

**CHASSIS SECTION**

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

<b>FRONT SUSPENSION</b>	<b>FS</b>
<b>REAR SUSPENSION</b>	<b>RS</b>
<b>WHEEL AND TIRE SYSTEM</b>	<b>WT</b>
<b>DIFFERENTIALS</b>	<b>DI</b>
<b>TRANSFER CASE</b>	<b>TC</b>
<b>DRIVE SHAFT SYSTEM</b>	<b>DS</b>
<b>ABS</b>	<b>ABS</b>
<b>ABS (DIAGNOSTICS)</b>	<b>ABS(diag)</b>
<b>BRAKE</b>	<b>BR</b>
<b>PARKING BRAKE</b>	<b>PB</b>
<b>POWER ASSISTED SYSTEM (POWER STEERING)</b>	<b>PS</b>

# DIFFERENTIALS

*DI*

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# Rear Differential for VA-type

## DIFFERENTIALS

### 5. Rear Differential for VA-type

#### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Move the select lever or gear shift lever to "N".
- 4) Release the parking brake.
- 5) Loosen the wheel nuts.
- 6) Lift-up the vehicle.
- 7) Remove the wheels.
- 8) Remove the rear exhaust pipe and muffler.

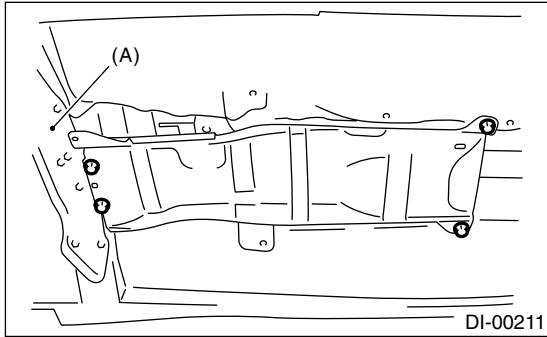
Non-turbo model without OBD

<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>

Non-turbo model with OBD

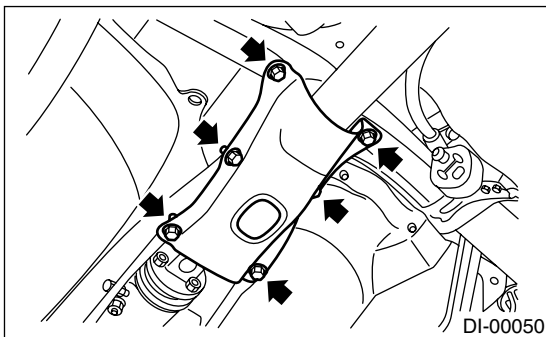
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

- 9) Remove the heat shield cover.



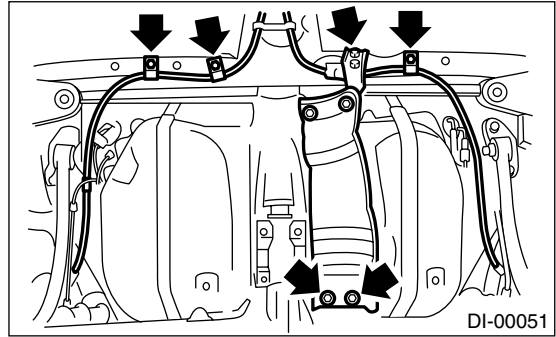
(A) Transmission mounting

- 10) Remove the front cover of rear differential mount.

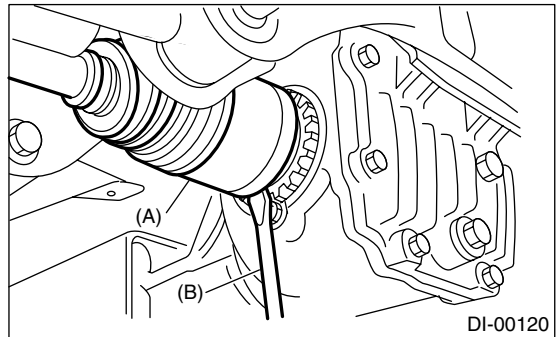


- 11) Remove the propeller shaft. <Ref. to DS-16, REMOVAL, Propeller Shaft.>

- 12) Remove the clamps and bracket of parking brake cable.

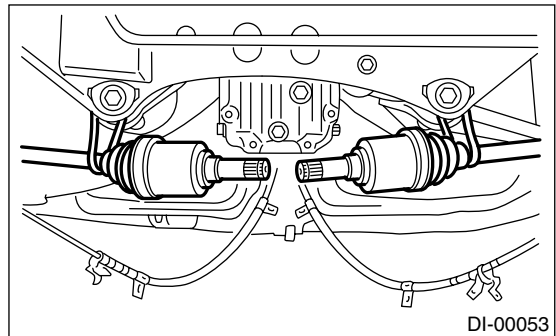


- 13) Remove the DOJ of rear drive shaft from rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

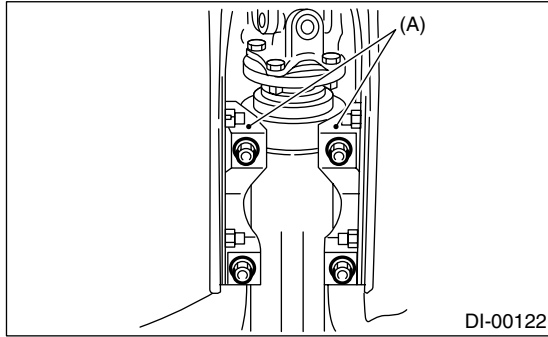


(A) DOJ  
(B) Tire lever

- 14) Secure the rear drive shaft to rear crossmember using wire.

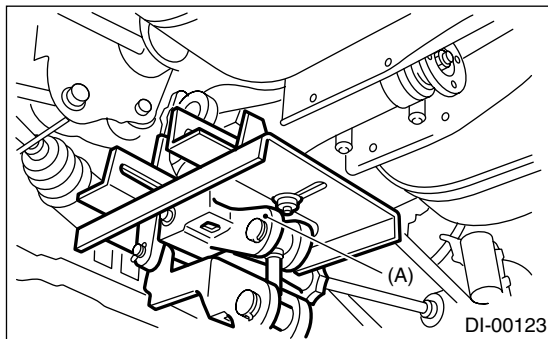


15) Remove the lower bracket.



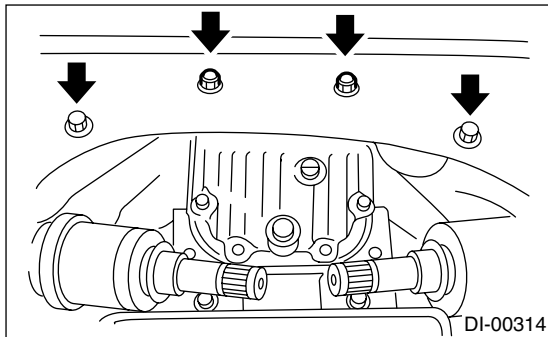
(A) Lower bracket

16) Support the rear differential with transmission jack.



(A) Transmission jack

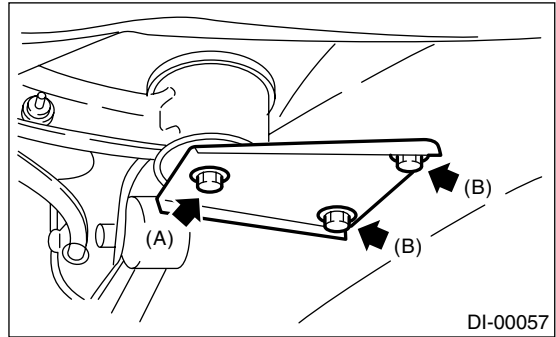
17) Remove the self-locking nuts and bolts.



18) Remove the bolts which secure the rear differential front member to bolts B.

NOTE:

Support the front member with use of a helper to prevent it from dropping.

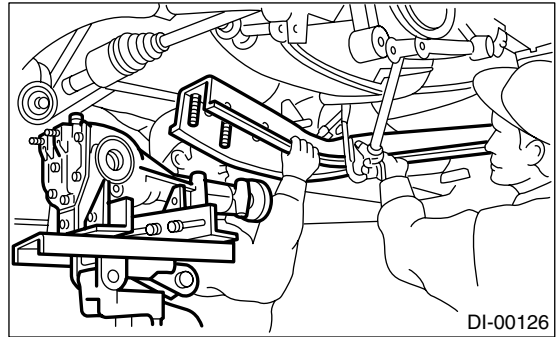


(A) Bolt A  
(B) Bolt B

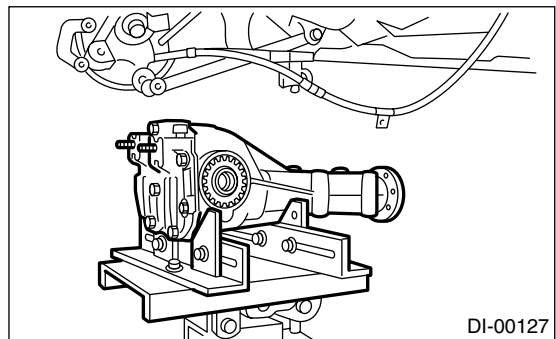
19) Remove the bolt A.

20) While slowly lowering the transmission jack, move the rear differential forward, and then remove the bolts from rear crossmember.

21) Remove the front member from vehicle.



22) Remove the rear differential from vehicle.



## B: INSTALLATION

Install in the reverse order of removal.

1) Position the front member on body by passing it under the parking brake cable and securing to rear differential.

NOTE:

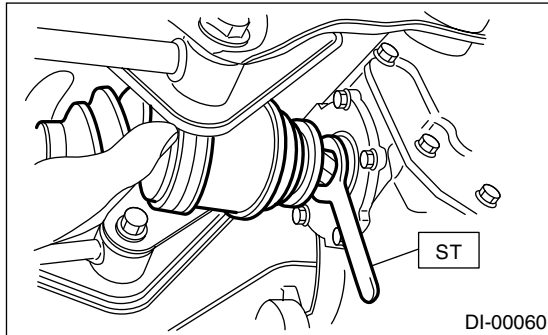
When installing the rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

# Rear Differential for VA-type

## DIFFERENTIALS

2) Install the DOJ of rear drive shaft into rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

ST 28099PA090 SIDE OIL SEAL PROTECTOR



3) Install in the reverse order of removal.

4) After installation, fill the differential carrier with gear oil to the upper plug level. <Ref. to DI-27, Front Differential.>

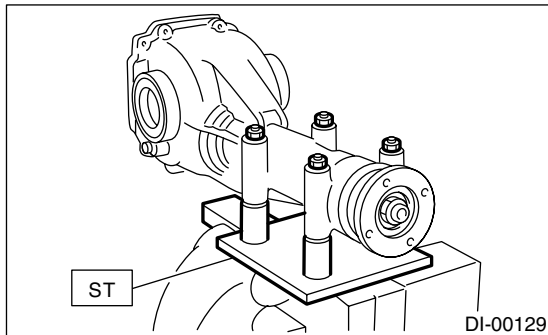
### C: DISASSEMBLY

To detect the 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
- Total preload of drive pinion

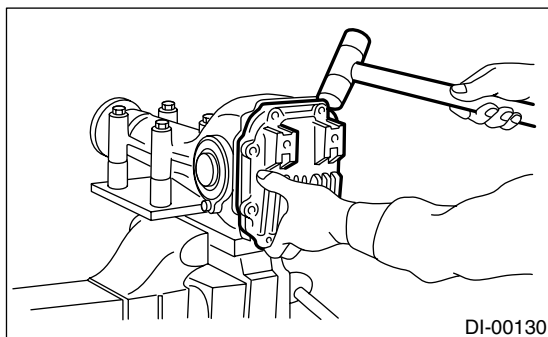
1) Set the ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT



2) Drain the gear oil by removing the plug.

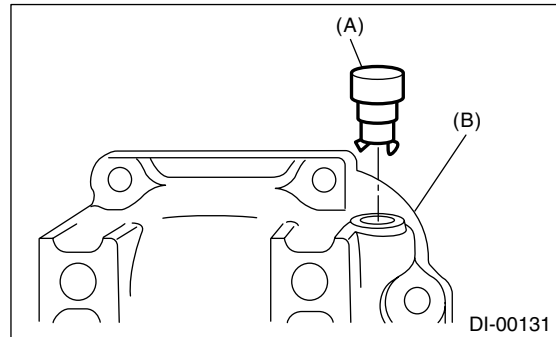
3) Remove the rear cover by loosening the retaining bolts.



4) Replace the air breather cap.

NOTE:

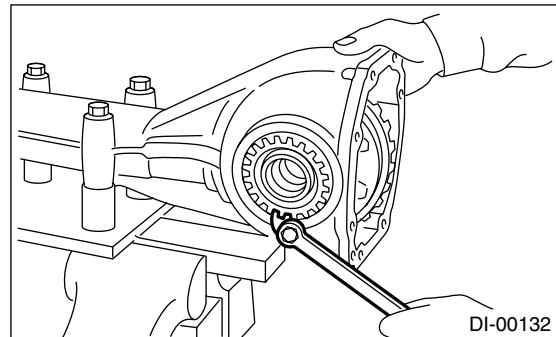
Do not attempt to replace the air breather cap unless necessary.



(A) Air breather cap

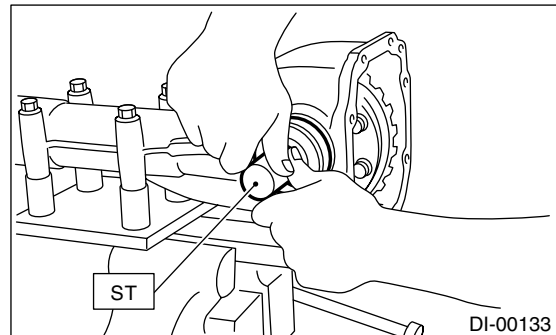
(B) Rear cover

5) Remove the right and left lock plates.



6) Remove the right and left holders with ST.

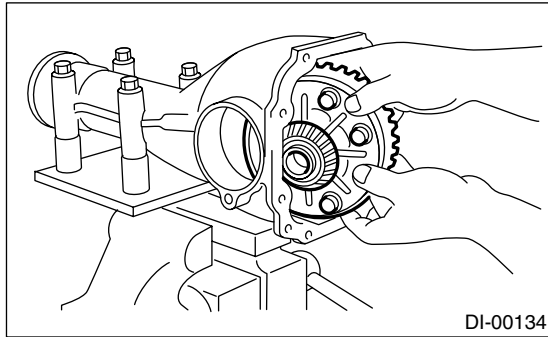
ST 499785500 WRENCH



7) Pull out the differential assembly from differential case.

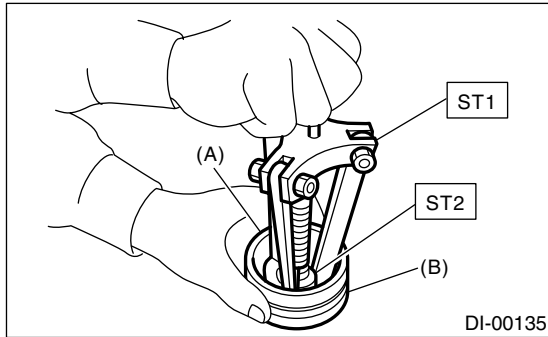
**NOTE:**

Be careful not to hit the teeth against the case.



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

ST1 499705401 PULLER ASSY  
ST2 499705404 SEAT

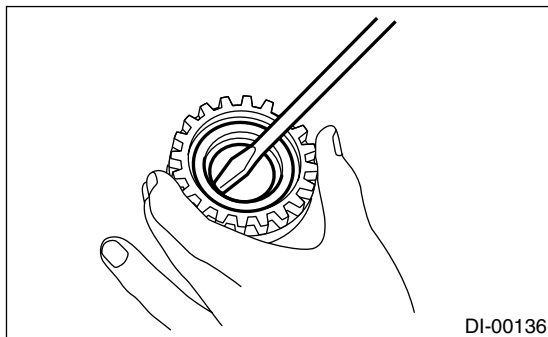


- (A) Bearing race
- (B) Holder

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

**NOTE:**

Perform this operation only when changing oil seal.

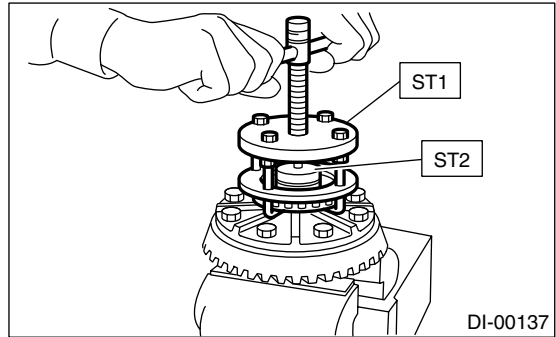


10) Extract the bearing cone with ST1 and ST2.

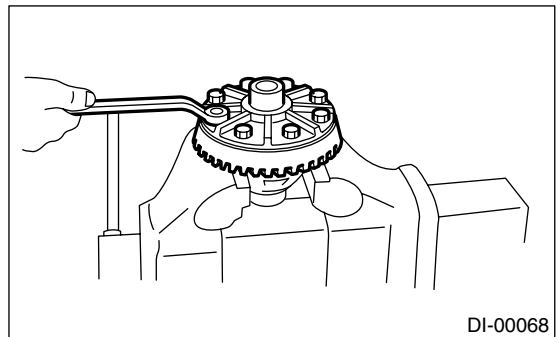
**NOTE:**

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

ST1 899524100 PULLER SET  
ST2 399520105 SEAT



11) Remove the crown gear by loosening the crown gear bolts.

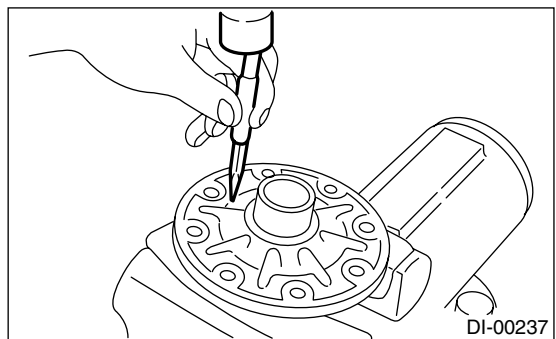


12) Drive out the pinion shaft lock pin from crown gear side.

**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



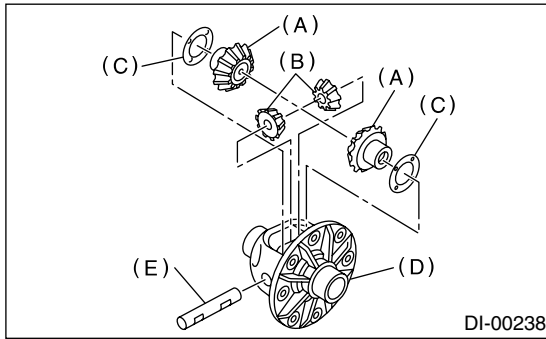
13) Draw out the pinion mate shaft and remove the pinion mate gears, side gears and thrust washers.

# Rear Differential for VA-type

## DIFFERENTIALS

**NOTE:**

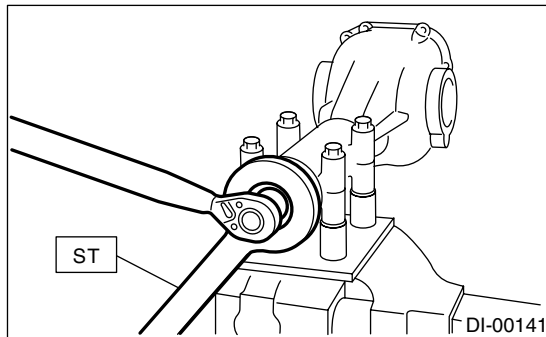
The gears as well as thrust washers should be marked or kept separated right and left, front and rear.



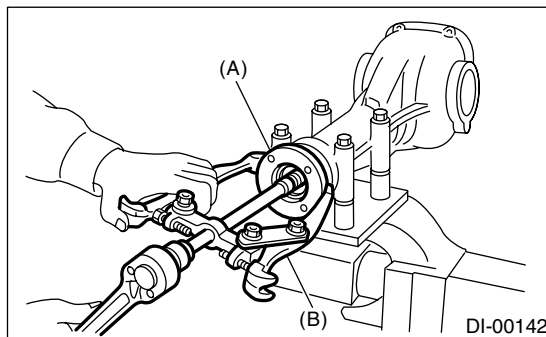
- (A) Side gear
- (B) Pinion mate gear
- (C) Thrust washer
- (D) Differential case
- (E) Pinion mate shaft

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

ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.



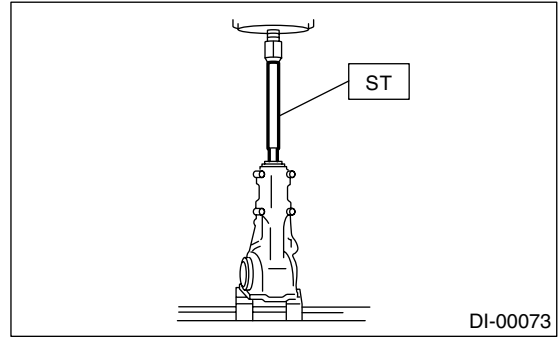
- (A) Companion flange
- (B) Puller

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

**NOTE:**

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

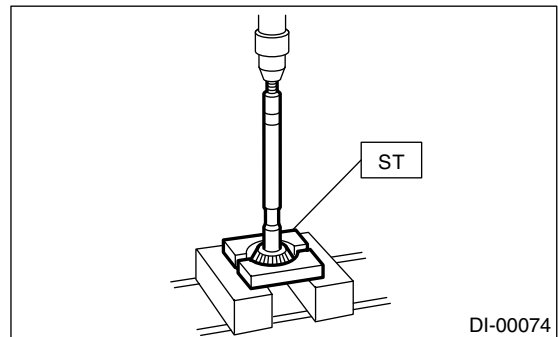


17) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

**NOTE:**

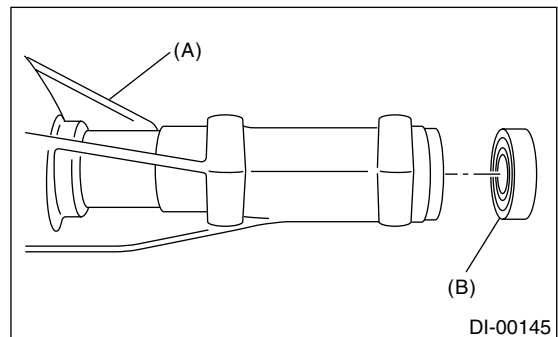
Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER



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

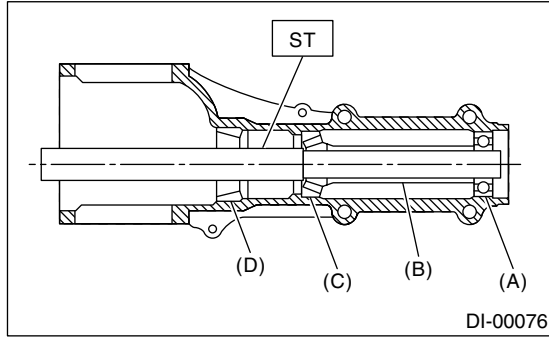
ST 398527700 PULLER SET



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

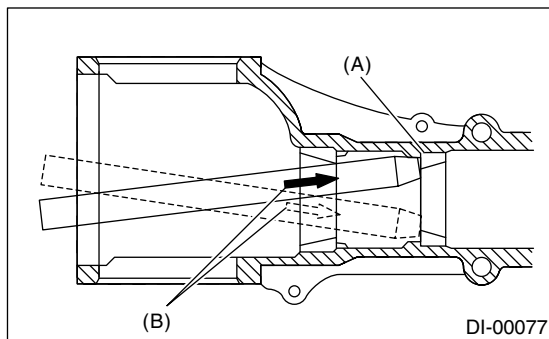
19) Remove the pilot bearing together with front bearing cone and spacer using ST.

ST 398467700 DRIFT



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

20) When replacing the bearings, tap the 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.

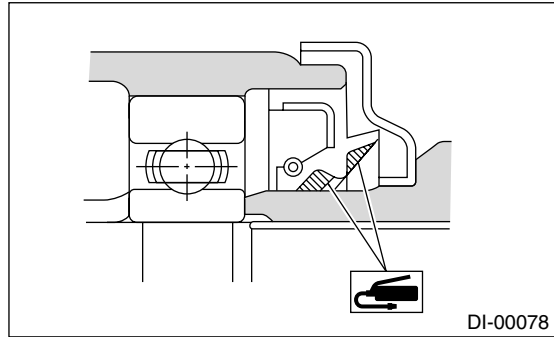
## D: ASSEMBLY

### NOTE:

#### Precautions for assembling

- 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 improperly installed.
- 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 a new one at every dis-assembly. Apply chassis grease between the lips when installing the oil seal.



1) Adjust the 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 the rear bearing race into differential carrier using ST1 and ST2.

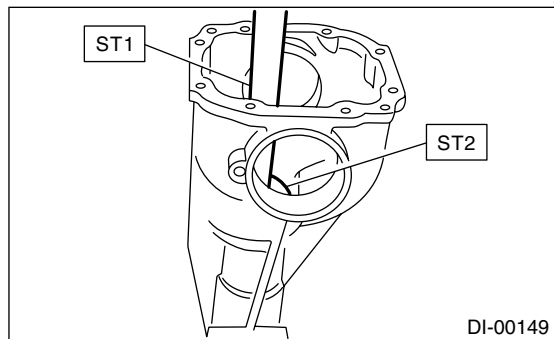
ST1 398477701 HANDLE

ST2 398477702 DRIFT

(2) Press the rear bearing race into differential carrier using ST1 and ST2.

ST1 398477701 HANDLE

ST2 498447110 DRIFT



(3) Install the front bearing race to differential carrier using ST1 and ST2.

ST1 398477701 HANDLE

ST2 398447110 DRIFT

(4) Insert the front bearing cone.

### NOTE:

Use a new front bearing cone.

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

### NOTE:

- Re-use the used washer if not deformed.
- Use a new rear bearing cone.

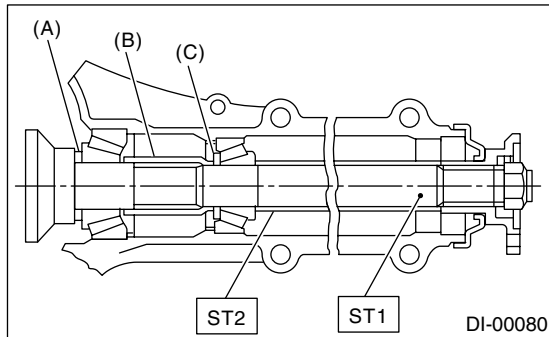


# Rear Differential for VA-type

## DIFFERENTIALS

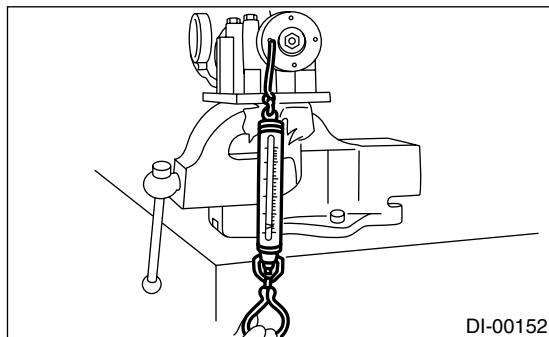
(6) Then install the preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and self-locking nut.

ST1 498447150 DUMMY SHAFT  
ST2 32285AA000 DUMMY COLLAR



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

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



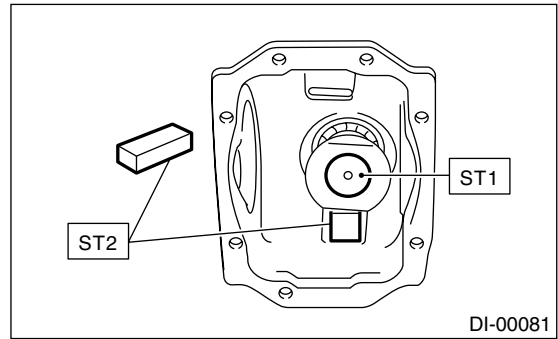
**NOTE:**

- Use a new self-locking nut.
- Measure the preload in direction of tangent to flange.
- Be careful not to give excessive preload.
- When tightening the self locking nut, lock ST1 with ST2 as shown in the figure.

ST1 498447150 DUMMY SHAFT  
ST2 398507704 BLOCK

**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

	Part No.	Thickness mm (in)
Preload adjusting washer	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 the drive pinion height with shim installed between the rear bearing cone and back of pinion gear.

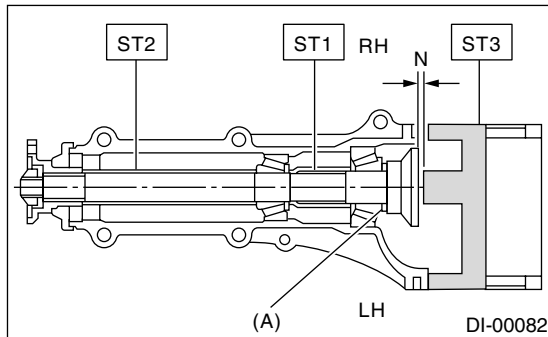
(1) Install the ST3.

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

### NOTE:

At this time, install the pinion height adjusting shim which is temporarily selected or same as that used before.

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



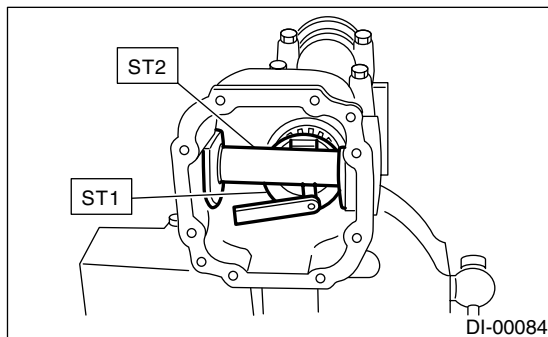
(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST3 and 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 shim 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<sub>o</sub> = Thickness of shim originally installed (mm)

N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(Example of calculation)

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

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

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

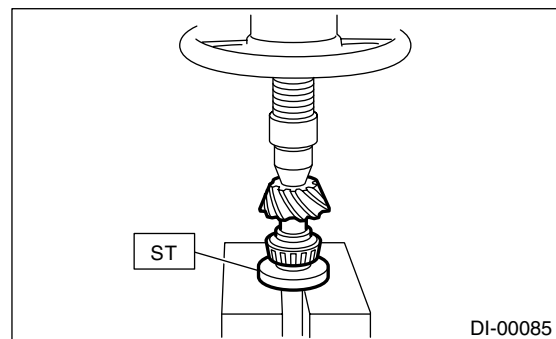
Result: Thickness = 0.2 mm

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.

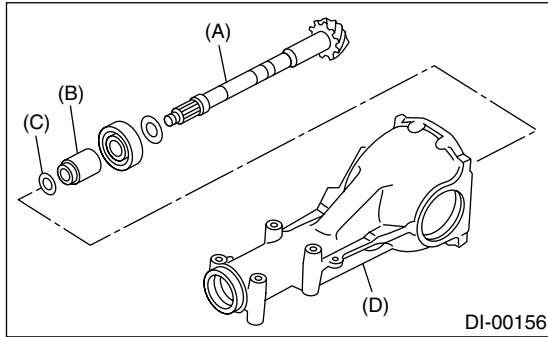
ST 498175500 INSTALLER



## Rear Differential for VA-type

### DIFFERENTIALS

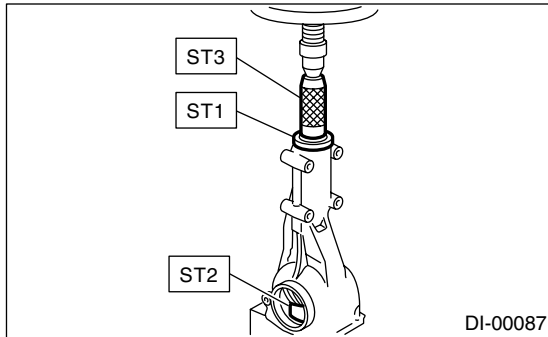
4) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



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

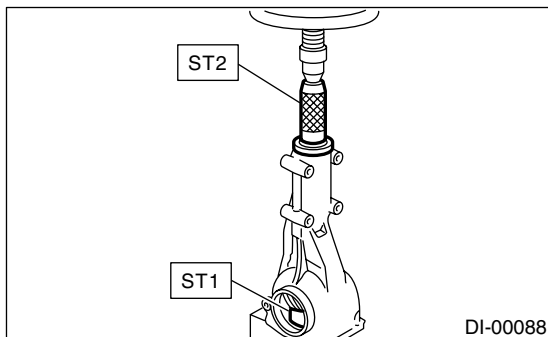
5) Press-fit the front bearing cone into carrier with ST1, ST2 and ST3.

ST1 32285AA000 DUMMY COLLAR  
ST2 399780104 WEIGHT  
ST3 899580100 INSTALLER



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

ST1 399780104 WEIGHT  
ST2 899580100 INSTALLER



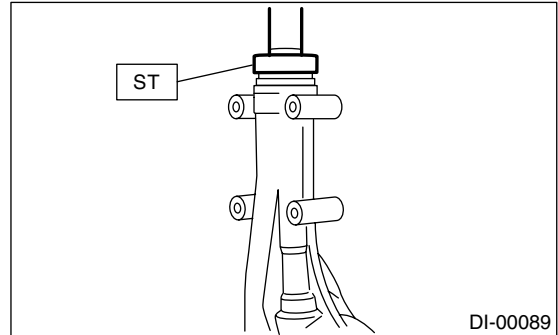
7) Fit a new oil seal with ST.

#### NOTE:

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

- Apply grease between the oil seal lips.

ST 498447120 INSTALLER

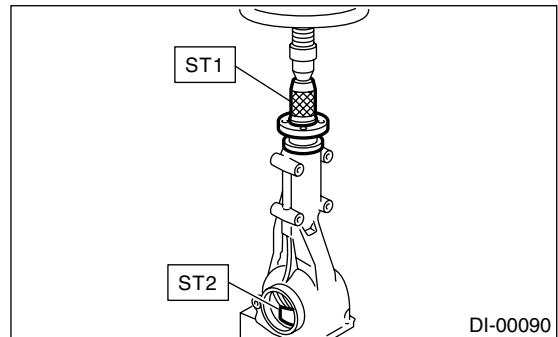


8) Press-fit the companion flange with ST1 and ST2.

#### NOTE:

Be careful not to damage the bearing.

ST1 899874100 INSTALLER  
ST2 399780104 WEIGHT

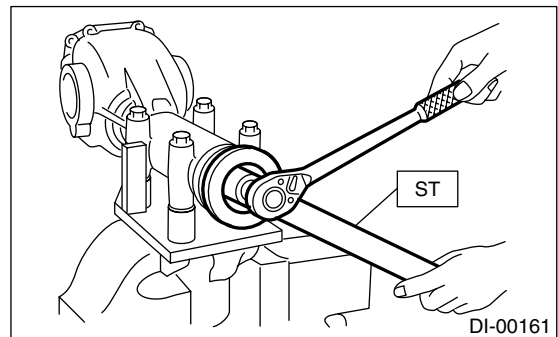


9) Install the self-locking nut. Then tighten it with the ST.

ST 498427200 FLANGE WRENCH

#### Tightening torque:

**191 N·m (19.5 kgf·m, 141 ft·lb)**



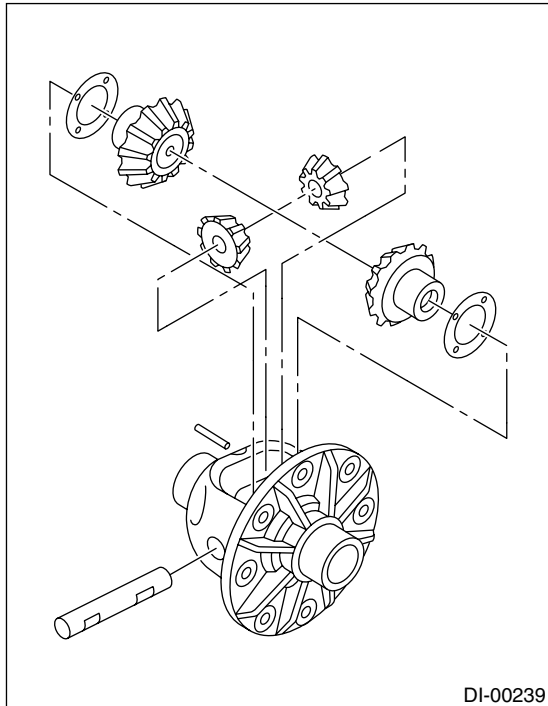
10) Assembling differential case

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

#### NOTE:

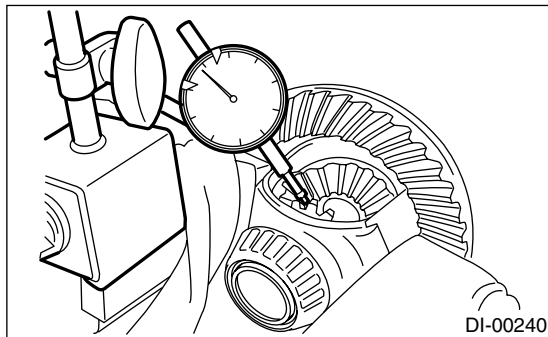
- Apply gear oil on both sides of the washer and on the side gear shaft before installing.

- Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the side gear backlash.

**Side gear backlash:**  
**0.05 — 0.15 mm (0.0020 — 0.0059 in)**



(2) Adjust the side gear backlash as specified by selecting the 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 the pinion shaft lock pin, stake both sides of the hole to prevent pin from falling off.

11) Install the crown gear on differential case.

NOTE:

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

**Lock Tite:**

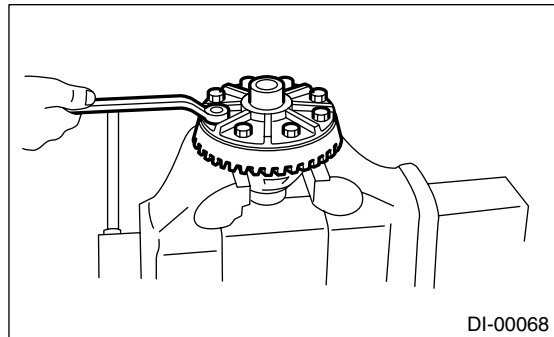
**THREE BOND 1324 (Part No. 004403042) or equivalent**

NOTE:

Tighten diagonally while tapping the bolt heads.

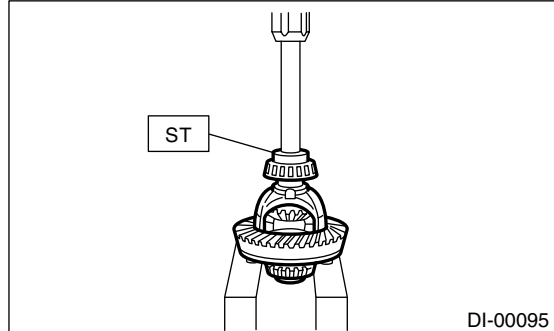
**Tightening torque:**

**62 N·m (6.3 kgf-m, 45.6 ft-lb)**



12) Press the side bearing cone onto differential case with ST.

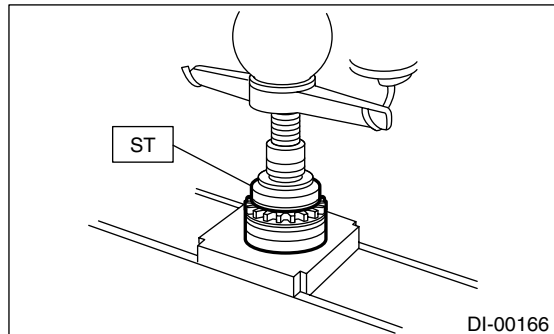
ST 498485400 DRIFT



13) Assemble holders.

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

ST 498447100 INSTALLER



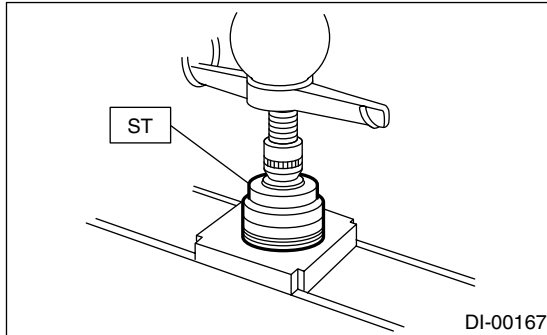
(2) Install the bearing race into right and left holders.

# Rear Differential for VA-type

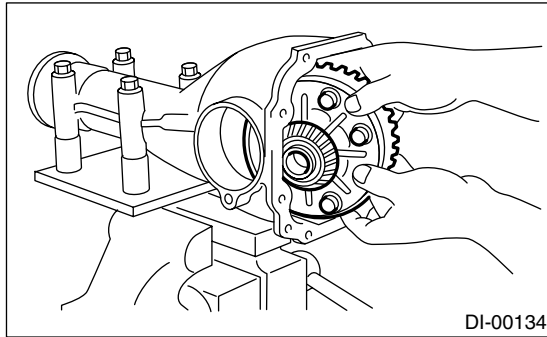
## DIFFERENTIALS

ST 398477702 BEARING OUTER RACE  
DRIFT

**CAUTION:**  
Make sure that the oil seal, bearing outer race  
and cone are properly assembled.



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

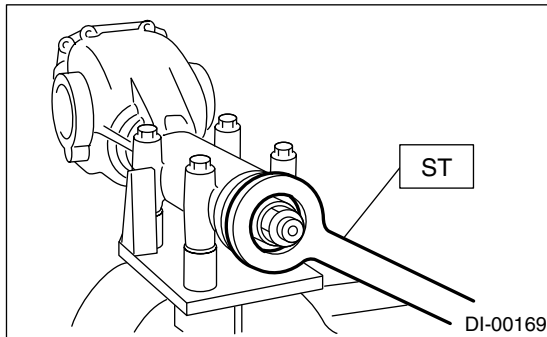


(4) Temporarily tighten the side holder RH and LH in differential carrier, to install.

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

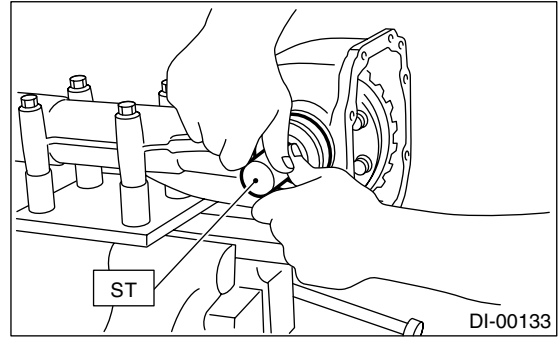
(1) Turn the drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



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

ST 499785500 WRENCH



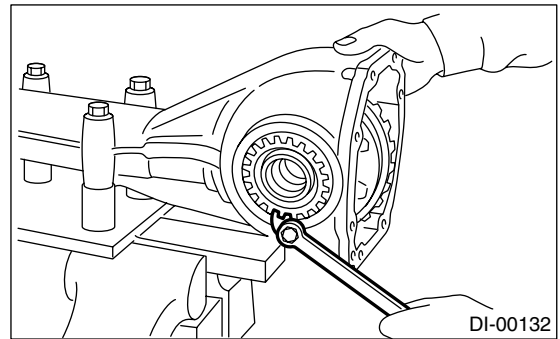
(3) Back off the side (left-side) holder approx. 1 1/2 teeth of holder, and tighten the left-side holder by approx. 2 teeth (approx. 1 1/2 + 1/2 teeth). [Back off amount of side (left-side) holder + 1/2 tooth.]

This + 1/2 tooth gives preload.

(4) Temporarily tighten the lock plate.

**NOTE:**

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



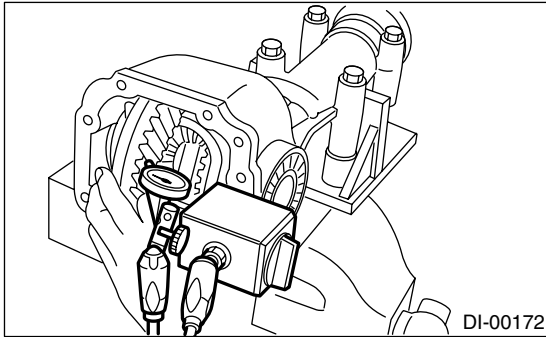
(5) Measure the crown gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of crown gear, and move the crown gear while holding drive pinion still. Read the value indicated on dial gauge.

**NOTE:**

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

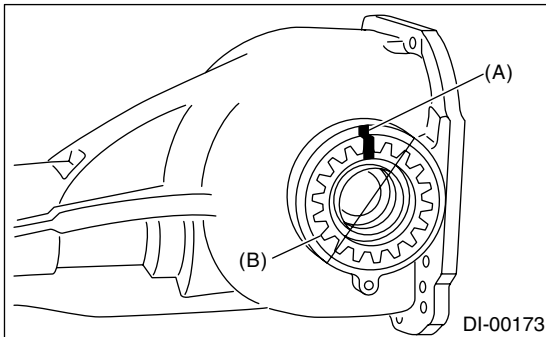
**Backlash:**

**0.10 — 0.15 mm (0.0039 — 0.0059 in)**



15) Draw a matching mark on both differential carrier and holder. Remove the holder one side at a time.

Replace in the original position after inserting an O-ring and applying grease to threaded portion.

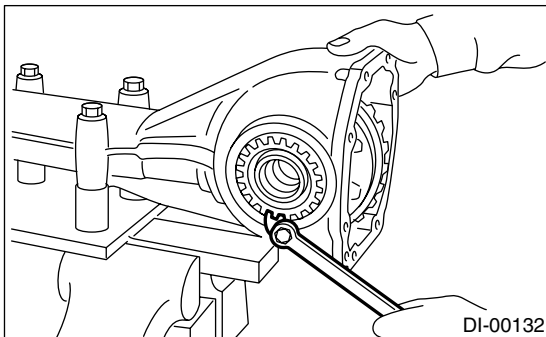


- (A) Matching mark
- (B) Holder

16) Tighten the bolt of lock plate to specified torque.

**Tightening torque:**

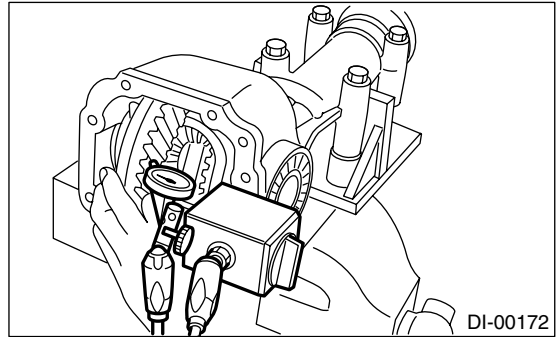
**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



17) Re-check the crown gear-to-pinion backlash.

**Backlash:**

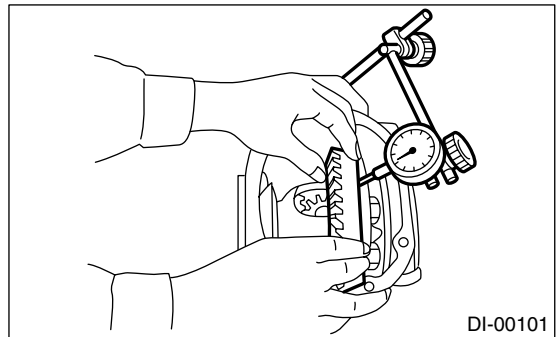
**0.10 — 0.15 mm (0.0039 — 0.0059 in)**



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

**Limit of runout:**

**0.05 mm (0.0020 in)**



19) 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 the 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:**

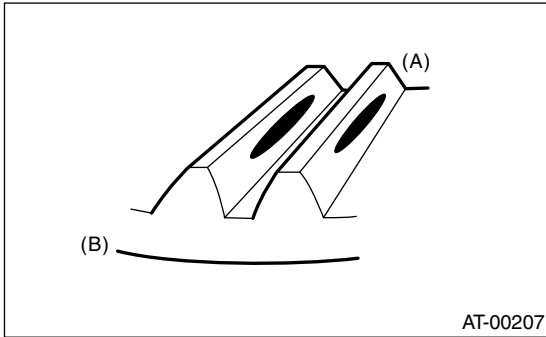
Be sure to wipe off red lead completely after adjustment is completed.

# Rear Differential for VA-type

## DIFFERENTIALS

- Correct tooth contact

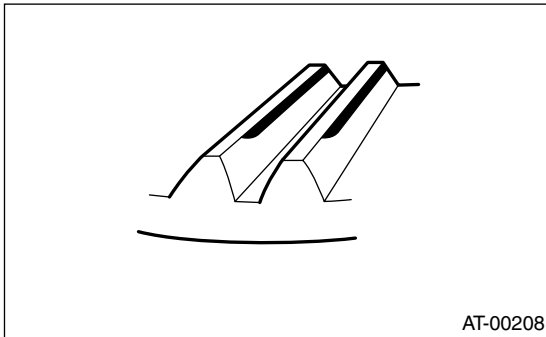
**Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)**



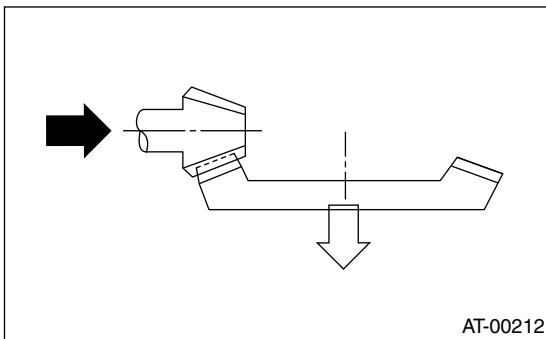
- (A) Toe side
- (B) Heel side

- Face contact

**Checking item: Backlash is too large.**  
Contact pattern

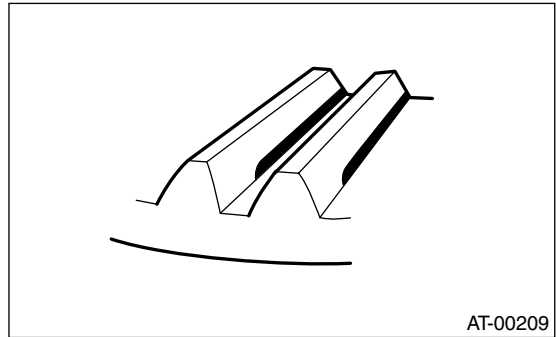


**Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.**

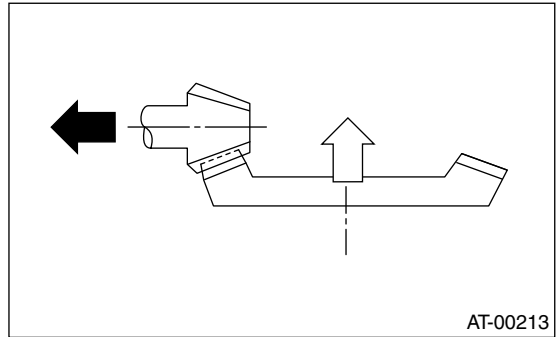


- Flank contact

**Checking item: Backlash is too small.**  
Contact pattern

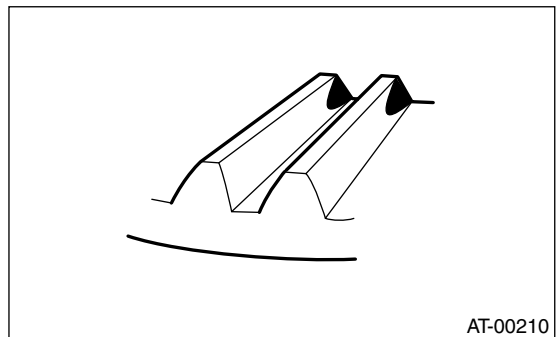


**Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.**

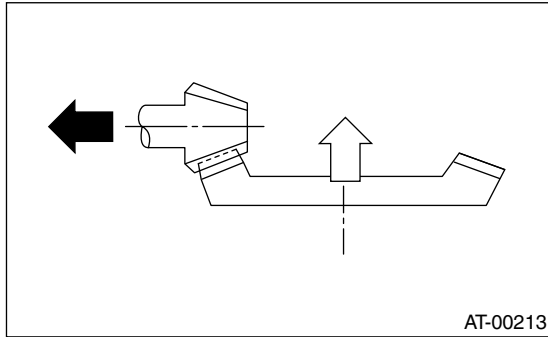


- Toe contact (Inside end contact)

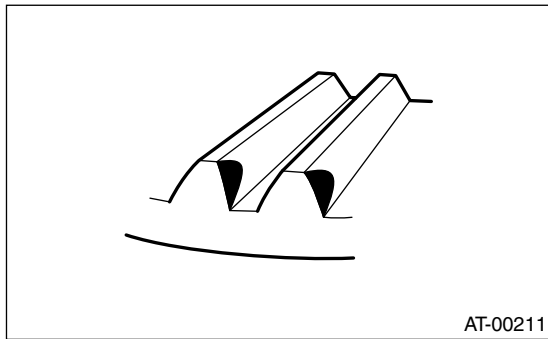
**Checking item: Contact area is small.**  
Contact pattern



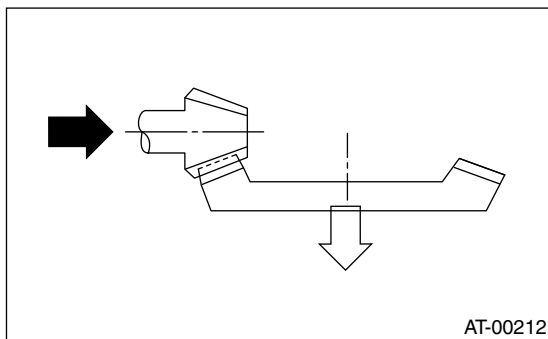
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



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

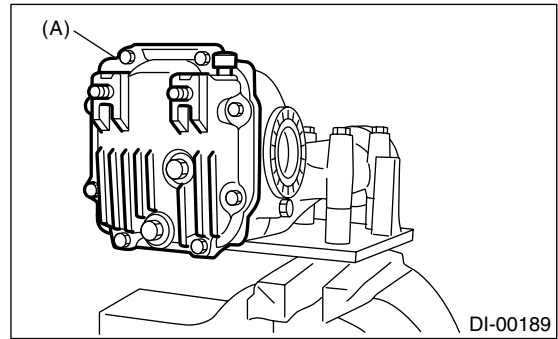


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



- 20) 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.
- 21) Install the rear cover and tighten the 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.



# Rear Differential for VA-type

## DIFFERENTIALS

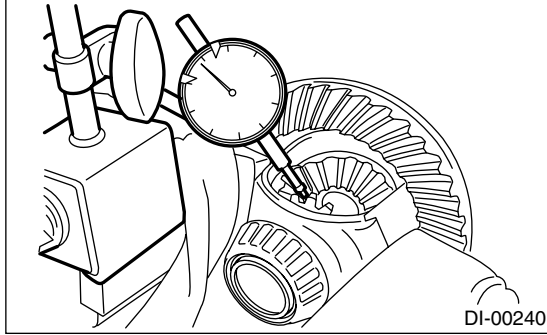
### 1. SIDE GEAR BACKLASH

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



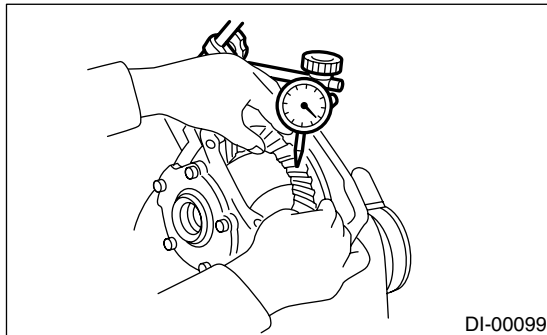
### 2. CROWN GEAR BACKLASH

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



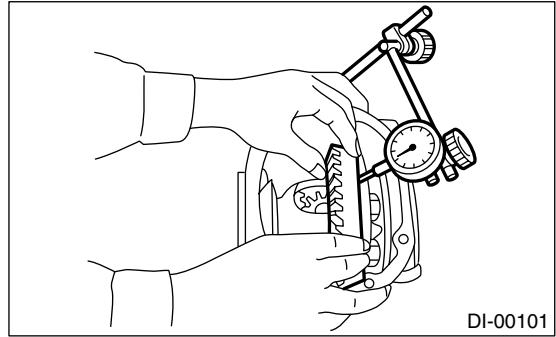
### 3. CROWN GEAR RUNOUT

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 the tooth contact between crown gear and drive pinion.

<Ref. to DI-59, ASSEMBLY, Rear Differential for VA-type.>

### F: ADJUSTMENT

#### 1. SIDE GEAR BACKLASH

Adjust the side gear backlash.

<Ref. to DI-59, ASSEMBLY, Rear Differential for VA-type.>

#### 2. CROWN GEAR BACKLASH

Adjust the crown gear backlash.

<Ref. to DI-59, ASSEMBLY, Rear Differential for VA-type.>

#### 3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION

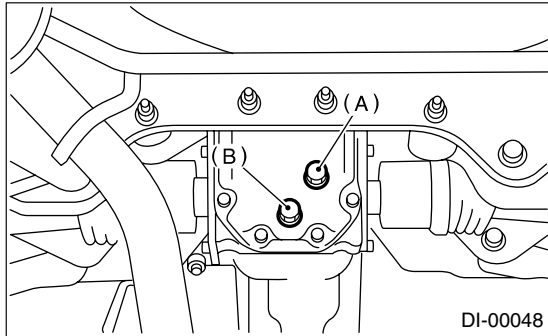
Adjust the tooth contact between crown gear and drive pinion gear.

<Ref. to DI-59, ASSEMBLY, Rear Differential for VA-type.>

## 6. Rear Differential Front Oil Seal

### A: REPLACEMENT

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



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

- 5) Install the oil drain plug.

**NOTE:**

- Apply liquid gasket to the drain plug for T-type.

**Liquid gasket:**

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

- Use a new aluminum gasket for VA-type.

**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)**

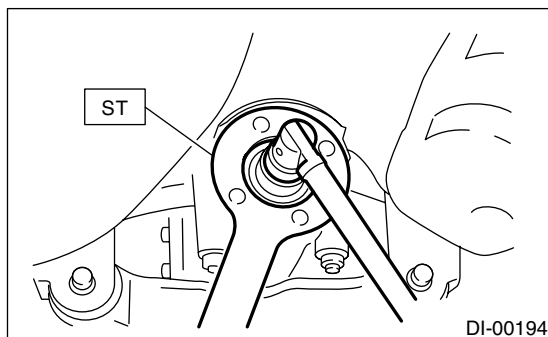
- 6) Jack-up the vehicle and support with sturdy racks.

- 7) Remove the rear exhaust pipe and muffler.

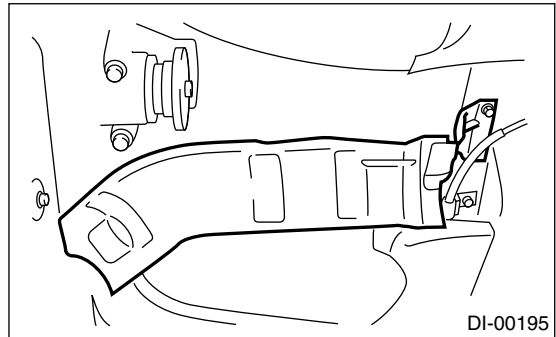
- 8) Remove the propeller shaft from body. <Ref. to DS-16, REMOVAL, Propeller Shaft.>

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

ST 498427200 FLANGE WRENCH

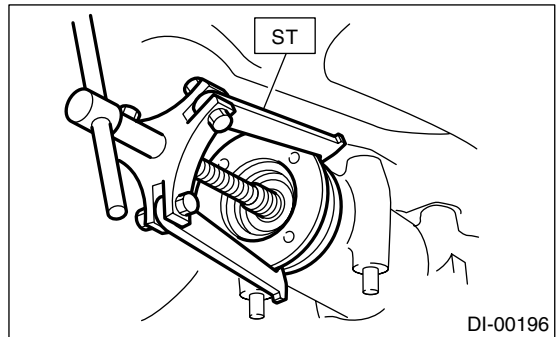


- 10) Remove the tank cover.



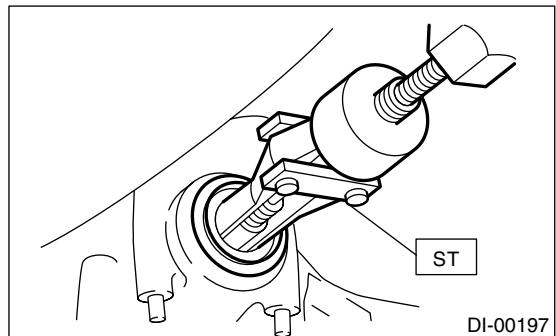
- 11) Extract the companion flange using ST.

ST 399703600 PULLER ASSY



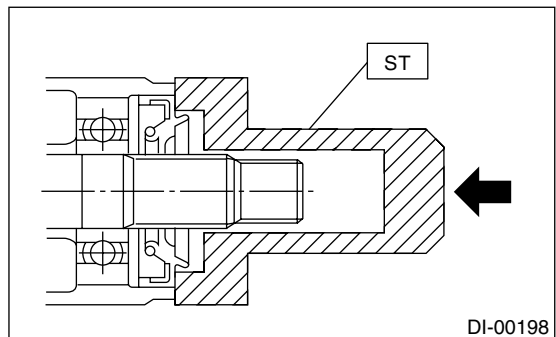
- 12) Remove the oil seal using ST.

ST 398527700 PULLER ASSY



- 13) Fit a new oil seal using ST.

ST 498447120 INSTALLER



## Rear Differential Front Oil Seal

### DIFFERENTIALS

---

14) Install the companion flange.

**NOTE:**

Use a plastic hammer to install the companion flange.

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

ST 498427200 FLANGE WRENCH

**NOTE:**

Use a new self-locking nut.

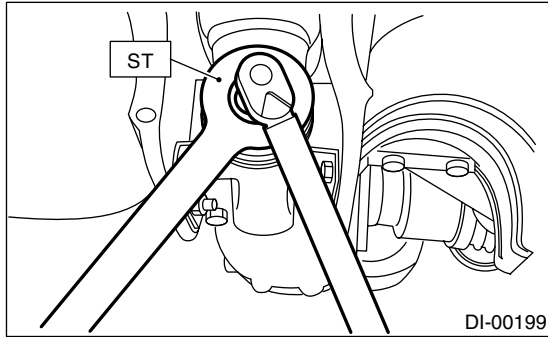
**Tightening torque:**

**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) Hereafter, reassemble in the reverse order of disassembly.

## 7. Rear Differential Side Oil Seal

### A: INSPECTION

Make sure that there is no oil leakage from side oil seal.

If there is any oil leakage, replace the oil seal.

### B: REPLACEMENT

#### 1. T-TYPE

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

Non-turbo model without OBD

<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>

Non-turbo model with OBD

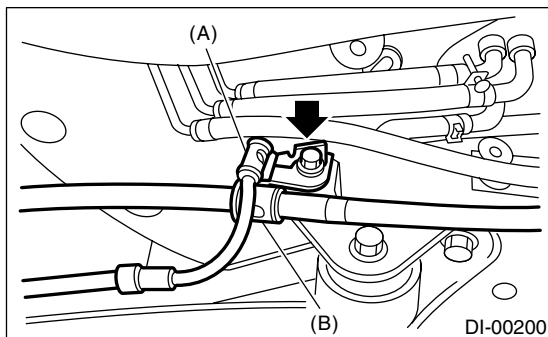
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

Turbo model

<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>

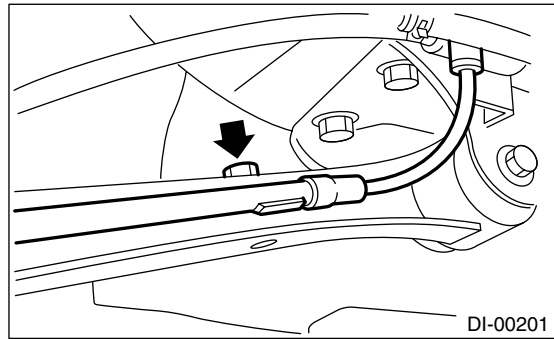
- 8) Remove the DOJ of rear drive shaft from rear differential.

- (1) Remove the ABS wheel speed sensor cable clamp and parking brake cable clamp from bracket.

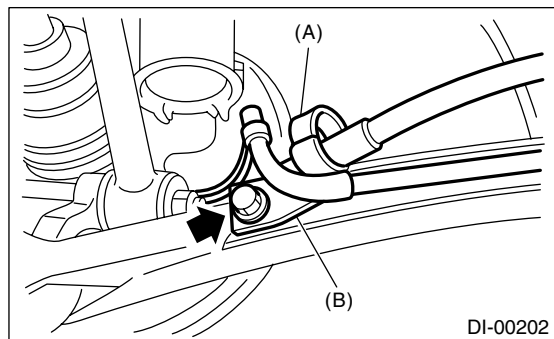


- (A) ABS wheel speed sensor cable clamp
- (B) Parking brake cable clamp

- (2) Remove the ABS wheel speed sensor cable clamp from trailing link.

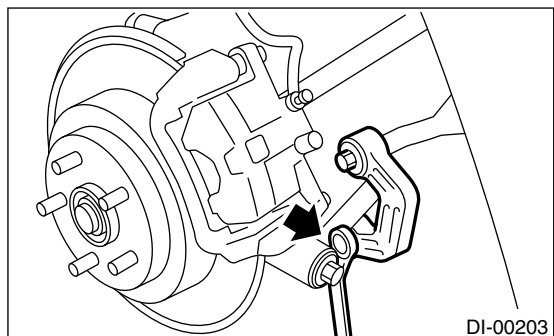


- (3) Remove the ABS wheel speed sensor cable clamp and parking brake cable guide from trailing link.

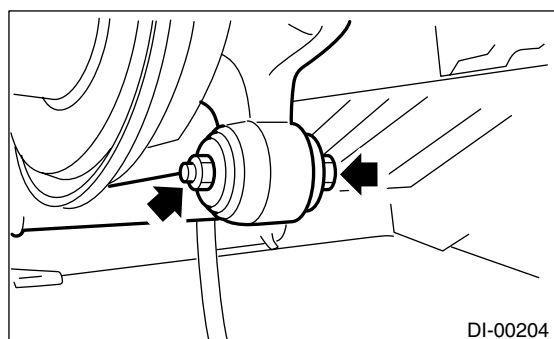


- (A) Parking brake cable guide
- (B) ABS wheel speed sensor cable clamp

- (4) Remove the rear stabilizer link.



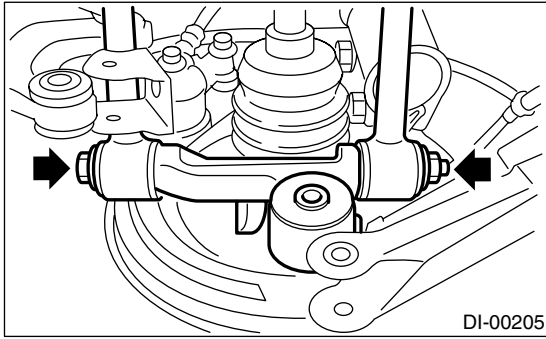
- (5) Remove the bolts which secure trailing link to housing.



# Rear Differential Side Oil Seal

## DIFFERENTIALS

(6) Remove the bolts which secure the front and rear lateral link to rear housing.

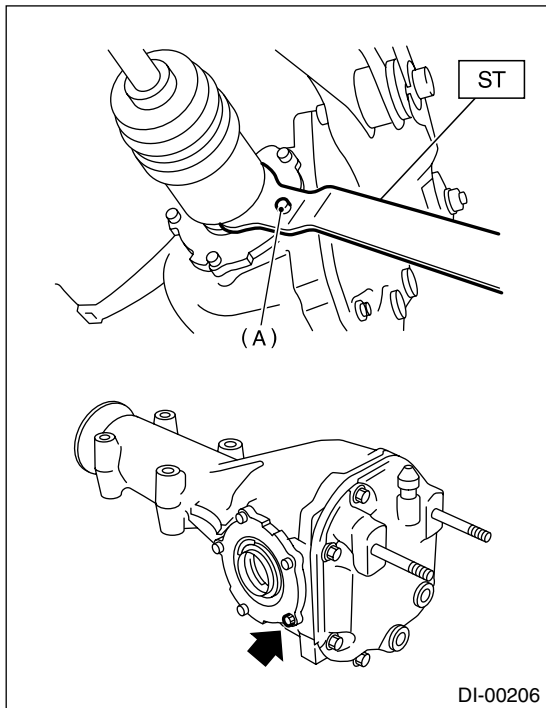


(7) Remove the DOJ from the rear differential by using ST.

### NOTE:

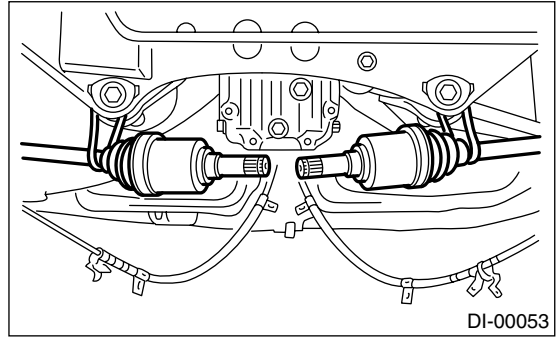
When removing the DOJ from rear differential, fit ST to the bolts as shown in the figure so as not to damage the side bearing retainer.

ST 208099PA100 DRIVE SHAFT REMOVER

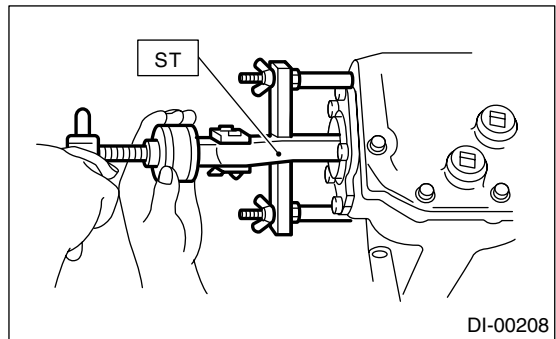


(A) Bolt

9) Suspend the rear drive shaft to the rear cross-member using wire.



10) Remove the oil seal using ST.  
ST 398527700 PULLER ASSY

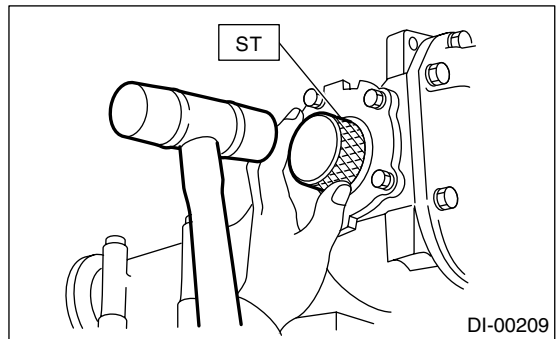


11) Drive in a new side oil seal using ST.

### NOTE:

Apply chassis grease between the oil seal lips.

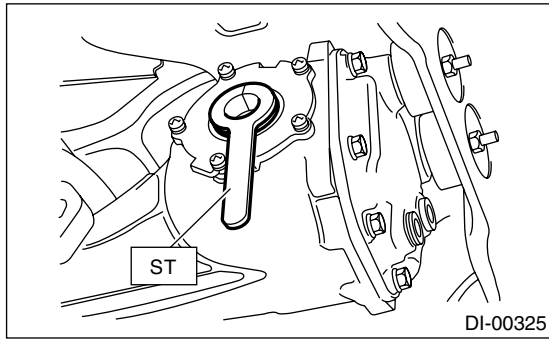
ST 398437700 DRIFT



12) Insert the DOJ into rear differential.

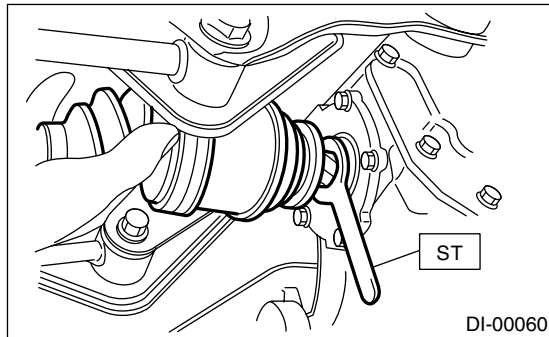
(1) Install the ST to rear differential.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



(2) Install the spline shaft until the spline portion is inside the side oil seal using ST.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



(3) Remove the ST.

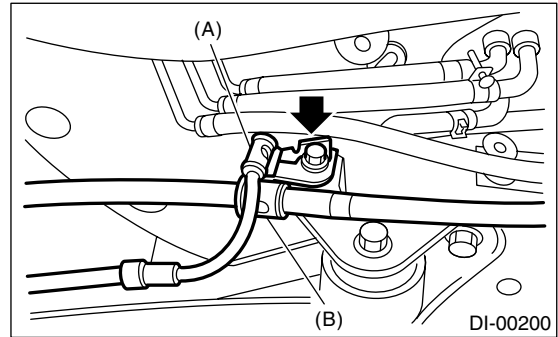
ST 28099PA090 SIDE OIL SEAL PROTECTOR

13) Hereafter, reassemble in the reverse order of disassembly.

## 2. VA-TYPE

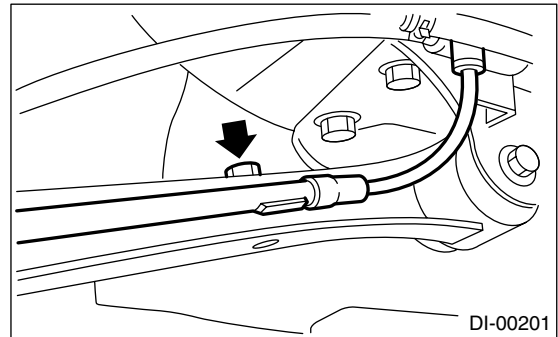
- 1) Disconnect the ground cable from battery.
- 2) Move the select lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen both wheel nuts.
- 5) Jack-up the vehicle and support it with rigid racks.
- 6) Remove the wheels.
- 7) Remove the rear exhaust pipe and muffler.  
 Non-turbo model without OBD  
 <Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>  
 Non-turbo model with OBD  
 <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
- 8) Remove the DOJ of rear drive shaft from rear differential.

(1) Remove the ABS wheel speed sensor cable clamp and parking brake cable clamp from bracket.

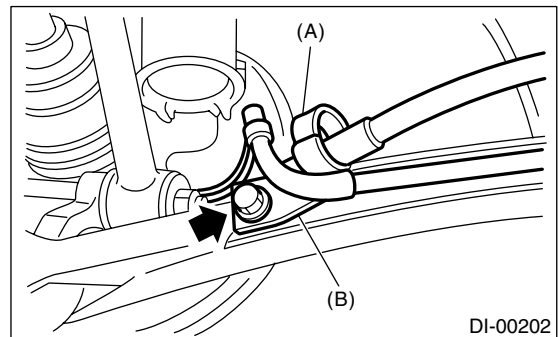


- (A) ABS wheel speed sensor cable clamp
- (B) Parking brake cable clamp

(2) Remove the ABS wheel speed sensor cable clamp from trailing link.



(3) Remove the ABS wheel speed sensor cable clamp and parking brake cable guide from trailing link.

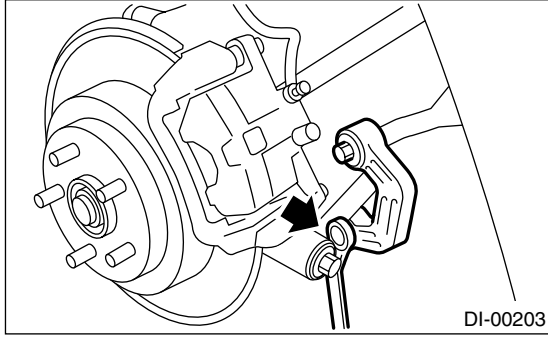


- (A) Parking brake cable guide
- (B) ABS wheel speed sensor cable clamp

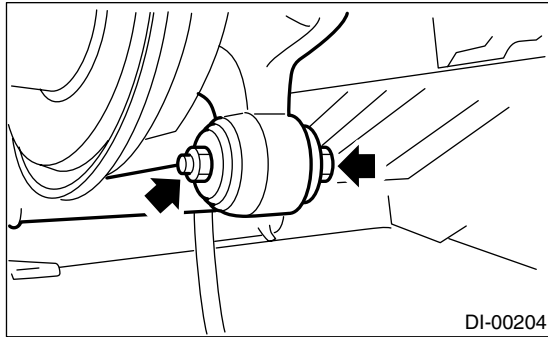
# Rear Differential Side Oil Seal

## DIFFERENTIALS

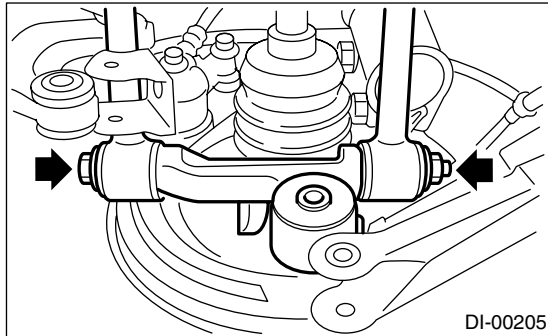
(4) Remove the rear stabilizer link.



(5) Remove the bolts which secure the trailing link to housing.



(6) Remove the bolts which secure the front and rear lateral link to rear housing.

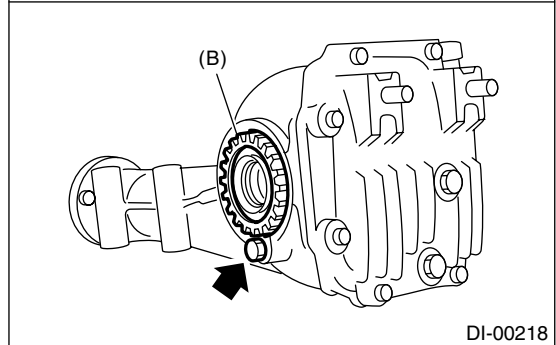
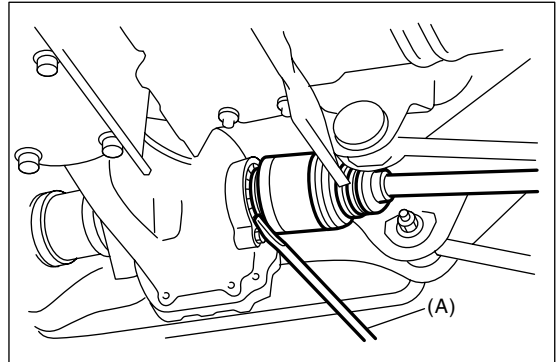


(7) Remove the DOJ from the rear differential using tire lever.

### NOTE:

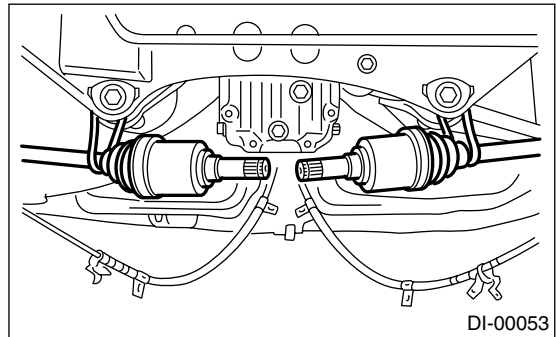
- When removing the DOJ from rear differential, fit tire lever to the bolt as shown in the figure so as not to damage the axle shaft holder.

- The side spline shaft circlip comes out together with the shaft.

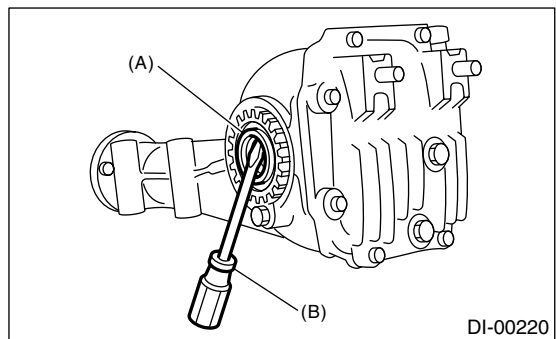


- (A) Tire lever  
(B) Axle shaft holder

9) Suspend the rear drive shaft to rear crossmember using wire.



10) Remove the oil seal with screwdriver.



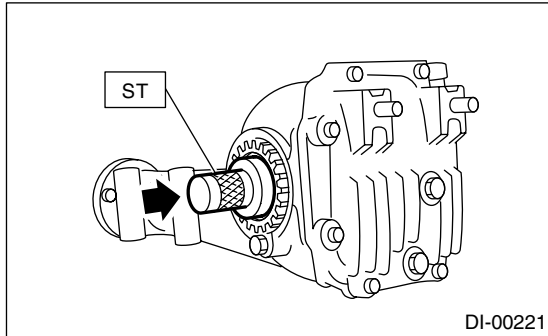
- (A) Side oil seal  
(B) Screwdriver

11) Drive in a new side oil seal using ST.

**NOTE:**

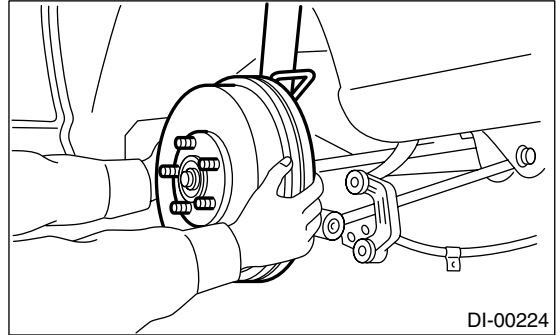
Apply chassis grease between the oil seal lips.

ST 498447100 OIL SEAL INSTALLER



**NOTE:**

Make sure that the oil seal lip is not folded over inward.



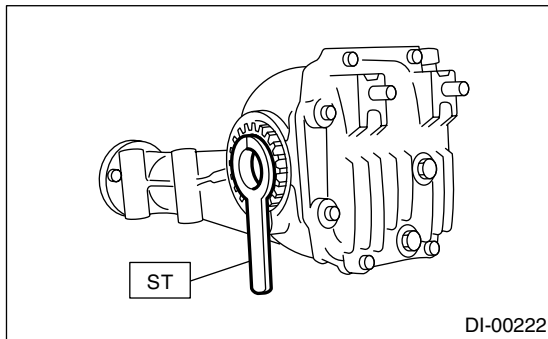
12) Insert the DOJ into rear differential.

**NOTE:**

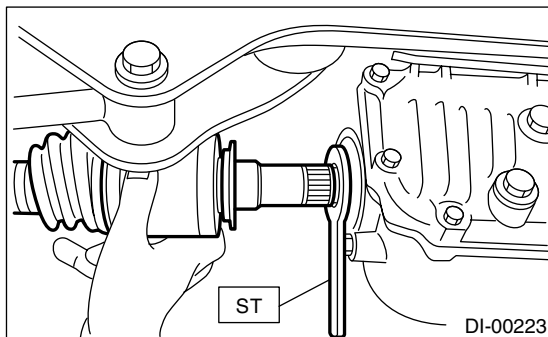
Before inserting, replace the circlip at the end of spline shaft with a new one.

(1) Install the ST to rear differential.

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(2) Install the spline shaft until the spline portion is inside the side oil seal.



(3) Remove the ST.

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(4) Completely insert the DOJ into rear differential by pressing rear housing.



# Rear Differential Member

## DIFFERENTIALS

### 8. Rear Differential Member

#### A: REMOVAL

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

Non-turbo model without OBD

<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>

Non-turbo model with OBD

<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

Turbo model

<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>

- 9) Remove the rear differential front member.

NOTE:

When removing the rear differential front member, work the removal procedure as rear differential.

T-type

<Ref. to DI-28, REMOVAL, Rear Differential for T-type.>

VA-type

<Ref. to DI-54, REMOVAL, Rear Differential for VA-type.>

- 10) Remove the differential rear member.

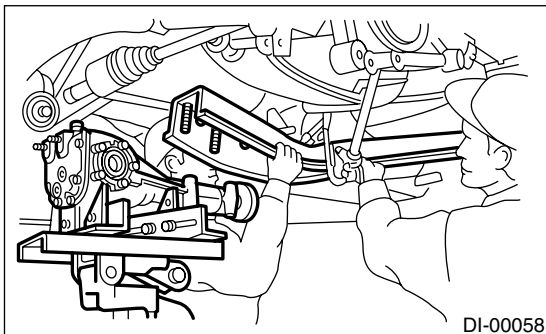
#### B: INSTALLATION

Install in the reverse order of removal.

- 1) Position the front member on body by passing it under the parking brake cable and securing to rear differential.

NOTE:

When installing the rear differential front member, do not confuse the installation sequence of the stopper.

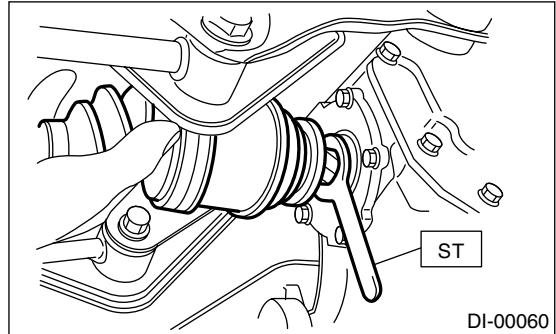


- 2) Insert the DOJ of rear drive shaft into rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

NOTE:

Before inserting, replace the differential side oil seal with a new one.

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- 3) Hereafter, install in the reverse order of removal.

#### C: INSPECTION

- 1) Check the rear differential member for damage, bend, or corrosion.

If damage, bend, or corrosion is excessive, replace the rear differential member.

- 2) Check the bushings of rear differential member for cracking, hardening, or damage.

If cracking, hardening, or damage is excessive, replace the rear differential member.

## 9. General Diagnostic Table

### A: INSPECTION

Symptom or trouble	Possible cause	Remedy
<b>1. Oil leakage</b>	(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten the bolts to specified torque. Replace the O-ring.
	(4) Loose rear cover attaching bolts or damaged gasket.	Tighten the bolts to specified torque. Replace the gasket and apply liquid packing.
	(5) Loose oil filler or drain plug.	Retighten and apply liquid packing.
	(6) Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
<b>2. Seizure</b> 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.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Replace the seized part and fill with specified oil to specified level.
<b>3. Damage</b> 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.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace the gear or thrust washer.
	(4) Loose bolts and nuts such as crown gear bolt.	Retighten.
	(5) Damage due to overloading.	Replace.
<b>4. Noises when starting or shifting gears</b> NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	(1) Excessive backlash for hypoid gear.	Readjust.
	(2) Excessive backlash for differential gear.	Replace the gear or thrust washer.
	(3) Insufficient preload for front or rear bearing.	Readjust.
	(4) Loose drive pinion nut.	Tighten to specified torque.
	(5) Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
<b>5. Noises when cornering</b>	(1) Damaged differential gear.	Replace.
	(2) Excessive wear or damage of thrust washer.	Replace.
	(3) Broken pinion mate shaft.	Replace.
	(4) Seized or damaged side bearing.	Replace.

## General Diagnostic Table

### DIFFERENTIALS

Symptom or trouble	Possible cause	Remedy
<b>6. Gear noises</b> 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.	(1) Improper tooth contact of hypoid gear.	Readjust or replace the hypoid gear set.
	(2) Improper backlash for hypoid gear.	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace the hypoid gear set.
	(4) Seized hypoid gear.	Replace the hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Seized, scored, or chipped front or rear bearing.	Replace.
	(7) Seized, scored, or chipped side bearing.	Replace.
	(8) Vibrating differential carrier.	Replace.