TRANSMISSION SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

AUTOMATIC TRANSMISSION

4AT

1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Model	2.0 L	2.5 L
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	2.0 — 2.2	2.1 — 2.3
Nominal diameter mm (in)	236 (9.29)	249 (9.69)
Stall speed (at sea level)	2,300 — 2,700 rpm	2,500 — 2,900 rpm
One-way clutch	Sprague type one-way clutch	

2. OIL PUMP

Type	Pracoid 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	2.0 L	2.5 L
Front sun gear number of teeth	33	
Front pinion number of teeth	21	
Front internal gear number of teeth	75	
Rear sun gear number of teeth	42	
Rear pinion number of teeth	17	
Rear internal gear number of teeth	75	
Drive plate number of high clutch	4	
Drive plate number of low clutch	4	5
Drive plate number of reverse clutch	2	
Drive plate number of 2-4 brake	2	3
Drive plate number of low & reverse brake	4	5

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)	4-forward automatic gear change 1st $\leftarrow\rightarrow$ 2nd $\leftarrow\rightarrow$ 3rd $\leftarrow\rightarrow$ 4th
SPORT mode	4-forward automatic gear change 1st $\leftarrow\rightarrow$ 2nd $\leftarrow\rightarrow$ 3rd $\leftarrow\rightarrow$ 4th
Manual mode (+)	4-forward manual gear change (shift up) 1st $\rightarrow$ 2nd $\rightarrow$ 3rd $\rightarrow$ 4th
Manual mode (–)	4-forward manual gear change (shift down) 1st $\leftarrow$2nd $\leftarrow$ 3rd $\leftarrow$ 4th
Control method	Wire cable

7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	SUBARU ATF or Idemitsu “Apolloil ATF HP”, Castrol “Transmax J” NOTE: If the ATFs above are not available, use Dexron III.
Fluid capacity ℓ (US qt, Imp qt)	8.4 — 8.7 (8.9 — 9.2, 7.4 — 7.7)
Lubrication system	Forced feed lubrication with oil pump
Oil	Automatic transmission fluid (above mentioned)

8. COOLING AND HARNESS

Cooling System	Liquid-cooled cooler
Inhibitor switch	12 poles
Transmission harness	20 poles

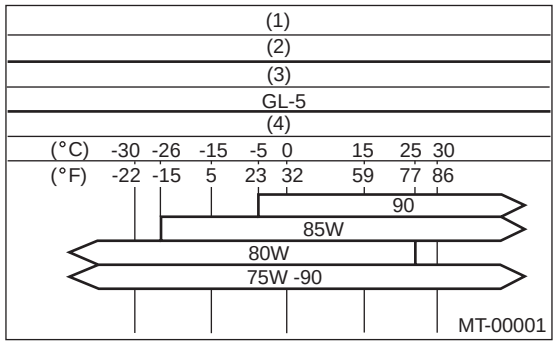
9. TRANSFER

Model	2.0 L	2.5 L without vehicle dynamics control (VDC)	2.5 L with vehicle dynamics control (VDC)
Transfer type	Multi-plate transfer (MPT)		Variable torque distribution (VTD)
Drive & driven plate number of transfer clutch	4	5	3
Control method	Electronic hydraulic type		
Lubricant	The same Automatic transmission fluid used in automatic transmission		
Reduction gear ratio	1.000 (53/53)		

10.FINAL REDUCTION

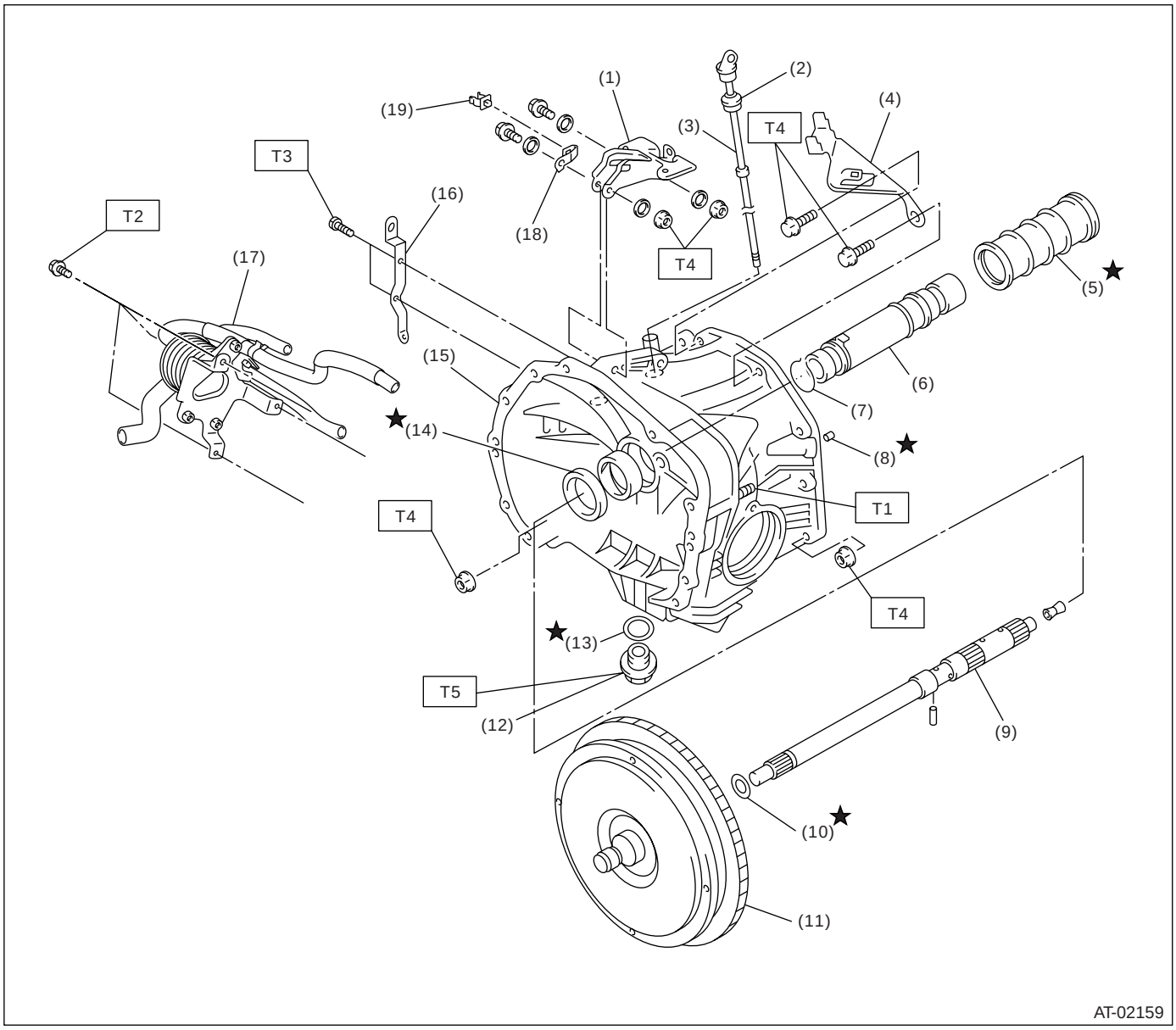
Model	Except for OUTBACK	OUTBACK
Front final reduction gear ratio	4.111 (37/9)	4.444 (40/9)

11.RECOMMENDED GEAR OIL

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

B: COMPONENT

1. TORQUE CONVERTER CLUTCH AND CASE

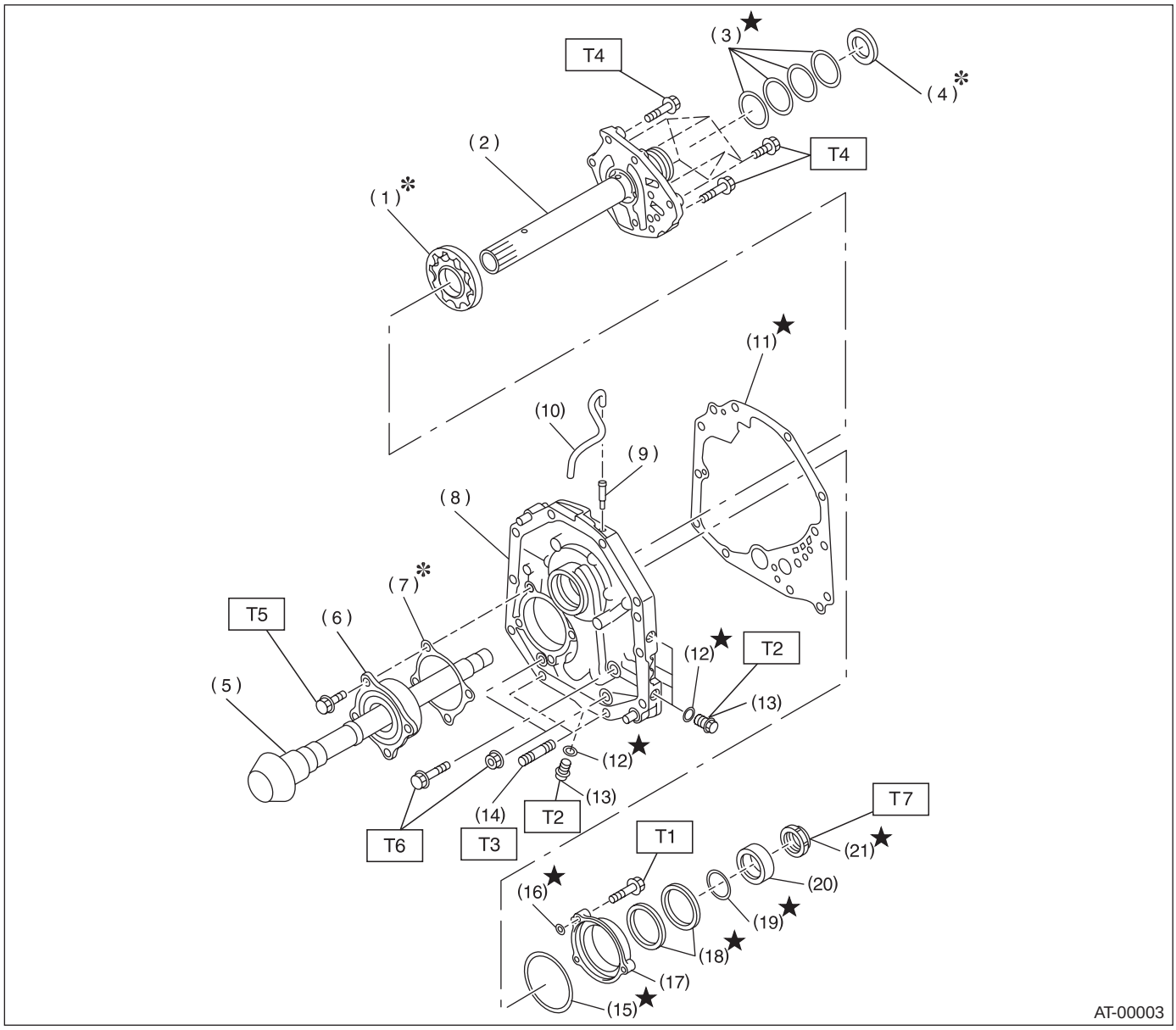


(1) Pitching stopper bracket
(2) O-ring
(3) Differential oil level gauge
(4) Stay
(5) Seal pipe
(6) Oil pump shaft
(7) Clip
(8) Oil drain pipe
(9) Input shaft
(10) O-ring
(11) Torque converter clutch ASSY
(12) Drain plug
(13) Gasket
(14) Oil seal
(15) Converter case
(16) Harness stay
(17) ATF cooler ASSY with warmer function (if equipped)
(18) Bracket (if equipped)
(19) Clip (if equipped)

Tightening torque: N·m (kgf-m, ft-lb)

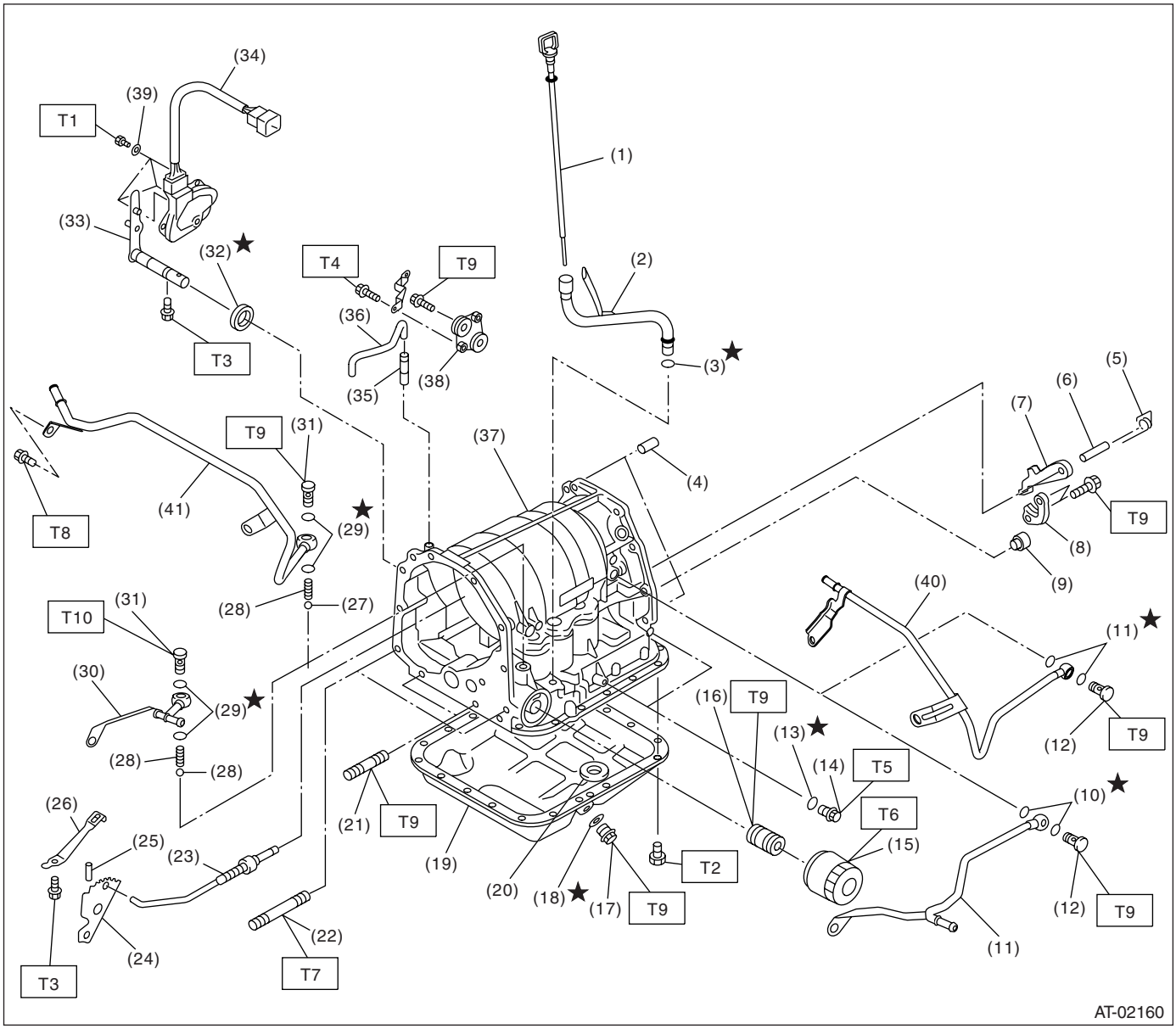
T1: 18 (1.8, 13.0)
T2: 23 (2.3, 16.7)
T3: 33 (3.4, 24.3)
T4: 41 (4.2, 30.4)
T5: 70 (7.1, 51.6)

2. OIL PUMP



(1)	Oil pump rotor	(11)	Gasket	(21)	Lock nut
(2)	Oil pump cover	(12)	O-ring		
(3)	Seal ring	(13)	Test plug	***Tightening torque: N·m (kgf-m, ft-lb)***	
(4)	Thrust needle bearing	(14)	Stud bolt	***T1:***	***7 (0.7, 5.1)***
(5)	Drive pinion shaft	(15)	O-ring	***T2:***	***13 (1.3, 9.4)***
(6)	Roller bearing	(16)	O-ring	***T3:***	***18 (1.8, 13.0)***
(7)	Shim	(17)	Oil seal retainer	***T4:***	***25 (2.5, 18.1)***
(8)	Oil pump housing	(18)	Oil seal	***T5:***	***40 (4.1, 30)***
(9)	Nipple	(19)	O-ring	***T6:***	***42 (4.3, 31)***
(10)	Air breather hose	(20)	Drive pinion collar	***T7:***	***116 (11.8, 85)***

3. TRANSMISSION CASE AND CONTROL DEVICE

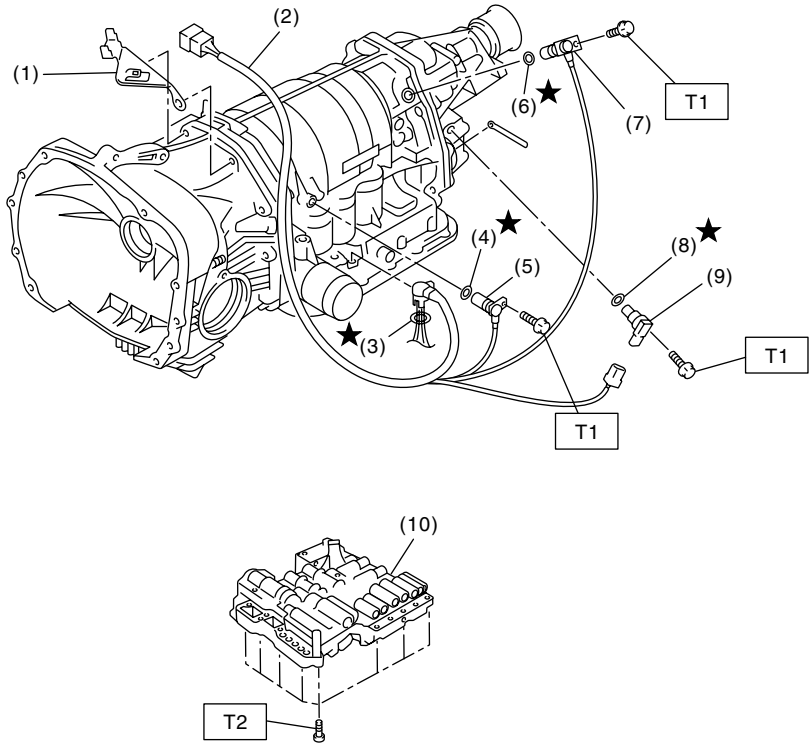


(1) ATF level gauge
(2) Oil charge pipe
(3) O-ring
(4) Straight pin
(5) Return spring
(6) Shaft
(7) Parking pawl
(8) Parking support
(9) Bushing
(10) Gasket
(11) Inlet pipe (Model without ATF cooler with warmer function)
(12) Union screw
(13) O-ring
(14) Test plug
(15) Oil filter
(16) Oil filter stud bolt
(17) Drain plug
(18) Gasket
(19) Oil pan
(20) Magnet
(21) Stud bolt (Short)
(22) Stud bolt (Long)
(23) Parking rod
(24) Manual plate
(25) Spring pin
(26) Detention spring
(27) Ball
(28) Spring
(29) Gasket
(30) Outlet pipe (Model without ATF cooler with warmer function)
(31) Union screw
(32) Oil seal
(33) Select lever
(34) Inhibitor switch ASSY
(35) Nipple
(36) Air breather hose
(37) Transmission case
(38) Plate ASSY
(39) Washer
(40) Inlet pipe (Model with ATF cooler with warmer function)
(41) Outlet pipe (Model with ATF cooler with warmer function)

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***3.4 (0.35, 2.5)***
T2:	***5 (0.5, 3.6)***
T3:	***6 (0.6, 4)***
T4:	***12 (1.2, 8.7)***
T5:	***13 (1.3, 10)***
T6:	***14 (1.4, 10)***
T7:	***18 (1.8, 13)***
T8:	***21 (2.1, 15.5)***
T9:	***25 (2.5, 18.1)***
T10:	***44 (4.5, 32.5)***

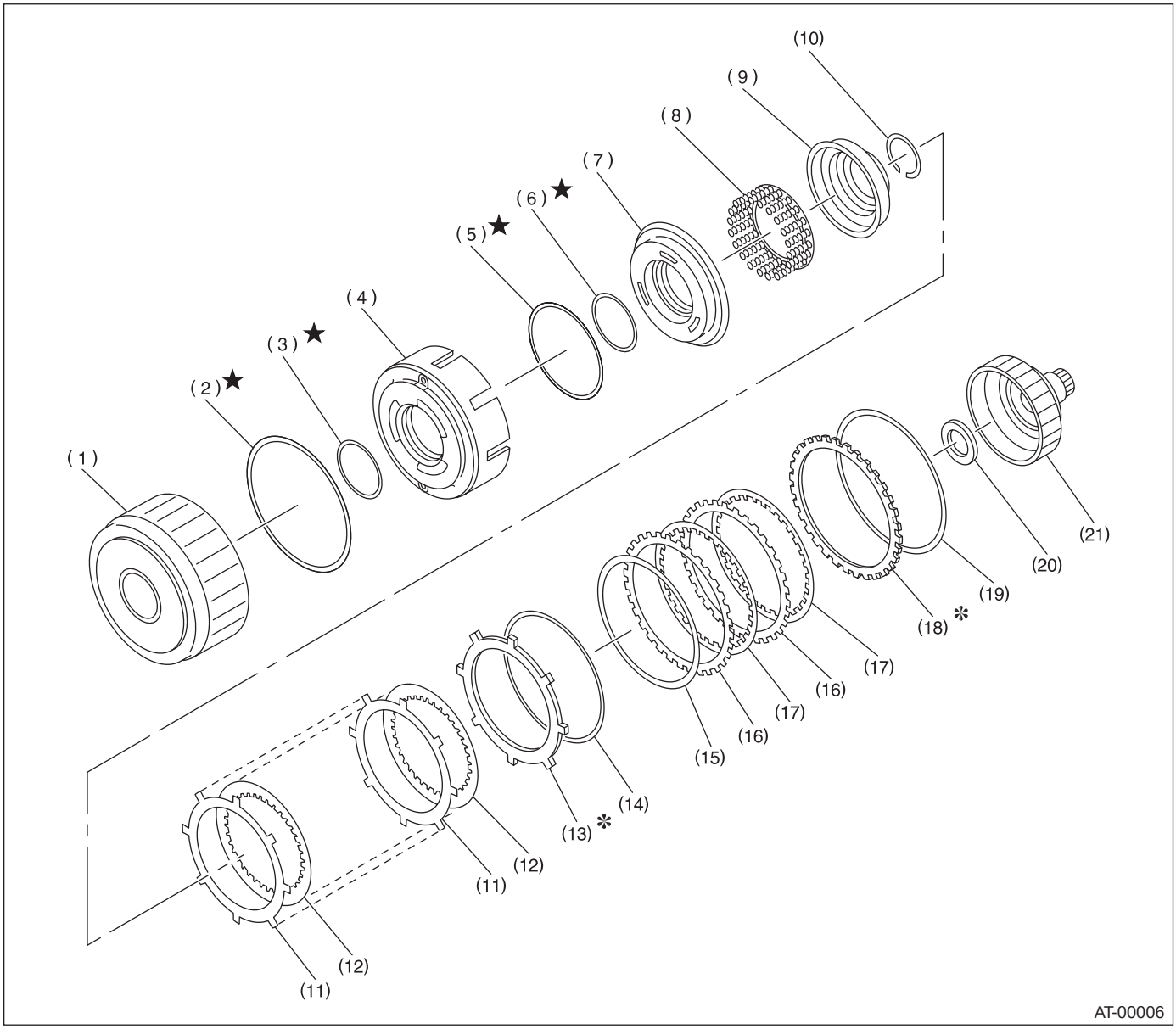
4. CONTROL VALVE AND HARNESS ROUTING



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

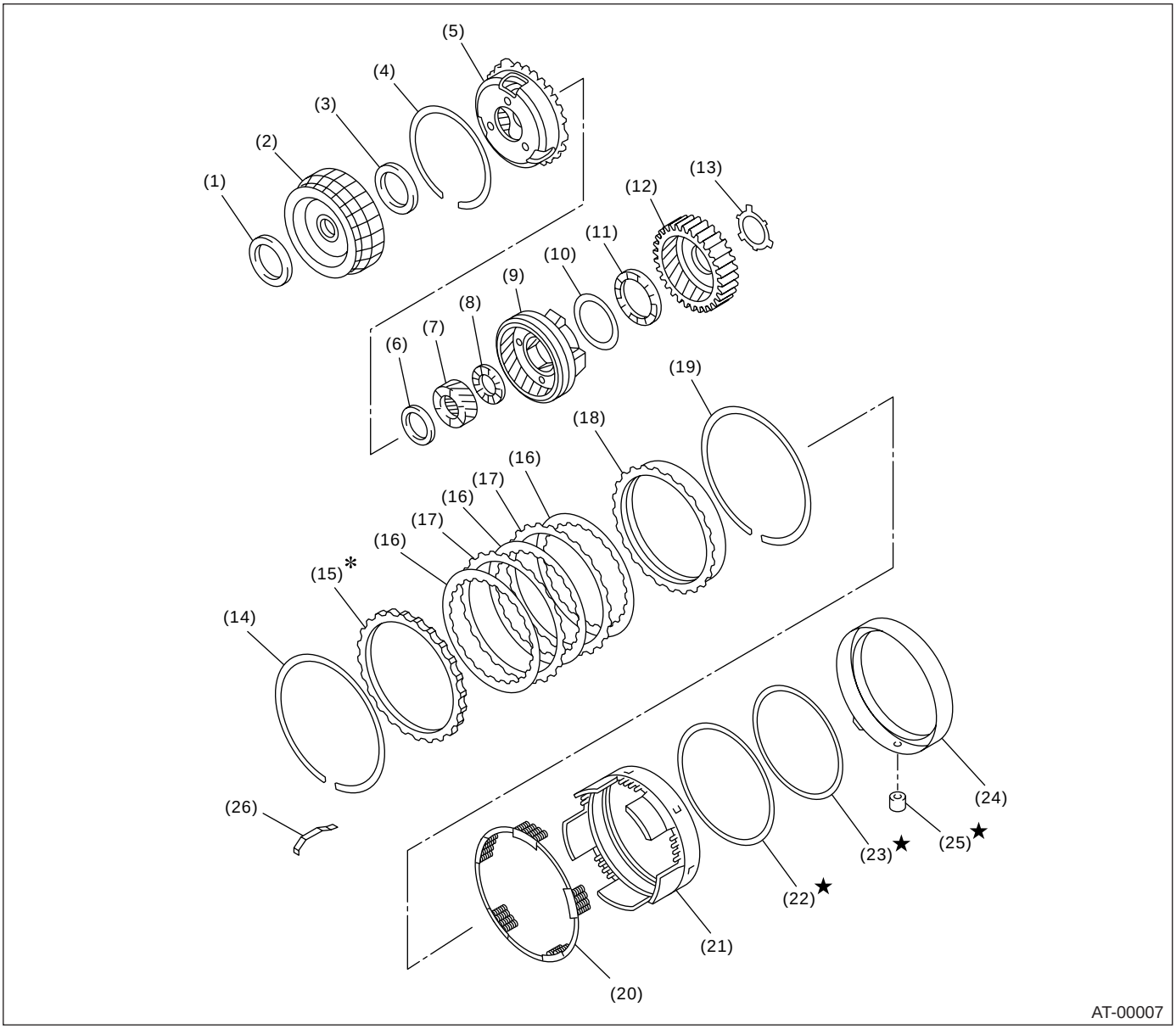
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.1)
T2: 8 (0.8, 5.8)

5. HIGH CLUTCH AND REVERSE CLUTCH



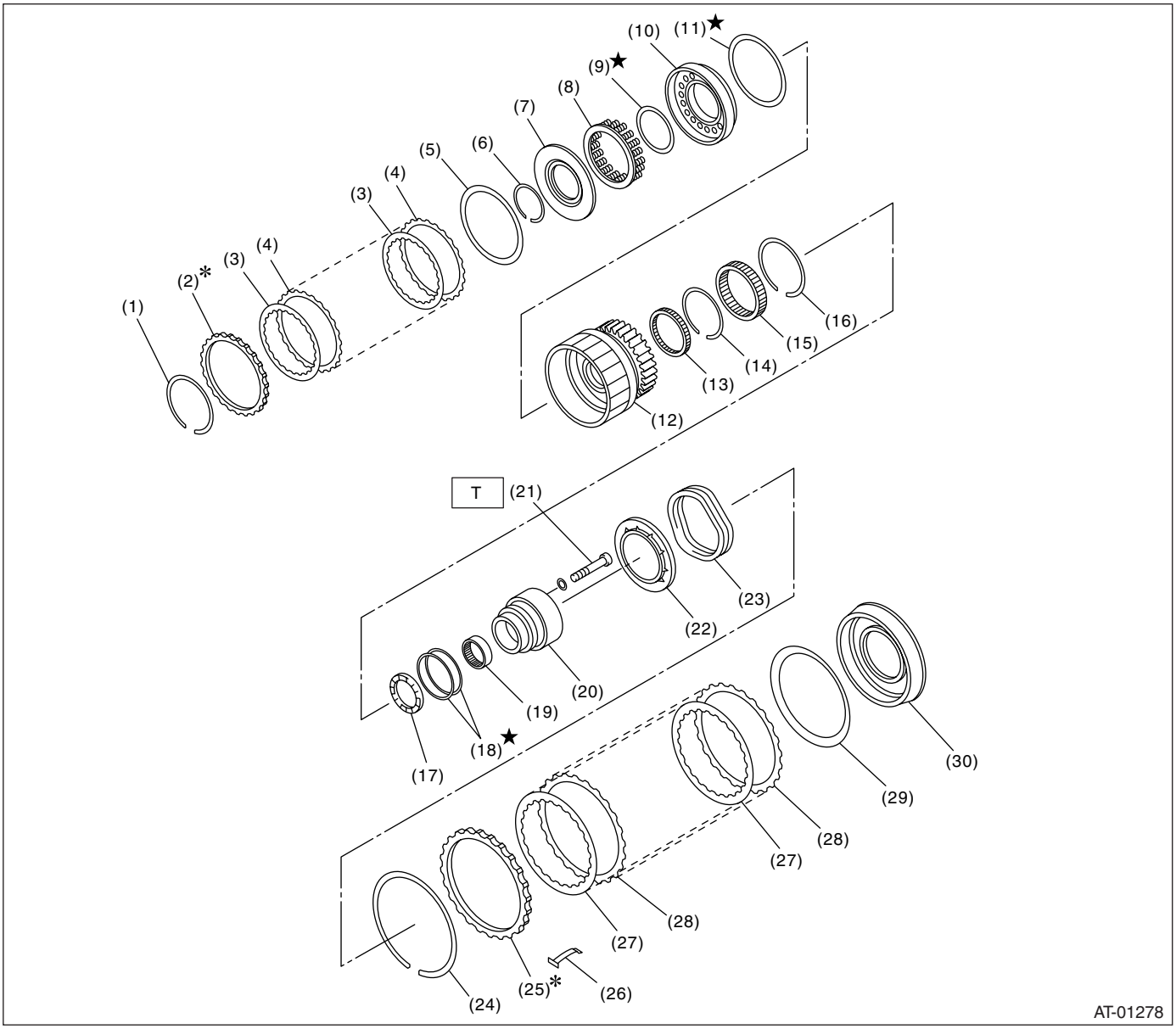
(1)	High clutch drum	(8)	Spring retainer	(15)	Dish plate
(2)	Lip seal	(9)	Cover	(16)	Driven plate (reverse clutch)
(3)	D-ring	(10)	Snap ring	(17)	Drive plate (reverse clutch)
(4)	Reverse clutch piston	(11)	Driven plate (high clutch)	(18)	Retaining plate (reverse clutch)
(5)	D-ring	(12)	Drive plate (high 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

6. PLANETARY GEAR AND 2-4 BRAKE



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

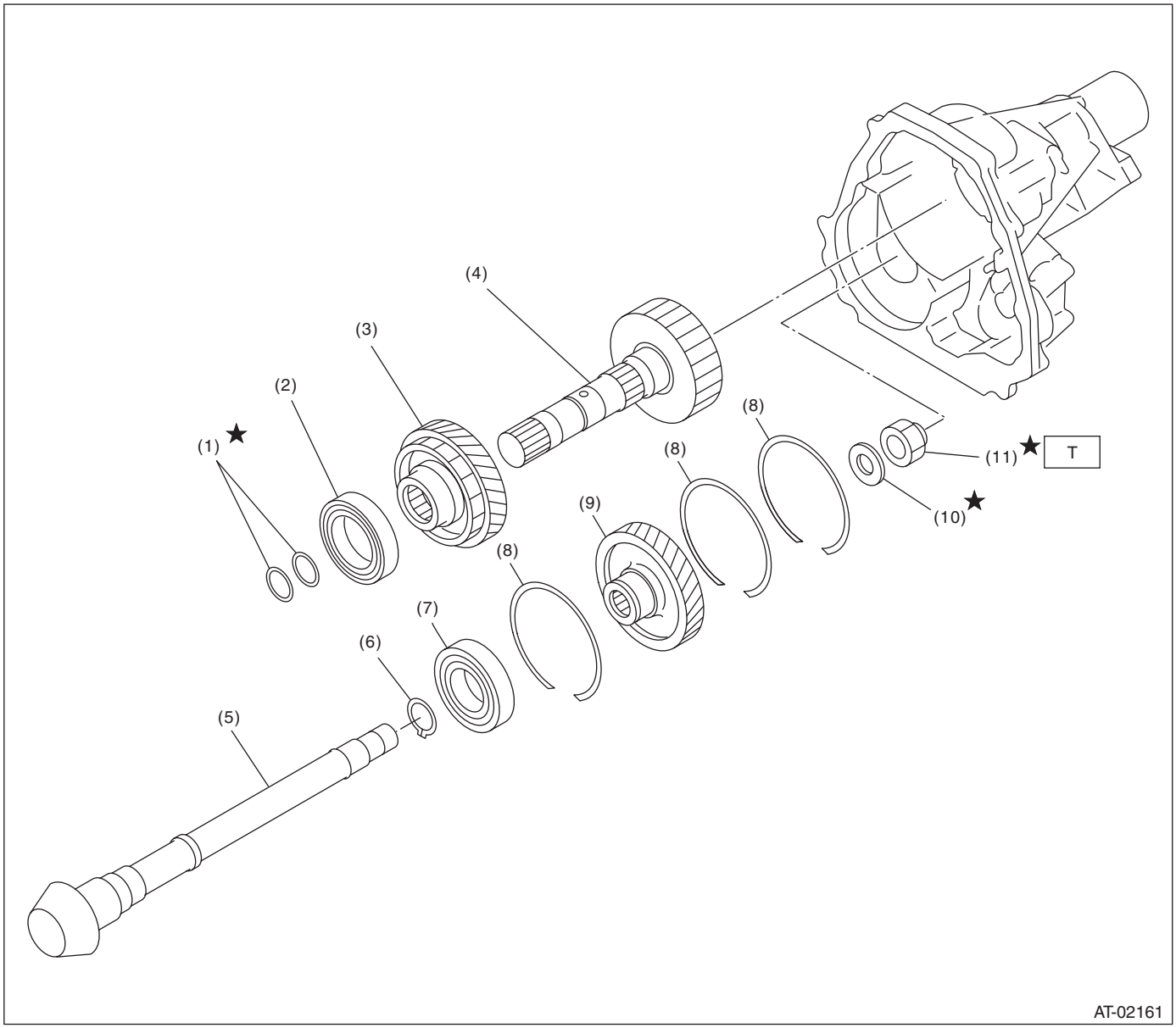
7. LOW CLUTCH AND LOW & REVERSE BRAKE



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

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

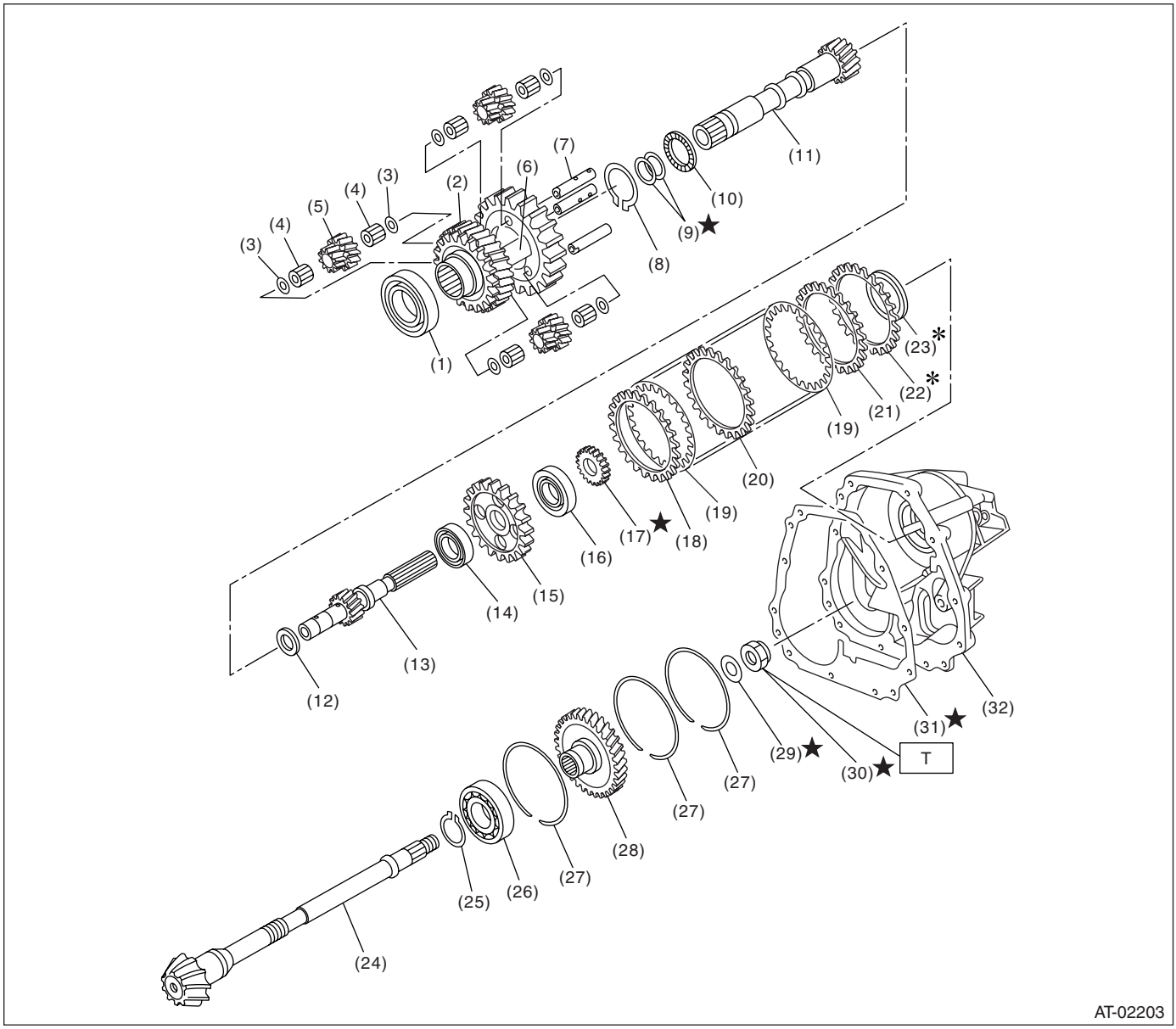
8. REDUCTION GEAR



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

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

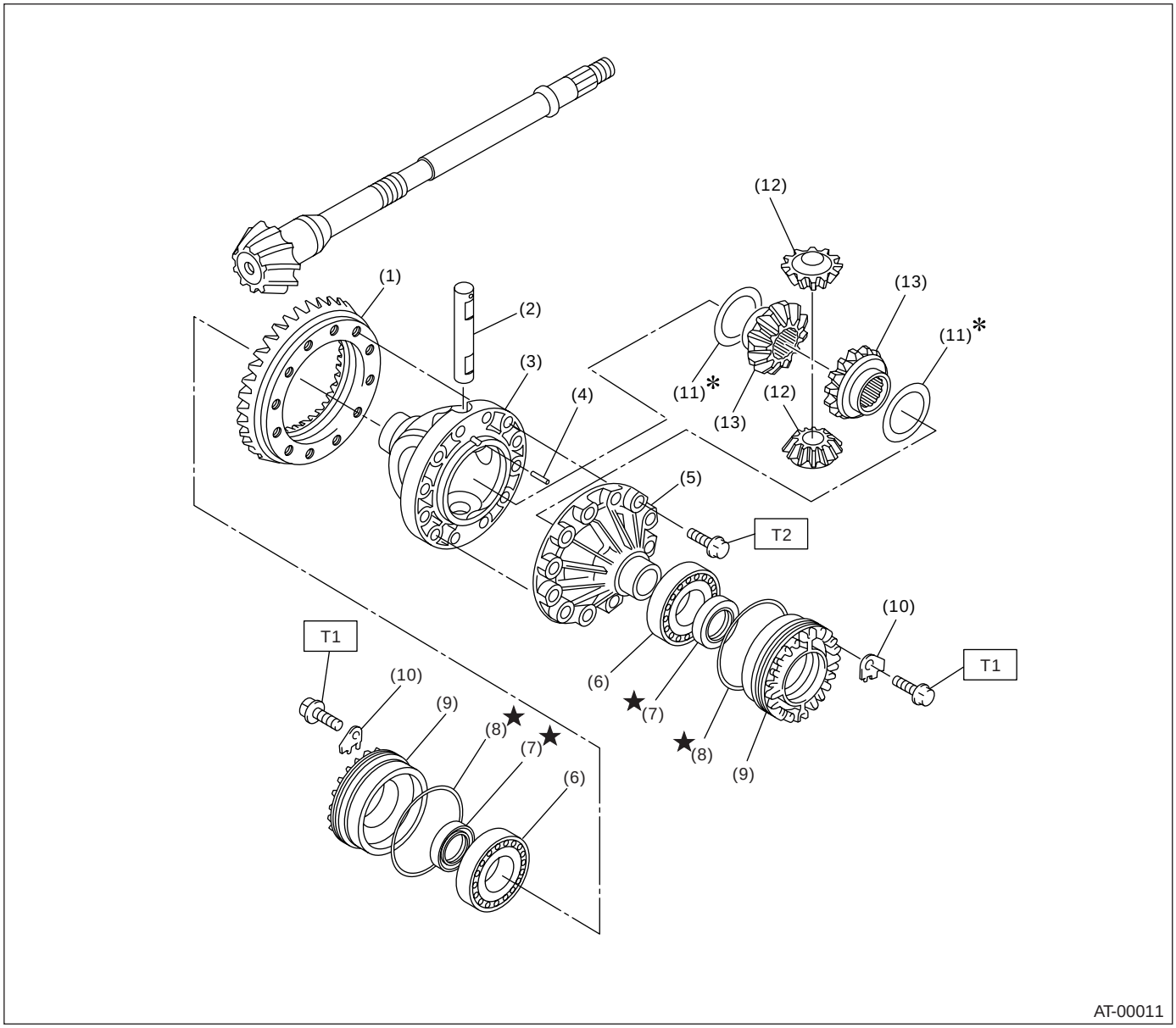
9. REDUCTION GEAR WITH VTD



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

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

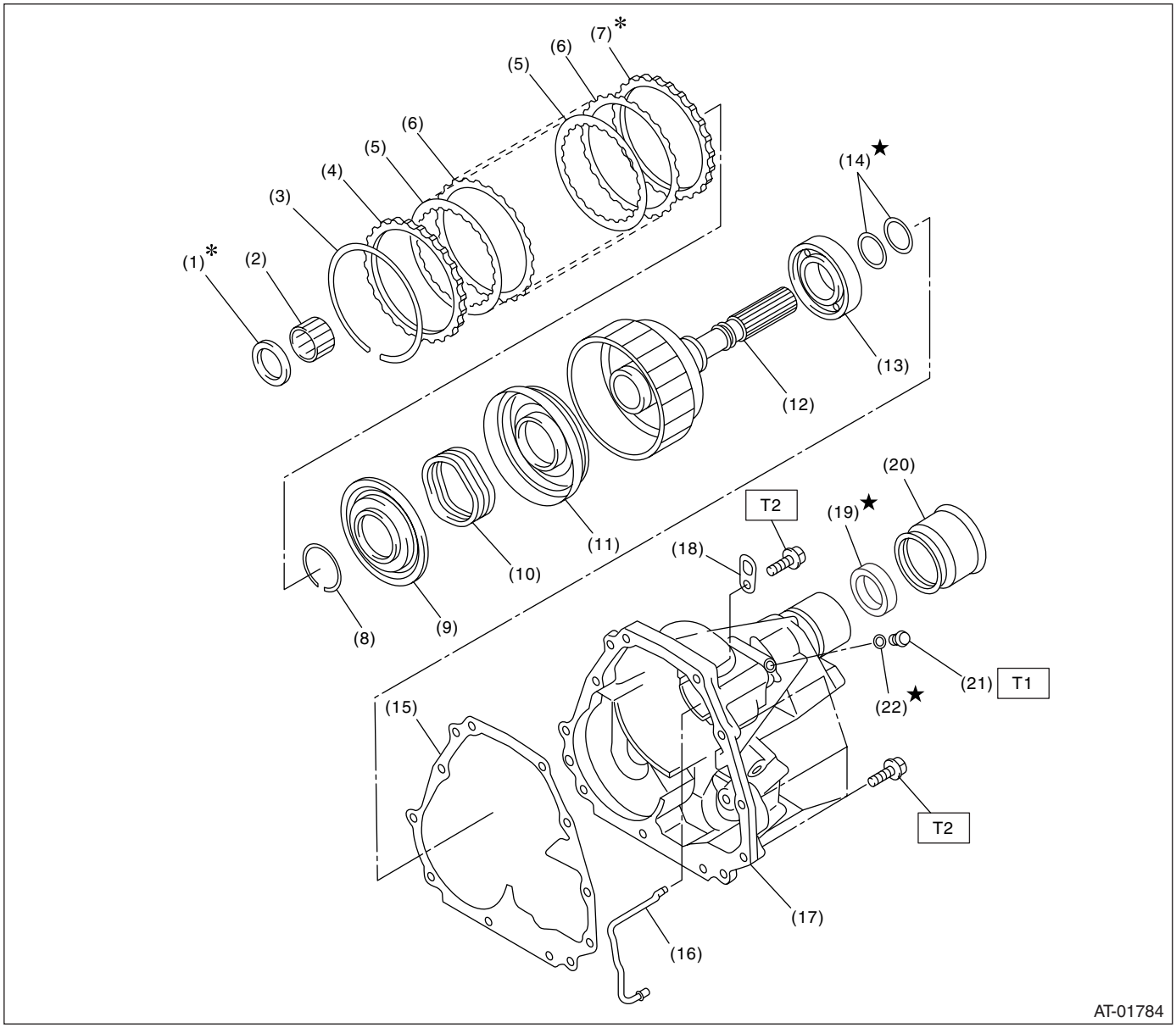
10.DIFFERENTIAL GEAR



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 62 (6.3, 45.6)

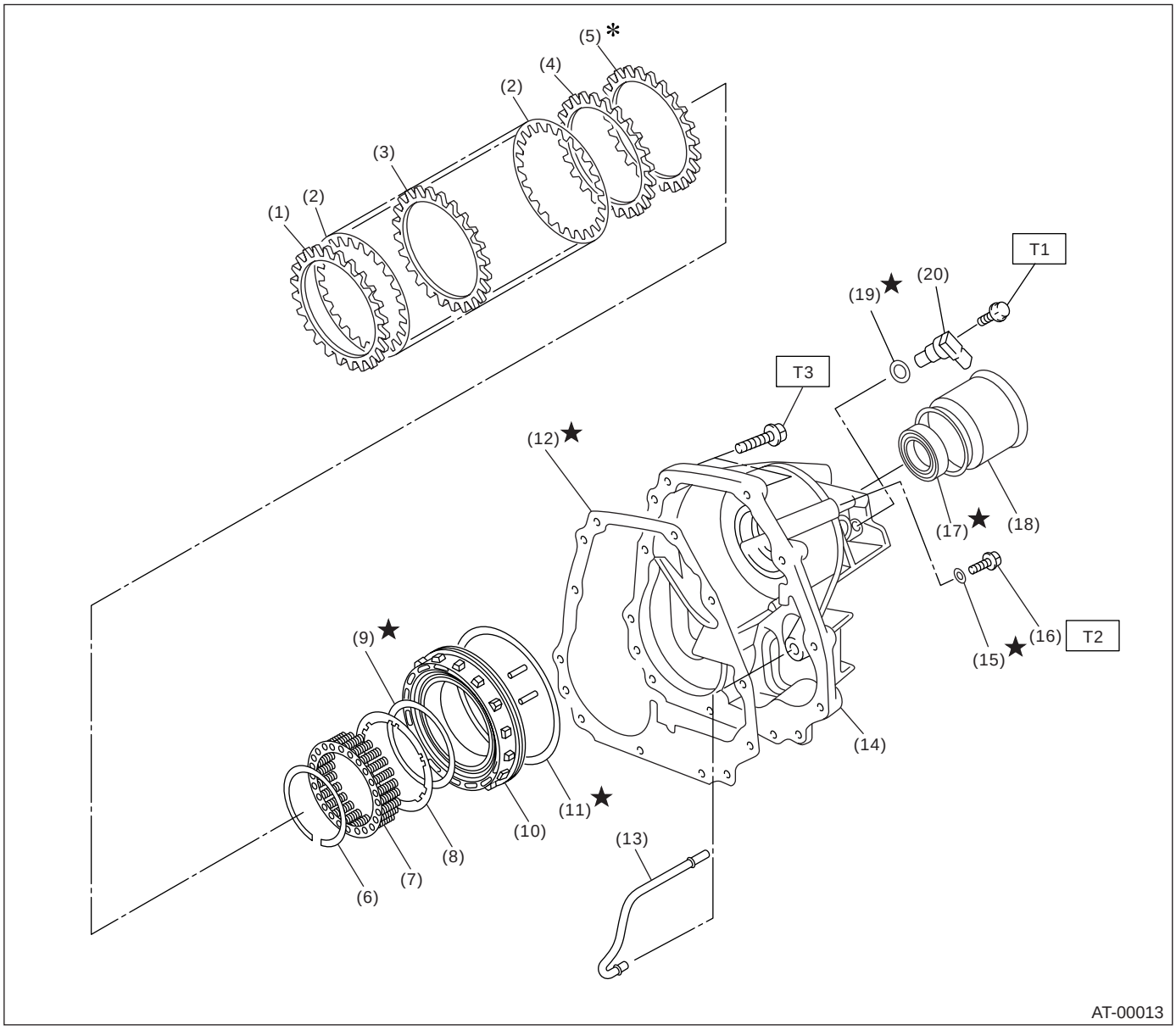
11.TRANSFER AND EXTENSION CASE



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 25 (2.5, 18.1)

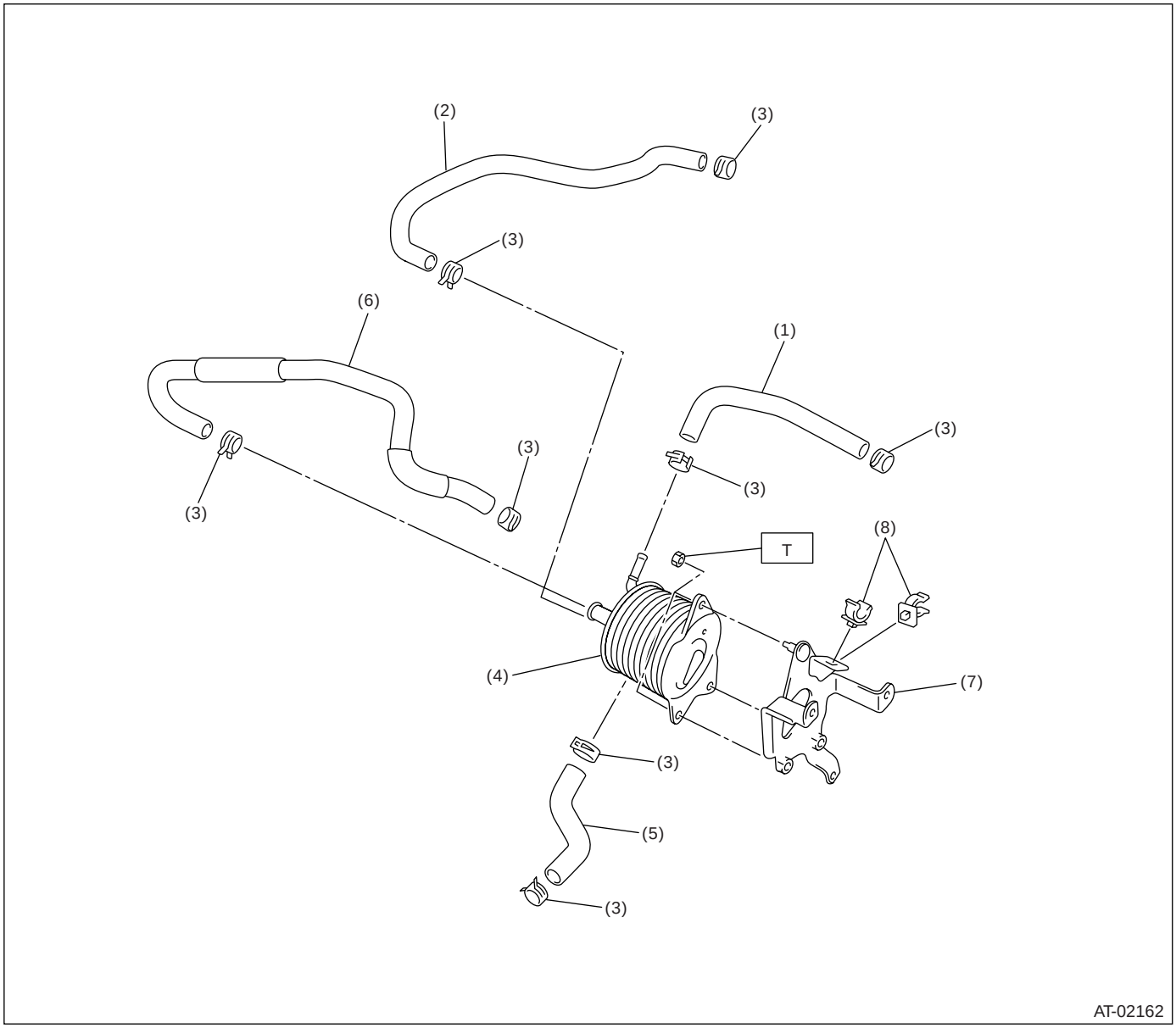
12.TRANSFER AND EXTENSION CASE WITH VTD



(1) Driven plate (Thicker)
(2) Drive plate
(3) Driven plate (Thinner)
(4) Driven plate (Thicker)
(5) Adjusting plate
(6) Snap ring
(7) Spring retainer
(8) Plate
(9) O-ring
(10) Multi-plate clutch (LSD) piston ASSY
(11) D-ring
(12) Gasket
(13) Multi-plate clutch (LSD) pipe
(14) Extension case
(15) O-ring
(16) Test plug
(17) Oil seal
(18) Dust cover
(19) O-ring
(20) Rear vehicle speed sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.1)
T2: 13 (1.3, 9.4)
T3: 25 (2.5, 18.1)

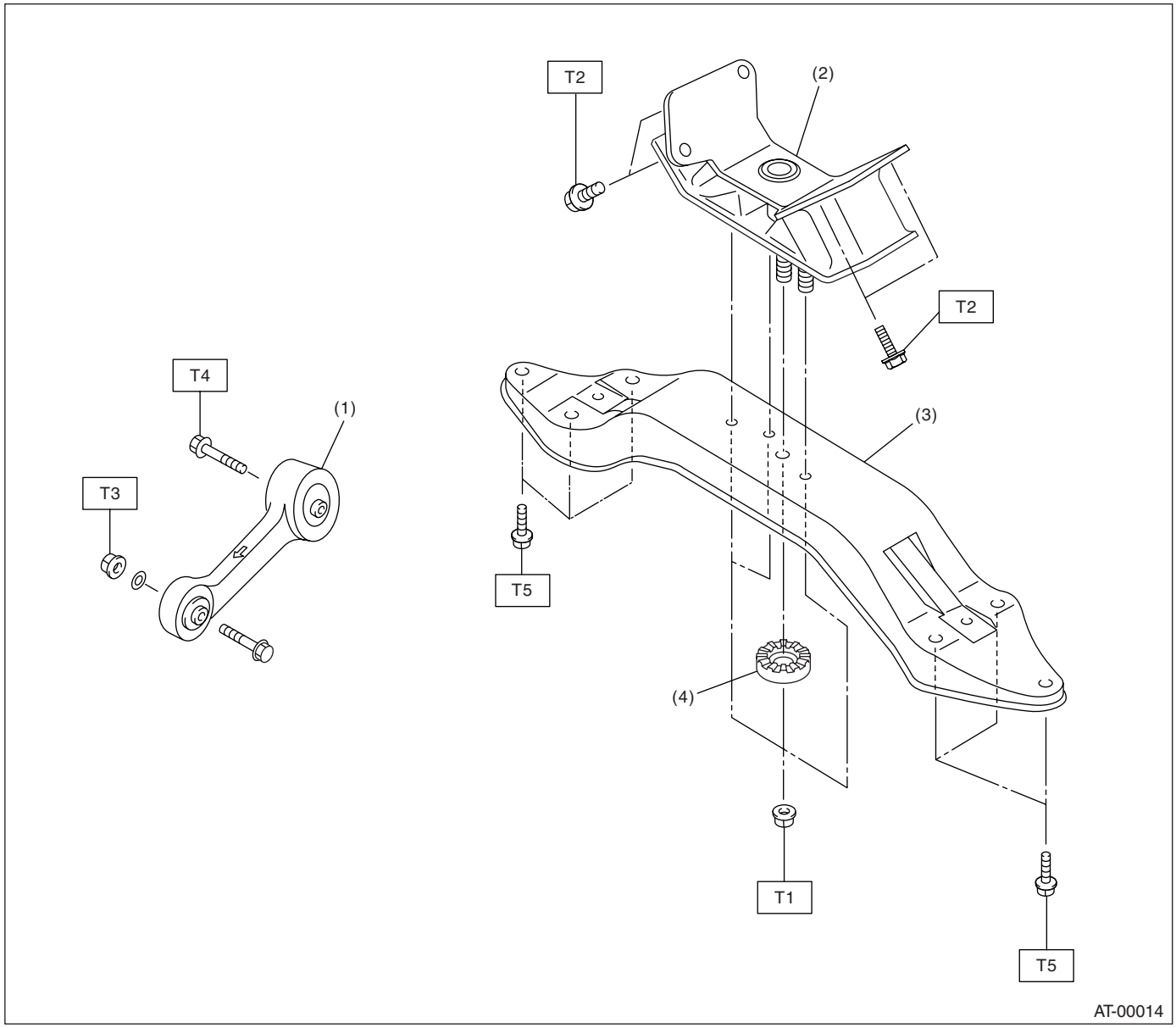
13.ATF COOLER WITH ATF WARMER FUNCTION



(1) ATF cooler outlet hose
(2) ATF cooler inlet hose
(3) Hose clamp
(4) ATF cooler ASSY
(5) Engine coolant inlet pipe
(6) Engine coolant outlet pipe
(7) ATF cooler bracket
(8) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T: 23 (2.3, 16.6)

14.TRANSMISSION MOUNTING



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 40 (4.1, 30)
T3: 50 (5.1, 37)
T4: 58 (5.9, 43)
T5: 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 or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Do not place the oil pan with its inner side facing 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 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 bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply gear oil or ATF onto sliding or 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 vice, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vice.
• Avoid damaging the mating surface of the case.
• Before applying liquid gasket, completely remove the old seal.

D: PREPARATION TOOL

1. SPECIAL TOOL

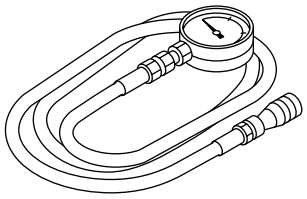
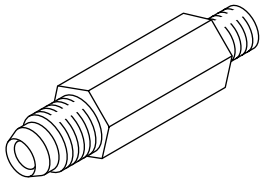
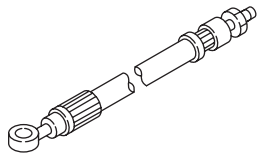
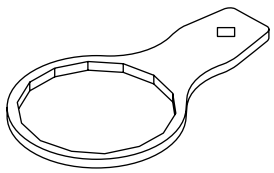
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used for oil pump housing when measuring reverse clutch pressure and line pressure.
 ST-498897700	498897700	ADAPTER SET	Used for measuring transfer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

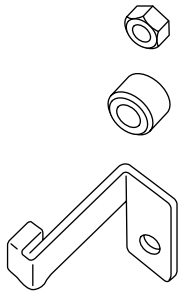
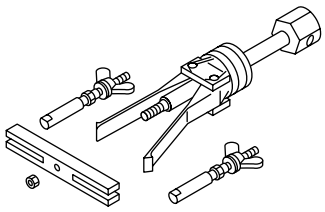
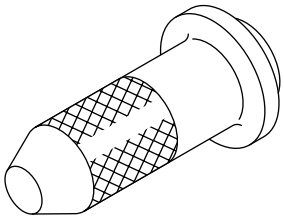
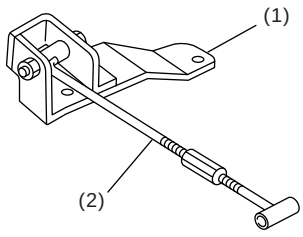
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST-398527700	398527700	PULLER ASSY	• Used for removing extension case roller bearing. • Used for removing extension oil seal. • Used for removing front differential side retainer bearing outer race. • Used for removing front differential side retainer oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting engine. (1) ENGINE SUPPORT BRACKET (41099AC010) (2) ENGINE SUPPORT (41099AC020)

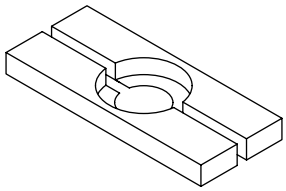
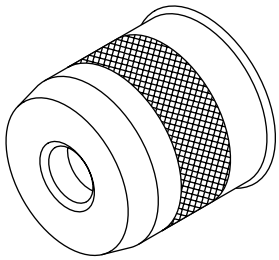
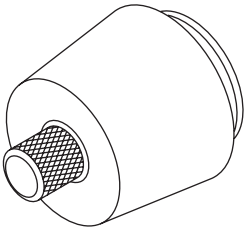
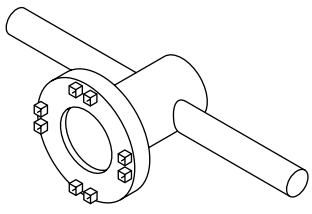
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.
 ST-499247400	499247400	INSTALLER	• Used for installing transfer outer snap ring. • Used with GUIDE (499257300).
 ST-499257300	499257300	SNAP RING OUTER GUIDE	• Used for installing transfer outer snap ring. • Used with INSTALLER (499247400).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.

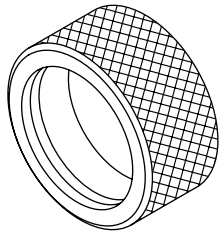
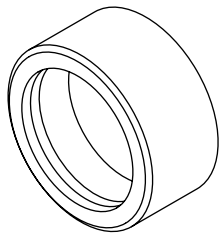
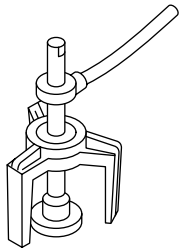
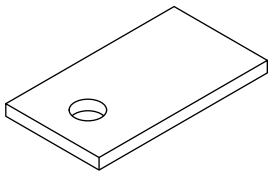
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398437700	398437700	DRIFT	Used for installing converter case oil seal.
 ST-398487700	398487700	INSTALLER	Used for installing front differential taper roller bearing.
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing clutch spring.
 ST-498255400	498255400	PLATE	Used for measuring backlash of hypoid gear.

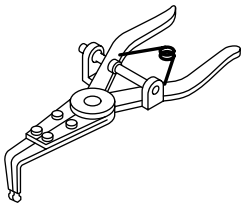
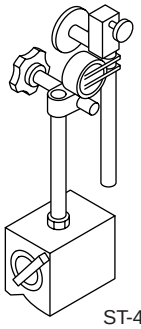
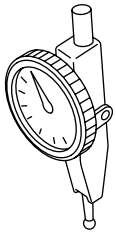
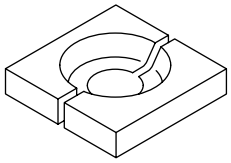
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399893600	399893600	PLIERS	Used for removing and installing clutch spring.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring gear backlash. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring gear backlash. • Used with MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing front roller bearing.

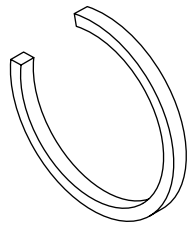
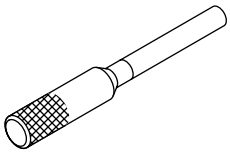
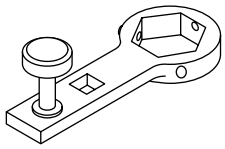
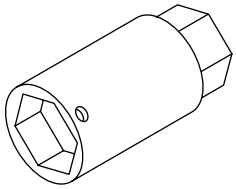
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398623600	398623600	SEAT	Used for removing spring of transfer clutch piston.
 ST-499267300	499267300	STOPPER PIN	Used for installing inhibitor switch.
 ST-499787700	499787700	WRENCH	Used for removing and installing drive pinion lock nut.
 ST-499787500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

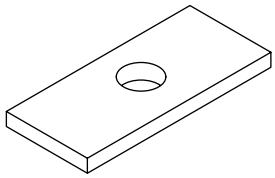
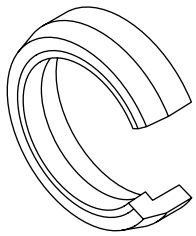
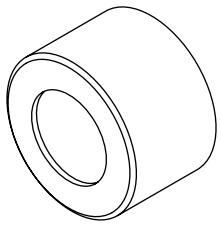
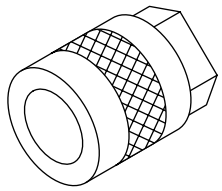
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-498627100	498627100	SEAT	Used for holding low clutch piston retainer spring when installing snap ring.
 ST-499577000	499577000	GAUGE	Used for measuring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

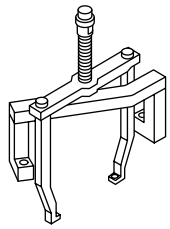
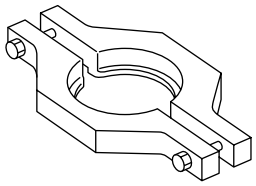
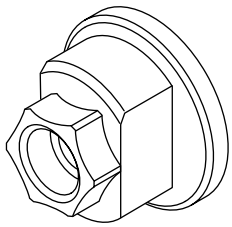
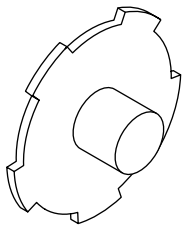
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499737100	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing ball bearing.
 ST-498937110	498937110	HOLDER	Used for removing and installing drive pinion lock nut.
 ST-498677100	498677100	COMPRESSOR	Used for installing 2-4 brake snap ring.

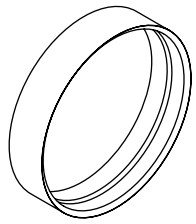
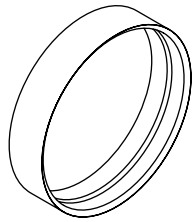
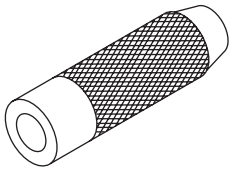
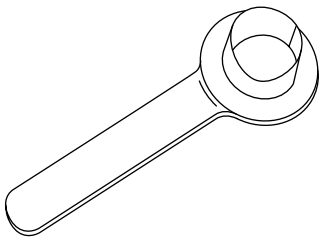
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498437000	498437000	HIGH CLUTCH PISTON GUIDE	Used for installing high clutch piston.
 ST-498437100	498437100	LOW CLUTCH PISTON GUIDE	Used for installing low clutch piston.
 ST-899580100	899580100	INSTALLER	Used for press-fitting of ball bearing for transfer clutch.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for installing axle shaft.

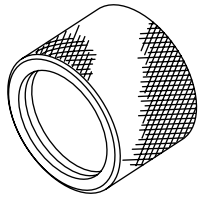
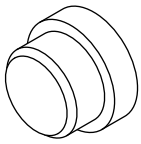
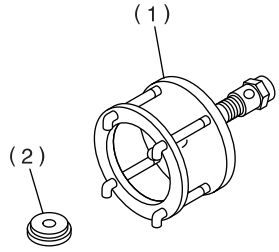
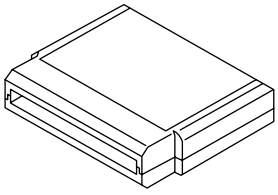
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18675AA000	18675AA000	DIFFERENTIAL OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST-398497701	398497701	SEAT	Used for installing needle bearing.
 ST-899524100	899524100	PULLER SET	Used for bolt only. • Used with PULLER SET (499737100). • Used with PULLER (499737000). (1) Puller (2) Cap
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

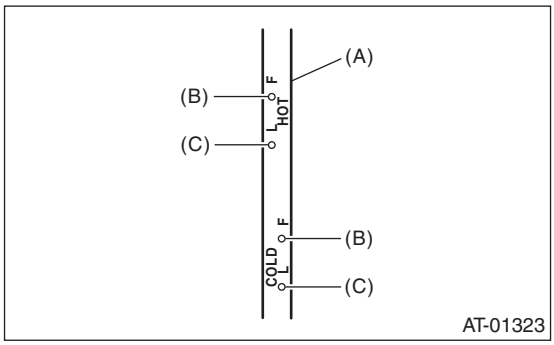
TOOL NAME	REMARKS
Depth gauge	Used for measuring transmission end play.
Thickness gauge	Used for measuring clearance of clutch, brake and oil pump.
Micro meter	Used for measuring thickness of drive pinion.
Spring balance	Used for measuring starting torque of drive pinion.
Circuit tester	Used for measuring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

2. Automatic Transmission Fluid

A: INSPECTION

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

1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
2) Park the vehicle on a level surface.
3) After selecting all positions (P, R, N, D), set the select lever in "P" range. Measure the ATF level with engine idling for one or two minutes.



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

4) Make sure that ATF level is above the center of upper level and lower level at HOT side.
5) If the ATF level is below the center between upper level and lower level, replenish a recommended ATF until the fluid level exceeds the center between upper level and lower level.

CAUTION:
- **Use care not to exceed the upper limit level.**
- **Be sure that the replenishment of ATF to the upper level with the transmission cold will cause overfilling of ATF and result in a transmission failure.**

6) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Check the ATF for leaks.
Make visual inspection for leaks from the inside of transmission. If there are leaks, repair or replace the gasket, oil seals, plugs or other parts.

B: REPLACEMENT

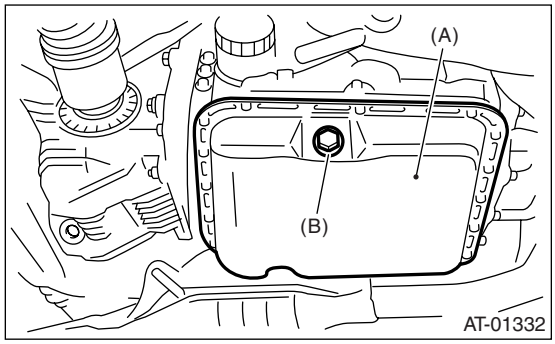
1) Lift-up the vehicle.
2) Remove the ATF drain plug to drain ATF.

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

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

NOTE:
Use a new gasket.

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



(A) Oil pan
(B) ATF drain plug

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

Recommended fluid:
SUBARU ATF (Part No. K0410Y0700) or Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:
If the ATFs above are not available, use Dexron III.

Capacity:
Fill the same amount of ATF drained.

Capacity when transmission is overhauled:
2.0 L model
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
2.5 L model
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

7) Bleed the air of control valve.
<Ref. to 4AT-63, Air Bleeding of Control Valve.>
8) Check the level and leaks of ATF.
<Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

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

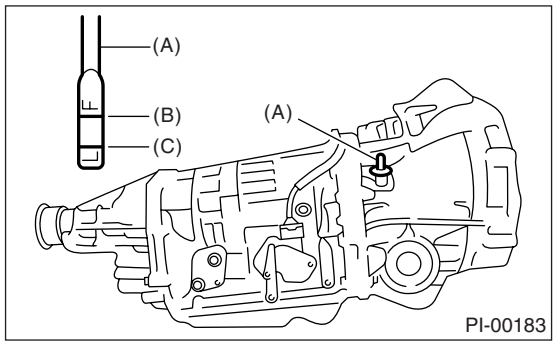
Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Excessive wear of the internal of the transmission body.	Replace ATF and check if AT operates correctly.
Thick and varnish-form fluid.	Burned clutch and etc.	Replace ATF and check AT itself and vehicle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

3. Differential Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
4) Remove the level gauge 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.

NOTE:
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

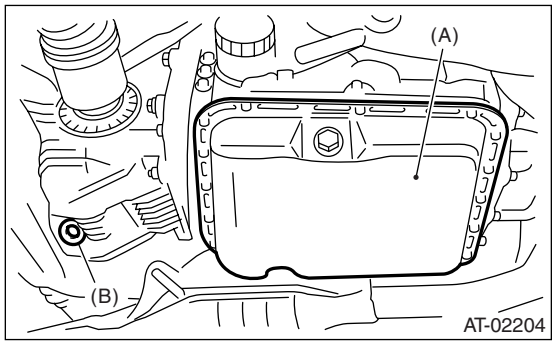
1) Lift-up the vehicle.
2) Remove the differential gear oil drain plug using TORX® BIT T70, and drain the differential gear oil completely.

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) Tighten the differential gear oil drain plug using TORX® BIT T70.

NOTE:
Use a new gasket.

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



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

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

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

Differential 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 the 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 ←→ 2nd ←→ 3rd ←→ 4th while driving on general 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 down from 4th to 3rd range while driving in 4th gear of manual mode [50 — 60 km/h (31 — 37 MPH)].
• Check the 2nd gear engine brake when shifting down from 3rd to 2nd range while driving in 3rd gear of manual mode [40 — 50 km/h (25 — 31 MPH)].
• Check the 1st gear engine brake when shifting down from 2nd to 1st range while driving in 2nd gear of manual mode [20 — 30 km/h (12 — 19 MPH)].

6. LOCK-UP FUNCTION

• Check that rpm does not change sharply when the axle pedal is lightly depressed while driving on flat roads at normal speed in “D” range.
• Check slip lock-up with following procedure. Subaru Select Monitor is needed for checking.
Before start checking, check that no DTC is displayed using Subaru Select Monitor. When DTC is displayed, perform the collective action with DTC and check that any more DTC is displayed, and then start the checking.
1) Perform the check on flat and straight road or free roller.

NOTE:
• Slip lock-up does not operate when the vehicle is lifted up, because of not occurring surface resistance.
• Also when checking on the free roller, check with depressing the foot brake lightly to make the checking easier, because the surface resistance will be deficient.

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

NOTE:
• ATF temperature is between 50 — 100°C (122 — 212°F).
• When the temperature is low, warm-up the ATF by running the vehicle or etc.

4) Start the engine, so that the lock-up duty can be read on data display of Subaru Select Monitor.
5) Drive the vehicle at a constant speed of 35 — 40 km/h (22 — 25 MPH).
6) Read the lock-up duty while vehicle is running.

Standard value:
25 — 45%

NOTE:
The value may be lower on the free roller.

• Slip lock-up control is not operating when the lock-up duty is less than 5%, or when the lock-up duty goes down immediately after starts rising. On these cases, improper ATF or deterioration of ATF may be the cause. Check the amount of ATF or replace them, and then recheck it.

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. NOISE AND VIBRATION

Check for noise and vibration while driving and during shifting.

9. CLIMBING CONTROL FUNCTION

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

10.TRANSFER CLUTCH

Check tight corner braking when the vehicle started with steering fully turned.

11.OIL LEAKS

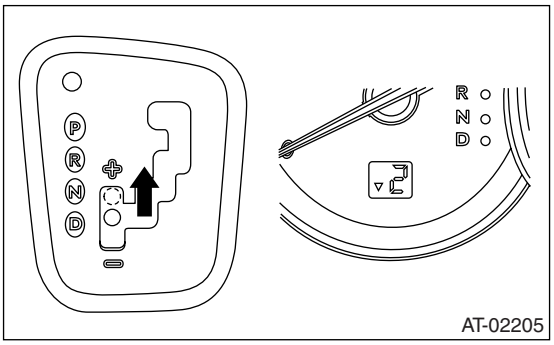
After the driving test, inspect for oil leaks.

5. Stall Test

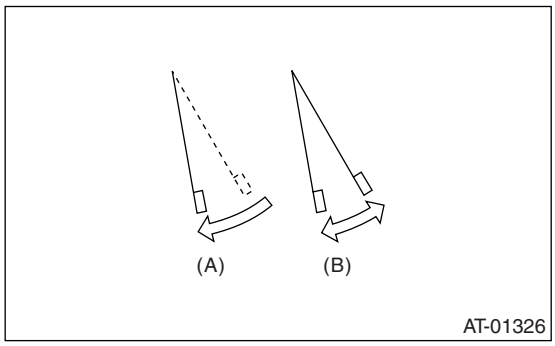
A: INSPECTION

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 2nd of manual mode.
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 the throttle valve opens fully.
2) Check that the engine oil level is correct.
3) Check that the coolant level is correct.
4) Check that the ATF level is correct.
5) Check that the differential gear oil level is correct.
6) Increase ATF temperature to 70 — 80°C (158 — 176°F) by idling the engine for approximately 30 minutes (with select lever set to “N” or “P”).
7) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
8) Move the manual linkage to ensure it operates properly, and then set to the 2nd on manual mode.



9) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



(A) Brake pedal
(B) Accelerator pedal

10) When the engine speed 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 the 2nd of manual mode 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.
13) Perform the stall tests with the select lever in “D” range.

NOTE:
• Do not continue the stall test for more than five 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 one minute after each stall test with the select lever set in “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 model:
2,300 — 2,700 rpm
2.5 L model:
2,600 — 2,900 rpm

Stall speed (at sea level)	Range	Cause
Less than standard	2nd on manual mode, R	• Throttle valve not fully open • Erroneous engine operation • Torque converter clutch's one-way clutch slipping
More than standard	D	• Line pressure is too low • Low clutch slipping • One-way clutch malfunctioning
	R	• Line pressure is too low • Reverse clutch slipping • Low & reverse brake slipping
	2nd on manual mode	• Line pressure is 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 operation fluid temperature 70 — 80°C (158 — 176°F).
- Be sure to allow a one minute interval between tests.
- Make three measurements and take the average value.

1) Fully apply the parking brake.
2) Start the engine.
Check the 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

7. Line Pressure Test

A: MEASUREMENT

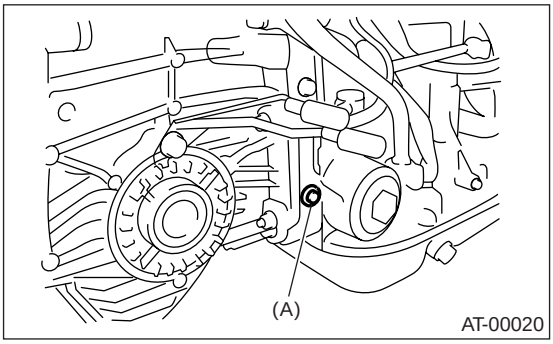
NOTE:
If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

• 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 line pressure, jack-up all the wheels.
   (2) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above-mentioned temperature after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)
2) Line pressure measurement (under heavy load):
   (1) Before measuring line pressure, apply both the foot and parking brakes with all wheels chocked (Same as for “stall” test conditions).
   (2) Measure the line pressure when the select lever is in “R” or 2nd of manual mode with engine under stall conditions.
   (3) Measure the line pressure within 5 seconds after shifting the select lever to each position. (If the line pressure needs to be measured again, allow the engine to idle and cool it down more than 1 minute.)
   (4) Maintain the ATF temperature at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above-mentioned temperature after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)
3) Remove the test plug and install the ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



(A) Test plug

4) Connect the ST1 with ST2.

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

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

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

8. Transfer Clutch Pressure Test

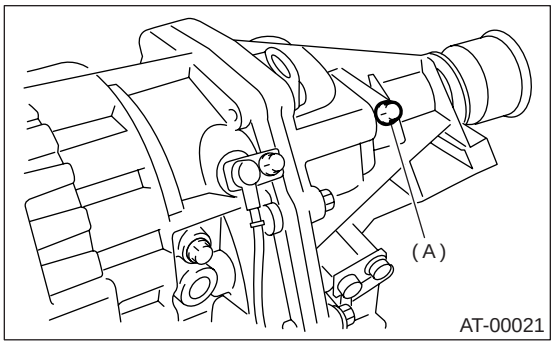
A: INSPECTION

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

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

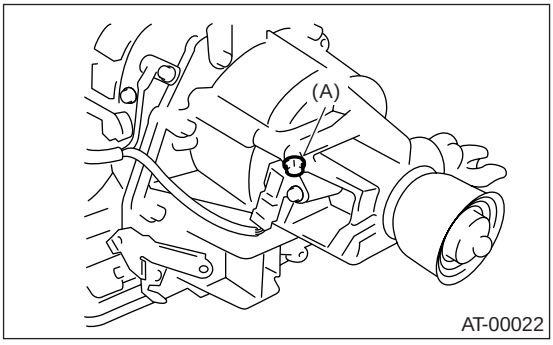
NOTE:
• Before setting in FWD mode, install the spare fuse on FWD mode switch. (MPT model)

- MTP model



(A) Test plug

- VTD model



(A) Test plug

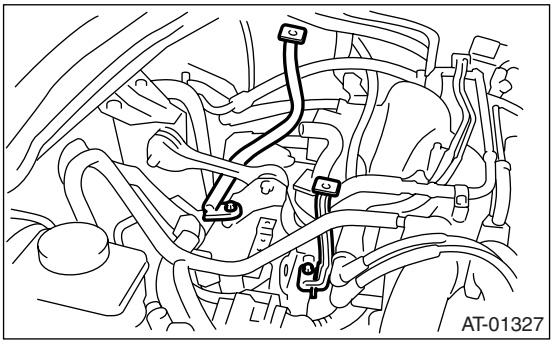
• If no oil pressure is produced or if it does not change in AWD mode, the control valve body may be malfunctioning. If oil pressure is produced in FWD mode, the same problem as AWD mode occurs.

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

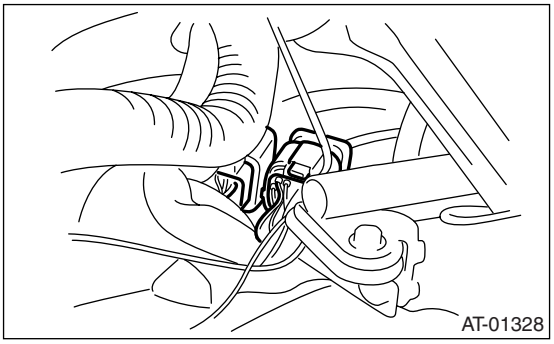
9. Automatic Transmission Assembly

A: REMOVAL

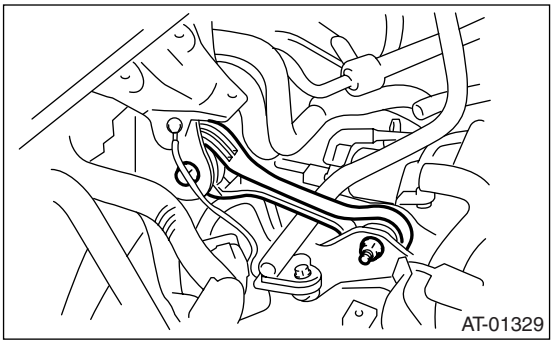
1) Set the vehicle on a lift.
2) Fully open the front hood and support with hood stay.
3) Disconnect the ground cable from battery.
4) Remove the air intake duct.
<Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
5) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
6) Remove the air cleaner case stay.



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

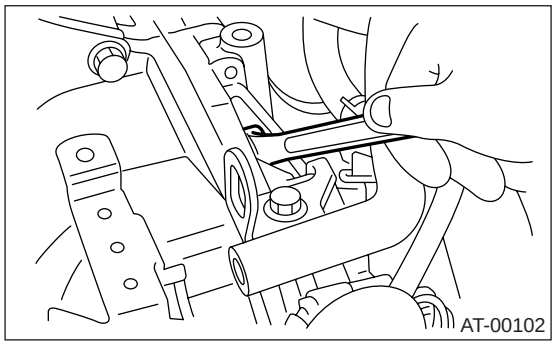


(2) Transmission ground terminal
8) Remove the starter.
<Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
9) Remove the pitching stopper.

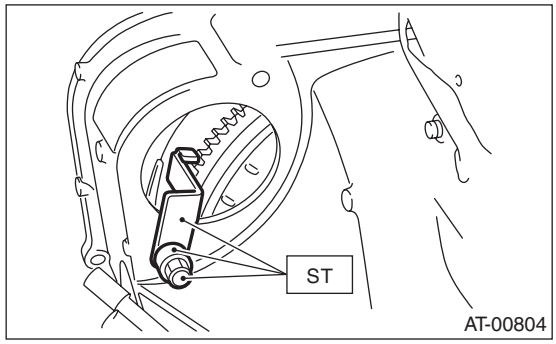


10) Separate the torque converter clutch from drive plate.
(1) Remove the V-belt covers.
(2) Remove the service hole plug.
(3) Remove the bolts which hold torque converter clutch to drive plate.
(4) Insert the wrench to crank pulley bolt, and then remove all the bolts with slightly rotating crank pulley.

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

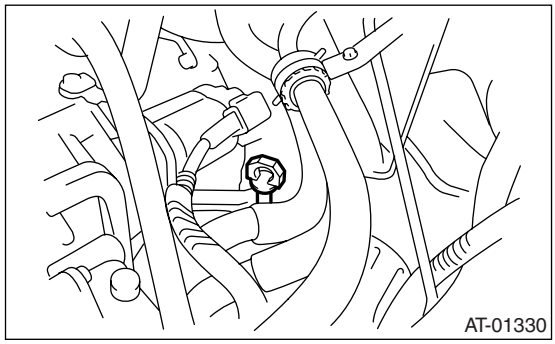


11) Install the ST to converter case.
ST 498277200 STOPPER SET



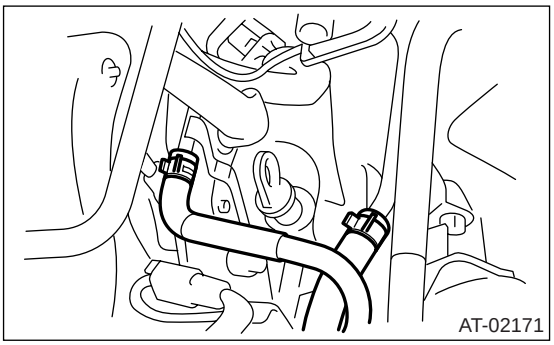
12) Remove the ATF level gauge.

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

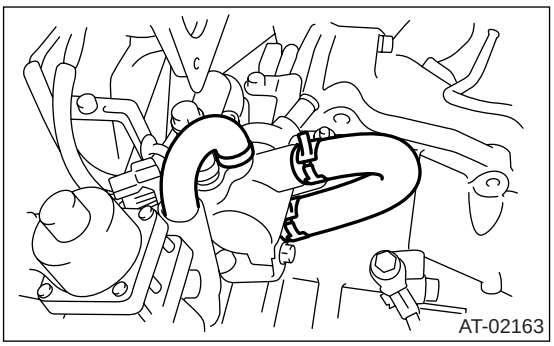


13) Remove the throttle body. <Ref. to FU(H4SO 2.0)-10, REMOVAL, Throttle Body.>

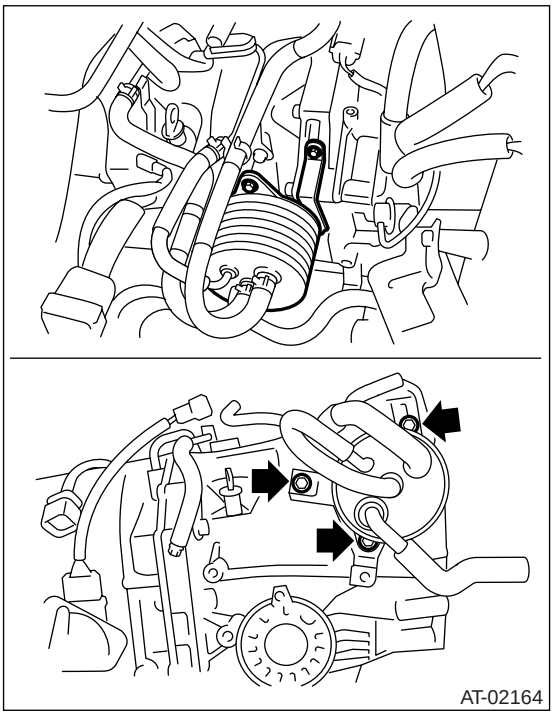
14) Drain the engine coolant by approx. 2 ℓ (2.1 US qt, 1.8 Imp qt). (Model with ATF cooler with warmer function)
15) Disconnect the ATF cooler inlet and outlet hoses from ATF cooler pipes.



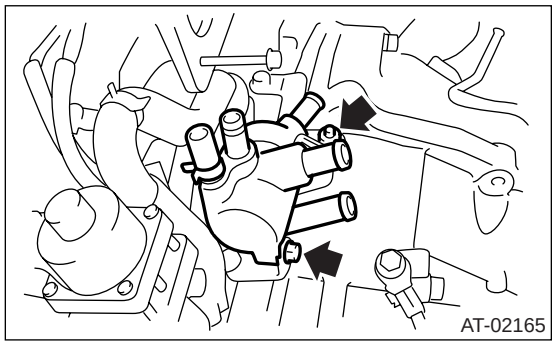
16) Disconnect each hose from warmer cock assembly.



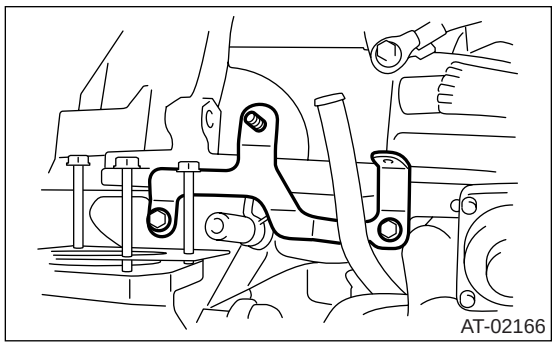
17) Remove the ATF cooler with warmer function from transmission body, and then secure it to vehicle body by wire, etc.. Select the place not to prevent transmission from being replaced. (Model with ATF cooler with warmer function)



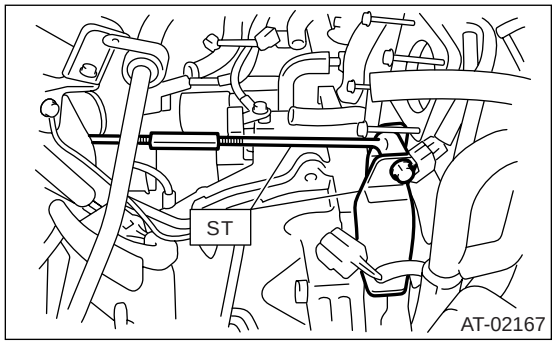
18) Remove the warmer cock assembly. (Model with ATF cooler with warmer function)



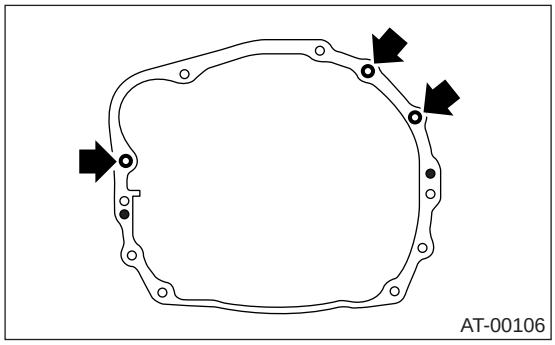
19) Remove the bracket for warmer cock assembly. (Model with ATF cooler with warmer function)



20) Remove the pitching stopper bracket.
21) Set the ST.
ST 41099AC000 ENGINE SUPPORT ASSEMBLY

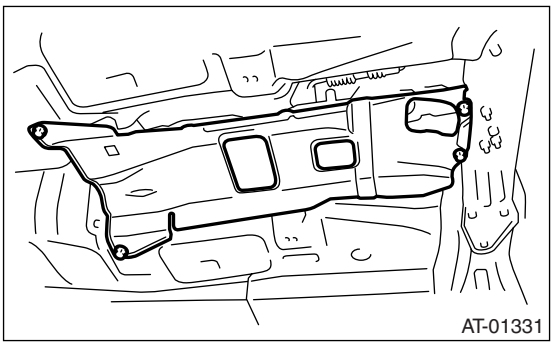


22) Remove the bolts which hold upper side of transmission to engine.

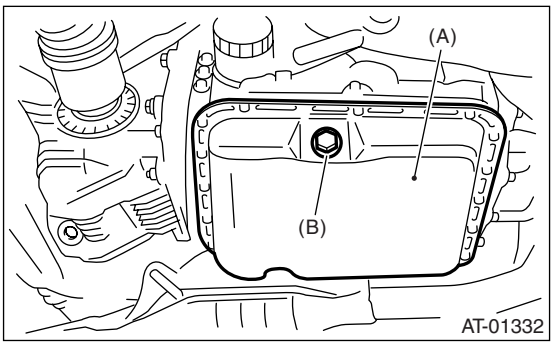


23) Lift-up the vehicle.
24) Remove the under cover.

25) Remove the front, center and rear exhaust pipes and muffler.
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
26) Remove the heat shield cover.

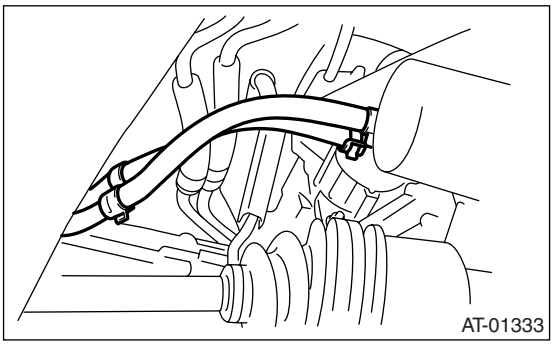


27) Remove the ATF drain plug to drain ATF.

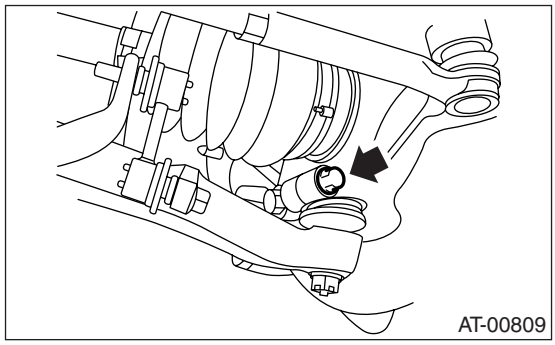


(A) Oil pan
(B) ATF drain plug

28) Disconnect the ATF cooler hoses from pipes of transmission side, and remove the oil charge pipe. (Model without ATF cooler with warmer function)



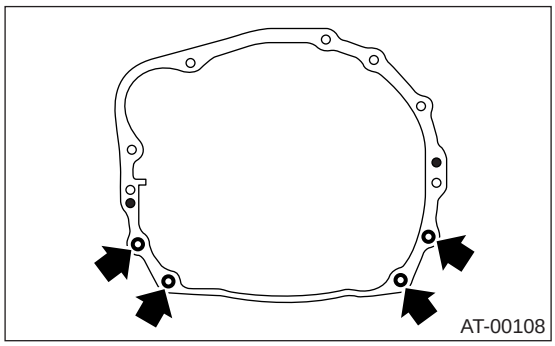
29) Remove the propeller shaft.
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
30) Remove the shift select cable.
<Ref. to CS-12, REMOVAL, Select Cable.>
31) Remove the brackets (two) which hold front stabilizer.
32) Remove the bolt securing ball joint of front arm to housing.



33) 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.

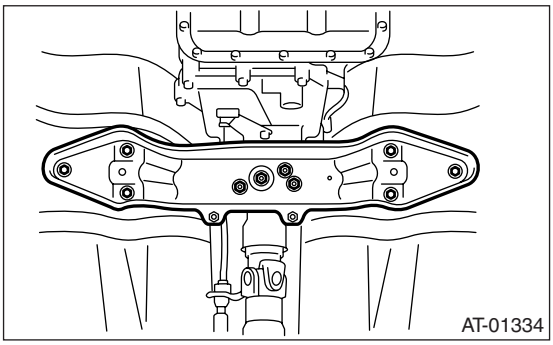
(2) Hold the transmission side joint portion of front drive shaft by hand and extract the housing from the transmission by pressing it outside so as not to stretch the boot.
34) Remove the bolts which hold the clutch housing cover.
35) Remove the bolts which hold lower side of transmission to engine.



36) Place the transmission jack under transmission.

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

37) Remove the transmission rear crossmember from the vehicle.

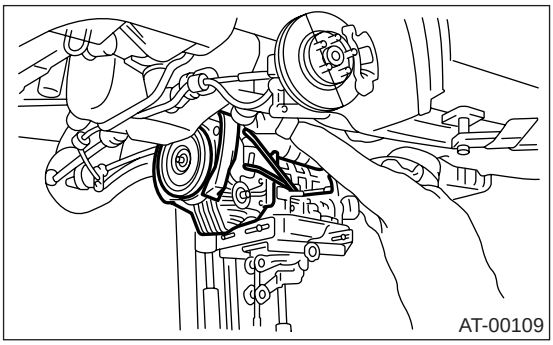


38) Fully contract the engine support while lowering the transmission jack gradually, and tilt the engine backward.

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

39) Remove the transmission.

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



40) Remove the rear cushion rubber from transmission assembly.

B: INSTALLATION

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

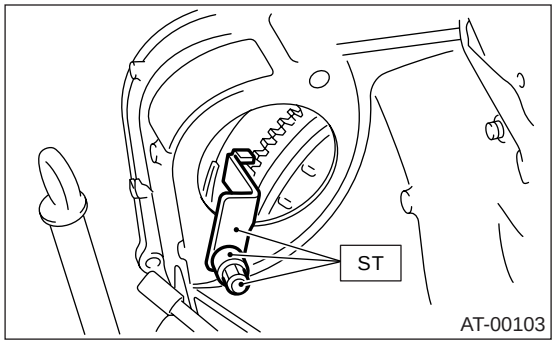
NOTE:
When a new oil seal has been installed, the replacement is not required.

2) Install the rear cushion rubber to transmission assembly.

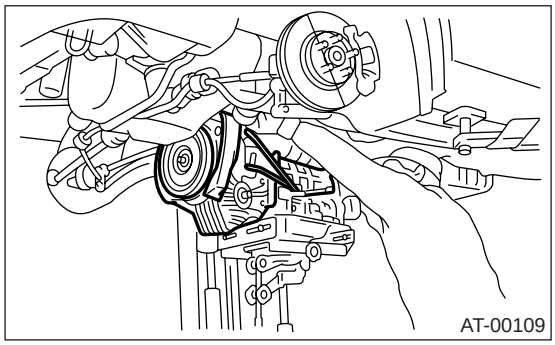
Tightening torque:
39 N·m (4.0 kgf-m, 29 ft-lb)

3) Install the ST to converter case.

ST 498277200 STOPPER SET



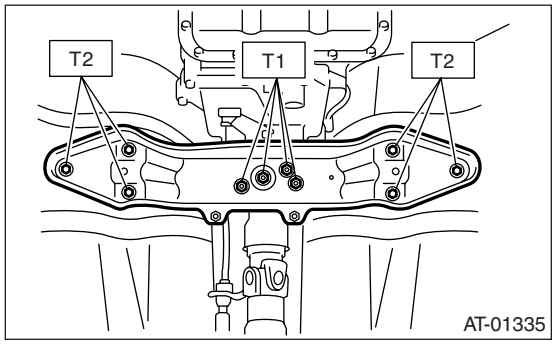
4) Install the transmission onto engine.
(1) Lift up the transmission gradually using a transmission jack.



(2) Engage them at splines.
(3) Turn the screws of engine support while raising the transmission jack gradually, and tilt the engine forward.

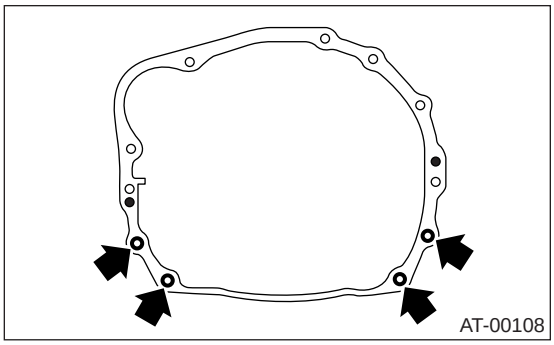
5) Install the transmission rear crossmember.

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 bolts which hold the lower side of transmission to engine.

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



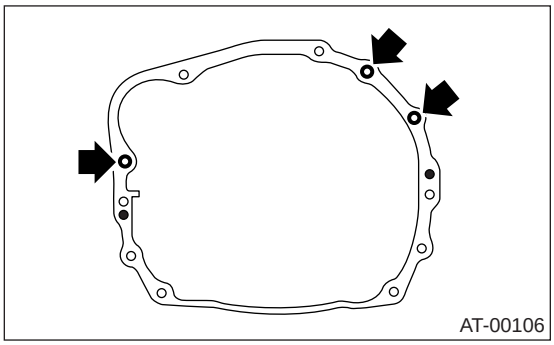
8) Screw the bolts for the clutch housing cover.
9) Lower the lift.
10) Connect the engine and transmission.
(1) Remove the ST from converter case.

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

ST 498277200 STOPPER SET

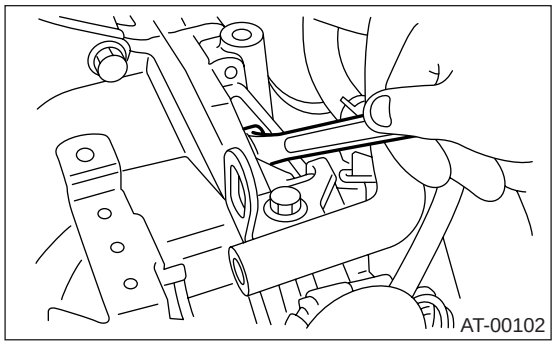
(2) Install the starter.
<Ref. to SC(H4SO 2.0)-6, INSTALLATION, Starter.>
(3) Tighten the bolts which hold the upper side of transmission to engine.

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

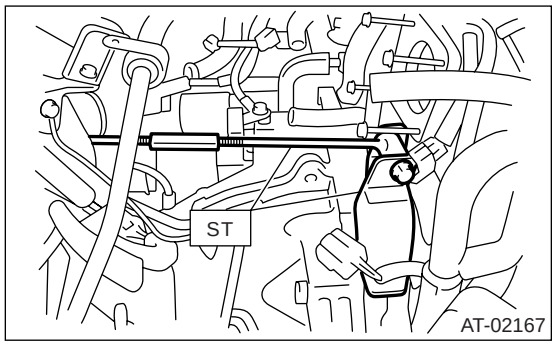


11) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Insert the wrench to crank pulley bolt, and then tighten all bolts while slightly rotating the crank pulley.

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

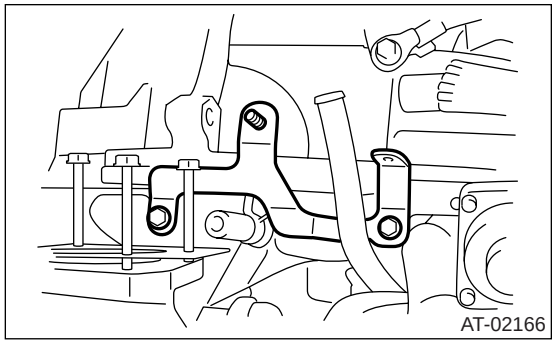


(3) Fit the plug to service hole.
(4) Install the V-belt cover.
12) Remove the ST.



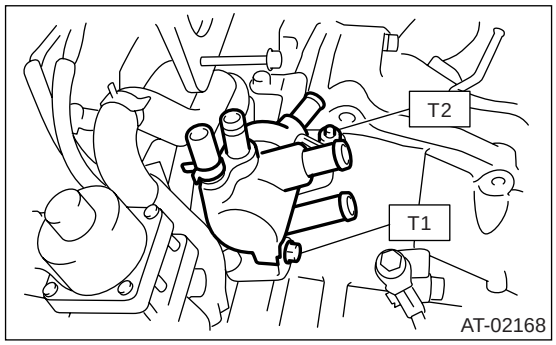
13) Install the warmer cock assembly bracket. (Model with ATF cooler with warmer function)

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

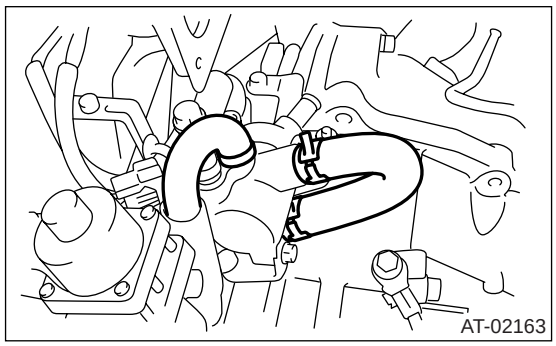


14) Install the warmer cock assembly. (Model with ATF cooler with warmer function)

Tightening torque:
T1: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
T2: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

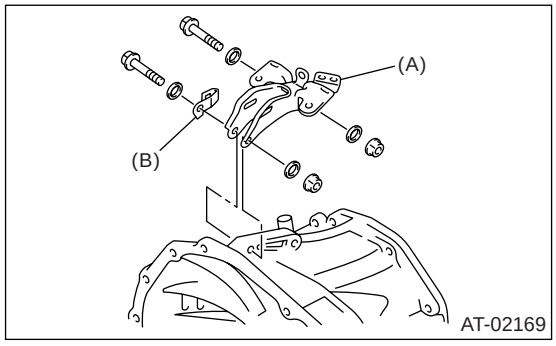


15) Connect each hose to warmer cock assembly. (Model with ATF cooler with warmer function)



16) Install the pitching stopper bracket and bracket (Model with ATF cooler with warmer function).

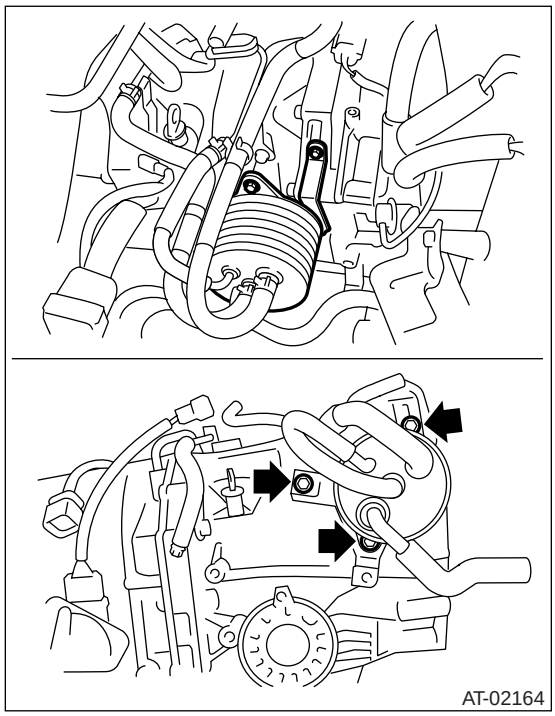
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



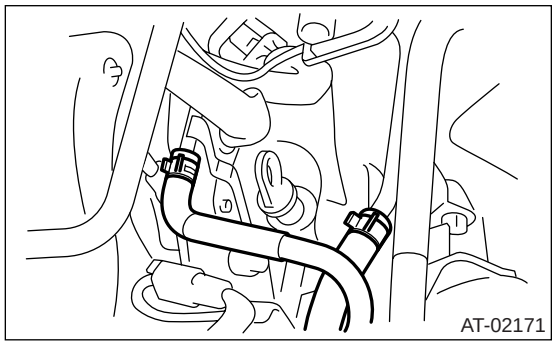
(A) Pitching stopper bracket
(B) Bracket (Model with ATF cooler with warmer function)

17) Install the ATF cooler with warmer function to transmission body. (Model with ATF cooler with warmer function)

Tightening torque:
23 N·m (2.3 kgf-m, 16.6 ft-lb)

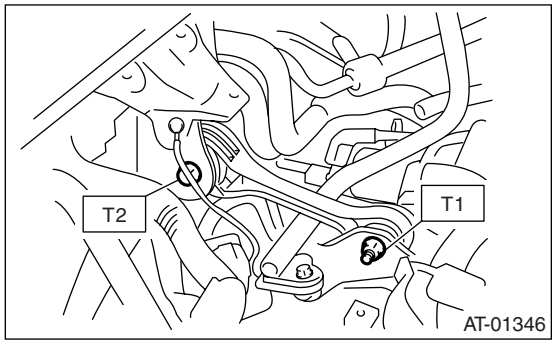


18) Connect the ATF cooler inlet and outlet hoses to ATF cooler pipes. (Model with ATF cooler with warmer function)

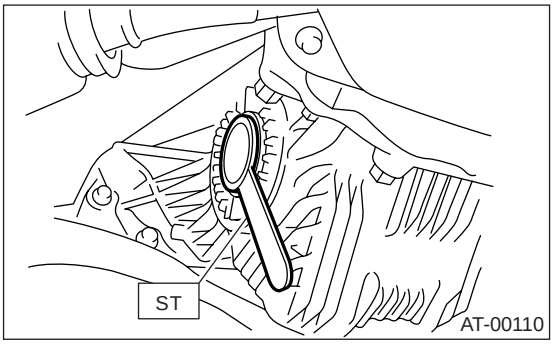


19) Install the throttle body. <Ref. to FU(H4SO 2.0)-10, INSTALLATION, Throttle Body.>
20) Install the pitching stopper.

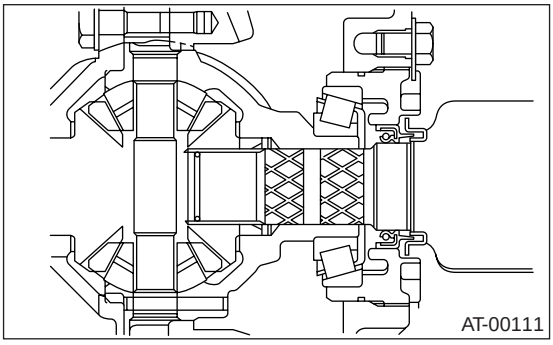
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



21) Lift-up the vehicle.
22) Replace the snap ring of front drive shaft with a new one.
23) Apply grease to the oil seal lips.
24) Install the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR

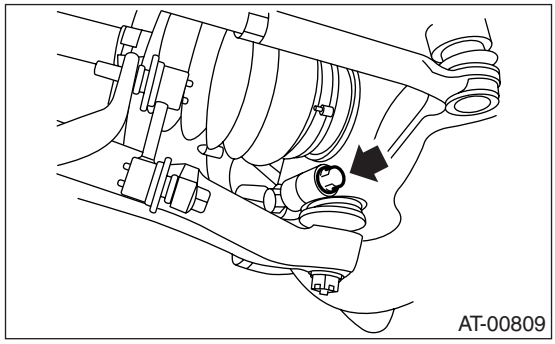


25) Align the spline of front differential shaft to that of differential bevel gear for insertion, and remove them using ST.
ST 28399SA010 OIL SEAL PROTECTOR
26) Insert the front drive shaft into transmission securely by pressing the front housing from outside.



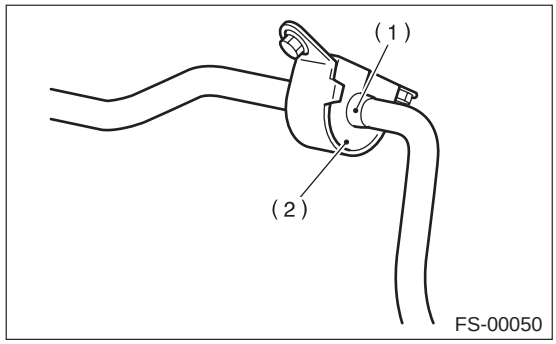
27) Install the ball joint into housing.
28) Tighten the attachment bolts.

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



29) Install the stabilizer to crossmember.

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

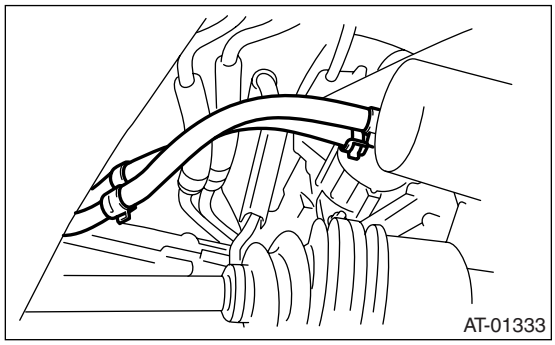


(1) Identification mark on stabilizer
(2) Bushing identification color

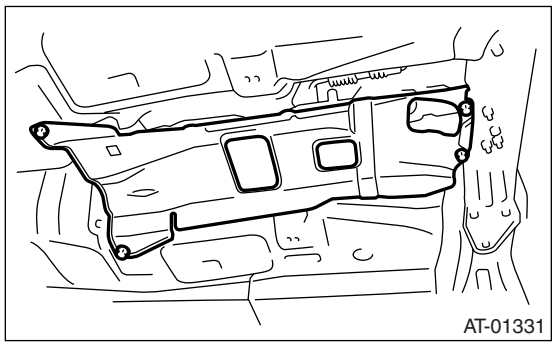
30) Always tighten the rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

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

31) Install the shift select cable onto select lever.
<Ref. to CS-13, INSTALLATION, Select Cable.>
32) Install the oil charge pipe, and connect the ATF cooler hoses to pipe. (Model without ATF cooler with warmer function)

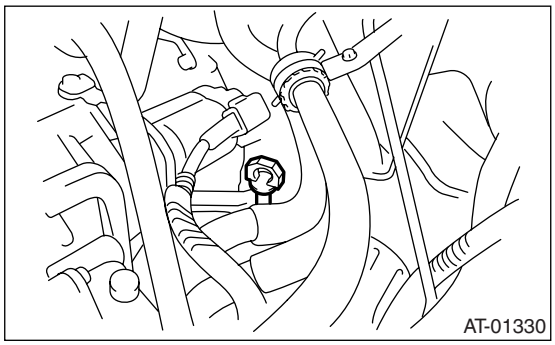


33) Install the oil charge pipe. (Model with ATF cooler with warmer function)
34) Install the propeller shaft.
<Ref. to DS-11, INSTALLATION, Propeller Shaft.>
35) Install the heat shield cover.



36) Install the rear exhaust pipe and muffler assembly.

<Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
37) Install the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
38) Install the under cover.
39) Lower the lift.
40) Install the ATF level gauge.



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

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

43) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
44) Install the air intake duct.
<Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
45) Using a gauge hole, add the ATF until the fluid level is found at the center between upper and lower levels of level gauge “COLD” side. <Ref. to 4AT-31, Automatic Transmission Fluid.>
46) Take off the vehicle from a lift.
47) Check the level of differential gear oil. <Ref. to 4AT-33, Differential Gear Oil.>
48) Check the select lever operation.
<Ref. to 4AT-52, INSPECTION, Inhibitor Switch.>
49) Bleed the air of control valve. <Ref. to 4AT-63, Air Bleeding of Control Valve.>
50) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>
51) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>
52) Perform the road test.
<Ref. to 4AT-34, Road Test.>