

General Description

AUTOMATIC TRANSMISSION

1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER

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

2. OIL PUMP

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

3. TRANSMISSION CONTROL ELEMENT

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

4. TRANSMISSION GEAR RATIO

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

5. PLANETARY GEAR AND PLATE

Number of front sun gear teeth	33
Number of front pinion teeth	21
Number of front internal gear teeth	75
Number of rear sun gear teeth	42
Number of rear pinion teeth	17
Number of rear internal gear teeth	75
Number of high clutch drive plates	4
Number of low clutch drive plates	5
Number of reverse clutch drive plates	2
Number of drive plates for the 2-4 brake	3
Number of drive plates for low & reverse brake	5

6. SELECTOR POSITION

P (Park)	Transmission is in neutral, output member is fixed, engine start is possible
R (Reverse)	Transmission in reverse for backing up
N (Neutral)	Transmission is in neutral and engine start is possible
D (Drive)	4-forward automatic gear change 1st ← → 2nd ← → 3rd ← → 4th
SPORT mode	4-forward automatic gear change 1st ← → 2nd ← → 3rd ← → 4th
Manual mode (+)	4-forward manual gear change (shift up) 1st → 2nd → 3rd → 4th
Manual mode (-)	4-forward manual gear change (shift down) 1st ← 2nd ← 3rd ← 4th
Control method	Wire cable type

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7. HYDRAULIC CONTROL AND LUBRICATION

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

8. COOLING AND HARNESS

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

9. TRANSFER

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

10.FINAL REDUCTION GEAR

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

11.RECOMMENDED GEAR OIL

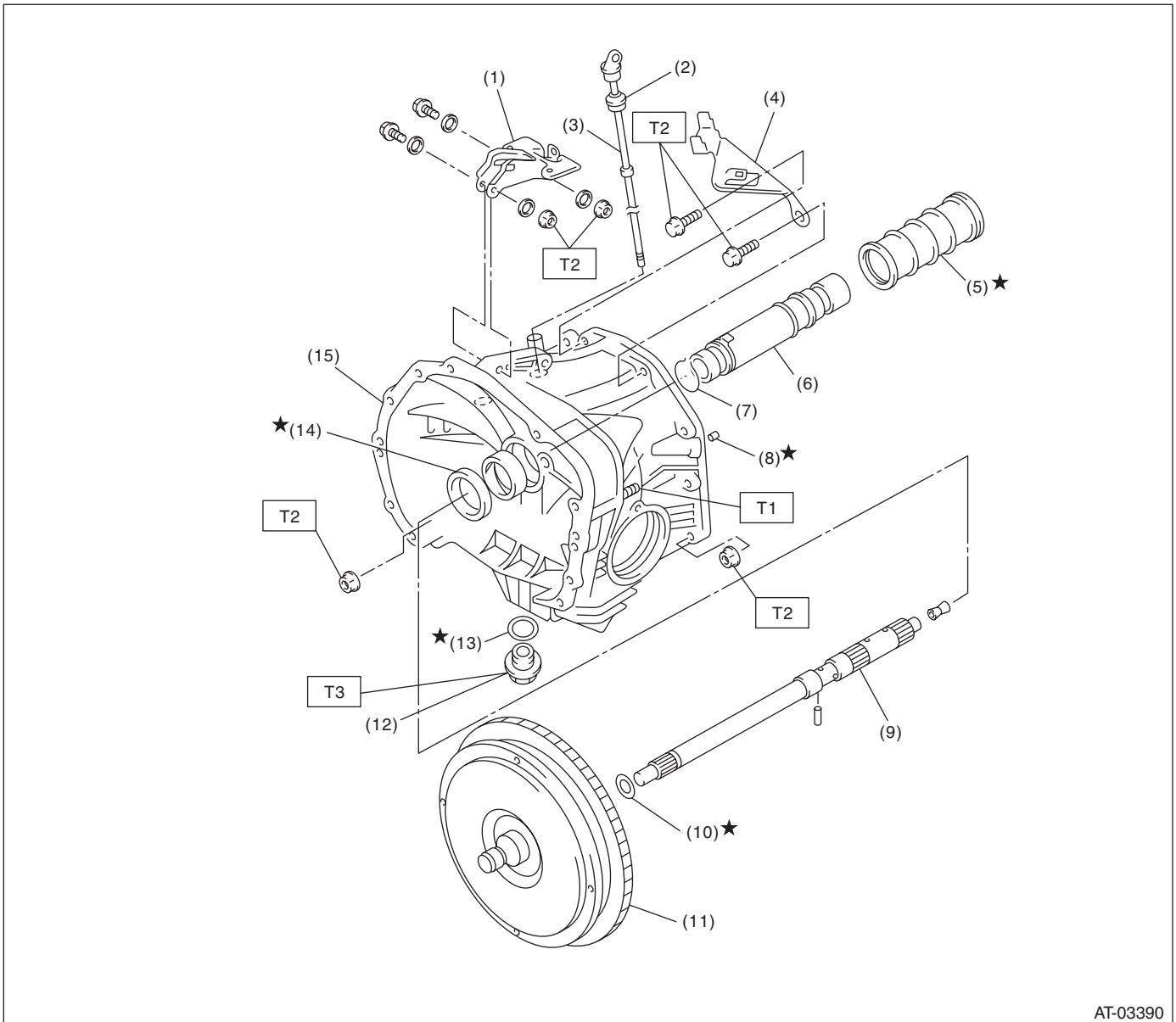
Lubrication oil		
	<p>(1) Item</p> <p>(2) Front differential gear oil</p> <p>(3) API standard</p> <p>(4) SAE viscosity No. and applicable temperature</p>	
Front differential oil capacity	ℓ (US qt, Imp qt)	1.1 — 1.3 (1.2 — 1.4, 1.0 — 1.1)

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B: COMPONENT

1. TORQUE CONVERTER AND CASE



- (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 ASSY
- (12) Drain plug
- (13) Gasket
- (14) Oil seal

- (15) Converter case

Tightening torque: N·m (kgf·m, ft·lb)

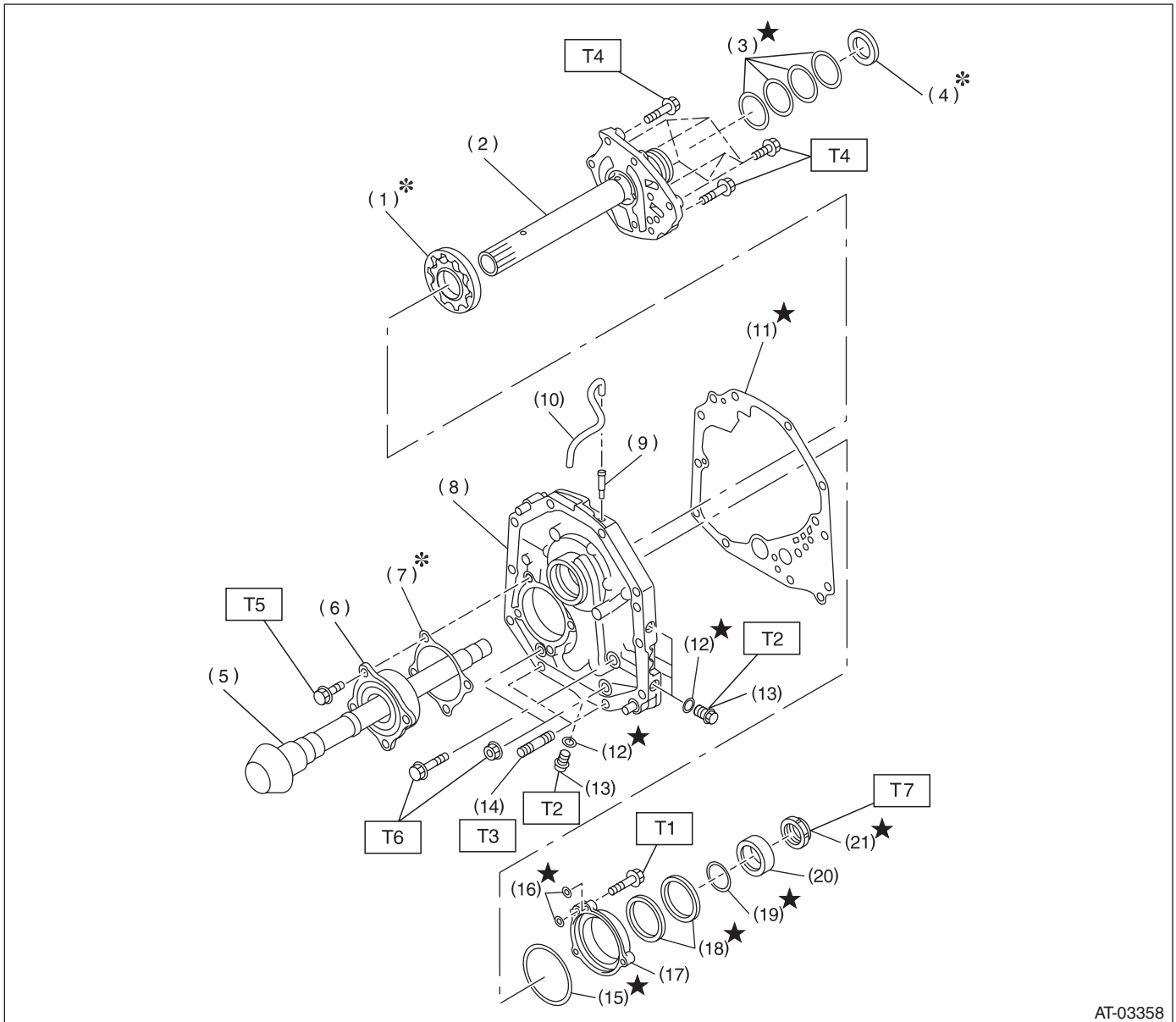
T1: 18 (1.8, 13.3)

T2: 41 (4.2, 30.4)

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

70 (7.1, 51.6) (Copper gasket)

2. OIL PUMP



AT-03358

- | | | |
|---------------------------|--------------------------|---------------|
| (1) Oil pump rotor | (11) Gasket | (21) Lock nut |
| (2) Oil pump cover | (12) O-ring | |
| (3) Seal ring | (13) Test plug | |
| (4) Thrust needle bearing | (14) Stud bolt | |
| (5) Drive pinion shaft | (15) O-ring | |
| (6) Roller bearing | (16) O-ring | |
| (7) Shim | (17) Oil seal retainer | |
| (8) Oil pump housing | (18) Oil seal | |
| (9) Nipple | (19) O-ring | |
| (10) Air breather hose | (20) Drive pinion collar | |

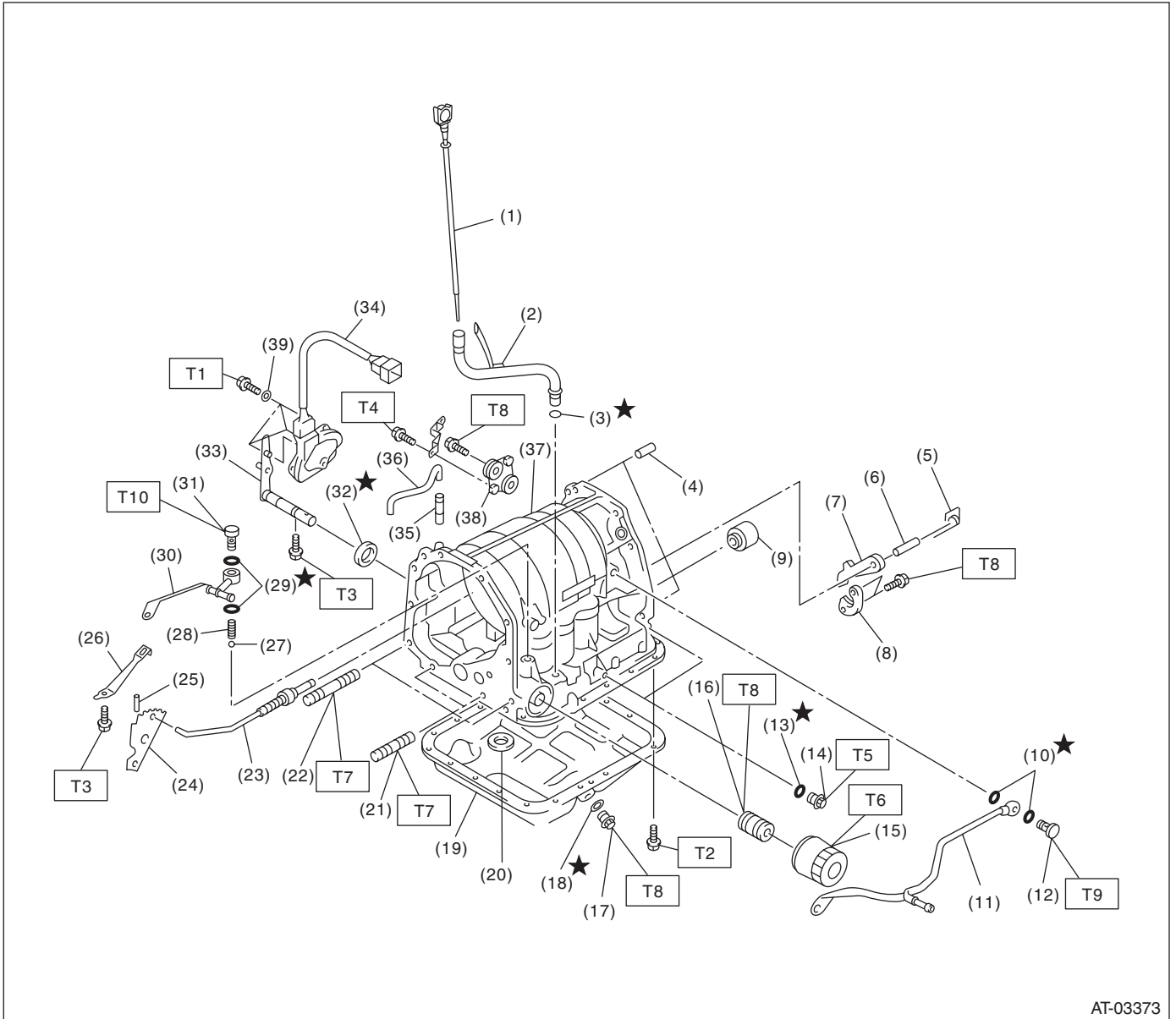
Tightening torque: N-m (kgf-m, ft-lb)

- T1: 7 (0.7, 5.1)**
T2: 13 (1.3, 9.4)
T3: 18 (1.8, 13.3)
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-03373

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

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, 13.3)

T8: 25 (2.5, 18)

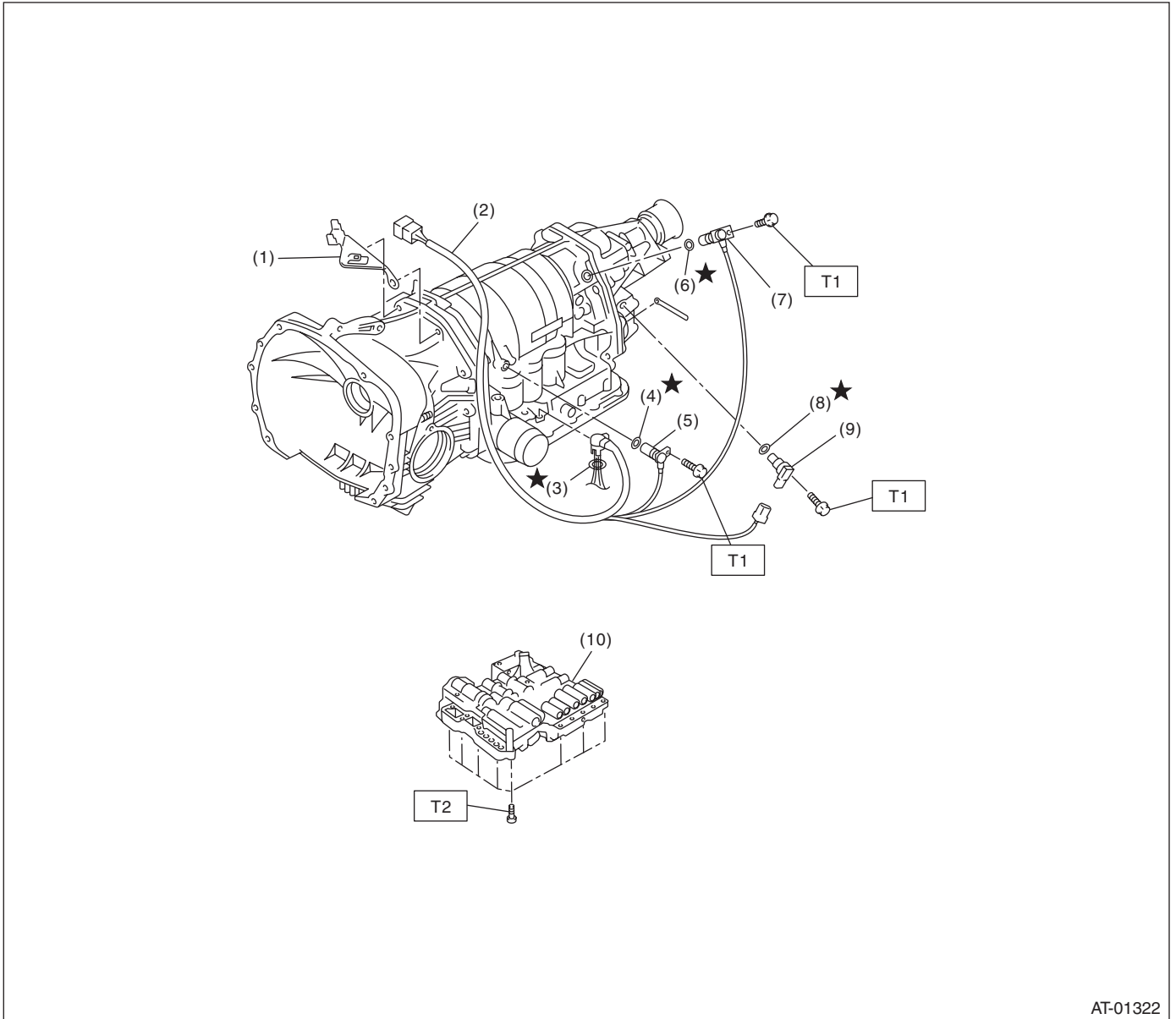
T9: 40 (4.1, 29.5)

T10: 44 (4.5, 32.5)

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4. CONTROL VALVE AND HARNESS ROUTING



AT-01322

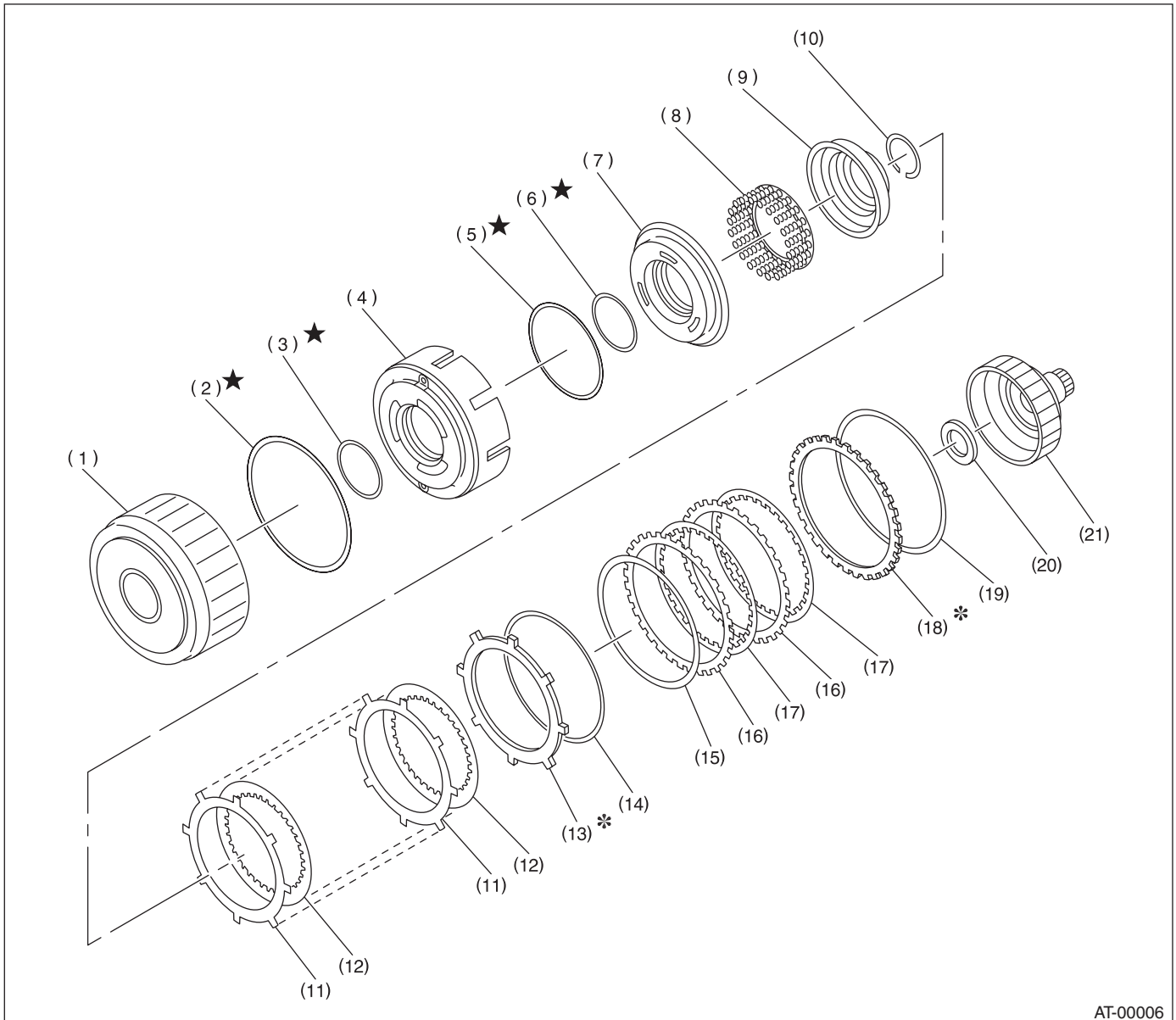
- | | |
|---|--------------------------------|
| (1) Stay | (6) O-ring |
| (2) Transmission harness | (7) Front vehicle speed sensor |
| (3) O-ring | (8) O-ring |
| (4) O-ring | (9) Rear vehicle speed sensor |
| (5) Torque converter turbine speed sensor | (10) Control valve body |

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



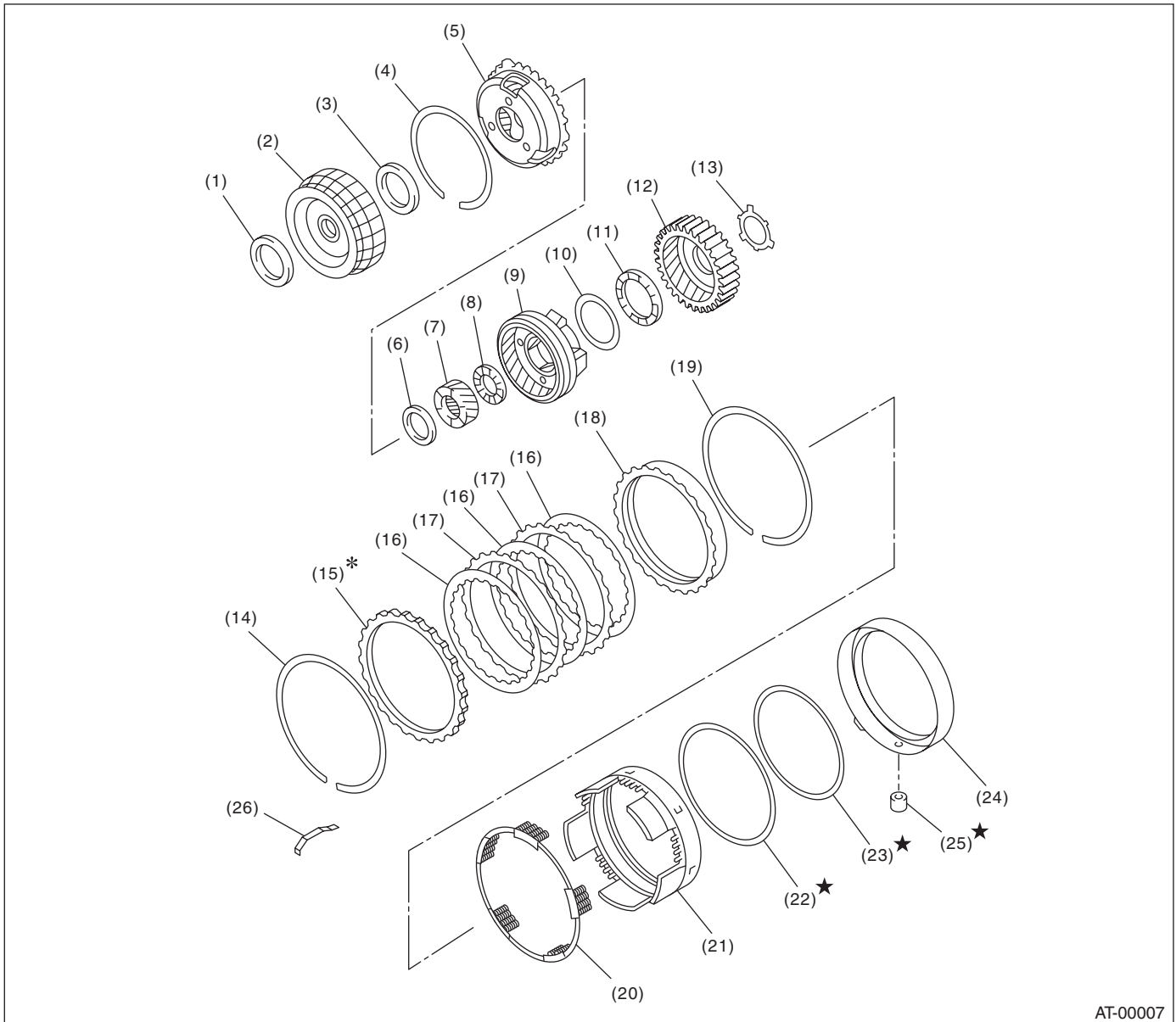
AT-00006

- | | | |
|---------------------------|------------------------------------|---------------------------------------|
| (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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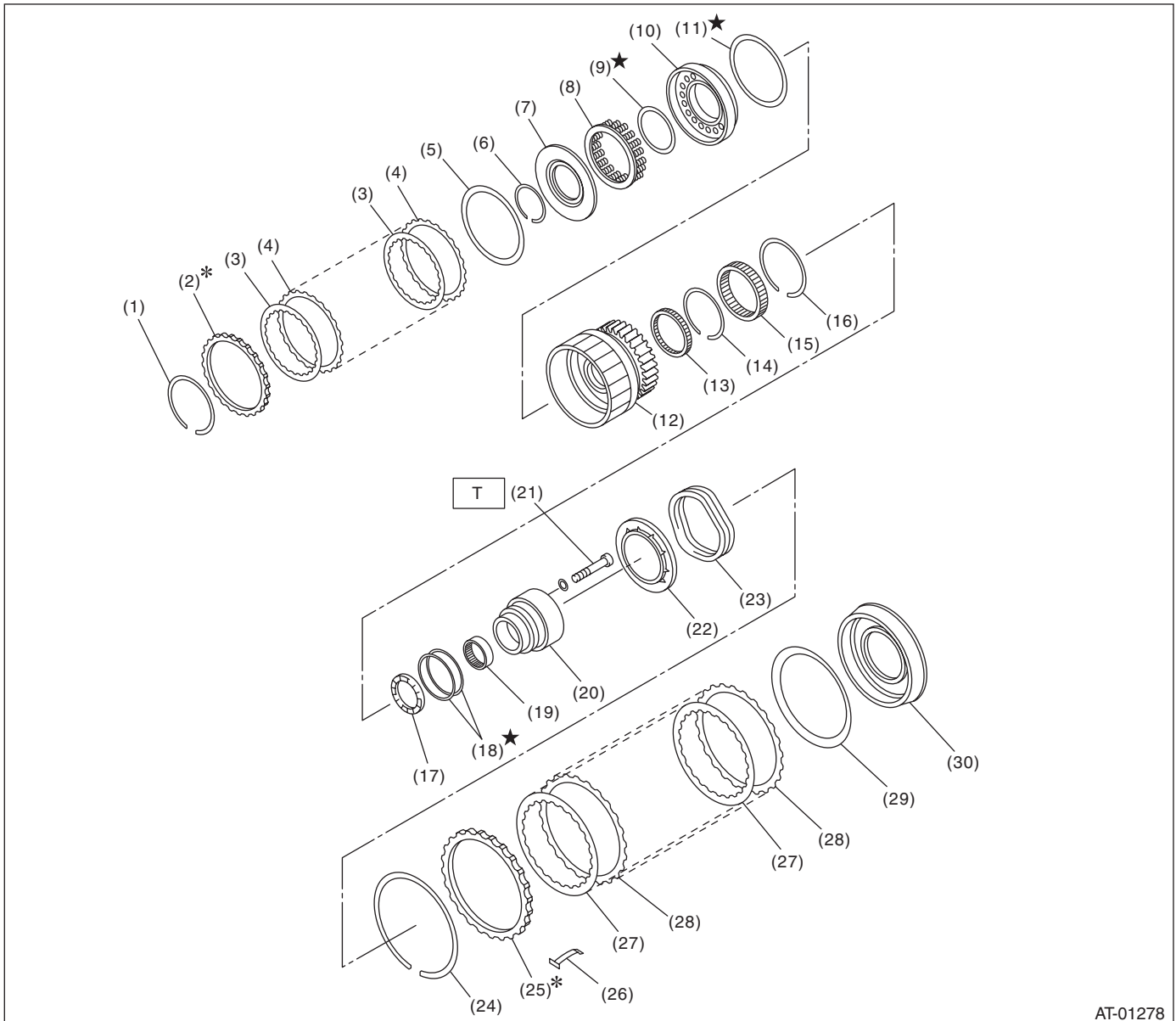
6. PLANETARY GEAR AND 2-4 BRAKE



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 BREAK



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 | |

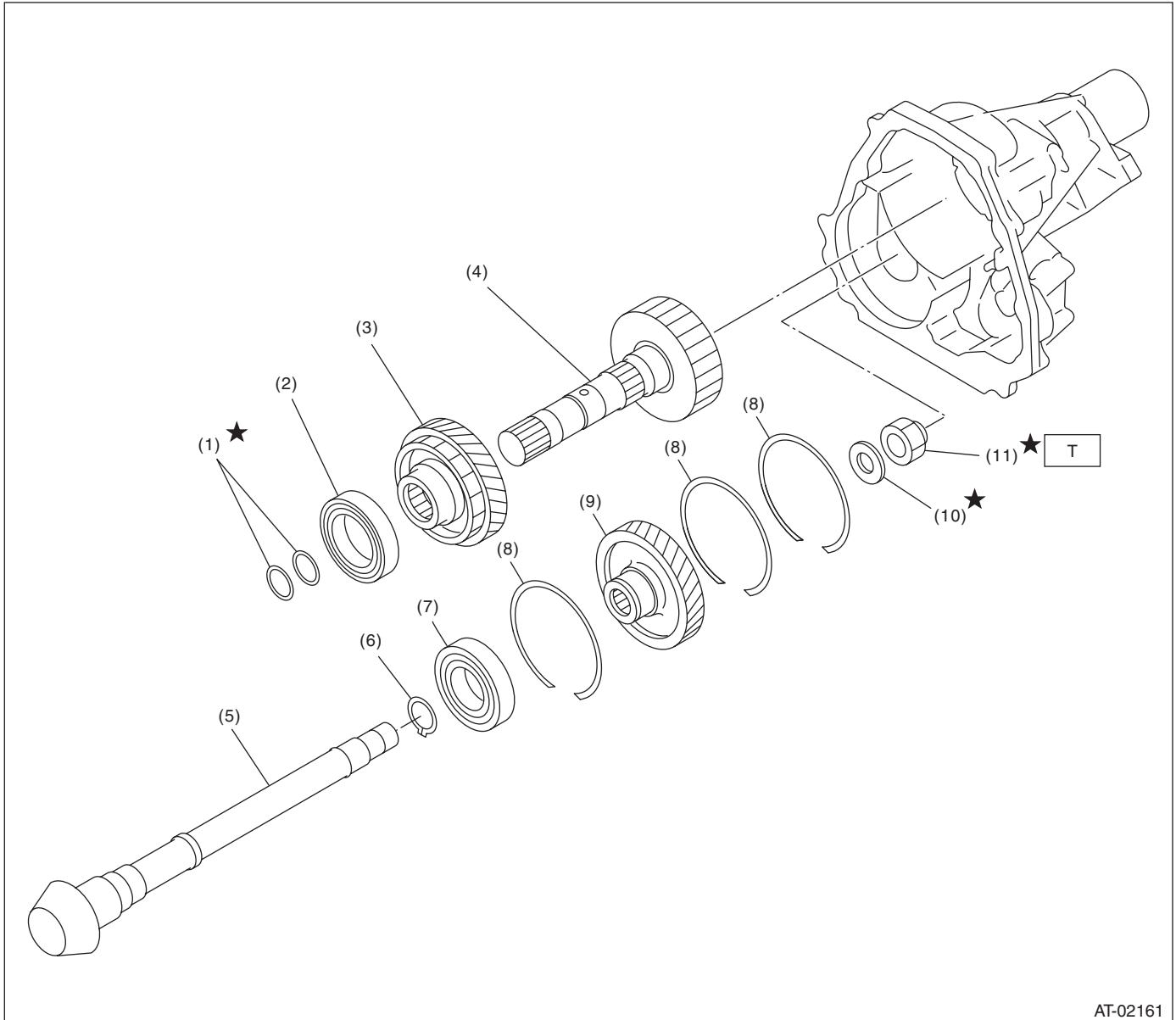
Tightening torque: N-m (kgf-m, ft-lb)

T: 25 (2.5, 18)

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8. REDUCTION GEAR



AT-02161

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

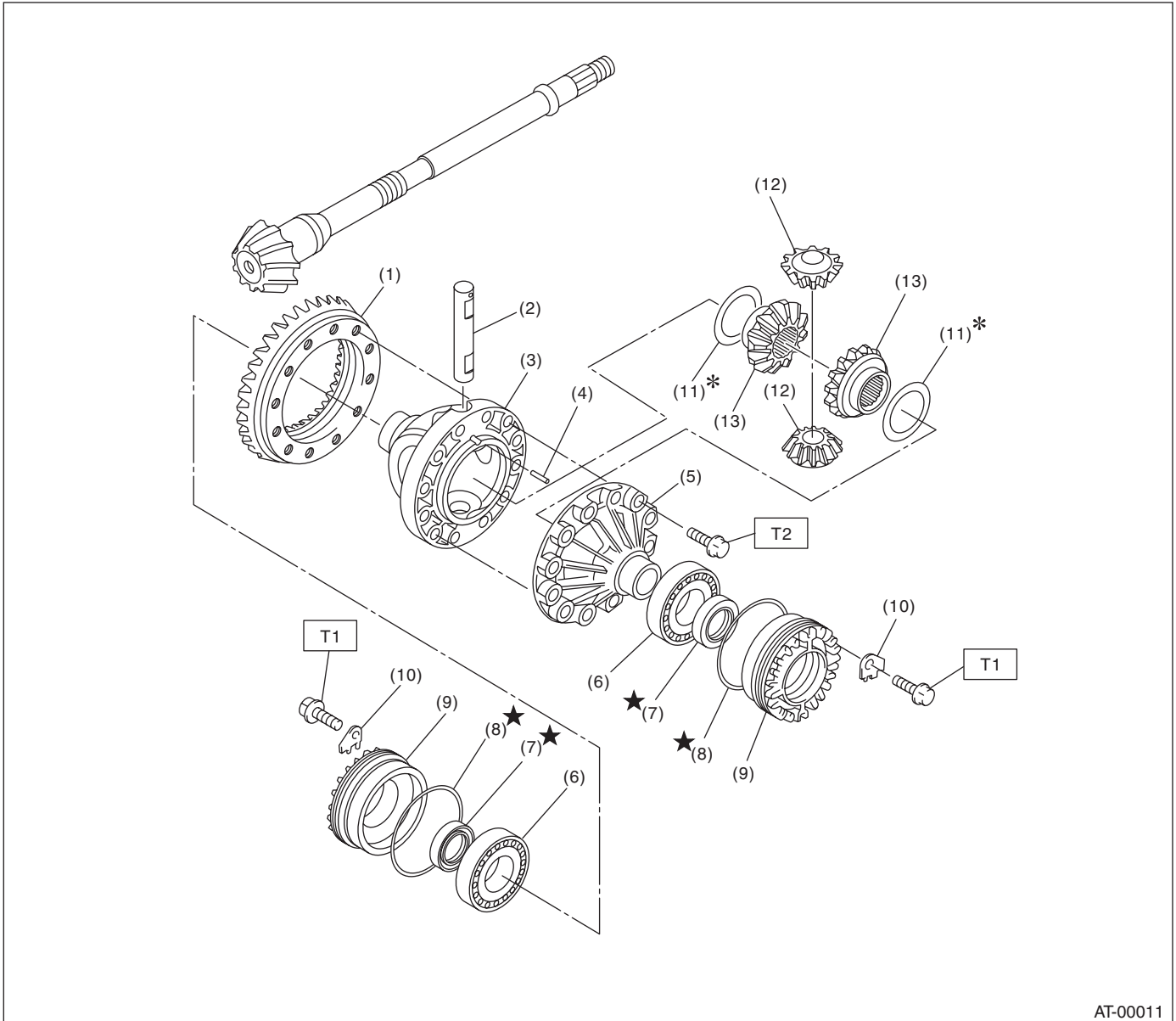
- (6) Snap ring
- (7) Ball bearing
- (8) Snap ring
- (9) Reduction driven gear
- (10) Washer

- (11) Lock nut

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

T: 100 (10.2, 73.8)

9. DIFFERENTIAL GEAR



AT-00011

- | | | |
|----------------------------|--------------------------------|------------------------------|
| (1) Hypoid driven gear | (7) Oil seal | (13) Differential bevel gear |
| (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 | |

Tightening torque: N·m (kgf·m, ft·lb)

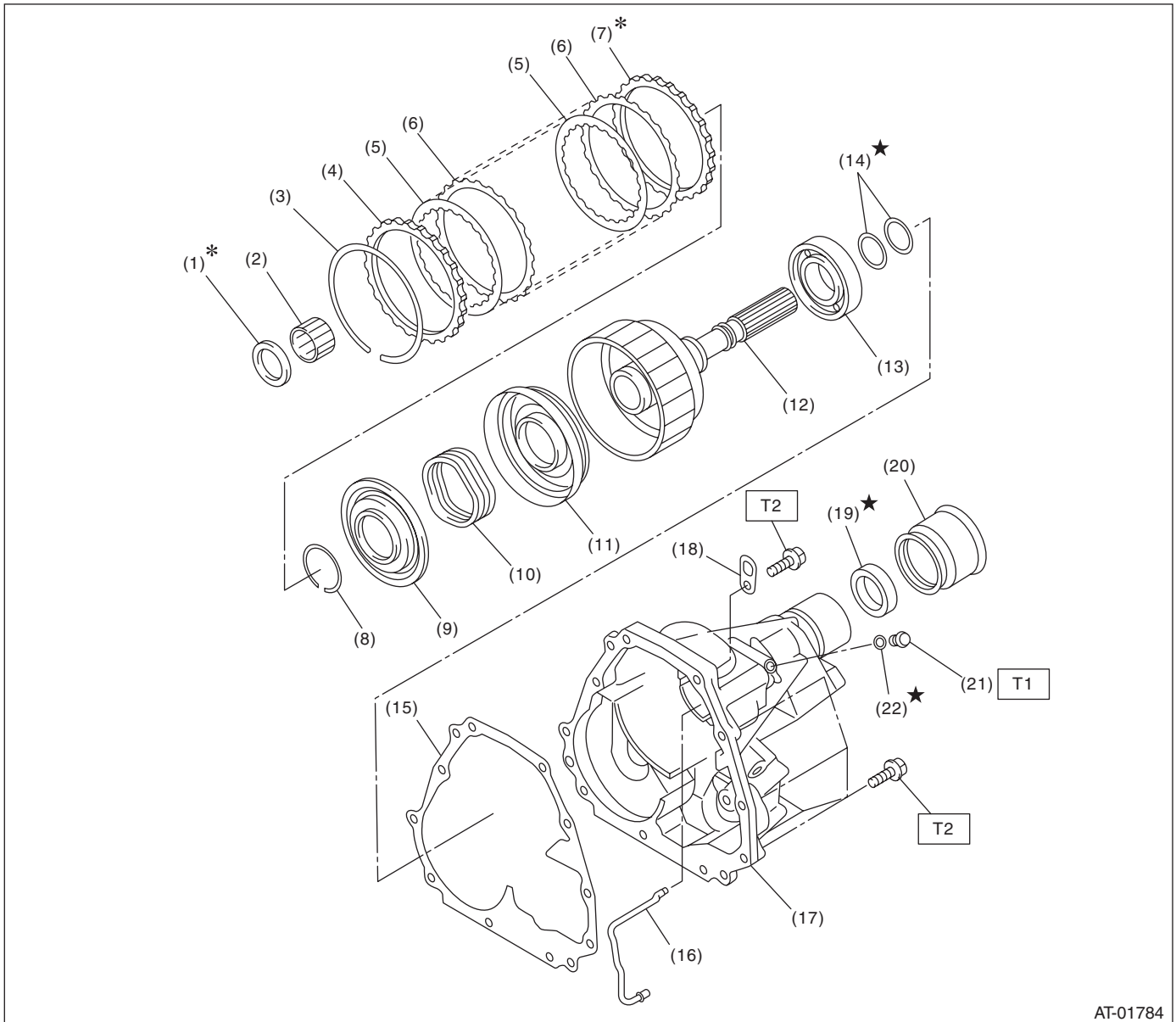
T1: 25 (2.5, 18)

T2: 62 (6.3, 45.6)

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10. TRANSFER AND EXTENSION CASE



AT-01784

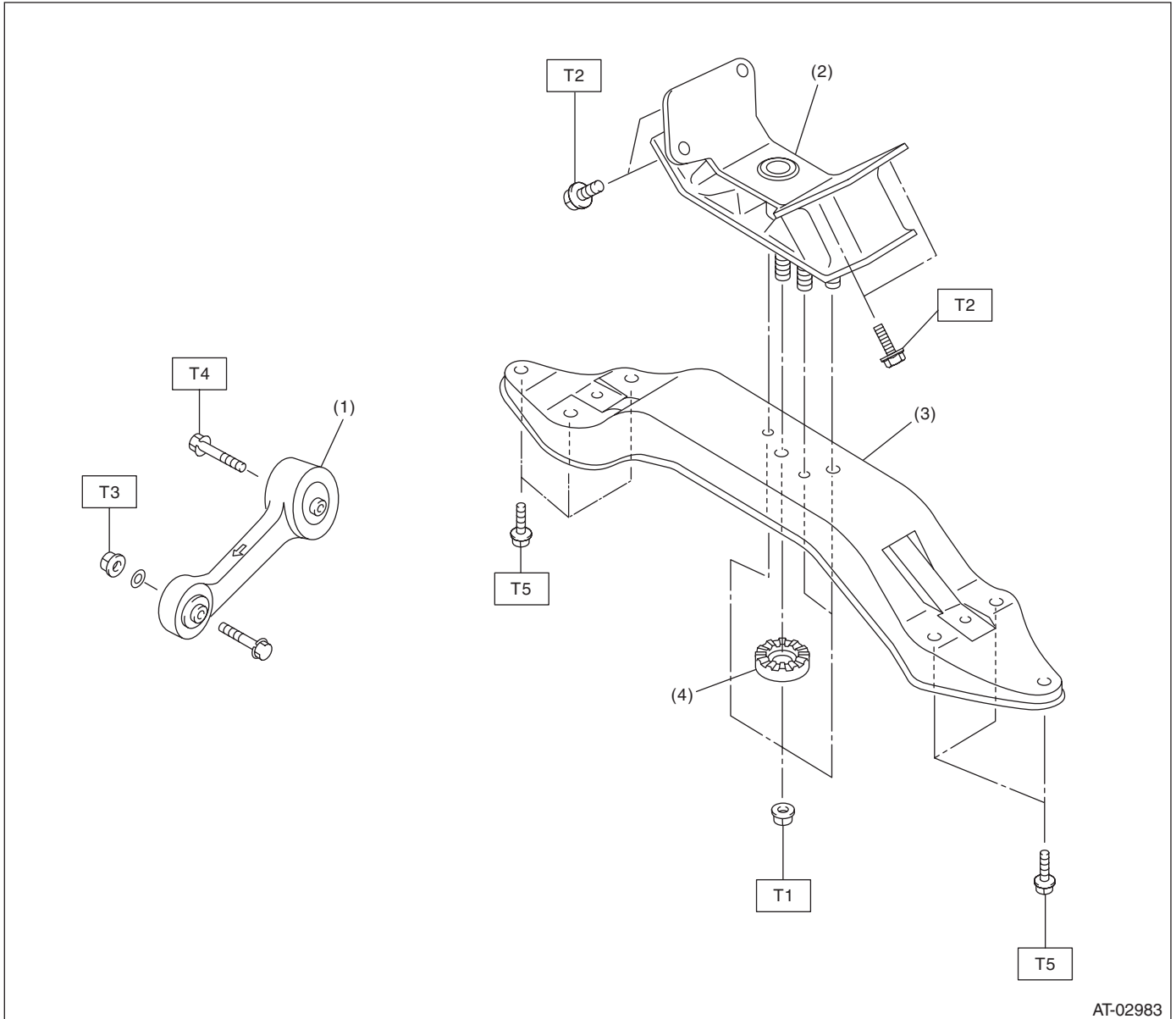
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|---------------------------|-----------------------------|-----------------|
| (1) Thrust needle bearing | (10) Return spring | (19) Oil seal |
| (2) Needle bearing | (11) Transfer clutch piston | (20) Dust cover |
| (3) Snap ring | (12) Rear drive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

Tightening torque: N·m (kgf·m, ft·lb)

T1: 13 (1.3, 9.4)

T2: 25 (2.5, 18)

11. TRANSMISSION MOUNTING



AT-02983

- | | |
|-------------------------|-----------------|
| (1) Pitching stopper | (3) Crossmember |
| (2) Rear cushion rubber | (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: 75 (7.6, 55)

General Description

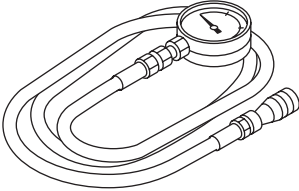
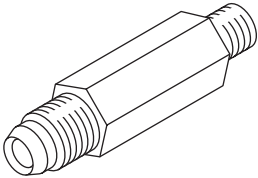
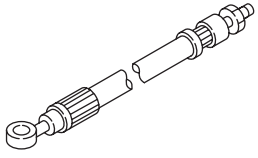
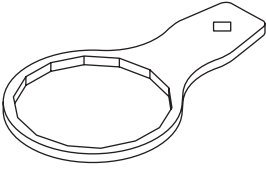
AUTOMATIC TRANSMISSION

C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Do not place the oil pan with its inner side facing up until it is installed, to prevent intrusion of foreign matter into the valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine gear oil, grease or the equivalent. Do not mix fluid, grease, etc. of different grades or manufacturers.
- Be sure to tighten bolts and nuts to the specified torque.
- Place lifts, shop jacks or rigid racks at the specified points.
- Apply gear oil or ATF onto sliding or revolving surfaces before installation in view of components usage.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old seal.
- When disassembling the AT, be sure to use nylon gloves and paper towels. Do not use cloth gloves or waste cloth.

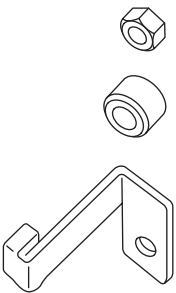
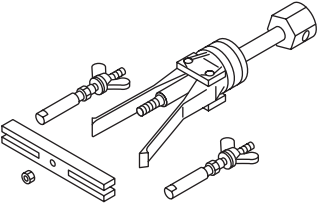
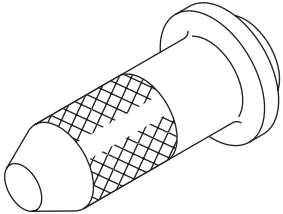
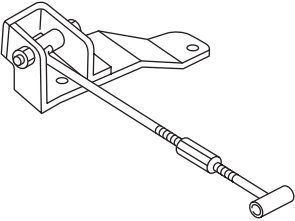
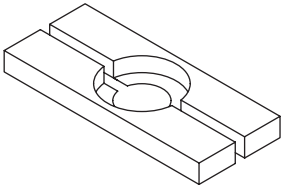
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498575400</p>	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 <p style="text-align: center;">ST-498897200</p>	498897200	ADAPTER	Used at the oil pump housing when measuring reverse clutch pressure and line pressure.
 <p style="text-align: center;">ST-498897700</p>	498897700	ADAPTER SET	Used for measuring transfer clutch pressure.
 <p style="text-align: center;">ST-498545400</p>	498545400	FILTER WRENCH	Used for removing and installing the ATF filter.

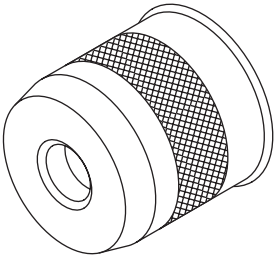
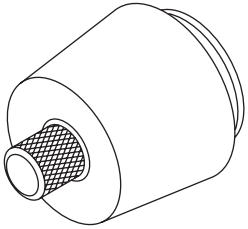
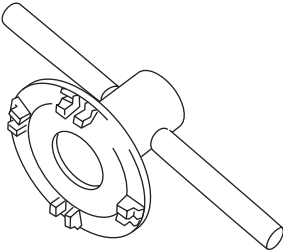
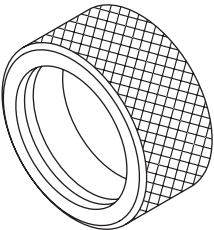
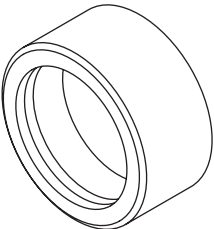
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 <p style="text-align: center;">ST-498277200</p>	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 <p style="text-align: center;">ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> • Used for removing the extension case roller bearing. • Used for removing the extension oil seal. • Used for removing the front differential side retainer bearing outer race. • Used for removing the front differential side retainer oil seal.
 <p style="text-align: center;">ST-498057300</p>	498057300	INSTALLER	Used for installing the extension oil seal.
 <p style="text-align: center;">ST41099AC000</p>	41099AC000	ENGINE SUPPORT ASSY	Used for supporting the engine.
 <p style="text-align: center;">ST-498077000</p>	498077000	REMOVER	Used for removing the differential taper roller bearing.

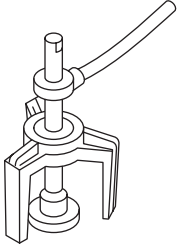
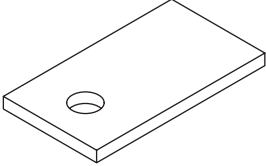
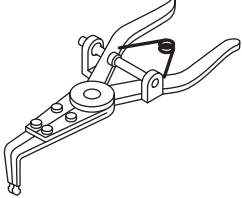
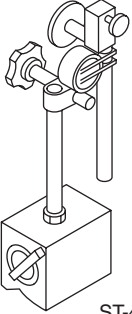
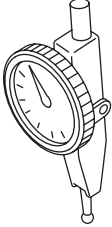
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499247400</p>	499247400	INSTALLER	<ul style="list-style-type: none"> • Used for installing the transfer outer snap ring. • Used with GUIDE (499257300).
 <p>ST-499257300</p>	499257300	SNAP RING OUTER GUIDE	<ul style="list-style-type: none"> • Used for installing the transfer outer snap ring. • Used with INSTALLER (499247400).
 <p>ST18630AA010</p>	18630AA010	WRENCH ASSY	<ul style="list-style-type: none"> • Used for removing and installing the differential side retainer. • WRENCH ASSY (499787000) can also be used.
 <p>ST-398437700</p>	398437700	DRIFT	Used for installing the converter case oil seal.
 <p>ST-398487700</p>	398487700	INSTALLER	Used for installing the front differential taper roller bearing.

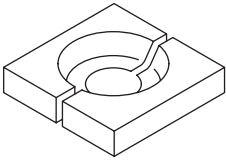
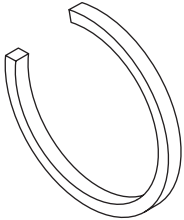
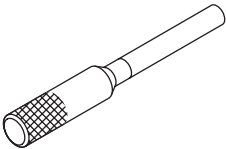
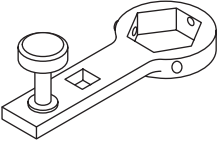
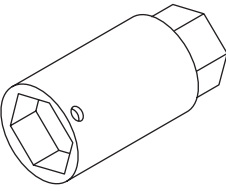
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398673600</p>	398673600	COMPRESSOR	Used for removing and installing the clutch spring.
 <p style="text-align: center;">ST-498255400</p>	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 <p style="text-align: center;">ST-399893600</p>	399893600	PLIERS	Used for removing and installing the clutch spring.
 <p style="text-align: center;">ST-498247001</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> • Used for measuring the gear backlash. • Used with DIAL GAUGE (498247100).
 <p style="text-align: center;">ST-498247100</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> • Used for measuring the gear backlash. • Used with MAGNET BASE (498247001).

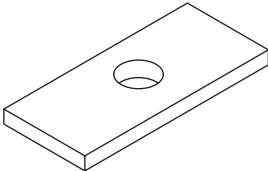
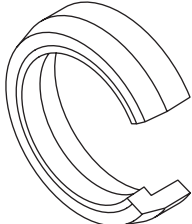
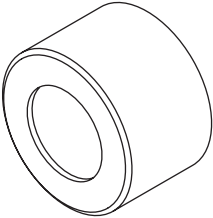
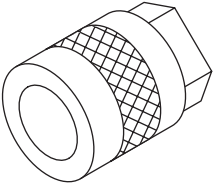
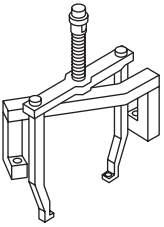
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498517000</p>	498517000	REPLACER	Used for removing the front roller bearing.
 <p>ST-398623600</p>	398623600	SEAT	Used for removing the spring of the transfer clutch piston.
 <p>ST-499267300</p>	499267300	STOPPER PIN	Used for installing the inhibitor switch.
 <p>ST-499787700</p>	499787700	WRENCH	Used for removing and installing the drive pinion lock nut.
 <p>ST-499787500</p>	499787500	ADAPTER	Used for removing and installing the drive pinion lock nut.

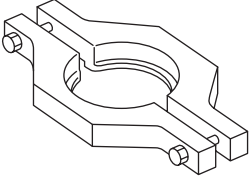
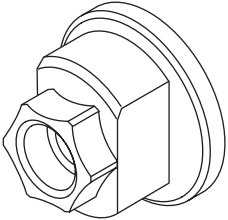
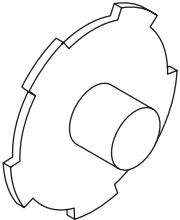
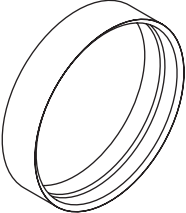
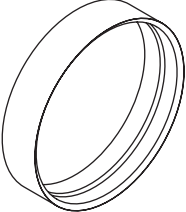
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398643600</p>	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
 <p style="text-align: center;">ST-498627100</p>	498627100	SEAT	Used for holding the low clutch piston retainer spring when installing snap ring.
 <p style="text-align: center;">ST-499577000</p>	499577000	GAUGE	Used for measuring the mating surface of the transmission to the end face of the reduction gear.
 <p style="text-align: center;">ST-499737000</p>	499737000	PULLER	Used for removing the reduction driven gear assembly.
 <p style="text-align: center;">ST-499737100</p>	499737100	PULLER SET	Used for removing the reduction drive gear assembly.

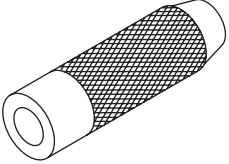
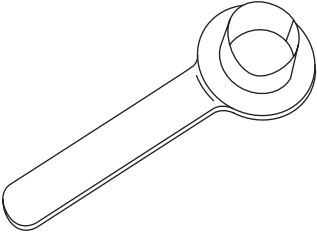
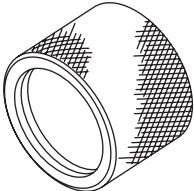
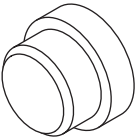
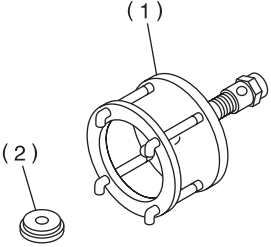
General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498077600</p>	498077600	REMOVER	Used for removing the ball bearing.
 <p>ST-498937110</p>	498937110	HOLDER	Used for removing and installing the drive pinion lock nut.
 <p>ST-498677100</p>	498677100	COMPRESSOR	Used for installing the 2-4 brake snap ring.
 <p>ST-498437000</p>	498437000	HIGH CLUTCH PISTON GUIDE	Used for installing the high clutch piston.
 <p>ST-498437100</p>	498437100	LOW CLUTCH PISTON GUIDE	Used for installing the low clutch piston.

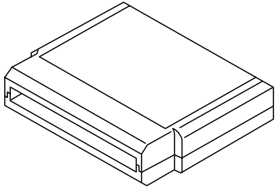

General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-899580100</p>	899580100	INSTALLER	Used for press-fitting the ball bearing of the transfer clutch.
 <p style="text-align: center;">ST28399SA010</p>	28399SA010	OIL SEAL PROTECTOR	Used for installing the axle shaft.
 <p style="text-align: center;">ST18675AA000</p>	18675AA000	DIFFERENTIAL OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 <p style="text-align: center;">ST-398497701</p>	398497701	SEAT	Used for installing the needle bearing.
 <p style="text-align: center;">ST-899524100</p>	899524100	PULLER SET	Use only the bolt. <ul style="list-style-type: none"> • Used with PULLER SET (499737100). • Used with PULLER (499737000). 1. Puller 2. Cap

General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18482AA010</p>	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 <p>ST22771AA030</p>	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

2. GENERAL TOOL

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