

General Description

AUTOMATIC TRANSMISSION

1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

| | |
|----------------------------|--|
| Type | Symmetric, 3 element, single stage, 2 phase torque converter |
| Stall torque ratio | 1.8 |
| Nominal diameter | 246 mm (9.69 in) |
| Stall speed (at sea level) | 2,100 — 2,600 rpm |
| One-way clutch | Sprague type one-way clutch |

2. OIL PUMP

| | | |
|-----------------|---------------------------------------|----|
| Type | Internal gear fixed displacement pump | |
| Driving method | Driven by engine | |
| Number of teeth | Inner rotor | 9 |
| | Outer rotor | 10 |

3. TRANSMISSION CONTROL ELEMENT

| | |
|-------------------------------|--|
| Type | 5-forward, 1-reverse, double-row planetary gears |
| Multi-plate clutch | 3 sets |
| Multi-plate brake | 3 sets |
| One-way clutch (sprague type) | 2 sets |

4. TRANSMISSION GEAR RATIO

| | |
|------|-------|
| 1st | 3.540 |
| 2nd | 2.264 |
| 3rd | 1.471 |
| 4th | 1.000 |
| 5th | 0.834 |
| Rev. | 2.370 |

5. PLANETARY GEAR AND PLATE

| | |
|--|-----|
| Number of front internal gear teeth | 106 |
| Number of front carrier teeth | 28 |
| Number of front sun gear teeth | 50 |
| Number of mid internal gear teeth | 78 |
| Number of mid carrier teeth | 18 |
| Number of mid sun gear teeth | 42 |
| Number of rear internal gear teeth | 110 |
| Number of rear carrier teeth | 24 |
| Number of rear sun gear teeth | 62 |
| Number of front brake drive plates | 2 |
| Number of input clutch drive plates | 6 |
| Number of high & low reverse clutch drive plates | 4 |
| Number of direct clutch drive plates | 5 |
| Number of reverse brake drive plates | 5 |
| Number of forward brake drive plates | 5 |

6. SELECTOR POSITION

| | |
|-----------------|---|
| P (Park) | Transmission is in neutral, output member is immovable, engine start is possible |
| R (Reverse) | Transmission in reverse for backing |
| N (Neutral) | Transmission is in neutral and engine start is possible |
| D (Drive) | Automatic gear change 1st \leftrightarrow 2nd \leftrightarrow 3rd \leftrightarrow 4th \leftrightarrow 5th |
| Manual mode (+) | Manual gear change 1st \rightarrow 2nd \rightarrow 3rd \rightarrow 4th \rightarrow 5th |
| Manual mode (-) | Manual gear change 1st \leftarrow 2nd \leftarrow 3rd \leftarrow 4th \leftarrow 5th |
| Control method | Wire cable type |

7. HYDRAULIC CONTROL AND LUBRICATION

| | |
|--------------------|---|
| Type | Electronic/hydraulic control [5 forward gear changes made by electronic signals of vehicle speed and accelerator (throttle) opening] |
| Fluid | Specified fluid: SUBARU ATF HP Recommended fluid: IDEMITSU ATF HP NOTE: Use of the recommended fluid is permitted only in regions where the specified fluid is not available. |
| Fluid capacity | 9.6 — 10.0 (10.1 — 10.6, 8.4 — 8.8) |
| Lubrication system | Forced feed lubrication with oil pump |

8. COOLING AND HARNESS

| | |
|----------------------|--|
| Cooling system | Liquid-cooler incorporated in radiator |
| Transmission harness | 20 + 8 poles |

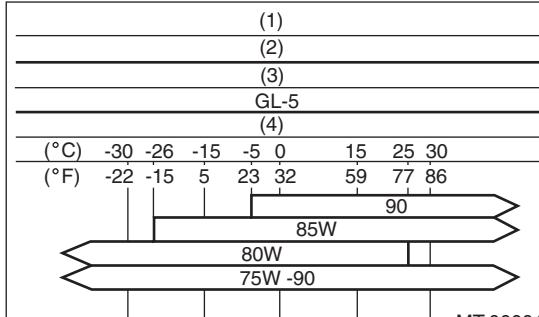
9. TRANSFER

| | |
|--|------------------------------------|
| Transfer type | Variable torque distribution (VTD) |
| Number of transfer clutch drives & driven plates | 4 |
| Reduction gear ratio | 1.000 (41/41) |

10. FINAL REDUCTION GEAR

| | |
|----------------------------------|-------|
| Front final reduction gear ratio | 3.583 |
|----------------------------------|-------|

11. RECOMMENDED GEAR OIL

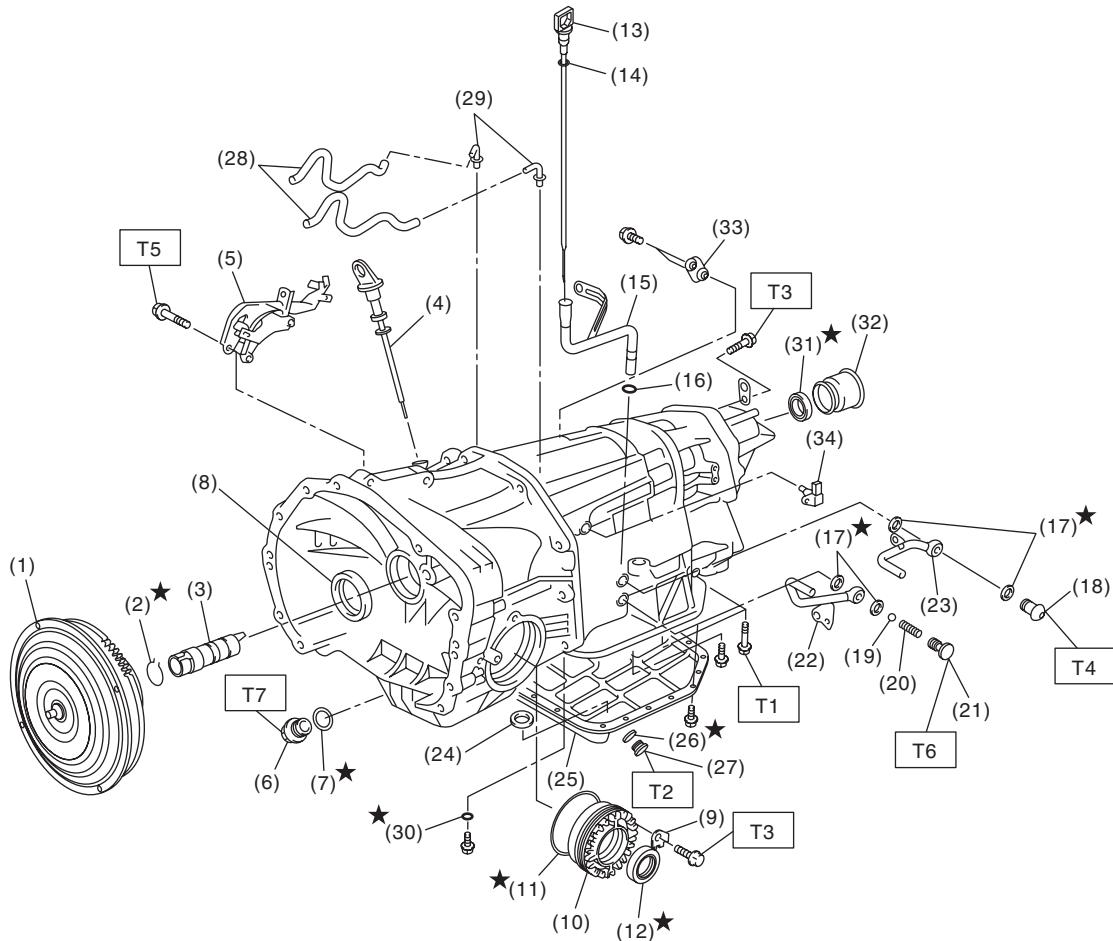
| | |
|---|--|
| Lubrication oil |  (1) Item (2) Front differential gear oil (3) API standard (4) SAE viscosity No. and applicable temperature MT-00001 |
| Front differential gear oil capacity ℓ (US qt, Imp qt) | 1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3) |

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B: COMPONENT

1. TORQUE CONVERTER CLUTCH & TRANSMISSION ASSEMBLY



AT-04325

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| | | |
|----------------------------------|----------------------|-----------------------------|
| (1) Torque converter ASSY | (16) O-ring | (30) O-ring |
| (2) Circlip | (17) Gasket | (31) Oil seal |
| (3) Oil pump shaft | (18) Union screw | (32) Dust cover |
| (4) Differential oil level gauge | (19) Ball | (33) Floating bracket |
| (5) Pitching stopper bracket | (20) Spring | (34) Turbine speed sensor 1 |
| (6) Differential oil drain plug | (21) Union screw | |
| (7) Gasket | (22) ATF outlet pipe | |
| (8) Oil seal | (23) ATF inlet pipe | |
| (9) Lock plate | (24) Magnet | |
| (10) Side retainer | (25) Oil pan | |
| (11) O-ring | (26) Gasket | |
| (12) Oil seal | (27) ATF drain plug | |
| (13) ATF level gauge | (28) Breather hose | |
| (14) O-ring | (29) Nipple | |
| (15) Oil charge pipe | | |

Tightening torque:N·m (kgf·m, ft-lb)

T1: 5 (0.5, 3.7)

T2: 20 (2.0, 14.8)

T3: 25 (2.5, 18.4)

T4: 40 (4.1, 29.5)

T5: 41 (4.2, 30.2)

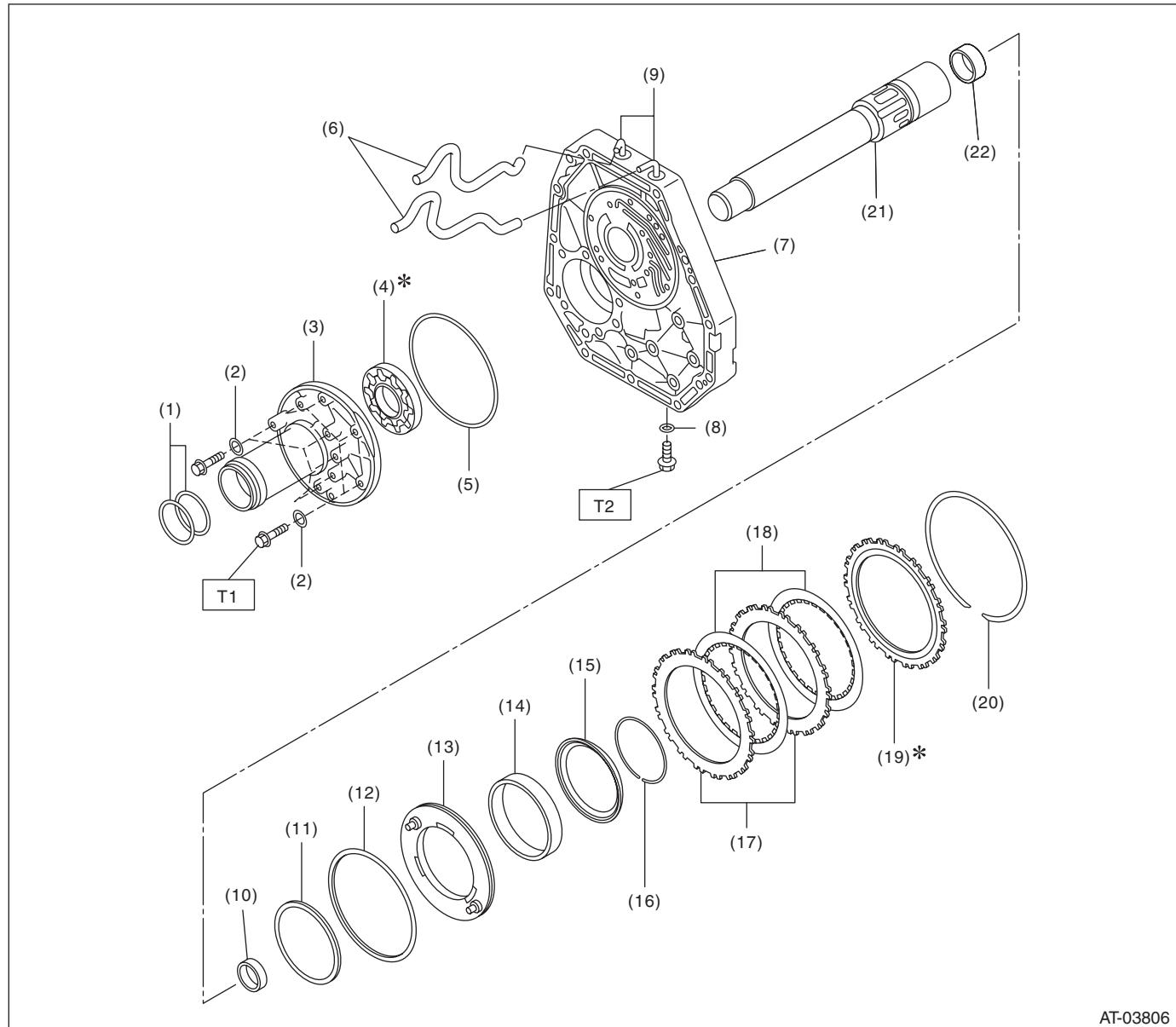
T6: 45 (4.6, 33.2)

T7: 70 (7.1, 51.6)

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2. OIL PUMP & FRONT BRAKE



AT-03806

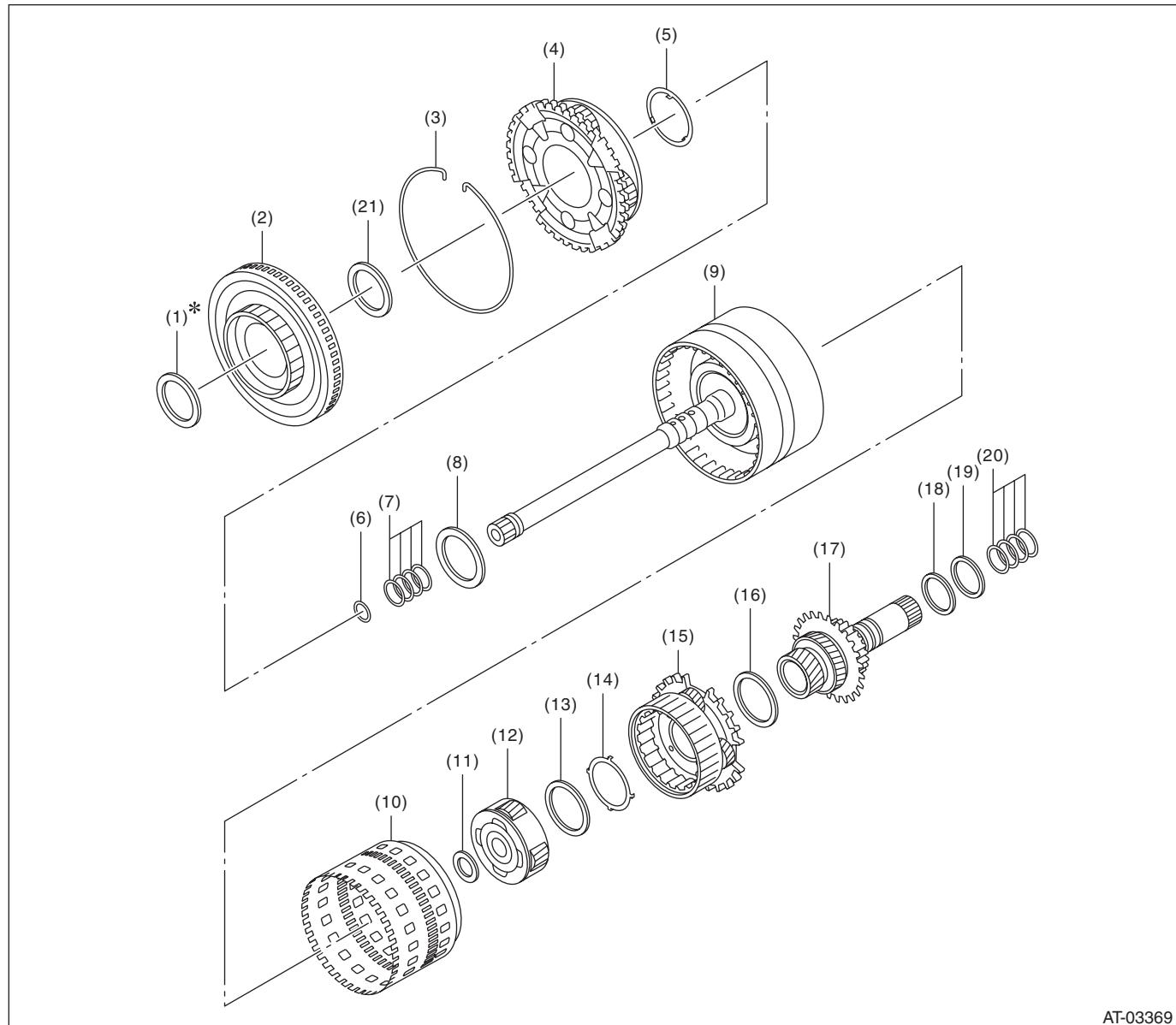
| | | | | | |
|-----|-------------------|------|--------------------|------|------------------------------|
| (1) | O-ring | (10) | Needle bearing | (19) | Retainer plate |
| (2) | Washer | (11) | D-ring (Inner) | (20) | Snap ring |
| (3) | Oil pump housing | (12) | D-ring (Outer) | (21) | Stator shaft |
| (4) | Oil pump rotor | (13) | Front brake piston | (22) | Needle bearing |
| (5) | O-ring | (14) | Return spring | | |
| (6) | Air breather hose | (15) | Retainer | | Tightening torque:N·m |
| (7) | Oil pump cover | (16) | Snap ring | | T1: 10 (1.0, 7.4) |
| (8) | O-ring | (17) | Driven plate | | T2: 13 (1.3, 9.6) |
| (9) | Nipple | (18) | Drive plate | | |

Tightening torque:N·m (kgf·m, ft-lb)

T1: 10 (1.0, 7.4)

T2: 13 (1.3, 9.6)

3. FRONT PLANETARY CARRIER AND MIDDLE & REAR PLANETARY CARRIER



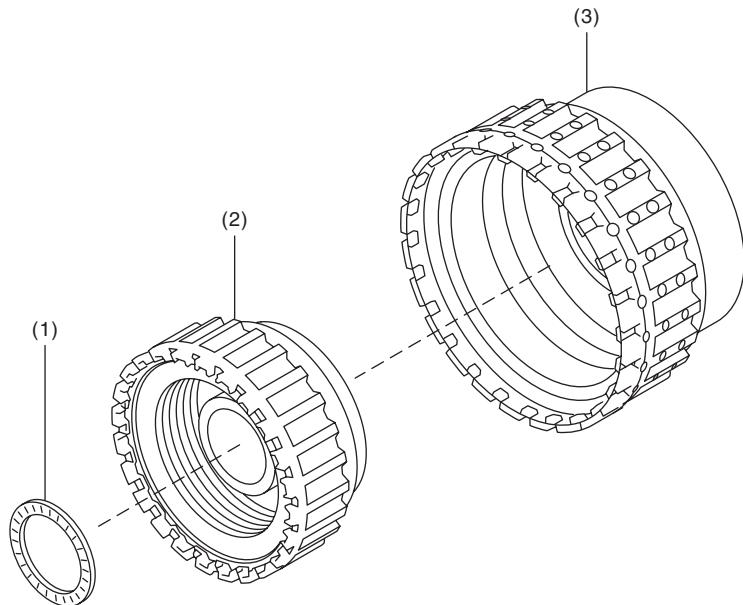
AT-03369

| | | |
|-------------------------|------------------------------|----------------------------------|
| (1) Thrust bearing | (8) Thrust bearing | (15) Rear carrier ASSY |
| (2) Front sun gear ASSY | (9) Input clutch ASSY | (16) Thrust bearing |
| (3) Snap ring | (10) Rear internal gear ASSY | (17) Middle & rear sun gear ASSY |
| (4) Front carrier ASSY | (11) Thrust bearing | (18) Washer |
| (5) Race bearing | (12) Middle carrier ASSY | (19) Thrust bearing |
| (6) O-ring | (13) Thrust bearing | (20) Seal ring |
| (7) Seal ring | (14) Race bearing | (21) Thrust bearing |

General Description

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4. DIRECT CLUTCH AND HIGH & LOW REVERSE CLUTCH



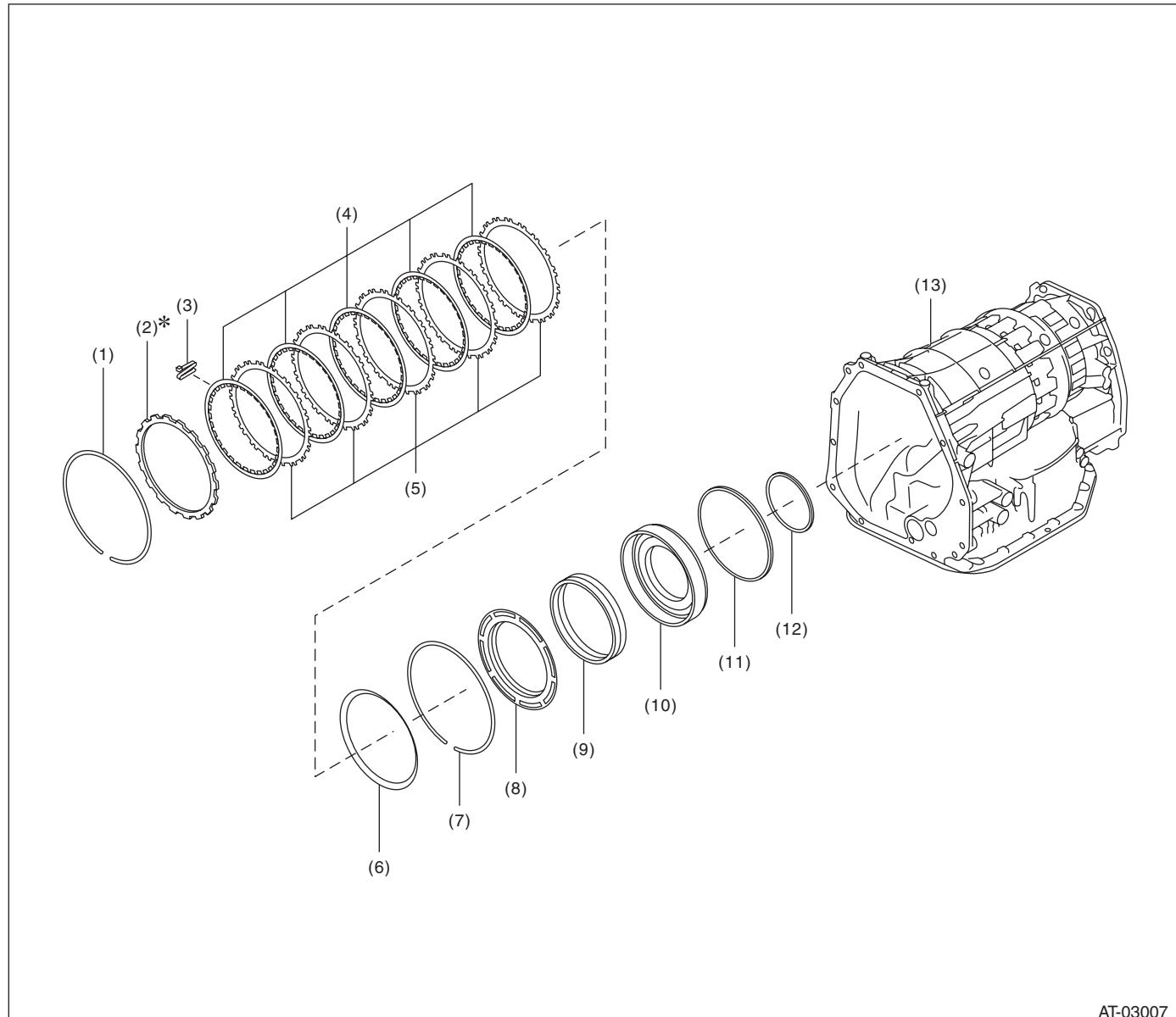
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(1) Thrust bearing

(2) High & low reverse clutch ASSY

(3) Direct clutch ASSY

5. REVERSE BRAKE



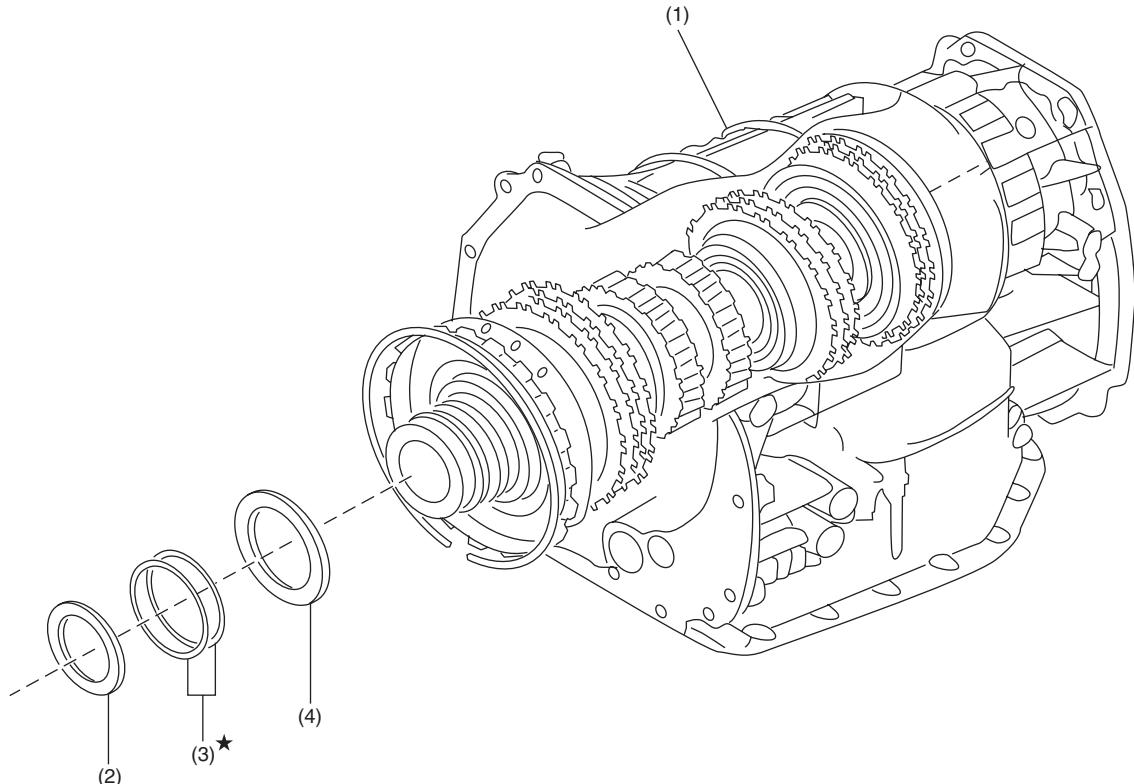
AT-03007

| | | |
|--------------------|-----------------|---------------------------|
| (1) Snap ring | (6) Dish plate | (10) Reverse brake piston |
| (2) Retainer plate | (7) Snap ring | (11) D-ring (Outer) |
| (3) Leaf spring | (8) Retainer | (12) D-ring (Inner) |
| (4) Drive plate | (9) Leaf spring | (13) AT main case |
| (5) Driven plate | | |

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6. SHORT AT ASSEMBLY



AT-04385

(1) Short AT ASSY (Non-disassembled)

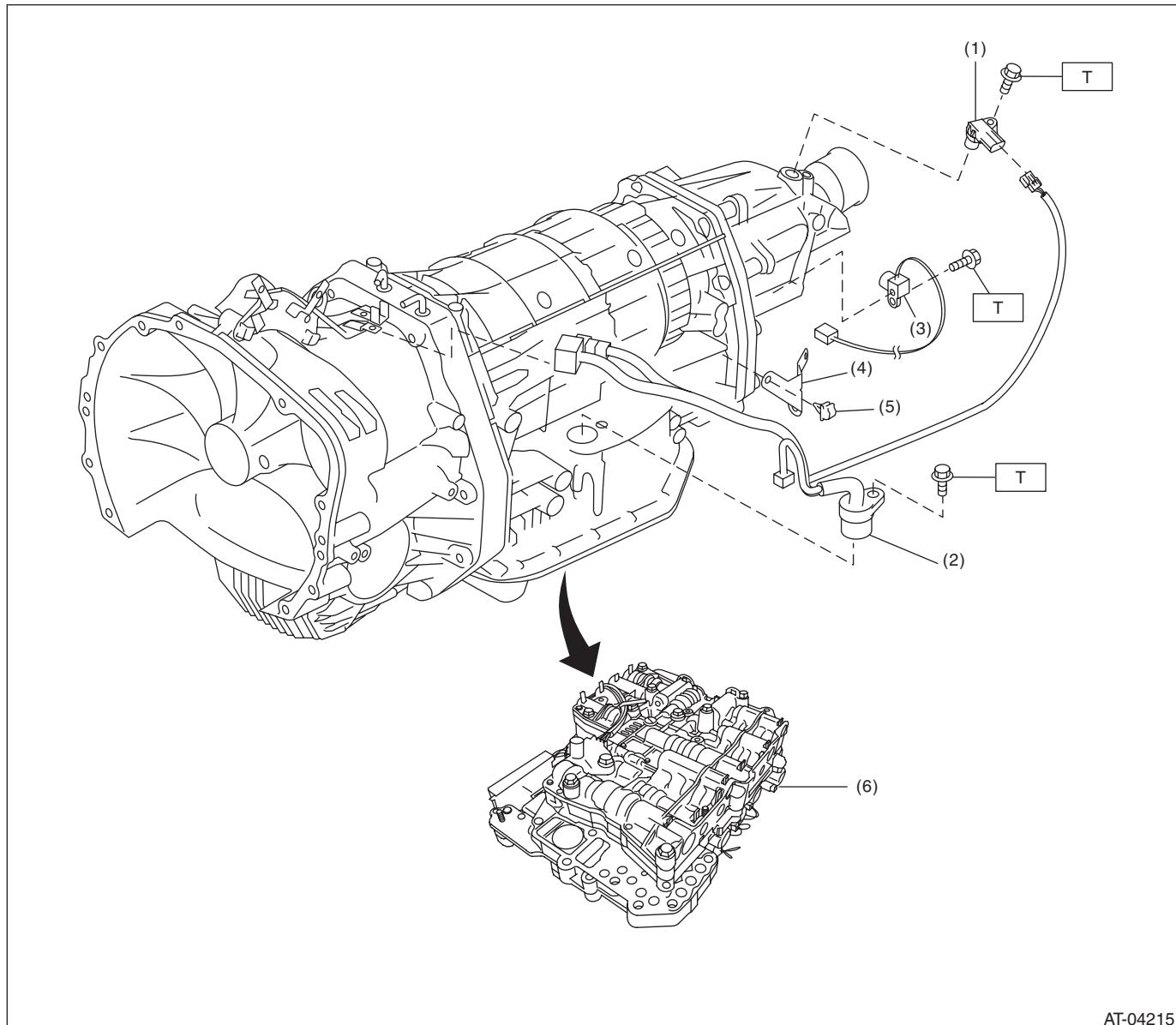
(2) Thrust bearing

(4) Thrust bearing

(3) Seal ring

(3) Seal ring

7. CONTROL VALVE & TRANSMISSION HARNESS



AT-04215

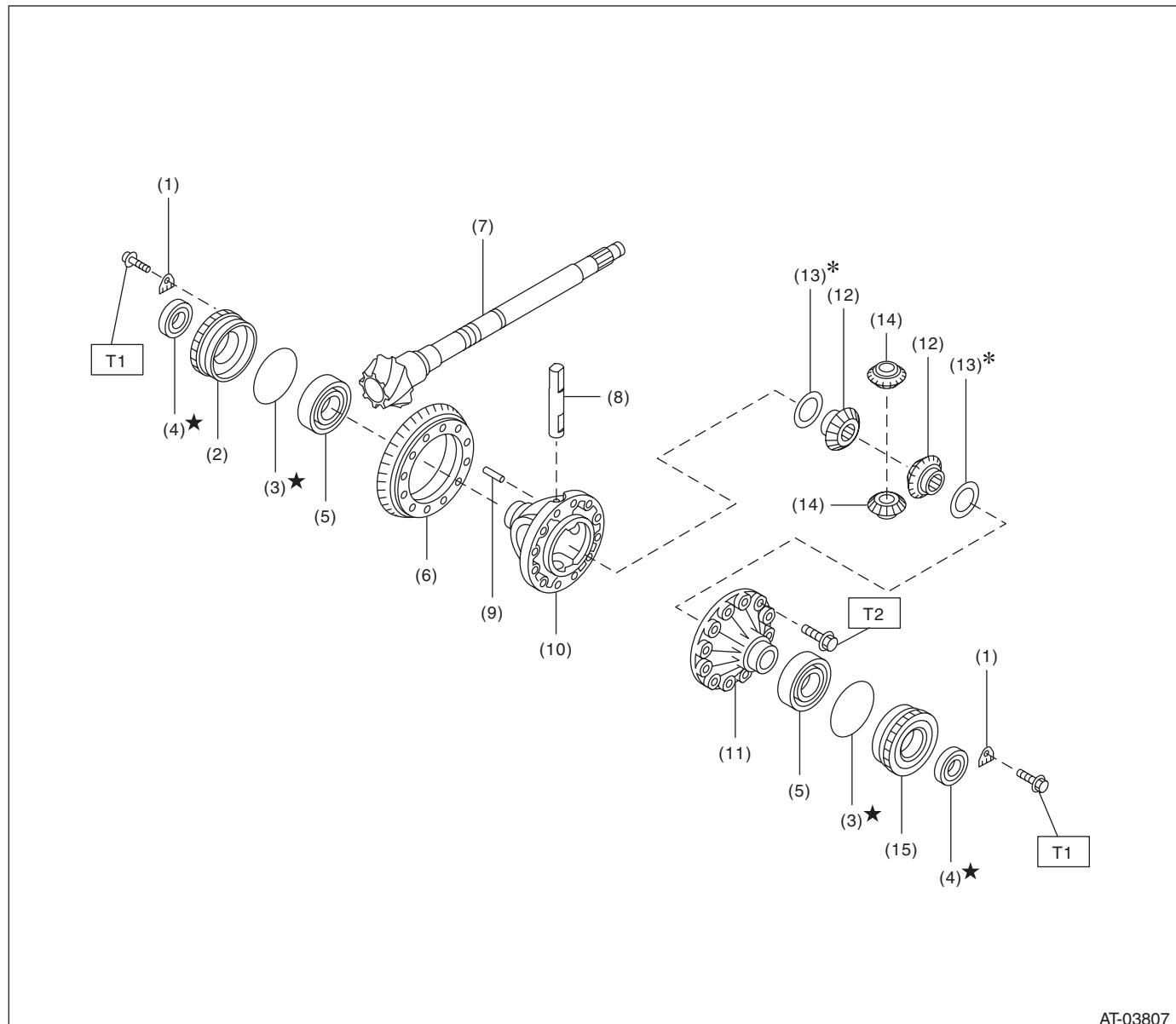
| | |
|--------------------------------|------------------------|
| (1) Rear vehicle speed sensor | (4) Harness bracket |
| (2) Transmission harness ASSY | (5) Clip |
| (3) Front vehicle speed sensor | (6) Control valve ASSY |

Tightening torque: N·m (kgf·m, ft·lb)
T: 7 (0.7, 5.2)

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8. DIFFERENTIAL GEAR



AT-03807

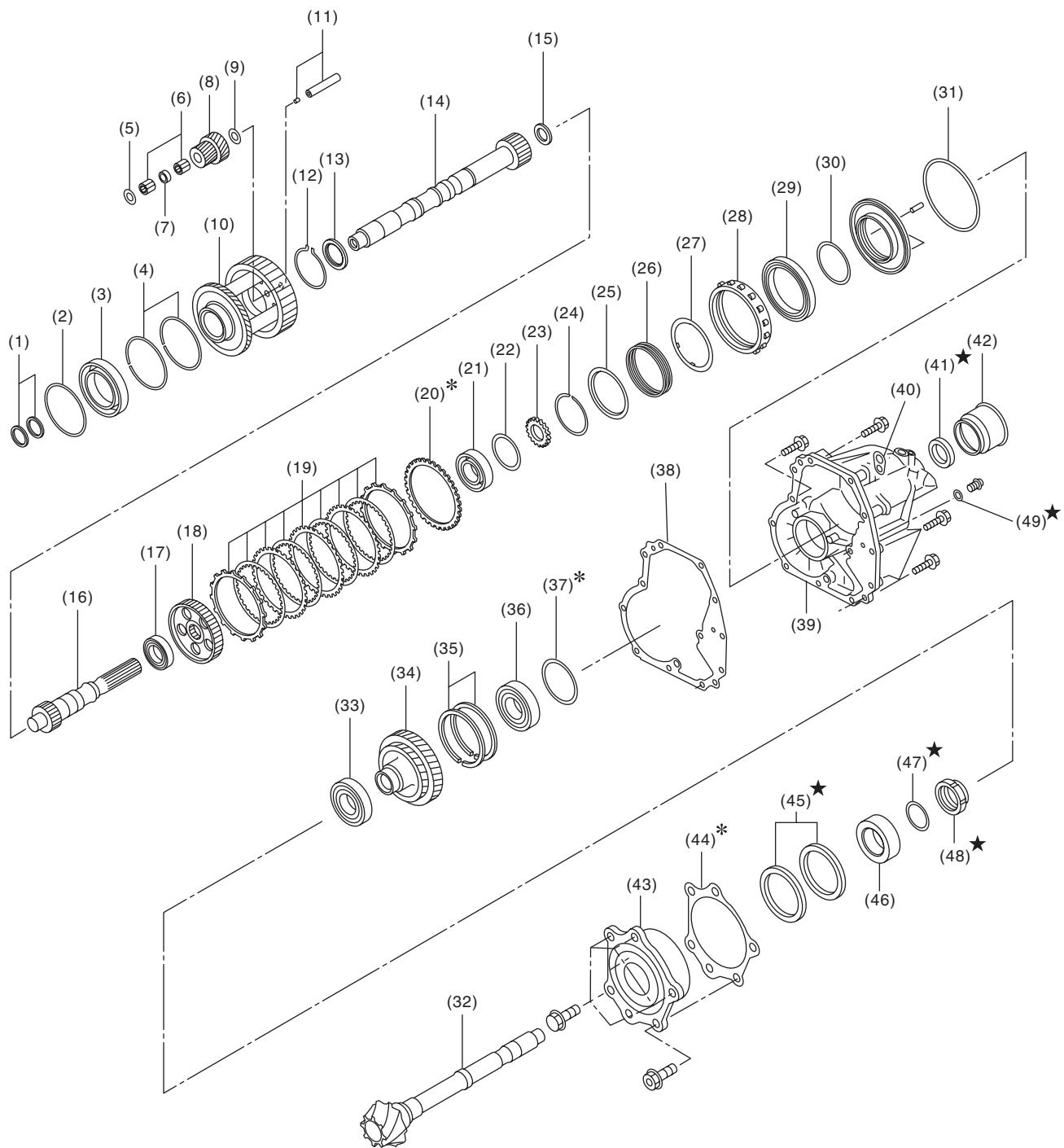
| | | |
|-----------------------------------|------------------------------|------------------------------------|
| (1) Lock plate | (8) Pinion shaft | (14) Differential bevel pinion |
| (2) Differential side retainer RH | (9) Straight pin | (15) Differential side retainer LH |
| (3) O-ring | (10) Differential case RH | |
| (4) Oil seal | (11) Differential case LH | |
| (5) Taper roller bearing | (12) Differential bevel gear | |
| (6) Hypoid driven gear | (13) Washer | |
| (7) Drive pinion shaft | | |

Tightening torque:N·m (kgf·m, ft·lb)

T1: 25 (2.5, 18.4)

T2: 70 (7.1, 51.6)

9. TRANSFER CASE, EXTENSION CASE & REDUCTION GEAR



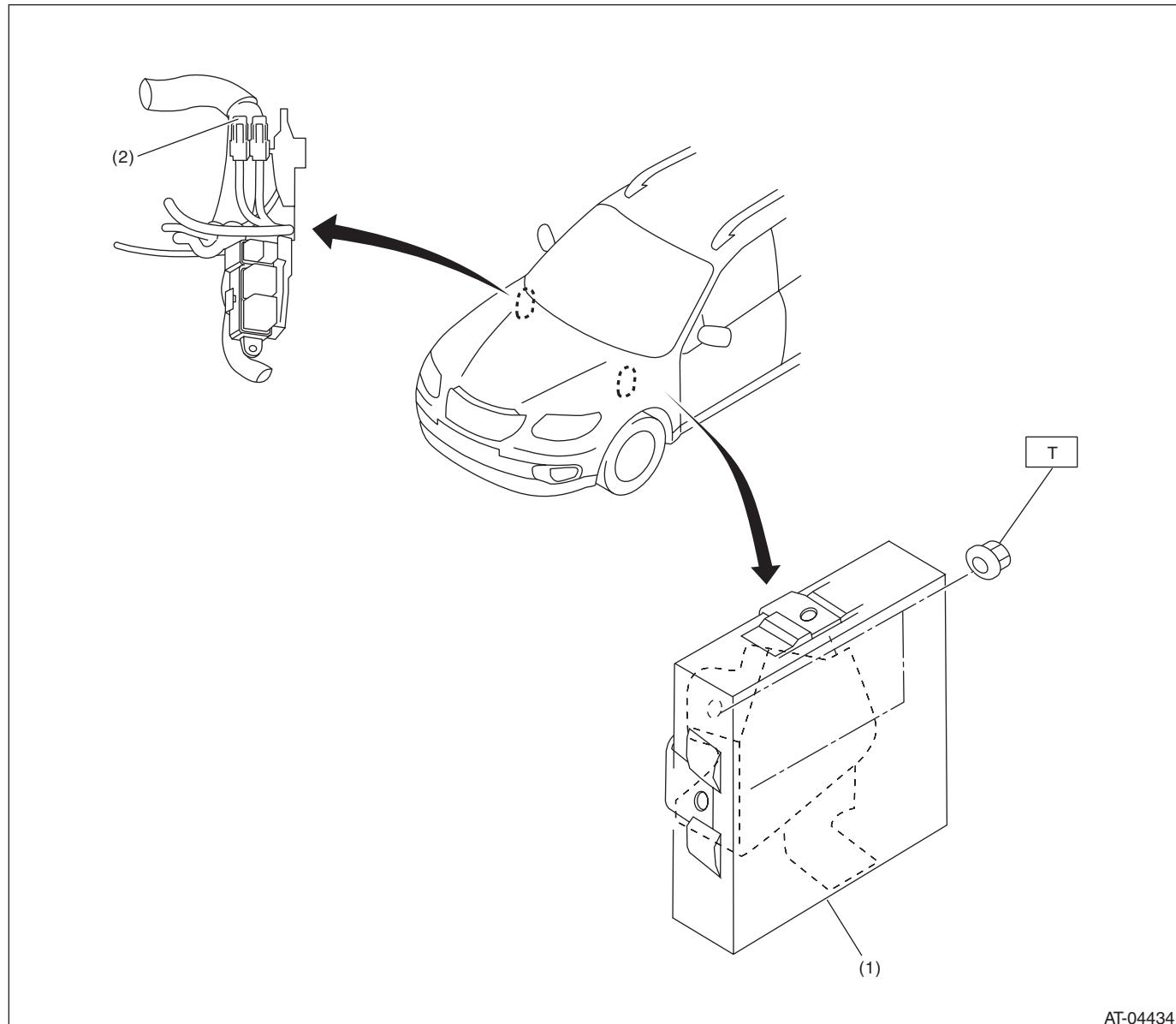
AT-03247

General Description

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| | | |
|----------------------------------|-----------------------------|----------------------------|
| (1) Seal ring | (18) Transfer clutch hub | (34) Reduction driven gear |
| (2) Reduction gear shim | (19) Transfer clutch plate | (35) Snap ring |
| (3) Ball bearing | (20) Driven plate No. 3 | (36) Ball bearing |
| (4) Snap ring | (21) Ball bearing | (37) Shim |
| (5) Planetary pinion washer | (22) Rear drive shaft shim | (38) Shim |
| (6) Needle bearing | (23) Revolution gear | (39) Extension case |
| (7) Spacer | (24) Snap ring | (40) Transmission hanger |
| (8) Pinion gear | (25) Clutch spring retainer | (41) Oil seal |
| (9) Washer | (26) Return spring | (42) Dust cover |
| (10) Planetary carrier ASSY | (27) Spring retainer | (43) Taper roller bearing |
| (11) Planetary pinion shaft ASSY | (28) Pressure plate | (44) Drive pinion shim |
| (12) Snap ring | (29) Ball bearing | (45) Oil seal |
| (13) Thrust bearing | (30) O-ring | (46) Drive pinion collar |
| (14) Intermediate shaft | (31) D-ring | (47) O-ring |
| (15) Thrust washer | (32) Drive pinion shaft | (48) Lock nut |
| (16) Rear drive shaft | (33) Ball bearing | (49) O-ring |
| (17) Ball bearing | | |

10. TRANSMISSION CONTROL MODULE



AT-04434

(1) Transmission control module
(TCM)

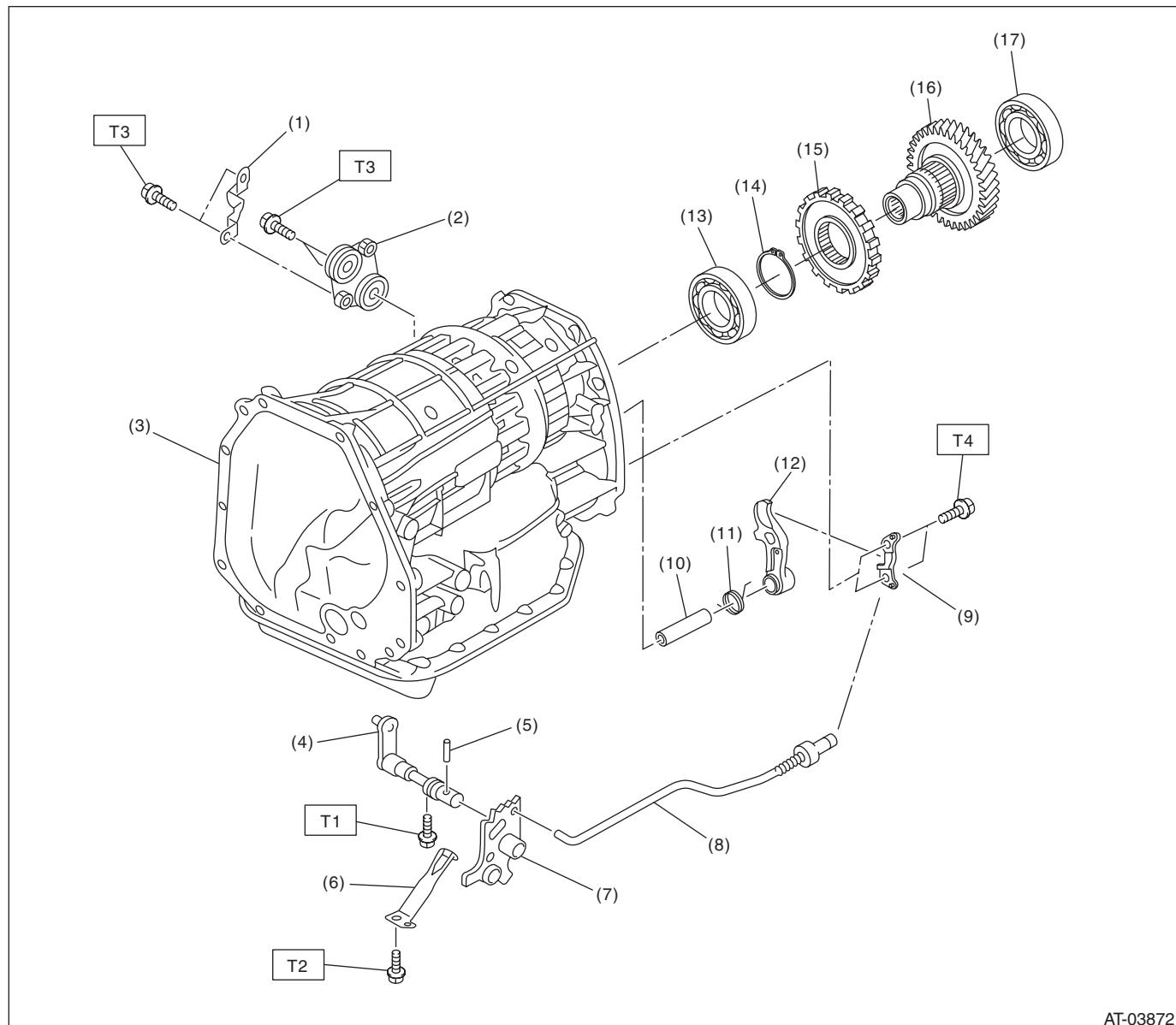
(2) Relay

Tightening torque: N·m (kgf·m, ft·lb)
T: 7.5 (0.8, 5.5)

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11. TRANSMISSION CONTROL DEVICE & PARKING SUPPORT



| | | |
|------------------------|------------------------------|-------------------|
| (1) Bracket | (9) Parking support actuator | (17) Ball bearing |
| (2) Floating bracket | (10) Parking pawl shaft | |
| (3) AT main case | (11) Return spring | |
| (4) Range select lever | (12) Parking pawl | |
| (5) Straight pin | (13) Ball bearing | |
| (6) Detent spring | (14) Snap ring | |
| (7) Manual plate | (15) Parking gear | |
| (8) Parking rod | (16) Reduction driven gear | |

Tightening torque:N·m (kgf·m, ft·lb)

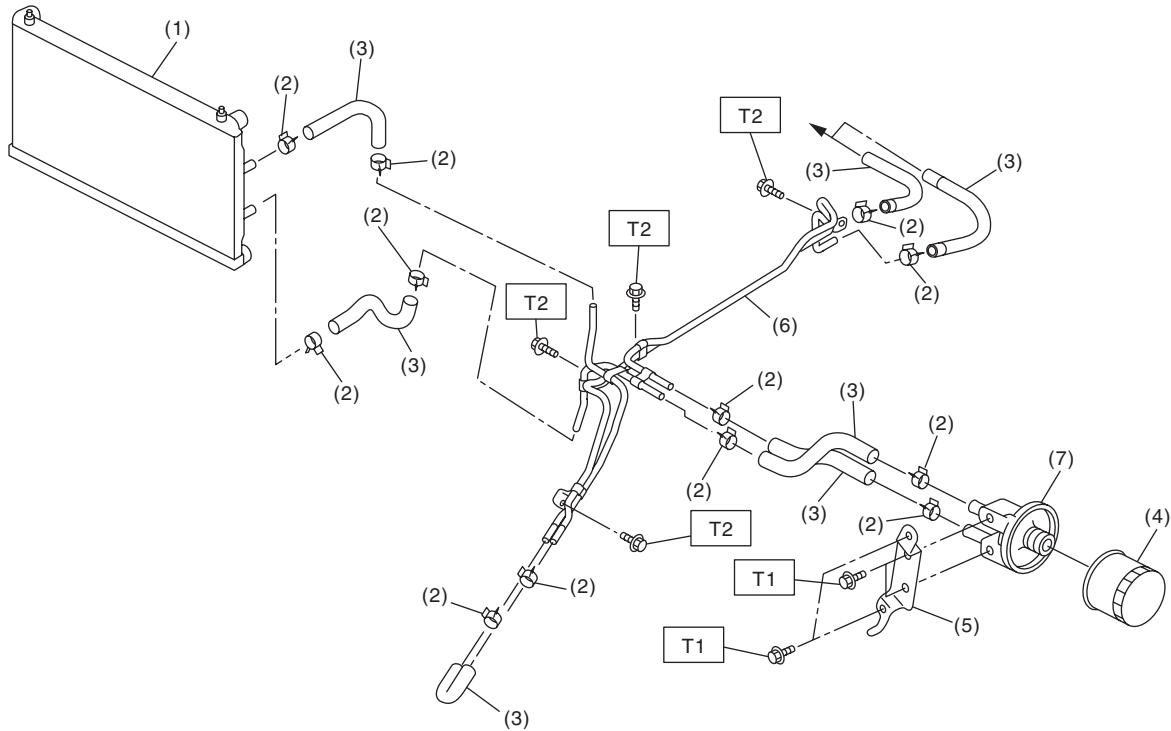
T1: 6 (0.6, 4.4)

T2: 7 (0.7, 5.2)

T3: 25 (2.5, 18.4)

T4: <Ref. to 5AT-78, Parking Pawl.>

12.OIL COOLER PIPE AND OIL COOLER



AT-04149

| | | | |
|-----|------------|-----|-----------------------|
| (1) | Radiator | (5) | ATF filter bracket |
| (2) | Clip | (6) | ATF cooler pipe |
| (3) | ATF hose | (7) | ATF filter attachment |
| (4) | ATF filter | | |

Tightening torque:N·m (kgf·m, ft·lb)

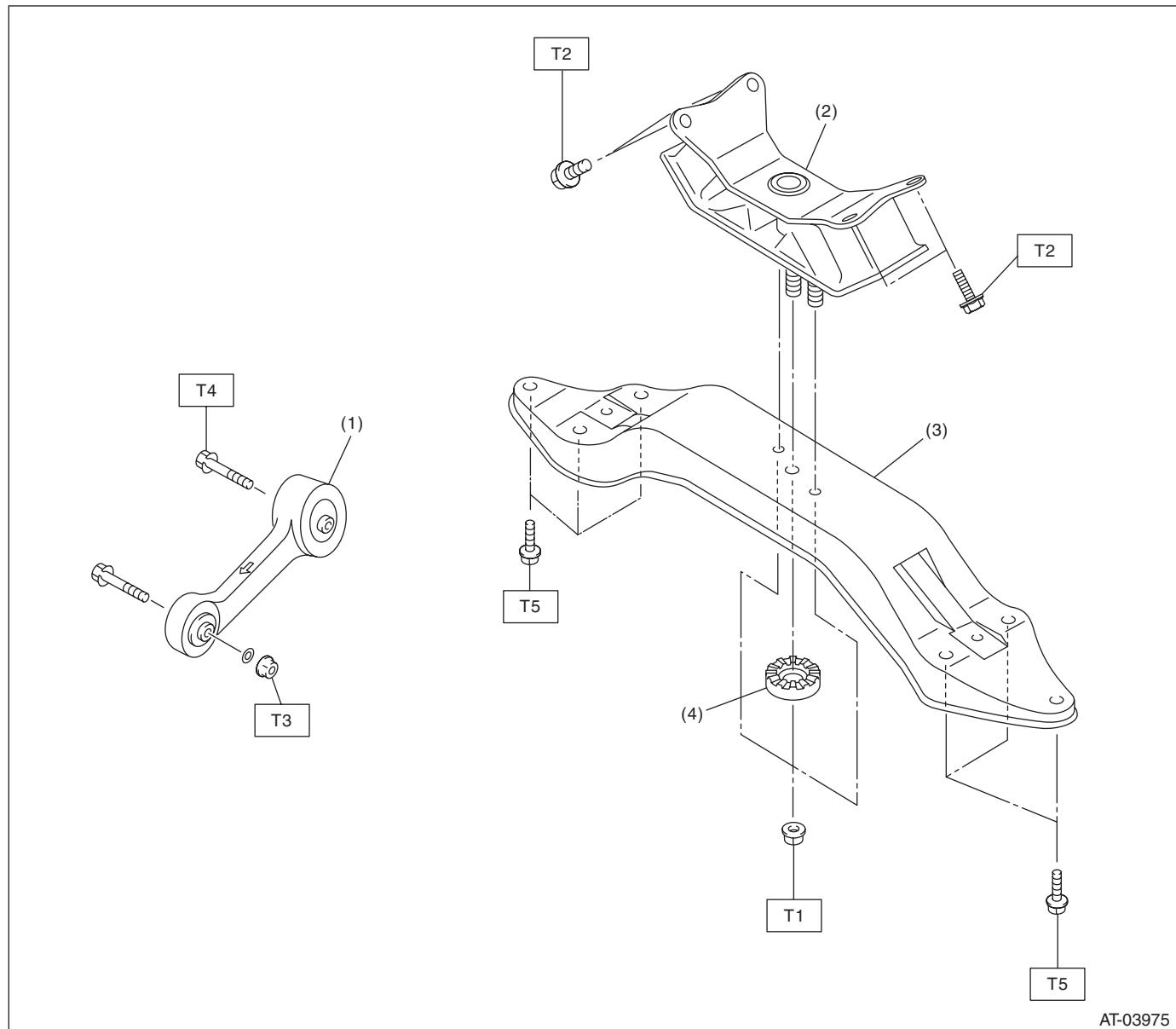
T1: 7 (0.7, 5.2)

T2: 7.5 (0.8, 5.5)

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13. 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, 25.8) |
| T2: | 40 (4.1, 29.5) |
| T3: | 50 (5.1, 36.9) |
| T4: | 58 (5.9, 42.8) |
| T5: | 75 (7.6, 55.3) |

C: CAUTION

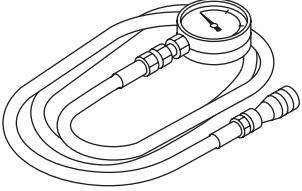
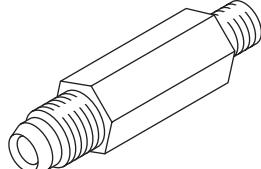
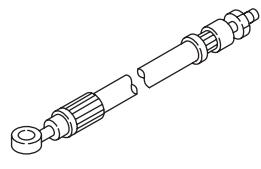
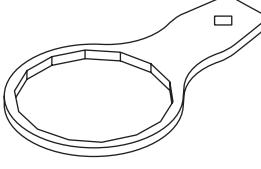
- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Until the oil pan is removed, do not place with the oil pan side facing up to prevent foreign matter from entering the valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, disassembly and replacement.
- When disassembling the case and other light alloy parts, disassemble them by slightly tapping with a plastic hammer. 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 equivalent. Do not mix them of different grades or 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 onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old liquid gasket.

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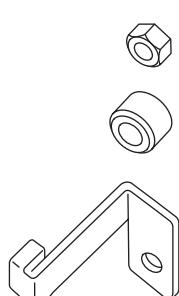
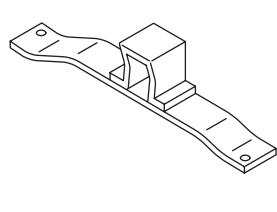
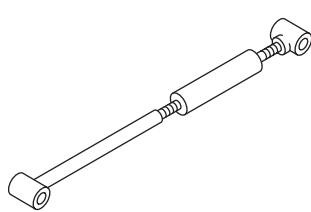
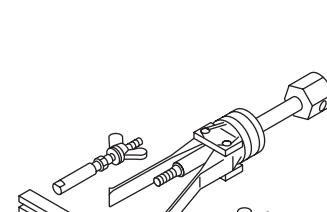
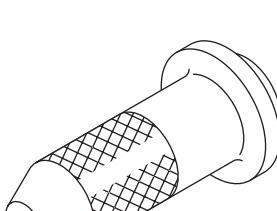
D: PREPARATION TOOL

1. SPECIAL TOOL

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|-------------|--------------------------|---|
|  ST-498575400 | 498575400 | OIL PRESSURE GAUGE ASSY | Used for measuring oil pressure. |
|  ST-498897200 | 498897200 | OIL PRESSURE ADAPTER | Used with oil pump cover installed on when measuring line pressure. |
|  ST-498897800 | 498897800 | OIL PRESSURE ADAPTER SET | Used for measuring transfer clutch pressure. |
|  ST-498545400 | 498545400 | FILTER WRENCH | Used for removing and installing the ATF filter. |

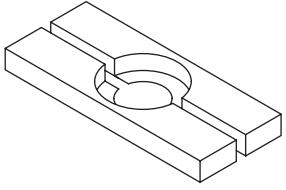
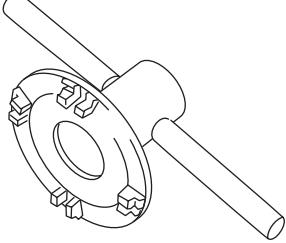
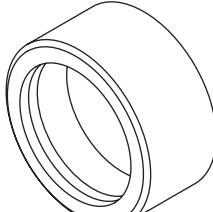
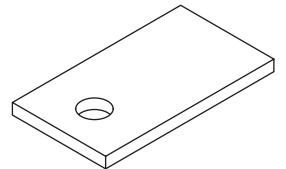
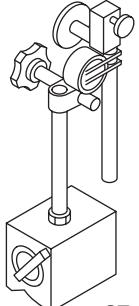
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| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|-------------|------------------------|---|
|  ST-498277200 | 498277200 | STOPPER SET | Used for preventing the torque converter assembly from falling when removing and installing automatic transmission assembly. |
|  ST41099AA010 | 41099AA010 | ENGINE SUPPORT BRACKET | Used for supporting engine. |
|  ST41099AA020 | 41099AA020 | ENGINE SUPPORT | Used for supporting engine. |
|  ST-398527700 | 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. |
|  ST-498057300 | 498057300 | INSTALLER | Used for installing the extension oil seal. |

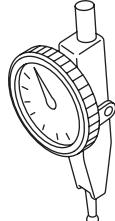
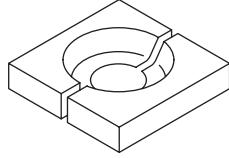
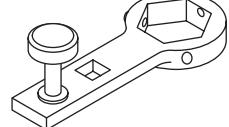
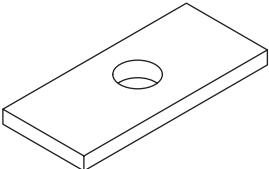
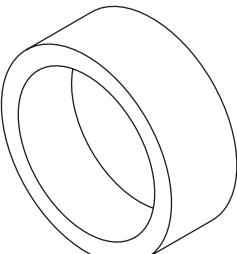
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|---|-------------|-----------------------|--|
|  ST-498077000 | 498077000 | REMOVER | Used for removing the differential taper roller bearing. |
|  ST18630AA010 | 18630AA010 | WRENCH COMPL RETAINER | Used for removing and installing the differential side retainer. |
|  ST-398487700 | 398487700 | DRIFT | Used for installing the front differential taper roller bearing. |
|  ST-498255400 | 498255400 | PLATE | Used for measuring the backlash of hypoid gear. |
|  ST-498247001 | 498247001 | MAGNET BASE | <ul style="list-style-type: none"> • Used for measuring the gear backlash. • Used with DIAL GAUGE (498247100). |

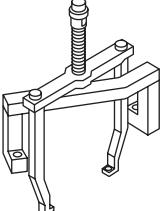
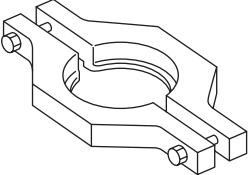
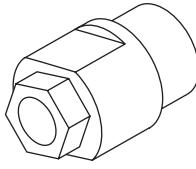
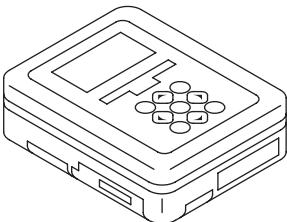
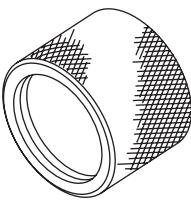
General Description

AUTOMATIC TRANSMISSION

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|-------------|--------------|---|
|  ST-498247100 | 498247100 | DIAL GAUGE | <ul style="list-style-type: none"> Used for measuring the gear backlash. Used with MAGNET BASE (498247001). |
|  ST-498517000 | 498517000 | REPLACER | Used for removing the front roller bearing. |
|  ST-499787700 | 499787700 | WRENCH | Used for removing and installing the drive pinion lock nut. |
|  ST-398643600 | 398643600 | GAUGE | Used for measuring the total end play, extension end play and drive pinion height. |
|  ST-398744300 | 398744300 | PISTON GUIDE | Used for measuring height from mating surface of the main case to pressure plate. |

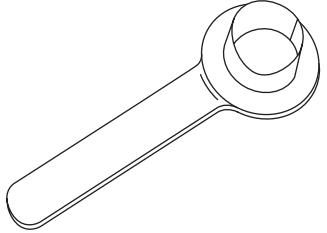
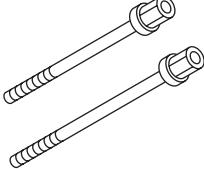
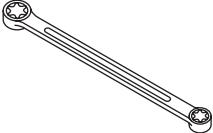
General Description

AUTOMATIC TRANSMISSION

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|-------------|--------------------------------------|---|
|  ST-499737100 | 499737100 | PULLER SET | Used for removing the reduction driven gear assembly. |
|  ST-498077600 | 498077600 | REMOVER | Used for removing the ball bearing. |
|  ST18667AA010 | 18667AA010 | HOLDER | <ul style="list-style-type: none"> Used for removing and installing the drive pinion lock nut. Used as a handle to rotate gear when checking tooth contact. |
|  ST1B022XU0 | 1B022XU0 | SUBARU SELECT MONITOR III KIT | Used for troubleshooting for electrical system. |
|  ST18675AA000 | 18675AA000 | DIFFERENTIAL SIDE OIL SEAL INSTALLER | Used for installing the differential side retainer oil seal. |

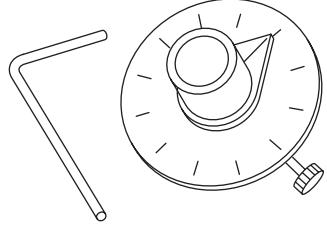
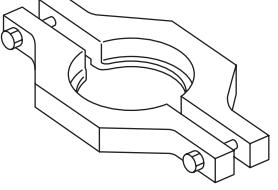
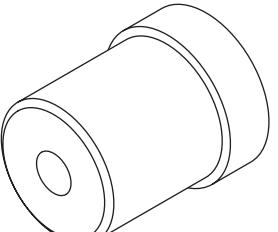
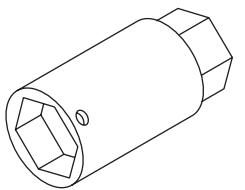
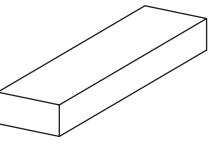
General Description

AUTOMATIC TRANSMISSION

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|-------------|--------------------|---|
|  ST18654AA000 | 18654AA000 | INSTALLER | Used for removing and installing the ball bearing. |
|  ST28399SA010 | 28399SA010 | OIL SEAL PROTECTOR | Used for protecting oil seal when installing front drive shaft. |
|  ST18763AA000 | 18763AA000 | COMPRESSOR SHAFT | Used for disassembling multi-plate clutch for shift transmission. |
|  ST18765AA000 | 18765AA000 | COMPRESSOR SUPPORT | Used for disassembling multi-plate clutch for shift transmission. |
|  ST18676AA020 | 18676AA020 | TORX® WRENCH | Used for disassembling torque converter case. |

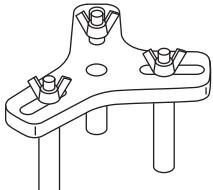
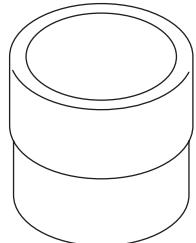
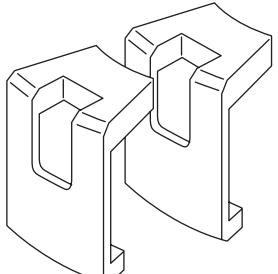
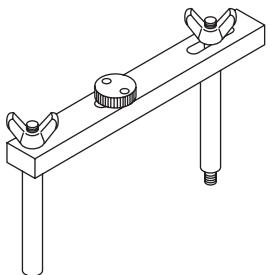
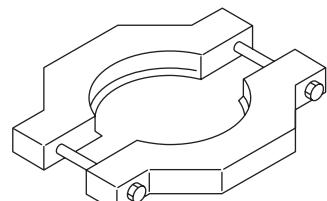
General Description

AUTOMATIC TRANSMISSION

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|-------------|-----------------------|--|
|  ST18854AA000 | 18854AA000 | ANGLE GAUGE | Used for tightening parking support. |
|  ST-498077300 | 498077300 | REMOVER | Used for removing ball bearing of reduction driven gear. |
|  ST-499587100 | 499587100 | OIL SEAL INSTALLER | Used for installing the oil seal. |
|  ST-499787500 | 499787500 | ADAPTER | Used for removing and installing drive pinion lock nut. |
|  ST-499575400 | 499575400 | GAUGE | Used for measuring height of total end play. |

General Description

AUTOMATIC TRANSMISSION

| ILLUSTRATION | TOOL NUMBER | DESCRIPTION | REMARKS |
|---|-------------|-------------------------|---|
|  ST18762AA000 | 18762AA000 | COMPRESSOR SPECIAL TOOL | Used for disassembling multi-plate clutch for shift transmission. |
|  ST-499755602 | 499755602 | PRESS | Used for installing the parking gear. |
|  ST18680AA010 | 18680AA010 | HOLDER GEAR | Used for removing reduction driven gear assembly. (2-piece set) |
|  ST18766AA000 | 18766AA000 | SUPPORT PULLER | Used for removing reduction driven gear assembly. |
|  ST18767AA000 | 18767AA000 | REMOVER | <ul style="list-style-type: none"> Used to pull out the parking gear. Used to pull out the bearing from the VTD assembly. |

General Description

AUTOMATIC TRANSMISSION

2. GENERAL TOOL

| TOOL NAME | REMARKS |
|------------------|--|
| Depth gauge | Used for measuring the transmission end play. |
| Thickness gauge | Used for measuring clearance of the clutch, brake and oil pump. |
| Micrometer | Used for measuring thickness of the drive pinion. |
| Spring scale | Used for measuring the starting torque of the drive pinion. |
| Circuit tester | Used for measuring resistance and voltage. |
| TORX® T70 | Used for removing and installing differential gear oil drain plug. |
| Snap ring pliers | Used for removing and installing each snap ring. |