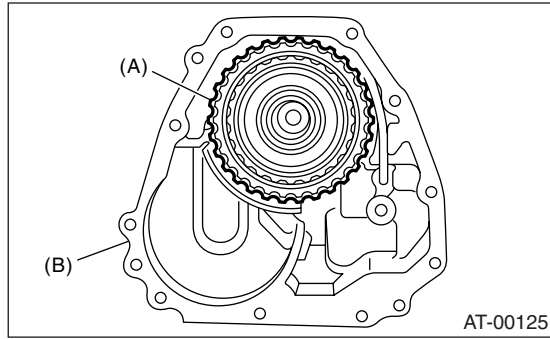
Do not expand the seal ring excessively when installing.



(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, return spring for permanent set and breakage, and return spring for deformation.
- Check the D-ring for damage.
- Measure the extension end play and adjust it to within specifications.

<Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>

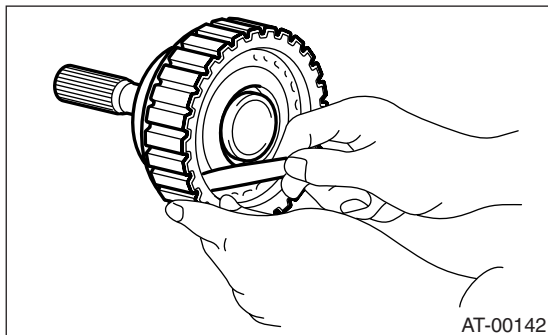
- 1) Inspect clearance between snap ring and pressure plate.
- 2) Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.
- 3) If the clearance is not within specification, adjust it by selecting a suitable pressure plate on the transfer clutch piston side. If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification by selecting the pressure plate.

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:

1.6 mm (0.063 in)



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 the 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.

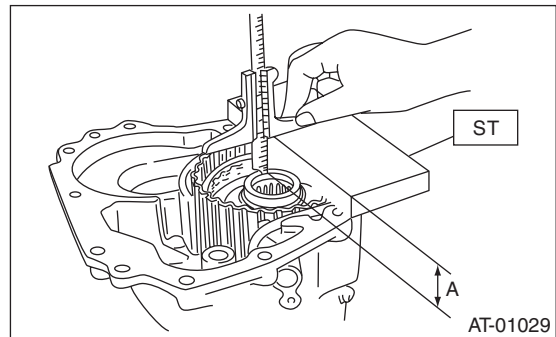
- (1) With the steering wheel held at fully turned position, drive the vehicle in "D" range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.
- (2) If the tight corner braking still persists, drive the vehicle again in a circle for several laps.

F: ADJUSTMENT

1. MPT MODEL

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

ST 398643600 GAUGE



A: Measured value

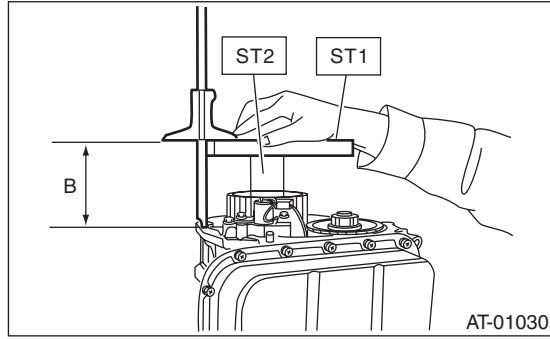
2) Using the ST1 and ST2, measure the distance "B" from the transmission case mating surface to the end surface of ST.

ST1 398643600 GAUGE

Transfer Clutch

AUTOMATIC TRANSMISSION

ST2 499577000 GAUGE



B: Measured value

3) Calculation formula:

NOTE:

- Calculate "T":

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

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

T: Thrust needle bearing thickness

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

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

Example:

When, A = 33.6 mm (1.3228 in), B = 65.05 mm (2.5610 in)

$$T = 33.6 - 65.05 + 35.4 = 3.95$$

$$[T = 1.3228 - 2.5610 + 1.3937 = 0.1555]$$

After calculation, the value of "T" becomes 3.95 mm (0.1555 in), therefore select bearing thickness of 3.8 mm (0.150 in).

- Calculation formula for "T" is applied when measuring using ST (398643600 GAUGE, 499577000 GAUGE). When not using ST, apply

$$T = (A - \alpha + 0.45 \text{ mm}) - (B - \beta) - H$$

$$[T = (A - \alpha + 0.0177 \text{ in}) - (B - \beta) - H]$$

T: Thrust needle bearing thickness

A: Distance from the end surface of collar as substitute for ST to the end surface of reduction drive shaft

B: Distance from the mating surface of transmission case to the end surface of collar as substitute for ST

α : Collar thickness used when measuring "A"

β : Collar thickness used when measuring "B"

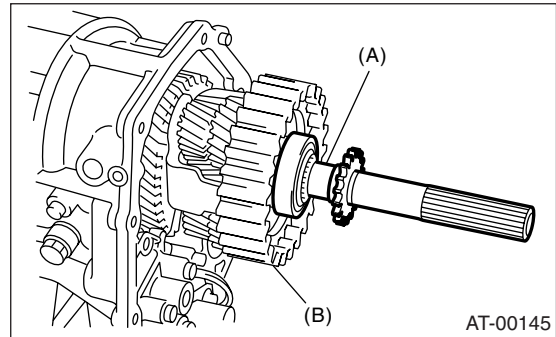
0.45 (0.0177): Gasket thickness (mm (in))

H: Shim clearance

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 driveshaft into the reduction drive gear and center differential assembly.

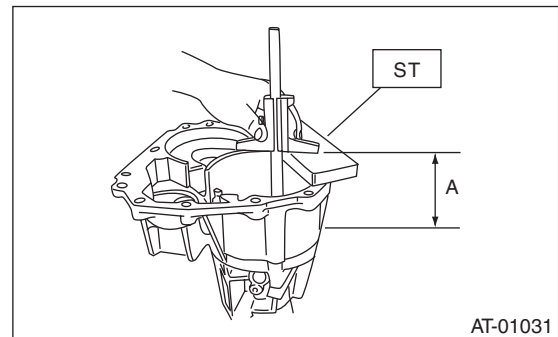


(A) Rear drive shaft

(B) Center differential carrier

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

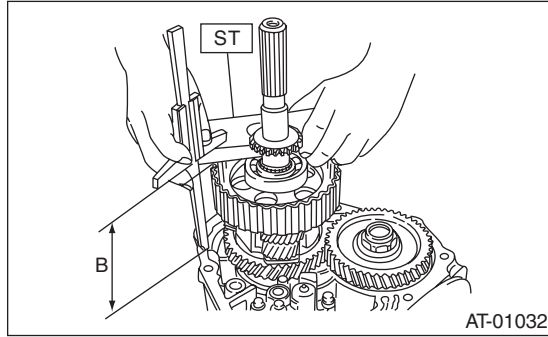
ST 398643600 GAUGE



A: Measured value

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

ST 398643600 GAUGE



B: Measured value

α : Collar thickness used when measuring "A"
 β : Collar thickness used when measuring "B"
 0.45 (0.0177): Gasket thickness (mm (in))
 H: Shim clearance

After calculation, the value of "T" becomes between 0.35 mm (0.0138 in) and 0.55 mm (0.0216 in), therefore select two shims with thickness of 0.2 mm (0.010 in) or one shim with thickness of 0.5 mm (0.020 in).

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

4) Formula:

NOTE:

- Calculation of "T":

When clearances are 0.05 mm (0.0020 in), select up to four adjusting shims from the table, suitable for clearance value.

When clearances are 0.05 mm (0.0020 in)

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

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

When clearances are 0.25 mm (0.0098 in)

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

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

T: Shim clearance

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

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

T: Shim thickness

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Example:

When, A = 90.50 mm (3.5630 in), B = 90.35 mm (3.5571 in)

Calculation for 0.05 mm (0.0020 in) of clearance

$$T = 90.50 - 90.35 + 0.4 = 0.55$$

$$[T = 3.5630 - 3.5571 + 0.0157 = 0.0216]$$

Calculation when clearance is 0.25 mm (0.0098 in)

$$T = 90.50 - 90.35 + 0.2 = 0.35$$

$$[T = 3.5630 - 3.5571 + 0.0079 = 0.0138]$$

- Calculation formula for "T" is applied when measuring using ST (398643600 GAUGE). When not using ST, apply

$$T = (A - \alpha + 0.45 \text{ mm}) - (B - \beta) - H$$

$$[T = (A - \alpha + 0.0177 \text{ in}) - (B - \beta) - H].$$

T: Thrust needle bearing thickness

A: Distance from the end surface of collar as substitute for ST to the rear drive shaft ball bearing outer ring contact surface

B: Distance from the mating surface of transmission case to the end surface of collar as substitute for ST

29.Multi-plate Clutch

A: REMOVAL

Remove multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-82, REMOVAL, Extension Case.>

B: INSTALLATION

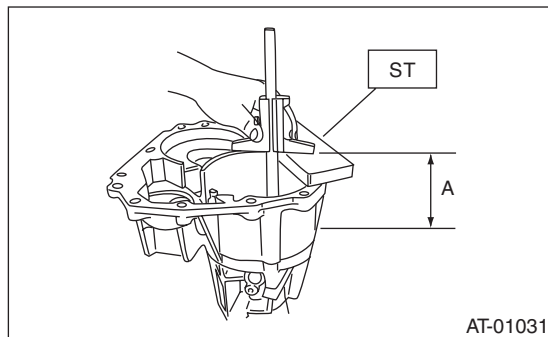
Install multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-82, INSTALLATION, Extension Case.>

C: INSPECTION

- Inspect drive plate facing for wear and damage.
- Make sure snap ring is not worn and return spring has no permanent distortion, damage, or deformation.
- Inspect D-ring for damage.
- Measure multi-plate clutch clearance and adjust it to within the specification range. <Ref. to 4AT-92, ADJUSTMENT, Multi-plate Clutch.>

D: ADJUSTMENT

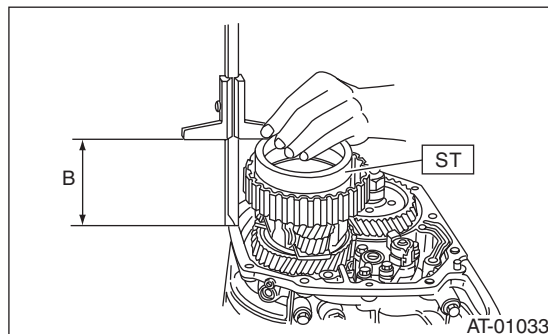
- 1) Install the drive plate and driven plate to center differential carrier.
 - 2) Using the ST, measure the distance “A” from the end surface of ST to multi-plate clutch piston.
- ST 398643600 GAUGE



A: Measured value

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

ST 398744300 GAUGE



B: Measured value

4) Calculation formula

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

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

NOTE:

- Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 398744300 GAUGE). When not using ST, apply

$$T = (A - \alpha + 0.45 \text{ mm}) - (B - \beta)$$

$$[T = (A - \alpha + 0.0177 \text{ in}) - (B - \beta)]$$

T: Thrust needle bearing thickness

A: Distance from the end surface of collar as substitute for ST to multi-plate clutch piston

B: Distance from the mating surface of transmission case to the end surface of collar as substitute for ST

α : Collar thickness used when measuring “A”

β : Collar thickness used when measuring “B”

0.45 (0.0177): Gasket thickness (mm (in))

- Measure multi-plate clutch driven and drive plate thickness to find the clearance between measurement value and “T”.

Standard value:

0.2 — 0.6 mm (0.008 — 0.024 in)

Limit value:

1.6 mm (0.063 in)

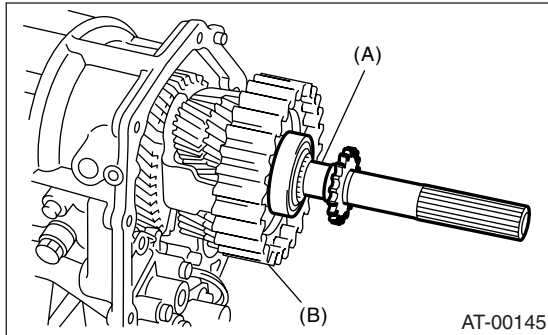
If outside the standard value, replace the plate set (drive and driven plate). Select a multi-plate clutch piston side adjustment plate that will bring clearance within the standard value.

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

30.Rear Drive Shaft

A: REMOVAL

- 1) Remove transmission assembly. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear wheel speed sensor and separate extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Pull out the rear driveshaft from the center differential assembly.



- (A) Rear driveshaft
(B) Center differential carrier

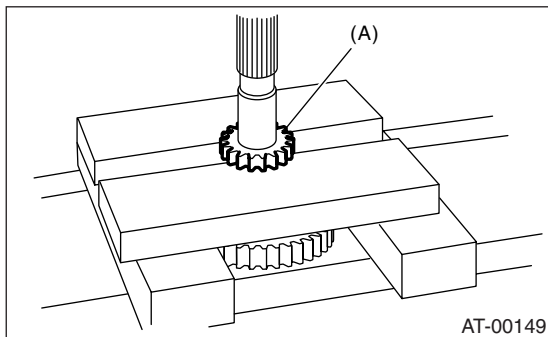
- 4) Remove drive plate and driven plate.

B: INSTALLATION

- 1) Select the appropriate shim. <Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>
- 2) Install drive plate and driven plate.
- 3) Insert rear driveshaft into the center differential assembly.
- 4) Join transmission case and extension case. Install rear wheel speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 5) Install transmission assembly. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

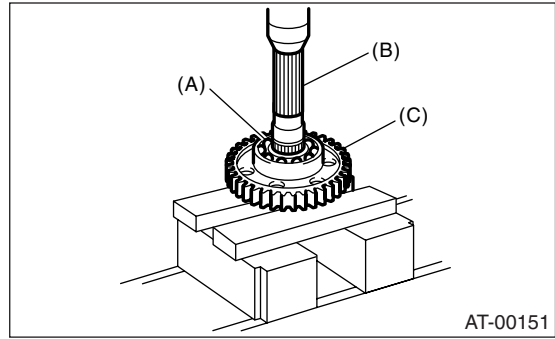
C: DISASSEMBLY

- 1) Using a press, remove revolution gear.



- (A) Revolution gear

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



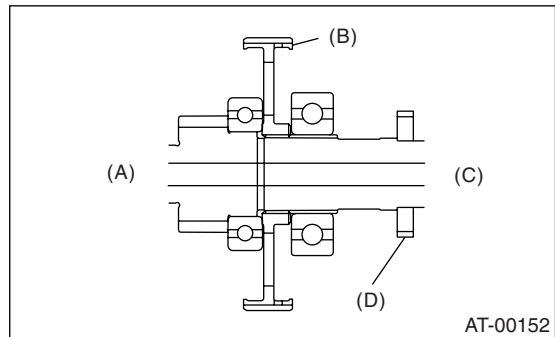
- (A) Rear ball bearing
(B) Rear driveshaft
(C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:

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



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

E: INSPECTION

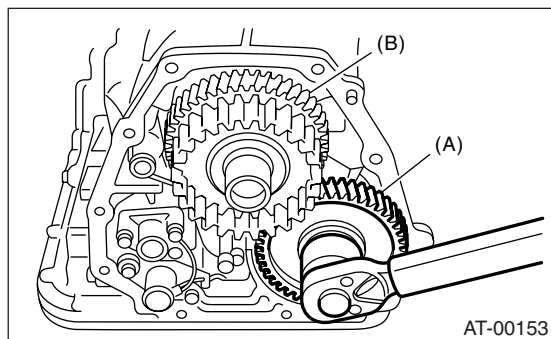
- Inspect parts to make sure there are no holes, cuts, and that they are not dusty.
- Inspect extension end play and adjust it to within the standard value. <Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

31.Reduction Driven Gear

A: REMOVAL

1. MPT MODEL

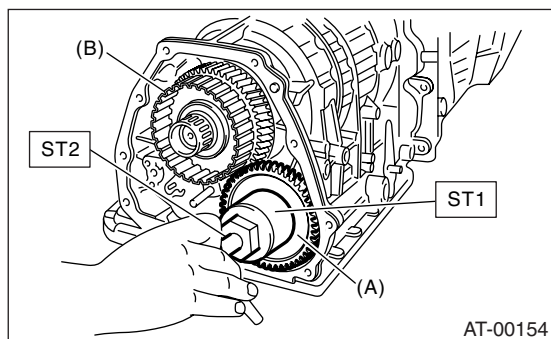
- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Set the range select lever to "P".
- 4) Straighten 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

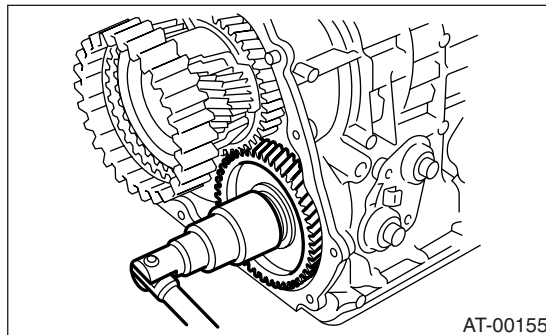


(A) Reduction driven gear
(B) Reduction drive gear

2. VTD MODEL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft. <Ref. to 4AT-93, 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

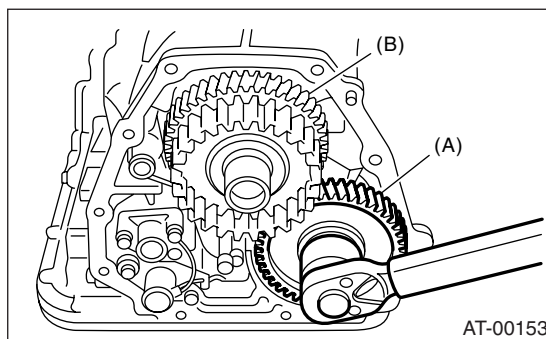
- 7) Pull out the center differential assembly. <Ref. to 4AT-98, REMOVAL, Center Differential Carrier.>

B: INSTALLATION

1. MPT MODEL

- 1) Set the select lever to "P" range.
- 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, 74 ft-lb)



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

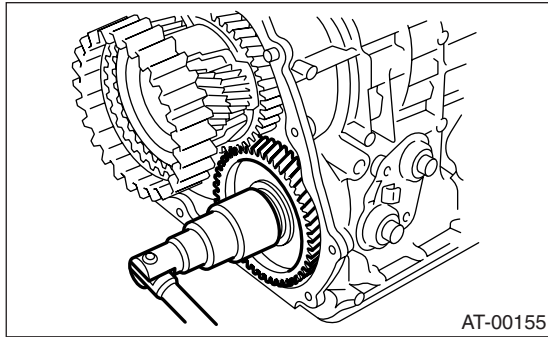
- 3) After tightening, stake the lock nut securely.
- 4) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

2. VTD MODEL

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

Tightening torque:

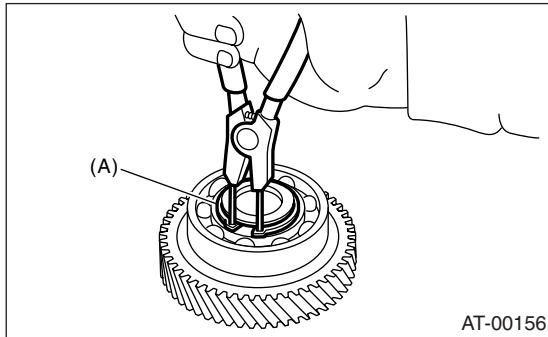
100 N·m (10.2 kgf-m, 74 ft-lb)



- 5) After tightening, stake the lock nut securely.
- 6) Insert the rear drive shaft assembly. <Ref. to 4AT-93, INSTALLATION, Rear Drive Shaft.>
- 7) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 8) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

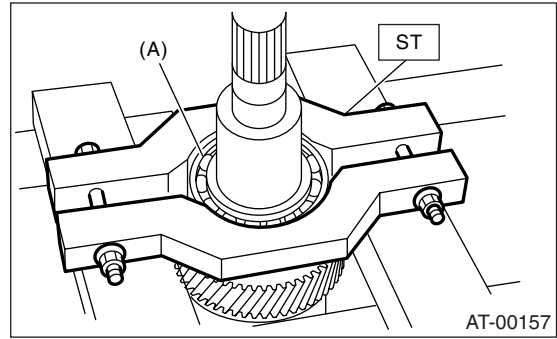
- 1) Remove snap ring from reduction driven gear.



(A) Snap ring

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

ST 498077600 REMOVER

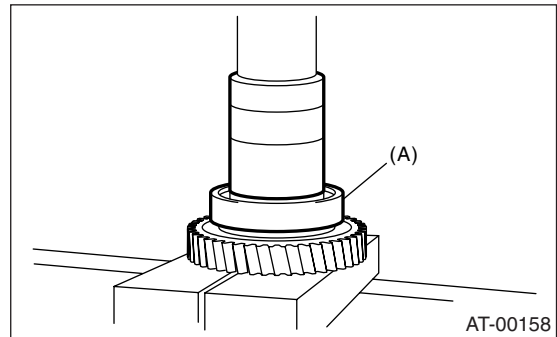


(A) Ball bearing

- 3) Remove snap ring reduction driven gear.

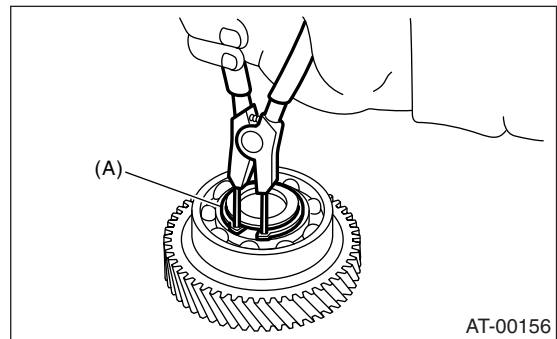
D: ASSEMBLY

- 1) Install snap ring to reduction driven gear.
- 2) Using a press, install a new ball bearing to reduction driven gear.



(A) Ball bearing

- 3) Install snap ring to reduction driven gear.



(A) Snap ring

E: INSPECTION

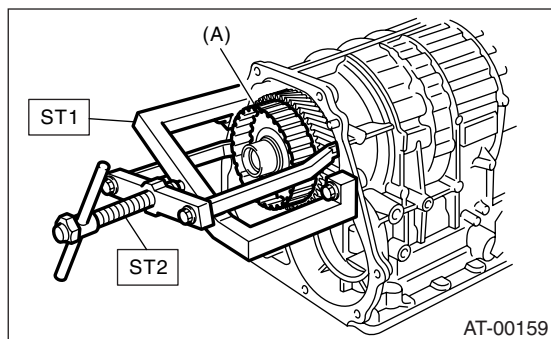
Check ball bearing and gear for dents or damage.

32.Reduction Drive Gear

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>
- 4) Using ST, extract the reduction drive gear.

ST1 499737100 PULLER SET
ST2 899524100 PULLER SET



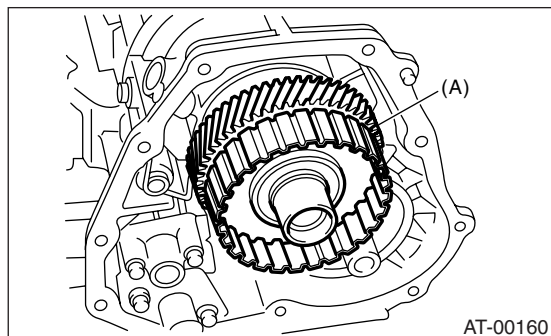
(A) Reduction drive gear

B: INSTALLATION

- 1) Install the reduction drive gear assembly.

NOTE:

Insert it fully into position until the bearing shoulder bottoms.

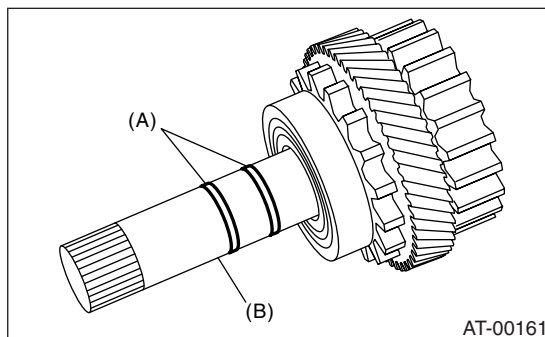


(A) Reduction drive gear

- 2) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
- 3) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

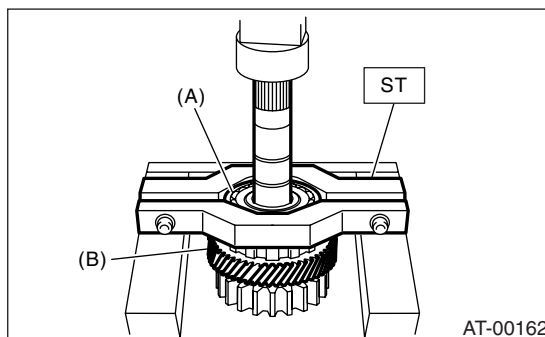
- 1) Take out the seal rings.



(A) Seal rings
(B) Reduction drive shaft

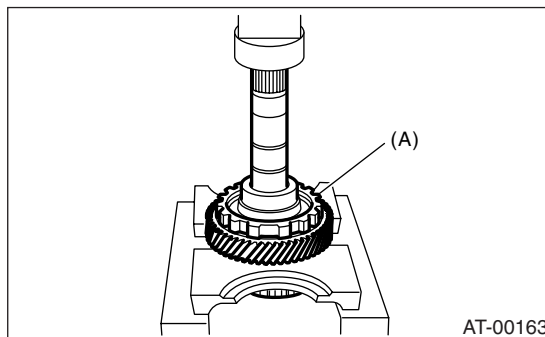
- 2) Using ST, remove the ball bearing.

ST 498077600 REMOVER



(A) Ball bearing
(B) Reduction drive gear

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

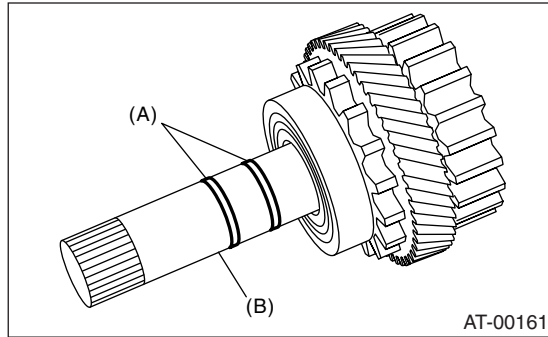


(A) Reduction drive gear

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 vaseline to outer surface of seal ring and shaft groove.

4) Apply ATF to new seal rings and attach them.



(A) Seal rings

(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 4AT-89, ADJUSTMENT, Transfer Clutch.>

Center Differential Carrier

AUTOMATIC TRANSMISSION

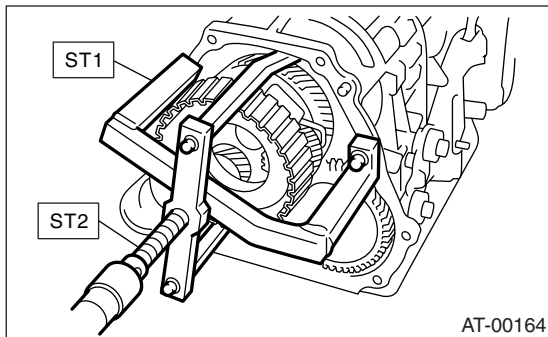
33.Center Differential Carrier

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from the transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Pull out the rear driveshaft. <Ref. to 4AT-93, REMOVAL, Rear Drive Shaft.>
- 4) Using the special tools, pull out the center differential carrier assembly.

ST1 499737100 PULLER SET

ST2 899524100 PULLER SET



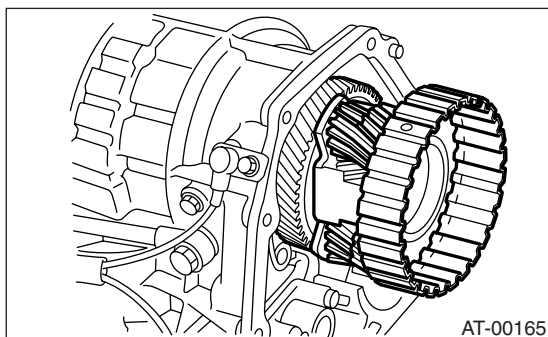
- 5) Pull out the shim(s) from transmission case.

B: INSTALLATION

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

NOTE:

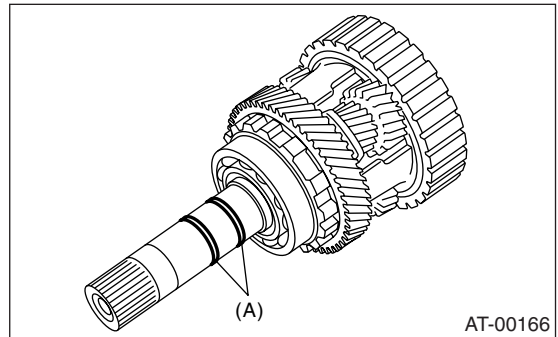
Insert the center differential assembly and shim(s) completely into the bearing shoulder bottom.



- 2) Insert the rear driveshaft. <Ref. to 4AT-93, INSTALLATION, Rear Drive Shaft.>
- 3) Connect the transmission case and extension case, and install the rear wheel speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly onto vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

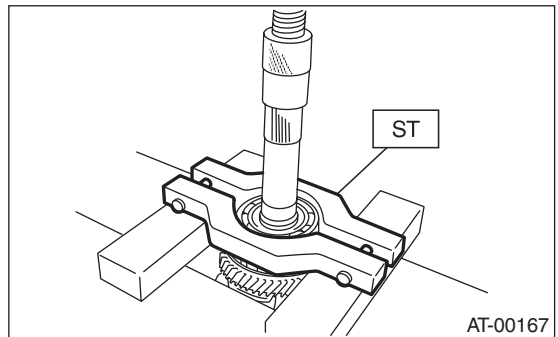
- 1) Remove the seal rings.



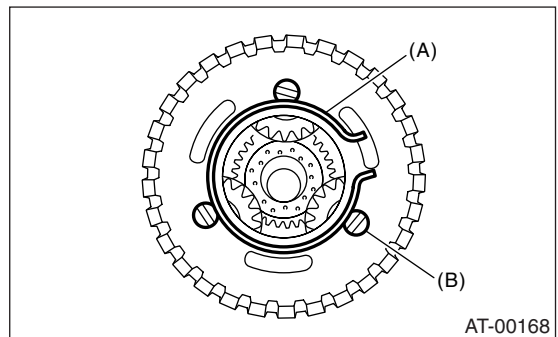
(A) Seal ring

- 2) Using a press and the special tool, remove the ball bearing.

ST 498077600 REMOVER



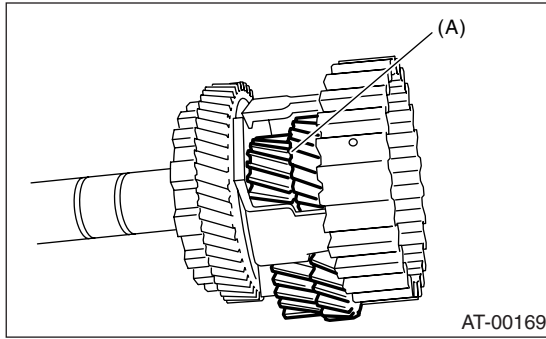
- 3) Remove the snap ring, and pull out the shaft from the center differential assembly.



(A) Snap ring

(B) Shaft

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



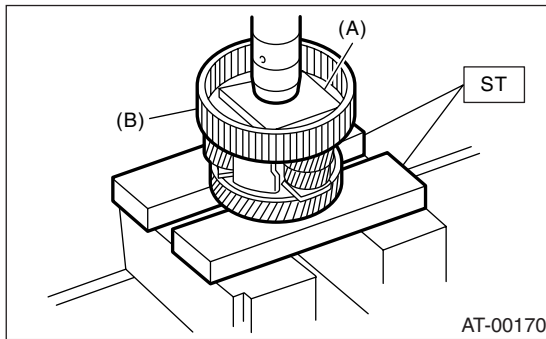
(A) Pinion gear

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

D: ASSEMBLY

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

ST 498077000 REMOVER



(A) Plate

(B) Center differential carrier

- 7) Apply Vaseline onto the seal ring outer surface and shaft grooves.
- 8) Apply ATF to new seal rings and install them.

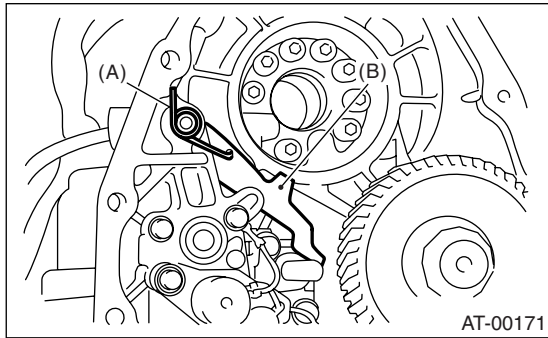
E: INSPECTION

- Check all parts for hole, score, or dirt.
- Check the play of the extension end, and if necessary, adjust it. <Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

34. Parking Pawl

A: REMOVAL

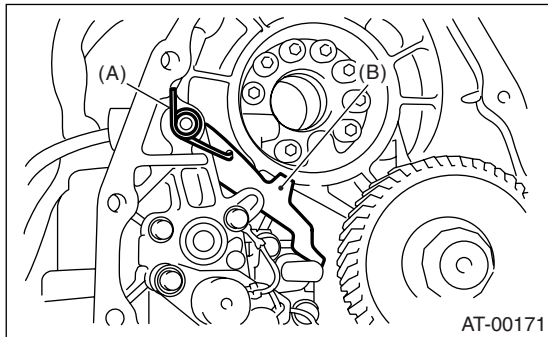
- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor and separate transmission case and extension case sections. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
- 4) Remove the center differential carrier. (VTD model) <Ref. to 4AT-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, shaft and return spring.



- (A) Return spring
(B) Parking pawl

- 2) Install the reduction drive gear. <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
- 3) Install the center differential carrier. (VTD model) <Ref. to 4AT-98, INSTALLATION, Center Differential Carrier.>
- 4) Install the rear vehicle speed sensor and extension case. <Ref. to 4AT-82, INSTALLATION, Extension Case.>

- 5) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

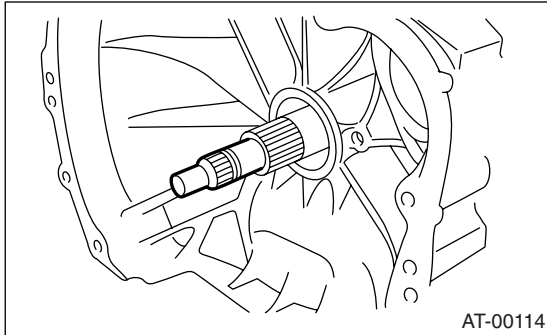
C: INSPECTION

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

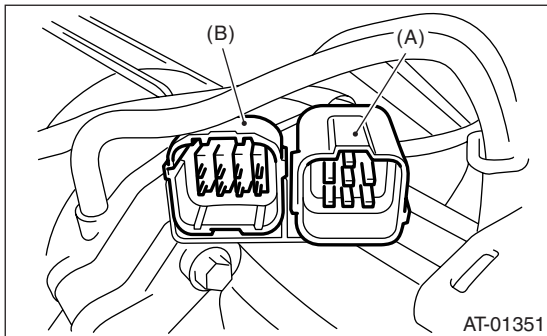
35. Converter Case

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-81, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



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



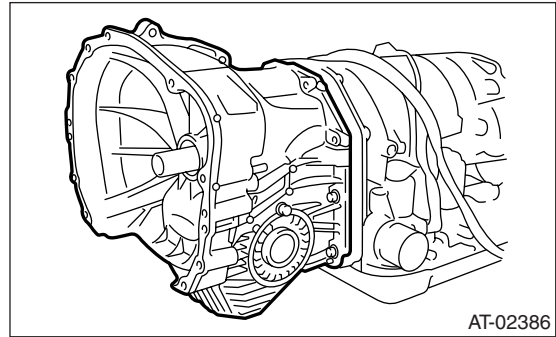
- (A) Transmission harness
(B) Inhibitor switch harness

- 6) Remove the oil charge pipe. <Ref. to 4AT-80, REMOVAL, Oil Charge Pipe.>
- 7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Lightly tapping the converter case with plastic hammer, separate the transmission case and converter case.

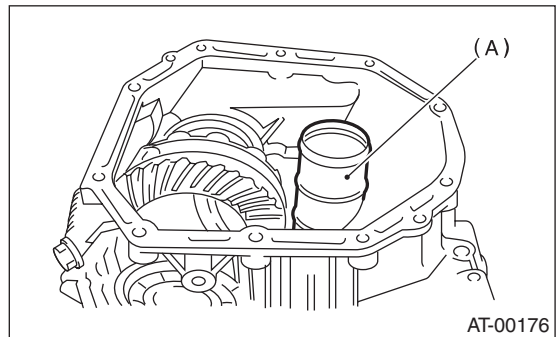
NOTE:

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

- Be careful not to lose the rubber seal.



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

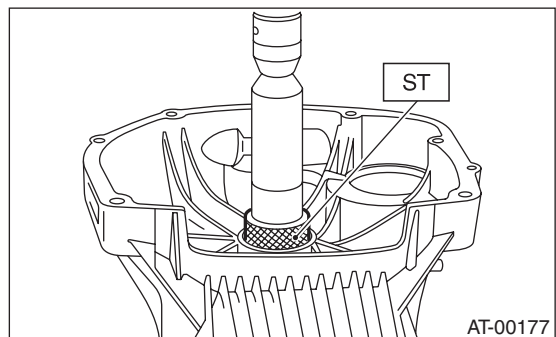


- (A) Seal pipe

- 10) Remove the differential assembly. <Ref. to 4AT-113, REMOVAL, Front Differential Assembly.>
- 11) Remove the oil seal from converter case.

B: INSTALLATION

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

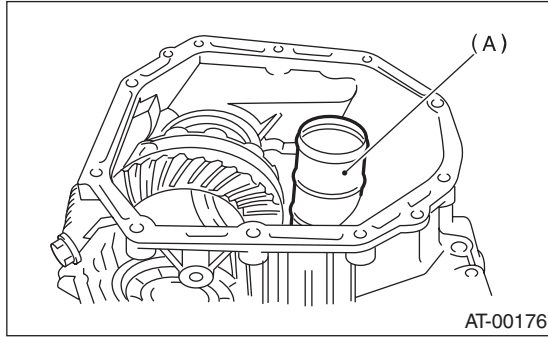


- 3) Install the differential assembly to the case. <Ref. to 4AT-113, INSTALLATION, Front Differential Assembly.>
- 4) Install the left and right side retainers. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

Converter Case

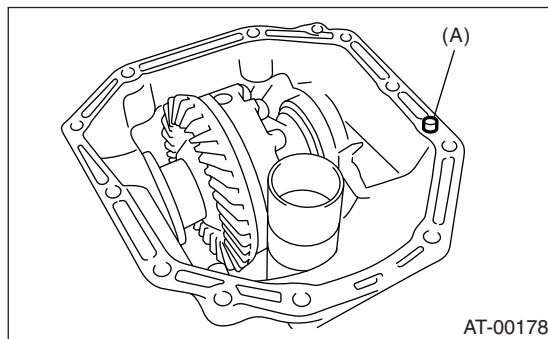
AUTOMATIC TRANSMISSION

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



(A) Seal pipe

6) Install the rubber seal to the converter case.

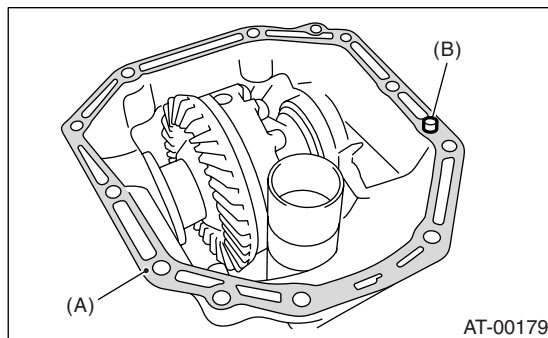


(A) Rubber seal

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

Liquid gasket:

THREE BOND 1215 (Part No. 004403007)



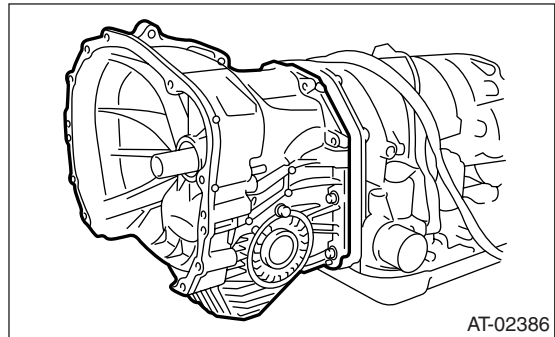
(A) THREE BOND 1215

(B) Rubber seal

8) Install the converter case assembly without damaging bushing and oil seal and secure with six bolts and four nuts.

Tightening torque:

41 N·m (4.2 kgf-m, 30 ft-lb)



9) Insert inhibitor switch and transmission connector into stay.

10) Install air breather hose. <Ref. to 4AT-79, INSTALLATION, Air Breather Hose.>

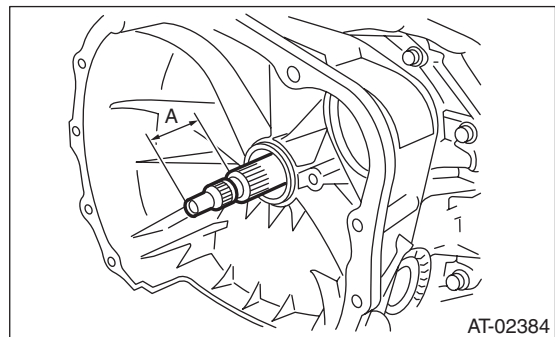
11) Install the oil cooler pipes. <Ref. to 4AT-78, INSTALLATION, ATF Cooler Pipe and Hose.>

12) Install the oil charge pipe with O-ring. <Ref. to 4AT-80, INSTALLATION, Oil Charge Pipe.>

13) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



14) Install the torque converter clutch assembly. <Ref. to 4AT-81, INSTALLATION, Torque Converter Clutch Assembly.>

15) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

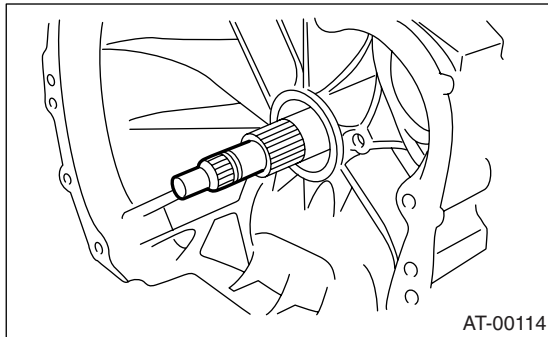
C: INSPECTION

Measure the backlash and adjust to within specifications. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

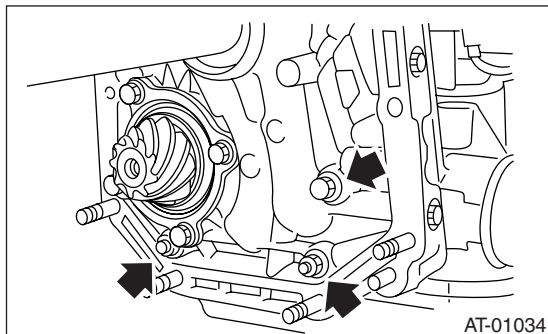
36.Oil Pump Housing

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-81, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



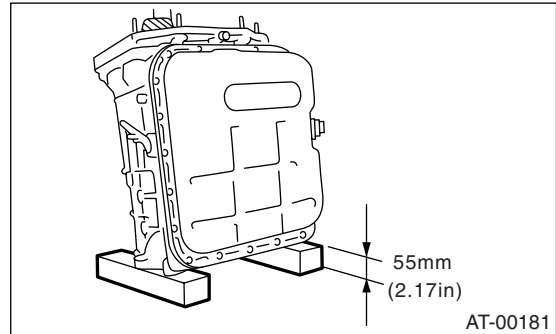
- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Remove the oil charge pipe. <Ref. to 4AT-80, REMOVAL, Oil Charge Pipe.>
- 7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separation of converter case and transmission case sections <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 9) Separate transmission case and extension case sections. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
- 11) Remove the center differential carrier. (VTD model) <Ref. to 4AT-98, REMOVAL, Center Differential Carrier.>
- 12) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>
- 13) Loosen the oil pump housing mounting bolts.



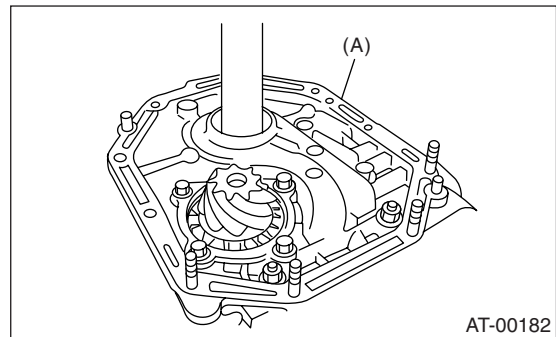
- 14) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

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.



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



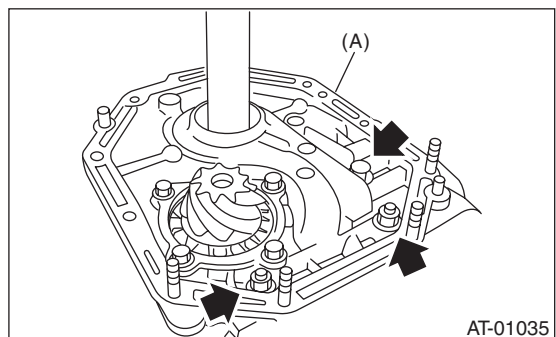
(A) Oil pump housing

B: INSTALLATION

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

Tightening torque:

42 N·m (4.3 kgf-m, 31 ft-lb)

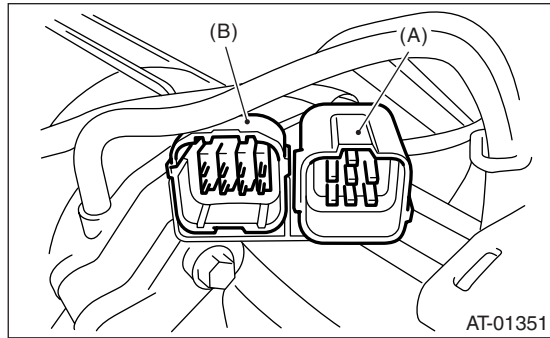


(A) Oil pump housing

Oil Pump Housing

AUTOMATIC TRANSMISSION

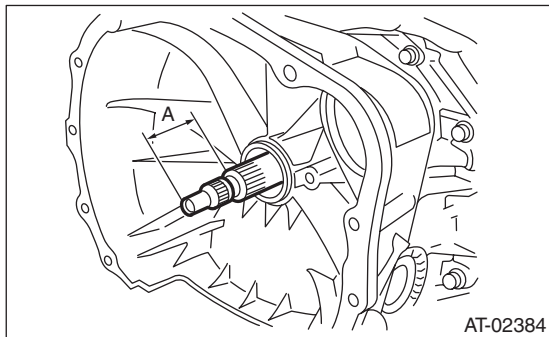
- 2) Install the converter case assembly to the transmission case assembly. <Ref. to 4AT-81, INSTALLATION, Torque Converter Clutch Assembly.>
- 3) Install reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. (MPT model) <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
- 5) Install the center differential carrier. (VTD model) <Ref. to 4AT-98, INSTALLATION, Center Differential Carrier.>
- 6) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 7) Insert inhibitor switch and transmission connector into stay.



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

- 8) Install the oil cooler pipe. <Ref. to 4AT-78, INSTALLATION, ATF Cooler Pipe and Hose.>
- 9) Install the oil charge pipe with O-ring. <Ref. to 4AT-80, INSTALLATION, Oil Charge Pipe.>
- 10) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

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



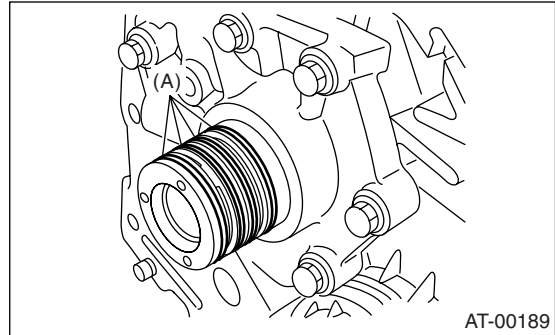
- 11) Install the torque converter clutch assembly. <Ref. to 4AT-81, INSTALLATION, Torque Converter Clutch Assembly.>

- 12) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

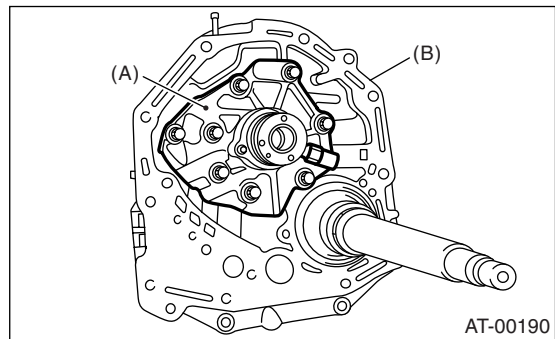
1. OIL PUMP COVER

- 1) Remove four seal rings.



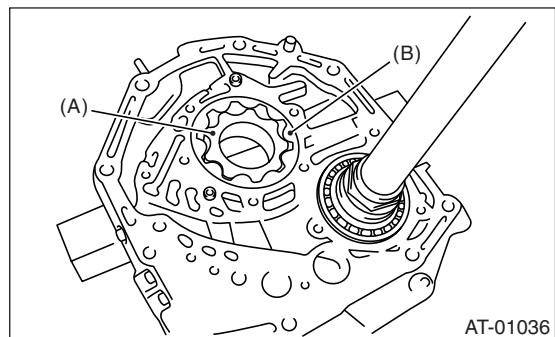
- (A) Seal rings

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



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

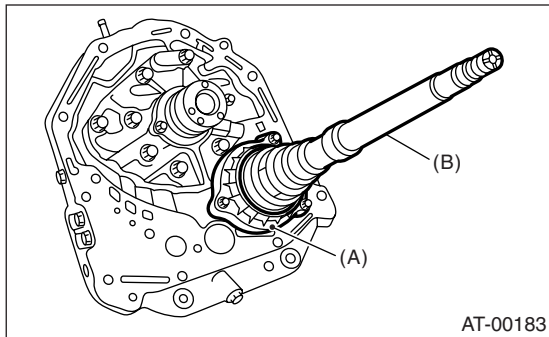
- 3) Remove the inner and outer rotor.



- (A) Inner rotor
(B) Outer rotor

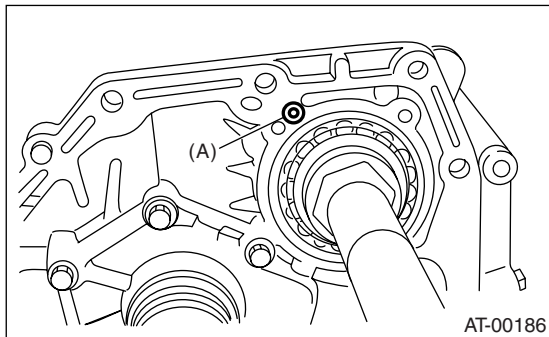
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



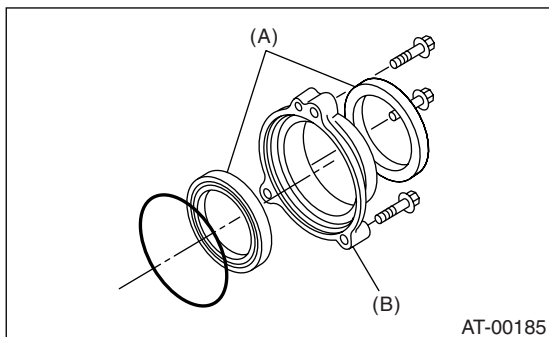
(A) Oil seal retainer
(B) Drive pinion shaft

2) Remove the O-ring.



(A) O-ring

3) Remove the oil seal from oil seal retainer.

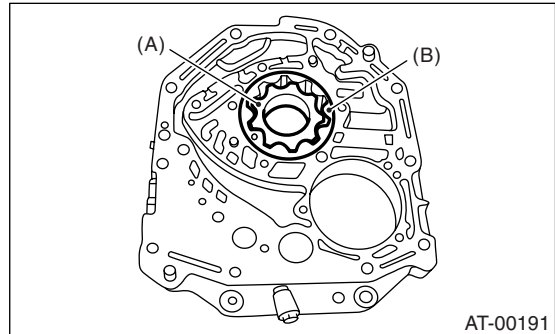


(A) Oil seal
(B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

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

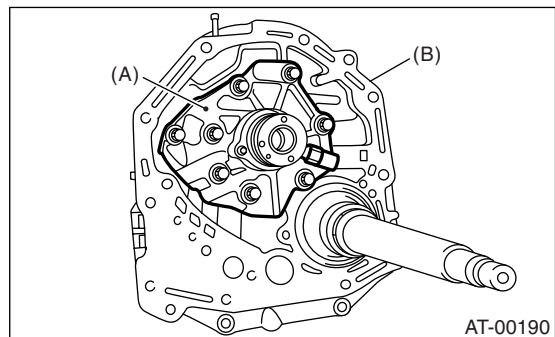


(A) Inner rotor
(B) Outer rotor

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 ft-lb)



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

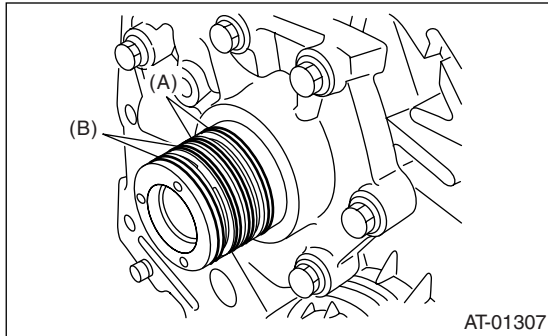
3) After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.

4) Install the oil seal retainer and new seal rings. After adjusting the drive pinion backlash and tooth

Oil Pump Housing

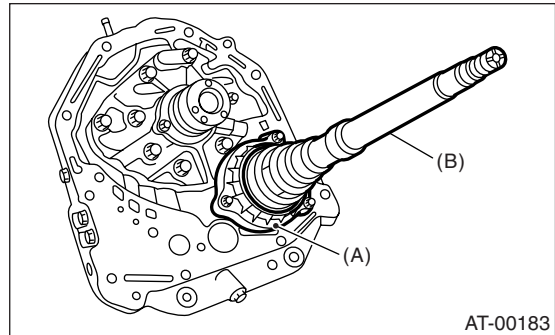
AUTOMATIC TRANSMISSION

contact. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>



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

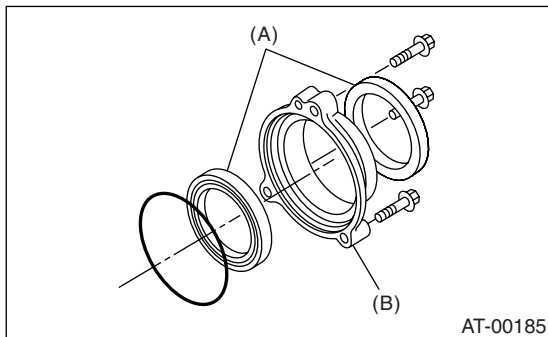
Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)



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

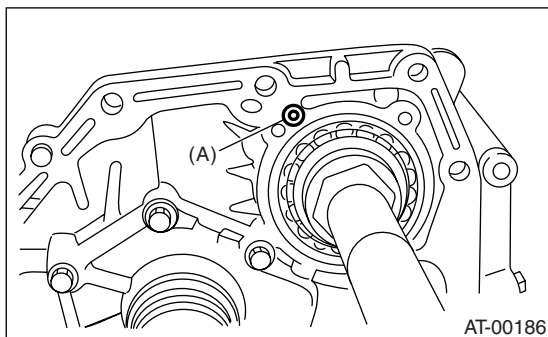
2. OIL SEAL RETAINER

1) Install two new oil seals to the oil seal retainer in proper position using ST.
ST 499247300 INSTALLER



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

2) Install a new O-ring to the oil seal retainer using vaseline. Install the seal to oil pump housing bore.



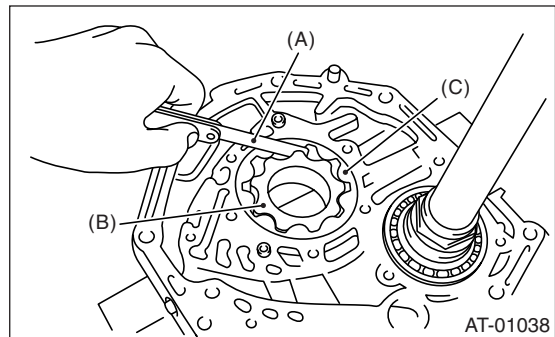
- (A) O-ring

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

E: INSPECTION

- 1) Check seal ring and O-ring 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)

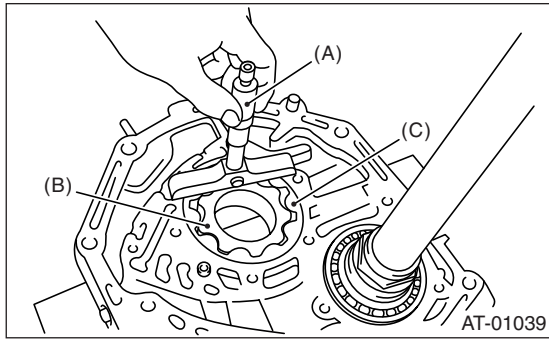


- (A) Thickness gauge
- (B) Inner rotor
- (C) Outer rotor

- (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.

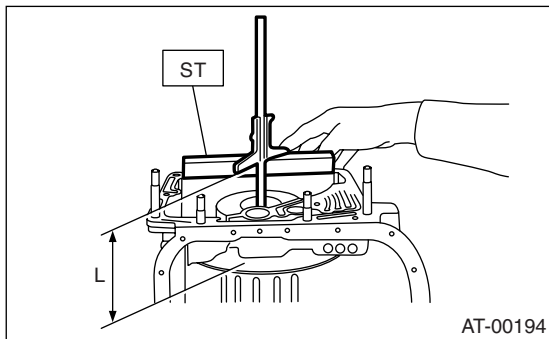
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust to within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

F: ADJUSTMENT

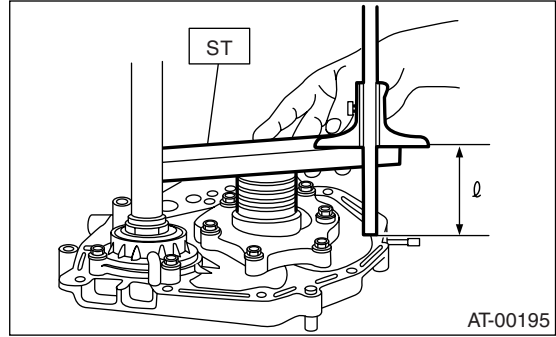
1) Using the ST, measure the distance from the end surface of ST to the recessed portion “L” of the high clutch drum.

ST 398643600 GAUGE



2) Using the ST, measure the distance from the oil pump housing mating surface to the end surface of ST.

ST 398643600 GAUGE

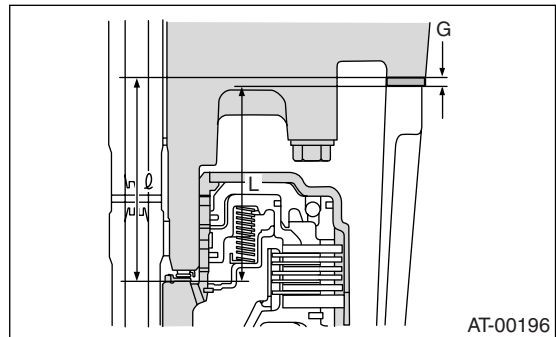


3) Calculation of total end play

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.

$$C = (L + G) - l$$

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



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 vaseline.

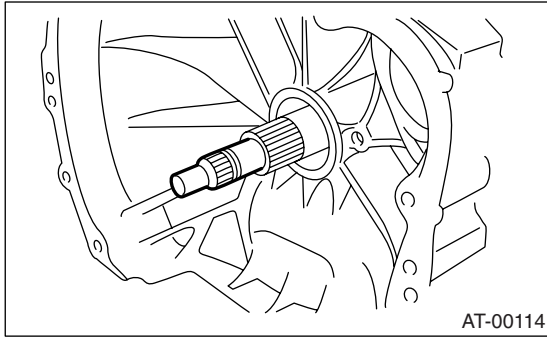
5) After correctly installing the new gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

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

37. Drive Pinion Shaft Assembly

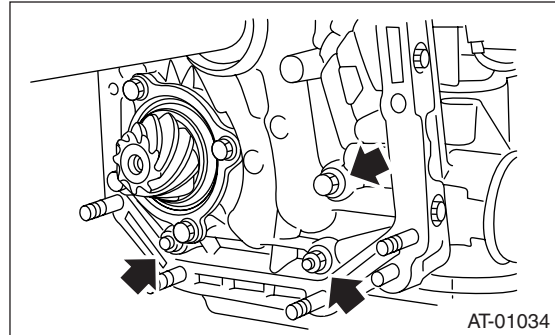
A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-81, 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 4AT-79, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charge pipe. <Ref. to 4AT-80, REMOVAL, Oil Charge Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of converter case and transmission case sections <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 10) Separate transmission case and extension case sections. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to 4AT-98, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>

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



B: INSTALLATION

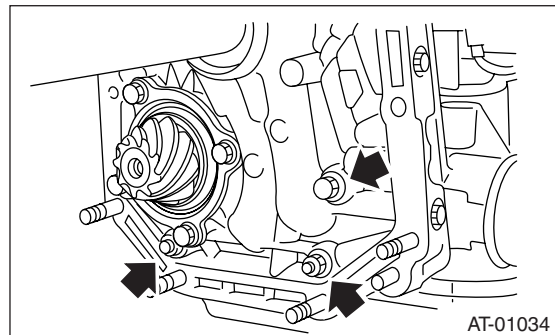
- 1) Assemble the drive pinion assembly to the oil pump housing.

NOTE:

- Pay attention not to bend the shim.
- Pay attention not to press the pinion into housing bore.

Tightening torque:

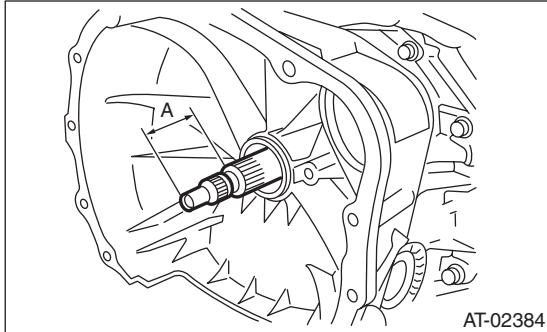
40 N·m (4.1 kgf-m, 30 ft-lb)



- 2) Combine the torque converter case with the transmission case. <Ref. to 4AT-101, INSTALLATION, Converter Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. (MPT model) <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
- 5) Install the center differential carrier. (VTD model) <Ref. to 4AT-98, INSTALLATION, Center Differential Carrier.>
- 6) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 7) Insert inhibitor switch and transmission connector into stay.
- 8) Install the oil cooler inlet and outlet pipes. <Ref. to 4AT-78, INSTALLATION, ATF Cooler Pipe and Hose.>

- 9) Install the oil charge pipe with O-ring.
- 10) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

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

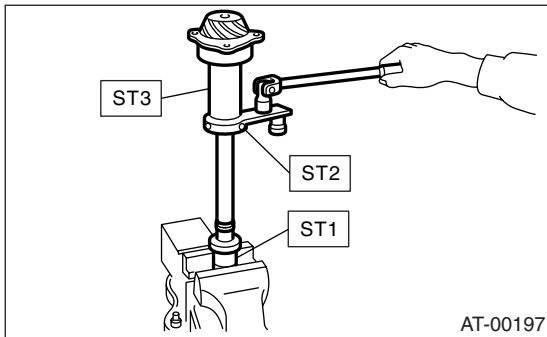


- 11) Install the torque converter clutch assembly.
 <Ref. to 4AT-81, INSTALLATION, Torque Converter Clutch Assembly.>
- 12) Install the transmission assembly to vehicle.
 <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

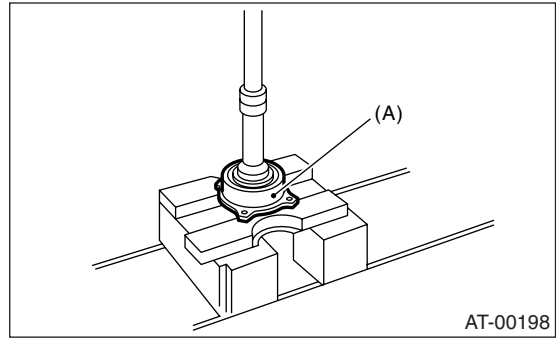
- 1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.

ST1 498937110 HOLDER
 ST2 499787700 WRENCH
 ST3 499787500 ADAPTER



- 2) Remove the O-ring.

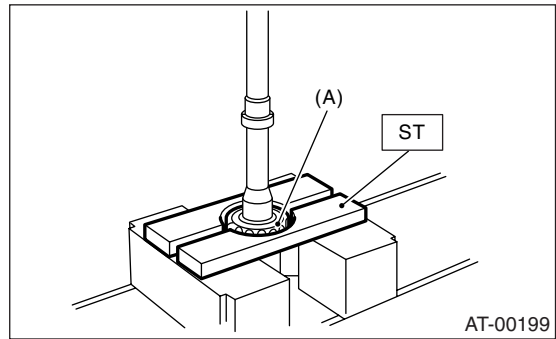
- 3) Using a press, separate the rear roller bearing and outer race from the shaft.



(A) Outer race

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

ST 498517000 REPLACER

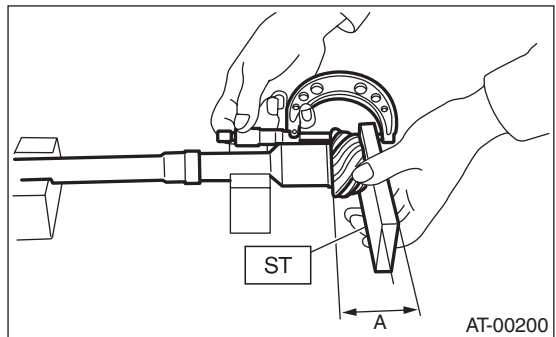


(A) Front roller bearing

D: ASSEMBLY

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

ST 398643600 GAUGE



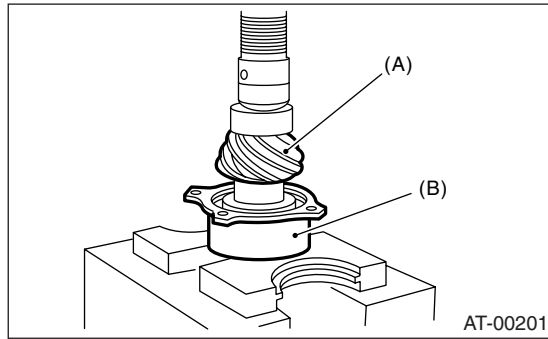
- 2) Using a press, force-fit a new roller bearing in position.

Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

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)

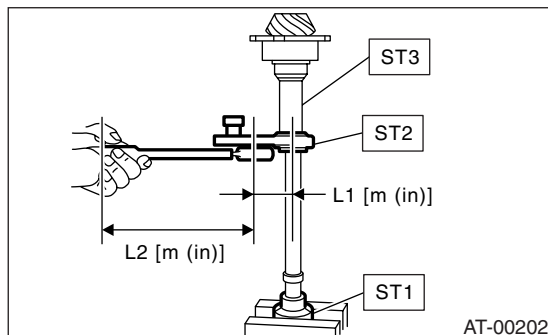
ST1 498937110 HOLDER

ST2 499787700 WRENCH

ST3 499787500 ADAPTER

NOTE:

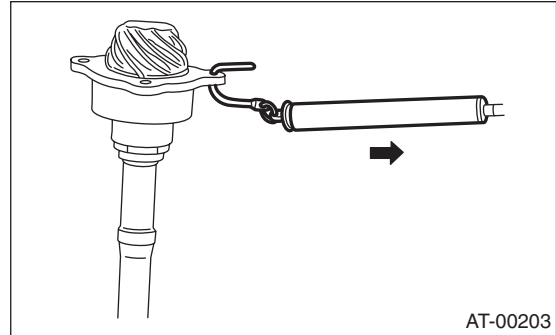
Install ST2 to torque wrench as straight as possible.



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:

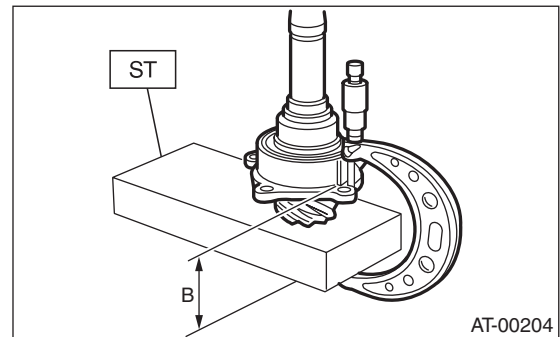
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



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 component parts are free of harmful cuts, gouges, and other faults.
- Adjust the teeth alignment. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

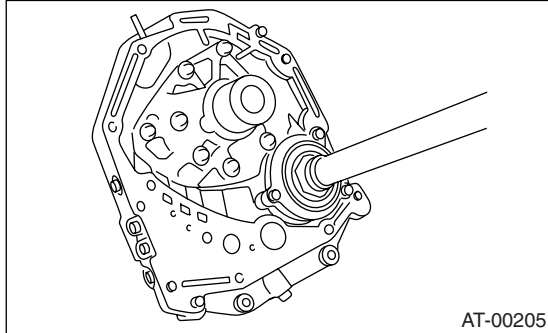
- 1) Thoroughly remove the liquid gasket from the case mating surface beforehand.
- 2) Install the oil pump housing assembly to the converter case, and secure evenly by tightening four bolts.

NOTE:

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

Tightening torque:

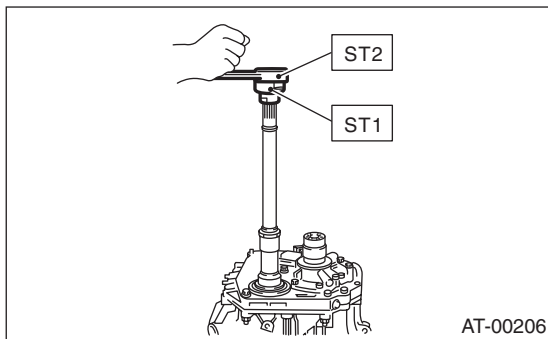
41 N·m (4.2 kgf-m, 30 ft-lb)



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

ST1 498937110 HOLDER

ST2 499787700 WRENCH



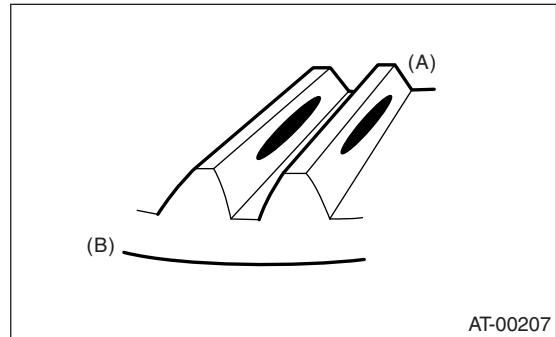
4) Adjust the backlash between drive pinion and hypoid driven gear. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

5) Apply red lead evenly to the surfaces of three or four teeth of the hypoid driven 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 4AT-117, ADJUSTMENT, Front Differential Assembly.>

• 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.]



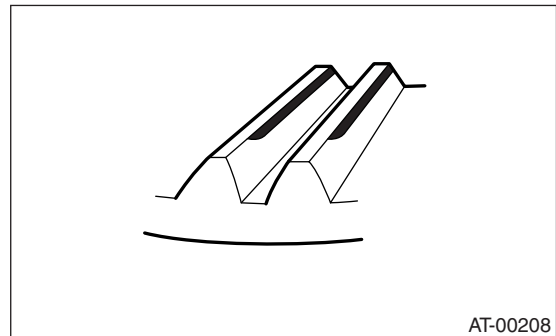
(A) Toe side

(B) Heel side

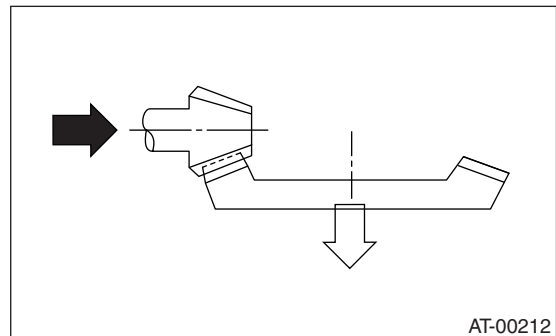
• Face contact

Checking item: Backlash is too large.

Contact pattern



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



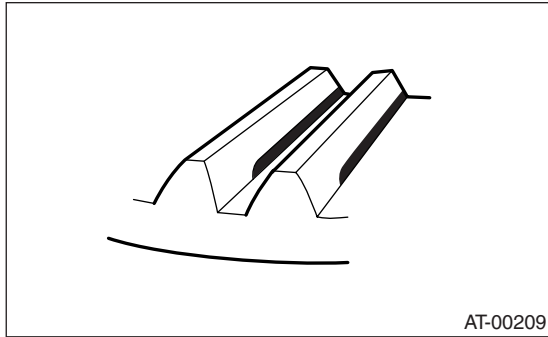
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

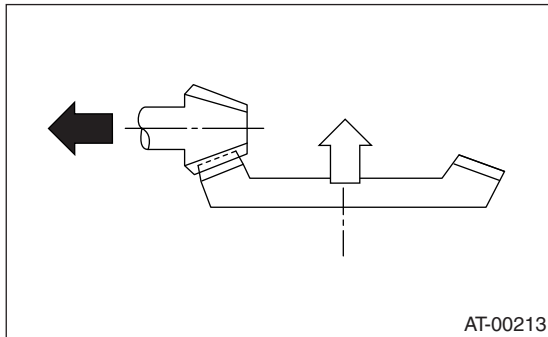
- Flank contact

Checking item: Backlash is too small.

Contact pattern



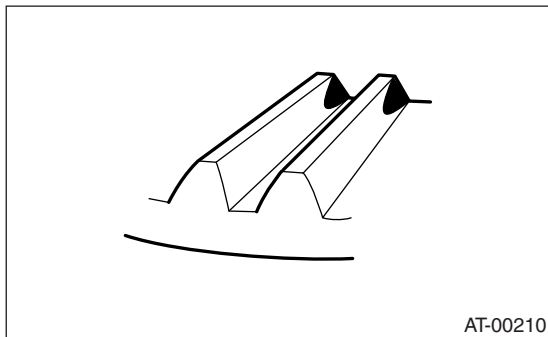
Corrective action: Reduce thickness of drive pinion height adjusting washer in order to move drive pinion away from hypoid driven gear.



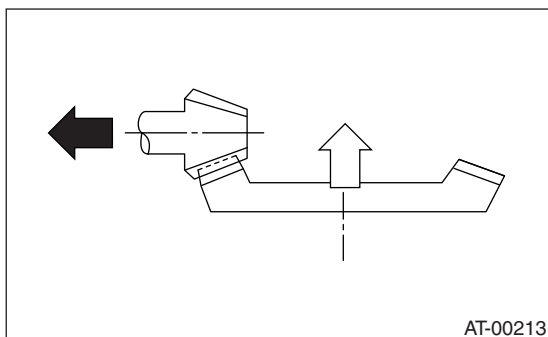
- Toe contact (Inside end contact)

Checking item: Contact areas is small.

Contact pattern



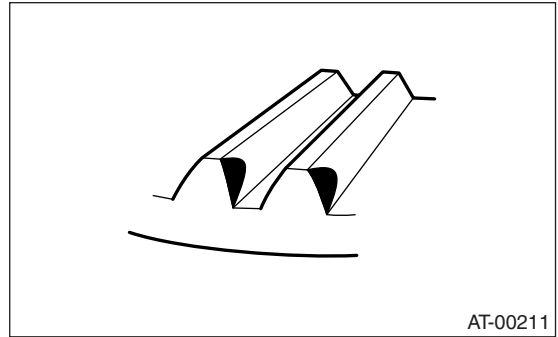
Corrective action: Decrease thickness of drive pinion height adjusting washer in order to move drive pinion away from hypoid driven gear.



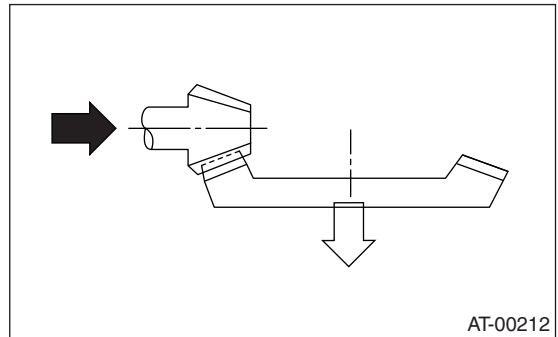
- Heel contact (Outside end contact)

Checking item: Contact areas is small.

Contact pattern



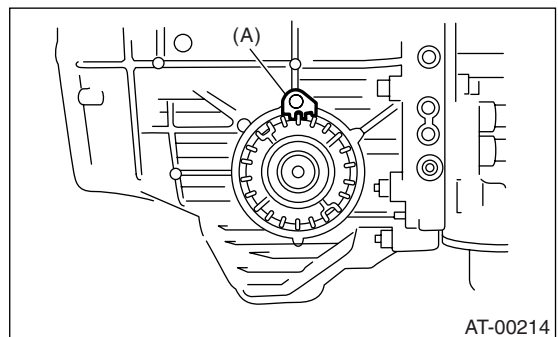
Corrective action: Increase thickness of drive pinion height adjusting washer in order to move drive pinion close to hypoid driven gear.



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 ft-lb)

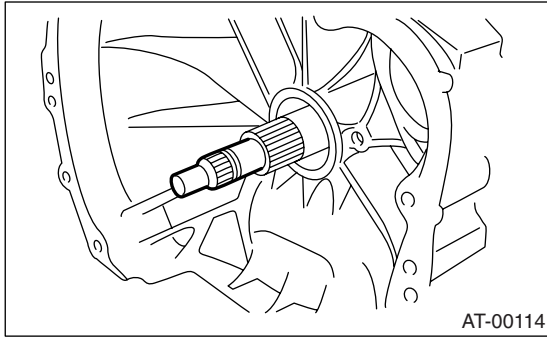


(A) Lock plate

38.Front Differential Assembly

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-81, 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 from stay.
- 6) Remove the oil charge pipe. <Ref. to 4AT-80, REMOVAL, Oil Charge Pipe.>
- 7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separation of converter case and transmission case. <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 9) Remove the seal pipe.
- 10) Remove the differential side retainer with ST.

NOTE:

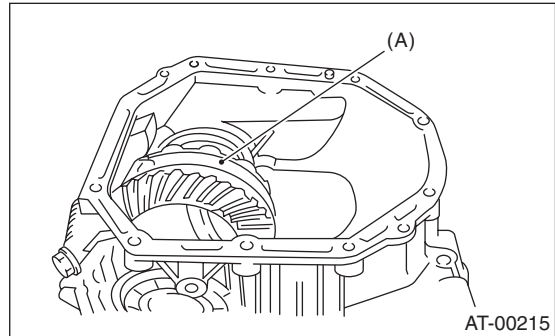
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the converter case.

ST 499787000 WRENCH ASSY

- 11) 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).

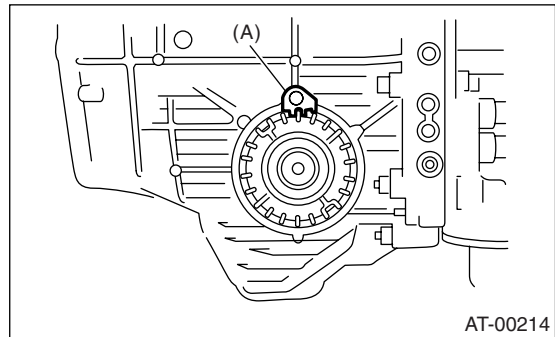


(A) Differential ASSY

- 2) Install the O-rings from left and right side retainer.
- 3) Using ST, install the side retainers. <Ref. to 4AT-113, REMOVAL, Front Differential Assembly.>
ST 499787000 WRENCH ASSY
- 4) Adjust the front differential backlash. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>
- 5) Install the lock plate.

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)

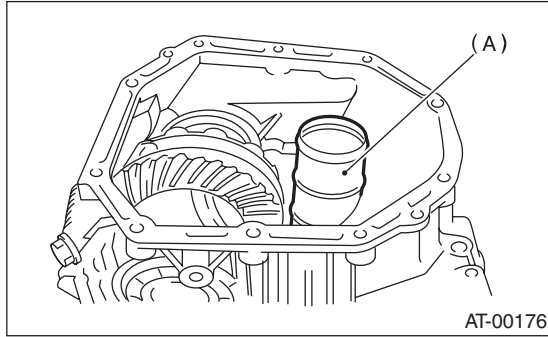


(A) Lock plate

Front Differential Assembly

AUTOMATIC TRANSMISSION

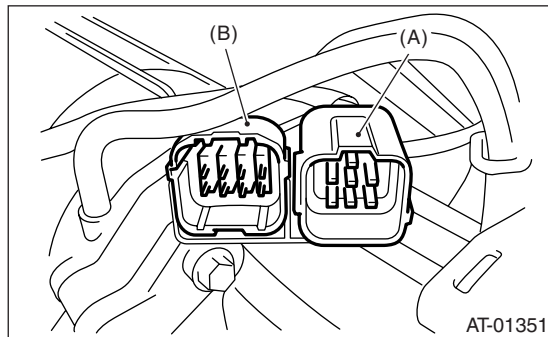
6) Install the new seal pipe to the converter case.



(A) Seal pipe

7) Install the converter case to transmission case.
<Ref. to 4AT-101, INSTALLATION, Converter Case.>

8) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness

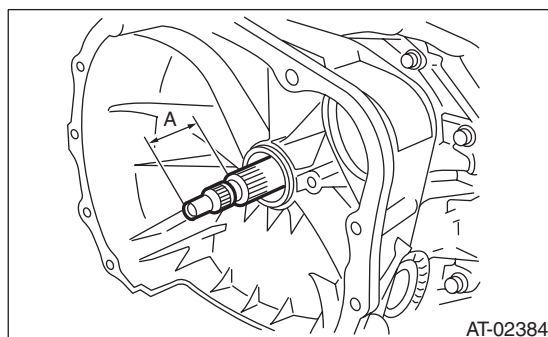
(B) Inhibitor switch harness

9) Install oil cooler pipes. <Ref. to 4AT-78, INSTALLATION, ATF Cooler Pipe and Hose.>

10) Install the oil charge pipe with O-ring <Ref. to 4AT-80, INSTALLATION, Oil Charge Pipe.>

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

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



12) Install the torque converter clutch assembly.
<Ref. to 4AT-81, INSTALLATION, Torque Converter Clutch Assembly.>

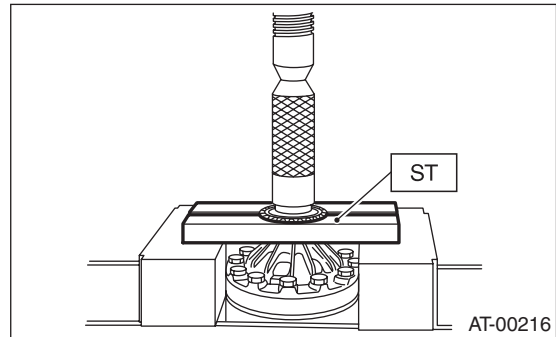
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

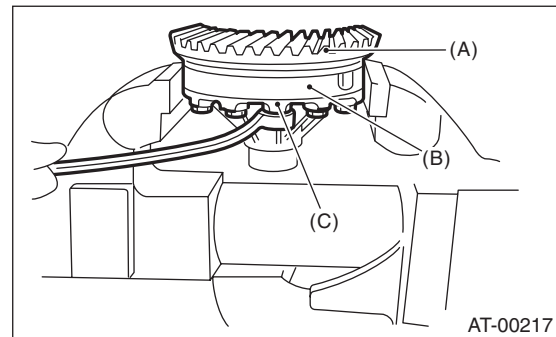
1. DIFFERENTIAL CASE ASSEMBLY

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

ST 498077000 REMOVER



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

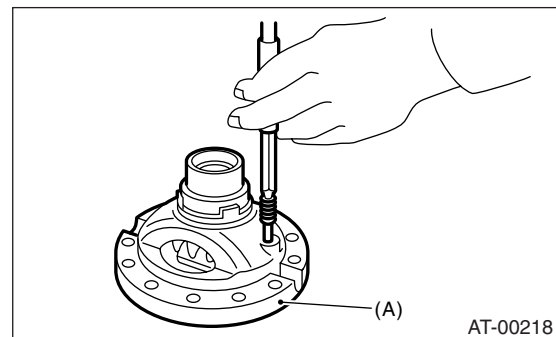


(A) Hypoid driven gear

(B) Differential case (RH)

(C) Differential case (LH)

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



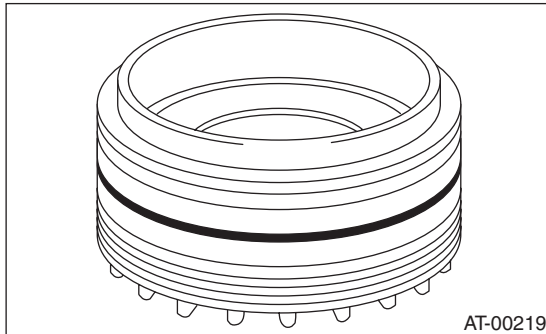
(A) Differential case (RH)

2. SIDE RETAINER

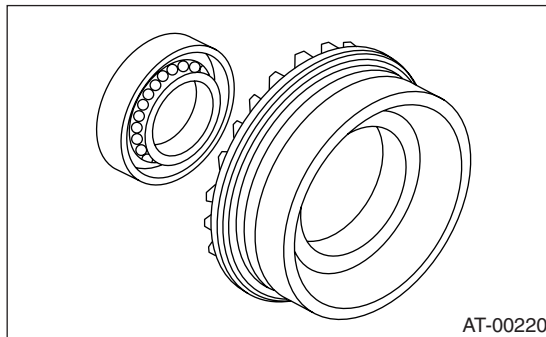
NOTE:

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

1) Remove O-ring.

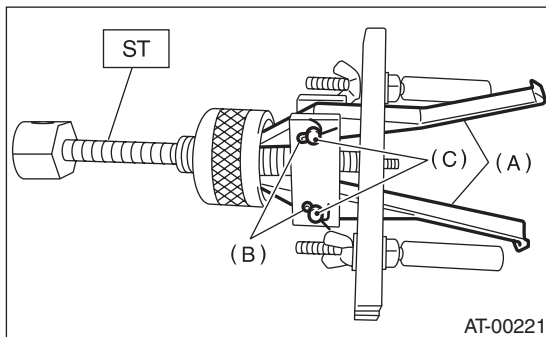


2) Remove oil seal.



3) Take out either split pin, remove claw.

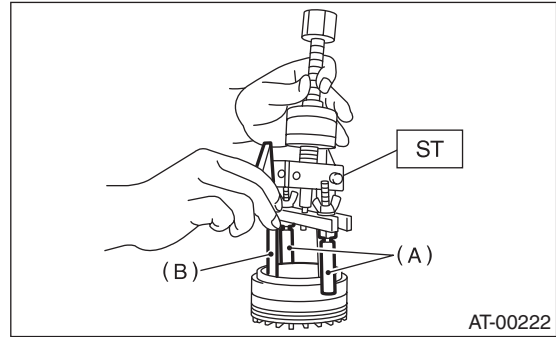
ST 398527700 PULLER ASSY



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

4) Securely attach two claws to outer race, set ST to side retainer.

ST 398527700 PULLER ASSY



- (A) Shaft
- (B) Claw

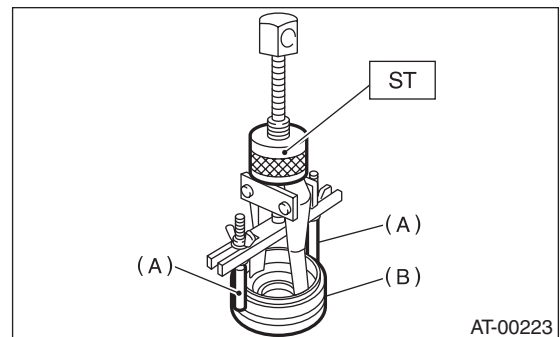
5) Return removed claw to the original position, and install pin and split pin.

6) Hold the shaft of ST to avoid removing 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

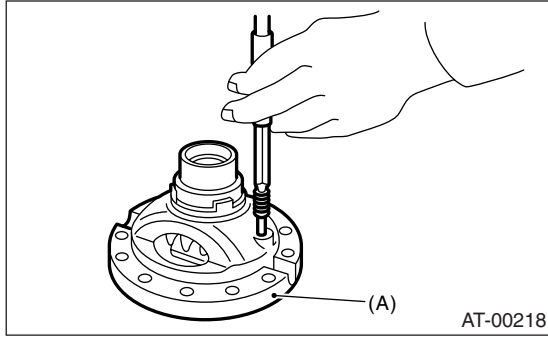
1. DIFFERENTIAL CASE ASSEMBLY

1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.

Front Differential Assembly

AUTOMATIC TRANSMISSION

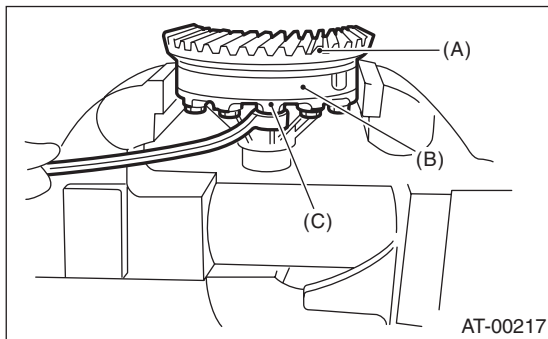
2) Install straight pin from reverse direction.



(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 hypoid driven gear and secure by tightening the bolt.

Standard tightening torque:
62 N·m (6.3 kgf-m, 46 ft-lb)



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

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

Part No. 38415AA070 AXLE SHAFT

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

ST1 498247001 MAGNET BASE

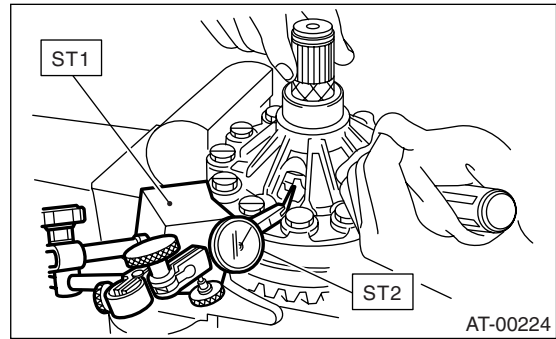
ST2 498247100 DIAL GAUGE

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 value:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

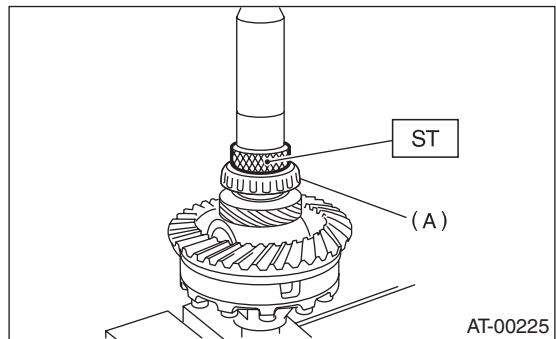


(3) If backlash is not as specified, select a washer from the table below.

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

6) Using ST, install taper roller bearing.

ST 398437700 DRIFT



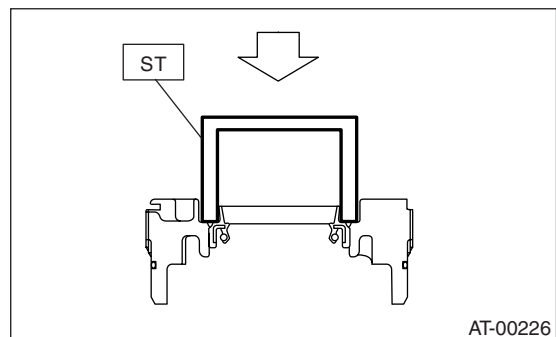
(A) Taper roller bearing

2. SIDE RETAINER

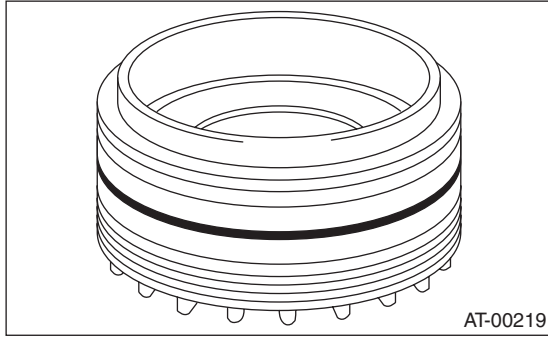
1) Install bearing outer race to side retainer.

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

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



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



E: INSPECTION

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

<Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

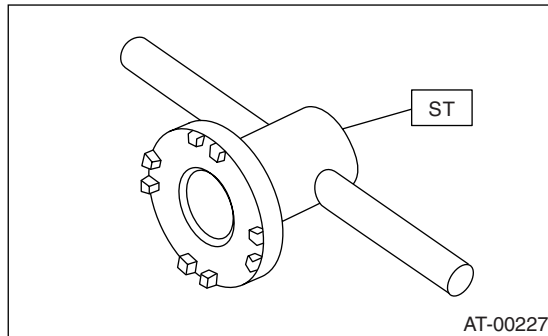
F: ADJUSTMENT

1) Using ST, screw in the retainer until light contact 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 case mating surface beforehand.

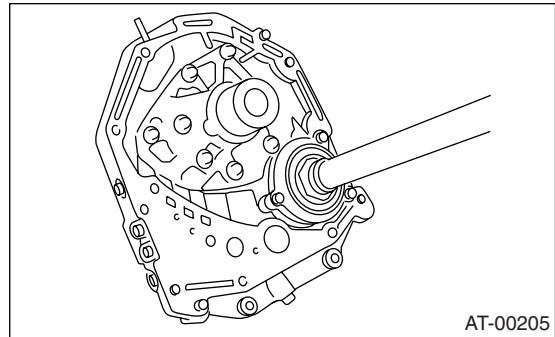
4) Install the oil pump housing assembly to the converter case, and secure evenly by tightening four bolts.

NOTE:

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

Tightening torque:

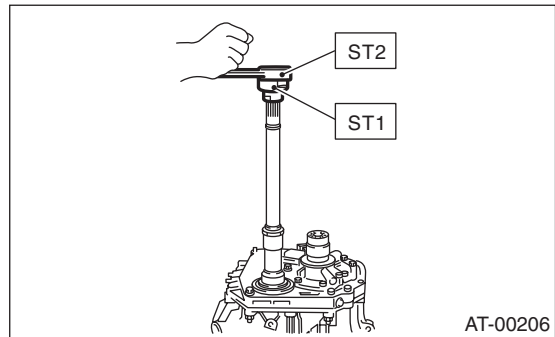
41 N·m (4.2 kgf-m, 30 ft-lb)



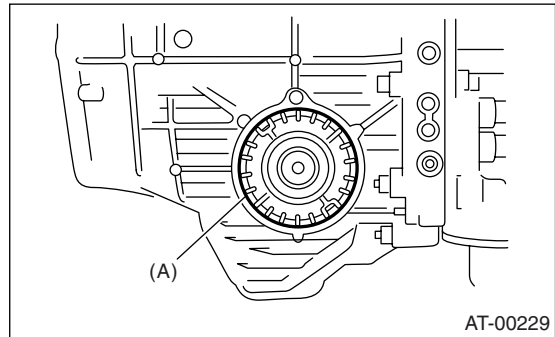
5) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER

ST2 499787700 WRENCH



6) Tighten the LH retainer until contact 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.



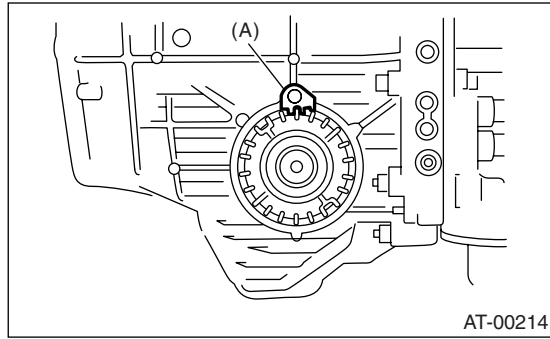
(A) Retainer

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

Front Differential Assembly

AUTOMATIC TRANSMISSION

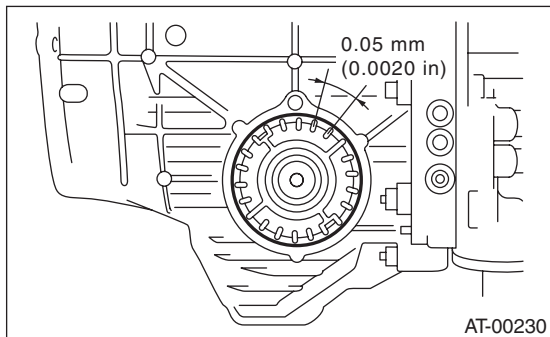
the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

NOTE:

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

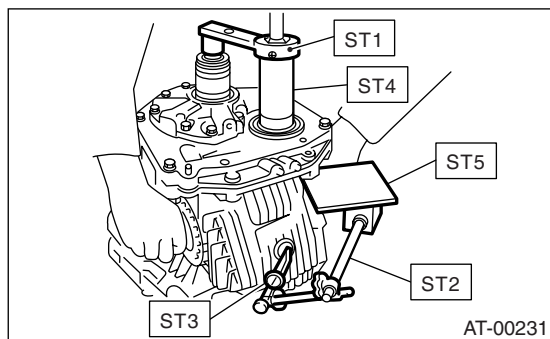


8) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

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)

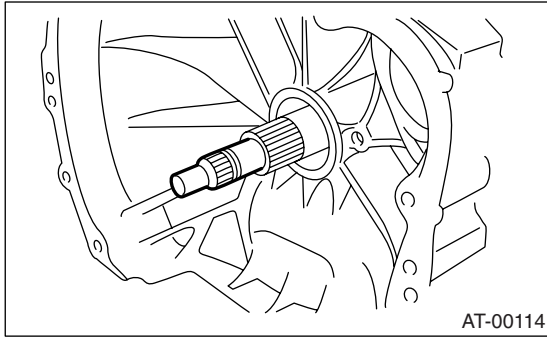


9) Adjust the tooth contact between front differential and drive shaft. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

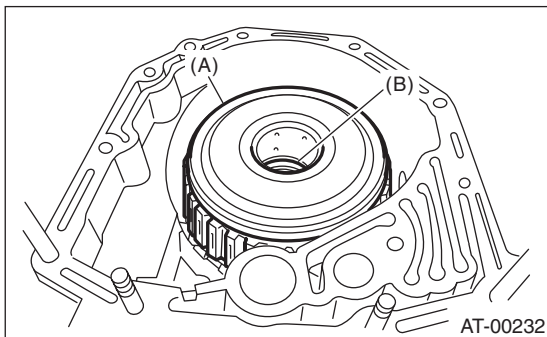
39.AT Main Case

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-81, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

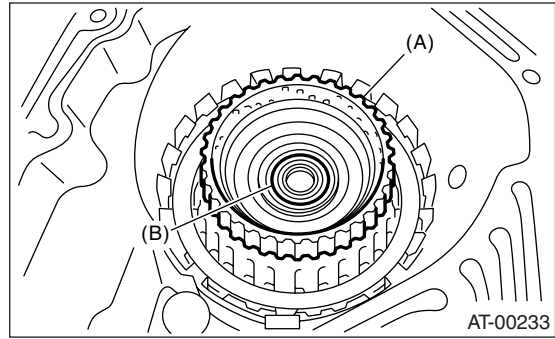


- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charge pipe. <Ref. to 4AT-80, REMOVAL, Oil Charge Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of converter case and transmission case. <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 10) Remove the oil pump housing. <Ref. to 4AT-103, REMOVAL, Oil Pump Housing.>
- 11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



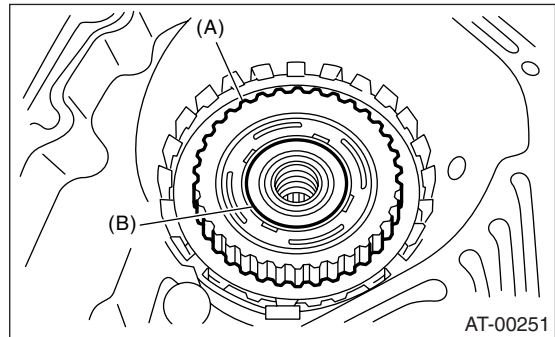
- (A) High clutch and reverse clutch ASSY
- (B) Thrust needle bearing

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



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

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

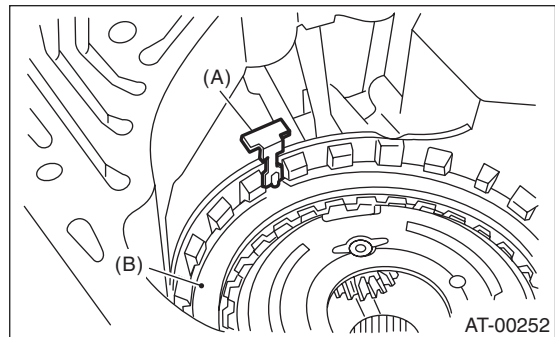


- (A) Front sun gear
- (B) Thrust needle bearing

- 14) Pull out leaf spring without folding.

NOTE:

Remove it while pressing down on lower leaf spring.

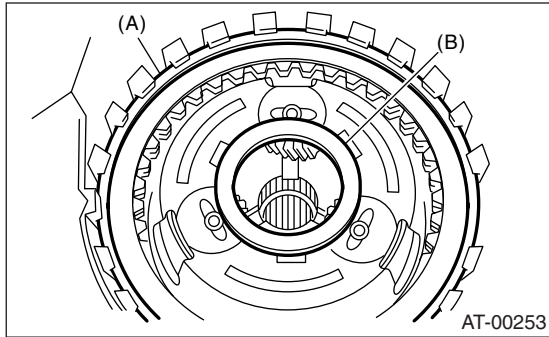


- (A) Leaf spring
- (B) Retaining plate

AT Main Case

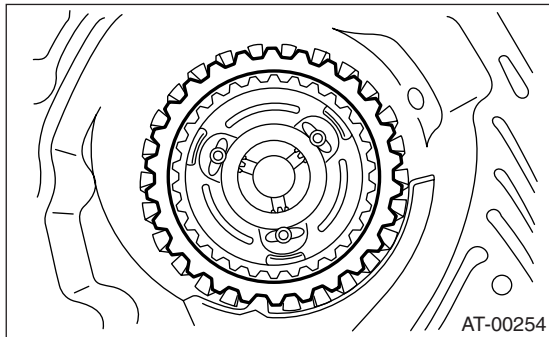
AUTOMATIC TRANSMISSION

15) Remove snap ring and thrust needle bearing.

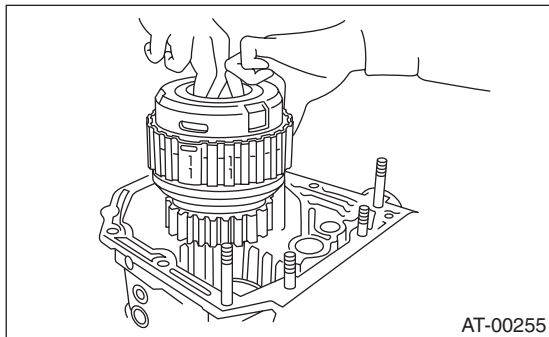


- (A) Snap ring
- (B) Thrust needle bearing

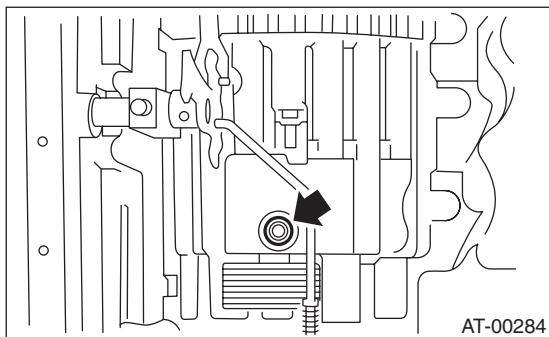
16) Take out retaining plate, drive plate and driven plate of 2-4 brake.



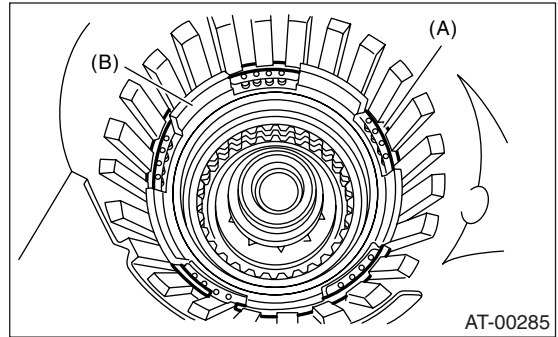
17) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



18) Remove 2-4 brake seal.

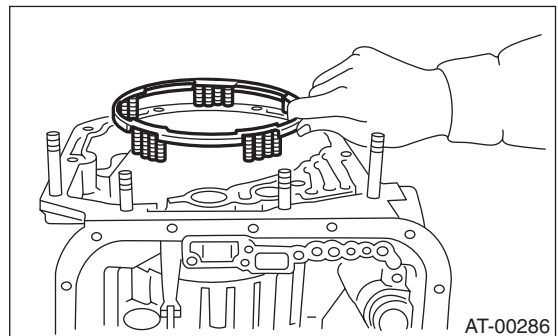


19) Remove snap ring.

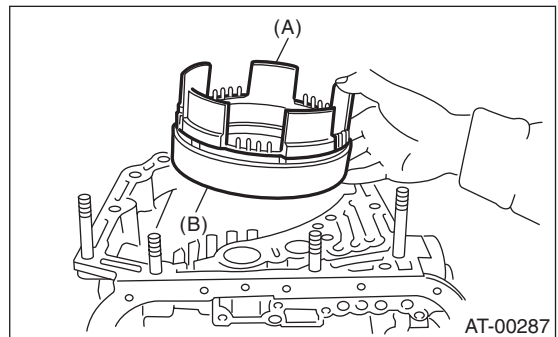


- (A) Snap ring
- (B) 2-4 brake piston

20) Take out 2-4 brake return spring.

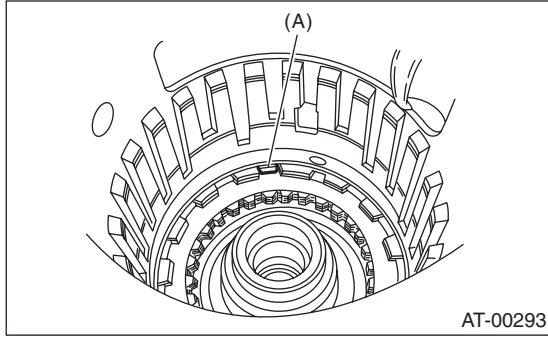


21) Remove the 2-4 brake piston and piston retainer without damaging.



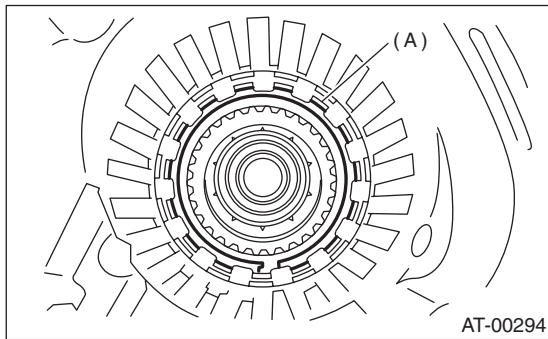
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

22) Pull out the leaf spring without folding.



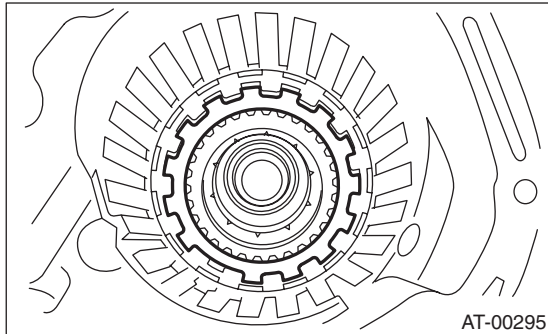
(A) Leaf spring

23) Remove snap ring.

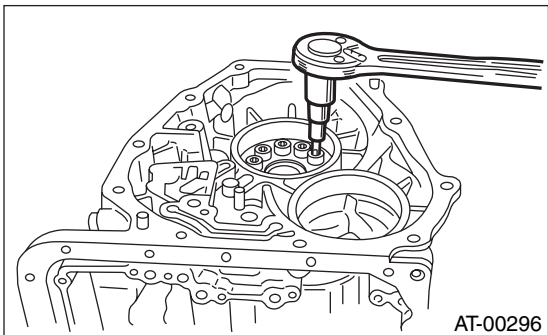


(A) Snap ring

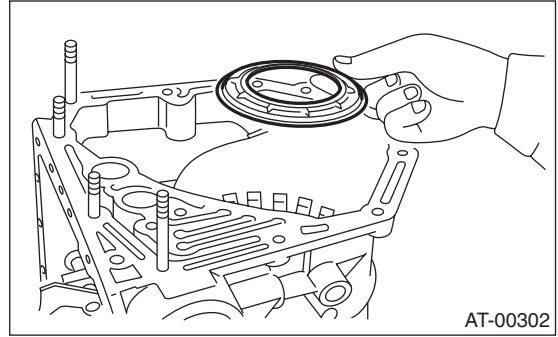
24) Take out retaining plate, drive plate, driven plate and dish plate.



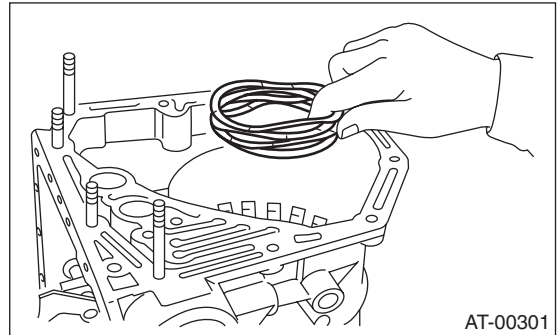
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.



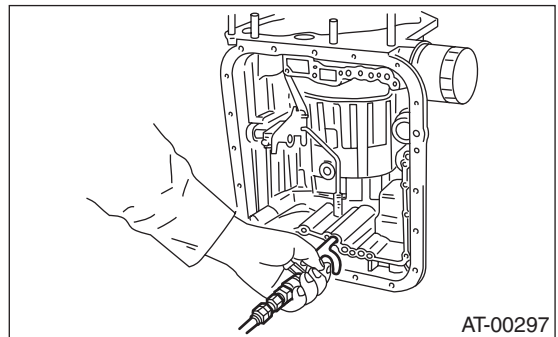
26) Take out the spring retainer.



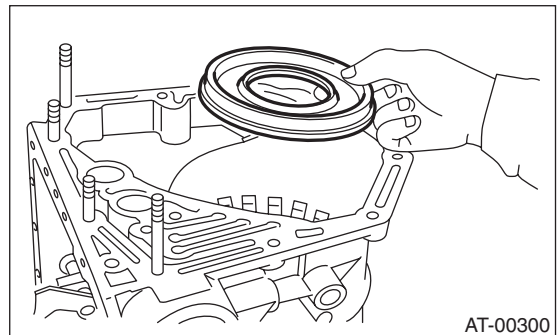
27) Take out the return spring.



28) Apply compressed air.



29) Take out the low & reverse piston.

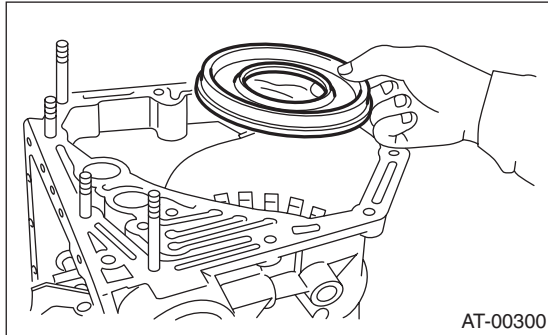


B: INSTALLATION

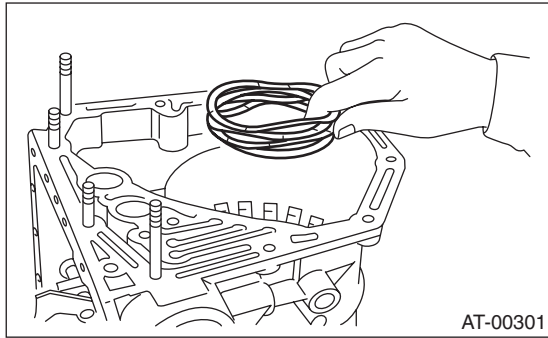
1) Install the low & reverse piston without tilting.

NOTE:

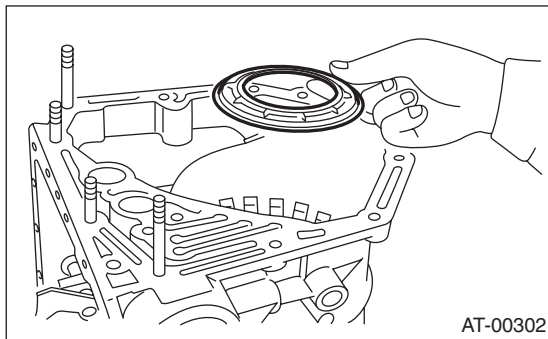
Be careful not to damage the lip seal.



2) Install return spring.



3) Install spring retainer.

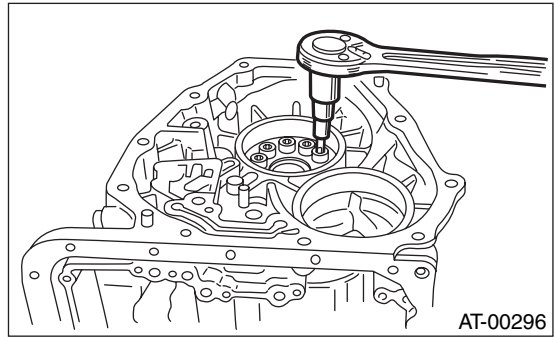


4) Install the one-way clutch inner race, spring retainer and return spring.

5) Tighten socket head bolts evenly from the rear side of the transmission case.

Tightening torque:

25 N·m (2.5 kgf-m, 18 ft-lb)



6) Place the front side of transmission body up.

7) Install thrust needle bearing.

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

9) Set the micro gauge to retaining plate, and read its scale. Make more than three measurements at even distance and take the average value.

NOTE:

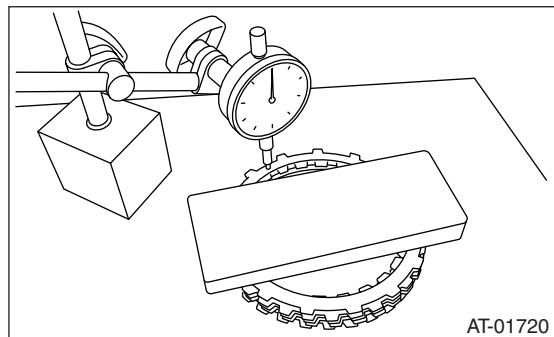
The value, which is read in the gauge at this time, is zero point.

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

NOTE:

- Use a stiff flat board which does not bend against load.
- Use a flat board of its weight less than 8.5 kg (18.7 lb).

11) Put the flat board on retaining plate.



12) Using the following formula, calculate N indicated on the push/pull gauge.

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

N: Value indicated on push/pull gauge

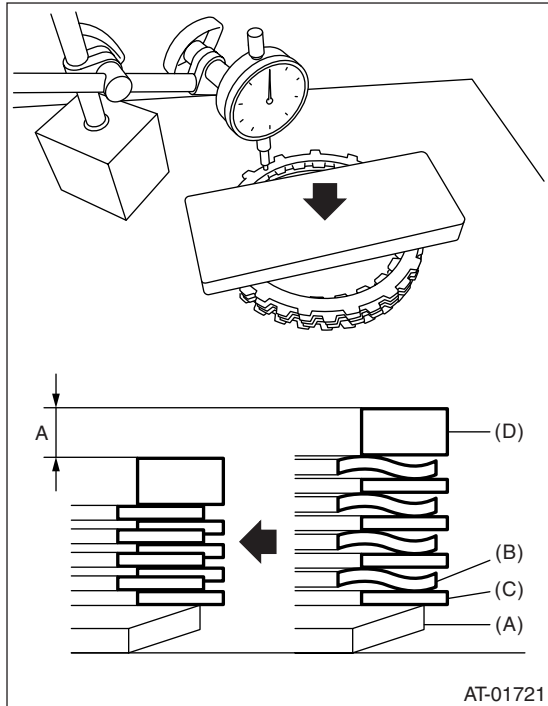
83 N (8.5 kgf, 18.7 lb): Load applied to clutch plate

Z: Flat board weight

13) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height "A". Make more than three measurements at even distance and take the average value.

NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.

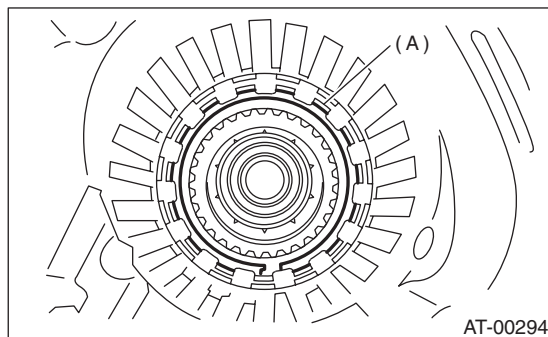


- (A) Dish plate
- (B) Driven plate
- (C) Drive plate
- (D) Retaining plate

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

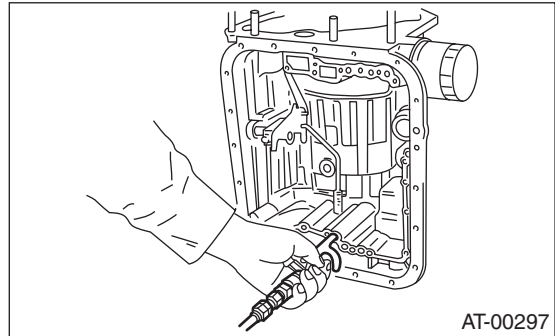
NOTE:

Pay attention to the orientation of dish plate.



- (A) Snap ring

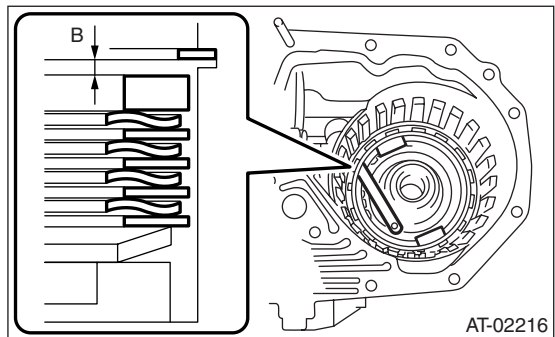
15) Apply compressed air intermittently to check for operation.



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

NOTE:

Do not press the shim downward with excessive force, or else the waveform of drive plates will be broken down.



17) Piston stroke calculation

Select the retaining plate within the specification by calculating with "A" and "B" dimensions which have been recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

Non-turbo model

Initial standard:

2.15 — 2.65 mm (0.073 — 0.093 in)

Limit thickness:

2.95 mm (0.104 in)

Turbo model

Initial standard:

2.70 — 3.20 mm (0.106 — 0.126 in)

Limit thickness:

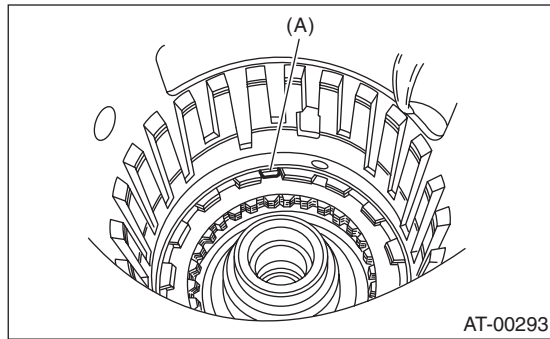
3.90 mm (0.154 in)

AT Main Case

AUTOMATIC TRANSMISSION

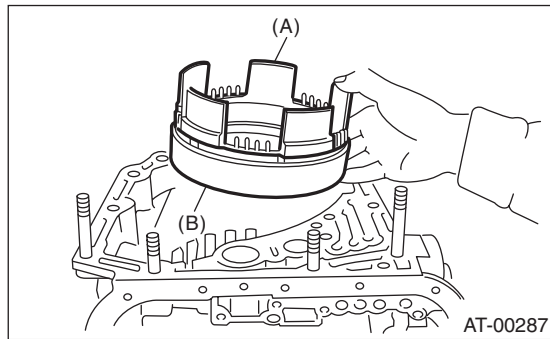
Retaining plate	
Part number	Thickness mm (in)
31667AA420	3.8 (0.150)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

18) Install the low & reverse brake leaf spring.



(A) Leaf spring

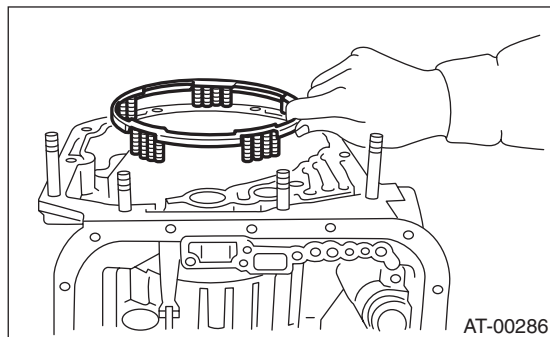
19) Install the 2-4 brake piston and 2-4 brake retainer by aligning hole of 2-4 brake retainer and hole of transmission case.



(A) 2-4 brake piston

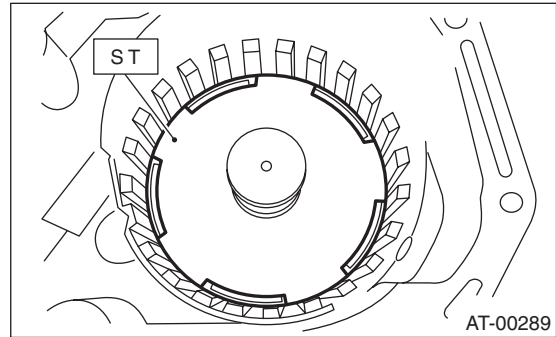
(B) 2-4 brake piston retainer

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



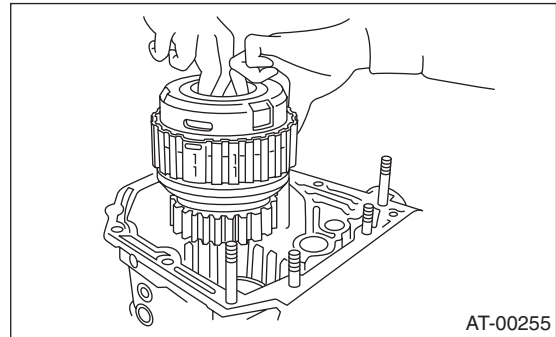
21) Position snap ring in transmission. Using ST, press the snap ring into place.

ST 498677100 COMPRESSOR



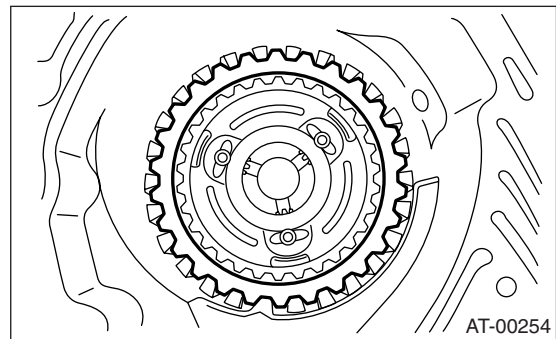
22) Install planetary gear and low clutch assembly to transmission case.

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

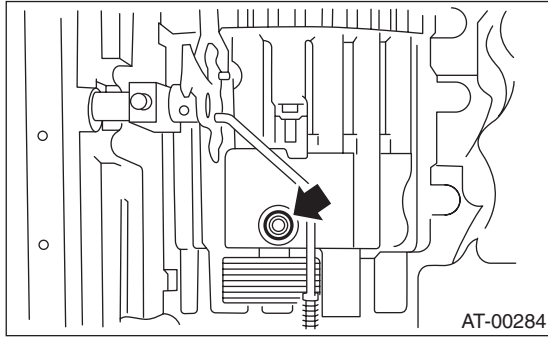


23) Selection of 2-4 brake retaining plate (Turbo model)

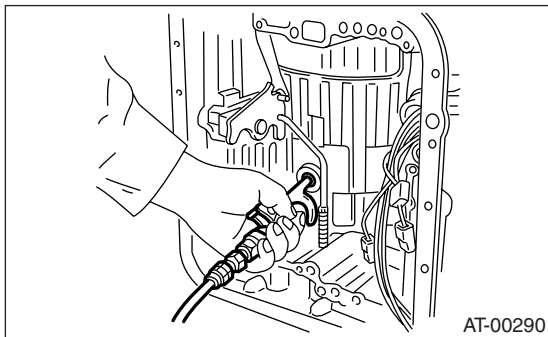
(1) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



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



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



- (4) Check the clearance between the retaining plate and the snap ring.

NOTE:

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

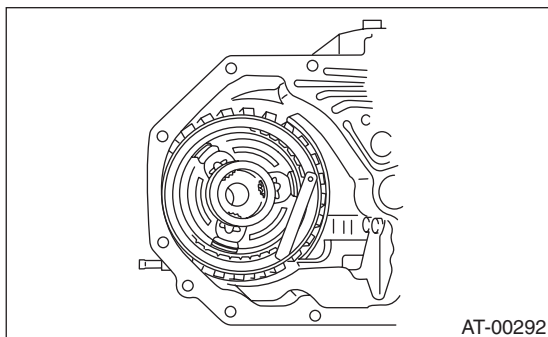
If it exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.

Initial standard:

0.8 — 1.2 mm (0.031 — 0.047 in)

Limit thickness:

1.5 mm (0.059 in)



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

- 24) Selection of 2-4 brake retaining plate (Non-turbo model)

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

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

NOTE:

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

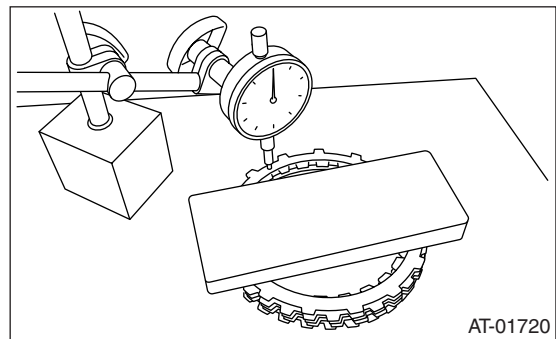
(3) Scale and record the weight Z of a flat board which will be put on plates.

NOTE:

- Use a stiff flat board which does not bend against load.

- Use a flat board of its weight less than 10.2 kg (22.5 lb).

(4) Put the flat board on retaining plate.



(5) Using the following formula, calculate N indicated on the push/pull gauge.

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

N: Value indicated on push/pull gauge

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

Z: Flat board weight

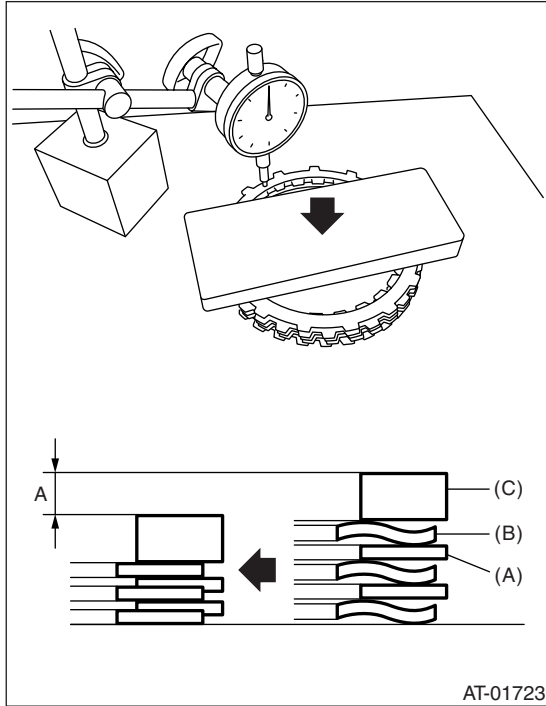
(6) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

AT Main Case

AUTOMATIC TRANSMISSION

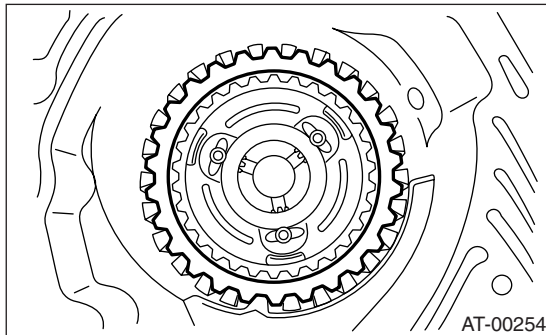
NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.

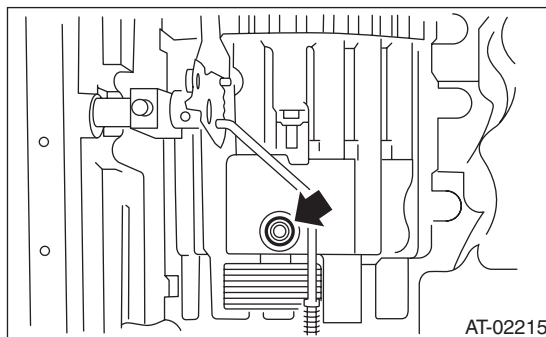


- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate

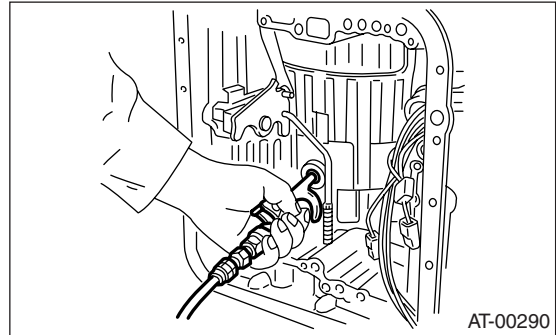
(7) Install the pressure plate, drive plate, driven plate, retaining plate and snap ring.



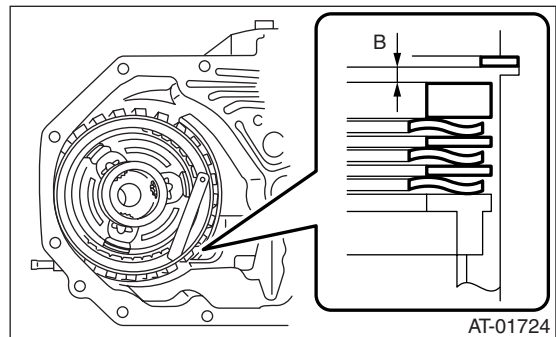
(8) Install a new 2-4 brake oil seal to transmission case.



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



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



(11) Piston stroke calculation

Select the retaining plate within the specification by calculating with "A" and "B" dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

Initial standard:

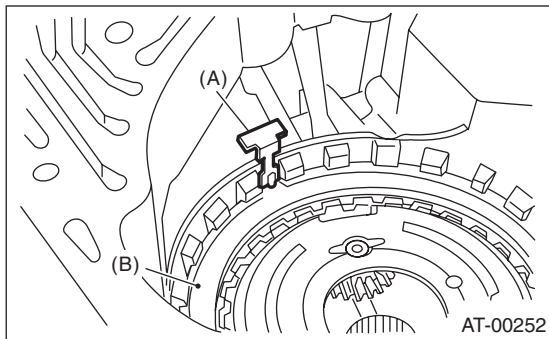
1.7 — 2.1 mm (0.067 — 0.083 in)

Limit thickness:

2.3 mm (0.091 in)

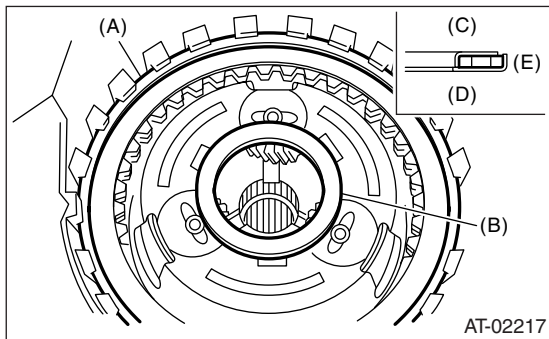
Retaining plate	
Part number	Thickness mm (in)
31567AA991	5.6 (0.220)
31567AB001	5.8 (0.228)
31567AB011	6.0 (0.236)
31567AB021	6.2 (0.244)
31567AB031	6.4 (0.252)
31567AB041	6.6 (0.260)

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



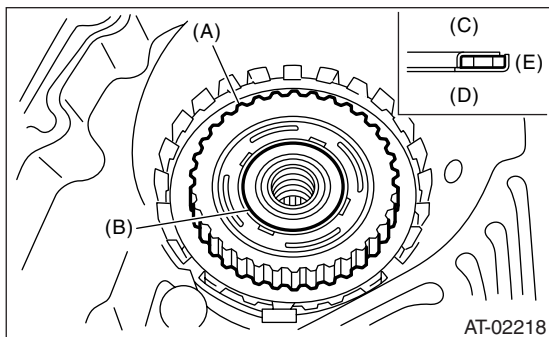
- (A) Leaf spring
- (B) Retaining plate

26) Install thrust needle bearing in the correct direction.



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

27) Install front sun gear and thrust needle bearing.

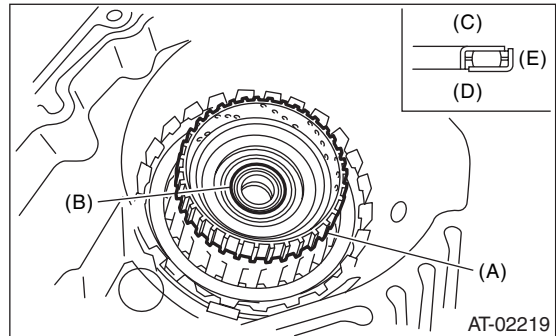


- (A) Front sun gear
- (B) Thrust needle bearing
- (C) Clutch hub side
- (D) Front sun gear side
- (E) Outside

28) Install the high clutch hub.

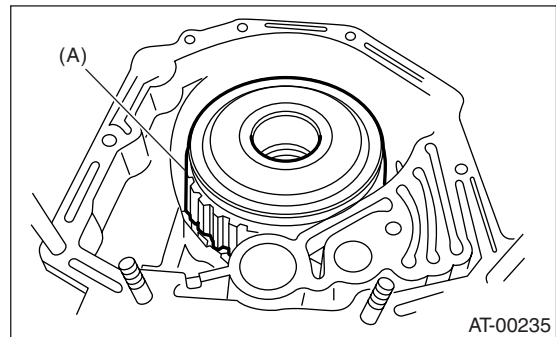
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

29) Install the thrust needle bearing in proper direction.



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

30) Install the high clutch assembly.



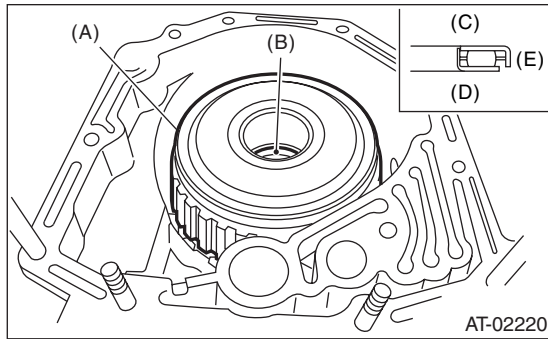
- (A) High clutch and reverse clutch ASSY

31) Adjust total end play. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

AT Main Case

AUTOMATIC TRANSMISSION

32) Install the thrust needle bearing in proper direction.



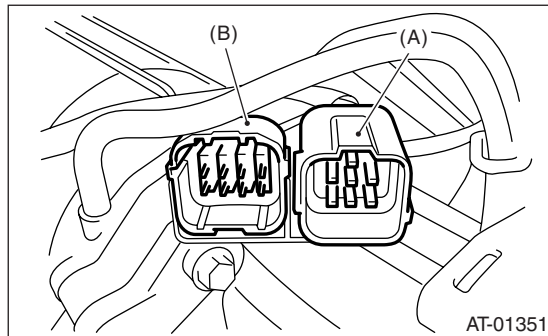
- (A) High clutch and reverse clutch ASSY
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

33) Install the oil pump housing assembly.

34) Install the converter case assembly to the transmission case assembly. <Ref. to 4AT-101, INSTALLATION, Converter Case.>

35) Insert inhibitor switch and transmission connector into stay.

36) Install air breather hose. <Ref. to 4AT-79, INSTALLATION, Air Breather Hose.>



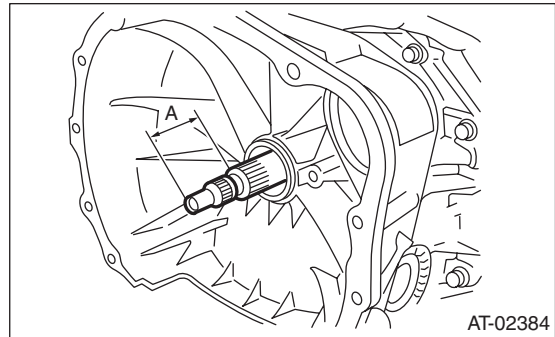
- (A) Transmission harness
- (B) Inhibitor switch harness

37) Install oil cooler pipes. <Ref. to 4AT-78, INSTALLATION, ATF Cooler Pipe and Hose.>

38) Install the oil charge pipe with O-ring. <Ref. to 4AT-80, INSTALLATION, Oil Charge Pipe.>

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

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



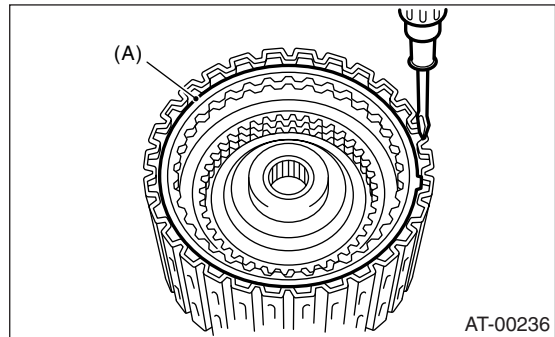
40) Install the torque converter clutch assembly. <Ref. to 4AT-81, INSTALLATION, Torque Converter Clutch Assembly.>

41) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

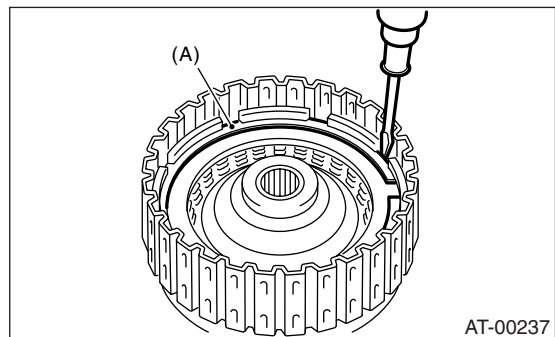
1. HIGH CLUTCH, REVERSE CLUTCH

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



(A) Snap ring

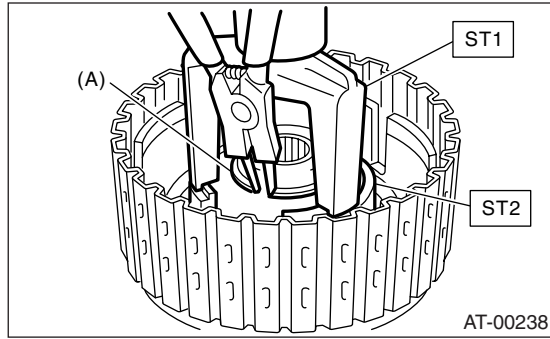
2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.



(A) Snap ring

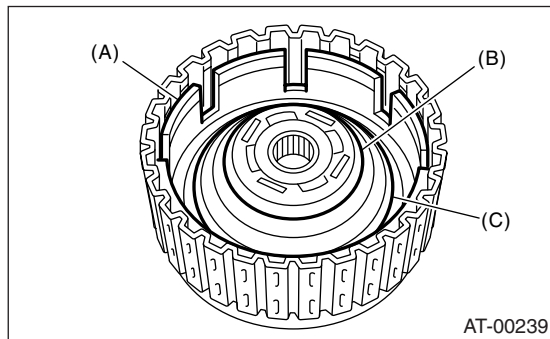
3) Using ST1 and ST2, remove snap ring.
ST1 398673600 COMPRESSOR

ST2 498627100 SEAT



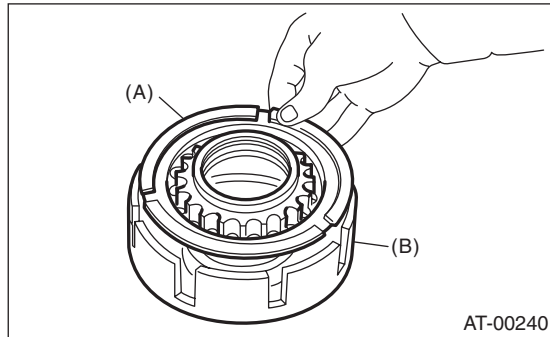
(A) Snap ring

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



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

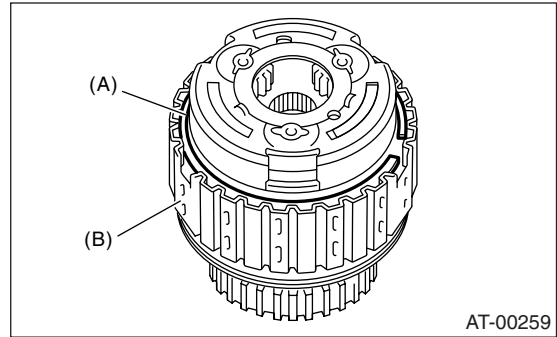
5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.



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

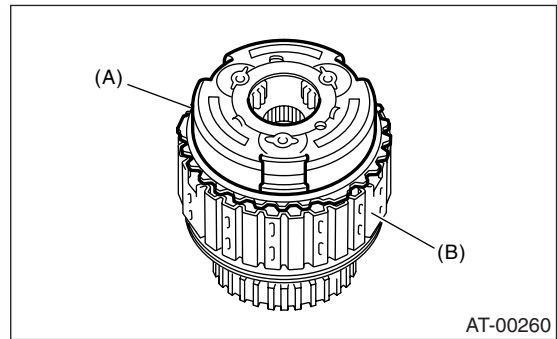
2. PLANETARY GEAR, LOW CLUTCH

1) Remove snap ring from the low clutch drum.



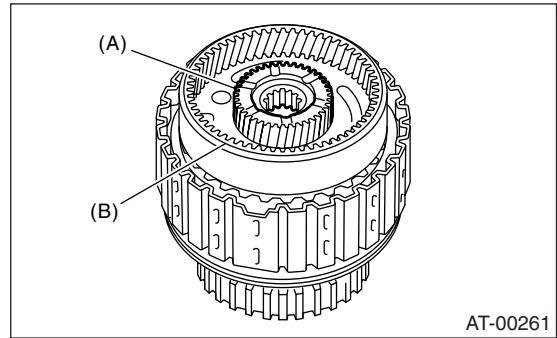
(A) Snap ring
(B) Low clutch drum

2) Take out front planetary carrier.



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

3) Take out rear sun gear.

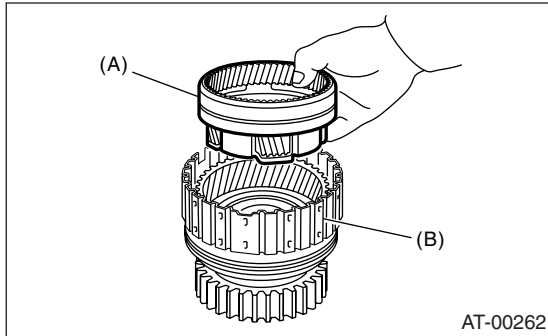


(A) Rear sun gear
(B) Rear planetary carrier

AT Main Case

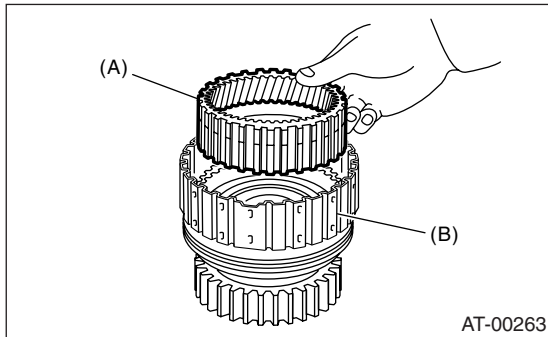
AUTOMATIC TRANSMISSION

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



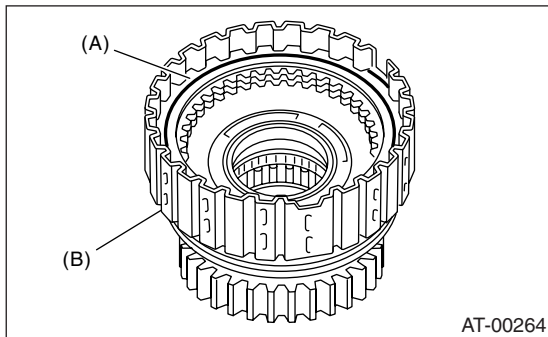
- (A) Rear planetary carrier
- (B) Low clutch drum

5) Take out rear internal gear.



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

6) Remove the snap ring from the low clutch drum.

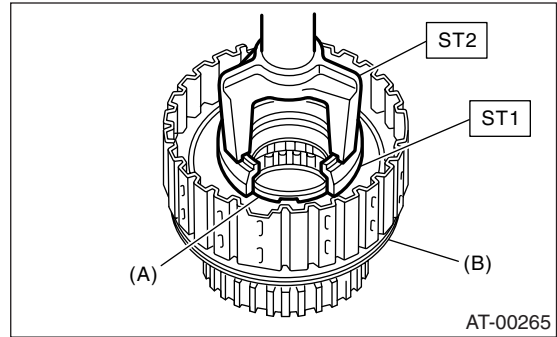


- (A) Snap ring
- (B) Low clutch drum

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

ST1 498627100 SEAT

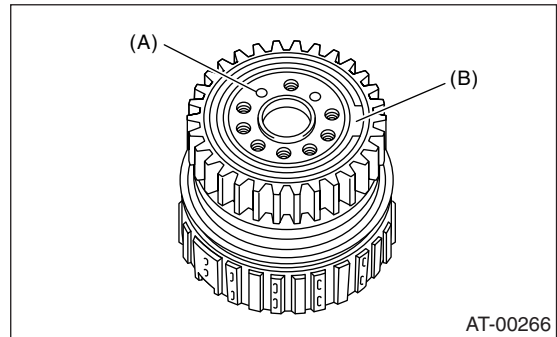
ST2 398673600 COMPRESSOR



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

8) Remove one-way clutch. <Ref. to 4AT-119, REMOVAL, AT Main Case.>

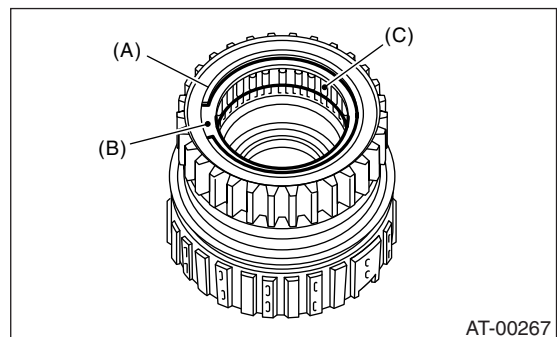
9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



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

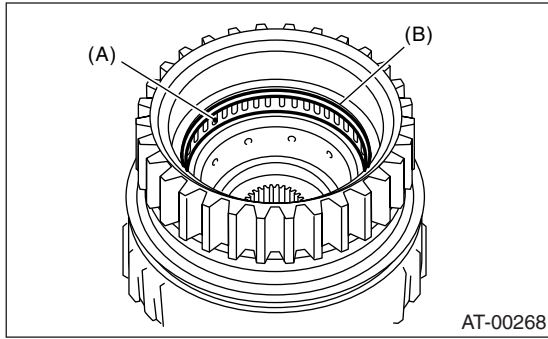
10) Remove the one-way clutch inner race.

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



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

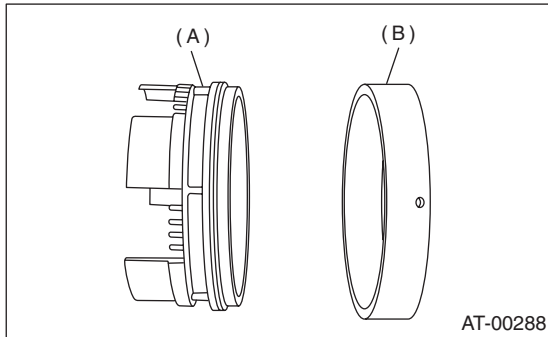
12) Remove the needle bearing after taking out the snap ring.



(A) Needle bearing
(B) Snap ring

3. 2-4 BRAKE

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

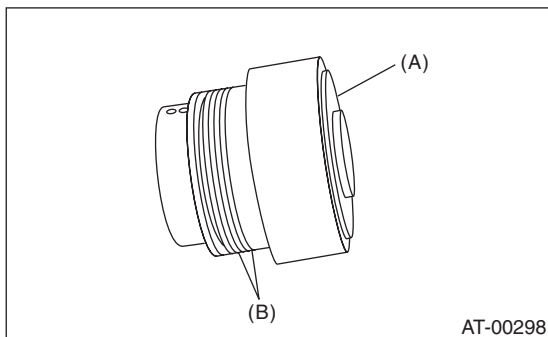


(A) 2-4 brake piston
(B) 2-4 brake piston retainer

2) Remove the D-ring from 2-4 brake piston.

4. ONE-WAY CLUTCH INNER RACE

1) Remove seal rings.

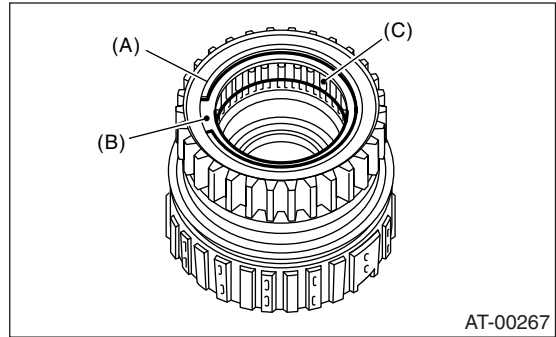


(A) One way clutch inner race
(B) Seal rings

2) Using ST, remove needle bearing.
ST 398527700 PULLER ASSY

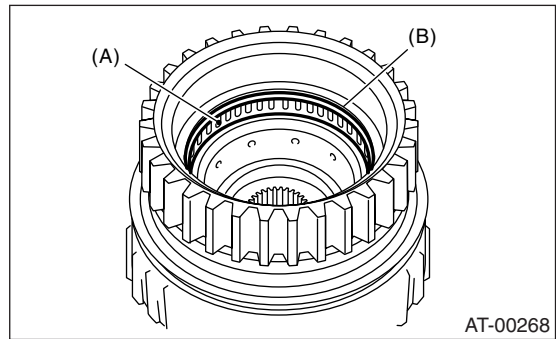
5. ONE-WAY CLUTCH OUTER RACE

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



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

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



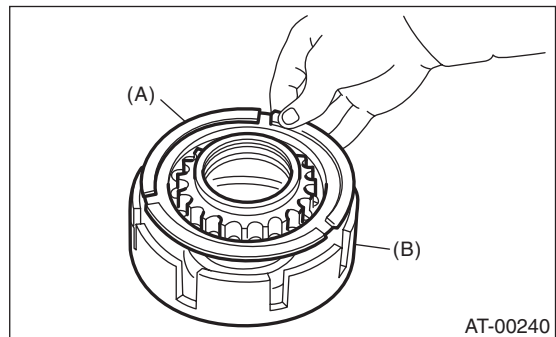
(A) Needle bearing
(B) Snap ring

D: ASSEMBLY

1. HIGH CLUTCH, REVERSE CLUTCH

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

2) Install high clutch piston to reverse clutch piston.

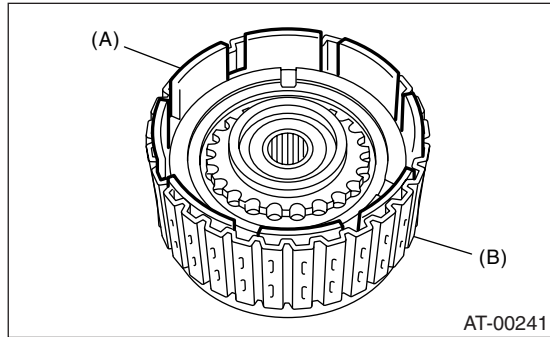


(A) High clutch piston
(B) Reverse clutch piston

AT Main Case

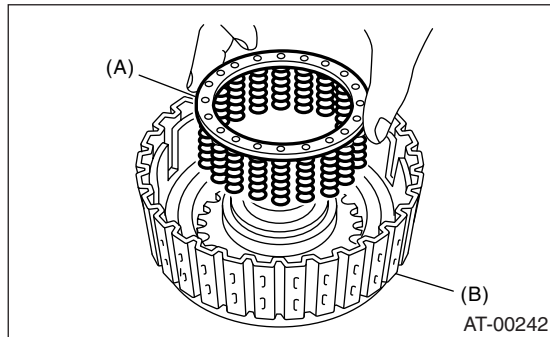
AUTOMATIC TRANSMISSION

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.



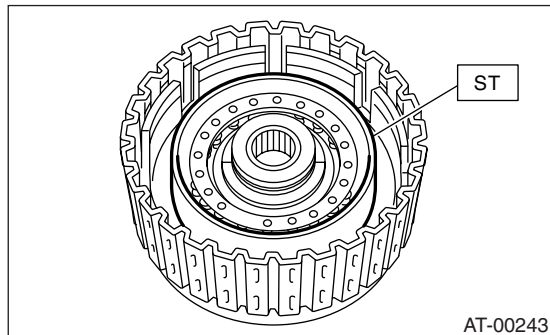
- (A) Reverse clutch piston
- (B) High clutch drum

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 GUIDE

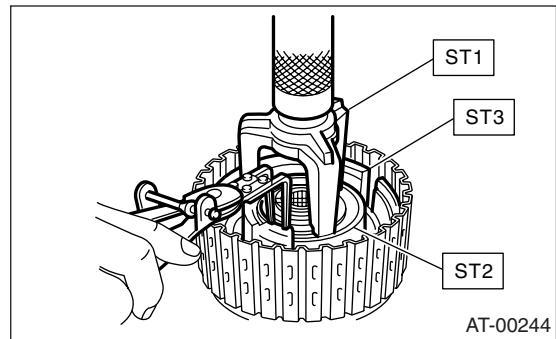


6) Avoid folding the high clutch piston seal, when installing the cover to high clutch piston.

7) Using ST1 and ST2, install snap ring.

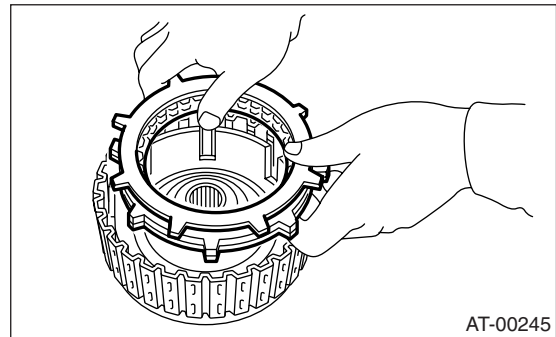
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT

ST3 498437000 HIGH CLUTCH PISTON GUIDE



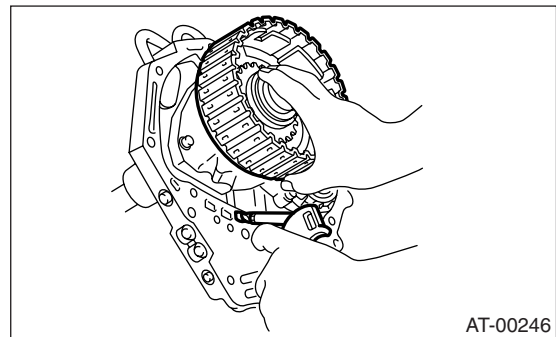
8) Selection of high clutch retaining plate (Turbo model)

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



(2) Install snap ring to high clutch drum.

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

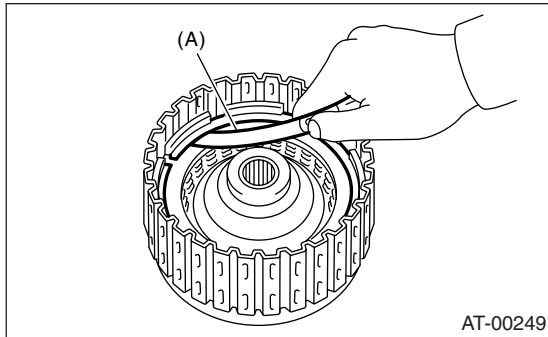


(4) Measure the clearance between the retaining plate and snap ring. (High clutch) At this time, do not press down retaining plate.

Initial standard:

0.8 — 1.1 mm (0.031 — 0.043 in)

Limit thickness:
1.5 mm (0.059 in)



(A) Thickness gauge

If specified tolerance limits are exceeded, select a suitable high clutch retaining plate. If it exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.

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)

9) Selection of high clutch retaining plate (Non-turbo model)

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

NOTE:

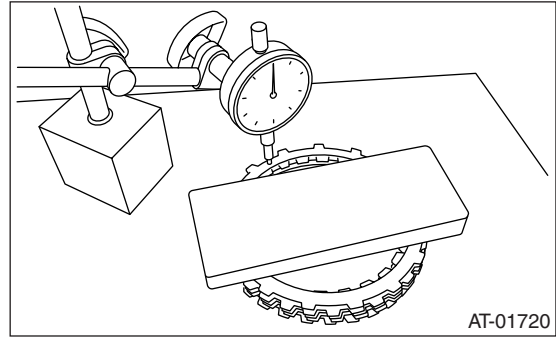
The value, which is read in the gauge at this time, is zero point.

- (3) Scale and record the weight Z of a flat board which will be put on plates.

NOTE:

- Use a stiff flat board which does not bend against load.
- Use a flat board of its weight less than 25.5 kg (56.2 lb).

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



- (5) Using the following formula, calculate N indicated on the push/pull gauge.

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

N: Value indicated on push/pull gauge

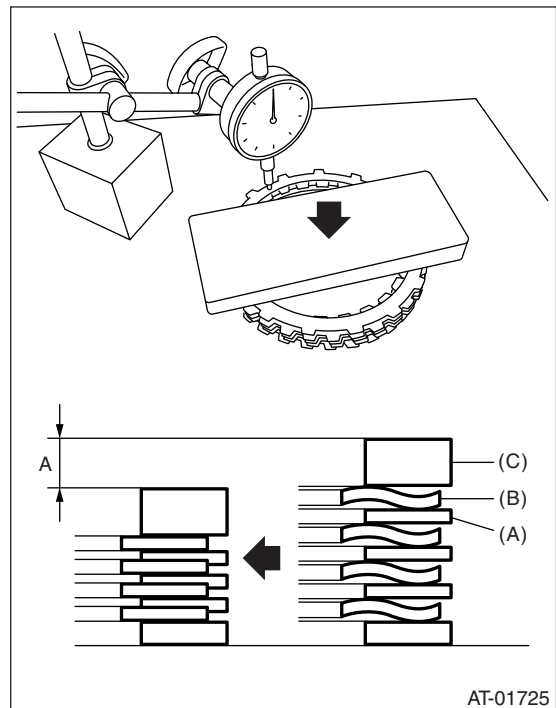
250 N (25.5 kgf, 56.2 lb): Load applied to clutch plate

Z: Flat board weight

- (6) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height "A". Make more than three measurements at even distance and take the average value.

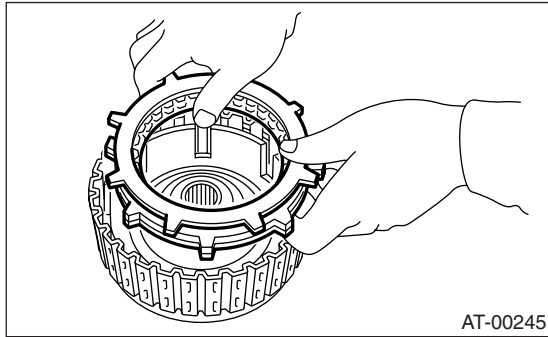
NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.

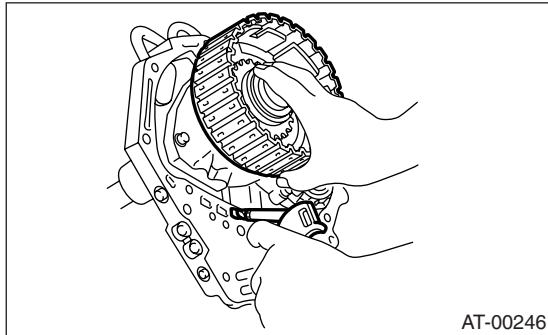


- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate

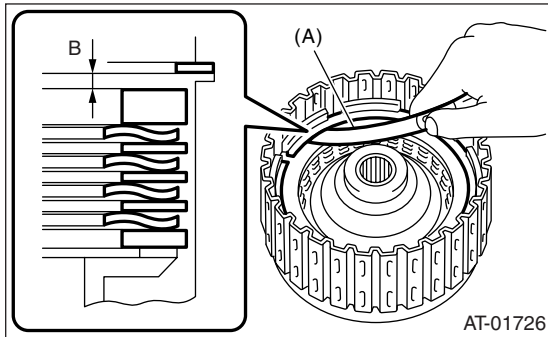
- (7) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.



- (8) Install the snap ring to high clutch drum.
(9) Apply compressed air intermittently to check for operation.



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



(A) Thickness gauge

- (11) Piston stroke calculation
Select the retaining plate within the specification by calculating with "A" and "B" dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

Initial standard:

2.0 — 2.3 mm (0.079 — 0.091 in)

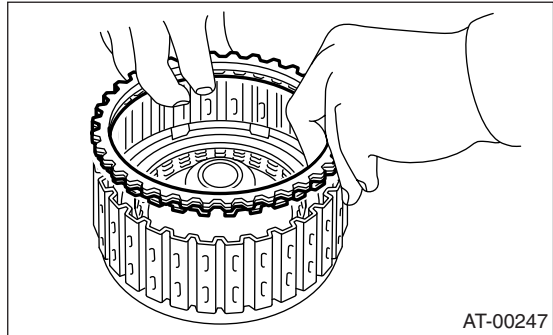
Limit thickness:

2.6 mm (0.102 in)

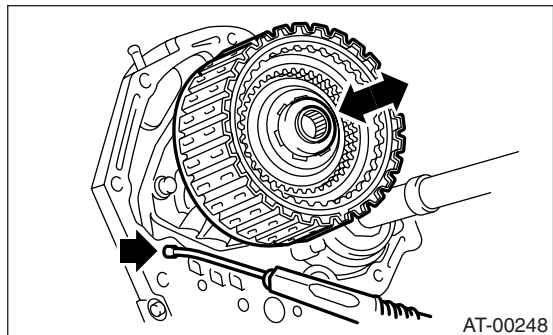
High clutch retaining plate	
Part number	Thickness mm (in)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)
31567AA710	5.5 (0.217)
31567AA720	5.6 (0.220)
31567AA730	5.7 (0.224)
31567AA740	5.8 (0.228)

- 10) Selection of reverse clutch retaining plate (Turbo model)

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



- (2) Apply compressed air intermittently to check for operation.

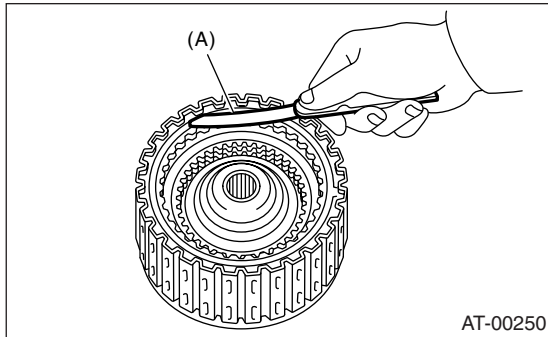


- (3) Measure the clearance between the retaining plate and snap ring. (Reverse clutch) At this time, do not press down retaining plate.

Initial standard:

0.5 — 0.8 mm (0.020 — 0.031 in)

Limit thickness:
1.2 mm (0.047 in)



(A) Thickness gauge

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

If it exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.

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

11) Selection of reverse clutch retaining plate (Non-turbo model)

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

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

NOTE:

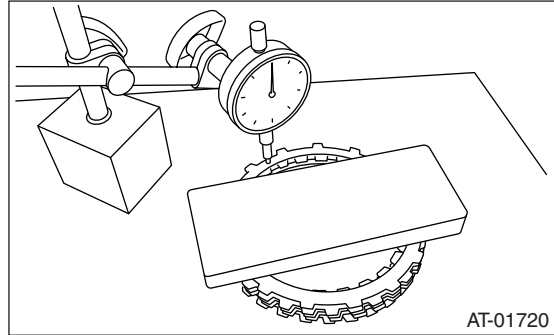
The value, which is read in the gauge at this time, is zero point.

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

NOTE:

- Use a stiff flat board which does not bend against load.
- Use a flat board of its weight less than 15.3 kg (33.7 lb).

(4) Put the flat board on retaining plate.



(5) Using the following formula, calculate N indicated on the push/pull gauge.

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

N: Value indicated on push/pull gauge

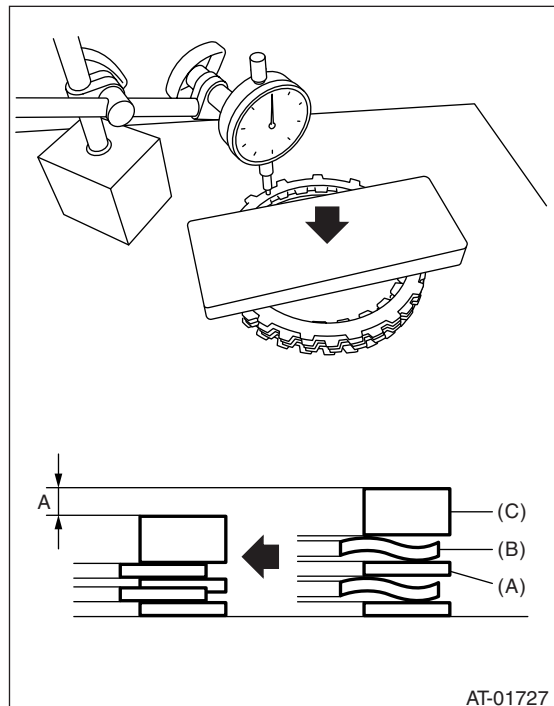
150 N (15.3 kgf, 33.7 lb): Load applied to clutch plate

Z: Flat board weight

(6) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height "A". Make more than three measurements at even distance and take the average value.

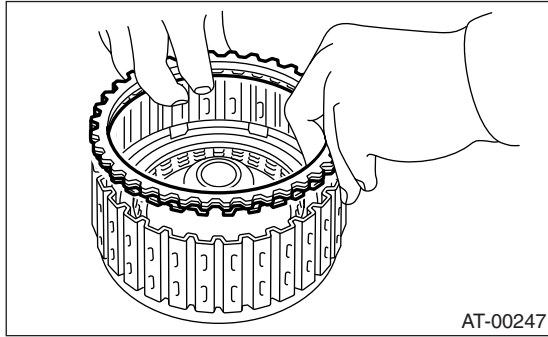
NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.

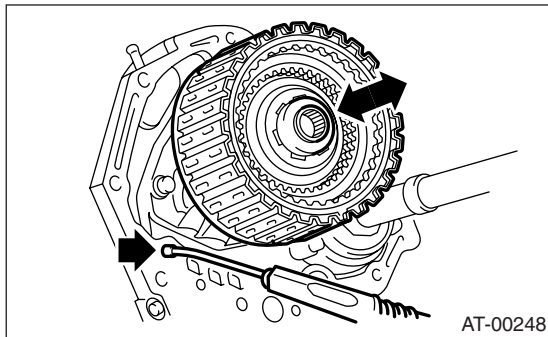


- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate

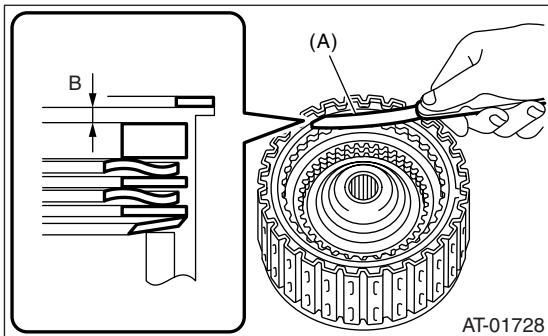
- (7) Install the driven plate, drive plate, retaining plate and snap ring.



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



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



(A) Thickness gauge

- (10) Piston stroke calculation

Select the retaining plate within the specification by calculating with "A" and "B" dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

Initial standard:

1.1 — 1.4 mm (0.043 — 0.055 in)

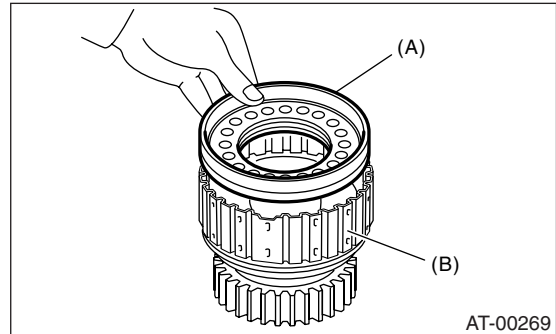
Limit thickness:

1.6 mm (0.063 in)

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

2. PLANETARY GEAR, LOW CLUTCH

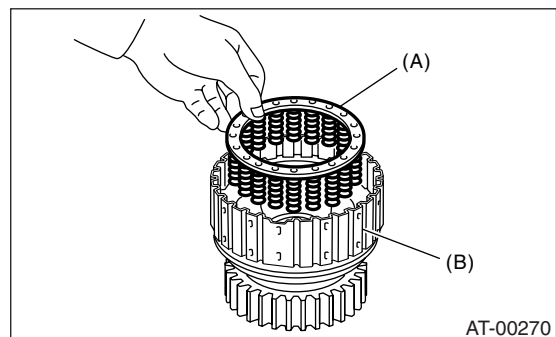
- 1) Install D-ring to low clutch piston.
- 2) Fit the low clutch piston to the low clutch drum.



(A) Low clutch piston

(B) Low clutch drum

- 3) Install spring retainer to low clutch piston.

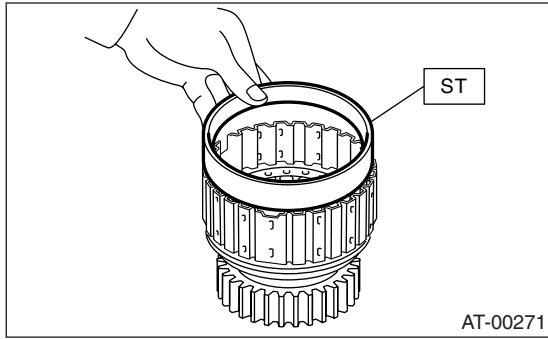


(A) Spring retainer

(B) Low clutch drum

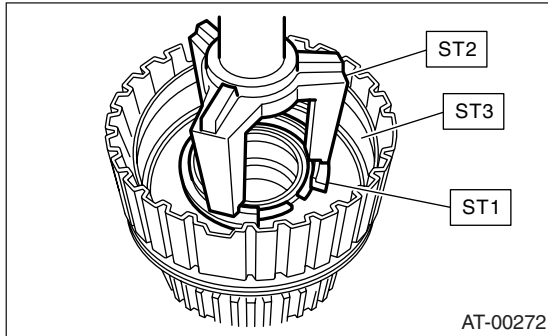
- 4) Install ST to low clutch drum.

ST 498437100 LOW CLUTCH PISTON GUIDE

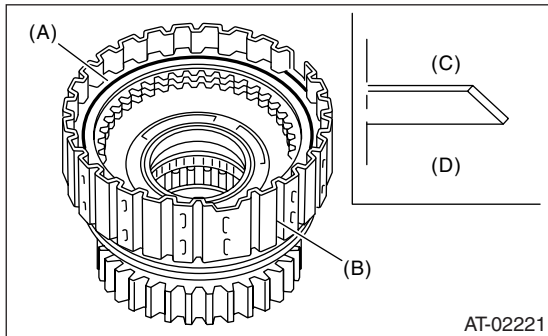


5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold cover seal during installation.

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



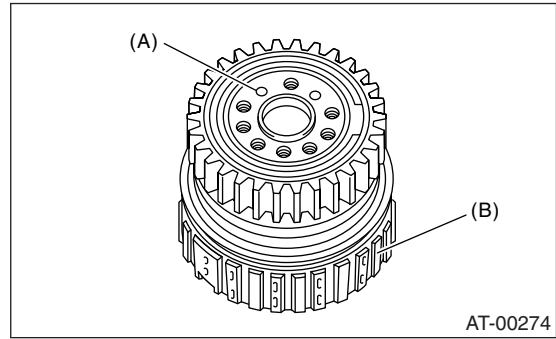
6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.



- (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 4AT-119, REMOVAL, AT Main Case.>

(2) Set the one-way clutch inner race, and apply compressed air for checking.

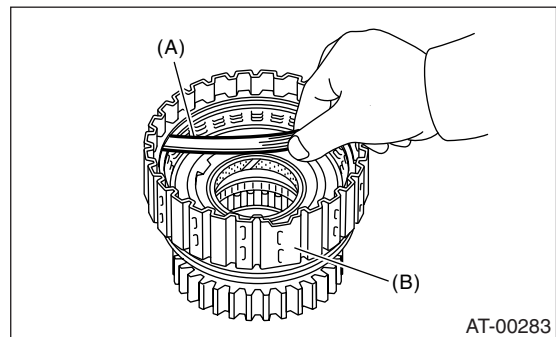


- (A) Apply compressed air.
- (B) Low clutch drum

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

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

Limit thickness:
1.6 mm (0.063 in)



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

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

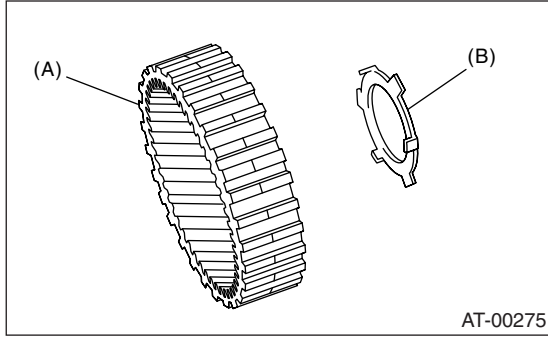
If it exceeds the service limit, replace the drive plate with a new one and adjust it to the specification.

Available retaining plate	
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)

AT Main Case

AUTOMATIC TRANSMISSION

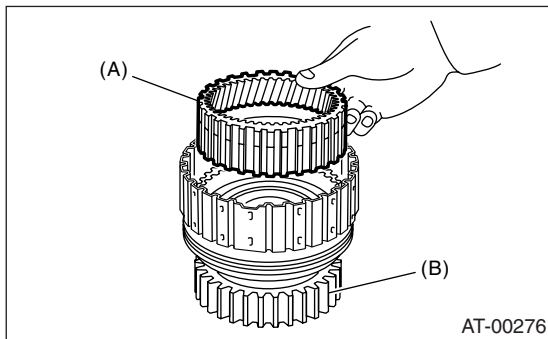
9) Install washer to rear internal gear.



(A) Rear internal gear

(B) Washer

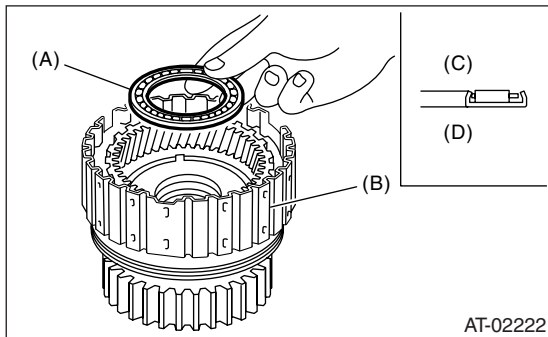
10) Install rear internal gear.



(A) Rear internal gear

(B) Low clutch drum

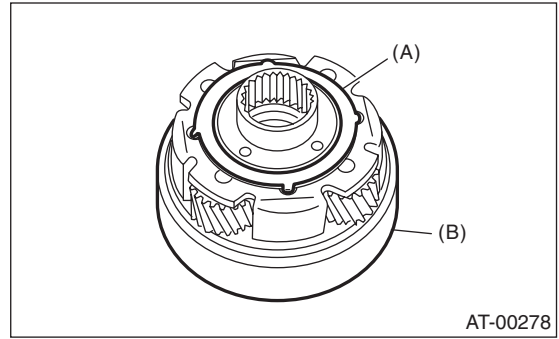
11) Install thrust needle bearing in the correct direction.



(A) Thrust needle bearing

(B) Low clutch drum

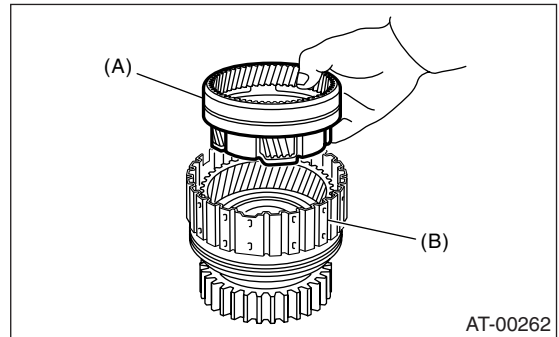
12) Install the washer by aligning protrusion of washer and hole of rear planetary carrier.



(A) Washer

(B) Rear planetary carrier

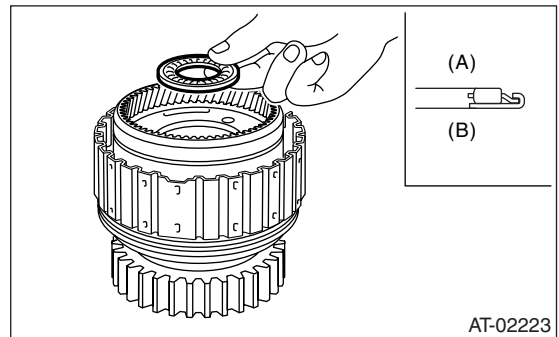
13) Install rear planetary carrier to low clutch drum.



(A) Rear planetary carrier

(B) Low clutch drum

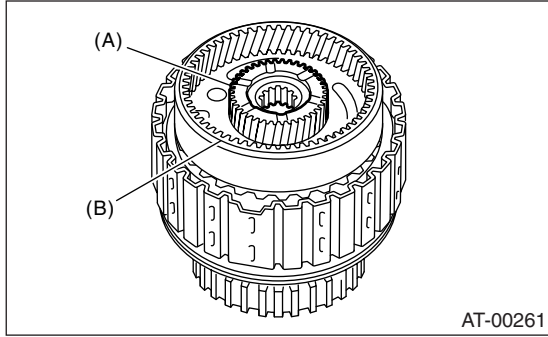
14) Install thrust needle bearing in the correct direction.



(A)

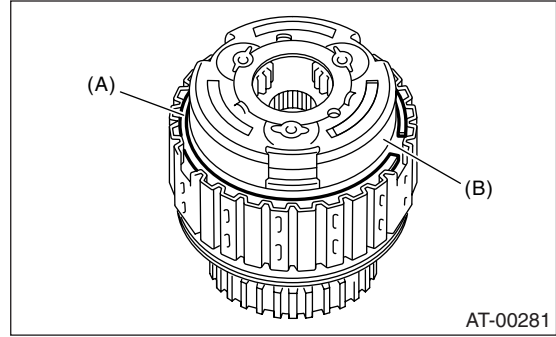
(B)

15) Install the rear sun gear in proper direction.



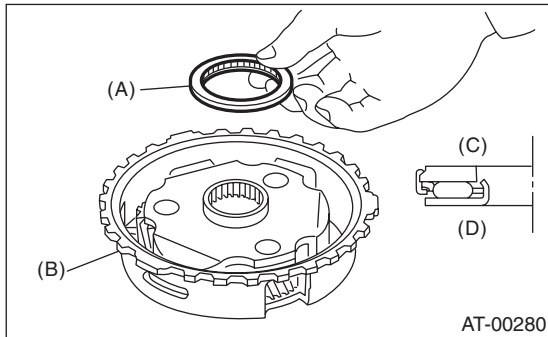
- (A) Rear sun gear
- (B) Rear planetary carrier

18) Install snap ring to low clutch drum.



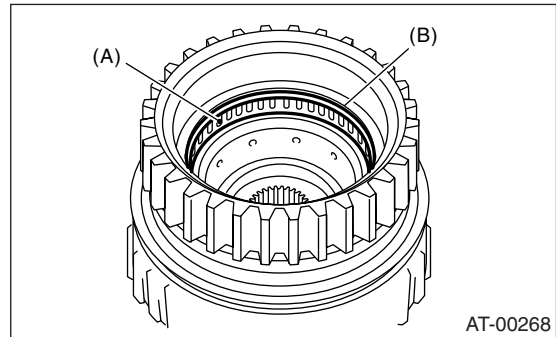
- (A) Snap ring
- (B) Front planetary carrier

16) Install the thrust needle bearing in proper direction.



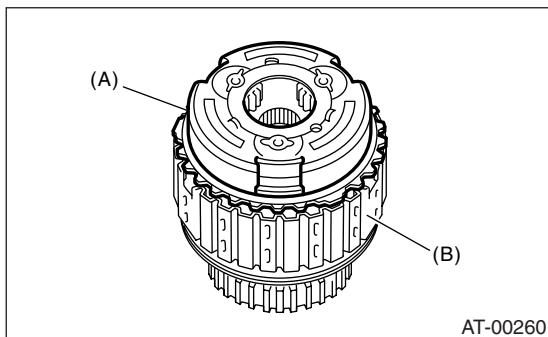
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

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



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

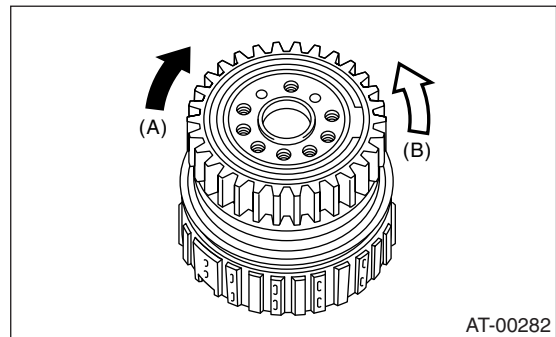
17) Install front planetary carrier to low clutch drum.



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

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

21) Set the inner race. Make sure that the clutch is locked in the clockwise direction and free in the counterclockwise direction.

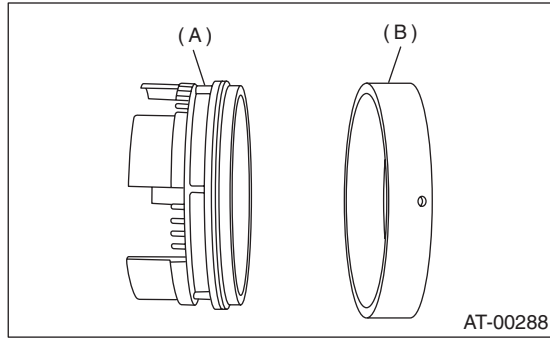


- (A) Locked
- (B) Free

3. 2-4 BRAKE

1) Apply ATF to new D-ring, and install it to 2-4 brake piston.

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

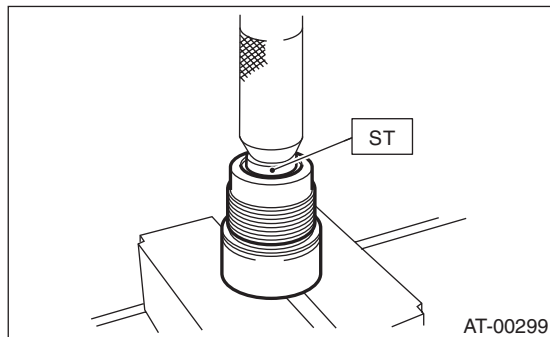


(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

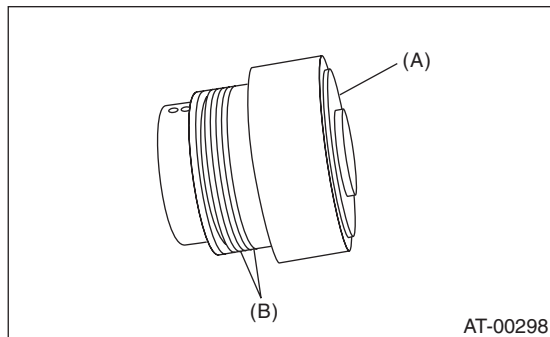
1) Using a press and ST, install the needle bearing to the inner race.

ST 398497701 INSTALLER



2) Apply vaseline to the groove of the inner race and to the seal ring.

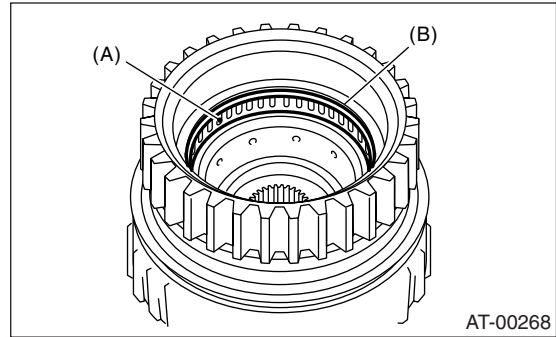
3) Install two seal rings to one-way clutch inner race.



(A) One way clutch inner race
(B) Seal rings

5. ONE-WAY CLUTCH OUTER RACE

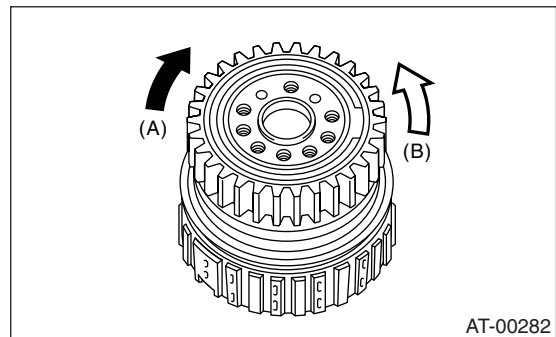
1) Install the needle bearing, and secure with the snap ring.



(A) Needle bearing
(B) Snap ring

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

3) Set the inner race. Make sure that the clutch is locked in the clockwise direction and free in the counterclockwise direction.



(A) Locked
(B) Free

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Inspect the following items.

- Drive plate facing for wear and damage
- Discoloration of driven plate (Burnt color)
- 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 4AT-107, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Inspect the following items.

- Drive plate facing for wear and damage
- Discoloration of driven plate (Burnt color)
- 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 4AT-107, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Inspect the following items.

- Drive plate facing for wear and damage
- Discoloration of driven plate (Burnt color)
- 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 4AT-107, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- 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 4AT-107, ADJUSTMENT, Oil Pump Housing.>

5. LOW & REVERSE BRAKE

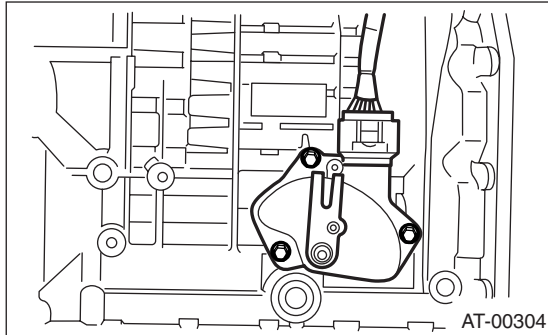
Check for the following.

- Drive plate facing for wear or damage
- Discoloration of driven plate (Burnt color)
- Snap ring for wear and spring retainer for deformation

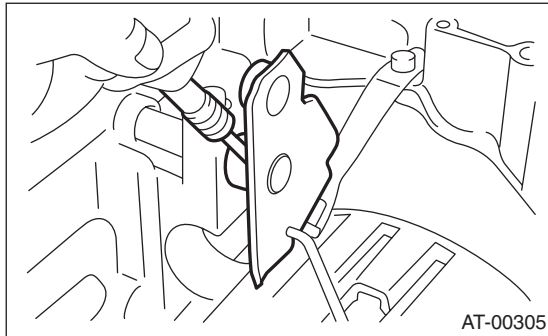
40. Transmission Control Device

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-42, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-81, 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 hoses. <Ref. to 4AT-79, 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.



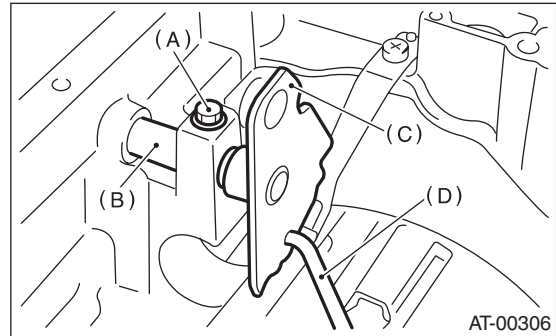
- 10) Remove control valve body assembly. <Ref. to 4AT-61, REMOVAL, Control Valve Body.>
- 11) Pull off the straight pin of manual plate.



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

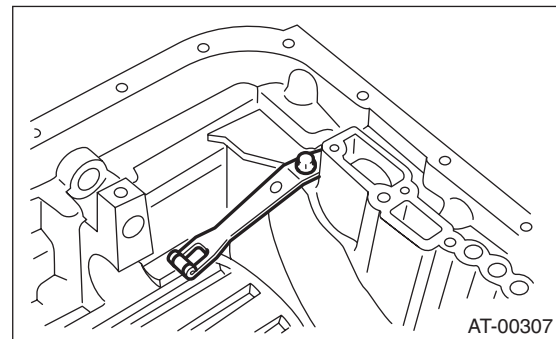
NOTE:

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.

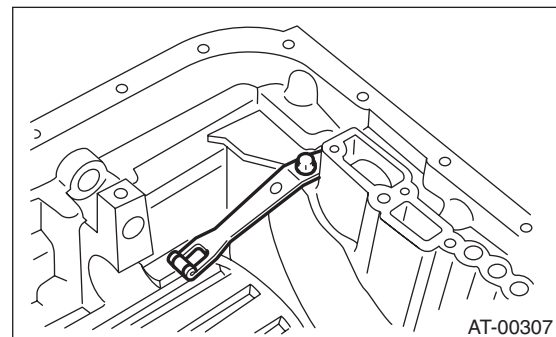


B: INSTALLATION

- 1) Install detention spring to transmission case.

Tightening torque:

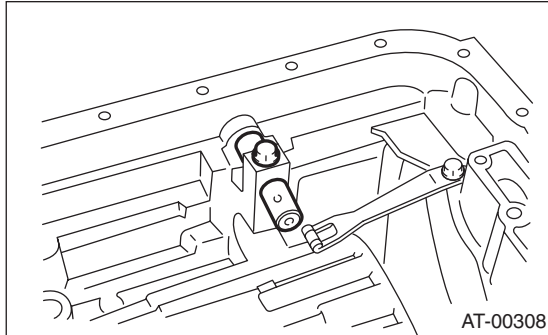
6 N·m (0.6 kgf-m, 4.3 ft-lb)



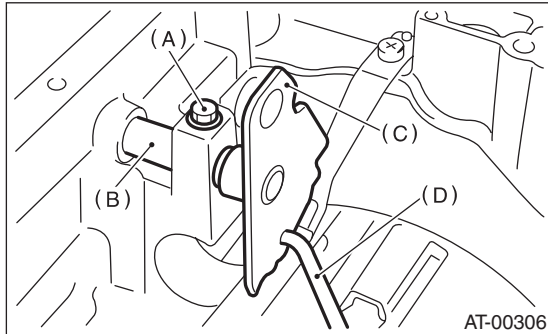
- 2) Insert range select lever, and tighten bolt.

Tightening torque:

6 N·m (0.6 kgf-m, 4.3 ft-lb)

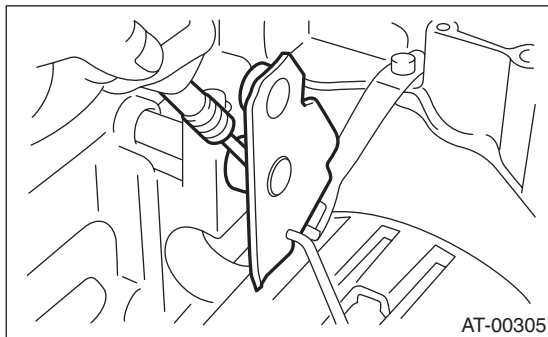


3) Install the manual plate and parking rod.



- (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 4AT-62, INSTALLATION, Control Valve Body.>

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

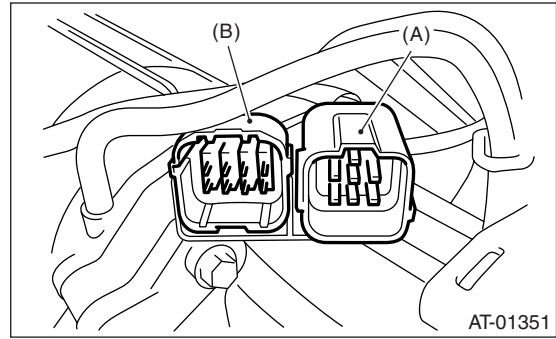
7) Install pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf-m, 30 ft-lb)

8) Install inhibitor switch and adjust the inhibitor switch. <Ref. to 4AT-52, Inhibitor Switch.>

9) Insert inhibitor switch and transmission connector into stay.



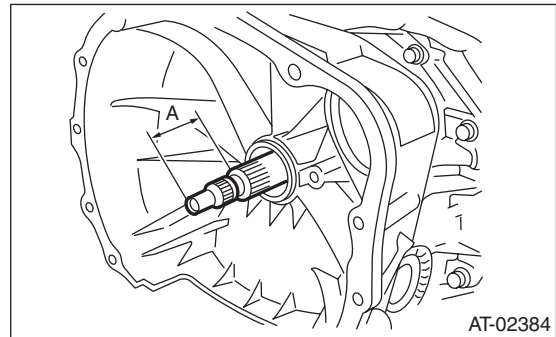
- (A) Transmission harness
- (B) Inhibitor switch harness

10) Install air breather hose. <Ref. to 4AT-79, INSTALLATION, Air Breather Hose.>

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

Normal protrusion amount A:

50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-81, INSTALLATION, Torque Converter Clutch Assembly.>

13) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

Transmission Control Device

AUTOMATIC TRANSMISSION

**AUTOMATIC TRANSMISSION
(DIAGNOSTICS)
H4SO (non-turbo)**

Basic Diagnostic Procedure

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

1. Basic Diagnostic Procedure

A: PROCEDURE

NOTE:

This section is specified for H4SO engine model.

Step	Check	Yes	No
1 CHECK PRE-INSPECTION. 1) Ask the customer when and how trouble occurred using interview checklist. <Ref. to 4AT(D)(diag)-4, Check List for Interview.> 2) Before performing the diagnosis, inspect following items which might influence the AT problems. • General inspection <Ref. to 4AT(D)(diag)-5, INSPECTION, General Description.> • Oil leak • Stall speed test <Ref. to 4AT-35, Stall Test.> • Line pressure test <Ref. to 4AT-38, Line Pressure Test.> • Transfer clutch pressure test <Ref. to 4AT-40, Transfer Clutch Pressure Test.> • Time lag test <Ref. to 4AT-37, Time Lag Test.> • Road test <Ref. to 4AT-34, Road Test.> • Inhibitor switch <Ref. to 4AT-52, Inhibitor Switch.>	Is the item that might influence AT problem 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 illuminate?	Go to step 4.	Go to step 3.
3 CHECK AT OIL TEMP WARNING LIGHT. 1) Turn the ignition switch to OFF. 2) Repair the AT OIL TEMP warning light circuit or power supply and ground line circuit. <Ref. to 4AT(D)(diag)-19, AT OIL TEMP Warning Light Display.> 3) Turn the ignition switch to ON.	Is the AT OIL TEMP warning light illuminate?	Go to step 4.	Go to step 5.
4 CHECK INDICATION OF DTC. Calling up the DTC. <Ref. to 4AT(D)(diag)-16, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of select monitor cannot be executed normally, check the communication circuit. <Ref. to 4AT(D)(diag)-22, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is the DTC displayed?	Go to step 6. NOTE: Record all DTC.	Go to step 5.

Basic Diagnostic Procedure

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 PERFORM THE GENERAL DIAGNOSTICS. 1) Inspect using "Diagnostic Procedure without Diagnostic Trouble Code (DTC)". <Ref. to 4AT(D)(diag)-89, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using "General Diagnostic Table". <Ref. to 4AT(D)(diag)-92, General Diagnostic Table.> 3) Perform the clear memory mode. <Ref. to 4AT(D)(diag)-18, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to 4AT(D)(diag)-17, Inspection Mode.> 5) Calling up the DTC. <Ref. to 4AT(D)(diag)-16, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Complete the diagnosis.	Go to step 6.
6 PERFORM THE DIAGNOSIS. 1) Inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 4AT(D)(diag)-28, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 4AT(D)(diag)-25, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the clear memory mode. <Ref. to 4AT(D)(diag)-18, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to 4AT(D)(diag)-17, Inspection Mode.> 5) Calling up the DTC. <Ref. to 4AT(D)(diag)-16, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Inspect using "Diagnostics Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 4AT(D)(diag)-28, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

Check List for Interview

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. Check List for Interview

A: CHECK

Check the following items when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km/h or miles		
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)		
AT diagnostic indicator light (AT OIL TEMP warning light)	☐ Continuously blinking		☐ Not blinking
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
POWER switch	☐ ON ☐ OFF		
HOLD switch	☐ ON ☐ OFF		
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 TCM.

CAUTION:

- All airbag system wiring harness and connectors are colored yellow. Do not use an 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 ECM, TCM or each sensor, use a tapered pin with 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 (0.026 in).

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

Specific gravity: Above 1.260

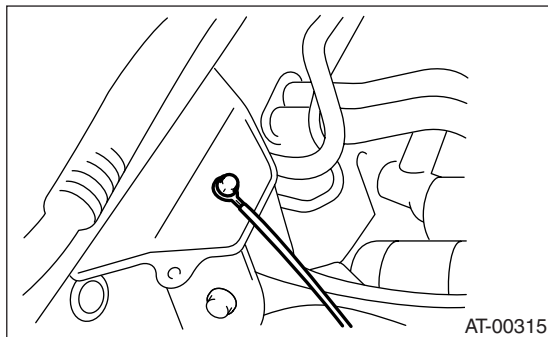
2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

- **Chassis side**

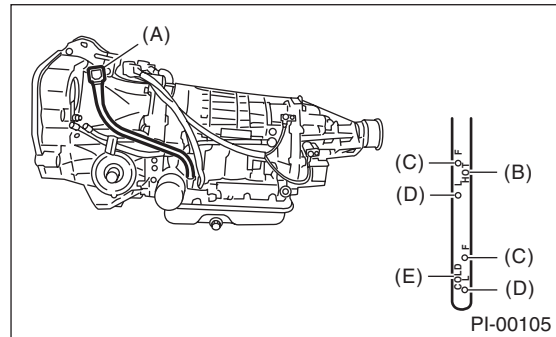
Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

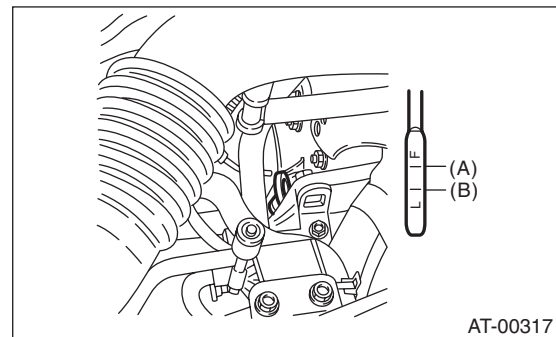
Make sure that ATF level is within the specification. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>



- (A) Level gauge
- (B) “HOT” side
- (C) Upper level
- (D) Lower level
- (E) “COLD” side

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure that front differential oil level is within the specification. <Ref. to 4AT-33, INSPECTION, Differential Gear Oil.>



- (A) Upper level
- (B) Lower level

5. OPERATION OF SELECT LEVER

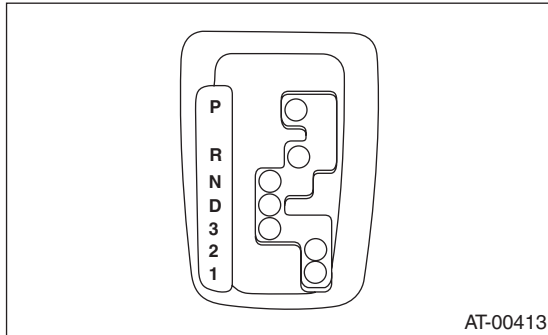
Make sure there is no abnormal noise, dragging or contact pattern in each select lever range.

General Description

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

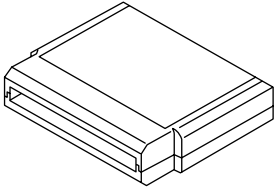
WARNING:

Stop the engine while checking operation of select lever.



C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA260	24082AA260	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA010	22771AA010	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems.

2. GENERAL TOOL

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

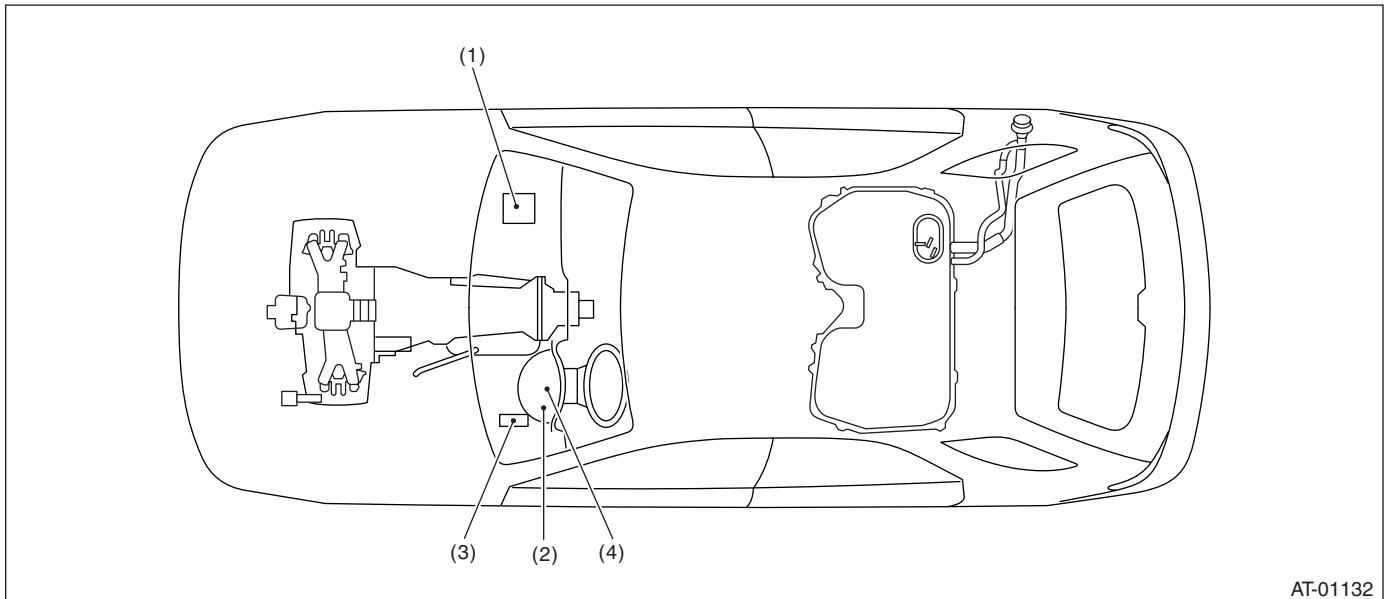
Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

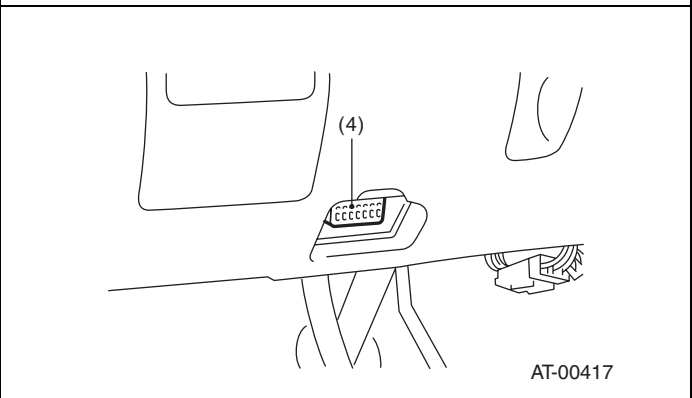
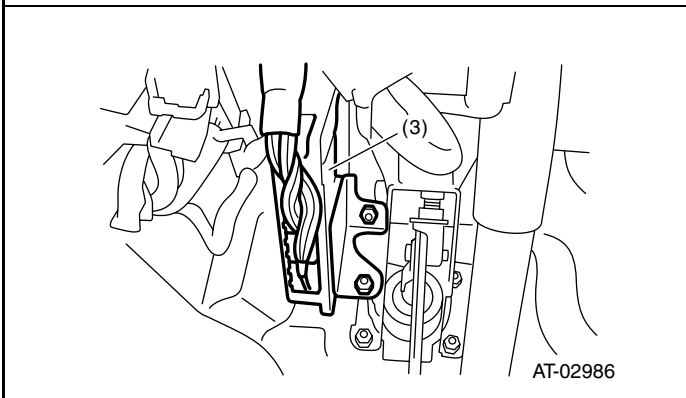
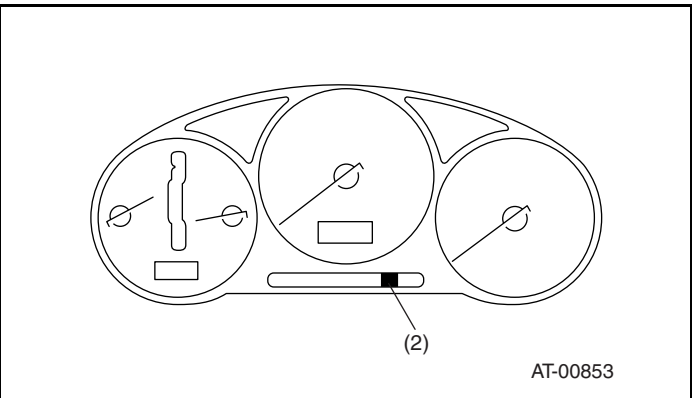
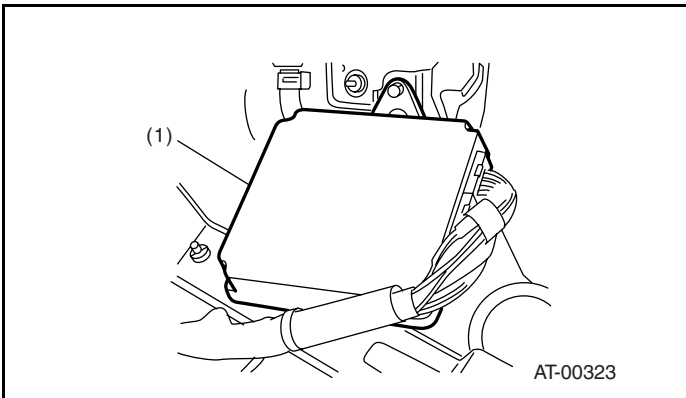
4. Electrical Component Location

A: LOCATION

1. CONTROL MODULE



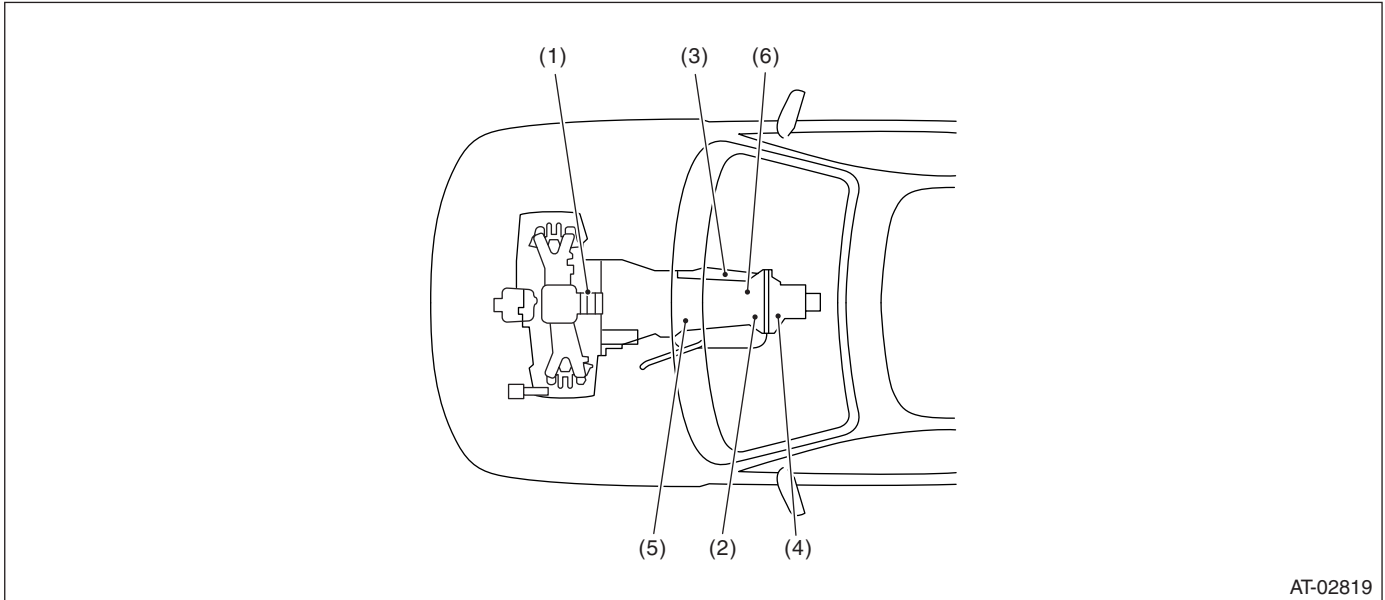
(1) Engine control module (ECM)	(3) Transmission control module (TCM)	(4) Data link connector
(2) AT OIL TEMP warning light (AT warning light)		



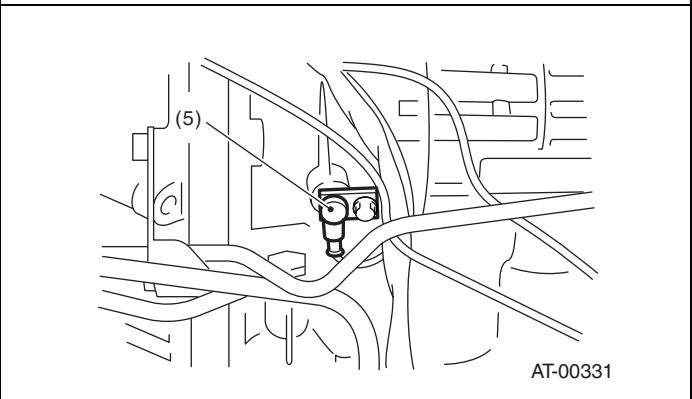
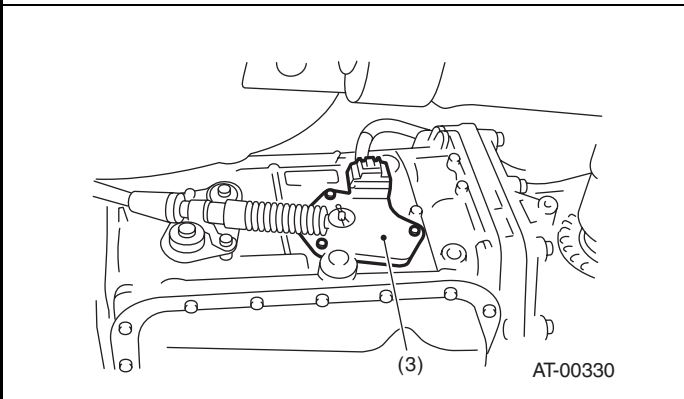
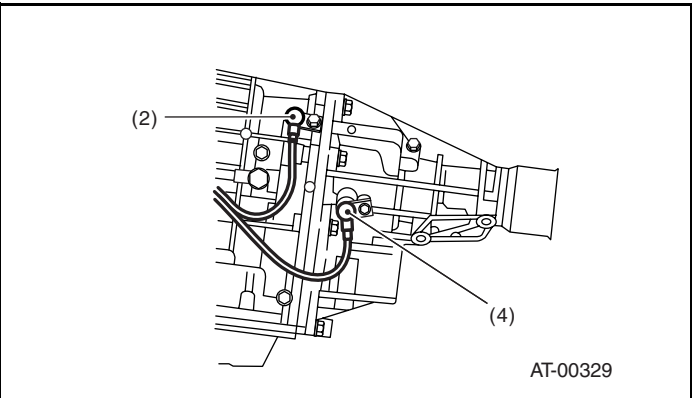
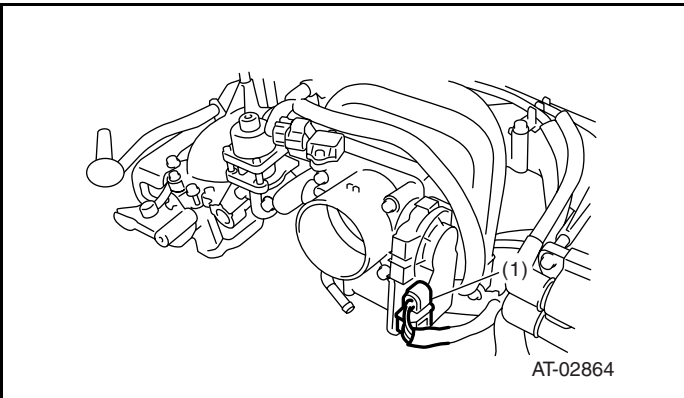
Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. SENSOR

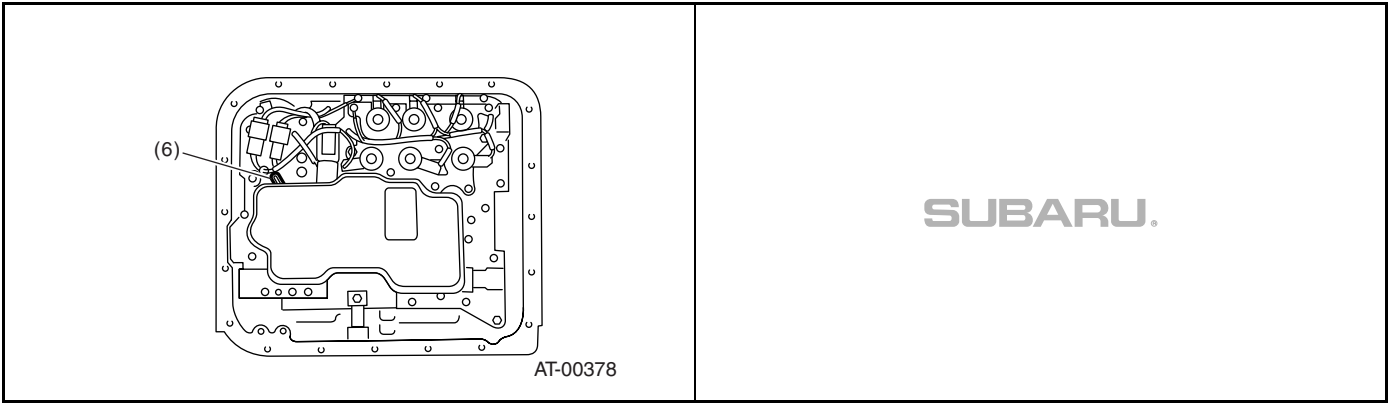


(1) Throttle position sensor	(4) Rear vehicle speed sensor	(6) ATF temperature sensor
(2) Front vehicle speed sensor	(5) Torque converter turbine speed sensor	
(3) Inhibitor switch		

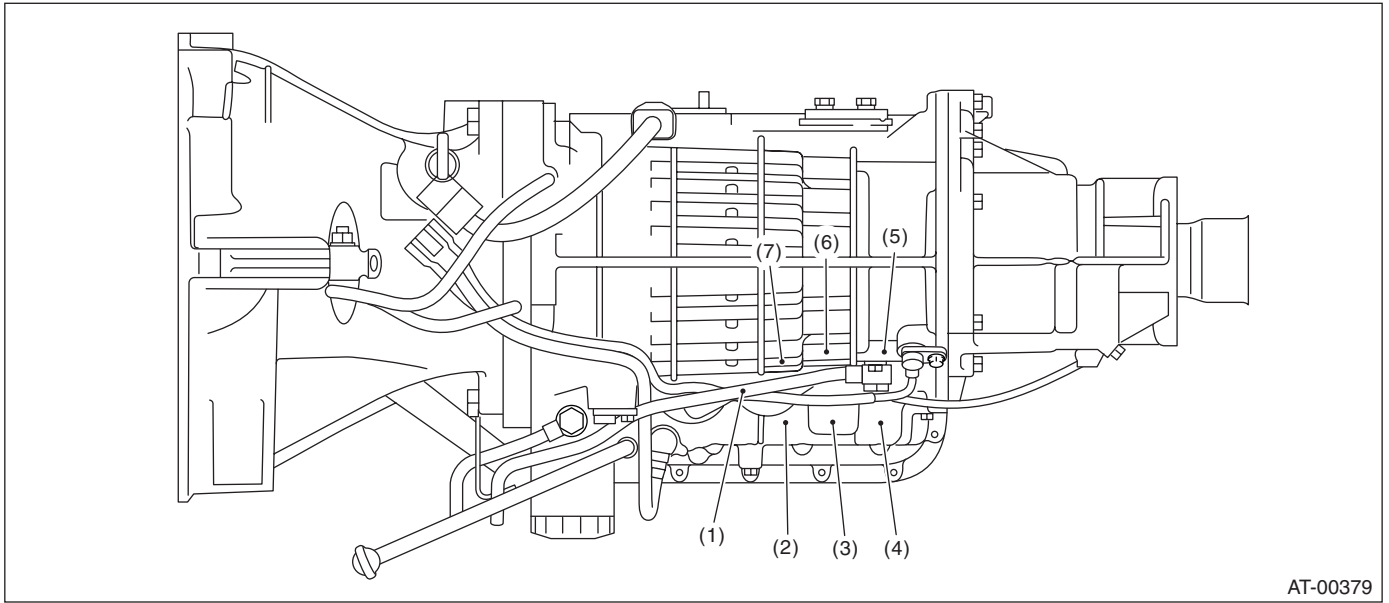


Electrical Component Location

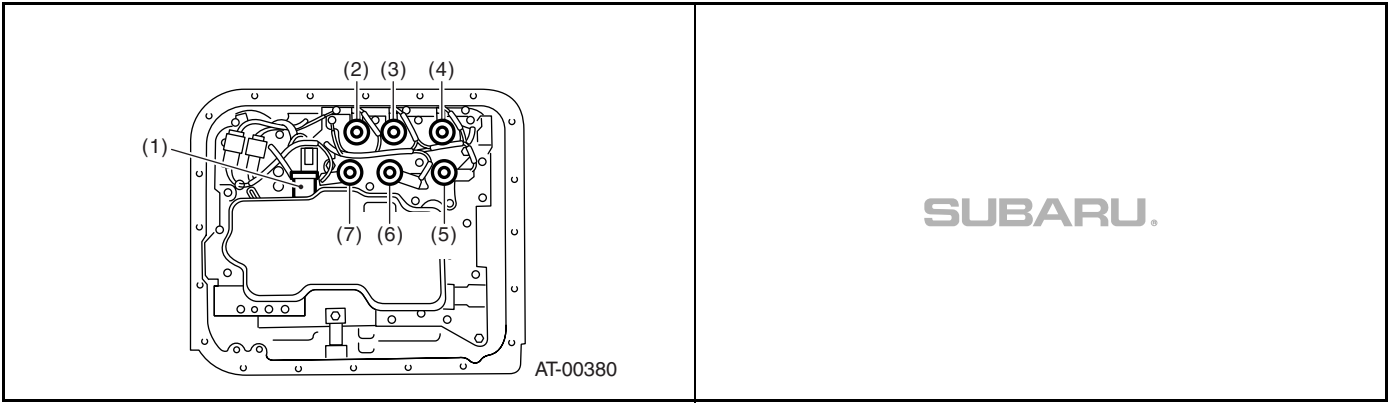
AUTOMATIC TRANSMISSION (DIAGNOSTICS)



3. SOLENOID



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



Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

A: ELECTRICAL SPECIFICATION

To **B54**

6	5	4	3	2	1
12	11	10	9	8	7
17	16	15	14	13	

To **B55**

7	6	5	4	3	2	1
16	15	14	13	12	11	10
24	23	22	21	20	19	18

To **B56**

9	8	7	6	5	4	3	2	1
21	20	19	18	17	16	15	14	13
31	30	29	28	27	26	25	24	23

AT-01107

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (Ω)
Back-up power supply		B56	27	Ignition switch OFF	10 — 13	—
			29			
		B56	28			
ACC power supply		B56	16	Ignition switch ACC	10 — 13	—
Ignition power supply		B56	21	Ignition switch ON (with engine OFF)	10 — 13	—
		B56	31			
Inhibitor switch	“P” range switch	B55	5	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	More than 8	
	“R” range switch	B55	14	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	B54	16	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B54	4	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B54	10	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	20	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	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (Ω)
AT OIL TEMP warning light	B56	13	Light ON	Less than 1	—
			Light OFF	More than 9	
Accelerator pedal position sensor	B55	19	Throttle fully closed.	More than 0.2	—
			Throttle fully open.	Less than 4.6	
Accelerator pedal position sensor power supply	B55	10	Ignition switch ON (with engine OFF)	Approx. 4.6 — 5.4	—
ATF temperature sensor	B55	21	ATF temperature 20°C (68°F)	3.5 — 4.3	3.9 k — 4.7 k
			ATF temperature 80°C (176°F)	1.5 — 1.9	300 — 800
Rear vehicle speed sensor	B55	24	Vehicle speed at least 20 km/h (12 MPH)	More than 2 (AC range)	—
Front vehicle speed sensor	B55	6	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	7	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	1	Vehicle speed at least 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Engine speed signal	B55	13	Ignition switch ON (with engine OFF)	Less than 1	—
			Ignition switch ON (with engine ON)	More than 5 (AC range)	
Line pressure linear solenoid	B56	20	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up. ("R" range)	3.7 — 7.5	4.0 — 8.0
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up. ("R" range)	1.0 — 5.1	
Lock-up duty solenoid	B56	5	When lock up occurs.	More than 10.5	2.0 — 6.0
			When lock up is released.	Less than 1	
Transfer duty solenoid	B56	4	"P" or "N" range	Less than 1	2.0 — 6.0
			Select lever in 1st gear.	1.7 — 4.0	
2-4 brake duty solenoid	B56	6	"P" or "N" range	More than 10.5	2.0 — 6.0
			2nd or 4th gear	Less than 1	
High clutch duty solenoid	B56	8	3rd or 4th gear	Less than 1	2.0 — 6.0
			"P" or "N" range	More than 10.5	
Low clutch duty solenoid	B56	9	1st or 2nd gear	Less than 1	2.0 — 6.0
			"P" or "N" range	More than 10.5	
Low & reverse duty solenoid	B56	7	"P" or "N" range	More than 10.5	2.0 — 6.0
			"1" range	5 — 10	
Front vehicle speed sensor ground	B55	15	—	0	Less than 1
Rear vehicle speed sensor ground	B55	23	—	0	Less than 1

Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

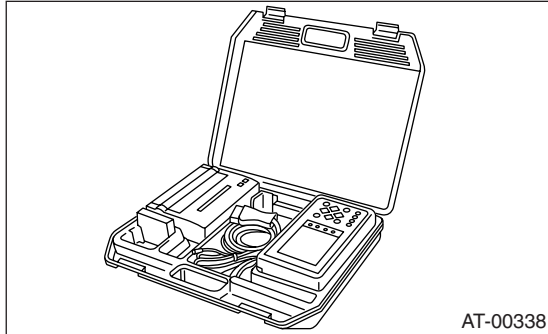
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (Ω)
System ground line	B55	17	—	0	Less than 1
	B56	2			
	B56	3			
	B55	8			
Torque converter turbine speed sensor ground	B55	16	—	0	Less than 1
Sensor ground line 4	B55	9	—	0	Less than 1
Range lock signal	B56	18	“D” range 0 km/h (0 mile)	More than 10.5	20 — 40
			“D” range 20 km/h (12 mile/h)	Less than 1	
Data link signal (Subaru Select Monitor)	B54	2	—	—	—
FWD switch	B56	17	Fuse removed	9.5	—
			Fuse installed	Less than 1	
AWD indicator light	B56	14	FWD switch fuse installed	Less than 1	—
			FWD switch fuse removed	More than 9	
CAN communication signal (+)	B55	3	Ignition switch ON	Pulse signal	—
CAN communication signal (–)	B55	12	Ignition switch ON	Pulse signal	—

6. Subaru Select Monitor

A: OPERATION

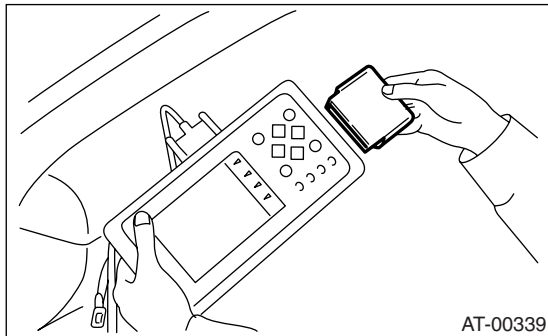
1. READ DIAGNOSTIC TROUBLE CODE

1) Prepare the Subaru Select Monitor kit.



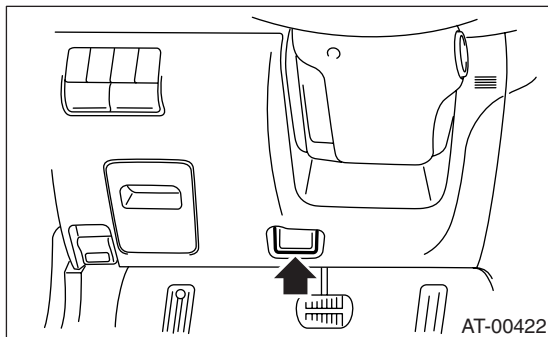
2) Connect the diagnosis cable to Subaru Select Monitor.

3) Insert the cartridge into Subaru Select Monitor.
<Ref. to 4AT(D)(diag)-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 instrument panel (on driver's side).

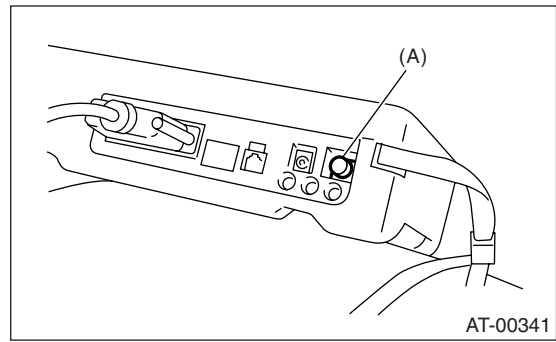


(2) Connect the diagnosis cable to data link connector.

NOTE:

Do not connect scan tools except for Subaru Select Monitor.

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 the information of transmission type is displayed.

9) On the «Transmission Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

- For details concerning the DTC, refer to the DTC LIST. <Ref. to 4AT(D)(diag)-25, 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 the information of transmission type is displayed.

4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.

5) On the «Transmission Diagnosis» display screen, select the {Data Display} and press the [YES] key.

Subaru Select Monitor

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

6) Using the scroll key, move the display screen up or down until desired data is shown.

- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
ATF temperature signal	ATF Temp.	°C or °F
Throttle position sensor	Throttle Sensor Voltage	V
Throttle position	Throttle opening angle	%
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 Power	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Low clutch duty ratio	L/C Duty	%
High clutch duty ratio	H/C Duty	%
Low & reverse brake duty ratio	L&R/B Duty	%
Stop light switch signal	Stop Light Switch	ON or OFF
Parking range signal	P Range Signal	ON or OFF
Neutral range signal	N Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
AT diagnosis indicator lamp	Diagnosis Lamp	ON or OFF
Shift lock solenoid signal	Shift Lock solenoid	ON or OFF
FWD switch signal	FWD SW	ON or OFF
Cruise control On signal	Cruise Control Signal	ON or OFF
AT OIL TEMP warning light	AT OIL TEMP light	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 the information of transmission type is displayed.
- 4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
- 5) When the “Done” is shown on 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.
- When {Clear Memory 2} is selected and executed, DTC and learned control memory is cleared. If Clear Memory 2 is performed, execute the learning control. <Ref. to 4AT(D)(diag)-15, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

4. FACILITATION OF LEARNING CONTROL

- 1) Shift the select lever to "P" range, and apply parking brake.
- 2) Lift-up the vehicle.
- 3) Connect the Subaru Select Monitor to data link connector, and then turn the ignition switch to ON.
- 4) Perform the {Clear Memory 2} using Subaru Select Monitor. <Ref. to 4AT(D)(diag)-14, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
- 5) Using Subaru Select Monitor, check that the DTC is not output. <Ref. to 4AT(D)(diag)-13, READ DIAGNOSTIC TROUBLE CODE, OPERATION, Subaru Select Monitor.>
- 6) Warm-up the engine until the ATF temperature which is displayed on the Subaru Select Monitor is within 60 — 90°C (140 — 194°F). <Ref. to 4AT(D)(diag)-13, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
- 7) Shift the select lever to "R" range.
- 8) Turn all switches including headlight, air conditioner, seat heater, rear defogger and etc. to OFF.
- 9) Turn the ignition switch to OFF.
- 10) Depress the brake pedal fully until the facilitation of learning control is completed when the "Communication Failed!" is displayed on Subaru Select Monitor.
- 11) Turn the ignition switch to ON.
- 12) Read the current data to check that the Subaru Select Monitor is returned to normal operation. <Ref. to 4AT(D)(diag)-13, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
- 13) Shift the select lever to "P" range, and then wait for more than 3 seconds.
- 14) Shift the select lever to "R" range, and then wait for more than 3 seconds.
- 15) Shift the select lever to "N" range, and then wait for more than 3 seconds.
- 16) Shift the select lever to "D" range, and then wait for more than 3 seconds.
- 17) Shift the select lever to "N" range, and then wait for more than 3 seconds.
- 18) Slowly depress the accelerator pedal fully.
- 19) Slowly release the accelerator pedal fully.
- 20) Start the engine, and idle it.
- 21) Shift the select lever to "D" range.
- 22) Start the facilitation of learning control. At this time, the AT OIL TEMP warning light in combination meter blinks at 2 Hz. When the AT OIL TEMP warning light does not blink, turn the ignition switch to OFF and repeat the procedures from step 4). When the AT OIL TEMP warning light which blinking at 2 Hz changes to blink at 0.5 Hz, facilitation of learning control is completed.

NOTE:

When blinking of AT OIL TEMP warning light changes from 2 Hz to 4 Hz during facilitation of learning control, repeat the procedure from step 4).

23) Shift the select lever to "N" range, and then turn the ignition switch to OFF.

24) Shift the select lever to the "P" range, and then complete the facilitation of learning control.

Read Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to Subaru Select Monitor for information about how to obtain and understand DTC. <Ref. to 4AT(D)(diag)-13, OPERATION, Subaru Select Monitor.>

NOTE:

DTC can not be read through AT OIL TEMP warning light.

8. Inspection Mode

A: OPERATION

WARNING:

Observe the road traffic law.

Move the select lever to “D” range, and then drive the vehicle at 60 km/h (37 MPH) for at least 10 seconds.

9. Clear Memory Mode

A: OPERATION

1. WITH SUBARU SELECT MONITOR

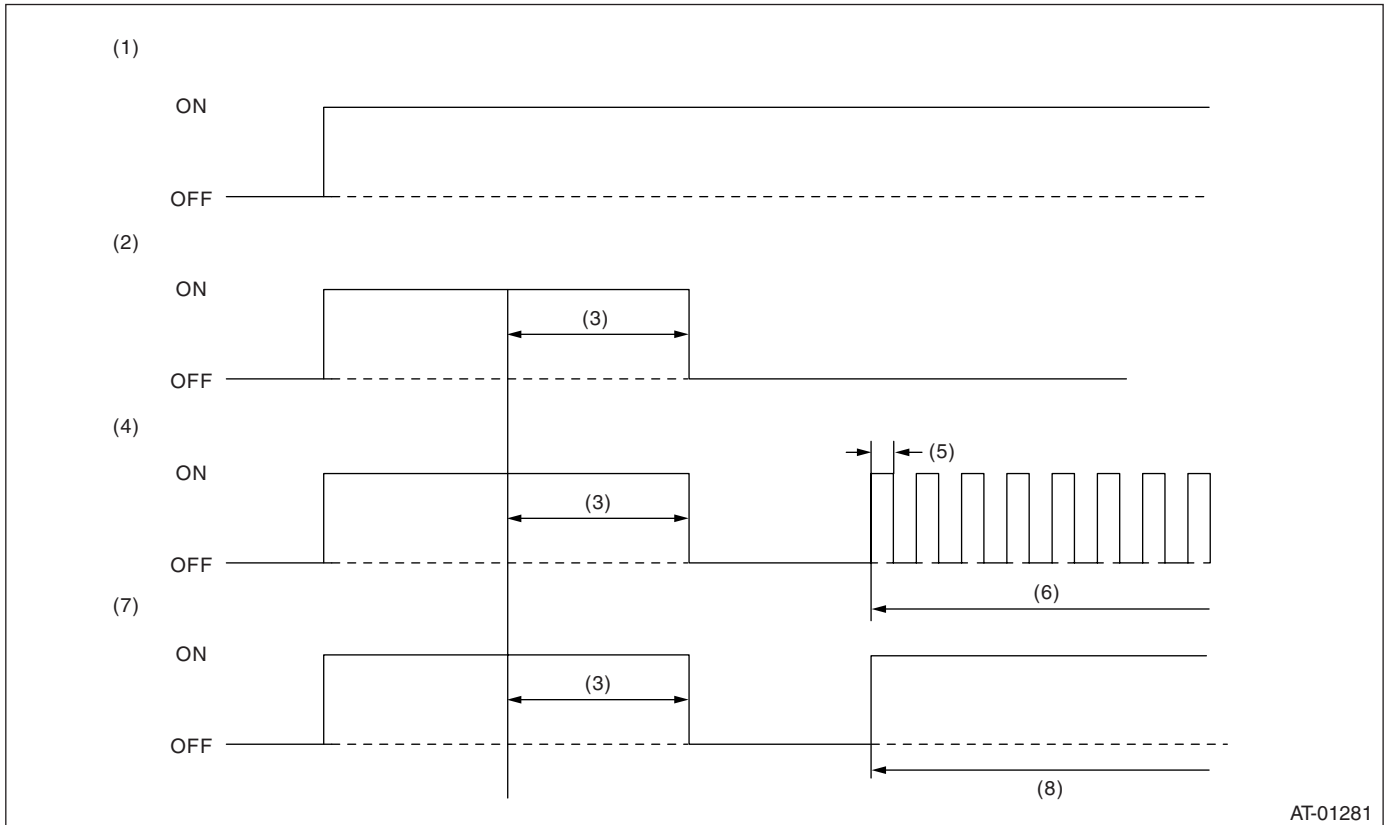
Refer to Subaru Select Monitor for information about how to clear DTC.

<Ref. to 4AT(D)(diag)-14, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

10.AT OIL TEMP Warning Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, the display on AT OIL TEMP warning light blinks from the time malfunction is detected after starting the engine until ignition switch is turned to OFF. The malfunctioning part or unit can be determined by a DTC during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the POWER indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using Subaru Select Monitor. The indicator signal is as shown in the figure.



AT-01281

(1) Ignition switch (engine OFF)	(4) Abnormal (Trouble occurs)	(7) Normal (ATF temperature is high)
(2) Normal	(5) 0.25 secs	(8) ATF temperature is high
(3) 2 secs	(6) Blink	

Execute the inspection if AT OIL TEMP warning light does not operate normally. <Ref. to 4AT(D)(diag)-20, INSPECTION, AT OIL TEMP Warning Light Display.>

AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: INSPECTION

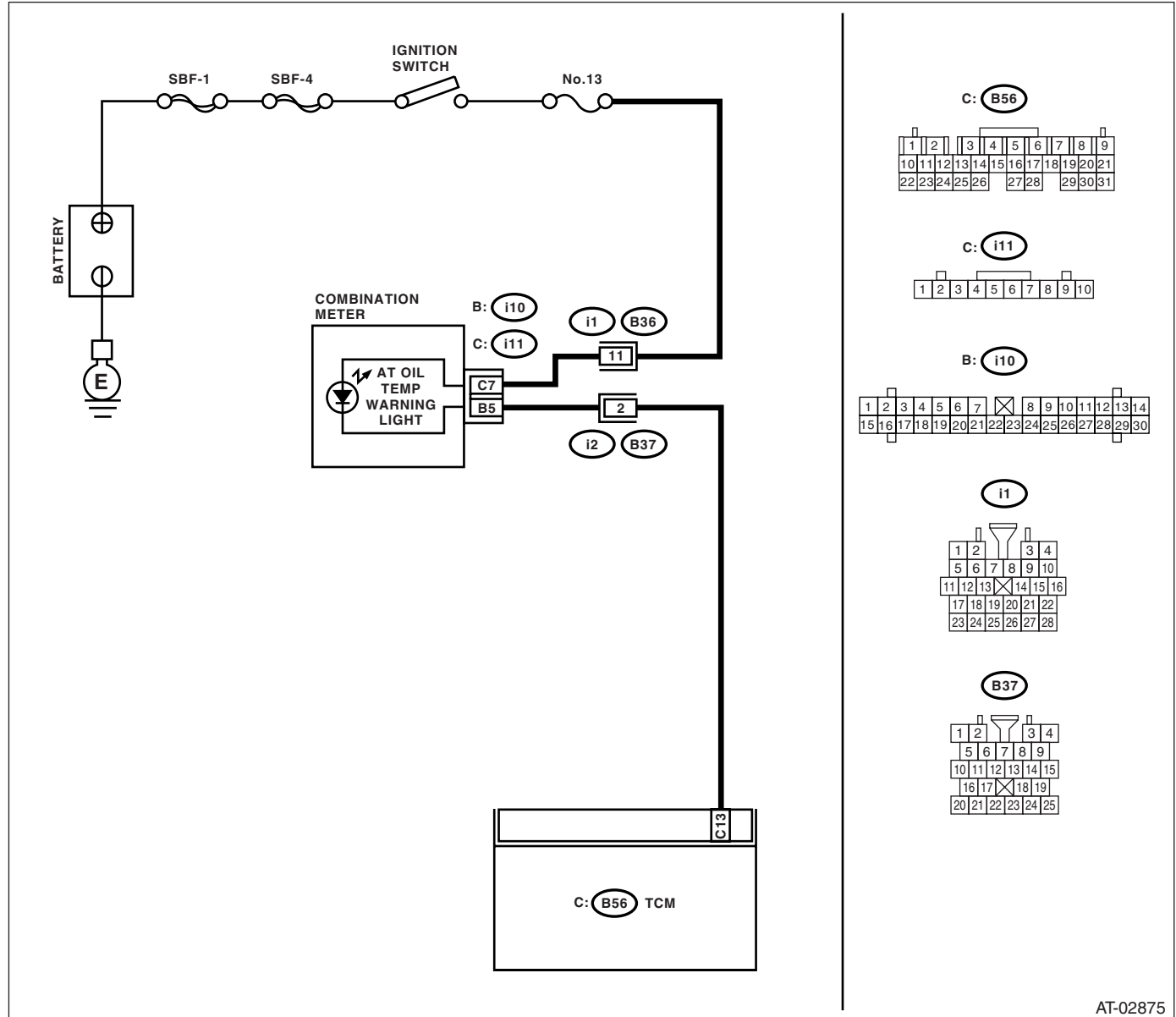
DIAGNOSIS:

The AT OIL TEMP warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When the ignition switch is turned to ON (engine OFF), AT OIL TEMP warning light does not illuminate.

WIRING DIAGRAM:



AT-02875

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?	Go to step 2.	Go to step 3.
2	CHECK FUSE (No. 13). Remove the fuse (No. 13). Is the fuse (No. 13) blown out?	Replace the fuse (No. 13). If replaced fuse (No. 13) is blown out easily, repair short circuit in harness between fuse (No. 13) and combination meter.	Go to step 4.

AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK AT OIL TEMP WARNING LIGHT. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is the AT OIL TEMP warning light OK?	Go to step 4.	Check the combination meter.
4 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 (i11) No. 7 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 5.	Repair the open circuit in harness between combination meter and battery.
5 CHECK COMBINATION METER. Measure the voltage between combination meter connector and chassis ground. Connector & terminal (i10) No. 5 (+) — Chassis ground (-):	Is the voltage less than 9 V?	Repair the combination meter. <Ref. to IDI-10, Combination Meter.>	Go to step 6.
6 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 (B56) No. 13 — (i10) No. 5:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
7 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 (B56) No. 13 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 8.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
8 INSPECT AT OIL TEMP WARNING LIGHT.	Does the AT OIL TEMP warning light illuminate?	Diagnose according to basic diagnostic procedure.	Inspect power supply and ground circuit.

11. Diagnostic Procedure for Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

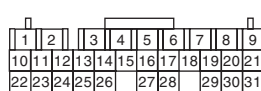
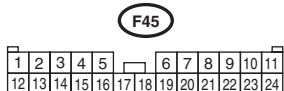
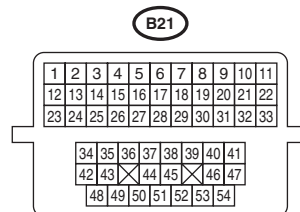
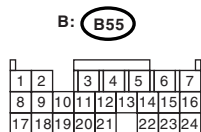
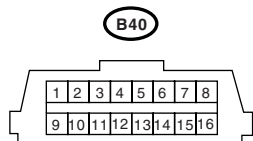
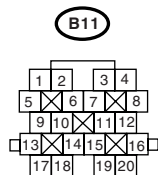
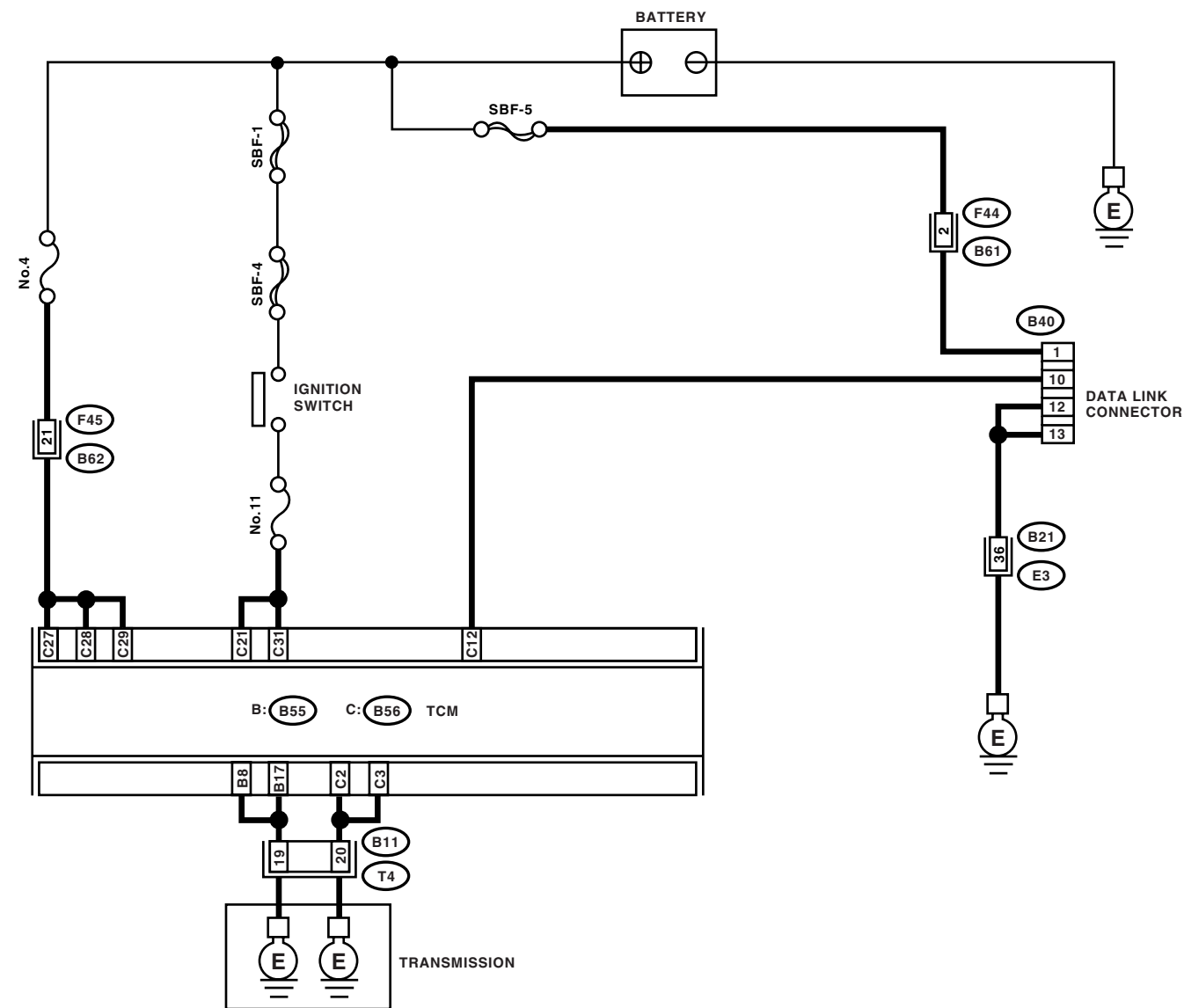
DIAGNOSIS:

- Faulty harness connector

TROUBLE SYMPTOM:

- Subaru select monitor communication failure

WIRING DIAGRAM:



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. Connector & terminal (B40) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 2.	Repair the 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. Connector & terminal (B40) No. 12 — Chassis ground: (B40) No. 13 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
3 CHECK COMMUNICATION OF SUBARU SELECT MONITOR. 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to transmission systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Go to step 8.	Go to step 4.
4 CHECK COMMUNICATION OF SUBARU SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Turn the ignition switch to ON and turn Subaru Select Monitor switch to ON. 4) Check whether communication to engine systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Go to step 6.	Go to step 5.
5 CHECK COMMUNICATION OF SUBARU SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ECM connector. 4) Check whether communication to transmission systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step 6.
6 CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM connectors. 3) Measure the resistance between TCM connector and chassis ground. Connector & terminal (B40) No. 10 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 7.	Check the harness and connector between each control module and data link connector.
7 CHECK OUTPUT SIGNAL FOR TCM. 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B40) No. 10 (+) — Chassis ground (-):	Is the voltage more than 1 V?	Repair the harness and connector between each control module and data link connector.	Go to step 8.
8 CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure the resistance between TCM connector and data link connector. Connector & terminal (B56) No. 12 — (B40) No. 10:	Is the resistance less than 0.5 Ω ?	Go to step 9.	Check the harness and connector between TCM and data link connector.

Diagnostic Procedure for Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK INSTALLATION OF TCM CONNECTOR. Turn the ignition switch to OFF.	Is the TCM connector inserted into TCM?	Go to step 10.	Insert the TCM connector into TCM.
10 INSPECTION OF TRANSMISSION HARNESS CONNECTOR.	Is the transmission harness connector inserted into bulk-head harness connector?	Go to step 11.	Connect the bulk-head harness connector to transmission harness connector.
11 CHECK POOR CONTACT IN CONNECTORS.	Is there poor contact in control module and data link connector?	Repair the poor contact.	Go to step 12.
12 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. Connector & terminal (B55) No. 27 (+) — Chassis ground (-): (B55) No. 28 (+) — Chassis ground (-): (B55) No. 29 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 14.	Go to step 13.
13 CHECK FUSE (No. 11). Remove the fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace the fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair the open circuit in harness between fuse (No. 11) and TCM, or fuse (No. 11) and battery, and poor contact in coupling connector.
14 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 (B55) No. 8 — (B11) No. 19: (B55) No. 17 — (B11) No. 19: (B56) No. 2 — (B11) No. 20: (B56) No. 3 — (B11) No. 20:	Is the resistance less than 1 Ω ?	Go to step 15.	Repair the open circuit in harness between TCM and transmission harness connector, and poor contact in connector.
15 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND. Measure the resistance of harness between transmission and transmission ground. Connector & terminal (T4) No. 19 — Transmission ground: (T4) No. 20 — Transmission ground:	Is the resistance less than 1 Ω ?	Go to step 16.	Repair the open circuit in harness between transmission and transmission ground.
16 CHECK POOR CONTACT IN CONNECTORS.	Is there poor contact in TCM power supply, ground line and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

12. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Diagnosis content	Reference
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction, open or short circuit	<Ref. to 4AT(D)(diag)-28, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor malfunction, open input signal circuit	<Ref. to 4AT(D)(diag)-37, DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0713	Transmission Fluid Temperature Sensor Circuit High Input	ATF temperature sensor malfunction, open input signal circuit	<Ref. to 4AT(D)(diag)-40, DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Input/Turbine Speed Sensor Circuit	Torque converter turbine speed sensor malfunction, open or short input signal circuit	<Ref. to 4AT(D)(diag)-43, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Torque Converter/Brake Switch "B" Circuit Low	Brake switch malfunction, open input signal circuit	<Ref. to 4AT(D)(diag)-45, DTC P0719 TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	AT Vehicle Speed Sensor Circuit	Front vehicle speed sensor malfunction, open or short input signal circuit	<Ref. to 4AT(D)(diag)-47, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Torque Converter/Brake Switch "B" Circuit High	Brake switch malfunction, short input signal circuit	<Ref. to 4AT(D)(diag)-50, DTC P0724 TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine Speed Input Circuit	Open or short engine speed output signal circuit	<Ref. to 4AT(D)(diag)-52, DTC P0725 ENGINE SPEED INPUT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle speed sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(D)(diag)-53, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle speed sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(D)(diag)-53, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle speed sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(D)(diag)-53, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle speed sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(D)(diag)-53, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DTC	Item	Diagnosis content	Reference
P0736	Reverse Incorrect Ratio	Vehicle speed sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(D)(diag)-54, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Lock up clutch malfunction or locking of valve	<Ref. to 4AT(D)(diag)-55, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque Converter Clutch Circuit Electrical	Lock up solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-56, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid "A" Electrical	Line pressure linear solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-58, DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid "A" Electrical	Low clutch duty solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-60, DTC P0753 SHIFT SOLENOID "A" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid "B" Electrical	2-4 brake duty solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-63, DTC P0758 SHIFT SOLENOID "B" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0763	Shift Solenoid "C" Electrical	High clutch duty solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-66, DTC P0763 SHIFT SOLENOID "C" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0768	Shift Solenoid "D" Electrical	Low & reverse duty solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-69, DTC P0768 SHIFT SOLENOID "D" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0801	Reverse Inhibitor Control Circuit	Shift lock solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-72, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (rear wheel)	Rear vehicle speed sensor malfunction, open or short input signal circuit	<Ref. to 4AT(D)(diag)-74, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1707	AT AWD Solenoid Valve Circuit Malfunction	Transfer duty solenoid malfunction, open or short output signal circuit	<Ref. to 4AT(D)(diag)-77, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1708	Throttle Position Sensor Circuit Low Input	Throttle position sensor malfunction, open input signal circuit	<Ref. to 4AT(D)(diag)-79, DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1709	Throttle Position Sensor Circuit High Input	Throttle position sensor malfunction, open input signal circuit	<Ref. to 4AT(D)(diag)-82, DTC P1709 THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DTC	Item	Diagnosis content	Reference
P1714	Throttle Position Sensor Power Supply Circuit	Throttle position sensor malfunction, open or short input signal circuit	<Ref. to 4AT(D)(diag)-85, DTC P1714 THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	CAN Communication Circuit	Open or short AT communication signal circuit	<Ref. to 4AT(D)(diag)-87, DTC P1718 CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

13.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

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

DIAGNOSIS:

- There is malfunction in inhibitor switch.
- The input signal circuit of inhibitor switch is open or shorted.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when select lever is in “3” range.
- Engine brake is not effected when select lever is in “2” range.
- Engine brake is not effected when select lever is in “1” range.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No	
3	CHECK “P” RANGE SWITCH.	When the “R” range is selected, does “P” range LED light up?	Go to step 28.	Go to step 4.
4	CHECK “R” RANGE SWITCH.	When the “R” range is selected, does LED light up?	Go to step 5.	Go to step 29.
5	CHECK INDICATOR LIGHT.	Does the combination meter “R” range indicator illuminate?	Go to step 6.	Go to step 32.
6	CHECK “R” RANGE SWITCH.	When the “N” range is selected, does “R” range LED light up?	Go to step 34.	Go to step 7.
7	CHECK “N” RANGE SWITCH.	When the “N” range is selected, does LED light up?	Go to step 8.	Go to step 35.
8	CHECK INDICATOR LIGHT.	Does the combination meter “N” range indicator illuminate?	Go to step 9.	Go to step 38.
9	CHECK “N” RANGE SWITCH.	When the “D” range is selected, does “N” range LED light up?	Go to step 40.	Go to step 10.
10	CHECK “D” RANGE SWITCH.	When the “D” range is selected, does LED light up?	Go to step 11.	Go to step 41.
11	CHECK INDICATOR LIGHT.	Does the combination meter “D” range indicator illuminate?	Go to step 12.	Go to step 44.
12	CHECK “D” RANGE SWITCH.	When the “3” range is selected, does “D” range LED light up?	Go to step 46.	Go to step 13.
13	CHECK “3” RANGE SWITCH.	When the “3” range is selected, does LED light up?	Go to step 14.	Go to step 47.
14	CHECK INDICATOR LIGHT.	Does the combination meter “3” range indicator illuminate?	Go to step 15.	Go to step 50.
15	CHECK “3” RANGE SWITCH.	When the “2” range is selected, does “3” range LED light up?	Go to step 52.	Go to step 16.
16	CHECK “2” RANGE SWITCH.	When the “2” range is selected, does LED light up?	Go to step 17.	Go to step 53.
17	CHECK INDICATOR LIGHT.	Does the combination meter “2” range indicator illuminate?	Go to step 18.	Go to step 56.
18	CHECK “2” RANGE SWITCH.	When the “1” range is selected, does “2” range LED light up?	Go to step 58.	Go to step 19.
19	CHECK “1” RANGE SWITCH.	When the “1” range is selected, does LED light up?	Go to step 20.	Go to step 59.
20	CHECK INDICATOR LIGHT.	Does the combination meter “1” range indicator illuminate?	Go to step 21.	Go to step 62.
21	CHECK “1” RANGE SWITCH.	When the “2” range is selected, does “1” range LED light up?	Go to step 64.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
22	CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between inhibitor switch and chassis ground. Connector & terminal (T7) No. 5 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 23.	Repair the open circuit in harness between inhibitor switch connector and chassis ground, and poor contact in coupling connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 (B55) No. 5 — (T7) No. 9:	Is the resistance less than 1 Ω ?	Go to step 24.	Repair the 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 select lever to "P" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 25.	Go to step 65.
25 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever except for "P" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 5 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
26 CHECK "P" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is the "P" range indicator light OK?	Go to step 27.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>
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 (B55) No. 5 — (i12) No. 14:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the 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 connector and chassis ground. Connector & terminal (B55) No. 5 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 29.	Repair the ground short circuit in "P" range circuit.
29 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 14 — (T7) No. 8:	Is the resistance less than 1 Ω ?	Go to step 30.	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
30 CHECK INPUT SIGNAL FOR TCM. 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to "R" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 31.	Go to step 65.
31 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever except for "R" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
32 CHECK "R" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is "R" range indicator light OK?	Go to step 33.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>
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. Connector & terminal (B55) No. 14 — (i12) No. 13:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
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 connector and chassis ground. Connector & terminal (B55) No. 14 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 35.	Repair the 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 (B55) No. 22 — (T7) No. 10:	Is the resistance less than 1 Ω ?	Go to step 36.	Repair the 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 select lever to "N" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 22 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 37.	Go to step 65.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
37 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever to except for "N" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 22 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
38 CHECK "N" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is the "N" range indicator light OK?	Go to step 39.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>
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 (B55) No. 22 — (i12) No. 12:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the 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 connector and chassis ground. Connector & terminal (B55) No. 22 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 41.	Repair the 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 (B55) No. 4 — (T7) No. 3:	Is the resistance less than 1 Ω ?	Go to step 42.	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
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 select lever to "D" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 4 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 43.	Go to step 65.
43 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever except for "D" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 4 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
44 CHECK "D" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is the "D" range indicator light OK?	Go to step 45.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 (B55) No. 4 — (i12) No. 11:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the open circuit in harness between TCM connector and combination meter, and TCM connector.
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 connector and chassis ground. Connector & terminal (B55) No. 4 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 47.	Repair the 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 (B54) No. 16 — (T7) No. 11:	Is the resistance less than 1 Ω ?	Go to step 48.	Repair the 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 select lever to "3" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 49.	Go to step 65.
49 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever except for "3" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
50 CHECK "3" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is the "3" range indicator light OK?	Go to step 51.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>
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 (B51) No. 15 — (i12) No. 10:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 connector and chassis ground. Connector & terminal (B54) No. 15 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 53.	Repair the 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 (B54) No. 4 — (T7) No. 4:	Is the resistance less than 1 Ω?	Go to step 54.	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
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 select lever to "2" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 4 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 55.	Go to step 65.
55 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever except for "2" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 4 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
56 CHECK "2" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is the "2" range indicator light OK?	Go to step 57.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>
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 (B54) No. 4 — (i12) No. 4:	Is the resistance less than 1 Ω?	Go to step 65.	Repair the open circuit in harness between TCM and combination meter, and poor contact in TCM connector.
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 (B54) No. 4 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 59.	Repair the ground short circuit in "2" range circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 (B54) No. 10 — (T7) No. 6:	Is the resistance less than 1 Ω ?	Go to step 60.	Repair the 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 select lever to "1" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 10 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 61.	Go to step 65.
61 CHECK INPUT SIGNAL FOR TCM. 1) Move the select lever except for "1" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B54) No. 10 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
62 CHECK "1" RANGE INDICATOR LIGHT BULB. 1) Turn the ignition switch to OFF. 2) Remove the combination meter.	Is the "1" range indicator light OK?	Go to step 63.	Replace the combination meter. <Ref. to IDI-10, Combination Meter.>
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 (B54) No. 10 — (i12) No. 5:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the 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 connector and chassis ground. Connector & terminal (B54) No. 10 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 65.	Repair the ground short circuit in "1" range circuit.
65 CHECK POOR CONTACT.	Is there poor contact in inhibitor switch circuit?	Repair the poor contact.	Go to step 66.
66 CHECK INHIBITOR SWITCH.	Is the inhibitor switch in proper position?	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>	Adjust the inhibitor switch and select cable. <Ref. to 4AT-52, Inhibitor Switch.> and <Ref. to CS-26, Select Cable.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

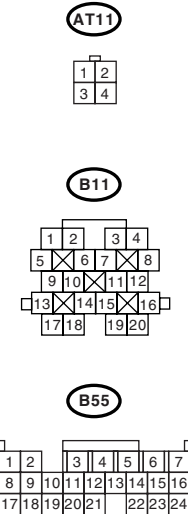
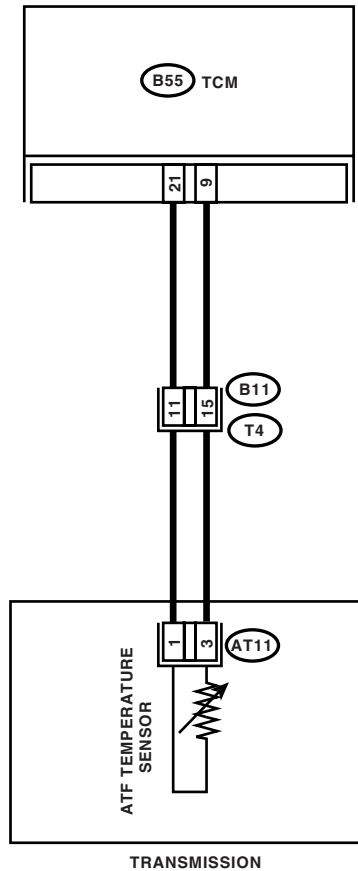
DIAGNOSIS:

The input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02395

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 (B55) No. 21 — (B11) No. 11:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B55) No. 9 — (B11) No. 15:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit in harness between TCM and transmission connector.
3 CHECK ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 15:	Is the resistance 300 — 800 Ω ?	Go to step 4.	Go to step 7.
4 CHECK ATF TEMPERATURE SENSOR. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 15:	Does the resistance value increase when ATF temperature decreases?	Go to step 5.	Go to step 7.
5 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connector to transmission. 2) Turn the ignition switch to ON (engine OFF).	Does the ATF temperature gradually decrease?	Even if the AT OIL TEMP warning light blinks, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in ATF temperature sensor and transmission connector.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place safety stand. NOTE: Raise all wheels off floor. 5) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 6) Remove the oil pan, and disconnect the connector from ATF temperature sensor connector. 7) Measure the resistance of harness between ATF temperature sensor and transmission connector. Connector & terminal (T4) No. 11 — (AT11) No. 1:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair the open circuit in harness between ATF temperature sensor and transmission connector.
8 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between ATF temperature sensor and transmission connector. Connector & terminal (T4) No. 15 — (AT11) No. 3:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between ATF temperature sensor and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 11 — Transmission ground:	Is the resistance more than 1 $M\Omega$?	Go to step 10.	Repair the short circuit in harness between ATF temperature sensor and transmission connector.
10 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 15 — Transmission ground:	Is the resistance more than 1 $M\Omega$?	Replace the ATF temperature sensor. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>	Repair the short circuit in harness between ATF temperature sensor and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

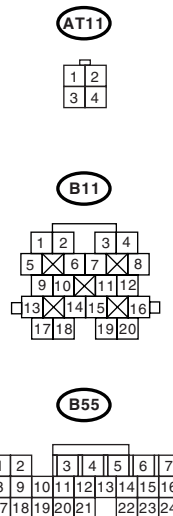
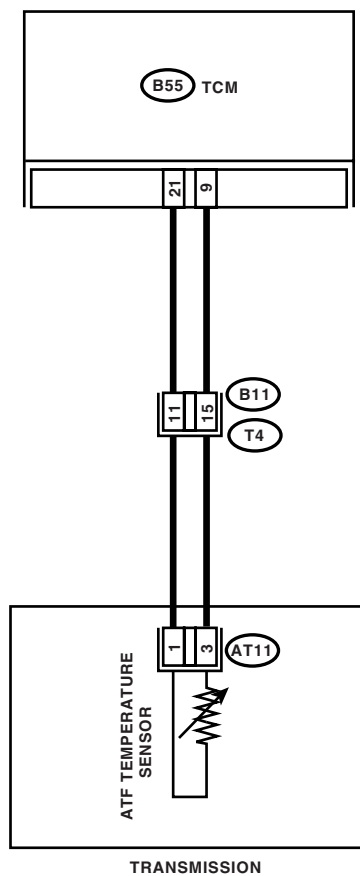
DIAGNOSIS:

The input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02395

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. Connector & terminal (B55) No. 21 — No. 9:	Is the resistance more than 500 Ω ?	Go to step 2.	Go to step 4.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 21 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Go to step 4.
3 CHECK HARNESS. Measure the resistance between TCM connector terminals while shaking the harness. Connector & terminal (B55) No. 21 — No. 9:	Does the resistance change?	Go to step 4.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 21 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair the short circuit in harness between TCM and transmission harness.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 9 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between TCM and transmission harness.
6 CHECK ATF TEMPERATURE SENSOR. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 15:	Is the resistance more than 500 Ω ?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK TRANSMISSION HARNESS. 1) Lift-up the vehicle and place it on rigid racks. 2) Drain the ATF. NOTE: Do not drain the ATF until it cools down. 3) Remove the oil pan. 4) Disconnect the harness connector from control valve. 5) Measure the resistance between ATF temperature sensor connector terminals 6) Measure the resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 11 — Transmission ground:	Is the resistance more than 1 MΩ?	Go to step 8.	Replace the transmission harness.
8 CHECK TRANSMISSION HARNESS. Measure the resistance between transmission connector and transmission ground, Connector & terminal (T4) No. 15 — Transmission ground:	Is the resistance more than 1 MΩ?	Go to step 9.	Replace the transmission harness.
9 CHECK ATF TEMPERATURE SENSOR. Measure the resistance between control valve connector terminals Terminal No. 1 — No. 3:	Is the resistance more than 500 Ω?	Even if the AT OIL TEMP warning light is blinking, the circuit has returned to normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Replace the control valve body. <Ref. to 4AT-61, Control Valve Body.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

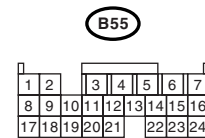
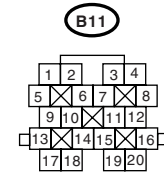
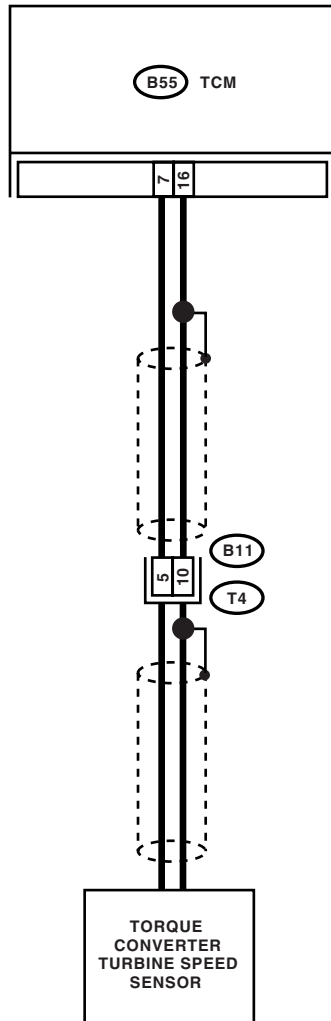
DIAGNOSIS:

The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02396

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 5 — No. 10:	Is the resistance 450 — 650 Ω ?	Go to step 2.	Replace the torque converter turbine speed sensor. <Ref. to 4AT-60, Torque Converter Turbine Speed Sensor.>
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and transmission connector. Connector & terminal (B55) No. 7 — (B11) No. 5:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit in harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and transmission connector. Connector & terminal (B55) No. 16 — (B11) No. 10:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the 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 connector and chassis ground. Connector & terminal (B55) No. 16 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair the short circuit in harness between TCM and transmission connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 7 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and turn 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 reading with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the AT OIL TEMP warning light blinks, 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 and transmission.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

E: DTC P0719 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT LOW

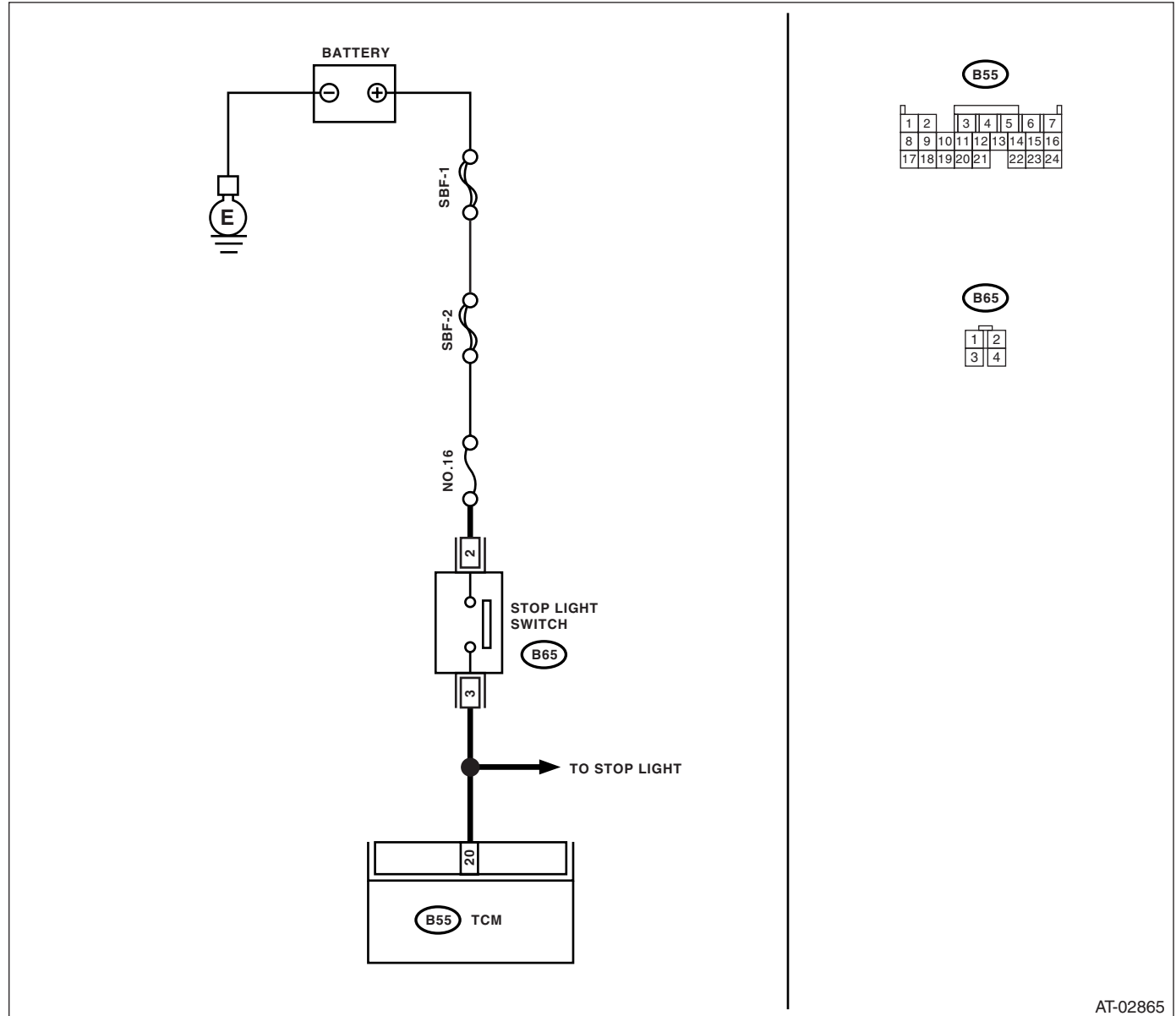
DIAGNOSIS:

Brake switch malfunction or input signal open circuit.

TROUBLE SYMPTOM:

Gear is not shifted down when climbing hill.

WIRING DIAGRAM:



AT-02865

Step	Check	Yes	No
1 CHECK OPERATION OF BRAKE LIGHT. Depress the brake pedal.	Does the brake light illuminate?	Go to step 2.	Check the brake light circuit.
2 CHECK TCM INPUT SIGNAL. 1) Depress the brake pedal. 2) Measure the voltage of harness between TCM and stop light switch. Connector & terminal (B55) No. 20 (+) — Chassis ground (–):	Is the voltage more than 10 V?	Go to step 5.	Go to step 3.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND STOP LIGHT SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and stop light switch. 3) Measure the resistance between TCM and stop light switch. <i>Connector & terminal</i> <i>(B55) No. 20 — (B65) No. 3:</i>	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open harness between TCM and stop light switch.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND STOP LIGHT SWITCH. Measure the resistance between TCM and stop light switch. <i>Connector & terminal</i> <i>(B55) No. 20 — (B65) No. 3:</i>	Is the resistance more than 1 $M\Omega$?	Go to step 5.	Repair the short harness between TCM and stop light switch.
5 INSPECT POOR CONTACT.	Is there poor contact in the brake switch input signal circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

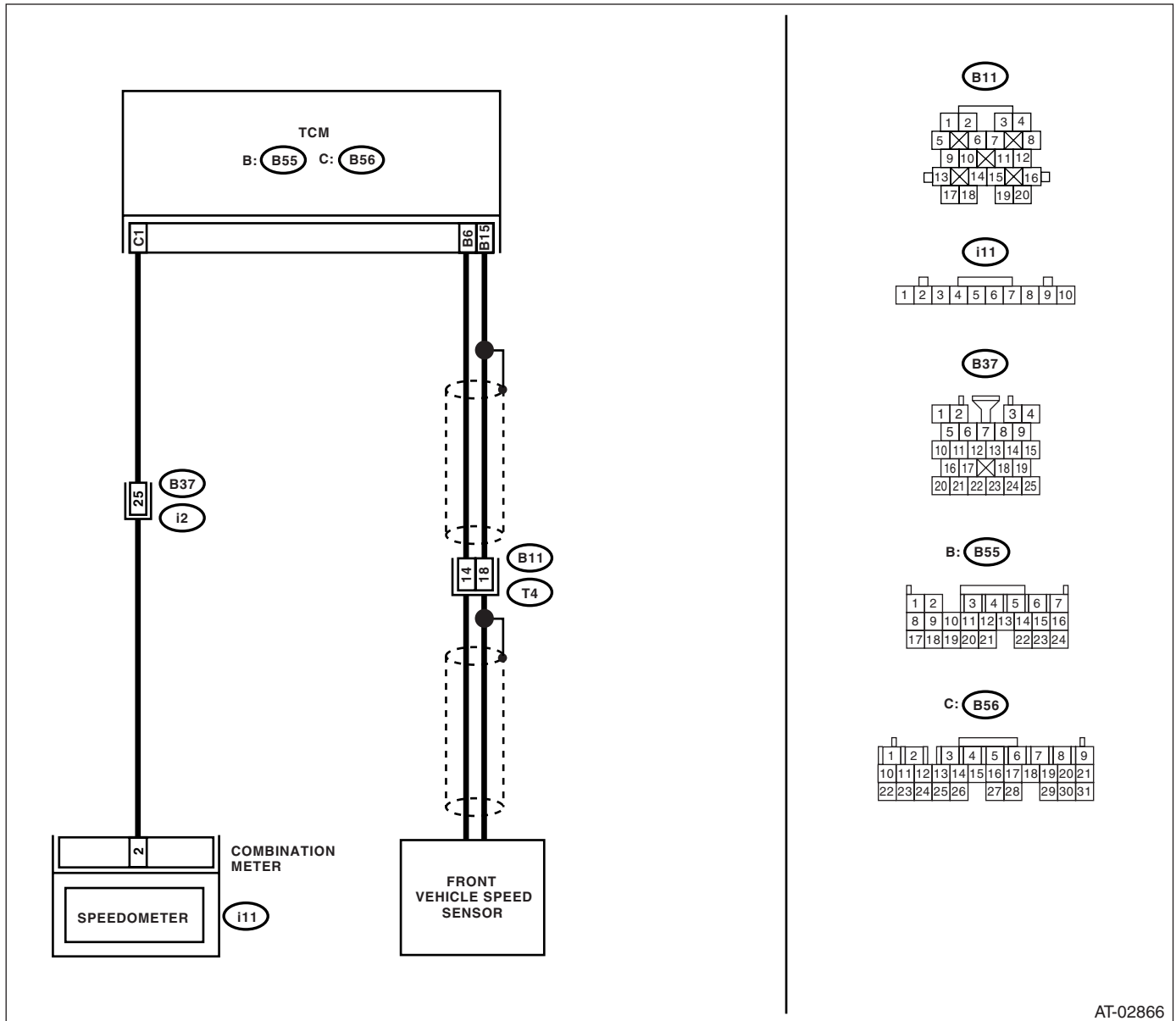
DIAGNOSIS:

- 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.

WIRING DIAGRAM:



AT-02866

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 connector and transmission connector. <i>Connector & terminal</i> <i>(B55) No. 6 — (B11) No. 14:</i>	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 connector. <i>Connector & terminal</i> <i>(B55) No. 15 — (B11) No. 18:</i>	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the 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 connector and transmission connector. <i>Connector & terminal</i> <i>(B55) No. 6 — Chassis ground:</i>	Is the resistance more than 1 $M\Omega$?	Go to step 4.	Repair the short circuit in harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM CONNECTOR AND TRANSMISSION. Measure the resistance of harness between TCM connector and transmission connector. <i>Connector & terminal</i> <i>(B55) No. 15 — Chassis ground:</i>	Is the resistance more than 1 $M\Omega$?	Go to step 5.	Repair the 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. <i>Connector & terminal</i> <i>(T4) No. 14 — No. 18:</i>	Is the resistance 450 — 650 Ω ?	Go to step 6.	Replace the front vehicle speed sensor. <Ref. to 4AT-55, Front Vehicle Speed Sensor.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 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 the vehicle and place safety stands. NOTE: Raise all wheels off floor. 4) Turn the ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. - Compare the speedometer reading 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Does the speedometer indication increase as Subaru Select Monitor front speed sensor data increases?	Even if the AT OIL TEMP warning light blinks, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the cause. Repair the harness or connector in front vehicle speed sensor circuit.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

G: DTC P0724 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT HIGH

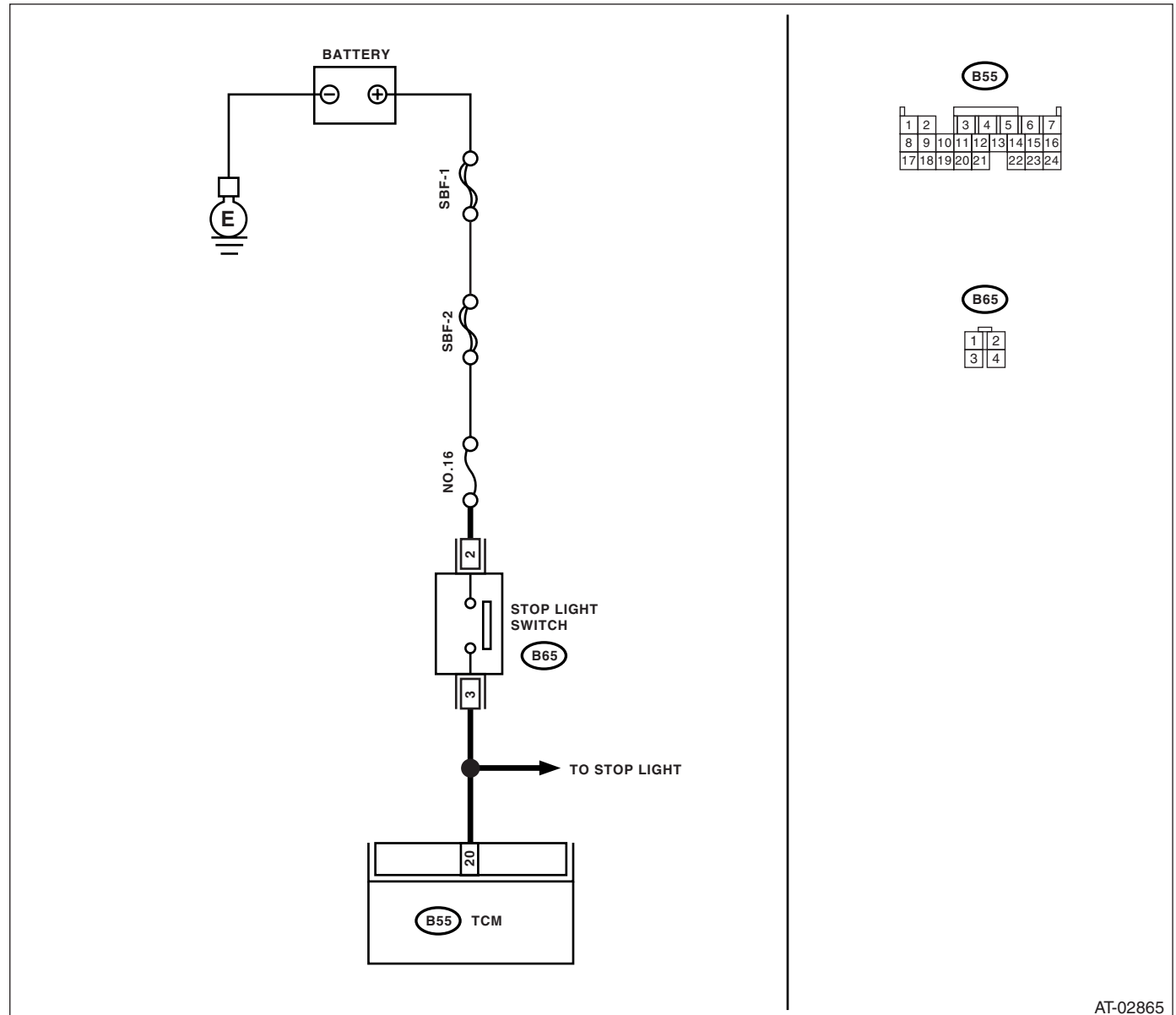
DIAGNOSIS:

Brake switch malfunction or open brake switch input signal circuit.

TROUBLE SYMPTOM:

Gear is not shifted down when climbing hill.

WIRING DIAGRAM:



AT-02865

Step	Check	Yes	No
1 CHECK TCM INPUT SIGNAL. 1) Disconnect the harness connector from TCM. 2) Measure the voltage of harness between TCM and stop light switch. Connector & terminal (B55) No. 20 (+) — Chassis ground (–):	Is the voltage more than 10 V?	Go to step 2.	Go to step 4.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK STOP LIGHT SWITCH. 1) Turn the ignition switch OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between stop light switch connector. Connector & terminal (B65) No. 2 — No. 3:	Is the resistance more than 1 M Ω ?	Go to step 3.	Replace the stop light switch.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND STOP LIGHT SWITCH. 1) Turn the ignition switch ON. 2) Measure the voltage of harness between TCM and chassis ground. Connector & terminal (B55) No. 20 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 4.	Repair the short in power supply circuit to harness between TCM and stop light switch.
4 INSPECT POOR CONTACT.	Is there poor contact in the brake switch input signal circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

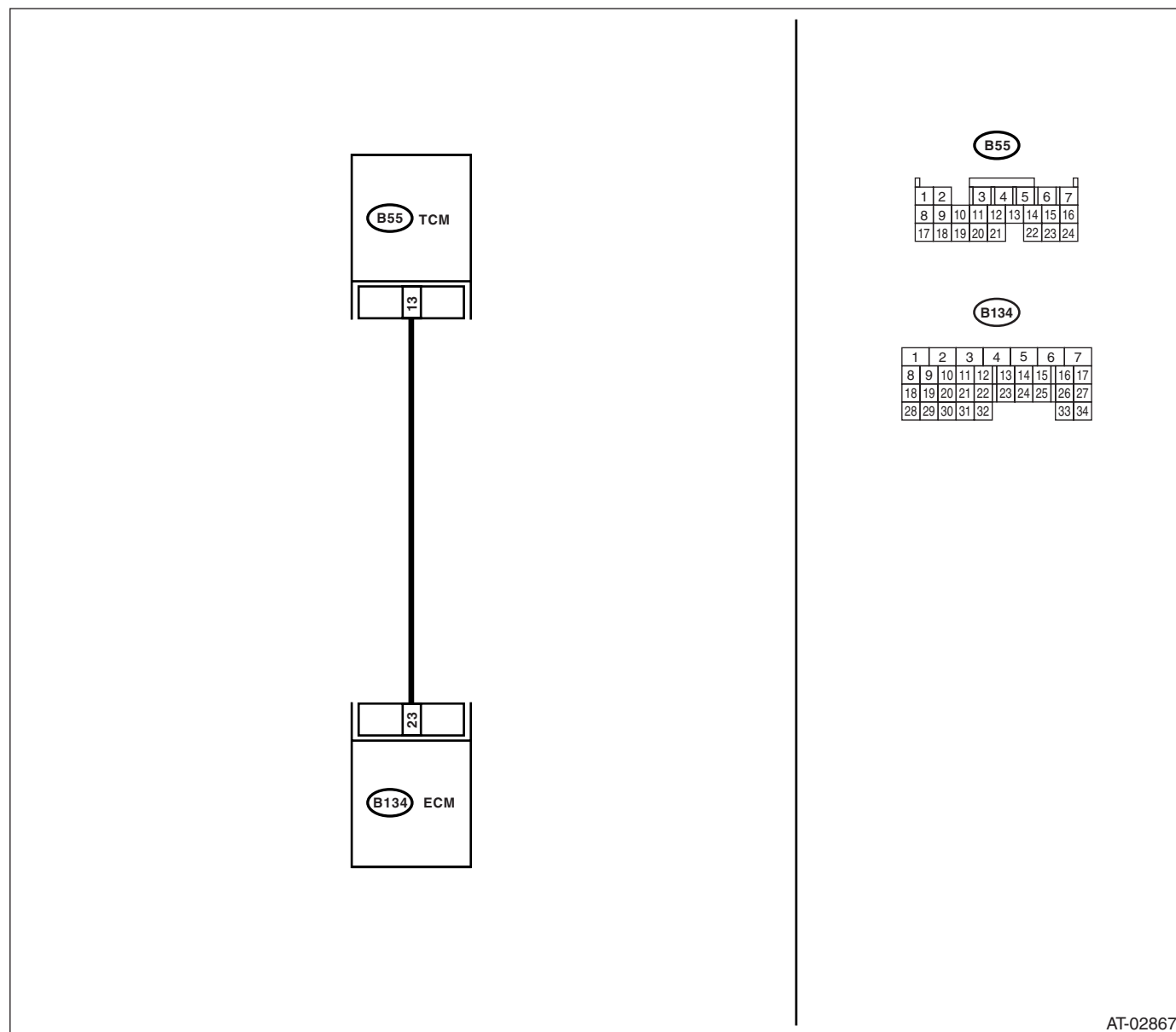
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DIAGNOSIS:

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- The AT OIL TEMP warning light remains on when vehicle speed is “0”.

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. Connector & terminal (B55) No. 13 — (B134) No. 23:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the 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 (B55) No. 13 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair the short circuit in harness between TCM and ECM connector.
3 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and turn Subaru Select Monitor switch to ON. 4) Idle the engine. 5) Read the data of engine speed using Subaru Select Monitor. • Display shows the engine speed signal value sent from ECM.	Is the revolution value same as tachometer reading shown on combination meter?	Even if the AT OIL TEMP warning light blinks, 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 and ECM.	Go to step 4.
4 CHECK POOR CONTACT.	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step 5.
5 CONFIRM DTC P0725. Replace the ECM with a new one.	Does the DTC appear again, after memory has been cleared?	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>	Replace the ECM.

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(D)(diag)-54, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(D)(diag)-54, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(D)(diag)-54, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC P0734 GEAR 4 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(D)(diag)-54, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

M: DTC P0736 REVERSE INCORRECT RATIO

DIAGNOSIS:

Vehicle speed sensor malfunction and torque converter turbine speed sensor malfunction, etc. or control valve malfunction.

TROUBLE SYMPTOM:

- Shift point is too high or too low.
- Excessive shift shock.
- Tight cornering condition is occurred.
- Gear is not shifted to reverse.
- Gear position is held by fail safe function.

Step	Check	Yes	No
1 CHECK THROTTLE POSITION SENSOR. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Read the value of accelerator pedal position sensor using Subaru Select Monitor.	Does the value of accelerator pedal position sensor change from 0% to 100% smoothly when throttle position sensor was operated from fully closing to fully opening?	Go to step 2.	Check throttle position sensor circuit. <Ref. to 4AT(D)(diag)-79, DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2 FRONT VEHICLE SPEED SENSOR. 1) Lift-up the vehicle and place safety stand. 2) Start the engine. 3) Move the select lever "D" range and slowly increase vehicle speed. NOTE: The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system.	Does the vehicle speed displayed by Subaru Select Monitor almost correspond with vehicle speed indicated by combination meter?	Go to step 3.	Check the front vehicle speed sensor circuit.
3 CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Move the select lever to "P" or "N" range. 2) Idle the engine.	Does the turbine speed sensor revolution displayed by Subaru Select Monitor almost correspond with engine revolution indicated by tachometer?	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.	Check the torque converter turbine speed sensor circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

DIAGNOSIS:

- Lock up clutch malfunction
- Locking of valve

TROUBLE SYMPTOM:

Lock up is not operated.

WIRING DIAGRAM:

Step	Check	Yes	No
1 CHECK LOCK UP DUTY SOLENOID CIRCUIT. Check according as DTC P0743 procedure.	Is there malfunction?	Repair or replace the lock up duty solenoid circuit.	Go to step 2.
2 CHECK INHIBITOR SWITCH CIRCUIT. Check according as DTC P0705 procedure.	Is there malfunction?	Repair or replace the inhibitor switch circuit.	Go to step 3.
3 CHECK STOP LIGHT SWITCH CIRCUIT. Check according as DTC P0719 and DTC P0724 procedure.	Is there malfunction?	Repair or replace the stop light switch circuit.	Go to step 4.
4 CHECK ATF TEMPERATURE SENSOR CIRCUIT. Check according to DTC P0712 and DTC P0713 procedure.	Is there malfunction?	Repair or replace the ATF temperature sensor circuit.	Go to step 5.
5 CHECK THROTTLE POSITION SENSOR. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Read the value of accelerator pedal position sensor using Subaru Select Monitor.	Does the value of accelerator pedal position sensor change from 0% to 100% smoothly when throttle position sensor was operated from fully closing to fully opening?	Go to step 6.	Check the throttle position sensor circuit.
6 CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Move the select lever to "P" or "N" range. 2) Idle the engine.	Does the engine revolution displayed by Subaru Select Monitor almost correspond with engine revolution indicated by tachometer?	Go to step 7.	Check the torque converter turbine speed sensor circuit.
7 CHECK ENGINE SPEED SIGNAL. Idle the engine.	Does the engine revolution displayed by Subaru Select Monitor almost correspond with engine revolution indicated by tachometer?	There is malfunction in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.	Check the engine speed signal circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

O: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

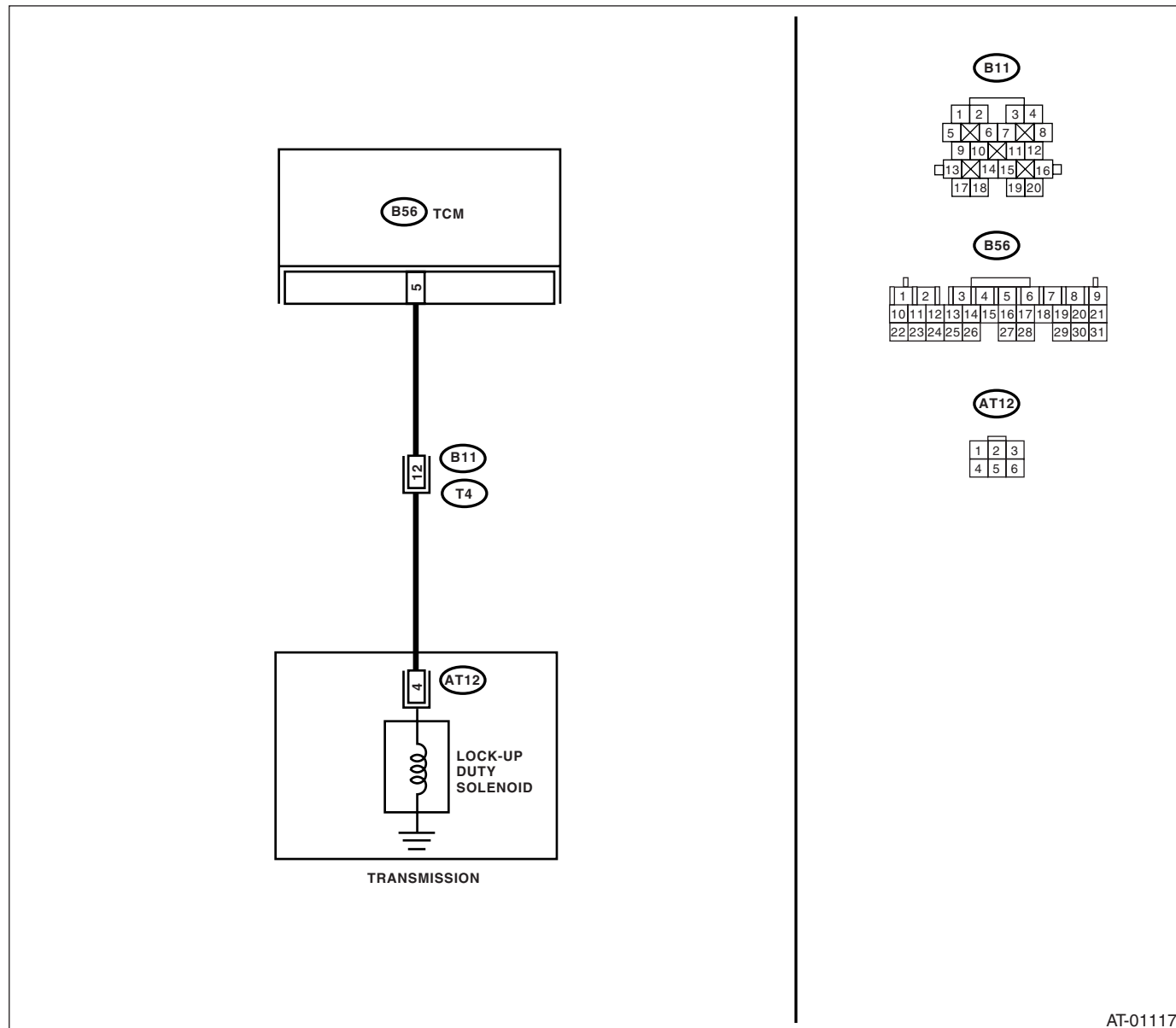
DIAGNOSIS:

The output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No "lock-up" (after engine warm-up).

WIRING DIAGRAM:



AT-01117

Step	Check	Yes	No
1 CHECK DTC.	Do multiple DTCs appear in the on-board diagnostics test mode?	Go to another DTC.	Go to step 2.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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. Connector & terminal (B56) No. 5 — (B11) No. 12:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the 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 connector and chassis ground. Connector & terminal (B56) No. 5 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair the short circuit in harness between TCM and transmission connector.
4 CHECK LOCK-UP DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 12 — No. 20:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 6.	Go to step 5.
5 CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION). 1) Disconnect the transmission connector. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan and disconnect connector from lock-up duty solenoid. 4) Measure the resistance between lock-up duty solenoid and transmission ground. Connector & terminal (AT12) No. 4 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 6.	Replace the control valve body. <Ref. to 4AT-61, Control Valve Body.>
6 CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between lock-up duty solenoid and transmission connector. Connector & terminal (T4) No. 12 — (AT12) No. 4:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the open circuit in harness between TCM and transmission connector.
7 CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 12 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 lock-up duty solenoid and transmission.	Repair the short circuit in harness between lock-up duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

P: DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL

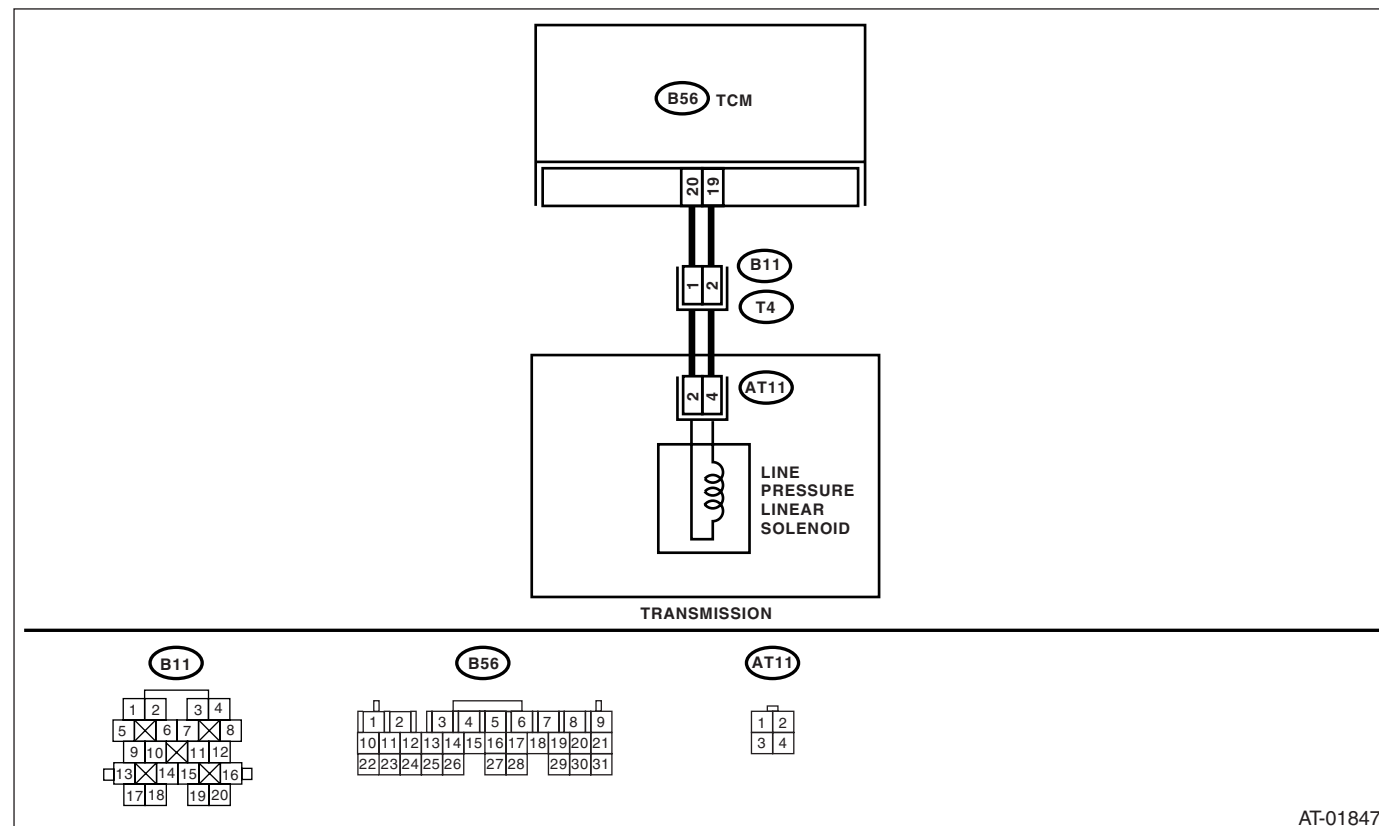
DIAGNOSIS:

The output signal circuit of line pressure linear solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-01847

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> (B56) No. 19 — (B11) No. 2: (B56) No. 20 — (B11) No. 1:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM connector and chassis ground. <i>Connector & terminal</i> (B56) No. 19 — Chassis ground: (B56) No. 20 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK LINE PRESSURE LINEAR SOLENOID. Measure the resistance between transmission connector receptacle's terminals. <i>Connector & terminal</i> (T4) No. 1 — No. 2:	Is the resistance 4 — 8 Ω ?	Go to step 5.	Go to step 4.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK LINE PRESSURE LINEAR SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan, and disconnect connector from line pressure linear solenoid. 4) Measure the resistance between line pressure linear solenoid connector and transmission ground. Connector & terminal (AT11) No. 2 — No. 4:	Is the resistance 4 — 8 Ω ?	Go to step 5.	Replace the control valve body. <Ref. to 4AT-61, Control Valve Body.>
5 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE LINEAR SOLENOID. Measure the resistance of harness between line pressure linear solenoid and transmission connector. Connector & terminal (T4) No. 2 — (AT11) No. 4: (T4) No. 1 — (AT11) No. 2:	Is the resistance less than 1 Ω ?	Go to step 6.	Repair the open circuit in harness between line pressure linear solenoid and transmission connector.
6 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE LINEAR SOLENOID. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 1 — Transmission ground: (T4) No. 2 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 line pressure linear solenoid and transmission.	Repair the short circuit in harness between line pressure linear solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Q: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

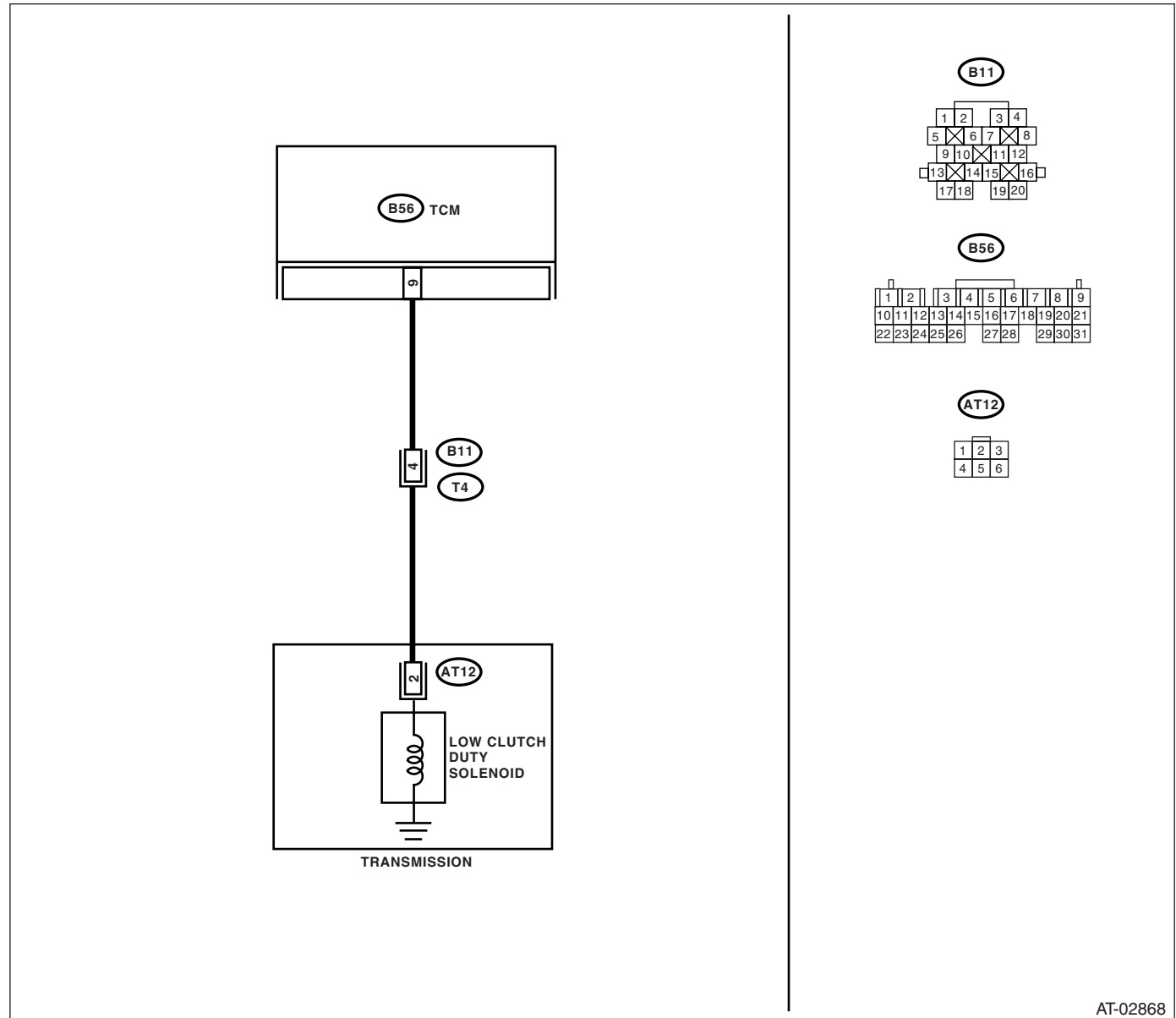
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02868

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 (B56) No. 9 — (B11) No. 2:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B56) No. 9 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK LOW CLUTCH DUTY SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 4 — No. 20:	Is the resistance 2.0 — 6.0 Ω?	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and turn Subaru Select Monitor switch to ON. 4) 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 ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Shift the select lever to “P” or “N” range, and depress the accelerator pedal. 7) Read the data of low clutch duty solenoid using Subaru Select Monitor. • Low clutch duty solenoid is indicated in “%”.	Is the value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Turn the ignition switch to ON (engine OFF). 2) Move the select lever to “D” range. 3) Read the data of low clutch duty solenoid.	Is the value 0%?	Even if the AT OIL TEMP warning light blinks, 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 transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in low clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK LOW CLUTCH DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan, and disconnect connector from low clutch duty solenoid. 4) Measure the resistance between low clutch duty solenoid connector and transmission ground. <i>Connector & terminal</i> <i>(AT12) No. 2 — Transmission ground:</i>	Is the resistance 2.0 — 6.0 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-61, Control Valve Body.>
8 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW CLUTCH DUTY SOLENOID. Measure the resistance of harness between low clutch duty solenoid and transmission connector. <i>Connector & terminal</i> <i>(T4) No. 4 — (AT12) No. 2:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between low clutch duty solenoid and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW CLUTCH DUTY SOLENOID. Measure the resistance of harness between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 4 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 low clutch duty solenoid and transmission.	Repair the short circuit in harness between low clutch duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

R: DTC P0758 SHIFT SOLENOID “B” ELECTRICAL

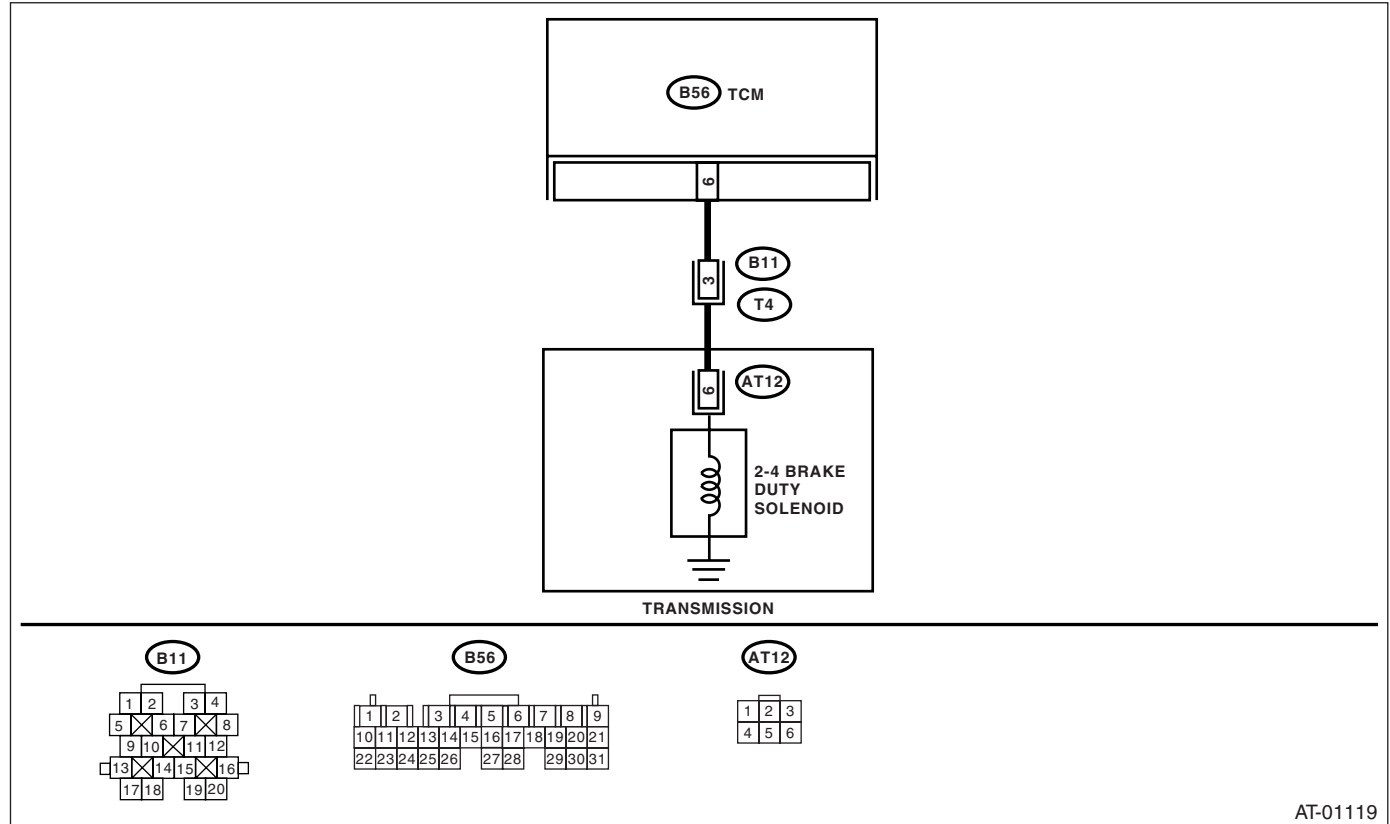
DIAGNOSIS:

The output signal circuit of 2-4 brake duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-01119

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 connector and shift transmission connector. Connector & terminal (B56) No. 6 — (B11) No. 3:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B56) No. 6 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK 2-4 BRAKE DUTY SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 3 — No. 20:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL 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 Subaru Select Monitor switch to ON. 4) 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 ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move the select lever to "N" range. 7) Read the data of 2-4 brake duty solenoid using Subaru Select Monitor. • 2-4 brake duty solenoid is indicated in "%".	Is the value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Move the select lever to "2" range. 2) Turn the HOLD switch to ON.	Is the value 0%?	Even if the AT OIL TEMP warning light blinks, 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 and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
7 CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan, and disconnect connector from 2-4 brake duty solenoid. 4) Measure the resistance of harness between 2-4 brake duty solenoid connector and transmission ground. Connector & terminal (AT12) No. 6 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-61, Control Valve Body.>
8 CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between 2-4 brake duty solenoid and transmission connector. Connector & terminal (T4) No. 3 — (AT12) No. 6:	Is the resistance less than 1 Ω?	Go to step 9.	Repair the open circuit in harness between 2-4 brake duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 3 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 high clutch duty solenoid and transmission.	Repair the short circuit harness between 2-4 brake duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

S: DTC P0763 SHIFT SOLENOID “C” ELECTRICAL

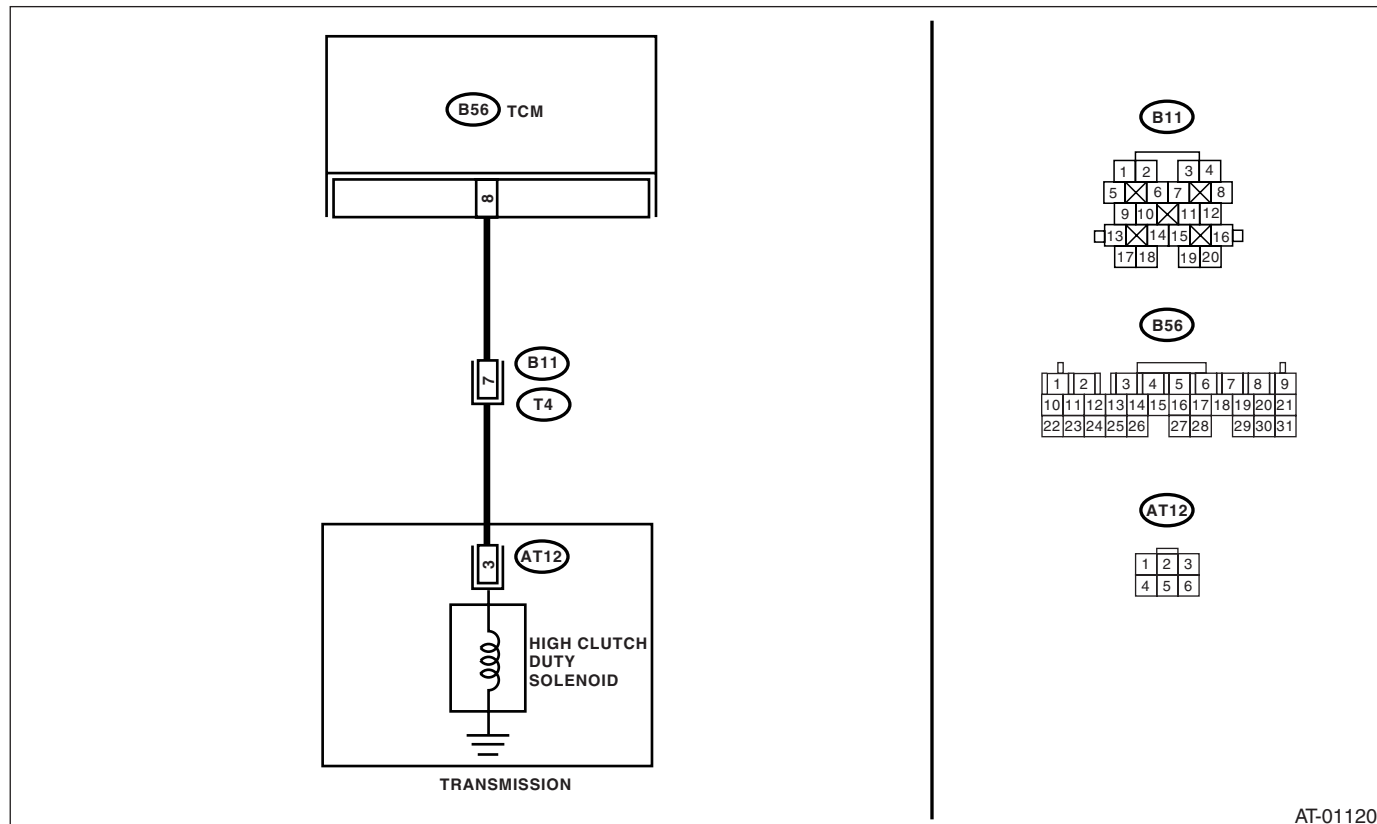
DIAGNOSIS:

The output signal circuit of high clutch duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-01120

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 (B56) No. 8 — (B11) No. 7:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness connector between TCM connector and chassis ground. Connector & terminal (B56) No. 8 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK HIGH CLUTCH DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 7 — No. 20:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. NOTE: Raise all wheels off ground. 3) Connect the Subaru Select Monitor to data link connector. 4) Start the engine and turn Subaru Select Monitor switch to ON. 5) 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 ATF reaches its operating temperature. 6) Read the data of high clutch duty solenoid using Subaru Select Monitor. • High clutch duty solenoid is indicated in “%”. 7) Move the select lever to “D” range and slowly increase vehicle speed and measure at 3rd or 4th gear. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Is the value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. Return the engine to idling speed and move select lever to “N” range. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Is the value 100%?	Even if the AT OIL TEMP warning light blinks, 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 and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in high clutch duty circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK HIGH CLUTCH DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan and disconnect connector from high clutch duty solenoid. 4) Measure the resistance between high clutch duty solenoid connector and transmission ground. Connector & terminal (AT12) No. 3 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 8.	Replace the control valve body. <Ref. to 4AT-61, Control Valve Body.>
8 CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between high clutch duty solenoid and transmission connector. Connector & terminal (T4) No. 7 — (AT12) No. 3:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between TCM and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 7 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 high clutch duty solenoid and transmission.	Repair the short circuit in harness between high clutch duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

T: DTC P0768 SHIFT SOLENOID “D” ELECTRICAL

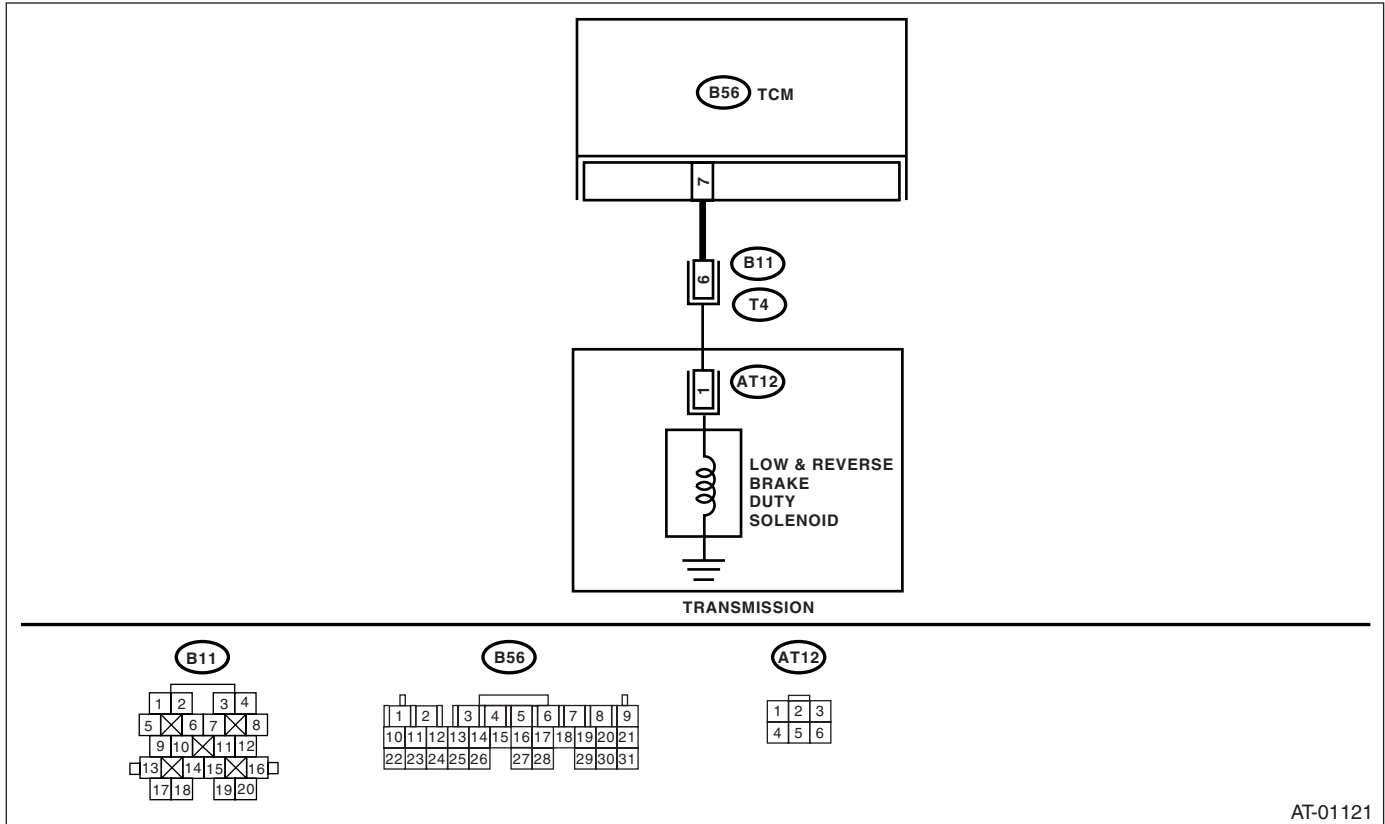
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Gear is not changed.

WIRING DIAGRAM:



AT-01121

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM connector and transmission connector. Connector & terminal (B56) No. 7 — (B11) No. 6:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B56) No. 7 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK LOW & REVERSE BRAKE DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 6 — No. 20:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 4.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK OUTPUT SIGNAL 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 Subaru Select Monitor switch to ON. 4) 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 ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Shift the select lever to "P" or "N" range, and depress the accelerator pedal. 7) Read the data of low & reverse duty solenoid using Subaru Select Monitor. • Low & reverse duty solenoid is indicated in "%".	Is the value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL FROM TCM USING SUBARU SELECT MONITOR. 1) Move the select lever to "1" range. 2) Read the data of low & reverse duty solenoid.	Is the value 55%?	Even if the AT OIL TEMP warning light blinks, 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 and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in low & reverse duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
7 CHECK LOW & REVERSE BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan, and disconnect connector from low & reverse duty solenoid. 4) Measure the resistance between low & reverse duty solenoid connector and transmission ground. Connector & terminal (AT12) No. 1 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω?	Go to step 8.	Replace the low & reverse brake duty solenoid. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE DUTY SOLENOID. Measure the resistance of harness between low & reverse duty solenoid and transmission connector. <i>Connector & terminal</i> <i>(T4) No. 6 — (AT12) No. 1:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between low & reverse brake duty solenoid and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE BRAKE DUTY SOLENOID. Measure the resistance of harness between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 6 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 low & reverse brake duty solenoid and transmission.	Repair the short circuit in harness between low & reverse brake duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

U: DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

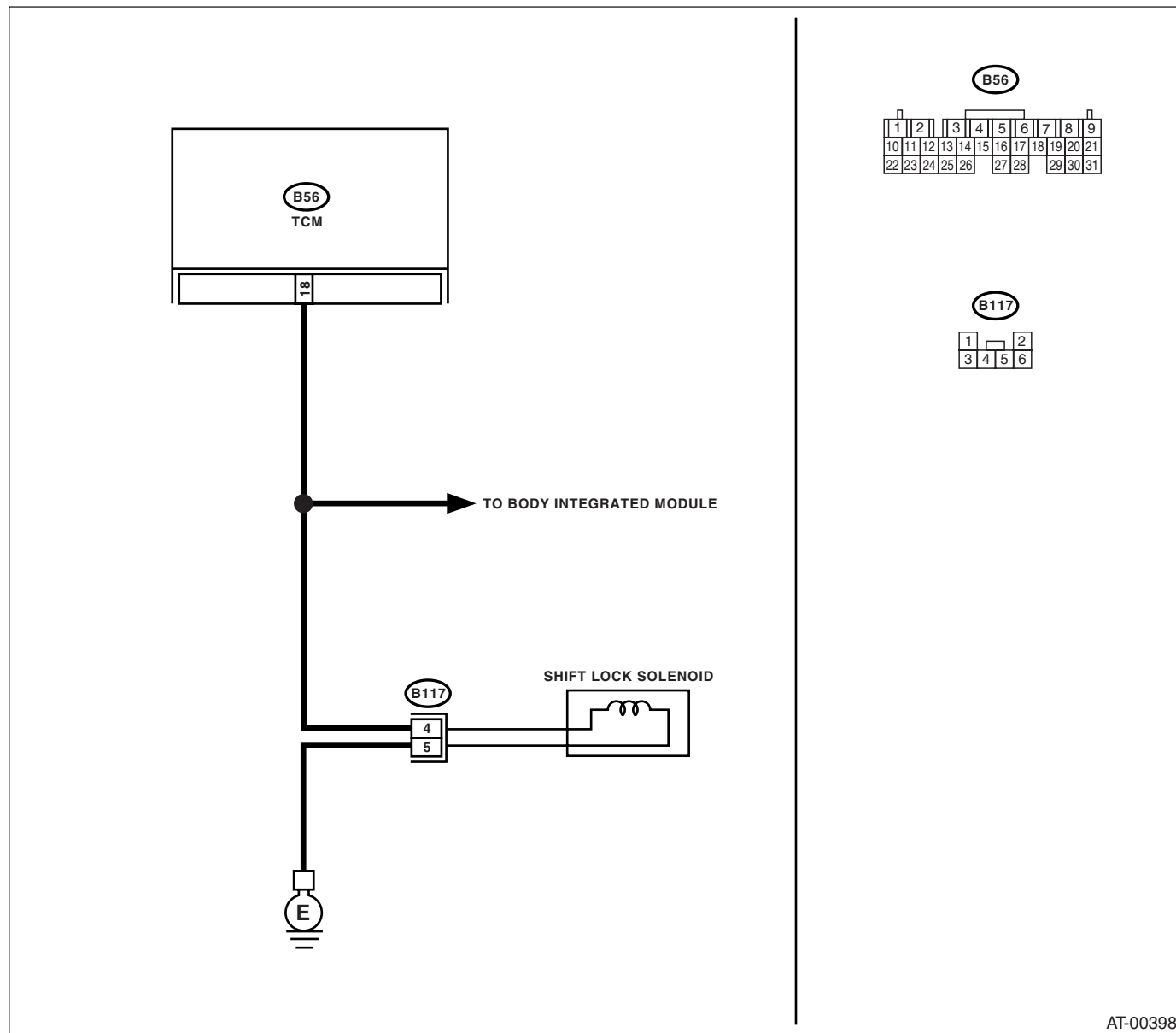
DIAGNOSIS:

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

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



AT-00398

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and shift lock solenoid. 3) Measure the resistance of harness between TCM and shift lock solenoid connector. Connector & terminal (B56) No. 18 — (B117) No. 4:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit in harness between TCM and shift lock solenoid connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID. Measure the resistance of harness between TCM and chassis ground. Connector & terminal (B56) No. 18 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and shift lock solenoid connector.
3 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B117) No. 5 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit in harness between chassis ground terminal and shift lock solenoid connector.
4 CHECK SHIFT LOCK SOLENOID. Measure the resistance between shift lock solenoid. Connector & terminal (B117) No. 5 — No. 4:	Is the resistance 20 — 40 Ω ?	Go to step 5.	Replace the shift lock solenoid.
5 CHECK TCM OUTPUT SIGNAL. 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Move the select lever to "D" range. 4) Measure the voltage between TCM and chassis ground. Connector & terminal (B56) No. 18 (+) — Chassis ground (-):	Is the voltage more than 10.5 V?	Go to step 6.	Go to step 7.
6 CHECK OUTPUT SIGNAL FROM TCM. 1) Lift-up the vehicle and place safety stand. NOTE: Raise all wheels off ground. 2) Start the engine. 3) Move the select lever "D" range and slowly increase vehicle speed to 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. 4) Measure the voltage between TCM and chassis ground. Connector & terminal (B56) No. 18 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be cause. Repair the harness or connector in reverse inhibitor control circuit.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in the reverse inhibitor control circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

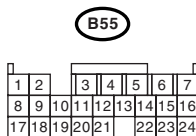
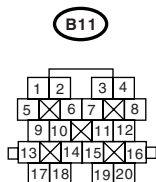
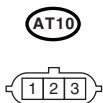
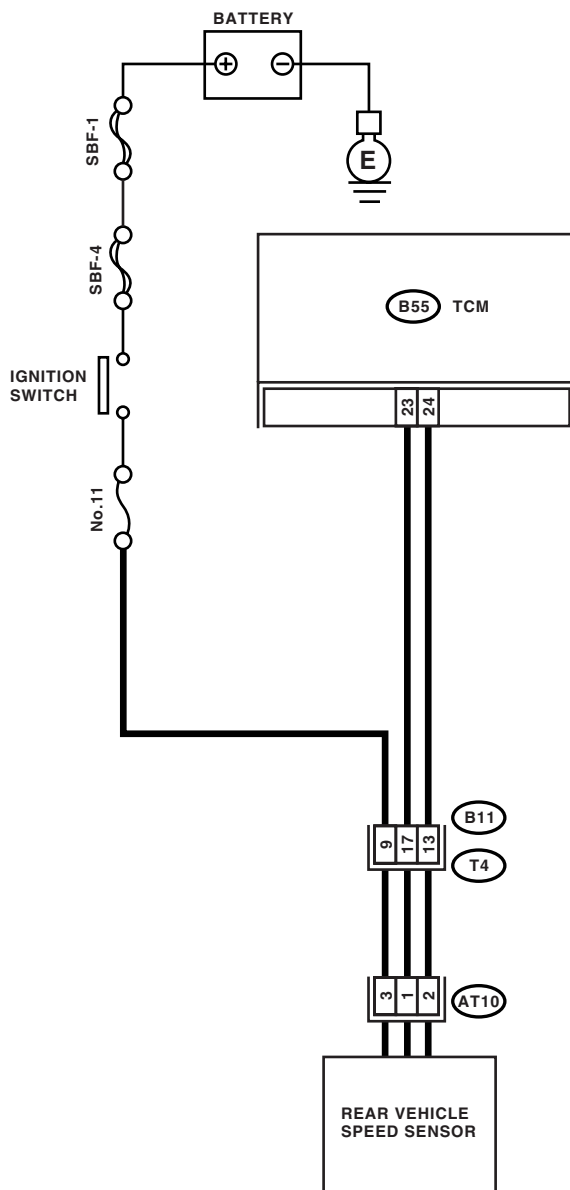
DIAGNOSIS:

The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner “braking”.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear vehicle speed sensor. 3) Turn the ignition switch to ON. 4) Measure the ignition power supply between rear vehicle speed sensor connector and transmission ground. Connector & terminal (AT10) No. 3 (+) — Transmission ground (-):	Is the voltage more than 10 V?	Go to step 2.	Check harness between rear vehicle speed sensor and battery for open circuit, short or poor contact. Repair the harness if required.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 23 — (AT10) No. 1:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit or poor contact of connector in harness between TCM and rear vehicle speed sensor connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 24 — (AT10) No. 2:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit or poor contact of connector in harness between TCM and rear vehicle speed sensor connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 23 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair the short circuit in harness between TCM and rear vehicle speed sensor connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 24 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between TCM and rear vehicle speed sensor connector.
6 PREPARE OSCILLOSCOPE.	Do you have an oscilloscope?	Go to step 8.	Go to step 7.
7 CHECK INPUT SIGNAL FOR TCM. 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stands. NOTE: Raise all wheels off ground. 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.> 4) Measure the AC voltage between TCM connector terminals. Connector & terminal (B55) No. 24 (+) — No. 23 (-):	Is the voltage more than 2 V?	Go to step 9.	Replace the rear vehicle speed sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stands. NOTE: Raise all wheels off ground. 3) Set the oscilloscope to TCM connector terminals. Connector & terminal Positive lead; (B55) No. 24: Earth lead; (B55) No. 23: 4) 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.> 5) Measure the signal voltage indicated on oscilloscope.	Is the pulse voltage approx. 5 V?	Go to step 9.	Replace the rear vehicle speed sensor.
9 CHECK POOR CONTACT.	Is there poor contact in rear vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

W: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

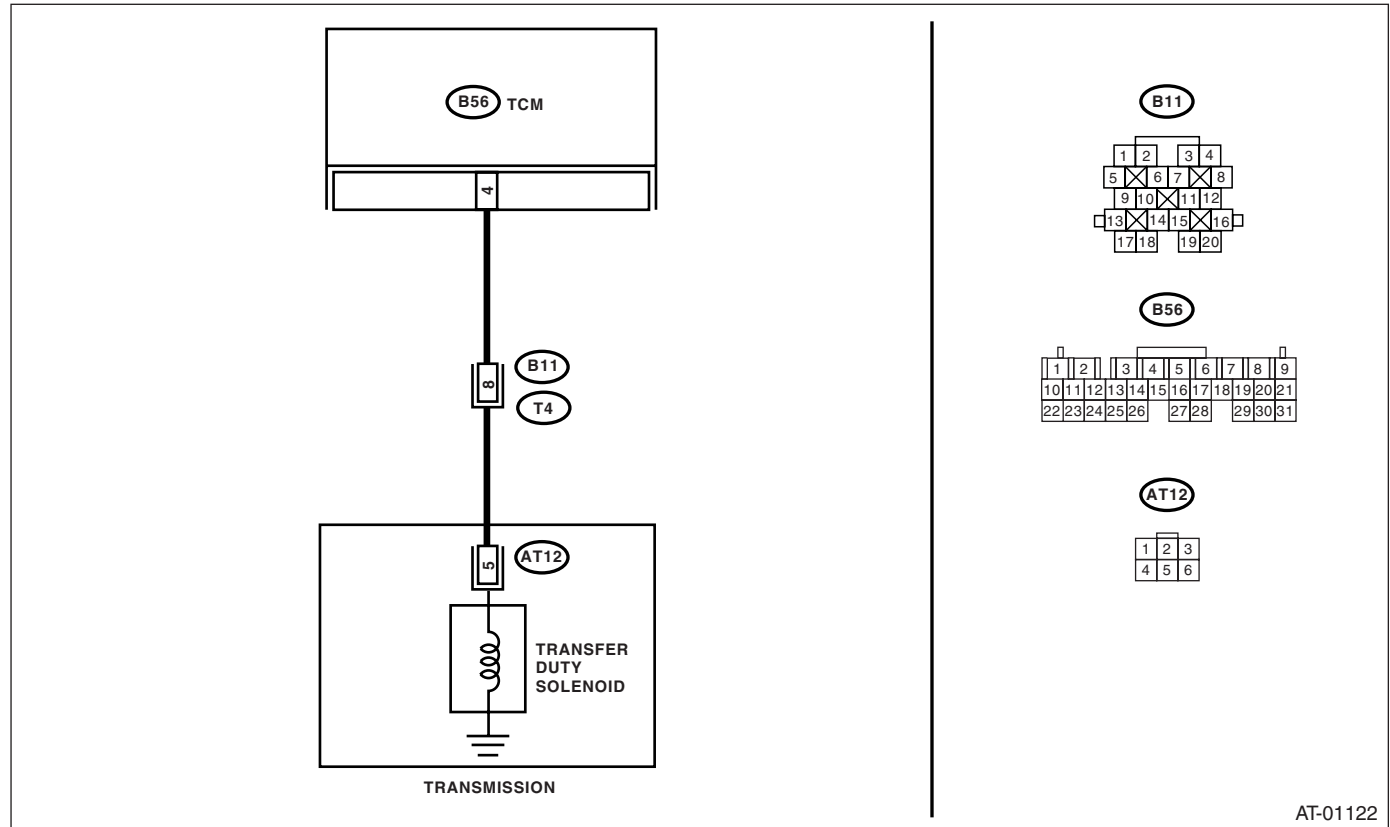
DIAGNOSIS:

The output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

- Excessive tight corner “braking”.
- Front wheel slips on the slippery road.

WIRING DIAGRAM:



AT-01122

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 connector and transmission connector. Connector & terminal (B56) No. 4 — (B11) No. 8:	Is the resistance less than 1 Ω	Go to step 2.	Repair the 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. Connector & terminal (B56) No. 4 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK TRANSFER DUTY SOLENOID. Measure the resistance between transmission connector and transmission terminals. Connector & terminal (T4) No. 8 — No. 20:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 5.	Go to step 4.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift-up the vehicle and place safety stand. NOTE: Raise all wheels off ground. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the extension case and disconnect connector from transfer duty solenoid. 4) Measure the resistance between transfer duty solenoid connector and transmission ground. Connector & terminal (AT12) No. 5 — Transmission ground:	Is the resistance 2.0 — 6.0 Ω ?	Go to step 5.	Replace the control valve body. <Ref. to 4AT-61, Control Valve Body.>
5 CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transfer duty solenoid and transmission connector. Connector & terminal (T4) No. 8 — (AT12) No. 5:	Is the resistance less than 1 Ω ?	Go to step 6.	Repair the open circuit in harness between transfer duty solenoid and transmission connector.
6 CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 8 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 contact in transfer duty solenoid and transmission.	Repair the short circuit in harness between transfer duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

X: DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT

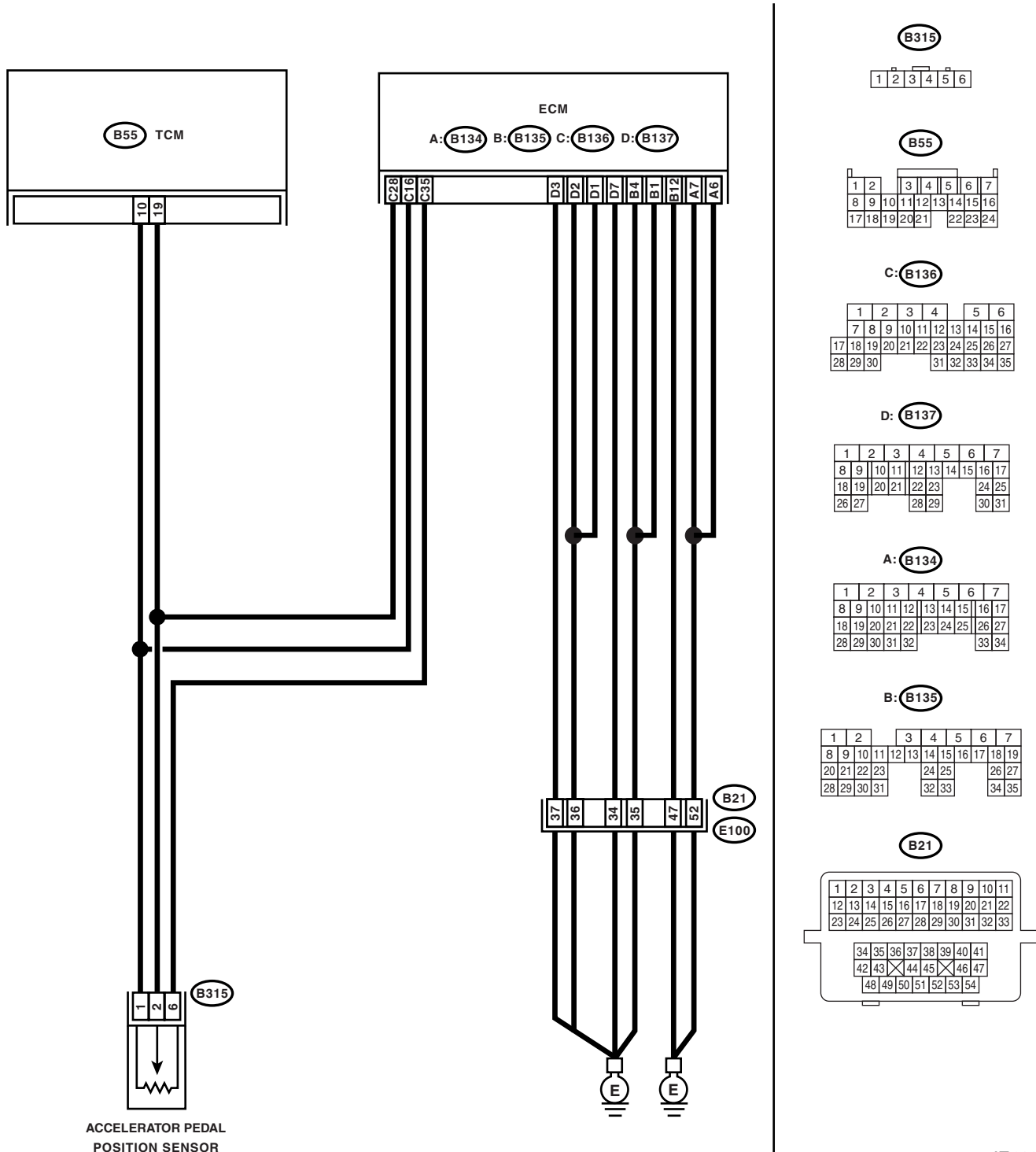
DIAGNOSIS:

The input signal circuit of accelerator pedal position sensor is open or shorted.

TROUBLE SYMPTOM:

- Shift point too high or too low.
- Excessive shift shock.
- Excessive tight corner "braking".

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK ENGINE GROUND TERMINALS.	Have engine ground terminals been 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 (B134) No. 7 — Engine ground: (B134) No. 6 — Engine ground: (B135) No. 1 — Engine ground: (B135) No. 4 — Engine ground: (B135) No. 12 — Engine ground: (B137) No. 1 — Engine ground: (B137) No. 2 — Engine ground: (B137) No. 3 — Engine ground: (B137) No. 7 — Engine ground:	Is the resistance less than 5 Ω ?	Go to step 3.	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3 CHECK ACCELERATOR PEDAL POSITION SENSOR. 1) Disconnect the connector from accelerator pedal position sensor. 2) Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. Connector & terminal (B315) No. 1 — No. 6:	Is the resistance 0.5 — 4.5 k Ω ?	Go to step 4.	Replace the accelerator pedal position sensor.
4 CHECK ACCELERATOR PEDAL POSITION SENSOR. Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. Connector & terminal (B315) No. 2 — No. 6:	Is the resistance 0.5 — 4.5 k Ω ?	Go to step 5.	Replace the accelerator pedal position sensor.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and accelerator pedal position sensor connector. Connector & terminal (B55) No. 19 — (B315) No. 2:	Is the resistance less than 1 Ω ?	Go to step 6.	Repair the open circuit in harness between TCM and accelerator pedal position sensor connector, and poor contact in coupling connector.
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR. Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 19 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 8.	Repair the short circuit in harness between TCM and accelerator pedal position sensor connector.
7 CHECK HARNESS CONNECTOR BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR. 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between accelerator pedal position sensor and chassis ground. Connector & terminal (B315) No. 6 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 8.	Repair the short circuit in harness between ECM and accelerator pedal position sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM, accelerator pedal 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 accelerator pedal position sensor using Subaru Select Monitor. • Accelerator pedal position SENSOR input signal is indicated.	Is the voltage more than 0.2 V?	Even if the AT OIL TEMP warning light blinks, 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 accelerator pedal position sensor circuit.	Go to step 9 .
9 CHECK POOR CONTACT.	Is there poor contact in accelerator pedal position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Y: DTC P1709 THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT

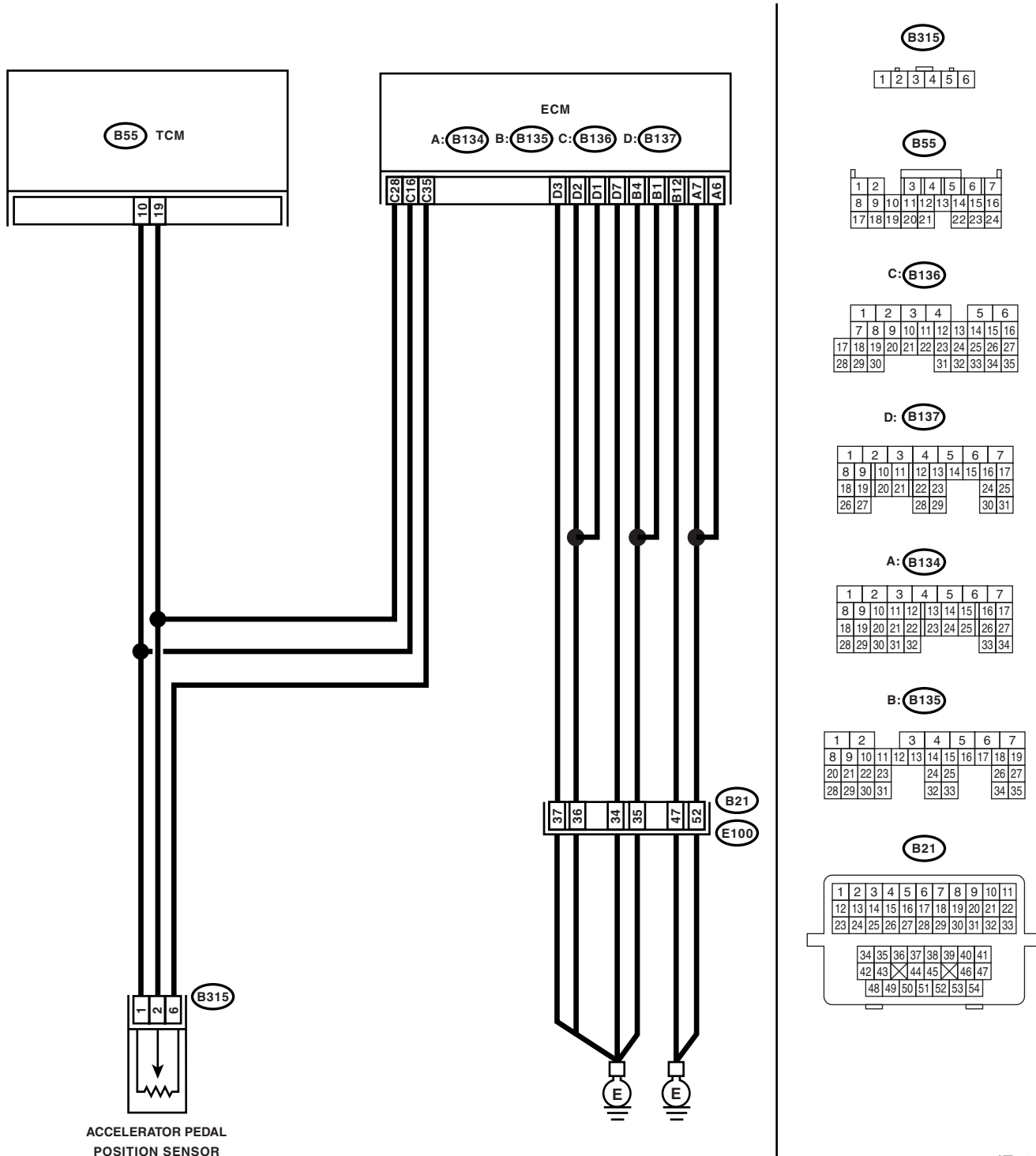
DIAGNOSIS:

The input signal circuit of accelerator pedal position sensor is shorted.

TROUBLE SYMPTOM:

- Shift point too high or too low.
- Excessive shift shock.
- Excessive tight corner "braking".

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK ENGINE GROUND TERMINALS.	Have engine ground terminals been tightened securely?	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 (B134) No. 7 — Engine ground: (B134) No. 6 — Engine ground: (B135) No. 1 — Engine ground: (B135) No. 4 — Engine ground: (B135) No. 12 — Engine ground: (B137) No. 1 — Engine ground: (B137) No. 2 — Engine ground: (B137) No. 3 — Engine ground: (B137) No. 7 — Engine ground:	Is the resistance less than 5 Ω ?	Go to step 3.	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3 CHECK ACCELERATOR PEDAL POSITION SENSOR. 1) Disconnect the connector from accelerator pedal position sensor. 2) Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. Connector & terminal (B315) No. 1 — No. 6:	Is the resistance 0.5 — 4.5 k Ω ?	Go to step 4.	Replace the accelerator pedal position sensor.
4 CHECK ACCELERATOR PEDAL POSITION SENSOR. Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. Connector & terminal (B315) No. 6 — No. 2:	Is the resistance 0.5 — 4.5 k Ω ?	Go to step 5.	Replace the accelerator pedal position sensor.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR. 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 19 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between TCM and accelerator pedal position sensor connector.
6 CHECK HARNESS CONNECTOR BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR. 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector. Connector & terminal (B315) No. 6 — (B136) No. 35:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the short circuit in harness between ECM and accelerator pedal position sensor connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM, accelerator pedal 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 opened. 6) Read the data of accelerator pedal position sensor using Subaru Select Monitor. • Accelerator pedal position sensor input signal is indicated.	Is the voltage less than 4.6 V?	Go to step 8.	Even if the AT OIL TEMP warning light blinks, 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 accelerator pedal position sensor circuit.
8 CHECK POOR CONTACT.	Is there poor contact in accelerator pedal position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Z: DTC P1714 THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

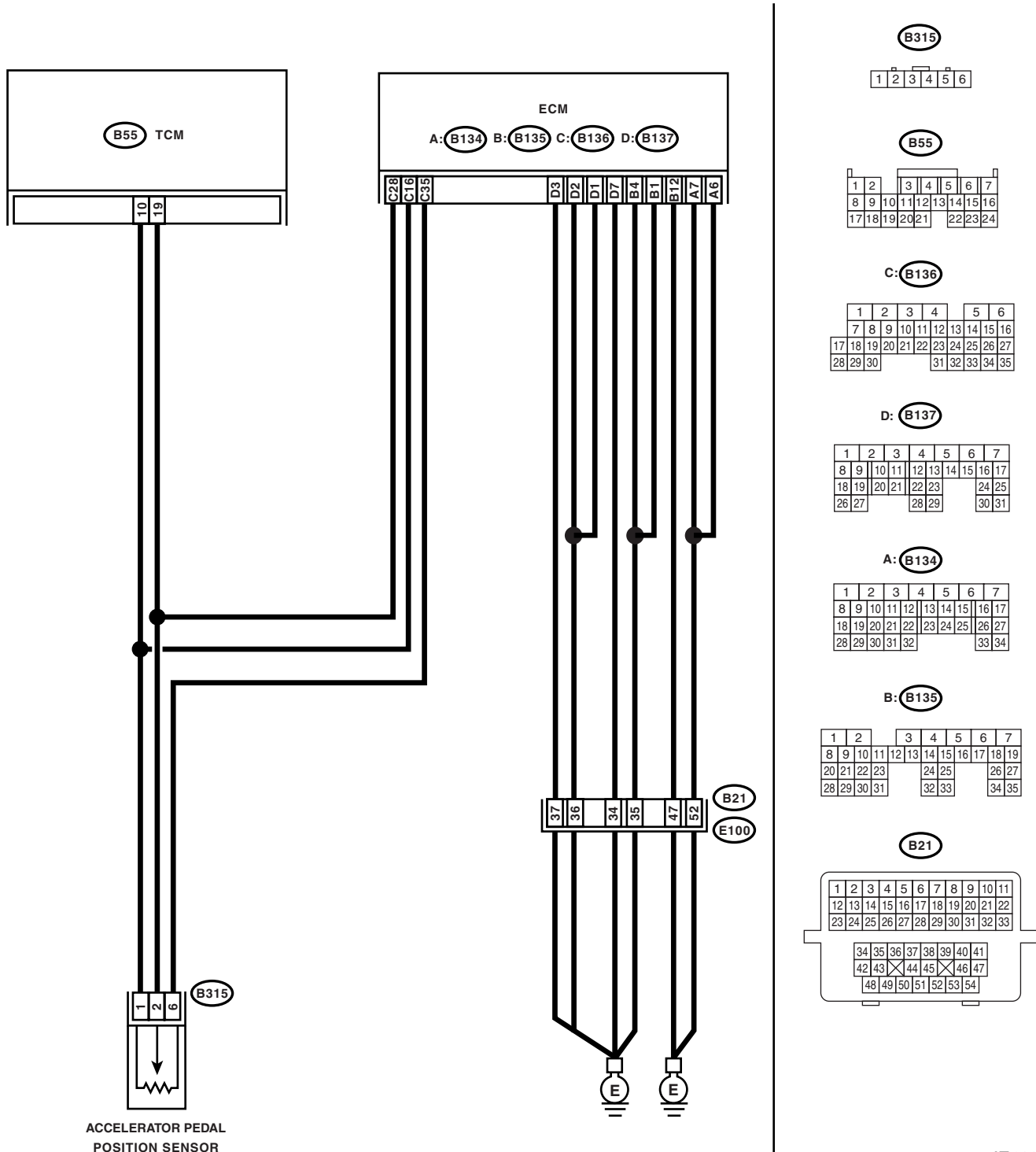
DIAGNOSIS:

The power supply 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:



AT-02870

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 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. <i>Connector & terminal</i> <i>(B55) No. 10 — (B315) No. 1:</i>	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure the resistance of harness between TCM connector and chassis ground. <i>Connector & terminal</i> <i>(B55) No. 10 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and throttle position sensor connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM and chassis ground. <i>Connector & terminal</i> <i>(B55) No. 10 (+) — Chassis ground (-):</i>	Is the voltage 4.6 — 5.4 V?	Go to step 4.	Even if the AT OIL TEMP warning light blinks, 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 throttle position sensor circuit.
4 CHECK POOR CONTACT.	Is there poor contact in throttle position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

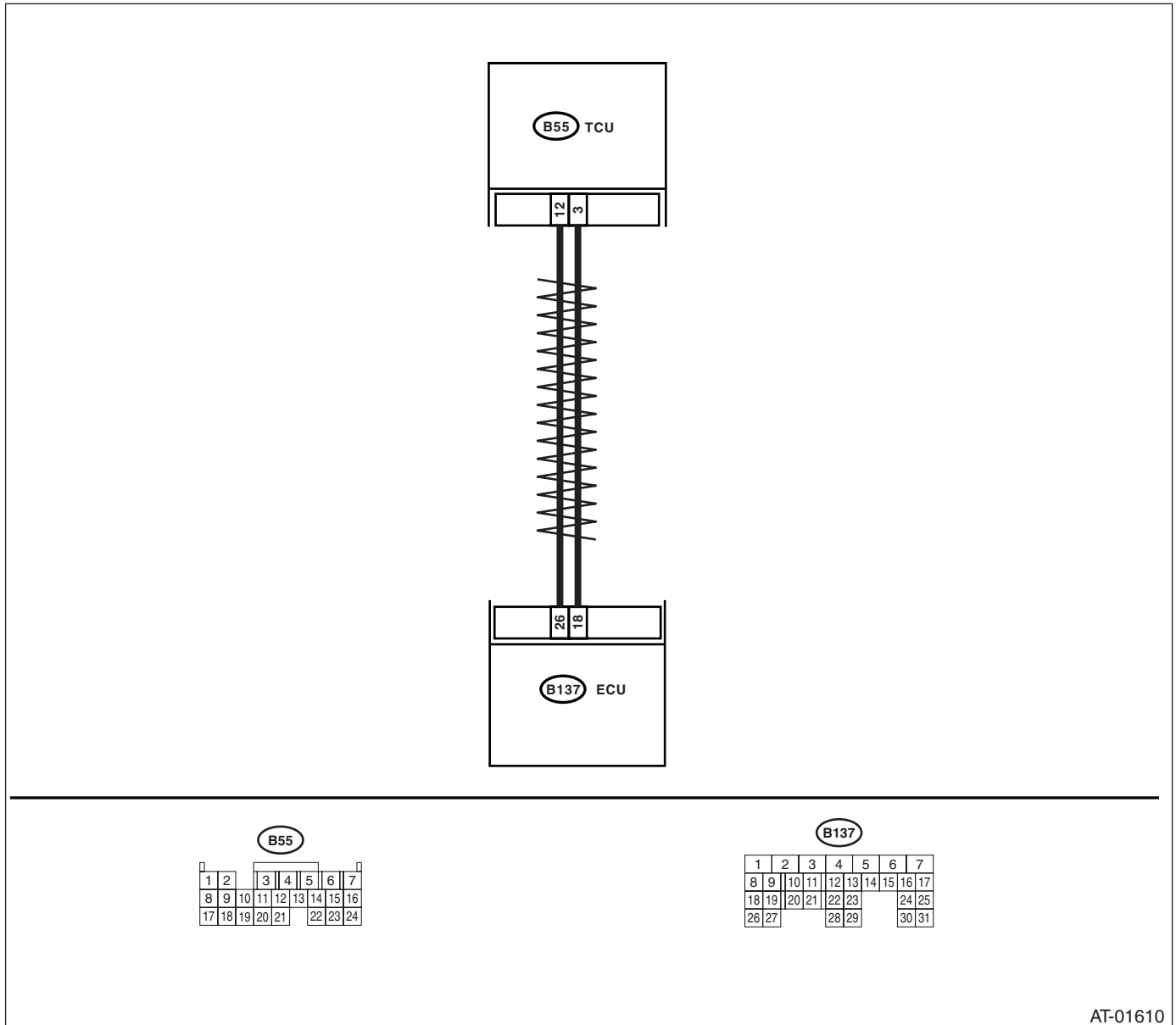
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

AA:DTC P1718 CAN COMMUNICATION CIRCUIT

DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

WIRING DIAGRAM:



AT-01610

Step	Check	Yes	No
1	CHECK DTC. Check if multiple trouble codes appear in the on-board diagnostics test mode.	Go to other DTC.	Go to step 2.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect TCM and ECM connectors. 3) Measure resistance of harness between ECM and TCM connector. Connector & Terminal (B55) No. 3 — (B137) No. 18:	Go to step 3.	Repair open circuit in harness between TCM and ECM, or poor contact in coupling connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between ECM and TCM connector. Connector & Terminal (B55) No. 12 — (B137) No. 26:	Is the measured value less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between TCM and ECM, or poor contact in coupling connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM and chassis ground. Connector & Terminal (B55) No. 3 — Chassis ground: (B55) No. 12 — Chassis ground:	Is the measured value more than 1 M Ω ?	There is failure in the TCM or ECM. (Replace and check again)	Repair short circuit in harness between TCM and ECM.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

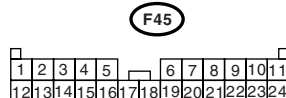
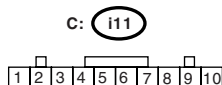
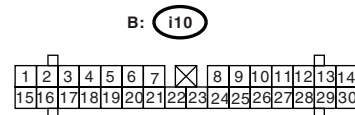
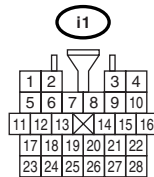
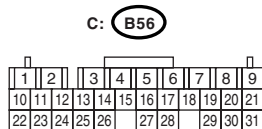
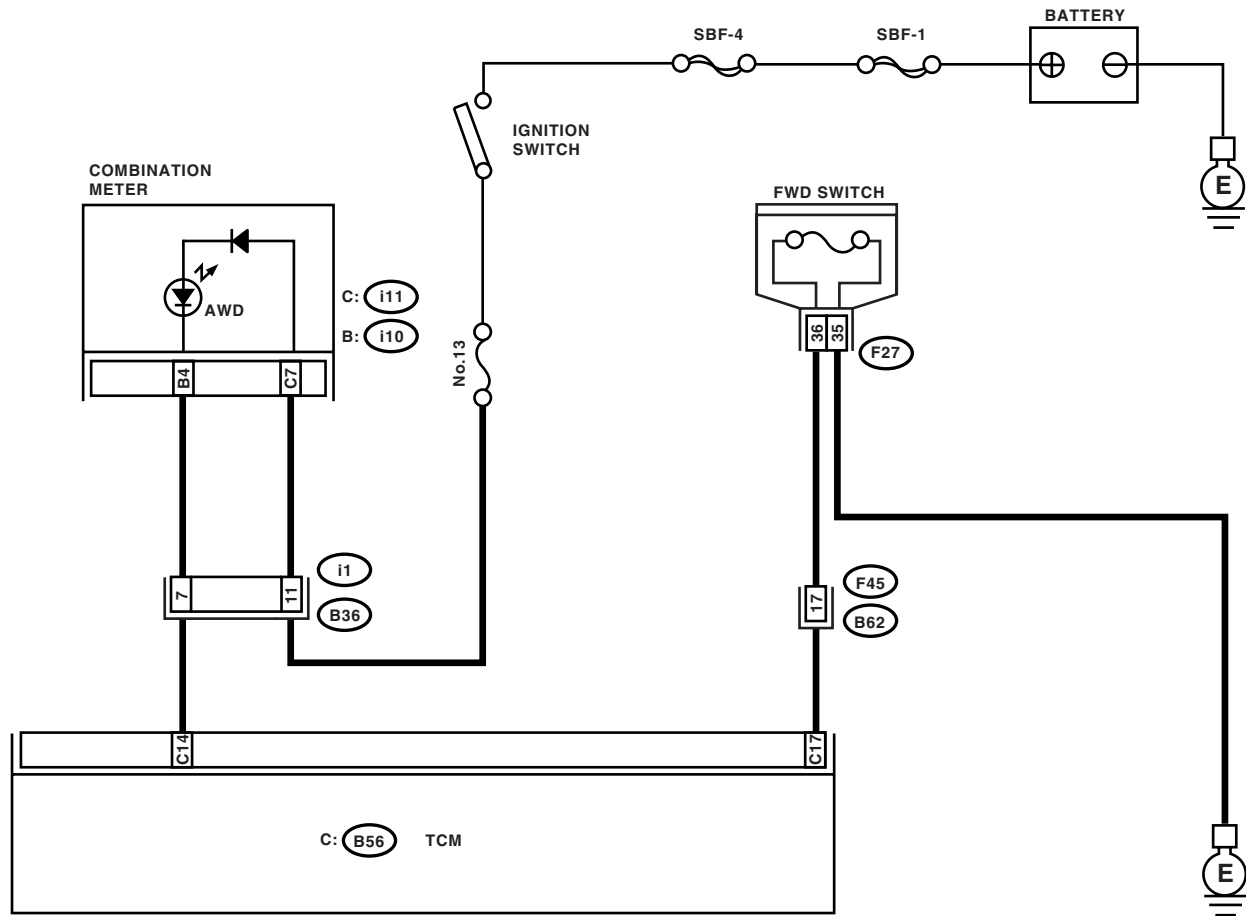
14. Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: INSPECTION OF FWD SWITCH

DIAGNOSIS:

- The LED does not come on even if FWD switch is ON.
- The FWD switch circuit is open or short.

WIRING DIAGRAM:



AT-03014

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No	
1	CHECK SPARE FUSE.	Is the spare fuse OK?	Go to step 2.	Replace the fuse.
2	CHECK FWD SWITCH. Connect the Subaru Select Monitor to data link connector.	When the fuse is inserted to FWD switch, does the LED light up?	Go to step 3.	Go to step 4.
3	CHECK COMBINATION METER.	Does the AWD indicator light illuminate?	Go to INSPECTION FOR CRUISE CONTROL SWITCH. <Ref. to 4AT(D)(diag)-91, CHECK CRUISE CONTROL SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step 9.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance of harness between TCM and FWD switch connector. Connector & terminal (B56) No. 17 — (F27) No. 36:	Is the resistance less than 1 Ω?	Go to step 5.	Repair the open circuit in harness between TCM and FWD switch connector.
5	CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND. Measure the resistance of harness between FWD switch and chassis ground. Connector & terminal (F27) No. 35 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 6.	Repair the open circuit in harness between FWD switch connector and chassis ground.
6	CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. Measure the resistance of harness connector between TCM and body to make sure that circuit does not short. Connector & terminal (B56) No. 17 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 7.	Repair the short circuit in harness between TCM and FWD switch connector.
7	CHECK INPUT SIGNAL FOR TCM. 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing the fuse to FWD switch connector. Connector & terminal (B56) No. 17 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 8.	Go to step 12.
8	CHECK INPUT SIGNAL FOR TCM. Measure the signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B56) No. 17 (+) — Chassis ground (-):	Is the voltage 6 — 9.1 V?	Go to step 9.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 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 check connector. Connector & terminal (B56) No. 14 — (i10) No. 4:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair the open circuit in harness between TCM and combination meter and poor contact in coupling connector.
10 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 (B56) No. 14 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 11.	Repair the short circuit in harness between TCM and combination meter connector.
11 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 the fuse to FWD switch connector. Connector & terminal (B56) No. 14 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 12.	Go to step 13.
12 CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure the signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B56) No. 14 (+) — Chassis ground (-):	Is the voltage 6 — 9.1 V?	Go to step 13.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
13 CHECK FUSE.	Is the fuse OK?	Go to step 14.	Replace the fuse.
14 CHECK POOR CONTACT.	Is there poor contact in FWD switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

B: CHECK CRUISE CONTROL SWITCH

Step	Check	Yes	No
1 CHECK CRUISE CONTROL SWITCH.	When the cruise control is set, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to 4AT(D)(diag)-28, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Check the cruise control. <Ref. to CC(ETC)(diag)-18, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

15. General Diagnostic Table

A: INSPECTION

Symptom	Problem parts
Starter does not rotate when select lever is in "P" or "N" range, starter rotates when select lever is in "R", "D", "3" or "2" range.	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Noise when select lever is in "P" or "N" range.	• Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	• Strainer • ATF level too high or too low
Noise occurs while driving in "D1".	• Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in "D2".	
Noise occurs while driving in "D3".	• Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in "D4".	• Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Engine stalls while shifting from "1" range to another.	• Control valve • Lock-up damper • Engine performance • Input shaft
Vehicle moves when select lever is in "N" range.	• Select cable • Inhibitor switch • TCM • Low clutch
Shock occurs when select lever is moved from "N" to "D" range.	• Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Low clutch duty solenoid • Low clutch • TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from "N" to "D" range.	• Control valve • Low clutch • Line pressure linear solenoid • Seal ring • Front gasket of transmission case
Shock occurs when select lever is moved from "N" to "R" range.	• Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • TCM • Harness • Control valve • ATF deterioration

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Excessive time lag occurs when select lever is moved from "N" to "R" range.	- Control valve - Low & reverse clutch - Reverse clutch - Line pressure linear solenoid - Seal ring - Front gasket of transmission case
Vehicle does not start in any shift range (engine stalls).	- Parking brake mechanism - Planetary gear
Vehicle does not start in any shift range (engine revving up).	- Strainer - Line pressure linear solenoid - Control valve - Drive pinion - Hypoid gear - Axle shaft - Differential gear - Oil pump - Input shaft - Output shaft - Planetary gear - Drive plate - ATF level too low - Front gasket of transmission case
Vehicle does not start in "R" range only (engine revving up).	- Select cable - Select lever - Line pressure linear solenoid - Control valve - Low & reverse clutch - Reverse clutch
Vehicle does not start in "R" range only (engine stalls).	- Low clutch 2-4 brake - Planetary gear - Parking brake mechanism
Vehicle does not start in "D", "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 - ATF deterioration - Front gasket of 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 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 select lever is in "R" (normal stall rpm).	- Control valve - High clutch 2-4 brake - Planetary gear

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Does not shift from 1st to 2nd gear.	• TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Accelerator pedal position sensor • Control valve • 2-4 brake
Does not shift from 2nd to 3rd gear.	• TCM • Control valve • High clutch
Does not shift from 3rd to 4th gear.	• TCM • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when select lever is in "3" range.	• Inhibitor switch • TCM • Accelerator pedal position sensor • Control valve
Engine brake is not effected when select lever is in "3" or "2" range.	• Control valve
Engine brake is not effected when 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 • Accelerator pedal position sensor • Control valve • Ground earth
No lock-up occurs.	• TCM • Accelerator pedal 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 • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • Low & reverse duty solenoid

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Slippage occurs from 1st to 2nd gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake
Shock occurs from 2nd to 3rd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Low & reverse duty solenoid • Control valve • High clutch • 2-4 brake • ATF deterioration • Engine performance • High clutch duty solenoid
Slippage occurs from 2nd to 3rd gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • High clutch • 2-4 brake • Low & reverse duty solenoid
Shock occurs from 3rd to 4th gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • Low clutch duty solenoid • 2-4 brake • ATF deterioration • Engine performance
Slippage occurs from 3rd to 4th gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake
Shock occurs when select lever is moved from "3" to "2" range.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • High clutch duty solenoid

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Shock occurs when select lever is moved from "D" to "1" range.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • ATF deterioration • Low & reverse brake duty solenoid • Low & reverse clutch solenoid
Shock occurs when select lever is moved from "2" to "1" range.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • Low & reverse brake duty solenoid
Shock occurs when accelerator pedal is released at medium speeds.	• TCM • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • Lock-up damper • Engine performance
Vibration occurs during straight-forward operation.	• TCM • Lock-up duty solenoid • Lock-up facing • Lock-up damper
Vibration occurs during turns (tight corner "braking" phenomenon).	• TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Transfer clutch • Transfer valve • Transfer duty solenoid • ATF deterioration • Harness
Front wheel slippage occurs during standing starts.	• TCM • Front vehicle speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Transfer clutch • Control valve • Transfer pipe • Transfer duty solenoid
Vehicle is not set in FWD mode.	• TCM • Transfer clutch • Control valve • Transfer duty solenoid • FWD fuse
Select lever is hard to move.	• Select cable • Select lever • Detention spring • Manual plate
Select lever is excessively hard to move (unreasonable resistance).	• Detention spring • Manual plate

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Select lever slips out of operation during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detention spring • Manual plate

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

**AUTOMATIC TRANSMISSION
(DIAGNOSTICS)
H4DOTC (turbo)**

Basic Diagnostic Procedure

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

1. Basic Diagnostic Procedure

A: PROCEDURE

NOTE:

This section is specified for H4DOTC engine model.

Step	Check	Yes	No
1 CHECK PRE-INSPECTION. 1) Ask the customer when and how trouble occurred using interview checklist. <Ref. to 4AT(diag)-4, Check List for Interview.> 2) Before performing the diagnosis, inspect following items which might influence the AT problems. • General inspection <Ref. to 4AT(diag)-5, INSPECTION, General Description.> • Oil leak • Check if each harness connector is securely connected. • Visually check the harness for damage. • Stall speed test <Ref. to 4AT-35, Stall Test.> • Line pressure test <Ref. to 4AT-38, Line Pressure Test.> • Transfer clutch pressure test <Ref. to 4AT-40, Transfer Clutch Pressure Test.> • Time lag test <Ref. to 4AT-37, Time Lag Test.> • Road test <Ref. to 4AT-34, Road Test.> • Inhibitor switch <Ref. to 4AT-52, Inhibitor Switch.>	Is the unit that might influence AT problem 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 illuminate?	Go to step 4.	Go to step 3.
3 CHECK AT OIL TEMP WARNING LIGHT. 1) Turn the ignition switch to OFF. 2) Repair the AT OIL TEMP warning light circuit or power supply and ground line circuit. <Ref. to 4AT(diag)-23, Diagnostic Procedure for AT OIL TEMP Warning Light.> 3) Turn the ignition switch to ON.	Is the AT OIL TEMP warning light illuminate?	Go to step 4.	Go to step 5.
4 CHECK INDICATION OF DTC. Calling up the DTC. With Subaru Select Monitor <Ref. to 4AT(diag)-18, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of select monitor cannot be executed normally, check the communication circuit. <Ref. to 4AT(diag)-28, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is the DTC displayed?	Go to step 6. NOTE: Record all DTC.	Go to step 5.

Basic Diagnostic Procedure

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 PERFORM THE GENERAL DIAGNOSTICS. 1) Inspect using "Diagnostic Procedure without DTC". <Ref. to 4AT(diag)-78, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using "Symptom Related Diagnostic". <Ref. to 4AT(diag)-88, General Diagnostic Table.> 3) Perform the clear memory mode. With Subaru Select Monitor <Ref. to 4AT(diag)-20, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to 4AT(diag)-19, Inspection Mode.> 5) Calling up the DTC. With Subaru Select Monitor <Ref. to 4AT(diag)-18, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Go to step 6.	Complete the diagnosis.
6 PERFORM THE DIAGNOSIS. 1) Inspect using "Diagnostics Chart with DTC". <Ref. to 4AT(diag)-31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-22, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the clear memory mode. With Subaru Select Monitor <Ref. to 4AT(diag)-20, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to 4AT(diag)-19, Inspection Mode.> 5) Calling up the DTC. With Subaru Select Monitor <Ref. to 4AT(diag)-18, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Inspect using "Diagnostics Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

Check List for Interview

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. Check List for Interview

A: CHECK

Check the following items when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km/h or miles		
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)		
AT diagnostic indicator light (AT OIL TEMP warning light)	☐ 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 an 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 ECM, TCM or each sensor, use a tapered pin with 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 (0.256 in).

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

Specific gravity: Above 1.260

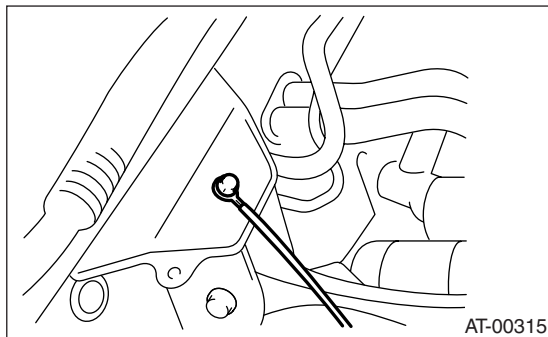
2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

- **Chassis side**

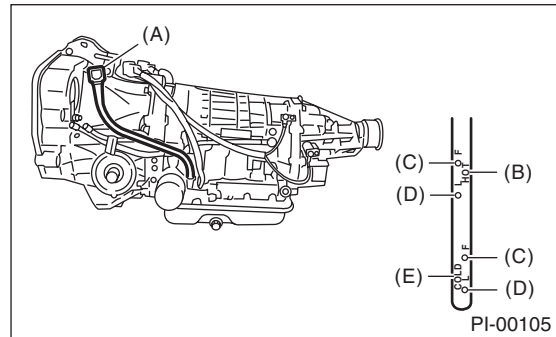
Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

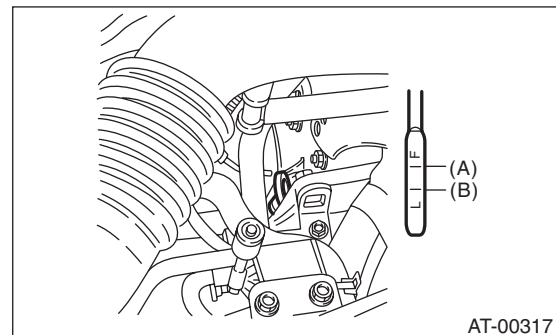
Make sure that ATF level is in the specification. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>



- (A) Level gauge
- (B) "HOT" side
- (C) Upper level
- (D) Lower level
- (E) "COLD" side

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure that the front differential oil level is in specification. <Ref. to 4AT-33, INSPECTION, Differential Gear Oil.>



- (A) Upper level
- (B) Lower level

General Description

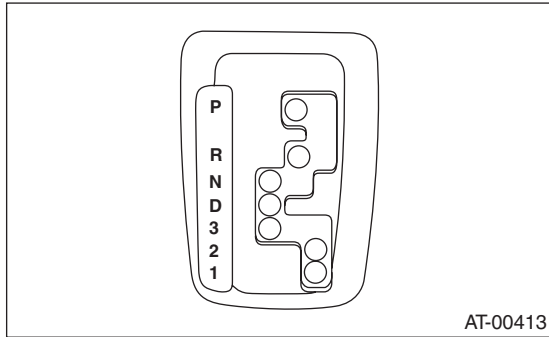
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

5. OPERATION OF SHIFT SELECT LEVER

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

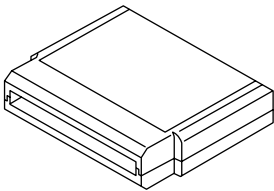
WARNING:

Stop the engine while checking operation of selector lever.



C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA260	24082AA260 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems.

2. GENERAL PURPOSE TOOL

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

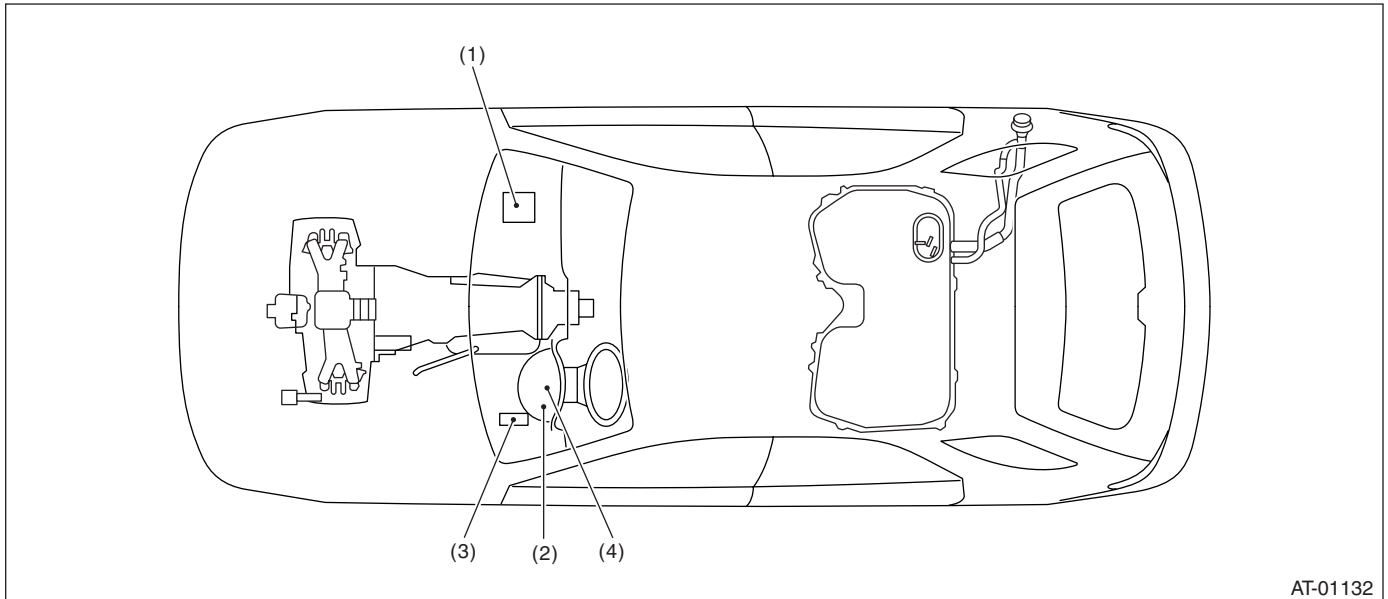
Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

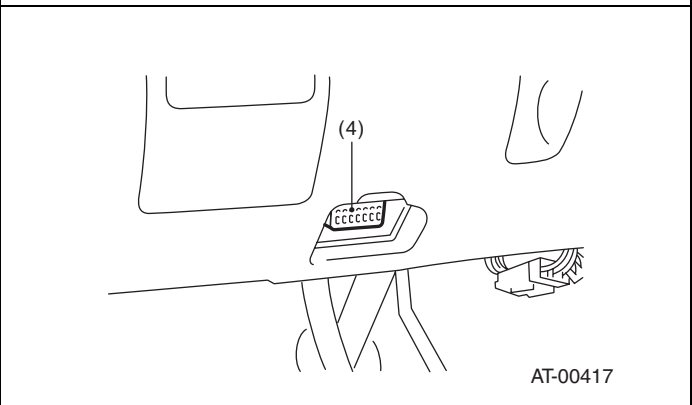
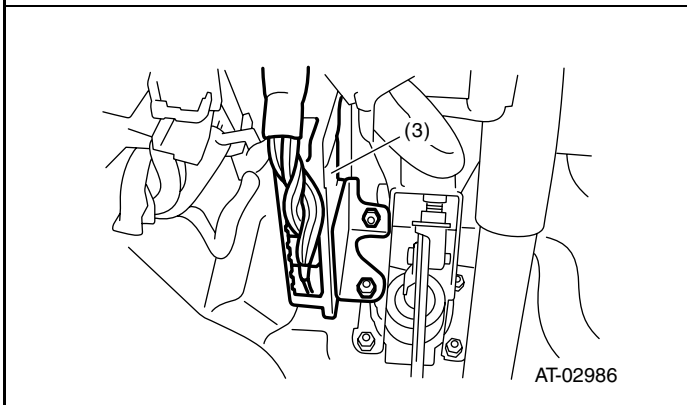
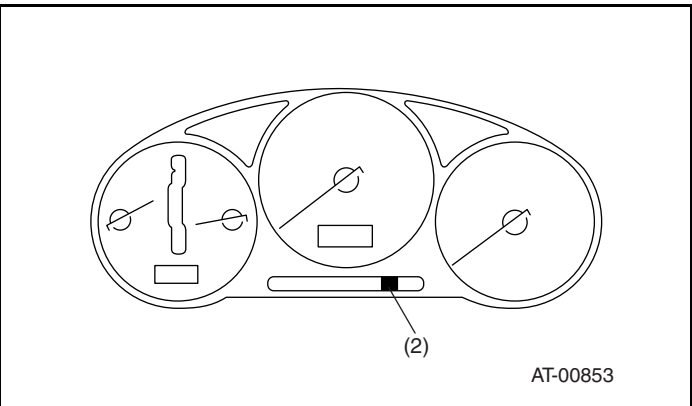
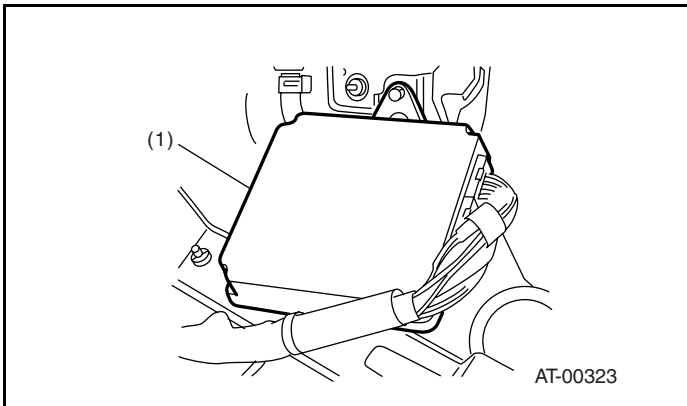
4. Electrical Component Location

A: LOCATION

1. CONTROL MODULE



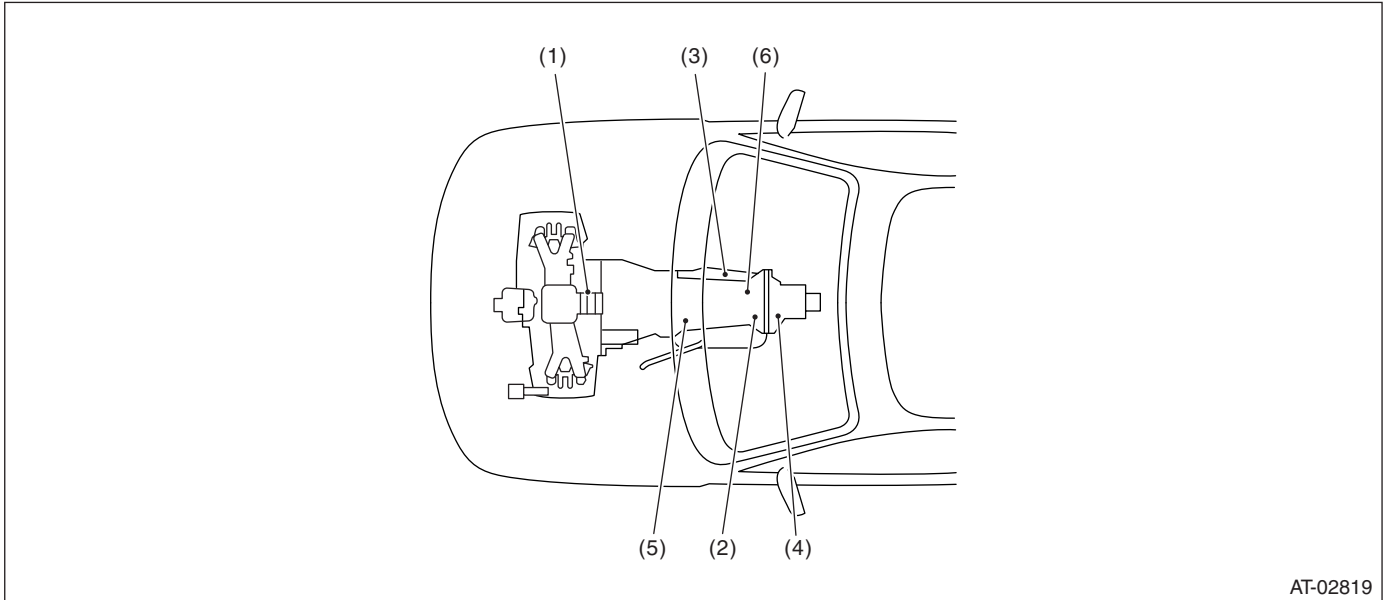
(1) Engine control module (ECM)	(3) Transmission control module (TCM)	(4) Data link connector
(2) AT OIL TEMP warning light (AT diagnostic indicator light)		



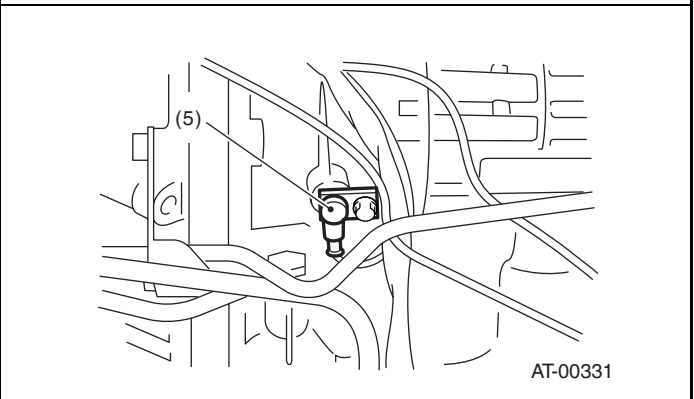
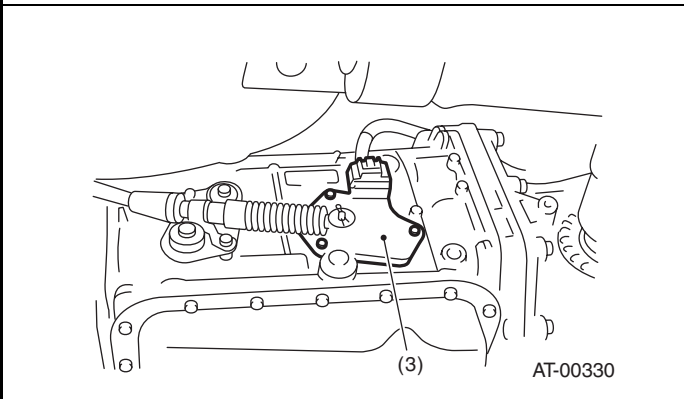
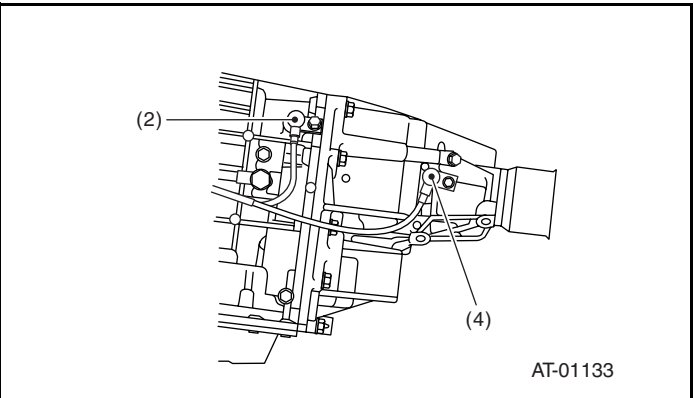
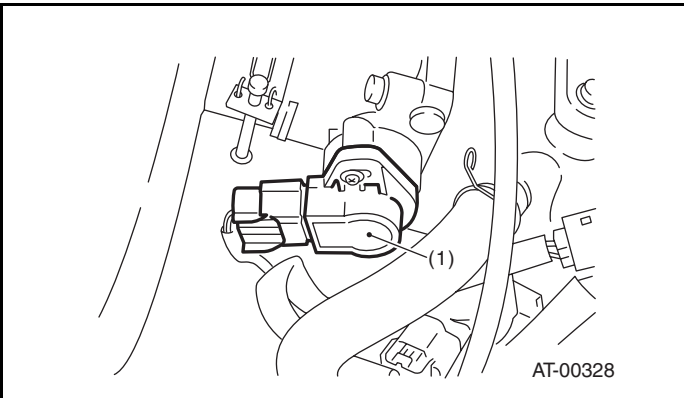
Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. SENSOR

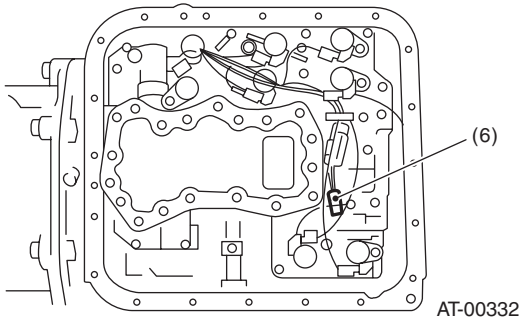


(1) Throttle position sensor	(4) Rear vehicle speed sensor	(6) ATF temperature sensor
(2) Front vehicle speed sensor	(5) Torque converter turbine speed sensor	
(3) Inhibitor switch		



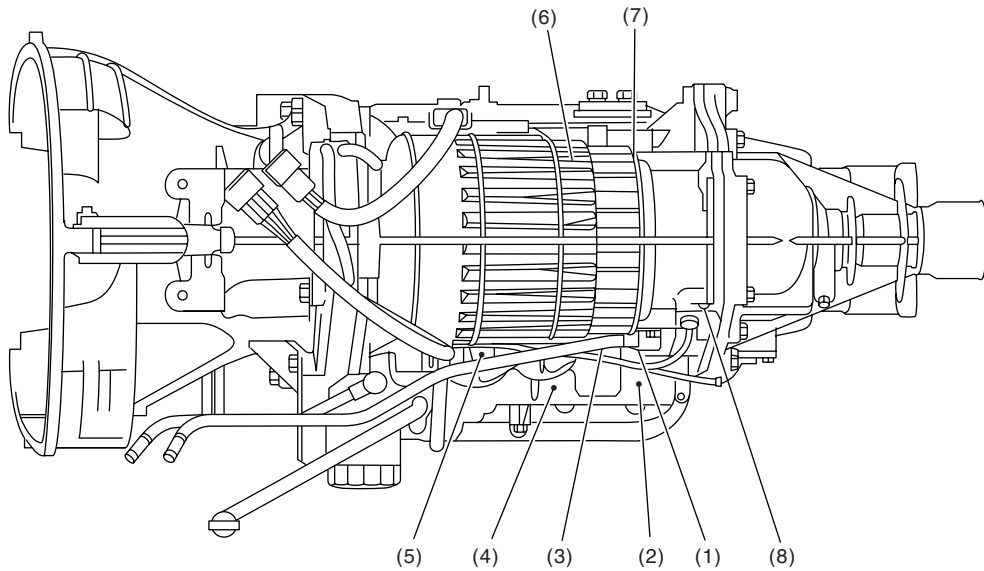
Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

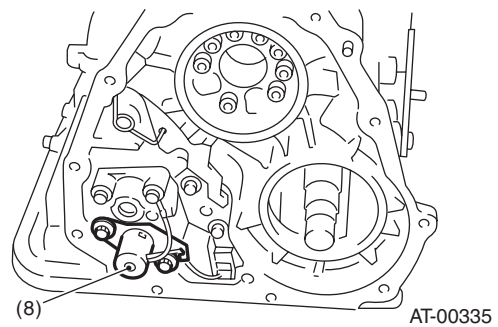
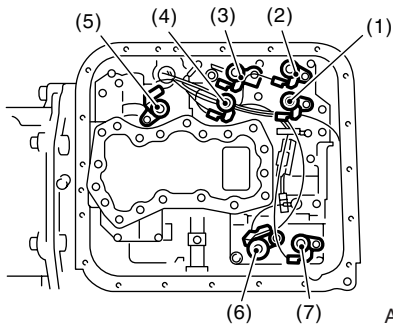


SUBARU.

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	

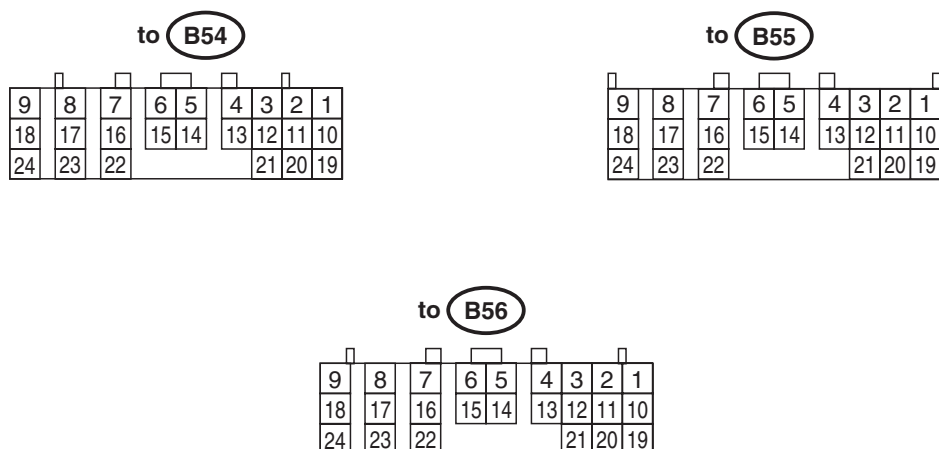


Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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

A: ELECTRICAL SPECIFICATION



AT-00568

Check with ignition switch ON.						
Item		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to chassis ground (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			
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	

Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.						
Item		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to chassis ground (ohms)
Inhibitor switch	“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	
AWD warning light		B56	2	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)	More than 10.5	—
				Ignition switch ON (with engine ON)	8 — 11	
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	—
Torque control signal 2		B56	14	Ignition switch ON (with engine ON)	More than 4	—
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	

Transmission Control Module (TCM) I/O Signal

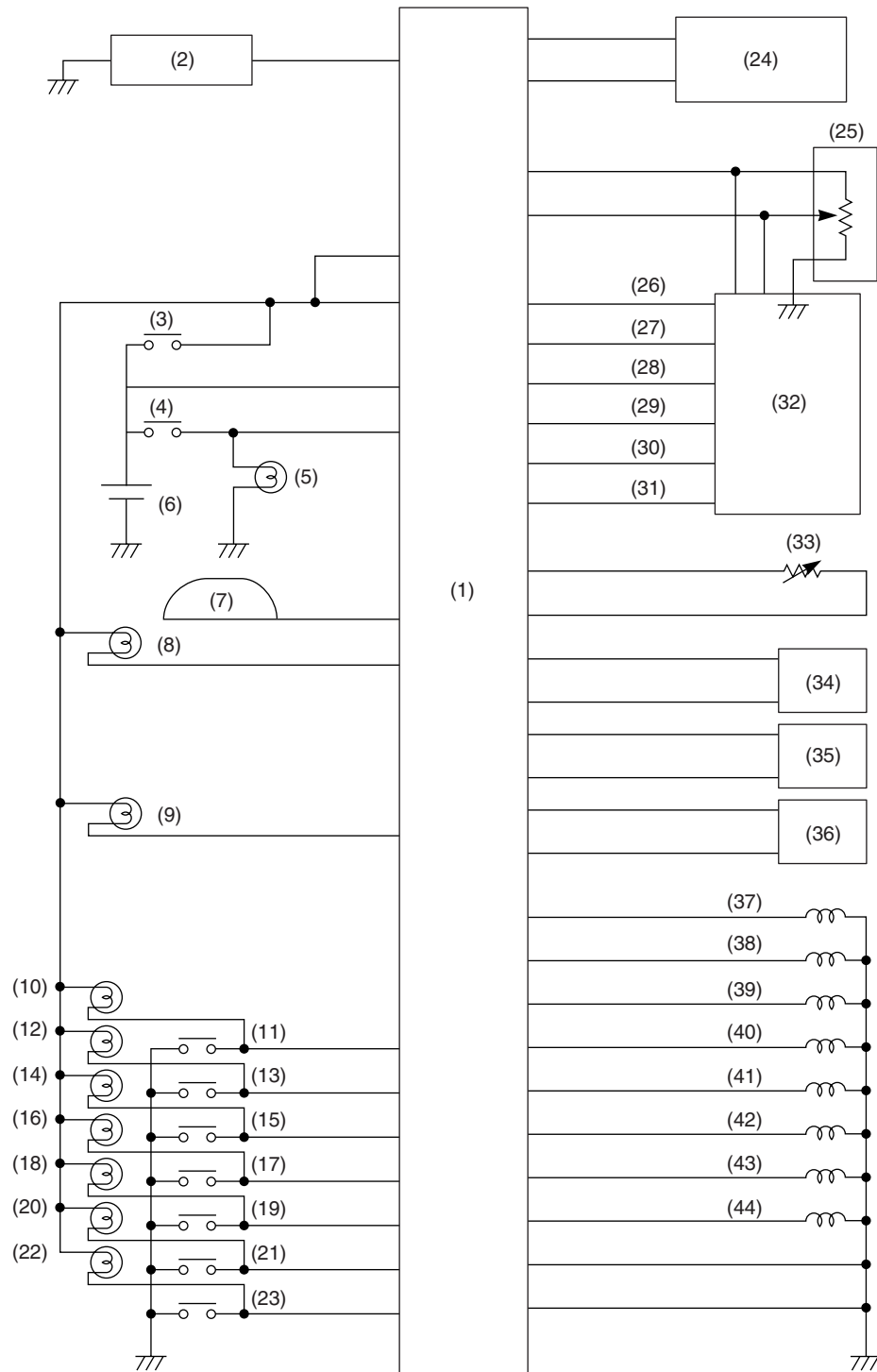
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.					
Item	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to chassis ground (ohms)
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF). Throttle fully closed after warm-up.	1.5 — 4.0	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	Throttle fully closed.	More than 8.5	10 — 17
			Throttle fully open.	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	
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: WIRING DIAGRAM



AT-02820

Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

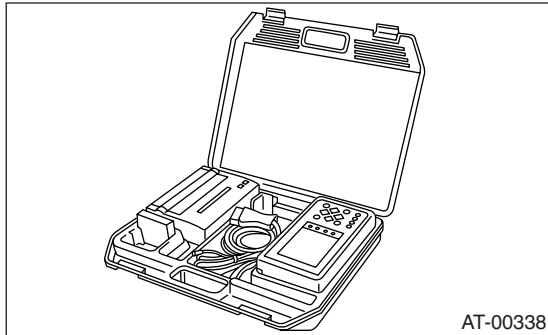
(1) Transmission control module (TCM)	(15) "N" range switch	(31) AT diagnostics signal
(2) Cruise control module	(16) "D" range indicator light	(32) Engine control module (ECM)
(3) Ignition switch	(17) "D" range switch	(33) ATF temperature sensor
(4) Brake switch	(18) "3" range indicator light	(34) Torque converter turbine speed sensor
(5) Brake light	(19) "3" range switch	(35) Rear vehicle speed sensor
(6) Battery	(20) "2" range indicator light	(36) Front vehicle speed sensor
(7) Combination meter (Speedometer circuit)	(21) "2" range switch	(37) Shift solenoid 1
(8) AT OIL TEMP warning light	(22) "1" range indicator light	(38) Shift solenoid 2
(9) AWD warning light	(23) "1" range switch	(39) 2-4 brake timing solenoid
(10) "P" range indicator light	(24) Data link connector	(40) Line pressure duty solenoid
(11) "P" range switch	(25) Throttle position sensor	(41) 2-4 brake duty solenoid
(12) "R" range indicator light	(26) Engine speed signal	(42) Lock-up duty solenoid
(13) "R" range switch	(27) Torque control cut signal	(43) Low clutch timing solenoid
(14) "N" range indicator light	(28) Torque control signal 2	(44) Transfer duty solenoid
	(29) Torque control signal 1	
	(30) Mass air flow signal	

6. Subaru Select Monitor

A: OPERATION

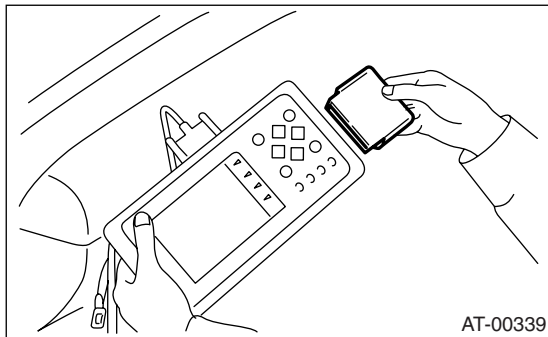
1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit.



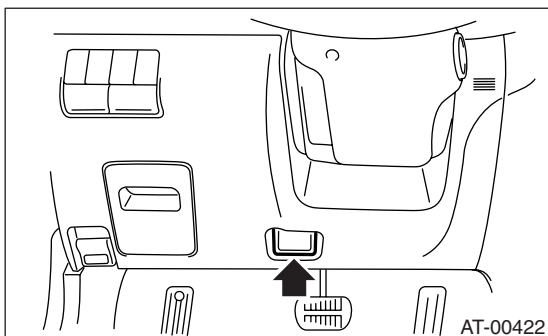
2) Connect the diagnosis cable to Subaru Select Monitor.

3) Insert the cartridge into Subaru Select Monitor.
<Ref. to 4AT(diag)-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 instrument panel (on driver's side).

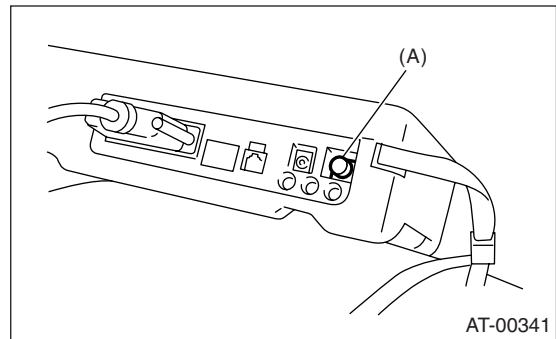


(2) Connect the diagnosis cable to data link connector.

NOTE:

Do not connect scan tools except for Subaru Select Monitor and 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 the information of transmission type is displayed.

9) On the «Transmission Diagnosis» display screen, select the {DTC Display} and press the [YES] key.

10) On the «DTC Display» display screen, select the {Memorized DTC} and press the [YES] key.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

- For details concerning the DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to 4AT(diag)-22, List of Diagnostic Trouble Code (DTC).>

Subaru Select Monitor

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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 the information of transmission type is displayed.
 - 4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
 - 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 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 sensor	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	Air Flow Sensor Voltage	V
Stop light 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
Parking range signal	P Range Signal	ON or OFF
Neutral range signal	N Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid 1	Shift Solenoid #1	ON or OFF
Shift control solenoid 2	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
Automatic transmission fluid temperature lamp	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 the information of transmission type is displayed.
- 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 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. WITH SUBARU SELECT MONITOR

Refer to Subaru Select Monitor for information about how to obtain and understand DTC. <Ref. to 4AT(diag)-15, OPERATION, Subaru Select Monitor.>

8. Inspection Mode

A: PROCEDURE

Shift the select lever to D range, and drive continuously for 10 seconds or more at 60 km/h (37 MPH).

WARNING:

Observe the road traffic law.

9. Clear Memory Mode

A: OPERATION

1. WITH SUBARU SELECT MONITOR

Refer to Subaru Select Monitor for information about how to clear DTC.

<Ref. to 4AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

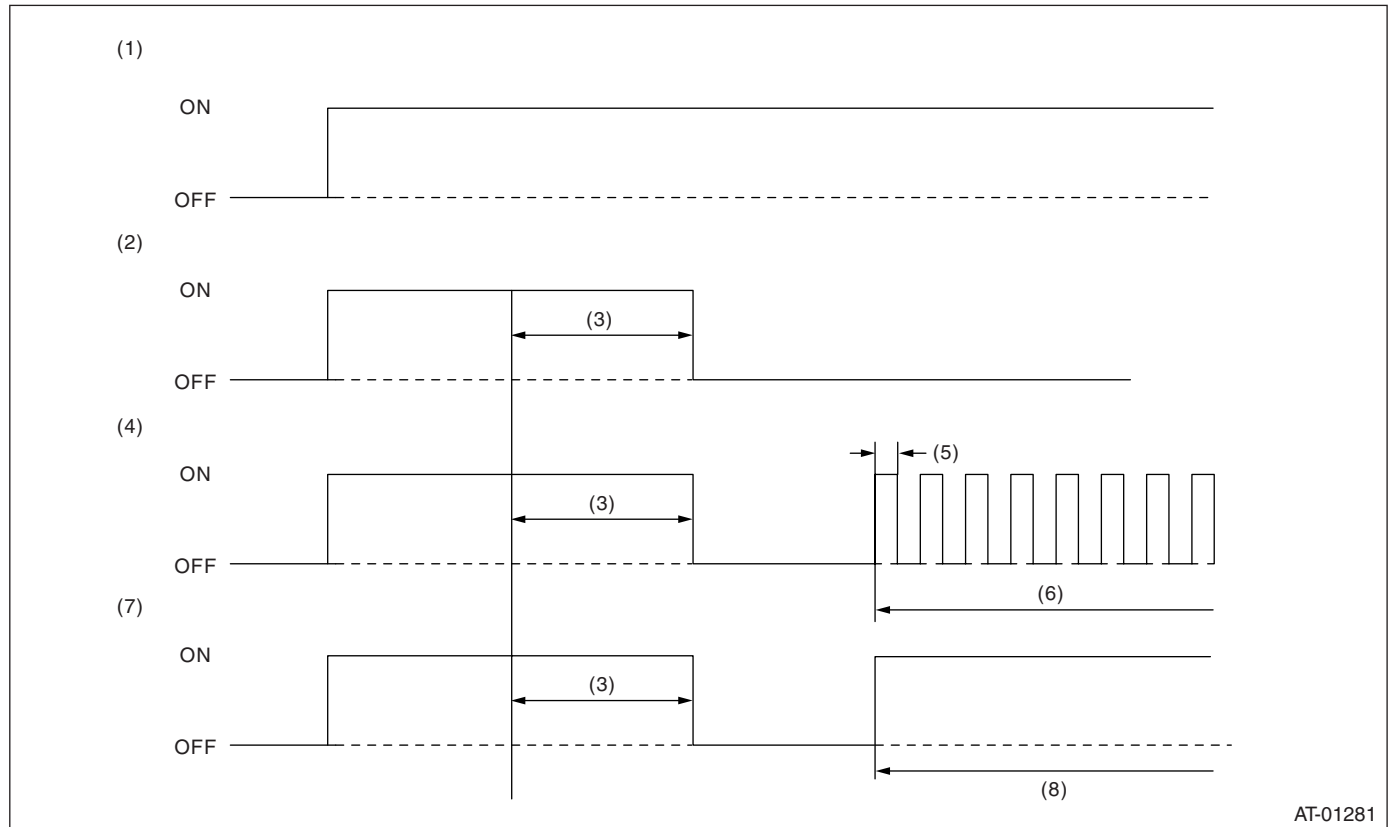
AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

10.AT OIL TEMP Warning Light Display

A: INSPECTION

When any on-board diagnostics item is malfunctioning, the display on AT OIL TEMP warning light blinks from the time malfunction is detected after starting the engine until ignition switch is turned to OFF. The malfunctioning part or unit can be determined by a DTC during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP warning light does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using Subaru Select Monitor. The AT OIL TEMP warning light signal is as shown in the figure.



(1) Ignition switch (Engine OFF)

(2) Normal (Engine ON)

(3) 2 seconds

(4) Faulty (Engine ON)

(5) 0.25 seconds

(6) Blink

(7) Normal (ATF temperature is high)

(8) ATF temperature is high

List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

11. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-31, 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 4AT(diag)-33, 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 4AT(diag)-35, 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 4AT(diag)-38, 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 4AT(diag)-41, 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 4AT(diag)-45, 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 4AT(diag)-47, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-49, 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 4AT(diag)-52, 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 4AT(diag)-56, 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 4AT(diag)-59, 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 4AT(diag)-63, 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 4AT(diag)-66, 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 4AT(diag)-69, 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 4AT(diag)-72, 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 4AT(diag)-75, DTC 93 REAR VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Diagnostic Procedure for AT OIL TEMP Warning Light

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

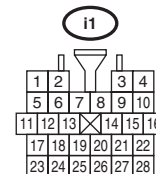
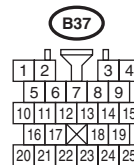
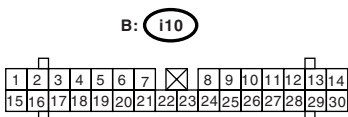
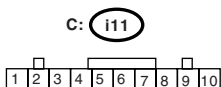
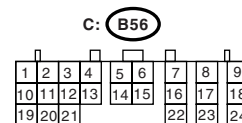
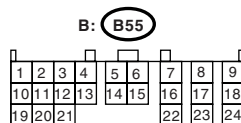
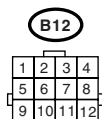
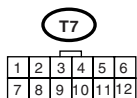
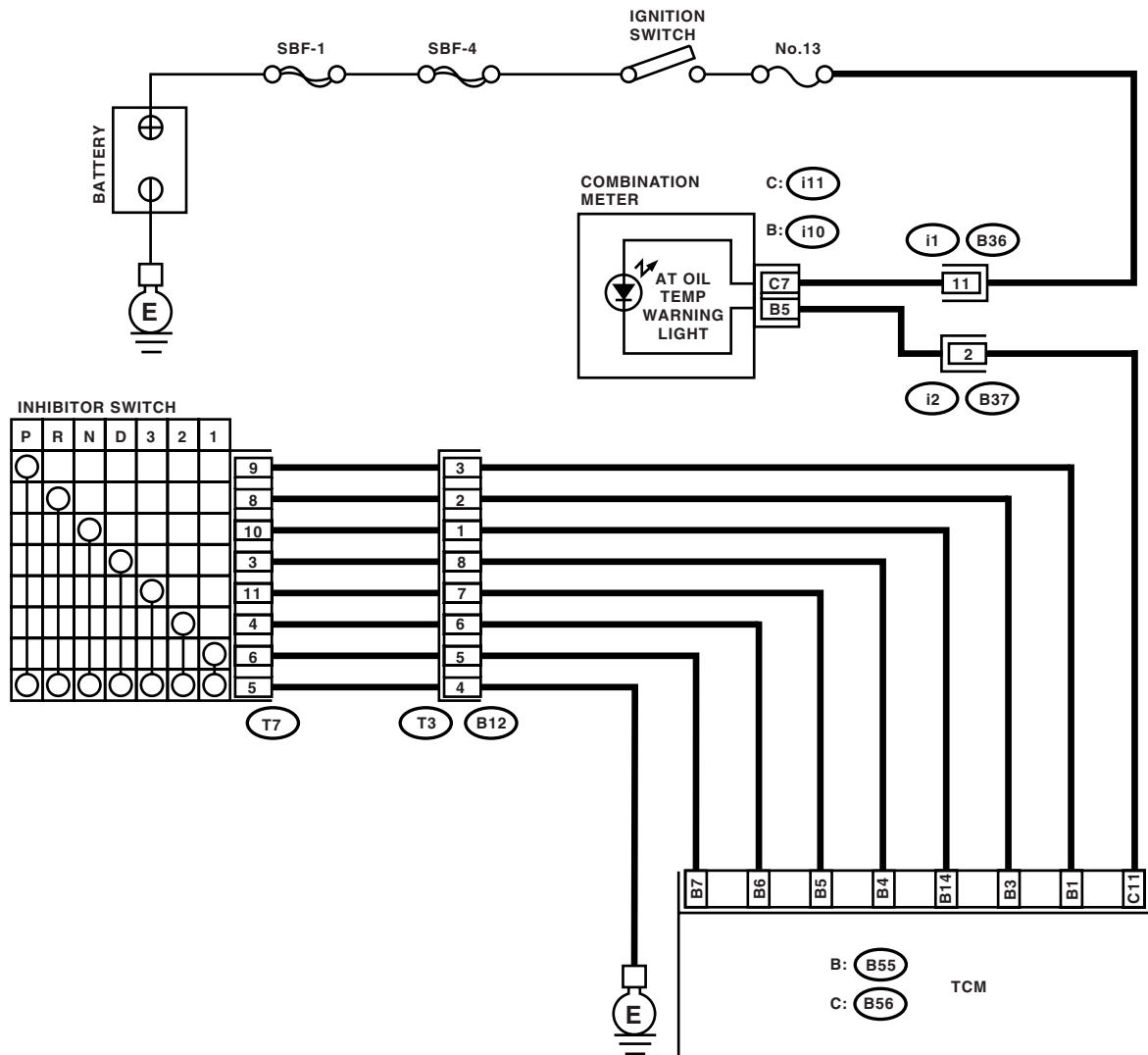
DIAGNOSIS:

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.

WIRING DIAGRAM:



AT-02821

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?	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.	Is the AT OIL TEMP warning light bulb OK?	Go to step 4.	Check the combination meter.
3 CHECK AT OIL TEMP WARNING LIGHT. Perform "Read Diagnostic Trouble Code (DTC)". <Ref. to 4AT(diag)-18, Read Diagnostic Trouble Code (DTC).>	Does the AT OIL TEMP warning light blink?	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 9.
4 CHECK FUSE (No. 13). Remove the fuse (No. 13).	Is the fuse (No. 13) blown out?	Replace the fuse (No. 13). If 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 (i11) No. 7 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 6.	Repair the open circuit in harness between combination meter and battery.
6 CHECK COMBINATION METER. Measure the voltage between combination meter connector and chassis ground. Connector & terminal (i10) No. 5 (+) — Chassis ground (-):	Is the voltage less than 9 V?	Repair the combination meter. <Ref. to IDI-10, Combination Meter.>	Go to step 7.
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 (B56) No. 11 — (i10) No. 5:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair the open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
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 (B56) No. 11 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning light illuminates, 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 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure for AT OIL TEMP Warning Light

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

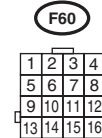
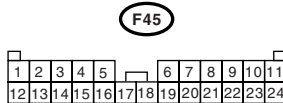
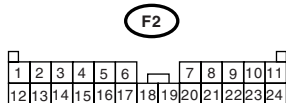
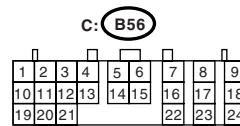
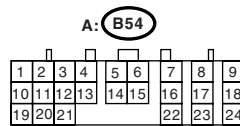
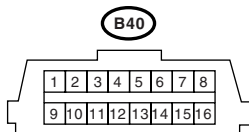
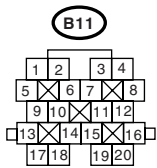
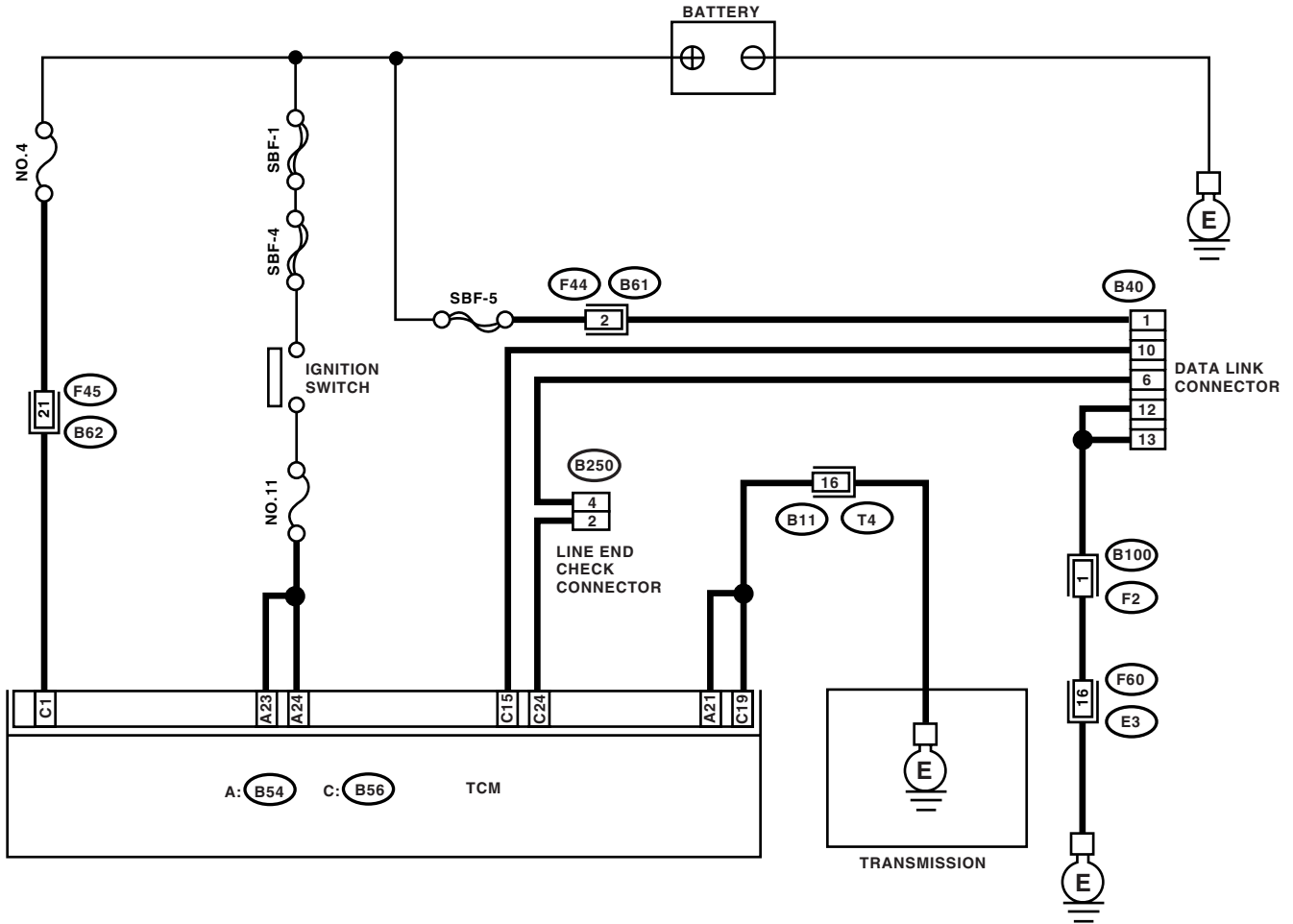
Step	Check	Yes	No
9 CHECK INHIBITOR SWITCH. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Turn the Subaru Select Monitor to ON. 4) Read the data of range switch using Subaru Select Monitor. • Range switch is indicated in ON ←→ OFF.	When each range is selected, does the LED of Subaru Select Monitor light up?	Go to step 10.	Check the inhibitor switch circuit. <Ref. to 4AT(diag)-79, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>
10 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 (B56) No. 11 — Chassis ground:	Is the resistance less than 1 MΩ?	Check the TCM power supply and ground line. <Ref. to 4AT(diag)-26, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for AT OIL TEMP Warning Light.>	Repair the short circuit in harness between combination meter connector and TCM connector.

Diagnostic Procedure for AT OIL TEMP Warning Light

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: CHECK POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:



AT-02822

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?	Repair or tighten the battery terminal.	Go to step 2.
2 CHECK POWER SUPPLY OF TCM. 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B56) No. 1 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 4.	Go to step 3.
3 CHECK FUSE (No. 4). Remove the fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace the fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair the 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. Connector & terminal (B54) No. 23 (+) — Chassis ground (-): (B54) No. 24 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 6.	Go to step 5.
5 CHECK FUSE (No. 11). Remove the fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace the fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair the 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. Connector & terminal (B56) No. 19 — (B11) No. 16: (B54) No. 21 — (B11) No. 16:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the open circuit in harness between TCM, transmission harness connector, and poor contact in coupling connector.
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 resistance less than 1 Ω ?	Go to step 8.	Repair the 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?	Repair the connector.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

13. Diagnostic Procedure for Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

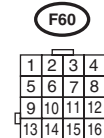
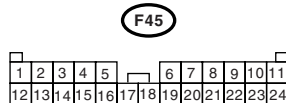
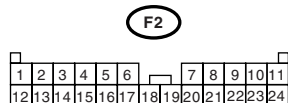
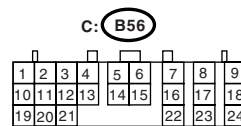
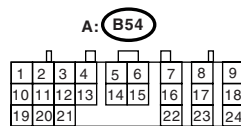
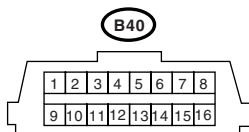
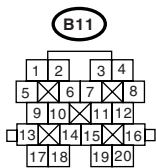
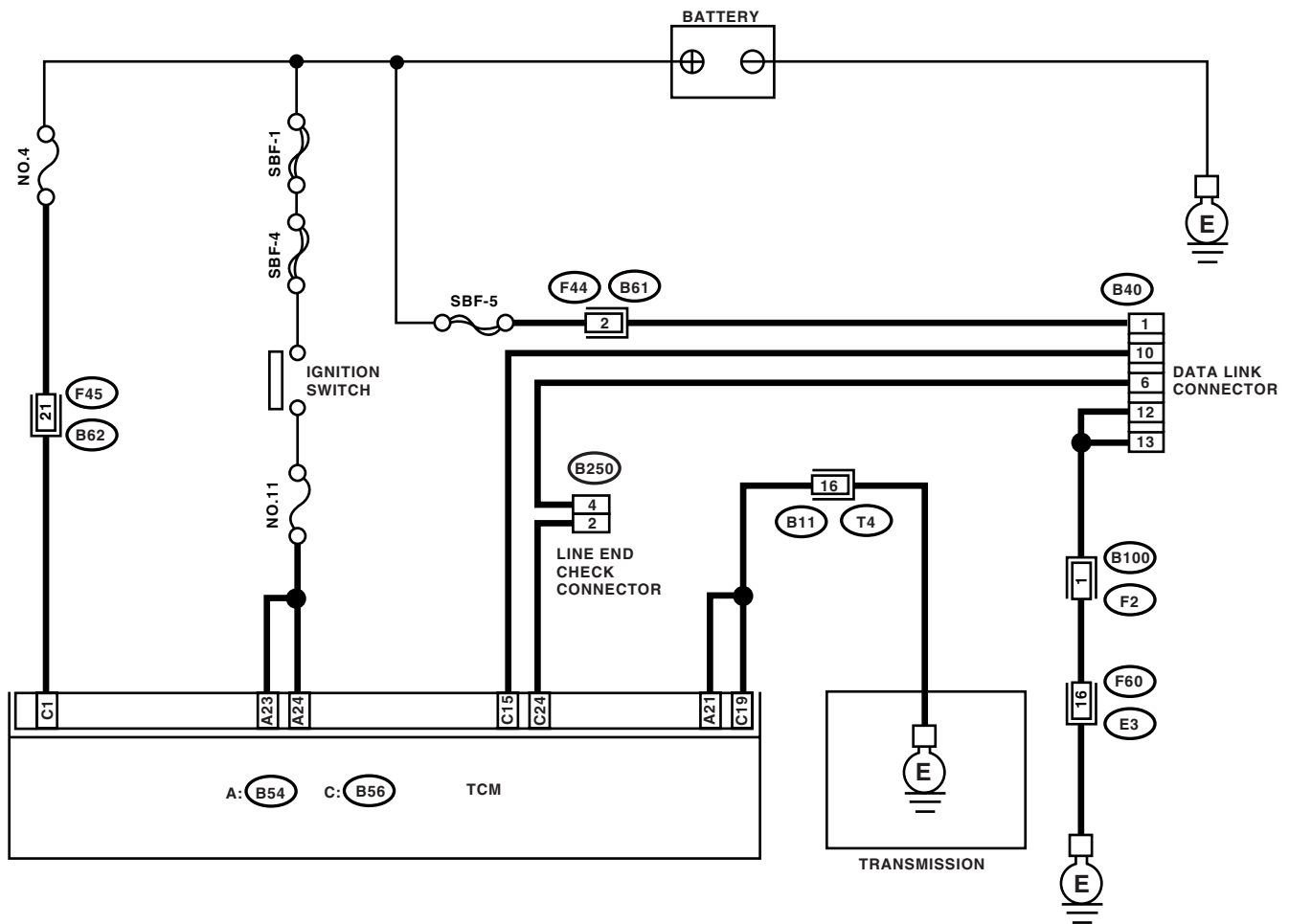
DIAGNOSIS:

Faulty harness connector

TROUBLE SYMPTOM:

Select monitor communication failure

WIRING DIAGRAM:



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. Connector & terminal (B40) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 2.	Repair the 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. Connector & terminal (B40) No. 12 — Chassis ground: (B40) No. 13 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit 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 Subaru Select Monitor, check whether communication to engine systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step 8.	Go to step 4.
4 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Check whether communication to engine systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step 6.	Go to step 5.
5 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ECM connector. 4) Check whether communication to transmission systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step 6.
6 CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the TCM, ECM, ABSCM&H/U, cruise control module and immobilizer control module connectors. 3) Measure the resistance between TCM connector and chassis ground. Connector & terminal (B40) No. 10 — Chassis ground: (B40) No. 6 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 7.	Repair the short circuit in harness between each control module and data link connector.
7 CHECK OUTPUT SIGNAL FOR TCM. 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B40) No. 10 (+) — Chassis ground (-): (B40) No. 6 (+) — Chassis ground (-):	Is the voltage more than 1 V?	Repair the harness and connector between each control module and data link connector.	Go to step 8.
8 CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure the resistance between TCM connector and data link connector. Connector & terminal (B56) No. 15 — (B40) No. 10:	Is the resistance less than 0.5 Ω ?	Go to step 9.	Repair the open circuit in harness between TCM and data link connector.

Diagnostic Procedure for Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure the resistance between TCM and data link connector. Connector & terminal (B56) No. 24 — (B40) No. 6:	Is the resistance more than 1 M Ω ?	Repair the open circuit in harness between TCM and data link connector.	Go to step 10 .
10 CHECK INSTALLATION OF TCM CONNECTOR. Turn the ignition switch to OFF.	Is the TCM connector inserted into TCM?	Go to step 11 .	Insert the TCM connector into TCM.
11 CHECK POOR CONTACT IN CONNECTORS.	Is there poor contact in control module and data link connector?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

14. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 ENGINE SPEED SIGNAL

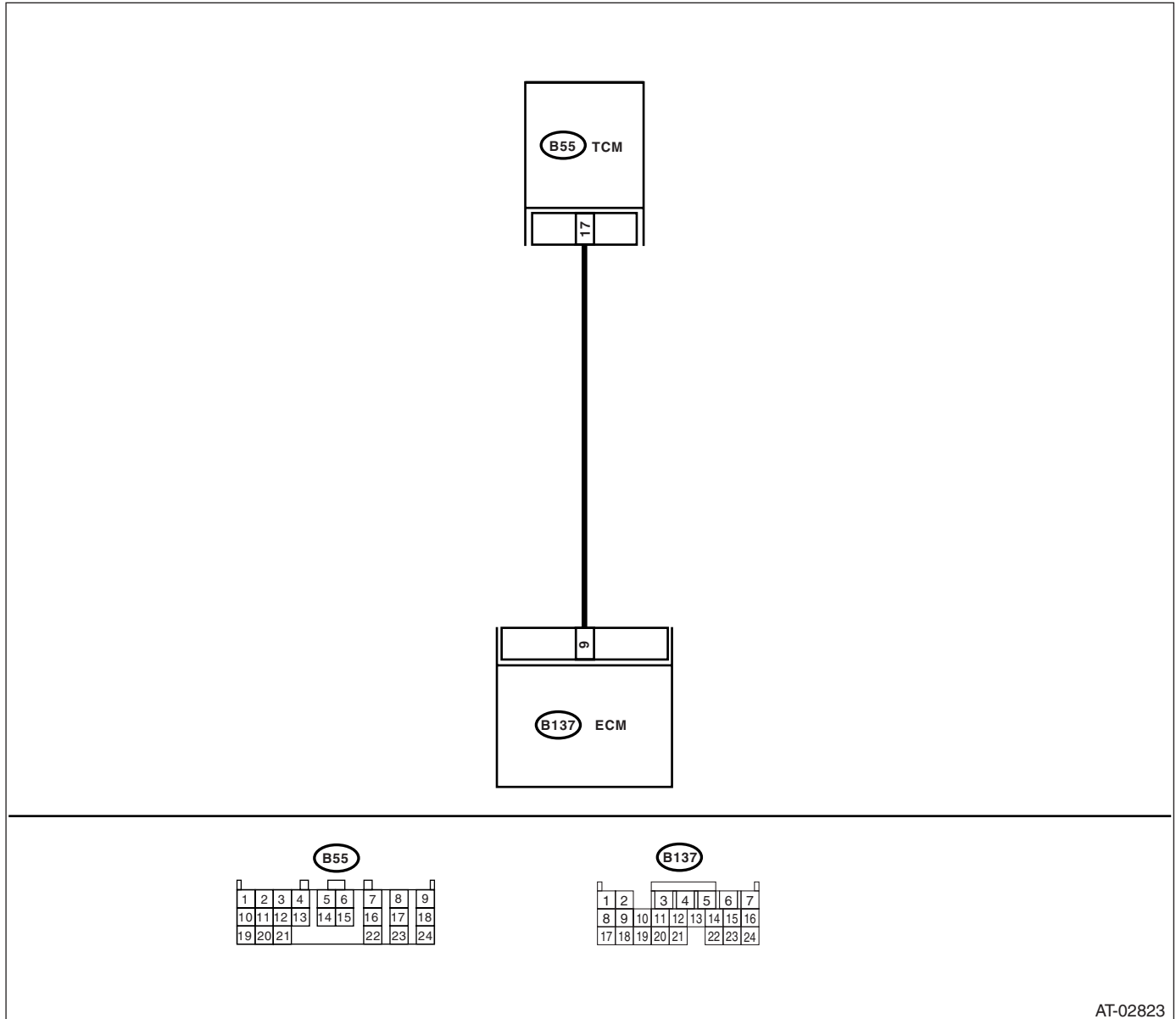
DIAGNOSIS:

The engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- The AT OIL TEMP warning light remains on when vehicle speed is "0".

WIRING DIAGRAM:



AT-02823

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 (B55) No. 17 — (B137) No. 9:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B55) No. 17 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and ECM connector.
3 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and turn Subaru Select Monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Idle the engine. 6) Read the data of engine speed using Subaru Select Monitor. • Display shows the engine speed signal value sent from ECM.	Is the revolution value same as tachometer reading shown on combination meter?	Even if the AT OIL TEMP warning light illuminates, 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 and ECM.	Go to step 4.
4 CHECK POOR CONTACT.	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step 5.
5 CONFIRM DTC 11.	Replace the ECM with a new one. Does the DTC appear again, after memory has been cleared?	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>	Complete the diagnosis.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: DTC 23 MASS AIR FLOW SIGNAL

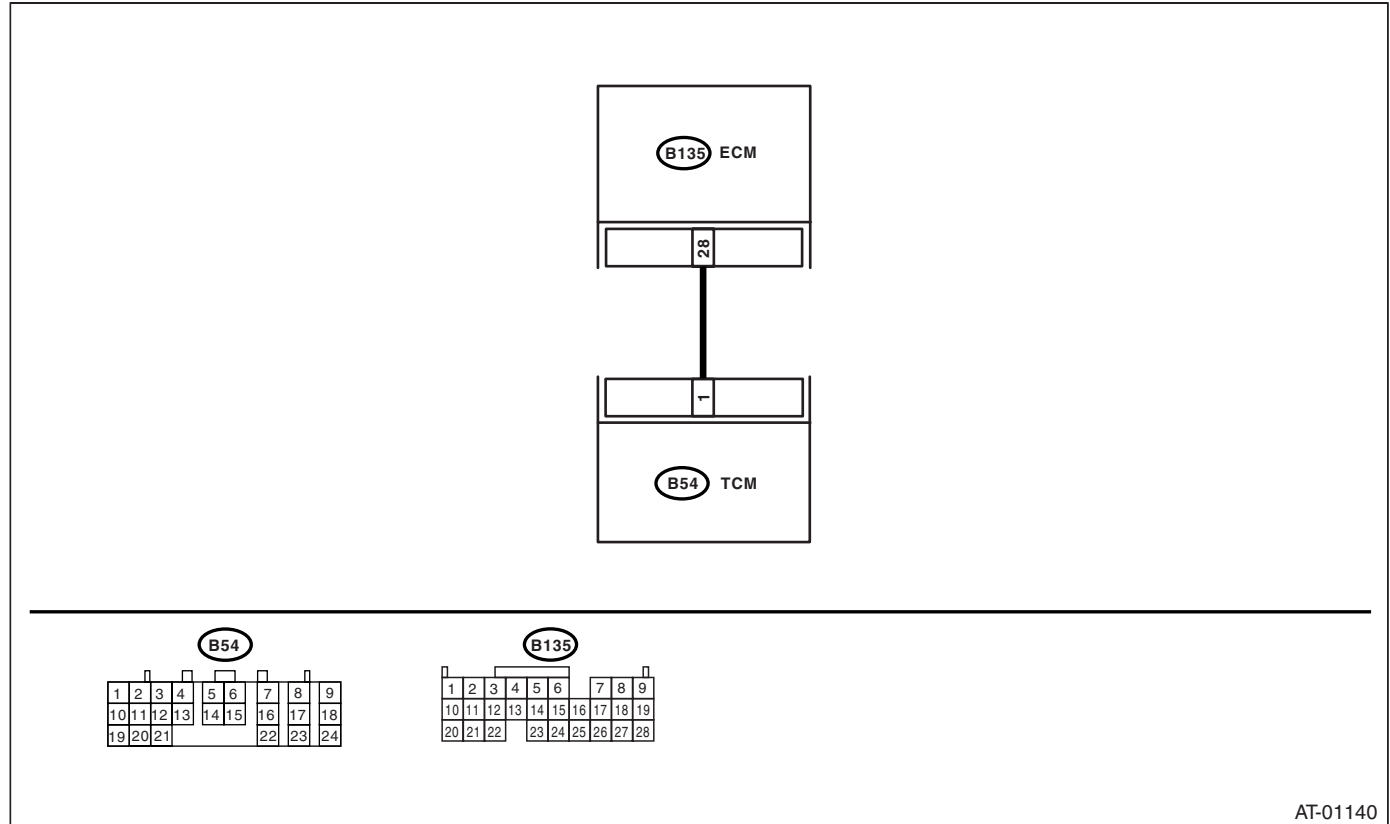
DIAGNOSIS:

The input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-01140

Step	Check	Yes	No
1 CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM. <Ref. to 4AT(diag)-38, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the 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 resistance less than 1 Ω?	Go to step 3.	Repair the open circuit in harness between TCM and ECM connector.
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 resistance more than 1 MΩ?	Go to step 4.	Repair the short circuit in harness between TCM and ECM connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
4 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) Idle the engine. 6) Read the data of mass air flow sensor signal using Subaru Select Monitor. • Display shows the mass air flow sensor signal value sent from ECM.	Is the value voltage 0.9 — 1.4 V?	Even if the AT OIL TEMP warning light illuminates, 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 5.
5 CHECK POOR CONTACT.	Is there poor contact in intake manifold pressure signal circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

C: DTC 27 ATF TEMPERATURE SENSOR

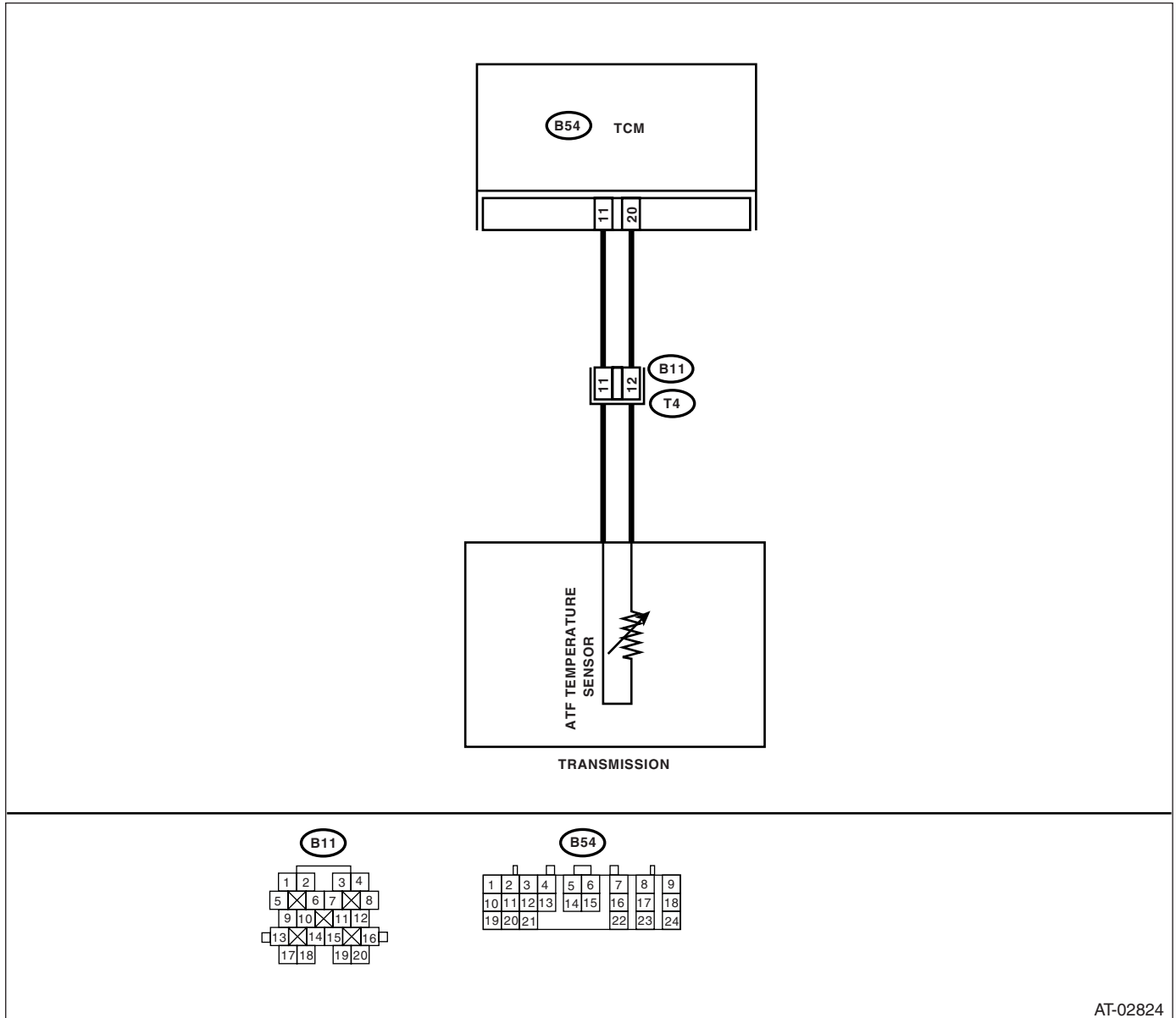
DIAGNOSIS:

The input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 20 — (B11) No. 12:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B54) No. 11 — (B11) No. 11:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the 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 (B54) No. 20 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair the 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 (B54) No. 11 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair the short circuit in harness between TCM and transmission connector.
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 ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until 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 resistance 275 — 375 Ω ?	Go to step 6.	Replace the ATF temperature sensor. <Ref. to 4AT-70, 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 ATF temperature decreases?	Go to step 7.	Replace the ATF temperature sensor. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 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?	Even if the AT OIL TEMP warning light illuminates, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the cause. Repair the harness or poor contact in ATF temperature sensor and transmission connector.	Go to step 8 .
8 CHECK POOR CONTACT.	Is there poor contact in ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: DTC 31 THROTTLE POSITION SENSOR

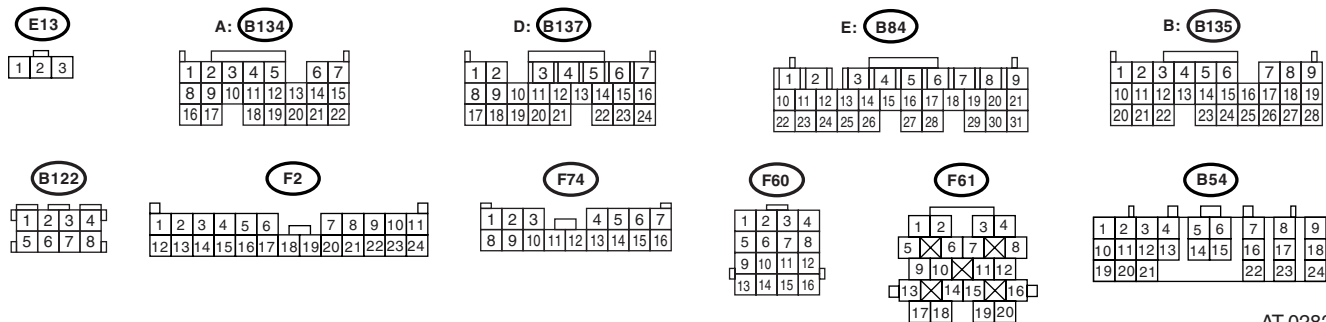
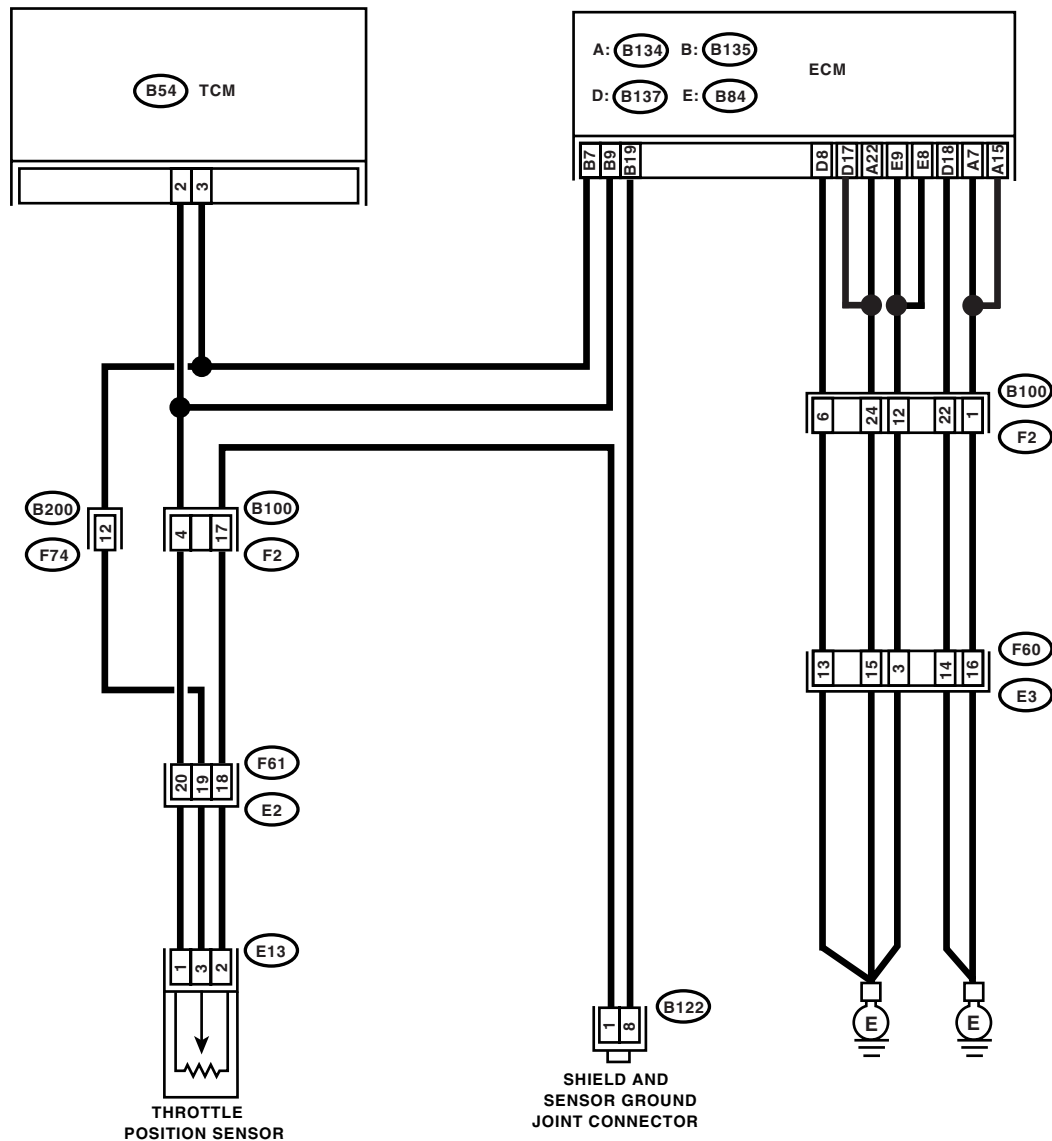
DIAGNOSIS:

The input signal circuit of throttle position sensor is open or shorted.

TROUBLE SYMPTOM:

Shift point too high or too low, excessive shift shock, tight corner braking phenomenon.

WIRING DIAGRAM:



AT-02825

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK ENGINE GROUND TERMINALS.	Have engine ground terminals been 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 (B134) No. 7 — Engine ground: (B134) No. 15 — Engine ground: (B134) No. 22 — Engine ground: (B137) No. 8 — Engine ground: (B137) No. 17 — Engine ground: (B137) No. 18 — Engine ground: (B84) No. 8 — Engine ground: (B84) No. 9 — Engine ground:	Is the resistance less than 5 Ω ?	Go to step 3.	Repair the 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 (E13) No. 1 — No. 2:	Is the resistance 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 (E13) No. 2 — No. 3:	Is the resistance 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 (B54) No. 3 — (E13) No. 3:	Is the resistance less than 1 Ω ?	Go to step 6.	Repair the open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure the resistance of harness between TCM and throttle position sensor connector. Connector & terminal (B54) No. 2 — (E13) No. 1:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the 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 (B54) No. 3 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 8.	Repair the 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 (B54) No. 2 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 9.	Repair the short circuit in harness between TCM and throttle position sensor connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure the resistance of harness between TCM and ECM connector. Connector & terminal (B54) No. 3 — (B135) No. 7:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair the 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 (B54) No. 2 — (B135) No. 9:	Is the resistance less than 1 Ω ?	Go to step 11.	Repair the open circuit in harness between TCM and ECM connector.
11 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 value voltage 0.2 — 1.0 V?	Go to step 12.	Go to step 14.
12 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. Throttle fully open. NOTE: Must be changed correspondingly with the accelerator pedal operation (from “released” to “depressed” position).	Is the value voltage 4.2 — 4.7 V?	Go to step 14.	Go to step 13.
13 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 value voltage 4.8 — 5.3 V?	Even if the AT OIL TEMP warning light illuminates, 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 throttle position sensor circuit.	Go to step 14.
14 CHECK POOR CONTACT.	Is there poor contact in throttle position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

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.

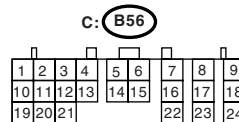
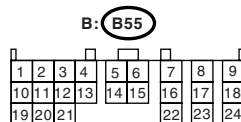
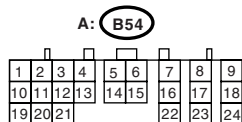
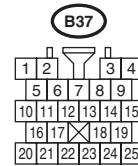
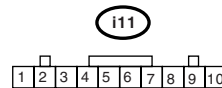
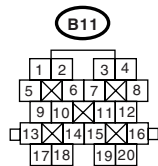
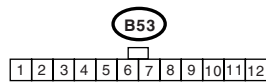
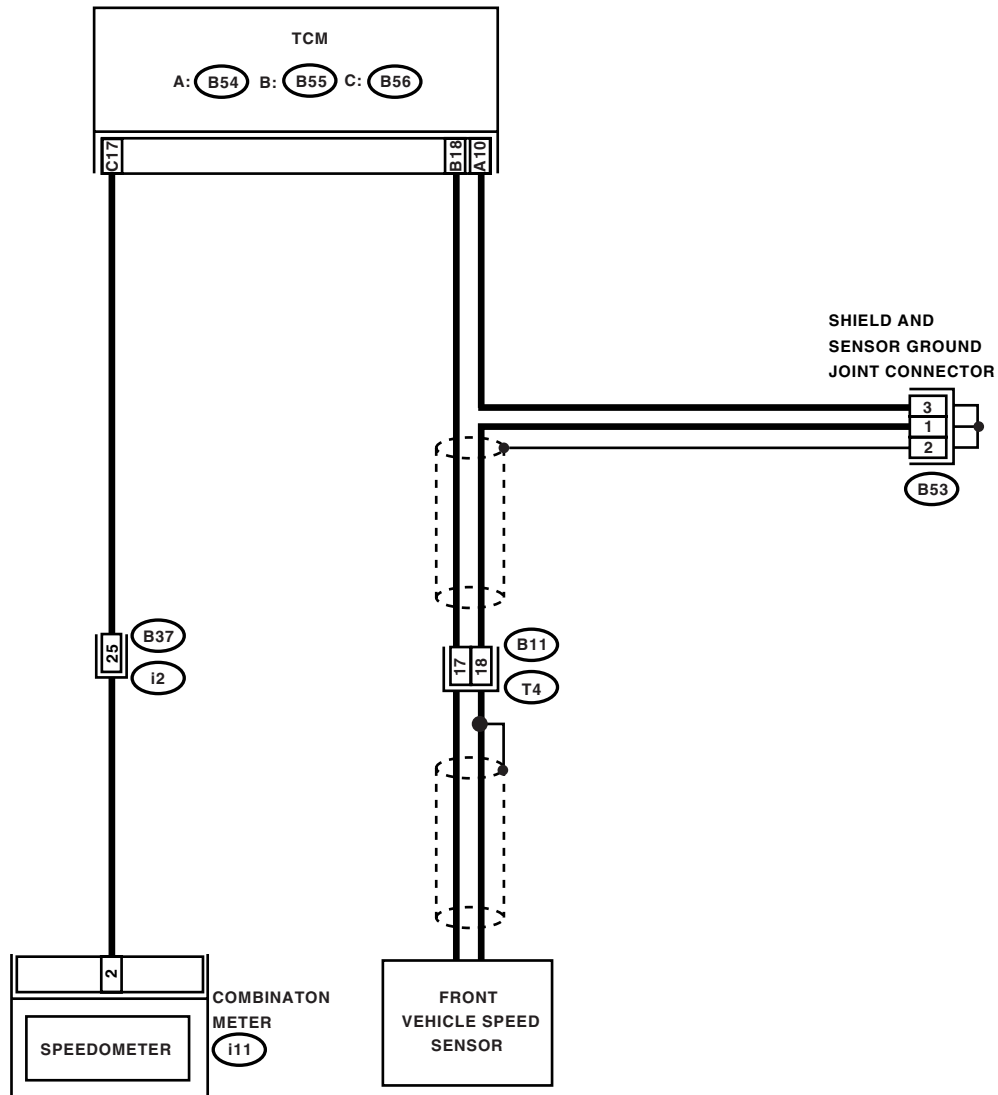
TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



AT-02826

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 (B55) No. 18 — (B11) No. 17:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B54) No. 10 — (B11) No. 18:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the 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 (B54) No. 10 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Go to step 4.	Repair the 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 (B55) No. 18 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Go to step 5.	Repair the 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 resistance 450 — 650 Ω ?	Go to step 6.	Replace the front vehicle speed sensor. <Ref. to 4AT-55, Front Vehicle Speed Sensor.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 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 rigid racks. NOTE: Raise all wheels off floor. 4) Turn the ignition switch to ON and turn 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Does the speedometer indication increase as Subaru Select Monitor data increases?	Even if the AT OIL TEMP warning light illuminates, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the cause. Repair the harness or connector in front vehicle speed sensor circuit.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR

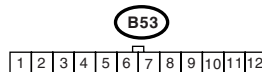
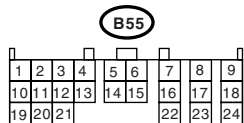
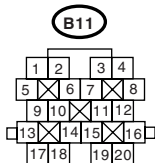
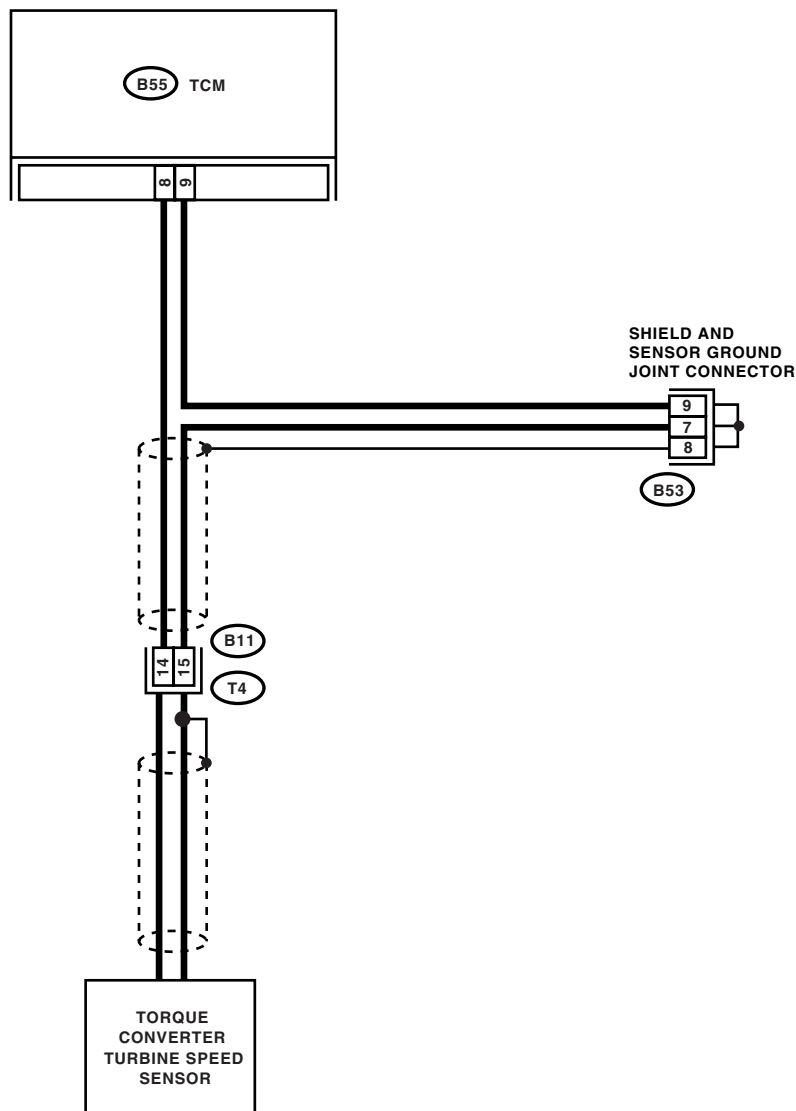
DIAGNOSIS:

The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02827

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 resistance 450 — 650 Ω ?	Go to step 2.	Replace the turbine speed sensor. <Ref. to 4AT-60, 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 (B55) No. 8 — (B11) No. 14:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the 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 (B55) No. 9 — (B11) No. 15:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the 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 (B55) No. 9 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair the 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 (B55) No. 8 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and turn 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?	Even if the AT OIL TEMP warning light illuminates, 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 and transmission.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

G: DTC 38 TORQUE CONTROL SIGNAL

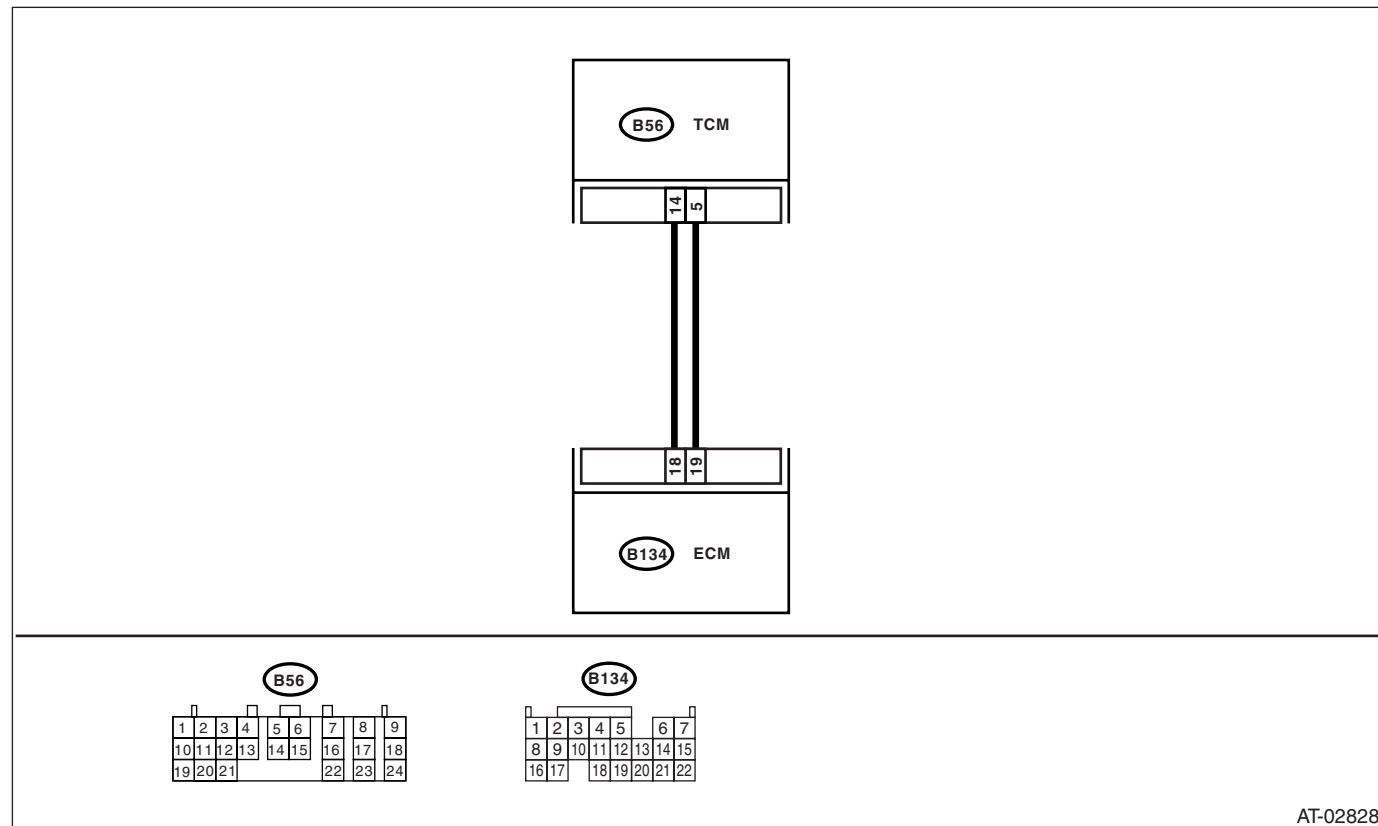
DIAGNOSIS:

The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



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. <i>Connector & terminal</i> <i>(B56) No. 14 — (B134) No. 18:</i> <i>(B56) No. 5 — (B134) No. 19:</i>	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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. <i>Connector & terminal</i> <i>(B56) No. 14 — Chassis ground:</i> <i>(B56) No. 5 — Chassis ground:</i>	Is the resistance more than 1 $M\Omega$?	Go to step 3.	Repair the short circuit in harness between TCM and ECM connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-):	Is the voltage more than 4.8 V?	Even if the AT OIL TEMP warning light illuminates, 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 and ECM.	Go to step 4.
4 CHECK POOR CONTACT.	Is there poor contact in torque control signal circuit?	Repair the poor contact.	Go to step 5.
5 CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY. Check installing condition of the ground line in transmission and body.	Is there any dirt or rust at the ground line installing point?	Remove dirt and rust.	Go to step 6.
6 CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY. Check installing condition of the ground line in transmission and body. Tightening torque: 10 — 16 N·m (1.0 — 1.6 kgf-m, 7.2 — 11.6 ft-lb)	Is the tightening torque value within specification?	Go to step 7.	Tighten to the specified torque.
7 CHECK GROUND LINE INSIDE TRANSMISSION. 1) Drain the ATF and remove oil pan. 2) Check the tightening torque value of ground line installing bolt. Tightening torque: 7 — 9 N·m (0.7 — 0.9 kgf-m, 5.1 — 6.5 ft-lb)	Is the tightening torque value within specification?	Go to step 9.	Tighten to the specified torque.
8 CHECK GROUND CIRCUIT OF ECM. <Ref. to 4AT(diag)-38, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the ground terminal and/or ground circuit of ECM.	Go to step 9.
9 RECHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure the voltage between TCM connector and chassis ground. Connector & terminal (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-):	Is each voltage more than 4 V?	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>	Replace the ECM.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

H: DTC 71 SHIFT SOLENOID 1

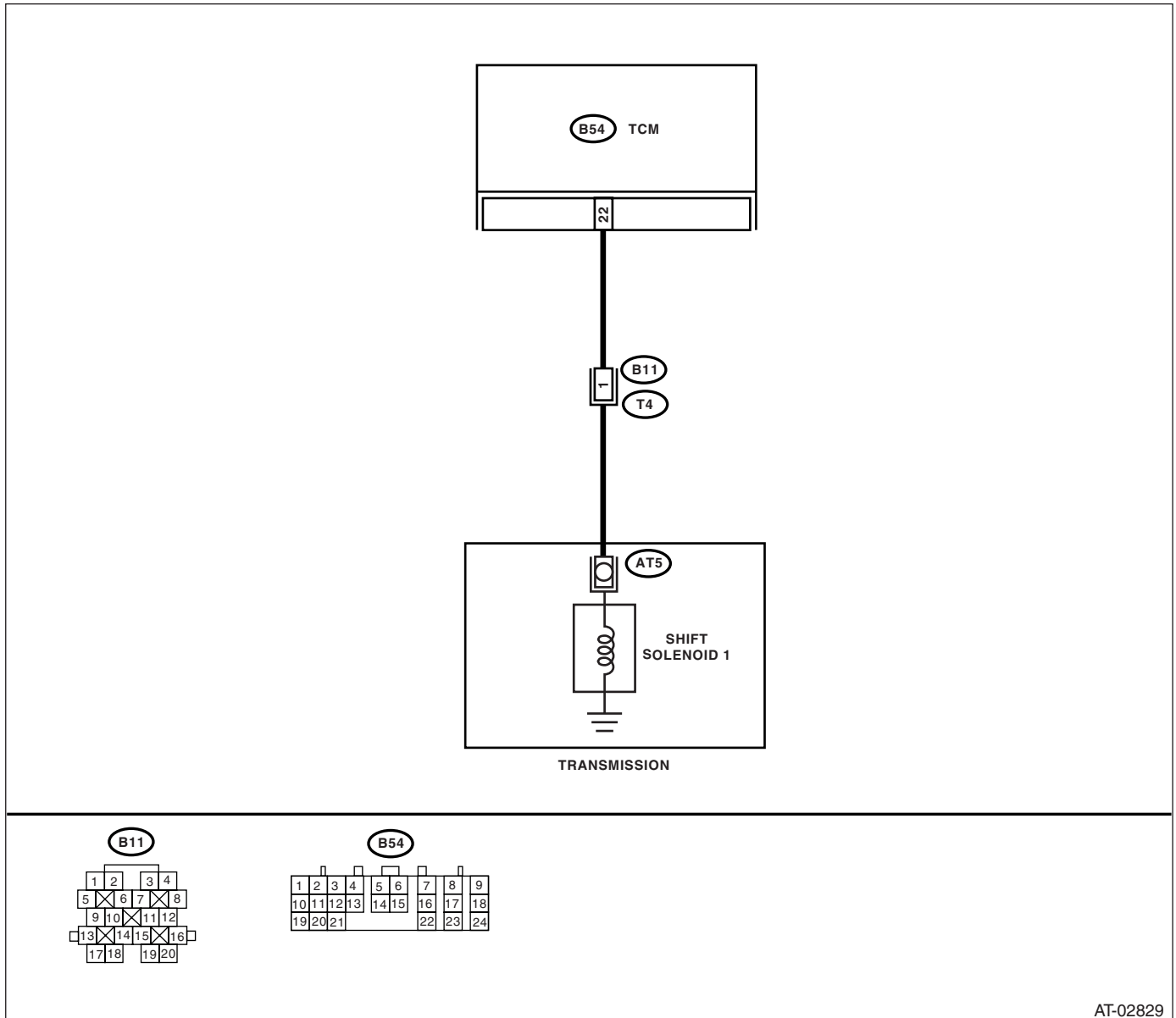
DIAGNOSIS:

The output signal circuit of shift solenoid 1 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



AT-02829

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 (B54) No. 22 — (B11) No. 1:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B54) No. 22 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the 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 resistance 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 (B54) No. 22 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 5.	Go to step 6.
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 (B54) No. 22 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning light illuminates, 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 poor contact in TCM.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK SHIFT SOLENOID 1 (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Lift-up the vehicle and support with rigid rack. NOTE: Raise all wheels off ground. 3) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 4) Remove the oil pan, and disconnect connector from shift solenoid 1. 5) Measure the resistance between shift solenoid 1 connector and transmission ground. Terminals (T4) No. 1 — Transmission ground:	Is the resistance 10 — 16 Ω ?	Go to step 8.	Replace the shift solenoid 1. <Ref. to 4AT-70, 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 (T4) No. 1 — (AT5) No. 1:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the 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 resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light illuminates, 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 shift solenoid 1 and transmission.	Repair the short circuit harness between shift solenoid 1 and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

I: DTC 72 SHIFT SOLENOID 2

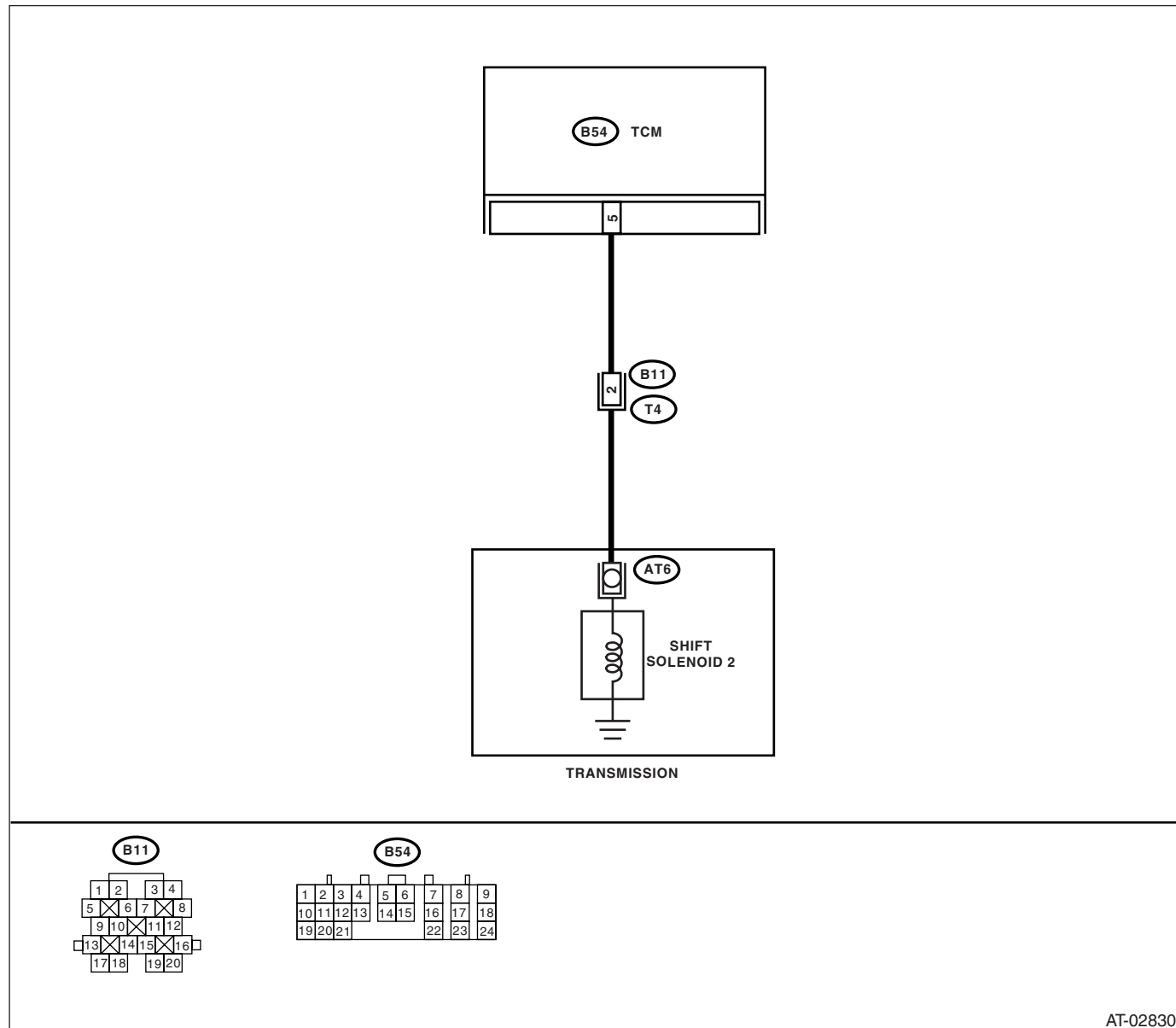
DIAGNOSIS:

The output signal circuit of shift solenoid 2 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



AT-02830

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. Connector & terminal (B54) No. 5 — (B11) No. 2:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B54) No. 5 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK SHIFT SOLENOID 2. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 2 — No. 16:	Is the resistance 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 (B54) No. 5 (+) — Chassis ground (-):	Is the voltage more than 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) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and support with rigid rack. NOTE: Raise all wheels off ground. 3) 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 ATF reaches its operating temperature. 4) Move the selector lever to "D" range, and slowly increase 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.> 5) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning light illuminates, 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 and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in shift solenoid 2 circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
7 CHECK SHIFT SOLENOID 2 (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan, and disconnect connector from shift solenoid 2. 4) Measure the resistance between shift solenoid 2 connector and transmission ground. Terminals No. 1 — Transmission ground:	Is the resistance 10 — 16 Ω?	Go to step 8.	Replace the shift solenoid 2. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 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 resistance less than 1 Ω?	Go to step 9.	Repair the open circuit in harness between shift solenoid 2 and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure the resistance of harness between shift solenoid 2 connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 2 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light illuminates, 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 shift solenoid 2 and transmission.	Repair the short circuit harness between shift solenoid 2 and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

J: DTC 73 LOW CLUTCH TIMING SOLENOID

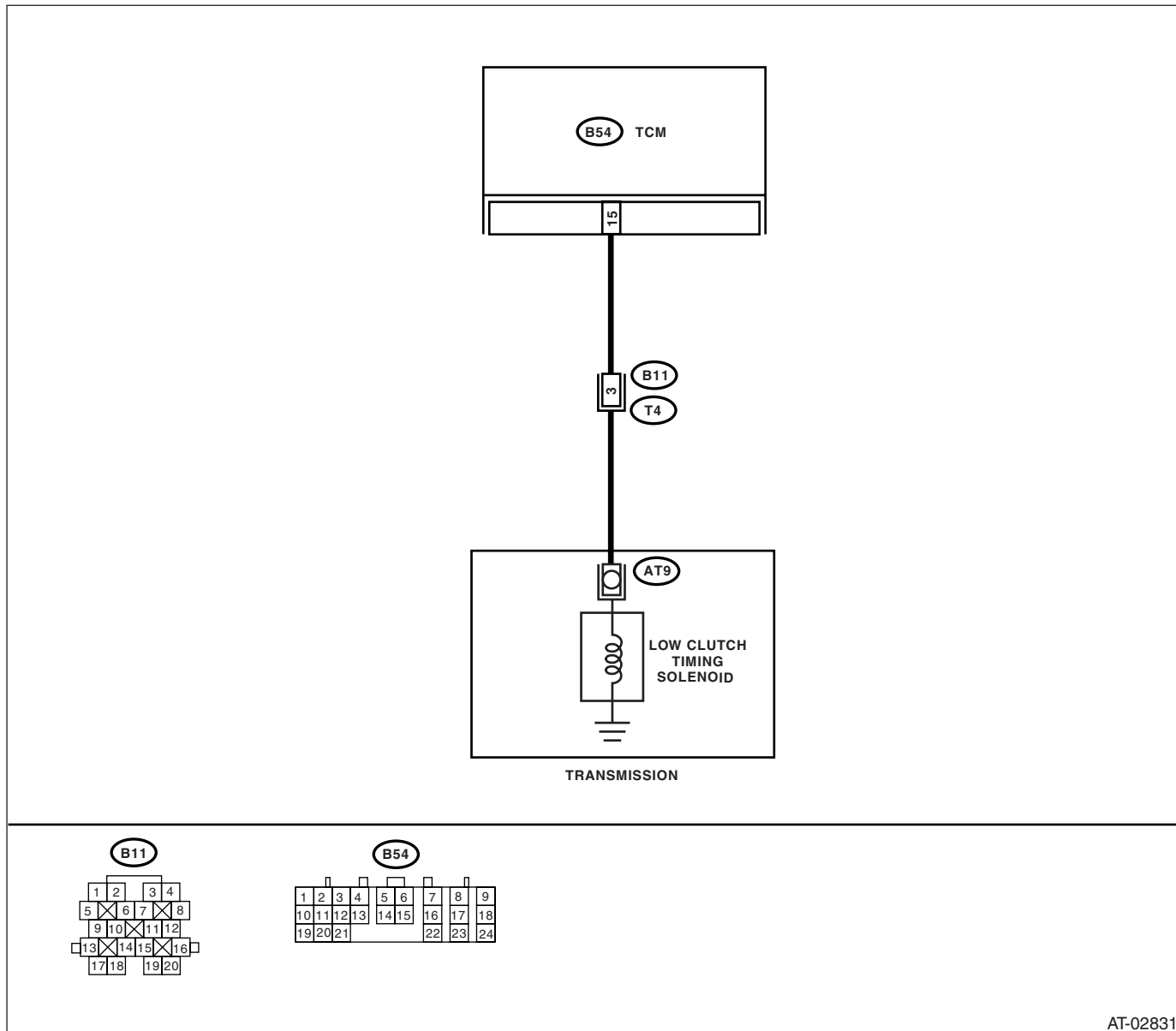
DIAGNOSIS:

The output signal circuit of low clutch timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02831

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 (B54) No. 15 — (B11) No. 3:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B54) No. 15 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK LOW CLUTCH TIMING SOLENOID. Measure the resistance between transmission connector terminals. Connector & terminal (T4) No. 3 — No. 16:	Is the resistance 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 (B54) No. 15 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Set the select lever to "2" range. 2) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning light illuminates, 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 poor contact in TCM and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in low clutch timing solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Lift-up the vehicle and support with rigid rack. NOTE: Raise all wheels off ground. 3) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 4) Remove the oil pan, and disconnect connector from low clutch timing solenoid. 5) Measure the resistance between low clutch timing solenoid connector and transmission ground. Terminals No. 1 — Transmission ground:	Is the resistance 10 — 16 Ω ?	Go to step 8.	Replace the low clutch timing solenoid. <Ref. to 4AT-70, 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 resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between low clutch timing solenoid and transmission connector.
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 resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light illuminates, 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 low clutch timing solenoid and transmission.	Repair the short circuit harness between low clutch timing solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

K: DTC 74 2-4 BRAKE TIMING SOLENOID

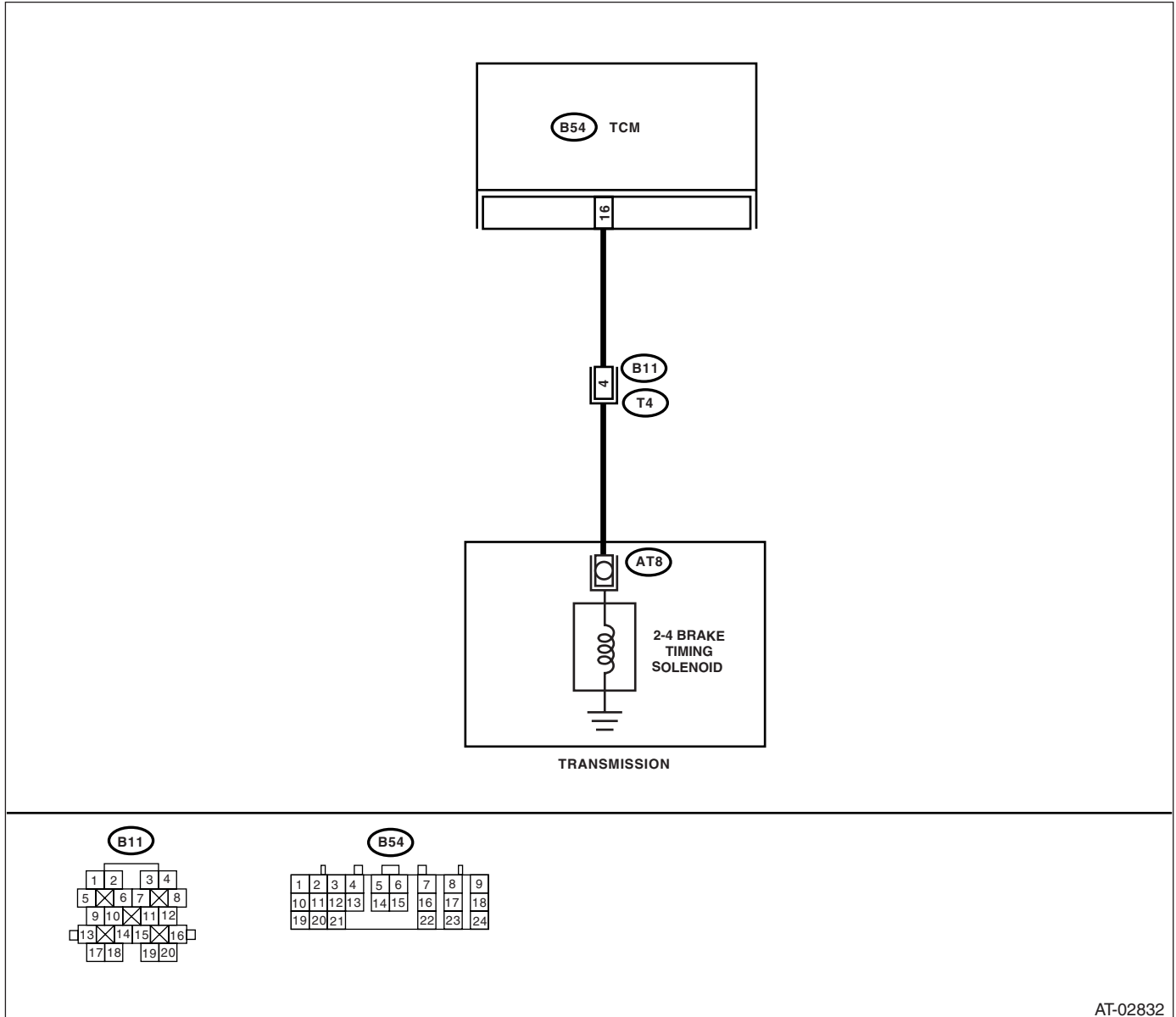
DIAGNOSIS:

The output signal circuit of 2-4 brake timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02832

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 (B54) No. 16 — (B11) No. 4:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B54) No. 16 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the 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 resistance 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 (B54) No. 15 (+) — Chassis ground (-):	Is the voltage more than 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) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and support with rigid rack. NOTE: Raise all wheels off ground. 3) 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 ATF reaches its operating temperature. 4) Move the selector lever to "1" range, 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.> 5) Measure the voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 16 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning light illuminates, 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 poor contact in transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
7 CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Lift-up the vehicle and support with rigid rack. NOTE: Raise all wheels off ground. 3) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 4) Remove the oil pan, and disconnect connector from 2-4 brake timing solenoid. 5) Measure the resistance between 2-4 brake timing solenoid connector and transmission ground. Terminals No. 1 — Transmission ground:	Is the resistance 10 — 16 Ω?	Go to step 8.	Replace the 2-4 brake timing solenoid. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 resistance less than 1 Ω ?	Go to step 9.	Repair the 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 resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light illuminates, 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 2-4 brake timing solenoid and transmission.	Repair the short circuit harness between 2-4 brake timing solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

L: DTC 75 LINE PRESSURE DUTY SOLENOID

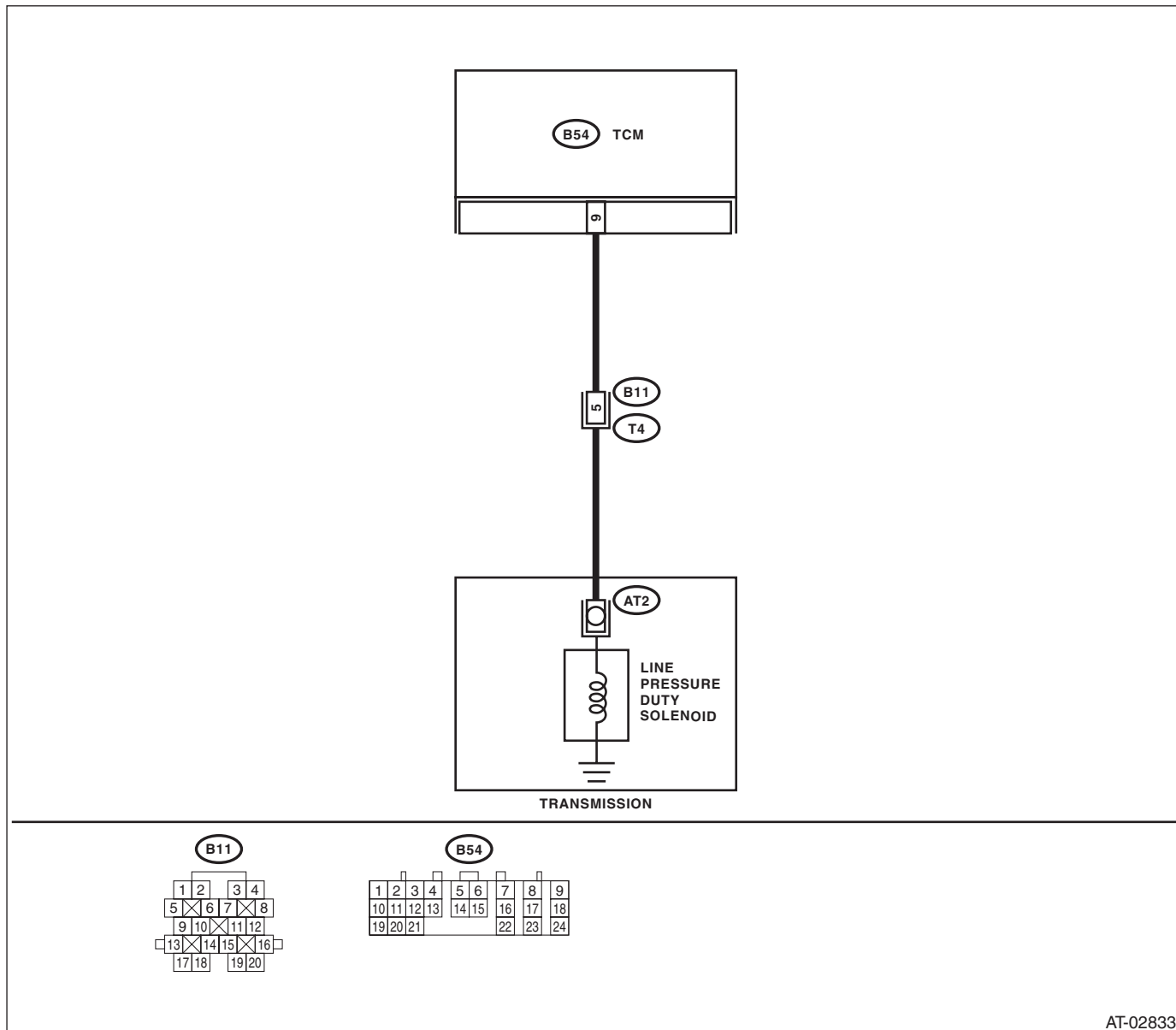
DIAGNOSIS:

Output signal circuit of line pressure duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02833

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 9 — (B11) No. 5:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.
2 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 resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK LINE PRESSURE DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Terminals (T4) No. 5 — No. 16:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 4.	Go to step 7.
4 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 Subaru Select Monitor switch to ON. 4) 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 ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move the select lever to "N" range. 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 value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn the ignition switch to ON (engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if the AT OIL TEMP warning light illuminates, 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 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 line pressure duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
7 CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan, and disconnect connector from line pressure duty solenoid. 4) Measure the resistance between line pressure duty solenoid connector and transmission ground. Terminals No. 1 — Transmission ground:	Is the resistance 2.0 — 4.5 Ω ?	Go to step 8.	Replace the line pressure duty solenoid. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 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 resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between line pressure duty solenoid and transmission connector.
9 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 resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light illuminates, 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 line pressure duty solenoid and transmission.	Repair the short circuit in harness between line pressure duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

M: DTC 76 2-4 BRAKE DUTY SOLENOID

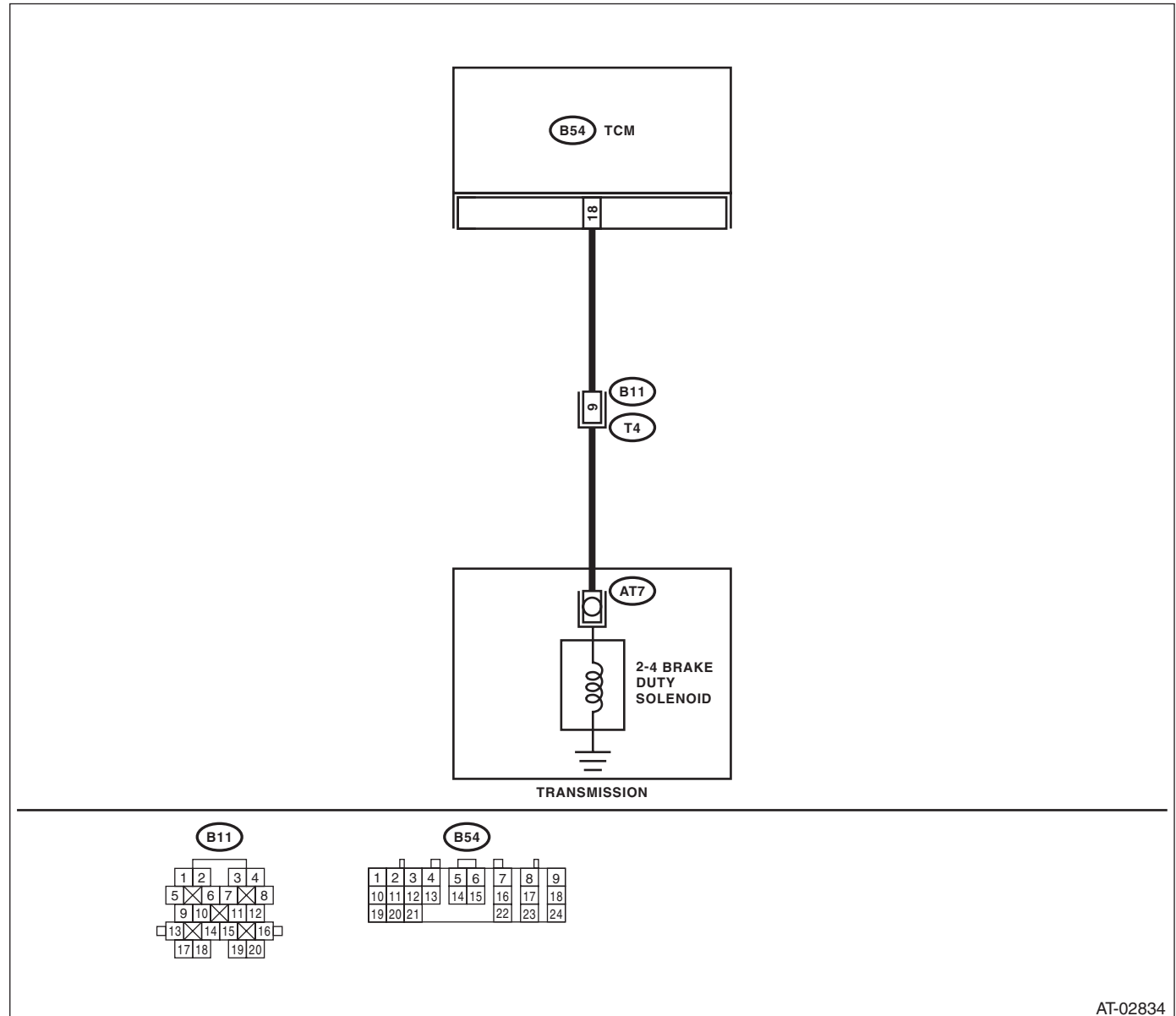
DIAGNOSIS:

Output signal circuit of 2-4 brake duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-02834

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 18 — (B11) No. 9:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure the resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 18 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK 2-4 BRAKE DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Terminals (T4) No. 16 — No. 9:	Is the resistance 2.0 — 4.5 Ω?	Go to step 4.	Go to step 7.
4 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 Subaru Select Monitor switch to ON. 4) 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 ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move the select lever to "N" range. 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 value 100%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn the ignition switch to ON (engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if the AT OIL TEMP warning light illuminates, 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 and transmission.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan, and disconnect connector from 2-4 brake duty solenoid. 4) Measure the resistance between 2-4 brake duty solenoid connector and transmission ground. Terminals No. 1 — Transmission ground:	Is the resistance 2.0 — 4.5 Ω ?	Go to step 8.	Replace the 2-4 brake duty solenoid. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 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 resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between 2-4 brake duty solenoid and transmission connector.
9 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 resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light illuminates, 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 line pressure duty solenoid and transmission.	Repair the short circuit in harness between 2-4 brake duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

N: DTC 77 LOCK-UP DUTY SOLENOID

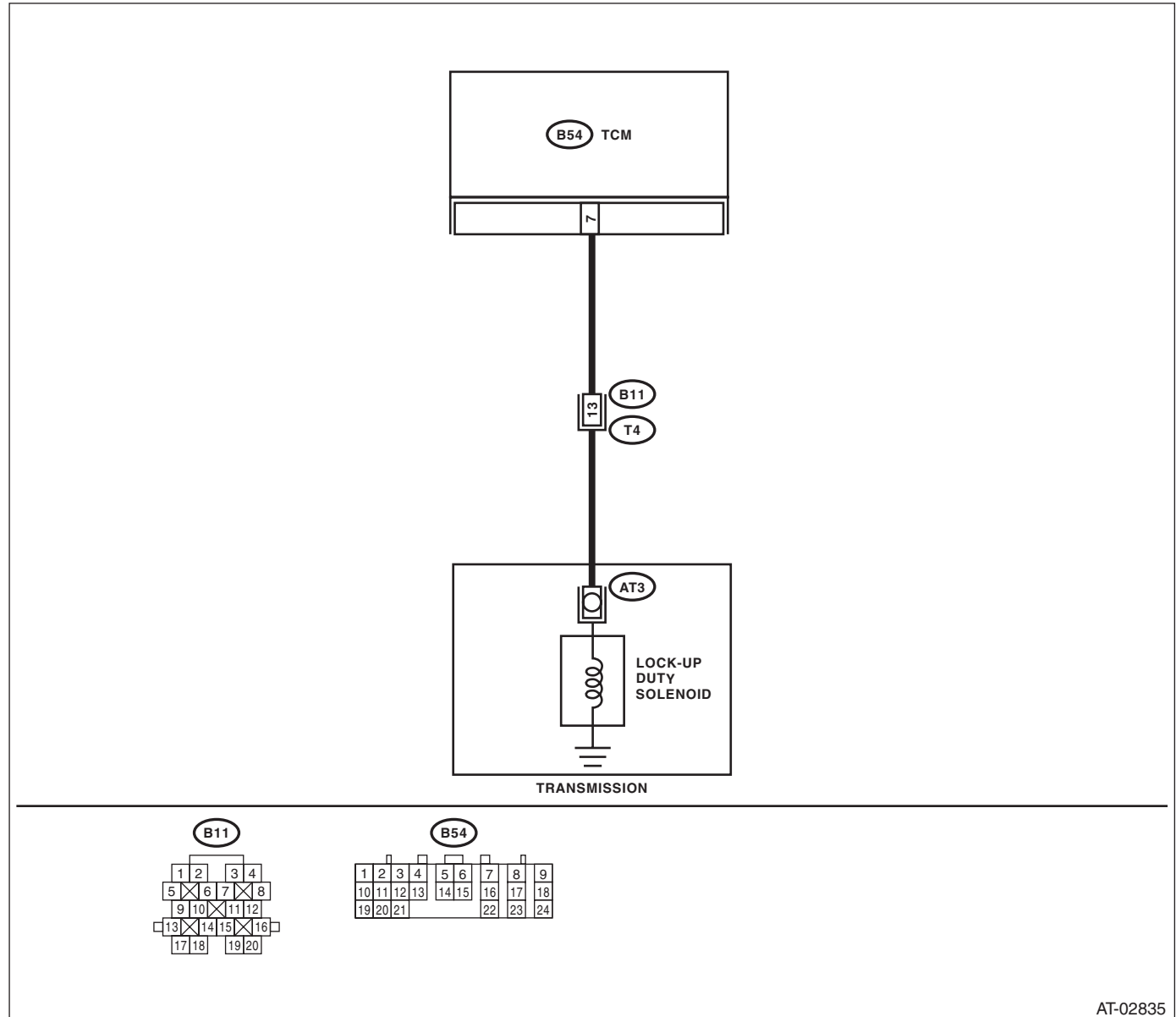
DIAGNOSIS:

The output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No "lock-up" (after engine warm-up).

WIRING DIAGRAM:



AT-02835

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 (B54) No. 7 — (B11) No. 13:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between TCM and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure the resistance of harness connector between TCM and chassis ground. Connector & terminal (B54) No. 7 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK LOCK-UP DUTY SOLENOID. Measure the resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 13 — No. 16:	Is the resistance 10 — 17 Ω ?	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off ground. 3) Connect the Subaru Select Monitor to data link connector. 4) Start the engine and turn Subaru Select Monitor switch to ON. 5) 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 ATF reaches its operating temperature. 6) Read the data of lock-up duty solenoid using Subaru Select Monitor. • Lock-up duty solenoid is indicated in “%”. 7) Move the selector lever to “D” range and slowly increase 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Is the value 95%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. Return the engine to idling speed and move selector lever to “N” range. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Is the value 5%?	Even if the AT OIL TEMP warning light blinks, 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 and transmission.	Go to step 6.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK POOR CONTACT.	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
7 CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION). 1) Remove the transmission connector from bracket. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the oil pan and disconnect connector from lock-up duty solenoid. 4) Measure the resistance between lock-up duty solenoid connector and transmission ground. Terminals No. 1 — Transmission ground:	Is the resistance 10 — 17 Ω ?	Go to step 8.	Replace the lock-up duty solenoid. <Ref. to 4AT-70, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 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 resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between TCM and transmission connector.
9 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 resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light blinks, 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 lock-up duty solenoid and transmission.	Repair the short circuit in harness between lock-up duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

O: DTC 79 TRANSFER DUTY SOLENOID

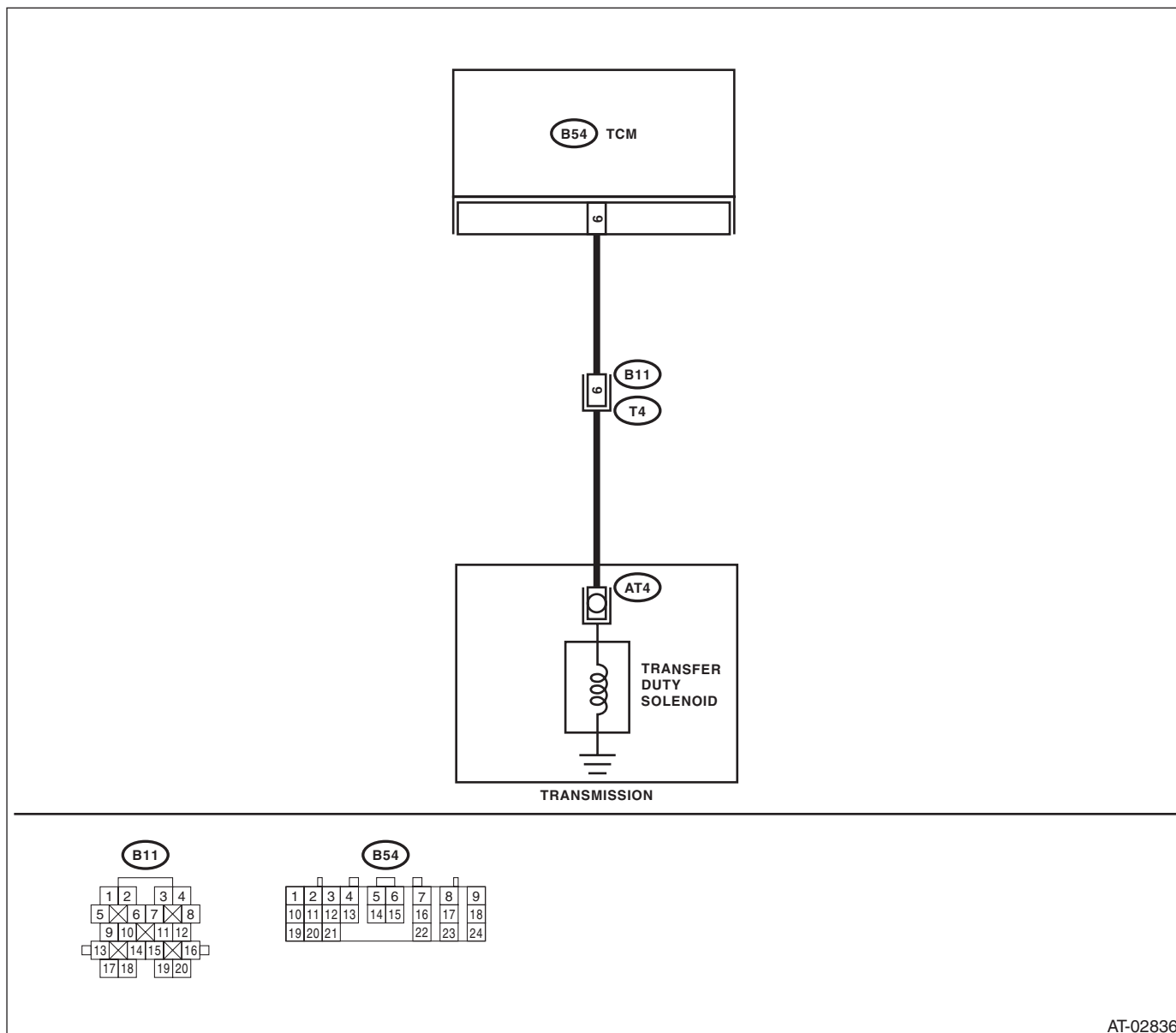
DIAGNOSIS:

The output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Tight corner braking phenomenon.

WIRING DIAGRAM:



AT-02836

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 (B54) No. 6 — (B11) No. 6:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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. Connector & terminal (B54) No. 6 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between TCM and transmission connector.
3 CHECK TRANSFER DUTY SOLENOID. Measure the resistance between transmission connector and transmission terminals. Connector & terminal (T4) No. 6 — No. 16:	Is the resistance 10 — 17 Ω ?	Go to step 4.	Go to step 7.
4 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 Subaru Select Monitor switch to ON. 4) Move the select lever to "D" range with throttle fully open (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 "%".	Is the value 80 — 95%?	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Move the select lever to "N" range with throttle fully close (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 value approx. 40%?	Even if the AT OIL TEMP warning light illuminates, 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 transfer duty solenoid and TCM connector.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in transfer duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off ground. 2) Drain the ATF. CAUTION: Do not drain the ATF until it cools down. 3) Remove the extension case and disconnect connector from transfer duty solenoid. 4) Measure the resistance between transfer duty solenoid connector and transmission ground. <i>Connector & terminal</i> <i>(AT4) No. 1 — Transmission ground:</i>	Is the resistance 10 — 17 Ω ?	Go to step 8.	Replace the transfer duty solenoid.
8 CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transfer duty solenoid and transmission connector. <i>Connector & terminal</i> <i>(T4) No. 6 — (AT4) No. 1:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Repair the open circuit in harness between transfer duty solenoid and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure the resistance of harness between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 6 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Even if the AT OIL TEMP warning light illuminates, 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 poor contact in transfer duty solenoid and transmission.	Repair the short circuit in harness between transfer duty solenoid and transmission connector.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

P: DTC 93 REAR VEHICLE SPEED SENSOR

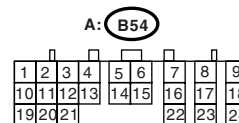
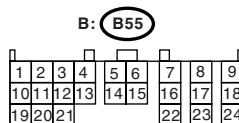
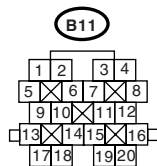
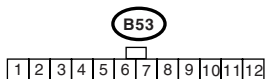
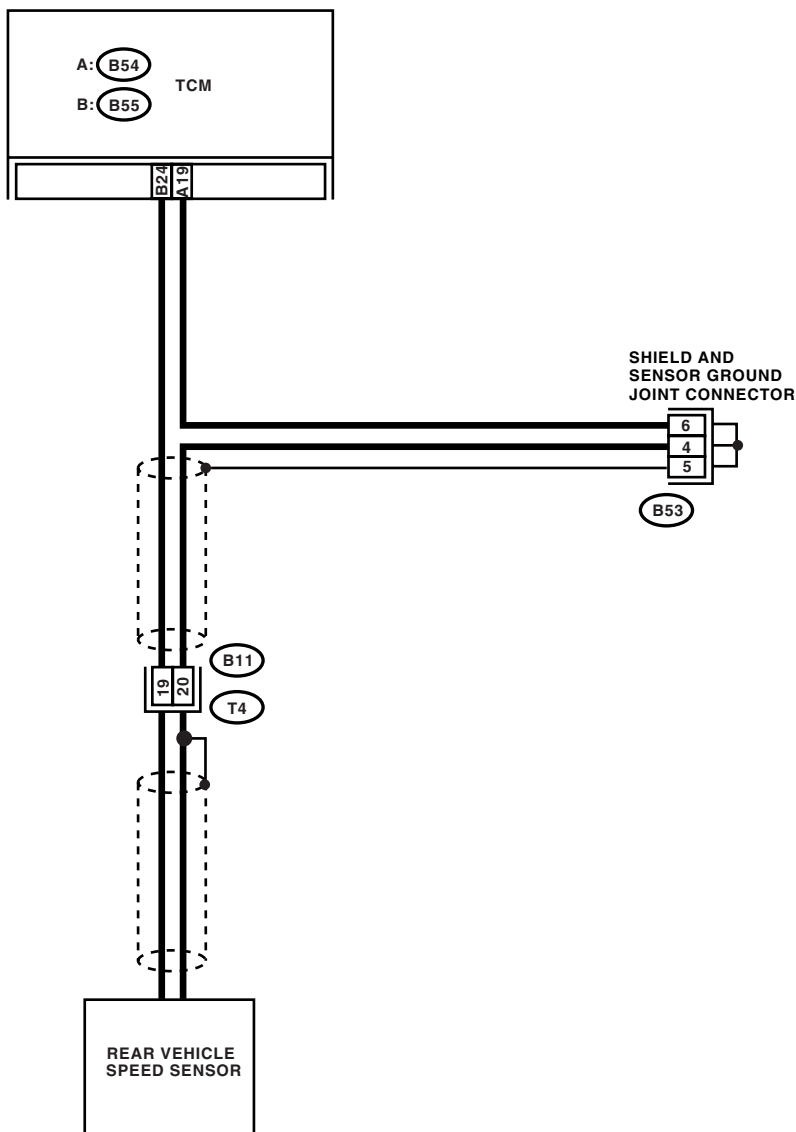
DIAGNOSIS:

The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Tight corner braking phenomenon.

WIRING DIAGRAM:



AT-02837

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 (B55) No. 24 — (B11) No. 19:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the 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 (B54) No. 19 — (B11) No. 20:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the 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 (B55) No. 24 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Go to step 4.	Repair the 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 (B54) No. 19 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Go to step 5.	Repair the 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 resistance 450 — 650 Ω ?	Go to step 6.	Replace the rear vehicle speed sensor. <Ref. to 4AT-59, Rear Vehicle Speed Sensor.>

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place rigid racks. NOTE: Raise all wheels off floor. 4) Turn the ignition switch to ON and turn 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 AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-26, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if the AT OIL TEMP warning light illuminates, 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 and transmission.	Go to step 7.
7 CHECK POOR CONTACT.	Is there poor contact in rear vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

15.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK BRAKE SWITCH

Step	Check	Yes	No
1 CHECK BRAKE SWITCH.	When the brake pedal is depressed, does LED light up?	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to 4AT(diag)-78, CHECK CRUISE CONTROL SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Check the brake switch circuit.

B: CHECK CRUISE CONTROL SWITCH

Step	Check	Yes	No
1 CHECK CRUISE CONTROL SWITCH.	When the cruise control is set, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to 4AT(diag)-79, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Check the cruise control. <Ref. to CC(ETC)(diag)-18, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: CHECK INHIBITOR SWITCH

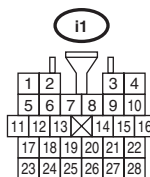
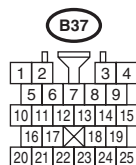
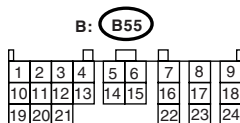
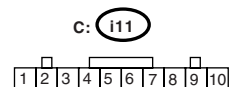
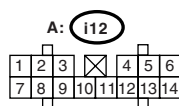
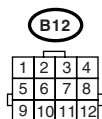
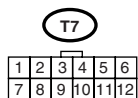
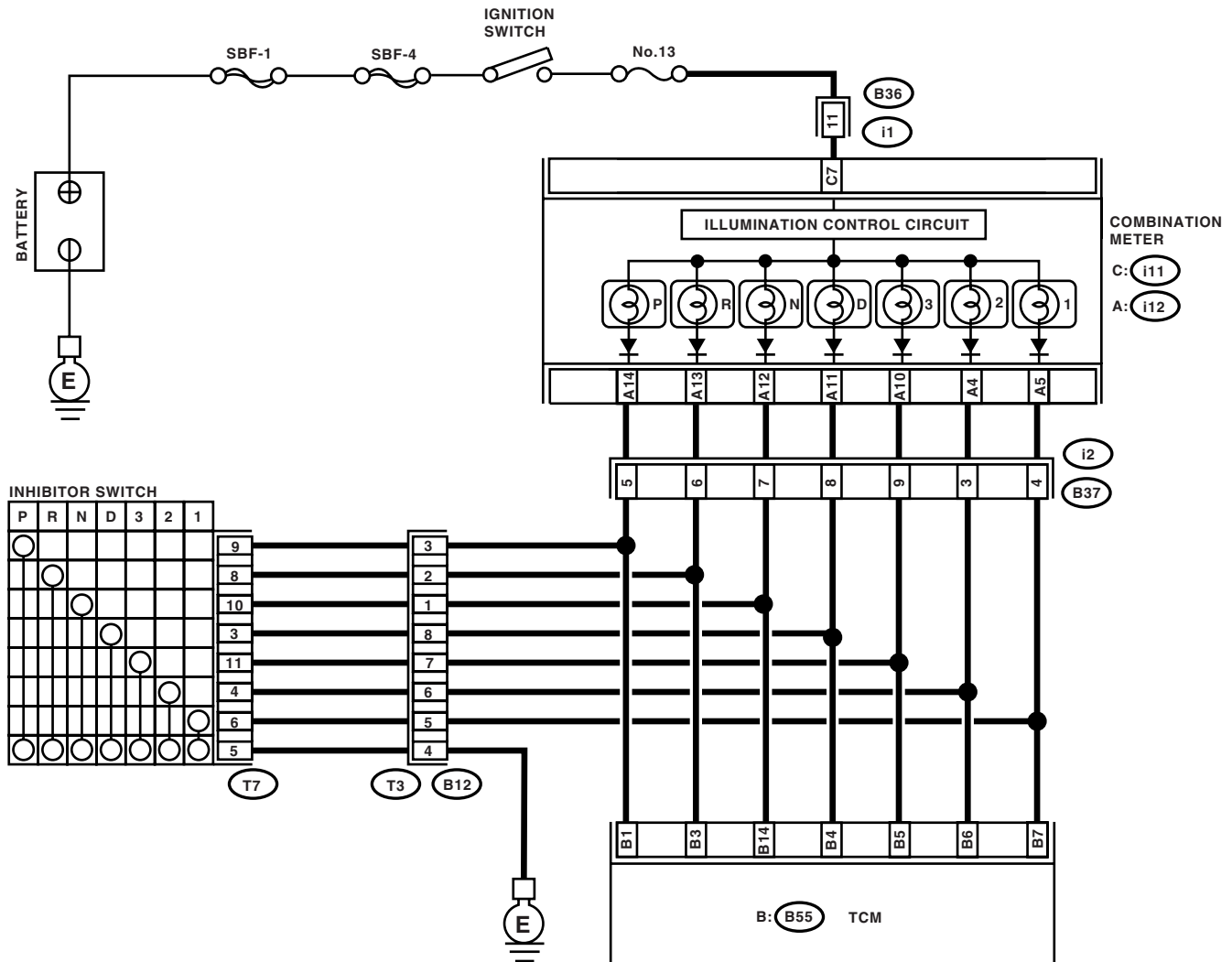
DIAGNOSIS:

The 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.

WIRING DIAGRAM:



Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
1	CHECK "P" RANGE SWITCH.	When the "P" range is selected, does LED light up?	Go to step 22.
2	CHECK INDICATOR LIGHT.	Does the combination meter "P" range indicator illuminate?	Go to step 26.
3	CHECK "P" RANGE SWITCH.	When the "R" range is selected, does "P" range LED light up?	Go to step 28.
4	CHECK "R" RANGE SWITCH.	When the "R" range is selected, does LED light up?	Go to step 29.
5	CHECK INDICATOR LIGHT.	Does the combination meter "R" range indicator illuminate?	Go to step 32.
6	CHECK "R" RANGE SWITCH.	When the "N" range is selected, does "R" range LED light up?	Go to step 34.
7	CHECK "N" RANGE SWITCH.	When the "N" range is selected, does LED light up?	Go to step 8.
8	CHECK INDICATOR LIGHT.	Does the combination meter "N" range indicator illuminate?	Go to step 9.
9	CHECK "N" RANGE SWITCH.	When the "D" range is selected, does "N" range LED light up?	Go to step 40.
10	CHECK "D" RANGE SWITCH.	When the "D" range is selected, does LED light up?	Go to step 11.
11	CHECK INDICATOR LIGHT.	Does the combination meter "D" range indicator illuminate?	Go to step 12.
12	CHECK "D" RANGE SWITCH.	When the "3" range is selected, does "D" range LED light up?	Go to step 46.
13	CHECK "3" RANGE SWITCH.	When the "3" range is selected, does LED light up?	Go to step 14.
14	CHECK INDICATOR LIGHT.	Does the combination meter "3" range indicator illuminate?	Go to step 15.
15	CHECK "3" RANGE SWITCH.	When the "2" range is selected, does "3" range LED light up?	Go to step 52.
16	CHECK "2" RANGE SWITCH.	When the "2" range is selected, does LED light up?	Go to step 17.
17	CHECK INDICATOR LIGHT.	Does the combination meter "2" range indicator illuminate?	Go to step 18.
18	CHECK "2" RANGE SWITCH.	When the "1" range is selected, does "2" range LED light up?	Go to step 58.
19	CHECK "1" RANGE SWITCH.	When the "1" range is selected, does LED light up?	Go to step 20.
20	CHECK INDICATOR LIGHT.	Does the combination meter "1" range indicator illuminate?	Go to step 21.
21	CHECK "1" RANGE SWITCH.	When the "2" range is selected, does "1" range LED light UP?	Go to step 64.
			Go to Symptom Related Diagnostic. <Ref. to 4AT(diag)-88, General Diagnostic Table.>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
22 CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between inhibitor switch and chassis ground. Connector & terminal (T7) No. 5 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 23.	Repair the open circuit 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 (B55) No. 1 — (T7) No. 9:	Is the resistance less than 1 Ω ?	Go to step 24.	Repair the 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 select lever to "P" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 1 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 25.	Go to step 65.
25 CHECK INPUT SIGNAL FOR TCM. 1) Position the select lever to any other than "P" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 1 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, 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?	Go to step 27.	Replace the "P" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
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 (B55) No. 1 — (i12) No. 14:	Is the resistance more than 1 Ω ?	Go to step 65.	Repair the 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 (B55) No. 1 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 29.	Repair the ground short circuit in "P" range circuit.

Diagnostic Procedure without 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. Connector & terminal (B55) No. 3 — (T7) No. 8:	Is the resistance less than 1 Ω ?	Go to step 30.	Repair the 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 select lever to "R" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 3 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 31.	Go to step 65.
31 CHECK INPUT SIGNAL FOR TCM. 1) Position the select lever to any other than "R" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 3 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, 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 "R" range indicator light bulb OK?	Go to step 33.	Replace the "R" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
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. Connector & terminal (B55) No. 3 — (i12) No. 13:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
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 (B55) No. 3 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 35.	Repair the 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 (B55) No. 14 — (T7) No. 10:	Is the resistance less than 1 Ω ?	Go to step 36.	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 select lever to "N" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 37.	Go to step 65.
37 CHECK INPUT SIGNAL FOR TCM. 1) Position the select lever to any other than "N" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
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?	Go to step 39.	Replace the "N" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
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 (B55) No. 14 — (i12) No. 12:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the 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 (B55) No. 14 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 41.	Repair the 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 (B55) No. 4 — (T7) No. 3:	Is the resistance less than 1 Ω ?	Go to step 42.	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
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 select lever to "D" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 4 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 43.	Go to step 65.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
43 CHECK INPUT SIGNAL FOR TCM. 1) Position select lever to any other than "D" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 4 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, 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?	Go to step 45.	Replace the "D" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
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 (B55) No. 4 — (i12) No. 11:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the open circuit in harness between TCM connector and combination meter, and TCM connector.
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 (B55) No. 4 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 47.	Repair the 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 (B55) No. 5 — (T7) No. 11:	Is the resistance less than 1 Ω ?	Go to step 48.	Repair the 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 select lever to "3" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 49.	Go to step 65.
49 CHECK INPUT SIGNAL FOR TCM. 1) Position the select lever to any other than "3" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 5 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>

Diagnostic Procedure without 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?	Go to step 51.	Replace the "3" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
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 (B55) No. 5 — (i12) No. 10:	Is the resistance more than 1 Ω ?	Go to step 65.	Repair the 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 (B55) No. 5 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 53.	Repair the 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 (B55) No. 6 — (T7) No. 4:	Is the resistance less than 1 Ω ?	Go to step 54.	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
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 select lever to "2" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 6 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 55.	Go to step 65.
55 CHECK INPUT SIGNAL FOR TCM. 1) Position the select lever to any other than "2" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 6 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, 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?	Go to step 57.	Replace the "2" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 (B55) No. 6 — (i12) No. 4:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the open circuit in harness between TCM and combination meter, and poor contact in TCM connector.
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 (B55) No. 6 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 59.	Repair the 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 (B55) No. 7 — (T7) No. 6:	Is the resistance less than 1 Ω ?	Go to step 60.	Repair the 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 select lever to "1" range. 5) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 7 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 61.	Go to step 65.
61 CHECK INPUT SIGNAL FOR TCM. 1) Position the select lever to any other than "1" range. 2) Measure the voltage between TCM and chassis ground. Connector & terminal (B55) No. 7 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 65.	Replace the TCM. <Ref. to 4AT-76, Transmission Control Module (TCM).>
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?	Go to step 63.	Replace the "1" range indicator light bulb. <Ref. to IDI-10, Combination Meter.>
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 (B55) No. 7 — (i12) No. 5:	Is the resistance less than 1 Ω ?	Go to step 65.	Repair the open circuit in harness between TCM and combination meter, poor contact in TCM connector.

Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
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 (B55) No. 7 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 65.	Repair the ground short circuit in “1” range circuit.
65 CHECK POOR CONTACT.	Is there poor contact in inhibitor switch circuit?	Repair the poor contact.	Adjust the inhibitor switch and select cable. <Ref. to 4AT-52, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-26, Select Cable.>

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

16.General Diagnostic Table

A: INSPECTION

Symptom	Problem parts
Starter does not rotate when select lever is in "P" or "N" range; starter rotates when select lever is in "R", "D", "3" or "2" range.	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Noise when select lever is in "P" or "N" range.	• Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	• Strainer • ATF level too high or too low
Noise occurs while driving in "D1".	• Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in "D2".	
Noise occurs while driving in "D3".	• Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in "D4".	• Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Engine stalls while shifting from "1" range to another.	• Control valve • Lock-up damper • Engine performance • Input shaft
Vehicle moves when select lever is in "N" range.	• TCM • Low clutch
Shock occurs when select lever is moved from "N" to "D" range.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from "N" to "D" range.	• Control valve • Low clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Shock occurs when select lever is moved from "N" to "R" range.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from "N" to "R" range.	• 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

General Diagnostic Table

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 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 select lever is in "R" (normal stall rpm).	• Control valve • High clutch • 2-4 brake • Planetary gear
Does not shift 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
Does not shift from 2nd to 3rd gear.	• TCM • Control valve • High clutch • Shift solenoid 2

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Does not shift from 3rd to 4th gear.	• TCM • Shift solenoid 1 • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when select lever is in "3" range.	• Inhibitor switch • TCM • Throttle position sensor • Control valve
Engine brake is not effected when select lever is in "3" or "2" range.	• Control valve
Engine brake is not effected when 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

General Diagnostic Table

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 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 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

General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
Shock occurs when 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 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
Select lever is hard to move.	• Select cable • Select lever • Detention spring • Manual plate
Select lever is excessively hard to move (unreasonable resistance).	• Detention spring • Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detention spring • Manual plate

MANUAL TRANSMISSION AND DIFFERENTIAL 5-SPEED (5MT)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

1. General Description

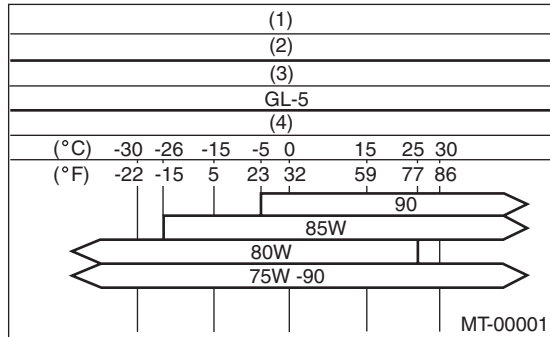
A: SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Model			2.5 L		2.0 L Turbo
			RS sport package	Except RS sport package	
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 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

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

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

4. DRIVE PINION ASSEMBLY

Preload adjustment of thrust bearing

Starting torque:

0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

5. REVERSE IDLER GEAR

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance:

6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust the clearance using washers.

Reverse idler gear to transmission case wall clearance:

0 — 0.5 mm (0 — 0.020 in)

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

6. SHIFTER FORK AND ROD

Select the 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 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd 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 model)		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in)

5th shifter fork (Turbo model)		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA241	No mark	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

7. TRANSFER CASE OR REAR CASE

Neutral position adjustment

Adjusting shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

8. EXTENSION ASSEMBLY

Standard protrusion amount of taper roller bearing outer race:

0.2 — 0.3 mm (0.008 — 0.012 in)

NOTE:

Be sure that it is within the standard protrusion amount.

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)

9. FRONT DIFFERENTIAL***Bevel gear to pinion backlash:******0.13 — 0.18 mm (0.0051 — 0.0071 in)***

Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

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)

10. TRANSFER DRIVE GEAR***Snap ring (Outer-30) to ball bearing clearance:******0.01 — 0.15 mm (0.0004 — 0.0059 in)***

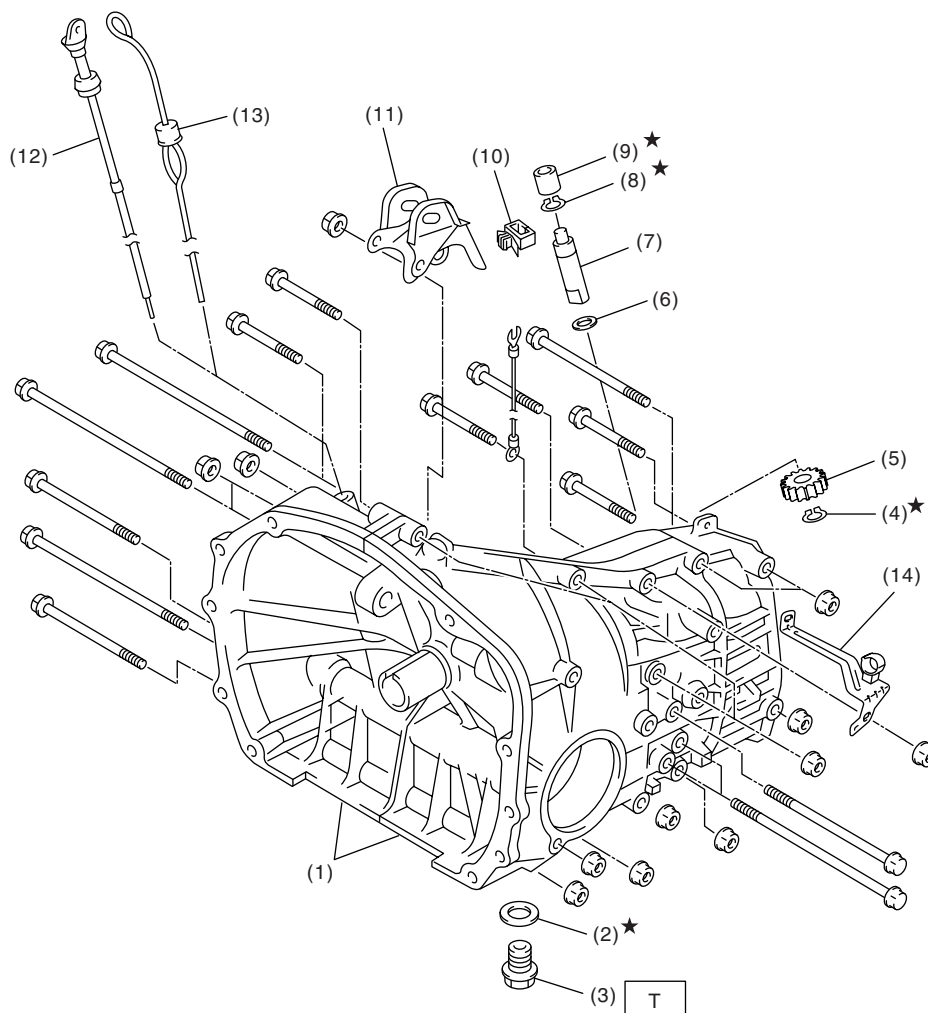
Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

B: COMPONENT

1. TRANSMISSION CASE



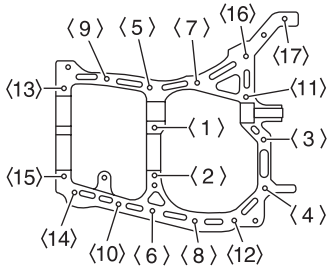
MT-00974

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

(1) Transmission case ASSY	(7) Speedometer shaft	(13) Oil level gauge (Turbo model)
(2) Gasket	(8) Snap ring (Outer)	(14) Harness bracket (Non-turbo model)
(3) Drain plug	(9) Oil seal	
(4) Snap ring (Outer)	(10) Clamp	
(5) Speedometer driven gear	(11) Pitching stopper bracket	Tightening torque: N·m (kgf-m, ft-lb)
(6) Washer	(12) Oil level gauge (Non-turbo model)	T: 69 (7.0, 50.6)

Transmission case tightening torque:

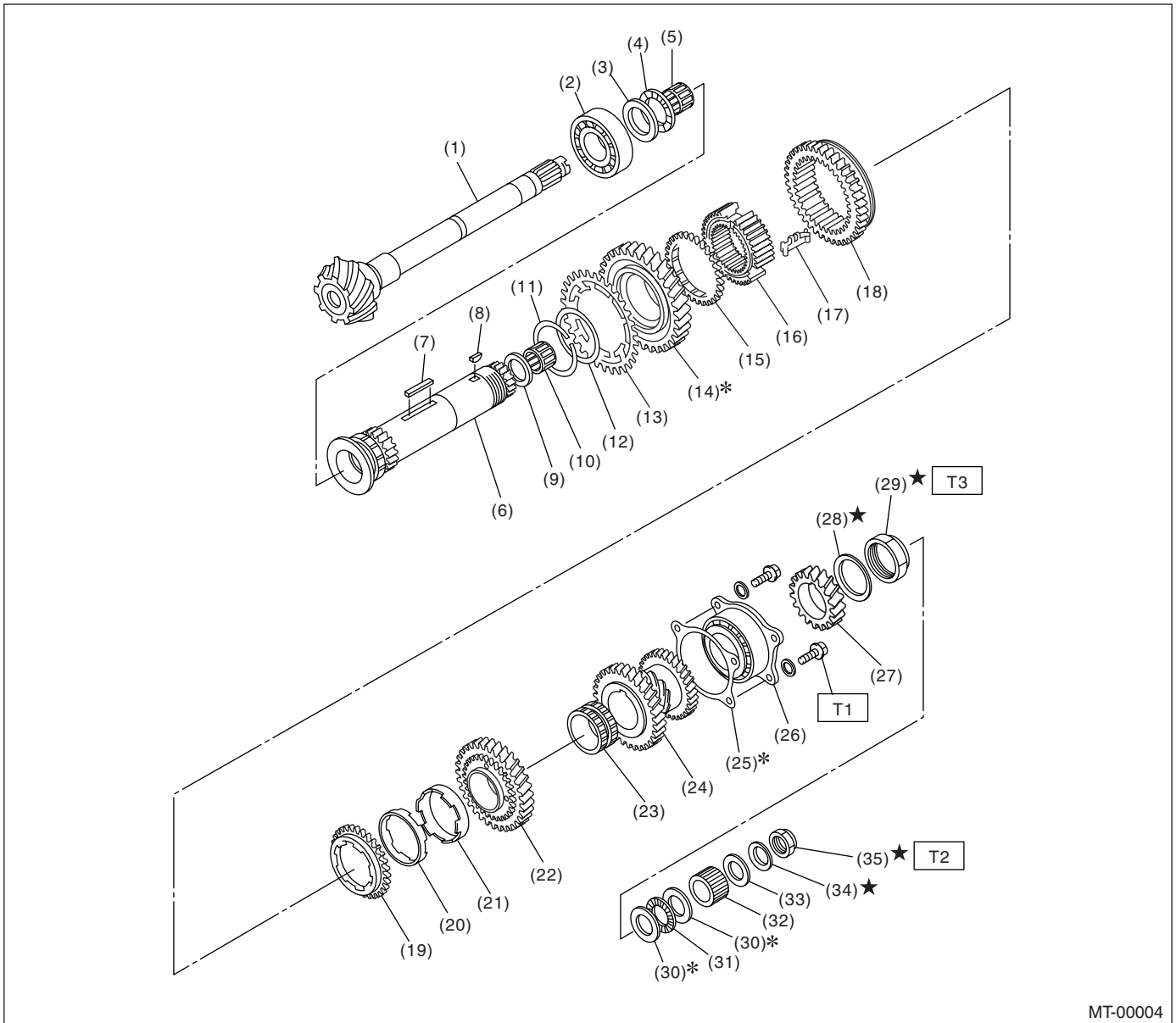
 MT-00003	Bolt No.	Bolt size mm	Tightening torque N·m (kgf-m, ft-lb)
	(5) to (15)	8	24.5 (2.5, 18.1)
	(1) to (4) (16), (17)	10	39 (4.0, 28.9)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DRIVE PINION ASSEMBLY

- Non-turbo model



MT-00004

(1) Drive pinion shaft	(15) Baulk ring	(28) Lock washer
(2) Roller bearing	(16) 1st-2nd synchronizer hub	(29) Lock nut
(3) Washer	(17) Insert key	(30) Washer
(4) Thrust bearing	(18) Reverse driven gear	(31) Thrust bearing
(5) Needle bearing	(19) Outer baulk ring	(32) Differential bevel gear sleeve
(6) Driven shaft	(20) Synchro cone	(33) Washer
(7) Key	(21) Inner baulk ring	(34) Lock washer
(8) Woodruff key	(22) 2nd driven gear	(35) Lock nut
(9) Drive pinion collar	(23) 2nd driven gear bushing	
(10) Needle bearing	(24) 3rd-4th driven gear	
(11) Snap ring (Outer)	(25) Driven pinion shim	
(12) Washer	(26) Roller bearing	
(13) Sub gear	(27) 5th driven gear	
(14) 1st driven gear		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 30 (3.1, 22.1)

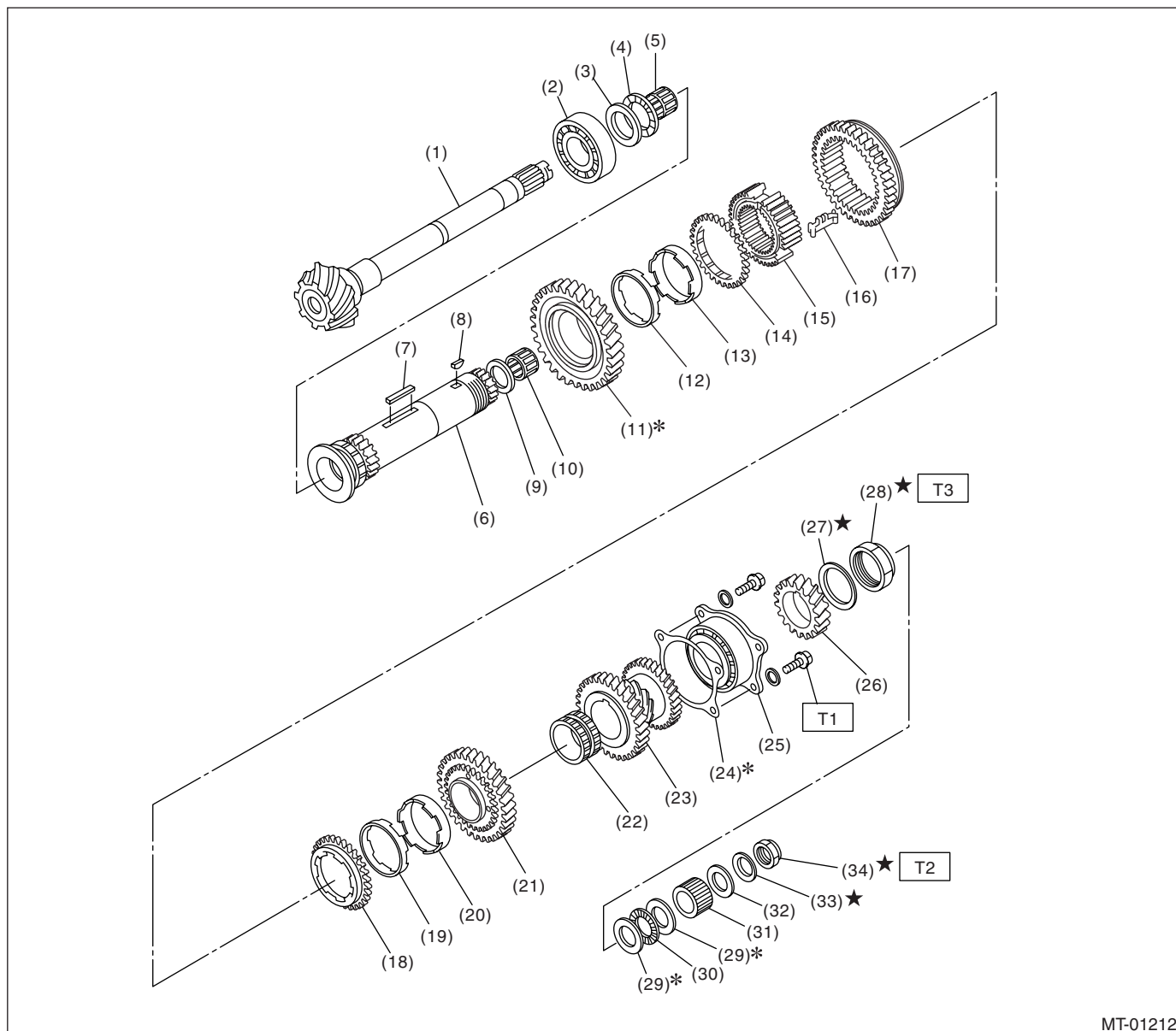
T2: 120 (12.2, 88.5)

T3: 260 (26.5, 191.7)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

• Turbo model



MT-01212

(1) Drive pinion shaft	(14) Outer baulk ring	(27) Lock washer
(2) Roller bearing	(15) 1st-2nd synchronizer hub	(28) Lock nut
(3) Washer	(16) Insert key	(29) Washer
(4) Thrust bearing	(17) Reverse driven gear	(30) Thrust bearing
(5) Needle bearing	(18) Outer baulk ring	(31) Differential bevel gear sleeve
(6) Driven shaft	(19) Synchro cone	(32) Washer
(7) Key	(20) Inner baulk ring	(33) Lock washer
(8) Woodruff key	(21) 2nd driven gear	(34) Lock nut
(9) Drive pinion collar	(22) 2nd driven gear bushing	
(10) Needle bearing	(23) 3rd-4th driven gear	
(11) 1st driven gear	(24) Driven pinion shim	
(12) Inner baulk ring	(25) Roller bearing	
(13) Synchro cone	(26) 5th driven gear	

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

T1: 30 (3.1, 22.1)

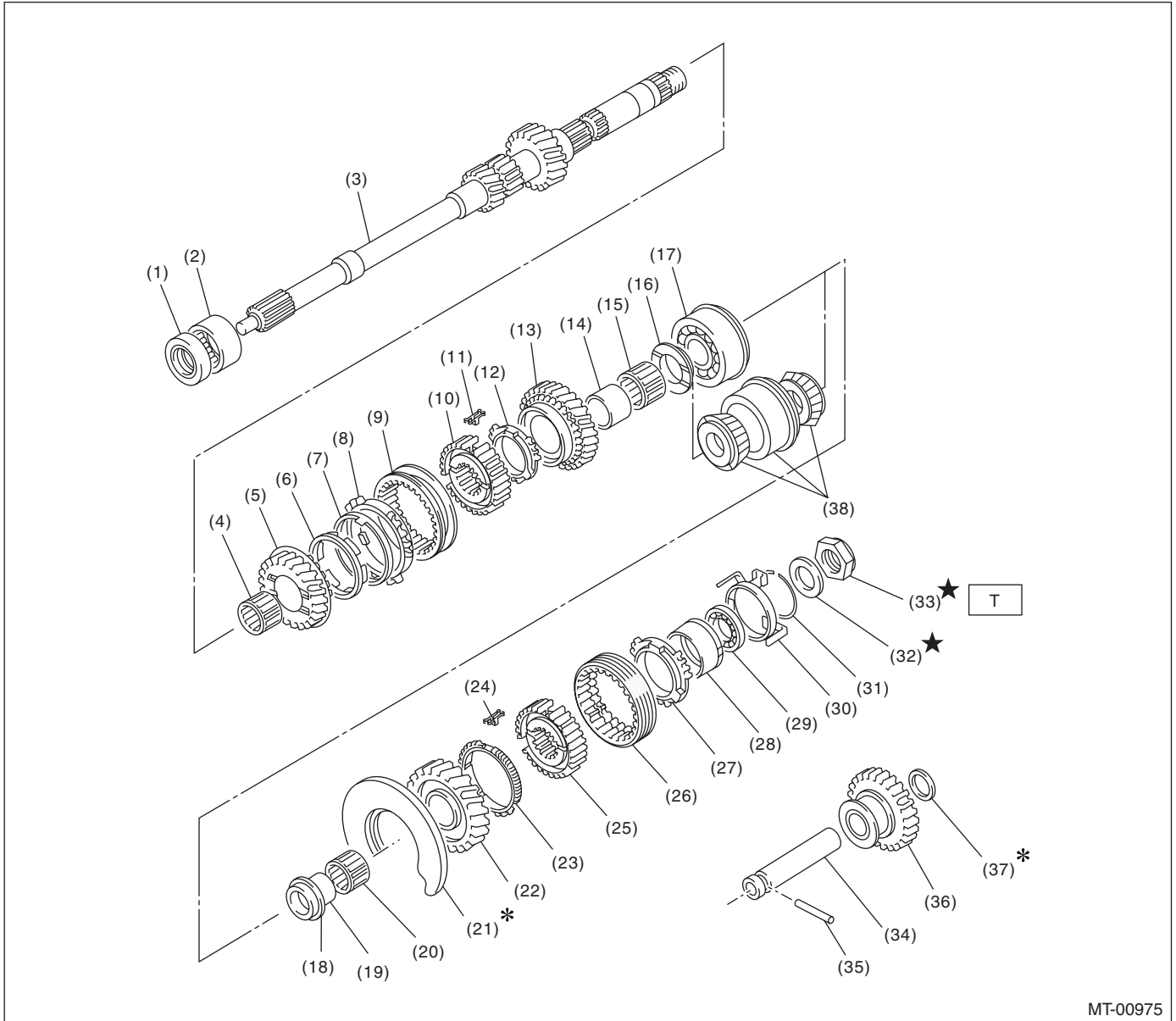
T2: 120 (12.2, 88.5)

T3: 260 (26.5, 191.7)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

3. MAIN SHAFT ASSEMBLY



MT-00975

(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 (Non-turbo model)	(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) 3rd synchro cone	(21) Main shaft rear plate	(35) Straight pin
(8) Outer baulk ring	(22) 5th drive gear	(36) Reverse idler gear
(9) 3rd-4th coupling sleeve	(23) 5th baulk ring	(37) Washer
(10) 3rd-4th synchronizer hub	(24) 5th-Rev shifting insert key	(38) Taper roller bearing (Turbo model)
(11) 3rd-4th shifting insert key	(25) 5th-Rev synchronizer hub	
(12) 4th baulk ring	(26) 5th-Rev coupling sleeve	
(13) 4th drive gear	(27) Rev baulk ring	
(14) 4th needle bearing race	(28) Rev synchro cone	

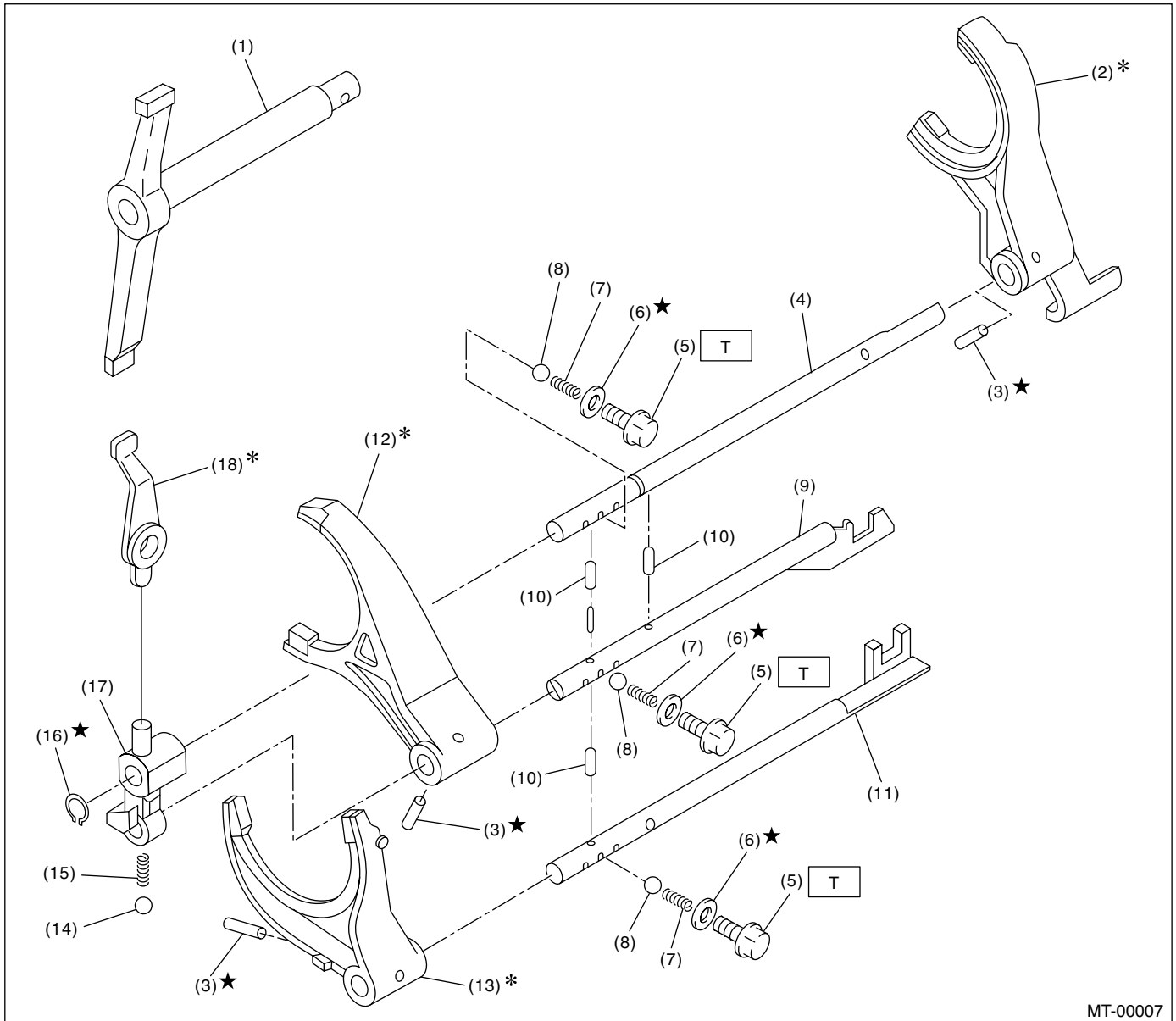
Tightening torque: N·m (kgf-m, ft-lb)

T: 120 (12.2, 88.5)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

4. SHIFTER FORK AND SHIFTER ROD



MT-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)

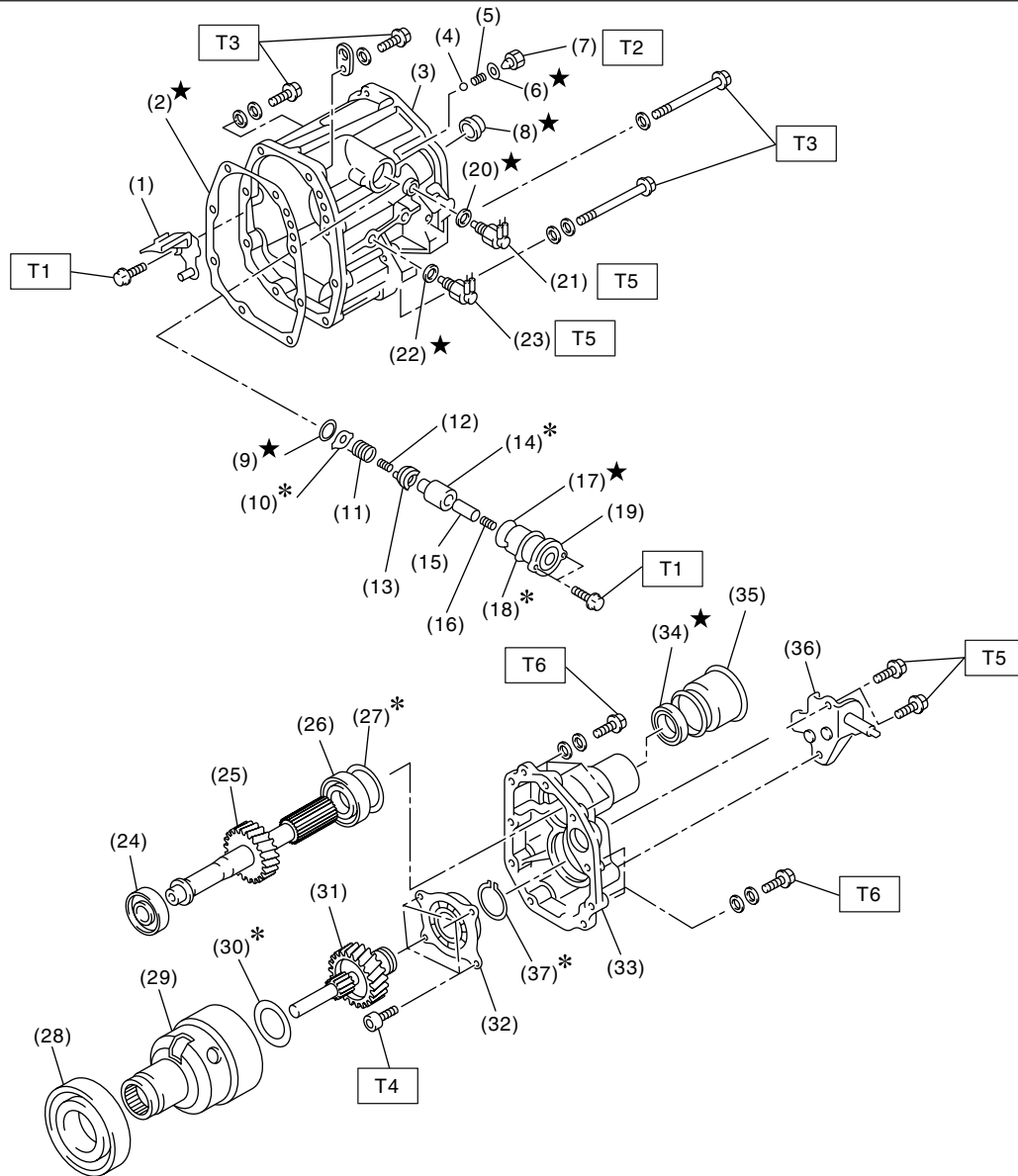
- | |
|----------------------------|
| (17) Reverse fork rod arm |
| (18) Reverse shifter lever |

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

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

5. TRANSFER CASE AND EXTENSION



MT-01255

(1) Oil guide	(16) Return spring	(31) Transfer drive gear
(2) Gasket	(17) O-ring	(32) Ball bearing
(3) Transfer case	(18) Adjusting select shim	(33) Extension case
(4) Ball	(19) Reverse check sleeve	(34) Oil seal
(5) Reverse accent spring	(20) Gasket	(35) Dust cover
(6) Gasket	(21) Neutral 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)

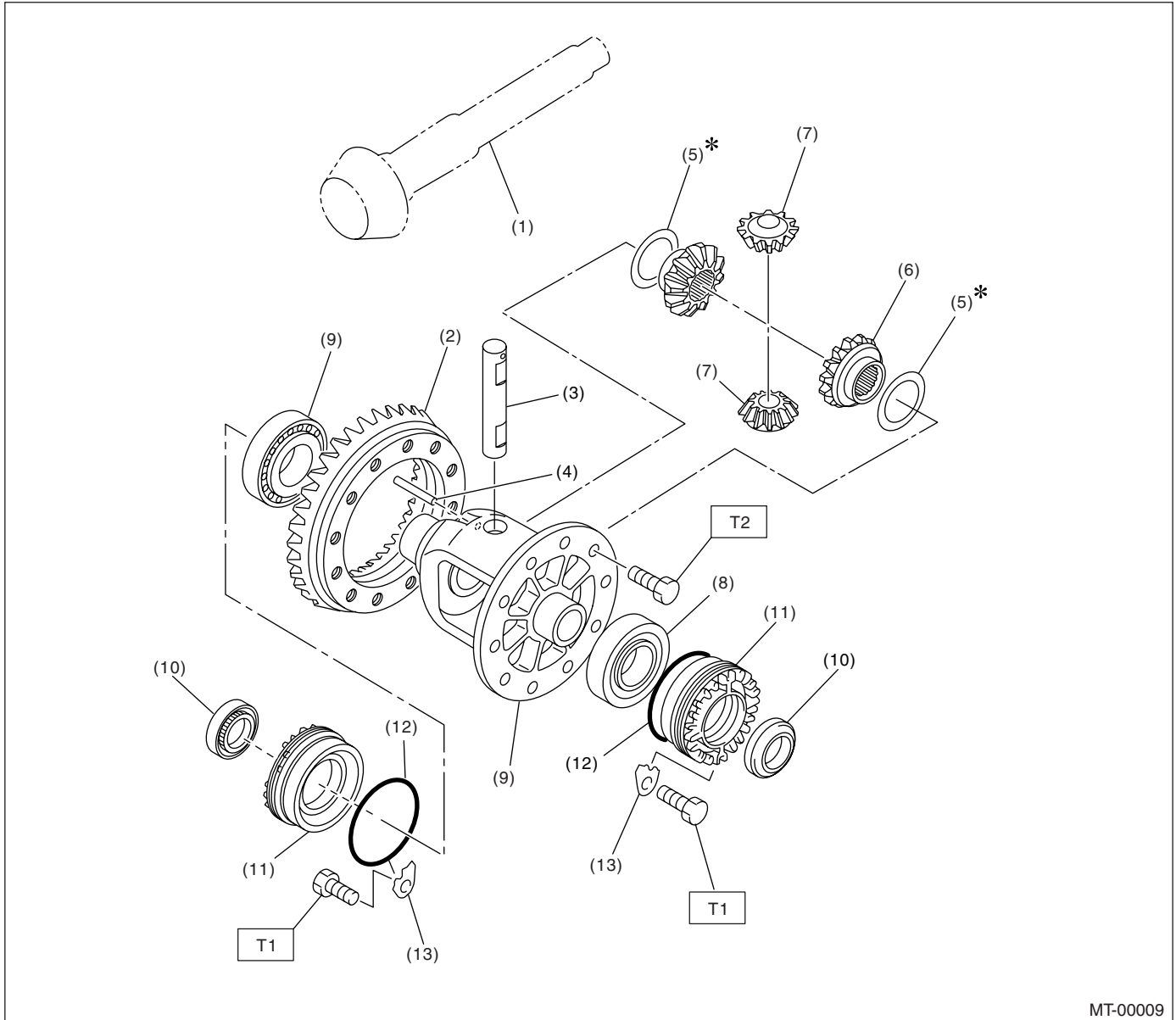
T5: 32.3 (3.3, 23.8)

T6: 40 (4.1, 29.7)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

6. FRONT DIFFERENTIAL



(1) Drive pinion shaft	(7) Differential bevel pinion
(2) Hypoid driven gear	(8) Roller bearing
(3) Pinion shaft	(9) Differential case
(4) Straight pin	(10) Oil seal
(5) Washer	(11) Differential side retainer
(6) Differential bevel gear	(12) O-ring

- (13) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)

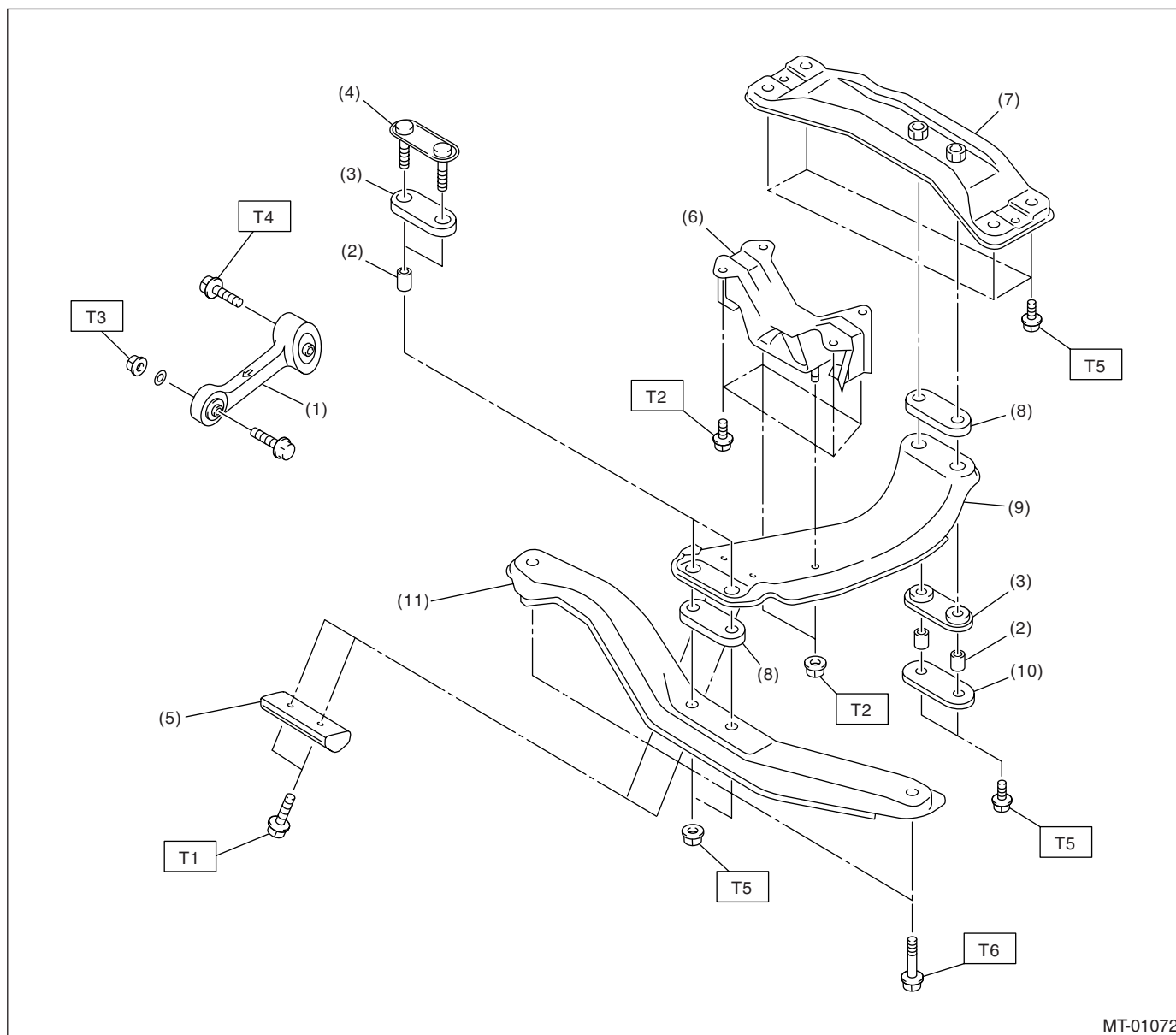
T1: 25 (2.5, 18.1)

T2: 62 (6.3, 45.6)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

7. TRANSMISSION MOUNTING



(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

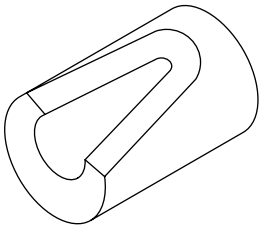
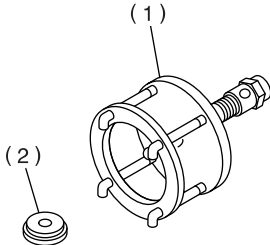
C: CAUTION

- Wear work 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 and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn yourself, 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 rigid racks 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 vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

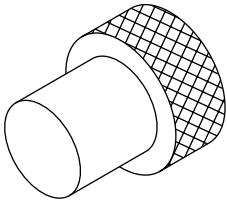
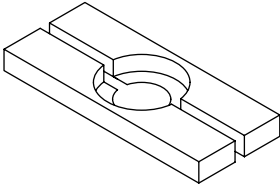
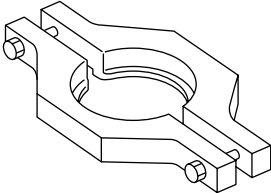
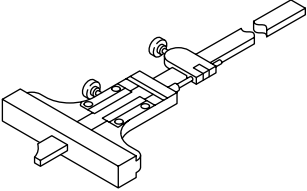
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399411700	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.
 ST-899524100	899524100	PULLER SET	Used for removing and installing roller bearing (Differential). (1) PULLER (2) CAP

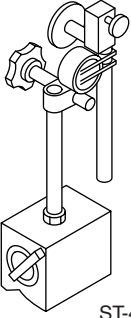
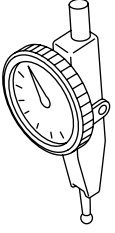
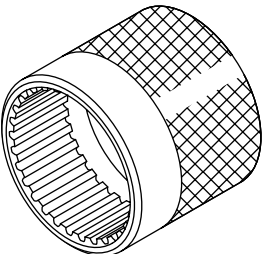
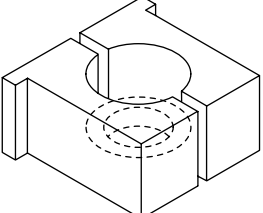
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-498147000	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.

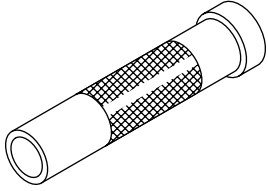
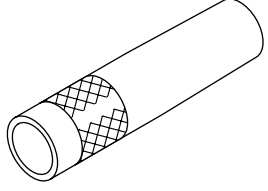
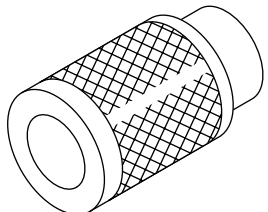
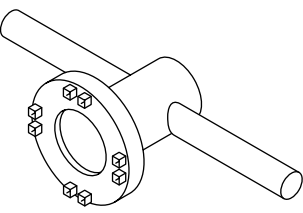
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.

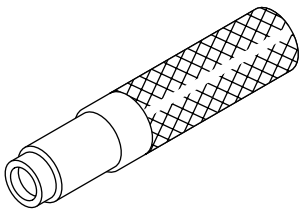
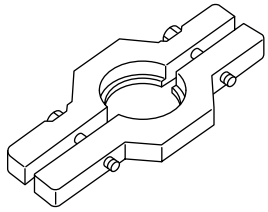
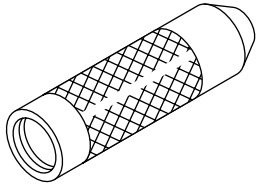
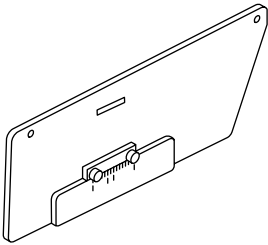
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499277100	499277100	BUSHING 1-2 INSTALLER	- Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bushing. - 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.
 ST-499757002	499757002	INSTALLER	- Used for installing snap ring (OUT 25) and ball bearing (25 × 26 × 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.

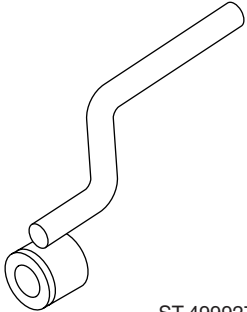
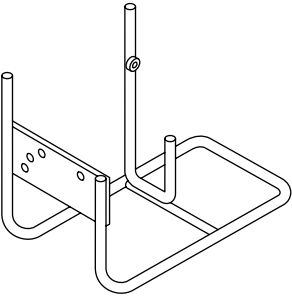
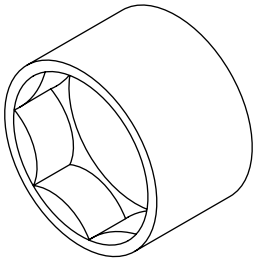
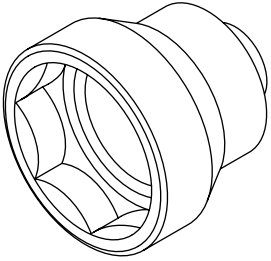
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 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.

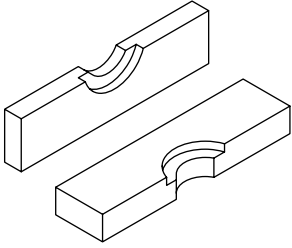
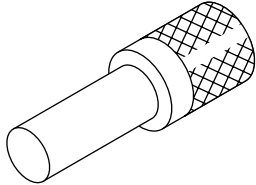
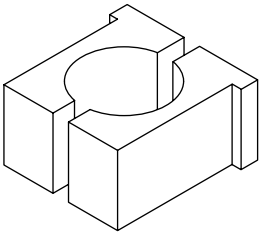
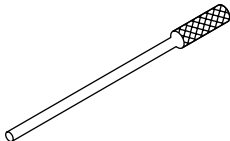
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499927100	499927100	HANDLE	Used for fitting transmission main shaft.
 ST-499937100	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.
 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.

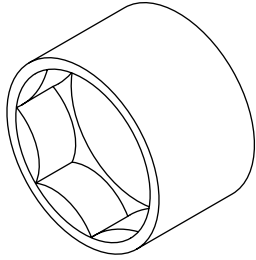
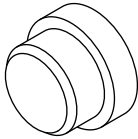
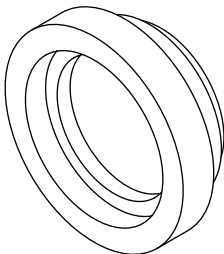
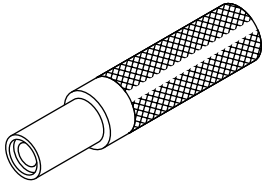
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899714110	899714110	REMOVER	Used for installing transmission main shaft, drive pinion and rear drive shaft.
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 ST-899884100	899884100	HOLDER	Used for tightening lock nut on sleeve.
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.

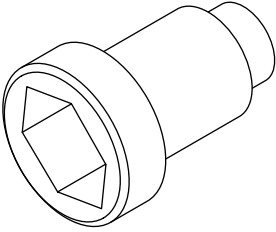
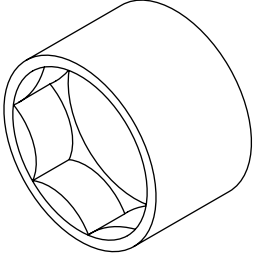
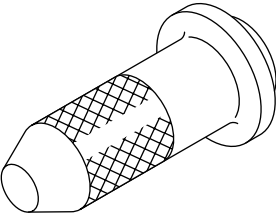
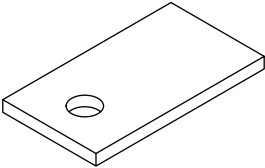
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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).
 ST-499587000	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 ST-899824100	899824100	PRESS	Used for installing speedometer shaft oil seal.

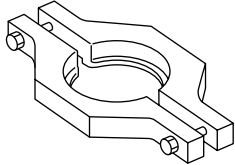
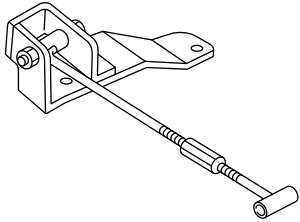
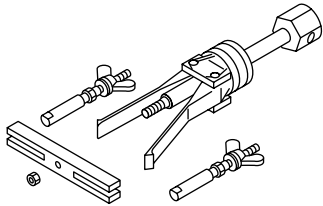
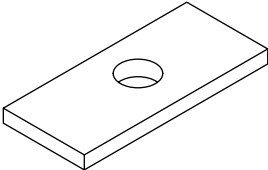
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.

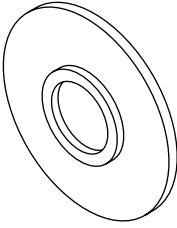
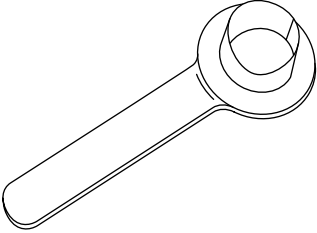
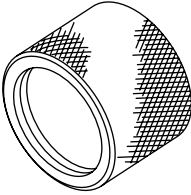
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077400	498077400	SYNCHRONIZER CONE REMOVER	- Used for removing synchronizer cone of main shaft. - Used for removing 5th driven gear of drive pinion shaft.
 ST41099AC000	41099AC000	ENGINE SUPPORT BRACKET	Used for supporting engine.
 ST-398527700	398527700	PULLER ASSY	Used for removing extension case roller bearing.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	38177700	INSTALLER	- Used for installing bearing cone of transfer driven gear (transfer case side). - Used for installing ball bearing of transfer driven gear.
 ST28399SA010	28399SA010	FRONT DRIVE SHAFT OIL SEAL PROTECTOR	Used for protecting oil seal from damage when inserting front drive shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

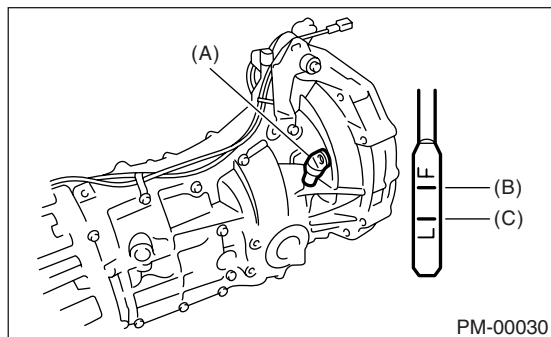
Transmission Gear Oil

MANUAL TRANSMISSION AND DIFFERENTIAL

2. Transmission Gear Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Turn the ignition switch to OFF, and then 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 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 the oil level gauge.
- 2) Lift-up the vehicle.
- 3) Drain the transmission gear oil completely.

CAUTION:

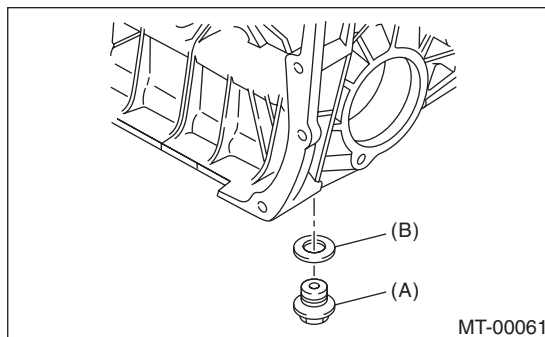
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:

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

Tightening torque:

69 N·m (7.0 kgf-m, 50.6 ft-lb)



- (A) Drain plug
- (B) Gasket

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

Recommended gear oil:

Use GL-5 (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 top end of level gauge with the notch in the gauge hole.

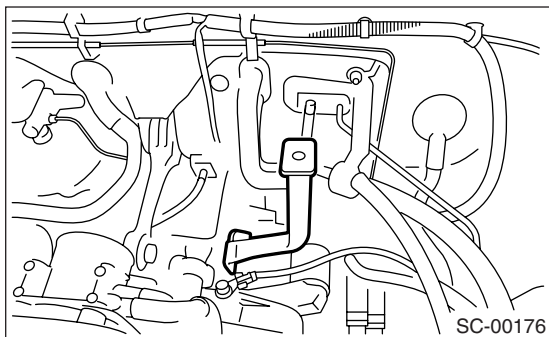
NOTE:

The level should be within the specified range marked on the gauge.

3. Manual Transmission Assembly

A: REMOVAL

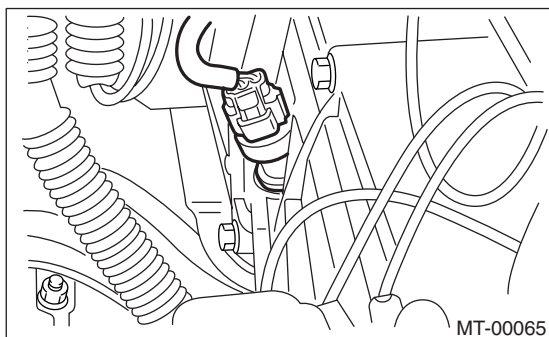
- 1) Open the front hood fully, and support with stay.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 4) Remove the air cleaner case stay.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



- 5) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

- 6) Disconnect the following connectors:

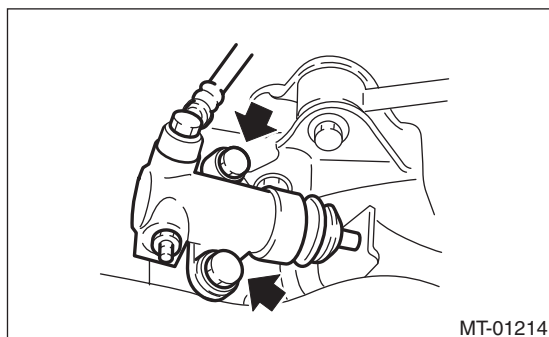
- (1) Neutral position switch connector
- (2) Back-up light switch connector
- (3) Vehicle speed sensor



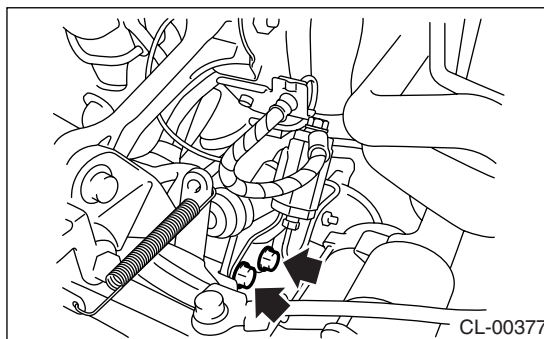
- 7) Remove the starter. <Ref. to SC(H4SO)-8, REMOVAL, Starter.>

- 8) Remove the operating cylinder from transmission.

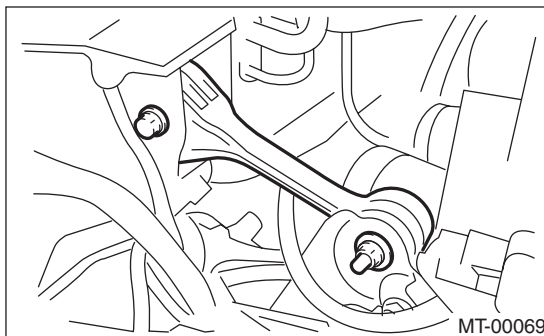
- Non-turbo model



- Turbo model

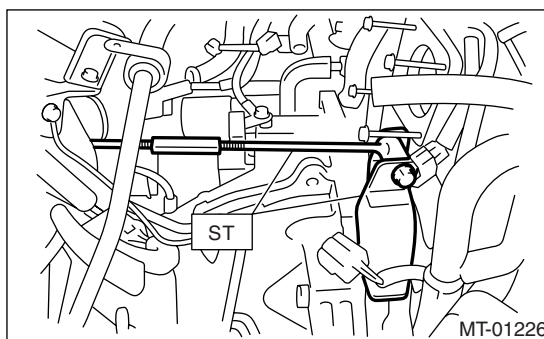


- 9) Remove the pitching stopper.



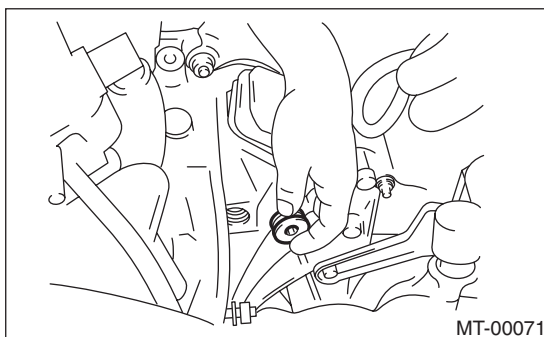
- 10) Set the ST.

ST 41099AC000 ENGINE SUPPORT ASSY



- 11) Separate the clutch release fork from release bearing. (Turbo model)

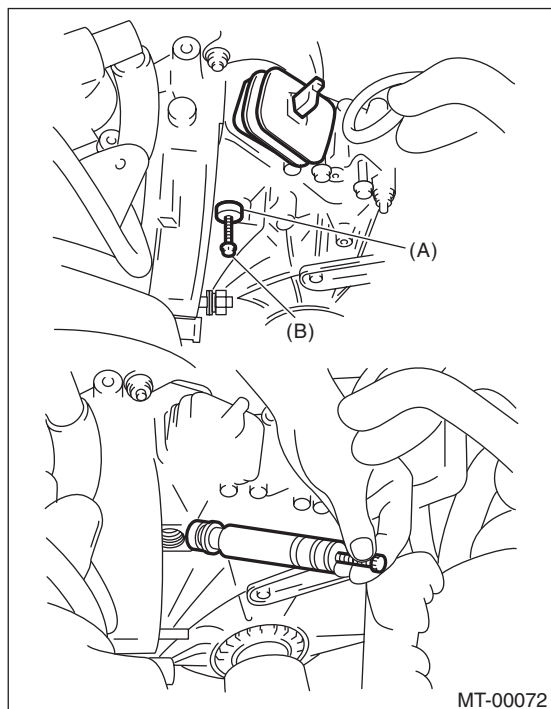
- (1) Remove the clutch operating cylinder from transmission.
- (2) Remove the plug using 10 mm hexagon wrench.



Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

- (3) Screw the 6 mm dia. bolt into release fork shaft, and then remove it.



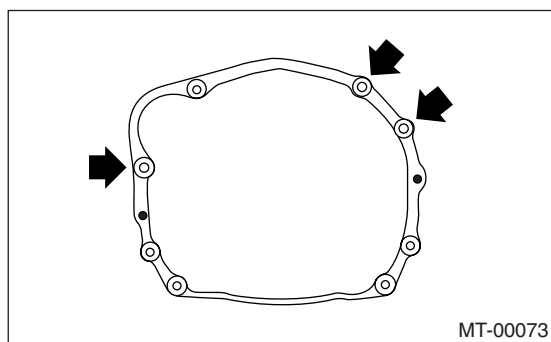
(A) Shaft
(B) Bolt

- (4) Raise the release fork and unfasten the release bearing tabs to release the fork.

NOTE:

Step (4) is required to prevent interference with engine when removing the engine from transmission.

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



- 13) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>

- 14) Remove the center exhaust pipe. (Turbo model). <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>

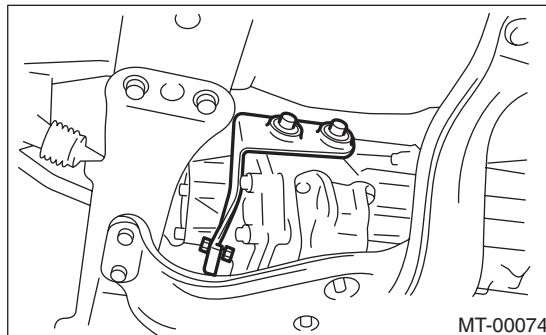
- 15) Remove the rear exhaust pipe and muffler.

CAUTION:

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

- 16) Remove the heat shield cover. (If equipped)

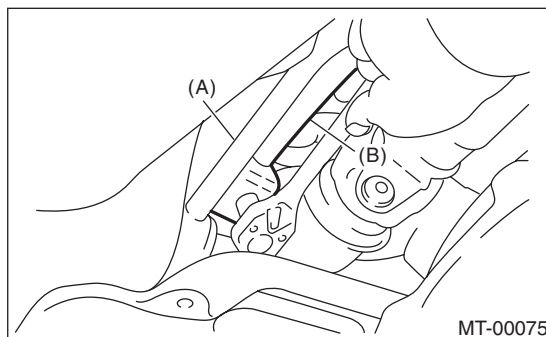
- 17) Remove the hanger bracket from right side of transmission.



- 18) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>

- 19) Remove the gear shift rod and the stay from transmission.

- (1) Disconnect the stay from transmission.
- (2) Disconnect the rod from transmission.

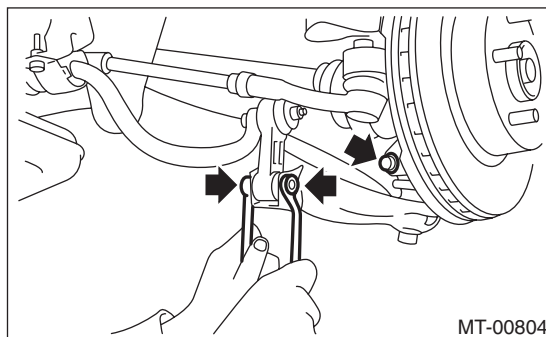


(A) Stay
(B) Rod

- 20) Disconnect the stabilizer link from transverse link.

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

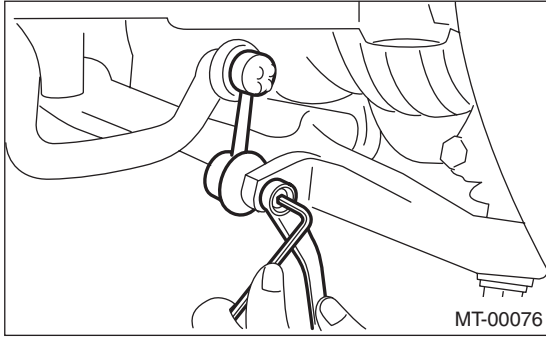
- Wagon model



Manual Transmission Assembly

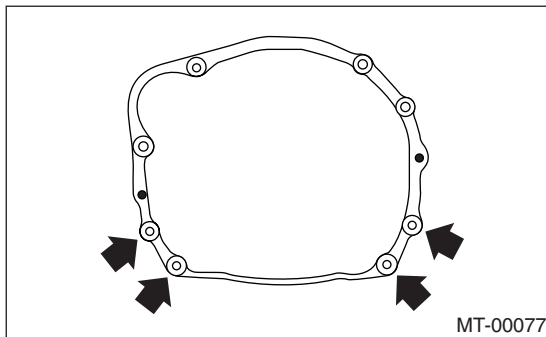
MANUAL TRANSMISSION AND DIFFERENTIAL

- Sedan model



22) Remove the drive shafts from the transmission.
<Ref. to DS-33, REMOVAL, Front Drive Shaft.>

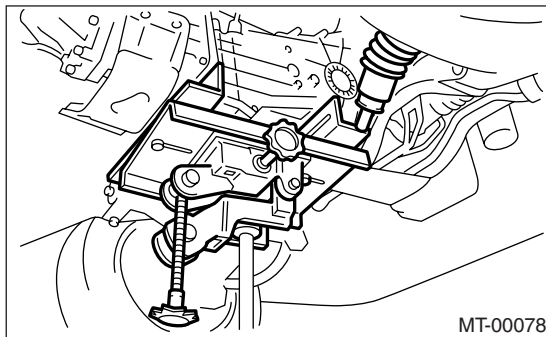
23) Remove the nuts which hold the lower side of transmission to engine.



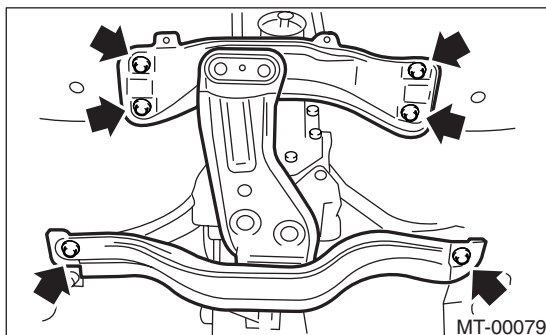
24) Place the transmission jack under transmission.

CAUTION:

Always support the transmission case with a transmission jack.



25) Remove the transmission rear crossmember from vehicle.



26) Remove the transmission.

NOTE:

Move the transmission jack toward rear until main shaft is withdrawn from clutch cover.

27) Separate the transmission assembly and rear cushion rubber.

28) Remove the clutch release bearing from engine side. (Turbo model) <Ref. to CL-14, REMOVAL, Release Bearing and Lever.>

B: INSTALLATION

1) Install the rear cushion rubber to transmission assembly.

Tightening torque:

35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install the clutch release lever and bearing onto transmission. (Turbo model) <Ref. to CL-14, INSTALLATION, Release Bearing and Lever.>

3) Install the transmission onto engine.

(1) Gradually raise the transmission with transmission jack.

(2) Engage them at splines.

NOTE:

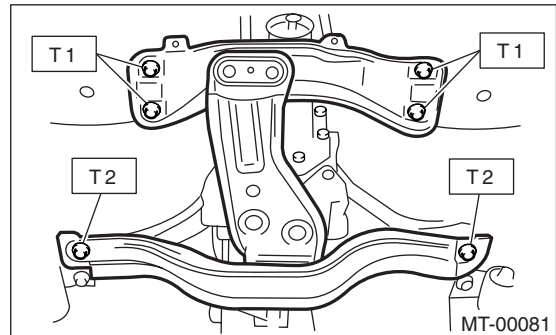
Be careful not to strike the main shaft against clutch cover.

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.

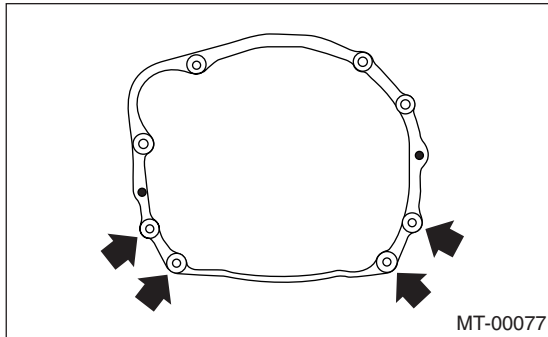
6) Tighten the nuts which hold the lower side of transmission to engine.

Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

Tightening torque:

50 N·m (5.1 kgf-m, 37 ft-lb)



7) Connect the engine and transmission.

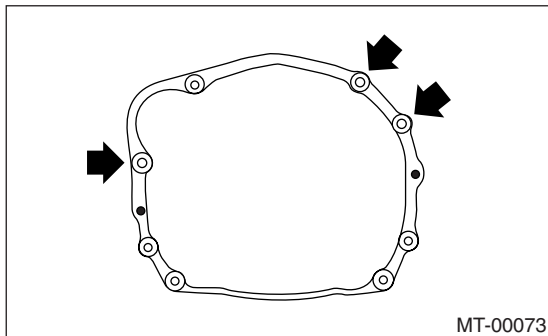
(1) Install the starter.

<Ref. to SC(H4SO)-8, INSTALLATION, Starter.>

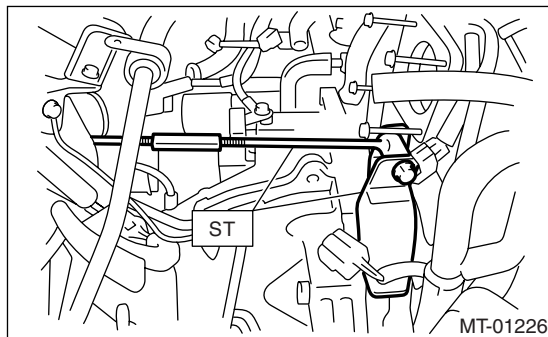
(2) Tighten the bolt which holds right upper side of transmission to engine.

Tightening torque:

50 N·m (5.1 kgf-m, 37 ft-lb)



8) Remove the ST.

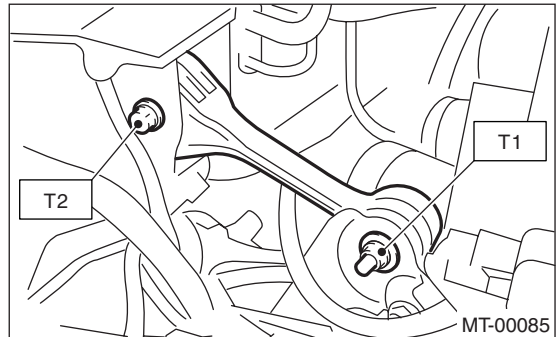


9) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)

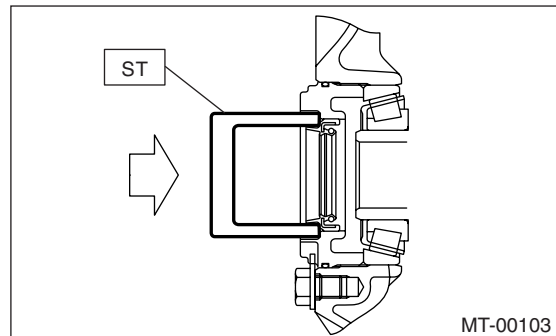


10) Lift-up the vehicle.

11) Replace the differential side retainer oil seal.

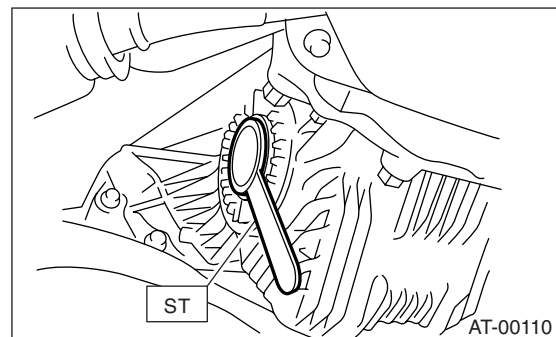
NOTE:

Be sure to replace the differential side retainer oil seal after the procedure of removing the front drive shaft.



12) Install the front drive shaft into transmission.

ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR



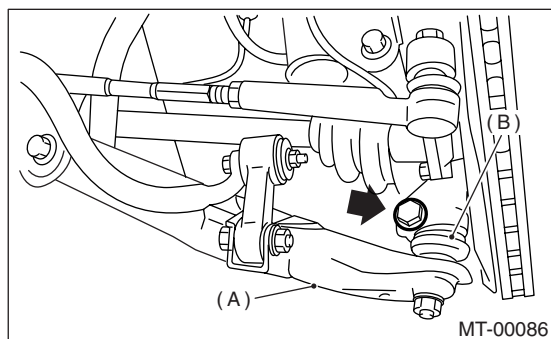
13) Install the ball joints of lower arm into knuckle arm of housing, and tighten the installing bolts.

Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

Tightening torque:

49 N·m (5.0 kgf-m, 36 ft-lb)

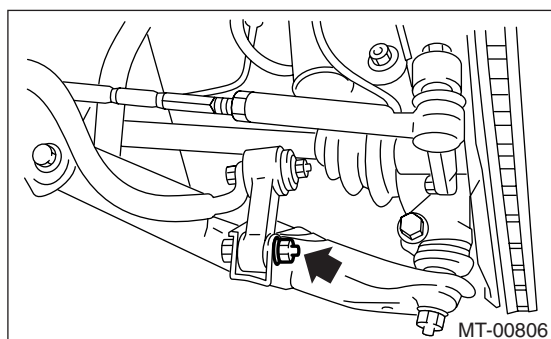


- (A) Transverse link
(B) Ball joint

- 14) Install the stabilizer link from transverse link.
• Wagon model

Tightening torque:

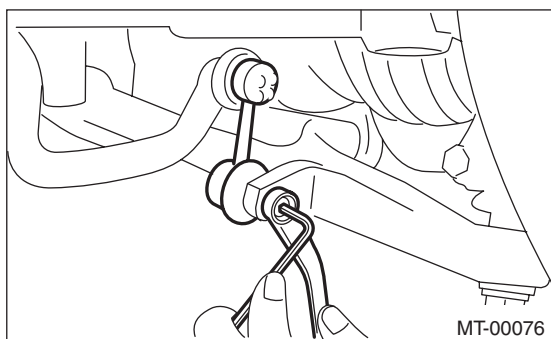
30 N·m (3.1 kgf-m, 22.1 ft-lb)



- Sedan model

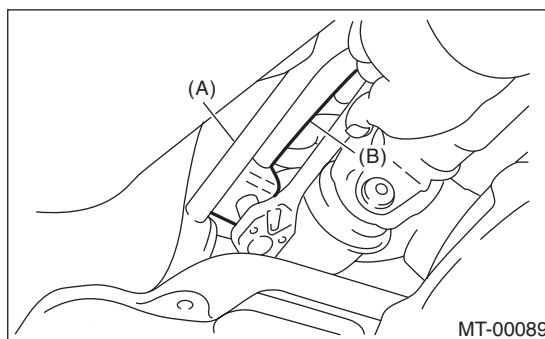
Tightening torque:

45 N·m (4.6 kgf-m, 33.2 ft-lb)



- 15) Install the gear shift rod and the stay.

- (1) Install the gear shift rod onto transmission.



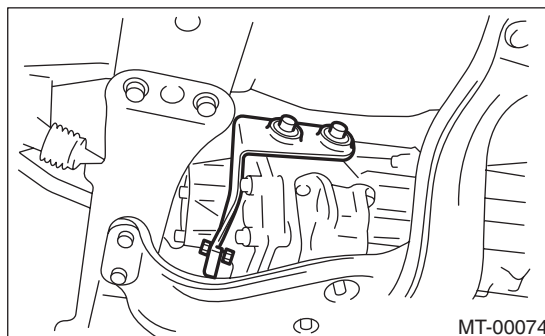
- (A) Stay
(B) Rod

- (2) Install the stay onto transmission.

- 16) Install the propeller shaft. <Ref. to DS-17, INSTALLATION, Propeller Shaft.>

- 17) Install the heat shield cover. (If equipped)

- 18) Install the hanger bracket on right side of transmission.



- 19) Install the rear exhaust pipe and muffler.

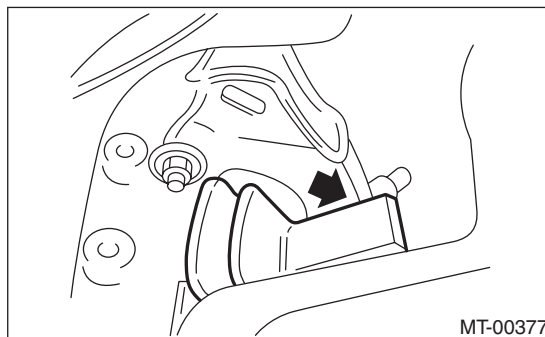
- 20) Install the front exhaust pipe and center exhaust pipe. (Non-turbo model)

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

- 21) Install the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

- 22) Install the under cover.

- 23) Push the clutch release lever to fit the bearing into clutch cover. (Turbo model)



- 24) Install the operating cylinder.

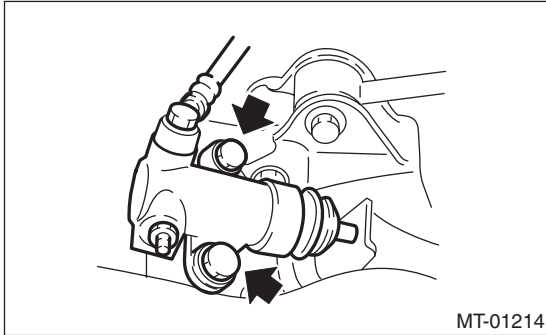
Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

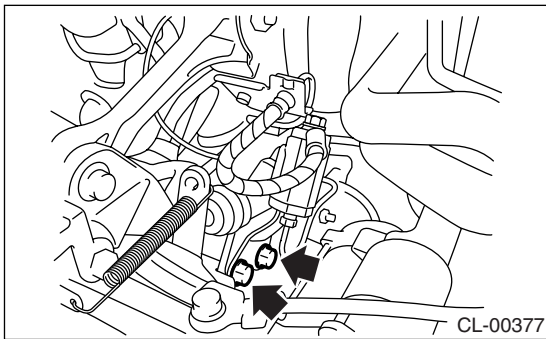
Tightening torque:

37 N·m (3.8 kgf-m, 27.5 ft-lb)

- Non-turbo model



- Turbo model



25) Connect the following connectors:

- (1) Transmission ground cable

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)

- (2) Vehicle speed sensor connector
- (3) Neutral position switch connector
- (4) Back-up light switch connector

26) Install the air cleaner case stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

27) Install the air cleaner case and duct.

28) Connect the battery ground cable to battery.

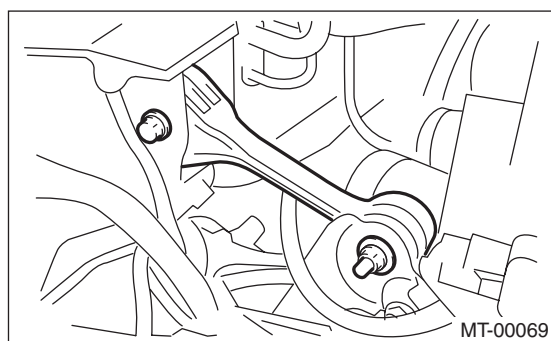
29) Take off the vehicle from lift arms.

4. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake 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)-5, REMOVAL, Air Cleaner Case.>
- 4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 5) Remove the pitching stopper.



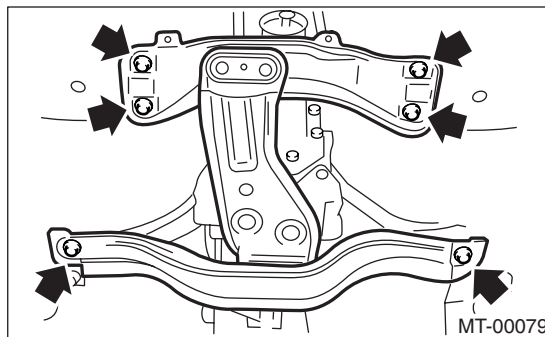
2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Jack-up the vehicle and support it with rigid racks.
- 3) Remove the front and center exhaust pipes. (Non-turbo model)
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.>
- 4) Remove the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 5) Remove the rear exhaust pipe and muffler.
- 6) Remove the heat shield cover. (If equipped)
- 7) Set the transmission jack under the transmission body.

CAUTION:

Always support the transmission case with a transmission jack.

- 8) Remove the rear crossmember.



- 9) Remove the rear cushion rubber.

B: INSTALLATION

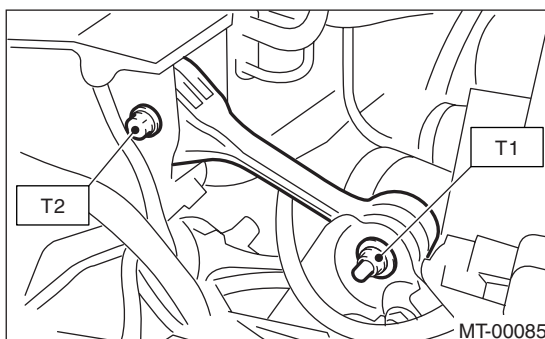
1. PITCHING STOPPER

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 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)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.>
- 3) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>
- 4) Connect the battery ground cable to battery.

2. CROSSMEMBER AND CUSHION RUBBER

- 1) Install the rear cushion rubber.

Tightening torque:

35 N·m (3.6 kgf-m, 26 ft-lb)

- 2) Install the rear crossmember.

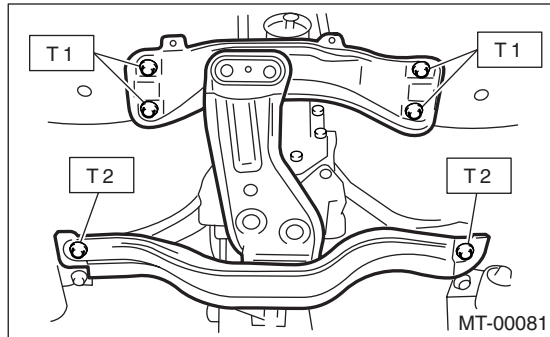
Transmission Mounting System

MANUAL TRANSMISSION AND DIFFERENTIAL

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)-5, INSTALLATION, Front Exhaust Pipe.>
- 6) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
- 7) Install the rear exhaust pipe and muffler.

C: INSPECTION

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

1. PITCHING STOPPER

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

2. CROSSMEMBER AND CUSHION RUBBER

Make sure the crossmember is not bent or damaged. Make sure the cushion rubber is not stiff, cracked, or otherwise damaged.

5. Oil Seal

A: INSPECTION

Check the oil seal portion for leakage. If leakage is found, replace the oil seal with a new one.

B: REPLACEMENT

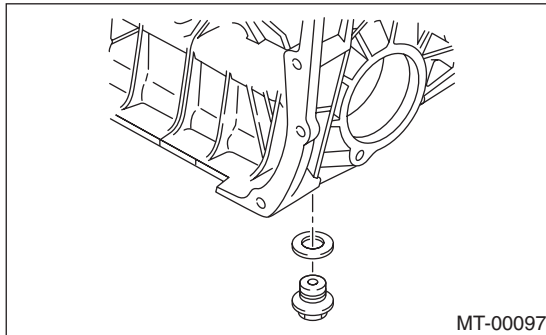
- 1) Clean the transmission exterior.
- 2) Drain the gear oil completely.

NOTE:

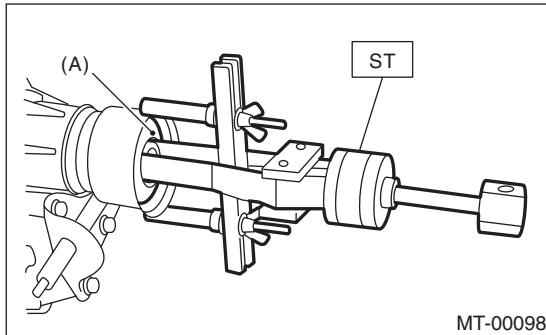
Tighten the drain plug after draining gear oil.

Tightening torque:

69 N·m (7.0 kgf-m, 50.6 ft-lb)



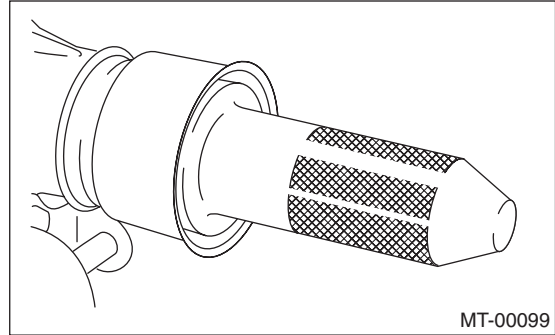
- 3) Remove the rear exhaust pipe and muffler.
 - 4) Remove the heat shield cover. (If equipped)
 - 5) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>
 - 6) Using the ST, remove the oil seal.
- ST 398527700 PULLER ASSY



(A) Oil seal

- 7) Using the ST, install the oil seal.

ST 498057300 INSTALLER



- 8) Install the propeller shaft. <Ref. to DS-17, INSTALLATION, Propeller Shaft.>
- 9) Install the heat shield cover. (If equipped)
- 10) Install the rear exhaust pipe and muffler.
- 11) Pour gear oil and check the oil level. <Ref. to 5MT-26, REPLACEMENT, Transmission Gear Oil.>

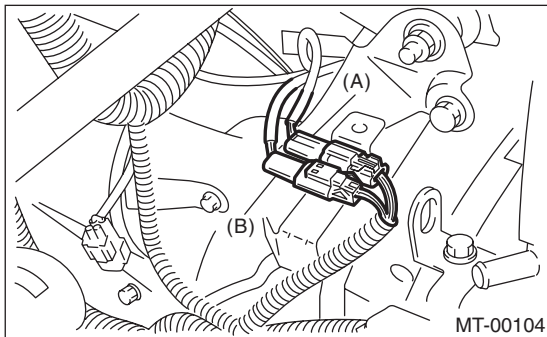
6. Switches and Harness

A: REMOVAL

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

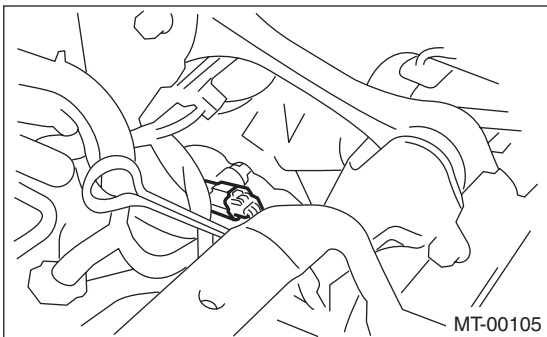
- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO)-7, REMOVAL, Air Intake Duct.>
- 3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 4) Disconnect the connector of back-up light switch and neutral position switch.

- Non-turbo model



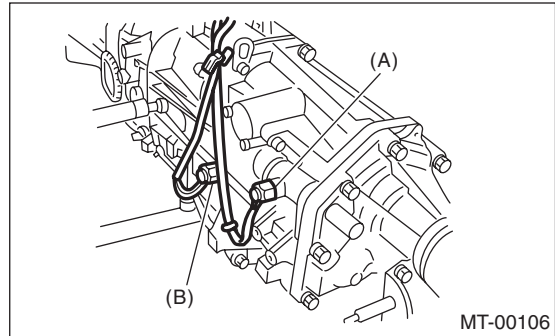
- (A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

- Turbo model



- 5) Lift-up the vehicle.

- 6) Remove the back-up light switch and neutral position switch with harness.



- (A) Neutral position switch (Brown)
(B) Back-up light switch (Gray)

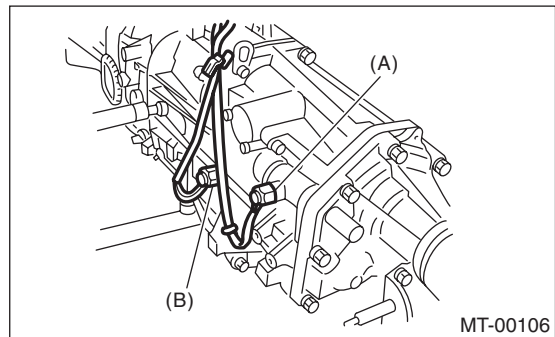
B: INSTALLATION

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

- 1) Install the back-up light switch and neutral position switch with harness.

Tightening torque:

32.3 N·m (3.3 kgf-m, 23.8 ft-lb)



- (A) Neutral position 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)-5, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO)-7, INSTALLATION, Air Intake Duct.>
- 4) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>
- 5) Connect the battery ground cable to battery.

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 of neutral position switch.
- 3) Measure the resistance between neutral position switch terminals.

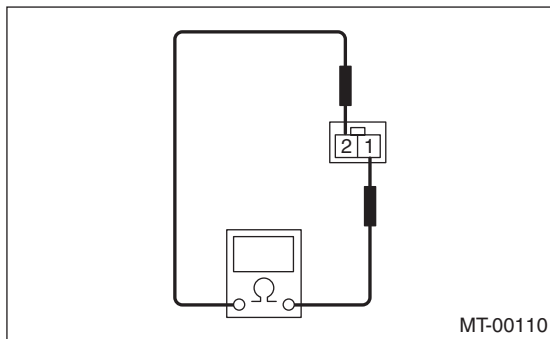
Non-turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		More than 1 M Ω

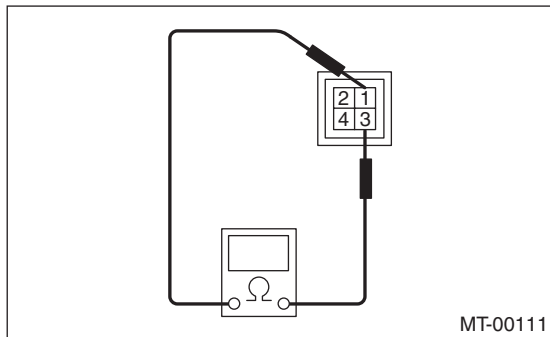
Turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 Ω
Other positions		More than 1 M Ω

- Non-turbo model



- Turbo model

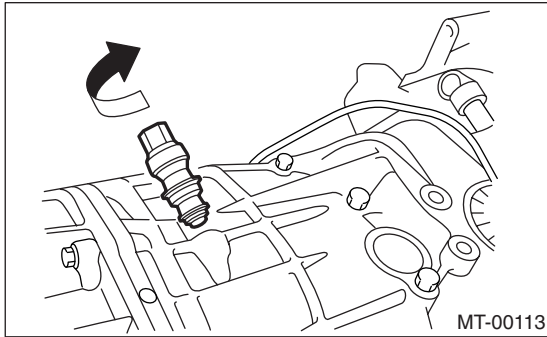


- 4) Replace defective parts.

7. Vehicle Speed Sensor

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift-up the vehicle.
- 3) Remove the front, center rear exhaust pipes and muffler.
- 4) Disconnect the connector from vehicle speed sensor.
- 5) Turn and remove the vehicle speed sensor.



B: INSTALLATION

NOTE:

- When the vehicle speed sensor is removed, discard it and 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 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, center exhaust pipes and muffler.
- 5) Lower the vehicle.
- 6) Connect the battery ground cable to battery.

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-3, INSPECTION, Combination Meter System.>

8. Preparation for Overhaul

A: PROCEDURE

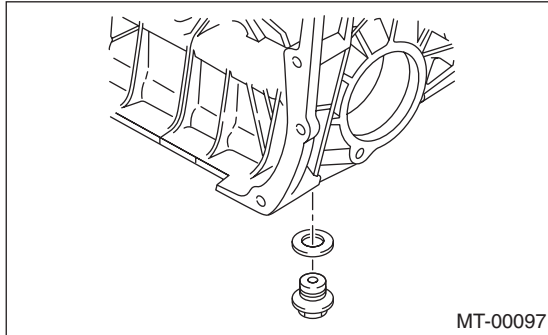
- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove the drain plug to drain oil. After draining, retighten it.

NOTE:

Replace the gasket with a new one.

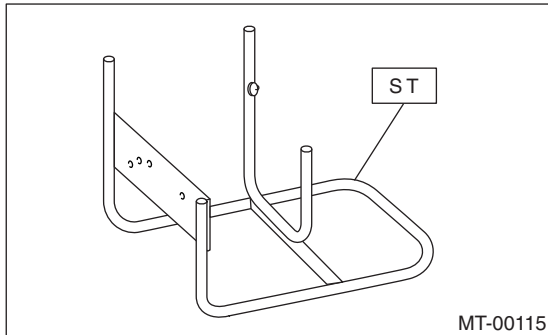
Tightening torque:

69 N·m (7.0 kgf-m, 50.6 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.

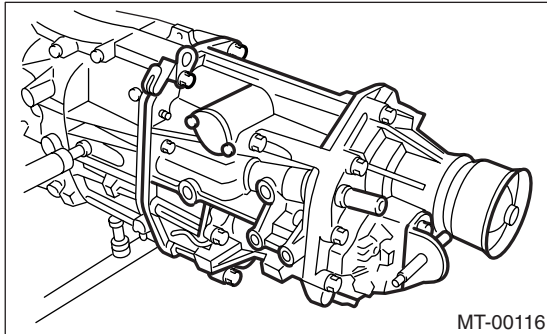
Transfer Case and Extension Case Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

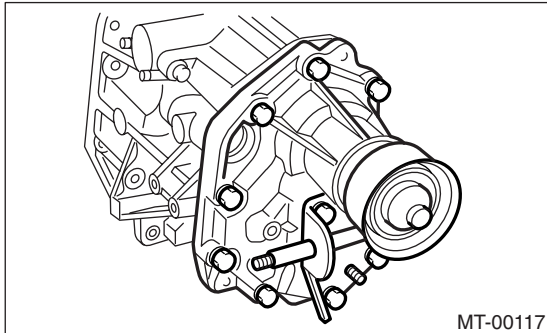
9. Transfer Case and Extension Case Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly.

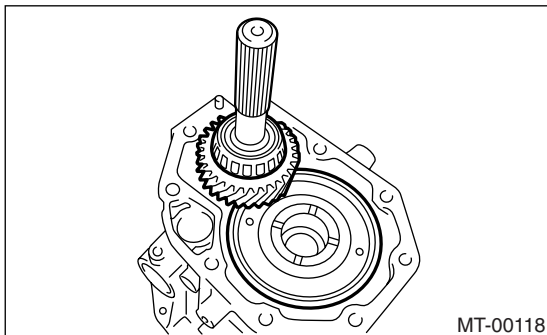


- 4) Remove the shifter arm.
- 5) Remove the extension case assembly.

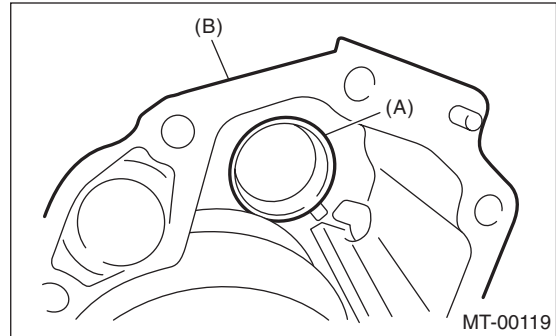


B: INSTALLATION

- 1) Install the center differential and transfer driven gear into transfer case.

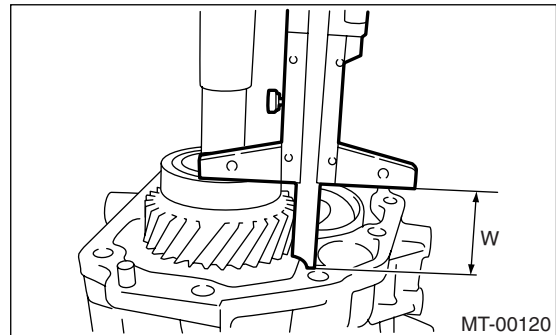


- 2) Remove the bearing outer race from the extension case.



- (A) Bearing outer race
(B) Extension case

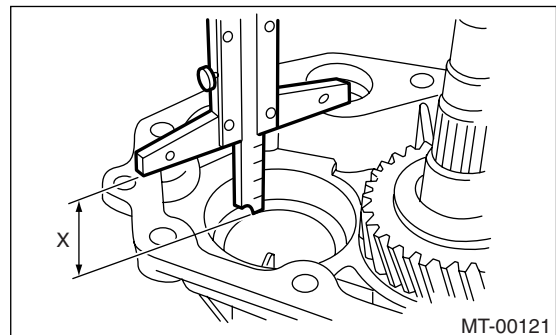
- 3) While pressing the bearing outer race horizontally, turn the driven shaft ten rotations.
- 4) Measure the height "W" between transfer case and taper roller bearing on the transfer driven gear.



- 5) Measure the depth "X".

NOTE:

Measure with bearing cone and thrust washer removed.



- 6) Calculate the thrust washer thickness "t" using the following equation: $t = X - W + 0.2$ to 0.3 mm (0.008 to 0.012 in)
- 7) Select the nearest washer in the following table:

Standard protrusion amount of taper roller bearing outer race:

0.2 — 0.3 mm (0.008 — 0.012 in)

Transfer Case and Extension Case Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

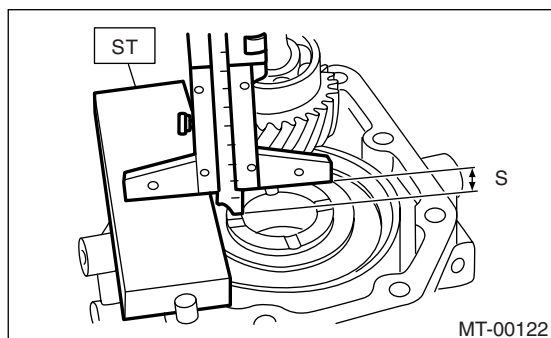
NOTE:

Be sure that it is within the standard protrusion amount.

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)

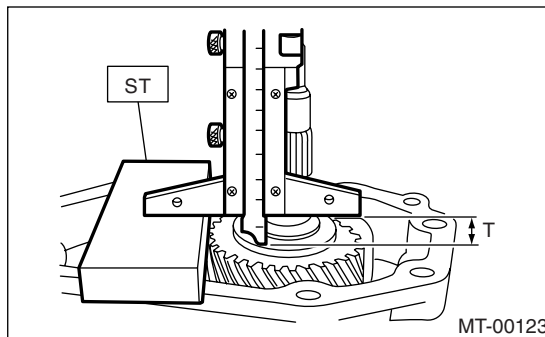
- 8) Fit the thrust washers on transfer drive shaft.
- 9) Install the bearing cone into extension case.
- 10) Measure the depth “S” between transfer case and center differential.

ST 398643600 GAUGE



- 11) Measure the depth “T” between extension case and transfer drive gear.

ST 398643600 GAUGE



NOTE:

Thickness of ST: 15 mm (0.59 in)

12) Calculate the space “U” using the following equation: $U = S + T - 30 \text{ mm (1.18 in)}$ [Thickness of ST]

13) Select the suitable washer in the following table:

Standard clearance:

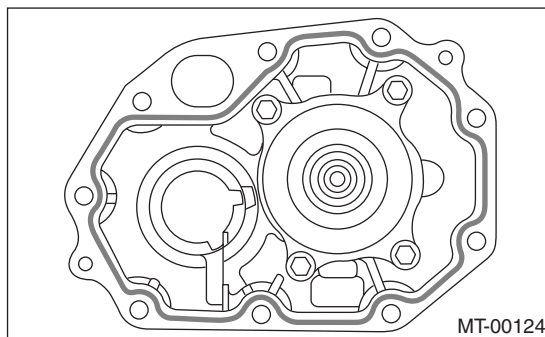
0.15 — 0.35 mm (0.0059 — 0.0138 in)

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)

- 14) Fit the thrust washer on center differential.
- 15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:

THREE BOND 1215 (Part No. 004403007) or equivalent



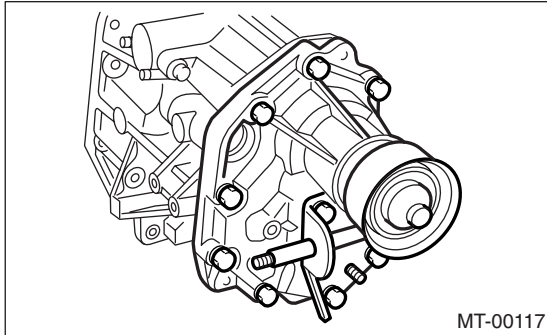
- 16) Install the extension assembly into transfer case.

Transfer Case and Extension Case Assembly

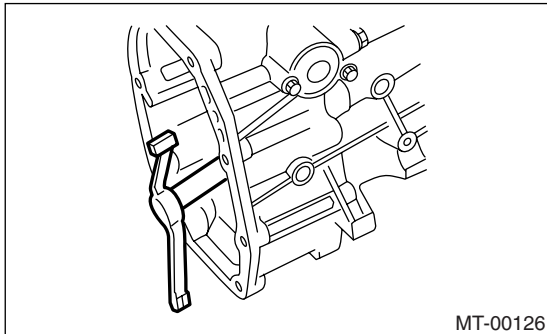
MANUAL TRANSMISSION AND DIFFERENTIAL

Tightening torque:

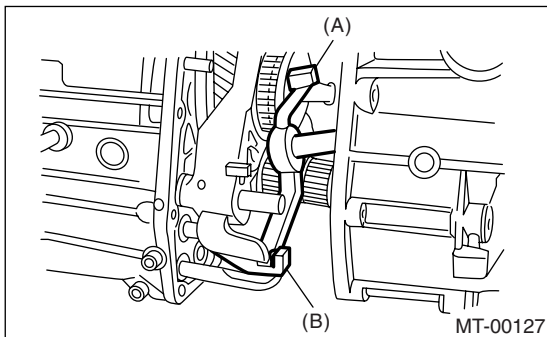
40 N·m (4.1 kgf-m, 29.7 ft-lb)



17) Install the shifter arm to transfer case.



18) Hang the shifter arm on 3rd-4th fork rod.



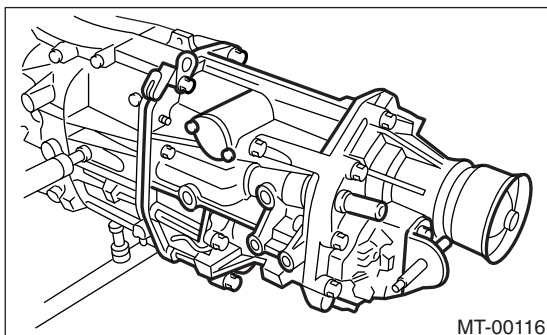
(A) Shifter arm

(B) 3rd-4th fork rod

19) Install the transfer case with extension case assembly to transmission case.

Tightening torque:

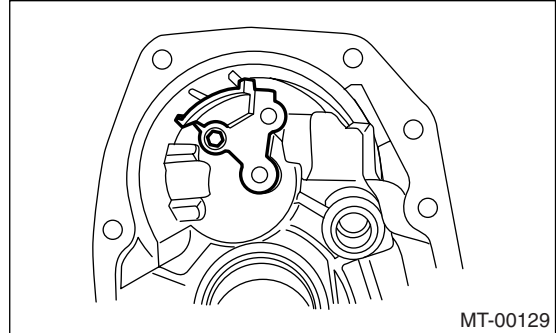
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



C: DISASSEMBLY

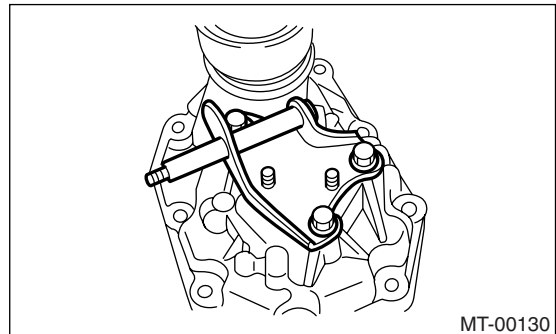
1. TRANSFER CASE

- 1) Remove the reverse check assembly. <Ref. to 5MT-49, REMOVAL, Reverse Check Sleeve.>
- 2) Remove the oil guide.



2. EXTENSION CASE

- 1) Remove the transfer drive gear assembly. <Ref. to 5MT-44, REMOVAL, Transfer Drive Gear.>
- 2) Remove the shift bracket.



- 3) Remove the oil seal from extension case. <Ref. to 5MT-35, Oil Seal.>

D: ASSEMBLY

1. EXTENSION CASE

1) Using the ST, install the oil seal to extension case. <Ref. to 5MT-35, Oil Seal.>

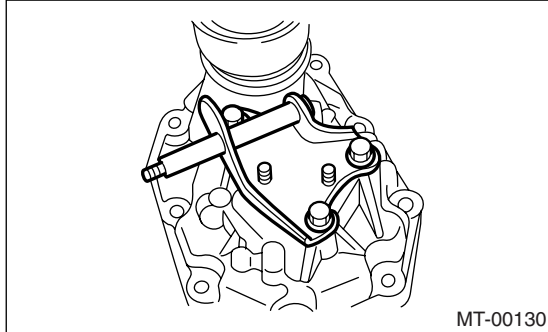
NOTE:

Use a new oil seal.

2) Install the shift bracket to extension case.

Tightening torque:

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



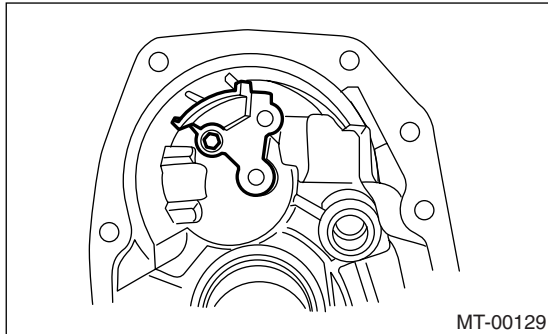
3) Install the transfer drive gear to extension case. <Ref. to 5MT-44, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE

1) Install the oil guide to transfer case.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



2) Install the reverse check sleeve assembly to transfer case. <Ref. to 5MT-49, INSTALLATION, Reverse Check Sleeve.>

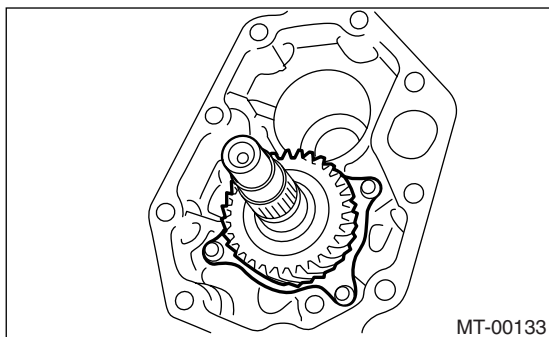
Transfer Drive Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

10. Transfer Drive Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly.
- 5) Remove the transfer driven gear.
- 6) Remove the transfer drive gear.

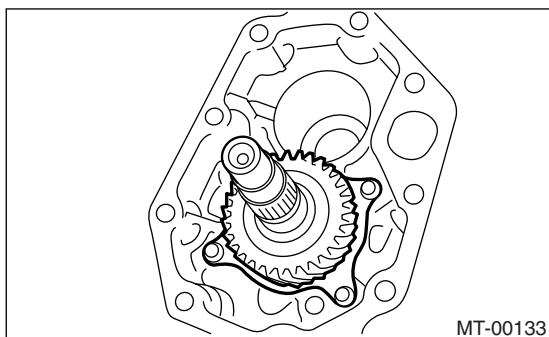


B: INSTALLATION

- 1) Install the transfer drive gear.

Tightening torque:

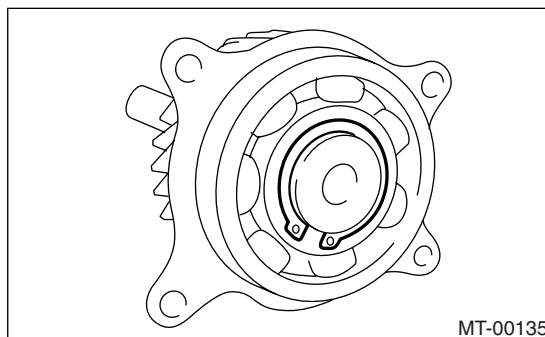
26 N·m (2.7 kgf-m, 20 ft-lb)



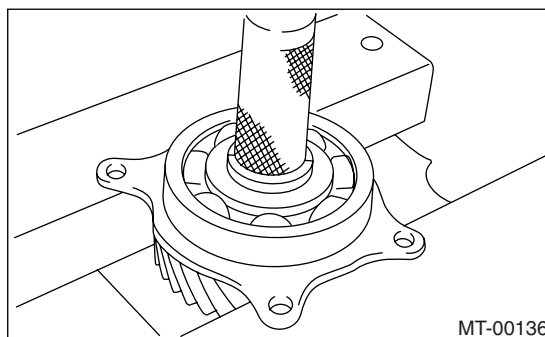
- 2) Install the transfer driven gear.
- 3) Install the extension case assembly.
- 4) Install the transfer case and extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-36, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly from vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Remove the snap ring.



- 2) Remove the ball bearing.



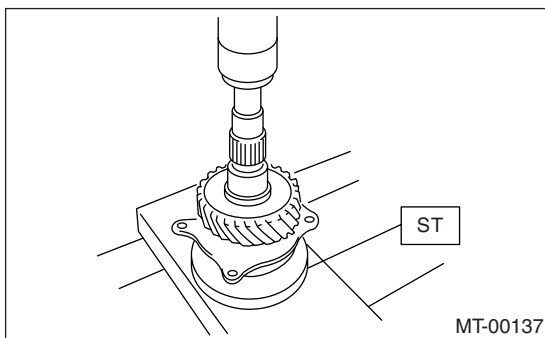
D: ASSEMBLY

- 1) Set the ST applying to inner race of bearing and install to drive shaft.

ST 398177700 INSTALLER

NOTE:

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) Check the clearance between snap ring and ball bearing. <Ref. to 5MT-44, INSPECTION, Transfer Drive Gear.>

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 noise when turned after gear oil lubrication.

Transfer Drive Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Drive gear

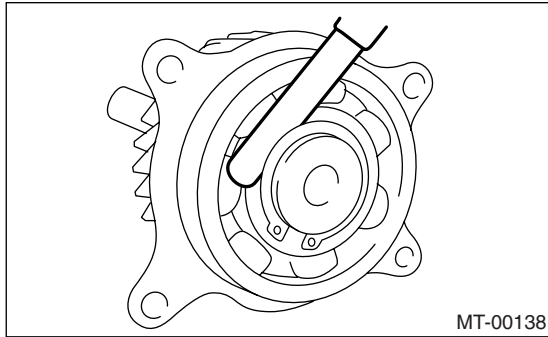
Replace the drive gear in the following cases:

- 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 specification, select a suitable snap ring and replace.

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

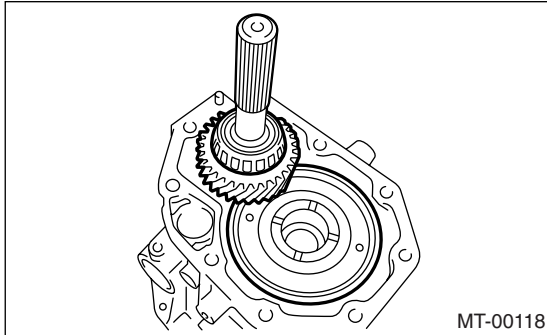
Transfer Driven Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

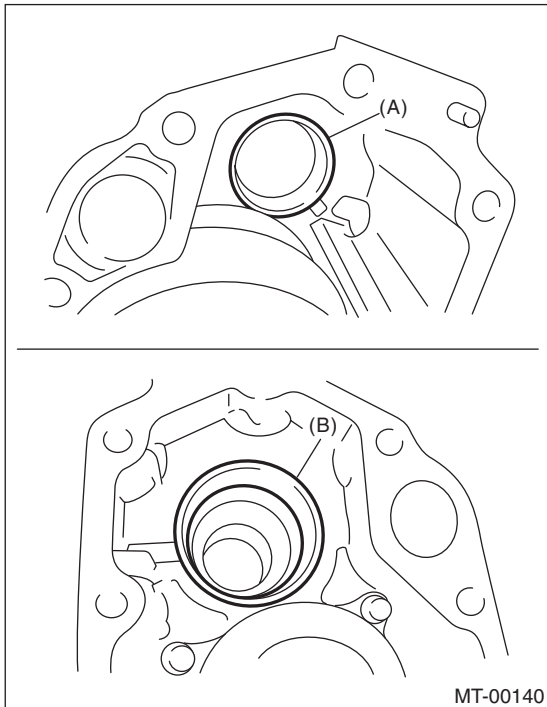
11. Transfer Driven Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly.
- 5) Remove the transfer driven gear.



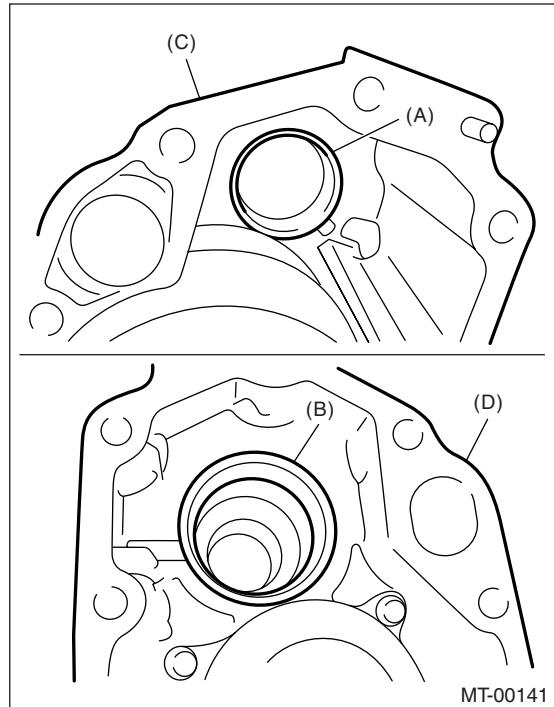
- 6) Remove the bearing outer race from extension case and transfer case.



- (A) Bearing outer race (transfer case side)
(B) Bearing outer race (extension case side)

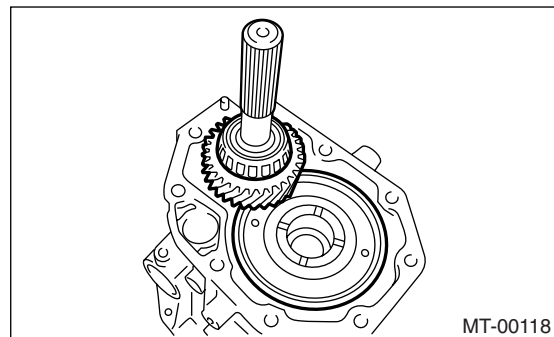
B: INSTALLATION

- 1) Install the bearing outer race to extension case and transfer case.



- (A) Bearing outer race
(B) Bearing outer race
(C) Transfer case
(D) Extension case

- 2) Install the transfer driven gear.



- 3) Install the transfer case and extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the back-up light switch and neutral position switch. <Ref. to 5MT-36, INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

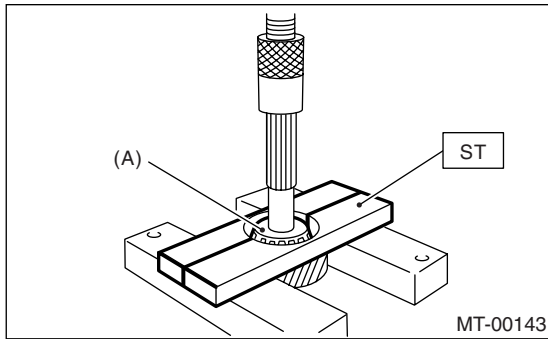
Transfer Driven Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).

ST 498077000 REMOVER

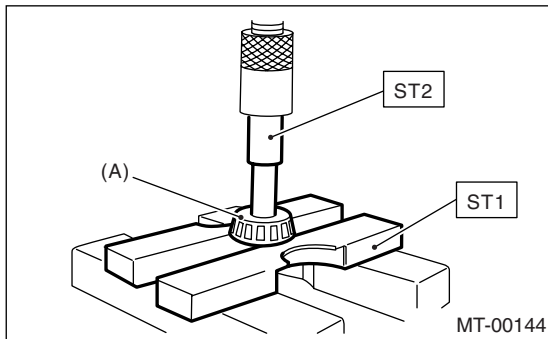


(A) Roller bearing

2) Using the ST1 and ST2, remove the roller bearing (transfer case side).

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Roller bearing

D: ASSEMBLY

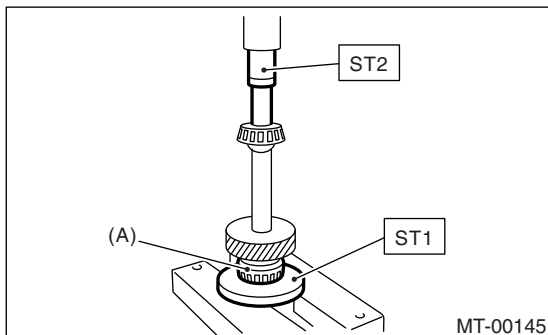
1) Using the ST, install the roller bearing (extension case side).

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



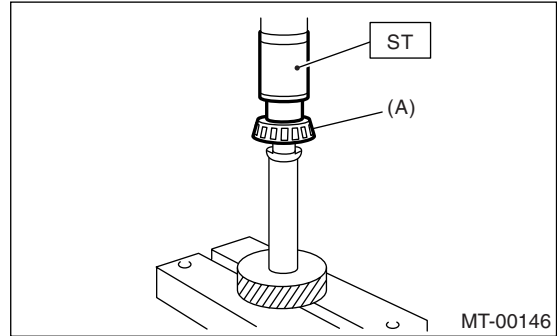
(A) Roller bearing

2) Using the ST, install the roller bearing (transfer case side).

ST 499757002 INSTALLER

NOTE:

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 noise when turned after gear oil lubrication.

2) Driven gear

Replace the driven gear in the following cases:

- If their tooth surfaces and shaft are excessively broken or damaged.

Center Differential

MANUAL TRANSMISSION AND DIFFERENTIAL

12.Center Differential

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to 5MT-46, REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential.

B: INSTALLATION

- 1) Install the center differential into transfer case.
- 2) Install the transfer driven gear. <Ref. to 5MT-46, INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

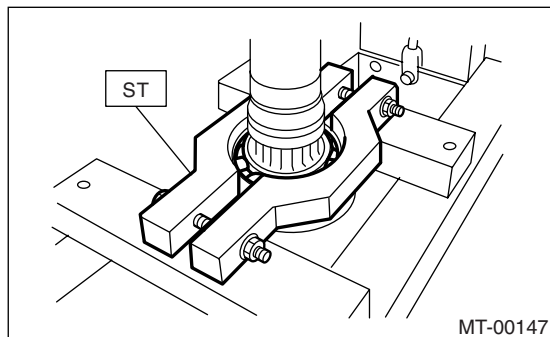
Do not disassemble the center differential because it is a non-disassemble part.

Remove the ball bearing using ST.

NOTE:

Do not reuse the ball bearing.

ST 498077300 CENTER DIFFERENTIAL
BEARING REMOVER

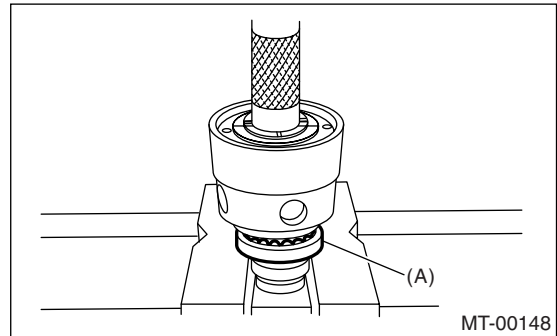


D: ASSEMBLY

Install the ball bearing to center differential assembly.

NOTE:

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 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

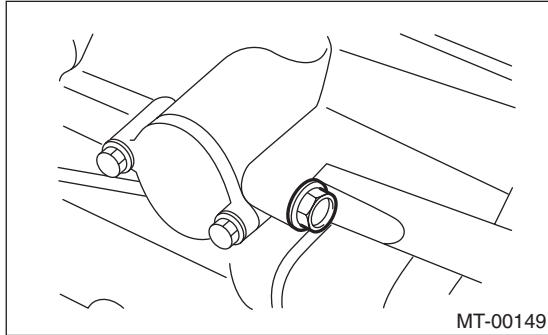
Reverse Check Sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL

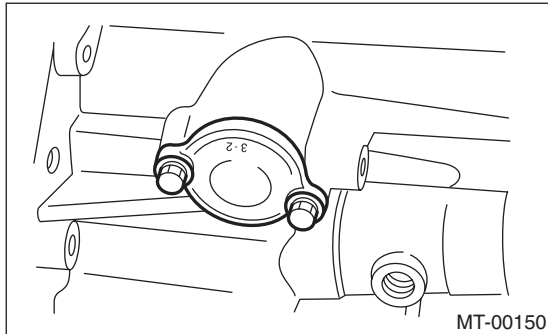
13.Reverse Check Sleeve

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, 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.

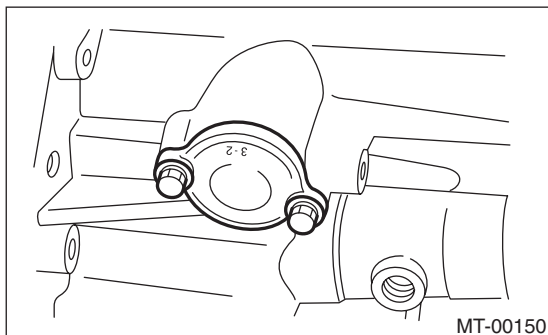


B: INSTALLATION

- 1) Install the reverse check sleeve.

Tightening torque:

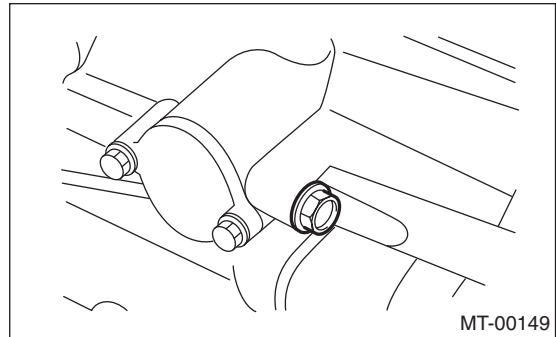
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 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)



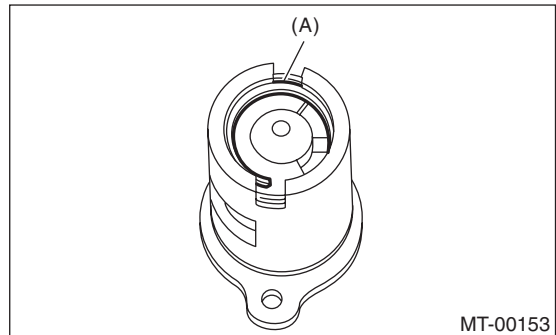
- 3) Install the shifter arm to transfer case assembly.
- 4) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Cover the reverse check sleeve with a rag, and remove the snap ring using a screwdriver.

NOTE:

Replace the snap ring with a new one if deformed or weakened.

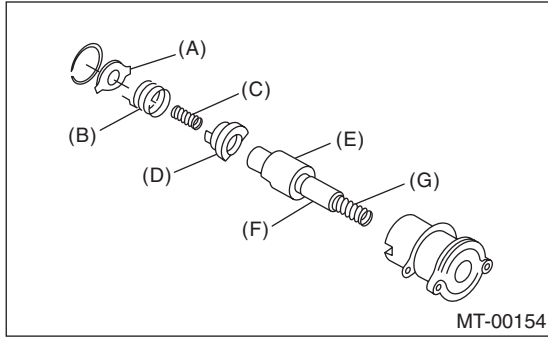


(A) Snap ring

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 the O-ring.

NOTE:

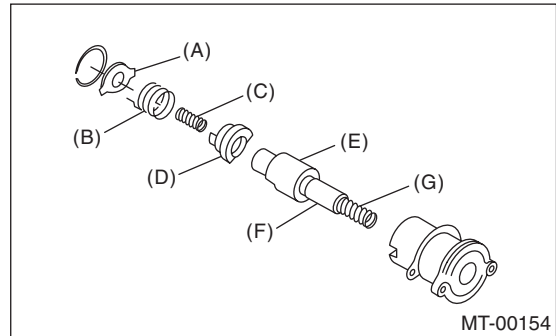
- For reverse check sleeve assembly, use an O-ring which should not be scratched.
- Be careful not to break the adjusting shim placed between reverse check sleeve assembly and case.

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 plate
- (B) Reverse check spring
- (C) Return spring (5th-Rev)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

2) Hook the bent section of reverse check spring over reverse check plate.

3) Rotate the cam so that the protrusion of reverse check cam is at the opening in plate.

4) With the cam held in that position, install the plate onto reverse check sleeve and hold with snap ring.

5) Position the O-ring in groove in sleeve.

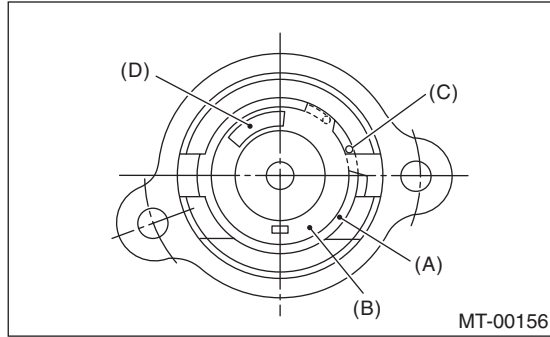
E: INSPECTION

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
- Spin the cam by hand for smooth rotation.
- Move the cam and shaft all the way toward plate and release.

Reverse Check Sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL

If the cam does not return properly, replace the reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace the 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 5MT-51, 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 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 the bolts holding reverse check sleeve assembly to the case, move the sleeve assembly outward, and place adjusting shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

CAUTION:

Be careful not to break the O-ring when placing shim(s).

NOTE:

- When the shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
- If the shims alone cannot adjust clearance, replace the reverse accent shaft and re-adjust.

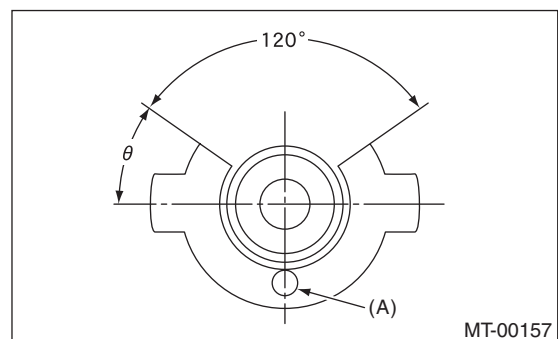
Adjusting shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st gear.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

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 reverse position. If the arm does not return properly, replace the 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.



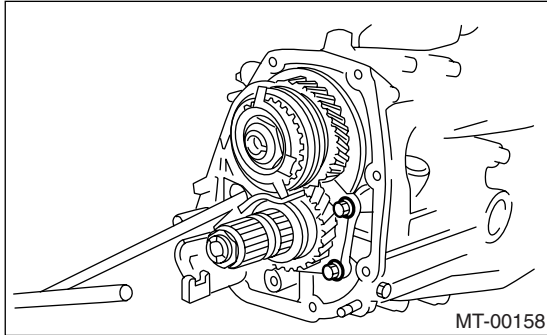
Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

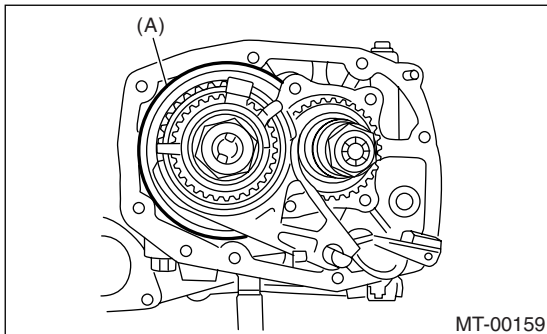
14. Transmission Case

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the clutch release lever. <Ref. to CL-14, REMOVAL, Release Bearing and Lever.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the bearing mounting bolts.

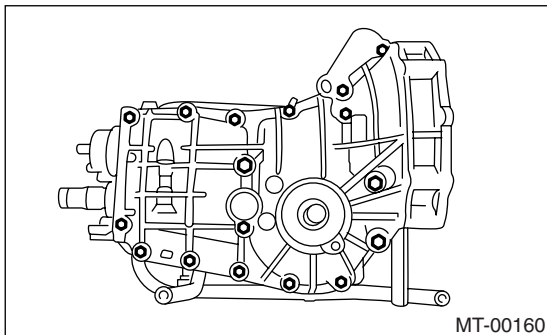


- 5) Remove the main shaft rear plate.



(A) Main shaft rear plate

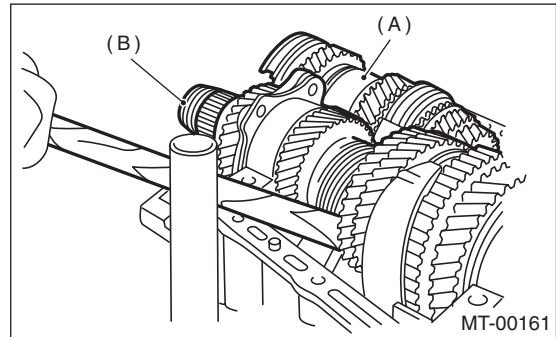
- 6) Separate the transmission case into right and left cases by loosening the coupling bolts and nuts.



- 7) 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 ASSY

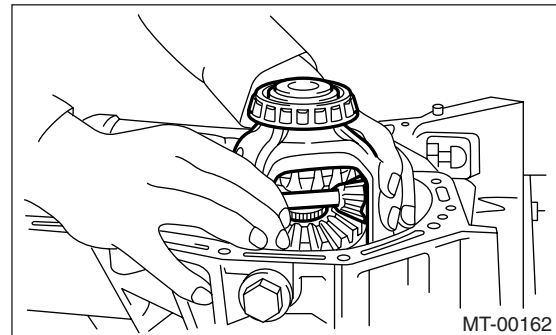
(B) Drive pinion shaft ASSY

- 8) Remove the main shaft assembly.

- 9) Remove the differential assembly.

NOTE:

- Be careful not to confuse the right and left roller bearing outer races.
- Be careful not to damage the retainer oil seal.



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 transmission case knock pin into needle bearing knock pin hole.
- 4) Install the drive pinion shaft assembly.
Install the transmission case knock pin into roller bearing knock pin hole.
- 5) Apply liquid gasket, and then put the case right side and left side together.

Liquid gasket:

THREE BOND 1215 (Part No. 004403007) or equivalent

- 6) Tighten the seventeen bolts with bracket, clip, etc. as shown in the figure.

NOTE:

- Insert the bolts from bottom and tighten the nuts at top.

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

- Put the cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that the speedometer gear is meshed.

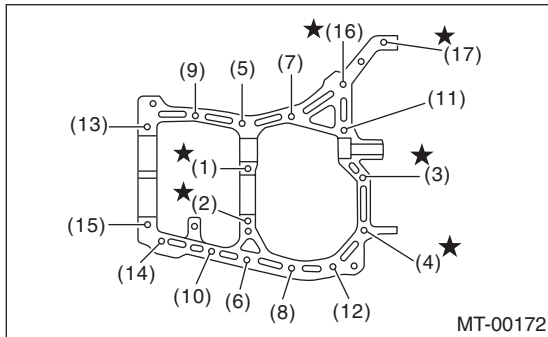
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.1 ft-lb)

★ 10 mm bolt

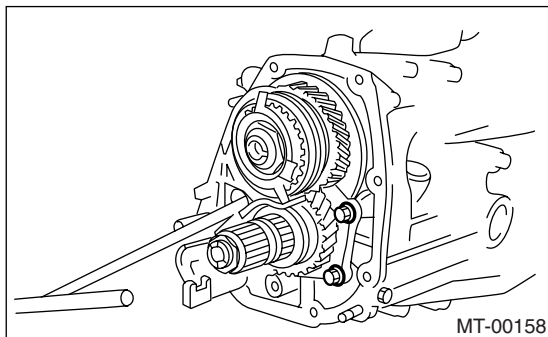
39 N·m (4.0 kgf-m, 28.9 ft-lb)



7) Tighten the ball bearing attachment bolts.

Tightening torque:

29 N·m (3.0 kgf-m, 21.7 ft-lb)

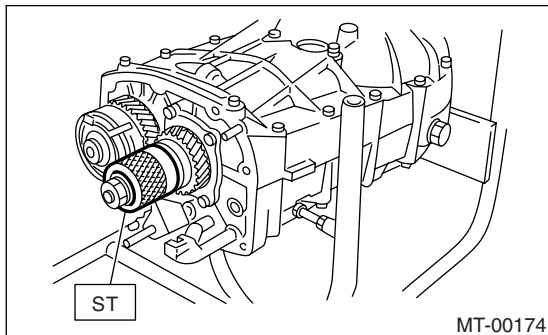


8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing:

NOTE:

Support the drive pinion assembly with ST.

ST 498427100 STOPPER



9) Place the transmission with case left side facing downward and put ST1 on bearing cup.

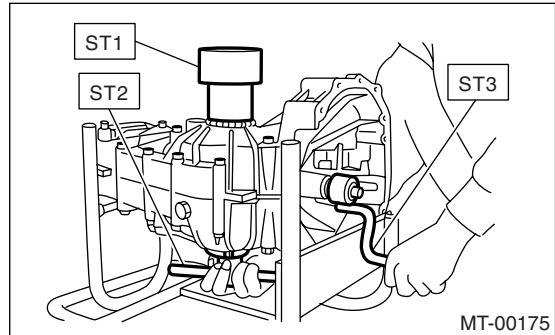
10) Screw the retainer assembly into left case from the bottom using ST2. Fit the ST3 on transmission

main shaft. Shift the gear into 4th or 5th and turn the shaft several times. Screw in the retainer while 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

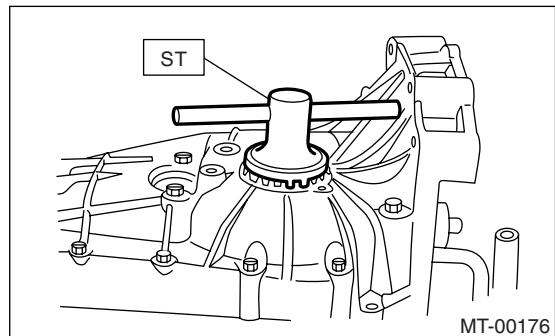


11) Remove the weight and screw in the retainer without O-ring on upper side and stop at the point where slight resistance is felt.

NOTE:

At this point, the backlash between hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



12) Fit the lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on upper side by the same amount in order to obtain the backlash.

NOTE:

The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

14) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

15) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

16) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-72, 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 the O-ring into groove and tighten the retainer into the position where retainer has been tightened in.

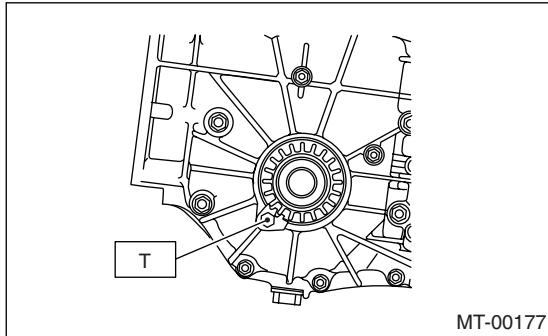
Tighten the lock plate.

NOTE:

Carry out this job on both upper and lower retainers.

Tightening torque:

T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



18) Selection of main shaft rear plate <Ref. to 5MT-59, ADJUSTMENT, Main Shaft Assembly.>

19) Install the clutch release lever and bearing. <Ref. to CL-14, INSTALLATION, Release Bearing and Lever.>

20) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly into the vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, and oil leaks.

15. Main Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-60, 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.

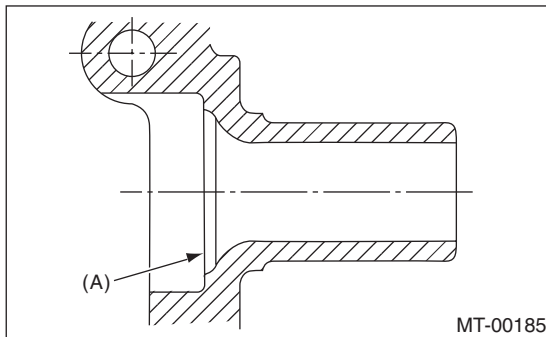
NOTE:

- Wrap the 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 transmission case knock pin into needle bearing outer race knock pin hole.

NOTE:

Align the end face of seal with surface (A) when installing oil seal.



- 3) Install the drive pinion assembly. <Ref. to 5MT-60, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install the transmission case. <Ref. to 5MT-52, INSTALLATION, Transmission Case.>
- 5) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

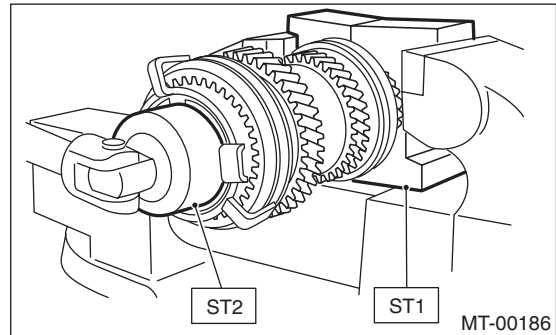
C: DISASSEMBLY

- 1) Put vinyl tape around the 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.

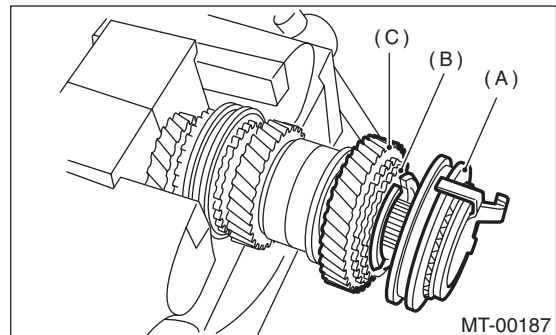
NOTE:

Remove the caulking before removing lock nut.

ST1	498937000	TRANSMISSION HOLDER
ST2	499987003	SOCKET WRENCH (35)

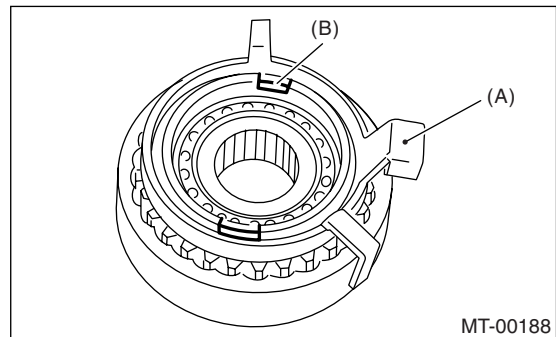


- 3) Remove the 5th-Rev sleeve & hub assembly, baulk ring, 5th drive gear and needle bearing.



(A)	5th-Rev sleeve & hub ASSY
(B)	Baulk ring
(C)	5th drive gear

- 4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve & hub assembly.



(A)	Synchro cone stopper
(B)	Snap ring

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

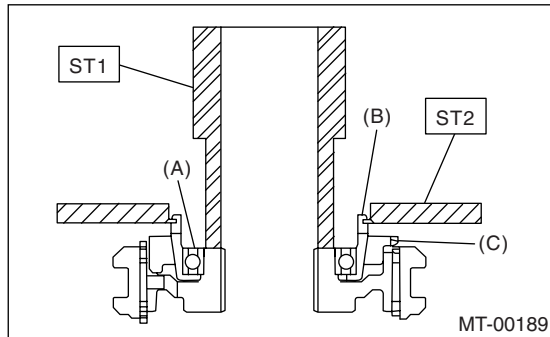
5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

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 splines beforehand.
- Do not reuse the ball bearing.

ST1 499757002 INSTALLER

ST2 498077400 SYNCHRO CONE REMOVER



- (A) Ball bearing
(B) Synchro cone
(C) Baulk ring

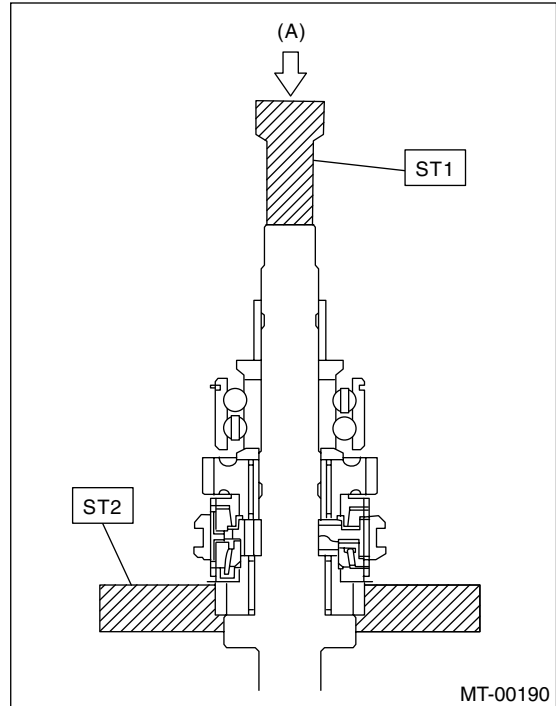
6) Using the ST1 and ST2, remove rest of the parts.

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 splines beforehand.

ST1 899864100 REMOVER

ST2 899714110 REMOVER



- (A) Press

Main Shaft Assembly

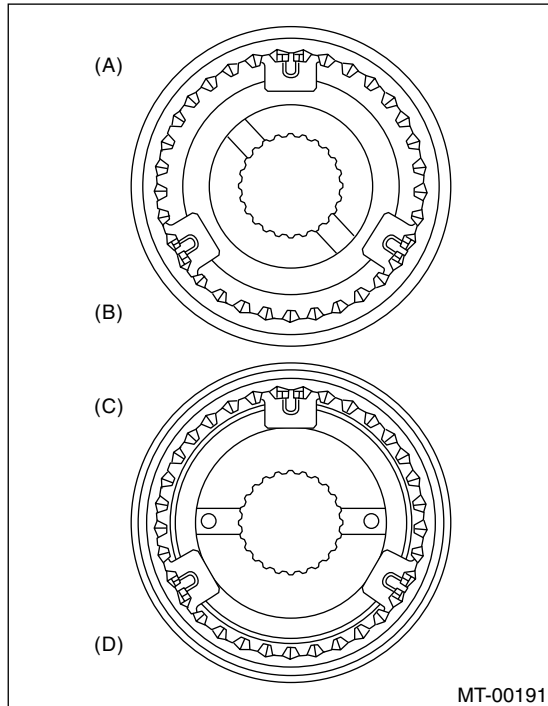
MANUAL TRANSMISSION AND DIFFERENTIAL

D: ASSEMBLY

1) Assemble each sleeve & hub assembly.

NOTE:

Position the open ends of spring 120° apart.

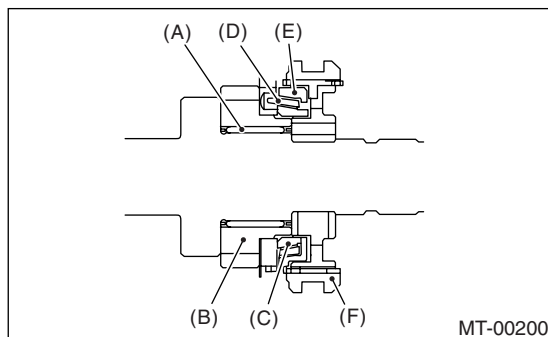


- (A) 3rd-4th hub ASSY
- (B) 3rd gear side
- (C) 5th-Rev hub ASSY
- (D) 5th gear side

2) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve & hub assembly for 3rd needle bearing on 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 & hub ASSY

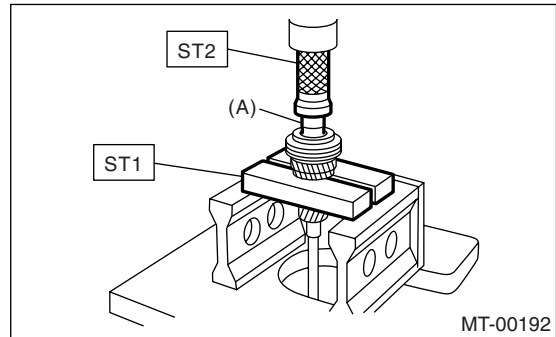
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

NOTE:

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

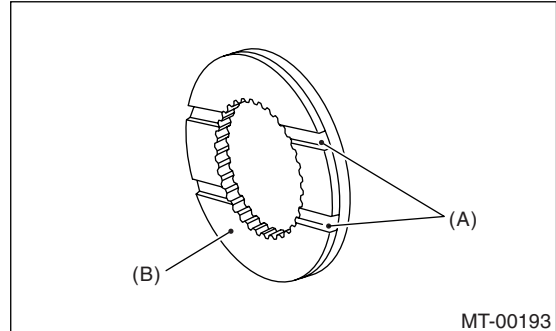


(A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to 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.

NOTE:

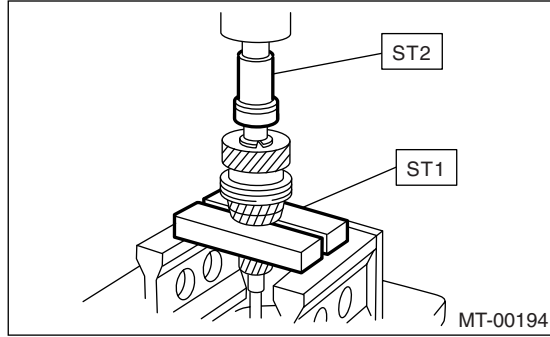
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

ST2 499877000 RACE 4-5 INSTALLER



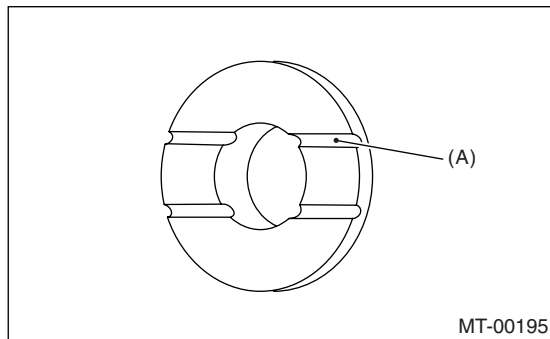
6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Face the thrust washer in correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

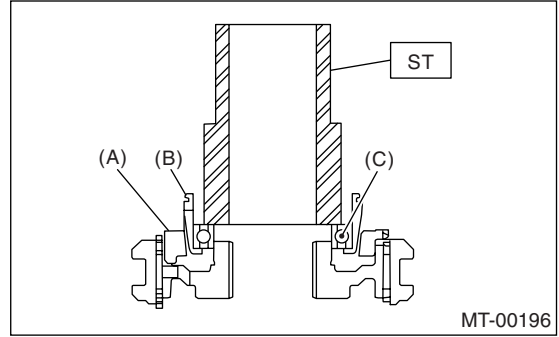
7) Install the bearing onto synchro cone.

8) Install the baulk ring and synchro cone onto 5th-Rev sleeve & hub assembly using ST and a press.

NOTE:

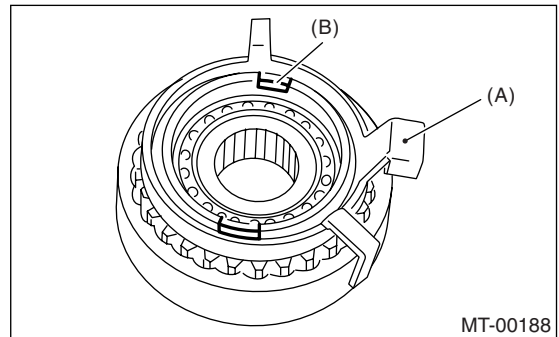
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



- (A) Baulk ring
- (B) Synchro cone
- (C) Ball bearing

9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve & hub assembly.

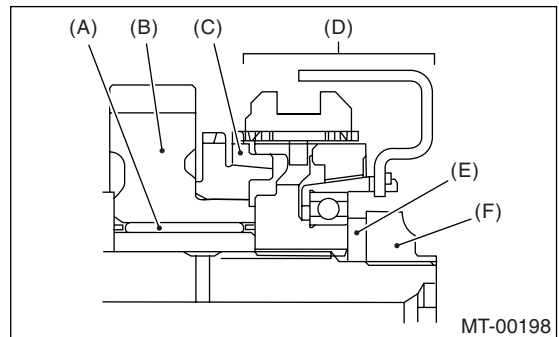


- (A) Synchro cone stopper
- (B) Snap ring

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 & hub ASSY
- (E) Lock washer
- (F) Lock nuts

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

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, 88.5 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 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.

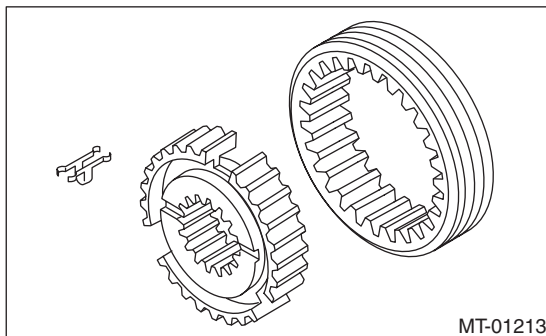
4) Baulk ring

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.

8) Gearshift mechanism

Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

F: ADJUSTMENT

Selection of main shaft rear plate:

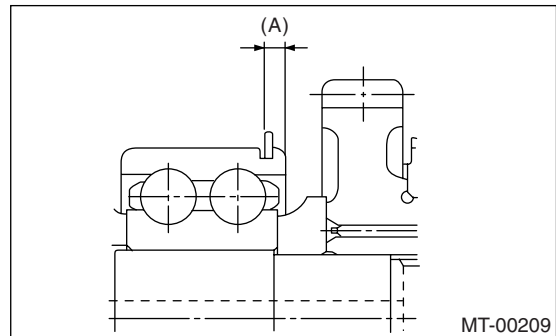
Using the ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table.

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

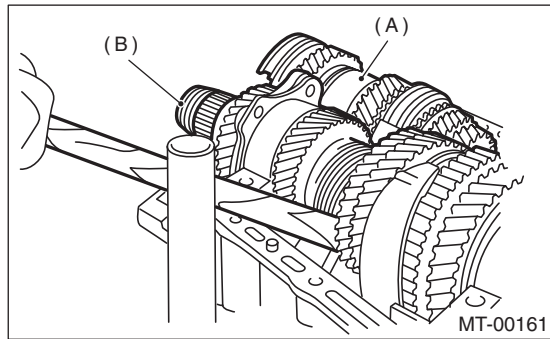
16. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-52, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly.

NOTE:

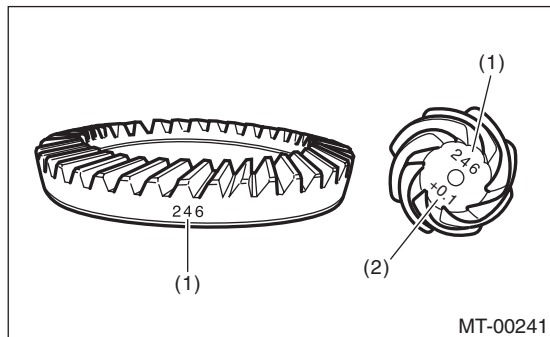
Use a hammer handle, etc. to remove if too tight.



- (A) Main shaft ASSY
(B) Drive pinion shaft ASSY

B: INSTALLATION

- 1) Remove the differential assembly.
- 2) Alignment marks/numbers on hypoid gear set:
The upper number on drive pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



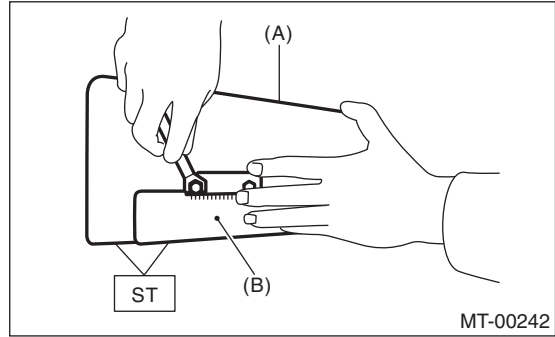
- (A) Match number
(B) Shim adjust number

- 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



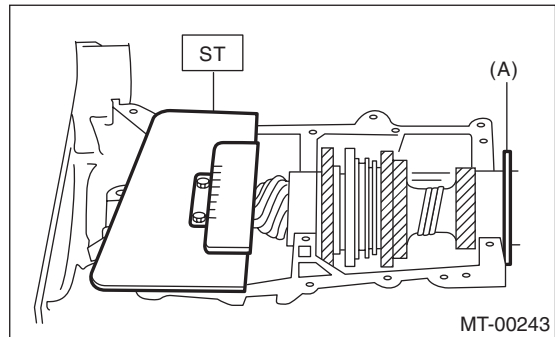
- (A) Plate
(B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole in 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 ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

- 8) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the indicated value.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

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 5MT-69, 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 coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to 5MT-65, INSPECTION, Drive Pinion Shaft Assembly.>

11) Install the transmission case. <Ref. to 5MT-52, INSTALLATION, Transmission Case.>

12) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to vehicle. <Ref. to 5MT-27, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

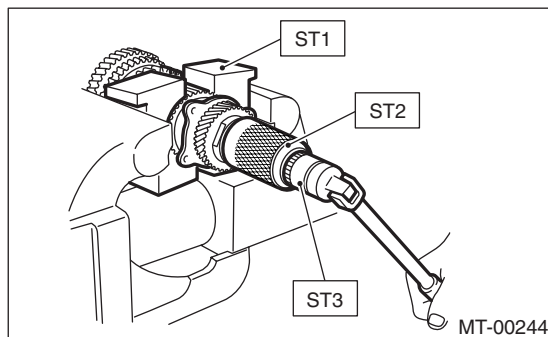
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Straighten the lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.

ST1 899884100 HOLDER

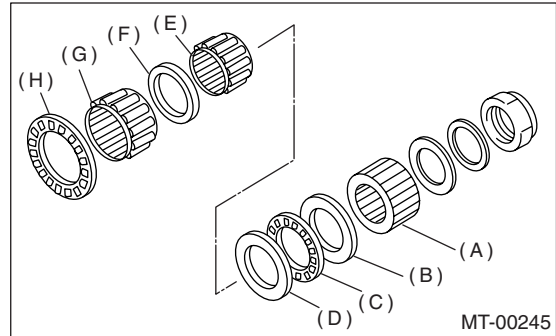
ST2 498427100 STOPPER

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.



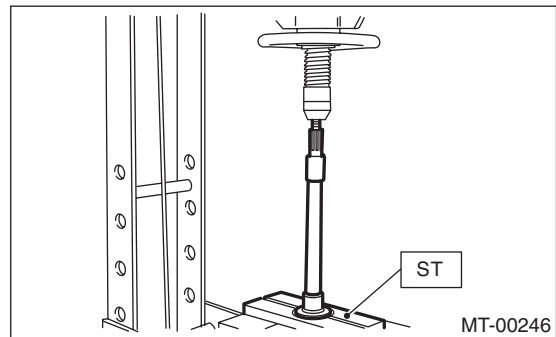
- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

3) Remove the roller bearing and washer using ST and press.

NOTE:

Do not reuse the roller bearing.

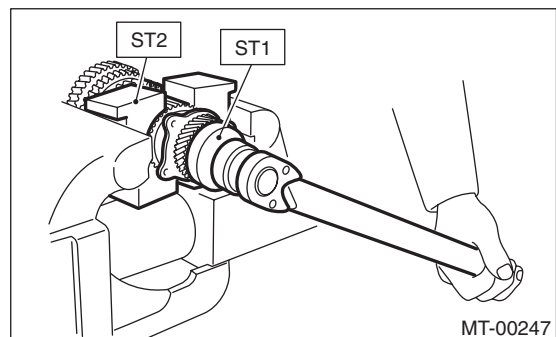
ST 498077000 REMOVER



4) Straighten the lock nut at staked portion. Remove the lock nut using ST1 and ST2.

ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER

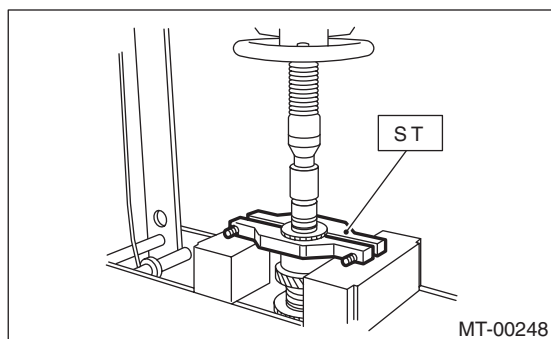


5) Remove the 5th driven gear using ST.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

ST 499857000 5TH DRIVEN GEAR REMOVER

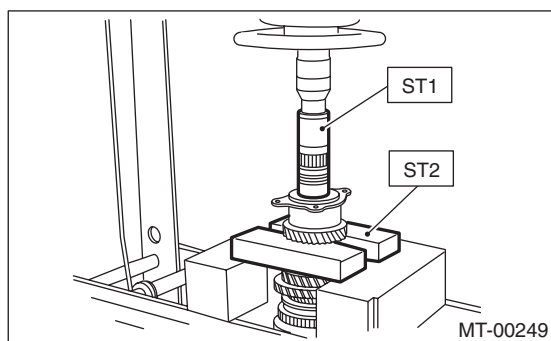


6) Remove the woodruff key.

7) Remove the roller bearing, 3rd-4th driven gear using ST1 and ST2.

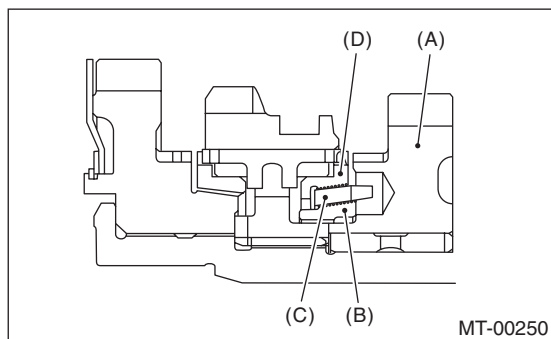
ST1 499757002 INSTALLER

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. (Non-turbo model)

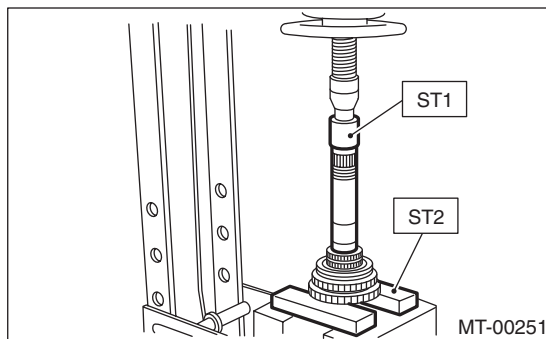
NOTE:

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 should be

disassembled, mark engagement point beforehand.

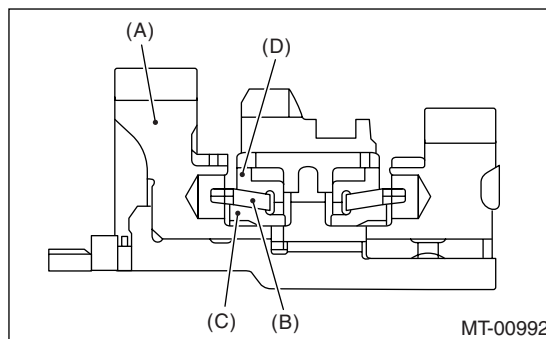
ST1 499757002 INSTALLER

ST2 899714110 REMOVER



11) Remove the sub gear for 1st driven gear. (Non-turbo model)

12) Remove the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, 2nd gear bushing, gear and hub using ST1 and ST2. (Turbo model)



(A) 1st driven gear

(B) Inner baulk ring

(C) Synchro cone

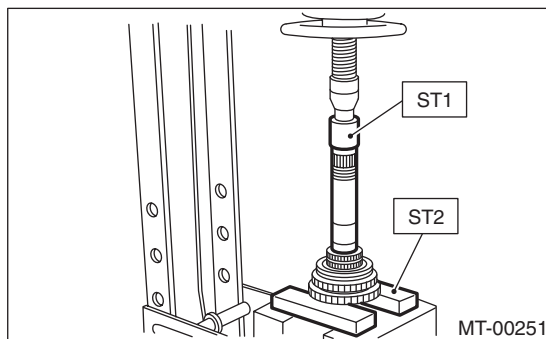
(D) Outer baulk ring

NOTE:

Replace the gear and hub if necessary. Do not disassemble because they must engage at a specified point. If they have to be disassembled, mark the engaging point on the spline beforehand.

ST1 499757002 INSTALLER

ST2 899714110 REMOVER



Drive Pinion Shaft Assembly

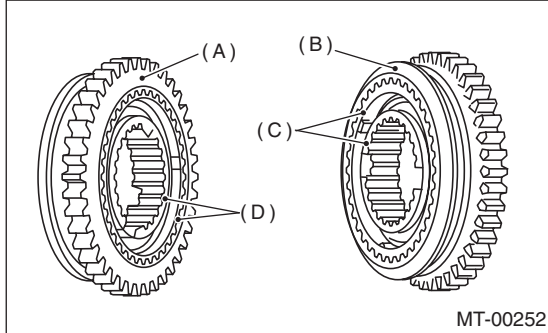
MANUAL TRANSMISSION AND DIFFERENTIAL

D: ASSEMBLY

1) Install the sleeve & hub assembly by matching alignment marks.

NOTE:

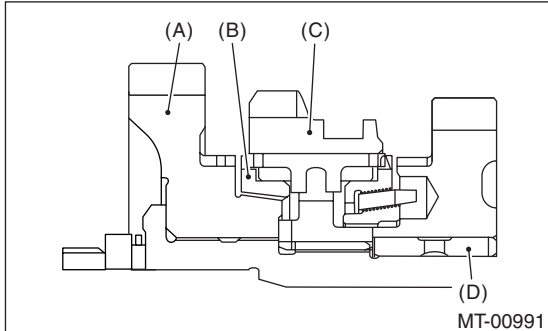
Use a new gear & hub assembly, if gear or hub have been replaced.



- (A) 1st gear side
- (B) 2nd gear side
- (C) Flush surface
- (D) Stepped surface

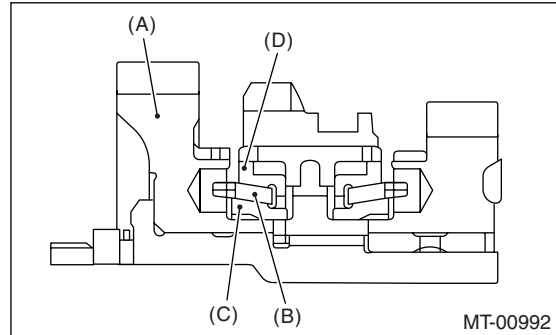
2) Install the washer, snap ring and sub gear to 1st driven gear.

3) Install the 1st driven gear, 1st baulk ring, gear & hub assembly onto driven shaft. (Non-turbo model)



- (A) 1st driven gear
- (B) 1st baulk ring
- (C) Gear & hub ASSY
- (D) 2nd gear bushing

4) Install the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, gear & hub assembly onto driven shaft. (Turbo model)



- (A) 1st driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

NOTE:

- Take care to install the gear & hub assembly in proper direction.
- Align the baulk ring and gear & hub assembly with key groove.

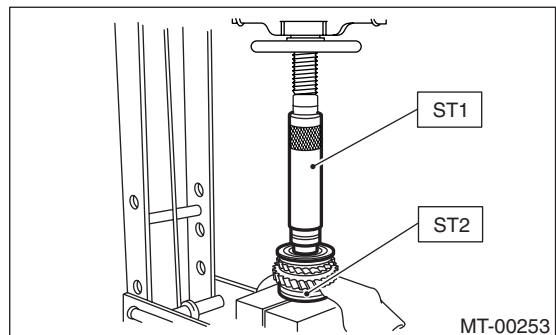
5) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Attach a cloth to the end of driven shaft to prevent damage.
- When press fitting, align the oil holes of shaft and bushing.

ST1 499277200 INSTALLER

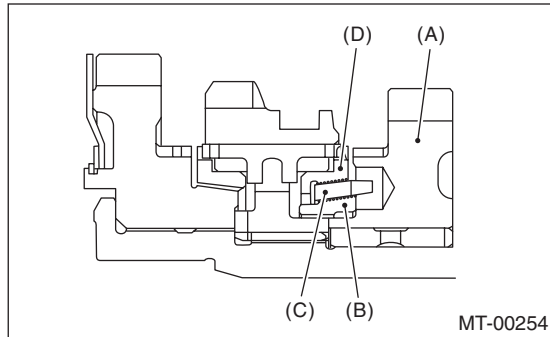
ST2 499587000 INSTALLER



Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

6) Install the 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.



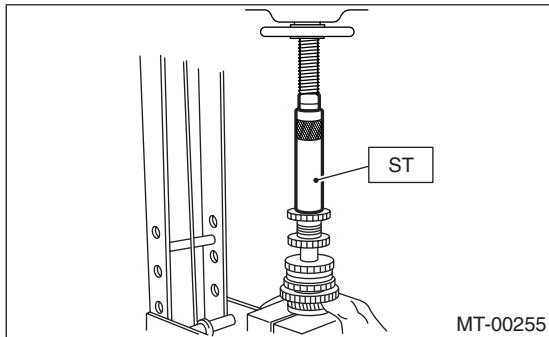
- (A) 2nd driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

7) After installing the key on driven shaft, install the 3rd-4th driven gear using ST and press.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Align the groove in baulk ring with insert.

ST 499277200 INSTALLER

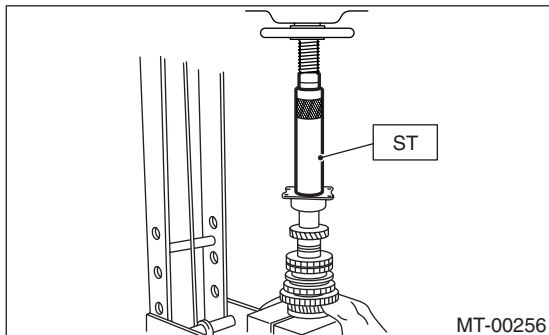


8) Install a set of roller bearings onto the driven shaft using ST and press.

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

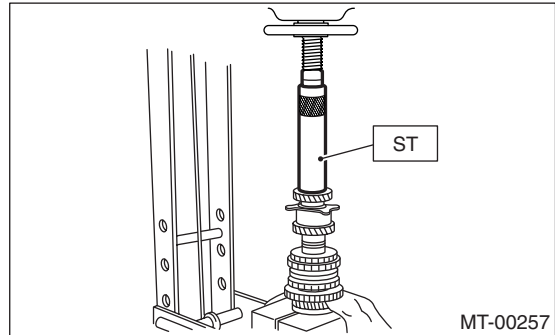


9) Position the woodruff key in groove on the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and press.

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

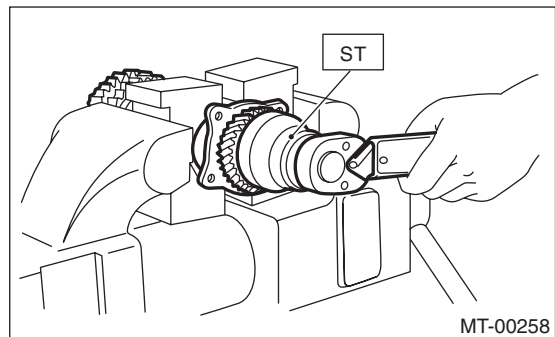


10) Install the lock washer. Install the lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

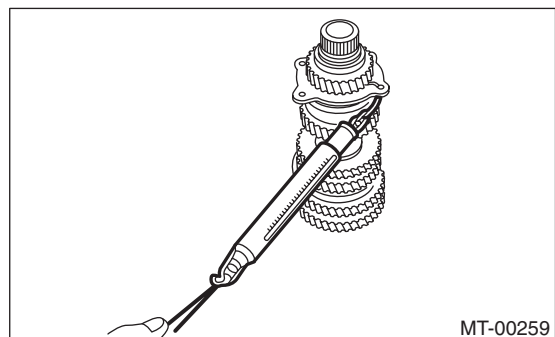
Tightening torque:

260 N·m (26.5 kgf-m, 191.7 ft-lb)



NOTE:

- Stake the lock nut at two points.
- Using the 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 0.33 ft).



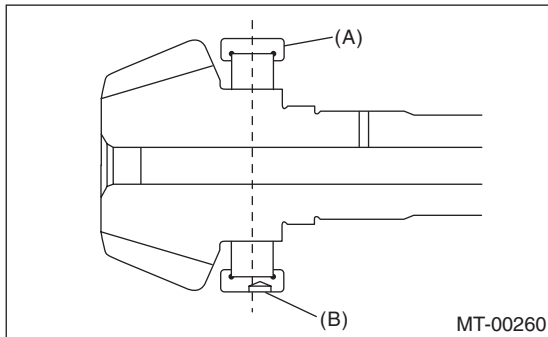
11) Install the roller bearing onto drive pinion.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

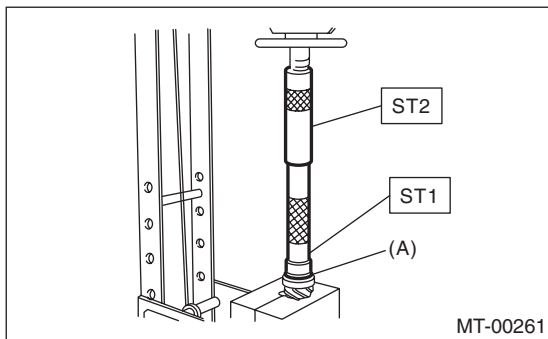
NOTE:

When installing the roller bearing, note its directions (front and rear) because the knock pin hole in outer race is offset.



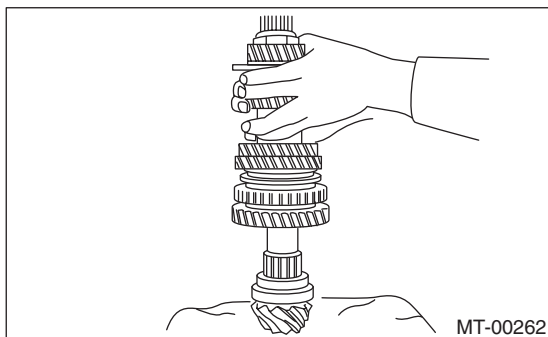
- (A) Roller bearing
- (B) Knock pin hole

12) Install the washer using ST1, ST2 and press.
ST1 499277100 BUSHING 1-2 INSTALLER
ST2 499277200 INSTALLER



- (A) Washer

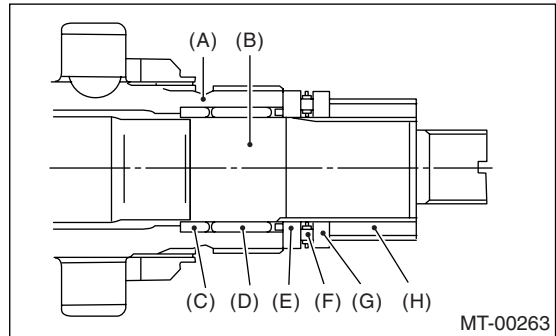
13) Install the thrust bearing and needle bearing.
Install the driven shaft assembly.



14) Install the drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in this order.

NOTE:

Be careful 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

15) Adjust the thrust bearing preload. <Ref. to 5MT-67, ADJUSTMENT, Drive Pinion Shaft Assembly.>

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

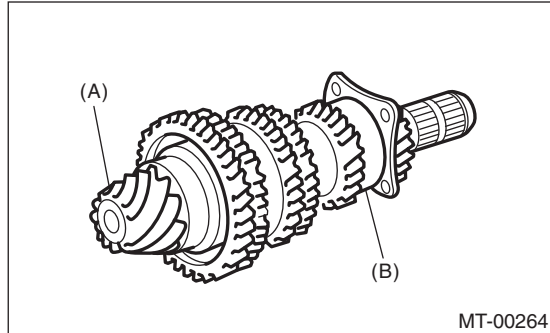
Replace the bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make noise when turned after gear oil lubrication.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

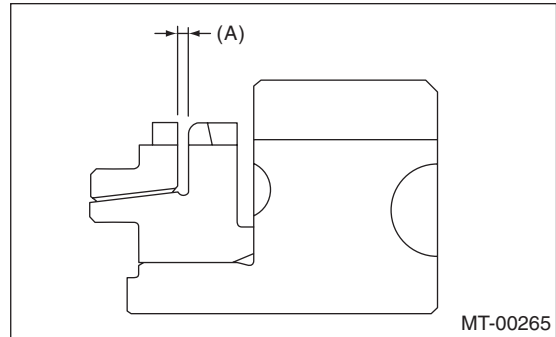
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike other bearings.



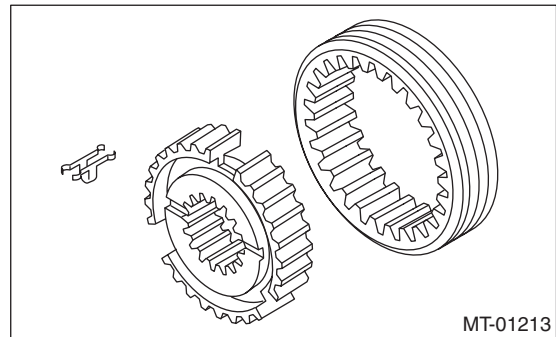
(A) Drive pinion shaft
(B) Ball bearing

- 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.
 - 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.
- 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.

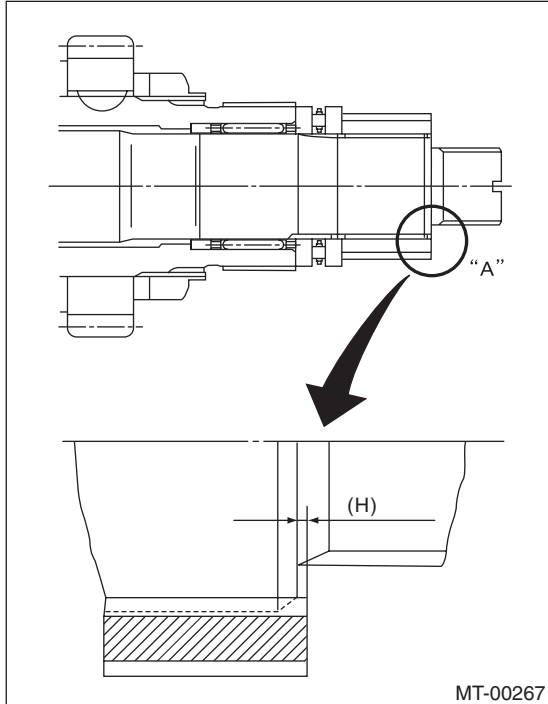
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

F: ADJUSTMENT

1. THRUST BEARING PRELOAD

1) Select the adjusting washer No. 1 so that dimension (H) is zero through visual check. Position the washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install the lock nut (18 × 13.5).



2) Using the ST1, ST2 and ST3, tighten the new lock nut to specified torque.

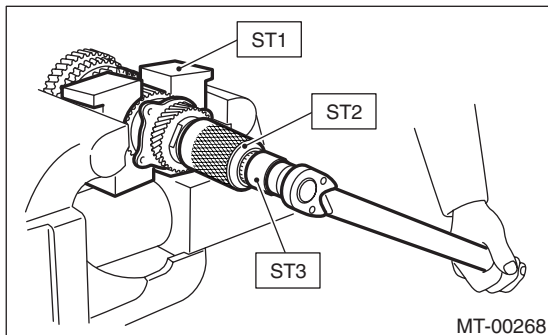
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

120 N·m (12.2 kgf·m, 88.5 ft·lb)



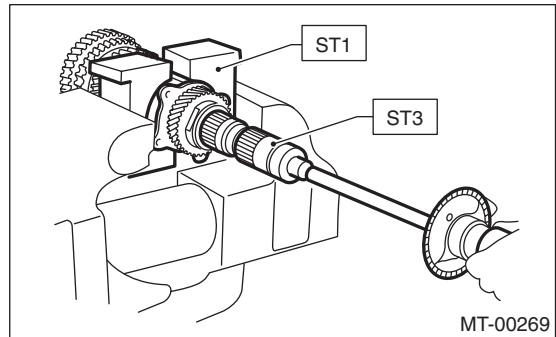
3) After removing the ST2, measure the starting torque using torque driver.

ST1 899884100 HOLDER

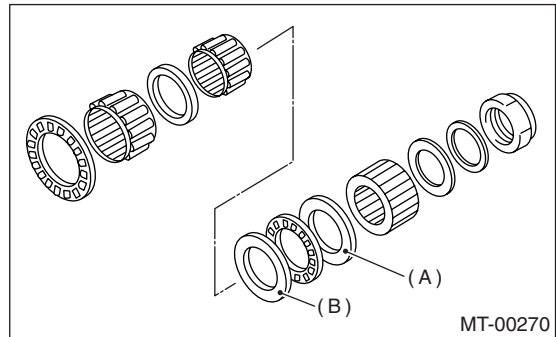
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

0.3 — 0.8 N·m (0.03 — 0.08 kgf·m, 0.2 — 0.6 ft·lb)



4) If the starting torque is not within specified limit, select a new adjusting washer No. 1 and recheck starting torque.



(A) Adjusting washer No. 1

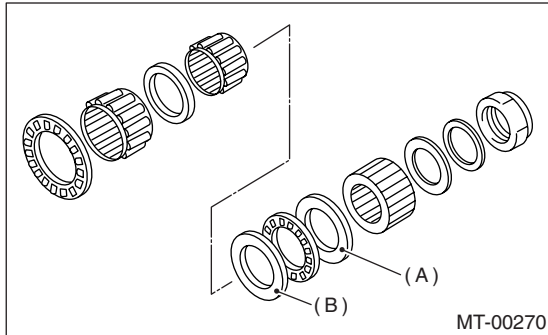
(B) Adjusting washer No. 2

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

5) If the 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.

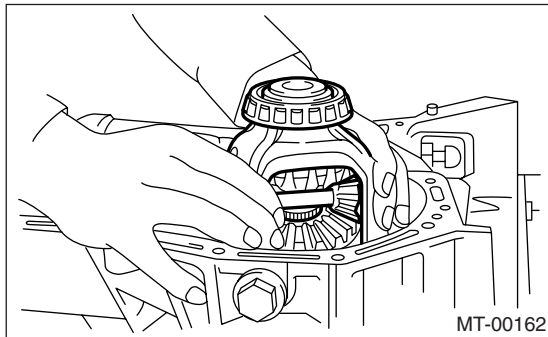
17.Front Differential Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-52, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly. <Ref. to 5MT-55, REMOVAL, Main Shaft Assembly.>
- 6) Remove the differential assembly.

NOTE:

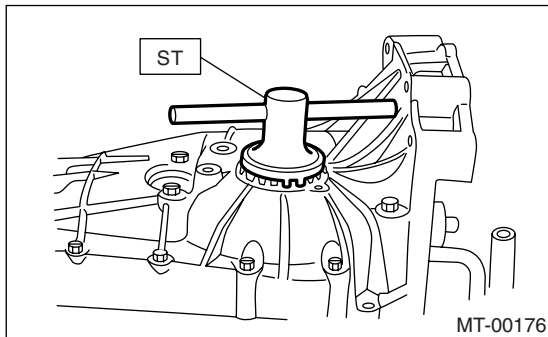
- Be careful not to confuse the right and left roller bearing outer races.
- Be careful not to damage the retainer oil seal.



- 7) Remove the differential side retainers using ST. ST 18630AA010 WRENCH ASSY

NOTE:

WRENCH ASSY (ST 499787000) can also be used.

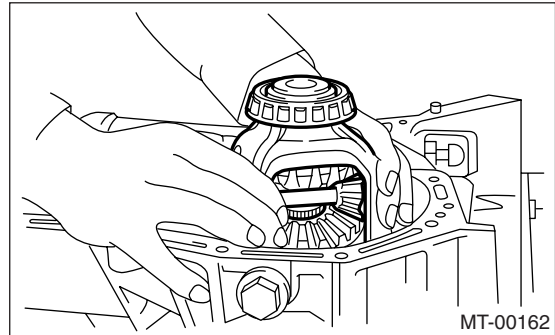


B: INSTALLATION

- 1) Install the differential side retainers using ST. ST 499787000 WRENCH ASSY
- 2) Install the bearing outer race to transmission case.
- 3) Install the differential assembly.

NOTE:

Be careful not to fold the sealing lip of oil seal.



- 4) Install the main shaft assembly. <Ref. to 5MT-55, INSTALLATION, Main Shaft Assembly.>
- 5) Install the drive pinion assembly. <Ref. to 5MT-60, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 5MT-52, INSTALLATION, Transmission Case.>
- 7) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 8) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

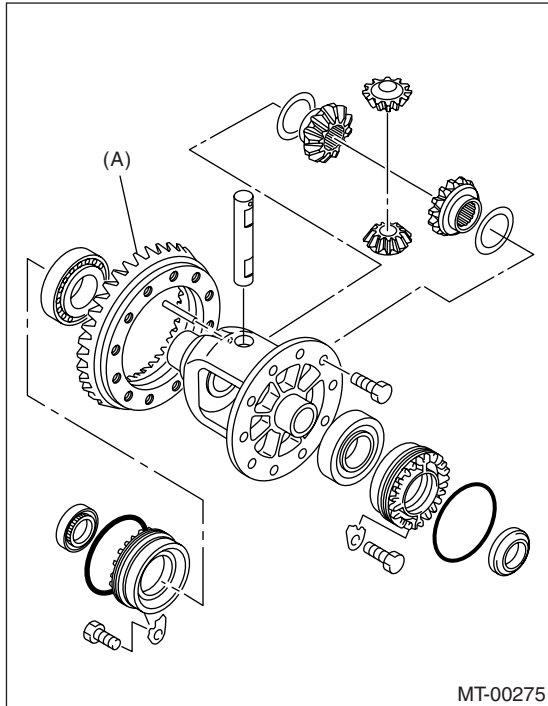
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

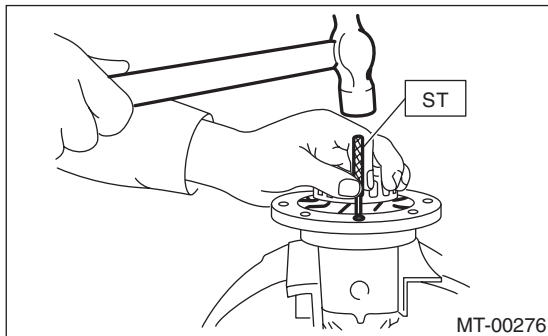
1) Loosen the twelve bolts and remove the hypoid driven gear.



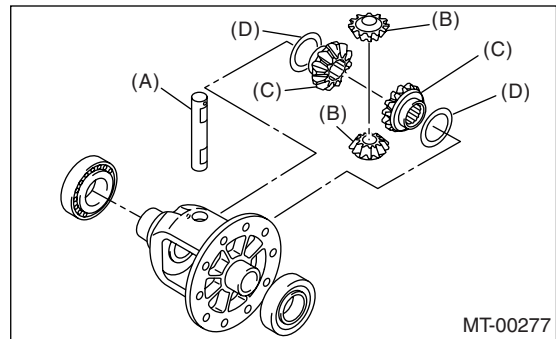
(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER

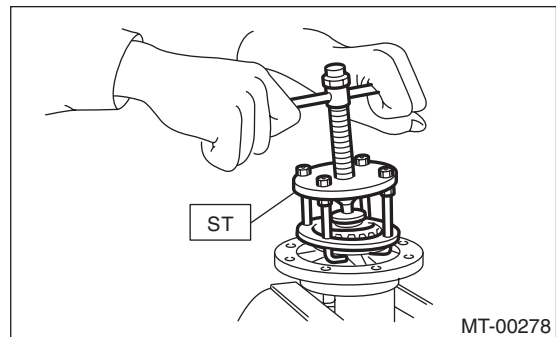


3) Pull out the pinion shaft, and remove the differential bevel pinion and gear and washer.



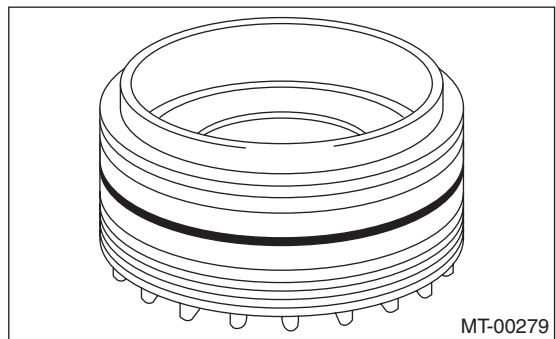
- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

4) Remove the roller bearing using ST.
ST 899524100 PULLER SET



2. SIDE RETAINER

1) Remove the O-ring.



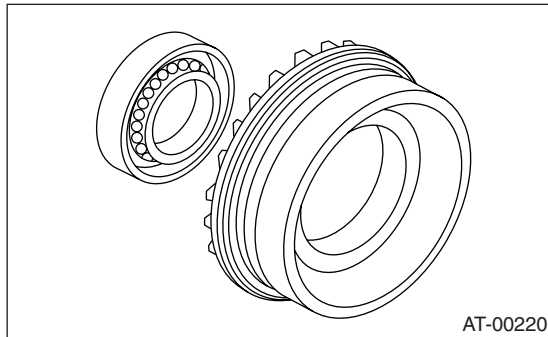
2) Remove the oil seal.

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Do not reuse the oil seal. Prepare a new oil seal.



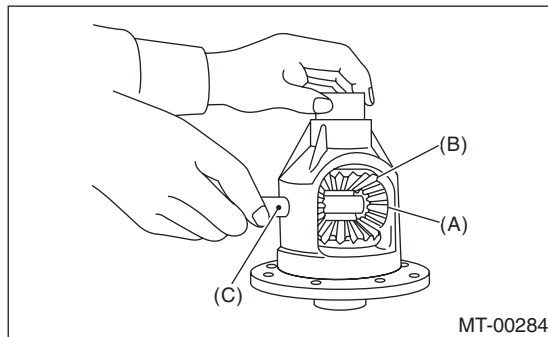
D: ASSEMBLY

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

2) Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to 5MT-74, ADJUSTMENT, Front Differential Assembly.>

NOTE:

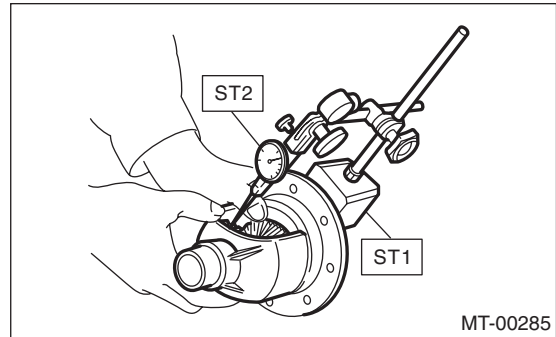
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

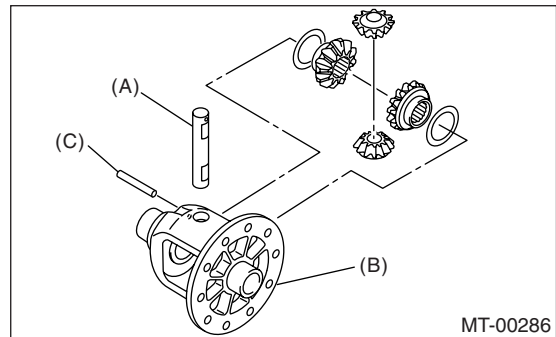


3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

NOTE:

Lock the straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

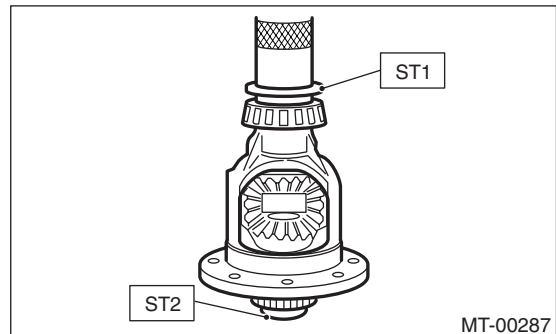
4) Install the roller bearing to differential case.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 398497701 ADAPTER



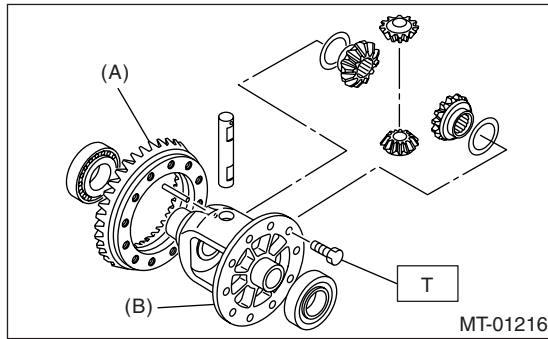
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

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

6) Set the drive axle shaft into differential case and hold it using outer spring. Measure the shaft to case clearance to check if it is within specifications using thickness gauge.

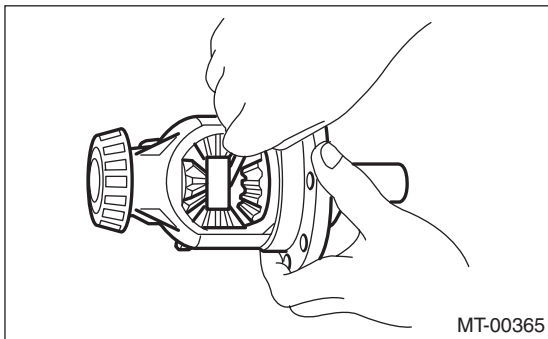
NOTE:

Replace the snap ring with suitable one, if the measurement is not within specifications.

Snap ring (Outer)	
Part No.	Thickness mm (in)
805028011	1.05 (0.0413)
805028012	1.20 (0.0472)

Clearance:

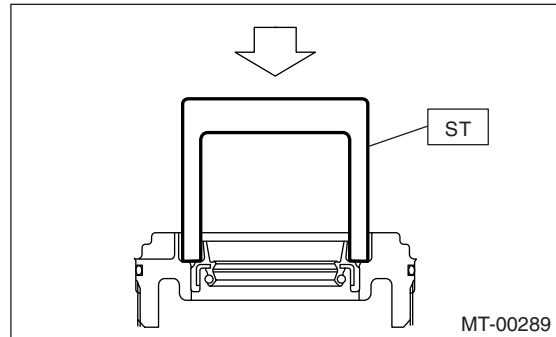
0 — 0.2 mm (0 — 0.008 in)



2. SIDE RETAINER

1) Install a new oil seal.

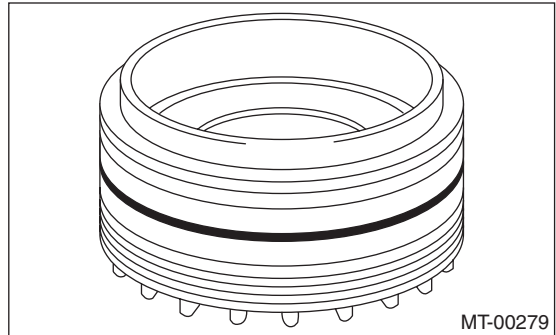
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2) Install a new O-ring.

NOTE:

Do not stretch or damage the O-ring.



E: INSPECTION

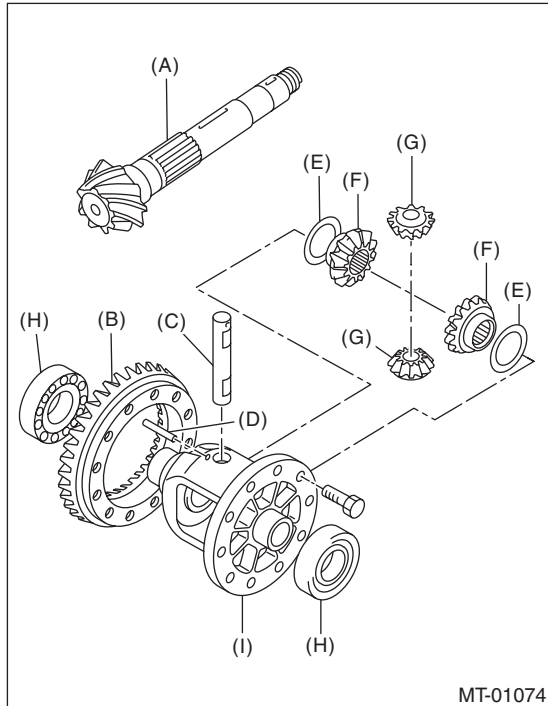
Repair or replace the differential gear in the following cases:

- 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.

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

- The differential case has worn or damaged sliding surfaces.



MT-01074

- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Roller bearing
- (I) Differential case

1. BEVEL PINION GEAR BACKLASH

Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

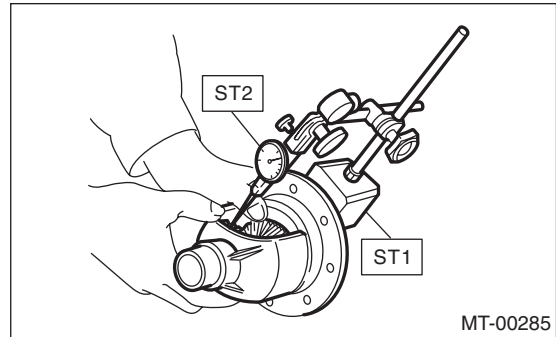
NOTE:

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)



MT-00285

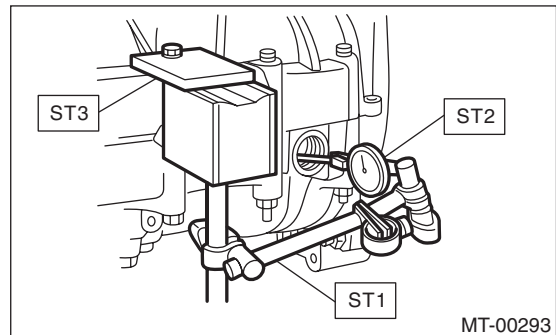
2. HYPOID GEAR BACKLASH

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)



MT-00293

NOTE:

If the backlash is outside specified range, adjust it by turning the holder in right side case.

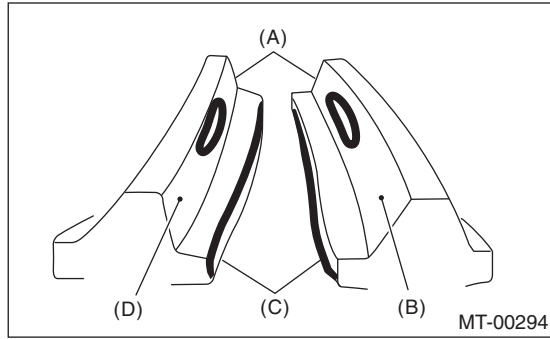
3. TOOTH CONTACT OF HYPOID GEAR

Check the 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 5MT-74, ADJUSTMENT, Front Differential Assembly.>

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

- 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 5MT-69, REMOVAL, Front Differential Assembly.>
- 2) Select a differential 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.

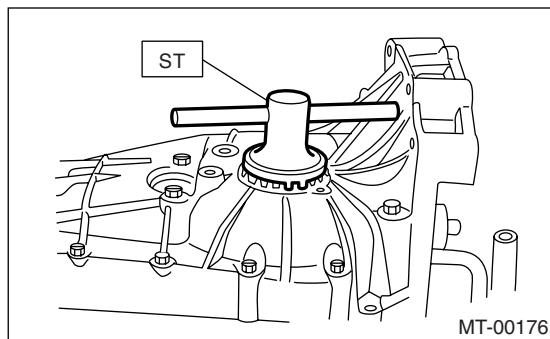
Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

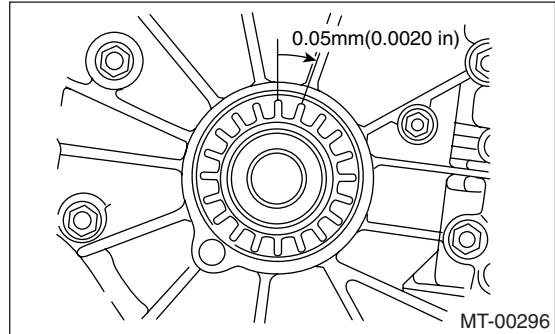
Adjust backlash by turning the holder in right side case.

ST 499787000 WRENCH ASSY



NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.020 in).

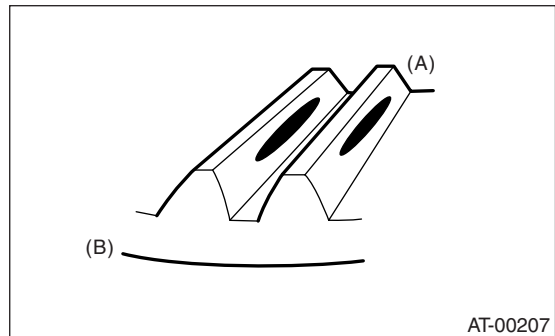


3. TOOTH CONTACT OF HYPOID GEAR

- 1) Adjust until the tooth contact is correct.
- 2) Check and adjust the tooth contact with following.

- 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.]

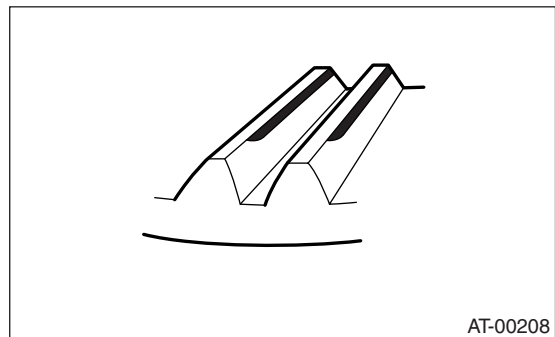


- (A) Toe side
- (B) Heel side

- Face contact

Checking item: Backlash is too large.

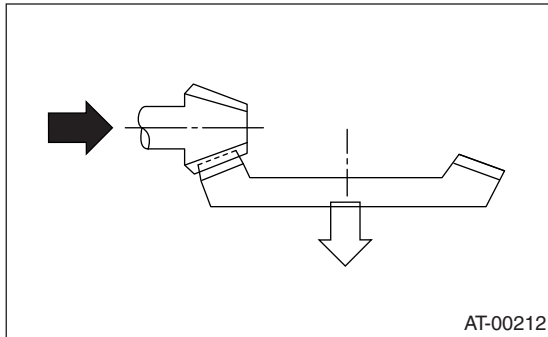
Contact pattern



Front Differential Assembly

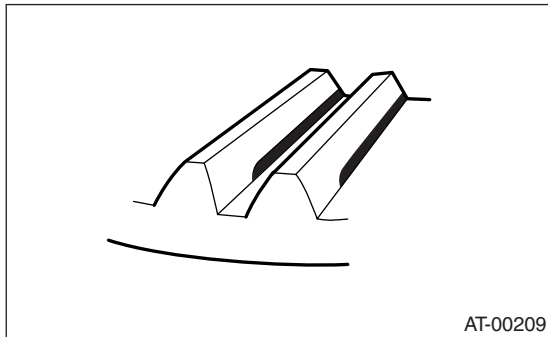
MANUAL TRANSMISSION AND DIFFERENTIAL

Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion close to driven gear.

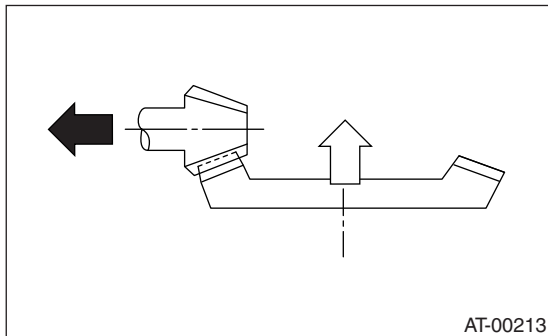


- Flank contact

Checking item: Backlash is too small.
Contact pattern

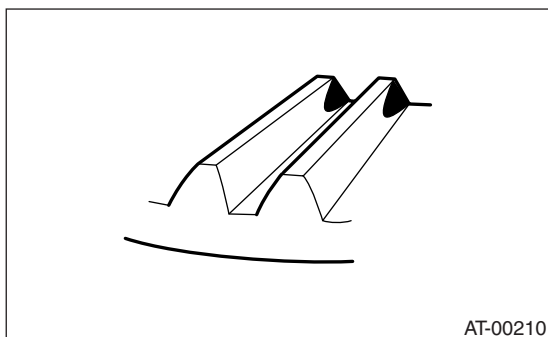


Corrective action: Increase thickness of pinion height adjusting washer in order to move drive pinion away from driven gear.

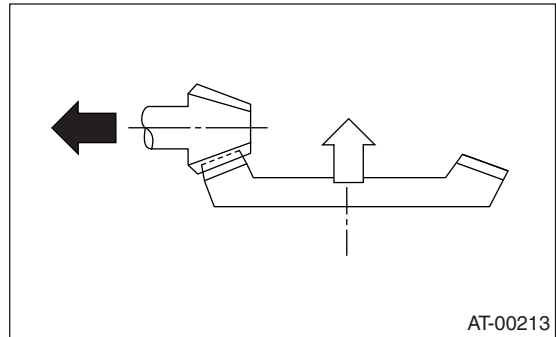


- Toe contact (Inside end contact)

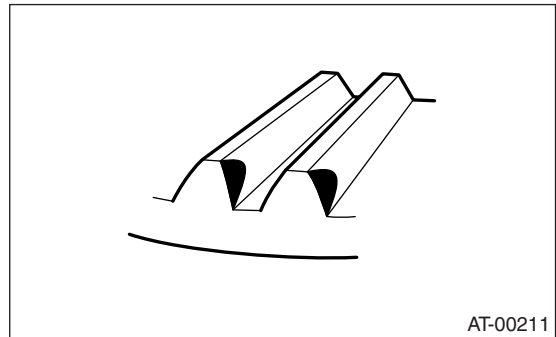
Checking item: Contact area is small.
Contact pattern



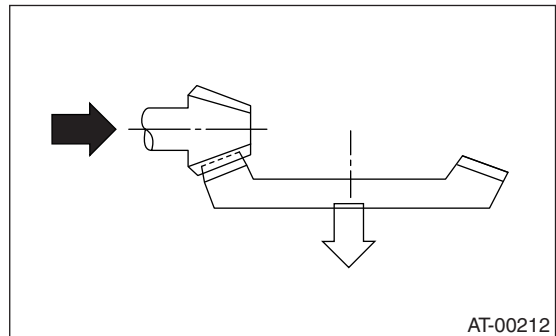
Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion close to driven gear.



- Heel contact (Outside end contact)
- Checking item: Contact area is small.**
Contact pattern



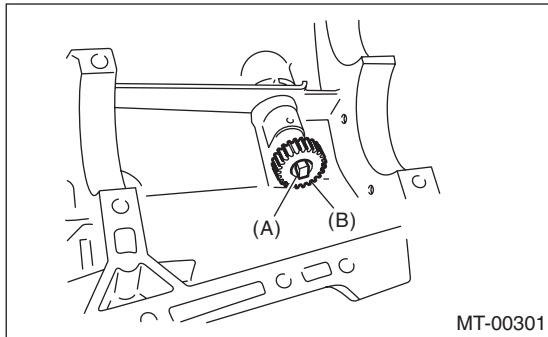
Corrective action: Reduce thickness of pinion height adjusting washer in order to move drive pinion away from driven gear.



18.Speedometer Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-52, REMOVAL, Transmission Case.>
- 5) Remove the vehicle speed sensor. <Ref. to 5MT-38, REMOVAL, Vehicle Speed Sensor.>
- 6) Remove the outer snap ring and pull out 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 the oil seal with ST.

NOTE:

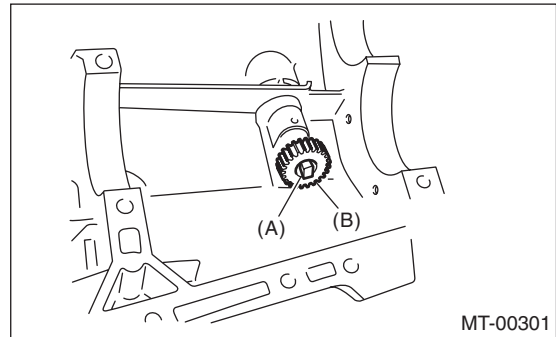
Use a new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

- 2) Install the vehicle speed sensor. <Ref. to 5MT-38, INSTALLATION, Vehicle Speed Sensor.>
- 3) Install the speedometer driven gear and snap ring.

NOTE:

Use a new snap ring, if it has been removed.



- (A) Outer snap ring
(B) Speedometer driven gear

- 4) Install the transmission case. <Ref. to 5MT-52, INSTALLATION, Transmission Case.>
- 5) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the back-up light switch and neutral position switch. <Ref. to 5MT-36, INSTALLATION, Switches and Harness.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

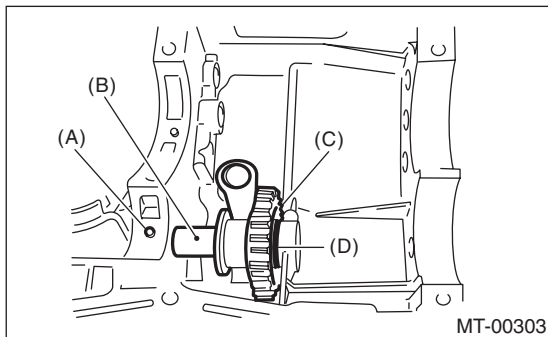
C: INSPECTION

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

19.Reverse Idler Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the drive pinion shaft assembly. <Ref. to 5MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly. <Ref. to 5MT-55, REMOVAL, Main Shaft Assembly.>
- 7) Remove the differential assembly. <Ref. to 5MT-69, REMOVAL, Front Differential Assembly.>
- 8) Remove the shifter forks and rods. <Ref. to 5MT-79, 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

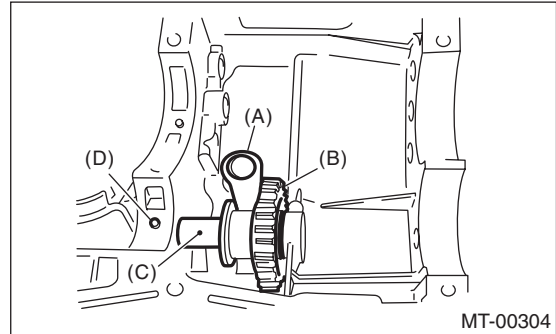
- 10) Remove the reverse shifter lever.

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 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 5MT-77, INSTALLATION, Reverse Idler Gear.> <Ref. to 5MT-78, ADJUSTMENT, Reverse Idler Gear.>
- 3) Install the shifter forks and rods. <Ref. to 5MT-79, INSTALLATION, Shifter Fork and Rod.>
- 4) Install the differential assembly. <Ref. to 5MT-69, INSTALLATION, Front Differential Assembly.>
- 5) Install the main shaft assembly. <Ref. to 5MT-55, INSTALLATION, Main Shaft Assembly.>
- 6) Install the drive pinion shaft assembly. <Ref. to 5MT-60, INSTALLATION, Drive Pinion Shaft Assembly.>
- 7) Install the transmission case. <Ref. to 5MT-52, INSTALLATION, Transmission Case.>
- 8) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install the back-up light switch and neutral position switch. <Ref. to 5MT-36, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

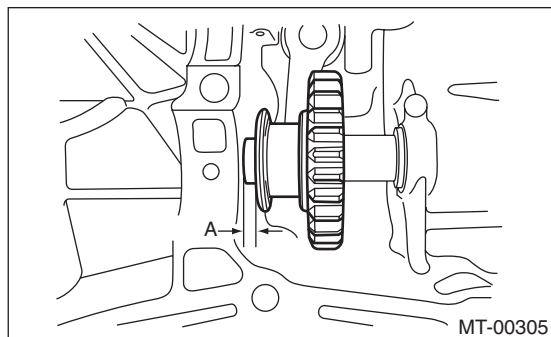
- 1) Move the reverse shifter rod toward the reverse side. Inspect the clearance between reverse idler gear and transmission case wall. If out of specification, select the appropriate reverse shifter lever and adjust.

Reverse Idler Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

Clearance A:

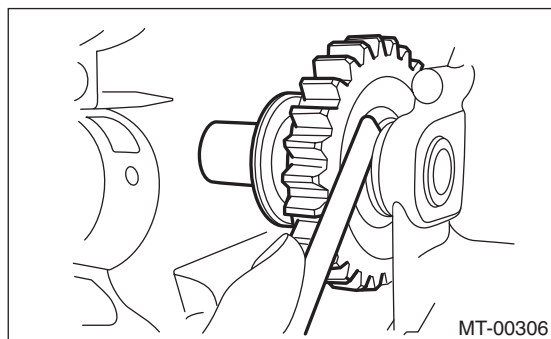
6.0 — 7.5 mm (0.236 — 0.295 in)



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)



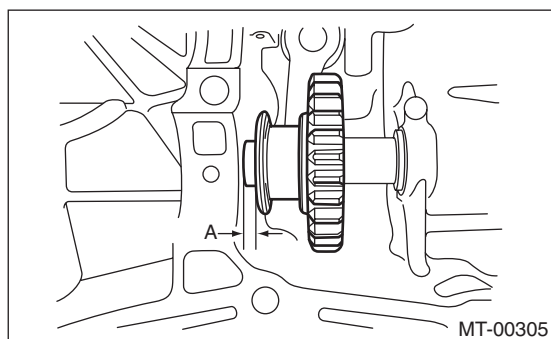
3) Check the reverse idler gear and shaft for damage. Replace if damaged.

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)

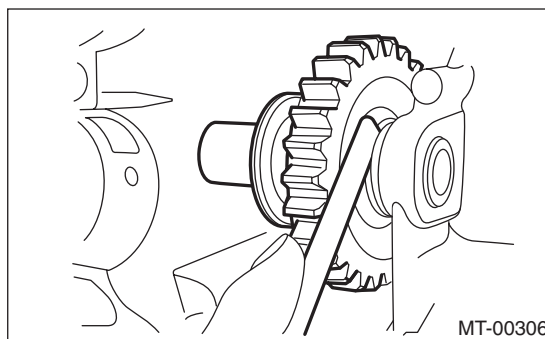


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

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

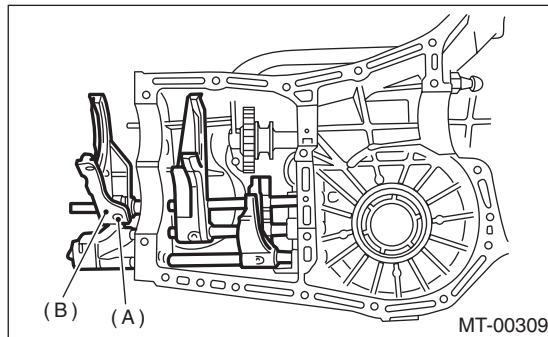
MANUAL TRANSMISSION AND DIFFERENTIAL

20.Shifter Fork and Rod

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-36, REMOVAL, Switches and Harness.>
- 3) Remove the transfer case with extension case assembly. <Ref. to 5MT-40, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transmission case. <Ref. to 5MT-52, REMOVAL, Transmission Case.>
- 5) Remove the drive pinion shaft assembly. <Ref. to 5MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove the main shaft assembly. <Ref. to 5MT-55, REMOVAL, Main Shaft Assembly.>
- 7) Remove the differential assembly. <Ref. to 5MT-69, REMOVAL, Front Differential Assembly.>
- 8) Drive out the straight pin with ST, and 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER

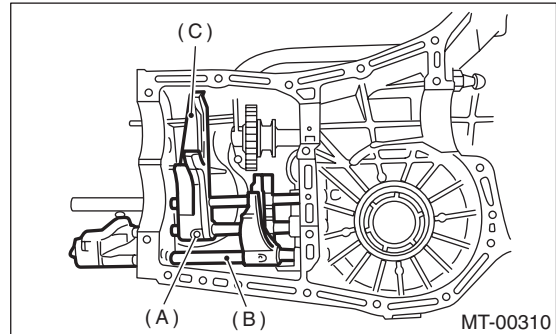


- (A) Straight pin
(B) 5th shifter fork

- 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 the rod, keep other rods in neutral. Also, when pulling out the straight pin, remove it toward the inside of case so that it does not hit against the case.



- (A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

- 11) Drive out the straight pin, and pull out 1-2 fork rod and shifter fork.

- 12) Remove the outer snap ring, and pull out the 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 the reverse shifter rod arm, be careful not to let the ball pop out of arm.

- 13) Remove the reverse shifter lever.

B: INSTALLATION

- 1) Install the reverse arm fork spring, ball and interlock plunger to 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.

NOTE:

Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

- 2) Position the ball, spring and new gasket in reverse shifter rod hole, on left side transmission case, and tighten the checking ball plug.
- 3) Install the 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.
- 4) Align the holes in rod and fork, and new drive straight pin into these holes using ST.

NOTE:

- Set other rods to neutral.
- Make sure the 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.

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

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 new drive straight pin into these holes.

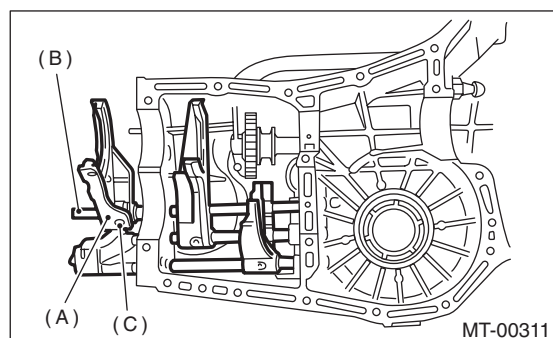
NOTE:

- Set the reverse fork rod to neutral.
- Make sure the interlock plunger to be installed 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 holes in the two parts and new drive straight pin into place.

ST 398791700 STRAIGHT PIN REMOVER

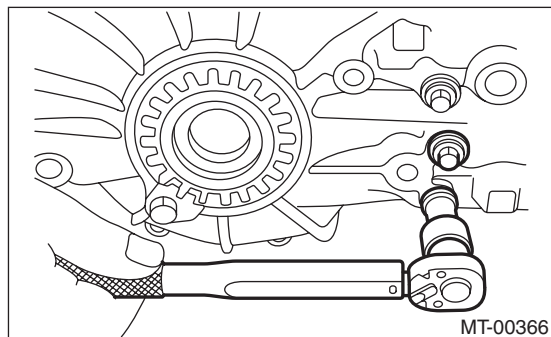


- (A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

9) Position the balls, checking ball springs and new gaskets into 3-4 and 1-2 rod holes, and install plugs.

Tightening torque:

20 N·m (2.0 kgf·m, 14.5 ft·lb)



10) Install the differential assembly. <Ref. to 5MT-69, INSTALLATION, Front Differential Assembly.>

11) Install the main shaft assembly.

<Ref. to 5MT-55, INSTALLATION, Main Shaft Assembly.>

12) Install the drive pinion shaft assembly. <Ref. to 5MT-60, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install the transmission case. <Ref. to 5MT-52, INSTALLATION, Transmission Case.>

14) Install the transfer case with extension case assembly. <Ref. to 5MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch and neutral position switch. <Ref. to 5MT-36, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to vehicle. <Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

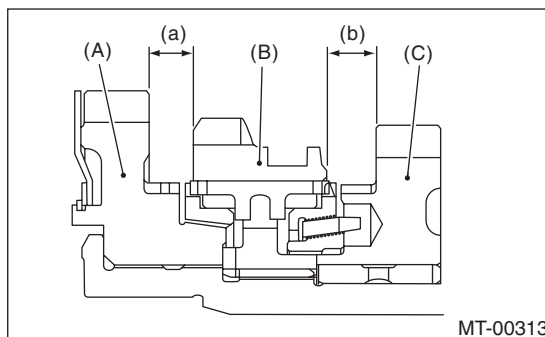
1) Check the shift shaft and shift rod for damage. Replace if damaged.

2) Gearshift mechanism:

Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

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

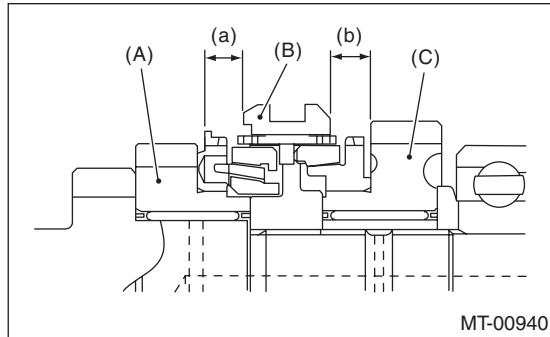
1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	No mark	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

4) Inspect the clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

Clearance (a) and (b):
9.3 mm (0.366 in)

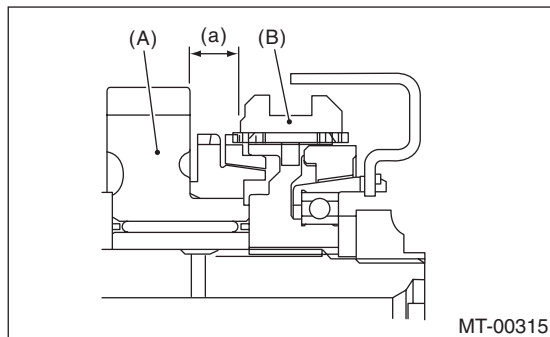


- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	No mark	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

5) Inspect the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



- (A) 5th drive gear
- (B) Coupling sleeve

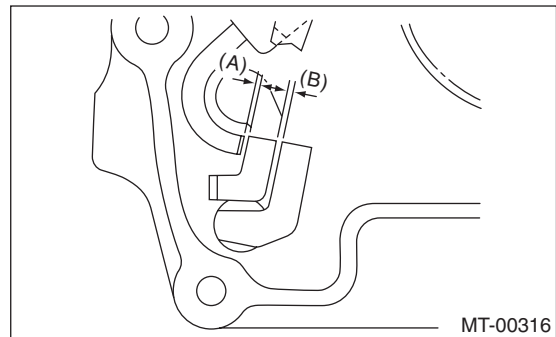
5th shifter fork (Non-turbo)		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (Turbo)		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA241	No mark	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in).

6) Inspect the rod end clearances (A) and (B). If any clearance is not within specifications, replace the rod or fork as required.

Clearance (A):
3rd-4th to 5th:
0.5 — 1.3 mm (0.020 — 0.051 in)

Clearance (B):
1st-2nd to 3rd-4th:
0.4 — 1.4 mm (0.016 — 0.055 in)



General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL

21. General Diagnostic Table

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 and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 4th drive gear and needle bearing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Noise comes from transmission. NOTE: If an 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 with specified oil or replace.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DIFFERENTIAL

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: 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 the 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 the 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 the 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 the bearing preload.
	(d) Loose roller bearing	Readjust the 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 Table

MANUAL TRANSMISSION AND DIFFERENTIAL

MANUAL TRANSMISSION AND DIFFERENTIAL 6-SPEED (6MT)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

1. General Description

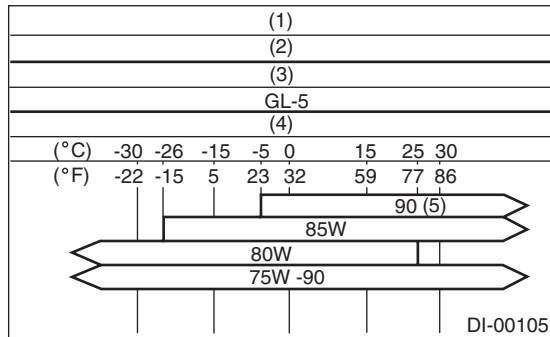
A: SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Type			6-forward speeds and 1-reverse
Transmission gear ratio		1st	3.636
		2nd	2.375
		3rd	1.761
		4th	1.346
		5th	0.971
		6th	0.756
		Reverse	3.545
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	3.900
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	3.900
Front differential	Type and number of gear		Planetary gear (Pinion gear: 8)
	Type of LSD		Helical
Center differential	Type and number of gear		Planetary gear (Internal gear: 1, Pinion gear: 6, Sun gear: 1 and Electromagnetic floating variable control multiple clutch)
Transmission gear oil			GL-5
Transmission gear oil capacity			4.1 ℓ (4.3 US qt, 3.6 Imp qt)

2. TRANSMISSION GEAR OIL

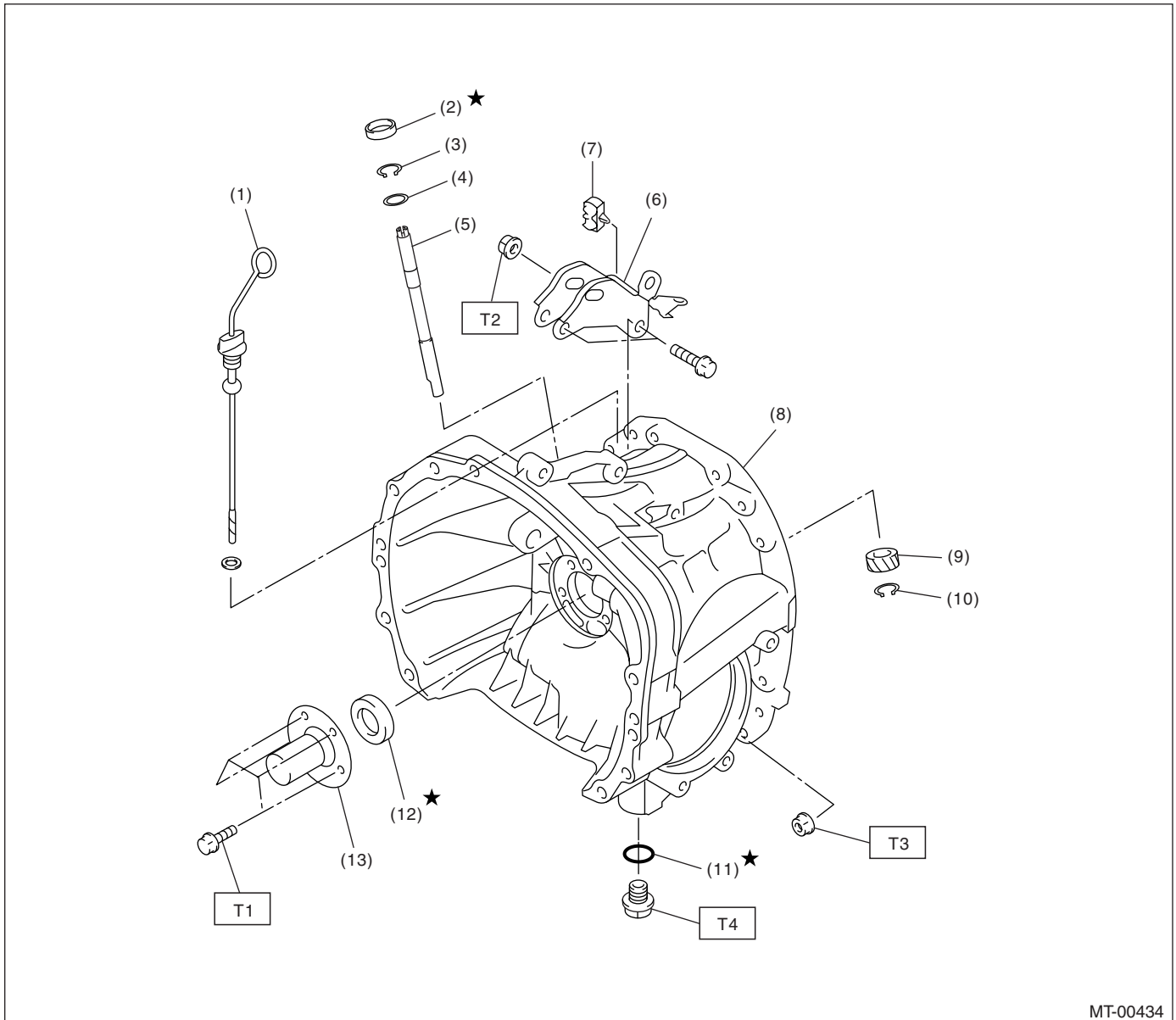
Recommended oil:



- (1) Item
- (2) Transmission gear oil
- (3) API standard
- (4) SAE viscosity No. and applicable temperature
- (5) STi model

B: COMPONENT

1. CLUTCH HOUSING



MT-00434

(1) Oil level gauge	(8) Clutch housing
(2) Oil seal	(9) Speedometer driven gear
(3) Snap ring	(10) Snap ring
(4) Washer	(11) Gasket
(5) Speedometer driven gear shaft	(12) Oil seal
(6) Pitching stopper bracket	(13) Clutch release bearing guide
(7) Clip	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 41 (4.2, 30.2)

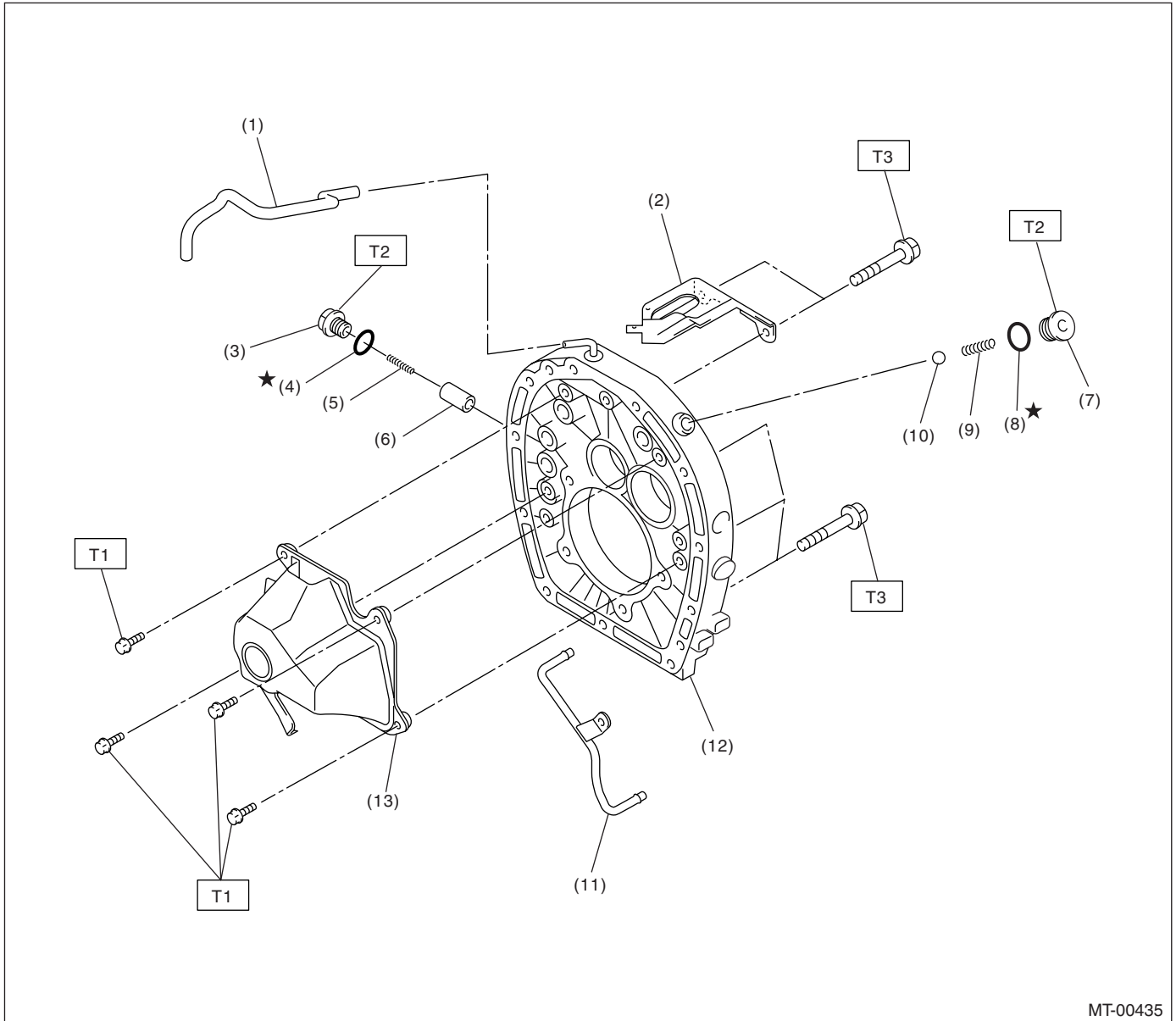
T3: 50 (5.1, 36.9)

T4: 70 (7.1, 51.6)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

2. ADAPTER PLATE



MT-00435

(1) Breather hose	(7) Plug
(2) Transmission harness stay	(8) Gasket
(3) Plug	(9) Spring
(4) Gasket	(10) Ball
(5) Spring	(11) Lubrication pipe
(6) Plunger	(12) Adapter plate

- (13) Oil chamber

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

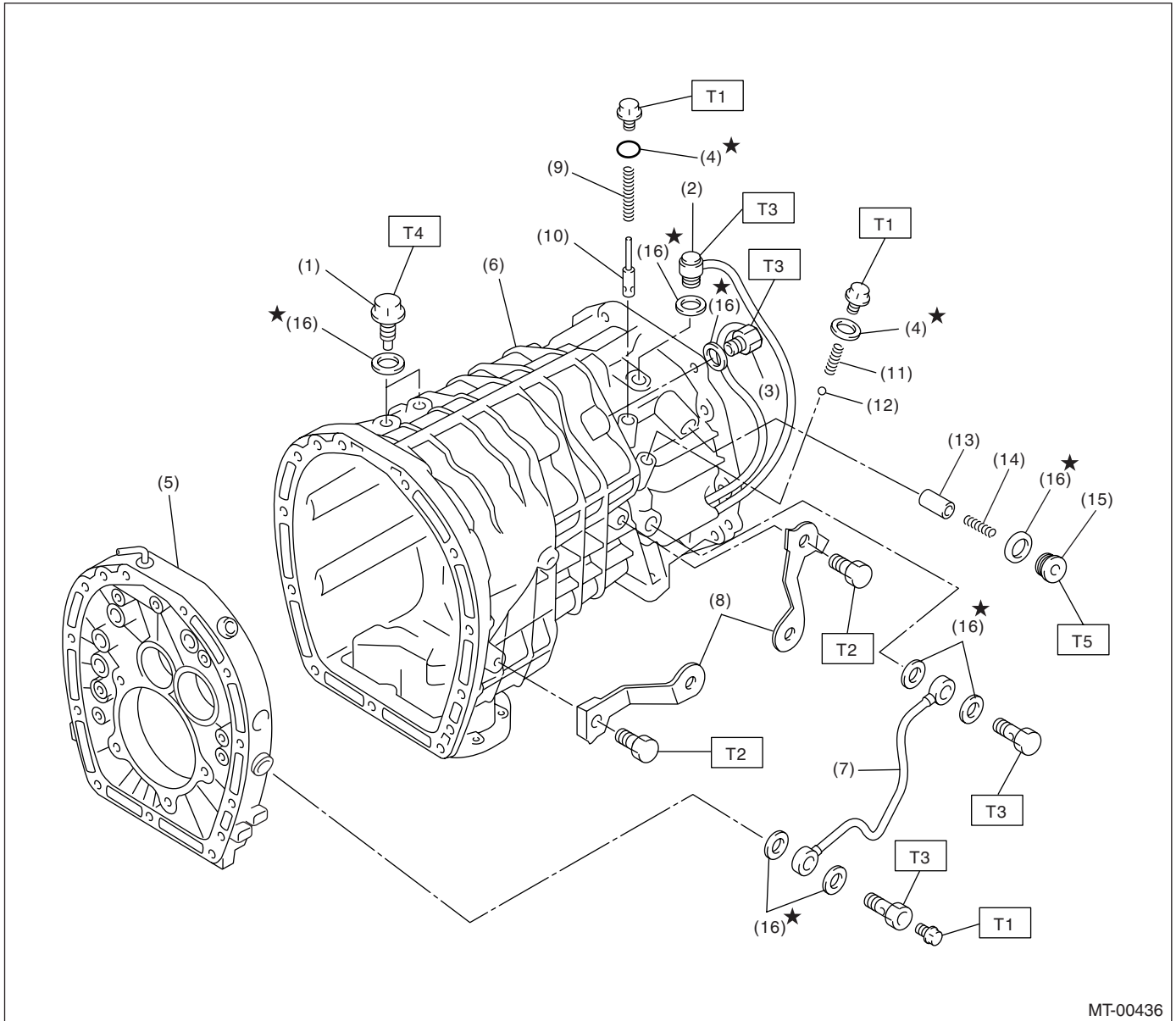
T2: 37 (3.8, 27.3)

T3: 50 (5.1, 36.9)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

3. TRANSMISSION CASE



MT-00436

(1) Pilot bolt	(9) Return spring
(2) Neutral switch	(10) Pressure relief valve
(3) Back-up light switch	(11) Return spring
(4) O-ring	(12) Ball
(5) Adapter plate	(13) Plunger
(6) Transmission case	(14) Spring
(7) Oil pipe	(15) Plug
(8) Harness bracket	(16) Gasket

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.6)

T2: 16 (1.6, 11.8)

T3: 32 (3.3, 23.6)

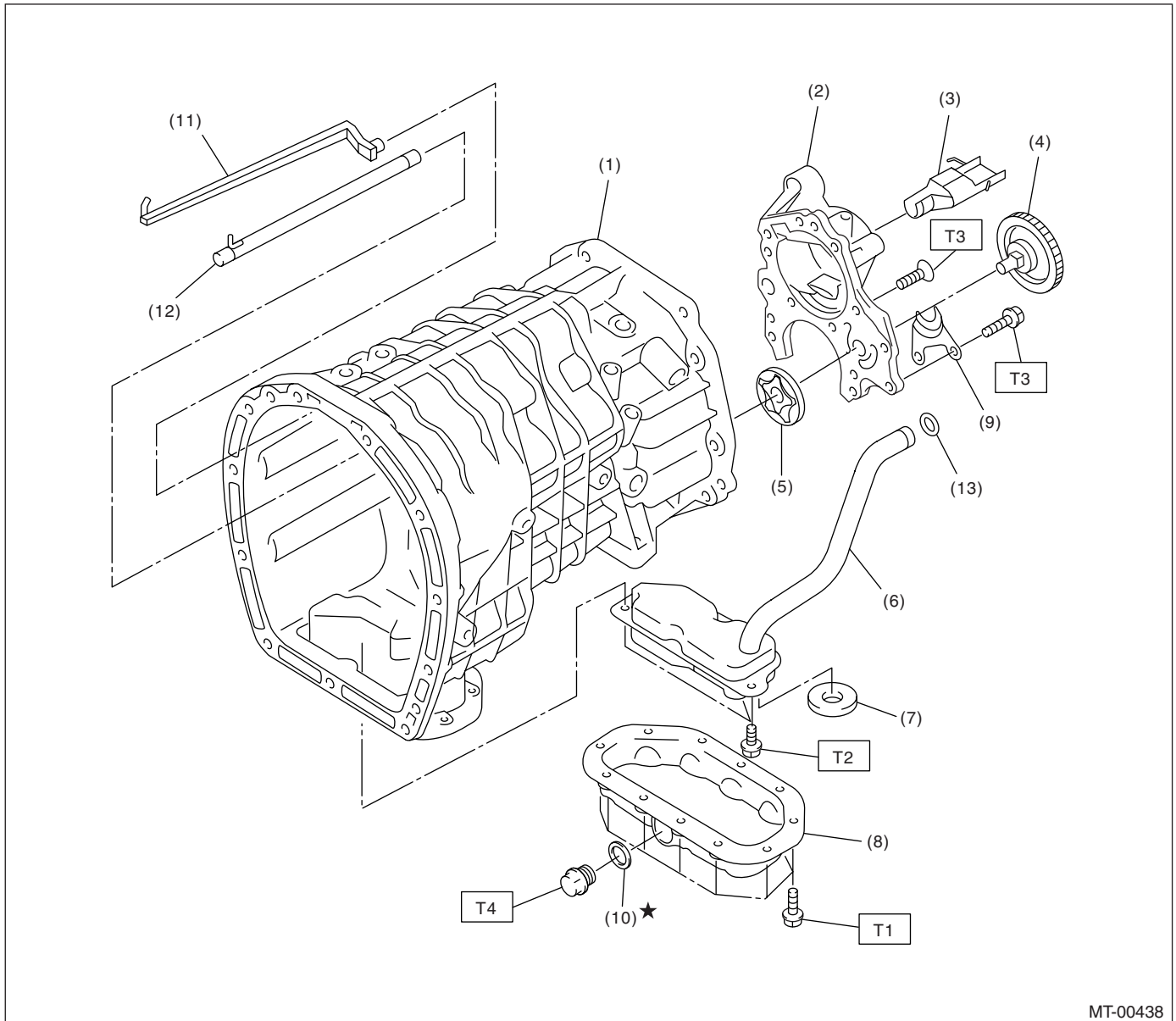
T4: 34 (3.5, 25.1)

T5: 41 (4.2, 30.2)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

4. OIL PAN AND OIL PUMP



(1) Transmission case	(8) Oil pan
(2) Oil pump cover	(9) Plate
(3) Oil guide	(10) Gasket
(4) Oil pump driven gear ASSY	(11) Oil guide
(5) Oil pump rotor ASSY	(12) Oil pipe
(6) Strainer ASSY	(13) O-ring
(7) Magnet	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 10 (1.0, 7.4)

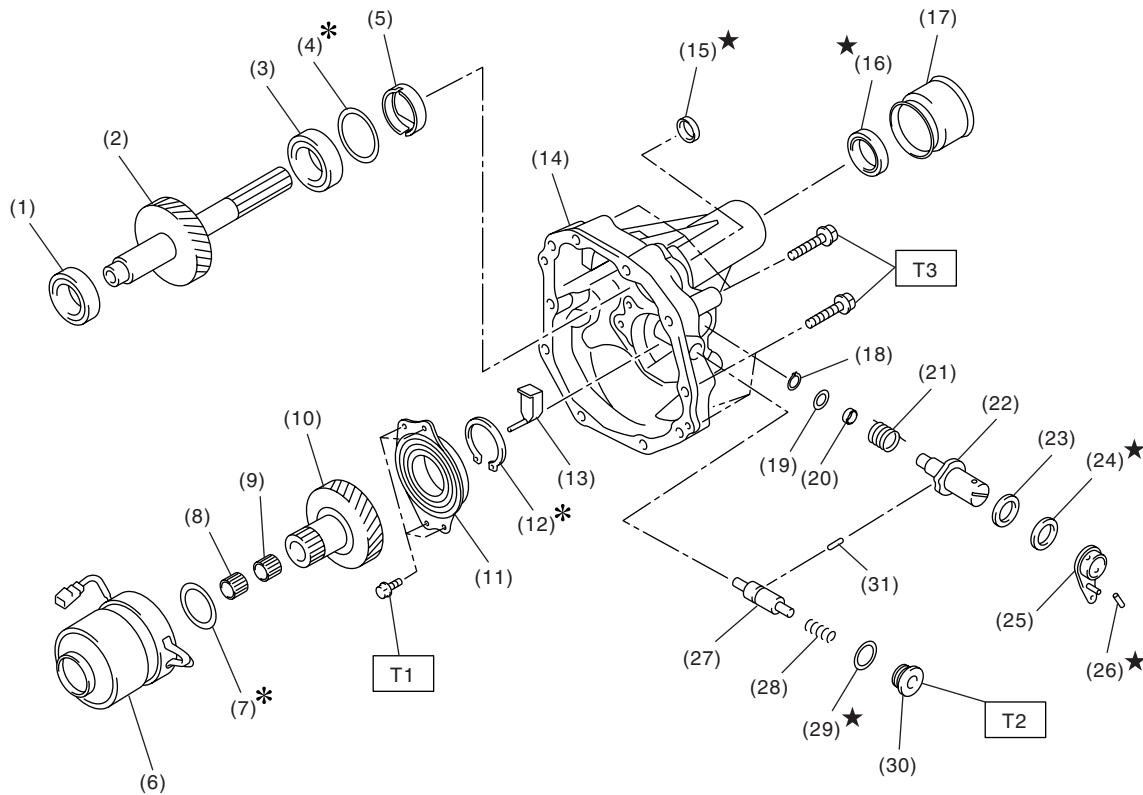
T3: 25 (2.5, 18.1)

T4: 44 (4.5, 32.5)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

5. EXTENSION CASE AND CENTER DIFFERENTIAL



MT-00945

(1) Taper roller bearing	(13) Extension guide
(2) Transfer driven gear	(14) Extension case
(3) Taper roller bearing	(15) Oil seal
(4) Shim	(16) Oil seal
(5) Oil plate	(17) Dust cover
(6) Center differential	(18) Snap ring
(7) Shim	(19) Washer
(8) Needle bearing	(20) Bushing
(9) Needle bearing	(21) Spring
(10) Transfer drive gear	(22) Reverse check shaft
(11) Ball bearing (with flange)	(23) Ball bearing
(12) Snap ring	(24) Oil seal

- | |
|--------------------------------|
| (25) Reverse check lever COMPL |
| (26) Straight pin |
| (27) Reverse check plug |
| (28) Spring |
| (29) Gasket |
| (30) Plug |
| (31) Plunger |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 25 (2.5, 18.1)

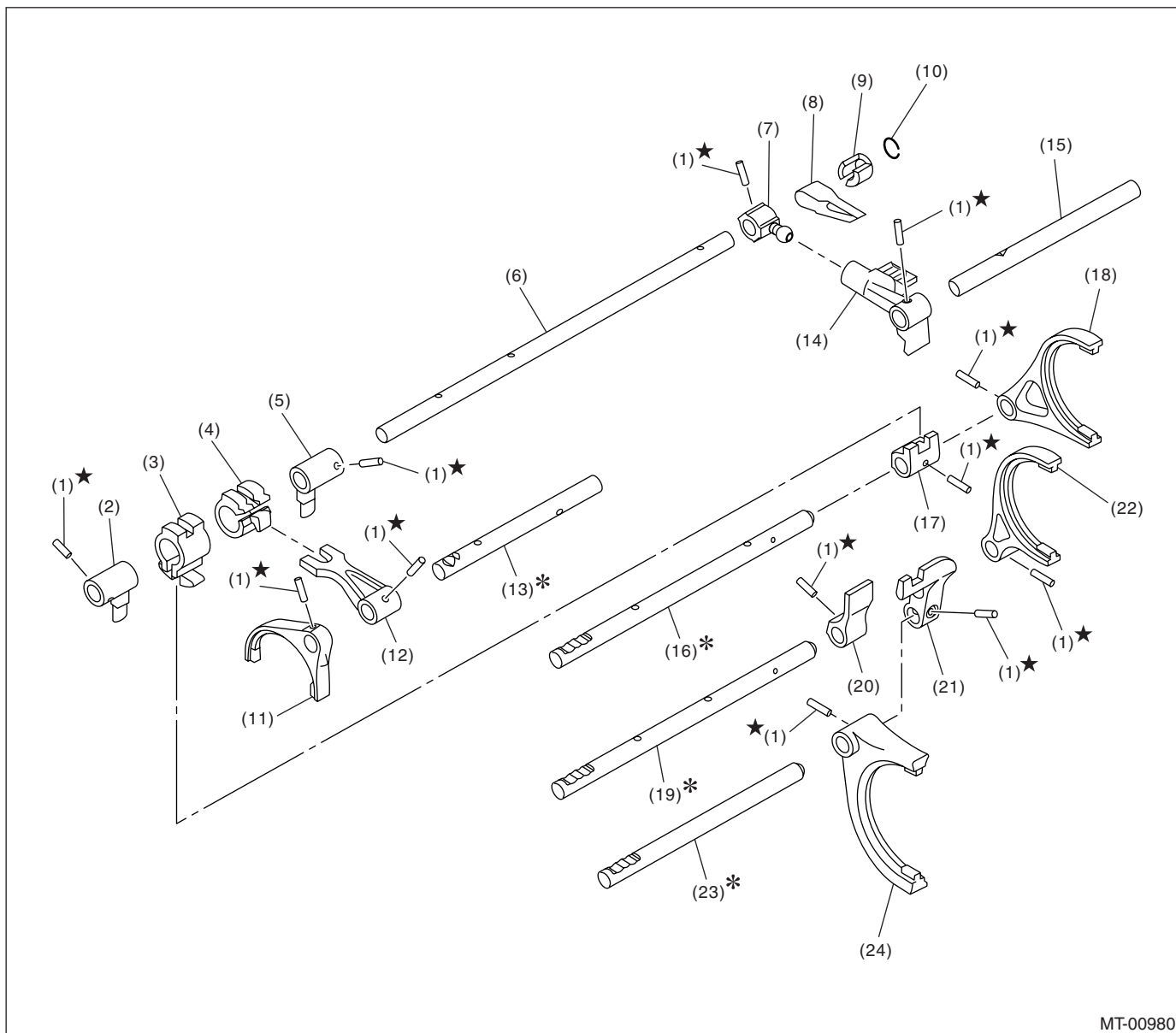
T2: 41 (4.2, 30.2)

T3: 48 (4.9, 35.4)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

6. SHIFTER FORK AND FORK ROD



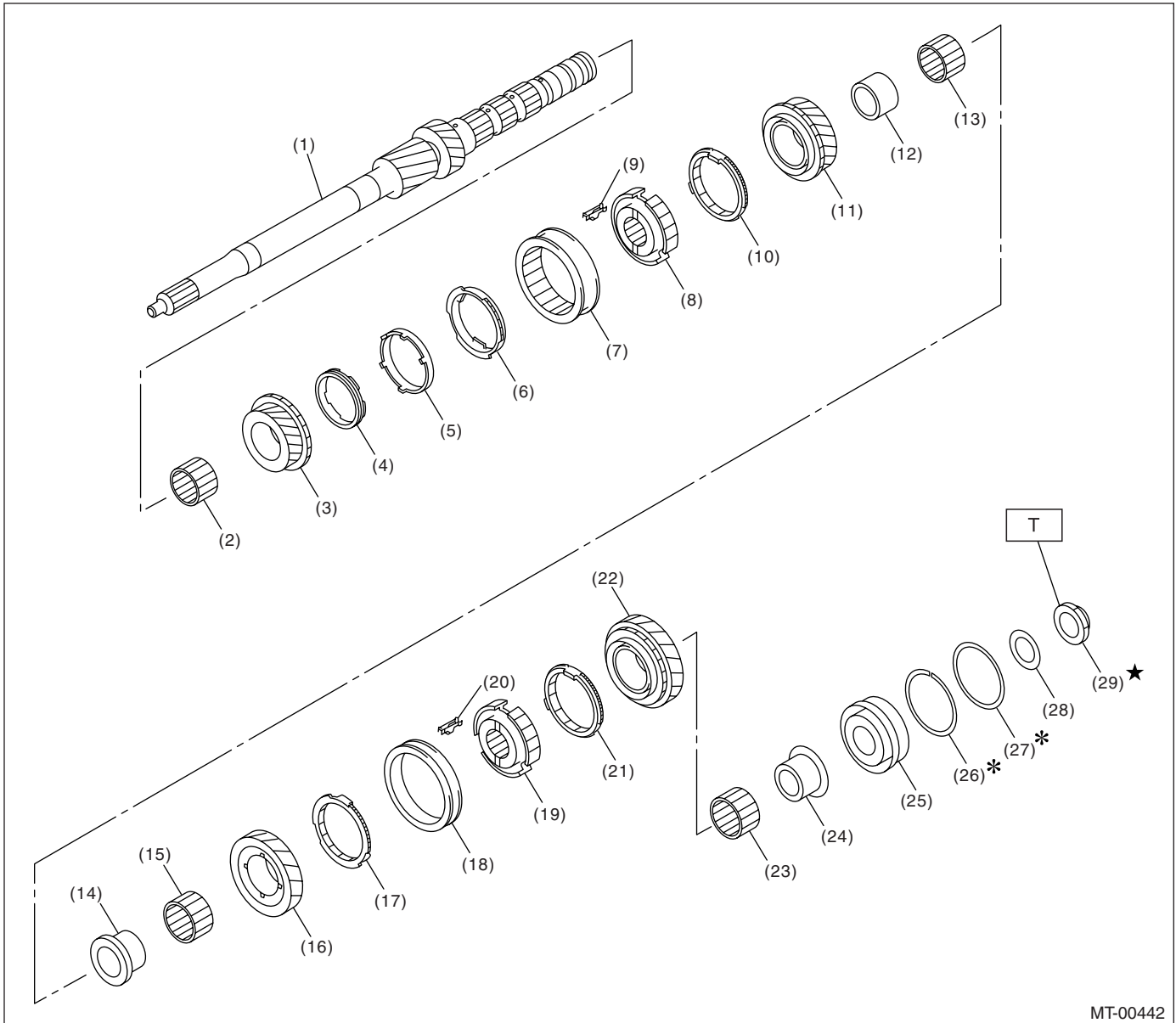
MT-00980

(1) Spring pin	(9) Support	(17) 5th-6th shifter arm
(2) Interlock arm	(10) Snap ring	(18) 5th-6th fork COMPL
(3) Interlock block	(11) Reverse fork COMPL	(19) 3rd-4th fork rod
(4) Reverse interlock block	(12) Reverse shifter arm	(20) 3rd-4th shifter arm
(5) Interlock arm	(13) Reverse fork rod	(21) 1st-2nd shifter arm
(6) Striking rod	(14) Selector arm COMPL	(22) 3rd-4th fork COMPL
(7) Selector arm No. 2	(15) Shifter arm shaft	(23) 1st-2nd fork rod
(8) Neutral set spring	(16) 5th-6th fork rod	(24) 1st-2nd fork COMPL

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

7. MAIN SHAFT ASSEMBLY



MT-00442

(1) Main shaft	(12) 4th bushing	(23) Needle bearing
(2) Needle bearing	(13) Needle bearing	(24) 6th bushing
(3) 3rd drive gear	(14) 5th bushing	(25) Taper roller bearing
(4) Inner baulk ring	(15) Needle bearing	(26) Snap ring
(5) Synchro cone	(16) 5th drive gear	(27) Washer
(6) Outer baulk ring	(17) 5th baulk ring	(28) Washer
(7) 3rd-4th sleeve	(18) 5th-6th sleeve	(29) Lock nut
(8) 3rd-4th hub	(19) 5th-6th hub	
(9) Shifting insert key	(20) Shifting insert key	
(10) 4th baulk ring	(21) 6th baulk ring	
(11) 4th gear	(22) 6th drive gear	

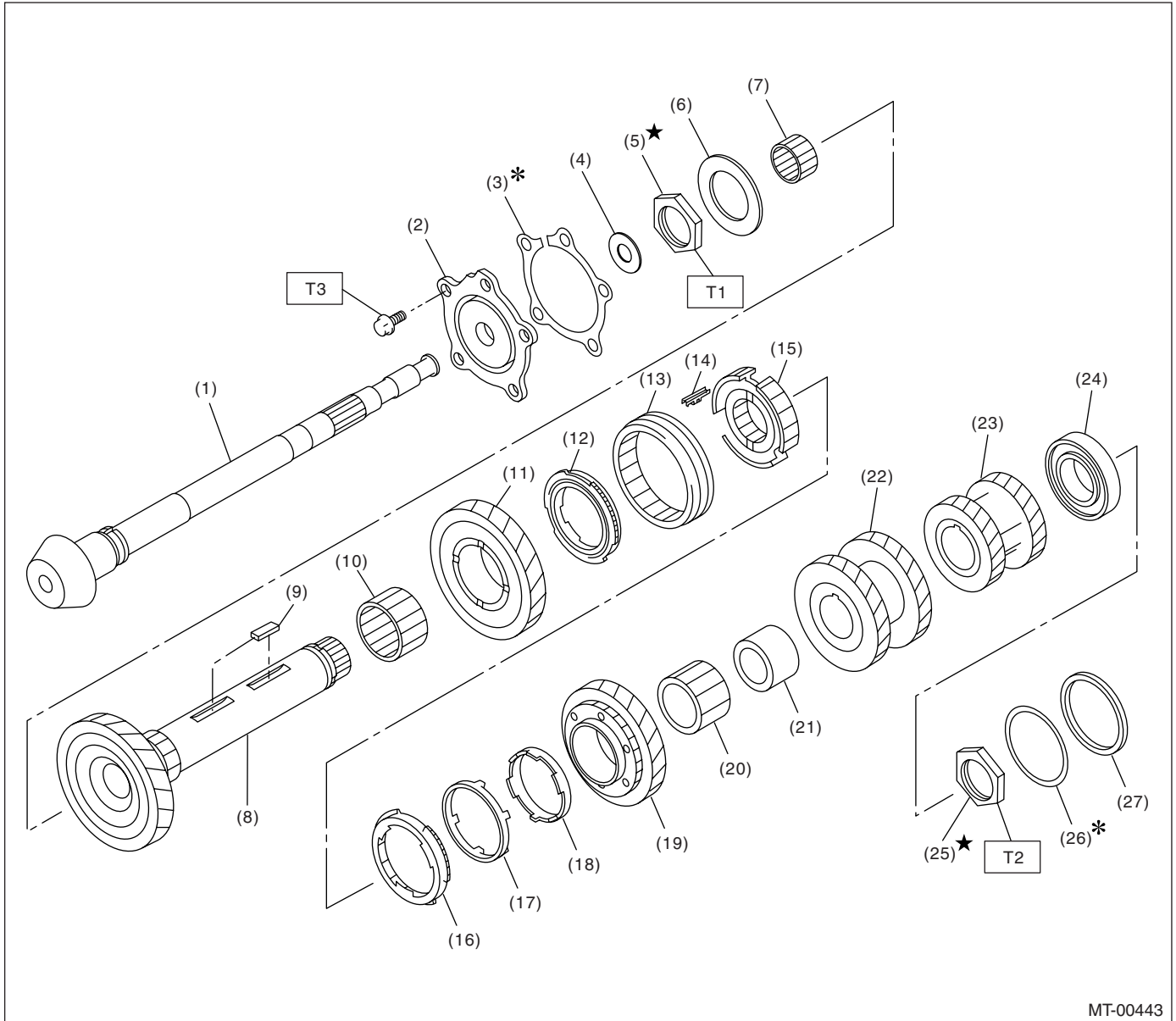
Tightening torque: N-m (kgf-m, ft-lb)

T: 392 (40.0, 289)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

8. DRIVE PINION AND DRIVEN SHAFT ASSEMBLY



- (1) Drive pinion shaft
- (2) Taper roller bearing
- (3) Shim
- (4) Washer
- (5) Lock nut
- (6) Thrust bearing
- (7) Needle bearing
- (8) Driven shaft
- (9) Key
- (10) Needle bearing
- (11) 1st driven gear
- (12) 1st synchro ring ASSY

- (13) 1st-2nd sleeve
- (14) Shifting insert key
- (15) 1st-2nd hub
- (16) Outer baulk ring
- (17) Synchro cone
- (18) Inner baulk ring
- (19) 2nd driven gear
- (20) Needle bearing
- (21) 2nd bushing
- (22) 3rd-4th driven gear
- (23) 5th-6th driven gear
- (24) Ball bearing

- (25) Lock nut
- (26) Shim
- (27) Collar

Tightening torque: N·m (kgf-m, ft-lb)

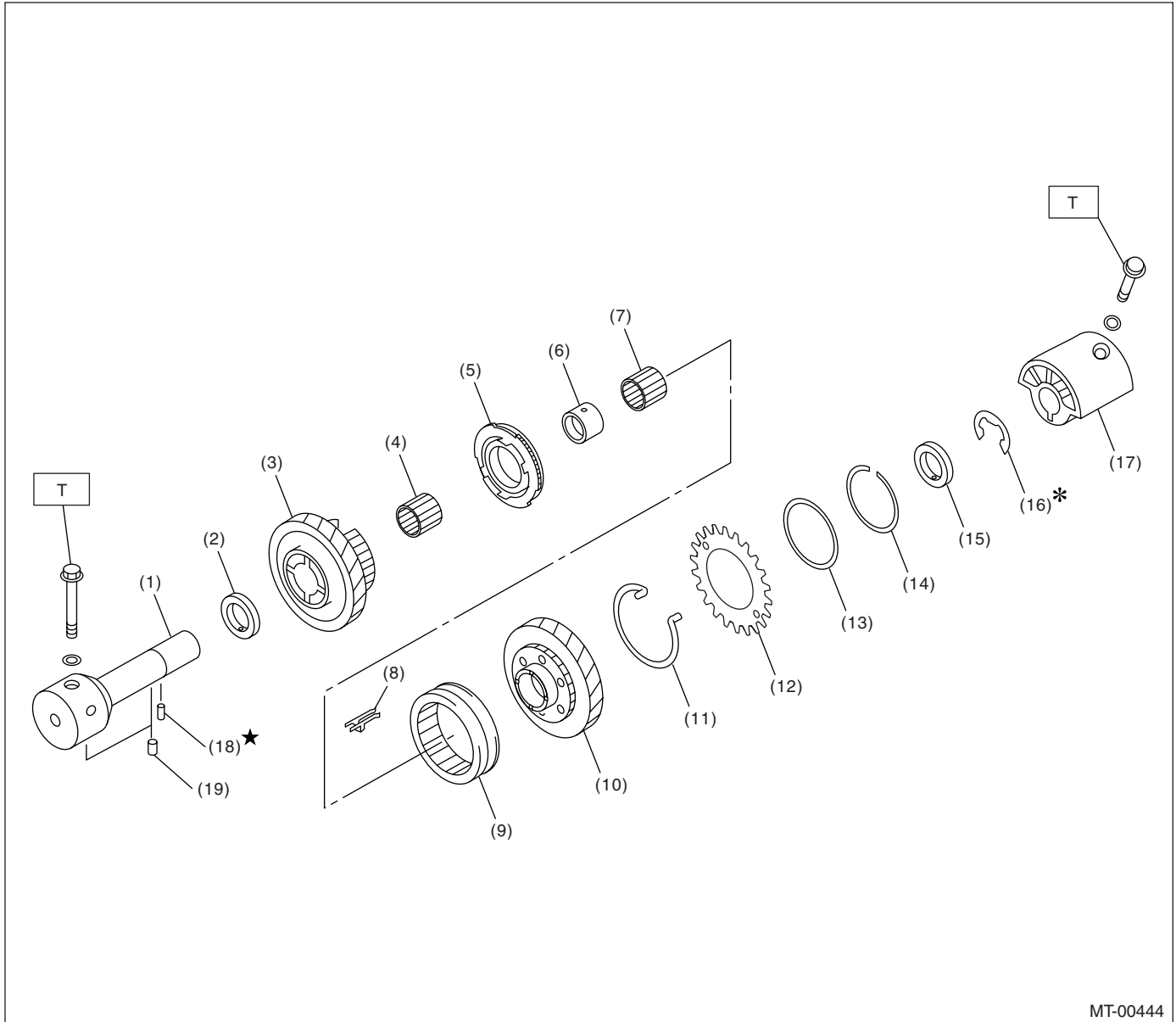
T1: 285 (29.1, 210)
*** 265 (27.0, 195)**

T2: 570 (58.1, 420)
*** 530 (54.0, 391)**

T3: 54 (5.5, 39.8)

* Tightening torque when using ST.

9. REVERSE IDLER GEAR ASSEMBLY



MT-00444

(1) Base	(9) Reverse coupling sleeve	(17) Reverse idler holder
(2) Washer	(10) Reverse idler gear	(18) Spring pin
(3) Reverse idler gear No. 2	(11) Spring	(19) Knock pin
(4) Needle bearing	(12) Sub gear	
(5) Reverse idler synchro set	(13) Friction plate	
(6) Reverse idler gear bushing	(14) Snap ring	
(7) Needle bearing	(15) Washer	
(8) Shifting insert key	(16) Snap ring	

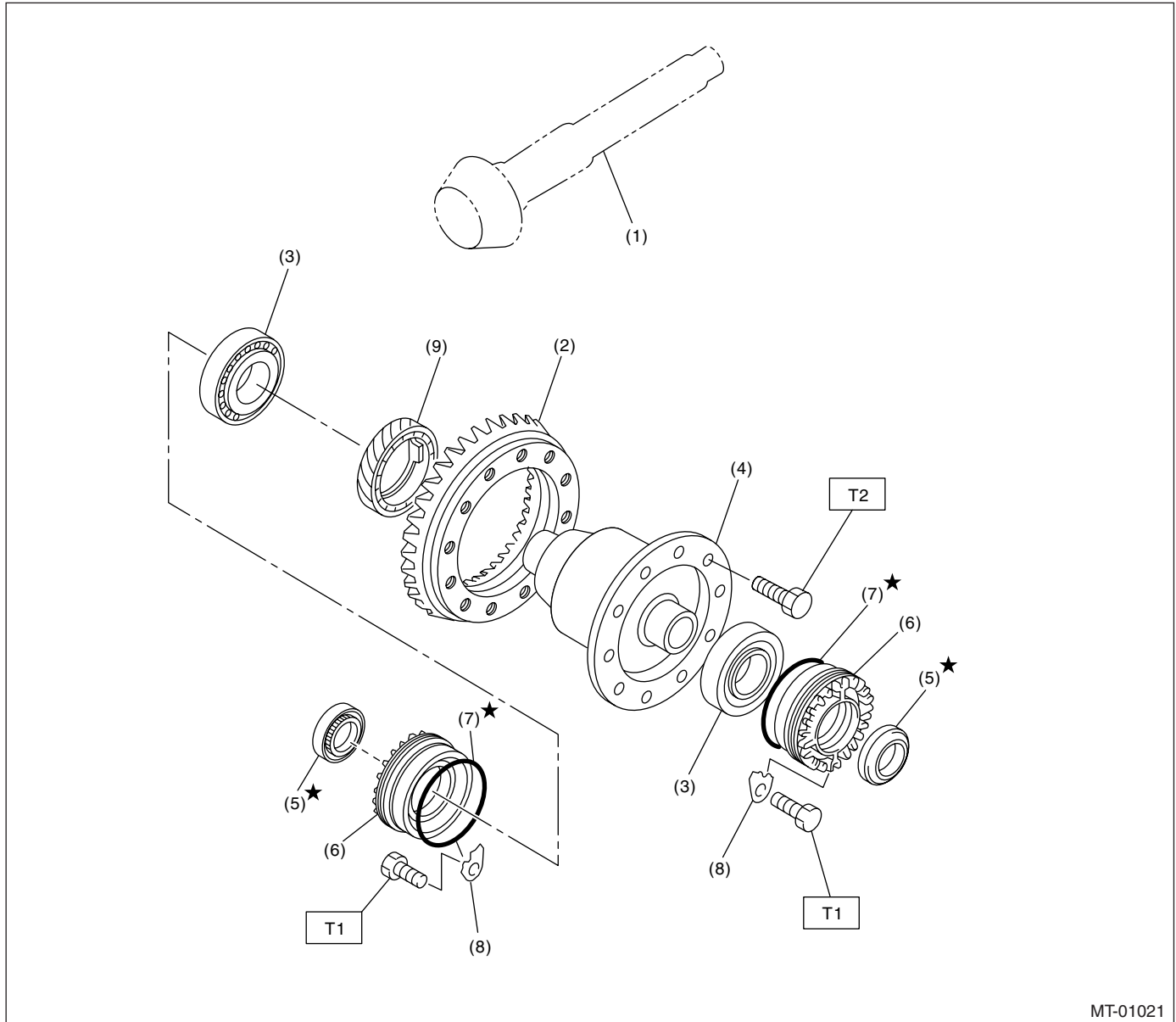
Tightening torque: N·m (kgf-m, ft-lb)

T: 25 (2.5, 18.1)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

10.FRONT DIFFERENTIAL



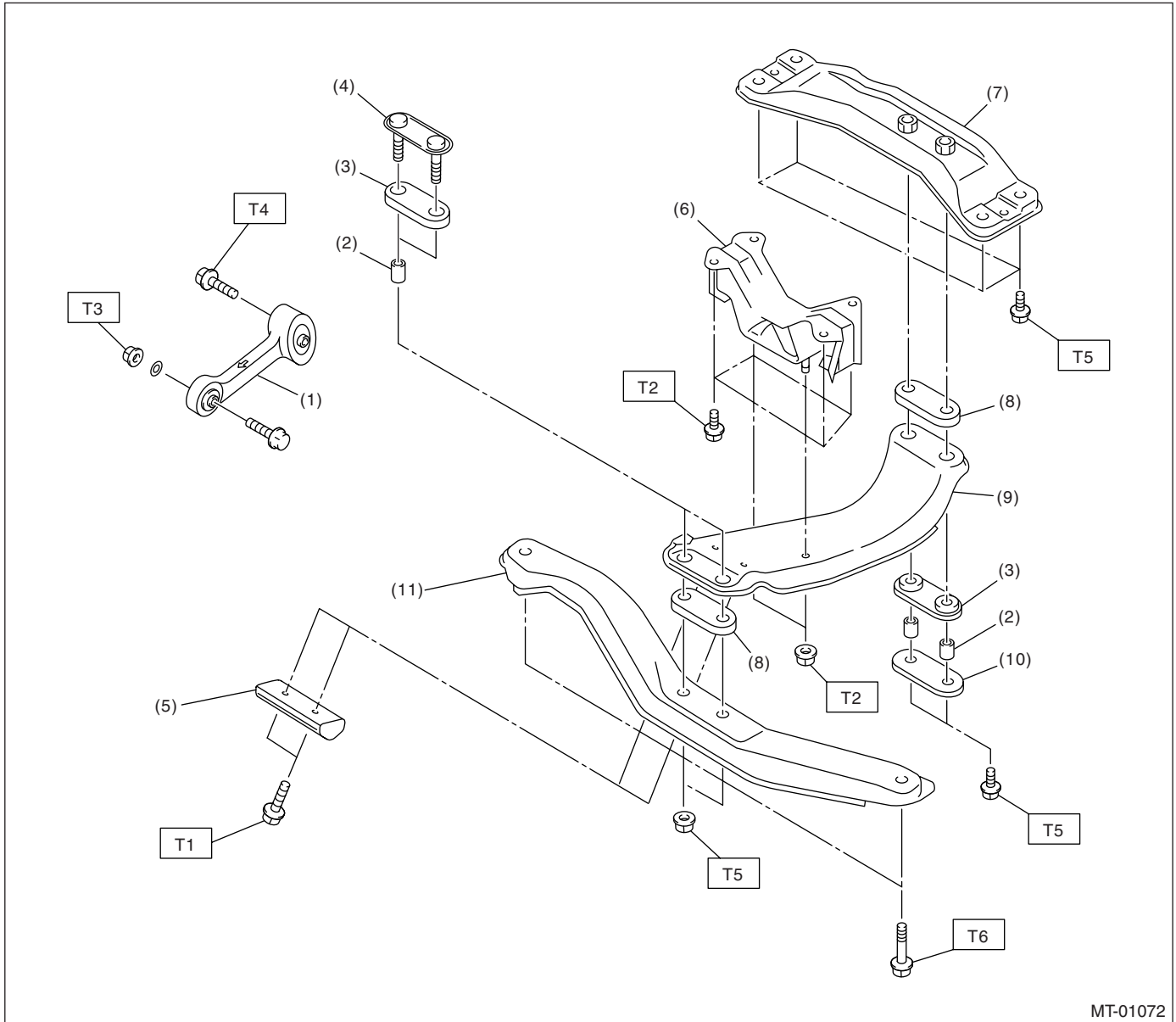
(1) Drive pinion shaft	(6) Differential side retainer
(2) Hypoid driven gear	(7) O-ring
(3) Roller bearing	(8) Retainer lock plate
(4) Differential ASSY	(9) Speedometer drive gear
(5) Oil seal	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.1)

T2: 69 (7.0, 50.9)

11.TRANSMISSION MOUNTING



MT-01072

(1) Pitching stopper	(7) Rear crossmember
(2) Spacer	(8) Cushion D
(3) Cushion C	(9) Center crossmember
(4) Front plate	(10) Rear plate
(5) Dynamic damper	(11) Front crossmember
(6) Rear cushion rubber	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.76, 5.5)

T2: 35 (3.6, 25.8)

T3: 50 (5.1, 36.9)

T4: 58 (5.9, 42.8)

T5: 70 (7.1, 51.6)

T6: 140 (14.3, 103)

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

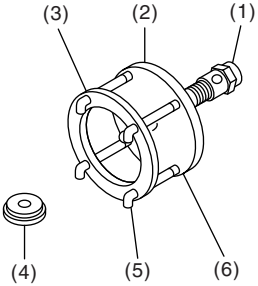
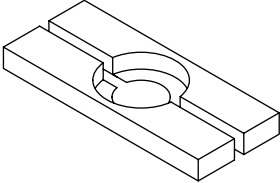
C: CAUTION

- Wear work 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 and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn yourself, 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 rigid racks 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 vise, place cushioning material such as wood blocks, aluminum plate or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

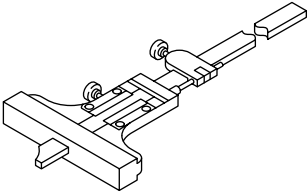
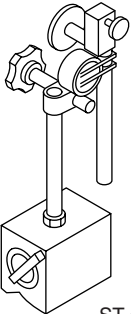
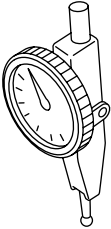
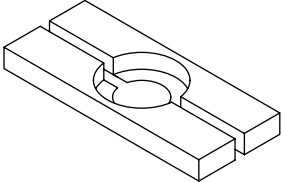
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399527700	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (2) PULLER (3) HOLDER (4) ADAPTER (5) BOLT (6) NUT
 ST-498515700	498515700	REMOVER	Used for removing roller bearing of drive pinion shaft.

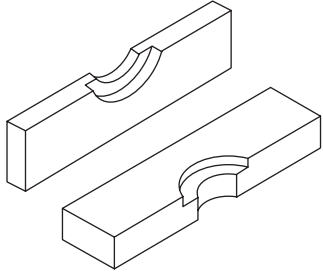
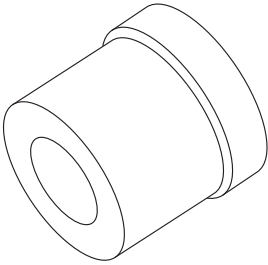
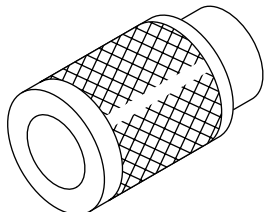
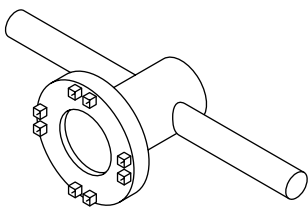
General Description

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-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.

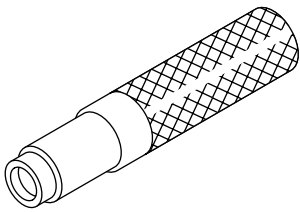
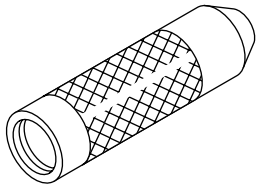
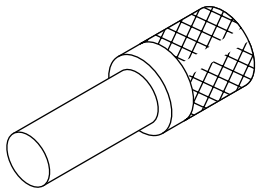
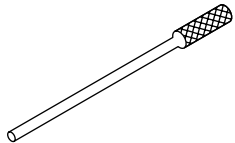
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899858600	899858600	REMOVER	Used for removing roller bearing.
 ST-399513600	399513600	INSTALLER	Used for installing oil seal.
 ST-499757002	499757002	INSTALLER	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.

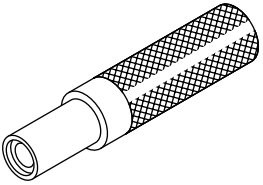
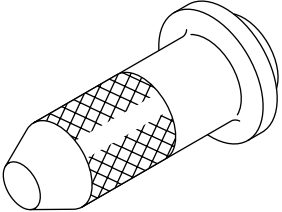
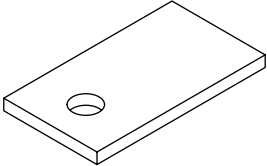
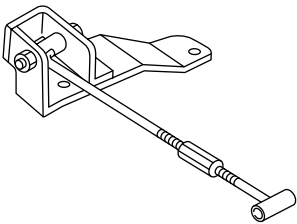
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499827000	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 ST-499877000	499877000	RACE 4-5 INSTALLER	Used for disassembling driven shaft and transfer driven gear.
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.

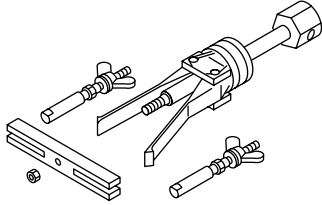
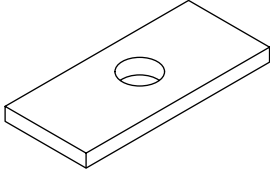
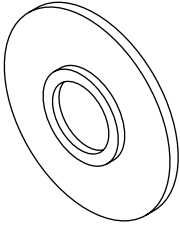
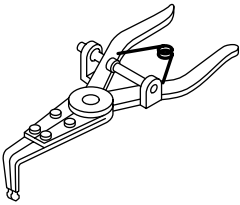
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899824100	899824100	PRESS	Used for installing speedometer shaft oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.
 ST41099AC000	41099AC000	ENGINE SUPPORT	Used for supporting engine.

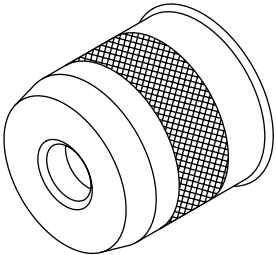
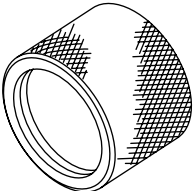
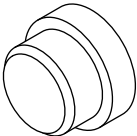
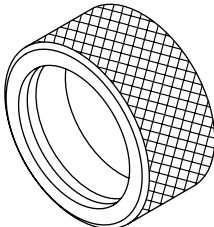
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398527700	398527700	PULLER ASSY	Used for removing extension case oil seal and clutch housing oil seal.
 ST-499575500	499575500	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-398177700	398177700	INSTALLER	Used for assembling main shaft.
 ST-399893600	399893600	PLIERS	- Used for removing and installing neutral set spring. - Used with CLAW (18756AA000).

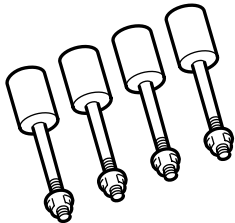
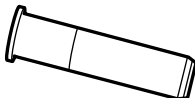
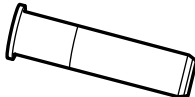
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499247400	499247400	INSTALLER	Used for installing transfer drive gear ball bearing.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST-398497701	398497701	SEAT	Used for installing transfer drive gear ball bearing.
 ST-398437700	398437700	INSTALLER	Used for installing front differential side bearing.

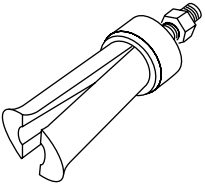
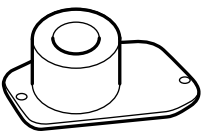
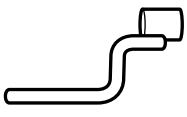
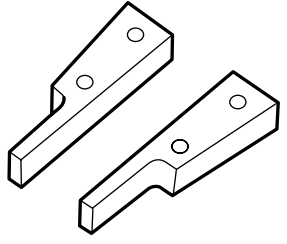
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18632AA000	18632AA000	STAND ASSY	Used for disassembling and assembling transmission.
 ST18671AA000	18671AA000	OIL SEAL GUIDE	- Used for installing oil seal to reverse check. - Used with INSTALLER (18657AA010).
 ST18657AA010	18657AA010	INSTALLER	- Used for installing oil seal to reverse check. - Used with OIL SEAL GUIDE (18671AA000).
 ST18657AA000	18657AA000	INSTALLER	Used for installing oil seal to shift rod.

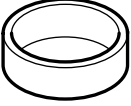
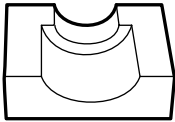
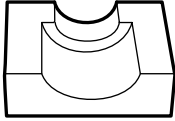
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18758AA000	18758AA000	PULLER	Used for removing extension taper roller bearing outer race.
 ST18831AA000	18831AA000	GAUGE	Used for measuring extension taper roller bearing.
 ST18631AA000	18631AA000	HANDLE	Used for measuring front differential backlash.
 ST18756AA000	18756AA000	CLAW	• Used for installing and removing neutral set spring. • Used with PLIERS (399893600).

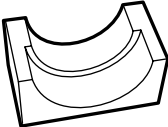
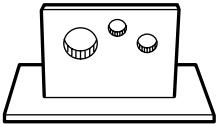
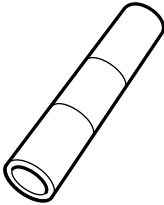
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18754AA000	18754AA000	REMOVER	Used for removing each parts of driven gear.
 ST18757AA000	18757AA000	STRAIGHT PIN REMOVER	Used for installing reverse idler gear.
 ST18665AA000	18665AA000	HOLDER	- Used for installing and removing main shaft lock nut. - Used with BASE (18664AA000).
 ST18666AA000	18666AA000	HOLDER	- Used for installing and removing driven shaft lock nut. - Used with BASE (18664AA000).

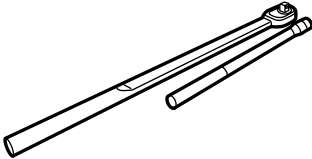
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18667AA000	18667AA000	HOLDER	- Used for installing and removing drive pinion shaft lock nut. - Used with BASE (18664AA000).
 ST18664AA000	18664AA000	BASE	- Used for installing and removing main shaft lock nut. - Used for installing and removing drive pinion shaft lock nut. - Used for installing and removing driven shaft lock nut.
 ST18722AA010	18722AA010	REMOVER	Used for disassembling main shaft.
 ST18651AA000	18651AA000	INSTALLER	Used for assembling main shaft.

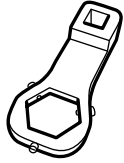
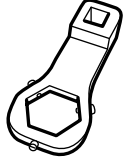
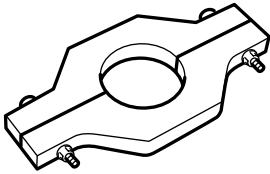
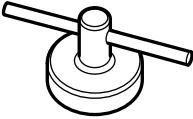
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18852AA000	18852AA000	TORQUE WRENCH	- Used for tightening main shaft lock nut. - Used for tightening drive pinion shaft lock nut. - Used for tightening driven shaft lock nut.
 ST18668AA000	18668AA000	PUNCH	Used for caulking main shaft lock nut.
 ST18669AA000	18669AA000	PUNCH	Used for caulking driven shaft lock nut.
 ST18670AA000	18670AA000	PUNCH	Used for caulking drive pinion shaft lock nut.

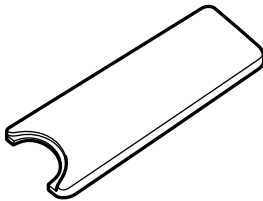
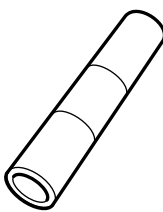
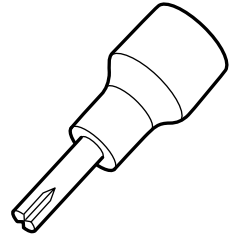
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18620AA000	18620AA000	ADAPTER WRENCH	Used for installing and removing driven gear shaft lock nut.
 ST18621AA000	18621AA000	ADAPTER WRENCH	Used for installing and removing drive pinion shaft lock nut.
 ST18723AA000	18723AA000	REMOVER	Used for disassembling the driven shaft.
 ST18630AA000	18630AA000	WRENCH ASSY	Used for removing and installing differential side retainer (left side).

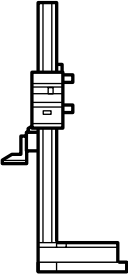
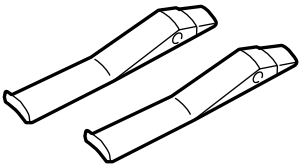
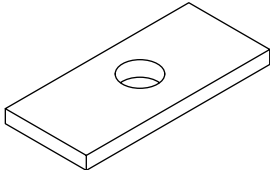
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18672AA000	18672AA000	GUIDE CLIP	Used for installing reverse idler gear snap ring.
 ST18720AA000	18720AA000	REMOVER	Used for disassembling main shaft.
 ST18654AA000	18654AA000	INSTALLER	Used for assembling driven shaft.
 ST18663AA000	18663AA000	SOCKET	Used for installing and removing oil pump cover.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18853AA000	18853AA000	HEIGHT GAUGE	Used for selecting shift rod.
 ST18760AA000	18760AA000	CLAW	• Used for removing front side retainer bearing outer race. • Used with PULLER ASSY (398527700).
 ST-398643600	398643600	GAUGE	Used for measuring drive pinion height.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Bar	Used for extracting drive shaft.

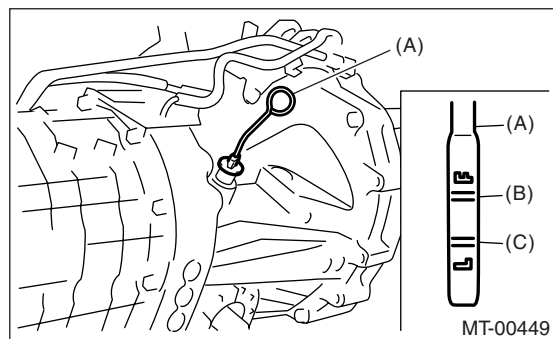
Transmission Gear Oil

MANUAL TRANSMISSION AND DIFFERENTIAL

2. Transmission Gear Oil

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Turn the ignition switch to OFF, and wait until the engine cools.
- 3) Remove the oil level gauge and wipe it clean.
- 4) Reinsert the 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 the oil level gauge.
- 2) Lift-up the vehicle.
- 3) Remove the transmission under cover.
- 4) Drain the transmission gear oil completely.

CAUTION:

Directly after the engine has been 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.
- Use a new gasket.

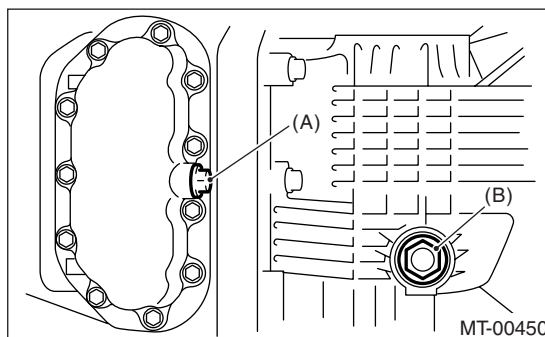
Tightening torque:

Oil pan side

44 N·m (4.5 kgf-m, 32.5 ft-lb)

Clutch housing side

70 N·m (7.1 kgf-m, 51.6 ft-lb)



- (A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

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

Recommended gear oil:

Use GL-5 or equivalent.

Gear oil capacity:

4.1 ℓ (4.3 US qt, 3.6 Imp qt)

- 7) Check the level of the transmission gear oil.

NOTE:

- 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.
- The gear oil level should be within the specified range marked on the level gauge.

Oil Seal

MANUAL TRANSMISSION AND DIFFERENTIAL

3. 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.
- Use a new gasket.

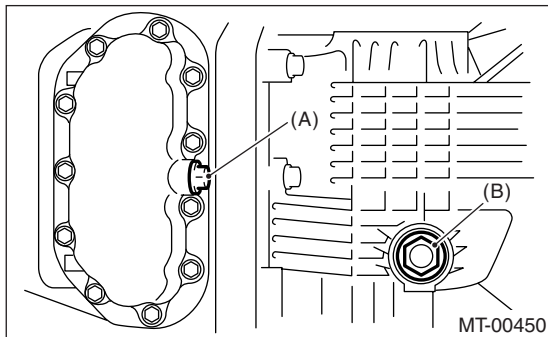
Tightening torque:

Oil pan side

44 N·m (4.5 kgf-m, 32.5 ft-lb)

Clutch housing side

70 N·m (7.1 kgf-m, 51.6 ft-lb)

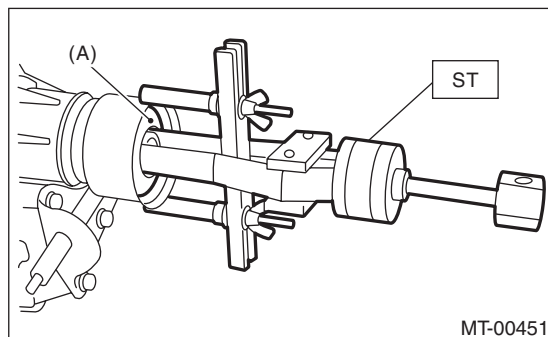


(A) Drain plug (Oil pan side)

(B) Drain plug (Clutch housing side)

- 3) Remove the rear exhaust pipe and muffler.
- 4) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>
- 5) Using the ST, remove the oil seal.

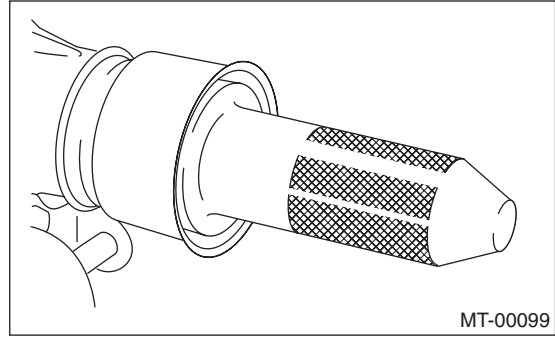
ST 398527700 PULLER ASSY



(A) Oil seal

- 6) Using the ST, install the oil seal.

ST 498057300 INSTALLER



- 7) Install the propeller shaft. <Ref. to DS-17, INSTALLATION, Propeller Shaft.>

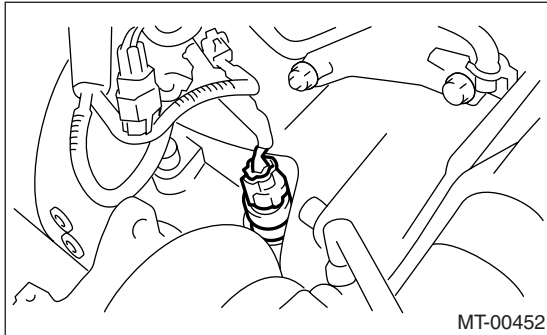
- 8) Install the rear exhaust pipe and muffler.

- 9) Pour gear oil and check the oil level. <Ref. to 6MT-29, REPLACEMENT, Transmission Gear Oil.>

4. Vehicle Speed Sensor

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the intercooler. <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 3) Disconnect the vehicle speed sensor connector.



- 4) Remove the vehicle speed sensor.

B: INSTALLATION

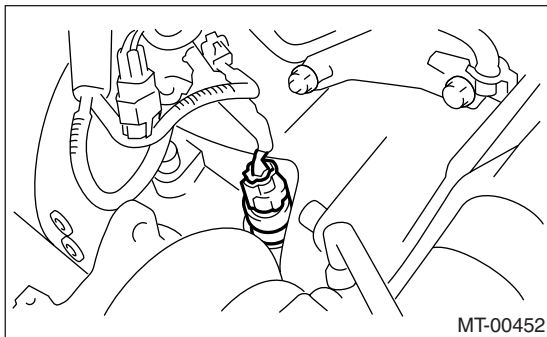
- 1) Align the tip end of vehicle speed sensor key with key groove on the end of speedometer driven gear shaft, and then install it.

Tightening torque:

5.9 N·m (0.6 kgf-m, 4.4 ft-lb)

NOTE:

- Ensure the sensor mounting hole is clean and free of foreign matter.
- Discard the vehicle speed sensor after removal, and replace it with a new one.



- 2) Connect the connector to vehicle speed sensor.
- 3) Install the intercooler. <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

C: INSPECTION

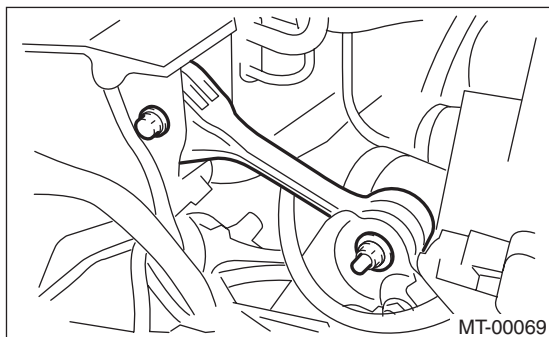
Inspect that the speedometer is normally operated, because vehicle speed sensor cannot be inspected as a single part. If it is not normally operated, inspect the combination meter system. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

5. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the intercooler. <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 3) Remove the pitching stopper.



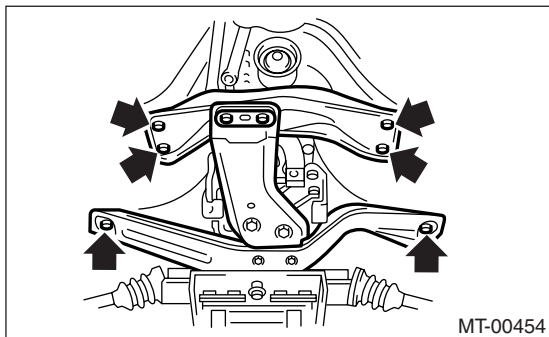
2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Jack-up the vehicle and support it with sturdy racks.
- 3) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>
- 4) Remove the rear exhaust pipe and muffler.
- 5) Set the transmission jack under the transmission body.

CAUTION:

Always support the transmission case with a transmission jack.

- 6) Remove the rear crossmember.



- 7) Remove the rear cushion rubber.

B: INSTALLATION

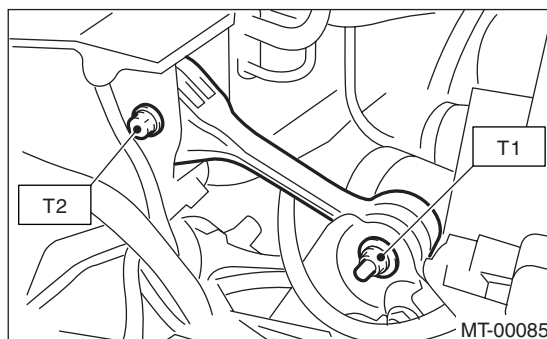
1. PITCHING STOPPER

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



- 2) Install the intercooler. <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>
- 3) Connect the battery ground cable to battery.

2. CROSSMEMBER AND CUSHION RUBBER

- 1) Install the rear cushion rubber.

Tightening torque:

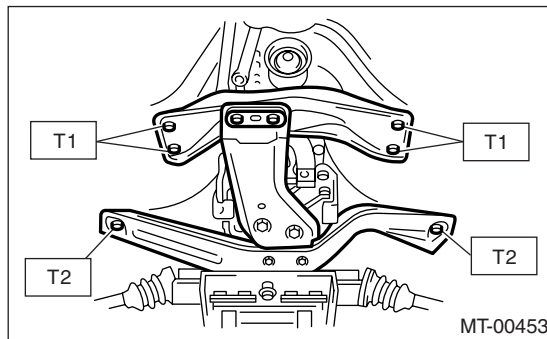
35 N·m (3.6 kgf-m, 25.8 ft-lb)

- 2) Install the crossmember.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



- 3) Remove the transmission jack.
- 4) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>
- 5) 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.

6. Manual Transmission Assembly

A: REMOVAL

1) Set the vehicle on a lift, and then open the front hood and support it with hood stay.

NOTE:

Set the hood stay to its specified hole.

2) Remove the front wheel.

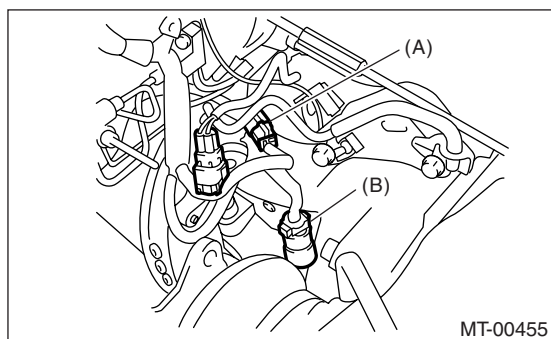
3) Disconnect the ground cable from battery.

4) Remove the intercooler assembly. <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

5) Lift-up the vehicle, and then remove the under cover.

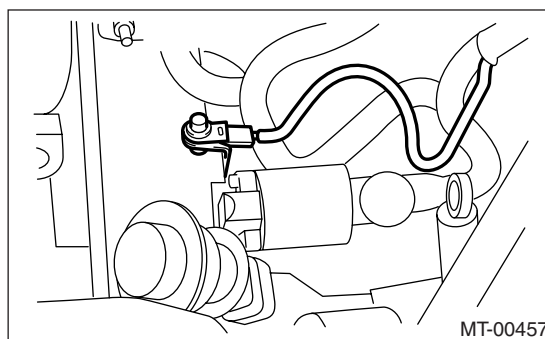
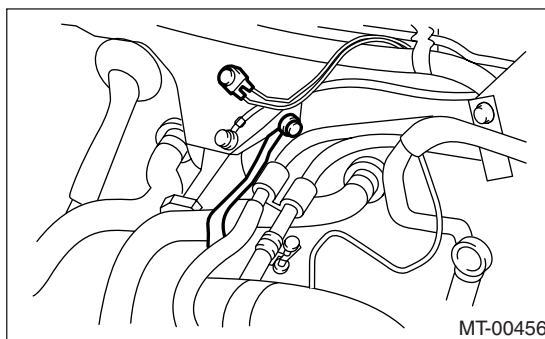
6) Remove the steering universal joint. <Ref. to PS-22, REMOVAL, Universal Joint.>

7) Lower the vehicle and disconnect the connector located on upper side of transmission.



- (A) Transmission connector
- (B) Vehicle speed sensor connector

8) Disconnect the ground cable at upper side of transmission case and body.

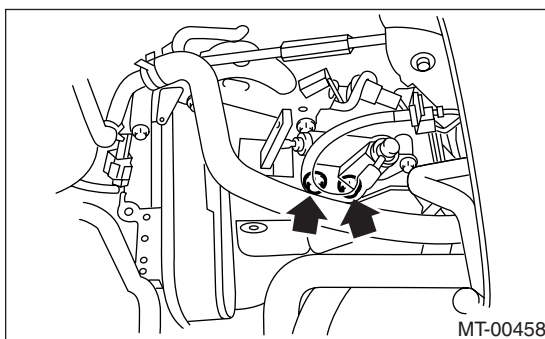


9) Remove the starter assembly. <Ref. to SC(H4SO)-8, REMOVAL, Starter.>

10) Remove the clutch operating cylinder.

NOTE:

Hang the removed operating cylinder with a wire, etc.



11) Remove the clutch release shaft.

(1) Remove the plug with hexagon wrench.

(2) Install a 6 mm bolt to the release shaft, then pull out the release shaft.

(3) Lift up the release fork, and then remove it from the release bearing claw. Pull it to the engine side and set it free.

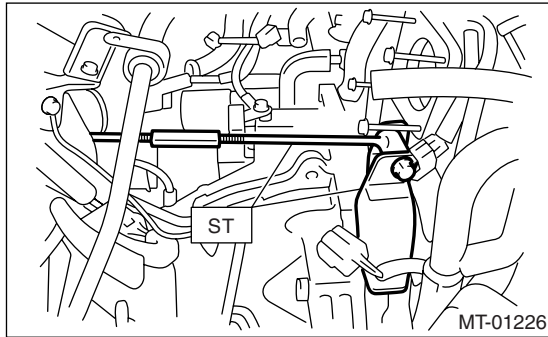
12) Remove the pitching stopper, and then remove the pitching stopper bracket.

Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

13) Set the ST.

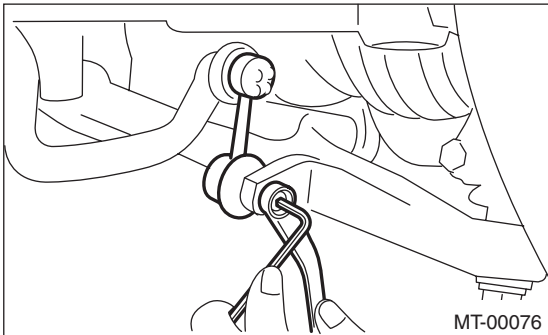
ST 41099AC000 ENGINE SUPPORT



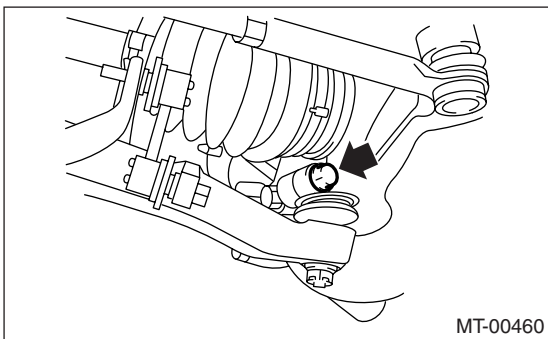
14) Remove the center and rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-8, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>

15) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>

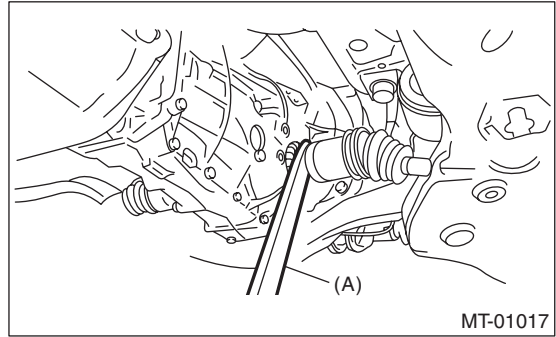
16) Remove the front stabilizer bolt.



17) Remove the ball joint of transverse link from housing.



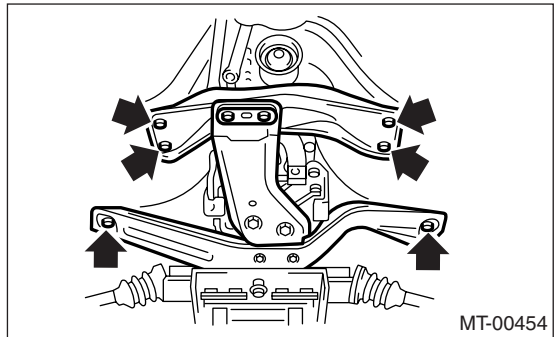
18) Using the bar, separate the drive shaft from transmission.



(A) Bar

19) Remove the front drive shaft, then take the front drive shaft.

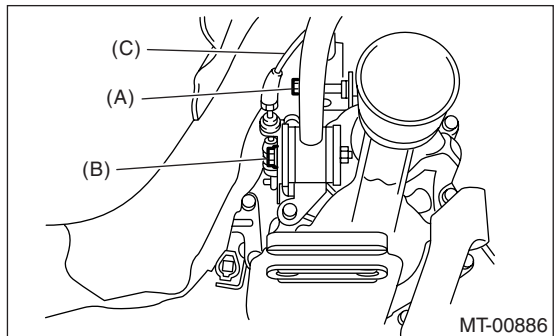
20) Set the transmission jack under the transmission, then remove the front crossmember and rear crossmember.



21) Move the transmission to right side, then remove the joint COMPL, stay bolt and reverse check cable.

NOTE:

If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.



(A) Joint COMPL bolt

(B) Stay bolt

(C) Reverse check cable

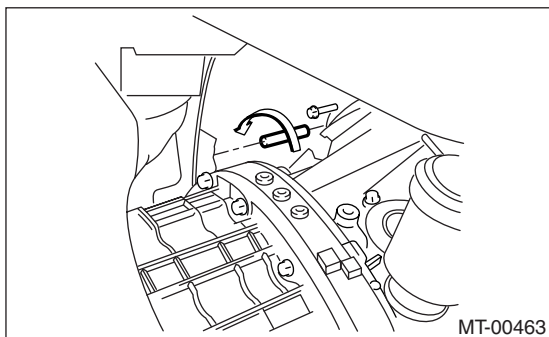
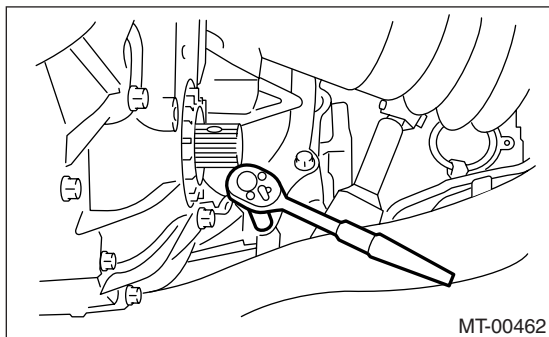
22) Remove the fixing bolt of engine and transmission, then remove the transmission from vehicle.

Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

- Rotate the ST (ENGINE SUPPORT ASSY) counterclockwise (to shorten the ST) and lower the rear side of engine to facilitate removal.
- Take care not to contact the transmission with body when pulling backward to remove.
- Remove the clutch pipe and breather pipe carefully which may interfere each other.



B: INSTALLATION

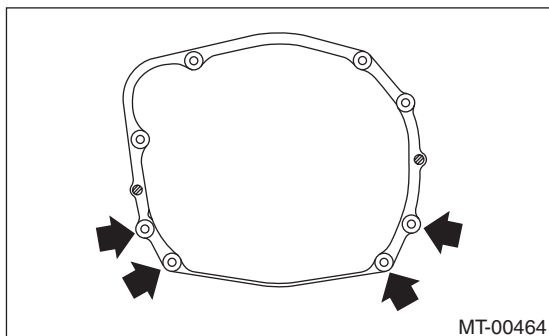
- 1) Set the release fork, release bearing and release shaft to transmission. <Ref. to CL-14, INSTALLATION, Release Bearing and Lever.>
- 2) Install the transmission.

NOTE:

- Make sure the main shaft spline part is inserted completely.
- Make sure the rear side of engine is lowered.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

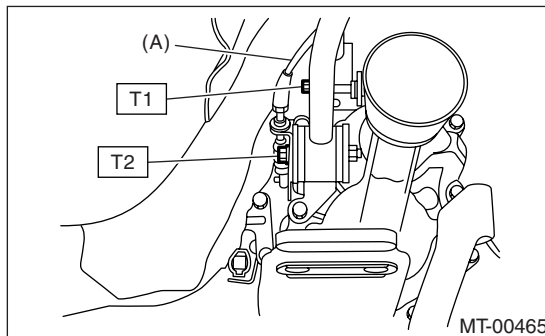


- 3) Move the transmission to the right side, then install the joint COMPL bolt, stay bolt and reverse check cable.

Tightening torque:

T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)

T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Reverse check cable

- 4) Install the front crossmember and rear crossmember.

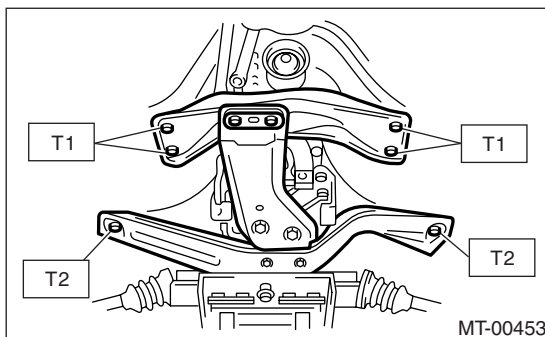
NOTE:

Rotate the ST (ENGINE SUPPORT ASSY) turn buckle clockwise (to make longer the ST) and lift up the rear side of engine to facilitate installation.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

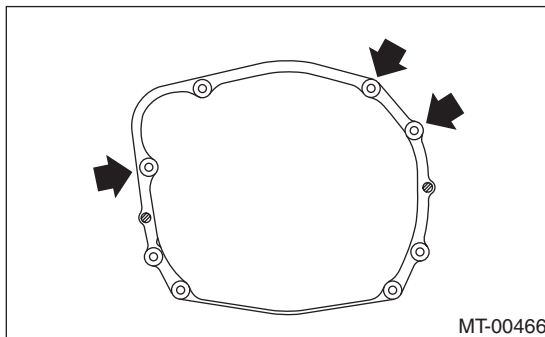
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



- 5) Lower the vehicle and install the fixing bolt.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



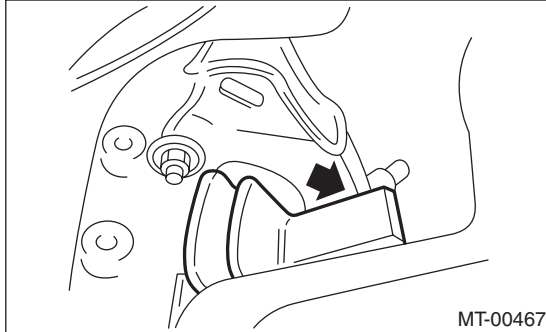
Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

6) Make sure the release bearing is installed completely.

NOTE:

- Push the release fork to operating cylinder side until you hear a “click” sound. Pull the release fork to engine side. Setting is completed if the release fork does not contact the case.
- Make sure the boot cover is firmly set.



7) Install the pitching stopper bracket.

Tightening torque:

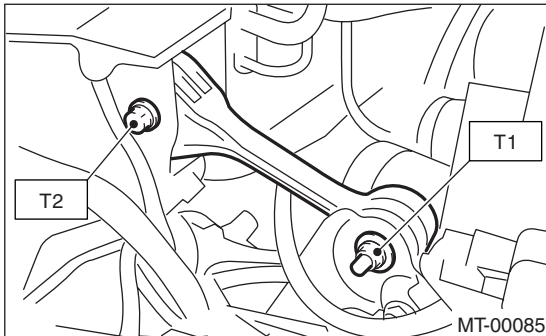
41 N·m (4.2 kgf-m, 30.2 ft-lb)

8) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



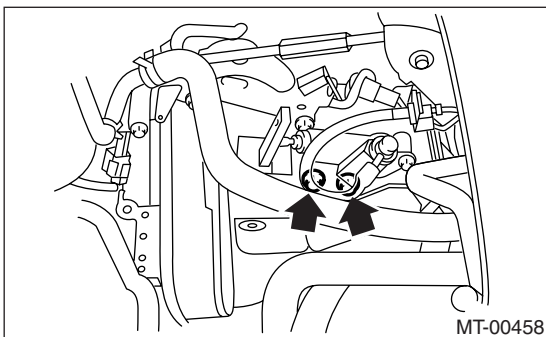
9) Install the clutch operating cylinder.

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

NOTE:

Check that the clutch hose is routed properly.

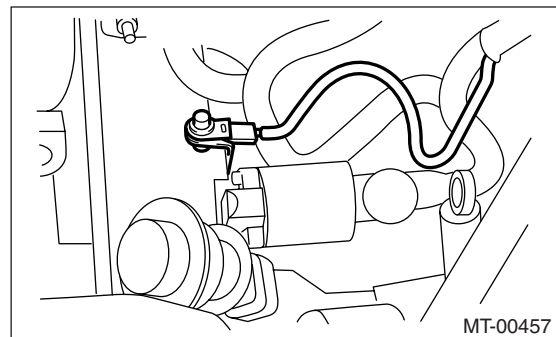
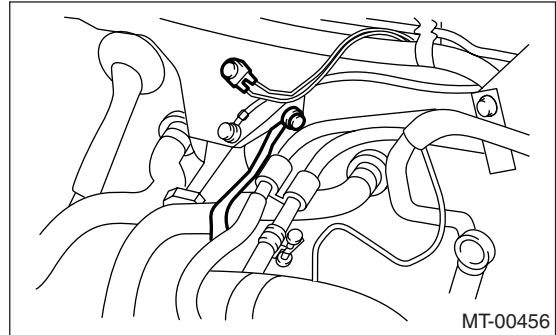


10) Install the starter assembly.

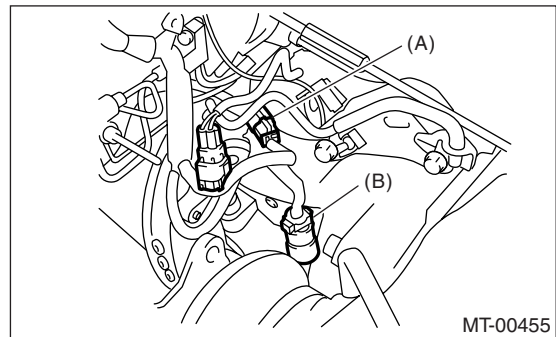
Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

11) Install the transmission and body ground cable.



12) Connect the connector located on the upper side of transmission.



(A) Transmission connector

(B) Vehicle speed sensor connector

13) Replace the front differential side retainer oil seal.

- (1) Remove the oil seal by using flat tip screwdriver and etc.
- (2) Fit a new oil seal using ST.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:

- Apply oil to the oil seal lips.
- Always replace the differential side oil seal after extracting front drive shaft from the transmission.

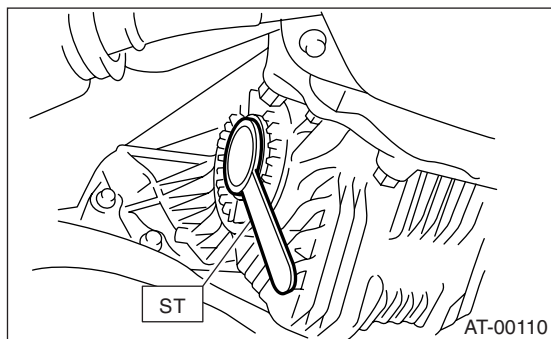
14) Apply grease to the oil seal lips.

Manual Transmission Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

15) Set the ST to the side retainer.

ST 28399SA000 OIL SEAL PROTECTOR



16) Install the front drive shaft into transmission.

NOTE:

Replace the circlip of drive shaft with a new one.

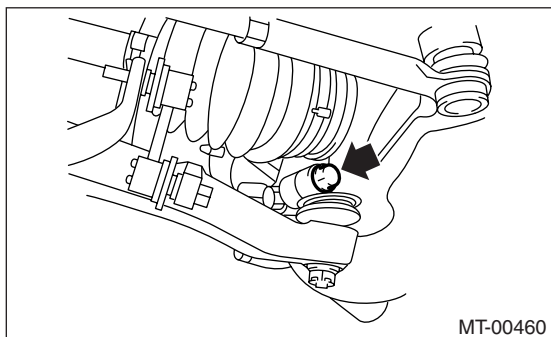
17) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.

ST 28399SA000 OIL SEAL PROTECTOR

18) Install the ball joint of transverse link to housing.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



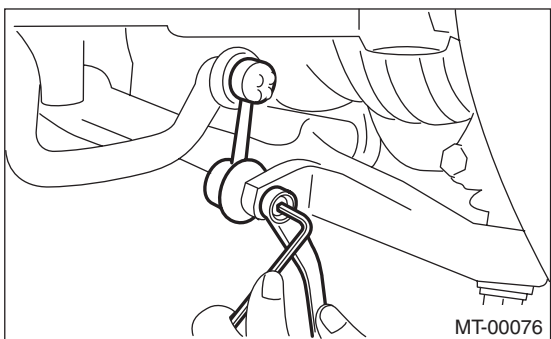
19) Install the stabilizer nut.

Tightening torque:

45 N·m (4.6 kgf-m, 33.2 ft-lb)

NOTE:

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



20) Install the propeller shaft. <Ref. to DS-17, INSTALLATION, Propeller Shaft.>

21) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-9, INSTALLATION, Center Exhaust Pipe.>

22) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

23) Install the universal joint. <Ref. to PS-22, INSTALLATION, Universal Joint.>

24) Install the under cover.

25) Install the intercooler assembly. <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

26) Connect the battery ground cable to battery.

7. Preparation for Overhaul

A: PROCEDURE

- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove the drain plug to drain oil. After draining, retighten it as before.

NOTE:

Replace the gasket with a new one.

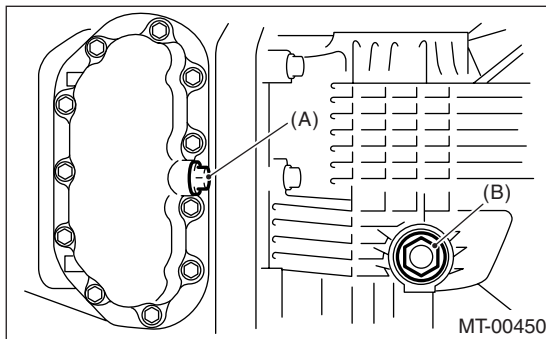
Tightening torque:

Oil pan side

44 N·m (4.5 kgf-m, 32.5 ft-lb)

Clutch housing side

70 N·m (7.1 kgf-m, 51.6 ft-lb)

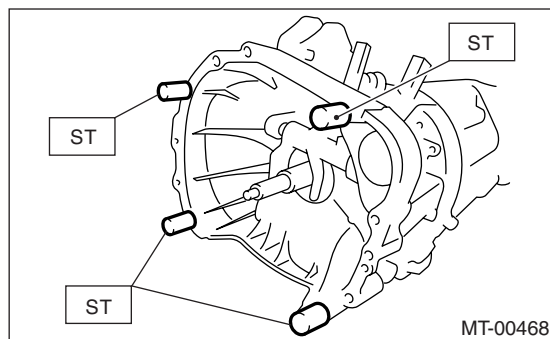


(A) Drain plug (Oil pan side)

(B) Drain plug (Clutch housing side)

- 3) Attach the transmission to ST.

ST 18632AA000 STAND ASSY



- 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.

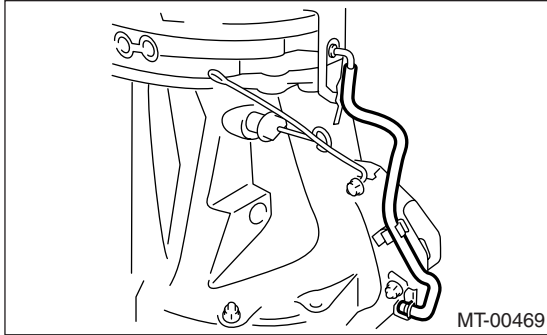
Air Breather Hose

MANUAL TRANSMISSION AND DIFFERENTIAL

8. Air Breather Hose

A: REMOVAL

Disconnect the air breather hose.

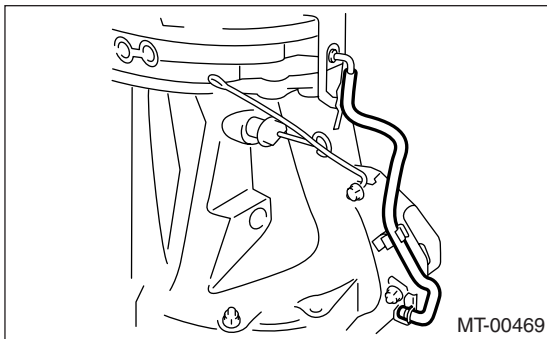


B: INSTALLATION

Install the air breather hose.

NOTE:

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



C: INSPECTION

Make sure the hose is not cracked or clogged.

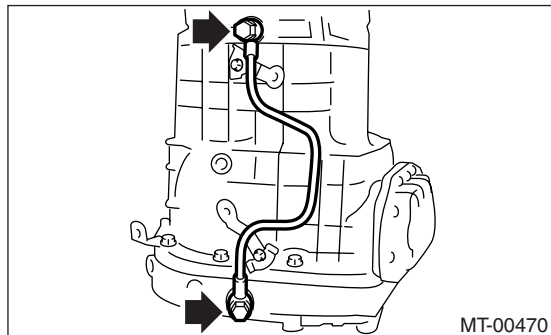
9. Oil Pipe

A: REMOVAL

Remove the oil pipe.

NOTE:

Use a new gasket.



B: INSTALLATION

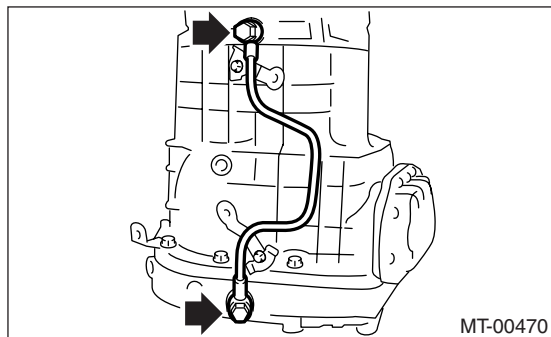
Install in the reverse order of removal.

NOTE:

Use a new gasket.

Tightening torque:

32 N·m (3.3 kgf-m, 23.6 ft-lb)



C: INSPECTION

- 1) Make sure there is no damage on pipe. If there is damage, replace the pipe.
- 2) Check the joint parts of pipe for oil leakage. If there is oil leakage, replace the gasket.

Back-up Light Switch

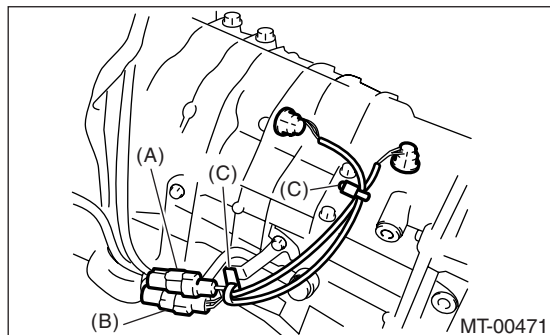
MANUAL TRANSMISSION AND DIFFERENTIAL

10. Back-up Light Switch

A: REMOVAL

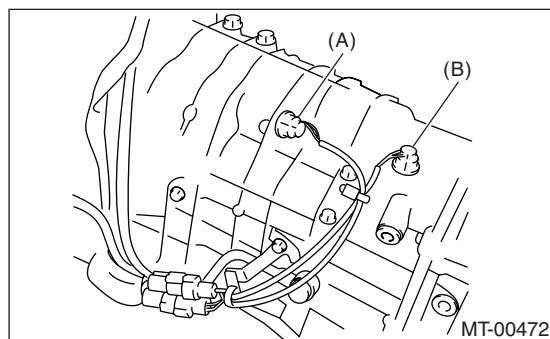
1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>

2) Disconnect the back-up light switch connector.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

3) Remove the back-up light switch.



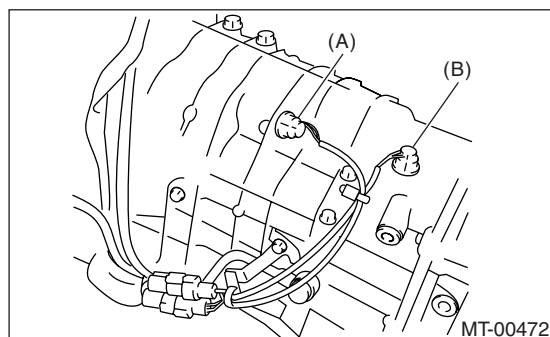
- (A) Back-up light switch
- (B) Neutral position switch

B: INSTALLATION

1) Install the back-up light switch.

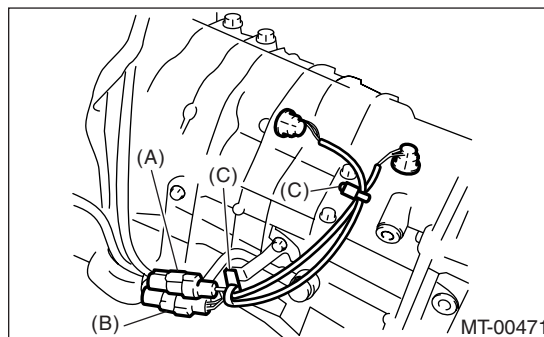
Tightening torque:

32 N·m (3.3 kgf-m, 23.6 ft-lb)



- (A) Back-up light switch
- (B) Neutral position switch

2) Connect the back-up light switch connector.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

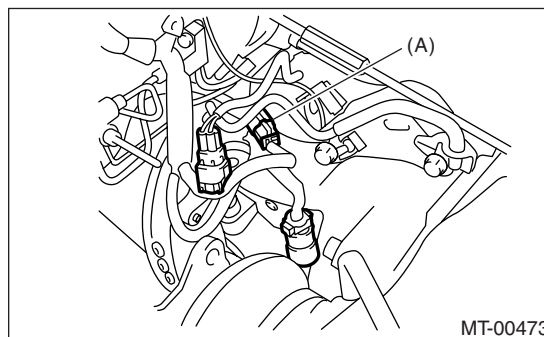
3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Disconnect the ground cable from battery.

2) Remove the intercooler. <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

3) Disconnect the transmission harness and chassis harness.



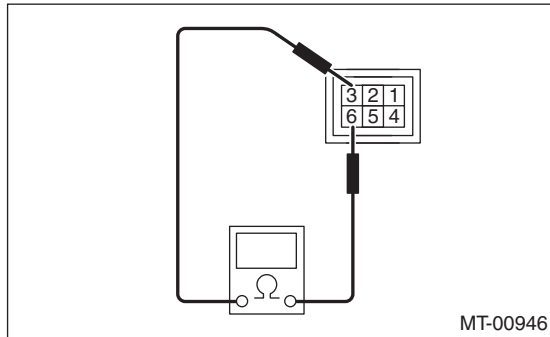
- (A) Transmission connector

4) Measure the resistance between back-up light switch terminals. If it is not within specifications, replace the back-up light switch.

Back-up Light Switch

MANUAL TRANSMISSION AND DIFFERENTIAL

Gear shift position	Terminal No.	Specified resistance
Back-up position	3 and 6	Less than 1 Ω
Other positions		More than 1 M Ω



Neutral Position Switch

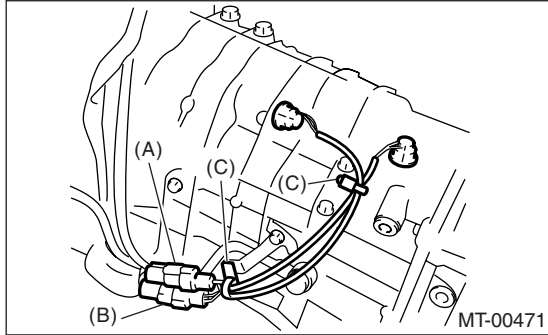
MANUAL TRANSMISSION AND DIFFERENTIAL

11. Neutral Position Switch

A: REMOVAL

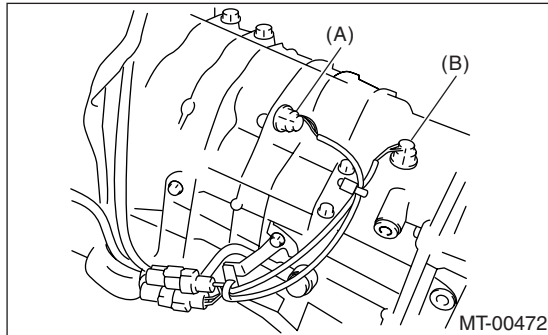
1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>

2) Disconnect the neutral position switch connector and clip.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

3) Remove the neutral position switch.



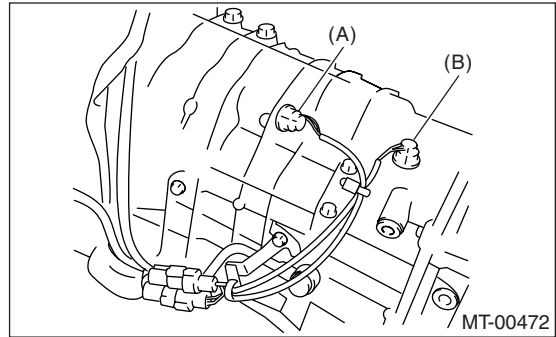
- (A) Back-up light switch
- (B) Neutral position switch

B: INSTALLATION

1) Install the neutral position switch.

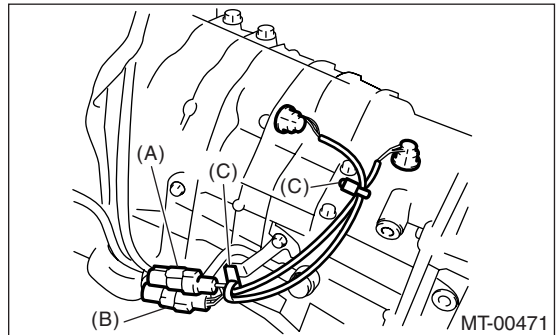
Tightening torque:

32 N·m (3.3 kgf-m, 23.6 ft-lb)



- (A) Back-up light switch
- (B) Neutral position switch

2) Connect the neutral position switch connector and clip.



- (A) Back-up light switch connector (White)
- (B) Neutral position switch connector (Black)
- (C) Clip

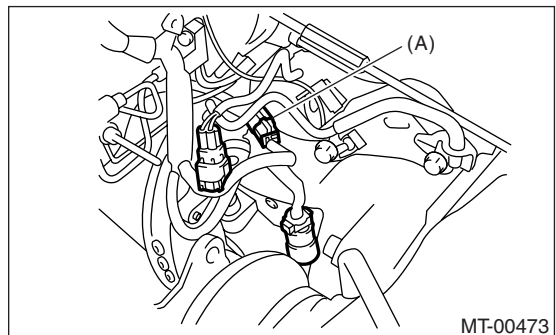
3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Disconnect the ground cable from battery.

2) Remove the intercooler. <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>

3) Disconnect the transmission harness and chassis harness.



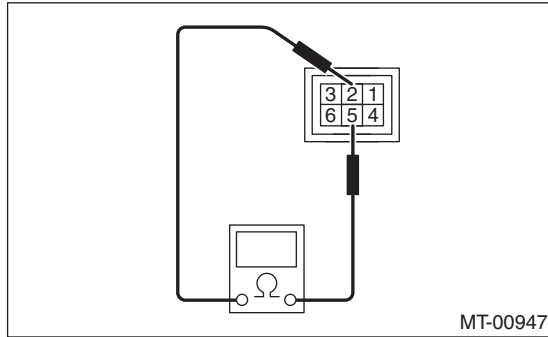
- (A) Transmission connector

Neutral Position Switch

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Measure the resistance between neutral position switch terminals. If it is not within specifications, replace the neutral position switch.

Gear shift position	Terminal No.	Specified resistance
Neutral position	2 and 5	Less than 1 Ω
Other positions		More than 1 M Ω



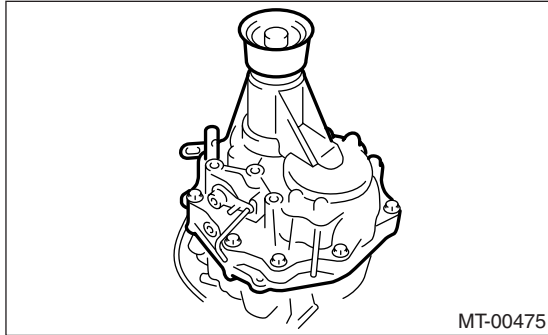
Extension Case

MANUAL TRANSMISSION AND DIFFERENTIAL

12.Extension Case

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the extension case.



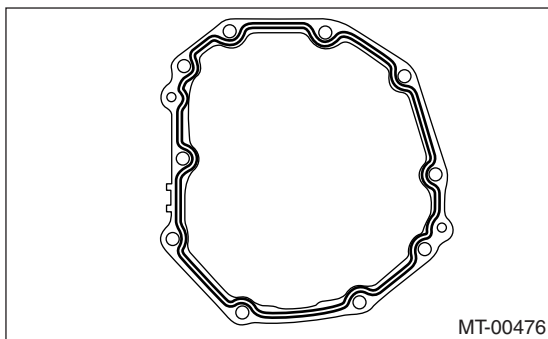
- 4) Completely remove the remaining liquid gasket from the extension case and transmission case.

B: INSTALLATION

- 1) Select the transfer driven gear thrust washer, and then install it to extension case. <Ref. to 6MT-48, ADJUSTMENT, Extension Case.>
- 2) Apply oil lightly to the outer periphery of bearing cone, and then install it to extension case.
- 3) Select the thrust washer of transfer drive gear, and then install it to center differential.
- 4) Apply liquid gasket to the transmission case.

Liquid gasket:

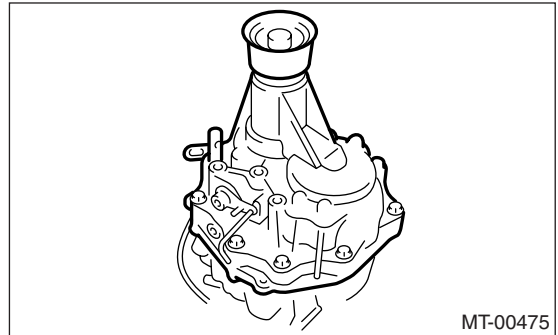
THREE BOND 1215 (Part No. 004403007)



- 5) Install the extension case.

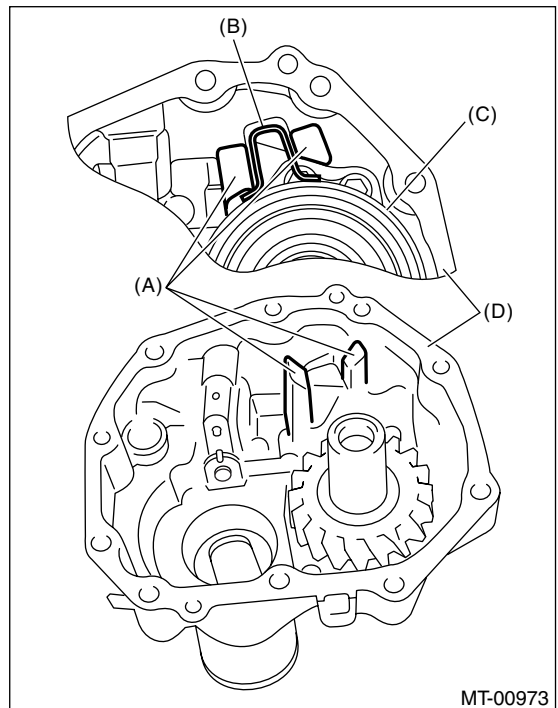
Tightening torque:

48 N·m (4.9 kgf-m, 35.4 ft-lb)



NOTE:

Insert the stopper portion of center differential between extension guides.



- (A) Extension guides
- (B) Stopper
- (C) Center differential
- (D) Extension case

- 6) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

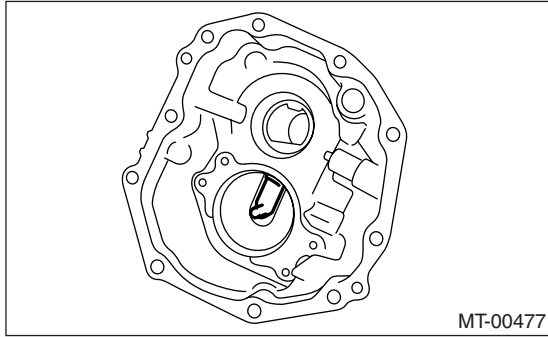
C: DISASSEMBLY

- 1) Remove the transfer drive gear. <Ref. to 6MT-55, REMOVAL, Transfer Drive Gear.>

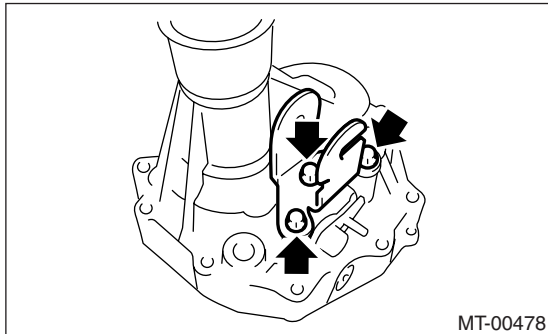
Extension Case

MANUAL TRANSMISSION AND DIFFERENTIAL

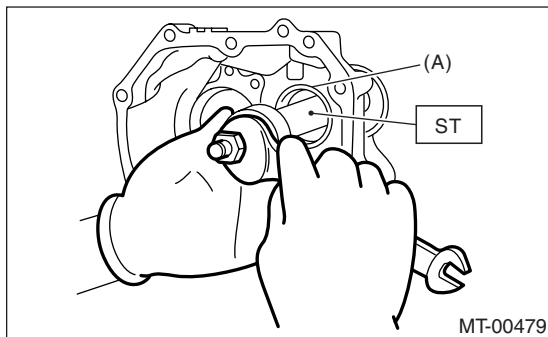
2) Remove the extension guide.



3) Remove the shift bracket.

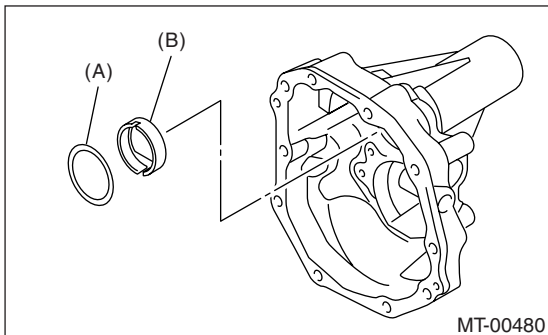


4) Using the ST, remove the bearing cone.
ST 18758AA000 PULLER



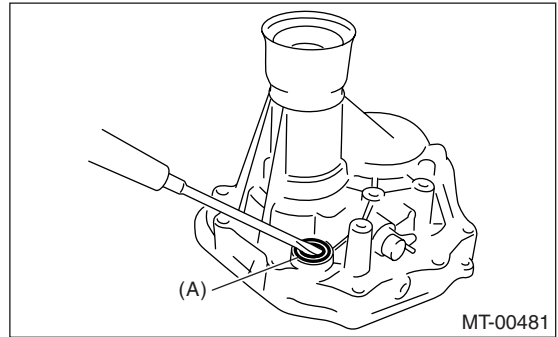
(A) Bearing cone

5) Remove the thrust washer and oil plate.



(A) Thrust washer
(B) Oil plate

6) Remove the shifter arm oil seal.



(A) Oil seal

7) Remove the reverse checking system. <Ref. to 6MT-52, REMOVAL, Reverse Check System.>

8) Remove the extension oil seal. <Ref. to 6MT-30, REPLACEMENT, Oil Seal.>

D: ASSEMBLY

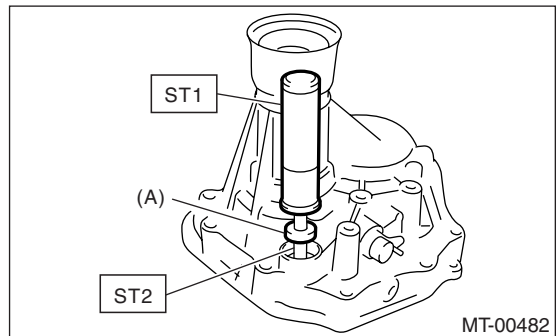
1) Install the reverse checking system. <Ref. to 6MT-52, INSTALLATION, Reverse Check System.>

2) Install the extension case oil seal. <Ref. to 6MT-30, REPLACEMENT, Oil Seal.>

3) Using the ST, install the shifter arm oil seal.

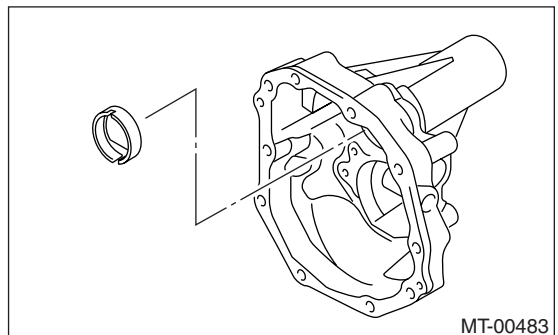
ST1 18657AA000 INSTALLER

ST2 18671AA000 OIL SEAL GUIDE



(A) Oil seal

4) Install the oil plate.



5) Select the bearing thrust washer, and then install it to extension case. <Ref. to 6MT-48, ADJUSTMENT, Extension Case.>

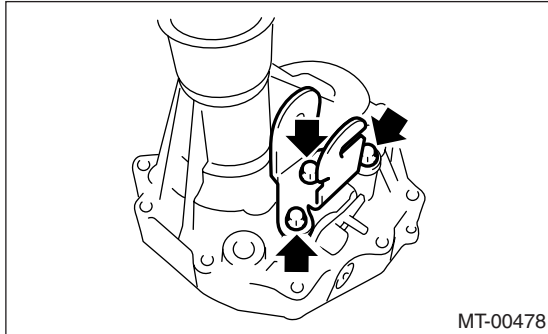
Extension Case

MANUAL TRANSMISSION AND DIFFERENTIAL

- 6) Apply oil lightly to the outer periphery of bearing cone, and then install it to extension case.
- 7) Install the shift bracket.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 8) Install the extension guide, and then install the transfer driven gear. <Ref. to 6MT-55, INSTALLATION, Transfer Drive Gear.>

E: INSPECTION

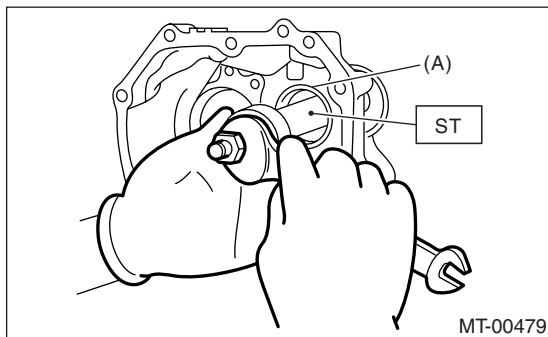
- 1) Make sure there is no damage or crack on extension case. If there is damage or crack, replace the extension case.
- 2) Check each oil seal and joint part of extension case and transmission case for oil leakage. If there is oil leakage, replace the oil seal and liquid gasket.

F: ADJUSTMENT

1. TRANSFER DRIVEN GEAR BEARING THRUST WASHER ADJUSTMENT

- 1) Using the ST, remove the bearing cone from extension case.

ST 18758AA000 PULLER

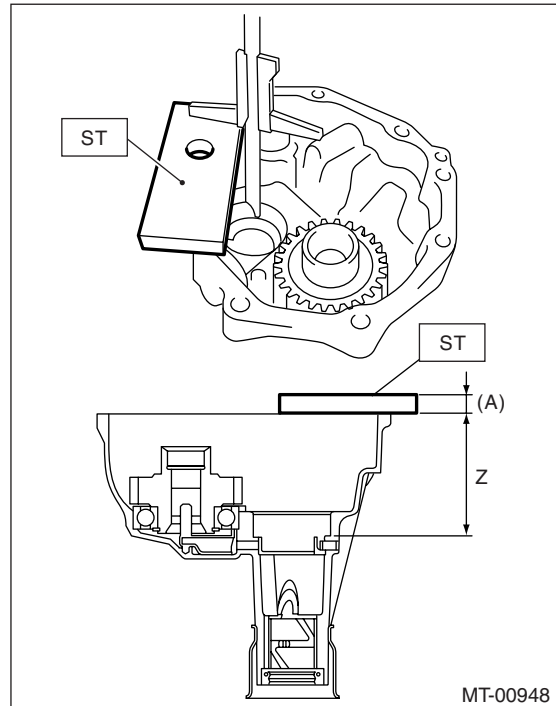


(A) Bearing cone

- 2) Remove the thrust washer.
 - 3) Measure the depth "Z" between end of extension case and contact point of bearing cone.
- ST 499575500 GAUGE

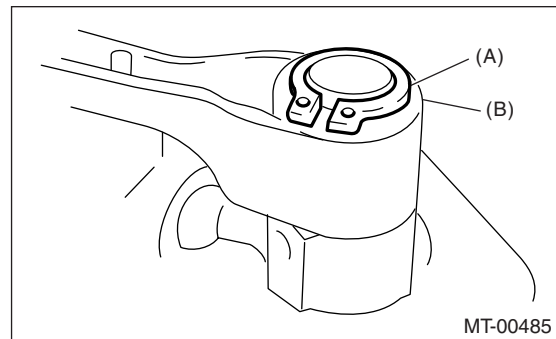
NOTE:

To measure the depth "Z", subtract the thickness of ST [15 mm (0.59 in)] from the measured value.



(A) 15 mm (0.59 in)

- 4) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 6) Remove the snap ring and support from selector arm part.



(A) Snap ring

(B) Support

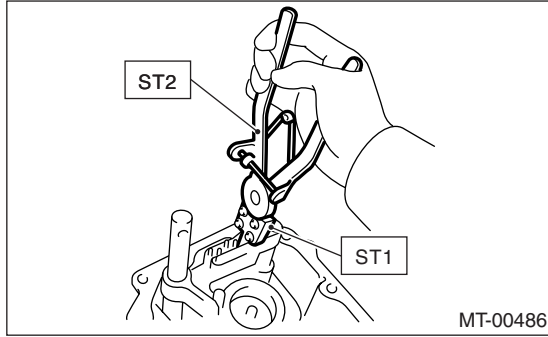
- 7) Using the ST, remove the neutral set spring and support.

ST1 18756AA000 CLAW

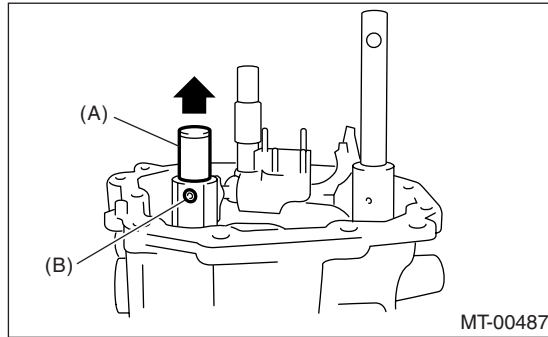
Extension Case

MANUAL TRANSMISSION AND DIFFERENTIAL

ST2 399893600 PLIERS

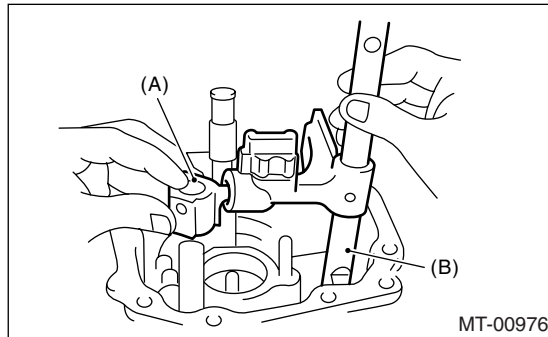


8) Lift-up the striking rod and remove the spring pin.



- (A) Striking rod
- (B) Spring pin

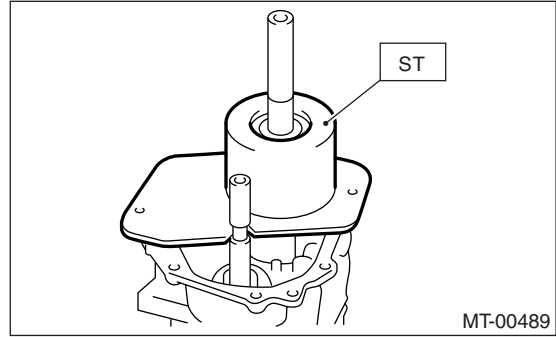
9) Remove the selector arm No. 2 and shifter arm.



- (A) Selector arm No. 2
- (B) Shifter arm

10) Install the bearing cone to transfer driven gear.
11) Set the ST.

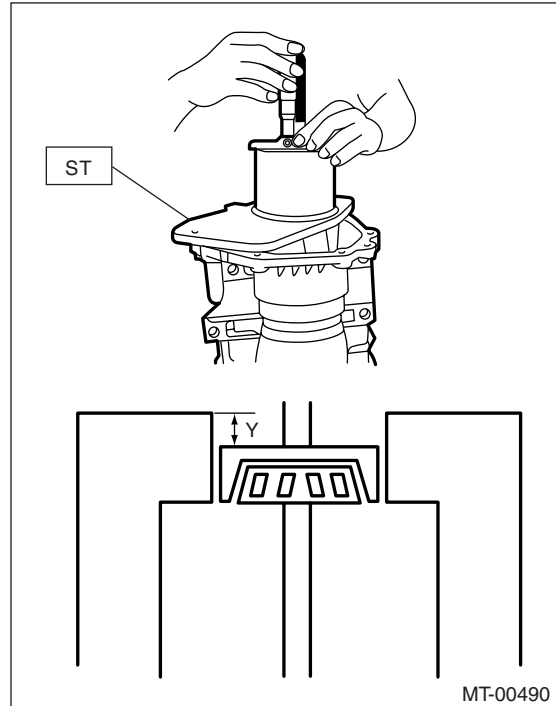
ST 18831AA000 GAUGE



12) Rotate the transfer driven gear approx. ten times to get the bearing accustomed.

13) Measure the depth "Y" between end of ST and bearing cone.

ST 18831AA000 GAUGE



14) Calculate the value "t" of transfer driven gear bearing thrust washer using the following equation.

$$t = Z - (100 - Y) - \{-0.04 \text{ to } 0.11 \text{ mm } (-0.0016 \text{ to } 0.0043 \text{ in})\}$$

t mm (in)	Thickness of transfer driven gear bearing thrust washer.
Y mm (in)	Depth from end of ST to bearing cone.
Z mm (in)	Depth from end of extension case to contact point of bearing cone.
-0.04 — 0.11 mm (-0.0016 — 0.0043 in)	Standard clearance between thrust washer and taper roller bearing.
100 mm (3.94 in)	Height of ST.

15) Select the nearest thrust washer from the following table, according to the calculated value "t".

Extension Case

MANUAL TRANSMISSION AND DIFFERENTIAL

Standard clearance between thrust washer and taper roller bearing:

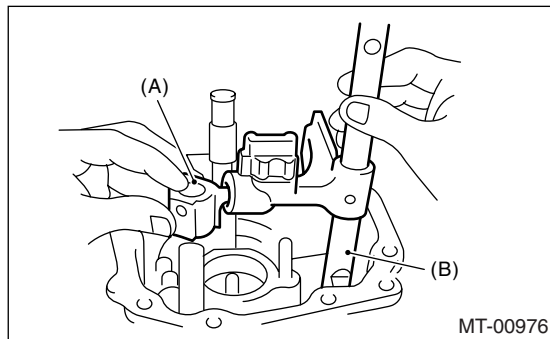
−0.04 — 0.11 mm (−0.0016 — 0.0043 in)

NOTE:

Make clearance within standard.

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050062	0.60 (0.0236)
803050064	0.70 (0.0276)
803050066	0.80 (0.0315)
803050068	0.90 (0.0354)
803050070	1.00 (0.0394)
803050072	1.10 (0.0433)
803050074	1.20 (0.0472)
803050076	1.30 (0.0512)
803050078	1.40 (0.0551)

16) Install the selector arm No. 2 and shifter arm.



(A) Selector arm No. 2

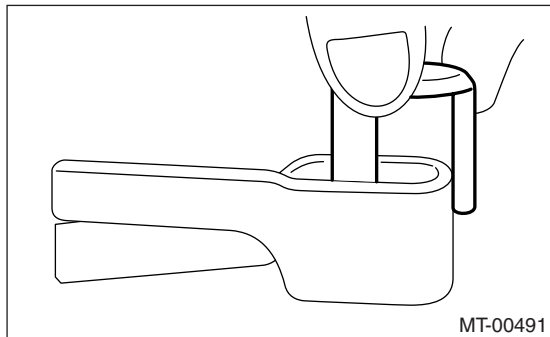
(B) Shifter arm

17) Install a new spring pin.

18) Install the support to neutral set spring.

NOTE:

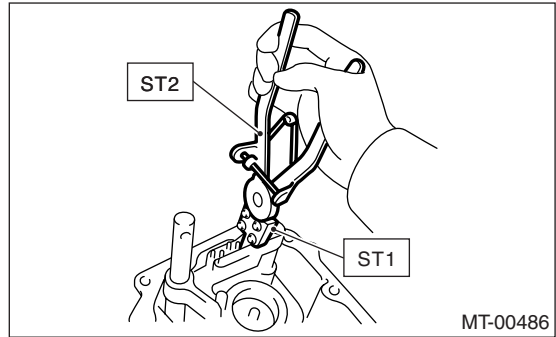
Make sure to install the support in proper direction.



19) Using the ST, install the neutral set spring and support.

ST1 18756AA000 CLAW

ST2 399893600 PLIERS



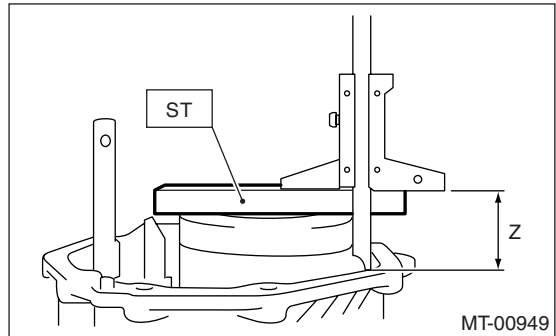
20) Install the snap ring.

21) Install the center differential.

2. SELECTING THE TRANSFER DRIVE GEAR THRUST WASHER

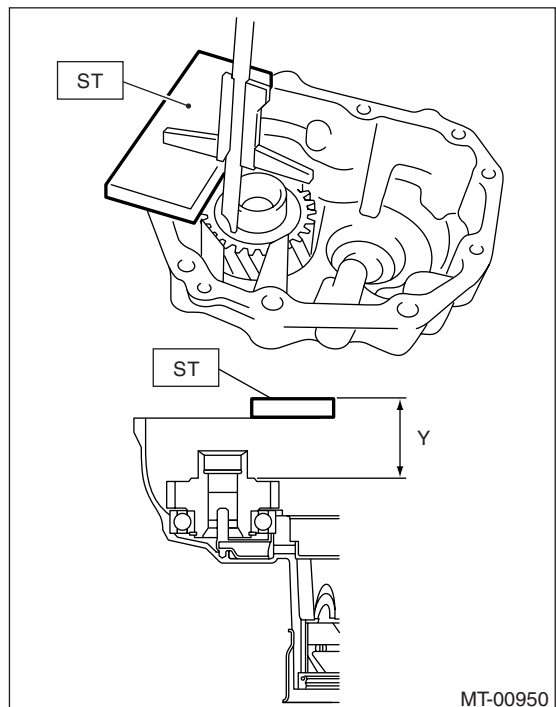
1) Measure the height “Z” between end of transmission case and end of ST.

ST 499575500 GAUGE



2) Measure the depth “Y” between end of ST and transfer drive gear.

ST 499575500 GAUGE



3) Calculate the value “t” of transfer drive gear thrust washer using the following equation.

$$t = \{Y - 15 \text{ mm (1.18 in)}\} - \{Z - 15 \text{ mm (1.18 in)}\} - 0.45 \text{ to } 0.65 \text{ mm (0.018 to 0.026 in)}$$

t mm (in)	Thickness of transfer drive gear thrust washer
Y mm (in)	Depth from end of ST to transfer drive gear
Z mm (in)	Height from end of transmission case to the end of ST
0.45 — 0.65 mm (0.018 — 0.026 in)	Standard clearance between thrust washer and transfer drive gear.
15 mm (1.18 in)	Thickness of ST

4) Select the nearest thrust washer from the following table, according to the calculated value “t”.

Standard clearance between thrust washer and transfer drive gear:

0.45 — 0.65 mm (0.018 — 0.026 in)

Thrust washer (36.3 × 52 × t)	
Part No.	Thickness mm (in)
803036070	0.80 (0.0315)
803036071	0.95 (0.0374)
803036072	1.10 (0.0433)
803036073	1.25 (0.0492)
803036074	1.40 (0.0551)
803036075	0.65 (0.0256)

5) Install the selected thrust washer.

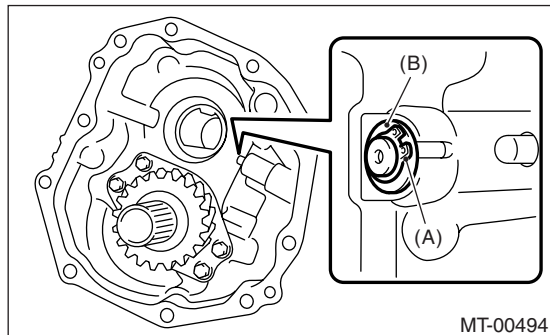
Reverse Check System

MANUAL TRANSMISSION AND DIFFERENTIAL

13.Reverse Check System

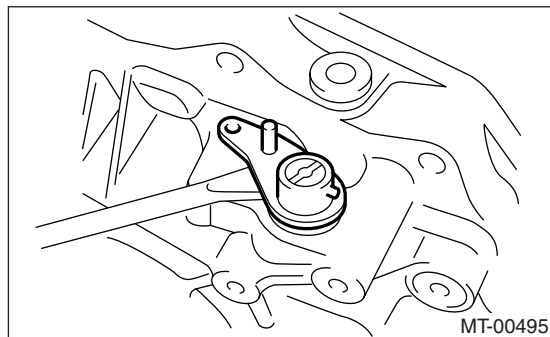
A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 4) Remove the snap ring and washer from reverse check shaft.



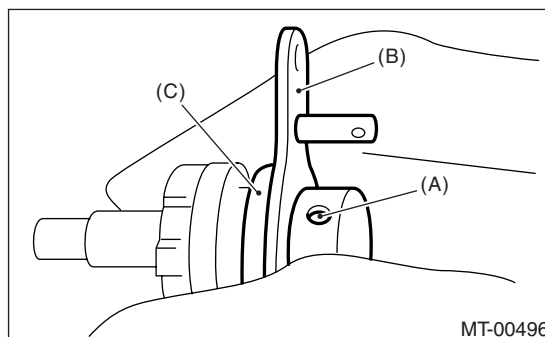
- (A) Snap ring
- (B) Washer

- 5) Remove the reverse check shaft and spring from extension case.



- 6) Remove the spring pin, and then remove the reverse check lever and oil seal from reverse check shaft.

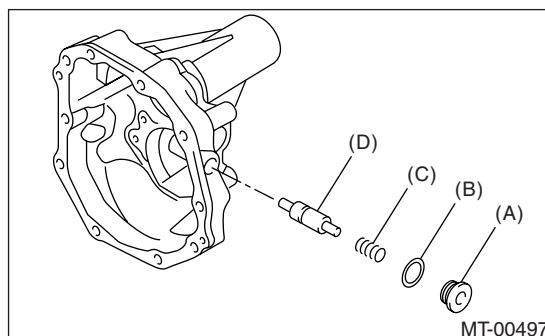
NOTE:
Do not reuse the oil seal.



- (A) Spring pin
- (B) Reverse check lever
- (C) Oil seal

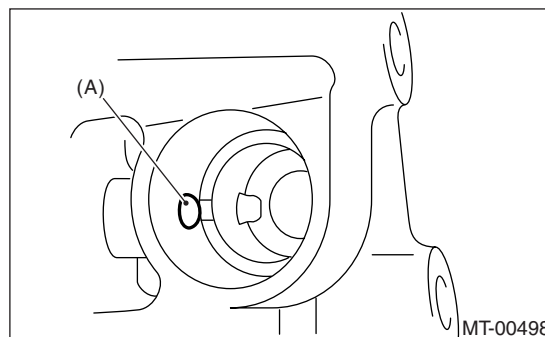
- 7) Remove the plug from extension case, then remove the gasket, spring and plunger.

NOTE:
Do not reuse the gasket.



- (A) Plug
- (B) Gasket
- (C) Spring
- (D) Plunger

- 8) Remove the reverse lock plunger.



- (A) Reverse lock plunger

B: INSTALLATION

- 1) Insert the reverse lock plunger.

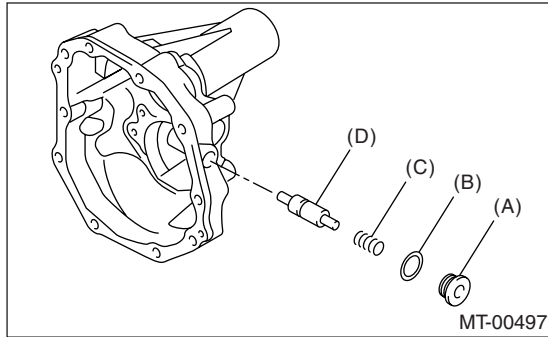
Reverse Check System

MANUAL TRANSMISSION AND DIFFERENTIAL

2) Install in the order of reverse check plug, spring, gasket and plug.

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

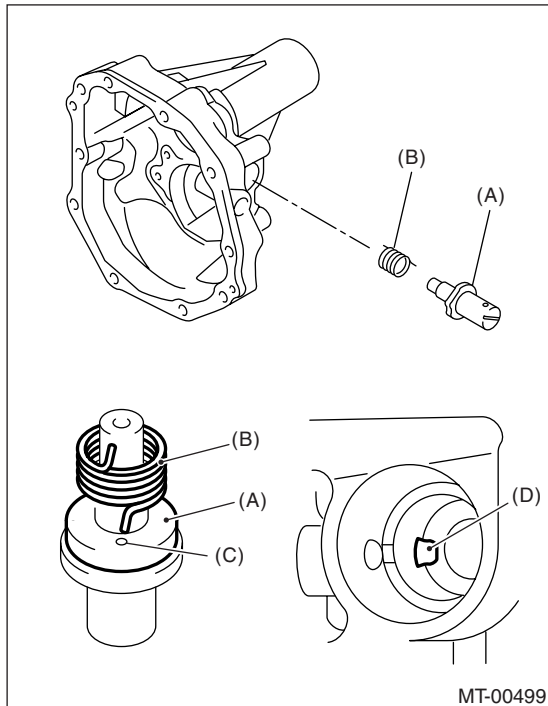


- (A) Plug
- (B) Gasket
- (C) Spring
- (D) Reverse check plug

3) Install the spring and reverse check shaft to extension case.

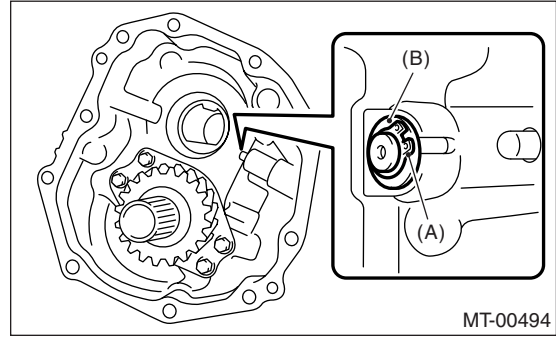
NOTE:

Be sure the spring end aligns with the hole of reverse check shaft and cutout portion of extension case.



- (A) Reverse check shaft
- (B) Spring
- (C) Hole
- (D) Cutout portion

4) Install the washer and snap ring.

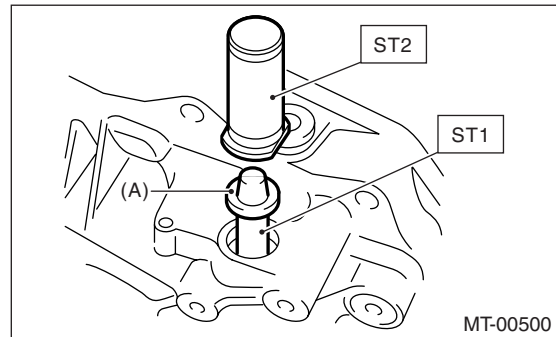


- (A) Snap ring
- (B) Washer

5) Set the ST1 to reverse check shaft. Install a new oil seal, then press with ST2.

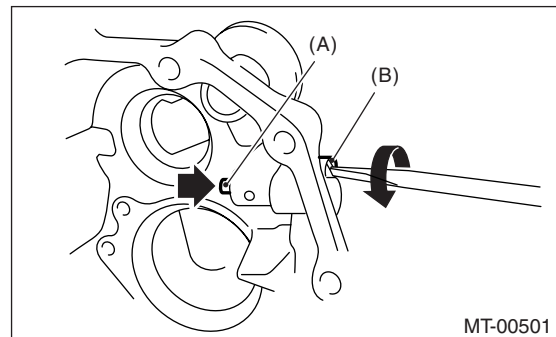
ST1 18671AA000 OIL SEAL GUIDE

ST2 18657AA010 INSTALLER



- (A) Oil seal

6) Insert the reverse check lever, then rotate the reverse check shaft until the plunger can be pushed in first.

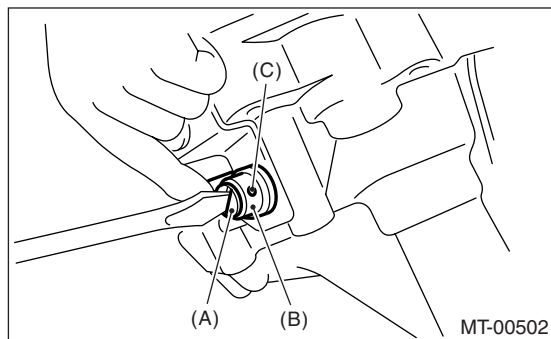


- (A) Plunger
- (B) Reverse check shaft

Reverse Check System

MANUAL TRANSMISSION AND DIFFERENTIAL

7) Align the hole of reverse check lever and reverse check shaft, then install the spring pin.



- (A) Reverse check shaft
- (B) Reverse check lever
- (C) Hole

8) Make sure the reverse check operates correctly. <Ref. to 6MT-54, INSPECTION, Reverse Check System.>

9) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>

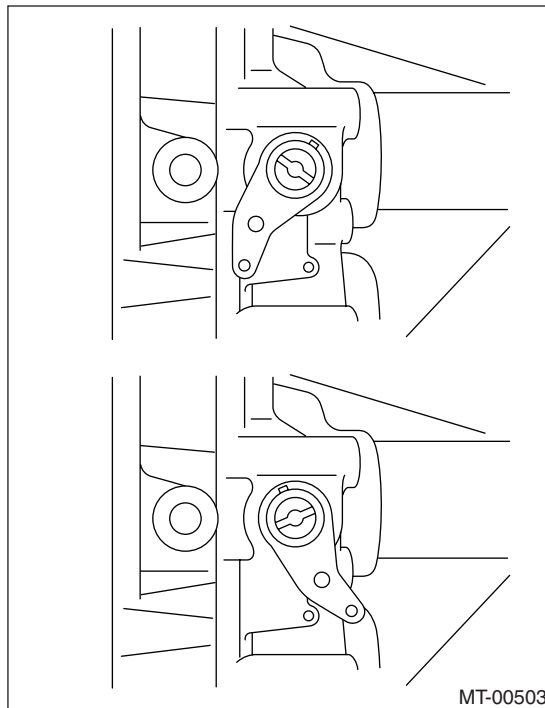
10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

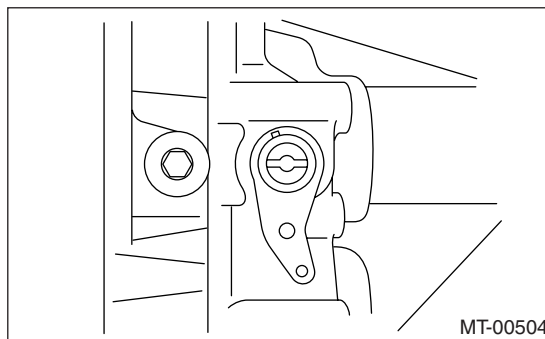
- 1) Make sure there is no damage on each parts.
- 2) Make sure the reverse check lever operates smoothly.
- 3) Make sure there is no oil leakage on oil seal part of reverse check shaft. If there is oil leakage, replace the oil seal.

4) Inspect the reverse check operation.

(1) The plunger can be pushed or the gear can be shifted to reverse, when reverse check lever is in the following position.



(2) The plunger cannot be pushed or the gear cannot be shifted to reverse, when reverse check lever is in the following position.

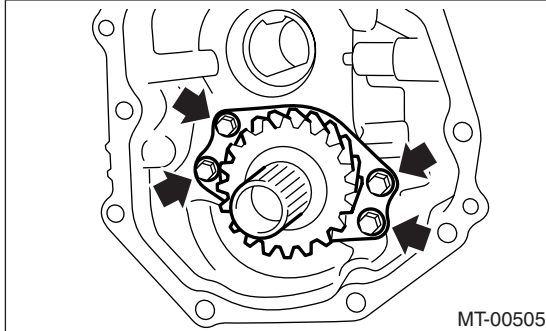


5) If not as specified, reassemble the reverse check system.

14. Transfer Drive Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 4) Remove the transfer drive gear.

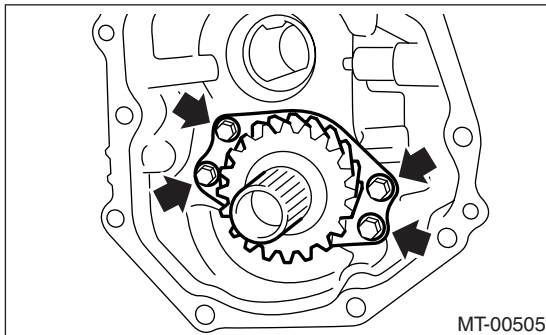


B: INSTALLATION

- 1) Install the transfer drive gear.

Tightening torque:

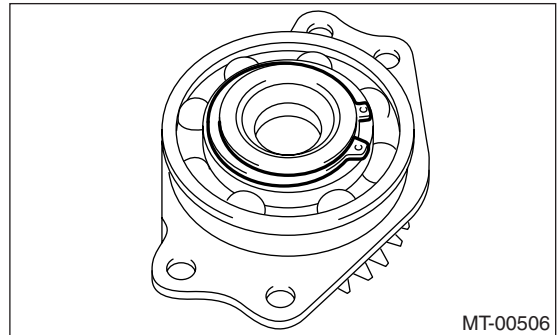
25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 2) If the ball bearing, transfer drive gear or snap ring is replaced, select the transfer drive gear thrust washer. <Ref. to 6MT-47, ASSEMBLY, Extension Case.>
- 3) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>
- 4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

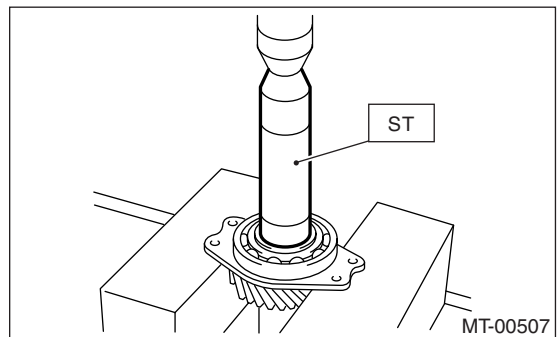
- 1) Remove the snap ring.



- 2) Using the ST, remove the ball bearing.
ST 499877000 RACE 4-5 INSTALLER

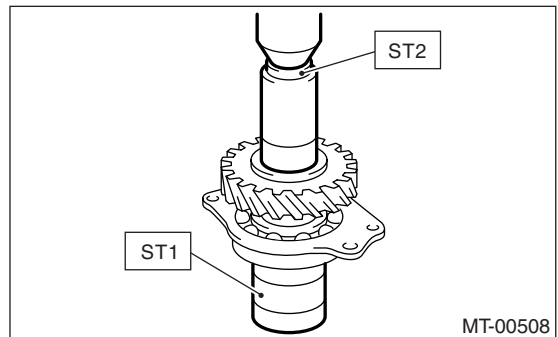
NOTE:

Do not reuse the ball bearing.

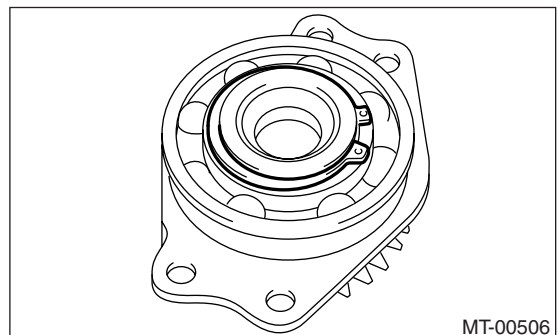


D: ASSEMBLY

- 1) Using the ST, install the ball bearing.
ST1 499247400 INSTALLER
ST2 398497701 SEAT



- 2) Install the snap ring.



Transfer Drive Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

3) Inspect the clearance between snap ring and ball bearing. <Ref. to 6MT-56, INSPECTION, Transfer Drive Gear.>

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.

2) Drive gear

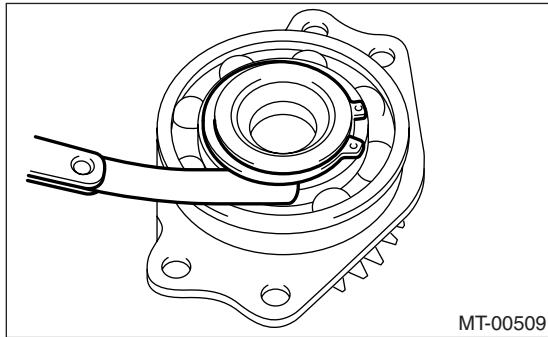
Replace the drive gear in the following cases.

- If their tooth surface and shaft are excessively broken or damaged.

3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

Standard clearance between snap ring and inner race:

0 — 0.15 mm (0 — 0.0059 in)



4) If the measurement is not within specifications, select suitable snap ring.

Thrust washer	
Part No.	Thickness mm (in)
805045050	1.76 (0.069)
805045060	1.88 (0.074)
805045070	2.00 (0.079)

After replacement of the snap ring, inspect the clearance again.

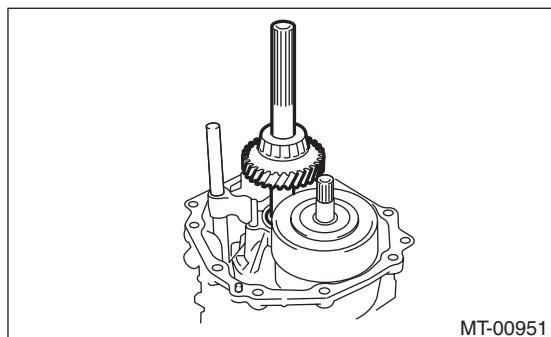
Transfer Driven Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

15. Transfer Driven Gear

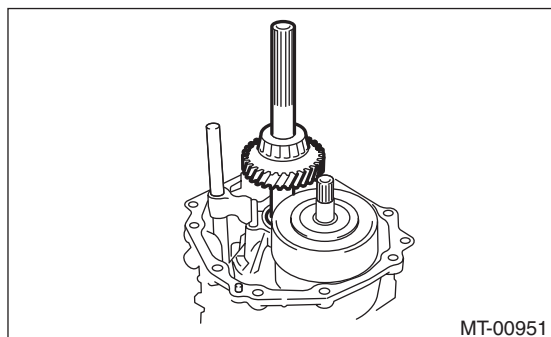
A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 4) Remove the transfer driven gear.



B: INSTALLATION

- 1) Install the transfer driven gear.

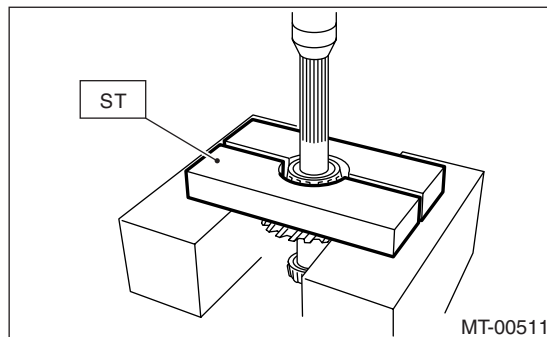


- 2) If the bearing or transfer driven gear is replaced, select the transfer driven thrust washer. <Ref. to 6MT-48, ADJUSTMENT, Extension Case.>
- 3) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>
- 4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Using the ST, remove the roller bearing of extension case side.

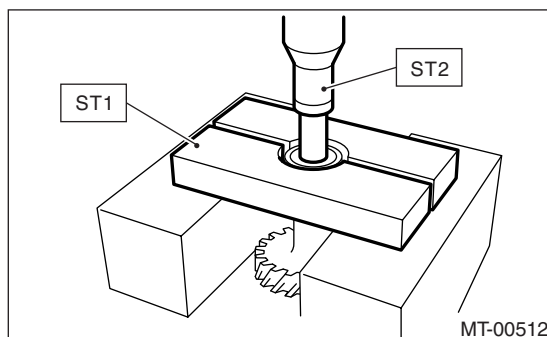
ST 498515700 REMOVER



- 2) Using the ST, remove the roller bearing of transmission case side.

ST1 899858600 REMOVER

ST2 899864100 REMOVER



D: ASSEMBLY

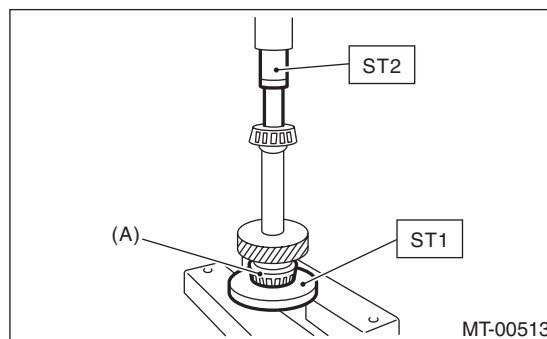
- 1) Using the ST, install the roller bearing of extension case side.

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

- 2) Using the ST, install the roller bearing of transmission case side.

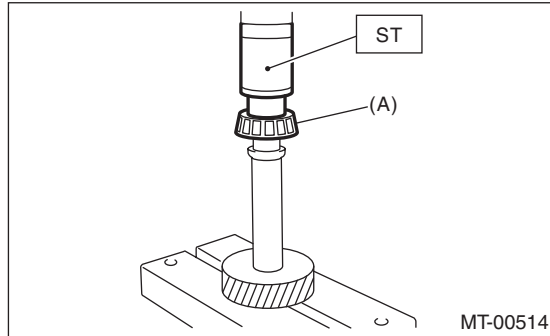
ST 499757002 INSTALLER

Transfer Driven Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

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 bearing in following cases.

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make noise when turned after gear oil lubrication.

2) Driven gear

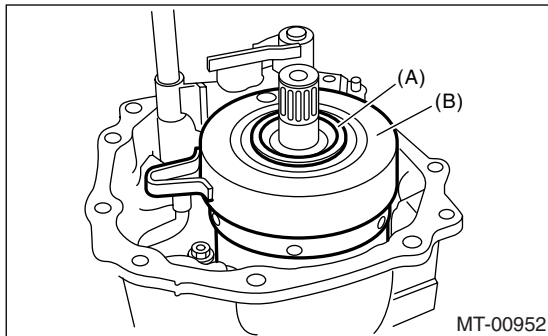
Replace the driven gear in following case.

- If their tooth surfaces and shaft are excessively broken or damaged.

16.Center Differential

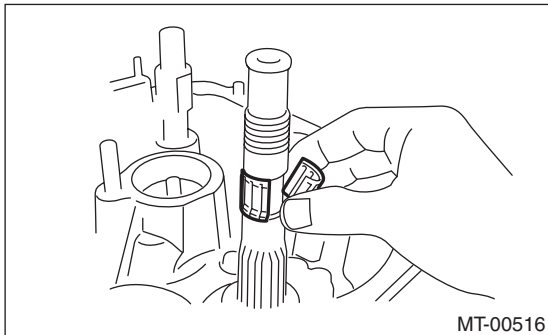
A: REMOVAL

- 1) Remove the manual transmission case assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 4) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 5) Disconnect the center differential connector.
- 6) Remove the thrust washer and center differential.



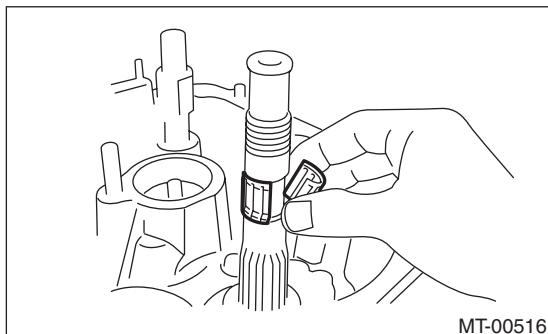
- (A) Thrust washer
(B) Center differential

- 7) Remove the needle bearing.

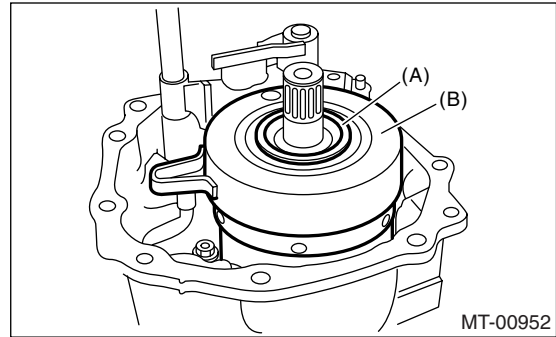


B: INSTALLATION

- 1) Install the needle bearing.



- 2) Install the thrust washer and center differential.



- (A) Thrust washer
(B) Center differential

- 3) If replacing the center differential, select the transfer drive gear and thrust washer and install. <Ref. to 6MT-48, ADJUSTMENT, Extension Case.>
- 4) Connect the center differential connector, and secure it to oil guide.
- 5) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
- 6) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>
- 7) Install the manual transmission case assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Make sure there is no damage on the center differential, ball bearing and oil pump drive gear. Replace the center differential assembly if damaged.

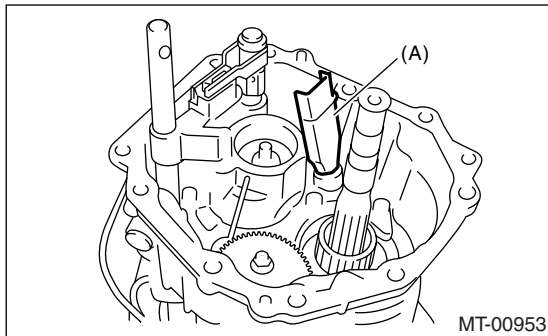
Oil Pump

MANUAL TRANSMISSION AND DIFFERENTIAL

17.Oil Pump

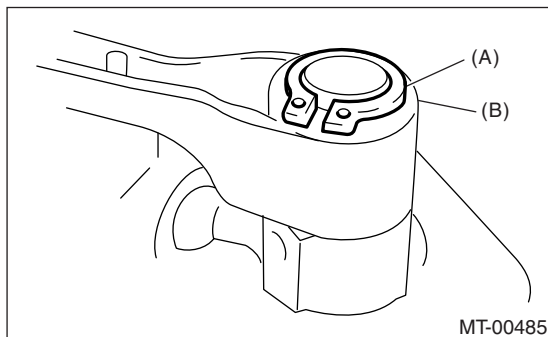
A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 4) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 6) Remove the oil guide.



(A) Oil guide

- 7) Remove the snap ring.

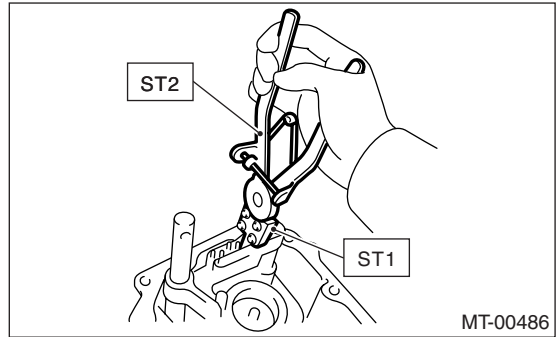


(A) Snap ring
(B) Support

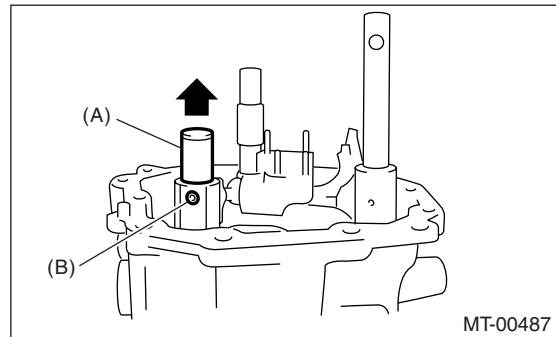
- 8) Using the ST, remove the neutral set spring and support.

ST1 18756AA000 CLAW

ST2 399893600 PLIERS

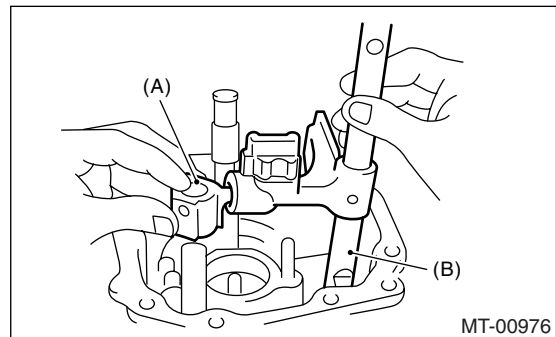


- 9) Raise the striking rod up, and then remove the spring pin.



(A) Striking rod
(B) Spring pin

- 10) Remove the selector arm No. 2 and shifter arm.



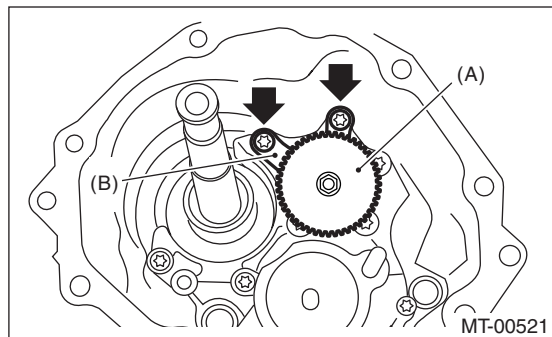
(A) Selector arm No. 2
(B) Shifter arm

- 11) Remove the oil pump shaft assembly and plate.

NOTE:

Remove the bolts using ST, because tool may break if general tool is used.

ST 18663AA000 SOCKET



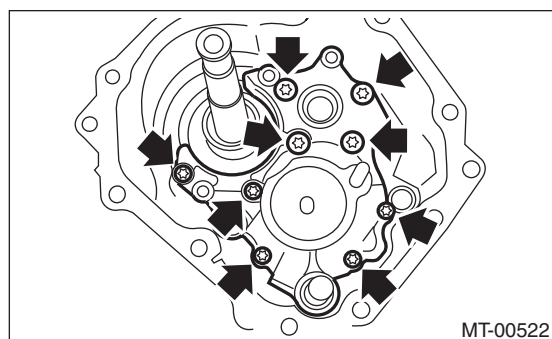
- (A) Oil pump shaft ASSY
- (B) Plate

12) Remove the oil pump cover assembly.

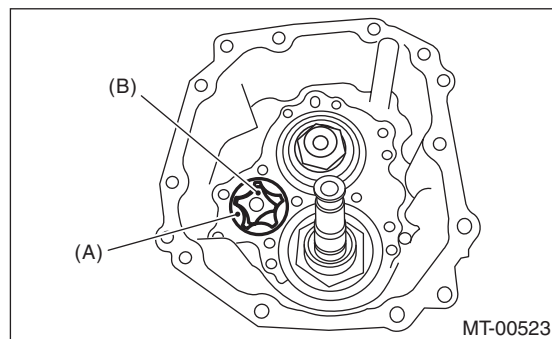
NOTE:

Remove the bolts using ST, because tool may break if general tool is used.

ST 18663AA000 SOCKET



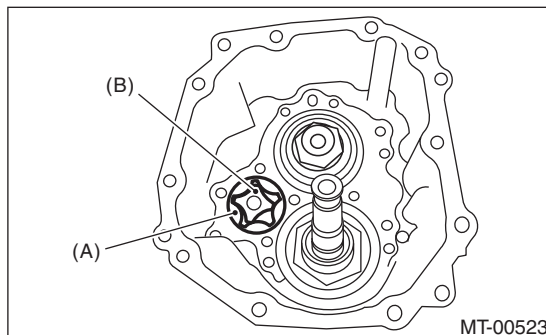
- 13) Remove the thrust washer on main shaft part.
- 14) Remove the oil pump rotor.



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

B: INSTALLATION

1) Apply oil to the outer periphery of outer rotor, then install to transmission case.



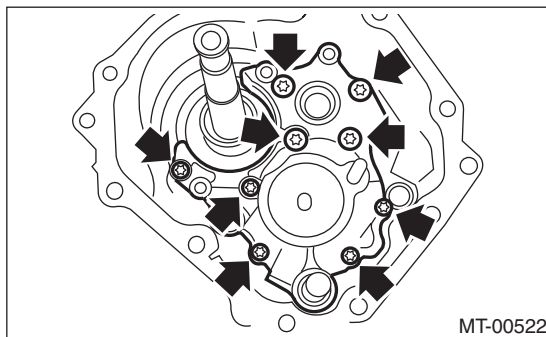
- (A) Outer rotor
- (B) Inner rotor

- 2) Install the thrust washer to main shaft part.
- 3) Install the oil pump cover assembly.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

ST 18663AA000 SOCKET

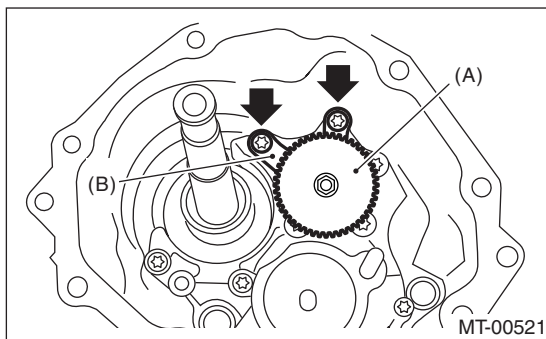


4) Install the oil pump shaft assembly and plate.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

ST 18663AA000 SOCKET



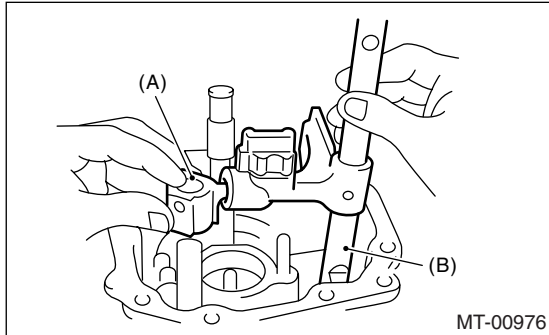
- (A) Oil pump shaft ASSY
- (B) Plate

Oil Pump

MANUAL TRANSMISSION AND DIFFERENTIAL

5) If replacing the oil pump cover assembly, select the transfer driven gear and thrust washer, then install them to the extension case. <Ref. to 6MT-48, ADJUSTMENT, Extension Case.>

6) Install the selector arm No. 2 and shifter arm.



(A) Selector arm No. 2

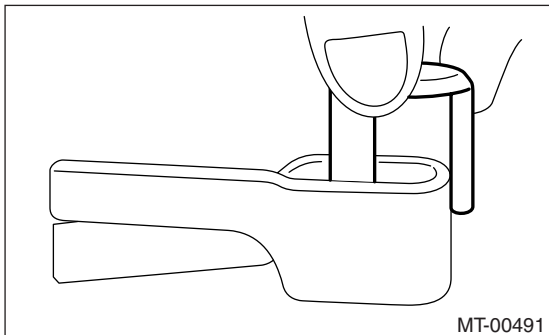
(B) Shift arm

7) Install a new spring pin.

8) Install the support to neutral set spring.

NOTE:

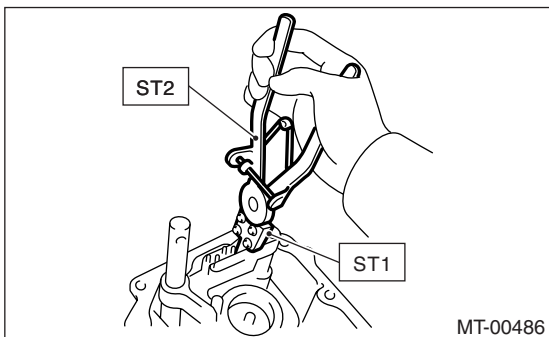
Make sure to install the support in proper direction.



9) Using the ST, install the neutral set spring and support.

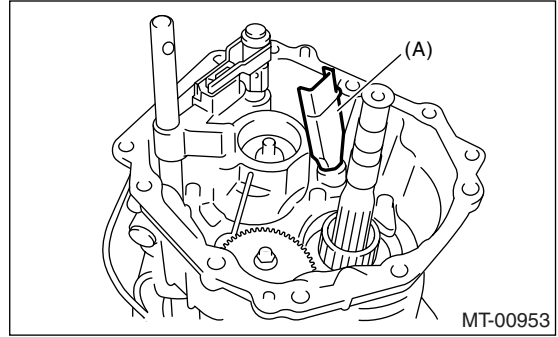
ST1 18756AA000 CLAW

ST2 399893600 PLIERS



10) Install the snap ring.

11) Install the oil guide.



(A) Oil guide

12) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>

13) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>

14) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>

15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

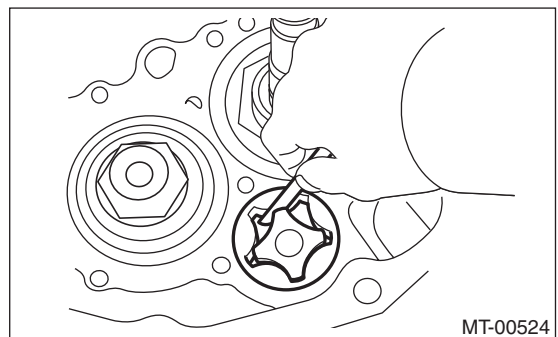
1) Make sure there is no damage on the inner rotor and outer rotor. Replace the inner rotor and outer rotor as assembly if damaged.

2) Clearance at tip

Install the inner rotor and outer rotor to transmission case. Align tip of the inner rotor and outer rotor, then measure the clearance. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

Specification of clearance at tip:

Less than 0.15 mm (0.0059 in)

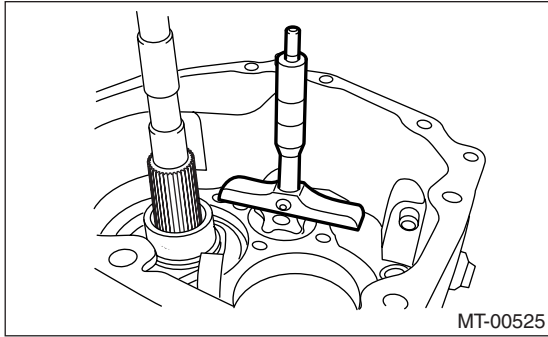


3) Side clearance

Measure to the transmission case and rotor. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

Specification of side clearance:

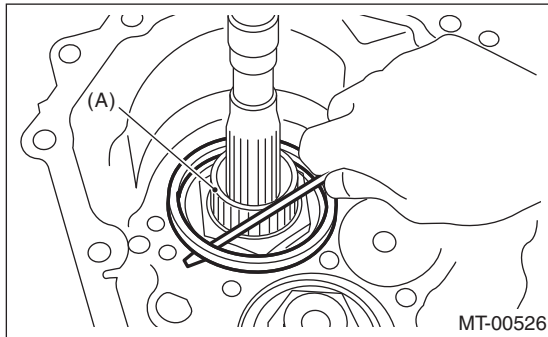
0.03 — 0.10 mm (0.0012 — 0.0039 in)



18. Transmission Case

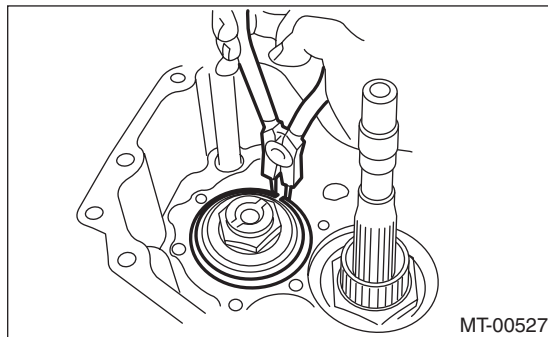
A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the shim and spacer of driven gear assembly.

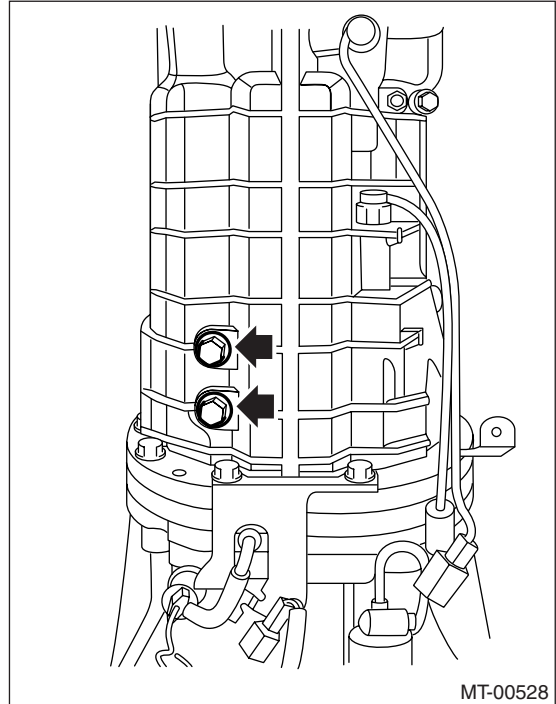


(A) Driven gear ASSY

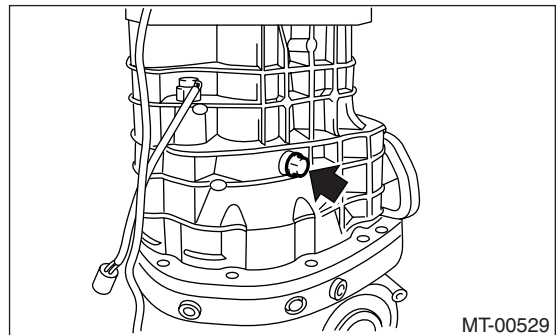
- 9) Remove the snap ring.



- 10) Remove the pilot bolt.



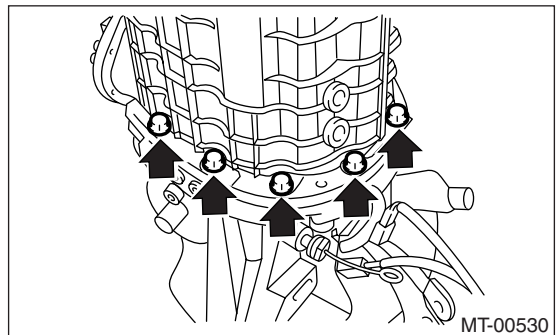
- 11) Remove the holder reverse bolt.



- 12) Remove the transmission case.

NOTE:

If the oil guide catches on shift fork, the transmission case may be difficult to be removed. Move the oil guide right and left to remove. Do not pull the transmission case by force.



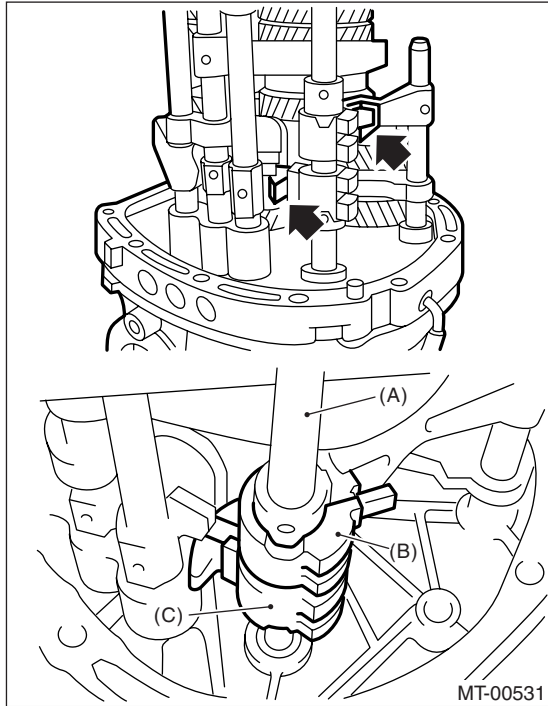
- 13) Completely remove the remaining liquid gasket on transmission case and adapter plate.

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

B: INSTALLATION

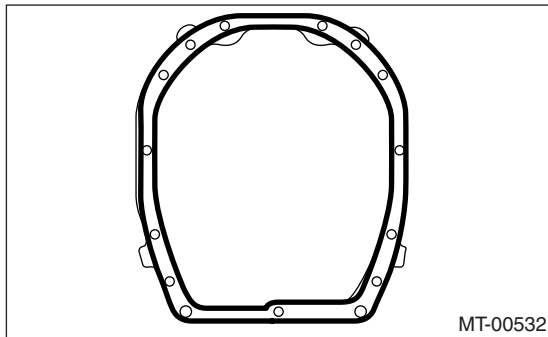
1) Make sure that each shifter fork and interlock block is shifted to neutral position. If not, shift to neutral position.



- (A) Striking rod
- (B) Reverse interlock block
- (C) Interlock block

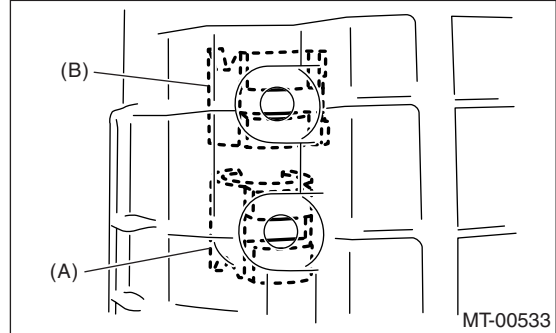
2) Apply liquid gasket to the adapter plate.

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



3) Install the transmission case.

4) Make sure the interlock block and reverse interlock block are aligned in neutral position by inspecting through the pilot bolt installation hole. If not aligned, remove the transmission case, then shift each shifter fork and interlock block to neutral position.



- (A) Interlock block
- (B) Reverse interlock block

5) Using a new gasket, install the pilot bolts temporarily.

6) Tighten the transmission case with bolts and nuts.

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

7) Tighten the pilot bolts.

Tightening torque:
34 N·m (3.5 kgf-m, 25.1 ft-lb)

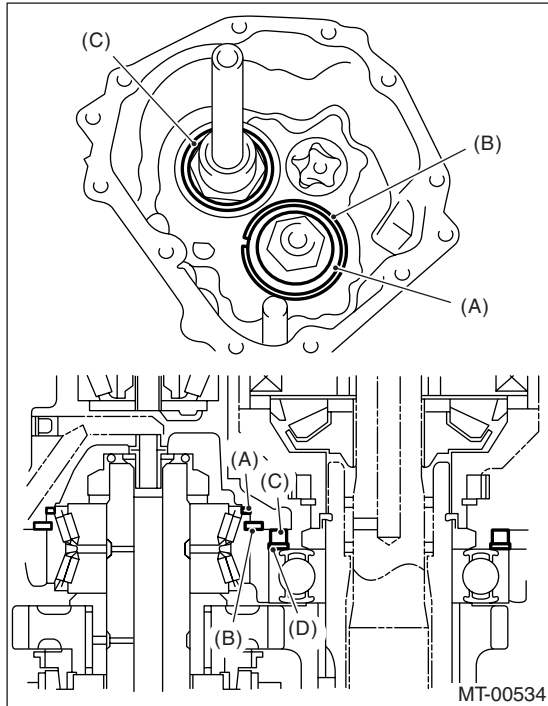
8) Tighten the holder reverse bolt.

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

Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

9) Install the snap ring, washer and collar of driven gear assembly.



- (A) Washer
- (B) Snap ring
- (C) Collar
- (D) Washer

10) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>

11) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>

12) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>

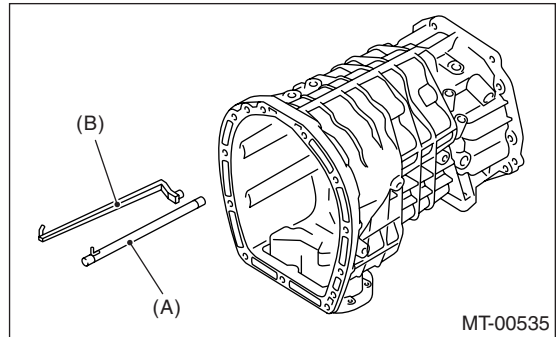
13) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>

14) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>

15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

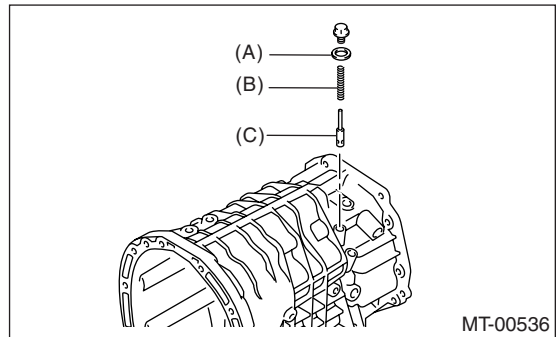
C: DISASSEMBLY

1) Remove the oil pipe and oil guide.



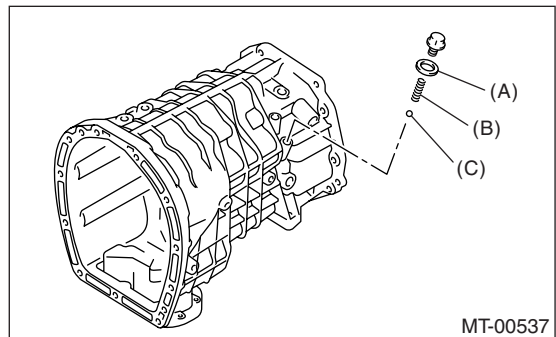
- (A) Oil pipe
- (B) Oil guide

2) Remove the bolt, and then remove the O-ring, relief spring and relief valve.



- (A) O-ring
- (B) Relief valve spring
- (C) Relief valve

3) Remove the bolt, and then remove the O-ring, valve spring and ball.

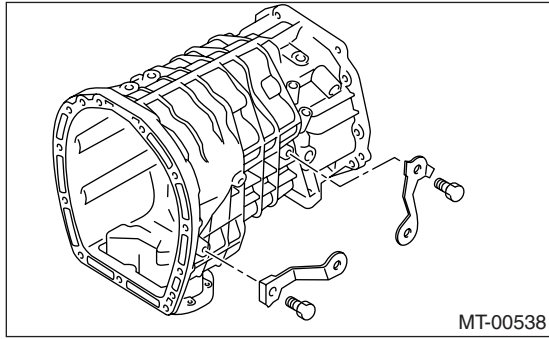


- (A) O-ring
- (B) Valve spring
- (C) Ball

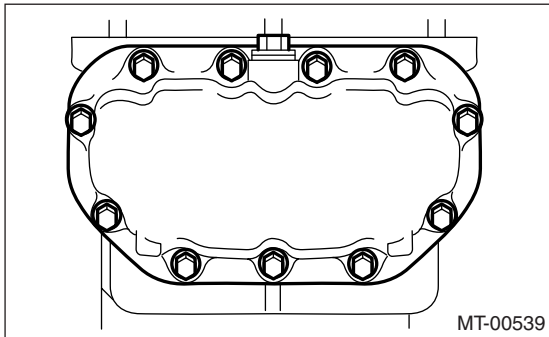
Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

4) Remove the harness bracket.

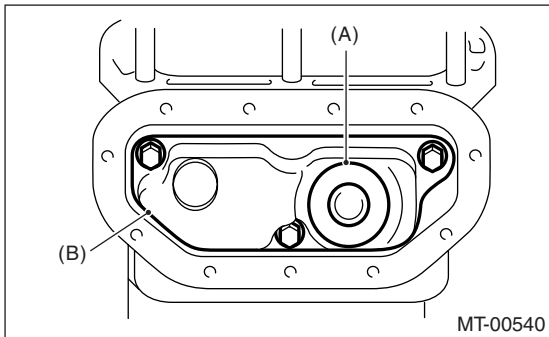


5) Remove the oil pan.



6) Completely remove the remaining liquid gasket on transmission case and oil pan.

7) Remove the oil pan magnet, and then remove the oil strainer.



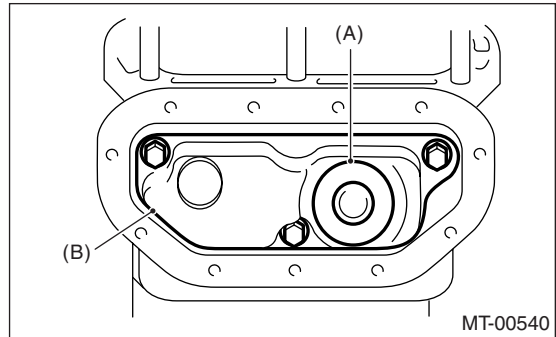
- (A) Oil pan magnet
(B) Oil strainer

D: ASSEMBLY

1) Install the oil strainer and magnet.

Tightening torque:

10 N·m (1.0 kgf-m, 7.4 ft-lb)

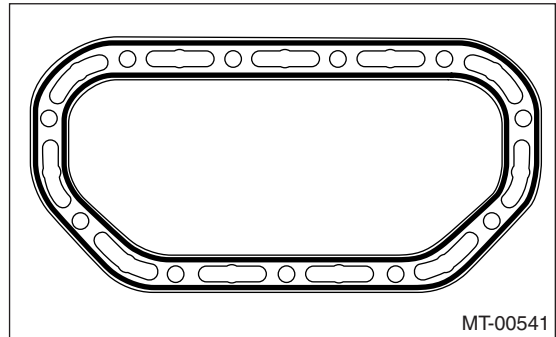


- (A) Oil pan magnet
(B) Oil strainer

2) Apply liquid gasket to the oil pan.

Liquid gasket:

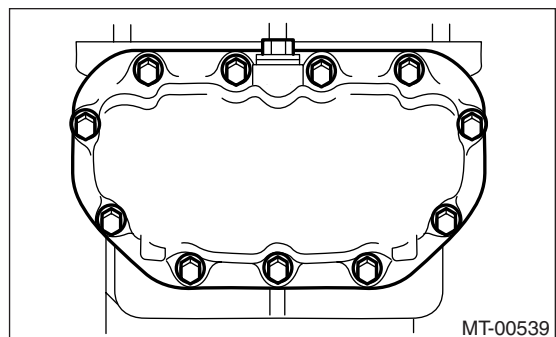
THREE BOND 1215 (Part No. 004403007)



3) Install the oil pan.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



4) Install the relief valve, relief valve spring and new O-ring.

5) Install the ball, valve spring and new O-ring.

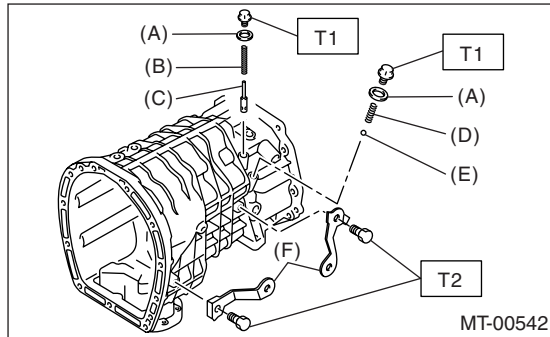
Transmission Case

MANUAL TRANSMISSION AND DIFFERENTIAL

Tightening torque:

T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)

T2: 16 N·m (1.6 kgf-m, 11.8 ft-lb)



- (A) O-ring
- (B) Relief valve spring
- (C) Relief valve
- (D) Valve spring
- (E) Ball
- (F) Harness bracket

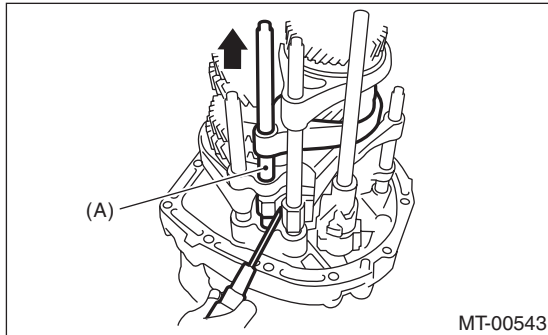
E: INSPECTION

- 1) Completely remove with shop cloth if sludge is adhered to the oil pan magnet.
- 2) Make sure there is no clog on the oil strainer. If clogged, remove clog or replace the oil strainer.
- 3) Make sure there is no damage on each parts.
Replace damaged parts with new parts.

19. Main Shaft Assembly

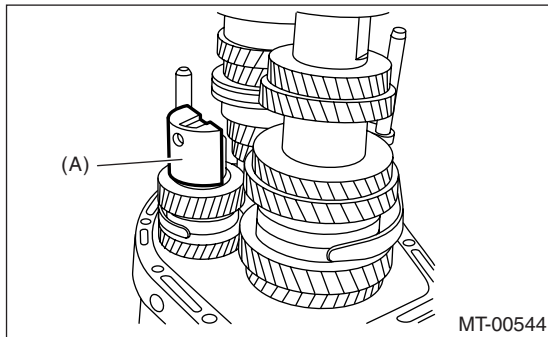
A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove the striking rod.
- 10) Using a screwdriver, shift to 4th gear position.



(A) 3rd-4th shift rod

- 11) Remove the reverse idler holder.

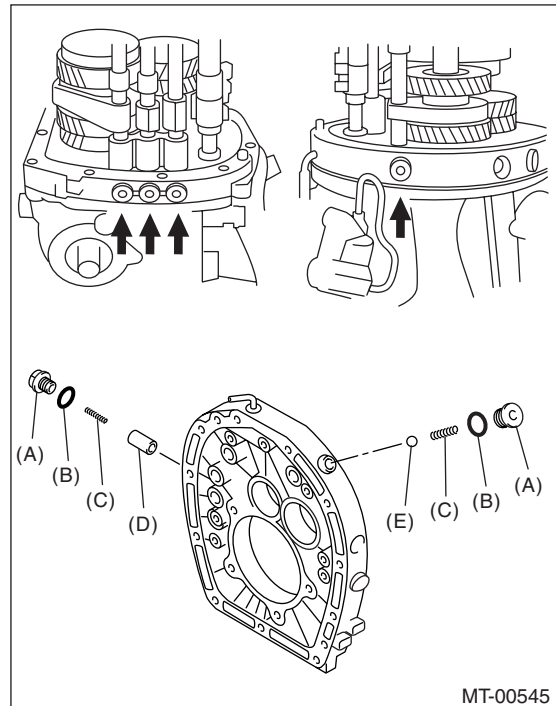


(A) Reverse idler holder

- 12) Remove all checking plug, gasket, checking spring, plunger and checking ball from adapter plate.

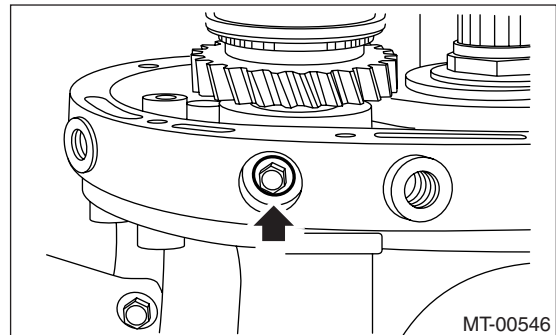
NOTE:

Do not reuse the gasket.



- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Plunger
- (E) Checking ball

- 13) Remove the bolt and gasket installing reverse idler shaft.



- 14) Press the main shaft assembly, driven gear assembly, reverse idler gear and each shifter fork, then remove from the adapter plate at once.

NOTE:

Two people should do the work.

B: INSTALLATION

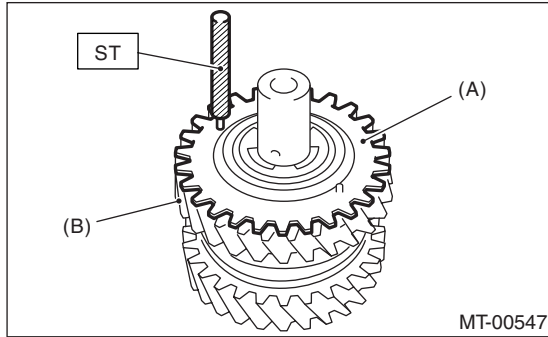
- 1) Adjust the 3rd-4th, and 5th-6th shifter fork rod. <Ref. to 6MT-113, ADJUSTMENT, Shifter Fork and Rod.>

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

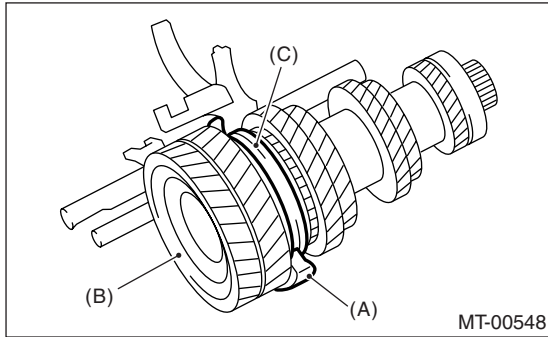
2) Turn the sub gear counterclockwise for approx. three teeth. Align the sub gear and reverse idler gear hole, then insert the ST.

ST 18757AA000 STRAIGHT PIN REMOVER



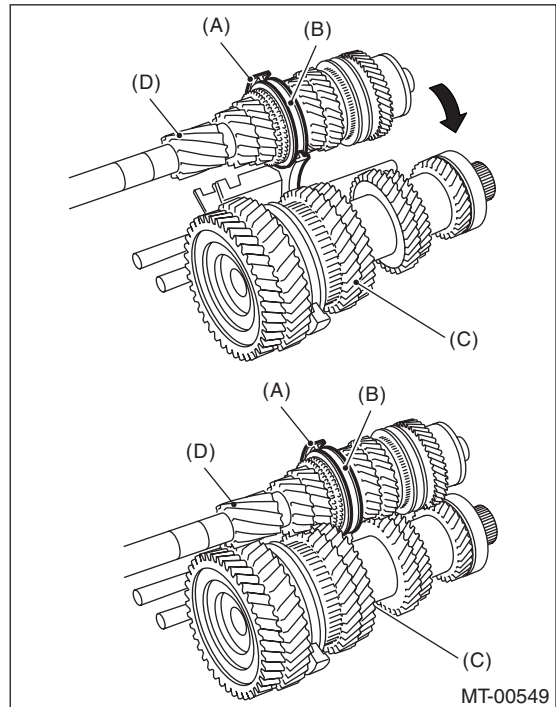
- (A) Sub gear
- (B) Reverse idler gear

3) Install the driven gear assembly to 1st-2nd shifter fork assembly.



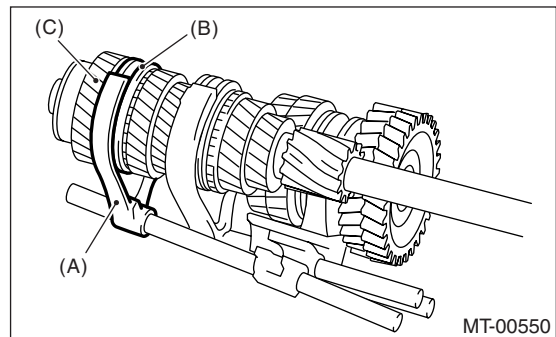
- (A) 1st-2nd shifter fork
- (B) Driven gear ASSY
- (C) 1st-2nd sleeve

4) Install the main shaft assembly to 3rd-4th shifter fork, and then assemble to driven gear assembly.



- (A) 3rd-4th shifter fork
- (B) 3rd-4th sleeve
- (C) Driven gear ASSY
- (D) Main shaft ASSY

5) Install the 5th-6th shifter fork assembly to main shaft assembly.

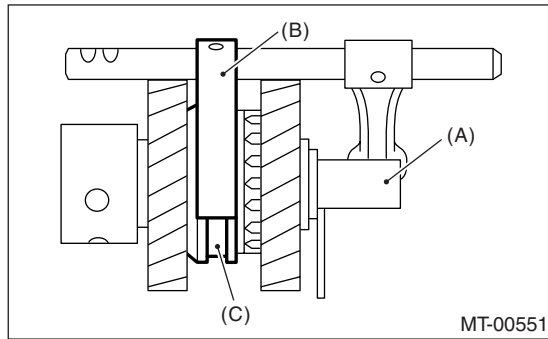


- (A) 5th-6th shifter fork
- (B) 5th-6th sleeve
- (C) Main shaft ASSY

Main Shaft Assembly

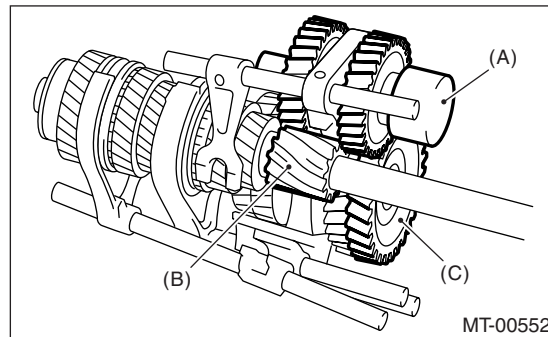
MANUAL TRANSMISSION AND DIFFERENTIAL

6) Install the reverse shifter fork assembly to reverse idler gear assembly.



- (A) Reverse idler gear ASSY
- (B) Reverse shifter fork
- (C) Reverse sleeve

7) Install the reverse idler gear assembly.



- (A) Reverse idler gear ASSY
- (B) 1st drive gear
- (C) Reverse gear

8) Install the thrust bearing of driven gear assembly.

9) Press each shifter fork, main shaft assembly, driven gear assembly and reverse idler gear assembly, then install them to the adapter plate at once.

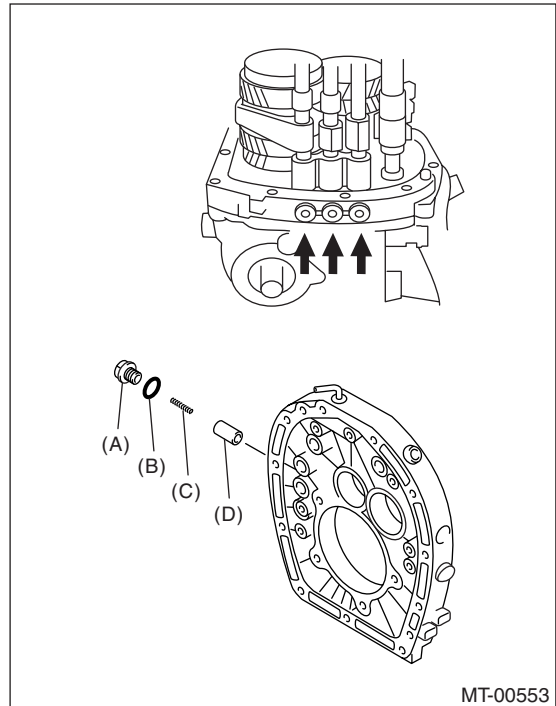
NOTE:

Two people should do the work.

10) Install the plunger, checking spring, new gasket and checking plug.

Tightening torque:

37 N·m (3.8 kgf-m, 27.3 ft-lb)



- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Plunger

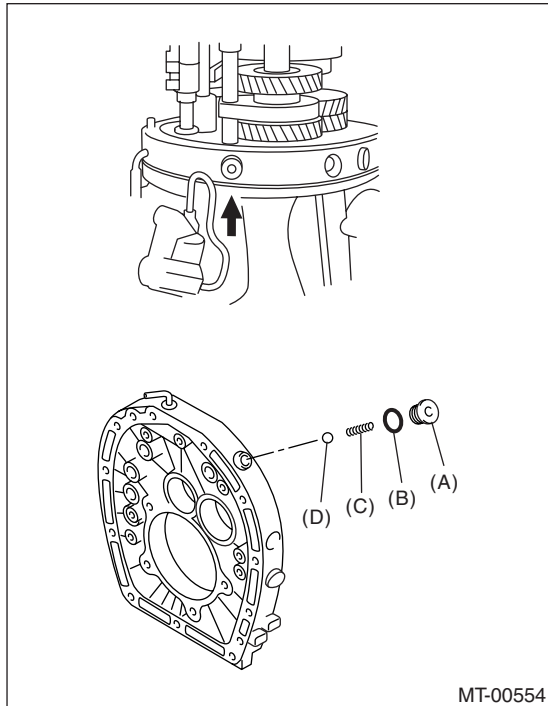
11) Install the checking ball, checking spring, new gasket and checking plug.

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

Tightening torque:

37 N·m (3.8 kgf-m, 27.3 ft-lb)

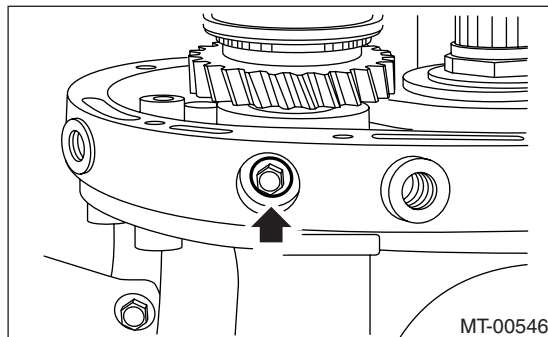


- (A) Checking plug
- (B) Gasket
- (C) Checking spring
- (D) Checking ball

12) Install the bolt and a new gasket.

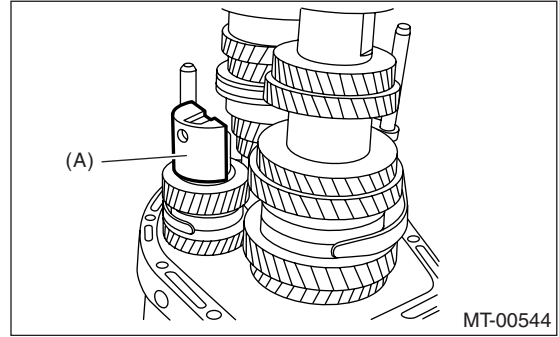
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



13) Using a screwdriver, shift to 4th gear position.

14) Install the reverse idler holder



- (A) Reverse idler holder

15) Install the striking rod.

16) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>

17) Install the selected main shaft snap ring and washer.

18) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>

19) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>

20) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>

21) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>

22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>

23) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

1) Secure the ST on workbench.

ST 18664AA000 BASE

2) Lift the caulking of lock nut.

3) Set the main shaft assembly on ST, then remove the lock nut and washer.

ST1 18665AA000 HOLDER

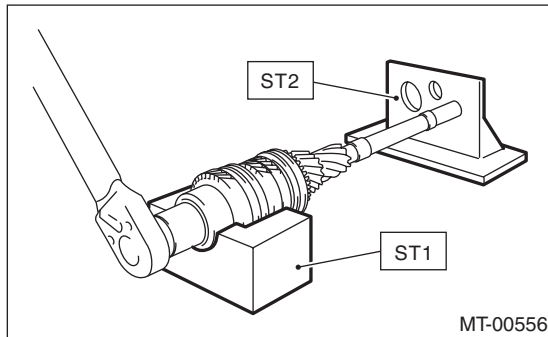
ST2 18664AA000 BASE

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Use a 38 mm (1.50 in) socket wrench.

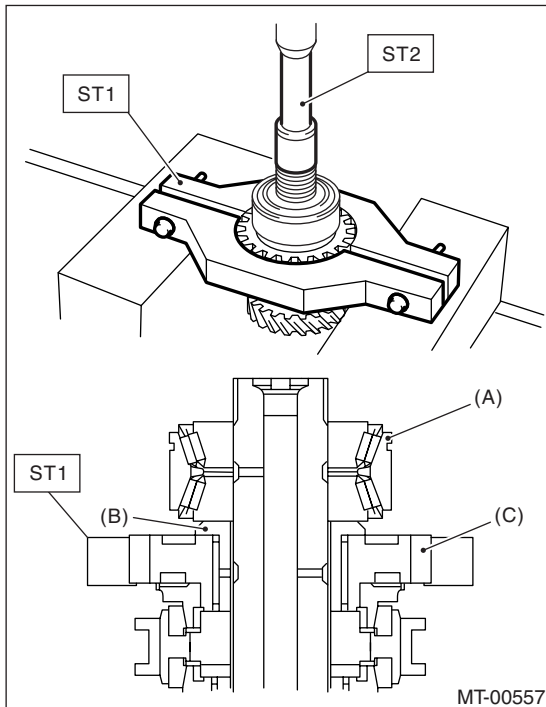


4) Remove the main shaft assembly from ST.

5) Set the ST1 on 6th drive gear, then remove the taper roller bearing, bushing and 6th drive gear using press.

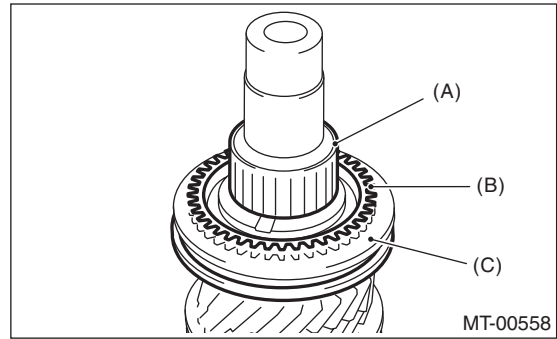
ST1 18722AA010 REMOVER

ST2 899864100 REMOVER



- (A) Taper roller bearing
- (B) Bushing
- (C) 6th drive gear

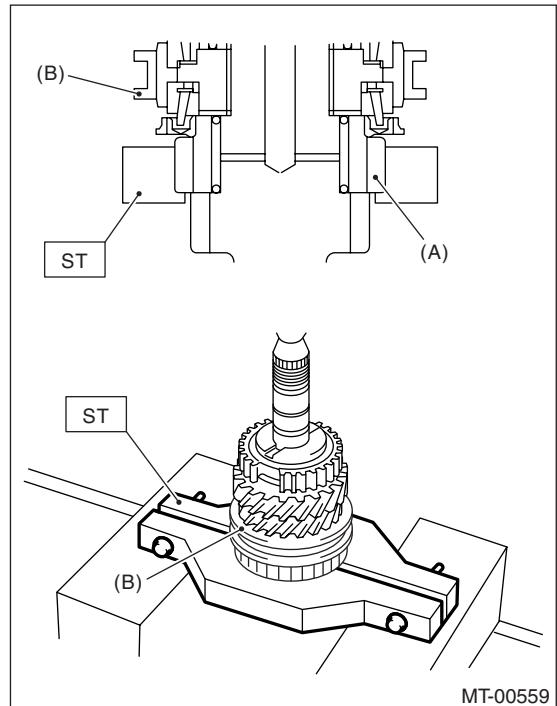
6) Remove the 5th-6th sleeve, 6th needle bearing and 6th baulk ring.



- (A) Needle bearing
- (B) 6th baulk ring
- (C) 5th-6th sleeve

7) Set the ST on 3rd drive gear, then remove each part using press.

ST 18720AA000 REMOVER



- (A) 3rd drive gear
- (B) 3rd-4th sleeve

D: ASSEMBLY

NOTE:

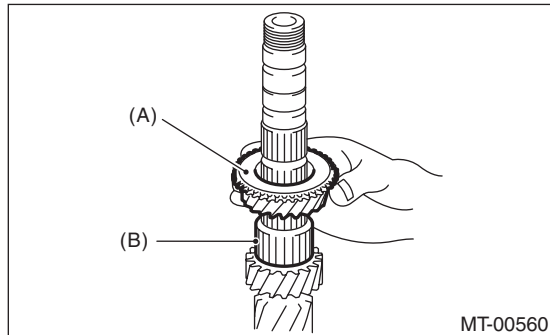
Replace the following parts as a set.

- Sleeve and hub
- Outer baulk ring, 3rd synchro cone and inner baulk ring
- Taper roller bearing

Main Shaft Assembly

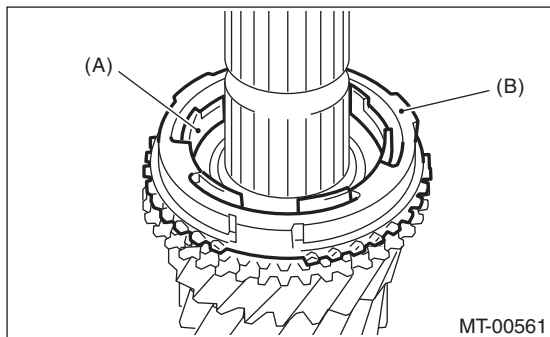
MANUAL TRANSMISSION AND DIFFERENTIAL

- 1) Sufficiently apply gear oil to the main shaft, 3rd needle bearing and inner periphery of 3rd drive gear.
- 2) Install the 3rd needle bearing and 3rd drive gear to main shaft.



- (A) 3rd needle bearing
(B) 3rd drive gear

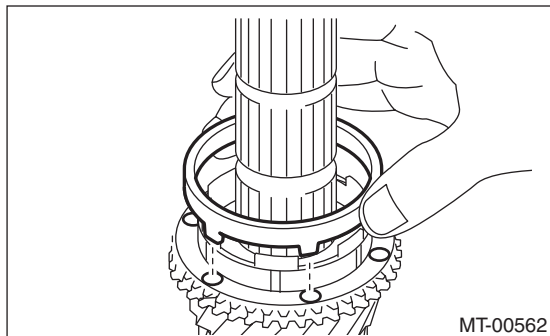
- 3) Install the inner baulk ring, 3rd synchro cone and outer baulk ring.



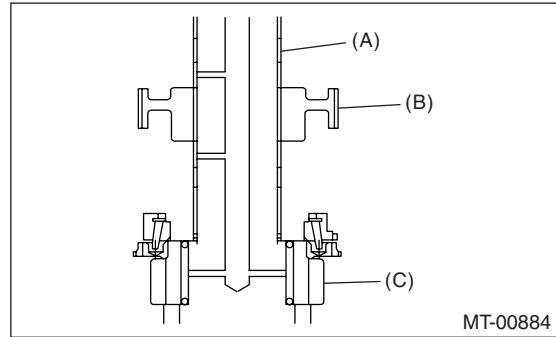
- (A) Inner baulk ring
(B) Outer baulk ring

NOTE:

Install the 3rd synchro cone, by aligning protrusion portions of the 3rd synchro cone with 3rd drive gear hole portion.

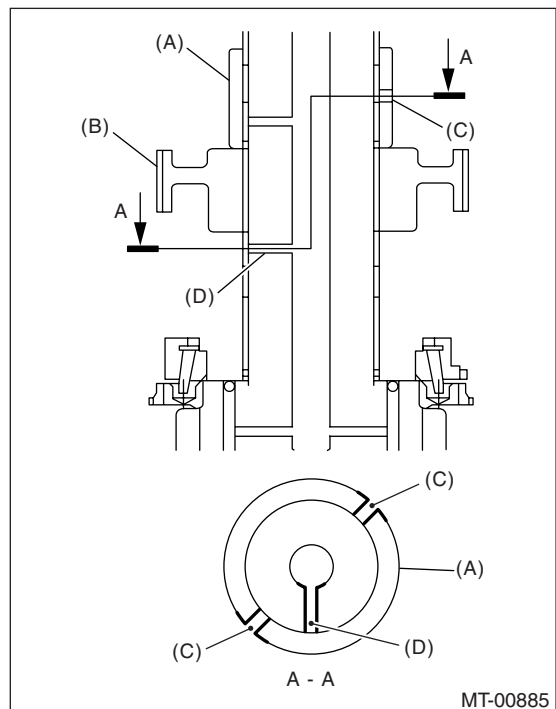


- 4) Install the 3rd-4th hub and 4th bushing.
(1) Set them to the main shaft, taking care of 3rd-4th hub installing direction.



- (A) Main shaft
(B) 3rd-4th hub
(C) 3rd drive gear

- (2) Set them to the main shaft, taking care not to overlap the main shaft oil hole and 4th bushing oil hole.



- (A) 4th bushing
(B) 3rd-4th hub
(C) 4th bushing oil hole
(D) Main shaft oil hole

- (3) Using the ST, press in the 3rd-4th hub and 4th bushing at once.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

CAUTION:

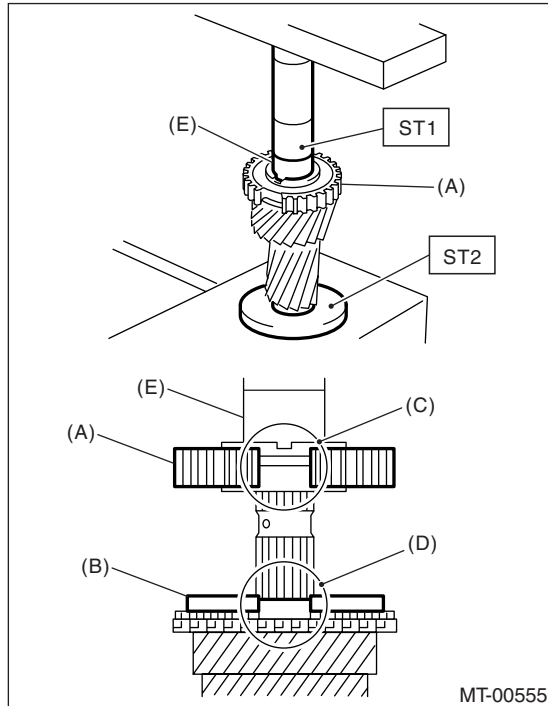
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

When pressing in 3rd-4th hub and 4th bushing, align the protrusion portion of outer baulk ring and cutout portion of 3rd-4th bushing by moving the outer baulk ring.



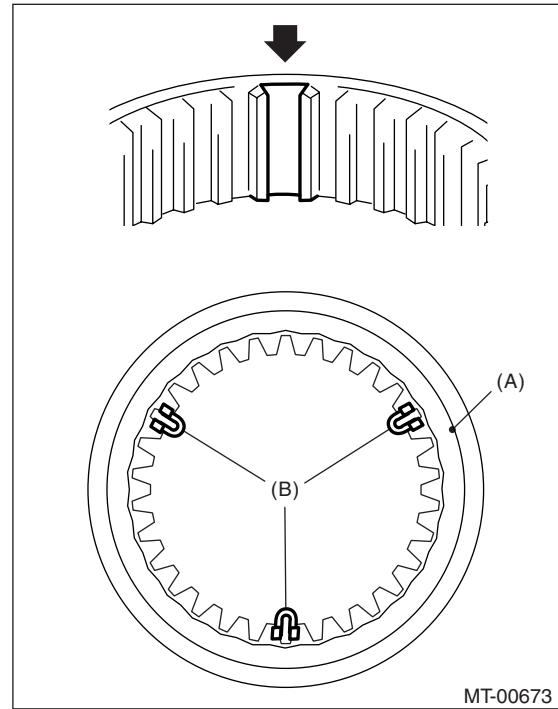
- (A) 3rd-4th hub
- (B) Outer baulk ring
- (C) Cutout portion of 3rd-4th hub
- (D) Protrusion portion of outer baulk ring
- (E) 4th bushing

5) Make sure the 3rd drive gear is smoothly turned by hand. If not, reassemble.

6) Install the 3rd-4th shifting insert key in proper place of 3rd-4th sleeve.

NOTE:

Angle of each shifting insert key is 120 apart.

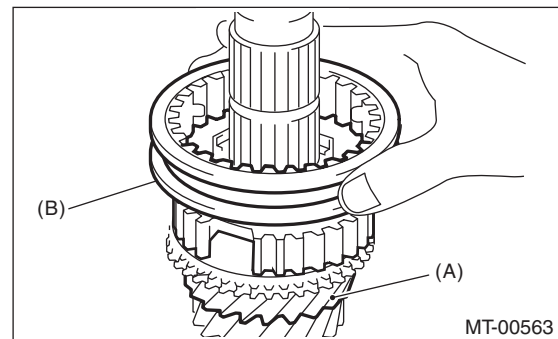


- (A) 3rd-4th sleeve
- (B) 3rd-4th shifting insert key

7) Install the 3rd-4th sleeve to 3rd-4th hub.

NOTE:

- 3rd-4th sleeve has a groove for identification.
- Install the 3rd-4th sleeve with groove facing to 3rd drive gear side.

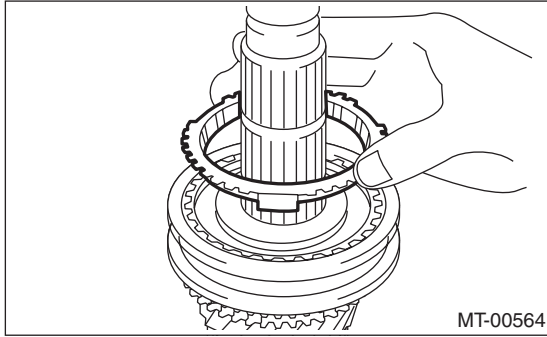


- (A) 3rd drive gear
- (B) Groove (single line) for identification of 3rd-4th sleeve

Main Shaft Assembly

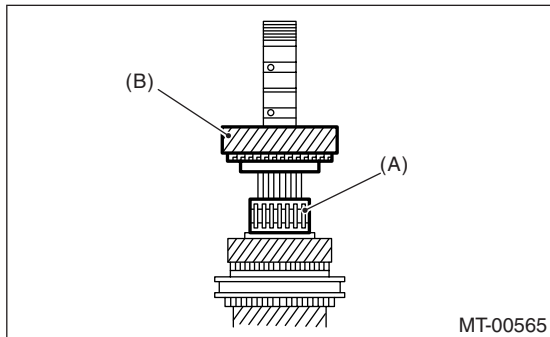
MANUAL TRANSMISSION AND DIFFERENTIAL

8) Install the 4th baulk ring.



9) Sufficiently apply gear oil to the main shaft, 4th needle bearing and inner periphery of 4th drive gear.

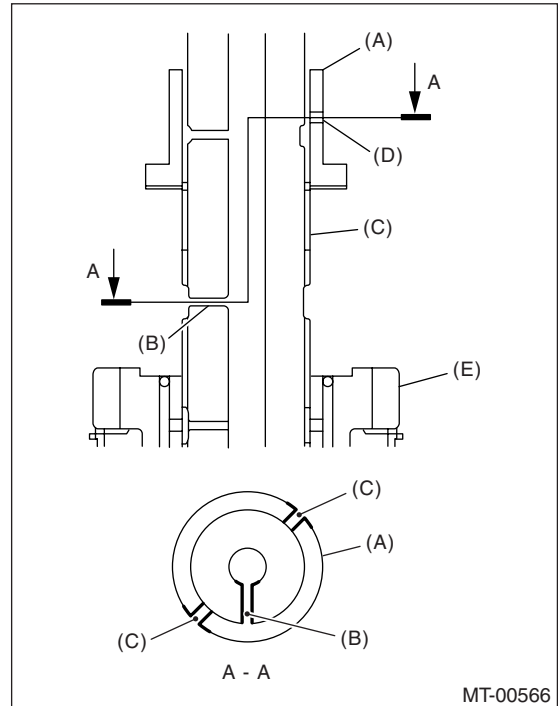
10) Install the 4th needle bearing and 4th drive gear.



- (A) 4th needle bearing
- (B) 4th drive gear

11) Install the 5th bushing.

(1) Set it to the main shaft, taking care not to overlap the main shaft oil hole and 5th bushing oil hole.



- (A) 5th bushing
- (B) Main shaft oil hole
- (C) Main shaft
- (D) 5th bushing oil hole
- (E) 4th drive gear

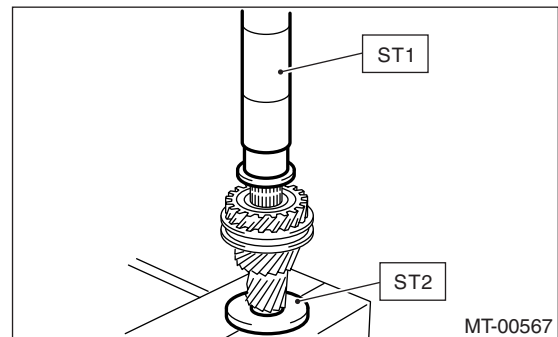
(2) Using the ST, press in the 5th bushing.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



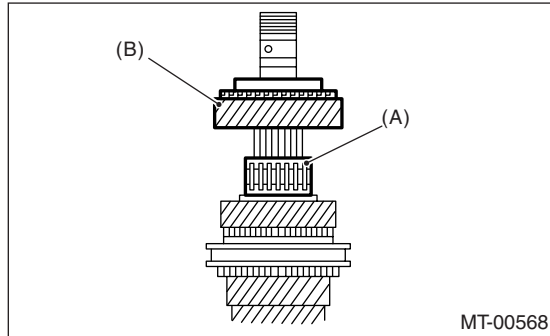
12) Make sure the 4th drive gear is smoothly turned by hand. If not, reassemble.

13) Sufficiently apply gear oil to the main shaft, 5th needle bearing and inner periphery of 5th drive gear.

Main Shaft Assembly

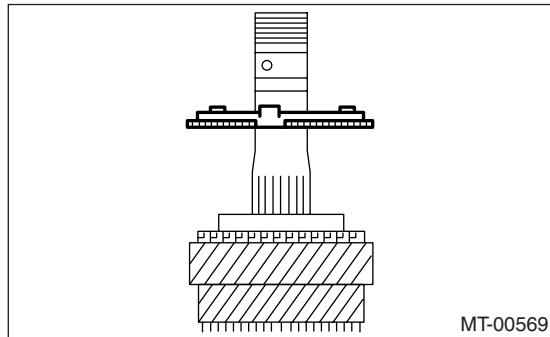
MANUAL TRANSMISSION AND DIFFERENTIAL

14) Install the 5th needle bearing and 5th drive gear.



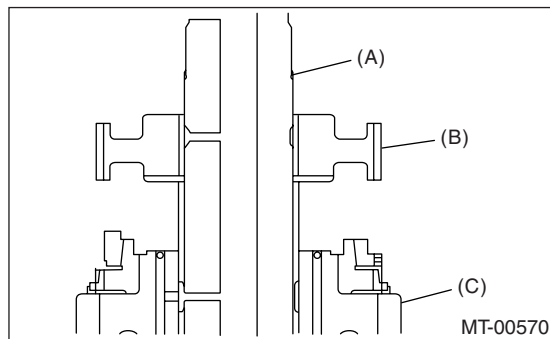
- (A) 5th needle bearing
- (B) 5th drive gear

15) Install the 5th baulk ring.



16) Install the 5th-6th hub.

- (1) Set it to the main shaft, taking care of 5th-6th hub installing direction.



- (A) Main shaft
- (B) 5th-6th hub
- (C) 5th drive gear

- (2) Using the ST, press in the 5th-6th hub.

ST1 18651AA000 INSTALLER

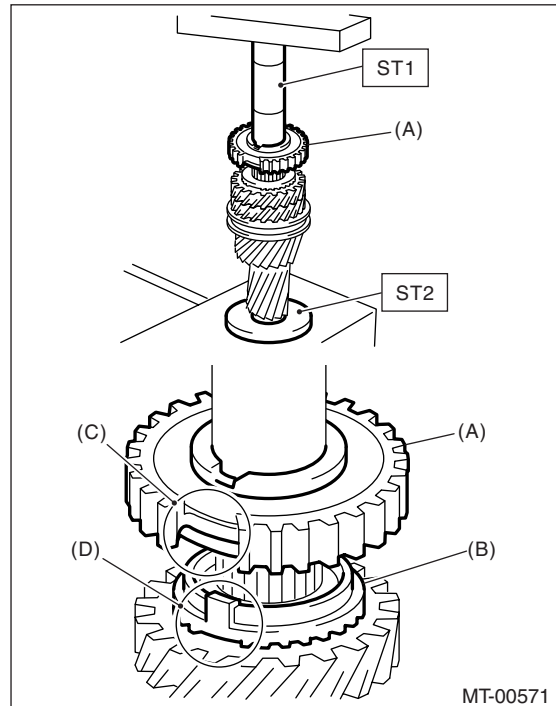
ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

When pressing in 5th-6th hub, align the protrusion portion of outer baulk ring and cutout portion of 5th-6th bushing by moving the outer baulk ring.



- (A) 5th-6th hub
- (B) Outer baulk ring
- (C) Cutout portion of 5th-6th hub
- (D) Protrusion portion of outer baulk ring

17) Make sure the 5th drive gear is smoothly turned by hand. If not, reassemble.

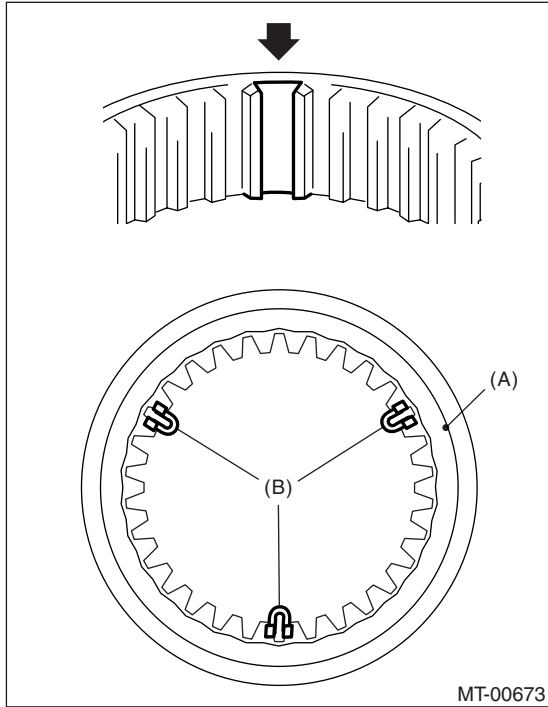
18) Install the 5th-6th shifting insert key in proper place of 5th-6th sleeve.

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Angle of each shifting insert key is 120° apart.

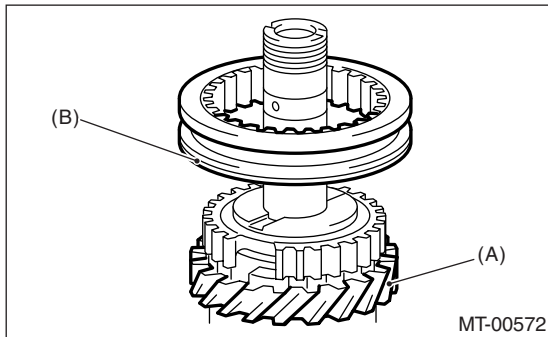


- (A) 5th-6th sleeve
(B) Shifting insert key

19) Install the 5th-6th sleeve to 5th-6th hub.

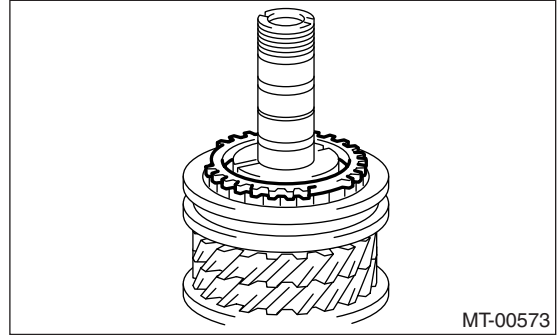
NOTE:

- 5th-6th sleeve has two grooves for identification.
- Install the 5th-6th sleeve with the groove facing to 5th drive gear side.



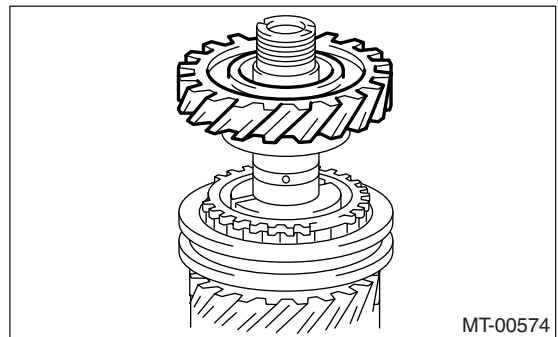
- (A) 5th drive gear
(B) Groove (2 lines) for identification of 5th-6th sleeve

20) Install the 6th baulk ring.

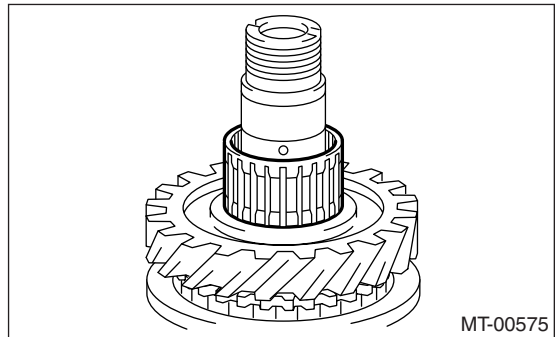


21) Sufficiently apply gear oil to the main shaft, 6th needle bearing and inner periphery of 6th drive gear.

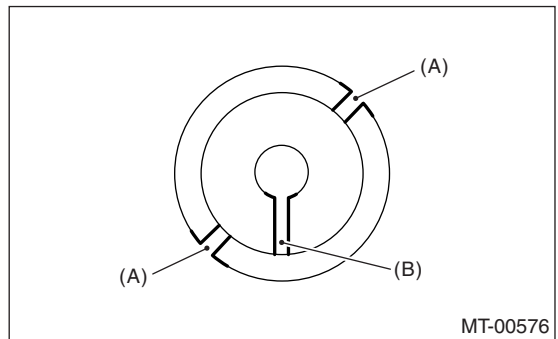
22) Install the 6th drive gear.



23) Install the 6th needle bearing.



24) Set the 6th bushing to main shaft, taking care not to overlap the 6th bushing oil hole and main shaft oil hole.



- (A) 6th bushing oil hole
(B) Main shaft oil hole

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

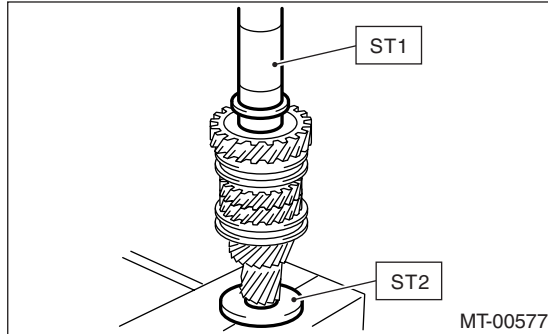
25) Using the ST, install the 6th bushing.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



26) Make sure the 6th drive gear is smoothly turned by hand. If not, reassemble.

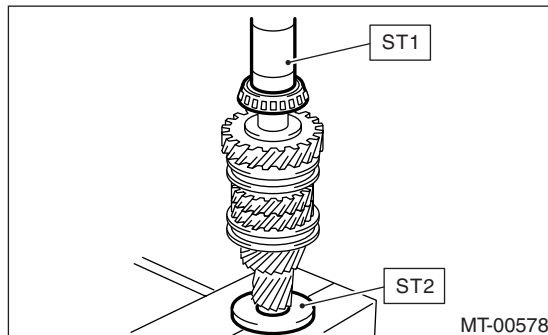
27) Using the ST, install the inner bearing inner race.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



28) Using the ST, install the retainer and outer bearing inner race.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

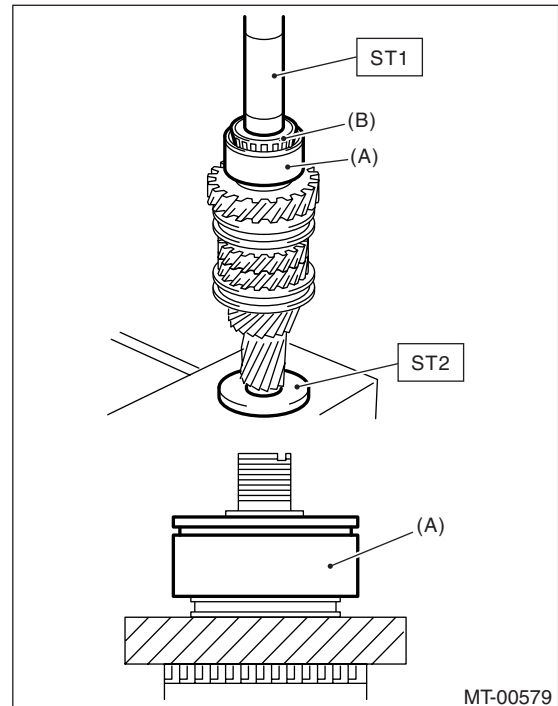
CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

- Make sure to install the retainer in proper direction.

- Press in until there is no backlash in retainer and where bearing is smoothly turned by hand.



(A) Retainer

(B) Outer bearing inner race

29) Make sure the taper roller bearing is smoothly turned by hand. If not, replace the taper roller bearing as a set and reassemble.

30) Install the lock washer and new lock nut.

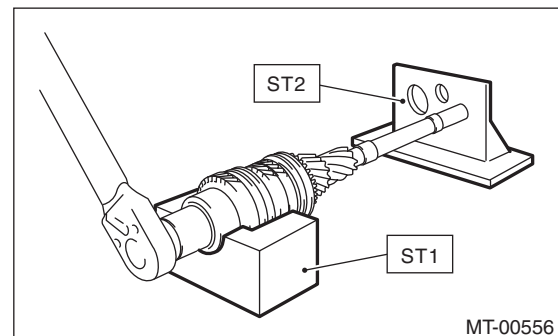
31) Set the main shaft assembly to ST, then tighten the lock nut.

ST1 18665AA000 HOLDER

ST2 18664AA000 BASE

Tightening torque:

392 N·m (40.0 kgf-m, 289 ft-lb)



32) Using the ST, caulk four portions on the lock nut to obtain dimension A 27 ± 0.3 mm (1.06 ± 0.01 in).

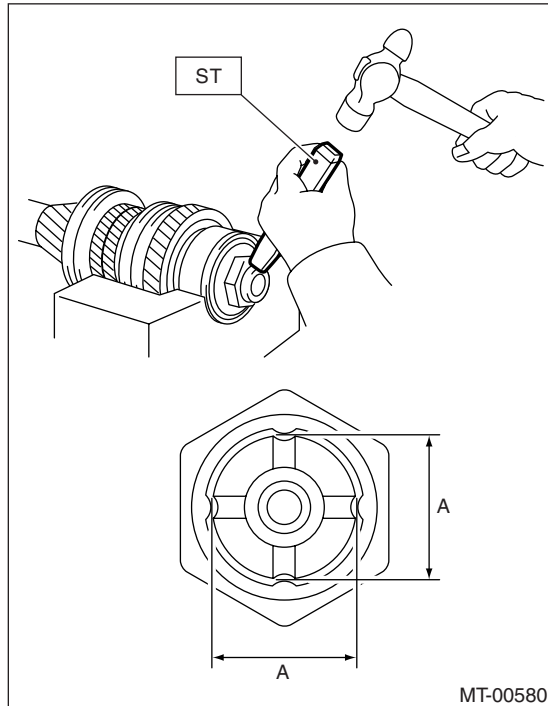
ST 18668AA000 PUNCH

Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Do not crack the caulking part of lock nut.



E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearing

Replace the bearings in the following cases.

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned
- Bearings having other defects

2) Bushing (each gear)

Replace the bushings in the following case.

- When the sliding surface is damaged or abnormally worn.

3) Gears

Replace the gears in the following cases.

- Gear teeth surfaces are broken or excessively worn.
- Parts that contact the baulk ring is damaged.
- The inner surface of gear is damaged.

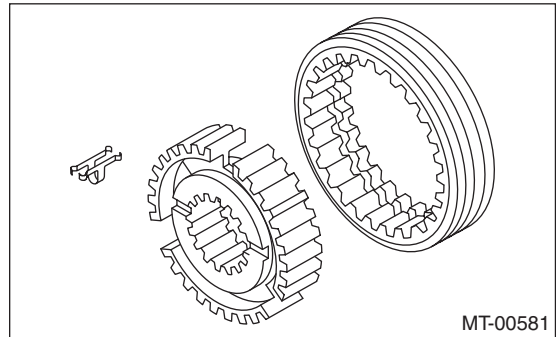
4) Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following case.

- Worn, rusted and damaged baulk ring

5) Shifting insert key

Replace the shifting insert key if deformed, excessively worn or defective in any way.



F: ADJUSTMENT

1. SELECTION OF MAIN SHAFT SNAP RING AND WASHER

NOTE:

Perform the following procedures when:

- Replacing the 1st to 6th driven gear.
- Replacing the 1st and 2nd synchro ring assembly.
- Replacing the ball bearing.
- Replacing the adapter plate.
- Replacing the driven shaft.

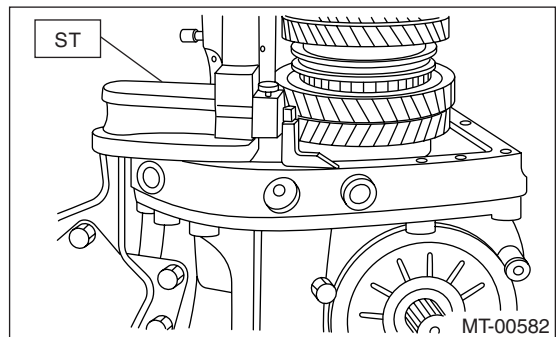
1) Insert the drive pinion assembly in adapter plate.

NOTE:

Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.

ST 18853AA000 HEIGHT GAUGE



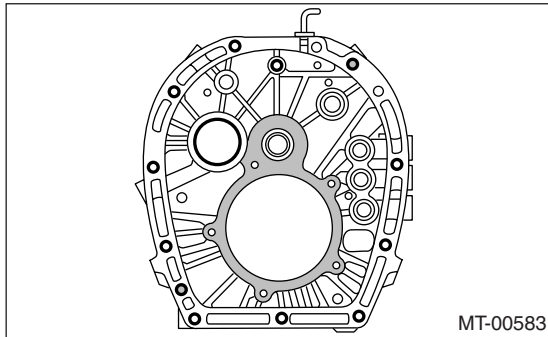
NOTE:

- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.

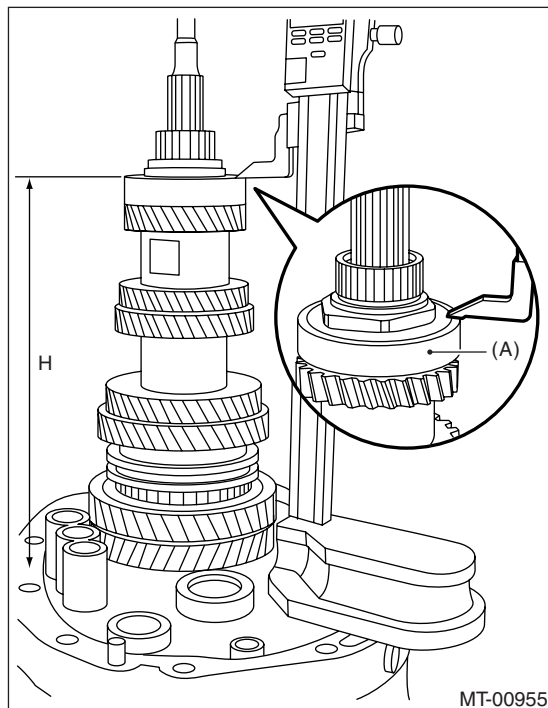
Main Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

- Do not place the height gauge on shaded area in the figure during measurement.



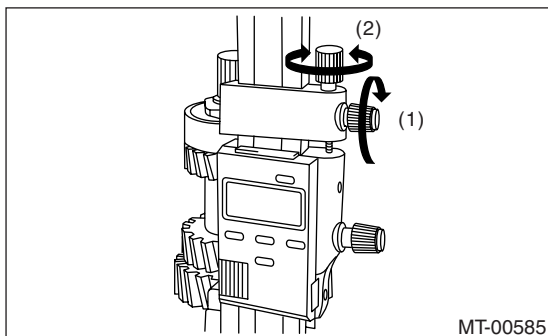
- 3) Measure the height to edge surface of ball bearing (height H).



(A) Ball bearing

NOTE:

Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of bearing.



Measure the five points of ball bearing by turning every approx. 120°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

- 4) According to measurement value, select the snap ring and washer from the following table.

Snap ring

H: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	805072010	1.65 (0.065)
271.41 — 271.98 (10.69 — 10.71)	805072011	1.95 (0.077)
271.99 — 272.56 (10.71 — 10.73)	805072012	2.25 (0.089)

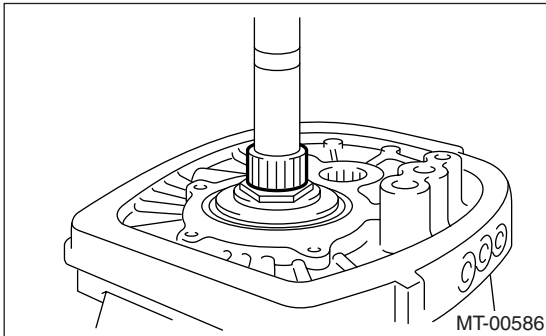
Washer

H: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	803067012	1.6 (0.063)
271.41 — 271.98 (10.69 — 10.71)	803067011	1.3 (0.051)
271.99 — 272.56 (10.71 — 10.73)	803067010	1.0 (0.039)

20. Driven Gear Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove the driven gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
- 10) Remove the needle bearing.



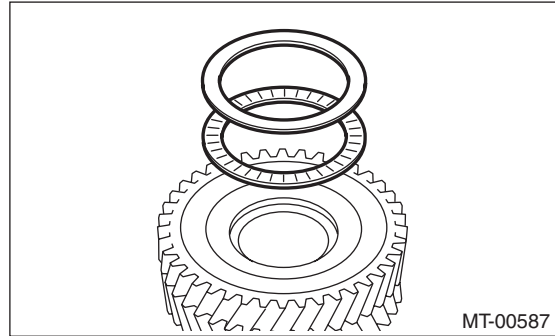
- 11) Remove the thrust needle bearing.

B: INSTALLATION

- 1) Adjust the main shaft snap ring. <Ref. to 6MT-80, ADJUSTMENT, Main Shaft Assembly.>
- 2) Adjust the 1st-2nd shifter rod. <Ref. to 6MT-113, ADJUSTMENT, Shifter Fork and Rod.>
- 3) Install the thrust needle bearing.

NOTE:

Make sure to install the thrust needle bearing in proper direction.



- 4) Install the 1st needle bearing.
- 5) Install the driven gear assembly. <Ref. to 6MT-69, INSTALLATION, Main Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
- 7) Adjust backlash at axial direction of driven gear assembly. <Ref. to 6MT-88, ADJUSTMENT, Driven Gear Assembly.>
- 8) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>
- 9) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
- 10) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
- 11) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>
- 12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>
- 13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

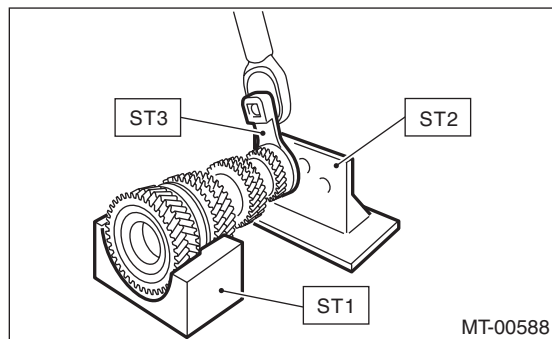
Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

- 1) Secure the ST on workbench.
ST 18664AA000 BASE
- 2) Lift the caulking of lock nut.
- 3) Install the ST3 to lock nut, set the driven gear assembly on ST, then remove the lock nut.
ST1 18666AA000 HOLDER
ST2 18664AA000 BASE

Driven Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

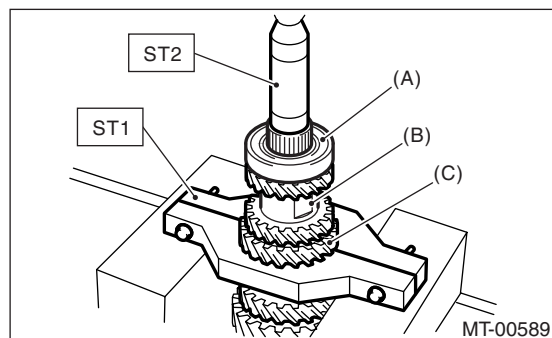
ST3 18620AA000 ADAPTER WRENCH



4) Install the ST1 to 4th gear, then remove the ball bearing, 5th-6th driven gear and 3rd-4th driven gear.

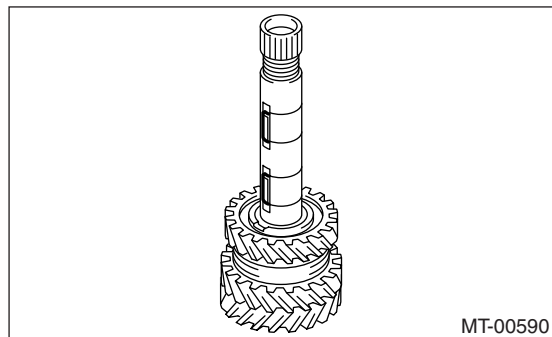
ST1 18723AA000 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

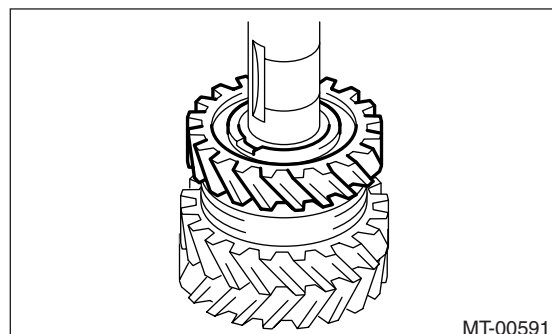


- (A) Ball bearing
- (B) 5th-6th driven gear
- (C) 3rd-4th driven gear

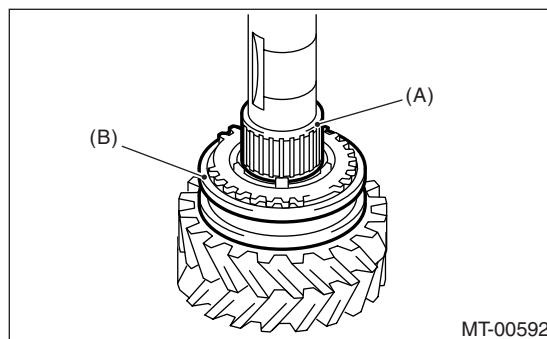
5) Remove the driven gear key.



6) Remove the 2nd gear.

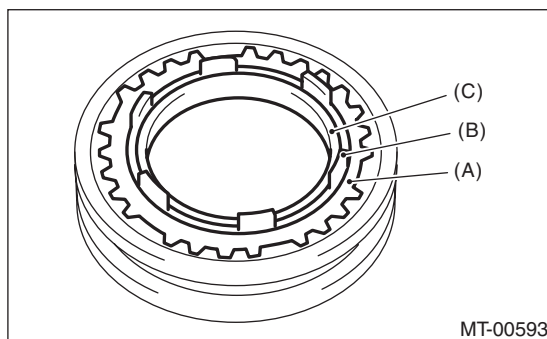


7) Remove the needle bearing and 1st-2nd sleeve.



- (A) Needle bearing
- (B) 1st-2nd sleeve

8) Remove the outer baulk ring, 2nd synchro cone and inner baulk ring.



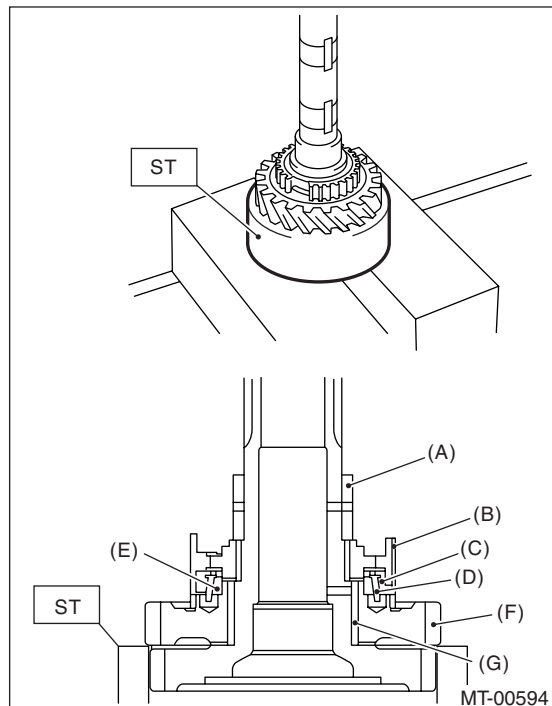
- (A) Outer baulk ring
- (B) 2nd synchro cone
- (C) Inner baulk ring

9) Using the ST, remove each part.

Driven Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

ST 18754AA000 REMOVER



- (A) 2nd bushing
- (B) 1st-2nd hub
- (C) Outer baulk ring
- (D) 1st synchro cone
- (E) Inner baulk ring
- (F) 1st driven gear
- (G) 1st needle bearing

D: ASSEMBLY

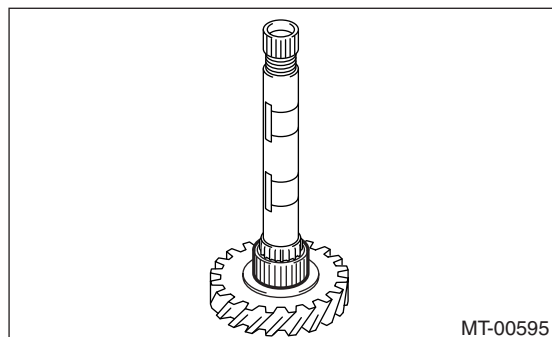
NOTE:

Replace the following parts as a set.

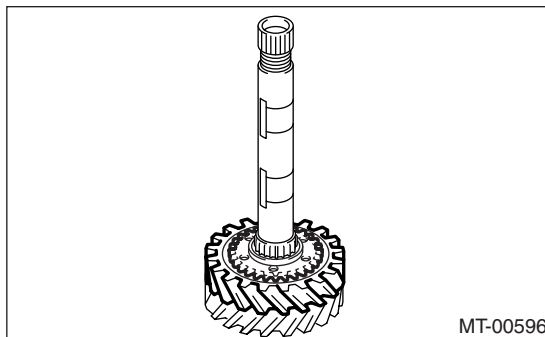
- Sleeve and hub
- Outer baulk ring, 1st synchro cone, inner baulk ring
- Outer baulk ring, 2nd synchro cone, inner baulk ring

1) Sufficiently apply gear oil to the drive shaft, 1st needle bearing and inner periphery of 1st driven gear.

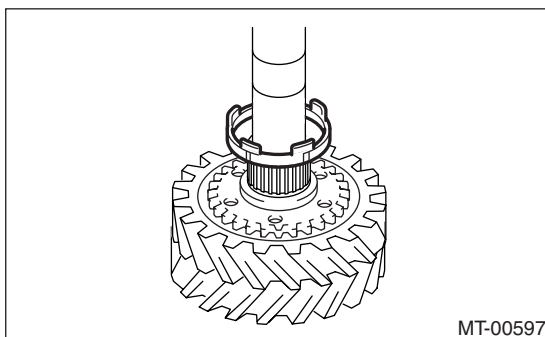
2) Install the 1st needle bearing.



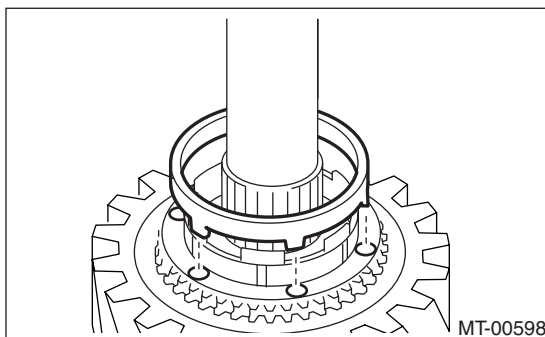
3) Install the 1st driven gear to driven shaft.



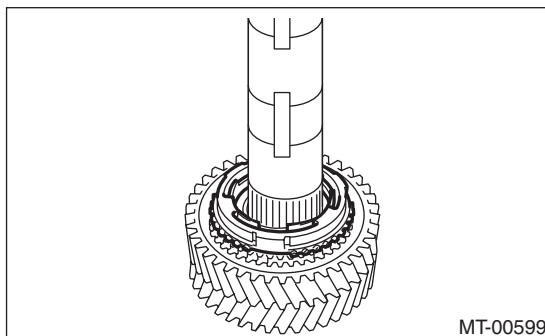
4) Install the inner baulk ring.



5) Align protrusion portions of the 1st synchro cone to the holes of 1st drive gear to install.



6) Install the outer baulk ring.



7) Install the 1st-2nd hub.

NOTE:

- Align the protrusion portion of outer baulk ring and cutout portion of 1st-2nd hub, then install.

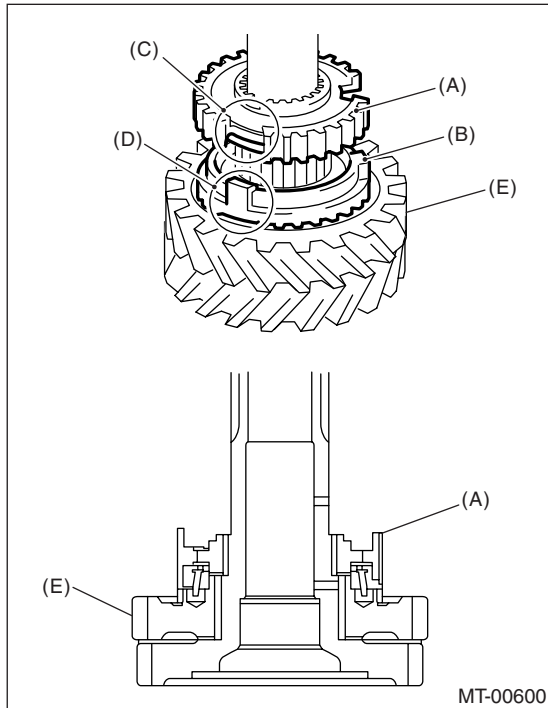
Driven Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

- Make sure to install the 1st-2nd hub in proper direction.

NOTE:

Angle of each shifting insert key is 120° apart.



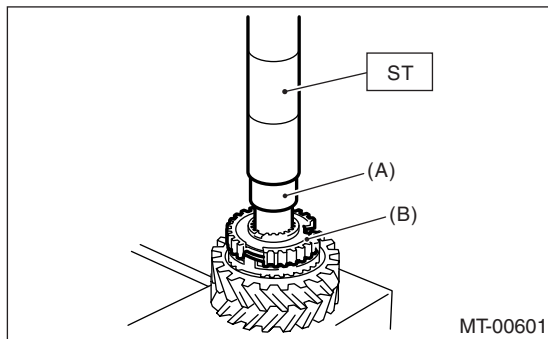
- (A) 1st-2nd hub
- (B) Outer baulk ring
- (C) Cutout portion of 1st-2nd hub
- (D) Protrusion portion of outer baulk ring
- (E) 1st driven gear

8) Using the ST, install the 2nd hub.

ST 18654AA000 INSTALLER

CAUTION:

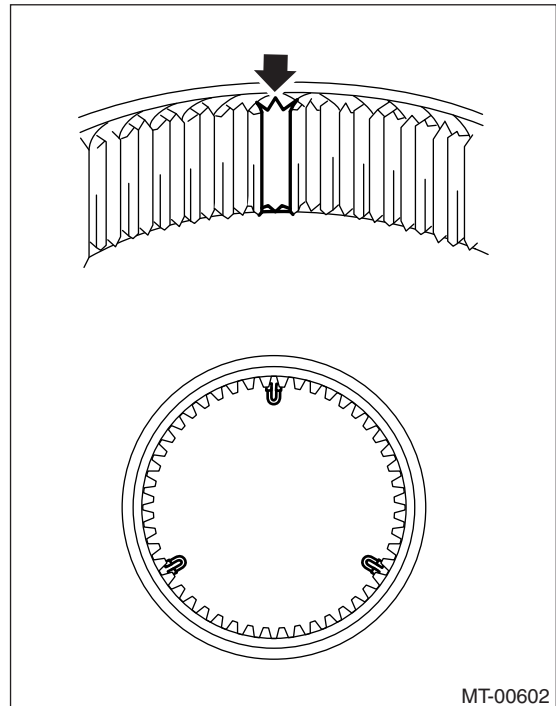
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



- (A) 2nd bushing
- (B) 1st-2nd hub

9) Make sure the 1st drive gear is smoothly turned by hand. If not, reassemble.

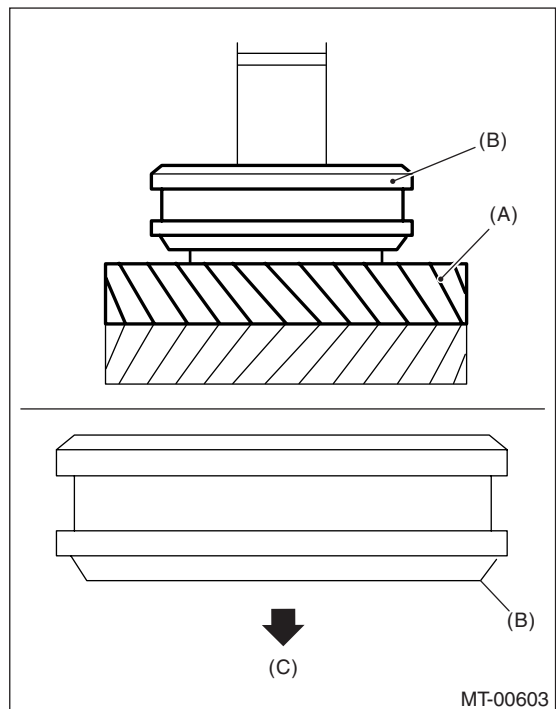
10) Install the shifting insert key in proper place of 1st-2nd sleeve.



11) Install the 1st-2nd sleeve to 1st-2nd hub.

NOTE:

Make sure to install the 1st-2nd sleeve in proper direction.

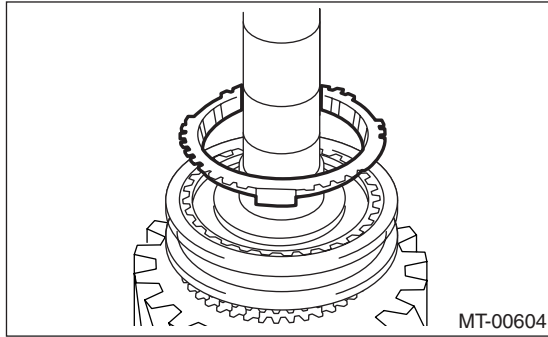


- (A) 1st driven gear
- (B) 1st-2nd sleeve
- (C) 1st driven gear side

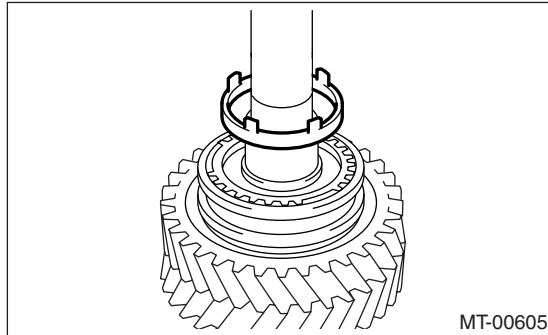
Driven Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

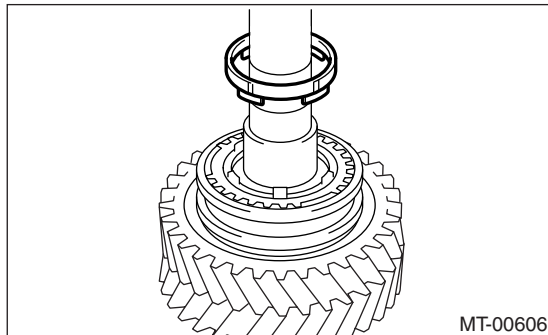
12) Install the outer baulk ring.



13) Install the 2nd synchro cone.



14) Install the inner baulk ring.

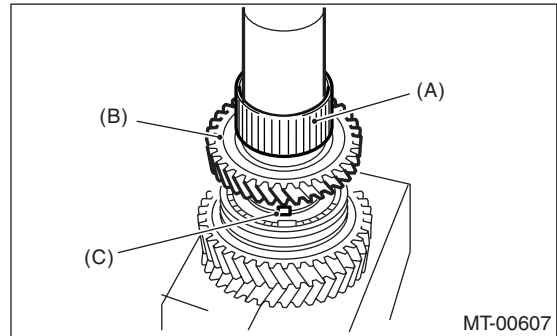


15) Sufficiently apply gear oil to the bushing, 2nd needle bearing and inner periphery of 2nd drive gear.

16) Install the 2nd needle bearing and 2nd driven gear.

NOTE:

Align the protrusion portion of 2nd synchro cone with 2nd driven gear hole, then install them.

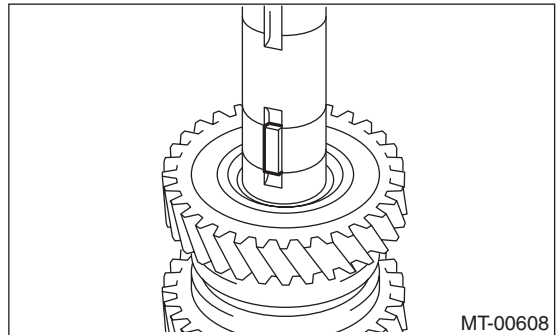


(A) 2nd needle bearing

(B) 2nd driven gear

(C) Protrusion portion of 2nd synchro cone

17) Install the key.



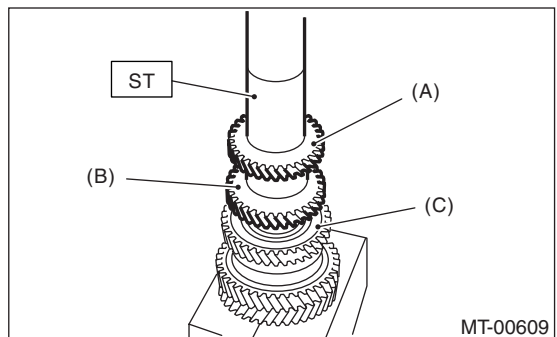
18) Using the ST, install the 3rd-4th driven gear.
ST 18654AA000 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

- Make sure to install the 3rd-4th driven gear in proper direction.
- Align the groove of 3rd-4th driven gear with key.



(A) 4th gear

(B) 3rd gear

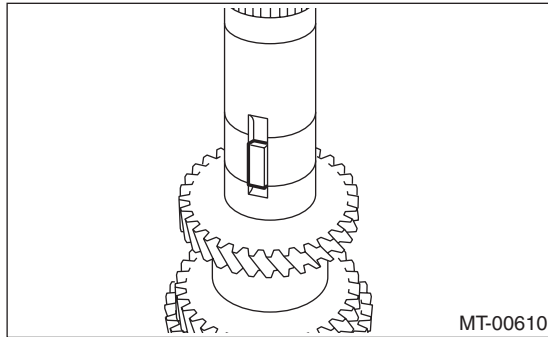
(C) 2nd gear

Driven Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

19) Make sure the 2nd driven gear is smoothly turned by hand. If not, reassemble.

20) Install the key.



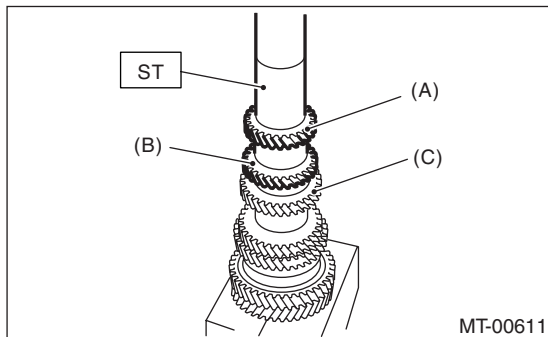
21) Using the ST, install the 5th-6th driven gear.
ST 18654AA000 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

- Make sure to install the 5th-6th driven gear in proper direction.
- Align the groove of 5th-6th driven gear with key.



- (A) 6th gear
(B) 5th gear
(C) 4th gear

22) Using the ST, install the ball bearing.

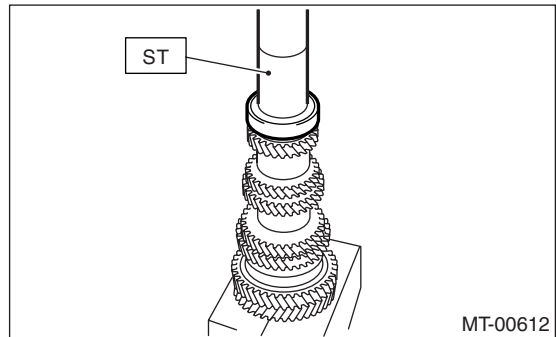
ST 18654AA000 INSTALLER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:

Make sure to install the ball bearing in proper direction.



23) Make sure the ball bearing is smoothly turned by hand. If not, reassemble.

24) Install a new lock nut.

25) Install the ST3 to lock nut, then install the ST to driven gear assembly and tighten lock nut.

ST1 18666AA000 HOLDER

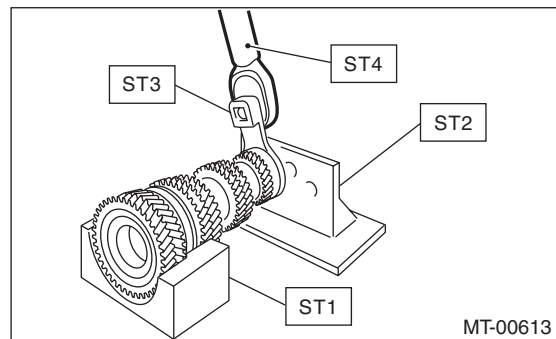
ST2 18664AA000 BASE

ST3 18620AA000 ADAPTER WRENCH

ST4 18852AA000 TORQUE WRENCH

Tightening torque:

530 N·m (54.0 kgf-m, 391 ft-lb)



NOTE:

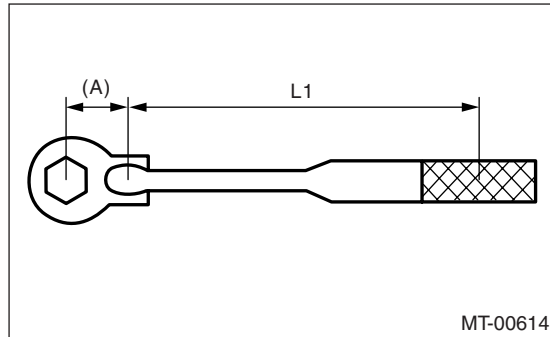
If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut.

$$T = L1 / (0.1 + L1) \times 570$$

Driven Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

T	N·m (kgf-m, ft-lb)	Setting value of torque wrench
L1	m (in)	Torque wrench length
0.1 m (3.94 in)		ST length
570 N·m (58.1 kgf-m, 420 ft-lb)		Tightening torque of lock nut



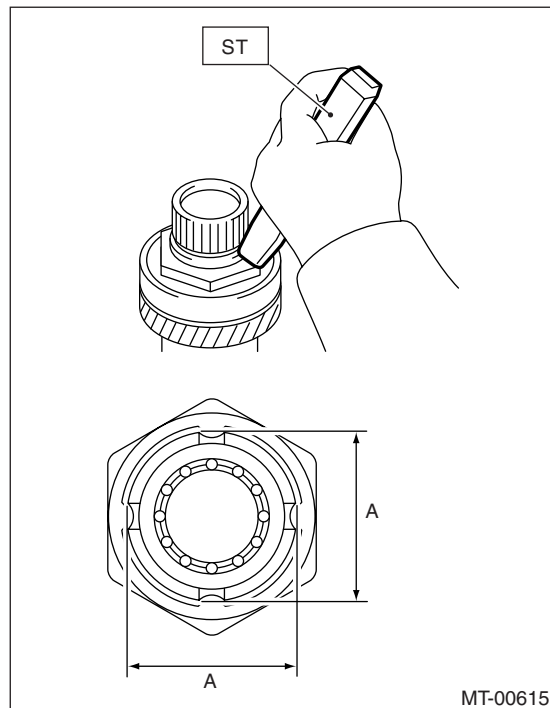
(A) 0.1 m (3.94 in)

26) Using the ST, caulk four portions on the lock nut to obtain dimension A 44 ± 0.5 mm (1.73 ± 0.02 in).

ST 18669AA000 PUNCH DRIVEN SHAFT

NOTE:

Do not crack the caulking part of lock nut.



E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearing

Replace the bearings in the following cases.

- Worn, rusted and damaged bearing

- Bearings that fail to turn smoothly or make abnormal noise when turned

- Bearings having other defects

2) Bushing (each gear)

Replace the bushings in the following case.

- When the sliding surface is damaged or abnormally worn.

3) Gears

Replace the gears in the following cases.

- Gear teeth surfaces are broken or excessively worn.
- Parts that contact the baulk ring is damaged.
- The inner surface of gear is damaged.

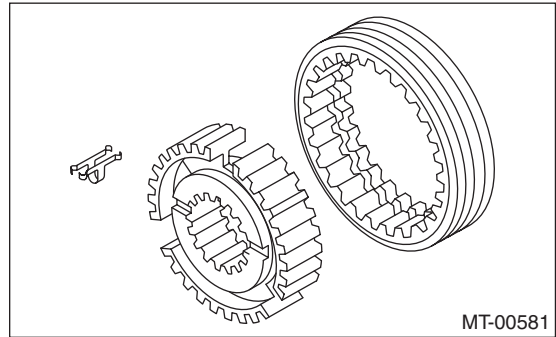
4) Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following case:

- Worn, rusted and damaged baulk ring

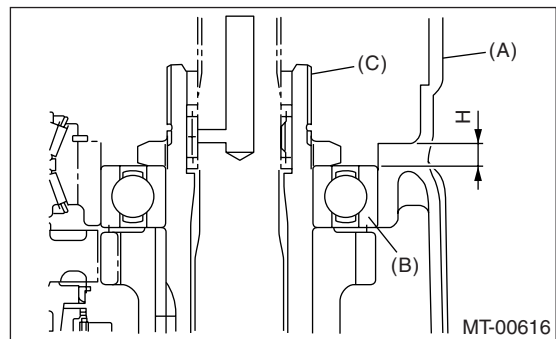
5) Shifting insert key

Replace the shifting insert key if deformed, excessively worn or defective in any way.



F: ADJUSTMENT

1) Measure length "H", which is from transmission case and oil pump cover mating surface to ball bearing edge.



(A) Transmission case

(B) Ball bearing

(C) Driven gear ASSY

2) Using the following equation, calculate the washer thickness of driven gear assembly.

$$T = H - \{5.8\pm0.05 \text{ mm (0.23}\pm0.002 \text{ in)}\} - \{0.1 \text{ to } 0.3 \text{ mm (0.0039 to 0.0118 in)}\}$$

Driven Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

t	Thickness of washer
H	Length from transmission case and oil pump cover mating surface to ball bearing edge
5.8±0.05 mm (0.23±0.002 in)	Thickness of collar
0.1 to 0.3 mm (0.0039 to 0.0118 in)	Backlash specification at axial direction of driven gear assembly

3) Select 0 to 3 washers from the following table to adjust backlash closest to specification.

Backlash specification at axial direction of driven gear assembly:

0.1 — 0.3 mm (0.0039 — 0.0118 in)

Washer	
Part No.	Thickness t mm (in)
803072030	0.15 (0.0059)
803072031	0.30 (0.0118)
803072032	0.45 (0.0177)
803072033	0.60 (0.0236)

Reverse Idler Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

21.Reverse Idler Gear Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove the reverse idler gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>

B: INSTALLATION

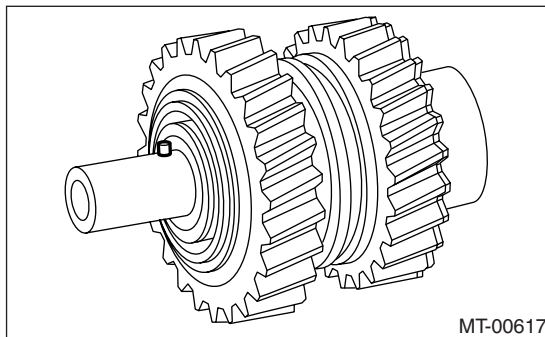
- 1) Select the reverse fork rod. <Ref. to 6MT-113, ADJUSTMENT, Shifter Fork and Rod.>
- 2) Install the reverse idler gear assembly. <Ref. to 6MT-69, INSTALLATION, Main Shaft Assembly.>
- 3) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
- 4) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>
- 5) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
- 6) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
- 7) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>
- 8) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>
- 9) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

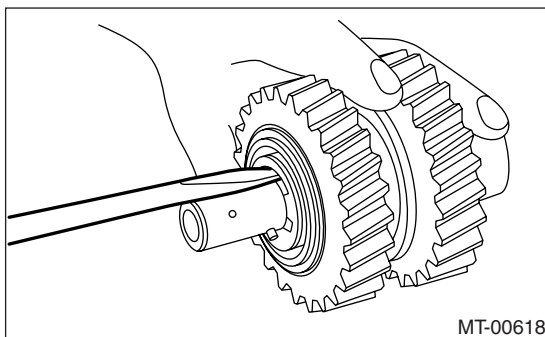
NOTE:

Sleeve and reverse gear engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

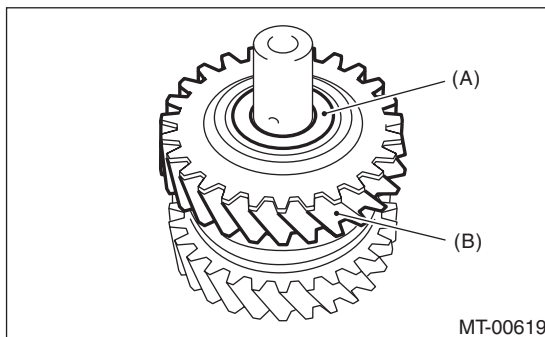
- 1) Remove the spring pin.



- 2) Remove the snap ring.

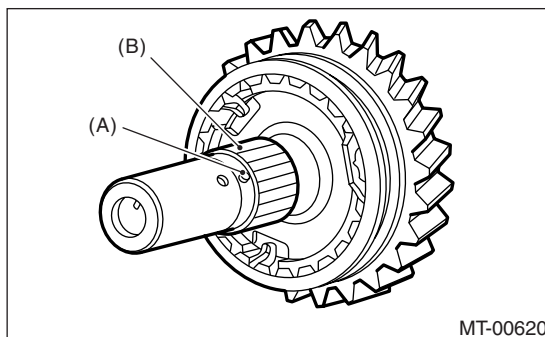


- 3) Remove the washer and reverse idler gear.



- (A) Washer
(B) Reverse idler gear

- 4) Remove the knock pin and reverse idler gear needle bearing.



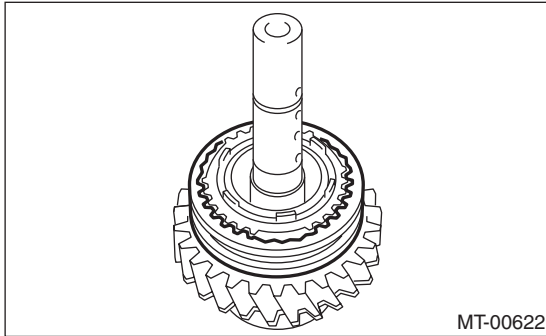
- (A) Knock pin
(B) Reverse idler gear needle bearing

Reverse Idler Gear Assembly

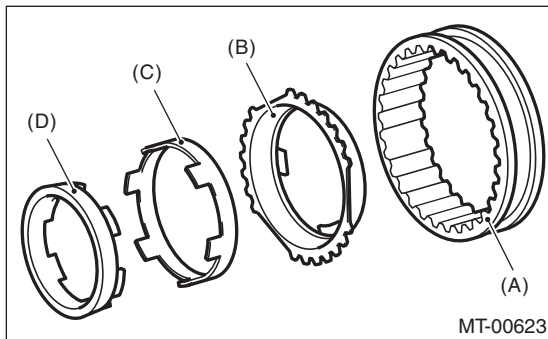
MANUAL TRANSMISSION AND DIFFERENTIAL

5) Remove the collar.

6) Remove the reverse sleeve.

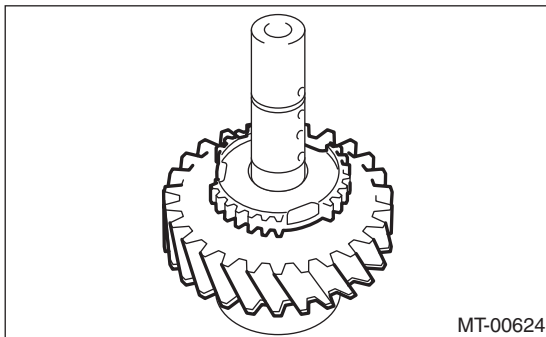


7) Remove the outer baulk ring, reverse synchro cone and inner baulk ring from reverse sleeve.

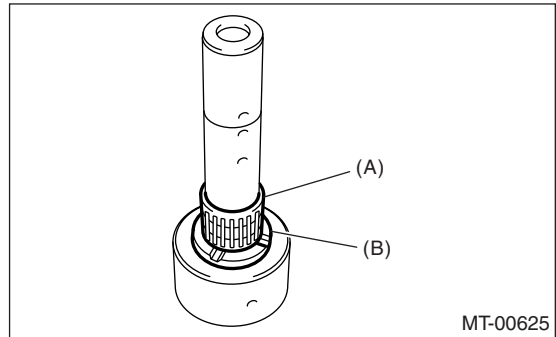


- (A) Reverse sleeve
- (B) Outer baulk ring
- (C) Reverse synchro cone
- (D) Inner baulk ring

8) Remove the reverse idler gear No. 2.

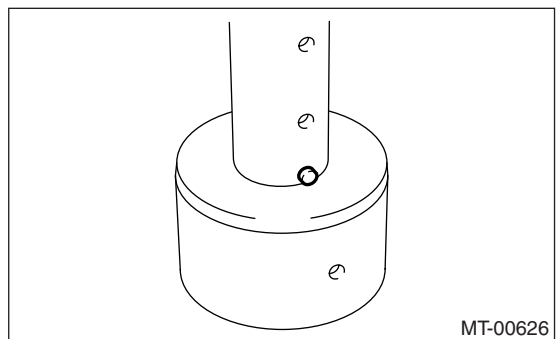


9) Remove the washer and needle bearing.

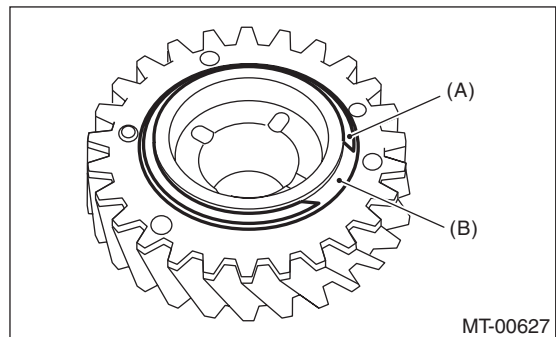


- (A) Needle bearing
- (B) Washer

10) Remove the knock pin.



11) Remove the snap ring and friction plate from reverse gear.

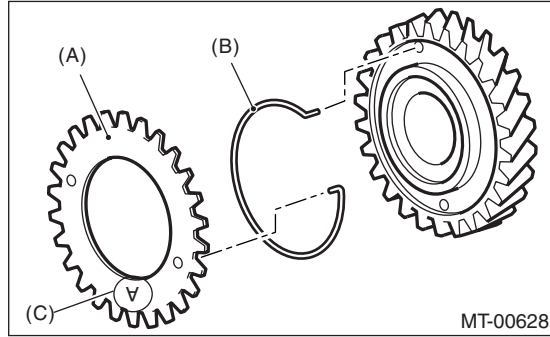


- (A) Snap ring
- (B) Friction plate

Reverse Idler Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

12) Remove the sub gear and spring.



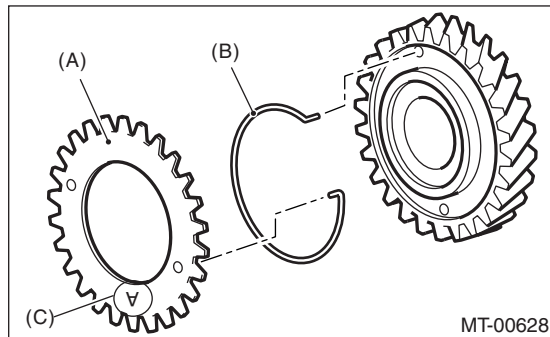
- (A) Sub gear
- (B) Spring
- (C) Punch mark (mark A)

D: ASSEMBLY

1) Install the sub gear and spring.

NOTE:

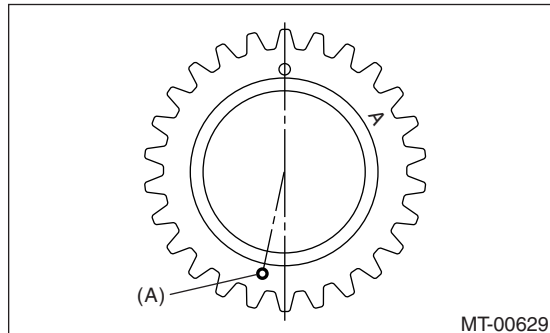
- Install the spring with white marking on hook part facing to sub gear side.
- Install the sub gear with punch mark (mark A) facing outside.



- (A) Sub gear
- (B) Spring
- (C) Punch mark (mark A)

NOTE:

- Install the spring and sub gear, taking care to install the sub gear installation hole in proper direction.

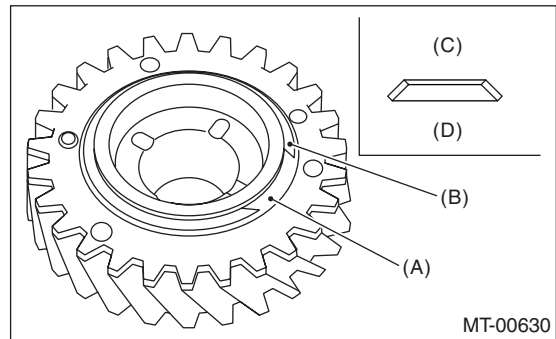


- (A) Installation hole

2) Install the friction plate and snap ring.

NOTE:

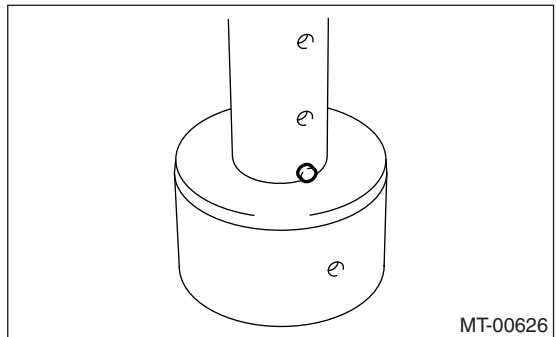
Make sure to install the friction plate in proper direction.



- (A) Friction plate
- (B) Snap ring
- (C) Snap ring side
- (D) Sub gear side

3) Sufficiently apply gear oil to the shaft, needle bearing and inner periphery of reverse drive gear.

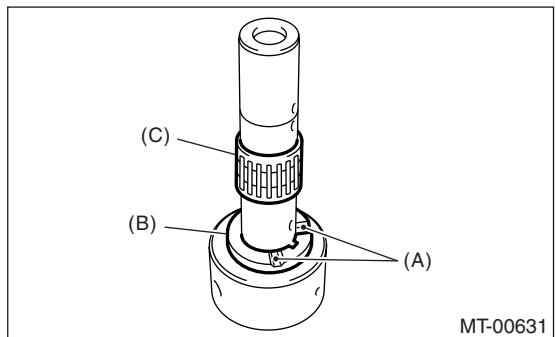
4) Install the knock pin.



5) Install the washer and needle bearing.

NOTE:

Install the washer with groove facing to reverse idler gear.

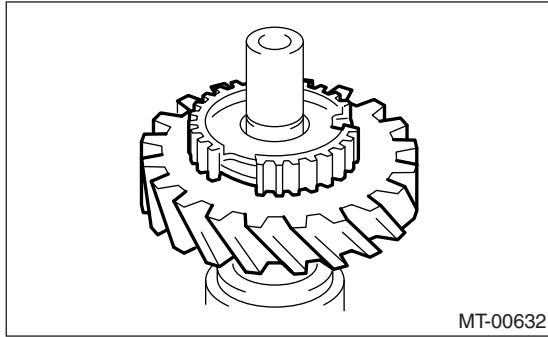


- (A) Groove
- (B) Washer
- (C) Needle bearing

Reverse Idler Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

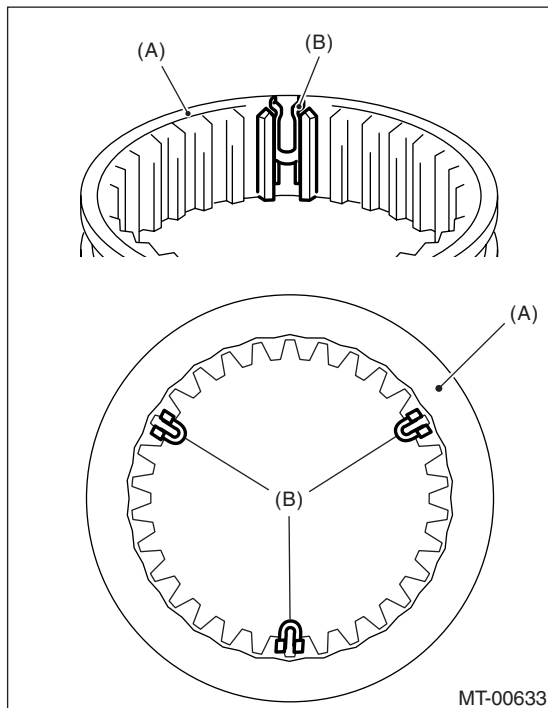
6) Install the reverse idler gear No. 2.



7) Install the shifting insert key in proper place of reverse sleeve.

NOTE:

Angle of each shifting insert key is 120° apart.

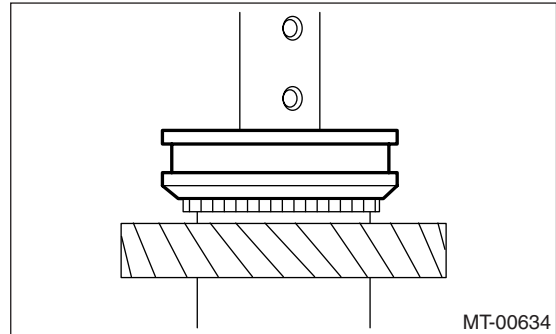


- (A) Reverse sleeve
- (B) Shifting insert key

8) Install the reverse sleeve to reverse idler gear No. 2.

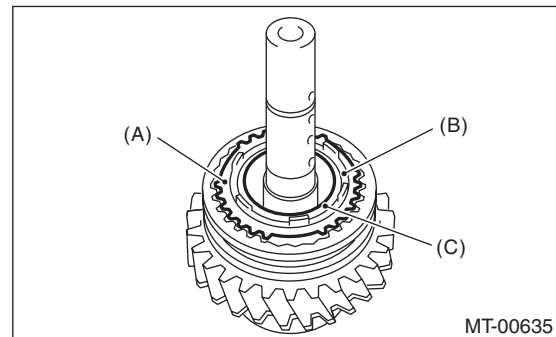
NOTE:

Make sure to install the reverse sleeve in proper direction.



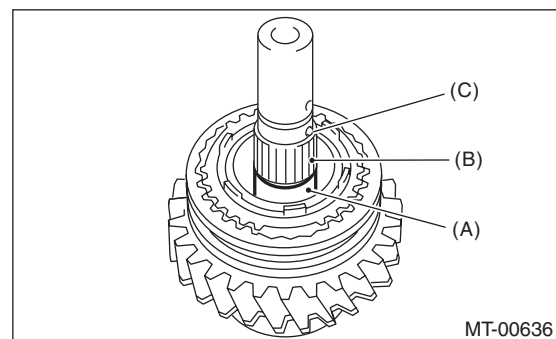
9) Sufficiently apply gear oil to the collar, needle bearing and inner periphery of reverse drive gear.

10) Install the outer baulk ring, reverse synchro cone and inner baulk ring.



- (A) Outer baulk ring
- (B) Reverse synchro cone
- (C) Inner baulk ring

11) Install the collar and needle bearing, then install the knock pin.

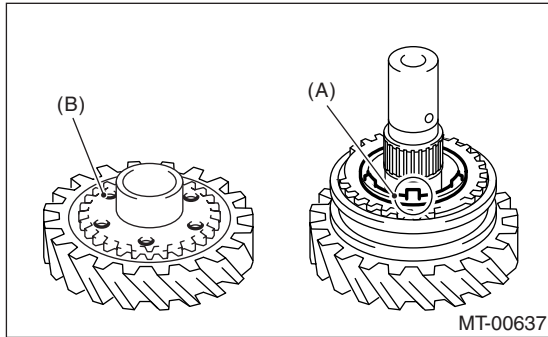


- (A) Collar
- (B) Needle bearing
- (C) Knock pin

Reverse Idler Gear Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

12) Align the protrusion portion of reverse synchro cone with reverse idler gear hole, then install the reverse idler gear.

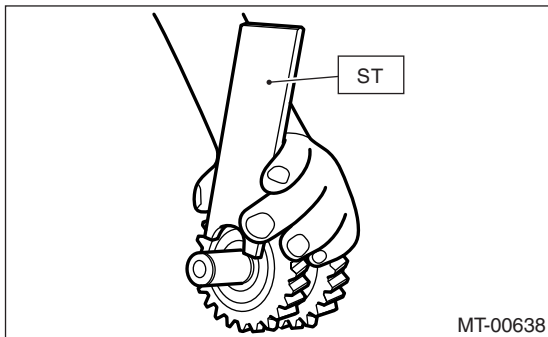


(A) Protrusion portion of reverse synchro cone
(B) Reverse idler gear hole

13) Install the washer with groove facing to reverse idler gear.

14) Using the ST, install the snap ring.

ST 18672AA000 GUIDE CLIP



15) Inspect and adjust the clearance between snap ring and washer. <Ref. to 6MT-94, INSPECTION, Reverse Idler Gear Assembly.>

16) Install a new spring pin.

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace the bearings in the following cases.

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned
- Bearings having other defects

2) Bushing (each gear)

Replace the bushings in the following case:

- When the sliding surface is damaged or abnormally worn.

3) Gears

Replace the gears in the following cases:

- The gear teeth surfaces are broken or excessively worn.
- The parts that contact the baulk ring is damaged.
- The inner surface of gear is damaged.

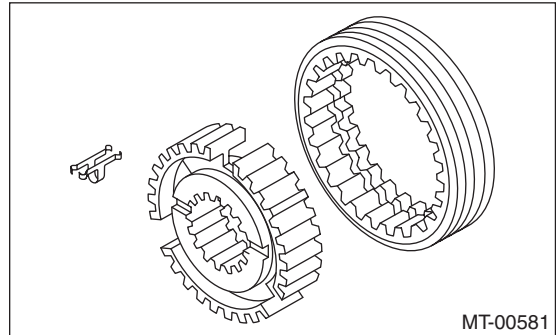
4) Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following case:

- Worn, rusted and damaged baulk ring

5) Shifting insert key

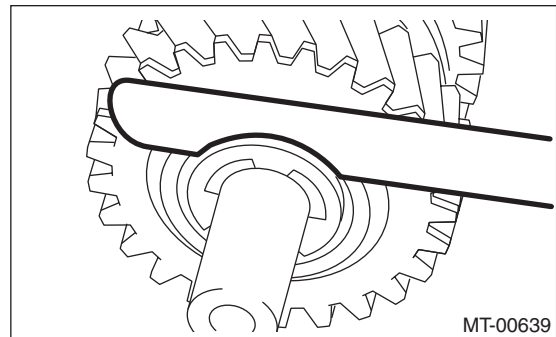
Replace the shifting insert key if deformed, excessively worn or defective in any way.



6) Inspect the clearance between snap ring and washer.

Specification of clearance:

0.1 — 0.3 mm (0.0039 — 0.0118 in)



Select and replace the snap ring from the following table if clearance is out of specification.

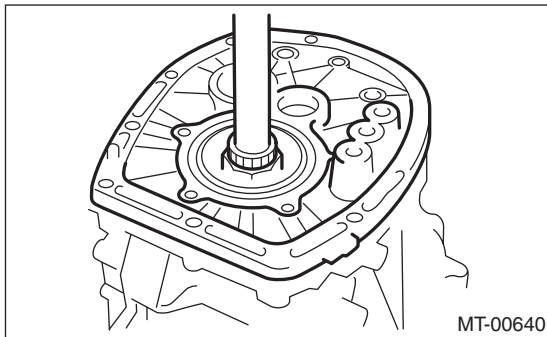
Snap ring	
Parts No.	Thickness mm (in)
031319000	1.50 (0.059)
805019030	1.60 (0.062)
805019010	1.72 (0.068)

Inspect the clearance again after replacing snap ring.

22. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly.

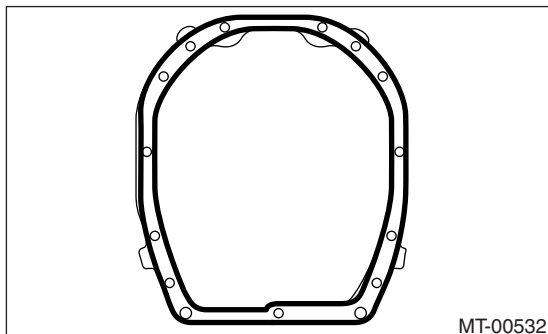


B: INSTALLATION

- 1) Completely remove the remaining gasket on drive plate and clutch housing.
- 2) Apply liquid gasket to the clutch housing.

Liquid gasket:

THREE BOND 1215 (Part No. 004403007)



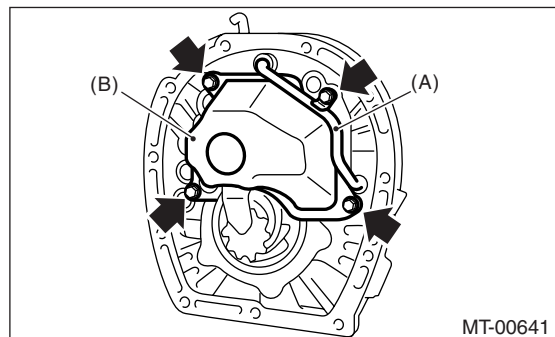
- 3) Install each gear assembly. <Ref. to 6MT-69, INSTALLATION, Main Shaft Assembly.>
- 4) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
- 5) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>
- 6) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
- 7) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
- 8) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>
- 9) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>
- 10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

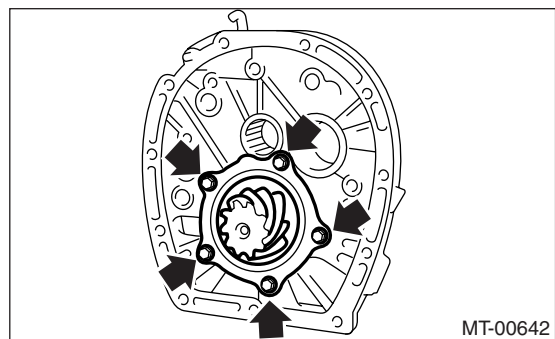
Replace the drive pinion shaft as a set with hypoid driven gear.

- 1) Remove the pipe and oil chamber.



- (A) Pipe
(B) Oil chamber

- 2) Remove the drive pinion shaft and shim from adapter plate.



- 3) Secure the ST on workbench.
ST 18664AA000 BASE
- 4) Lift the caulking of lock nut.

Drive Pinion Shaft Assembly

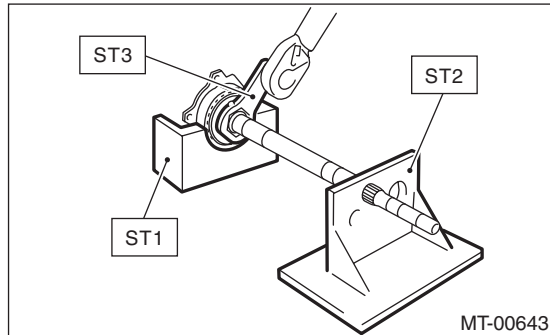
MANUAL TRANSMISSION AND DIFFERENTIAL

5) Install the ST3 to lock nut, then set drive pinion shaft to ST. Remove the lock nut and washer.

ST1 18667AA000 HOLDER

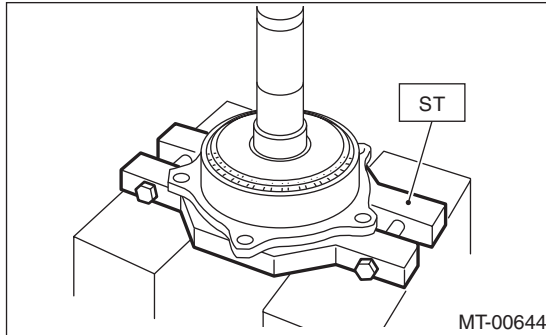
ST2 18664AA000 BASE

ST3 18621AA000 ADAPTER WRENCH



6) Using the ST, remove the taper roller bearing assembly.

ST 18723AA000 REMOVER



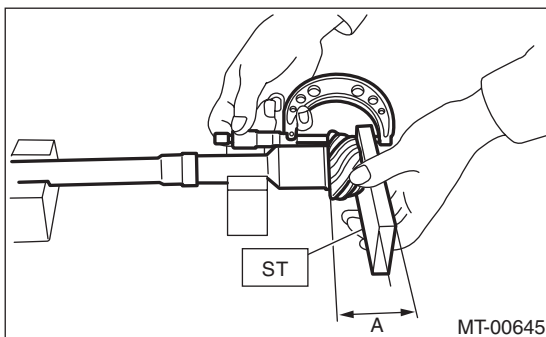
D: ASSEMBLY

1) Using the ST, measure dimension A of drive pinion.

NOTE:

Note dimension A for selection of drive pinion shim.

ST 398643600 GAUGE

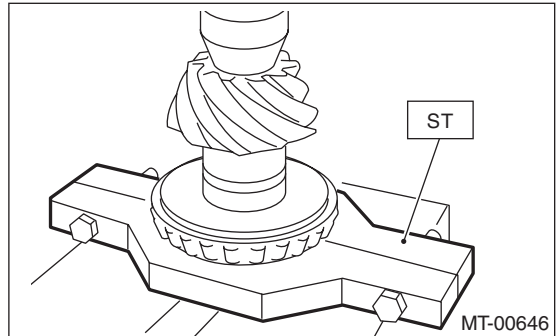


2) Install the inner bearing inner race to drive pinion shaft using ST and press.

ST 18723AA000 REMOVER

CAUTION:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

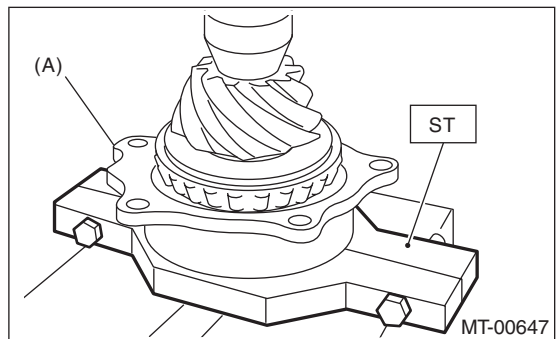


3) Install the retainer and outer bearing inner race to drive pinion shaft using ST and press.

ST 18723AA000 REMOVER

NOTE:

Press to the point where bearing is turned smoothly without slack.



(A) Retainer

4) Install the washer and a new lock nut.

5) Set the ST to drive pinion, then tighten the lock nut.

ST1 18667AA000 HOLDER

ST2 18664AA000 BASE

ST3 18621AA000 ADAPTER WRENCH

ST4 18852AA000 TORQUE WRENCH

NOTE:

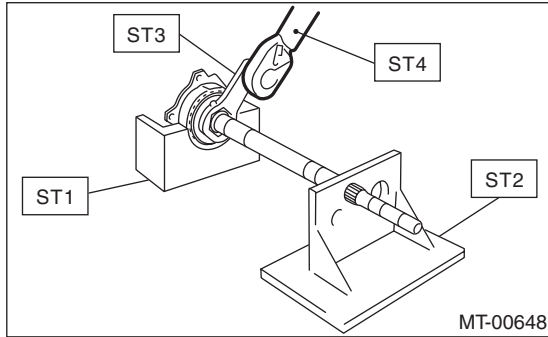
Tighten with the ST and torque wrench straight-lined.

Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

Tightening torque:

265 N·m (27.0 kgf-m, 195 ft-lb)

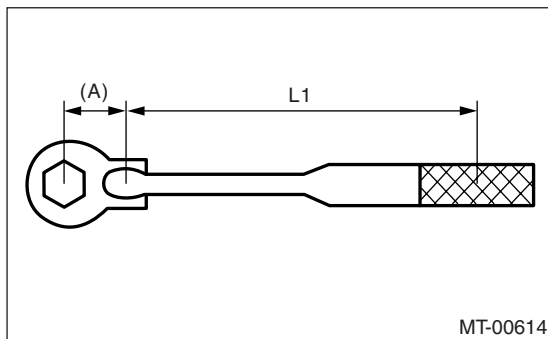


NOTE:

- If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut. Tighten with the ST and torque wrench straight-lined.

$$T = L1 / (0.1 + L1) \times 285$$

T	N·m (kgf-m, ft-lb)	Setting value of torque wrench
L1	m (in)	Torque wrench length
0.1 m (3.94 in)		ST length
285 N·m (29.0 kgf-m, 210 ft-lb)		Tightening torque of lock nut



(A) 0.1 m (3.94 in)

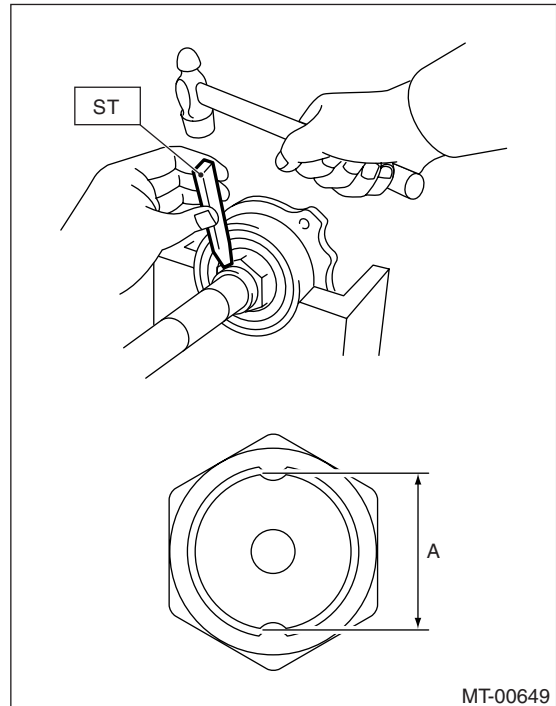
6) Measure the starting torque. <Ref. to 6MT-98, INSPECTION, Drive Pinion Shaft Assembly.>

7) Using the ST, caulk two portions on the lock nut to obtain dimension A 37 ± 0.5 mm (1.46 ± 0.02 in).

ST 18670AA000 PUNCH

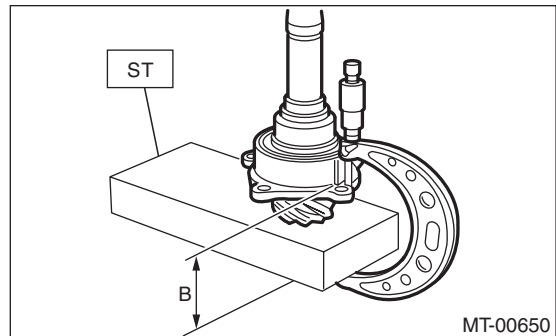
NOTE:

Do not crack the caulking part of lock nut.



8) Using the ST, measure dimension B of the drive pinion.

ST 398643600 GAUGE



9) Calculate the following formula, then select one or two pieces of drive pinion shim from the table below.

$$6.5 \pm 0.0625 \text{ mm} - (B - A) [0.26 \pm 0.0025 \text{ in} - (B - A)]$$

NOTE:

A: Measured value from step 1).

B: Measured value from step 8).

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA270	0.15 (0.0059)
32295AA280	0.175 (0.0069)
32295AA290	0.20 (0.0079)
32295AA300	0.225 (0.0089)
32295AA310	0.25 (0.0098)
32295AA320	0.275 (0.0108)

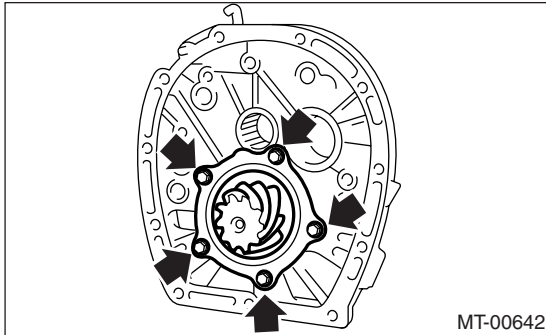
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

10) Apply gear oil to the side face of taper roller bearing, then install the drive pinion shaft and selected shim to adapter plate.

Tightening torque:

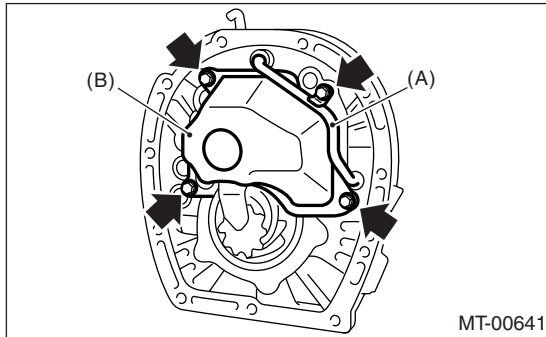
54 N·m (5.5 kgf-m, 39.8 ft-lb)



11) Install the oil chamber and pipe.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



(A) Pipe

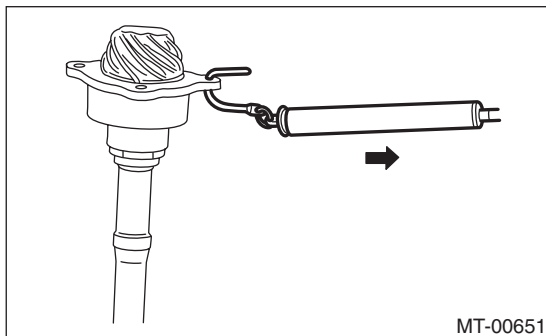
(B) Oil chamber

E: INSPECTION

1) Using the spring balancer, measure the starting torque. If the starting torque is out of specification, replace the taper roller bearing.

Starting torque:

0 — 0.95 N (0 — 0.097 kgf, 0 — 0.21 lb)



2) Gears

Replace the gears in the following case.

- Gear teeth surfaces are broken or excessively worn.

3) Bearings

Replace the bearings in the following cases.

- Worn, rusted and damaged bearing
- Bearings that fail to turn smoothly or make abnormal noise when turned

4) Adapter plate

Replace the adapter plate in the following cases.

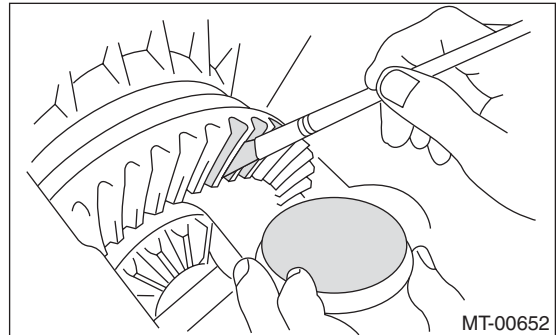
- Worn, rusted and damaged bearing
- Damaged adapter plate

5) Make sure the pipe and pipe chamber is not damaged or clogged. Repair or replace if damaged or clogged.

F: ADJUSTMENT

1) Inspect and adjust the backlash between hypoid driven gear and drive pinion. <Ref. to 6MT-105, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>

2) Apply a uniform thin coat of red lead on both teeth surfaces of three or four teeth of the hypoid driven gear.



3) Install the drive pinion shaft assembly to clutch housing, then tighten it with at least four bolts.

NOTE:

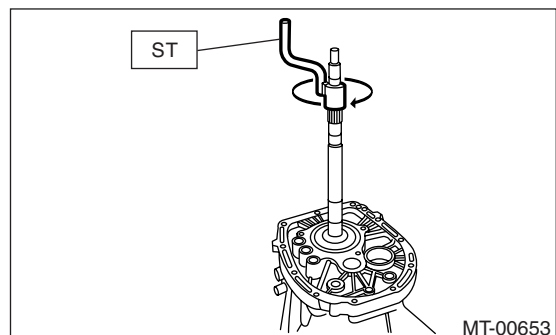
Install it with the remaining liquid gasket to prevent the mating surface of clutch housing and adapter plate from damaging.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

4) Using the ST, rotate several times.

ST 18631AA000 HANDLE



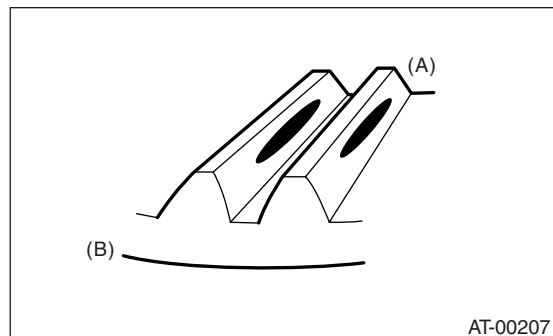
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Remove the drive pinion shaft assembly, and then check tooth contact. If it is inaccurate, adjust the backlash or thickness of shim.

- 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.]

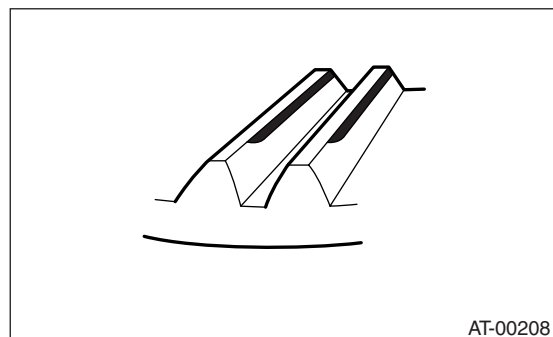


- (A) Toe side
(B) Heel side

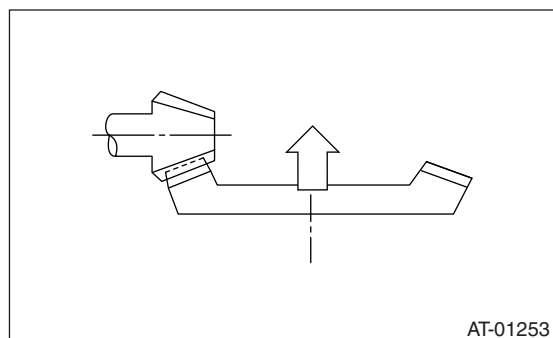
- Face contact

Checking item: Backlash is too large.

Contact pattern



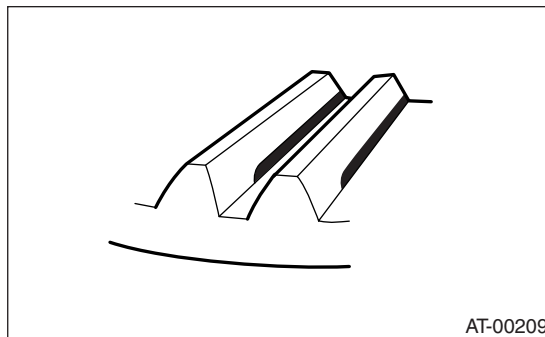
Corrective action: Verify the backlash again, and then adjust it.



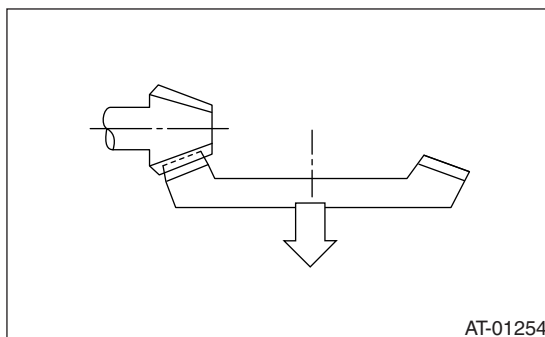
- Flank contact

Checking item: Backlash is too small.

Contact pattern



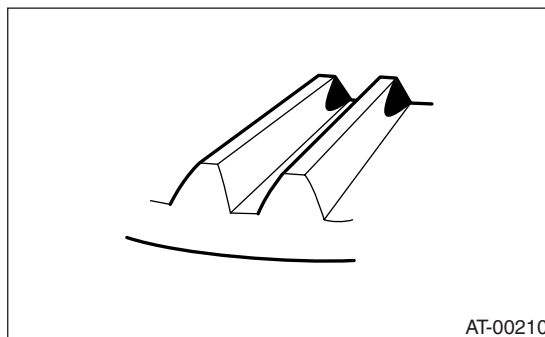
Corrective action: Verify the backlash again, and then adjust it.



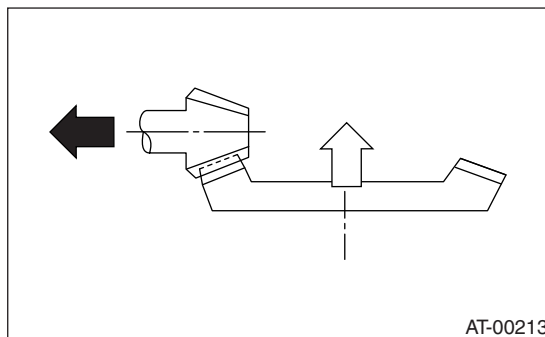
- Toe contact (Inside end contact)

Checking item: Contact areas is small.

Contact pattern



Corrective action: Reduce thickness of drive pinion shim in order to move drive pinion away from crown gear.



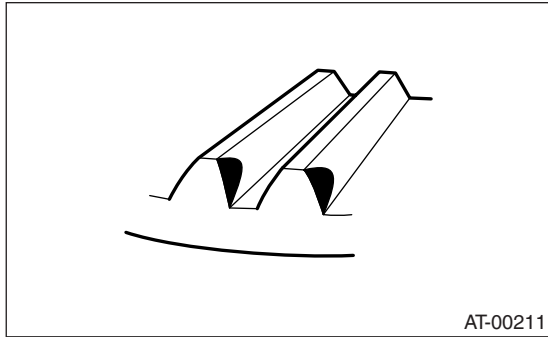
Drive Pinion Shaft Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

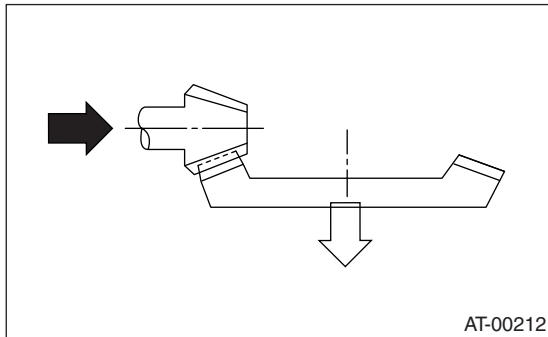
- Heel contact (Outside end contact)

Checking item: Contact areas is small.

Contact pattern



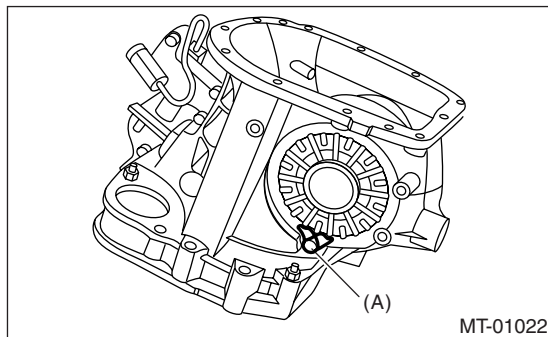
Corrective action: Increase thickness of drive pinion shim in order to bring drive pinion close to crown gear.



23.Front Differential Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.> <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly. <Ref. to 6MT-95, REMOVAL, Drive Pinion Shaft Assembly.>
- 11) Remove the lock plates on both side.



(A) Lock plate

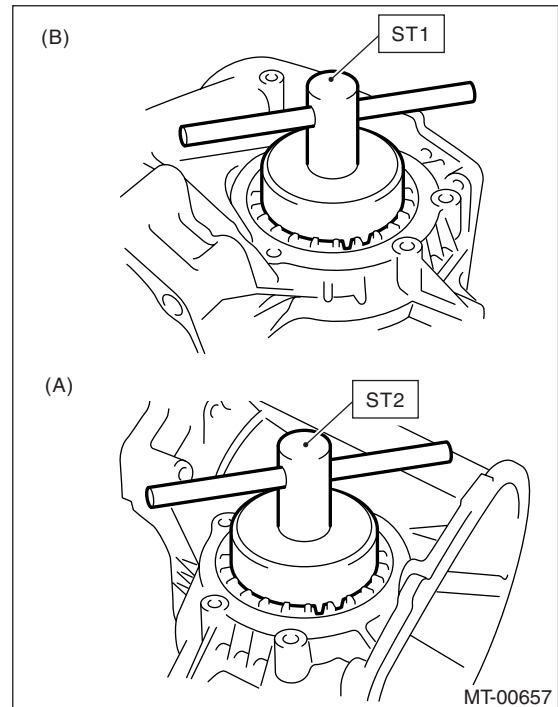
- 12) Using the ST, remove the differential side retainer on both side.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

NOTE:

Be careful not to damage the part of clutch case where the retainer is to be installed.



(A) Left side

(B) Right side

- 13) Remove the front differential.

B: INSTALLATION

- 1) Install the differential assembly into clutch housing.
- 2) Apply oil to the threaded portion part of side retainer.
- 3) Remove the O-ring from side retainer of both sides.
- 4) Using the ST, install the differential side retainer to both sides.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

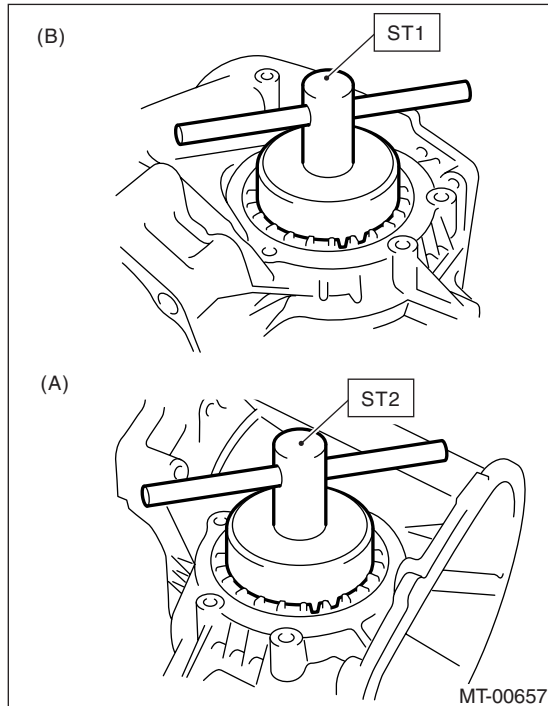
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Be careful not to damage the oil seal.

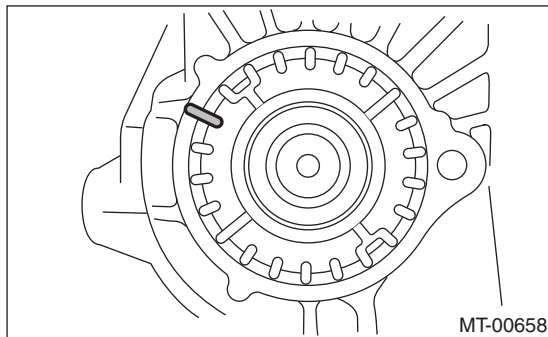


- (A) Left side
(B) Right side

5) Check and adjust the hypoid gear backlash. <Ref. to 6MT-105, HYPOID GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

6) Check and adjust the tooth contact. <Ref. to 6MT-98, ADJUSTMENT, Drive Pinion Shaft Assembly.>

7) Mark an engagement point on the right and left side retainer and clutch housing.



8) Remove the differential side retainer from both sides.

NOTE:

Note the rotating number of time till removal, when removing the side retainer.

9) Install a new O-ring to side retainer of both sides.

10) Install the differential side retainer to both sides.

NOTE:

Install the side retainer by screwing in the same rotating number of time till removal, and then align the mark.

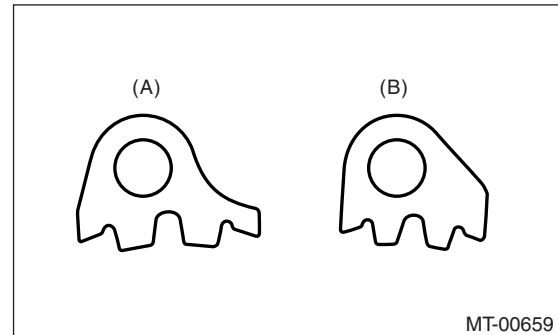
11) Install the lock plate.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

NOTE:

Be careful not to confuse right and left lock plates.



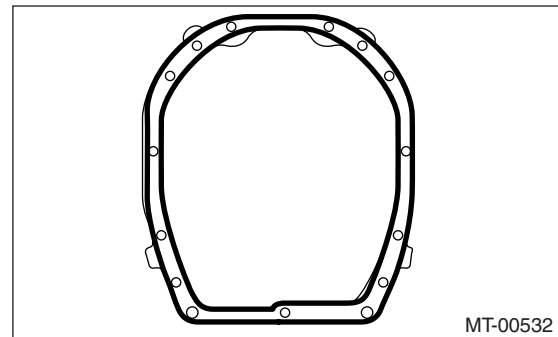
- (A) Left
(B) Right

12) Completely remove the remaining gasket from the clutch housing and adapter plate.

13) Apply liquid gasket to the clutch housing.

Liquid gasket:

THREE BOND 1215 (Part No. 004403007)



14) Install the drive pinion shaft assembly. <Ref. to 6MT-95, INSTALLATION, Drive Pinion Shaft Assembly.>

15) Install each gear assembly at once. <Ref. to 6MT-69, INSTALLATION, Main Shaft Assembly.>

16) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>

17) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>

18) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>

19) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>

20) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>

Front Differential Assembly

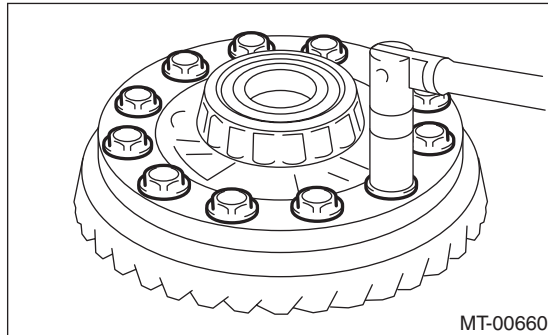
MANUAL TRANSMISSION AND DIFFERENTIAL

- 21) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>
- 22) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

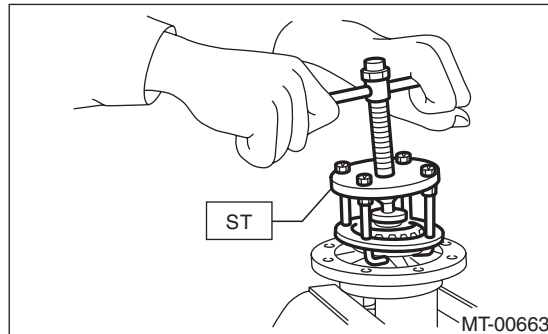
1. DIFFERENTIAL CASE

- 1) Secure the differential assembly on a vise, and then remove the hypoid driven gear.



- 2) Using the ST, remove the hypoid driven gear side bearing.

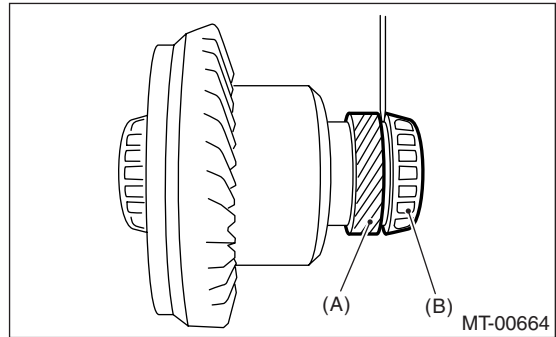
ST 399527700 PULLER SET



- 3) Using a screw driver, make clearance of 2 — 3 mm (0.079 — 0.118 in) between the speedometer drive gear and roller bearing.

NOTE:

Be careful not to damage the differential case.

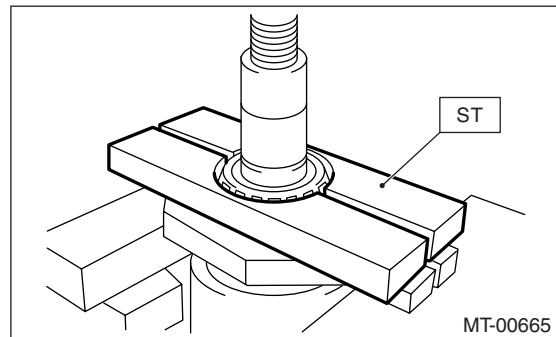


(A) Speedometer drive gear

(B) Roller bearing

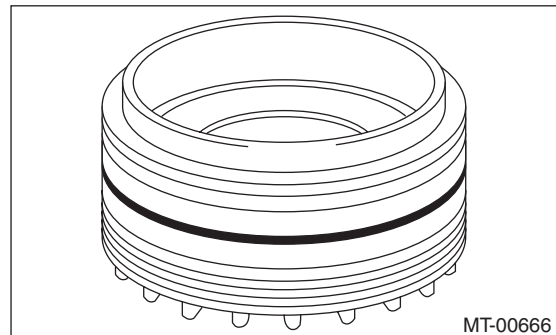
- 4) Using the ST, remove the roller bearing.

ST 498077000 REMOVER

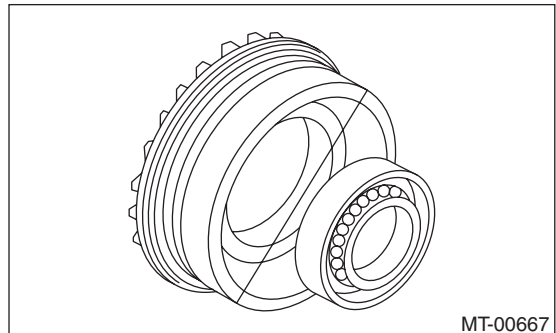


2. SIDE RETAINER

- 1) Remove the O-ring from side retainer.



- 2) Remove the oil seal from side retainer.

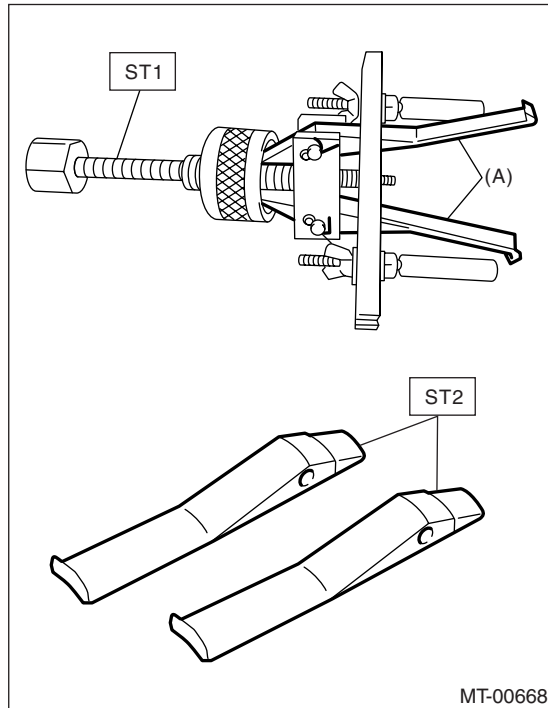


Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

3) Remove the claw of ST1, and then install the claw of ST2.

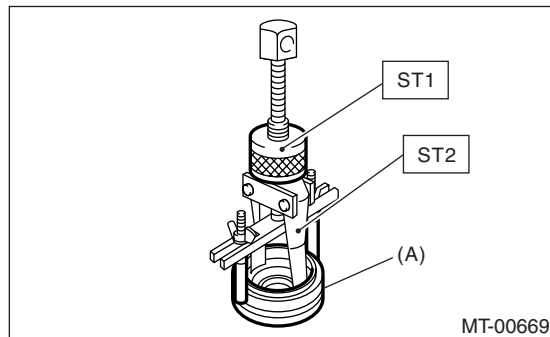
ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



(A) Claw

4) Remove the bearing outer race from side retainer.

ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



(A) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE

1) Using the ST, install a new speedometer drive gear and right and left side bearing inner race to differential case.

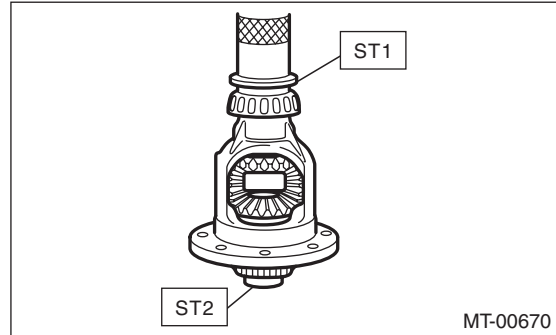
ST1 398437700 INSTALLER
ST2 398497701 SEAT

CAUTION:

Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).

NOTE:

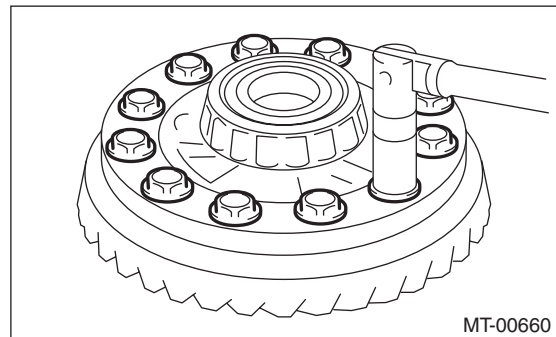
Always replace the inner race and outer race as a set.



2) Install the hypoid driven gear to differential case.

Tightening torque:

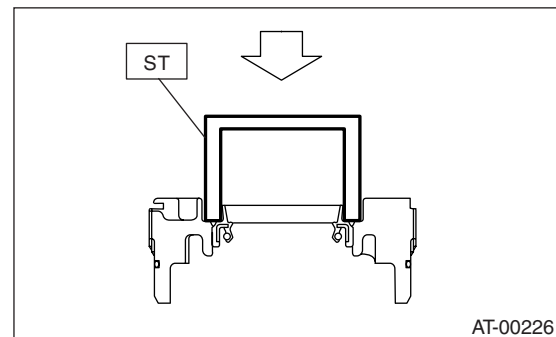
69 N·m (7.0 kgf·m, 50.9 ft·lb)



2. SIDE RETAINER

1) Using the ST, install the oil seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2) Install the bearing outer race to retainer on both sides.

3) Install the O-ring to retainer on both sides.

NOTE:

Be careful not to damage the O-ring.

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

Repair or replace the front differential in following cases.

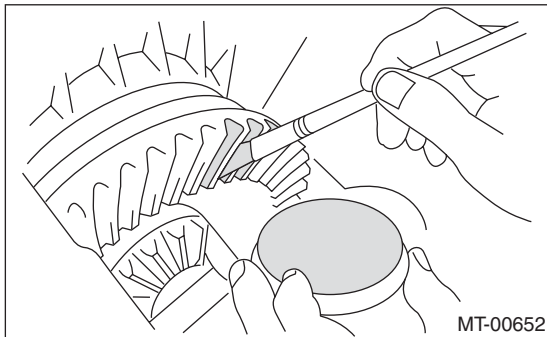
- Each gear is damaged, seized, or excessively worn.
- Sliding surface of the differential case is damaged, seized or excessively worn.
- Bearings and bearings part are damaged, rusted or worn.
- Bearings fail to turn smoothly or make abnormal noise when turned.

1. HYPOID GEAR BACKLASH

Check the hypoid gear backlash. If it is not within specifications, adjust it. <Ref. to 6MT-105, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>

2. TOOTH CONTACT OF HYPOID GEAR

- 1) Be sure the hypoid gear backlash is within specifications. If it is not within specifications, adjust it. <Ref. to 6MT-105, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>
- 2) Apply a uniform thin coat of red lead on both tooth surfaces of three or four teeth of the hypoid driven gear.



- 3) Install the drive pinion shaft assembly, and then secure it with four bolts.

NOTE:

Use the old gasket and washer to prevent the mating surface of housing from damaging.

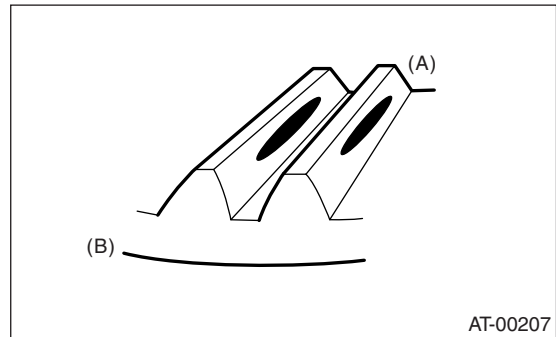
Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

- 4) Rotate the drive pinion shaft to right and left for several times.
 - 5) Remove the drive pinion shaft assembly, and then check tooth contact. If tooth contact is inaccurate, adjust it. <Ref. to 6MT-98, ADJUSTMENT, Drive Pinion Shaft Assembly.>
- Correct tooth contact.

NOTE:

Under no load, tooth contacts 50 — 60% from center to toe side (tooth contact shifts to heel side when driving).



(A) Toe side

(B) Heel side

F: ADJUSTMENT

1. HYPOID GEAR BACKLASH

- 1) Install the right and left side retainer.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

NOTE:

Screw in the right side retainer a bit further than left side.

- 2) Install the drive pinion shaft assembly, and then secure it with four bolts.

NOTE:

Use the old gasket and washer to prevent the mating surface of housing from damaging.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

- 3) Using the ST, screw in the left side retainer until the drive pinion and hypoid driven gear contacts lightly. Then loosen the right side retainer.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)

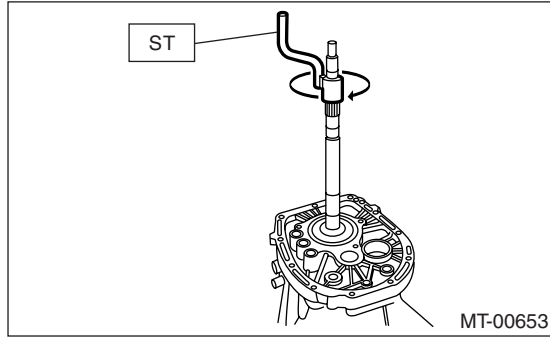
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

- 4) Using the ST, rotate the drive pinion shaft several times.

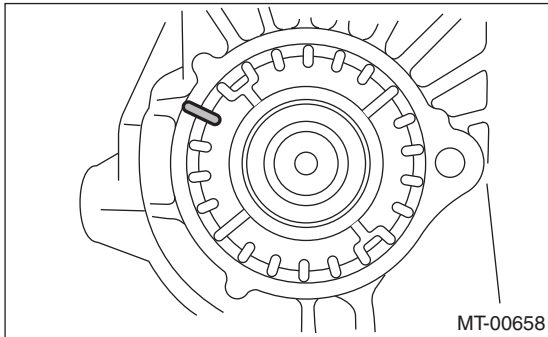
Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

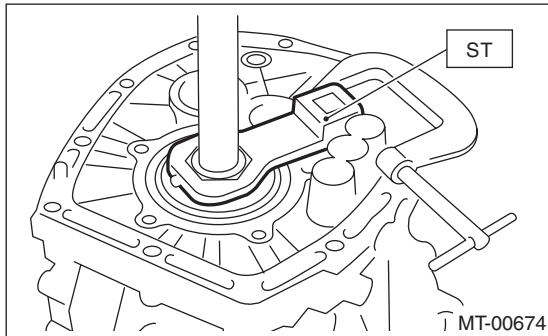
ST 18631AA000 HANDLE



- 5) Repeat step 3) and 4) until the left side retainer can not be rotated. For the right side retainer, screw it in until the inner race and outer race contacts lightly. This condition is "0" backlash.
6) Mark an engagement point on the right and left side retainer and clutch housing.



- 7) Return the left side retainer for three teeth, and screw in the right side retainer for three teeth.
8) Using the ST, secure the drive pinion shaft.
ST 18621AA000 ADAPTER WRENCH



- 9) Install the axle shafts to both sides of front differential.

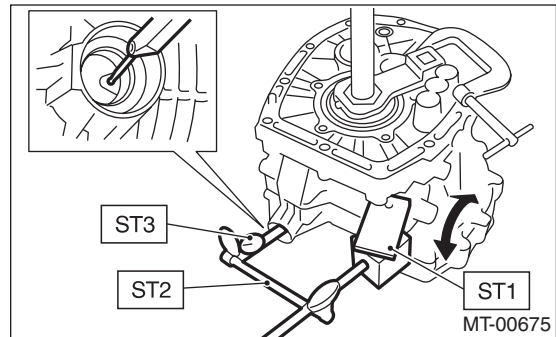
Parts No. 38415AA000 AXLE SHAFT

- 10) Move the axle shaft, and measure the hypoid gear backlash.

ST1 498255400 PLATE
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE

Hypoid gear backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



- 11) If the backlash is out of specification, adjust it by turning the right and left side retainers.
12) Screw in the right side retainer for further 1.75 teeth.

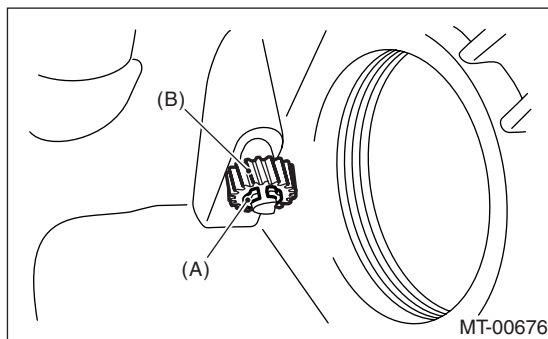
2. TOOTH CONTACT OF HYPOID GEAR

Refer to the section of drive pinion shaft for checking of tooth contact. <Ref. to 6MT-105, TOOTH CONTACT OF HYPOID GEAR, INSPECTION, Front Differential Assembly.>

24.Speedometer Gear

A: REMOVAL

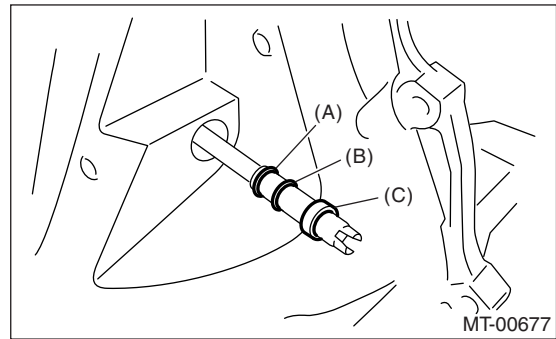
- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly. <Ref. to 6MT-95, REMOVAL, Drive Pinion Shaft Assembly.>
- 11) Remove the front differential assembly. <Ref. to 6MT-101, REMOVAL, Front Differential Assembly.>
- 12) Remove the vehicle speed sensor. <Ref. to 6MT-31, REMOVAL, Vehicle Speed Sensor.>
- 13) Remove the snap ring, and then remove the speedometer driven gear.



- (A) Snap ring
(B) Speedometer driven gear

- 14) Remove the speedometer driven gear shaft from clutch housing.

- 15) Remove the oil seal, speedometer driven gear shaft and washer.



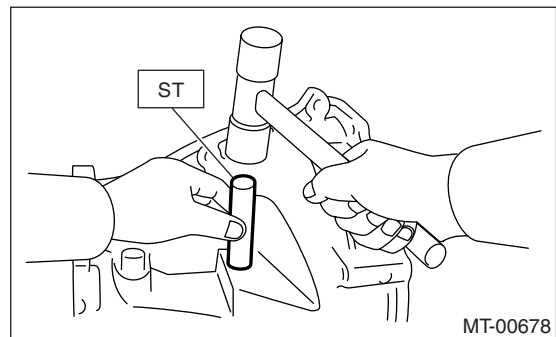
- (A) Washer
(B) Snap ring
(C) Oil seal

- 16) Remove the snap ring from speedometer driven gear shaft.

B: INSTALLATION

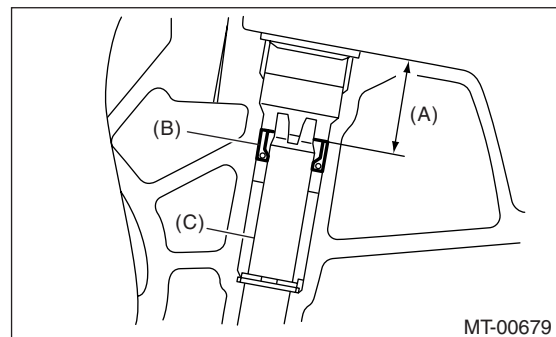
- 1) Install the oil seal, washer and snap ring to speedometer driven gear shaft.
- 2) Insert the speedometer driven gear shaft. Using the ST, press the oil seal.

ST 899824100 or 499827000 PRESS



NOTE:

- Replace the oil seal with a new one.
- Insert the oil seal approx. 24 mm (0.94 in) from the edge of clutch case.

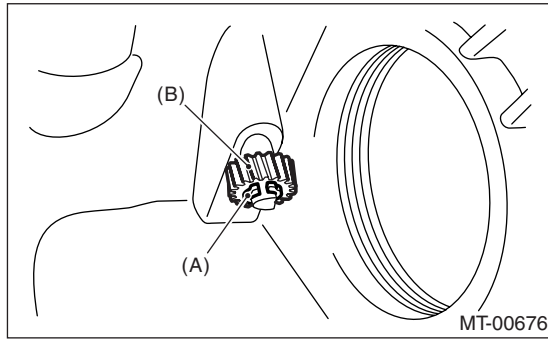


- (A) Approx. 24 mm (0.94 in)
(B) Oil seal
(C) Speedometer driven gear shaft

Speedometer Gear

MANUAL TRANSMISSION AND DIFFERENTIAL

3) Install the speedometer driven gear and snap ring.



(A) Snap ring

(B) Speedometer driven gear

4) Install the vehicle speed sensor. <Ref. to 6MT-31, INSTALLATION, Vehicle Speed Sensor.>

5) Install the front differential assembly. <Ref. to 6MT-101, INSTALLATION, Front Differential Assembly.>

6) Install the drive pinion shaft assembly. <Ref. to 6MT-95, INSTALLATION, Drive Pinion Shaft Assembly.>

7) Install each gear assembly at once. <Ref. to 6MT-69, INSTALLATION, Main Shaft Assembly.>

8) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>

9) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>

10) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>

11) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>

12) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>

13) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>

14) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

25.Shifter Fork and Rod

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>

B: INSTALLATION

- 1) Install each gear assembly at once. <Ref. to 6MT-69, INSTALLATION, Main Shaft Assembly.>
- 2) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
- 3) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>
- 4) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
- 5) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
- 6) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>
- 7) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>
- 8) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

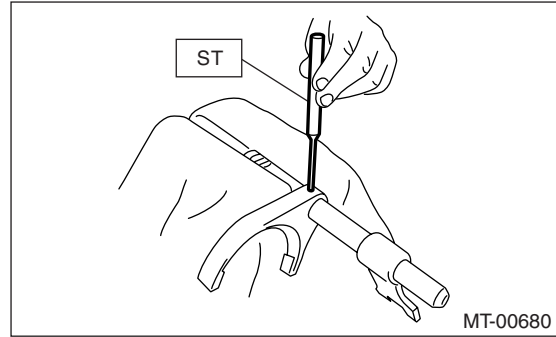
NOTE:

Discard the removed spring pin and replace it with a new one.

1. REVERSE SHIFTER FORK

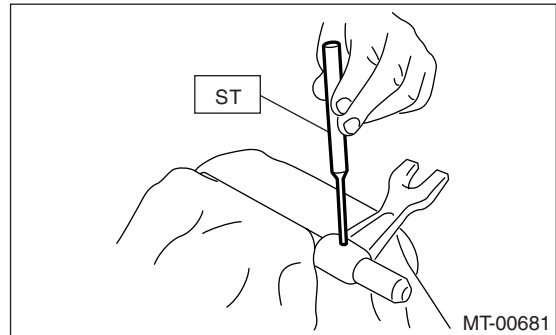
- 1) Using the ST, remove the reverse fork.

ST 398791700 REMOVER



- 2) Using the ST, remove the reverse shifter arm.

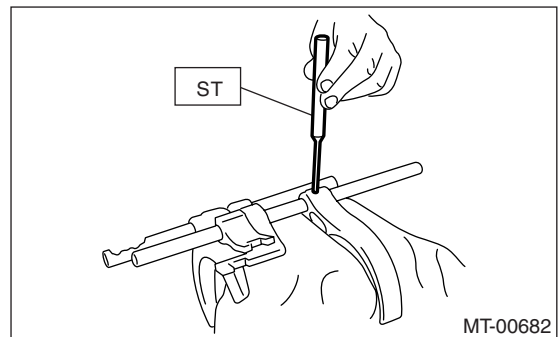
ST 398791700 REMOVER



2. 1st-2nd, 3rd-4th SHIFTER FORK

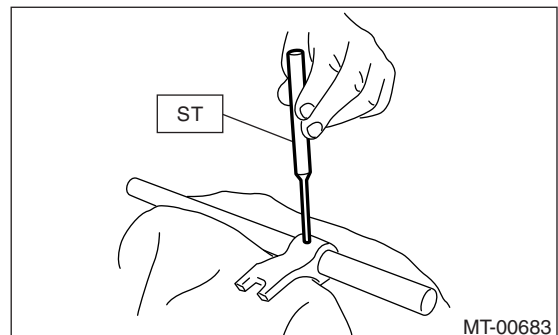
- 1) Using the ST, remove the 3rd-4th shifter fork.

ST 398791700 REMOVER



- 2) Using the ST, remove the 3rd-4th shifter arm.

ST 398791700 REMOVER

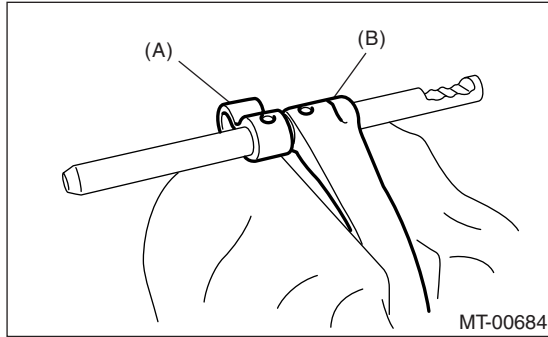


- 3) Using the ST, remove the 1st-2nd shifter arm and 1st-2nd shifter fork.

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

ST 398791700 REMOVER



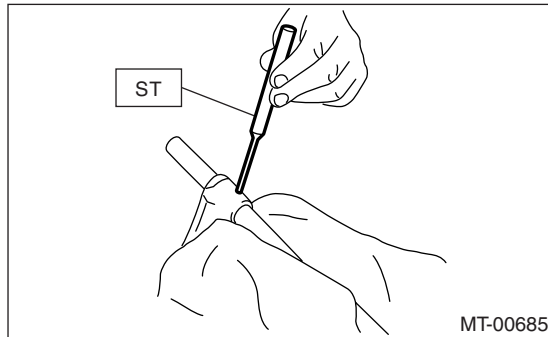
(A) 1st-2nd shifter arm

(B) 1st-2nd shifter fork

3. 5th-6th SHIFTER FORK

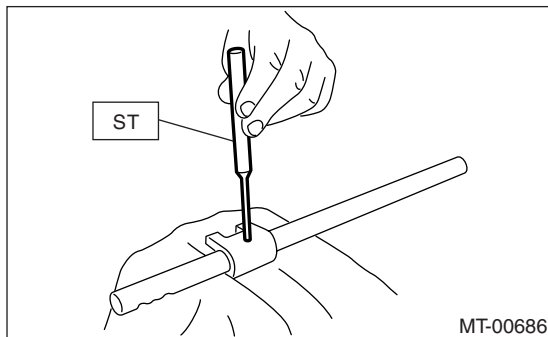
1) Using the ST, remove the 5th-6th shifter fork.

ST 398791700 REMOVER



2) Using the ST, remove the 5th-6th shifter arm.

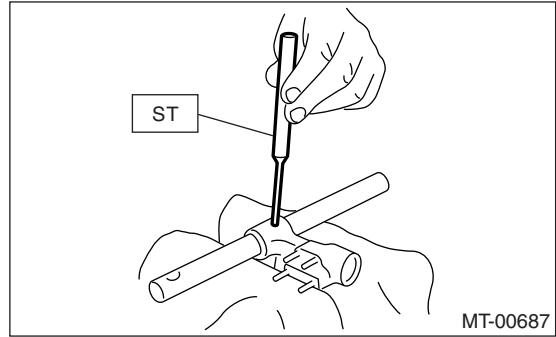
ST 398791700 REMOVER



4. SHIFT ARM SHAFT

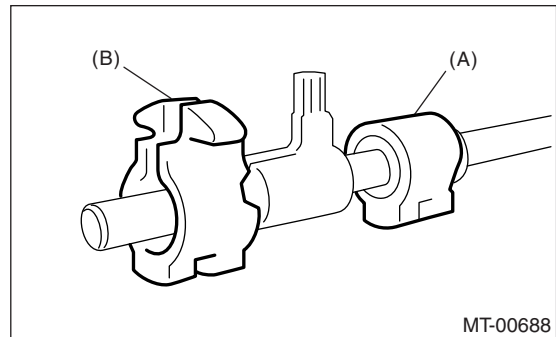
Using the ST, remove the selector arm.

ST 398791700 REMOVER



5. STRIKING ROD

1) Remove the reverse interlock block and interlock block from striking rod.

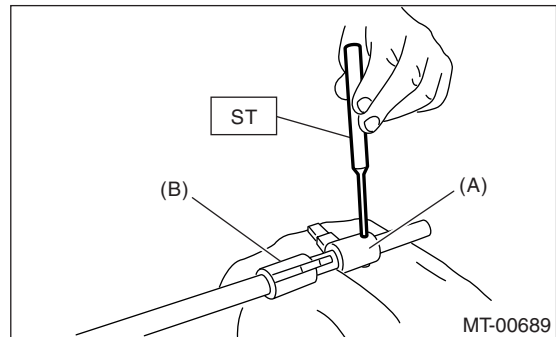


(A) Reverse interlock block

(B) Interlock block

2) Using the ST, remove the reverse interlock arm.

ST 398791700 REMOVER



(A) Reverse interlock arm

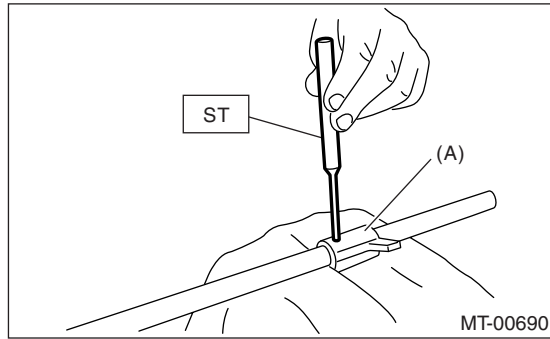
(B) Interlock arm

3) Using the ST, remove the interlock arm.

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

ST 398791700 REMOVER



(A) Interlock arm

D: ASSEMBLY

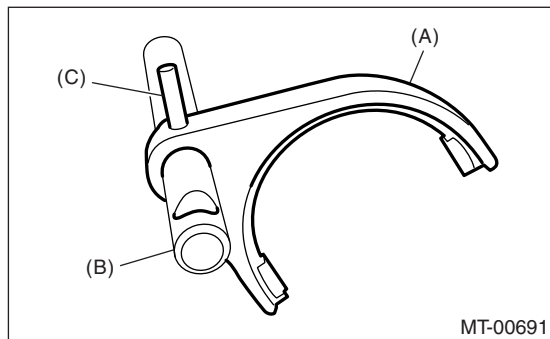
1. REVERSE SHIFTER FORK

1) Using the ST, install the reverse fork.

ST 398791700 REMOVER

NOTE:

Make sure to install the reverse fork and rod in proper direction.



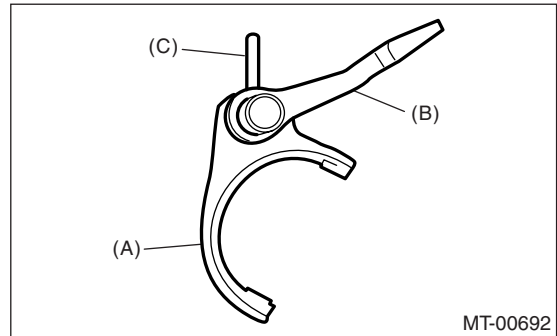
- (A) Reverse fork
- (B) Reverse fork rod
- (C) Spring pin

2) Using the ST, install the reverse arm.

ST 398791700 REMOVER

NOTE:

Make sure to install the reverse arm and rod in proper direction.



- (A) Reverse arm
- (B) Reverse fork rod
- (C) Spring pin

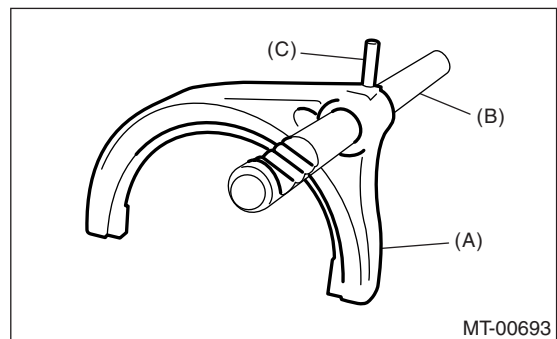
2. 1st-2nd, 3rd-4th SHIFTER FORK

1) Using the ST, install the 1st-2nd shifter fork.

ST 398791700 REMOVER

NOTE:

Make sure to install the 1st-2nd shifter fork and rod in proper direction.



- (A) 1st-2nd shifter fork
- (B) 1st-2nd fork rod
- (C) Spring pin

2) Using the ST, install the 1st-2nd shifter arm.

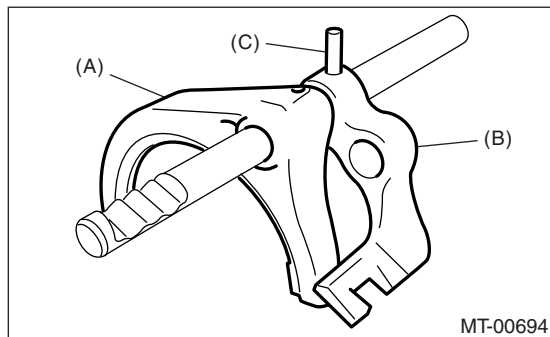
ST 398791700 REMOVER

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Make sure to install the 1st-2nd shifter arm and fork in proper direction.

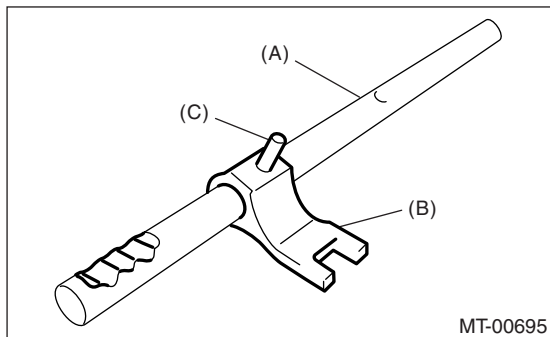


- (A) 1st-2nd shifter fork
- (B) 1st-2nd fork arm
- (C) Spring pin

3) Using the ST, install the 3rd-4th shifter arm.
ST 398791700 REMOVER

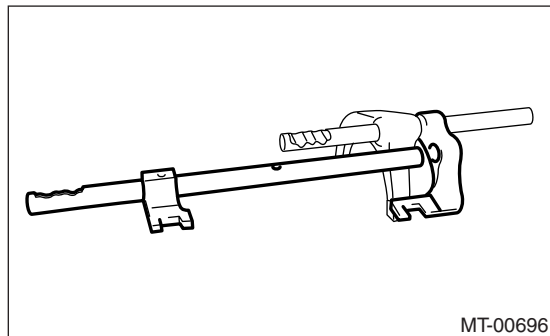
NOTE:

Make sure to install the 3rd-4th shifter arm and rod in proper direction.



- (A) 3rd-4th fork rod
- (B) 3rd-4th shifter arm
- (C) Spring pin

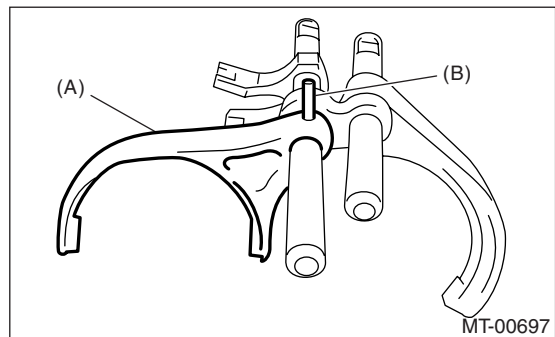
4) Install the 3rd-4th fork rod into 1st-2nd shifter arm.



5) Using the ST, install the 3rd-4th shifter fork.
ST 398791700 REMOVER

NOTE:

Make sure to install the 3rd-4th shifter fork in proper direction.



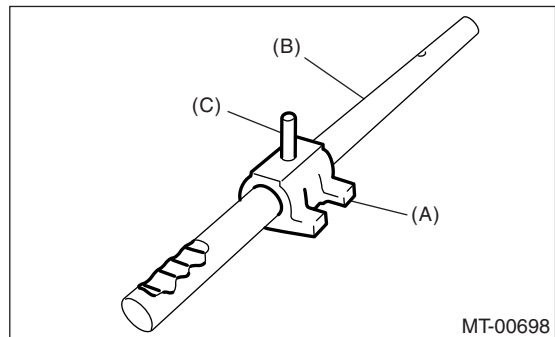
- (A) 3rd-4th shifter fork
- (B) Spring pin

3. 5th-6th SHIFTER FORK

1) Using ST, install the 5th-6th shifter arm.
ST 398791700 REMOVER

NOTE:

Make sure to install the 5th-6th shifter arm and rod in proper direction.



- (A) 5th-6th shifter arm
- (B) 5th-6th fork rod
- (C) Spring pin

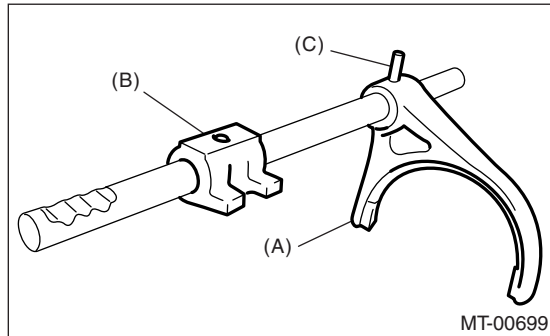
2) Using the ST, install the 5th-6th shifter fork.
ST 398791700 REMOVER

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Make sure to install the 5th-6th shifter fork and arm in proper direction.



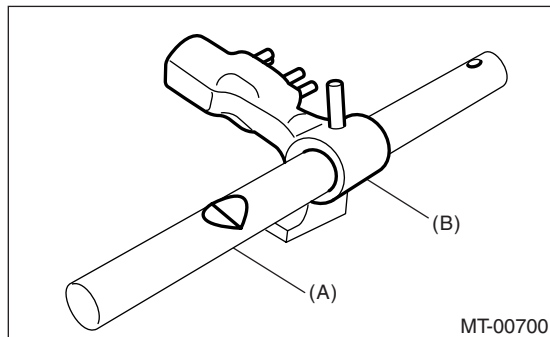
- (A) 5th-6th shifter fork
- (B) 5th-6th shifter arm
- (C) Spring pin

4. SHIFT ARM SHAFT

Using the ST, install the selector arm.
ST 398791700 REMOVER

NOTE:

Make sure to install the selector arm and rod in proper direction.



- (A) Selector rod
- (B) Selector arm

5. STRIKING ROD

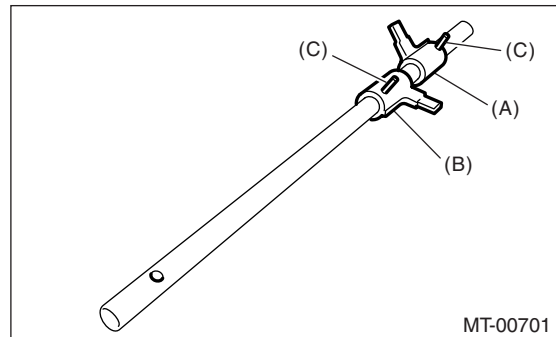
1) Using the ST, install the reverse interlock arm and interlock arm.

ST 398791700 REMOVER

NOTE:

- Make sure to install the reverse interlock arm and rod in proper direction.

- Make sure to install the interlock arm and rod in proper direction.

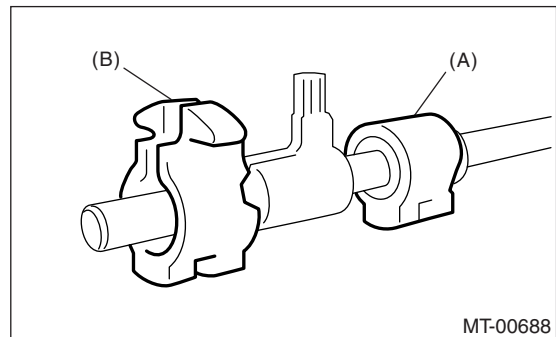


- (A) Reverse interlock arm
- (B) Interlock arm
- (C) Spring pin

2) Install the reverse interlock block and interlock block to striking rod.

NOTE:

Make sure to install the reverse interlock block and interlock block in proper direction.



- (A) Reverse interlock block
- (B) Interlock block

E: INSPECTION

- 1) Check the shift shaft and shift rod for damage. Replace if damaged.
- 2) Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

F: ADJUSTMENT

1. SELECTION OF 1st-2nd FORK ROD

NOTE:

- Perform the following procedures when.
 - Replacing the 1st, 2nd driven gear.
 - Replacing the 1st, 2nd synchro ring assembly.
 - Replacing the adapter plate.
 - Replacing the driven shaft.
 - Replacing the 1st-2nd hub, sleeve assembly.
- 1) Insert the drive pinion assembly in adapter plate.

Shifter Fork and Rod

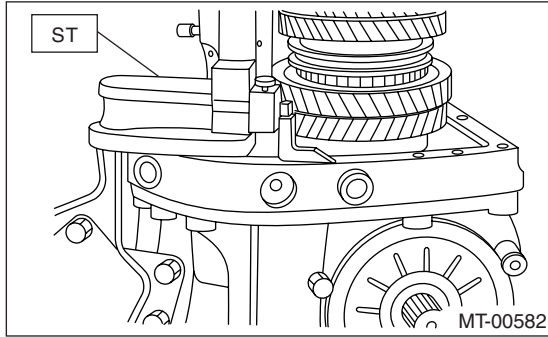
MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

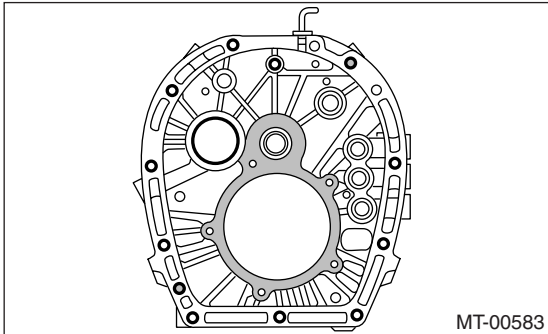
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.

ST 18853AA000 HEIGHT GAUGE



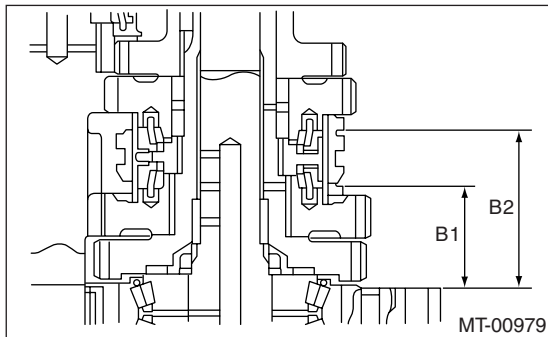
NOTE:

- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.

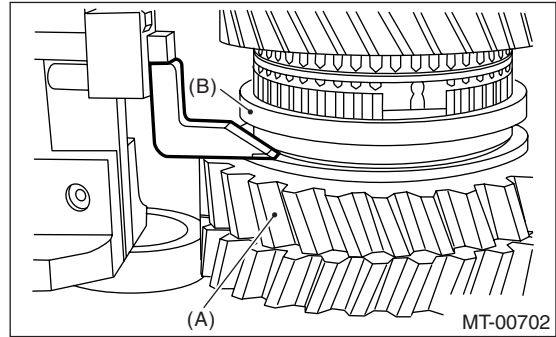


3) Select the main shaft snap ring. <Ref. to 6MT-80, ADJUSTMENT, Main Shaft Assembly.>

4) Measure "B1" and "B2" as shown in the figure.



(1) Shift the 1st-2nd sleeve to 1st driven gear side, then press down to the stopper and measure "B1".

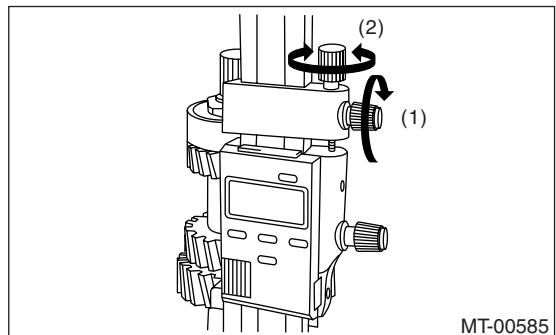


(A) 1st driven gear

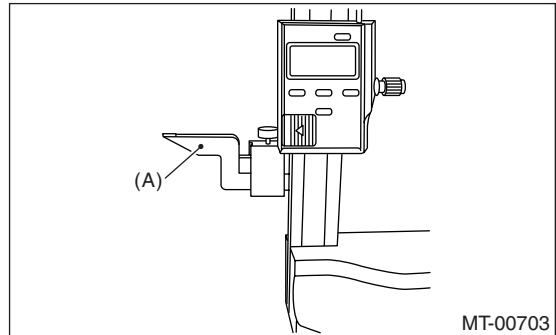
(B) 1st-2nd sleeve

NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 1st side.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



(2) Set the height gauge indicator upside down.

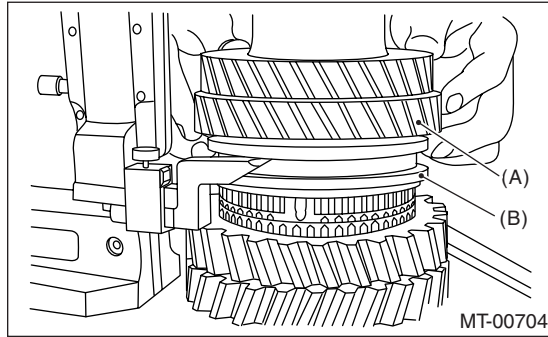


(A) Indicator

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

(3) Shift the 1st-2nd sleeve to 2nd driven gear side, then press up to the stopper and measure "B2".

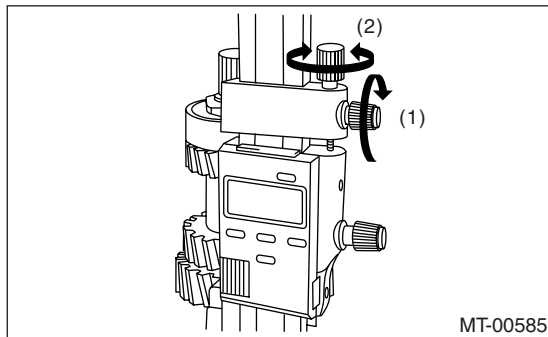


(A) 2nd driven gear

(B) 1st-2nd sleeve

NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 2nd side.
- Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
- Measure five points of the sleeve turning every approx. 72° apart. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



(4) According to both measurements, calculate the 1st-2nd sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: $T = (B1 + B2) / 2$

T: 1st-2nd sleeve center position

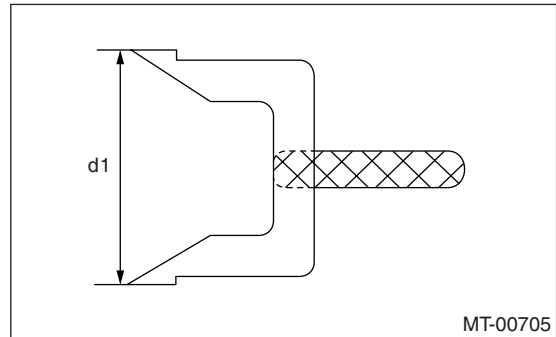
B1: Height from adapter plate edge to sleeve edge when shifted to 1st gear.

B2: Height from adapter plate edge to sleeve edge when shifted to 2nd gear. [measurement value + 55 mm (2.17 in)]

NOTE:

The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing

value: 55 mm (2.17 in)] from the following figure to "B2", to obtain measurement value of "B2".



T	mm (in)	Lot No. (Mark)
62.93 — 63.23 (2.4776 — 2.4894)		32801AA111 (1)
63.23 — 63.53 (2.4894 — 2.5012)		32801AA131 (None)
63.53 — 63.83 (2.5012 — 2.5130)		32801AA141 (2)

2. SELECTION OF 3rd-4th FORK ROD

NOTE:

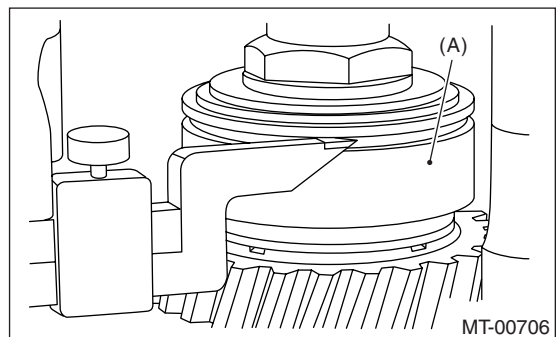
Perform the following procedures when.

- Replacing the main shaft.
- Replacing the 3rd, 3rd to 6th drive gear and bushing.
- Replacing the 3rd, 3rd to 6th synchro assembly.
- Replacing the 3rd-4th hub, sleeve assembly.

1) Insert the main shaft assembly in adapter plate.

2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, on the upper side of main rear bearing, then set to zero point.

ST 18853AA000 HEIGHT GAUGE



(A) Roller bearing

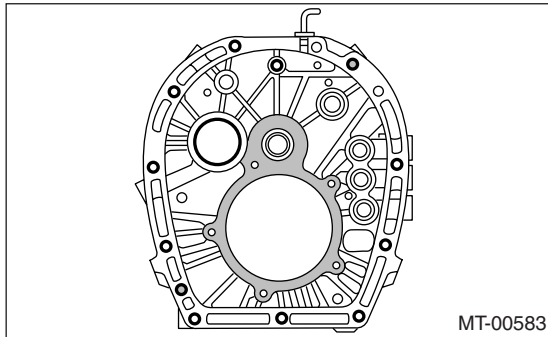
NOTE:

- Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.

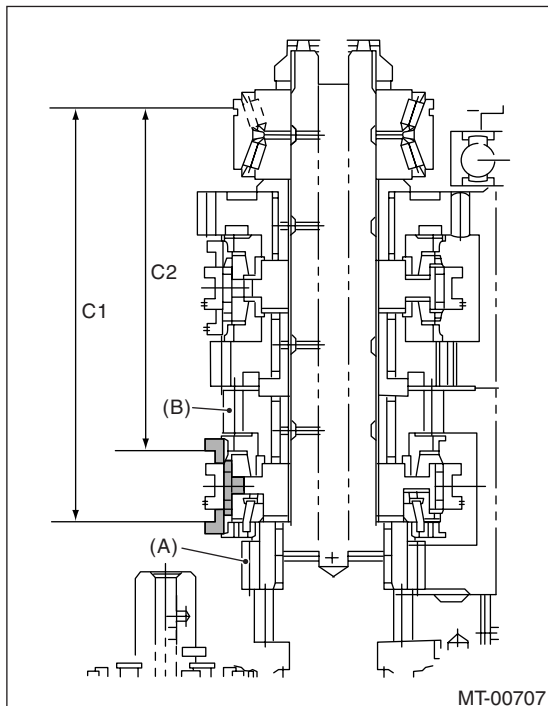
Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

- Do not put the height gauge on shaded area in the figure during the measurement.

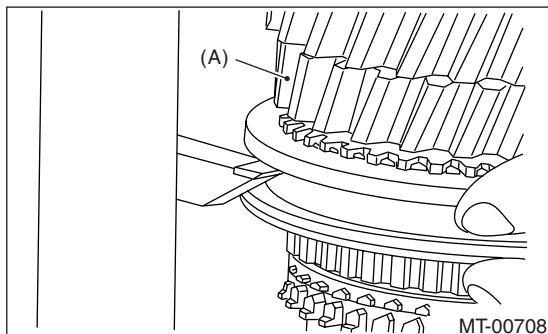


3) Using the height gauge, measure “C1” and “C2” shown in the figure.



- (A) 3rd drive gear
(B) 4th drive gear

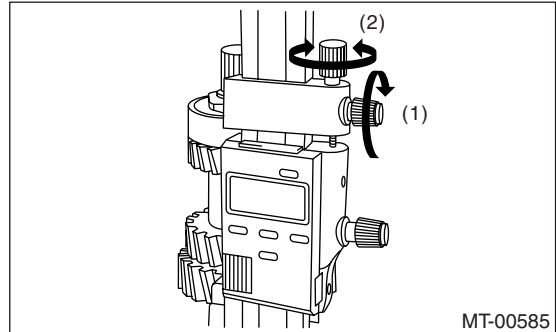
(1) Shift the 3rd-4th sleeve to 4th gear side, then press up to the stopper and measure “C2”.



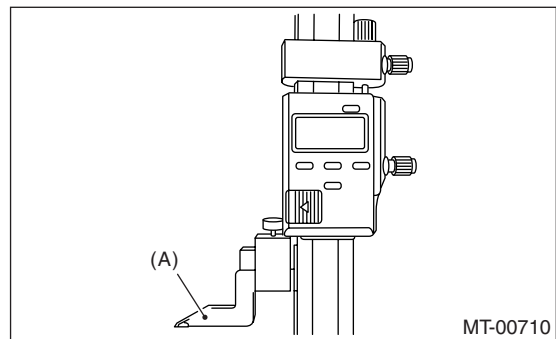
- (A) 4th drive gear

NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure.
- Turn dial (2) to set the indicator to edge surface of sleeve 4th side.
- Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

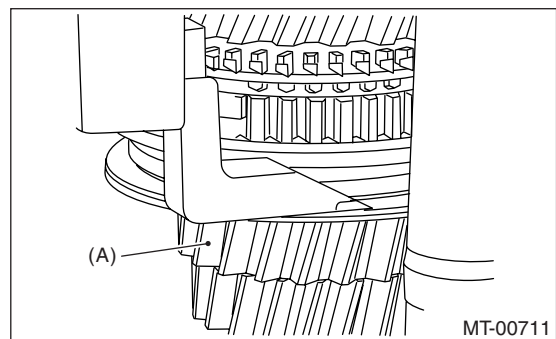


(2) Set the height gauge indicator upside down.



- (A) Indicator

(3) Shift the 3rd-4th sleeve to 3rd drive gear side, then press down to the stopper and measure “C1”.



- (A) 3rd drive gear

NOTE:

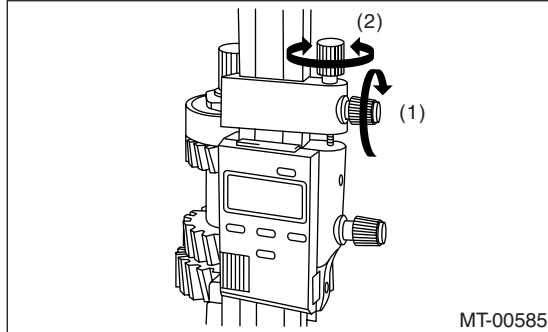
- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure.

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

Turn dial (2) to set the indicator to edge surface of sleeve 3rd side.

- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



4) According to both measurements, calculate the 3rd-4th sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: $T = (C1 + C2) / 2$

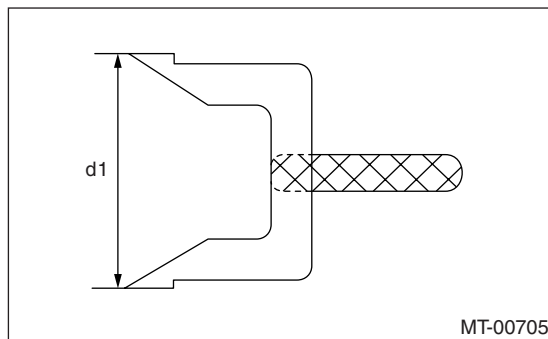
T: 3rd-4th sleeve center position

C1: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 3rd gear. [measurement value +55 mm (2.17 in)]

C2: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 4th gear.

NOTE:

The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to "C1", to obtain measurement value of "C1".



T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t = 1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t = 1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t = 2.25 mm (0.089 in)]
137.22 — 137.52 (5.4024 — 5.4142)	32809AA171 (None)	32809AA181 (2)	32809AA191 (4)
137.52 — 137.82 (5.4142 — 5.4260)	32809AA161 (1)	32809AA171 (None)	32809AA181 (2)
137.82 — 138.12 (5.4260 — 5.4379)	32809AA141 (3)	32809AA161 (1)	32809AA171 (None)
T = Thickness			

3. SELECTION OF 5th-6th FORK ROD

NOTE:

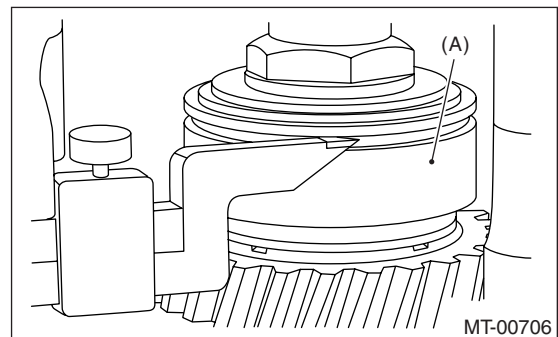
Perform the following procedures when.

- Replacing the main shaft.
- Replacing the 3rd to 6th drive gear and bushing.
- Replacing the 3rd to 6th synchro ring assembly.
- Replacing the 3rd-4th hub, sleeve assembly.
- Replacing the 5th-6th hub, sleeve assembly.

1) Insert the main shaft assembly in adapter plate.

2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, or the upper side of main rear bearing. Then set to zero point.

ST 18853AA000 HEIGHT GAUGE



(A) Ball bearing

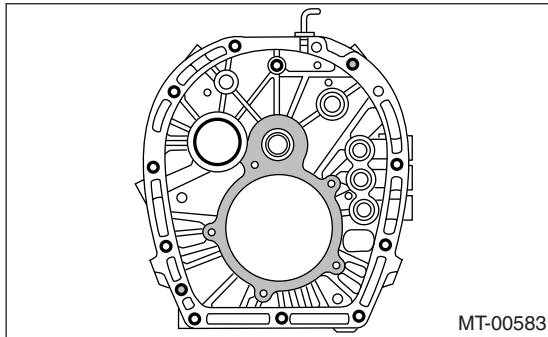
NOTE:

- Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.

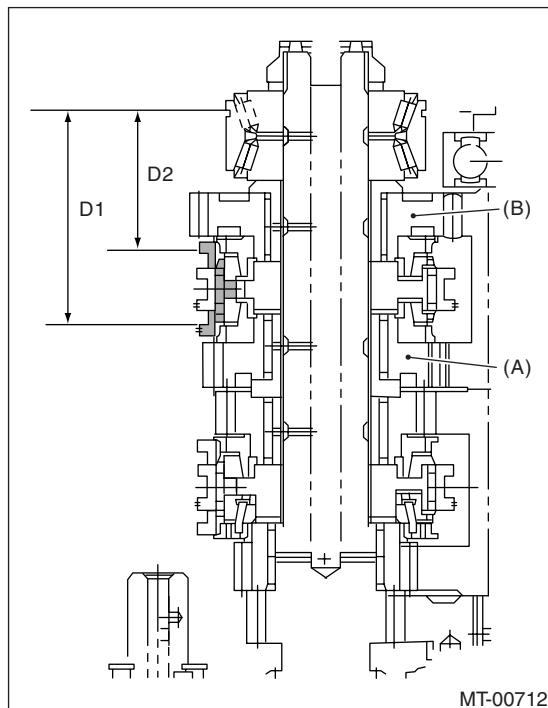
Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

- Do not place the height gauge on shaded area in the figure during the measurement.

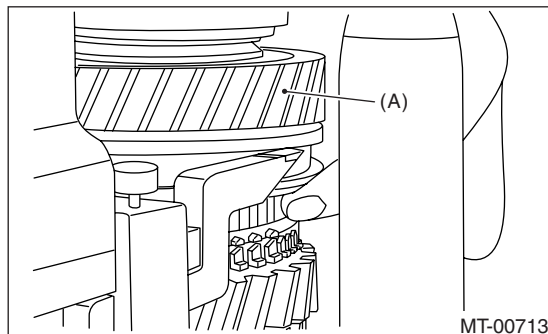


3) Using the height gauge, measure “D1” and “D2” shown in the figure.



- (A) 5th main gear
(B) 6th main gear

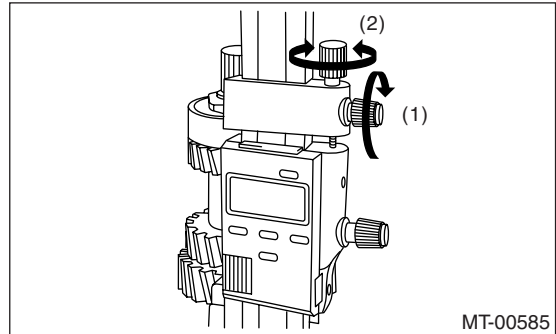
(1) Shift the 5th-6th sleeve to 6th main gear side, then press up to the stopper and measure “D2”.



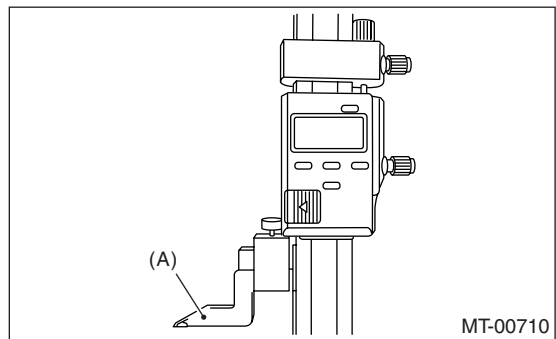
- (A) 6th main gear

NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 6th side.
- Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

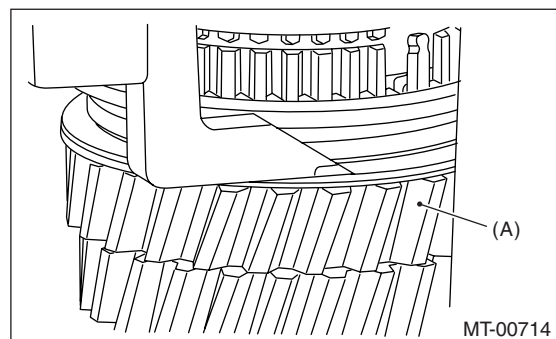


(2) Set the height gauge indicator upside down.



- (A) Indicator

(3) Shift the 5th-6th sleeve to 5th main gear side, then press down to the stopper and measure “D1”.



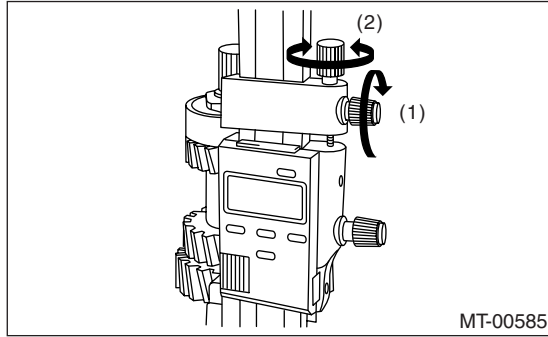
- (A) 5th main gear

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 5th side.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



4) According to both measurements, calculate the 5th-6th sleeve neutral position. Select the fork rod, which applies to the calculated value from following equation.

Equation: $T = (D1 + D2) / 2$

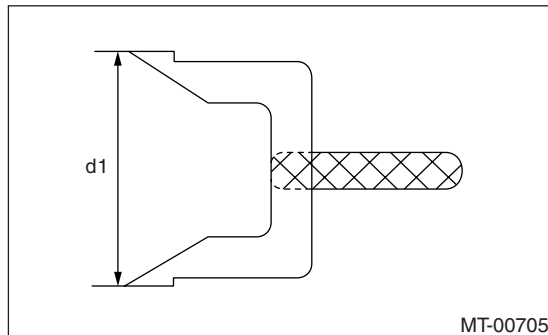
T: 5th-6th sleeve center position

D1: Length from the shaft rear bearing snap ring groove to sleeve groove edge when shifted to 5th gear. [measurement value + 55 mm (2.17 in)]

D2: Length from main shaft rear bearing snap ring groove to sleeve groove edge when shifted to 6th gear.

NOTE:

The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to "D1", to obtain measurement value of "D1".



T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t = 1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t = 1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t = 2.25 mm (0.089 in)]
64.12 — 64.42 (2.5244 — 2.5362)	32945AA021 (None)	32945AA031 (2)	32945AA041 (4)
64.42 — 64.72 (2.5362 — 2.5480)	32945AA011 (1)	32945AA021 (None)	32945AA031 (2)
64.72 — 65.02 (2.5480 — 2.5598)	32945AA001 (3)	32945AA011 (1)	32945AA021 (None)
T = Thickness			

4. SELECTION OF REVERSE FORK ROD

NOTE:

Perform the following procedures when.

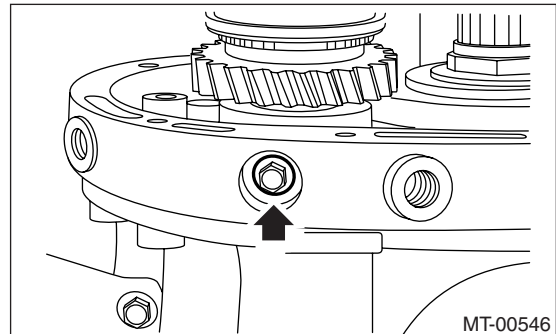
- Replacing the reverse idler gear.
- Replacing the reverse idler gear No. 2.
- Replacing the adapter plate.
- Replacing the base.

1) Insert the reverse idler gear assembly in adapter plate.

2) Tighten the base COMPL fixing bolt.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

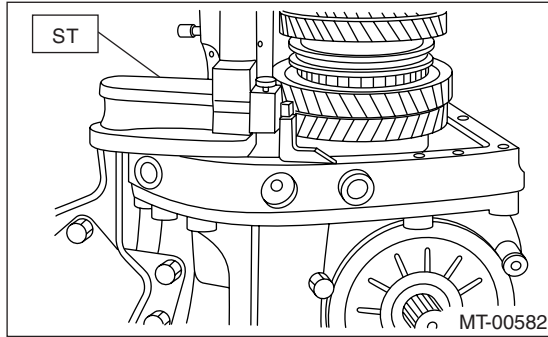


3) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.

Shifter Fork and Rod

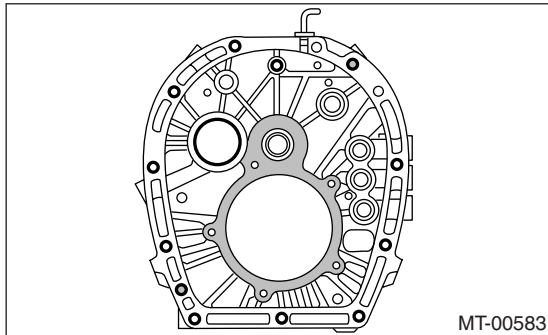
MANUAL TRANSMISSION AND DIFFERENTIAL

ST 18853AA000 HEIGHT GAUGE

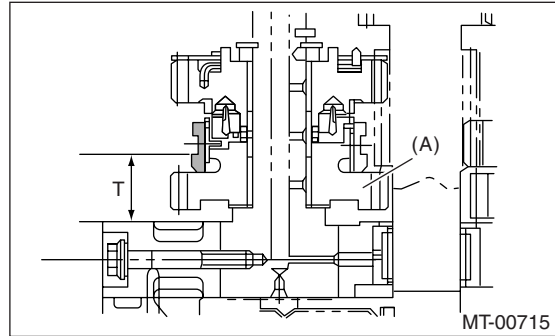


NOTE:

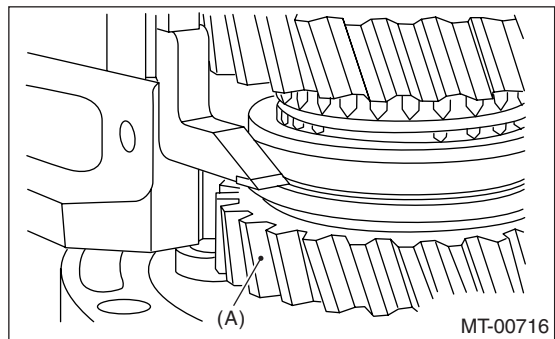
- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.



- 4) Press the reverse sleeve to reverse side idler gear No. 2, then measure "T".



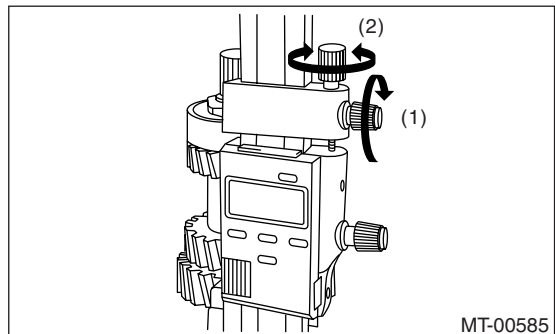
(A) Reverse idler gear No. 2



(A) Reverse idler gear No. 2

NOTE:

- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of reverse sleeve side.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



- 5) According to measurement, calculate the reverse sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: $T + 4.8 \text{ mm (0.189 in)}$

Shifter Fork and Rod

MANUAL TRANSMISSION AND DIFFERENTIAL

T + 4.8 mm (0.189 in)	Lot No. (Mark)
33.50 — 33.80 (1.3189 — 1.3307)	32816AA110 (1)
33.80 — 34.10 (1.3307 — 1.3425)	32816AA130 (None)
34.10 — 34.40 (1.3425 — 1.3543)	32816AA140 (2)
T = Thickness	

26.Clutch Housing

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>
- 2) Prepare the transmission for overhaul. <Ref. to 6MT-39, Preparation for Overhaul.>
- 3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, REMOVAL, Oil Pipe.>, <Ref. to 6MT-44, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-42, REMOVAL, Back-up Light Switch.>
- 4) Remove the extension case. <Ref. to 6MT-46, REMOVAL, Extension Case.>
- 5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
- 6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
- 7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
- 8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
- 9) Remove each gear assembly. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
- 10) Remove the drive pinion shaft assembly. <Ref. to 6MT-95, REMOVAL, Drive Pinion Shaft Assembly.>
- 11) Remove the front differential assembly. <Ref. to 6MT-101, REMOVAL, Front Differential Assembly.>
- 12) Remove the vehicle speed sensor. <Ref. to 6MT-31, REMOVAL, Vehicle Speed Sensor.>
- 13) Remove the speedometer gear. <Ref. to 6MT-107, REMOVAL, Speedometer Gear.>

B: INSTALLATION

- 1) Install the pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

- 2) Install the speedometer gear. <Ref. to 6MT-107, INSTALLATION, Speedometer Gear.>
- 3) Install the vehicle speed sensor. <Ref. to 6MT-31, INSTALLATION, Vehicle Speed Sensor.>
- 4) Install the front differential assembly. <Ref. to 6MT-101, INSTALLATION, Front Differential Assembly.>
- 5) Install the drive pinion shaft assembly. <Ref. to 6MT-95, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install each gear assembly at once. <Ref. to 6MT-69, INSTALLATION, Main Shaft Assembly.>
- 7) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
- 8) Install the oil pump. <Ref. to 6MT-61, INSTALLATION, Oil Pump.>

- 9) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>

- 10) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>

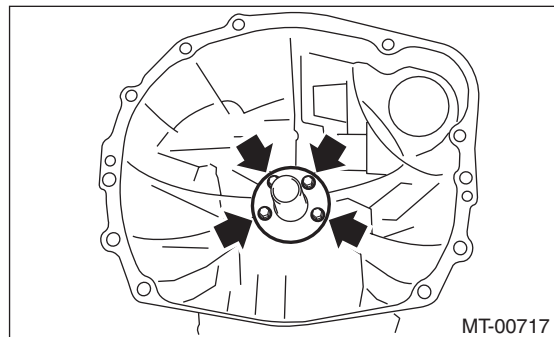
- 11) Install the extension case. <Ref. to 6MT-46, INSTALLATION, Extension Case.>

- 12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-41, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-44, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-42, INSTALLATION, Back-up Light Switch.>

- 13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Remove the clutch release bearing guide.

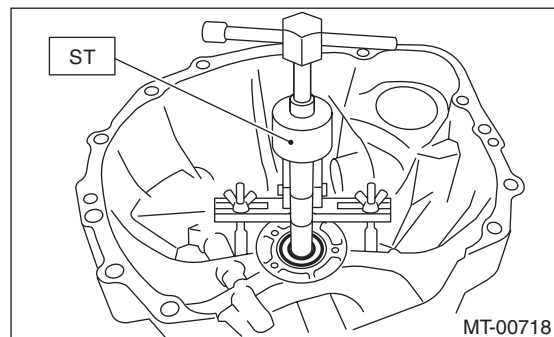


- 2) Remove the oil seal.

ST 398527700 PULLER ASSY

NOTE:

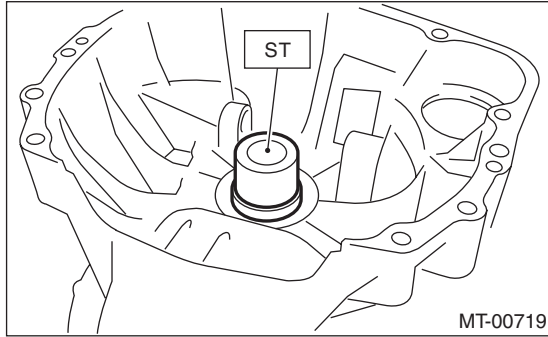
Do not reuse the oil seal.



D: ASSEMBLY

- 1) Install the oil seal into clutch housing without damaging.

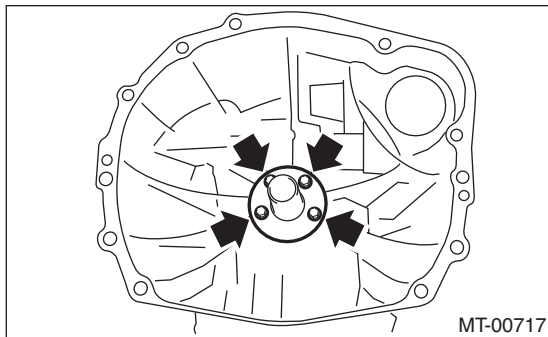
ST 399513600 INSTALLER



2) Install the clutch release bearing guide.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



E: INSPECTION

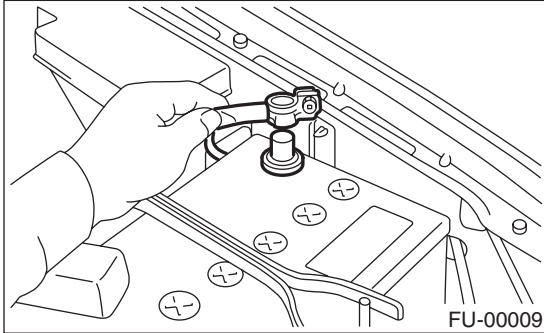
1) Make sure there is no damage or crack on the clutch housing. Replace the clutch housing with a new one if there is excessive damage.

2) Check the clutch housing for gear oil leakage. If there is oil leakage, repair or replace the leakage part.

27. Yaw Rate and Lateral G Sensor

A: REMOVAL

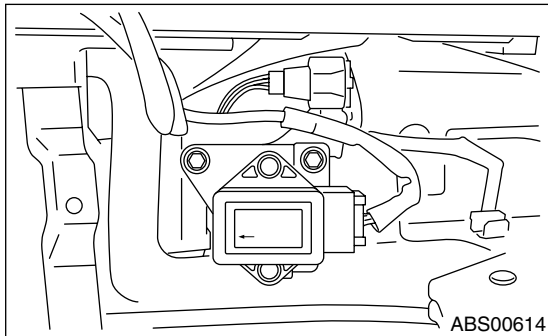
- 1) Disconnect the ground cable from battery.



- 2) Remove the console cover. <Ref. to EI-47, Console Box.>
- 3) Disconnect the connector from yaw rate & lateral G sensor.
- 4) Remove the yaw rate & lateral G sensor from body.

CAUTION:

Do not drop or bump the yaw rate & lateral G sensor.



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:

Do not drop or bump the yaw rate & lateral G sensor.

Tightening torque:

18 N·m (1.8 kgf-m, 13 ft-lb)

28.Driver's Control Center Differential Control Module

A: REMOVAL

- 1) Remove the ground cable from battery.
- 2) Remove the glove box. <Ref. to EI-44, REMOVAL, Glove Box.>
- 3) Disconnect the connector after removing the bolt from the inside of glove box, and then remove the control module.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL

29. General Diagnostic Table

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.
	(k) Worn 5th drive gear and bushing	Replace.
	(l) Worn 6th drive gear and bushing	Replace.
	(m) Worn reverse idler gear and bushing	Replace.
3. 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 Table

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	Replace.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Replace.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) 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 the vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to 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 the 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) Broken or damaged LSD.	Replace.

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Basic Diagnostic Procedure

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

1. Basic Diagnostic Procedure

A: PROCEDURE

Step	Check	Yes	No
1 CHECK PRE-INSPECTION. 1) Ask the customer when and how trouble occurred using the check list for interview. <Ref. to 6MT(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the unit which might influence the driver's control center differential. <Ref. to 6MT(diag)-5, INSPECTION, General Description.>	Is unit that might influence the driver's control center differential problem normal?	Go to step 2.	Repair the faulty unit.
2 CALLING UP THE DTC. Check the DTC. <Ref. to 6MT(diag)-20, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: - For DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-25, List of Diagnostic Trouble Code (DTC).> - If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit.	Is the DTC called up?	Go to step 3. NOTE: Record all DTC.	Go to step 4.
3 PERFORM THE DIAGNOSIS. 1) Inspect and repair the all DTC using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-27, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-25, List of Diagnostic Trouble Code (DTC).> 2) Start the engine. 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-20, WITH SUBARU SELECT MONITOR.>	Is the DTC displayed?	Record all DTC, and inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)" <Ref. to 6MT(diag)-27, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Repeat "PERFORM THE DIAGNOSIS" until normal code called up.	Go to step 4.
4 READ THE DTC WITH COMBINATION METER. Check DTC with combination meter. <Ref. to 6MT(diag)-20, READ DIAGNOSTIC TROUBLE CODE (DTC) WITH DIAGNOSTIC INDICATOR LIGHT..> NOTE: For details concerning DTCs refer to the "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-25, List of Diagnostic Trouble Code (DTC).>	Is the DTC called up?	Go to step 5. NOTE: Record all DTC.	Inspect using "Can not calling up DTC". NOTE: After the inspection, read the DTC again.

Basic Diagnostic Procedure

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
5 PERFORM THE DIAGNOSIS. 1) Inspect and repair the all DTC using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 6MT(diag)-27, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 6MT(diag)-25, List of Diagnostic Trouble Code (DTC).> 2) Perform the inspection mode. <Ref. to 6MT(diag)-22, Inspection Mode.>	Is the DTC displayed?	Record all DTC, and inspect using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)” <Ref. to 6MT(diag)-27, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Repeat “PERFORM THE DIAGNOSIS” until normal code called up.	Inspect using “General Diagnostic Table”.

Check List for Interview

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

2. Check List for Interview

A: CHECK

Check the following items when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km or miles		
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)		
Driver's control center differential indicator light	☐ Flashing		☐ Except flashing
Driving condition	☐ Not affected ☐ While decelerating	☐ At starting ☐ While accelerating	☐ While turning (☐ RH / ☐ LH) ☐ While cruising
Symptoms	☐ No change to AUTO or MANUAL		
	☐ No change of front and rear torque distribution		
	☐ No change to differential free		
	☐ No change to differential lock		
	☐ Tight cornering condition is occurred in AUTO or MANUAL mode with differential free		
	☐ Noise or vibration		
	☐ Others ()		

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

3. General Description

A: CAUTION

Supplemental restraint system airbag wiring harness is routed near the driver's control center differential control module.

CAUTION:

- All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
- Be careful not to damage the airbag system wiring harness when performing diagnostics and servicing the driver's control center differential control module.

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

B: INSPECTION

1. POWER SUPPLY

1) Measure battery voltage and specific gravity of electrolyte.

Standard of voltage: More than 12 V

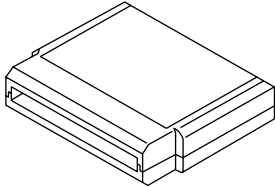
Standard of gravity: More than 1.260

2) Check the condition of fuse.

3) Check the condition of harness and harness connector.

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA260	24082AA260	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA010	22771AA010	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

2. GENERAL TOOL

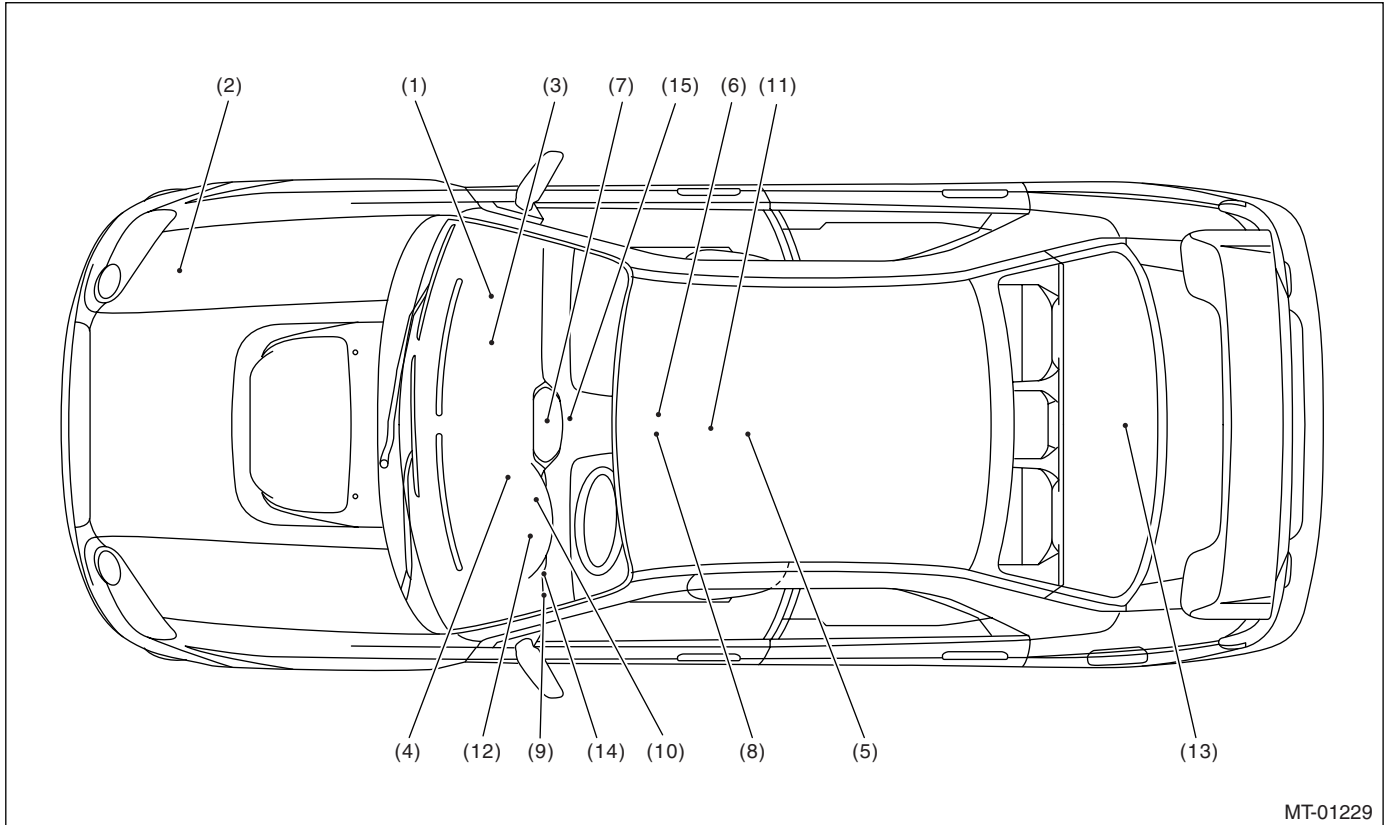
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

Electrical Component Location

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

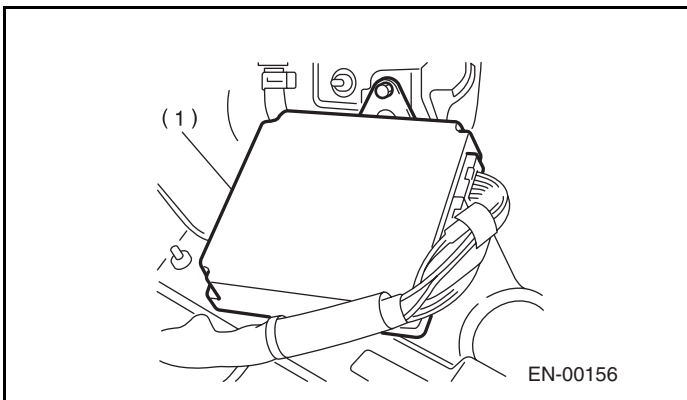
4. Electrical Component Location

A: LOCATION

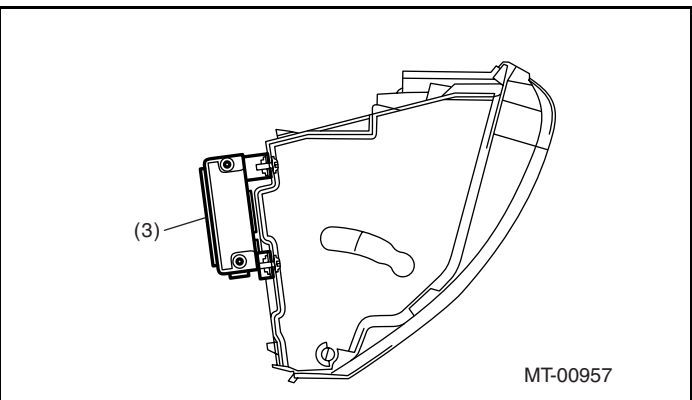


MT-01229

(1) Engine control module (ECM)	(7) Center differential	(11) Parking brake switch
(2) ABS control module & hydraulic control unit (ABSCM&H/U)	(8) Manual mode switch	(12) Brake light switch
(3) Driver's control center differential control module	(9) Driver's control center differential relay	(13) Rear differential oil temperature switch
(4) Accelerator position sensor	(10) Driver's control center differential indicator light (driver's control center differential diagnostic indicator light)	(14) Data link connector
(5) Yaw rate & lateral G sensor		(15) Neutral position switch
(6) Center differential control dial		



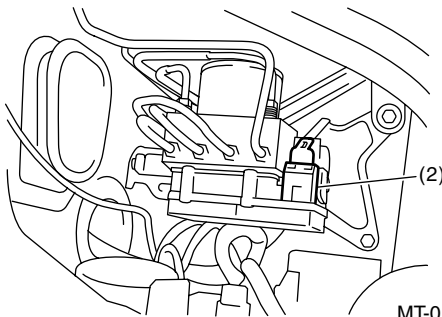
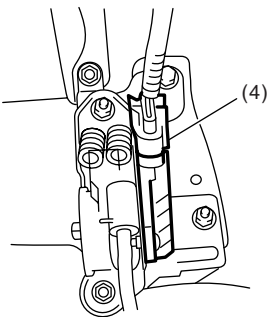
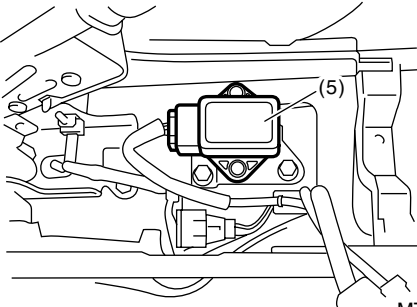
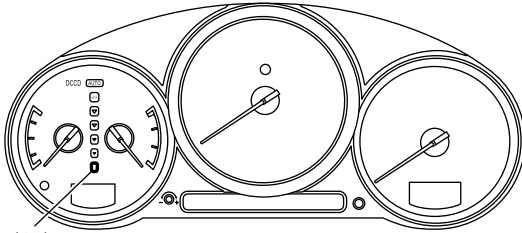
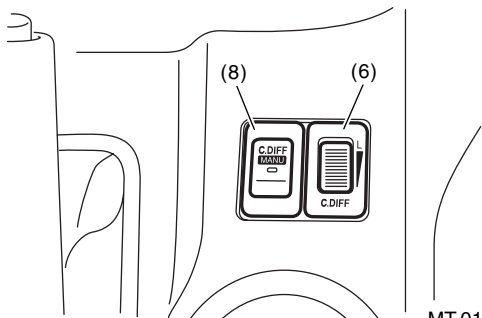
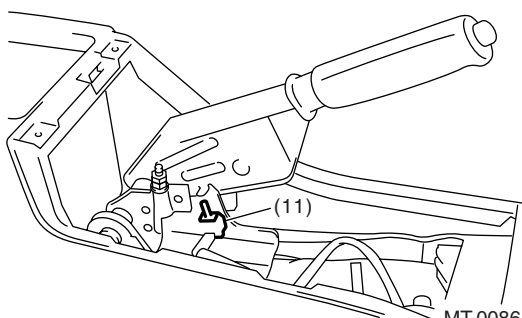
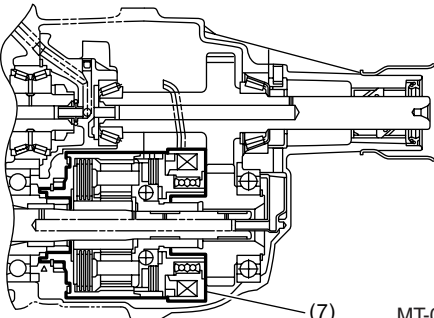
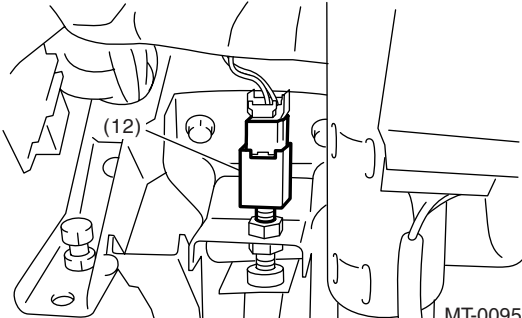
EN-00156



MT-00957

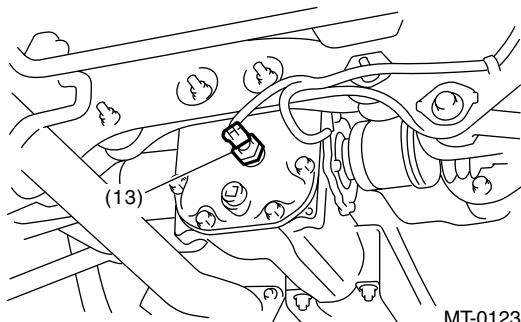
Electrical Component Location

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

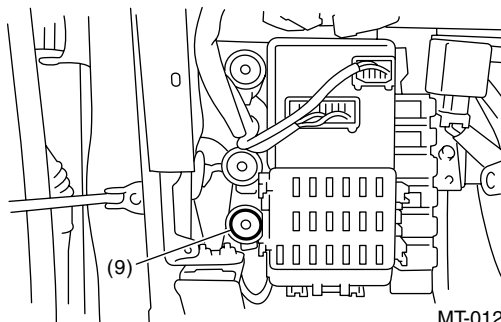
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 MT-01231	 MT-00860
 MT-01232	 MT-00861
 MT-00857	 MT-00959

Electrical Component Location

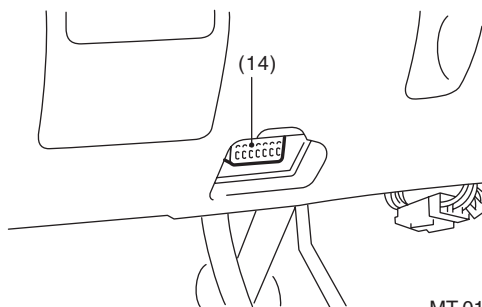
MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)



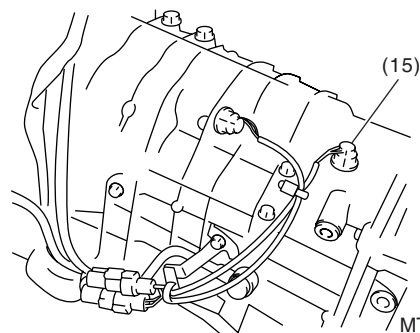
MT-01235



MT-01233



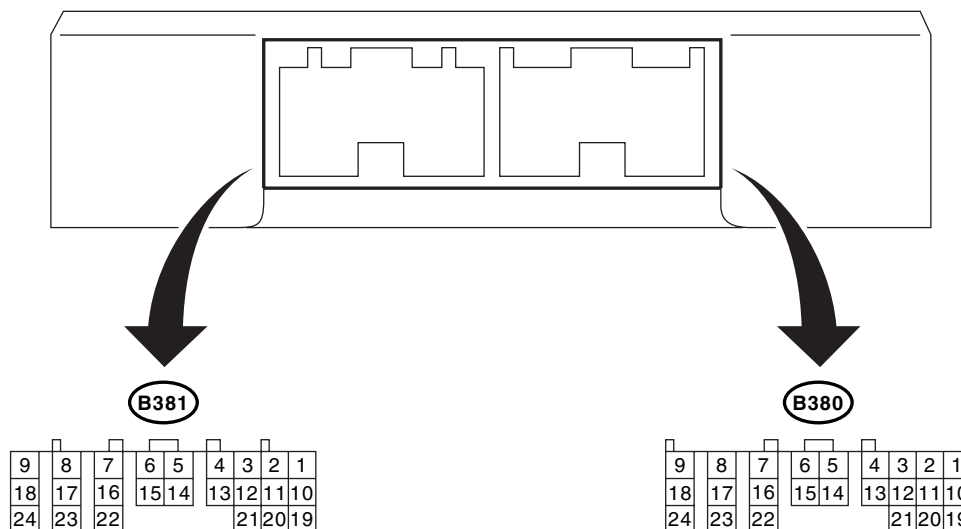
MT-01236



MT-01234

5. Driver's Control Center Differential Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



MT-01237

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	To body resistance (ohm)
Back-up power supply	B381	17	Ignition switch ON or OFF	10 — 13	—
Ignition power supply	B381	5	Ignition switch ON (engine OFF)	10 — 13	—
	B381	6			—
Driver's control center differential power supply	B381	7			—
Driver's control relay	B381	8			—
Accelerator position sensor	B380	2	Ignition switch ON	Less than 1	—
			Accelerator pedal is released.	0.3 — 1.8	
			Accelerator pedal is fully depressed.	2.8 — 4.7	
Center differential control dial power supply	B380	23	Ignition switch ON	Approx. 5	—
Center differential control dial ground line	B381	14	Ignition switch ON	0	—
Center differential control dial input signal	B380	3	When differential is locked	Approx. 5	—
			When differential is free	Less than 0.5	

Driver's Control Center Differential Control Module I/O Signal

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

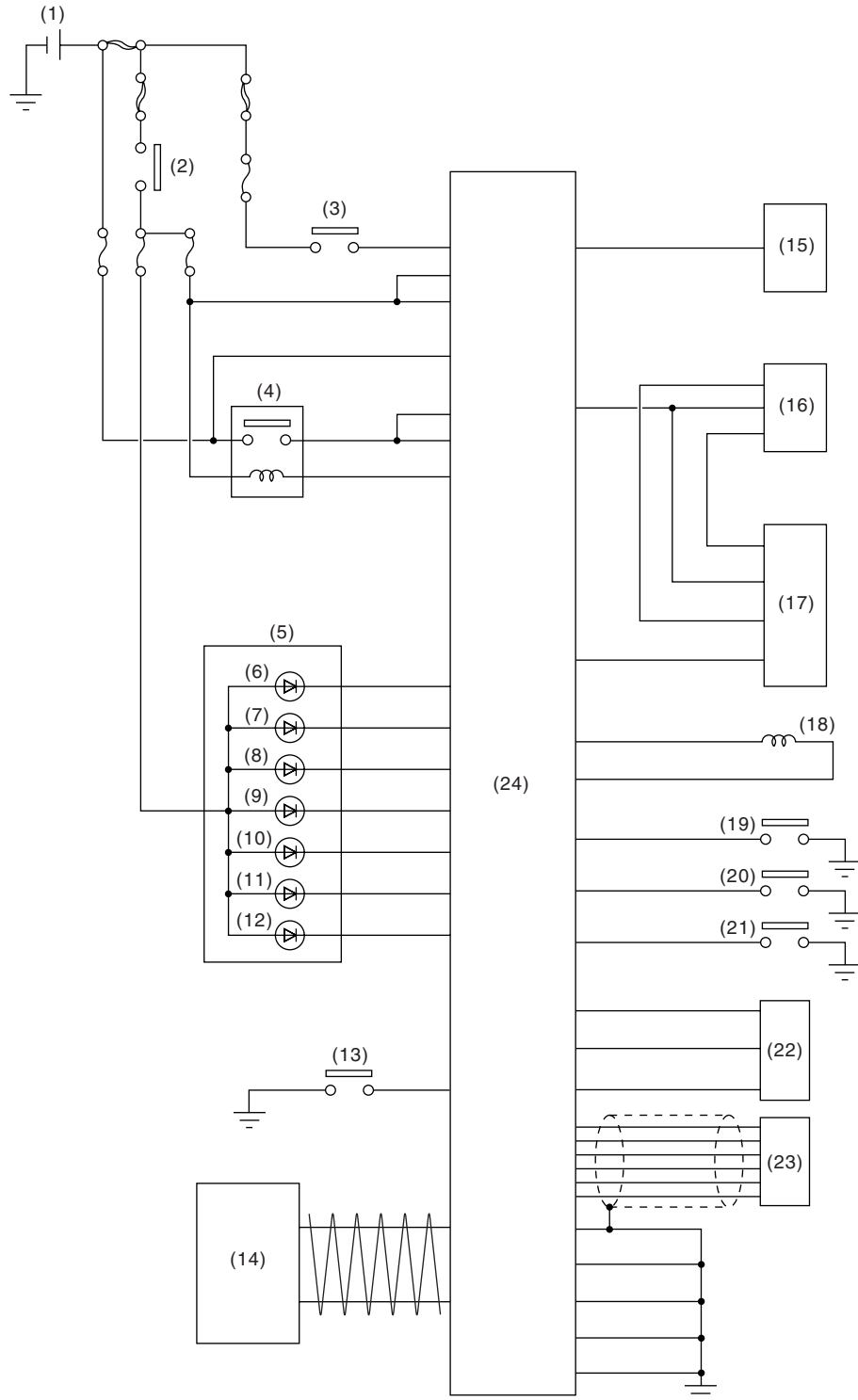
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	To body resistance (ohm)
Driver's control center differential output	B381	9	When differential is locked (When driver's control center differential indicator light is in differential lock)	6.0 — 7.0	1.0 — 2.0 (between connector terminals)
			When differential is free (When parking brake is applied)	Less than 0.5	
Driver's control center differential ground line	B381	24	When differential is free	Less than 0.5	
Parking brake switch	B380	5	When parking brake is applied	Less than 0.4	—
			When parking brake is released	More than 8	
Driver's control center differential indicator light (Lock ratio 0%)	B381	4	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 15%)	B381	3	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 35%)	B381	2	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 65%)	B381	1	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 85%)	B381	13	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 100%)	B381	12	When illuminates	Less than 1	—
			When turned off	More than 8	
AUTO indicator light	B381	11	When illuminates	Less than 1	—
			When turned off	More than 8	
Stop light switch	B380	4	Brake pedal depressed.	More than 8	—
			Brake pedal released.	Less than 1	
Rear differential oil temperature switch	B380	14	Rear differential oil temperature switch OFF	More than 8	—
			Rear differential oil temperature switch ON	Less than 0.4	
Manual mode switch	B380	13	Switch is released	More than 4.3	—
			Switch is depressed	Less than 0.1	
Data link signal (Subaru Select Monitor)	B380	9	—	—	—
Driver's control center differential control module ground line	B381	16	—	0	—
	B381	22			—
	B381	23			—
	B380	20			—
	B381	15			—

Driver's Control Center Differential Control Module I/O Signal

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	To body resistance (ohm)
Yaw rate & lateral G sensor	Input (lateral G sensor)	B380	1	Ignition switch ON (When vehicle on the level)	2.35 — 2.65 When vehicle on the level	—
	Battery voltage	B380	22	Ignition switch ON	more than 8	—
	Input (Yaw rate sensor)	B380	10	Ignition switch ON (engine OFF, when stopped, ABS is in normal condition)	Waveform <Ref. to 6MT(diag)-13, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	—
	Standard (Yaw rate sensor)	B380	19	Ignition switch ON	2.1 — 2.9	—
	Test	B380	21	Ignition switch ON (engine OFF, when stopped, ABS is in normal condition)	Waveform <Ref. to 6MT(diag)-13, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	—
	Ground	B380	10	—	—	—
CAN communication signal		B380	18	Ignition switch ON	Pulse signal	—
		B380	24			—
Neutral position switch		B380	15	Neutral	less than 0.1	—
				Except neutral	more than 8	—
Engine speed signal		B380	6	Ignition switch ON (engine OFF)	less than 1	
				Ignition switch ON (engine ON)	Less than 1 ←→ More than 8	

B: WIRING DIAGRAM



MT-01238

Driver's Control Center Differential Control Module I/O Signal

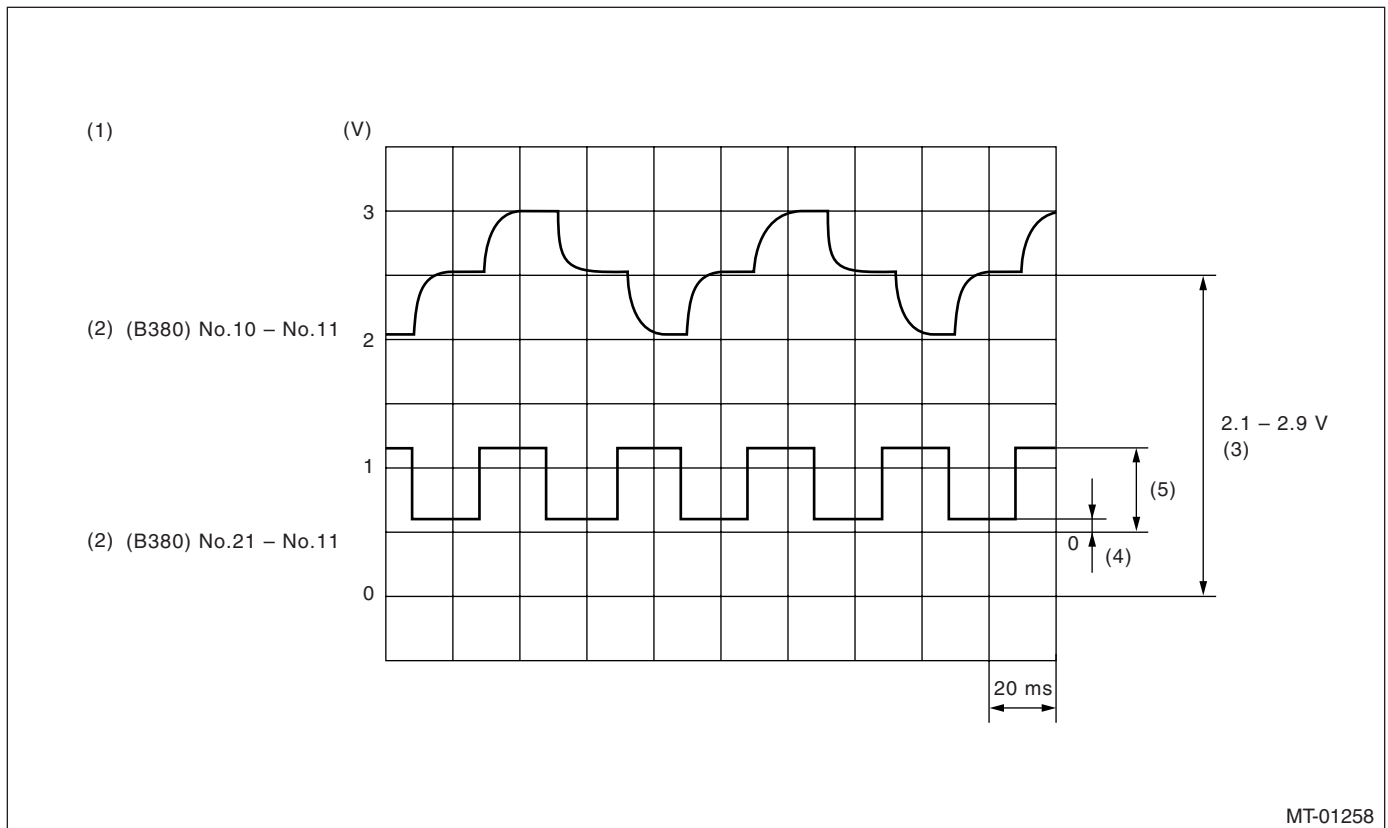
MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

(1) Battery	(9) Driver's control center differential indicator light (Lock ratio 65%)	(17) Engine control module (ECM)
(2) Ignition relay	(10) Driver's control center differential indicator light (Lock ratio 85%)	(18) Driver's control center differential
(3) Stop light switch	(11) Driver's control center differential indicator light (Lock ratio 100%)	(19) Parking brake switch
(4) Driver's control center differential relay	(12) AUTO indicator light	(20) Manual mode switch
(5) Combination meter	(13) Neutral position switch	(21) Rear differential oil temperature switch
(6) Driver's control center differential indicator light (Lock ratio 0%)	(14) ABS control module & hydraulic control unit (ABSCM&H/U)	(22) Center differential control dial
(7) Driver's control center differential indicator light (Lock ratio 15%)	(15) Data link connector	(23) Yaw rate & lateral G sensor
(8) Driver's control center differential indicator light (Lock ratio 35%)	(16) Accelerator position sensor	(24) Driver's control center differential control module

C: MEASUREMENT

Measure input and output signal voltage.

1. WAVEFORM



(1) Yaw rate sensor	(3) Vehicle is at a standstill. (engine OFF, ABS is in normal condition)	(4) Less than 1 V
(2) Terminal No.		(5) Approx. 6 V

Subaru Select Monitor

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

6. Subaru Select Monitor

A: OPERATION

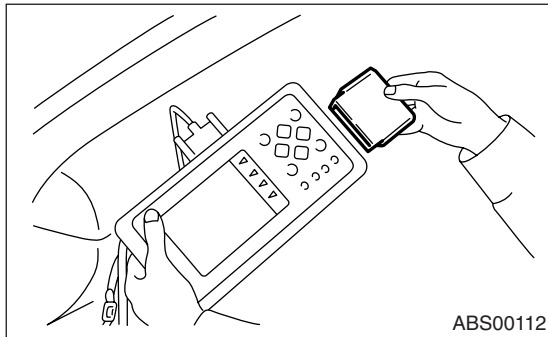
1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit. <Ref. to 6MT(diag)-5, SPECIAL TOOL, PREPARATION TOOL, General Description.>



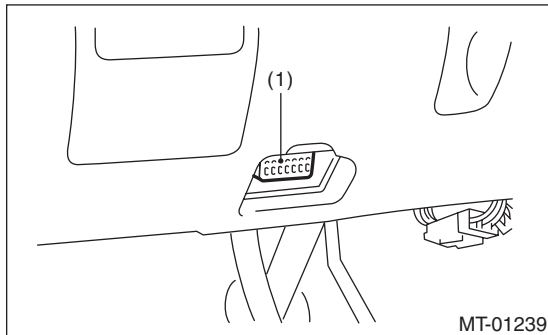
2) Connect the diagnosis cable to Subaru Select Monitor.

3) Insert the cartridge to Subaru Select Monitor. <Ref. to 6MT(diag)-5, SPECIAL TOOL, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



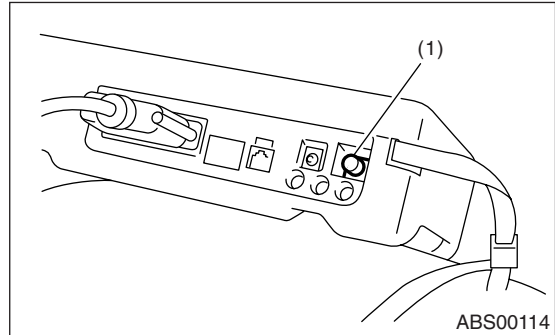
(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

CAUTION:

Do not connect the scan tools except for Subaru Select Monitor or general scan tool.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(1) 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} and press the [YES] key.

8) Press the [YES] key after the {Center Differential Control} is displayed.

9) On the «Transmission Diagnosis» display screen, select the {DTC Display} and press the [YES] key.

NOTE:

- For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".

- For details concerning DTCs, refer to the "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-25, List of Diagnostic Trouble Code (DTC).>

10) If transmission and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to 6MT(diag)-17, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

11) On the «Check DTC» display screen, select the {Latest Code} or {Memory Code} and press the [Yes] key.

Display	Contents to be monitored
Latest	Indicate the latest DTC on the Subaru Select Monitor display.
Memory Code	Indicate the latest DTC in previous trouble on the Subaru Select Monitor display.

Subaru Select Monitor

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

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} and press the [YES] key.
 - 3) Press the [YES] key after the {Center Differential Control} is displayed.
 - 4) On the «Transmission Diagnosis» screen, select the {Current Data Display/Save}, and then press the [YES] key.
 - 5) On the «Data Display Menu» screen, select the data display style and press the [YES] key.
 - 6) Using a scroll key, move the display screen up or down until necessary data is shown.
- A list of the support data is shown in the following table.

Display	Contents to be monitored	Unit of measure
Lateral G Sensor	Lateral G sensor voltage is displayed.	V
Center Differential Switch Voltage	Center differential switch voltage is displayed.	V
Center Differential Actual Current	Actual current of center differential is displayed.	A
Center Differential Set Current	Set current of center differential is displayed.	A
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed.	km/h or MPH
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed.	km/h or MPH
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed.	km/h or MPH
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed.	km/h or MPH
Sub-Accelerator Sensor	Accelerator pedal position sensor voltage is displayed.	V
Yaw rate sensor voltage	Voltage detected by yaw rate sensor is displayed.	V
Yaw rate & G sensor ref. V	Reference voltage of yaw rate & lateral G sensor is displayed.	V
Engine Speed	Current engine speed is displayed.	rpm
ABS Signal	ON/OFF of ABS signal is displayed.	ON or OFF
Stop Light SW	ON/OFF of stop light switch is displayed.	ON or OFF
Rear differential Oil Temperature SW	ON/OFF of rear differential oil temperature switch is displayed.	ON or OFF
Module Identification Signal	ON/OFF of module identification signal is displayed.	ON or OFF
Center Differential Light 1	ON/OFF of center differential light 1 is displayed.	ON or OFF
Center Differential Light 2	ON/OFF of center differential light 2 is displayed.	ON or OFF
Center Differential Light 3	ON/OFF of center differential light 3 is displayed.	ON or OFF
Center Differential Light 4	ON/OFF of center differential light 4 is displayed.	ON or OFF
Center Differential Light 5	ON/OFF of center differential light 5 is displayed.	ON or OFF
Center Differential Light 6	ON/OFF of center differential light 6 is displayed.	ON or OFF
Parking SW	ON/OFF of parking switch is displayed.	ON or OFF
Center Differential Relay	ON/OFF of center differential relay is displayed.	ON or OFF
AUTO/MANUAL Mode Change SW	ON/OFF of AUTO/MANUAL mode change switch is displayed.	ON or OFF
AUTO Mode Light	ON/OFF of AUTO mode light is displayed.	ON or OFF
Neutral Switch	Neutral switch condition (neutral/except neutral) is displayed.	ON or OFF

NOTE:

For details concerning 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} and press the [YES] key.
- 3) Press the [YES] key after the {Center Differential Control} is displayed.
- 4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.

Display	Contents to be monitored
Is a memory clearance performed?	Function of clearing DTC.

- 5) When “Done” and “Turn ignition switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:

For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. FREEZE FRAME DATA

NOTE:

- Data stored at the time of trouble occurrence is shown on display.
- Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
- Freeze frame data will be memorized up to seven.

DTC	Content	Contents be monitored
P1720	DCCD CAN system circuit	CAN communication circuit condition is displayed.
P1721	DCCD engine rpm signal system	Engine speed signal circuit condition is displayed.
P1759	Lateral G sensor	Lateral G sensor circuit condition is displayed.
P1764	Yaw rate sensor system circuit	Yaw rate sensor circuit condition is displayed.
P1765	Yaw rate side G sensor reference system circuit	Yaw rate reference circuit condition is displayed.
P1875	Center differential	Center differential circuit condition is displayed.
P2125	Accelerator pedal position sensor	Accelerator pedal position sensor circuit condition is displayed.

Subaru Select Monitor

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

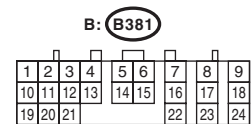
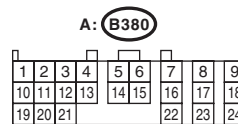
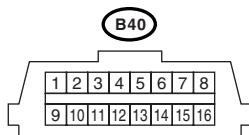
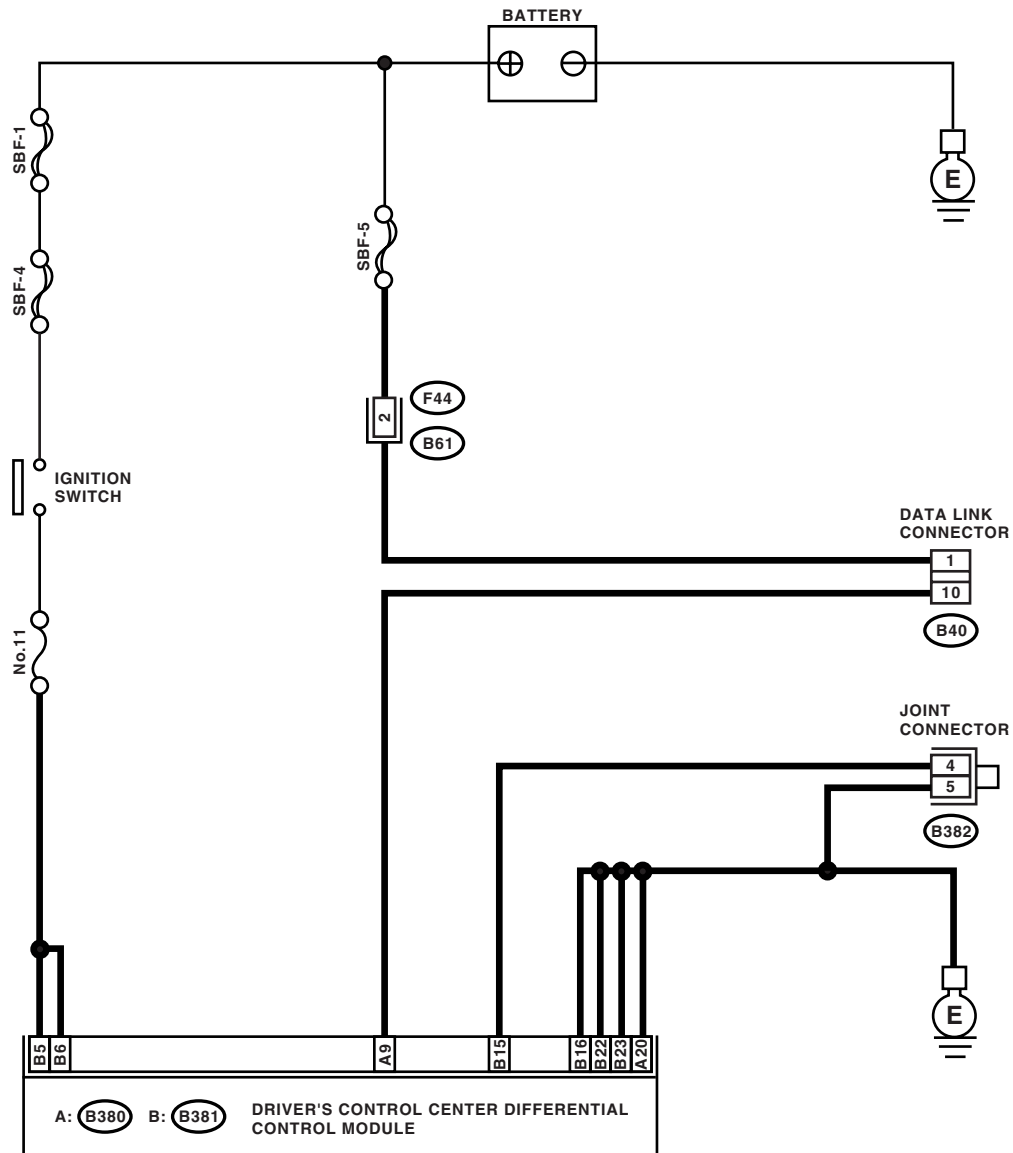
DETECTING CONDITION:

Faulty harness connector.

TROUBLE SYMPTOM:

Communication is impossible between driver's control center differential control module and Subaru Select Monitor.

WIRING DIAGRAM:



Subaru Select Monitor

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK IGNITION SWITCH.	Does the ignition switch turn to ON?	Go to step 2.	Turn the ignition switch to ON, and select transmission mode using Subaru Select Monitor.
2 CHECK BATTERY. 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 10 V?	Go to step 3.	Charge or replace the battery.
3 CHECK BATTERY TERMINAL.	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step 4.
4 CHECK INSTALLATION OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE CONNECTOR. Turn the ignition switch to OFF.	Is the driver's control center differential control module connector inserted into driver's control center differential control module until it is locked by clamps?	Go to step 5.	Insert driver's control center differential control module connector into driver's control center differential control module.
5 CHECK SUBARU SELECT MONITOR COMMUNICATION. 1) Turn the ignition switch to ON. 2) Using Subaru Select Monitor, check whether communication to other system can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Go to step 9.	Go to step 6.
6 CHECK SUBARU SELECT MONITOR COMMUNICATION. 1) Turn the ignition switch to OFF. 2) Disconnect the driver's control center differential control module connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Replace driver's control center differential control module. <Ref. to 6MT(diag)-6, LOCATION, Electrical Component Location.>	Go to step 7.
7 CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect driver's control center differential control module connector, ECM connector and ABSCM connector. 3) Measure the resistance between data link connector and chassis ground. Connector & terminal (B40) No. 10 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 8.	Repair harness and connector between each control module and data link connector.
8 CHECK OUTPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to ON. 2) Measure the voltage between data link connector and chassis ground. Connector & terminal (B40) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 9.	Repair harness and connector between each control module and data link connector.

Subaru Select Monitor

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn the ignition switch OFF. 2) Disconnect the driver's control center differential control module connector. 3) Measure the resistance between driver's control center differential control module connector and data link connector. Connector & terminal (B380) No. 9 — (B40) No. 10:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair harness and connector between driver's control center differential control module and data link connector.
10 CHECK POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the ignition power supply voltage between driver's control center differential control module connector and chassis ground. Connector & terminal (B381) No. 15 (+) — Chassis ground (-): (B381) No. 16 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 11.	Repair open circuit in harness between driver's control center differential control module and battery.
11 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND CHASSIS GROUND. 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 20 — Chassis ground: (B381) No. 15 — Chassis ground: (B381) No. 21 — Chassis ground: (B381) No. 22 — Chassis ground: (B381) No. 23 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair open circuit in harness between driver's control center differential control module and inhibitor side connector, and poor contact in coupling connector.
12 CHECK POOR CONTACT IN CONNECTOR.	Is there poor contact in control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the driver's control center differential control module only. <Ref. to 6MT(diag)-6, LOCATION, Electrical Component Location.>

Read Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC) WITH DIAGNOSTIC INDICATOR LIGHT.

NOTE:

Perform the following step 4) to 8) within 30 sec.

- 1) Securely apply the parking brake.
- 2) Set the center differential control dial to differential free.
- 3) Start the engine.
- 4) Set the center differential control dial to differential lock.
- 5) Release the parking brake.
- 6) Set the center differential control dial to differential free.
- 7) Securely apply the parking brake.
- 8) Repeat the step 4) to 7) for twice.

NOTE:

Repeat the step from the beginning when diagnostic indicator light does not blink.

9) Execute inspection mode. <Ref. to 6MT(diag)-22, Inspection Mode.>

NOTE:

Refer to "HOW TO READ DIAGNOSTIC TROUBLE CODE (DTC)" for reading DTC. <Ref. to 6MT(diag)-21, HOW TO READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Read Diagnostic Trouble Code (DTC).>

2. WITH SUBARU SELECT MONITOR

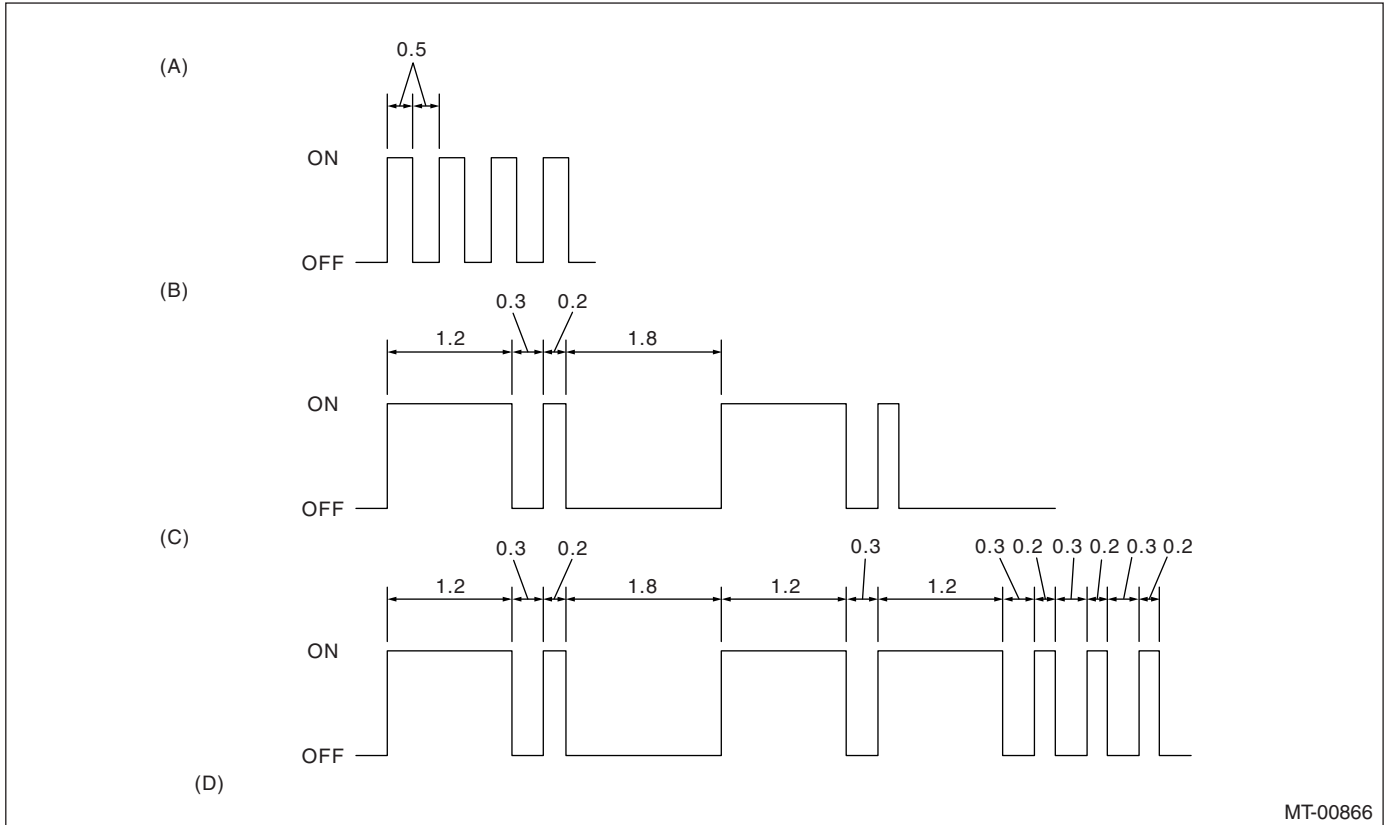
Detail procedure for reading DTC, refer to "SUBARU SELECT MONITOR". <Ref. to 6MT(diag)-14, Subaru Select Monitor.>

Read Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

3. HOW TO READ DIAGNOSTIC TROUBLE CODE (DTC)

DTC for faulty part is indicated by blinking of driver's control center differential indicator. Long blink (1.2 sec.) means ten's place, short blink (0.2 sec.) means one's place.



(A) Normal code

(B) DTC 11

(C) DTC 11 and 23

(D) Unit: Seconds

NOTE:

- The codes which are memorized in control module, and the codes which are appeared to inform the trouble to driver in normal driving condition; are only "21", "22", "23", "25", "26", "27" and "28".
- For details of DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-25, List of Diagnostic Trouble Code (DTC).>

8. Inspection Mode

A: PROCEDURE

WARNING:

Observe the road traffic law.

- 1) Call up the Self-diagnosis diagnostic trouble code (DTC). <Ref. to 6MT(diag)-20, READ DIAGNOSTIC TROUBLE CODE (DTC) WITH DIAGNOSTIC INDICATOR LIGHT., OPERATION, Read Diagnostic Trouble Code (DTC).>
- 2) A brake pedal is stepped on and a brake pedal is returned.
- 3) Operate the Manual mode switch once or more, and then set to Manual mode.
- 4) Turn the center differential control dial to differential lock and differential free for once, and turn it to differential lock, and then wait three seconds.
- 5) With the vehicle parked, shift the gear position to 1st then neutral.

9. Clear Memory Mode

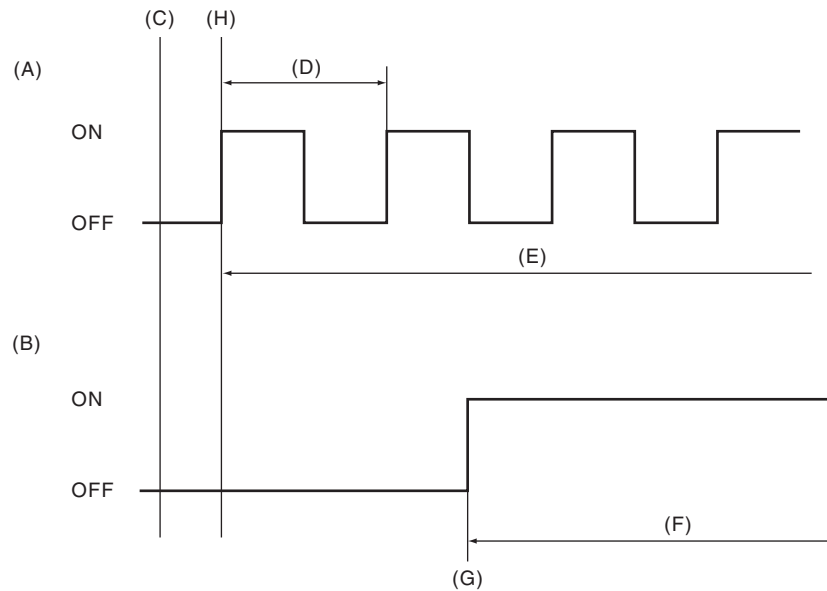
A: OPERATION

Detail procedure for clearing DTCs, refer to “SUB-ARU SELECT MONITOR”. <Ref. to 6MT(diag)-14, Subaru Select Monitor.>

10.Driver's Control Center Differential Indicator Light Display

A: INSPECTION

When the malfunction occurs on part or unit, the control module performs self diagnosis and driver's control center differential indicator light (at the bottom differential free light) keep blinking until detect the malfunction and the ignition switch is turned to OFF. Faulty part or unit can be identified by calling up DTC. Indicator display is as shown in the figure.



MT-01241

(A) Faulty	(E) Blink	(G) Set manual mode dial to differential free position
(B) Normal	(F) Driver's control center differential indicator light illuminates	(H) Malfunction is detected
(C) Ignition switch ON		
(D) 1 sec.		

List of Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

11. List of Diagnostic Trouble Code (DTC)

A: LIST

1. SUBARU SELECT MONITOR DISPLAY

DTC	Connect	Content of diagnosis	Index
P1720	DCCD CAN system circuit	CAN communication circuit is open or shorted.	<Ref. to 6MT(diag)-32, DTC P1720 DCCD CAN SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1721	DCCD engine rpm signal system circuit	Engine speed signal circuit is open or shorted.	<Ref. to 6MT(diag)-34, DTC P1721 DCCD ENGINE RPM SIGNAL SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1759	Lateral Acceleration Sensor Circuit	Lateral G sensor circuit is open or shorted.	<Ref. to 6MT(diag)-37, DTC P1759 LATERAL ACCELERATION SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1764	Yaw rate sensor system circuit	Yaw rate sensor circuit is open or shorted.	<Ref. to 6MT(diag)-40, DTC P1764 YAW RATE SENSOR SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1765	Yaw rate side G sensor reference system circuit	Yaw rate reference circuit is open or shorted.	<Ref. to 6MT(diag)-43, DTC P1765 YAW RATE SIDE G SENSOR REFERENCE SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1875	Circuit of Center Diff.	Driver's control center differential circuit is open or shorted.	<Ref. to 6MT(diag)-46, DTC P1875 CIRCUIT OF CENTER DIFF., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2125	Accelerator Position Sensor E	Accelerator pedal position circuit is open or shorted.	<Ref. to 6MT(diag)-52, DTC 2125 ACCELERATOR POSITION SENSOR E, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

2. COMBINATION METER INDICATOR LIGHT

DTC	Connect	Content of diagnosis	Index
21	Accelerator Position Sensor E	Accelerator pedal position circuit is open or shorted.	<Ref. to 6MT(diag)-52, DTC 2125 ACCELERATOR POSITION SENSOR E, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Lateral Acceleration Sensor Circuit	Lateral G sensor circuit is open or shorted.	<Ref. to 6MT(diag)-37, DTC P1759 LATERAL ACCELERATION SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Circuit of Center Diff.	Driver's control center differential circuit is open or shorted.	<Ref. to 6MT(diag)-46, DTC P1875 CIRCUIT OF CENTER DIFF., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Center differential control dial	Center differential control dial circuit is open or shorted.	<Ref. to 6MT(diag)-55, DTC 24 CHECK CENTER DIFFERENTIAL CONTROL DIAL., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	DCCD CAN system circuit	CAN communication circuit is open or shorted.	<Ref. to 6MT(diag)-32, DTC P1720 DCCD CAN SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	DCCD engine rpm signal system	Engine speed signal circuit is open or shorted.	<Ref. to 6MT(diag)-34, DTC P1721 DCCD ENGINE RPM SIGNAL SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

DTC	Connect	Content of diagnosis	Index
27	Yaw rate side G sensor reference system circuit	Yaw rate reference circuit is open or shorted.	<Ref. to 6MT(diag)-43, DTC P1765 YAW RATE SIDE G SENSOR REFERENCE SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
28	Yaw rate sensor system circuit	Yaw rate sensor circuit is open or shorted.	<Ref. to 6MT(diag)-43, DTC P1765 YAW RATE SIDE G SENSOR REFERENCE SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Manual mode switch	Manual mode switch circuit is open or shorted.	<Ref. to 6MT(diag)-57, DTC 31 MANUAL MODE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	Parking brake switch	Parking brake switch circuit is open or shorted.	<Ref. to 6MT(diag)-61, DTC 32 CHECK PARKING BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Stop light switch	Brake switch circuit is open or shorted.	<Ref. to 6MT(diag)-63, DTC 33 STOP LIGHT SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	Neutral position switch	Neutral position switch circuit is open or shorted.	<Ref. to 6MT(diag)-65, DTC 37 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

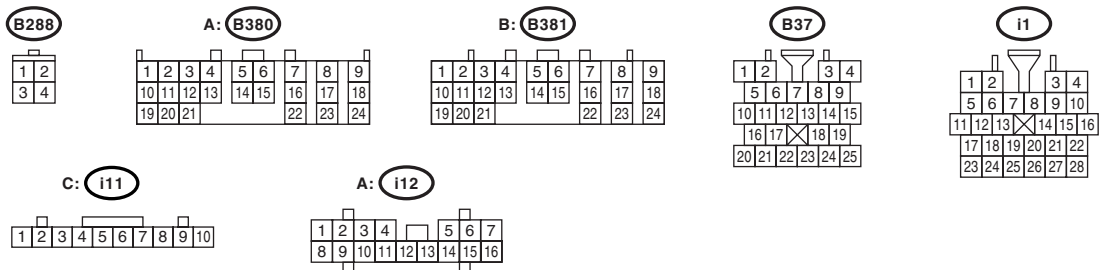
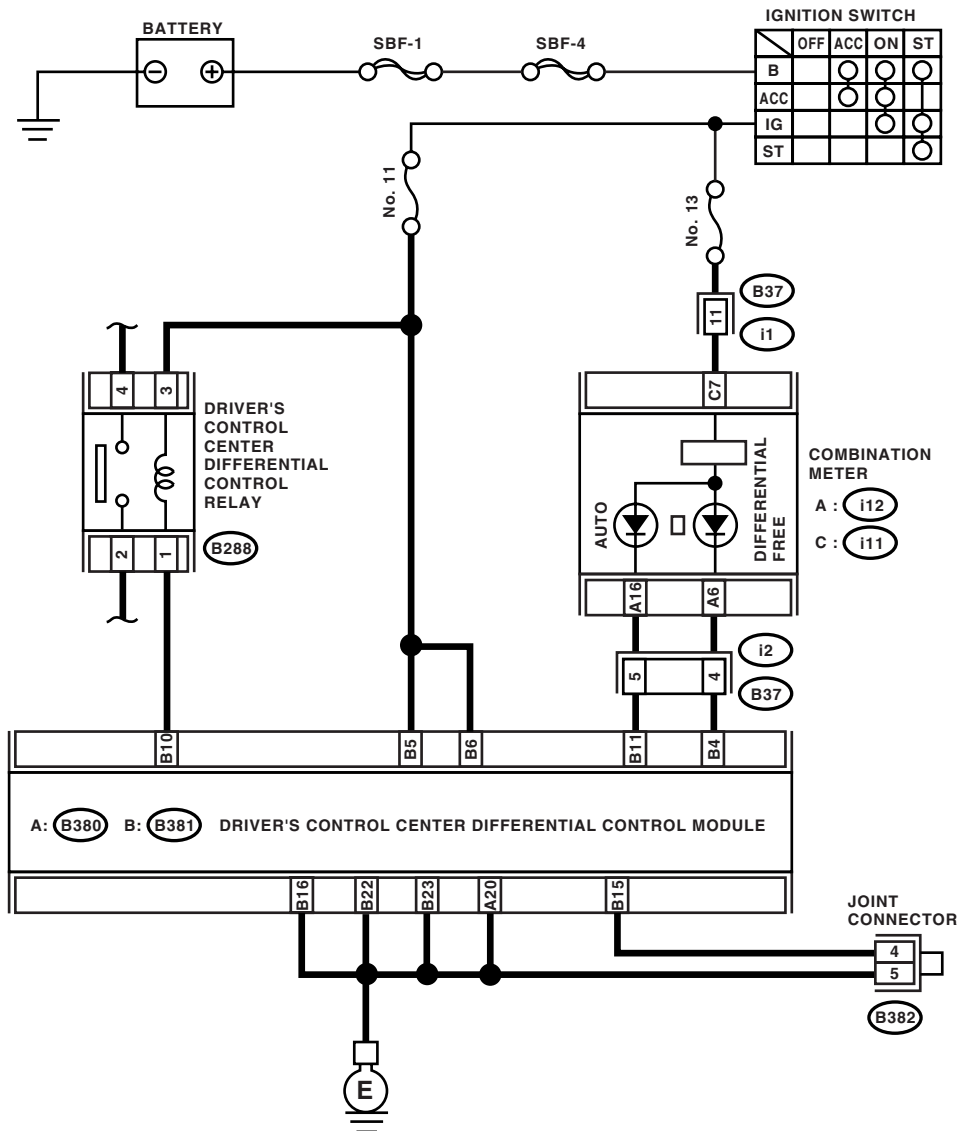
Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

12. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC CANNOT BE CALLED UP

WIRING DIAGRAM:



MT-01242

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK THE AUTO INDICATOR LIGHT. Turn the ignition switch to ON.	Does the AUTO indicator light illuminate?	Go to step 5.	Go to step 2.
2 CHECK THE GROUND CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the connector of driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module harness connector and chassis ground. Connector & terminal (B380) No. 20 — Chassis ground: (B381) No. 15 — Chassis ground: (B381) No. 16 — Chassis ground: (B381) No. 22 — Chassis ground: (B381) No. 23 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit of driver's control center differential control module ground circuit.
3 CHECK FUSE (No. 11). Remove the fuse (No. 11).	Is the fuse (No. 11) is blown out?	Replace fuse (No.11). If the replaced fuse (No.11) is blown out easily, repair short circuit in harness between fuse (No.11) and driver's control center differential control module.	Go to step 4.
4 CHECK IGNITION POWER SUPPLY CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between driver's control center differential control module and chassis ground. Connector & terminal (B381) No. 5 (+) — Chassis ground (-): (B381) No. 6 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 5.	Repair the open circuit in harness between fuse (No. 11) and driver's control center differential control module, or fuse (No. 11) and battery.
5 CHECK MANUAL MODE SWITCH. 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Turn the ignition switch to ON. 4) Push the manual mode switch to enter the manual mode.	Is the manual mode obtained?	Go to step 6.	Repair the switch. <Ref. to 6MT(diag)-57, DTC 31 MANUAL MODE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
6 CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL INDICATOR LIGHT. Operate the center differential control dial.	Does the center differential indicator light illuminate according to center differential control dial?	Go to step 8.	Go to step 7.
7 CHECK THE CENTER DIFFERENTIAL CONTROL DIAL <Ref. to 6MT(diag)-55, DTC 24 CHECK CENTER DIFFERENTIAL CONTROL DIAL., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is the center differential control dial circuit normal?	Go to step 8.	Repair it.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK THE PARKING BRAKE SWITCH <Ref. to 6MT(diag)-61, DTC 32 CHECK PARKING BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is the parking brake switch circuit normal?	Go to step 9.	Repair it.
9 READ THE DTC. Read the DTC. <Ref. to 6MT(diag)-20, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC called up?	Go back to the Basic Diagnostic Procedure. <Ref. to 6MT(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>	Go to step 10.
10 CHECK THE DRIVER'S CONTROL CENTER DIFFERENTIAL INDICATOR LIGHT. 1) Turn the ignition switch to OFF. 2) Disconnect harness connector from combination meter. 3) Turn the ignition switch to ON. (engine OFF) 4) Short between the combination meter harness connector and chassis ground. Connector & terminal (i12) No. 6 — Chassis ground:	Does the lowest light of driver's control center differential indicator illuminate?	Go to step 11.	Check the combination meter.
11 CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from driver's control center differential control module. 3) Measure the resistance of harness between combination meter harness connector and driver's control center differential control module harness connector. Connector & terminal (i12) No. 6 — (B381) No. 4:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair the open circuit and connector of harness between combination meter harness connector and driver's control center differential control module harness connector.
12 CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. Measure the resistance of harness between driver's control center differential control module harness connector and chassis ground. Connector & terminal (B381) No. 4 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 13.	Repair the short of harness between combination meter harness connector and driver's control center differential control module harness connector.
13 CHECK THE POOR CONTACT IN HARNESS CONNECTOR	Is there any poor contact in harness connectors of each circuit?	Repair the poor contact.	Replace the driver's control center differential control module.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

B: CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH

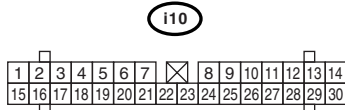
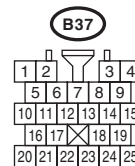
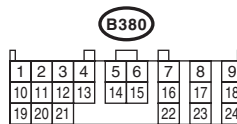
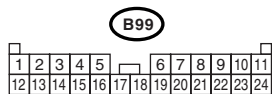
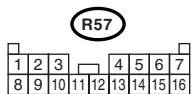
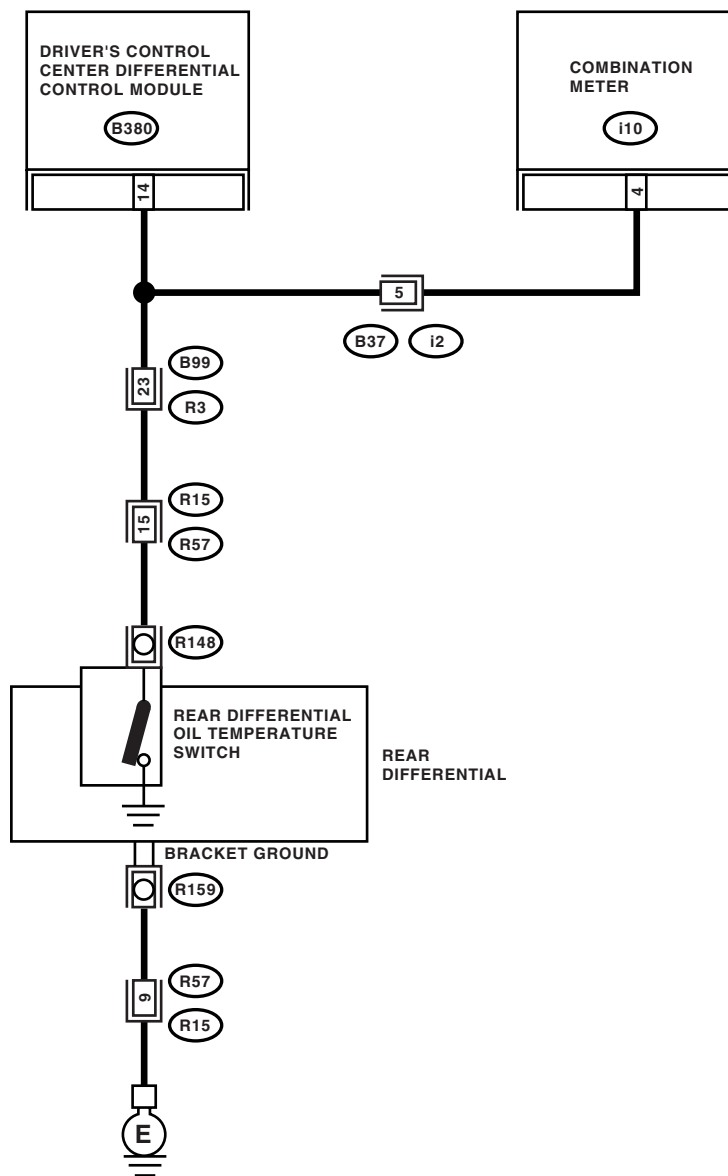
DIAGNOSIS:

Input signal circuit of rear differential oil temperature switch is open or shorted.

TROUBLE SYMPTOM:

- Center differential stays free.
- Handling tends to oversteer.
- Rear differential oil temperature switch warning light illuminates.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH WARNING LIGHT CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connector of driver's control center differential control module harness connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage of rear differential oil temperature switch. Connector & terminal (B380) No. 14 (+) — Chassis ground (-):	Is the voltage less than 0.4 V?	Go to step 7.	Go to step 2.
2 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND COMBINATION METER. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from the combination meter. 3) Disconnect the connector from the rear differential oil temperature switch. 4) Measure the resistance between combination meter and driver's control center differential control module harness connector. Connector & terminal (B380) No. 14 — (i10) No. 4:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit between driver's control center differential control module and combination meter.
3 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND REAR DIFFERENTIAL OIL TEMPERATURE SWITCH. Measure the resistance between driver's control center differential control module harness connector and rear differential oil temperature switch harness connector. Connector & terminal (B380) No. 14 — (R148) No. 1:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit between driver's control center differential control module and rear differential oil temperature switch.
4 CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH GROUND CIRCUIT. 1) Disconnect the harness connector from bracket ground of rear differential. 2) Measure the resistance between the rear differential oil temperature switch ground harness connector and chassis ground. Connector & terminals (R159) No. 1 — Chassis ground:	Is the resistance more than 1 M Ω ?	Repair the open circuit of rear differential oil temperature switch ground circuit and poor contact of harness connector.	Go to step 5.
5 CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH. Measure the resistance between rear differential oil temperature switch terminal and rear differential oil temperature switch body. Terminals (R148) No. 1 — Rear differential oil temperature switch body:	Is the resistance less than 1 Ω ?	Go to step 6.	Replace the rear differential oil temperature switch.
6 CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH WARNING LIGHT. 1) Turn the ignition switch to ON. 2) Short between the combination meter harness connector and chassis ground. Terminals (R148) No. 4 (+) — Chassis ground (-):	Does the rear differential oil temperature switch warning light turn OFF?	Go to step 7.	Replace the combination meter.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK POOR CONTACT.	Is there any poor contact in the circuit of rear differential oil temperature switch?	Repair the poor contact.	Replace the driver's control center differential control module.

C: DTC P1720 DCCD CAN SYSTEM CIRCUIT

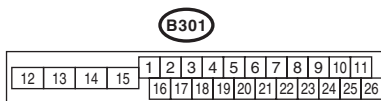
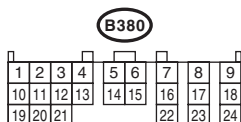
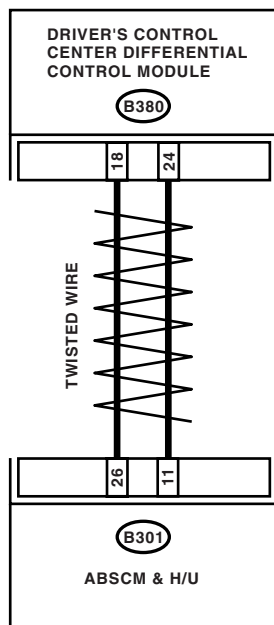
DIAGNOSIS:

Open or short circuit in CAN communication circuit

TROUBLE SYMPTOM:

- Tight corner braking phenomenon is occurred.
- ABS does not operate.
- ABS warning light illuminates.

WIRING DIAGRAM:



MT-01243

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ABSCM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module and ABSCM&H/U. 3) Measure the resistance of harness connector between driver's control center differential control module and ABSCM&H/U. Connector & terminal (B380) No. 18 — (B301) No. 26: (B380) No. 24 — (B301) No. 11:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between driver's control center differential control module and ABSCM&H/U.
2 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ABSCM. Measure the resistance between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 18 — Chassis ground: (B380) No. 24 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between driver's control center differential control module and ABSCM&H/U.
3 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ABSCM. 1) Turn the ignition switch to ON. 2) Measure the voltage between driver's control center differential control module connector and chassis ground. Connector & terminal (B380) No. 18 (+) — Chassis ground (-): (B380) No. 24 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 4.	Repair the short circuit in harness between driver's control center differential control module and ABSCM&H/U.
4 CHECK POOR CONTACT.	Is there poor contact in CAN communication circuit?	Repair the poor contact.	Go to step 5.
5 CHECK ABSCM. 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Clear DTCs. 4) Check DTC of ABSCM.	Is the DTC of CAN communication circuit displayed on ABSCM?	Replace the driver's control center differential control module. <Ref. to 6MT-125, Driver's Control Center Differential Control Module.>	Check ABSCM.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

D: DTC P1721 DCCD ENGINE RPM SIGNAL SYSTEM CIRCUIT

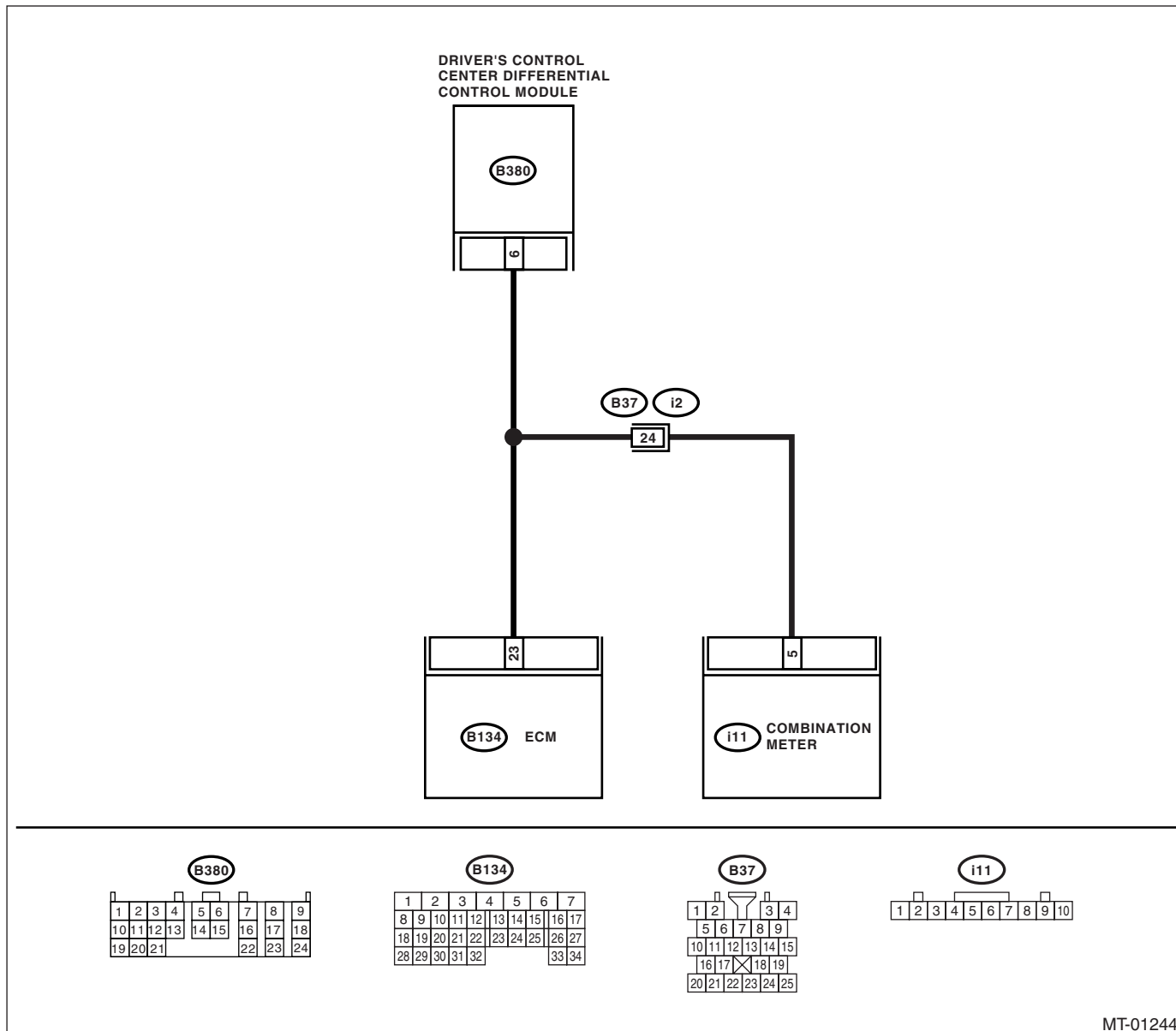
DIAGNOSIS:

DCCD Open or short in engine speed output signal circuit

TROUBLE SYMPTOM:

The tendency of oversteer occurred when high speed cornering.

WIRING DIAGRAM:



MT-01244

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ECM. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module, Combination Meter and ECM. 3) Measure the resistance of harness connector between driver's control center differential control module and ECM. Connector & terminal (B380) No. 6 — (B134) No. 23:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between driver's control center differential control module and ECM.
2 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ECM. Measure the resistance between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 6 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between driver's control center differential control module and ECM.
3 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ECM. 1) Turn the ignition switch to ON. 2) Measure the resistance between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 6 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 4.	Repair the short circuit in harness between driver's control center differential control module and ECM.
4 CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Start the engine and let it idle.	Does the tachometer in the combination meter operate?	Go to step 5.	Check ECM.
5 CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and Subaru Select Monitor switch to ON. 4) Idle the engine. 5) Read the data of engine speed using Subaru Select Monitor.	Is the revolution value about the same as tachometer reading shown in the combination meter?	Go to step 7.	Go to step 6.
6 CHECK POOR CONTACT.	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step		Check	Yes	No
7	CHECK DTC. Perform the inspection mode and read DTC.	Is the DTC 26 displayed?	Replace the driver's control center differential control module. <Ref. to 6MT-125, Driver's Control Center Differential Control Module.>	Even if the center differential indicator light (differential free position) blinks, the circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and ECM.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

E: DTC P1759 LATERAL ACCELERATION SENSOR CIRCUIT

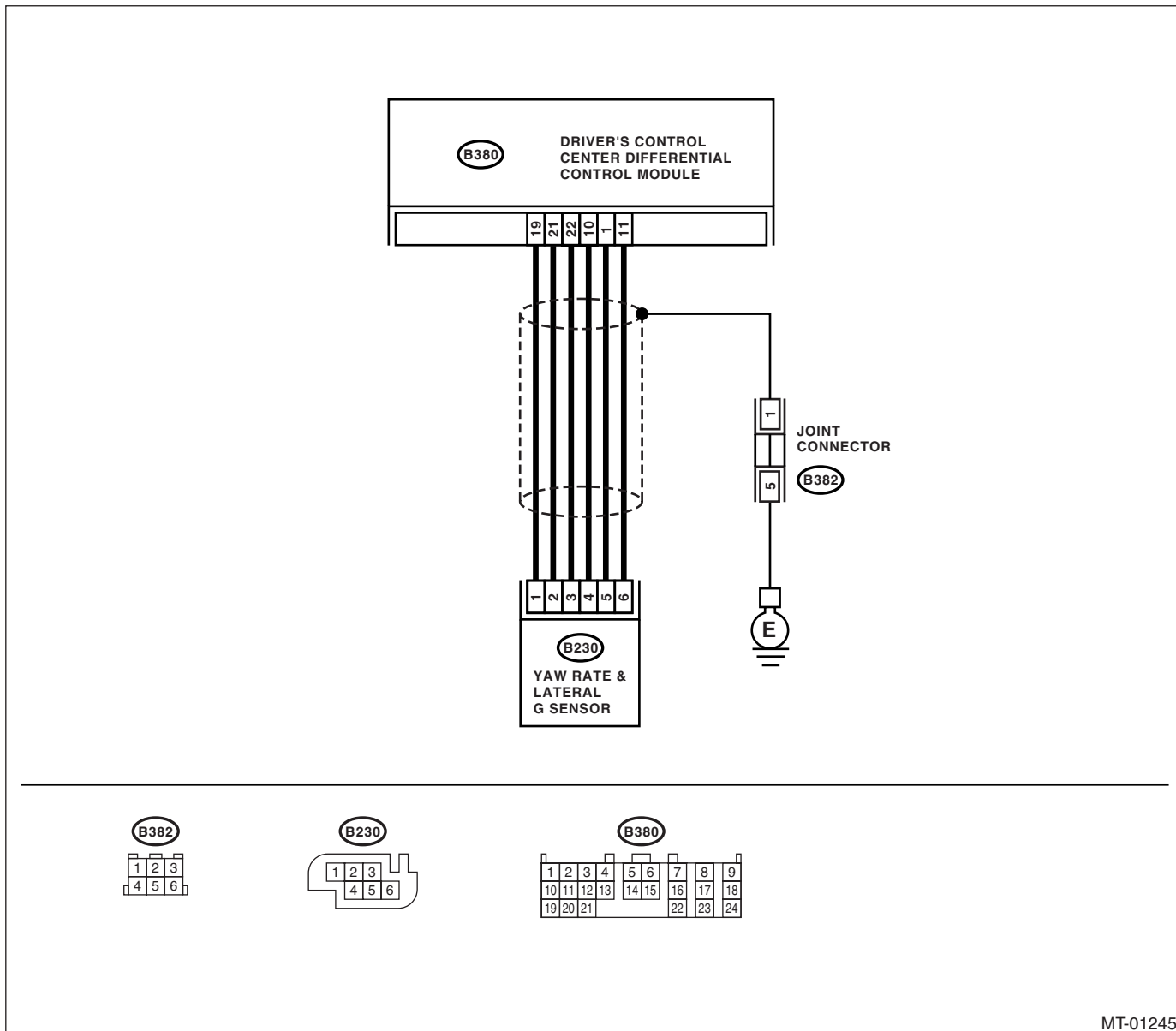
DIAGNOSIS:

Open or short in lateral G sensor circuit

TROUBLE SYMPTOM:

The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:



MT-01245

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK YAW RATE & LATERAL G SENSOR VOLTAGE. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between yaw rate & lateral G sensor harness connector and Chassis ground (-). Connector & terminal (B230) No. 3 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 4.	Go to step 2.
2 CHECK OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. Measure the voltage between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 22 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.	Go to step 3.
3 CHECK BATTERY.	Is the voltage more than 10 V?	Go to step 10.	Charge or replace the battery.
4 CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. Connector & terminal (B380) No. 10 — (B230) No. 4:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
5 CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. Measure the resistance between driver's control center differential control module connector and Chassis ground (-). Connector & terminal (B380) No. 10 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
6 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR. Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. Connector & terminal (B380) No. 1 — (B230) No. 5:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
7 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR. Measure the resistance between driver's control center differential control module harness connector and Chassis ground (-). Connector & terminal (B380) No. 1 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 8.	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK LATERAL G SENSOR. 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON, and Subaru Select Monitor switch to ON. 5) Read the data of "Lateral G sensor signal" using Subaru Select Monitor. <Ref. to 6MT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the data 2.35 — 2.65 V?	Go to step 11.	Go to step 9.
9 CHECK LATERAL G SENSOR. Measure the voltage yaw rate & lateral G sensor connector. Connector & terminal (B230) No. 5 (+) — (B230) No. 6 (-):	Is the voltage 2.35 — 2.65 V?	Go to step 10.	Replace the yaw rate & lateral G sensor.
10 CHECK POOR CONTACT.	Is there poor contact in lateral G sensor circuit?	Repair the poor contact.	Go to step 11.
11 CHECK DTC. 1) Perform the "clear memory". <Ref. to 6MT(diag)-23, Clear Memory Mode.> 2) Start the engine. 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is the DTC P1759 displayed?	Replace the driver's control center differential control module.	Go to step 12.
12 CHECK FOR OTHER DTC ON DISPLAY.	Is there any DTC other than P1759 displayed?	Perform the diagnosis according to DTC.	Lateral G sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and yaw rate & lateral G sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

F: DTC P1764 YAW RATE SENSOR SYSTEM CIRCUIT

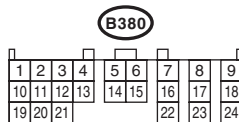
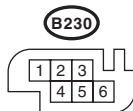
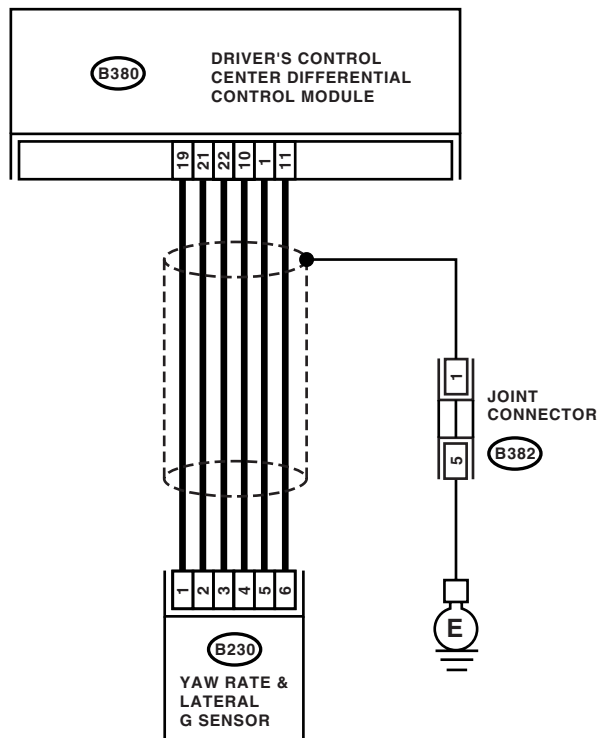
DIAGNOSIS:

Open or short in yaw rate sensor circuit

TROUBLE SYMPTOM:

The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:



MT-01245

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK YAW RATE & LATERAL G SENSOR POWER SUPPLY. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between yaw rate & lateral G sensor and chassis ground. Connector & terminal (B230) No. 3 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 4.	Go to step 2.
2 CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE POWER SUPPLY OUTPUT. Measure the resistance between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 22 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.	Go to step 3.
3 CHECK BATTERY.	Is the voltage more than 10 V?	Go to step 11.	Charge or replace the battery.
4 CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. Connector & terminal (B380) No. 11 — (B230) No. 6:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
5 CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. Measure the resistance between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 11 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
6 CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. Connector & terminal (B380) No. 10 — (B230) No. 4:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
7 CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. Measure the resistance between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 10 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 8.	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to vehicle. 3) Turn the ignition switch to ON. 4) Subaru Select Monitor switch to ON. 5) Read the data of "Yaw rate sensor signal" using Subaru Select Monitor. <Ref. to 6MT(diag)-14, OPERATION, Subaru Select Monitor.>	Is the voltage of 2.0 V $\longleftrightarrow$ 2.5 V $\longleftrightarrow$ 3.0 V displayed?	Go to step 12.	Go to step 9.
9 CHECK OUTPUT SIGNAL OF YAW RATE & LATERAL G SENSOR. 1) Turn the ignition switch to OFF. 2) Check the oscilloscope signal pattern between driver's control center differential control module connector terminals. Connector & terminal Positive test lead: (B380) No. 10 Ground harness: (B380) No. 20 3) Turn the ignition switch to ON.	Is the oscilloscope pattern the same waveform as shown in the figure? <Ref. to 6MT(diag)-13, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	Go to step 10.	Replace the yaw rate & lateral G sensor.
10 CHECK OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Check the oscilloscope signal pattern between driver's control center differential control module connector terminals. Connector & terminal Positive lead: (B380) No. 19 Ground harness: (B380) No. 20 3) Turn the ignition switch to ON.	Is the oscilloscope pattern the same waveform as shown in the figure? <Ref. to 6MT(diag)-13, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	Go to step 11.	Replace the driver's control center differential control module.
11 CHECK POOR CONTACT.	Is there poor contact in yaw rate sensor circuit?	Repair the poor contact.	Go to step 12.
12 CHECK DTC. 1) Perform the "clear memory". <Ref. to 6MT(diag)-23, Clear Memory Mode.> 2) Start the engine. 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is the DTC P1764 displayed?	Replace the driver's control center differential control module.	Go to step 13.
13 DETECTING CHECK FOR OTHER DTC.	Is there any DTC other than P1764 displayed?	Perform the diagnosis according to DTC.	Yaw rate sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and yaw rate & lateral G sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

G: DTC P1765 YAW RATE SIDE G SENSOR REFERENCE SYSTEM CIRCUIT

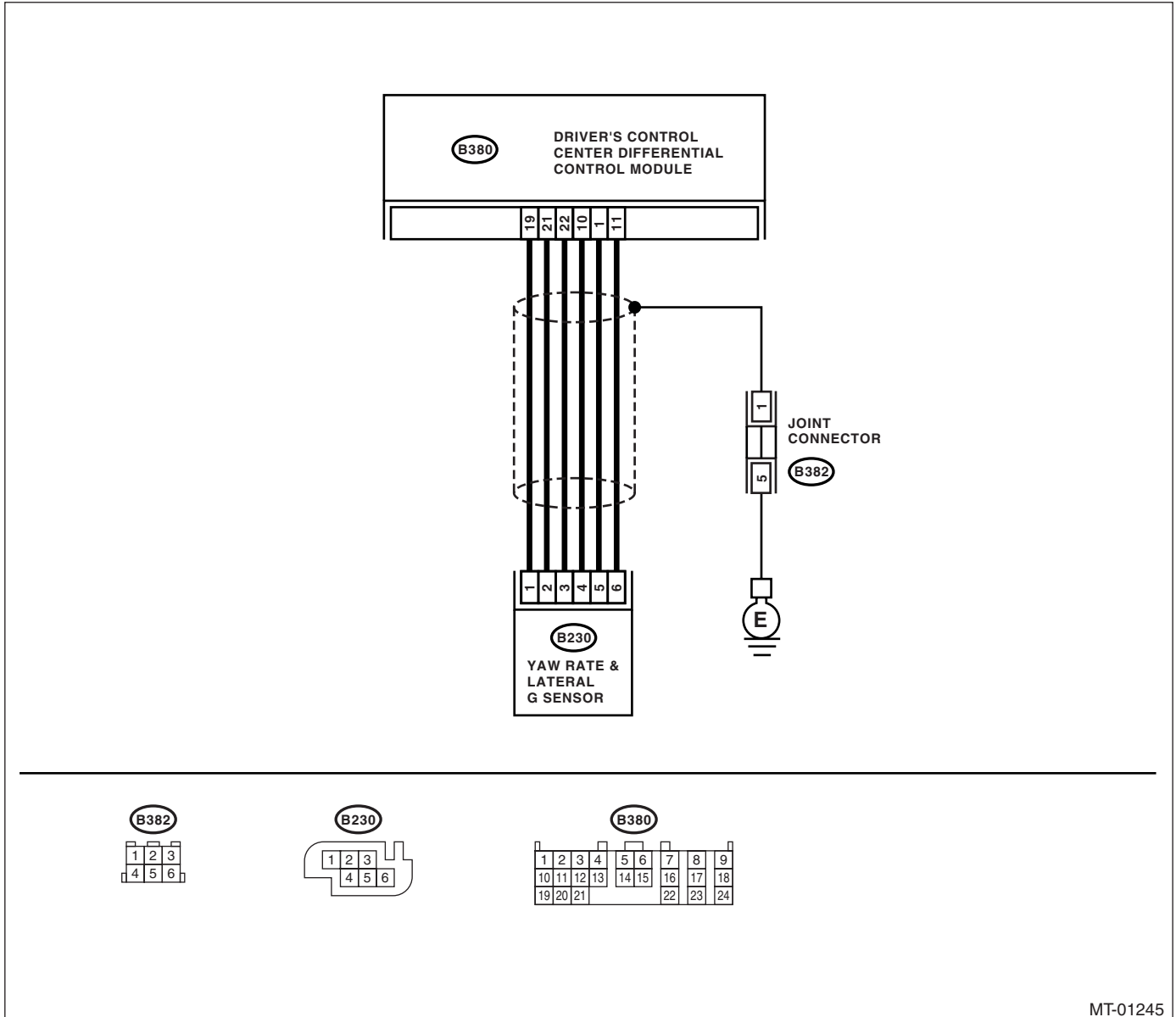
DIAGNOSIS:

Open or short in yaw rate & lateral G sensor reference circuit

TROUBLE SYMPTOM:

The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:



MT-01245

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK YAW RATE & LATERAL G SENSOR VOLTAGE. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between yaw rate & lateral G sensor harness connector and chassis ground (-). Connector & terminal (B230) No. 3 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 4.	Go to step 2.
2 CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE VOLTAGE. Measure the voltage between driver's control center differential control module harness connector and chassis ground (-). Connector & terminal (B380) No. 22 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.	Go to step 3.
3 CHECK BATTERY.	Is the voltage more than 10 V?	Go to step 10.	Charge or replace the battery.
4 CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module harness connector and yaw rate & lateral G sensor. Connector & terminal (B380) No. 11 — (B230) No. 6:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
5 CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT. Measure the resistance between driver's control center differential control module harness connector and Chassis ground (-). Connector & terminal (B380) No. 11 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
6 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR. Measure the resistance between driver's control center differential control module harness connector and yaw rate & lateral G sensor. Connector & terminal (B380) No. 19 — (B230) No. 1:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
7 CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR. Measure the resistance between driver's control center differential control module harness connector and Chassis ground (-). Connector & terminal (B380) No. 19 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 8.	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK LATERAL G SENSOR. 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON, and Subaru Select Monitor switch to ON. Read the data of "Yaw rate & lateral G sensor" using Subaru Select Monitor. <Ref. to 6MT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the data 2.1 — 2.9?	Go to step 11.	Go to step 9.
9 CHECK YAW RATE & LATERAL G SENSOR. Measure the driver's control center differential control module harness connector voltage. Connector & terminal (B380) No. 19 (+) — No. 20 (-):	Is the voltage 2.1 — 2.9 V?	Go to step 10.	Replace the yaw rate & lateral G sensor.
10 CHECK POOR CONTACT.	Is there poor contact in yaw rate & lateral G sensor reference circuit?	Repair the poor contact.	Go to step 11.
11 CHECK DTC. 1) Perform the "clear memory". <Ref. to 6MT(diag)-23, Clear Memory Mode.> 2) Start the engine. 3) Read the DTC. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is the DTC P1765 displayed?	Replace the driver's control center differential control module.	Go to step 12.
12 DETECTING CHECK FOR OTHER DTC.	Is there any DTC other than P1765 displayed?	Perform the diagnosis according to DTC.	Lateral G sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and yaw rate & lateral G sensor.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

H: DTC P1875 CIRCUIT OF CENTER DIFF.

DIAGNOSIS:

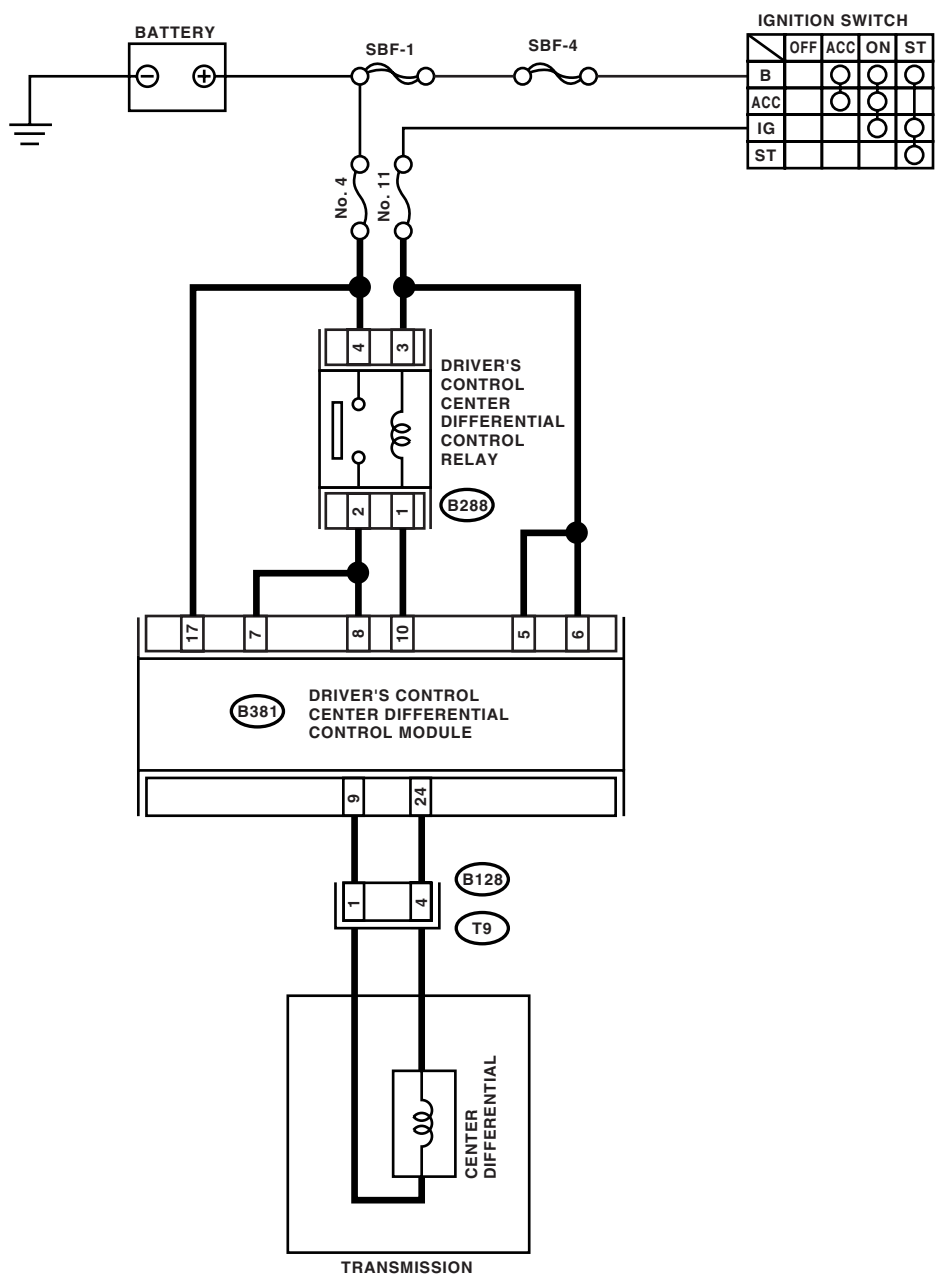
Output signal circuit of center differential is open or shorted.

TROUBLE SYMPTOM:

- Center differential does not operate.
- Lock ratio of center differential does not variation, or malfunction occurs.
- Tight corner braking condition occurs.
- Handling tends to oversteer.
- The tendency of understeer occurred when high speed cornering.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)
MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

WIRING DIAGRAM:



MT-01246

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND TRANSMISSION HARNESS. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module. 3) Disconnect the transmission harness connector and bulk harness connector. 4) Measure the resistance of harness between driver's control center differential control module harness connector and transmission harness connector. Connector & terminal (B381) No. 9 — (B128) No. 1: (B381) No. 24 — (B128) No. 4:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit of bulk harness between driver's control center differential control module and transmission harness.
2 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND TRANSMISSION HARNESS. Measure the resistance between driver's control center differential control module harness connector and chassis ground. Connector & terminal (B381) No. 9 — Chassis ground: (B381) No. 24 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Go to step 3.	Repair the short circuit of bulk harness between driver's control center differential control module and transmission harness.
3 CHECK THE CENTER DIFFERENTIAL. Measure the resistance between transmission harness connector terminals. Connector & terminals (T9) No. 1 — No. 4:	Is the resistance 1.0 — 2.0 Ω ?	Go to step 4.	Replace the center differential.
4 CHECK THE OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Connect all the harness connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Release the parking brake. 4) Set the driver's control center differential to manual mode by pressing manual mode switch. 5) Set the center differential control dial to differential lock. 6) Measure the voltage between driver's control center differential control module and harness connector. Connector & terminal (B381) No. 9 (+) — (B381) No. 24 (-):	Is the voltage 6.0 — 7.0 V?	Go to step 5.	Go to step 6.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
5 CHECK THE OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the center differential control dial from differential lock to differential free position. 2) Measure the voltage between driver's control center differential control module and harness connector. Connector & terminal (B381) No. 9 (+) — (B381) No. 24 (-):	Does the voltage change smoothly?	Circuit is already returned to normal condition this time though the indicator blink illuminates. A temporary poor connector or harness may be the case. Repair the poor contact in connector or harness of driver's control center differential control module and transmission harness. Check the poor contact in power supply circuit, too.	Go to step 6.
6 CHECK FUSE (No. 4). Remove the fuse (No. 4).	Is the fuse (No. 4) is blown out?	Replace fuse (No.4). If the replaced fuse (No.4) is blown out easily, repair short circuit in harness between fuse (No.4) and driver's control center differential control module.	Go to step 7.
7 CHECK POWER SUPPLY CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY. 1) Fuse installation. 2) Disconnect the harness connector of driver's control center differential relay. 3) Measure the voltage between driver's control center differential relay harness connector and chassis ground. Connector & terminal (B288) No. 4 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 8.	Repair the open or short circuit between fuse (No. 4) and driver's control center differential relay, battery.
8 CHECK IGNITION POWER SUPPLY CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY. Measure the voltage between driver's control center differential relay and chassis ground. Connector & terminal (B288) No. 3 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 9.	Repair the open circuit between fuse (No. 11) and driver's control center differential control module.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
9 CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND DRIVER'S CONTROL RELAY. 1) Turn the ignition switch to OFF. 2) Disconnect the driver's control center differential control unit connector. 3) Measure the resistance of harness between driver's control center differential control module harness connector and driver's control relay harness connector. Connector & terminal (B381) No. 18 — (B288) No. 2: (B381) No. 19 — (B288) No. 2: (B381) No. 21 — (B288) No. 1:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair the open circuit between driver's control center differential control module harness connector and driver's control relay harness connector.
10 CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND DRIVER'S CONTROL RELAY. Measure the resistance of harness between driver's control center differential control module harness connector and chassis ground. Connector & terminal (B381) No. 7 — Chassis ground: (B381) No. 8 — Chassis ground: (B381) No. 10 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Go to step 11.	Repair the short circuit between driver's control center differential control module harness connector and driver's control relay, battery harness connector.
11 CHECK DRIVER'S CONTROL RELAY. Measure the resistance between driver's control relay terminals. Terminals (B288) No. 4 — No. 2:	Is the resistance more than 1 $M\Omega$?	Go to step 12.	Replace the driver's control relay.
12 CHECK DRIVER'S CONTROL RELAY. Connect the terminal No. 3 to battery positive side, and terminal No.1 to battery negative side, and then measure the resistance between driver's control relay terminals. Terminals (B288) No. 4 — No. 2:	Is the resistance less than 1 Ω ?	Go to step 13.	Replace the driver's control relay.
13 CHECK IGNITION POWER SUPPLY CIRCUIT FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL UNIT. 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between driver's control center differential control unit and chassis ground. Connector & terminal (B381) No. 10 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 14.	Go to step 16.
14 CHECK IGNITION POWER SUPPLY CIRCUIT FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL UNIT. Measure the voltage between driver's control center differential control unit and chassis ground. Connector & terminal (B381) No. 7 (+) — Chassis ground (-): (B381) No. 8 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 15.	Go to step 16.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
15 CHECK CENTER DIFFERENTIAL. 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch and Subaru Select Monitor switch to ON. 4) Set the driver's control center differential to manual mode by pressing manual mode switch. 5) Release the parking brake. 6) Set the center differential control dial to lock position. 7) Read the data of "center differential indicator current" and "center differential actual current" using Subaru Select Monitor.	Are both of the "center differential indicator current" and "center differential actual current" approx. 4.3 — 4.5A?	Go to step 16.	Go to step 17.
16 CHECK CENTER DIFFERENTIAL. 1) Operate the center differential control dial so that the "2A" is displayed for "center differential indicator current" on the Subaru Select Monitor. 2) Read the data of "center differential actual current" using Subaru Select Monitor.	Is the "center differential actual current" almost same as "center differential indicator current"?	The center differential circuit is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in driver's control center differential circuit.	Go to step 17.
17 CHECK POOR CONTACT IN HARNESS CONNECTOR.	Is there poor contact in harness connector?	Repair the poor contact.	Go to step 18.
18 CHECK DTC. 1) Erase the memory. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).> 2) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is P1875 displayed?	Replace the driver's control center differential control unit.	Go to step 19.
19 CHECK OTHER DTC DETECTION.	Is any DTC except P1875 displayed?	Diagnose according to DTC.	The center differential circuit is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in driver's control center differential circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

I: DTC 2125 ACCELERATOR POSITION SENSOR E

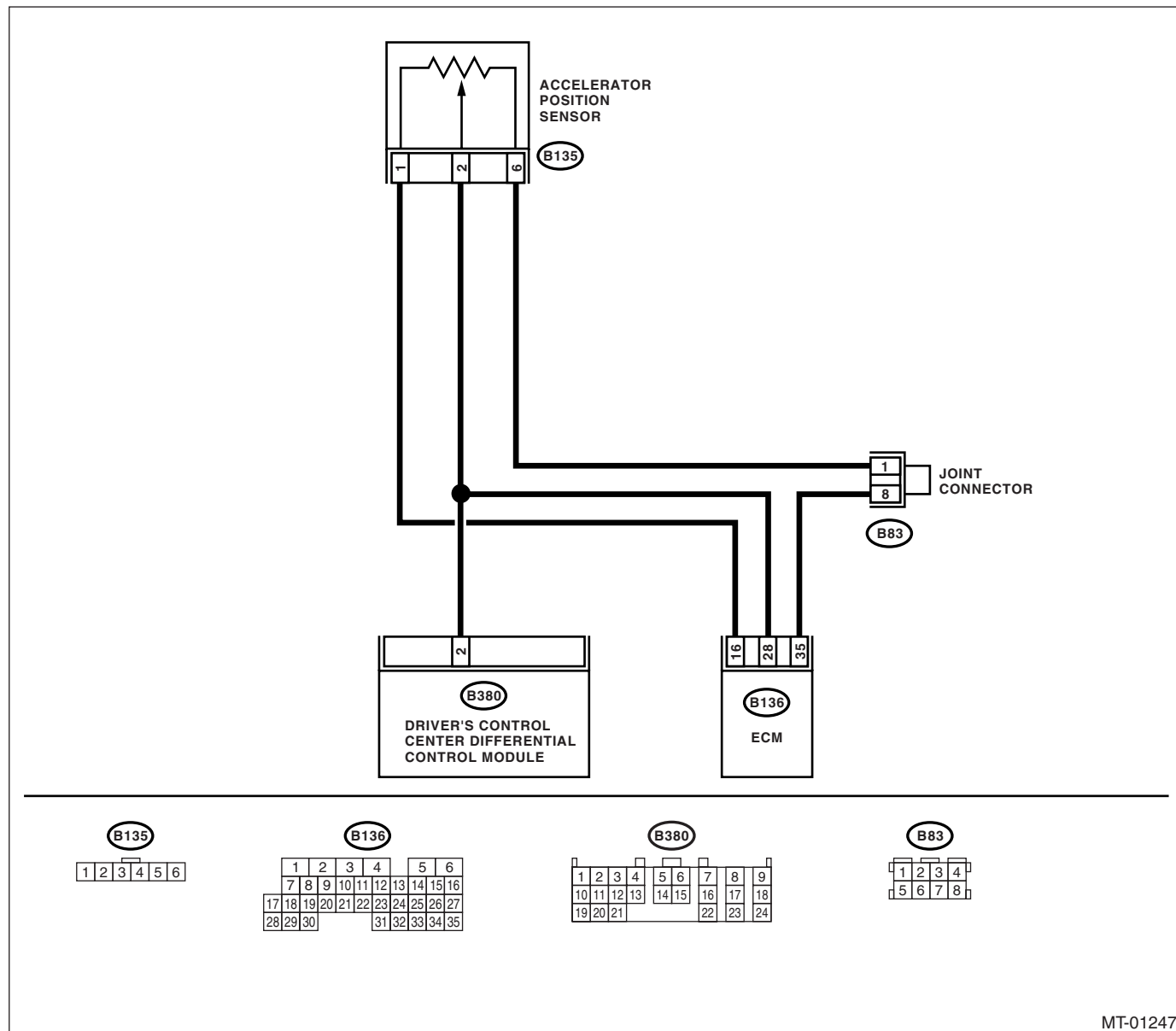
DIAGNOSIS:

The accelerator position sensor input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- Tight corner braking condition occurs.
- Handling tends to oversteer.

WIRING DIAGRAM:



MT-01247

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK DTC.	Is the DTC displayed on engine self diagnosis test mode?	Check with referring to DTC section of engine. <Ref. to EN(H4DOTC)(diag)-73, LIST, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ACCELERATOR POSITION SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module, ECM and accelerator position sensor. 3) Measure the resistance of harness between driver's control center differential control module harness connector and accelerator position sensor. Connector & terminal (B380) No. 2 — (B135) No. 2:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit of harness between driver's control center differential control module and accelerator position sensor.
3 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ECM. Measure the resistance of harness between driver's control center differential control module harness connector and ECM harness connector. Connector & terminal (B380) No. 2 — (B136) No. 28:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit of harness between driver's control center differential control module and ECM.
4 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ACCELERATOR POSITION SENSOR. Measure the resistance of harness between driver's control center differential control module harness connector and chassis ground. Connector & terminal (B380) No. 2 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair the short circuit of harness between driver's control center differential control module and accelerator position sensor and ECM.
5 CHECK INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF), and Subaru Select Monitor switch to ON. 4) Read the data of sub accelerator sensor signal using Subaru Select Monitor. Check the measured value is within specification without depressing the accelerator pedal.	Is the voltage 0.3 — 1.8 V?	Go to step 6.	Go to step 7.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
6 CHECK INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Fully depress the accelerator pedal. 2) Read the data of sub accelerator sensor signal using Subaru Select Monitor. Check the measured value is within specification the accelerator pedal depressed.	Is the data 2.8 — 4.7 V?	Go to step 10.	Go to step 7.
7 CHECK ACCELERATOR PEDAL POSITION SENSOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector of accelerator pedal position sensor. 3) Measure the resistance of accelerator pedal position sensor. Terminal No. 1 — No. 6:	Is the resistance 0.75 k — 3.15 kΩ?	Go to step 8.	Replace the accelerator pedal position sensor.
8 CHECK ACCELERATOR PEDAL POSITION SENSOR. Measure the resistance of accelerator pedal position sensor. Terminal No. 2 — No. 6:	Is the resistance 0.15 k — 0.63 kΩ?	Go to step 9.	Replace the accelerator pedal position sensor.
9 CHECK THE POOR CONTACT.	Is there any poor contact in accelerator position sensor circuit?	Repair the poor contact.	Go to step 10.
10 CHECK DTC. 1) Perform the "clear memory". <Ref. to 6MT(diag)-23, Clear Memory Mode.> 2) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is the DTC P2125 displayed?	Replace the driver's control center differential control module.	Go to step 11.
11 DETECTING CHECK FOR OTHER DTC	Is there any DTC other than P2125 displayed?	Perform the diagnosis according to DTC.	Accelerator position sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module, accelerator pedal position sensor and ECM.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

J: DTC 24 CHECK CENTER DIFFERENTIAL CONTROL DIAL.

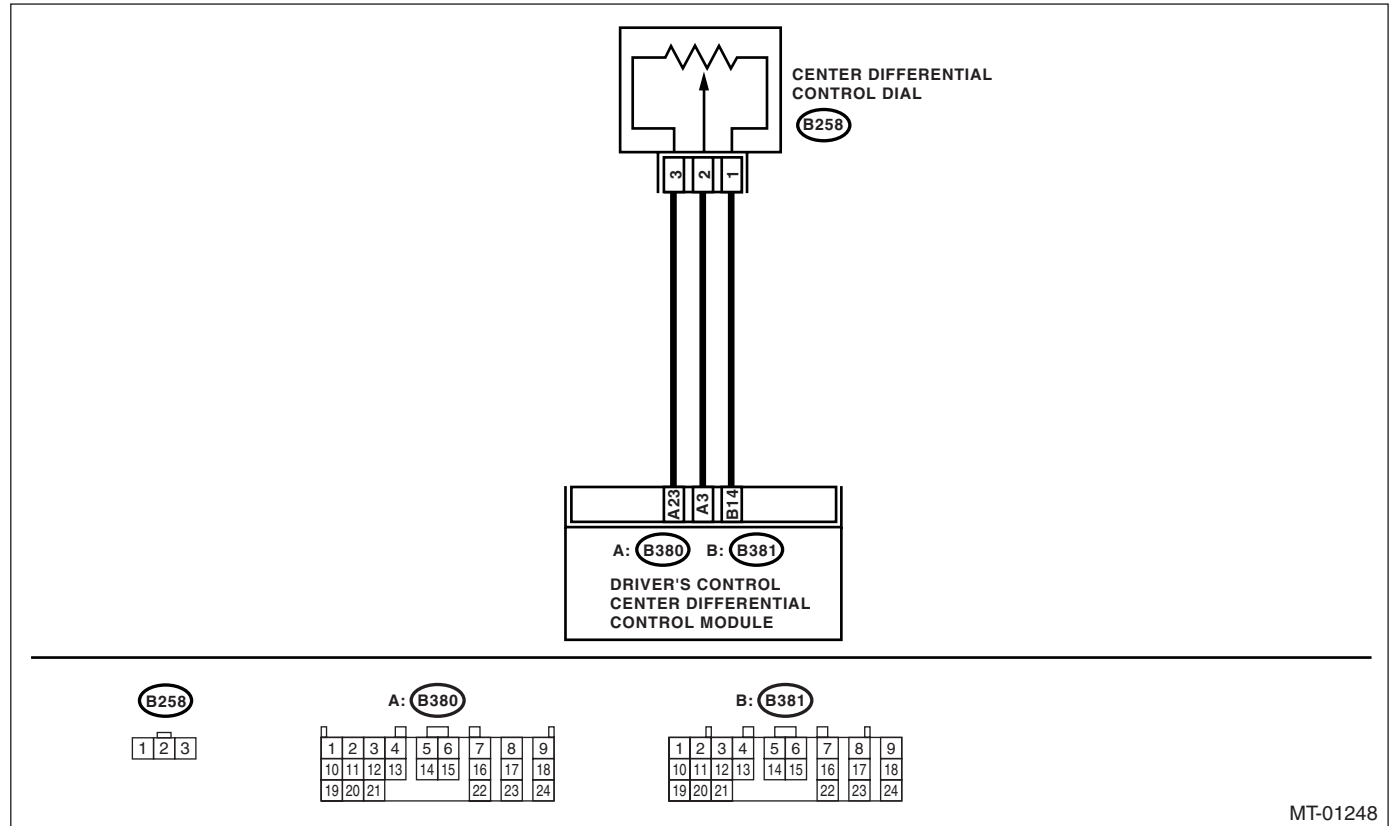
DIAGNOSIS:

Input signal circuit of center differential control dial is open or shorted.

TROUBLE SYMPTOM:

- Indicator light does not operate though setting the center differential control dial.
- Torque characteristics do not change.

WIRING DIAGRAM:



MT-01248

Step	Check	Yes	No
1 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND CENTER DIFFERENTIAL CONTROL DIAL. 1) Turn the ignition switch to OFF. 2) Disconnect the connector of driver's control center differential control module and center differential control dial. 3) Measure the resistance of harness between driver's control center differential control module and center differential control dial harness connector. Connector & terminal (B380) No. 3 — (B258) No. 3: (B380) No. 23 — (B258) No. 3: (B381) No. 14 — (B258) No. 1:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit between driver's control center differential control module and center differential control dial.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND CENTER DIFFERENTIAL CONTROL DIAL. Measure the resistance between driver's control center differential control module harness connector and chassis ground. <i>Connector & terminal</i> <i>(B380) No. 3 — Chassis ground:</i> <i>(B380) No. 23 — Chassis ground:</i> <i>(B381) No. 14 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit between driver's control center differential control module and center differential control dial.
3 CHECK THE CENTER DIFFERENTIAL CONTROL DIAL. 1) Remove the center differential control dial. 2) Measure the resistance between center differential control dial connectors. <i>Terminals</i> <i>(B258) No. 1 — No. 3:</i>	Is the resistance 7.5 — 12.5 k Ω ?	Go to step 4.	Replace the driver's control dial.
4 CHECK THE CENTER DIFFERENTIAL CONTROL DIAL. Measure the resistance between center differential control dial connectors. <i>Terminals</i> <i>(B258) No. 1 — No. 2:</i>	Dose the resistance change smoothly when setting the dial from differential lock to differential free?	Go to step 5.	Replace the center differential control dial.
5 CHECK THE OUTPUT POWER SUPPLY OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Connect all the harness connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage driver's control center differential control module harness connector. <i>Connector & terminal</i> <i>(B380) No. 23 — (B381) No. 14</i>	Is the voltage approx. 5 V?	Go to step 6.	Replace the driver's control center differential control module.
6 CHECK POOR CONTACT.	Is there poor contact in center differential control dial circuit?	Repair the poor contact.	Center differential control dial circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and driver's control center differential.

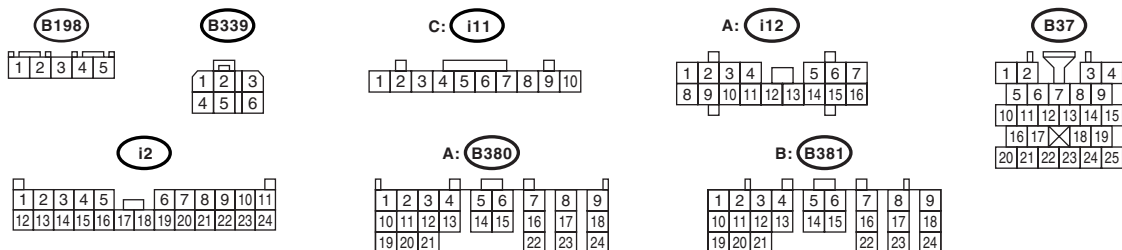
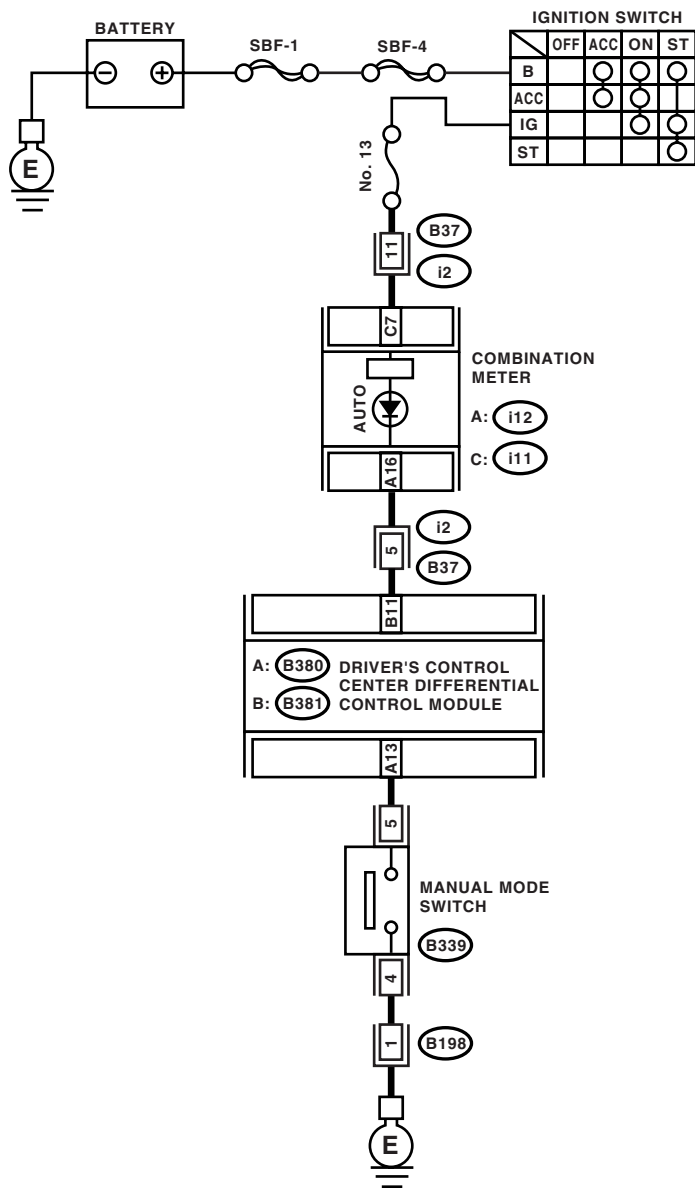
MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

DIAGNOSIS:

TROUBLE SYMPTOM:

- Driver's control center differential can not be manual mode. Or can not be auto mode.
- AUTO indicator does not illuminate, or does not go off.

WIRING DIAGRAM:



Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK OPERATION OF MANUAL MODE SWITCH. Set the manual mode switch to auto mode.	Does the AUTO indicator light in combination meter illuminate?	Go to step 8.	Go to step 2.
2 CHECK AUTO INDICATOR LIGHT. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module. 3) Turn the ignition switch to ON. (engine OFF) 4) Short between the driver's control center differential control module and chassis ground. Connector & terminal (B381) No. 11 — Chassis ground:	Does the AUTO indicator light in combination meter illuminate?	Replace the driver's control center differential control module.	Go to step 3.
3 CHECK POWER SUPPLY OF COMBINATION METER. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of combination meter. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between combination meter harness connector and chassis ground. Connector & terminal (i11) No. 7 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 4.	Check and repair the open and short of harness between battery and combination meter, and poor contact of harness connector.
4 CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of combination meter. 3) Measure the resistance between combination meter harness connector and driver's control center differential control module harness connector. Connector & terminal (i12) No. 16 — (B381) No. 11:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit of harness between combination meter harness connector and driver's control center differential control module harness connector, and poor contact of harness connector.
5 CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. Measure the resistance between driver's control center differential control module harness connector and chassis ground. Connector & terminal (B381) No. 11 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair the short circuit of harness between combination meter harness connector and driver's control center differential control module harness connector.
6 CHECK HARNESS CONNECTOR POOR CONTACT.	Is there any poor contact in the circuit between combination meter and driver's control module?	Repair the poor contact.	Go to step 7.
7 CHECK AUTO INDICATOR LIGHT. 1) Connect the harness connector of combination meter. 2) Short between the driver's control center differential control module harness connector and chassis ground. Connector & terminal (B381) No. 11 — Chassis ground:	Does the AUTO indicator light light up?	Replace the driver's control center differential control module.	Replace the combination meter.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK GROUND CIRCUIT OF MANUAL MODE SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the manual mode switch connector. 3) Measure the resistance between manual mode switch harness connector and chassis ground. Connector & terminal (B339) No. 4 — Chassis ground:	Is the resistance more than 1 MΩ?	Repair the open circuit of harness between manual mode switch harness connector and chassis ground.	Go to step 9.
9 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND MANUAL MODE SWITCH. 1) Disconnect the driver's control center differential control module harness connector. 2) Measure the resistance of harness between driver's control center differential control module and manual mode switch. Connector & terminal (B380) No. 13 — (B339) No. 5:	Is the resistance less than 1 Ω?	Go to step 10.	Repair the open circuit of harness between driver's control center differential control module and manual mode switch.
10 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND MANUAL MODE SWITCH. Measure the resistance of harness between driver's control center differential control module and chassis ground. Connector & terminal (B380) No. 13 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 11.	Repair the short circuit of harness between driver's control center differential control module and manual mode switch.
11 CHECK THE MANUAL MODE SWITCH. 1) Remove the manual mode switch. 2) Measure the resistance of between manual mode switch connectors. Terminals (B339) No. 4 — No. 5:	Is the resistance more than 1 MΩ?	Go to step 12.	Replace the manual mode switch.
12 CHECK THE MANUAL MODE SWITCH. 1) Keep depressing the manual mode switch. 2) Measure the resistance of between manual mode switch connectors. Terminals (B339) No. 4 — No. 5:	Is the resistance less than 1 Ω?	Go to step 13.	Replace the manual mode switch.
13 CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Install the manual mode switch. 2) Connect the harness connector of driver's control center differential control module. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. (engine OFF) 5) Subaru Select Monitor switch to ON. 6) Read the data of AUTO/MANUAL mode switch signal using Subaru Select Monitor.	Is the data OFF?	Go to step 14.	Replace the driver's control center differential control module.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
14 CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Keep depressing the manual mode switch. 2) Read the data of AUTO/MANUAL mode switch signal using Subaru Select Monitor.	Is the data ON?	Go to step 15.	Replace the driver's control center differential control module.
15 CHECK POOR CONTACT IN HARNESS CONNECTOR.	Is there any poor contact in manual mode switch circuit?	Repair the poor contact.	Go to step 16.
16 CHECK DTC. Read the DTC from combination meter. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is the DTC 31 displayed?	Replace the driver's control center differential control module.	Go to step 17.
17 DETECTING CHECK FOR OTHER DTC.	Is there any DTC other than 31 displayed?	Perform the diagnosis according to DTC.	Center differential control dial circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module, manual mode switch and chassis ground.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

L: DTC 32 CHECK PARKING BRAKE SWITCH

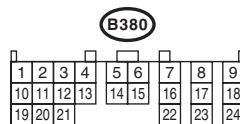
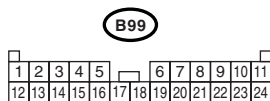
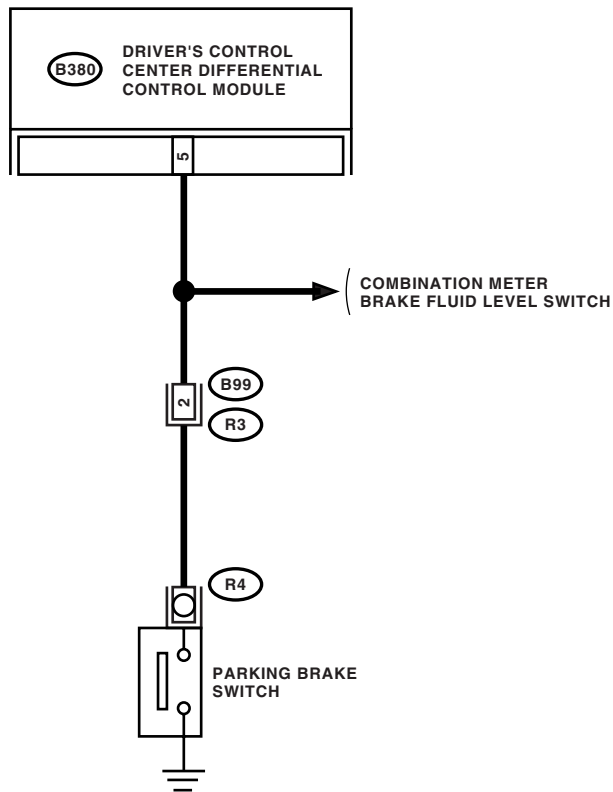
DIAGNOSIS:

Input signal circuit of parking brake switch is open or shorted.

TROUBLE SYMPTOM:

- Differential does not tend to be free though apply the parking brake.
- Differential stays free by releasing the parking brake.

WIRING DIAGRAM:



MT-01250

Step	Check	Yes	No
1 CHECK THE PARKING BRAKE SWITCH CIRCUIT. 1) Turn the ignition switch to ON. 2) Start the engine. 3) Apply the parking brake.	Does the parking brake warning light illuminate?	Go to step 2.	Check the parking pilot & brake fluid warning light circuit.
2 CHECK THE PARKING BRAKE SWITCH CIRCUIT. Release the parking brake.	Does the parking brake warning light turn OFF?	Go to step 3.	Check the brake fluid level, parking pilot & brake fluid level warning light circuit.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
3 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND PARKING BRAKE SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module, combination meter and parking brake switch. 3) Measure the resistance of harness between driver's control center differential control module and parking brake switch. Connector & terminal (B380) No. 5 — (R4) No. 1:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit of harness and poor contact of connector.
4 CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND PARKING BRAKE SWITCH. Measure the resistance between driver's control center differential control module harness connector and chassis ground. Connector & terminal (B380) No. 5 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair the short circuit of harness.
5 CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Connect all the harness connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and Subaru Select Monitor switch to ON. 4) Release the parking brake. 5) Read the data of parking switch signal using subaru Select Monitor.	Is the data OFF?	Go to step 6.	Replace the driver's control center differential control module.
6 CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Apply the parking brake. 2) Read the data of parking switch signal using subaru Select Monitor.	Is the data ON?	Go to step 7.	Replace the driver's control center differential control module.
7 CHECK POOR CONTACT IN HARNESS CONNECTOR.	Is there any poor contact in harness connector of parking brake circuit?	Repair the poor contact of harness connector.	Center differential control dial circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and neutral switch.

M: DTC 33 STOP LIGHT SWITCH

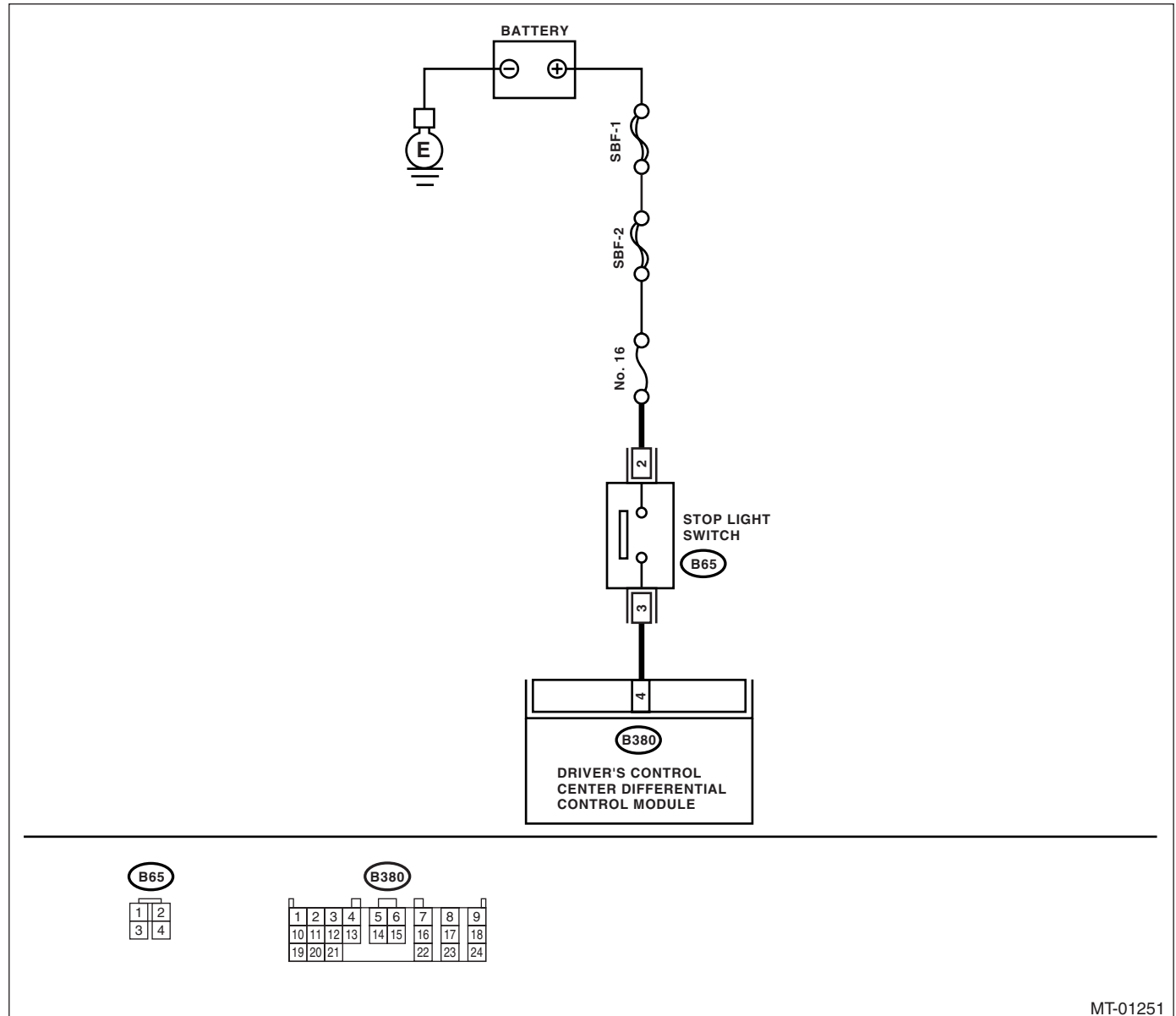
DIAGNOSIS:

Open or short circuit in stop light switch circuit

TROUBLE SYMPTOM:

Wheels are locked while the ABS operates.

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK DTC.	Is the stop light switch related DTC displayed during ABS self-diagnosis test mode?	Check according to ABS DTC.	Go to step 2.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and Subaru Select Monitor switch to ON. 4) Read the data of "Stop Light Switch" using Subaru Select Monitor.	Is the "OFF" displayed?	Go to step 3.	Replace the driver's control center differential control module.
3 CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Depress the brake pedal and hold it. 2) Read the data of "Stop Light Switch" using Subaru Select Monitor.	Is the "ON" displayed?	Go to step 6.	Go to step 4.
4 CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module. 3) Depress the brake pedal and hold it. 4) Measure the voltage between driver's control center differential control module and chassis ground. <i>Connector & terminal (B380) No. 4 (+) — Chassis ground (-):</i>	Is the voltage more than 8 V?	Go to step 5.	Repair the open circuit in harness between driver's control center differential control module and stop light switch.
5 CHECK POOR CONTACT.	Is there poor contact in stop light switch circuit?	Repair the poor contact in harness connector.	Replace the driver's control center differential control module.
6 CHECK DTC. Read the DTC from combination meter. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is the DTC 33 displayed?	Replace the driver's control center differential control module.	Go to step 7.
7 CHECK FOR OTHER DTC ON DISPLAY.	Is there any DTC other than 33 displayed?	Perform the diagnosis according to DTC.	Stop light switch circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and stop light switch.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

N: DTC 37 NEUTRAL POSITION SWITCH

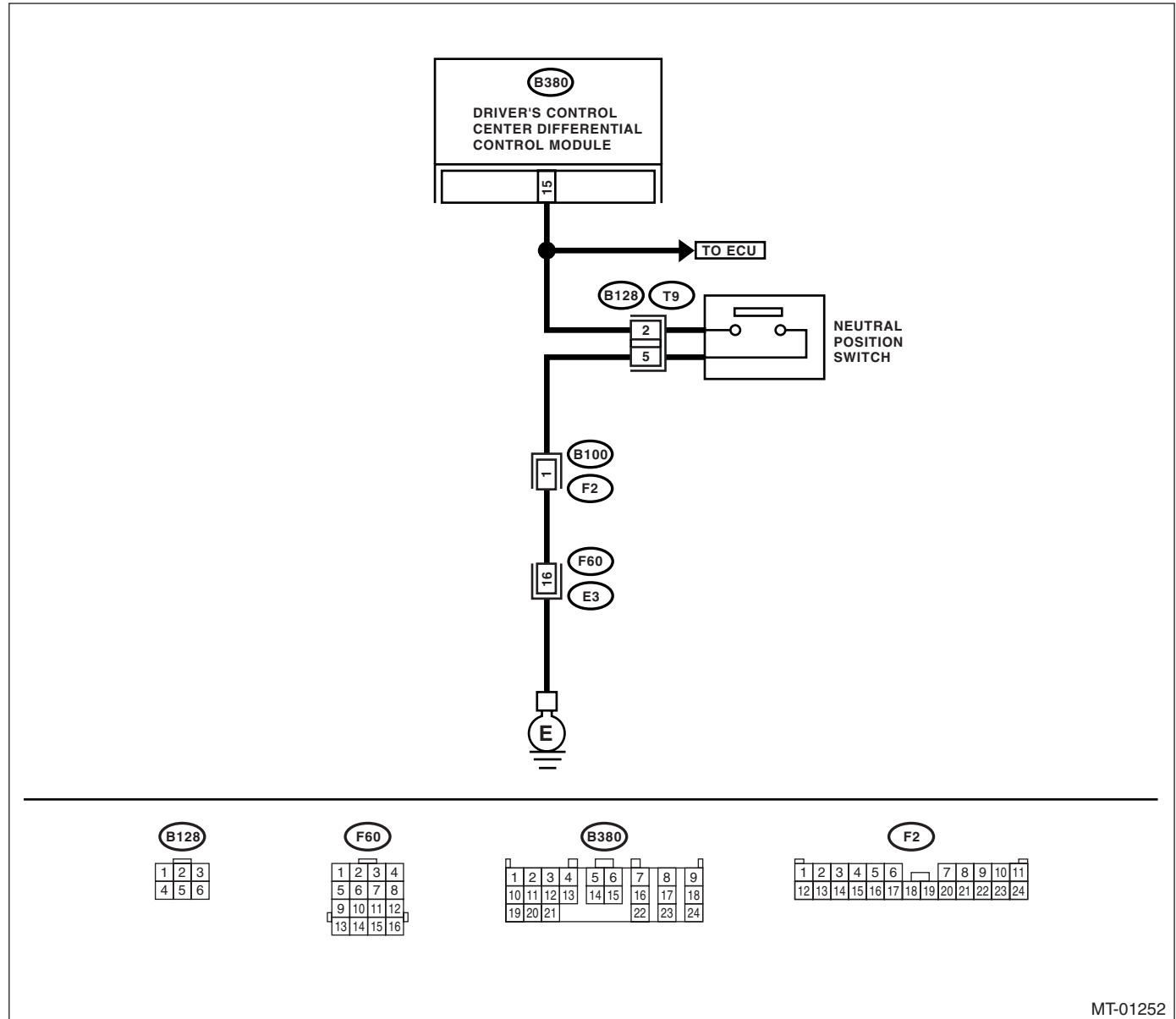
DIAGNOSIS:

Open or short in neutral position switch circuit

TROUBLE SYMPTOM:

- Handling tends to oversteer.
- The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:



MT-01252

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND NEUTRAL POSITION SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module, ECM and in neutral position switch. 3) Measure the resistance between driver's control center differential control module and neutral position switch. Connector & terminal (B380) No. 15 — (B128) No. 2:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair the open circuit in harness between neutral position switch connector and Engine ground (-).
2 CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND NEUTRAL POSITION SWITCH. Measure the resistance between driver's control center differential control module connector and Chassis ground (-). Connector & terminal (B380) No. 15 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair the short circuit in harness between neutral position switch and driver's control center differential control unit.
3 CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ENGINE GROUND. Measure the resistance between neutral position switch connector and Engine ground (-). Connector & terminal (B128) No. 5 — Engine ground:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair the open circuit in harness between neutral position switch connector and Engine ground (-).
4 CHECK NEUTRAL POSITION SWITCH. 1) Move the shift lever to "N". 2) Measure the resistance between transmission harness connector terminals. Connector & terminal (T9) No. 2 — No. 5:	Is the resistance less than 1 Ω ?	Go to step 5.	Replace the neutral position switch.
5 CHECK NEUTRAL POSITION SWITCH. 1) Move the shift lever to other than "N". 2) Measure the resistance between transmission harness connector terminals. Connector & terminal (T9) No. 2 — No. 5:	Is the resistance more than 1 M Ω ?	Go to step 6.	Replace the neutral position switch.
6 CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Subaru Select Monitor switch to ON. 4) Move the shift lever to "N". 5) Read the data of "Neutral switch" using Subaru Select Monitor.	Is the "ON" displayed?	Go to step 7.	Go to step 8.

Diagnostic Procedure with Diagnostic Trouble Code (DTC)

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Step	Check	Yes	No
7 CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE. 1) Move the shift lever to other than "N". 2) Read the data of "Neutral switch" using Subaru Select Monitor.	Is the "OFF" displayed?	Neutral switch circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module, neutral switch and ECM.	Go to step 8 .
8 CHECK POOR CONTACT.	Is there any poor contact in neutral position switch circuit?	Repair the poor contact.	Go to step 9 .
9 CHECK DTC. Read the DTC from combination meter. <Ref. to 6MT(diag)-20, Read Diagnostic Trouble Code (DTC).>	Is DTC 33 displayed?	Replace the driver's control center differential control unit.	Go to step 10 .
10 CHECK OTHER DTC DETECTION.	Is any DTC except DTC 33 displayed?	Diagnose according to DTC.	The neutral position switch circuit is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in neutral position switch circuit.

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

13.General Diagnostic Table

A: INSPECTION

Symptom	Abnormal units/parts
Tight cornering condition	• ABSCM&H/U • ABS wheel speed sensor • Accelerator position sensor • ECM • Center differential • Center differential control dial • Manual mode switch • Tire/Wheel • Driver's control center differential control module
Tendency to oversteer	• Accelerator position sensor • ECM • Center differential control dial • Manual mode switch • Tire/Wheel • Driver's control center differential control module • Center differential • Driver's control center differential relay • Rear differential oil temperature switch • Neutral position switch
Tendency to understeer at high speed cornering	• Yaw rate & lateral G sensor • Center differential • ECM • Engine speed signal • Neutral position switch
No change in the center differential torque character	• Center differential control dial • Driver's control center differential relay • Center differential • Driver's control center differential control module
Driver's control center differential indicator does not operate	• Combination meter • Driver's control center differential control module
Driver's control center differential indicator does not operate though setting the center differential control dial	• Center differential control dial • Combination meter • Driver's control center differential control module
No change to AUTO or MANUAL	• Manual mode switch • Combination meter • Driver's control center differential control module
AUTO indicator light does not illuminate	• Manual mode switch • Combination meter • Driver's control center differential control module
Differential does not become free, or stays free	• Parking brake switch • Center differential • Manual mode switch • Center differential control dial • Rear differential • Tire/Wheel • Driver's control center differential relay • Rear differential oil temperature switch • Driver's control center differential control module
ABS does not operation	• ABSCM&H/U • CAN communication signal • Stop light switch • Driver's control center differential control module

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

Symptom	Abnormal units/parts
Differential does not become lock, or stays lock	• ABSCM&H/U • ABS wheel speed sensor • Accelerator position sensor • ECM • Center differential • Center differential control dial • Manual mode switch • Tire/Wheel • Driver's control center differential control module • Driver's control center differential relay

General Diagnostic Table

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

CLUTCH SYSTEM

General Description

CLUTCH SYSTEM

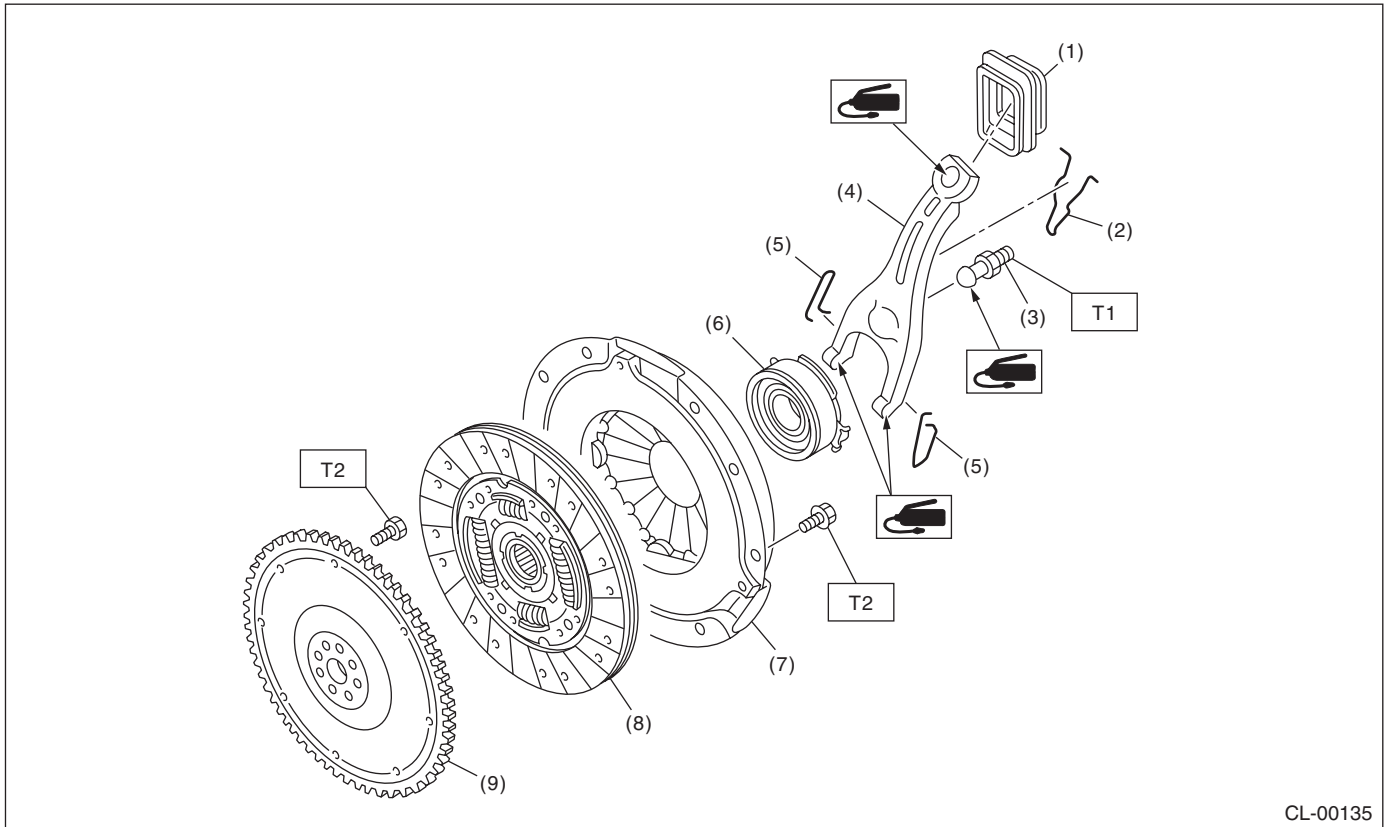
1. General Description

A: SPECIFICATION

Model			2.0 L TURBO	2.5 L	
Clutch cover	Type		Pull type	Push type	
	Diaphragm set load	kgf (lb)	800 (1,764)	580 (1,279)	
Clutch disc	Facing material		Woven (Non asbestos)		
	O.D. × I.D. × thickness	mm (in)	230 × 150 × 3.5 (9.06 × 5.91 × 0.138)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	
	Spline O.D.		25.2 (0.992), (No. of teeth: 24)		
Clutch release lever ratio			1.7	1.6	
Release bearing			Grease-packed self-aligning		
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)		
	Free play	mm (in)	4 — 11 (0.16 — 0.43)		
Release lever	Stroke		mm (in)	11.1 — 12.5 (0.437 — 0.492)	12.1 — 13.5 (0.48 — 0.53)
Clutch disc	Depth of rivet head	mm (in)	Clutch cover side	1.65 — 2.25 (0.065 — 0.089)	1.65 — 2.25 (0.065 — 0.089)
			Fly-wheel side	1.35 — 1.95 (0.053 — 0.076)	1.65 — 2.25 (0.065 — 0.089)
			Limit of sinking	0.3 (0.012)	
	Limit for deflection		mm (in)	0.7 (0.028) at R = 110 (4.33)	

Model			2.5 L TURBO STi
Clutch cover	Type		Pull type
	Diaphragm set load	kgf (lb)	930 (2,050)
Clutch disc	Facing material		Woven (Non asbestos)
	O.D. × I.D. × thickness	mm (in)	Flywheel side: 240 × 160 × 3.2 (9.45 × 6.30 × 0.126) Clutch cover side: 240 × 160 × 3.5 (9.45 × 6.30 × 0.138)
	Spline O.D.	mm (in)	25.2 (0.992), (No. of teeth: 24)
Clutch release lever ratio			1.7
Release bearing			Grease-packed self-aligning
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)
	Free play	mm (in)	3 — 13 (0.12 — 0.51)
Release lever	Stroke	mm (in)	13.3 — 14.7 (0.524 — 0.579)
Clutch disc	Depth of rivet head mm (in)	Standard	Flywheel side: 1.35 — 1.95 (0.053 — 0.077) Clutch cover side: 1.65 — 2.25 (0.065 — 0.089)
		Limit of sinking	0.3 (0.012)
	Limit for deflection		mm (in)

I.D.: Inner diameter O.D.: Outer diameter

B: COMPONENT**1. CLUTCH ASSEMBLY****• NON-TURBO MODEL**

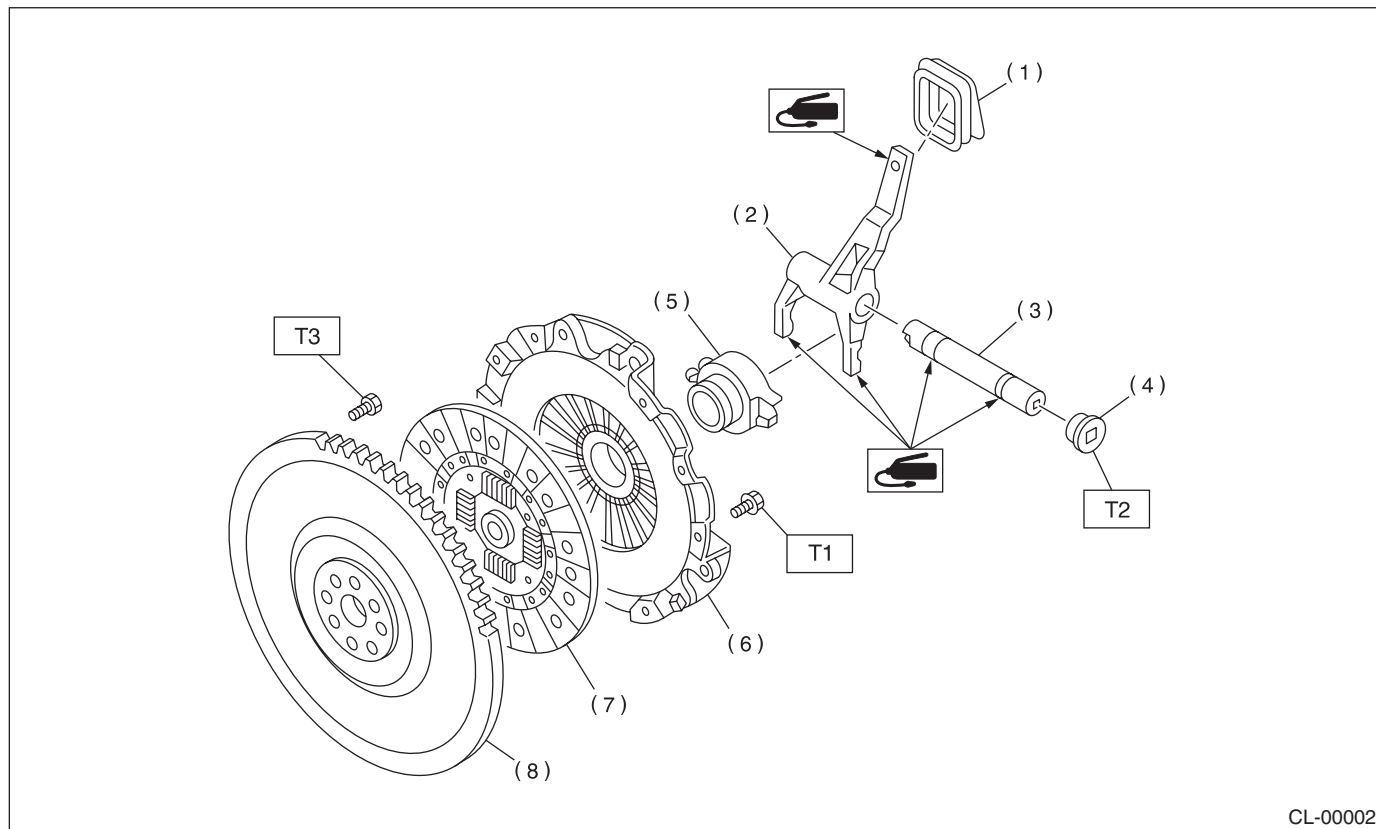
(1) Dust cover	(6) Release bearing
(2) Lever spring	(7) Clutch cover
(3) Pivot	(8) Clutch disc
(4) Release lever	(9) Flywheel
(5) Clip	

Tightening torque: N·m (kgf-m, ft-lb)**T1: 16 (1.6, 11.8)****T2: 72 (7.3, 52.8)**

General Description

CLUTCH SYSTEM

• TURBO MODEL



- (1) Dust cover
- (2) Release lever
- (3) Clutch release lever shaft
- (4) Plug

- (5) Release bearing
- (6) Clutch cover
- (7) Clutch disc
- (8) Flywheel

Tightening torque: N·m (kgf-m, ft-lb)

T1: 16 (1.6, 11.8)

T2: 44 (4.5, 32.5)

T3: Except STi model

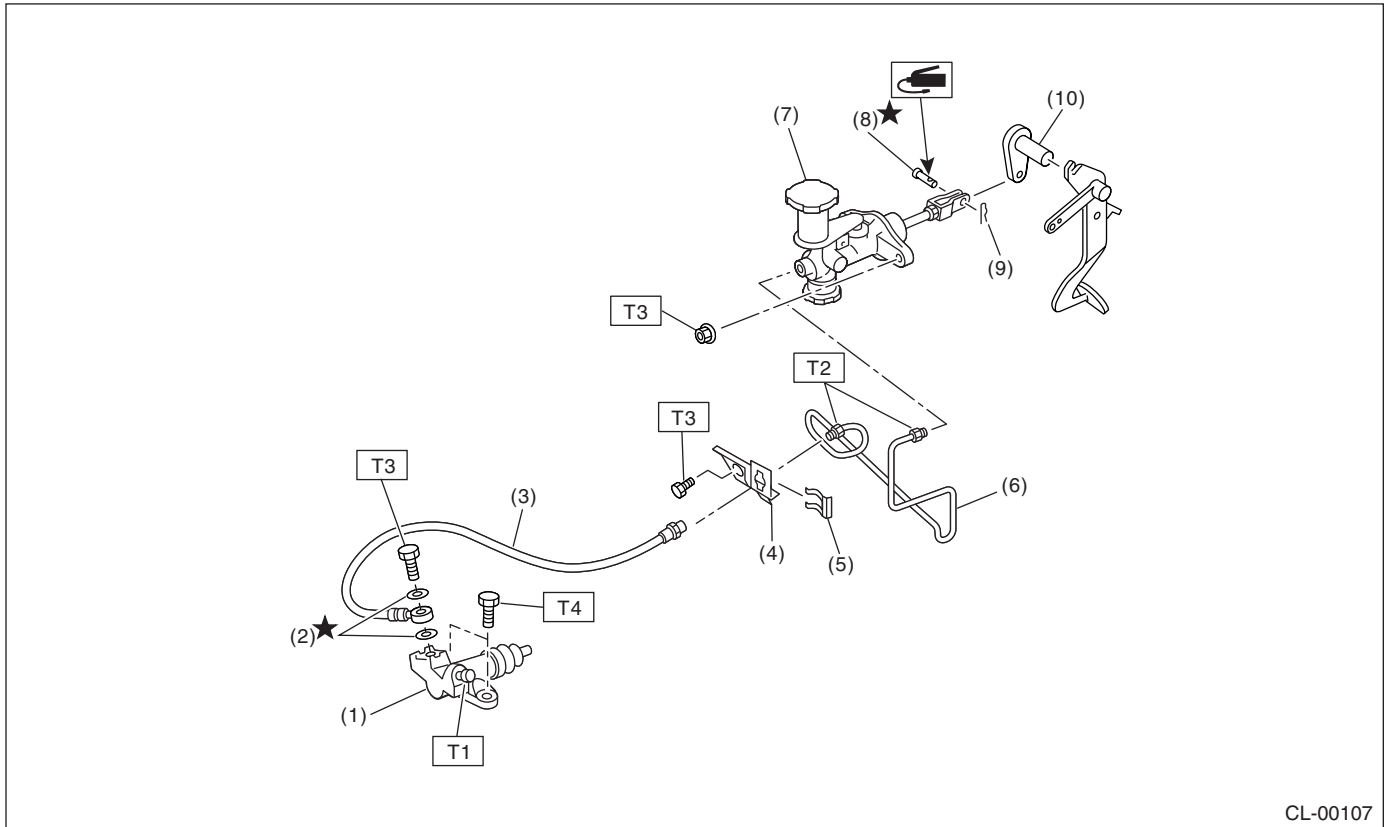
72 (7.3, 52.8)

STi model

75 (7.6, 55.3)

2. CLUTCH PIPE AND HOSE

• NON-TURBO MODEL



CL-00107

(1) Operating cylinder	(6) Clutch pipe
(2) Washer	(7) Master cylinder ASSY
(3) Clutch hose	(8) Clevis pin
(4) Bracket	(9) Snap pin
(5) Clip	(10) Lever

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.9)

T2: 15 (1.5, 10.8)

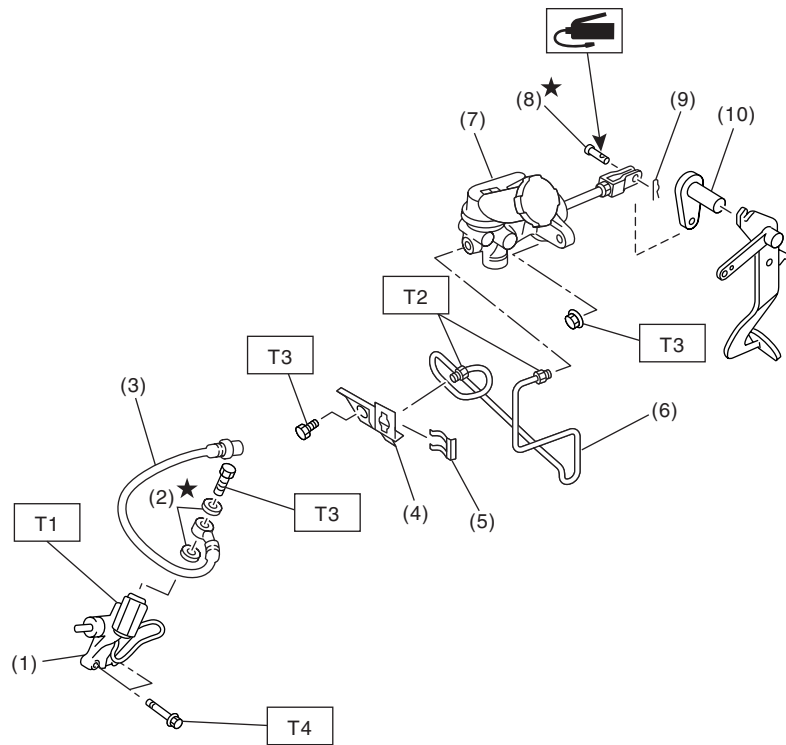
T3: 18 (1.8, 13.3)

T4: 37 (3.8, 27.5)

General Description

CLUTCH SYSTEM

• TURBO MODEL



CL-00246

(1) Operating cylinder	(6) Clutch pipe
(2) Washer	(7) Master cylinder ASSY
(3) Clutch hose	(8) Clevis pin
(4) Bracket	(9) Snap pin
(5) Clip	(10) Lever

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.9)

T2: 15 (1.5, 10.8)

T3: 18 (1.8, 13.3)

T4: Except STi model

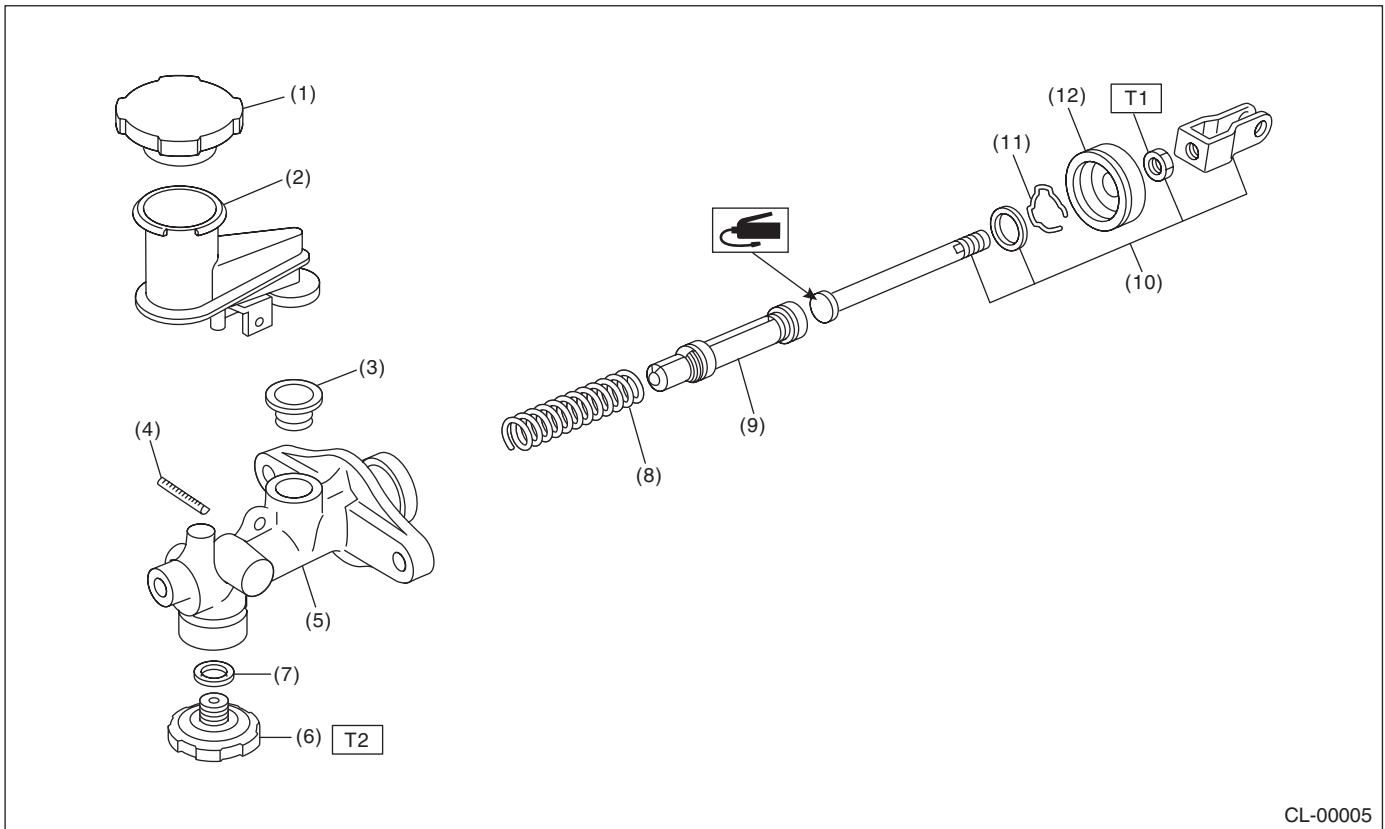
37 (3.8, 27.5)

STi model

41 (4.2, 30.2)

3. 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 ASSY
(5) Master cylinder	(11) Piston stop ring
(6) Clutch damper	(12) Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)

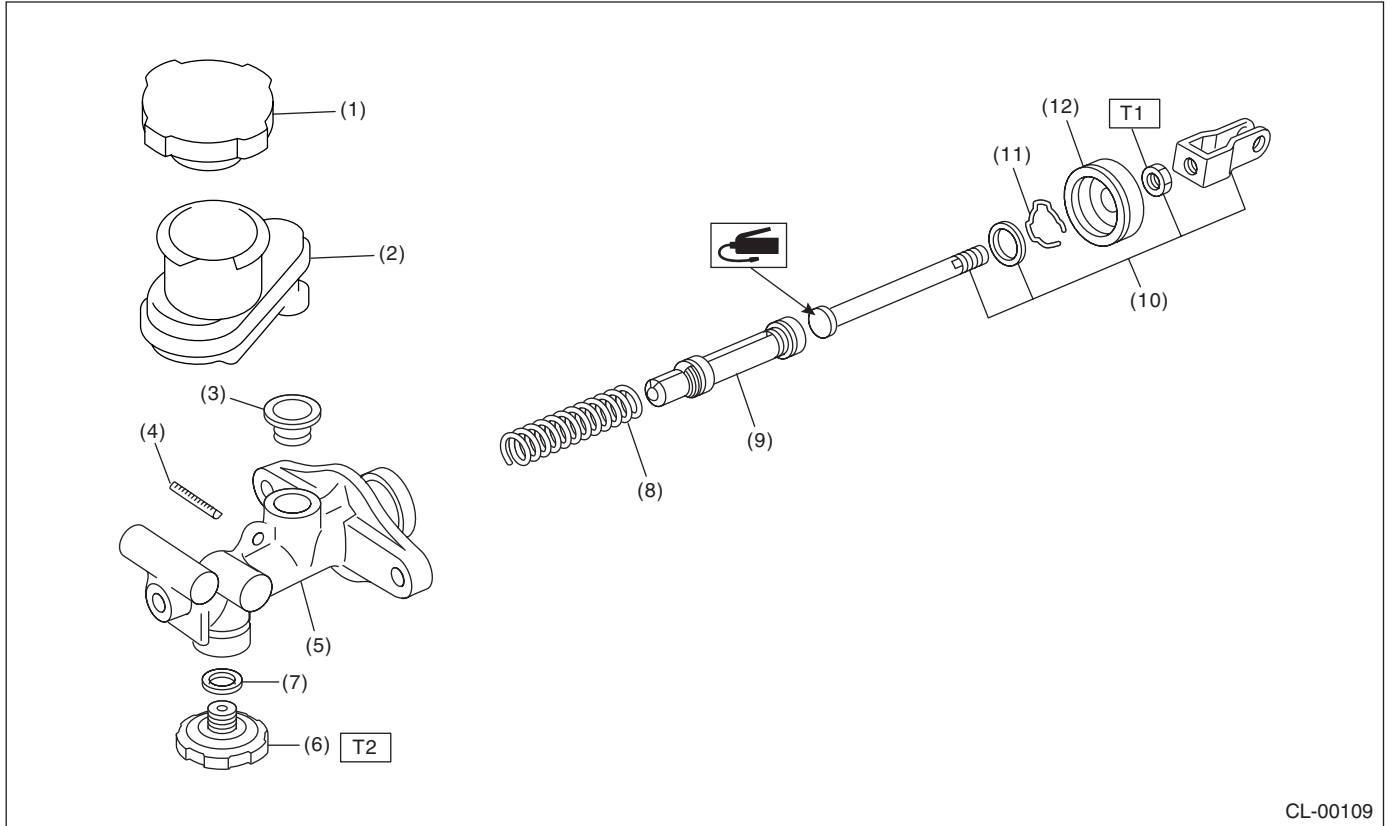
T1: 10 (1.0, 7)

T2: 46.6 (4.75, 34.4)

General Description

CLUTCH SYSTEM

• TURBO MODEL

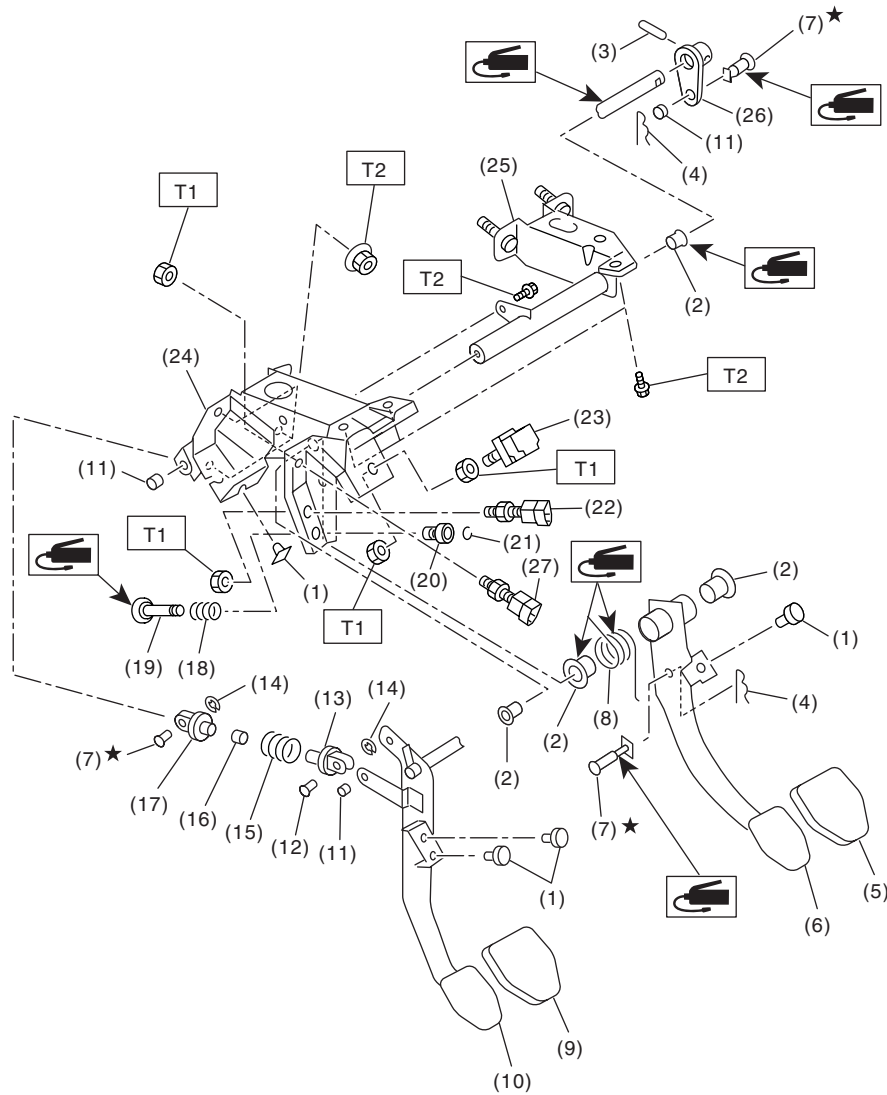


(1) Reservoir cap	(7) Gasket
(2) Reservoir tank	(8) Return spring
(3) Oil seal	(9) Piston
(4) Straight pin	(10) Push rod ASSY
(5) Master cylinder	(11) Piston stop ring
(6) Clutch damper	(12) Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)

T1: 10 (1.0, 7)

T2: 46.6 (4.75, 34.4)



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

General Description

CLUTCH SYSTEM

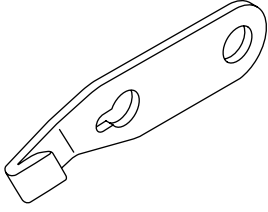
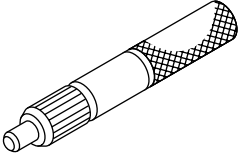
C: CAUTION

- Wear work 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 and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn yourself, 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 rigid racks 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 vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Dial gauge	Used for measuring clutch disc run-out.
Depth gauge	Used for measuring clutch disc wear.

2. Clutch Disc and Cover

A: REMOVAL

1) Remove the transmission assembly from vehicle body.

5MT:

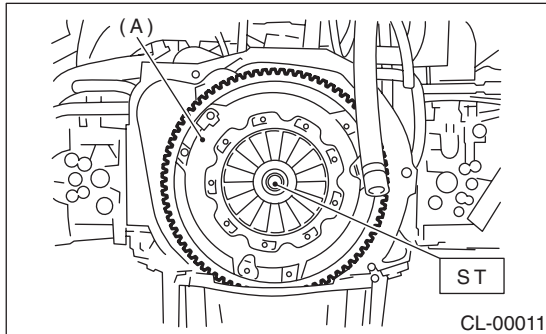
<Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>

6MT:

<Ref. to 6MT-34, 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.

NOTE:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble the clutch cover and clutch disc.
- Be sure to put alignment marks on the flywheel and clutch cover before removing clutch cover.

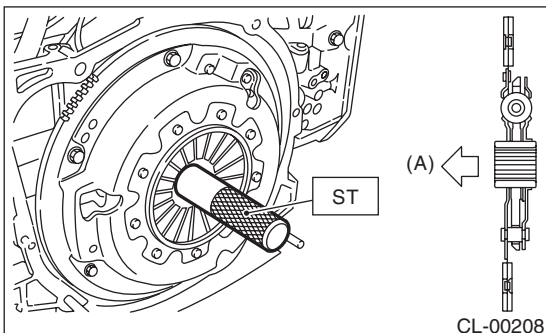
B: INSTALLATION

1) Insert the ST into clutch disc and install them on the flywheel by inserting the ST end into pilot bearing.

NOTE:

When installing the clutch disc, be careful to its direction.

ST 499747100 CLUTCH DISC GUIDE



(A) Flywheel side

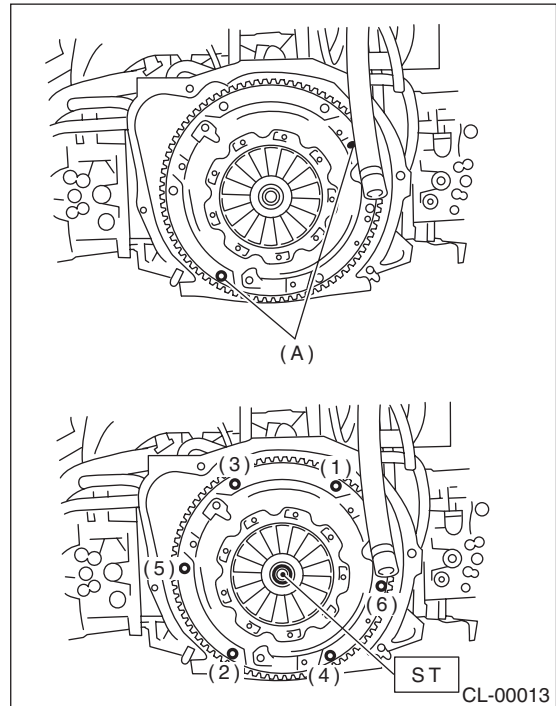
2) Install the clutch cover on flywheel and tighten the bolts to specified torque.

NOTE:

- When reinstalling, align the alignment marks.
- When installing a new clutch cover, position the clutch cover so that there is a gap of 120° or more between "0" marks on the flywheel and clutch cover. ("0" marks indicate the directions of residual unbalance.)
- Note the front and rear of the clutch disc when installing.
- Tighten the clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross order.

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) "0" marks

3) Remove the ST.

ST 499747100 CLUTCH DISC GUIDE

4) Install the transmission assembly.

5MT:

<Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

6MT:

<Ref. to 6MT-36, 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 facings are worn locally or worn down to less than the specified value.

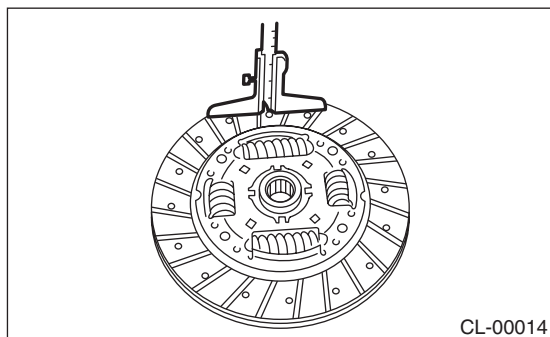
Depth of rivet head:

Limit of sinking

0.3 mm (0.012 in)

NOTE:

Do not wash the clutch disc with any cleaning fluid.

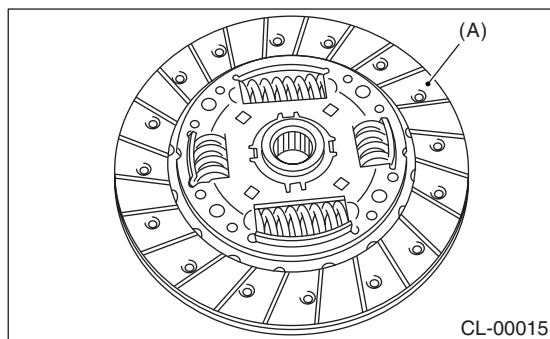


2) Hardened facing

Correct by using emery paper or replace.

3) Oil leakage on facing

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



(A) Clutch 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

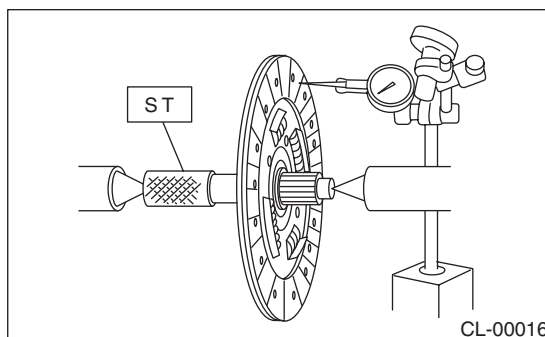
Limit for deflection:

Except STi model

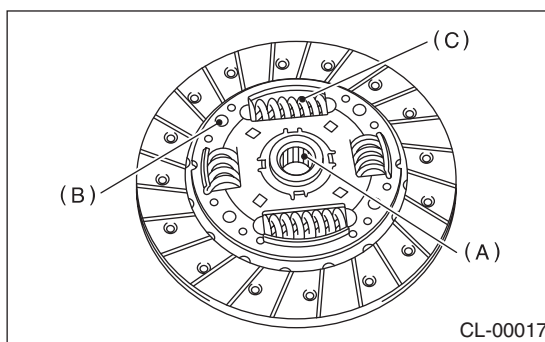
0.7 mm (0.028 in) at R = 110 mm (4.33 in)

STi model

0.7 mm (0.028 in) at R = 115 mm (4.53 in)



5) If worn spline, loose rivets or damper spring failure is found, replace the clutch disc.



(A) Spline

(B) Rivet

(C) Damper spring

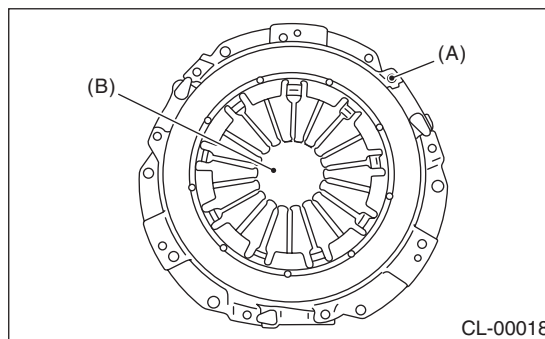
2. CLUTCH COVER

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 center of diaphragm spring



(A) Thrust rivet

(B) Diaphragm spring

3. Flywheel

A: REMOVAL

1) Remove the transmission assembly.

5MT:

<Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>

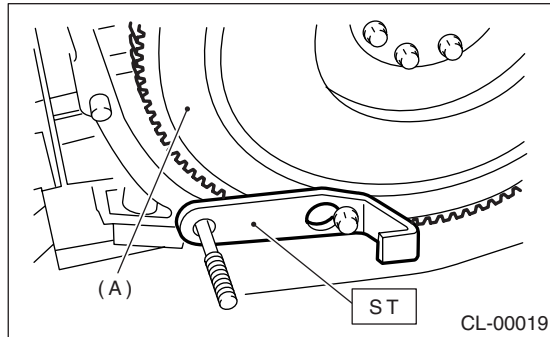
6MT:

<Ref. to 6MT-34, REMOVAL, Manual Transmission Assembly.>

2) Remove the clutch cover and clutch disc. <Ref. to CL-11, REMOVAL, Clutch Disc and Cover.>

3) Using the ST, remove the flywheel.

ST 498497100 CRANKSHAFT STOPPER

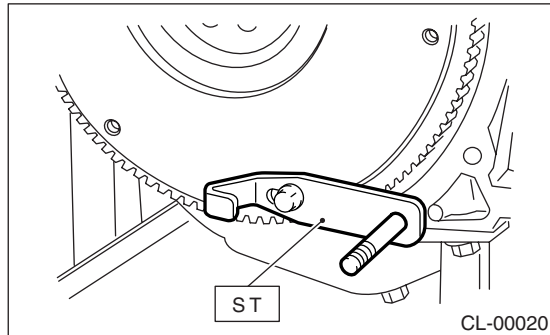


(A) Flywheel

B: INSTALLATION

1) Install the flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



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

NOTE:

Tighten the flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

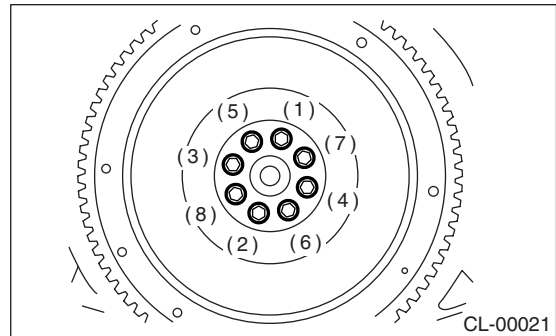
Tightening torque:

Except STi model

72 N·m (7.3 kgf-m, 52.8 ft-lb)

STi model

75 N·m (7.6 kgf-m, 55.3 ft-lb)



3) Install the clutch disc and cover. <Ref. to CL-11, INSTALLATION, Clutch Disc and Cover.>

4) Install the transmission assembly.

5MT:

<Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

6MT:

<Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

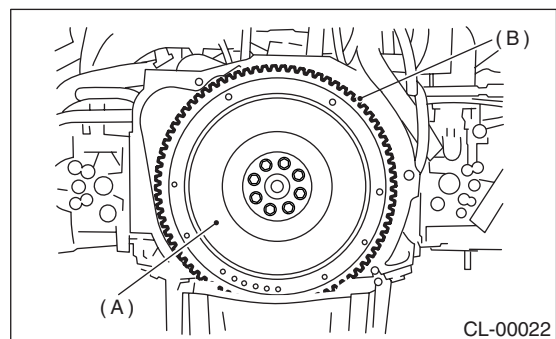
C: INSPECTION

CAUTION:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

1) Damage on sliding surface 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.

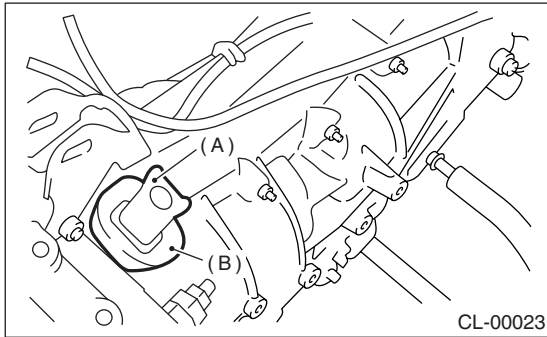
<Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>

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

CAUTION:

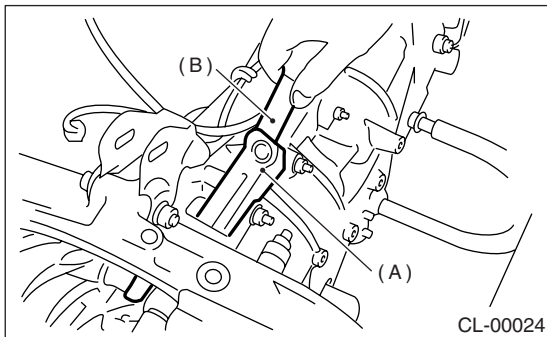
Be careful not to deform clips.

3) Remove the dust cover.



(A) Clutch release lever
(B) Dust cover

4) Remove the lever spring from pivot with a screwdriver by accessing it through 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.

5MT:

<Ref. to 5MT-27, REMOVAL, Manual Transmission Assembly.>

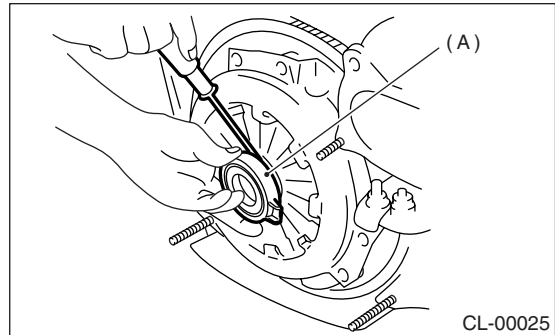
6MT:

<Ref. to 6MT-34, 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 the clutch cover using flat-type screwdriver.



(A) Clutch release bearing

B: INSTALLATION

1. NON-TURBO MODEL

NOTE:

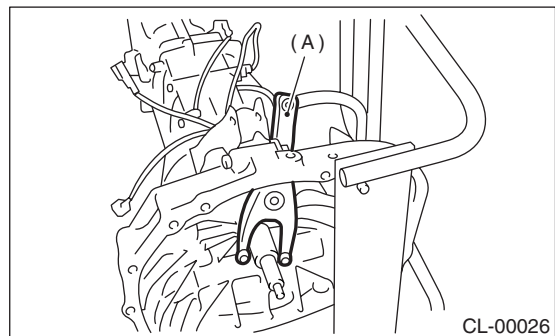
Before or during assembling, lubricate the following points with a light coat of grease.

- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)

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

NOTE:

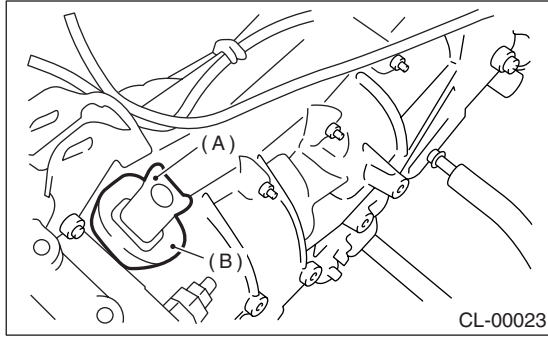
- Apply grease (SUNLIGHT 2: Part No. 003602010) to the contact point of release lever and operating cylinder.
- Confirm that the lever spring is securely fitted by observing it through the main case hole.



(A) Release lever

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

3) Install the dust cover.



- (A) Release lever
- (B) Dust cover

4) Check smooth movement of the bearing with operating release lever.

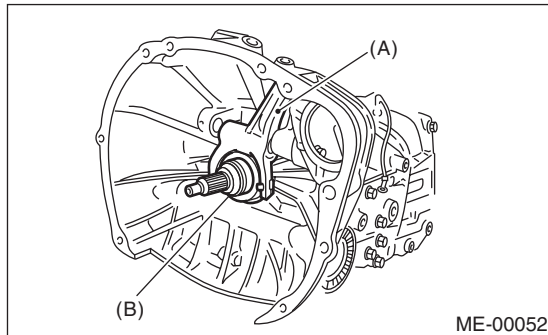
5) Install the transmission assembly.

<Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

2. TURBO MODEL

1) Install the release bearing on transmission.

2) Insert the release fork into release bearing tab.

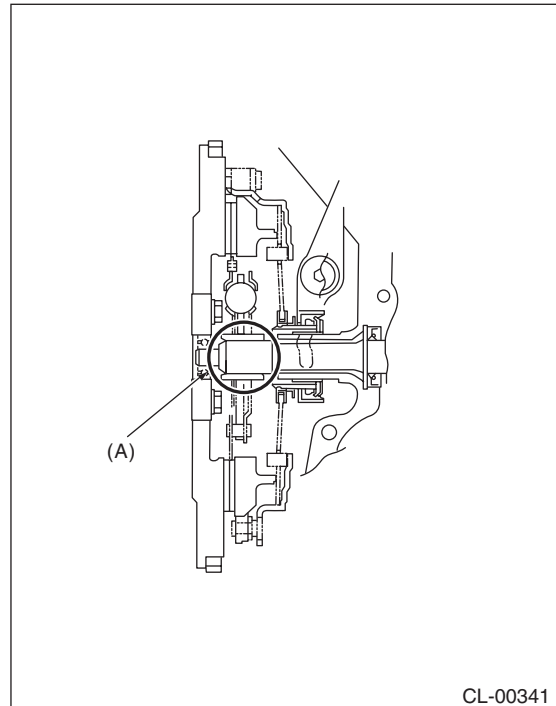


- (A) Release fork
- (B) Release bearing

3) Apply grease to the spline portion.

Grease:

FX2200 (Part No. 000040901)

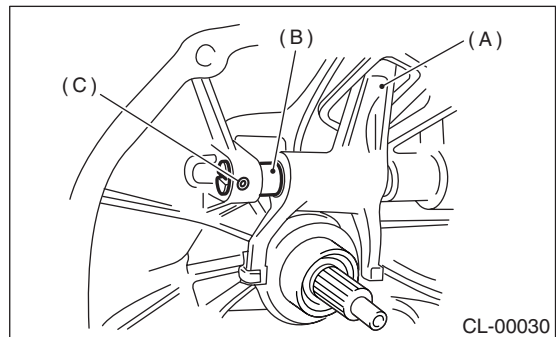


- (A) Spline

4) Insert the release fork shaft into release fork.

NOTE:

Make sure the cutout portion of release fork shaft contacts spring pin.



- (A) Release fork
- (B) Release shaft
- (C) Spring pin

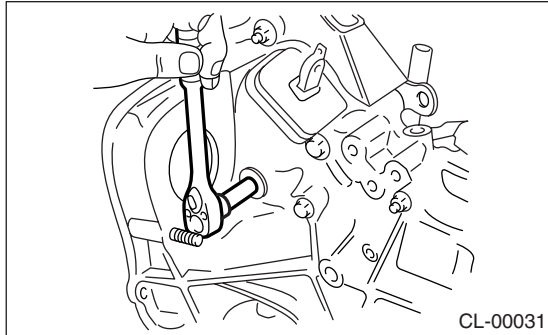
5) Tighten the plug.

Release Bearing and Lever

CLUTCH SYSTEM

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)



6) Install the transmission assembly.

5MT:

<Ref. to 5MT-29, INSTALLATION, Manual Transmission Assembly.>

6MT:

<Ref. to 6MT-36, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. RELEASE BEARING

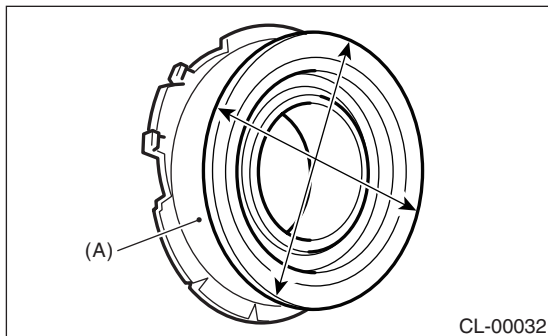
NOTE:

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.

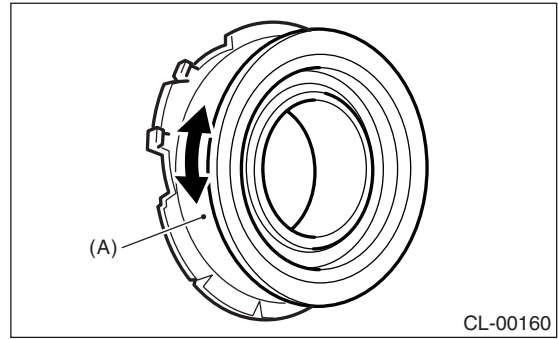
Radial direction stroke:

1.4 mm (0.055 in)



(A) Bearing case

2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

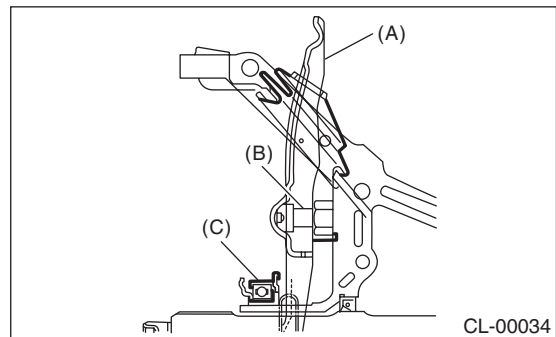


(A) Bearing case

3) Check wear and damage of the bearing case surface contacting with lever.

2. RELEASE LEVER

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



(A) Clutch release lever

(B) Pivot

(C) Clutch release bearing

5. Operating Cylinder

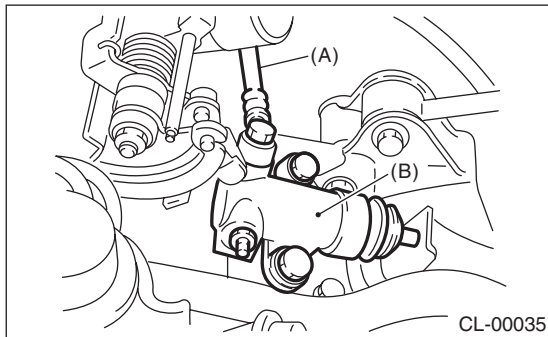
A: REMOVAL

- 1) Remove the air intake chamber (Non-turbo model). <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 2) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 3) Remove the clutch hose from operating cylinder.

CAUTION:

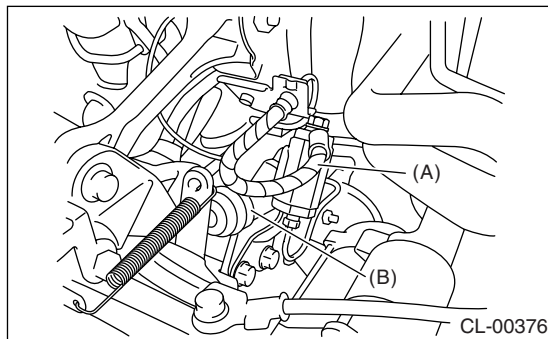
Cover the hose joint to prevent clutch fluid from flowing out.

- Non-turbo model



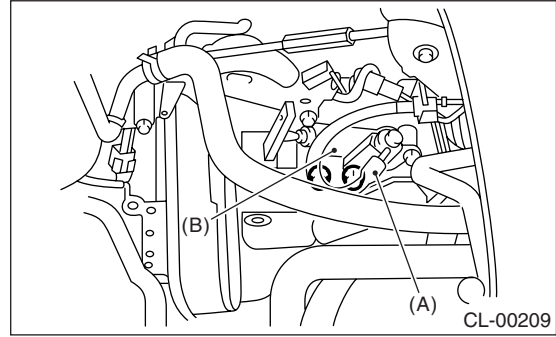
- (A) Clutch hose
(B) Operating cylinder

- Turbo model (5MT)



- (A) Clutch hose
(B) Operating cylinder

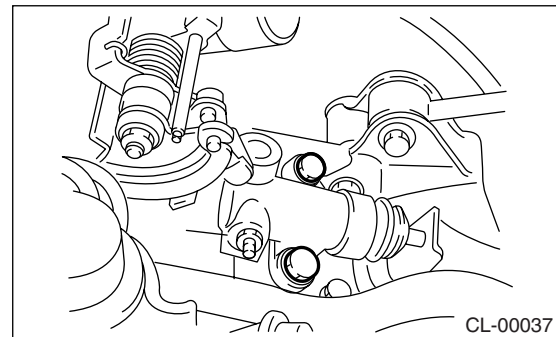
- Turbo model (6MT)



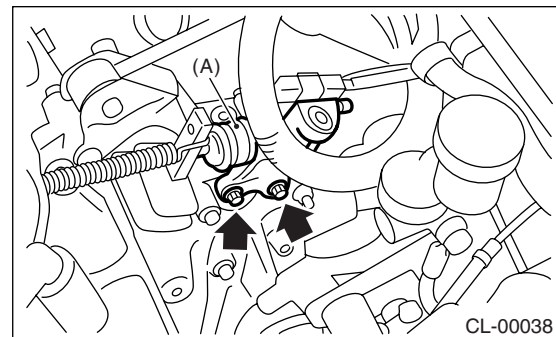
- (A) Clutch hose
(B) Operating cylinder

- 4) Remove the operating cylinder from transmission.

- Non-turbo model



- Turbo model (5MT)

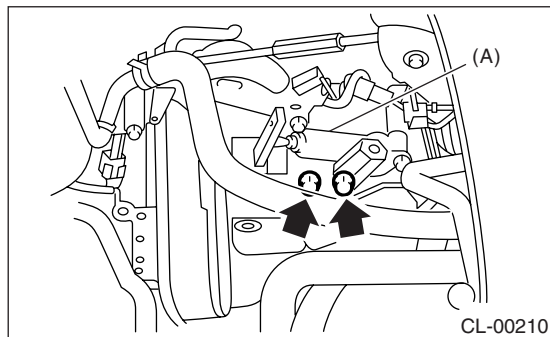


- (A) Operating cylinder

Operating Cylinder

CLUTCH SYSTEM

- Turbo model (6MT)



(A) Operating cylinder

B: INSTALLATION

1) Install in the reverse order of removal.

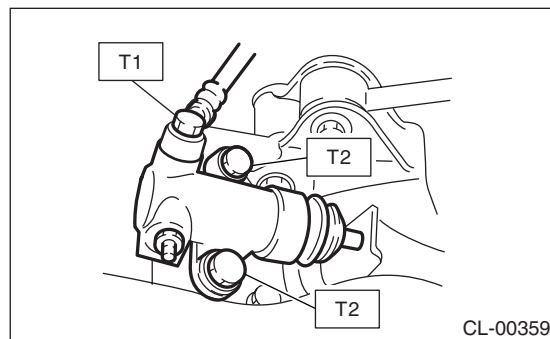
NOTE:

- Before installing the operating cylinder, apply grease (SUNLIGHT 2: Part No. 003602010) to contact point of the release lever and operating cylinder.
- For turbo model, bleed air with the operating cylinder attached to clutch hose, and then install it to vehicle. <Ref. to CL-24, TURBO MODEL, PROCEDURE, Clutch Fluid Air Bleeding.>
- Non-turbo model

Tightening torque:

T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)

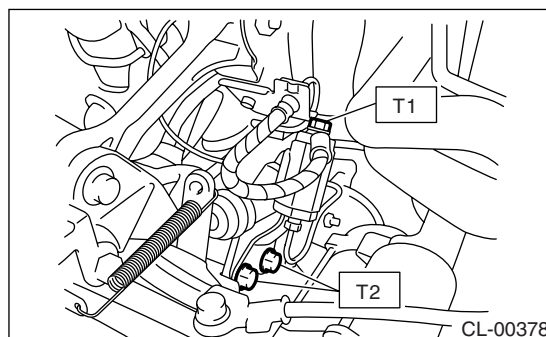


- Turbo model (5MT)

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)

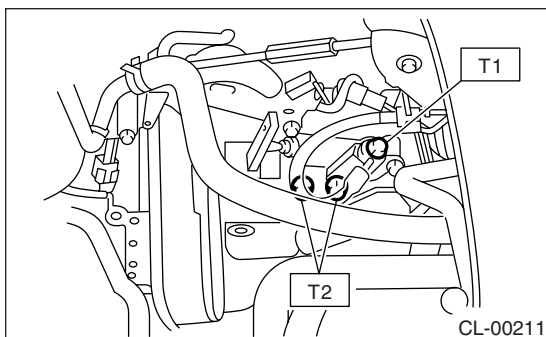


- Turbo model (6MT)

Tightening torque:

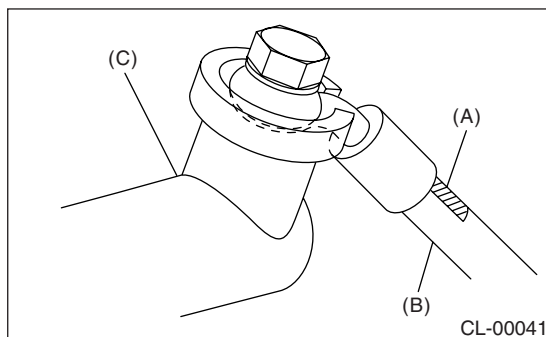
T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

T2: 41 N·m (4.2 kgf-m, 30.2 ft-lb)



NOTE:

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



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

2) After bleeding air from the operating cylinder, ensure that clutch operates properly.
<Ref. to CL-24, Clutch Fluid Air Bleeding.>

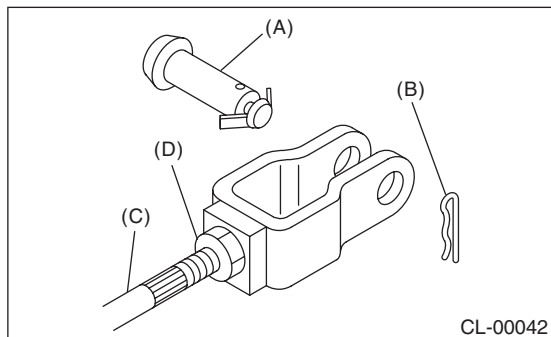
C: INSPECTION

- 1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
- 2) Check the operating cylinder for fluid leakage or damage on 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.

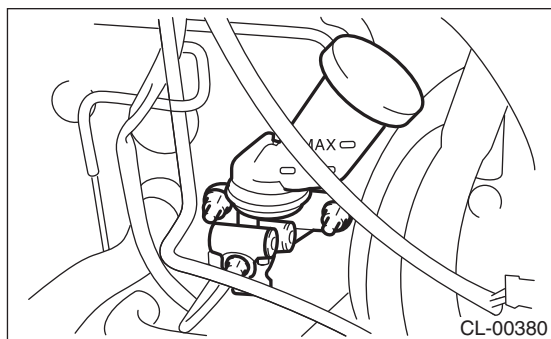


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

- 3) Remove the air intake chamber (Non-turbo model). <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-10, REMOVAL, Intercooler.>
- 5) Disconnect the clutch pipe from master cylinder.
- 6) Remove the master cylinder and reservoir tank as a unit.

CAUTION:

Be extremely careful not to spill 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 connect the clutch pipe to master cylinder.

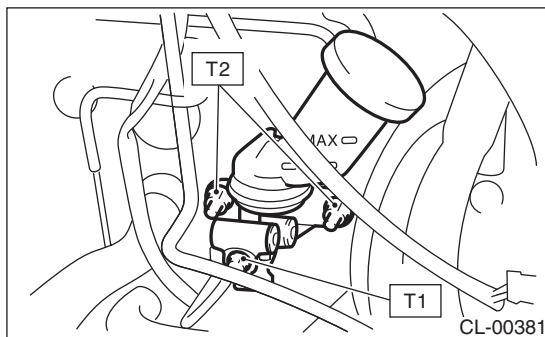
NOTE:

Check that the pipe is routed properly.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

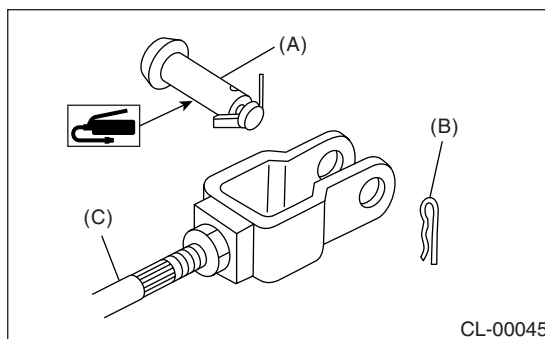
T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



- 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.

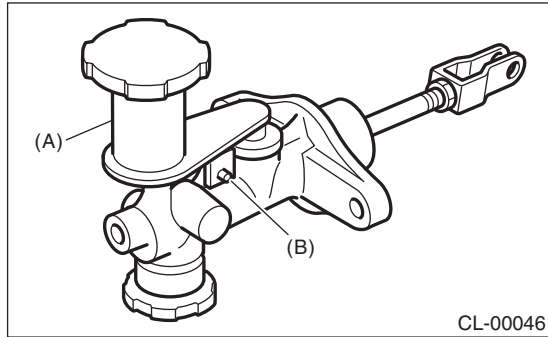


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

- 3) After bleeding air from the clutch system, ensure that clutch operates properly. <Ref. to CL-24, Clutch Fluid Air Bleeding.>
- 4) Install the air intake chamber (Non-turbo model). <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>
- 5) Install the intercooler (Turbo model). <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

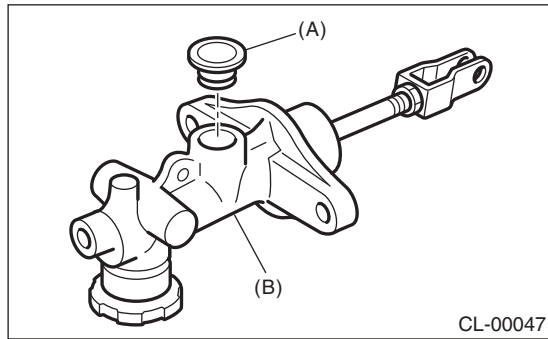
C: DISASSEMBLY

1) Remove the straight pin and reservoir tank.



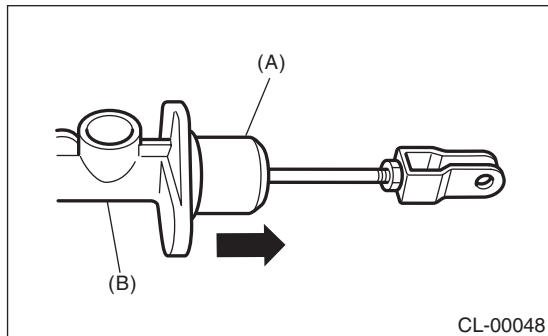
- (A) Reservoir tank
- (B) Straight pin

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 snap ring.

CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

5) Remove the clutch damper.

D: ASSEMBLY

1) Install the clutch damper. (Turbo model)

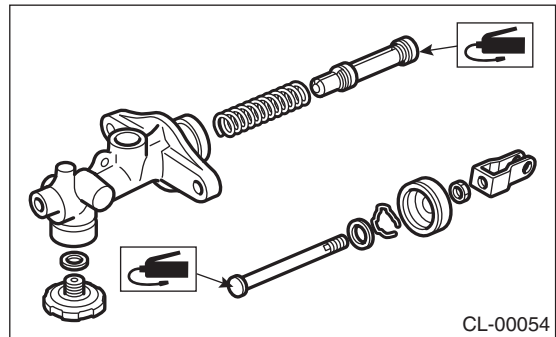
Tightening torque:

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)



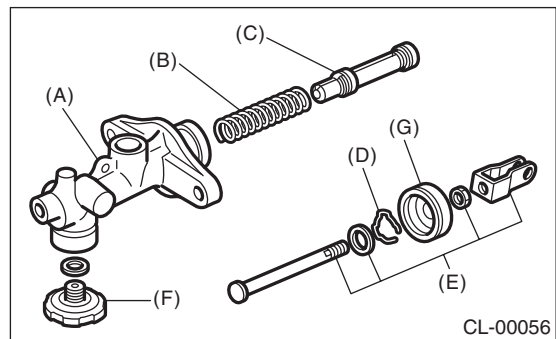
3) Assemble in the reverse order of disassembly.

Tightening torque:

10 N·m (1.0 kgf-m, 7 ft-lb)

E: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring, gasket, clutch damper, cylinder boot and hose replace the faulty part.



- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Snap ring
- (E) Push rod ASSY
- (F) Clutch damper
- (G) Cylinder boot

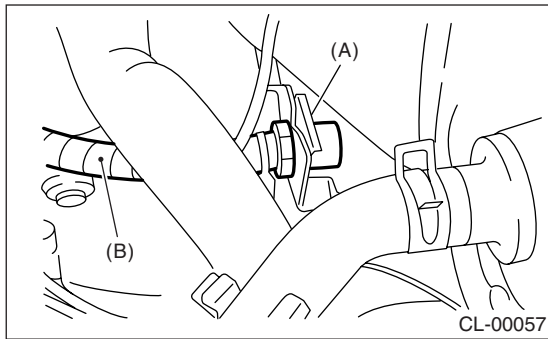
Clutch Pipe and Hose

CLUTCH SYSTEM

7. Clutch Pipe and Hose

A: REMOVAL

- 1) Remove the air intake chamber (Non-turbo model). <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 2) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-10, 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:

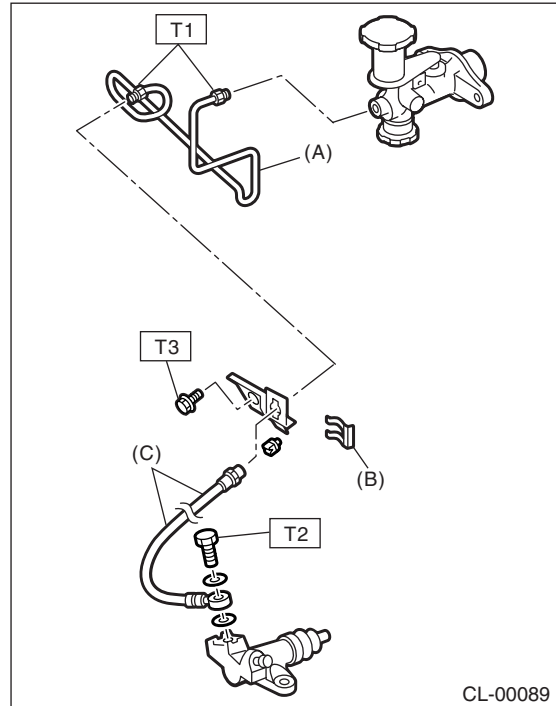
Bleed air of the clutch fluid. <Ref. to CL-24, Clutch Fluid Air Bleeding.>

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

T3: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



- (A) Clutch pipe
(B) Clip
(C) Clutch hose

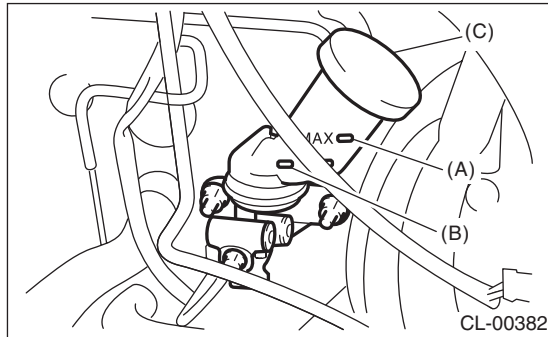
C: INSPECTION

Check the pipes and hoses for cracks, breakage, or damage. Check the 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 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) Max. level
- (B) Min. level
- (C) Reservoir tank

- 5) Drain all contaminated fluid in the same method as air bleeding.
- 6) Refill the brake fluid before reservoir tank becomes empty, and drain contaminated fluid again.
- 7) Repeat the above procedure until the contaminated fluid is completely drained.

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 people working.
- The amount of brake fluid required is approx. 70 m l (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

- 1) Remove the air intake chamber. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 2) Either jack-up the vehicle and place a rigid racks under it, or lift-up the vehicle.
- 3) Drain brake fluid from the reservoir tank.
- 4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

9. Clutch Fluid Air Bleeding

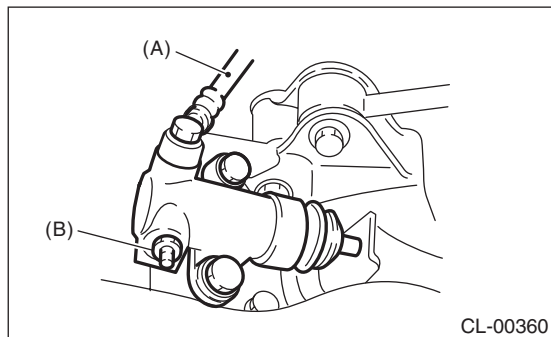
A: PROCEDURE

1. NON-TURBO MODEL

NOTE:

Bleed air from the oil line with help of a co-worker.

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

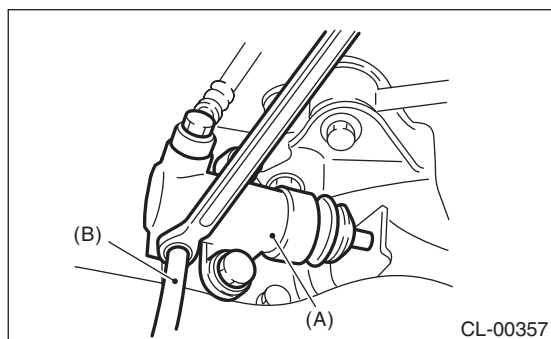


- (A) Clutch hose
(B) Air bleeder

- 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.

CAUTION:

Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

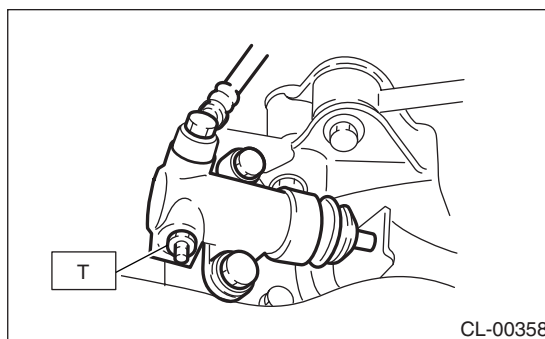


- (A) Operating cylinder
(B) Vinyl tube

- 4) Repeat the procedure 3), until there are no more air bubbles in the vinyl tube.
- 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 clutch system.
- 7) After bleeding air from the clutch system, ensure that clutch operates properly.
- 8) Install the air intake chamber. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Chamber.>

2. TURBO MODEL

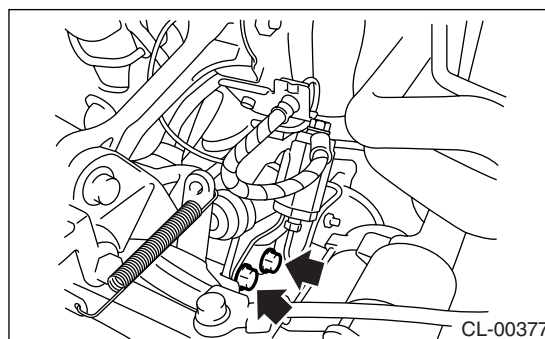
NOTE:

Bleed air from the oil line with help of a co-worker.

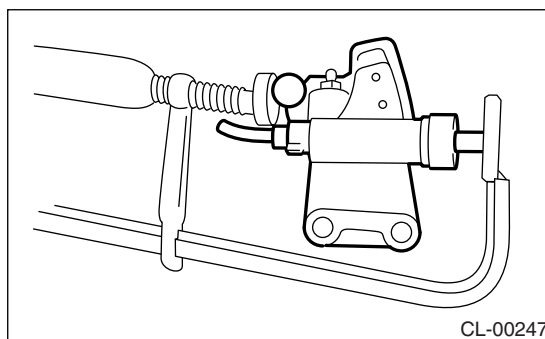
- 1) Remove the operating cylinder.

NOTE:

Do not remove the clutch hose.



- 2) Fix the piston with clamp to avoid the piston from jumping out.

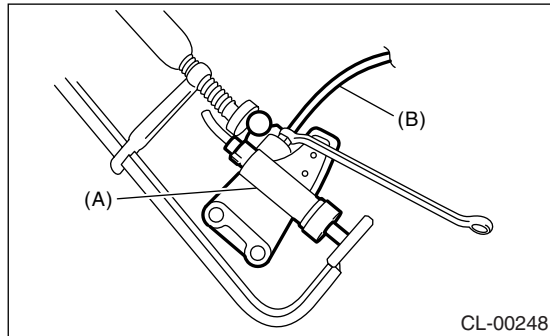


- 3) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.

4) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid. Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

NOTE:

Set the air breather screw position higher than the tip of operating cylinder when performing this procedure.



- (A) Operating cylinder
(B) Vinyl tube

5) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:

Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

6) Tighten the air bleeder.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

7) Install the operating cylinder.

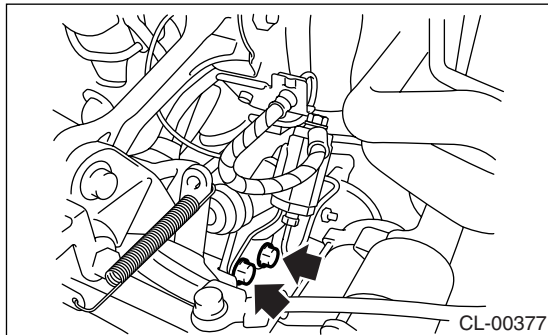
Tightening torque:

5MT model:

37 N·m (3.8 kgf-m, 27.5 ft-lb)

6MT model:

41 N·m (4.2 kgf-m, 30.2 ft-lb)



8) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.

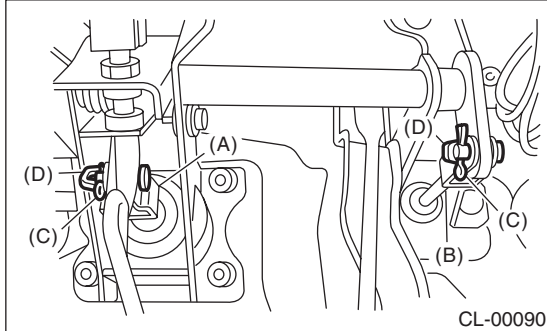
9) After bleeding air from the system, ensure that clutch operates properly.

10) Install the intercooler. <Ref. to IN(H4DOTC)-10, INSTALLATION, Intercooler.>

10.Clutch Pedal

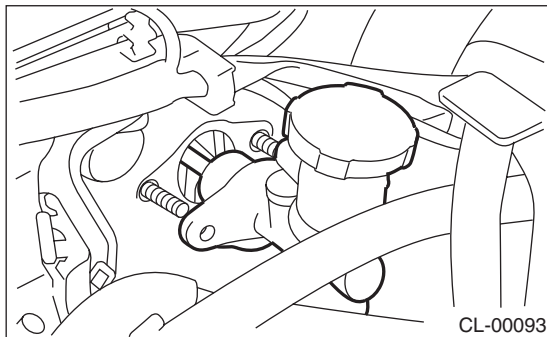
A: REMOVAL

- 1) Remove the steering column. <Ref. to PS-24, 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 intake chamber. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Chamber.>
- 6) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-10, 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 the pedal assembly.

B: INSTALLATION

- 1) Install in the reverse order of removal.

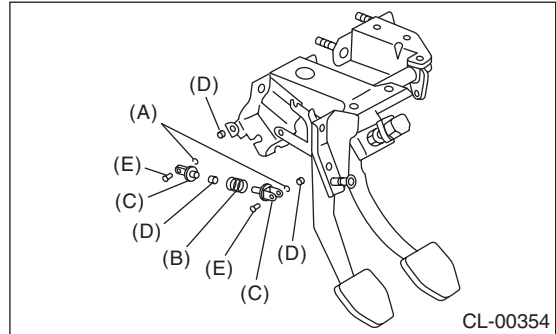
CAUTION:

- Be careful not to kink the accelerator cable.
- Always use new clevis pins.

- 2) Adjust the clutch pedal after installation. <Ref. to CL-27, ADJUSTMENT, Clutch Pedal.>

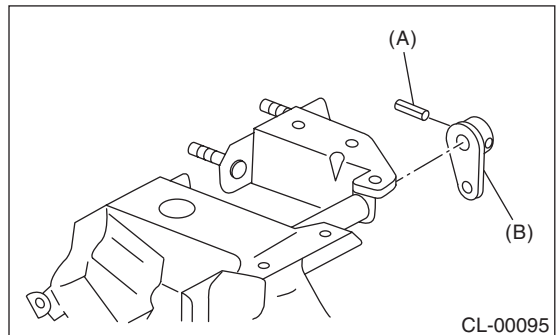
C: DISASSEMBLY

- 1) Remove the clips, assist spring, rod and bushing.



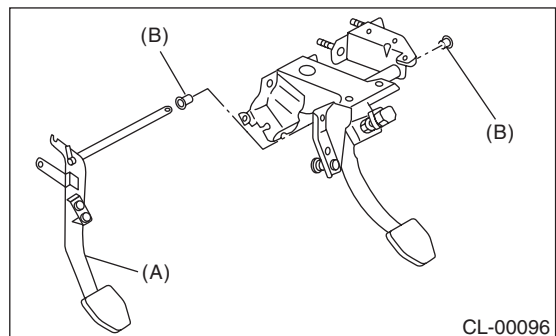
- (A) Clip
- (B) Assist spring
- (C) Assist rod
- (D) Bushing
- (E) Clevis pin

- 2) Remove the spring pin and lever.



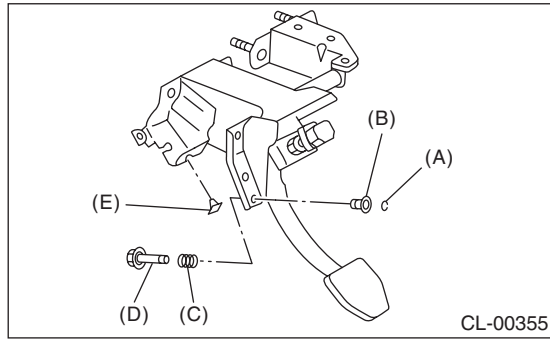
- (A) Pin
- (B) Lever

- 3) Remove the clutch pedal and bushings.



- (A) Clutch pedal
- (B) Bushing

- 4) Remove the stopper, clip, O-ring, rod S, and then remove the spring and bushing S.



- (A) Clip
- (B) Bushing S
- (C) Spring S
- (D) Rod S
- (E) Stopper

- 5) Remove the stoppers from clutch pedal.
6) Remove the clutch pedal pad. (Non-turbo model)

D: ASSEMBLY

- 1) Attach the stopper, etc. to pedal bracket temporarily.
- 2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
- 3) Align bores of pedal bracket, clutch pedal and brake pedal, attach the brake pedal return spring, assist rods, spring, and bushing.

NOTE:

Clean up inside of bushings and apply grease before installing the spacer.

E: INSPECTION

1. CLUTCH PEDAL

Move the clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure pedal play is in specified range.

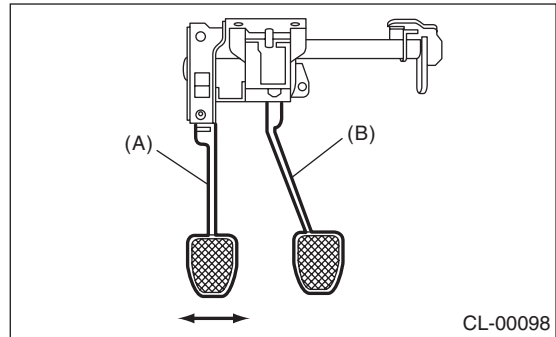
CAUTION:

If excessive movement is noted, replace the bushings with new ones.

Play of clutch pedal:

Service limit

5.0 mm (0.197 in) or less



- (A) Clutch pedal
- (B) Brake pedal

F: ADJUSTMENT

1. CLUTCH PEDAL

- 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:

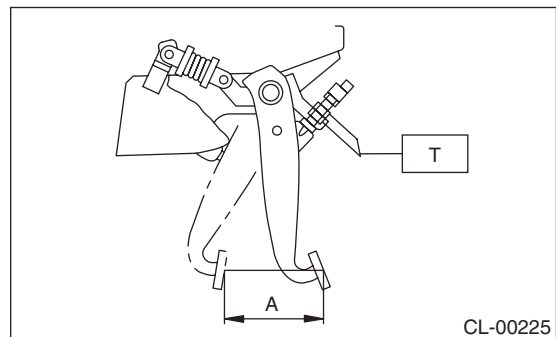
If lock nuts cannot adjust the clutch pedal full stroke length to specifications, turn the master cylinder push rod to adjust it.

Clutch pedal full stroke A:

130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):

T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)

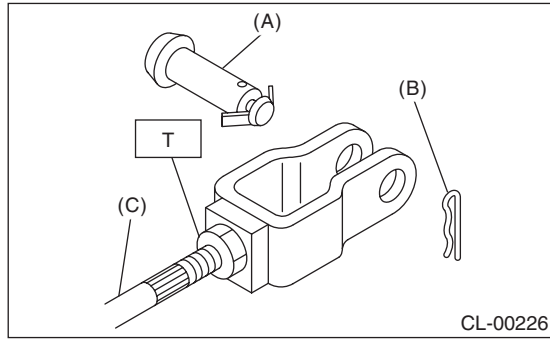


- 2) Turn the master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

Clutch Pedal

CLUTCH SYSTEM

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

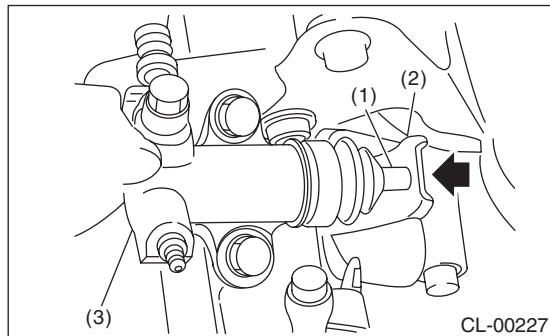
3) Depress and release the clutch pedal two to three times to ensure that clutch pedal and release fork operates smoothly. If the clutch pedal and release fork do not operate smoothly, bleed air from the clutch hydraulic system. <Ref. to CL-24, Clutch Fluid Air Bleeding.>

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.

Clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

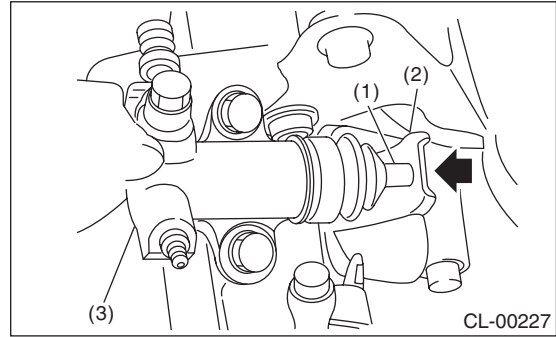
5) Move the clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

6) Push the release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If the clutch fluid level increases, the 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

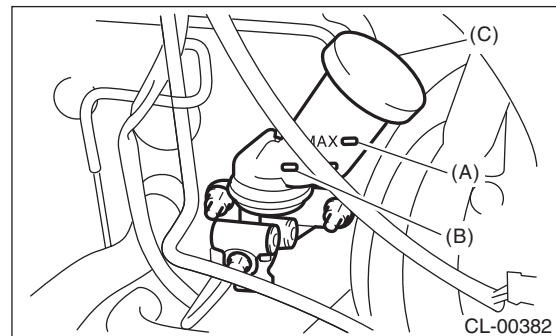
8) If the clutch fluid level increases, hydraulic clutch play is correct.

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) Max. level
- (B) Min. level
- (C) Reservoir tank

11.Clutch Switch

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the instrument panel lower cover.
- 3) Disconnect the connector from clutch switch.
- 4) Remove the clutch switch.

B: INSTALLATION

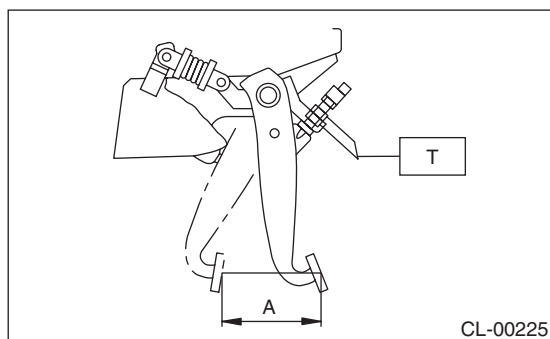
1. CLUTCH SWITCH (CRUISE CONTROL)

- 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, 5.9 ft·lb)



- 2) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-27, ADJUSTMENT, Clutch Pedal.>

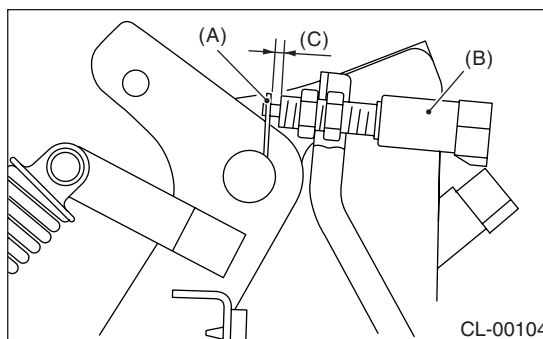
- 3) Connect clutch switch connector.

2. CLUTCH SWITCH (STARTER INTER-LOCK)

- 1) Fully depress the clutch pedal.
- 2) Install the clutch pedal plate and clutch pedal so that the gap between them is 3 — 3.5 mm (0.12 — 0.14 in), and then tighten the lock nut.

Tightening torque:

8 N·m (0.8 kgf·m, 5.9 ft·lb)



(A) Plate

(B) Clutch pedal

(C) 3 — 3.5 mm (0.12 — 0.14 in)

- 3) Connect the clutch switch connector.

- 4) Confirm that the engine does not start when the clutch pedal is released.

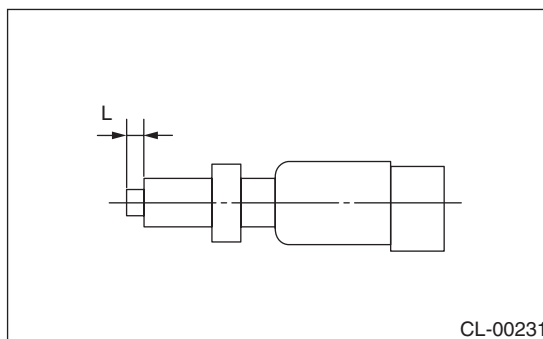
- 5) Confirm that the engine starts when the clutch pedal is fully depressed.

C: INSPECTION

- 1) If the clutch switch (cruise control) does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position L:

$2^{+1.5}_{-0}$ mm ($0.079^{+0.059}_{-0}$ in)



- 2) Check the clutch switch continuity. If the resistance is not as specified, replace the switch.

- (1) Disconnect the clutch switch connector.

- (2) Measure the resistance between 1 and 2 of switch terminal.

Terminals/Specified resistance

When clutch pedal depressed:

1 — 2/Less than 1 Ω

Terminals/Specified resistance

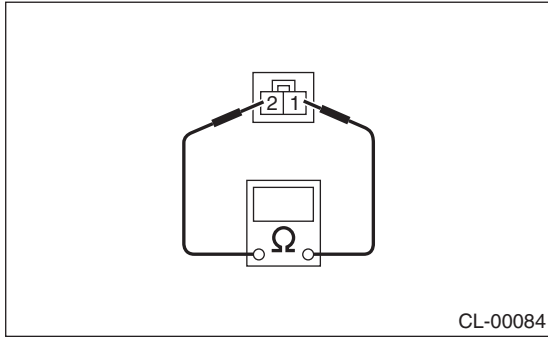
When clutch pedal not depressed:

1 — 2/More than 1 MΩ

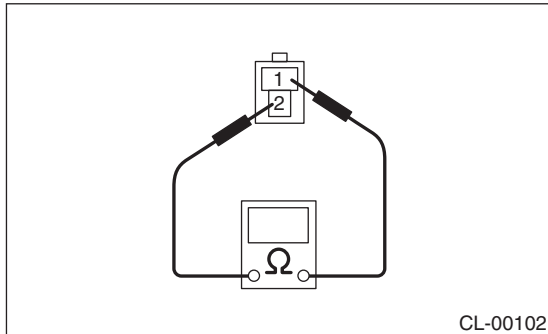
Clutch Switch

CLUTCH SYSTEM

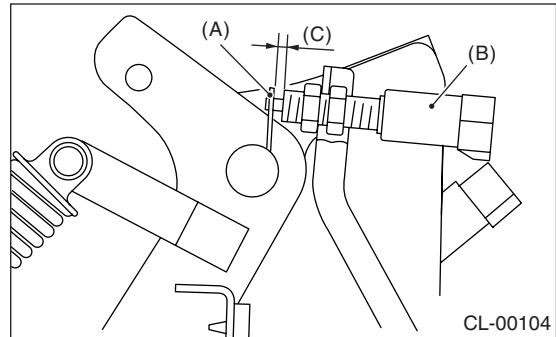
- Clutch switch (Cruise control)



- Clutch switch (Starter interlock)



3) Adjust the clutch pedal plate and clutch switch so that the gap between them is 3 — 3.5 mm (0.12 — 0.14 in).



- (A) Plate
- (B) Clutch switch (Starter interlock)
- (C) 3 — 3.5 mm (0.12 — 0.14 in)

4) Tighten the lock nut.

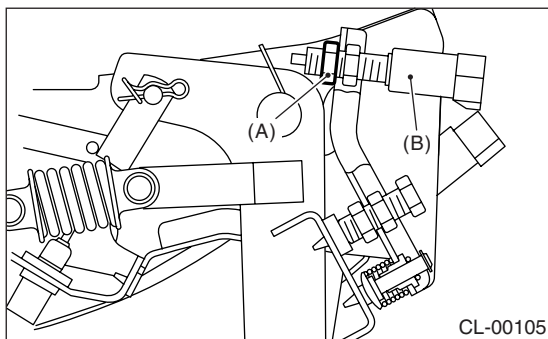
Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

3) Confirm that the engine does not start when the clutch pedal is not depressed. If the engine starts, adjust the clutch switch, and inspect the starter interlock circuit.

4) Confirm that the engine starts when the clutch pedal is fully depressed. If the engine does not start, adjust the clutch switch, and inspect the starter interlock circuit.

D: ADJUSTMENT

1) Loosen the clutch switch mounting lock nut (Starter interlock).



- (A) Lock nut
- (B) Clutch switch (Starter interlock)

2) Fully depress the clutch pedal.

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 speed up when shifting. • High speed 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 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-31, CLUTCH, 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 the 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) Stuck 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 the clutch disc.
	(b) Weak or broken torsion spring	Replace the clutch disc.
	(c) Defective facing contact or excessive disc wear	Replace the defective clutch disc.
	(d) Warped pressure plate or flywheel	Correct or replace.
	(e) Loose disc rivets	Replace the clutch disc.
	(f) Loose engine mounting	Retighten or replace the mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.
4. Noisy clutch The noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace the release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace the clutch disc.
	(d) Loose torsion spring retainer	Replace the clutch disc.
	(e) Deteriorated or broken torsion spring	Replace the clutch disc.

General Diagnostic Table

CLUTCH SYSTEM

Symptom	Possible cause	Corrective
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 the clutch disc.
	(b) Deteriorated cushioning spring	Replace the clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace the clutch disc or main shaft.
	(d) Deteriorated or broken torsion spring	Replace the clutch disc.
	(e) Loose engine mounting	Retighten or replace the 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 the bushing and/or shaft with a 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 in idling condition.	Is there any abnormal noise from the transmission gear?	Go to step 2.	Clutch is normal.
2 CHECK GEAR NOISE. Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds.	Is there any abnormal noise from the transmission gear?	Go to step 3.	Defective transmission or excessive clutch drag torque. Inspect the pilot bearing, clutch disc, transmission and clutch disc hub spline.
3 CHECK GEAR NOISE. 1) Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds. 2) With the clutch disengaged, shift from N to R, R to N several times.	Is there any abnormal noise from the transmission gear?	Defect in clutch disengaging. Inspect the clutch disc, clutch cover, clutch release, and clutch pedal free play.	Clutch and fly-wheel seizure. Inspect the clutch disc, spline of clutch disc hub.

CONTROL SYSTEMS

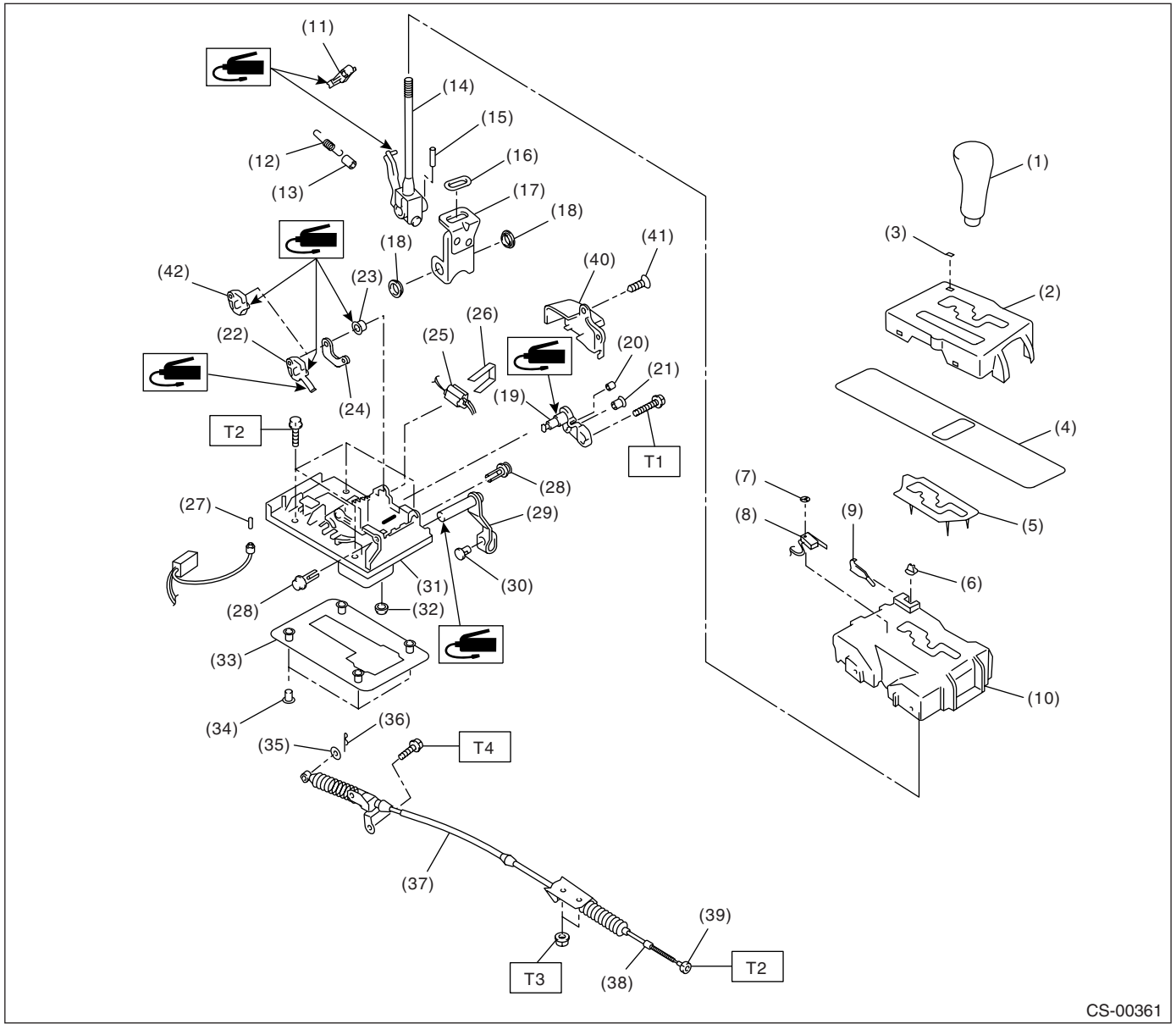
1. General Description

A: SPECIFICATION

Item		Specification
Swing torque of rod against lever	N (kgf, lb)	3.7 (0.38, 0.84) or less

B: COMPONENT

1. AT SELECT LEVER



CS-00361

General Description

CONTROL SYSTEMS

(1) Grip	(17) Bracket	(33) Packing
(2) Indicator cover	(18) Bushing	(34) Spacer
(3) Cover	(19) Lock plate B	(35) Washer
(4) Blind	(20) Bushing	(36) Snap pin
(5) Cushion	(21) Bushing	(37) Select cable
(6) Button	(22) Lock plate A (Non-turbo model)	(38) Adjusting nut B
(7) Clip	(23) Bushing	(39) Adjusting nut A
(8) "P" range switch	(24) Lock plate C	(40) Cover
(9) Spring	(25) Shift lock solenoid	(41) Clip
(10) Guide plate	(26) Clamp	(42) Lock plate A (Turbo model)
(11) Detent arm	(27) Indicator light bulb	
(12) Detent spring	(28) Clip	
(13) Tube	(29) Select lever lower	
(14) Select lever COMPL	(30) Bushing COMPL	
(15) Spring pin	(31) Base plate	
(16) Bushing	(32) Grommet	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 2.0 (0.2, 1.4)

T2: 7.5 (0.76, 5.5)

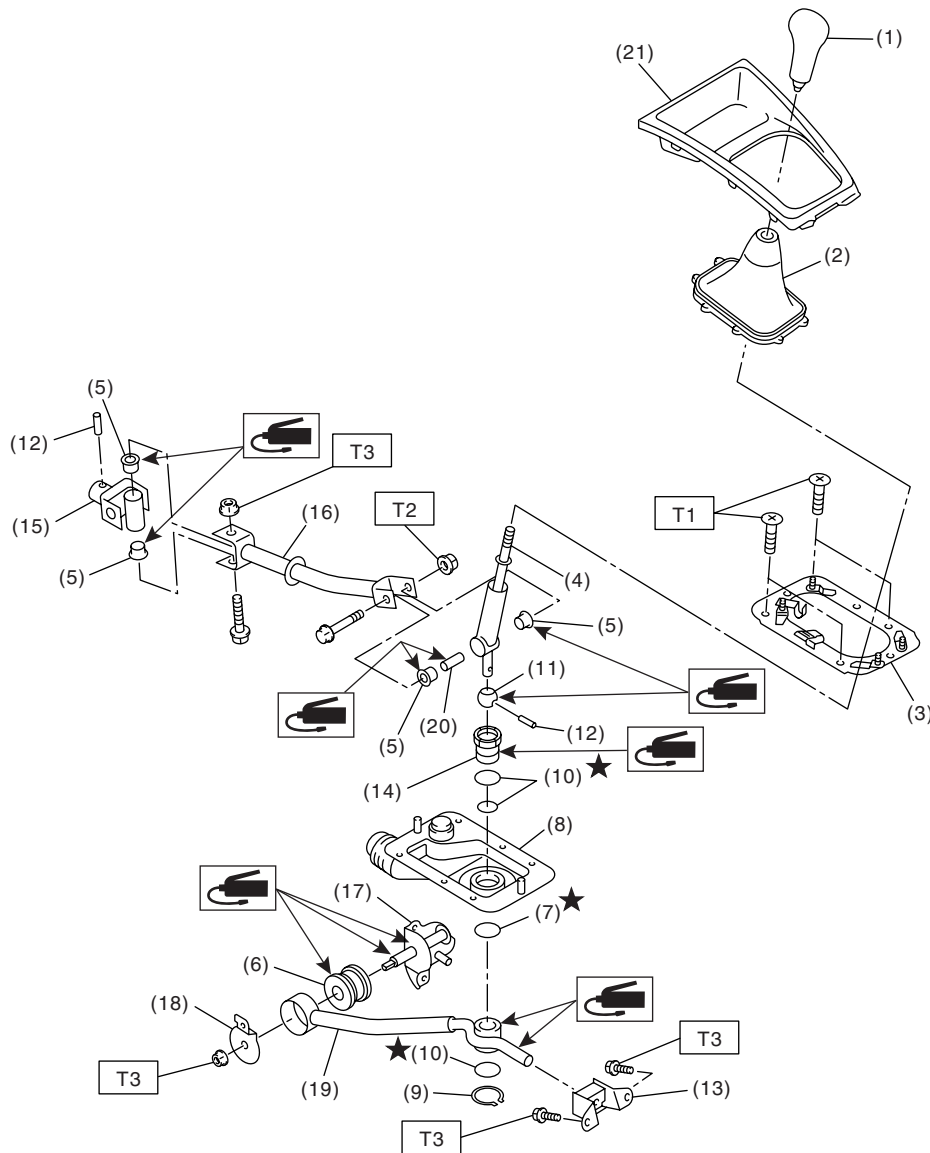
T3: 13 (1.3, 9.4)

T4: 18 (1.8, 13.0)

General Description

CONTROL SYSTEMS

2. 5MT GEAR SHIFT LEVER



CS-00217

(1) Gear shift knob	(10) O-ring	(19) Stay
(2) Console boot	(11) Bushing A	(20) Spacer
(3) Plate ASSY	(12) Spring pin	(21) Front cover
(4) Lever	(13) Cushion rubber	
(5) Bushing	(14) Bushing B	
(6) Bushing	(15) Joint	
(7) Lock wire	(16) Rod	
(8) Boot	(17) Bracket	
(9) Snap ring	(18) Washer	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.76, 5.5)

T2: 12 (1.2, 8.7)

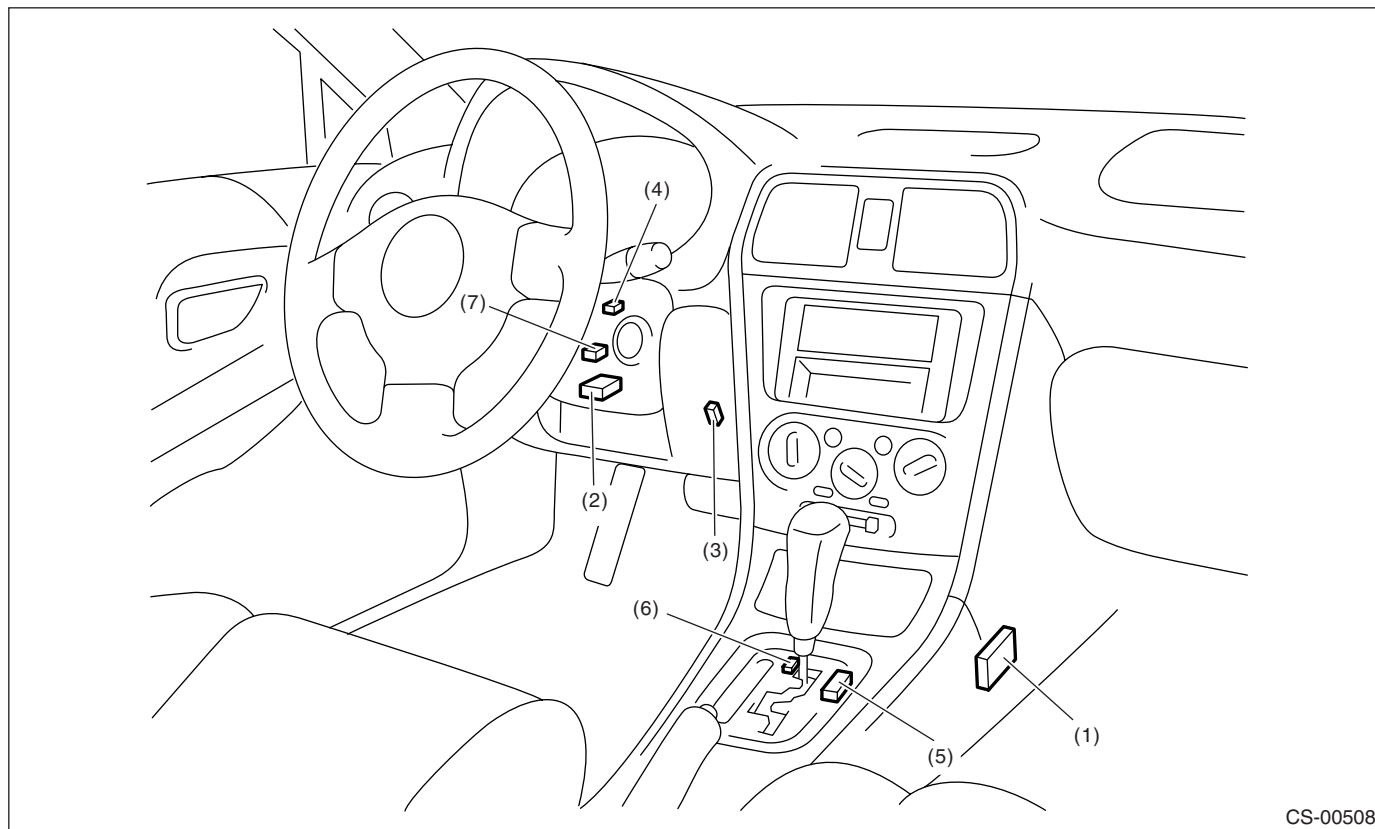
T3: 18 (1.8, 13.0)

C: CAUTION

- Wear work 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 and 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 rigid racks 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 ground cable from battery.

2. AT Shift Lock Control System

A: LOCATION

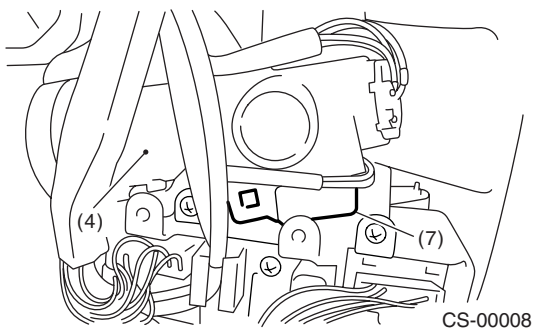
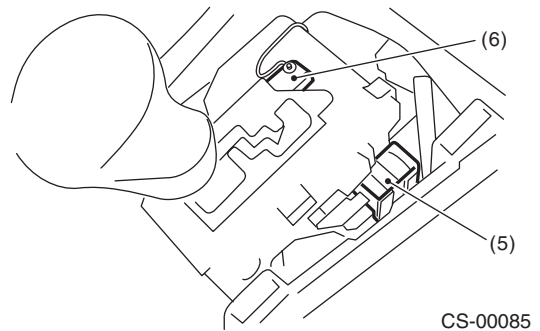
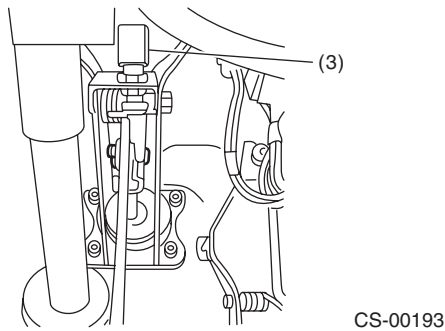
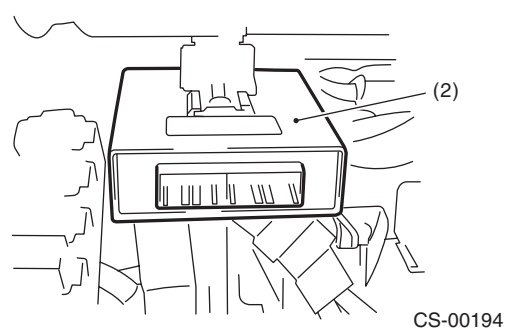
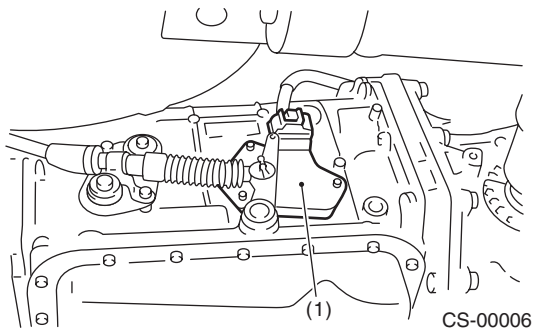


CS-00508

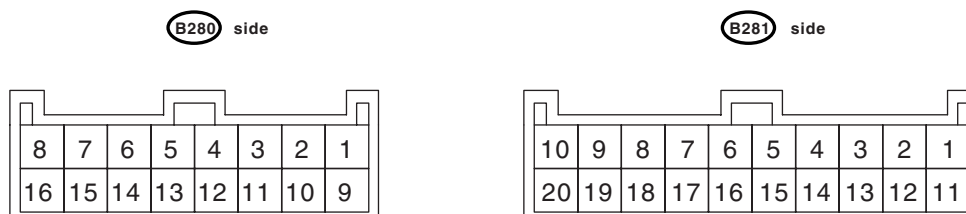
(1) Inhibitor switch	(4) Key warning switch	(7) Key lock solenoid
(2) Body integrated unit	(5) Shift lock solenoid	
(3) Stop light switch	(6) "P" range switch	

AT Shift Lock Control System

CONTROL SYSTEMS



SUBARU.

B: ELECTRICAL SPECIFICATION

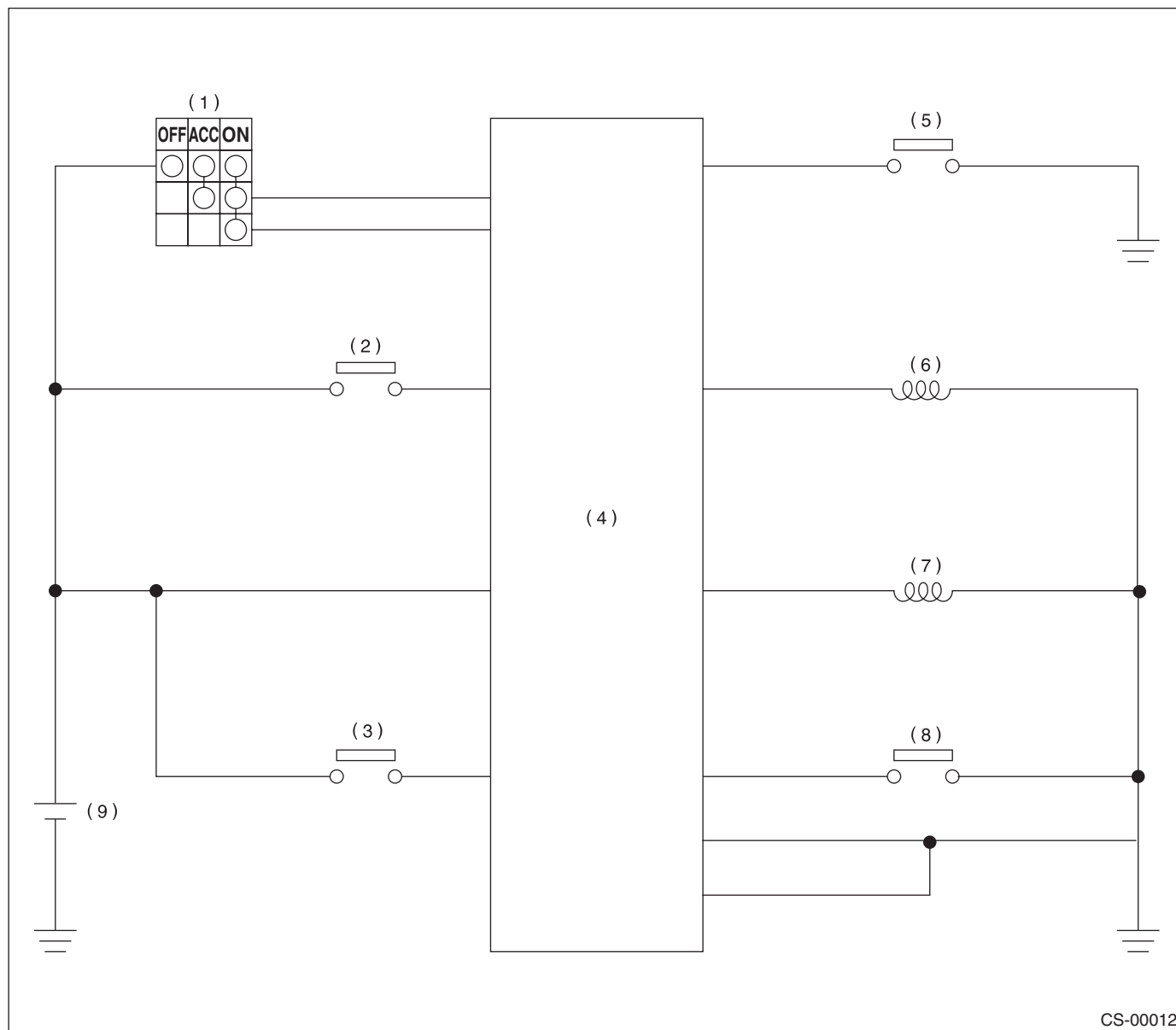
CS-00011

Contents	To Connector No.	Terminal No.	Input/Output signal
			Measured value and measuring conditions
Battery power supply	B280	2	9 — 16 V
Ignition power supply	B281	19	10 — 15 V when ignition switch is at ON or START.
Ignition power supply	B281	10	10 — 15 V when ignition switch is at ACC.
Inhibitor Switch ("P" range)	B281	5	0 V when select lever is in "P" range. 9 — 16 V when select lever is in other ranges than "P" range.
Stop light switch	B281	9	9 — 16 V when stop light switch is ON. 0 V when stop light switch is OFF.
"P" range switch	B281	6	0 V when select lever is in "P" range. 9 — 16 V when select lever is in other ranges than "P" range.
Shift lock solenoid signal	B280	9	8.5 — 16 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	B281	20	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B280	3	7.5 — 16 V when turning ignition switch to ON, select lever is in "P" range and brake switch is ON. 0 V at other conditions than above.
Ground	B280	4	—
Ground	B280	13	—

AT Shift Lock Control System

CONTROL SYSTEMS

C: WIRING DIAGRAM



- (1) Ignition switch
- (2) Stop light switch
- (3) Key warning switch

- (4) Body integrated unit
- (5) Inhibitor switch
- (6) Key lock solenoid

- (7) Shift lock solenoid
- (8) "P" range switch
- (9) Battery

D: INSPECTION

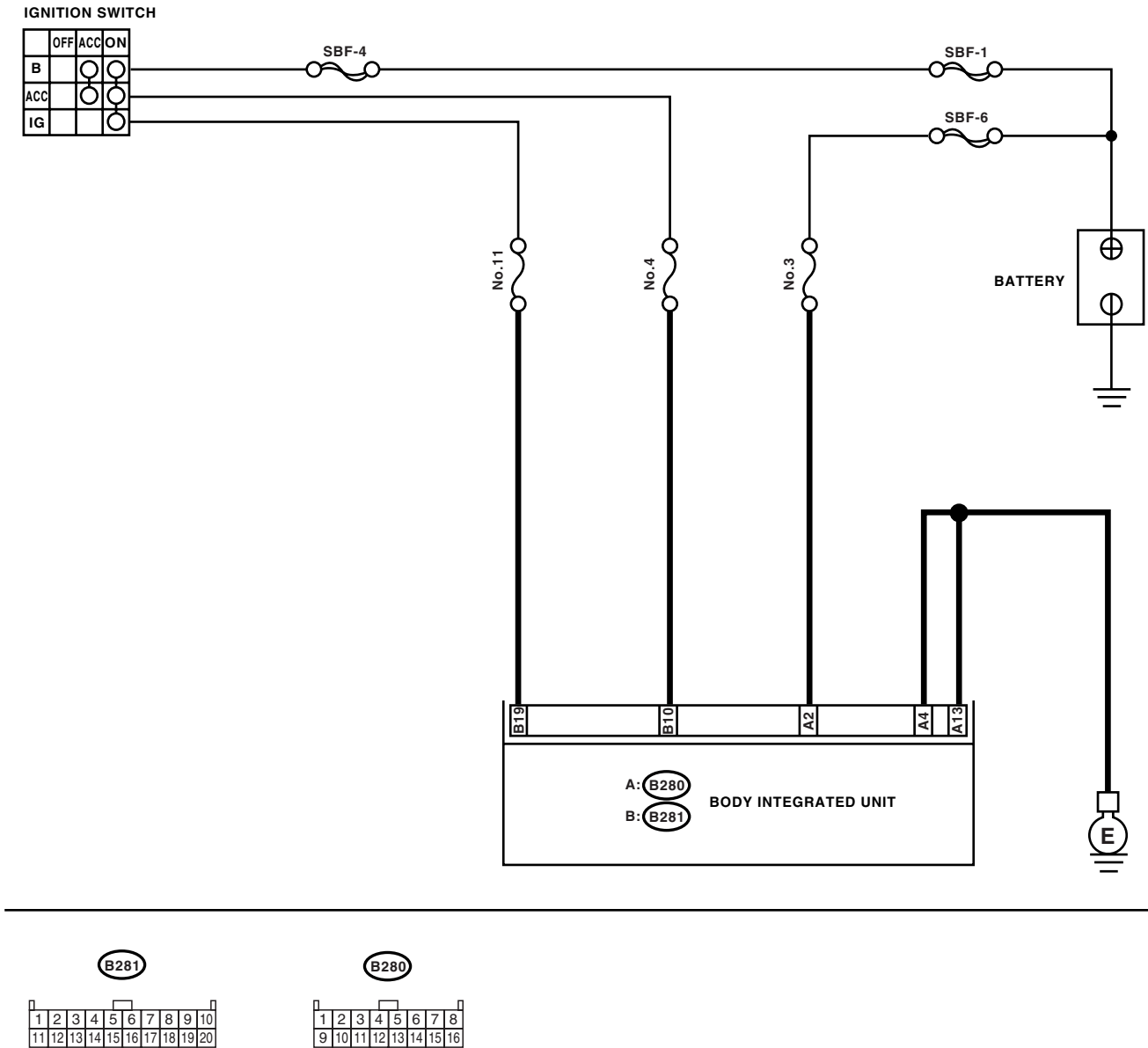
1. SHIFT LOCK OPERATION

Step	Check	Yes	No
1 CHECK SHIFT LOCK. 1) Turn the ignition switch ON. 2) Move the select lever to "P" range.	While the brake pedal is not depressed, can select lever move from "P" range to other ranges?	Inspect "SELECT LEVER SHIFT LOCK CANNOT BE RELEASED". <Ref. to CS-16, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock Control System.>	Go to step 2.
2 CHECK SHIFT LOCK.	While the brake pedal is depressed, can select lever move from "P" range to other ranges?	Go to step 3.	Inspect "SELECT LEVER CANNOT BE SHIFT LOCKED". <Ref. to CS-14, SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock Control System.>
3 CHECK KEY INTERLOCK.	When the select lever is in other than "P" range, does ignition switch turn to "LOCK" position?	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED. <Ref. to CS-16, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock Control System.>	Go to step 4.
4 CHECK KEY INTERLOCK.	When the select lever is in "P" range, does ignition switch turn to "LOCK" position?	AT shift lock system is normal.	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED. <Ref. to CS-16, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock Control System.>

AT Shift Lock Control System

CONTROL SYSTEMS

2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND LINE



CS-00258

AT Shift Lock Control System

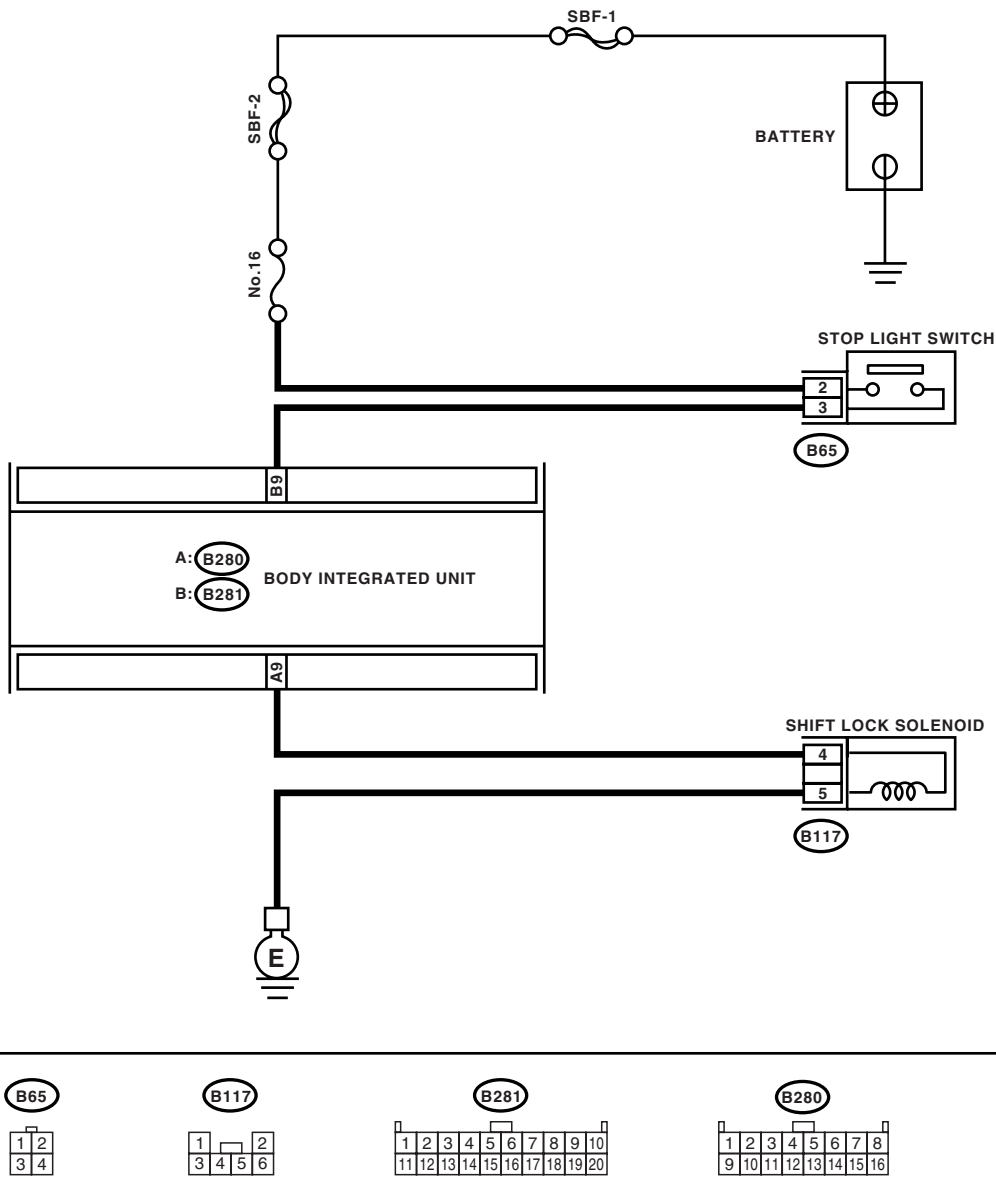
CONTROL SYSTEMS

Step	Check	Yes	No
1 CHECK FUSE. Remove the fuse (No. 3, 4 and 11).	Is the fuse (No. 3, 4 or 11) 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 body integrated unit.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND BODY GROUND. 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between body integrated unit and chassis ground. Connector & terminal (B280) No. 4 — Chassis ground: (B280) No. 13 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair the open circuit in harness between body integrated unit and body ground.
3 CHECK BATTERY POWER SUPPLY. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltages between body integrated unit and chassis ground. Connector & terminal (B280) No. 2 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 4.	Repair the open circuit harness between battery and body integrated unit, and poor contact in coupling connector.
4 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ACC. 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 10 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 5.	Repair the open circuit harness between battery and body integrated unit, 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 body integrated unit and chassis ground. Connector & terminal (B281) No. 19 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 6.	Repair the open circuit harness between battery and body integrated unit, and poor contact in coupling connector.
6 CHECK POOR CONTACT.	Is there poor contact in connector?	Repair the poor contact.	Replace the body integrated unit.

AT Shift Lock Control System

CONTROL SYSTEMS

3. SELECT LEVER CANNOT BE SHIFT LOCKED



CS-00259

AT Shift Lock Control System

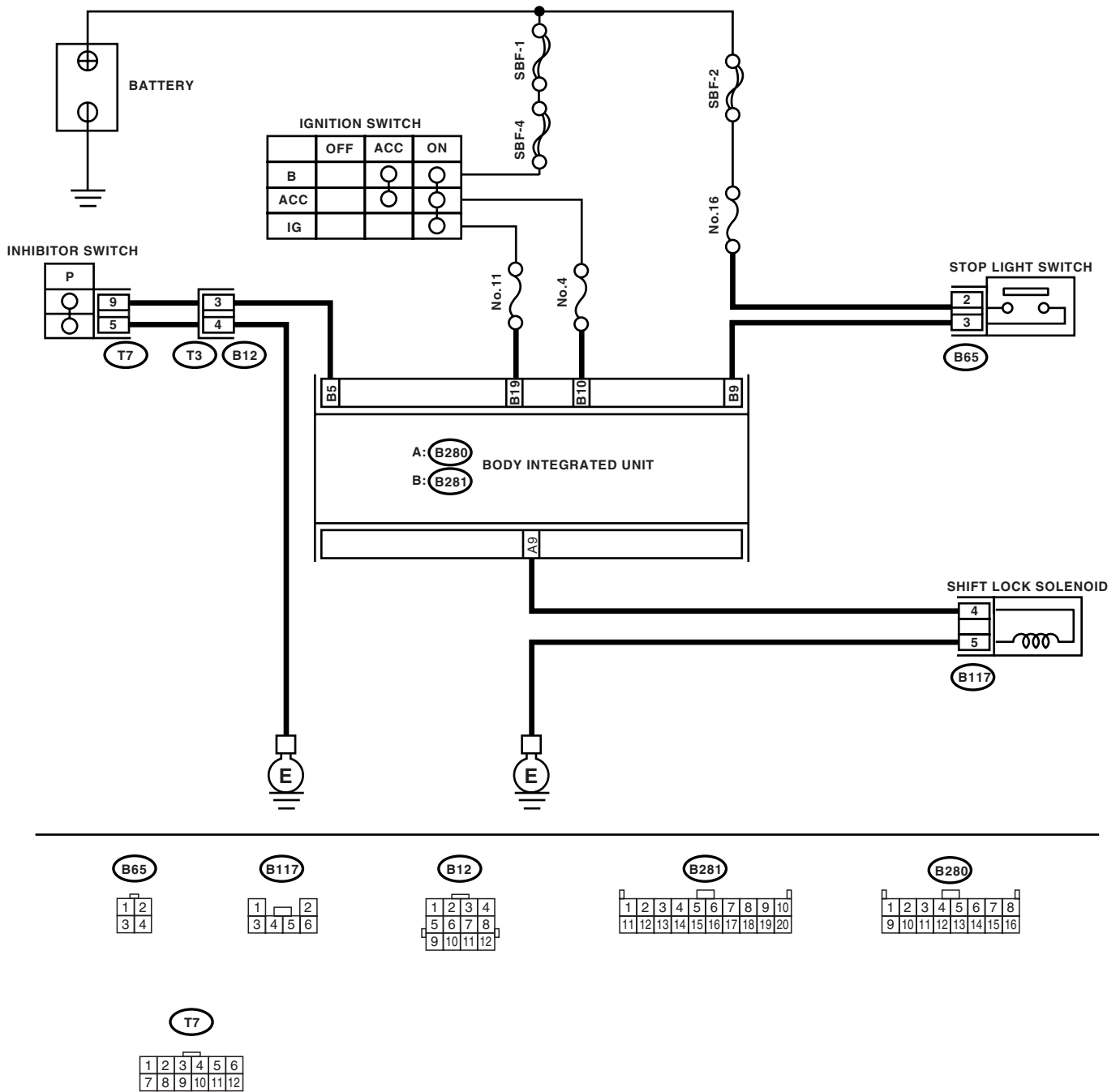
CONTROL SYSTEMS

Step	Check	Yes	No
1 CHECK STOP LIGHT SWITCH. Depress the brake pedal.	Does the stop light turn on?	Go to step 2 .	Inspect the stop light system.
2 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND BODY INTEGRATED UNIT. 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit and stoplight switch connector. 3) Measure the resistance of harness between stop light switch and body integrated unit. <i>Connector & terminal</i> <i>(B65) No. 3 — (B281) No. 9:</i>	Is the resistance more than 1 M Ω ?	Repair the open circuit in harness between body integrated unit and stop light switch.	Go to step 3 .
3 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND BODY INTEGRATED UNIT. Measure the resistance of harness between stop light switch and chassis ground. <i>Connector & terminal</i> <i>(B65) No. 3 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Repair the short circuit in harness between body integrated unit and stop light switch.	Go to step 4 .
4 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. 1) Disconnect the shift lock solenoid connector. 2) Measure the resistance of harness between body integrated unit and shift lock solenoid. <i>Connector & terminal</i> <i>(B117) No. 4 — (B280) No. 9:</i>	Is the resistance more than 1 M Ω ?	Repair the open circuit in harness between body integrated unit and shift lock solenoid.	Go to step 5 .
5 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. <i>Connector & terminal</i> <i>(B117) No. 4 — Chassis ground:</i>	Is the resistance less than 1 Ω ?	Repair the short circuit in harness between body integrated unit 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. <i>Connector & terminal</i> <i>(B117) No. 5 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Repair the open circuit in harness between shift lock solenoid and body ground.	Go to step 7 .
7 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. <i>Terminals</i> <i>No. 4 — No. 5:</i>	Is the resistance 20 — 40 Ω ?	Go to step 8 .	Replace the shift lock solenoid.
8 CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal and operate solenoid. <i>Terminals</i> <i>No. 4 (+) — No. 5 (-):</i>	Does the shift lock solenoid operate properly?	Go to step 9 .	Replace the shift lock solenoid.
9 CHECK POOR CONTACT.	Is there poor contact in connector?	Repair the poor contact.	Replace the body integrated unit.

AT Shift Lock Control System

CONTROL SYSTEMS

4. SELECT LEVER SHIFT LOCK CANNOT BE RELEASED



CS-00260

AT Shift Lock Control System

CONTROL SYSTEMS

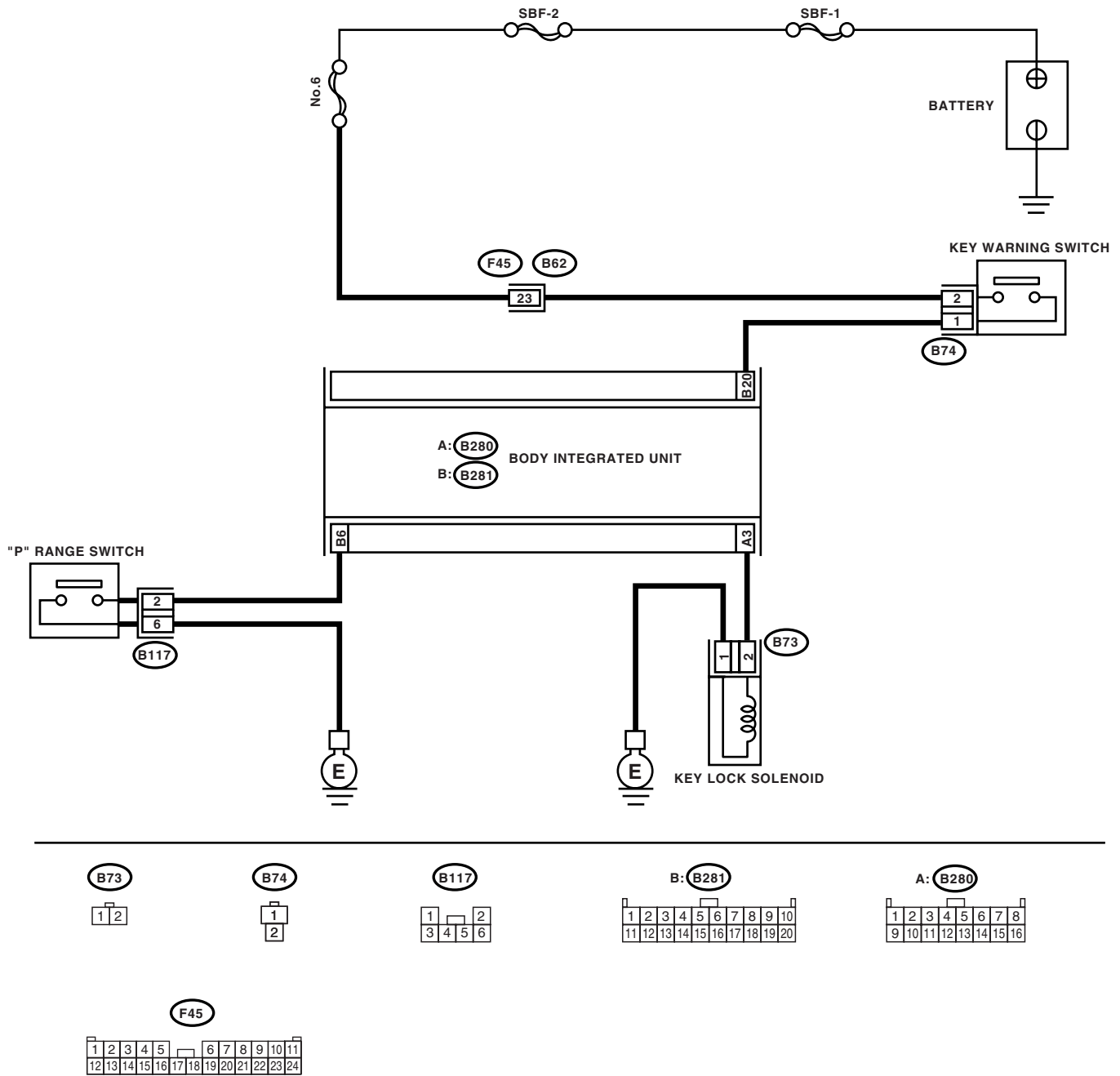
Step	Check	Yes	No
1 CHECK INHIBITOR SWITCH. 1) Turn the ignition switch to ON (engine OFF). 2) Move the select lever from "P" to "1" range.	Are combination meter indicator light and select lever "P", "R", "N", "3", "2" and "1" correctly matched?	Go to step 2.	Adjust the inhibitor switch and select cable.
2 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND BODY INTEGRATED UNIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connector of transmission harness and body integrated unit. 3) Measure the resistance of harness between body integrated unit and chassis ground. Connector & terminal (B281) No. 5 — Chassis ground:	Is the resistance less than 1 Ω ?	Repair the short circuit in harness between body integrated unit and transmission connector.	Go to step 3.
3 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND BODY INTEGRATED UNIT. Measure the resistance of harness between body integrated unit and inhibitor switch. Connector & terminal (B12) No. 3 — (B281) No. 5:	Is the resistance more than 1 M Ω ?	Repair the open circuit in harness between body integrated unit and transmission connector	Go to step 4.
4 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. Measure the resistance of harness between body integrated unit and chassis ground. Connector & terminal (B12) No. 4 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the open circuit in harness between body integrated unit and chassis ground.
5 CHECK INHIBITOR SWITCH. 1) Move the select lever to "P" range. 2) Measure the resistance of transmission harness connector terminals. Connector & terminal (T3) No. 3 — No. 4:	Is the resistance more than 1 M Ω ?	Repair or replace the inhibitor switch.	Go to step 6.
6 CHECK OUTPUT SIGNAL FOR BODY INTEGRATED UNIT. 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 5 (+) — Chassis ground (-):	Is the voltage 9 — 16 V?	Go to step 7.	Go to step 15.
7 CHECK STOP LIGHT SWITCH. Depress the brake pedal.	Does the stop light turn on?	Go to step 8.	Inspect the stop light system.
8 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE. 1) Depress the brake pedal. 2) Measure the voltage between body integrated unit and chassis ground. Connector & terminal (B281) No. 9 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 9.	Repair the open or short circuit in harness between body integrated unit and stop light switch.

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Step	Check	Yes	No
9 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from shift lock solenoid and body integrated unit. 3) Measure the resistance of harness between body integrated unit and shift lock solenoid. <i>Connector & terminal</i> <i>(B280) No. 9 — (B117) No. 4:</i>	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between body integrated unit and shift lock solenoid.	Go to step 10.
10 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. <i>Connector & terminal</i> <i>(B280) No. 9 — Chassis ground:</i>	Is the resistance less than 10 Ω?	Go to step 11.	Repair the short circuit in harness between body integrated unit 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. <i>Connector & terminal</i> <i>(B117) No. 5 — Chassis ground:</i>	Is the resistance less than 1 Ω?	Go to step 12.	Repair the 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. <i>Terminals</i> <i>No. 4 — No. 5:</i>	Is the resistance 20 — 40 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. <i>Terminals</i> <i>No. 4 (+) — No. 5 (-):</i>	Is the shift lock solenoid operating properly?	Go to step 14.	Replace the shift lock solenoid.
14 CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between body integrated unit and chassis ground. <i>Connector & terminal</i> <i>(B280) No. 9 (+) — Chassis ground (-):</i>	Is the voltage more than 8.5 V?	Go to step 15.	Replace the body integrated unit.
15 CHECK POOR CONTACT.	Is there poor contact in connector?	Repair the poor contact.	Replace the body integrated unit.

5. KEY INTERLOCK DOES NOT LOCK OR RELEASE



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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 voltage 9 — 16 V?	Go to step 2.	Repair the open or short circuit in harness between battery and key warning switch.
2 CHECK KEY WARNING SWITCH. Measure the resistance of key warning switch connector terminals. Terminals No. 1 — No. 2:	Is the resistance more than 1 MΩ?	Replace the key warning switch.	Go to step 3.
3 CHECK KEY WARNING SWITCH. 1) Remove the key. 2) Measure the resistance of key warning switch connector terminals. Terminals No. 1 — No. 2:	Is the resistance more than 1 MΩ?	Go to step 4.	Replace the key warning switch.
4 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH. 1) Disconnect the body integrated unit connector. 2) Measure the voltage of harness body integrated unit and chassis ground. Connector & terminal (B281) No. 20 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Go to step 5.	Repair the open circuit in harness between body integrated unit and key warning switch.
5 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND KEY LOCK SOLENOID. 1) Disconnect the connector of key lock solenoid. 2) Measure the resistance of harness between body integrated unit and key lock solenoid. Connector & terminal (B73) No. 2 — (B280) No. 3:	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between body integrated unit and key lock solenoid.	Go to step 6.
6 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND KEY LOCK SOLENOID. Measure the resistance of harness between body integrated unit and chassis ground. Connector & terminal (B280) No. 3 — Chassis ground:	Is the resistance more than 1 Ω?	Go to step 7.	Repair the short circuit in harness between body integrated unit and key lock solenoid.
7 CHECK HARNESS BETWEEN KEY LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between key lock solenoid and chassis ground. Connector & terminal (B73) No. 1 — Chassis ground:	Is the resistance less than 10 Ω?	Go to step 8.	Repair the 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. Terminals No. 1 — No. 2:	Is the resistance 4 — 8 Ω?	Go to step 9.	Replace the key lock solenoid.

AT Shift Lock Control System

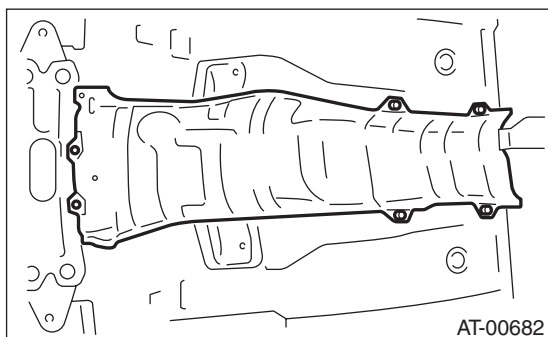
CONTROL SYSTEMS

Step	Check	Yes	No
9 CHECK HARNESS BETWEEN “P” RANGE SWITCH AND CHASSIS GROUND. Measure the resistance of harness between “P” range switch and chassis ground. Connector & terminal (B117) No. 2 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair the short circuit in harness between “P” range switch and body integrated unit.
10 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” RANGE SWITCH. 1) Disconnect the connector from “P” range switch. 2) Measure the resistance of harness between body integrated unit and “P” range switch. Connector & terminal (B117) No. 2 — (B281) No. 6:	Is the resistance more than 1 $M\Omega$?	Repair the open circuit in harness between body integrated unit and “P” range switch.	Go to step 11.
11 CHECK HARNESS BETWEEN “P” RANGE SWITCH AND CHASSIS GROUND. Measure the resistance of harness “P” range switch and chassis ground. Connector & terminal (B117) No. 6 — Chassis ground:	Is the resistance more than 1 $M\Omega$?	Repair the open circuit in harness between “P” range switch and chassis ground.	Go to step 12.
12 CHECK “P” RANGE SWITCH. 1) Move the select lever to “P” range. 2) Measure resistance between “P” range switch connector terminals. Terminals No. 2 — No. 6:	Is the resistance less than 1 Ω ?	Go to step 13.	Replace the “P” range switch.
13 CHECK “P” RANGE SWITCH. 1) Move the select lever to other than “P” range. 2) Measure resistance between “P” range switch connector terminals. Terminals No. 2 — No. 6:	Is the resistance more than 1 $M\Omega$?	Go to step 14.	Replace the “P” range switch.
14 CHECK OUTPUT SIGNAL FOR BODY INTEGRATED UNIT. 1) Connect all connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to “P” range. 4) Press the brake pedal. 5) Measure the voltage between body integrated unit connector and chassis ground. Connector & terminal (B280) No. 3 (+) — Chassis ground (-):	Is the voltage 7.5 — 16 V?	Go to step 15.	Replace the body integrated unit.
15 CHECK POOR CONTACT.	Is there poor contact in connector?	Repair the poor contact.	Replace the body integrated unit.

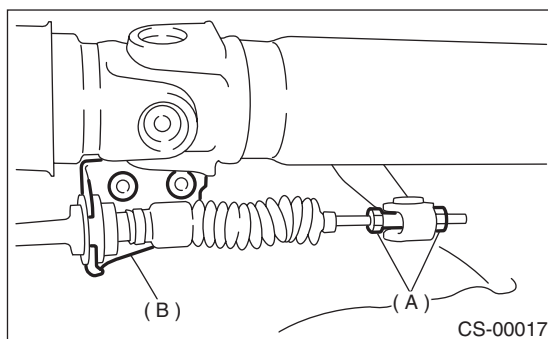
3. Select Lever

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Set the select lever to the "N" range.
- 4) Lift-up the vehicle.
- 5) Remove the rear exhaust pipe and muffler.
 - SOHC model
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>
 - DOHC turbo model
<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 6) Remove the heat shield cover. (If equipped)



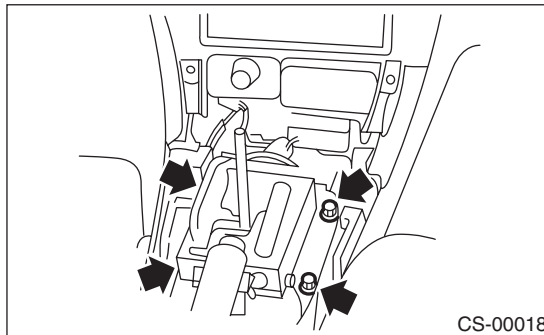
- 7) Disconnect the cable from select lever, and then remove the cable bracket.



- (A) Adjusting nuts
(B) Cable bracket

- 8) Lower the vehicle.
- 9) Remove the console box. <Ref. to EI-47, REMOVAL, Console Box.>

- 10) Disconnect the connectors, then remove the four bolts to take out the select lever assembly from the body.

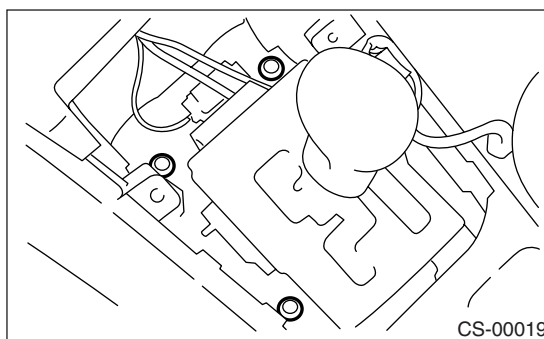


B: INSTALLATION

- 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 connector.

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)



- 3) Install the console box. <Ref. to EI-47, INSTALLATION, Console Box.>
- 4) Set location of the select lever at "N" range.
- 5) Lift-up the vehicle.
- 6) Set location of the range select lever to "N" range.
- 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.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 8) Adjust the select cable position. <Ref. to CS-27, ADJUSTMENT, Select Cable.>
- 9) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
- 10) Install the heat shield cover. (If equipped)
- 11) Install the rear exhaust pipe and muffler.
 - SOHC model
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Muffler.>

- DOHC turbo model

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

12) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-27, ADJUSTMENT, Select Cable.> <Ref. to 4AT-52, ADJUSTMENT, Inhibitor Switch.>

(1) The engine starts operating when select lever is in range "P" and "N", but not in other ranges.

(2) The back-up light is lit when the select lever is in range "R", but not in other ranges.

(3) Select lever and indicator ranges are matched.

C: DISASSEMBLY

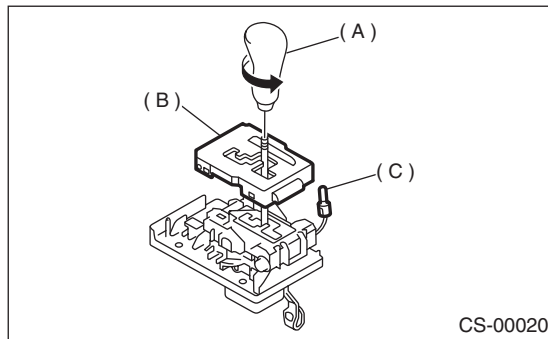
1) Remove the packing.

2) Remove the grip.

3) Remove the indicator light, and then remove the indicator cover.

NOTE:

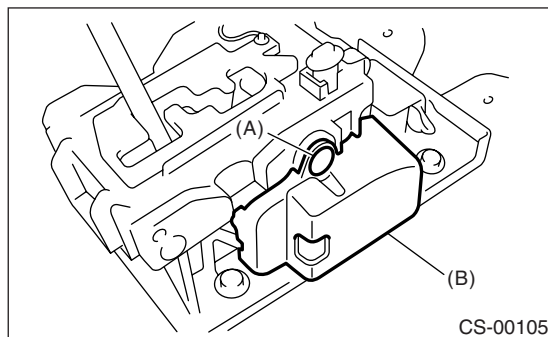
Be careful not to break the indicator light during removal.



- (A) Grip
- (B) Indicator cover
- (C) Indicator light

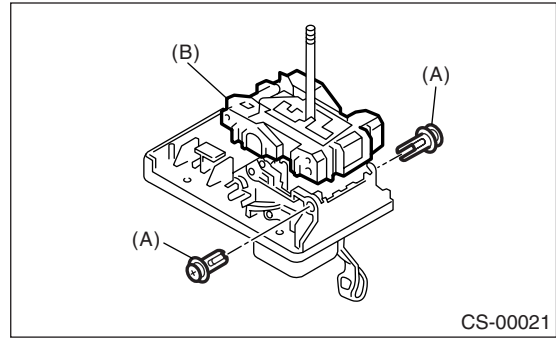
4) Remove the slider.

5) Remove the cover.



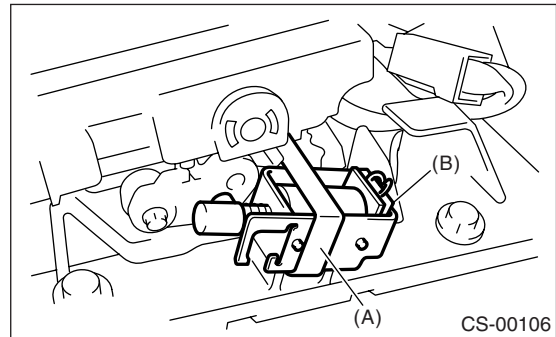
- (A) Clip
- (B) Cover

6) Remove the clips, and then remove the guide plate.



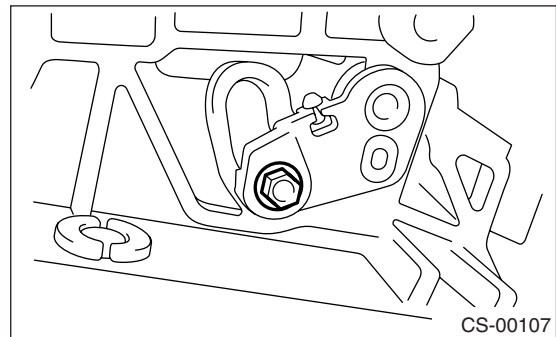
- (A) Clips
- (B) Guide plate

7) Remove the clamp, and the remove the shift lock solenoid.



- (A) Clamp
- (B) Shift lock solenoid

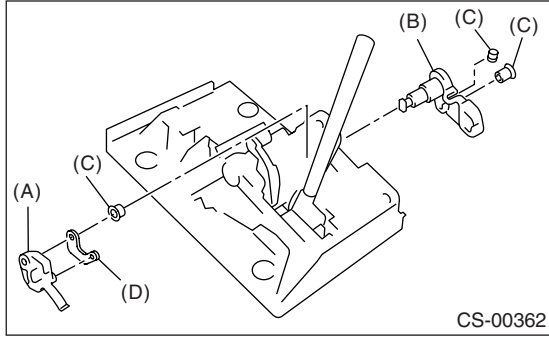
8) Remove the bolt securing lock plate B.



Select Lever

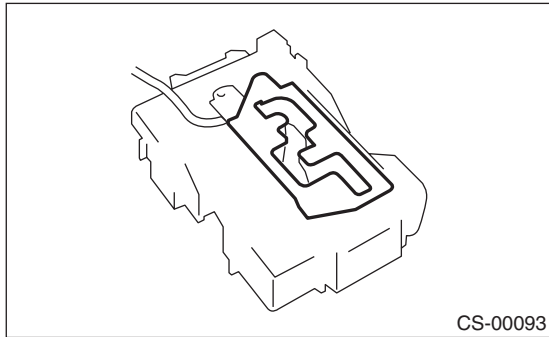
CONTROL SYSTEMS

9) Remove the lock plate A, B, C and bushing.

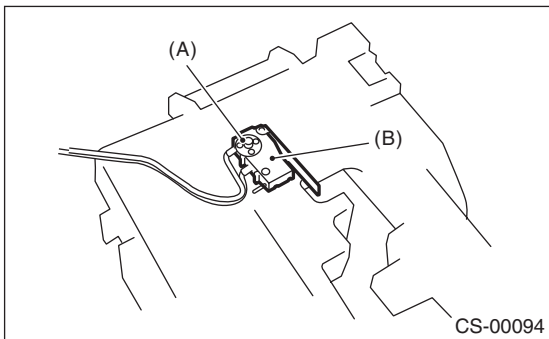


- (A) Lock plate A
- (B) Lock plate B
- (C) Bushing
- (D) Lock plate C

10) Remove the cushion plate.

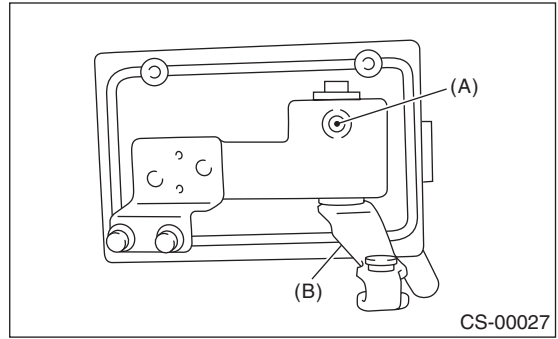


11) Remove the clip, and then remove the "P" range switch.



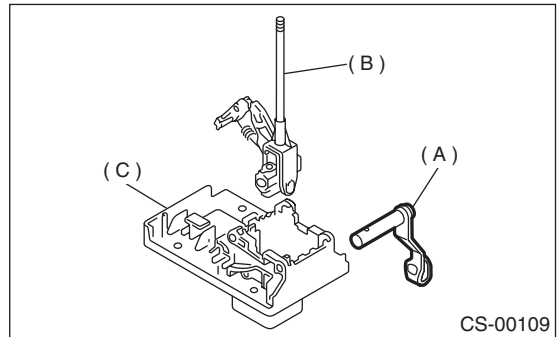
- (A) Clip
- (B) "P" range switch

12) Remove the grommet, and then extract spring pin.



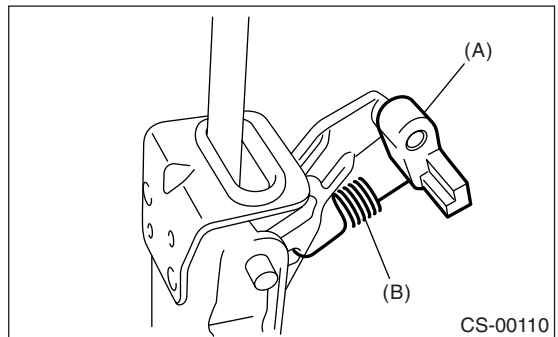
- (A) Spring pin
- (B) Select lever lower

13) Remove the select lever lower, and then take away the select lever COMPL from plate.



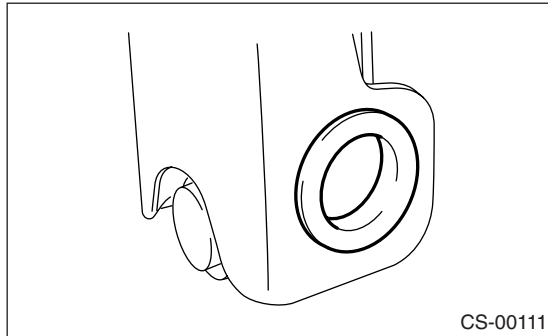
- (A) Select lever lower
- (B) Select lever COMPL
- (C) Plate

14) Remove the detent spring, and then remove the detent arm.

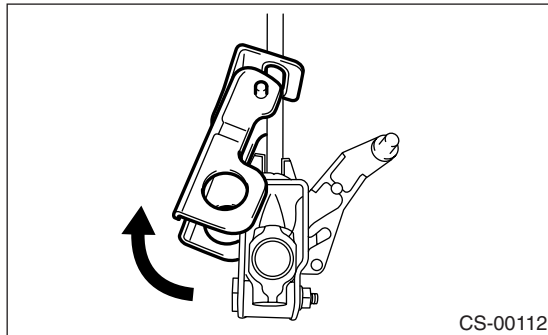


- (A) Detent arm
- (B) Detent spring

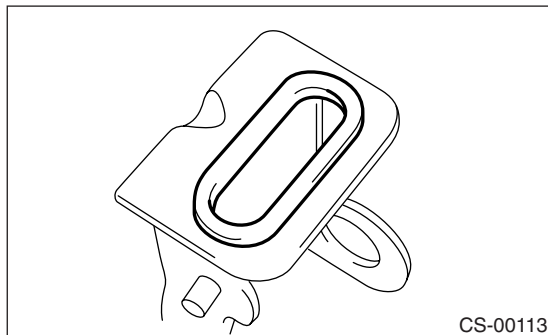
- 15) Remove the select lever COMPL bushing from bracket.



- 16) Remove the bracket from select lever COMPL.



- 17) Remove the bushing from bracket.



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 select lever assembly, it should move smoothly.

D: ASSEMBLY

- 1) Clean all parts before assembly.
- 2) Apply grease to each select lever parts. <Ref. to CS-2, AT SELECT LEVER, COMPONENT, General Description.>

Lock plate:

SUNCALL GREASE (Part No. 0029408040)

Except lock plate:

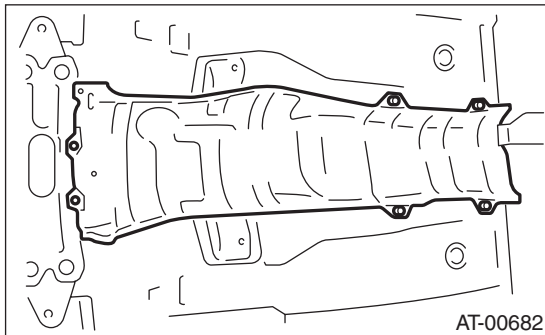
SUNLIGHT 2 (Part No. 003602010) or equivalent

- 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.

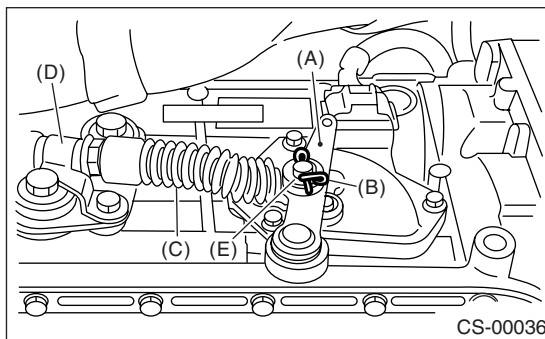
4. Select Cable

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Set the select lever to "N" range.
- 3) Disconnect negative cable from battery.
- 4) Lift-up the vehicle.
- 5) Remove front, center, rear exhaust pipe and muffler. (SOHC model)
<Ref. to EX(H4SO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-7, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>
- 6) Remove the center and rear exhaust pipes and muffler. (DOHC 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.>
- 7) Remove the heat shield cover. (If equipped)

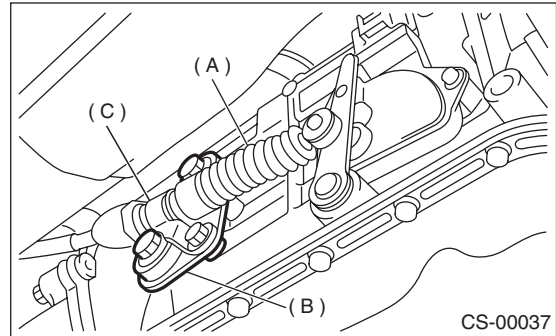


- 8) Remove the snap pin and washer from range select lever.



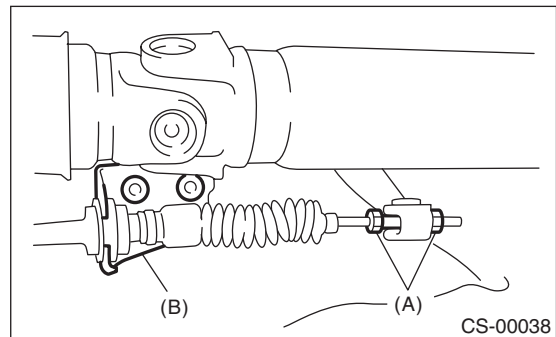
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp
- (E) Washer

- 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.

B: INSTALLATION

- 1) Install the select cable to plate assembly.

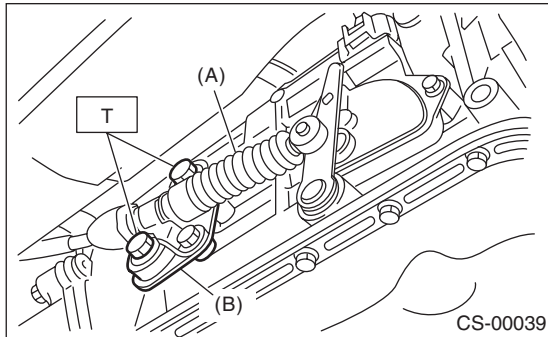
Tightening torque:

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.

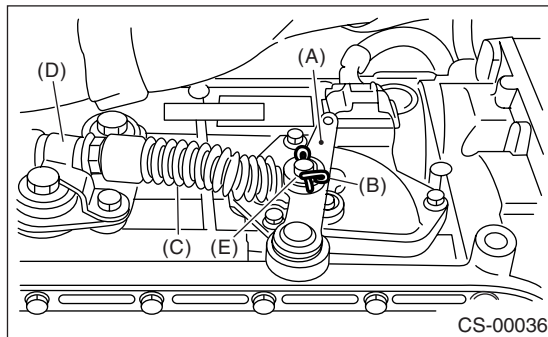
Tightening torque:

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

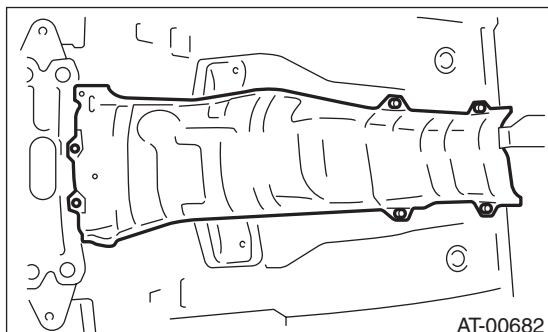
5) Insert the thread portion of other inner cable and into connector hole of select lever, and fix the other outer cable end to the bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13 ft-lb)

6) Move the select lever to "N" range, and then adjust the select cable position. <Ref. to CS-27, ADJUSTMENT, Select Cable.>

7) Install the heat shield cover.



8) Install the front, center, rear exhaust pipe and muffler. (SOHC model)

<Ref. to EX(H4SO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-7, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Muffler.>

9) Install center and rear exhaust pipes and muffler. (DOHC turbo model)

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

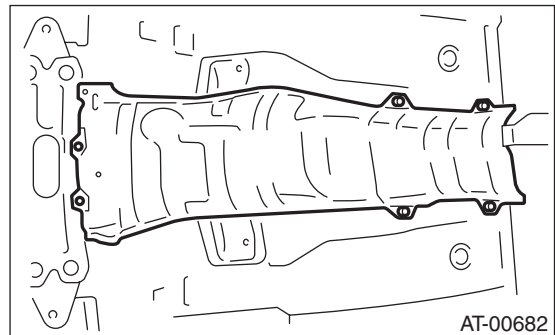
C: INSPECTION

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" range to "1" range. You should be able to feel the detents in each range. If the detents cannot be felt or the range pointer is improperly aligned, adjust the cable.

D: ADJUSTMENT

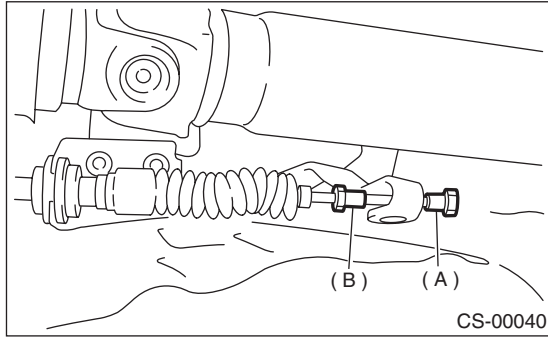
- 1) Set the select lever to "N" range.
- 2) Remove the rear exhaust pipe and muffler.
 - SOHC model
 - <Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>
 - DOHC turbo model
 - <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 3) Remove the heat shield cover. (If equipped)



Select Cable

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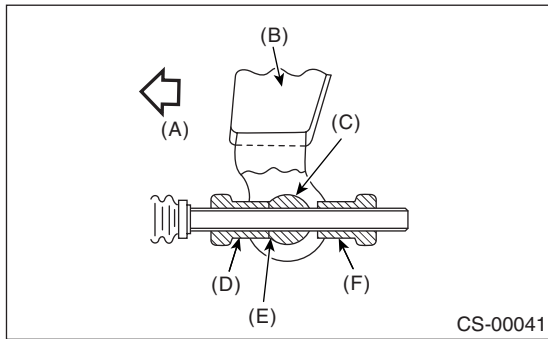
4) Loosen the adjusting nut on each side.



(A) Adjusting nut A

(B) Adjusting nut B

5) Turn the adjusting nut B until it lightly touches the connector.



(A) Front side

(B) Select lever

(C) Connector

(D) Adjusting nut B

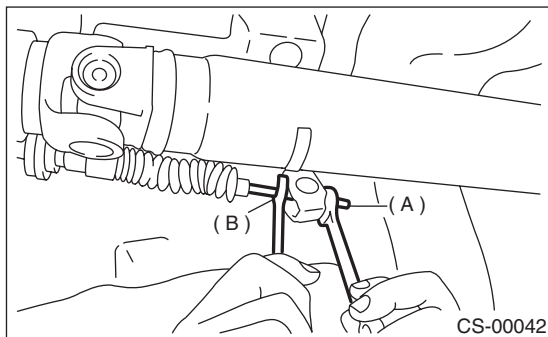
(E) Contact point

(F) Adjusting nut A

6) While preventing the adjusting nut B from moving with a wrench, tighten the adjusting nut A.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



(A) Adjusting nut A

(B) Adjusting nut B

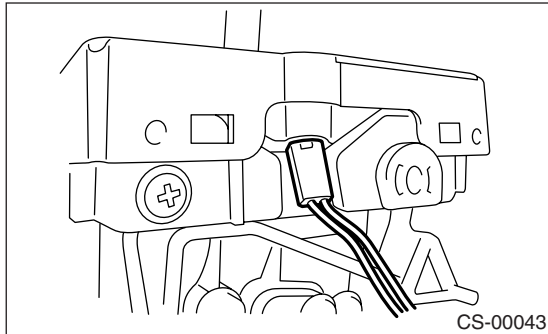
7) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.

8) Install in the reverse order of removal.

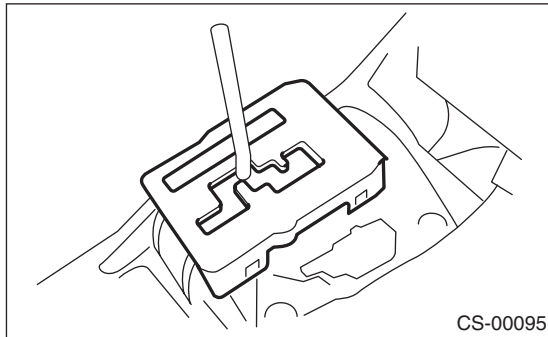
5. AT Shift Lock Solenoid and “P” Range Switch

A: REMOVAL

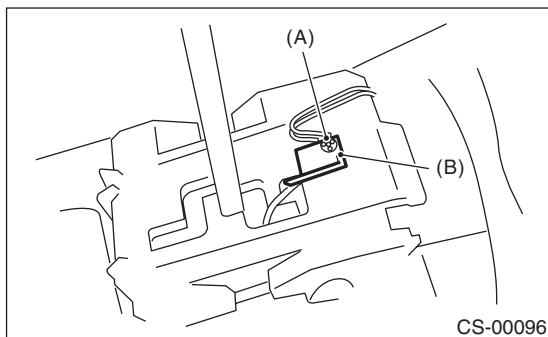
- 1) Disconnect the ground cable from battery.
- 2) Remove the console box. <Ref. to EI-47, REMOVAL, Console Box.>
- 3) Disconnect the connector.
- 4) Remove the grip.
- 5) Remove the indicator bulb from indicator cover.



- 6) Remove the indicator cover.

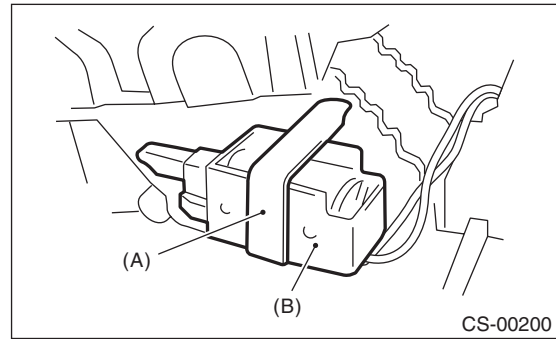


- 7) Remove the blind.
- 8) Remove the cushion.
- 9) Remove the clip, and then remove the “P” range switch.



- (A) Clip
(B) “P” range switch

- 10) Remove the clamp, and then remove the shift lock solenoid.



- (A) Clamp
(B) Shift lock solenoid

B: INSTALLATION

Install in the reverse order of removal.

AT Shift Lock Solenoid and “P” Range Switch

CONTROL SYSTEMS

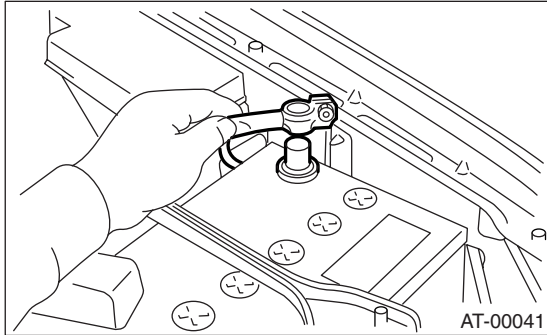
C: INSPECTION

	Step	Check	Yes	No
1	CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. Terminals No. 4 — No. 5:	Is the resistance between 20 and 40 Ω ?	Go to step 2.	Replace the shift lock solenoid and “P” range switch assembly.
2	CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal, operate solenoid. Terminals No. 4 (+) — No. 5 (-):	Is the shift lock solenoid operating properly?	Go to step 3.	Replace the shift lock solenoid and “P” range switch assembly.
3	CHECK “P” RANGE SWITCH. 1) Move the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals.	Is the resistance less than 1 Ω ?	Go to step 4.	Replace the “P” range switch.
4	CHECK “P” RANGE SWITCH. 1) Move the select lever to other than “P” range. 2) Measure the resistance between “P” range switch connector terminals.	Is the resistance more than 1 $M\Omega$?	Normal	Replace the “P” range switch.

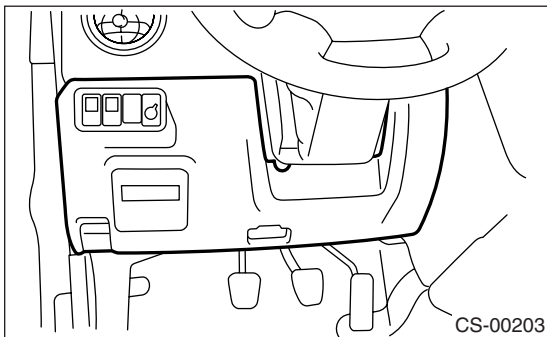
6. Body Integrated Unit

A: REMOVAL

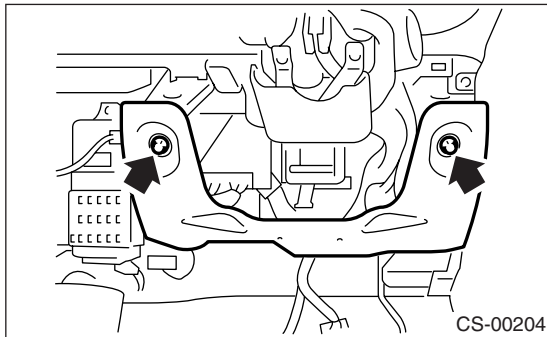
1) Disconnect the ground cable from battery.



2) Remove the lower cover.

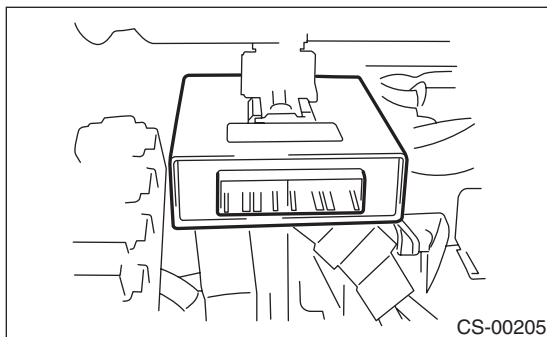


3) Remove the knee bolster.



4) Disconnect the connector from body integrated unit.

5) Remove the body integrated unit.



B: INSTALLATION

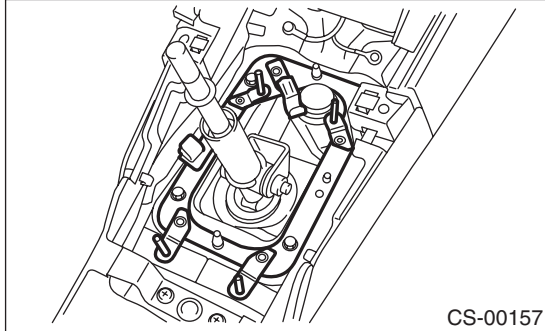
Install in the reverse order of removal.

7. MT Gear Shift Lever

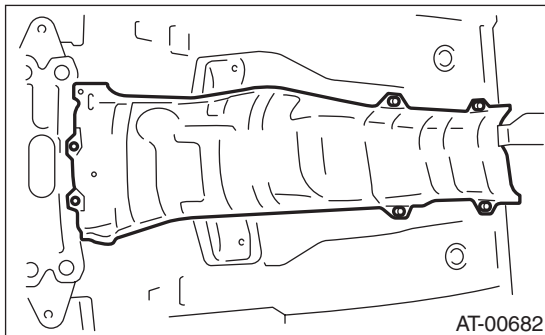
A: REMOVAL

1. 5MT

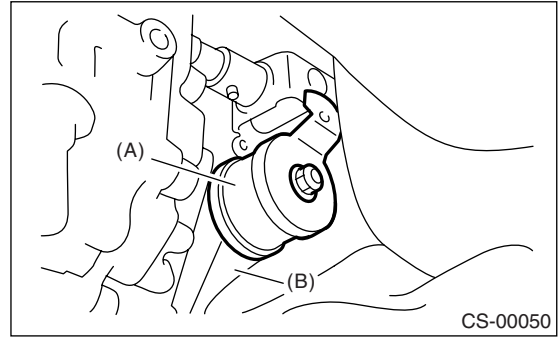
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the gear shift knob.
- 4) Remove the console box. <Ref. to EI-47, REMOVAL, Console Box.>
- 5) Remove the plate assembly from body.



- 6) Lift-up the vehicle.
- 7) Remove the rear exhaust pipe and muffler.
 - SOHC model
<Ref. to EX(H4SO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Muffler.>
 - DOHC turbo model
<Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 8) Remove the heat shield cover. (If equipped)

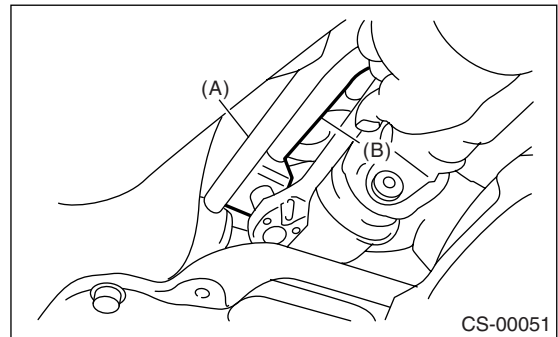


- 9) Remove the stay from transmission bracket.



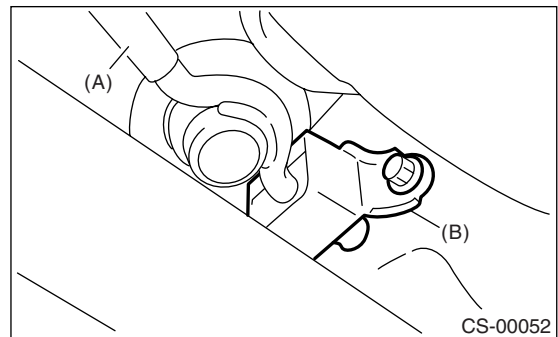
- (A) Stay
(B) Transmission bracket

- 10) Remove the rod from joint.



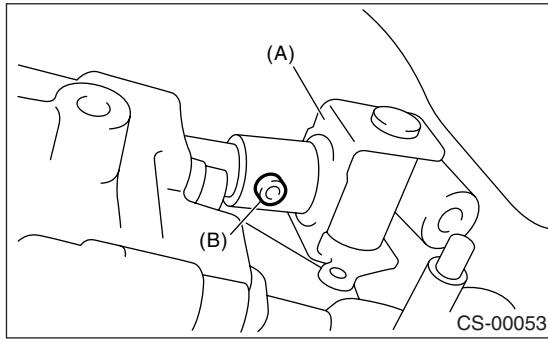
- (A) Stay
(B) Rod

- 11) Remove the cushion rubber from body.



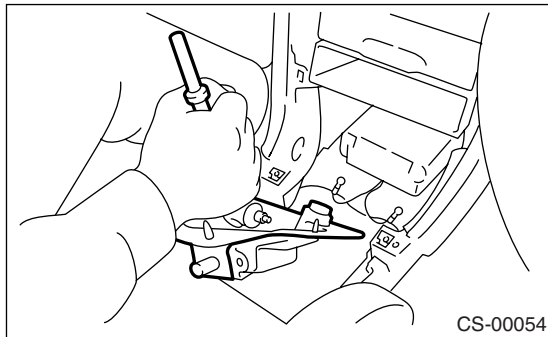
- (A) Stay
(B) Cushion rubber

- 12) Extract the spring pin, and then remove the joint.



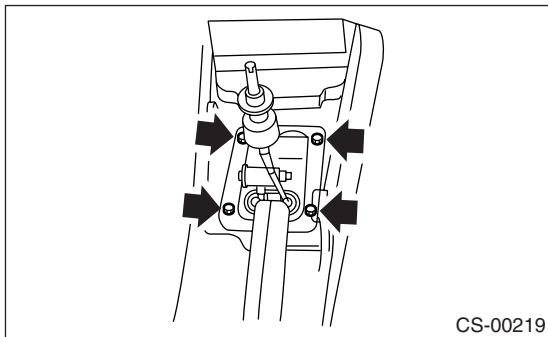
- (A) Joint
(B) Spring pin

- 13) Lower the vehicle.
14) Remove the gear shift lever.



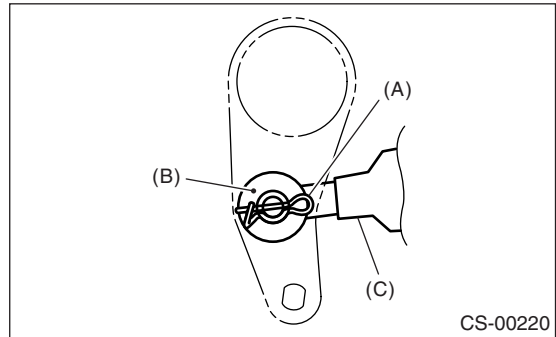
2. 6MT

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the gear shift knob.
- 4) Remove the console box front. <Ref. to EI-47, REMOVAL, Console Box.>
- 5) Remove the boot plate from body.



- 6) Lift-up the vehicle.
- 7) Remove the under cover.
- 8) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>
- 9) Remove the crossmember. <Ref. to 6MT-32, REMOVAL, Transmission Mounting System.>

- 10) Remove the snap pin and washer, and then remove the reverse check cable from reverse check lever.

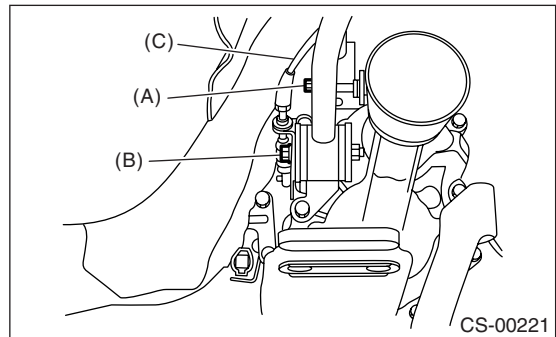


- (A) Snap pin
(B) Washer
(C) Reverse check cable

- 11) Move the transmission to right side, and then remove the joint COMPL, stay bolt and reverse check cable.

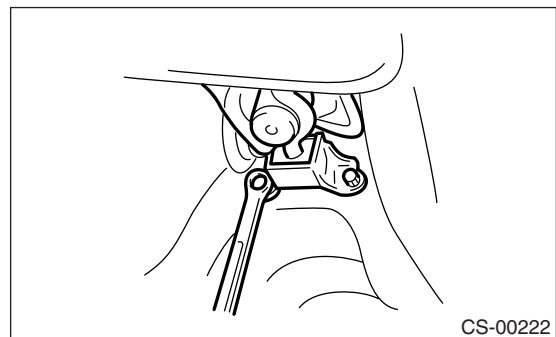
NOTE:

If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.



- (A) Joint COMPL bolt
(B) Stay bolt
(C) Reverse check cable

- 12) Remove the cushion rubber from body.



- 13) Lower the vehicle.
14) Remove the gear shift lever.

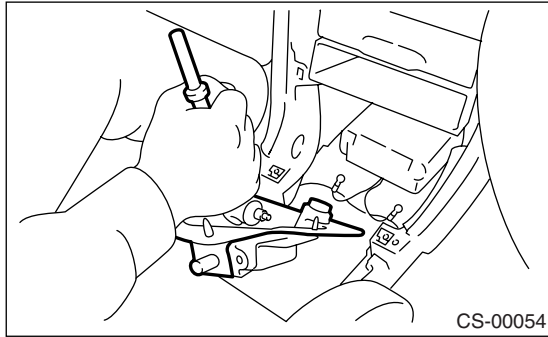
B: INSTALLATION

1. 5MT

- 1) Install the joint to the transmission and secure with the spring pin.
- 2) Insert gear shift lever from room side.

NOTE:

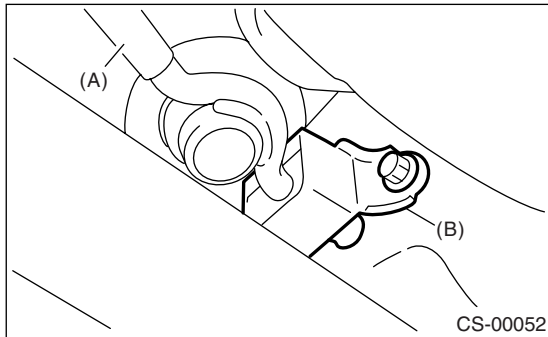
After inserting rod and stay, temporarily put them onto transmission mount.



- 3) Lift-up the vehicle.
- 4) Mount the cushion rubber on body.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

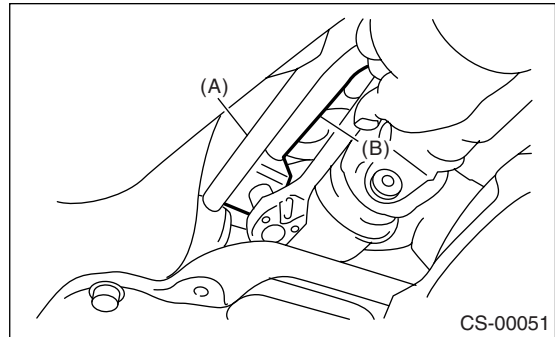


- (A) Stay
- (B) Cushion rubber

- 5) Connect the rod to the joint.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

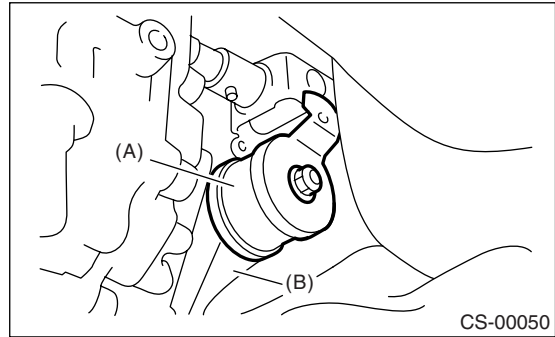


- (A) Stay
- (B) Rod

- 6) Connect the stay to transmission bracket.

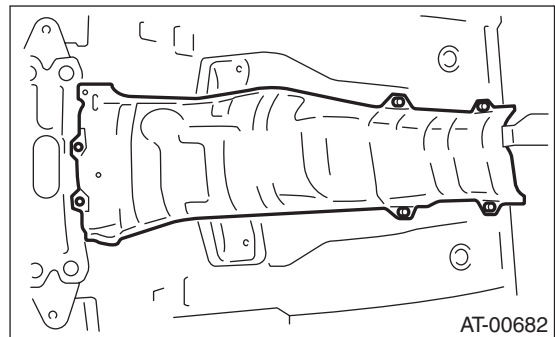
Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Stay
- (B) Transmission bracket

- 7) Install the heat shield cover. (If equipped)

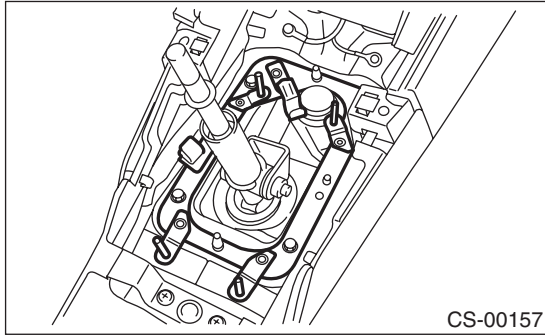


- 8) Install the rear exhaust pipe and muffler.

- SOHC model
<Ref. to EX(H4SO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Muffler.>
 - DOHC turbo model
<Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>
- 9) Install the plate assembly to body.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



10) Install console box. <Ref. to EI-47, INSTALLATION, Console Box.>

2. 6MT

1) Insert the gear shift lever from room side.

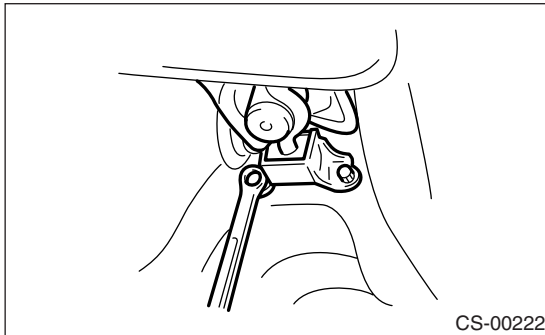
NOTE:

After inserting the rod and stay, temporarily put them onto transmission mount.

2) Mount the cushion rubber on body.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

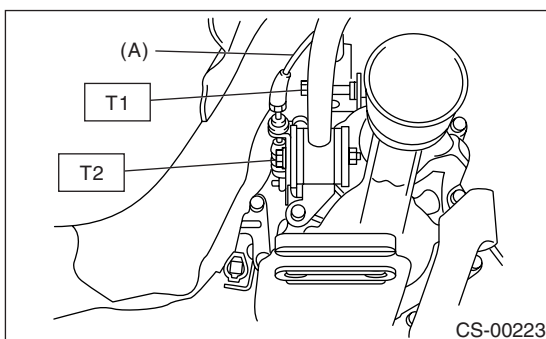


3) Move the transmission to right side, and then install the joint COMPL and stay.

Tightening torque:

T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)

T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



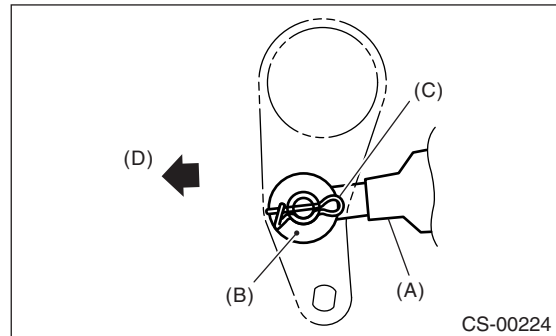
(A) Reverse check cable

4) Install the crossmember. <Ref. to 6MT-32, INSTALLATION, Transmission Mounting System.>

5) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:

- Take care to install the snap pin in proper direction.
- Conduct the adjustment of reverse check cable before installation. <Ref. to CS-47, ADJUSTMENT, Reverse Check Cable.>



(A) Reverse check cable

(B) Washer

(C) Snap pin

(D) Front side

6) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

7) Install the under cover.

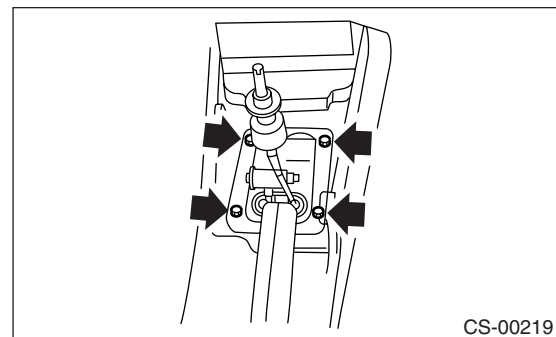
8) Install the boot plate.

NOTE:

Install the inner boot without any twist.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



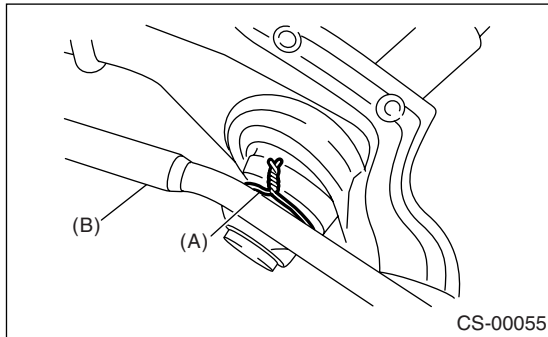
9) Install the console box. <Ref. to EI-47, INSTALLATION, Console Box.>

10) Check that the gear shift is correctly shifted to each gear.

C: DISASSEMBLY

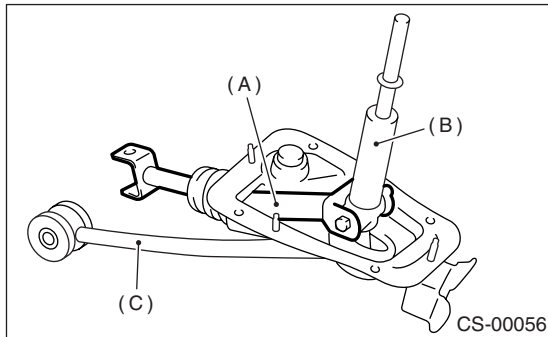
1. 5MT

1) Disassemble the lock wire.



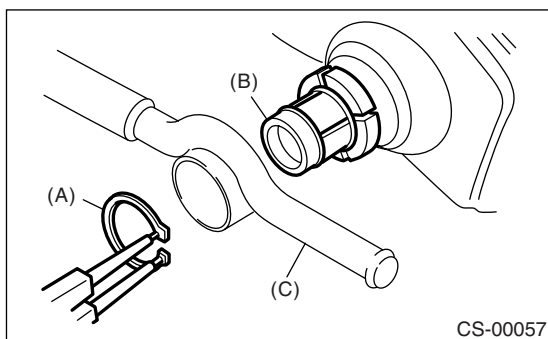
- (A) Lock wire
- (B) Stay

2) Remove the rod from lever.



- (A) Rod
- (B) Lever
- (C) Stay

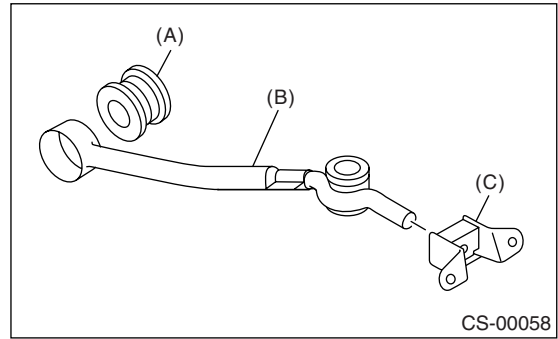
3) Remove the snap ring from bushing B, and then disconnect the stay.



- (A) Snap ring
- (B) Bushing B
- (C) Stay

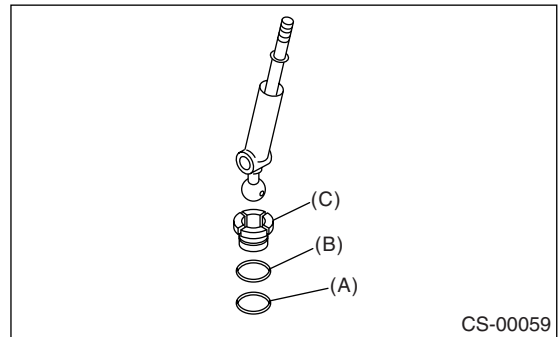
4) Remove the boot from gear shift lever.

5) Remove the bushing and cushion rubber from stay.



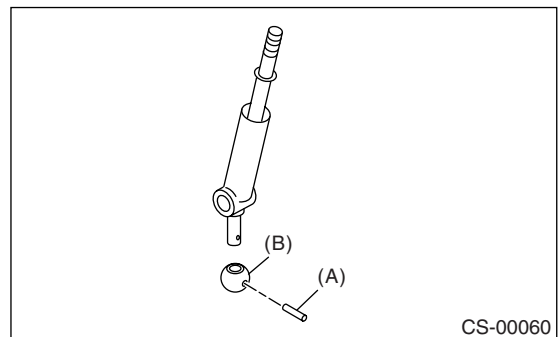
- (A) Bushing
- (B) Stay
- (C) Cushion rubber

6) Remove O-ring, and then disconnect the bushing B.



- (A) O-ring
- (B) O-ring
- (C) Bushing B

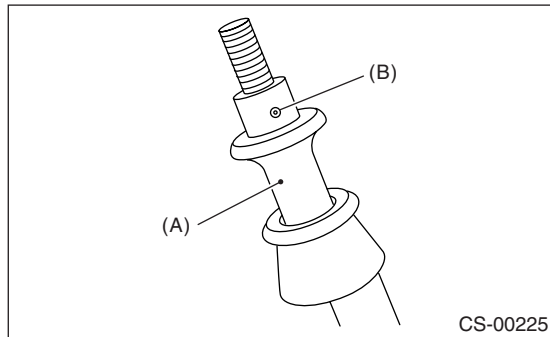
7) Draw out the spring pin, and then remove the bushing A from gear shift lever.



- (A) Spring pin
- (B) Bushing A

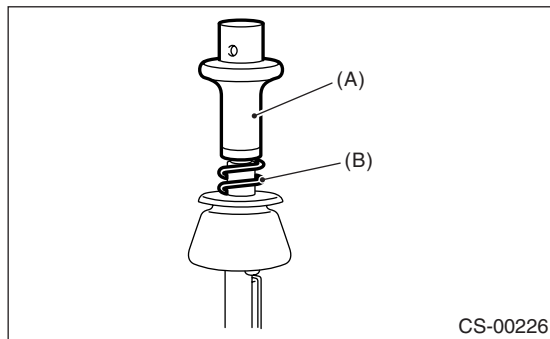
2. 6MT

1) Remove the spring pin from slider.



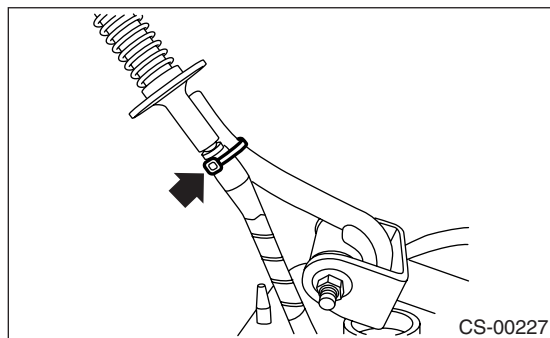
(A) Slider
(B) Spring pin

2) Remove the slider and spring.

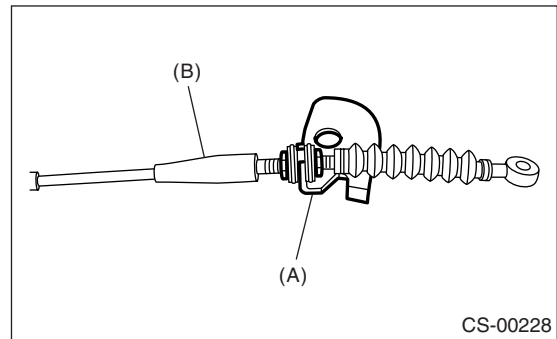


(A) Slider
(B) Spring

3) Cut the band clip.

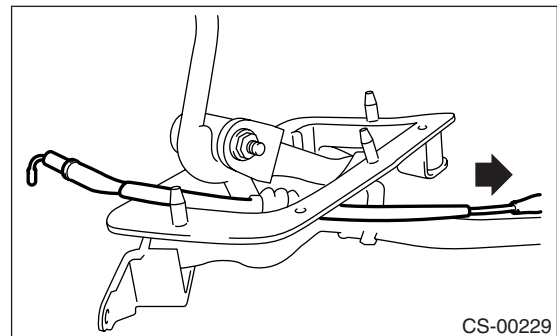


4) Remove the reverse check cable from cable plate.

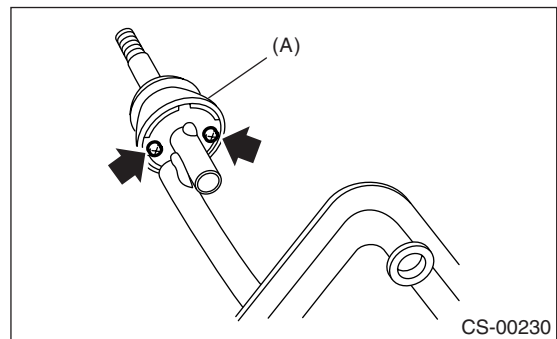


(A) Cable plate
(B) Reverse check cable

5) Remove the reverse check cable from gear shift assembly.



6) Remove the holder and spring seat.



(A) Holder

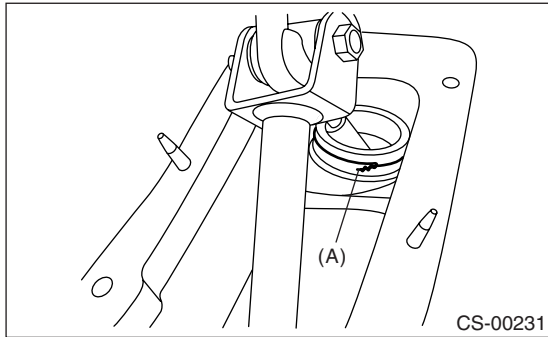
7) Disassemble the lock wire.

MT Gear Shift Lever

CONTROL SYSTEMS

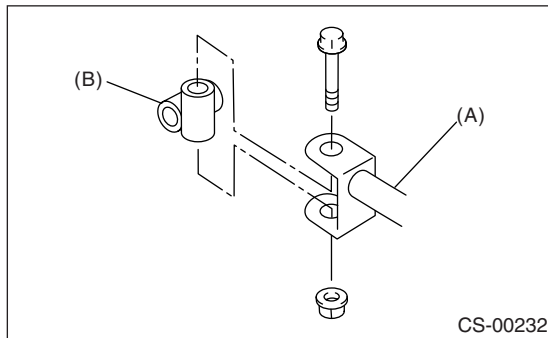
NOTE:

Do not reuse the lock wire.



(A) Lock wire

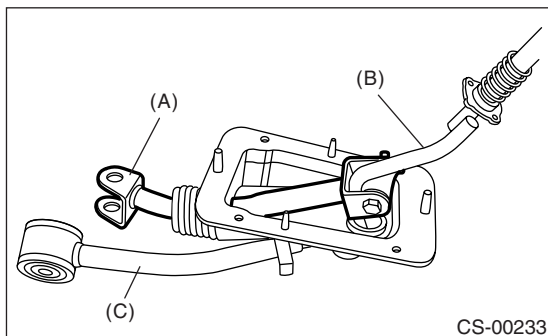
8) Remove the boss from rod.



(A) Rod

(B) Boss

9) Remove the rod from lever.



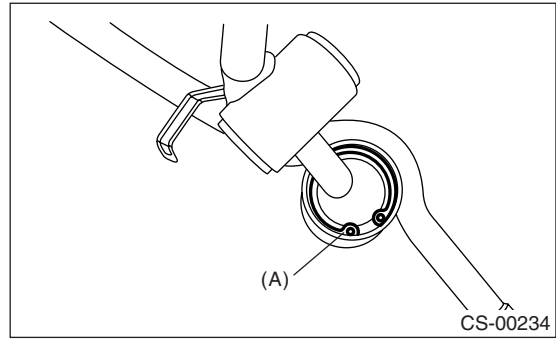
(A) Rod

(B) Lever

(C) Stay

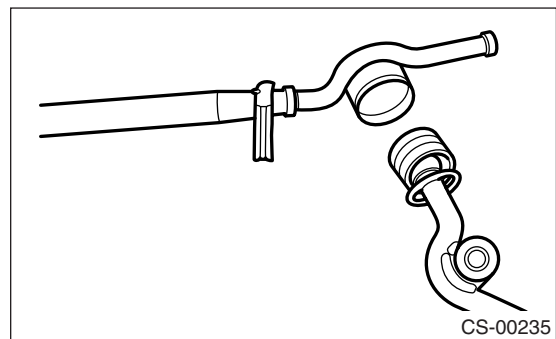
10) Separate the rod and inner boot.

11) Remove the snap ring from stay.

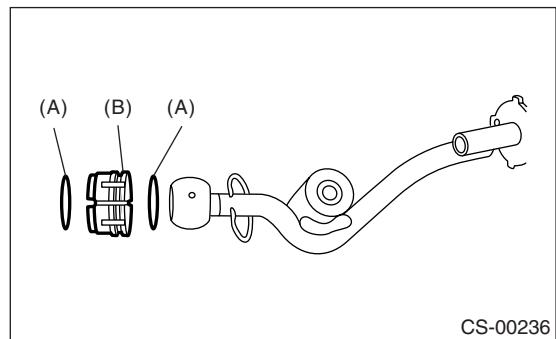


(A) Snap ring

12) Separate the gear shift lever and stay.



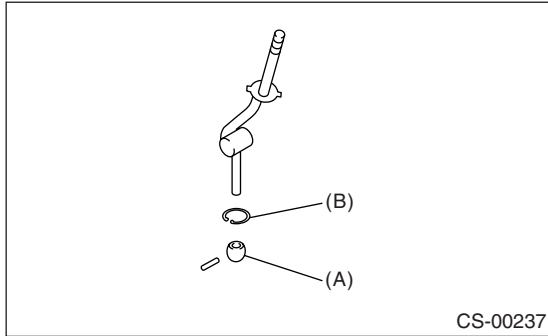
13) Remove the boot and bushing from gear shift lever.



(A) O-ring

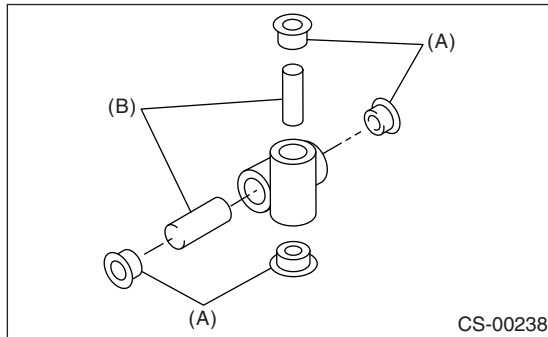
(B) Bushing

14) Remove the spring pin, and then remove the bushing and snap ring.



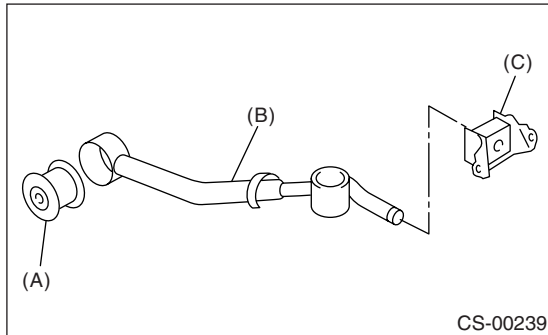
- (A) Bushing
- (B) Snap ring

15) Remove the bushing and spacer from boss.



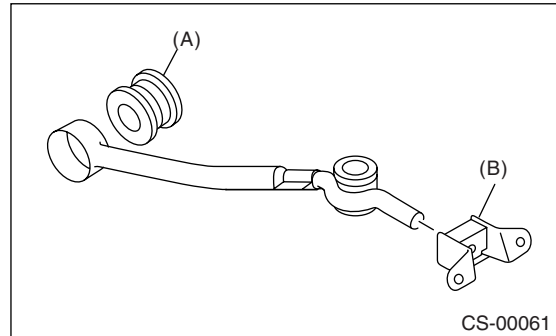
- (A) Bushing
- (B) Spacer

16) Remove the bushing and cushion rubber from stay.



- (A) Bushing
- (B) Stay
- (C) Cushion rubber

2) Mount the bushing and cushion rubber on the stay.

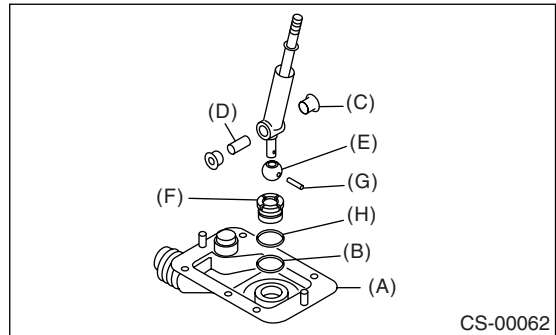


- (A) Bushing
- (B) Cushion rubber

3) Mount each part; boot, O-ring, bushing A, spacer, bushing B, bushing and spring pin on the gear shift lever.

NOTE:

- Always use new O-rings.
- Apply grease [SUNLIGHT 2 (Part No. 003602010 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.

D: ASSEMBLY

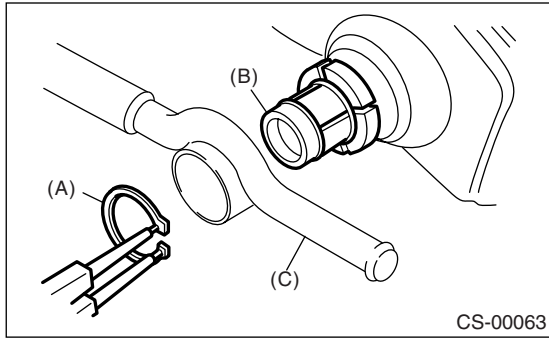
1. 5MT

1) Clean all parts before assembly.

MT Gear Shift Lever

CONTROL SYSTEMS

5) Install the snap ring and stay to bushing B.

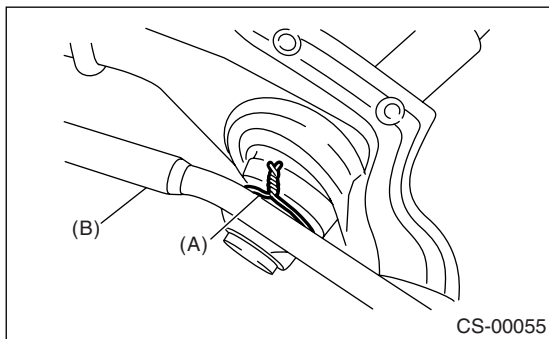


- (A) Snap ring
- (B) Bushing B
- (C) Stay

6) Tighten with lock wire to the extent that the boot will not come off.

NOTE:

Always use new lock wire.



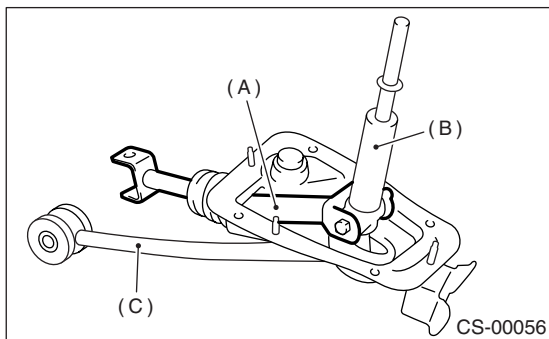
- (A) Lock wire
- (B) Stay

7) Insert the rod into the boot hole.

8) Connect rod to 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 rod in relation to the gear shift lever.

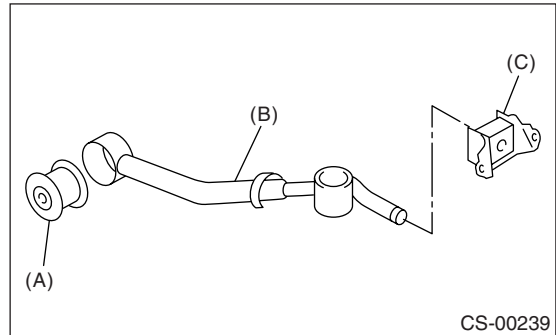
10) Check that there is no excessive play and that parts move smoothly.

2. 6MT

NOTE:

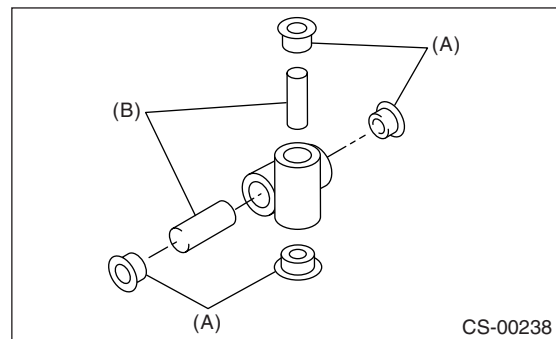
- Clean all parts before assembly.
- Apply NIGTIGHT LYW No.2 grease or equivalent to each parts.

1) Mount the bushing and cushion rubber on the stay.



- (A) Bushing
- (B) Stay
- (C) Cushion rubber

2) Install the bushing and spacer to boss.

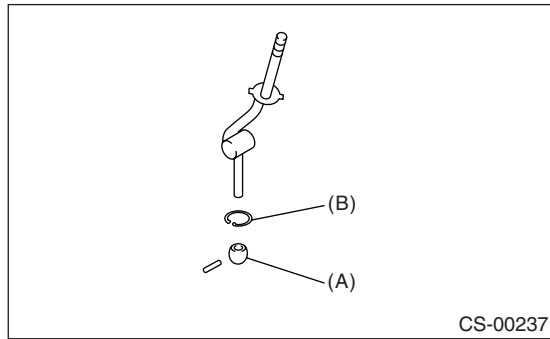


- (A) Bushing
- (B) Spacer

3) Install the snap ring to gear shift lever, and then install the bushing.

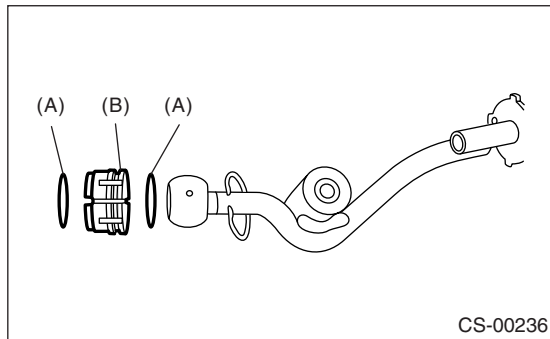
NOTE:

Apply grease to the bushing.



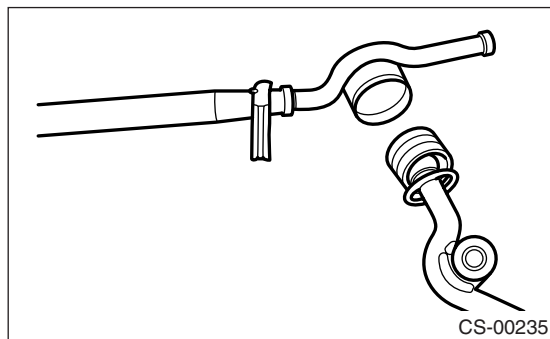
- (A) Bushing
- (B) Snap ring

4) Apply grease to the bushing and O-ring, and then install to the gear shift lever.

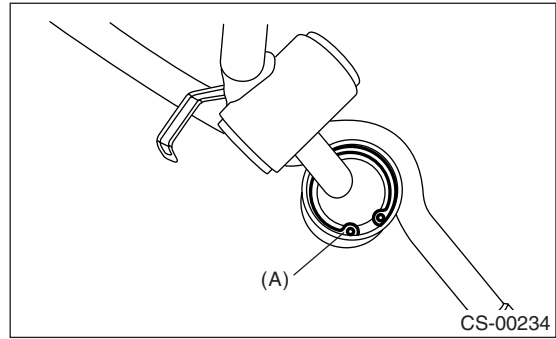


- (A) O-ring
- (B) Bushing

5) Apply sufficient grease into the boss, and then install the gear shift lever to stay.



6) Install the washer and snap ring.



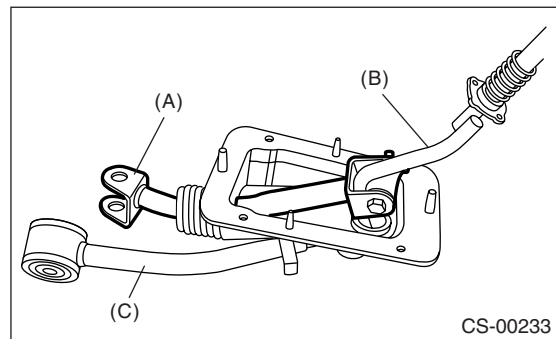
- (A) Snap ring

7) Insert the gear shift lever and rod into boot hole.

8) Install the rod.

Tightening torque:

11.8 N·m (1.2 kgf-m, 8.7 ft-lb)

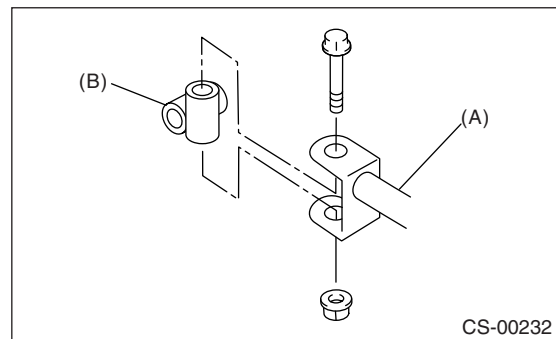


- (A) Rod
- (B) Lever
- (C) Stay

9) Install the boss to rod.

Tightening torque:

11.8 N·m (1.2 kgf-m, 8.7 ft-lb)

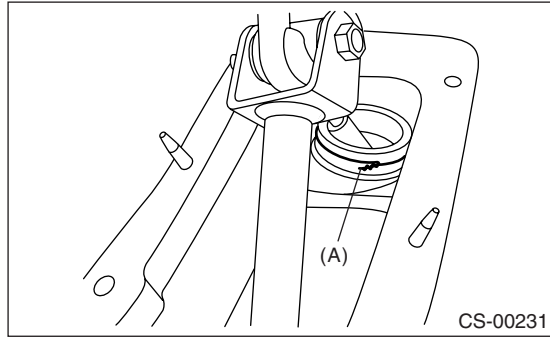


- (A) Rod
- (B) Boss

MT Gear Shift Lever

CONTROL SYSTEMS

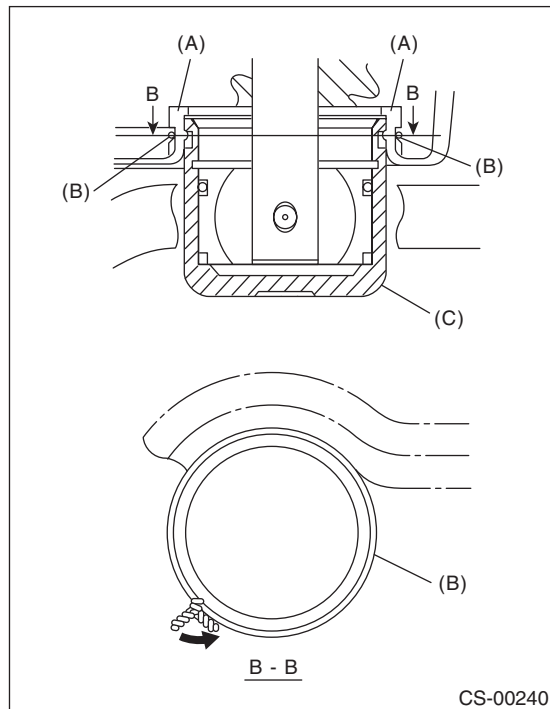
10) Install a new lock wire.



(A) Lock wire

NOTE:

- Install the lock wire to the stay groove.
- Bend the extra wire to same direction of lock wire winding.

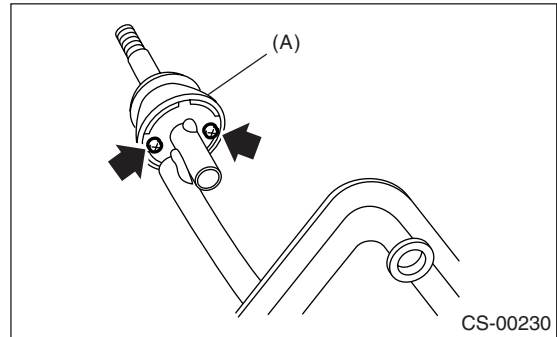


- (A) Inner boot
(B) Lock wire
(C) Stay

11) Install the holder.

Tightening torque:

1.3 N·m (0.13 kgf-m, 0.96 ft-lb)



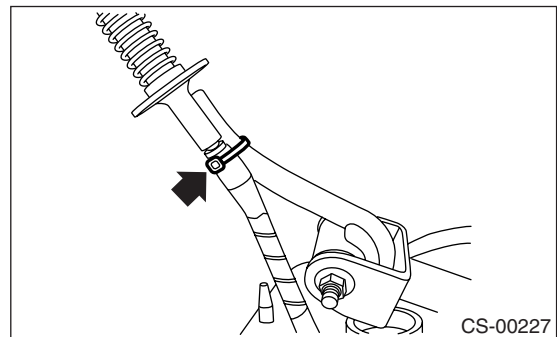
(A) Holder

12) Insert the reverse check cable into boot hole.

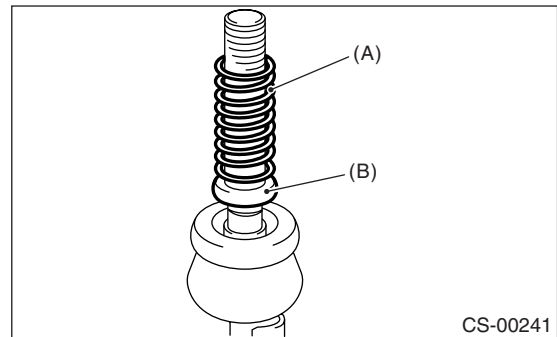
13) Insert the reverse check cable into gear shift assembly, and fix with band clip.

NOTE:

- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.



14) Install the seat cushion and spring.

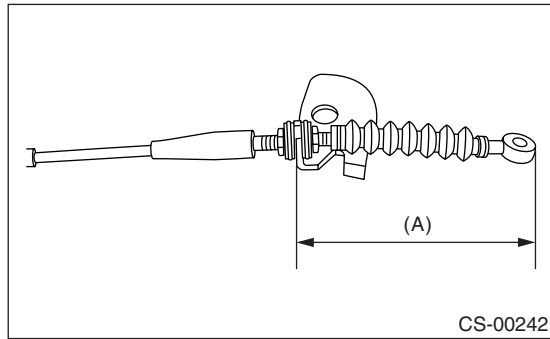


- (A) Spring
(B) Seat cushion

15) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in), and then tighten the lock nut.

Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)

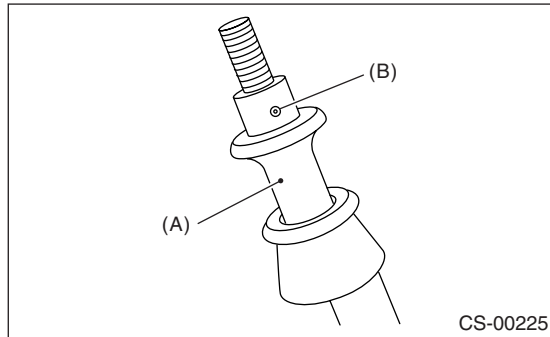


(A) 84 mm (3.31 in)

16) Fix the slider and reverse check cable end with spring pin.

NOTE:

Apply grease to the sliding part of slider.



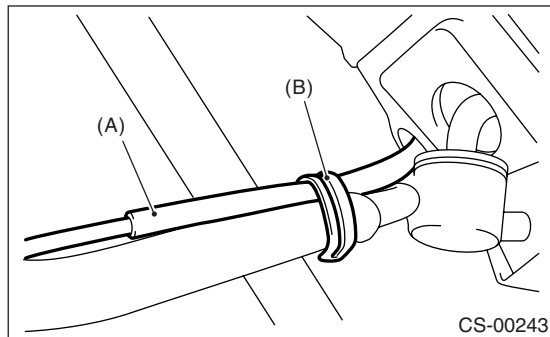
(A) Slider

(B) Spring pin

17) Fix the reverse check cable to clip of stay.

NOTE:

Install the reverse check cable to upper side of stay.



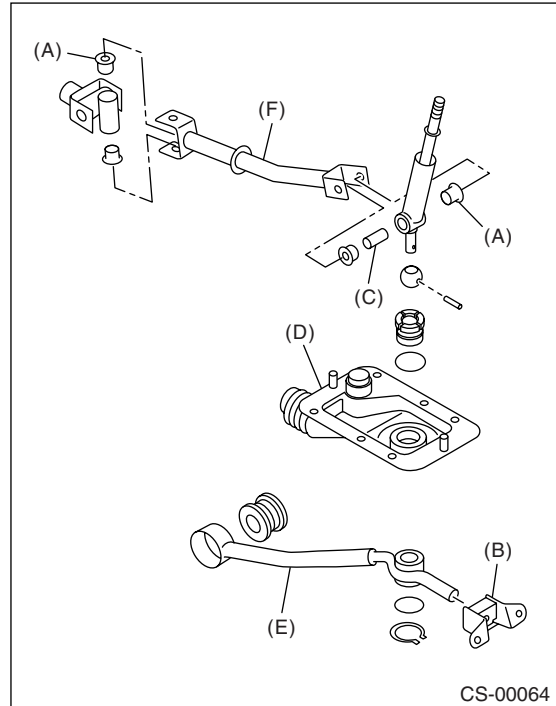
(A) Reverse check cable

(B) Clip

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.

• 5MT



(A) Bushing

(B) Cushion rubber

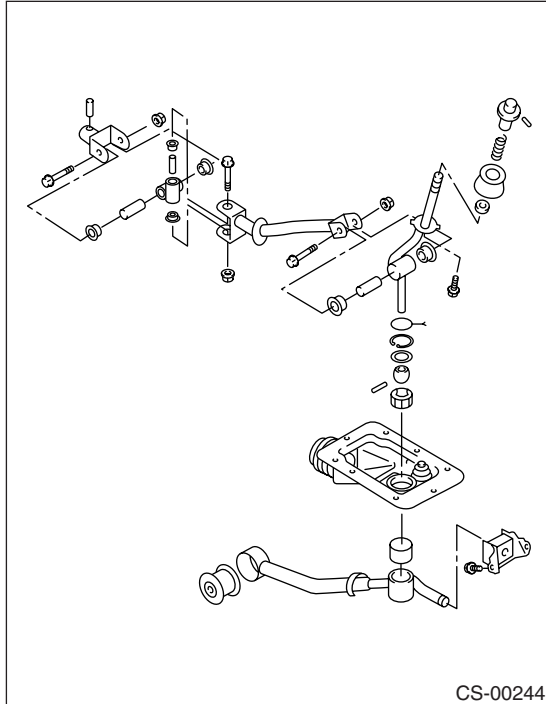
(C) Spacer

(D) Boot

(E) Stay

(F) Rod

- 6MT

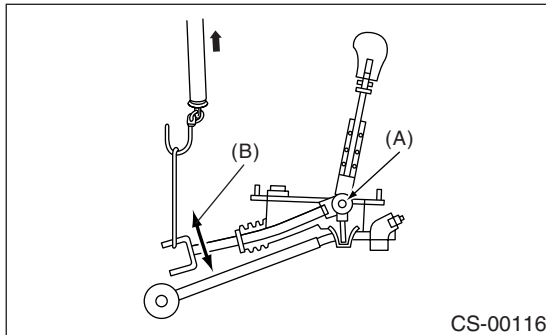


2) Check the swing torque of the rod in relation of the gear shift lever.

If the torque exceeds the specification, replace the bushing or retighten the nuts.

Swing torque:

3.7 N (0.38 kgf, 0.84 lb) or less



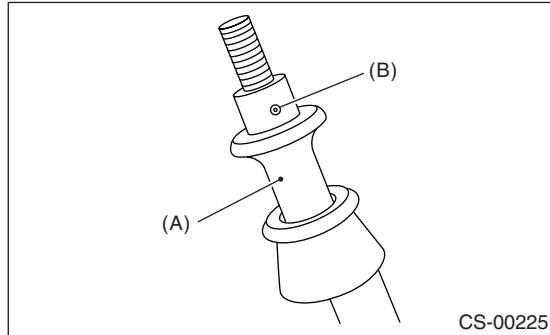
(A) Center of rotation

(B) Swing torque

8. Reverse Check Cable

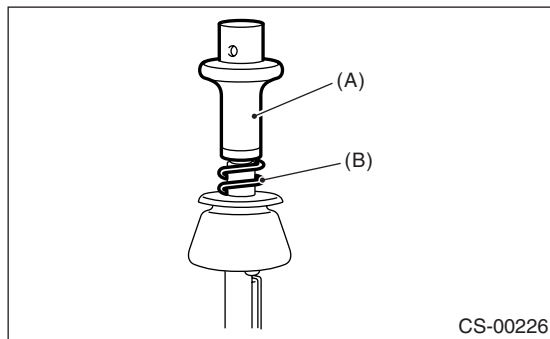
A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Remove the gear shift knob.
- 3) Remove the console box front. <Ref. to EI-47, REMOVAL, Console Box.>
- 4) Remove the spring pin from slider.



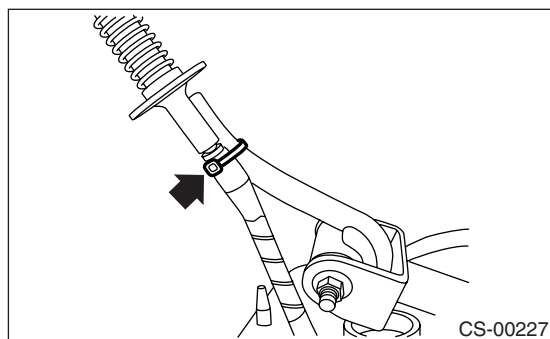
- (A) Slider
(B) Spring pin

- 5) Remove the slider and spring.



- (A) Slider
(B) Spring

- 6) Cut the band clip, and then separate the reverse check cable from gear shift lever.

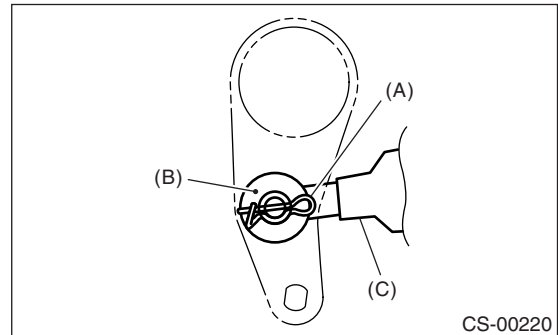


- 7) Lift-up the vehicle.
- 8) Remove the under cover.

- 9) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>

- 10) Remove the crossmember. <Ref. to 6MT-32, REMOVAL, Transmission Mounting System.>

- 11) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.

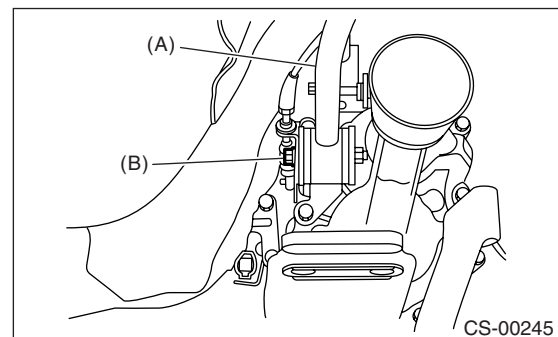


- (A) Snap pin
(B) Washer
(C) Reverse check cable

- 12) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

NOTE:

If the transmission is not moved, the stay bolt will contact body and damage may occur.

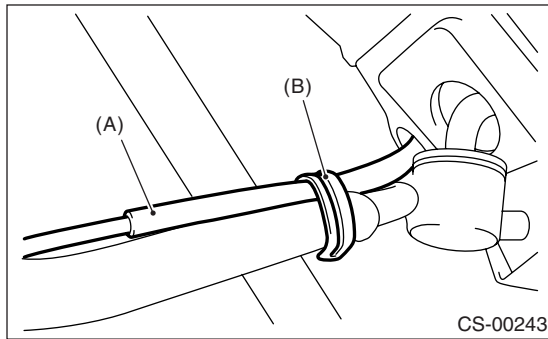


- (A) Stay
(B) Stay bolt

Reverse Check Cable

CONTROL SYSTEMS

13) Raise the clip of stay, and then separate the stay and reverse check cable.



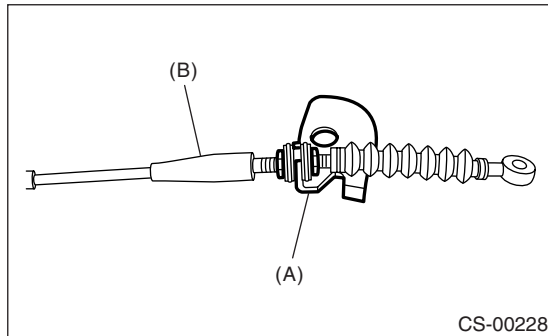
(A) Reverse check cable
(B) Clip

14) Remove the reverse check cable by pulling from underneath the vehicle.

NOTE:

Take care not to damage the inner boot.

15) Loosen the lock nut, then remove the reverse check cable from cable plate.



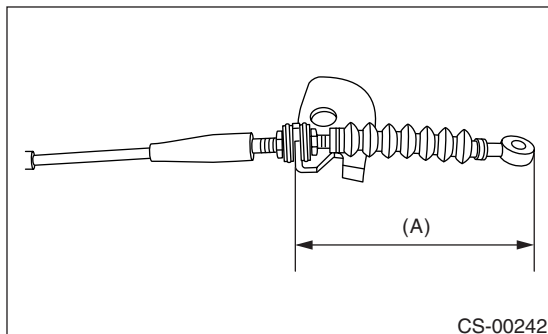
(A) Cable plate
(B) Reverse check cable

B: INSTALLATION

1) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in), and then tighten the lock nut.

Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)



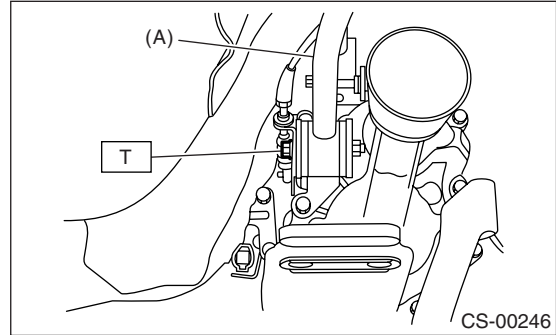
(A) 84 mm (3.31 in)

2) Insert the reverse check cable to the hole of inner boots from underneath the vehicle.

3) Move the transmission to right side, and then install the stay.

Tightening torque:

T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



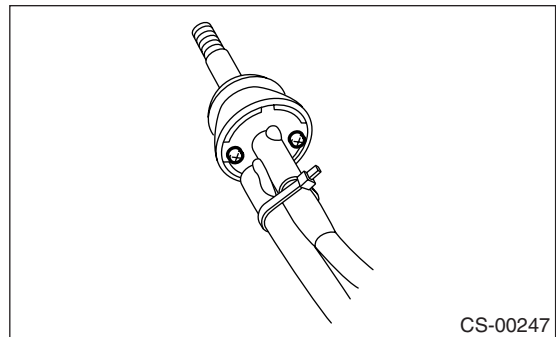
(A) Stay

4) Lower the vehicle.

5) Insert the reverse check cable to the gear shift lever assembly, then fix with the band clip.

NOTE:

- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.

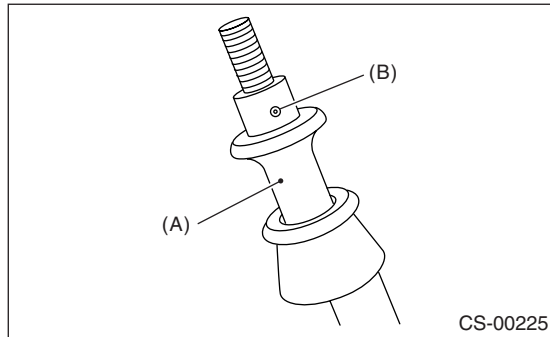


CS-00247

6) Fix the slider and reverse check cable end with spring pin.

NOTE:

Apply grease to the sliding part of slider.



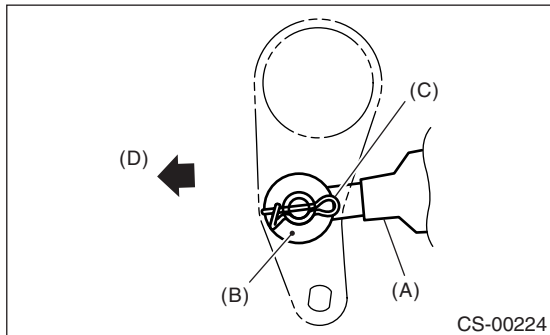
- (A) Slider
- (B) Spring pin

7) Lift-up the vehicle.

8) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:

Take care to install the snap pin in proper direction.

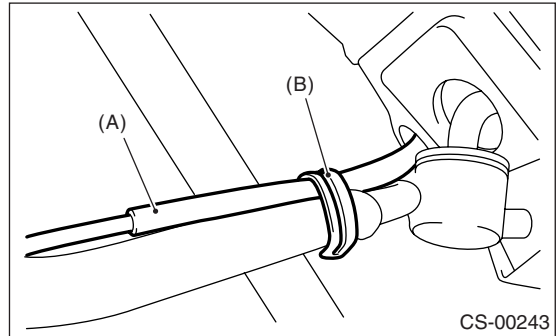


- (A) Reverse check cable
- (B) Washer
- (C) Snap pin
- (D) Front side

9) Fix the reverse check cable to clip of stay.

NOTE:

Install the reverse check cable to upper side of stay.



- (A) Reverse check cable
- (B) Clip

10) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

11) Install the console box. <Ref. to EI-47, INSTALLATION, Console Box.>

C: INSPECTION

1) Verify whether the slider moves smoothly. If not, adjust the reverse check cable or check damage of slider. <Ref. to CS-47, ADJUSTMENT, Reverse Check Cable.>

2) Check that the gear can be shift to reverse, when the slider is pulled up. If the gear can not be shift to reverse, adjust the reverse check cable. <Ref. to CS-47, ADJUSTMENT, Reverse Check Cable.>

3) Check that the gear can not be shift to reverse, when the slider is not pulled up. If the gear can be shift to reverse, adjust or replace the reverse check cable. <Ref. to CS-47, ADJUSTMENT, Reverse Check Cable.>

D: ADJUSTMENT

1) Set the vehicle on a lift.

2) Remove the under cover.

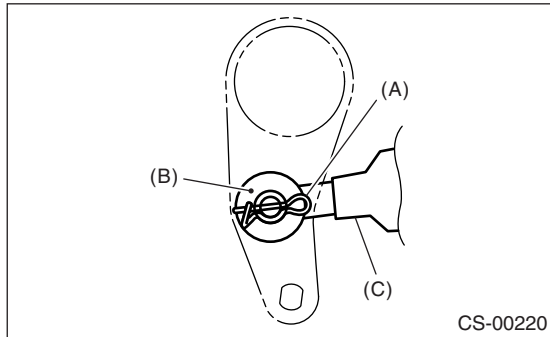
3) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, REMOVAL, Muffler.>

4) Remove the crossmember. <Ref. to 6MT-32, REMOVAL, Transmission Mounting System.>

Reverse Check Cable

CONTROL SYSTEMS

5) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.

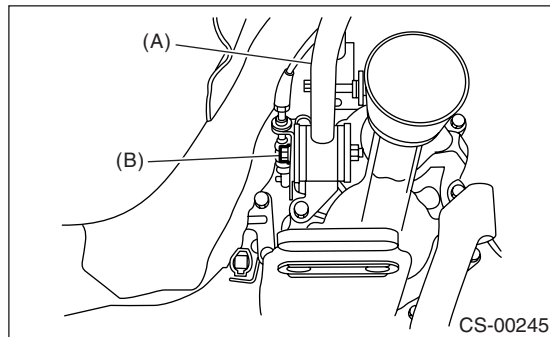


- (A) Snap pin
- (B) Washer
- (C) Reverse check cable

6) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

NOTE:

If the transmission is not moved, the stay bolt will contact body and damage may occur.

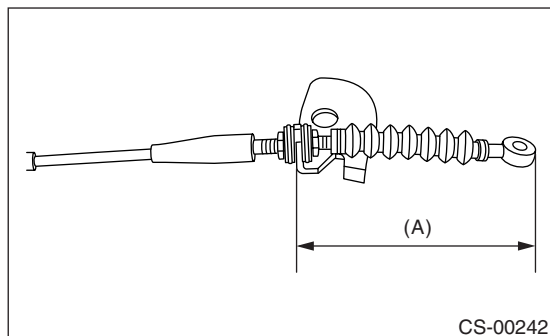


- (A) Stay
- (B) Stay bolt

7) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in), and then tighten the lock nut.

Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)

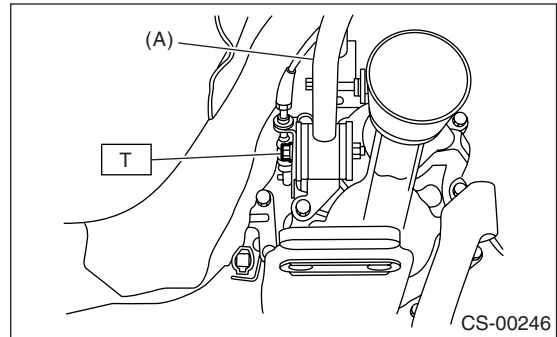


- (A) 84 mm (3.31 in)

8) Move the transmission to right side, and then install the stay.

Tightening torque:

T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



- (A) Stay

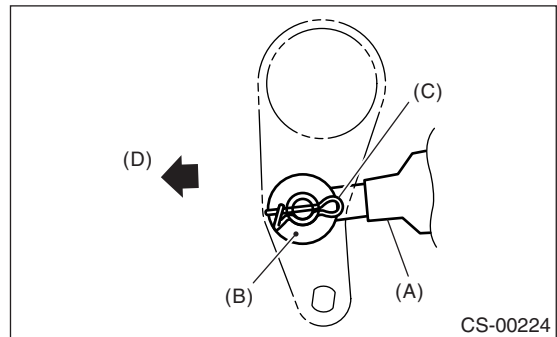
9) Install the crossmember. <Ref. to 6MT-32, INSTALLATION, Transmission Mounting System.>

10) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-13, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-14, INSTALLATION, Muffler.>

11) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:

Take care to install the snap pin in proper direction.



- (A) Reverse check cable
- (B) Washer
- (C) Snap pin
- (D) Front side

12) Install the under cover.

9. General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Remedy
1. Select lever	Starter does not run.	Adjust select cable and inhibitor switch, or inspect circuit.
	Back-up light does not light up.	Adjust select cable and inhibitor switch, or inspect circuit.
	AT shift lock system does not operate normally.	Adjust select cable and inhibitor switch, or inspect circuit.
2. MT gear shift lever (6MT)	Shift into reverse is impossible.	Adjust reverse check cable.
	Shift into reverse is possible without pulling up slider.	Adjust or replace reverse check cable.
	Slider cannot be pulled up. Or slider is pulled up being stucked.	- Inspect reverse check system of transmission. - Adjust or replace reverse check cable.

General Diagnostic Table

CONTROL SYSTEMS

SECTION 5

TRANSMISSION