

# General Description

## DIFFERENTIALS

### 1. General Description

#### A: SPECIFICATION

##### 1. REAR DIFFERENTIAL

When replacing a rear differential assembly, select the correct one according to the following table.

NOTE:

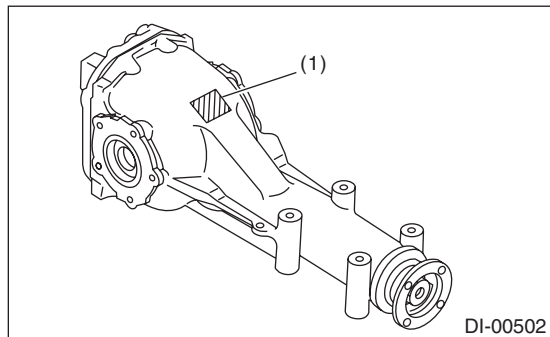
- Using a different rear differential assembly will cause the drive train and tires to drag or emit abnormal noise.
- For option code, refer to “ID” section. <Ref. to ID-2, IDENTIFICATION, Identification.>

Model	2.5 L non-turbo		2.0 L turbo
	CVT	6MT	CVT
Rear differential type	VA1-type	T-type	T-type
Identification	XD	B4	X1
LSD type	—		
Type of gear	Hypoid gear		
Gear ratio (number of gear teeth)	3.700 (37/10)	4.444 (40/9)	4.111 (37/9)
Oil capacity	0.8 L (0.8 US qt, 0.7 Imp qt)		
Rear differential gear oil	GL-5		

##### 2. IDENTIFICATION

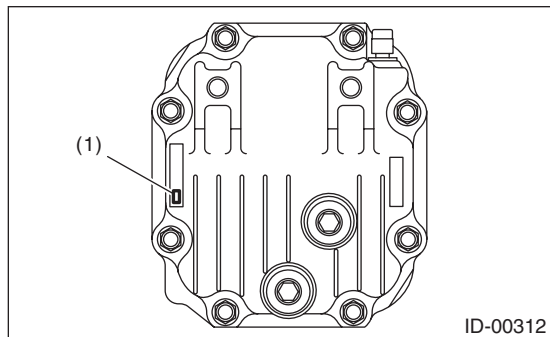
Identification positions are shown in the following figures. For details concerning identification, refer to the “ID” section.

- T-type



(1) Identification

- VA1-type



(1) Identification

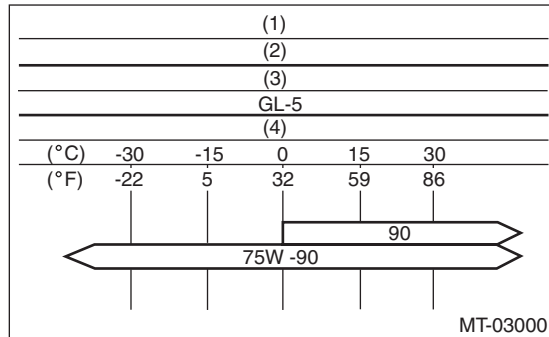
### 3. REAR DIFFERENTIAL GEAR OIL

**Recommended gear oil:**

**GL-5 (75W-90) or equivalent**

**CAUTION:**

Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



- (1) Item
- (2) Rear differential gear oil
- (3) API classification
- (4) SAE viscosity No. and applicable temperature

### 4. SERVICE DATA

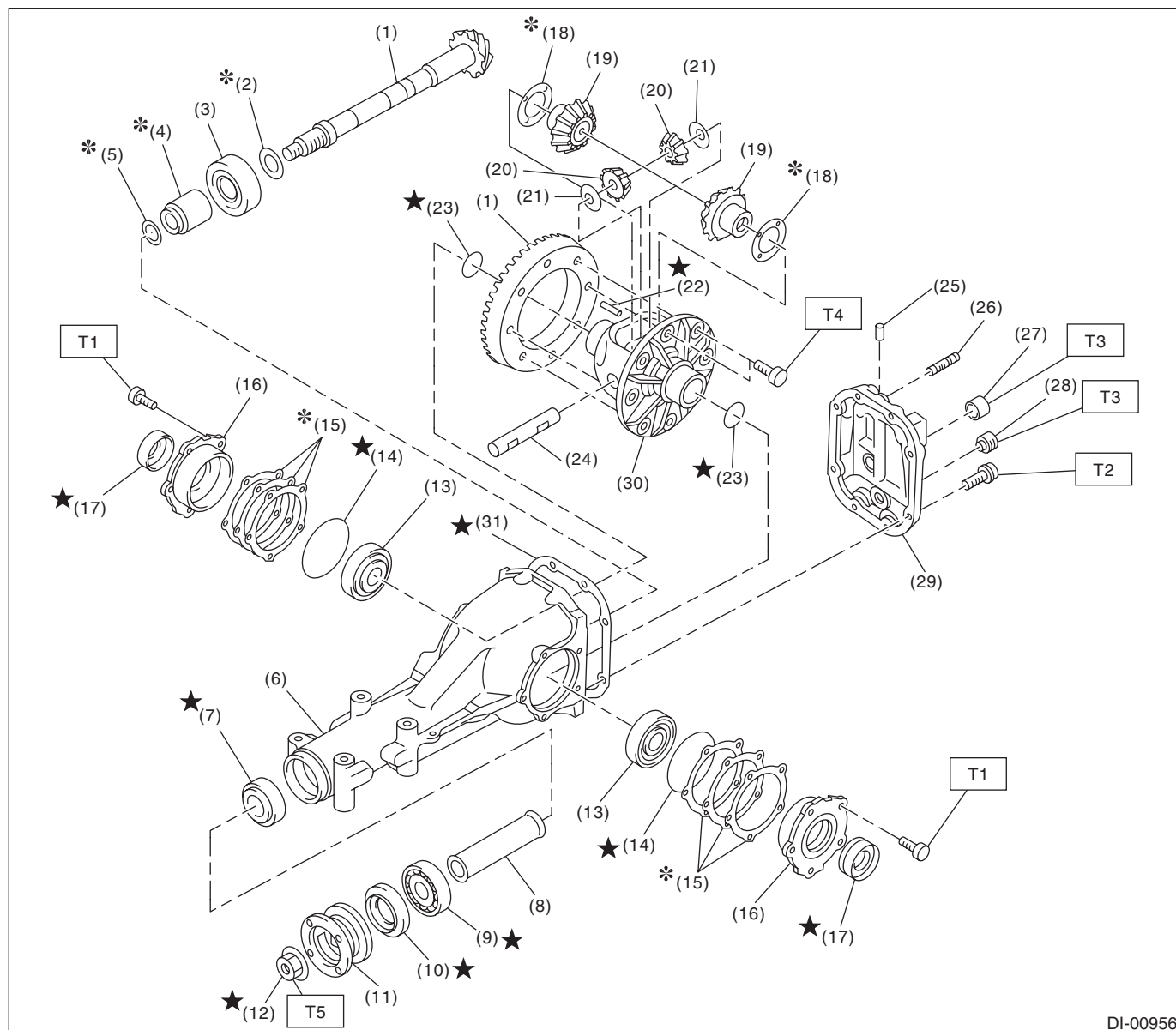
Drive pinion bearing preload (for new bearing)	Measured with spring measurement (measured from the companion flange bolt) N (kgf, lbf)	T-type	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)
		VA1-type	12.7 — 32.2 (1.3 — 3.3, 2.9 — 7.2)
	Measured with torque wrench N·m (kgf-m, ft-lb)	T-type	0.69 — 1.47 (0.07 — 0.15, 0.51 — 1.08)
		VA1-type	0.48 — 1.22 (0.05 — 0.12, 0.35 — 0.90)
Side gear backlash	mm (in)	T-type	0.10 — 0.20 (0.004 — 0.008)
		VA1-type	0.05 — 0.15 (0.002 — 0.006)
Hypoid driven gear backlash	mm (in)	T-type	0.10 — 0.20 (0.004 — 0.008)
		VA1-type	0.10 — 0.15 (0.004 — 0.006)
Hypoid driven gear runout on its back surface	mm (in)	T-type	0.05 (0.002)
Total preload (measured from the companion flange bolt hole)	N (kgf, lbf)	T-type	20.7 — 54.4 (2.1 — 5.5, 4.7 — 12.2)
Companion flange mating surface runout	mm (in)		0.08 (0.003)
Companion flange runout on its inner side	mm (in)		0.08 (0.003)

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### B: COMPONENT

#### 1. REAR DIFFERENTIAL (T-TYPE)



DI-00956

- (1) Hypoid driven gear and drive pinion set
- (2) Pinion height adjusting washer
- (3) Rear bearing
- (4) Preload adjusting spacer
- (5) Preload adjusting washer
- (6) Differential carrier
- (7) Front bearing
- (8) Spacer
- (9) Pilot bearing
- (10) Front oil seal
- (11) Companion flange
- (12) Self-locking nut
- (13) Side bearing

- (14) O-ring
- (15) Side retainer shim
- (16) Side retainer
- (17) Side oil seal
- (18) Side gear thrust washer
- (19) Side gear
- (20) Pinion mate gear
- (21) Pinion mate gear washer
- (22) Pinion shaft lock pin
- (23) Snap ring
- (24) Pinion mate shaft
- (25) Air breather cap
- (26) Stud bolt

- (27) Filler plug
- (28) Drain plug
- (29) Rear cover
- (30) Differential case
- (31) Gasket

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

**T1: 10.5 (1.1, 7.7)**

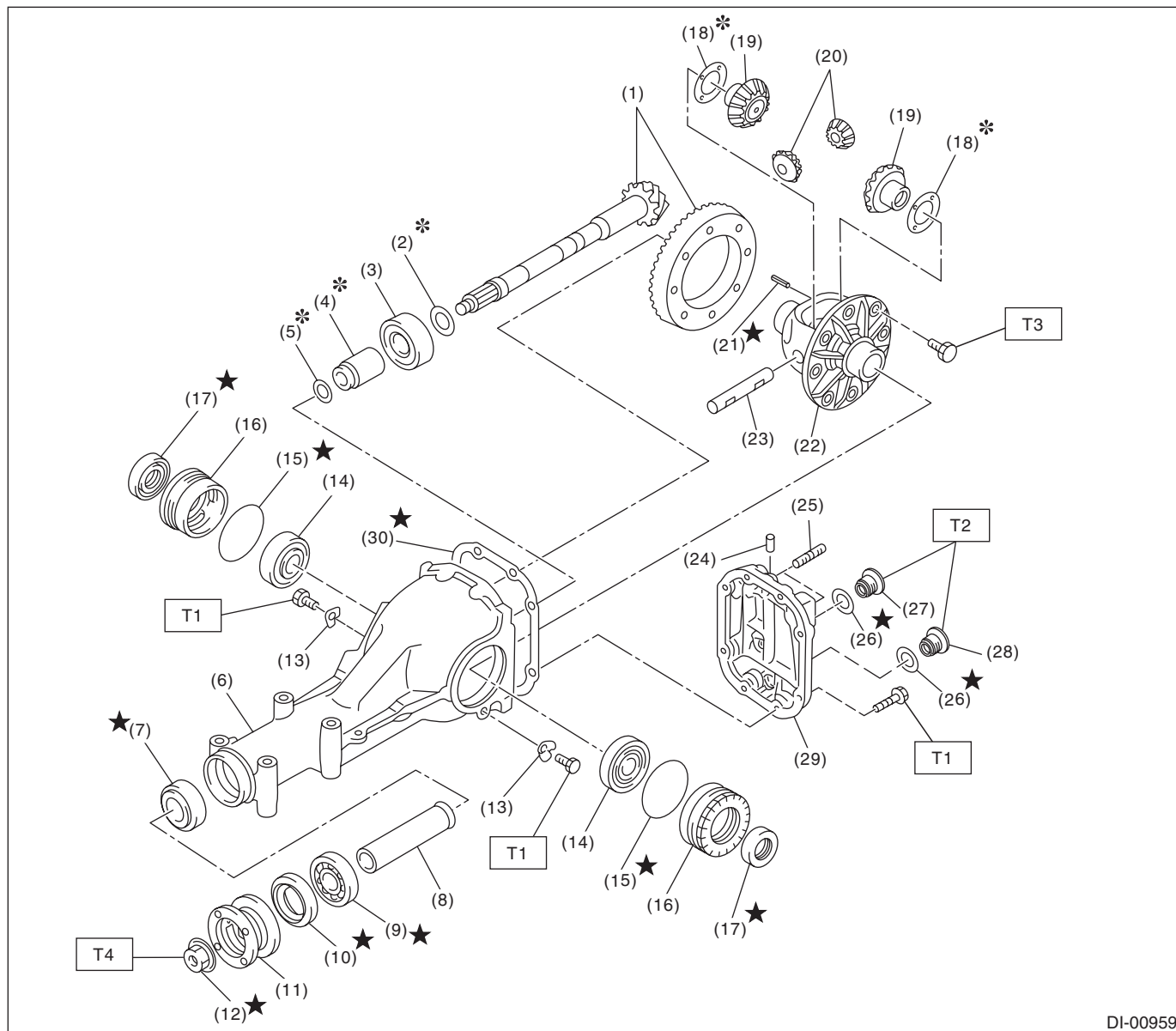
**T2: 29.5 (3.0, 21.8)**

**T3: 49 (5.0, 36.1)**

**T4: 103 (10.5, 76.0)**

**T5: 181.5 (18.5, 133.9)**

## 2. REAR DIFFERENTIAL (VA1-TYPE)



DI-00959

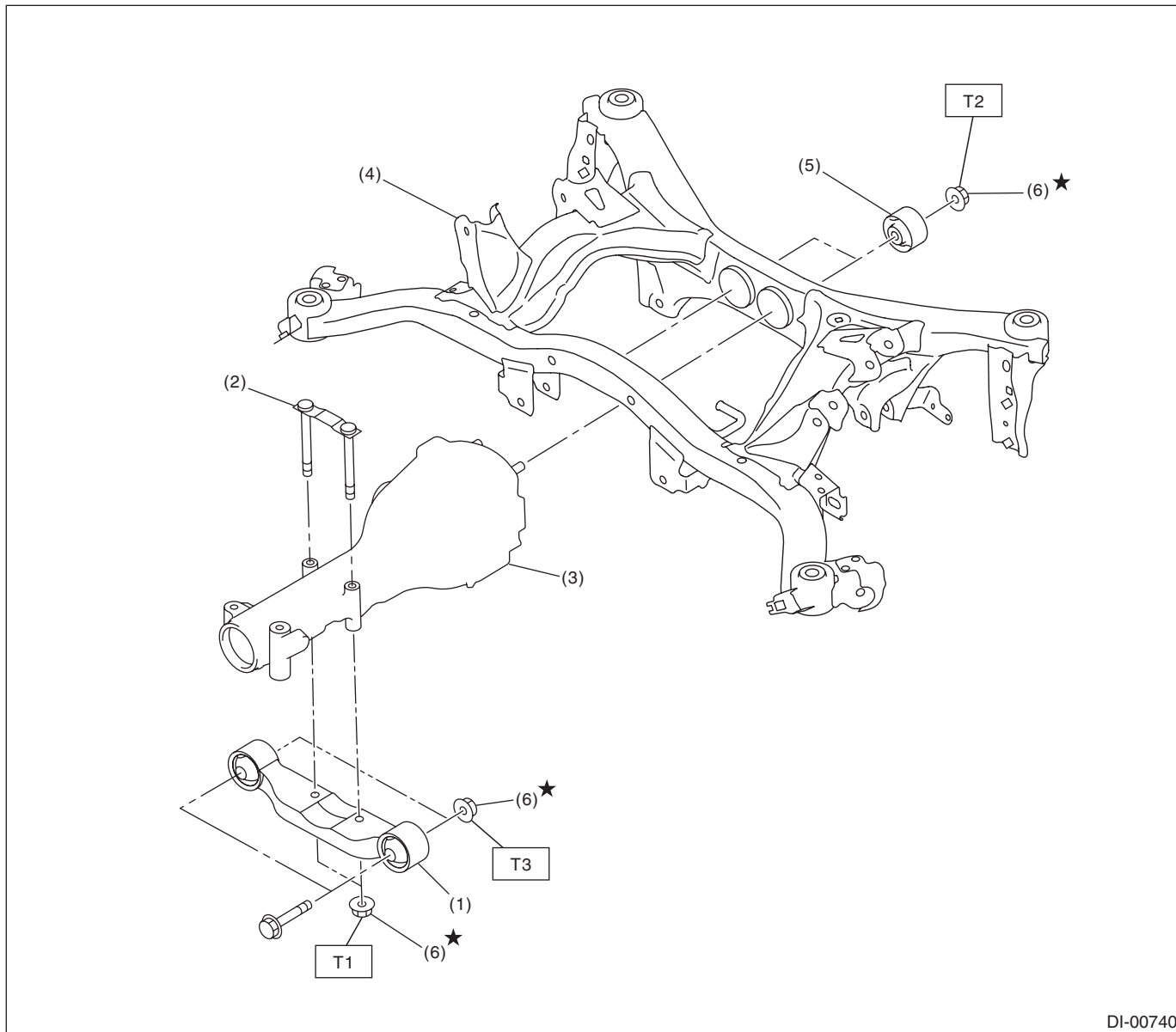
- |   |                              |                  |
|---|------------------------------|------------------|
| (1) Hypoid driven gear and drive pinion set | (13) Lock plate              | (25) Stud bolt   |
| (2) Pinion height adjusting washer          | (14) Side bearing            | (26) Gasket      |
| (3) Rear bearing                            | (15) O-ring                  | (27) Filler plug |
| (4) Preload adjusting spacer                | (16) Side retainer           | (28) Drain plug  |
| (5) Preload adjusting washer                | (17) Side oil seal           | (29) Rear cover  |
| (6) Differential carrier                    | (18) Side gear thrust washer | (30) Gasket      |
| (7) Front bearing                           | (19) Side gear               |                  |
| (8) Spacer                                  | (20) Pinion mate gear        |                  |
| (9) Pilot bearing                           | (21) Spring pin              |                  |
| (10) Front oil seal                         | (22) Differential case       |                  |
| (11) Companion flange                       | (23) Pinion mate shaft       |                  |
| (12) Self-locking nut                       | (24) Air breather cap        |                  |

**Tightening torque: N-m (kgf-m, ft-lb)****T1: 25 (2.5, 18.4)****T2: 50 (5.1, 36.9)****T3: <Ref. to DI-45, ASSEMBLY, Rear Differential (VA-type).>****T4: 191 (19.5, 140.9)**

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### 3. REAR DIFFERENTIAL MOUNTING SYSTEM



- (1) Rear differential front member
- (2) Rear differential member plate
- (3) Rear differential ASSY

- (4) Rear sub frame
- (5) Rear differential mount bushing
- (6) Self-locking nut

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

**T1: 50 (5.1, 36.9)**

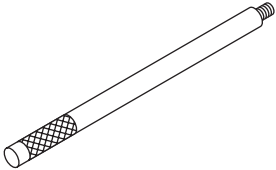
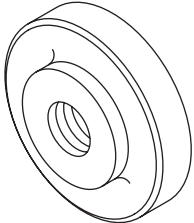
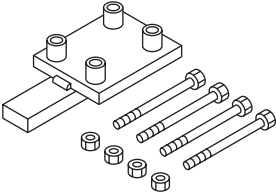
**T2: 70 (7.1, 51.6)**

**T3: 110 (11.2, 81.1)**

**C: CAUTION**

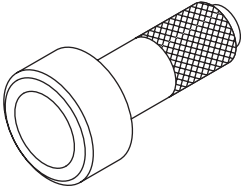
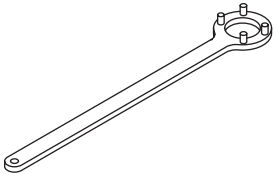
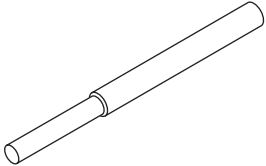
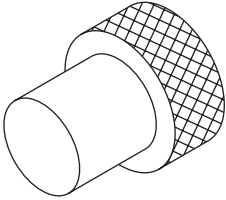
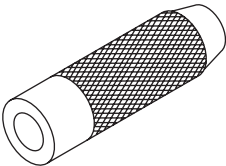
- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- 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.
- Before installing the O-ring or snap ring, apply a sufficient amount of gear oil to avoid damage and deformation.
- 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.

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

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477701	398477701	HANDLE	<ul style="list-style-type: none"> <li>• Used for installing the rear bearing race.</li> <li>• Used for installing the front bearing race.</li> </ul>
 ST-398477702	398477702	DRIFT	<ul style="list-style-type: none"> <li>• Used for installing the front bearing race. (T-type)</li> <li>• Used for installing the rear bearing race. (VA1-type)</li> <li>• Used for installing side bearing race. (VA1-type)</li> </ul>
 ST-398217700	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.

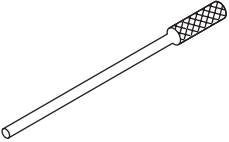
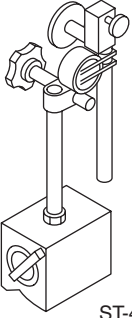
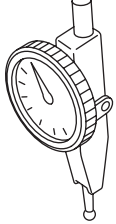
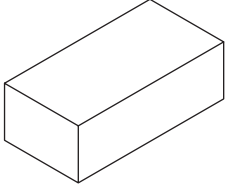
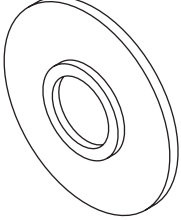
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498447120	498447120	INSTALLER	Used for installing the front oil seal.
 ST-498427200	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when removing and tightening self-lock nut.
 ST-398467700	398467700	DRIFT	Used for removing drive pinion shaft, pilot bearing and front bearing cone.
 ST-399780104	399780104	WEIGHT	<ul style="list-style-type: none"> <li>Used for installing the front bearing cone and the companion flange.</li> <li>Used for installing the pilot bearing.</li> </ul>
 ST-899580100	899580100	INSTALLER	Used for installing the front bearing cone and the pilot bearing.

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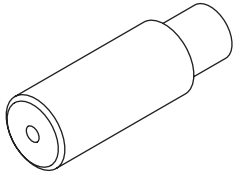
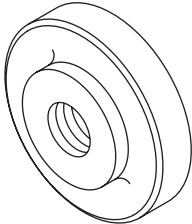
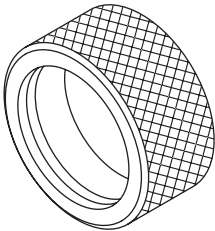
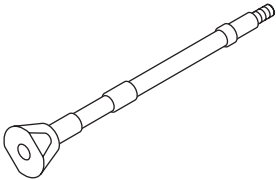
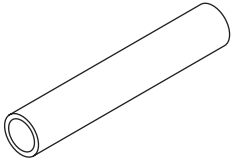
## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899904100	899904100	STRAIGHT PIN REMOVER	<ul style="list-style-type: none"> <li>Used for removing and installing the pinion mate shaft lock pin. (T-type)</li> <li>Used for removing and installing the pinion mate shaft spring pin. (VA1-type)</li> </ul>
 ST-498247001	498247001	MAGNET BASE	<ul style="list-style-type: none"> <li>Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>Used together with DIAL GAUGE (498247100).</li> </ul>
 ST-498247100	498247100	DIAL GAUGE	<ul style="list-style-type: none"> <li>Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>Used together with MAGNET BASE (498247001).</li> </ul>
 ST-398507704	398507704	BLOCK	Used for adjusting pinion height and preload.
 ST-398177700	398177700	INSTALLER	Used for installing the rear bearing cone. (T-type)



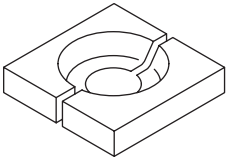
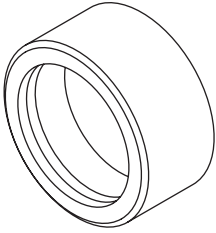
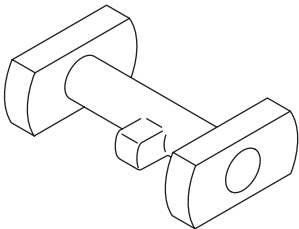
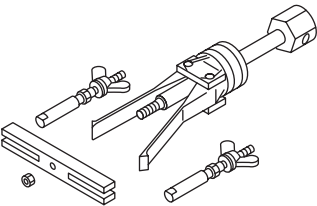
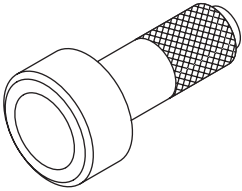
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398457700	398457700	ATTACHMENT	Used for removing the side retainer. (T-type)
 ST-398477703	398477703	DRIFT 2	Used for installing the rear bearing race. (T-type)
 ST-398437700	398437700	DRIFT	Used for installing the side oil seal. (T-type)
 ST-398507702	398507702	DUMMY SHAFT	Used for adjusting pinion height and preload. (T-type)
 ST-398507703	398507703	DUMMY COLLAR	Used for adjusting pinion height and preload. (T-type)

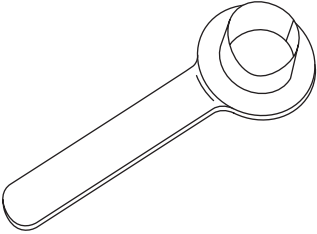
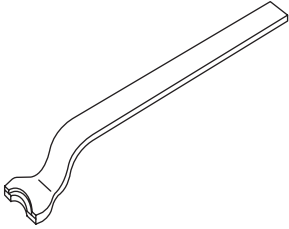
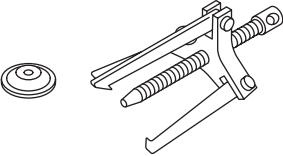
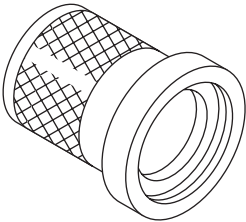
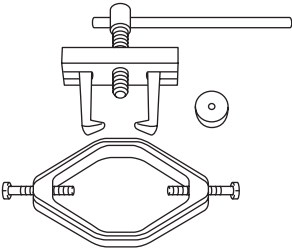
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398517700</p>	398517700	REPLACER	Used for removing rear bearing cone. (T-type)
 <p>ST-398487700</p>	398487700	DRIFT	Used for installing side bearing cone. (T-type)
 <p>ST-398507701</p>	398507701	DIFFERENTIAL CARRIER GAUGE	Used for adjusting pinion height. (T-type)
 <p>ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> <li>• Used for removing front oil seal.</li> <li>• Used for removing the side bearing race. (T-type)</li> <li>• Used for removing side oil seal.</li> </ul>
 <p>ST-398417700</p>	398417700	DRIFT	Used for installing side bearing race. (T-type)

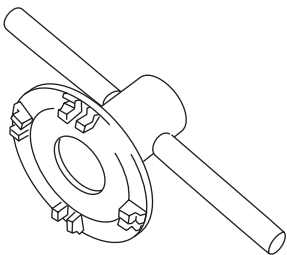
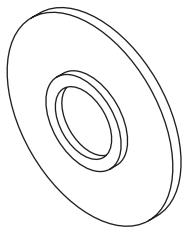
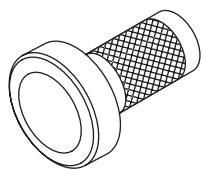
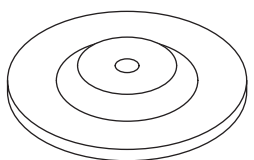
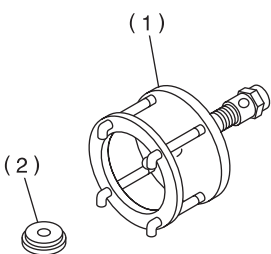
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	Used for installing the rear drive shaft to the rear differential. (For oil seal protection)
 ST28099PA100	28099PA100	DRIVE SHAFT REMOVER	Used for removing the rear drive shaft from rear differential. (T-type)
 ST-399703600	399703600	PULLER ASSY	Used for removing companion flange.
 ST-899874100	899874100	INSTALLER	Used for installing the companion flange.
 ST18759AA000	18759AA000	PULLER ASSY	Used for removing the side bearing cone. (T-type)

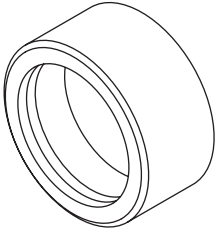
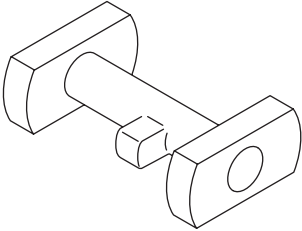
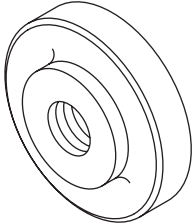
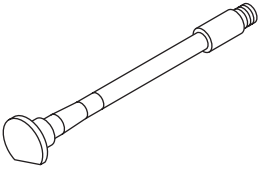
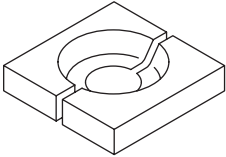
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	<ul style="list-style-type: none"> <li>Used for removing and installing the side retainer. (VA1-type)</li> <li>WRENCH ASSY (499787000) can also be used.</li> </ul>
 ST-498175500	498175500	INSTALLER	Used for installing the rear bearing cone. (VA1-type)
 ST498447100	498447100	INSTALLER	Used for installing the side oil seal. (VA1-type)
 ST-399520105	399520105	SEAT	<ul style="list-style-type: none"> <li>Used for removing the side bearing cone. (VA1-type)</li> <li>Used together with PULLER SET (899524100). (VA1-type)</li> </ul>
 ST-899524100	899524100	PULLER SET	<ul style="list-style-type: none"> <li>Used for removing the side bearing cone. (VA1-type)</li> <li>Used together with SEAT (399520105).</li> <li>(1) Puller</li> <li>(2) Cap</li> </ul>

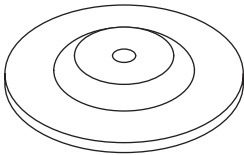
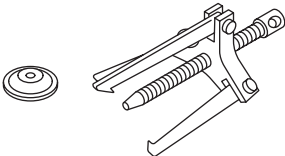
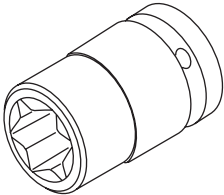
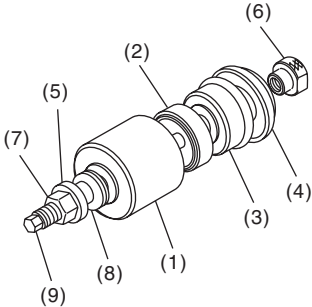
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498485400</p>	498485400	DRIFT	Used for installing side bearing cone. (VA1-type)
 <p>ST-498505501</p>	498505501	DIFFERENTIAL CARRIER GAUGE	Used for adjusting pinion height. (VA1-type)
 <p>ST-498447110</p>	498447110	DRIFT	Used for installing the front bearing race. (VA1-type)
 <p>ST-498447150</p>	498447150	DUMMY SHAFT	Used for adjusting pinion height and preload. (VA1-type)
 <p>ST-498515500</p>	498515500	REPLACER	Used for removing rear bearing cone. (VA1-type)

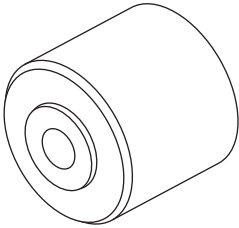
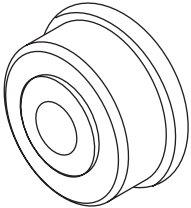
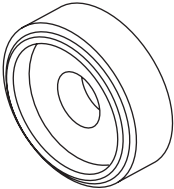
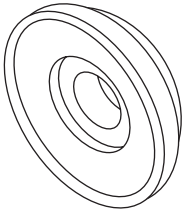
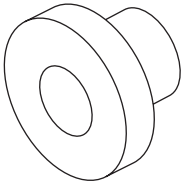
# General Description

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499705404</p>	499705404	SEAT	<ul style="list-style-type: none"> <li>Used for removing the side bearing race. (VA1-type)</li> <li>Used together with PULLER ASSY (499705401).</li> </ul>
 <p>ST-499705401</p>	499705401	PULLER ASSY	<ul style="list-style-type: none"> <li>Used for removing the side bearing race. (VA1-type)</li> <li>Used together with SEAT (499705404).</li> </ul>
 <p>ST18270KA020</p>	18270KA020	SOCKET (E20)	Used for removing and installing the hypoid driven gear. (VA1-type)
 <p>ST41399FG001</p>	41399FG001	SPECIAL TOOL ASSY	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>Use (1), (3), (5), (6), (7), (8) and (9) for removal.</li> <li>Use (2), (4), (5), (6), (7), (8) and (9) for installation.</li> </ul> <p>                     (1) SPECIAL TOOL A (41399FG010)                      (2) SPECIAL TOOL B (41399FG020)                      (3) SPECIAL TOOL C (41399FG031)                      (4) SPECIAL TOOL D (41399FG041)                      (5) SPECIAL TOOL SLEEVE (41399FG050)                      (6) SPECIAL TOOL RING (41399FG061)                      (7) SPECIAL TOOL NUT (41399FG070)                      (8) SPECIAL TOOL BEARING (41399FG080)                      (9) SPECIAL TOOL SHAFT (41399FG091)                 </p>

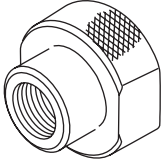
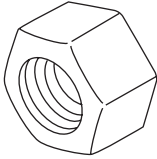
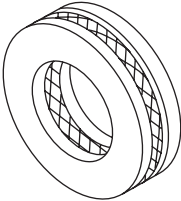
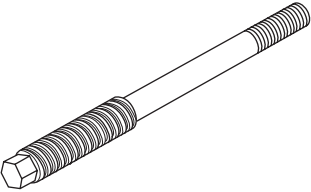
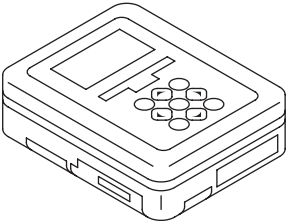
# General Description

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41399FG010	41399FG010	SPECIAL TOOL A	<ul style="list-style-type: none"> <li>Used for removing the rear differential mount bushing.</li> <li>For combination of tools for removal, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 ST41399FG020	41399FG020	SPECIAL TOOL B	<ul style="list-style-type: none"> <li>Used for installing the rear differential mount bushing.</li> <li>For combination of tools for installation, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 ST41399FG031	41399FG031	SPECIAL TOOL C	<ul style="list-style-type: none"> <li>Used for removing the rear differential mount bushing.</li> <li>For combination of tools for removal, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 ST41399FG041	41399FG041	SPECIAL TOOL D	<ul style="list-style-type: none"> <li>Used for installing the rear differential mount bushing.</li> <li>For combination of tools for installation, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 ST41399FG050	41399FG050	SPECIAL TOOL SLEEVE	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>

# General Description

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST41399FG061</p>	41399FG061	SPECIAL TOOL RING	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 <p>ST41399FG070</p>	41399FG070	SPECIAL TOOL NUT	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 <p>ST41399FG080</p>	41399FG080	SPECIAL TOOL BEARING	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 <p>ST41399FG091</p>	41399FG091	SPECIAL TOOL SHAFT	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG001)".</li> </ul>
 <p>ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.



## General Description

### DIFFERENTIALS

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#### 2. GENERAL TOOL

TOOL NAME	REMARKS
Transmission jack	Used for removing and installing the rear differential.
Puller	Used for removing the side bearing retainer.
Thickness gauge	Used for measuring clearance.
Hexagon wrench	Used for installing and removing the filler plug and drain plug.
Tire lever	Used for removing the rear drive shaft. (VA1-type)
Angle gauge	Used for installing the hypoid driven gear.