

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

1. General Description

A: SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Model			Except for XV model		XV model		
Type			5-forward speeds and 1-reverse (all stage with synchromesh)				
Transmission gear ratio			1st	3.454		3.545	
			2nd	1.888			
			3rd	1.296			
			4th	0.972			
			5th	0.738		0.780	
			Reverse	3.333			
Front reduction gear	Final	Type of gear	Hypoid				
		Gear ratio	4.111		4.444		
Rear reduction gear	Transfer	Type of gear	Helical				
		Gear ratio	1.000				
	Final	Type of gear	Hypoid				
		Gear ratio	4.111		4.444		
Front differential	Type and number of gear		Straight bevel gear (bevel pinion: 2, bevel gear: 2)				
Center differential	Type and number of gear		Straight bevel gear (bevel pinion: 2, bevel gear: 2 and viscous coupling)				
Transmission gear oil			SUBARU GEAR OIL EXTRA MT or equivalent				
Transmission gear oil capacity			3.5 L (3.7 US qt, 3.1 Imp qt)				

2. TRANSMISSION GEAR OIL

Recommended oil:

SUBARU GEAR OIL EXTRA MT

Alternative:

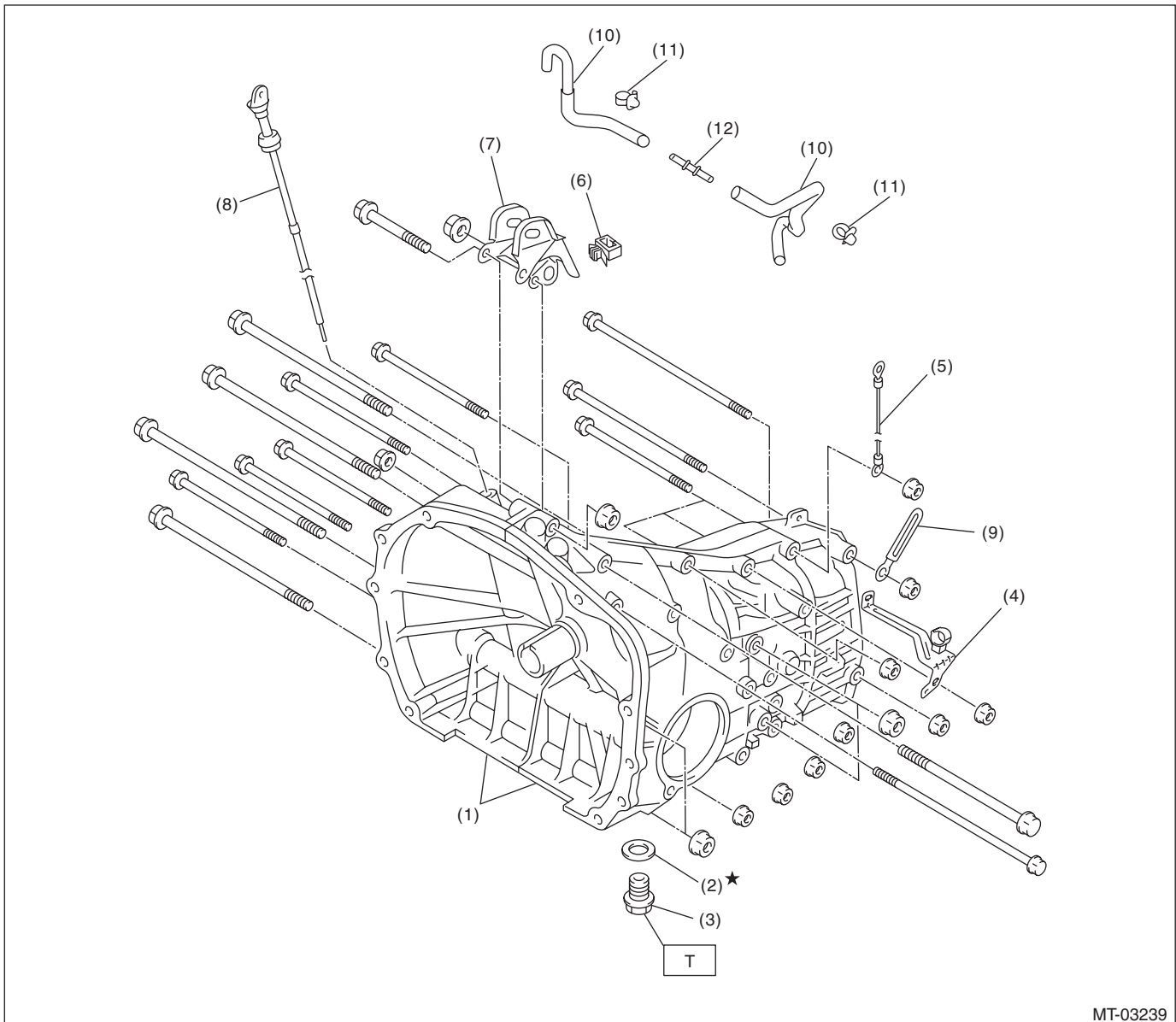
GL-5 (75W-90)

CAUTION:

If an alternative gear oil is used, you may not have expected functionality and performance.

B: COMPONENT

1. TRANSMISSION CASE



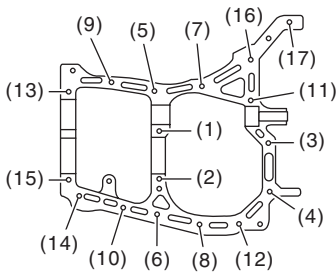
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|------------------------------------|------------------------------|
| (1) Transmission case ASSY | (7) Pitching stopper bracket |
| (2) Gasket | (8) Oil level gauge |
| (3) Drain plug | (9) Harness clip |
| (4) Harness bracket | (10) Air breather hose |
| (5) Transmission radio ground cord | (11) Clip |
| (6) Clamp | (12) Hose connector |

Tightening torque: N·m (kgf·m, ft·lb)
T: 44 (4.5, 32.5) (aluminum gasket, silver)
70 (7.1, 51.6) (copper gasket, brown)
70 (7.1, 51.6) (metal gasket, black)

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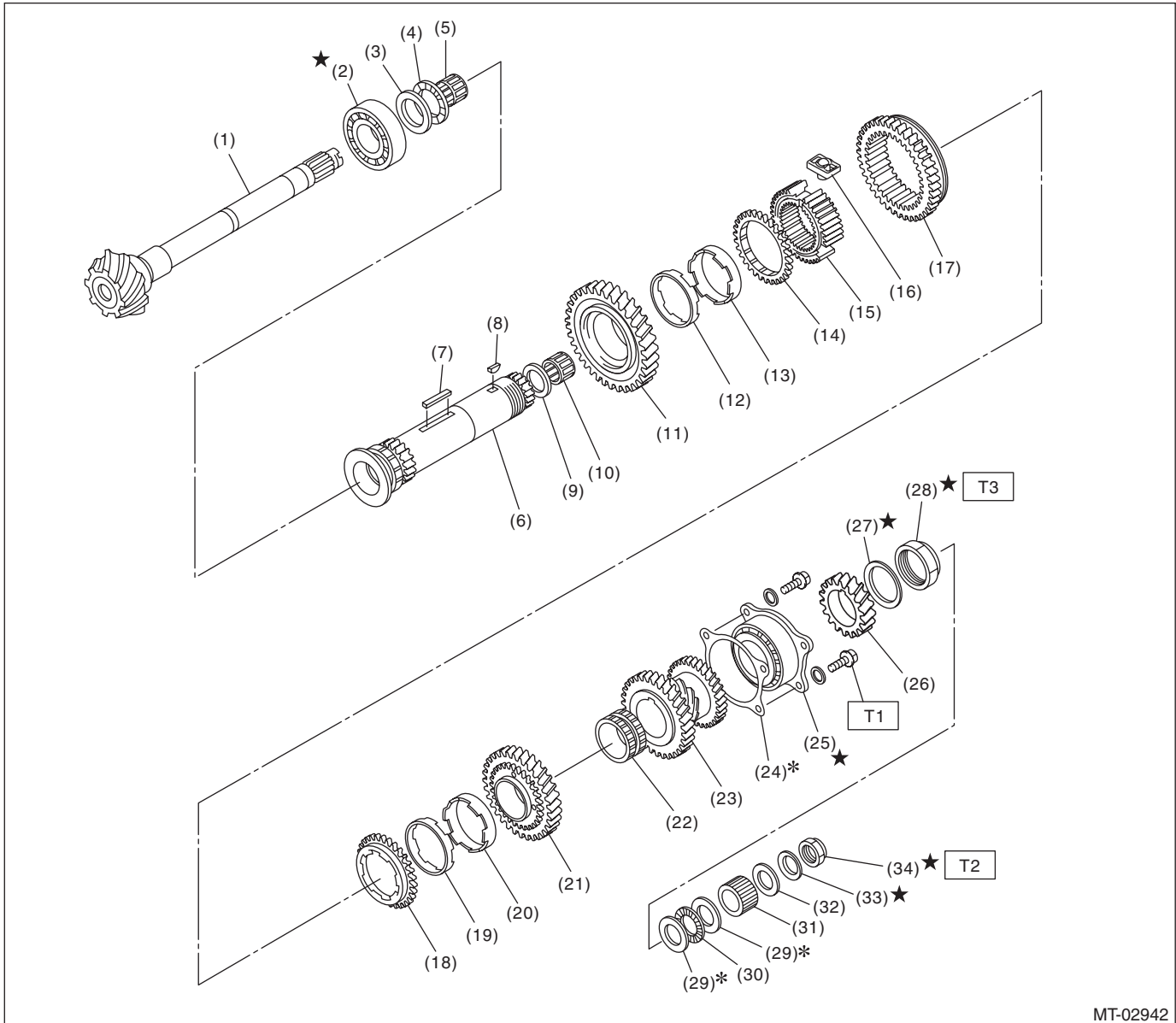
Transmission case tightening torque

 MT-00003	Bolt No.	Bolt size mm	Tightening torque: N·m (kgf-m, ft-lb)
	(5) — (15)	8	25 (2.5, 18.4)
	(1) — (4) (16), (17)	10	39 (4.0, 28.8)

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2. DRIVE PINION SHAFT ASSEMBLY



MT-02942

(1) Drive pinion shaft	(14) Outer baulk ring	(27) Lock washer
(2) Roller bearing	(15) 1st-2nd synchronizer hub	(28) Lock nut
(3) Washer	(16) Ball detent	(29) Adjusting washer
(4) Thrust bearing	(17) Reverse driven gear	(30) Thrust bearing
(5) Needle bearing	(18) Outer baulk ring	(31) Differential bevel gear sleeve
(6) Driven shaft	(19) Synchro cone	(32) Washer
(7) Key	(20) Inner baulk ring	(33) Lock washer
(8) Woodruff key	(21) 2nd driven gear	(34) Lock nut
(9) Drive pinion collar	(22) 2nd driven gear bushing	
(10) Needle bearing	(23) 3rd-4th driven gear	
(11) 1st driven gear	(24) Drive pinion shim	
(12) Inner baulk ring	(25) Double taper roller bearing	
(13) Synchro cone	(26) 5th driven gear	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 30 (3.1, 22.1)

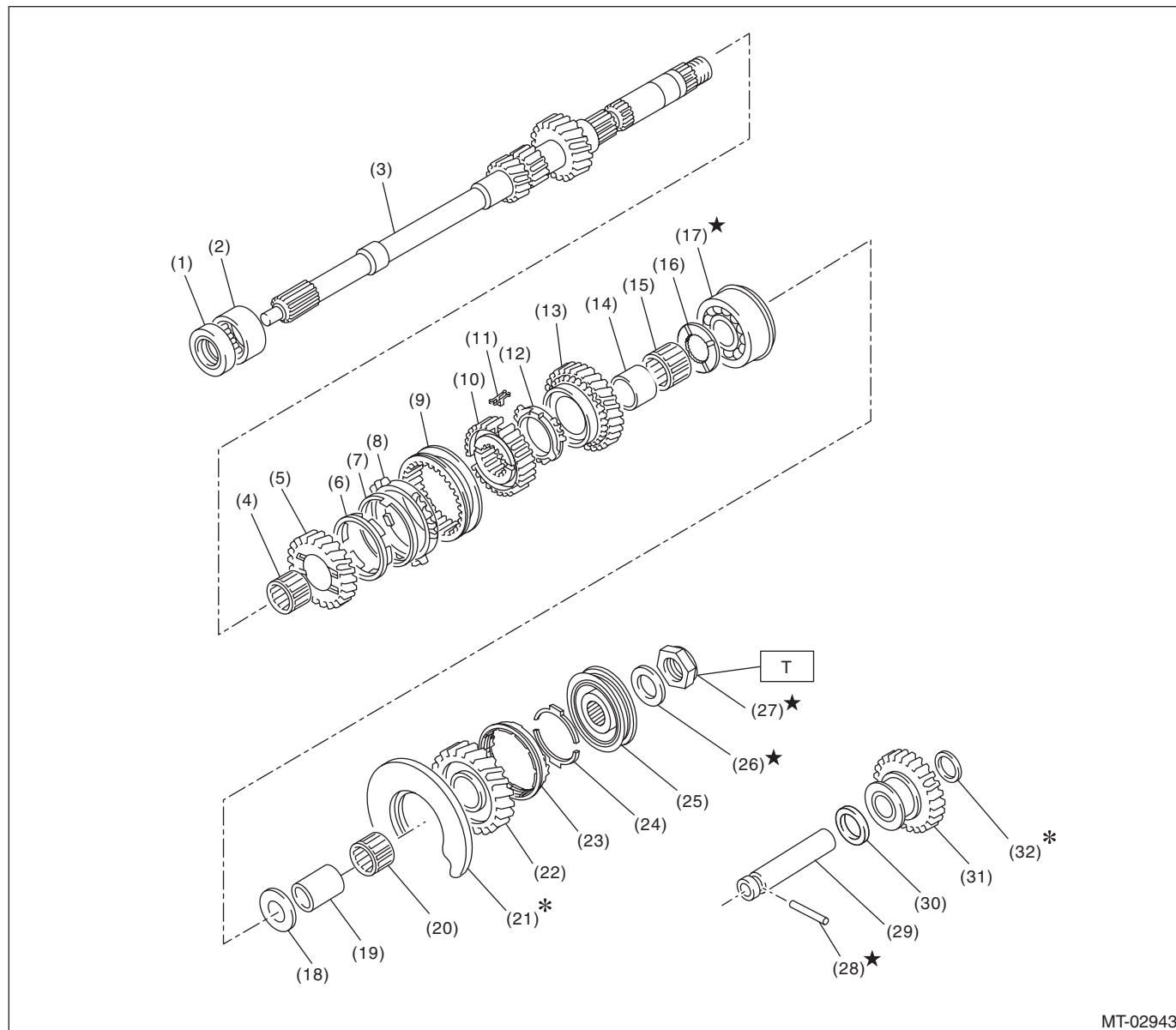
T2: 120 (12.2, 88.5)

T3: 260 (26.5, 191.8)

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3. MAIN SHAFT ASSY



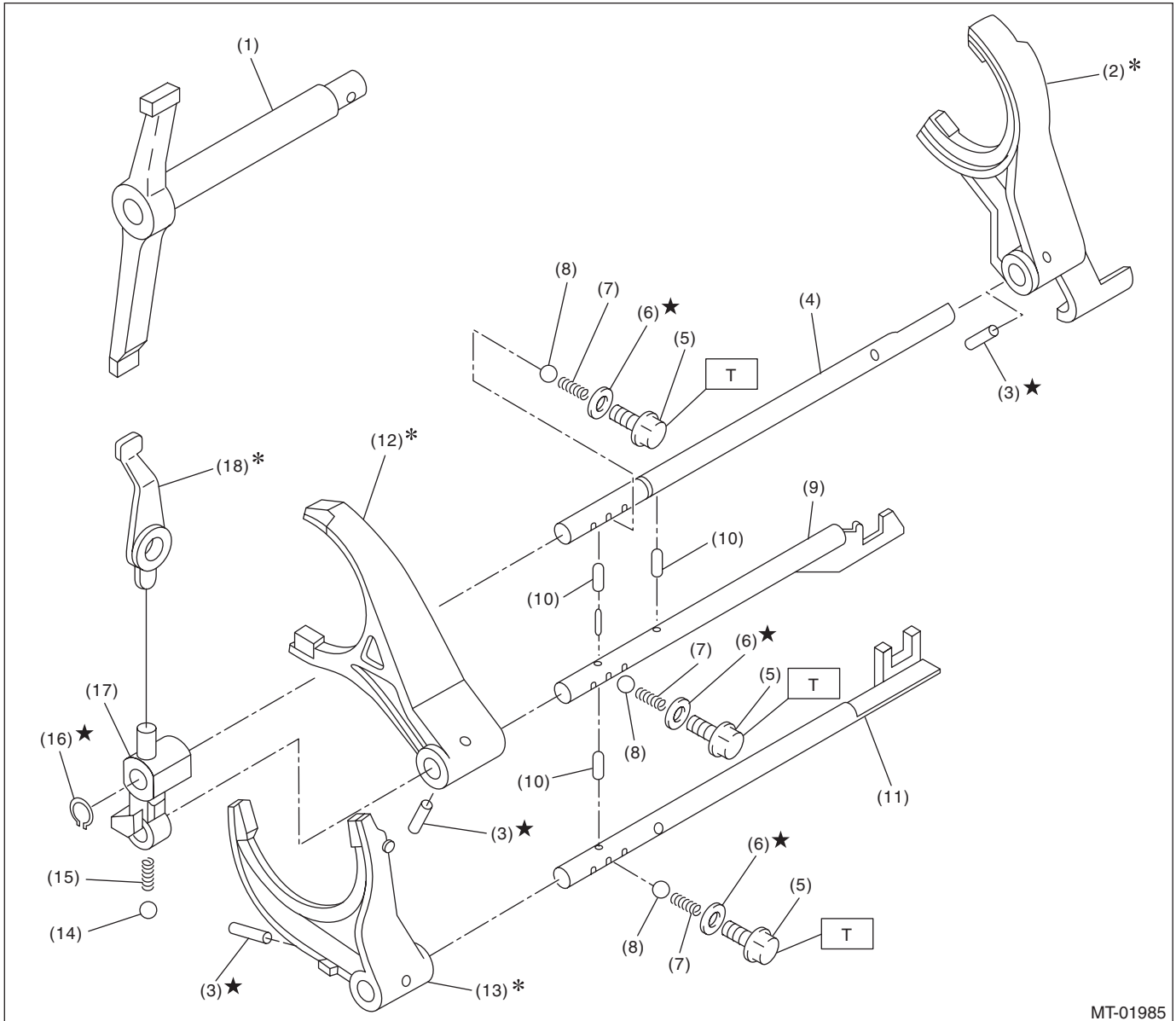
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|----------------------------------|------------------------------|--------------------------------|
| (1) Oil seal | (14) 4th needle bearing race | (26) Lock washer |
| (2) Needle bearing | (15) Needle bearing | (27) Lock nut |
| (3) Main shaft | (16) 4th gear thrust washer | (28) Straight pin |
| (4) Needle bearing | (17) Double ball bearing | (29) Reverse idler gear shaft |
| (5) 3rd drive gear | (18) 5th gear thrust washer | (30) Reverse idler gear washer |
| (6) Inner baulk ring | (19) 5th needle bearing race | (31) Reverse idler gear |
| (7) 3rd synchro cone | (20) Needle bearing | (32) Adjusting washer |
| (8) Outer baulk ring | (21) Main shaft rear plate | |
| (9) 3rd-4th coupling sleeve | (22) 5th drive gear | |
| (10) 3rd-4th synchronizer hub | (23) 5th baulk ring | |
| (11) 3rd-4th shifting insert key | (24) Baulk lever | |
| (12) 4th baulk ring | (25) 5th hub & sleeve No. 2 | |
| (13) 4th drive gear | | |

Tightening torque: N·m (kgf-m, ft-lb)
T: 120 (12.2, 88.5)

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4. SHIFTER FORK AND SHIFTER ROD



MT-01985

- | | | |
|---------------------------|----------------------------|-----------------------------|
| (1) Shifter arm | (8) Ball | (15) Spring |
| (2) 5th shifter fork | (9) 3rd-4th fork rod | (16)★ Snap ring (outer) |
| (3)★ Straight pin | (10) Interlock plunger | (17) Reverse fork rod arm |
| (4) Reverse fork rod | (11) 1st-2nd fork rod | (18)* Reverse shifter lever |
| (5)★ Checking ball plug | (12)* 3rd-4th shifter fork | |
| (6)★ Gasket | (13)* 1st-2nd shifter fork | |
| (7)★ Checking ball spring | (14) Ball | |

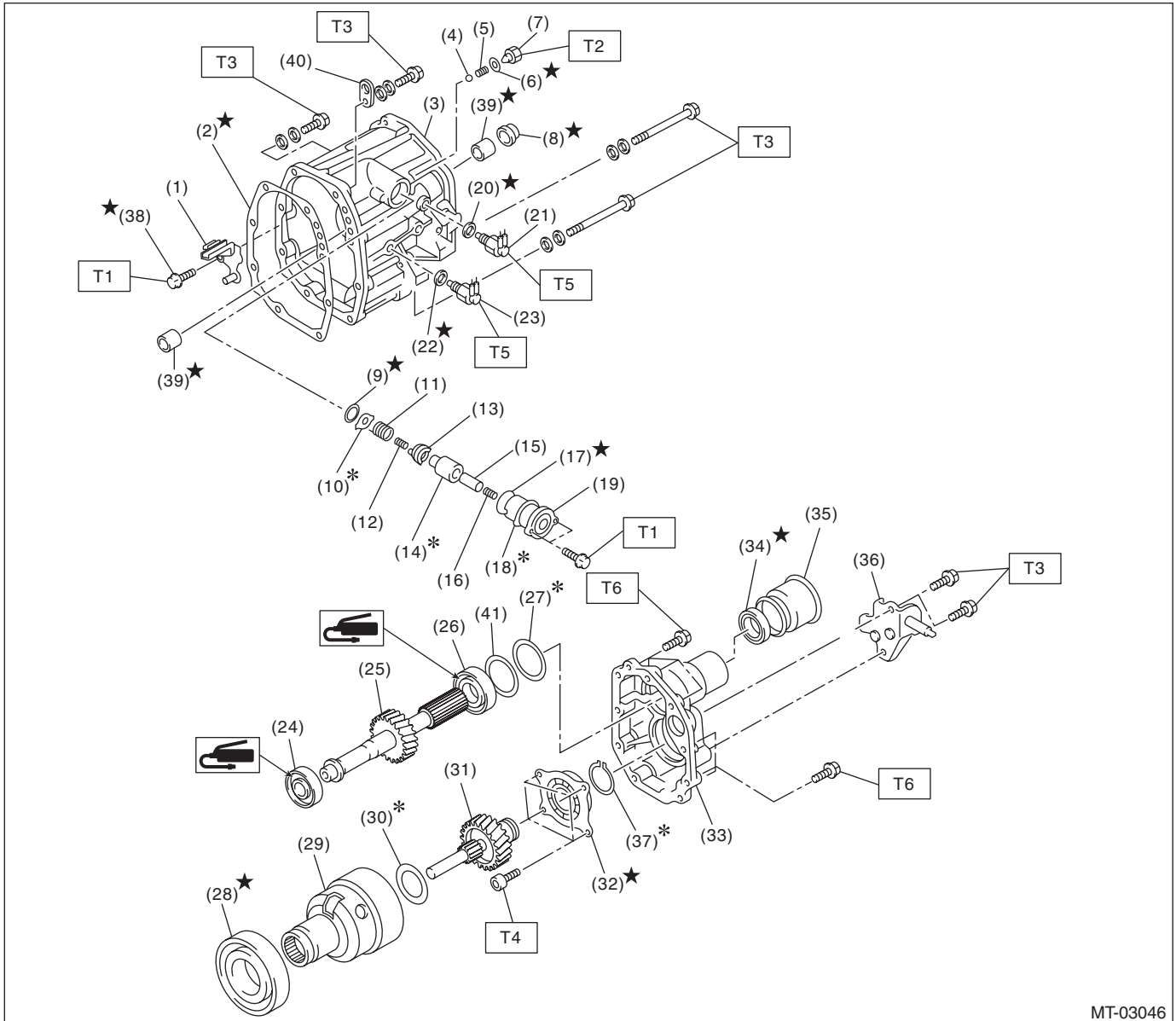
Tightening torque: N·m (kgf-m, ft-lb)

T: 20 (2.0, 14.8)

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5. TRANSFER CASE AND EXTENSION



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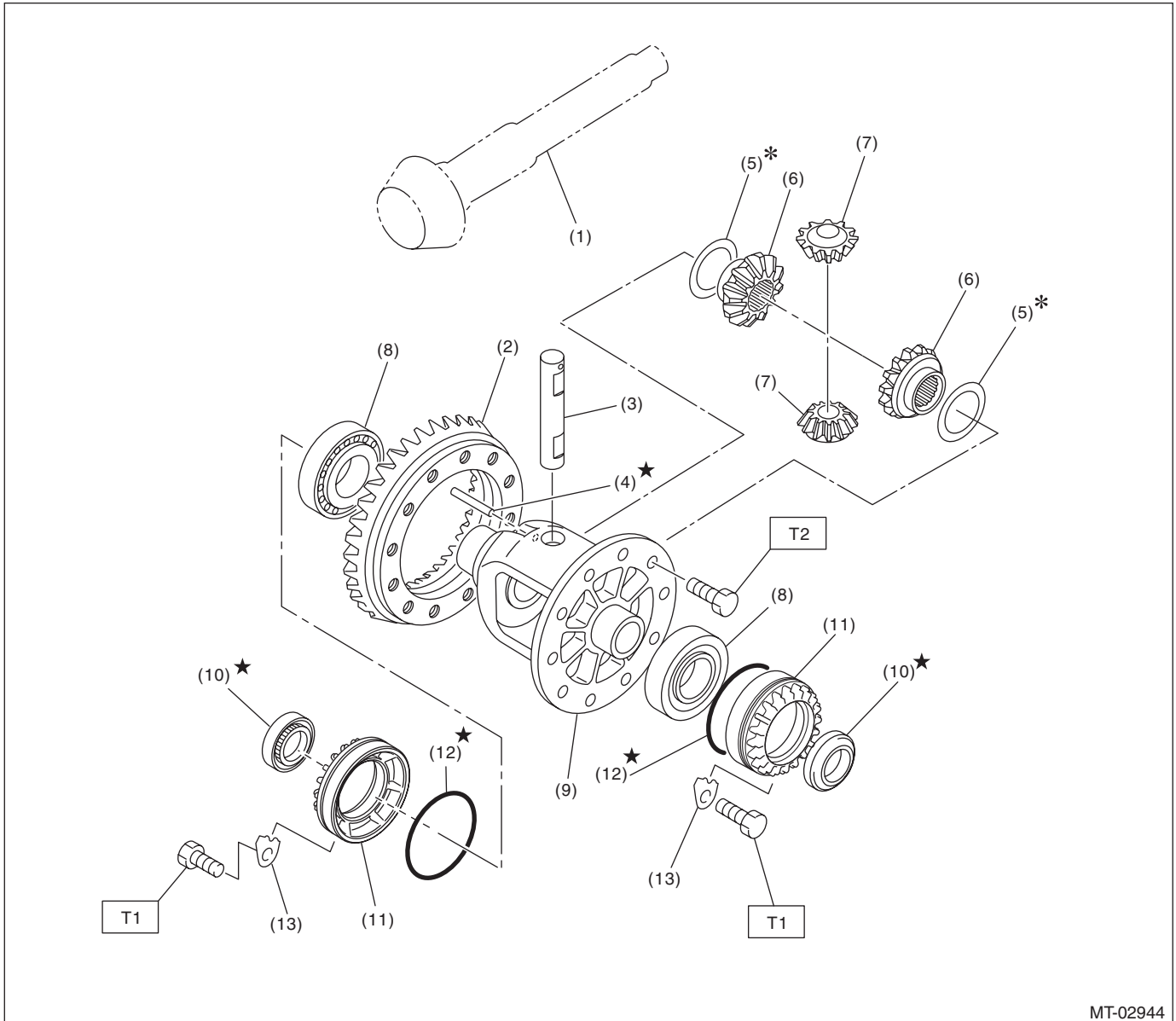
(1) Oil guide	(18) Adjusting select shim	(34) Oil seal
(2) Gasket	(19) Reverse check sleeve	(35) Dust cover
(3) Transfer case	(20) Gasket	(36) Shift bracket
(4) Ball	(21) Neutral position switch	(37) Snap ring
(5) Reverse accent spring	(22) Gasket	(38) Precoat bolt
(6) Gasket	(23) Back-up light switch	(39) Roller bearing
(7) Plug	(24) Taper roller bearing (transfer case side)	(40) Transmission hanger
(8) Oil seal	(25) Transfer driven gear	(41) Dish plate
(9) Snap ring (inner)	(26) Taper roller bearing (extension case side)	
(10) Reverse check plate	(27) Adjusting washer	
(11) Reverse check spring	(28) Ball bearing	
(12) Reverse return spring	(29) Center differential	
(13) Reverse check cam	(30) Adjusting washer	
(14) Reverse accent shaft	(31) Transfer drive gear	
(15) Return spring cap	(32) Ball bearing	
(16) Return spring	(33) Extension case	
(17) O-ring		

Tightening torque: N·m (kgf-m, ft-lb)**T1: 6.4 (0.7, 4.7)****T2: 9.75 (1.0, 7.2)****T3: 24.5 (2.5, 18.1)****T4: 26 (2.7, 19.2)****T5: 32.3 (3.3, 23.8)****T6: 40 (4.1, 29.5)**

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6. FRONT DIFFERENTIAL



- | | |
|-----------------------------|---------------------------------|
| (1) Drive pinion shaft | (7) Differential bevel pinion |
| (2) Hypoid driven gear | (8) Taper roller bearing |
| (3) Pinion shaft | (9) Differential case |
| (4) Straight pin | (10) Oil seal |
| (5) Adjusting washer | (11) Differential side retainer |
| (6) Differential bevel gear | (12) O-ring |

- (13) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)

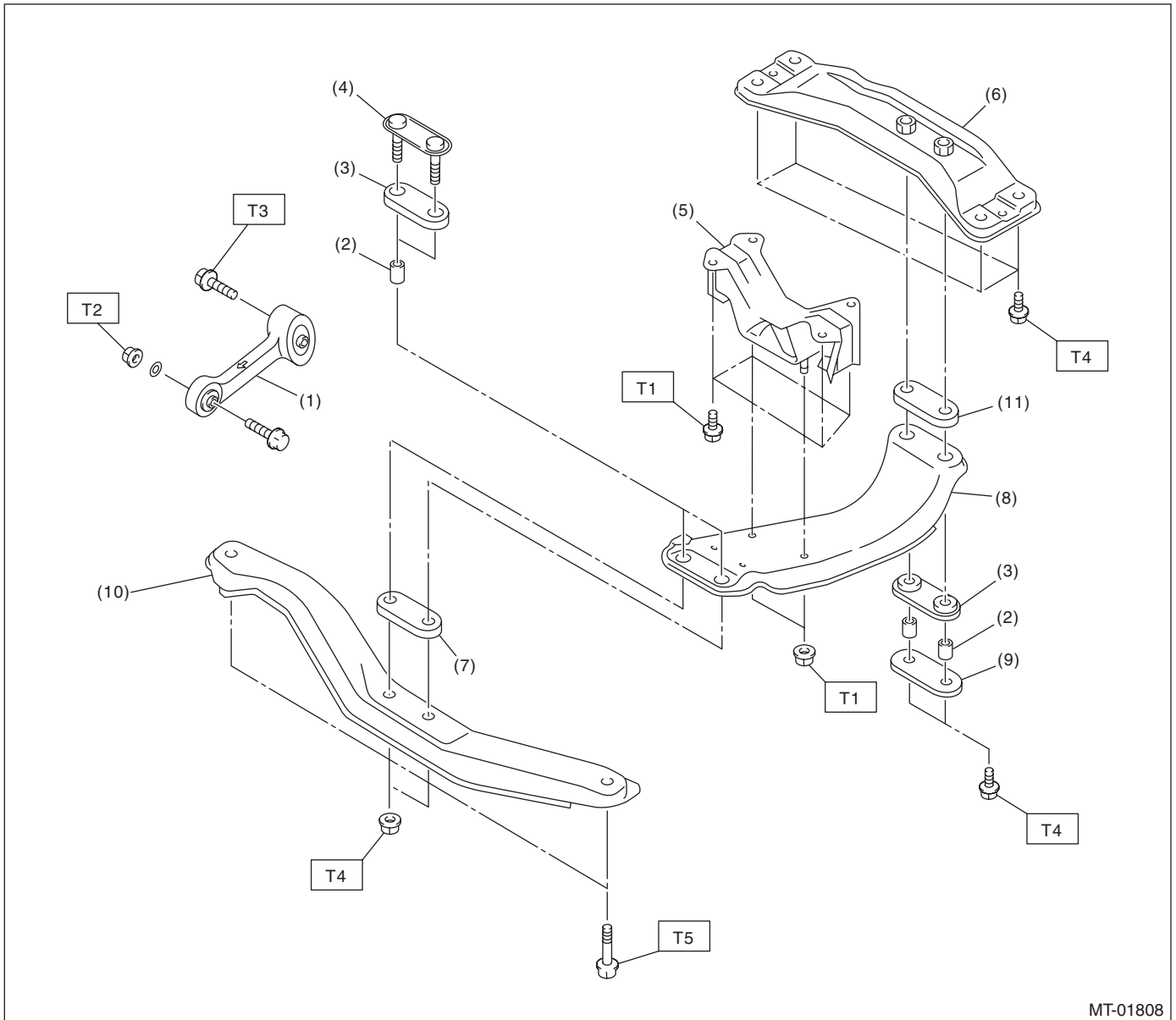
T1: 25 (2.5, 18.4)

T2: 62 (6.3, 45.7)

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7. TRANSMISSION MOUNTING



MT-01808

- | | |
|---------------------------------|--------------------------|
| (1) Pitching stopper | (7) Upper cushion rubber |
| (2) Spacer | (8) Center crossmember |
| (3) Lower cushion rubber | (9) Rear plate |
| (4) Front plate | (10) Front crossmember |
| (5) Transmission cushion rubber | (11) Rear cushion rubber |
| (6) Rear crossmember | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 35 (3.6, 25.8)

T2: 50 (5.1, 36.9)

T3: 58 (5.9, 42.8)

T4: 70 (7.1, 51.6)

T5: 140 (14.3, 103.3)

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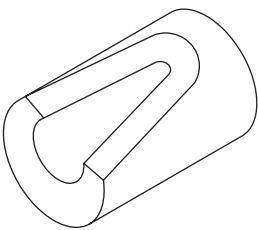
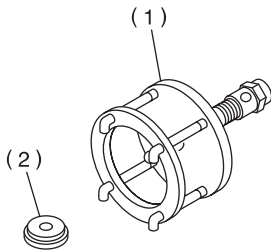
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C: CAUTION

- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, disassemble by using 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 gear oil, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove and clean the old liquid gasket.
- Be careful of handling the oil seal, O-ring and gasket. If the contact surface of them is damaged, oil leakage may occur.
- When pressing-in the oil seal, make sure that the oil seal lip portion and outer surface are not damaged or tilted.
- When replacing the taper roller bearing, replace the outer race and inner race as a set.
- When replacing the hypoid gear, replace the hypoid driven gear and drive pinion shaft as a set.
- Replace the bolts if the seating surface or the thread surface is excessively rusted.

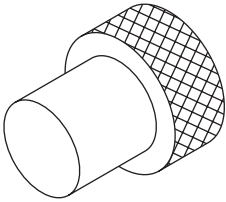
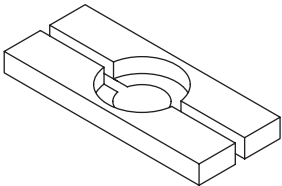
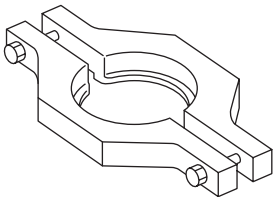
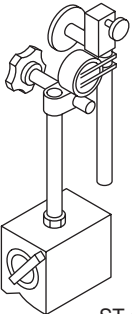
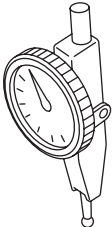
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399411700	399411700	ACCENT BALL INSTALLER	Used for installing reverse fork rod arm.
 ST-899524100	899524100	PULLER SET	Used for removing the front differential taper roller bearing. (1) Puller (2) Cap

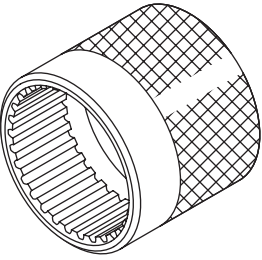
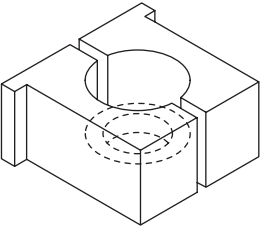
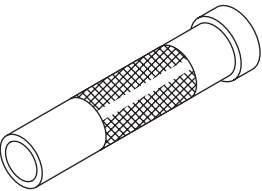
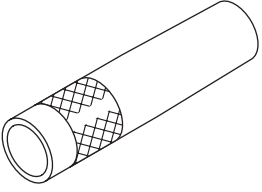
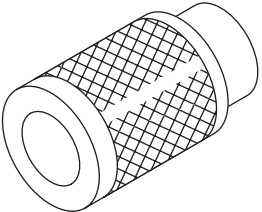
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399780104	399780104	WEIGHT	Used for adjusting preload on the front differential taper roller bearing.
 ST-498077000	498077000	REMOVER	<ul style="list-style-type: none"> • Used for removing the taper roller bearing of the drive pinion shaft assembly. • Used for removing the roller bearing of the transfer driven gear.
 ST-498077300	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential ball bearing.
 ST-498247001	498247001	MAGNET BASE	<ul style="list-style-type: none"> • Used for measuring the backlash of differential bevel pinion gear and hypoid driven gear. • Used together with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	<ul style="list-style-type: none"> • Used for measuring the backlash of differential bevel pinion gear and hypoid driven gear. • Used together with MAGNET BASE (498247001).

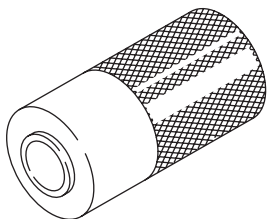
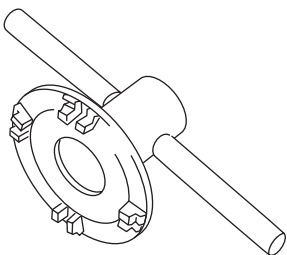
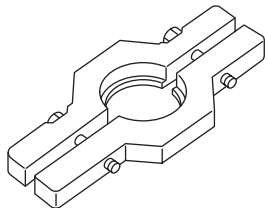
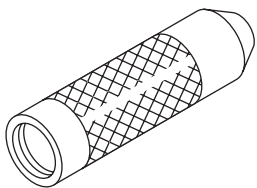
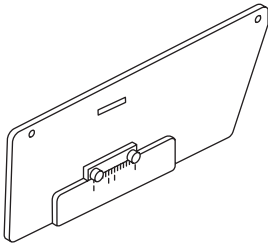
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498427100</p>	498427100	STOPPER	<ul style="list-style-type: none"> Used for removing and installing the drive pinion shaft assembly lock nut. Used for measuring the backlash of hypoid driven gear. Used for adjusting preload on the front differential taper roller bearing.
 <p>ST-498937000</p>	498937000	TRANSMISSION HOLDER	Used for removing and installing the main shaft assembly lock nut.
 <p>ST-499277100</p>	499277100	BUSHING 1-2 INSTALLER	<ul style="list-style-type: none"> Used for installing the drive pinion shaft assembly washer. Used for installing the front differential taper roller bearing inner race.
 <p>ST-499277200</p>	499277200	INSTALLER	<ul style="list-style-type: none"> Used for installing the drive pinion shaft assembly washer. Used for installing the 2nd driven gear bushing, 3rd-4th driven gear, double taper roller bearing and 5th driven gear.
 <p>ST-499757002</p>	499757002	INSTALLER	Used for removing the double taper roller bearing and driven gear of the drive pinion shaft assembly.

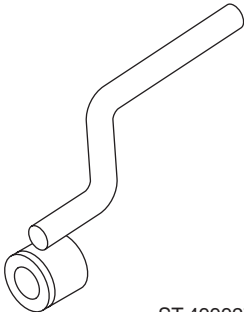
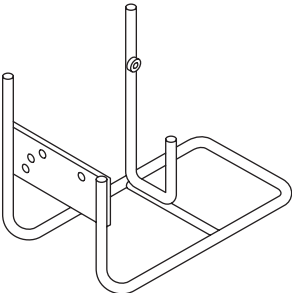
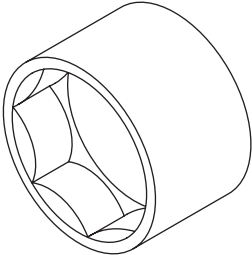
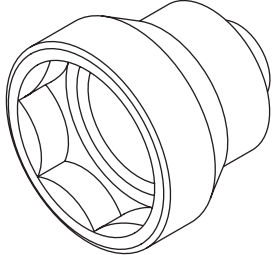
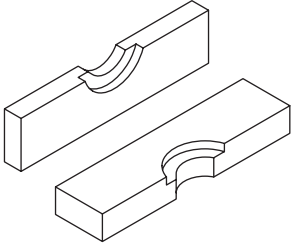
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927640000	927640000	INSTALLER	Used for installing the taper roller bearing (transfer case side) of transfer driven gear.
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	<ul style="list-style-type: none"> • Used for removing and installing the differential side retainer. • Used for adjusting preload on the front differential taper roller bearing. • Used for adjusting the backlash of hypoid driven gear. • WRENCH ASSY (499787000) can also be used.
 ST-499857000	499857000	5TH DRIVEN GEAR REMOVER	Used for removing the 5th driven gear.
 ST-499877000	499877000	RACE 4-5 INSTALLER	<ul style="list-style-type: none"> • Used for installing the 4th needle bearing race. • Used together with REMOVER (899714110). • Used for installing the ball bearing of the main shaft assembly. • Used for installing the 5th gear thrust washer.
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting the drive pinion shaft assembly shim.

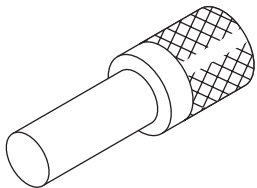
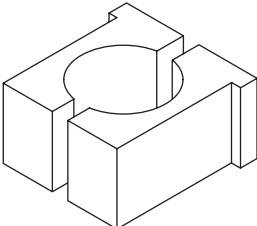
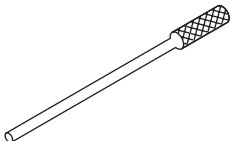
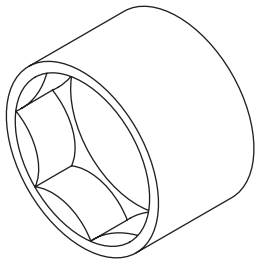
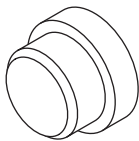
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499927100	499927100	HANDLE	Used for backlash adjustment of the front differential hypoid driven gear and preload adjustment of the taper roller bearing.
 ST-499937100	499937100	TRANSMISSION STAND SET	Used for disassembling and assembling the transmission.
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing the main shaft assembly lock nut.
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing the driven shaft lock nut.
 ST-899714110	899714110	REMOVER	Used for removing and installing the parts of main shaft assembly and driven shaft.

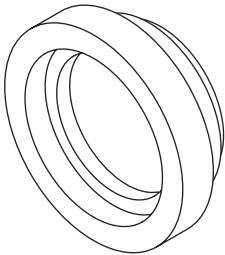
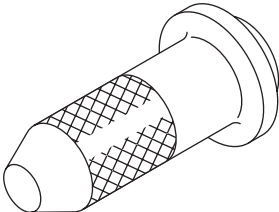
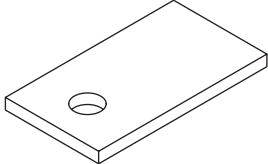
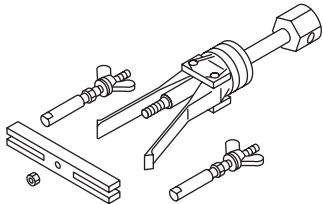
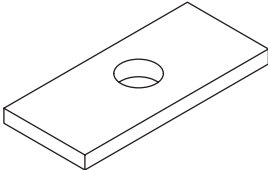
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 <p>ST-899864100</p>	899864100	REMOVER	<ul style="list-style-type: none"> Used for removing the parts of the main shaft assembly. Used for installing the transfer case roller bearing. Used for removing the taper roller bearing of transfer driven gear (transfer case side). Used for installing the taper roller bearing of transfer driven gear (extension case side).
 <p>ST-899884100</p>	899884100	HOLDER	<ul style="list-style-type: none"> Used for removing and installing the drive pinion shaft assembly lock nut. Used for removing and installing the driven shaft lock nut. Used for measuring the starting torque of the drive pinion shaft assembly.
 <p>ST-899904100</p>	899904100	STRAIGHT PIN REMOVER	Used for removing and installing the straight pin.
 <p>ST-899988608</p>	899988608	SOCKET WRENCH (27)	<ul style="list-style-type: none"> Used for removing and installing the drive pinion shaft assembly lock nut. Used for measuring the starting torque of the drive pinion shaft assembly.
 <p>ST-398497701</p>	398497701	ADAPTER	Used for installing the front differential taper roller bearing.

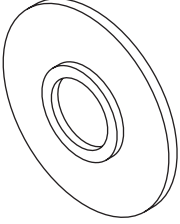
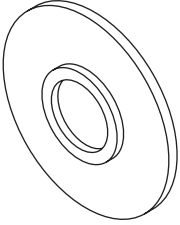
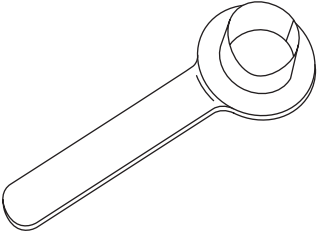
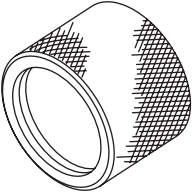
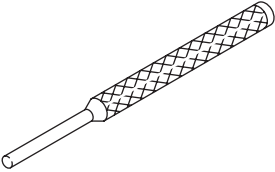
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499587000</p>	499587000	INSTALLER	Used for installing the driven shaft parts.
 <p>ST-498057300</p>	498057300	INSTALLER	Used for installing the oil seal of extension case.
 <p>ST-498255400</p>	498255400	PLATE	Used for measuring the hypoid driven gear backlash.
 <p>ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> • Used for removing the oil seal of extension case. • Used for removing the taper roller bearing outer race of front differential. • Used for removing the oil seal of front differential side retainer.
 <p>ST-398643600</p>	398643600	GAUGE	Used for adjusting the extension end play.

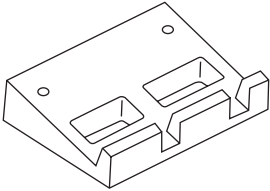
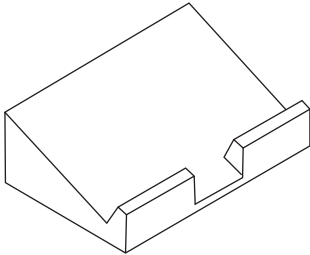
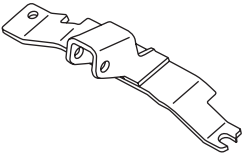
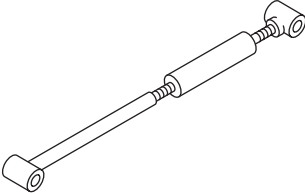
General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	398177700	INSTALLER	Used for installing the ball bearing of the transfer drive gear.
 ST-498175500	498175500	INSTALLER	Used for installing the taper roller bearing of transfer driven gear (extension case side).
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when inserting the front drive shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST-398791700	398791700	STRAIGHT PIN REMOVER 2	Used for removing and installing the straight pin.

General Description

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498267200</p>	498267200	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.
 <p style="text-align: center;">ST-498267300</p>	498267300	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.
 <p style="text-align: center;">ST41099AA012</p>	41099AA012 (Newly adopted tool)	ENGINE SUPPORT BRACKET	<ul style="list-style-type: none"> • Used for supporting engine. • ENGINE SUPPORT BRACKET (41099AA010) can also be used.
 <p style="text-align: center;">ST41099AA020</p>	41099AA020	ENGINE SUPPORT	Used for supporting engine.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
TORX® bit T70	Used for removing and installing the drain plug.