

DIFFERENTIALS

DI

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GENERAL DESCRIPTION

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1. General Description

A: SPECIFICATIONS

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

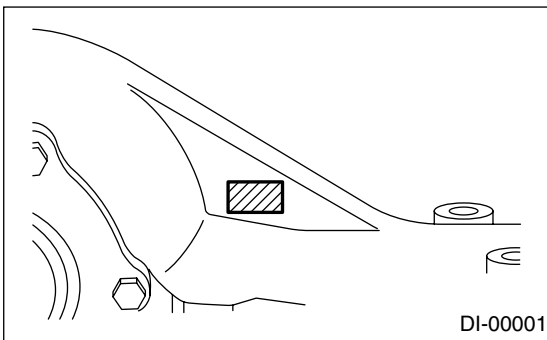
NOTE:

Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise.

MODEL	2.5 L Non-turbo					
	L-S and L		Except BAJA, L-S and L		BAJA	
	MT	AT	MT	AT	MT	AT
	T-type	VA-type	T-type		T-type	VA-type
Rear differential type	T1	XJ	JE (with LSD)	CD (with LSD)	J (with LSD)	XS (with LSD)
Gear	Hypoid gear					
Gear ratio (Number of gear teeth)	3.900 (39/10)	4.111 (37/9)	4.111 (37/9)	4.444 (40/9)	4.111 (37/9)	4.444 (40/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)					
Rear differential gear oil	GL-5					

MODEL	2.5 L turbo		3.0 L	
	BAJA		OUTBACK SEDAN, OUTBACK	
	MT	AT	With VDC	Without VDC
	T-type		T-type	
Rear differential type	F (with LSD)		T2	JE (with LSD)
Gear	Hypoid gear		Hypoid gear	
Gear ratio (Number of gear teeth)	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		GL-5	

• **Identification**

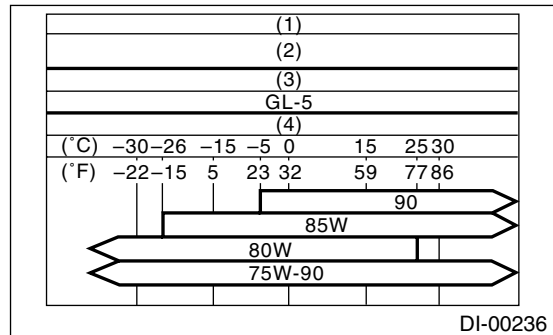


• **Rear differential gear oil**

Recommended oil

NOTE:

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 Application Temperature

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1. SERVICE DATA

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	T-type	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)
	VA-type	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
Side gear backlash mm (in)	T-type	0.10 — 0.20 (0.0039 — 0.0079)
	VA-type	0.05 — 0.15 (0.0020 — 0.0059)
Side bearing standard width mm (in)		20.00 (0.7874)
Crown gear to drive pinion backlash mm (in)	T-type	0.10 — 0.20 (0.0039 — 0.0079)
	VA-type	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface mm (in)	T-type only	0.05 (0.0020) or less

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2. ADJUSTING PARTS

• VA-type

Item	Part No.	Length or thickness
Preload adjusting spacer	32288AA040	52.3 mm (2.059 in)
	32288AA050	52.5 mm (2.067 in)
	31454AA100	52.6 mm (2.071 in)
	32288AA060	52.7 mm (2.075 in)
	31454AA110	52.8 mm (2.079 in)
	32288AA070	52.9 mm (2.083 in)
	31454AA120	53.0 mm (2.087 in)
	32288AA080	53.1 mm (2.091 in)
Preload adjusting washer	32288AA090	53.3 mm (2.098 in)
	38336AA000	1.500 mm (0.0591 in)
	38336AA120	1.513 mm (0.0596 in)
	38336AA010	1.525 mm (0.0600 in)
	38336AA130	1.538 mm (0.0606 in)
	38336AA020	1.550 mm (0.0610 in)
	38336AA140	1.563 mm (0.0615 in)
	38336AA030	1.575 mm (0.0620 in)
	38336AA150	1.588 mm (0.0625 in)
	38336AA040	1.600 mm (0.0630 in)
	38336AA160	1.613 mm (0.0635 in)
	38336AA050	1.625 mm (0.0640 in)
	38336AA170	1.638 mm (0.0645 in)
	38336AA060	1.650 mm (0.0650 in)
	38336AA180	1.663 mm (0.0655 in)
	38336AA070	1.675 mm (0.0659 in)
	38336AA190	1.688 mm (0.0665 in)
	38336AA080	1.700 mm (0.0669 in)
	38336AA200	1.713 mm (0.0674 in)
	38336AA090	1.725 mm (0.0679 in)
38336AA210	1.738 mm (0.0684 in)	
38336AA100	1.750 mm (0.0689 in)	
38336AA220	1.763 mm (0.0694 in)	
38336AA110	1.775 mm (0.0699 in)	
Pinion height adjusting shim	32295AA200	0.150 mm (0.0059 in)
	32295AA210	0.175 mm (0.0069 in)
	32295AA220	0.200 mm (0.0079 in)
	32295AA230	0.225 mm (0.0089 in)
	32295AA240	0.250 mm (0.0098 in)
	32295AA250	0.275 mm (0.0108 in)
Side gear thrust washer (Without LSD)	803135011	0.925 — 0.950 mm (0.0364 — 0.0374 in)
	803135012	0.950 — 0.975 mm (0.0374 — 0.0384 in)
	803135013	0.975 — 1.000 mm (0.0384 — 0.0394 in)
	803135014	1.000 — 1.025 mm (0.0394 — 0.0404 in)
	803135015	1.025 — 1.050 mm (0.0404 — 0.0413 in)

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• T-type

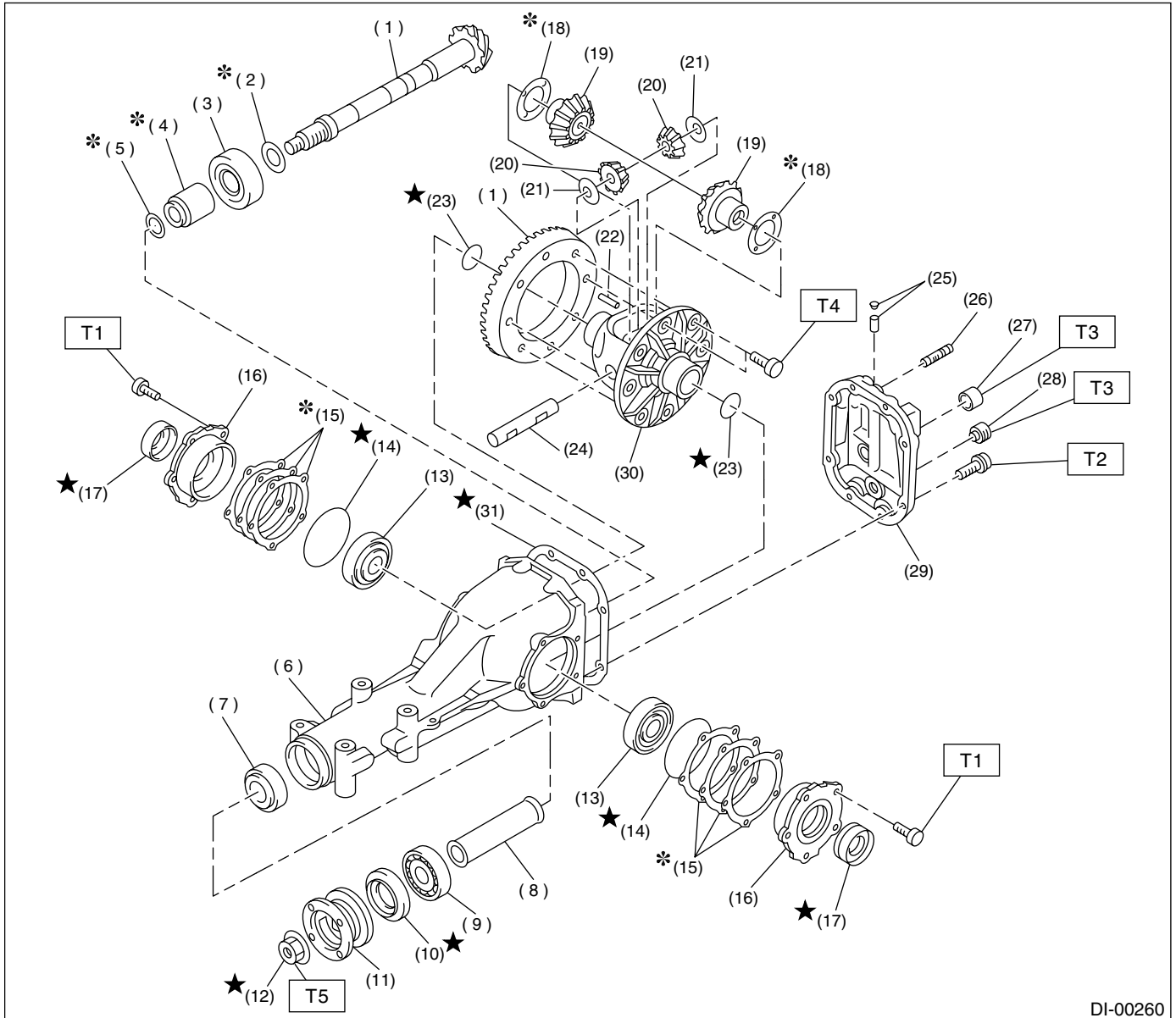
Item	Part No.	Length or thickness
Preload adjusting spacer	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
	383845200	2.31 mm (0.0909 in)
Pinion height adjusting shim	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
	383655200	3.57 mm (0.1406 in)
	383665200	3.60 mm (0.1417 in)
Side gear thrust washer (Without LSD)	383445201	0.75 — 0.80 mm (0.0295 — 0.0315 in)
	383445202	0.80 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.90 mm (0.0335 — 0.0354 in)
Side bearing retainer shim	383475201	0.20 mm (0.0079 in)
	383475202	0.25 mm (0.0098 in)
	383475203	0.30 mm (0.0118 in)
	383475204	0.40 mm (0.0157 in)
	383475205	0.50 mm (0.0197 in)

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B: COMPONENT

1. REAR DIFFERENTIAL FOR T-TYPE WITHOUT LSD



DI-00260

- | | | |
|--|---------------------------------|------------------------|
| (1) Pinion crown gear and drive pinion set | (14) O-ring | (28) Oil drain plug |
| (2) Pinion height adjusting washer | (15) Side bearing retainer shim | (29) Rear cover |
| (3) Rear bearing | (16) Side bearing retainer | (30) Differential case |
| (4) Bearing preload adjusting spacer | (17) Side oil seal | (31) Gasket |
| (5) Bearing preload adjusting washer | (18) Side gear thrust washer | |
| (6) Differential carrier | (19) Side gear | |
| (7) Front bearing | (20) Pinion mate gear | |
| (8) Collar | (21) Pinion mate gear washer | |
| (9) Pilot bearing | (22) Pinion shaft lock pin | |
| (10) Front oil seal | (23) Circlip | |
| (11) Companion flange | (24) Pinion mate shaft | |
| (12) Self-locking nut | (25) Air breather cap | |
| (13) Side bearing | (26) Stud bolt | |
| | (27) Oil filler plug | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 10.3 (1.05, 7.6)

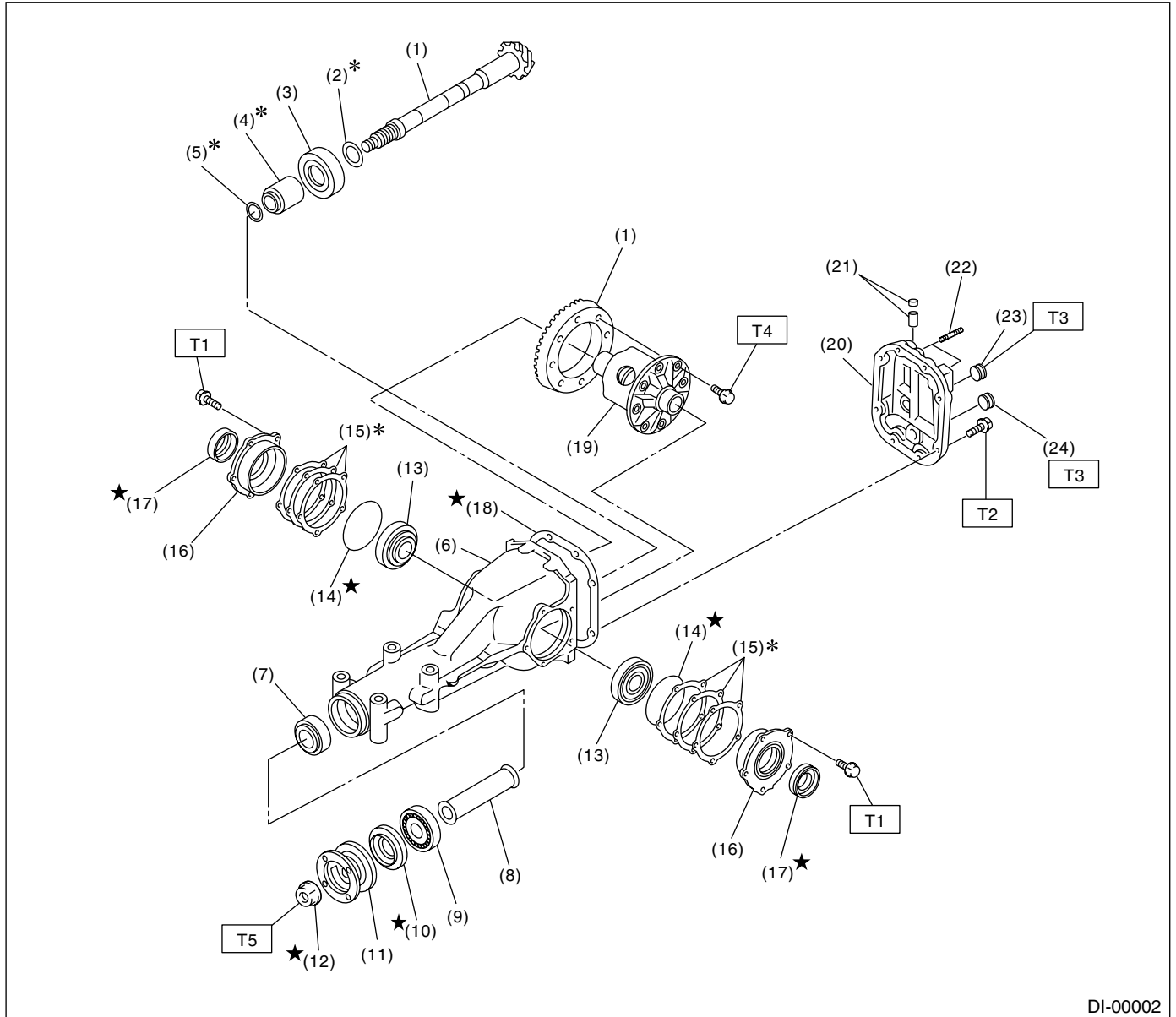
T2: 29 (3.00, 21.7)

T3: 49.0 (5.0, 36.2)

T4: 105 (10.7, 77.4)

T5: 181 (18.5, 134)

2. REAR DIFFERENTIAL FOR T-TYPE WITH LSD



DI-00002

- | | |
|--|---------------------------------|
| (1) Pinion crown gear and drive pinion set | (11) Companion flange |
| (2) Pinion height adjusting shim | (12) Self-locking nut |
| (3) Rear bearing | (13) Side bearing |
| (4) Bearing preload adjusting spacer | (14) O-ring |
| (5) Bearing preload adjusting washer | (15) Side bearing retainer shim |
| (6) Differential carrier | (16) Side bearing retainer |
| (7) Front bearing | (17) Side oil seal |
| (8) Collar | (18) Gasket |
| (9) Pilot bearing | (19) Differential case ASSY |
| (10) Front oil seal | (20) Rear cover |
| | (21) Air breather cap |

- | |
|----------------------|
| (22) Stud bolt |
| (23) Oil filler plug |
| (24) Oil drain plug |

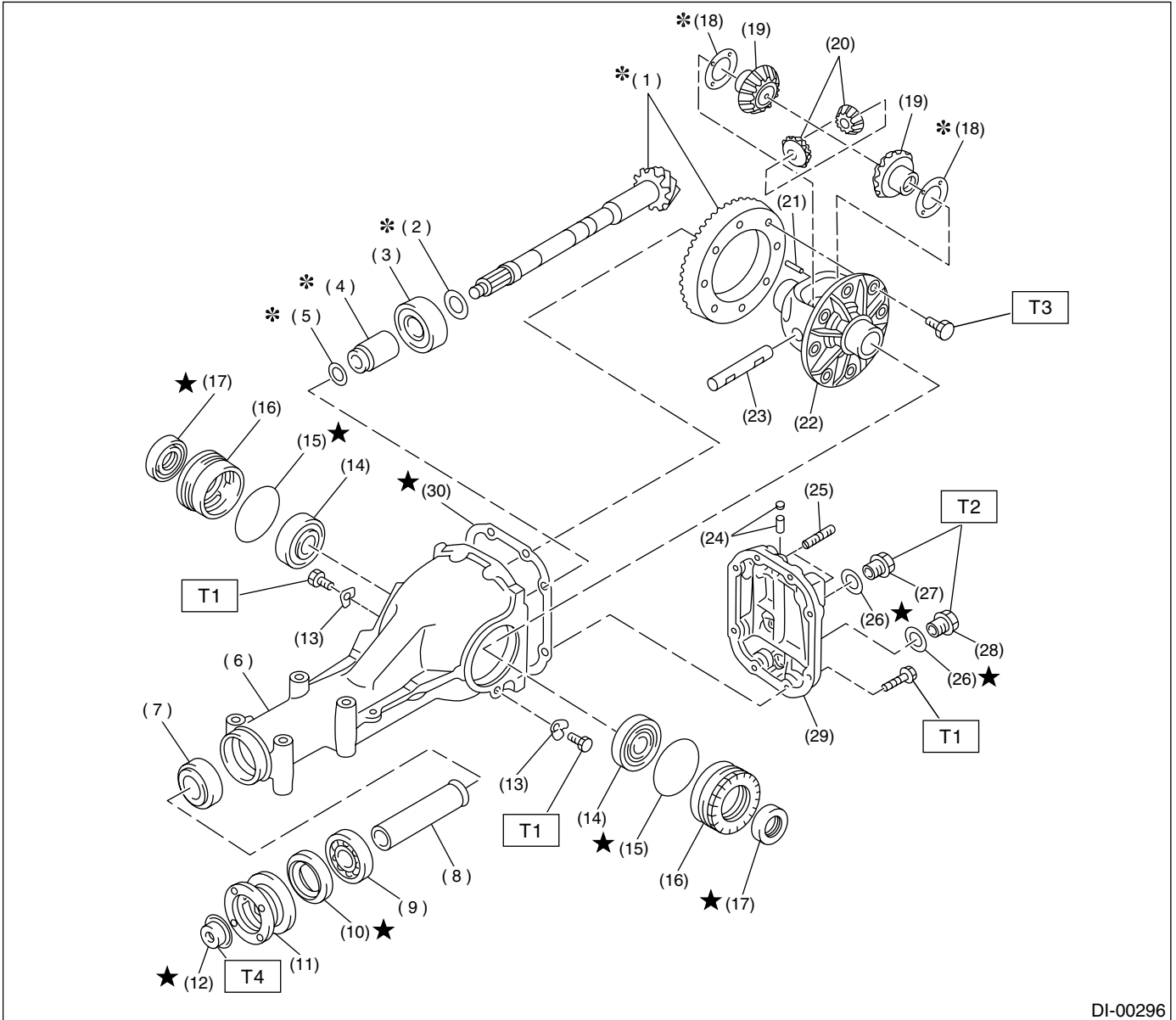
Tightening torque: N-m (kgf-m, ft-lb)

- | |
|------------------------------|
| T1: 10.3 (1.05, 7.6) |
| T2: 29.0 (3.00, 21.7) |
| T3: 49.0 (5.00, 36.2) |
| T4: 105 (10.7, 77.4) |
| T5: 181 (18.5, 134) |

GENERAL DESCRIPTION

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3. REAR DIFFERENTIAL FOR VA-TYPE WITHOUT LSD



DI-00296

- | | | |
|--|------------------------------|----------------------|
| (1) Pinion crown gear and drive pinion set | (13) Lock plate | (26) Gasket |
| (2) Pinion height adjusting shim | (14) Side bearing | (27) Oil filler plug |
| (3) Rear bearing | (15) O-ring | (28) Oil drain plug |
| (4) Bearing preload adjusting spacer | (16) Axle shaft holder | (29) Rear cover |
| (5) Bearing preload adjusting washer | (17) Side oil seal | (30) Gasket |
| (6) Differential carrier | (18) Side gear thrust washer | |
| (7) Front bearing | (19) Side gear | |
| (8) Collar | (20) Pinion mate gear | |
| (9) Pilot bearing | (21) Pinion shaft lock pin | |
| (10) Front oil seal | (22) Differential case | |
| (11) Companion flange | (23) Pinion mate shaft | |
| (12) Self-locking nut | (24) Air breather cap | |
| | (25) Stud bolt | |

Tightening torque: N·m (kgf·m, ft·lb)

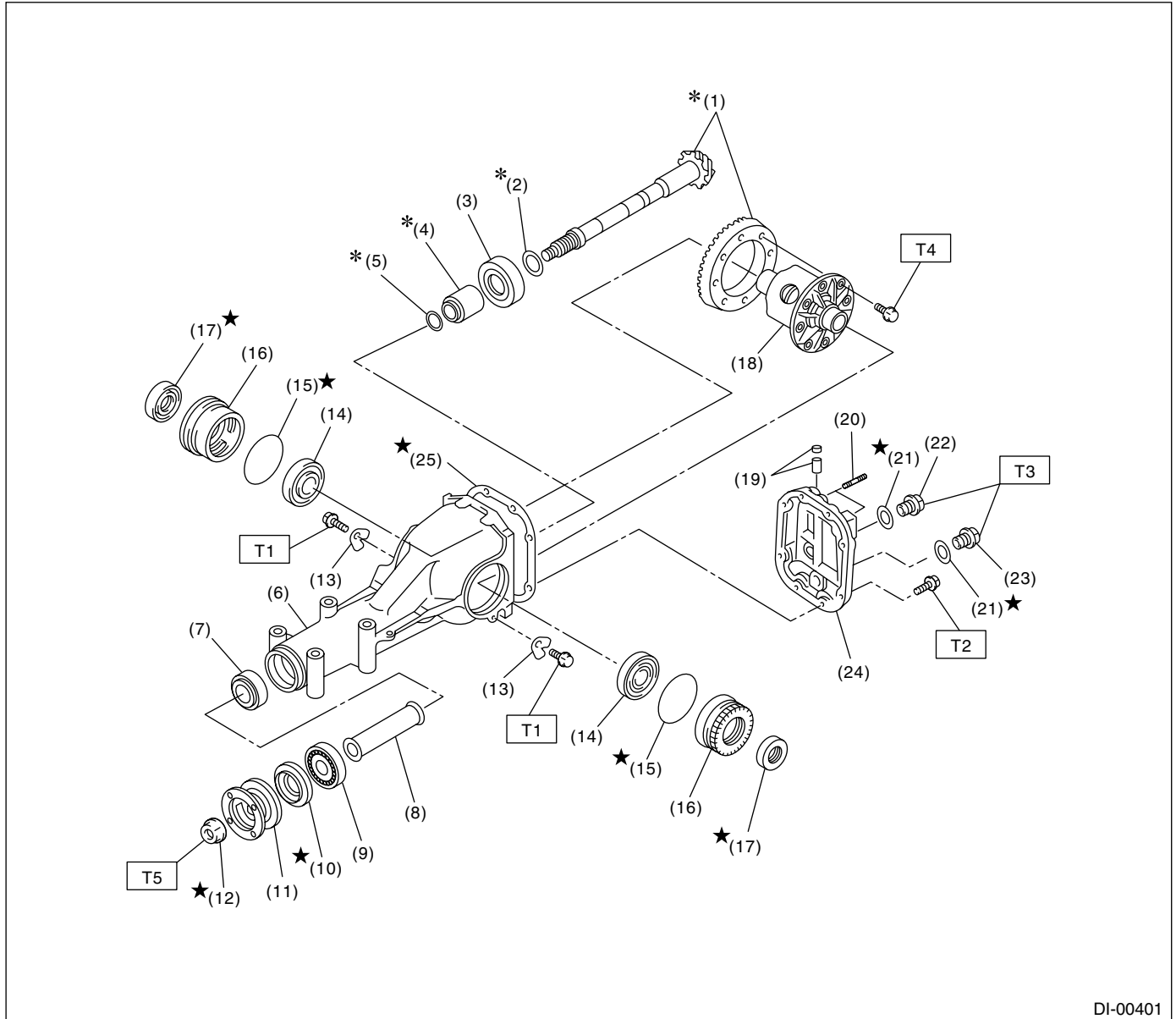
T1: 25 (2.5, 18.1)

T2: 34 (3.5, 25.3)

T3: 62 (6.3, 45.6)

T4: 191 (19.5, 141)

4. REAR DIFFERENTIAL FOR VA-TYPE WITH LSD



DI-00401

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> (1) Pinion crown gear and drive pinion set (2) Pinion height adjusting shim (3) Rear bearing (4) Bearing preload adjusting spacer (5) Bearing preload adjusting washer (6) Differential carrier (7) Front bearing (8) Collar (9) Pilot bearing (10) Front oil seal | <ul style="list-style-type: none"> (11) Companion flange (12) Self-locking nut (13) Lock plate (14) Side bearing (15) O-ring (16) Axle shaft holder (17) Side oil seal (18) Differential case ASSY (19) Air breather cap (20) Stud bolt (21) Gasket | <ul style="list-style-type: none"> (22) Oil filler plug (23) Oil drain plug (24) Rear cover (25) Gasket |
|---|--|---|

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

T1: 25 (2.5, 18.1)

T2: 25 (2.5, 18.1)

T3: 34 (3.5, 25.3)

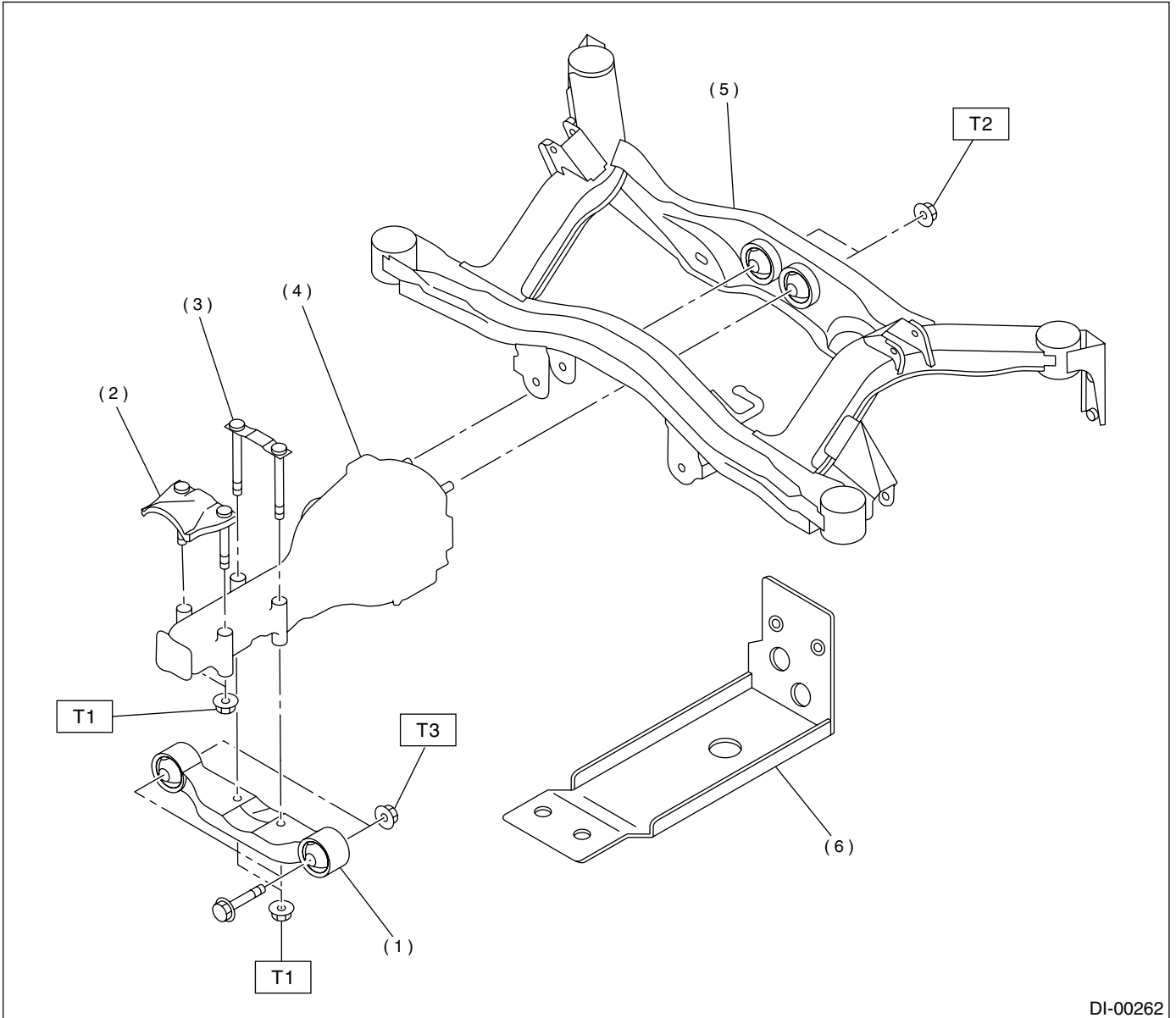
T4: 62 (6.3, 45.6)

T5: 191 (19.5, 141)

GENERAL DESCRIPTION

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5. REAR DIFFERENTIAL MOUNTING SYSTEM



DI-00262

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

- (5) Sub frame
- (6) Rear differential protector (if equipped)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 65 (6.6, 48)

T2: 70 (7.1, 51)

T3: 110 (11.2, 81)

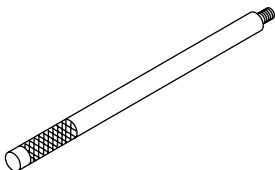
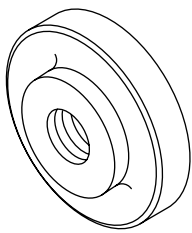
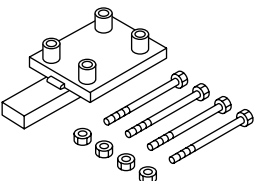
C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.

- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply 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 shop cloth between the part and the vise.
- Avoid damaging the mating face of the case.

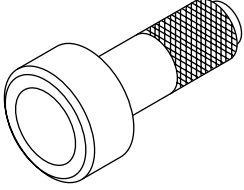
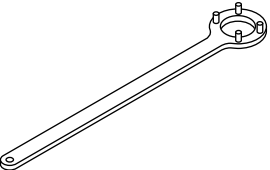
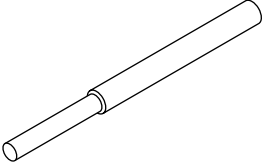
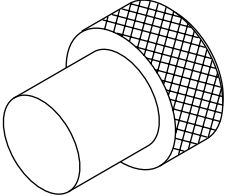
D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477701	398477701	HANDLE	Used for installing front and rear bearing cone.
 ST-398477702	398477702	DRIFT	Used press-fitting the bearing cone of differential carrier (front).
 ST-398217700	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.

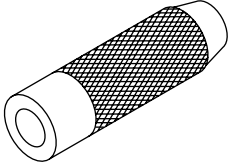
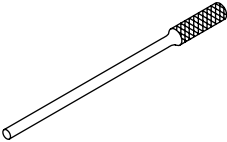
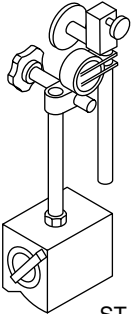
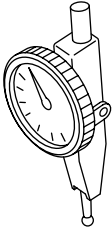
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498447120</p>	498447120	INSTALLER	Used for installing front oil seal.
 <p style="text-align: center;">ST-498427200</p>	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when loosening and tightening self-lock nut.
 <p style="text-align: center;">ST-398467700</p>	398467700	DRIFT	Used for removing pinion, pilot bearing and front bearing cone.
 <p style="text-align: center;">ST-399780104</p>	399780104	WEIGHT	Used for installing front bearing cone, pilot bearing companion flange.

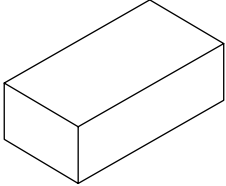
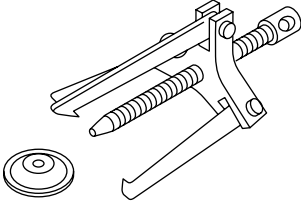
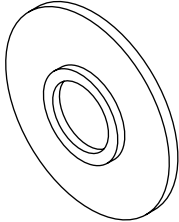
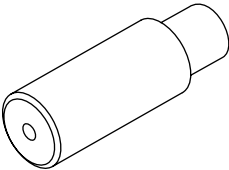
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-899580100</p>	899580100	INSTALLER	Used for press-fitting the front bearing cone, pilot bearing.
 <p style="text-align: center;">ST-899904100</p>	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.
 <p style="text-align: center;">ST-498247001</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> • Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 <p style="text-align: center;">ST-498247100</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> • Used measuring backlash between side gear and pinion, hypoid gear. • Used with MAGNET BASE (498247001).

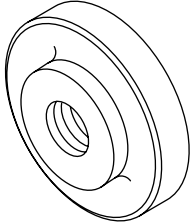
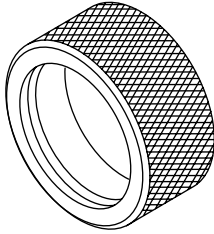
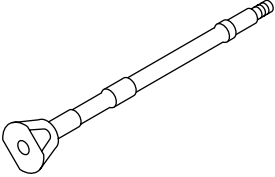
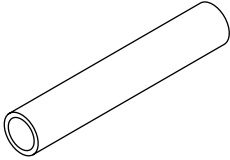
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398507704</p>	398507704	BLOCK	Used for adjusting pinion height and preload.
 <p style="text-align: center;">ST-399703600</p>	399703600	PULLER ASSY	Use for removing companion flange.
 <p style="text-align: center;">ST-398177700</p>	398177700	INSTALLER	<ul style="list-style-type: none"> • Used for installing rear bearing cone. • For T-type.
 <p style="text-align: center;">ST-398457700</p>	398457700	ATTACHMENT	<ul style="list-style-type: none"> • Used for removing side bearing retainer. • For T-type.

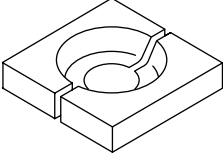
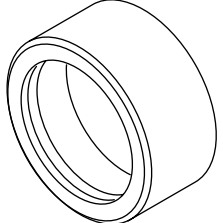
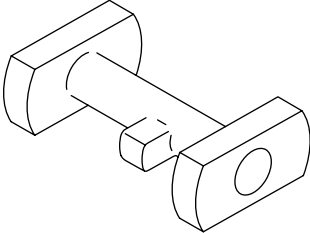
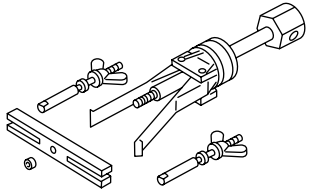
GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398477703</p>	<p style="text-align: center;">398477703</p>	<p>DRIFT 2</p>	<ul style="list-style-type: none"> • Used for press-fitting the bearing race (rear) of differential carrier. • For T-type.
 <p style="text-align: center;">ST-398437700</p>	<p style="text-align: center;">398437700</p>	<p>DRIFT</p>	<ul style="list-style-type: none"> • Used for installing side oil seal. • For T-type.
 <p style="text-align: center;">ST-398507702</p>	<p style="text-align: center;">398507702</p>	<p>DUMMY SHAFT</p>	<ul style="list-style-type: none"> • Used for adjusting pinion height and preload. • For T-type.
 <p style="text-align: center;">ST-398507703</p>	<p style="text-align: center;">398507703</p>	<p>DUMMY COLLAR</p>	<ul style="list-style-type: none"> • Used for adjusting pinion height and preload. • For T-type.

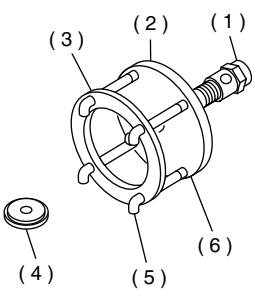
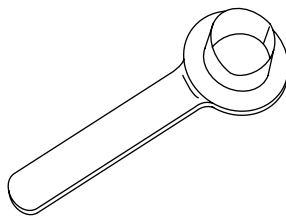
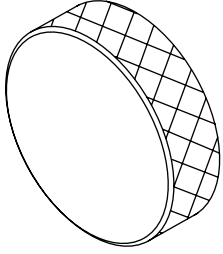
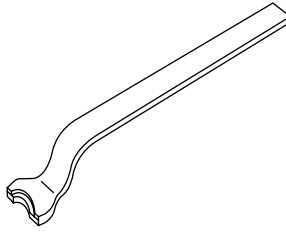
GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398517700</p>	398517700	REPLACER	<ul style="list-style-type: none"> • Used for removing rear bearing cone. • For T-type.
 <p style="text-align: center;">ST-398487700</p>	398487700	DRIFT	<ul style="list-style-type: none"> • Used for press-fitting the side bearing cone. • For T-type.
 <p style="text-align: center;">ST-398507701</p>	398507701	GAUGE	<ul style="list-style-type: none"> • Used for adjusting pinion height. • For T-type.
 <p style="text-align: center;">ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> • Used for removing oil seal and side bearing cup. • For T-type.

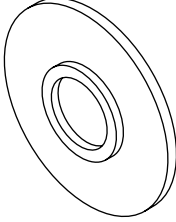
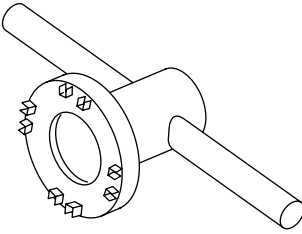
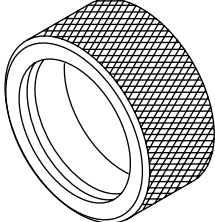
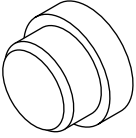
GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-399527700</p>	399527700	PULLER SET	<ul style="list-style-type: none"> • Used for extracting side bearing cone. (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000) • For T-type.
 <p style="text-align: center;">ST28099PA090</p>	28099PA090	OIL SEAL PRO- TECTOR	<ul style="list-style-type: none"> • Used for installing rear drive shaft into rear differential. • For protecting oil seal.
 <p style="text-align: center;">ST-398237700</p>	398237700	GAUGE	<ul style="list-style-type: none"> • Used for installing side bearing. • For T-type.
 <p style="text-align: center;">ST28099PA100</p>	28099PA100	DRIVE SHAFT REMOVER	<ul style="list-style-type: none"> • Used for removing rear drive shaft from rear differential. • For T-type.

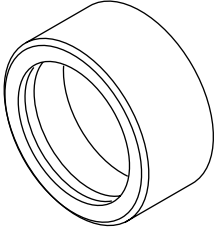
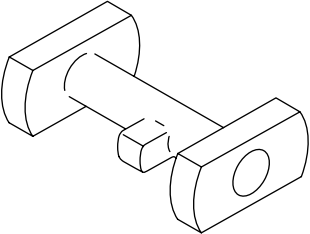
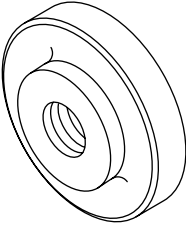
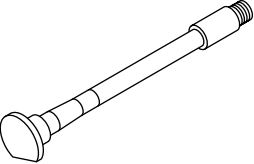
GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498175500</p>	498175500	INSTALLER	<ul style="list-style-type: none"> • Used for installing rear bearing cone. • For VA-type.
 <p style="text-align: center;">ST-499785500</p>	499785500	WRENCH ASSY	<ul style="list-style-type: none"> • Used for removing and installing side oil seal holder. • For VA-type.
 <p style="text-align: center;">ST-498447100</p>	498447100	INSTALLER	<ul style="list-style-type: none"> • Used for installing oil seal. • For VA-type.
 <p style="text-align: center;">ST-399520105</p>	399520105	SEAT	<ul style="list-style-type: none"> • Used for removing side bearing cone. • Used with PULLER SET (899524100). • For VA-type.

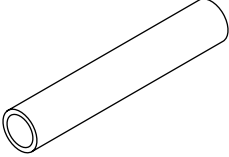
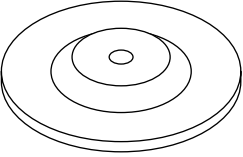
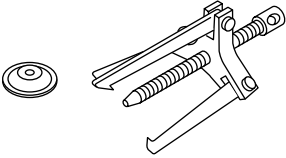
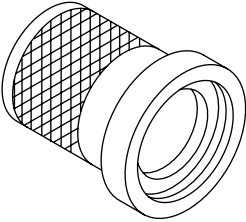
GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498485400</p>	498485400	DRIFT	<ul style="list-style-type: none"> • Used for installing side bearing cone. • For VA-type.
 <p style="text-align: center;">ST-498505501</p>	498505501	GAUGE	<ul style="list-style-type: none"> • Used for adjusting pinion height. • For VA-type.
 <p style="text-align: center;">ST-498447110</p>	498447110	BEARING OUTER RACE DRIFT	<ul style="list-style-type: none"> • Used for press-fitting the bearing race (front) of differential carrier. • For VA-type.
 <p style="text-align: center;">ST-498447150</p>	498447150	DUMMY SHAFT	<ul style="list-style-type: none"> • Used for adjusting pinion height and pre-load. • For VA-type.

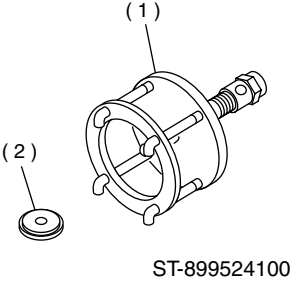
GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST32285AA000</p>	32285AA000	DUMMY COLLAR	<ul style="list-style-type: none"> • Used for adjusting pinion height and pre-load. • For VA-type.
 <p style="text-align: center;">ST-499705404</p>	499705404	SEAT	<ul style="list-style-type: none"> • Used for removing side bearing race. • Used with PULLER ASSY (499705401). • For VA-type.
 <p style="text-align: center;">ST-499705401</p>	499705401	PULLER ASSY	<ul style="list-style-type: none"> • Used for removing side bearing race. • Used with SEAT (499705404). • For VA-type.
 <p style="text-align: center;">ST-899874100</p>	899874100	INSTALLER	<ul style="list-style-type: none"> • Used for installing companion flange. • For VA-type.

GENERAL DESCRIPTION

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-899524100</p>	899524100	DIFFERENTIAL BEARING PULLER SET	<ul style="list-style-type: none"> • Used for removing side bearing cone of differential. • For VA-type. (1) Puller (2) Cap

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Transmission Jack	Used for assembly/disassembly of rear differential.
Puller	Used for removal of side bearing retainer. (T-type)
Thickness Gauge	Used for measuring clearance.
Tire Lever	Used for removal of rear drive shaft. (VA-type)

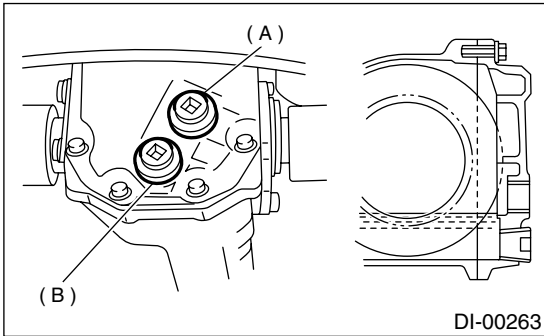
DIFFERENTIAL GEAR OIL

DIFFERENTIALS

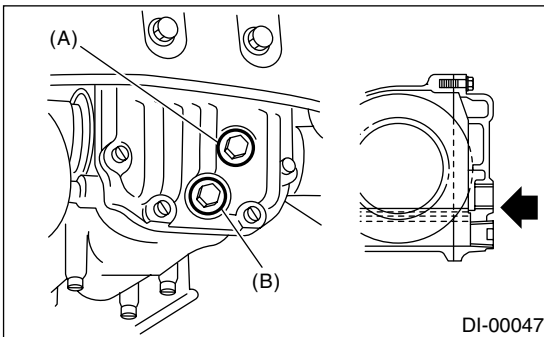
2. Differential Gear Oil

A: INSPECTION

- 1) Take out filler plug, and replace gear oil if it is contaminated or deteriorated. <Ref. to DI-22, REPLACEMENT, Differential Gear Oil.>
- 2) Check gear oil level is up to the bottom part of filler bolt. If the level is low, refill up to the bottom of filler bolt.



- (A) Filler plug
(B) Drain plug



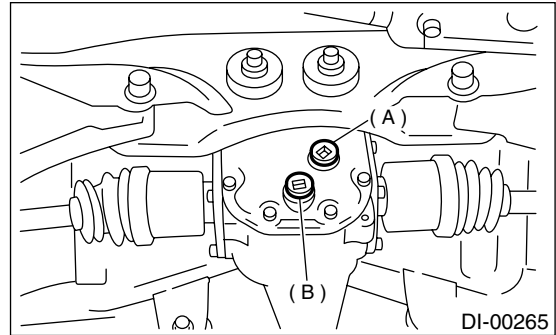
- (A) Filler plug
(B) Drain plug

B: REPLACEMENT

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle and support it with sturdy racks.
- 3) Remove the oil drain plug and filler plug, and drain the gear oil.

CAUTION:

Be careful not to burn your hands, because gear oil becomes extremely hot after running.



- (A) Filler plug
(B) Drain plug

- 4) Tighten oil drain plug.

NOTE:

- Apply fluid gasket to drain plug for T-type.
- VA-type uses a new aluminum gasket.

Fluid gasket:

**THREE BOND 1105 (Part No.: 004403010)
or equivalent**

Tightening torque:

T-type;

49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

VA-type;

34 N·m (3.5 kgf-m, 25.3 ft-lb)

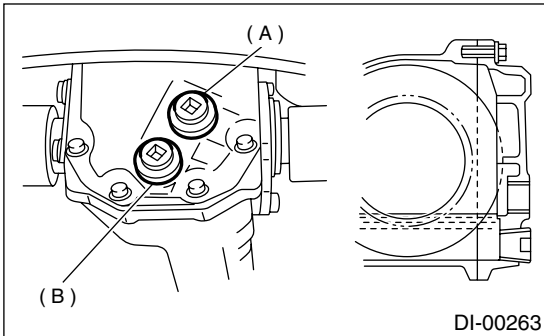
5) Fill differential carrier with gear oil to the upper plug level.

CAUTION:

Carefully refill gear oil while watching the level. Excess or insufficient oil must be avoided.

Oil capacity:

0.8 ℓ (0.8 US qt, 0.7 Imp qt)



- (A) Filler plug
- (B) Drain plug

6) Install filler plug.

NOTE:

- Apply fluid gasket to filler plug for T-type.
- VA-type uses a new aluminum gasket.

Fluid gasket:

**THREE BOND 1105 (Part No.: 004403010)
or equivalent**

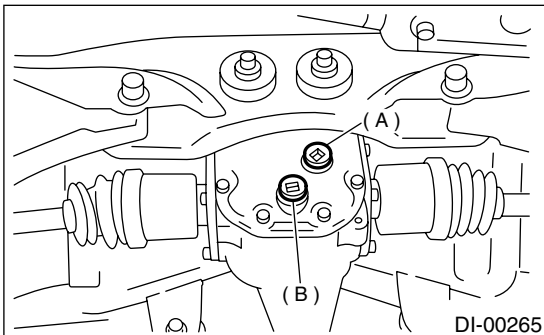
Tightening torque:

T-type;

49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

VA-type;

34 N·m (3.5 kgf-m, 25.3 ft-lb)



- (A) Filler plug
- (B) Drain plug

3. Front Differential

A: NOTE

1. AT MODEL

For front differential of automatic transmission, refer to "AT" section. <Ref. to 4AT-121, Front Differential.>

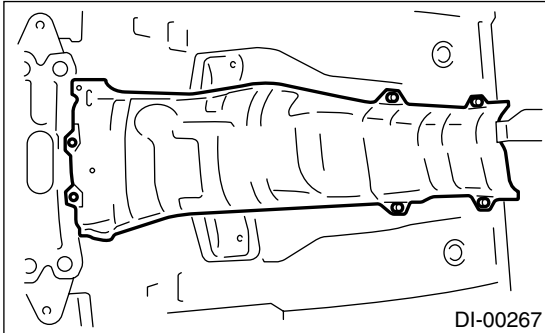
2. MT MODEL

For front differential of manual transmission, refer to "MT" section. <Ref. to 5MT-72, Front Differential Assembly.>

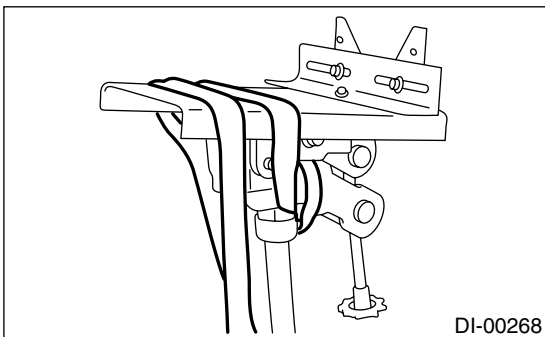
4. Rear Differential for T-type

A: REMOVAL

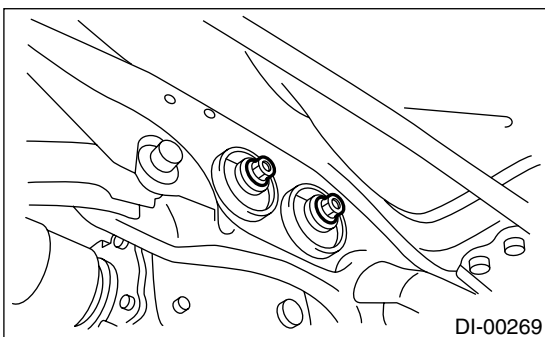
- 1) Disconnect ground cable from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Loosen wheel nuts.
- 4) Release the parking brake.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
- 8) Remove heat shield cover.



- 9) Remove propeller shaft.
<Ref. to DS-15, REMOVAL, Propeller Shaft.>
- 10) Remove rear differential protector (if equipped).
- 11) Prepare a transmission jack and a band.

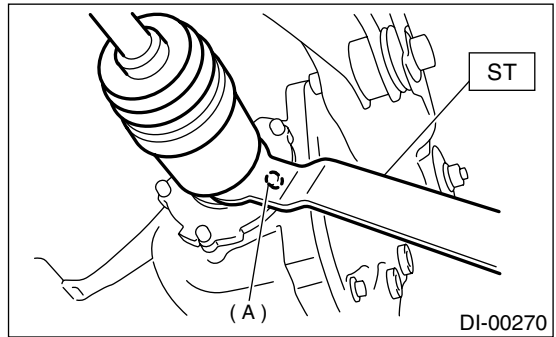


- 12) Loosen self-locking nuts connecting rear differential to rear crossmember.



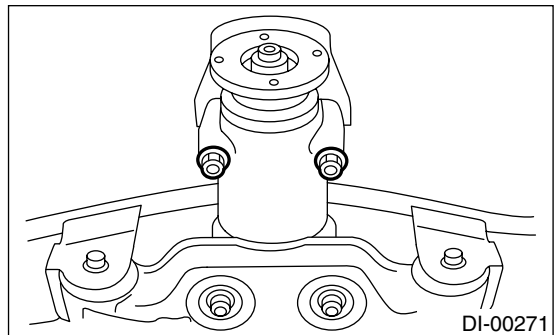
- 13) Remove DOJ of rear drive shaft from rear differential using ST.

ST 28099PA100 DRIVE SHAFT REMOVER

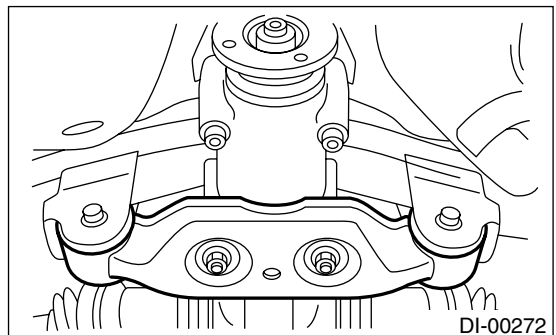


(A) Bolt

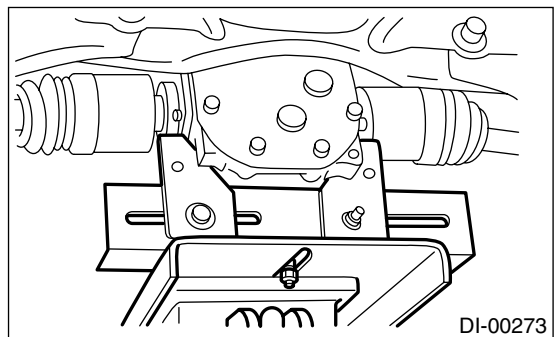
- 14) Remove protector nuts.



- 15) Remove rear differential front member.



- 16) Support rear differential with transmission jack.



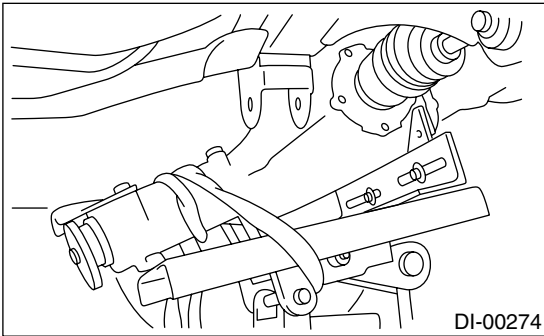
REAR DIFFERENTIAL FOR T-TYPE

DIFFERENTIALS

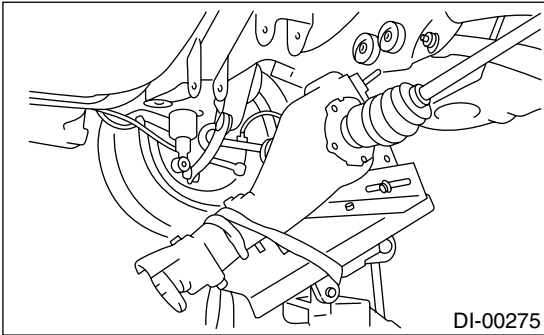
- 17) Be sure to secure differential to transmission jack by hand.
- 18) Remove self-locking nuts connecting rear differential to crossmember.
- 19) Remove rear differential stud bolt from rear crossmember bushing.

NOTE:

Carefully adjust angle and position of transmission jack and jack stand as required during stud bolt removal.



- 20) After removing rear differential stud bolt from rear crossmember, lower transmission jack stand. Do not allow rear drive shaft to strike lateral link bolt.

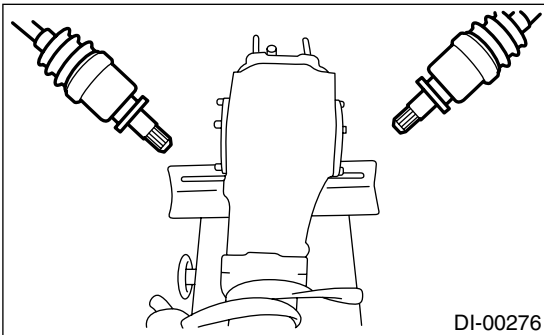


- 21) Pull out axle shaft from rear differential.

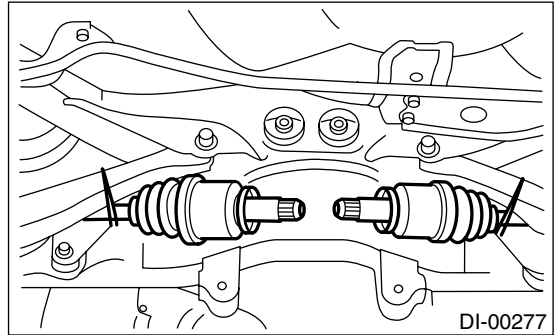
NOTE:

If axle shaft is difficult to remove from rear differential, use ST to remove it.

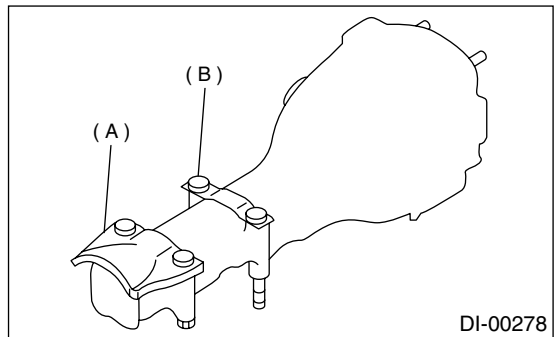
ST 28099PA100 DRIVE SHAFT REMOVER



- 22) Take down transmission jack.
- 23) Secure rear drive shaft to lateral link use wire.



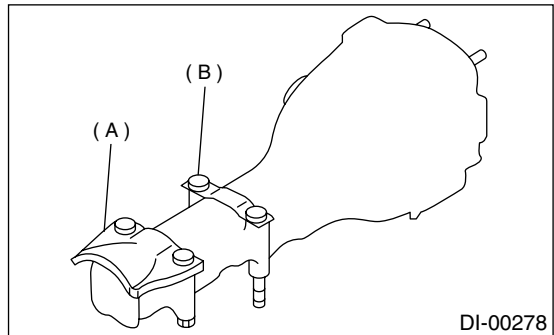
- 24) Remove protector and rear differential member plate from rear differential.



- (A) Protector
- (B) Rear differential member plate

B: INSTALLATION

- 1) Install protector and rear differential member plate to rear differential.



- (A) Protector
- (B) Rear differential member plate

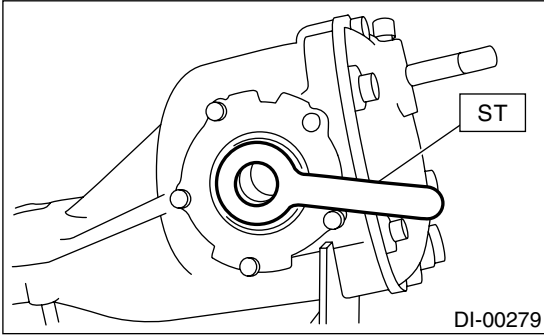
- 2) Set rear differential to transmission jack.

NOTE:

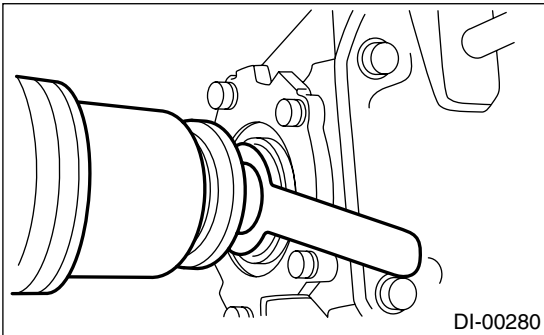
Secure rear differential to transmission jack using a band.

- 3) Install ST to rear differential.

ST 28099PA090 OIL SEAL PROTECTOR



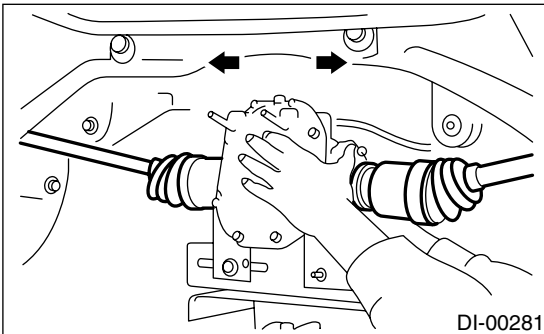
4) Insert the spline shaft until the spline portion is inside the side oil seal.



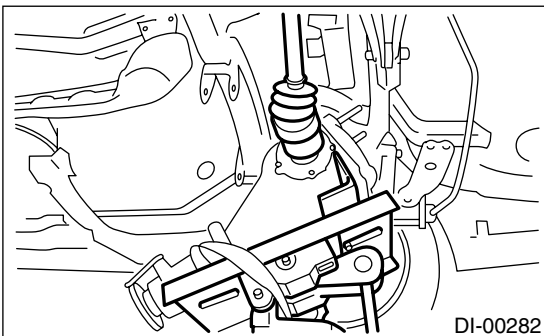
5) Remove ST from rear differential.

ST 28099PA090 OIL SEAL PROTECTOR

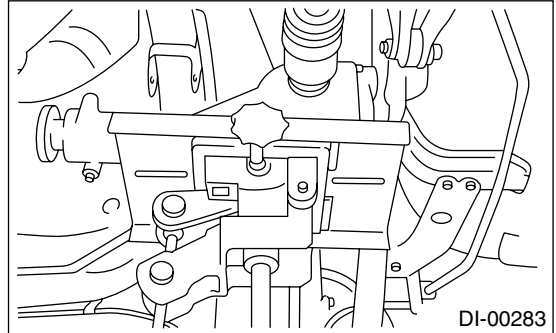
6) Completely insert axle shaft into rear differential by pressing rear differential.



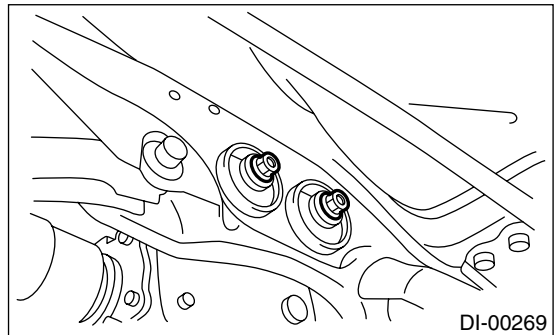
7) Adjust transmission jack as required so rear differential stud bolt is properly inserted into rear crossmember bushing.



8) After rear differential stud bolt has been inserted into rear crossmember bushing, raise transmission jack to make jack rear differential level.



9) Temporarily tighten rear crossmember self-locking nuts.



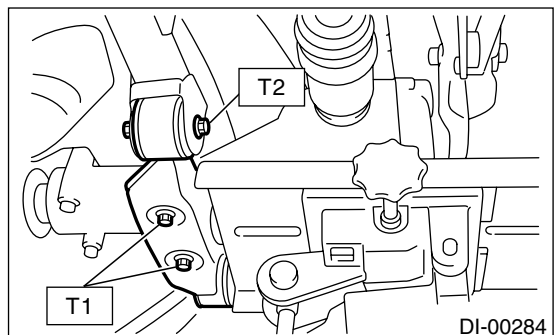
10) Remove band from rear differential. Raise rear differential just enough to move transmission jack away from it.

11) Install rear differential front member.

Tightening torque:

T1: 65 N·m (6.6 kgf-m, 48 ft-lb)

T2: 110 N·m (11.2 kgf-m, 81 ft-lb)



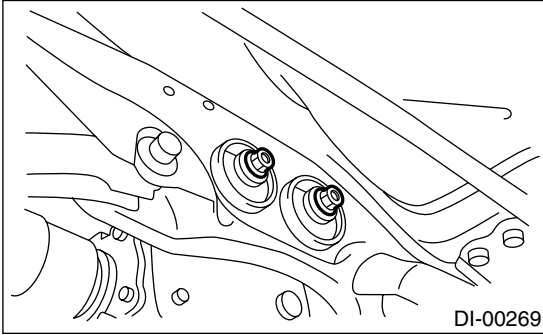
REAR DIFFERENTIAL FOR T-TYPE

DIFFERENTIALS

12) Tighten self-locking nuts.

Tightening torque:

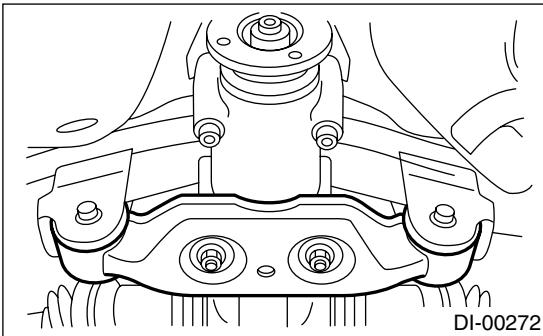
70 N·m (7.1 kgf-m, 51 ft-lb)



13) Tighten protector nut.

Tightening torque:

65 N·m (6.6 kgf-m, 48.0 ft-lb)



14) Take down transmission jack.

15) Install propeller shaft.

<Ref. to DS-16, INSTALLATION, Propeller Shaft.>

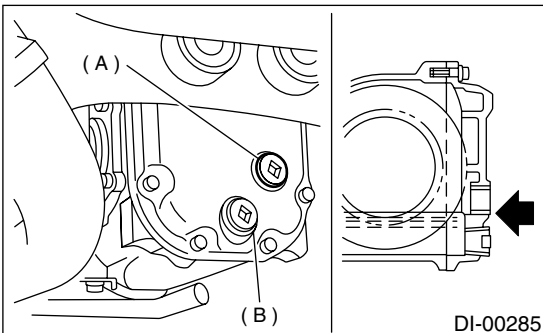
16) Install heat shield cover.

17) Install rear exhaust pipe and muffler.

18) After installing rear differential carrier on vehicle, remove filler plug and replenish gear oil up to upper level mark.

Oil capacity:

0.8 ℓ (0.8 US qt, 0.7 Imp qt)



- (A) Filler plug
- (B) Drain plug

19) Tighten filler plug.

NOTE:

Apply fluid gasket to plug.

Fluid gasket:

THREE BOND 1105 (Part No. 04403010) or equivalent

Tightening torque:

49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

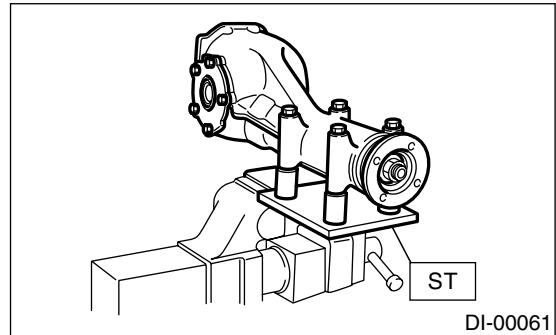
C: DISASSEMBLY

To detect real cause of trouble, inspect the following items before disassembling.

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

1) Set ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT

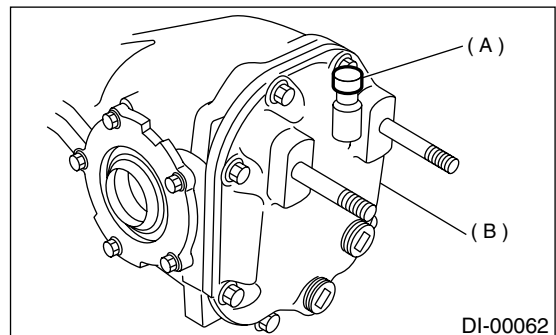


2) Drain gear oil by removing plug.

3) Remove the air breather cap.

NOTE:

- Do not attempt to remove the air breather cap unless necessary.
- When the air breather cap is removed, replace it with a new one.

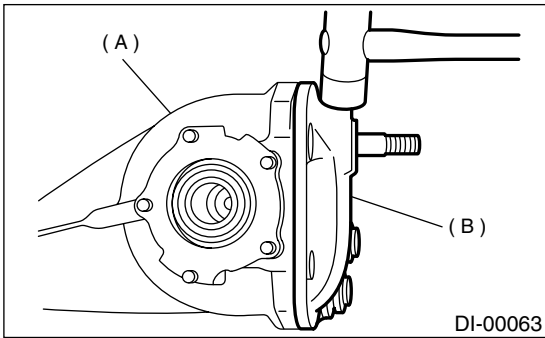


- (A) Air breather cap
- (B) Rear cover

4) Remove rear cover by loosening bolts.

NOTE:

Remove rear cover while tapping it lightly with plastic hammer, if it is hard to remove.



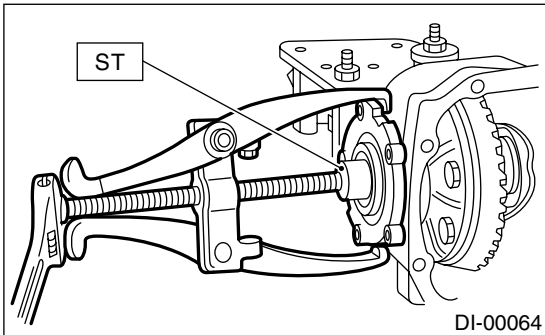
(A) Rear cover
(B) Differential carrier

5) Make right and left side bearing retainers in order to identify them at reassembly. Remove side bearing retainer attaching bolts, set ST to differential case, and extract right and left side bearing retainers with a puller.

NOTE:

Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

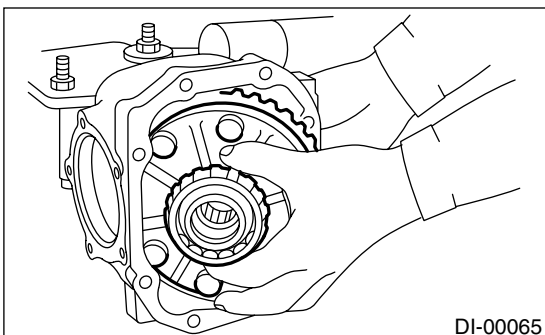
ST 398457700 ATTACHMENT



6) Pull out differential case assembly from differential carrier.

CAUTION:

Be careful not to hit the teeth against the case.

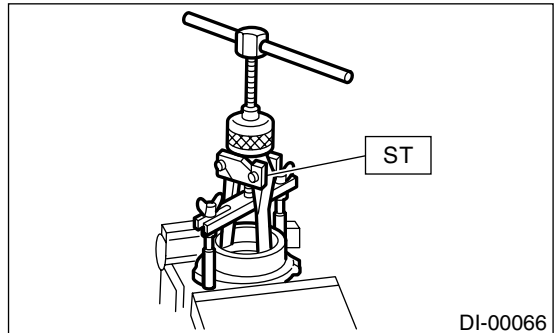


7) Remove O-ring from side bearing retainer.

8) Remove oil seal from side bearing retainer.

9) Remove bearing cup from side bearing retainer using ST.

ST 398527700 PULLER ASSY

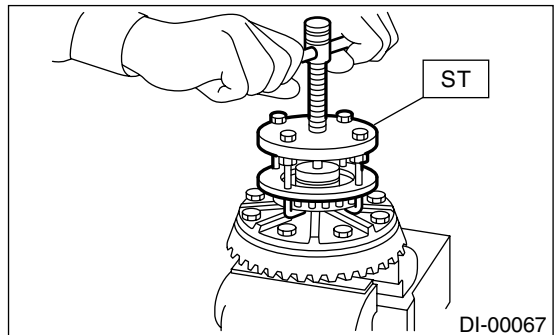


10) Extract bearing cone with ST.

NOTE:

- Do not attempt to disassemble the parts unless necessary.
- Set puller so that its claws catch the edge of the bearing cone.
- Never mix up the right and left hand bearing races and cones.

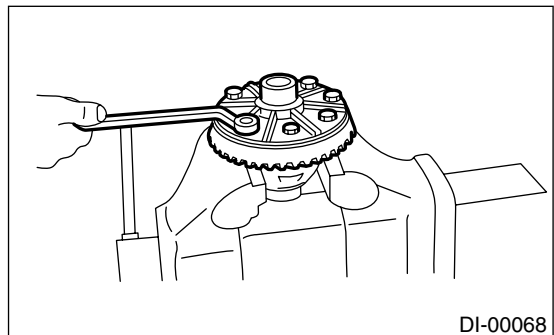
ST 399527700 PULLER SET



11) Remove crown gear by loosening crown gear bolts.

NOTE:

Further disassembling is not allowed.



REAR DIFFERENTIAL FOR T-TYPE

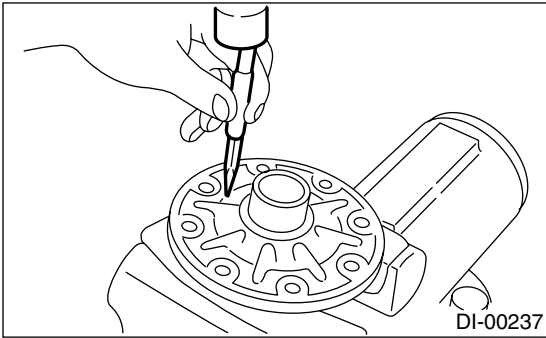
DIFFERENTIALS

12) Drive out pinion shaft lock pin from crown gear side. (Without LSD)

NOTE:

The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

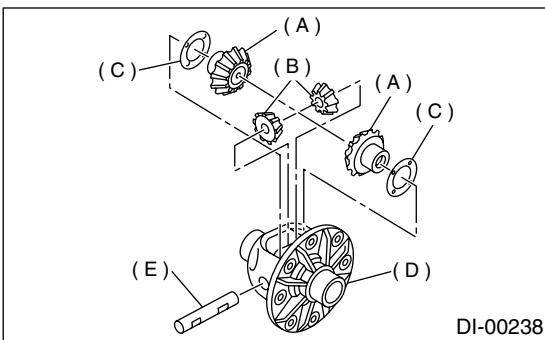
ST 899904100 STRAIGHT PIN REMOVER



13) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers. (Without LSD)

NOTE:

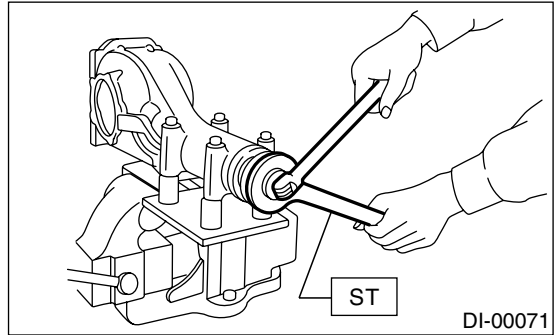
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



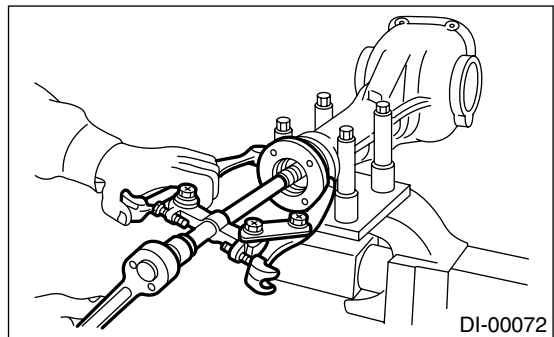
- (A) Side gear
- (B) Pinion mate gear
- (C) Thrust washer
- (D) Differential case
- (E) Pinion mate shaft

14) Hold companion flange with ST and remove drive pinion nut.

ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.

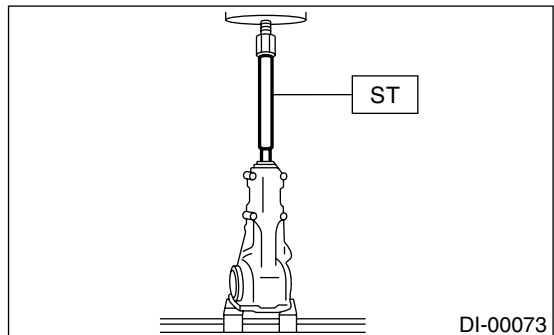


16) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

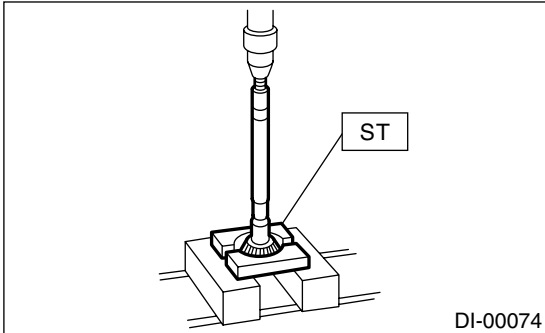


17) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:

Place the replacer so that its center-recessed side faces the pinion gear.

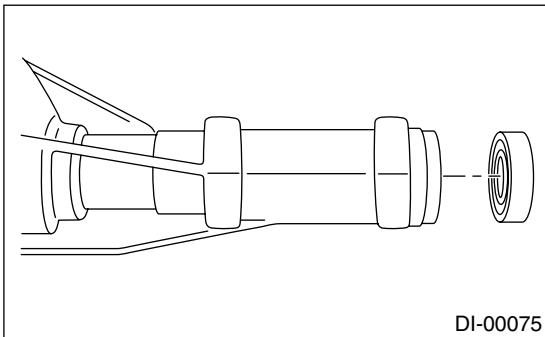
ST 398517700 REPLACER



DI-00074

18) Remove front oil seal from differential carrier using ST.

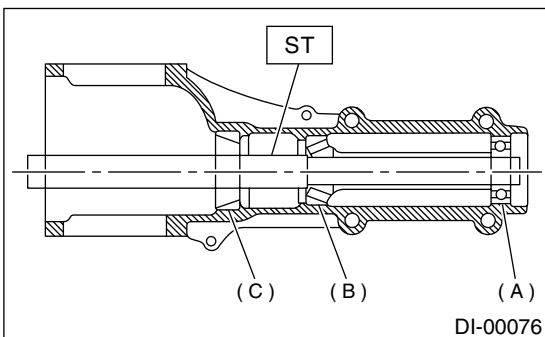
ST 398527700 PULLER ASSY



DI-00075

19) Remove pilot bearing together with front bearing cone using ST.

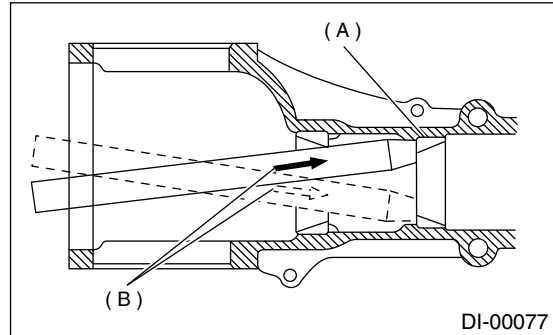
ST 398467700 DRIFT



DI-00076

- (A) Pinion bearing
- (B) Front bearing
- (C) Rear bearing cup

20) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



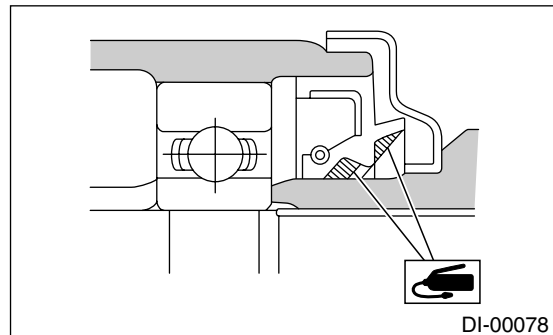
DI-00077

- (A) 2 cutouts along diagonal lines
- (B) Tap alternately with brass bar.

D: ASSEMBLY

NOTE:

- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- Keep the shims and washers in order, so that they are not misinstalled.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand races of the bearings.
- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.



DI-00078

- Use new O-ring and gasket.

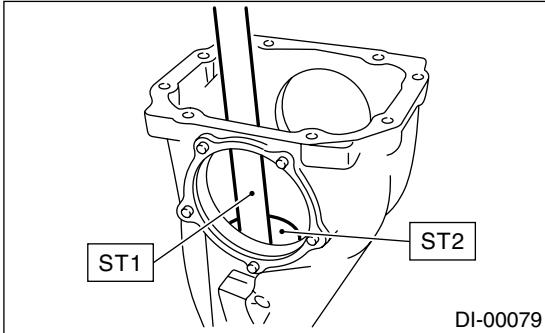
REAR DIFFERENTIAL FOR T-TYPE

DIFFERENTIALS

- 1) Adjusting preload for front and rear bearings
 - Adjust the bearing preload with spacer and washer between front and rear bearings.
 - Pinion height adjusting washer are not affected by this adjustment.
 - The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race rear into differential carrier with ST1 and ST2.

- ST1 398477701 HANDLE
ST2 398477703 DRIFT 2



(2) Install rear bearing race (front) in differential carrier using ST1 and ST2.

- ST1 398477701 HANDLE
ST2 398477702 DRIFT

(3) Measure and record the thickness of pinion height adjusting washer.

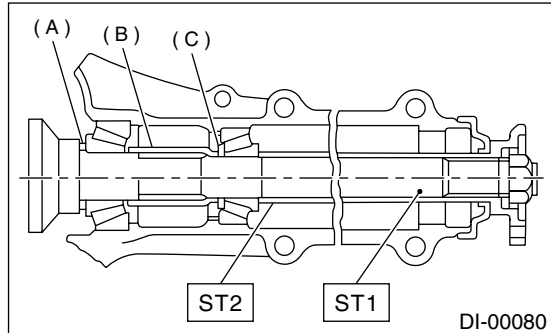
NOTE:

The used washer can be used after checking that it is not deformed when the tooth contact of drive gear and driven gear is correct during pre-disassembly.

(4) Insert ST1 into carrier with pinion height adjusting washer and new rear bearing cone fitted onto it.

(5) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

- ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



- (A) Pinion height adjusting shim
(B) Preload adjusting spacer
(C) Preload adjusting washer

(6) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

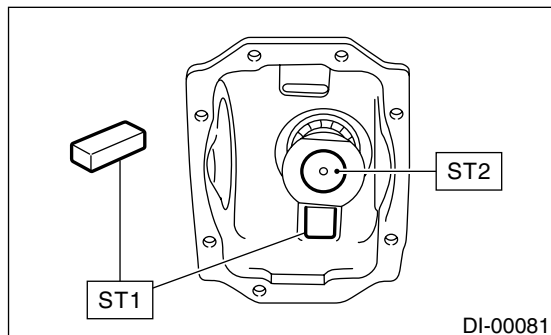
NOTE:

- Use a new lock nut.
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST2 with ST1 as shown in the figure.

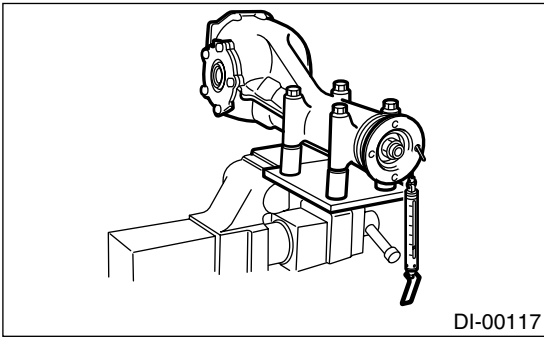
- ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT

Tightening torque:

181 N·m (18.5 kgf·m, 134 ft·lb)



Front and rear bearing preload
For new bearing: 18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.71 lb) at companion flange bolt hole

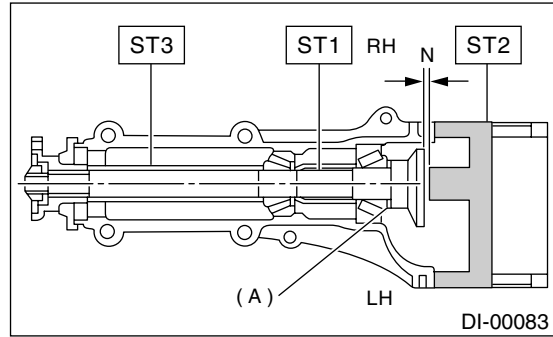


2) Adjusting drive pinion height

Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Set ST2.

- ST1 398507702 DUMMY SHAFT
- ST2 398507701 DIFFERENTIAL CARRIER GAUGE
- ST3 398507703 DUMMY COLLAR



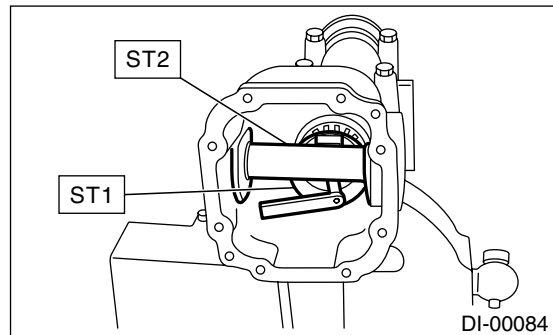
(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:

Make sure there is no clearance between the case and ST2.

- ST1 398507702 DUMMY SHAFT
- ST2 398507701 DIFFERENTIAL CARRIER GAUGE



Preload adjusting washer	Part No.	Thickness mm (in)
	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
383835200	2.33 (0.0917)	
383845200	2.31 (0.0909)	
Preload adjusting spacer	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

REAR DIFFERENTIAL FOR T-TYPE

DIFFERENTIALS

(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

$$T = T_o + N - (H \times 0.01) - 0.20 \text{ mm (0.0079 in)}$$

NOTE:

Use copies of this page.

T	Thickness of pinion height adjusting shim mm (in)	
T _o	Thickness of shim temporarily inserted mm (in)	
N	Reading of thickness gauge mm (in)	
H	Figure marked on drive pinion head	
Memo:		

(Example of calculation)

$$T_o = 2.20 + 1.20 = 3.40 \text{ mm}$$

$$N = 0.23 \text{ mm}$$

$$H = + 1$$

$$T = 3.40 + 0.23 - 0.01 - 0.20 = 3.42$$

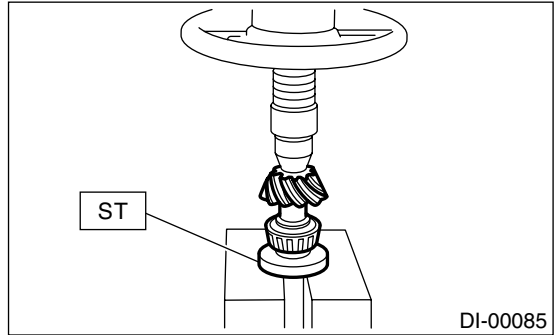
Result: Thickness = 3.42 mm

Therefore use the shim 383605200.

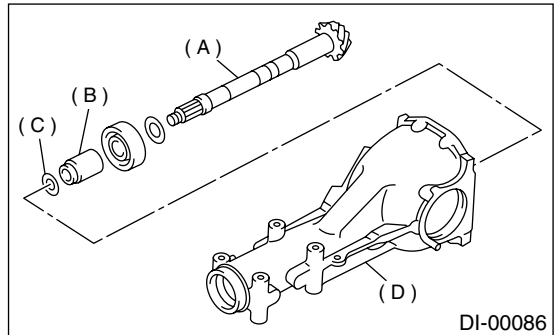
Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)
383635200	3.51 (0.1382)
383645200	3.54 (0.1394)
383655200	3.57 (0.1406)
383665200	3.60 (0.1417)
383675200	3.63 (0.1429)
383685200	3.66 (0.1441)

3) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

ST 398177700 INSTALLER



4) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



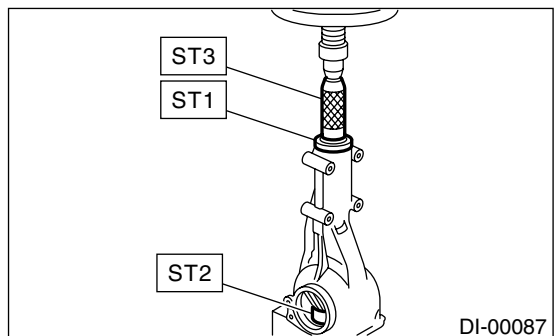
- (A) Drive pinion
- (B) Bearing adjusting spacer
- (C) Bearing adjusting washer
- (D) Differential carrier

5) Press-fit front bearing cone into case with ST1, ST2 and ST3.

ST1 398507703 DUMMY COLLAR

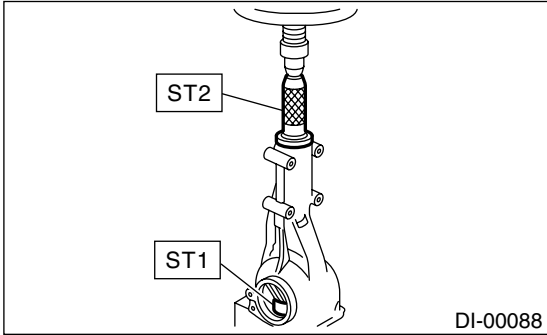
ST2 399780104 WEIGHT

ST3 899580100 INSTALLER



6) Insert spacer, then press-fit pilot bearing with ST1 and ST2.

ST1 399780104 WEIGHT
ST2 899580100 INSTALLER

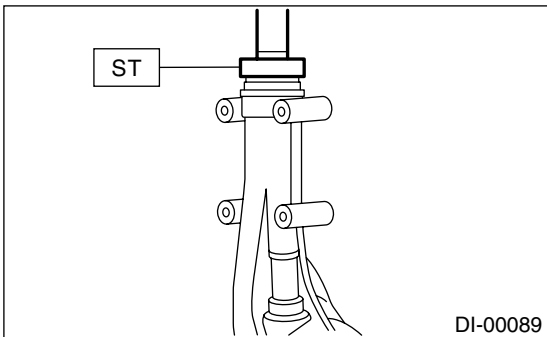


7) Fit a new oil seal with ST.

NOTE:

- Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips.

ST 498447120 OIL SEAL INSTALLER

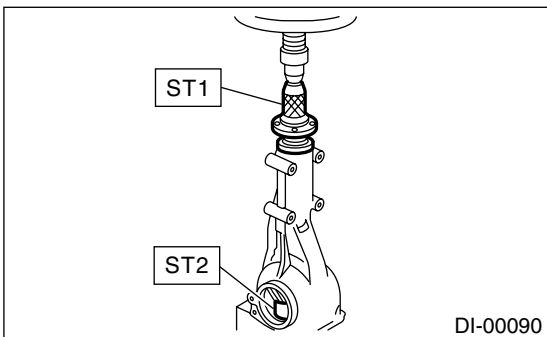


8) Press-fit companion flange with ST1 and ST2.

NOTE:

Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT

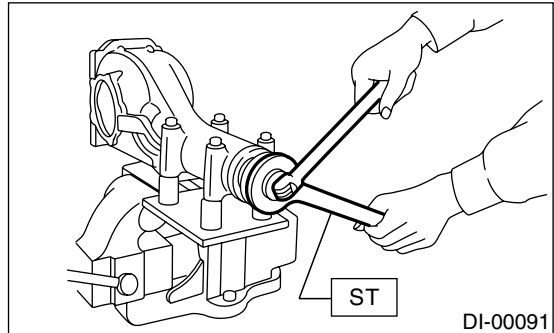


9) Install new self-locking nut. Then fix and tighten companion flange with ST.

ST 498427200 FLANGE WRENCH

Tightening torque:

181 N·m (18.5 kgf·m, 134 ft·lb)

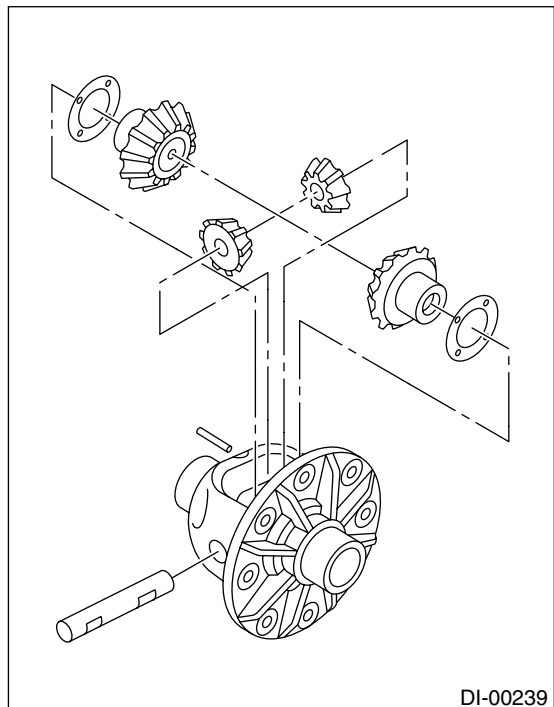


10) Assembling differential case (Without LSD)

Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

NOTE:

- Apply gear oil on both sides of the washer and on the side gear shaft before installing.
- Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



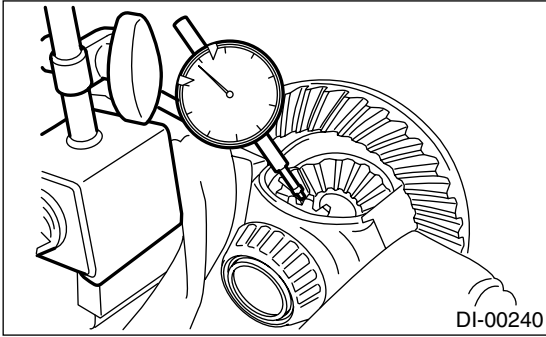
REAR DIFFERENTIAL FOR T-TYPE

DIFFERENTIALS

(1) Measure the side gear backlash.

Side gear back clearance:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



(2) Adjust the backlash as specified by selecting side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.

(4) After inserting pinion shaft lock pin into differential case, stake the both sides of the hole to prevent pin from falling off.

11) Install crown gear on differential case.

NOTE:

- Before installing bolts, apply Lock Tite to bolt threads.

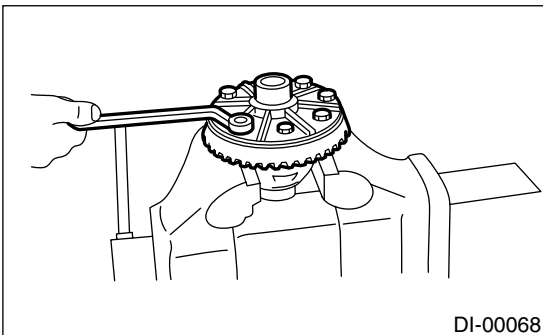
Lock Tite:

THREE BOND 1324 (Part No. 004403042) or equivalent

- Tighten diagonally while tapping the bolt heads.

Tightening torque:

105 N·m (10.7 kgf-m, 77.4 ft-lb)

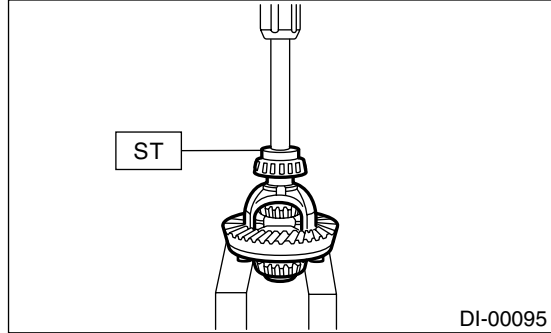


12) Press side bearing onto differential case with ST.

ST 398237700 DRIFT

NOTE:

When replacing bearing cone, replace it with bearing cap as a set.



13) Install bearing cup to side bearing retainer.

NOTE:

- Press in while be careful not to scratch bearing cup and side bearing retainer.
- When replacing bearing cup, replace it with bearing cone as a set.

14) Using ST, press in new oil seal to side bearing retainer.

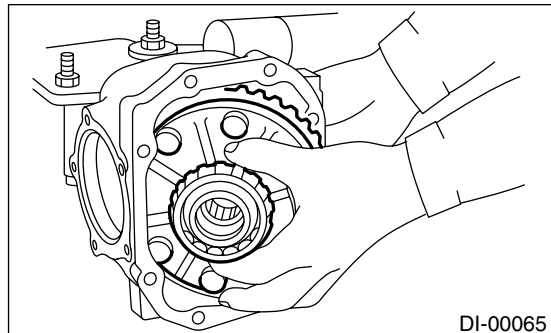
ST 398437700 DRIFT

NOTE:

Apply thin oil gear oil on the mating surface of side bearing retainer and oil seal.

15) Adjusting side bearing retainer shims

- (1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.
- (2) Install the differential case assembly into differential carrier in the reverse order of disassembly.



(3) Install side retainer shims to the left and right retainers from which they were removed.

NOTE:

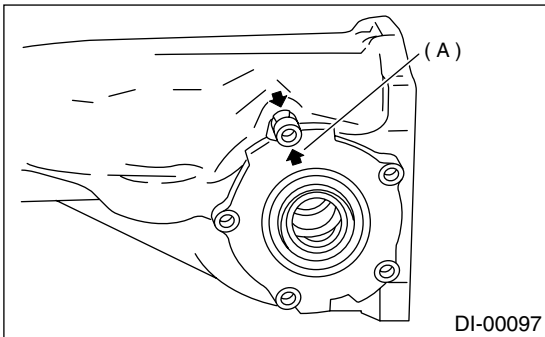
Replace broken or corroded side retainer shim with new one of same thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

(4) Align arrow marked on differential carrier with that marked on side retainer during installation.

NOTE:

Be careful that side bearing outer race is not damaged by bearing roller.

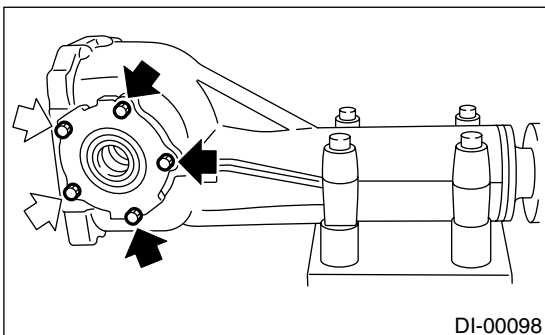


(A) Arrow mark

(5) Tighten side bearing retainer bolts.

Tightening torque:

10.3 N·m (1.05 kgf·m, 7.6 ft·lb)



DI-00098

(6) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

If the measured backlash is not within the specified range, adjust side bearing retainer shims as follows:

Backlash is over 0.2 mm (0.008 in):

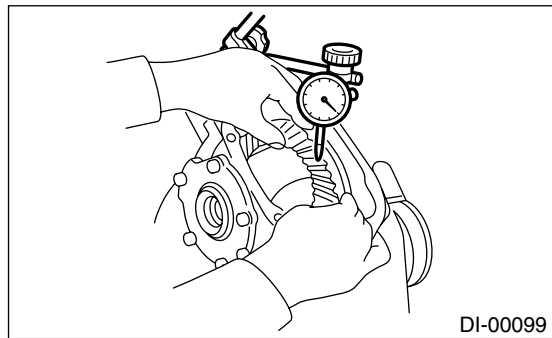
Reduce the shim thickness of crown gear back-side and increase crown gear tooth-side.

Backlash is less than 0.1 mm (0.004 in):

Increase the shim thickness of crown gear back-side and reduce crown gear tooth-side.

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



DI-00099

(7) At the same time, measure the turning resistance of drive pinion. Compare with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, adjust thickness of side bearing retainer shims so that the back- and tooth-sides are the same thickness.

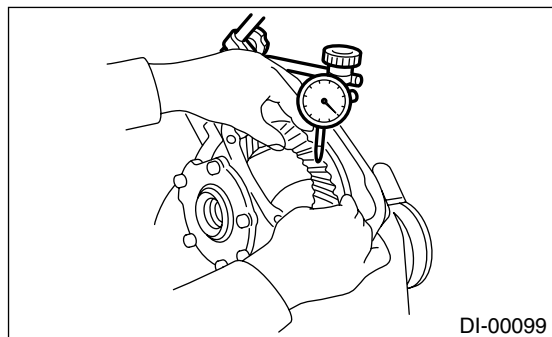
Turning resistance increase:

20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lb)

16) Re-check crown gear-to-pinion backlash.

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



DI-00099

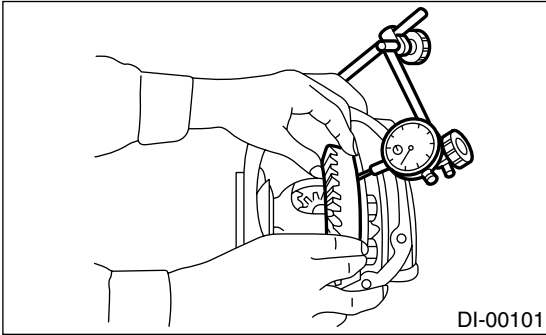
REAR DIFFERENTIAL FOR T-TYPE

DIFFERENTIALS

17) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

Limit of runout:

Less than 0.05 mm (0.0020 in)



18) Checking and adjusting tooth contact of crown gear

(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

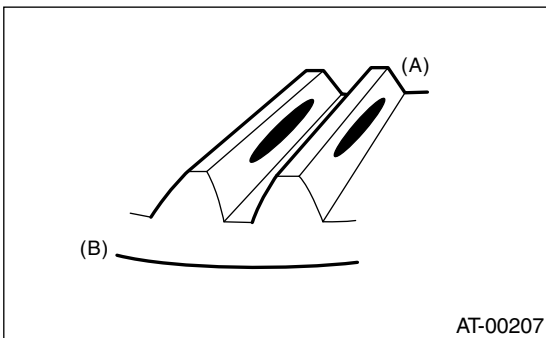
(2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:

Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)

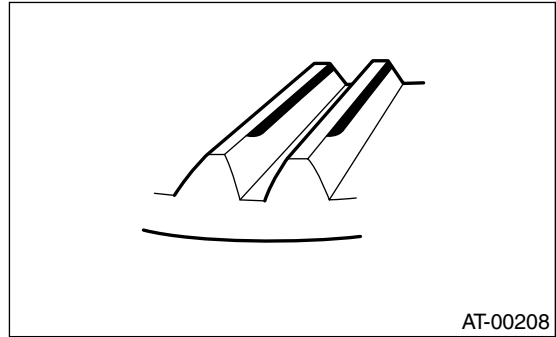


- (A) Toe side
- (B) Heel side

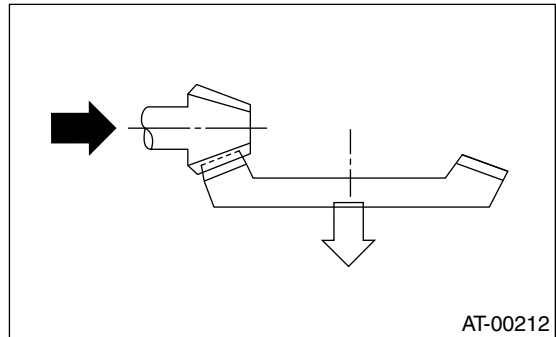
- Face contact

Checking item: Backlash is too large.

Contact pattern



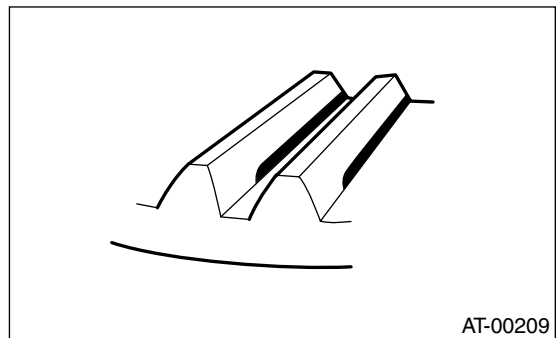
Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



- Flank contact

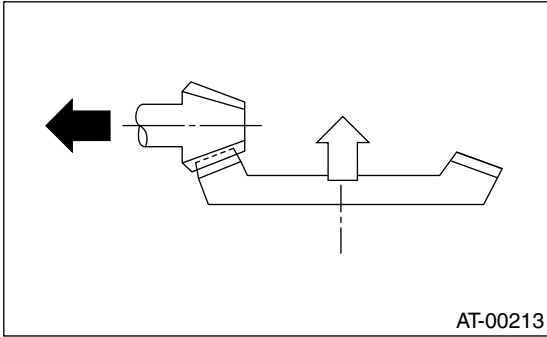
Checking item: Backlash is too small.

Contact pattern

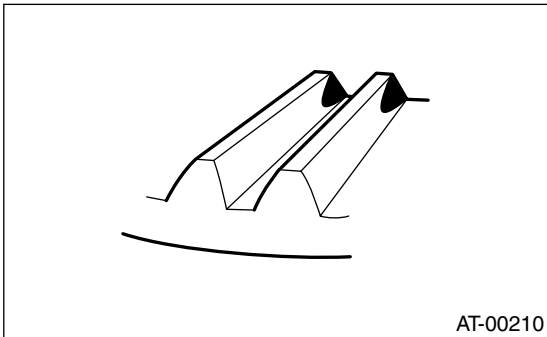


REAR DIFFERENTIAL FOR T-TYPE

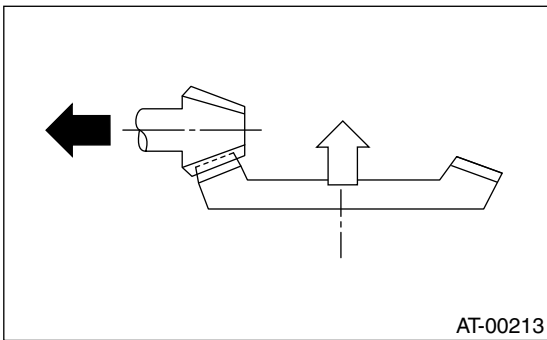
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



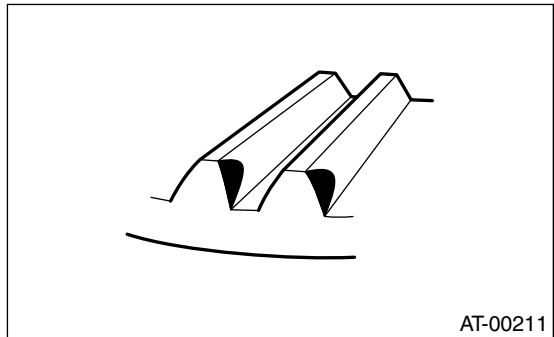
• Toe contact (Inside end contact)
Checking item: Contact area is small.
Contact pattern



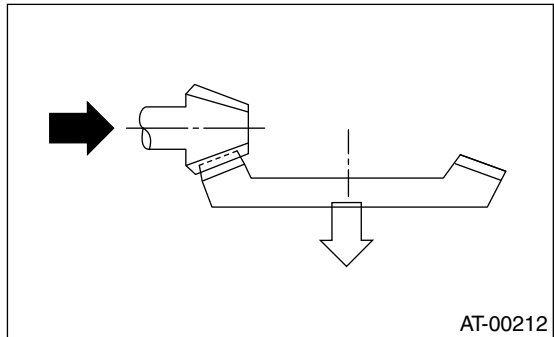
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



• Heel contact (Outside end contact)
Checking item: Contact area is small.
Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.

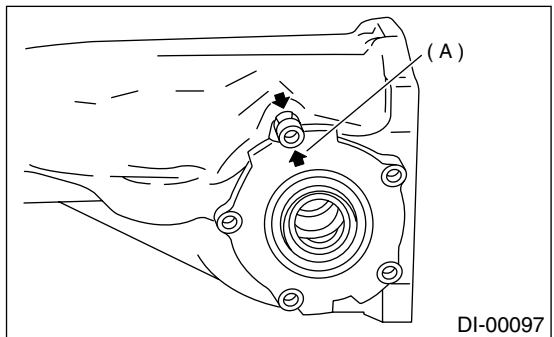


19) If proper tooth contact is not obtained, once again adjust the drive pinion height changing RH and LH side bearing retainer shims and the hypoid gear backlash.

20) Remove left and right side retainer.

21) Install left and right side bearing retainer, new O-rings and side retainer shims.

22) Align the arrow mark on differential carrier with the mark on side retainer during installation.



(A) Arrow mark

REAR DIFFERENTIAL FOR T-TYPE

DIFFERENTIALS

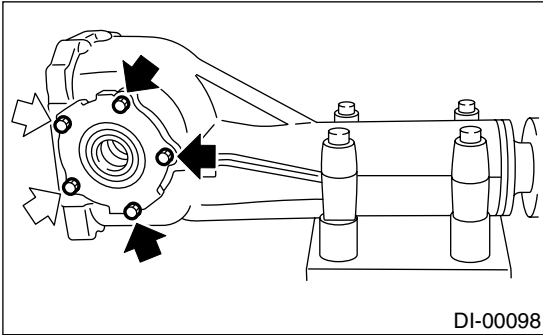
23) Tighten the side bearing retainer bolts.

Lock Tite:

THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:

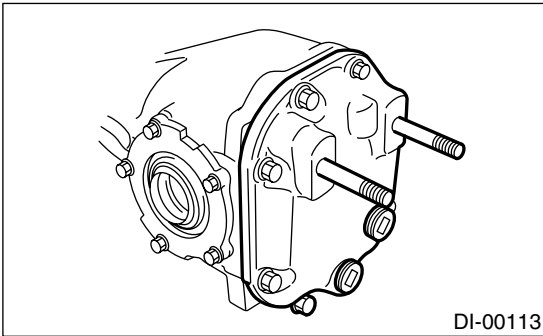
10.3 N·m (1.05 kgf·m, 7.6 ft·lb)



24) Install new gasket and rear cover, and tighten bolts to specified torque.

Tightening torque:

29 N·m (3.0 kgf·m, 21.7 ft·lb)



E: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Crown gear and drive pinion

- If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.
- If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear

- Replace if crack, score, or other defects are evident on tooth surface.
- Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing

Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.

4) Thrust washers of side gear and pinion mate gear

Replace if seizure, flaw, abnormal wear or other defect is evident.

5) Oil seal

Replace if deformed or damaged, and at every disassembling.

6) Differential carrier

Replace if the bearing bores are worn or damaged.

7) Differential case

Replace if its sliding surfaces are worn or cracked.

8) Companion flange

Replace if the oil seal lip contacting surfaces have flaws.

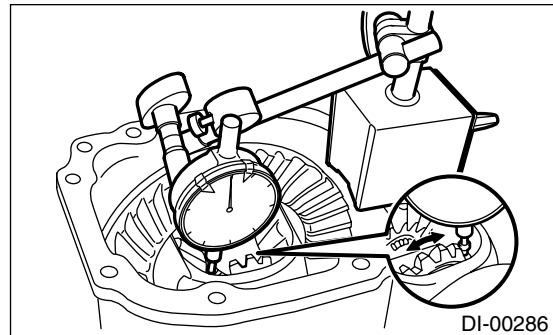
1. SIDE GEAR BACKLASH

Using a dial gauge, check the backlash of the side gear.

Side gear backlash:

0.1 — 0.2 mm (0.004 — 0.008 in)

If side gear backlash is not within the specification, adjust clearance as specified by selecting side gear thrust washer.



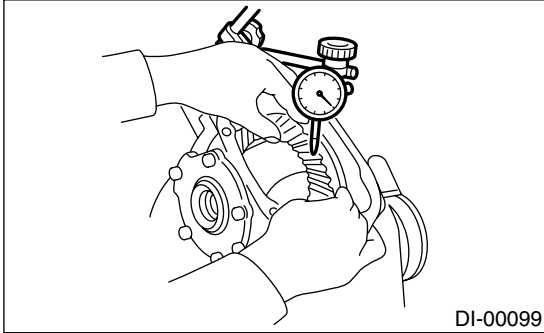
2. CROWN GEAR BACKLASH

Using a dial gauge, check the backlash of the crown gear.

Crown gear backlash:

0.1 — 0.2 mm (0.004 — 0.008 in)

If crown gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.



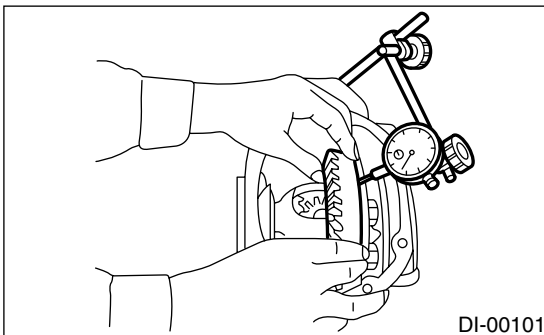
3. CROWN GEAR RUNOUT

Using a dial gauge, check the crown gear runout.

Crown gear runout:

Less than 0.05 mm (0.0020 in)

If the crown gear runout exceeds 0.05 mm (0.0020 in), replace the crown gear.



4. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION

Inspect tooth contact between crown gear and drive pinion. <Ref. to DI-31, ASSEMBLY, Rear Differential for T-type.>

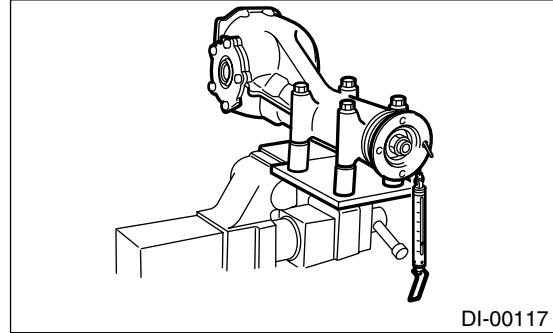
5. TOTAL PRELOAD

Using a gauge, check the turning resistance increase.

Turning resistance increase:

2.9 — 10.8 N (0.3 — 1.1 kgf, 0.7 — 2.4 lb)

If the increase of the resistance is not within the specification, adjust the side bearing retainer shims.



F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust side gear backlash.

<Ref. to DI-31, ASSEMBLY, Rear Differential for T-type.>

2. CROWN GEAR BACKLASH

Adjust crown gear backlash.

<Ref. to DI-31, ASSEMBLY, Rear Differential for T-type.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION

Adjust the tooth contact between crown gear and drive pinion gear.

<Ref. to DI-31, ASSEMBLY, Rear Differential for T-type.>

4. TOTAL PRELOAD

Adjust side bearing shim.

<Ref. to DI-31, ASSEMBLY, Rear Differential for T-type.>

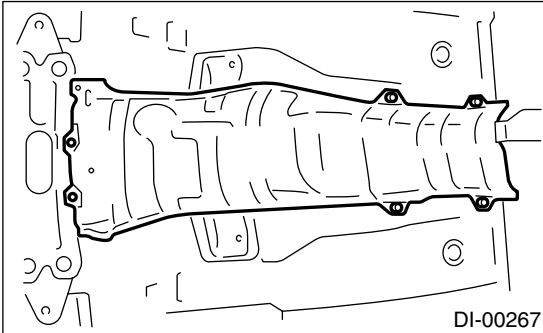
REAR DIFFERENTIAL FOR VA-TYPE

DIFFERENTIALS

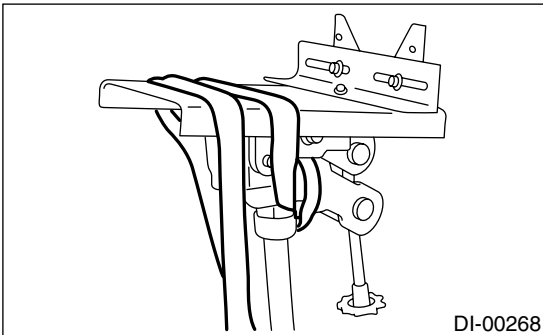
5. Rear Differential for VA-type

A: REMOVAL

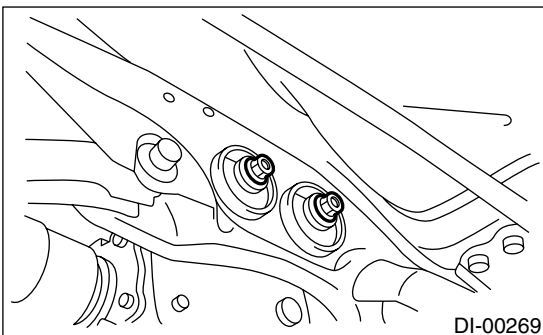
- 1) Disconnect ground cable from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Loosen wheel nuts.
- 4) Release the parking brake.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
- 8) Remove heat shield cover.



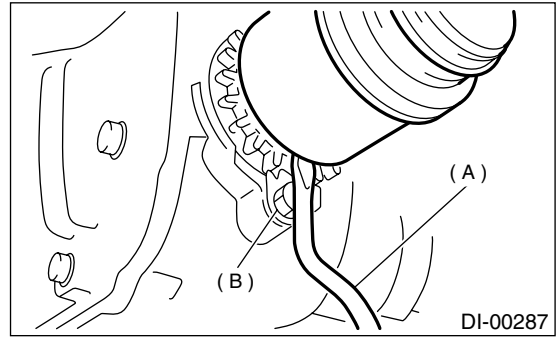
- 9) Remove propeller shaft.
<Ref. to DS-15, REMOVAL, Propeller Shaft.>
- 10) Prepare a transmission jack and a band.



- 11) Loosen self-locking nuts connecting rear differential to rear crossmember.

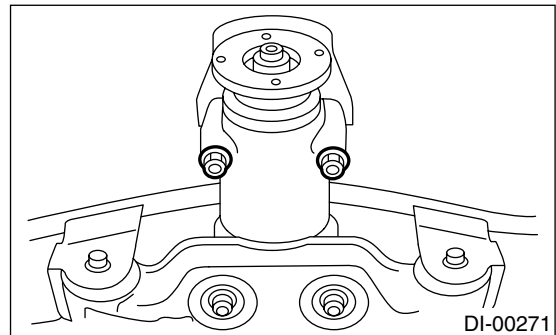


- 12) Remove DOJ of rear drive shaft from rear differential.

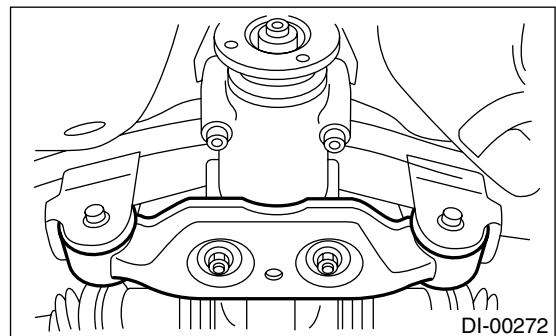


- (A) Tire lever
(B) Bolt

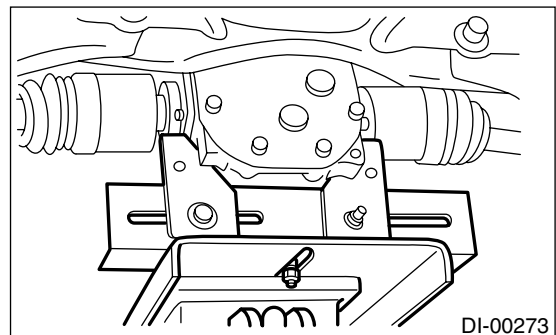
- 13) Remove protector nuts.



- 14) Remove nuts which secure rear differential front member.



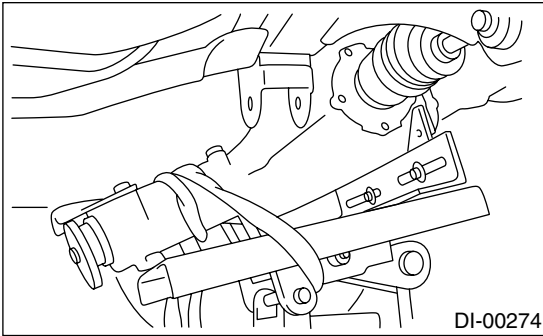
- 15) Support rear differential with transmission jack.



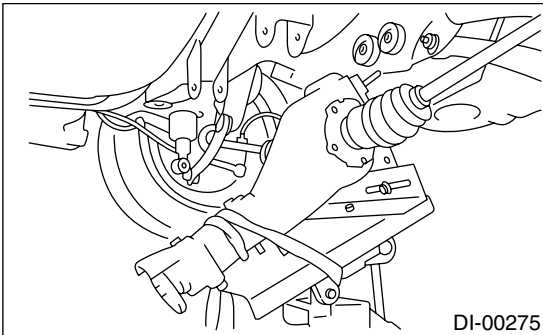
- 16) Remove rear differential front member.
- 17) Fix rear differential at band.
- 18) Remove self-locking nuts connecting rear differential to rear crossmember.
- 19) Remove rear differential stud bolt from rear crossmember bushing.

NOTE:

Carefully adjust angle and position of transmission jack and jack stand as required during stud bolt removal.



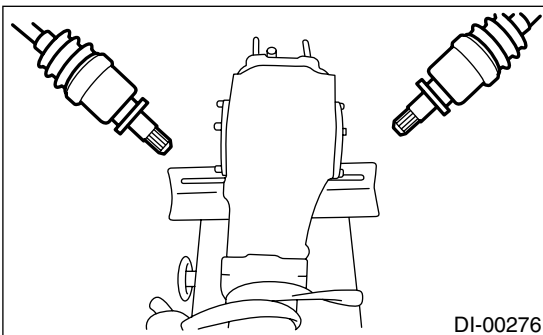
- 20) After removing rear differential stud bolt from rear crossmember, lower transmission jack stand. Do not allow rear drive shaft to strike lateral link bolt.



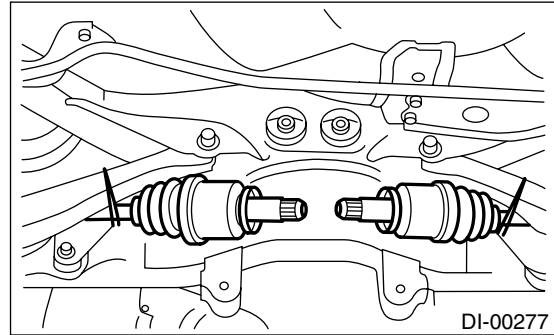
- 21) Pull out axle shaft from rear differential.

NOTE:

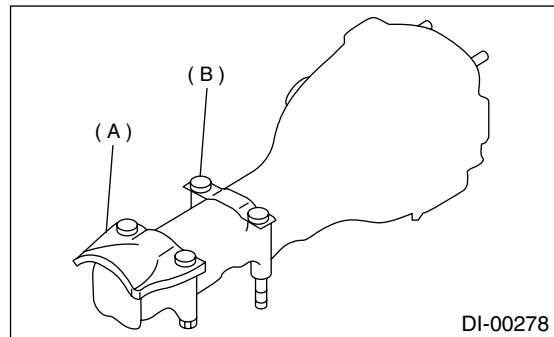
If axle shaft is difficult to remove from rear differential, use a tire lever to remove it.



- 22) Take down transmission jack.
- 23) Secure rear drive shaft to lateral link using wire.



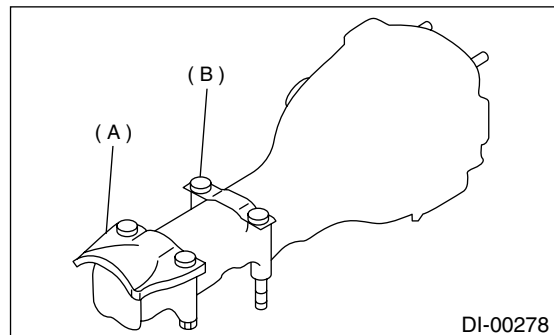
- 24) Remove protector and rear differential member plate from rear differential.



- (A) Protector
- (B) Rear differential member plate

B: INSTALLATION

- 1) Insert protector and plate to rear differential.



- (A) Protector
- (B) Rear differential member plate

- 2) Set rear differential to transmission jack.

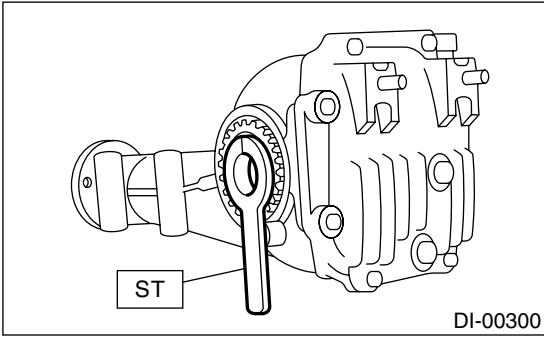
NOTE:

Secure rear differential to transmission jack using a band.

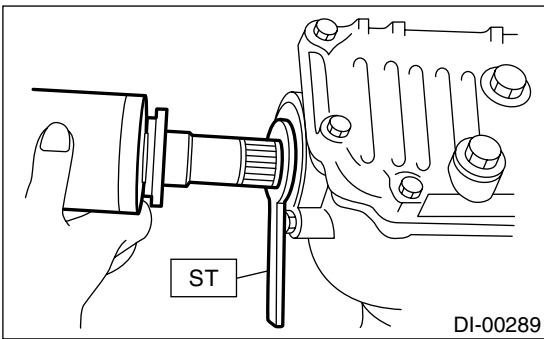
REAR DIFFERENTIAL FOR VA-TYPE

DIFFERENTIALS

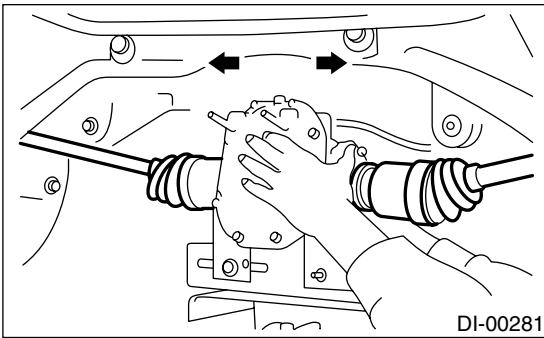
- 3) Install ST to rear differential.
ST 28099PA090 OIL SEAL PROTECTOR



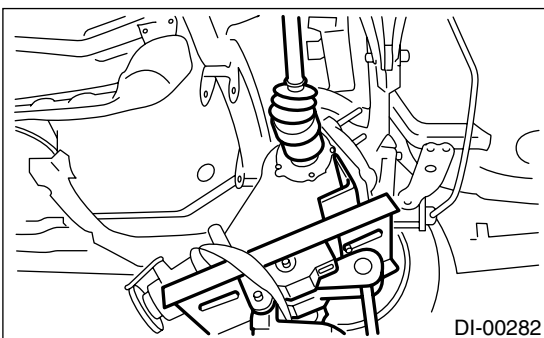
- 4) Insert the spline shaft until the spline portion is inside the side oil seal.



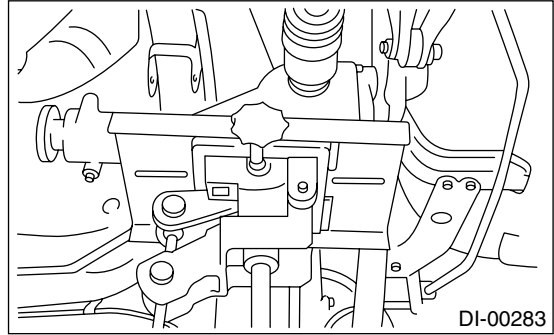
- 5) Remove ST from rear differential.
ST 28099PA090 OIL SEAL PROTECTOR
6) Completely insert axle shaft into rear differential by pressing rear differential.



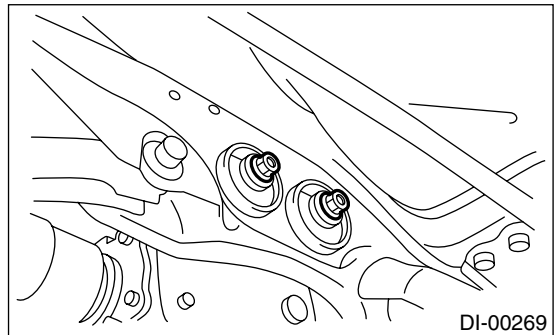
- 7) Adjust transmission jack as required so rear differential stud bolt is properly inserted into rear crossmember bushing.



- 8) After rear differential stud bolt has been inserted into rear crossmember bushing, raise transmission jack to make jack rear differential level.



- 9) Temporarily tighten rear crossmember self-locking nuts.



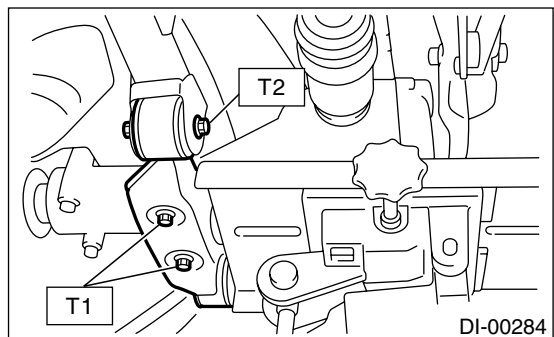
- 10) Remove band from rear differential. Raise rear differential just enough to move transmission jack away from it.

- 11) Install rear differential front member.

Tightening torque:

T1: 65 N·m (6.6 kgf·m, 48 ft·lb)

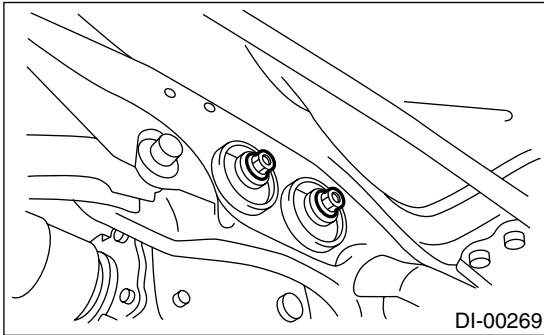
T2: 110 N·m (11.2 kgf·m, 81 ft·lb)



12) Tighten self-locking nuts.

Tightening torque:

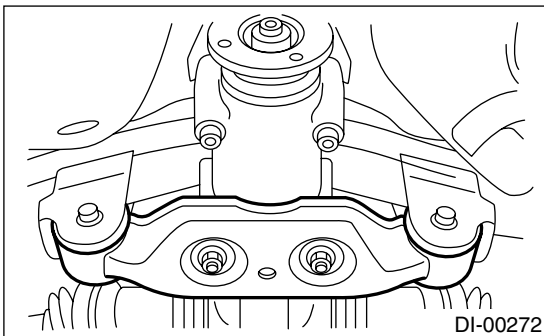
70 N·m (7.1 kgf·m, 51 ft·lb)



13) Tighten protector nut.

Tightening torque:

65 N·m (6.6 kgf·m, 48.0 ft·lb)



14) Take down transmission jack.

15) Install propeller shaft.

<Ref. to DS-16, INSTALLATION, Propeller Shaft.>

16) Install heat shield cover.

17) Install rear exhaust pipe and muffler.

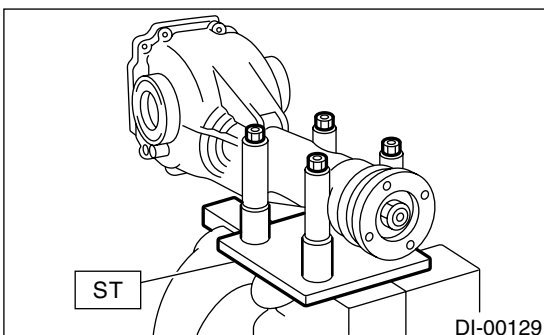
C: DISASSEMBLY

To detect real cause of trouble, inspect the following items before disassembling.

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

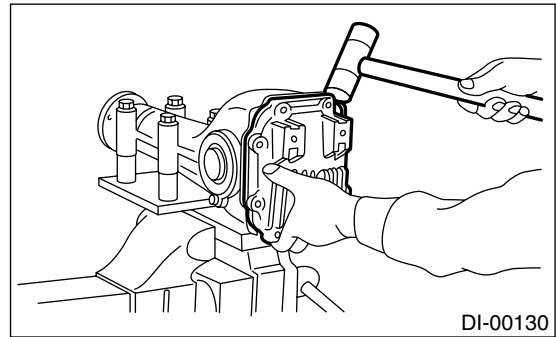
1) Set ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT



2) Drain gear oil by removing plug.

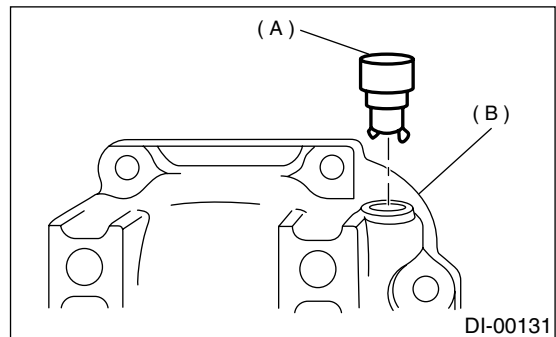
3) Remove rear cover by loosening retaining bolts.



4) Replace air breather cap.

NOTE:

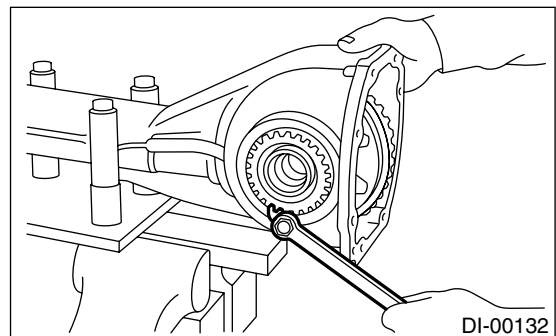
Do not attempt to replace the air breather cap unless necessary.



(A) Air breather cap

(B) Rear cover

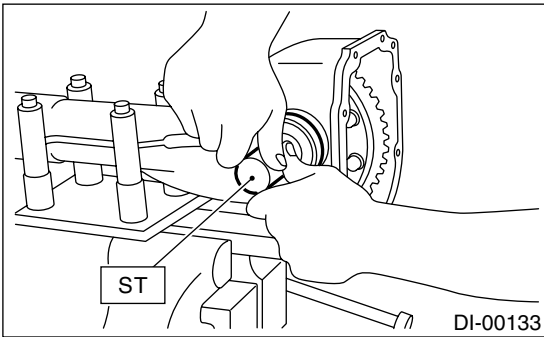
5) Remove right and left lock plates.



REAR DIFFERENTIAL FOR VA-TYPE

DIFFERENTIALS

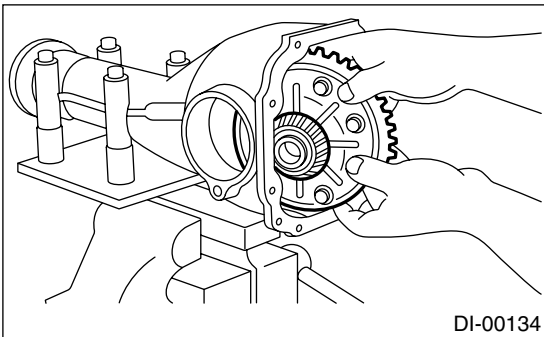
6) Remove right and left holders with ST.
ST 499785500 WRENCH



7) Pull out differential assembly from differential case.

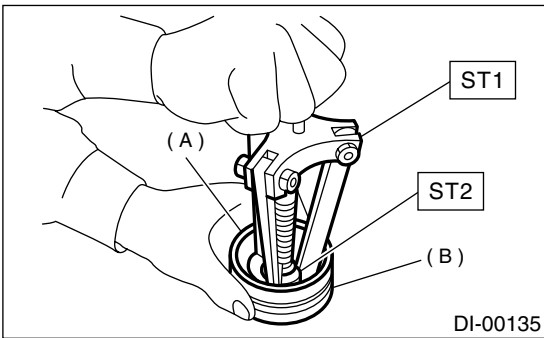
NOTE:

Be careful not to hit the teeth against the case.



8) Remove bearing race from right and left holders with ST1 and ST2.

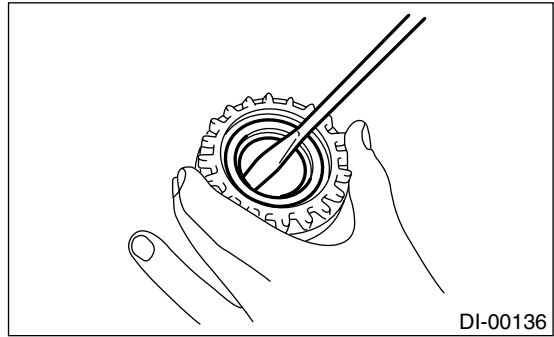
ST1 499705401 PULLER ASSY
ST2 499705404 SEAT



(A) Bearing race

(B) Holder

9) Remove oil seal from right and left holders with screwdriver.

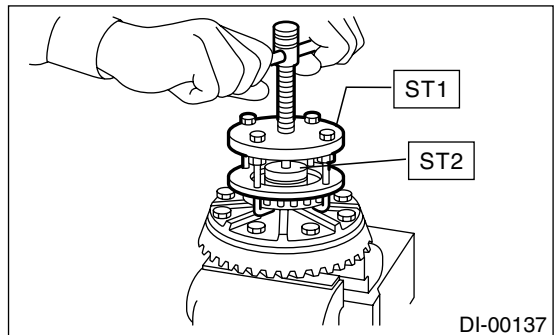


10) Extract bearing cone with ST1 and ST2.

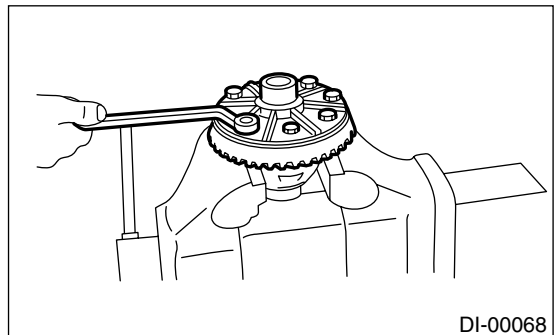
NOTE:

- Do not attempt to disassemble the parts unless necessary.
- Set puller so that its claws catch the edge of the bearing cone.
- Never mix up the right and left hand bearing races and cones.

ST1 899524100 PULLER SET
ST2 399520105 SEAT



11) Remove crown gear by loosening crown gear bolts.

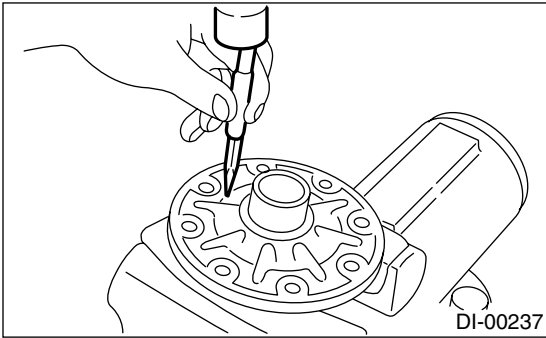


12) Drive out pinion shaft lock pin from crown gear side. (Without LSD)

NOTE:

The lock pin is staked at the pin hole end on the differential case; do not drive it out forcibly before unstaking it.

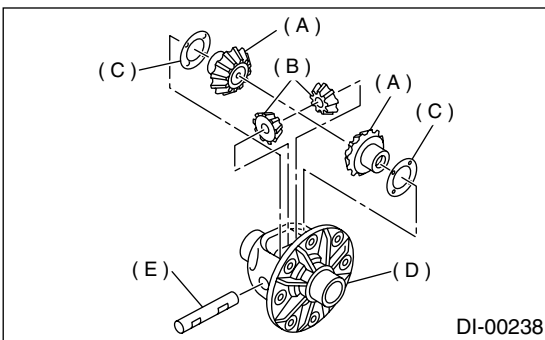
ST 899904100 STRAIGHT PIN REMOVER



13) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers. (Without LSD)

NOTE:

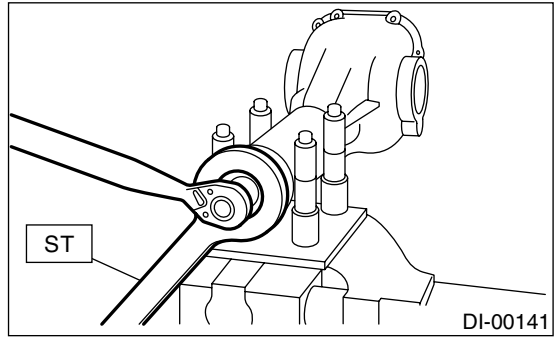
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



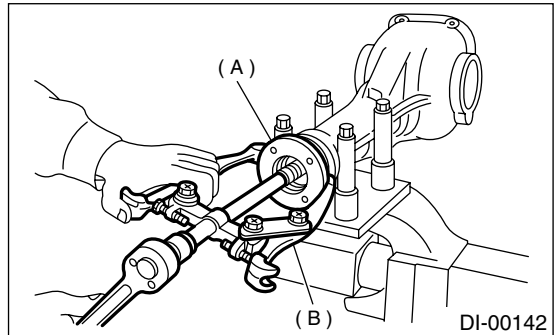
- (A) Side gear
- (B) Pinion mate gear
- (C) Thrust washer
- (D) Differential case
- (E) Pinion mate shaft

14) Hold companion flange with ST and remove self-locking nut.

ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.



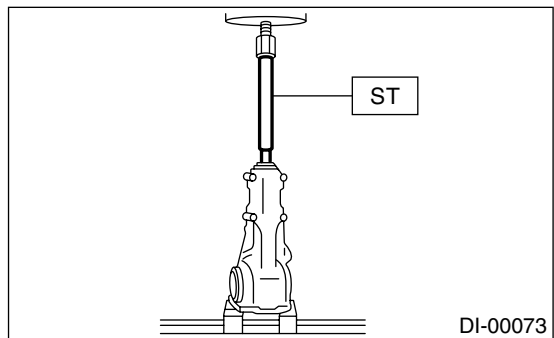
- (A) Companion flange
- (B) Puller

16) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT



REAR DIFFERENTIAL FOR VA-TYPE

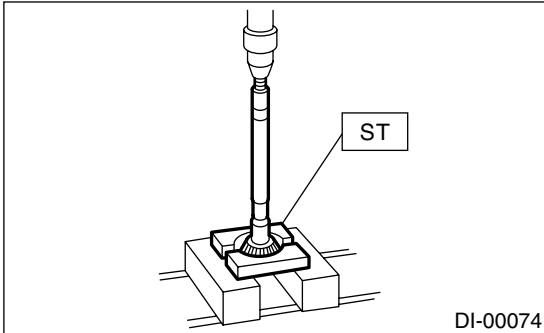
DIFFERENTIALS

17) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:

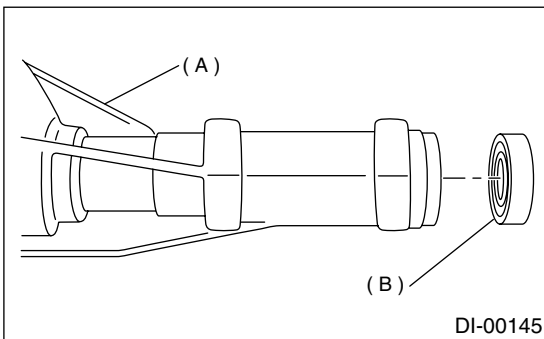
Place ST so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER



18) Remove front oil seal from differential carrier using ST.

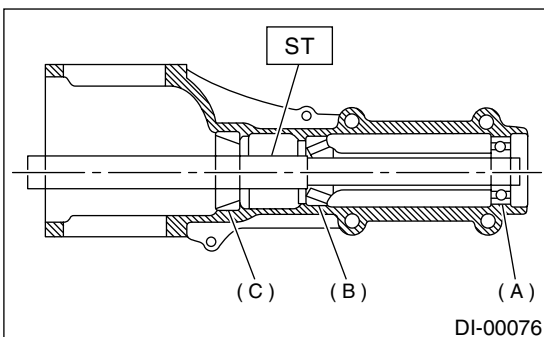
ST 398527700 PULLER ASSY



- (A) Differential carrier
- (B) Front oil seal

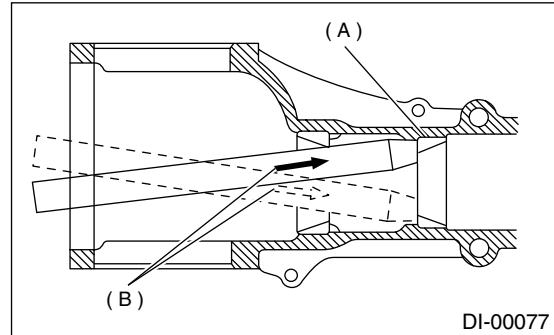
19) Remove pilot bearing together with front bearing cone using ST.

ST 398467700 DRIFT



- (A) Pilot bearing
- (B) Front bearing
- (C) Rear bearing cup

20) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.

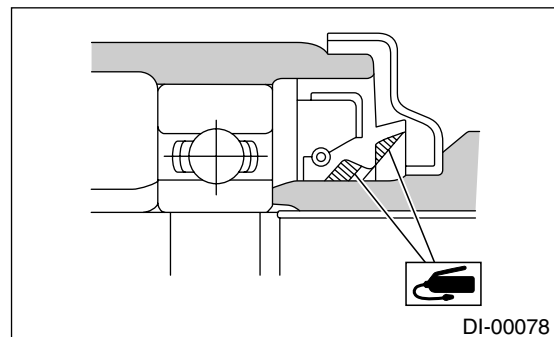


- (A) 2 cutouts along diagonal lines
- (B) Tap alternately with brass bar.

D: ASSEMBLY

NOTE:

- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- Keep the shims and washers in order, so that they are not misinstalled.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand races of the bearings.
- Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.



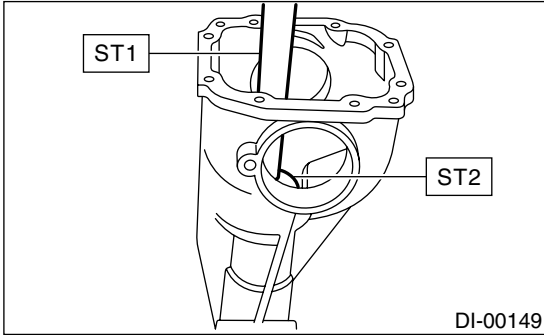
- Use new O-ring and gasket.
- 1) Adjust preload for front and rear bearings.
- Adjust the bearing preload with spacer and washer between front and rear bearings.
- Pinion height adjusting washer are not affected by this adjustment.
- The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race (rear) into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 398477702 DRIFT

(2) Press front bearing race (front) into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 498447110 DRIFT



(3) Insert new front bearing cone.
(4) Measure and record the thickness of pinion height adjusting washer.

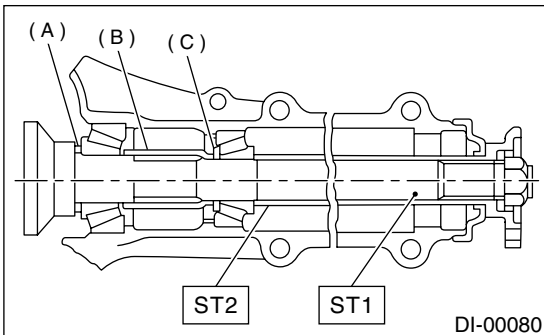
NOTE:

The used washer can be used after checking that it is not deformed when the tooth contact of drive gear and driven gear is correct during pre-disassembly.

(5) Insert ST1 into case with pinion height adjusting shim and new rear bearing cone fitted onto it.

(6) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and self-locking nut.

ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR



- (A) Pinion height adjusting shim
- (B) Preload adjusting spacer
- (C) Preload adjusting washer

(7) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

NOTE:

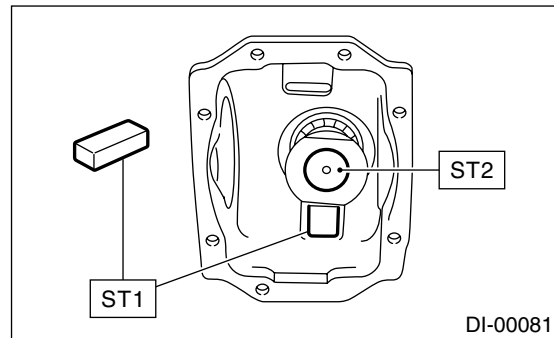
Use a new self-locking nut.

- Measure the preload in direction of tangent.
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST2 with ST1 as shown in the figure.

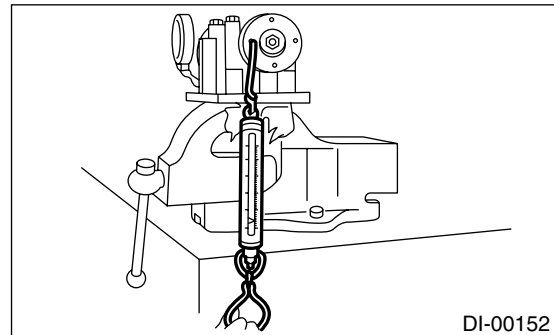
ST1 398507704 BLOCK
ST2 498447150 DUMMY SHAFT

Tightening torque:

191 N·m (19.5 kgf·m, 141 ft·lb)



Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kgf, 2.9 — 7.3 lb) at companion flange bolt hole



REAR DIFFERENTIAL FOR VA-TYPE

DIFFERENTIALS

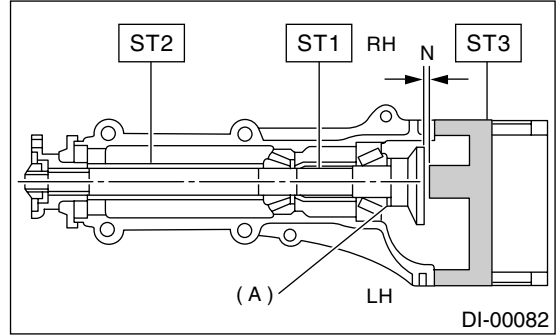
Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
38336AA210	1.738 (0.0684)	
38336AA100	1.750 (0.0689)	
38336AA220	1.763 (0.0694)	
38336AA110	1.775 (0.0699)	
Preload adjusting spacer	Part No.	Length mm (in)
	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
32288AA090	53.3 (2.098)	

2) Adjusting drive pinion height

Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Set ST3.

ST1 498447150 DUMMY SHAFT
 ST2 32285AA000 DUMMY COLLAR
 ST3 498505501 DIFFERENTIAL CARRIER GAUGE



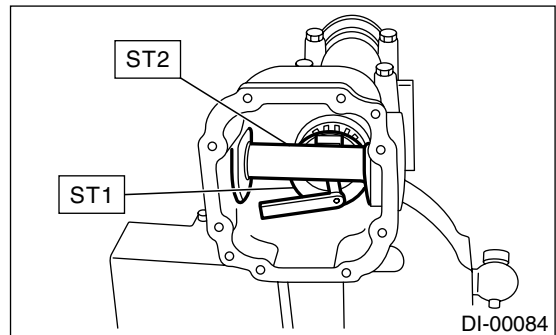
(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST3 and the end surface of ST1 by using a thickness gauge.

NOTE:

Make sure there is no clearance between the case and ST3.

ST1 498447150 DUMMY SHAFT
 ST2 498505501 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed shim with this one.

NOTE:

Use 1 to 3 shims as required for adjustment.

$$T = T_o + N - 0.05 \text{ (mm)}$$

where

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim originally installed (mm)

N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(Example of calculation)

$$T_o = 0.15 \text{ mm}$$

$$N = 0.1 \text{ mm}$$

$$T = 0.15 + 0.1 - 0.05 = 0.2 \text{ mm}$$

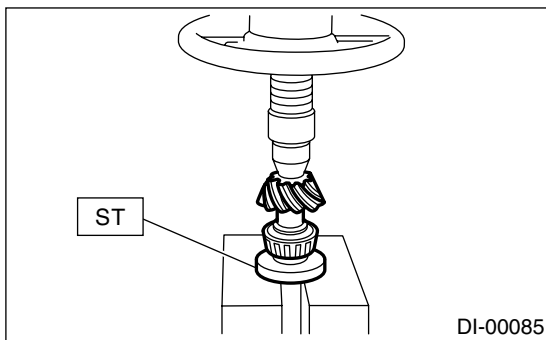
Result: Thickness = 0.2 mm

Therefore use the 32295AA220.

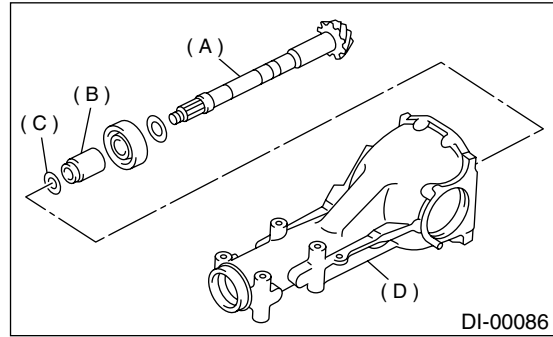
Pinion height adjusting shim	
Part No.	Thickness mm (in)
32295AA200	0.150 (0.0059)
32295AA210	0.175 (0.0069)
32295AA220	0.200 (0.0079)
32295AA230	0.225 (0.0089)
32295AA240	0.250 (0.0098)
32295AA250	0.275 (0.0108)

3) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

ST 498175500 INSTALLER



4) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



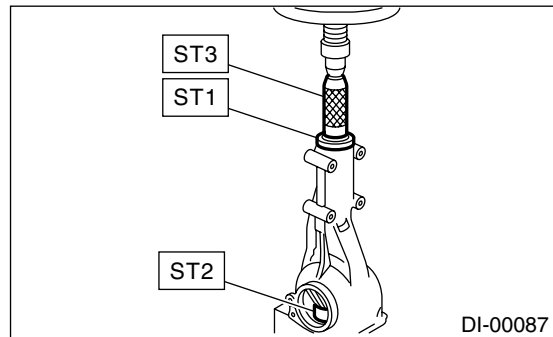
- (A) Drive pinion
- (B) Bearing preload adjusting spacer
- (C) Bearing preload adjusting washer
- (D) Differential carrier

5) Press-fit front bearing cone into carrier with ST1, ST2 and ST3.

ST1 32285AA000 DUMMY COLLAR

ST2 399780104 WEIGHT

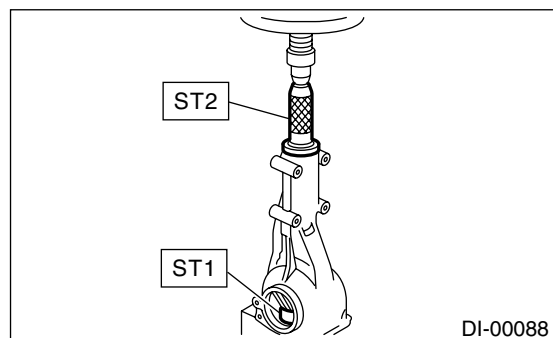
ST3 899580100 INSTALLER



6) Insert spacer, then press-fit pilot bearing with ST1 and ST2.

ST1 399780104 WEIGHT

ST2 899580100 INSTALLER



REAR DIFFERENTIAL FOR VA-TYPE

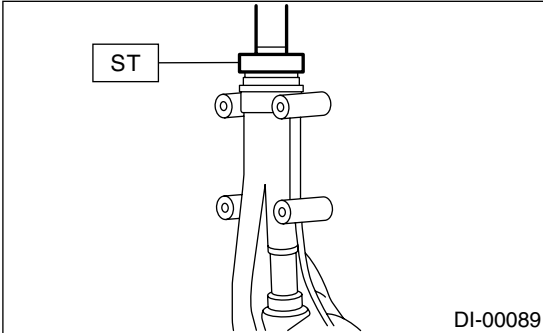
DIFFERENTIALS

7) Fit a new oil seal with ST.

NOTE:

- Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips.

ST 498447120 OIL SEAL INSTALLER



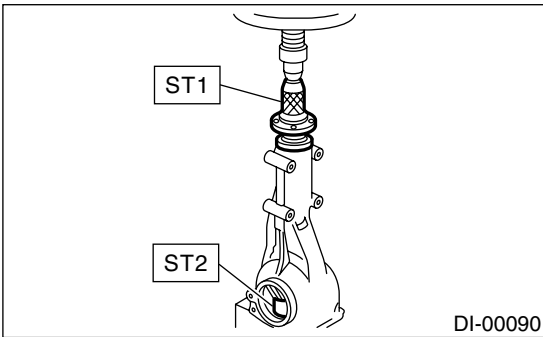
8) Press-fit companion flange with ST1 and ST2.

NOTE:

Be careful not to damage bearing.

ST1 899874100 INSTALLER

ST2 399780104 WEIGHT

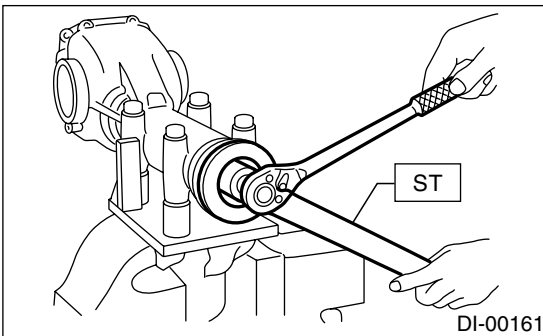


9) Install self-locking nut. Then tighten it with ST.

ST 398427200 FLANGE WRENCH

Tightening torque:

191 N·m (19.5 kgf·m, 141 ft·lb)

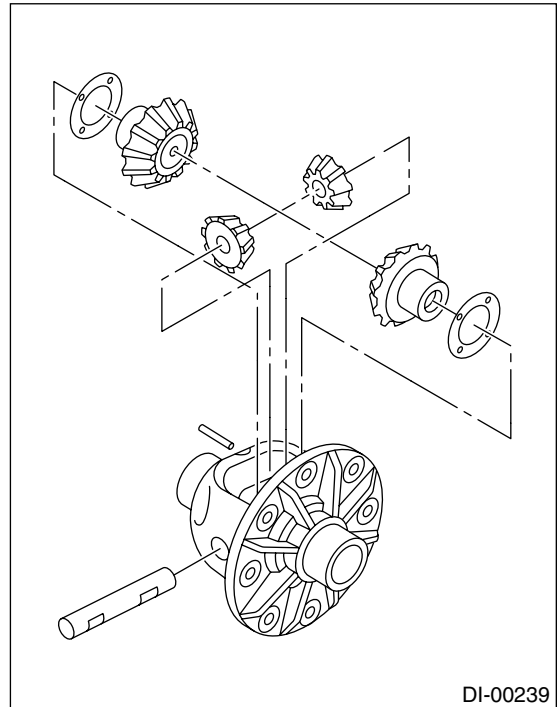


10) Assembling differential case (Without LSD)

Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

NOTE:

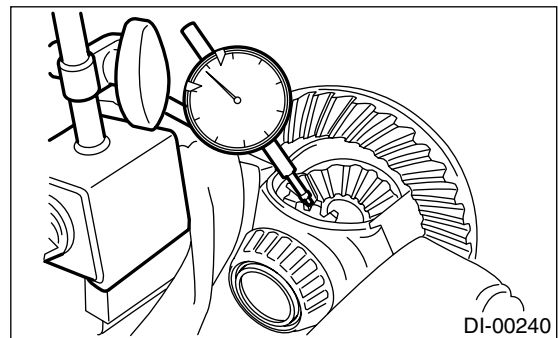
- Apply gear oil on both sides of the washer and on the side gear shaft before installing.
- Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the side gear backlash.

Side gear back clearance:

0.05 — 0.15 mm (0.0020 — 0.0059 in)



(2) Adjust the side gear backlash as specified by selecting side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
803135011	0.925 — 0.950 (0.0364 — 0.0374)
803135012	0.950 — 0.975 (0.0374 — 0.0384)
803135013	0.975 — 1.000 (0.0384 — 0.0394)
803135014	1.000 — 1.025 (0.0394 — 0.0404)
803135015	1.025 — 1.050 (0.0404 — 0.0413)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.

(4) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.

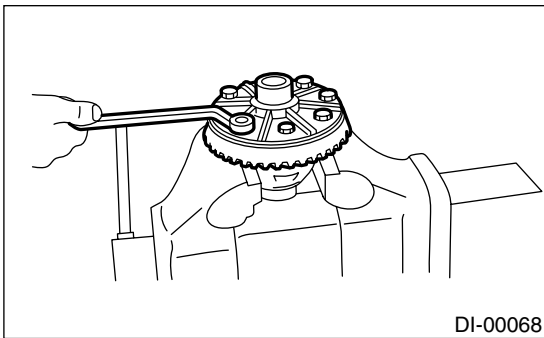
(5) Install crown gear on differential case.

NOTE:

Tighten diagonally while tapping the bolt heads.

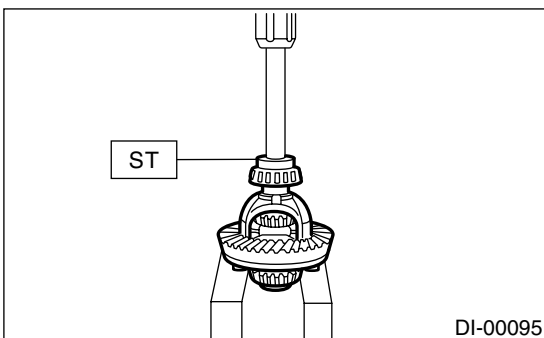
Tightening torque:

62 N·m (6.3 kgf·m, 45.6 ft·lb)



11) Press side bearing cone onto differential case with ST.

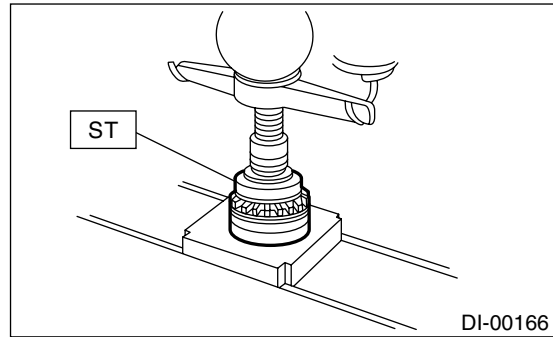
ST 498485400 DRIFT



12) Assemble holders.

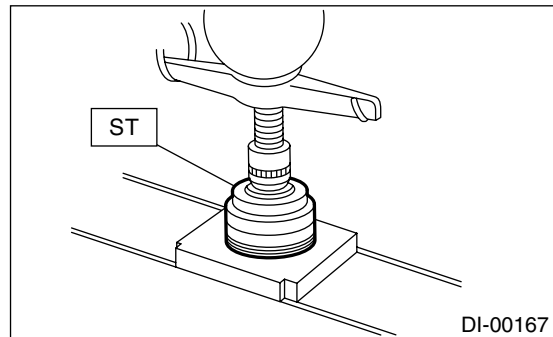
(1) Install oil seal into right and left holders.

ST 498447100 INSTALLER

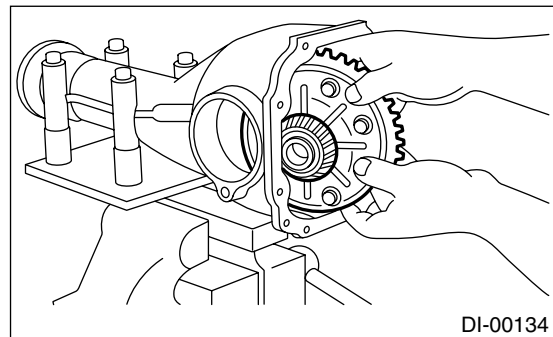


(2) Install bearing race into right and left holders.

ST 398477702 BEARING OUTER RACE DRIFT



(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.



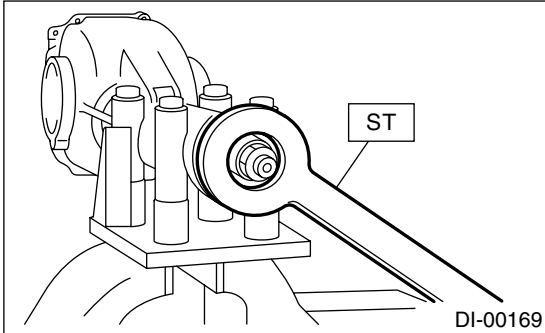
REAR DIFFERENTIAL FOR VA-TYPE

DIFFERENTIALS

13) Perform adjustment of backlash of pinion crown gear set and adjustment of preload of differential side bearing.

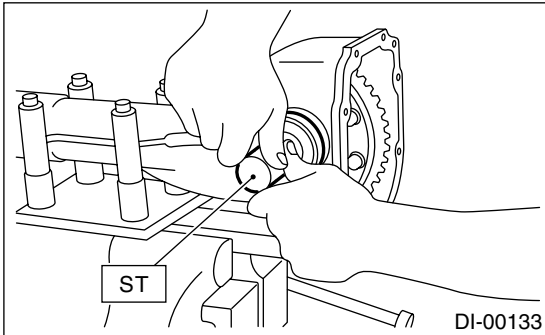
(1) Turn drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



(2) Screw in side (left-side) holder until light contact is made with ST.

ST 499785500 WRENCH



(3) Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth).

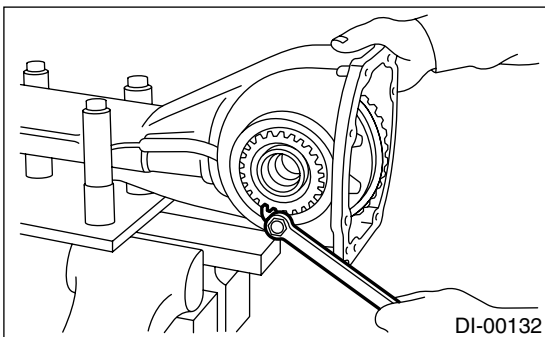
[Back off amount of side (left-side) holder + 1/2 tooth.]

This + 1/2 tooth gives preload.

(4) Temporarily tighten lock plate.

NOTE:

Turn over lock plate to displace holder 1/2 tooth.



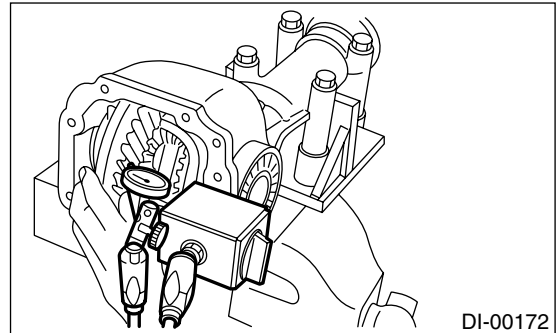
(5) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

NOTE:

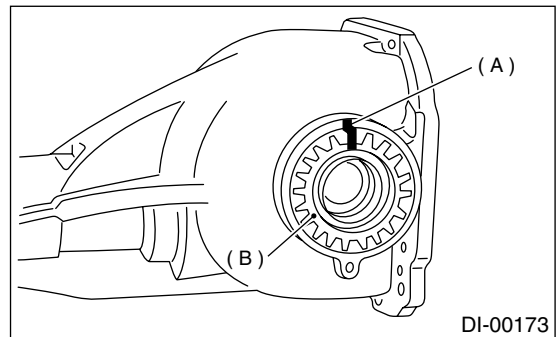
If measured backlash is not within specified range, repeat procedures for pinion crown gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)



14) Draw a matching mark on both differential carrier and holder. Remove holder one side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



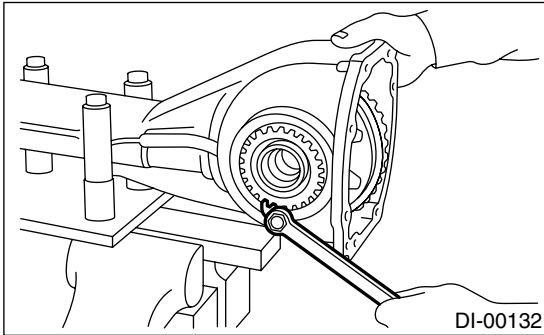
(A) Matching mark

(B) Holder

15) Tighten bolt of lock plate to specified torque.

Tightening torque:

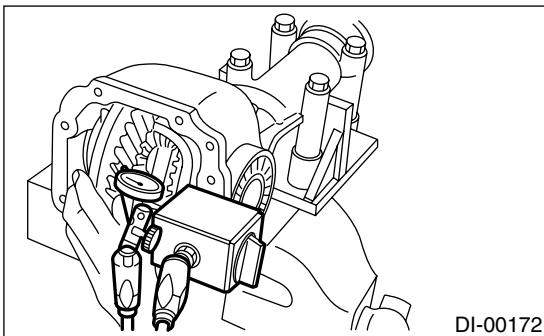
25 N·m (2.5 kgf·m, 18.1 ft·lb)



16) Re-check crown gear-to-pinion backlash.

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)



17) Checking and adjusting tooth contact of crown gear.

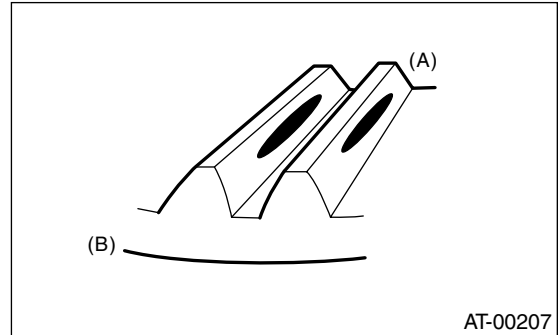
- (1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.
- (2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:

Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

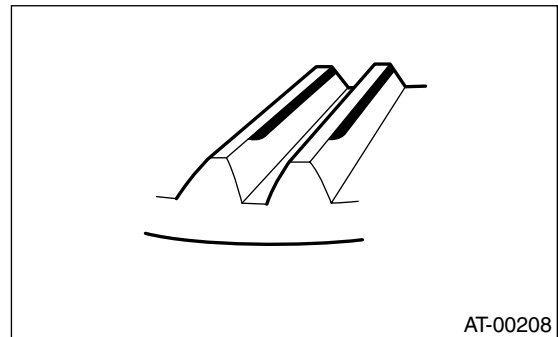
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)



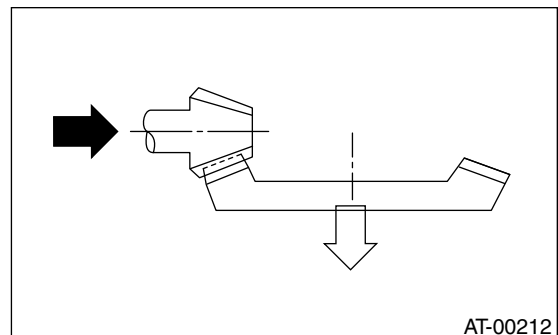
- (A) Toe side
- (B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



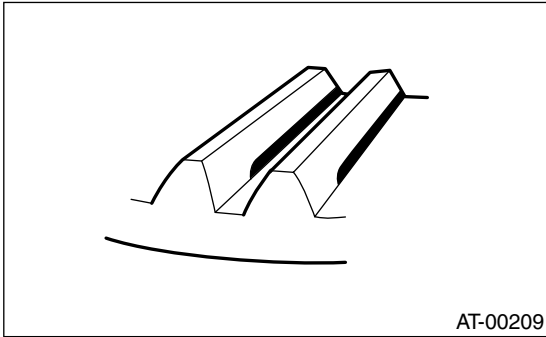
REAR DIFFERENTIAL FOR VA-TYPE

DIFFERENTIALS

- Flank contact

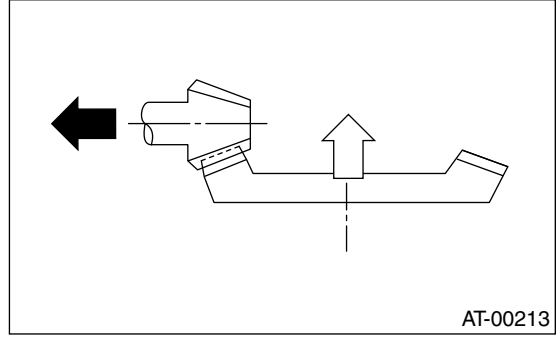
Checking item: Backlash is too small.

Contact pattern



Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.

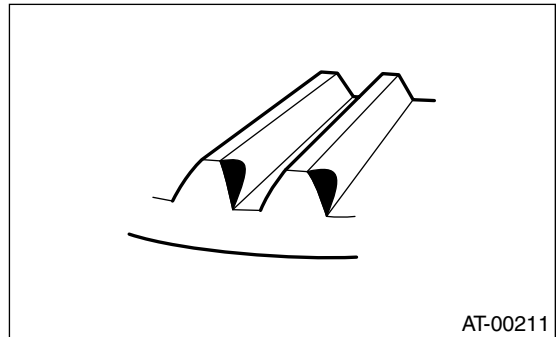
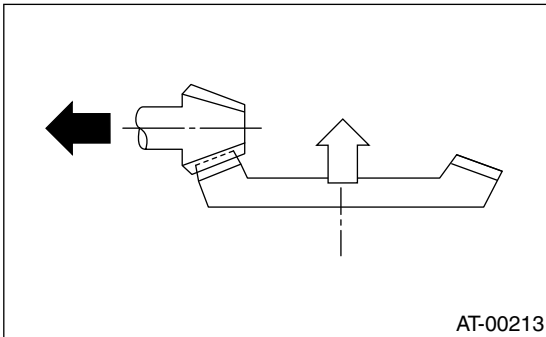
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



- Heel contact (Outside end contact)

Checking item: Contact area is small.

Contact pattern

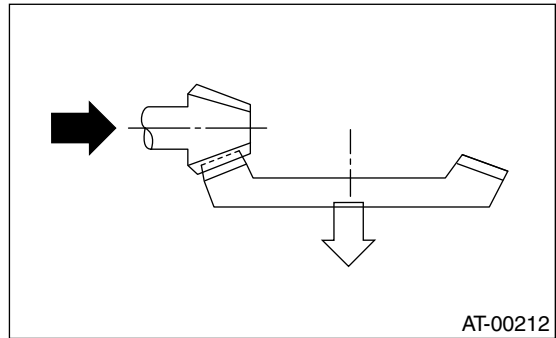
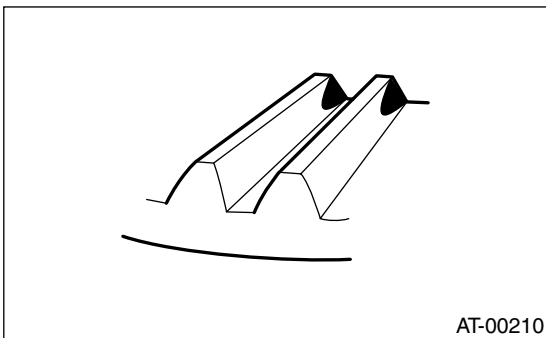


- Toe contact (Inside end contact)

Checking item: Contact area is small.

Contact pattern

Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



NOTE:

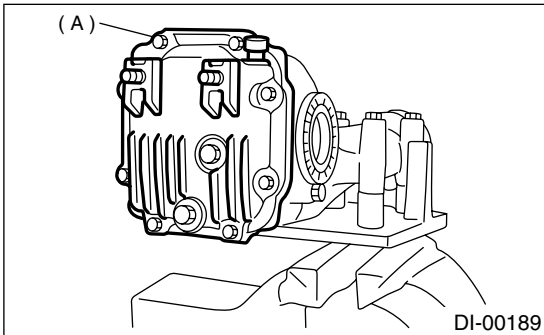
Be sure to wipe off red lead completely after adjustment is completed.

18) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.

19) Install new gasket and rear cover, and tighten bolts to specified torque.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



(A) Rear cover

E: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Crown gear and drive pinion

- If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.

- If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear

- Replace if crack, score, or other defects are evident on tooth surface.

- Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing

Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.

4) Thrust washers of side gear and pinion mate gear

Replace if seizure, flaw, abnormal wear or other defect is evident.

5) Oil seal

Replace if deformed or damaged, and at every disassembling.

6) Differential carrier

Replace if the bearing bores are worn or damaged.

7) Differential case

Replace if its sliding surfaces are worn or cracked.

8) Companion flange

Replace if the oil seal lip contacting surfaces have flaws.

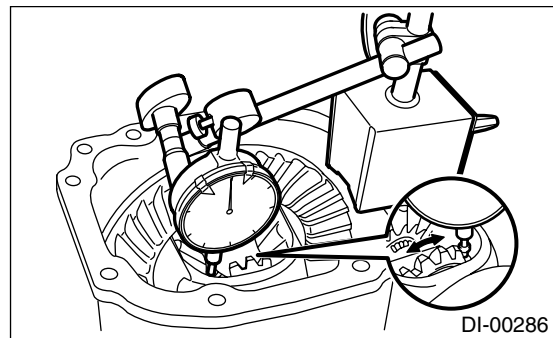
1. SIDE GEAR BACKLASH

Using a dial gauge, check the backlash of the side gear.

Side gear backlash:

0.05 — 0.15 mm (0.0020 — 0.0059 in)

If side gear backlash is not within the specification, adjust clearance as specified by selecting side gear thrust washer.



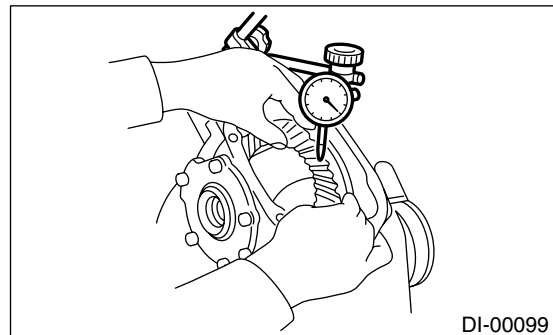
2. CROWN GEAR BACKLASH

Using a dial gauge, check the backlash of the crown gear.

Crown gear backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)

If crown gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.



3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION

Inspect tooth contact between crown gear and drive pinion.

<Ref. to DI-48, ASSEMBLY, Rear Differential for VA-type.>

REAR DIFFERENTIAL FOR VA-TYPE

DIFFERENTIALS

F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust side gear backlash.

<Ref. to DI-48, ASSEMBLY, Rear Differential for VA-type.>

2. CROWN GEAR BACKLASH

Adjust crown gear backlash.

<Ref. to DI-48, ASSEMBLY, Rear Differential for VA-type.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION

Adjust the tooth contact between crown gear and drive pinion gear.

<Ref. to DI-48, ASSEMBLY, Rear Differential for VA-type.>

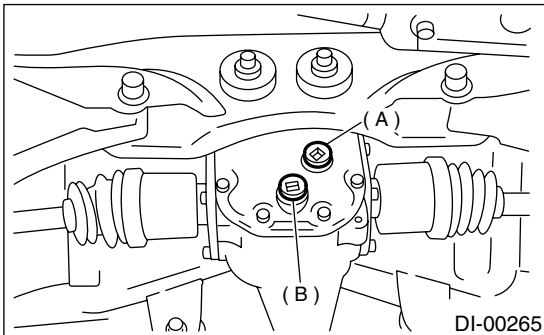
6. Rear Differential Front Oil Seal

A: INSPECTION

Check front oil seal portion for oil leakage, if any leak is found, replace the oil seal and inspect propeller shaft.

B: REPLACEMENT

- 1) Disconnect ground cable from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Remove oil drain plug, and drain gear oil.



- (A) Filler plug
(B) Drain plug

- 5) Install oil drain plug.

NOTE:

- Apply fluid gasket to oil drain plug for T-type.
- VA-type uses a new aluminum gasket.

Fluid packing:

**THREE BOND 1105 (Part No.:004403010)
or equivalent**

Tightening torque:

T-type;

49 N·m (5.0 kgf-m, 36.2 ft-lb)

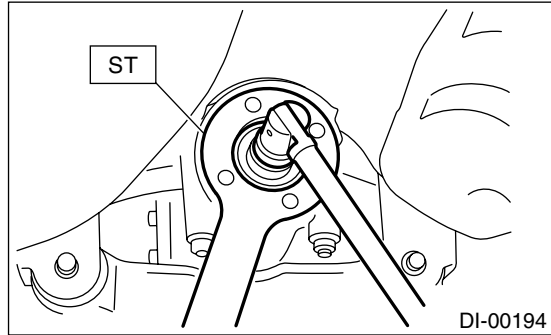
VA-type;

34 N·m (3.5 kgf-m, 25.3 ft-lb)

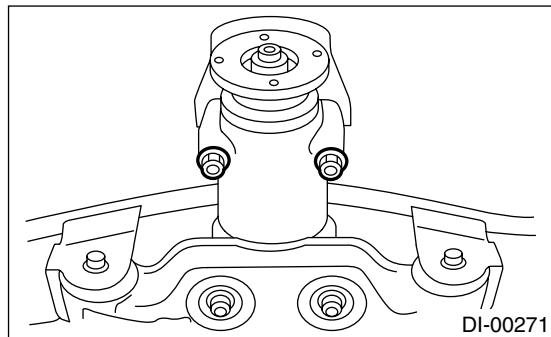
- 6) Jack-up rear wheels and support the vehicle body with sturdy racks.
- 7) Remove rear exhaust pipe and muffler.
- 8) Remove propeller shaft from body. <Ref. to DS-15, REMOVAL, Propeller Shaft.>

- 9) Remove self-locking nut while holding companion flange with ST.

ST 498427200 FLANGE WRENCH

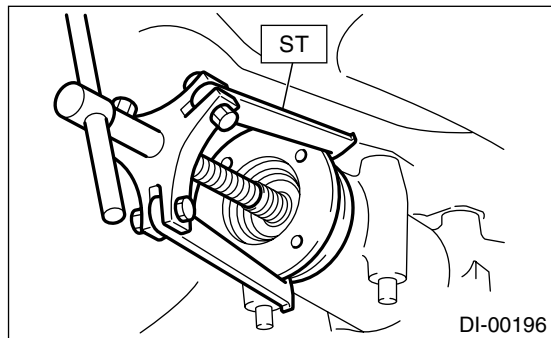


- 10) Remove protector nuts.



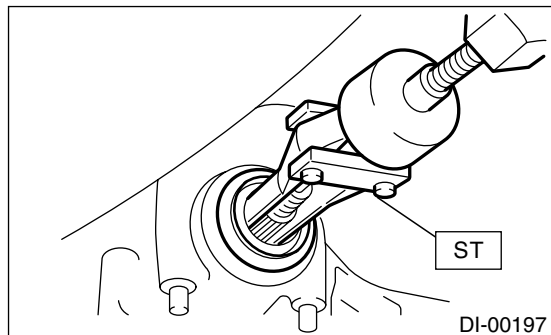
- 11) Extract companion flange using ST.

ST 399703600 PULLER ASSY



- 12) Remove oil seal using ST.

ST 398527700 PULLER ASSY

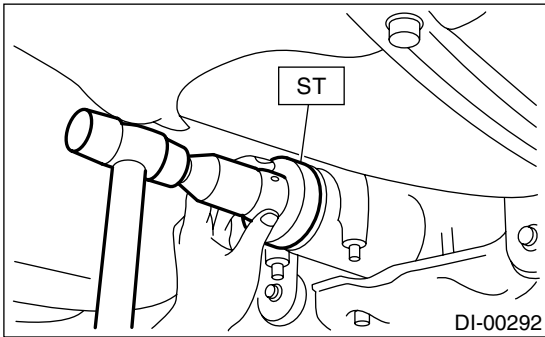


REAR DIFFERENTIAL FRONT OIL SEAL

DIFFERENTIALS

13) Fit a new oil seal using ST.

ST 498447120 OIL SEAL INSTALLER



14) Install companion flange.

NOTE:

Use a plastic hammer to install companion flange.

15) Tighten new self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.

ST 498427200 FLANGE WRENCH

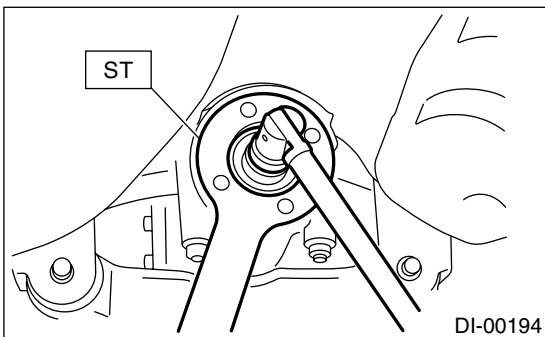
Tightening torque:

T-type

181 N·m (18.5 kgf-m, 134 ft-lb)

VA-type

191 N·m (19.5 kgf-m, 141 ft-lb)

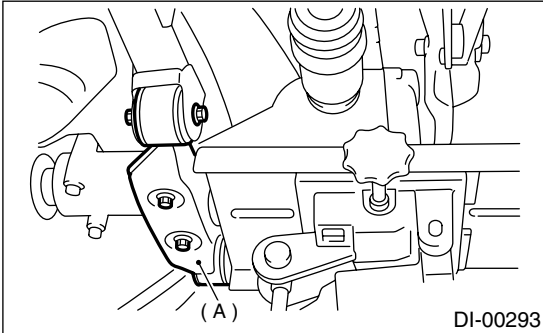


16) Reassembling procedure hereafter is the reverse of the disassembling.

7. Rear Differential Front Member

A: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Jack-up the vehicle.
- 3) Using a transmission jack, support rear differential, and remove rear differential front member.



(A) Rear differential front member

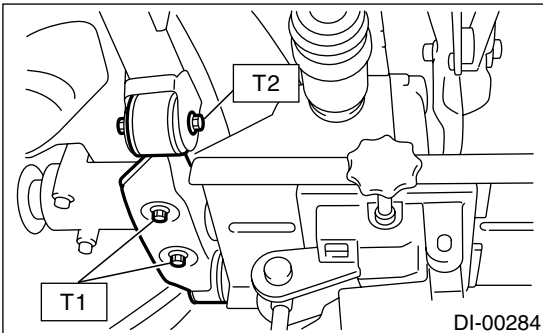
B: INSTALLATION

- 1) Install rear differential front member.

Tightening torque:

T1: 65 N·m (6.6 kgf·m, 48 ft·lb)

T2: 110 N·m (11.2 kgf·m, 81 ft·lb)



C: INSPECTION

- 1) Check rear differential front member for damage, bend, or corrosion.
If damage, bend, or corrosion is excessive, replace rear differential front member.
- 2) Check bushings of rear differential front member for cracking, hardening, or damage.
If cracking, hardening, or damage is excessive, replace rear differential front member.

GENERAL DIAGNOSTIC TABLE

DIFFERENTIALS

8. General Diagnostic Table

A: INSPECTION

Symptom or trouble	Possible cause	Remedy
1. Oil leakage	Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
	Clogged or damaged air breather.	Clean, repair or replace.
	Loose bolts on side retainer, or incorrectly fitted O-ring.	Tighten bolts to specified torque. Replace O-ring.
	Loose rear cover attaching bolts or damaged gasket.	Tighten bolts to specified torque. Replace gasket and apply liquid packing.
	Loose oil filler or drain plug.	Retighten and apply liquid packing.
	Wear, damage or incorrectly fitting for side retainer and oil seal.	Repair or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	Insufficient backlash for hypoid gear.	Readjust or replace.
	Excessive preload for side, rear, or front bearing.	Readjust or replace.
	Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	Improper backlash for hypoid gear.	Replace.
	Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
	Excessive backlash for differential gear.	Replace gear or thrust washer.
	Loose bolts and nuts such as crown gear bolt.	Retighten.
	Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	Excessive backlash for hypoid gear.	Readjust.
	Excessive backlash for differential gear.	Replace gear or thrust washer.
	Insufficient preload for front or rear bearing.	Readjust.
	Loose drive pinion nut.	Tighten to specified torque.
	Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	Damaged differential gear.	Replace.
	Excessive wear or damage of thrust washer.	Replace.
	Broken pinion mate shaft.	Replace.
	Seized or damaged side bearing.	Replace.
6. Gear noises NOTE: Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
	Improper backlash for hypoid gear.	Readjust.
	Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	Seized hypoid gear.	Replace hypoid gear set.
	Improper preload for front or rear bearings.	Readjust.
	Seized, scored, or chipped front or rear bearing.	Replace.
	Seized, scored, or chipped side bearing.	Replace.
	Vibrating differential carrier.	Replace.