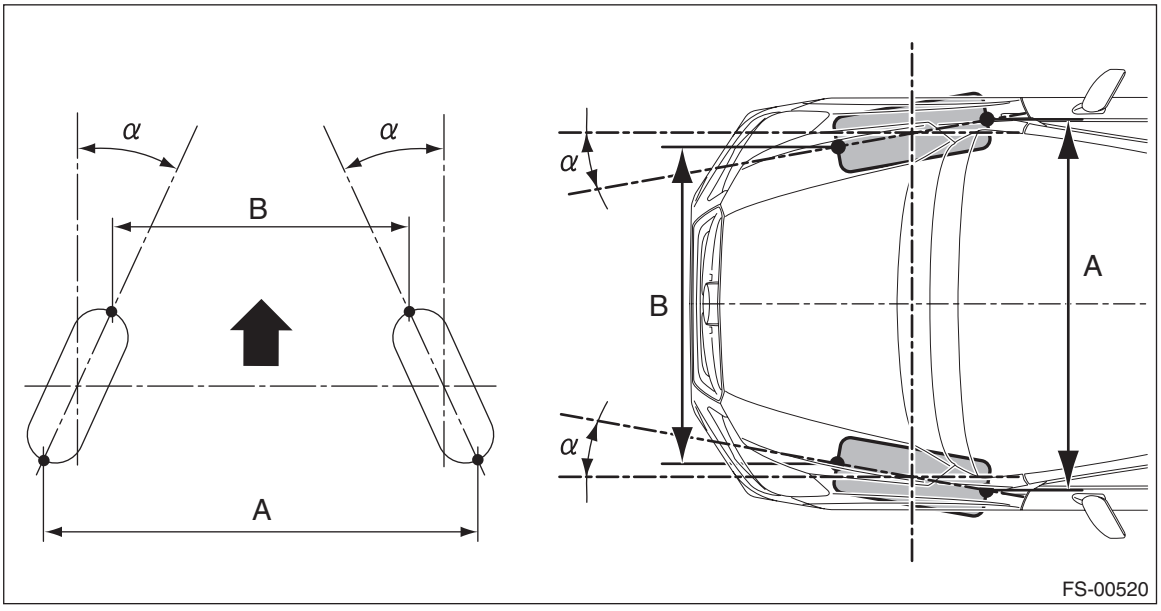
1. General Description

A: SPECIFICATION

			Standard vehicle height model	SPORT model	XV model
Tire size			P195/65R15 P205/55R16 P205/50R17	P205/50R17	P225/55R17
Front	Wheel arch height (Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$)) mm (in)		387 (15.24)	392 (15.43)	452 (17.8)
	Camber (Tolerance: ±0°45′ Differences between RH and LH: 45′ or less)		–0°20′	–0°15′	0°10′
	Caster (Referential Value)		6°00′	5°58′	
	Steering angle (Tolerance: ±1.5°)	Inner wheel	38.3°		38.5°±1.5°
		Outer wheel	33.7°		34.0°±1.5°
	Toe-in mm (in)		0±3 (0±0.12) Toe angle (sum of both wheels): 0°±0°12′		0±3 (0±0.12) Toe angle (sum of both wheels): 0°±0°10′
	Kingpin angle (Referential Value)		13°51′	13°44′	13°06′
Rear	Wheel arch height (Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$)) mm (in)		368 (14.49)	371 (14.61)	450 (17.72)
	Camber (Tolerance: ±0°45′ Differences between RH and LH: 45′ or less)		–1°20′	–1°15′	–0°20′
	Toe-in mm (in)		IN 3±3 (IN 0.12±0.12) Toe angle (sum of both wheels): IN 0°12′±12′		IN 3±3 (IN 0.12±0.12) Toe angle (sum of both wheels): IN 0°10′±10′
	Thrust angle (Tolerance: 0°00′±30′)		0°00′		

NOTE:
• Front toe-in, rear toe-in and front camber can be adjusted. Adjust if the value of toe-in or camber exceeds the tolerance range of the specification chart.
• Other items except for front toe-in, rear toe-in and front camber that are described in the specification chart cannot be adjusted. If other items exceed the tolerance range of the specification chart, check the suspension parts and connections for deformation. If defective, replace with new parts.

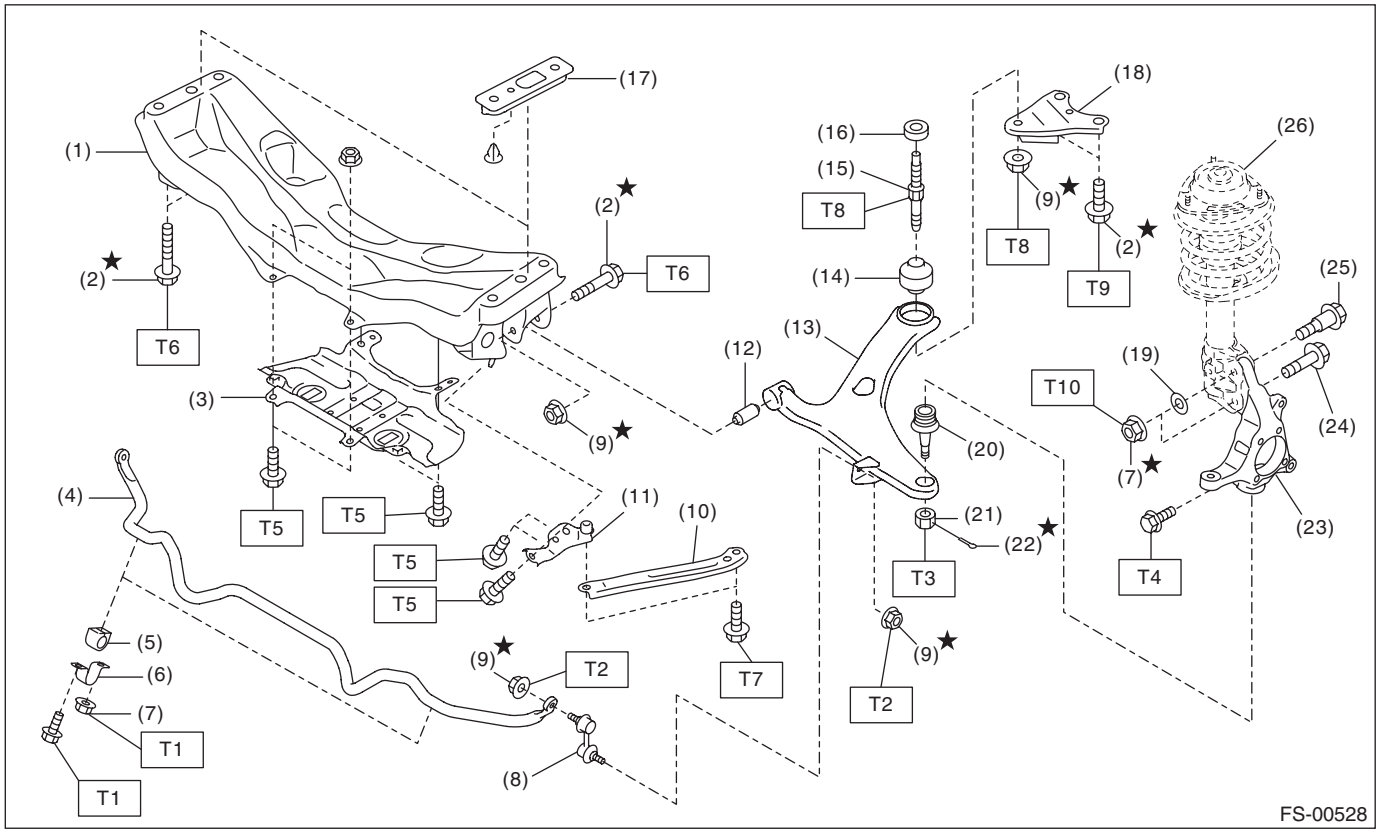


A – B = Positive: Toe-in, Negative: Toe-out

α = Individual toe angles

B: COMPONENT

1. FRONT SUSPENSION

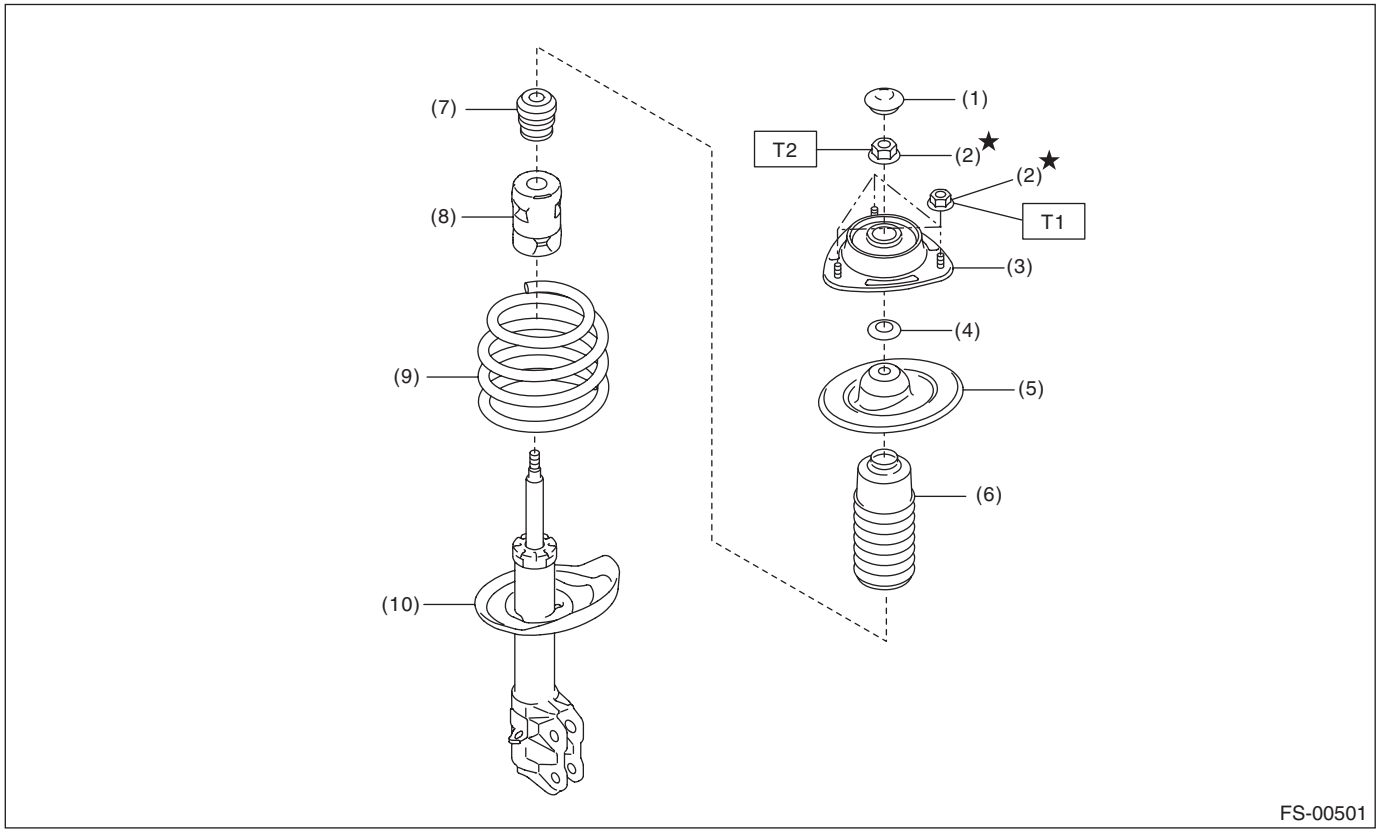


(1)	Front crossmember ASSY	(14)	Bushing rear - front arm	
(2)	Flange bolt	(15)	Stud bolt	
(3)	Front crossmember support	(16)	Stopper - front arm bushing rear	
(4)	Front stabilizer	(17)	Adapter (XV model)	
(5)	Bushing - stabilizer	(18)	Front arm rear plate	
(6)	Clamp - stabilizer bushing	(19)	Adjusting washer	
(7)	Flange nut	(20)	Ball joint ASSY	
(8)	Stabilizer link ASSY	(21)	Castle nut	
(9)	Self-locking nut	(22)	Cotter pin	
(10)	Front support	(23)	Housing ASSY - front axle	
(11)	Support plate - front crossmember	(24)	Flange bolt	
(12)	Bushing front - front arm	(25)	Adjusting bolt	
(13)	Front arm ASSY	(26)	Front strut ASSY	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.55, 18.4)
T2: Except for XV model: 38 (3.87, 28.0)
XV model: 60 (6.12, 44.3)
T3: 39 (3.98, 28.8)
T4: 50 (5.10, 36.9)
T5: 60 (6.12, 44.3)
T6: 95 (9.69, 70.1)
T7: 100 (10.20, 73.8)
T8: 110 (11.22, 81.1)
T9: 150 (15.30, 110.6)
T10: 155 (15.81, 114.3)

2. FRONT STRUT



(1) Dust seal - front strut
(2) Self-locking nut
(3) Strut mount - front
(4) Spacer - front strut
(5) Spring seat - front strut UPR
(6) Dust cover - front strut
(7) Helper - front strut
(8) Dust cover inner
(9) Coil spring - front
(10) Strut COMPL - front

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.04, 14.8)
T2: 55 (5.61, 40.6)

C: CAUTION

• Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• When the suspension-related components have been replaced, perform “VDC sensor midpoint setting mode” of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

D: PREPARATION TOOL

1. SPECIAL TOOL

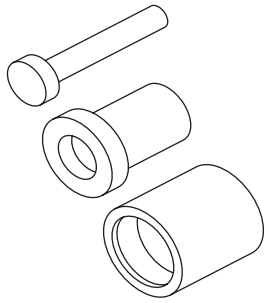
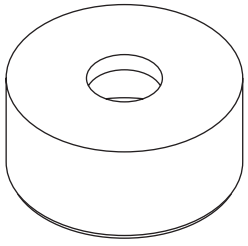
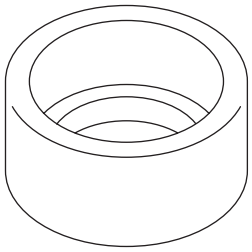
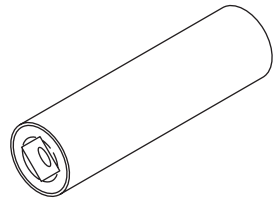
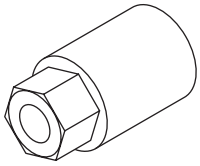
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927680000	927680000	INSTALLER & REMOVER SET	Used for replacing the bushing front - front arm of front arm assembly.
 ST20299AG000	20299AG000	REMOVER	• Used for replacing the bushing rear - front arm of front arm assembly. • Used together with BASE (20299AG010).
 ST20299AG010	20299AG010	BASE	• Used for replacing the bushing rear - front arm of front arm assembly. • Used together with REMOVER (20299AG000).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20299AG020	20299AG020	STUD BOLT SOCKET	Used for removing and installing the stud bolt for front arm assembly installing portion.
 ST20399AG000	20399AG000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut mount.

2. GENERAL TOOL

TOOL NAME	REMARKS
Alignment gauge	Used for measuring wheel alignment.
Alignment gauge adapter	Used for measuring wheel alignment.
Turning radius gauge	Used for measuring wheel alignment.
Toe-in gauge	Used for toe-in measurement.
Tie-rod ball joint puller	Used for disconnecting tie-rod end.
Dial gauge	Used for damper strut measurement.
Coil spring compressor	Used for strut assembly/disassembly.

2. Wheel Alignment

A: INSPECTION

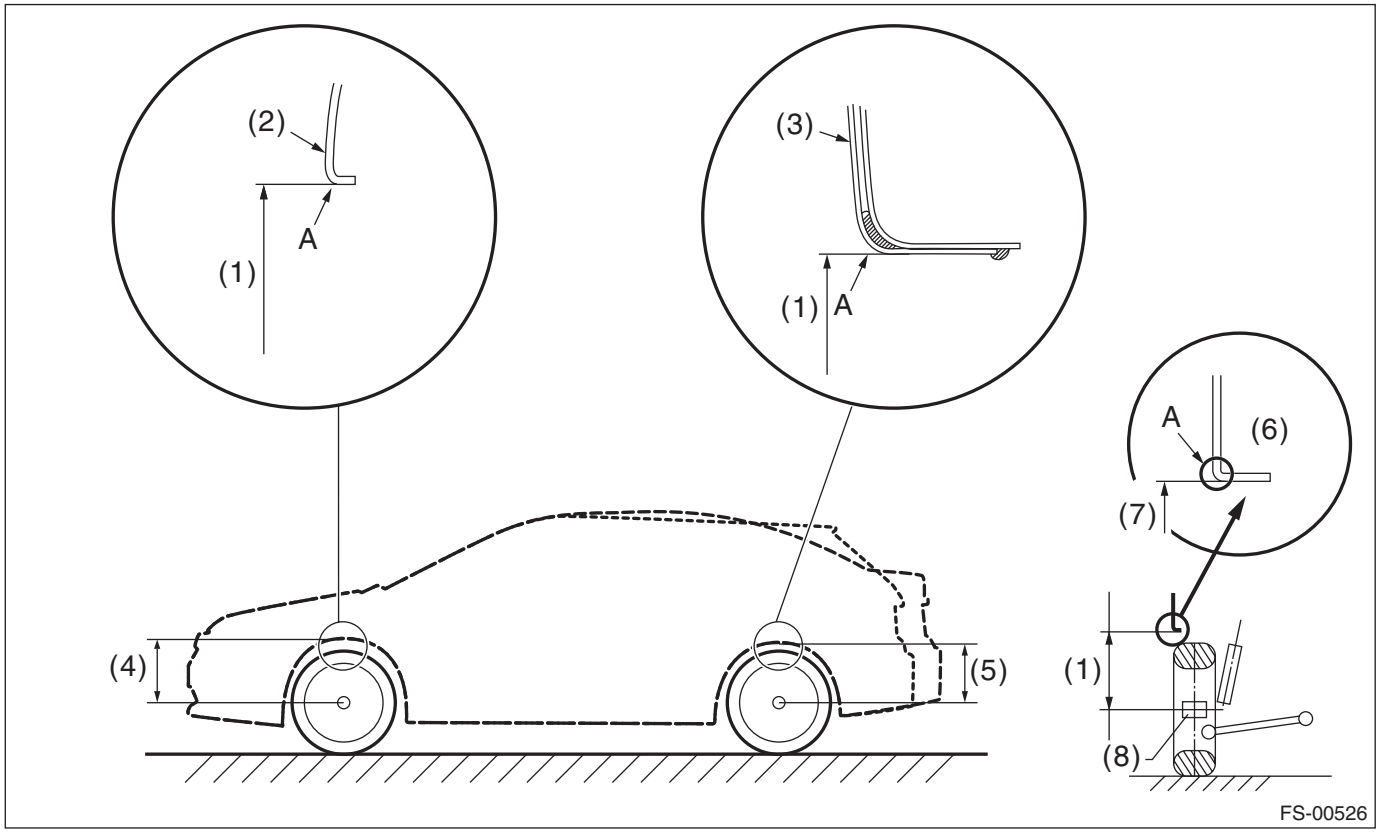
Check the following items before performing the wheel alignment measurement.
- Tire inflation pressure
- Uneven wear of RH and LH tires, or difference of sizes
- Tire runout
- Excessive play and wear of ball joint
- Excessive play and wear of tie-rod end
- Excessive play of wheel bearing
- Right and left wheel base imbalance
- Deformation and excessive play of steering link
- Deformation and excessive play of suspension parts

Check, adjust and measure the wheel alignment in accordance with the following procedures.

1	Wheel arch height (front and rear wheels)	Inspection: <Ref. to FS-11, REAR WHEEL TOE-IN, INSPECTION, Wheel Alignment.>
↓		
2	Camber (front and rear wheels)	Inspection: <Ref. to FS-9, CAMBER, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-12, FRONT CAMBER, ADJUSTMENT, Wheel Alignment.>
↓		
3	Caster (front wheel)	Inspection: <Ref. to FS-10, CASTER, INSPECTION, Wheel Alignment.>
↓		
4	Steering angle	Inspection: <Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-14, STEERING ANGLE, ADJUSTMENT, Wheel Alignment.>
↓		
5	Front wheel toe-in	Inspection: <Ref. to FS-10, STEERING ANGLE, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-15, FRONT WHEEL TOE-IN, ADJUSTMENT, Wheel Alignment.>
↓		
6	Rear wheel toe-in	Inspection: <Ref. to FS-8, WHEEL ARCH HEIGHT, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-16, REAR WHEEL TOE-IN, ADJUSTMENT, Wheel Alignment.>
↓		
7	Thrust angle	Inspection: <Ref. to FS-12, THRUST ANGLE, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-18, THRUST ANGLE, ADJUSTMENT, Wheel Alignment.>

1. WHEEL ARCH HEIGHT

1) Park the vehicle on a level surface.
2) Empty the vehicle so that it is at “curb weight”. (Empty the luggage compartment, load the spare tire, jack and service tools, and fill up the fuel tank.)
3) Set the steering wheel in a straight-ahead position, and stabilize the suspension by moving the vehicle in a straight line for 5 m (16 ft) or more.
4) Suspend a thread from the wheel arch (point “A” in the figure below) and affix at a position directly above the center of wheel.
5) Measure the distance between the point “A” and the center of wheel.



(1) Wheel arch height
(2) Front fender
(3) Rear quarter
(4) Front wheel arch height
(5) Rear wheel arch height
(6) Flange bend line
(7) Point of measurement
(8) End of spindle

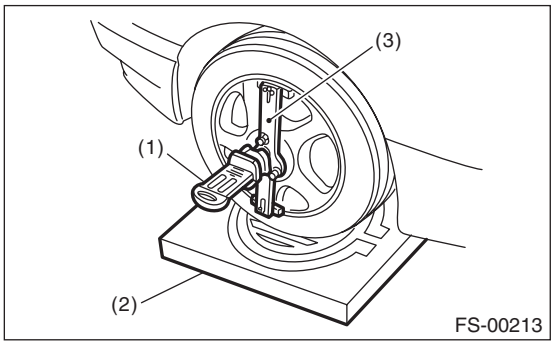
Wheel arch height specification mm (in) (Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$))			
Tire size	Standard vehicle height model	SPORT model	XV model
	P195/65R15 P205/55R16 P205/50R17	P205/50R17	P225/55R17
Front	387 (15.24)	392 (15.43)	452 (17.8)
Rear	368 (14.49)	371 (14.61)	450 (17.72)

2. CAMBER

1) Place the front wheel on the turning radius gauge.

NOTE:
Make sure the ground contact surfaces of the front and rear wheels are at the same height.

2) Set the adapter into the center of wheel, and then set the wheel alignment gauge.



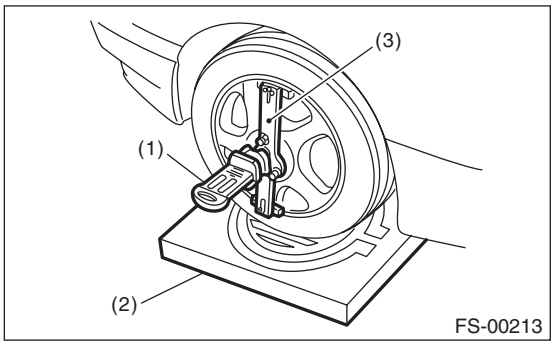
(1) Alignment gauge
(2) Turning radius gauge
(3) Adapter

3) Measure the camber angle in accordance with the operation manual for wheel alignment gauge.

Tire size		Camber (Difference between RH and LH 45′ or less)
Standard vehicle height model	P195/65R15 P205/55R16 P205/50R17	–0°20′±0°45′
SPORT model	P205/50R17	–0°15′±0°45′
XV model	P225/55R17	0°10′

3. CASTER

1) Place the front wheel on the turning radius gauge. Make sure the ground contact surfaces of the front and rear wheels are at the same height.
2) Set the adapter into the center of wheel, and then set the wheel alignment gauge.



(1) Alignment gauge
(2) Turning radius gauge
(3) Adapter

3) Measure the caster angle in accordance with the operation manual for wheel alignment gauge.

Tire size	Caster
P195/65R15 P205/55R16 P205/50R17*1	6°00′
P205/50R17*2 P225/55R17	5°58′

*1: Except for SPORT model
*2: SPORT model

4. STEERING ANGLE

1) Place the vehicle on turning radius gauge.
2) While depressing the brake pedal, turn the steering wheel fully to the left and right.
3) With the steering wheel held at each fully turned position, measure both the inner and outer wheel steering angles.

Tire size	Inner wheel	Outer wheel
P195/65R15 P205/55R16 P205/50R17	38.3°±1.5°	33.7°±1.5°
P225/55R17	38.5°±1.5°	34.0°±1.5°

5. FRONT WHEEL TOE-IN

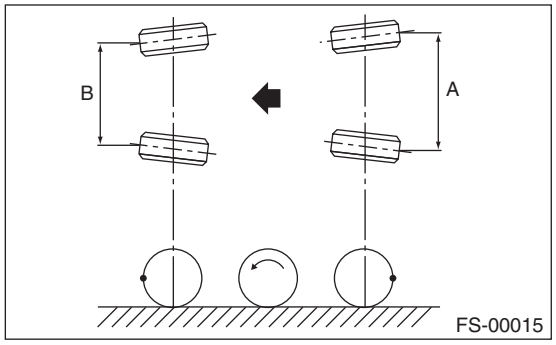
Toe-in: Inspection value
0±3 mm (0±0.12 in)

1) Set the toe-in gauge in the position at wheel axis center height behind the right and left front tires.
2) Place a mark at the center of both left and right tires, and measure distance “A” between the marks.
3) Move the vehicle forward to rotate the tires 180°.

NOTE:
Be sure to rotate the tires in the forward direction.

4) Measure the distance “B” between the left and right marks. Find toe-in using the following calculation:

A – B = Toe-in



6. REAR WHEEL TOE-IN

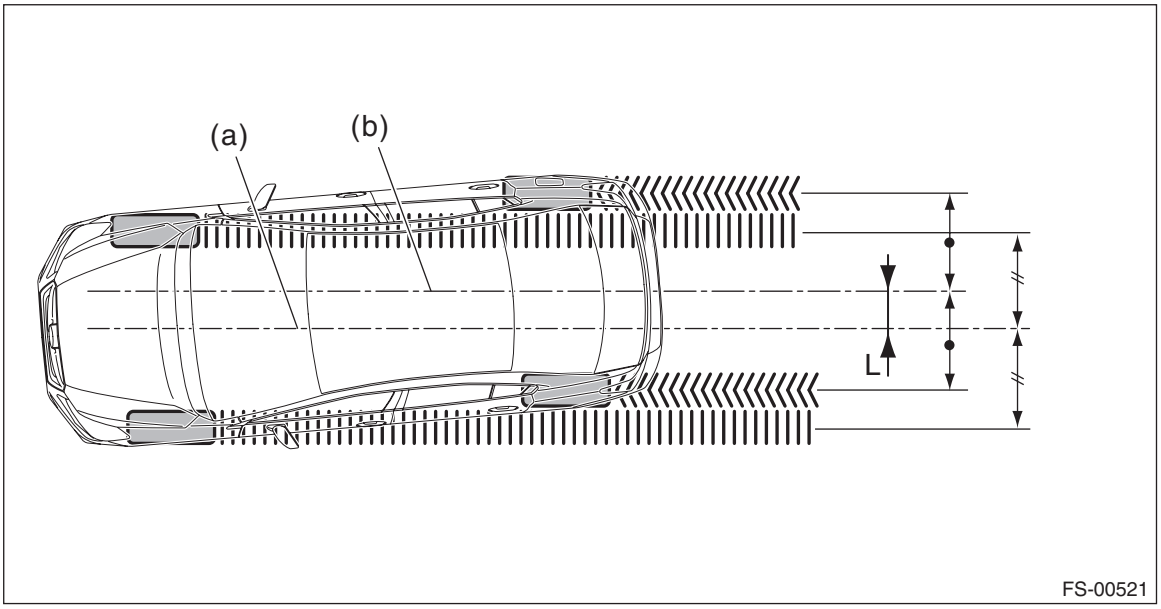
Refer to the FRONT WHEEL TOE-IN for rear toe-in inspection procedures. <Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

Toe-in: Inspection value
3±3 mm (0.12±0.12 in)

7. THRUST ANGLE

1) Park the vehicle on a level surface.
2) Move the vehicle 3 to 4 meters (10 to 13 feet) straight forward.
3) Draw the center of loci for both the front and rear axles.
4) Measure distance “L” between the center lines of the axle loci.

Thrust angle: Inspection value
0°±30′
Less than 30′ when “L” is 23 mm (0.9 in) or less



(a) Center line of loci (front axle) (b) Center line of loci (rear axle)

B: ADJUSTMENT

CAUTION:
When the wheel alignment has been adjusted, perform “VDC sensor midpoint setting mode” of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

1. FRONT CAMBER

1) Adjust the camber angle to the following value.

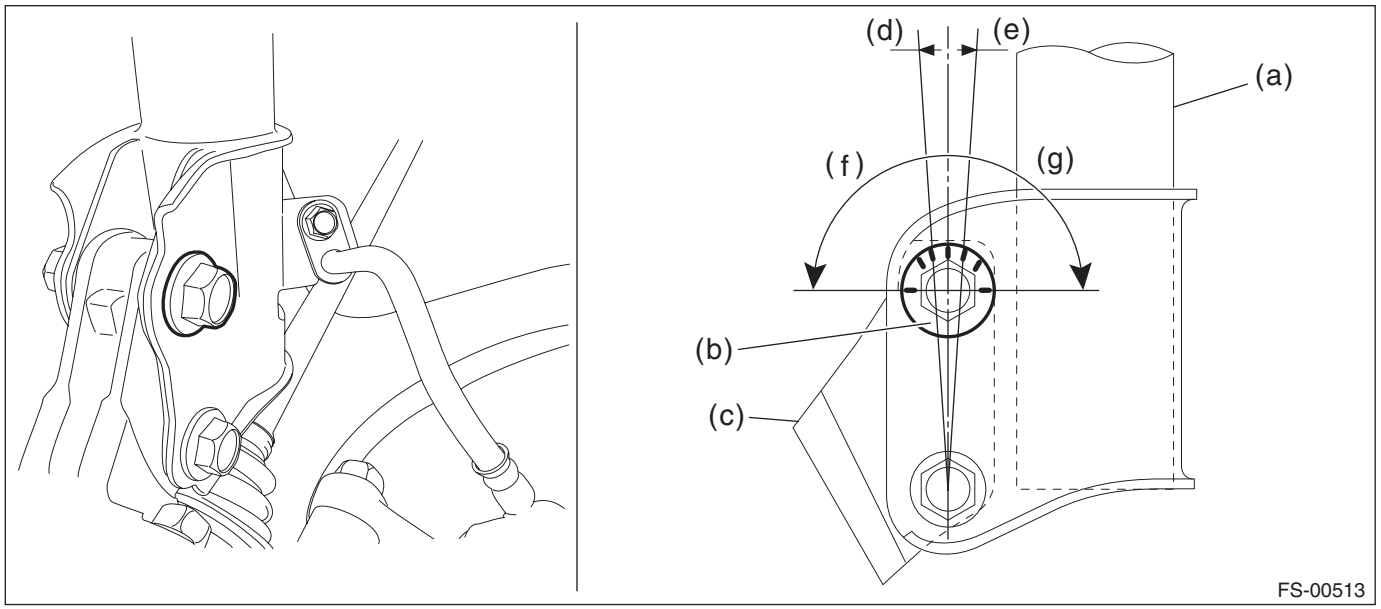
Tire size		Camber (Difference between RH and LH 45′ or less)
Standard vehicle height model	P195/65R15 P205/55R16 P205/50R17	–0°20′±0°30′
SPORT model	P205/50R17	–0°15′±0°30′
XV model	P225/55R17	0°10′±0°30′

2) Loosen the two flange nuts located at the front lower section of the strut.

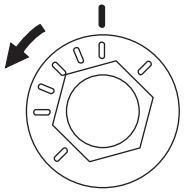
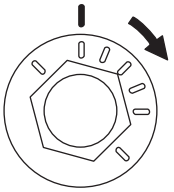
NOTE:
When the adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn the flange nut.

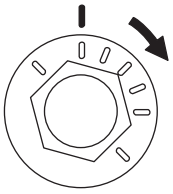
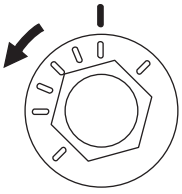
3) Turn the camber adjusting bolt so that the camber is set at specification.

NOTE:
Moving the adjusting bolt by one scale changes the camber by approximately 0°15′.



(a) Strut ASSY
(b) Adjusting bolt
(c) Housing ASSY - front axle
(d) Outer direction
(e) Inner direction
(f) Camber is increased.
(g) Camber is decreased.

To increase camber.	
Rotate the left side counterclockwise.	Rotate the right side clockwise.
 FS-00352	 FS-00353

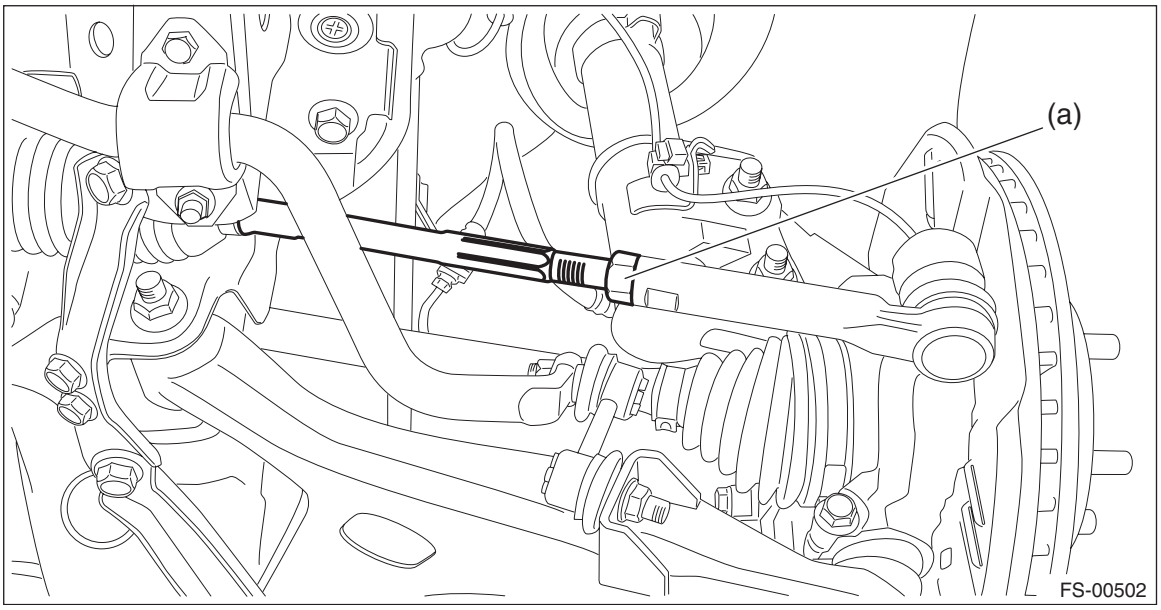
To decrease camber.	
Rotate the left side clockwise.	Rotate the right side counterclockwise.
 FS-00353	 FS-00352

4) Tighten two new flange nuts.

Tightening torque:
155 N·m (15.81 kgf-m, 114.3 ft-lb)

2. STEERING ANGLE

1) Adjust the steering angle of both inner and outer wheels.
(1) Loosen the steering tie-rod lock nut (a), and rotate the tie-rod.



(2) Turn the tie-rod to adjust the steering angle of both inner and outer wheels.
(3) Tighten the steering tie-rod lock nut (a).

Tightening torque:
85 N·m (8.67 kgf-m, 62.7 ft-lb)

NOTE:
Check and correct the tie-rod boot if twisted.
2) Check the toe-in. <Ref. to FS-10, STEERING ANGLE, INSPECTION, Wheel Alignment.>

3. FRONT WHEEL TOE-IN

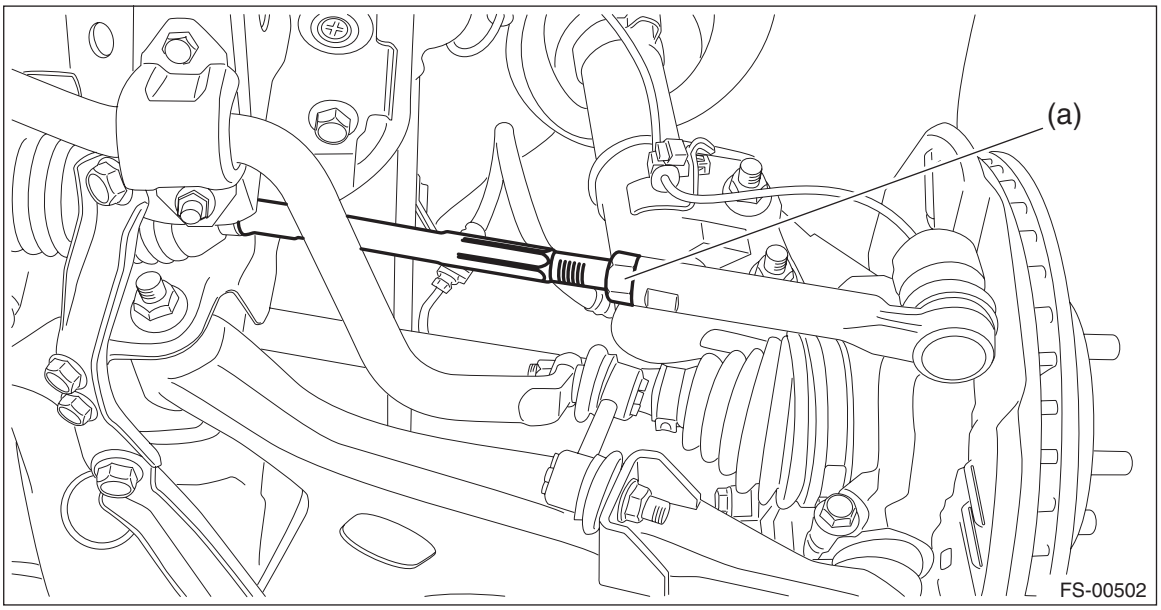
When adjusting the toe-in, adjust it to the following value. <Ref. to FS-14, STEERING ANGLE, ADJUSTMENT, Wheel Alignment.>

Toe-in: Adjustment value
0±2 mm (0±0.08 in)

1) Check that the left and right wheel steering angles are within specification.
2) Loosen the left and right side steering tie-rod lock nuts (a).
3) Turn the left and right tie-rods by equal amounts until the toe-in is at the specification.

NOTE:
Both the left and right tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise by equal amount (viewing from the inside of vehicle).

4) Tighten the tie-rod lock nut (a).



Tightening torque:
85 N·m (8.67 kgf-m, 62.7 ft-lb)

5) Check and correct the tie-rod boot if twisted.

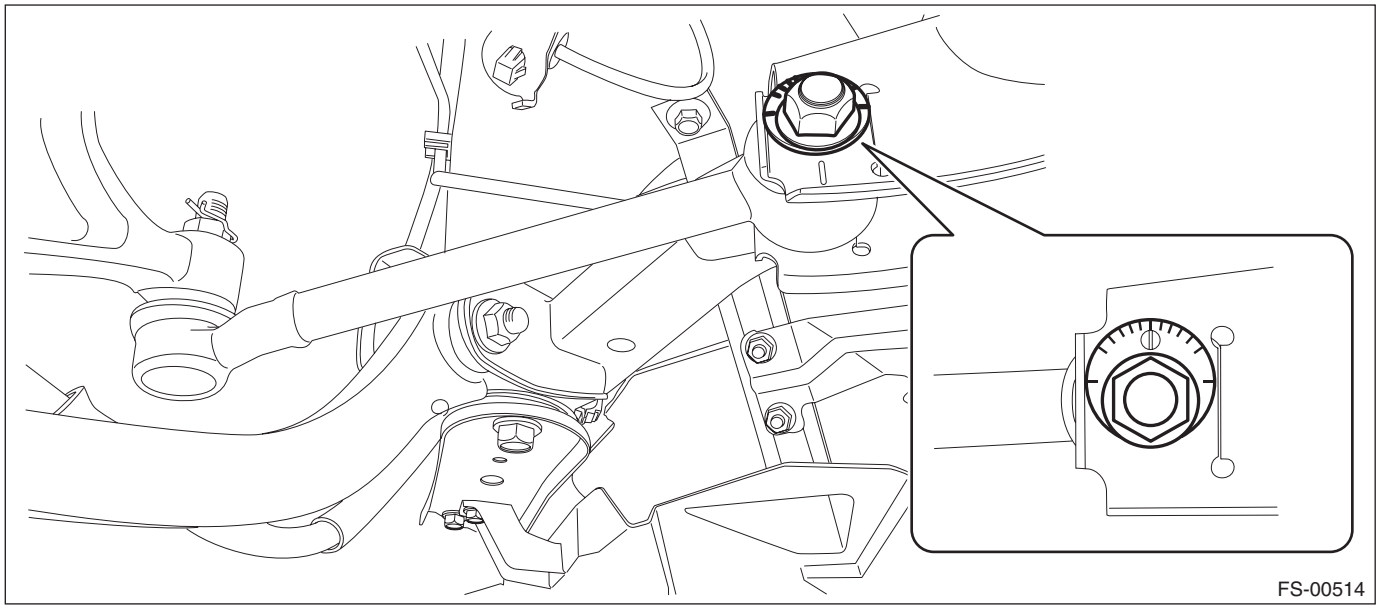
4. REAR WHEEL TOE-IN

When adjusting, adjust it to the following value.

Toe-in: Adjustment value
3±2 mm (0.12±0.08 in)

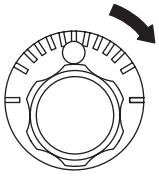
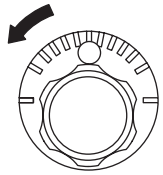
1) Loosen the self-locking nut for the lateral link assembly - front.

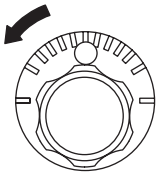
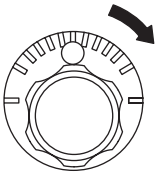
NOTE:
When loosening or tightening the adjusting bolt, hold the bolt head and turn the self-locking nut.



2) Turn the adjusting bolt until toe-in is within the specification.

NOTE:
When the left and right wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approx. 1.3 mm (0.05 in).

To increase toe-in.	
Rotate the left side clockwise.	Rotate the right side counterclockwise.
 FS-00018	 FS-00019

To decrease toe-in.	
Rotate the left side counterclockwise.	Rotate the right side clockwise.
 FS-00019	 FS-00018

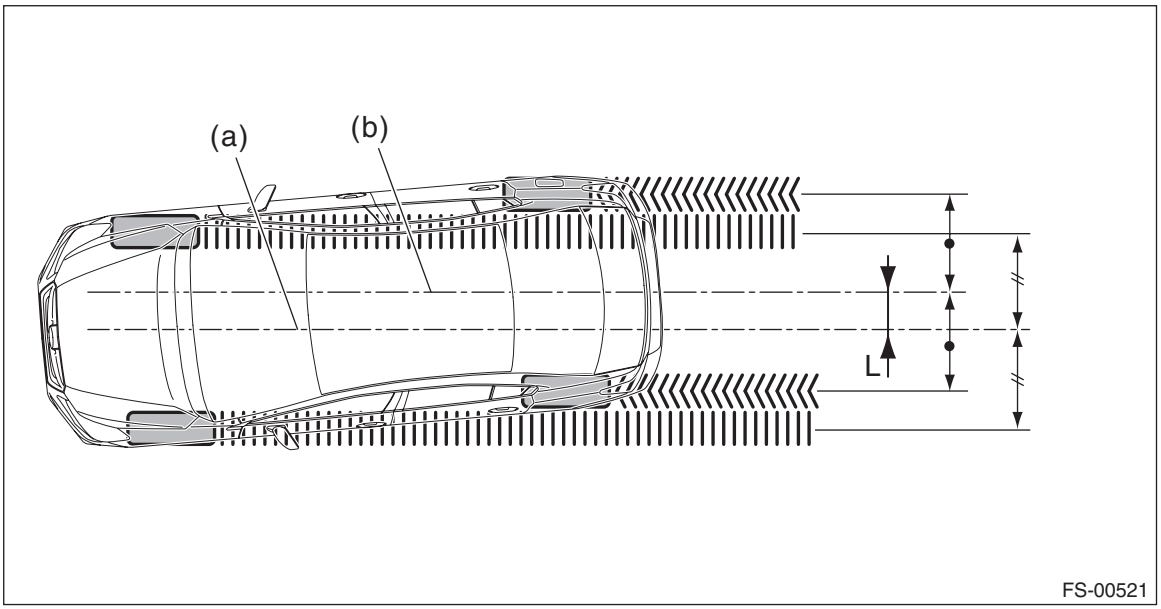
3) Attach and tighten a new self-locking nut.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

5. THRUST ANGLE

When adjusting, adjust it to the following value.

Thrust angle: Adjustment value
0°±20′
Less than 20′ when "L" is 15 mm (0.6 in) or less

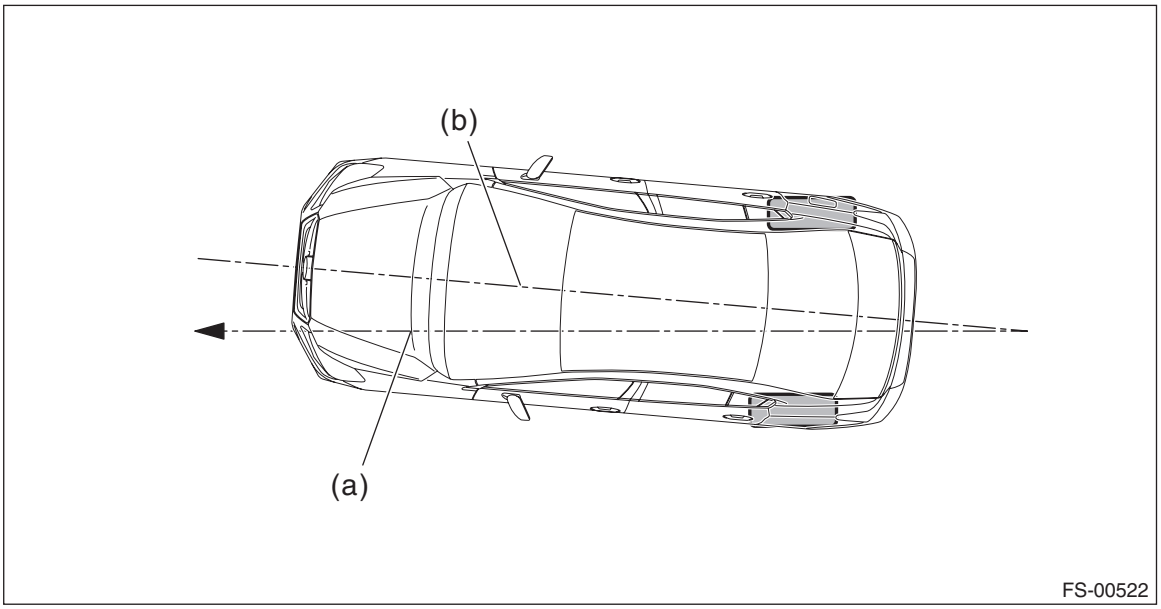


(a) Center line of loci (front axle) (b) Center line of loci (rear axle)

1) Make thrust angle adjustments by turning the toe-in adjusting bolts of the rear suspension equally in the same direction.
2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make the thrust angle adjustment.

3) When the left and right adjusting bolts are turned by one graduation, the thrust angle will change approx. 15′. (“L” is approx. 11 mm (0.43 in)).

NOTE:
Thrust angle is a mean value of left and right wheel toe angles in relation to the vehicle body center line. Vehicle is driven straight in the thrust angle direction while slanting in the oblique direction depending on the degree of the mean thrust angle.

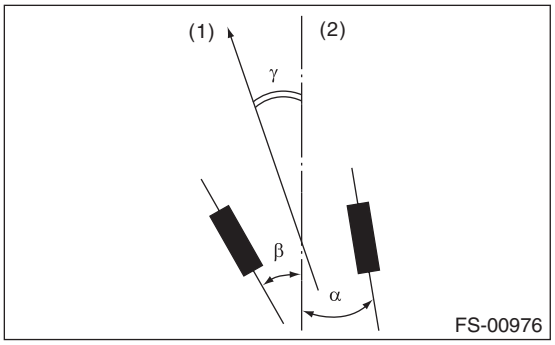


(a) Thrust angle (b) Body center line

Thrust angle:

$\gamma = (\alpha - \beta)/2$

α: Rear RH wheel toe-in angle
β: Rear LH wheel toe-in angle
Substitute only the positive toe-in values from each wheel into α and β in the calculation.

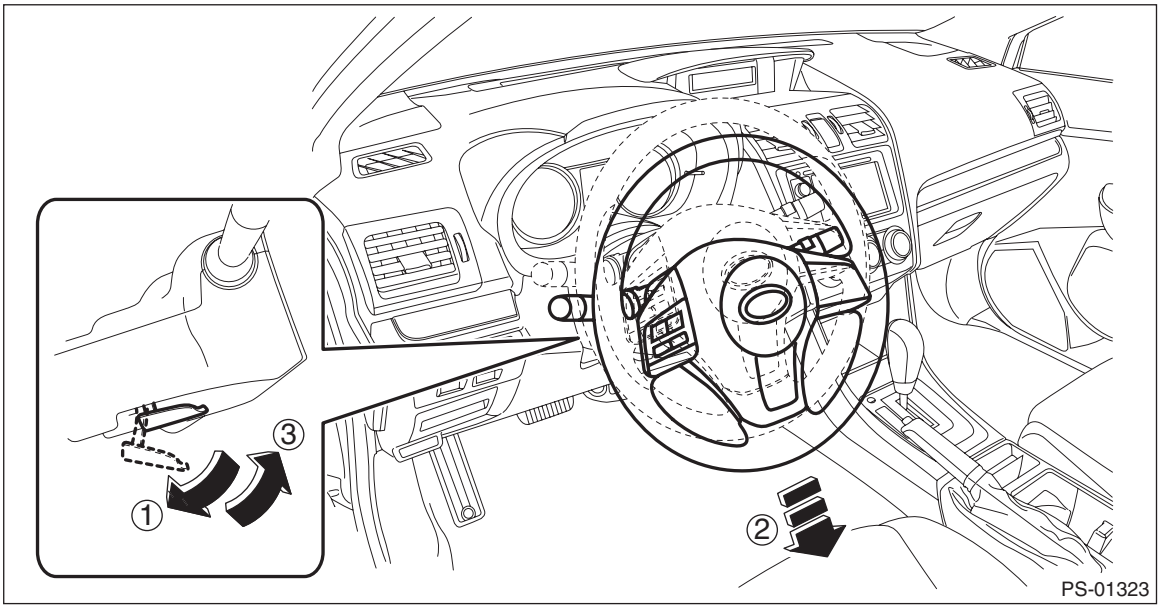


(1) Front
(2) Body center line

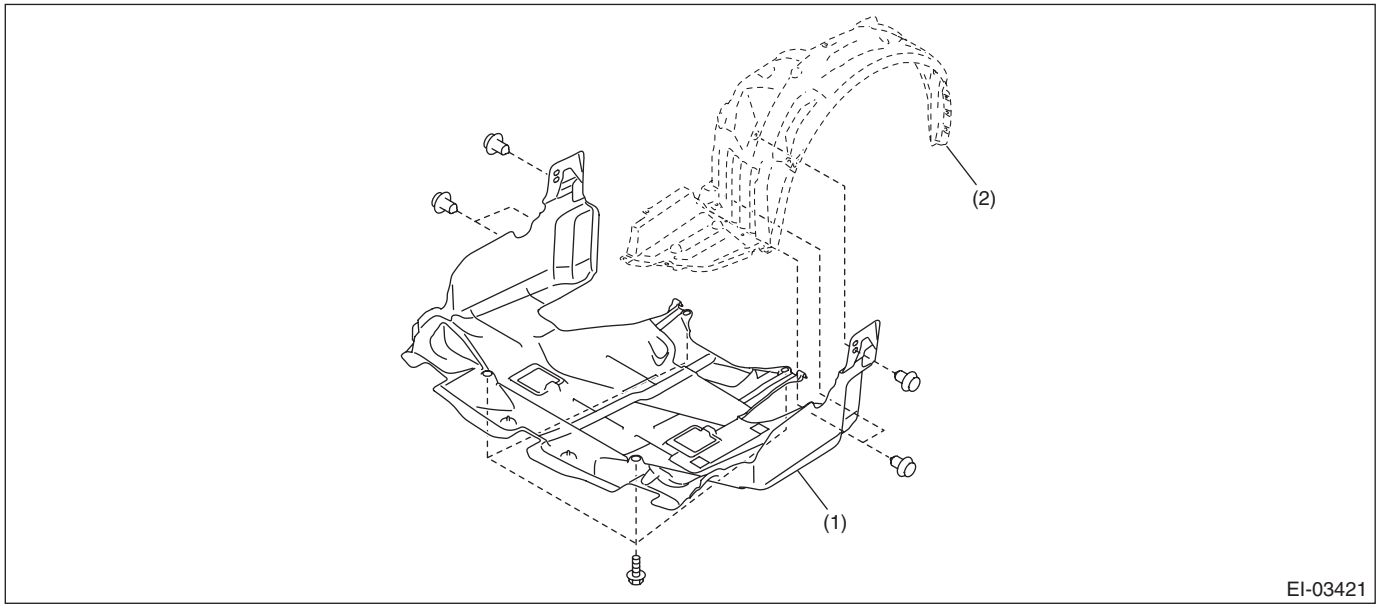
3. Front Crossmember

A: REMOVAL

CAUTION:
• The power steering control module continues to operate after the engine stops and calculate the temperature in the control module. Therefore, before starting service of the power steering system which requires disconnection of the connector, stop the engine and allow approx. 30 minutes until the control module becomes cold.
• Before removal or installation, be sure to remove any foreign matter (dust, moisture, oil, etc.) from the power steering control module connector.
1) Disconnect the ground cable from battery.
2) Adjust the tilt position of the steering column to the lowest position and lock the tilt lever.



3) Lift up the vehicle, and then remove the front wheels.
4) Remove the bolts and clips, and remove the under cover - front.

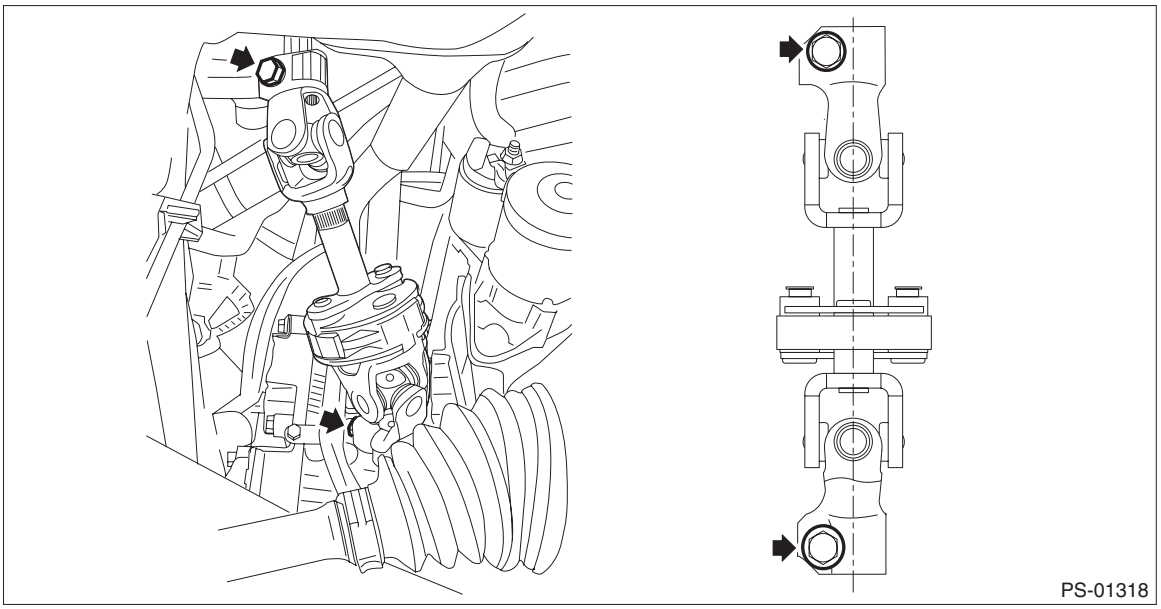


(1) Under cover - front
(2) Mud guard - front

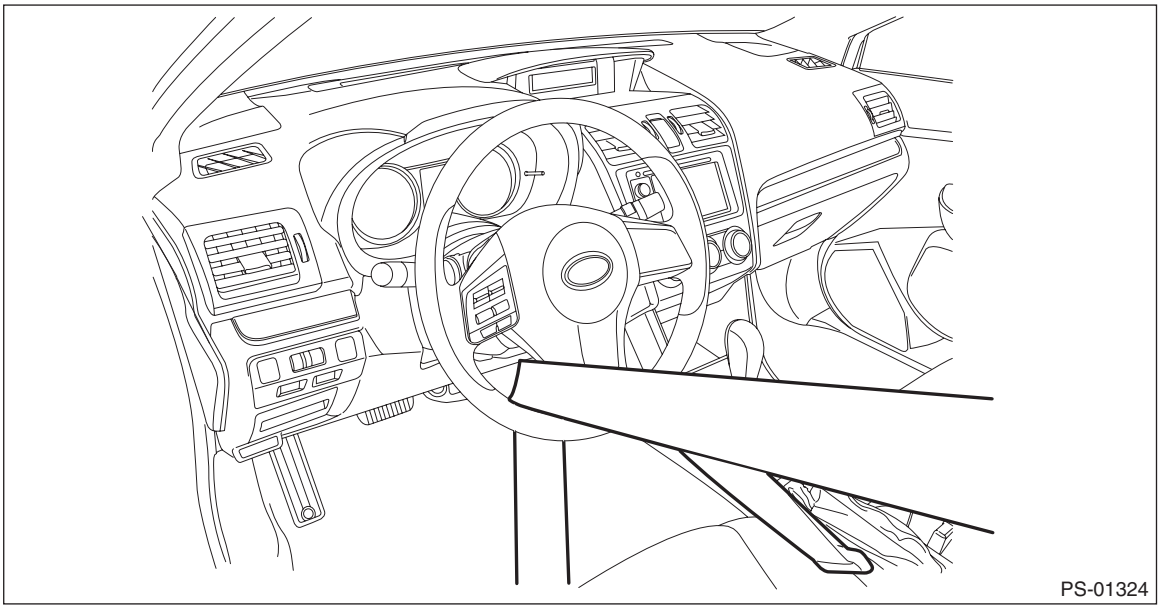
5) Remove the universal joint assembly - steering.
(1) Place alignment marks on the universal joint assembly - steering.

NOTE:
Place alignment marks on the following positions.
- Between the column assembly - steering and the universal joint assembly - steering
- Between the steering gearbox assembly and the universal joint assembly - steering

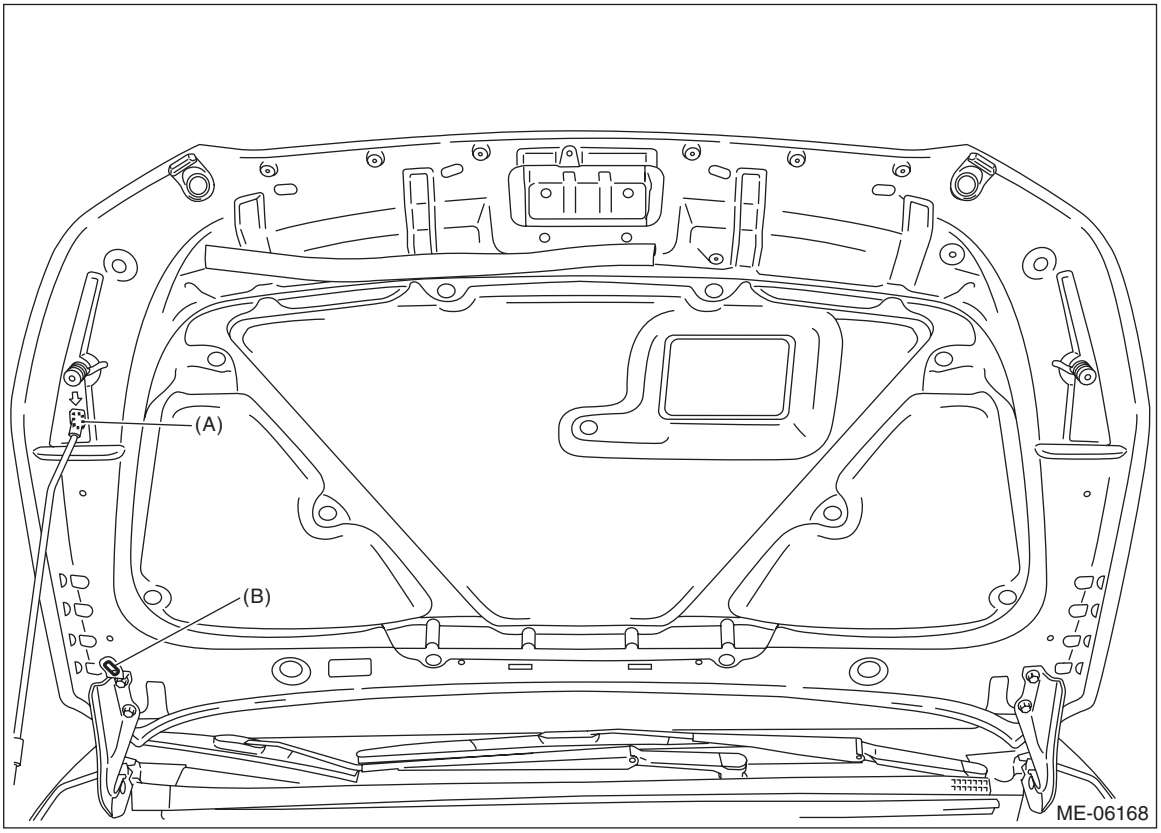
(2) Remove the bolt, and remove the universal joint assembly - steering.



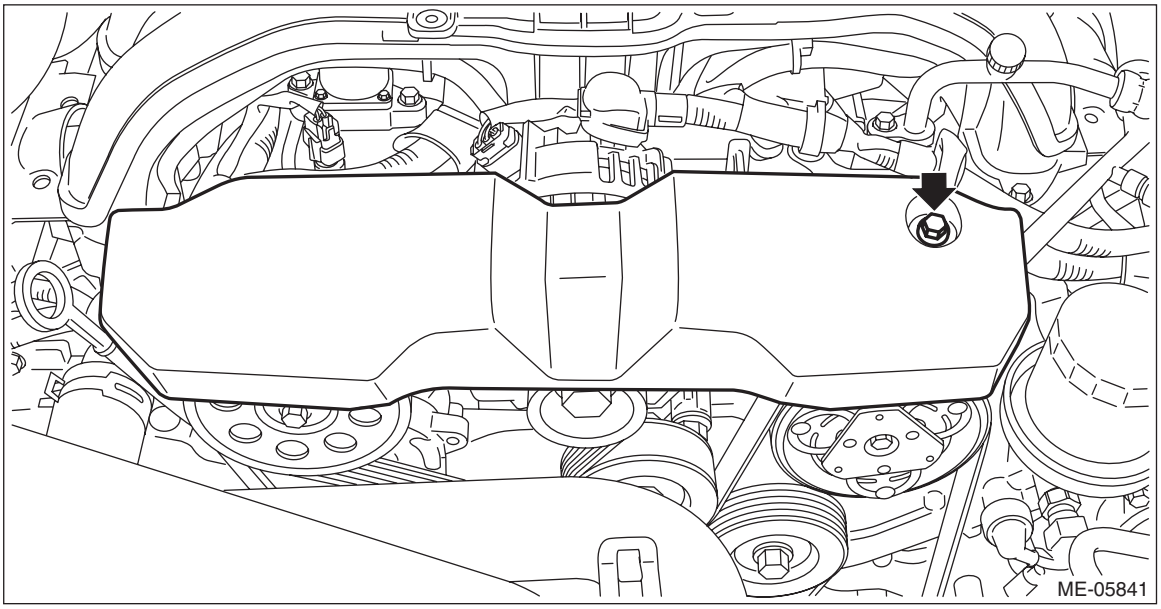
6) Prevent the steering wheel from turning using the seat belt.



7) Change the front hood stay position from (A) to (B), and completely open the front hood.



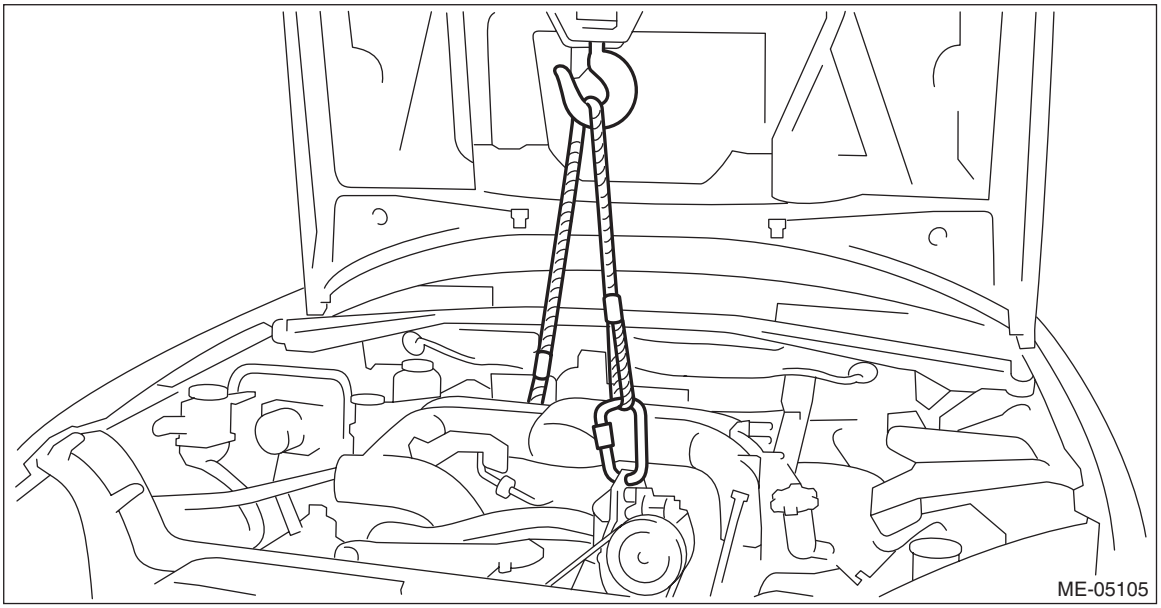
8) Remove the V-belt covers.



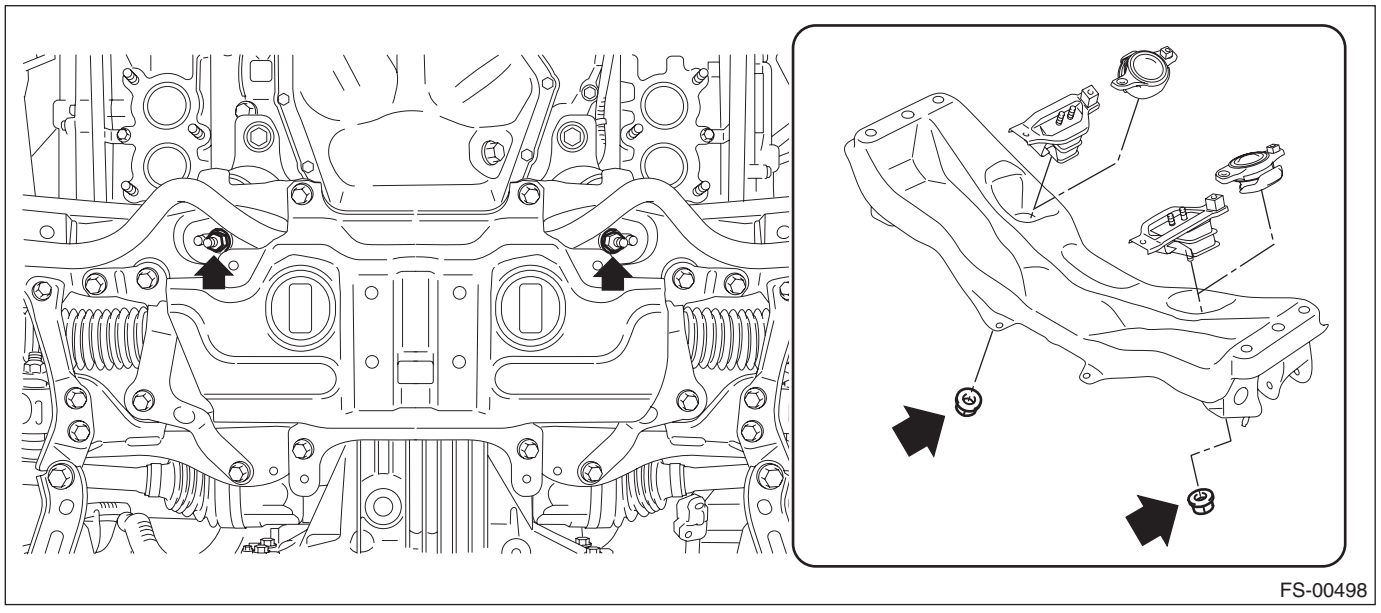
9) Disconnect the connector and harness clamp from power steering control module.

10) Support the engine with a lifting device and wire ropes.
(1) Support the engine with a lifting device and wire ropes.
(2) While lifting up the vehicle, also raise up the lifting device.

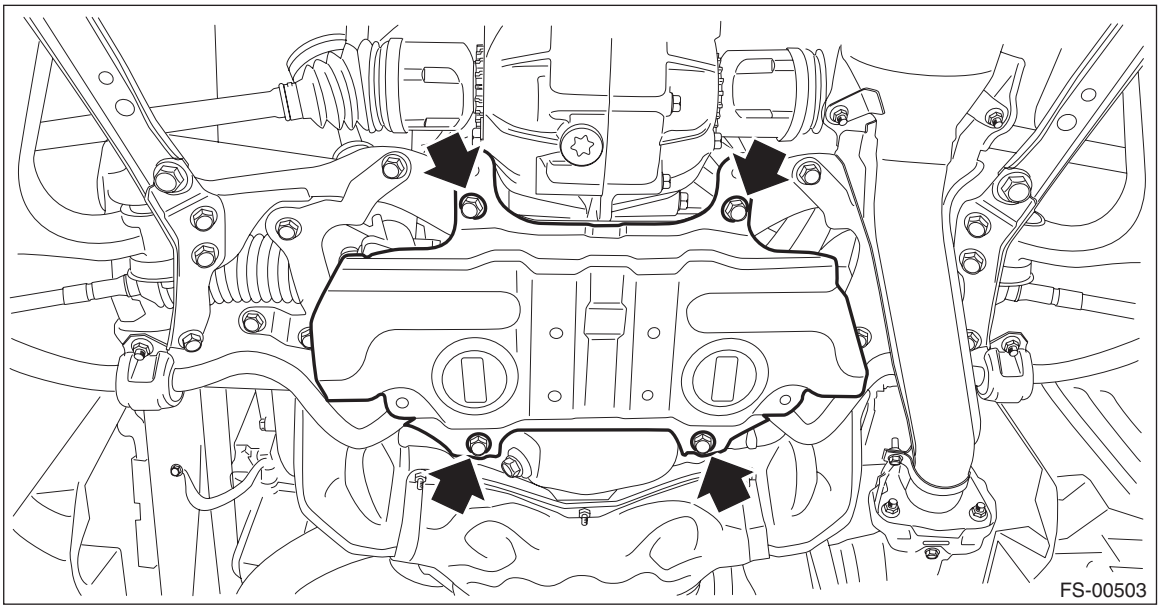
CAUTION:
When lifting up the vehicle, raise up wire ropes at the same time.



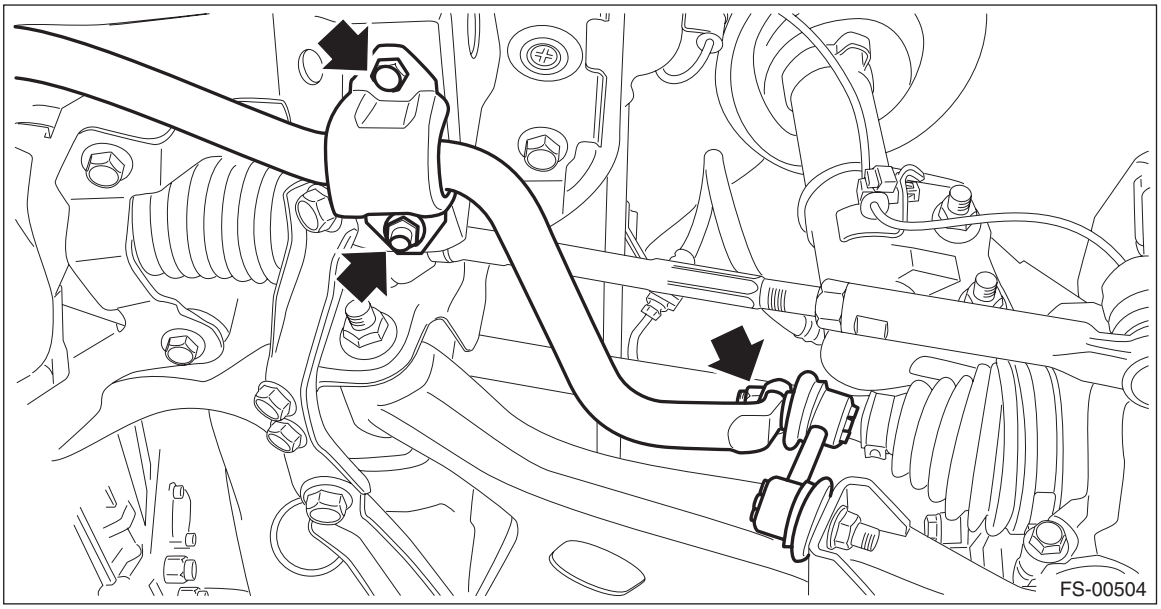
11) Remove the nuts which secure the engine mounting.
(1) Raise up the lifting device, and lift the engine by approx. 10 mm (0.39 in).
(2) Remove the nuts which secure the engine mounting to the front crossmember assembly.



12) Remove the bolt, and remove the front crossmember support.

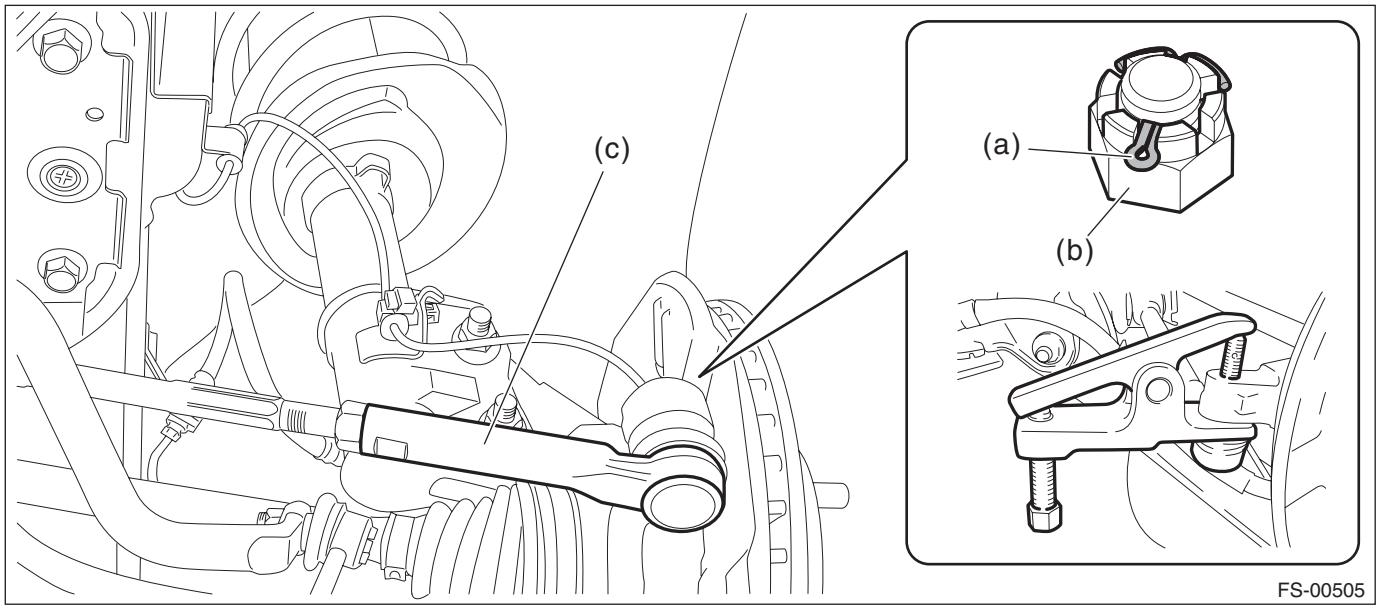


13) Remove the front exhaust pipe. <Ref. to EX(H4DO)-7, REMOVAL, Front Exhaust Pipe.>
14) Remove the front stabilizer.
    (1) Remove the left and right stabilizer links.
    (2) Remove the clamp - stabilizer bushing on the left and right sides.

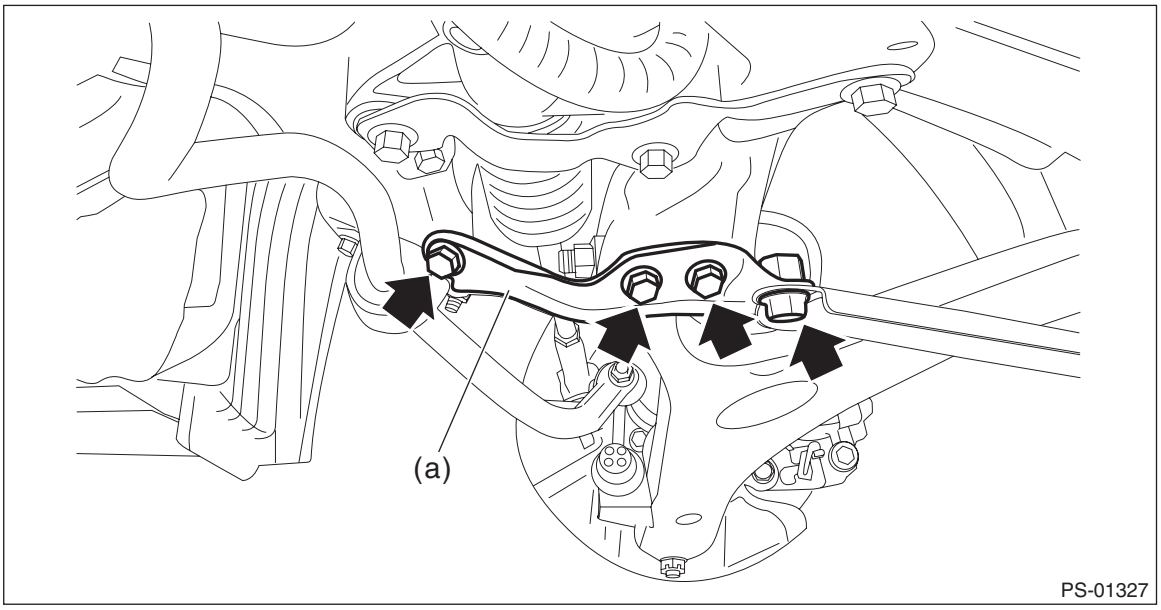


15) Disconnect the tie-rod end.
(1) Pull out the cotter pin (a).
(2) Remove the castle nut (b).
(3) Using a tie-rod ball joint puller, remove the tie-rod end (c).

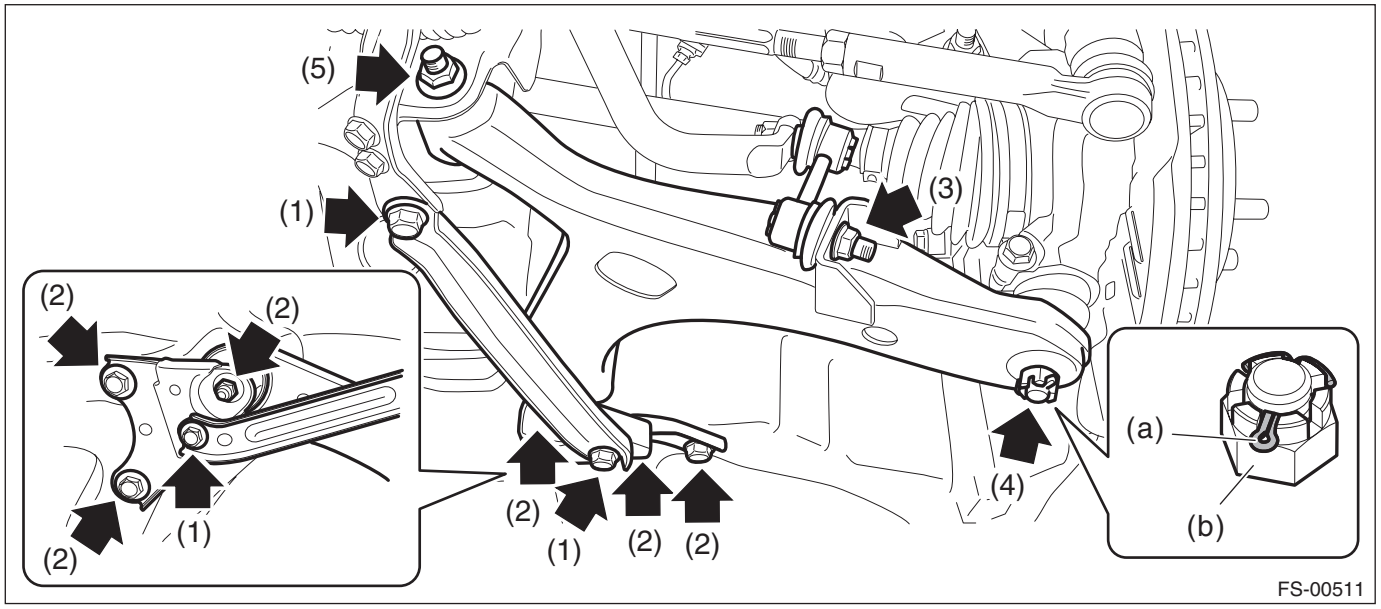
Preparation tool:
Tie-rod ball joint puller



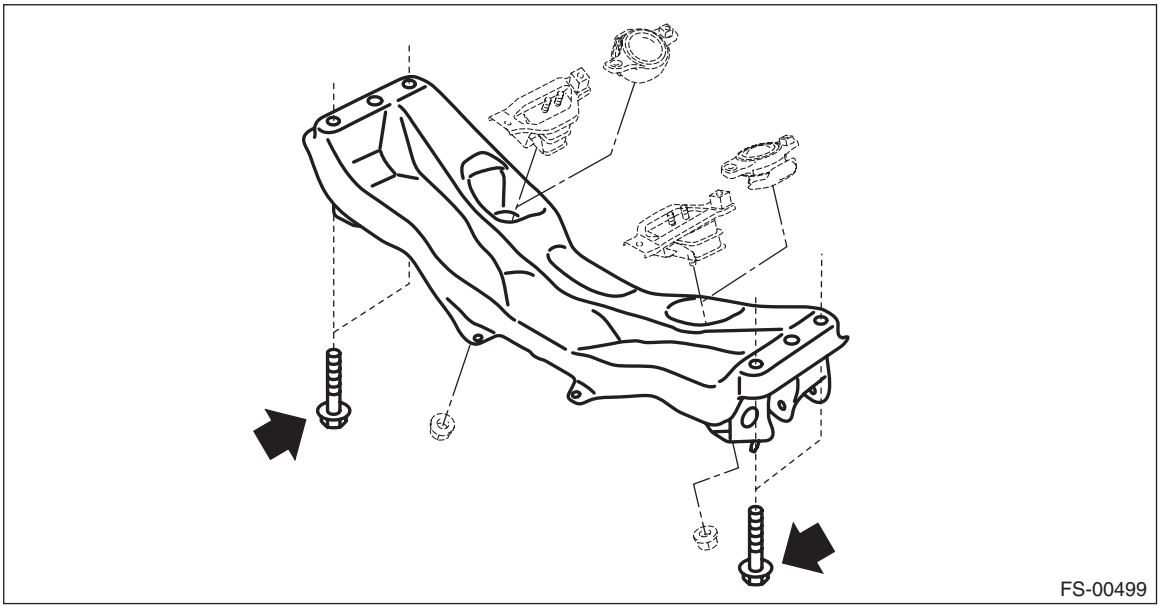
16) Remove the support plate - front crossmember (a).



17) Remove the front arm assembly.
(1) Remove the bolt, and then detach the front support.
(2) Remove the bolts and nuts, and then remove the front arm rear plate.
(3) Remove the nut and disconnect the stabilizer link assembly.
(4) Pull out the cotter pin (a), remove the castle nut (b), and remove the ball joint from front arm assembly.
(5) Remove the nuts, pull out the flange bolt, and remove the front arm assembly.



18) Support the front crossmember assembly using a jack, and remove the bolts which hold the crossmember on the body.



19) Slowly lower the front crossmember assembly with the steering gearbox assembly as a single unit.

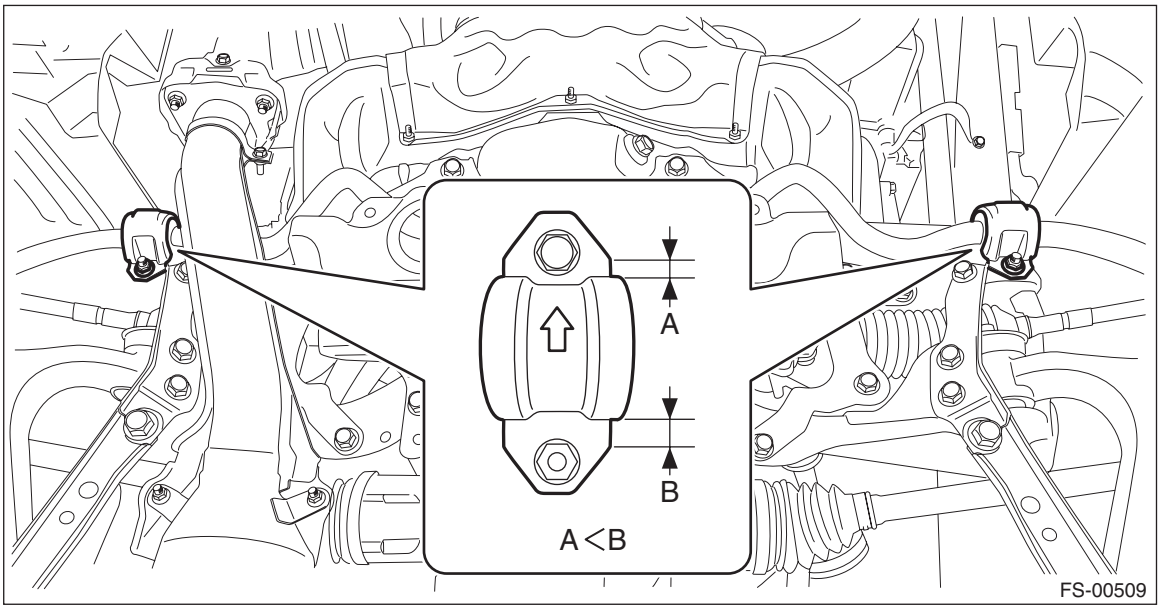
CAUTION:
When removing the crossmember, make sure that the tie-rod end does not interfere with the drive shaft boot.

20) Remove the steering gearbox assembly from the front crossmember assembly.

B: INSTALLATION

1) Check the crossmember for damage or cracks, and correct or replace if defective.
2) Install the universal joint assembly - steering. <Ref. to PS-14, INSTALLATION, Universal Joint.>
3) Install each part in the reverse order of removal.

CAUTION:
• Use a new bolt and self-locking nut. For parts which are not reusable, refer to "COMPONENT". <Ref. to FS-3, COMPONENT, General Description.>
• Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.
• Install the clamp - stabilizer bushing with the arrow mark facing the front of the vehicle.



Tightening torque:
Engine mount — front crossmember assembly: 45 N·m (4.59 kgf-m, 33.2 ft-lb)
Universal joint assembly - steering: 24 N·m (2.45 kgf-m, 17.7 ft-lb)
V-belt cover: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
Under cover - front: 17.5 N·m (1.78 kgf-m, 12.9 ft-lb)
Front suspension parts: <Ref. to FS-3, FRONT SUSPENSION, COMPONENT, General Description.>
When tightening the castle nut, tighten the castle nut to the specified torque first, then tighten it further but within 60° until the hole in the ball stud is aligned with a slot in castle nut.
4) Install the front wheels.

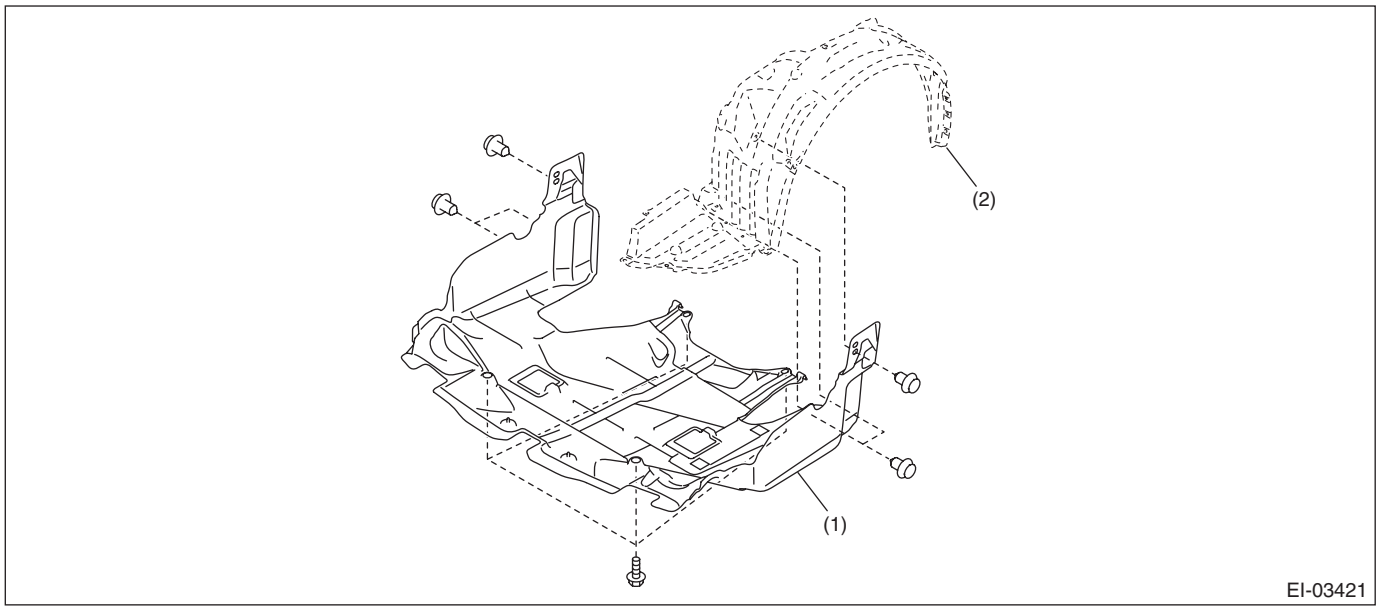
Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)
5) Inspect the wheel alignment and adjust if necessary.
• Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
• Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC.
6) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

4. Front Crossmember Support Plate

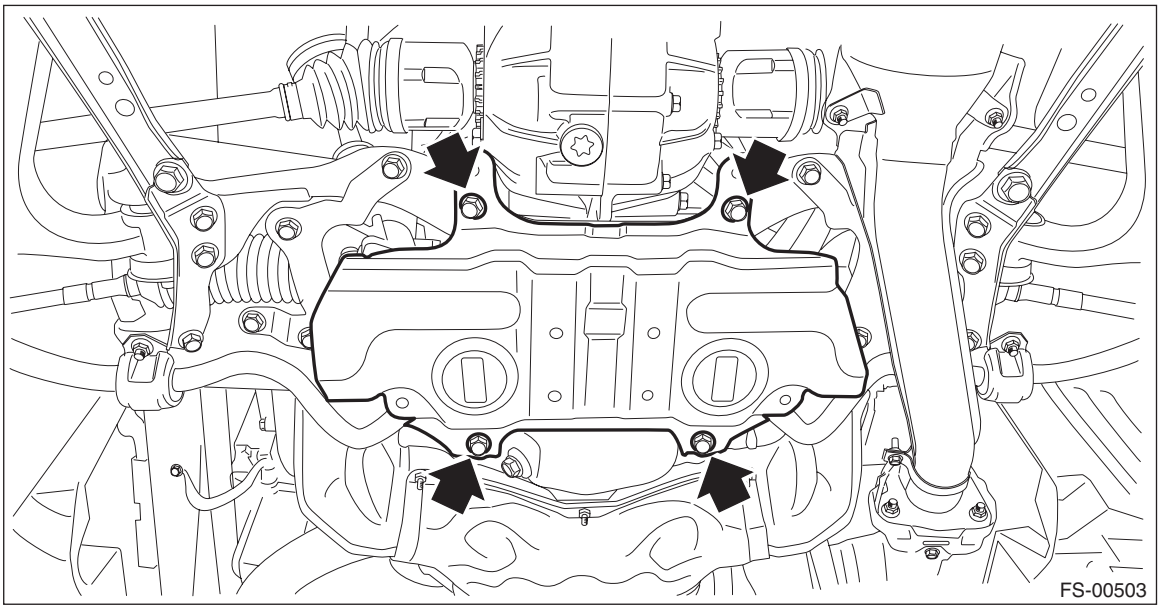
A: REMOVAL

1) Lift up the vehicle.
2) Remove the bolts and clips, and remove the under cover - front.



(1) Under cover - front (2) Mud guard - front

3) Remove the bolt, and remove the front crossmember support.



B: INSTALLATION

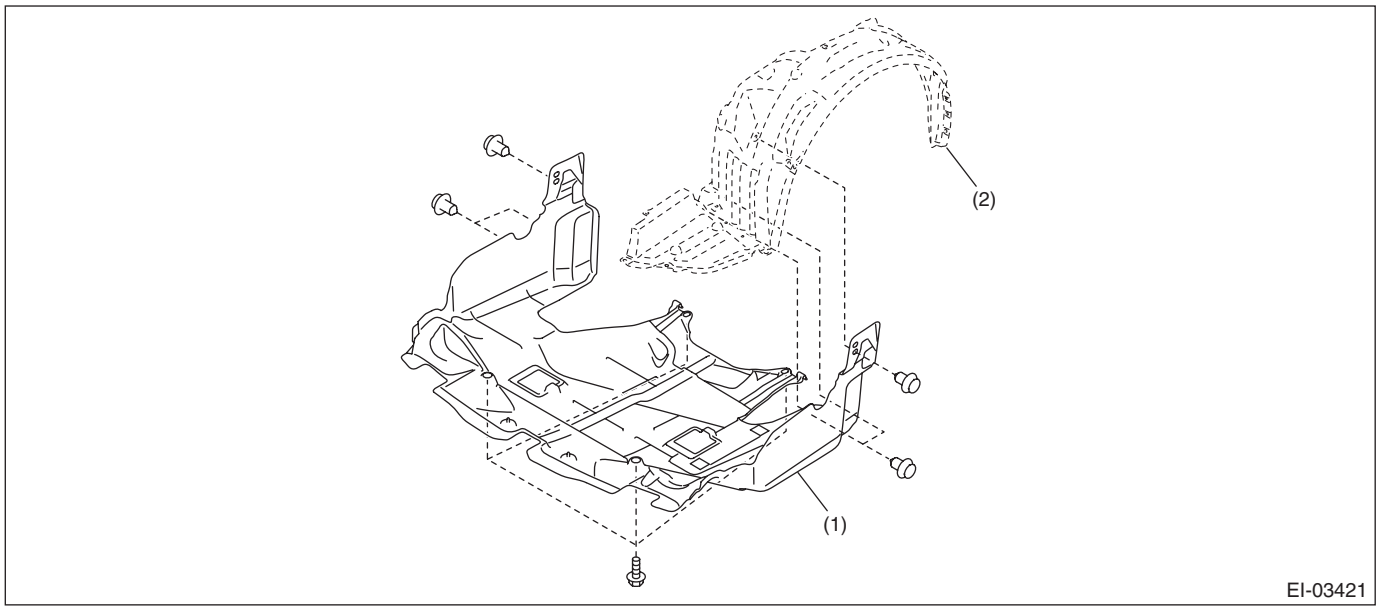
Install each part in the reverse order of removal.

Tightening torque:
Front crossmember support — front crossmember assembly: 60 N·m (6.12 kgf-m, 44.3 ft-lb)
Under cover - front: 17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

5. Front Stabilizer

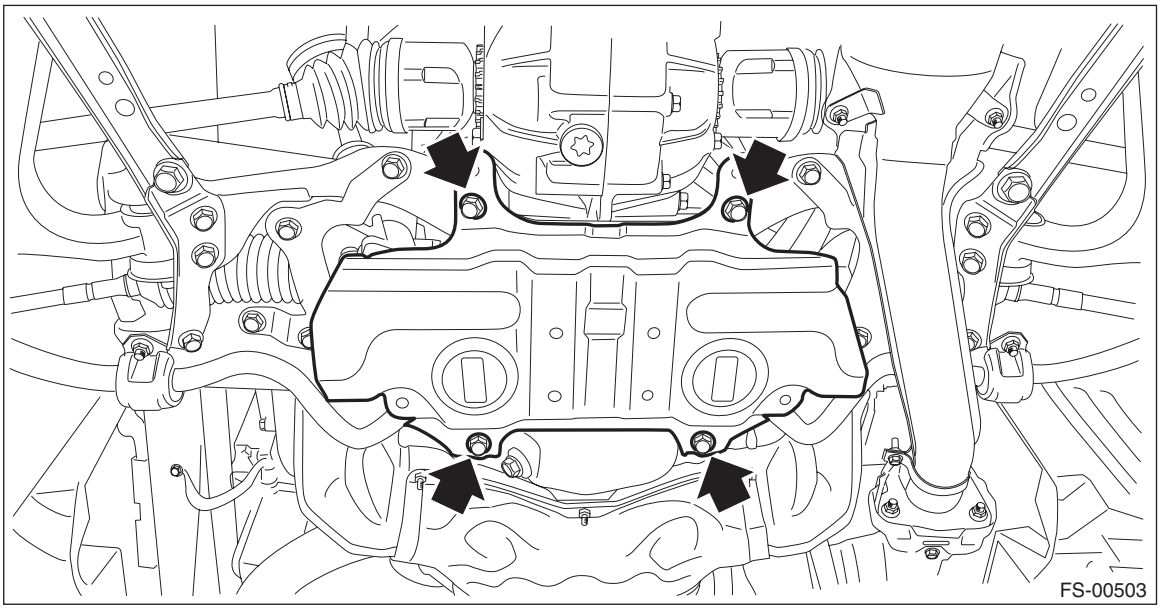
A: REMOVAL

1) Lift up the vehicle, and then remove the left and right front wheels.
2) Remove the bolts and clips, and remove the under cover - front.

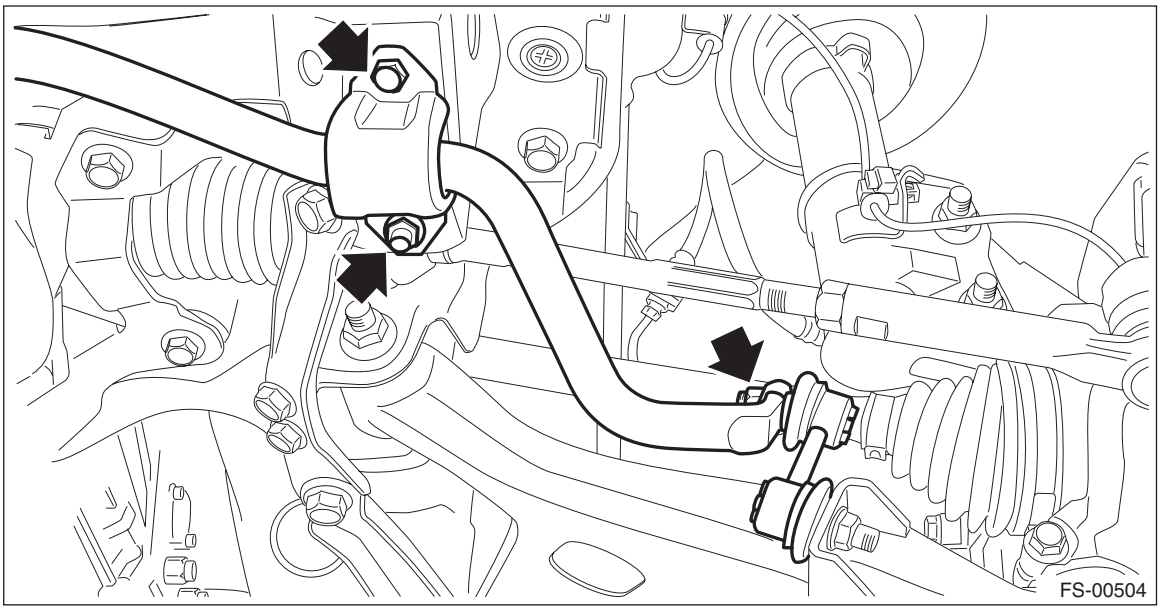


(1) Under cover - front (2) Mud guard - front

3) Remove the bolt, and remove the front crossmember support.



4) Remove the front stabilizer.
   (1) Remove the left and right stabilizer links.
   (2) Remove the clamp - stabilizer bushing on the left and right sides.

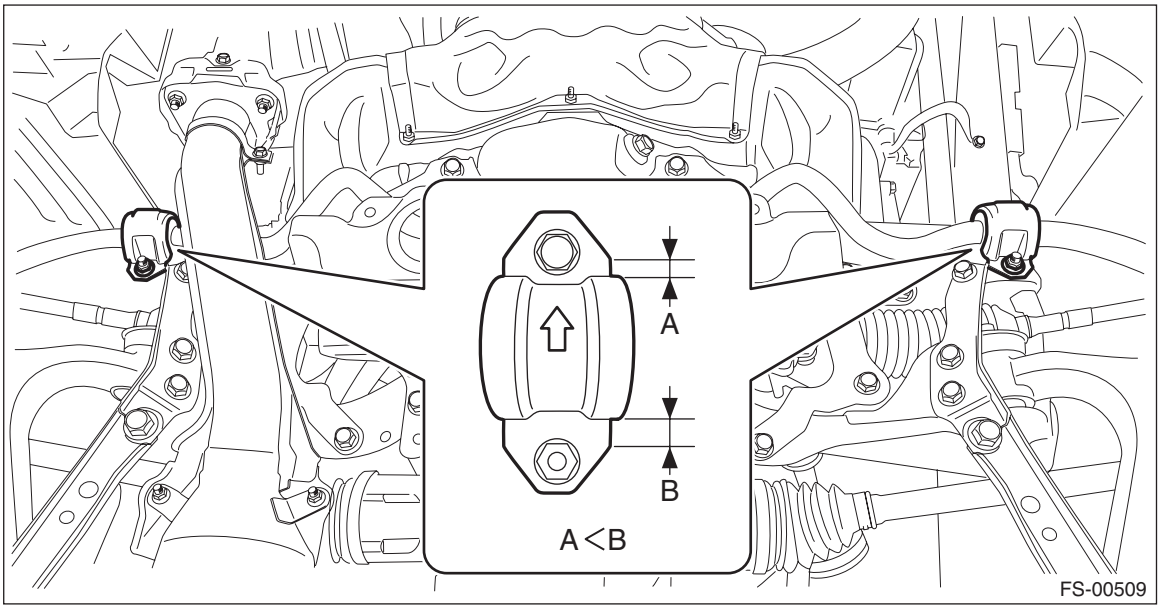


B: INSTALLATION

1) Before installation, inspect the following items and replace any faulty part with a new one.
- Check the bushing - stabilizer for abnormal cracks, fatigue or damage.
- Check the stabilizer link assembly for damage.

2) Install each part in the reverse order of removal.

CAUTION:
Install the clamp - stabilizer bushing with the arrow mark facing the front of the vehicle.



Tightening torque:
Clamp - stabilizer bushing: 25 N·m (2.55 kgf-m, 18.4 ft-lb)
Stabilizer link assembly: 38 N·m (3.87 kgf-m, 28.0 ft-lb)
Support plate - front crossmember: 60 N·m (6.12 kgf-m, 44.3 ft-lb)
Under cover - front: 17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

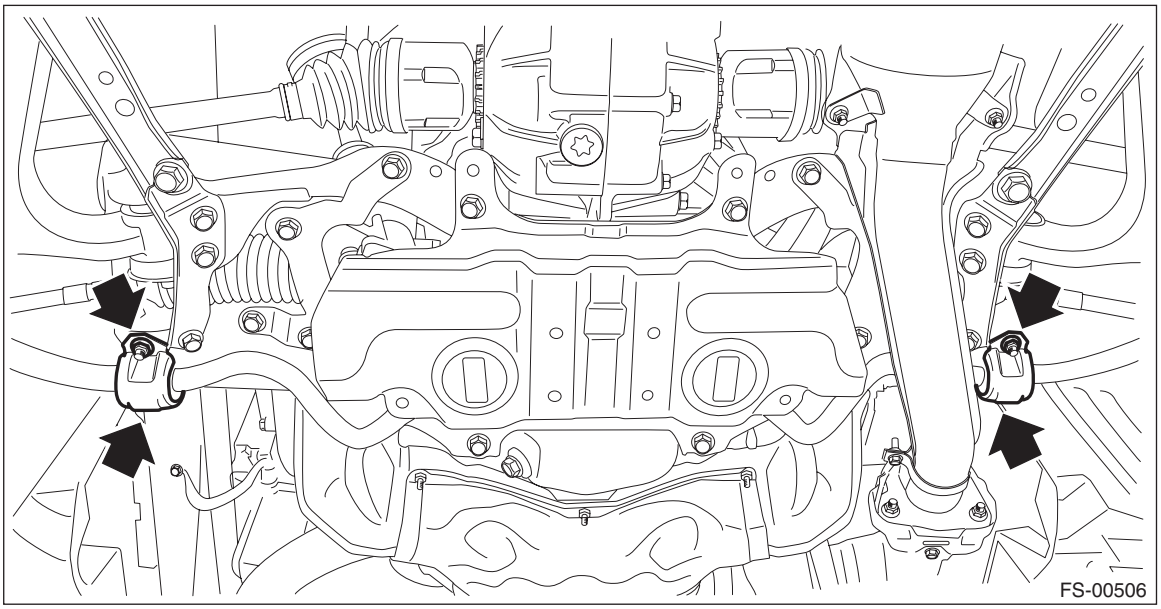
3) Install the front wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

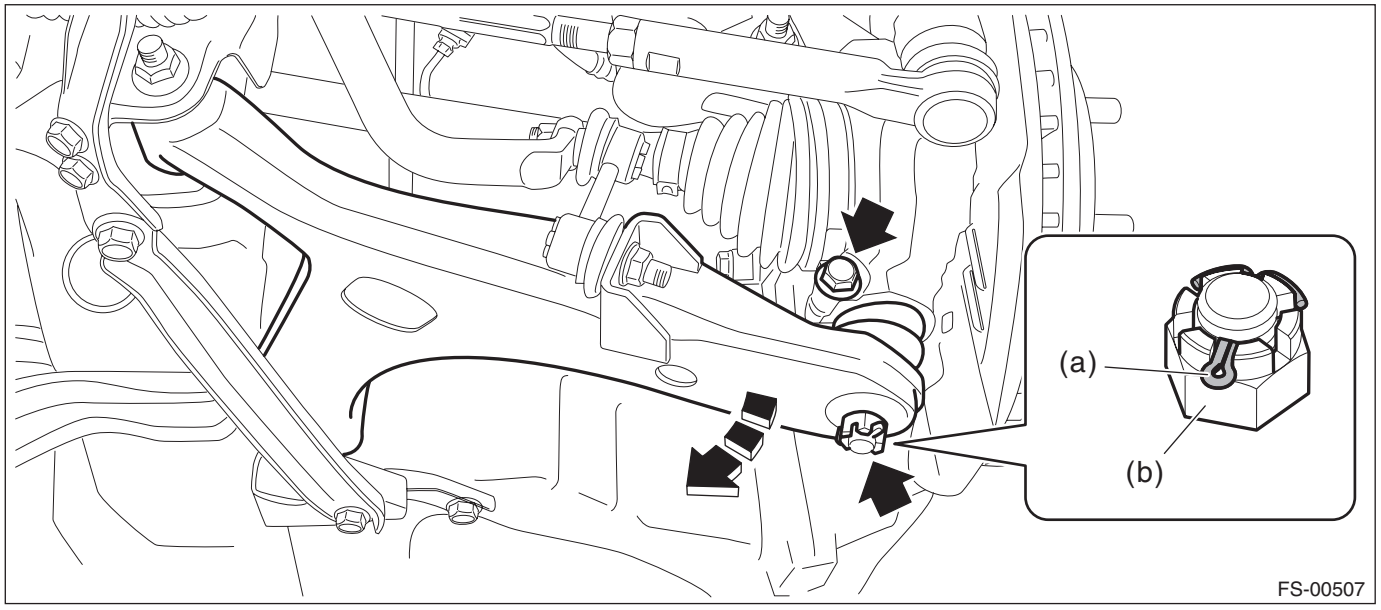
6. Front Ball Joint

A: REMOVAL

1) Lift up the vehicle, and then remove the front wheels.
2) Remove the clamp - stabilizer bushing on the left and right sides.



3) Remove the ball joint assembly.
   (1) Pull out the cotter pin (a), and remove the castle nut (b).
   (2) Lower the front arm assembly, and remove the ball stud.
   (3) Remove the bolt from the housing assembly - front axle.

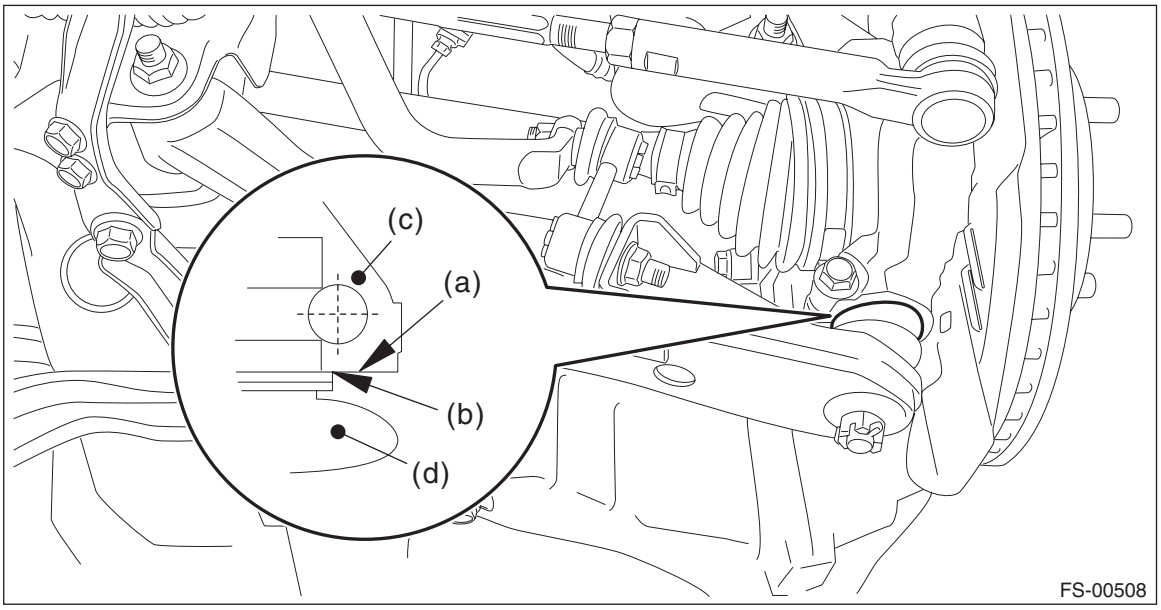


   (4) Extract the ball joint assembly from the housing assembly - front axle.

B: INSTALLATION

1) Install the ball joint assembly to the housing assembly - front axle.

CAUTION:
- **Do not apply grease to the tapered portion of ball stud.**
- **Before tightening, make sure the bottom surface of the housing assembly - front axle and the stepped section of ball joint are in contact.**



(a) Bottom surface of housing ASSY - front axle
(b) Raised section of ball joint
(c) Housing ASSY - front axle
(d) Ball joint ASSY

Tightening torque:
50 N·m (5.10 kgf-m, 36.9 ft-lb)

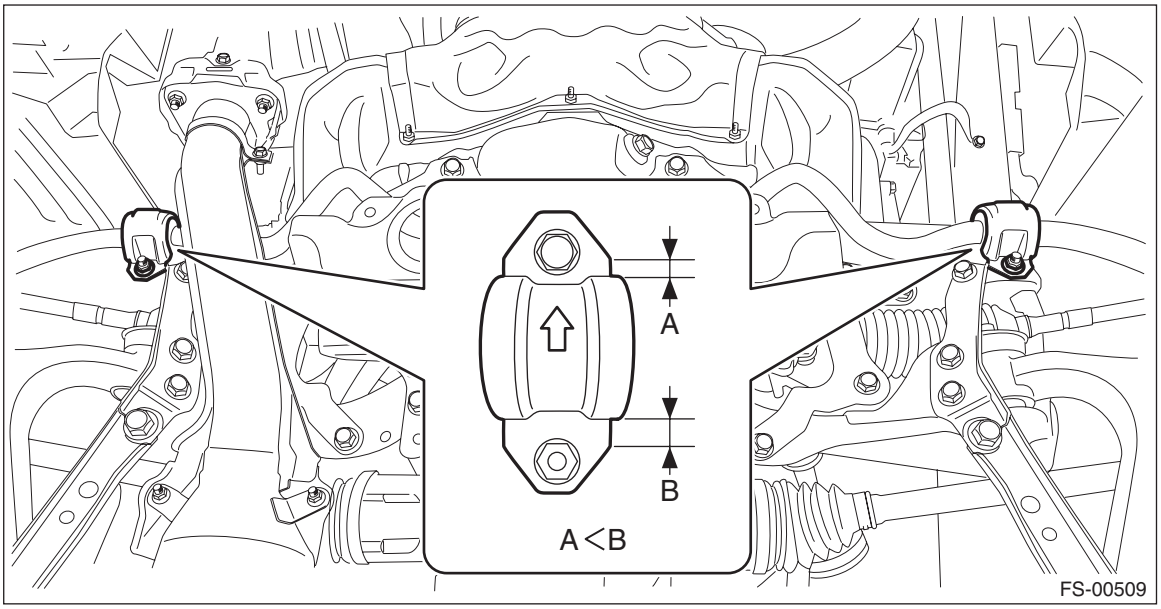
2) Install the ball joint assembly to the front arm assembly.
(1) Connect the ball joint assembly to the front arm assembly.

Tightening torque:
39 N·m (3.98 kgf-m, 28.8 ft-lb)

(2) Retighten the castle nut further up to 60° until the hole in the ball stud is aligned with a slot in castle nut.
(3) Insert a new cotter pin and bend it around the castle nut.

3) Install the clamp - stabilizer bushing.

CAUTION:
Install the clamp - stabilizer bushing with the arrow mark facing the front of the vehicle.



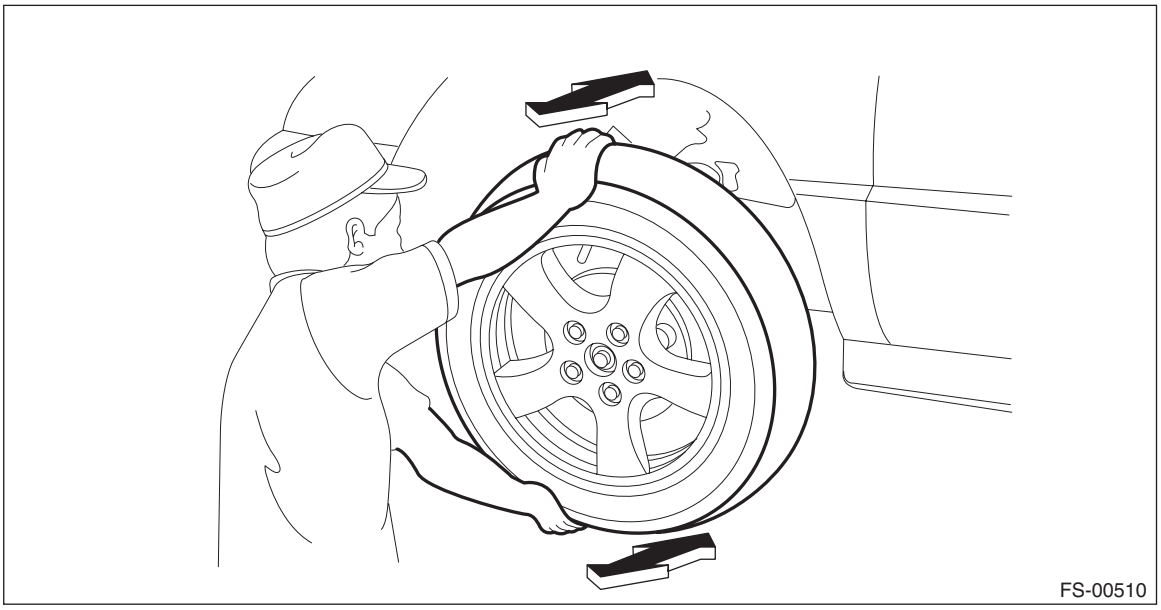
Tightening torque:
25 N·m (2.55 kgf-m, 18.4 ft-lb)

4) Install the front wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

1) Check that there is no play by moving the upper and lower portions of front tire in an axial direction with the brake pedal depressed.



- **Play exists.** → Replace the ball joint assembly. <Ref. to FS-32, REMOVAL, Front Ball Joint.>

2) Check that there is no play by moving the upper and lower portions of front tire in an axial direction with the brake pedal released.

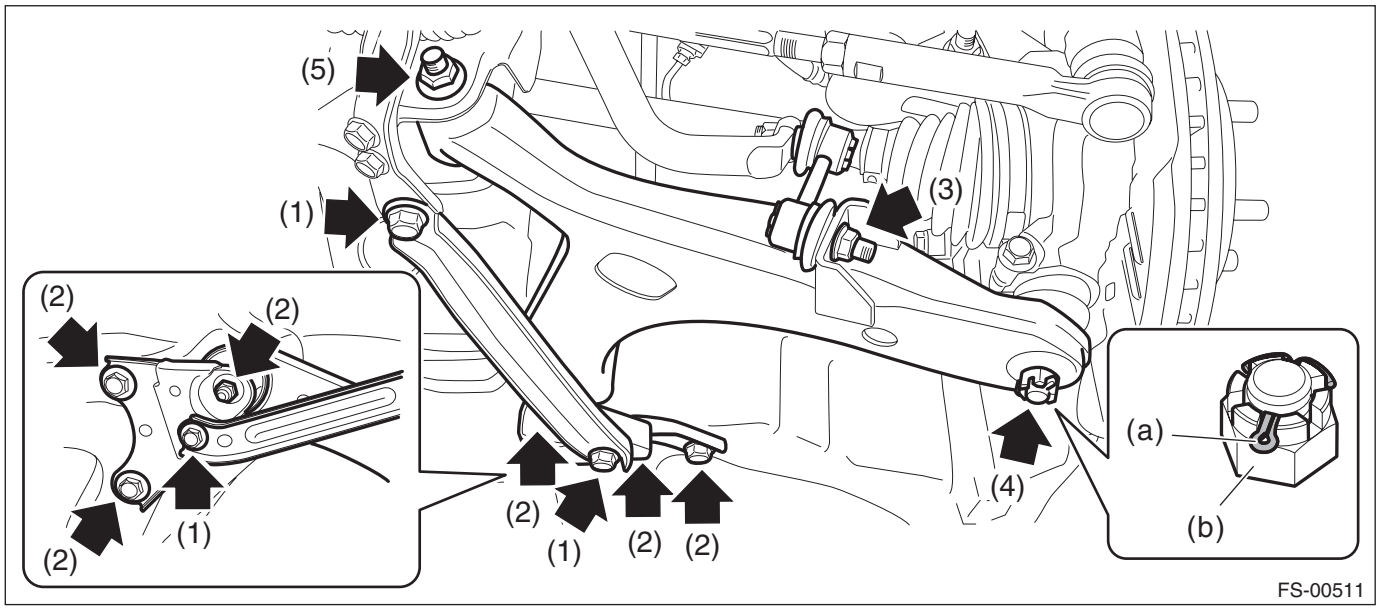
- **Play exists.** → Check the hub unit COMPL - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>

3) Replace the ball joint assembly if the dust cover is damaged when visually inspecting the dust cover.

7. Front Arm

A: REMOVAL

1) Lift up the vehicle, and then remove the front wheels.
2) Remove the front arm assembly.
   (1) Remove the bolt, and then detach the front support.
   (2) Remove the bolts and nuts, and then remove the front arm rear plate.
   (3) Remove the nut and disconnect the stabilizer link assembly.
   (4) Pull out the cotter pin (a), remove the castle nut (b), and remove the ball joint assembly from front arm assembly.
   (5) Remove the nuts, pull out the flange bolt, and remove the front arm assembly.

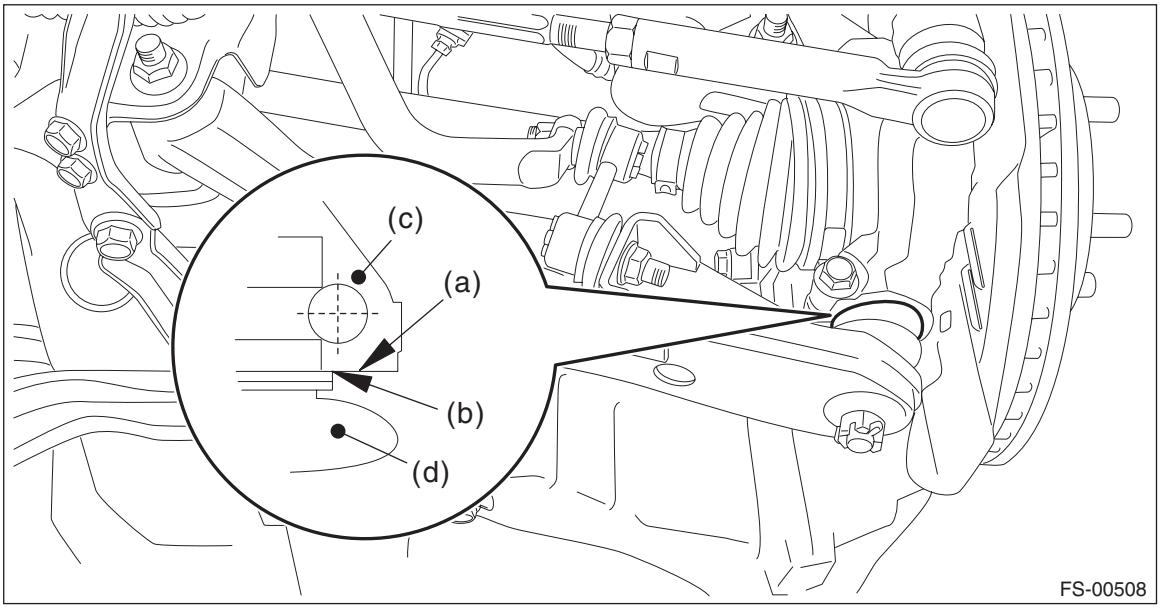


B: INSTALLATION

1) Before installation, inspect the following items and replace any faulty part with a new one.
- Check the front arm assembly for damage or cracks, and replace if defective.
- Visually check the bushing for abnormal cracks, fatigue or damage.
- Visually check the dust cover on the ball joint assembly for damage.

2) Using new self-locking nuts and flange bolts, temporarily tighten the front arm assembly to the front crossmember assembly.
3) Install the ball joint assembly to the housing assembly - front axle.

CAUTION:
Before tightening, make sure the bottom surface of the housing assembly - front axle and the stepped section of ball joint are in contact.



(a) Bottom surface of housing ASSY - front axle
(c) Housing ASSY - front axle
(d) Ball joint ASSY
(b) Raised section of ball joint

Tightening torque:
50 N·m (5.10 kgf-m, 36.9 ft-lb)

4) Install the stabilizer link assembly.

Tightening torque:
Except for XV model: 38 N·m (3.87 kgf-m, 28.0 ft-lb)
XV model: 60 N·m (6.12 kgf-m, 44.3 ft-lb)

5) Install the front wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

6) Unload the vehicle from the lift, and tighten the bolt which secures the front arm assembly to the front crossmember assembly while the wheels are in full contact with the ground and the vehicle is at curb weight.

Tightening torque:
Busing front - front arm: 95 N·m (9.7 kgf-m, 70.1 ft-lb)
Busing rear - front arm: 110 N·m (11.22 kgf-m, 81.1 ft-lb)

7) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC.

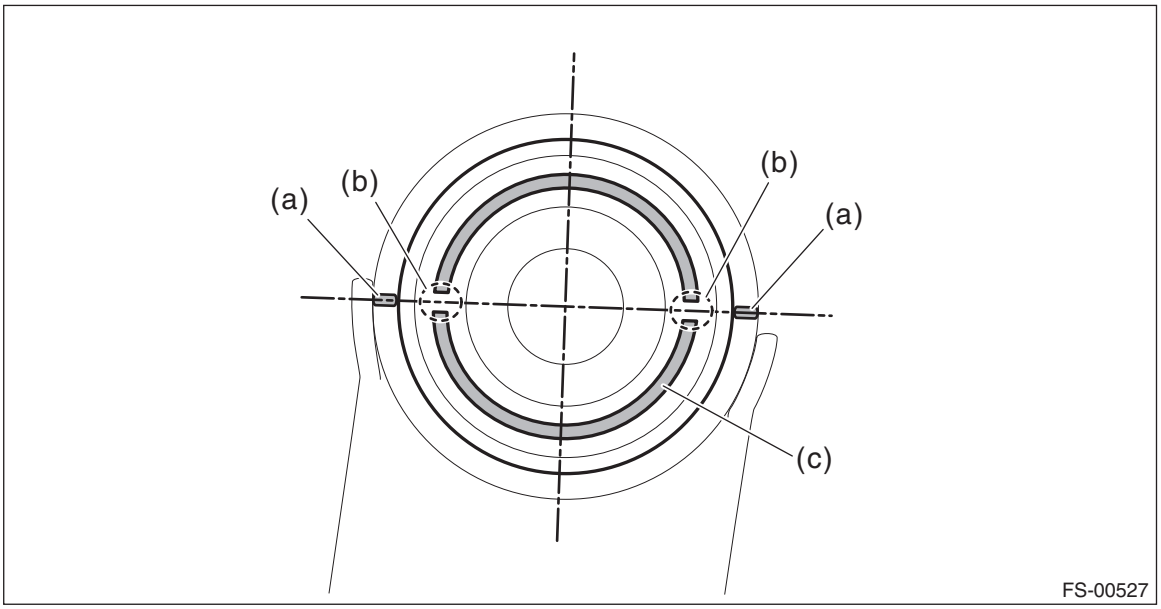
8) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

C: DISASSEMBLY

1. BUSHING FRONT - FRONT ARM

1) Put an alignment mark on the front arm assembly based on the split portion of the bushing intermediate plate of the busing front - front arm.

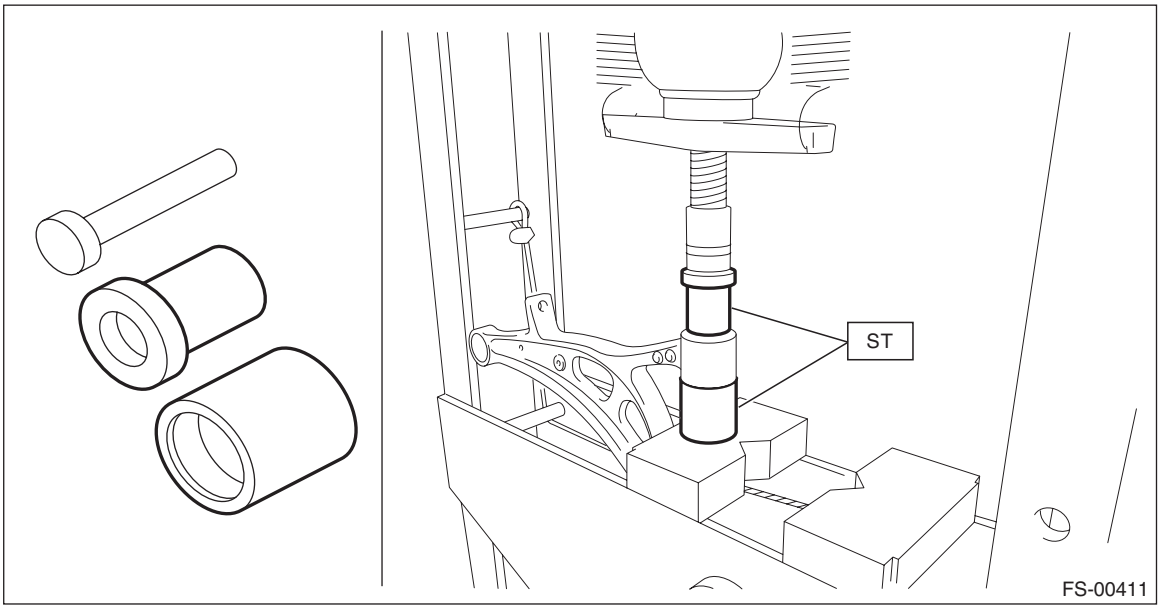
CAUTION:
Always put an alignment mark for aligning the position on bushing installation.



(a) Put an alignment mark.
(b) Split portion of bushing intermediate plate
(c) Bushing intermediate plate

2) Using the ST and a press, remove the busing front - front arm.

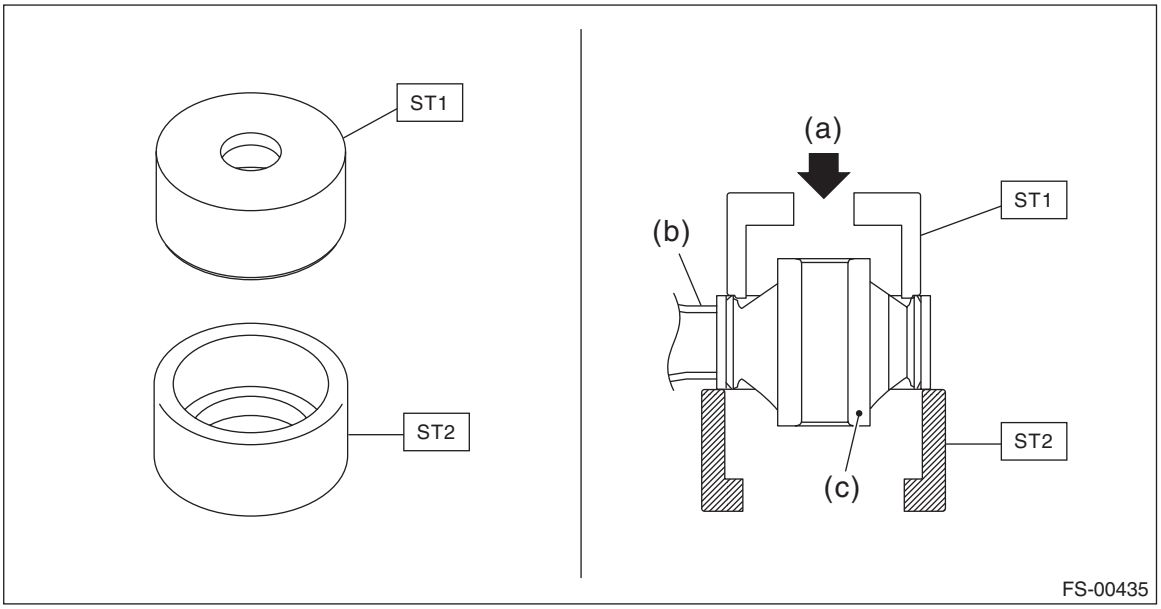
PREPARATION TOOL:
ST: INSTALLER & REMOVER SET (927680000)



2. BUSHING REAR - FRONT ARM

1) Put an alignment mark on the front arm assembly based on the center of recess portion of the busing rear - front arm.
2) Using the ST and a press, remove the busing rear - front arm.

PREPARATION TOOL:
ST1: REMOVER (20299AG000)
ST2: BASE (20299AG010)



(a) Press (b) Front arm ASSY (c) Bushing rear - front arm

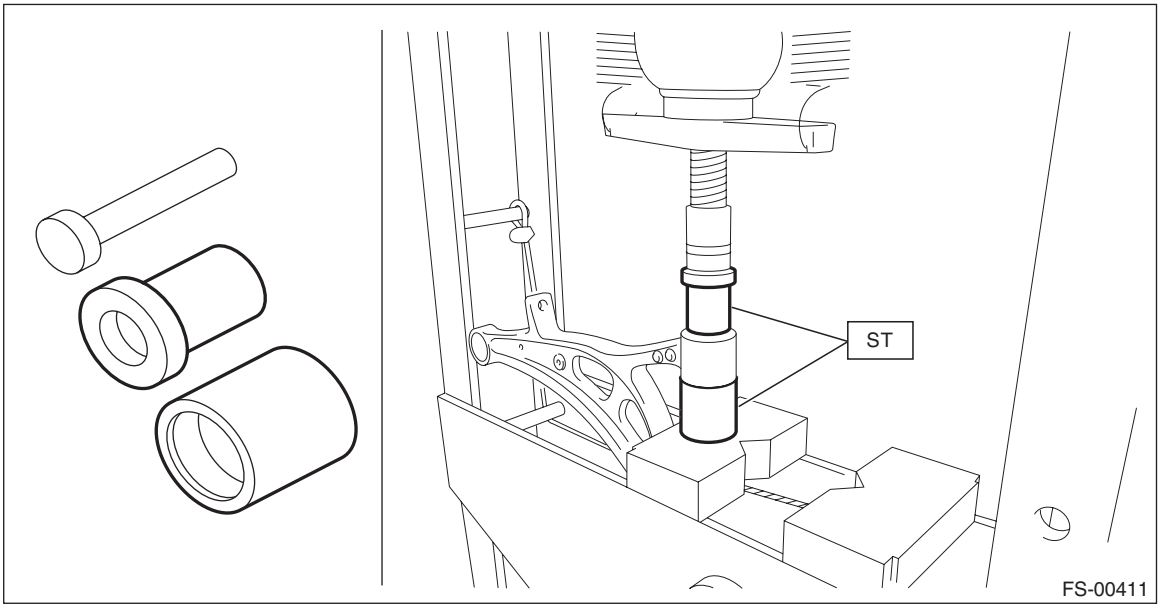
D: ASSEMBLY

1. BUSHING FRONT - FRONT ARM

1) Before assembly, inspect the following items and replace any faulty part with a new one.
- Check the front arm assembly for damage or cracks, and replace if defective.
- Visually check the bushing for abnormal cracks, fatigue or damage.
- Visually check the dust cover on the ball joint assembly for damage.

2) Align the alignment mark on the front arm assembly to the split portion of the bushing intermediate plate of the busing front - front arm.
3) Using the ST and a press, assemble the busing front - front arm.

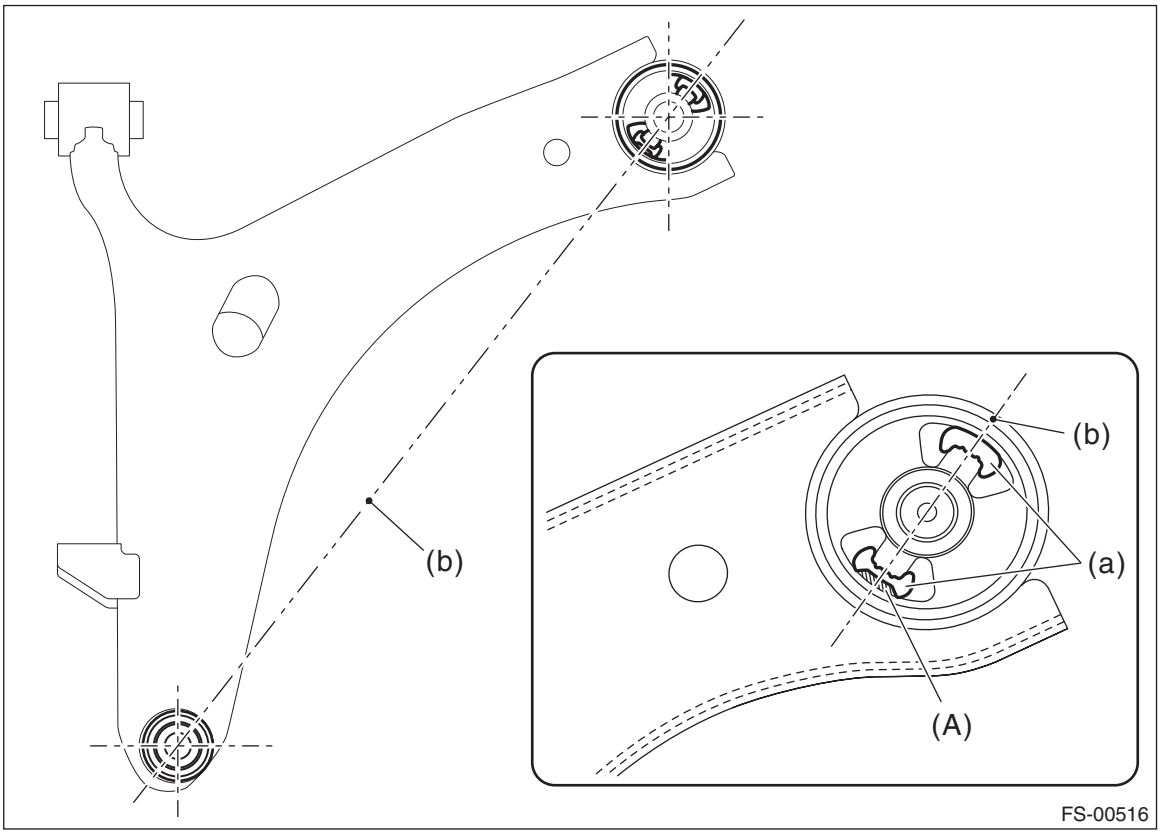
PREPARATION TOOL:
ST: INSTALLER & REMOVER SET (927680000)



2. BUSHING REAR - FRONT ARM

1) Before installation, inspect the following items and replace any faulty part with a new one.
- Check the front arm assembly for damage or cracks, and replace if defective.
- Visually check the bushing for abnormal cracks, fatigue or damage.
- Visually check the dust cover on the ball joint assembly for damage.

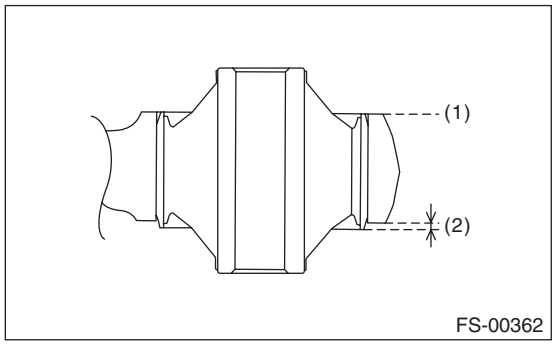
2) Align a line extending from the center of recess portion with the ball joint after placing the protrusion (A) of recess portion to the ball joint side of the front arm assembly.



(a) Recess section
(b) Center line of recess section

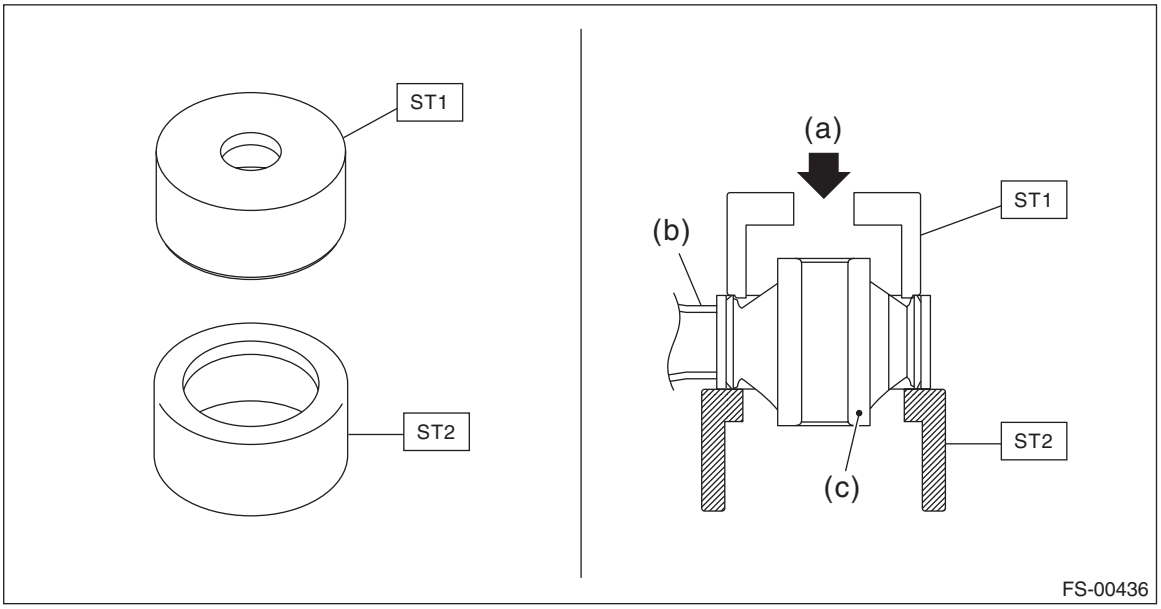
3) Using the ST and a press, install the busing rear - front arm.

CAUTION:
Align the upper face of front arm assembly and the end of bushing during installation.



(1) Aligned
(2) Not aligned

PREPARATION TOOL:
ST1: REMOVER (20299AG000)
ST2: BASE (20299AG010)



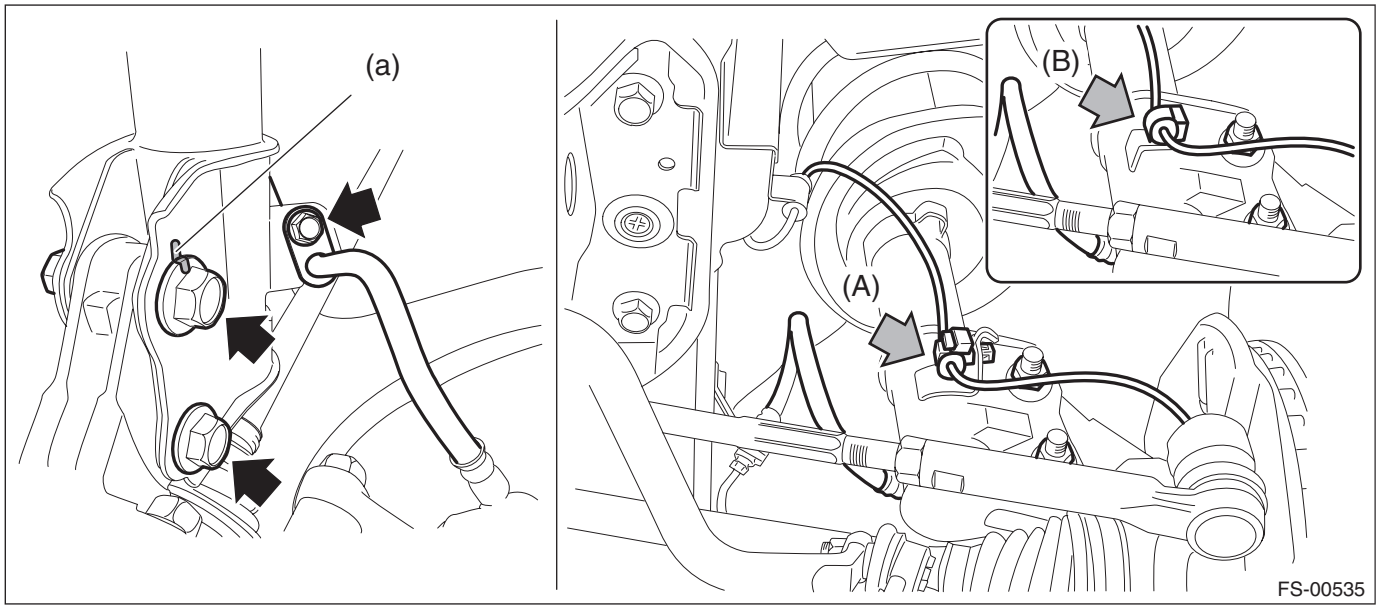
(a) Press (b) Front arm ASSY (c) Bushing rear - front arm

8. Front Strut

A: REMOVAL

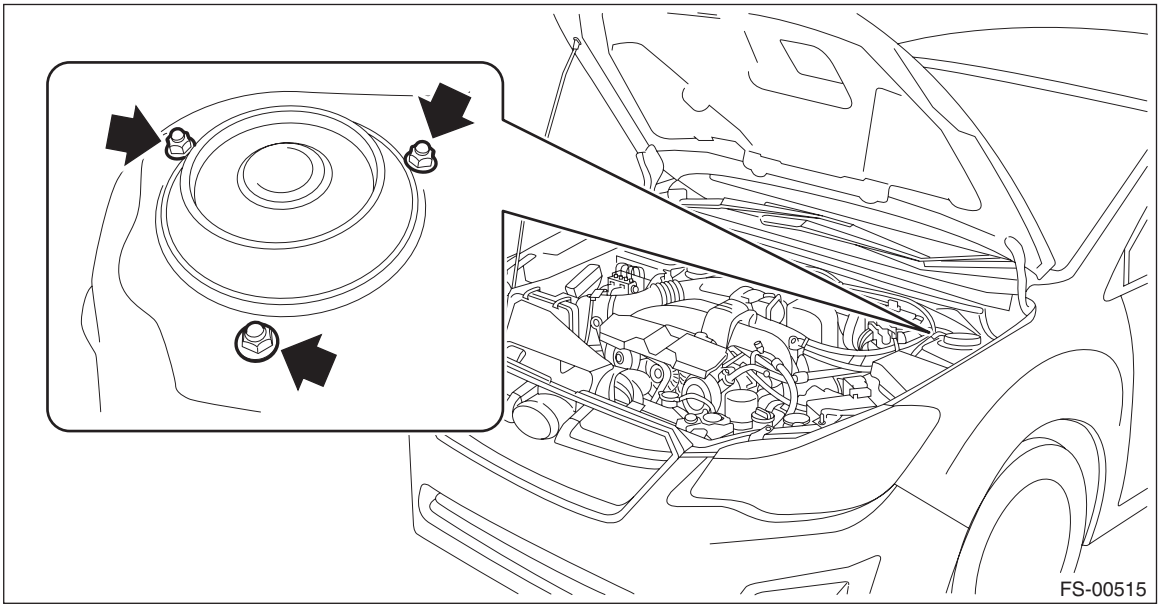
1) Lift up the vehicle, and then remove the front wheels.
2) Remove the front strut assembly.
   (1) Place an alignment mark (a) on the adjusting bolt and the strut.
   (2) Remove the brake hose bracket.
   (3) Remove the clamp of ABS wheel speed sensor harness.
   (4) Remove the adjusting bolts and flange bolts for the strut assembly.

CAUTION:
While holding the head of the adjusting bolt, loosen the flange nut.



(A) Except for XV model (B) XV model

(5) Remove the three nuts securing strut mount to body.



B: INSTALLATION

1) Install the strut mount - front at the upper side of the strut to the body, and tighten it with new self-locking nuts.

Tightening torque:
20 N·m (2.04 kgf-m, 14.8 ft-lb)

2) Align alignment marks on the camber adjusting bolt and strut.
Using new self-locking nuts, install the strut to the housing assembly - front axle.

NOTE:
While holding the head of adjusting bolt, tighten the nut.

Tightening torque:
155 N·m (15.81 kgf-m, 114.3 ft-lb)

3) Secure the ABS wheel speed sensor harness bracket to the strut.

CAUTION:
During the installation, make sure that the marking of ABS wheel speed sensor harness does not twist.

4) Install the brake hose bracket.

Tightening torque:
33 N·m (3.36 kgf-m, 24.3 ft-lb)

5) Install the front wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

6) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

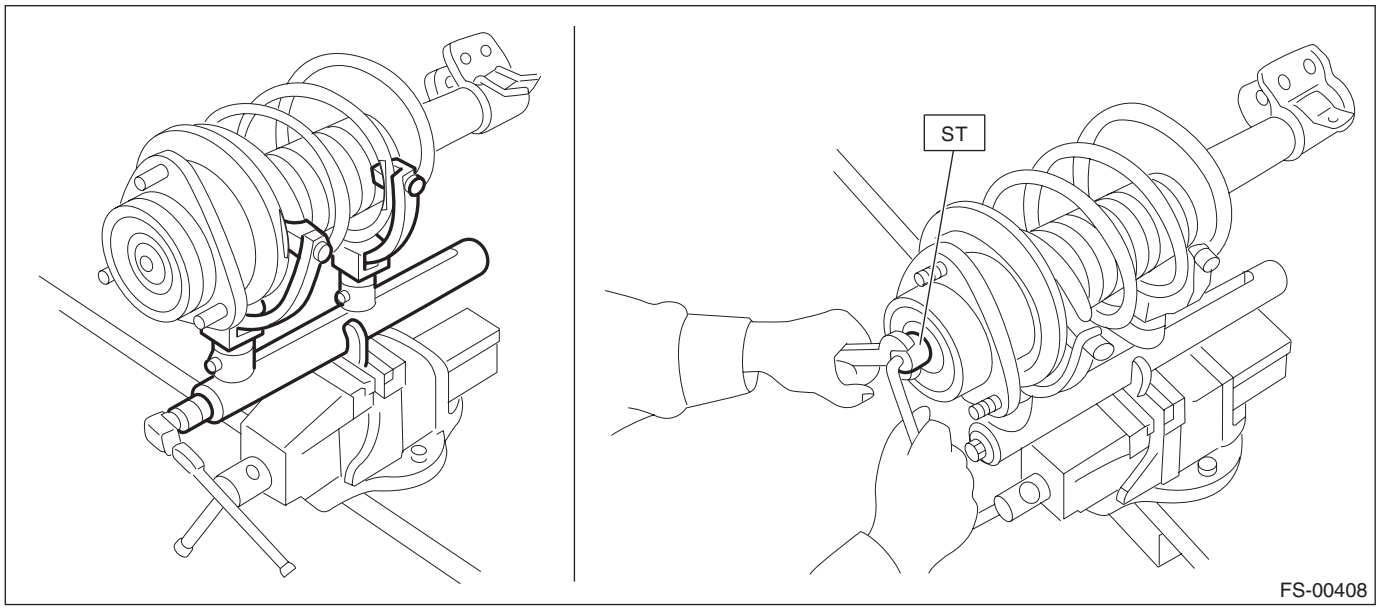
CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC.

7) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

C: DISASSEMBLY

1) Using a coil spring compressor, compress the coil spring - front.
2) Using the ST, remove the self-locking nut.

PREPARATION TOOL:
ST: STRUT MOUNT SOCKET (20399AG000)

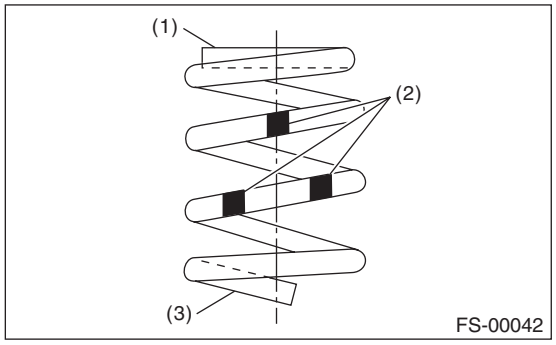


3) Remove the strut mount - front, spacer - front strut and spring seat - front strut UPR from the strut.
4) Gradually decrease the compression pressure of compressor, and remove the coil spring - front.
5) Remove the dust cover - inner and the helper - front strut.

D: ASSEMBLY

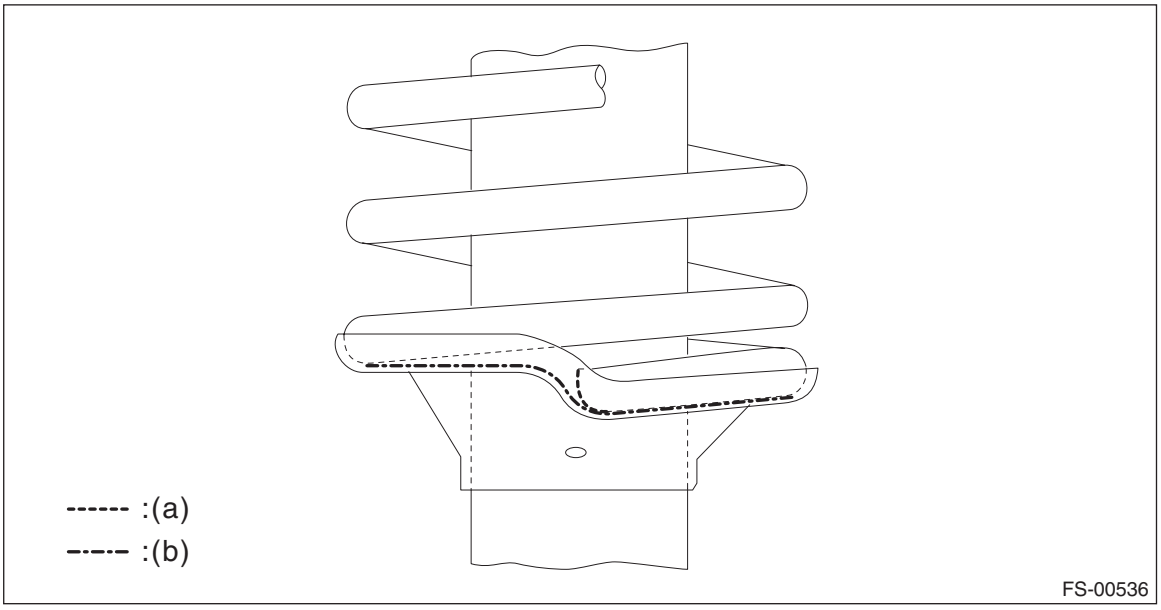
1) Before assembly, check each part. <Ref. to FS-48, INSPECTION, Front Strut.>
2) Using a coil spring compressor, compress the coil spring - front.

NOTE:
Make sure that the vertical installation direction of the coil spring - front is as shown in the figure.



(1) Diameter is small (Upper part)
(2) Identification paint
(3) Diameter is large (Bottom part)

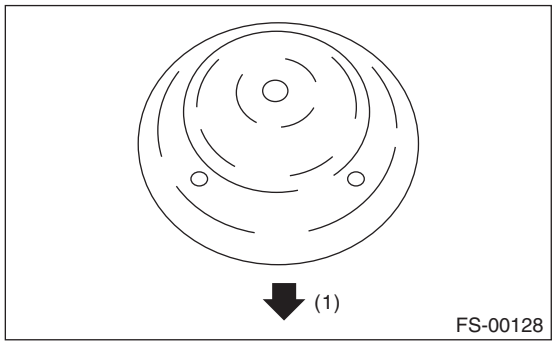
3) Set the coil spring - front correctly so that its end face (a) contacts the vertical surface (b) of the spring seat - front strut UPR as shown in the figure.



4) Install the dust cover - inner and the helper - front strut to the piston rod.

5) Pull the piston rod fully upward, and install the spring seat.

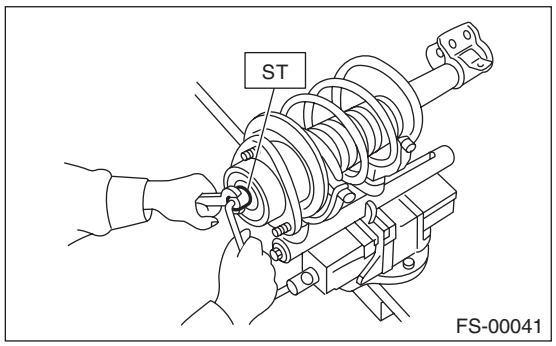
NOTE:
Position the spring seat - front strut UPR as shown in the figure.



(1) Outside of body

6) Install the spacer - front strut and the strut mount - front to the piston rod, and temporarily tighten a new self-locking nut.
7) Using a hexagon wrench to prevent strut rod from turning, tighten the new self-locking nut with ST.

PREPARATION TOOL:
ST: STRUT MOUNT SOCKET (20399AG000)



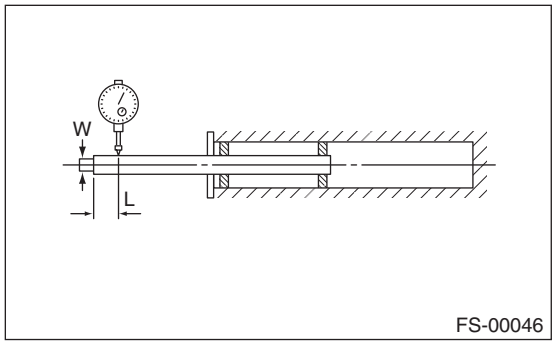
Tightening torque:
55 N·m (5.61 kgf-m, 40.6 ft-lb)
8) Loosen the coil spring compressor carefully.

E: INSPECTION

Check the removed part for wear, damage and cracks, and then repair or replace it if defective.

1. STRUT

1) Check for oil leaks.
2) Move the piston rod up and down to check that it operates smoothly without any hitch.
3) Check the piston rod for play.
   (1) Fix the outer shell in place and fully extend the rod.
   (2) Set the dial gauge on the end of the rod L [10 mm (0.39 in)].
   (3) While applying a force of W [20 N (2 kgf, 4 lbf)] to the threaded part, read the dial gauge indication P_1.
   (4) Apply a force of 20 N (2 kgf, 4 lbf) from the opposite direction of "W", and then read the dial gauge indication P_2.



Play limit ($P_1 + P_2$): 0.8 mm (0.031 in)

4) Replace the strut if faulty is found in the inspection or limit value is exceeded.

2. STRUT MOUNT - FRONT

Check the rubber part for deformation, cracks or deterioration, and then replace it with a new part if defective.

3. DUST COVER - INNER

If cracks or damage are found, replace it with a new part.

4. COIL SPRING - FRONT

If a permanent strain is found, replace it with a new part.

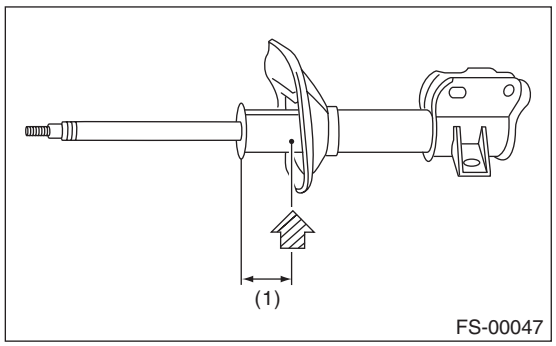
5. HELPER - FRONT STRUT

If major cracks or damage are found, replace it with a new part.

F: DISPOSAL

CAUTION:
- **Before handling struts, be sure to wear goggles to protect eyes from gas, oil and cutting powder.**
- **Do not disassemble the strut damper or throw into flames.**
- **When discarding gas filled struts, drill holes in them to purge the gas.**

1) Place the strut on a level surface with the piston rod fully expanded.
2) Using a 2 — 3 mm (0.08 — 0.12 in) dia. drill, make holes in areas shown in the figure.



(1) 40 mm (1.57 in)

9. General Diagnostic Table

A: INSPECTION

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible cause	Corrective action
(1) Permanent distortion or damage of the coil spring	Replace.
(2) Rough operation of strut or shock absorber	Replace.
(3) Improper installation of strut or shock absorber	Replace with appropriate parts.
(4) Installation of the wrong coil spring	Replace with appropriate parts.

2. POOR RIDE COMFORT

1) Large rebound shock
2) Rocking of the vehicle continues too long after running over bump and hump.
3) Excessive shock in bumping

Possible cause	Corrective action
(1) Damaged coil spring	Replace.
(2) Overinflation of tires	Adjust.
(3) Improper wheel arch height	Replace the coil springs with new parts.
(4) Fault in operation of strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitable length (maximum or minimum) of strut or shock absorber	Replace with appropriate parts.
(7) Abnormal deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly or shock absorber	Replace.
(9) Oil leakage from the strut or shock absorber	Replace.

3. NOISE

Possible cause	Corrective action
(1) Wear or damage of strut or shock absorber component parts	Replace.
(2) Loosening of the suspension link installing bolt	Tighten to the specified torque.
(3) Abnormal deformation or loss of bushing	Replace.
(4) Unsuitable length (maximum or minimum) of strut or shock absorber	Replace with appropriate parts.
(5) Damaged coil spring	Replace.
(6) Wear or damage of the ball joint	Replace.
(7) Deformation of the clamp - stabilizer bushing	Replace.

REAR SUSPENSION

RS

Page

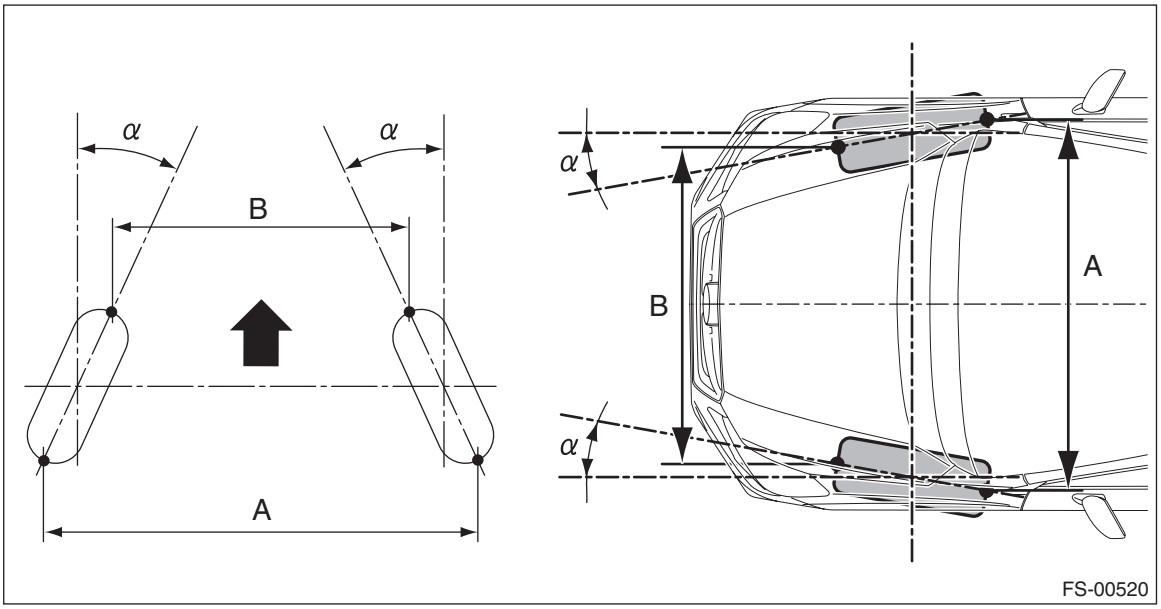
1. General Description 2
2. Wheel Alignment 8
3. Rear Sub Frame 9
4. Rear Stabilizer 14
5. Rear Trailing Link 16
6. Upper Arm 19
7. Front Lateral Link 21
8. Rear Lateral Link 24
9. Rear Shock Absorber 27
10. General Diagnostic Table 33

1. General Description

A: SPECIFICATION

Refer to “SPECIFICATIONS” in “FRONT SUSPENSION” section for rear suspension specifications. <Ref. to FS-2, SPECIFICATION, General Description.>

NOTE:
• Front toe-in, rear toe-in and front camber can be adjusted. Adjust if the value of toe-in or camber exceeds the tolerance range of the specification chart.
• Other items except for front toe-in, rear toe-in and front camber that are described in the specification chart cannot be adjusted. If other items exceed the tolerance range of the specification chart, check the suspension parts and connections for deformation. If defective, replace with new parts.

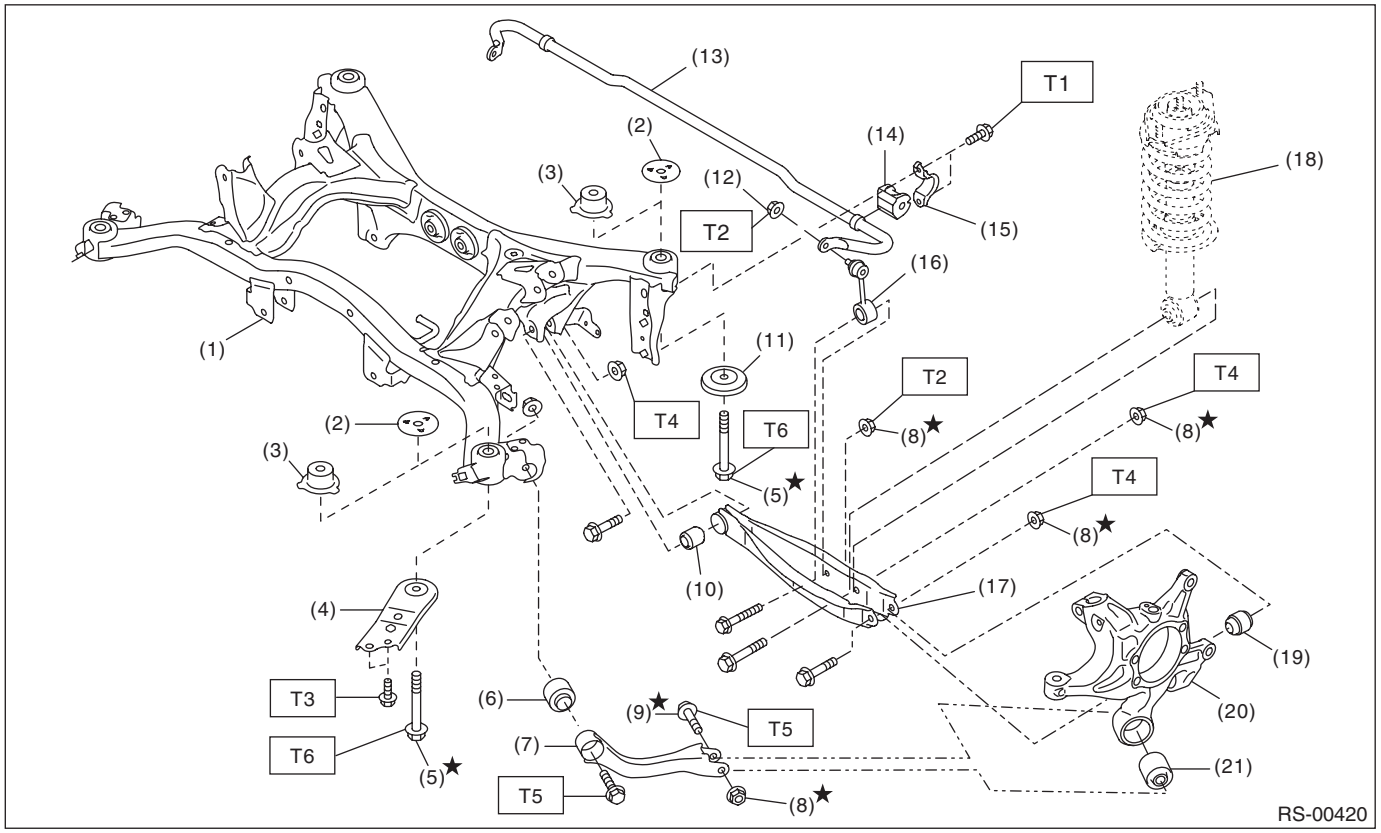


A – B = Positive: Toe-in, Negative: Toe-out

α = Individual toe angles

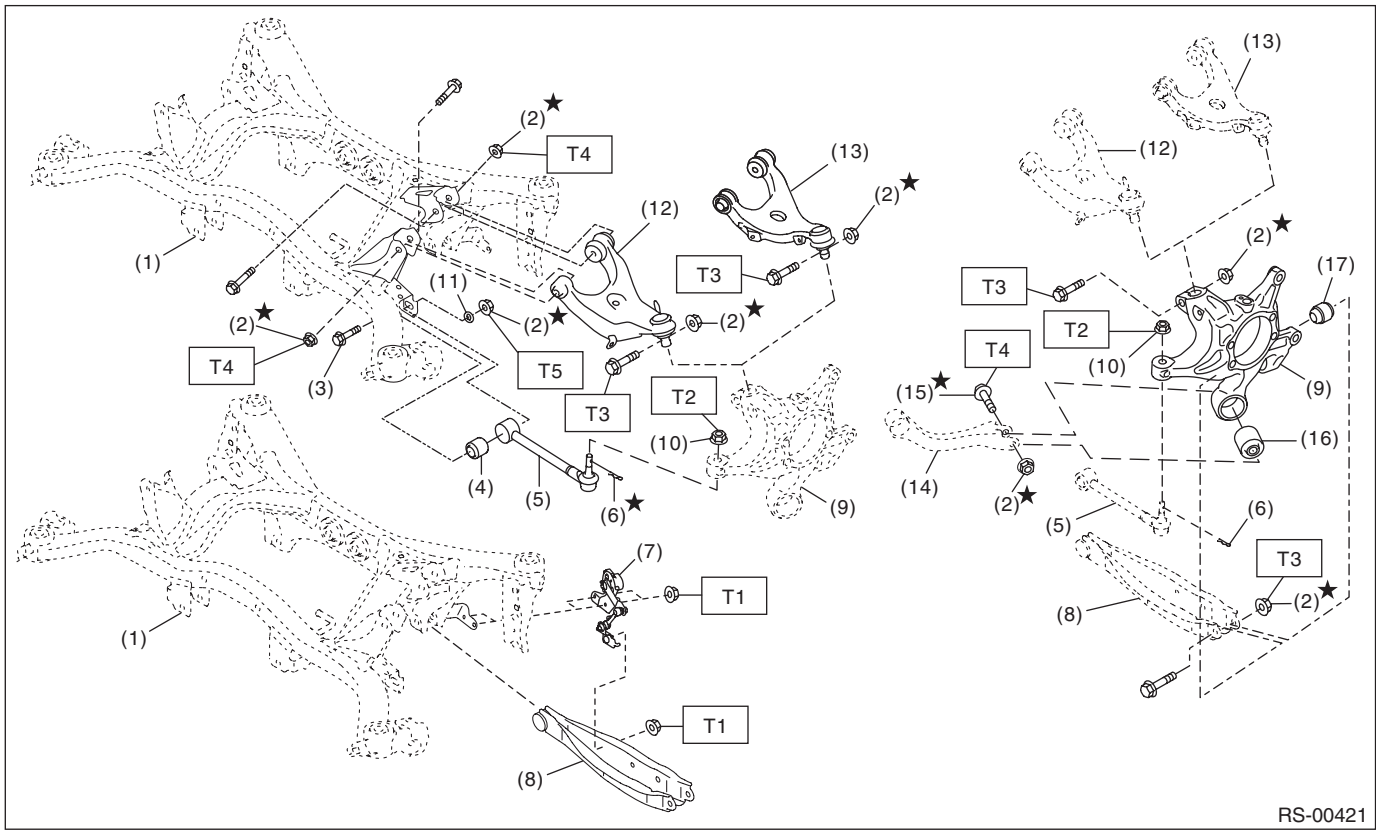
B: COMPONENT

1. REAR SUSPENSION



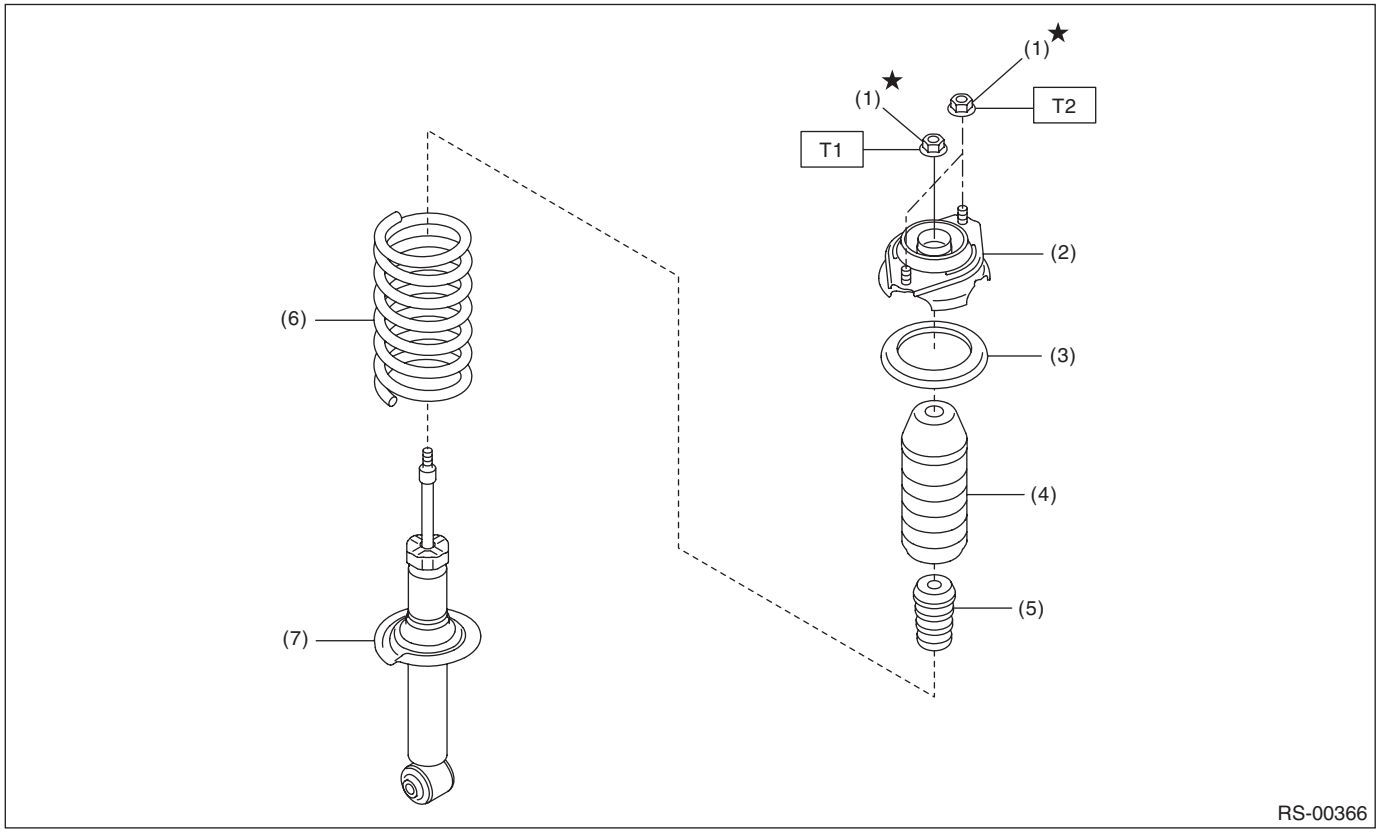
(1) Rear sub frame ASSY
(2) Stopper UPR
(3) Stopper UPR (XV model)
(4) Sub frame support
(5) Flange bolt A
(6) Bushing A - trailing link
(7) Trailing link
(8) Self-locking nut
(9) Flange bolt B
(10) Bushing C - lateral link rear
(11) Stopper LWR
(12) Flange nut
(13) Rear stabilizer
(14) Bushing - stabilizer
(15) Clamp - stabilizer bushing
(16) Stabilizer link ASSY
(17) Rear lateral link ASSY
(18) Rear strut ASSY
(19) Bushing - rear axle housing
(20) Housing ASSY - rear axle
(21) Bushing - trailing link

Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.06, 22.1)
T2: 38 (3.87, 28.0)
T3: 70 (7.14, 51.6)
T4: 80 (8.16, 59.0)
T5: 90 (9.18, 66.4)
T6: 145 (14.79, 106.9)



(1)	Rear sub frame ASSY	(9)	Housing ASSY - rear axle	(17)	Bushing - rear axle housing
(2)	Self-locking nut	(10)	Flange nut		
(3)	Adjusting bolt	(11)	Adjusting washer	***Tightening torque: N·m (kgf-m, ft-lb)***	
(4)	Bushing B - lateral link	(12)	Rear upper arm ASSY	***T1: 7.5 (0.76, 5.5)***	
(5)	Lateral link ASSY - front	(13)	Rear upper arm ASSY (XV model)	***T2: 60 (6.12, 44.3)***	
(6)	Snap pin	(14)	Trailing link	***T3: 80 (8.16, 59)***	
(7)	Sensor ASSY - headlight beam leveler (models with auto headlight beam leveler only)	(15)	Flange bolt	***T4: 90 (9.18, 66.4)***	
(8)	Lateral link ASSY - rear	(16)	Bushing - trailing link	***T5: 100 (10.20, 73.8)***	

2. REAR STRUT



(1) Self-locking nut
(2) Strut mount - rear
(3) Rubber seat - strut UPR
(4) Dust cover - rear strut
(5) Helper - rear
(6) Coil spring - rear
(7) Shock absorber ASSY - rear

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.55, 18.4)
T2: 30 (3.06, 22.1)

C: CAUTION

Please clearly understand and adhere to the following general precautions. They must be strictly followed to avoid minor or serious injury to the person doing the work or people in the area.

1. EACH PROCEDURE

• Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
• Before disposing of shock absorbers, be sure to bleed the gas out completely. Also, do not expose to flames or fire.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• When the suspension-related components have been replaced, perform “VDC sensor midpoint setting mode” of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

2. OIL

When handling oil, adhere to the following to prevent unexpected accident.
• Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
• Follow all government regulations concerning disposal of refuse when disposing.

D: PREPARATION TOOL

1. SPECIAL TOOL

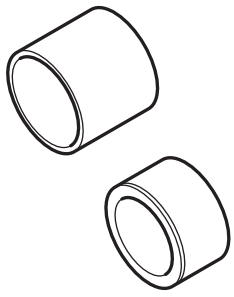
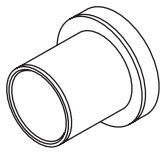
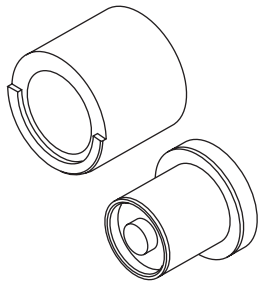
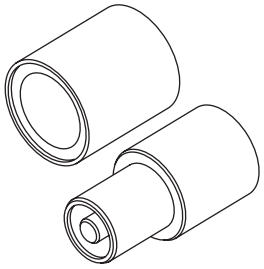
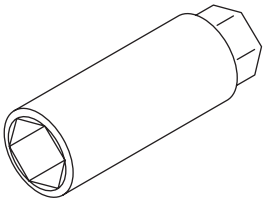
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20099PA010	20099PA010	INSTALLER & REMOVER	• Used for replacing the bushing A - trailing link of the housing assembly - rear axle. • Used together with BUSHING REMOVER (20099FG000).
 ST20099FG000	20099FG000	BUSHING REMOVER	• Used for replacing the bushing A - trailing link of the housing assembly - rear axle. • Used together with base part of INSTALLER & REMOVER (20099PA000).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20099AE000	20099AE000	INSTALLER & REMOVER	Used for replacing the bushing B - lateral link.
 ST20099AE010	20099AE010	INSTALLER & REMOVER	Used for replacing the bushing C - lateral link.
 ST20399FG000	20399FG000	STRUT MOUNT SOCKET	• Used for removing and installing strut mount. • Used for checking torque of strut mount center nut.

2. GENERAL TOOL

TOOL NAME	REMARKS
Alignment tester	Used for measuring wheel alignment.
Toe-in gauge	Used for toe-in measurement.
Jack	Used for removing and installing suspension.
Bearing puller	Used for removing bushings.
Tie-rod ball joint puller	Used for disconnecting the lateral link assembly - front.
Coil spring compressor	Used for disassembling and assembling shock absorber.

2. Wheel Alignment

A: INSPECTION

NOTE:
Measure and adjust the front and rear wheel alignment at a time. Refer to “Wheel Alignment” in “FRONT SUSPENSION” section for measurement or adjustment of wheel alignment.

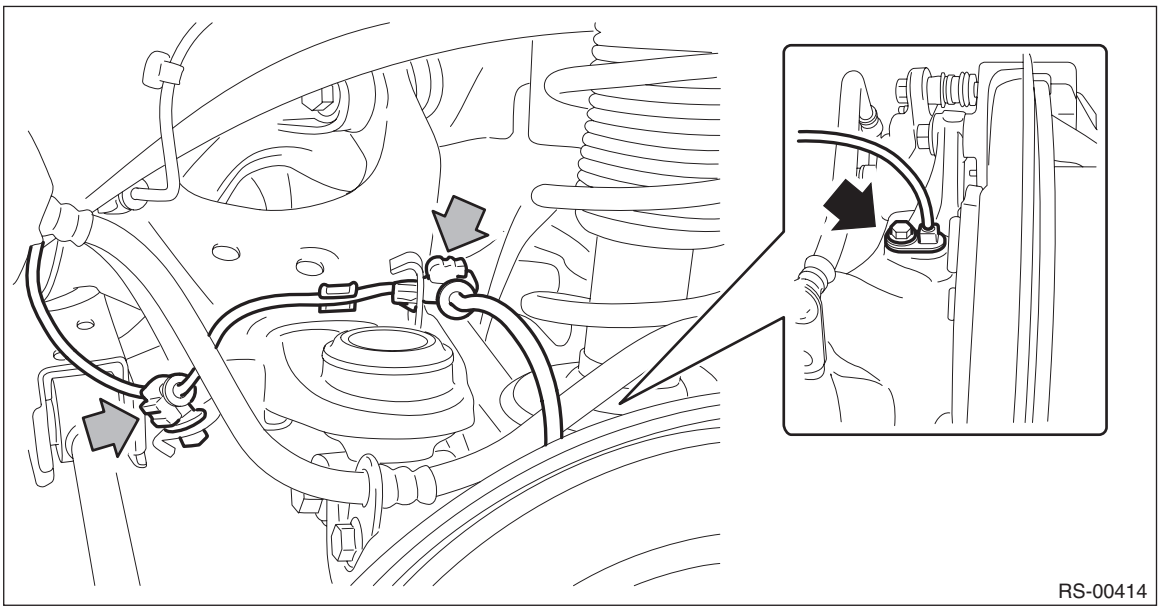
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

3. Rear Sub Frame

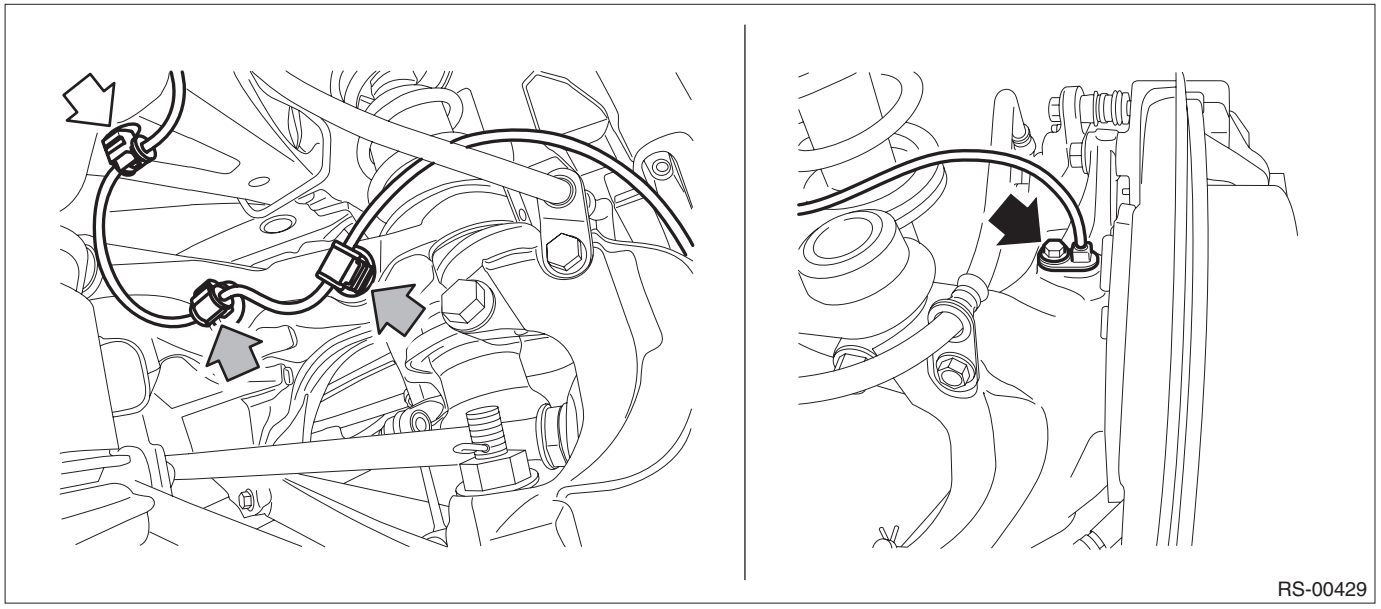
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the propeller shaft assembly. <Ref. to DS-12, REMOVAL, Propeller Shaft.>
4) Remove the clip and bolt on the harness clamp, and remove the rear ABS wheel speed sensor.

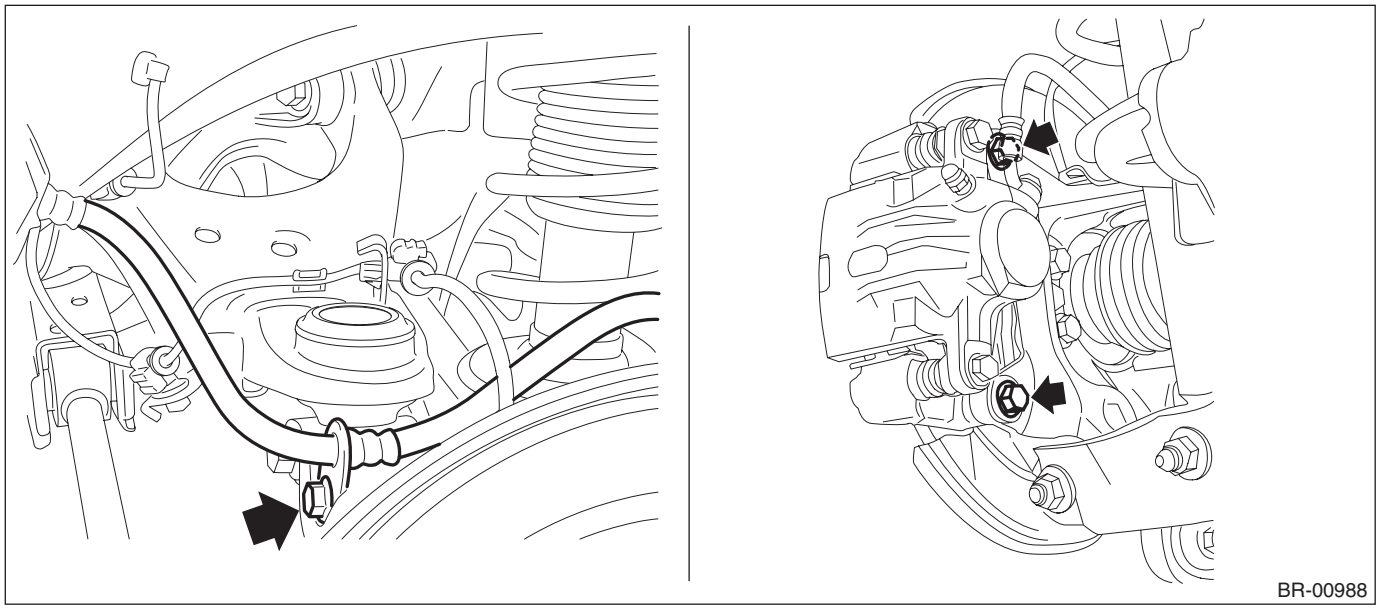
CAUTION:
- **Be careful not to damage the sensor.**
- **Do not apply excessive force to the sensor harness.**
- Except for XV model


RS-00414

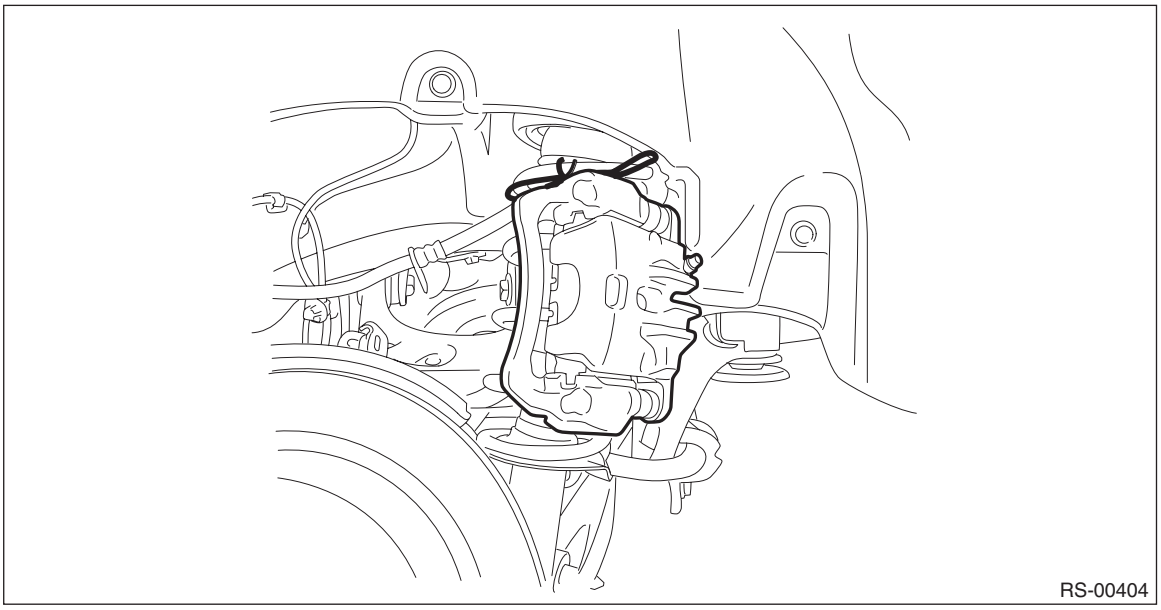
- XV model


RS-00429

5) Remove the caliper body assembly from the housing assembly - rear axle.
(1) Remove the bolts and then remove the brake hose bracket and caliper body assembly.

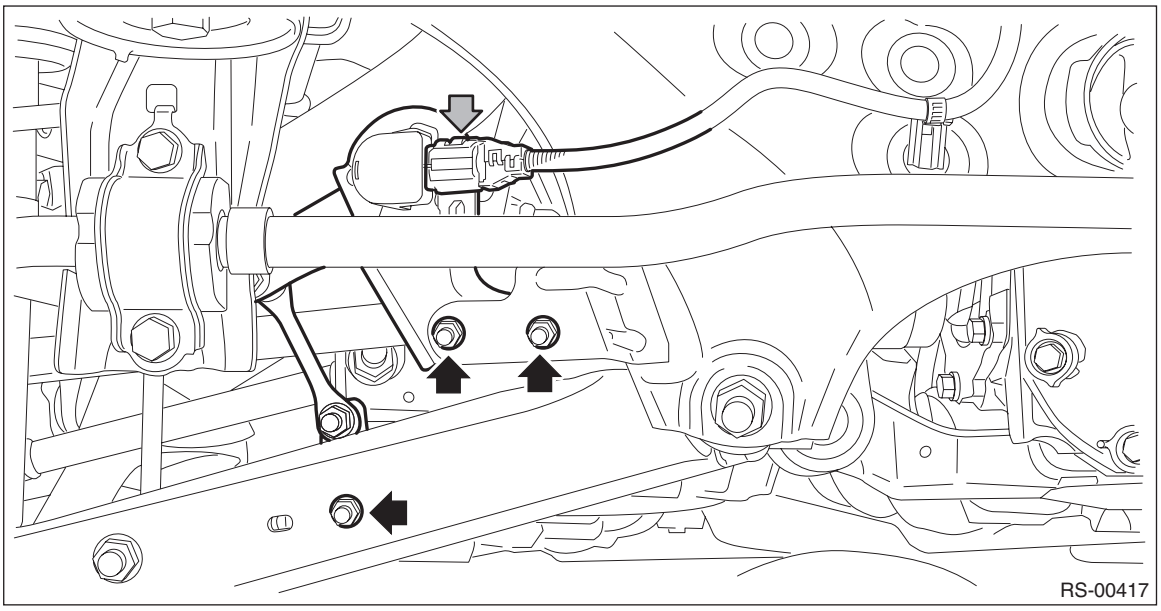


(2) Prepare wiring harnesses etc. to be discarded, and suspend the caliper body assembly from the strut assembly.

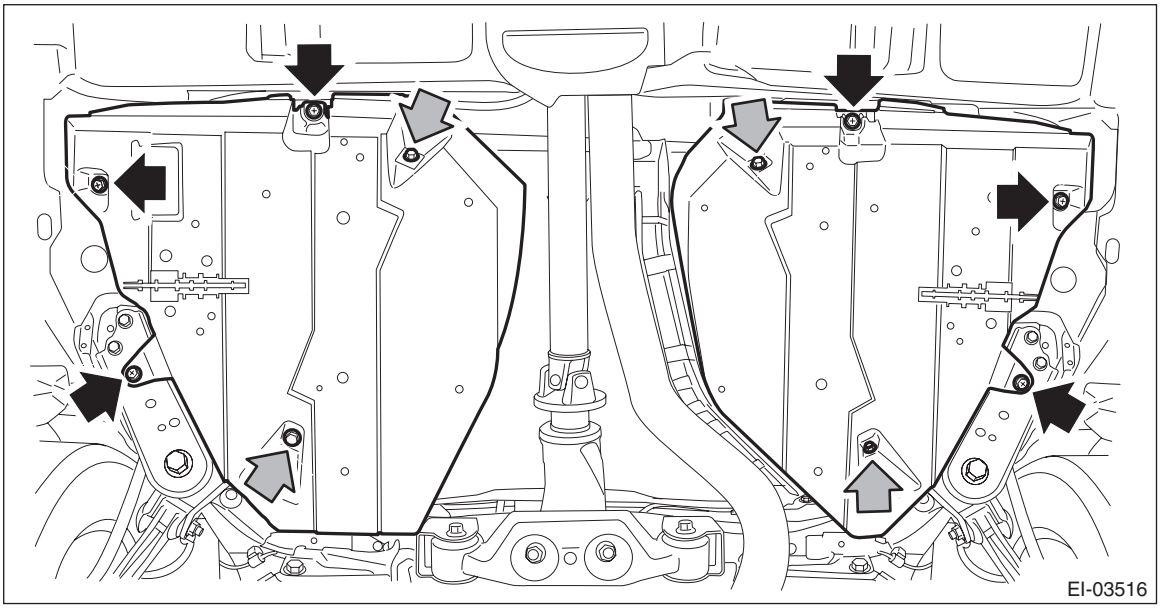


6) Remove the rear parking brake cable from the parking brake assembly. <Ref. to PB-15, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>

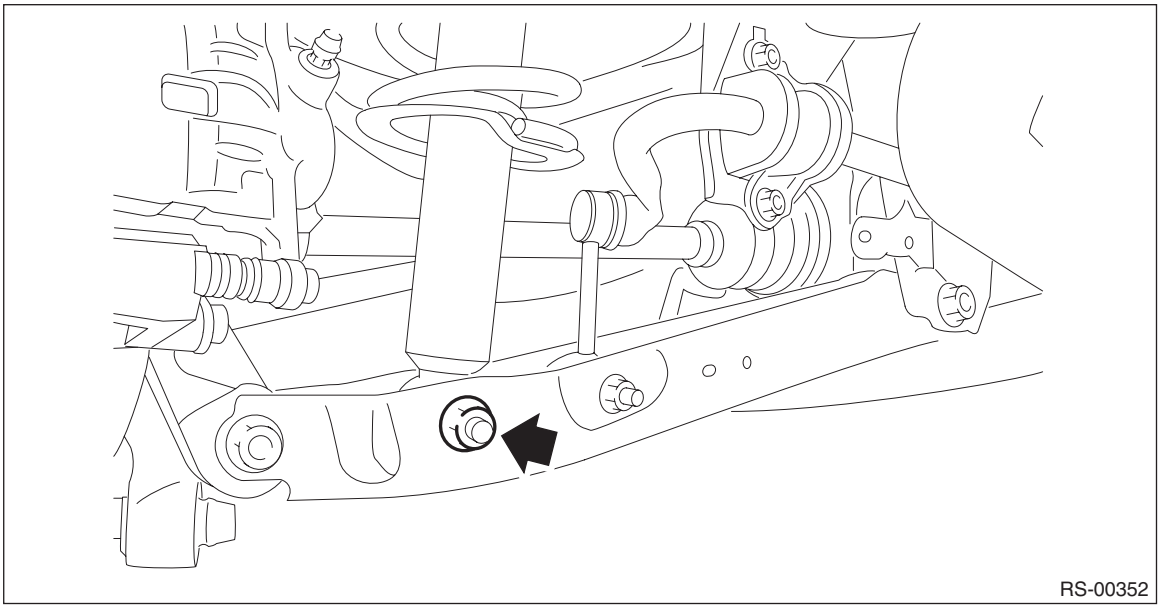
7) Remove the sensor assembly - headlight beam leveler. (Model with auto headlight beam leveler, left side only)
(1) Disconnect the connector of the sensor assembly - headlight beam leveler.
(2) Remove the nuts, and remove the sensor assembly - headlight beam leveler.



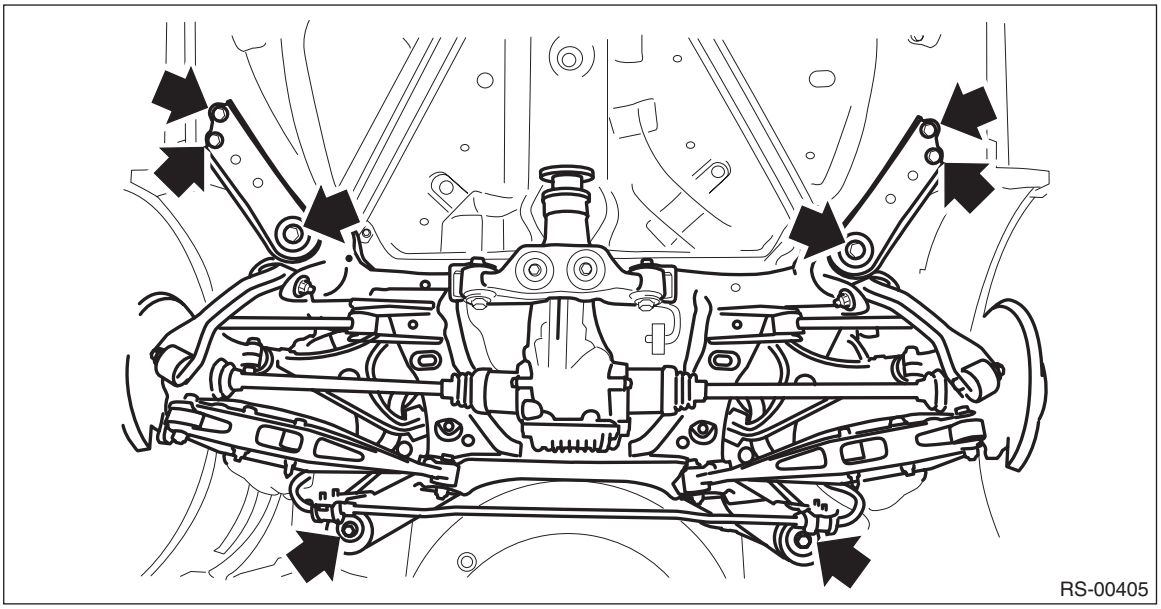
8) Remove the bolt and nuts and remove the fuel tank protector.



9) Remove the rear sub frame assembly.
(1) Remove the bolts at the bottom of rear strut assembly.


RS-00352

(2) Support the rear sub frame assembly using a transmission jack.
(3) Remove the bolt, and remove the left and right sub frame supports.
(4) Remove the bolts, then remove the rear sub frame assembly.


RS-00405

10) As necessary, remove each part from the rear sub frame assembly.

B: INSTALLATION

CAUTION:
- **Be sure to use a new self-locking nut.**
- **Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.**

1) Check the removed parts for wear, damage and crack, and repair or replace them if faulty.
2) Install each part in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description" for the tightening torque.

- ***Rear suspension parts: <Ref. to RS-3, COMPONENT, General Description.>***
- ***Fuel tank protector: <Ref. to FU(H4DO)-7, FUEL TANK, COMPONENT, General Description.>***
- ***Rear disc brake parts: <Ref. to BR-6, REAR DISC BRAKE, COMPONENT, General Description.>***

3) Bleed air from brake system.
4) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

5) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC.

6) Connect the battery ground terminal.
7) Perform reinitialization of the auto headlight beam leveler system. (model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

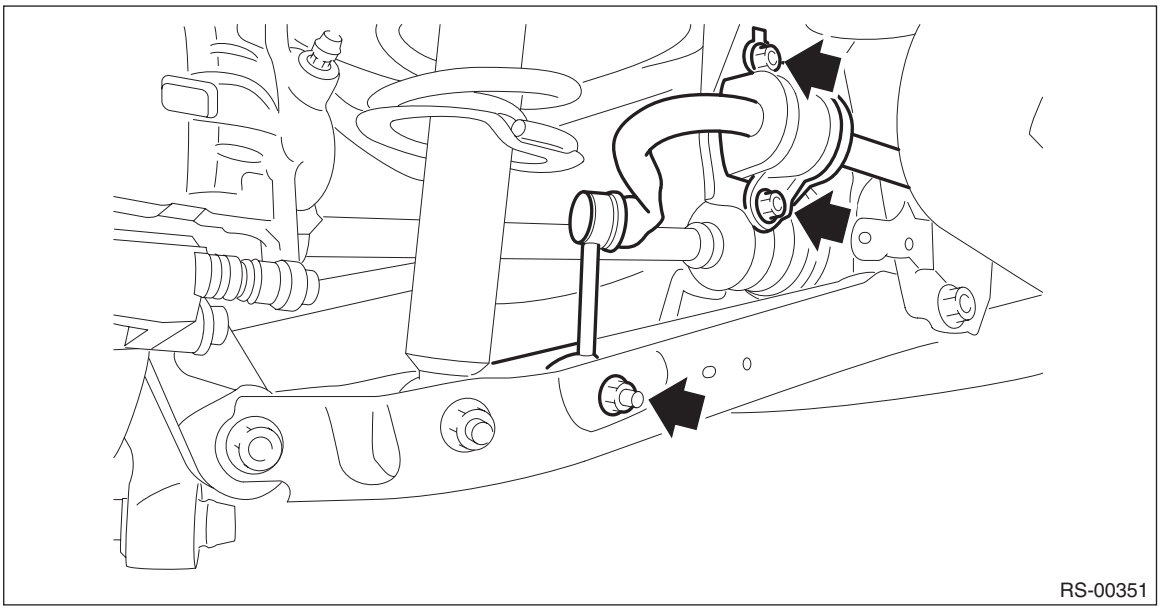
C: INSPECTION

Check the removed parts for wear, damage and crack, and repair or replace them if faulty.

4. Rear Stabilizer

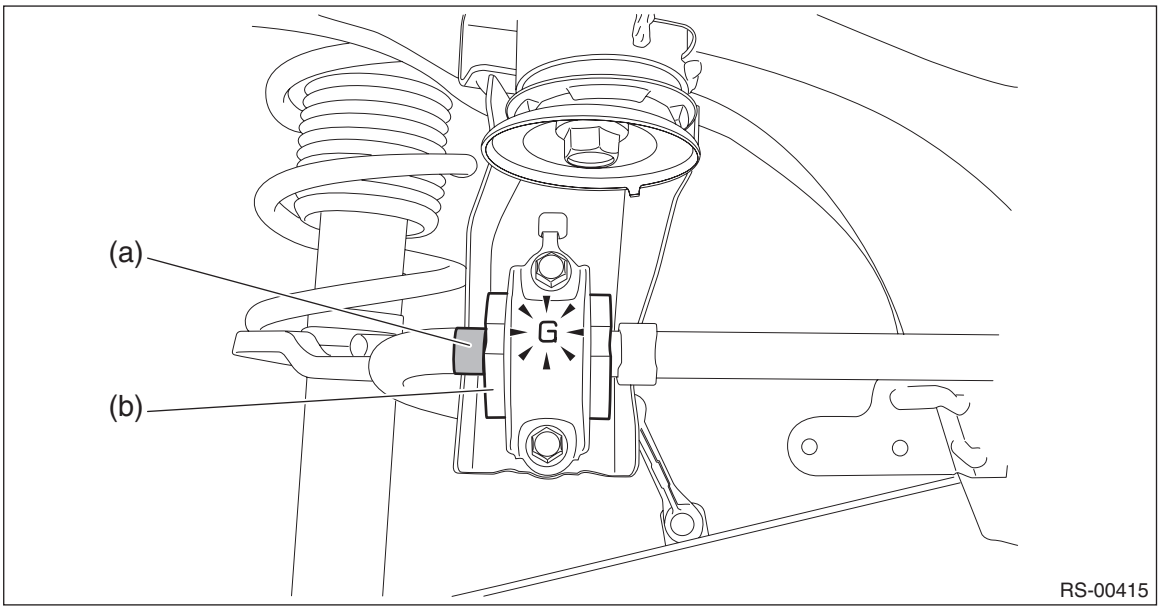
A: REMOVAL

1) Lift up the vehicle, and then remove the rear wheels.
2) Remove the rear stabilizer.
   (1) Remove the left and right stabilizer link assemblies.
   (2) Detach the clamp - stabilizer bushing and remove the rear stabilizer.



B: INSTALLATION

CAUTION:
- **Be sure to use a new flange nut and self-locking nut.**
- **Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.**
- **Install the clamp - stabilizer bushing with the "G" character facing upward.**
- **When installing, align the edge of identification paint (a) to the end face of the bushing (b).**



1) Before installation, inspect the following items and replace any faulty part with a new one.
- Check the bushing - stabilizer for abnormal cracks, fatigue or damage.
- Check the stabilizer link assembly for damage.

2) Install each part in the reverse order of removal.

Tightening torque:
Clamp - stabilizer bushing: 30 N·m (3.06 kgf-m, 22.1 ft-lb)
Stabilizer link assembly: 38 N·m (3.87 kgf-m, 28.0 ft-lb)

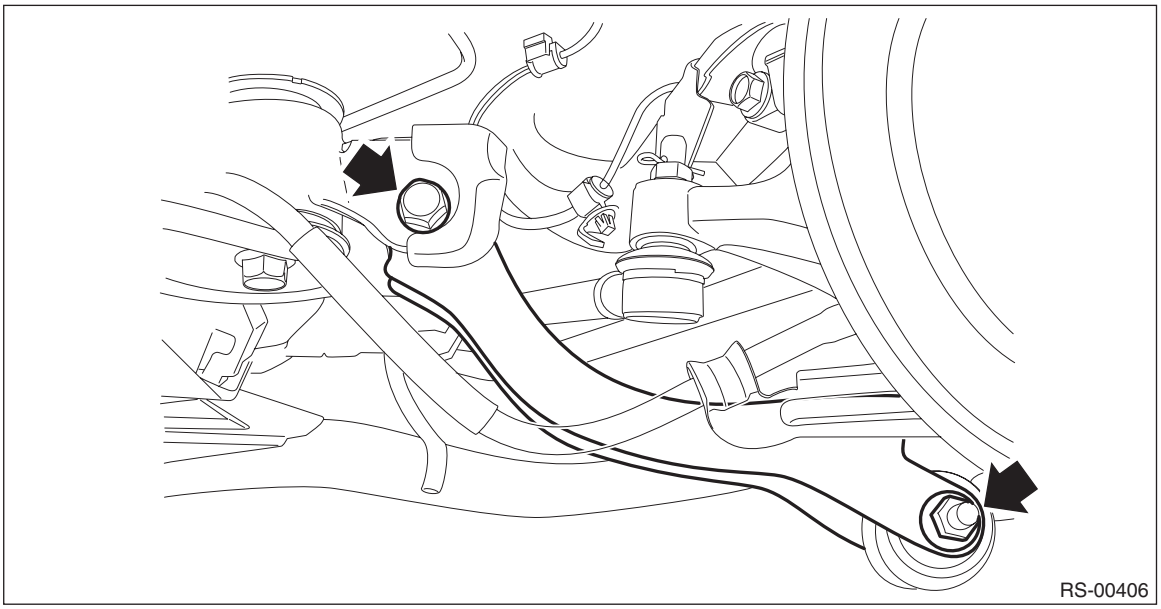
3) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

5. Rear Trailing Link

A: REMOVAL

1) Lift up the vehicle, and then remove the rear wheels.
2) Remove the bolts and nuts, and then remove the trailing link.



B: INSTALLATION

CAUTION:
- **Be sure to use a new self-locking nut.**
- **Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.**

1) Install each part in the reverse order of removal.

Tightening torque:
Trailing link — rear sub frame assembly: 90 N·m (9.18 kgf-m, 66.4 ft-lb)
Trailing link — housing assembly - rear axle: 90 N·m (9.18 kgf-m, 66.4 ft-lb)

2) Install the rear wheels.

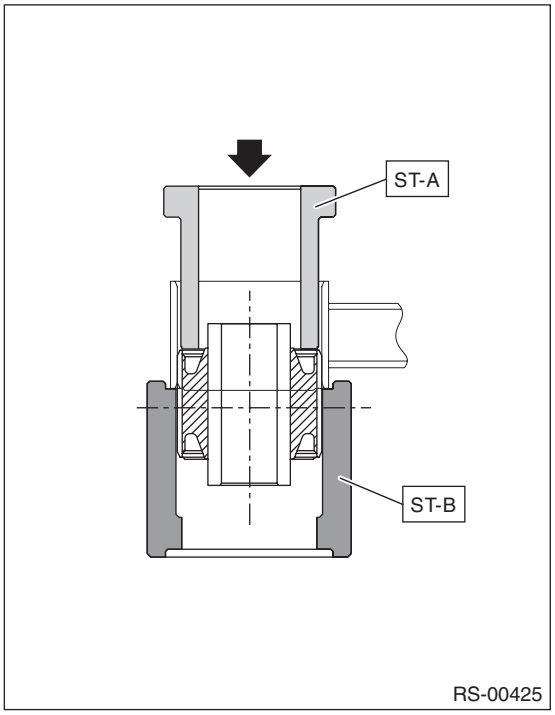
Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: DISASSEMBLY

1. BUSHING A - TRAILING LINK

Using the ST, push out the bushing A - trailing link.

Preparation tool:
ST-A: INSTALLER (899874100)
ST-B: INSTALLER & REMOVER (BASE) (20099PA010)



2. BUSHING - TRAILING LINK

For the removal procedure of bushing - trailing link, refer to “Rear Axle” in the “DRIVE SHAFT SYSTEM” section. <Ref. to DS-44, BUSHING - TRAILING LINK, DISASSEMBLY, Rear Axle.>

D: ASSEMBLY

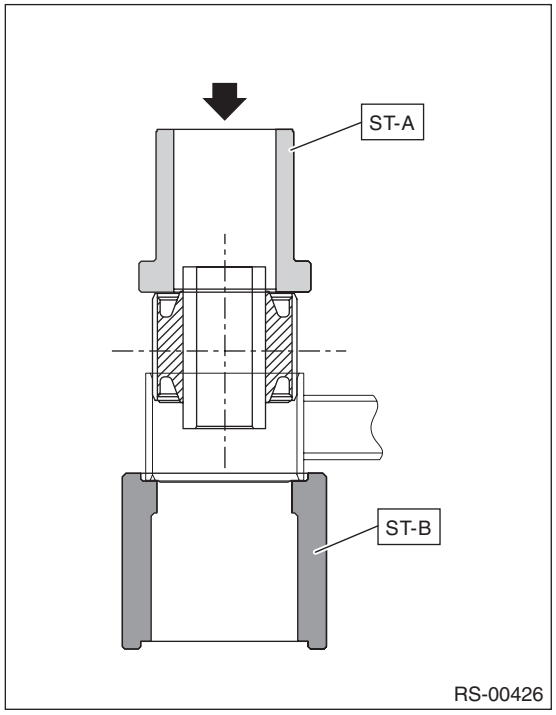
1. BUSHING A - TRAILING LINK

1) Before assembly, inspect the following items and replace any faulty part with a new one.
- Perform visual check for damage or bend on the trailing link.
- Visually check the bushing for abnormal cracks, fatigue or damage.

2) Using the ST-A and ST-B, press-fit the bushing.

CAUTION:
Make sure to press the bushing straight in.

Preparation tool:
ST-A: INSTALLER (899874100)
ST-B: INSTALLER & REMOVER (BASE) (20099PA010)



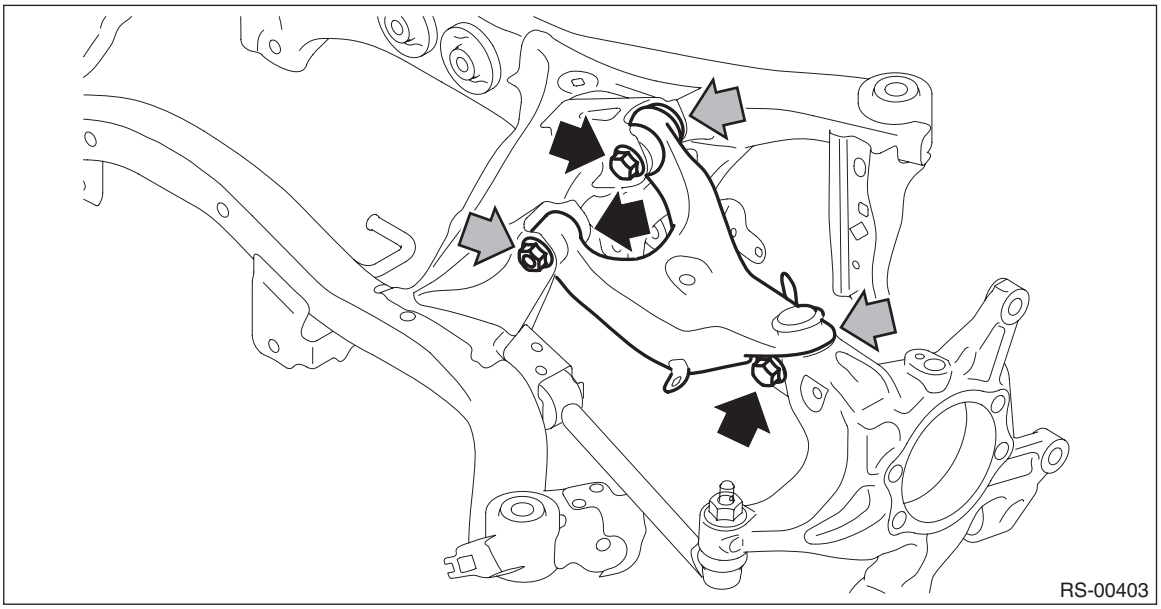
2. BUSHING - TRAILING LINK

For the installation procedure of bushing - trailing link, refer to “Rear Axle” in the “DRIVE SHAFT SYSTEM” section. <Ref. to DS-44, BUSHING - TRAILING LINK, DISASSEMBLY, Rear Axle.>

6. Upper Arm

A: REMOVAL

1) Remove the rear sub frame assembly. <Ref. to RS-9, REMOVAL, Rear Sub Frame.>
2) Remove the bolts and nuts to remove the upper arm assembly.

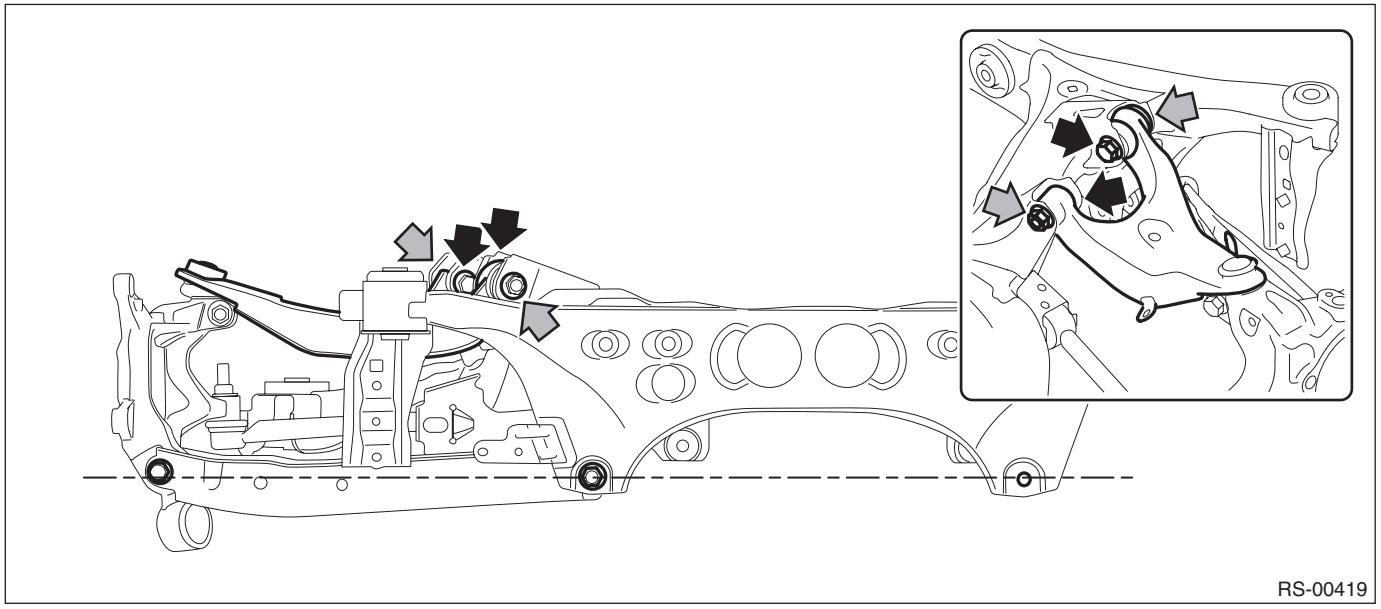


B: INSTALLATION

CAUTION:
- **Use a new self-locking nut.**
- **Always tighten the bushing when the arm is positioned in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.**

1) Before installation, inspect the following items and replace any faulty part with a new one.
- Visually check the upper arm assembly for damage and deformation.
- Visually check the bushing for abnormal cracks, fatigue or damage.
- Visually check the dust cover on the ball joint for abnormal cracks, fatigue or damage.

2) Install the upper arm assembly to the rear sub frame assembly.
   (1) Make the installation sections of the rear lateral link assembly (the bolt on the housing assembly - rear axle side and the bolt on the rear sub frame assembly side) horizontal.
   (2) Install the upper arm assembly to the rear sub frame assembly.



Tightening torque:
Upper arm assembly — rear sub frame assembly: 90 N·m (9.18 kgf-m, 66.4 ft-lb)

3) Connect the upper arm assembly and the housing assembly - rear axle.

Tightening torque:
Upper arm assembly — housing assembly - rear axle: 80 N·m (8.16 kgf-m, 59.0 ft-lb)

4) Install the rear sub frame assembly in the reverse order of removal. <Ref. to RS-13, INSTALLATION, Rear Sub Frame.>
5) Route the rear ABS wheel speed sensor cable to the upper arm assembly.
6) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

7) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

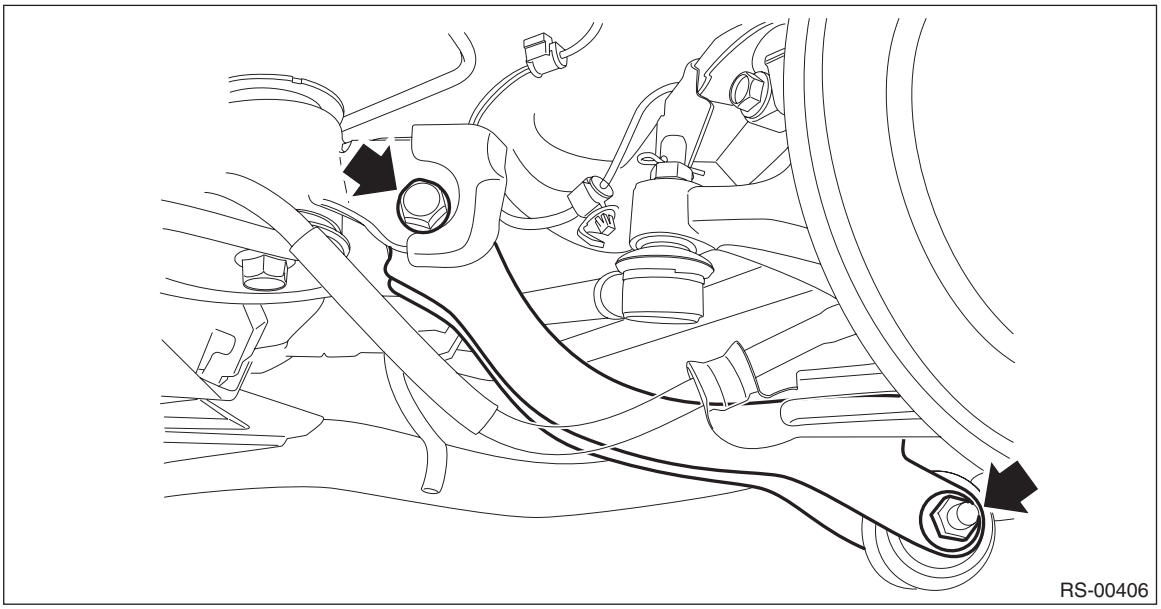
CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC.

8) Connect the battery ground terminal.
9) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

7. Front Lateral Link

A: REMOVAL

1) Lift up the vehicle, and then remove the rear wheels.
2) Remove the bolts and nuts, and then remove the trailing link.

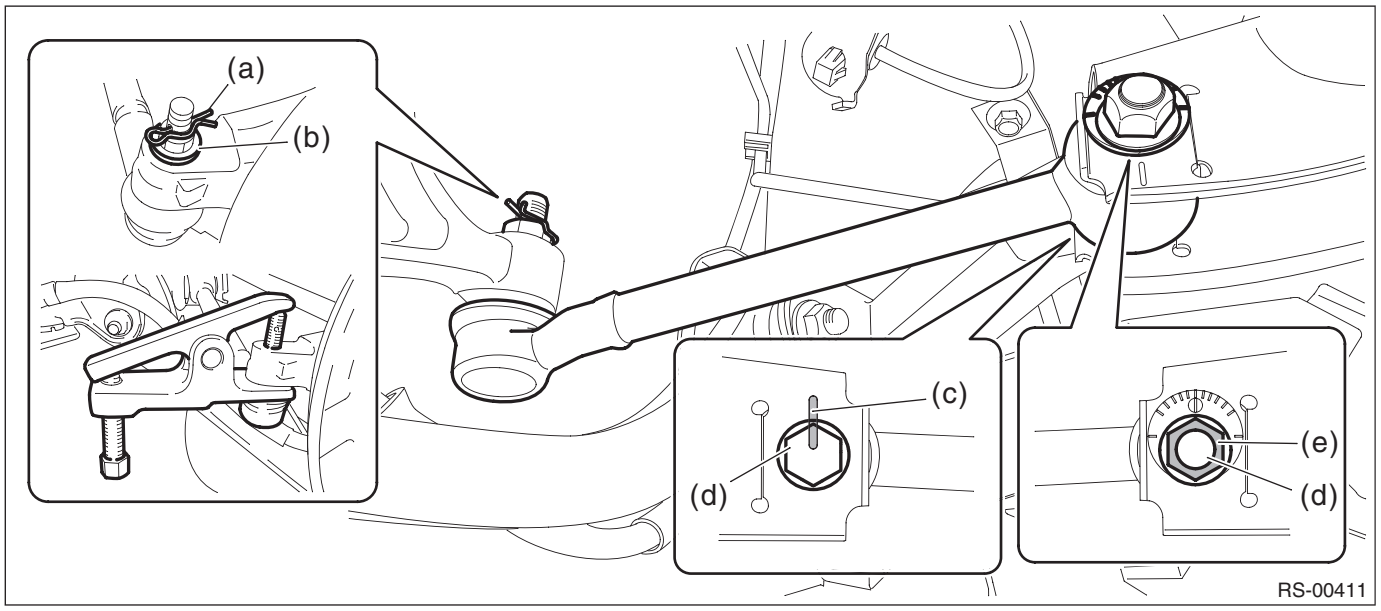


3) Remove the lateral link assembly - front.
   (1) Remove the snap pin (a) and nut (b).
   (2) Remove the ball joint from the housing assembly - rear axle.

Preparation tool:
Tie-rod ball joint puller

   (3) Scribe alignment marks (c) on the adjusting bolt for lateral link assembly - front and on the rear sub frame assembly.
   (4) Remove the adjusting bolt (d), and remove the lateral link assembly - front.

CAUTION:
When removing the adjusting bolt (d), make sure to fix the bolt head in place when loosening the nut (e).



B: INSTALLATION

CAUTION:
- **Be sure to use a new self-locking nut.**
- **Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.**

1) Before installation, inspect the following items and replace any faulty part with a new one.
- Visually check the lateral link assembly - front for damage and deformation.
- Visually check the bushing for abnormal cracks, fatigue or damage.
- Visually check the dust cover on the ball joint for abnormal cracks, fatigue or damage.

2) Install each part in the reverse order of removal.

Tightening torque:
Lateral link assembly - front — rear sub frame assembly: 100 N·m (10.20 kgf-m, 73.8 ft-lb)
Lateral link assembly - front — housing assembly - rear axle: 60 N·m (6.12 kgf-m, 44.3 ft-lb)

3) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

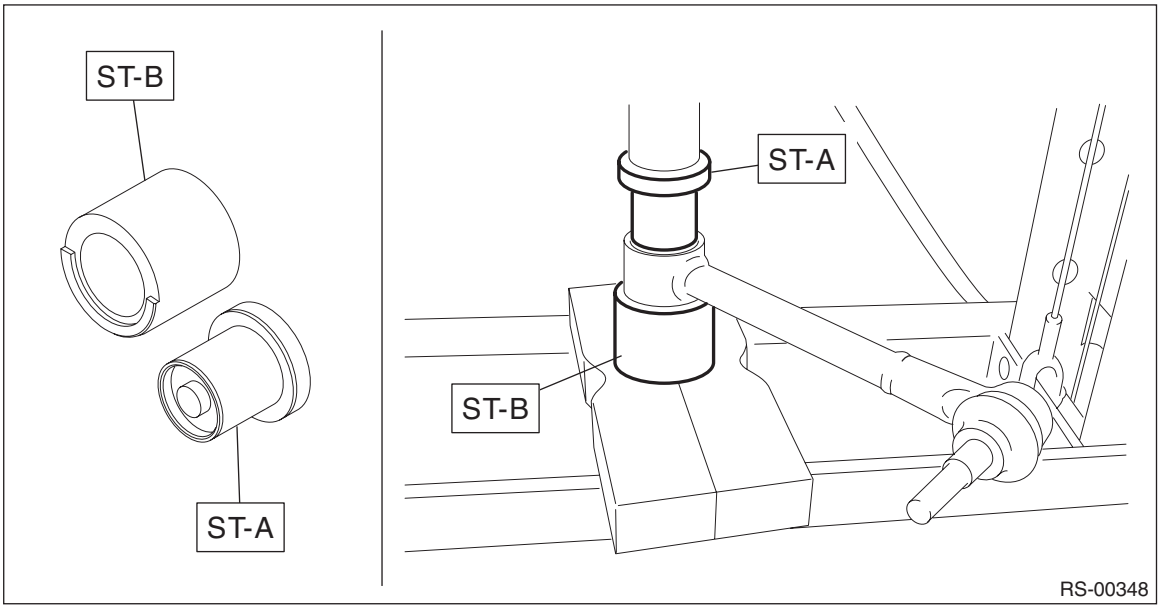
4) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

CAUTION:
When the wheel alignment has been adjusted, perform “VDC sensor midpoint setting mode” of the VDC.

C: DISASSEMBLY

Using the ST, push out the bushing B - lateral link.

PREPARATION TOOL:
ST-A & ST-B: INSTALLER & REMOVER (20299AE000)



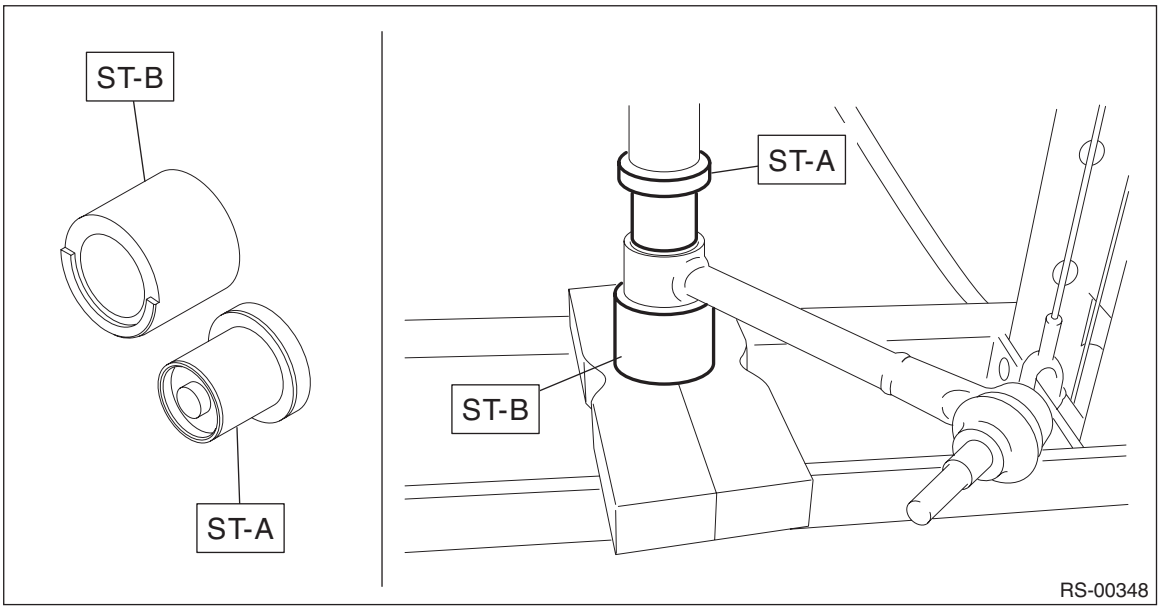
D: ASSEMBLY

1) Before assembly, inspect the following items and replace any faulty part with a new one.
- Visually check the lateral link assembly - front for damage and deformation.
- Visually check the bushing for abnormal cracks, fatigue or damage.
- Visually check the dust cover on the ball joint for damage.

2) Using the ST, press-fit the bushing B - lateral link.

CAUTION:
Make sure to press the bushing straight in.

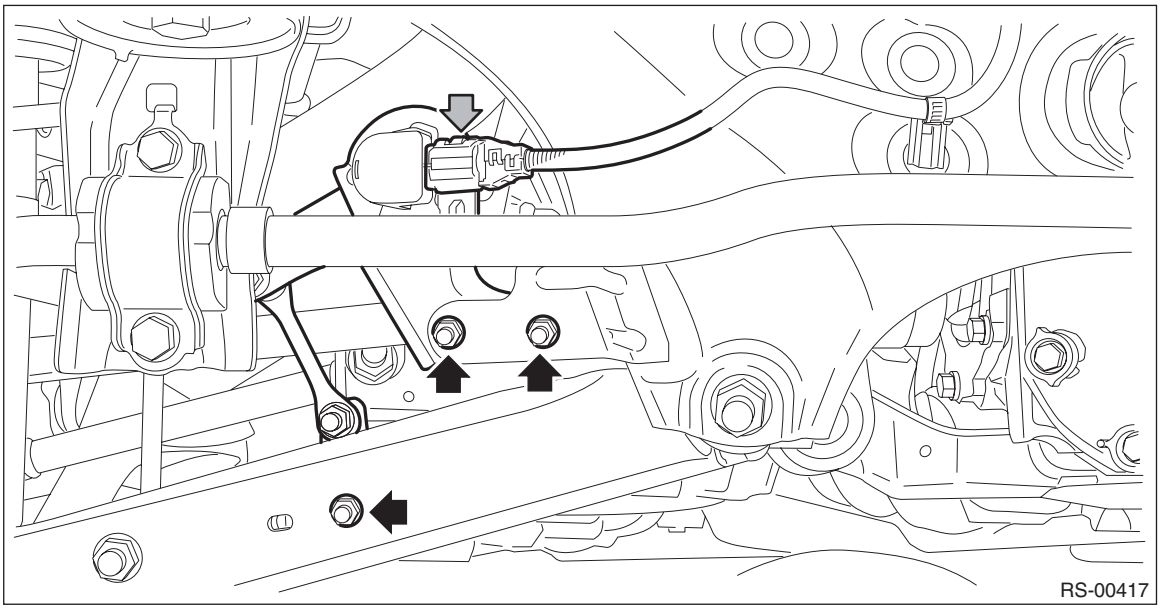
Preparation tool:
ST-A & ST-B: INSTALLER & REMOVER (20299AE000)



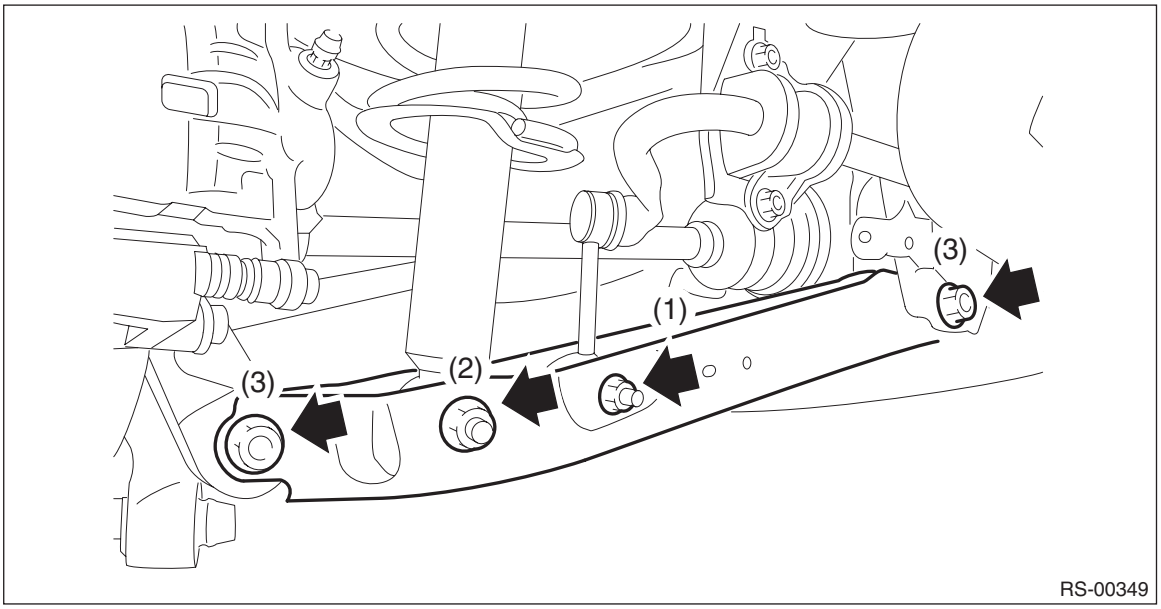
8. Rear Lateral Link

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the sensor assembly - headlight beam leveler. (Model with auto headlight beam leveler, left side only)
   (1) Disconnect the connector of the sensor assembly - headlight beam leveler.
   (2) Remove the nuts, and remove the sensor assembly - headlight beam leveler.



4) Remove the bolts and nuts, and remove the lateral link assembly - rear on the left and right sides.
   (1) Remove the nut and disconnect the rear stabilizer link assembly.
   (2) Remove the bolts at the bottom of rear strut assembly.
   (3) Disconnect the lateral link assembly - rear.



B: INSTALLATION

CAUTION:
- **Be sure to use a new self-locking nut.**
- **Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.**

1) Before installation, inspect the following items and replace any faulty part with a new one.
- Visually check the lateral link assembly - rear for damage and deformation.
- Visually check the bushing for abnormal cracks, fatigue or damage.

2) Install each part in the reverse order of removal.

Tightening torque:
Sensor assembly - headlight beam leveler: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
Lateral link assembly - rear: 80 N·m (8.16 kgf-m, 59.0 ft-lb)
Rear strut assembly: 80 N·m (8.16 kgf-m, 59.0 ft-lb)
Stabilizer link assembly: 38 N·m (3.87 kgf-m, 28.0 ft-lb)
Sensor assembly - headlight beam leveler: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

3) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

4) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

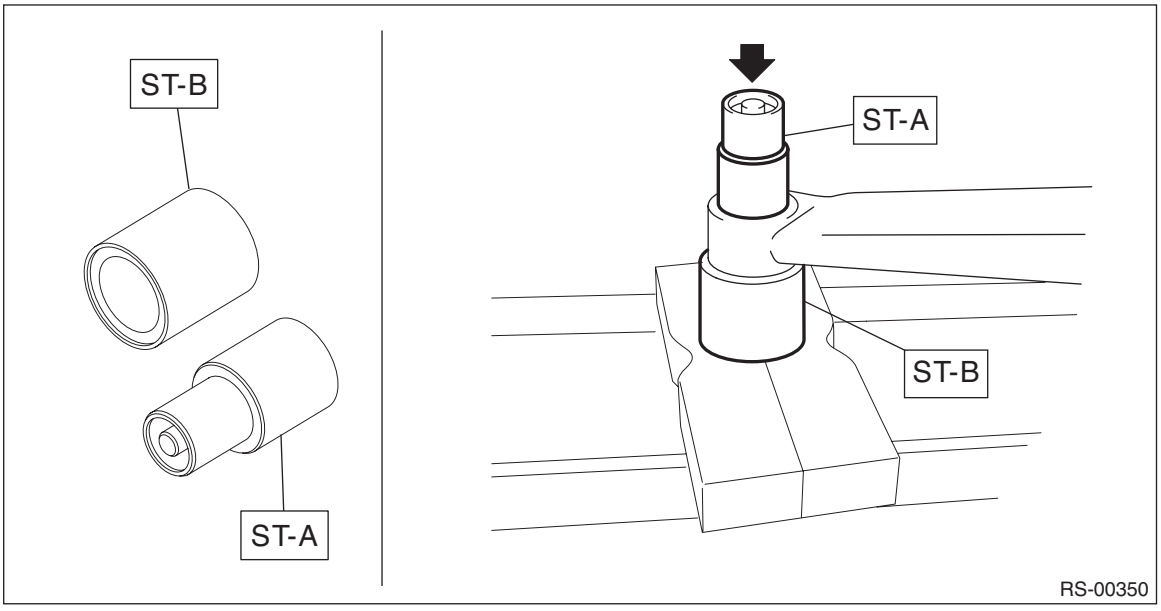
CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC.

5) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, REINITIALIZATION, PROCEDURE, Auto Headlight Beam Leveler System.>

C: DISASSEMBLY

Using the ST, push out the bushing.

Preparation tool:
ST-A & ST-B: INSTALLER & REMOVER (20099AE010)

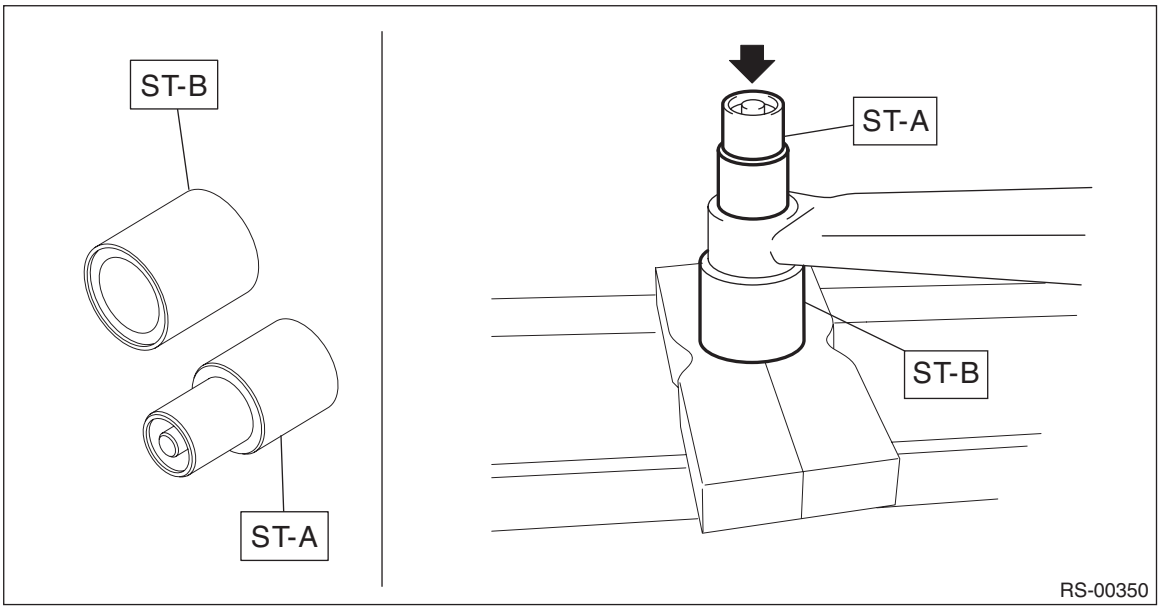


D: ASSEMBLY

1) Before assembly, inspect the following items and replace any faulty part with a new one.
- Visually check the lateral link assembly - rear for damage and deformation.
- Visually check the bushing for abnormal cracks, fatigue or damage.

2) Using the ST, press the bushing into place.

Preparation tool:
ST-A & ST-B: INSTALLER & REMOVER (20099AE010)

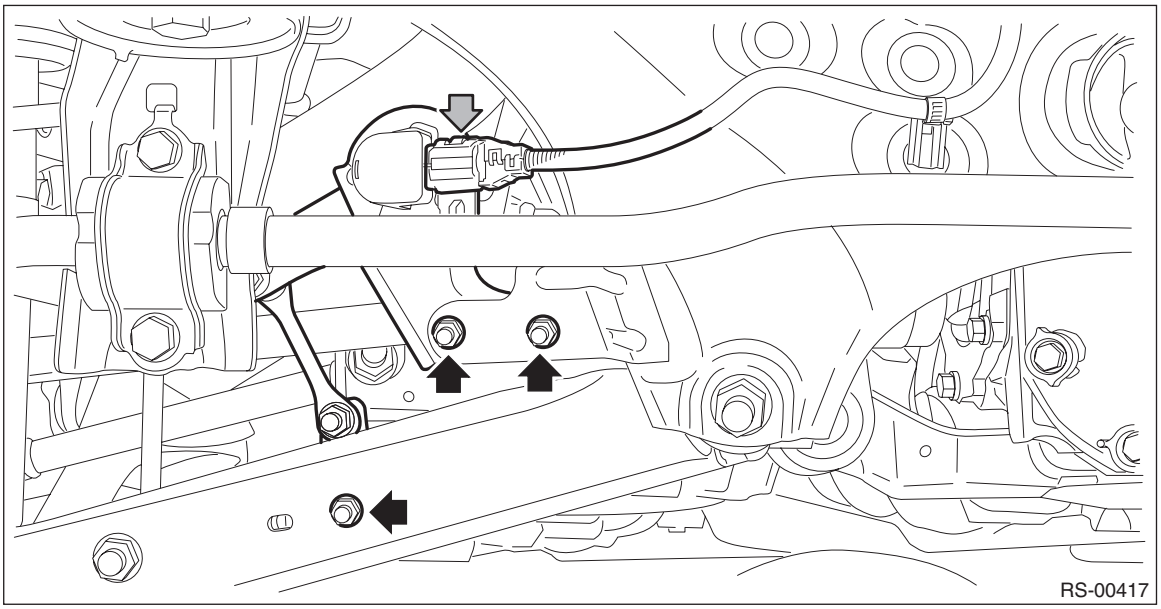


9. Rear Shock Absorber

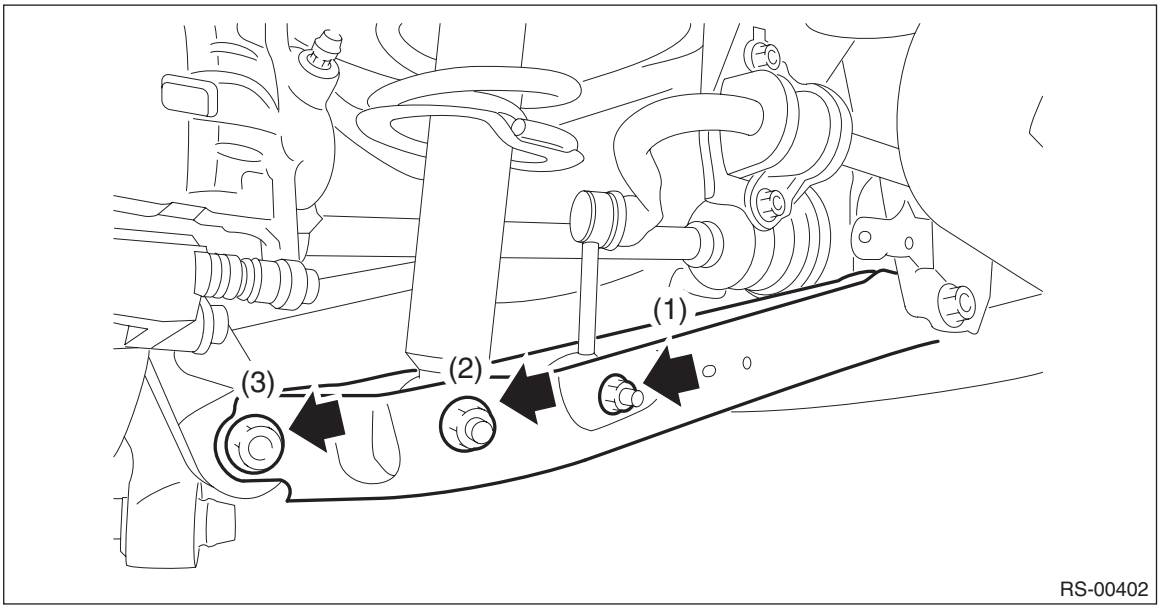
A: REMOVAL

1. 4 DOOR MODEL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the sensor assembly - headlight beam leveler. (Model with auto headlight beam leveler, left side only)
   (1) Disconnect the connector of the sensor assembly - headlight beam leveler.
   (2) Remove the nuts, and remove the sensor assembly - headlight beam leveler.

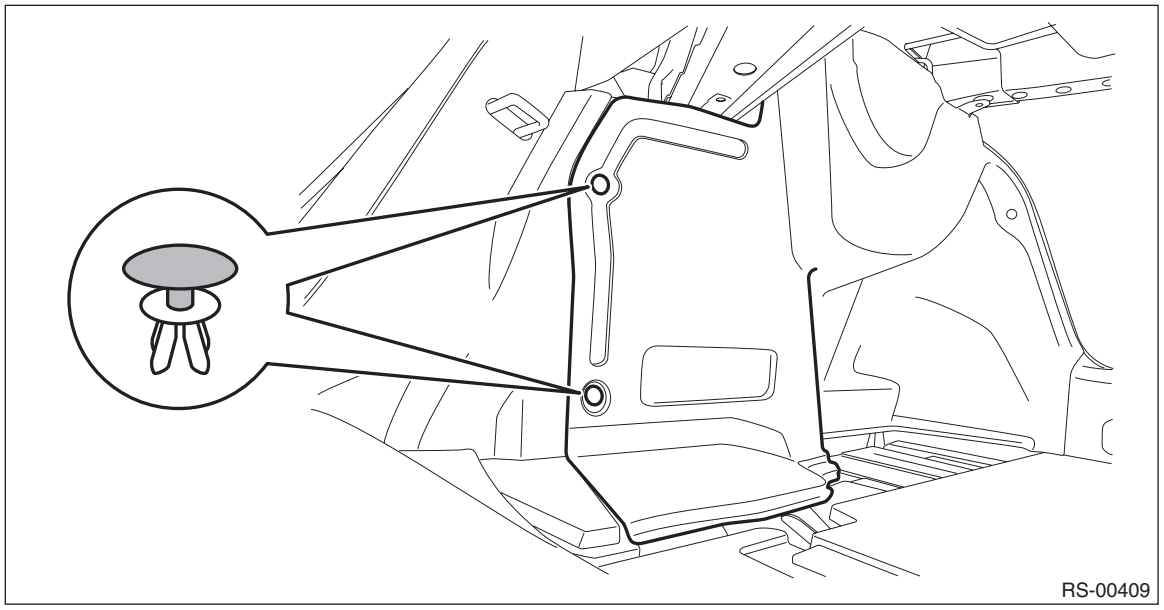


4) Remove the bolts and nuts, and lower the lateral link assembly - rear.
   (1) Remove the nut and disconnect the rear stabilizer link assembly. (model with rear stabilizer)
   (2) Remove the bolts at the bottom of rear strut assembly.
   (3) Disconnect the housing assembly - rear axle from the lateral link assembly - rear.

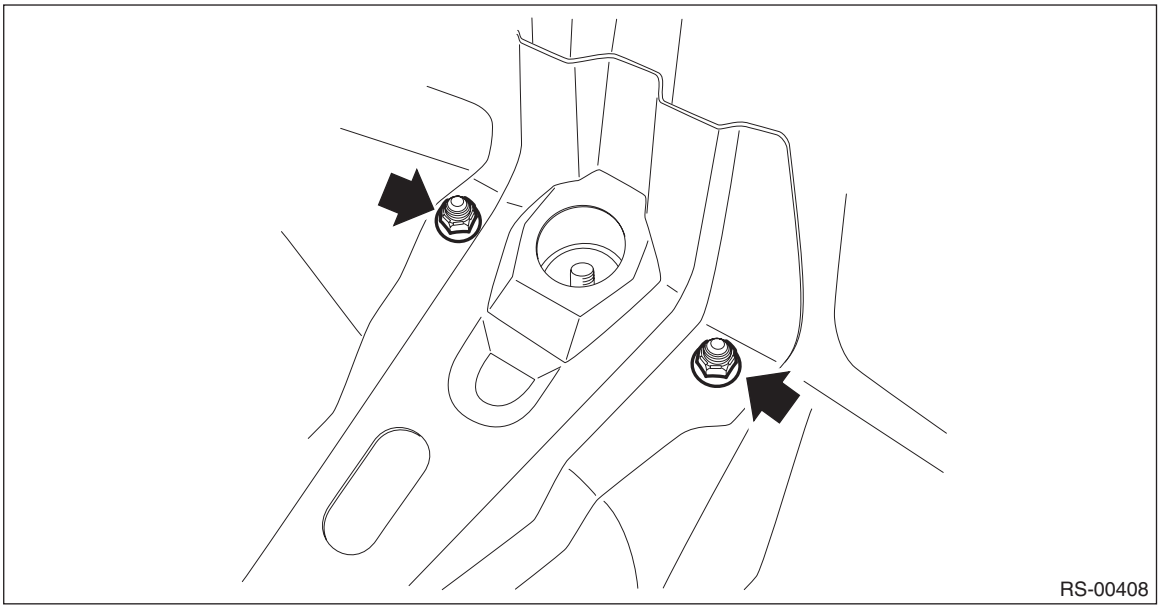


5) Take out the trunk mat.
6) Fold down the rear seat backrest.

7) Remove the clips, and turn over the trim panel - trunk side.



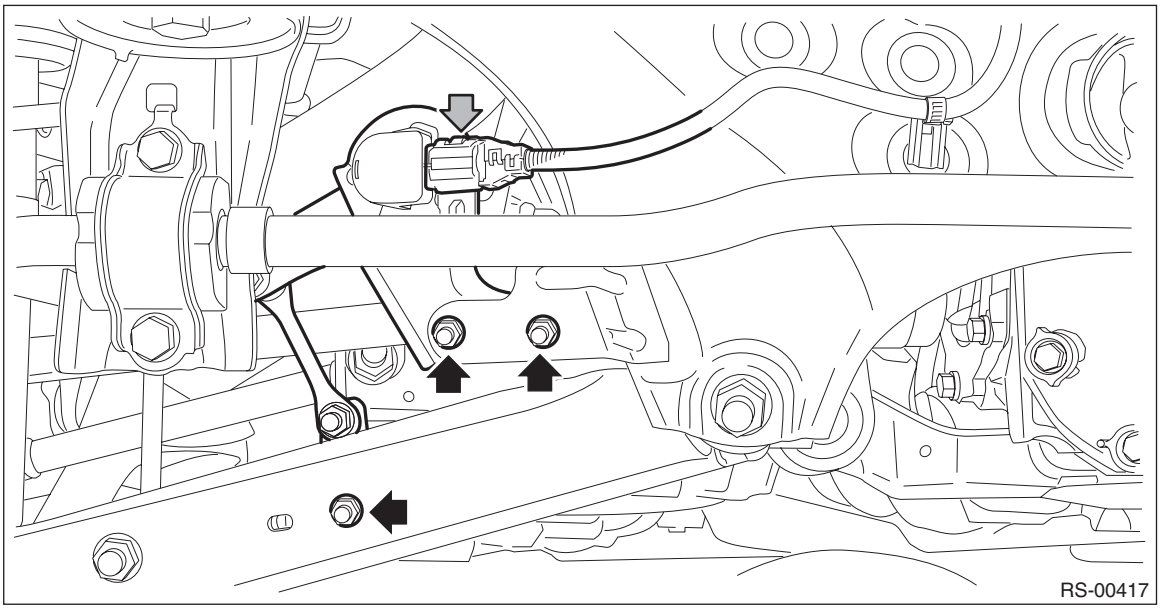
8) Remove the nuts on the upper side of rear strut assembly.



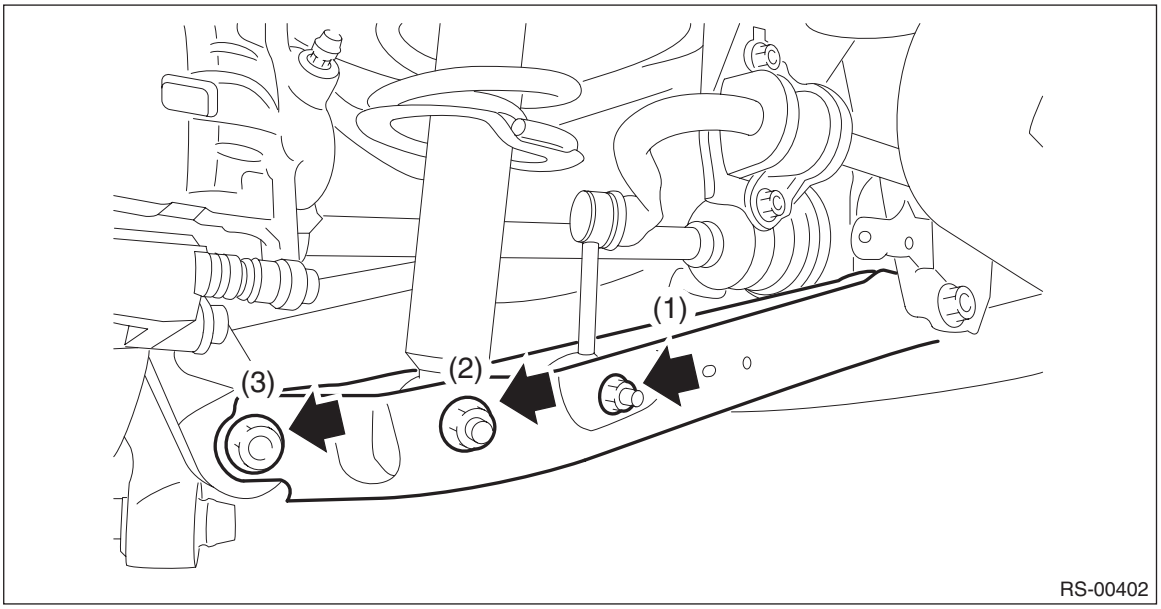
9) Lower the lateral link assembly - rear, and remove the rear strut assembly.

2. 5 DOOR MODEL/XV MODEL

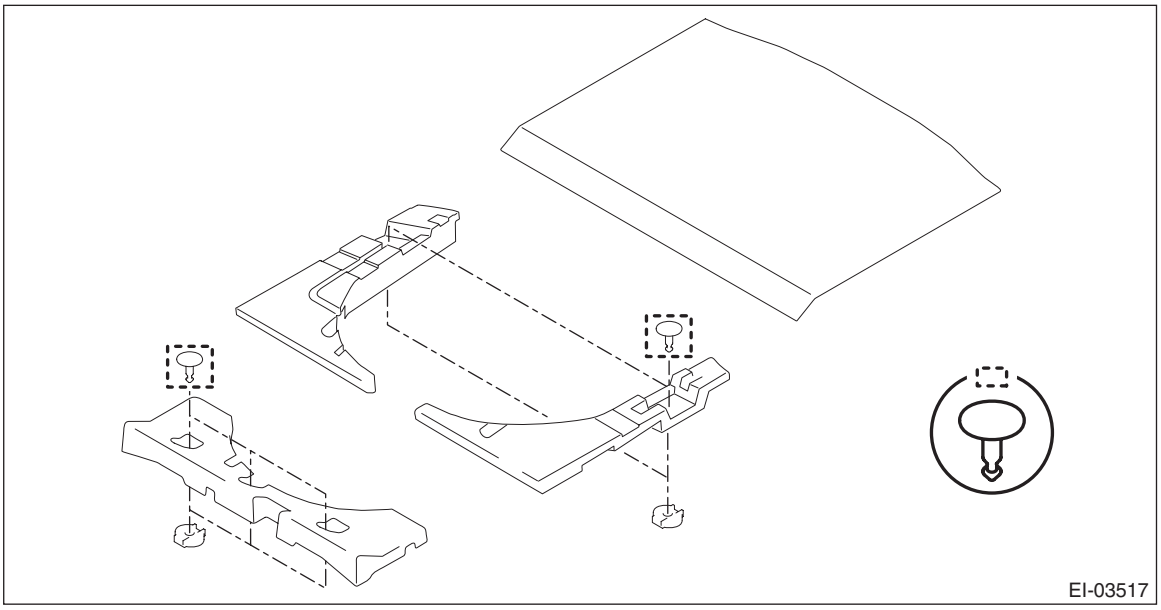
1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the sensor assembly - headlight beam leveler. (Model with auto headlight beam leveler, left side only)
   (1) Disconnect the connector of the sensor assembly - headlight beam leveler.
   (2) Remove the nuts, and remove the sensor assembly - headlight beam leveler.



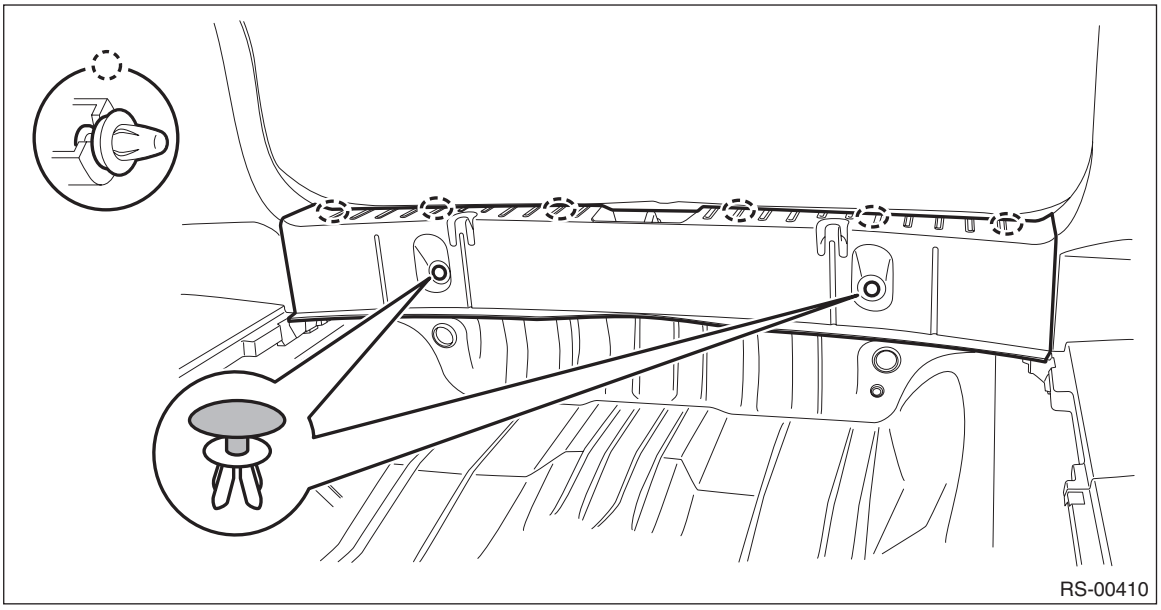
4) Remove the bolts and nuts, and lower the lateral link assembly - rear.
   (1) Remove the nut and disconnect the rear stabilizer link assembly. (model with rear stabilizer)
   (2) Remove the bolts at the bottom of rear strut assembly.
   (3) Disconnect the housing assembly - rear axle from the lateral link assembly - rear.



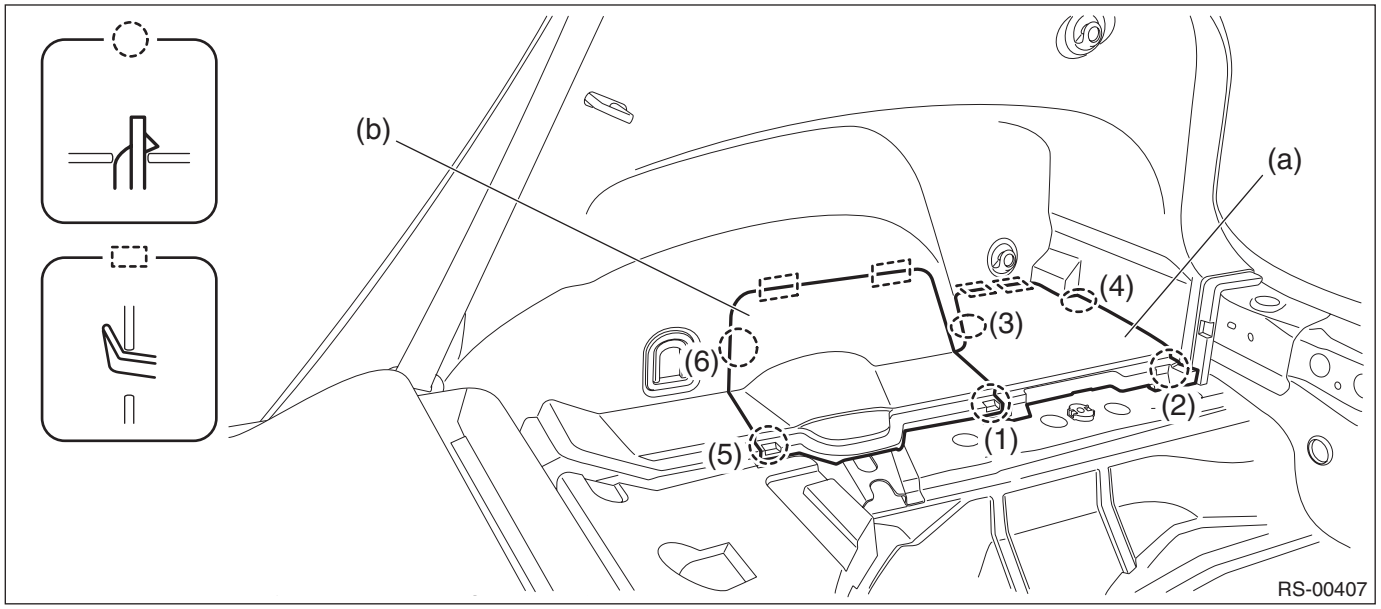
5) Remove the mat - rear floor CTR and the spacer - rear floor side.



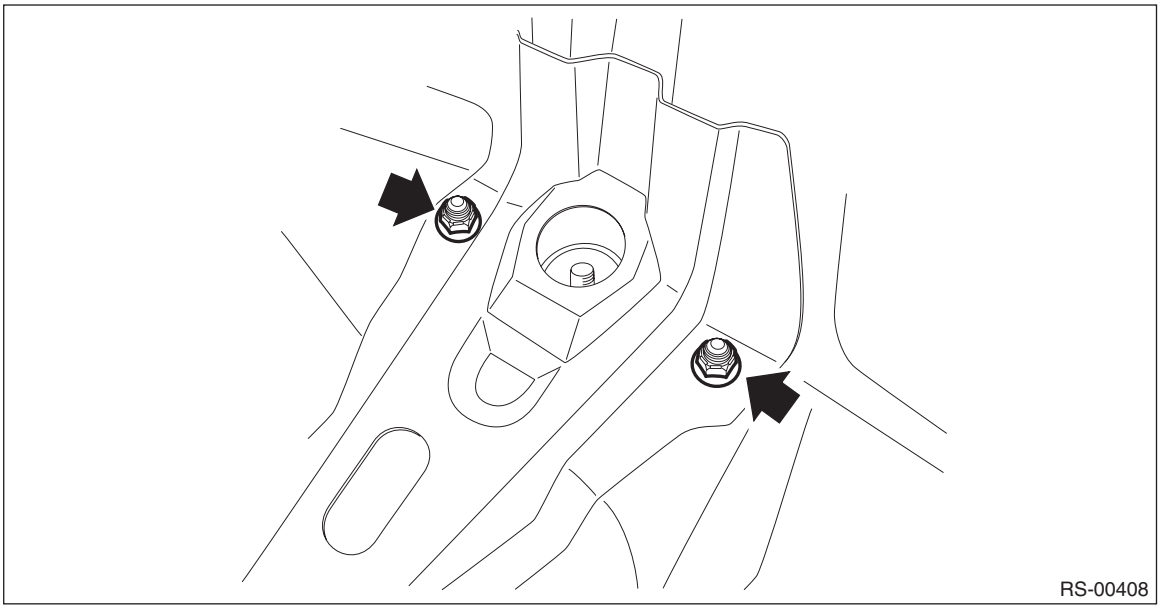
6) Remove the clips, and remove the trim panel - rear skirt.



7) Remove the lid upper rear (a) and cap rear strut (b) in the order from (1) to (6).



8) Remove the nuts on the upper side of rear strut assembly.



9) Lower the lateral link assembly - rear, and remove the rear strut assembly.

B: INSTALLATION

CAUTION:
- **Be sure to use a new self-locking nut.**
- **Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.**

1) Install each part in the reverse order of removal.

Tightening torque:
Sensor assembly - headlight beam leveler: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
Rear suspension: <Ref. to RS-3, REAR SUSPENSION, COMPONENT, General Description.>
Rear strut: <Ref. to RS-5, REAR STRUT, COMPONENT, General Description.>

2) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

3) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC.

4) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, REINITIALIZATION, PROCEDURE, Auto Headlight Beam Leveler System.>

C: DISASSEMBLY

Refer to "Front Strut" in "FRONT SUSPENSION" section for disassembly. <Ref. to FS-45, DISASSEMBLY, Front Strut.>

D: ASSEMBLY

Refer to "Front Strut" in "FRONT SUSPENSION" section for assembly. <Ref. to FS-46, ASSEMBLY, Front Strut.>

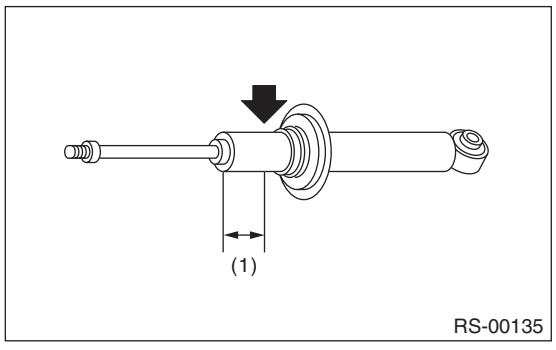
E: INSPECTION

Refer to "Front Strut" in "FRONT SUSPENSION" section for inspection procedures. <Ref. to FS-48, INSPECTION, Front Strut.>

F: DISPOSAL

CAUTION:
- **Before discarding the shock absorber, be sure to wear goggles to protect eyes from gas, oil and cutting powder.**
- **Do not disassemble the shock absorber or place it into a fire.**
- **When discarding gas filled shock absorbers, drill holes in them to purge the gas.**

1) Place the shock absorber on a level surface with the piston rod fully expanded.
2) Make a hole into the specified position 30 mm (1.18 in) deep using a drill with 2 — 3 mm (0.08 — 0.12 in) diameter.



(1) 40 mm (1.57 in)

10.General Diagnostic Table

A: INSPECTION

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible cause	Corrective action
(1) Permanent distortion or damaged coil spring	Replace.
(2) Rough operation of shock absorber	Replace.
(3) Installation of the wrong shock absorber	Replace with proper parts.
(4) Installation of the wrong coil spring	Replace with proper parts.

2. POOR RIDE COMFORT

1) Large rebound shock
2) Rocking of the vehicle continues too long after running over bump and hump.
3) Excessive shock in bumping

Possible cause	Corrective action
(1) Damaged coil spring	Replace.
(2) Overinflation of tires	Adjust.
(3) Improper wheel arch height	Replace the coil springs with new parts.
(4) Defective operation of shock absorber	Replace.
(5) Damage or deformation of shock absorber mount	Replace.
(6) Unsuitable length (maximum or minimum) of shock absorber	Replace with appropriate parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in shock absorber	Replace.
(9) Oil leakage from the shock absorber	Replace.

3. NOISE

Possible cause	Corrective action
(1) Wear or damage of shock absorber component parts	Replace.
(2) Loosening of the suspension link or arm installing bolt	Tighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitable length (maximum or minimum) of shock absorber	Replace with appropriate parts.
(5) Damaged coil spring	Replace.
(6) Wear or damage of the ball joint	Replace.
(7) Deformation of the clamp - stabilizer bushing	Replace.

WHEEL AND TIRE SYSTEM

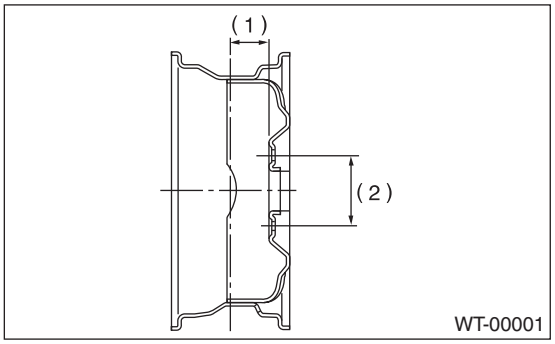
WT

Page

1. General Description 2
2. Tire and Wheel 4
3. “T-type” Tire 7
4. Full Wheel Cap 8
5. Tire Pressure Monitoring System 9
6. General Diagnostic Table 13

1. General Description

A: SPECIFICATION



(1) Inset
(2) P.C.D.

- Except for XV model

Tire size	Wheel size	Inset mm (in)	P.C.D. mm (in)	Tire inflation pressure kPa (kgf/cm^2, psi)	
				Front wheel	Rear wheel
P195/65R15 89H	15 × 6J	48 (1.89)	100 (3.94)	230 (2.3, 33)	220 (2.2, 32)
P205/55R16 89V	16 × 6$^1/_2$J				
P205/50R17 88V	17 × 7J			220 (2.2, 32)	210 (2.1, 30)
	17 × 7JJ				
T135/80D16 101M	16 × 4T	20 (0.79)		420 (4.2, 60)	

- XV model

Tire size	Wheel size	Inset mm (in)	P.C.D. mm (in)	Tire inflation pressure kPa (kgf/cm^2, psi)		
				Front wheel		Rear wheel
P225/55R17 95H	17 × 7J	20 (0.79)	100 (3.94)	MT	220 (2.2, 32)	210 (2.1, 30)
				CVT	230 (2.3, 33)	220 (2.2, 32)
T145/90D16 106M	16 × 4T			420 (4.2, 60)		

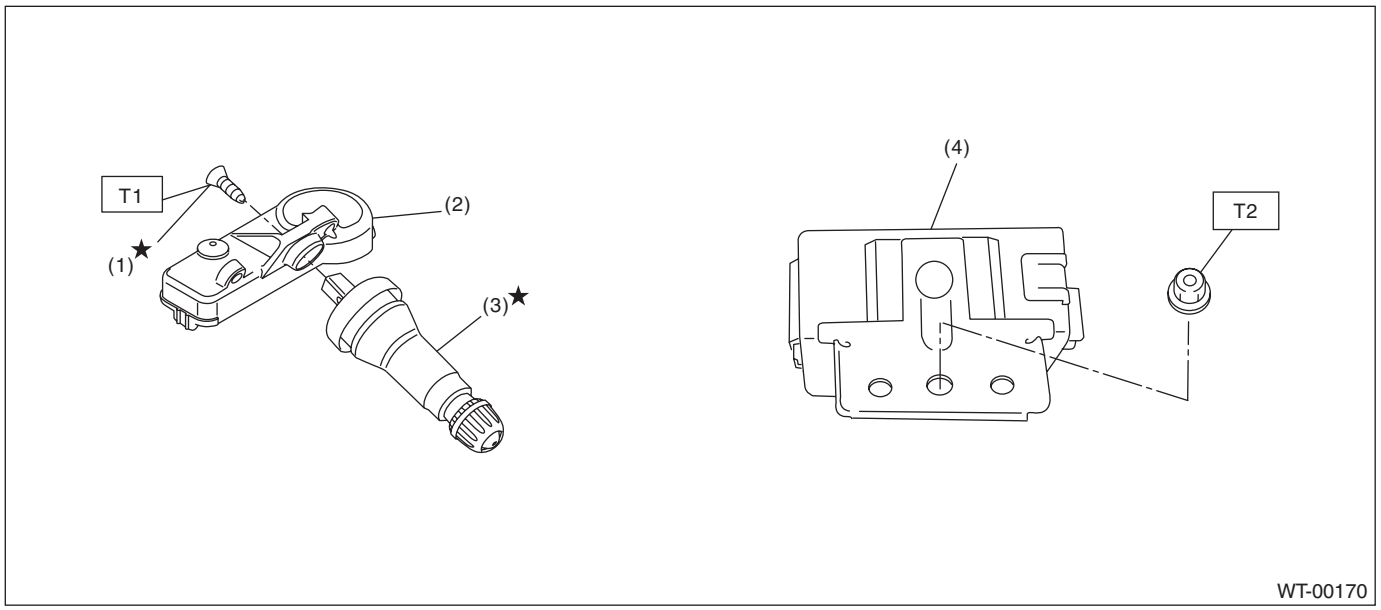
NOTE:
Size and inflation pressure of the standard equipment tire and spare tire for emergency are described on the “Tire inflation pressure” label attached to the body side of the driver’s door.

1. SERVICE DATA

Part	Axial runout	Radial runout
Steel wheel	1.5 mm (0.059 in)	
Aluminum wheel	1.0 mm (0.039 in)	

Wheel balancing	Standard	Service limit
Dynamic unbalance	5 g (0.18 oz) or less	

B: COMPONENT



(1) Screw
(2) Transmitter (Snap in type)
(3) Valve
(4) TPMS & keyless entry control module

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.4 (0.14, 1.0)
T2: 7.5 (0.76, 5.5)

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Air pressure gauge	Used for measuring tire air pressure.
Dial gauge	Used for measuring wheel runout.
Wheel balancer	Used for adjusting wheel balance.

2. Tire and Wheel

A: REMOVAL

1) Remove the hubcap. (model with hubcap) <Ref. to WT-8, REMOVAL, Full Wheel Cap.>
2) Lift up the vehicle.
3) Remove the wheel nut.
4) Remove the wheels.

CAUTION:
When removing the wheels, be careful not to damage the bolt - hub.

B: INSTALLATION

1) Install the wheels to vehicle.
2) Tighten the wheel nuts to the specified torque.

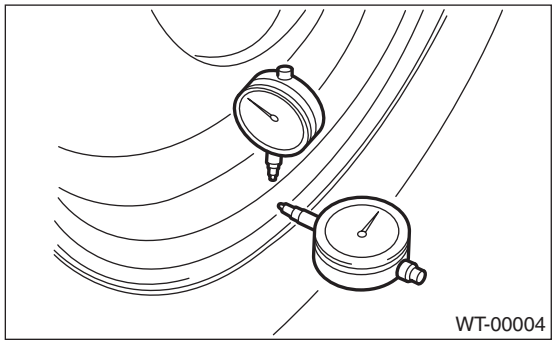
Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

1. TIRE

CAUTION:
When replacing a tire, make sure to use tires of the same size, construction and load range as originally installed.

1) Tire size and tire inflation pressure check <Ref. to WT-2, SPECIFICATION, General Description.>
2) Cracks, damage and wear check
3) Tire runout check
   (1) Lift up the vehicle.
   (2) Slowly rotate the wheel to check rim “runout” using a dial gauge.



- Aluminum wheel

Axial runout limit	Radial runout limit
1.0 mm (0.039 in)	

- Steel wheel

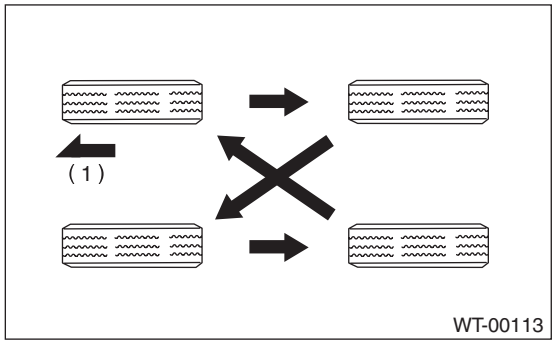
Axial runout limit	Radial runout limit
1.5 mm (0.059 in)	

   (3) If the rim runout exceeds service limit, replace the wheel.

2. TIRE ROTATION

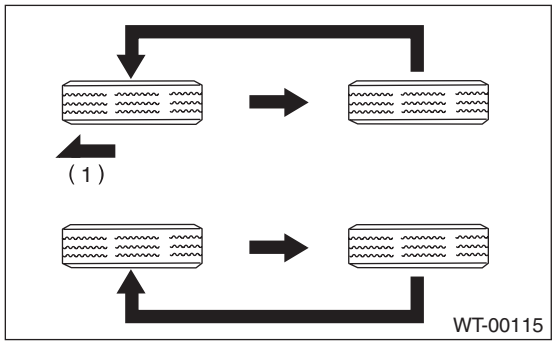
NOTE:
Rotate tires periodically (12,500 km/7,500 miles) in order to prolong life and to prevent uneven wear.
Rotate tires as shown in the figure depending on whether or not the direction of the tire rotation is specified.

- When the direction of tire rotation is not specified



(1) Front side of vehicle

- When the direction of tire rotation is specified

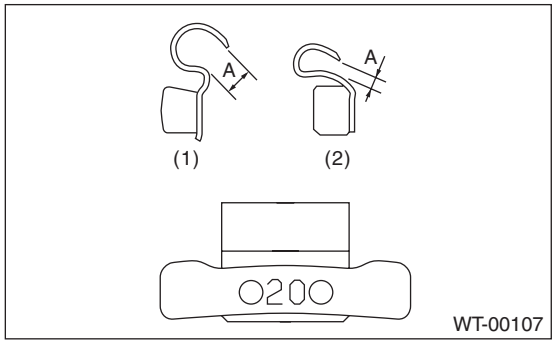


(1) Front side of vehicle

3. WHEEL BALANCING

1) Using the wheel balancer, measure wheel balance.
2) Adjust the wheel balancing.

NOTE:
- Unbalance after adjusting the wheel balancing should be 5 g (0.18 oz) or less.
- When using the adhesive type weight, degrease the surface where the adhesive type weight will be applied securely.
- After applying the adhesive type weight, apply a force to the weight and attain full adhesion.
- Using the knock-on type weight, check the size of the knock-on part.



(1) Knock-on type weight for aluminum wheel
(2) Knock-on type weight for steel wheel

Service limit A:
Knock-on type weight for steel wheel: 2.0 mm (0.079 in)
Knock-on type weight for aluminum wheel: 5.0 mm (0.197 in)

3. "T-type" Tire

A: NOTE

"T-type" tire for temporary use is prepared as a spare tire.

CAUTION:
- **The "T-type" tire is only for temporary use. Replace with a conventional tire as soon as possible.**
- **Do not use tire chains for "T-type" tires. Doing so can damage the vehicle and the tires because the tires are too small in size to attach chains to.**
- **Do not drive at a speed greater than 80 km/h (50 MPH).**
- **Drive at as low a speed as possible and avoid bumps on the road.**

B: REPLACEMENT

Refer to "Tire & Wheel" for removal and installation of the "T-type" tire. <Ref. to WT-4, Tire and Wheel.>

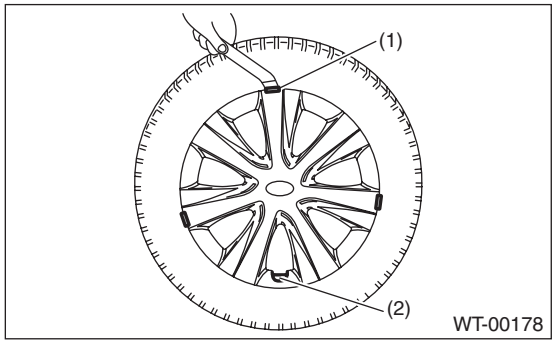
C: INSPECTION

Refer to "Tire & Wheel" for inspection of the "T-type" tire. <Ref. to WT-4, TIRE, INSPECTION, Tire and Wheel.>

4. Full Wheel Cap

A: REMOVAL

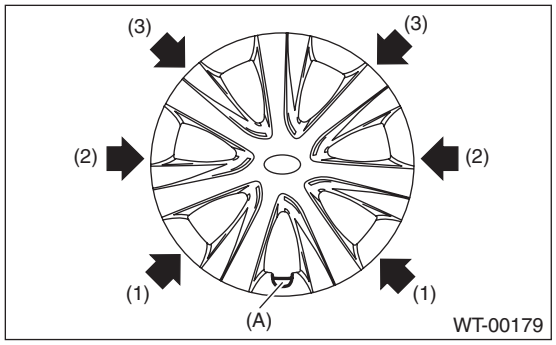
Insert a remover into the notch located diagonally to the valve, and remove the cap by prying the remover to the tire side.



(1) Cutout portion
(2) Valve hole

B: INSTALLATION

1) Align the valve with the valve hole in the hubcap.
2) Install the hubcap by tapping it in the order from (1) to (3) described in the figure.



(A) Valve hole

C: INSPECTION

Check for damage on the hubcap.

5. Tire Pressure Monitoring System

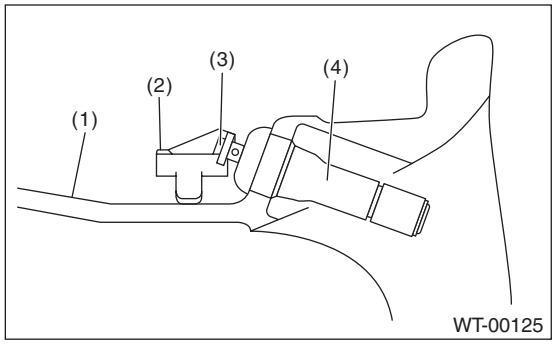
A: REMOVAL

1. TRANSMITTER (TIRE INFLATION PRESSURE SENSOR)

1) Remove the wheels from the vehicle. <Ref. to WT-4, REMOVAL, Tire and Wheel.>
2) Remove the tires from wheels.

CAUTION:
Use a tire changer when removing the tire from the wheel.
3) Loosen the screw to remove the transmitter from the valve stem.

CAUTION:
Do not reuse the valve and screw.
Replace the valve and screw with a new part even when reusing transmitter.



(1) Wheel
(2) Transmitter
(3) Screw
(4) Valve

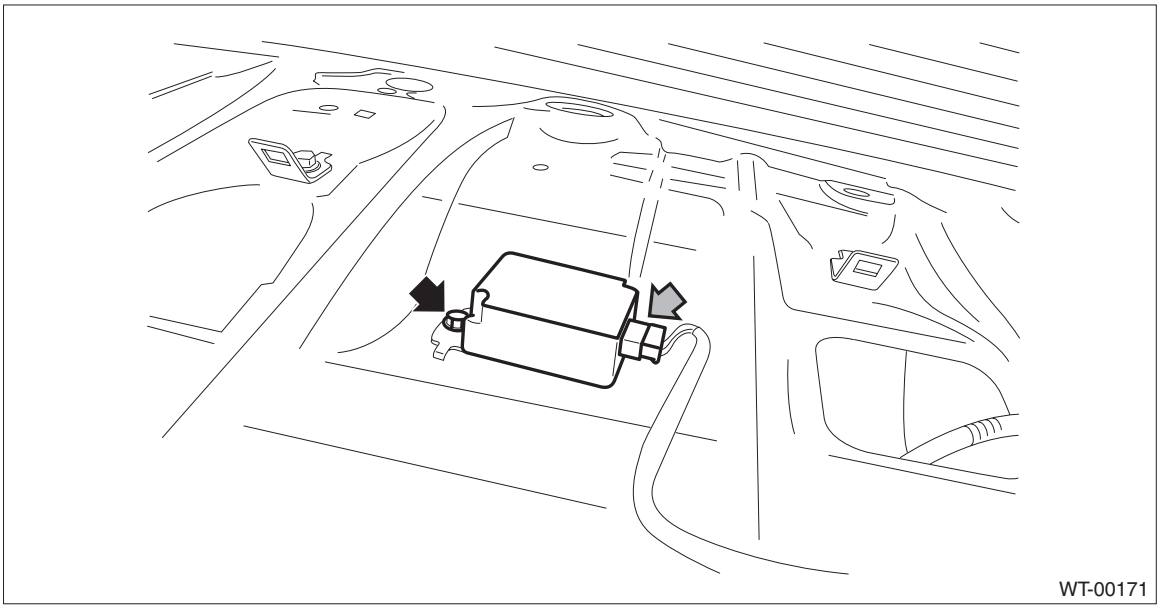
4) Remove the valve from the wheel.

2. TPMS & KEYLESS CONTROL MODULE

NOTE:
TPMS control module is integrated with the keyless entry control module.

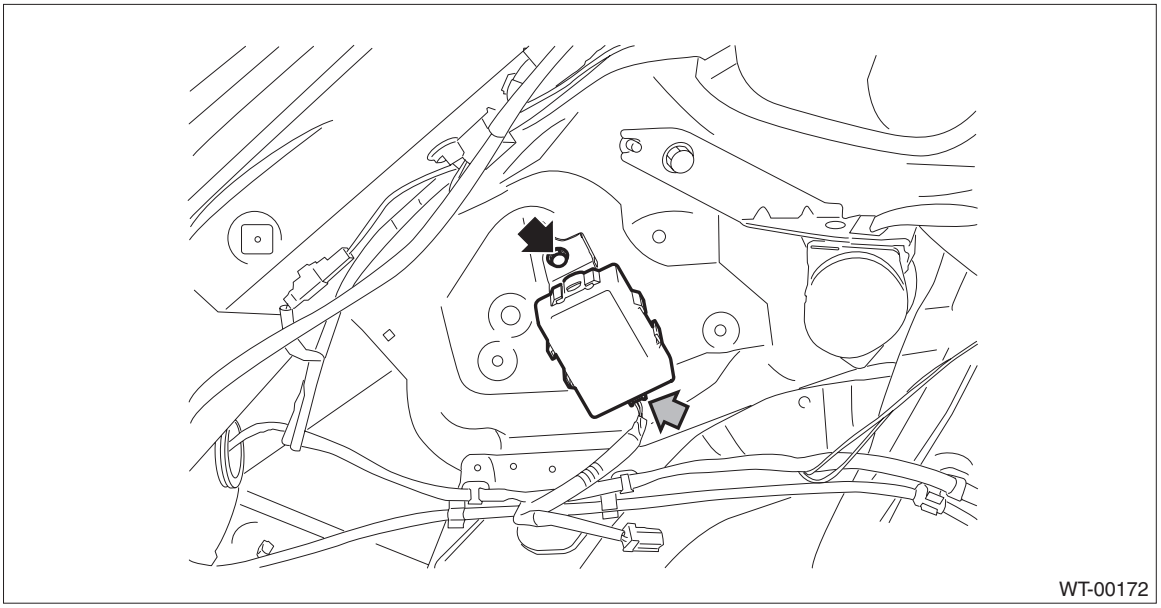
4 door model

1) Disconnect the ground cable from battery.
2) Remove the trim panel assembly - rear shelf. <Ref. to EI-112, REMOVAL, Rear Shelf Trim.>
3) Remove the TPMS & keyless control module.
   (1) Disconnect the connector.
   (2) Remove the bolt and then remove the TPMS & keyless control module.



5 door model/XV model

1) Disconnect the ground cable from battery.
2) Remove the trim panel - rear apron LH. <Ref. to EI-108, 5 DOOR MODEL/XV MODEL, REMOVAL, Rear Quarter Trim.>
3) Remove the TPMS & keyless control module.
   (1) Disconnect the connector.
   (2) Remove the bolt and then remove the TPMS & keyless control module.

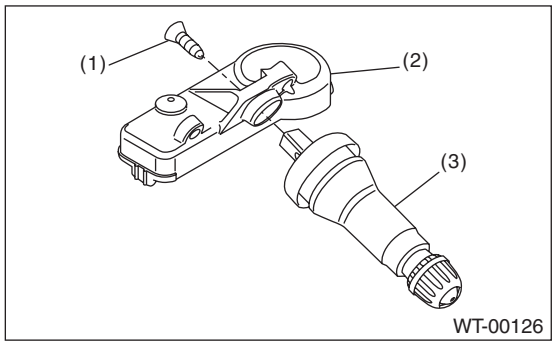


B: INSTALLATION

1. TRANSMITTER (TIRE INFLATION PRESSURE SENSOR)

CAUTION:
Use the new transmitter assembly or replace the new valve and screw, when installing.

1) Replace the valve and screw with a new part when reusing transmitter.



(1) Screw
(2) Transmitter
(3) Valve

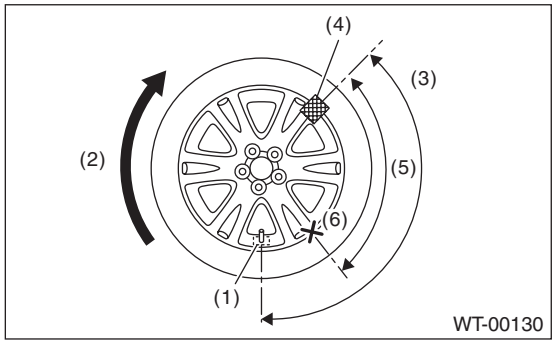
Tightening torque:
1.4 N·m (0.14 kgf-m, 1.0 ft-lb)

2) Install the transmitter to the wheel by aligning it with valve hole.

NOTE:
When using the jig that pulls the valve cap by hooking its neck part, use another short-type cap.

3) Install the tires to wheels.

CAUTION:
- **Use a tire changer when installing tire to wheel.**
- **To prevent damaging the transmitter, set the tire changer boom in the position as shown in the figure.**



(1) Transmitter
(2) Direction of turn table rotation
(3) 135°
(4) Tire changer boom
(5) 90°
(6) Starting point for fitting the bead to the rim

4) Install the wheels to vehicle. <Ref. to WT-4, INSTALLATION, Tire and Wheel.>
5) Register the transmitter ID to the TPMS & keyless control module. <Ref. to TPM(diag)-13, Register Transmitter (ID).>

2. TPMS & KEYLESS CONTROL MODULE

Install each part in the reverse order of removal.

Tightening torque:
13 N·m (1.33 kgf-m, 9.6 ft-lb)

C: ADJUSTMENT

Re-register the transmitter ID when transmitter has been replaced. <Ref. to TPM(diag)-13, Register Transmitter (ID).>

6. General Diagnostic Table

A: INSPECTION

Symptoms	Possible cause	Corrective action
Wheel is out of balance.	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to “Abnormal tire wear” in this table, carry out the procedure and replace the tire.
	Front wheel alignment	Check or adjust the front wheel alignment. • Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.> • Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>
	Rear wheel alignment	Check or adjust the rear wheel alignment. • Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.> • Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-48, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-32, INSPECTION, Rear Shock Absorber.>
	Housing ASSY - front axle	Check the housing assembly - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>
	Hub unit COMPL - front axle	Check the hub unit COMPL - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>
	Hub unit COMPL - rear axle	Check the hub unit COMPL - rear axle. <Ref. to DS-56, INSPECTION, Rear Hub Unit Bearing.>
Vehicle is abnormally out of balance.	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to “Abnormal tire wear” in this table, carry out the procedure and replace the tire.
	Front stabilizer	Inspect the front stabilizer.
	Front wheel alignment	Check or adjust the front wheel alignment. • Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.> • Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>
	Rear wheel alignment	Check or adjust the rear wheel alignment. • Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.> • Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>
Abnormal wheel vibration	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to “Abnormal tire wear” in this table, carry out the procedure and replace the tire.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Housing ASSY - front axle	Check the housing assembly - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>
	Hub unit COMPL - front axle	Check the hub unit COMPL - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>
	Hub unit COMPL - rear axle	Check the hub unit COMPL - rear axle. <Ref. to DS-56, INSPECTION, Rear Hub Unit Bearing.>

Symptoms	Possible cause	Corrective action
Abnormal tire wear	Improperly inflated tire.	Adjust the tire pressure.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Front wheel alignment	Check or adjust the front wheel alignment. • Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.> • Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>
	Rear wheel alignment	Check or adjust the rear wheel alignment. • Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.> • Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

TPM(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	General Description	3
3.	Electrical Component Location	5
4.	Control Module I/O Signal	6
5.	Subaru Select Monitor	7
6.	Read Diagnostic Trouble Code (DTC)	10
7.	Clear Memory Mode	11
8.	Read Current Data	12
9.	Register Transmitter (ID)	13
10.	Display Transmitter (ID)	14
11.	Inspection Mode	15
12.	Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern	16
13.	List of Diagnostic Trouble Code (DTC)	20
14.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	22
15.	General Diagnostic Table	31

1. Basic Diagnostic Procedure

A: PROCEDURE

CAUTION:
Before removal or installation, be sure to remove any foreign matter (dust, moisture, oil, etc.) from the TPMS & keyless entry control module connector.

NOTE:
To check harness for open or short circuits, shake the suspected trouble spot or connector.

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Check with the user regarding when the warning light lit or started blinking. 2) Before performing diagnostics, check all components which may adversely affect the tire pressure monitor system. <Ref. to TPM(diag)-3, INSPECTION, General Description.>	Is the component that might affect the tire pressure monitor system normal?	Go to step **2**.	Repair or replace each component.
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to TPM(diag)-7, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 4) Read the DTC. <Ref. to TPM(diag)-10, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Go to step **4**.	Go to step **3**.
3	**PERFORM GENERAL DIAGNOSTICS.** 1) Perform the inspection by referring to “General Diagnostic Table”. <Ref. to TPM(diag)-31, General Diagnostic Table.> 2) Perform the Clear Memory Mode. <Ref. to TPM(diag)-11, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to TPM(diag)-15, Inspection Mode.> 4) Read the DTC. <Ref. to TPM(diag)-10, OPERATION, Read Diagnostic Trouble Code (DTC).> Check the DTC is not displayed.	Does the tire pressure warning light illuminates for about 2 seconds and then foes off after turning on the ignition switch, and then go out?	Finish the diagnosis.	Check the tire inflation pressure warning light. <Ref. to TPM(diag)-16, Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern.>
4	**PERFORM DIAGNOSIS.** 1) Refer to “List of Diagnostic Trouble Code (DTC)”. 2) Correct the cause of trouble. 3) Perform the Clear Memory Mode. <Ref. to TPM(diag)-11, OPERATION, Clear Memory Mode.> 4) Perform the drive test. Drive the vehicle at 40 km/h (25 MPH) or faster for at least 10 minutes. 5) Read the DTC. <Ref. to TPM(diag)-10, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repeat steps 1 to 4 until DTC is not shown.	Finish the diagnosis.

2. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the TPM control module.

CAUTION:
• Do not use electrical test equipment on any of the airbag system wiring harness circuits.
• Be careful not to damage the wiring harness of the airbag system when servicing the TPMS & keyless entry control module.

2. TPMS & KEYLESS ENTRY CONTROL MODULE

• If the transmitter is replaced, ID registration for the transmitter is required. <Ref. to TPM(diag)-13, OPERATION, Register Transmitter (ID).>
• When adjusting tire pressure indoors in winter, there is a big temperature difference between the indoor facilities and outside. Once the car is outside where the temperature is lower, the air pressure in the tires will drop, causing the tire pressure warning light to illuminate, even if the pressure in the tires was adjusted to standard values indoors. To avoid this, it is necessary to adjust the tire pressure to the high side in consideration of the difference in temperature between inside and outside according to the following table.
• P195/65R15, P205/55R16, P225/55R17 (CVT)

Temperature °C (°F)	Indoor temperature	15.5 (60)		
	Ambient temperature	–1 (30)	–12 (10)	–23 (–10)
Air pressure kPa (psi)	Front	250 (36)	265 (38)	280 (40)
	Rear	240 (35)	255 (37)	270 (39)

• P205/50R17, P225/55R17 (MT)

Temperature °C (°F)	Indoor temperature	15.5 (60)		
	Ambient temperature	–1 (30)	–12 (10)	–23 (–10)
Air pressure kPa (psi)	Front	240 (35)	255 (37)	270 (39)
	Rear	230 (33)	245 (35)	255 (37)

B: INSPECTION

Before performing diagnosis, check the following item which might affect the quality of the tire pressure monitoring system.

1. TIRE

• Inspect that the tire pressure is within the specification while the tire is cool. (Refer to Tire Caution Label.)
• Check the tires for damage or the insertion of foreign matters.

2. BATTERY

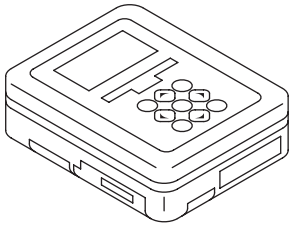
Check that amount of battery fluid, gravity and voltage are within the specifications.

Standard voltage: 12 V or more

Specific gravity: 1.260 or more

C: PREPARATION TOOL

1. SPECIAL TOOL

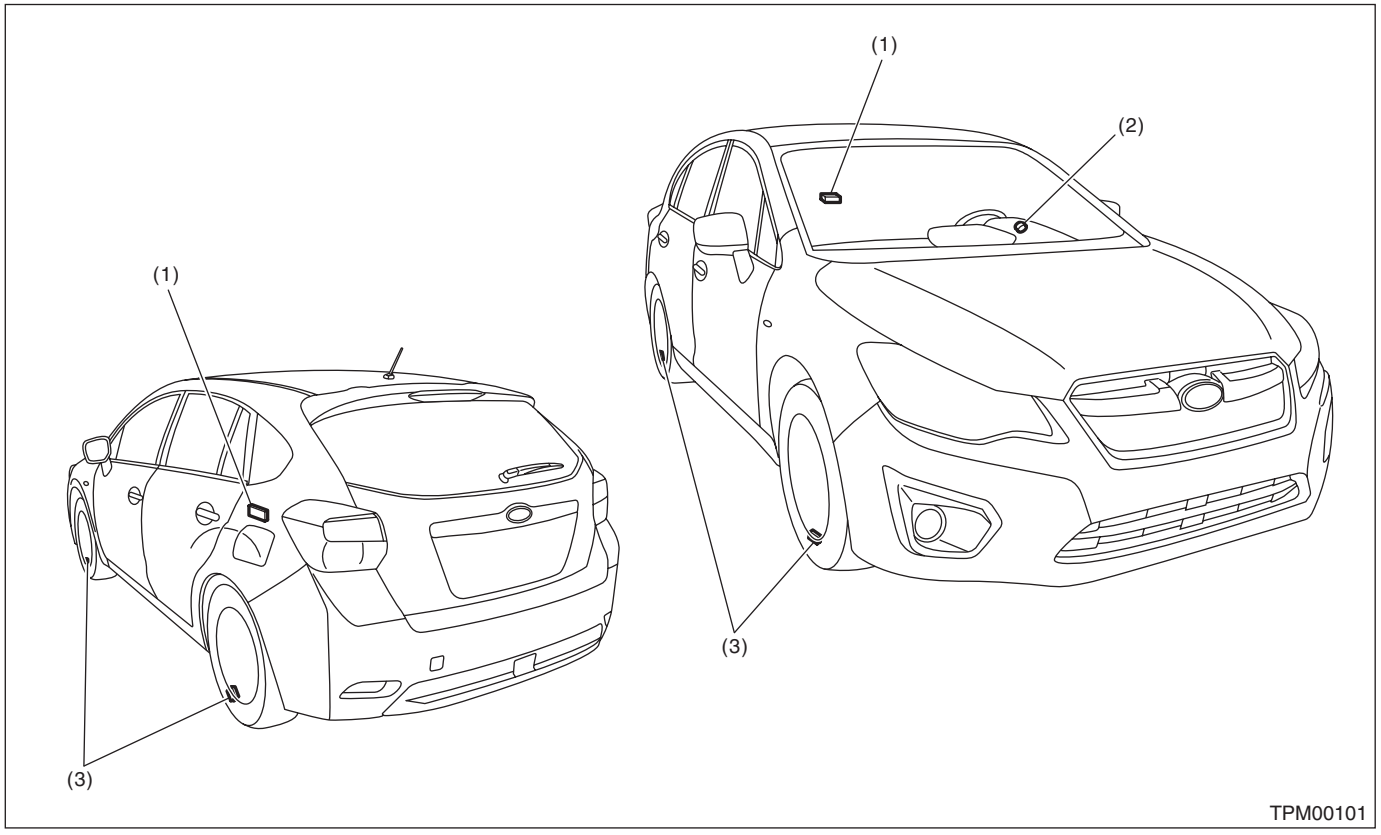
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Transmitter registration tool	Used to register the transmitter ID. Manufacturer: Kent-Moore Item number: J45295

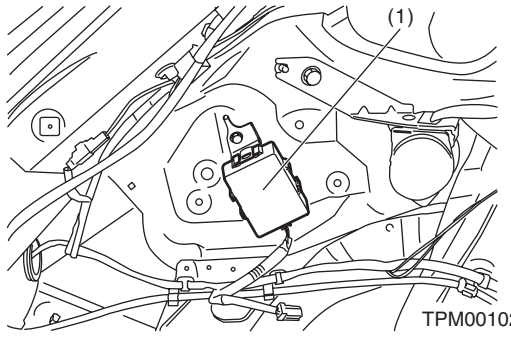
3. Electrical Component Location

A: LOCATION

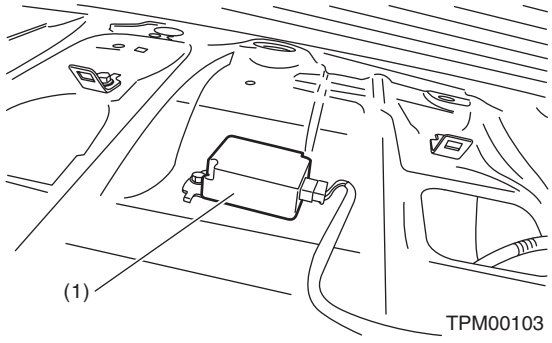


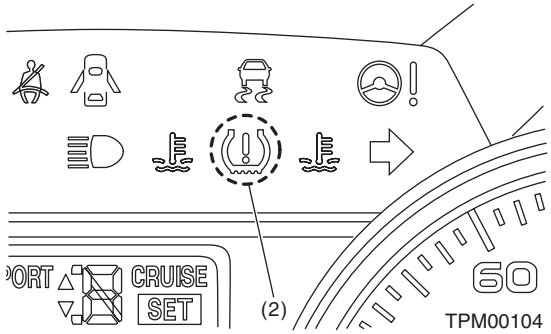
(1) TPMS & keyless entry control module
(2) Tire pressure warning light
(3) Snap-in type transmitter

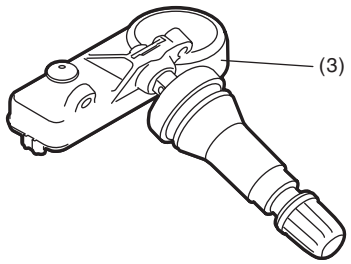
• 5 door model/XV model



• 4 door model

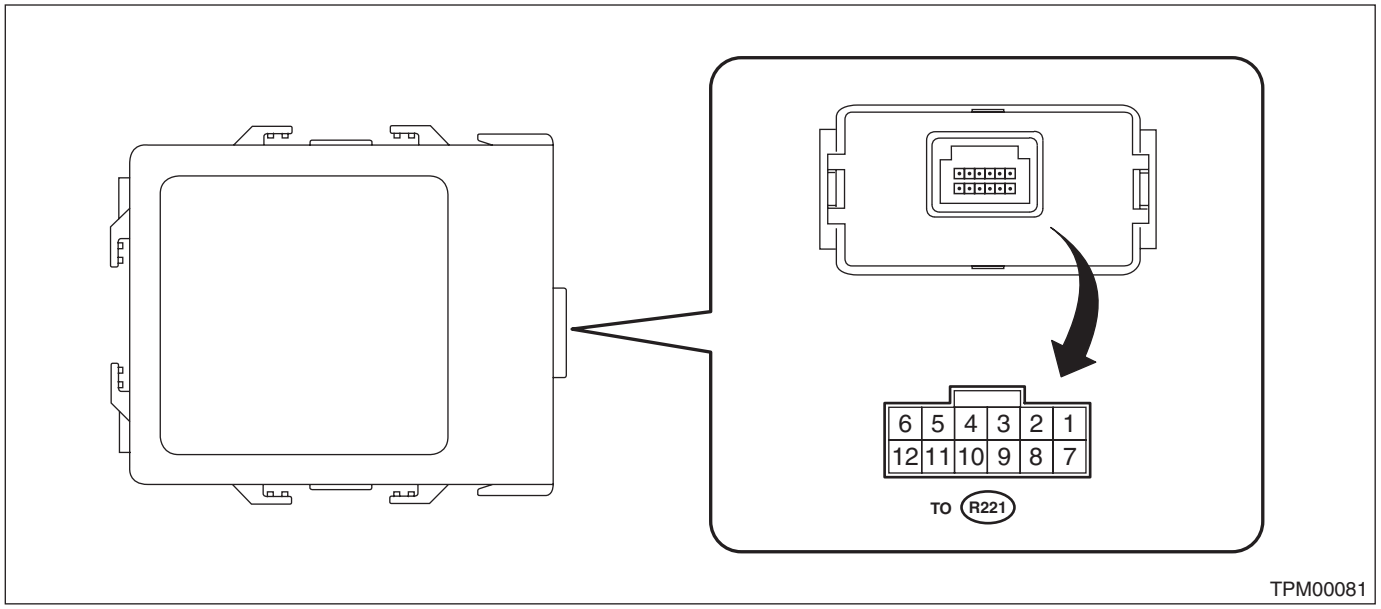






4. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



Terminal No.	Content	Measured value and measuring conditions	Remarks
1	—	—	—
2	—	—	—
3	—	—	—
4	Ignition power supply	IG switch ON (Battery voltage)	—
5	GND	0 V (Always)	—
6	Battery power supply	Battery voltage (Always)	—
7	—	—	—
8	—	—	—
9	—	—	—
10	—	—	—
11	Body integrated unit	—	—
12	—	—	—

B: WIRING DIAGRAM

<Ref. to WI-148, WIRING DIAGRAM, Tire Pressure Monitoring System.>

5. Subaru Select Monitor

A: OPERATION

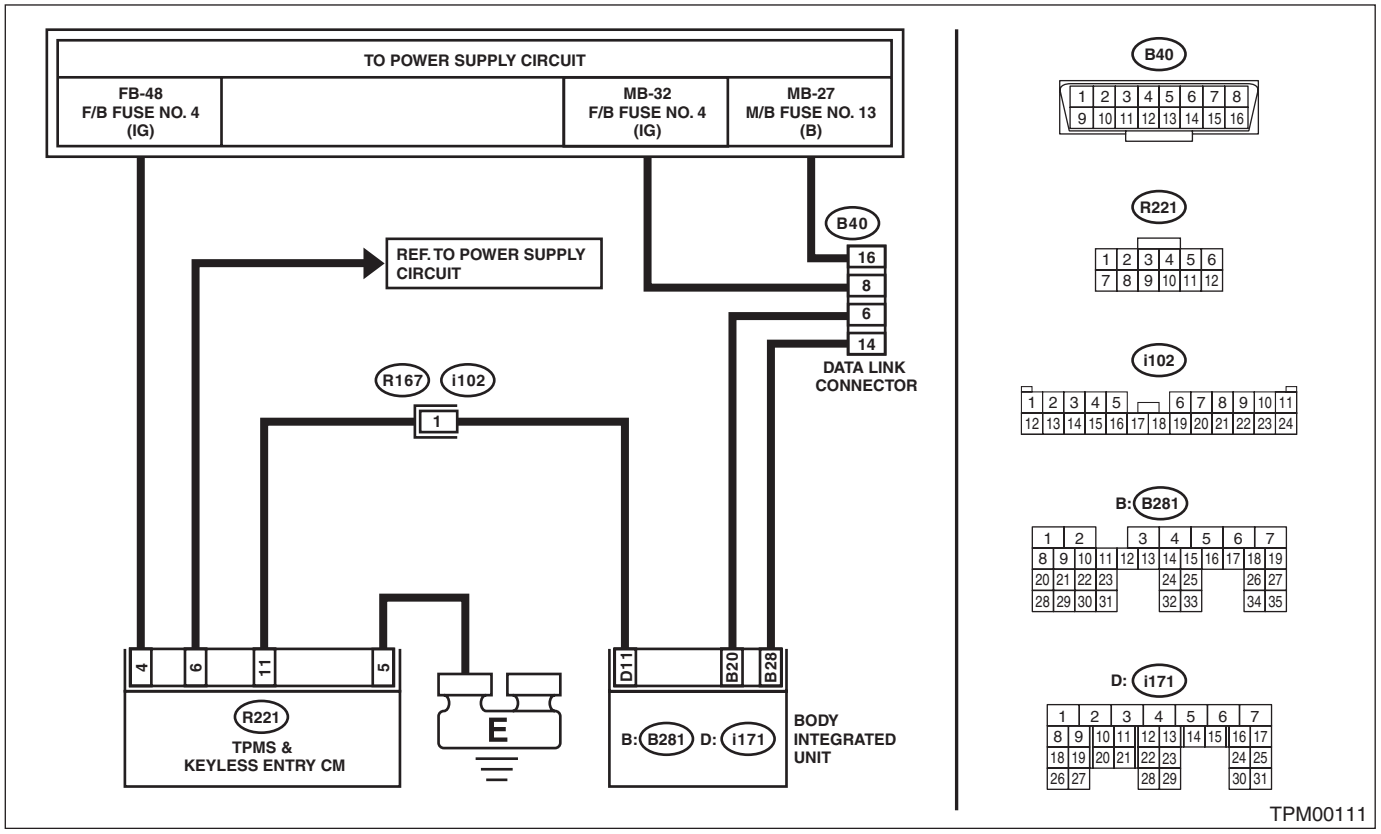
For the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

NOTE:
If TPMS & keyless entry control module and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to TPM(diag)-7, INSPECTION, Subaru Select Monitor.>

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:
Defective harness connector
TROUBLE SYMPTOM:
Communication is impossible between the TPMS & keyless entry control module and the Subaru Select Monitor.
WIRING DIAGRAM:
Tire Pressure Monitoring System <Ref. to WI-148, WIRING DIAGRAM, Tire Pressure Monitoring System.>



Step		Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2**.	Turn the ignition switch to ON, and select TPM mode using Subaru Select Monitor.
2	**CHECK BATTERY.**	Is the voltage 11 V or more?	Go to step **3**.	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4**.

	Step	Check	Yes	No
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Go to step **8**.	Go to step **5**.
5	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the TPMS & keyless entry control module connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Replace the TPMS & keyless entry control module.	Go to step **6**.
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the TPMS & keyless entry control module. 3) Measure the resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(B40) No. 6 — Chassis ground:*** ***(B40) No. 14 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the harness and connector between each control module and body integrated unit.
7	**CHECK OUTPUT SIGNAL TO TPMS & KEYLESS ENTRY CONTROL MODULE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TPMS & keyless entry control module and chassis ground. ***Connector & terminal*** ***(B40) No. 6 (+) — Chassis ground (–):*** ***(B40) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8**.	Repair the harness and connector between each control module and body integrated unit.
8	**CHECK HARNESS CONNECTOR BETWEEN TPMS & KEYLESS ENTRY CONTROL MODULE AND BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between TPMS & keyless entry control module connector and body integrated unit. ***Connector & terminal*** ***(R221) No. 11 — (i171) No. 11:***	Is the resistance less than 0.5 Ω?	Go to step **9**.	Repair the harness and connector between TPMS & keyless entry control module and body integrated unit.
9	**CHECK TPMS & KEYLESS ENTRY CONTROL MODULE CONNECTOR.**	Is the connector inserted into the TPMS & keyless entry control module until it locks?	Go to step **10**.	Insert the connector into the TPMS & keyless entry control module.
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. 2) Measure the ignition power supply voltage between TPMS & keyless entry control module connector and chassis ground. ***Connector & terminal*** ***(R221) No. 4 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **11**.	Repair open circuit of the harness between TPMS & keyless entry control module and battery.

	Step	Check	Yes	No
11	**CHECK HARNESS CONNECTOR BETWEEN TPMS & KEYLESS ENTRY CONTROL MODULE AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the TPMS & keyless entry control module. 3) Measure the resistance of harness between TPMS & keyless entry control module and chassis ground. ***Connector & terminal*** ***(R221) No. 5 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12**.	Repair open circuit of the harness of the TPMS & keyless entry control module.
12	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact in TPMS & keyless entry control module power supply, ground circuit and body integrated unit?	Repair the connector.	Replace the TPMS & keyless entry control module.

6. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For operation procedures, refer to the “PC application help for Subaru Select Monitor”.

NOTE:
• For details concerning DTCs, refer to List of Diagnostic Trouble Code (DTC). <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>
• All DTCs detected will be displayed.
• If a particular DTC is not properly stored in memory (due to a voltage drop of the TPMS & keyless entry control module power supply, etc.) when a problem occurs, a DTC suffixed with a question mark will appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.
• When DTC is not displayed, check the indicator circuit and communication circuit. <Ref. to TPM(diag)-16, Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern.>

7. Clear Memory Mode

A: OPERATION

For the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

8. Read Current Data

A: OPERATION

For the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

B: LIST

Display	Contents to be displayed	Unit of measure
Tire 1 FN code	LEARN, LOW BAT, OFF, WAKE, RE ME, NORMAL	LEARN: Transmitted transmitter ID using the transmitter registration tool LOW BAT: Transmitter battery voltage running low OFF: Transmitter function stops (no data transmission) RE ME: Tire air changes ±8.4 kPa WAKE: When data transmission is started from a stopped state. NORMAL: Conditions other than above
Tire 2 FN code		
Tire 3 FN code		
Tire 4 FN code		
Tire 1 air pressure	Value converted to tire pressure from data delivered from transmitter is displayed. (The figure may differ from the actual measured values.)	kPa, psig, mmHg, inHg
Tire 2 air pressure		kPa, psig, mmHg, inHg
Tire 3 air pressure		kPa, psig, mmHg, inHg
Tire 4 air pressure		kPa, psig, mmHg, inHg
Vehicle Speed	Vehicle speed signal which is input in control module	km/h, MPH
Pressure warning	Threshold where tire pressure warning light illuminates	kPa, psig, mmHg, inHg
Return pressure	Threshold where tire pressure warning light goes out	kPa, psig, mmHg, inHg

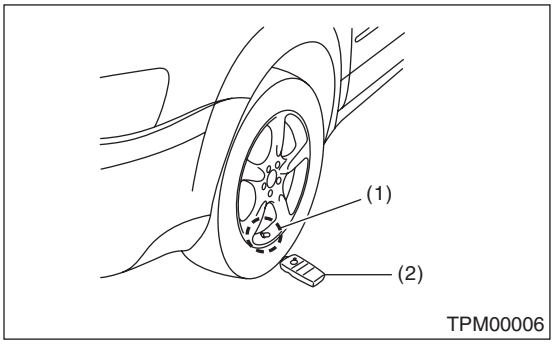
9. Register Transmitter (ID)

A: OPERATION

Perform the registration procedure of the transmitter in the following cases:
- Transmitter replaced.
- TPMS & keyless entry control module replaced.

NOTE:
- If registration of the transmitter ID is not possible after two attempts, replace the TPMS & keyless entry control module.
- During the registration, turn the ignition switch to OFF and end the Subaru Select Monitor. Or if the registration is not performed for 5 minutes or more, the registration mode is cancelled.
- When rotating tires, there is no affect on the performance or functions of the tire pressure monitoring control module even if the transmitter (ID) is not registered, however, the tire position displayed on the Subaru Select Monitor will be incorrect.

1) Adjust all tire pressures to the specifications.
2) Connect Subaru Select Monitor and select the {Each System Check} on the «Main Menu».
3) On «System Selection Menu» display, select {Tire pressure monitor}.
4) After the {Tire pressure monitor} is displayed, select [OK].
5) On «Tire pressure monitor diagnosis» display, select {Transmitter ID regist confirm}.
6) {ID registration mode When execute Registered ID is deleted. Continue?} is displayed, select [OK].
7) Contact the transmitter registration tool to the side wall area near the air valve on the front left tire, and press the switch. The transmitter ID is sent to the TPMS & keyless entry control module. (At that time, the tire pressure warning light blinks to confirm that the registration has started.)



(1) Air valve (transmitter)
(2) Transmitter registration tool

NOTE:
- The registration order of transmitter ID is not specified.
- The transmitter registration tool is used by touching the side wall area near the transmitter.
- When registration of each tire is completed, {ID registration completed} is displayed on the Select Monitor screen.
- If registration procedure stop in the halfway (turning ignition switch to OFF, wrong registration order, etc), proceed from step 5).

8) When ID registration is completed, the tire pressure warning light remains lit for approximately 2 seconds, to end the registration. Switch to the screen displaying the transmitter ID on the Subaru Select Monitor display. <Ref. to TPM(diag)-14, Display Transmitter (ID).>
9) Check the transmitter ID that was registered, then perform a driving test. <Ref. to TPM(diag)-15, Inspection Mode.>

10.Display Transmitter (ID)

A: OPERATION

For the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

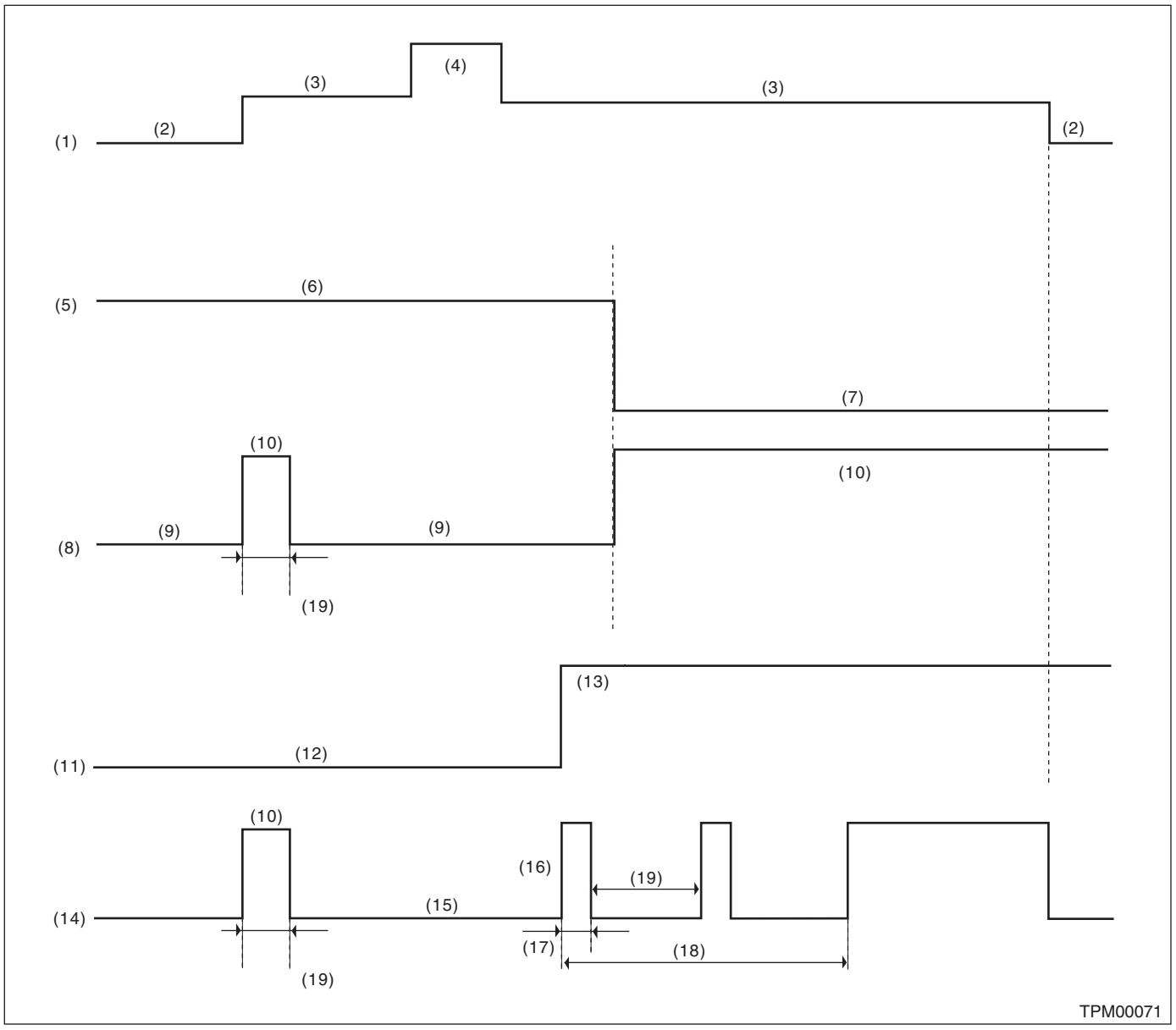
11.Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as much as possible. Drive the vehicle at 40 km/h (25 MPH) or faster for at least ten minutes.

12. Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern

A: INSPECTION



(1) Ignition switch
(2) OFF
(3) ON
(4) Start
(5) Tire inflation pressure condition
(6) Meet the specification
(7) Less than standard value (For the pressure warning level, refer to "CURRENT DATA".) <Ref. to TPM(diag)-12, LIST, Read Current Data.>
(8) Tire inflation pressure warning light (pressure condition)
(9) Light OFF
(10) Light ON
(11) System status
(12) Normal
(13) Malfunction
(14) Tire inflation pressure warning light (system condition)
(15) Light OFF
(16) Blink
(17) 1 second
(18) Blinks 25 times
(19) 2 seconds

1) When the tire pressure warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) If the tire pressure warning light does not go off, check the TPMS & keyless entry control module/warning light circuit and the combination meter circuit. <Ref. to TPM(diag)-18, TIRE PRESSURE WARNING LIGHT DOES NOT COME OFF, Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern.>

NOTE:
If the problem is fixed while driving at approximately 40 km/h (25 MPH) after the tire pressure warning light blinks/lights, the warning light goes out and the tire pressure monitor system operates normally. (If there is a decrease in tire pressure, or a malfunction of the system, the malfunction history is displayed.)

B: TIRE PRESSURE WARNING LIGHT DOES NOT COME ON

DETECTING CONDITION:
Defective combination meter

TROUBLE SYMPTOM:
When the ignition switch is turned to ON, the tire pressure warning light does not turn on (for approx. 2 seconds).

	Step	Check	Yes	No
1	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** Connect the Subaru Select Monitor, and read the Diagnostic Trouble Code. <Ref. to TPM(diag)-10, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is diagnostics code (DTC) displayed?	Perform the diagnosis according to the DTC. <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>	Replace the combination meter. <Ref. to IDI-17, REMOVAL, Combination Meter.>

C: TIRE PRESSURE WARNING LIGHT DOES NOT COME OFF

DETECTING CONDITION:

- Defective combination meter
- Tires pressure drop
- Transmitter ID not registered

TROUBLE SYMPTOM:

Tire pressure warning light remains illuminating after engine starts.

	Step	Check	Yes	No
1	**CHECK DTC.** Connect the Subaru Select Monitor, and read the Diagnostic Trouble Code. <Ref. to TPM(diag)-10, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is a DTC displayed?	Perform the diagnosis according to the DTC. <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK TRANSMITTER (ID).** Display the transmitter ID of the tire pressure monitor system.	Is the transmitter ID registered?	Go to step **3**.	Register the transmitter ID. <Ref. to TPM(diag)-13, OPERATION, Register Transmitter (ID).>
3	**CHECK TRANSMITTER DATA OUTPUT.** 1) Select data display of the tire pressure monitoring. 2) Start the engine and check the tire pressure warning light output.	Is the warning light output ON?	Replace the TPMS & keyless entry control module.	Replace the combination meter. <Ref. to IDI-17, REMOVAL, Combination Meter.>

D: TIRE PRESSURE WARNING LIGHT IS 25 TIMES BLINKING AND TURN ON

DETECTING CONDITION:

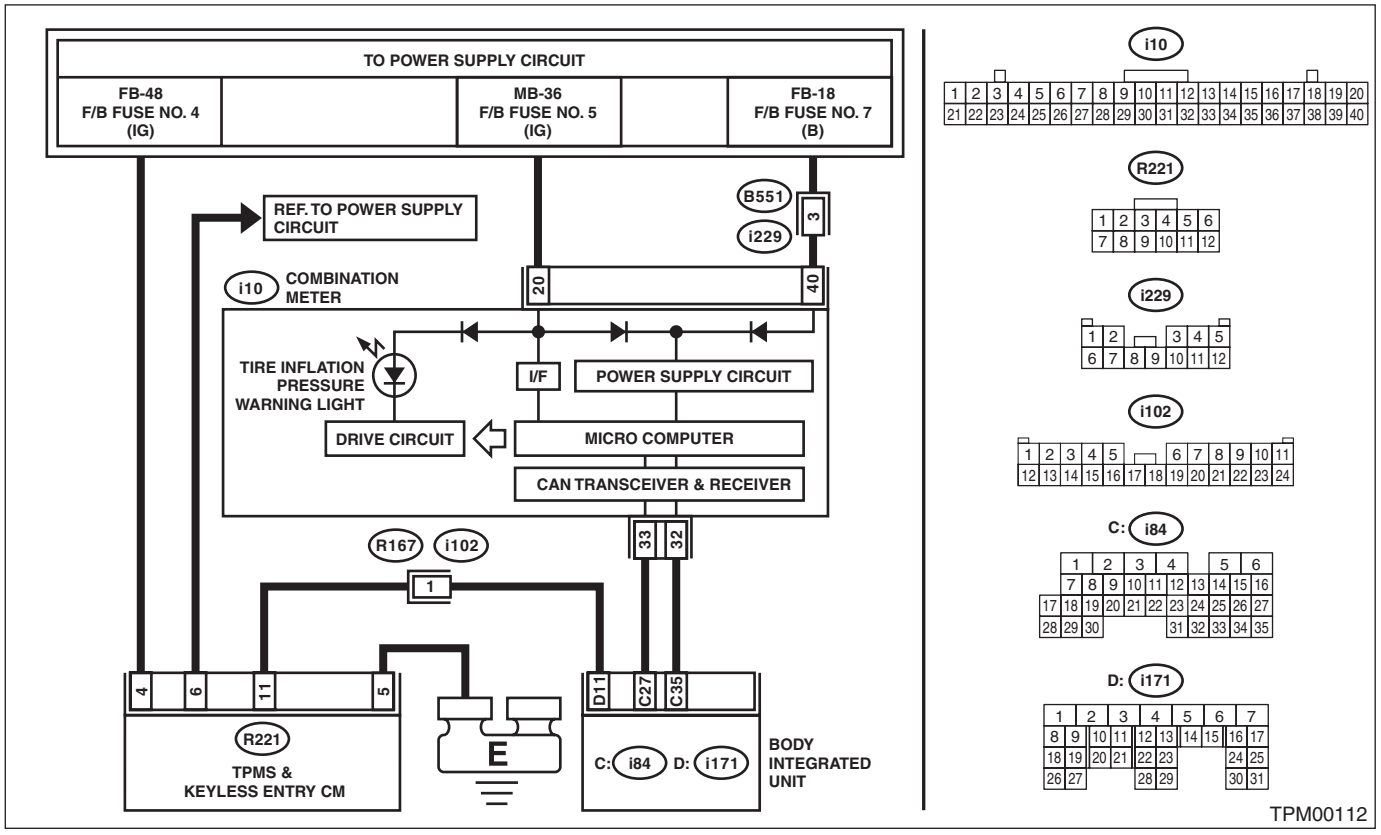
- Defective TPMS & keyless entry control module
- Defective harness
- Transmitter is faulty.

TROUBLE SYMPTOM:

Every time the engine starts, tire pressure warning light blinks 25 times and then illuminates.

WIRING DIAGRAM:

Tire Pressure Monitoring System <Ref. to WI-148, WIRING DIAGRAM, Tire Pressure Monitoring System.>



Step		Check	Yes	No
1	**CHECK DTC.** Connect the Subaru Select Monitor, and read the Diagnostic Trouble Code. <Ref. to TPM(diag)-10, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is diagnostics code (DTC) displayed?	Perform the diagnosis according to the DTC. <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK LAN COMMUNICATION.** Inspect LAN system. <Ref. to LAN(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>	Is there any fault?	Repair it according to the diagnosis for LAN system.	Go to step **3**.
3	**CHECK HARNESS.** Measure the resistance between TPMS & keyless entry control module and body integrated unit. ***Connector & terminal*** ***(R221) No. 11 — (i171) No. 11:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the harness.
4	**CHECK CONNECTOR.** Check each connector.	Is there poor contact or any other faults?	Repair the connector.	Replace the TPMS & keyless entry control module.

13.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Contents of diagnosis	Remarks
C2021	Tire 1 Air Pressure Decrease	Tire pressure of tire 1 is reduced.	<Ref. to TPM(diag)-22, DTC C2021 TIRE 1 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2022	Tire 2 Air Pressure Decrease	Tire pressure of tire 2 is reduced.	<Ref. to TPM(diag)-22, DTC C2022 TIRE 2 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2023	Tire 3 Air Pressure Decrease	Tire pressure of tire 3 is reduced.	<Ref. to TPM(diag)-22, DTC C2023 TIRE 3 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2024	Tire 4 Air Pressure Decrease	Tire pressure of tire 4 is reduced.	<Ref. to TPM(diag)-22, DTC C2024 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2121	Transmitter 1 No Data	Data cannot be received from transmitter 1.	<Ref. to TPM(diag)-23, DTC C2121 TRANSMITTER 1 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2122	Transmitter 2 No Data	Data cannot be received from transmitter 2.	<Ref. to TPM(diag)-23, DTC C2122 TRANSMITTER 2 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2123	Transmitter 3 No Data	Data cannot be received from transmitter 3.	<Ref. to TPM(diag)-23, DTC C2123 TRANSMITTER 3 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2124	Transmitter 4 No Data	Data cannot be received from transmitter 4.	<Ref. to TPM(diag)-24, DTC C2124 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2221	Transmitter 1 Pressure Data Abnormal	Transmitter 1 data contents are abnormal.	<Ref. to TPM(diag)-25, DTC C2221 TRANSMITTER 1 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2222	Transmitter 2 Pressure Data Abnormal	Transmitter 2 data contents are abnormal.	<Ref. to TPM(diag)-25, DTC C2222 TRANSMITTER 2 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2223	Transmitter 3 Pressure Data Abnormal	Transmitter 3 data contents are abnormal.	<Ref. to TPM(diag)-25, DTC C2223 TRANSMITTER 3 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2224	Transmitter 4 Pressure Data Abnormal	Transmitter 4 data contents are abnormal.	<Ref. to TPM(diag)-26, DTC C2224 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2321	Transmitter 1 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-27, DTC C2321 TRANSMITTER 1 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Contents of diagnosis	Remarks
C2322	Transmitter 2 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-27, DTC C2322 TRANSMITTER 2 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2323	Transmitter 3 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-27, DTC C2323 TRANSMITTER 3 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2324	Transmitter 4 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-28, DTC C2324 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2421	Transmitter 1 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-29, DTC C2421 TRANSMITTER 1 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2422	Transmitter 2 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-29, DTC C2422 TRANSMITTER 2 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2423	Transmitter 3 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-29, DTC C2423 TRANSMITTER 3 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2424	Transmitter 4 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-29, DTC C2424 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2521	Vehicle Speed Is Abnormal	Vehicle speed signal is not input to the control module when the vehicle speed is 6 km/h (3.7 MPH) or more.	<Ref. to TPM(diag)-30, DTC C2521 VEHICLE SPEED IS ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC C2021 TIRE 1 AIR PRESSURE DECREASE

NOTE:
Refer to DTC C2024 for diagnostic procedure. <Ref. to TPM(diag)-22, DTC C2024 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC C2022 TIRE 2 AIR PRESSURE DECREASE

NOTE:
Refer to DTC C2024 for diagnostic procedure. <Ref. to TPM(diag)-22, DTC C2024 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC C2023 TIRE 3 AIR PRESSURE DECREASE

NOTE:
Refer to DTC C2024 for diagnostic procedure. <Ref. to TPM(diag)-22, DTC C2024 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC C2024 TIRE 4 AIR PRESSURE DECREASE

DTC DETECTING CONDITION:
Inflation pressure of tires dropped below the specified value.

NOTE:
For the specifications, refer to “CURRENT DATA”. <Ref. to TPM(diag)-12, LIST, Read Current Data.>
TROUBLE SYMPTOM:
Tire pressure warning light illuminates.

	Step	Check	Yes	No
1	**CHECK TIRES.** Lift up the vehicle and check for damage in the tires.	Are there cracks or damage?	Replace the tire.	Go to step **2**.
2	**CHECK TIRES.** Check the tire air pressure.	Is the tire pressure in the specifications?	Go to step **3**.	Adjust the air pressure.
3	**CHECK TRANSMITTER.** Drive the vehicle at 40 km/h (25 MPH) or faster and compare the data from the transmitter on the four wheels.	Is there a transmitter with different data?	Replace the transmitter (tire pressure sensor).	Go to step **4**.
4	**PERFORM DRIVING TEST.** 1) Perform the Clear Memory Mode. <Ref. to TPM(diag)-11, OPERATION, Clear Memory Mode.> 2) Perform a driving test. <Ref. to TPM(diag)-15, PROCEDURE, Inspection Mode.> 3) Read the DTC. <Ref. to TPM(diag)-10, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Inspect by referring to “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to TPM(diag)-22, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

CAUTION:
When driving vehicle to perform driving test, there should be always 2 persons (driver and checker) to check.

E: DTC C2121 TRANSMITTER 1 NO DATA

NOTE:
Refer to DTC C2124 for diagnostic procedure. <Ref. to TPM(diag)-24, DTC C2124 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC C2122 TRANSMITTER 2 NO DATA

NOTE:
Refer to DTC C2124 for diagnostic procedure. <Ref. to TPM(diag)-24, DTC C2124 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC C2123 TRANSMITTER 3 NO DATA

NOTE:
Refer to DTC C2124 for diagnostic procedure. <Ref. to TPM(diag)-24, DTC C2124 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC C2124 TRANSMITTER 4 NO DATA

DTC DETECTING CONDITION:
Data from each transmitter is not received for 8 minutes.
TROUBLE SYMPTOM:
Tire pressure warning light blinks 25 times and then illuminates.

	Step	Check	Yes	No
1	**START FL TRANSMITTER.** 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select “Transmit ID data monitor”. <Ref. to TPM(diag)-14, OPERATION, Display Transmitter (ID).> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **2**.	Replace front left transmitter.
2	**CHECK FL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 1 registered ID.	Are the two IDs same?	Go to step **3**.	Record the received ID update as the FL transmitter. Go to step **3**.
3	**START FR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the FR transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **4**.	Replace the front right transmitter.
4	**CHECK FR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 2 registered ID.	Are the two IDs same?	Go to step **5**.	Record the received ID update as the FR transmitter. Go to step **5**.
5	**START RR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RR transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **6**.	Replace the RR transmitter.
6	**CHECK RR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 3 registered ID.	Are the two IDs same?	Go to step **7**.	Record the received ID update as the RR transmitter. Go to step **7**.
7	**START RL TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RL transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **8**.	Replace the RL transmitter.
8	**CHECK RL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 4 registered ID.	Are the two IDs same?	Go to step **9**.	Record the received ID update as the RL transmitter. Go to step **9**.
9	**CHECK MALFUNCTION TRANSMITTER.**	Is ID recorded by this procedure?	Go to step **10**.	Go to step **1**.
10	**CHECK MALFUNCTION TRANSMITTER.** Check the registered ID of the transmitter indicated by DTC.	Is there checked ID in the record?	Replace the transmitter of the recorded position.	Replace the transmitter showing the latest ID that is not included in the registered IDs.

CAUTION:
When driving vehicle to perform driving test, there should be always 2 persons (driver and checker) to check.

I: DTC C2221 TRANSMITTER 1 PRESSURE DATA ABNORMAL

NOTE:
Refer to DTC C2224 for diagnostic procedure. <Ref. to TPM(diag)-26, DTC C2224 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC C2222 TRANSMITTER 2 PRESSURE DATA ABNORMAL

NOTE:
Refer to DTC C2224 for diagnostic procedure. <Ref. to TPM(diag)-26, DTC C2224 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC C2223 TRANSMITTER 3 PRESSURE DATA ABNORMAL

NOTE:
Refer to DTC C2224 for diagnostic procedure. <Ref. to TPM(diag)-26, DTC C2224 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC C2224 TRANSMITTER 4 PRESSURE DATA ABNORMAL

DTC DETECTING CONDITION:

- When comparing the data from each transmitter to the previous data, the change is large.
- The pressure exceeds what the transmitter can measure. (Excessive pressure)

TROUBLE SYMPTOM:

Tire pressure warning light blinks 25 times and then illuminates.

	Step	Check	Yes	No
1	**START FL TRANSMITTER.** 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select “Transmit ID data monitor”. <Ref. to TPM(diag)-14, OPERATION, Display Transmitter (ID).> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **2**.	Replace front left transmitter.
2	**CHECK FL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 1 registered ID.	Are the two IDs same?	Go to step **3**.	Record the received ID update as the FL transmitter. Go to step **3**.
3	**START FR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the FR transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **4**.	Replace the front right transmitter.
4	**CHECK FR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 2 registered ID.	Are the two IDs same?	Go to step **5**.	Record the received ID update as the FR transmitter. Go to step **5**.
5	**START RR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RR transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **6**.	Replace the RR transmitter.
6	**CHECK RR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 3 registered ID.	Are the two IDs same?	Go to step **7**.	Record the received ID update as the RR transmitter. Go to step **7**.
7	**START RL TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RL transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **8**.	Replace the RL transmitter.
8	**CHECK RL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 4 registered ID.	Are the two IDs same?	Go to step **9**.	Record the received ID update as the RL transmitter. Go to step **9**.
9	**CHECK MALFUNCTION TRANSMITTER.**	Is ID recorded by this procedure?	Go to step **10**.	Go to step **1**.
10	**CHECK MALFUNCTION TRANSMITTER.** Check the registered ID of the transmitter indicated by DTC.	Is there checked ID in the record?	Replace the transmitter of the recorded position.	Replace the transmitter showing the latest ID that is not included in the registered IDs.

M: DTC C2321 TRANSMITTER 1 FUNCTION CODE ABNORMAL

NOTE:
Refer to DTC C2324 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC C2324 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: DTC C2322 TRANSMITTER 2 FUNCTION CODE ABNORMAL

NOTE:
Refer to DTC C2324 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC C2324 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC C2323 TRANSMITTER 3 FUNCTION CODE ABNORMAL

NOTE:
Refer to DTC C2324 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC C2324 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC C2324 TRANSMITTER 4 FUNCTION CODE ABNORMAL

DTC DETECTING CONDITION:
Unexpected function codes received from each transmitter.
TROUBLE SYMPTOM:
Tire pressure warning light blinks 25 times and then illuminates.

	Step	Check	Yes	No
1	**START FL TRANSMITTER.** 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select “Transmit ID data monitor”. <Ref. to TPM(diag)-14, OPERATION, Display Transmitter (ID).> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **2**.	Replace front left transmitter.
2	**CHECK FL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 1 registered ID.	Are the two IDs same?	Go to step **3**.	Record the received ID update as the FL transmitter. Go to step **3**.
3	**START FR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the FR transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **4**.	Replace the front right transmitter.
4	**CHECK FR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 2 registered ID.	Are the two IDs same?	Go to step **5**.	Record the received ID update as the FR transmitter. Go to step **5**.
5	**START RR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RR transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **6**.	Replace the RR transmitter.
6	**CHECK RR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 3 registered ID.	Are the two IDs same?	Go to step **7**.	Record the received ID update as the RR transmitter. Go to step **7**.
7	**START RL TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RL transmitter to check “Latest reception ID”.	Is “Latest reception ID” updated?	Go to step **8**.	Replace the RL transmitter.
8	**CHECK RL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the tire 4 registered ID.	Are the two IDs same?	Go to step **9**.	Record the received ID update as the RL transmitter. Go to step **9**.
9	**CHECK MALFUNCTION TRANSMITTER.**	Is ID recorded by this procedure?	Go to step **10**.	Replace the transmitter indicated by diagnostics trouble code (DTC).
10	**CHECK MALFUNCTION TRANSMITTER.** Check the registered ID of the transmitter indicated by DTC.	Is there checked ID in the record?	Replace the transmitter of the recorded position.	Replace the transmitter indicated by diagnostics trouble code (DTC).

Q: DTC C2421 TRANSMITTER 1 BATTERY VOLTAGE DECREASE

NOTE:
Refer to DTC C2424 for diagnostic procedure. <Ref. to TPM(diag)-29, DTC C2424 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

R: DTC C2422 TRANSMITTER 2 BATTERY VOLTAGE DECREASE

NOTE:
Refer to DTC C2424 for diagnostic procedure. <Ref. to TPM(diag)-29, DTC C2424 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

S: DTC C2423 TRANSMITTER 3 BATTERY VOLTAGE DECREASE

NOTE:
Refer to DTC C2424 for diagnostic procedure. <Ref. to TPM(diag)-29, DTC C2424 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

T: DTC C2424 TRANSMITTER 4 BATTERY VOLTAGE DECREASE

DTC DETECTING CONDITION:
Low battery signals received 20 times from each transmitter.
TROUBLE SYMPTOM:
Tire pressure warning light blinks 25 times and then illuminates.

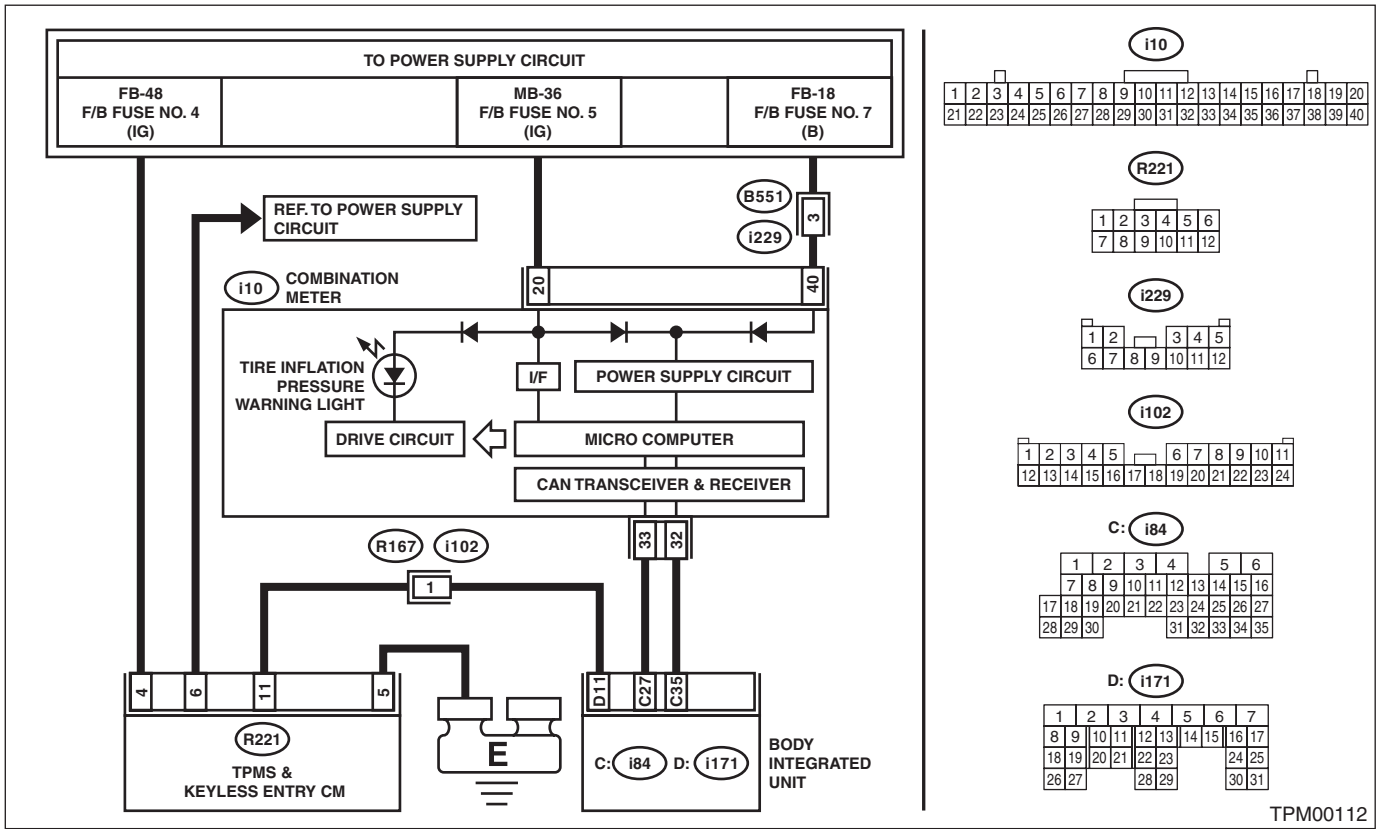
	Step	Check	Yes	No
1	**CHECK TRANSMITTER.** 1) Replace all transmitters and register their IDs. <Ref. to TPM(diag)-13, OPERATION, Register Transmitter (ID).> 2) Perform the Clear Memory Mode, and perform driving test.	Is the fault eliminated?	Internal battery of the transmitter had worn out.	Replace the TPMS & keyless entry control module.

U: DTC C2521 VEHICLE SPEED IS ABNORMAL

DTC DETECTING CONDITION:
Vehicle speed function codes were received from the transmitter, but the vehicle speed signal was not input to the module.

TROUBLE SYMPTOM:
Tire pressure warning light blinks 25 times and then illuminates.

WIRING DIAGRAM:
Tire Pressure Monitoring System <Ref. to WI-148, WIRING DIAGRAM, Tire Pressure Monitoring System.>



	Step	Check	Yes	No
1	**CHECK LAN COMMUNICATION.** Inspect LAN system. <Ref. to LAN(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>	Is there any fault?	Repair it according to the diagnosis for LAN system.	Go to step **2**.
2	**CHECK HARNESS.** Measure the resistance between TPMS & keyless entry control module and body integrated unit. ***Connector & terminal*** ***(R221) No. 11 — (i171) No. 11:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the harness.
3	**CHECK CONNECTOR.** Check each connector.	Is there poor contact or any other faults?	Repair the connector.	Replace the TPMS & keyless entry control module.

15.General Diagnostic Table

A: INSPECTION

Symptoms		Faulty parts
Tire pressure warning light illuminates.	Tire pressure is reduced.	• Improper tire pressure adjustment. • Punctured tire
Tire pressure warning light blinks 25 times and then illuminates.	Tire pressure monitoring system has malfunction.	• Air pressure sensor malfunction • Air pressure sensor is out of battery. • Defective TPMS & keyless entry control module • Defective vehicle harness • Defective combination meter
Tire pressure is dropping but the warning light does not illuminate.	Tire pressure warning light does not illuminate.	• Air pressure sensor is faulty. • Defective TPMS & keyless entry control module • Defective combination meter

DIFFERENTIALS

DI

		Page
1.	General Description	2
2.	Differential Gear Oil	19
3.	Front Differential Assembly	21
4.	Rear Differential (T-type)	22
5.	Rear Differential (VA-type)	41
6.	Rear Differential Front Oil Seal	56
7.	Rear Differential Side Oil Seal	58
8.	Rear Differential Front Member	59
9.	Rear Differential Mount Bushing	60
10.	Rear Differential Inspection Mode	64
11.	General Diagnostic Table	65

1. General Description

A: SPECIFICATION

1. REAR DIFFERENTIAL

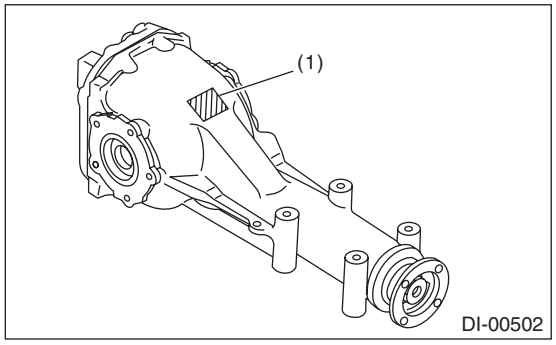
When replacing a rear differential assembly, select the correct one according to the following table.

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

Model	2.0 L non-turbo		
	CVT	5MT	
		Except for XV model	XV model
Rear differential type	VA1-type	T-type	
Identification	XD	T2	TP
LSD type	—		
Type of gear	Hypoid gear		
Gear ratio (Number of gear teeth)	3.700 (37/10)	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		

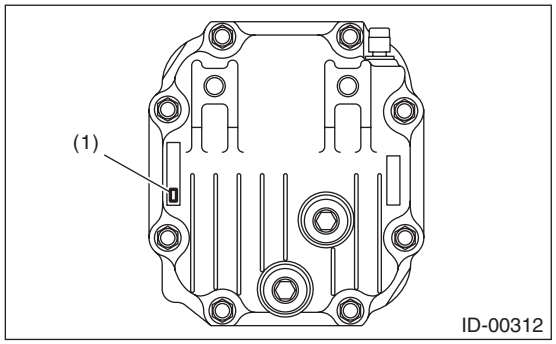
2. IDENTIFICATION

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



(1) Identification

• VA1-type

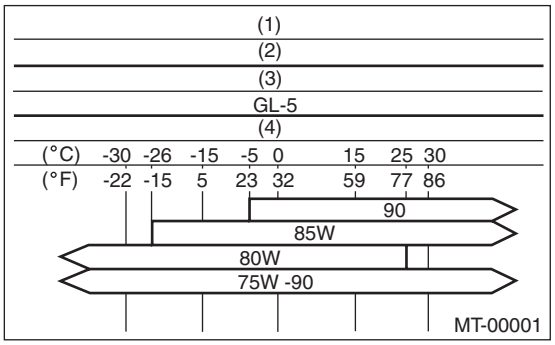


(1) Identification

3. REAR DIFFERENTIAL GEAR OIL

Recommended gear oil:
GL–5 (75W–90) or equivalent

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



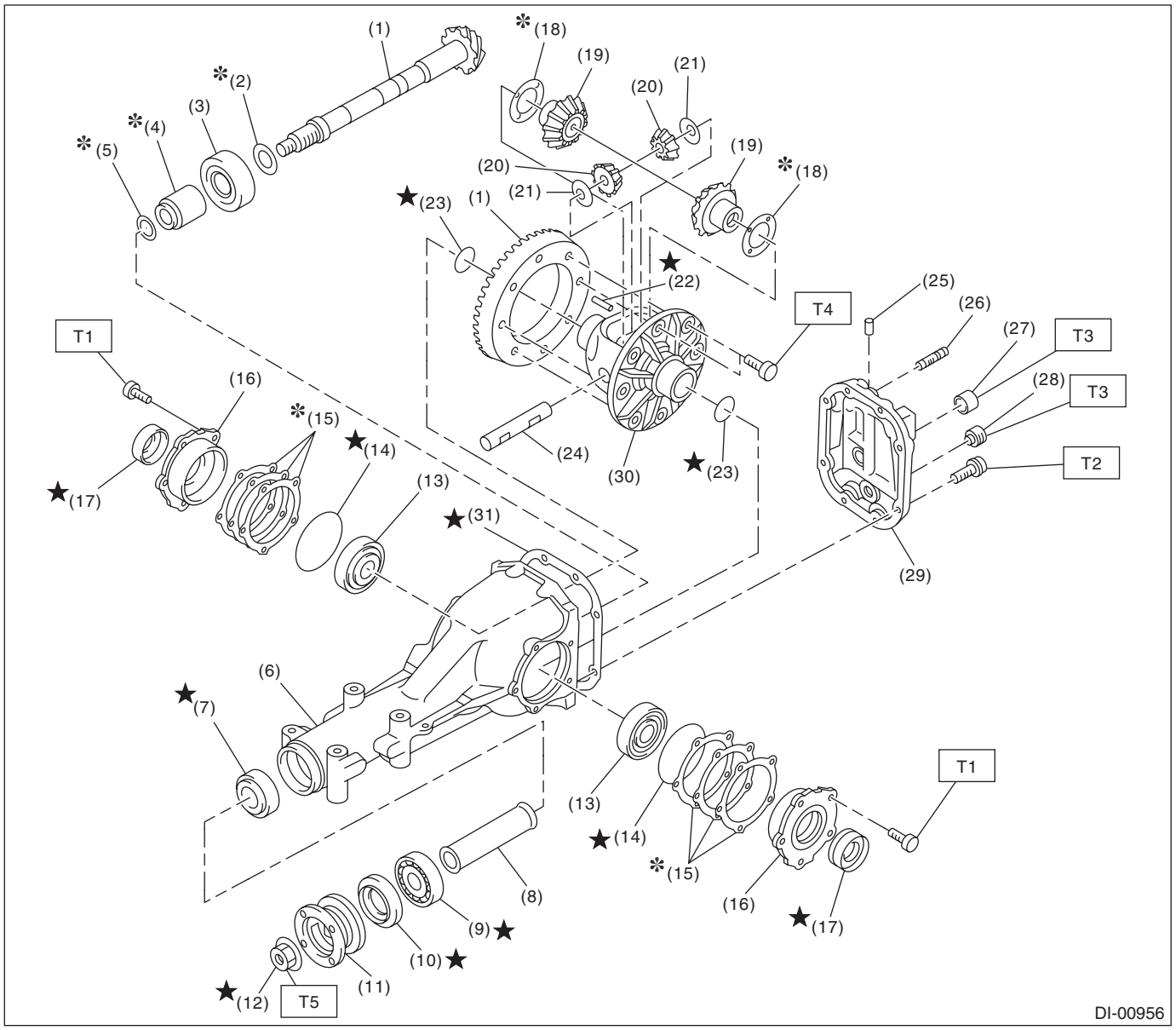
(1) Item
(2) Rear differential gear oil
(3) API classification
(4) SAE viscosity No. and applicable temperature

4. SERVICE DATA

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

B: COMPONENT

1. REAR DIFFERENTIAL (T-TYPE)

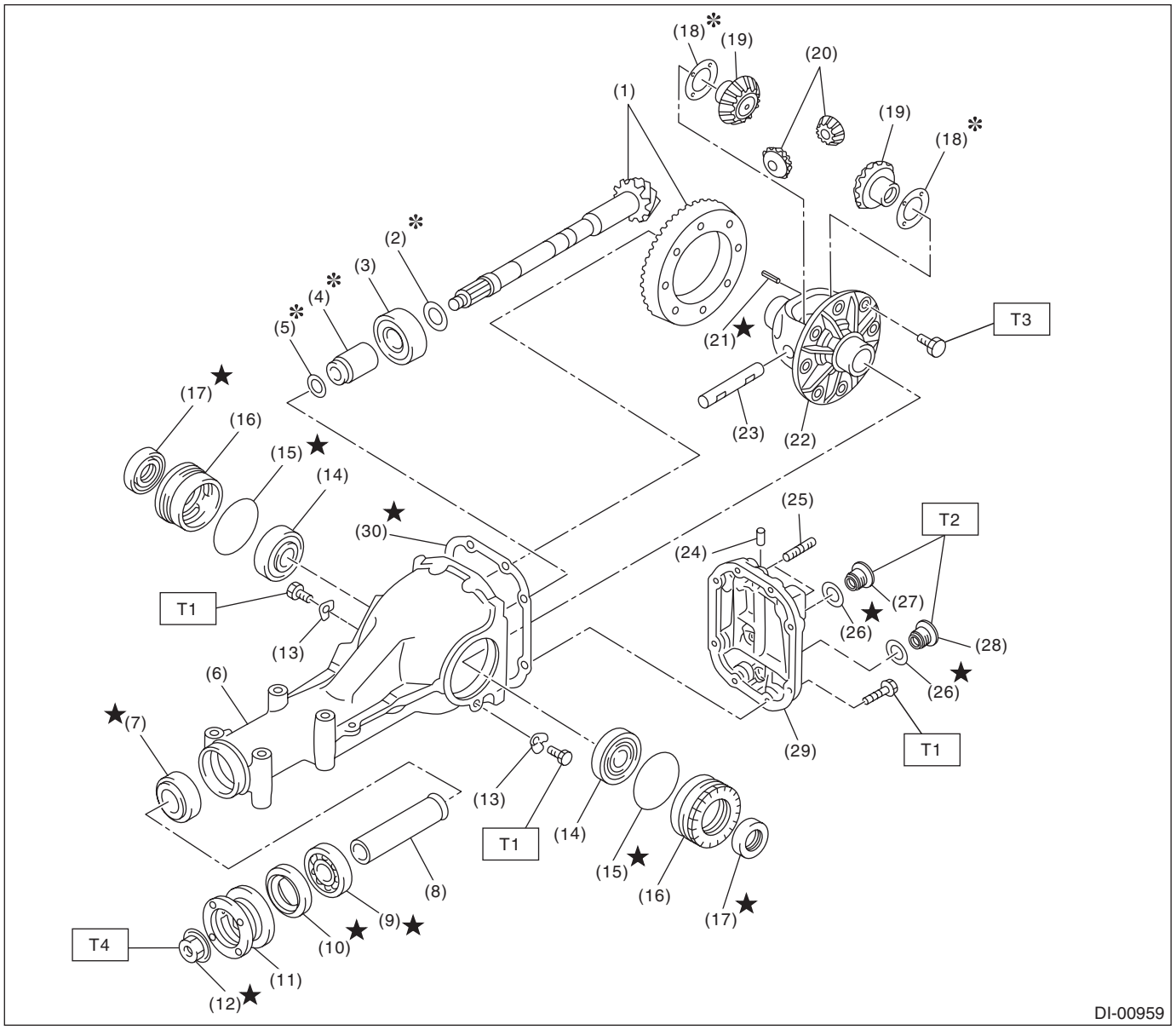


(1)	Hypoid driven gear and drive pinion set	(14)	O-ring	(27)	Filler plug
(2)	Pinion height adjusting washer	(15)	Side retainer shim	(28)	Drain plug
(3)	Rear bearing	(16)	Side retainer	(29)	Rear cover
(4)	Preload adjusting spacer	(17)	Side oil seal	(30)	Differential case
(5)	Preload adjusting washer	(18)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

Tightening torque: N·m (kgf-m, ft-lb)

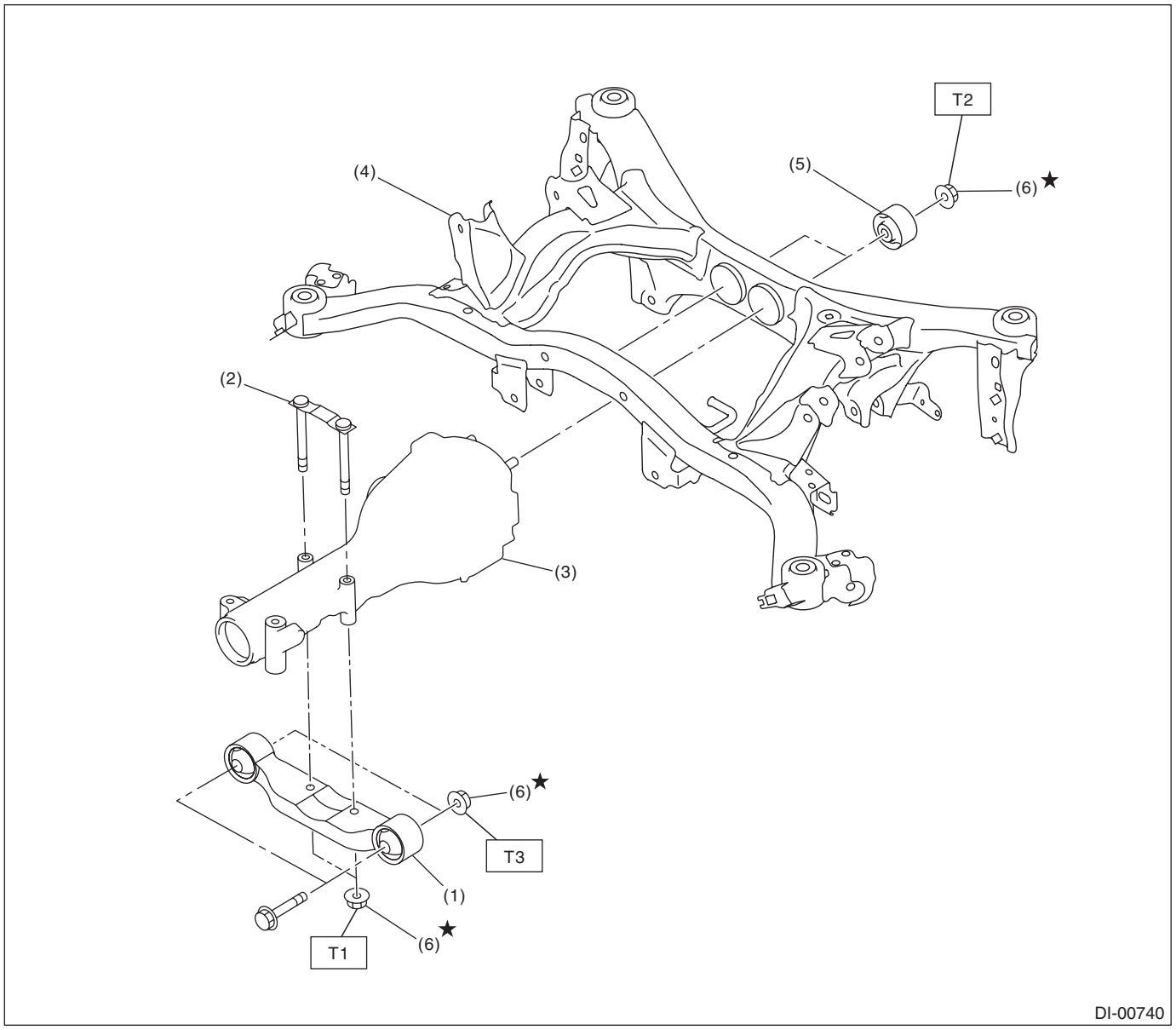
T1: 10.5 (1.1, 7.7)
T2: 29.5 (3.0, 21.8)
T3: 49 (5.0, 36.1)
T4: 103 (10.5, 76.0)
T5: 181.5 (18.5, 133.9)

2. REAR DIFFERENTIAL (VA1-TYPE)



(1)	Hypoid driven gear and drive pinion set	(13)	Lock plate	(25)	Stud bolt
(2)	Pinion height adjusting washer	(14)	Side bearing	(26)	Gasket
(3)	Rear bearing	(15)	O-ring	(27)	Filler plug
(4)	Preload adjusting spacer	(16)	Side retainer	(28)	Drain plug
(5)	Preload adjusting washer	(17)	Side oil seal	(29)	Rear cover
(6)	Differential carrier	(18)	Side gear thrust washer	(30)	Gasket
(7)	Front bearing	(19)	Side gear		
(8)	Spacer	(20)	Pinion mate gear	***Tightening torque: N·m (kgf-m, ft-lb)***	
(9)	Pilot bearing	(21)	Spring pin	***T1:***	***25 (2.5, 18.4)***
(10)	Front oil seal	(22)	Differential case	***T2:***	***50 (5.1, 36.9)***
(11)	Companion flange	(23)	Pinion mate shaft	***T3:***	***<Ref. to DI-44, ASSEMBLY, Rear Differential (VA-type).>***
(12)	Self-locking nut	(24)	Air breather cap	***T4:***	***191 (19.5, 140.9)***

3. REAR DIFFERENTIAL MOUNTING SYSTEM



(1)	Rear differential front member	(4)	Rear sub frame	
(2)	Rear differential member plate	(5)	Rear differential mount bushing	
(3)	Rear differential ASSY	(6)	Self-locking nut	

Tightening torque: N·m (kgf-m, ft-lb)
T1: 50 (5.1, 36.9)
T2: 70 (7.1, 51.6)
T3: 110 (11.2, 81.1)

C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine gear oil, grease or equivalent. Do not mix gear oil, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolving surfaces before installation.
- Before installing the O-ring or snap ring, apply a sufficient amount of gear oil to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.

D: PREPARATION TOOL

1. SPECIAL TOOL

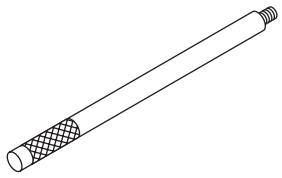
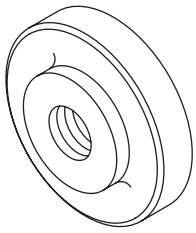
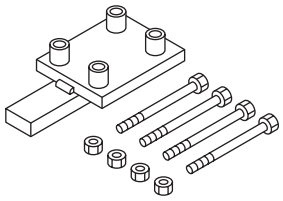
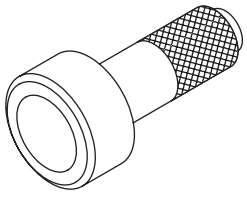
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477701	398477701	HANDLE	• Used for installing the rear bearing race. • Used for installing the front bearing race.
 ST-398477702	398477702	DRIFT	• Used for installing the front bearing race. (T-type) • Used for installing the rear bearing race. (VA1-type) • Used for installing side bearing race. (VA1-type)
 ST-398217700	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 ST-498447120	498447120	INSTALLER	Used for installing the front oil seal.

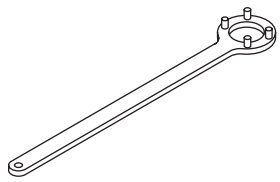
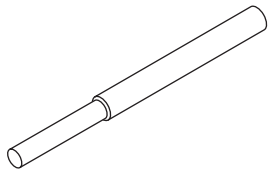
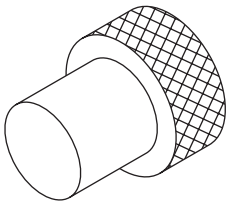
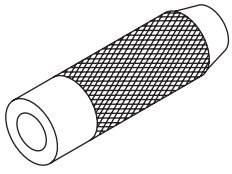
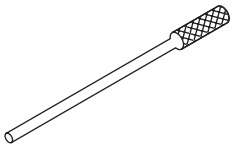
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498427200	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when removing and tightening self-lock nut.
 ST-398467700	398467700	DRIFT	Used for removing drive pinion shaft, pilot bearing and front bearing cone.
 ST-399780104	399780104	WEIGHT	• Used for installing the front bearing cone and the companion flange. • Used for installing the pilot bearing.
 ST-899580100	899580100	INSTALLER	Used for installing the front bearing cone and the pilot bearing.
 ST-899904100	899904100	STRAIGHT PIN REMOVER	• Used for removing and installing the pinion mate shaft lock pin. (T-type) • Used for removing and installing the pinion mate shaft spring pin. (VA1-type)

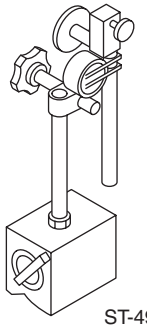
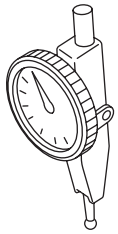
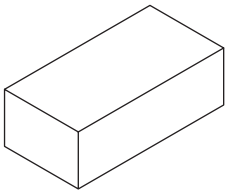
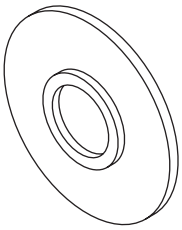
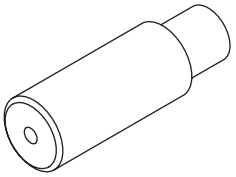
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used together with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used together with MAGNET BASE (498247001).
 ST-398507704	398507704	BLOCK	Used for adjusting pinion height and preload.
 ST-398177700	398177700	INSTALLER	Used for installing the rear bearing cone. (T-type)
 ST-398457700	398457700	ATTACHMENT	Used for removing the side retainer. (T-type)

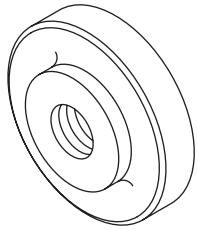
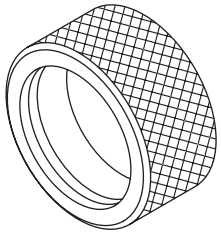
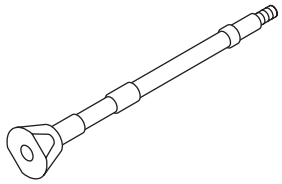
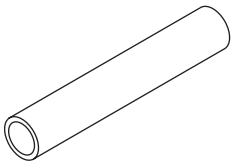
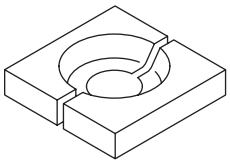
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477703	398477703	DRIFT 2	Used for installing the rear bearing race. (T-type)
 ST-398437700	398437700	DRIFT	Used for installing the side oil seal. (T-type)
 ST-398507702	398507702	DUMMY SHAFT	Used for adjusting pinion height and preload. (T-type)
 ST-398507703	398507703	DUMMY COLLAR	Used for adjusting pinion height and preload. (T-type)
 ST-398517700	398517700	REPLACER	Used for removing rear bearing cone. (T-type)

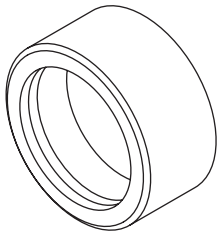
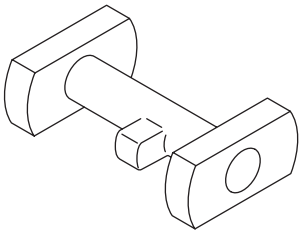
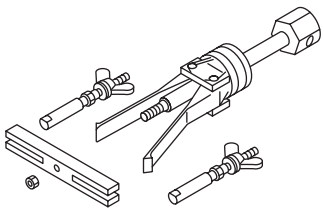
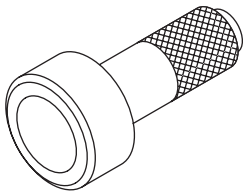
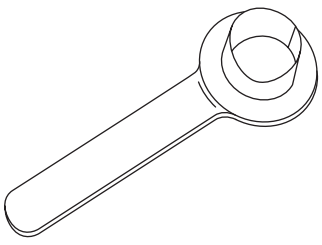
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398487700	398487700	DRIFT	Used for installing side bearing cone. (T-type)
 ST-398507701	398507701	DIFFERENTIAL CARRIER GAUGE	Used for adjusting pinion height. (T-type)
 ST-398527700	398527700	PULLER ASSY	• Used for removing front oil seal. • Used for removing the side bearing race. (T-type) • Used for removing side oil seal.
 ST-398417700	398417700	DRIFT	Used for installing side bearing race. (T-type)
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	Used for installing the rear drive shaft to the rear differential. (For oil seal protection)

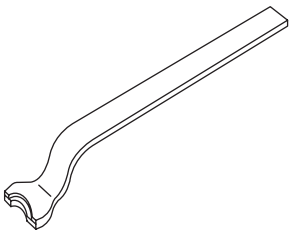
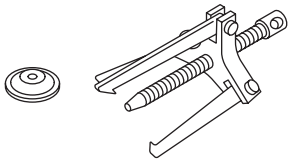
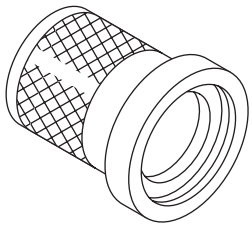
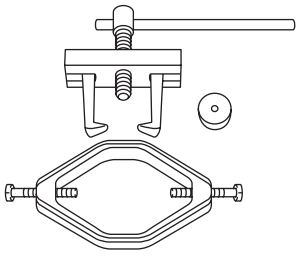
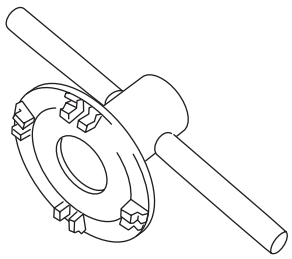
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 ST28099PA100	28099PA100	DRIVE SHAFT REMOVER	Used for removing the rear drive shaft from rear differential. (T-type)
 ST-399703600	399703600	PULLER ASSY	Used for removing companion flange.
 ST-899874100	899874100	INSTALLER	Used for installing the companion flange.
 ST18759AA000	18759AA000	PULLER ASSY	Used for removing the side bearing cone. (T-type)
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	• Used for removing and installing the side retainer. (VA1-type) • WRENCH ASSY (499787000) can also be used.

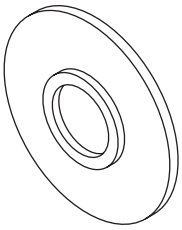
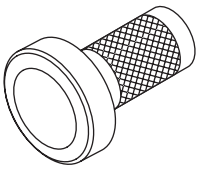
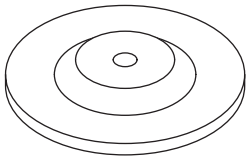
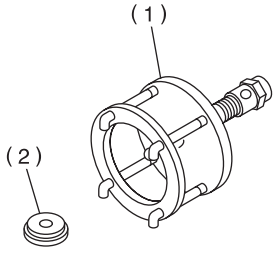
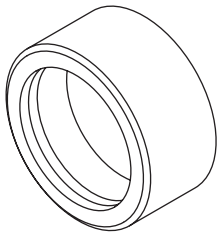
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498175500	498175500	INSTALLER	Used for installing the rear bearing cone. (VA1-type)
 ST498447100	498447100	INSTALLER	Used for installing the side oil seal. (VA1-type)
 ST-399520105	399520105	SEAT	• Used for removing the side bearing cone. (VA1-type) • Used together with PULLER SET (899524100). (VA1-type)
 ST-899524100	899524100	PULLER SET	• Used for removing the side bearing cone. (VA1-type) • Used together with SEAT (399520105). (1) Puller (2) Cap
 ST-498485400	498485400	DRIFT	Used for installing side bearing cone. (VA1-type)

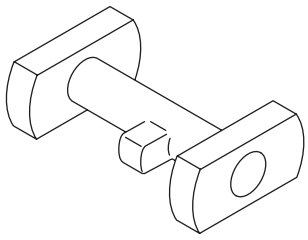
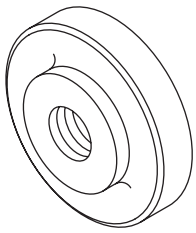
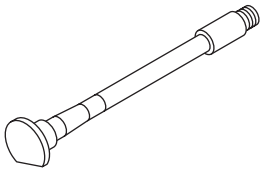
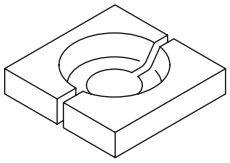
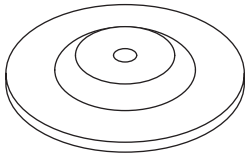
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498505501	498505501	DIFFERENTIAL CARRIER GAUGE	Used for adjusting pinion height. (VA1-type)
 ST-498447110	498447110	DRIFT	Used for installing the front bearing race. (VA1-type)
 ST-498447150	498447150	DUMMY SHAFT	Used for adjusting pinion height and preload. (VA1-type)
 ST-498515500	498515500	REPLACER	Used for removing rear bearing cone. (VA1-type)
 ST-499705404	499705404	SEAT	• Used for removing the side bearing race. (VA1-type) • Used together with PULLER ASSY (499705401).

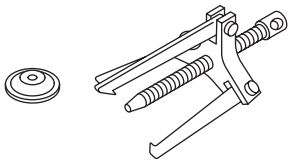
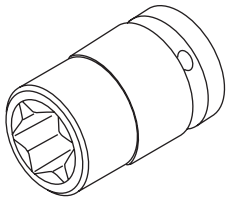
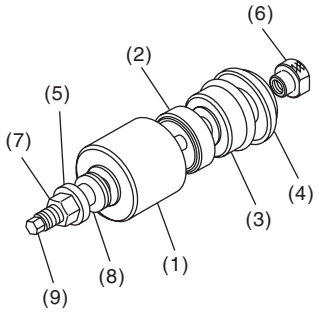
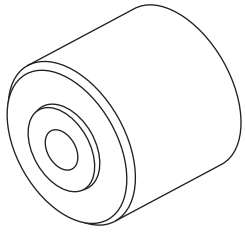
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499705401	499705401	PULLER ASSY	• Used for removing the side bearing race. (VA1-type) • Used together with SEAT (499705404).
 ST18270KA020	18270KA020	SOCKET (E20)	Used for removing and installing the hypoid driven gear. (VA1-type)
 ST41399FG001	41399FG001	SPECIAL TOOL ASSY	• Used for removing and installing the rear differential mount bushing. • Use (1), (3), (5), (6), (7), (8) and (9) for removal. • Use (2), (4), (5), (6), (7), (8) and (9) for installation. (1) SPECIAL TOOL A (41399FG010) (2) SPECIAL TOOL B (41399FG020) (3) SPECIAL TOOL C (41399FG031) (4) SPECIAL TOOL D (41399FG041) (5) SPECIAL TOOL SLEEVE (41399FG050) (6) SPECIAL TOOL RING (41399FG061) (7) SPECIAL TOOL NUT (41399FG070) (8) SPECIAL TOOL BEARING (41399FG080) (9) SPECIAL TOOL SHAFT (41399FG091)
 ST41399FG010	41399FG010	SPECIAL TOOL A	• Used for removing the rear differential mount bushing. • For combination of tools for removal, refer to “SPECIAL TOOL ASSY (41399FG001)”.

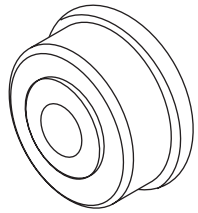
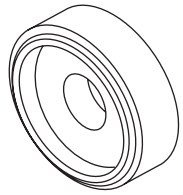
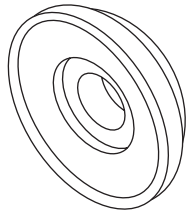
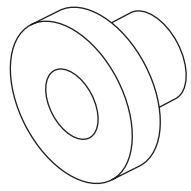
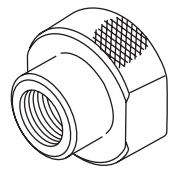
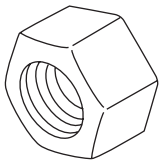
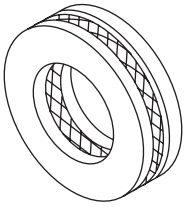
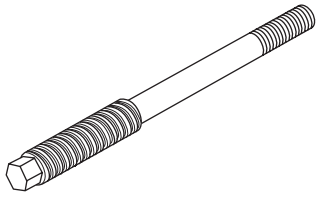
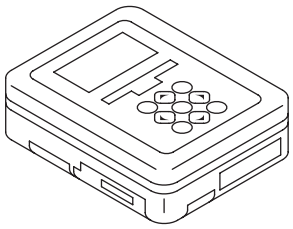
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41399FG020	41399FG020	SPECIAL TOOL B	• Used for installing the rear differential mount bushing. • For combination of tools for installation, refer to “SPECIAL TOOL ASSY (41399FG001)”.
 ST41399FG031	41399FG031	SPECIAL TOOL C	• Used for removing the rear differential mount bushing. • For combination of tools for removal, refer to “SPECIAL TOOL ASSY (41399FG001)”.
 ST41399FG041	41399FG041	SPECIAL TOOL D	• Used for installing the rear differential mount bushing. • For combination of tools for installation, refer to “SPECIAL TOOL ASSY (41399FG001)”.
 ST41399FG050	41399FG050	SPECIAL TOOL SLEEVE	• Used for removing and installing the rear differential mount bushing. • For combination of tools for removal and installation, refer to “SPECIAL TOOL ASSY (41399FG001)”.
 ST41399FG061	41399FG061	SPECIAL TOOL RING	• Used for removing and installing the rear differential mount bushing. • For combination of tools for removal and installation, refer to “SPECIAL TOOL ASSY (41399FG001)”.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41399FG070	41399FG070	SPECIAL TOOL NUT	• Used for removing and installing the rear differential mount bushing. • For combination of tools for removal and installation, refer to “SPECIAL TOOL ASSY (41399FG001)”.
 ST41399FG080	41399FG080	SPECIAL TOOL BEARING	• Used for removing and installing the rear differential mount bushing. • For combination of tools for removal and installation, refer to “SPECIAL TOOL ASSY (41399FG001)”.
 ST41399FG091	41399FG091	SPECIAL TOOL SHAFT	• Used for removing and installing the rear differential mount bushing. • For combination of tools for removal and installation, refer to “SPECIAL TOOL ASSY (41399FG001)”.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

2. GENERAL TOOL

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

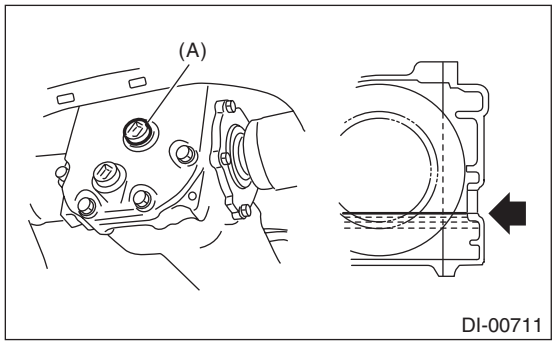
2. Differential Gear Oil

A: INSPECTION

1) Lift up the vehicle.
2) Remove the filler plug, and then check the gear oil. Replace the gear oil if it is contaminated, deteriorated or cloudy. <Ref. to DI-19, REPLACEMENT, Differential Gear Oil.>
3) Check that the gear oil level is within –5 mm (–0.2 in) from the bottom of the filler plug hole. If the level is low, make sure that there is no oil leakage and refill up to the bottom of filler plug hole.

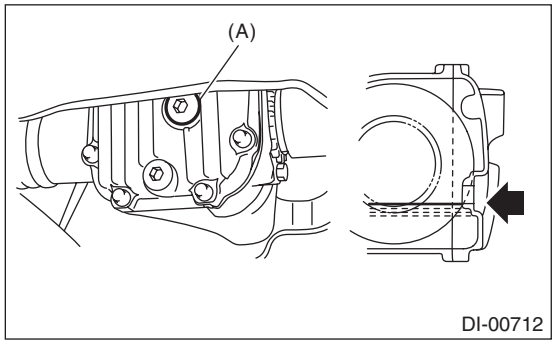
NOTE:
On VA1-types at factory settings, the oil level may be within –14 mm (–0.6 in) from the bottom of the filler plug. This is at normal level, requiring no oil refill.

- T-type



(A) Filler plug

- VA1-type



(A) Filler plug

4) Install the filler plug.

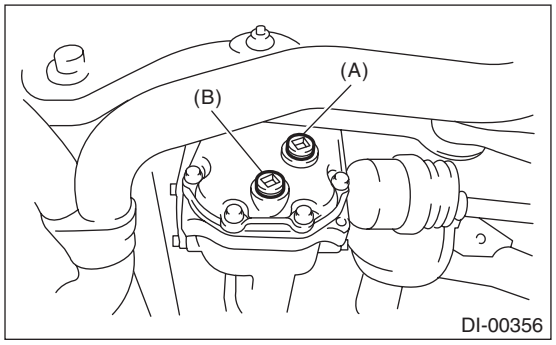
NOTE:
- For the T-type, apply liquid gasket to the filler plug.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent
- For VA type, use a new gasket.

Tightening torque:
T-type:
49 N·m (5.0 kgf-m, 36.1 ft-lb)
VA-type:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

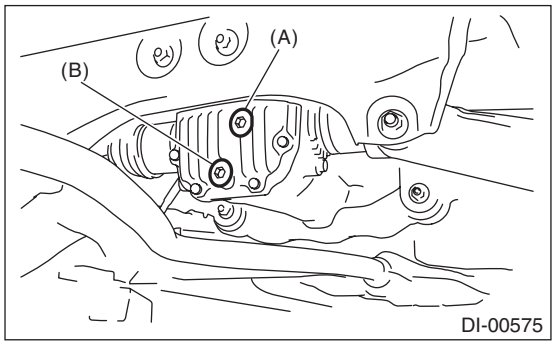
B: REPLACEMENT

CAUTION:
• Gear oil is extremely hot just after driving. Be wary of receiving burns.
• Be careful not to spill the differential gear oil on exhaust pipe. If gear oil is spilled, wipe it off completely.
1) Lift up the vehicle.
2) Remove the drain plug and filler plug, and drain the gear oil.
- T-type



(A) Filler plug
(B) Drain plug

- VA1-type



(A) Filler plug
(B) Drain plug

3) Tighten the drain plug.

NOTE:
• For the T-type, apply liquid gasket to the drain plug.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent
• For VA type, use a new gasket.

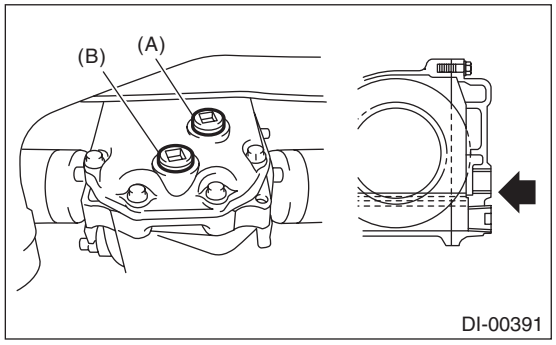
Tightening torque:
T-type
49 N·m (5.0 kgf-m, 36.1 ft-lb)
VA-type:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

4) Fill the differential carrier with gear oil to the bottom of filler plug.

NOTE:
Carefully refill gear oil while watching the level. Excessive or insufficient oil must be avoided.

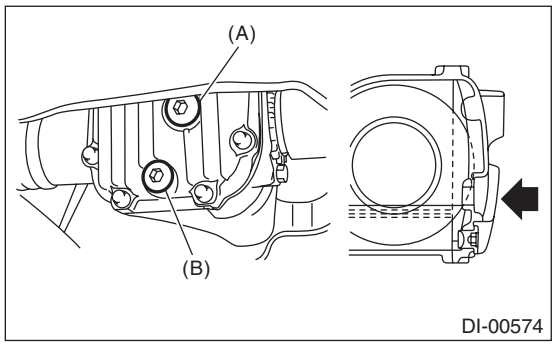
Recommended gear oil:
<Ref. to DI-2, SPECIFICATION, General Description.>

Oil capacity:
0.8 L (0.8 US qt, 0.7 Imp qt)
• T-type



(A) Filler plug
(B) Drain plug

• VA1-type



(A) Filler plug
(B) Drain plug

5) Install the filler plug.

NOTE:
• For the T-type, apply liquid gasket to the filler plug.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent
• For VA type, use a new gasket.

Tightening torque:
T-type:
49 N·m (5.0 kgf-m, 36.1 ft-lb)
VA-type:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

3. Front Differential Assembly

A: NOTE

1. CVT MODEL

For front differential for the CVT model, refer to the “CVT” section. <Ref. to CVT-294, Front Differential Assembly.>

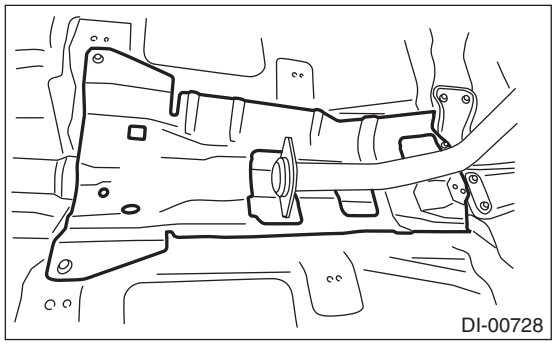
2. MT MODEL

For front differential for the 5MT model, refer to the “5MT” section. <Ref. to 5MT-71, Front Differential Assembly.>

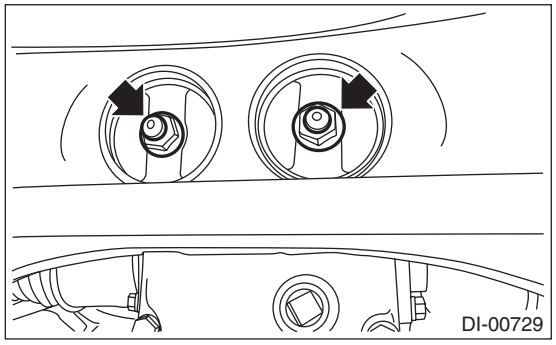
4. Rear Differential (T-type)

A: REMOVAL

1) Shift the select lever or gear shift lever to neutral.
2) Disconnect the ground cable from battery.
3) Release the parking brake.
4) Loosen the wheel nuts.
5) Lift up the vehicle.
6) Remove the rear wheels.
7) Drain differential gear oil. <Ref. to DI-19, REPLACEMENT, Differential Gear Oil.>
8) Remove the rear exhaust pipe. <Ref. to EX(H4DO)-15, REMOVAL, Rear Exhaust Pipe.>
9) Remove the center exhaust cover.


DI-00728

10) Remove the propeller shaft. <Ref. to DS-12, REMOVAL, Propeller Shaft.>
11) Loosen the self-lock nuts which hold the rear differential to the rear sub frame assembly.

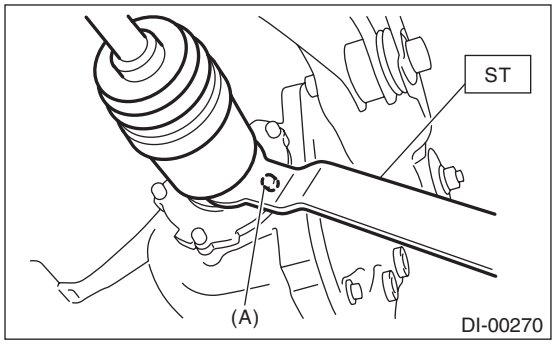

DI-00729

12) Remove the DOJ of rear drive shaft from rear differential using ST or tire lever.

NOTE:
- For the T-type, use the ST.
- For the VA-type, use the tire lever.
- When removing the DOJ from the rear differential, fit the tire lever or ST to the bolts as shown in the figure so as not to damage the side retainer.

T-type

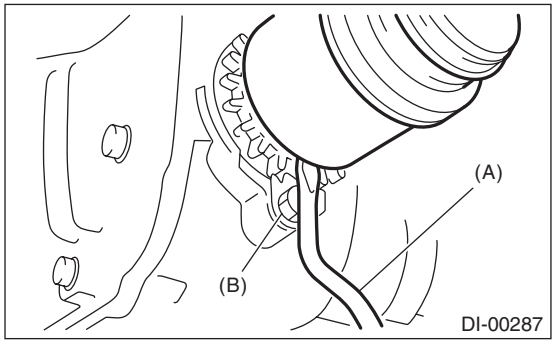
ST 28099PA100 DRIVE SHAFT REMOVER



DI-00270

(A) Bolt

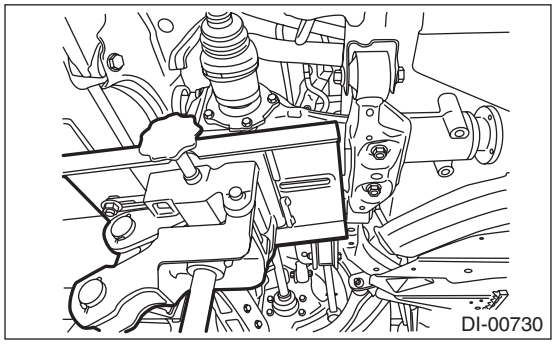
VA-type



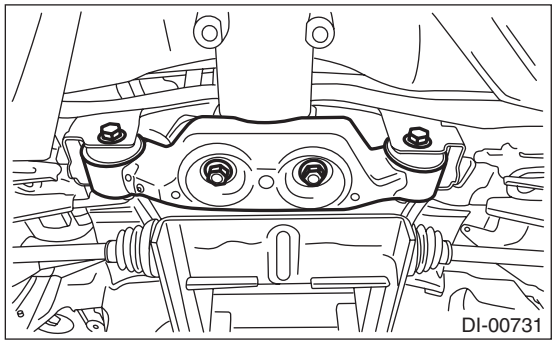
DI-00287

(A) Tire lever
(B) Bolt

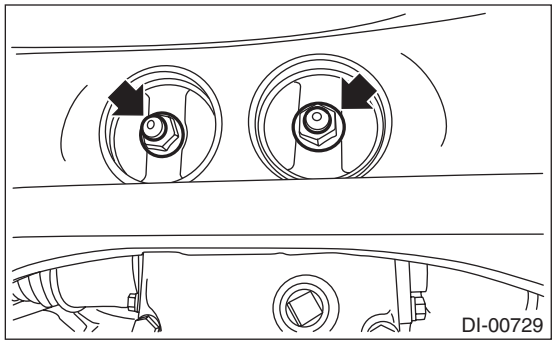
13) Set the rear differential to transmission jack.


DI-00730

14) Remove the rear differential front member.

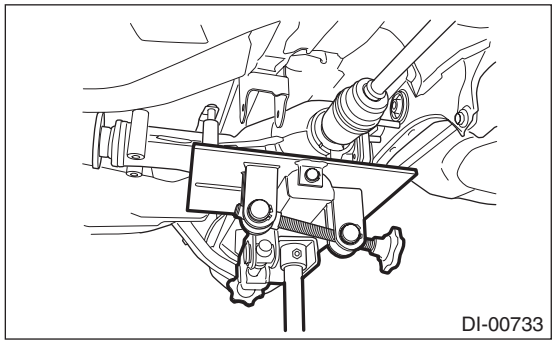


15) Remove the self-lock nuts which hold the rear differential to the rear sub frame assembly.



16) Pull out the rear differential stud bolt from rear differential mount bushing.

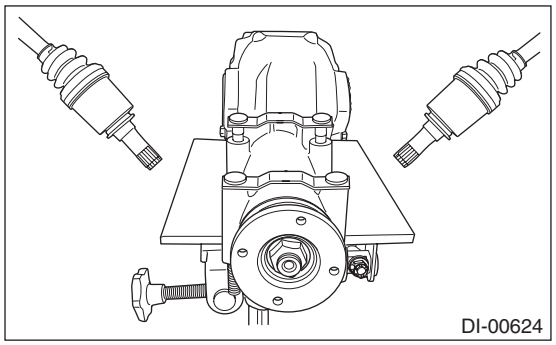
NOTE:
When removing the stud bolt from the rear differential mount bushing, carefully adjust the angle and location of transmission jack and jack stand, if necessary.



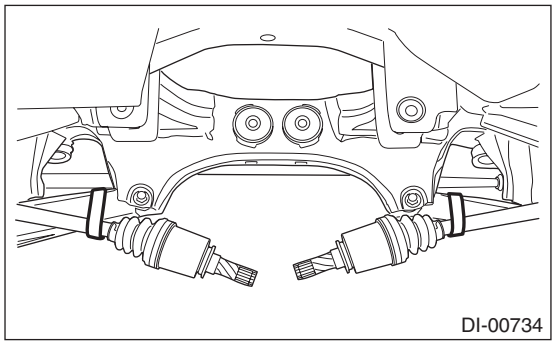
17) Lower the transmission jack.

18) Pull out the rear drive shaft from the rear differential.

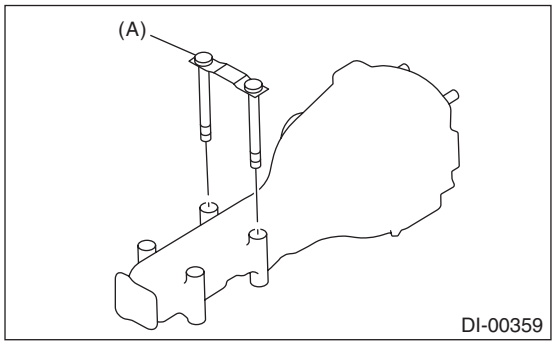
NOTE:
If it is difficult to pull out the rear drive shaft from rear differential, use the ST for T-type and the tire lever for VA-type.
ST 28099PA100 DRIVE SHAFT REMOVER



19) Lower the transmission jack.
20) Secure the rear drive shaft to rear lateral link using wire.



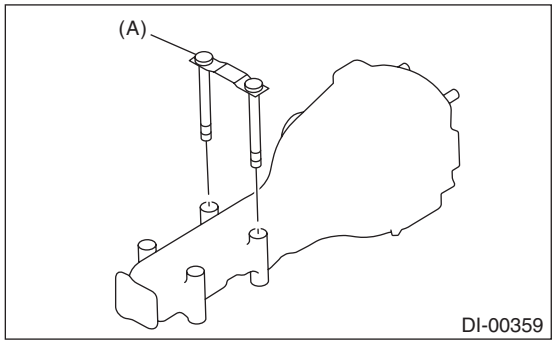
21) Remove the rear differential member plate from rear differential.



(A) Rear differential member plate

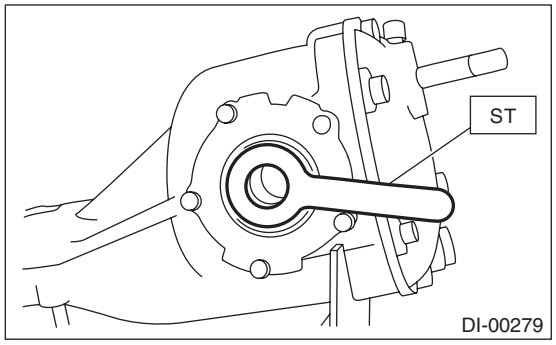
B: INSTALLATION

1) Attach the rear differential member plate to the rear differential.

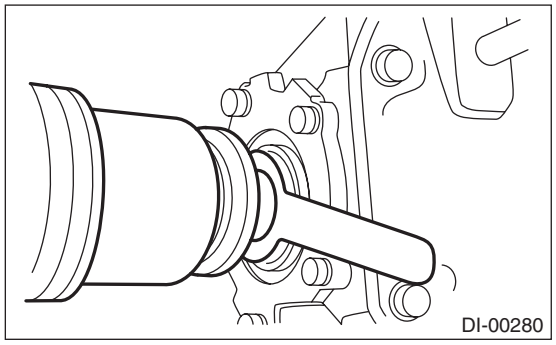


(A) Rear differential member plate

2) Set the rear differential to transmission jack.
3) Set the ST to the rear differential.
ST 28099PA090 OIL SEAL PROTECTOR

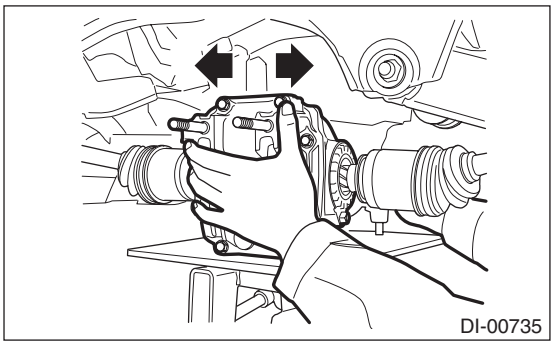


4) Insert the rear drive shaft until the spline portion of the rear drive shaft exceeds the side oil seal.

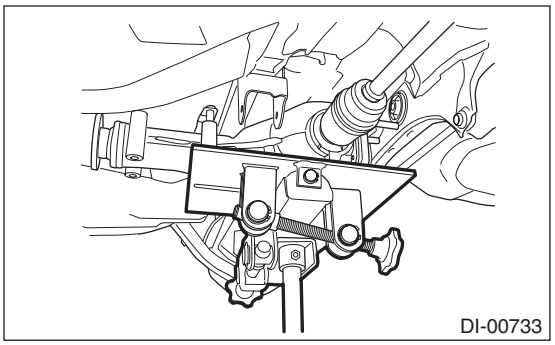


5) Remove ST from rear differential.

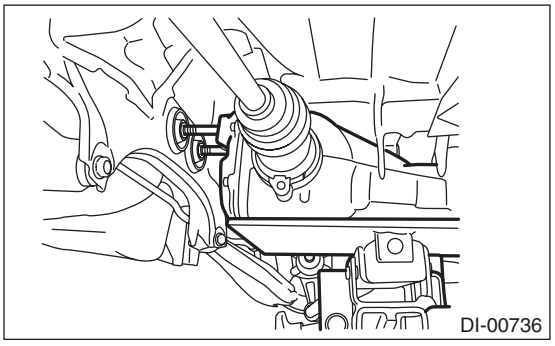
6) Push the rear differential from side to side to insert the DOJ into rear differential completely.



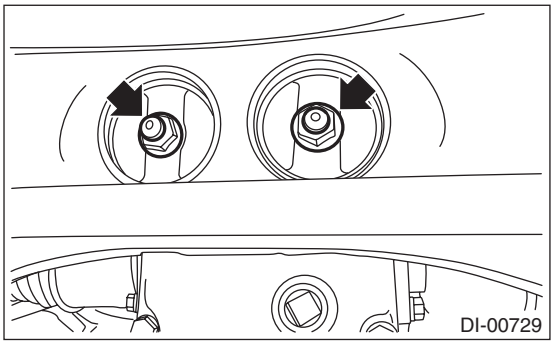
7) Adjust the transmission jack, if necessary, and insert the rear differential stud bolt into the rear differential mount bushing properly.



8) After inserting the rear differential stud bolt into the rear differential mount bushing, lift up the transmission jack and align the rear differential to its attachment position.

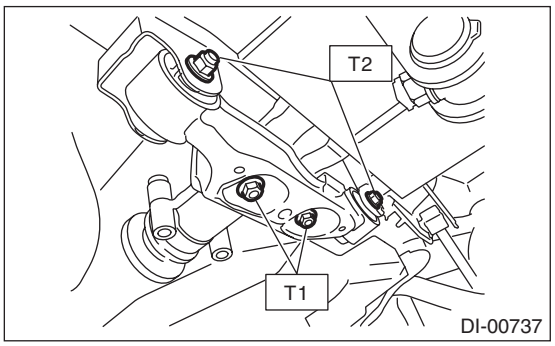


9) Tighten a new self-locking nut temporarily to the rear differential stud bolt.



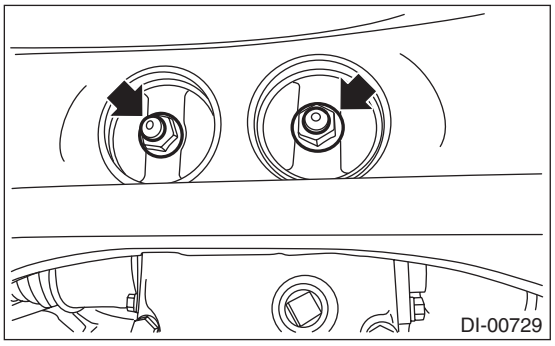
10) Install the rear differential front member with a new self-locking nut.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81.1 ft-lb)



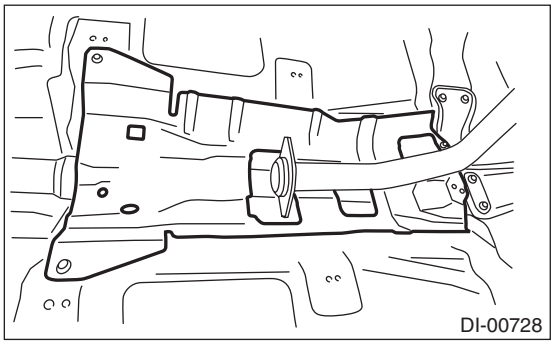
11) Remove the transmission jack.
12) Tighten the self-locking nut.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)



13) Install the propeller shaft. <Ref. to DS-13, INSTALLATION, Propeller Shaft.>
14) Install the center exhaust cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



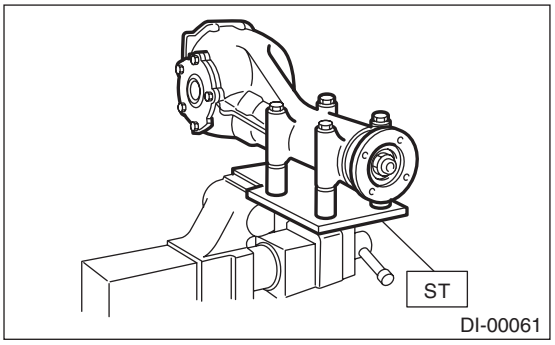
15) Install the rear exhaust pipe. <Ref. to EX(H4DO)-17, INSTALLATION, Rear Exhaust Pipe.>
16) Fill differential gear oil. <Ref. to DI-19, REPLACEMENT, Differential Gear Oil.>
17) Installing procedure hereafter is in the reverse order of removal.
18) Perform “Rear differential inspection mode” using the Subaru Select Monitor. (CVT model) <Ref. to DI-64, Rear Differential Inspection Mode.>

CAUTION:
Be sure to perform rear differential inspection mode when the following work has been performed.
- **Replacement of rear differential**
- **Replacement of rear differential hypoid gear set**
- **Replacement of transmission assembly**
- **Replacement of front differential hypoid gear set**

C: DISASSEMBLY

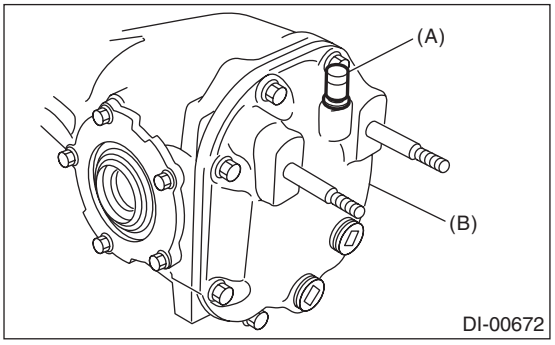
To detect the real cause of trouble, inspect the following items before disassembling.
- Tooth contact and backlash between hypoid driven gear and drive pinion
- Hypoid driven gear runout on its back surface
- Total preload of drive pinion

1) Set the ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT SET



2) Remove the drain plug and filler plug.
3) Remove the air breather cap.

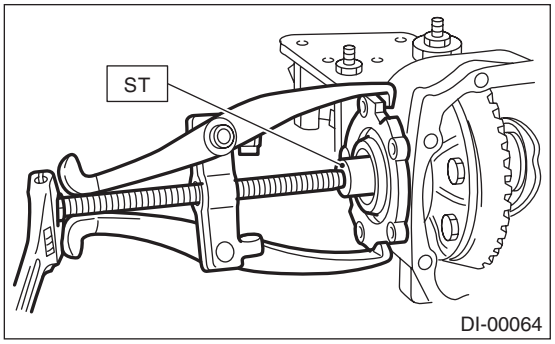
NOTE:
- Do not attempt to remove the air breather cap unless necessary.
- Whenever the air breather cap is removed, replace it with a new part.



(A) Air breather cap
(B) Rear cover

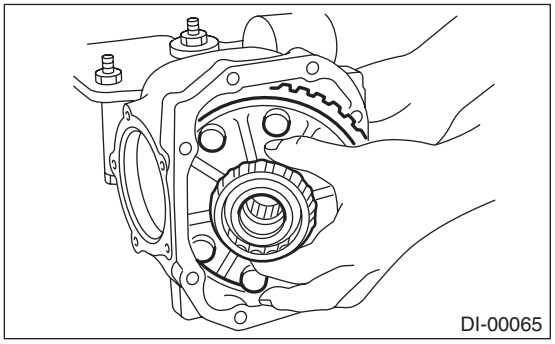
4) Remove the bolts, and then remove the rear cover.
5) Remove the side retainer attachment bolts, set the ST to differential case, and extract the side retainers RH and LH with a puller.

NOTE:
• Side retainer shim of each side should be kept together with its mating retainer.
• Keep the side retainers separate by attaching tags or in similar ways to make it possible to identify RH and LH sides during reassembly.
ST 398457700 ATTACHMENT

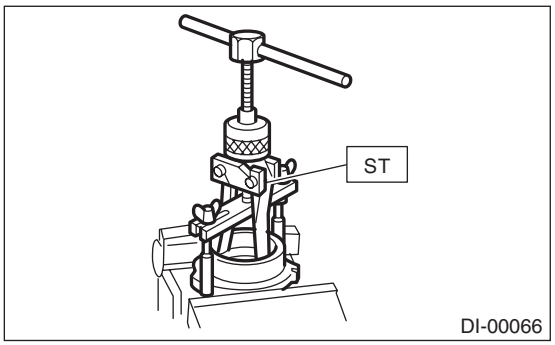


6) Pull out the differential case assembly from the differential carrier.

NOTE:
Be careful not to hit the teeth of hypoid driven gear against the differential carrier.

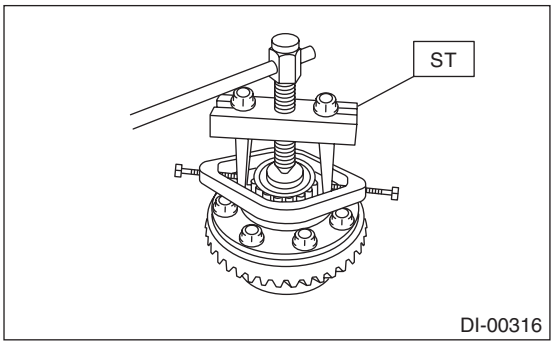


7) Remove the oil seal and O-ring from the side retainer.
8) When replacing the side bearing, remove the bearing race from the side retainer using ST.
ST 398527700 PULLER ASSY

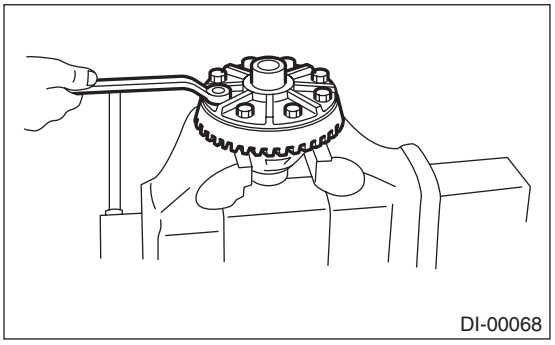


9) Using the ST, remove the bearing cone.

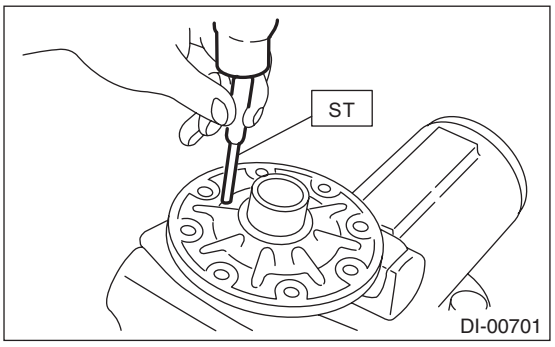
NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Set the ST so that its claws catch the edge of the bearing cone.
• Never mix up the RH and LH bearing races and cones.
ST 18759AA000 PULLER ASSY



10) Remove the hypoid driven gear by loosening hypoid driven gear bolts.

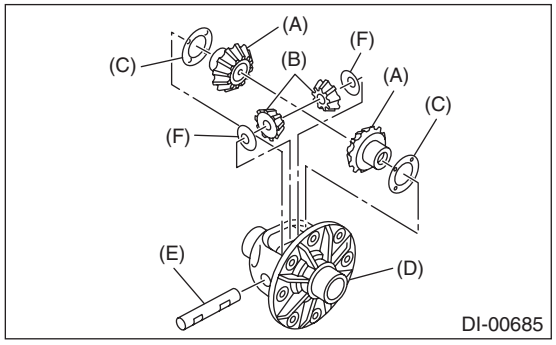


11) Remove the pinion shaft lock pin from hypoid driven gear side using ST.
ST 899904100 STRAIGHT PIN REMOVER



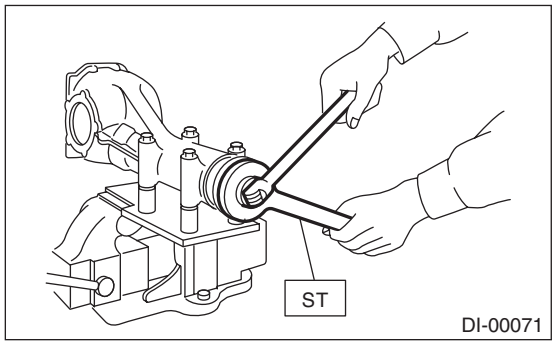
12) Draw out the pinion mate shaft, and remove pinion mate gears, pinion mate gear washers, side gears, and side gear thrust washers.

NOTE:
The gears and washers should be marked with RH or LH, front or rear, or kept separately.

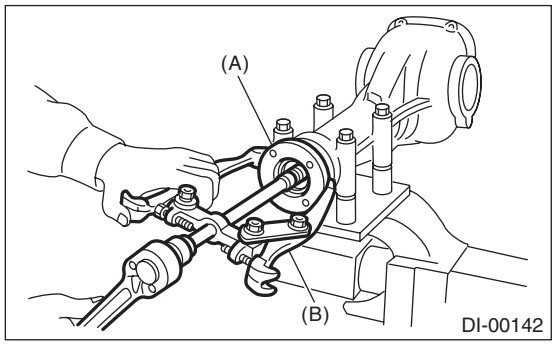


(A) Side gear
(B) Pinion mate gear
(C) Side gear thrust washer
(D) Differential case
(E) Pinion mate shaft
(F) Pinion mate gear washer

13) Remove the self-locking nut while securing the companion flange with ST.
ST 498427200 FLANGE WRENCH



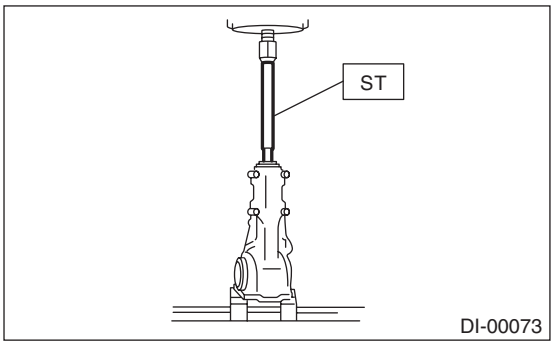
14) Extract the companion flange with a puller.



(A) Companion flange
(B) Puller

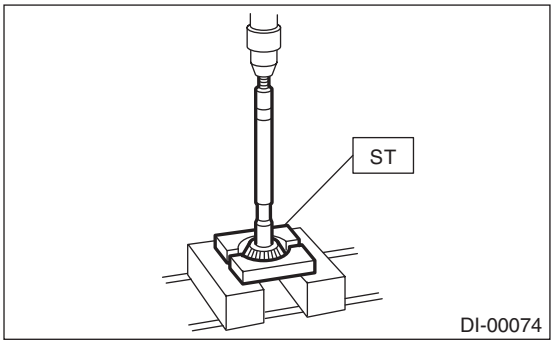
15) Press the end of drive pinion shaft using ST and remove the rear bearing cone, preload adjusting spacer and washer.

NOTE:
Hold the drive pinion so as not to drop it.
ST 398467700 DRIFT

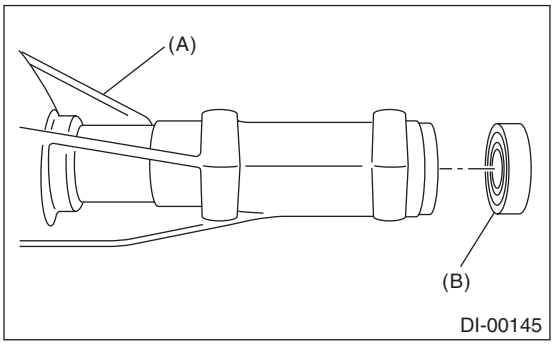


16) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the bearing cone.
ST 398517700 REPLACER

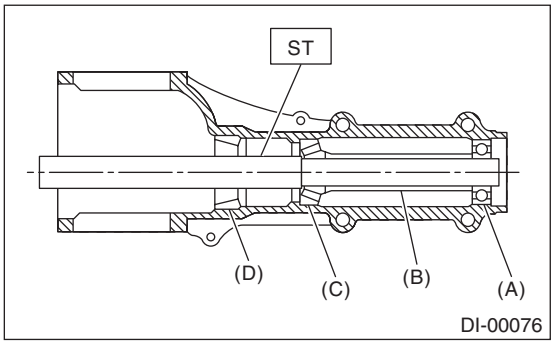


17) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



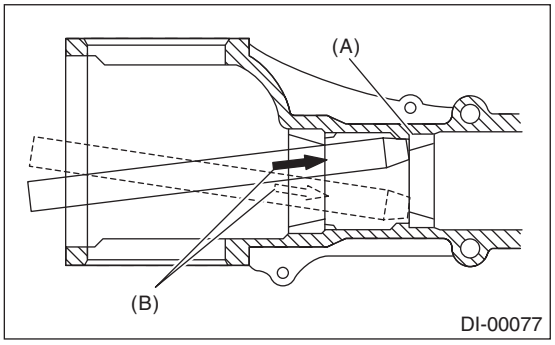
(A) Differential carrier
(B) Front oil seal

18) Remove the pilot bearing together with the front bearing cone and spacer using the ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Spacer
(C) Front bearing
(D) Rear bearing race

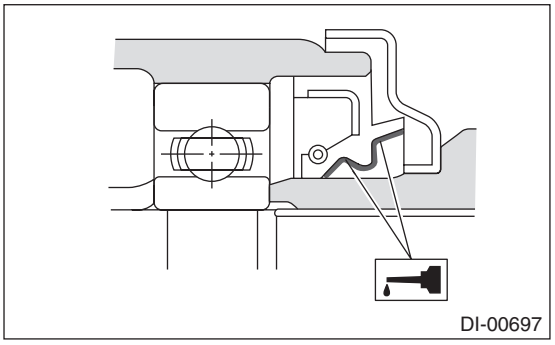
19) When replacing the bearings, use a brass bar to tap out the front bearing race and rear bearing race in this order to remove them.



(A) 2 cutout portions along diagonal lines
(B) Tap alternately with brass bar.

D: ASSEMBLY

NOTE:
- Assemble in the reverse order of disassembly.
- 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 RH and LH bearing races.
- Use a new O-ring and gasket.
- Replace the oil seal with a new part at every disassembly.
- Be careful not to mix up the oil seal RH and LH.
- Apply differential gear oil to the lips when installing the oil seal.

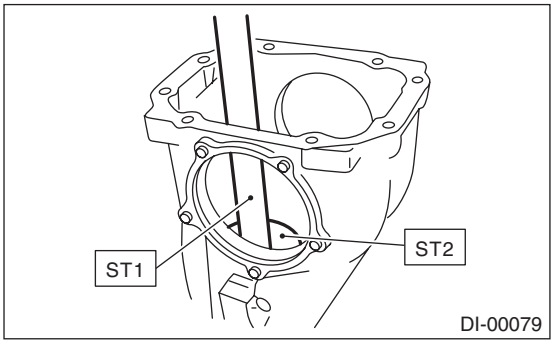


1) Adjusting preload for front and rear bearings

NOTE:
Adjust the bearing preload between front and rear bearings with preload adjusting spacer and washer. Pinion height adjusting washer is not affected by this adjustment. The adjustment must not be carried out with oil seal inserted.

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

ST1 398477701 HANDLE
ST2 398477703 DRIFT 2



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

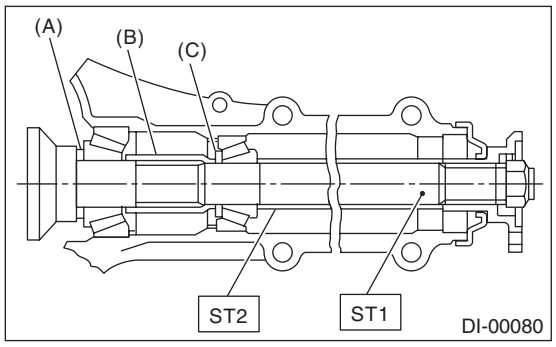
NOTE:
Use a new front bearing race.
ST1 398477701 HANDLE
ST2 398477702 DRIFT

(3) Insert ST1 into the differential carrier with the pinion height adjusting washer and rear bearing cone fitted onto it.

NOTE:
If tooth contact (drive pinion, hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then re-use the used washer.

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

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



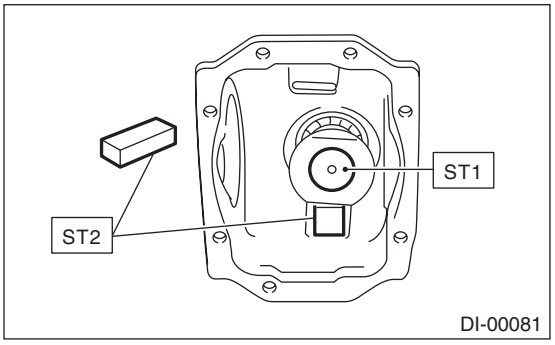
(A) Pinion height adjusting washer
(B) Preload adjusting spacer
(C) Preload adjusting washer

(5) Turn the ST1 by hand to smooth the bearing, and tighten the self-locking nut while measuring the initial load or initial torque with a spring scale or torque wrench. Select the preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

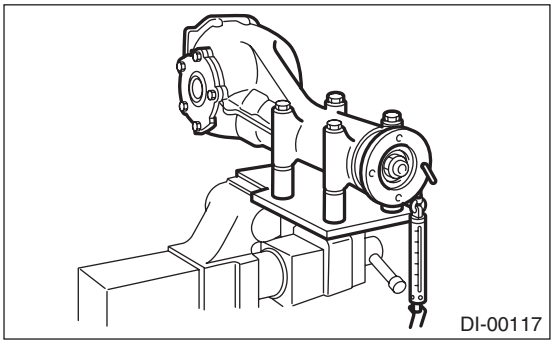
NOTE:
- Use a new self-locking nut.
- Measure the preload in direction of tangent to the flange.
- Be careful not to give excessive preload.
- When tightening the self-locking nut, lock ST1 with ST2 as shown in the figure.

ST1 398507702 DUMMY SHAFT
ST2 398507704 BLOCK

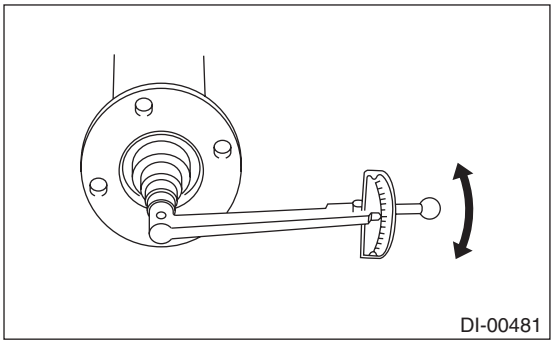
Tightening torque:
181.5 N·m (18.5 kgf-m, 133.9 ft-lb)



Initial load:
18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.7 lbf)



Initial torque:
0.69 — 1.47 N·m (0.07 — 0.15 kgf-m, 0.51 — 1.08 ft-lb)

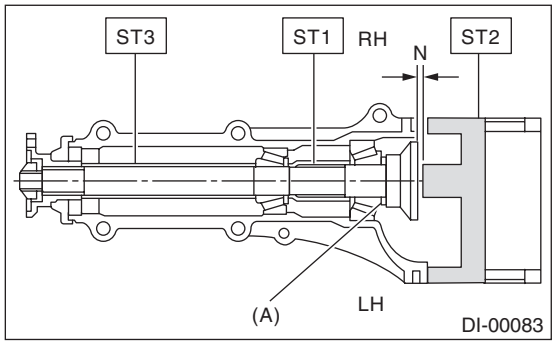


Preload adjusting washer	
Part No.	Thickness mm (in)
383705200	2.59 (0.1020)
383715200	2.57 (0.1012)
383725200	2.55 (0.1004)
383735200	2.53 (0.0996)
383745200	2.51 (0.0988)
383755200	2.49 (0.0980)
383765200	2.47 (0.0972)
383775200	2.45 (0.0965)
383785200	2.43 (0.0957)
383795200	2.41 (0.0949)
383805200	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)

2) Adjusting drive pinion height:
Adjust the drive pinion height with pinion height adjusting washer installed between the rear bearing cone and the back of pinion gear.
(1) Attach the ST2.

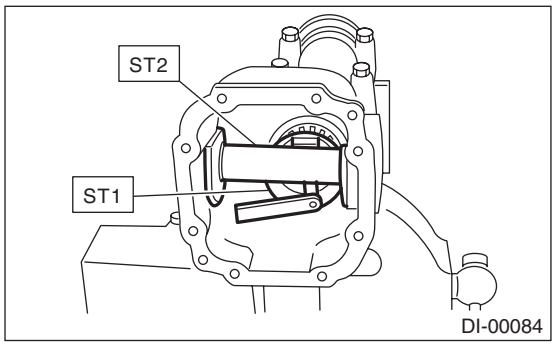
NOTE:
At this time, install a provisionally selected or previously used pinion height adjusting washer. Measure and record the thickness.
ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE
ST3 398507703 DUMMY COLLAR



(A) Pinion height adjusting washer

(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 differential carrier and ST2.
ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE



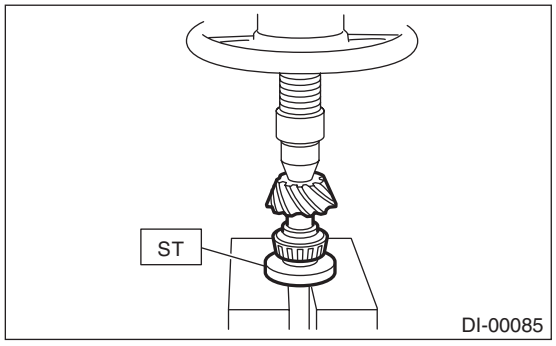
(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed washer with this one.
$T = To + N - (H \times 0.01) - 0.20$ mm (0.0079 in)

T	Thickness of pinion height adjusting washer mm (in)	
To	Thickness of washer temporarily inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
H	Figure marked on drive pinion head	
Memo:		

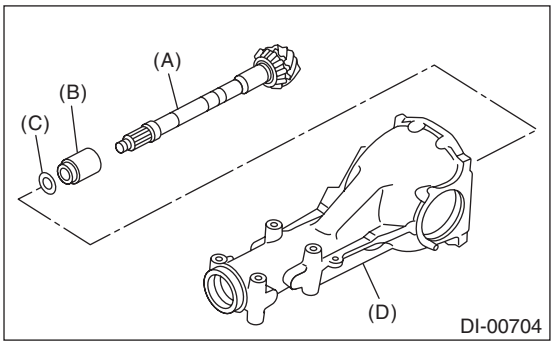
(Example of calculation)
To = 3.39 mm (0.1335 in)
N = 0.24 mm (0.0094 in)
H = + 1
T = 3.39 mm (0.1335 in) + 0.24 mm (0.0094 in) – 0.01 mm (0.0004 in) – 0.20 mm (0.0079 in) = 3.42 mm (0.1346 in)
Result: Thickness = 3.42 mm (0.1346 in)
Therefore use washer 383605200.

Pinion height adjusting washer	
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 washer on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER



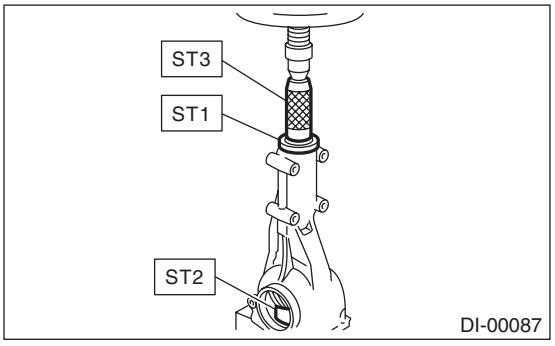
4) Insert the drive pinion into the differential carrier, and install the preselected preload adjusting spacer and washer.



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

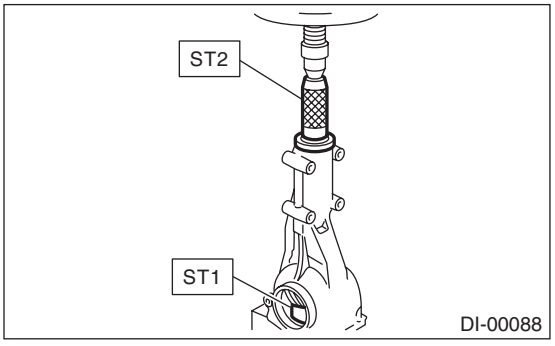
5) Press-fit the front bearing cone with ST1, ST2 and ST3.

NOTE:
Use new front bearing cone.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



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

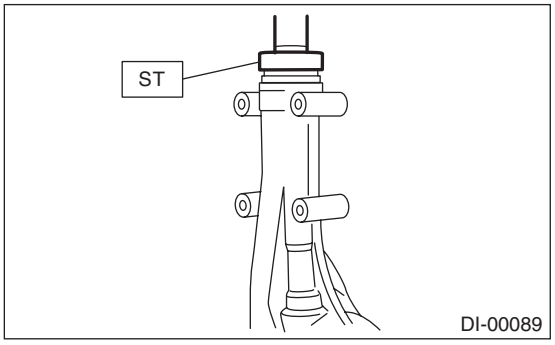
NOTE:
Use a new pilot bearing.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



7) Using the ST, install the oil seal.

NOTE:
- Use a new oil seal.
- Press-fit until the oil seal end comes 1 mm (0.04 in) inward from end of carrier.
- Apply differential gear oil to the oil seal lips.

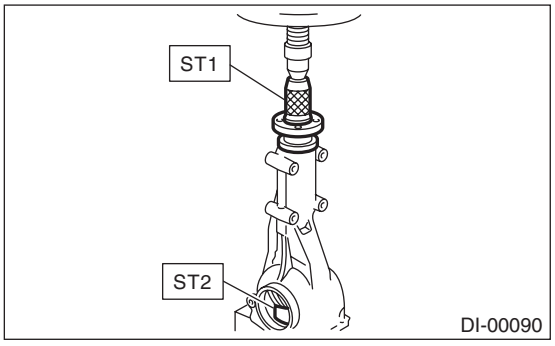
ST 498447120 INSTALLER



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

NOTE:
Be careful not to damage the bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



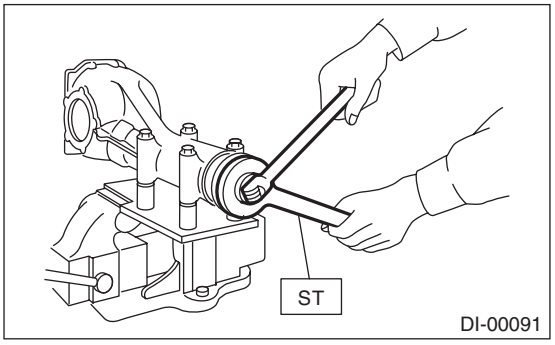
9) Apply seal material on the drive pinion shaft thread and new self-locking nut seat.

Seal material:
THREE BOND 1324 (Part No. 004403042) or equivalent

10) Attach the new self-locking nut and use the ST to fix the companion flange in place, then tighten the self-locking nut.

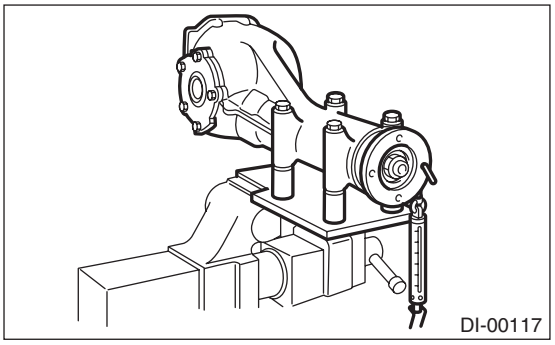
Tightening torque:
181.5 N·m (18.5 kgf-m, 133.9 ft-lb)

ST 498427200 FLANGE WRENCH

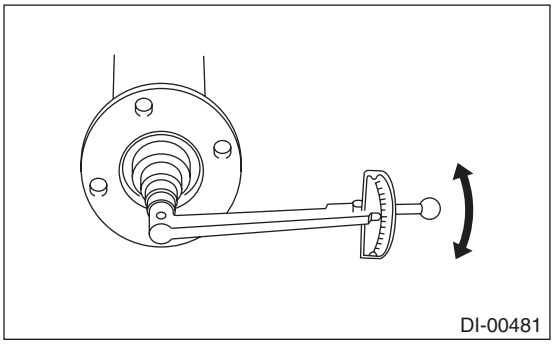


11) Check the initial torque or initial load.

Initial load:
18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.7 lbf)

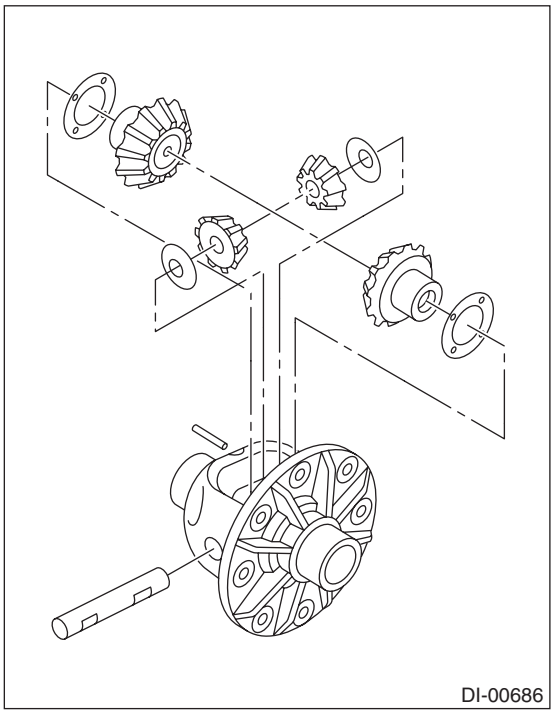


Initial torque:
0.69 — 1.47 N·m (0.07 — 0.15 kgf-m, 0.51 — 1.08 ft-lb)



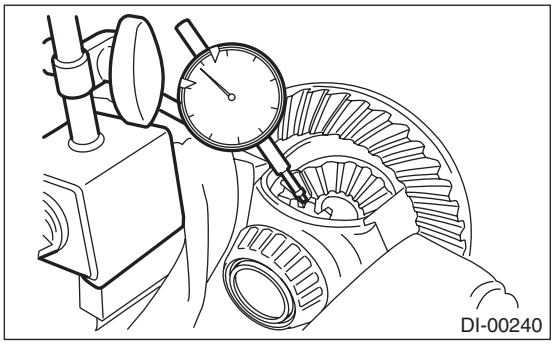
12) Assembling differential case
(1) Install the side gears and pinion mate gears, with their side gear thrust washers, pinion mate gear washer, and pinion mate shaft, into the differential case.

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



(2) Measure the side gear backlash.

Side gear backlash:
0.10 — 0.20 mm (0.004 — 0.008 in)



(3) 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)

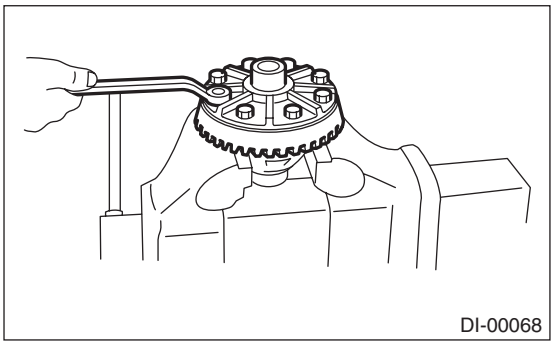
(4) Check the condition of rotation after applying oil to the gear tooth surfaces and washer surfaces.
(5) Drive the pinion shaft lock pin into the differential case.

NOTE:
Use a new pinion shaft lock pin.
ST 899904100 STRAIGHT PIN REMOVER
13) Install the driven gear to the differential case.

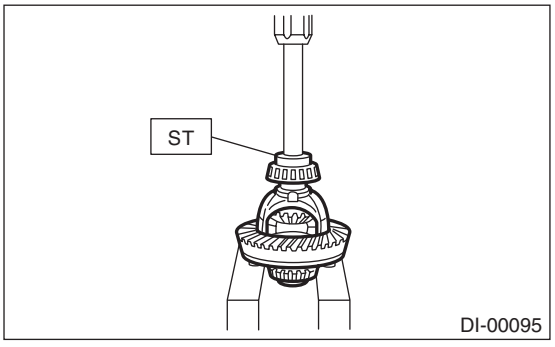
NOTE:
• Before installing bolts, apply seal material to bolt threads.

Seal material:
THREE BOND 1324 (Part No. 004403042) or equivalent
• Make sure there is no clearance between the differential case and driven gear.
• Tighten opposing bolts in order.

Tightening torque:
103 N·m (10.5 kgf-m, 76.0 ft-lb)

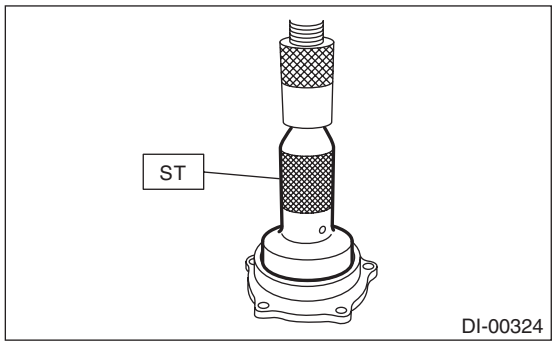


14) Using the ST, press-fit the side bearing to the differential case.
ST 398487700 DRIFT



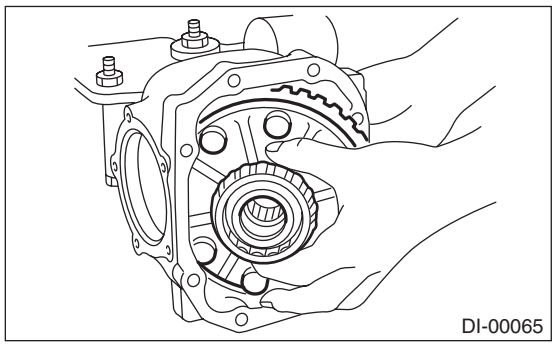
15) Using the ST, press-fit the side bearing outer race to the side retainer.

CAUTION:
Make sure that the bearing outer races and cones are properly assembled.
ST 398417700 DRIFT



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

NOTE:
Be careful not to hit the teeth of hypoid driven gear against the differential carrier.



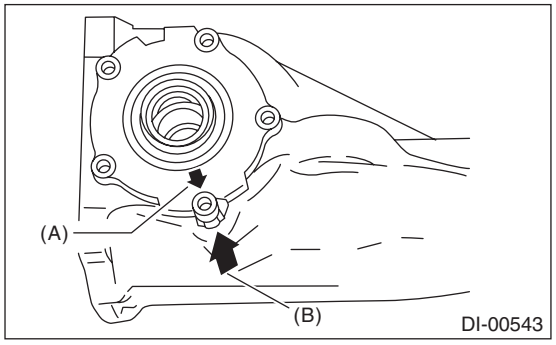
(3) Install the side retainer shim.

NOTE:
• Be careful not to mix up the side retainer shim RH and LH.
• Replace broken or corroded side retainer shims with a new part of the same thickness.

Side 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 the arrow mark on the differential carrier with the arrow mark on the side retainer when installing the side retainer.

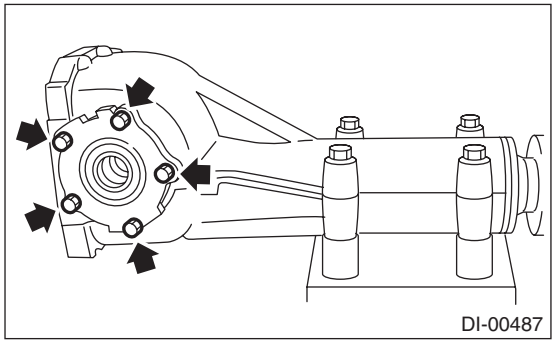
NOTE:
Be careful that the side bearing outer race is not damaged by the bearing roller.



(A) Arrow mark (on the side retainer)
(B) Arrow mark (on the differential carrier)

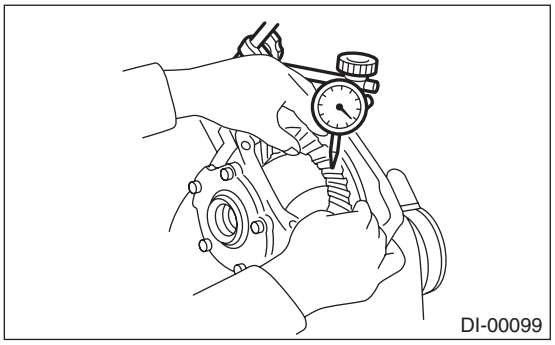
(5) Tighten the side retainer bolts.

Tightening torque:
10.5 N·m (1.1 kgf-m, 7.7 ft-lb)



(6) Measure the hypoid driven gear to drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge. If the backlash is outside the standard range, adjust the side retainer shim by the following method.
•When backlash is less than 0.1 mm (0.004 in):
Reduce the thickness of shim on the back side of the hypoid driven gear and increase the thickness of shims on the teeth side of the hypoid driven gear.
•When backlash exceeds 0.2 mm (0.008 in):
Increase the thickness of shim on the back side of the hypoid driven gear and reduce the thickness of shims on the teeth side of the hypoid driven gear.

Backlash:
0.10 — 0.20 mm (0.004 — 0.008 in)

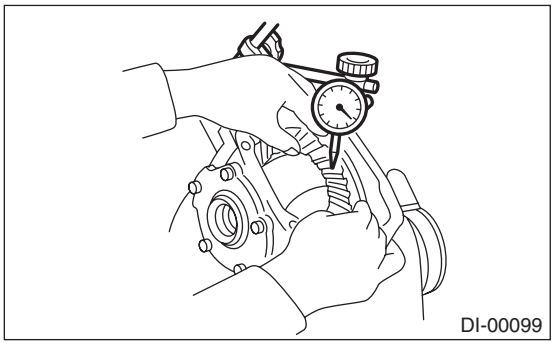


(7) Measure the total preload of the drive pinion. If the total preload is outside the specification range, adjust the thickness of side retainer shims, increasing/reducing both shims by an even amount at a time.

Total preload:
20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lbf)

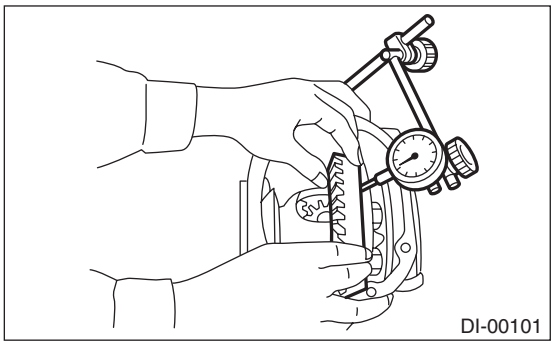
17) Recheck the hypoid driven gear to drive pinion backlash.

Backlash:
0.10 — 0.20 mm (0.004 — 0.008 in)



18) Check pinion and hypoid driven gears rotate smoothly and make sure of the hypoid driven gear runout on its back surface. If the hypoid driven gear runout on its back surface exceeds the specification, check for any foreign objects between the hypoid driven gear and differential case, and for any deformation of the differential case or hypoid driven gear.

Hypoid driven gear back surface runout:
0.05 mm (0.002 in)

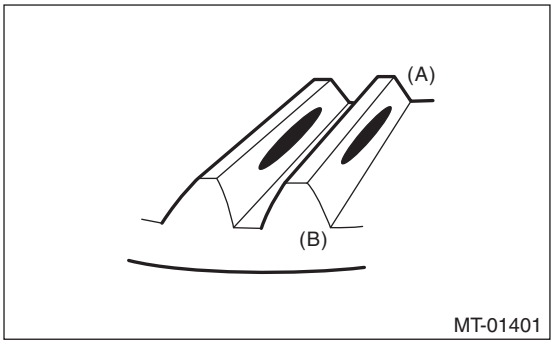


19) Check and adjustment of the tooth contact of hypoid driven gear and drive pinion
(1) Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.
(2) When the contact pattern is not correct, re-adjust.

NOTE:
Be sure to wipe off the lead-free red dye completely after the adjustment is completed.

- Correct tooth contact

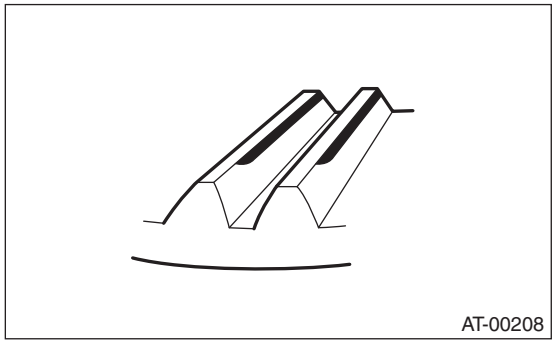
Check item: Tooth contact pattern is slightly shifted toward toe side under no-load rotation. (When driving, it moves towards the heel side.)



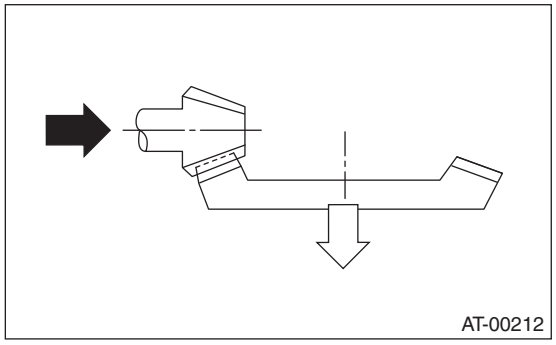
(A) Toe side
(B) Heel side

- Face contact

Check item: Backlash is too large.
Contact pattern

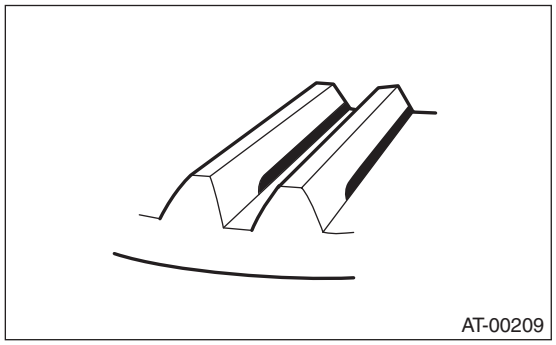


Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.

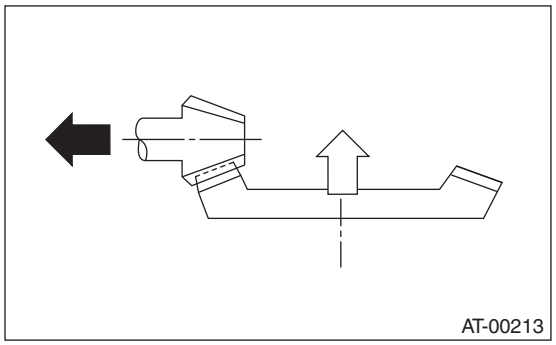


- Flank contact

Check item: Backlash is too small.
Contact pattern

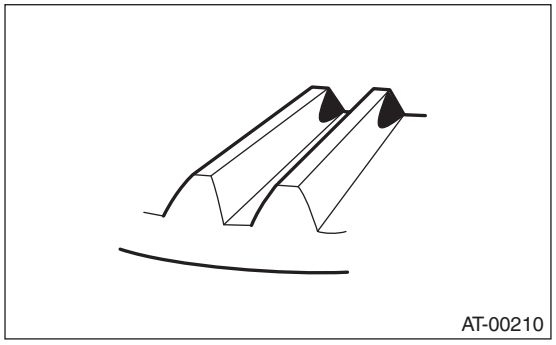


Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.

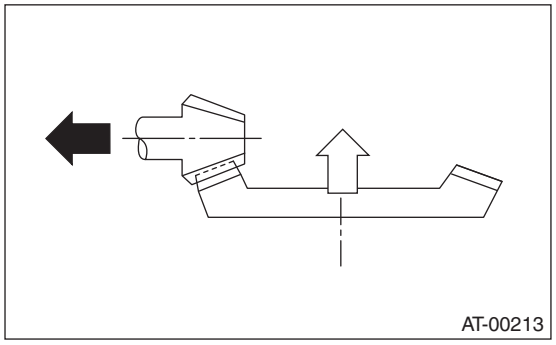


- Toe contact (inside contact)

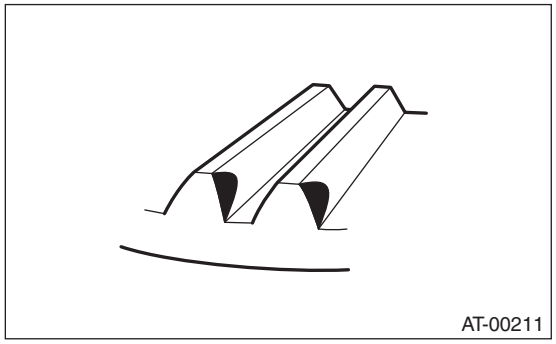
Check item: Teeth contact area is too small.
Contact pattern



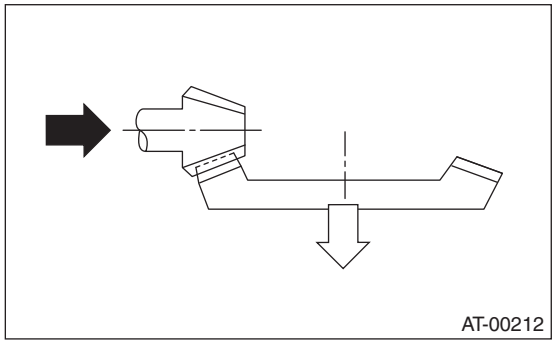
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



• Heel contact (outside end contact)
Check item: Teeth contact area is too small.
Contact pattern

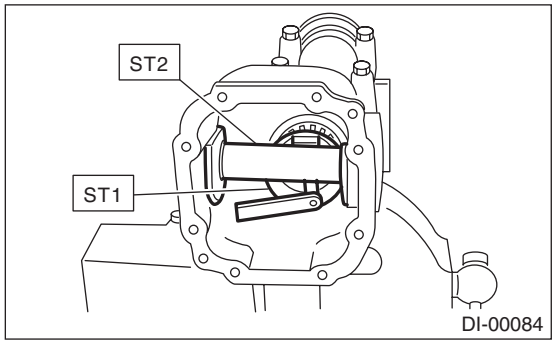


Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



20) If proper tooth contact is not obtained, readjust the drive pinion height by changing the RH and LH side retainer shims and the hypoid gear backlash.
(1) Drive pinion height

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE

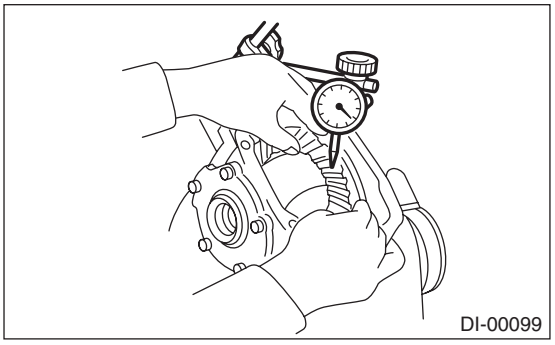


T = To + N – (H × 0.01) – 0.20 mm (0.0079 in)

T	Thickness of pinion height adjusting washer mm (in)	
To	Thickness of washer temporarily inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
H	Figure marked on drive pinion head	
Memo:		

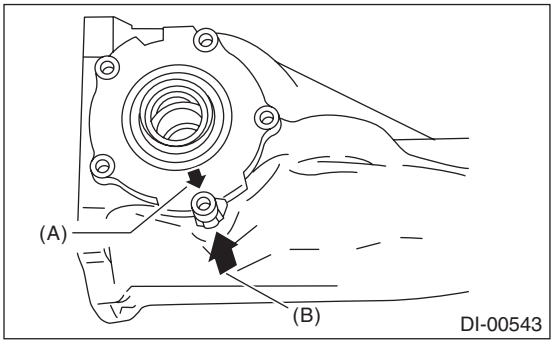
(2) Hypoid gear backlash

Backlash:
0.10 — 0.20 mm (0.004 — 0.008 in)



21) Remove the RH and LH side retainers.
22) Install the O-ring to left and right side retainers.

NOTE:
Use new O-rings.
23) Install the oil seal to the side retainers on both sides. <Ref. to DI-58, REPLACEMENT, Rear Differential Side Oil Seal.>
24) Align the arrow mark on the differential carrier with the arrow mark on the side retainer when installing the side retainer.

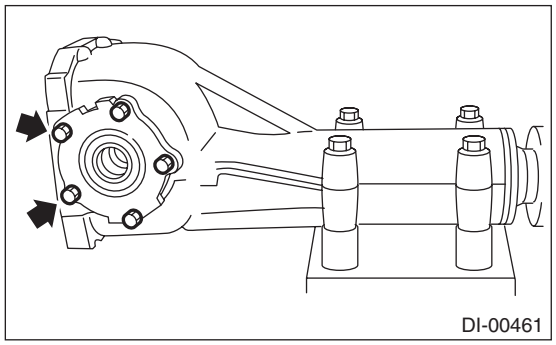


(A) Arrow mark (on the side retainer)
(B) Arrow mark (on the differential carrier)

25) Apply liquid gasket to the bolts indicated by arrows, and tighten the bolts.

Liquid gasket:
THREE BOND 1110F, THREE BOND 1110B or equivalent

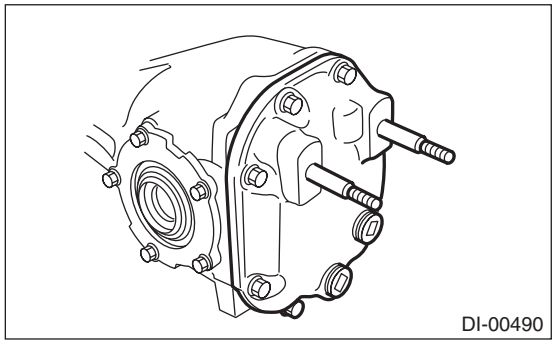
Tightening torque:
10.5 N·m (1.1 kgf-m, 7.7 ft-lb)


DI-00461

26) Install the gasket and rear cover, and tighten the bolts to specified torque.

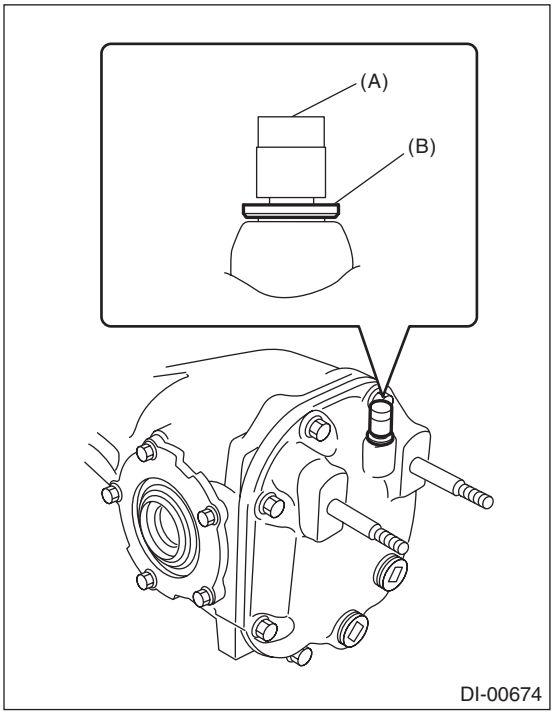
NOTE:
Use a new gasket.

Tightening torque:
29.5 N·m (3.0 kgf-m, 21.8 ft-lb)


DI-00490

27) Install the air breather cap.

NOTE:
When installing the air breather cap, do not tap section (A). Be sure to tap section (B) to install.



DI-00674

28) Install the drain plug.

NOTE:
Apply liquid gasket to the drain plug.

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

Tightening torque:
49 N·m (5.0 kgf-m, 36.1 ft-lb)

29) Install the filler plug.

NOTE:
After installing the rear differential assembly to the vehicle, fill the gear oil, then apply liquid gasket, and tighten to the specified torque. <Ref. to DI-19, REPLACEMENT, Differential Gear Oil.>

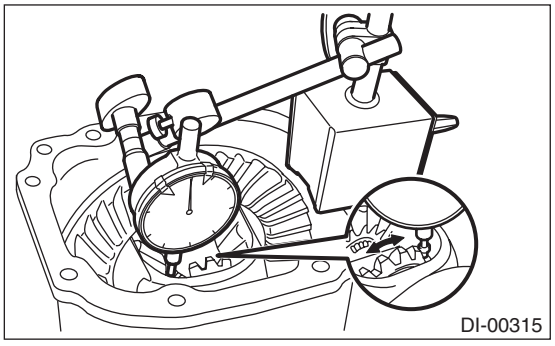
E: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage and other defects. Repair or replace the defective parts as necessary.
1) Hypoid driven gear and drive pinion
• If there is evidently an abnormal tooth contact, find out the cause and adjust until the teeth contact correctly. Replace the gear if there is an excessive worn or an incapable adjustment.
• If crack, cutout or seizure is found, replace the parts as a set. Slight damage of some teeth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
• Replace if cracks, scoring or other defects are evident on the tooth surface.
• Replace if thrust washer contact surface is worn or scored. Slight damages of the surface can be corrected by oil stones or equivalent.
3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, noise or other defect is evident.
4) Thrust washer of the side gear and pinion mate gear
Replace if seized, flawed, abnormally worn or having other defects.
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 sliding surfaces are abnormally worn, burned, or cracked.
8) Companion flange
Replace if the oil seal lip contact surface shows cracking.

1. SIDE GEAR BACKLASH

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

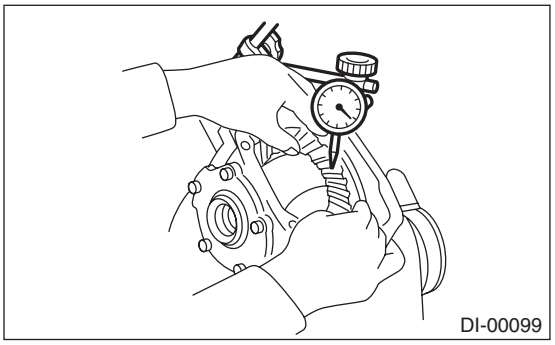
Side gear backlash:
0.10 — 0.20 mm (0.004 — 0.008 in)
If the side gear backlash is not within the specified range, select the side gear thrust washer and adjust the side gear backlash as specified.


DI-00315

2. HYPOID DRIVEN GEAR BACKLASH

Using a dial gauge, check the backlash of hypoid driven gear.

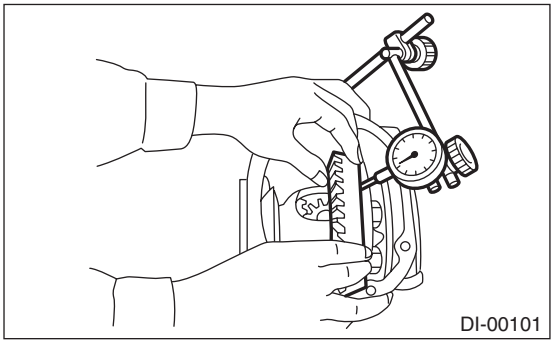
Hypoid driven gear backlash:
0.10 — 0.20 mm (0.004 — 0.008 in)
If the hypoid driven gear backlash is outside the specification range, adjust the side bearing preload and repair if necessary.


DI-00099

3. HYPOID DRIVEN GEAR RUNOUT ON ITS BACK SURFACE

Using a dial gauge, check the hypoid driven gear back surface runout.

Hypoid driven gear back surface runout:
0.05 mm (0.002 in)
If the hypoid driven gear runout on its back surface exceeds the limit, replace the hypoid driven gear.


DI-00101

4. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

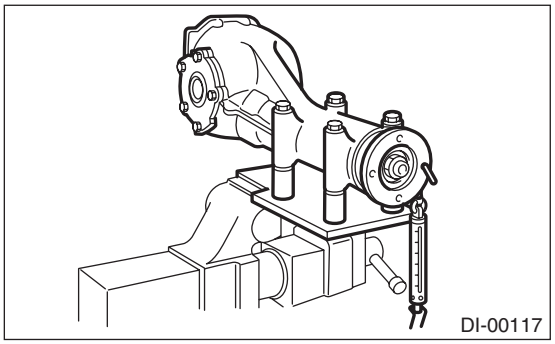
Inspect the tooth contact between the hypoid driven gear and drive pinion. <Ref. to DI-28, ASSEMBLY, Rear Differential (T-type).>

5. TOTAL PRELOAD

Using a spring scale, check the total preload.

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

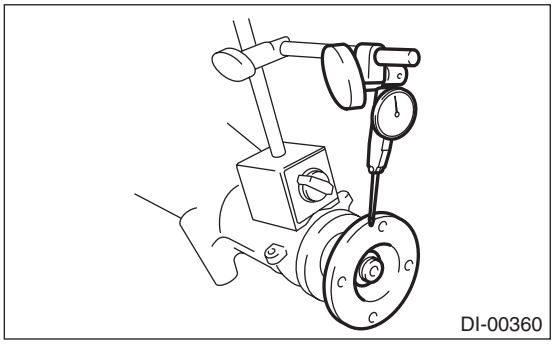
If the total preload is not within the specified range, adjust the side retainer shim.


DI-00117

6. COMPANION FLANGE

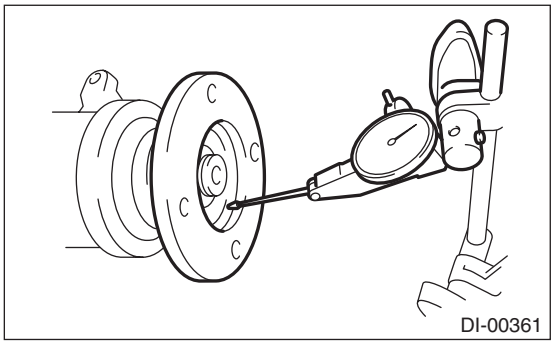
1) If rust or dirt is attached to the companion flange, remove them.
2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

Limit of runout:
0.08 mm (0.003 in)


DI-00360

3) Set the gauge inside of the companion flange, and measure the runout.

Limit of runout:
0.08 mm (0.003 in)


DI-00361

4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point where the runout is within the limit.
5) If the runout exceeds the limit even after changing the phase, replace the companion flange and recheck the runout.
6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust the side gear backlash. <Ref. to DI-28, ASSEMBLY, Rear Differential (T-type).>

2. HYPOID DRIVEN GEAR BACKLASH

Adjust hypoid driven gear backlash. <Ref. to DI-28, ASSEMBLY, Rear Differential (T-type).>

3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear. <Ref. to DI-28, ASSEMBLY, Rear Differential (T-type).>

4. TOTAL PRELOAD

Adjust the side retainer shim. <Ref. to DI-28, ASSEMBLY, Rear Differential (T-type).>

5. Rear Differential (VA-type)

A: REMOVAL

The removal procedure for VA-type is included in “REMOVAL” for T-type. <Ref. to DI-22, REMOVAL, Rear Differential (T-type).>

B: INSTALLATION

The installation procedure for VA-type is included in “INSTALLATION” for T-type. <Ref. to DI-24, INSTALLATION, Rear Differential (T-type).>

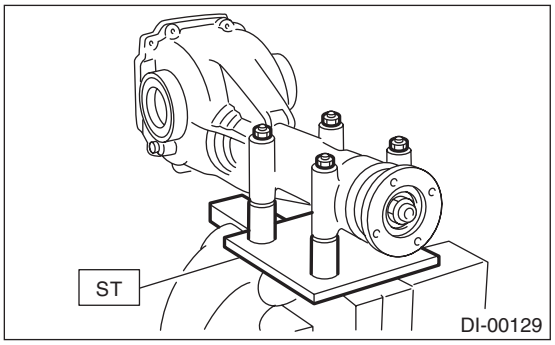
C: DISASSEMBLY

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

• Tooth contact and backlash between hypoid driven gear and drive pinion

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

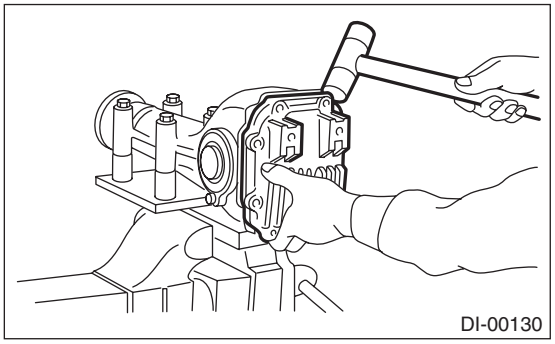
ST 398217700 ATTACHMENT SET



2) Remove the drain plug and filler plug.

3) Remove the rear cover by removing retaining bolts.

NOTE:
Remove it by tapping with a plastic hammer.

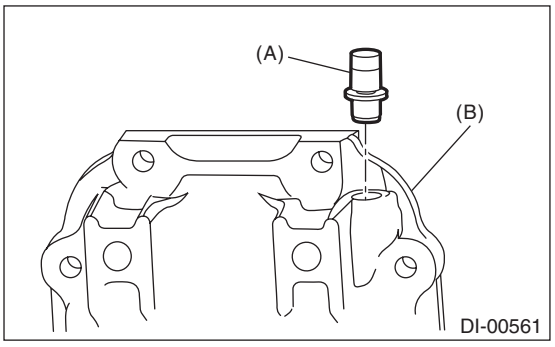


4) Remove the air breather cap.

NOTE:

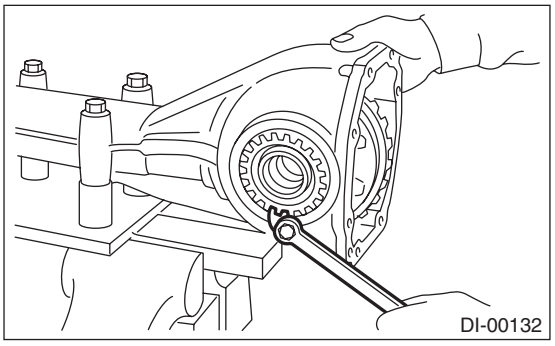
• Do not attempt to remove the air breather cap unless necessary.

• Whenever the air breather cap is removed, replace it with a new part.



(A) Air breather cap
(B) Rear cover

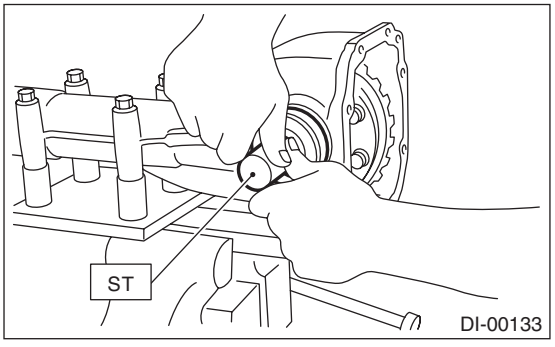
5) Remove the lock plate RH and LH.



6) Remove the side retainer RH and LH with ST.

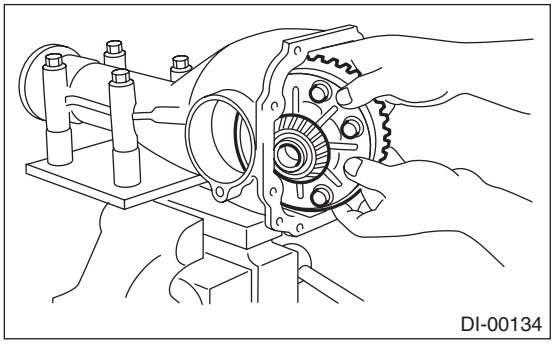
NOTE:
When keeping the retainers aside, use labels etc. to avoid confusing the left and right.

ST 18630AA010 WRENCH COMPL RETAINER

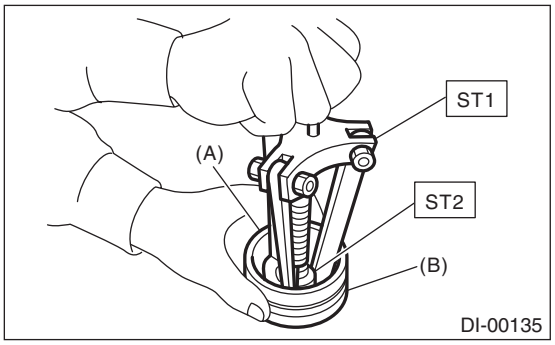


7) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth of hypoid driven gear against the differential carrier.



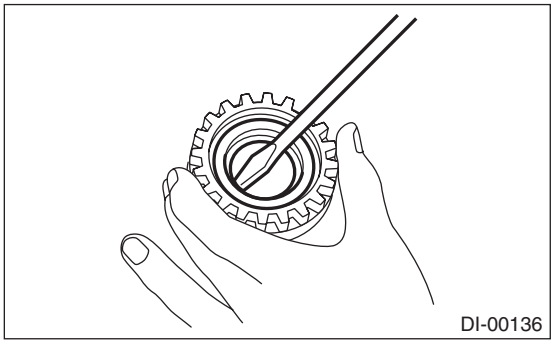
8) Remove the bearing race from side retainer RH and LH with ST1 and ST2.
ST1 499705401 PULLER ASSY
ST2 499705404 SEAT



(A) Bearing race
(B) Side retainer

9) Remove the oil seal from the RH and LH side retainers using a screwdriver.

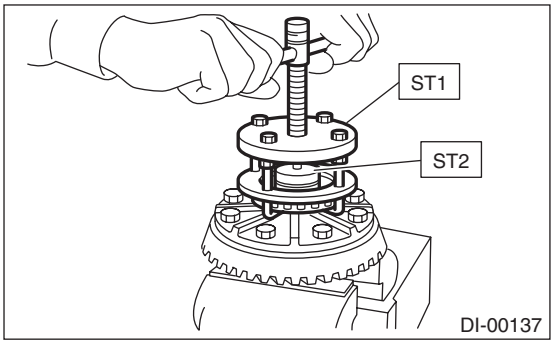
NOTE:
Perform this operation only when changing oil seal.



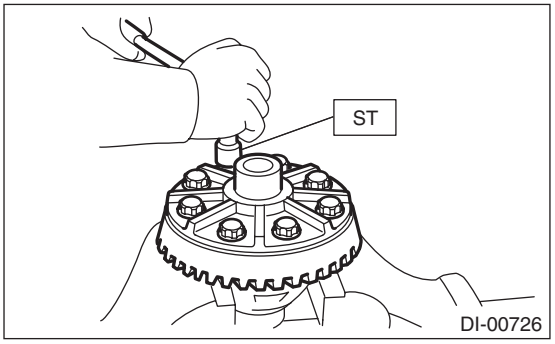
10) Remove the O-ring.

11) Extract the bearing cone with ST1 and ST2.

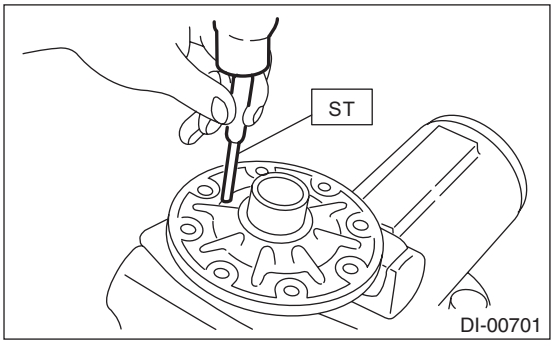
NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Set the puller so that its claws catch the edge of the bearing cone.
• Store so that the right and left side bearing races and cones are not mixed together.
ST1 899524100 PULLER SET
ST2 399520105 SEAT



12) Using the ST, loosen the hypoid driven gear bolt and remove the hypoid driven gear.
ST 18270KA020 SOCKET (E20)

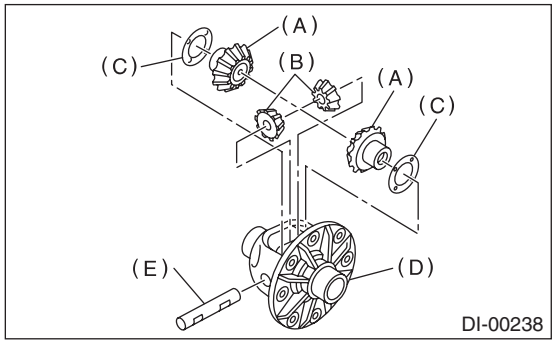


13) Remove the spring pin from hypoid driven gear side using ST.
ST 899904100 STRAIGHT PIN REMOVER



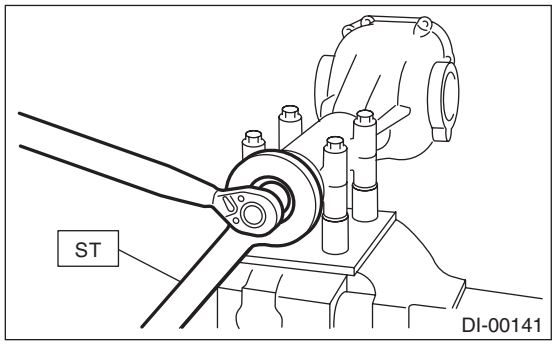
14) Draw out the pinion mate shaft and remove pinion mate gears, side gears and side gear thrust washers.

NOTE:
The gears and washers should be marked with RH or LH, front or rear, or kept separately.

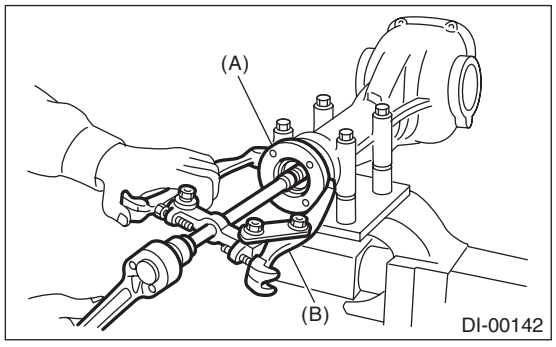


(A) Side gear
(B) Pinion mate gear
(C) Side gear thrust washer
(D) Differential case
(E) Pinion mate shaft

15) Remove the self-locking nut while securing the companion flange with ST.
ST 498427200 FLANGE WRENCH



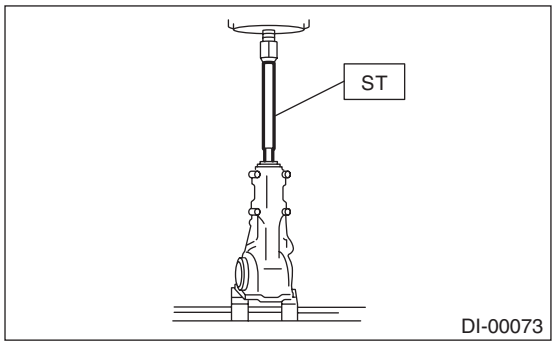
16) Extract the companion flange with a puller.



(A) Companion flange
(B) Puller

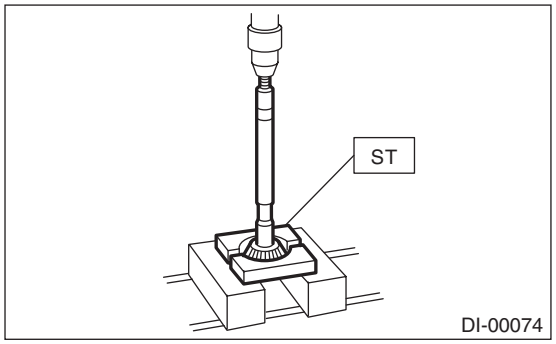
17) Press the end of drive pinion shaft and extract it together with rear bearing cone, pinion height adjusting washer and washer by using the ST.

NOTE:
Hold the drive pinion so as not to drop it.
ST 398467700 DRIFT

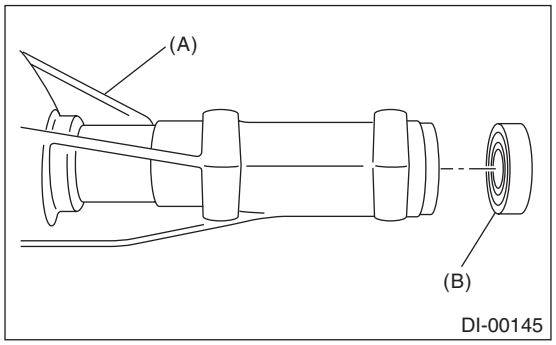


18) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the bearing cone.
ST 498515500 REPLACER

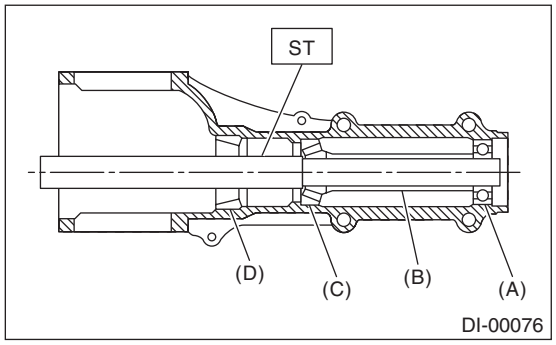


19) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



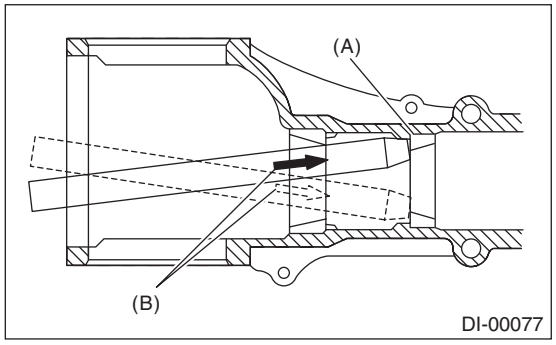
(A) Differential carrier
(B) Front oil seal

20) Remove the pilot bearing together with the front bearing cone and spacer using the ST.
ST 398467700 DRIFT



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

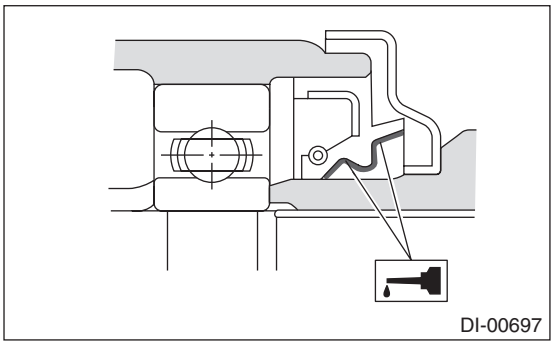
21) When replacing the bearings, hit out the front bearing cup and rear bearing cup in this order using a brass bar.



(A) 2 cutout portions along diagonal lines
(B) Tap alternately with brass bar.

D: ASSEMBLY

NOTE:
- Assemble in the reverse order of disassembly.
- Check and adjust each part during assembly.
- Use new gaskets and O-rings.
- 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 RH and LH bearing races.
- Replace the oil seal and O-ring with a new part at every disassembly.
- Be careful not to mix up the side oil seal RH and LH.
- Apply differential gear oil to the lips when installing the oil seal.

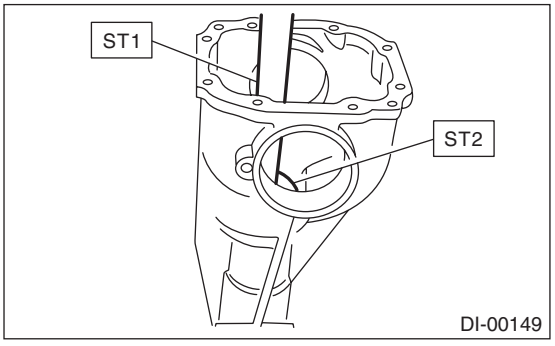


1) Adjusting preload for front and rear bearings

NOTE:
Adjust the bearing preload between front and rear bearings with preload adjusting spacer and washer. Pinion height adjusting washer is not affected by this adjustment. The adjustment must be carried out with oil seal removed.

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

ST1 398477701 HANDLE
ST2 398477702 DRIFT



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

NOTE:
Use a new front bearing race.
ST1 398477701 HANDLE
ST2 498447110 DRIFT

(3) Insert the front bearing cone.

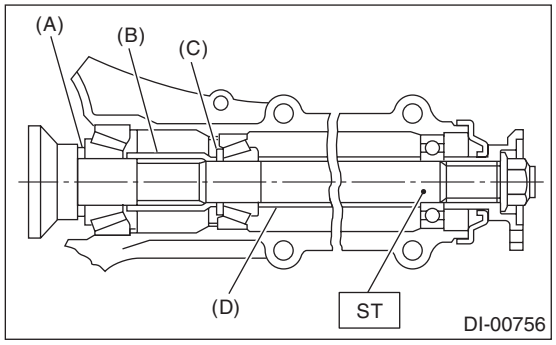
(4) Measure and record the thickness of pinion height adjusting washer.

NOTE:
If tooth contact (drive pinion and hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then reuse the used washer.

(5) Insert the ST (DUMMY SHAFT) into case with the pinion height adjusting washer and rear bearing cone fitted onto it.

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

ST 498447150 DUMMY SHAFT
Part No. 32285AA000 Spacer



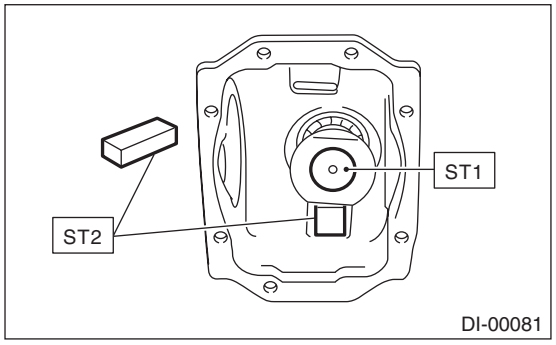
(A) Pinion height adjusting washer
(B) Preload adjusting spacer
(C) Preload adjusting washer
(D) Spacer (SUBARU genuine parts)

(7) Turn the ST by hand to slowly seat the bearing, and tighten the self-locking nut while measuring the initial load or initial torque with a spring scale or torque wrench. Select the preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

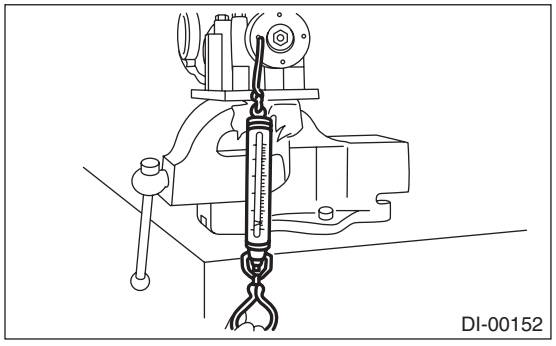
NOTE:
- Use a new self-locking nut.
- Measure the preload in direction of tangent to the flange.
- Be careful not to give excessive preload.
- When tightening the self-locking nut, lock ST1 with ST2 as shown in the figure.

ST1 498447150 DUMMY SHAFT
ST2 398507704 BLOCK

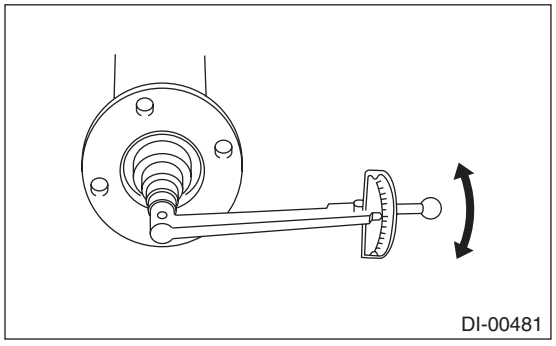
Tightening torque:
191 N·m (19.5 kgf-m, 140.9 ft-lb)



Initial load:
12.7 — 32.2 N (1.3 — 3.3 kgf, 2.9 — 7.2 lbf)



Initial torque:
0.48 — 1.22 N·m (0.05 — 0.12 kgf-m, 0.35 — 0.90 ft-lb)



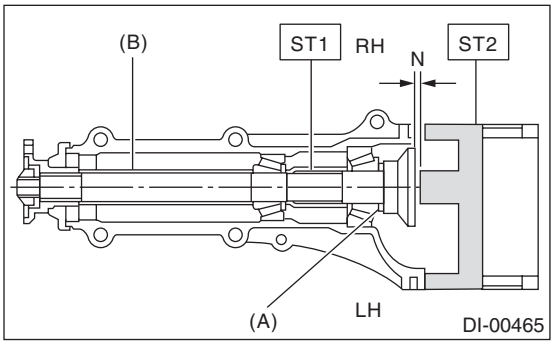
Preload adjusting washer	
Part No.	Thickness mm (in)
38336AA000	1.500 (0.0591)
38336AA120	1.513 (0.0596)
38336AA010	1.525 (0.0600)
38336AA130	1.538 (0.0606)
38336AA020	1.550 (0.0610)
38336AA140	1.563 (0.0615)
38336AA030	1.575 (0.0620)
38336AA150	1.588 (0.0625)
38336AA040	1.600 (0.0630)
38336AA160	1.613 (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 the drive pinion height with pinion height adjusting washer installed between the rear bearing cone and the back of pinion gear.

(1) Attach the ST2.

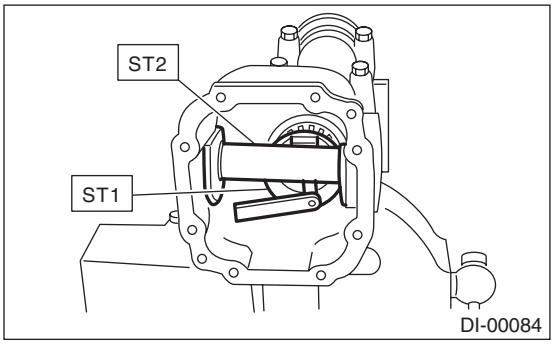
NOTE:
At this time, install a provisionally selected or previously used pinion height adjusting washer.
ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE
Part No. 32285AA000 Spacer



(A) Pinion height adjusting washer
(B) Spacer (SUBARU genuine parts)

(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 differential carrier and ST2.
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 washer with this one.

NOTE:
Adjust it using the 1 — 3 washers.

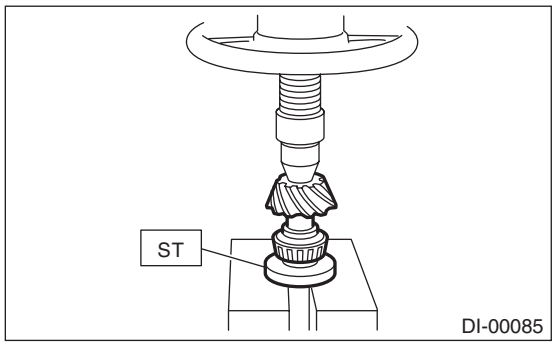
T = To + N – 0.05 mm (0.0020 in)

T	Thickness of pinion height adjusting washer mm (in)	
To	Thickness of washer temporarily inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
Memo:		

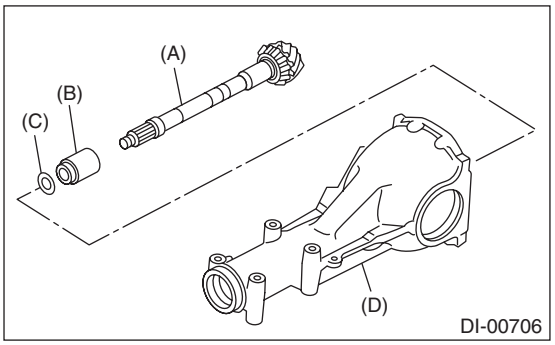
(Example of calculation)
To = 0.15 mm (0.0059 in)
N = 0.1 mm (0.0039 in)
T = 0.15 + 0.1 – 0.05 = 0.2 mm (0.0079 in)
Result: Thickness = 0.2 mm (0.0079 in)
Therefore use part number 32295AA220.

Pinion height adjusting washer	
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 washer on drive pinion, and press the rear bearing cone into position with ST.
ST 498175500 INSTALLER



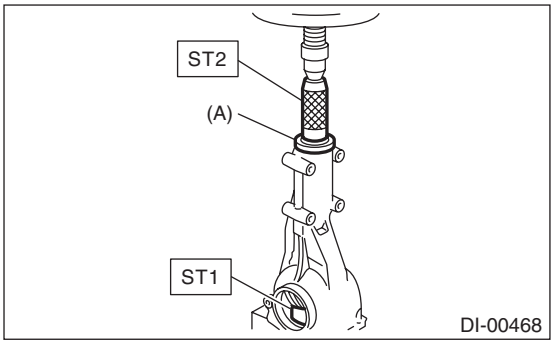
4) Insert the drive pinion into the differential carrier, and install the preselected preload adjusting spacer and washer.



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

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

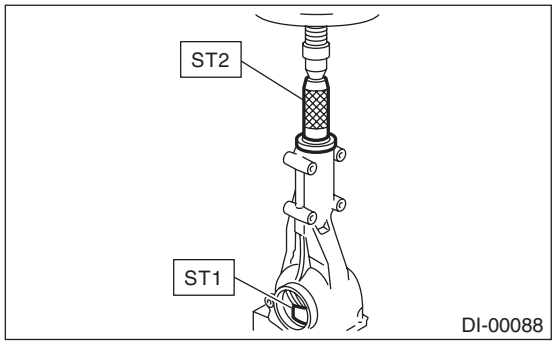
NOTE:
Use new front bearing cone.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER
Part No. 32285AA000 Spacer



(A) Spacer (SUBARU genuine parts)

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

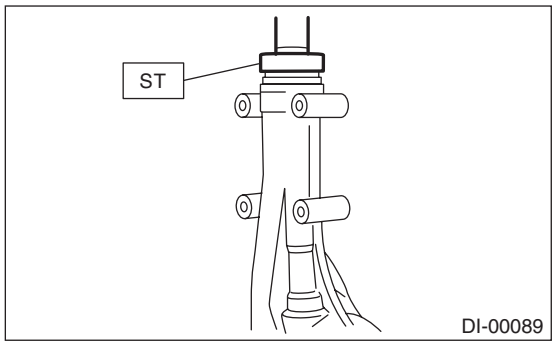
NOTE:
Use a new pilot bearing.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



7) Using the ST, install the oil seal.

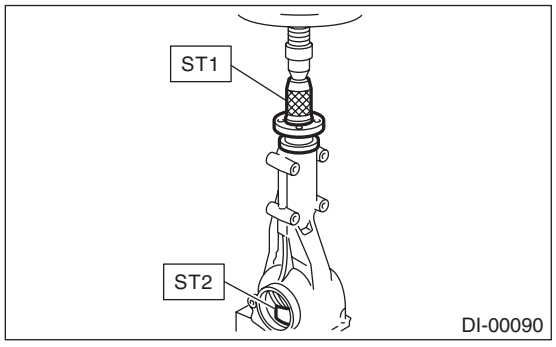
NOTE:
- Use a new oil seal.
- Press-fit until the oil seal end comes 1 mm (0.04 in) inward from end of carrier.
- Apply differential gear oil to the oil seal lips.

ST 498447120 INSTALLER



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

NOTE:
Be careful not to damage the pilot bearing.
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



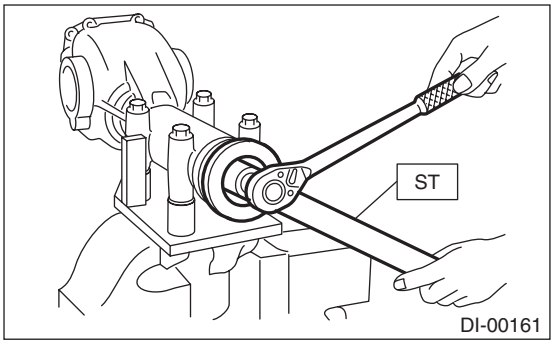
9) Attach the self-locking nut and use the ST to fix the companion flange in place, then tighten the self-locking nut.

NOTE:
- Use a new self-locking nut.
- Before installing the self-locking nut, apply the seal material to the threads of the drive pinion shaft and to the seating surface of the self-locking nut.

Seal material:
THREE BOND 1324 (Part No. 004403042) or equivalent

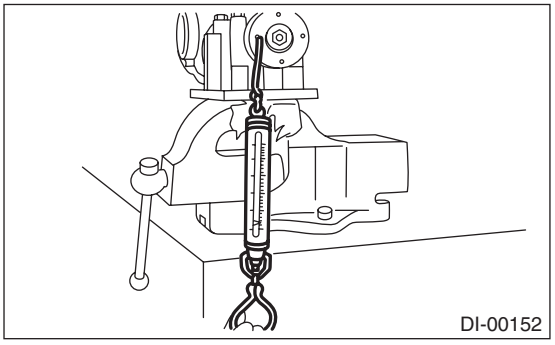
Tightening torque:
191 N·m (19.5 kgf-m, 140.9 ft-lb)

ST 498427200 FLANGE WRENCH

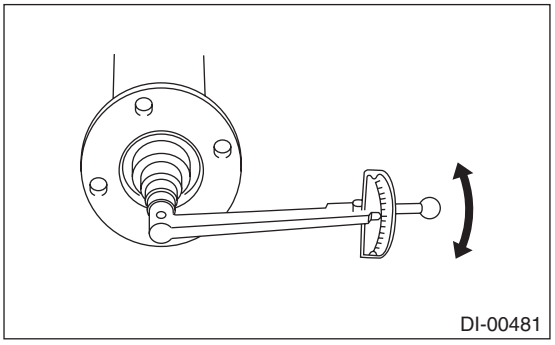


10) Check the initial torque or initial load.

Initial load:
12.7 — 32.2 N (1.3 — 3.3 kgf, 2.9 — 7.2 lbf)

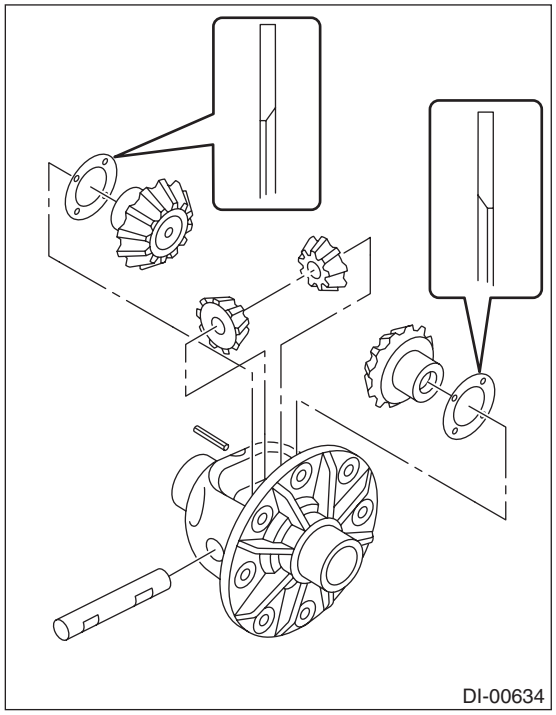


Initial torque:
0.48 — 1.22 N·m (0.05 — 0.12 kgf-m, 0.35 — 0.90 ft-lb)



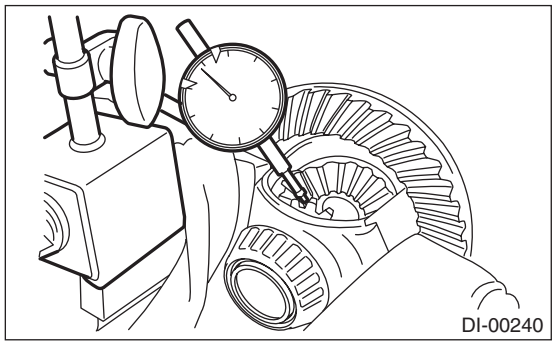
11) Assembling differential case
(1) Install the side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into the differential case.

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 pin holes.
• The side gear thrust washer inner surface has a chamfered side. Install the washer with the chamfered side facing toward the side gear.


DI-00634

(2) Measure the side gear backlash.

Side gear backlash:
0.05 — 0.15 mm (0.002 — 0.006 in)


DI-00240

(3) Adjust the side gear backlash 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)

(4) Check the condition of rotation after applying oil to the gear tooth surfaces and washer surfaces.
(5) Drive the spring pin into the differential case.

NOTE:
Use new spring pin.

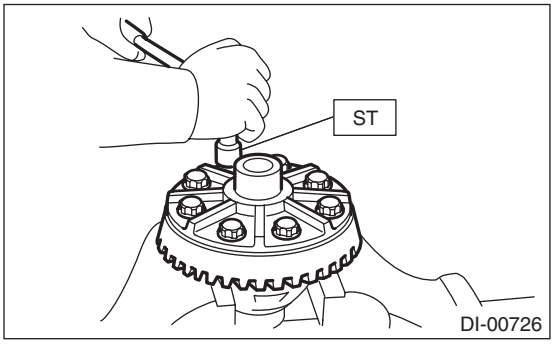
12) Install the hypoid driven gear to differential case.

NOTE:
• Before installing bolts, apply seal material to bolt threads.

Seal material:
THREE BOND 1324 (Part No. 004403042) or equivalent
• Tighten opposing bolts in order.
(1) Tighten the hypoid driven gear mounting bolts to the specified torque using the ST.

ST 18270KA020 SOCKET (E20)

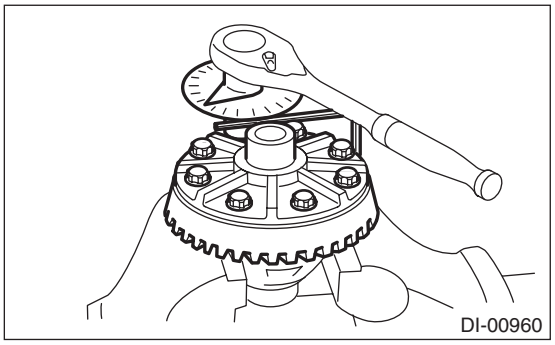
Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)



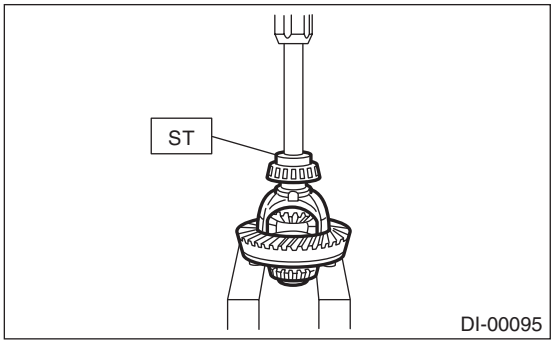
DI-00726

(2) While checking the tightening angle with the angle gauge, further tighten the hypoid driven gear mounting bolts.

Tightening angle:
35°±2°



13) Using the ST, press-fit the side bearing to the differential case.
ST 498485400 DRIFT

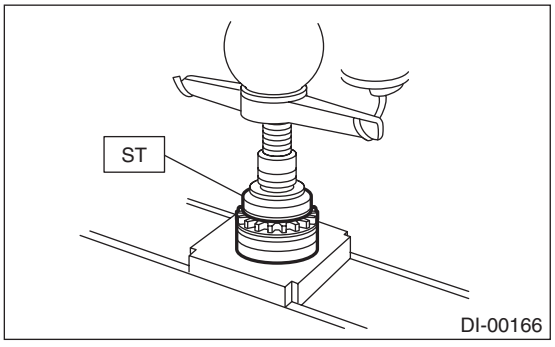


14) Assemble the side retainer.
(1) Install the oil seal into side retainer RH and LH.

CAUTION:
Pay attention to the left and right of the oil seal.

NOTE:
- Use a new oil seal.
- Apply differential gear oil to the oil seal lip.

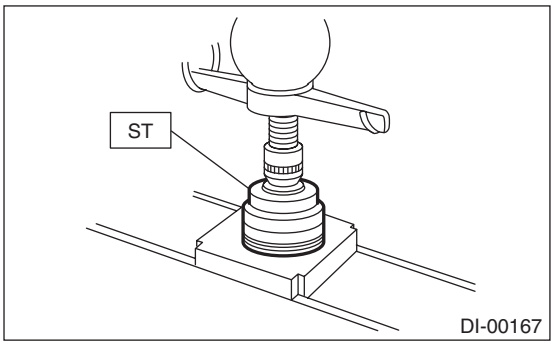
ST 498447100 INSTALLER



(2) Install the bearing race into side retainer RH and LH.

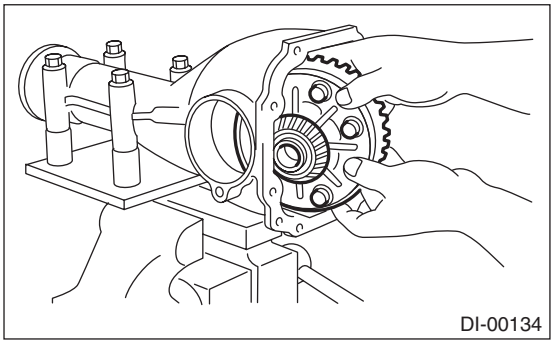
CAUTION:
Make sure that the bearing outer races and cones are properly assembled.

ST 398477702 DRIFT



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

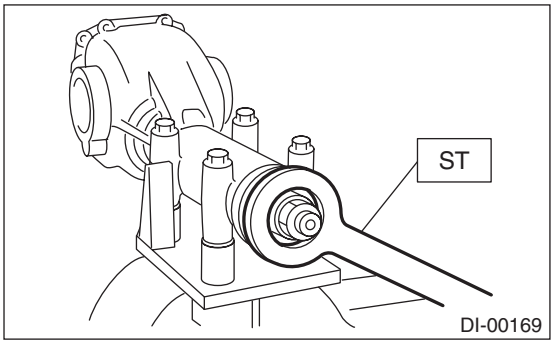
NOTE:
Be careful not to hit the teeth of hypoid driven gear against the differential carrier.



(4) Temporally tighten the side retainers RH and LH in differential carrier to install.

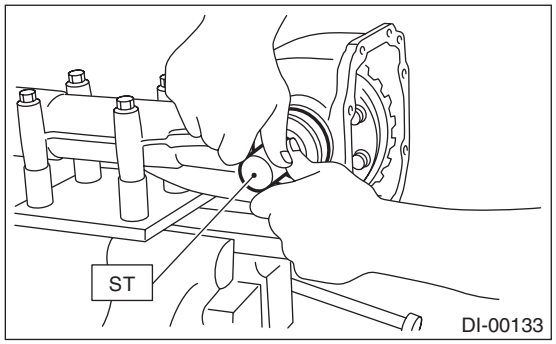
15) Perform the backlash adjustment between the hypoid driven gear and drive pinion, and preload adjustment of differential side bearing.
(1) Turn the drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



(2) Using the ST, tighten side retainer RH, and then tighten side retainer LH until there is no backlash.

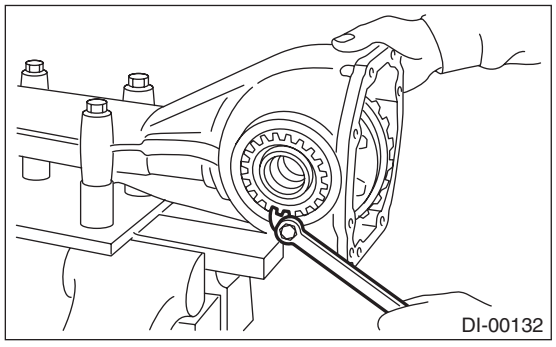
ST 18630AA010 WRENCH COMPL RETAINER



(3) Loosen the side retainer LH by approx. 1 and 1/2 teeth, and tighten the side retainer RH by approx. 2 teeth [amount that the side retainer LH is turned back (approx. 1 and 1/2 teeth) + approx. 1/2 teeth]. Difference between [amount that the side retainer LH is turned back (approx. 1 and 1/2 teeth)] and [amount that the side retainer RH is tightened (approx. 2 teeth)] gives preload.

(4) Temporarily tighten the lock plate.

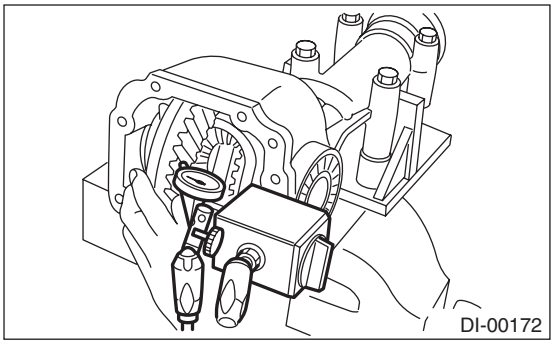
NOTE:
Turn over the lock plate to shift the holder by 1/2 teeth.



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

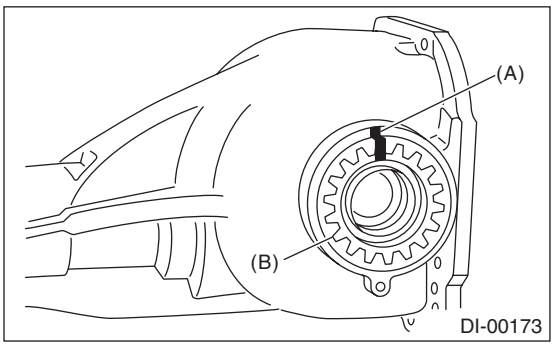
NOTE:
If measured value of backlash is not within the specified range, repeat the procedures for pinion driven gear set backlash adjustment and the differential side bearing preload adjustment.

Backlash:
0.10 — 0.15 mm (0.004 — 0.006 in)



16) Put alignment marks on both the differential carrier and side retainer. Remove the side retainers one side at a time. After installing an O-ring and applying oil to the threaded portion, restore them to the original position.

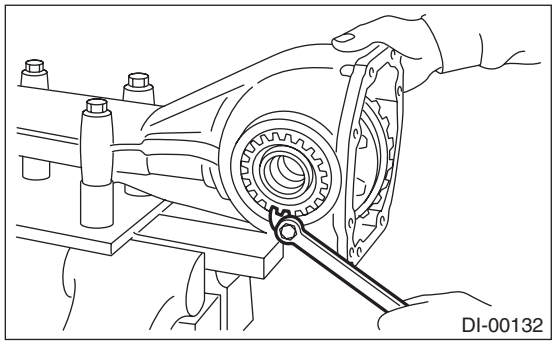
NOTE:
Use new O-rings.



(A) Alignment mark
(B) Side retainer

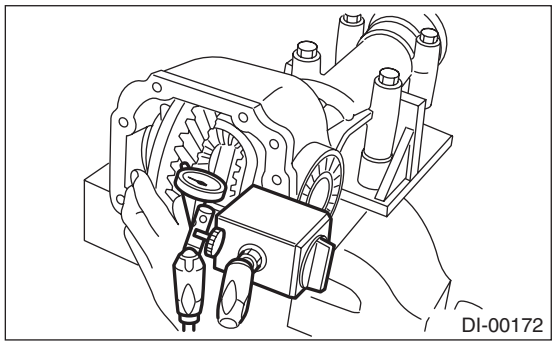
17) Install the lock plate, and tighten the bolts to the specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



18) Recheck the backlash between hypoid driven gear and drive pinion.

Backlash:
0.10 — 0.15 mm (0.004 — 0.006 in)



19) Checking and adjusting the tooth contact of hypoid driven gear

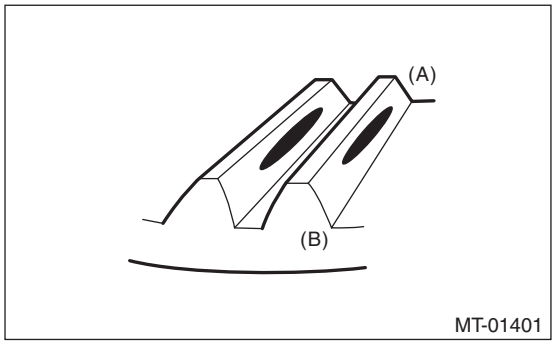
(1) Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.

(2) When the contact pattern is not correct, readjust.

NOTE:
Be sure to wipe off the lead-free red dye completely after the adjustment is completed.

- Correct tooth contact

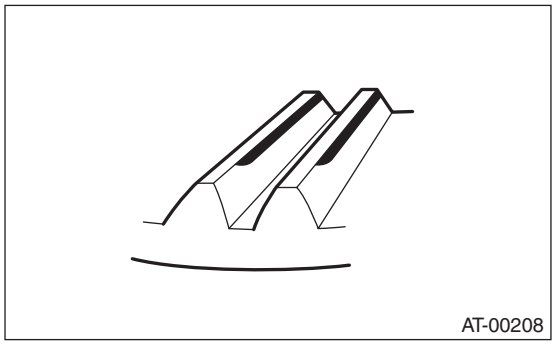
Check item: Tooth contact pattern is slightly shifted toward toe side under no-load rotation. (When driving, it moves towards the heel side.)



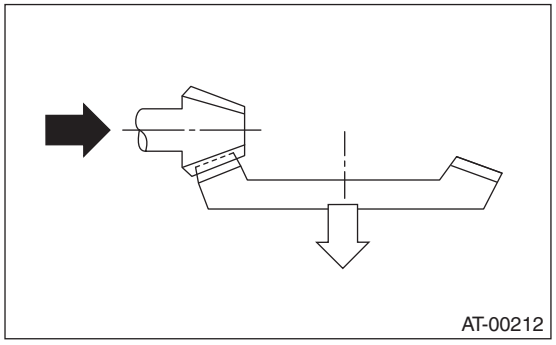
(A) Toe side
(B) Heel side

- Face contact

Check item: Backlash is too large.
Contact pattern



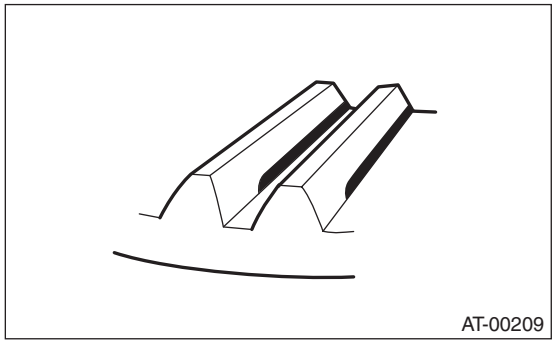
Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



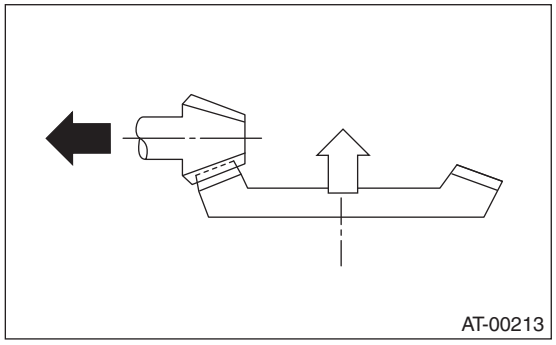
• Flank contact

Check item: Backlash is too small.

Contact pattern



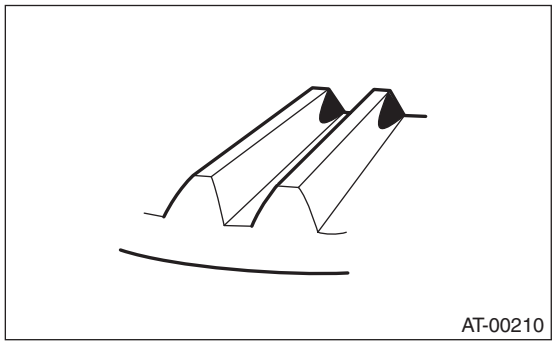
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



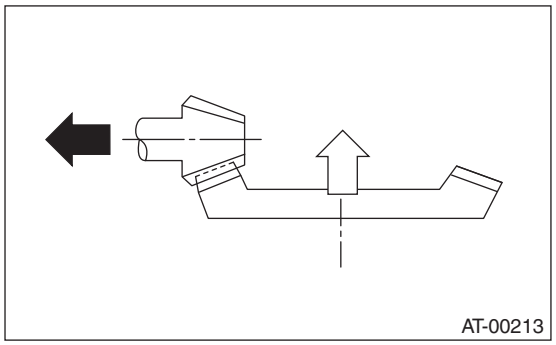
• Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



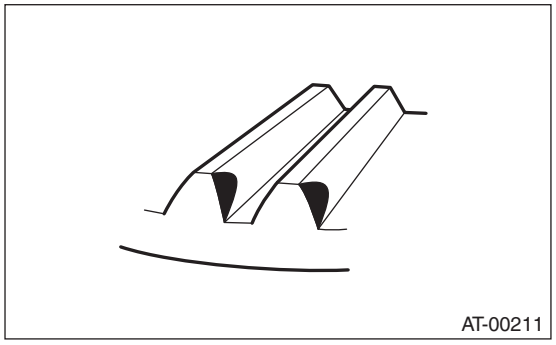
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear side.



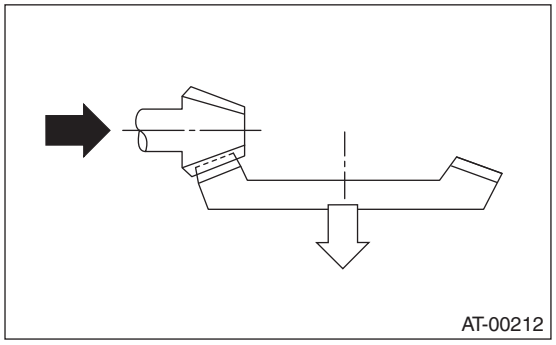
• Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern



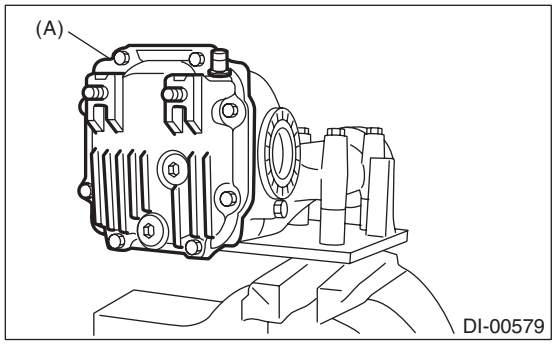
Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



20) If correct tooth contact is not obtained, readjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.
21) Install the gasket and rear cover to the differential carrier, and tighten the bolts to specified torque.

NOTE:
Use a new gasket.

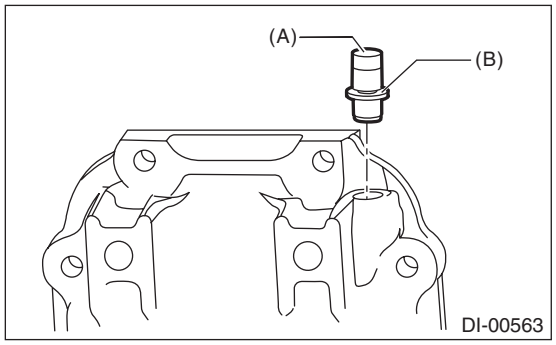
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Rear cover

22) Install the air breather cap.

NOTE:
When installing the air breather cap, do not tap section (A). Be sure to tap section (B) to install.



23) Install the drain plug.

NOTE:
Use a new gasket.

Tightening torque:
50 N·m (5.1 kg-m, 36.9 ft-lb)
24) Install the filler plug.

NOTE:
After installing the rear differential assembly to the vehicle, fill the gear oil, then use a new gasket, and tighten to the specified torque. <Ref. to DI-19, REPLACEMENT, Differential Gear Oil.>

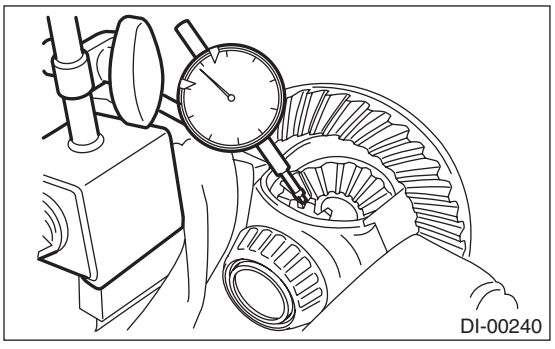
E: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage or other defects. Repair or replace the defective parts as necessary.
1) Hypoid driven gear and drive pinion
• If there is evidently an abnormal tooth contact, find out the cause and adjust until the teeth contact correctly. Replace the gear if there is an excessive worn or an incapable adjustment.
• If crack, cutout or seizure is found, replace the parts as a set. Slight damage of some teeth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
• Replace if cracks, scoring or other defects are evident on the tooth surface.
• Replace if thrust washer contact surface is worn or seized. Slight damages of the surface can be corrected by oil stones or equivalent.
3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, noise or other defect is evident.
4) Thrust washer of the side gear and pinion mate gear:
Replace if seized, flawed, abnormally worn or having other defects.
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 abnormally worn, burned, or cracked.
8) Companion flange
Replace if the oil seal lip contact surface shows cracking.

1. SIDE GEAR BACKLASH

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

Side gear backlash:
0.05 — 0.15 mm (0.002 — 0.006 in)
If the side gear backlash is outside the specification range, select the side gear thrust washer and adjust the side gear backlash as specified.

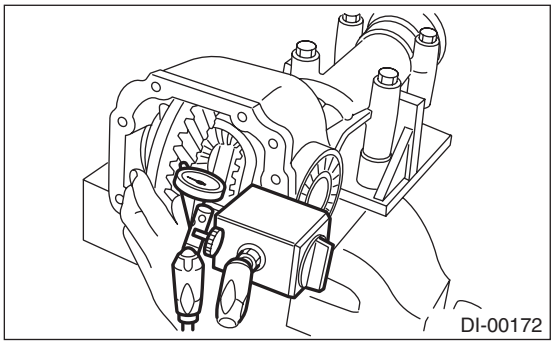


2. HYPOID DRIVEN GEAR BACKLASH

Using a dial gauge, check the backlash of hypoid driven gear.

Hypoid driven gear backlash:
0.10 — 0.15 mm (0.004 — 0.006 in)

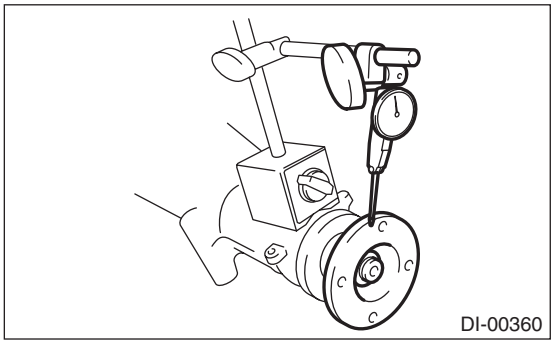
If the hypoid driven gear backlash is outside the specification range, adjust the side bearing preload and repair if necessary.


DI-00172

3. COMPANION FLANGE

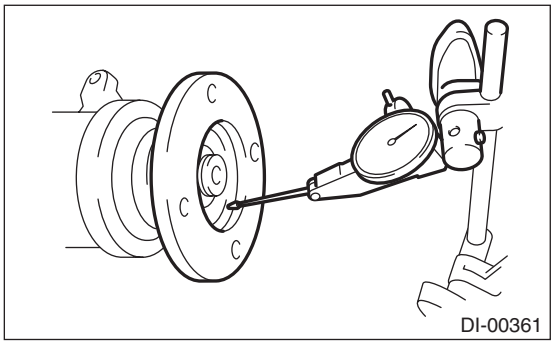
1) If rust or dirt is attached to the companion flange, remove them.
2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

Limit of runout:
0.08 mm (0.003 in)


DI-00360

3) Set the gauge inside of the companion flange, and measure the runout.

Limit of runout:
0.08 mm (0.003 in)


DI-00361

4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point where the runout is within the limit.
5) If the runout exceeds the limit even after changing the phase, replace the companion flange and recheck the runout.
6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

4. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Inspect the tooth contact between the hypoid driven gear and drive pinion. <Ref. to DI-44, ASSEMBLY, Rear Differential (VA-type).>

F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust the side gear backlash. <Ref. to DI-44, ASSEMBLY, Rear Differential (VA-type).>

2. HYPOID DRIVEN GEAR BACKLASH

Adjust hypoid driven gear backlash. <Ref. to DI-44, ASSEMBLY, Rear Differential (VA-type).>

3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear. <Ref. to DI-44, ASSEMBLY, Rear Differential (VA-type).>

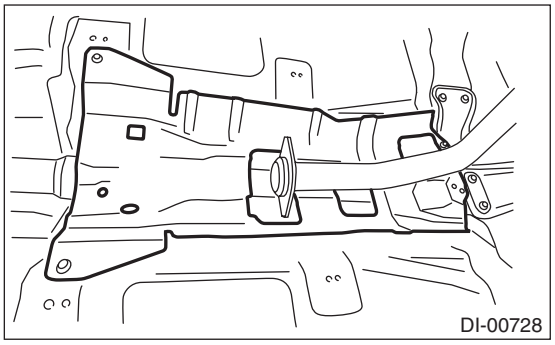
6. Rear Differential Front Oil Seal

A: INSPECTION

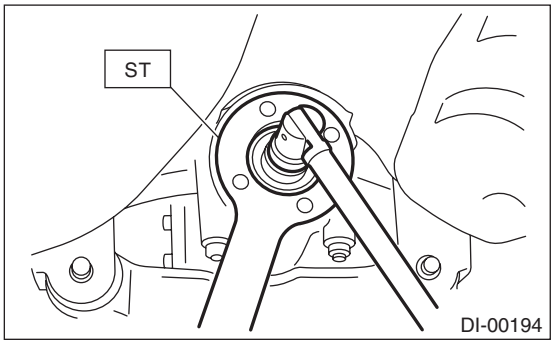
Make sure that there is no leakage from front oil seal portion. If there is any leakage, replace the oil seal and inspect the propeller shaft.

B: REPLACEMENT

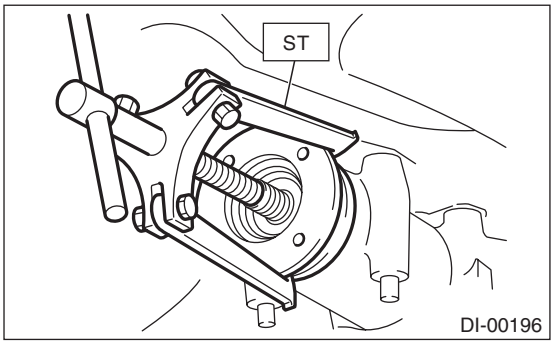
1) Shift the select lever or gear shift lever to neutral.
2) Disconnect the ground cable from battery.
3) Release the parking brake.
4) Lift up the vehicle.
5) Drain differential gear oil. <Ref. to DI-19, REPLACEMENT, Differential Gear Oil.>
6) Remove the rear exhaust pipe. <Ref. to EX(H4DO)-15, REMOVAL, Rear Exhaust Pipe.>
7) Remove the center exhaust cover.



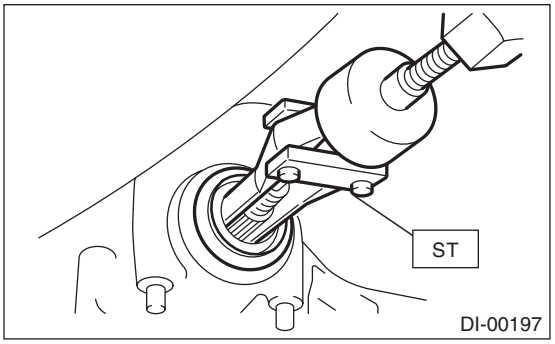
8) Remove the propeller shaft. <Ref. to DS-12, REMOVAL, Propeller Shaft.>
9) Check the initial torque and write it down.
10) Remove the self-locking nut while holding the companion flange with ST.
ST 498427200 FLANGE WRENCH



11) Extract the companion flange using the ST.
ST 399703600 PULLER ASSY



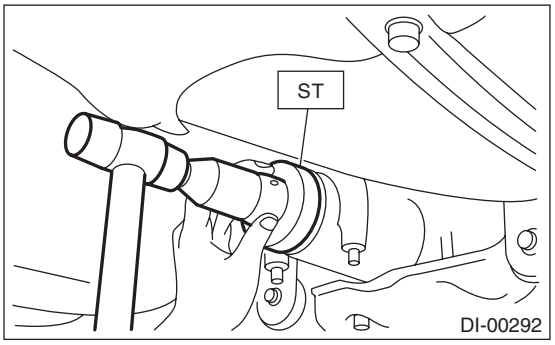
12) Remove the oil seal using ST or screwdriver.
ST 398527700 PULLER ASSY



13) Using the ST, install the oil seal.

NOTE:
- Use a new oil seal.
- Apply differential gear oil to the oil seal lips.

ST 498447120 INSTALLER



14) Install the companion flange.

NOTE:
Use a plastic hammer to install companion flange.

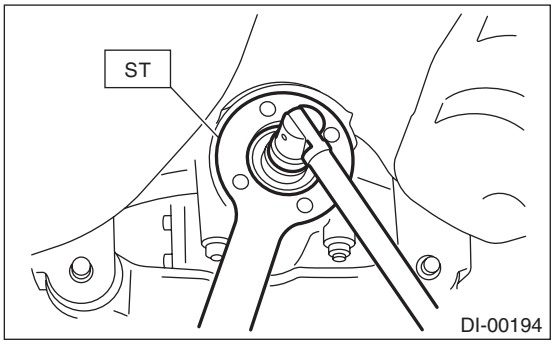
15) Tighten the self-locking nut to the specified torque so that the initial torque of companion flange becomes the same as that before replacing the oil seal.

NOTE:
- Use a new self-locking nut.
- Before installing the self-locking nut, apply the seal material to the threads of the drive pinion shaft and to the seating surface of the self-locking nut.

Seal material:
THREE BOND 1324 (Part No. 004403042) or equivalent

Tightening torque:
T-type
167 — 196 N·m (17.0 — 20.0 kgf-m, 123.2 — 144.6 ft-lb)
VA-type
162 — 220 N·m (16.5 — 22.5 kgf-m, 119.5 — 162.3 ft-lb)

ST 498427200 FLANGE WRENCH



16) Hereafter, perform assembly in the reverse order of disassembly.

17) Fill differential gear oil. <Ref. to DI-19, REPLACEMENT, Differential Gear Oil.>

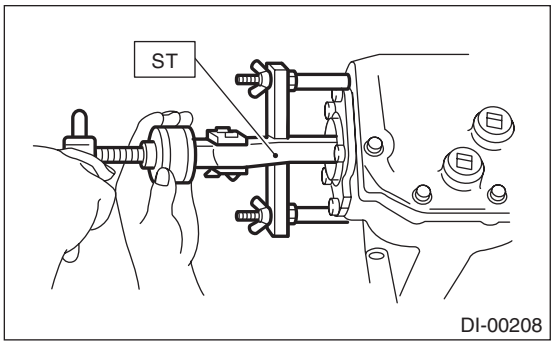
7. Rear Differential Side Oil Seal

A: INSPECTION

Make sure that there is no leakage from side oil seal. If there is any leakage, replace the oil seal.

B: REPLACEMENT

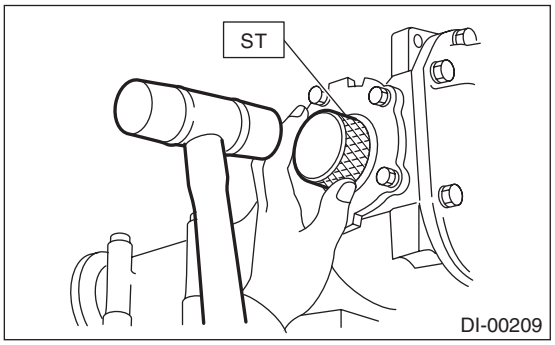
1) Remove the rear differential. <Ref. to DI-22, REMOVAL, Rear Differential (T-type).> <Ref. to DI-41, REMOVAL, Rear Differential (VA-type).>
2) Remove the rear differential side oil seal using a ST or screwdriver wrapped with vinyl tape to prevent the side retainer from scratching.
ST 398527700 PULLER ASSY



3) Using the ST, install the oil seal.

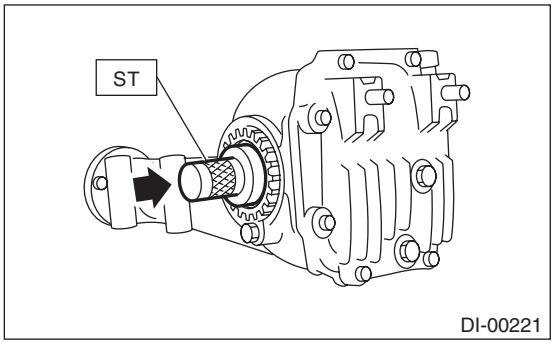
NOTE:
- Use a new oil seal.
- Apply differential gear oil to the oil seal lips.
- T-type

ST 398437700 DRIFT



- VA1-type

ST 498447100 INSTALLER

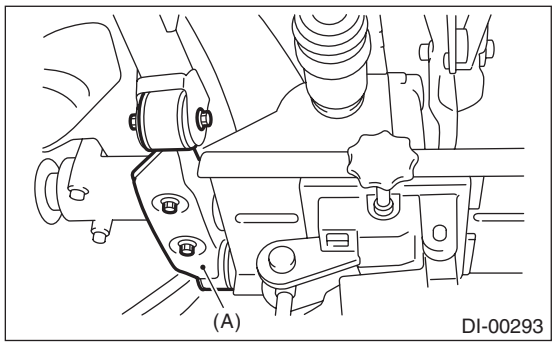


4) Install the rear differential. <Ref. to DI-24, INSTALLATION, Rear Differential (T-type).> <Ref. to DI-41, INSTALLATION, Rear Differential (VA-type).>

8. Rear Differential Front Member

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Support the rear differential using transmission jack, and then remove the rear differential front member.

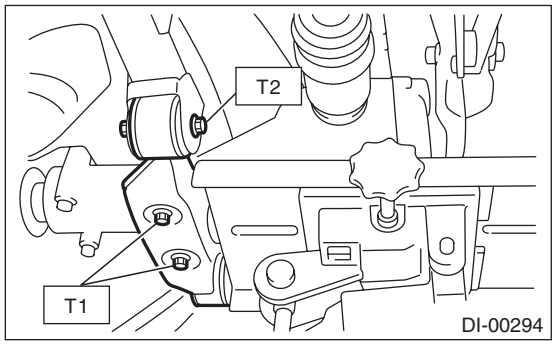


(A) Rear differential front member

B: INSTALLATION

Install the rear differential front member with a new self-locking nut.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81.1 ft-lb)



C: INSPECTION

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

9. Rear Differential Mount Bushing

A: INSPECTION

Check the rear differential mount bushing for cracks, hardening or damage. If cracking, hardening or damage is excessive, replace rear differential mount bushing.

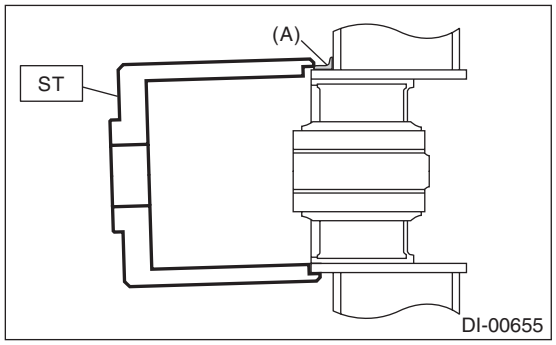
B: REPLACEMENT

CAUTION:
• If there was so much rust in the rear differential mount bushing, remove the rust before starting work.
• Apply molybdenum grease to the square thread of ST (shaft and nut) before use.

1) Remove the rear differential. <Ref. to DI-22, REMOVAL, Rear Differential (T-type).> <Ref. to DI-41, REMOVAL, Rear Differential (VA-type).>

2) Fit the ST to the periphery of the sub frame cylinder, and make sure that the ST does not contact with welded spots or spatters.

ST 41399FG010 SPECIAL TOOL A



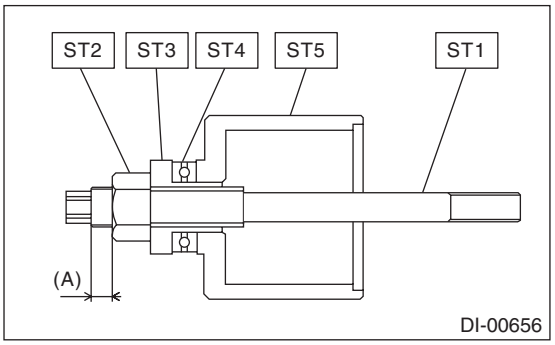
(A) Welded spot

3) If the ST contacts with welded spots or spatters, remove the excessive welds or spatters with sander or the equivalent so that the ST contacts the cylinder peripheral part.

CAUTION:
Performing the operation with the ST contacting with welded spots or spatters may break the ST. Be sure to remove excessive welds or spatters before the operation.

4) Set ST1, ST2, ST3, ST4 and ST5 as shown in the figure.

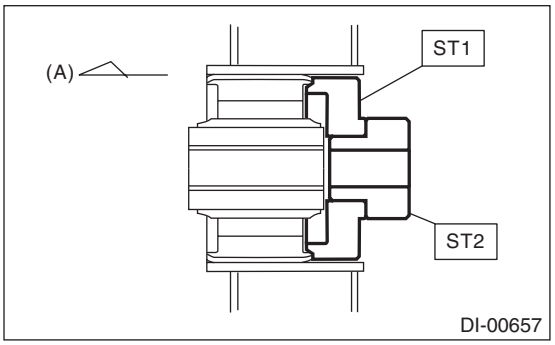
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG070 SPECIAL TOOL NUT
ST3 41399FG050 SPECIAL TOOL SLEEVE
ST4 41399FG080 SPECIAL TOOL BEARING
ST5 41399FG010 SPECIAL TOOL A



(A) 5 mm (0.2 in) or less

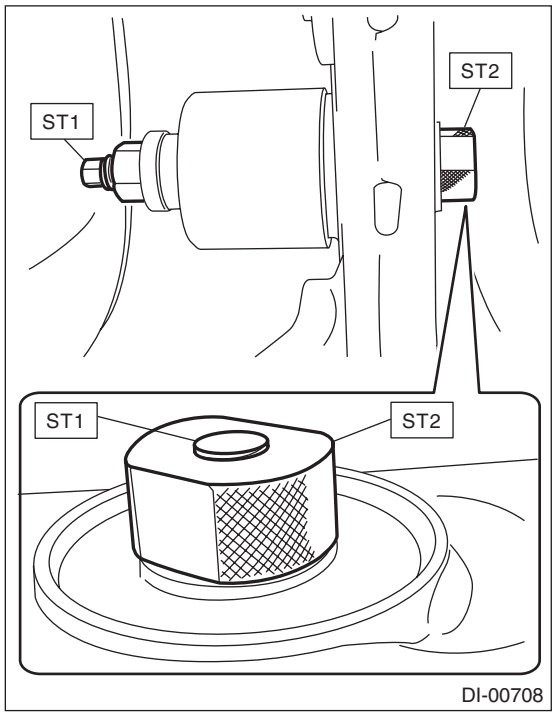
5) Fit and hold the ST1 and ST2 to the rear differential mount bushing from the rear side of vehicle.

ST1 41399FG031 SPECIAL TOOL C
ST2 41399FG061 SPECIAL TOOL RING



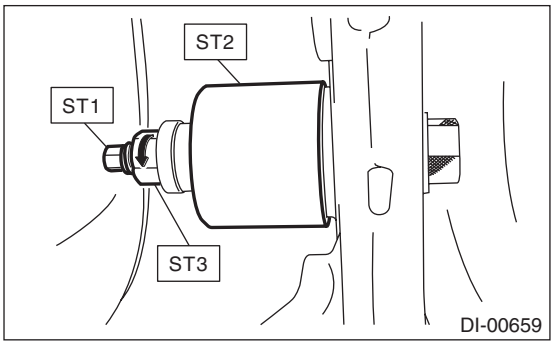
(A) Front side of vehicle

6) Insert the ST set in the step 4) through the rear differential mount bushing hole from the front side of vehicle, and screw in the ST1 by hand till the front end of ST1 comes out slightly from the rear end of ST2.
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG061 SPECIAL TOOL RING



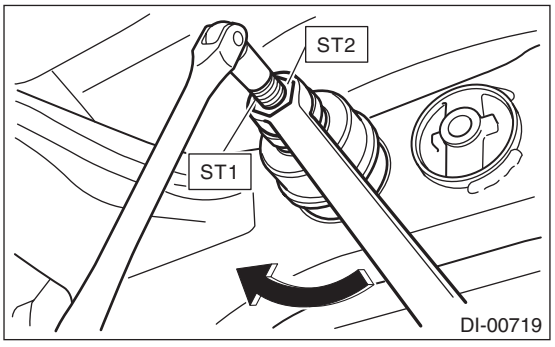
7) Hold the ST1 to prevent it from rotating, and screw in the ST3 by hand till there is no loose fit on the ST2.

CAUTION:
When setting the ST to the vehicle, always make sure that the ST2 fits the periphery of the sub frame cylinder and is not tilted.
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG010 SPECIAL TOOL A
ST3 41399FG070 SPECIAL TOOL NUT



8) Hold the ST1 with a tool to prevent it from rotating, and screw in the ST2 to remove the rear differential mount bushing.

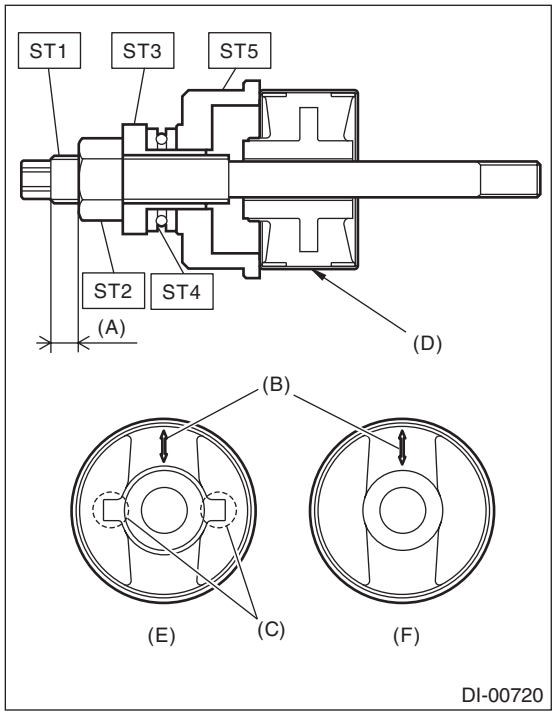
CAUTION:
• Rotation of ST1 will damage the screw at the rear end of rear differential mount bushing. Never rotate the ST1.
• If the ST starts to tilt while removing the rear differential mount bushing, stop the work and set the ST again.
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG070 SPECIAL TOOL NUT



9) Set ST1, ST2, ST3, ST4, ST5 and rear differential mount bushing as shown in the figure.

NOTE:
- Set the ST2 nut near to the end of ST1 screw.
- Hold the rear differential mount bushing with its rubber protrusion facing toward the front of the vehicle, and set the rear differential mount bushing to the ST so that the arrow mark faces upward and downward.
- Mark the bottom end of rear differential mount bushing to identify the installing direction.

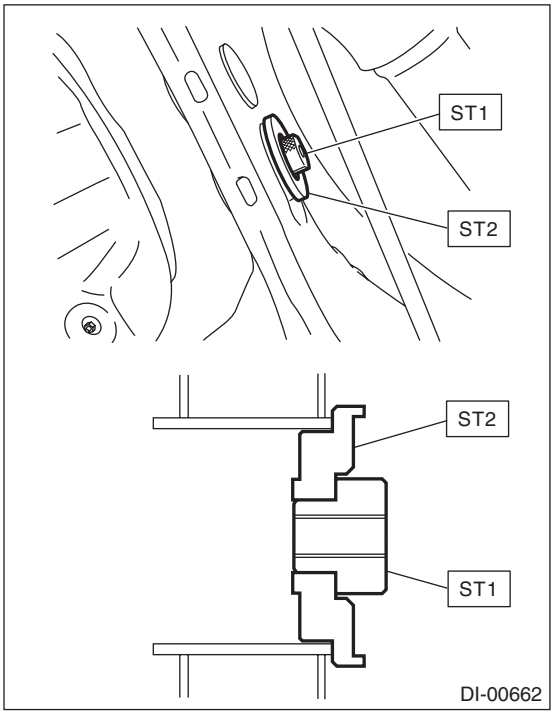
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG070 SPECIAL TOOL NUT
ST3 41399FG050 SPECIAL TOOL SLEEVE
ST4 41399FG080 SPECIAL TOOL BEARING
ST5 41399FG020 SPECIAL TOOL B



(A) 8 mm (0.31 in) or more
(B) Arrow mark
(C) Protrusion
(D) Marked position
(E) Front side of vehicle
(F) Rear side of vehicle

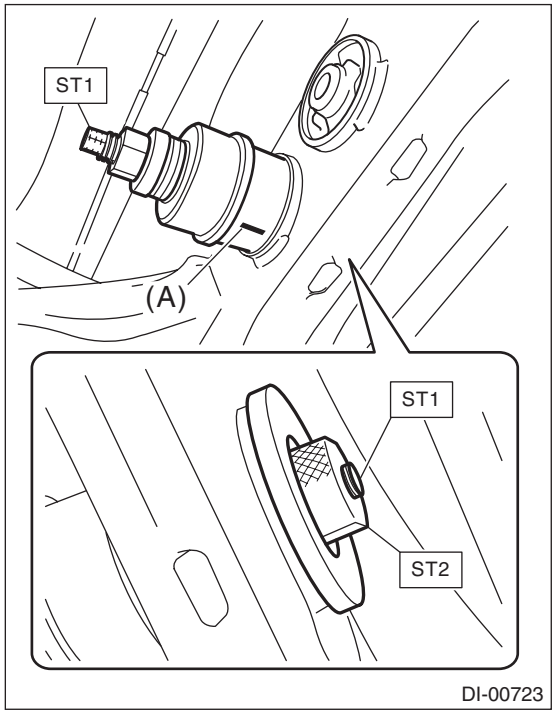
10) Attach ST1 to the ST2, and fit and hold the STs as a unit to the sub frame from the rear side of vehicle.

ST1 41399FG061 SPECIAL TOOL RING
ST2 41399FG041 SPECIAL TOOL D



11) Insert the ST and rear differential mount bushing set in the step 9) through the sub frame from the front side of vehicle, and screw in the ST1 by hand till the front end of ST1 comes out slightly from the rear end of ST2.

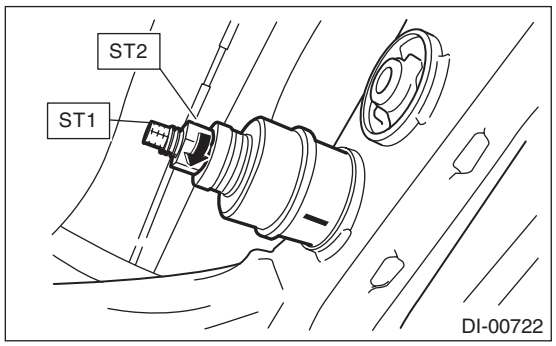
CAUTION:
Set the rear differential mount bushing with its mark facing the bottom end direction.
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG061 SPECIAL TOOL RING



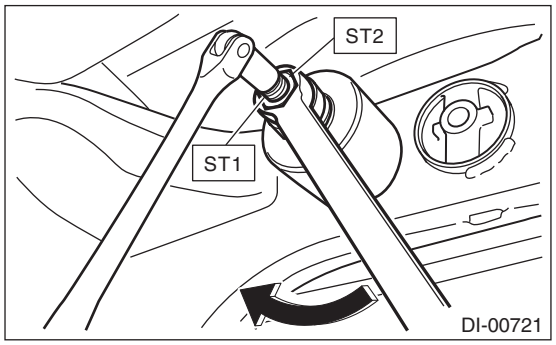
(A) Mark

12) Hold the ST1 to prevent it from rotating, and screw in the ST2 by hand till there is no loose fit on the ST and the rear differential mount bushing.

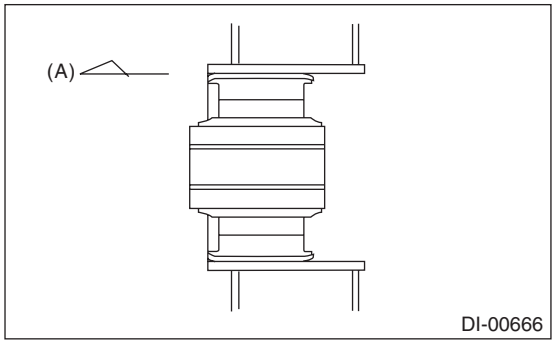
CAUTION:
Make sure that the ST and rear differential mount bushing are not tilted.
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG070 SPECIAL TOOL NUT



13) Screw in the ST2 while holding the ST1 with a tool to prevent it from rotating, and press-fit the rear differential mount bushing to the front end of sub frame cylinder.
ST1 41399FG091 SPECIAL TOOL SHAFT
ST2 41399FG070 SPECIAL TOOL NUT



14) Make sure that the rear differential mount bushing is inserted to the front end of sub frame cylinder.



(A) Front side of vehicle

15) Install the rear differential. <Ref. to DI-24, INSTALLATION, Rear Differential (T-type).> <Ref. to DI-41, INSTALLATION, Rear Differential (VA-type).>

10.Rear Differential Inspection Mode

A: GENERAL DESCRIPTION

CAUTION:
Be sure to perform rear differential inspection mode.
- Follow the messages displayed on the Subaru Select Monitor when working.
- “Rear differential inspection mode” using the Subaru Select Monitor is available only for the CVT model.
- Perform rear differential inspection mode when the following work has been performed.

Transmission assembly replacement/Replacement of rear differential/Replacement of front differential hypoid gear set/Replacement of rear differential hypoid gear set

B: PROCEDURE

CAUTION:
Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.
1) Shift the select lever to “P” range.
2) Apply the parking brake.
3) Lift up the vehicle.

WARNING:
Lift up the vehicle until the tire bottom is 30 cm or more above the ground.
4) Connect the Subaru Select Monitor to data link connector.
5) Turn the ignition switch to ON.
6) Select {Work Support} in the «Transmission Diagnosis» screen of Subaru Select Monitor.
7) Select {Maintenance mode} in the «Work Support» screen of Subaru Select Monitor.
8) Select {Rear differential inspection mode} in the «Maintenance mode» screen of the Subaru Select Monitor.
9) Follow the messages displayed on the Subaru Select Monitor screen when working.
10) The results of the rear differential inspection mode are displayed on the Subaru Select Monitor screen.
- When ended normally: “The rear differential has been replaced normally.”
- When ended abnormally: “A rear differential abnormality has been detected. Reinspect the items at the time of rear differential installation.”
- When interrupted: “Inspection is stopped. Restart this inspection mode from the beginning.”

11) After the message “Inspection has been completed. Set the ignition switch to OFF.” appears, the rear differential inspection mode completes.

NOTE:
- When the rear differential inspection mode is completed properly, the following warning lights may illuminate. But this is not a malfunction. If warning light illuminates, clear the memory.

VDC/ABS, engine, power steering
- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- If the rear differential inspection mode does not end normally, repeat the mode until it ends normally.
- When the inspection mode does not end normally, the AWD warning light will start blinking at 2 Hz.
- When the rear differential inspection mode ends abnormally, the front differential and rear differential may be different from the specifications for the vehicle.
- When the rear differential inspection mode is interrupted, the following reasons are possible.

Message	Main reasons for abnormal termination
• “Inspection is stopped.” • “Inspection is stopped. Restart this inspection mode from the beginning.”	• TCM has detected a failure. • VDC has a failure. • Brake is applied after start during automatic running. • Too delayed operation to the instructions displayed on the Subaru Select Monitor.
“TCM incompatible. Rear differential inspection mode is stopped.”	The model does not support the rear differential inspection mode.
The TCM has detected a fault. Inspect following the manual.	TCM has detected a failure.

12) Perform “Function Check Sequence” for VDC. <Ref. to VDC(diag)-18, FREEZE FRAME DATA, OPERATION, Subaru Select Monitor.> <Ref. to VDC-19, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

11.General Diagnostic Table

A: INSPECTION

Symptom or trouble	Possible cause	Remedy
1. Oil leakage	(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 cap.	Clean, repair or replace.
	(3) Loose bolts on the side retainer, or incorrectly fitted O-ring.	Tighten the bolts to specified torque. Replace the O-ring.
	(4) Loose rear cover attachment bolts or damaged gasket.	Replace the gasket, and tighten the bolts to specified torque.
	(5) Loose filler plug or drain plug.	• Apply liquid gasket, and tighten to the specified torque. (T-type) • Replace the gasket, and tighten to the specified torque. (VA-type)
	(6) Wear, damage or incorrect fitting of drive shaft, side retainer or 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.	(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.	Add recommended oil to the 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.	(1) Improper backlash for hypoid gear.	Readjust or replace.
	(2) Insufficient or excessive preload for side, rear or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(4) Loose bolts and nuts such as hypoid driven gear bolt.	Retighten.
	(5) 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 disassembling.	(1) Improper tooth contact of hypoid driven gear and drive pinion	Readjust. (drive pinion adjustment and backlash adjustment)
	(2) Excessive backlash for hypoid driven gear	Replace the gear or the pinion height adjusting washer.
	(3) Excessive backlash for side gear.	Replace gear or thrust washer.
	(4) Insufficient preload for front or rear bearing.	Readjust.
	(5) Loose drive pinion nut.	Tighten to the specified torque.
	(6) Loose bolts and nuts such as side retainer attachment bolt.	Tighten to the specified torque.
5. Noises when cornering	(1) Damaged differential gear.	Replace.
	(2) Excessive wear or damage of thrust washer.	Replace.
	(3) Broken pinion mate shaft.	Replace.
	(4) Stuck or damaged side bearing	Replace.

Symptom or trouble	Possible cause	Remedy
6. Gear Noise 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 lifting-up all four wheels. Perform these inspections according to the condition of trouble. When listening to noises, shift the gear into four-wheel drive and fourth speed position, trying to pick up only differential noise.	(1) Improper tooth contact of hypoid driven gear and drive pinion	Readjust or replace the hypoid gear set.
	(2) Improper backlash of the hypoid driven gear	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	(4) Scuffed hypoid gear	Replace hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Stuck, scored or chipped teeth of front or rear bearing	Replace.
	(7) Stuck, scored or chipped teeth of side bearing	Replace.
	(8) Vibrating differential gear.	Replace the differential gear.

TRANSFER CASE

TC

Page

1. General Description 2
2. Transfer Case and Extension Case Assembly 3
3. Transfer Clutch 4
4. Extension Case 5
5. Oil Seal 6
6. Transfer Drive Gear 7
7. Transfer Driven Gear 8
8. Reduction Drive Gear 9
9. Reduction Driven Gear 10
10. Center Differential 11
11. Transfer Clutch Pressure Test 12

1. General Description

A: NOTE

For general description, refer to “CVT” or “5MT” section.
CVT model:
<Ref. to CVT-2, General Description.>
5MT model:
<Ref. to 5MT-2, General Description.>

2. Transfer Case and Extension Case Assembly

A: NOTE

For removal, installation and inspection, refer to “5MT” section. <Ref. to 5MT-38, Transfer Case and Extension Case Assembly.>

3. Transfer Clutch

A: NOTE

For removal, installation and inspection, refer to “CVT” section. <Ref. to CVT-160, Transfer Clutch.>

4. Extension Case

A: NOTE

For removal, installation and inspection, refer to “CVT” section. <Ref. to CVT-156, Extension Case.>

5. Oil Seal

A: NOTE

For removal, installation and inspection, refer to “CVT” or “5MT” section.
CVT model:
<Ref. to CVT-83, Extension Case Oil Seal.>
5MT model:
<Ref. to 5MT-32, Oil Seal.>

6. Transfer Drive Gear

A: NOTE

For removal, installation and inspection, refer to “5MT” section. <Ref. to 5MT-44, Transfer Drive Gear.>

7. Transfer Driven Gear

A: NOTE

For removal, installation and inspection, refer to “CVT” or “5MT” section.
CVT model:
<Ref. to CVT-174, Transfer Driven Gear.>
5MT model:
<Ref. to 5MT-46, Transfer Driven Gear.>

8. Reduction Drive Gear

A: NOTE

For removal, installation and inspection, refer to “CVT” section. <Ref. to CVT-206, Reduction Drive Gear.>

9. Reduction Driven Gear

A: NOTE

For removal, installation and inspection, refer to “CVT” section. <Ref. to CVT-179, Reduction Driven Gear.>

10.Center Differential

A: NOTE

For removal, installation and inspection, refer to “5MT” section. <Ref. to 5MT-48, Center Differential.>

11.Transfer Clutch Pressure Test

A: NOTE

For inspection, refer to the “CVT” section. <Ref. to CVT-50, Transfer Clutch Pressure Test.>

DRIVE SHAFT SYSTEM

DS

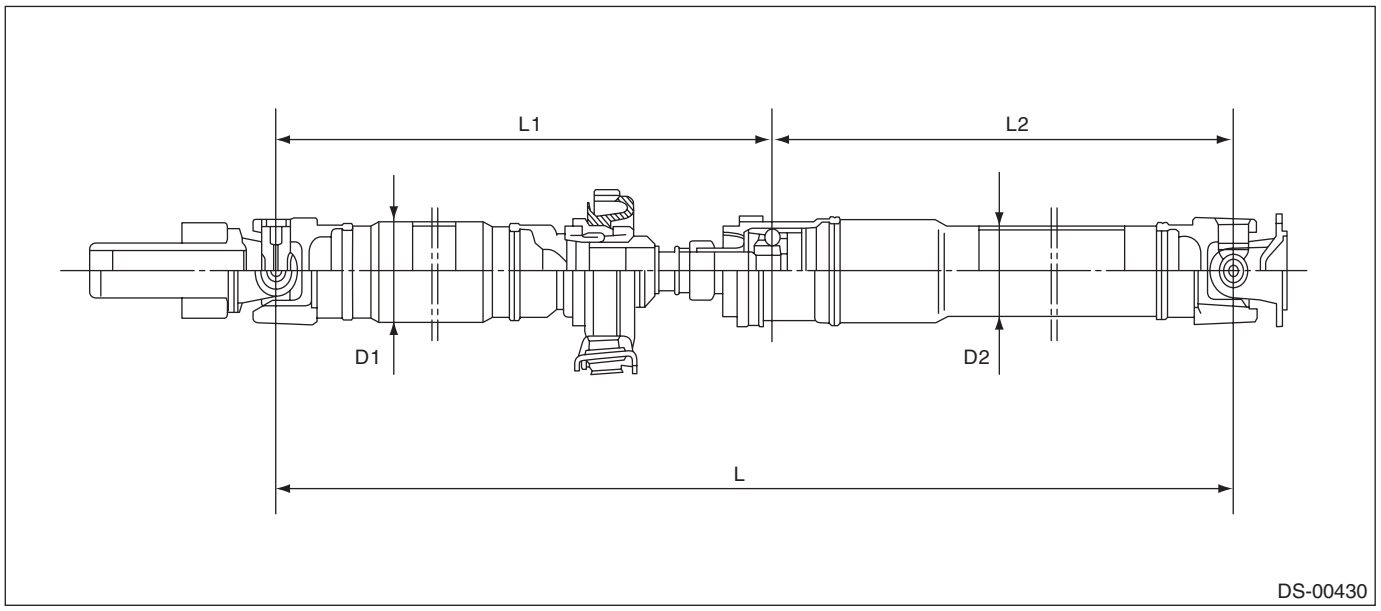
		Page
1.	General Description	2
2.	Propeller Shaft	12
3.	Front Axle	17
4.	Front Hub Unit Bearing	25
5.	Rear Axle	35
6.	Rear Hub Unit Bearing	46
7.	Front Drive Shaft	57
8.	Rear Drive Shaft	71
9.	General Diagnostic Table	85

1. General Description

A: SPECIFICATION

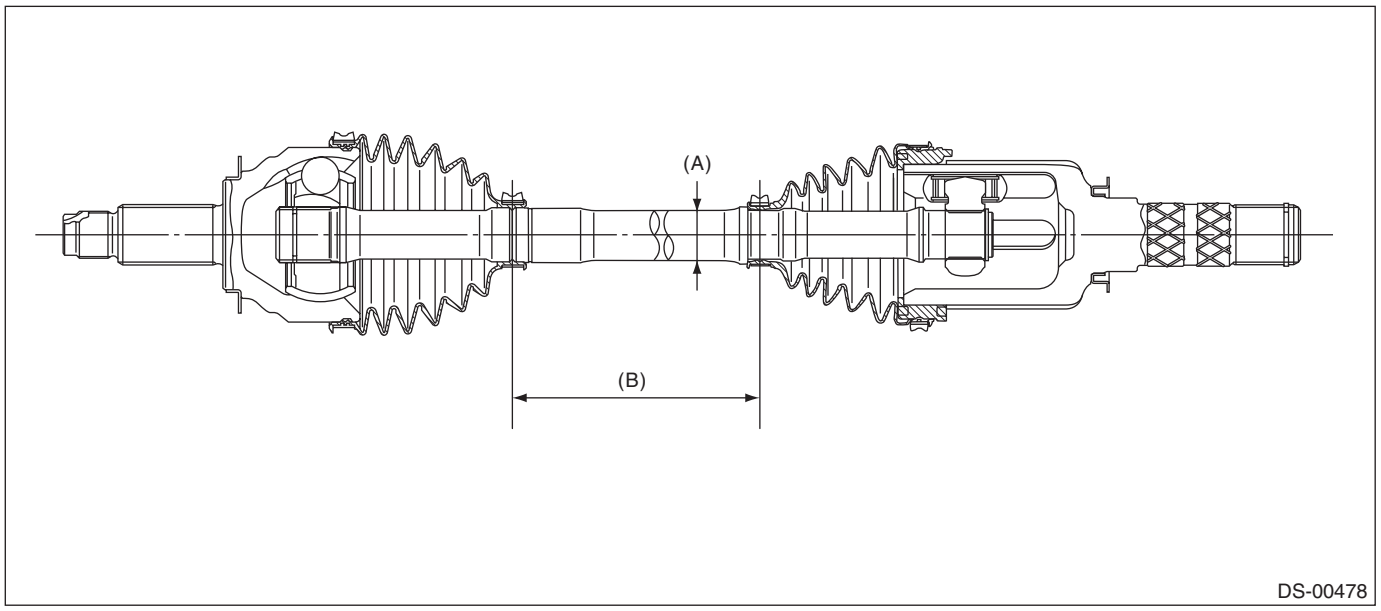
1. PROPELLER SHAFT

Car line		All models
Propeller shaft type		EDJ
Front propeller shaft Joint-to-Joint length: L_1	CVT	675.5 mm (26.59 in)
	5MT	735.5 mm (28.96 in)
Rear propeller shaft Joint-to-Joint length: L_2		723 mm (28.46 in)
Outer diameter of tube:	D_1	63.5 mm (2.50 in)
	D_2	57.5 mm (2.26 in)



2. FRONT AXLE SHAFT ASSEMBLY

Model	Axle shaft type	Axle diameter ϕ mm (in)	Axle length mm (in)
Except for XV model	AC + AAR	22 (0.87)	351.5 (13.84)
XV model	EBJ + PTJ	22 (0.87)	361.4 (14.23)



(A) Axle diameter (B) Axle length

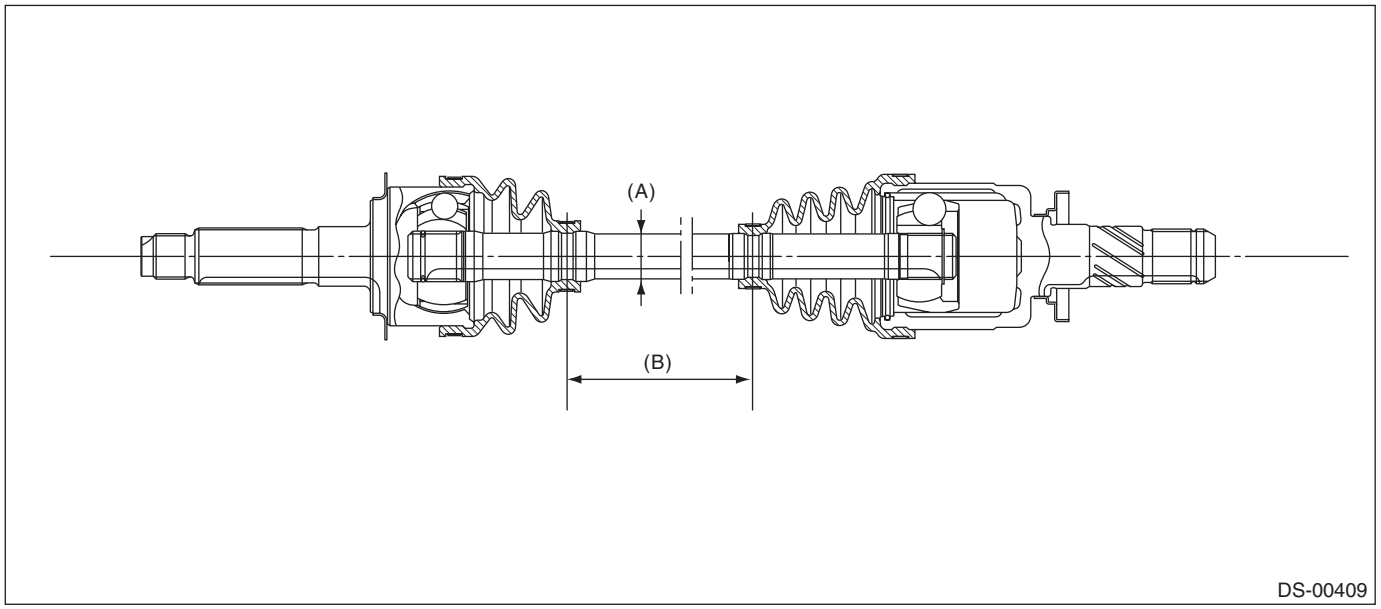
3. REAR AXLE SHAFT ASSEMBLY

- Except for XV model

T/M type	Axle shaft type	Axle diameter ϕ mm (in)	Axle length mm (in)
CVT	BJ + DOJ	22 (0.87)	357.45 (14.07)
MT	EBJ + DOJ	22 (0.87)	372.5 (14.67)

- XV model

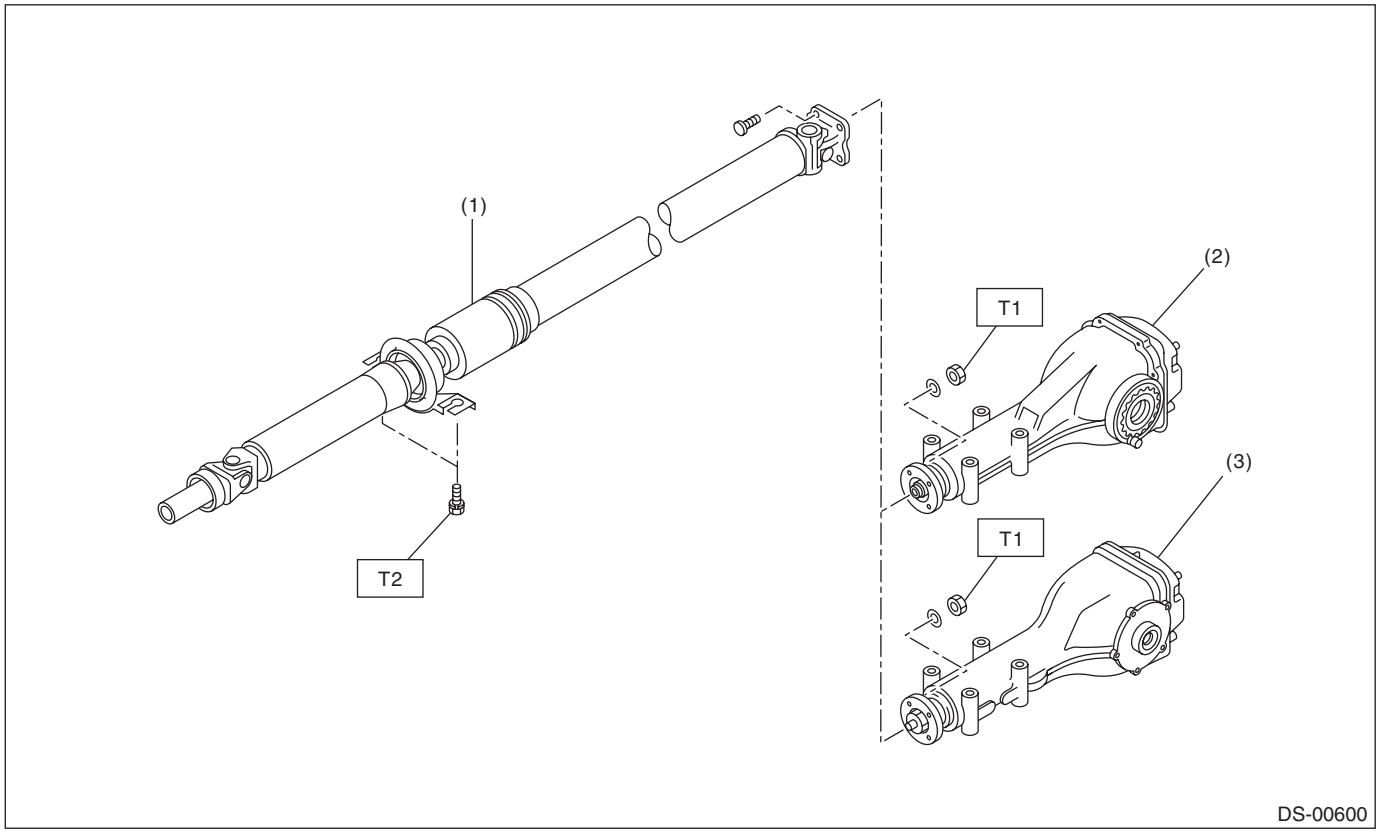
T/M type	Axle shaft type	Axle diameter ϕ mm (in)	Axle length mm (in)
CVT	BJ + DOJ	22 (0.87)	388.6 (15.30)
MT	EBJ + DOJ	22 (0.87)	388.5 (15.30)



(A) Axle diameter (B) Axle length

B: COMPONENT

1. PROPELLER SHAFT

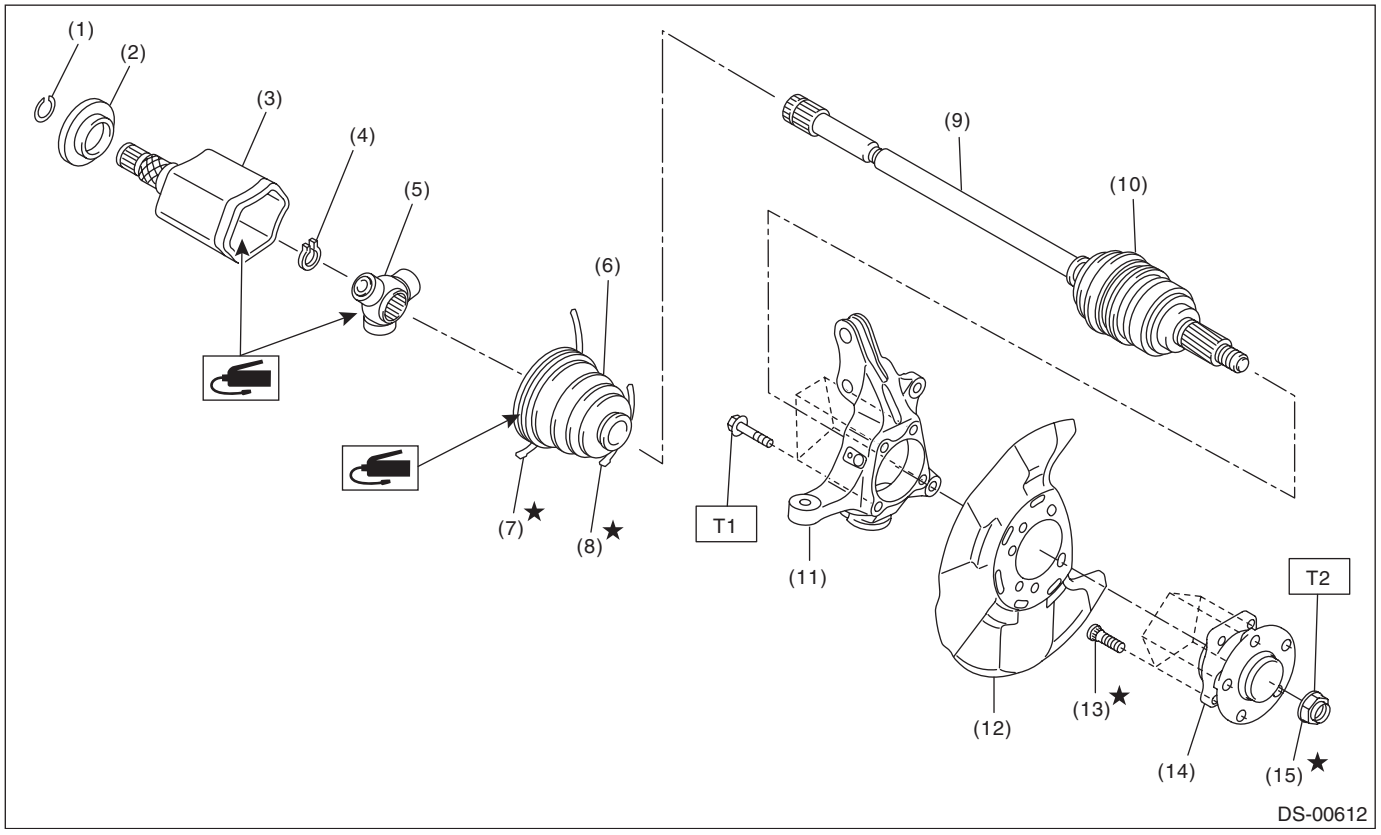


(1) Propeller shaft
(2) Rear differential (VA1-type)
(3) Rear differential (T-type)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 31 (3.16, 22.9)
T2: 52 (5.30, 38.4)

2. FRONT AXLE

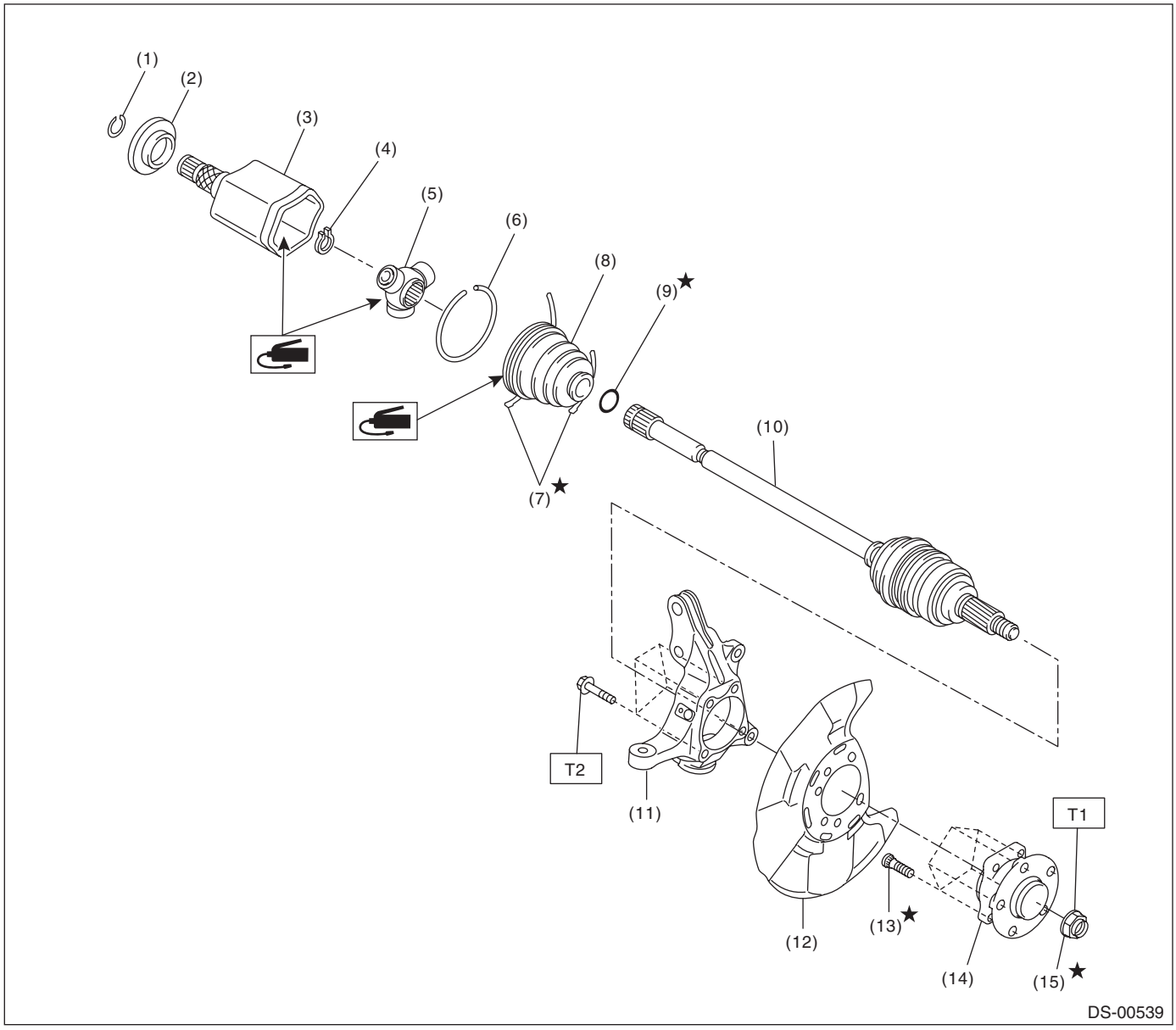
- AC + AAR type



(1) Circlip
(2) Baffle plate
(3) Outer race (AAR)
(4) Snap ring
(5) Trunnion
(6) Boot (AAR)
(7) Band - drive shaft A
(8) Band - drive shaft D
(9) Axle shaft ASSY
(10) Boot (AC)
(11) Housing ASSY - front axle
(12) Back plate - front brake
(13) Bolt - hub
(14) Hub unit COMPL - front axle
(15) Nut - axle

Tightening torque: N·m (kgf-m, ft-lb)
T1: 65 (6.63, 47.9)
T2: 220 (22.43, 162.3)

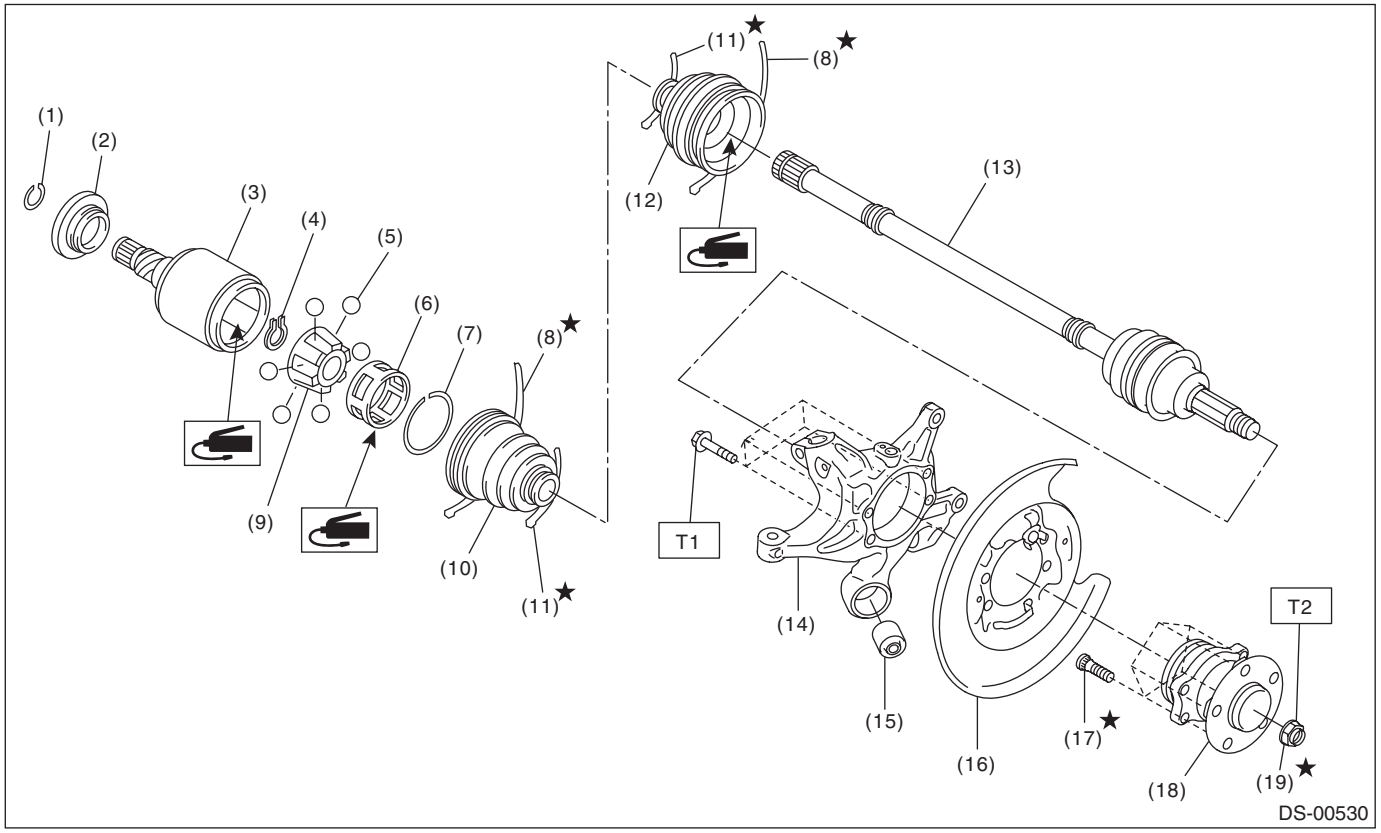
- EBJ + PTJ type



(1) Circlip
(2) Baffle plate
(3) Outer race (PTJ)
(4) Snap ring
(5) Trunnion
(6) Snap ring
(7) Boot band
(8) Boot (PTJ)
(9) O-ring
(10) EBJ shaft ASSY
(11) Housing ASSY - front axle
(12) Back plate - front brake
(13) Bolt - hub
(14) Hub unit COMPL - front axle
(15) Nut - axle

Tightening torque: N·m (kgf-m, ft-lb)
T1: 220 (22.43, 162.3)
T2: 65 (6.63, 47.9)

3. REAR AXLE



(1) Circlip A
(2) Baffle plate -
(3) Outer race (DOJ)
(4) Snap ring
(5) Ball
(6) Cage
(7) Circlip B
(8) Band - drive shaft A
(9) Inner race
(10) Boot - drive shaft (DOJ)
(11) Band - drive shaft B
(12) Boot - drive shaft (BJ)
Boot - drive shaft (EBJ)
(13) Shaft ASSY (EBJ) (CVT model)
Shaft ASSY (EBJ) (MT model)
(14) Housing ASSY - rear axle
(15) Bushing - trailing link
(16) Back plate - rear brake
(17) Bolt - hub
(18) Hub unit COMPL - rear axle
(19) Nut - axle

Tightening torque: N·m (kgf-m, ft-lb)

T1: 65 (6.63, 47.9)
T2: 190 (19.37, 140.1)

C: CAUTION

• Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
• Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolving surfaces before installation.
• Before installing snap rings, apply sufficient amount of grease to avoid damage and deformation.
• Before securing a part on a vise, place cushioning materials such as wood blocks, aluminum plates, or waste cloth between the part and the vise.
• When the suspension-related components have been removed and installed, be sure to adjust the steering sensor. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

D: PREPARATION TOOL

1. SPECIAL TOOL

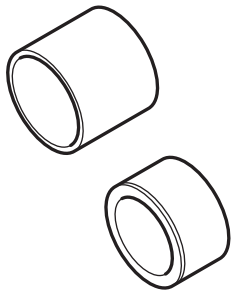
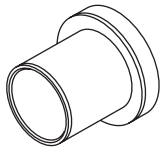
ILLUSTRATION	Part No.	DESCRIPTION	REMARKS
 ST20099PA010	20099PA010	INSTALLER & REMOVER	• Used for replacing the bushing - trailing link of the housing assembly - rear axle. • Used together with BUSHING REMOVER (20099FG000).
 ST20099FG000	20099FG000	BUSHING REMOVER	• Used for replacing the bushing - trailing link of the housing assembly - rear axle. • Used together with base part of INSTALLER & REMOVER (20099PA010).

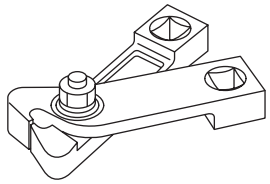
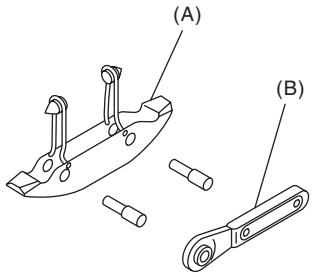
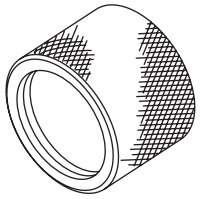
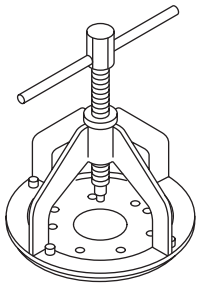
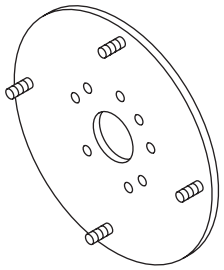
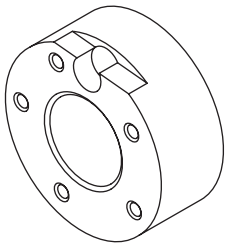
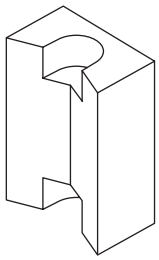
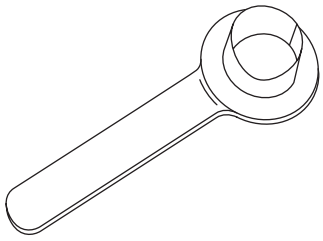
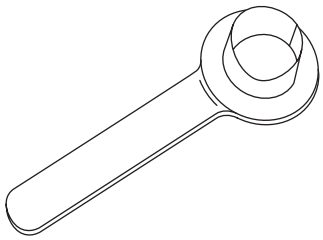
ILLUSTRATION	Part No.	DESCRIPTION	REMARKS
 ST28099AC000	28099AC000	BOOT BAND PLIER	Used for tightening the band - boot. (for front axle shaft)
 ST-925091000	925091000	BAND TIGHTENING TOOL	Used for tightening the band - boot. (A) Jig for the band (B) Ratchet wrench
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST-926470000	926470000	AXLE SHAFT PULLER	• Used for removing the axle shaft. • Used together with AXLE SHAFT PULLER PLATE (28099PA110).
 ST28099PA110	28099PA110	AXLE SHAFT PULLER PLATE	Exchange with the plate of the AXLE SHAFT PULLER (926470000) to use.

ILLUSTRATION	Part No.	DESCRIPTION	REMARKS
 ST-927080000	927080000	HUB STAND	Used for assembling the bolt - hub of the hub.
 ST28399AG000	28399AG000	HUB STAND	Used for extracting the bolt - hub.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	• Used for installing the front axle shaft into the front differential. • For protecting the oil seal.
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing the rear axle shaft into the rear differential. • For protecting the oil seal.

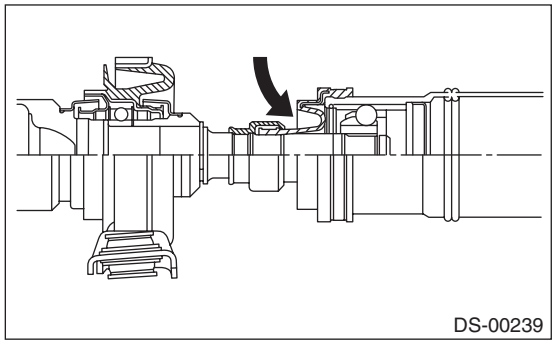
2. GENERAL TOOL

TOOL NAME	REMARKS
Tie-rod ball joint puller	Used for disconnecting joints.
Dial gauge	Used for inspecting the propeller shaft run-out.
Extension cap	Used for preventing leakage of gear oil or ATF.
Crowbar	Used for extracting the axle shaft.
Needle nose pliers	Used for tightening the band - boot of the rear axle shaft. • Snap-on 96BCP Or equivalent.

2. Propeller Shaft

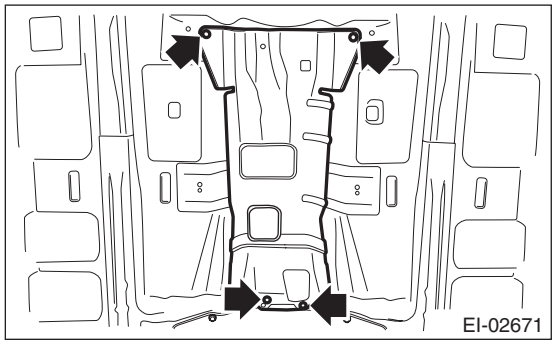
A: REMOVAL

CAUTION:
- **Before removing propeller shaft, wrap metal parts with a cloth or rubber material.**
- **Do not disassemble the center EDJ of the propeller shaft.**
- **Before removing propeller shaft, wrap the metal parts attached to the rubber boot of center EDJ with a cloth or rubber material, as shown in the figure. The rubber boot may be damaged due to interference with adjacent metal parts while bending the EDJ during removal.**


DS-00239

1) Shift the select lever or gear shift lever to neutral.
2) Release the parking brake.
3) Lift up the vehicle.
4) Remove the center exhaust pipe, rear exhaust pipe, and muffler.
- Center exhaust pipe & rear exhaust pipe: <Ref. to EX(H4DO)-15, REMOVAL, Rear Exhaust Pipe.>
- Muffler: <Ref. to EX(H4DO)-19, REMOVAL, Muffler.>

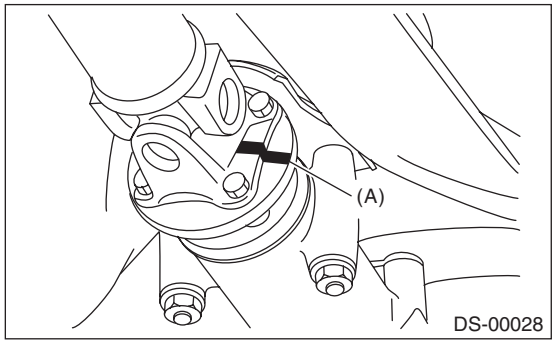
5) Remove the bolts to remove the front heat shield cover.


EI-02671

6) Remove the propeller shaft assembly.

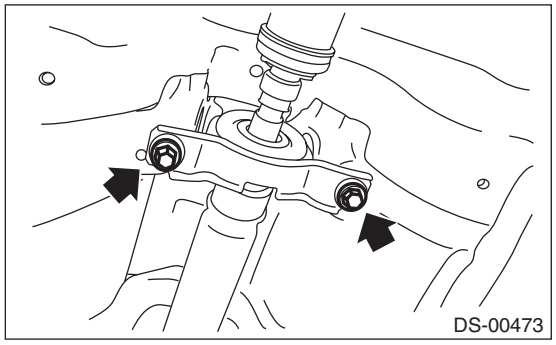
CAUTION:
Do not disassemble the propeller shaft.

(1) Place alignment marks (A) on the flange yoke and rear differential.
(2) Remove four bolts holding the propeller shaft to the rear differential.



DS-00028

(3) Remove the center bearing.



(4) Remove the propeller shaft from transmission.

CAUTION:
Be careful not to damage oil seals and contact surface of the sleeve yoke.

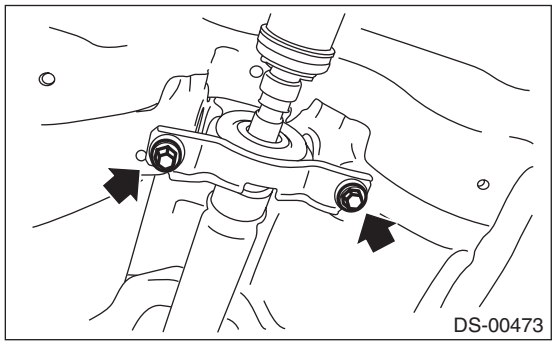
NOTE:
- Use a container to catch ATF or oil flowing from propeller shaft.
- To prevent ATF from leaking, install extension cap etc. to the transmission.

B: INSTALLATION

1) Before installation, check the following items, and replace the propeller shaft assembly as necessary.
- Dents or cracks on the tube surface
- Splines for deformation or abnormal wear
- Unsmooth joint operation or abnormal noise
- Center bearing for free play, noise or non-smooth operation.
- Oil seals for abnormal wear or damage
- Damaged center bearing

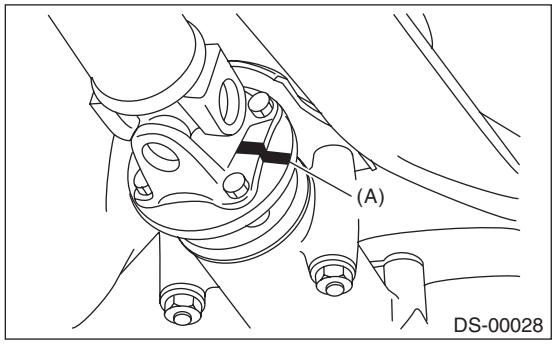
2) Apply fluid or gear oil to the oil seal lip and the propeller shaft.
- CVT model: SUBARU CVT OIL FOR LINEARTRONIC
- MT model: GL-5

3) Insert the sleeve yoke into the transmission and attach center bearing to body.



Tightening torque:
52 N·m (5.30 kgf-m, 38.4 ft-lb)

4) Align the alignment marks (A), and connect the yoke flange and rear differential.



Tightening torque:
31 N·m (3.16 kgf-m, 22.9 ft-lb)

5) Check the propeller shaft with the propeller shaft installed to the vehicle. <Ref. to DS-14, INSPECTION, Propeller Shaft.>
6) Install the heat shield cover.

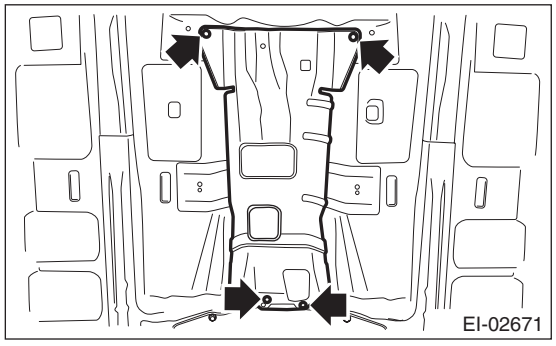
Tightening torque:
18 N·m (1.84 kgf-m, 13.3 ft-lb)

7) Install the center exhaust pipe and rear exhaust pipe.
8) Lower the vehicle.

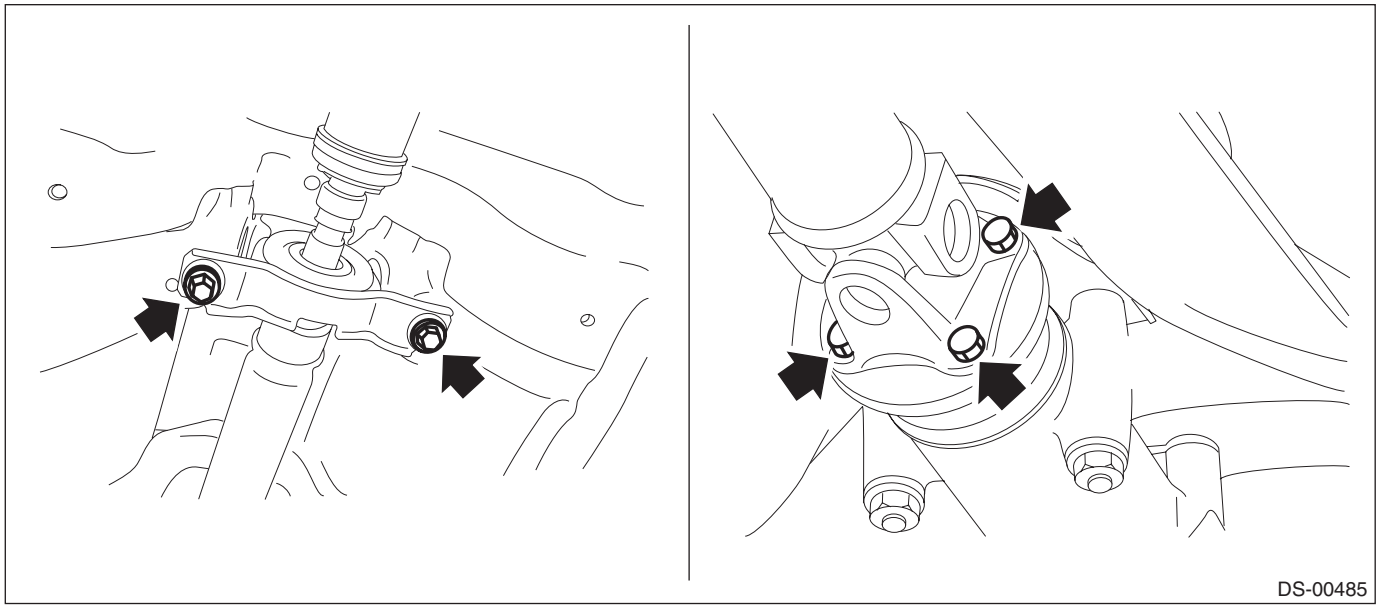
C: INSPECTION

Check the propeller shaft with the propeller shaft installed to the vehicle.
1) Remove the front exhaust pipe. <Ref. to EX(H4DO)-7, REMOVAL, Front Exhaust Pipe.>
2) Remove the center exhaust pipe, rear exhaust pipe, and muffler.
- Center exhaust pipe & rear exhaust pipe: <Ref. to EX(H4DO)-15, REMOVAL, Rear Exhaust Pipe.>
- Muffler: <Ref. to EX(H4DO)-19, REMOVAL, Muffler.>

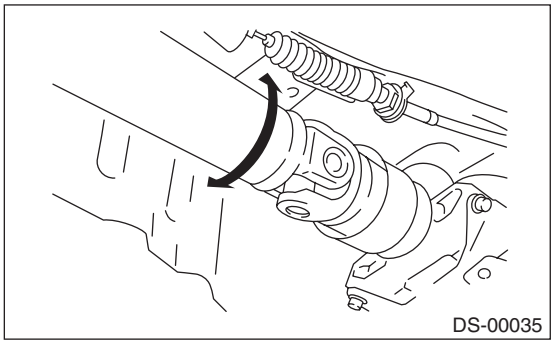
3) Remove the bolts to remove the front heat shield cover.



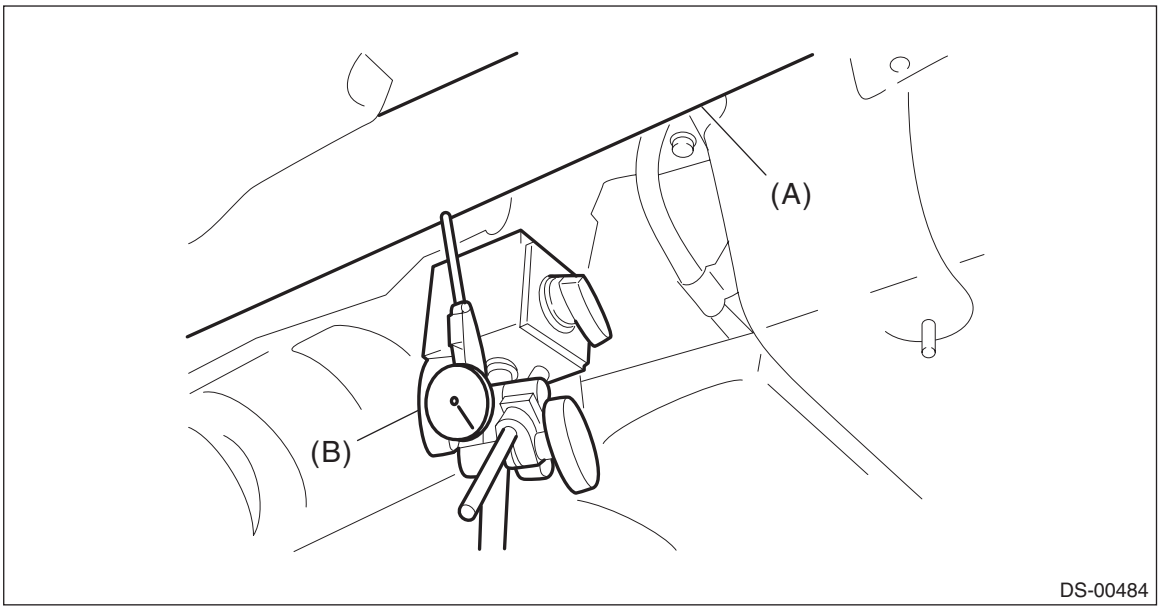
4) Check the propeller shaft mounting bolt for looseness.
   (1) Yoke flange mounting bolts which connect to the rear differential
   (2) Center bearing bracket mounting bolts



5) Check the spline and bearing for the propeller shaft.
   (1) Turn the propeller shaft by hand to check if abnormal free play exists at splines.
   (2) Also move yokes to check if abnormal free play exists at spiders and bearings.

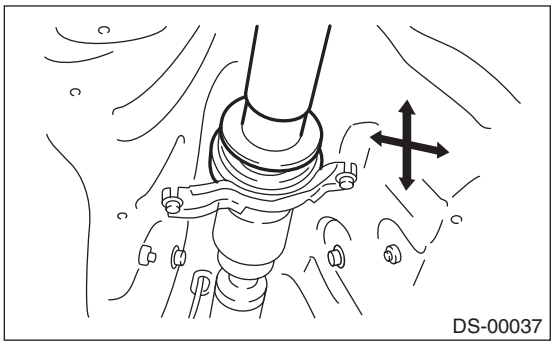


6) Measure the deflection of the propeller shaft.
   (1) Set the dial gauge (B) with its indicator stem at the center of the propeller shaft (A).
   (2) Turn the propeller shaft (A) slowly by hands to check for runout of the propeller shaft.



Runout:
Limit: 0.6 mm (0.024 in)

7) Check the center bearing for free play.
Move the propeller shaft near the center bearing up, down, left, right by hand, to check for any abnormal free play of the bearings.



8) Replace the propeller shaft assembly if faulty is found in the inspection.

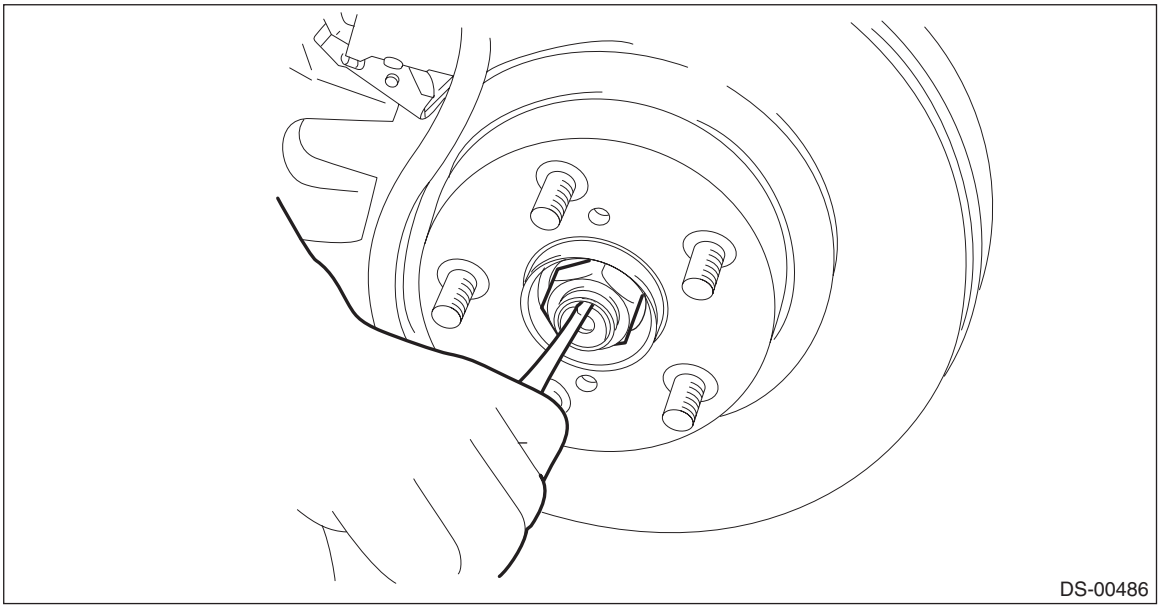
3. Front Axle

A: REMOVAL

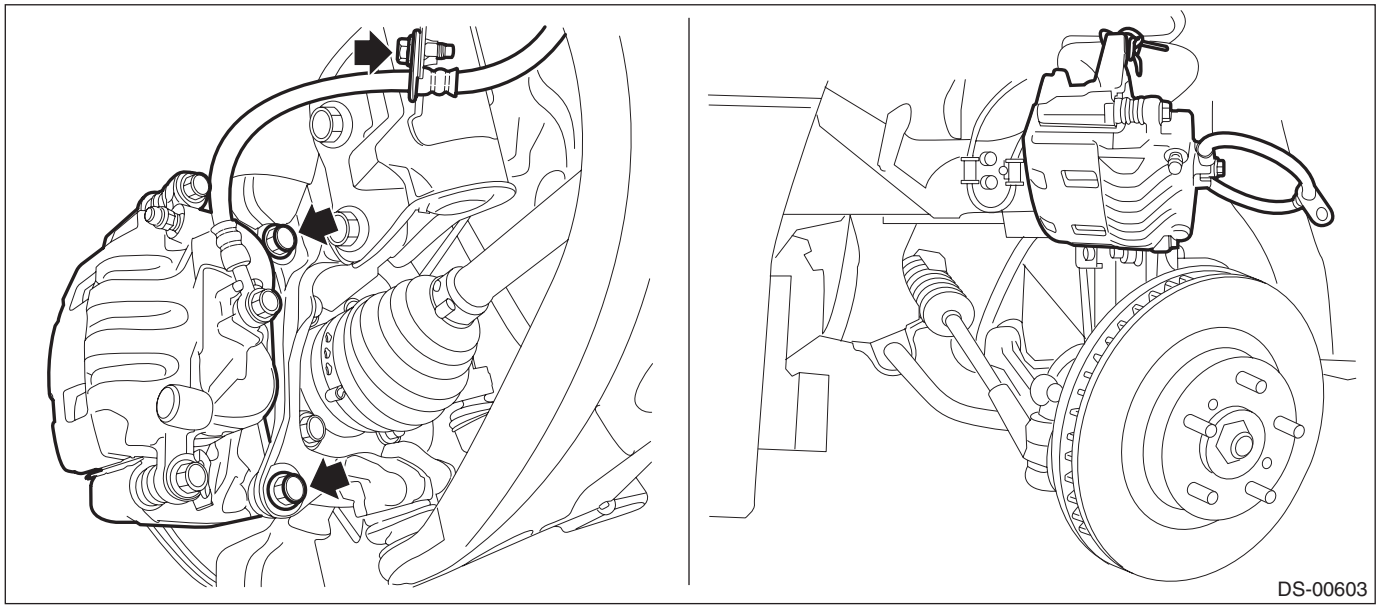
1) Lift up the vehicle, and then remove the front wheels.
2) Remove the nut - axle.

CAUTION:
Do not loosen the nut - axle while the front axle is loaded. Doing so may damage the hub unit COMPL.

(1) Lift the crimped section of the nut - axle.
(2) Remove the nut - axle using a socket wrench while depressing the brake pedal.

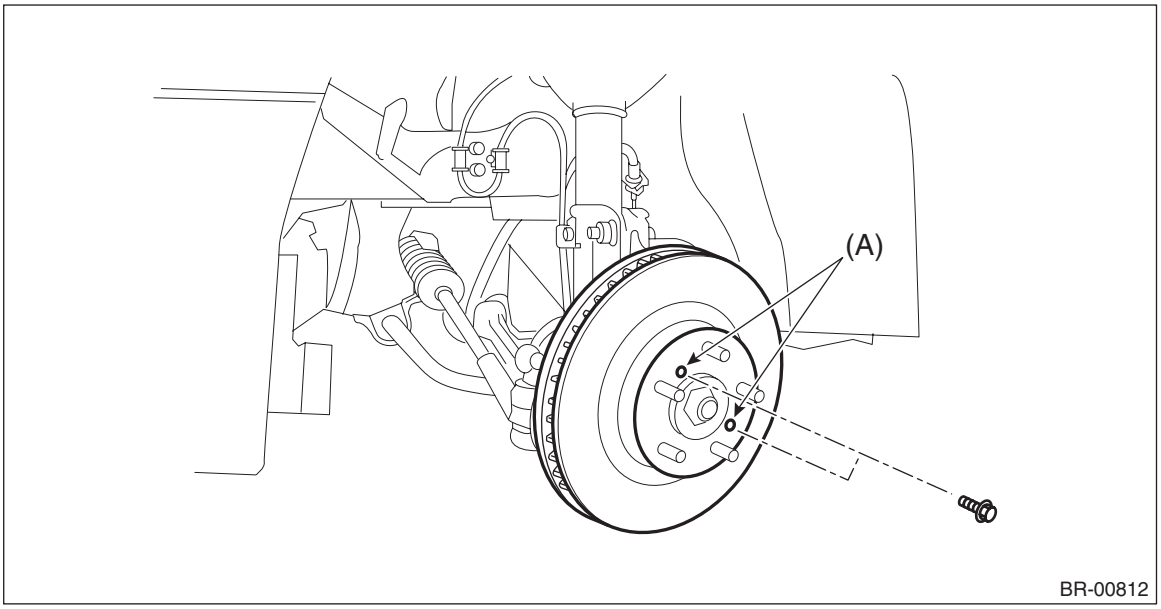


3) Remove the caliper body assembly from the housing assembly - front axle.
(1) Remove the mounting bolts, and then remove the caliper body assembly.
(2) Prepare wiring harnesses etc. to be discarded, and suspend the caliper body assembly from the strut assembly.



4) Remove the disc rotor.

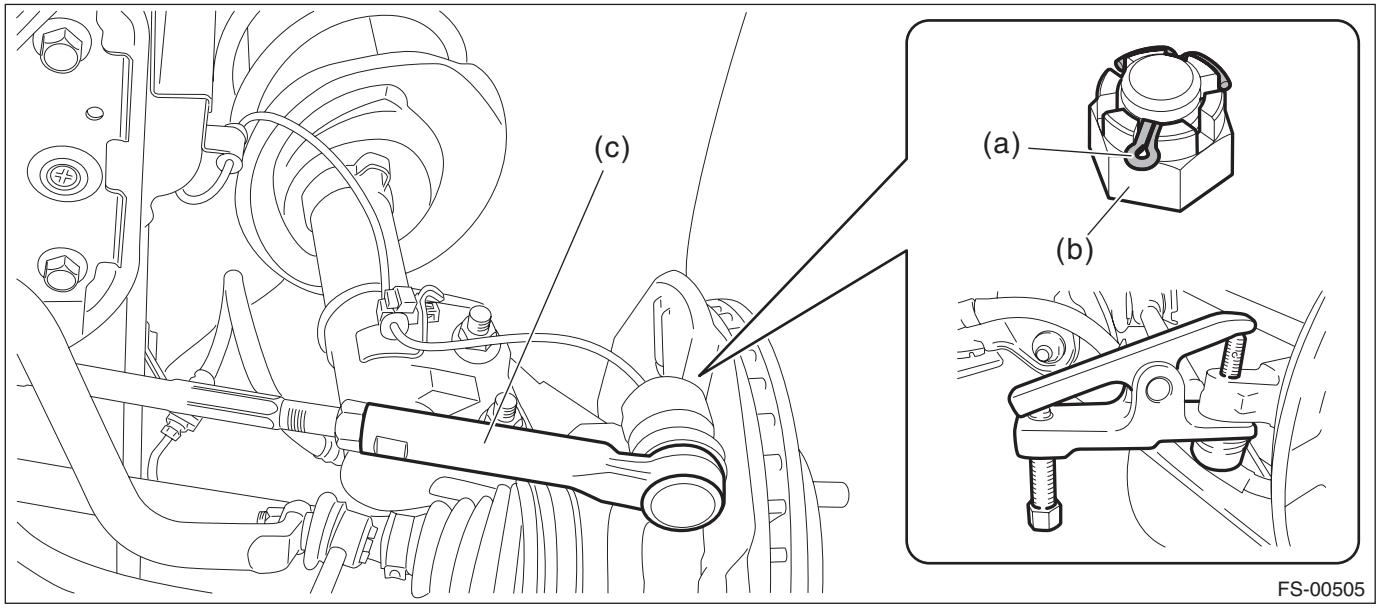
NOTE:
When the disc rotor is difficult to be removed from the hub unit COMPL - front axle, screw in 8 mm (0.31 in) bolt to the threaded part of the disc rotor (A), and remove the disc rotor.



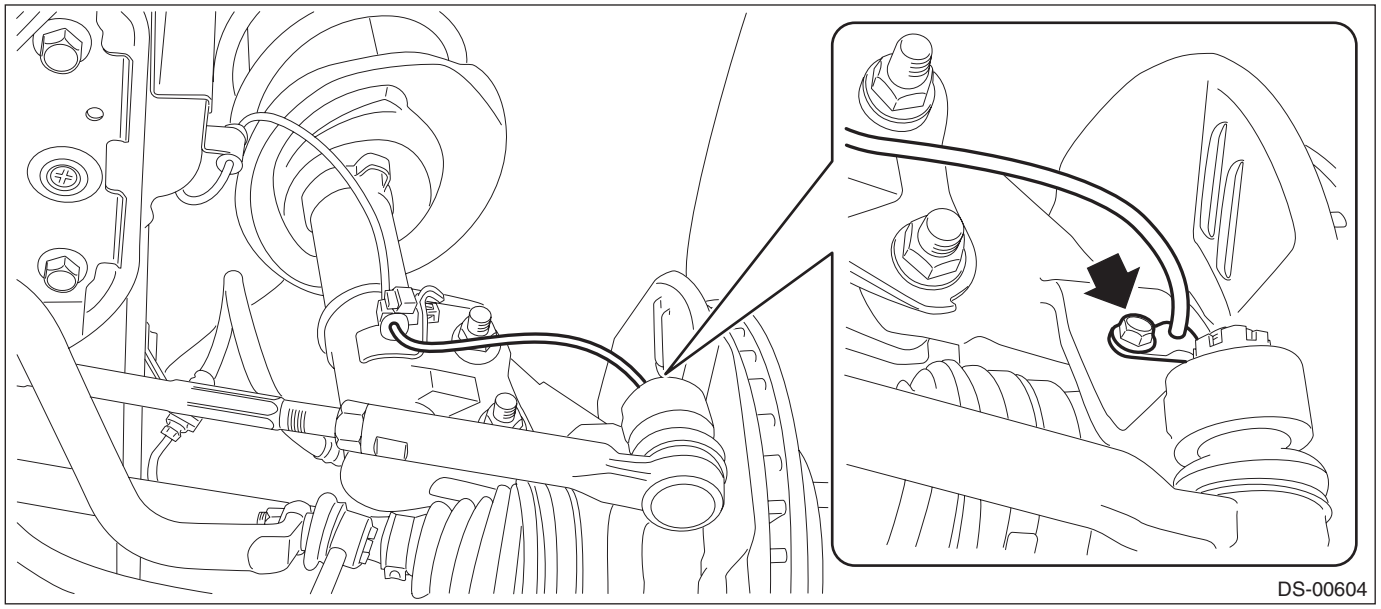
5) Disconnect the tie-rod end.
   (1) Pull out the cotter pin (a).
   (2) Remove the castle nut (b).
   (3) Using a tie-rod ball joint puller, remove the tie-rod end (c).

CAUTION:
Be careful not to damage the boot of the joint.

Preparation tool:
Tie-rod ball joint puller

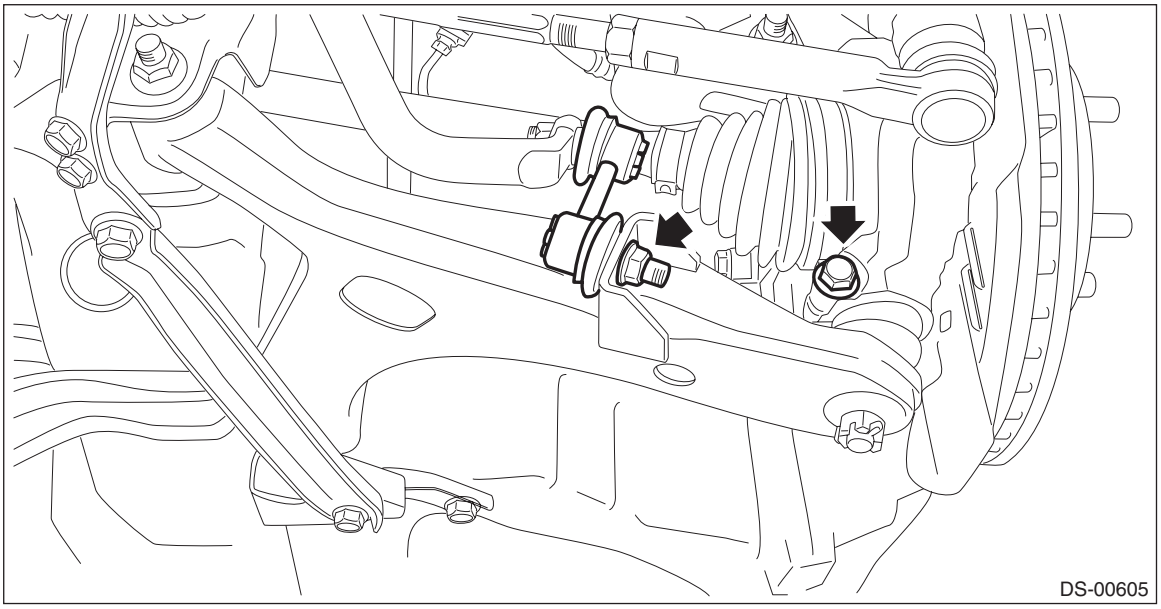


6) Remove the bolts, and remove the front ABS wheel speed sensor.



7) Remove the stabilizer link and ball joint.

CAUTION:
Be careful not to damage the boot of the joint.

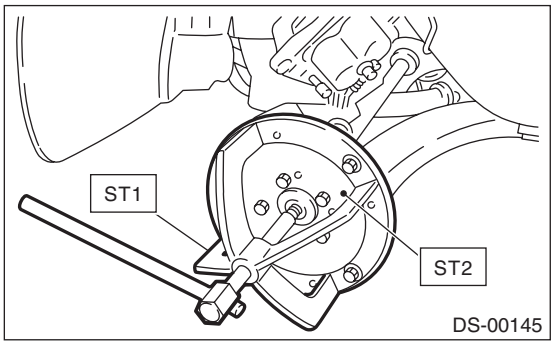


8) Using a crowbar, remove the front axle shaft from the transmission.

CAUTION:
Be careful not to allow the bar to damage holder area.

9) Remove the front axle shaft assembly from the hub unit COMPL - front axle.

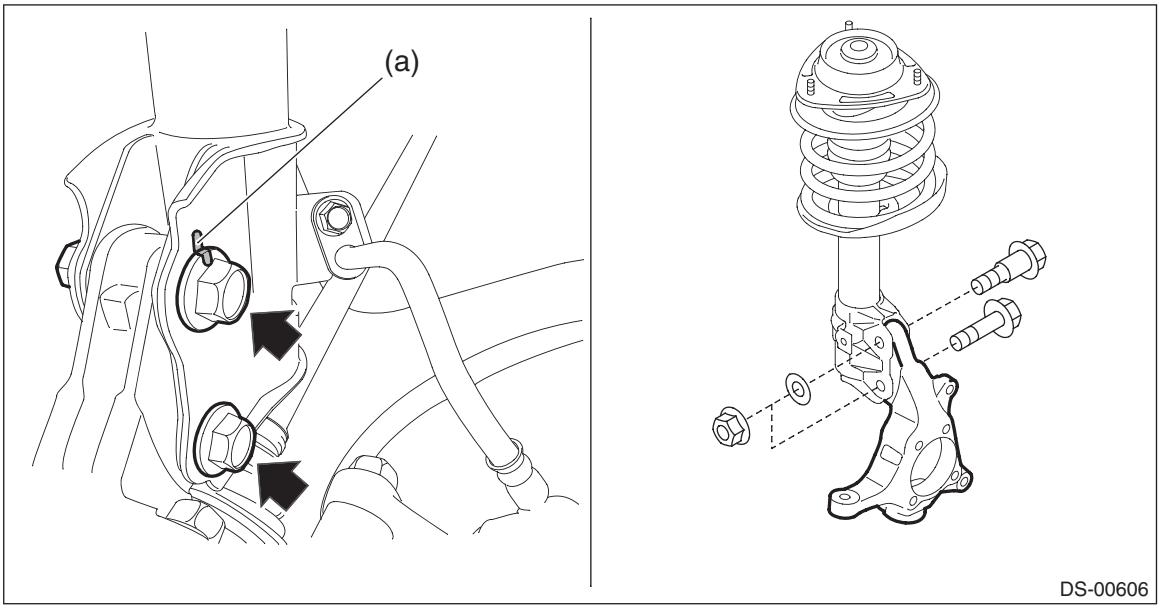
Preparation tool:
ST1: AXLE SHAFT PULLER (926470000)
ST2: AXLE SHAFT PULLER PLATE (28099PA110)



NOTE:
If it is hard to remove, use the ST.

10) Remove the housing assembly - front axle.
(1) Place an alignment mark (a) on the adjusting bolt and the strut.
(2) Remove the adjusting bolts and flange bolts for the strut assembly, and then remove the housing assembly - front axle.

CAUTION:
- **While holding the head of the adjusting bolt, loosen the flange nut.**
- **Be careful of the weight of the housing assembly - front axle.**
- **Be careful not to damage the spline portion of the axle shaft.**



11) For removal of the hub unit COMPL - front axle, refer to “Front Hub Unit Bearing”. <Ref. to DS-25, REMOVAL, Front Hub Unit Bearing.>

B: INSTALLATION

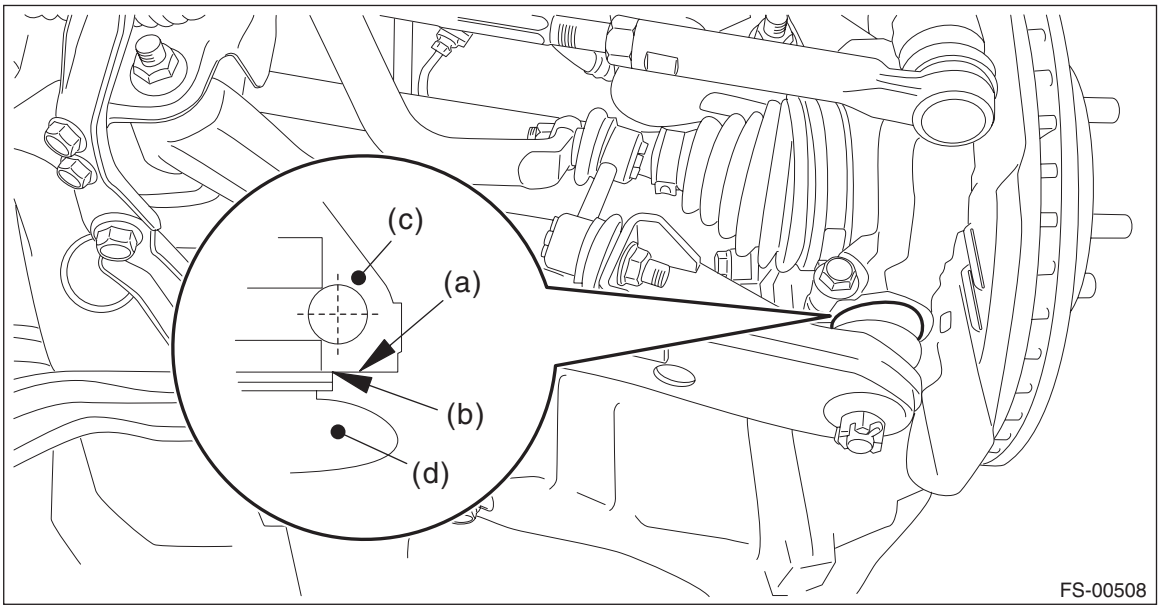
1) Install the front axle shaft assembly.

CAUTION:
- **Do not tap the axle shaft using a hammer when installing axle shaft assembly.**
- **Use new nut - axle.**

(1) Insert the axle shaft assembly into the hub spline, and pull in the axle shaft assembly into specified position.
(2) Temporarily tighten the nut - axle.

2) Install the ball joint assembly to the housing assembly - front axle.

CAUTION:
- **Before tightening, make sure the bottom surface of the housing assembly - front axle and the stepped section of ball joint are in contact.**
- **Be careful not to damage the boot of the joint.**



(a) Bottom surface of housing ASSY - front axle
(c) Housing ASSY - front axle
(d) Ball joint ASSY
(b) Raised section of ball joint

Tightening torque:
50 N·m (5.10 kgf-m, 36.9 ft-lb)

3) Install the front ABS wheel speed sensor.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

4) Install the disc rotor.
5) Install the caliper body assembly.

Tightening torque:
80 N·m (8.16 kgf-m, 59.0 ft-lb)

6) Install the stabilizer link assembly.
- Except for XV model

Tightening torque:
38 N·m (3.87 kgf-m, 28.0 ft-lb)
- XV model

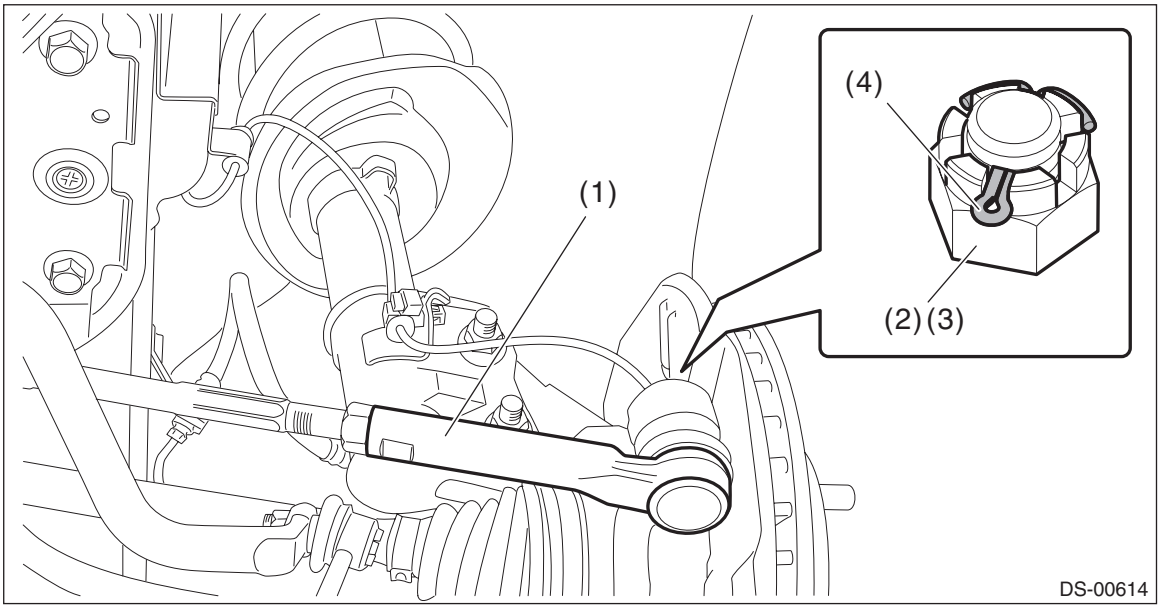
Tightening torque:
60 N·m (6.12 kgf-m, 44.3 ft-lb)

7) Connect the tie-rod ends.
(1) Connect the tie-rod ends to the housing assembly - front axle.
(2) Tighten the castle nuts to the specified torque.

CAUTION:
When connecting the tie-rod, do not hit the cap at bottom of tie-rod end with a hammer.

Tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

(3) Tighten the castle nut within the range of 60° so that the cotter pin hole and cutout portion of the castle nut are aligned.
(4) Insert the cotter pin, and bend the tip of the pin to fix it.

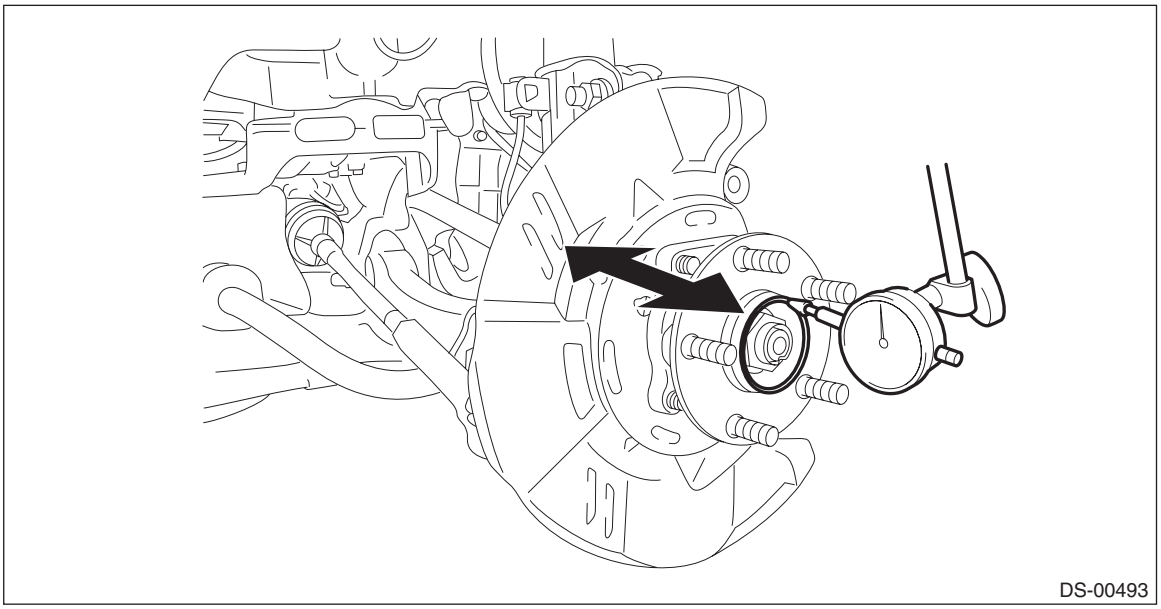


8) While depressing the brake pedal, tighten a new nut - axle to the specified torque and lock it securely.

CAUTION:
Do not load the front axle before tightening the nut - axle. Doing so may damage the hub unit COMPL.

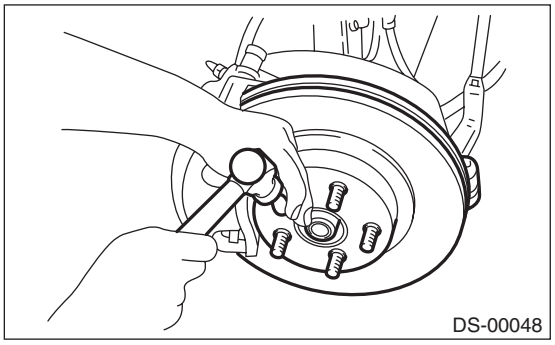
Tightening torque:
220 N·m (22.43 kgf-m, 162.3 ft-lb)

9) Inspect the lean of axis direction using a dial gauge. Replace the hub unit COMPL - front axle if the play exceeds the limit.



Service limit:
Maximum: 0.05 mm (0.0020 in)

10) After tightening the nut - axle, lock it securely.

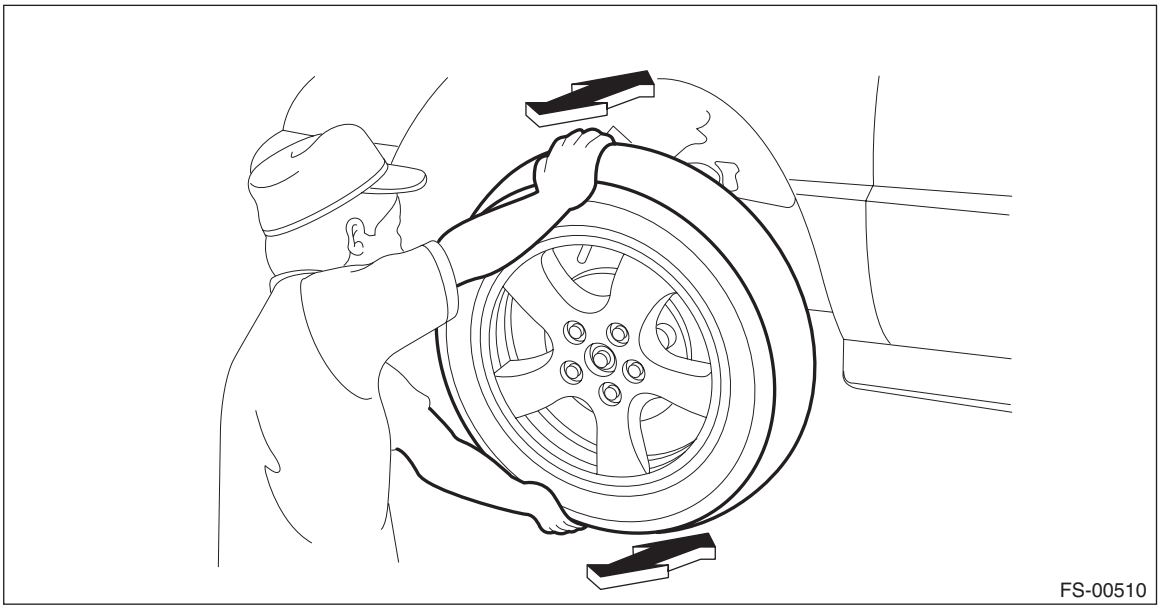


11) Install the front wheels, and perform the following inspections.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

1. Check the wheels for smooth rotation.

2. Check that there is no play by moving the upper and lower portions of front tire in an axial direction with the brake pedal released.



- **Play exists** → Check the hub unit COMPL - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>

3. Check that there is no play by moving the upper and lower portions of front tire in an axial direction with the brake pedal depressed.

- **Play exists** → Replace the ball joint assembly. <Ref. to FS-32, REMOVAL, Front Ball Joint.>

12) Inspect the wheel alignment and adjust if necessary.

- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

CAUTION:
When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode.".

13) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

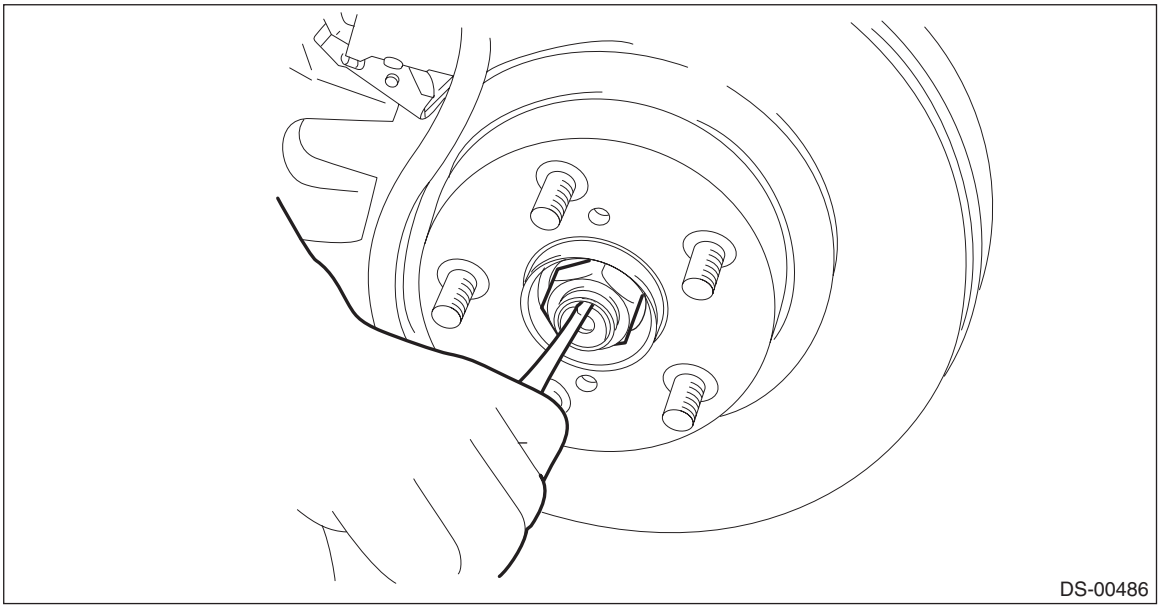
4. Front Hub Unit Bearing

A: REMOVAL

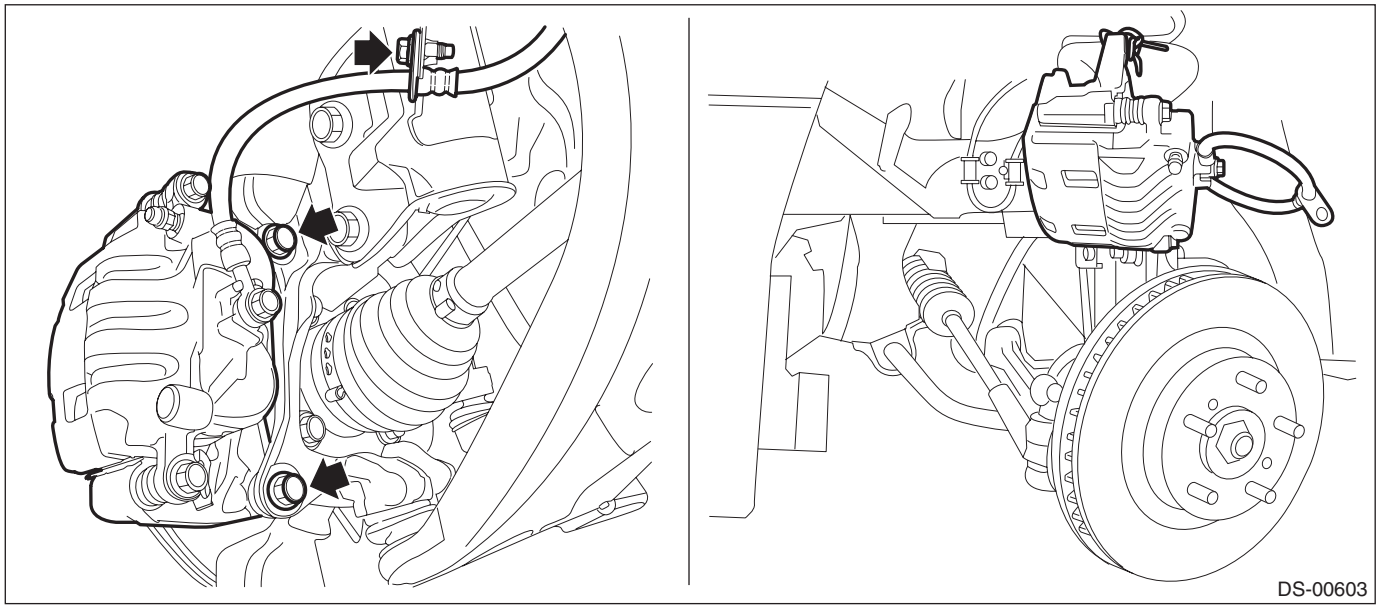
1) Lift up the vehicle, and then remove the front wheels.
2) Remove the nut - axle.

CAUTION:
Do not loosen the nut - axle while the front axle is loaded. Doing so may damage the hub unit COMPL.

(1) Lift the crimped section of the nut - axle.
(2) Remove the nut - axle using a socket wrench while depressing the brake pedal.

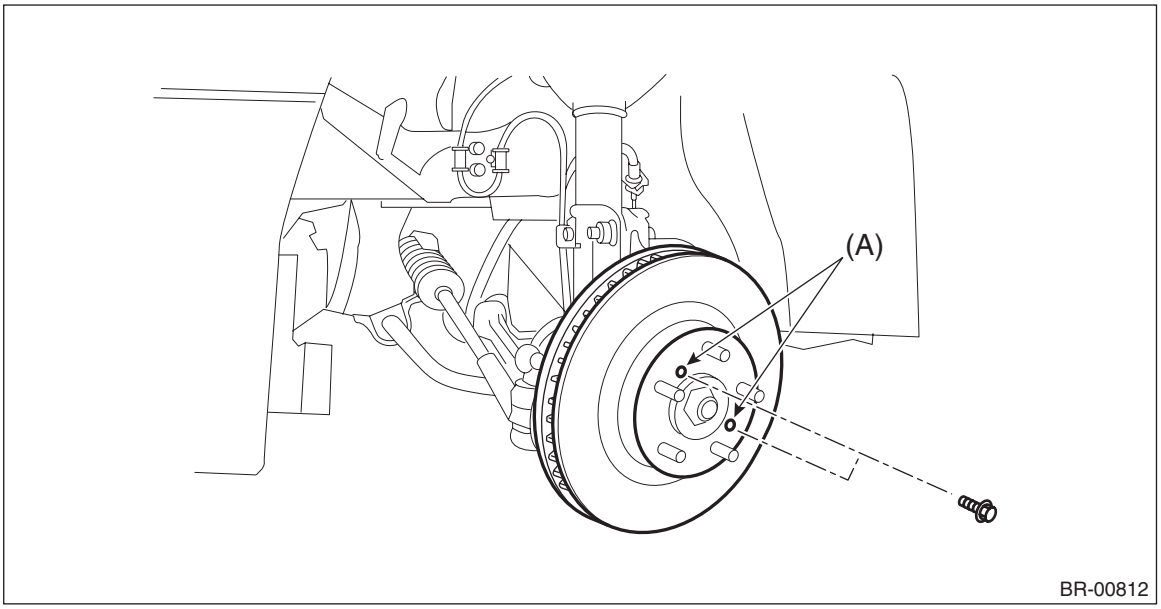


3) Remove the caliper body assembly from the housing assembly - front axle.
(1) Remove the mounting bolts, and then remove the caliper body assembly.
(2) Prepare wiring harnesses etc. to be discarded, and suspend the caliper body assembly from the strut assembly.

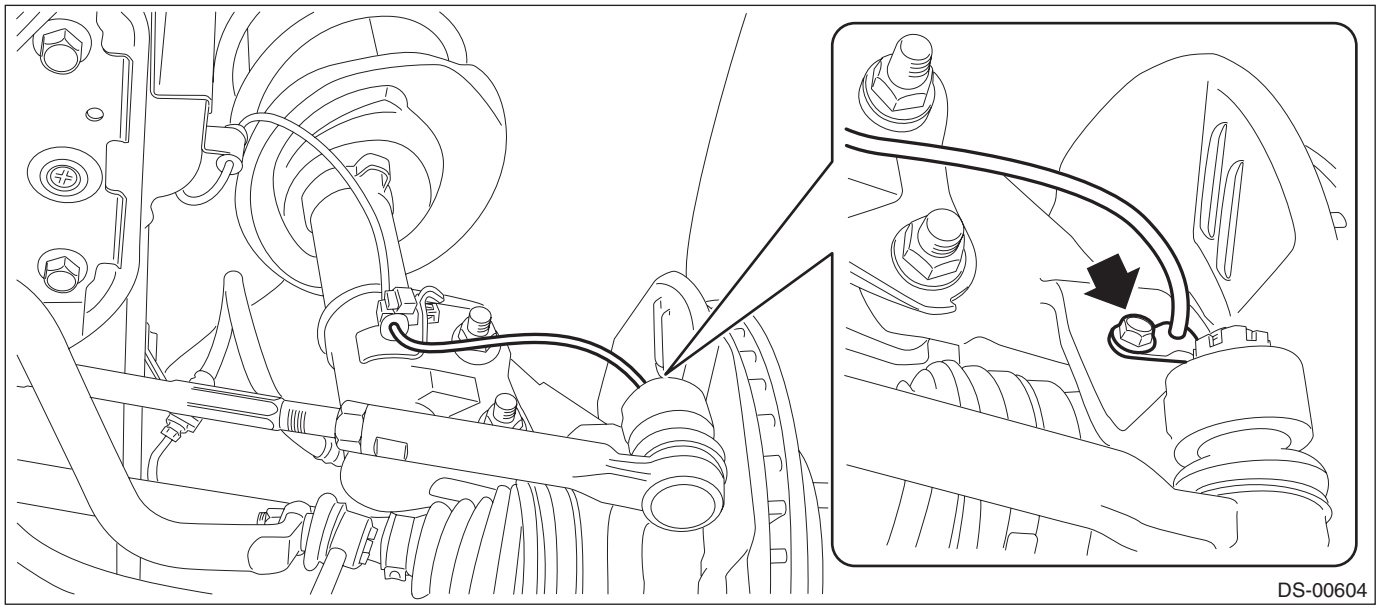


4) Remove the disc rotor.

NOTE:
When the disc rotor is difficult to be removed from the hub unit COMPL - front axle, screw in 8 mm (0.31 in) bolt to the threaded part of the disc rotor (A), and remove the disc rotor.

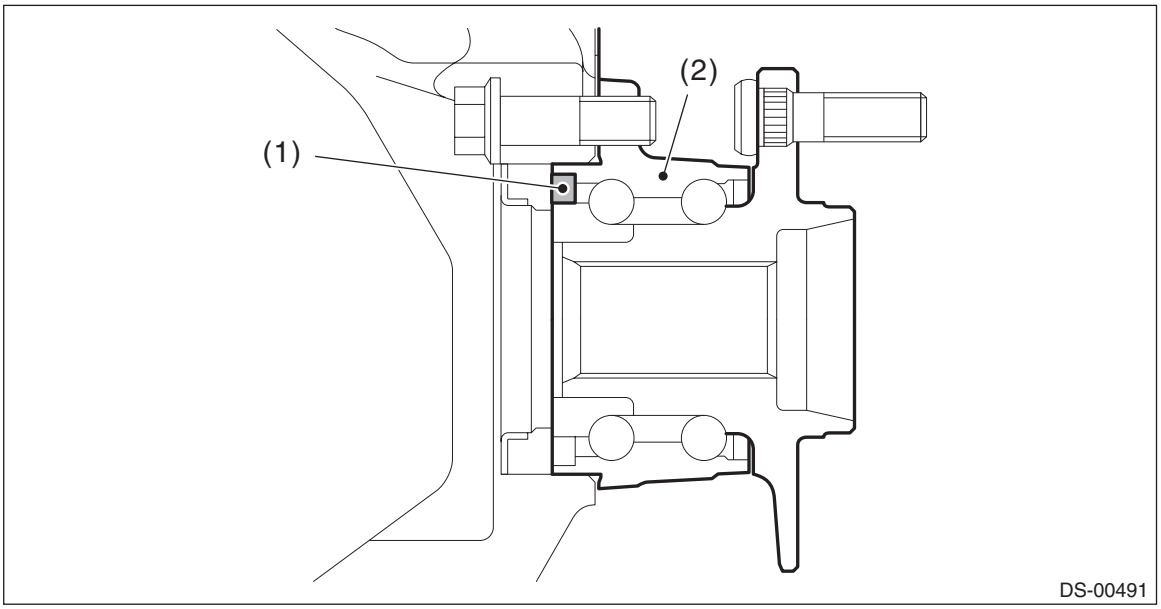


5) Remove the bolts, and remove the front ABS wheel speed sensor.

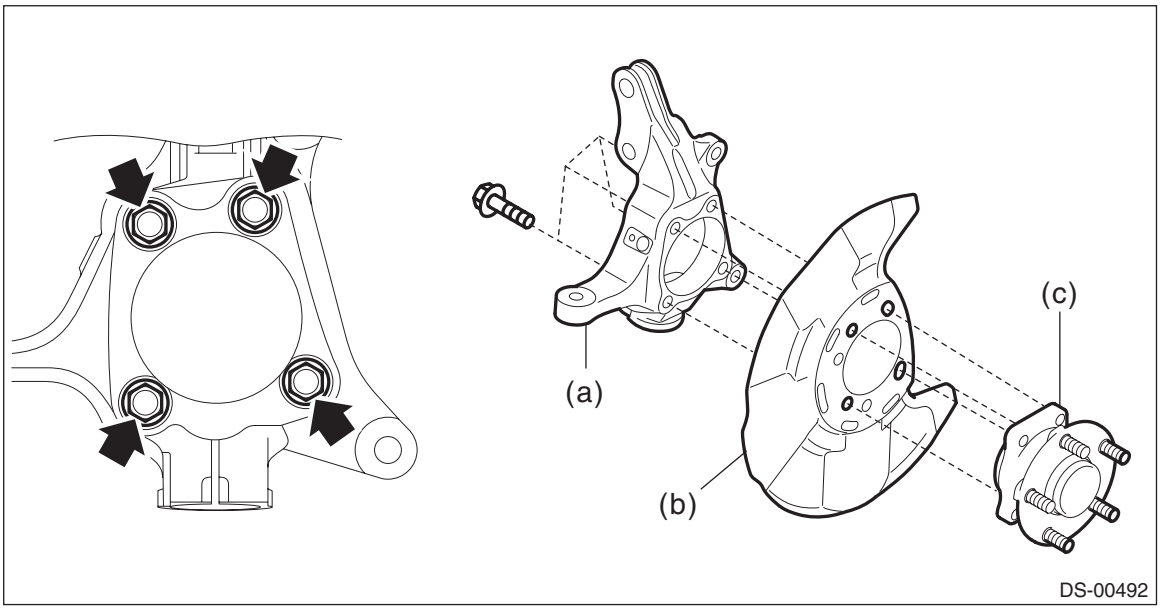


6) Remove the bolts from the housing assembly - front axle, and then remove the hub unit COMPL - front axle.

CAUTION:
- **Do not get closer the tool which charged magnetism to magnetic encoder.**
- **Be careful not to damage the magnetic encoder.**



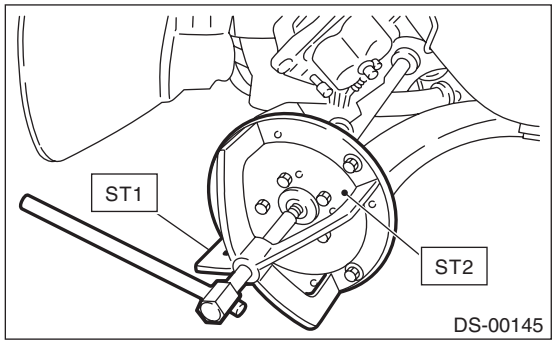
(1) Magnetic encoder (2) Hub unit COMPL - front axle



(a) Housing ASSY - front axle (b) Back plate - front brake (c) Hub unit COMPL - front axle

NOTE:
If it is hard to remove, use the ST.

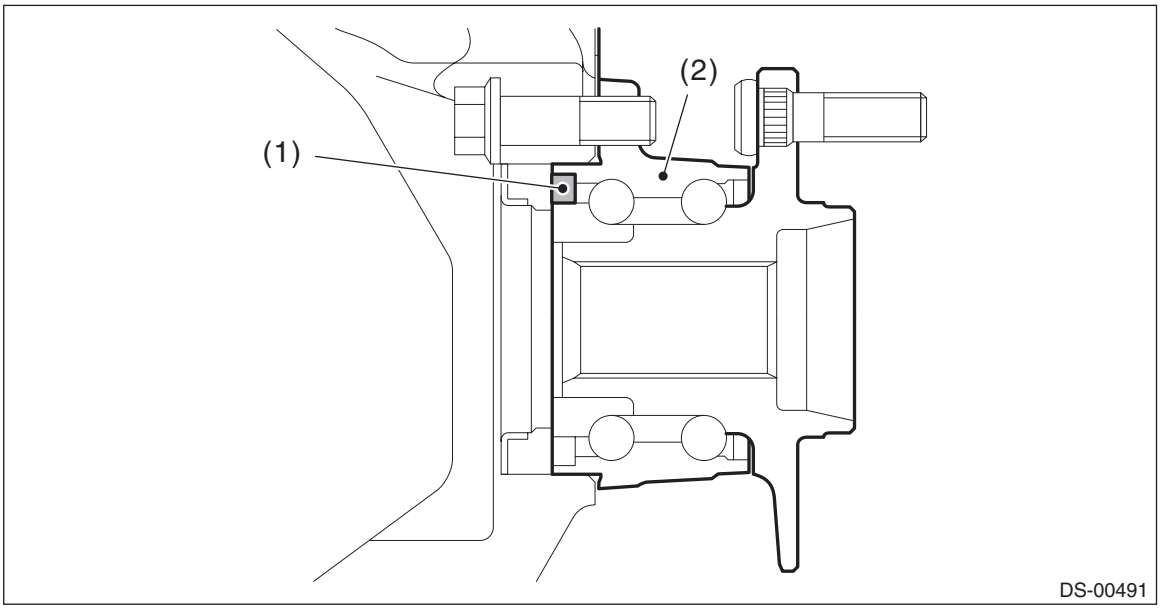
Preparation tool:
ST1: AXLE SHAFT PULLER (926470000)
ST2: AXLE SHAFT PULLER PLATE (28099PA110)



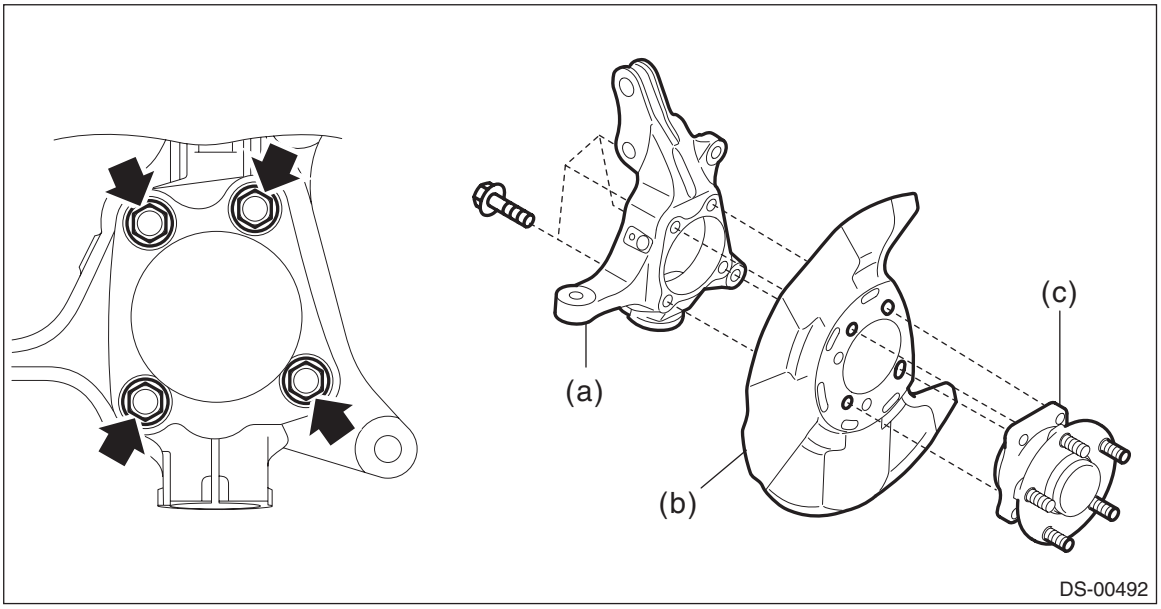
B: INSTALLATION

1) Place the back plate - front brake between the housing assembly - front axle and the hub unit COMPL - front axle, and tighten the bolt.

CAUTION:
- **Do not get closer the tool which charged magnetism to magnetic encoder.**
- **Be careful not to damage the magnetic encoder.**



(1) Magnetic encoder (2) Hub unit COMPL - front axle



(a) Housing ASSY - front axle (b) Back plate - front brake (c) Hub unit COMPL - front axle

Tightening torque:
65 N·m (6.63 kgf-m, 47.9 ft-lb)

2) Install the front axle shaft assembly.

CAUTION:
- **Do not tap the axle shaft using a hammer when installing axle shaft assembly.**
- **Use new nut - axle.**

(1) Insert the axle shaft assembly into the hub spline, and pull in the axle shaft assembly into specified position.
(2) Temporarily tighten the nut - axle.

3) Install the disc rotor to the hub unit COMPL - front axle.
4) Install the caliper body assembly to the housing assembly - front axle.

Tightening torque:
80 N·m (8.16 kgf-m, 59.0 ft-lb)

5) Install the front ABS wheel speed sensor.

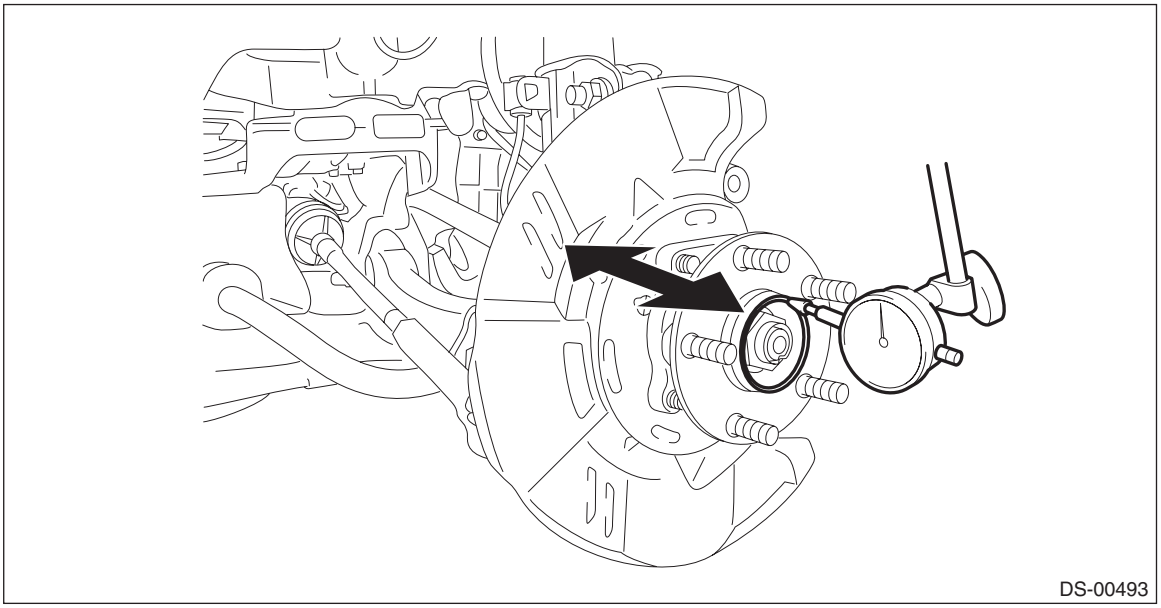
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

6) While depressing the brake pedal, tighten new nuts - axle to the specified torque.

CAUTION:
Do not load the front axle before tightening the nut - axle. Doing so may damage the hub unit COMPL.

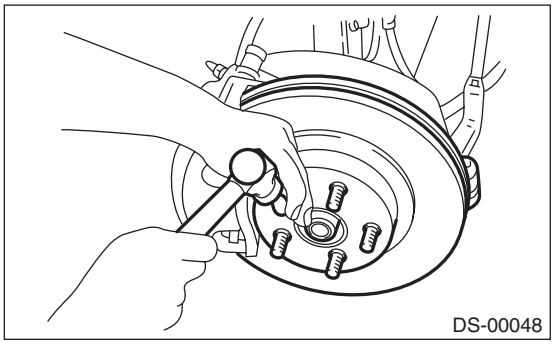
Tightening torque:
220 N·m (22.43 kgf-m, 162.3 ft-lb)

7) Inspect the lean of axis direction using a dial gauge. Replace the hub unit COMPL - front axle if the play exceeds the limit.


DS-00493

Service limit:
Maximum: 0.05 mm (0.0020 in)

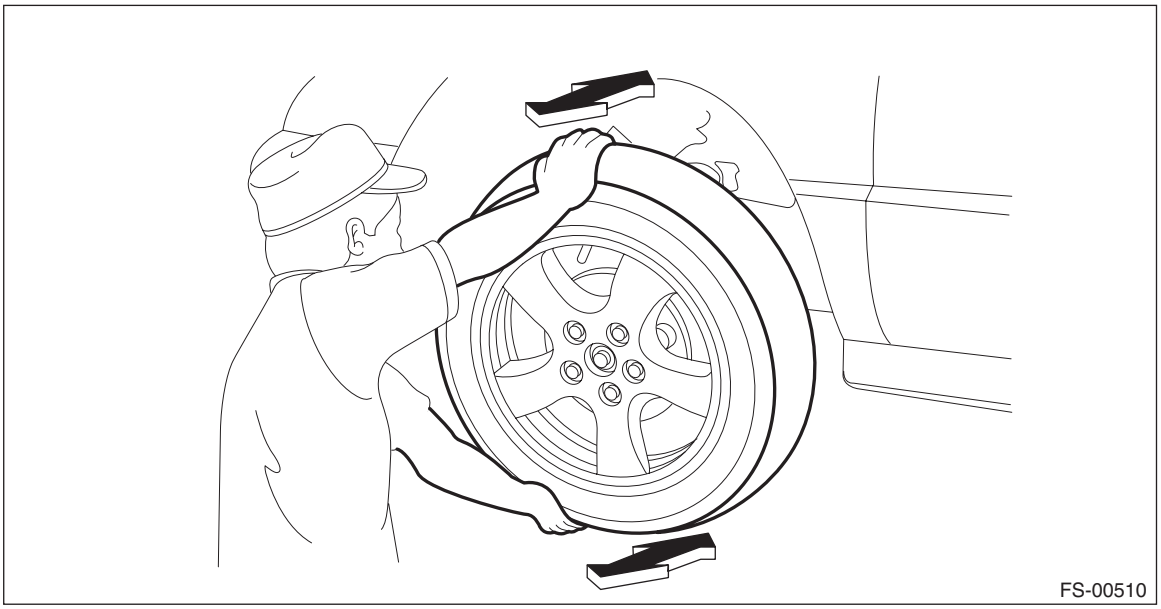
8) After tightening the nut - axle, lock it securely.


DS-00048

9) Install the front wheels, and perform the following inspections.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

1. Check the wheels for smooth rotation.
2. Check that there is no play by moving the upper and lower portions of front tire in an axial direction with the brake pedal released.



- **Play exists** → Check the hub unit COMPL - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>

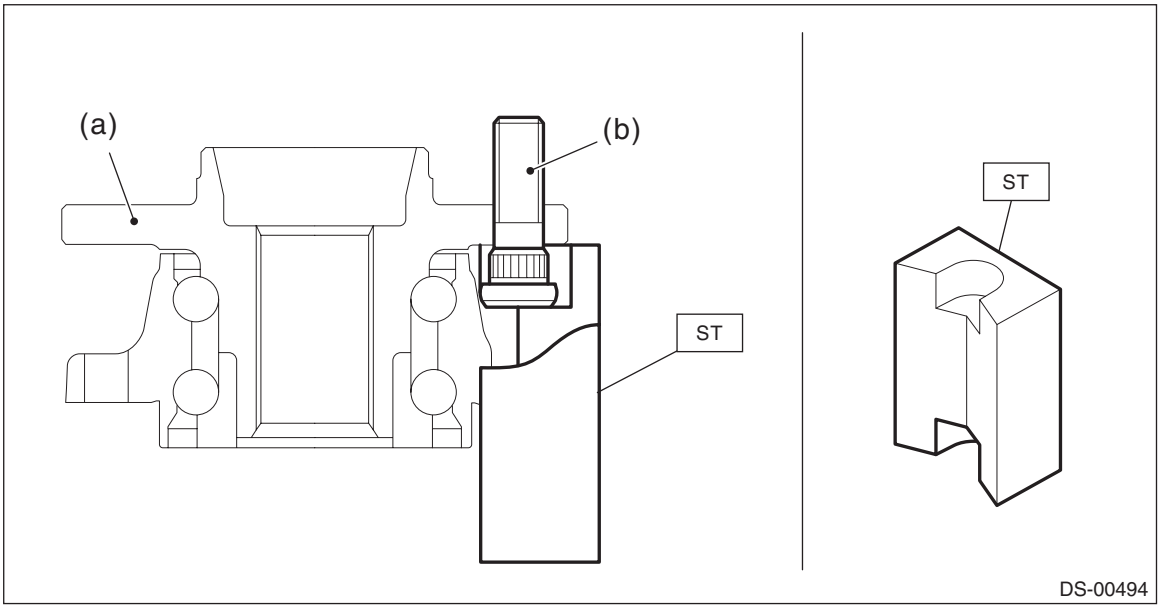
3. Check that there is no play by moving the upper and lower portions of front tire in an axial direction with the brake pedal depressed.
   - **Play exists** → Replace the ball joint assembly. <Ref. to FS-32, REMOVAL, Front Ball Joint.>

C: DISASSEMBLY

Using the ST or a hydraulic press, push out the bolt - hub (b) from the hub unit COMPL - front axle (a).

CAUTION:
- **Be careful not to hammer the bolts - hub. This may deform the hub unit COMPL.**
- **Do not reuse the bolt - hub.**

PREPARATION TOOL:
ST: HUB STAND (28399AG000)



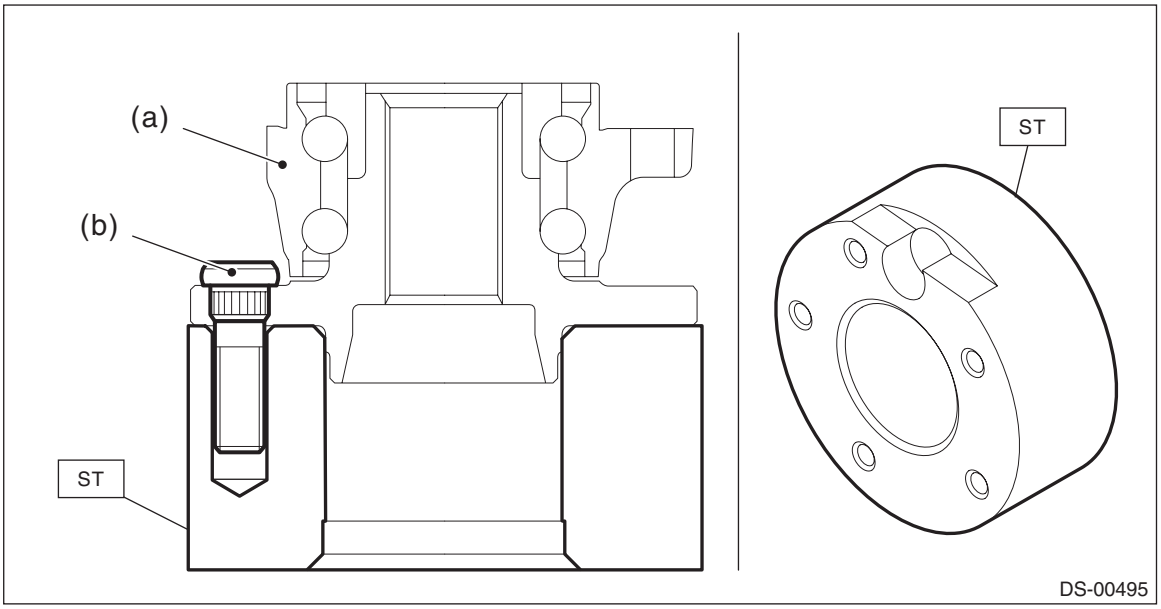
NOTE:
Since the hub unit COMPL can not be disassembled, only bolts - hub can be removed.

D: ASSEMBLY

1) Install the hub unit COMPL to the ST securely.

PREPARATION TOOL:
ST: HUB STAND (927080000)

2) Using a press, press new bolts - hub (b) until their seating surfaces contact the hub unit COMPL (a).

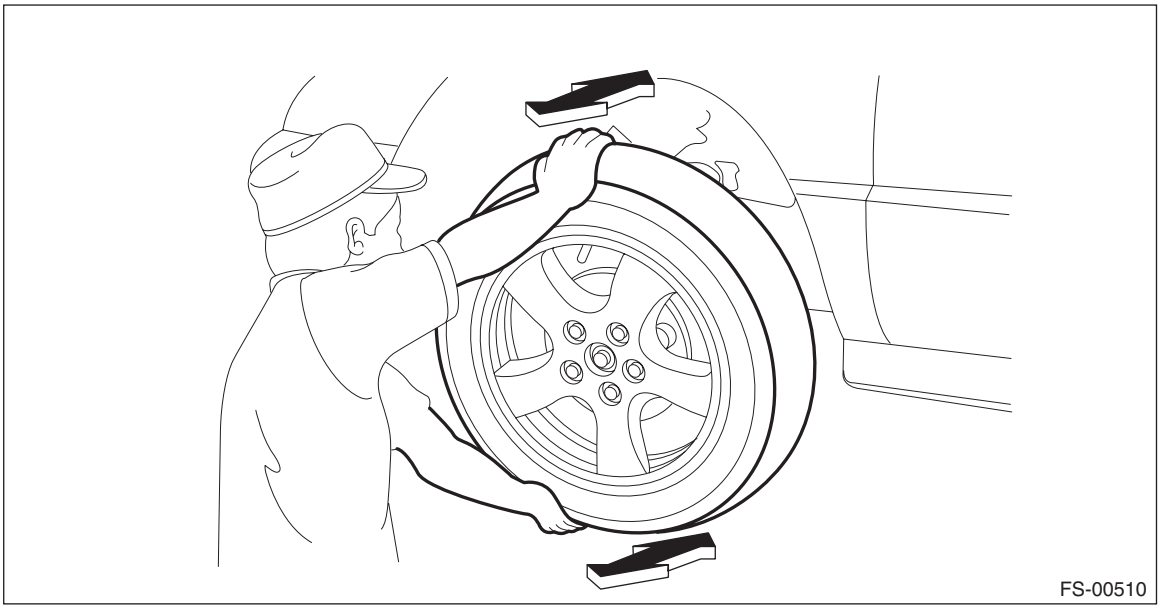


NOTE:
Use the 12 mm (0.47 in) dia. holes in the HUB STAND to prevent bolts from tilting.

E: INSPECTION

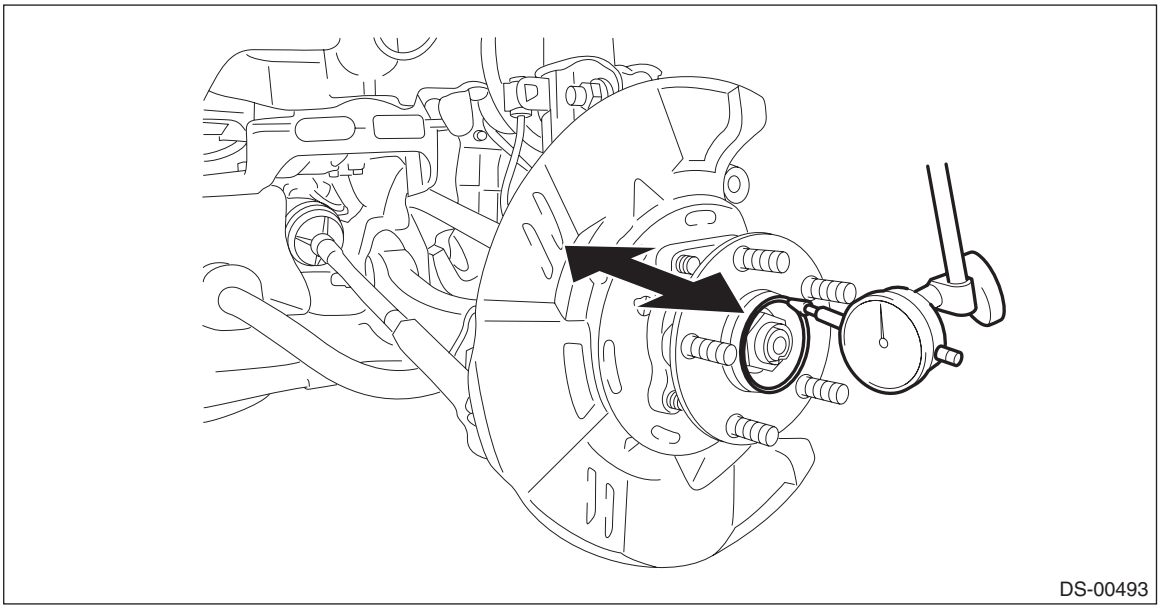
1) Moving the front tire up and down by hand, check there is no play in bearing, and check the wheel rotates smoothly.

CAUTION:
If there is any fault in the bearing, replace the hub unit COMPL.



2) Inspect the lean of axis direction using a dial gauge. Replace the hub unit COMPL if the play exceeds the limit.

Service limit:
Maximum: 0.05 mm (0.0020 in)

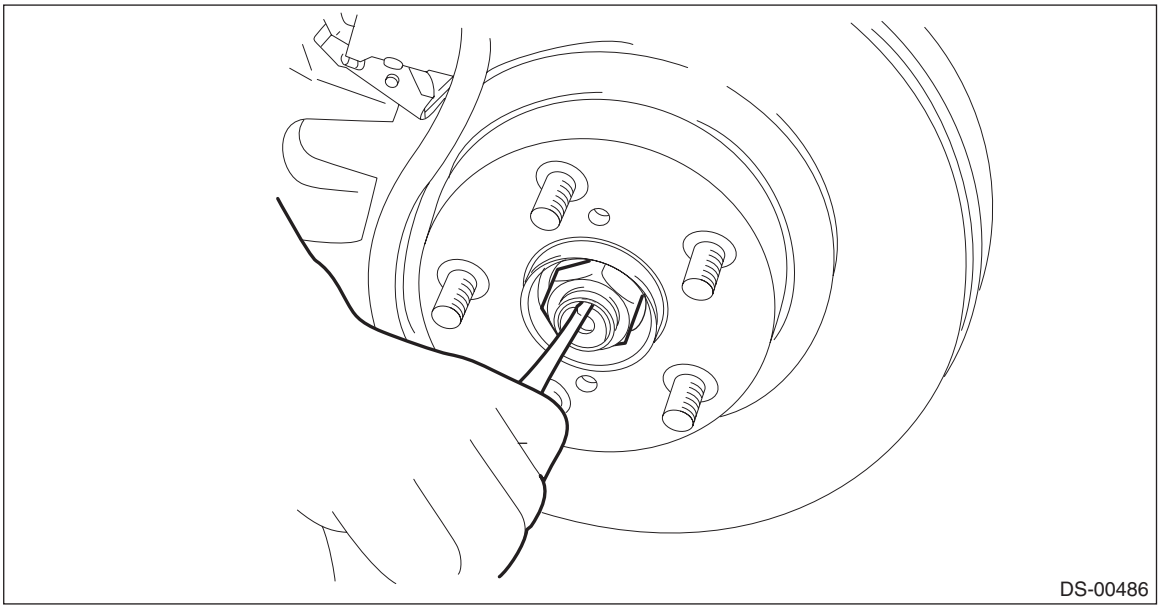


5. Rear Axle

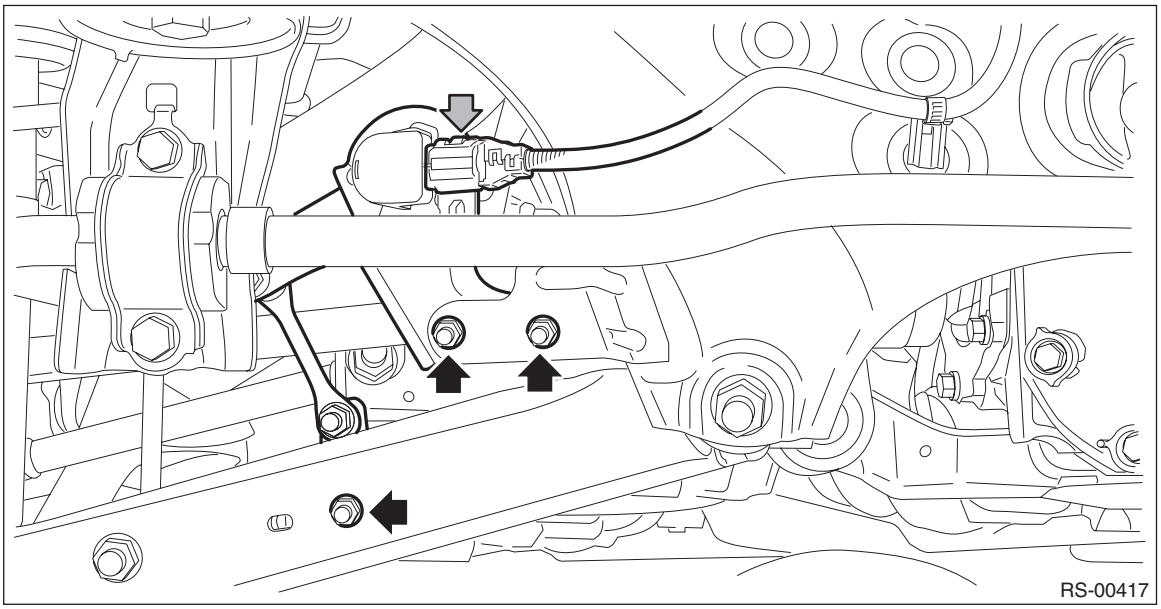
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the nut - axle.

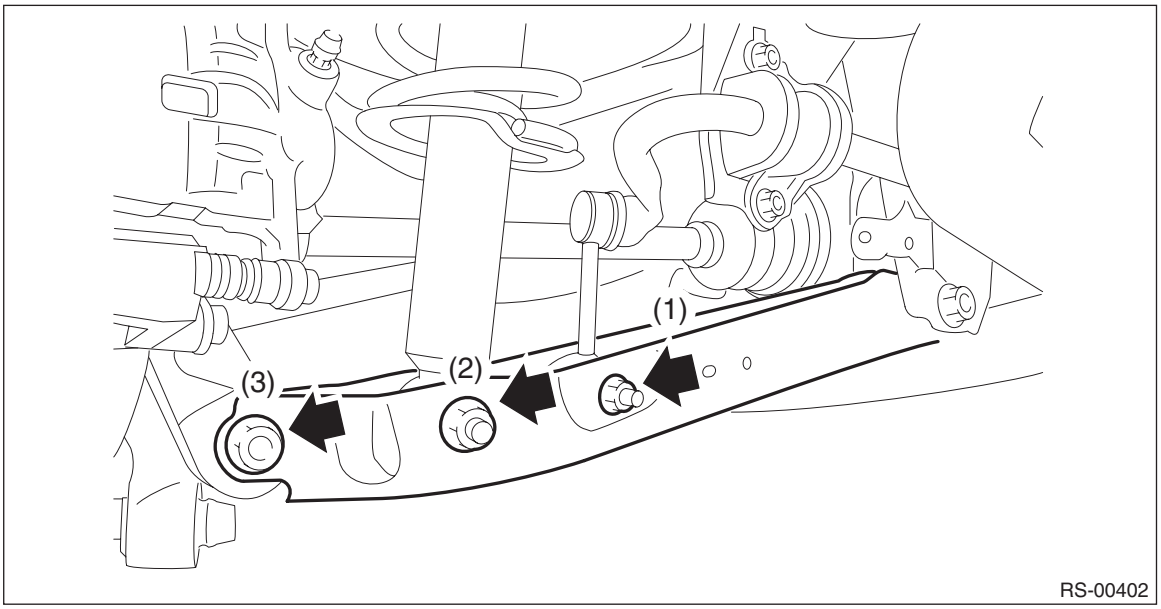
CAUTION:
Do not loosen the nut - axle while the rear axle is loaded. Doing so may damage the hub unit COMPL.
(1) Lift the crimped section of the nut - axle.
(2) Remove the nut - axle using a socket wrench while depressing the brake pedal.


DS-00486

4) Disconnect the sensor assembly - headlight beam leveler. (Model with auto headlight beam leveler)
(1) Disconnect the connector of the sensor assembly - headlight beam leveler.
(2) Remove the bolts and nuts, and remove the sensor assembly - headlight beam leveler.

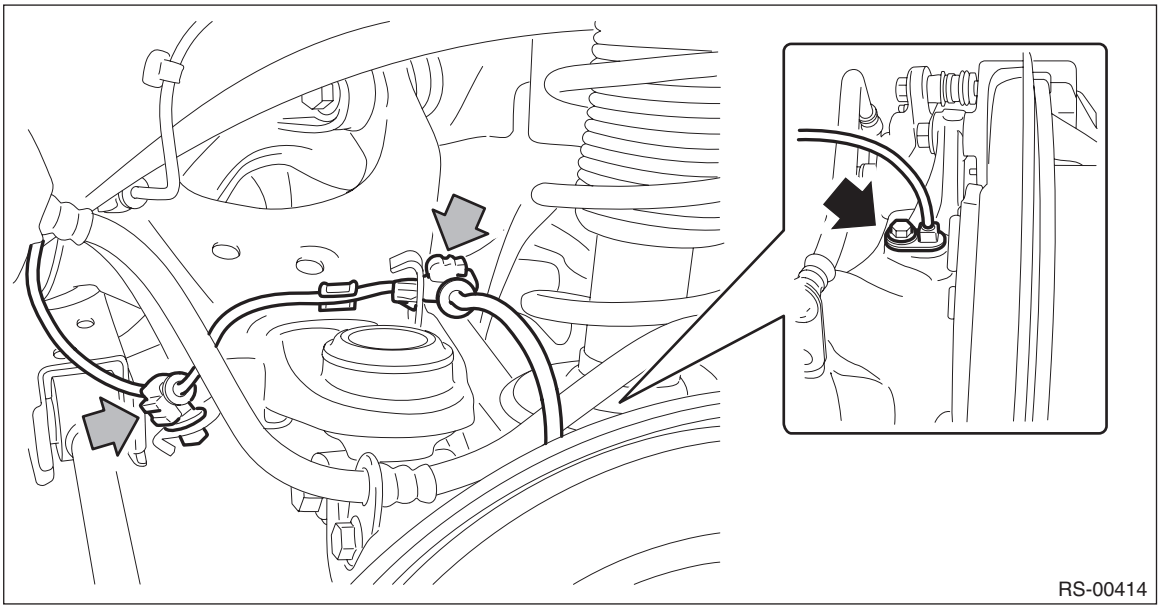

RS-00417

5) Remove the bolts and nuts, and lower the lateral link assembly - rear.
   (1) Remove the nut and disconnect the rear stabilizer link assembly. (model with rear stabilizer)
   (2) Remove the bolts at the bottom of rear strut assembly.
   (3) Disconnect the housing assembly - rear axle from the lateral link assembly - rear.

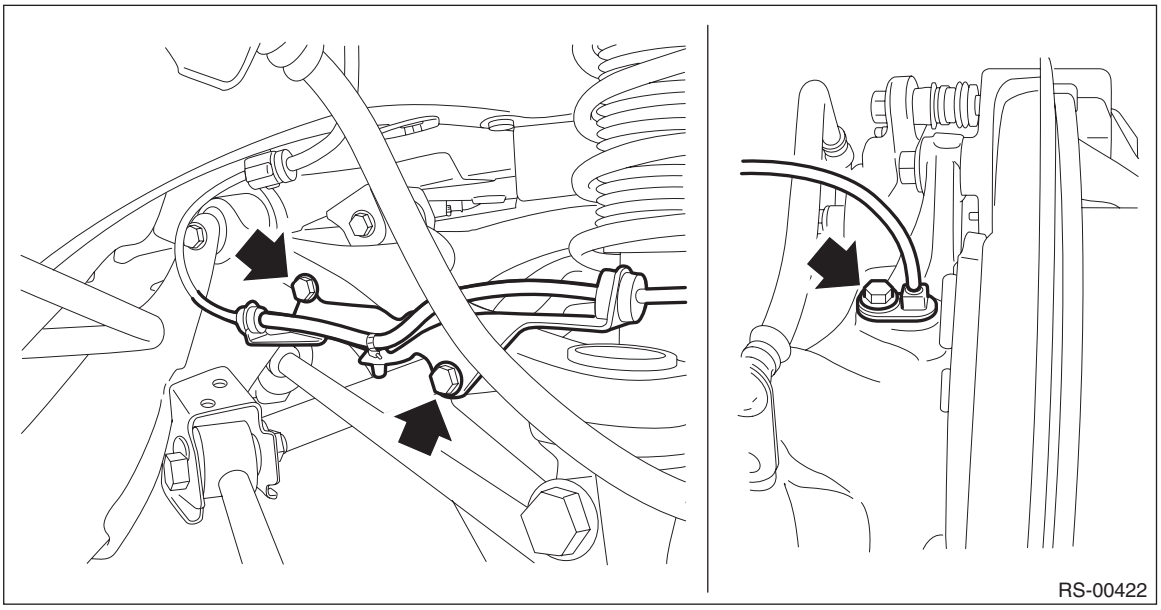


6) Remove the caliper body assembly from the housing assembly - rear axle.
   (1) Remove the bolts, and remove the brake hose bracket and ABS wheel speed sensor.
   (2) Remove the mounting bolts, and then remove the caliper body assembly.

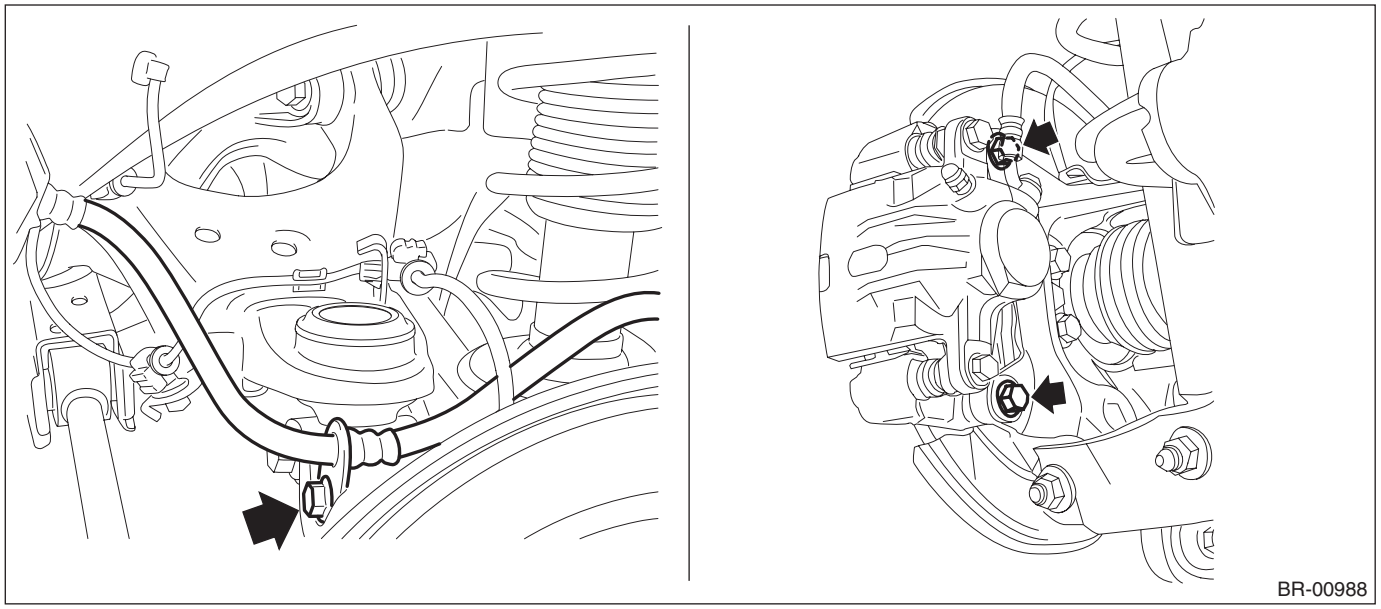
CAUTION:
- **Be careful not to damage the sensor.**
- **Do not apply excessive force to the sensor harness.**
  - Except for XV model: Remove the harness clamp clip.



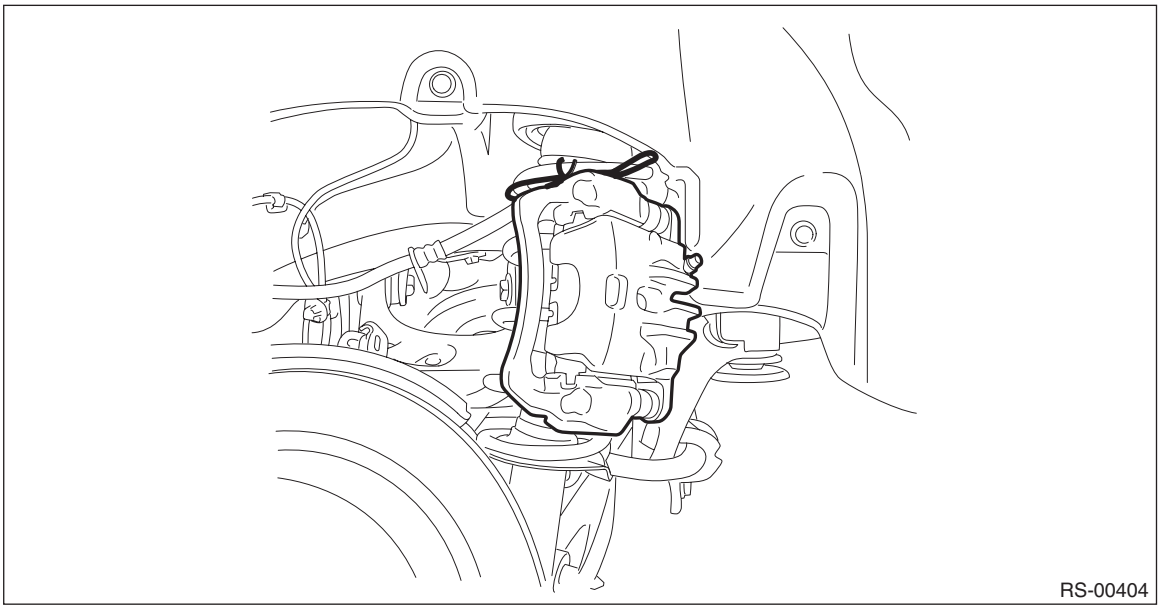
- XV model: Remove the bolts and remove the sensor bracket.



7) Remove the caliper body assembly from the housing assembly - rear axle.
(1) Remove the bolts and then remove the brake hose bracket and caliper body assembly.

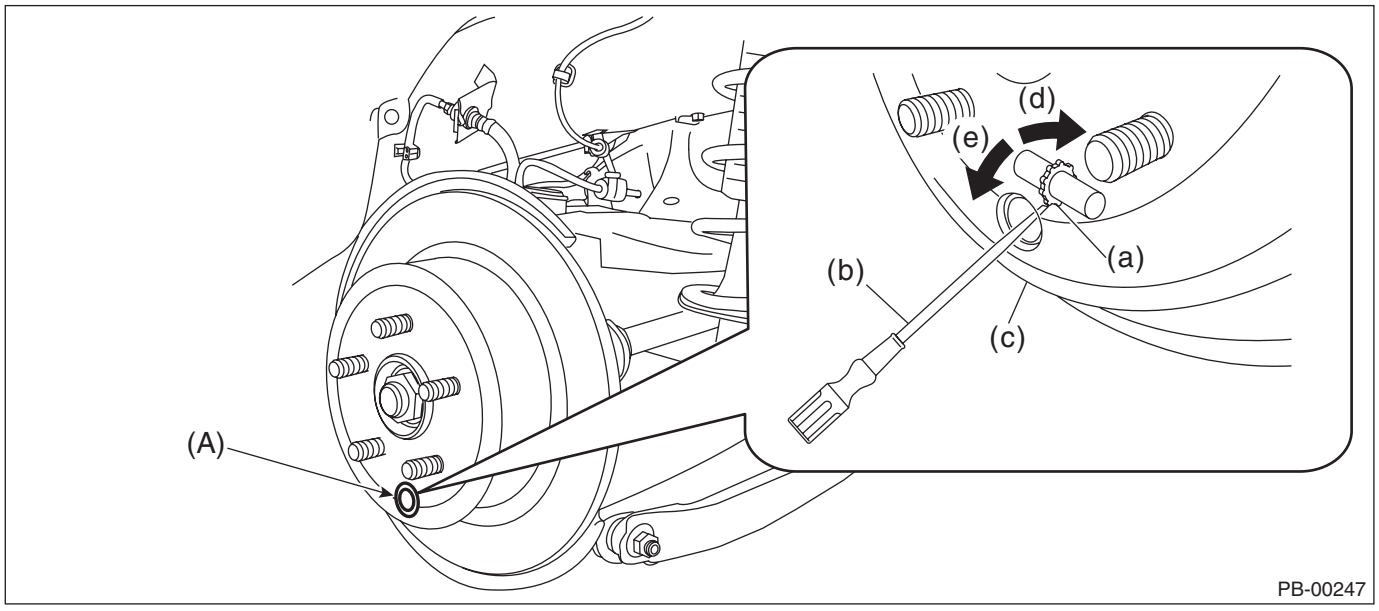


(2) Prepare wiring harnesses etc. to be discarded, and suspend the caliper body assembly from the strut assembly.



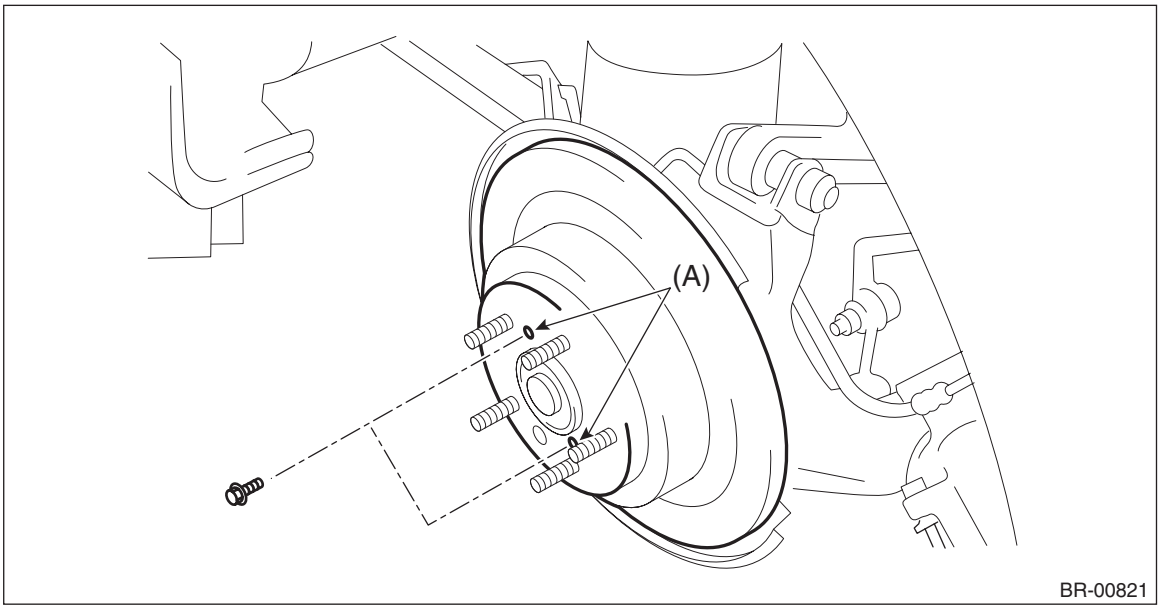
8) Remove the rear disc rotor.

NOTE:
If it is difficult to remove the disc rotor, perform the following two methods in order.
1. Remove the adjusting hole cover (A) for the disc rotor, and rotate the adjuster assembly - rear brake using a flat tip screwdriver until the brake shoe moves far enough from the disc rotor.



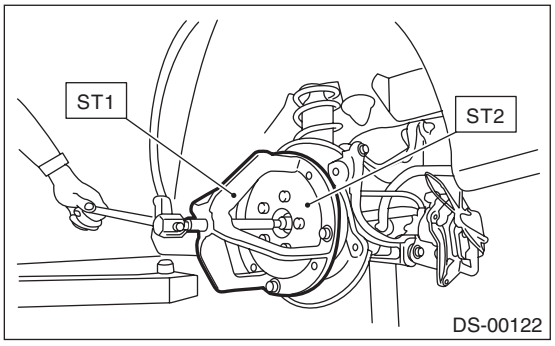
(a)	Adjuster ASSY - rear brake	(c)	Disc rotor	(e)	Shorten the adjuster ASSY - rear brake
(b)	Flat tip screwdriver	(d)	Extend the adjuster ASSY - rear brake		

2. When the disc rotor is difficult to be removed from the hub unit COMPL - rear axle, screw in 8 mm (0.31 in) bolt to the threaded part of the disc rotor (A), and remove the disc rotor.



9) Remove the rear axle shaft assembly from the hub unit COMPL - rear axle.

Preparation tool:
ST1: AXLE SHAFT PULLER (926470000)
ST2: AXLE SHAFT PULLER PLATE (28099PA110)

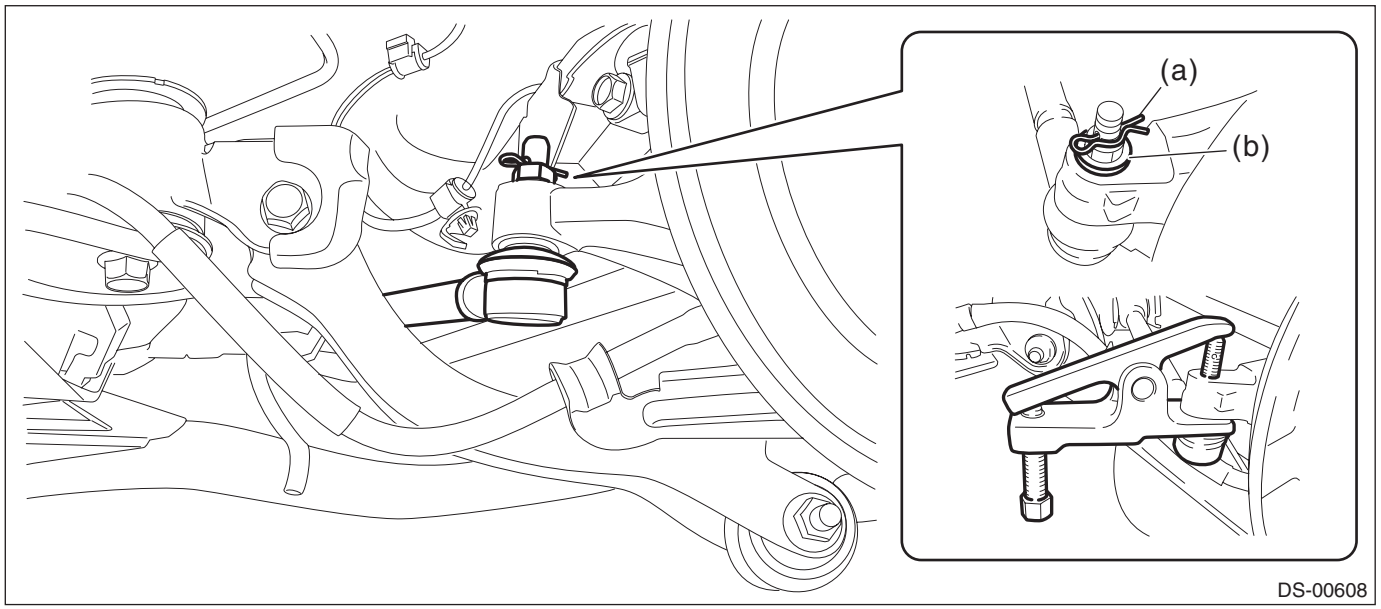


NOTE:
If it is hard to remove, use the ST.

10) Remove the lateral link assembly - front.
(1) Remove the snap pin (a) and nut (b).
(2) Remove the ball joint from the housing assembly - rear axle.

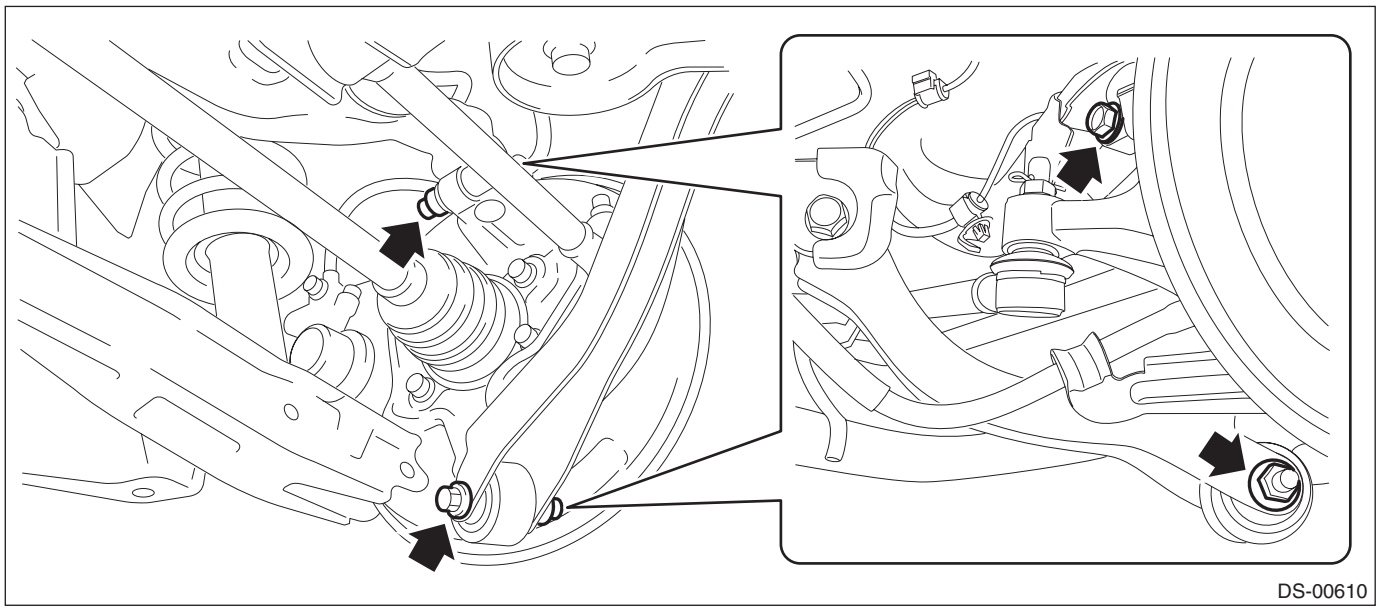
CAUTION:
Be careful not to damage the boot of the joint.

Preparation tool:
Tie-rod ball joint puller



11) Remove the housing assembly - rear axle.
(1) Remove the bolts for the upper arm, the trailing link, and the lateral link assembly - rear, and then separate the housing assembly - rear axle.

CAUTION:
Be careful not to damage the boot of the joint.



(2) Remove the housing assembly - rear axle.

CAUTION:
- **Be careful of the weight of the housing assembly - rear axle.**
- **Be careful not to damage the spline portion of the axle shaft.**

12) Refer to “Rear Hub Unit Bearing” for removal of the hub unit COMPL - rear axle. <Ref. to DS-46, REMOVAL, Rear Hub Unit Bearing.>

B: INSTALLATION

1) Temporarily tighten the housing assembly - rear axle to the upper arm assembly.
2) Install the rear axle shaft assembly.

CAUTION:
- **Do not tap the axle shaft using a hammer when installing axle shaft assembly.**
- **Use new nut - axle.**

(1) Insert the axle shaft assembly into the hub spline, and pull in the axle shaft assembly into specified position.
(2) Temporarily tighten the nut - axle.

3) Tighten the rear strut assembly, rear stabilizer link assembly and other links to the specified torque.

Tightening torque:
Rear suspension: <Ref. to RS-3, REAR SUSPENSION, COMPONENT, General Description.>
Rear strut: <Ref. to RS-5, REAR STRUT, COMPONENT, General Description.>

4) Install the rear disc rotor.
5) Install the caliper body assembly.

Tightening torque:
66 N·m (6.73 kgf-m, 48.7 ft-lb)

6) Install the brake hose bracket and rear ABS wheel speed sensor.

Tightening torque:
Brake hose bracket: 33 N·m (3.36 kgf-m, 24.3 ft-lb)
Rear ABS wheel speed sensor: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

7) Install the sensor assembly - headlight beam leveler. (Model with auto headlight beam leveler)

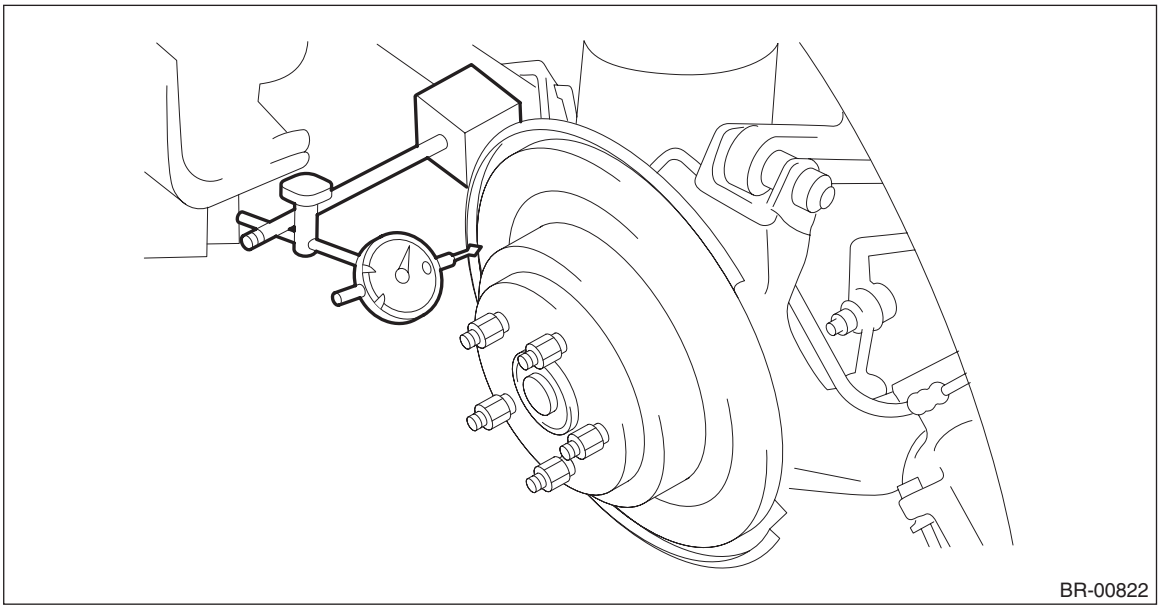
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

8) While depressing the brake pedal, tighten new nuts - axle to the specified torque.

CAUTION:
Do not load the rear axle before tightening the nut - axle. Doing so may damage the hub unit COMPL.

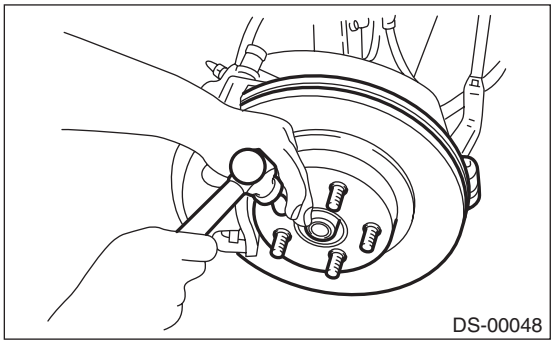
Tightening torque:
190 N·m (19.37 kgf-m, 140.1 ft-lb)

9) Inspect the lean of axis direction using a dial gauge. Replace the hub unit COMPL - rear axle if the play exceeds the limit.



Service limit:
Maximum: 0.05 mm (0.0020 in)

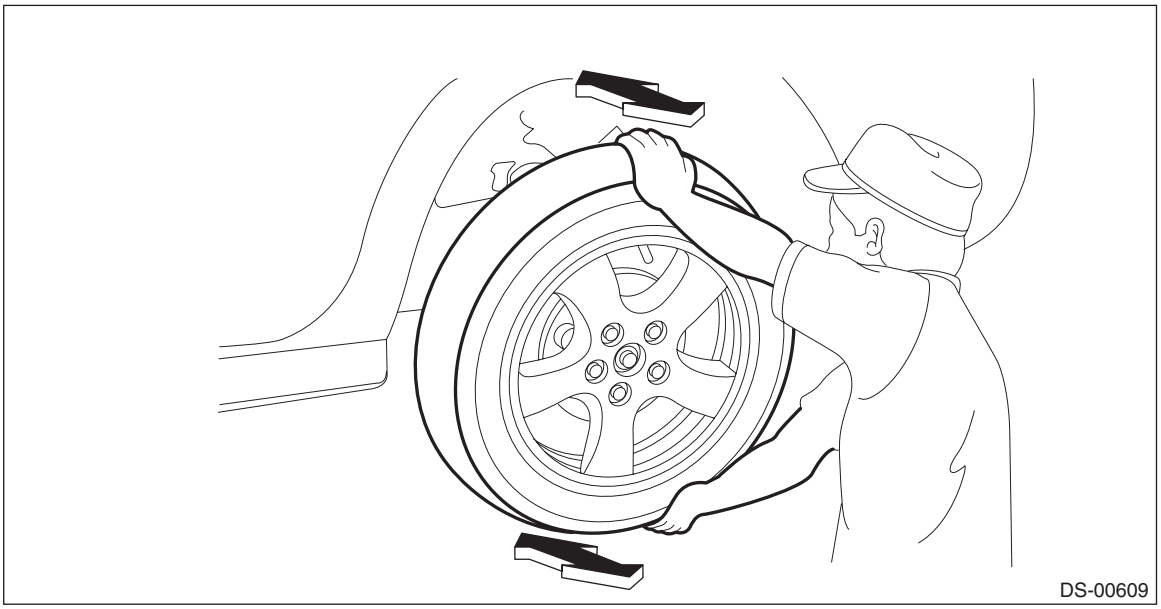
10) After tightening the nut - axle, lock it securely.



11) Install the rear wheels, and perform the following inspections.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

1. Check the wheels for smooth rotation.
2. Check that there is no play by moving the upper and lower portions of rear tire in an axial direction with the brake pedal released.



- **Play exists** → Check the hub unit COMPL - rear axle. <Ref. to DS-56, INSPECTION, Rear Hub Unit Bearing.>

12) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

13) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

C: DISASSEMBLY

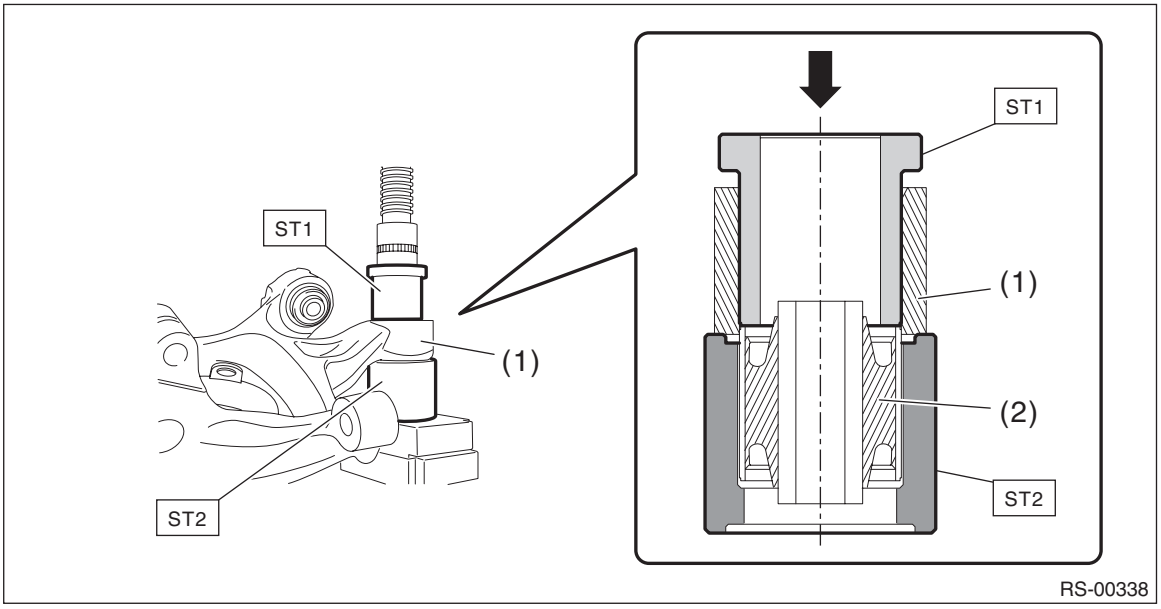
1. BUSHING - REAR AXLE HOUSING

Do not remove the housing assembly - rear axle because the bushing - rear axle housing cannot be replaced. If it is removed, replace the housing assembly - rear axle.

2. BUSHING - TRAILING LINK

1) Remove the housing assembly - rear axle. <Ref. to DS-35, REMOVAL, Rear Axle.>
2) Using the ST and a hydraulic press, push out the bushing.

Preparation tool:
ST1: BUSHING REMOVER (20099FG000)
ST2: INSTALLER & REMOVER (BASE) (20099PA010)



(1) Housing ASSY - rear axle
(2) Bushing - trailing link

D: ASSEMBLY

1. BUSHING - REAR AXLE HOUSING

Do not remove the housing assembly - rear axle because the bushing - rear axle housing cannot be replaced. If it is removed, replace the housing assembly - rear axle.

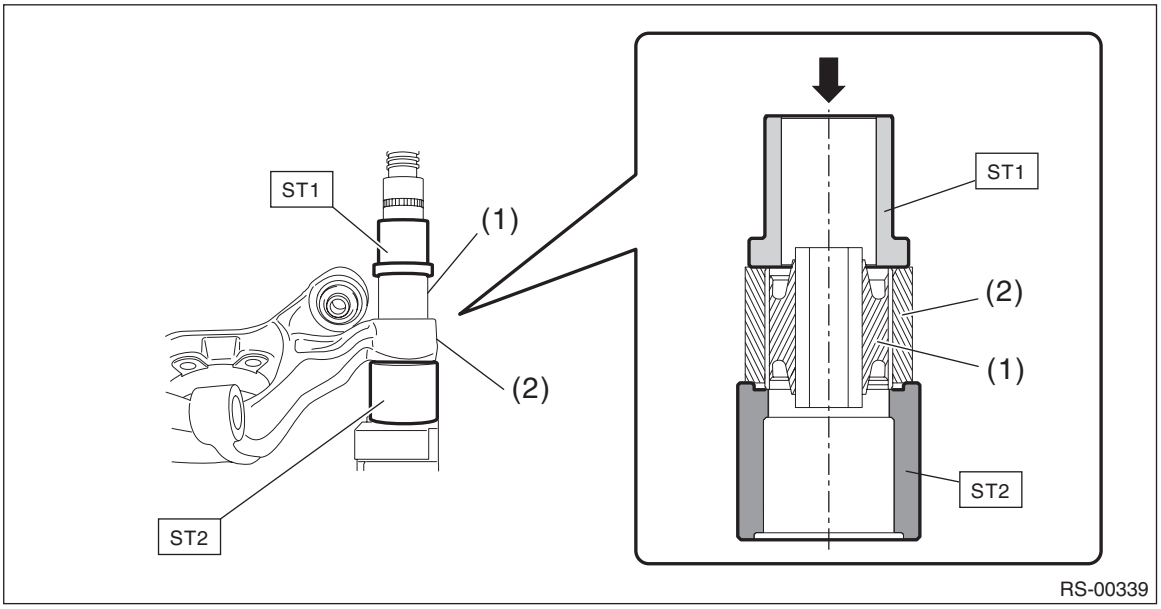
2. BUSHING - TRAILING LINK

1) Before assembly, inspect the following items and replace any faulty part with a new one.
- Perform visual check for damage or bend on the trailing link.
- Visually check the bushing for abnormal cracks, fatigue or damage.

2) Press-fit the bushing using ST and the hydraulic press.

CAUTION:
Make sure to press the bushing straight in.

Preparation tool:
ST1: BUSHING REMOVER (20099FG000)
ST2: INSTALLER & REMOVER (BASE) (20099PA010)



(1) Bushing
(2) Housing ASSY - rear axle

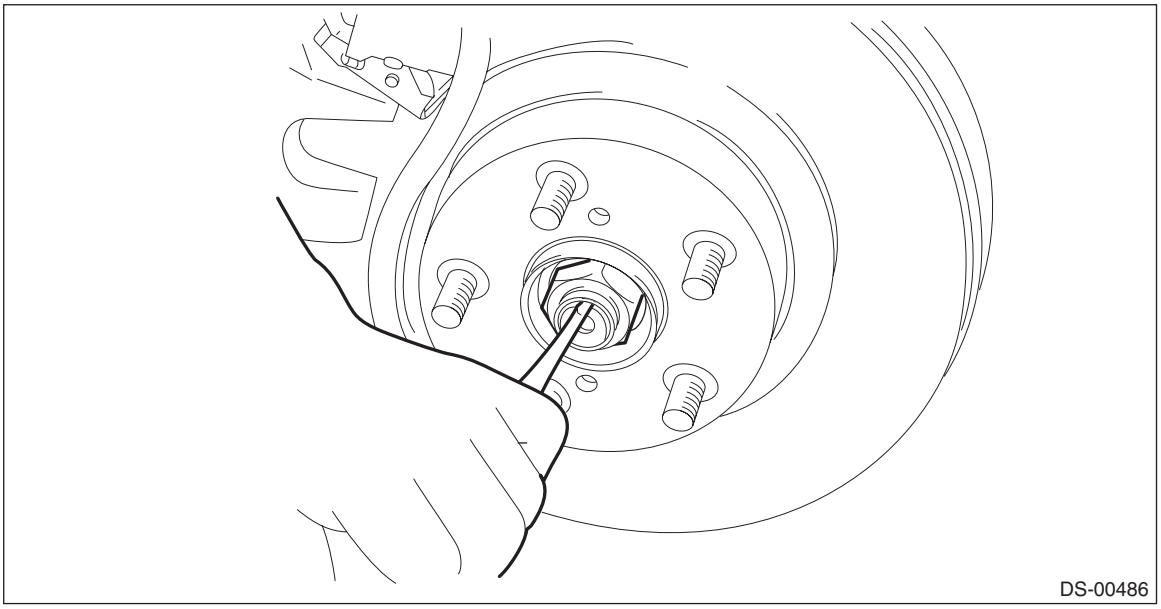
6. Rear Hub Unit Bearing

A: REMOVAL

1) Lift up the vehicle, and then remove the rear wheels.
2) Remove the nut - axle.

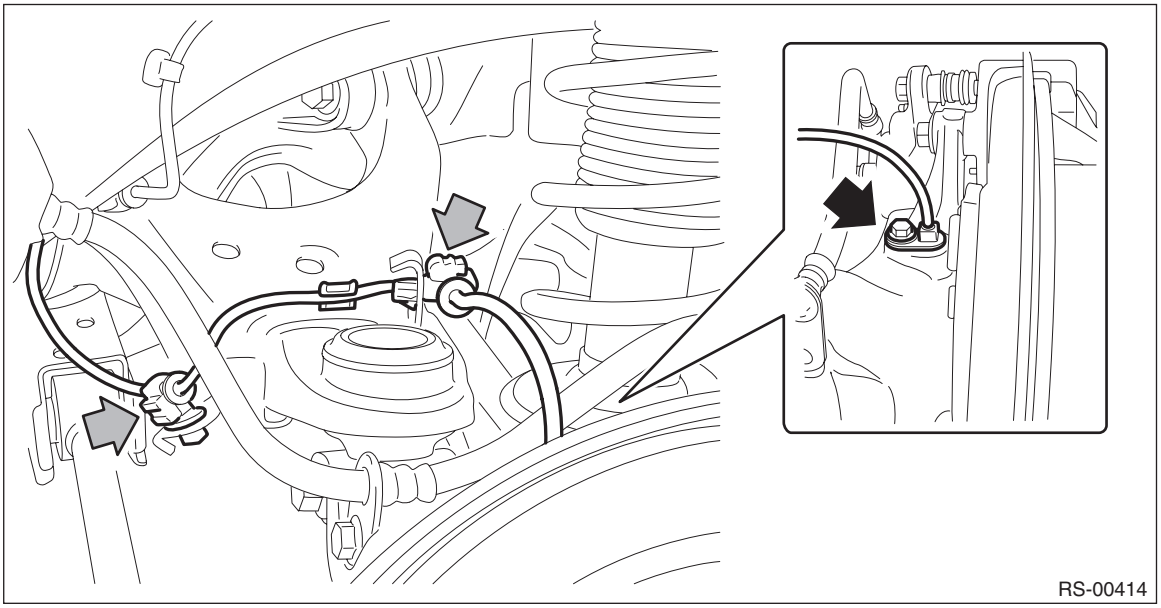
CAUTION:
Do not loosen the nut - axle while the rear axle is loaded. Doing so may damage the hub unit COMPL.

(1) Lift the crimped section of the nut - axle.
(2) Remove the nut - axle using a socket wrench while depressing the brake pedal.

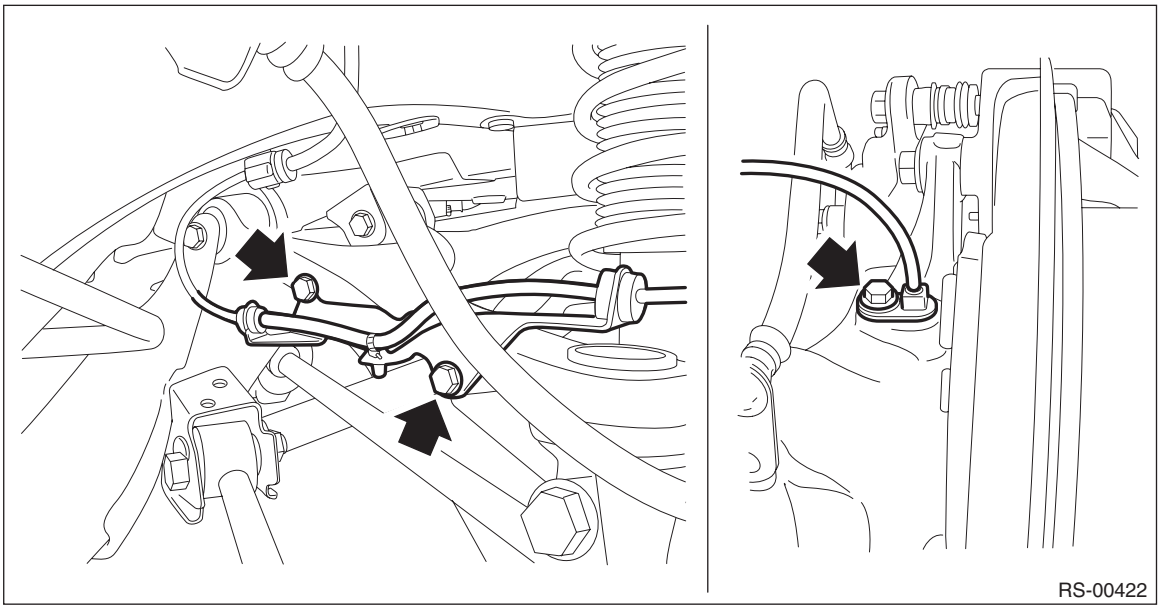

DS-00486

3) Remove the rear ABS wheel speed sensor from the rear axle housing.
(1) Remove the bolts, and remove the rear ABS wheel speed sensor.
(2) Remove the rear ABS wheel speed sensor harness from the upper arm.

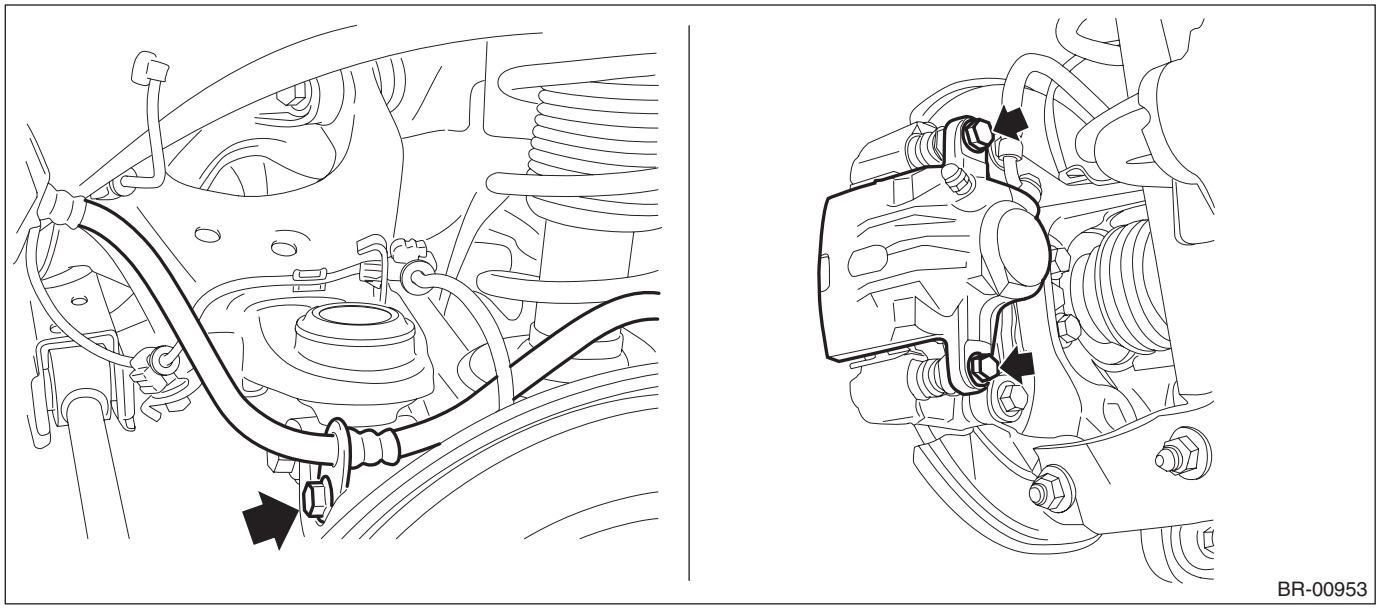
CAUTION:
- **Be careful not to damage the sensor.**
- **Do not apply excessive force to the sensor harness.**
  - Except for XV model: Remove the harness clamp clip.


RS-00414

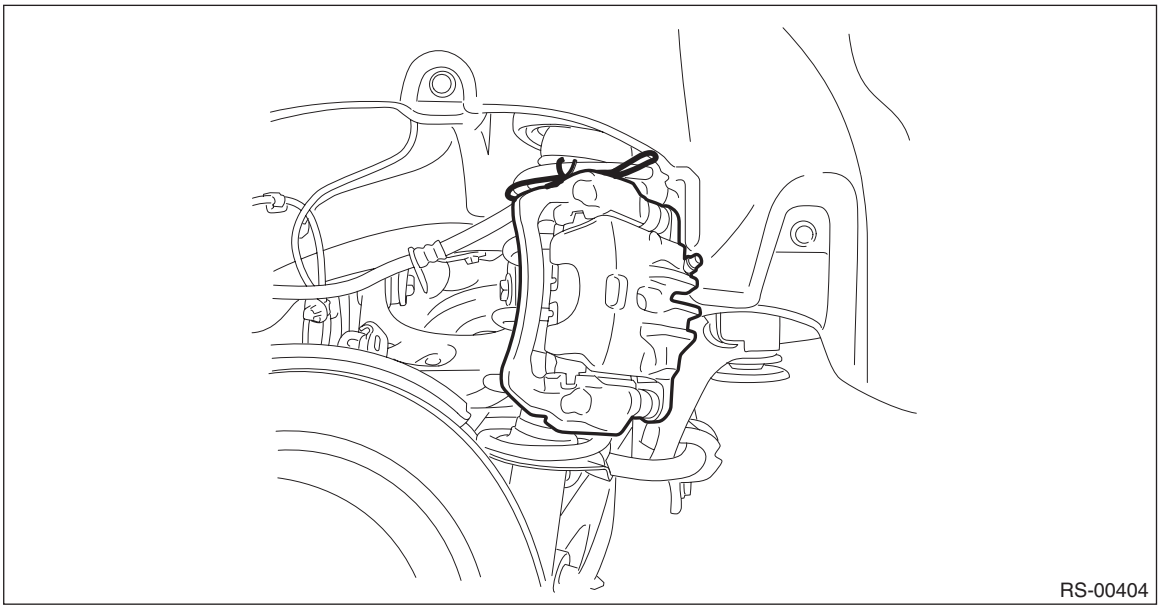
- XV model: Remove the bolts and remove the sensor bracket.



4) Remove the caliper body assembly from the housing assembly - rear axle.
   (1) Remove the bolts and then remove the brake hose bracket and caliper body assembly.

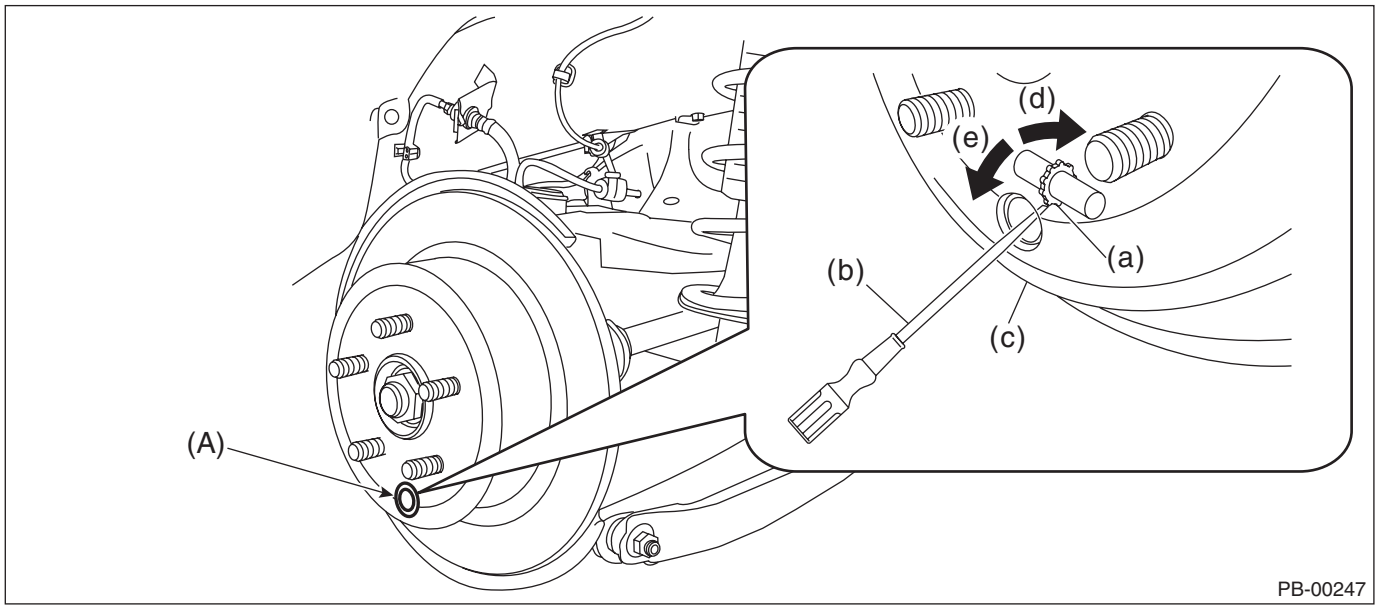


(2) Prepare wiring harnesses etc. to be discarded, and suspend the caliper body assembly from the strut assembly.



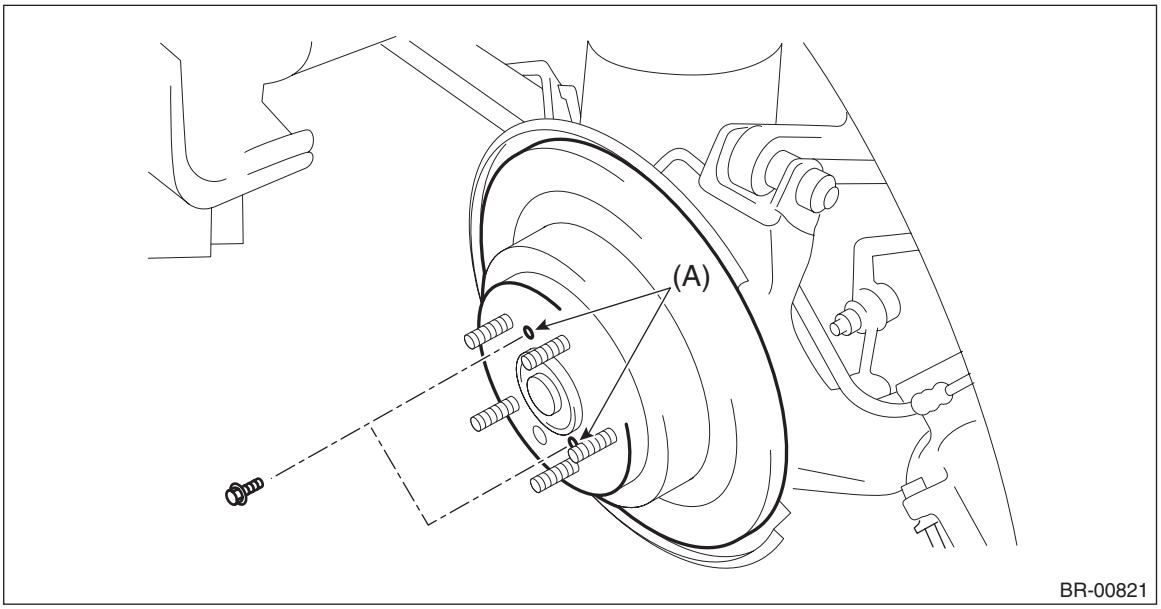
5) Remove the rear disc rotor.

NOTE:
If it is difficult to remove the disc rotor, perform the following two methods in order.
1. Remove the adjusting hole cover (A) for the disc rotor, and rotate the adjuster assembly - rear brake using a flat tip screwdriver until the brake shoe moves far enough from the disc rotor.



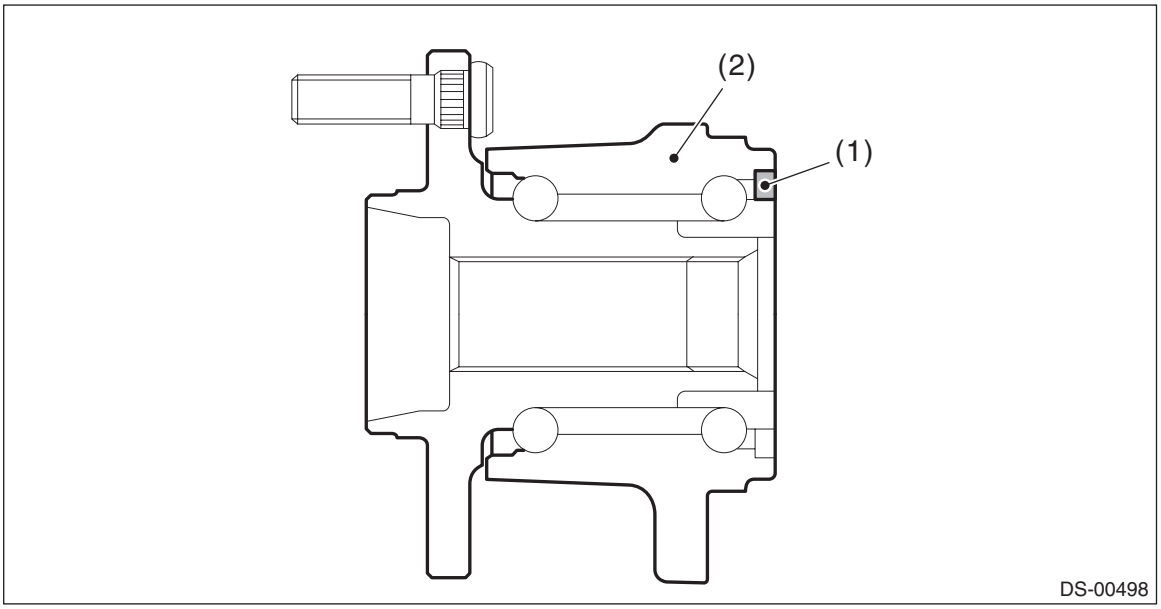
(a)	Adjuster ASSY - rear brake	(c)	Disc rotor	(e)	Shorten the adjuster ASSY - rear brake
(b)	Flat tip screwdriver	(d)	Extend the adjuster ASSY - rear brake		

2. When the disc rotor is difficult to be removed from the hub unit COMPL - rear axle, screw in 8 mm (0.31 in) bolt to the threaded part of the disc rotor (A), and remove the disc rotor.

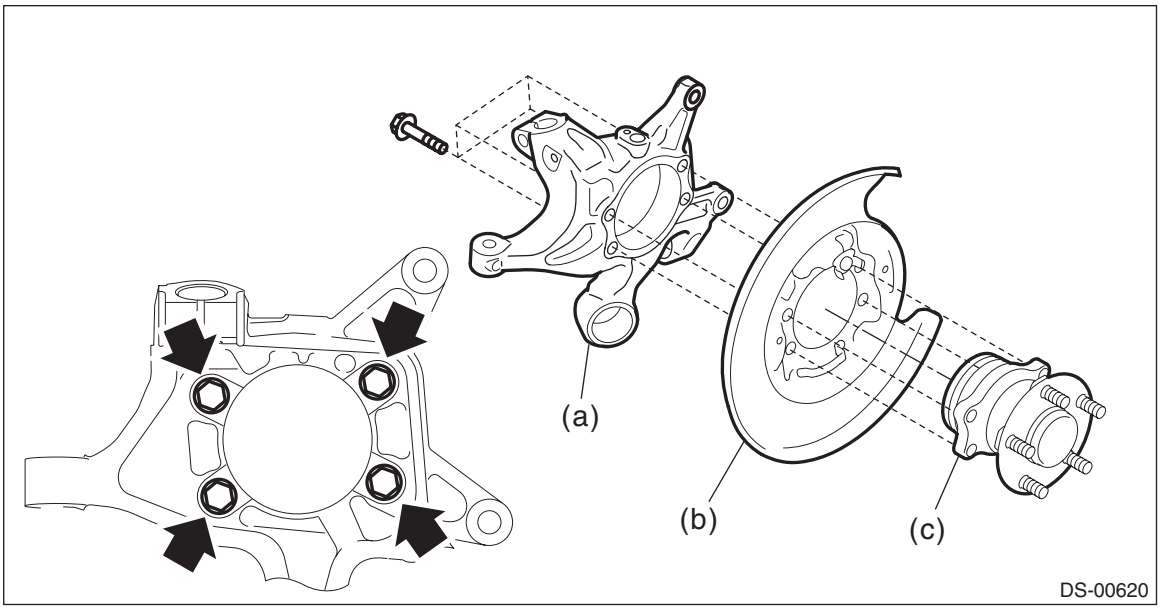


6) Remove the bolts from the housing assembly - rear axle, and then remove the hub unit COMPL - rear axle.

CAUTION:
- **Be careful not to damage the magnetic encoder.**
- **Do not get closer the tool which charged magnetism to magnetic encoder.**



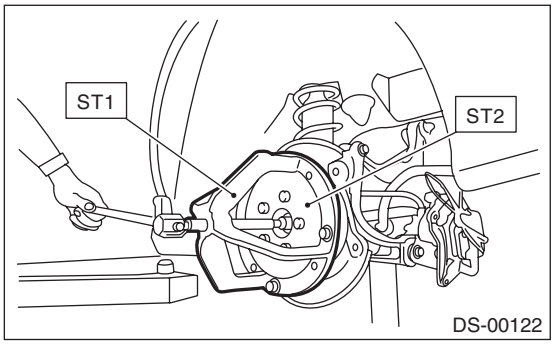
(1) Magnetic encoder (2) Hub unit COMPL - rear axle



(a) Housing ASSY - rear axle (b) Back plate - rear brake (c) Hub unit COMPL - rear axle

NOTE:
If it is hard to remove, use the ST.

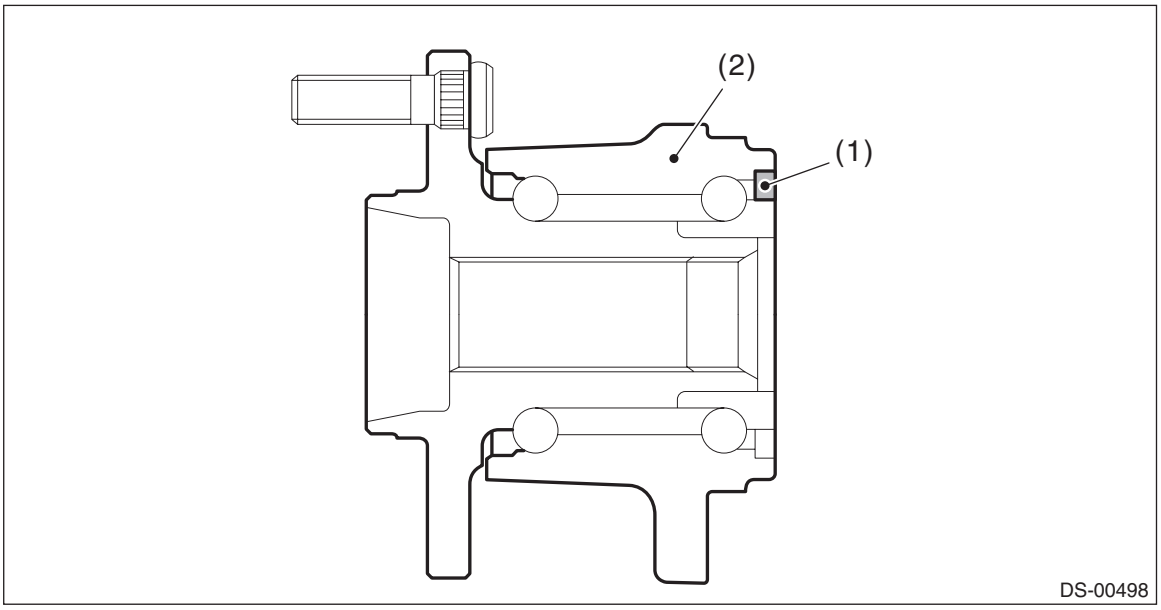
Preparation tool:
ST1: AXLE SHAFT PULLER (926470000)
ST2: AXLE SHAFT PULLER PLATE (28099PA110)



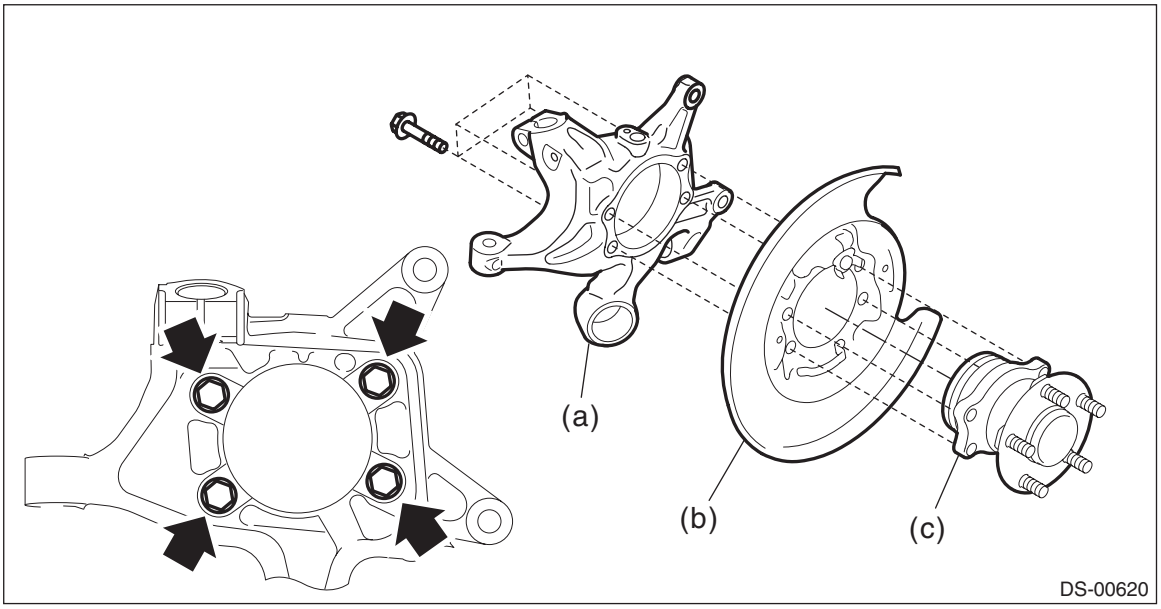
B: INSTALLATION

1) Place the back plate - rear brake between the housing assembly - rear axle and the hub unit COMPL - rear axle, and tighten the bolt.

CAUTION:
- **Be careful not to damage the magnetic encoder.**
- **Do not get closer the tool which charged magnetism to magnetic encoder.**



(1) Magnetic encoder (2) Hub unit COMPL - rear axle



(a) Housing ASSY - rear axle (b) Back plate - rear brake (c) Hub unit COMPL - rear axle

Tightening torque:
65 N·m (6.63 kgf-m, 47.9 ft-lb)

2) Install the rear axle shaft assembly.

CAUTION:
- **Do not tap the axle shaft using a hammer when installing axle shaft assembly.**
- **Use new nut - axle.**
  (1) Insert the axle shaft assembly into the hub spline, and pull in the axle shaft assembly into specified position.
  (2) Temporarily tighten the nut - axle.

3) Install the disc rotor to the hub unit COMPL - rear axle.
4) Install the caliper body assembly to the housing assembly - rear axle.

Tightening torque:
66 N·m (6.73 kgf-m, 48.7 ft-lb)

5) Install the rear ABS wheel speed sensor.

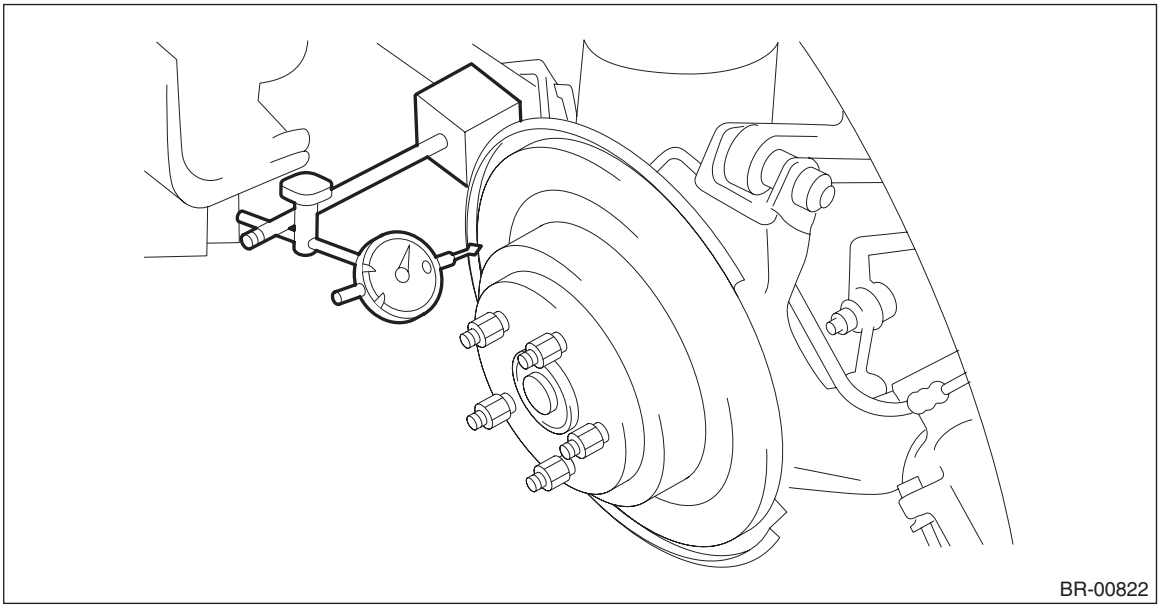
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

6) While depressing the brake pedal, tighten new nuts - axle to the specified torque.

CAUTION:
Do not load the rear axle before tightening the nut - axle. Doing so may damage the hub unit COMPL.

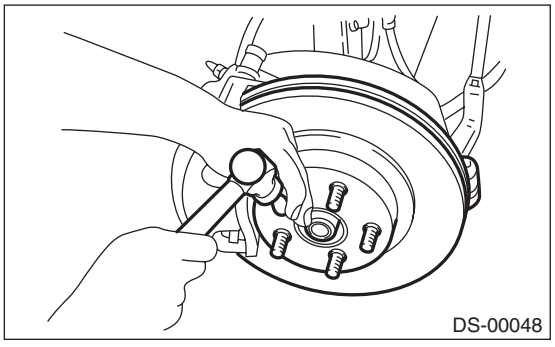
Tightening torque:
190 N·m (19.37 kgf-m, 140.1 ft-lb)

7) Inspect the lean of axis direction using a dial gauge. Replace the hub unit COMPL - rear axle if the play exceeds the limit.



Service limit:
Maximum: 0.05 mm (0.0020 in)

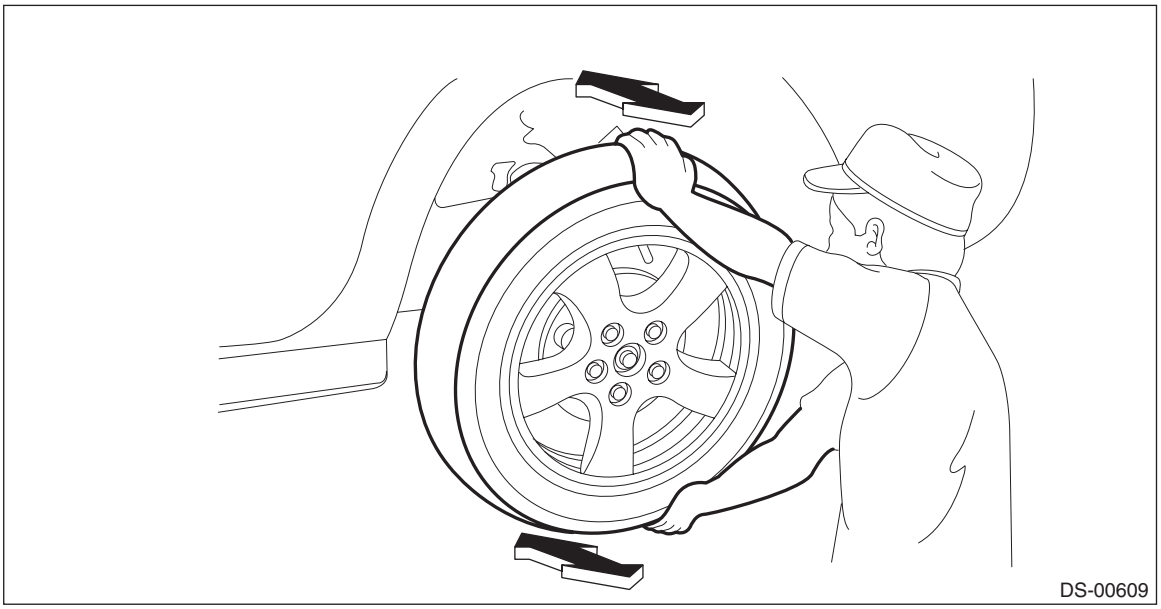
8) After tightening the nut - axle, lock it securely.



9) Install the rear wheels, and perform the following inspections.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

1. Check the wheels for smooth rotation.
2. Check that there is no play by moving the upper and lower portions of rear tire in an axial direction with the brake pedal released.



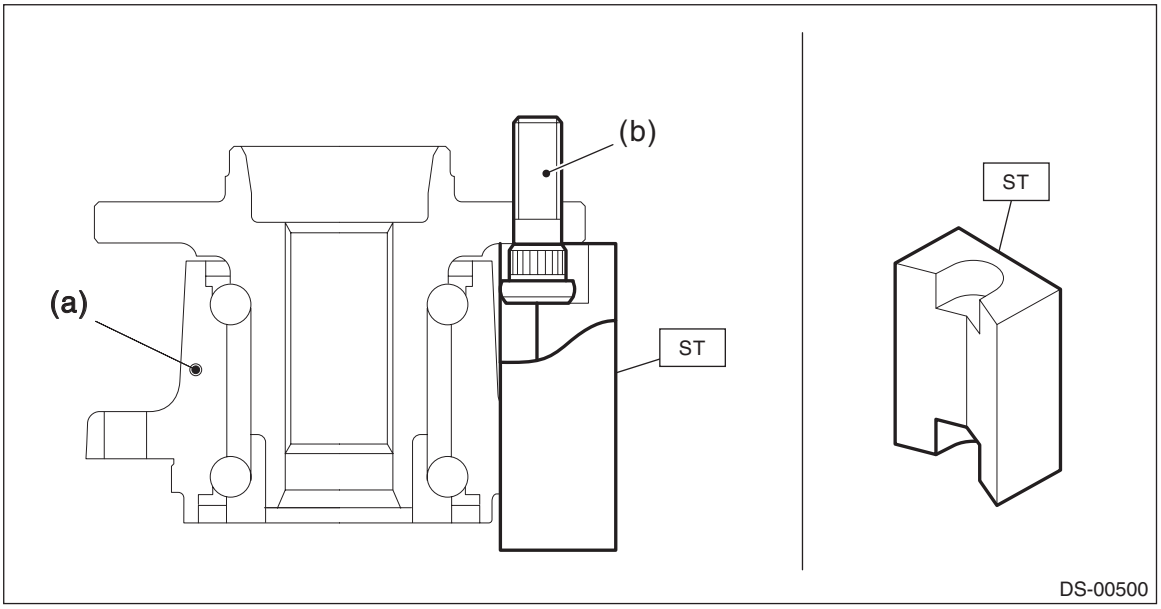
- **Play exists** → Check the hub unit COMPL - rear axle. <Ref. to DS-56, INSPECTION, Rear Hub Unit Bearing.>

C: DISASSEMBLY

Using the ST or a hydraulic press, push out the bolt - hub (b) from the hub unit COMPL - rear axle (a).

CAUTION:
- **Be careful not to hammer the bolts - hub. This may deform the hub unit COMPL.**
- **Do not reuse the bolt - hub.**

PREPARATION TOOL:
ST: HUB STAND (28399AG000)

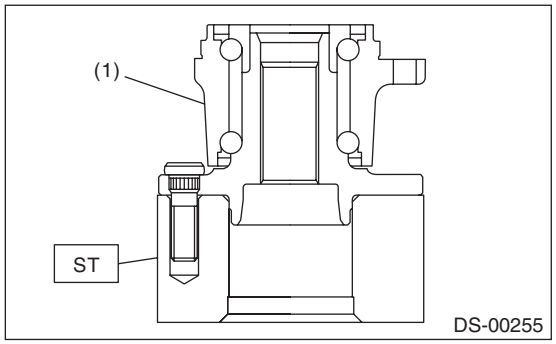


NOTE:
Since the hub unit COMPL - rear axle cannot be disassembled, only bolts - hub can be removed.

D: ASSEMBLY

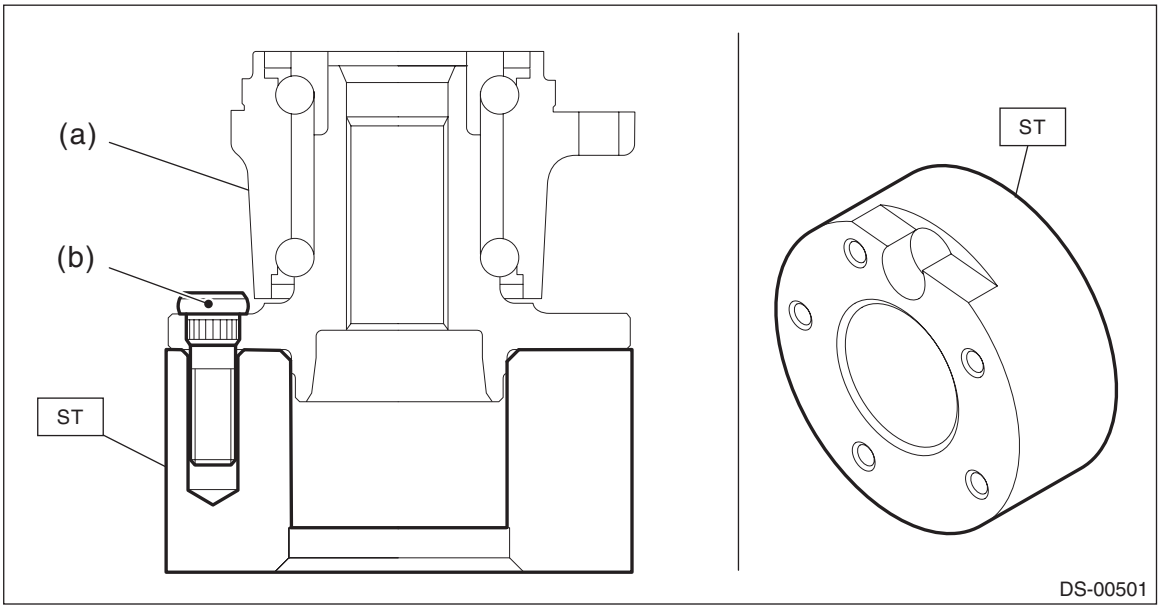
1) Install the hub unit COMPL - rear axle to the ST securely.

Preparation tool:
ST: HUB STAND (927080000)



(1) Hub unit COMPL - rear axle

2) Using a press, press new bolts - hub (b) until their seating surfaces contact the hub unit COMPL - rear axle (a).

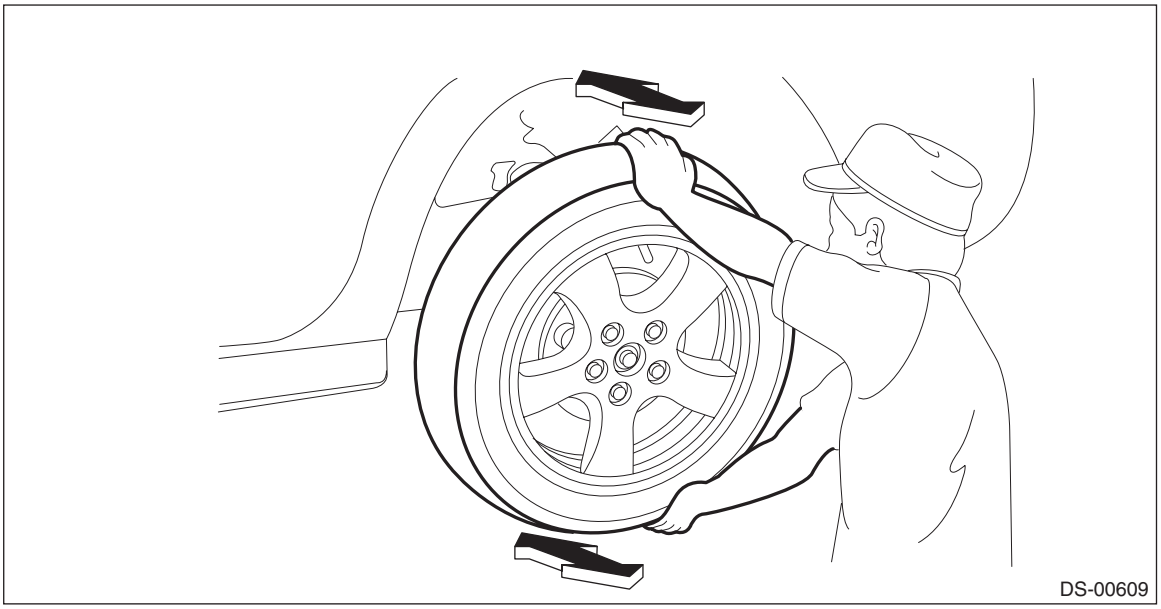


NOTE:
Use the 12 mm (0.47 in) dia. holes in the HUB STAND to prevent bolts from tilting.

E: INSPECTION

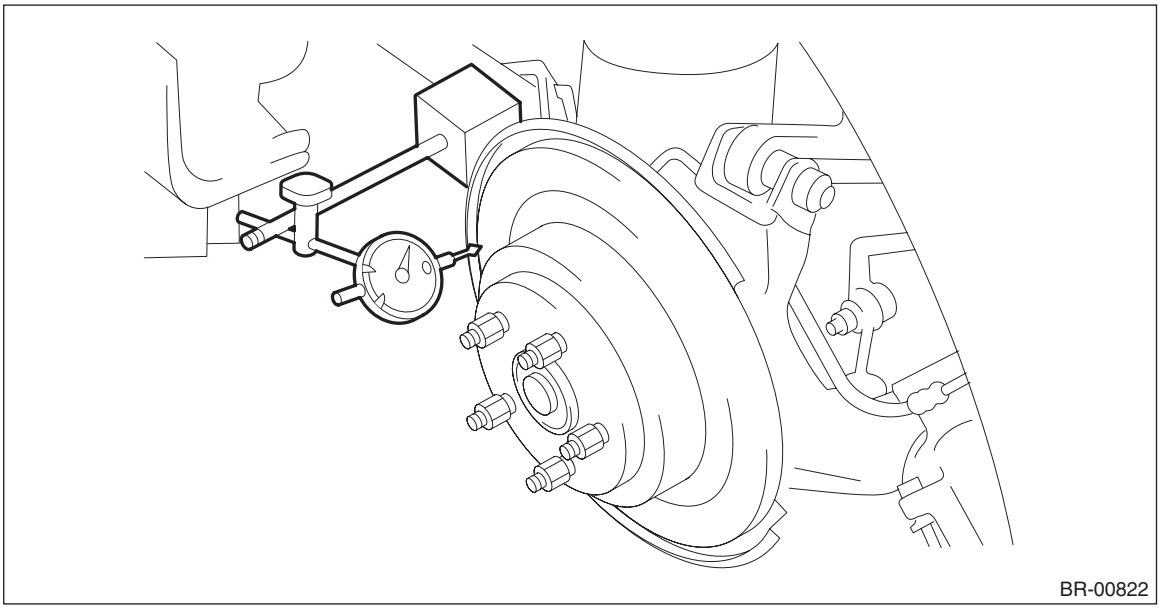
1) Moving the rear tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.

CAUTION:
If there is any fault in the bearing, replace the hub unit COMPL - rear axle.



2) Inspect the lean of axis direction using a dial gauge. Replace the hub unit COMPL - rear axle if the play exceeds the limit.

Service limit:
Maximum: 0.05 mm (0.0020 in)



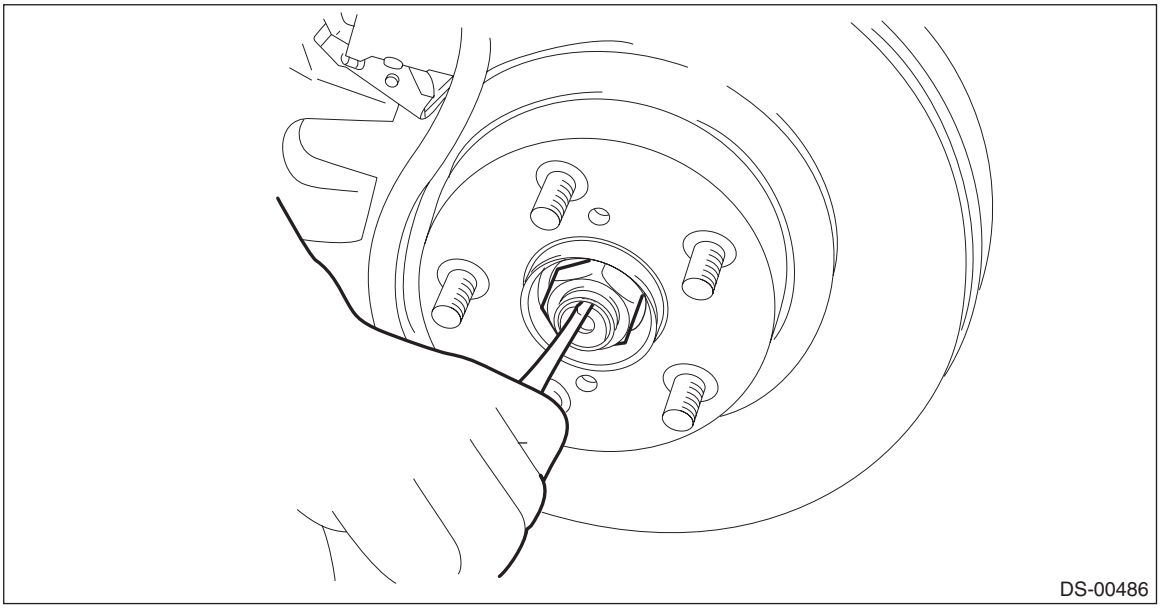
7. Front Drive Shaft

A: REMOVAL

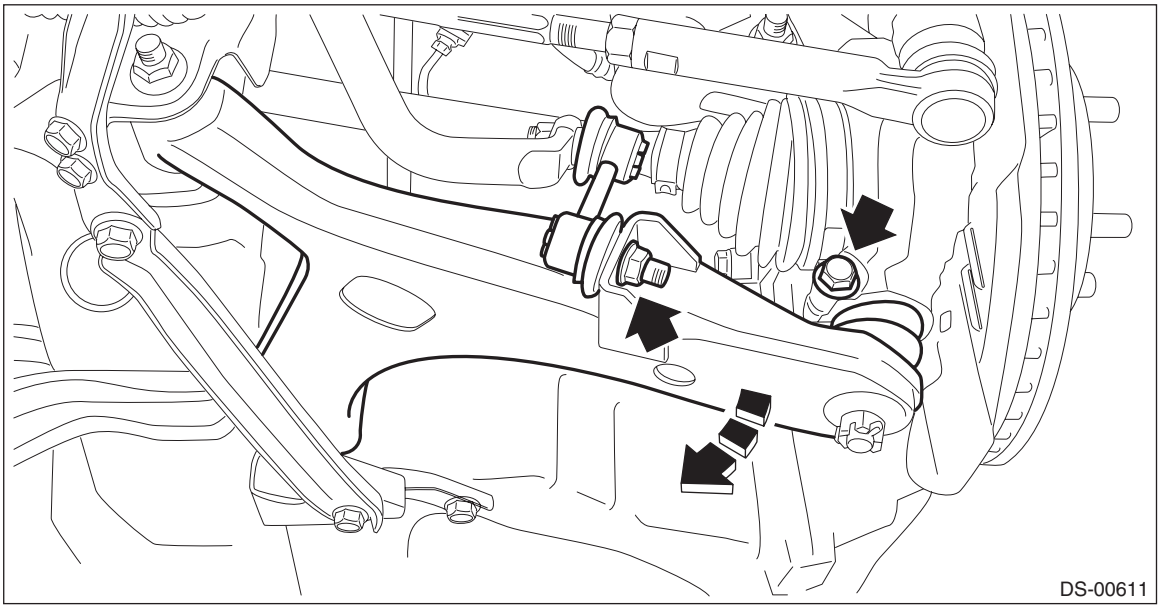
1) Lift up the vehicle, and then remove the front wheels.
2) Remove the nut - axle.

CAUTION:
Do not loosen the nut - axle while the front axle is loaded. Doing so may damage the hub unit COMPL.

(1) Lift the crimped section of the nut - axle.
(2) Remove the nut - axle using a socket wrench while depressing the brake pedal.



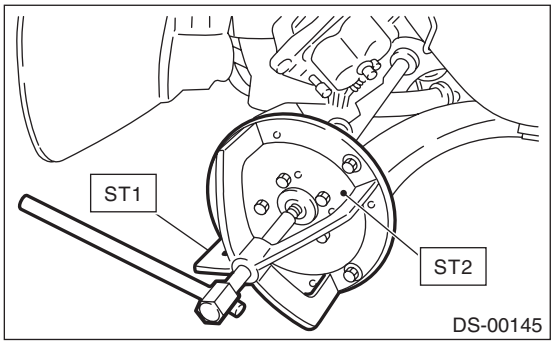
3) Drain the transmission gear oil. (MT model)
4) Drain differential gear oil. (CVT model)
5) Disconnect the ball joint assembly.
(1) Remove the nut and disconnect the front stabilizer link.
(2) Remove the bolts, disconnect the front arm ball joint, and lower the front arm assembly.



6) Remove the front axle shaft assembly from the housing assembly - front axle.

NOTE:
If it is hard to remove, use the ST.

PREPARATION TOOL:
ST1: AXLE SHAFT PULLER (926470000)
ST2: AXLE SHAFT PULLER PLATE (28099PA110)



7) Using a crowbar, remove the front axle shaft assembly from the transmission.

CAUTION:
Be careful not to allow the bar to damage holder area.

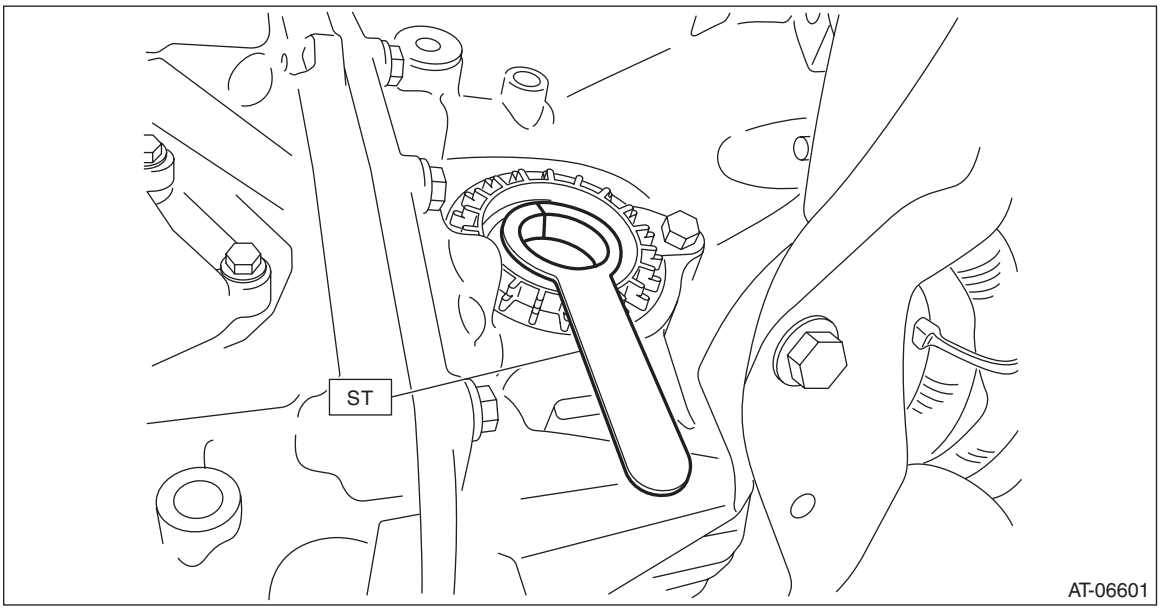
B: INSTALLATION

1) Before installation, check the axle shaft assembly. <Ref. to DS-70, INSPECTION, Front Drive Shaft.>
2) Replace the differential side retainer oil seal with a new part.
- 5MT model: <Ref. to 5MT-34, REPLACEMENT, Differential Side Retainer Oil Seal.>
- CVT model: <Ref. to CVT-85, REPLACEMENT, Differential Side Retainer Oil Seal.>

NOTE:
After pulling out the axle shaft assembly, be sure to replace with a new oil seal.
3) Insert the axle shaft assembly into the hub spline, and pull in the axle shaft assembly into specified position.

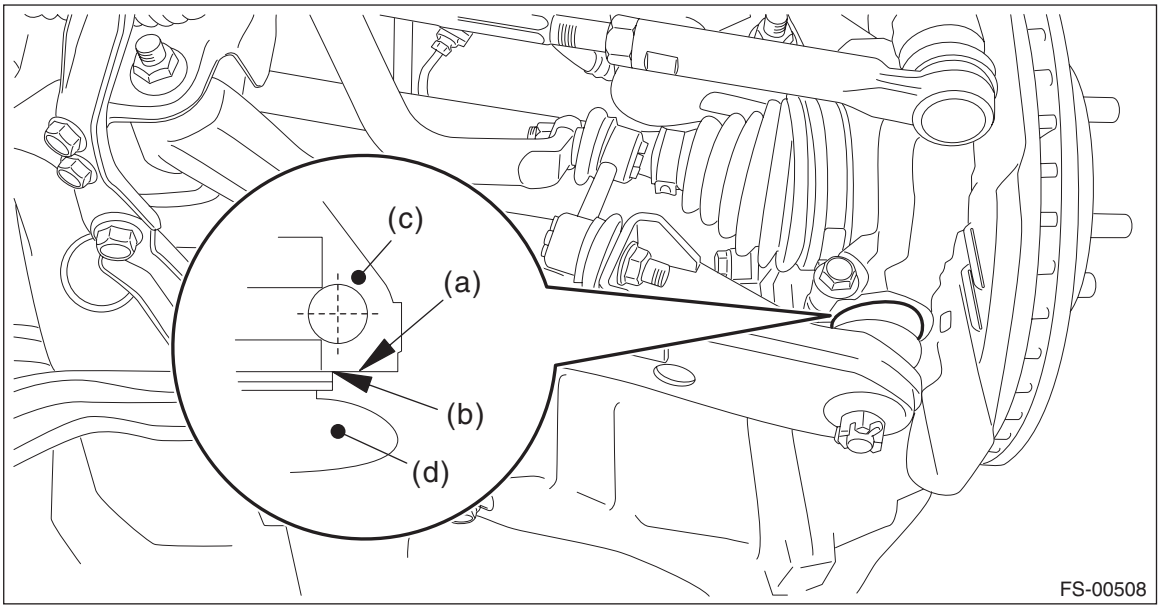
CAUTION:
Do not tap the axle shaft using a hammer when installing axle shaft assembly.
4) Temporarily tighten the nut - axle.
5) Using the ST, install the front axle shaft assembly to the transmission.

Preparation tool:
ST: OIL SEAL PROTECTOR (28399SA010)



6) Install the ball joint assembly to the housing assembly - front axle.

CAUTION:
Before tightening, make sure the bottom surface of the housing assembly - front axle and the stepped section of ball joint are in contact.



(a) Bottom surface of housing ASSY - front axle
(b) Raised section of ball joint
(c) Housing ASSY - front axle
(d) Ball joint

Tightening torque:
50 N·m (5.10 kgf-m, 36.9 ft-lb)

7) Install the stabilizer link.
- Except for XV model

Tightening torque:
38 N·m (3.87 kgf-m, 28.0 ft-lb)
- XV model

Tightening torque:
60 N·m (6.12 kgf-m, 44.3 ft-lb)

8) While depressing the brake pedal, tighten new nuts - axle to the specified torque.

CAUTION:
Do not load the front axle before tightening the nut - axle. Doing so may damage the hub unit COMPL.

Tightening torque:
220 N·m (22.43 kgf-m, 162.3 ft-lb)

9) After tightening the nut - axle, lock it securely.
10) Fill transmission gear oil. (MT model)
11) Fill differential gear oil. (CVT model)
12) Install the front wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

13) Inspect the wheel alignment and adjust if necessary.
- Inspection: <Ref. to FS-7, INSPECTION, Wheel Alignment.>
- Adjustment: <Ref. to FS-12, ADJUSTMENT, Wheel Alignment.>

CAUTION:
When the wheel alignment has been adjusted, perform “VDC sensor midpoint setting mode.”.

14) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

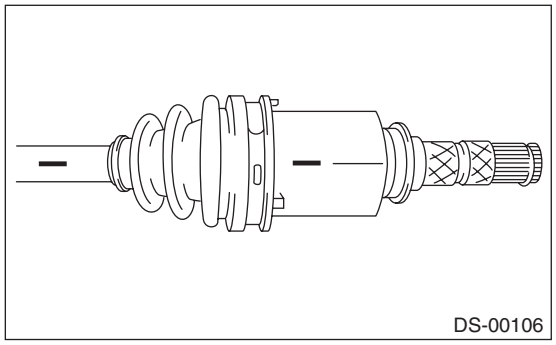
C: DISASSEMBLY

1. AC + AAR TYPE

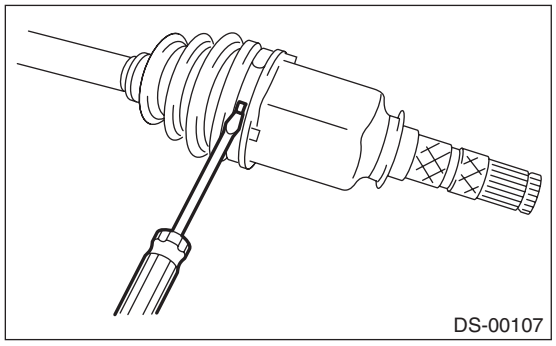
1) Remove the AAR outer race from shaft assembly.

CAUTION:
Be careful not to damage the boot.

(1) Place alignment marks on the shaft and outer race.

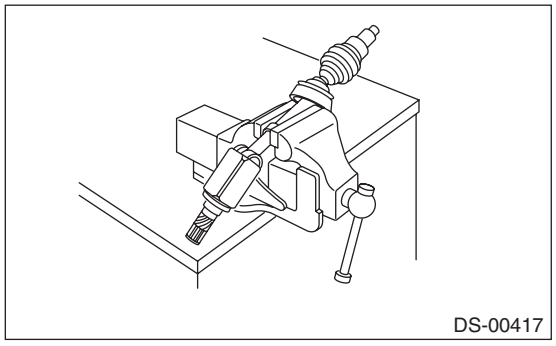

DS-00106

(2) Remove the AAR boot band and boot.


DS-00107

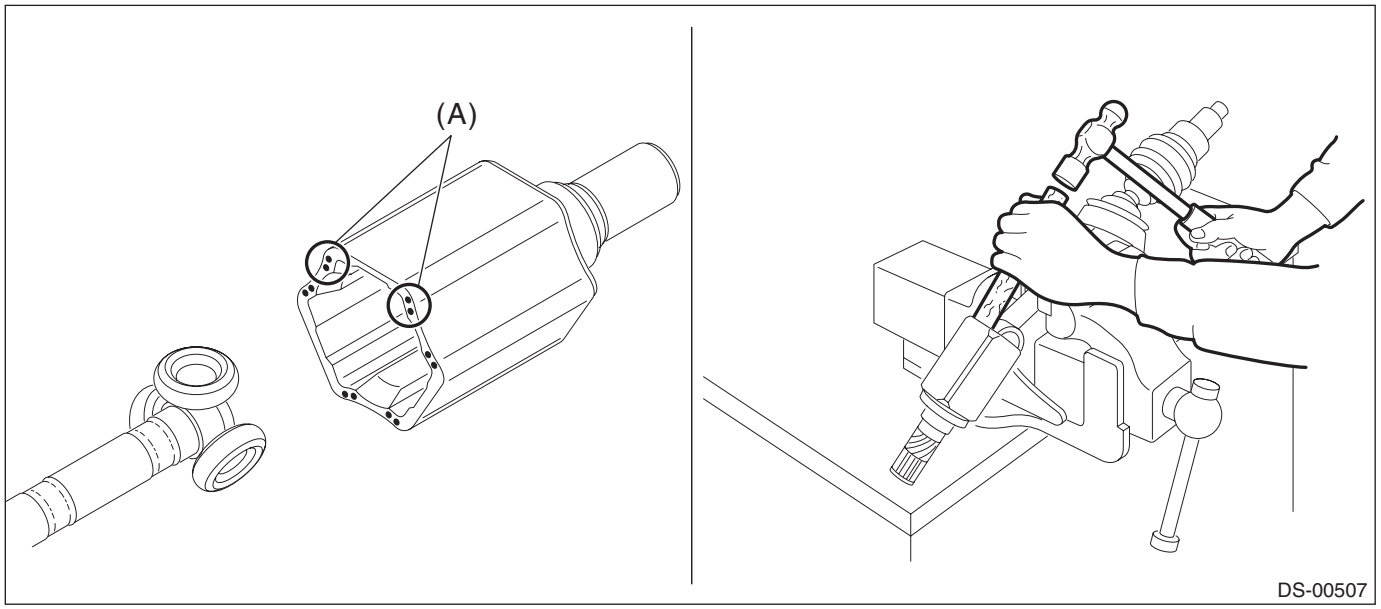
(3) Place the axle shaft between wooden blocks and fix it on a vise.

CAUTION:
Do not set the axle shaft directly on a vise.


DS-00417

(4) Tap the staking are of the outer race alternately with a plastic or wooden bar, and remove one roller at a time.

CAUTION:
- **Tap the staking area (A) of the outer race.**
- **Do not use a metal bar as the outer race may deform.**
- **Be careful not to damage the roller parts.**



(5) Remove the outer race from shaft assembly.

CAUTION:
Make sure to have your associate held the outer race when removing the third roller to prevent the outer race from falling.

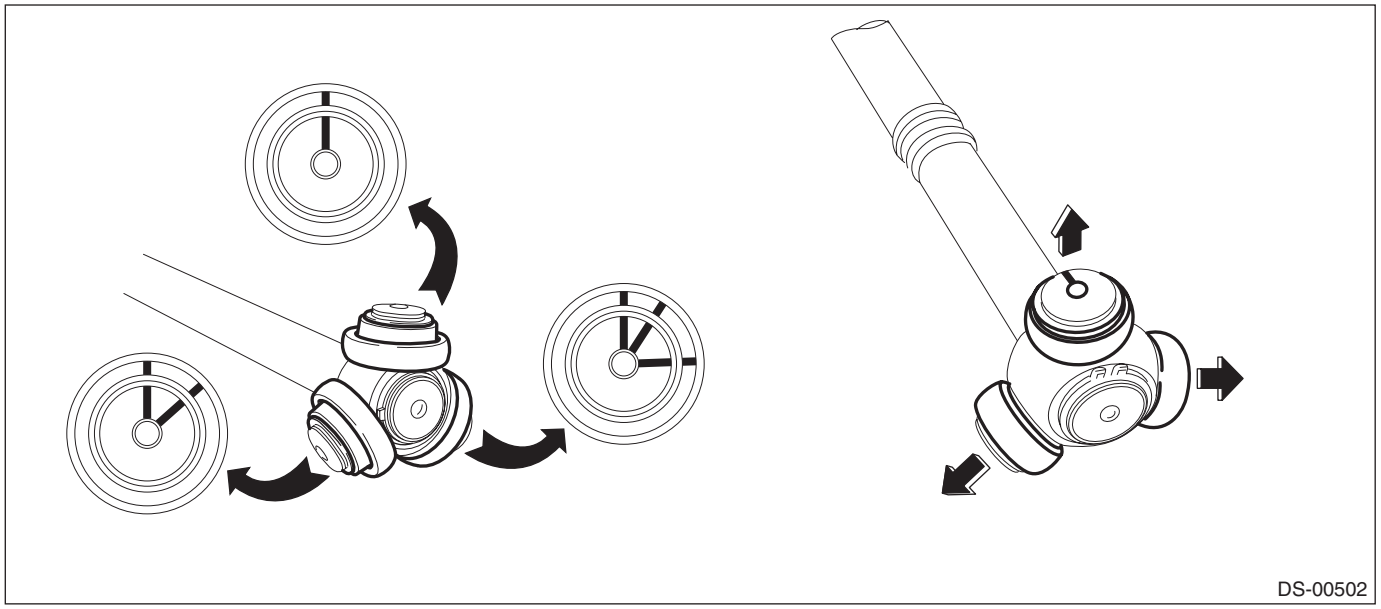
(6) Wipe off grease.

CAUTION:
The grease is a special type of grease. Do not mix with other grease.

2) Remove the roller kit from trunnion.

CAUTION:
Be careful with the roller kit position.

(1) Place alignment marks on the roller kit and trunnion.



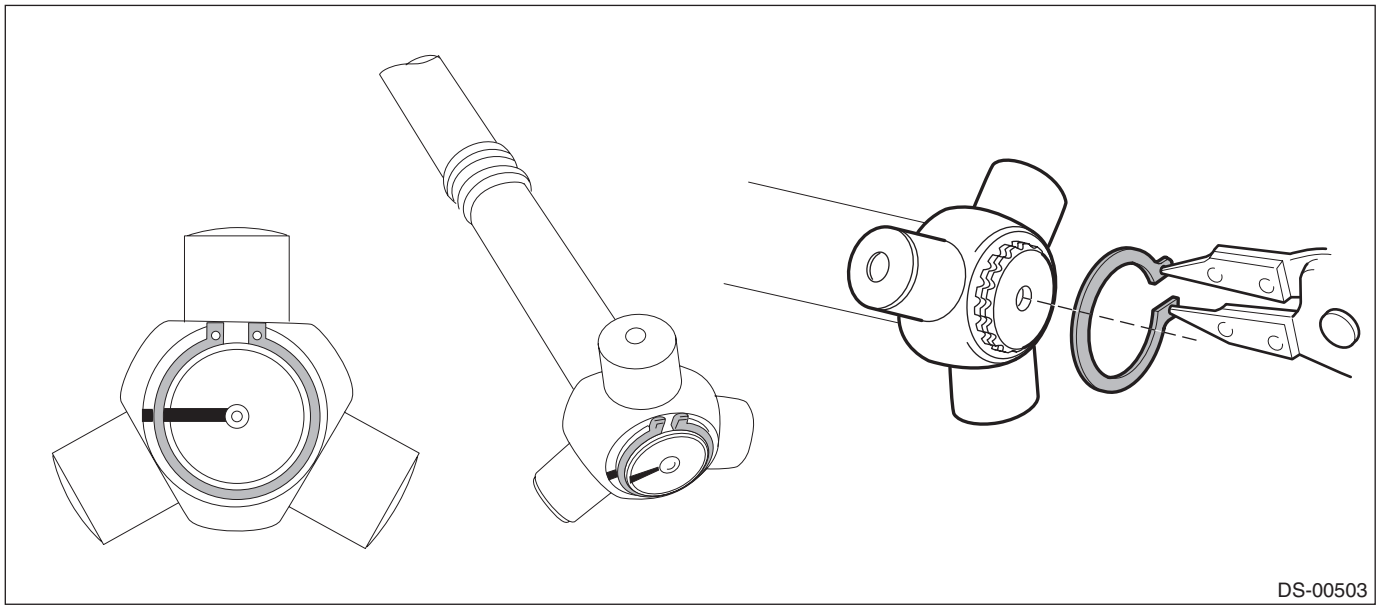
(2) Remove the roller kit from trunnion.

3) Remove the trunnion from the shaft.

(1) Place alignment marks on the trunnion and shaft.

(2) Remove the snap ring and trunnion.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to protect the boot from scratches.

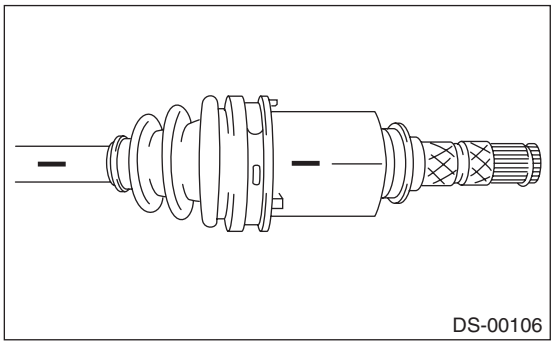


4) Remove the AAR boot.

NOTE:
The AC is a non-disassembly part, so the axle shaft disassembly stops here.

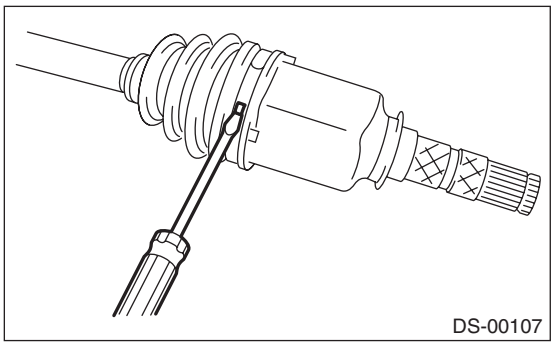
2. EBJ + PTJ TYPE

1) Place alignment marks on the shaft and outer race.

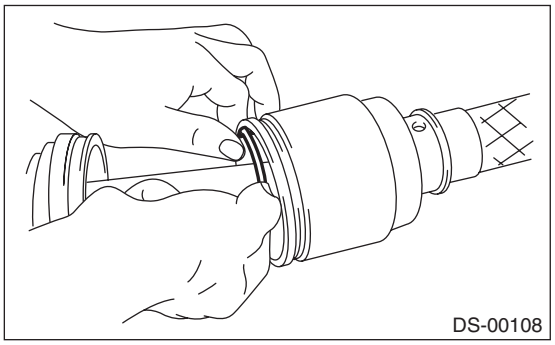


2) Remove the PTJ boot band and boot.

CAUTION:
Be careful not to damage the boot.



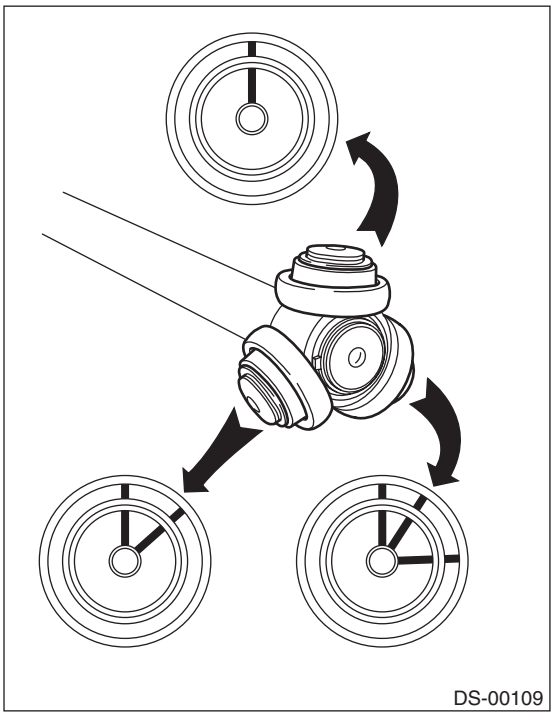
3) Remove the snap ring from PTJ outer race.



4) Remove the PTJ outer race from shaft assembly.
5) Wipe off grease.

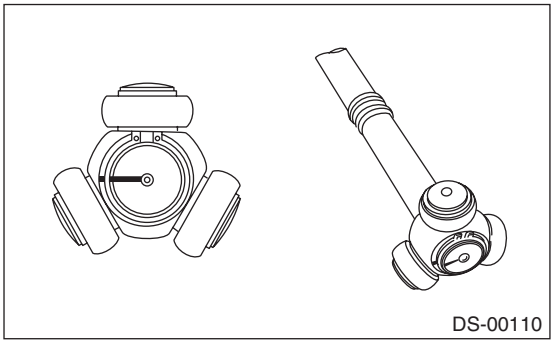
CAUTION:
The grease is a special type of grease. Do not mix with other grease.

6) Place alignment marks on the roller kit and trunnion.



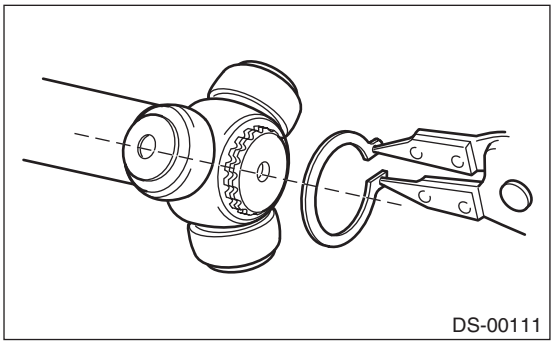
7) Remove the roller kit from trunnion.

CAUTION:
Be careful with the roller kit position.
8) Place alignment marks on the trunnion and shaft.



9) Remove the snap ring and trunnion.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to protect the boot from scratches.



10) Remove the PTJ boot.
11) Remove the O-ring from the groove of the shaft.

NOTE:
The EBJ is a non-disassembly part, so the axle disassembly stops here.

D: ASSEMBLY

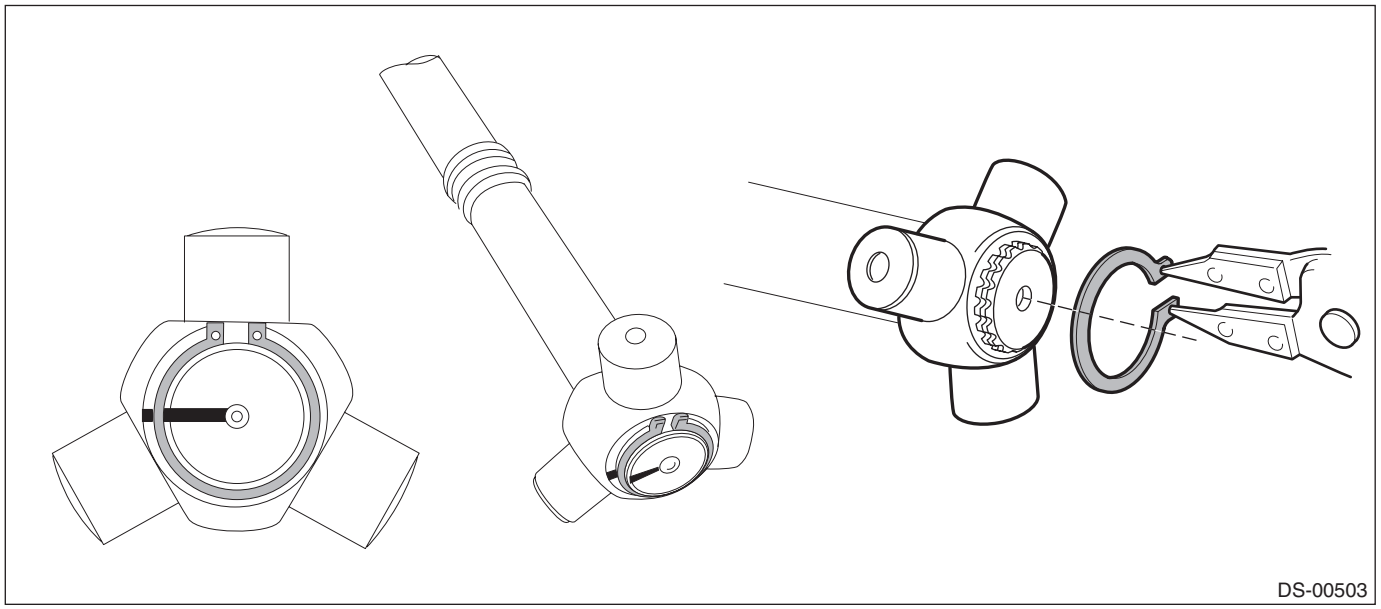
1. AC + AAR TYPE

NOTE:
Use specified grease.

AAR side:
One-Luber C

1) Pass the AAR boot through the shaft.
2) Install the trunnion to the shaft.
   (1) Match the alignment marks, and attach the trunnion onto the shaft.
   (2) Attach the snap ring to the shaft.

CAUTION:
Confirm that the snap ring is completely fitted in the shaft groove.

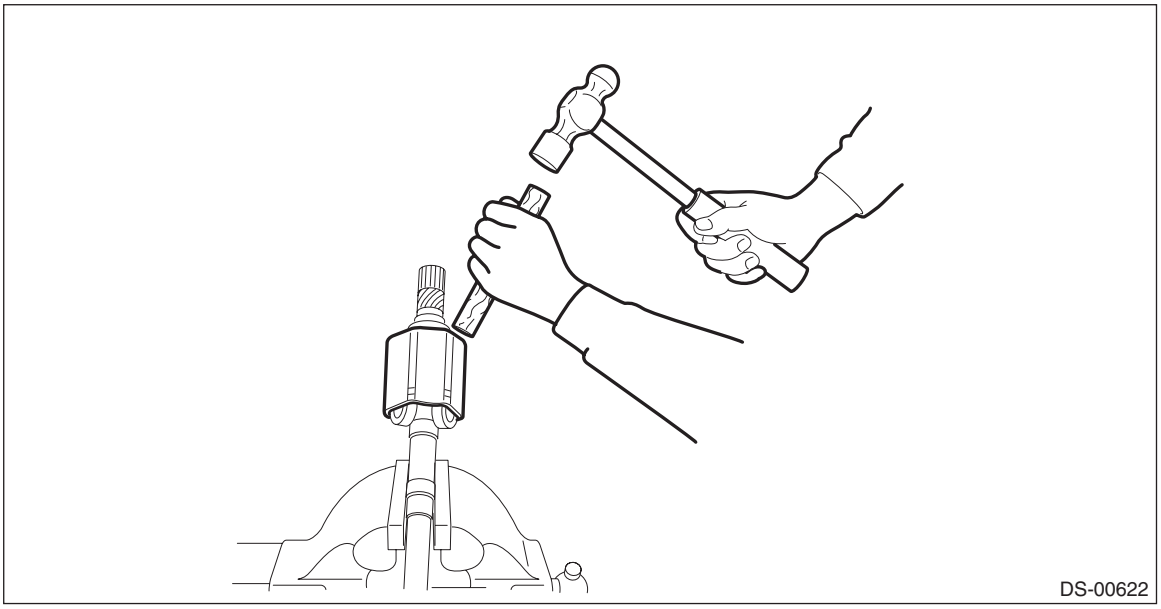


3) Fill 50 to 60 g (1.76 to 2.12 oz) of specified grease into the interior of AAR outer race.
4) Install the trunnion to the roller kit.
   (1) Apply a thin coat of specified grease to the roller kit and trunnion.
   (2) Place the axle shaft between wooden blocks and fix it on a vise.

CAUTION:
Do not set the axle shaft directly on a vise.
5) Align the alignment marks on the shaft and outer race.

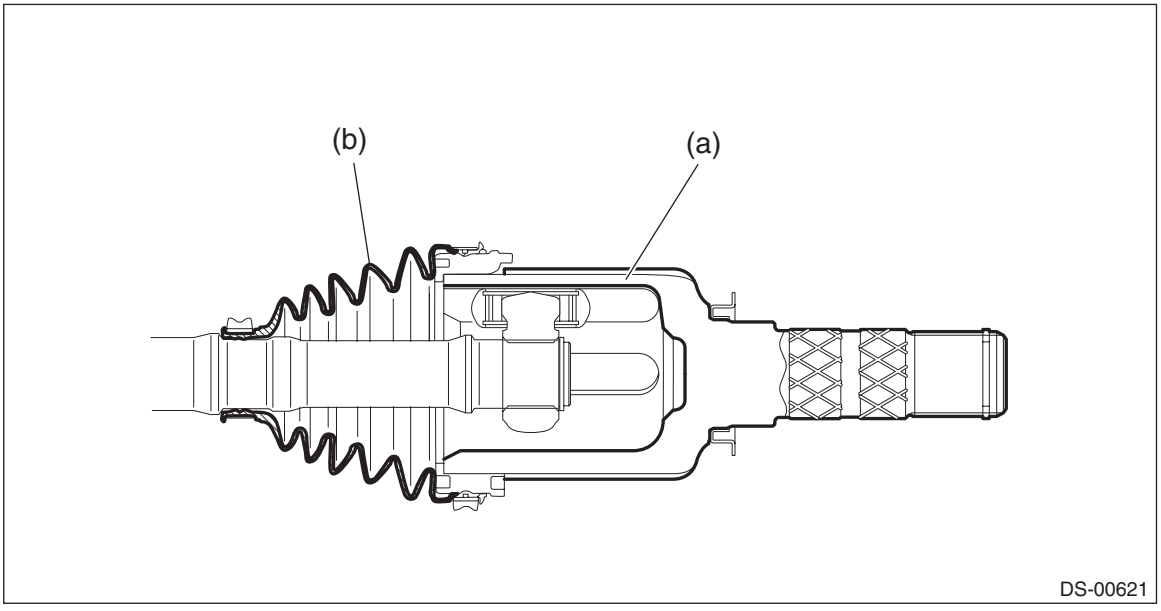
6) Tap the insertion upper part of the outer race alternately using a plastic or wood bar shown in the figure, and then insert the roller one by one.

CAUTION:
- **Do not use a metal bar as the outer race may deform.**
- **Do not tap on the end of outer race (shaft part).**
- **Be careful not to deform the baffle plate.**



7) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz) to the entire inner surface of boot.
8) Install the AAR boot taking care not to twist it.

CAUTION:
Do not let grease get on groove of the outer race side.



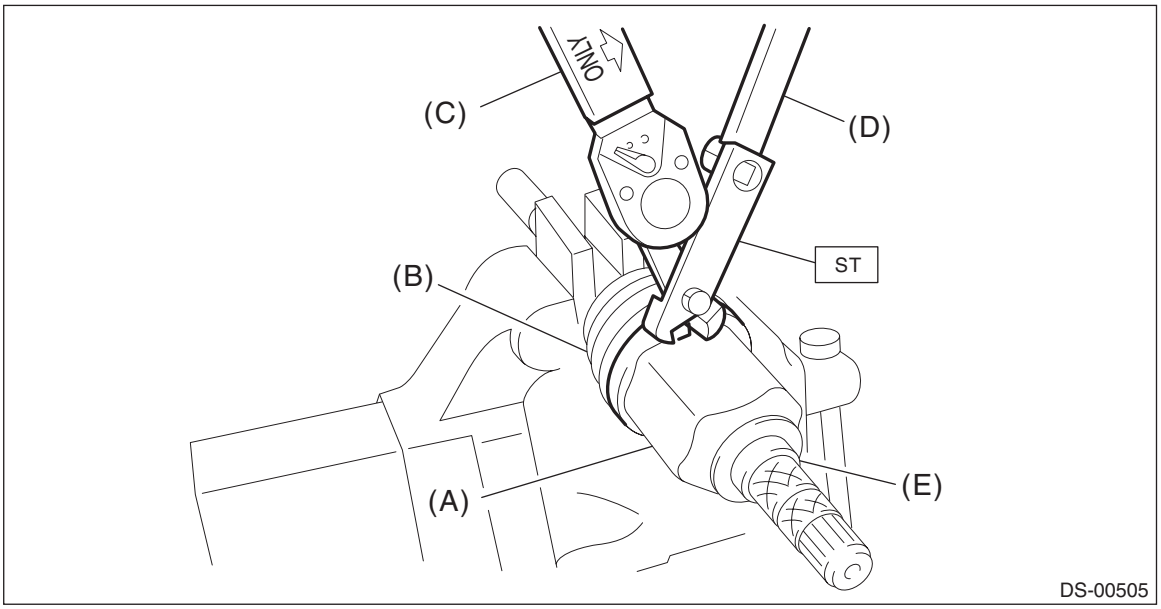
(a) Outer race (b) Boot

9) Insert a flat tip screwdriver, etc. between outer race and boot to make pressure inside of boot as high as barometric pressure.

10) Tighten the boot band.
(1) Install the new large boot band and small boot band at the required positions.
(2) Connect the torque wrench and socket flex handle to the ST.

Preparation tool:
ST: BOOT BAND PLIER (28099AC000)
Torque wrench
Socket flex handle

(3) Use a prepared tool, tighten the boot band.



(A) Large boot band
(B) Boot
(C) Torque wrench
(D) Socket flex handle
(E) Outer race

Clearance at the crimped section of the boot band:
Large boot band: 1 mm (0.04 in) or less
Small boot band: 1 mm (0.04 in) or less

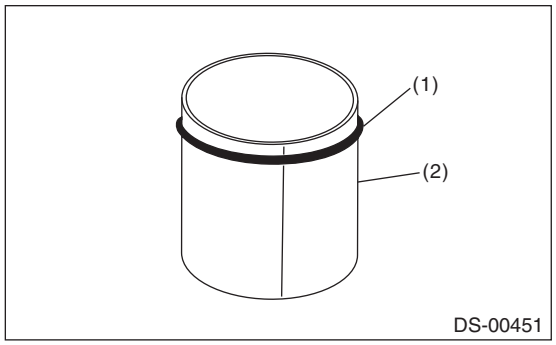
Tightening torque:
Large boot band: 178 N·m (18.15 kgf-m, 131.3 ft-lb)
Small boot band: 145 N·m (14.79 kgf-m, 106.9 ft-lb)

11) Extend and retract the AAR repeatedly to provide an equal coating of grease.

2. EBJ + PTJ TYPE

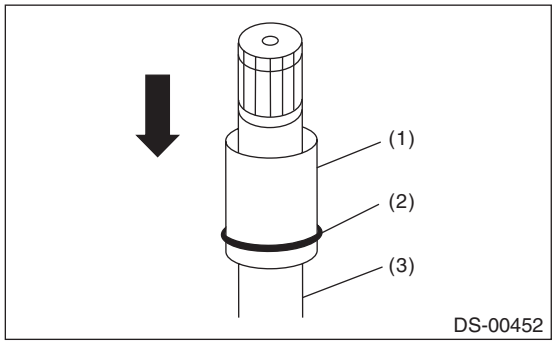
1) Roll up a thick piece of paper to a size where the shaft can pass through, and affix with tape to form a cylinder.
2) Attach a new O-ring on this cylinder.

CAUTION:
• Always use a new O-ring.
• Be careful that the O-ring does not become scratched and that there are no foreign objects attached to it.
• Make sure to install the O-ring so that it does not twist as much as possible.
• Do not stretch the O-ring to 30 mm (1.18 in) inner diameter or more.



(1) O-ring
(2) Cylinder made with thick paper, etc.

3) Pass the cylinder material onto the shaft, and slide in the direction of the shaft axis.

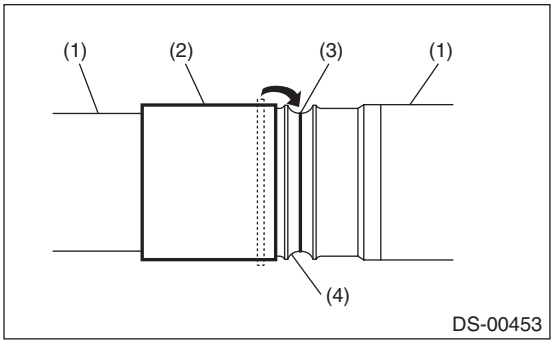


(1) Cylinder material
(2) O-ring
(3) Shaft

4) Clean the shaft boot groove, and wipe off the grease.

5) Slide the cylinder material near the shaft boot groove, and move the O-ring from the cylinder material onto the shaft boot groove.

CAUTION:
• Attach the O-ring to the shaft boot groove center.
• Be careful that the O-ring does not become scratched and that there are no foreign objects attached to it.
• Make sure to install the O-ring so that it does not twist as much as possible.
• With the O-ring attached, do not wash with kerosene, gasoline, etc.

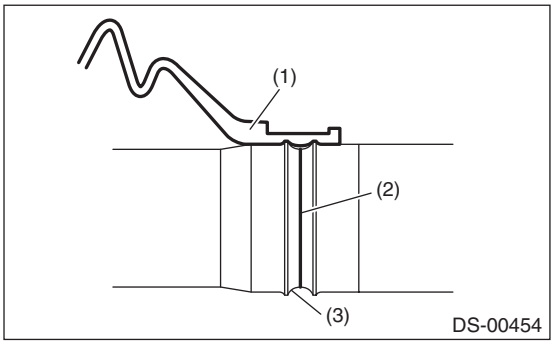


(1) Shaft
(2) Cylinder material
(3) O-ring
(4) Boot groove

6) Pass the PTJ small diameter boot band through the shaft.
7) Wrap vinyl tape around the splines of the shaft.

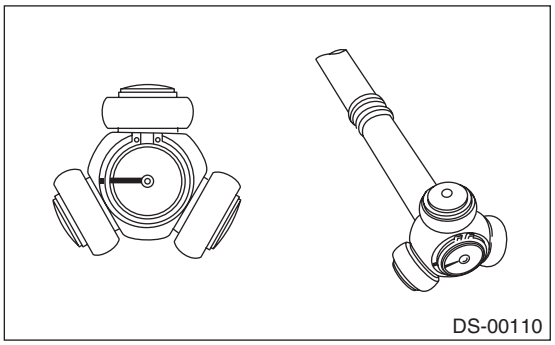
CAUTION:
To prevent damage to the boots, make sure to always wrap with vinyl tape for protection.
8) Install a new PTJ boot.

CAUTION:
Make sure to fit securely on the boot groove of the shaft.



(1) PTJ boot
(2) O-ring
(3) Boot groove

9) Match the alignment marks, and attach the trunnion onto the shaft.



10) Attach the snap ring to the shaft.

CAUTION:
Confirm that the snap ring is completely fitted in the shaft groove.

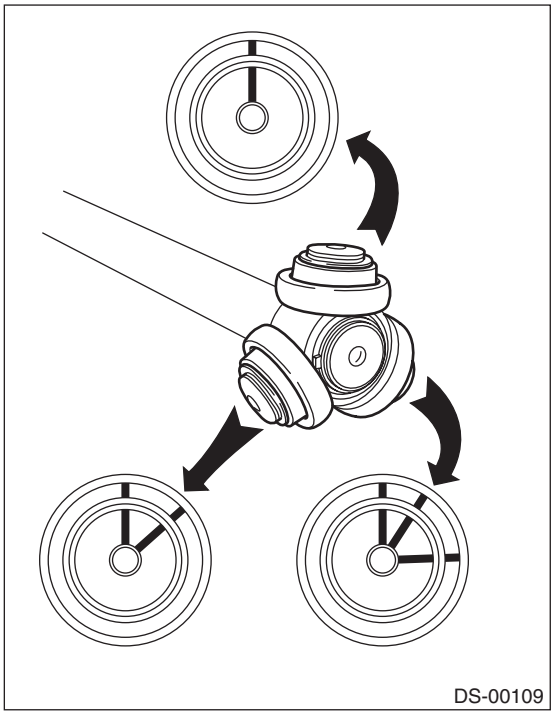
11) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of the PTJ outer race.

Grease:
NKG302

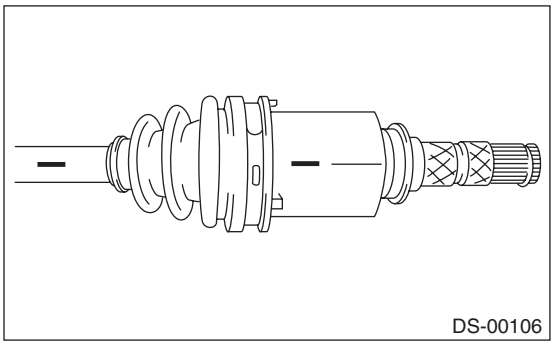
12) Apply a thin coat of specified grease to the roller kit and trunnion.

13) Match the alignment marks of the roller kit and trunnion, and attach the roller kit.

CAUTION:
Be careful with the roller kit position.



14) Match the alignment marks of the shaft and outer race, and attach the outer race.



15) Install the snap ring in the groove of the PTJ outer race.

CAUTION:
Pull the shaft lightly and make sure that the snap ring is completely fitted in the groove.

16) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz) to the entire inner surface of boot.

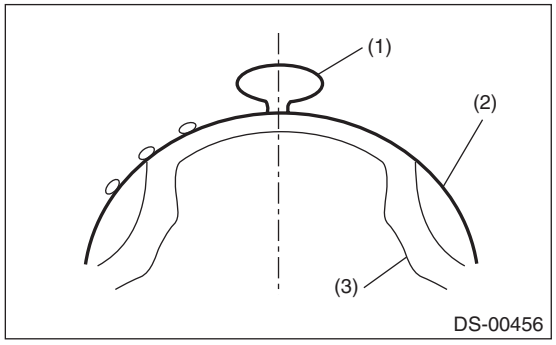
17) Attach the PTJ boot taking care not to twist it.

CAUTION:
- **Clean the large end of PTJ boot and the boot groove well, and remove the grease and other substances.**
- **When installing the PTJ boot, position the outer race of the PTJ at center of the stroke.**

18) Set the new boot band at the specified position.

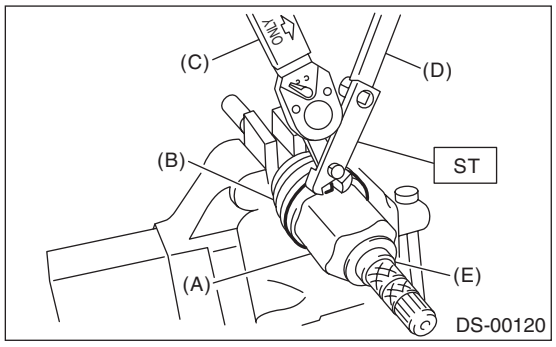
19) Tighten the boot bands using ST, torque wrench and socket flex handle.

CAUTION:
The large boot band is to be tightened so that the omega shaped part is at the position indicated in the figure below.



(1) Omega shaped part
(2) Boot band
(3) Outer race

ST 28099AC000 BOOT BAND PLIER



(A) Large boot band
(B) Boot
(C) Torque wrench
(D) Socket flex handle
(E) Outer race

Tightening torque:
Large boot band
178 N·m (18.15 kgf-m, 131.3 ft-lb)
Small boot band
145 N·m (14.79 kgf-m, 106.9 ft-lb)

20) Extend and retract the PTJ repeatedly so that grease is spread evenly.

E: INSPECTION

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.

- **AAR and AC:**

Check for seizure, corrosion, damage, wear and excessive play.

- **PTJ (Pillow Tripod Joint)**

Check for seizure, corrosion, damage, wear and excessive play.

- **EBJ (High-Efficiency Compact Ball fixed Joint)**

Check for seizure, corrosion, damage and excessive play.

- **Shaft:**

Check for excessive bending, twisting, damage and wear.

- **Boot:**

Check for wear, warping, breakage and scratches.

- **Grease:**

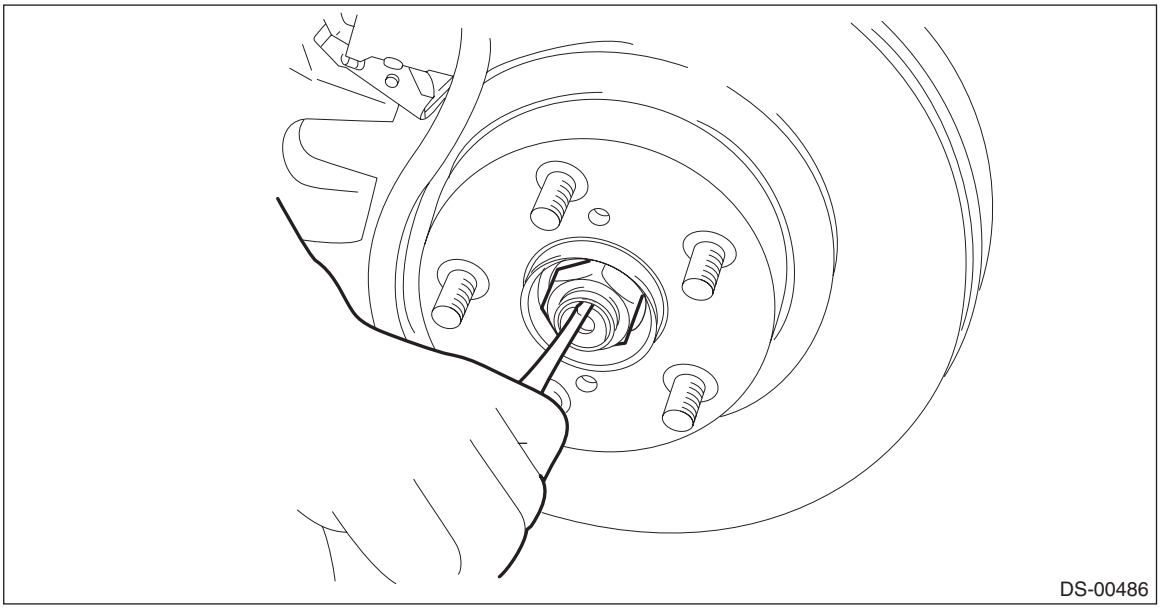
Check for discoloration and fluidity.

8. Rear Drive Shaft

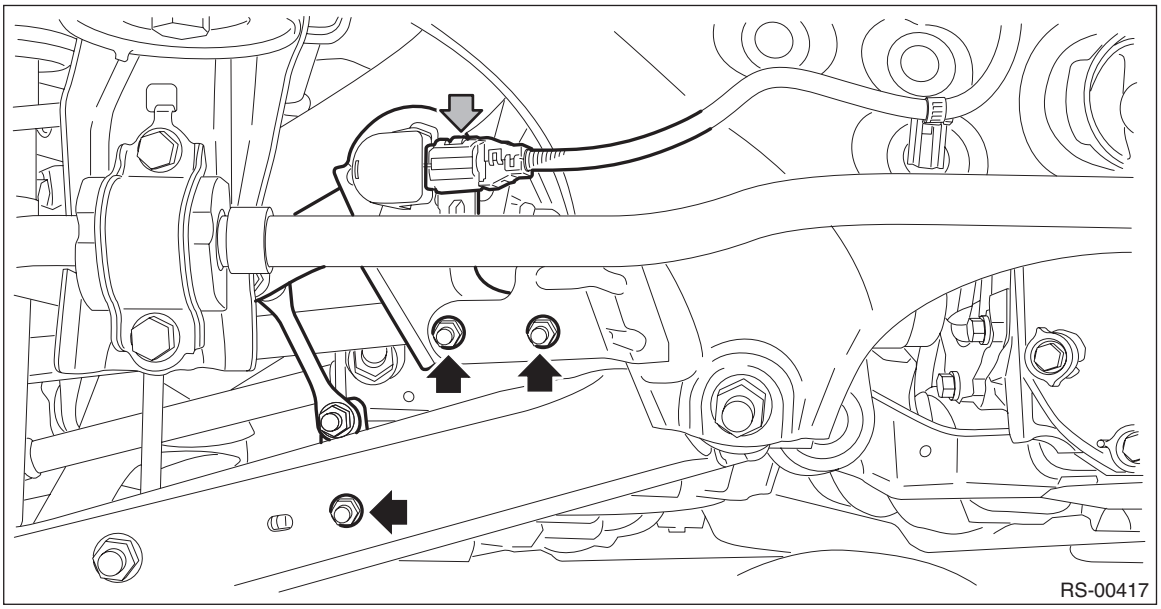
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the nut - axle.

CAUTION:
Do not loosen the nut - axle while the rear axle is loaded. Doing so may damage the hub unit COMPL.
(1) Lift the crimped section of the nut - axle.
(2) Remove the nut - axle using a socket wrench while depressing the brake pedal.


DS-00486

4) Remove the sensor assembly - headlight beam leveler. (Model with auto headlight beam leveler)
(1) Disconnect the connector of the sensor assembly - headlight beam leveler.
(2) Remove the bolts and nuts, and remove the sensor assembly - headlight beam leveler.

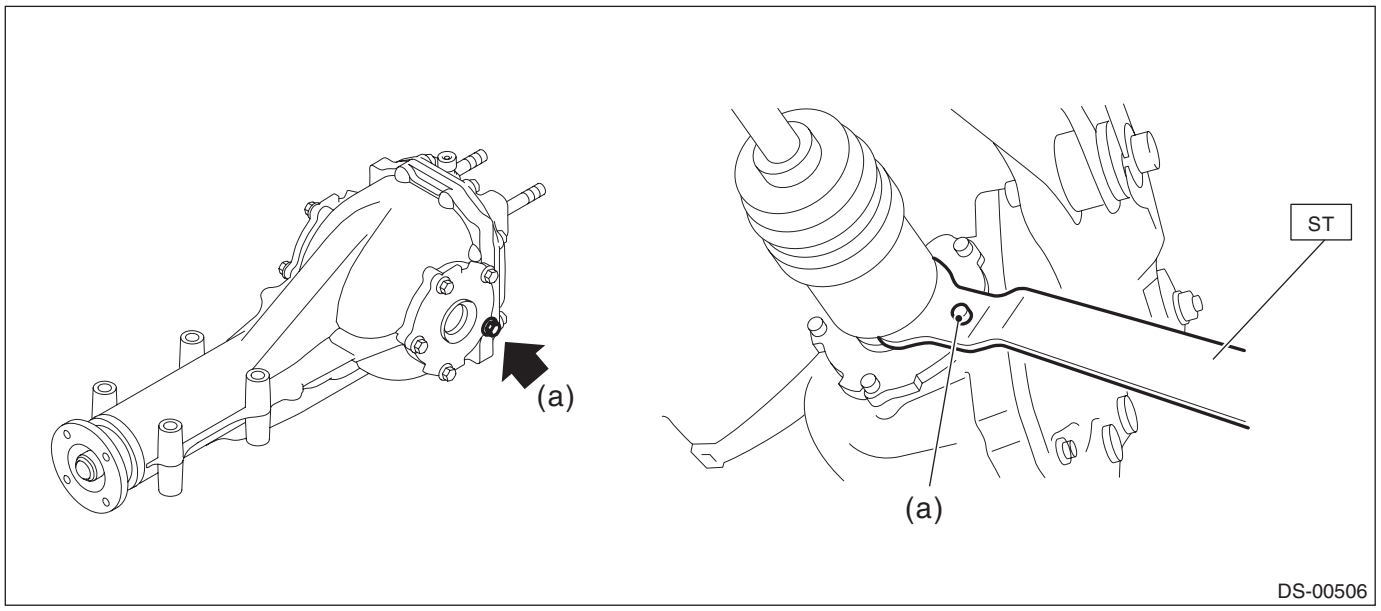

RS-00417

5) Drain differential gear oil.
6) Remove the propeller shaft. <Ref. to DS-12, REMOVAL, Propeller Shaft.>

7) Loosen the joint of rear differential assembly and rear axle shaft assembly.
- T type: Pull out the rear axle shaft assembly by fitting the ST to the bolt (a) as shown in the figure.

CAUTION:
Fit the ST to the bolts as shown in the figure to prevent damage of the side bearing retainer.

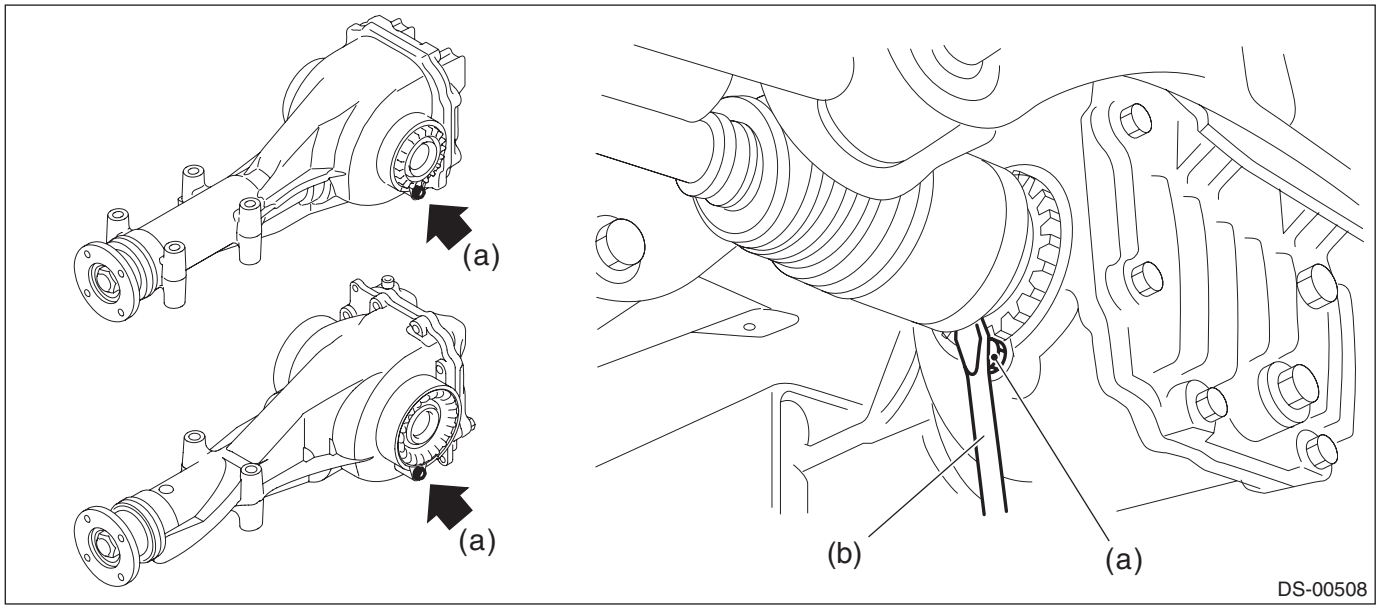
Preparation tool:
ST: DRIVE SHAFT REMOVER (28099PA100)



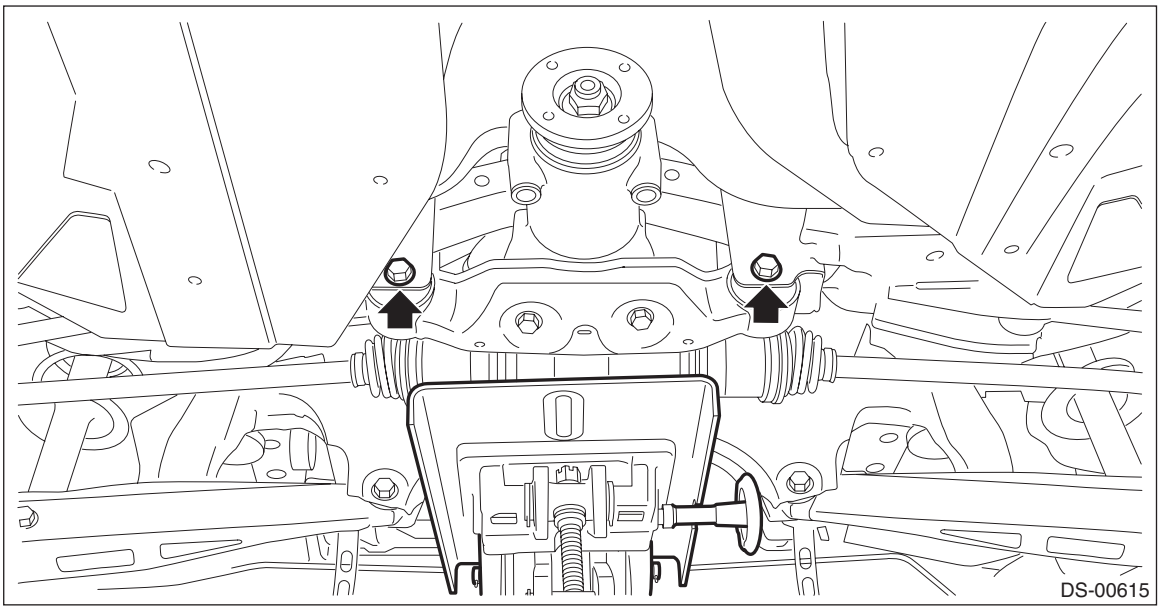
- VA type: Pull out the rear axle shaft assembly by fitting the tire lever (b) to the bolt (a) as shown in the figure.

CAUTION:
To prevent damage to the side bearing retainer, use by placing the tire lever against the bolt as shown in the figure.

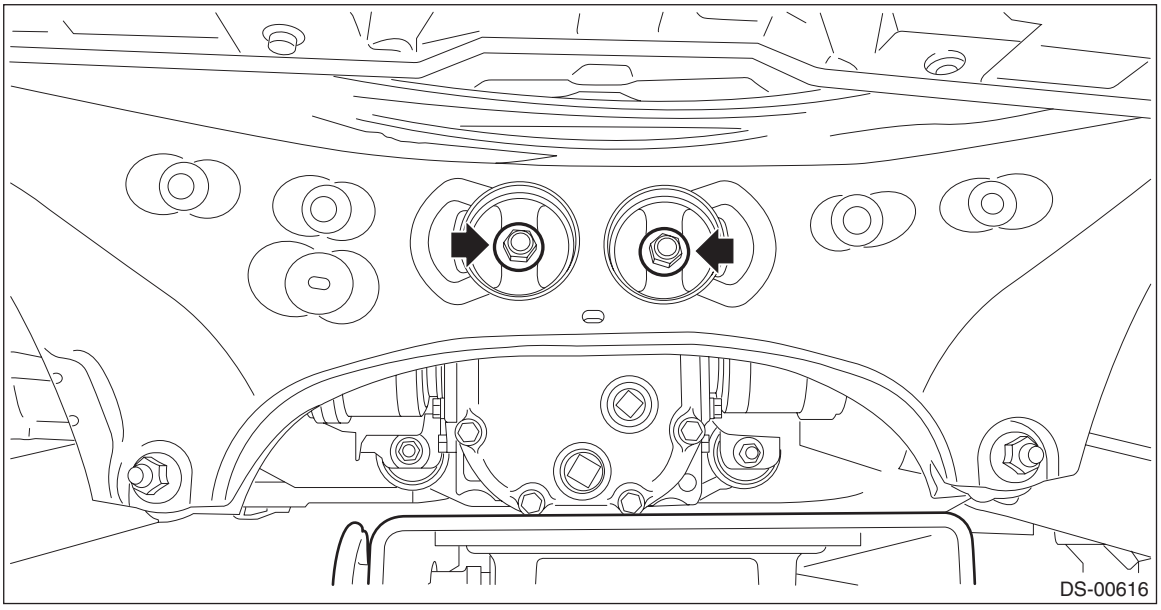
Preparation tool:
Tire lever



8) Remove the installation section of rear differential assembly.
(1) Support the rear differential assembly with a transmission jack.
(2) Remove the bolts which hold the rear differential front crossmember from the rear sub frame assembly.

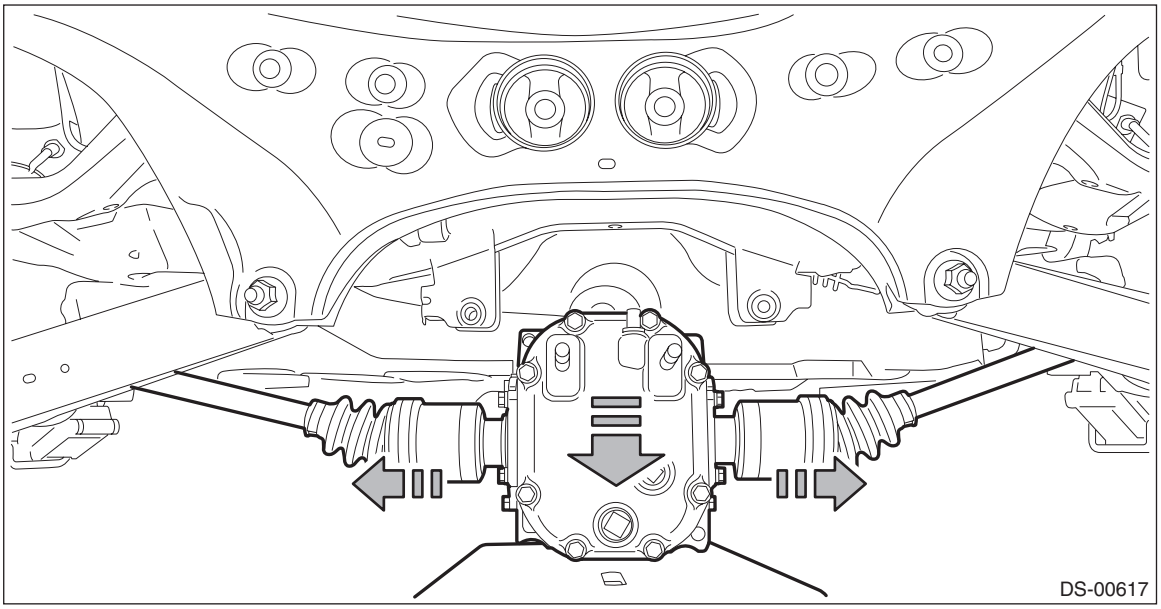


(3) Remove the self-locking nuts which hold the rear differential to the rear sub frame assembly.



9) Completely pull out the rear axle shaft assembly while lowering the rear differential.

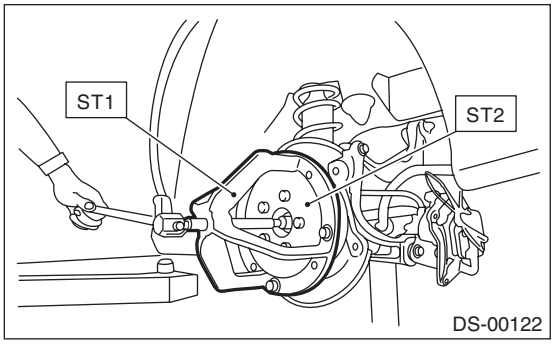
CAUTION:
Pay attention to avoid damaging the boot of axle shaft.



10) Remove the rear axle shaft assembly from the housing assembly - rear axle.

NOTE:
If it is hard to remove, use the ST.

Preparation tool:
ST1: AXLE SHAFT PULLER (926470000)
ST2: AXLE SHAFT PULLER PLATE (28099PA110)

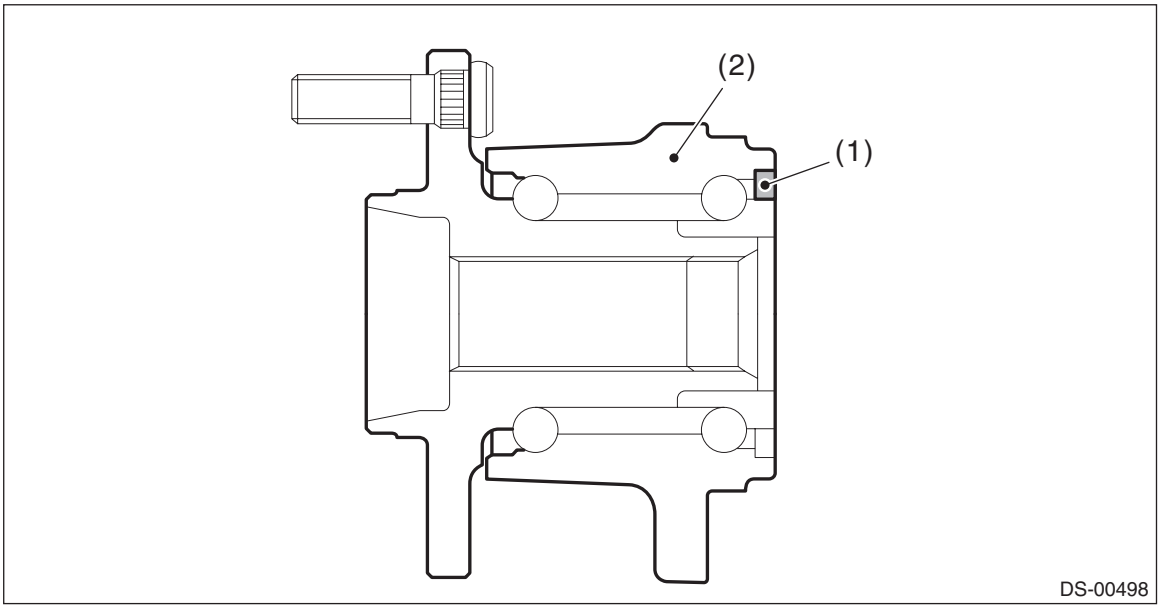


B: INSTALLATION

1) Replace the rear differential side oil seal. <Ref. to DI-58, REPLACEMENT, Rear Differential Side Oil Seal.>

NOTE:
After pulling out the axle shaft assembly, be sure to replace with a new oil seal.
2) Insert the axle shaft assembly into the rear hub spline, and pull in the axle shaft assembly into specified position.

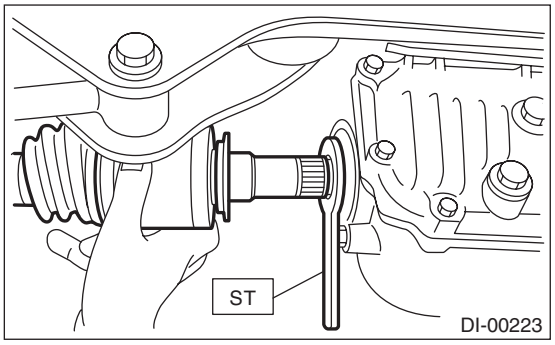
CAUTION:
- **Be careful not to damage the magnetic encoder.**
- **Do not get closer the tool which charged magnetism to magnetic encoder.**
- **Do not tap the axle shaft using a hammer when installing axle shaft assembly.**



(1) Magnetic encoder (2) Hub unit COMPL - rear axle

3) Temporarily tighten the nut - axle.
4) Using the ST, install the rear axle shaft assembly to the rear differential.

Preparation tool:
ST: OIL SEAL PROTECTOR (28099PA090)



5) Install the rear differential assembly to the rear sub frame assembly.

CAUTION:
Be sure to use a new self-locking nut.

Tightening torque:
Differential assembly — bushing - differential: 70 N·m (7.14 kgf-m, 51.6 ft-lb)
Differential assembly — rear sub frame assembly: 110 N·m (11.22 kgf-m, 81.1 ft-lb)

6) Install the sensor assembly - headlight beam leveler.

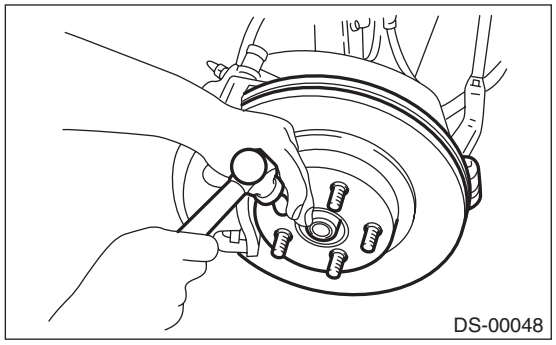
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

7) While pressing the brake pedal, tighten the new axle nuts to the specified torque.

CAUTION:
Do not load the rear axle before tightening the nut - axle. Doing so may damage the hub unit COMPL.

Tightening torque:
190 N·m (19.37 kgf-m, 140.1 ft-lb)

8) Lock the nut - axle securely.



9) Fill differential gear oil.
10) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

11) Perform reinitialization of the auto headlight beam leveler system. (Model with auto headlight beam leveler) <Ref. to LI-17, PROCEDURE, Auto Headlight Beam Leveler System.>

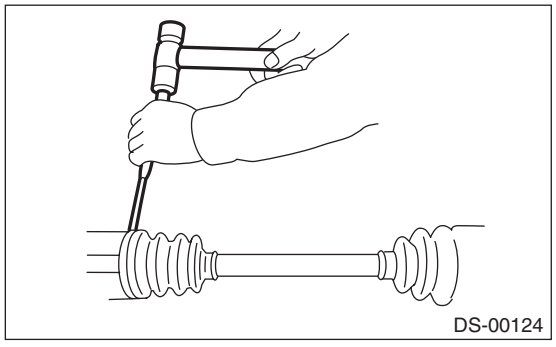
C: DISASSEMBLY

1) Take out the DOJ outer race from the shaft assembly.

CAUTION:
Be careful not to damage the boot.

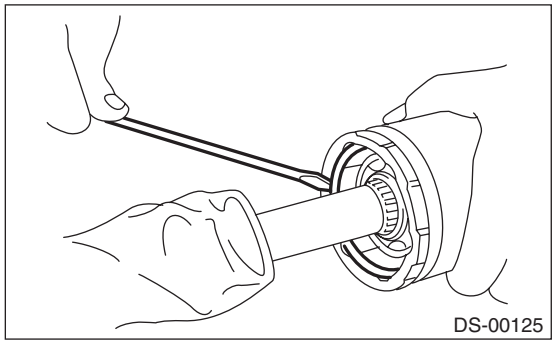
(1) Using a flat tip screwdriver or plier, loosen the boot band on the large end of DOJ boot.

CAUTION:
Be careful not to damage the boot.



(2) Remove the boot band on the small end of DOJ boot in the same manner.
(3) Remove the large end of DOJ boot from DOJ outer race.

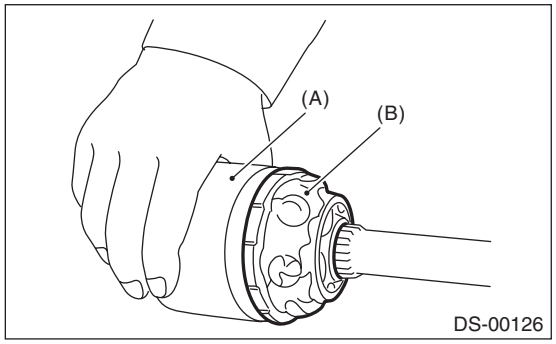
(4) Remove the round snap ring at the neck of DOJ outer race with a flat tip screwdriver.



(5) Take out the DOJ outer race from the shaft assembly.
(6) Wipe off the grease and take out the ball bearings.

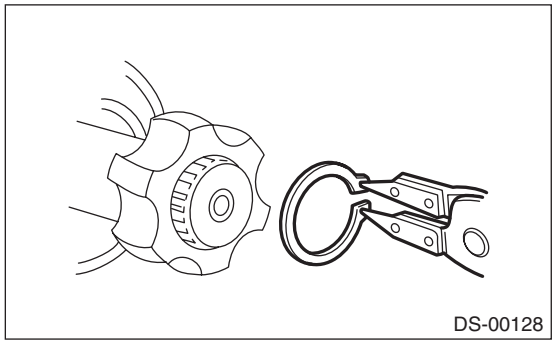
CAUTION:
The grease is a special grease (grease for constant velocity joints). Do not mix with other greases.

NOTE:
Disassemble the parts taking care not to lose balls.



(A) Outer race
(B) Grease

2) Remove the cage from the inner race.
(1) Turn the cage by a half pitch to the track groove of inner race and shift the cage.
(2) Using pliers, remove the snap ring fixing the inner race to the shaft.



(3) Take out the DOJ inner race.
(4) Take off the DOJ cage from shaft and remove the DOJ boot.

CAUTION:
Wrap shaft splines with vinyl tape to protect the boot from scratches.

3) Remove the BJ boot or EBJ boot in the same procedure as the DOJ boot.

NOTE:
The BJ is a non-disassembly part, so the axle shaft disassembly stops here.

D: ASSEMBLY

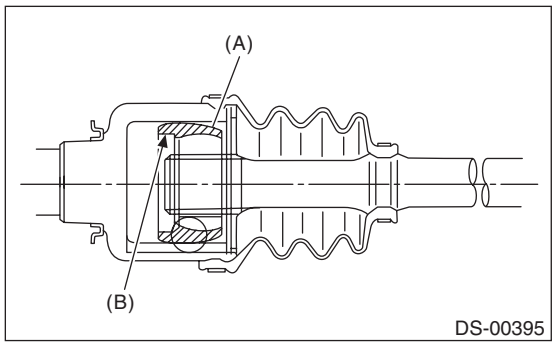
1. MT MODEL EXCEPT FOR XV MODEL AND XV MODEL

CAUTION:
Wrap shaft splines with vinyl tape to protect the boot from scratches.

NOTE:
Use specified grease.

Grease:
BJ, EBJ side: NKG814
DOJ side: NKG814

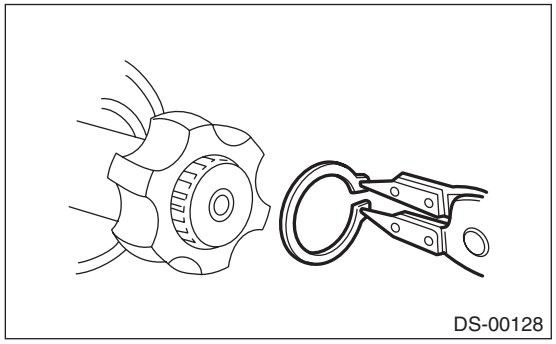
1) Install the DOJ inner race to the shaft.
   (1) Install the BJ or EBJ boot in specified position, and fill it with 50 to 60 g (1.76 to 2.12 oz) of specified grease.
   (2) Place the DOJ boot at the center of shaft.
   (3) Insert the DOJ cage onto shaft.



(A) Cage
(B) Cutout portion

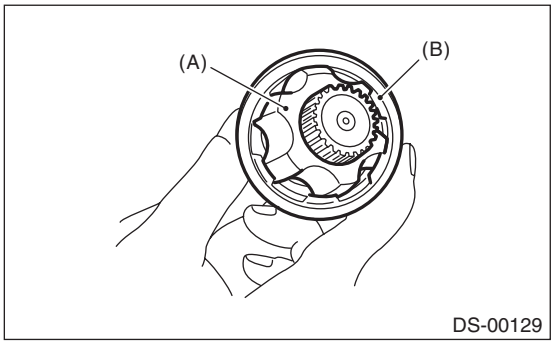
NOTE:
Insert the cage with the cutout portion facing the shaft end, since the cage has an orientation.

   (4) Install the DOJ inner race on shaft and fix the snap ring in place with pliers.

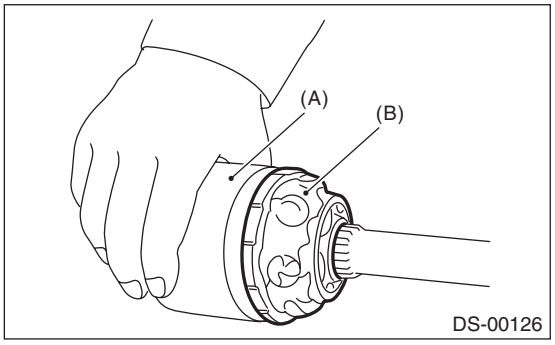


NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.

2) Install the cage to the inner race.
(1) Install the cage (B) with the protruding section aligned with the track on the inner race (A), and turn by a half pitch.



(2) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the inner side of the DOJ outer race.
(3) Apply a thin coat of specified grease to the cage pocket and ball.
(4) Insert the ball bearings into the cage pocket.
3) Connect the shaft assembly to the outer race.
(1) Align the outer race track and ball positions, and place the shaft, inner race, cage and ball bearings in the original positions, and then fix outer race in place.



(A) Outer race
(B) Grease

(2) Install the snap ring in the groove on the DOJ outer race.

CAUTION:
Be careful of the following items during installation:
- **Make sure that the balls, cage and inner race are completely fitted in the outer race of DOJ.**
- **Use care not to place the matched position of snap ring in the ball groove of outer race.**
- **Pull the shaft lightly and assure that the circlip is completely fitted in the groove.**

(3) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to the shaft.
(4) Install the DOJ boot taking care not to twist it.

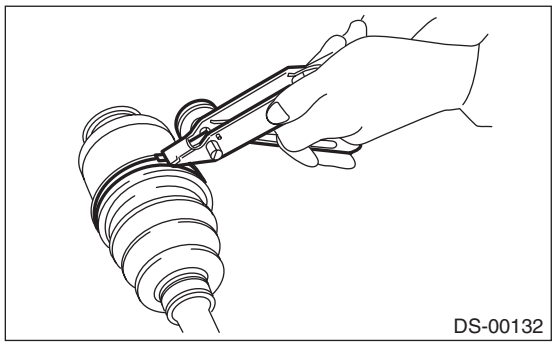
NOTE:
- The inside of the large end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing the DOJ boot, position the outer race of DOJ at center of the stroke.

(5) Put a new band through the clip and wind twice in the band groove of the boot.
(6) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, use care so that the air within the boot is appropriate.

(7) Tighten the band using the ST.

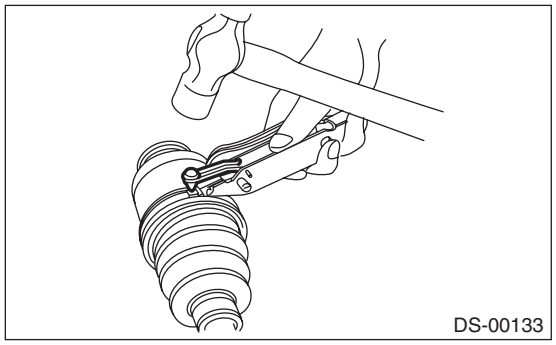
Preparation tool:
ST: BAND TIGHTENING TOOL (925091000)



NOTE:
Tighten the band until it cannot be moved by hand.

(8) Tap the clip with the punch provided at the end of the ST.

Preparation tool:
ST: BAND TIGHTENING TOOL (925091000)



NOTE:
Tap to an extent that the boot underneath is not damaged.

(9) Cut off the band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Make sure that the end of the band is in close contact with clip.

4) Extend and retract the DOJ repeatedly to provide an equal coating of grease.

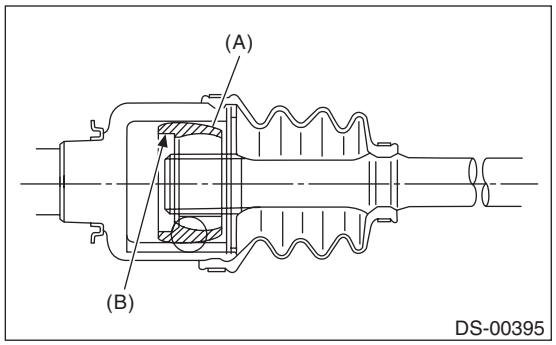
2. CVT MODEL EXCEPT FOR XV MODEL

CAUTION:
Wrap shaft splines with vinyl tape to protect the boot from scratches.

NOTE:
Use specified grease.

Grease:
BJ side: Raremax LF-G
DOJ side: Raremax LF-G

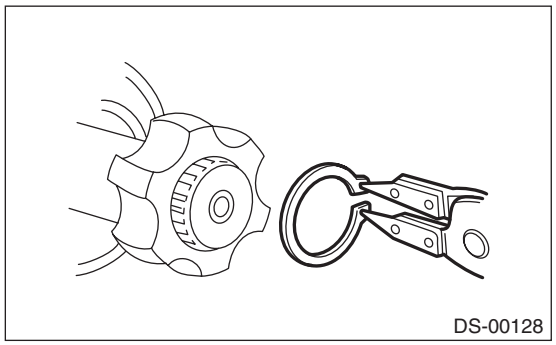
1) Install the DOJ inner race to the shaft.
   (1) Install the BJ boot to the specified position, and fill it with 50 to 60 g (1.76 to 2.12 oz) of specified grease.
   (2) Place the DOJ boot at the center of shaft.
   (3) Insert the DOJ cage onto shaft.



(A) Cage
(B) Cutout portion

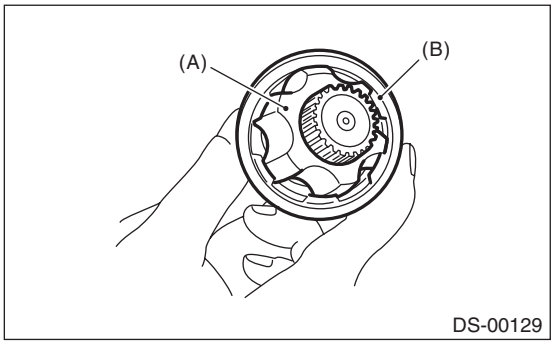
NOTE:
Insert the cage with the cutout portion facing the shaft end, since the cage has an orientation.

   (4) Install the DOJ inner race on shaft and fix the snap ring in place with pliers.



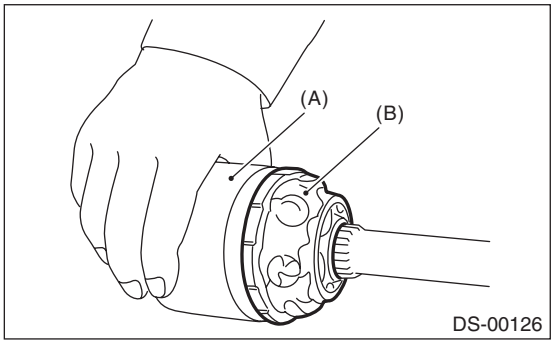
NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.

2) Install the cage to the inner race.
(1) Install the cage (B) with the protruding section aligned with the track on the inner race (A), and turn by a half pitch.



(2) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the inner side of the DOJ outer race.
(3) Apply a thin coat of specified grease to the cage pocket and ball.
(4) Insert the ball bearings into the cage pocket.

3) Connect the shaft assembly to the outer race.
(1) Align the outer race track and ball positions, and place the shaft, inner race, cage and ball bearings in the original positions, and then fix outer race in place.



(A) Outer race
(B) Grease

(2) Install the snap ring in the groove on the DOJ outer race.

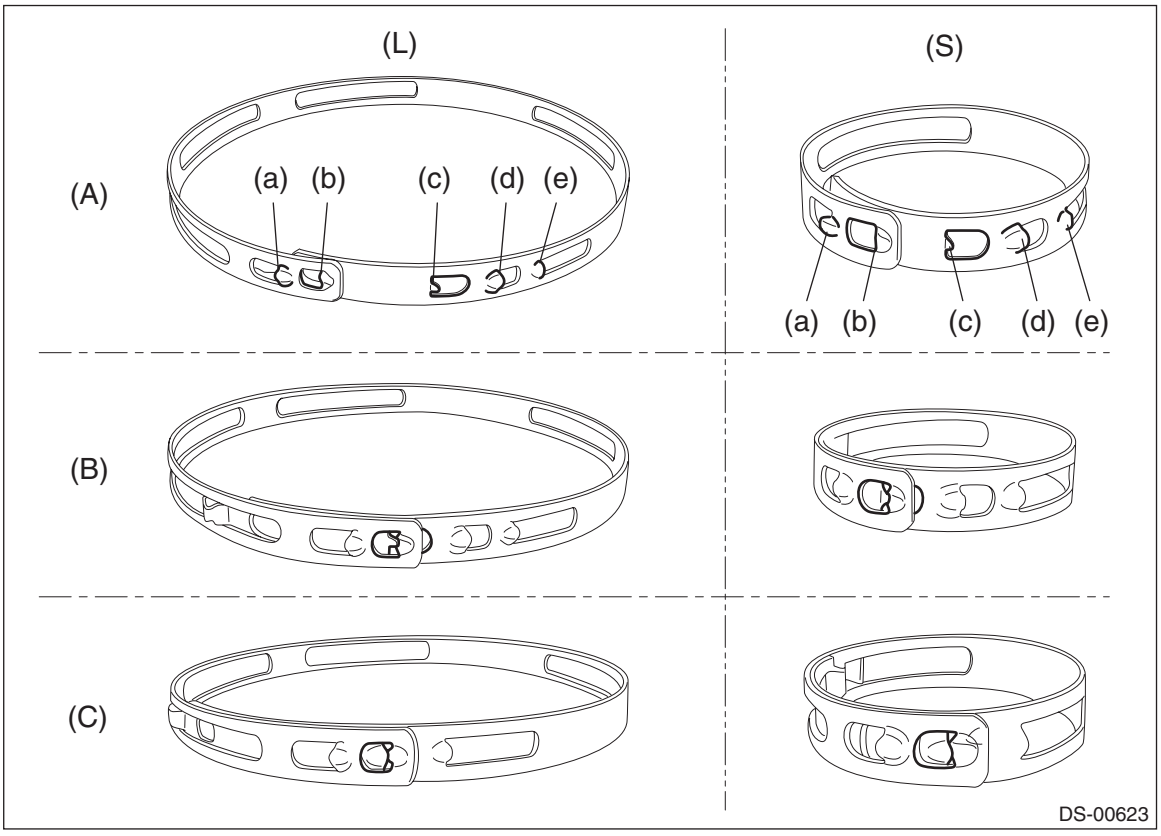
CAUTION:
Be careful of the following items during installation:
- **Make sure that the balls, cage and inner race are completely fitted in the outer race of DOJ.**
- **Use care not to place the matched position of snap ring in the ball groove of outer race.**
- **Pull the shaft lightly and assure that the circlip is completely fitted in the groove.**

(3) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to the shaft.
(4) Install the DOJ boot and BJ boot taking care not to twist it.

NOTE:
- The inside of the large end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing the DOJ boot, position the outer race of DOJ at center of the stroke.

(5) Prepare a new band, pinch (a) and (e) of the band with needle nose pliers, and align it with the groove of the boot.

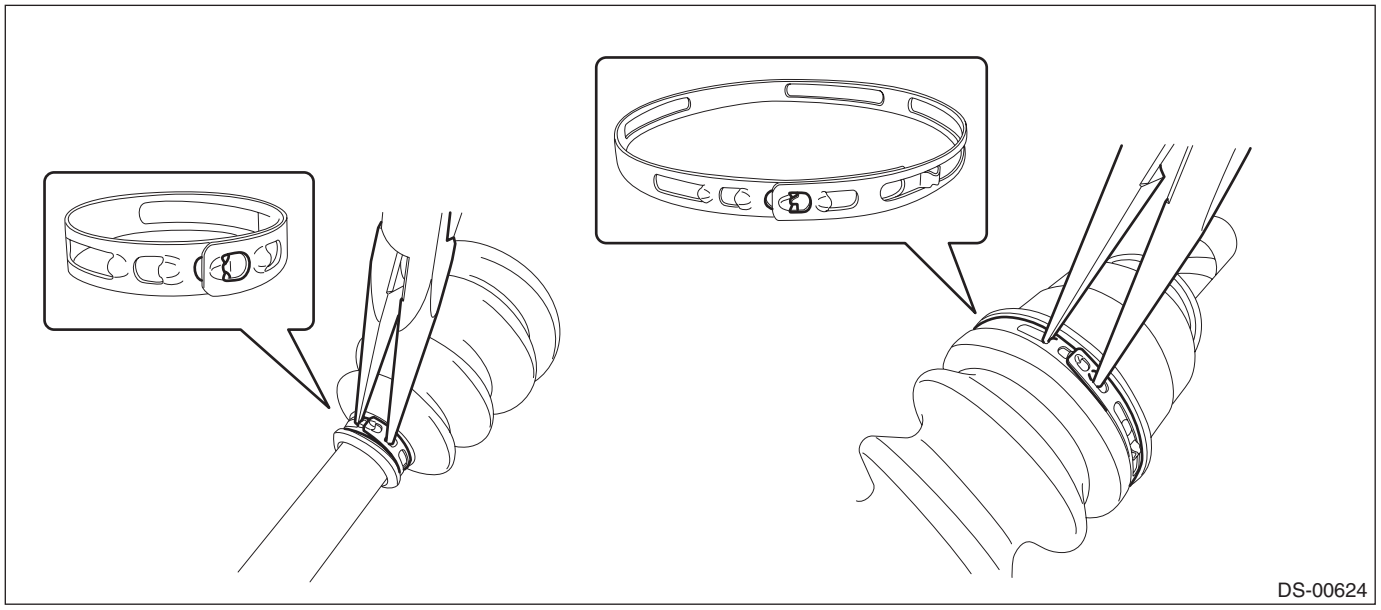
CAUTION:
- **Be careful not to damage the boot.**
- **When tightening boot, use care so that the air within the boot is appropriate.**



(L)	Band for large diameter	(S)	Band for small diameter		
(A)	Free position	(B)	Temporarily tightening position	(C)	Fully tightening position
(a)	Holding portion using pliers	(c)	Convex claw for temporarily tightening position	(e)	Holding portion using pliers
(b)	Concave claw	(d)	Convex claw		

(6) Pinch (a) and (e) of the band with needle nose pliers, and align the concave claw (b) with the convex claw (c) for temporarily tightening position.

Preparation tool:
Needle nose pliers



(7) Check the positions of the boot and band, align the concave claw (b) with the convex claw (d), and tighten the band.

4) Extend and retract the DOJ repeatedly to provide an equal coating of grease.

E: INSPECTION

Check the removed parts for damage, wear, corrosion etc. Repair or replace if defective.

- **DOJ (Double Offset Joint):**

Check for seizure, corrosion, damage, wear and excessive play.

- **BJ (Bell Joint):**

Check for seizure, corrosion, damage and excessive play.

- **EBJ (High-Efficiency Compact Ball fixed Joint)**

Check for seizure, corrosion, damage and excessive play.

- **Shaft:**

Check for excessive bending, twisting, damage and wear.

- **Boot:**

Check for wear, warping, breakage and scratches.

- **Grease:**

Check for discoloration and fluidity.

9. General Diagnostic Table

A: INSPECTION

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptoms	Possible cause	Corrective action
Noise or vibration from propeller shaft	• Center bearing • Runout of propeller shaft • Loose or gap at connections	Inspect the propeller shaft. <Ref. to DS-14, INSPECTION, Propeller Shaft.>
Abnormal wheel vibration	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-7, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-8, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-48, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-32, INSPECTION, Rear Shock Absorber.>
	Front axle shaft	Check the front axle shaft. <Ref. to DS-70, INSPECTION, Front Drive Shaft.>
	Rear axle shaft	Check the rear axle shaft. <Ref. to DS-84, INSPECTION, Rear Drive Shaft.>
	Hub unit COMPL - front axle	Check the hub unit COMPL - front axle. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>
	Hub unit COMPL - rear axle	Check the hub unit COMPL - rear axle. <Ref. to DS-56, INSPECTION, Rear Hub Unit Bearing.>
Noise from the underbody	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-7, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-8, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-48, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-32, INSPECTION, Rear Shock Absorber.>

VEHICLE DYNAMICS CONTROL (VDC)

VDC

		Page
1.	General Description	2
2.	Relay and Fuse	7
3.	Vehicle Dynamics Control System	8
4.	VDC Control Module and Hydraulic Control Unit (VDCCM&H/U)	9
5.	ABS Sequence Control	20
6.	VDC Sequence Control	23
7.	Yaw Rate and G Sensor	26
8.	Steering Angle Sensor	27
9.	Front ABS Wheel Speed Sensor	31
10.	Rear ABS Wheel Speed Sensor	34
11.	Front Magnetic Encoder	40
12.	Rear Magnetic Encoder	41
13.	VDC OFF Switch	42

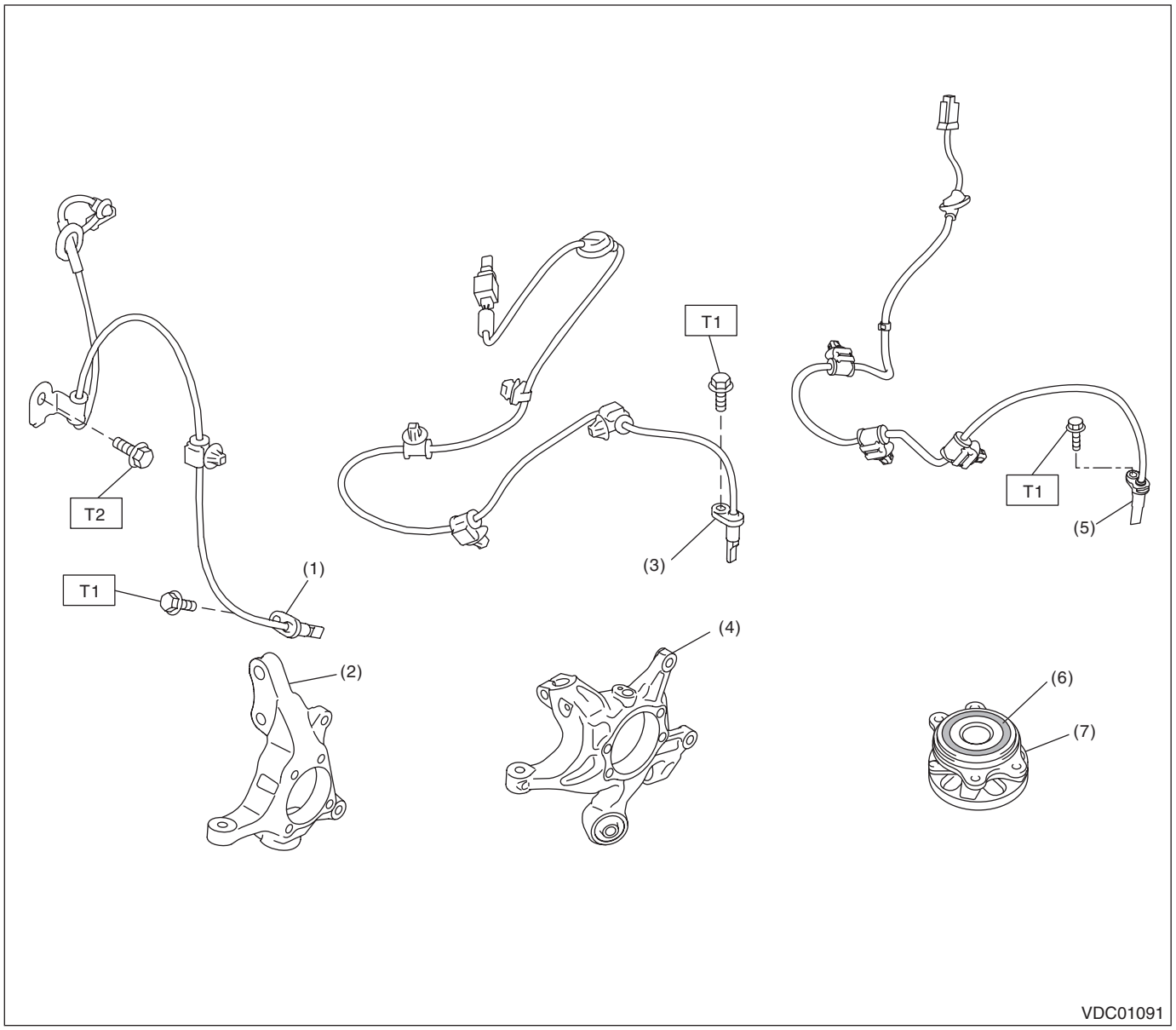
1. General Description

A: SPECIFICATION

Item				Specification or identification
ABS wheel speed sensor	ABS wheel speed sensor gap (for reference)	Front		0.77 — 1.43 mm (0.030 — 0.056 in)
		Rear		0.44 — 1.76 mm (0.017 — 0.069 in)
	Identifications of harness (symbol)	Front	RH	Z1
			LH	Z2
		Rear	RH (Except for XV model)	Z3
			RH (XV model)	Z5
			LH (Except for XV model)	Z4
			LH (XV model)	Z6
VDCCM&H/U Identification				XP

B: COMPONENT

1. ABS WHEEL SPEED SENSOR

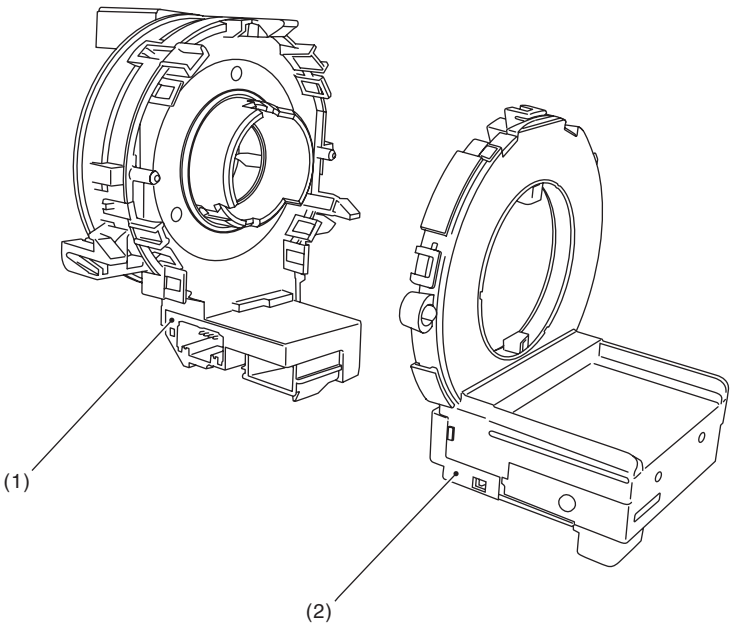


(1) Front ABS wheel speed sensor
(2) Housing ASSY - front axle
(3) Rear ABS wheel speed sensor (except for XV model)
(4) Housing ASSY - rear axle
(5) Rear ABS wheel speed sensor (XV model)
(6) Magnetic encoder
(7) Hub unit COMPL

Tightening torque: N·m (kgf-m, ft-lb)

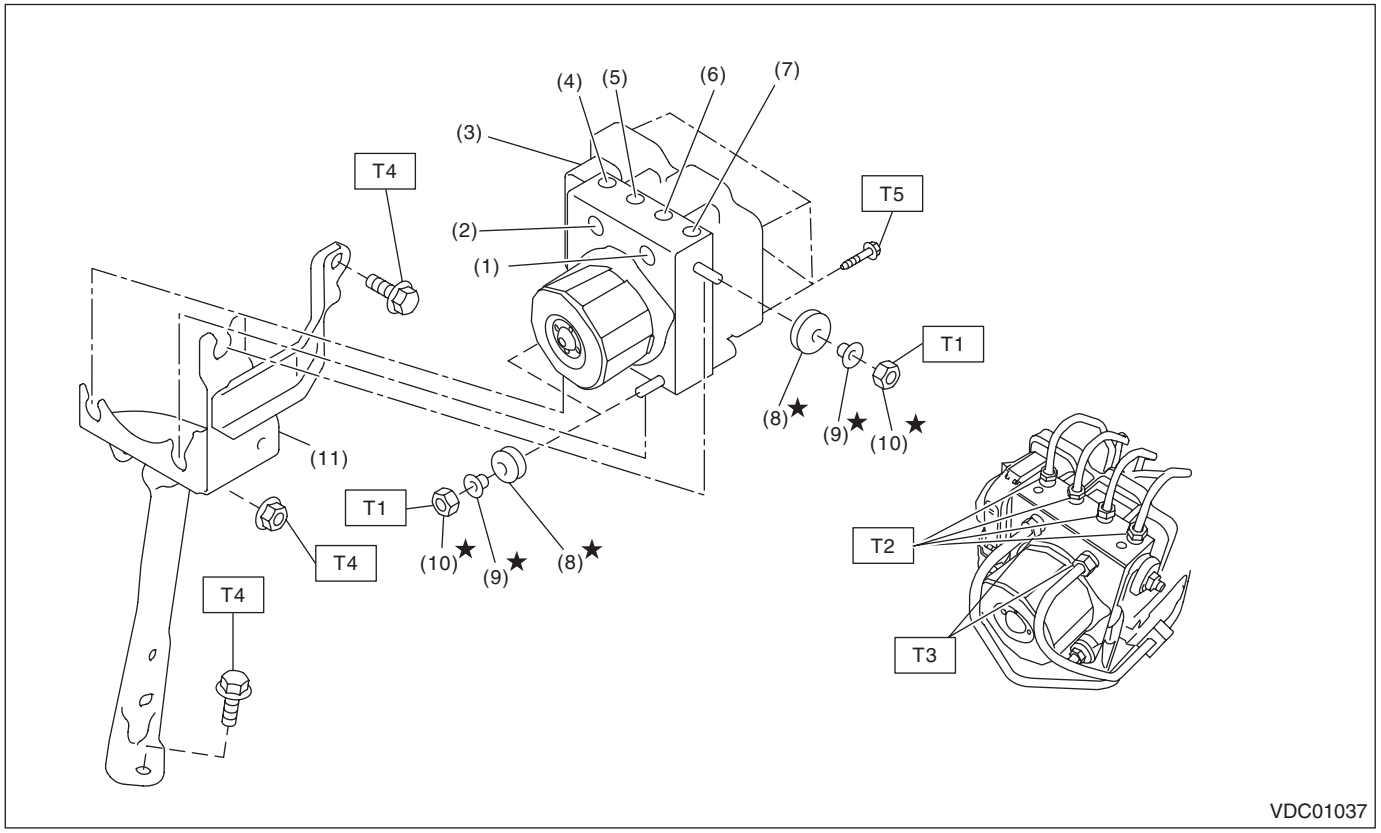
T1: 7.5 (0.76, 5.5)
T2: 33 (3.36, 24.3)

2. STEERING ANGLE SENSOR



(1) Steering roll connector
(2) Steering angle sensor

3. VDC CONTROL MODULE & HYDRAULIC CONTROL UNIT (VDCCM&H/U)



(1)	Primary inlet	(7)	Rear LH outlet
(2)	Secondary inlet	(8)	Damper - hydraulic unit
(3)	VDC control module and hydraulic control unit (VDCCM&H/U)	(9)	Spacer
(4)	Rear RH outlet	(10)	Nut
(5)	Front LH outlet	(11)	Bracket - hydraulic unit
(6)	Front RH outlet		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.76, 5.5)

T2: 15 (1.53, 11.1)

T3: 19 (1.94, 14.0)

T4: 33 (3.36, 24.3)

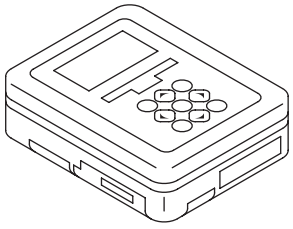
T5: <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

C: CAUTION

• Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• When removing, installing or replacing the VDCCM&H/U, VDCCM&H/U bracket, steering wheel or steering angle sensor, perform “VDC sensor midpoint setting mode” of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

D: PREPARATION TOOL

1. SPECIAL TOOL

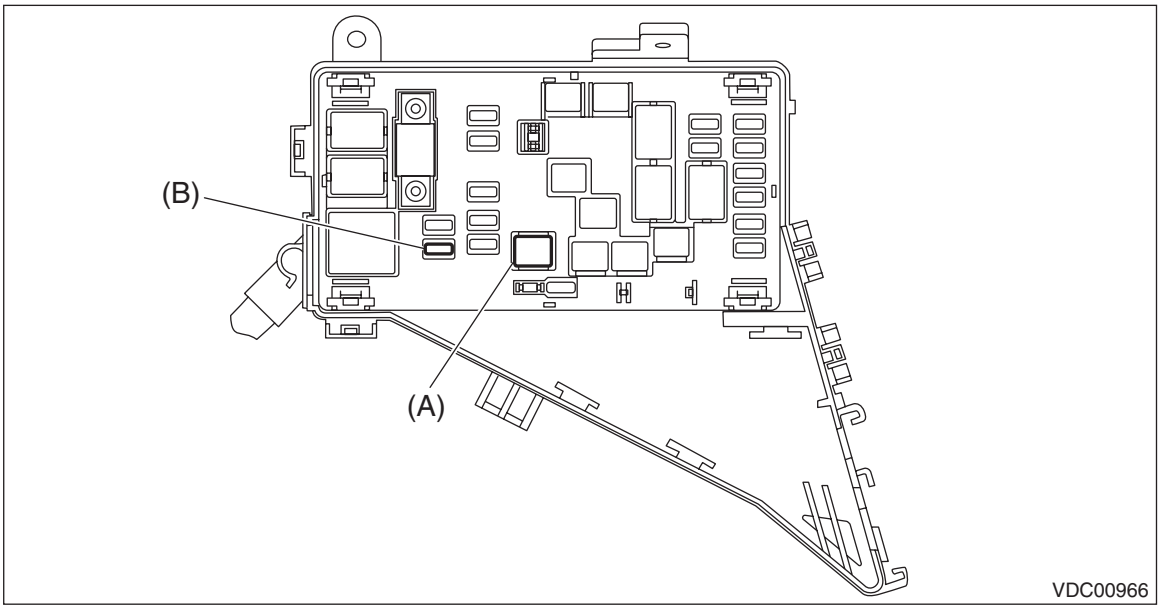
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for setting of each function and troubleshooting for electrical system.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Pressure gauge	Used for measuring oil pressure.
Oscilloscope	Used for measuring the sensor.
Steering wheel puller	Used for removing the steering wheel.

2. Relay and Fuse

A: LOCATION



Main fuse box	Fuse 50A (VDC CM&H/U)	(A)
	Fuse 30A (VDC CM&H/U)	(B)

NOTE:
For other related fuses, refer to the wiring diagram. <Ref. to WI-15, Power Supply Circuit.>

B: INSPECTION

1. CHECK FUSE

1) Remove the fuse and inspect visually.
2) If the fuse is blown out, replace the fuse.

3. Vehicle Dynamics Control System

A: WIRING DIAGRAM

Refer to “Vehicle Dynamics Control System” in the wiring diagram. <Ref. to WI-152, WIRING DIAGRAM, Vehicle Dynamics Control System.>

B: ELECTRICAL SPECIFICATION

Refer to the Control Module I/O Signal of the “Vehicle Dynamics Control System (VDC) (DIAGNOSTICS)”. <Ref. to VDC(diag)-12, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>

C: INSPECTION

Refer to the “Vehicle Dynamics Control System (VDC) (DIAGNOSTICS)”. <Ref. to VDC(diag)-86, INSPECTION, General Diagnostic Table.>

D: NOTE

For operation procedures of each component of the vehicle dynamics control system, refer to the respective section.

- VDC control module & hydraulic control unit (VDCCM&H/U): <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
- Yaw rate & G sensor: <Ref. to VDC-26, Yaw Rate and G Sensor.>
- Steering angle sensor: <Ref. to VDC-27, Steering Angle Sensor.>
- Front ABS wheel speed sensor: <Ref. to VDC-31, Front ABS Wheel Speed Sensor.>
- Rear ABS wheel speed sensor: <Ref. to VDC-34, Rear ABS Wheel Speed Sensor.>
- Front magnetic encoder: <Ref. to VDC-40, Front Magnetic Encoder.>
- Rear magnetic encoder: <Ref. to VDC-41, Rear Magnetic Encoder.>
- VDC OFF switch: <Ref. to VDC-42, VDC OFF Switch.>

4. VDC Control Module and Hydraulic Control Unit (VDCCM&H/U)

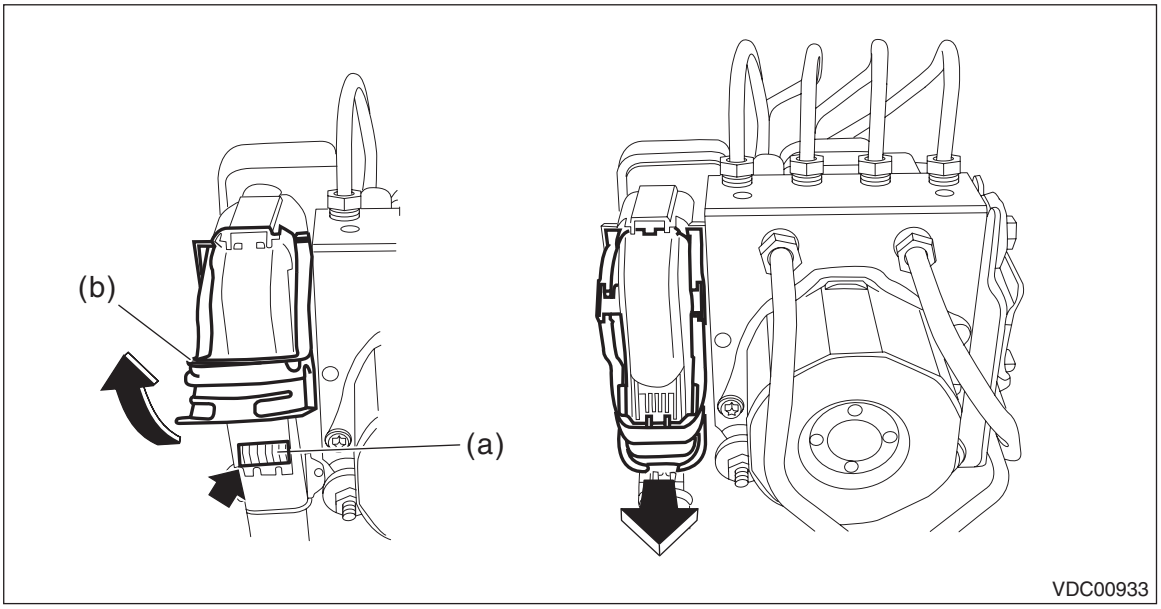
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the intake boot. <Ref. to IN(H4DO)-12, REMOVAL, Air Intake Boot.>

CAUTION:
Move aside the intake boot to perform the operation without disconnecting the PCV hose.

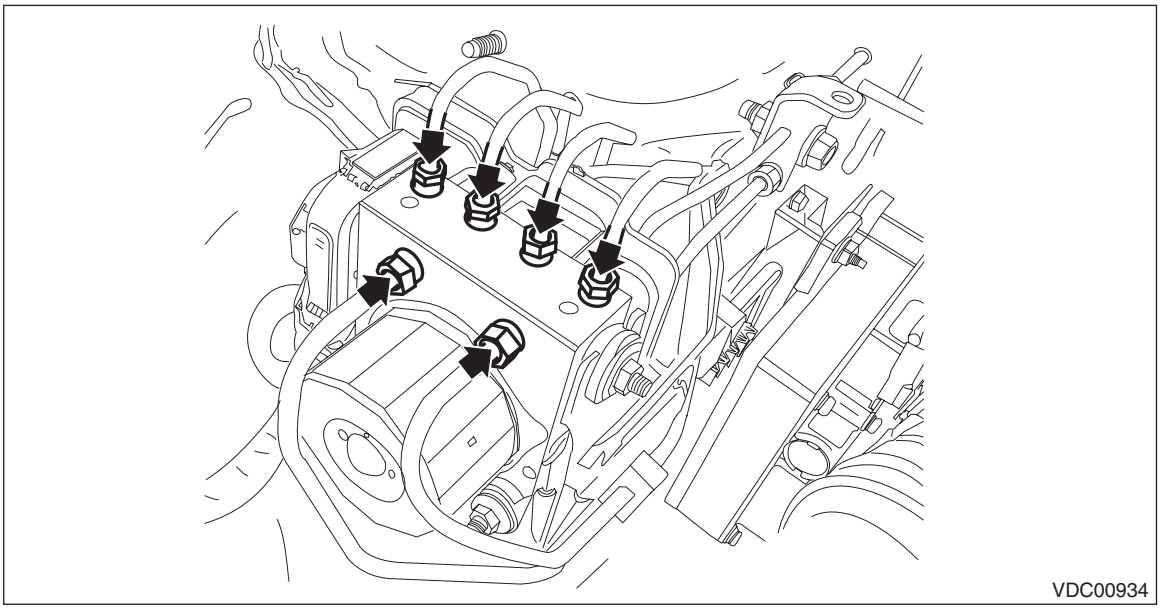
3) Remove the VDC control module & hydraulic control unit (VDCCM&H/U).
   (1) Remove any dirt from around the VDCCM&H/U.
   (2) Pull up the lock lever (b) while pressing the lock button (a) and disconnect the VDCCM&H/U connector.

CAUTION:
Do not pull on the harness when disconnecting the connector.



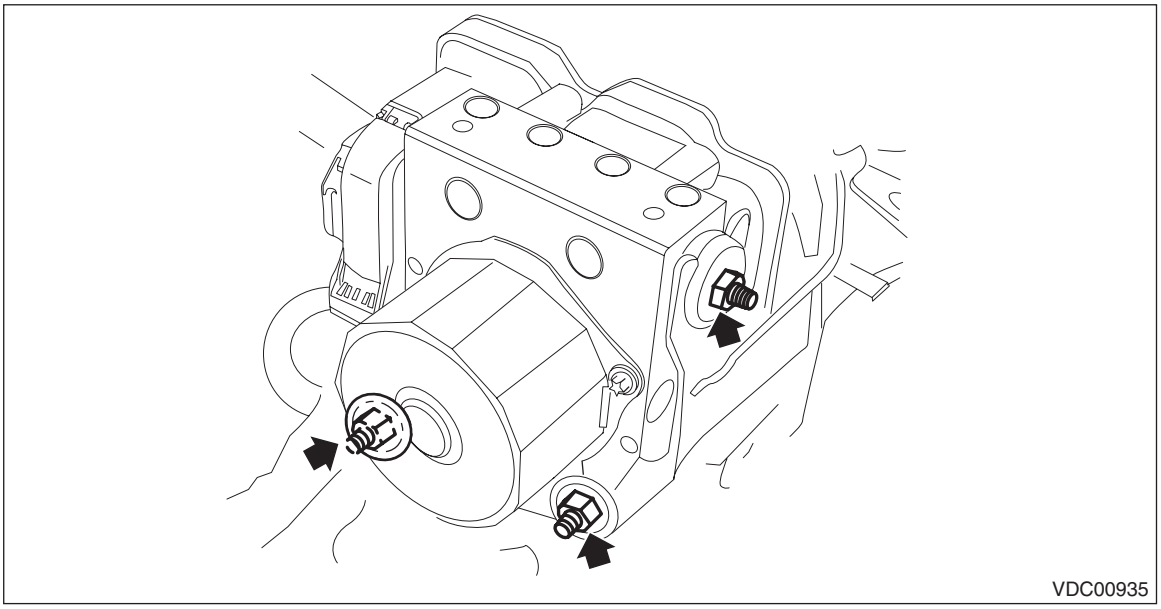
(3) Using a flare nut wrench, disconnect each brake pipe from VDCCM&H/U.

CAUTION:
• Wrap the brake pipe with a vinyl bag so as not to spill the brake fluid on the painted surface of the vehicle body.
• If brake fluid is spilled on the painted surface of the vehicle body, wash it off immediately with water and wipe clean.


VDC00934

(4) Remove the nuts and remove the VDCCM&H/U from the bracket - hydraulic unit.

CAUTION:
- **Do not drop or bump the VDCCM&H/U.**
- **Do not turn the VDCCM&H/U upside down or place it sideways for storage.**
- **Be careful not to let foreign matter enter the VDCCM&H/U.**
- **Be careful that no water and fluid enter the connectors.**


VDC00935

B: INSTALLATION

CAUTION:
• When installing the VDCCM&H/U to the bracket - hydraulic unit, make sure that there is no oil adhered to the bolts and the threads of VDCCM&H/U. If the oil is adhered, degrease it carefully before tightening.
• Connect the VDCCM&H/U connector securely.
• When installing the VDCCM&H/U, replace the damper - hydraulic unit, spacer and nut with new parts.
1) Install each part in the reverse order of removal.

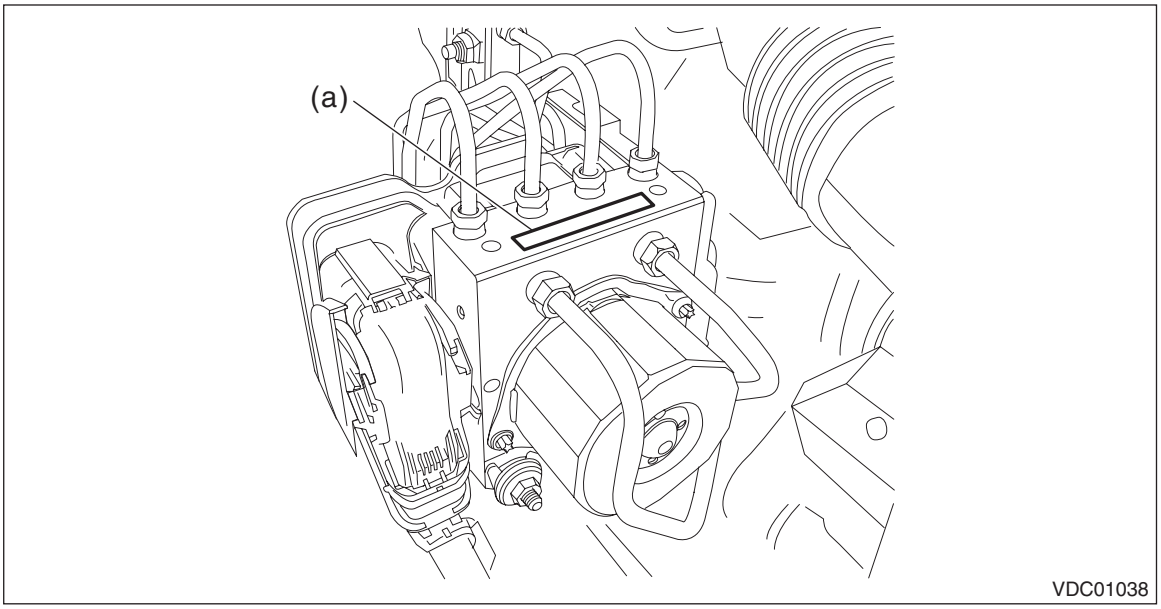
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to VDC-5, VDC CONTROL MODULE & HYDRAULIC CONTROL UNIT (VDCCM&H/U), COMPONENT, General Description.>
2) Bleed air from the brake system. <Ref. to BR-59, Air Bleeding.>
3) Perform parameter confirmation, selection, and registration.

NOTE:
• When the VDCCM&H/U is replaced with a new part, be sure to perform the selection · registration operation.
• Be sure to use the Subaru Select Monitor for the selection and registration of parameter.
• When the registration has not been performed, the DTC code "Parameter selection error" is detected together with the ABS/EBD/VDC warning light illumination.
(1) Check that the applied model and grade of the relevant vehicle are included. <Ref. to VDC(diag)-19, PARAMETER CHECK, OPERATION, Subaru Select Monitor.>
(2) On {Confirm on parameter} display, enter the applied model of the relevant vehicle and check if it is correct. If the information is not correct, perform parameter selection and registration. <Ref. to VDC(diag)-19, PARAMETER SELECTION, OPERATION, Subaru Select Monitor.>
4) Perform mode setting for each sensor.
• VDC sensor midpoint setting mode: <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

C: INSPECTION

1) Check the identification (a) of the VDC control module & hydraulic control unit (VDCCM&H/U).

NOTE:
For the identification, refer to "SPECIFICATION" in "General Description". <Ref. to VDC-2, SPECIFICATION, General Description.>



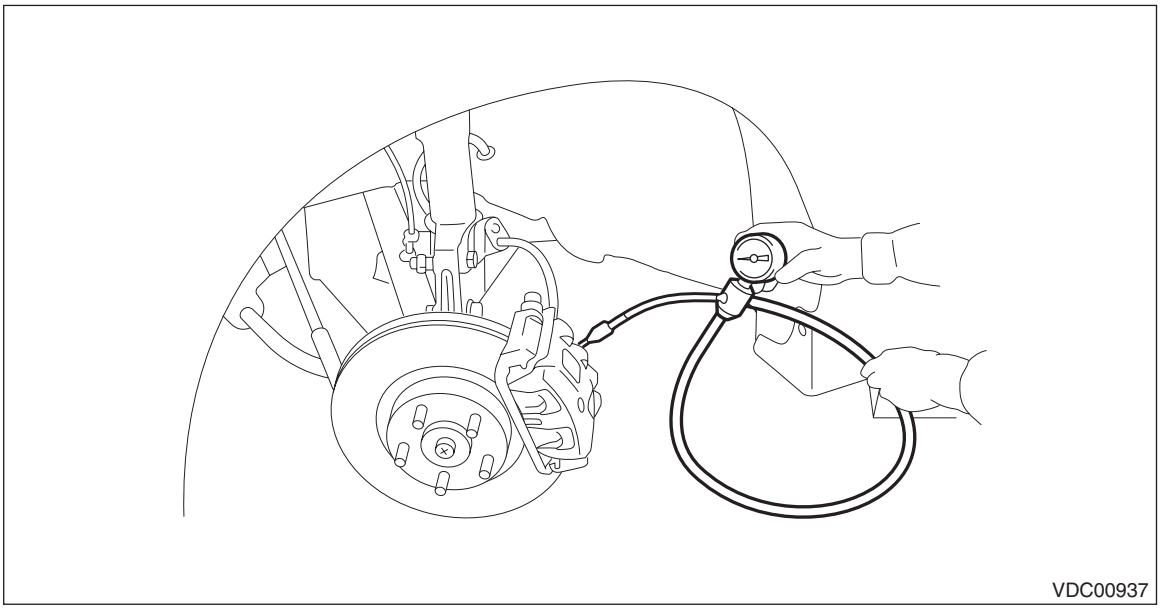
2) Check the condition of connection and settlement of connector, and correct or replace if defective.

1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

1) Lift up the vehicle, and then remove the wheel.
2) Remove the bleeder - screws from the FL and FR caliper bodies.
3) Connect two pressure gauges to FL and FR caliper bodies.

CAUTION:
- **Use a pressure gauge used exclusively for brake fluid measurement.**
- **Do not use the pressure gauge used for the measurement of transmission oil. Doing so will cause the piston seal to expand and deform.**

NOTE:
Wrap sealing tape around the pressure gauge.



4) Bleed air from the pressure gauges and the FL and FR caliper bodies.
5) Perform ABS sequence control. <Ref. to VDC-20, ABS Sequence Control.>

NOTE:
When the hydraulic unit begins to work, first the FL side performs decompression, hold and compression, and then the FR side performs decompression, hold and compression.
6) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Depress the brake pedal and check that the kick-back is normal, and tightness is normal.

Inspection conditions	Front wheel	Rear wheel
Initial value	3,500 kPa (36 kgf/cm^2, 511 psi)	3,500 kPa (36 kgf/cm^2, 511 psi)
When depressurized	500 kPa (5 kgf/cm^2, 73 psi) or less	500 kPa (5 kgf/cm^2, 73 psi) or less
When pressurized	3,500 kPa (36 kgf/cm^2, 511 psi) or more	3,500 kPa (36 kgf/cm^2, 511 psi) or more

7) Disconnect the pressure gauges from FL and FR caliper bodies.
8) Install the bleeder - screws of FL and FR caliper bodies.
9) Remove the bleeder - screws from RL and RR caliper bodies.
10) Connect two pressure gauges to RL and RR caliper bodies.
11) Bleed air from RL and RR caliper bodies, and pressure gauge.

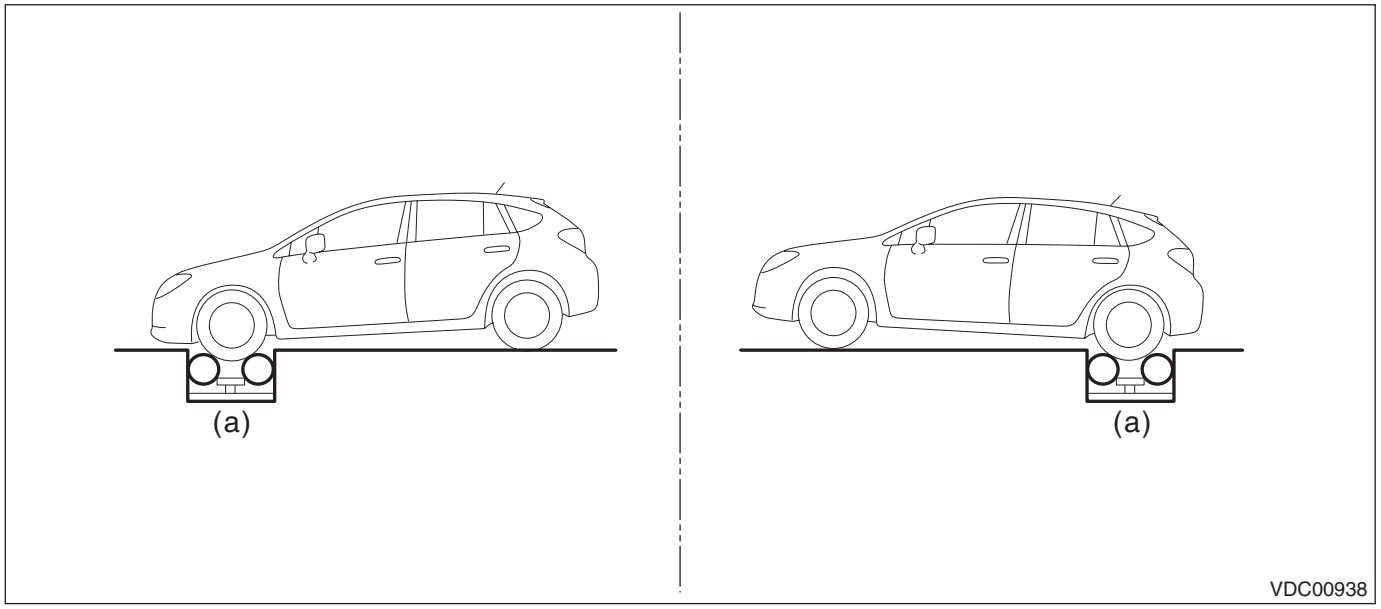
12) Perform ABS sequence control. <Ref. to VDC-20, ABS Sequence Control.>

NOTE:
When the hydraulic unit begins to work, first the RR side performs decompression, hold and compression, and then the RL side performs decompression, hold and compression.

13) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets specification. Depress the brake pedal and check that the kick-back is normal, and tightness is normal.
14) Disconnect the pressure gauge from the RL and RR caliper bodies.
15) Install the bleeder - screws of RL and RR caliper bodies.
16) Bleed air from the brake system. <Ref. to BR-59, Air Bleeding.>

2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH THE BRAKE TESTER

1) Set wheels other than the one to measure on free rollers.
2) Prepare for the ABS sequence control operation. <Ref. to VDC-20, ABS Sequence Control.>
3) Set the front wheels or rear wheels on the brake tester (a) and set the gear to neutral.



4) Operate the brake tester.
5) Perform ABS sequence control. <Ref. to VDC-20, ABS Sequence Control.>
6) When the hydraulic unit begins to work, check the following work sequence.
   (1) The FL wheel performs decompression, hold and compression in sequence, and subsequently the FR wheel repeats the cycle.
   (2) The RR wheel performs decompression, hold and compression in sequence, and subsequently the RL wheel repeats the cycle.
7) Read values indicated on the brake tester and check if the fluctuation of the values between decompression and compression meets specification.

Inspection conditions	Front wheel	Rear wheel
Initial value	1,000 N (102 kgf, 225 lb)	1,000 N (102 kgf, 225 lb)
When depressurized	500 N (51 kgf, 112 lb) or less	500 N (51 kgf, 112 lb) or less
When pressurized	1,000 N (102 kgf, 225 lb) or more	1,000 N (102 kgf, 225 lb) or more

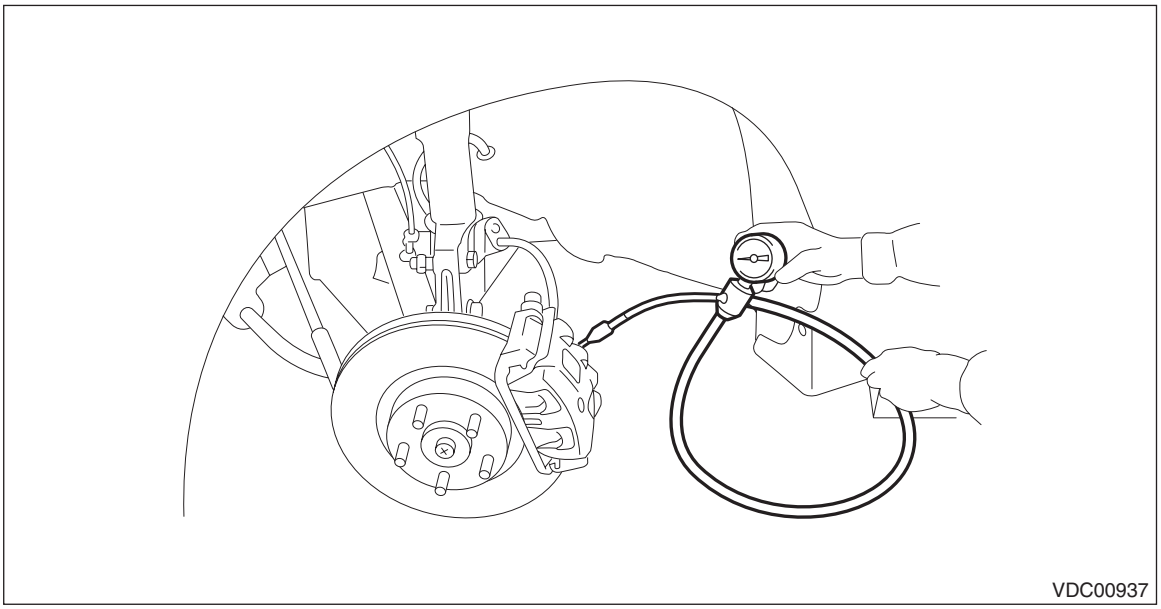
8) After the inspection, depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

3. CHECKING THE HYDRAULIC UNIT VDC OPERATION USING A PRESSURE GAUGE

1) Lift up the vehicle, and then remove the wheel.
2) Remove the bleeder - screws from FL and FR caliper bodies.
3) Connect two pressure gauges to FL and FR caliper bodies.

CAUTION:
- **Use a pressure gauge used exclusively for brake fluid measurement.**
- **Do not use a pressure gauge used for the measuring transmission oil pressure, as the piston seal may expand and deform.**

NOTE:
Wrap sealing tape around the pressure gauge.



4) Bleed air from the pressure gauge.
5) Perform VDC sequence control. <Ref. to VDC-23, VDC Sequence Control.>

NOTE:
When the hydraulic unit begins to work, first the FL side performs compression, hold, and decompression, and then the FR side performs compression, hold, and decompression.
6) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets specification. Depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

Inspection conditions	Front wheel	Rear wheel
When pressurized	3,000 kPa (31 kgf/cm^2, 441 psi) or more	3,000 kPa (31 kgf/cm^2, 441 psi) or more
When depressurized	500 kPa (5 kgf/cm^2, 73 psi) or less	500 kPa (5 kgf/cm^2, 73 psi) or less

7) Disconnect the pressure gauges from FL and FR caliper bodies.
8) Install the bleeder - screws of FL and FR caliper bodies.
9) Remove the bleeder - screws from RL and RR caliper bodies.
10) Connect two pressure gauges to RL and RR caliper bodies.
11) Bleed air from RL and RR caliper bodies, and pressure gauge.

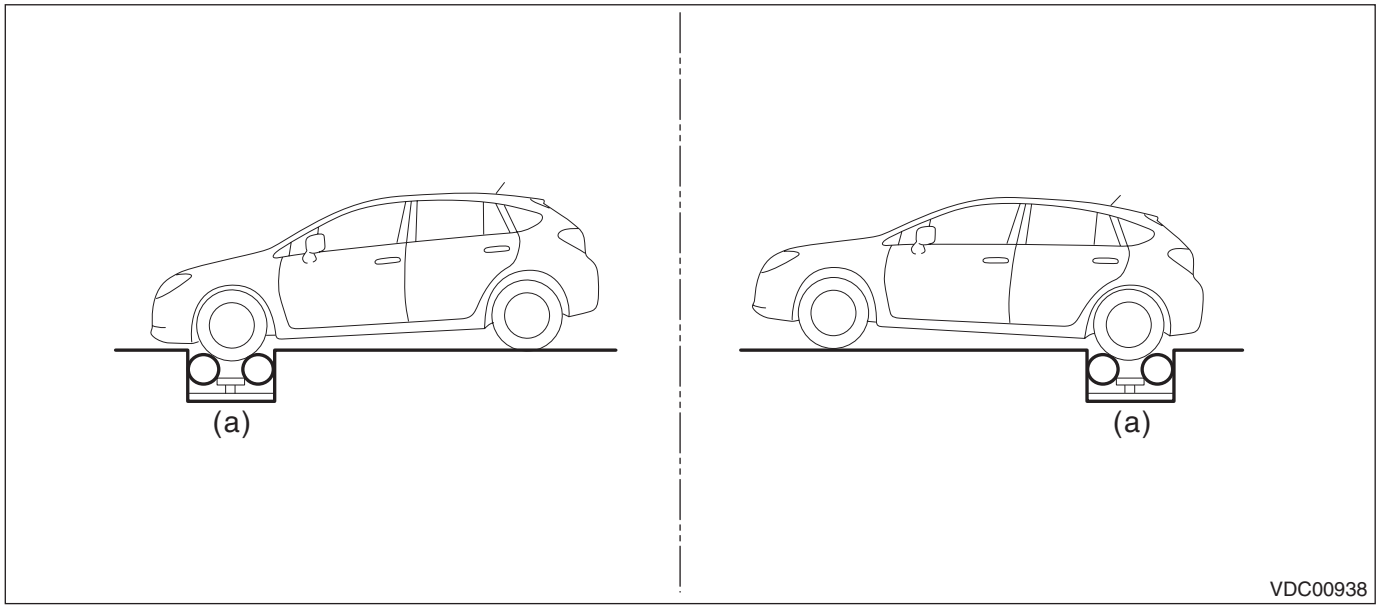
12) Perform VDC sequence control. <Ref. to VDC-23, VDC Sequence Control.>

NOTE:
When the hydraulic unit begins to work, first the RR side performs compression, hold, and decompression, and then the RL side performs compression, hold, and decompression.

13) Read the values indicated on the pressure gauges and check if it is within specification. Depress the brake pedal and check that it is not abnormally hard, and tightness is normal.
14) Disconnect the pressure gauge from the RL and RR caliper bodies.
15) Install the bleeder - screws of RL and RR caliper bodies.
16) Bleed air from the brake system. <Ref. to BR-59, Air Bleeding.>

4. CHECK HYDRAULIC UNIT VDC OPERATION WITH BRAKE TESTER

1) Set wheels other than the one to measure on free rollers.
2) Prepare to operate the VDC sequence control. <Ref. to VDC-23, VDC Sequence Control.>
3) Set the front wheels or rear wheels on the brake tester (a) and set the gear to neutral.



4) Operate the brake tester.
5) Perform VDC sequence control. <Ref. to VDC-23, VDC Sequence Control.>
6) When the hydraulic unit begins to work, check the following work sequence.
   (1) The FL wheel performs compression, hold and decompression in sequence, and subsequently the FR wheel repeats the cycle.
   (2) The RR wheel performs compression, hold and decompression in sequence, and subsequently the RL wheel repeats the cycle.
7) Read values indicated on the brake tester and check if the fluctuation of the values between decompression and compression meets specification.

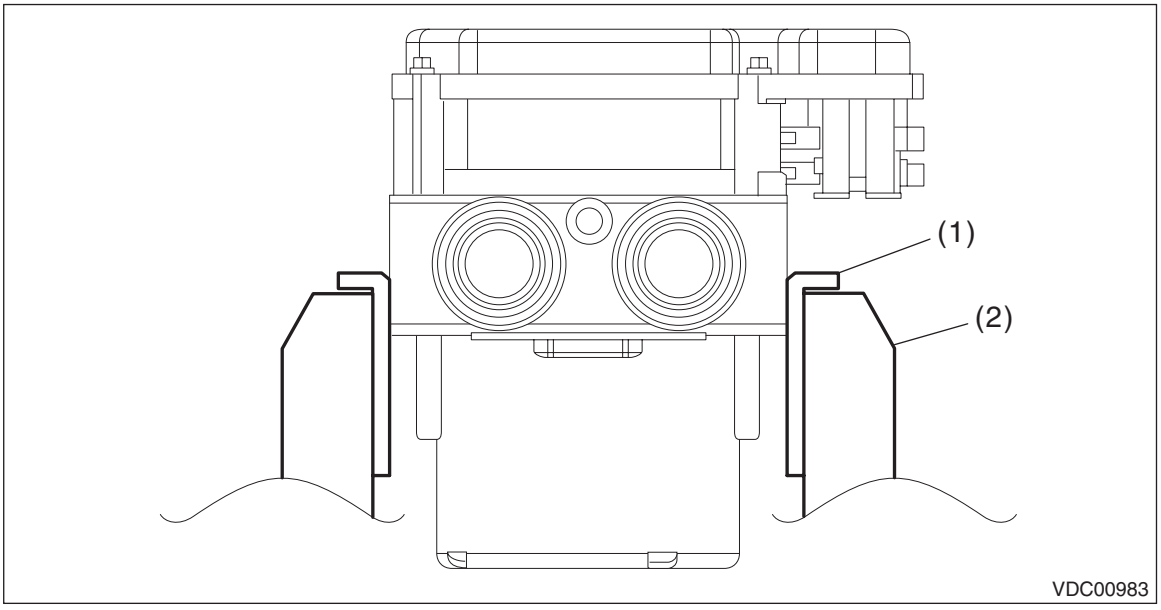
Inspection conditions	Front wheel	Rear wheel
When pressurized	2,000 N (204 kgf, 450 lbf) or more	2,000 N (204 kgf, 450 lbf) or more
When depressurized	500 N (51 kgf, 112 lbf) or less	500 N (51 kgf, 112 lbf) or less

8) After the inspection, depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

D: REPLACEMENT

CAUTION:
• Because the pressure sensor built into the H/U is easily damaged by static electricity, start the operation after performing static electricity measures.
• Be careful not to touch the sensors in the H/U to prevent damage.
• Because the seal of the VDCCM cannot be replaced, do not pull or peel it by lifting it up.
• Because the screw of the H/U will become slightly worn in every replacement procedure, 5 times is the maximum number of times for replacement. If a problem is found such as not being able to torque the screw to specifications even before 5 replacement operations are performed, replace the H/U body.
• When installing the VDCCM, always use new screws.
• When the sealing surface of the VDCCM or H/U is dirty or damaged and it cannot be cleaned or repaired, replace with a new part.
1) Remove the VDCCM&H/U. <Ref. to VDC-9, REMOVAL, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
2) To prevent entry of foreign objects and brake fluid leakage, plug the oil pressure port of the VDCCM&H/U using a screw plug, etc.
3) Set the pump motor section of the removed VDCCM&H/U face down on a vise.

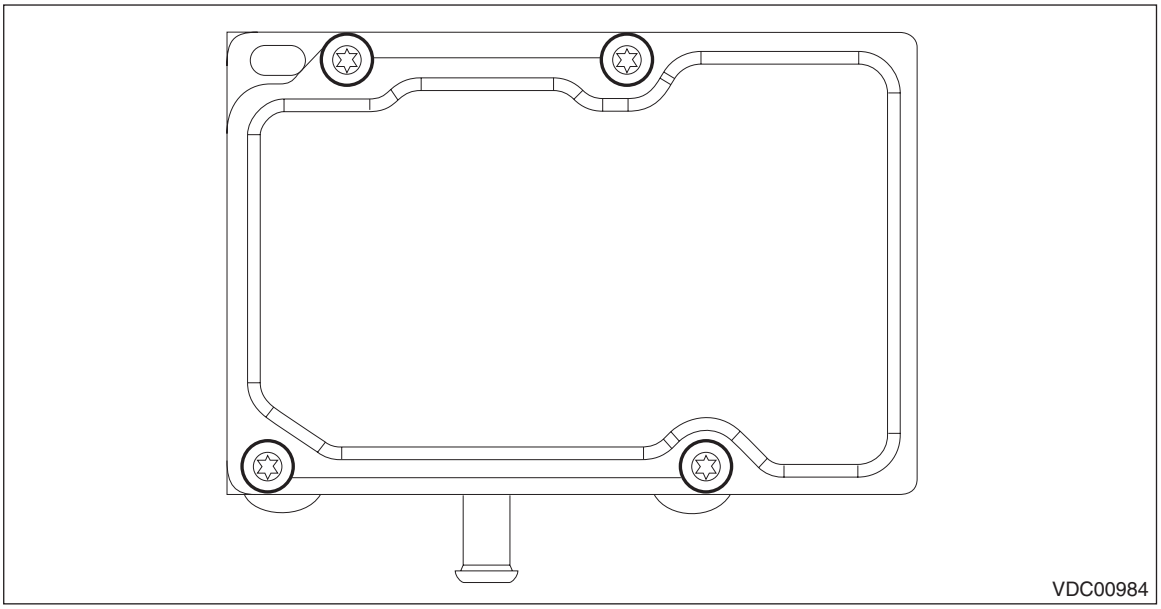
NOTE:
Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.



(1) Aluminum plate, etc. (2) Vise

4) Using TORX® bit E5, remove the four screws of VDCCM.

CAUTION:
Do not re-use the screws.



5) Slowly pull out the VDCCM upward from the H/U.

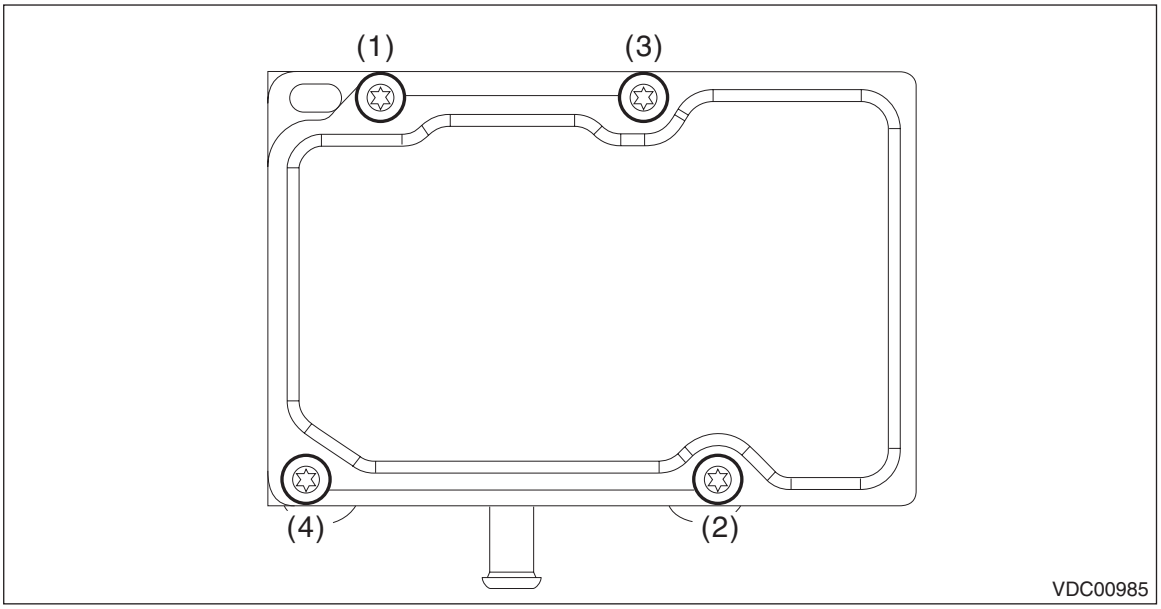
NOTE:
To prevent damaging of coil section, remove the VDCCM straight up from H/U without twisting.
6) Make sure there is no dirt or damage on the sealing surface of the H/U.

CAUTION:
- **Do not clean the VDCCM&H/U by applying compressed air.**
- **Even if damage is found on the H/U seal, do not attempt repair by filing or with a metal scraper. To remove the seal residue, always use a plastic scraper. Do not use chemical such as paint thinner, etc., to clean.**

7) Position the coil of the new VDCCM to align with the H/U valve.
8) To prevent deformation of the VDCCM housing cover, hold the corner of VDCCM and install it to the H/U without tilting.

9) Using a TORX® bit E5, attach/tighten new screws in the order of (1) through (4).

CAUTION:
Always use new screws.



Tightening torque:
1.5 N·m (0.15 kgf-m, 1.1 ft-lb)

10) Check that there is no foreign matter in mating surface between the VDCCM&H/U.
11) Using a TORX® bit E5, tighten the screws in the order of (1) through (4) again.

Tightening torque:
3 N·m (0.31 kgf-m, 2.2 ft-lb)

12) Check that there is no gap in the mating surface between VDCCM&H/U.
13) Install the VDCCM&H/U to the vehicle.

CAUTION:
When installing the VDCCM&H/U, replace the damper - hydraulic unit, spacer and nut with new parts.

14) Bleed air from the brake system. <Ref. to BR-59, PROCEDURE, Air Bleeding.>
15) Perform the selection and registration operation of parameter. <Ref. to VDC(diag)-19, PARAMETER SELECTION, OPERATION, Subaru Select Monitor.>

NOTE:
- After replacing the VDCCM, be sure to perform the selection · registration operation of parameter.
- For the selection and registration of parameter, the Subaru Select Monitor is required.
- When the registration has not been performed, the DTC code “Parameter selection error” is detected together with the ABS/EBD/VDC warning light illumination.

16) Check the parameter to confirm that the applied models and grades of the relevant vehicle are included. <Ref. to VDC(diag)-19, PARAMETER CHECK, OPERATION, Subaru Select Monitor.>
17) If the applied models and grades of the relevant vehicle are not included, perform the selection · registration operation of parameter with the {Confirm on parameter} screen again. <Ref. to VDC(diag)-19, PARAMETER SELECTION, OPERATION, Subaru Select Monitor.>
18) Execute Clear Memory after parameter selection and registration operations because the DTC for “Parameter selection error” is memorized.

E: ADJUSTMENT

1. VDC SENSOR MIDPOINT SETTING MODE

After installing, replacing or adjusting the following parts, perform the VDC sensor midpoint setting mode.
- Steering angle sensor
- Steering wheel
- Suspension parts
- Wheel alignment
- VDCCM&H/U
- VDCCM&H/U bracket

1) Park the vehicle on a level surface, and set the steering wheel to the neutral position.
2) Connect the Subaru Select Monitor to data link connector.
   (1) Run the “PC application for Subaru Select Monitor”.
   (2) On «Main Menu» display, select {Each System Check}.
   (3) Select {Brake Control System}. When {VDC} is displayed, select the [OK] button.
   (4) From {Current Data Display & Save}, select {Steer Angle Sensor Op}, {Longitudinal G Sensor} and {Lateral G sensor Output}.
3) Check that the steering angle sensor output value is between –10 and 10 deg.
4) Check that output values for the longitudinal G sensor and lateral G sensor are -2 — 2 m/s^2.
5) From {Work Support}, select {VDC sensor midpoint setting mode}, and perform the setting according to the procedure displayed on the Subaru Select Monitor Screen.
6) Drive the vehicle for 10 minutes, and check that there is no system malfunction or the warning light illumination while driving.
7) Make sure that the DTC is not stored.

5. ABS Sequence Control

A: OPERATION

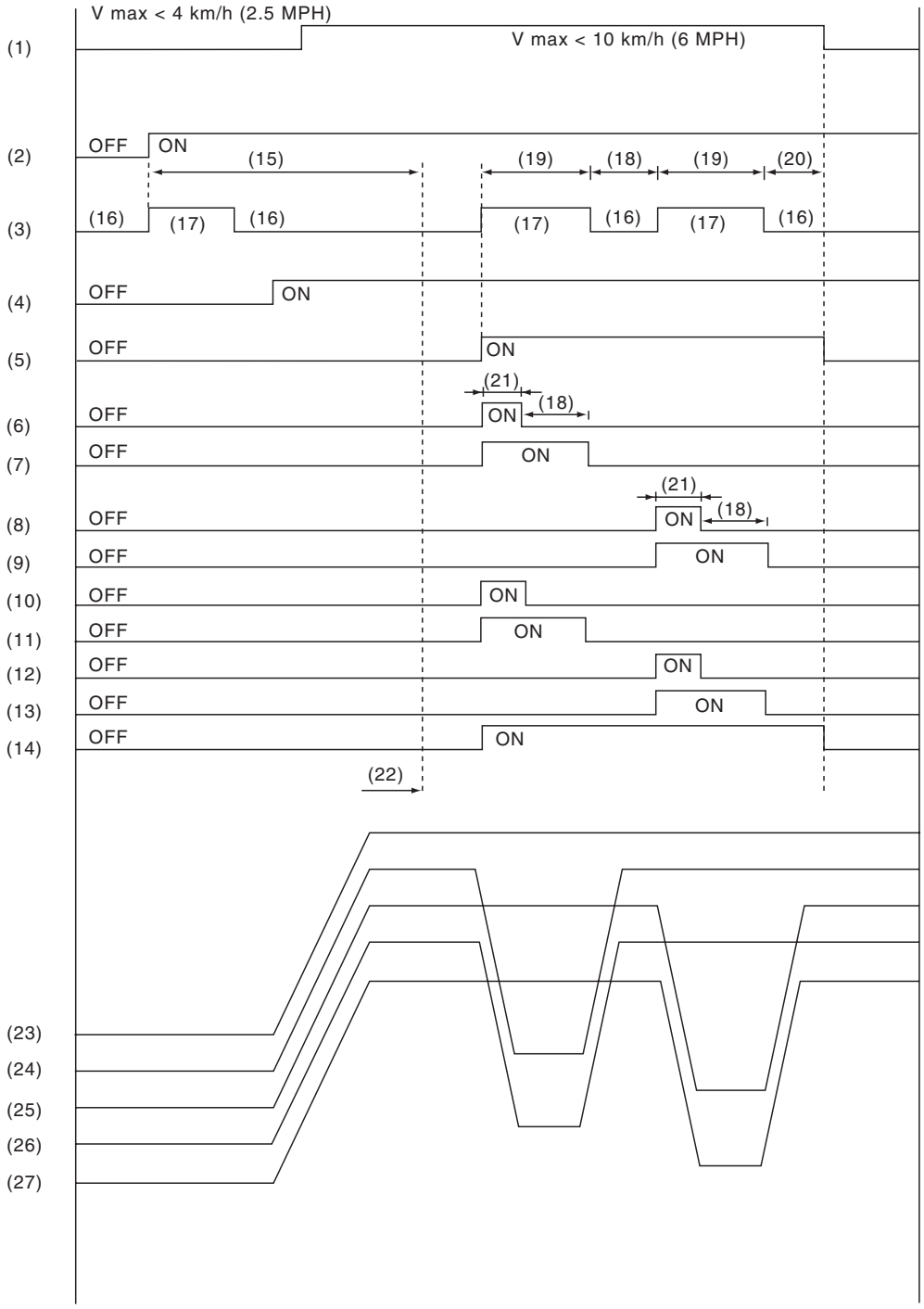
1) While the ABS sequence control is being performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve operation.
2) ABS sequence control can be started by the Subaru Select Monitor.

1. ABS SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

NOTE:
In the event of any trouble, the ABS sequence control will not operate.
1) Connect the Subaru Select Monitor to data link connector.
   (1) Run the “PC application for Subaru Select Monitor”.
   (2) On «Main Menu» display, select {Each System Check}.
   (3) Select {Brake Control System}. When {VDC} is displayed, select the [OK] button.
   (4) Select the {ABS Sequence Control Mode} from {Work Support}.
2) Follow the procedures displayed in the Subaru Select Monitor to execute the following.
   (1) When using a brake tester, depress the brake pedal with a force of 100 N (10.2 kgf, 22.5 lbf).
   (2) When using a pressure gauge, press the brake pedal so that the pressure gauge indicates 3,500 kPa (36 kgf/cm^2, 511 psi).
3) The brake system being operated is displayed on the Subaru Select Monitor.

2. CONDITIONS FOR ABS SEQUENCE CONTROL

NOTE:
The control operation starts at point A.



VDC00988

(1) All wheel speed
(2) Ignition key
(3) ABS warning light
(4) Switch - stop light
(5) Valve relay
(6) FL decompression valve
(7) FL compression valve
(8) FR decompression valve
(9) FR compression valve
(10) RR decompression valve
(11) RR compression valve
(12) RL decompression valve
(13) RL compression valve
(14) Pump motor
(15) A few seconds
(16) Light OFF
(17) Light ON
(18) 1.0 second
(19) 1.4 seconds
(20) 0.6 seconds
(21) 0.4 seconds
(22) Point A
(23) Master cylinder pressure
(24) FL wheel cylinder pressure
(25) FR wheel cylinder pressure
(26) RR wheel cylinder pressure
(27) RL wheel cylinder pressure

B: SPECIFICATION

1. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL

When the following conditions develop, the ABS sequence control stops and ABS operation is returned to the normal control mode.

- When the speed of at least one wheel reaches 10 km/h (6 MPH).
- When the brake pedal is released during ABS sequence control and the switch - stop light becomes OFF.
- After completion of ABS sequence control.
- When a malfunction is detected.

6. VDC Sequence Control

A: OPERATION

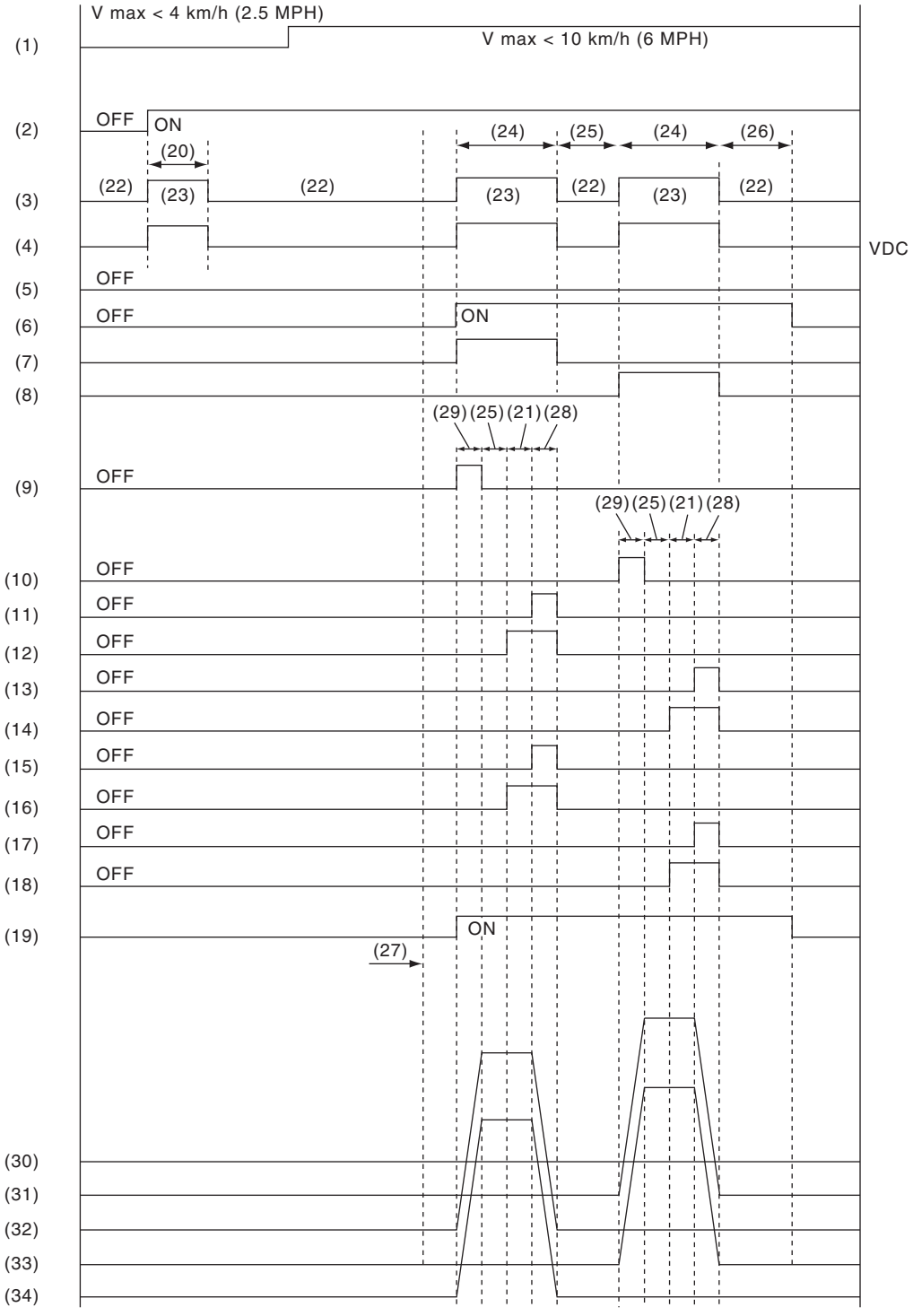
1) While the VDC sequence control is performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve is operated.
2) VDC sequence control can be started by Subaru Select Monitor.

1. VDC SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

NOTE:
In the event of any trouble, sequence control will not operate.
1) Connect the Subaru Select Monitor to data link connector.
   (1) Run the “PC application for Subaru Select Monitor”.
   (2) On «Main Menu» display, select {Each System Check}.
   (3) Select {Brake Control System}. When {VDC} is displayed, select the [OK] button.
   (4) Select the {VDC Function Check Mode} from {Work Support}.
2) Operate according to the procedures displayed in the Subaru Select Monitor.
3) The brake system being operated is displayed on the Subaru Select Monitor.

2. CONDITIONS FOR VDC SEQUENCE CONTROL

NOTE:
The control operation starts at point A.



(1) All wheel speed
(2) Ignition key
(3) ABS warning light
(4) VDC warning light
(5) Switch - stop light
(6) Valve relay
(7) VDC switching valve 1 FL
(8) VDC switching valve 1 FR
(9) VDC switching valve 2 FL
(10) VDC switching valve 2 FR
(11) FL decompression valve
(12) FL compression valve
(13) FR decompression valve
(14) FR compression valve
(15) RR decompression valve
(16) RR compression valve
(17) RL decompression valve
(18) RL compression valve
(19) Pump motor
(20) A few seconds
(21) 1.2 seconds
(22) Light OFF
(23) Light ON
(24) 3.4 seconds
(25) 1 second
(26) 1.6 seconds
(27) Point A
(28) 0.4 seconds
(29) 0.8 seconds
(30) Master cylinder pressure
(31) FR wheel cylinder pressure
(32) FL wheel cylinder pressure
(33) RL wheel cylinder pressure
(34) RR wheel cylinder pressure

B: SPECIFICATION

1. CONDITIONS FOR COMPLETION OF VDC SEQUENCE CONTROL

When the following conditions develop, the VDC sequence control stops and VDC operation is returned to the normal control mode.

- When the speed of at least one wheel reaches 10 km/h (6 MPH).
- After completion of VDC sequence control.
- When a malfunction is detected.

7. Yaw Rate and G Sensor

A: NOTE

Yaw rate & longitudinal G and lateral G sensor are integrated with the VDC control module&hydraulic control module (VDCCM&H/U).

B: INSPECTION

1. YAW RATE & LONGITUDINAL G AND LATERAL G SENSOR SIGNAL

	Step	Check	Yes	No
1	**CHECK YAW RATE & G SENSOR.** 1) Check the installation condition of the VDC control module & hydraulic control module (VDCCM&H/U). 2) Select “Current Data Display & Save” on the Subaru Select Monitor. 3) Read the output of yaw rate & G sensor.	When the vehicle is placed horizontally, are the displayed values –1.5 — 1.5 m/s^2 for longitudinal G and lateral G sensor, and –4 — 4 deg/s for yaw rate sensor?	Go to step **2**.	Replace the VDC control module & hydraulic control unit (VDCCM&H/U).
2	**PERFORM DRIVING TEST.** Drive for approximately 10 minutes, and check that there is no system malfunction or the warning light illumination while driving.	Is there any abnormal movement or the warning light illumination while driving?	Perform the diagnosis according to DTCs for the VDC system. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	G sensor is normal.

8. Steering Angle Sensor

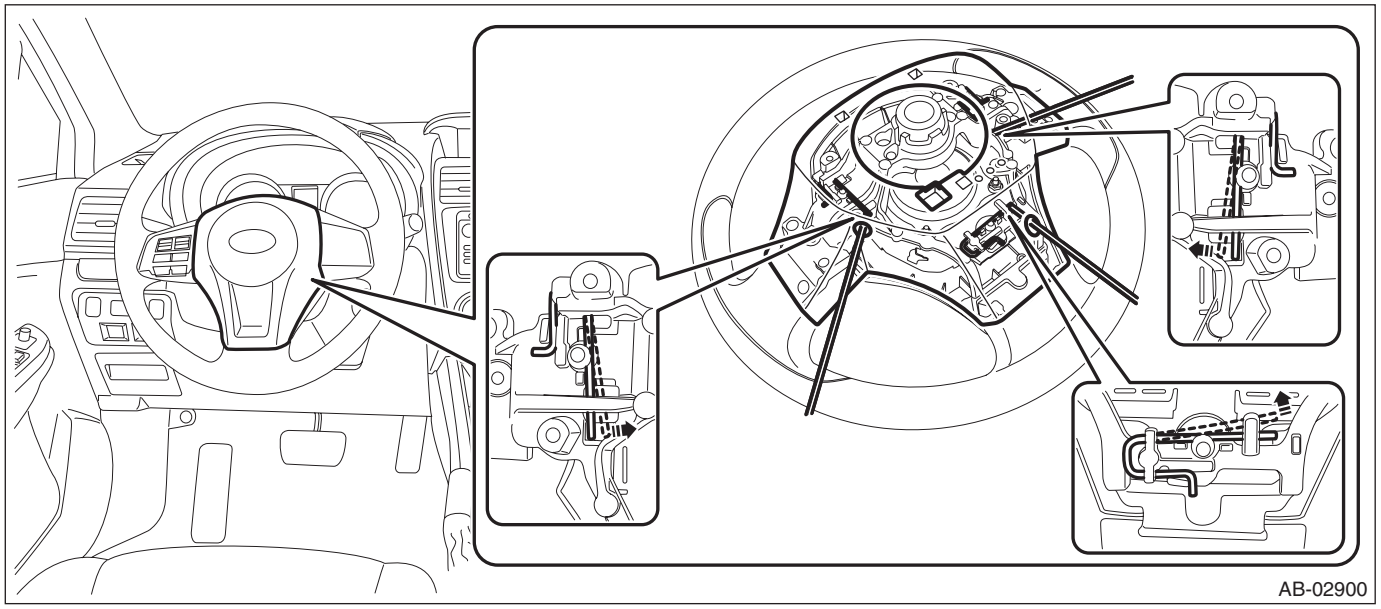
A: REPLACEMENT

CAUTION:
When the steering wheel and steering angle sensor have been removed, perform "VDC sensor midpoint setting mode" of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

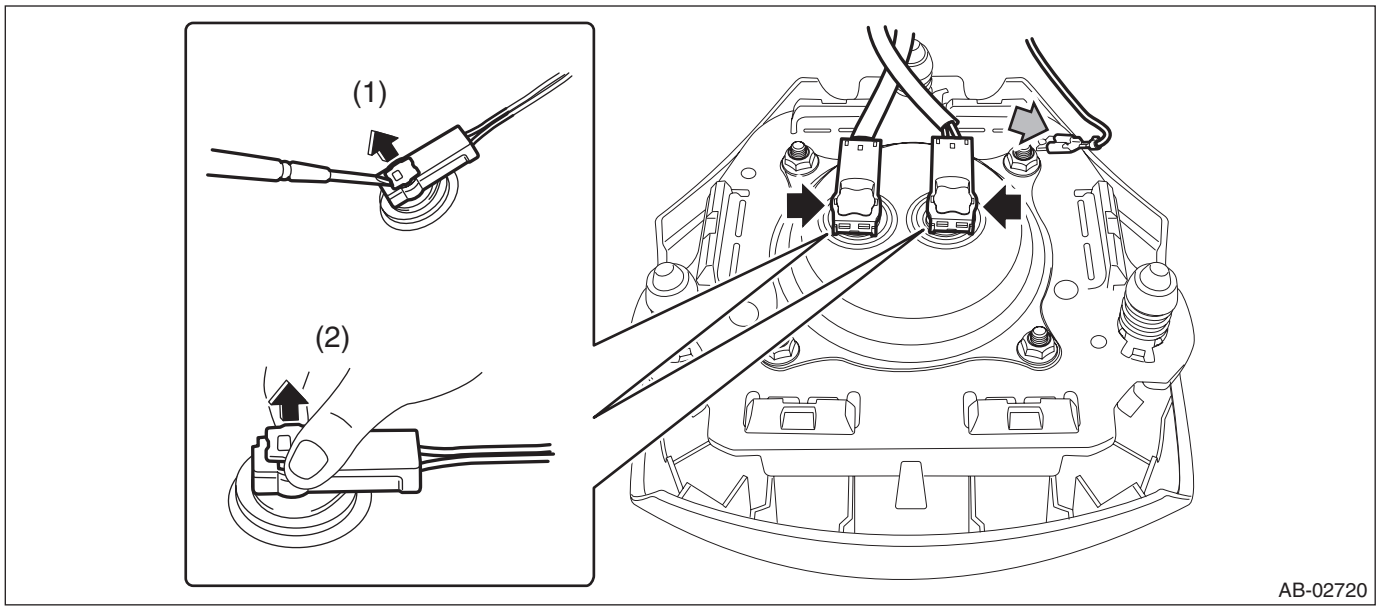
1) Position the front wheels straight ahead. (After moving a vehicle 5 m (16 ft) or more with front wheels positioned straight ahead, make sure that the vehicle moves straight ahead.)
2) Turn the ignition switch to OFF.
3) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
4) Remove the driver's airbag module.

CAUTION:
Before servicing the airbag module, always refer to "CAUTION" of "General Description" in the "AIRBAG SYSTEM" section. <Ref. to AB-11, CAUTION, General Description.>

(1) Using a hexagon wrench wrapped with protective tape, push in the snap pins to disengage the locks (3 places).



(2) Disconnect the horn harness and airbag connector, and remove the airbag module. <Ref. to AB-24, DRIVER'S AIRBAG MODULE, CURTAIN AIRBAG MODULE & PRETENSIONER, PROCEDURE, Airbag Connector.>

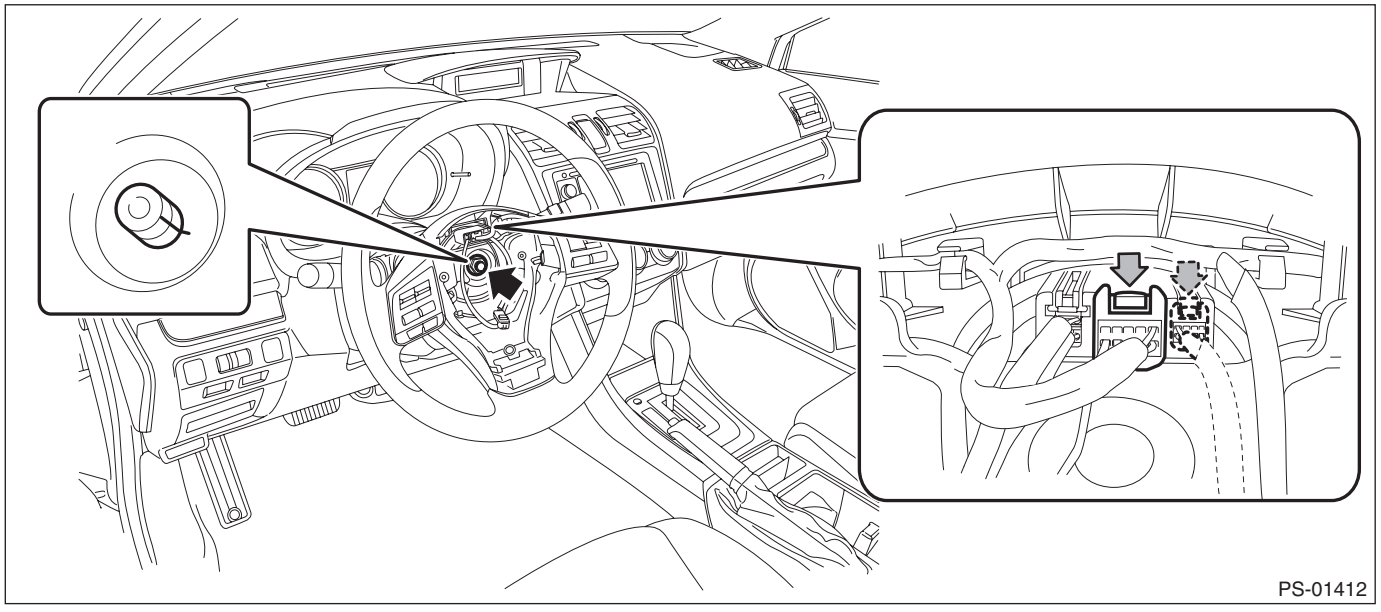


5) Remove the steering wheel.

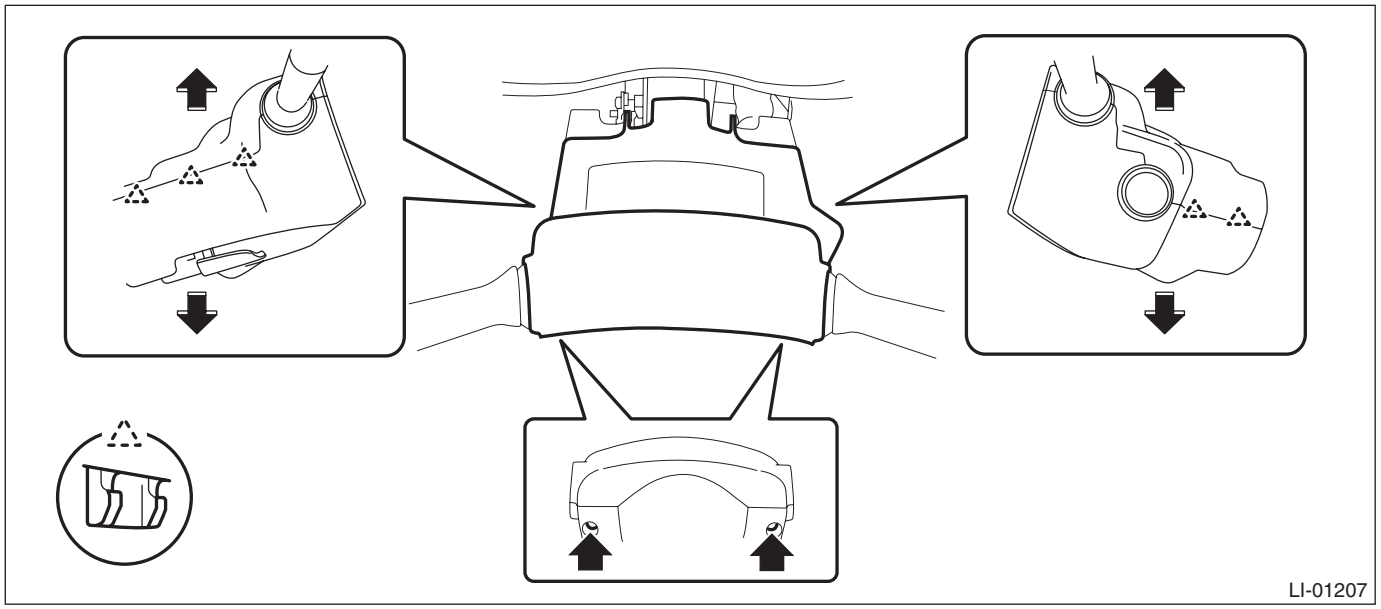
CAUTION:
• Always use the steering wheel puller for removal to avoid deforming the steering wheel.
• If the steering wheel has been removed, make sure that the steering roll connector is not turned from the original position.

PREPARATION TOOL:
Steering wheel puller

(1) Disconnect the connector and remove the nut.
(2) Put alignment marks and remove the steering wheel.

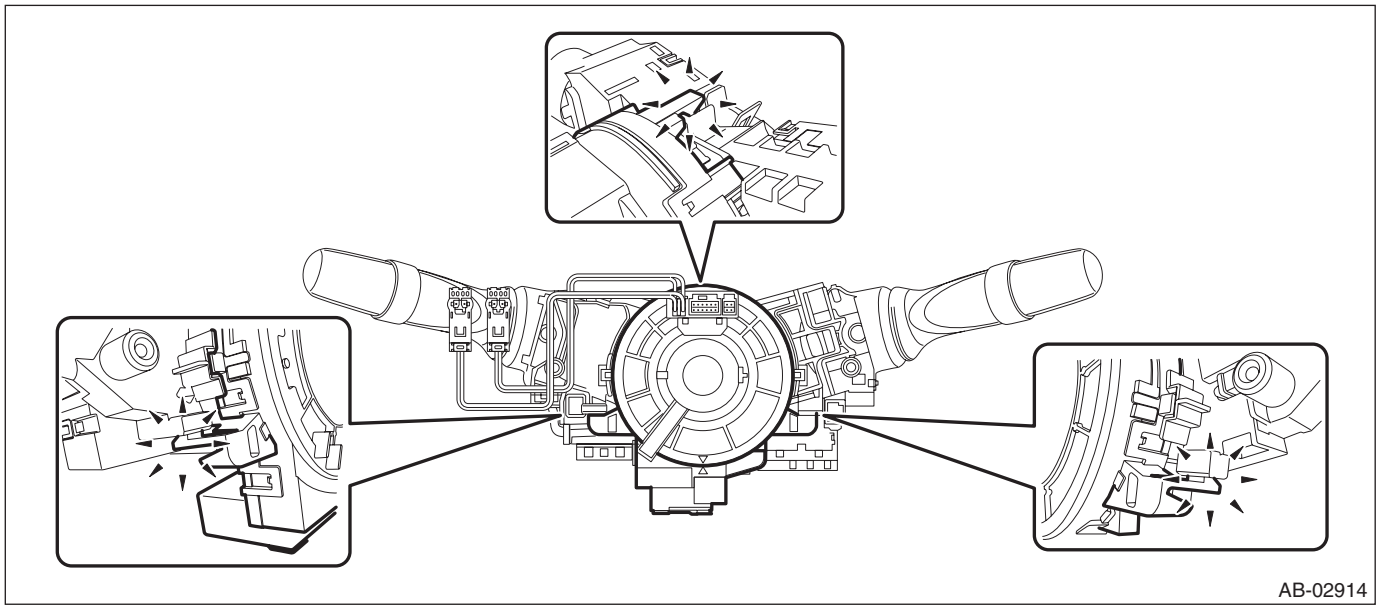


6) Remove the cover assembly - column.
(1) Release the screw and claw, and remove the cover assembly - column UPR and the cover assembly - column LWR.

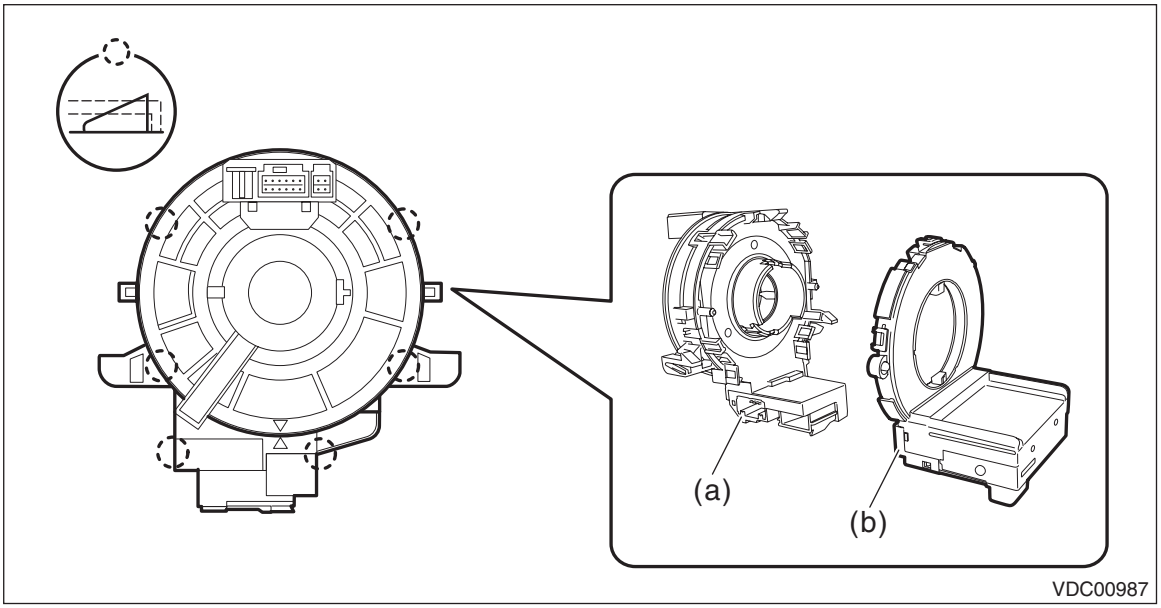

LI-01207

7) Remove the steering roll connector.

CAUTION:
Make sure that the steering roll connector is not turned from the original position.
(1) Disconnect the connector under the steering roll connector.
(2) Release the claws and remove the steering roll connector.

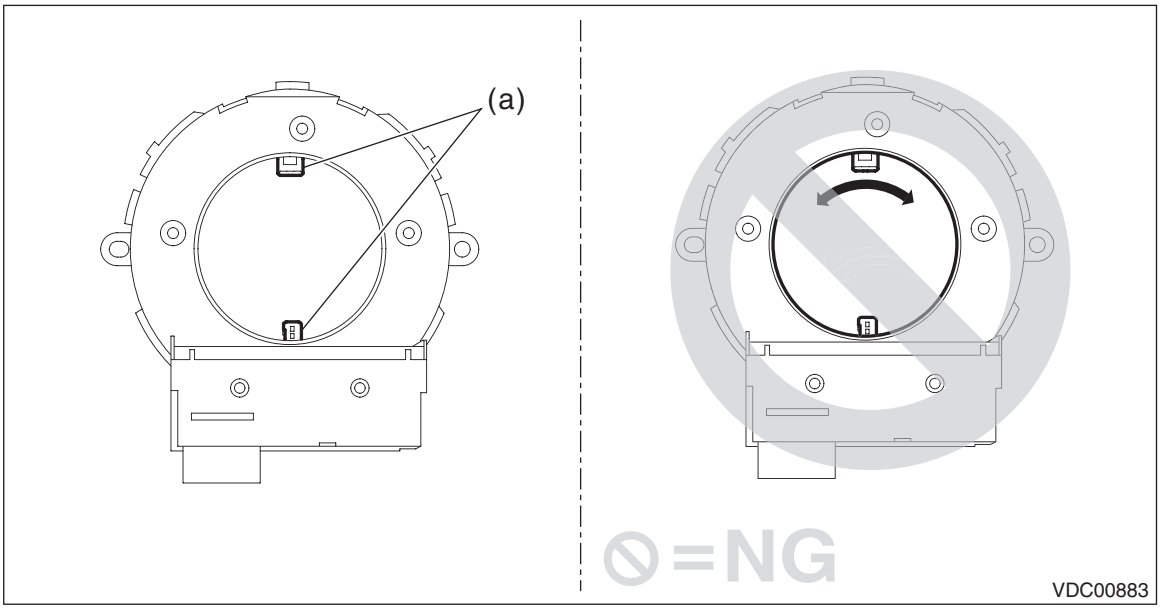

AB-02914

8) Remove the steering angle sensor.
(1) Release the claws and remove the steering angle sensor (b) from the steering roll connector (a).



9) Install the steering angle sensor.
(1) Apply grease to the protrusion (a) of new steering angle sensor.

CAUTION:
Do not rotate the steering angle sensor protrusion.



(2) Align the center of steering roll connector. <Ref. to AB-107, INSTALLATION, Roll Connector.>
(3) Align the position of the protrusion and install the steering angle sensor to the steering roll connector.
10) Install each part in the reverse order of removal.

Tightening torque:
Steering wheel: 39 N·m (3.98 kgf-m, 28.8 ft-lb)

Clearance:
Cover assembly - column to steering wheel: 4 — 6 mm (0.16 — 0.24 in)
11) After installation, perform the neutral position setting of the steering angle sensor. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

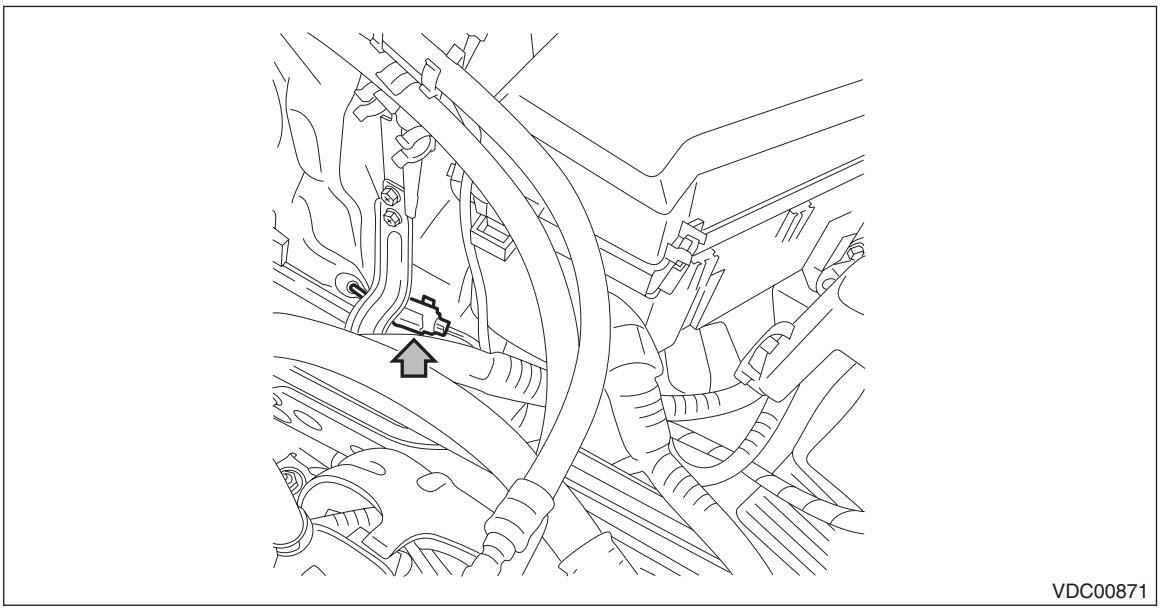
9. Front ABS Wheel Speed Sensor

A: REMOVAL

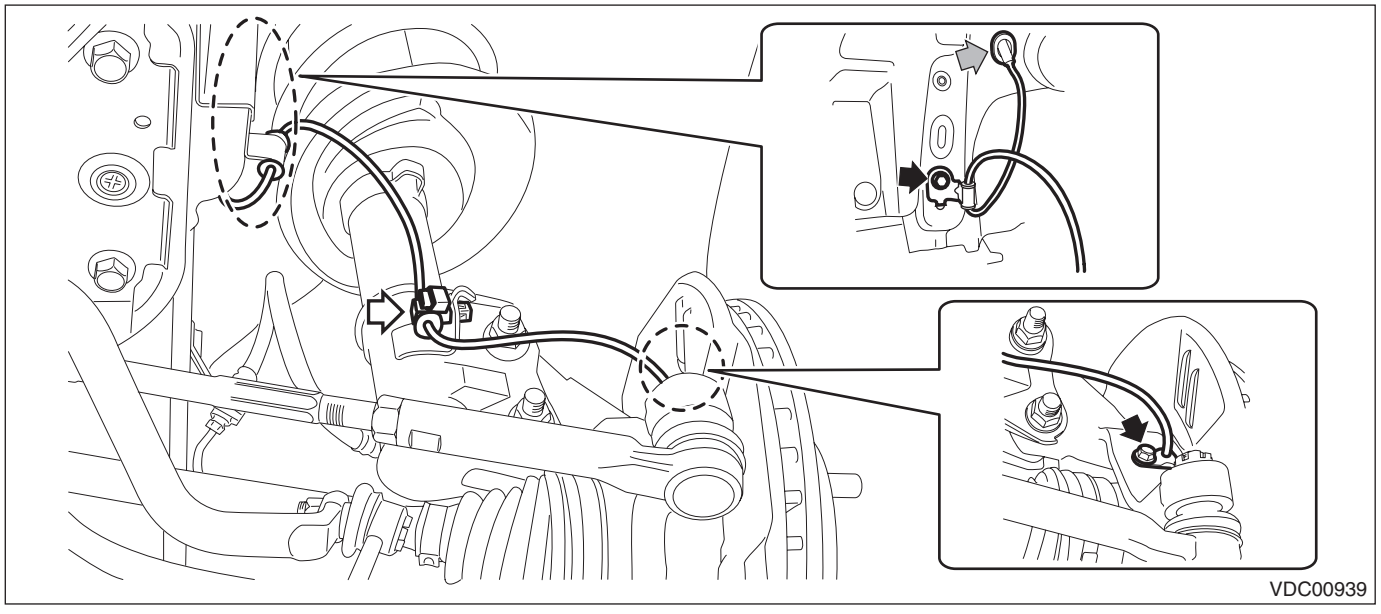
1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the front wheels.
3) Remove the front ABS wheel speed sensor.

CAUTION:
- **Be careful not to damage the sensor.**
- **Do not apply excessive force to the sensor harness.**
- **Leave the sensor harness clamp on the vehicle side.**

(1) Disconnect the connector of the front ABS wheel speed sensor in the engine compartment.



(2) Remove each harness clip and grommet.
(3) Remove the bolts, and remove the front ABS wheel speed sensor from the housing assembly - front axle.



B: INSTALLATION

CAUTION:
- **Be careful not to damage the sensor.**
- **Do not apply excessive force to the sensor harness.**

Install each part in the reverse order of removal.

NOTE:
- Check the identification (mark) on the harness to make sure there is no warpage. <Ref. to VDC-2, SPECIFICATION, General Description.>
- Check if the harness is not pulled and does not come in contact with the suspension or body while operating the steering.

Tightening torque:
Front ABS wheel speed sensor: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
Front ABS wheel speed sensor bracket: 33 N·m (3.36 kgf-m, 24.3 ft-lb)
Front wheel: 120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

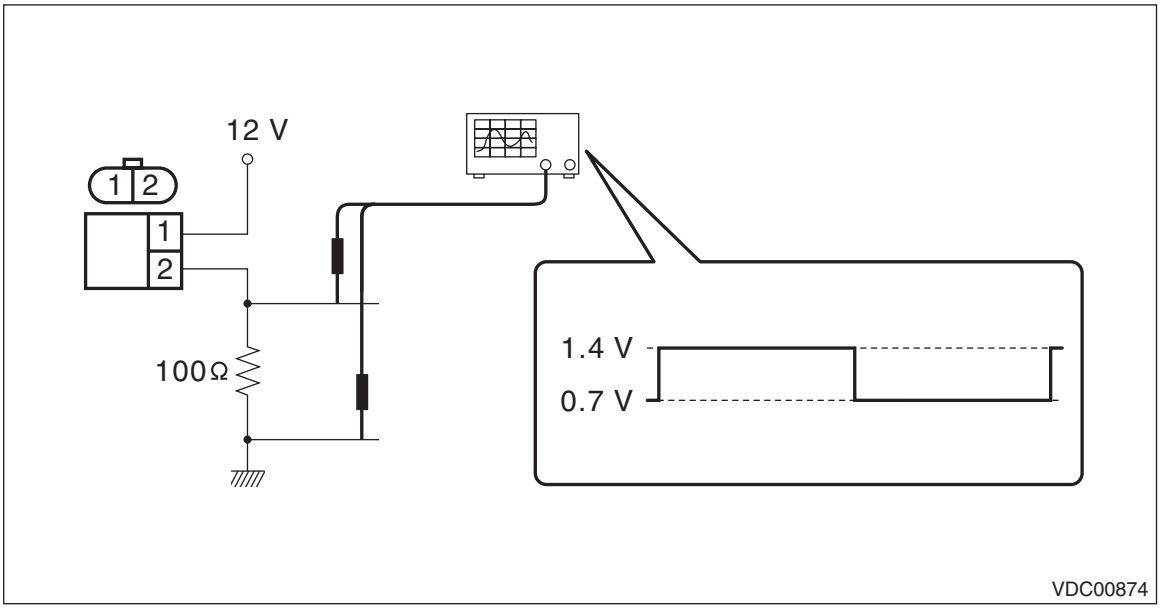
1. CHECK WITH SUBARU SELECT MONITOR

1) Connect the Subaru Select Monitor to data link connector.
   (1) Run the “PC application for Subaru Select Monitor”.
   (2) On «Main Menu» display, select {Each System Check}.
   (3) Select {Brake Control System}. When {VDC} is displayed, select the [OK] button.
   (4) From {Current Data Display & Save}, select {FR Wheel Speed} and {FL Wheel Speed}.
2) Check if the speed indicated on the display changes in the same manner as the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position.
3) If the speed indicated on the display does not change in the inspection, check the ABS wheel speed sensor. <Ref. to VDC-33, CHECK ABS WHEEL SPEED SENSOR UNIT, INSPECTION, Front ABS Wheel Speed Sensor.>

2. CHECK ABS WHEEL SPEED SENSOR UNIT

1) Visually check the tip of the ABS wheel speed sensor for foreign particles or damage. If necessary, clean the tip or replace the ABS wheel speed sensor.
2) Disconnect the ABS wheel speed sensor connector.
3) Check the ABS wheel speed sensor cable for discontinuity. If defective, replace the ABS wheel speed sensor.
4) Connect a 12 V power supply to No. 1 terminal of ABS wheel speed sensor connector, then attach resistance to the No. 2 terminal. Rotate the wheel at about 2.75 km/h (2 MPH), and measure the voltage using an oscilloscope.

Standard value of output voltage:
0.7 — 1.4 V



5) Replace the ABS wheel speed sensor if the inspection result is not within the standard value.

10.Rear ABS Wheel Speed Sensor

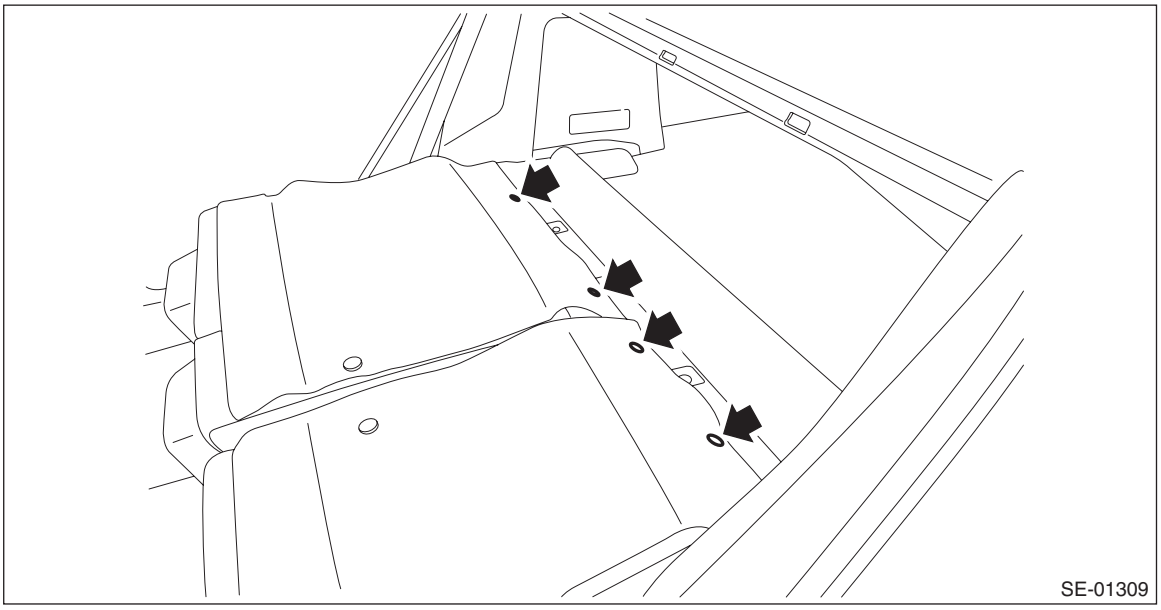
A: REMOVAL

1. 4 DOOR MODEL

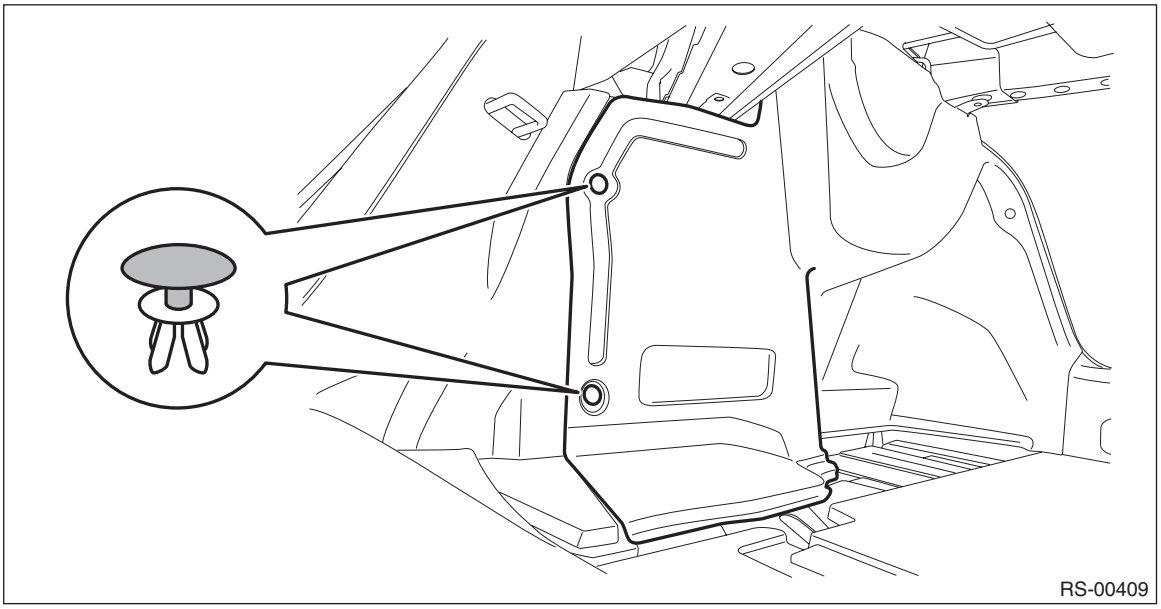
1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the rear ABS wheel speed sensor.

CAUTION:
- **Be careful not to damage the sensor.**
- **Do not apply excessive force to the sensor harness.**
- **Leave the sensor harness clamp on the vehicle side.**

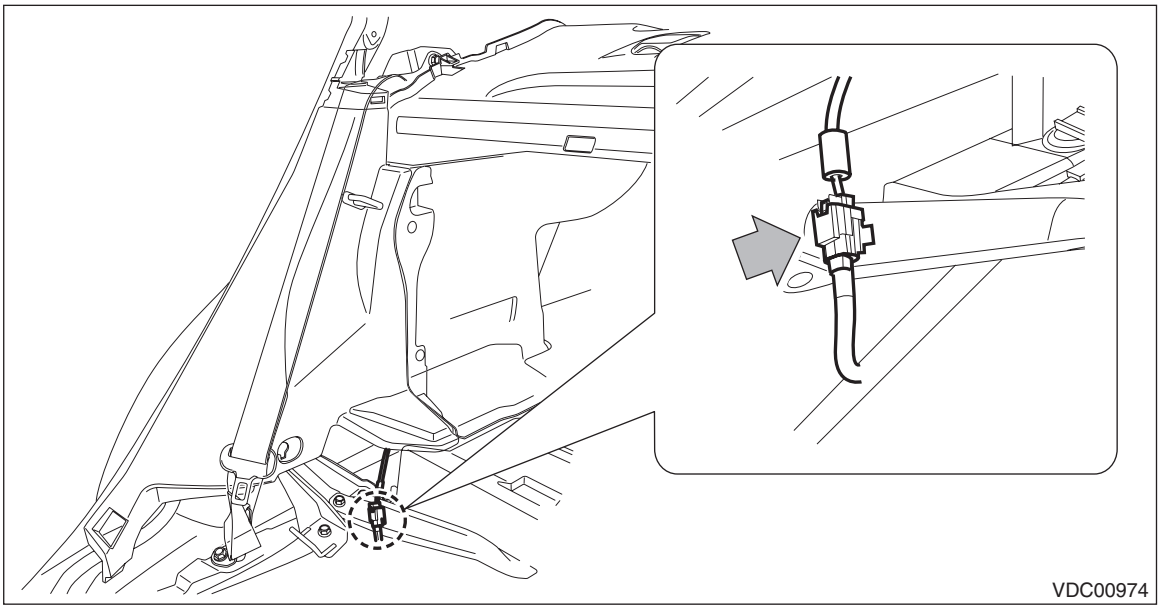
(1) Take out the trunk mat.
(2) Tilt the backrest assembly of the rear seat forward.
(3) Remove the clips located at the bottom of the cover COMPL - rear backrest LH and RH of the rear seat back.



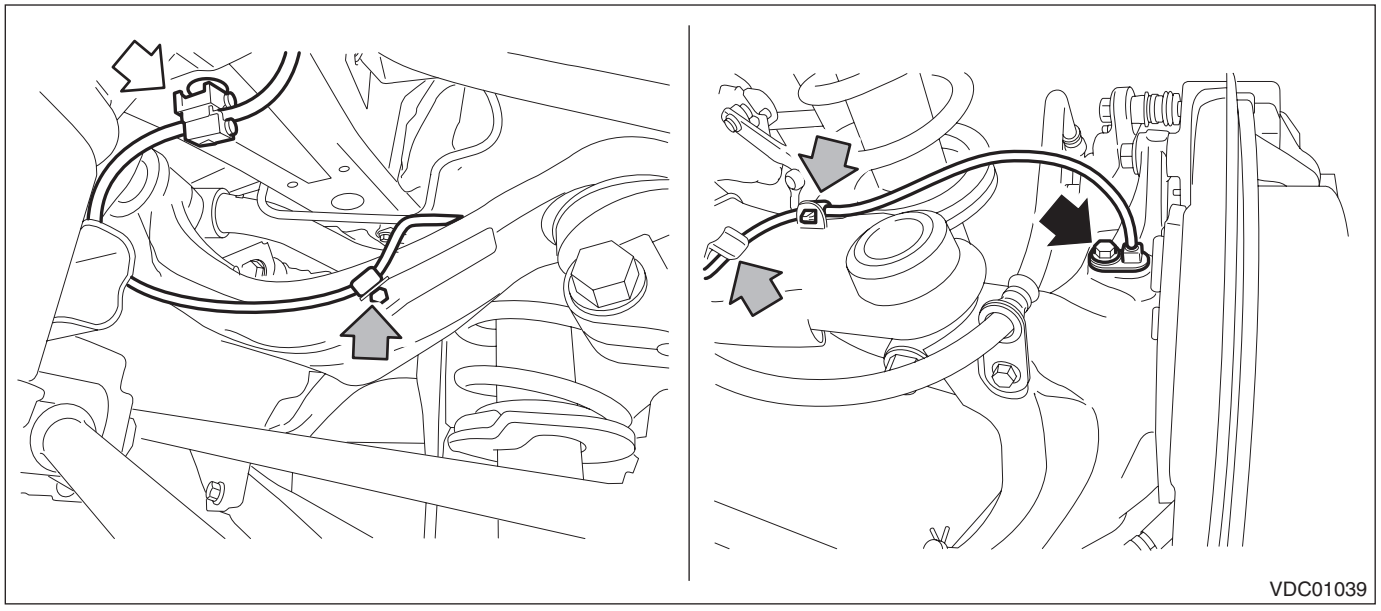
(4) Remove the clips, and turn over the trim panel - trunk side.



(5) Disconnect the connector of the rear ABS wheel speed sensor.



(6) Remove the grommet from the rear wheel housing, and pull out the connector of the rear ABS wheel speed sensor.
(7) Remove the harness clip and bolt, and remove the rear ABS wheel speed sensor.

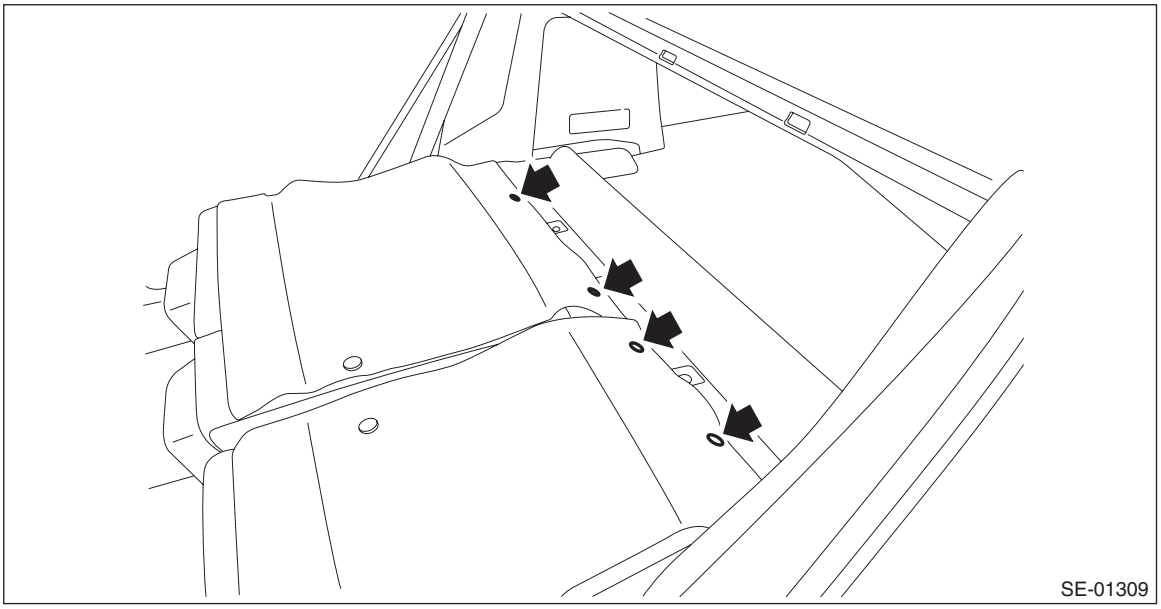


2. 5 DOOR MODEL/XV MODEL

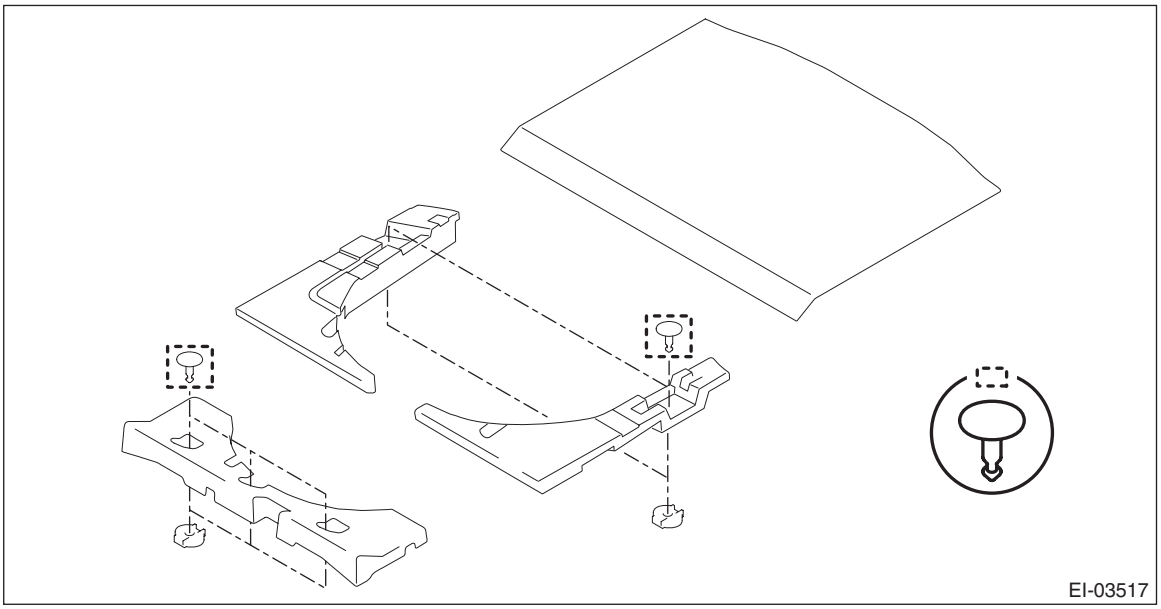
1) Disconnect the ground cable from battery.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the rear ABS wheel speed sensor.

CAUTION:
- **Be careful not to damage the sensor.**
- **Do not apply excessive force to the sensor harness.**
- **Leave the sensor harness clamp on the vehicle side.**

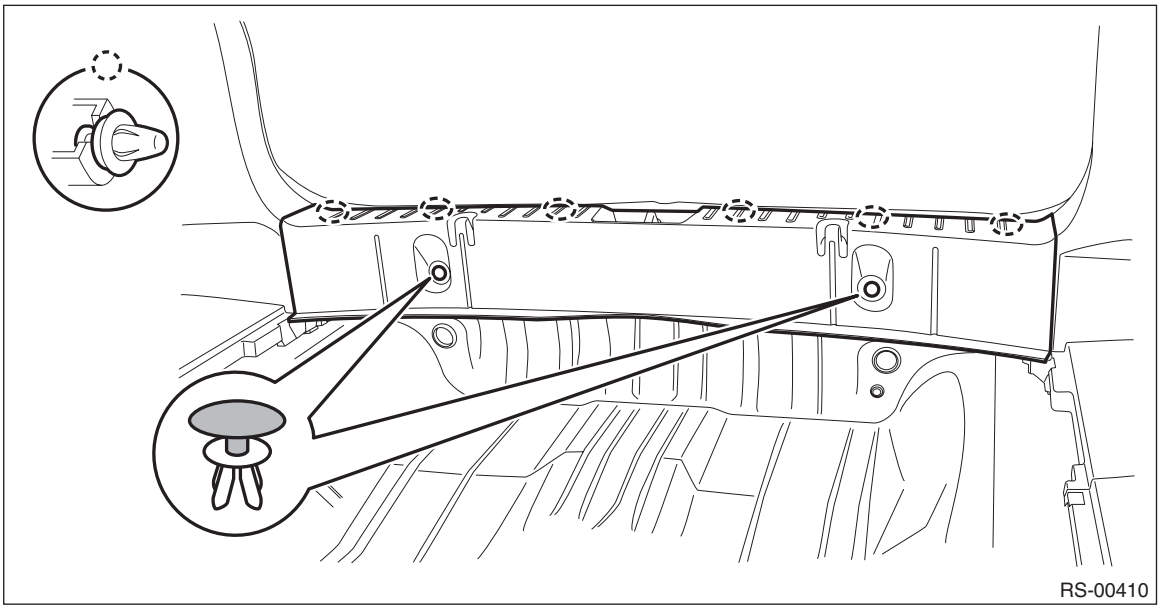
(1) Tilt the backrest assembly of the rear seat forward.
(2) Remove the clips located at the bottom of the cover COMPL - rear backrest LH and RH of the rear seat back.



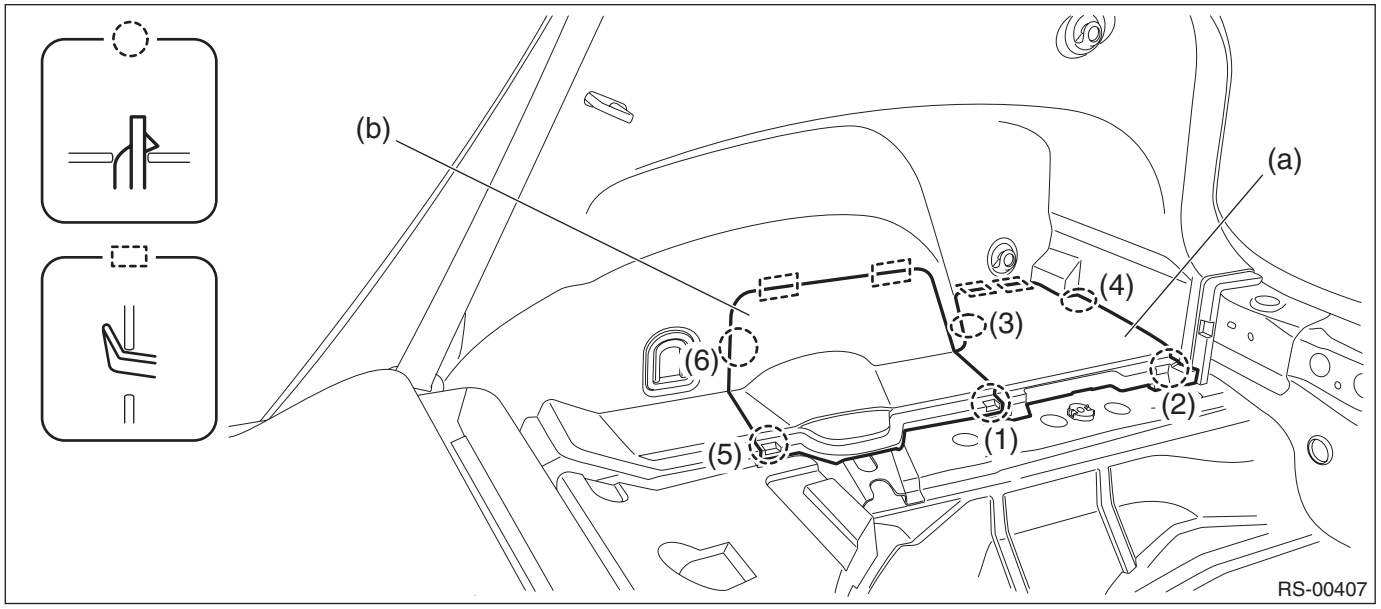
(3) Remove the mat - rear floor CTR and the spacer - rear floor side.



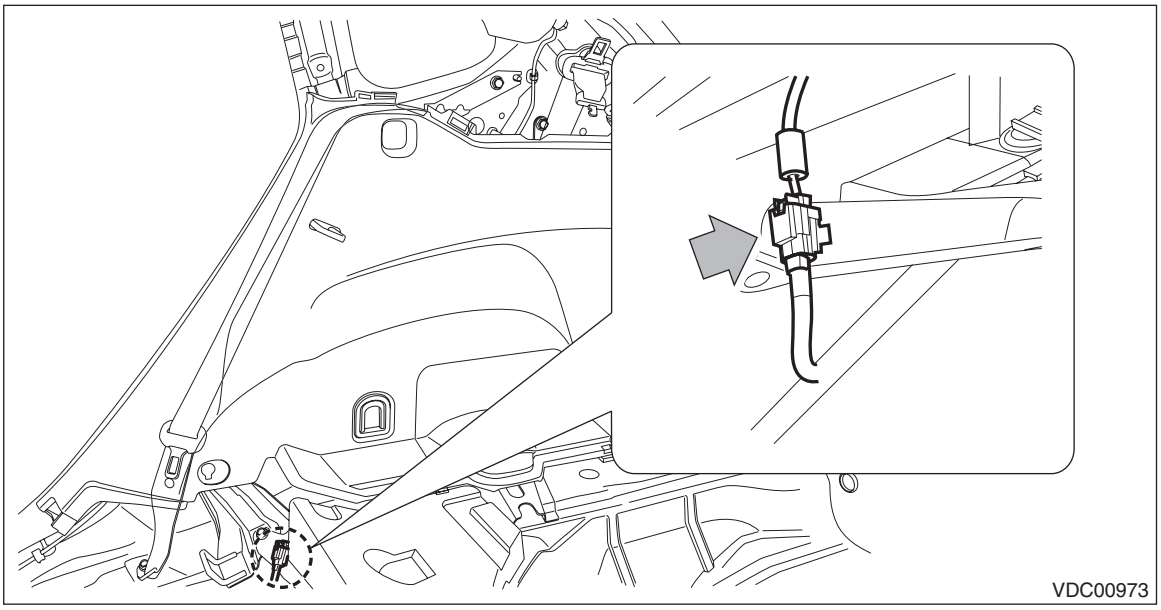
(4) Remove the clips, and remove the trim panel - rear skirt.



(5) Remove the lid upper rear (a) and the cap - rear strut (b) in the order from (1) to (6).

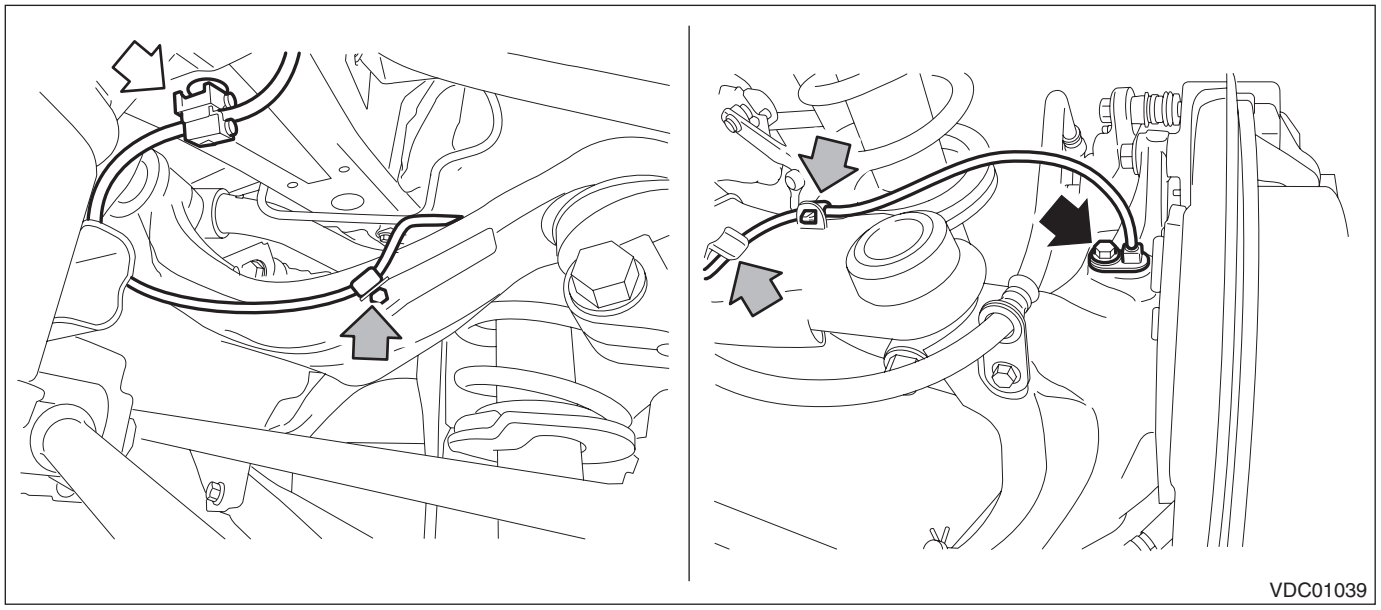


(6) Disconnect the connector of the rear ABS wheel speed sensor.

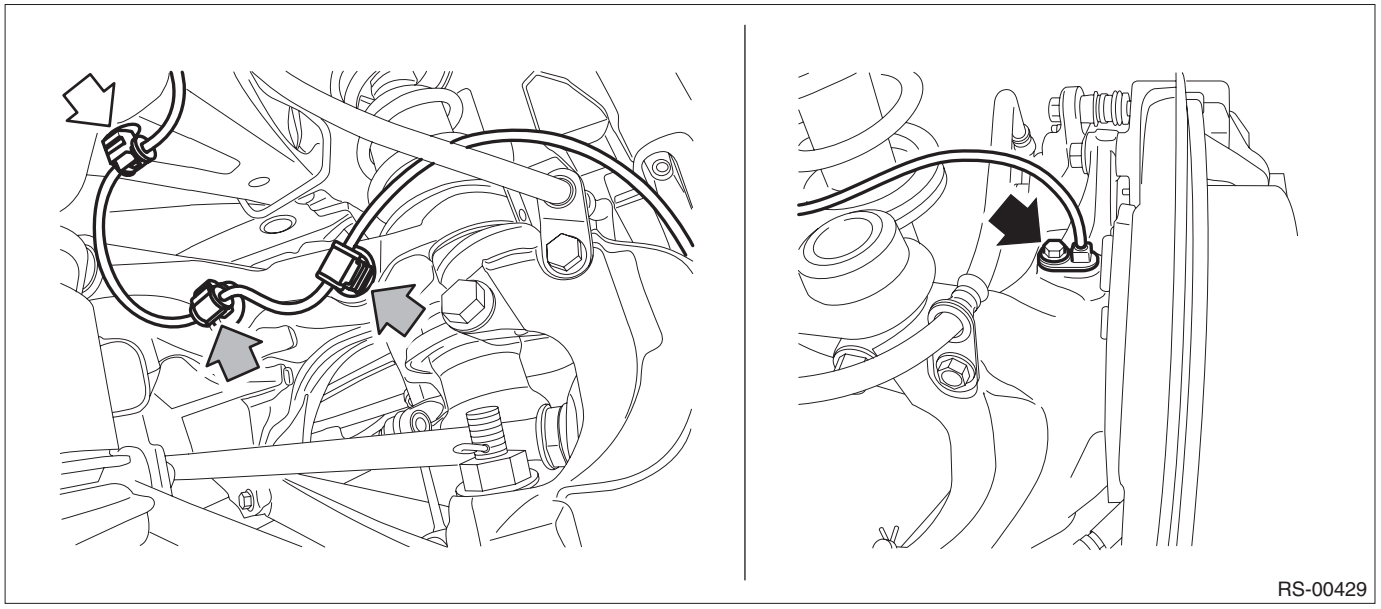


(7) Remove the grommet from the rear wheel housing, and pull out the connector of the rear ABS wheel speed sensor.
(8) Remove the harness clip and bolt, and remove the rear ABS wheel speed sensor.

- Except for XV model



- XV model



B: INSTALLATION

CAUTION:
Be careful not to damage the sensor.

1) Install each part in the reverse order of removal.
2) Route the rear ABS wheel speed sensor cable to the upper arm assembly.

NOTE:
Check the identification (mark) on the harness to make sure there is no warpage. <Ref. to VDC-2, SPECIFICATION, General Description.>

Tightening torque:
Rear ABS wheel speed sensor: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
Rear wheel: 120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

1. ABS WHEEL SPEED SENSOR

For inspection of rear ABS wheel speed sensor, refer to inspection of front ABS wheel speed sensor. <Ref. to VDC-33, CHECK ABS WHEEL SPEED SENSOR UNIT, INSPECTION, Front ABS Wheel Speed Sensor.>

11.Front Magnetic Encoder

A: REMOVAL

Refer to “Front Hub Unit Bearing” for removal, because the front magnetic encoder is integrated with the hub unit COMPL - front axle. <Ref. to DS-25, REMOVAL, Front Hub Unit Bearing.>

B: INSTALLATION

Refer to “Front Hub Unit Bearing” for installation, because the front magnetic encoder is integrated with the hub unit COMPL - front axle. <Ref. to DS-29, INSTALLATION, Front Hub Unit Bearing.>

C: INSPECTION

Visually check the magnetic encoder for any damage. If necessary, replace with a new hub unit COMPL - front axle.

NOTE:
Because the magnetic encoder is integrated with hub unit COMPL, replace the hub unit COMPL with a new part if there is any defect found on the magnetic encoder.

12.Rear Magnetic Encoder

A: REMOVAL

Refer to “Rear Hub Unit Bearing” for removal, because the rear magnetic encoder is integrated with the hub unit COMPL - rear axle. <Ref. to DS-46, REMOVAL, Rear Hub Unit Bearing.>

B: INSTALLATION

Refer to “Rear Hub Unit Bearing” for installation, because the rear magnetic encoder is integrated with the hub unit COMPL - rear axle. <Ref. to DS-51, INSTALLATION, Rear Hub Unit Bearing.>

C: INSPECTION

Visually check the magnetic encoder parts for any damage. If necessary, replace with a new hub unit COMPL - rear axle.

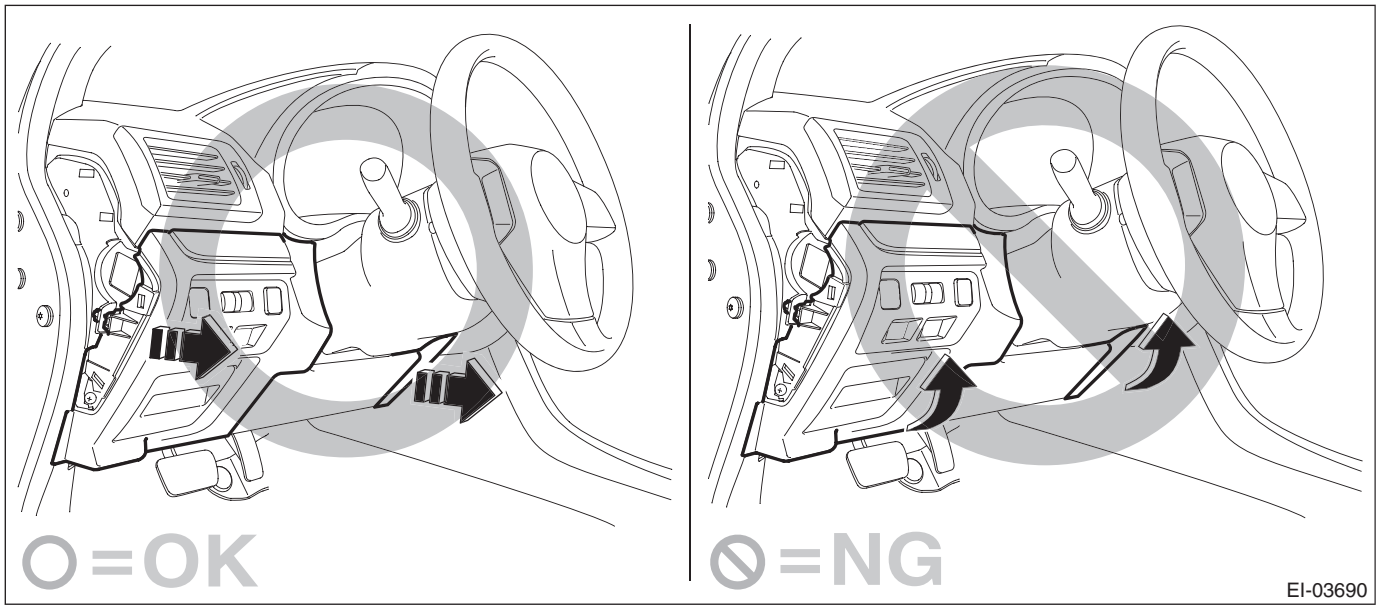
NOTE:
Because the magnetic encoder is integrated with hub unit COMPL, replace the hub unit COMPL with a new part if there is any defect found on the magnetic encoder.

13.VDC OFF Switch

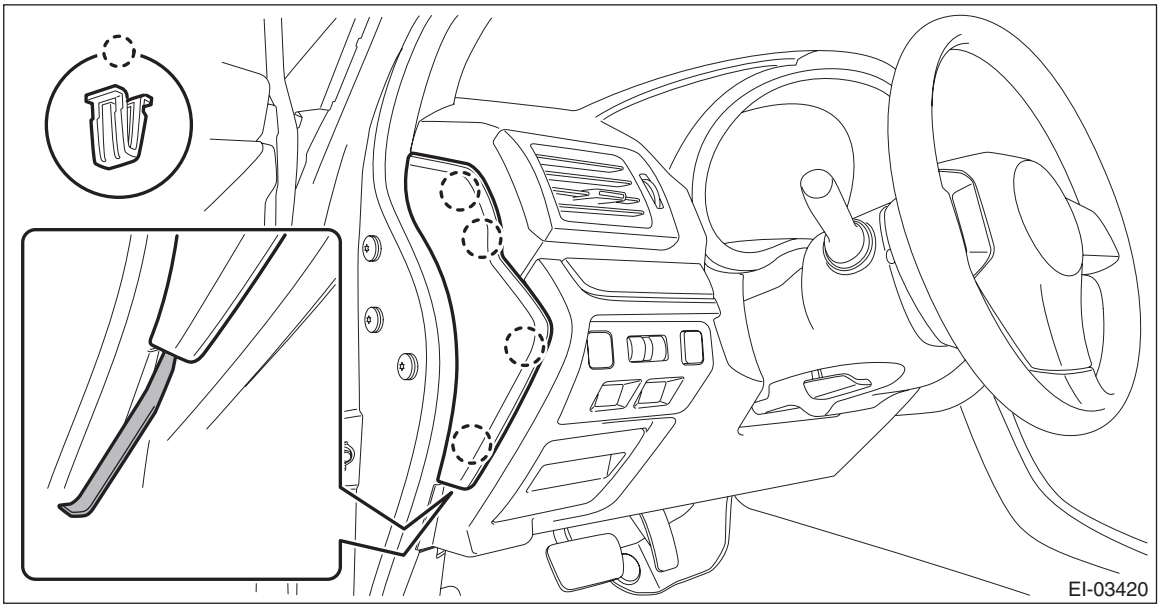
A: REMOVAL

1) Remove the cover assembly - instrument panel LWR driver.

CAUTION:
When removing the cover assembly - instrument panel LWR driver, be sure to pull it toward you. If attempting to remove by turning it upward, the claws may be damaged.



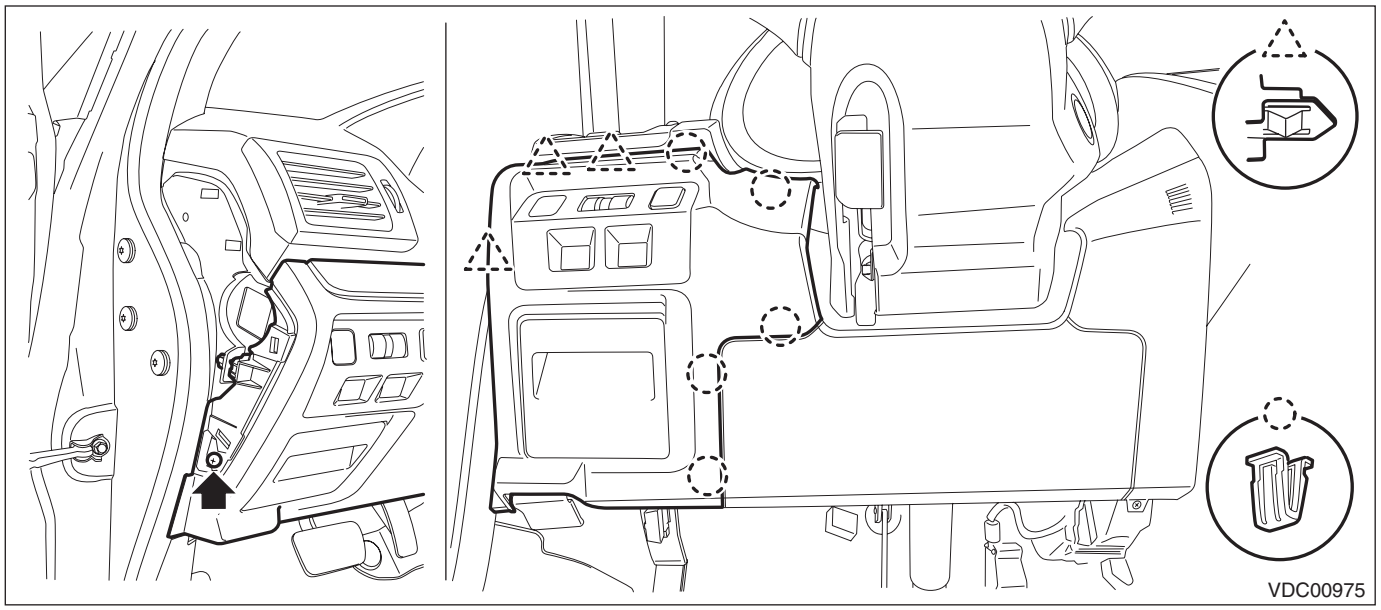
(1) Remove the clips, and remove the cover - instrument panel side LH.



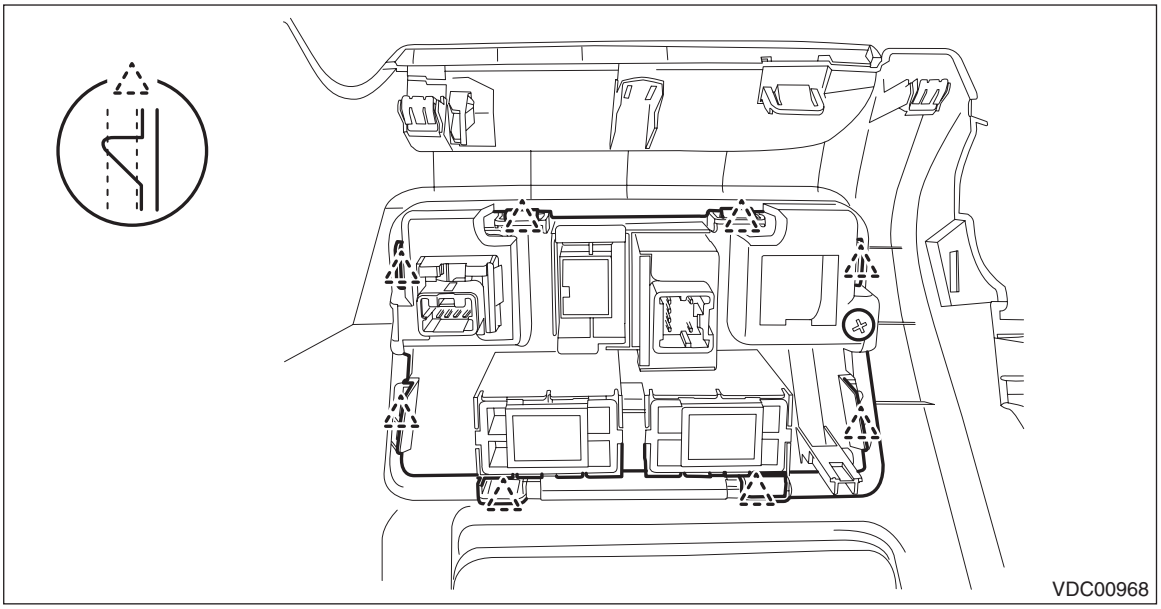
NOTE:
Using a plastic remover, open the cover - instrument panel side LH.

(2) Remove the screws and release the clips and claws.

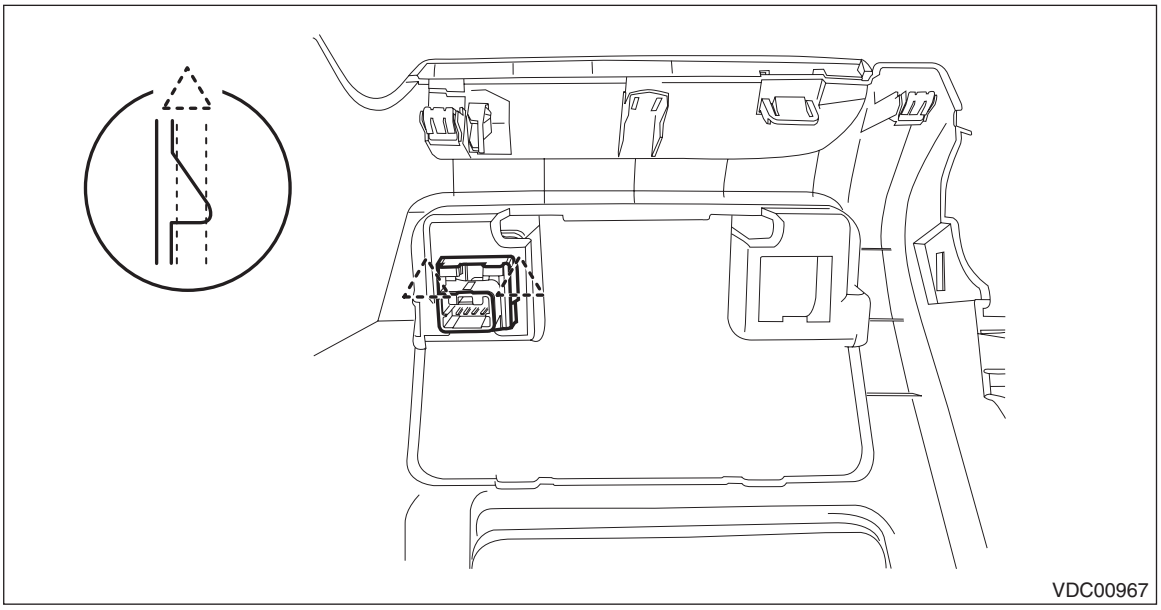
(3) Disconnect the harness connectors, and remove the cover assembly - instrument panel LWR driver OUT.



2) Remove the screws and release the claws, then detach the cover.



3) Release the claws and remove the VDC OFF switch.



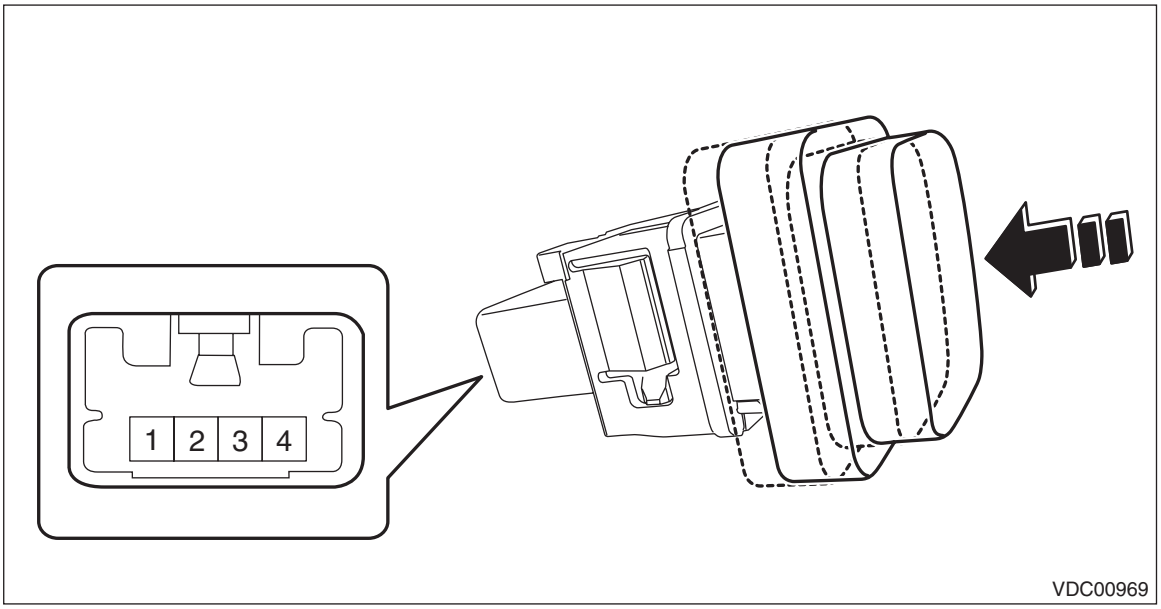
B: INSTALLATION

Install each part in the reverse order of removal.

C: INSPECTION

1) Disconnect the VDC OFF switch connector.
2) Check the resistance between the VDC OFF switch terminals.

PREPARATION TOOL:
Circuit tester



Terminal No.	Inspection conditions	Standard
2 — 3	Switch OFF	1 MΩ or more
	Switch ON	Less than 1 Ω

3) Replace the VDC OFF switch if the inspection result is not within the standard value.

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

VDC(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	4
3.	General Description	8
4.	Electrical Component Location	10
5.	Control Module I/O Signal	12
6.	Subaru Select Monitor	16
7.	Read Diagnostic Trouble Code (DTC)	22
8.	Inspection Mode	23
9.	Clear Memory Mode	24
10.	Warning Light Illumination Pattern	25
11.	List of Diagnostic Trouble Code (DTC)	37
12.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	41
13.	General Diagnostic Table	86

1. Basic Diagnostic Procedure

A: PROCEDURE

CAUTION:
Remove foreign matter (dust, water, oil etc.) from the VDCCM&H/U connector during removal and installation.

NOTE:
- To check the harness for open or short circuits, shake problem spot or connector.
- Refer to “Check List for Interview”. <Ref. to VDC(diag)-4, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to VDC(diag)-4, Check List for Interview.> 2) Before performing diagnostics, check the component which might affect VDC problems. <Ref. to VDC(diag)-8, INSPECTION, General Description.>	Is the component that might influence the VDC problem normal?	Go to step **2**.	Repair or replace each component.
2	**CHECK INDICATION OF DTC.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. 4) Read the DTC using the Subaru Select Monitor. <Ref. to VDC(diag)-22, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the Subaru Select Monitor cannot be executed properly, check the communication circuit. <Ref. to VDC(diag)-20, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>	Is DTC displayed on Subaru Select Monitor?	Record the DTC. Go to step **4**.	Go to step **3**.
3	**PERFORM GENERAL DIAGNOSTICS.** 1) Perform the inspection by referring to “General Diagnostic Table”. <Ref. to VDC(diag)-86, INSPECTION, General Diagnostic Table.> 2) Perform the Clear Memory Mode. <Ref. to VDC(diag)-24, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-22, OPERATION, Read Diagnostic Trouble Code (DTC).> 5) Check the DTC is not displayed.	Do the VDC warning light & VDC indicator light, VDC OFF indicator light and ABS warning light go off after starting the engine?	Finish the diagnosis.	Check the combination meter circuit. <Ref. to VDC(diag)-29, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-30, VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-31, VDC OFF INDICATOR LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.>

	Step	Check	Yes	No
4	**CHECK FREEZE FRAME DATA.** Using the Subaru Select Monitor, check the freeze frame data of the VDC control module.	Are freeze frame data recorded?	Record the freeze frame data. Go to step **5**.	Go to step **5**.
5	**PERFORM DIAGNOSIS.** 1) Refer to “List of Diagnostic Trouble Code (DTC)”. NOTE: For the DTC list, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to VDC(diag)-37, LIST, List of Diagnostic Trouble Code (DTC).> 2) Correct the cause of trouble. 3) Perform the Clear Memory Mode. <Ref. to VDC(diag)-24, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-22, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repeat step 5 until DTC is not shown.	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following item about the vehicle's state.

1. STATE OF ABS WARNING LIGHT

ABS warning light illuminates.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not illuminate • When/How long does it illuminate?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after starting engine, engine is running) ❑ ON (after starting engine, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ While accelerating	—	km/h
		—	MPH
	❑ While driving at a constant speed	km/h	MPH
	❑ While decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When other electrical parts are operating		
	• Part name: • Operating condition:		

2. STATE OF VDC WARNING LIGHT & VDC INDICATOR LIGHT

VDC warning light & VDC indicator light illuminates.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not illuminate • When/How long does it illuminate?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after starting engine, engine is running) ❑ ON (after starting engine, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ While accelerating	—	km/h
		—	MPH
	❑ While driving at a constant speed	km/h	MPH
	❑ While decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When other electrical parts are operating		
	• Part name: • Operating condition:		

3. STATE OF VDC OFF INDICATOR LIGHT

VDC OFF indicator light illuminates.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not illuminate • When/How long does it illuminate?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after starting engine, engine is running) ❑ ON (after starting engine, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ While accelerating	—	km/h
		—	MPH
	❑ While driving at a constant speed	km/h	MPH
	❑ While decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When other electrical parts are operating		
	• Part name: • Operating condition:		

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:
	b) Ambient temperature	°C (°F)
	c) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ Local street ❑ Uphill ❑ Downhill ❑ Paved road ❑ Gravel road ❑ Muddy road ❑ Sandy place ❑ Straight road ❑ Sharp curve ❑ Gentle curve ❑ S-curve ❑ Road with a slope on both sides ❑ Others:
	d) Road surface	❑ Dry ❑ Wet ❑ Covered with fresh snow ❑ Covered with hardened snow ❑ Frozen slope ❑ Others:

Condition	a) Brakes	Deceleration:	G
		❑ continuous / ❑ intermittent	
	b) Accelerator	Acceleration:	G
		❑ continuous / ❑ intermittent	
	c) Vehicle speed	km/h	MPH
		❑ Advancing ❑ While accelerating ❑ While decelerating ❑ At low speed ❑ When turning ❑ Others:	
	d) Tire inflation pressure	Front RH tire:	kPa
		Front LH tire:	kPa
		Rear RH tire:	kPa
		Rear LH tire:	kPa
	e) Degree of wear	Front RH tire:	mm (in)
		Front LH tire:	mm (in)
		Rear RH tire:	mm (in)
		Rear LH tire:	mm (in)
	f) Steering wheel	❑ Sharp turning ❑ Gentle turning ❑ Straight forward motion ❑ Gentle return ❑ Sharp return	
	g) Tire/Wheel size	❑ Specified size ❑ Except specification ( )	
	h) Tire variation	❑ Summer tire ❑ Studless tire (Brand:)	
	i) Tire chain is attached: ❑ Yes / ❑ No		
	j) Using T-type tires: ❑ Yes / ❑ No		
	k) Condition of suspension alignment:		
	l) Load condition:		
	m) Repaired parts are used: ❑ Yes / ❑ No		
	• Content:		
	n) Others:		

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the ABS wheel speed sensor and VDCCM&H/U.

CAUTION:
• Do not use electrical test equipment on wiring harness and connector circuits of the airbag system.
• Be careful not to damage the airbag system wiring harness when servicing the ABS wheel speed sensor and VDCCM&H/U.

B: INSPECTION

Before performing diagnosis, check the following items which might affect VDC problems.

1. BATTERY

Measure the battery voltage and check electrolyte.

Standard voltage:
12 V or more

Specific gravity:
1.260 or more

2. GROUND

Check the tightening torque of ground (GB-5) bolt of VDC.

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)

3. BRAKE FLUID

1) Check the brake fluid level.
2) Check the brake fluid for leaks.

4. HYDRAULIC UNIT

Check the hydraulic unit.
• When using the brake tester <Ref. to VDC-13, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH THE BRAKE TESTER, INSPECTION, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
• When not using the brake tester <Ref. to VDC-12, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

5. BRAKE DRAG

Check for brake drag.

6. BRAKE PAD AND ROTOR

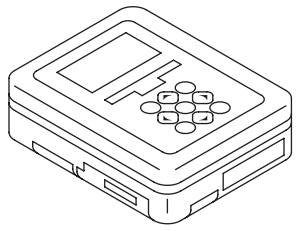
Check the brake pad and rotor.
• Front <Ref. to BR-17, INSPECTION, Front Brake Pad.> <Ref. to BR-19, INSPECTION, Front Disc Rotor.>
• Rear <Ref. to BR-31, INSPECTION, Rear Brake Pad.> <Ref. to BR-34, INSPECTION, Rear Disc Rotor.>

7. TIRES

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

C: PREPARATION TOOL

1. SPECIAL TOOL

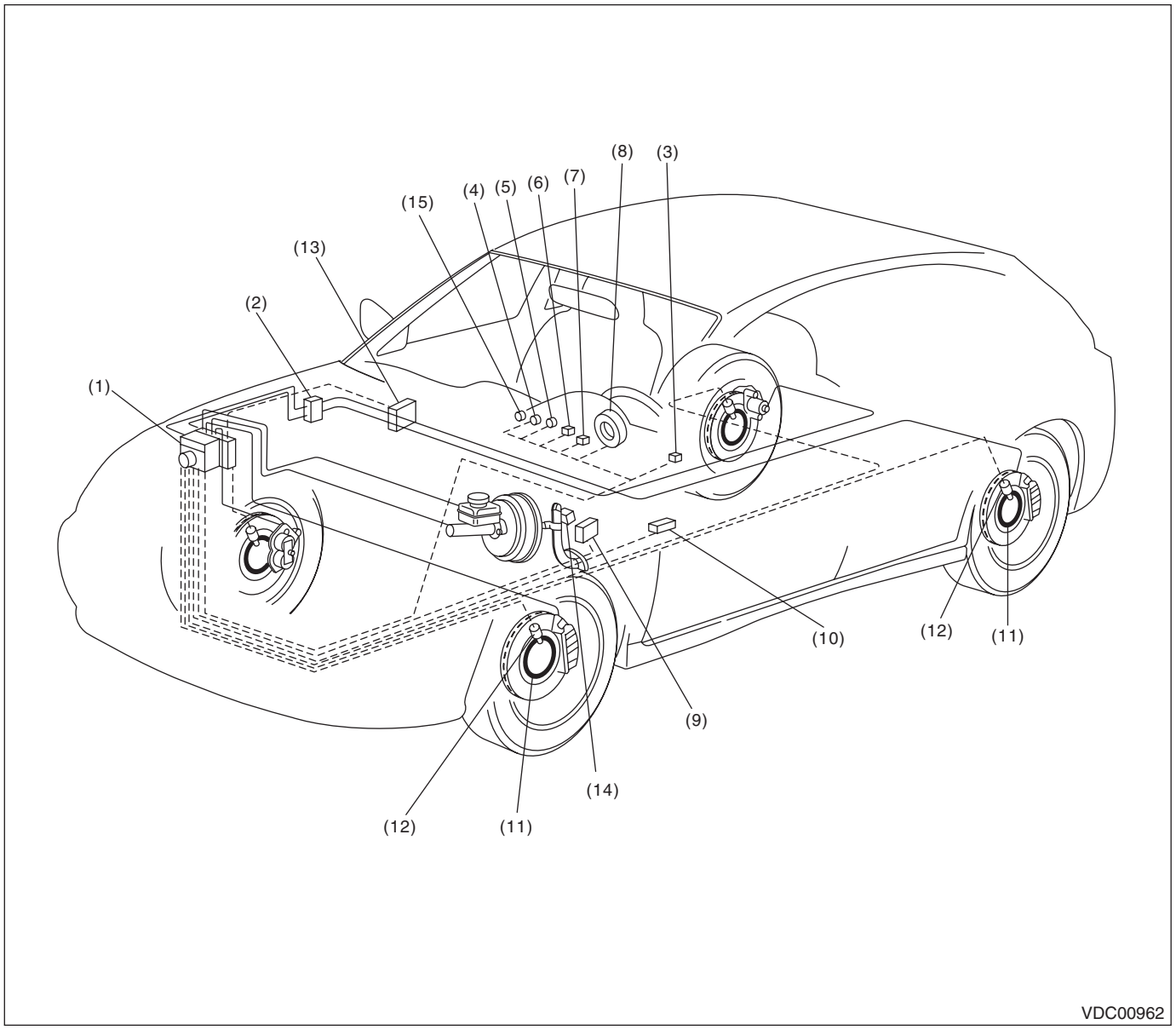
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

2. GENERAL TOOL

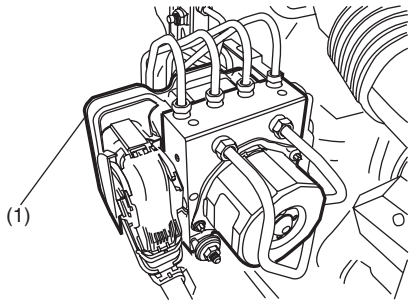
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

4. Electrical Component Location

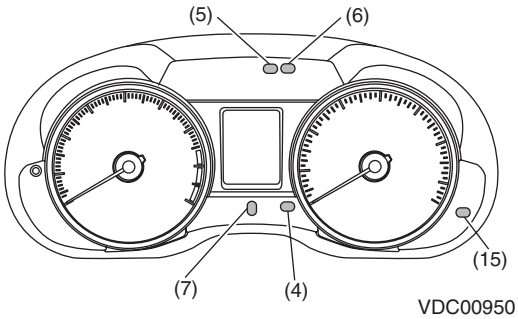
A: LOCATION



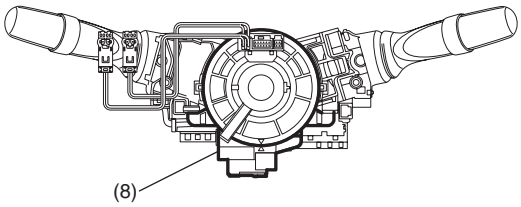
(1)	VDC control module and hydraulic control unit (VDCCM&H/U)	(6)	VDC warning light & VDC indicator light	(11)	Magnetic encoder
(2)	Connector	(7)	VDC OFF indicator light	(12)	ABS wheel speed sensor
(3)	VDC OFF switch	(8)	Steering angle sensor	(13)	Engine control module (ECM)
(4)	ABS warning light	(9)	Transmission control module (TCM)	(14)	Stop light switch
(5)	Brake warning light (EBD warning light)	(10)	Data link connector	(15)	Hill start assist warning light



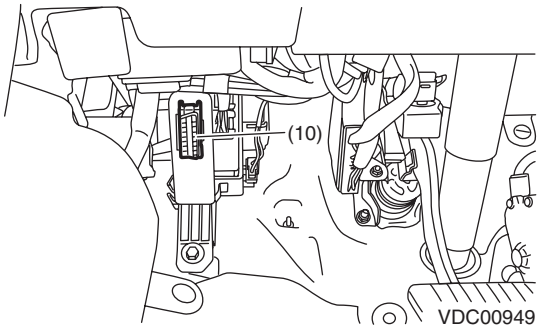
VDC00948



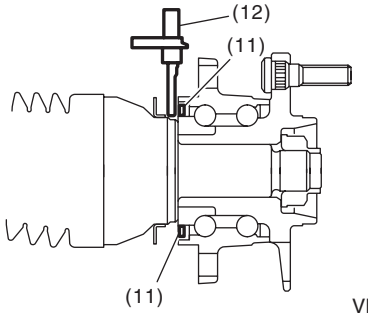
VDC00950



VDC00952



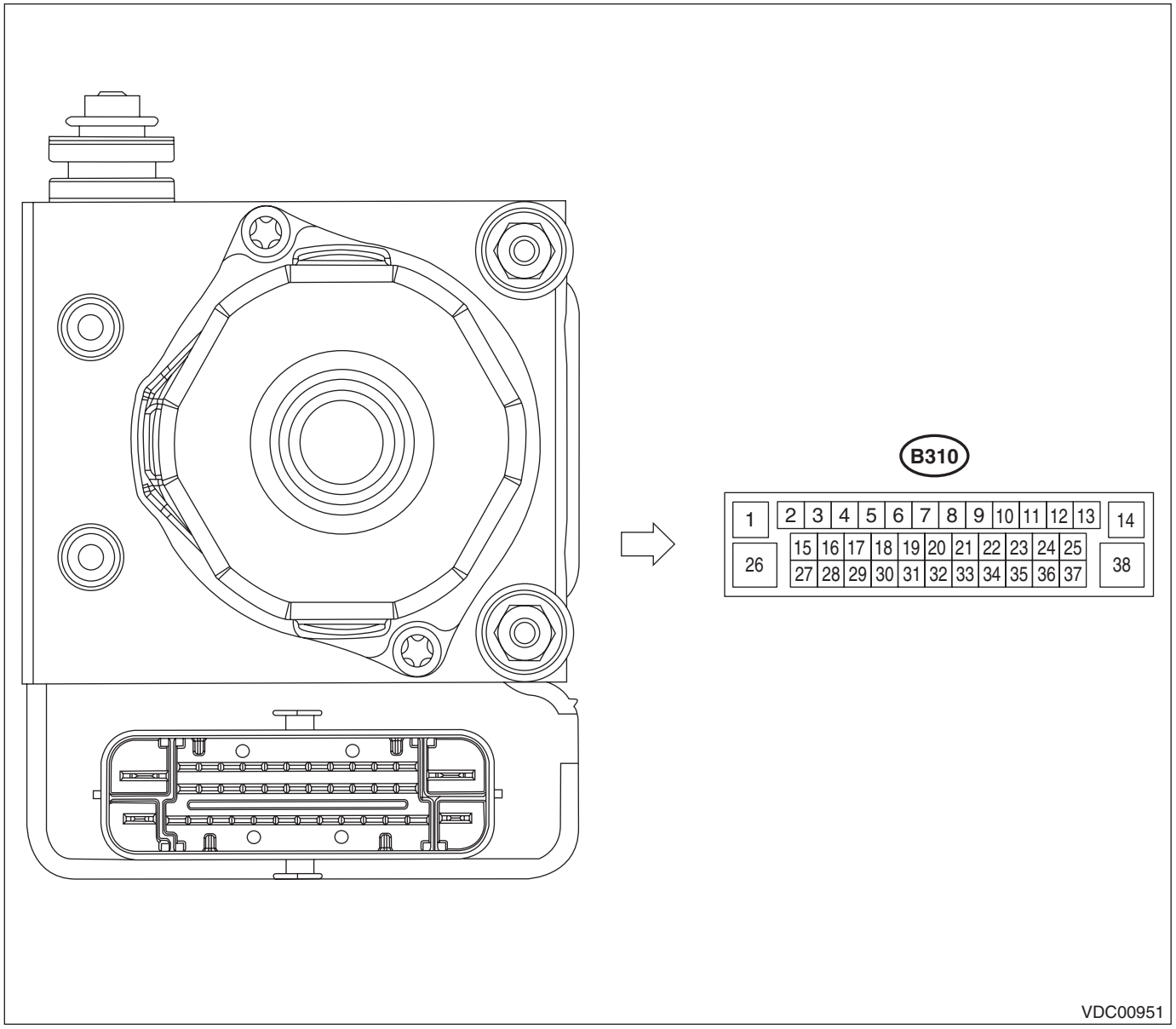
VDC00949



VDC00741

5. Control Module I/O Signal

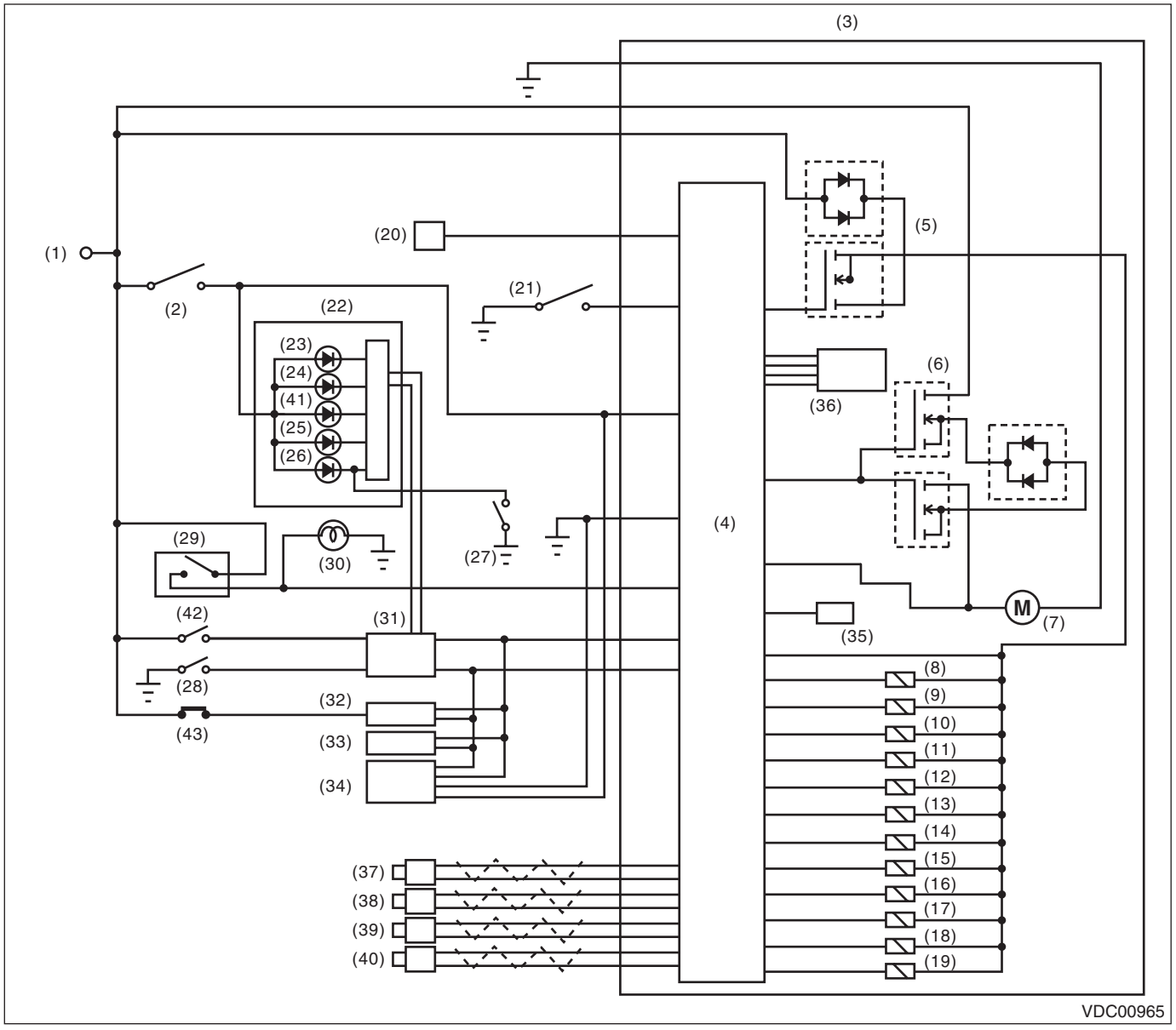
A: ELECTRICAL SPECIFICATION



NOTE:
- Terminal numbers in VDCCM&H/U connector are shown in the figure.
- When the connector is removed from the VDCCM&H/U, the brake warning light (EBD warning light), ABS warning light, VDC warning light & VDC indicator light, VDC OFF indicator light, and the hill start assist warning light illuminate.

Content			Terminal No. (+) — (–)	Input/Output signal Measured value and measuring conditions
Power supply			4 — 14	10 — 15 V when the ignition switch is ON.
ABS wheel speed sensor	Front LH wheel	Power supply	20 — 14	0 — 18 V
		Signal	8	7 — 14 mA: Rectangle waveform
	Front RH wheel	Power supply	17 — 14	0 — 18 V
		Signal	29	7 — 14 mA: Rectangle waveform
	Rear LH wheel	Power supply	7 — 14	0 — 18 V
		Signal	19	7 — 14 mA: Rectangle waveform
	Rear RH wheel	Power supply	18 — 14	0 — 18 V
		Signal	5	7 — 14 mA: Rectangle waveform
CAN communication line (H)			2	2.75 — 4.5 V pulse signal
CAN communication line (L)			15	0.5 — 2.25 V pulse signal
Valve relay power supply			1 — 14	10 — 15 V when the ignition switch is ON.
Motor relay power supply			26 — 38	10 — 15 V when the ignition switch is ON.
Stop light switch			6 — 14	1.5 V or less when the stop light is OFF; otherwise, 10 — 15 V when the stop light is ON.
Vehicle speed output signal			27	0 ←→ 12 V pulse
VDC OFF switch			37 — 14	1 Ω or less when the OFF switch is “ON”; 1 MΩ or more when the switch is “OFF”.
Ground			14	—
Ground			38	—

B: WIRING DIAGRAM



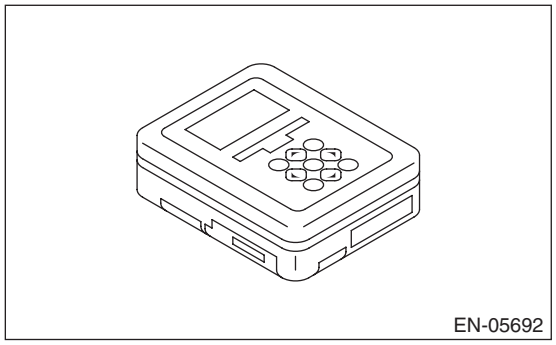
(1) Battery
(2) Ignition switch
(3) VDC control module and hydraulic control unit (VDCCM&H/U)
(4) VDC control module
(5) Valve relay
(6) Motor relay
(7) Motor
(8) Front inlet solenoid valve LH
(9) Front outlet solenoid valve LH
(10) Front inlet solenoid valve RH
(11) Front outlet solenoid valve RH
(12) Rear inlet solenoid valve LH
(13) Rear outlet solenoid valve LH
(14) Rear inlet solenoid valve RH
(15) Rear outlet solenoid valve RH
(16) Primary cut solenoid valve
(17) Primary suction solenoid valve
(18) Secondary cut solenoid valve
(19) Secondary suction solenoid valve
(20) Data link connector
(21) VDC OFF switch
(22) Combination meter
(23) VDC OFF indicator light
(24) VDC warning light & VDC indicator light
(25) ABS warning light
(26) Brake warning light (EBD warning light)
(27) Brake fluid level switch
(28) Parking brake switch
(29) Stop light switch
(30) Stop light
(31) Body integrated unit
(32) Engine control module (ECM)
(33) Transmission control module (TCM) (AT model)
(34) Steering angle sensor
(35) Yaw rate & G sensor
(36) Pressure sensor
(37) Front ABS wheel speed sensor LH
(38) Front ABS wheel speed sensor RH
(39) Rear ABS wheel speed sensor LH
(40) Rear ABS wheel speed sensor RH
(41) Hill start assist warning light
(42) Back-up light switch (MT model)
(43) Clutch switch (MT model)

6. Subaru Select Monitor

A: OPERATION

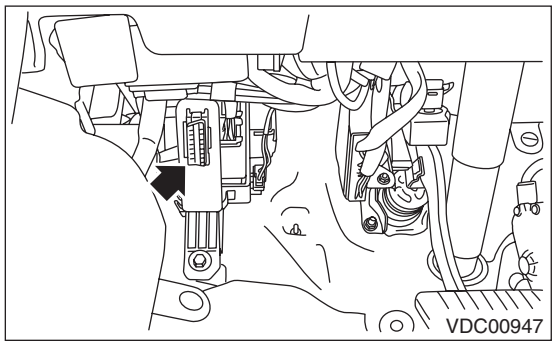
1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to VDC(diag)-9, SPECIAL TOOL, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.
3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

NOTE:
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.
4) Connect the diagnosis cable to SDI.
5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect scan tools other than the Subaru Select Monitor.
6) Start the PC.
7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

NOTE:
For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".
8) If VDC and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to VDC(diag)-20, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>
9) Record the DTC and data.

2. READ CURRENT DATA

1) On «Main Menu» display, select {Each System Check}.
2) On «System Selection Menu» display, select {Brake Control System}.
3) When {VDC} is displayed, select the [OK] button.
4) On «Brake Control Diagnosis» display, select {Current Data Display & Save}.
5) On «Data Display Menu» display, select the data display method.
6) Using the scroll key, scroll the display screen up or down until necessary data is shown.

- A list of the support data is shown in the following table.

Display	Contents to be displayed	Unit of measure
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed.	km/h or MPH
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed.	km/h or MPH
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed.	km/h or MPH
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed.	km/h or MPH
Steering Angle Sensor	Steering angle detected by steering angle sensor is displayed.	deg
Yaw Rate Sensor	Vehicle angular speed detected by yaw rate sensor is displayed.	deg/s
Pressure Sensor	Brake fluid pressure detected by pressure sensor is displayed.	bar
Longitudinal G Sensor	Vehicle longitudinal acceleration detected by longitudinal G sensor is displayed.	m/s^2
Lateral G Sensor	Vehicle lateral acceleration detected by lateral G sensor is displayed.	m/s^2
Voltage of IGN	Voltage supplied to VDCCM&H/U is displayed.	V
M. Relay monitor Voltage	Voltage applied to the motor relay is displayed.	V
Motor Relay Signal	Motor relay operation signal is displayed.	ON or OFF
Valve Relay Signal	Valve relay operation signal is displayed.	ON or OFF
EBD Warning Light	ON operation of the EBD warning light is displayed.	ON or OFF
ABS Warning Lamp	ON operation of the ABS warning light is displayed.	ON or OFF
VDC Warning Lamp	ON operation of the VDC warning light is displayed.	ON or OFF
EBD Control Flag	EBD operation condition is displayed.	ON or OFF
ABS Control Flag	ABS operation condition is displayed.	ON or OFF
TCS Control Flag	TCS operation condition is displayed.	ON or OFF
VDC Control Flag	VDC operation condition is displayed.	ON or OFF
E/G Control Stop Flag	Engine control command signal is displayed.	1 or 0
VDC-OFF Light	ON/OFF condition of VDC OFF indicator light is displayed.	ON or OFF
OFF SW Signal	Operation condition of VDC OFF switch is displayed.	ON or OFF
Brake Light Switch	Brake ON/OFF is displayed.	ON or OFF
Clutch Switch	Clutch ON/OFF is displayed. (For MT model only. Fixed to OFF on AT model.)	ON or OFF
Reverse Signal	Reverse gear ON/OFF is displayed. (For MT model only. Fixed to OFF on AT model.)	ON or OFF

NOTE:
For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

3. FUNCTION CHECK

Display	Contents of display	Index No.
ABS Sequence Control Mode	Operate the valve and pump motor continuously to perform the ABS sequence control.	<Ref. to VDC-20, ABS Sequence Control.>
VDC Function Check Mode	Operate the valve and pump motor continuously to perform the VDC sequence control.	<Ref. to VDC-23, VDC Sequence Control.>
VDC sensor midpoint setting mode	Set the steering angle sensor neutral position, and the lateral G sensor and longitudinal G sensor “0” point.	<Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

4. FREEZE FRAME DATA

NOTE:
- Data stored at the time of trouble occurrence is shown on display.
- Each time a trouble occurs, the latest information is stored in the freeze frame data in memory.
- If a freeze frame data is not properly stored in memory (due to a drop in VDCCM power supply, etc.), a DTC suffixed with a question mark “?” appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

Display	Contents to be displayed
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed in km/h or MPH.
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed in km/h or MPH.
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed in km/h or MPH.
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed in km/h or MPH.
Vehicle Speed	Vehicle speed calculated by VDC control module is displayed.
Steering Angle Sensor	Steering angle detected by steering angle sensor is displayed.
Yaw Rate Sensor	Vehicle angular speed detected by yaw rate sensor is displayed.
Pressure Sensor	Brake fluid pressure detected by pressure sensor is displayed.
Longitudinal G Sensor	Vehicle longitudinal acceleration detected by longitudinal G sensor is displayed.
Lateral G Sensor	Vehicle lateral acceleration detected by lateral G sensor is displayed.
Voltage of IGN	Voltage supplied to VDC control module is displayed.

Display	Contents to be displayed
Acceleration Pedal Position	Accelerator pedal opening angle is displayed.
Engine Speed	Engine speed on malfunction occurrence is displayed.
Steering angle flag	Whether the absolute angle of the steering angle sensor was determined is displayed.
EBD Control Flag	EBD control condition is displayed.
ABS Control Flag	ABS control condition is displayed.
TCS Control Flag	TCS control condition is displayed.
VDC Control Flag	VDC control condition is displayed.
E/G Control Stop Flag	Engine control command signal is displayed.
OFF Switch Detection	ON/OFF condition of the VDC operated by the driver is displayed.
Brake Light Switch	Brake ON/OFF is displayed.
Clutch Switch	Clutch ON/OFF is displayed. (For MT model only. Fixed to OFF on AT model.)
Reverse Signal	Reverse gear ON/OFF is displayed. (For MT model only. Fixed to OFF on AT model.)

5. PARAMETER SELECTION

CAUTION:
• Subaru Select Monitor is required for parameter selection.
• This function can be used for the replacement part of VDCCM&H/U.

NOTE:
• When the VDCCM&H/U is replaced with a replacement part, be sure to perform the parameter selection/registration to the VDCCM&H/U using this function.
• To confirm the applied model, refer to the “model number plate” attached on the vehicle. <Ref. to ID-2, IDENTIFICATION, Identification.>
• When the applied model is entered wrong, re-entry is possible.
• When the registration has not been performed, the DTC code “Parameter” is detected together with the ABS/EBD/VDC warning light illumination.
1) Connect the Subaru Select Monitor.
2) On «Main Menu» display, select {Each System Check}.
3) On «System Selection Menu» display, select {Brake Control System}.
4) When {VDC} is displayed, select the [OK] button.
5) On «Brake Control Diagnosis» display, select {Work Support}.
6) On «Work Support» display, select {Select Parameter}.
7) Check the applied model and option code indicated in the “Model number plate”. <Ref. to ID-2, IDENTIFICATION, Identification.>
8) Enter the applied model of 7-digit alphanumeric characters and press the [Enter] key.
9) When the option code input screen appears after entering the applied model, enter the option code consisting of 4-digit alphanumeric characters, and press the [Enter] key When the option code is 3 digits, add “0” (zero) in front and enter the code as 4 digits.
10) When the confirmation screen indicating the vehicle information appears, check that the correct applied model and grade are displayed and click the [OK] button.

NOTE:
When the displayed applied model and grade are different from those of the vehicle, perform registration operations again after clicking the [OK] button.
11) Execute the Clear Memory Mode after parameter selection and registration operations because the DTC for “Parameter selection error” is memorized. <Ref. to VDC(diag)-24, Clear Memory Mode.>

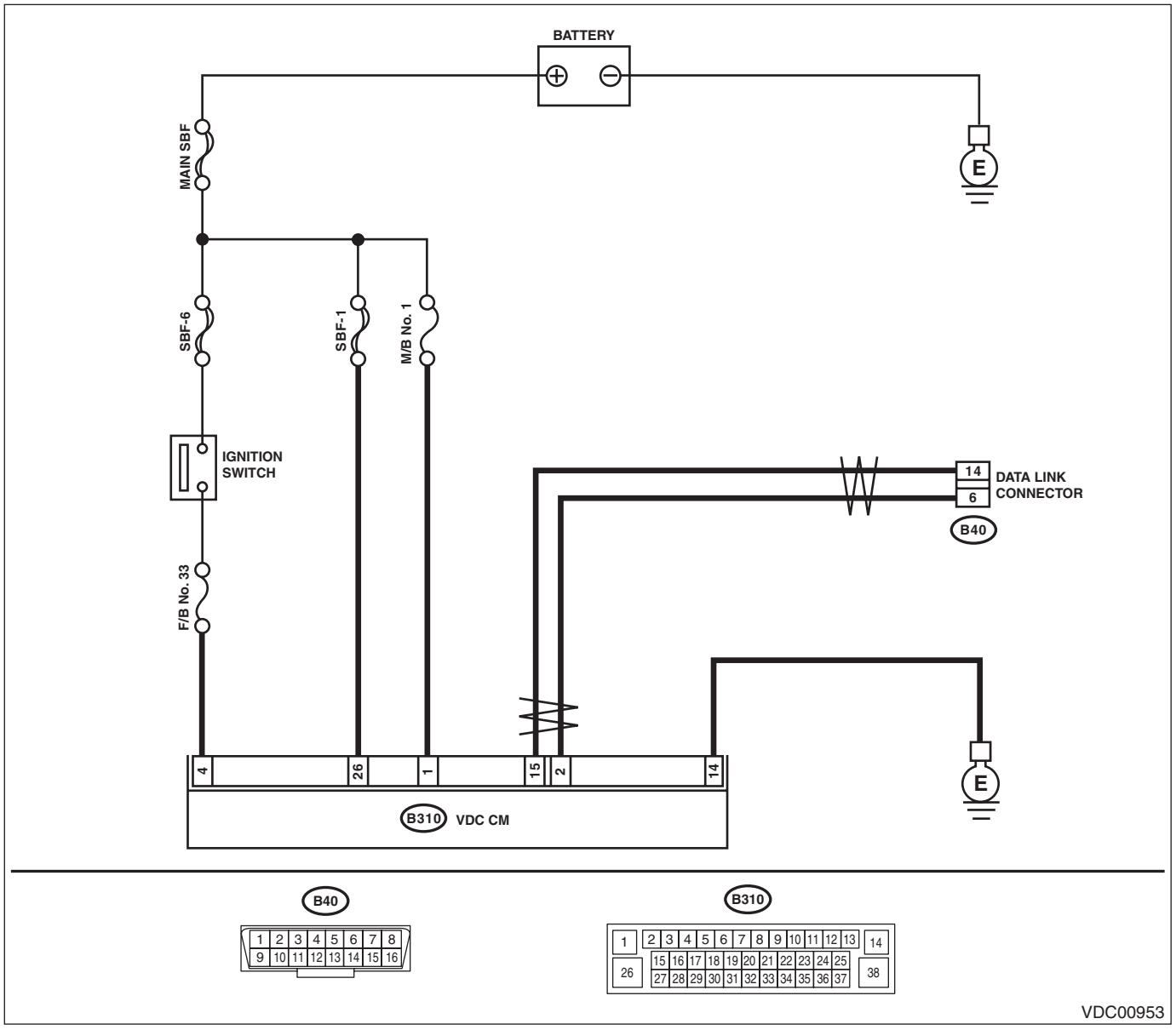
6. PARAMETER CHECK

NOTE:
The parameter data registered in the VDCCM is shown on the display.
1) Connect the Subaru Select Monitor.
2) On «Main Menu» display, select {Each System Check}.
3) On «System Selection Menu» display, select {Brake Control System}.
4) When {VDC} is displayed, select the [OK] button.
5) On «Brake Control Diagnosis» display, select {Work Support}.
6) On «Work Support» display, select {Confirm on parameter}.
7) On the {Confirm on parameter} display screen, check that the applied model and grade of the target vehicle are included, and click the [OK] button.
8) If the applied model and grade of the target vehicle are not included on the {Confirm on parameter} display screen, perform “parameter selection and registration”. <Ref. to VDC(diag)-19, PARAMETER SELECTION, OPERATION, Subaru Select Monitor.>

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:
Defective harness connector
TROUBLE SYMPTOM:
Communication is impossible between VDC and Subaru Select Monitor.
WIRING DIAGRAM:
Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



Step		Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2**.	Turn the ignition switch to ON, and select VDC mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage 11 V or more?	Go to step **3**.	Charge or replace the battery.

	Step	Check	Yes	No
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **5**.
4	**CHECK INSTALLATION OF VDCCM&H/U CONNECTOR.** Turn the ignition switch to OFF.	Is the VDCCM&H/U connector inserted into VDCCM&H/U until the clamp locks onto it?	Go to step **5**.	Insert VDCCM&H/U connector into VDCCM&H/U.
5	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **6**.
6	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Check whether communication to VDC system can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Check the DTC in VDC system. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Go to step **7**.
7	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the ignition power supply voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 4 (+) — Chassis ground (–):*** ***(B310) No. 1 (+) — Chassis ground (–):*** ***(B310) No. 26 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **8**.	Repair open circuit in harness between VDCCM&H/U and battery.
8	**CHECK HARNESS CONNECTOR BETWEEN VDCCM&H/U AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Measure the resistance of harness between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **9**.	Repair the open circuit of VDCCM&H/U ground circuit and poor contact of connector.
9	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact of control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

• For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
• For details concerning DTCs, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>

8. Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as much as possible.
Drive the vehicle at least ten minutes.

NOTE:
Make sure the vehicle is not dragged to one side under usual driving condition.

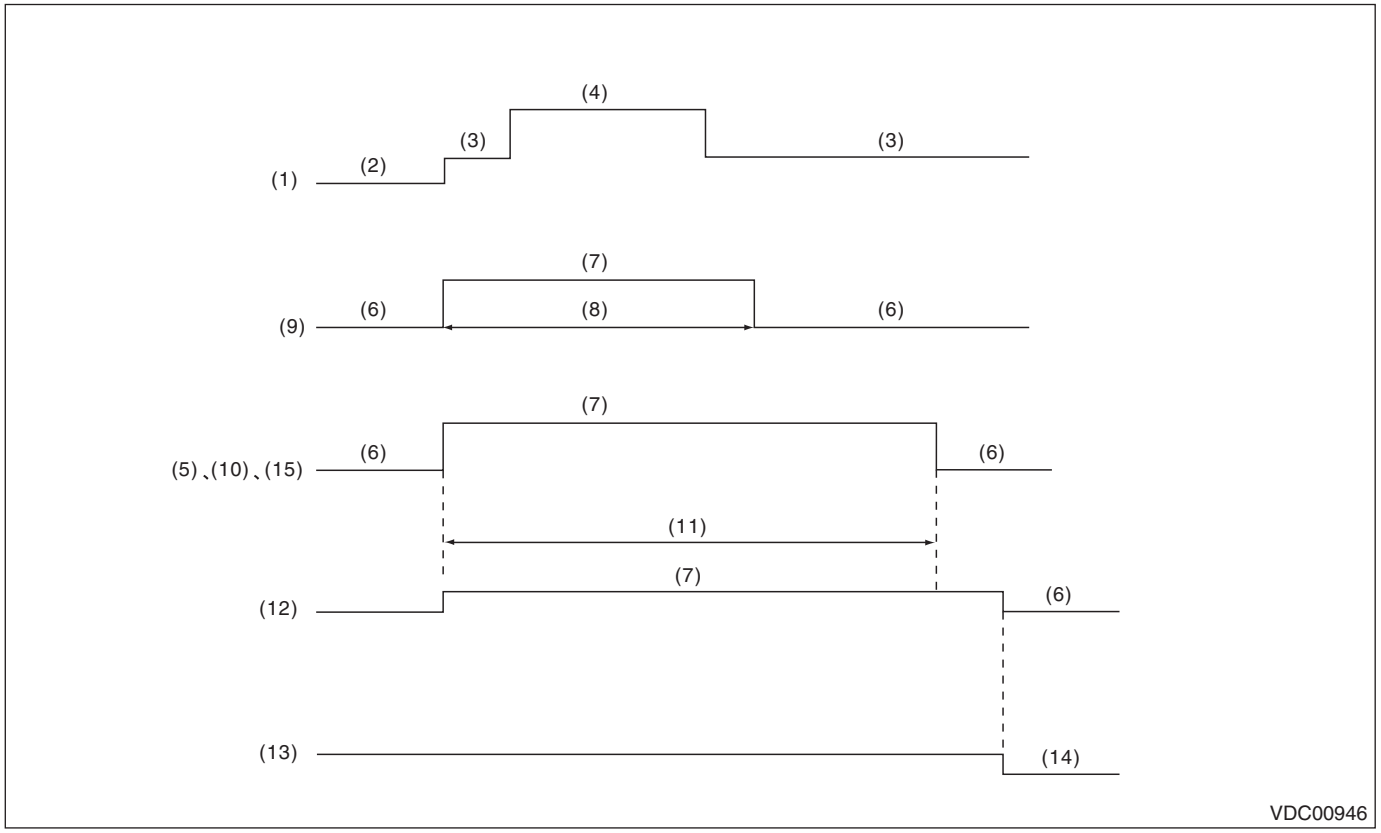
9. Clear Memory Mode

A: OPERATION

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

10.Warning Light Illumination Pattern

A: INSPECTION



(1)	Ignition switch	(6)	Light OFF	(11)	2 seconds or more
(2)	OFF	(7)	Light ON	(12)	Brake warning light (EBD warning light)
(3)	ON	(8)	2 seconds	(13)	Parking brake
(4)	Engine start	(9)	VDC OFF indicator light	(14)	Released
(5)	ABS warning light	(10)	VDC warning light & VDC indicator light	(15)	Hill start assist warning light

NOTE:
Hill start assist warning light always illuminates when the hill start assist is in the OFF mode.

1) When warning lights or indicator lights do not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When the warning lights or indicator lights remain constantly OFF, check the combination meter circuit. <Ref. to VDC(diag)-27, EBD WARNING LIGHT, ABS WARNING, VDC OFF INDICATOR LIGHT, VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-28, HILL START ASSIST WARNING LIGHT DOES NOT COME ON, Warning Light Illumination Pattern.>
3) When the ABS warning light, VDC OFF indicator light, VDC warning light & VDC indicator light, and hill start assist warning light do not go off, check the combination meter circuit or CAN communication circuit. <Ref. to VDC(diag)-29, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-31, VDC OFF INDICATOR LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-30, VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-33, HILL START ASSIST WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.>

NOTE:
• Even though the ABS warning light, and the VDC warning light & VDC indicator light do not go off in 2 seconds after illuminating, the ABS and VDC functions are normal if the warning lights go off while the vehicle is driven at approximately 38 km/h (23 MPH). However, while these lights are on, the functions with their warning lights illuminated do not operate.
• It may take several minutes before the VDC warning light & VDC indicator light goes off, if the vehicle is parked under low temperature for a specified time. This is not defective because it is resulted from low engine coolant temperature. Perform the Clear Memory Mode because DTC may be recorded at this time. <Ref. to VDC(diag)-24, Clear Memory Mode.>
• With the vehicle jack-up/lift-up or set on free rollers, when the wheels lock or spin after starting the engine, ABS warning light, and VDC warning light & VDC indicator light may illuminate because VDC-CM&H/U detects the abnormal conditions from ABS wheel speed sensor or longitudinal G sensor. In this case, this is not a malfunction. Perform the Clear Memory Mode. <Ref. to VDC(diag)-24, Clear Memory Mode.>

B: EBD WARNING LIGHT, ABS WARNING, VDC OFF INDICATOR LIGHT, VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON

DETECTING CONDITION:
Defective combination meter

TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), EBD warning light, ABS warning light, VDC OFF indicator light, and VDC warning light & VDC indicator light do not illuminate.

NOTE:
When pressing the VDC OFF switch for 10 seconds or more, the VDC OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

	Step	Check	Yes	No
1	**CHECK OTHER INDICATOR LIGHT.** Turn the ignition switch to ON.	Does other indicator light illuminate soon after “ON”?	Go to step **2**.	Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
2	**CHECK VDCCM.** When the engine does not start, display the current data of VDCCM using Subaru Select Monitor.	Immediately after the ignition switch is turned to ON, is the «EBD Warning Light» ON?	Go to step **3**.	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
3	**CHECK VDCCM.** When the engine does not start, display the current data of VDCCM using Subaru Select Monitor.	Immediately after the ignition switch is turned to ON, is the «ABS Warning Lamp» ON?	Go to step **4**.	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
4	**CHECK VDCCM.** When the engine does not start, display the current data of VDCCM using Subaru Select Monitor.	Immediately after the ignition switch is turned to ON, is the «VDC Warning Lamp» ON?	Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

C: HILL START ASSIST WARNING LIGHT DOES NOT COME ON

DETECTING CONDITION:
Defective combination meter

TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), hill start assist warning light does not illuminate.

	Step	Check	Yes	No
1	**CHECK OTHER INDICATOR LIGHT.** Turn the ignition switch to ON. (engine OFF)	Do other indicator lights illuminate?	Go to step **2**.	Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
2	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **4**.
4	**CHECK COMBINATION METER.** Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-17, Combination Meter.>

D: ABS WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication

TROUBLE SYMPTOM:

When starting the engine, the ABS warning light is kept on.

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK VDCCM.** Display the current data of VDCCM using Subaru Select Monitor.	Is the «ABS Warning Lamp» ON?	Go to step **3**.	Go to step **4**.
3	**READ DTC.** Read the DTC after driving the vehicle at 40 km/h (25 MPH) or more.	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **4**.
4	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **5**.
5	**CHECK COMBINATION METER.** Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-17, Combination Meter.>

E: VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT GO OFF

DETECTING CONDITION:

- Defective combination meter
- Defective engine
- Defective CAN communication

TROUBLE SYMPTOM:

When starting the engine, the VDC warning light & VDC indicator light remains lit.

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK VDCCM.** Display the current data of VDCCM using Subaru Select Monitor.	Is the «VDC Warning Lamp» ON?	Go to step **3**.	Go to step **4**.
3	**READ DTC.** Read the DTC after driving the vehicle at 40 km/h (25 MPH) or more.	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **4**.
4	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **5**.
5	**CHECK COMBINATION METER.** Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-17, Combination Meter.>

F: VDC OFF INDICATOR LIGHT DOES NOT GO OFF

DETECTING CONDITION:

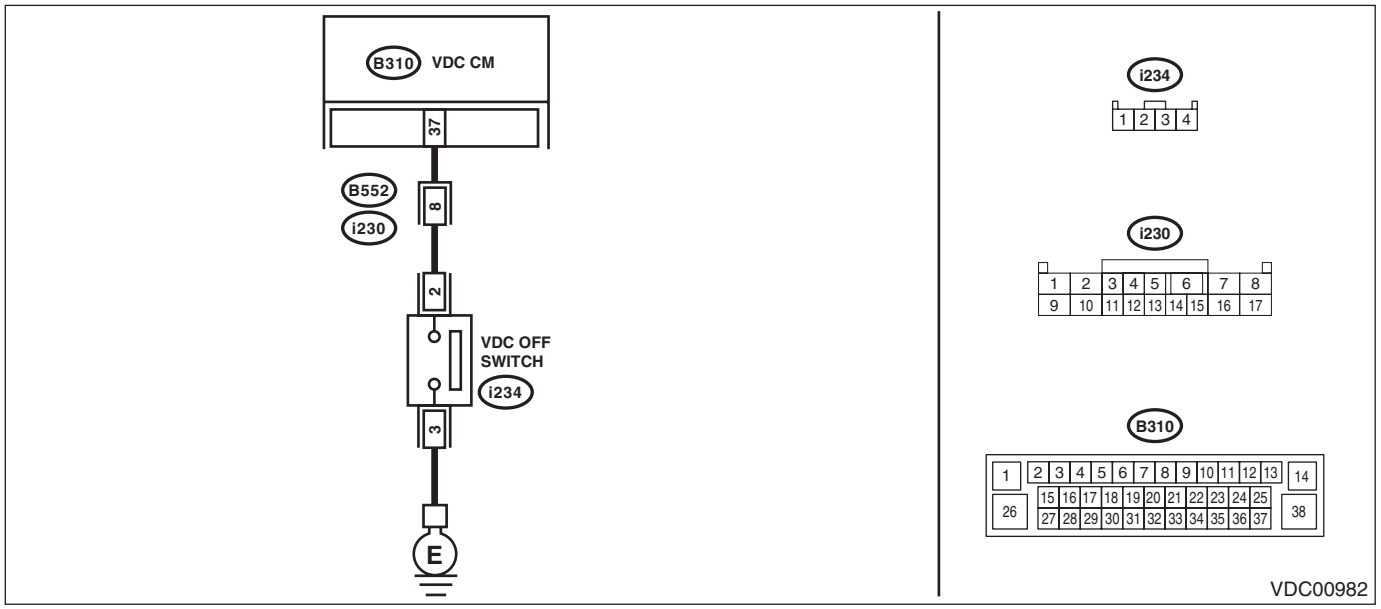
- Defective combination meter
- Defective CAN communication
- VDC OFF switch is shorted.

TROUBLE SYMPTOM:

When starting the engine, VDC OFF indicator light is kept ON.

WIRING DIAGRAM:

Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



Step		Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK VDC OFF SWITCH.** Remove and check VDC OFF switch. <Ref. to VDC-42, VDC OFF Switch.>	Is the VDC OFF switch normal?	Go to step **3**.	Replace the VDC OFF switch.
3	**CHECK VDC OFF SWITCH CIRCUIT.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 37 — Chassis ground:***	Is the resistance less than 10 Ω?	Check the VDC OFF switch circuit.	Go to step **4**.
4	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **5**.

Step		Check	Yes	No
5	**CHECK COMBINATION METER.** Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-17, Combination Meter.>

G: HILL START ASSIST WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication

TROUBLE SYMPTOM:

When starting the engine, the hill start assist warning light continues to illuminate.

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK COMBINATION METER.** Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-17, Combination Meter.>

H: BRAKE WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

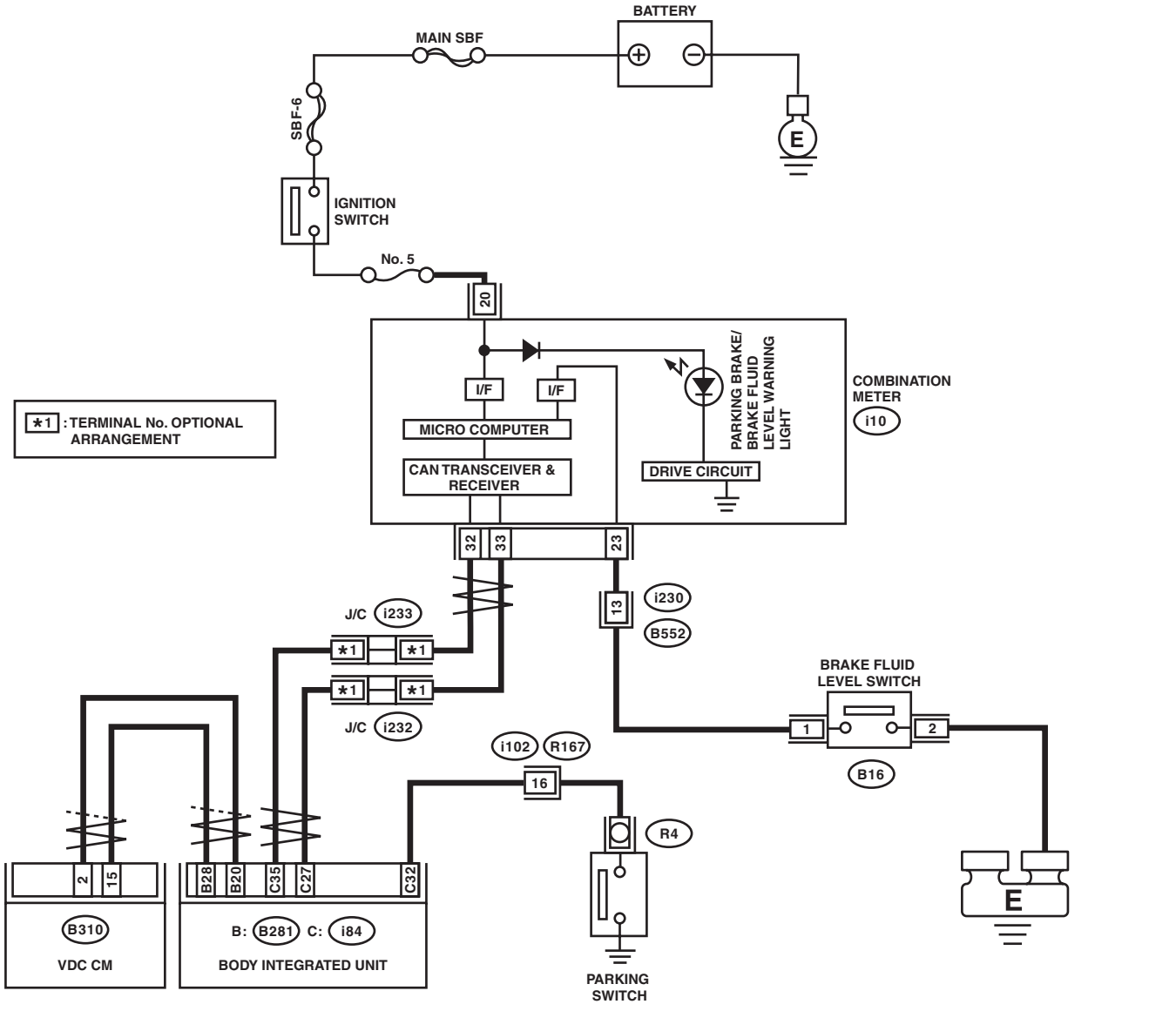
- Brake warning light circuit is shorted.
- Defective sensor/connector
- Defective CAN communication

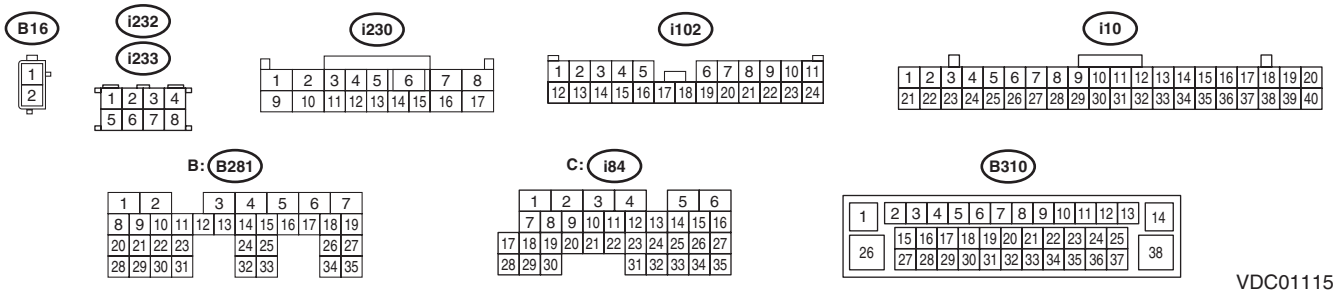
TROUBLE SYMPTOM:

After starting the engine, the brake warning light remains lit though the parking lever is released.

WIRING DIAGRAM:

Parking brake / brake fluid level warning light system <Ref. to WI-115, Parking Brake / Brake Fluid Level Warning Light System.>





VDC01115

	Step	Check	Yes	No
1	**CHECK INSTALLATION OF VDCCM&H/U CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Check that the VDCCM&H/U connector is inserted until it is locked by clamp.	Is the connector firmly inserted?	Go to step **2**.	Insert the VDCCM&H/U connector until it is locked by clamp.
2	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK BRAKE FLUID AMOUNT.** Check the amount of brake fluid in the reservoir tank of master cylinder.	Does the level of the brake fluid amount fall between the lines of "MAX" and "MIN"?	Go to step **4**.	Replenish brake fluid to the specified value.
4	**CHECK BRAKE FLUID LEVEL SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the level switch connector (B16) from master cylinder. 3) Measure the resistance of master cylinder terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Replace the master cylinder. <Ref. to BR-44, Master Cylinder.>
5	**CHECK GROUND SHORT OF HARNESS.** 1) Disconnect the connector (i10) from combination meter. 2) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 23 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the harness between combination meter and brake fluid level switch.
6	**CHECK PARKING BRAKE SWITCH.** 1) Disconnect the connector (R4) from parking brake switch. 2) Release the parking brake. 3) Measure the resistance between parking brake switch terminal and chassis ground.	Is the resistance 1 MΩ or more?	Go to step **7**.	Replace the parking brake switch.
7	**CHECK GROUND SHORT OF HARNESS.** 1) Disconnect the connector (i84) from body integrated unit. 2) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(i84) No. 32 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the harness between body integrated unit and parking brake switch.
8	**CHECK POOR CONTACT OF CONNECTOR.** Check for poor contact of all connectors.	Is there poor contact?	Repair the connector.	Go to step **9**.
9	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **10**.
10	**CHECK COMBINATION METER.** Check the combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-17, Combination Meter.>

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference
C1211	FR Wheel Speed Sensor System Wire Break/ Excessive Input	Open/high input of front ABS wheel speed sensor RH	<Ref. to VDC(diag)-41, DTC C1211 FR WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1212	FR Wheel Speed Sensor System	Front ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-44, DTC C1212 FR WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1221	FL Wheel Speed Sensor System Wire Break/ Excessive Input	Open/high input of front ABS wheel speed sensor LH	<Ref. to VDC(diag)-41, DTC C1221 FL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/ EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1222	FL Wheel Speed Sensor System	Front ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-44, DTC C1222 FL WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1231	RR Wheel Speed Sensor System Wire Break/ Excessive Input	Open/high input of rear ABS wheel speed sensor RH	<Ref. to VDC(diag)-41, DTC C1231 RR WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1232	RR Wheel Speed Sensor System	Rear ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-44, DTC C1232 RR WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1241	RL Wheel Speed Sensor System Wire Break/ Excessive Input	Open/high input of rear ABS wheel speed sensor LH	<Ref. to VDC(diag)-42, DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1242	RL Wheel Speed Sensor System	Rear ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-45, DTC C1242 RL WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1251	Wheel Speed Sensor System	Wheel speed sensor malfunction	<Ref. to VDC(diag)-46, DTC C1251 WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1252	Wheel Speed Sensor Signal of One of The Wheels	ABS wheel speed sensor signal malfunction in one of four wheels	<Ref. to VDC(diag)-47, DTC C1252 WHEEL SPEED SENSOR SIGNAL OF ONE OF THE WHEELS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1311	FR Inlet Solenoid Valve System	Front inlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-48, DTC C1311 FR INLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1312	FR Outlet Solenoid Valve System	Front outlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-48, DTC C1312 FR OUTLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1321	FL Inlet Solenoid Valve System	Front inlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-48, DTC C1321 FL INLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1322	FL Outlet Solenoid Valve System	Front outlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-48, DTC C1322 FL OUTLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference
C1331	RR Inlet Solenoid Valve System	Rear inlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-49, DTC C1331 RR INLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1332	RR Outlet Solenoid Valve System	Rear outlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-49, DTC C1332 RR OUTLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1341	RL Inlet Solenoid Valve System	Rear inlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-49, DTC C1341 RL INLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1342	RL Outlet Solenoid Valve System	Rear outlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-49, DTC C1342 RL OUTLET SOLENOID VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1351	VDC Change-Over Valve 1 (P)	Primary cut valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-49, DTC C1351 VDC CHANGE-OVER VALVE 1 (P), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1352	VDC Change-Over Valve 1 (S)	Secondary cut valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-49, DTC C1352 VDC CHANGE-OVER VALVE 1 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1361	VDC Change-Over Valve 2 (P)	Primary suction valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-49, DTC C1361 VDC CHANGE-OVER VALVE 2 (P), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1362	VDC Change-Over Valve 2 (S)	Secondary suction valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1411	ECU	VDC control module malfunction	<Ref. to VDC(diag)-52, DTC C1411 ECU, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1412	Parameter	VDC control module parameter failure	<Ref. to VDC(diag)-54, DTC C1412 PARAMETER, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1413	Power Supply Volt Error	Power voltage malfunction	<Ref. to VDC(diag)-55, DTC C1413 POWER SUPPLY VOLT ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1421	ECM Control System	Coordinate control prohibition of engine control module	<Ref. to VDC(diag)-57, DTC C1421 ECM CONTROL SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1422	VDC Interruption for Engine Convenience	VDC interrupted due to some reasons of the engine	<Ref. to VDC(diag)-57, DTC C1422 VDC INTERRUPTION FOR ENGINE CONVENIENCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1423	Different ECU Specifications	Different VDC control module specification	<Ref. to VDC(diag)-58, DTC C1423 DIFFERENT ECU SPECIFICATIONS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1424	ECM Failure	Engine control module is faulty	<Ref. to VDC(diag)-59, DTC C1424 ECM FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1431	AT Abnormal	Transmission control module is faulty	<Ref. to VDC(diag)-60, DTC C1431 AT ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1432	Different ECU Specifications	Different VDC control module specification	<Ref. to VDC(diag)-60, DTC C1432 DIFFERENT ECU SPECIFICATIONS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1511	Valve Relay	Defective valve relay	<Ref. to VDC(diag)-61, DTC C1511 VALVE RELAY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference
C1512	Valve System	Defective valve system	<Ref. to VDC(diag)-62, DTC C1512 VALVE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1521	Motor Relay	Motor relay malfunction	<Ref. to VDC(diag)-63, DTC C1521 MOTOR RELAY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1531	BLS Off Fault	Stop light switch malfunction	<Ref. to VDC(diag)-66, DTC C1531 BLS OFF FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1532	BLS On Fault	Stop light switch malfunction	<Ref. to VDC(diag)-68, DTC C1532 BLS ON FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1541	Clutch Off Fault	Clutch signal malfunction	<Ref. to VDC(diag)-69, DTC C1541 CLUTCH OFF FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1542	Clutch On Fault	Clutch signal malfunction	<Ref. to VDC(diag)-70, DTC C1542 CLUTCH ON FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1561	Reverse Off Fault	Reverse signal malfunction	<Ref. to VDC(diag)-72, DTC C1561 REVERSE OFF FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1562	Reverse On Fault	Reverse signal malfunction	<Ref. to VDC(diag)-73, DTC C1562 REVERSE ON FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1711	Steering Angle Sensor Abnormal	Steering angle sensor malfunction	<Ref. to VDC(diag)-75, DTC C1711 STEERING ANGLE SENSOR ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1721	Yaw Rate Sensor Abnormal	Defective yaw rate sensor	<Ref. to VDC(diag)-78, DTC C1721 YAW RATE SENSOR ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1731	G Sensor Abnormal	Defective G sensor	<Ref. to VDC(diag)-79, DTC C1731 G SENSOR ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1732	Lateral G Sensor Abnormal	Defective lateral G sensor	<Ref. to VDC(diag)-80, DTC C1732 LATERAL G SENSOR ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1733	Longitudinal G Sensor Abnormal	Defective longitudinal G sensor	<Ref. to VDC(diag)-81, DTC C1733 LONGITUDINAL G SENSOR ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1741	Pressure Sensor	Defective pressure sensor	<Ref. to VDC(diag)-82, DTC C1741 PRESSURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C1811	System Failure	System malfunction	<Ref. to VDC(diag)-83, DTC C1811 SYSTEM FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0073	Control Module Communication Bus “A” Off	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0073 CONTROL MODULE COMMUNICATION BUS “A” OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0100	Lost Communication With ECM/PCM “A”	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0100 LOST COMMUNICATION WITH ECM/PCM “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference
U0101	Lost Communication With TCM	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0101 LOST COMMUNICATION WITH TCM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0126	Lost Communication With Steering Angle Sensor Module	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0140	Lost Communication With Body Control Module	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0140 LOST COMMUNICATION WITH BODY CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0401	Invalid Data Received From ECM/PCM “A”	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0401 INVALID DATA RECEIVED FROM ECM/PCM “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0402	Invalid Data Received From TCM	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0402 INVALID DATA RECEIVED FROM TCM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0422	Invalid Data Received From Body Control Module	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0422 INVALID DATA RECEIVED FROM BODY CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0428	Invalid Data Received From Steering Angle Sensor Module	Defective CAN communication	<Ref. to VDC(diag)-85, DTC U0428 INVALID DATA RECEIVED FROM STEERING ANGLE SENSOR MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC C1211 FR WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT

NOTE:
For the diagnostic procedure, refer to “DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT”. <Ref. to VDC(diag)-42, DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC C1221 FL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT

NOTE:
For the diagnostic procedure, refer to “DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT”. <Ref. to VDC(diag)-42, DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC C1231 RR WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT

NOTE:
For the diagnostic procedure, refer to “DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT”. <Ref. to VDC(diag)-42, DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT

DTC DETECTING CONDITION:

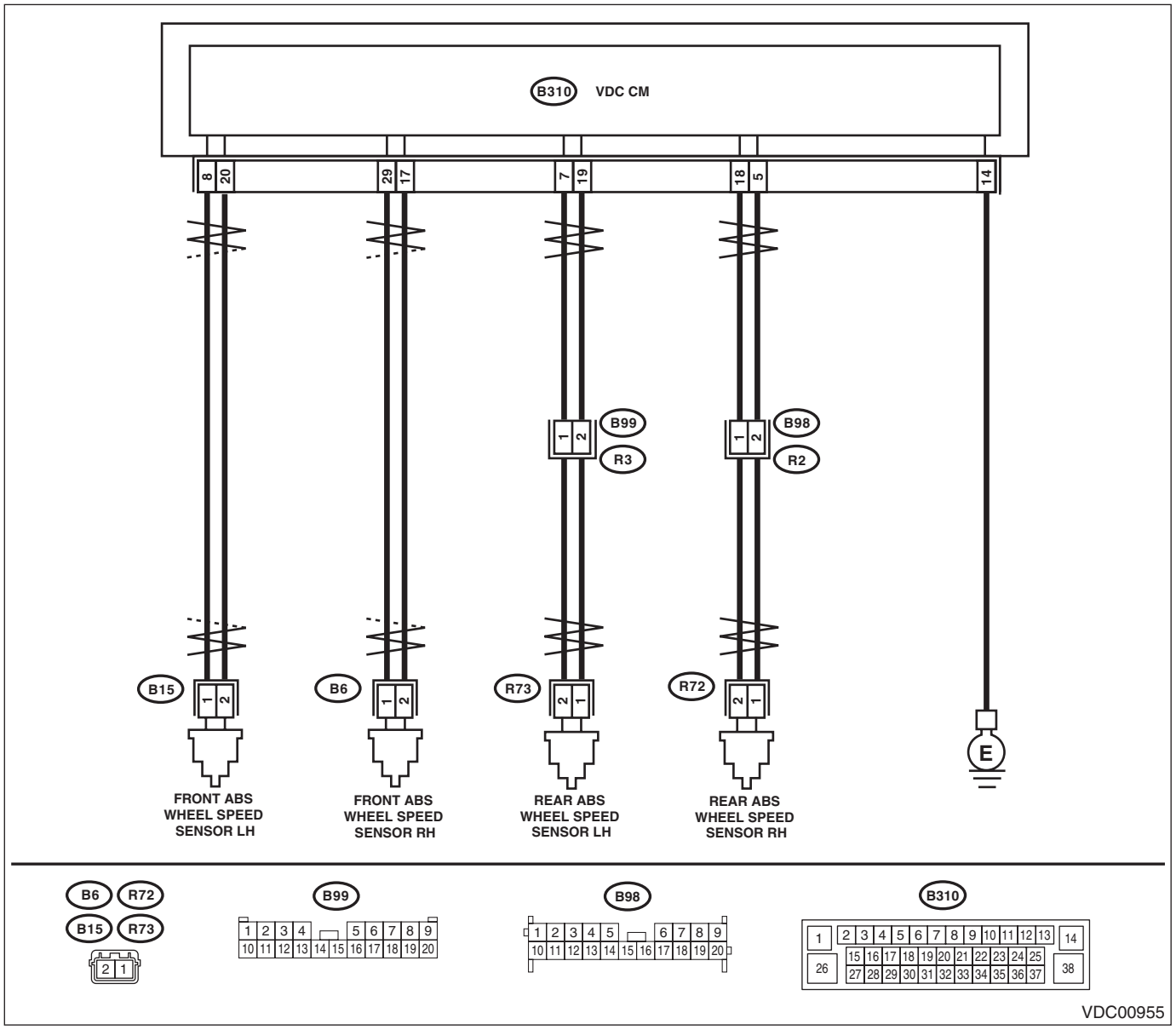
- Defective ABS wheel speed sensor (broken wire, input voltage too high)
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:

Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTOR.** Check if there is poor contact between VDCCM&H/U and ABS wheel speed sensor.	Is there poor contact?	Repair the connector.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN VDCCM&H/U AND ABS WHEEL SPEED SENSOR.** 1) Disconnect the connector (B310) from the VDCCM&H/U. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance between VDCCM&H/U connector and ABS wheel speed sensor connector. ***Connector & terminal*** ***DTC C1211*** ***(B310) No. 29 — (B6) No. 1:*** ***(B310) No. 17 — (B6) No. 2:*** ***DTC C1221*** ***(B310) No. 8 — (B15) No. 1:*** ***(B310) No. 20 — (B15) No. 2:*** ***DTC C1231*** ***(B310) No. 5 — (R72) No. 1:*** ***(B310) No. 18 — (R72) No. 2:*** ***DTC C1241*** ***(B310) No. 19 — (R73) No. 1:*** ***(B310) No. 7 — (R73) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
3	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC C1211*** ***(B310) No. 29 — Chassis ground:*** ***DTC C1221*** ***(B310) No. 8 — Chassis ground:*** ***DTC C1231*** ***(B310) No. 5 — Chassis ground:*** ***DTC C1241*** ***(B310) No. 19 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
4	**CHECK ABS WHEEL SPEED SENSOR POWER SUPPLY CIRCUIT.** 1) Connect the VDCCM&H/U connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ABS wheel speed sensor connector and chassis ground. ***Connector & terminal*** ***DTC C1211*** ***(B6) No. 2 (+) — Chassis ground (–):*** ***DTC C1221*** ***(B15) No. 2 (+) — Chassis ground (–):*** ***DTC C1231*** ***(R72) No. 2 (+) — Chassis ground (–):*** ***DTC C1241*** ***(R73) No. 2 (+) — Chassis ground (–):***	Is the voltage 5 — 16 V?	Go to step **6**.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK VDCCM&H/U POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector terminals. ***Connector & terminal*** ***(B310) No. 4 (+) — (B310) No. 14 (–):*** ***(B310) No. 1 (+) — (B310) No. 14 (–):*** ***(B310) No. 26 (+) — (B310) No. 14 (–):***	Is the voltage 10 — 15 V?	Go to step **6**.	Check the generator, battery and VDCCM&H/U power supply circuit.
6	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check the ABS wheel speed sensor. <Ref. to VDC-33, CHECK ABS WHEEL SPEED SENSOR UNIT, INSPECTION, Front ABS Wheel Speed Sensor.>	Is the pattern the same waveform as shown in the figure?	Go to step **7**.	Replace the ABS wheel speed sensor. <Ref. to VDC-31, Front ABS Wheel Speed Sensor.>
7	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **8**.
8	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

E: DTC C1212 FR WHEEL SPEED SENSOR SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1242 RL WHEEL SPEED SENSOR SYSTEM”. <Ref. to VDC(diag)-45, DTC C1242 RL WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC C1222 FL WHEEL SPEED SENSOR SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1242 RL WHEEL SPEED SENSOR SYSTEM”. <Ref. to VDC(diag)-45, DTC C1242 RL WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC C1232 RR WHEEL SPEED SENSOR SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1242 RL WHEEL SPEED SENSOR SYSTEM”. <Ref. to VDC(diag)-45, DTC C1242 RL WHEEL SPEED SENSOR SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC C1242 RL WHEEL SPEED SENSOR SYSTEM

DTC DETECTING CONDITION:

- Defective ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select "Current Data Display & Save" on the Subaru Select Monitor. 2) Read the defective ABS wheel speed sensor output.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **2**.	Go to step **7**.
2	**CHECK POOR CONTACT OF CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact of connectors between VDCCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **3**.
3	**CHECK CAUSE OF SIGNAL NOISE.** Make sure the radio wave devices and electronic components are installed correctly.	Are the radio wave devices and electronic components installed correctly?	Go to step **4**.	Install the radio wave devices and electronic components properly.
4	**CHECK CAUSE OF SIGNAL NOISE.** Check if the noise sources (such as an antenna) are installed near the sensor harness.	Are noise sources installed?	Install the noise sources apart from sensor harness.	Go to step **5**.
5	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.
7	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Is the ABS wheel speed sensor installation bolt tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **8**.	Tighten the ABS wheel speed sensor installation bolts.
8	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check the ABS wheel speed sensor. <Ref. to VDC-33, CHECK ABS WHEEL SPEED SENSOR UNIT, INSPECTION, Front ABS Wheel Speed Sensor.>	Does the oscilloscope indicate the waveform pattern like shown in the figure when the tire is slowly turned? Does the oscilloscope indication repeat the waveform pattern like shown in the figure when the tire is slowly turned in equal speed for one rotation or more?	Go to step **10**.	Go to step **9**.

	Step	Check	Yes	No
9	**CHECK ABS WHEEL SPEED SENSOR OR MAGNETIC ENCODER.**	Are there foreign matter, breakage or damage at the tip of ABS wheel speed sensor or magnetic encoder?	Remove dirt thoroughly. Also replace the ABS wheel speed sensor or magnetic encoder as a unit with hub unit bearing if it is broken or damaged.	Go to step **10**.
10	**CHECK CAUSE OF SIGNAL NOISE.** Make sure the radio wave devices and electronic components are installed correctly.	Are the radio wave devices and electronic components installed correctly?	Go to step **11**.	Install the radio wave devices and electronic components properly.
11	**CHECK CAUSE OF SIGNAL NOISE.** Check if the noise sources (such as an antenna) are installed near the sensor harness.	Are noise sources installed?	Install the noise sources apart from sensor harness.	Go to step **12**.
12	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **13**.
13	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference. NOTE: Though the ABS warning light may remain on at this time, this is normal. Drive the vehicle at 60 km/h (37 MPH) or more in order to turn ABS warning light off. Be sure to drive the vehicle and check that the warning light goes off.

I: DTC C1251 WHEEL SPEED SENSOR SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/ EXCESSIVE INPUT”. <Ref. to VDC(diag)-42, DTC C1241 RL WHEEL SPEED SENSOR SYSTEM WIRE BREAK/EXCESSIVE INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC C1252 WHEEL SPEED SENSOR SIGNAL OF ONE OF THE WHEELS

DTC DETECTING CONDITION:

- Defective ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Defective magnetic encoder
- When a wheel is turned freely for a long time

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.
- Hill start assist does not operate.

NOTE:
Brake warning light comes on as well as ABS warning light when EBD does not operate.

	Step	Check	Yes	No
1	**WHETHER A WHEEL TURNED FREELY OR NOT.** Check if the wheels have been turned freely for one minute or more, such as when the vehicle is jacked-up, under full-lock cornering or when the wheels are not in contact with road surface.	Did the wheels turn freely?	VDC is normal. Clear the memory. NOTE: This diagnostic trouble code may sometimes occur if the wheels turn freely for a long time, for example when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way.	Go to step **2**.
2	**CHECK TIRE SPECIFICATIONS.** Turn the ignition switch to OFF.	Are the tire specifications correct?	Go to step **3**.	Replace the tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace the tire.	Go to step **4**.
4	**CHECK TIRE INFLATION PRESSURE.**	Is the tire pressure correct?	Go to step **5**.	Adjust the tire pressure.
5	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)? (For four wheels)	Go to step **6**.	Tighten the ABS wheel speed sensor installation bolts.
6	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check the ABS wheel speed sensor. <Ref. to VDC-33, CHECK ABS WHEEL SPEED SENSOR UNIT, INSPECTION, Front ABS Wheel Speed Sensor.>	Does the oscilloscope indicate the waveform pattern like shown in the figure when the tire is slowly turned? Does the oscilloscope indication repeat the waveform pattern like shown in the figure when the tire is slowly turned in equal speed for one rotation or more? (For all four wheels)	Go to step **8**.	Go to step **7**.
7	**CHECK ABS WHEEL SPEED SENSOR OR MAGNETIC ENCODER.**	Are there foreign matter, breakage or damage at the tip of ABS wheel speed sensor or magnetic encoder? (For all four wheels)	Remove dirt thoroughly. Also replace the ABS wheel speed sensor or magnetic encoder as a unit with hub unit bearing if it is broken or damaged.	Go to step **8**.

	Step	Check	Yes	No
8	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **9**.
9	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

K: DTC C1311 FR INLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC C1312 FR OUTLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC C1321 FL INLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: DTC C1322 FL OUTLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC C1331 RR INLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC C1332 RR OUTLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Q: DTC C1341 RL INLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

R: DTC C1342 RL OUTLET SOLENOID VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

S: DTC C1351 VDC CHANGE-OVER VALVE 1 (P)

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

T: DTC C1352 VDC CHANGE-OVER VALVE 1 (S)

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

U: DTC C1361 VDC CHANGE-OVER VALVE 2 (P)

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-50, DTC C1362 VDC CHANGE-OVER VALVE 2 (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

V: DTC C1362 VDC CHANGE-OVER VALVE 2 (S)

DTC DETECTING CONDITION:

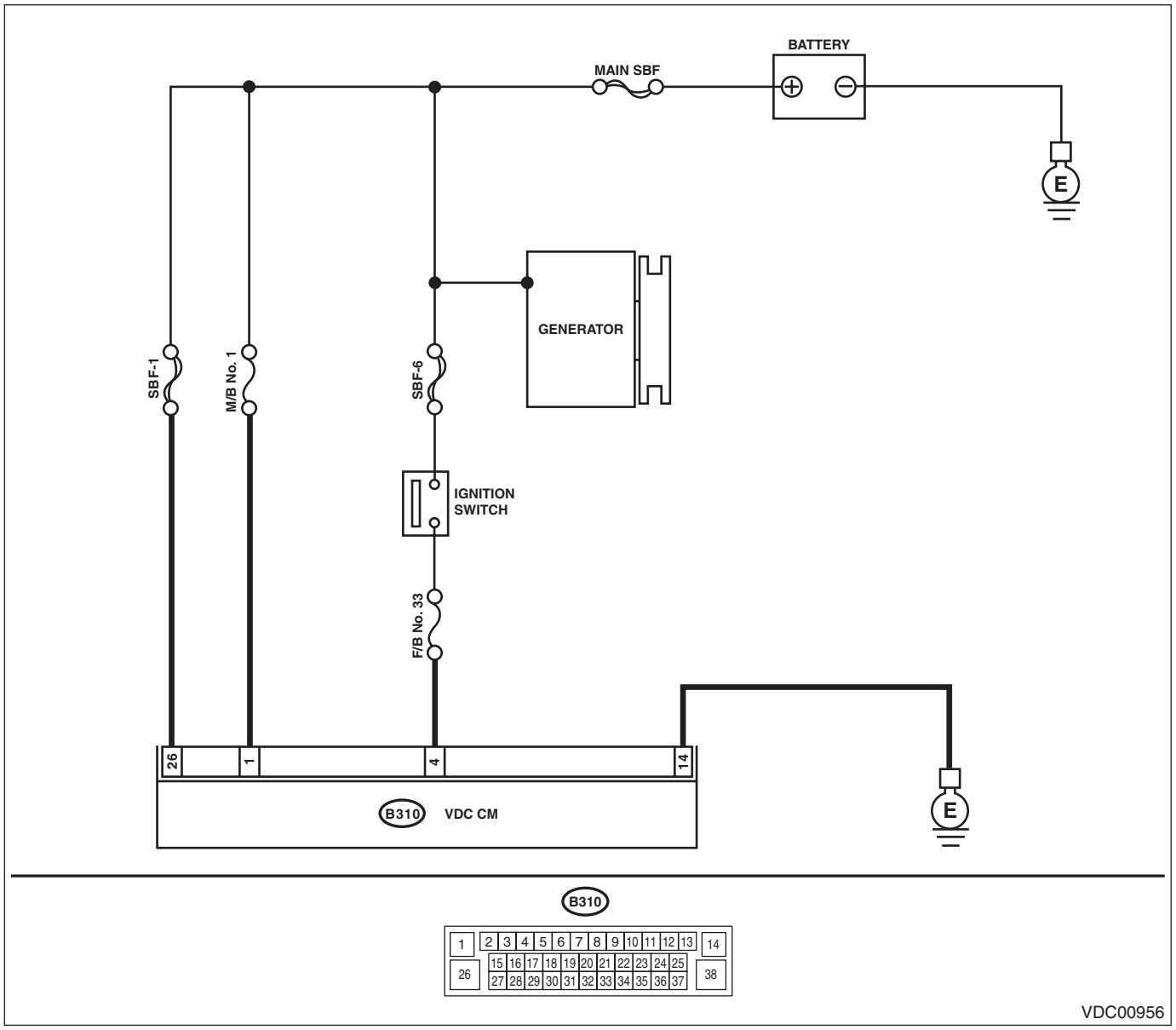
- Defective harness connector
- Defective VDCH/U solenoid valve

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:

Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>

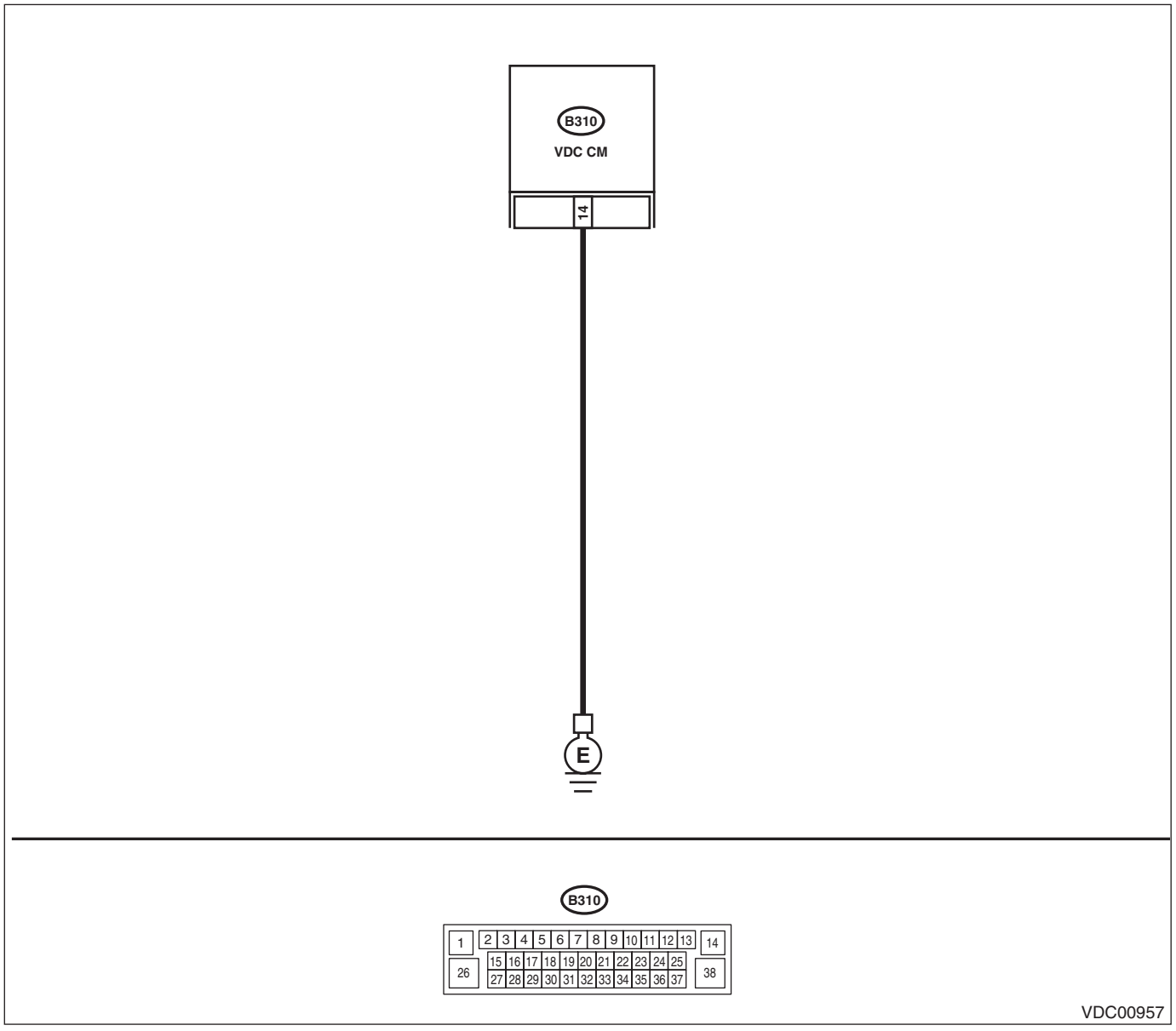


	Step	Check	Yes	No
1	**CHECK VDCCM&H/U INPUT VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 4 (+) — (B310) No. 14 (–):*** ***(B310) No. 1 (+) — (B310) No. 14 (–):*** ***(B310) No. 26 (+) — (B310) No. 14 (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the power supply circuit.
2	**CHECK VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the VDCCM&H/U ground harness.
3	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **4**.
4	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

W: DTC C1411 ECU

DTC DETECTING CONDITION:
Defective VDCCM
TROUBLE SYMPTOM:
- ABS does not operate.
- EBD does not operate.
- VDC does not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:
Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



	Step	Check	Yes	No
1	**CHECK VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 14 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **2**.	Repair the VDCCM&H/U ground harness.
2	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of the connector between the battery, ignition switch and VDCCM&H/U?	Repair the connector.	Go to step **3**.
3	**CHECK CAUSE OF SIGNAL NOISE.**	Are the radio wave devices and electronic components installed correctly?	Go to step **4**.	Install the radio wave devices and electronic components properly.
4	**CHECK CAUSE OF SIGNAL NOISE.**	Is there a noise source (such as an antenna) installed near the sensor harness and VDCCM?	Install the noise sources apart from sensor harness and VDCCM.	Go to step **5**.
5	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

X: DTC C1412 PARAMETER

DTC DETECTING CONDITION:
VDCCM parameter selection error
TROUBLE SYMPTOM:
- ABS does not operate.
- EBD does not operate.
- VDC does not operate.
- Hill start assist does not operate.

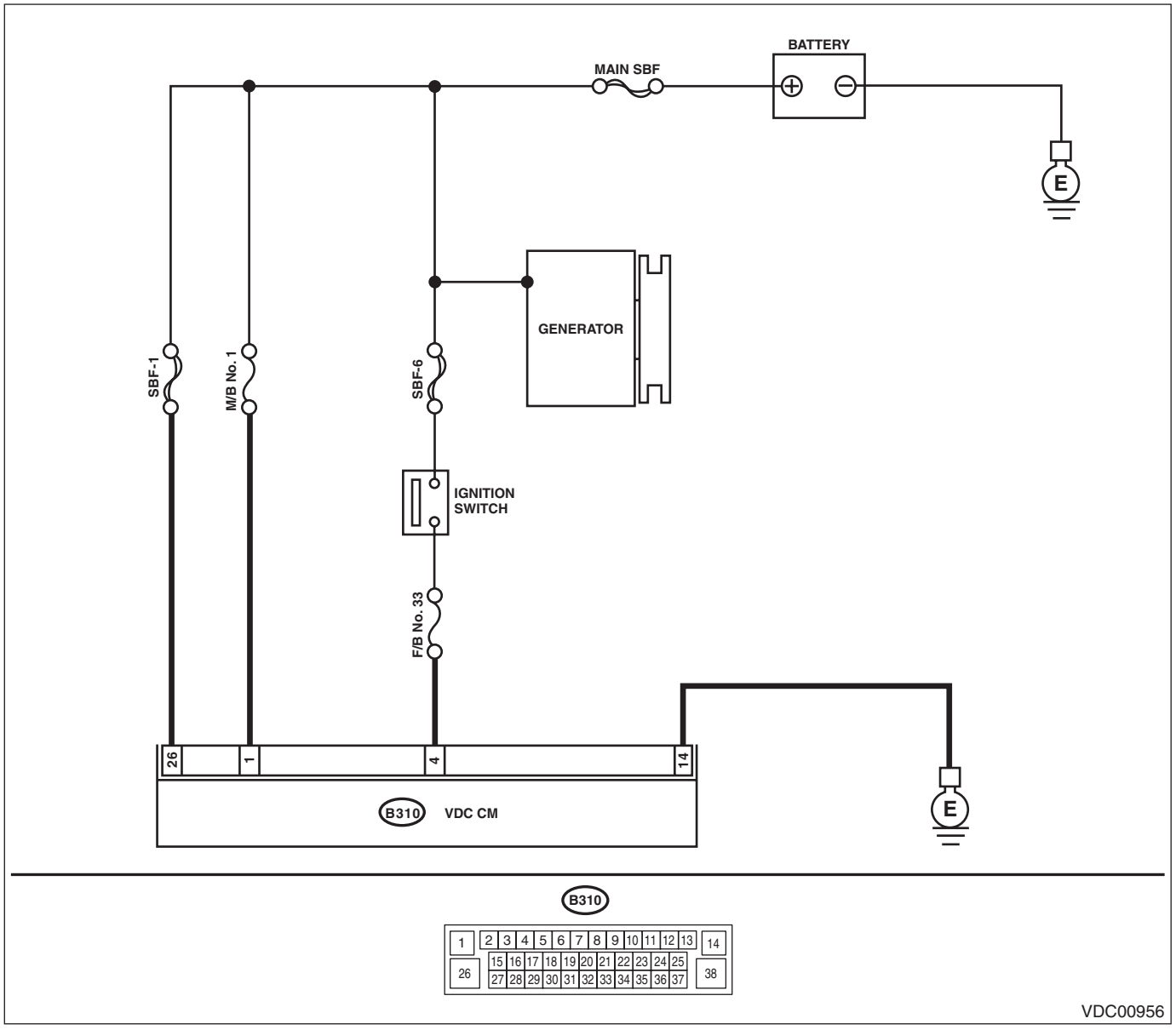
NOTE:
When the VDCCM or VDCCM&H/U is replaced, this DTC may be stored.

	Step	Check	Yes	No
1	**CHECK VDCCM&H/U IDENTIFICATION SYMBOL.** Check the identification symbol attached on the H/U. <Ref. to VDC-2, SPECIFICATION, General Description.>	Is the identification symbol correct?	Go to step **2**.	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
2	**CHECK PARAMETER SELECTED IN VDCCM.** <Ref. to VDC(diag)-19, PARAMETER CHECK, OPERATION, Subaru Select Monitor.>	Does the parameter registered in the VDCCM match the relevant vehicle?	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Select and register the correct parameter. <Ref. to VDC(diag)-19, PARAMETER SELECTION, OPERATION, Subaru Select Monitor.>

Y: DTC C1413 POWER SUPPLY VOLT ERROR

DTC DETECTING CONDITION:
Improper VDCCM&H/U power supply voltage
TROUBLE SYMPTOM:
- ABS does not operate.
- EBD may not operate.
- VDC does not operate.
- Hill start assist does not operate.

NOTE:
Warning lights go off if voltage returns.
WIRING DIAGRAM:
Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Run the engine at idle after warming up. 3) Measure the voltage between generator terminal B and chassis ground. ***Terminals*** ***Generator terminal B (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the generator. <Ref. to SC(H4DO)-35, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and negative battery terminals clamped tightly?	Go to step **3**.	Tighten the terminal.
3	**CHECK VDCCM&H/U INPUT VOLTAGE.** 1) Disconnect the connector from the VDCCM&H/U. 2) Run the engine at idle. 3) Operate devices such as headlights, air conditioner, rear defogger, etc. which produce an electrical load. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 4 (+) — (B310) No. 14 (–):*** ***(B310) No. 1 (+) — (B310) No. 14 (–):*** ***(B310) No. 26 (+) — (B310) No. 14 (–):***	Is the voltage 10 — 15 V?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the VDCCM&H/U ground harness.
5	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **6**.
6	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

Z: DTC C1421 ECM CONTROL SYSTEM

DTC DETECTING CONDITION:
ECM malfunctioning
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**CHECK COOPERATION CONTROL FEASIBILITY OF ECM USING SUBARU SELECT MONITOR.** 1) Start the engine, and run the engine at idle approximately 5 minutes. 2) Connect Subaru Select Monitor, and select "Current Data Display & Save". 3) Check the «E/G Control Stop Flag» displayed on screen.	Is the «E/G Control Stop Flag» "1"?	Go to step **4**.	Go to step **2**.
2	**CHECK WARNING LIGHT.** Check whether the VDC warning light illuminates after driving for 1 minute or more at a speed of 10 km/h (6 MPH) or more.	Does the VDC warning light illuminate?	Go to step **3**.	VDC is normal. Perform the Clear Memory Mode. NOTE: DTC may be recorded if cranking is performed during driving.
3	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of ECM connector?	Repair the connector.	Go to step **4**.
4	**CHECK ECM.** Refer to the basic diagnostic procedure for Engine (diagnostics).	Is ECM normal?	Go to step **5**.	Replace the ECM. <Ref. to FU(H4DO)-102, Engine Control Module (ECM).>
5	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Perform the Clear Memory Mode. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

AA:DTC C1422 VDC INTERRUPTION FOR ENGINE CONVENIENCE

DTC DETECTING CONDITION:
ECM prohibits the cooperation control.
TROUBLE SYMPTOM:
VDC does not operate.

NOTE:
- For the diagnostic procedure, refer to "DTC C1421 ECM CONTROL SYSTEM". <Ref. to VDC(diag)-57, DTC C1421 ECM CONTROL SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
- Warning lights go off if the cooperation control of ECM returns.

AB:DTC C1423 DIFFERENT ECU SPECIFICATIONS

DTC DETECTING CONDITION:
Different control module specification
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

NOTE:
When parameter selection for VDCCM is improper, this DTC may be memorized.

	Step	Check	Yes	No
1	**CHECK VDCCM&H/U IDENTIFICATION SYMBOL.** Check the identification symbol attached on the H/U. <Ref. to VDC-2, SPECIFICATION, General Description.>	Is the identification symbol correct?	Go to step **2**.	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
2	**CHECK PARAMETER SELECTED IN VDCCM.** <Ref. to VDC(diag)-19, PARAMETER CHECK, OPERATION, Subaru Select Monitor.>	Does the parameter registered in the VDCCM match the relevant vehicle?	CVT model: Go to step **3**. MT model: Go to step **5**.	Select and register the correct parameter. <Ref. to VDC(diag)-19, PARAMETER SELECTION, OPERATION, Subaru Select Monitor.>
3	**CHECK TCM SPECIFICATION.** Check the TCM specification.	Is the specification of TCM same as vehicle specification?	Go to step **4**.	Replace the TCM. <Ref. to CVT-136, Transmission Control Module (TCM).>
4	**CHECK CVT SYSTEM.** 1) Start the engine. 2) Check the DTC in CVT system.	Is DTC of CVT system displayed?	Perform the diagnosis according to DTC. <Ref. to CVT(diag)-29, List of Diagnostic Trouble Code (DTC).>	Go to step **5**.
5	**CHECK ECM SPECIFICATION.** Check the ECM specification.	Is the specification of ECM same as vehicle specification?	Go to step **6**.	Replace the ECM. <Ref. to FU(H4DO)-102, Engine Control Module (ECM).>
6	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

AC:DTC C1424 ECM FAILURE

DTC DETECTING CONDITION:
ECM malfunctioning
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**CHECK ECM.** 1) Start the engine. 2) Check DTC of ECM.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **3**.
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

AD:DTC C1431 AT ABNORMAL

DTC DETECTING CONDITION:
Defective TCM
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**CHECK TCM.** 1) Start the engine. 2) Check DTC of TCM.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) After turning the ignition switch to ON for approx. 10 seconds, turn it to OFF. 3) Turn the ignition switch to ON again. 4) Connect all connectors. 5) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 6) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 7) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **3**.
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

AE:DTC C1432 DIFFERENT ECU SPECIFICATIONS

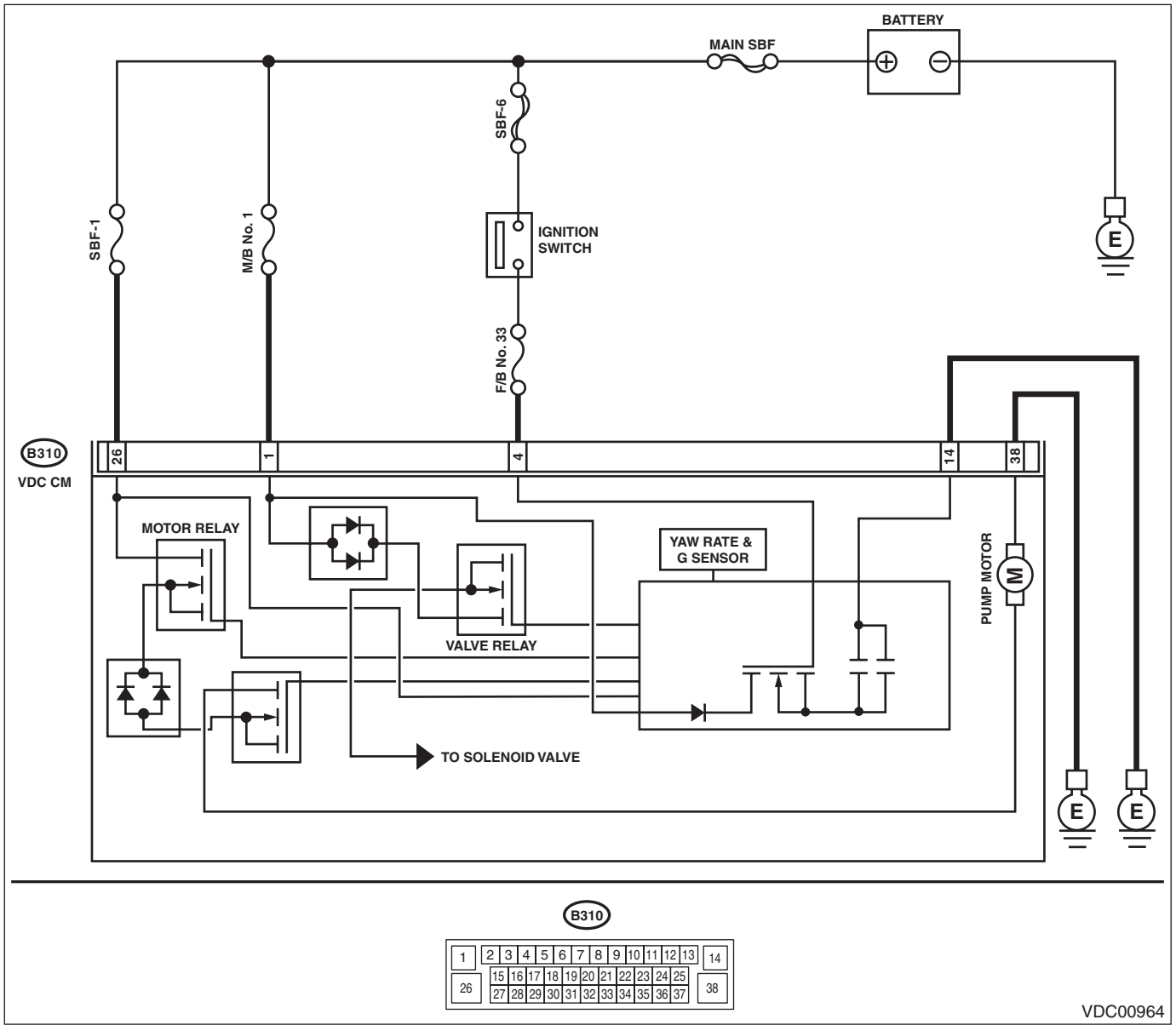
NOTE:
For the diagnostic procedure, refer to “DTC C1423 DIFFERENT ECU SPECIFICATIONS”. <Ref. to VDC(diag)-58, DTC C1423 DIFFERENT ECU SPECIFICATIONS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AF:DTC C1511 VALVE RELAY

DTC DETECTING CONDITION:
Defective valve relay

TROUBLE SYMPTOM:
- ABS does not operate.
- EBD does not operate.
- VDC does not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:
Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



	Step	Check	Yes	No
1	**CHECK VDCCM&H/U INPUT VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 1 (+) — Chassis ground (–):*** ***(B310) No. 4 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the power supply circuit.
2	**CHECK VDCCM&H/U INPUT VOLTAGE.** Calculate the voltage difference measured in step 1. A: (B310) No. 1 (+) — Chassis ground (–): B: (B310) No. 4 (+) — Chassis ground (–):	Is the voltage difference between A and B 2 V or more?	Repair the power supply circuit.	Go to step **3**.
3	**CHECK VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the VDCCM&H/U ground harness.
4	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **5**.
5	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AG:DTC C1512 VALVE SYSTEM

NOTE:
For the diagnostic procedure, refer to “DTC C1362 VDC CHANGE-OVER VALVE 2 (S)”. <Ref. to VDC(diag)-70, DTC C1542 CLUTCH ON FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AH:DTC C1521 MOTOR RELAY

DTC DETECTING CONDITION:

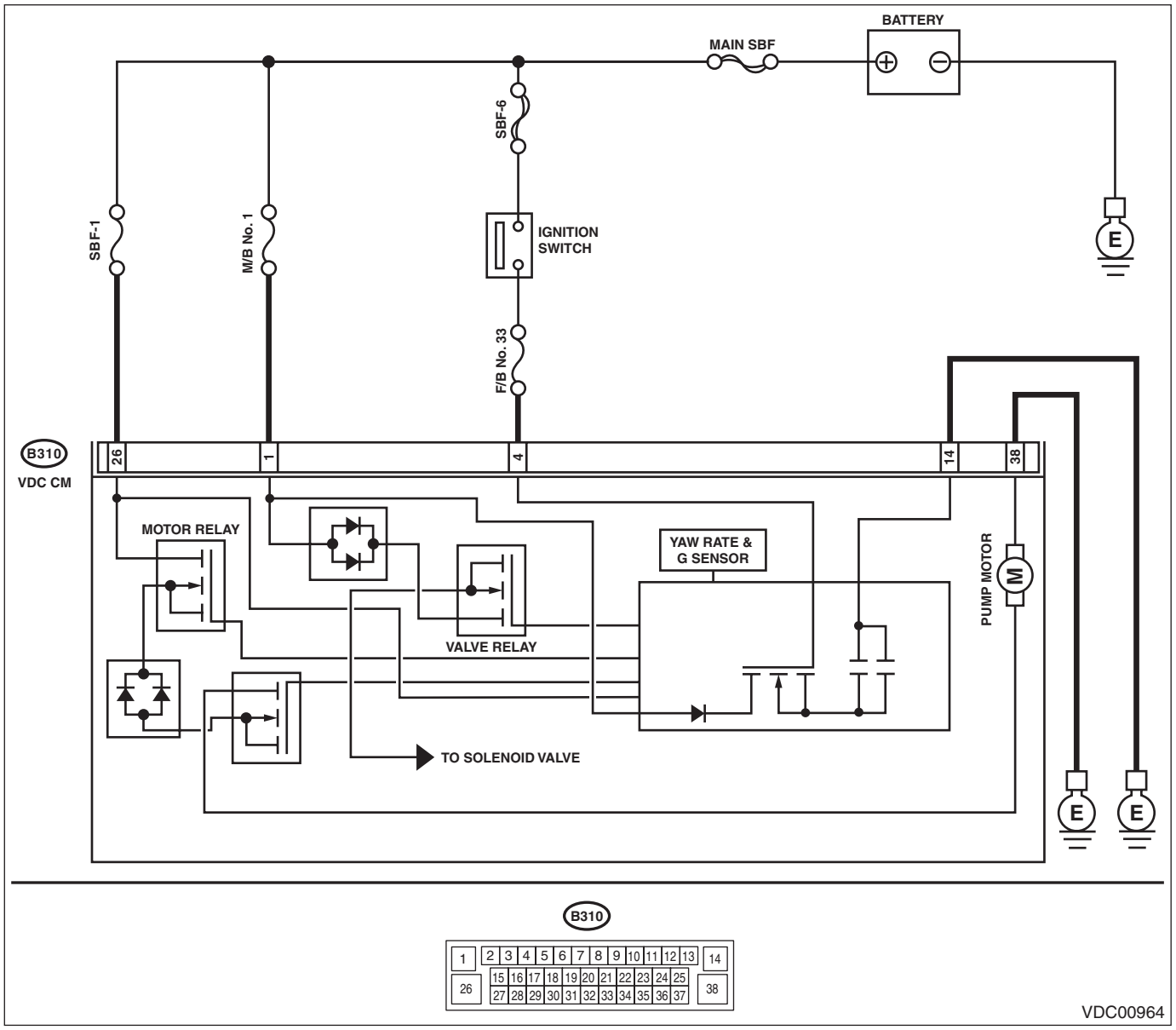
- Defective motor and motor relay
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:

Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



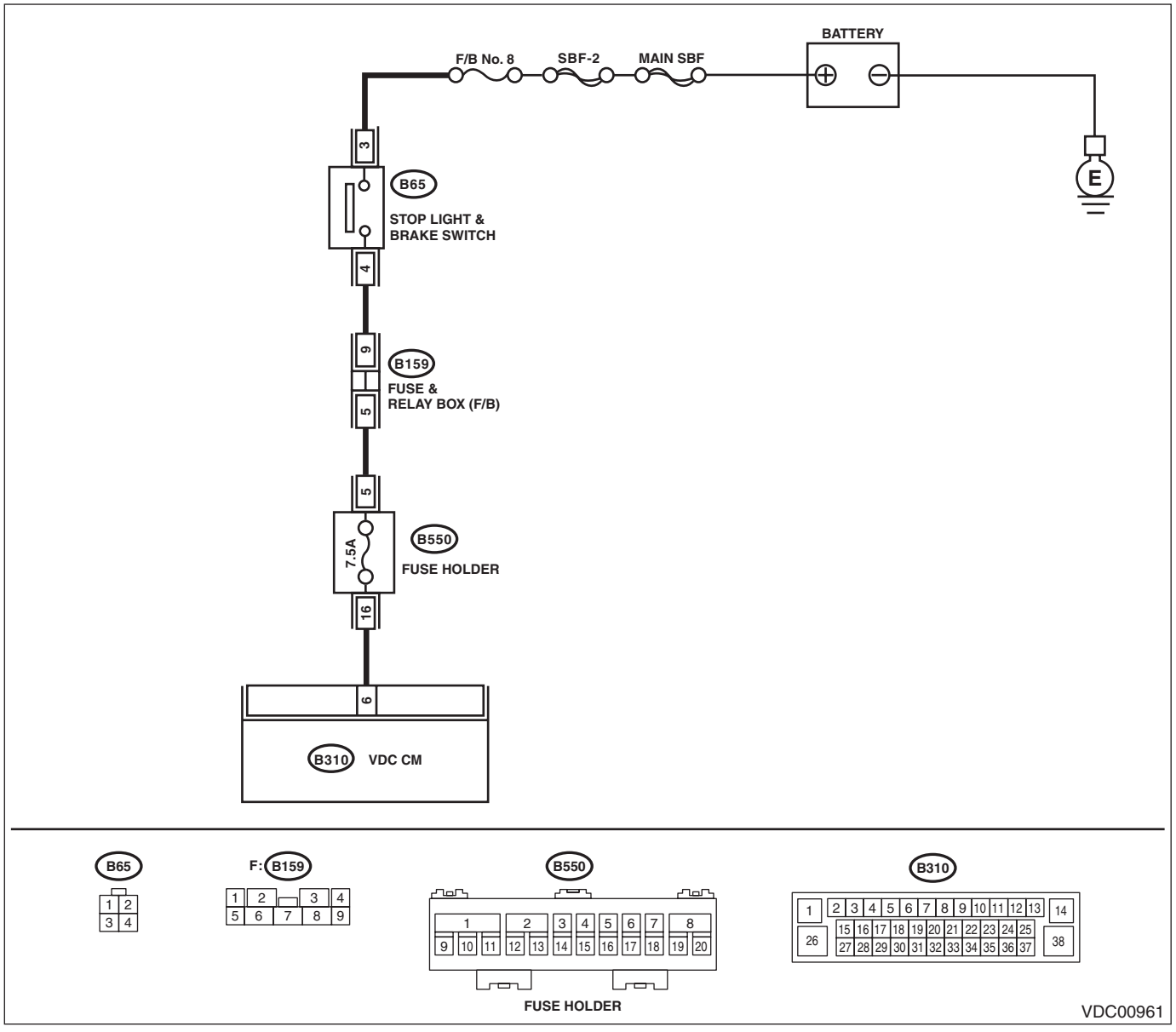
	Step	Check	Yes	No
1	**CHECK VDCCM&H/U INPUT VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 4 (+) — Chassis ground (–):*** ***(B310) No. 26 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the VDCCM&H/U power supply circuit.
2	**CHECK VDCCM&H/U INPUT VOLTAGE.** Calculate the voltage difference measured in step 1. A: (B310) No. 4 (+) — Chassis ground (–): B: (B310) No. 26 (+) — Chassis ground (–):	Is the voltage difference between A and B 2 V or more?	Repair the power supply circuit.	Go to step **3**.
3	**CHECK INSTALLATION OF VDCCM&H/U GROUND.**	Is the VDCCM&H/U ground terminal installation bolt tightened to 13 N·m (1.3 kgf-m, 9.6 ft-lb)?	Go to step **4**.	Tighten the VDCCM&H/U ground terminal installation bolt.
4	**CHECK VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 — Chassis ground:*** ***(B310) No. 38 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the VDCCM&H/U ground harness.
5	**CHECK VDCCM&H/U MOTOR RELAY.** Measure the resistance between VDCCM&H/U terminals. ***Terminals*** ***No. 26 — No. 38:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
6	**CHECK POOR CONTACT OF CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **7**.
7	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **8**.

Step		Check	Yes	No
8	CHECK OTHER DTC DETECTION.	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs. NOTE: Though the ABS warning light, and the VDC warning light & VDC indicator light may remain lit at this point, this is normal. Drive the vehicle at 40 km/h (25 MPH) or more in order to turn off the ABS warning light, and the VDC warning light & VDC indicator light. Be sure to drive the vehicle and check that the warning light goes off.

AI: DTC C1531 BLS OFF FAULT

DTC DETECTING CONDITION:
Defective stop light switch
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:
Stop light system <Ref. to WI-145, Stop Light System.>

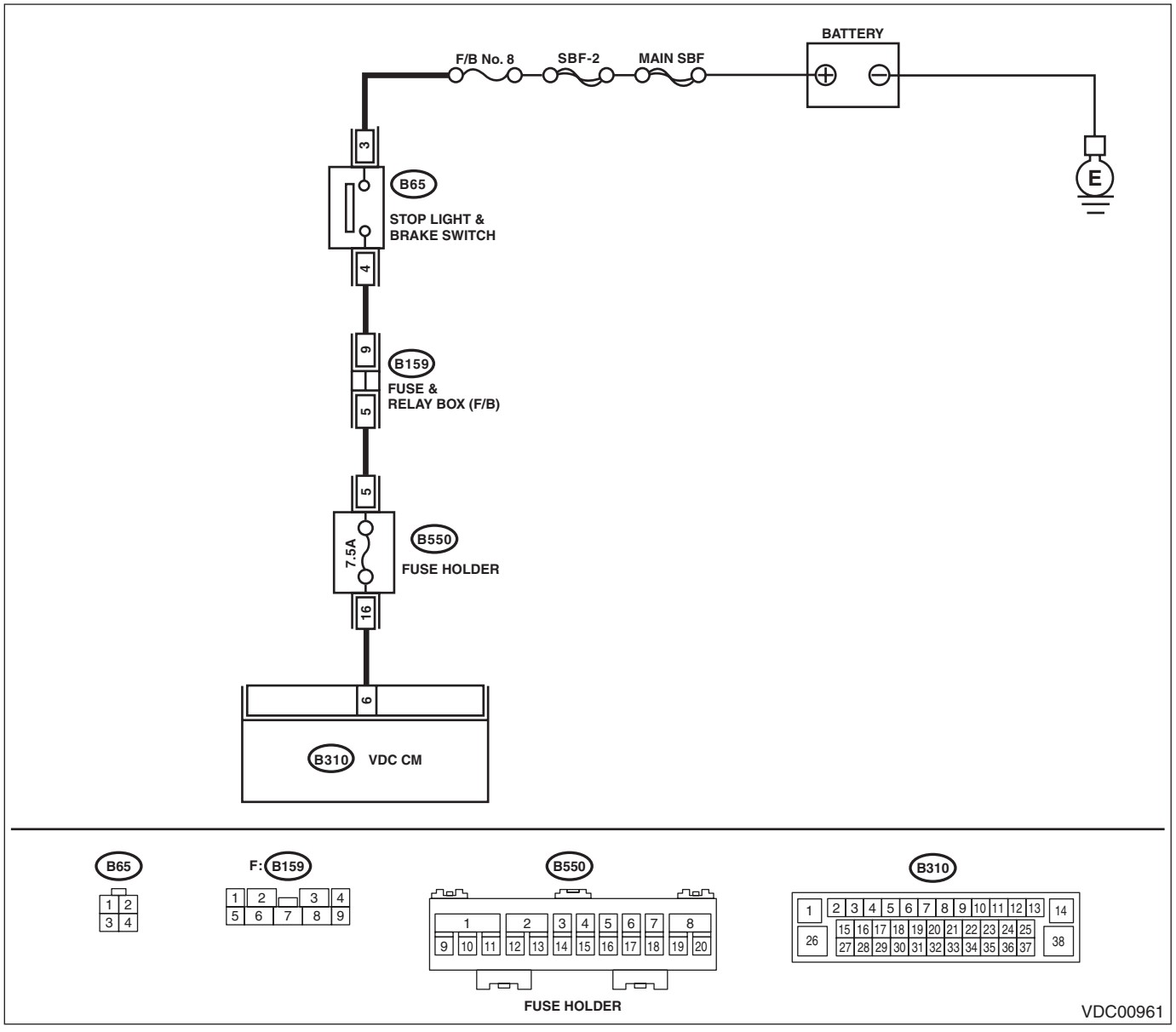


	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch connector. 3) Measure the resistance of stop light switch terminals. ***Connector & terminal (B65) No. 3 — No. 4:***	Is the resistance 1 Ω or less when the switch is ON (when pedal is depressed)?	Go to step **2**.	Replace the stop light switch. <Ref. to BR-71, Stop Light Switch.>
2	**CHECK STOP LIGHT POWER SUPPLY.** Measure the voltage between stop light switch terminal and chassis ground. ***Connector & terminal (B65) No. 3 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **3**.	Repair the stop light power supply circuit.
3	**CHECK STOP LIGHT SWITCH HARNESS.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and stop light switch. ***Connector & terminal (B65) No. 4 — (B310) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the stop light switch circuit.
4	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of connector between stop light switch and VDCCM&H/U?	Repair the connector.	Go to step **5**.
5	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AJ:DTC C1532 BLS ON FAULT

DTC DETECTING CONDITION:
Defective stop light switch
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:
Stop light system <Ref. to WI-145, Stop Light System.>



	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch connector. 3) Measure the resistance of stop light switch terminals. ***Connector & terminal*** ***(B65) No. 3 — No. 4:***	Is the resistance 1 MΩ or more when switch is OFF (when pedal is not depressed)?	Go to step **2**.	Replace the stop light switch. <Ref. to BR-71, Stop Light Switch.>
2	**CHECK STOP LIGHT SWITCH HARNESS.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 1 MΩ?	Go to step **3**.	Repair the stop light switch circuit.
3	**INTERVIEW CUSTOMERS.** Make sure that the operation was performed in which accelerator pedal and brake pedal were depressed simultaneously (with depressing brake pedal with left foot).	Were the acceleration pedal and brake pedal depressed simultaneously?	System is normal. (DTC may be recorded while brake is applied during driving.)	Go to step **4**.
4	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AK:DTC C1541 CLUTCH OFF FAULT

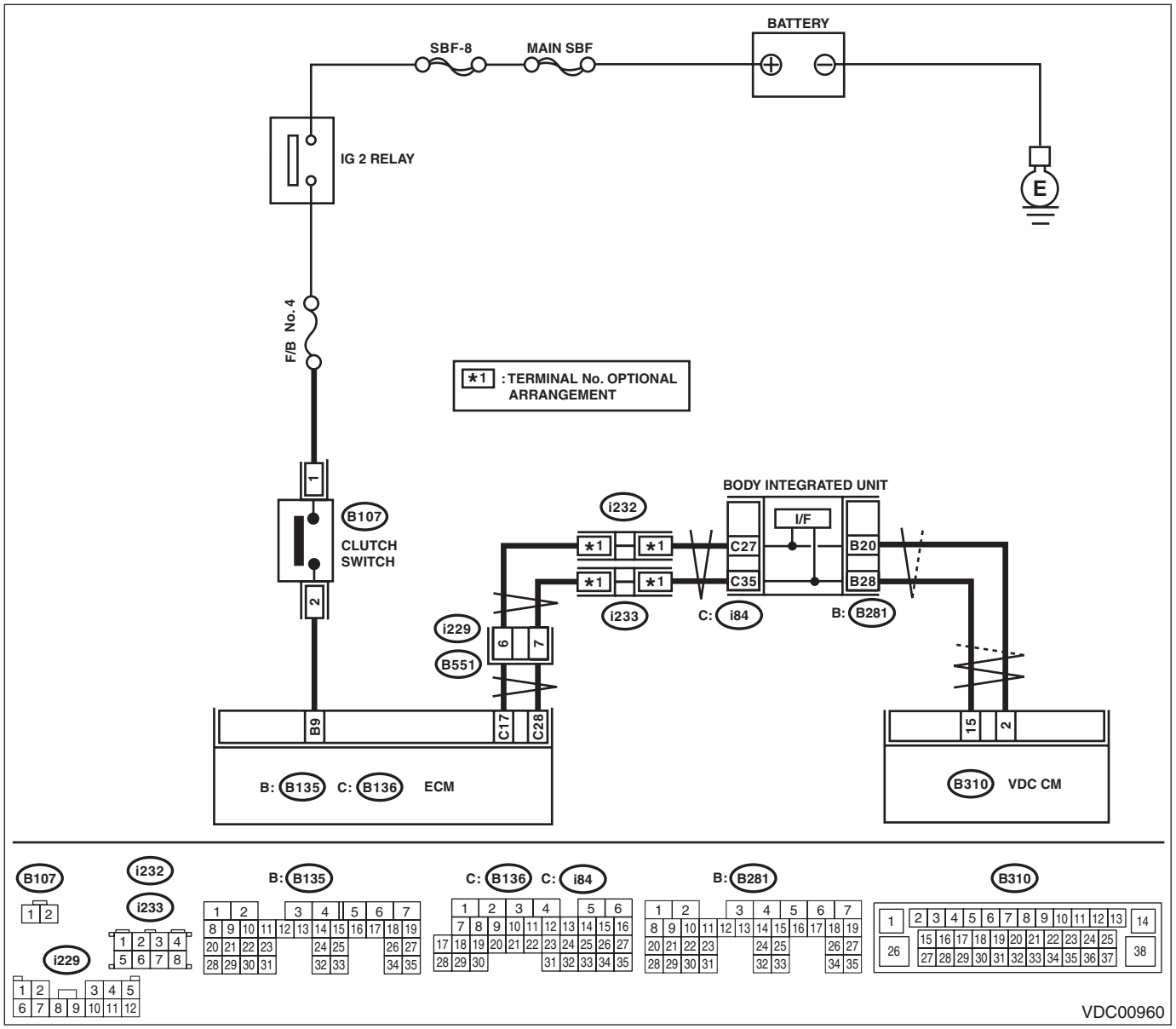
NOTE:
For the diagnostic procedure, refer to “DTC C1542 CLUTCH ON FAULT”. <Ref. to VDC(diag)-70, DTC C1542 CLUTCH ON FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AL:DTC C1542 CLUTCH ON FAULT

DTC DETECTING CONDITION:
Abnormal clutch signal
TROUBLE SYMPTOM:
Hill start assist does not operate.

NOTE:
Depending on the user clutch operation patterns, the hill start assist warning light may illuminate for a while, and then go off.
Illumination condition:
While the vehicle speed is 10 km/h (6 MPH) or above, and the clutch switch signal ON (depressed) condition continues five minutes or more, if the vehicle speed lowers to 10 km/h (6 MPH) or below, the module judge as abnormal (clutch switch stuck ON), and then turn on the warning light.
Turning off condition:
If the clutch switch signal OFF (foot released) condition continues for 2 second, the module turns off the warning light.
The hill start assist function does not operate, while the warning light illuminates.

WIRING DIAGRAM:
Engine electrical system <Ref. to WI-74, Engine Electrical System.>
CAN communication system <Ref. to WI-46, CAN Communication System.>



Step		Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CLUTCH SIGNAL USING SUBARU SELECT MONITOR.** 1) Select “Current Data Display & Save” on the Subaru Select Monitor. <Ref. to VDC(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Read the «Clutch Switch» displayed on display.	Is “OFF” displayed when the clutch pedal is not depressed, and is “ON” displayed when depressed?	Go to step **5**.	Go to step **3**.

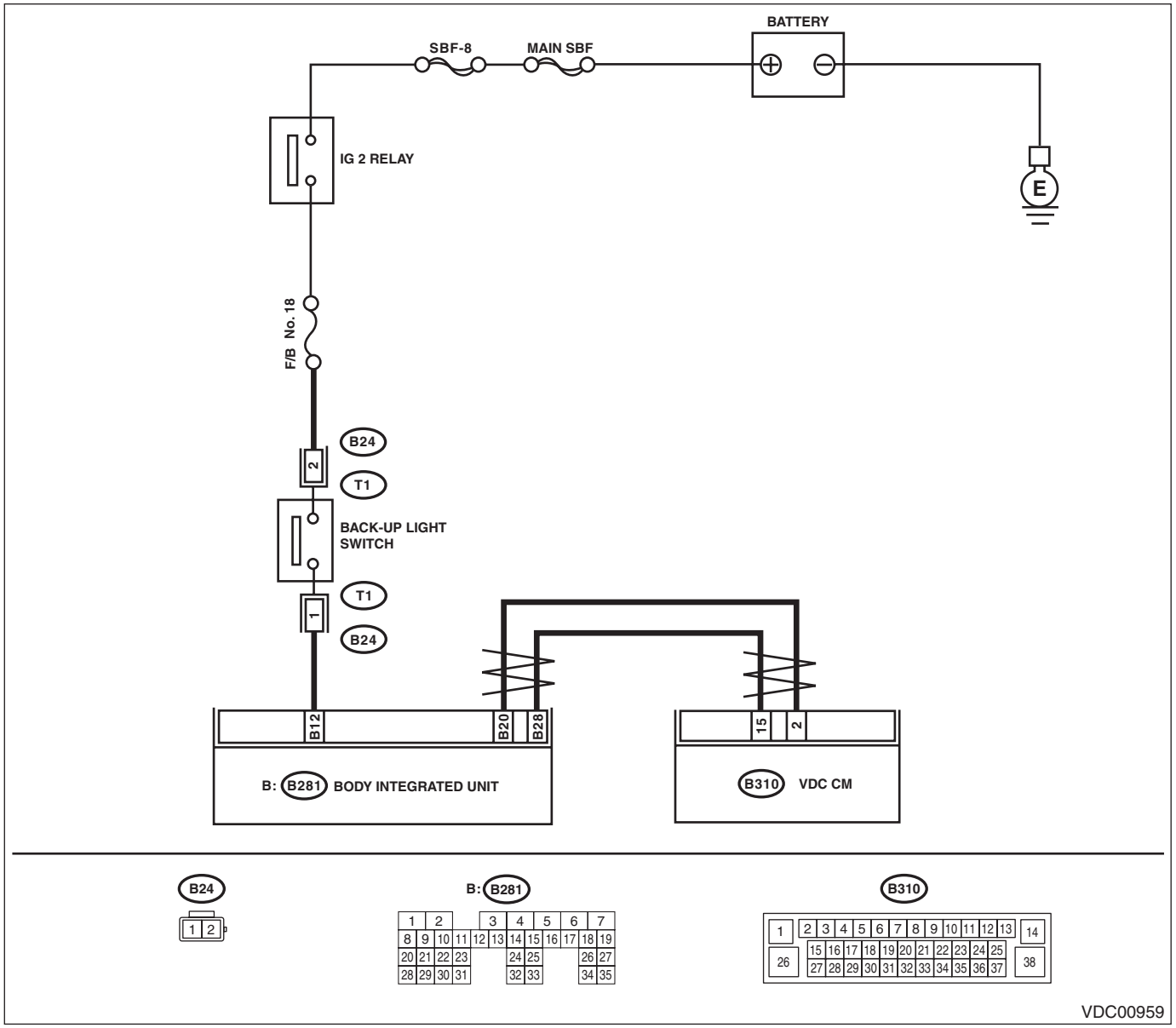
	Step	Check	Yes	No
3	**CHECK CLUTCH SIGNAL OF ECM USING SUBARU SELECT MONITOR.** 1) Select “Current Data Display & Save” on Subaru Select Monitor. <Ref. to EN(H4DO)(diag)-36, READ CURRENT DATA FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> 2) Read the «Clutch Switch» displayed on display.	Is “OFF” displayed when the clutch pedal is not depressed, and is “ON” displayed when depressed?	Go to step **5**.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND CLUTCH SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and clutch switch. 3) Measure the resistance of harness between ECM and clutch switch connector. ***Connector & terminal*** ***(B135) No. 9 — (B107) No. 2:***	Is the resistance less than 1 Ω?	Repair the power supply circuit of clutch switch. Or replace the clutch switch. <Ref. to CL-26, Clutch Switch.>	Repair the harness between ECM and clutch switch connector.
5	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AM:DTC C1561 REVERSE OFF FAULT

NOTE:
For the diagnostic procedure, refer to “DTC C1562 REVERSE ON FAULT”. <Ref. to VDC(diag)-73, DTC C1562 REVERSE ON FAULT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AN:DTC C1562 REVERSE ON FAULT

DTC DETECTING CONDITION:
Abnormal reverse signal
TROUBLE SYMPTOM:
Hill start assist does not operate.
WIRING DIAGRAM:
Back-up light system <Ref. to WI-45, Back-up Light System.>
CAN communication system <Ref. to WI-46, CAN Communication System.>



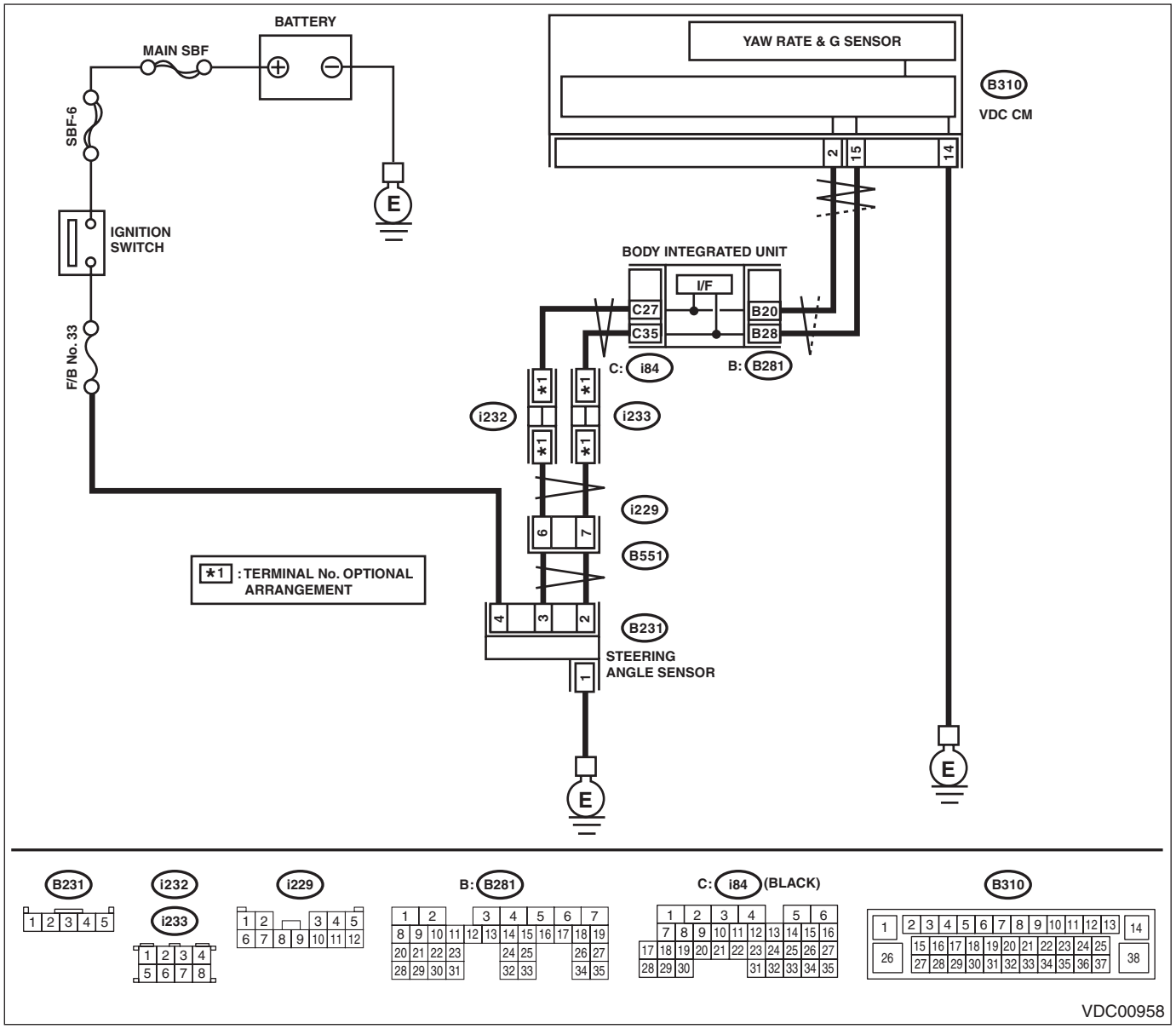
	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK REVERSE SIGNAL USING SUBARU SELECT MONITOR.** 1) Select "Current Data Display & Save" on the Subaru Select Monitor. <Ref. to VDC(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Read the «Reverse Signal» displayed on display.	Is "OFF" displayed when the shift lever is placed in any position other than reverse, and is "ON" displayed in reverse position?	Go to step **5**.	Go to step **3**.
3	**CHECK BACK-UP LIGHT ILLUMINATION.** 1) Turn the ignition switch to ON. 2) Place the shift lever in reverse position.	Does the back-up light illuminate?	Go to step **4**.	Repair the back-up light circuit.
4	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND BACK-UP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from body integrated unit and back-up light switch. 3) Measure the resistance of harness between body integrated unit and back-up light switch connector. ***Connector & terminal*** ***(B280) No. 12 — (B24) No. 1:***	Is the resistance less than 1 Ω?	Replace the back-up light switch. <Ref. to 5MT-35, Switches and Harness.>	Repair the harness between body integrated unit and back-up light switch connector.
5	**CHECK VDCCM&H/U.** 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AO:DTC C1711 STEERING ANGLE SENSOR ABNORMAL

DTC DETECTING CONDITION:
Defective steering angle sensor

TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

WIRING DIAGRAM:
Vehicle Dynamics Control System <Ref. to WI-152, Vehicle Dynamics Control System.>



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from steering angle sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 4 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the steering angle sensor power supply circuit.
2	**CHECK GROUND CIRCUIT OF STEERING ANGLE SENSOR.** Measure the resistance between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair ground circuit in the steering angle sensor.
3	**CHECK STEERING ANGLE SENSOR HARNESS.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and steering angel sensor. ***Connector & terminal*** ***(B231) No. 2 — (B310) No. 15:*** ***(B231) No. 3 — (B310) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness between the steering angle sensor and VDCCM&H/U.
4	**CHECK GROUND SHORT CIRCUIT OF STEERING ANGLE SENSOR HARNESS.** Measure the resistance between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 2 — Chassis ground:*** ***(B231) No. 3 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the harness between the steering angle sensor and VDCCM&H/U.
5	**CHECK STEERING WHEEL.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Check the steering wheel for deviation from center.	Is the deviation from the center of steering wheel less than 5°?	Go to step **6**.	Perform the centering adjustment of steering wheel, and perform the VDC sensor midpoint setting mode. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
6	**CHECK OUTPUT OF STEERING ANGLE SENSOR USING SUBARU SELECT MONITOR.** 1) Adjust steering wheel to the center position. 2) Connect Subaru Select Monitor, and select “Current Data Display & Save”. 3) Read the «Steering Angle Sensor» displayed on display.	Is the indicated reading of the «Steering Angle Sensor» on the monitor display –10° — 10°?	Perform the VDC sensor midpoint setting mode. Go to step **7**. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Check the installation of the steering wheel and steering angle sensor.

	Step	Check	Yes	No
7	**CHECK STEERING ANGLE SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 5) Read the DTC.	Is the same DTC displayed?	Go to step **8**.	Go to step **9**.
8	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Replace the steering angle sensor. <Ref. to VDC-27, Steering Angle Sensor.> 3) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **10**.
9	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.
10	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Original steering angle sensor malfunction

AP:DTC C1721 YAW RATE SENSOR ABNORMAL

DTC DETECTING CONDITION:
Defective yaw rate & G sensor
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**INTERVIEW CUSTOMERS.** Check if the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Did the vehicle run the road with banks or sandy surface (which does not mean a dirt road)?	VDCCM&H/U may record DTC when the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Go to step **2**.
2	**CHECK INSTALLATION OF VDCCM&H/U.**	Is VDCCM&H/U installed properly without being tilted? Is the bracket deformation-free? Are the VDCCM&H/U installation bolts installed without missing or getting loose?	Go to step **3**.	Repair the defective part. Go to step **3**. • Install VDCCM&H/U properly. • Replace the bracket if faulty. • Tighten the VDCCM&H/U installation bolt. <Ref. to VDC-5, VDC CONTROL MODULE & HYDRAULIC CONTROL UNIT (VDCCM&H/U), COMPONENT, General Description.>
3	**CHECK OUTPUT OF YAW RATE & G SENSOR WITH SUBARU SELECT MONITOR.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select “Current Data Display & Save” on the Subaru Select Monitor. 4) Read the «Yaw Rate Sensor» displayed on display.	Is the reading indicated on monitor display –4 — 4 deg/s?	Go to step **4**.	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
4	**CHECK OUTPUT OF STEERING ANGLE SENSOR WITH SUBARU SELECT MONITOR.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select “Current Data Display & Save” on the Subaru Select Monitor. 4) Read the «Steering Angle Sensor» displayed on display.	Is the reading indicated on monitor display –10 — 10°?	Go to step **5**.	Perform the centering adjustment of steering wheel.

	Step	Check	Yes	No
5	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

AQ:DTC C1731 G SENSOR ABNORMAL

NOTE:
For the diagnostic procedure, refer to “DTC C1732 LATERAL G SENSOR ABNORMAL”. <Ref. to VDC(diag)-80, DTC C1732 LATERAL G SENSOR ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AR:DTC C1732 LATERAL G SENSOR ABNORMAL

DTC DETECTING CONDITION:
Defective lateral G sensor
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**CHECK INSTALLATION OF VDCCM&H/U.**	Is VDCCM&H/U installed properly without being tilted? Is the bracket deformation-free? Are the VDCCM&H/U installation bolts installed without missing or getting loose?	Go to step **2**.	Repair the defective part. Go to step **2**. • Install VDCCM&H/U properly. • Replace the bracket if faulty. • Tighten the VDCCM&H/U installation bolt. <Ref. to VDC-5, VDC CONTROL MODULE & HYDRAULIC CONTROL UNIT (VDCCM&H/U), COMPONENT, General Description.>
2	**CHECK OUTPUT OF STEERING ANGLE SENSOR USING SUBARU SELECT MONITOR.** 1) Park the vehicle straight on a level surface. 2) Connect Subaru Select Monitor, and select “Current Data Display & Save”. 3) Read the «Steering Angle Sensor» displayed on display.	Is the indicated reading of the steering angle sensor on the monitor display –10° — 10°?	Go to step **3**.	Check the installation of steering angle sensor.
3	**CHECK OUTPUT OF LATERAL G SENSOR AND LONGITUDINAL G SENSOR WITH SUBARU SELECT MONITOR.** 1) Park the vehicle straight on a level surface. 2) Connect Subaru Select Monitor, and select “Current Data Display & Save”. 3) Read the «Lateral G Sensor» and « Longitudinal G Sensor » displayed on display.	Is the indicated reading of the lateral G sensor and longitudinal G sensor on the monitor display –2 — 2 m/s^2?	Go to step **4**.	Recheck from step 1, and if the problem is not solved, go to next. Go to step **7**.
4	**SET 0 POINT OF LATERAL G SENSOR AND LONGITUDINAL G SENSOR WITH SUBARU SELECT MONITOR.** 1) Select “Work Support” on Subaru Select Monitor. 2) Perform the VDC sensor midpoint setting mode. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Is the 0 point setting successful?	Go to step **5**.	Recheck from step 1, and when the 0 point setting is not possible, replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

	Step	Check	Yes	No
5	**PERFORM DRIVING TEST.** Drive approximately 10 minutes, and check if the warning lights illuminate or improperly operate during driving. In a safe place, drive the vehicle while alternating acceleration and deceleration as much as possible.	Did the ABS warning light or VDC warning light remain off? Does ABS or VDC operate without malfunction?	Go to step **6**.	Recheck from step 1, and when the warning lights illuminate or improperly operate, replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
6	**CHECK OUTPUT OF LATERAL G SENSOR AND LONGITUDINAL G SENSOR WITH SUBARU SELECT MONITOR.** 1) Park the vehicle on a level surface. 2) Connect Subaru Select Monitor, and select "Current Data Display & Save". 3) Read the «Lateral G Sensor» and « Longitudinal G Sensor » displayed on display.	Is the indicated reading of the lateral G sensor and longitudinal G sensor on the monitor display –1.5 — 1.5 m/s^2?	It results from a temporary noise interference.	Recheck from step 1, and if the problem is not solved, replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
7	**CHECK OUTPUT OF LATERAL G SENSOR AND LONGITUDINAL G SENSOR WITH SUBARU SELECT MONITOR.** 1) Remove the VDCCM&H/U installation bolt and bracket. 2) Keep VDCCM&H/U in a horizontal position. 3) Connect Subaru Select Monitor, and select "Current Data Display & Save". 4) Read the «Lateral G Sensor» and « Longitudinal G Sensor » displayed on display.	When the VDCCM&H/U is in a horizontal position, is the indicated reading of the lateral G sensor and longitudinal G sensor on the monitor display –1.5 — 1.5 m/s^2?	Check the bracket and brake pipe, and install VDCCM&H/U in a horizontal position to the vehicle.	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

AS:DTC C1733 LONGITUDINAL G SENSOR ABNORMAL

DTC DETECTING CONDITION:

Defective longitudinal G sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

NOTE:

For the diagnostic procedure, refer to "DTC C1732 LATERAL G SENSOR ABNORMAL". <Ref. to VDC(diag)-80, DTC C1732 LATERAL G SENSOR ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AT:DTC C1741 PRESSURE SENSOR

DTC DETECTING CONDITION:
Defective pressure sensor
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH CIRCUIT.** Check stop light switch open circuit.	Is the stop light switch circuit OK?	Go to step **2**.	Repair the stop light switch circuit. NOTE: If there is malfunction in the stop light circuit, DTC may be recorded in the memory.
2	**CHECK OUTPUT OF PRESSURE SENSOR WITH SUBARU SELECT MONITOR.** 1) Select “Current Data Display & Save” in Subaru Select Monitor. <Ref. to VDC(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Read the «Pressure Sensor» displayed on display.	With the brake pedal released, is the displayed value 0 — 11 bar?	Go to step **3**.	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
3	**CHECK OUTPUT OF PRESSURE SENSOR WITH SUBARU SELECT MONITOR.** 1) Select “Current Data Display & Save” in Subaru Select Monitor. <Ref. to VDC(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Read the «Pressure Sensor» displayed on display.	When the brake pedal is operated, does the pressure sensor output value displayed on the display change in accordance with the brake pedal?	Go to step **4**.	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
4	**CHECK PRESSURE SENSOR.** 1) Clear the memory. <Ref. to VDC(diag)-24, Clear Memory Mode.> 2) Perform the Inspection Mode. <Ref. to VDC(diag)-23, Inspection Mode.> 3) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-9, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.

AU:DTC C1811 SYSTEM FAILURE

DTC DETECTING CONDITION:
ABS and VDC long time sequential control
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.
- EBD may not operate.
- Hill start assist does not operate.

	Step	Check	Yes	No
1	**CHECK INSTALLATION OF VDCCM&H/U.**	Is VDCCM&H/U installed properly without being tilted? Is the bracket deformation-free? Are the VDCCM&H/U installation bolts installed without missing or getting loose?	Go to step **2**.	Repair the defective part. Go to step **2**. • Install VDCCM&H/U properly. • Replace the bracket if faulty. • Tighten the VDCCM&H/U installation bolt. <Ref. to VDC-5, VDC CONTROL MODULE & HYDRAULIC CONTROL UNIT (VDCCM&H/U), COMPONENT, General Description.>
2	**CHECK STEERING WHEEL.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Check the steering wheel for deviation from center.	Is the deviation from the center of steering wheel less than 5°?	Go to step **3**.	Perform the centering adjustment of steering wheel, and perform the VDC sensor midpoint setting mode. Go to step **3**. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
3	**CHECK OUTPUT OF STEERING ANGLE SENSOR USING SUBARU SELECT MONITOR.** 1) Adjust steering wheel to the center position. 2) Connect Subaru Select Monitor, and select “Current Data Display & Save”. 3) Read the «Steer Angle Sensor Op» displayed on display.	Is the indicated reading of the «Steer Angle Sensor Op» on the monitor display –10° — 10°?	Go to step **4**.	Check the installation of the steering wheel and steering angle sensor, and replace the parts if necessary.

	Step	Check	Yes	No
4	**CHECK OUTPUT OF SENSORS USING SUBARU SELECT MONITOR.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Connect Subaru Select Monitor, and select "Current Data Display & Save". 4) Read output of sensors displayed on display.	Are the indicated reading of sensor outputs following values? Lateral G sensor Output: –2 — 2 m/s^2 Fr Rr G sensor Output: –2 — 2 m/s^2 Yaw Rate Sensor Output: –4 — 4 deg/s	Go to step **5**.	Recheck from step 1, and if the problem is not solved, go to next. Go to step **8**.
5	**SET 0 POINT FOR LONGITUDINAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select "Work Support" on Subaru Select Monitor. 2) Perform the VDC sensor midpoint setting mode. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Is the 0 point setting successful?	Go to step **6**.	Recheck from step 1, and when the 0 point setting is not possible, replace the VDCCM and the steering angle sensor. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).> <Ref. to VDC-27, Steering Angle Sensor.>
6	**PERFORM DRIVING TEST.** Drive approximately 10 minutes, and check if the warning lights illuminate or improperly operate during driving.	Did the ABS warning light or VDC warning light remain off? Does ABS or VDC operate without malfunction?	Go to step **7**.	Recheck from step 1, and when the warning lights illuminate or improperly operate, replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
7	**CHECK OUTPUT OF SENSORS USING SUBARU SELECT MONITOR.** 1) Park the vehicle on a level surface. 2) Connect Subaru Select Monitor, and select "Current Data Display & Save". 3) Read output of sensors displayed on display.	Are the indicated reading of sensor outputs following values? Lateral G sensor Output: –2 — 2 m/s^2 Fr Rr G sensor Output: –2 — 2 m/s^2 Yaw Rate Sensor Output: –4 — 4 deg/s	It results from a temporary noise interference.	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
8	**CHECK OUTPUT OF SENSORS USING SUBARU SELECT MONITOR.** 1) Remove the VDCCM&H/U installation bolt and bracket. 2) Keep VDCCM&H/U in a horizontal position. 3) Connect Subaru Select Monitor, and select "Current Data Display & Save". 4) Read output of sensors displayed on display.	When VDCCM&H/U is in a horizontal position, are the indicated reading of sensor outputs following values? Lateral G sensor Output: –1.5 — 1.5 m/s^2 Fr Rr G sensor Output: –1.5 — 1.5 m/s^2 Yaw Rate Sensor Output: –4 — 4 deg/s	Check the bracket and brake pipe, and install VDCCM&H/U in a horizontal position to the vehicle.	Replace the VDCCM only. <Ref. to VDC-16, REPLACEMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

AV:DTC U0073 CONTROL MODULE COMMUNICATION BUS “A” OFF

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AW:DTC U0100 LOST COMMUNICATION WITH ECM/PCM “A”

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AX:DTC U0101 LOST COMMUNICATION WITH TCM

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AY:DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AZ:DTC U0140 LOST COMMUNICATION WITH BODY CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

BA:DTC U0401 INVALID DATA RECEIVED FROM ECM/PCM “A”

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

BB:DTC U0402 INVALID DATA RECEIVED FROM TCM

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

BC:DTC U0422 INVALID DATA RECEIVED FROM BODY CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

BD:DTC U0428 INVALID DATA RECEIVED FROM STEERING ANGLE SENSOR MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

13.General Diagnostic Table

A: INSPECTION

Symptoms		Main probable cause	Other probable cause
Poor brake performance	Long braking/ stopping distance	• VDCCM&H/U • Brake pad • Aeration to brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Master cylinder • Brake caliper • Disc rotor • Brake pipe • Brake booster
	Wheel lock	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Incorrect wiring or piping connections	• Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Brake caliper • Brake pipe
	Brake drag	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Parking brake • Axle and wheels • Brake pedal play	• Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Brake pad • Brake pipe
	Long brake pedal stroke	• Aeration to brake line • Brake pedal play	• VDCCM&H/U • Master cylinder • Brake caliper • Brake pad • Brake pipe • Brake booster
	Vehicle vertical pitching	• VDCCM&H/U • Road surface (uneven) • Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U.
Poor brake performance	Unstable or uneven braking	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Brake caliper • Brake pad • Road surface (uneven) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Master cylinder • Disc rotor • Brake pipe • Axle and wheels • Road with crowns or banks • Suspension play or fatigue (reduced damping)

General Diagnostic Table

Symptoms		Main probable cause	Other probable cause
Vibration or noise • When braking suddenly • When accelerating suddenly • While driving on a slippery road	Excessive brake pedal vibration	• Road surface (uneven) • Incorrect wiring or piping connections	• VDCCM&H/U • Brake booster • Suspension play or fatigue (reduced damping)
	Noise from VDCH/U	• VDCCM&H/U (mount bushing) • Defective ABS wheel speed sensor or sensor gap • Brake pipe	• VDCCM&H/U • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U.
	Noise from the front side of vehicle	• VDCCM&H/U (mount bushing) • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Brake pad • Disc rotor • Brake pipe • Brake booster • Suspension play or fatigue (reduced damping)	• Axle and wheels • Tire specifications, tire wear and air pressures
	Noise from the rear side of vehicle	• Defective ABS wheel speed sensor or sensor gap • Brake caliper • Brake pad • Disc rotor • Parking brake • Brake pipe • Suspension play or fatigue (reduced damping)	• Axle and wheels • Tire specifications, tire wear and air pressures
Engine does not accelerate or goes into a stall when accelerating suddenly or driving on a slippery surface.		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Parking brake • Incorrect wiring or piping	• Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Brake pad • Brake pipe

General Diagnostic Table

Symptoms		Main probable cause	Other probable cause
Poor change-direction-operation stability of TCS	Deviation to right or left direction	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Brake caliper • Brake pad • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Disc rotor • Brake pipe • Axle and wheels • Suspension play or fatigue (reduced damping)
	Vehicle spin	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Brake pad • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Brake caliper • Brake pipe
Steering wheel drag while driving		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Incorrect wiring or piping connections • Power steering system	• Brake caliper • Brake pad • Disc rotor • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Suspension play or fatigue (reduced damping) • Tire specifications, tire wear and air pressures
VDC operates while driving normally.		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation of VDCCM&H/U. • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Suspension play or fatigue (reduced damping) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Power steering system	

Symptoms	Main probable cause	Other probable cause
VDC OFF indicator light does not illuminate when the VDC OFF switch is depressed. NOTE: When pressing VDC OFF switch for 10 seconds or more, VDC OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the previous status is restored.	• Harness • Combination meter • VDC OFF switch	

BRAKE

BR

		Page
1.	General Description	2
2.	Front Brake Pad	14
3.	Front Disc Rotor	18
4.	Front Disc Brake Assembly	21
5.	Rear Brake Pad	29
6.	Rear Disc Rotor	32
7.	Rear Disc Brake Assembly	36
8.	Master Cylinder	44
9.	Brake Booster	46
10.	Brake Fluid	58
11.	Air Bleeding	59
12.	Brake Hose	62
13.	Brake Pipe	65
14.	Brake Pedal	66
15.	Stop Light Switch	71
16.	General Diagnostic Table	77

1. General Description

A: SPECIFICATION

Front disc brake	Size		15-inch type	16-inch type
	Type		Disc (Floating type, ventilated)	
	Effective disc diameter	mm (in)	228 (8.98)	244 (9.61)
	Disc thickness × Diameter	mm (in)	24 × 277 (0.94 × 10.91)	24 × 294 (0.94 × 11.57)
	Effective cylinder diameter	mm (in)	42.8 (1.685) × 2	42.8 (1.685) × 2
	Pad dimensions (Length × Width × Thickness)	mm (in)	117.8 × 50.5 × 11.0 (4.638 × 1.988 × 0.433)	117.8 × 50.5 × 11.0 *4 (4.638 × 1.988 × 0.433)
	Clearance adjustment		Automatic adjustment	
Rear disc brake	Size		15-inch type	
	Type		Disc (Floating type, solid)	
	Effective disc diameter	mm (in)	238 (9.37)	
	Disc thickness × Diameter	mm (in)	10 × 274 (0.39 × 10.79)	
	Effective cylinder diameter	mm (in)	38.1 (1.500)	
	Pad dimensions (Length × Width × Thickness)	mm (in)	92.0 × 33.0 × 9.0 (3.622 × 1.299 × 0.354)	
	Clearance adjustment		Automatic adjustment	
Master cylinder	Type		Tandem	
	Effective diameter	mm (in)	23.8 (15/16)	
	Reservoir type		Sealed type	
	Brake fluid reservoir capacity	cm^3 (cu in)	240 (12.51)	
Brake booster	Type		Vacuum suspended	
	Effective diameter	mm (in)	208 + 229 (8.19 + 9.02)	
Brake line			Dual circuit system	
Brake fluid			FMVSS No. 116, DOT3, or DOT4 **CAUTION:** **• Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.** **• When filling with brake fluid, be careful not to allow any dust to enter the reservoir.** **• Use new SUBARU genuine brake fluid when replacing or refilling the fluid.**	

NOTE:
Refer to “PARKING BRAKE” for parking brake specifications. <Ref. to PB-2, SPECIFICATION, General Description.>

Item			Standard	Limit
Front brake	Pad thickness	All models mm (in)	11 (0.43)	1.5 (0.059)
	Disc thickness	All models mm (in)	24 (0.94)	22 (0.87)
	Disc runout	mm (in)	—	0.05 (0.0020)
Rear brake (disc type)	Pad thickness mm (in)	Solid disc	9.0 (0.354)	1.5 (0.059)
	Disc thickness mm (in)	Solid disc	10 (0.39)	8.5 (0.335)
	Disc runout	mm (in)	—	0.05 (0.0020)
Parking brake	Inside diameter	mm (in)	170 (6.69)	171 (6.73)
	Lining thickness	mm (in)	3.5 (0.14)	1.5 (0.059)

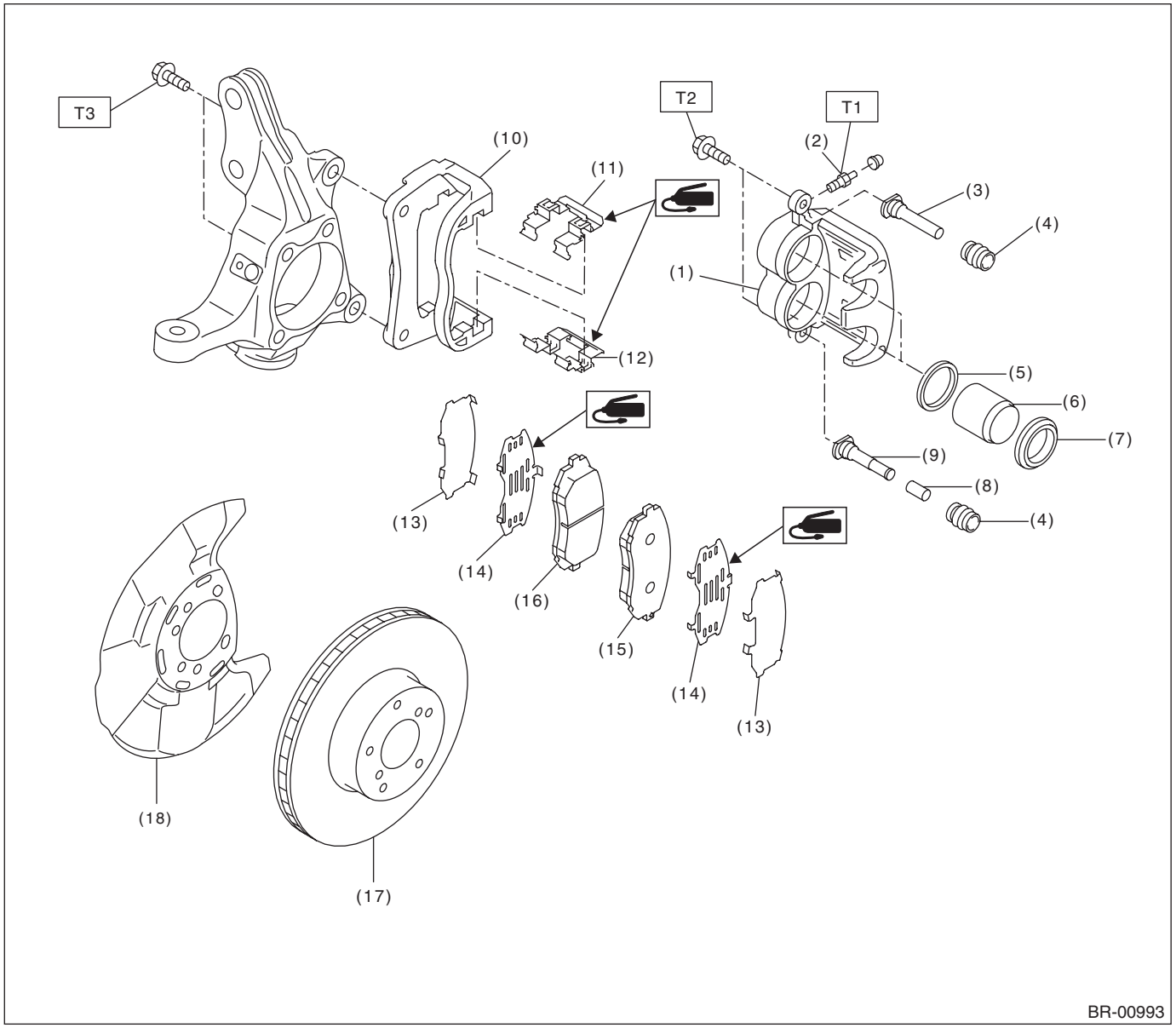
		Brake pedal force N (kgf, lbf)	Fluid pressure kPa (kgf/cm^2, psi)
Brake booster	Brake fluid pressure with engine stopped	147 (15, 33)	553 (5, 77)
		294 (30, 66)	1,551 (16, 225)
	Brake fluid pressure with engine running and vacuum pressure at 66.7 kPa (500 mmHg, 19.69 inHg)	147 (15, 33)	6,177 (63, 896)
		294 (30, 66)	11,273 (115, 1,635)

Brake pedal	Free play mm (in)	0.5 — 2 (0.020 — 0.079) [When pulling the brake pedal upward with a force of less than 10 N (1 kgf, 2 lbf)]

B: COMPONENT

1. FRONT DISC BRAKE

- 15-inch type



(1)	Caliper body	(9)	Lock pin - front brake (silver)	(17)	Disc rotor
(2)	Bleeder - screw	(10)	Support - front disc brake	(18)	Back plate - front brake
(3)	Guide pin - front brake (black)	(11)	Pad clip - upper		
(4)	Pin boot	(12)	Pad clip - lower		
(5)	Piston seal	(13)	Shim - disc brake front outer		
(6)	Piston - disc brake	(14)	Shim - disc brake front inner		
(7)	Piston boot	(15)	Pad - disc brake front outer		
(8)	Lock pin - sleeve	(16)	Pad - disc brake front inner		

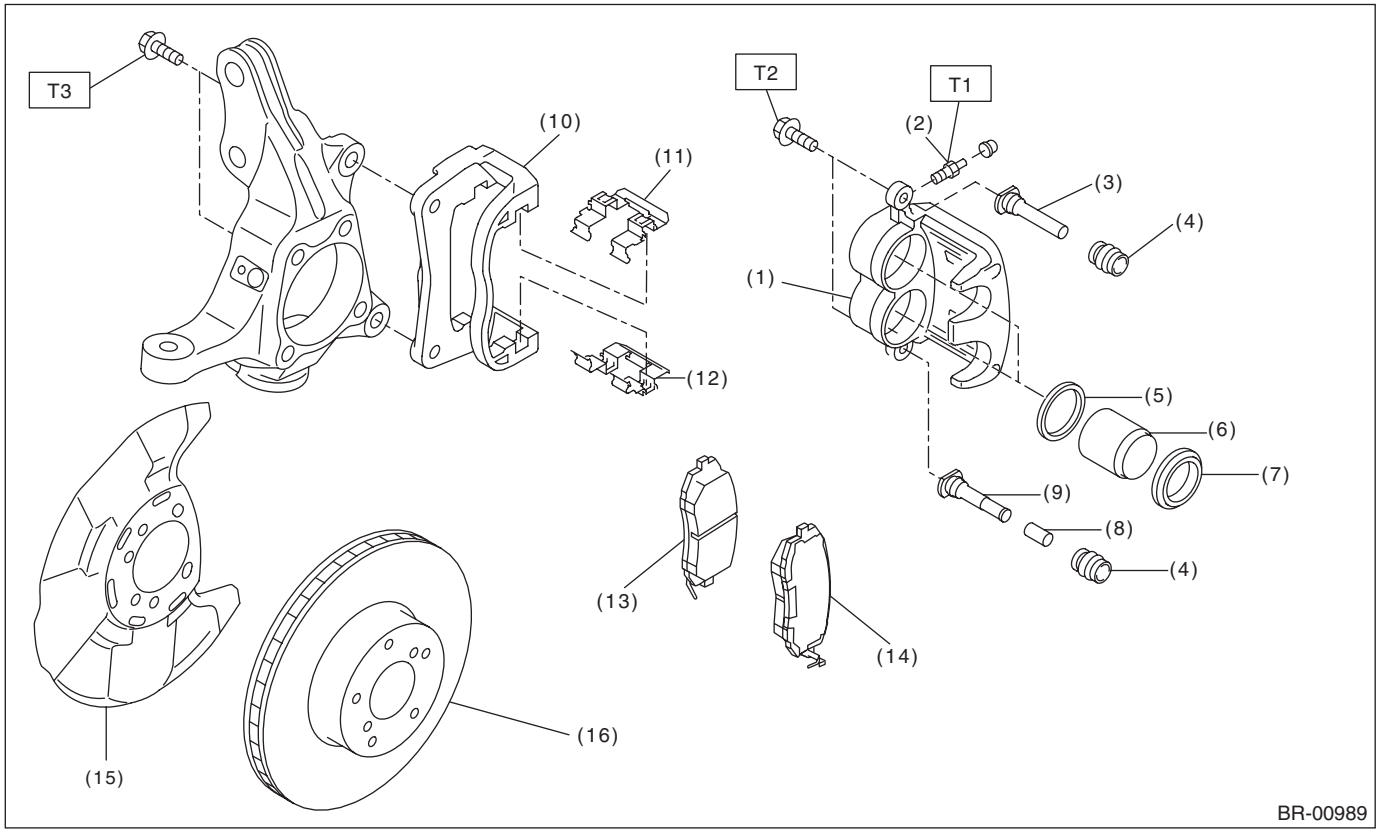
Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.82, 5.9)

T2: 27 (2.75, 19.9)

T3: 80 (8.16, 59)

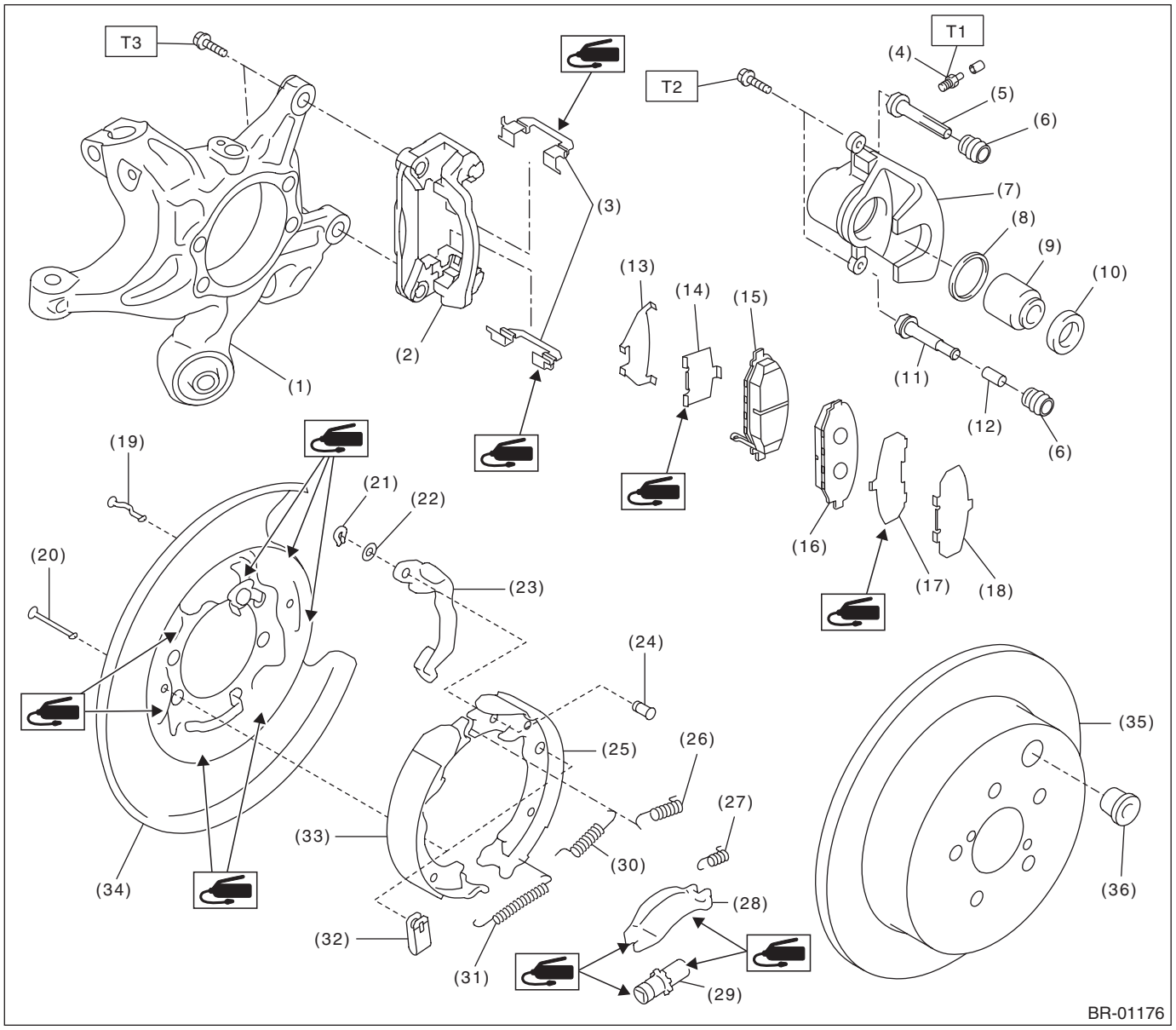
- 16-inch type



(1) Caliper body
(2) Bleeder - screw
(3) Guide pin - front brake (black)
(4) Pin boot
(5) Piston seal
(6) Piston - disc brake
(7) Piston boot
(8) Lock pin - sleeve
(9) Lock pin - front brake (silver)
(10) Support - front disc brake
(11) Pad clip - upper
(12) Pad clip - lower
(13) Pad - disc brake front inner
(14) Pad - disc brake front outer
(15) Back plate - front brake
(16) Disc rotor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.82, 5.9)
T2: 27 (2.75, 19.9)
T3: 80 (8.16, 59.0)

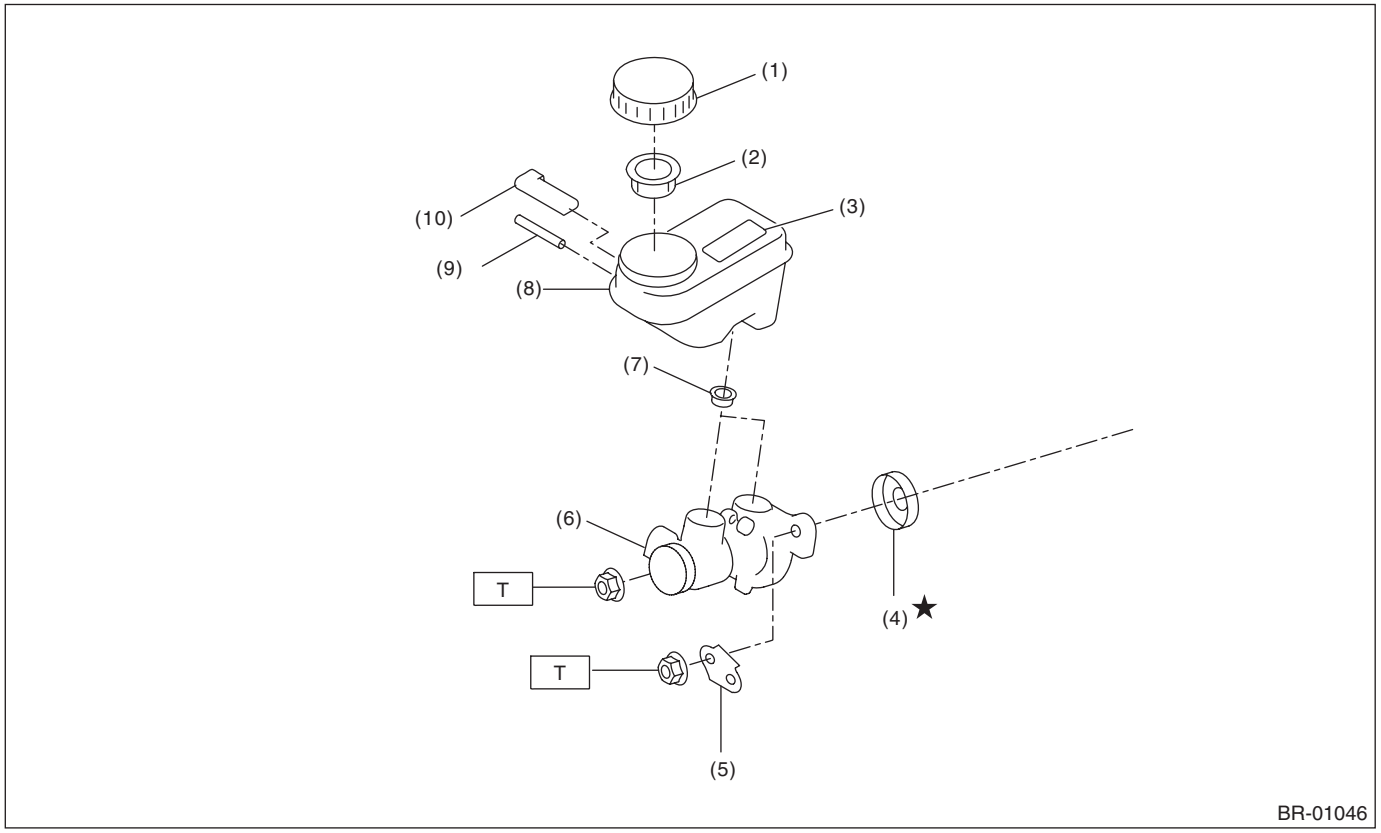
2. REAR DISC BRAKE



(1) Housing ASSY - rear axle
(2) Support - rear disc brake
(3) Pad clip - rear brake
(4) Bleeder - screw
(5) Guide pin - rear brake (black)
(6) Pin boot
(7) Caliper body
(8) Piston seal
(9) Piston - disc brake
(10) Piston boot
(11) Lock pin - rear brake (silver)
(12) Lock pin - sleeve
(13) Shim - disc brake rear outer
(14) Shim - disc brake rear inner
(15) Pad - disc brake rear inner
(16) Pad - disc brake rear outer
(17) Shim - disc brake rear inner
(18) Shim - disc brake rear outer
(19) Pin - secondary shoe hold-down
(20) Pin - primary shoe hold-down
(21) Retainer - rear brake
(22) Spring washer - rear brake
(23) Parking lever - rear
(24) Pin - parking lever
(25) Parking brake shoe (secondary)
(26) Spring - secondary shoe return
(27) Spring - strut
(28) Strut - brake
(29) Adjuster ASSY - rear brake
(30) Spring - primary shoe return
(31) Spring - adjuster
(32) Cup - shoe hold-down
(33) Parking brake shoe (primary)
(34) Back plate - rear brake
(35) Disc rotor (solid type)
(36) Adjusting hole cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.82, 5.9)
T2: 27 (2.75, 19.9)
T3: 66 (6.73, 48.7)

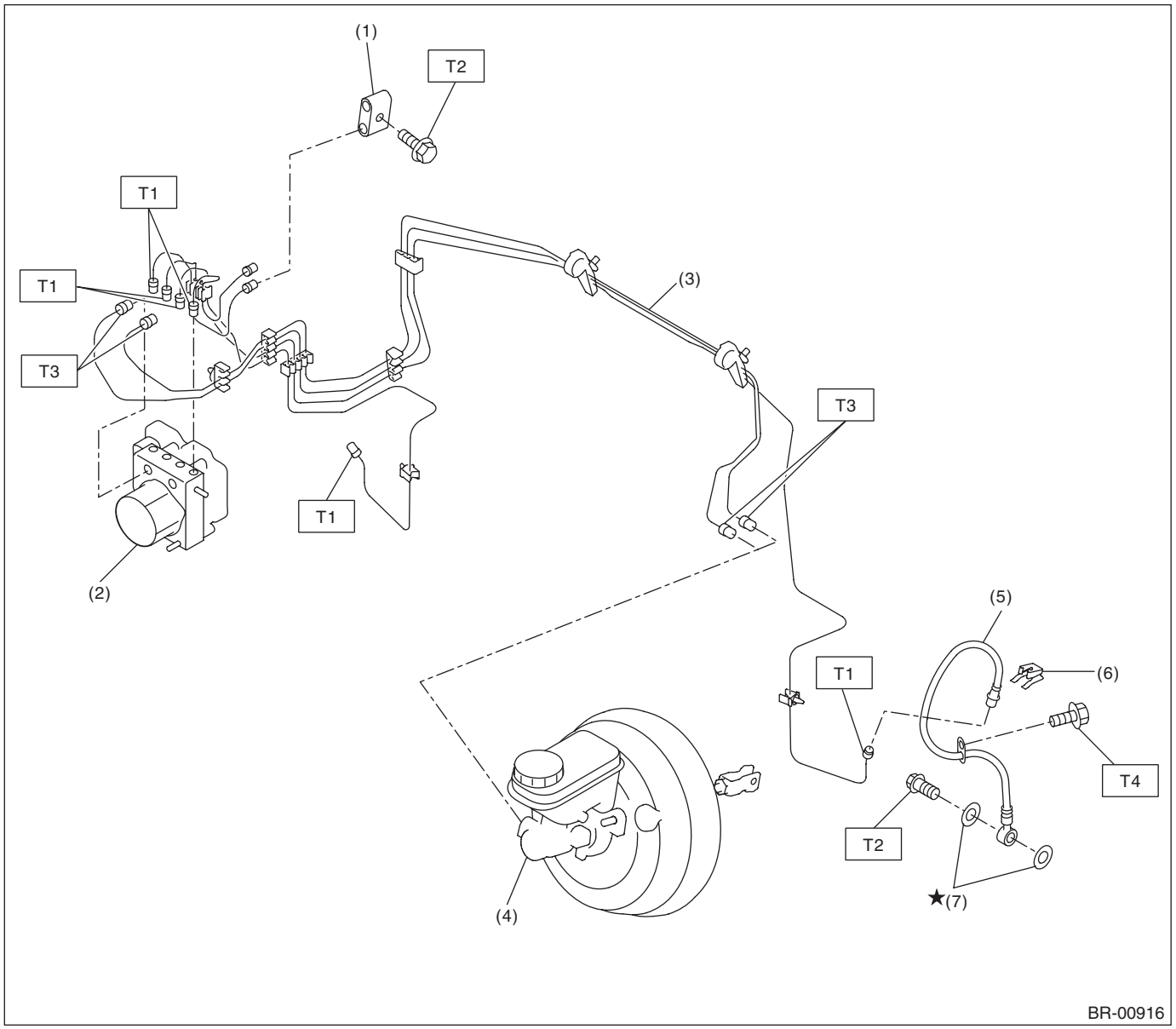
3. MASTER CYLINDER



(1)	Cap - reservoir tank	(6)	Cylinder body ASSY
(2)	Filter - master cylinder	(7)	Seal
(3)	Caution label (model with caution label)	(8)	Reservoir tank
(4)	Seal sub ASSY	(9)	Pin
(5)	Bracket - master cylinder	(10)	Level - indicator

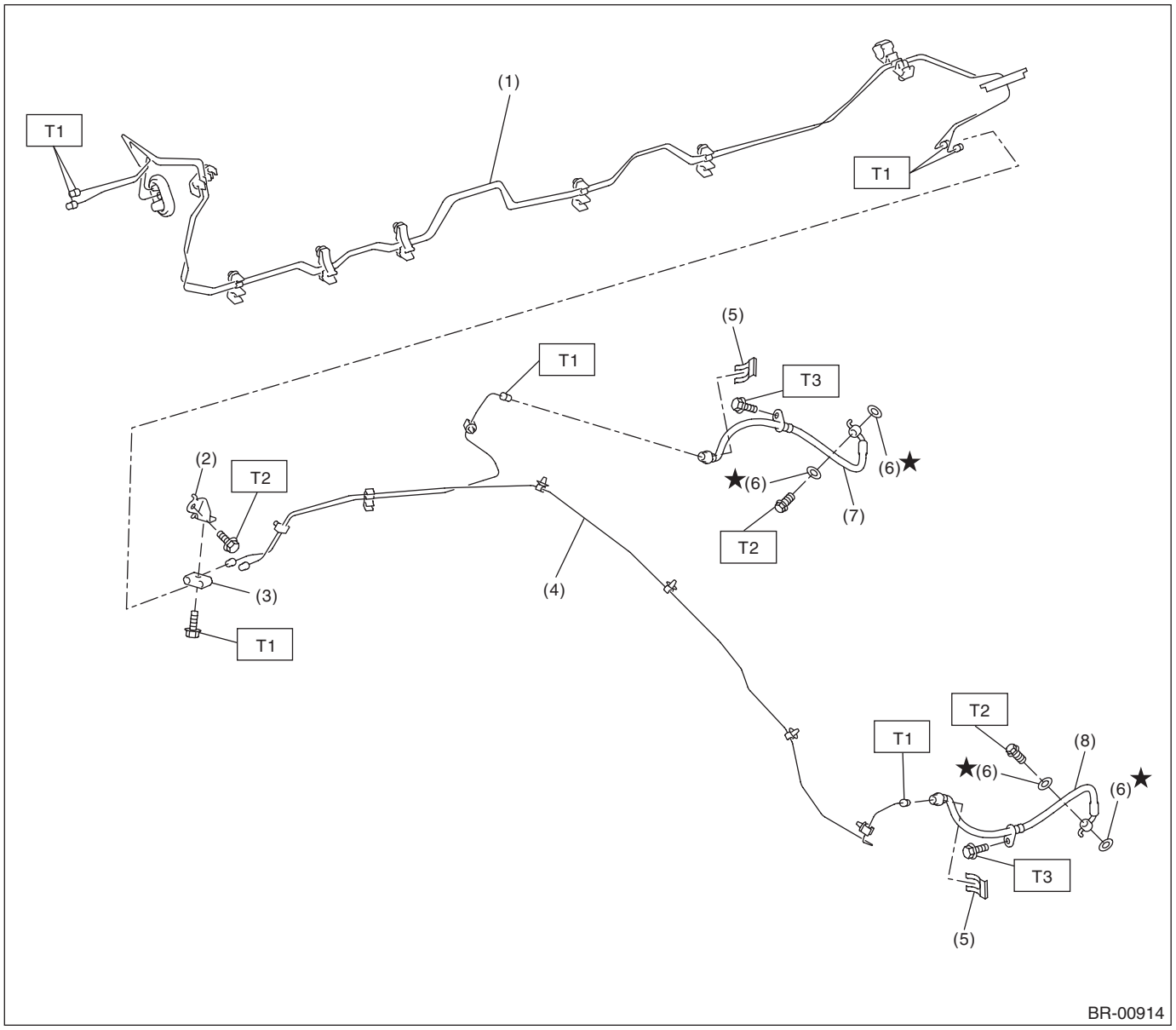
Tightening torque: N·m (kgf-m, ft-lb)
T: 13 (1.33, 9.6)

4. FRONT BRAKE PIPES AND HOSES



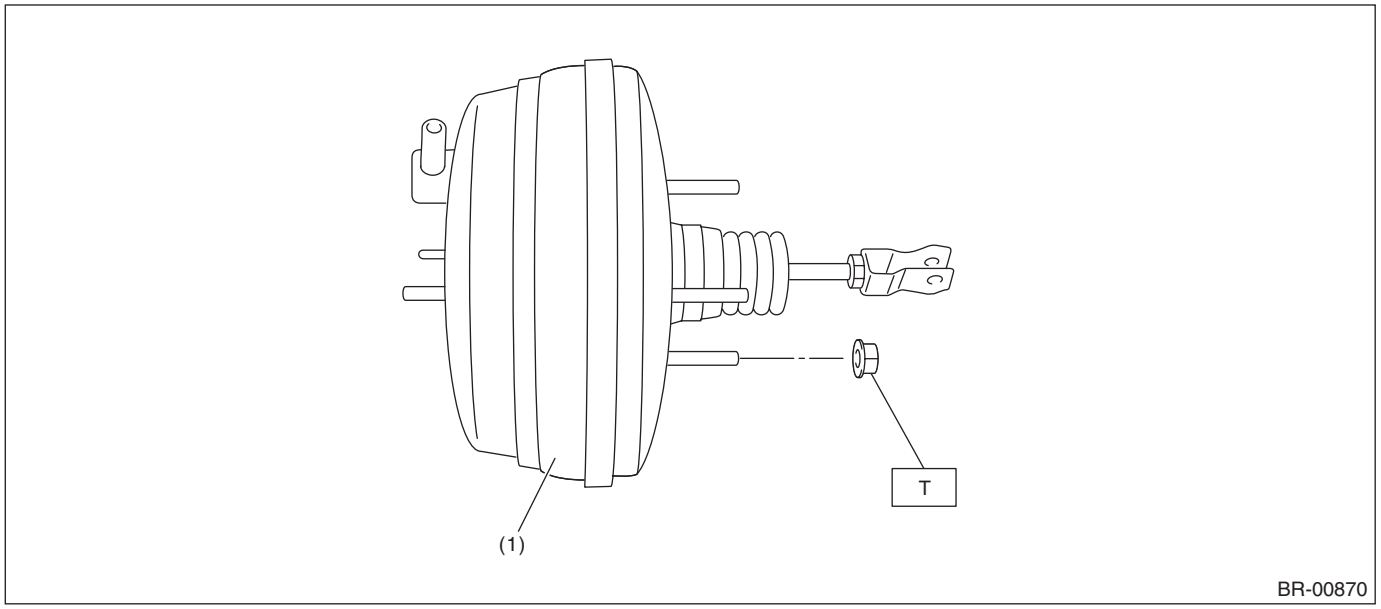
(1)	Connector - two-way	(5)	Front brake hose RH/LH	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	VDC control module and hydraulic control unit (VDCCM&H/U)	(6)	Clamp	***T1: 15 (1.53, 11.1)***
(3)	Front brake pipe ASSY	(7)	Gasket	***T2: 18 (1.84, 13.3)***
(4)	Master cylinder ASSY			***T3: 19 (1.94, 14.0)***
				T4: 33 (3.36, 24.3)

5. CENTER AND REAR BRAKE PIPES AND HOSES



(1)	Center brake pipe ASSY	(5)	Clamp	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Bracket	(6)	Gasket	***T1: 15 (1.53, 11.1)***
(3)	Connector	(7)	Rear brake hose RH	***T2: 18 (1.84, 13.3)***
(4)	Rear brake pipe ASSY	(8)	Rear brake hose LH	***T3: 33 (3.36, 24.3)***

6. BRAKE BOOSTER

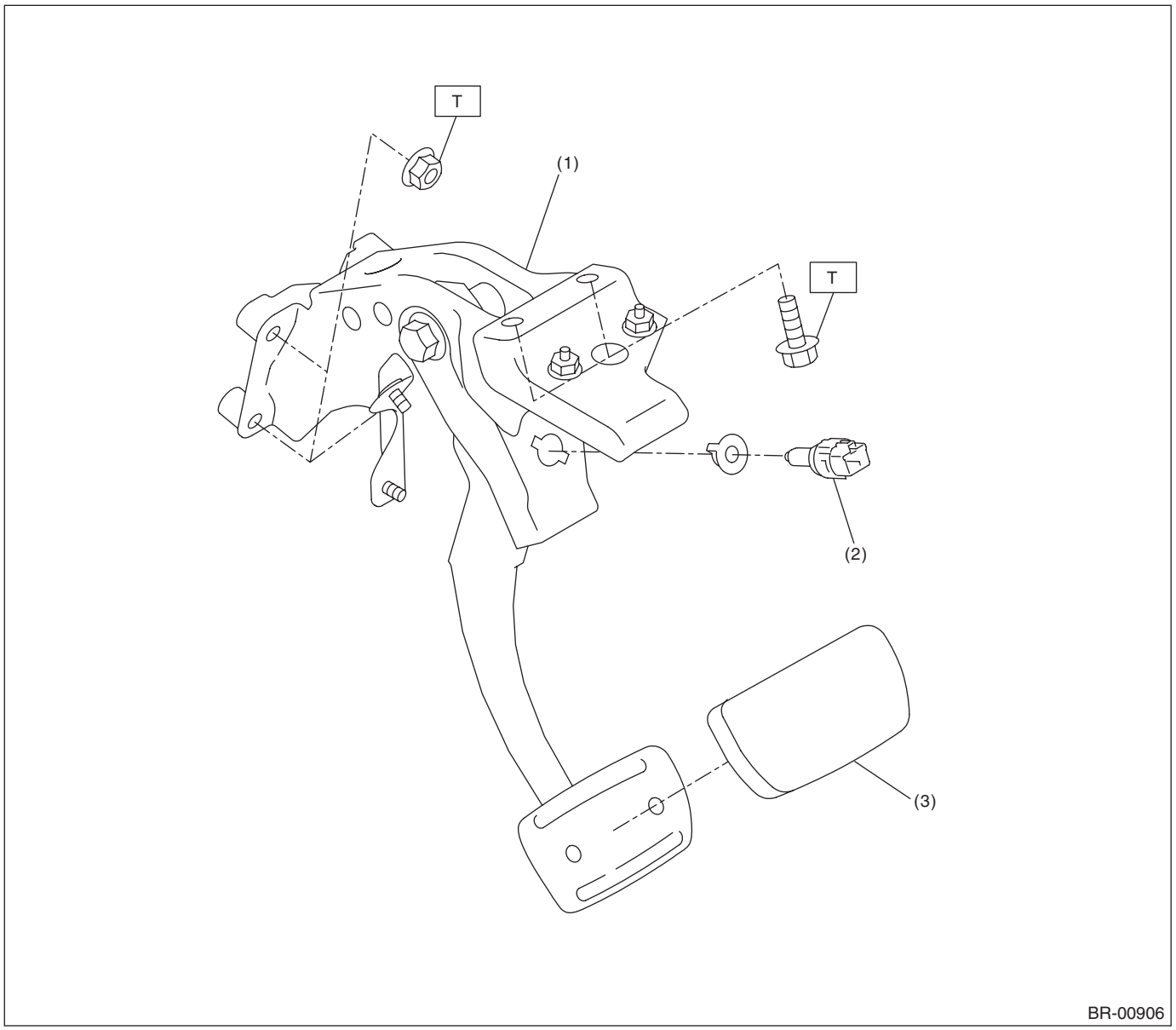


(1) Vacuum booster ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T: 18 (1.84, 13.3)

7. BRAKE PEDAL

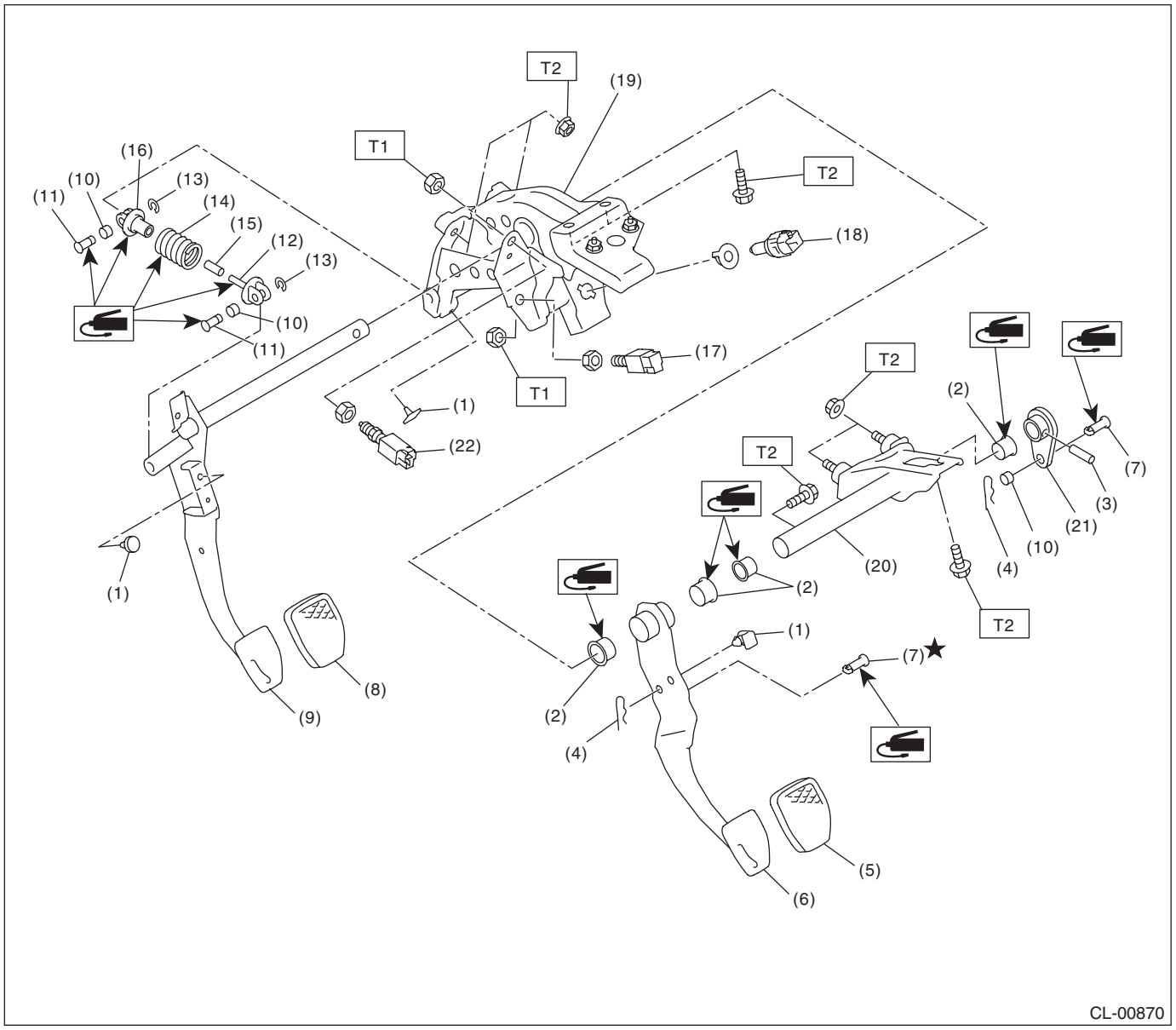
- AT model



(1) Brake pedal ASSY
(2) Switch - stop light
(3) Pad - brake pedal

Tightening torque: N·m (kgf-m, ft-lb)
T: 18 (1.84, 13.3)

- MT model



(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Pad - brake pedal
(6) Brake pedal
(7) Clevis pin
(8) Pad - clutch pedal
(9) Clutch pedal
(10) Bushing C
(11) Clutch clevis pin
(12) Assist rod A
(13) Clip
(14) Assist spring
(15) Assist bushing
(16) Assist rod B
(17) Clutch switch
(18) Switch - stop light
(19) Pedal bracket
(20) Clutch master cylinder bracket
(21) Lever
(22) Clutch start switch

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.82, 5.9)
T2: 18 (1.84, 13.3)

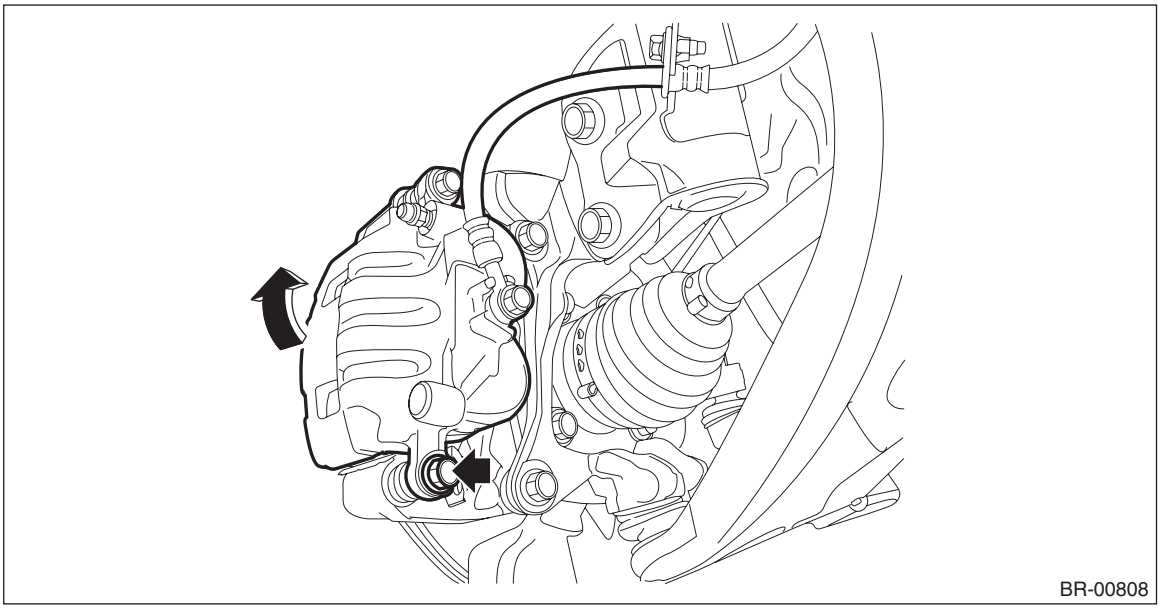
C: CAUTION

- Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.

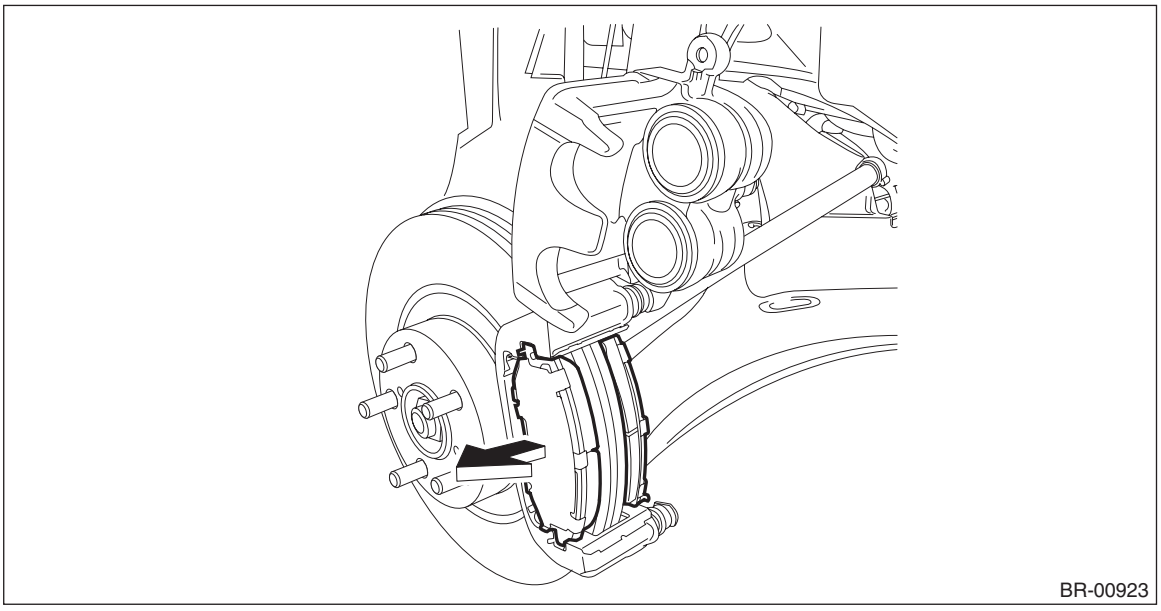
2. Front Brake Pad

A: REMOVAL

1) Lift up the vehicle, and then remove the front wheels.
2) Remove the front brake pad.
    (1) Remove the caliper bolt on the lower side.
    (2) Raise the caliper body assembly and support it.



NOTE:
Do not disconnect the brake hose from the caliper body assembly.
    (3) Remove the brake pad from support - front disc brake.

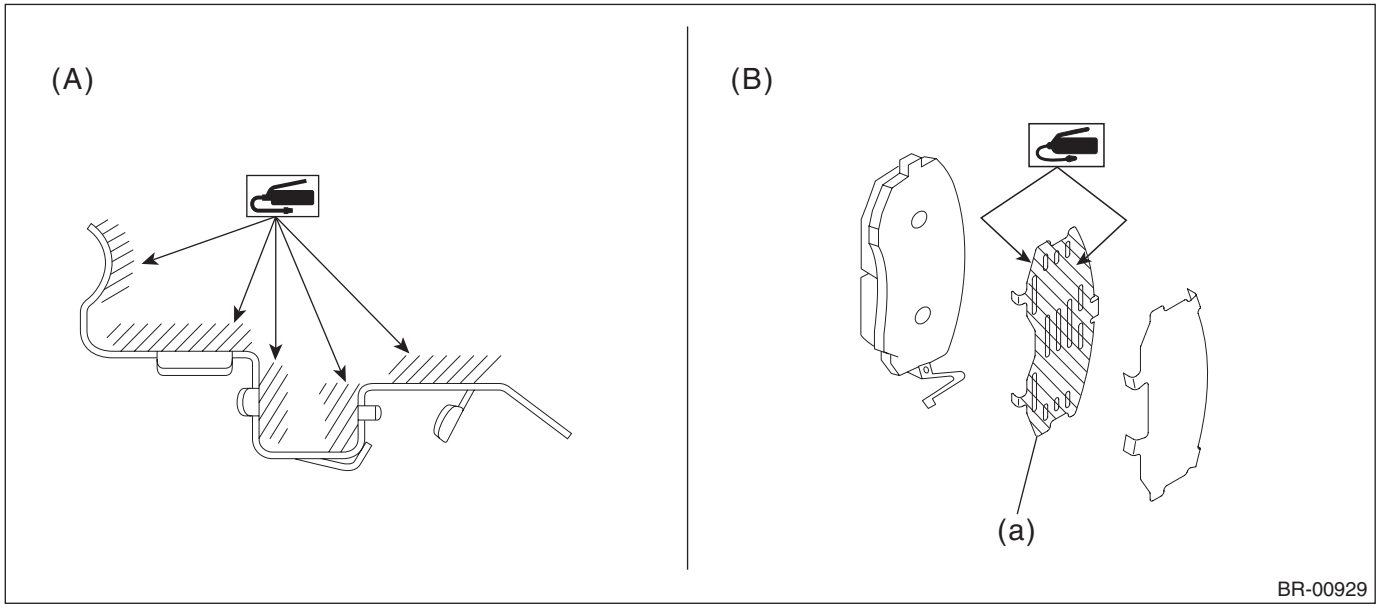


B: INSTALLATION

NOTE:
Before installation, remove mud and foreign matter from the caliper body assembly and support - front disc brake.
1) Check the brake pad. <Ref. to BR-17, INSPECTION, Front Brake Pad.>
2) Apply a thin coat of grease to the pad clip. (A)

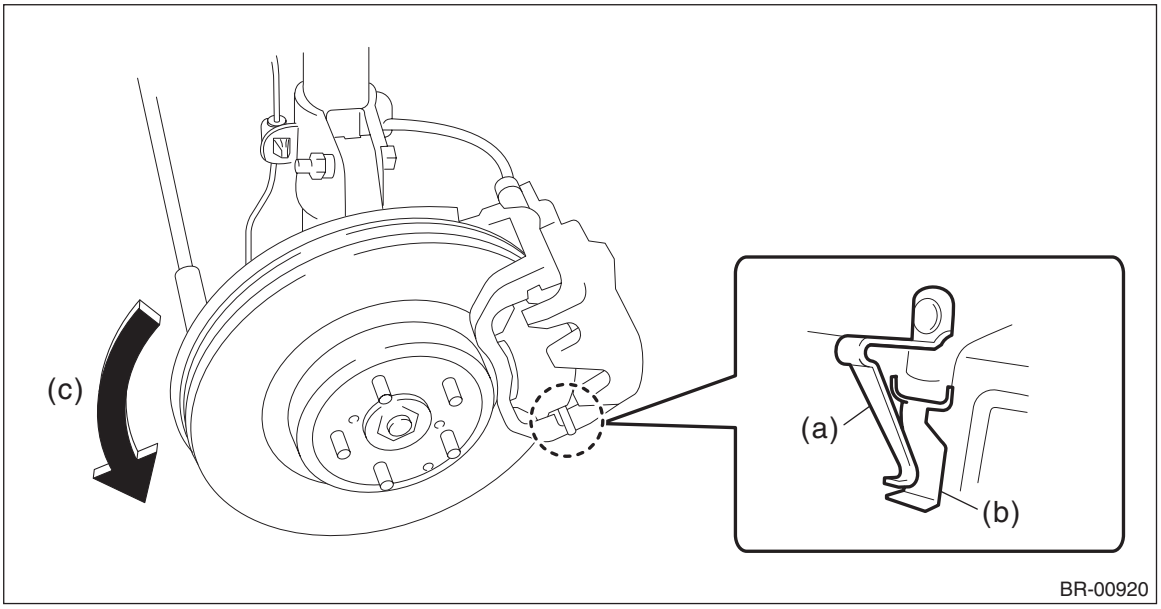
Grease:
Molykote M7439 (Part No. 003602001) or an item contained in the pad kit
3) Apply a thin coat of grease to the pad and both sides of the shim - disc brake front inner (a). (B)

Grease:
Molykote AS880N (Part No. K0777YA010) or an item contained in the pad kit



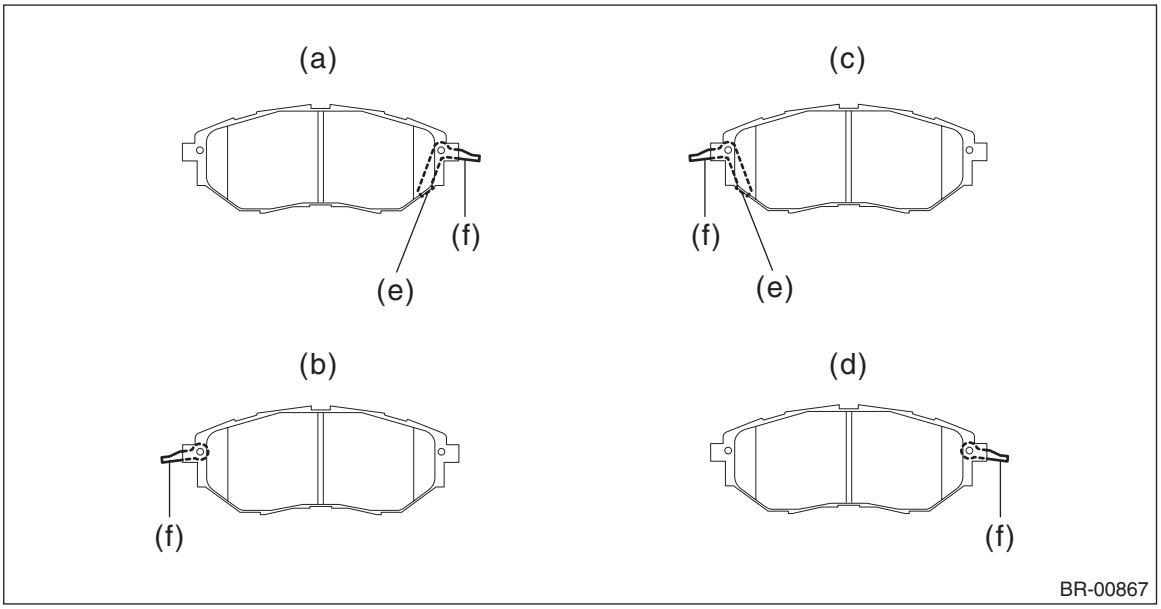
4) Install the brake pad to the support - front disc brake.

CAUTION:
• Be sure to install so that the pad return spring faces the input side of the direction of brake rotor rotation, as shown in the figure.
• Correctly install the pad return spring to the supporting surface of the pad clip as shown in the figure.
• If the pad return spring is deformed or damaged, replace the brake pad with a new part.



(a) Pad return spring
(b) Supporting surface of pad clip
(c) Direction of brake rotor rotation

NOTE:
Install the brake pad indicator in proper direction.



(a) LH — IN
(b) LH — OUT
(c) RH — IN
(d) RH — OUT
(e) Pad indicator
(f) Pad return spring

5) Install the caliper body assembly to the support - front disc brake.

Tightening torque:
Caliper bolt: 27 N·m (2.75 kgf-m, 19.9 ft-lb)

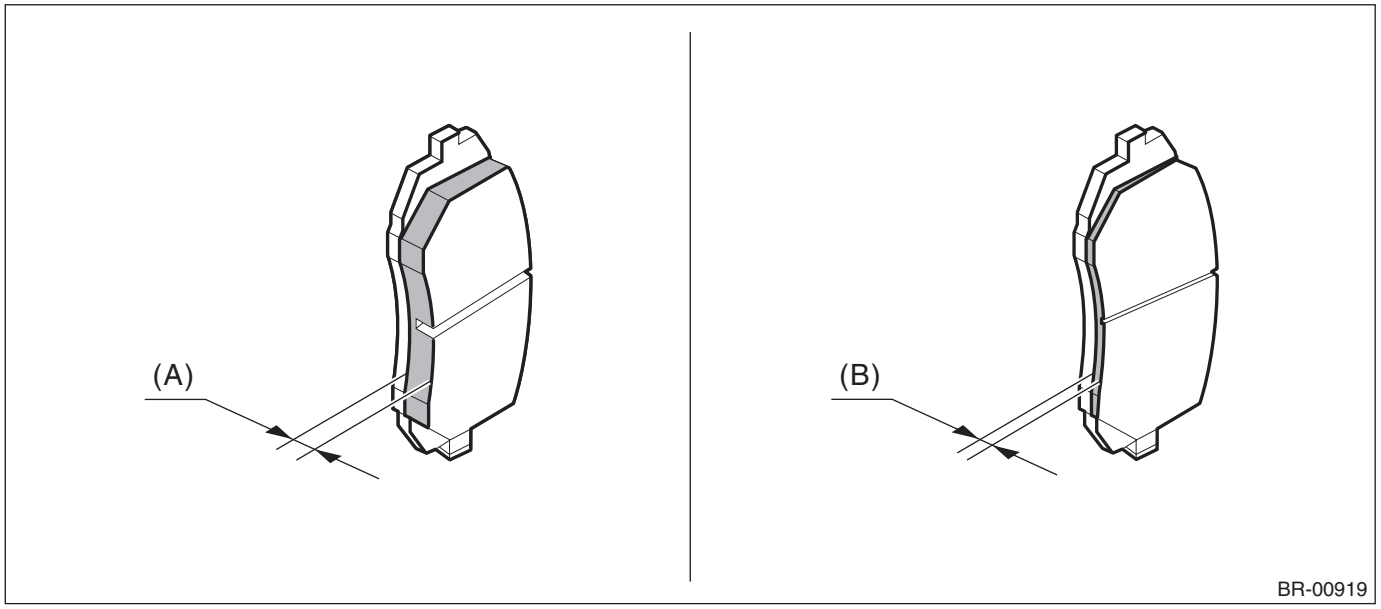
6) Install the front wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

1) Check the pad thickness (A).

NOTE:
- Always replace the pads of both wheels and both sides as a set.
- Replace pad clips if they are twisted or worn.
- Replace the pad if there is oil or grease on it.



	Standard (A)	Wear limit (B)
Pad thickness	11 mm (0.43 in)	1.5 mm (0.059 in)

NOTE:
- Always replace the pads of both wheels and both sides as a set.
- Replace pad clips if they are twisted or worn.
- Wear indicators are installed on the inner and outer disc brake pads.

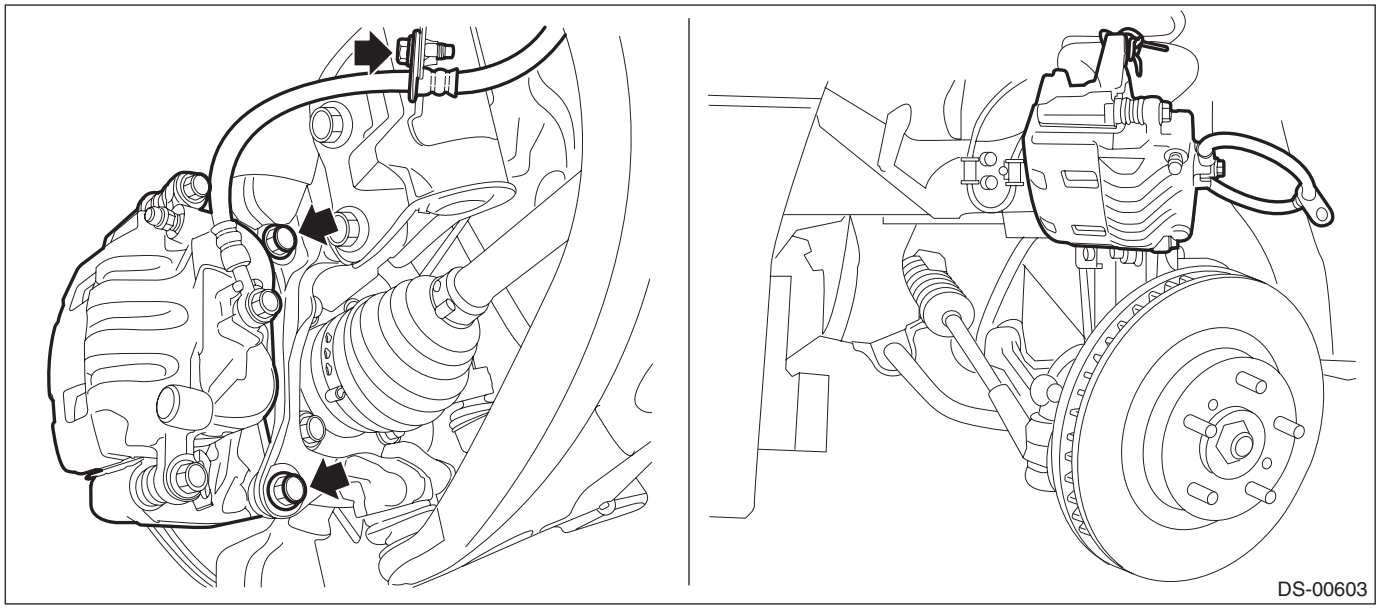
If the pad is worn to the limit, the end of wear indicator contacts disc rotor, and a squeaking sound is heard as the wheel rotates. If the sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

2) If the wear limit is exceeded in the inspection, replace the brake pad.

3. Front Disc Rotor

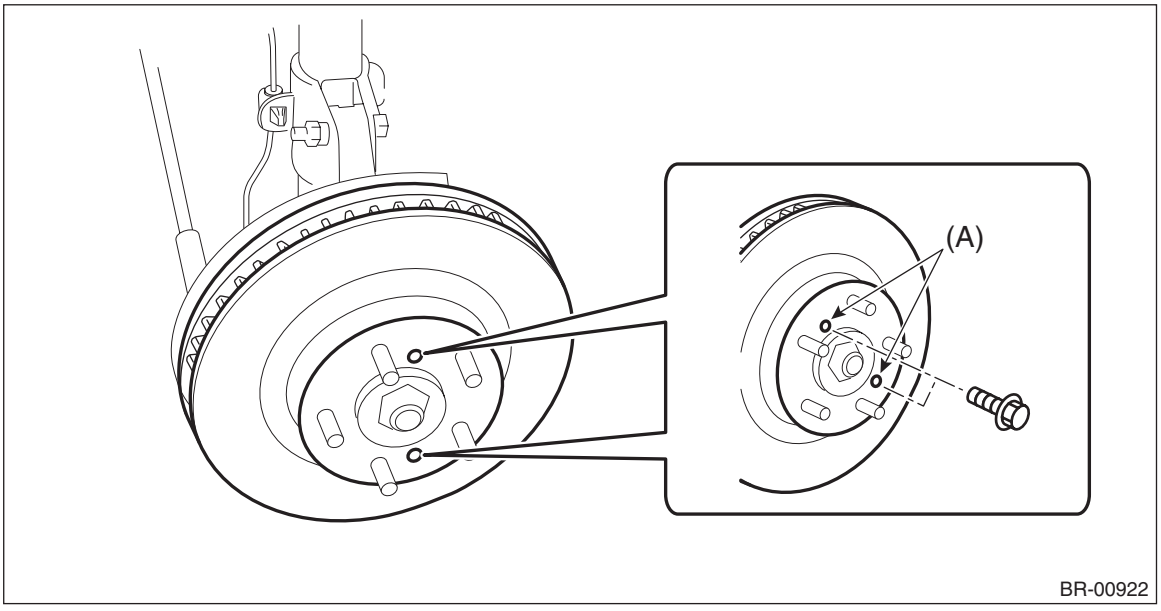
A: REMOVAL

1) Lift up the vehicle, and then remove the front wheels.
2) Remove the caliper body assembly from the housing assembly - front axle.
   (1) Remove the bolt from the brake hose bracket.
   (2) Remove the mounting bolt, and remove the caliper body assembly.
   (3) Prepare wiring harnesses etc. to be discarded, and suspend the caliper body assembly from the strut assembly.



3) Remove the front disc rotor.

NOTE:
When the disc rotor is difficult to be removed from the hub unit COMPL - front axle, screw in 8 mm (0.31 in) bolt to the threaded part of the disc rotor (A), and remove the disc rotor.



B: INSTALLATION

NOTE:
Before installation, remove mud and foreign matter from the caliper body assembly.
1) Before installation, check the front disc rotor. <Ref. to BR-19, INSPECTION, Front Disc Rotor.>
2) Install each part in the reverse order of removal.

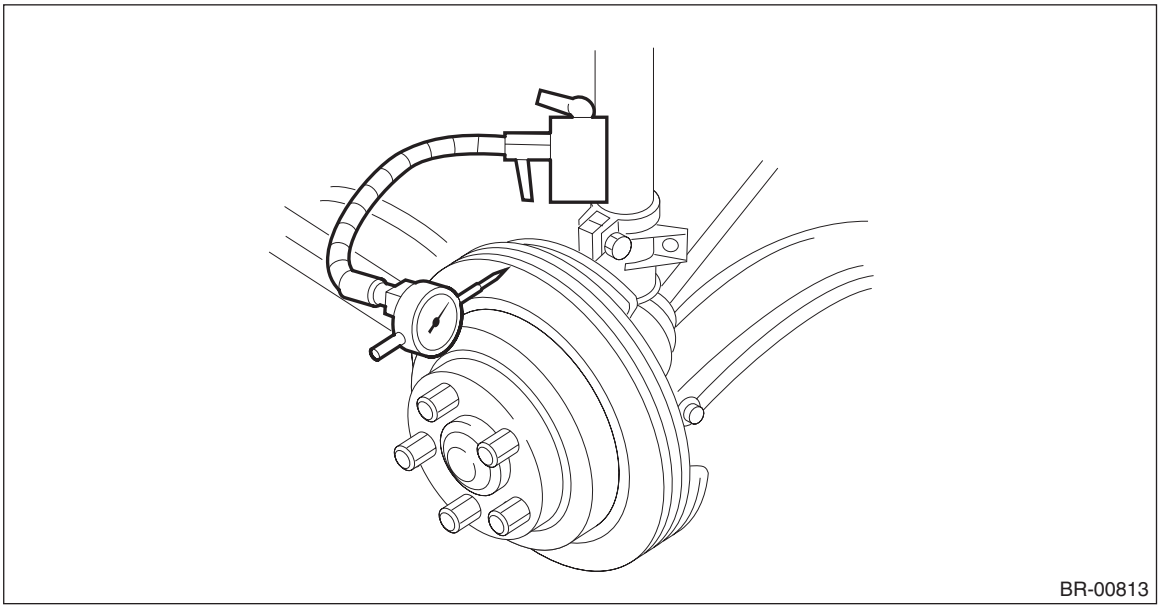
Tightening torque:
Brake hose bracket: 33 N·m (3.36 kgf-m, 24.3 ft-lb)
Mounting bolt: 80 N·m (8.16 kgf-m, 59.0 ft-lb)
Front wheel: 120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

1. DISC ROTOR RUNOUT CHECK

1) Check the hub unit COMPL - front axle for free play and runout before the inspection of disc rotor runout limit. <Ref. to DS-34, INSPECTION, Front Hub Unit Bearing.>
2) Tighten the wheel nuts to secure disc rotor.
3) Set a dial gauge 10 mm (0.39 in) inward from the disc rotor outer circumference, and check the disc rotor runout while rotating the disc rotor.

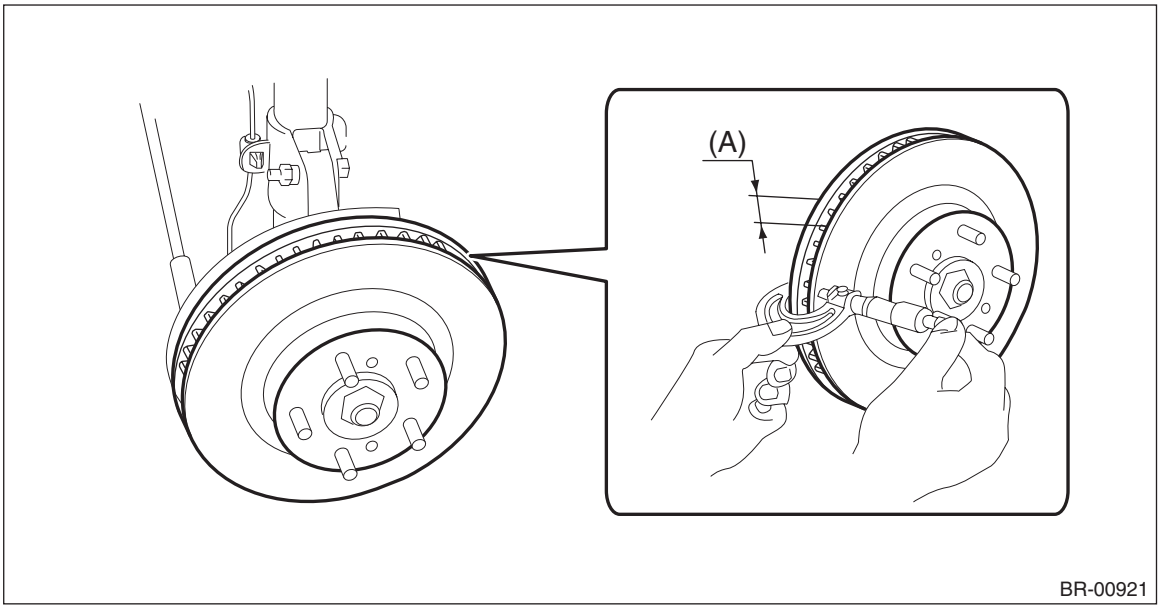
Disc rotor runout limit: 0.05 mm (0.0020 in)


BR-00813

4) If the runout limit is exceeded in the inspection, replace the disc rotor.

2. DISC ROTOR THICKNESS CHECK

1) Set a micrometer 10 mm (0.39 in) inward from the disc rotor outer perimeter, and then measure the disc rotor thickness (A).



	Size	Standard	Wear limit	Disc rotor outer diameter
Disc rotor thickness (A)	15-inch	24 mm (0.94 in)	22 mm (0.87 in)	277 mm (10.91 in)
	16-inch			294 mm (11.57 in)

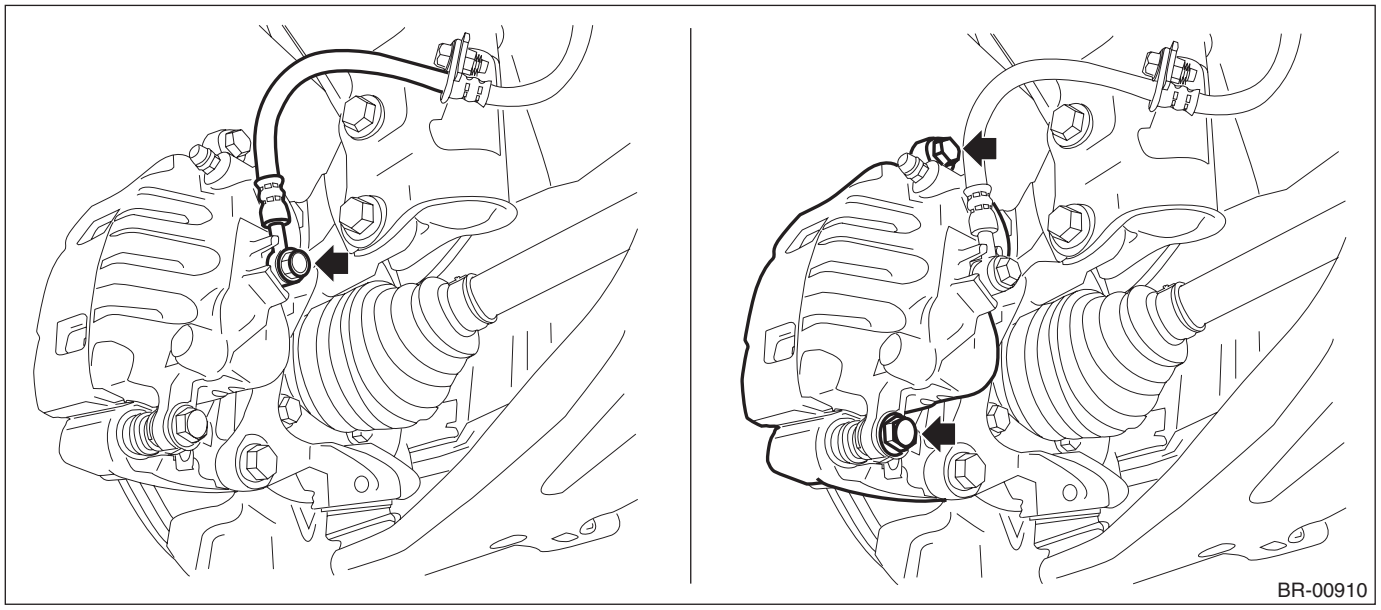
2) If the wear limit is exceeded in the inspection, replace the disc rotor.

4. Front Disc Brake Assembly

A: REMOVAL

CAUTION:
Do not allow brake fluid to come in contact with the painted surface of the vehicle body. If it does, wash off with water and wipe away completely.

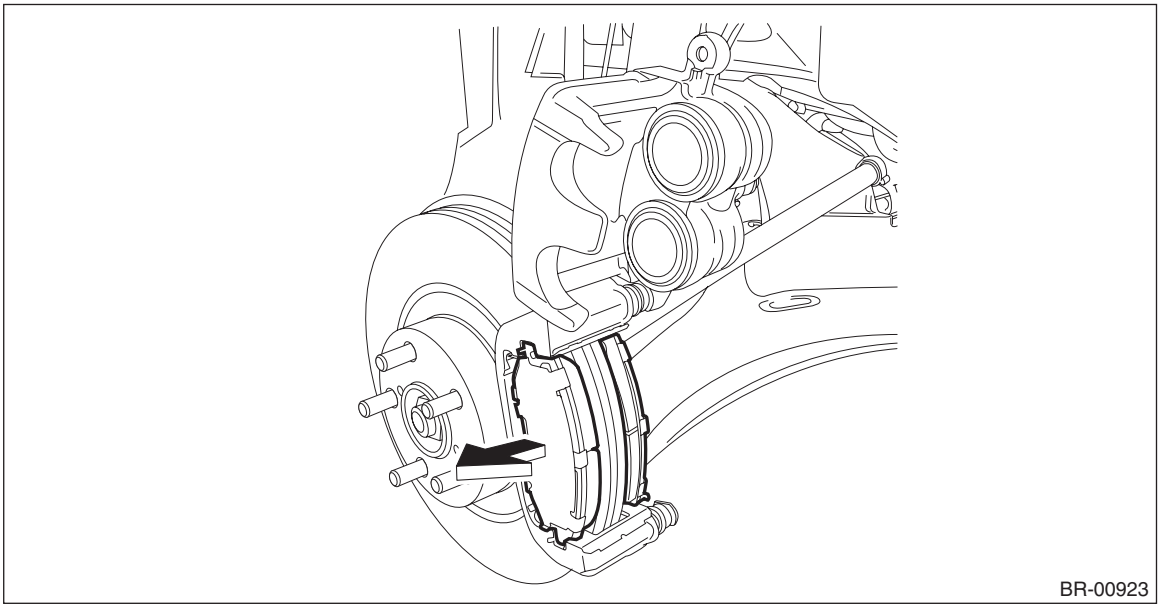
1) Lift up the vehicle, and then remove the front wheels.
2) Remove the caliper body assembly.
   (1) Remove the union bolt and caliper bolt, and remove the caliper body assembly from the support - front disc brake.



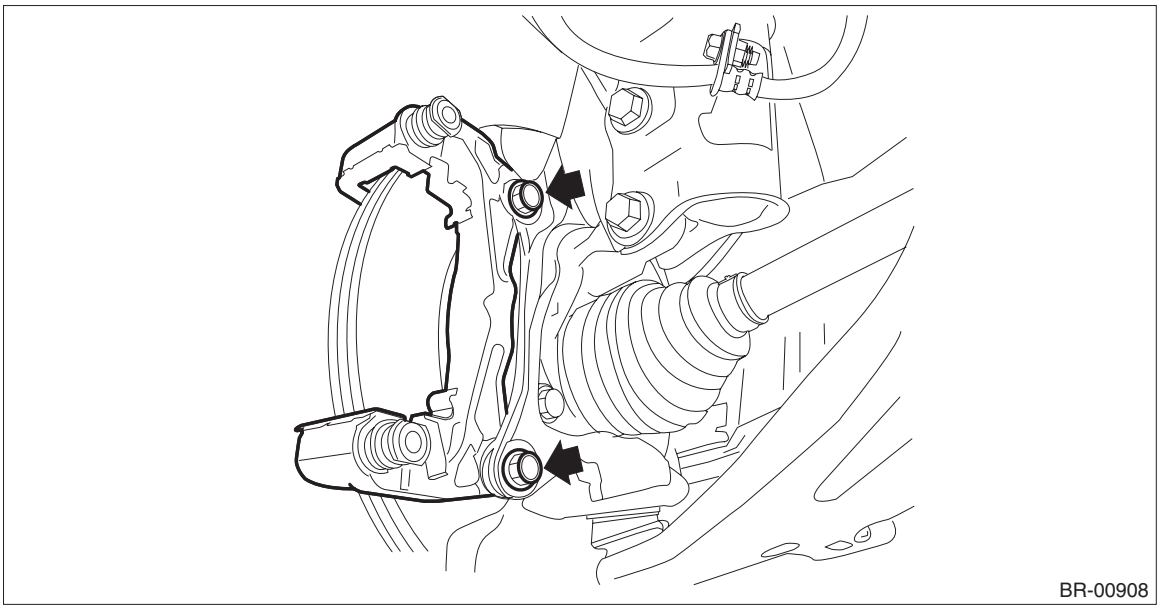
3) Remove the support - front disc brake.

NOTE:
Remove the support - front disc brake only when replacing the disc rotor or the support - front disc brake. It is not necessary to remove it when servicing the caliper body assembly.

   (1) Remove the brake pad from support - front disc brake.



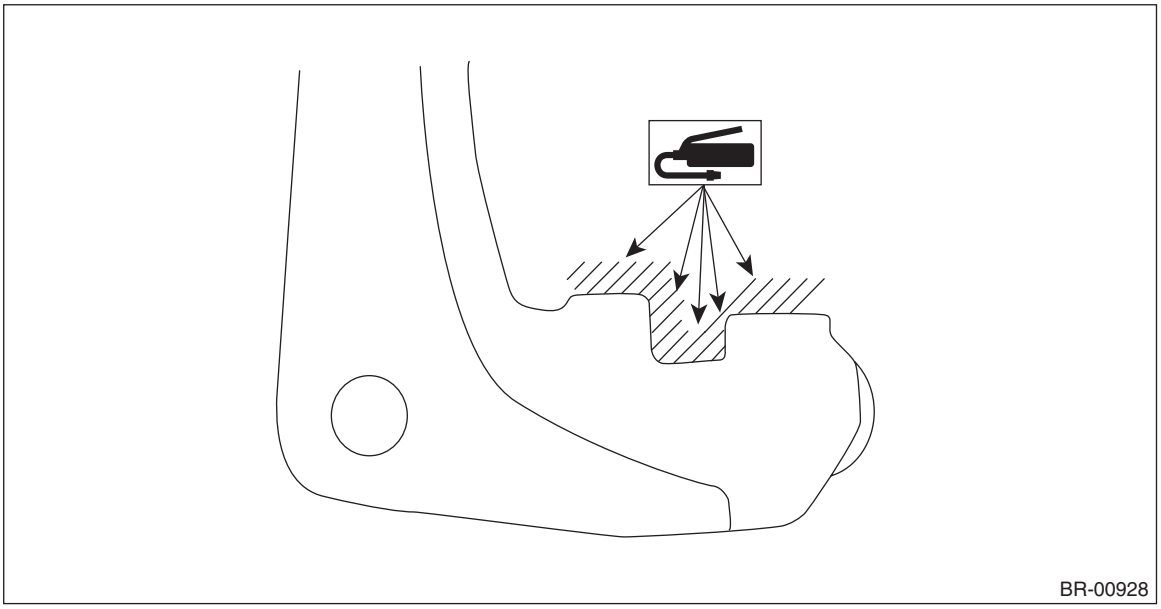
(2) Remove the mounting bolts, and then remove the support - front disc brake from the housing assembly - front axle.



B: INSTALLATION

NOTE:
Before installation, remove mud and foreign matter from the caliper body assembly and support - front disc brake.
1) Check each part. <Ref. to BR-28, INSPECTION, Front Disc Brake Assembly.>
2) Apply a thin coat of grease to the support - front disc brake.

Grease:
Molykote M7439 (Part No. 003602001)



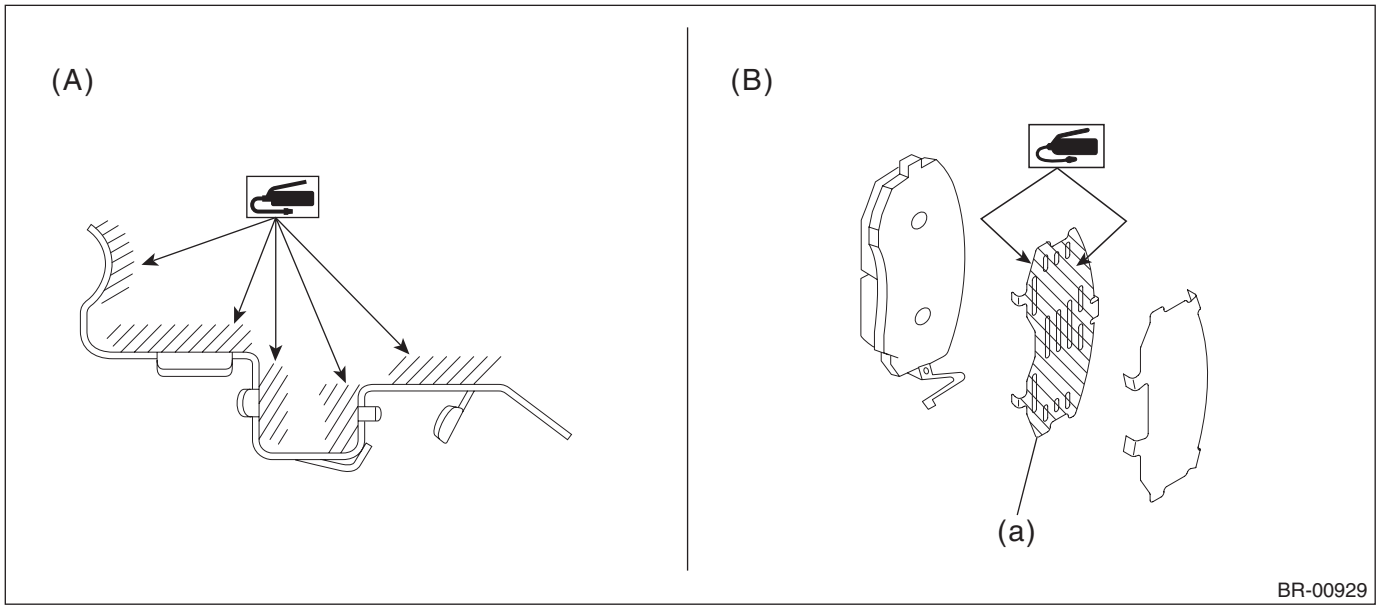
3) Install the support - front disc brake to the housing assembly - front axle.

Tightening torque:
Mounting bolt: 80 N·m (8.16 kgf-m, 59.0 ft-lb)
4) Apply a thin coat of grease to the pad clip. (A)

Grease:
Molykote M7439 (Part No. 003602001) or an item contained in the pad kit

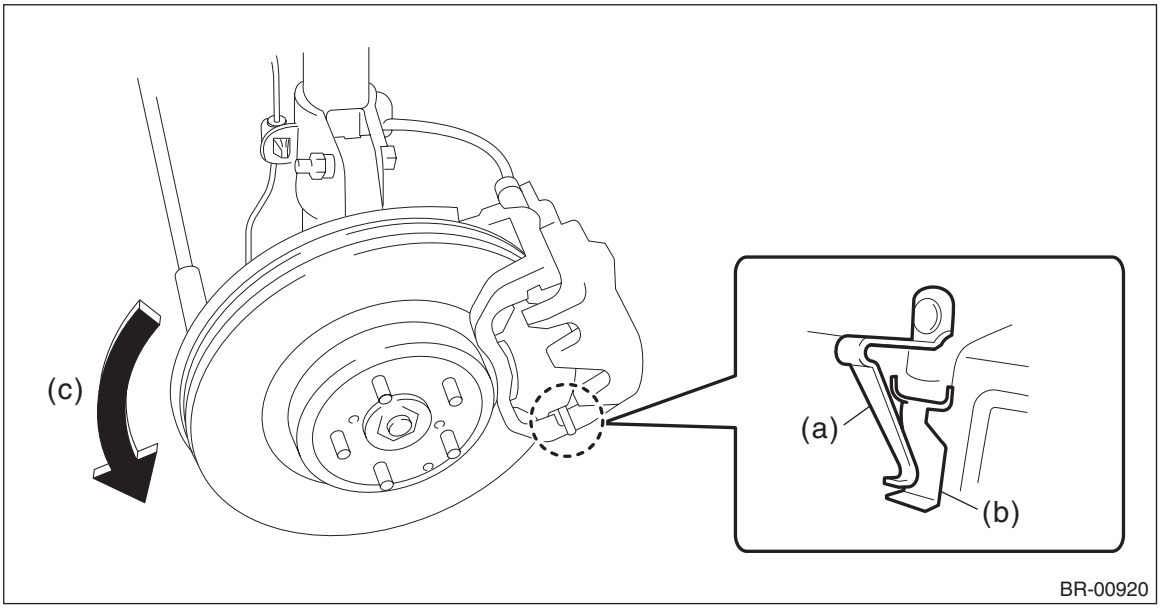
5) Apply a thin coat of grease to the pad and both sides of the shim - disc brake front inner (a). (B)

Grease:
Molykote AS880N (Part No. K0777YA010) or an item contained in the pad kit



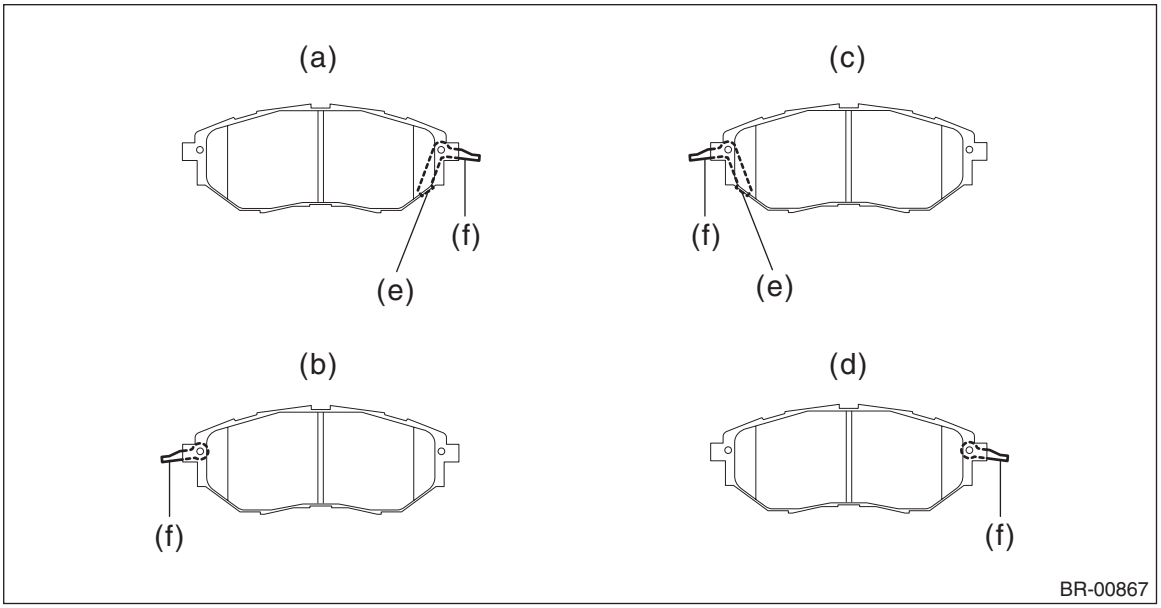
6) Install the brake pad to the support - front disc brake.

CAUTION:
• Be sure to install so that the pad return spring faces the input side of the direction of brake rotor rotation, as shown in the figure.
• Correctly install the pad return spring to the supporting surface of the pad clip as shown in the figure.
• If the pad return spring is deformed or damaged, replace the brake pad with a new part.



(a) Pad return spring (b) Supporting surface of pad clip (c) Direction of brake rotor rotation

NOTE:
Install the brake pad indicator in proper direction.



(a) LH — IN
(b) LH — OUT
(c) RH — IN
(d) RH — OUT
(e) Pad indicator
(f) Pad return spring

7) Install the caliper body assembly to the support - front disc brake.

Tightening torque:
Caliper bolt: 27 N·m (2.75 kgf-m, 19.9 ft-lb)

8) Connect the brake hose using a new brake hose gasket.

Tightening torque:
Union bolt: 18 N·m (1.84 kgf-m, 13.3 ft-lb)

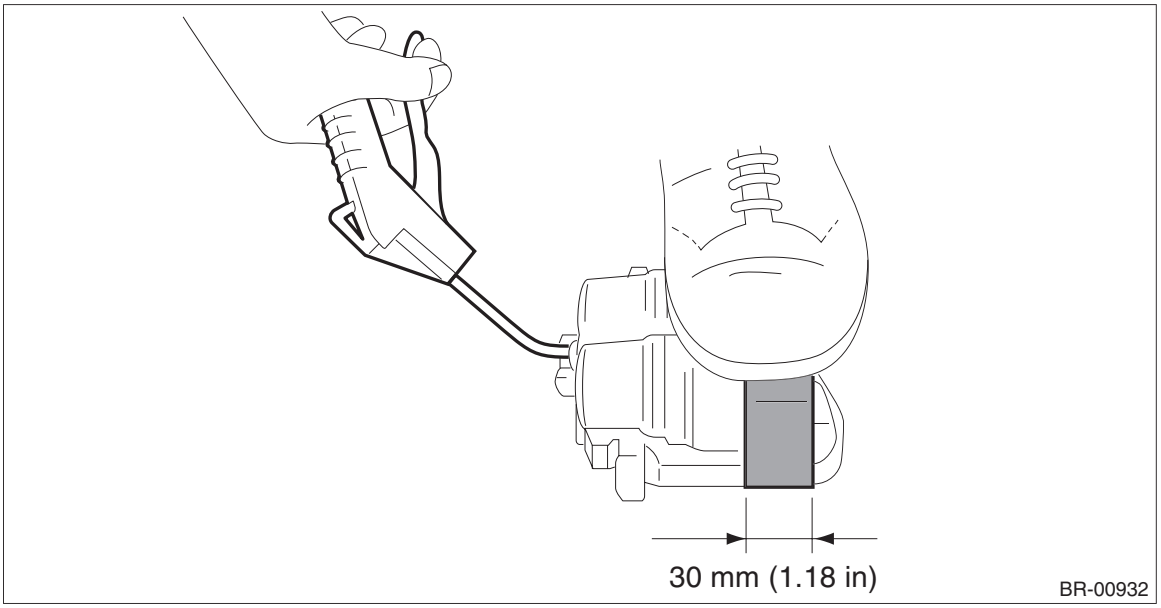
9) Bleed air from the brake system. <Ref. to BR-60, BRAKE LINE, PROCEDURE, Air Bleeding.>
10) Install the front wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: DISASSEMBLY

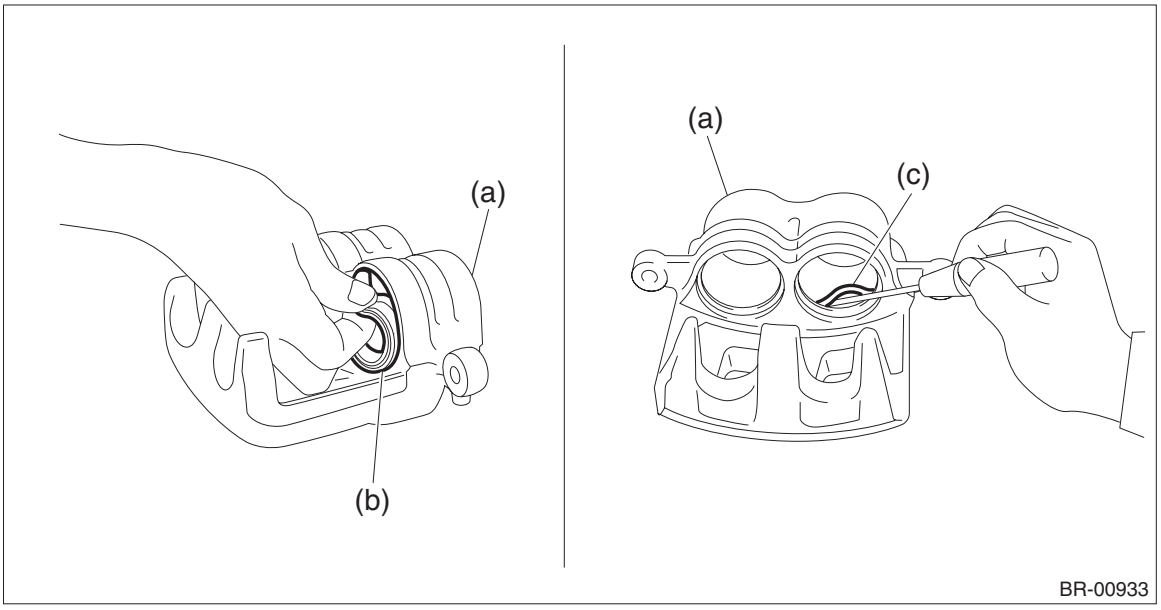
CAUTION:
Be careful not to allow foreign matter to enter the brake hose connector.

1) Remove mud and foreign matter from the caliper body.
2) Remove the piston - disc brake.
   (1) Place a wooden block in the caliper body as shown in the figure to prevent the piston - disc brake from jumping out and being damaged.
   (2) Using an air gun, gradually apply compressed air via the brake hose installation hole to push out the piston - disc brake.

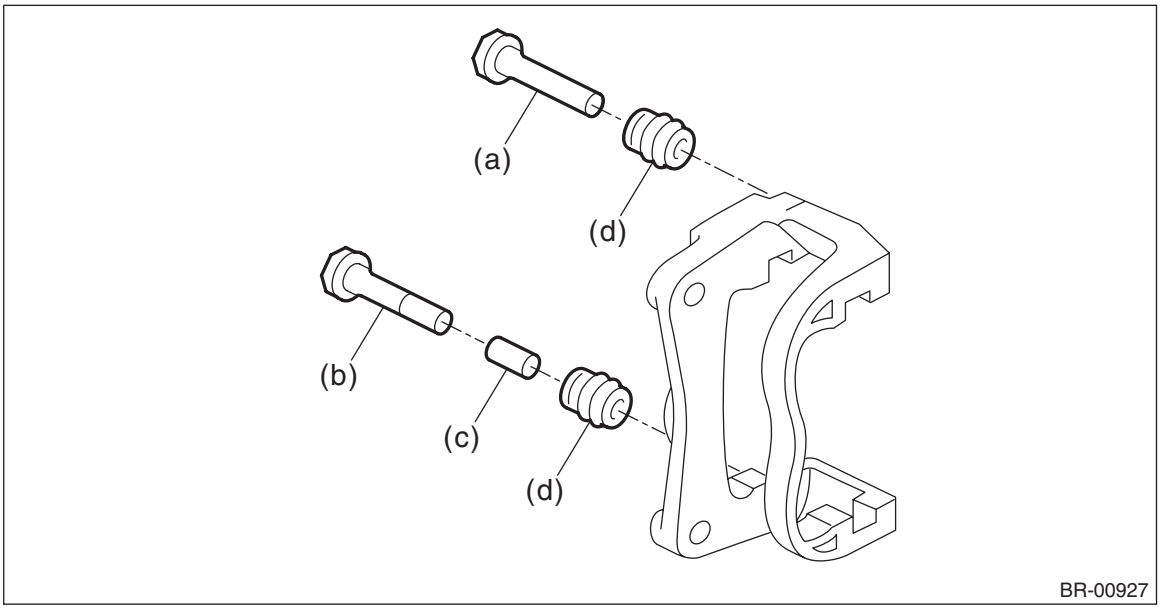


3) Remove the piston boot (b) and piston seal (c) from the caliper body cylinder (a).

CAUTION:
Do not damage the cylinder and piston seal groove.



4) Remove the guide pin - front brake, lock pin - front brake, lock pin - sleeve, and pin boot from the support - front disc brake.

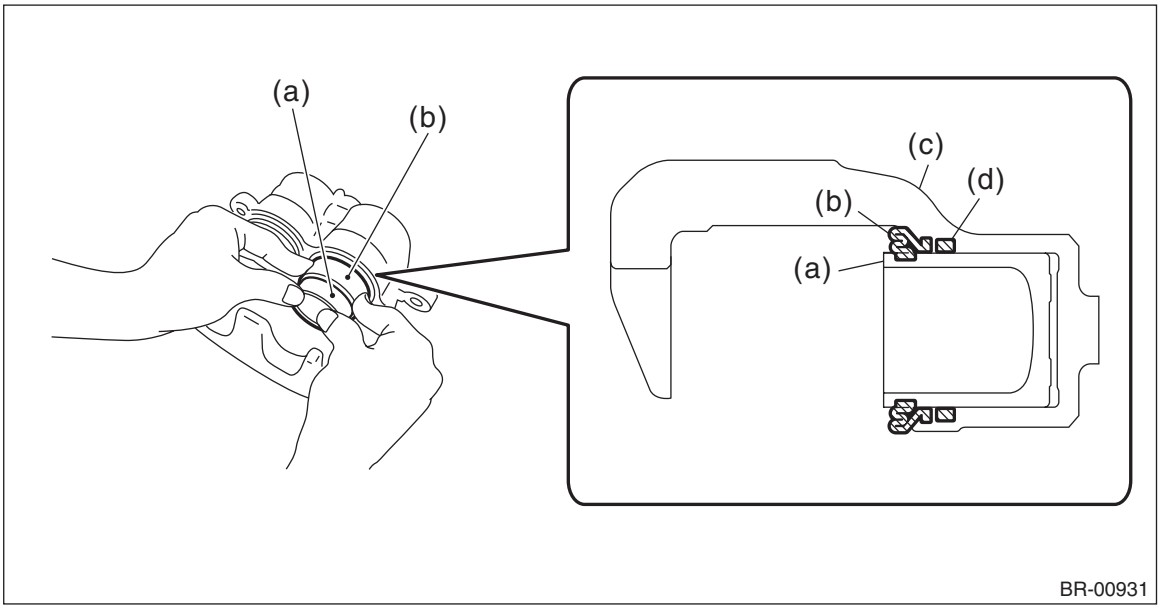


(a) Guide pin - front brake (black)
(b) Lock pin - front brake (silver)
(c) Lock pin - sleeve
(d) Pin boot

D: ASSEMBLY

1) Before assembly, check each part. <Ref. to BR-28, INSPECTION, Front Disc Brake Assembly.>
2) Clean the inside of the caliper body cylinder using brake fluid.
3) Apply a coat of brake fluid to piston seal and install the piston seal to the caliper body cylinder groove.
4) Apply a coat of brake fluid to the inner surface of caliper body cylinder and the entire outer surface of the piston - disc brake.
5) Apply grease contained in the piston seal kit to the piston boot, and install it to the groove at the end of the cylinder.
6) Insert the piston - disc brake into the caliper body cylinder.
7) Position the piston boot in the grooves on the piston - disc brake and the caliper body cylinder.

CAUTION:
Do not force the piston - disc brake into the caliper body cylinder.

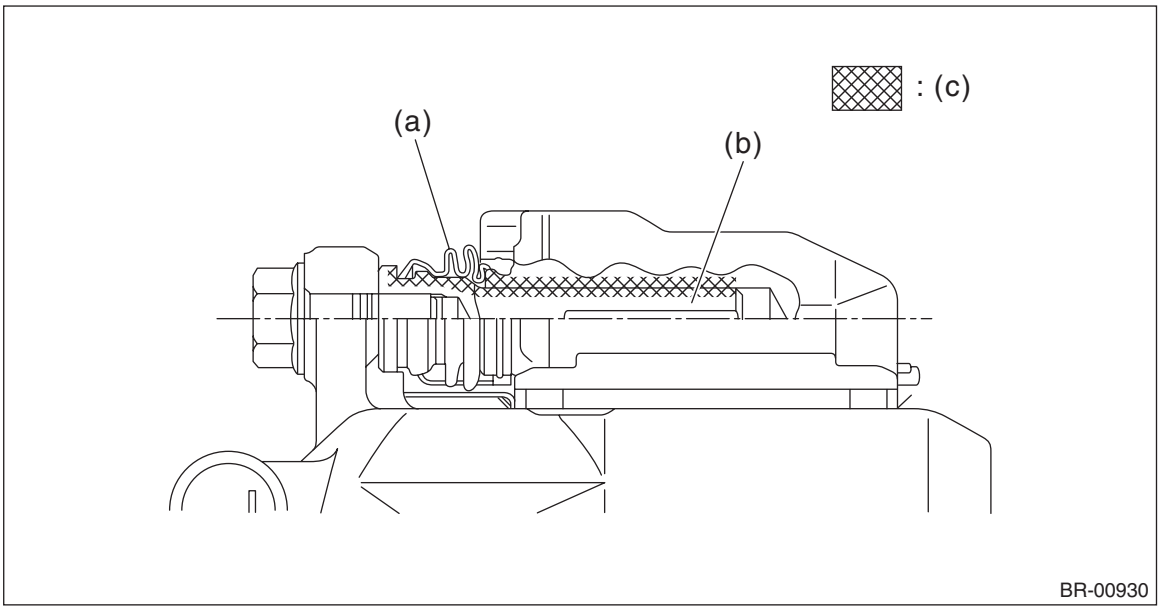


(a) Piston - disc brake
(b) Piston boot
(c) Caliper body assembly
(d) Piston seal

8) Apply grease contained in the piston seal kit to the lock pin - front brake, the outer surface of guide pin - front brake, the inner surface of support cylinder, and the grooves of pin boot.

9) Install the pin boot to the lock pin - front brake and guide pin - front brake, and insert them into the support cylinder.

CAUTION:
Insert the lock pin - front brake and guide pin - front brake into specified position, and make sure that they slide and seat properly.



(a) Pin boot
(b) Lock pin - front brake or guide pin - front brake
(c) Grease applied area

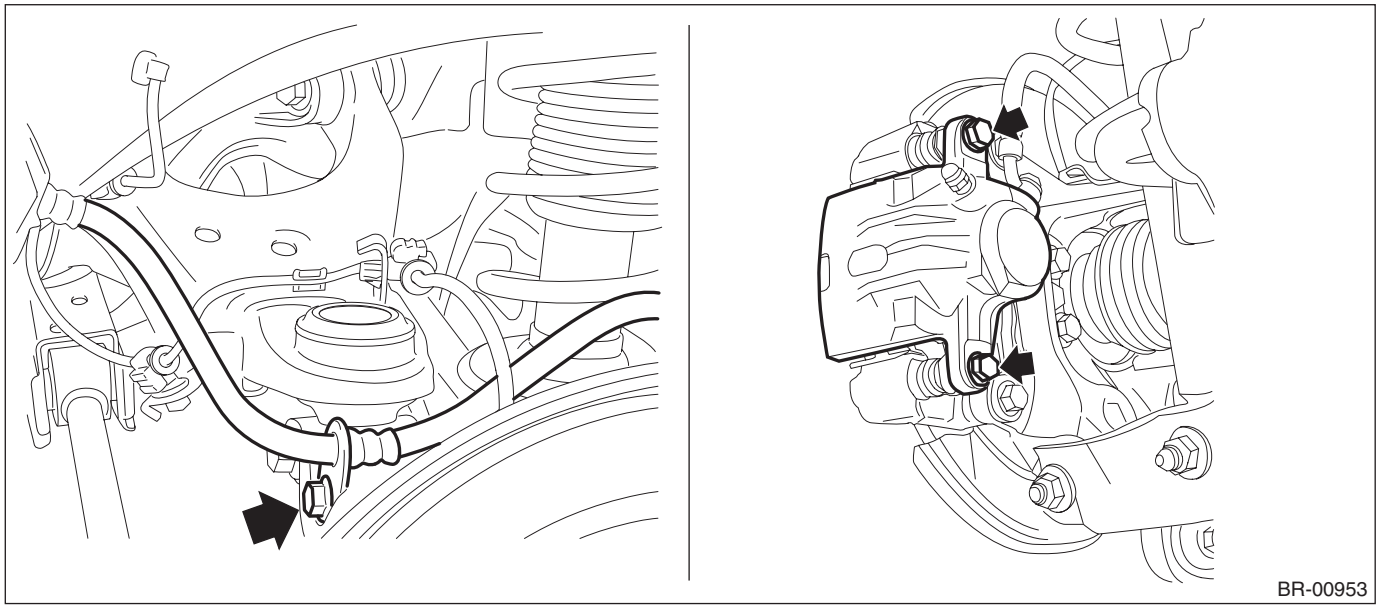
E: INSPECTION

1) Check the caliper body cylinder and piston for uneven wear, damage or rust.
2) Check the rubber parts for damage or deterioration.
3) If faulty is found in the inspection, replace the relevant part.

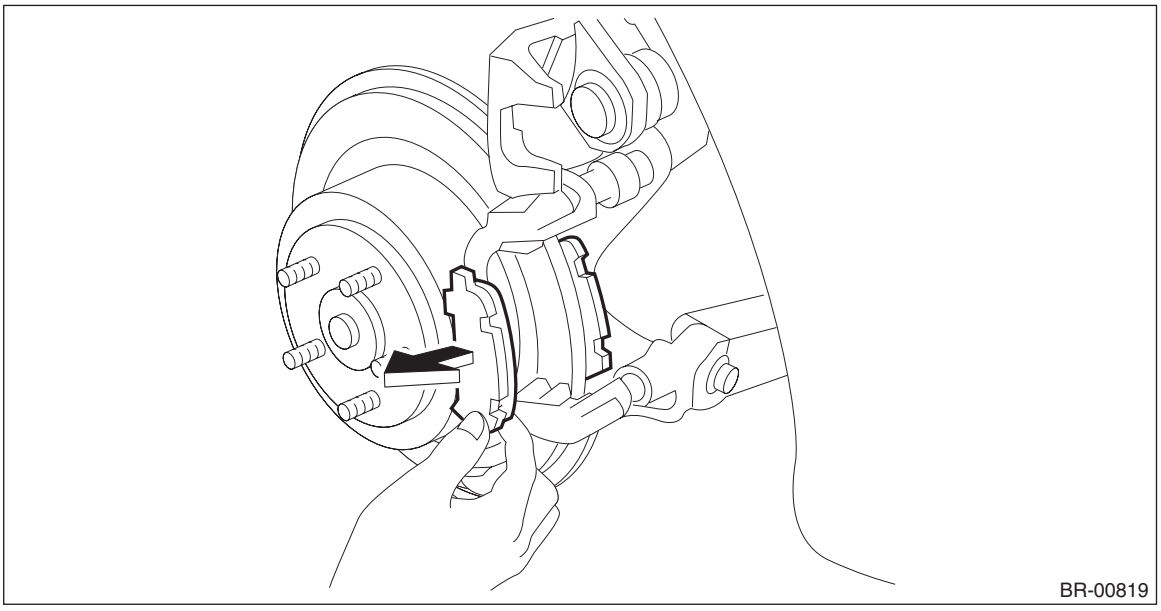
5. Rear Brake Pad

A: REMOVAL

1) Lift up the vehicle, and then remove the rear wheels.
2) Remove the rear brake pad.
   (1) Remove the bolts and remove the brake hose bracket.
   (2) Remove the caliper bolt, and raise and hold the caliper body assembly.



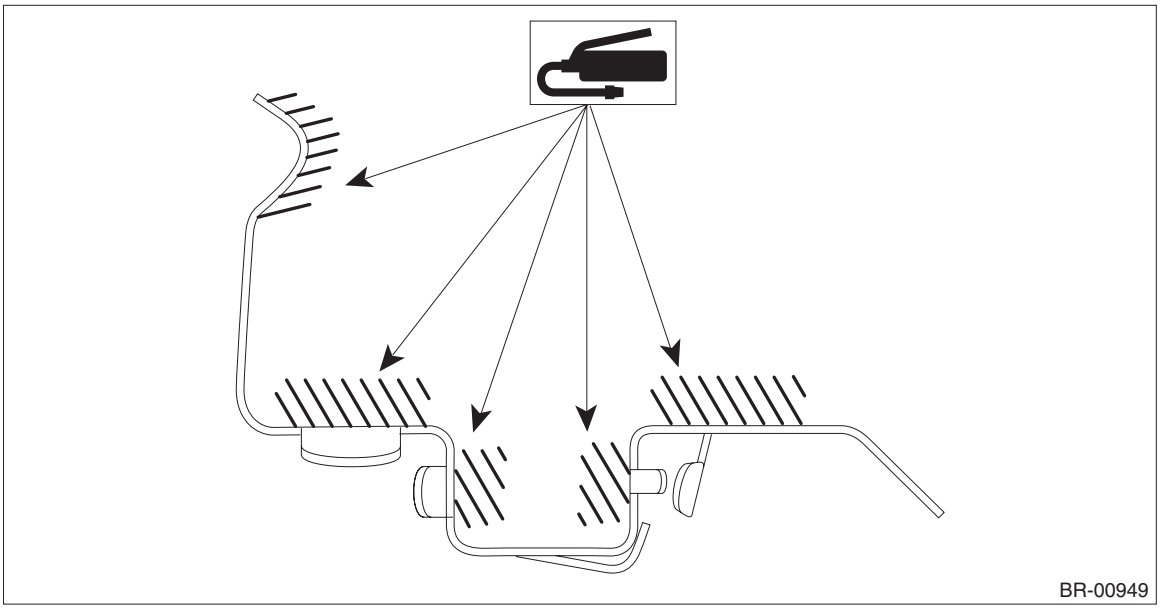
NOTE:
Do not disconnect the brake hose from the caliper body assembly.
   (3) Remove the brake pad from support - rear disc brake.



B: INSTALLATION

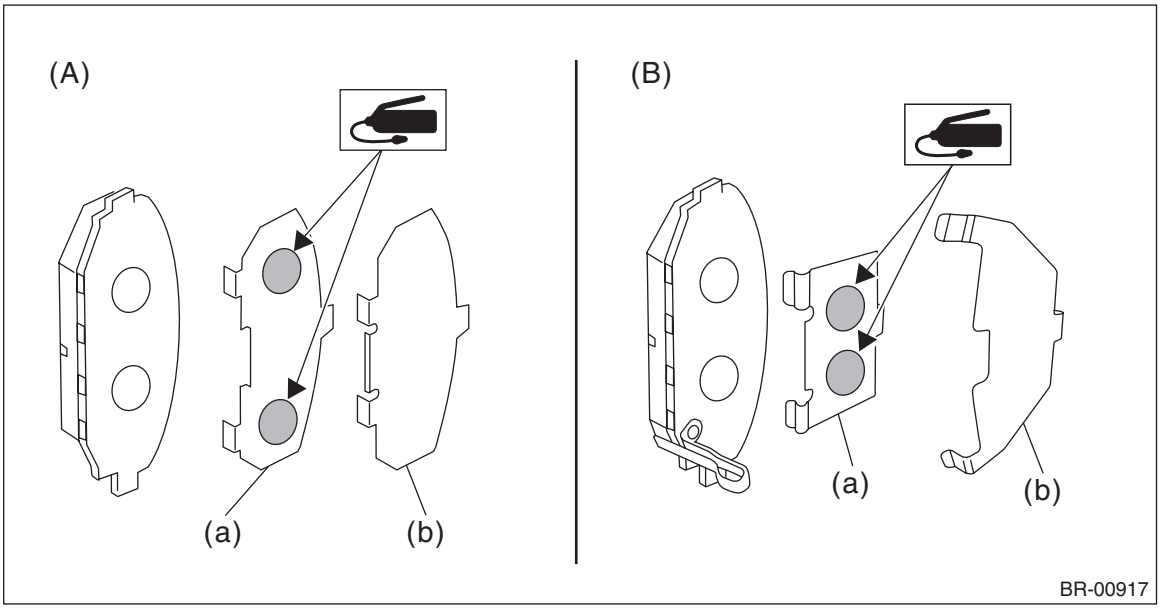
NOTE:
Before installation, remove mud and foreign matter from the caliper body assembly and support - rear disc brake.
1) Before installation, check the brake pad. <Ref. to BR-31, INSPECTION, Rear Brake Pad.>
2) Apply a thin coat of grease to the pad clip.

Grease:
Molykote M7439 (Part No. 003602001) or an item contained in the pad kit



3) Apply a thin coat of grease to the shim - disc brake rear inner (a) and the shim - disc brake rear outer (b).

Grease:
Grease contained in the pad kit or WAKO grease V160



(A) Pad - disc brake rear outer (B) Pad - disc brake rear inner

4) Install the brake pad to the support - rear disc brake.

5) Install the caliper body assembly to the support - rear disc brake.

Tightening torque:
Caliper bolt: 27 N·m (2.75 kgf-m, 19.9 ft-lb)

6) Install the brake hose bracket.

Tightening torque:
Brake hose bracket: 33 N·m (3.36 kgf-m, 24.3 ft-lb)

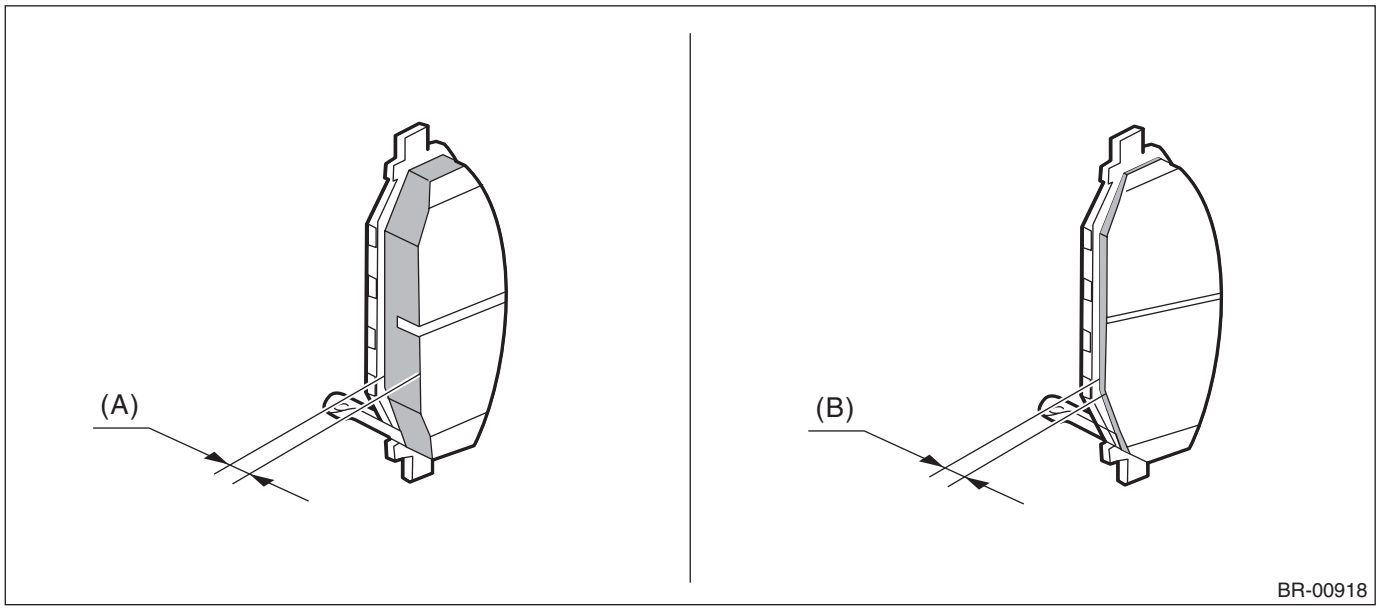
7) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

1) Check the pad thickness.

NOTE:
- Always replace the pads of both wheels and both sides as a set.
- Replace pad clips if they are twisted or worn.
- Replace the pad if there is oil or grease on it.
- A wear indicator is installed on the pad - disc brake rear inner. If the pad is worn to the limit, the end of wear indicator contacts disc rotor, and a squeaking sound is heard as the wheel rotates. If the sound is heard, replace the pad.



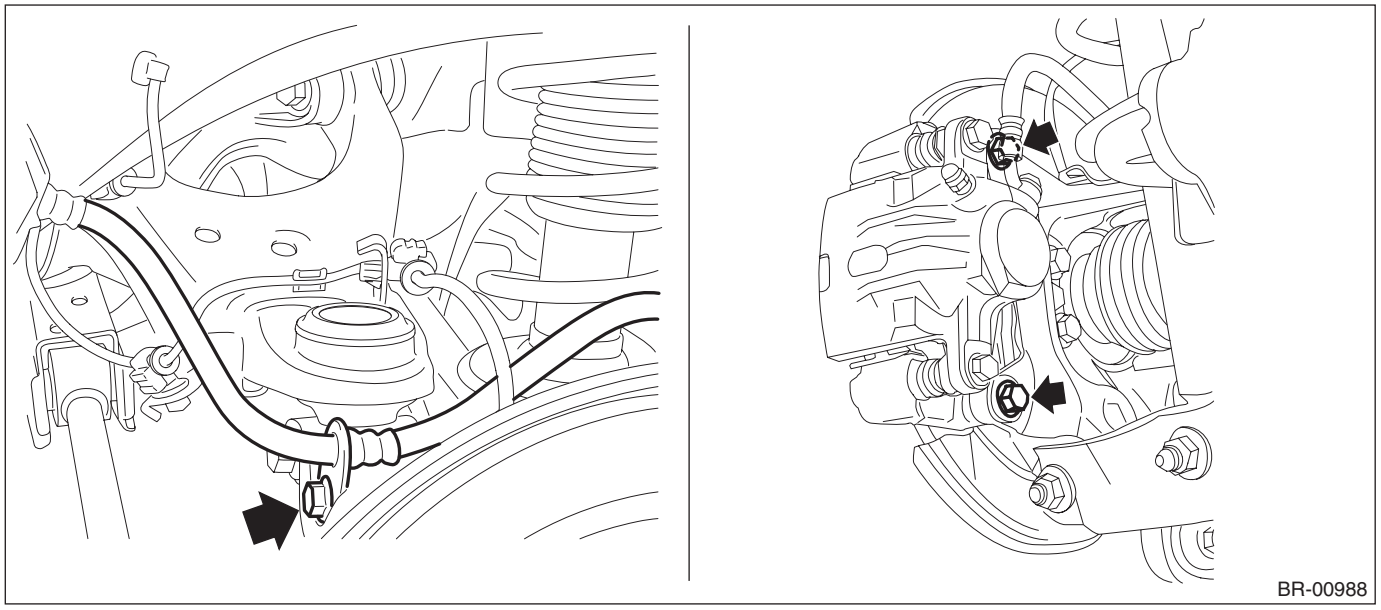
	Disc rotor type	Standard (A)	Wear limit (B)
Pad thickness	Solid	9 mm (0.35 in)	1.5 mm (0.059 in)

2) If the wear limit is exceeded in the inspection, replace the brake pad.

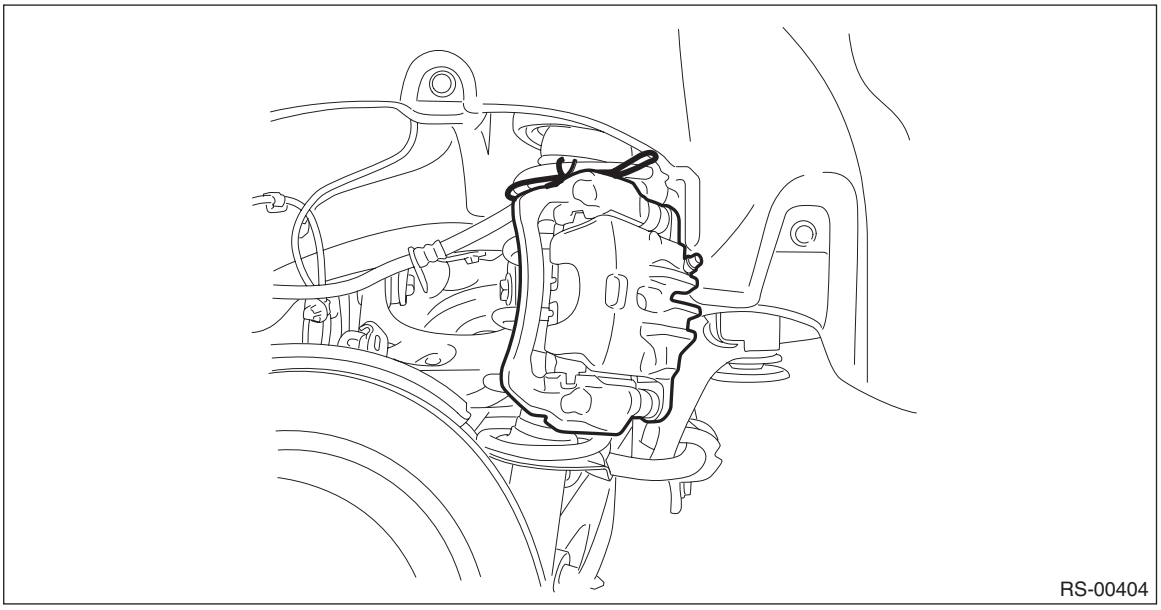
6. Rear Disc Rotor

A: REMOVAL

1) Lift up the vehicle, and then remove the rear wheels.
2) Release the lever assembly - hand brake.
3) Remove the caliper body assembly from the housing assembly - rear axle.
   (1) Remove the bolt from the brake hose bracket.
   (2) Remove the mounting bolt, and remove the caliper body assembly.

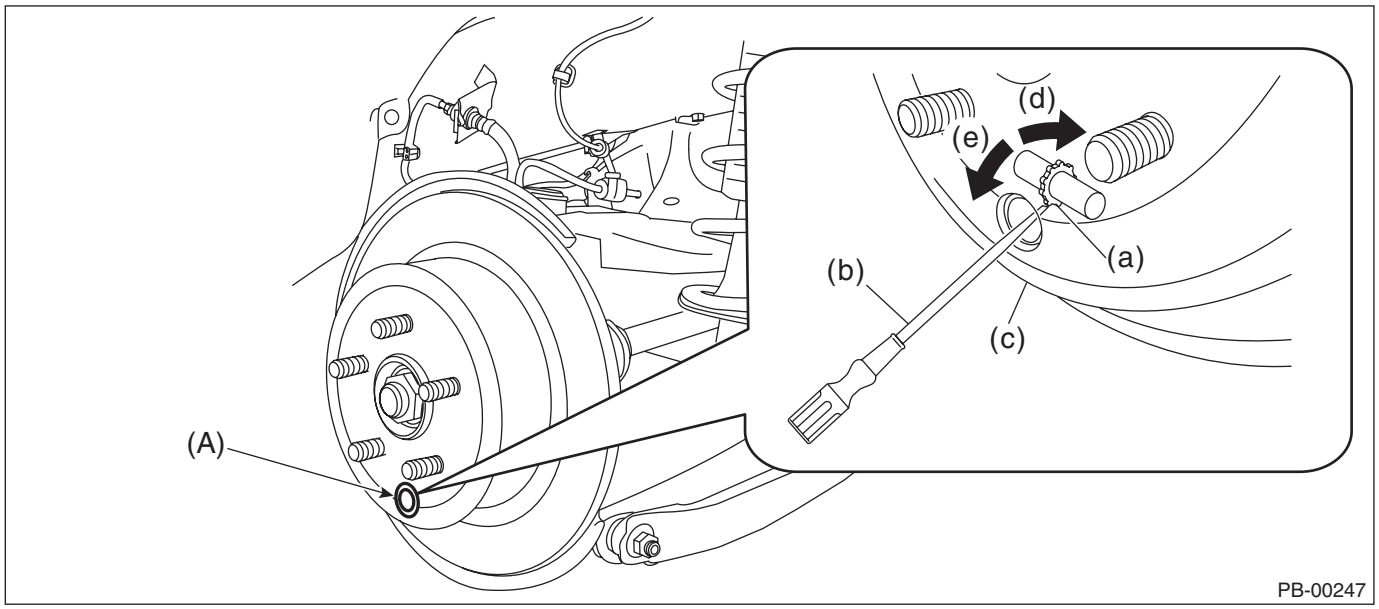


   (3) Prepare wiring harnesses etc. to be discarded, and suspend the caliper body assembly from the strut assembly.



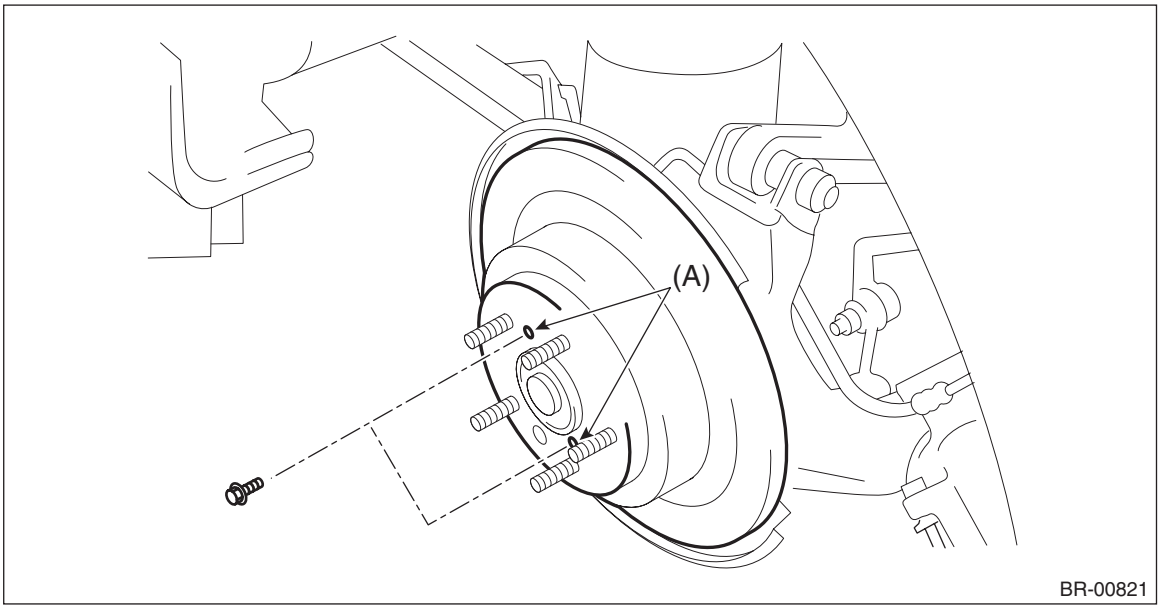
4) Remove the rear disc rotor.

NOTE:
If it is difficult to remove the disc rotor, perform the following two methods in order.
1. Remove the adjusting hole cover (A), insert the flat tip screwdriver, and rotate the adjuster assembly - rear brake until the brake shoe moves far enough to remove the disc rotor.



(a)	Adjuster ASSY - rear brake	(c)	Disc rotor	(e)	Shorten the adjuster ASSY - rear brake
(b)	Flat tip screwdriver	(d)	Extend the adjuster ASSY - rear brake		

2. When the disc rotor is difficult to be removed from the hub unit COMPL - rear axle, screw in 8 mm (0.31 in) bolt to the threaded part of the disc rotor (A), and remove the disc rotor.



B: INSTALLATION

NOTE:
Before installation, remove mud and foreign matter from the caliper body assembly.
1) Before installation, check the rear disc rotor. <Ref. to BR-34, INSPECTION, Rear Disc Rotor.>
2) Install each part in the reverse order of removal.
3) Adjust the parking brake. <Ref. to PB-22, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

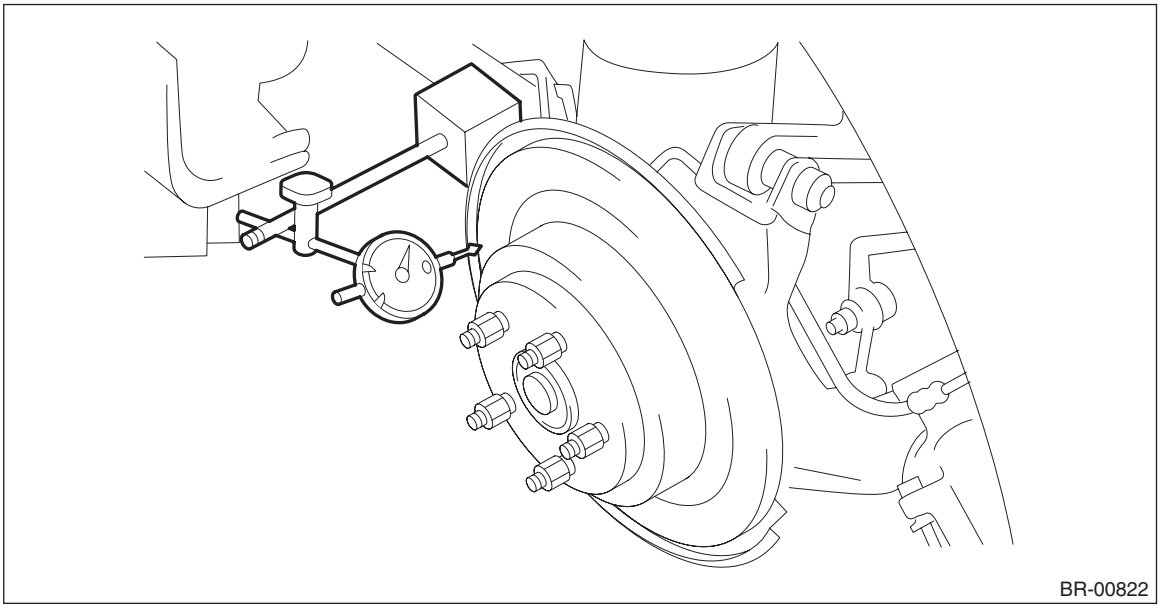
Tightening torque:
Brake hose bracket: 33 N·m (3.36 kgf-m, 24.3 ft-lb)
Mounting bolt: 66 N·m (6.73 kgf-m, 48.7 ft-lb)
Rear wheel: 120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: INSPECTION

1. DISC ROTOR RUNOUT CHECK

1) Check the hub unit COMPL - rear axle for free play and runout before the inspection of disc rotor runout limit. <Ref. to DS-56, INSPECTION, Rear Hub Unit Bearing.>
2) Secure the disc rotor by tightening the five wheel nuts.
3) Set a dial gauge 10 mm (0.39 in) inward from the disc rotor outer circumference, and check the disc rotor runout while rotating the disc rotor.

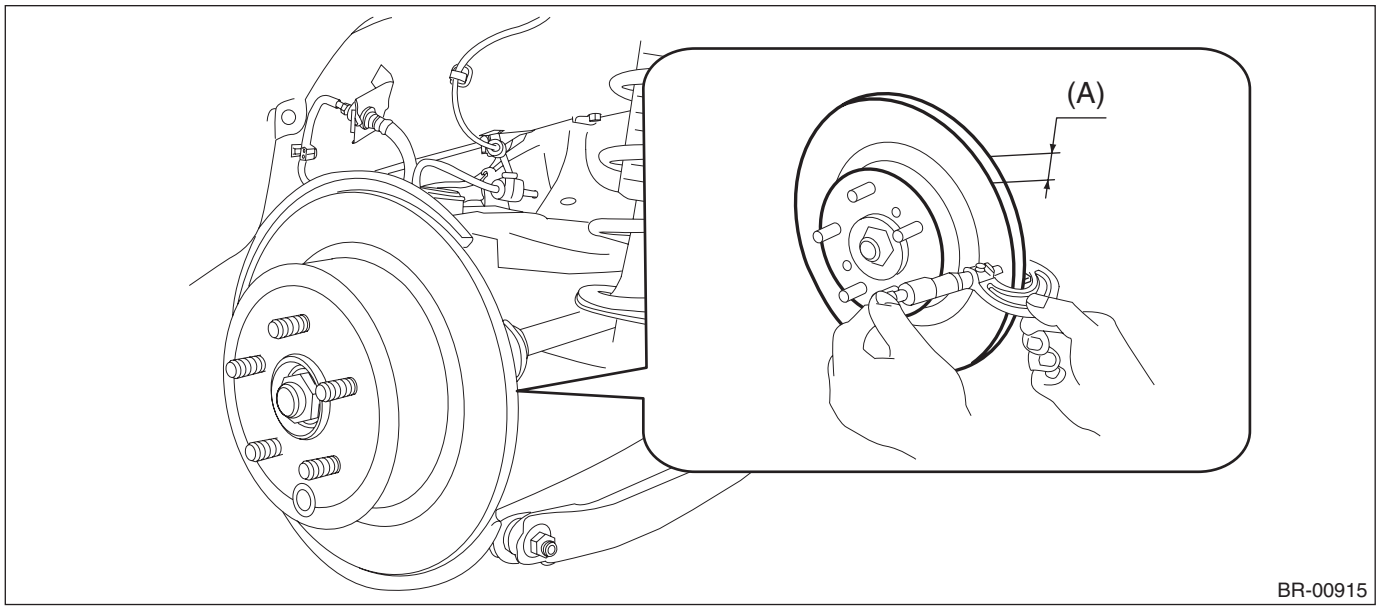
Disc rotor runout limit:
0.05 mm (0.0020 in)



4) If the runout limit is exceeded in the inspection, replace the disc rotor.

2. DISC ROTOR THICKNESS CHECK

1) Set a micrometer 10 mm (0.39 in) inward from the disc rotor outer perimeter, and then measure the disc rotor thickness (A).



	Type of disc rotor	Standard	Wear limit	Disc rotor outer diameter
Disc rotor thickness (A)	Solid disc	10 mm (0.39 in)	8.5 mm (0.33 in)	274 mm (10.79 in)

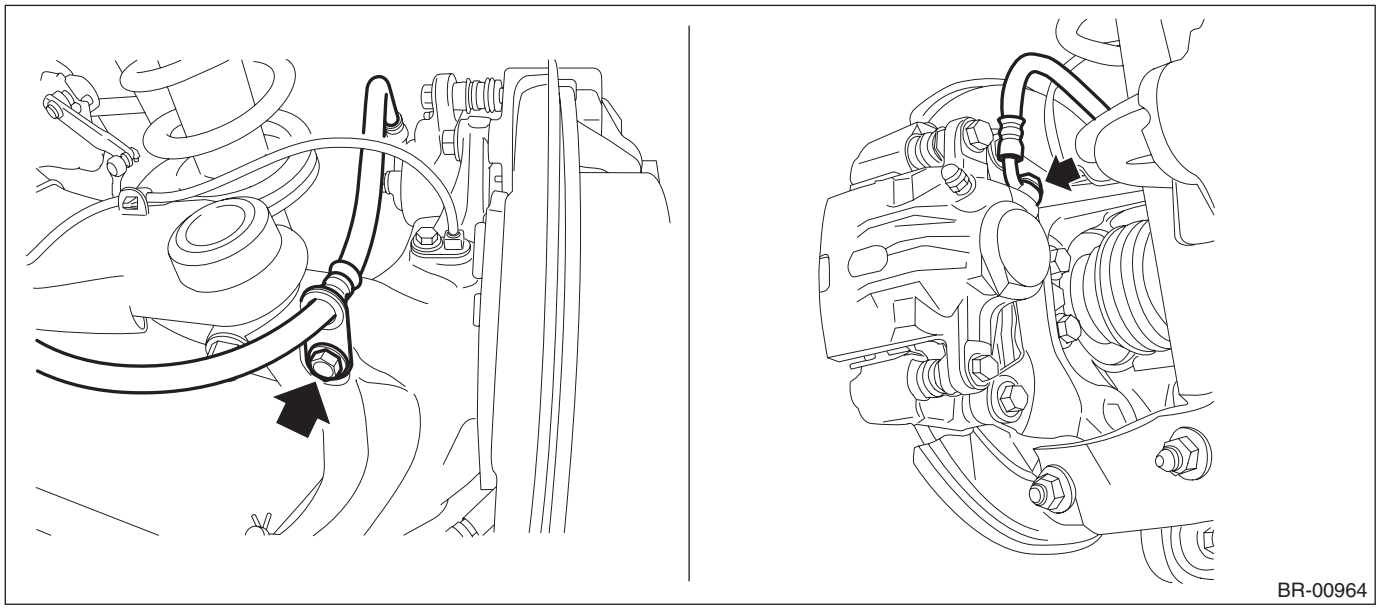
2) If the wear limit is exceeded in the inspection, replace the disc rotor.

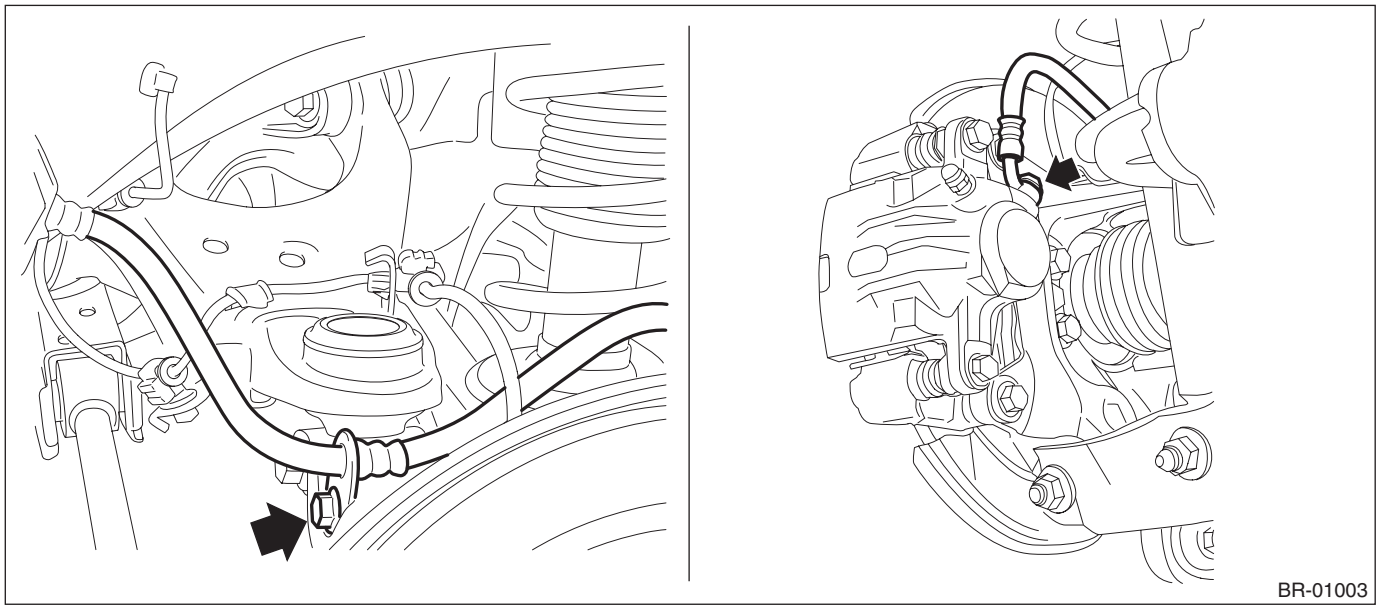
7. Rear Disc Brake Assembly

A: REMOVAL

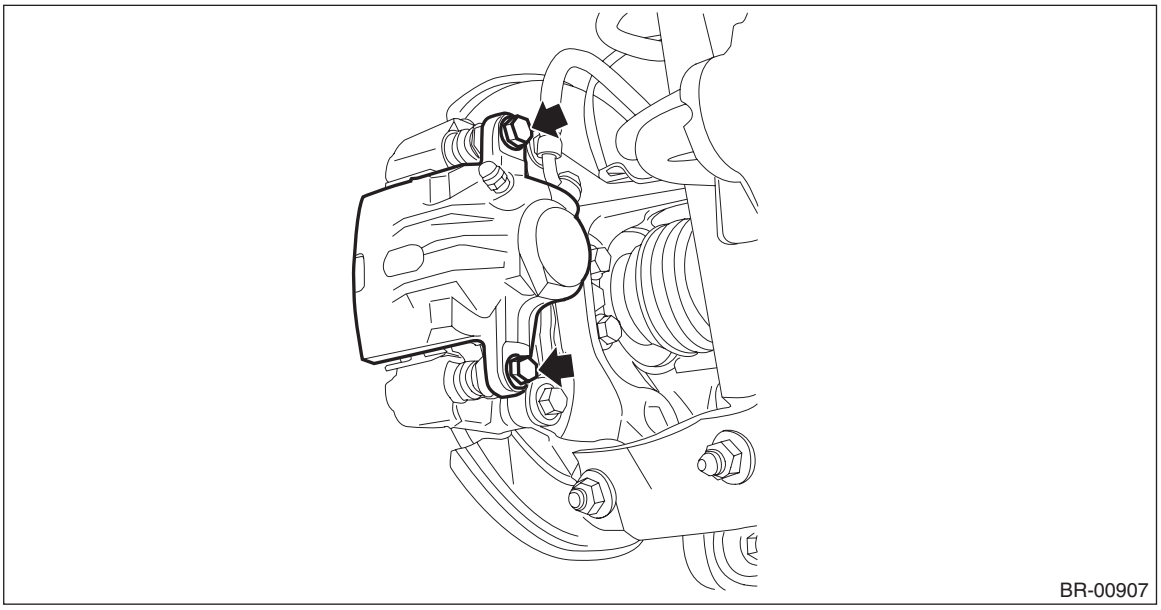
CAUTION:
Do not allow brake fluid to come in contact with the painted surface of the vehicle body. If it does, wash off with water and wipe away completely.

1) Lift up the vehicle, and then remove the rear wheels.
2) Remove the caliper body assembly from the support - rear disc brake.
   (1) Remove the brake hose bracket and union bolt.


BR-00964


BR-01003

(2) Remove the caliper bolt, and remove the caliper body assembly.



3) Remove the support - rear disc brake.

NOTE:
Remove the support - rear disc brake only when replacing the disc rotor or the support - rear disc brake. It is not necessary to remove it when servicing the caliper body assembly.

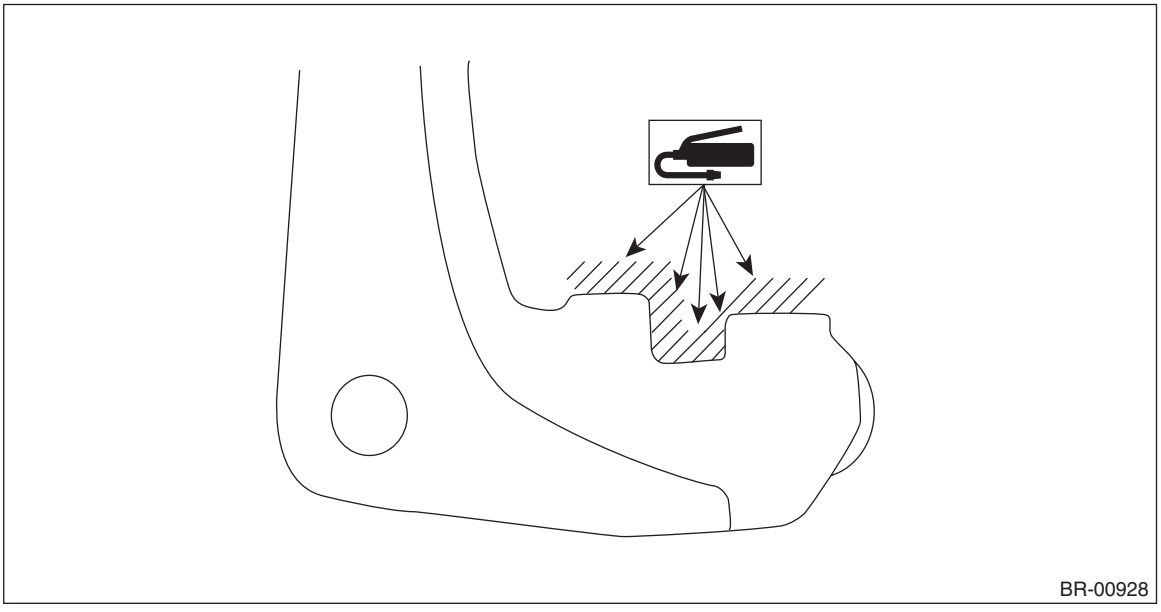
(1) Remove the brake pad from support - rear disc brake.
(2) Remove the mounting bolts, and then remove the support - rear disc brake from the housing assembly - rear axle.

B: INSTALLATION

NOTE:
Before installation, remove mud and foreign matter from the caliper body assembly and support - rear disc brake.

1) Before installation, check each part. <Ref. to BR-43, INSPECTION, Rear Disc Brake Assembly.>
2) Apply a thin coat of grease included with pad kit to the support - rear disc brake.

Grease:
Molykote M7439 (Part No. 003602001) or an item contained in the pad kit

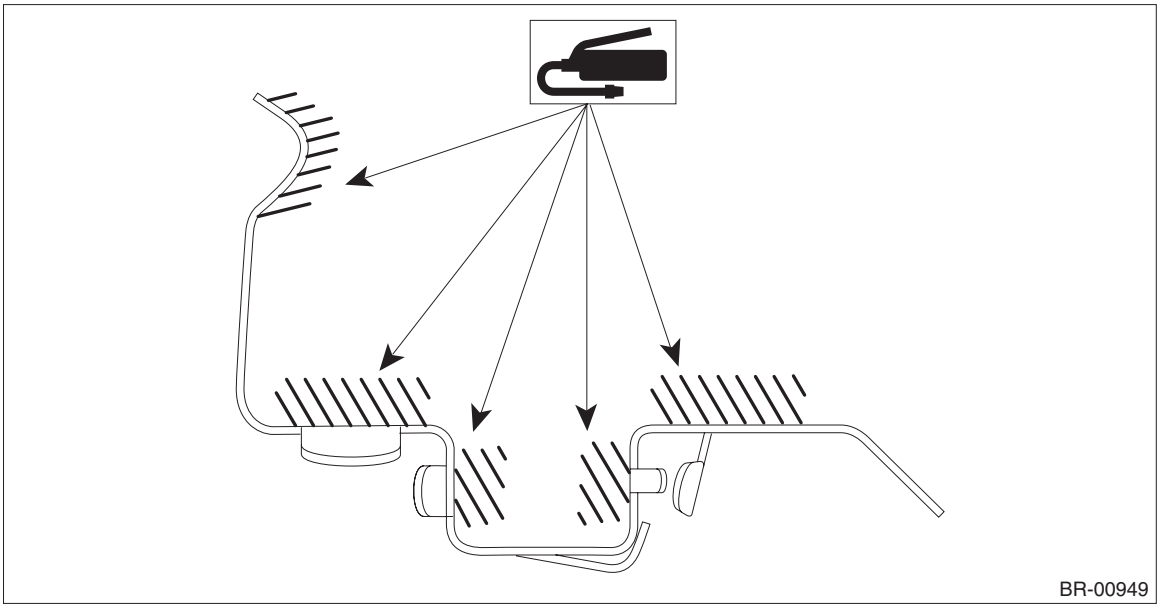


3) Install the support - rear disc brake to the housing assembly - rear axle.

Tightening torque:
Mounting bolt: 66 N·m (6.73 kgf-m, 48.7 ft-lb)

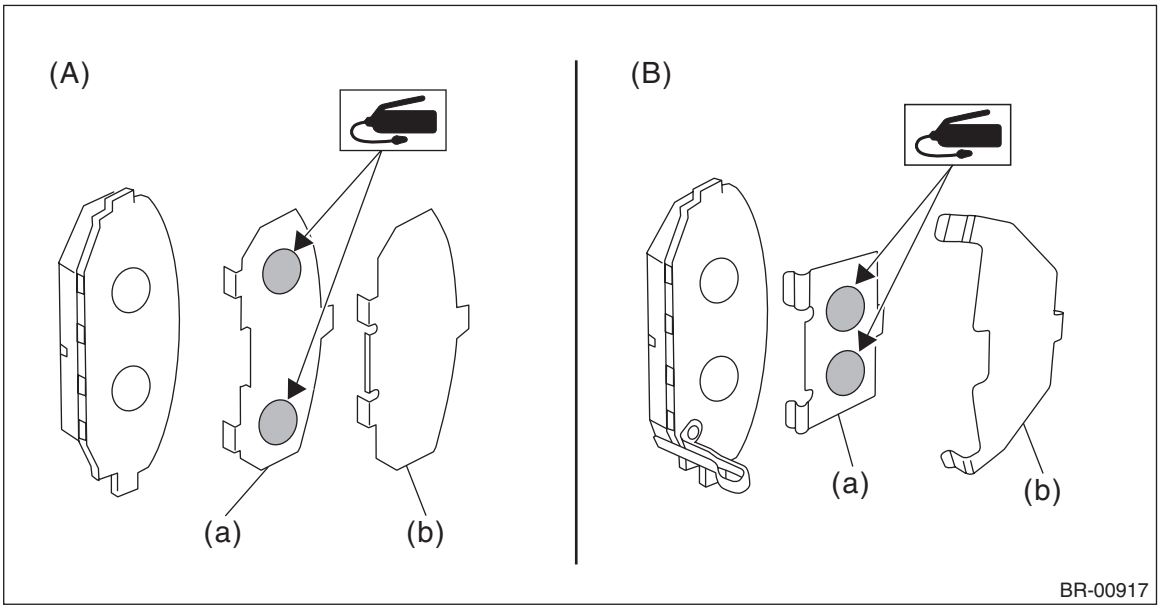
4) Apply a thin coat of grease to the pad clip.

Grease:
Molykote M7439 (Part No. 003602001) or an item contained in the pad kit



5) Apply a thin coat of grease to the shim - disc brake rear inner (a) and the shim - disc brake rear outer (b).

Grease:
Grease contained in the pad kit or WAKO grease V160



(A) Pad - disc brake rear outer (B) Pad - disc brake rear inner

6) Install the brake pad to the support - rear disc brake.

7) Install the caliper body assembly to the support - rear disc brake.

Tightening torque:
Caliper bolt: 27 N·m (2.75 kgf-m, 19.9 ft-lb)
8) Install the brake hose bracket.

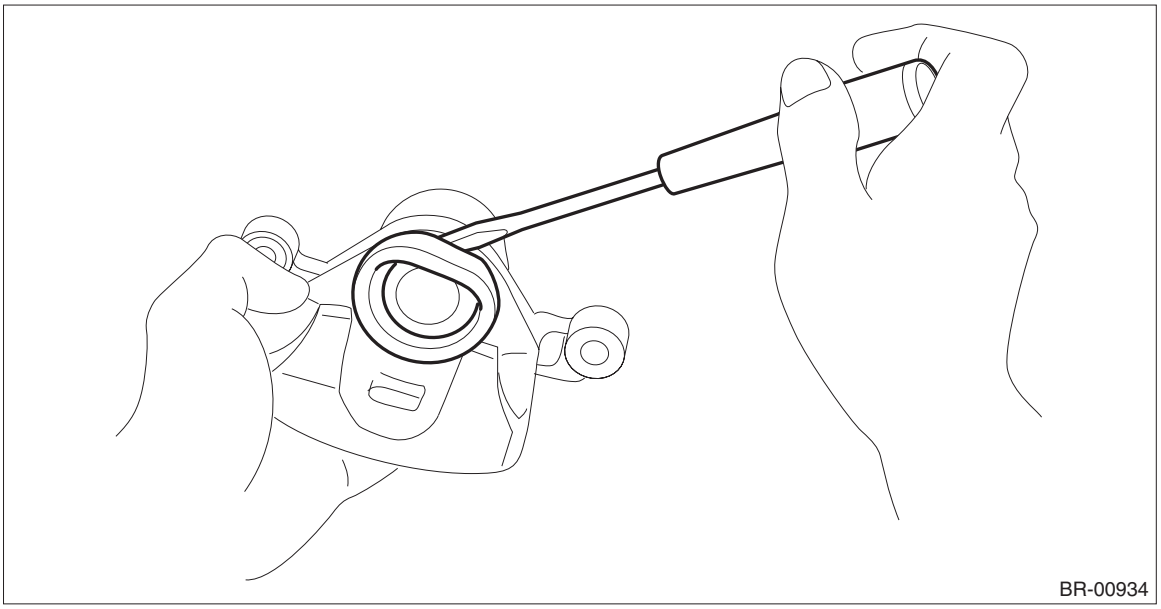
Tightening torque:
Brake hose bracket: 33 N·m (3.36 kgf-m, 14.3 ft-lb)
9) Connect the brake hose using a new brake hose gasket.

Tightening torque:
Union bolt: 18 N·m (1.84 kgf-m, 13.3 ft-lb)
10) Bleed air from the brake system. <Ref. to BR-60, BRAKE LINE, PROCEDURE, Air Bleeding.>
11) Install the rear wheels.

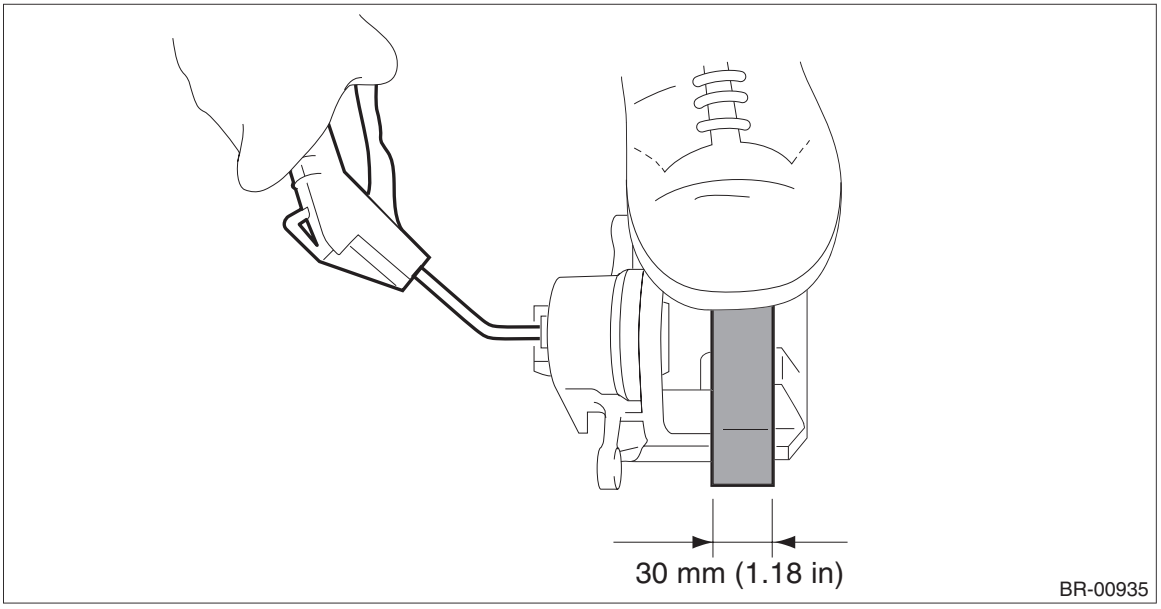
Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

C: DISASSEMBLY

CAUTION:
Be careful not to allow foreign matter to enter the brake hose connector.
1) Remove mud and foreign matter from the caliper body assembly.
2) Remove the piston boot from caliper body cylinder.

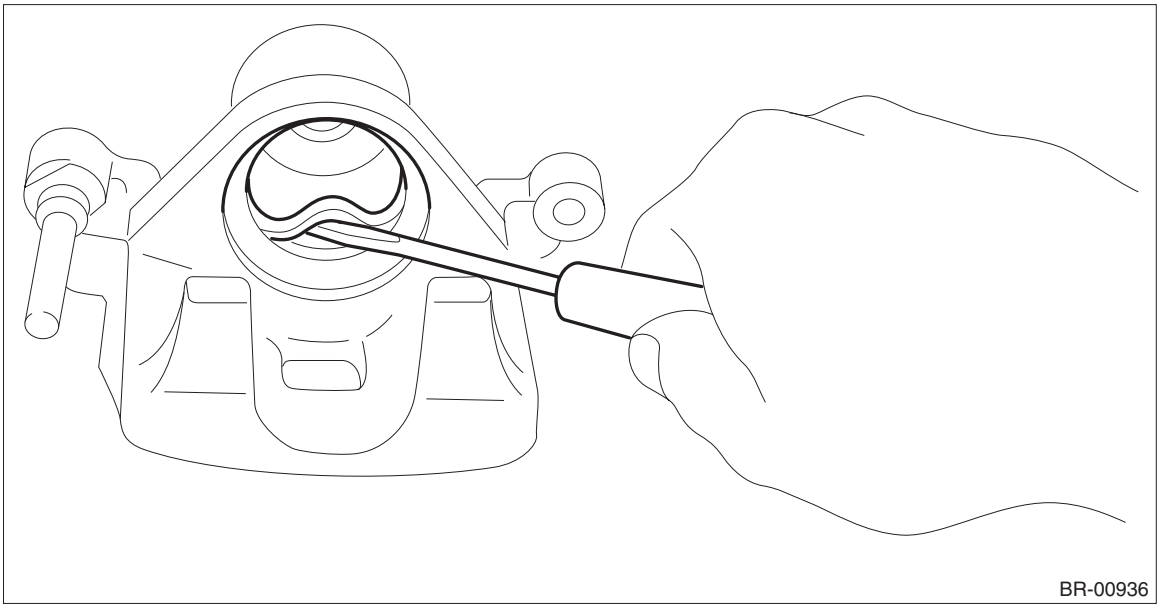


3) Remove the piston - disc brake.
(1) Place a wooden block in the caliper body assembly as shown in the figure to prevent the piston - disc brake from jumping out and being damaged.
(2) Using an air gun, gradually apply compressed air via the brake hose installation hole to push out the piston - disc brake.

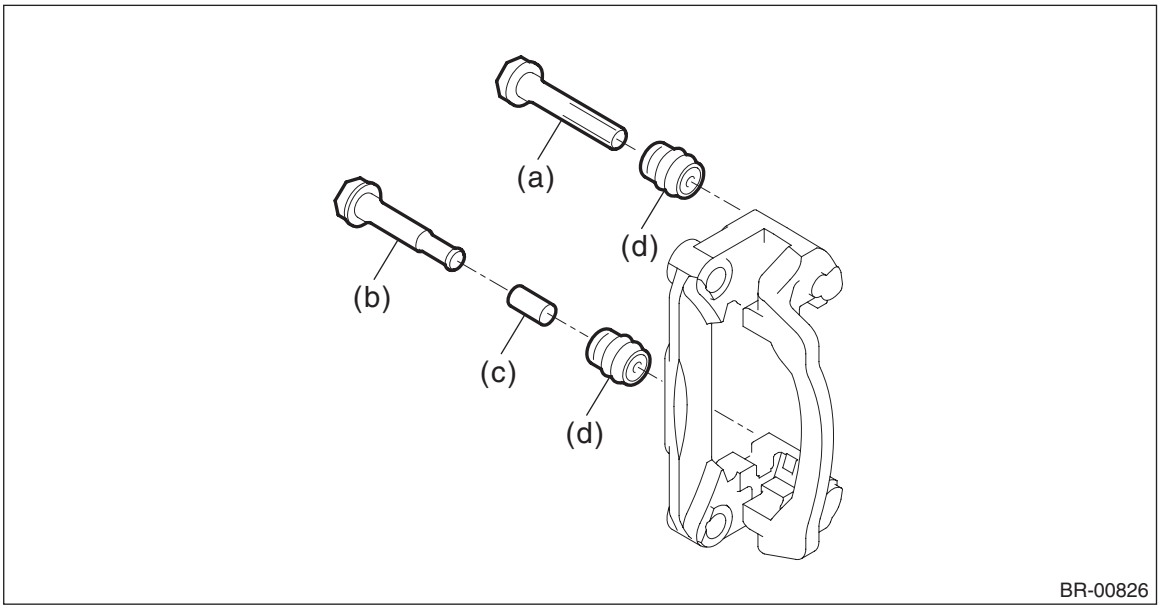


4) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



5) Remove the guide pin - rear brake, lock pin - rear brake, lock pin - sleeve, and pin boot from the support - rear disc brake.

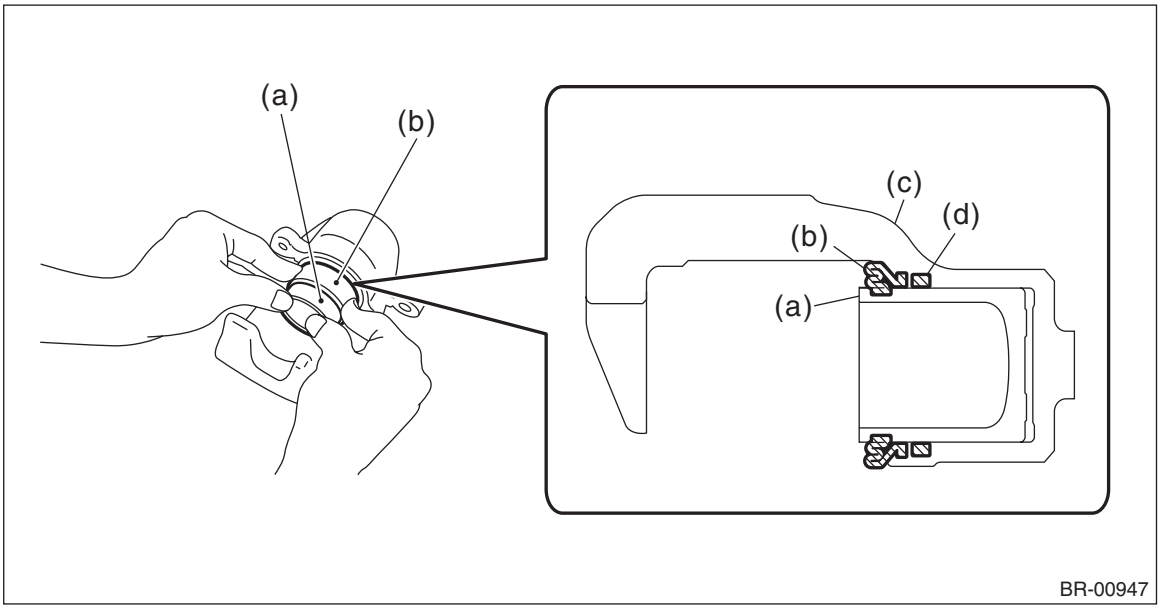


(a) Guide pin - rear brake (black)
(b) Lock pin - rear brake (silver)
(c) Lock pin - sleeve
(d) Pin boot

D: ASSEMBLY

1) Before installation, check each part. <Ref. to BR-43, INSPECTION, Rear Disc Brake Assembly.>
2) Clean the inside of the caliper body cylinder using brake fluid.
3) Apply a coat of brake fluid to piston seal and install the piston seal to the caliper body cylinder groove.
4) Apply a coat of brake fluid to the inner surface of caliper body cylinder and the entire outer surface of the piston - disc brake.
5) Apply grease contained in the piston seal kit to the piston boot, and install it to the groove at the end of the cylinder.
6) Insert the piston - disc brake into the caliper body cylinder.

CAUTION:
Do not force the piston - disc brake into the caliper body cylinder.
7) Position the piston boot in the grooves on the piston - disc brake and the caliper body cylinder.

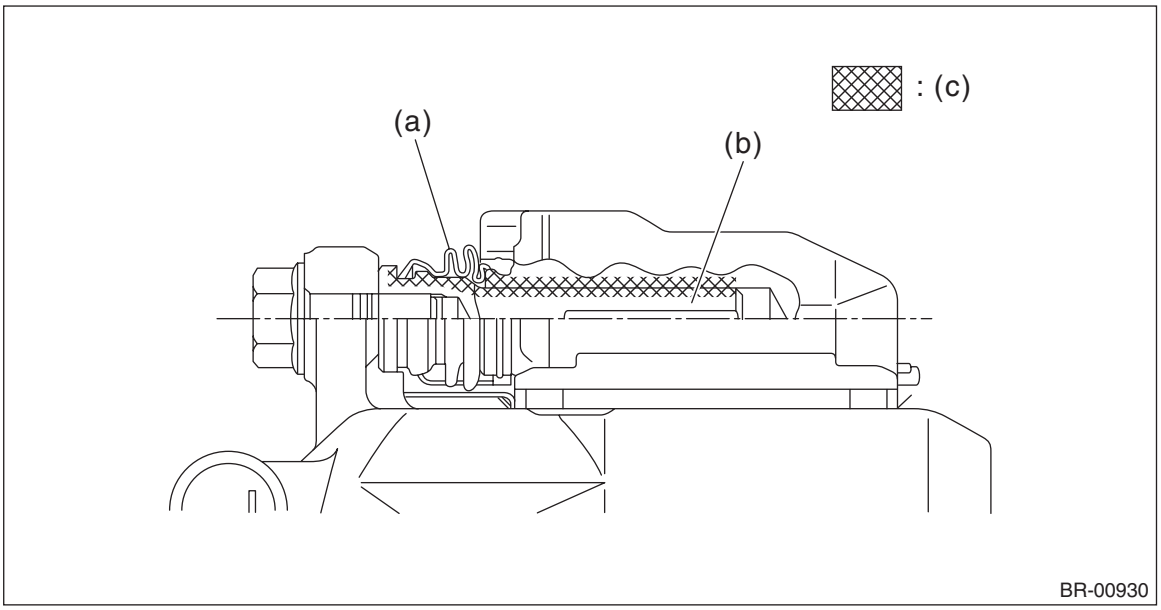


(a) Piston - disc brake
(b) Piston boot
(c) Caliper body
(d) Piston seal

8) Apply grease contained in the piston seal kit to the lock pin - rear brake, the outer surface of guide pin - rear brake, the inner surface of support cylinder, and the grooves of pin boot.

9) Install the pin boot to the lock pin - rear brake and guide pin - rear brake, and insert them into the support cylinder.

CAUTION:
Insert the lock pin - rear brake and guide pin - rear brake into specified position, and make sure that they slide and seat properly.



(a) Pin boot
(b) Lock pin - rear brake or guide pin - rear brake
(c) Grease applied area

E: INSPECTION

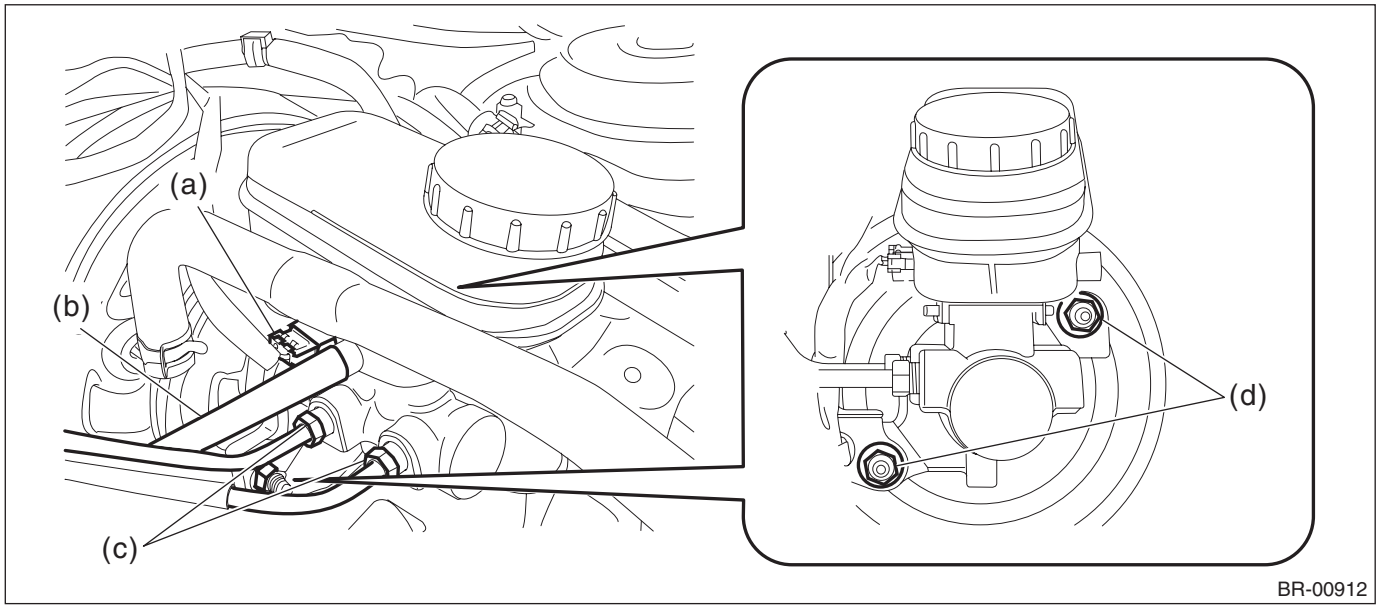
1) Check the caliper body cylinder and piston - disc brake for uneven wear, damage or rust.
2) Check the rubber parts for damage or deterioration.
3) If faulty is found in the inspection, replace the relevant part.

8. Master Cylinder

A: REMOVAL

CAUTION:
Do not allow brake fluid to come in contact with the painted surface of the vehicle body. If it does, wash off with water and wipe away completely.

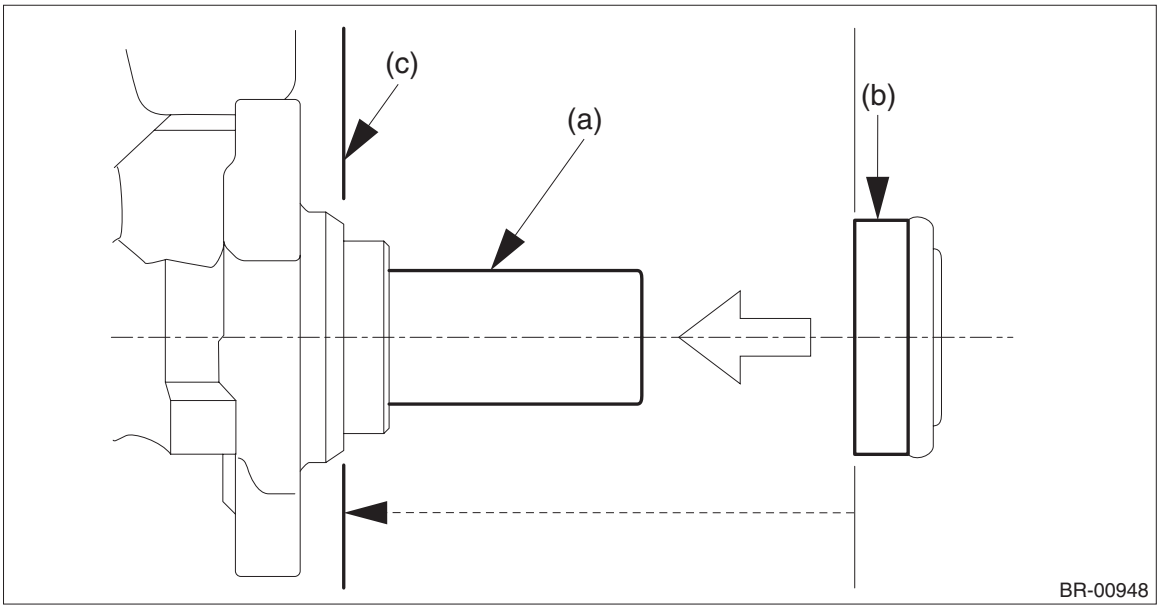
1) Disconnect the ground cable from battery.
2) Drain brake fluid from the reservoir tank completely.
3) Remove the master cylinder assembly.
   (1) Disconnect the fluid level gauge connector (a).
   (2) Disconnect the clutch hose (b). (MT model)
   (3) Disconnect the brake pipe (c).
   (4) Remove the nut (d), and slowly remove the master cylinder assembly from the vacuum booster assembly.



B: INSTALLATION

1) Replace the seal sub assembly for the master cylinder assembly with a new part.

CAUTION:
Be careful not to install the seal sub assembly in the wrong location.



(a) Primary piston
(b) Seal sub ASSY
(c) Install the seal sub assembly to this surface.

2) Install each part in the reverse order of removal.

Tightening torque:
Master cylinder assembly: 13 N·m (1.33 kgf-m, 9.6 ft-lb)
Brake pipe flare nut: 19 N·m (1.94 kgf-m, 14.0 ft-lb)

3) Bleed air from the brake system. <Ref. to BR-59, PROCEDURE, Air Bleeding.>

C: REPLACEMENT

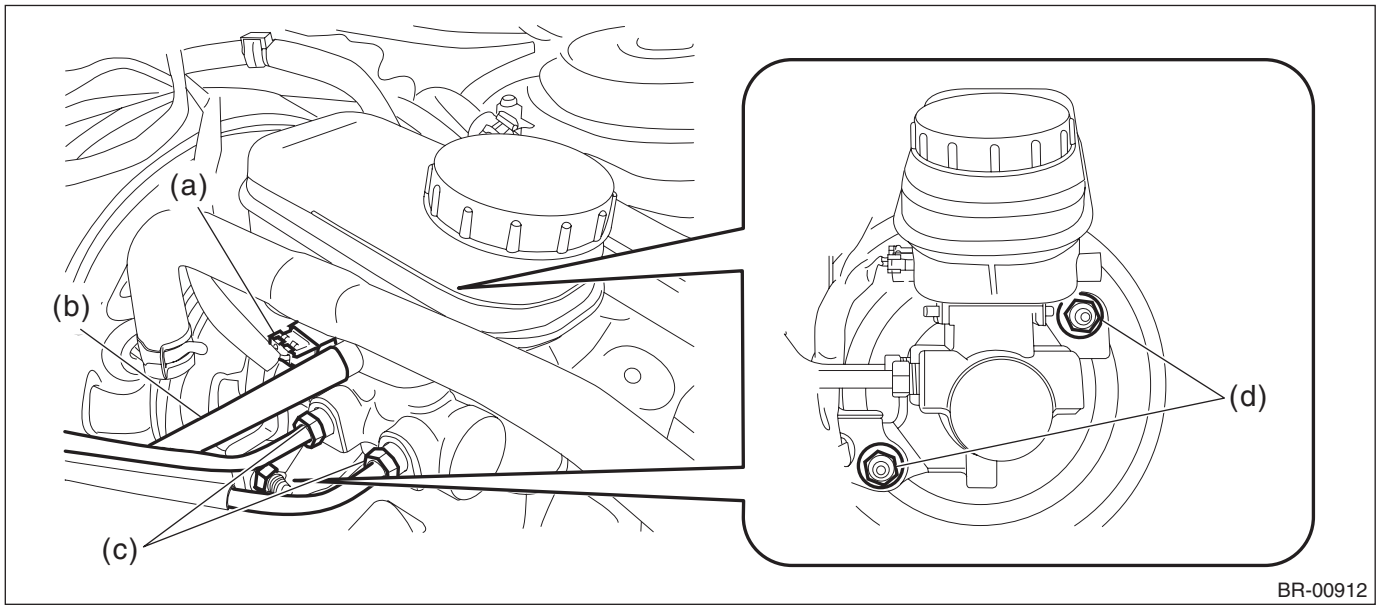
CAUTION:
Since the master cylinder assembly cannot be disassembled, disassembly and cleaning are prohibited. When replacing, replace the master cylinder assembly.

9. Brake Booster

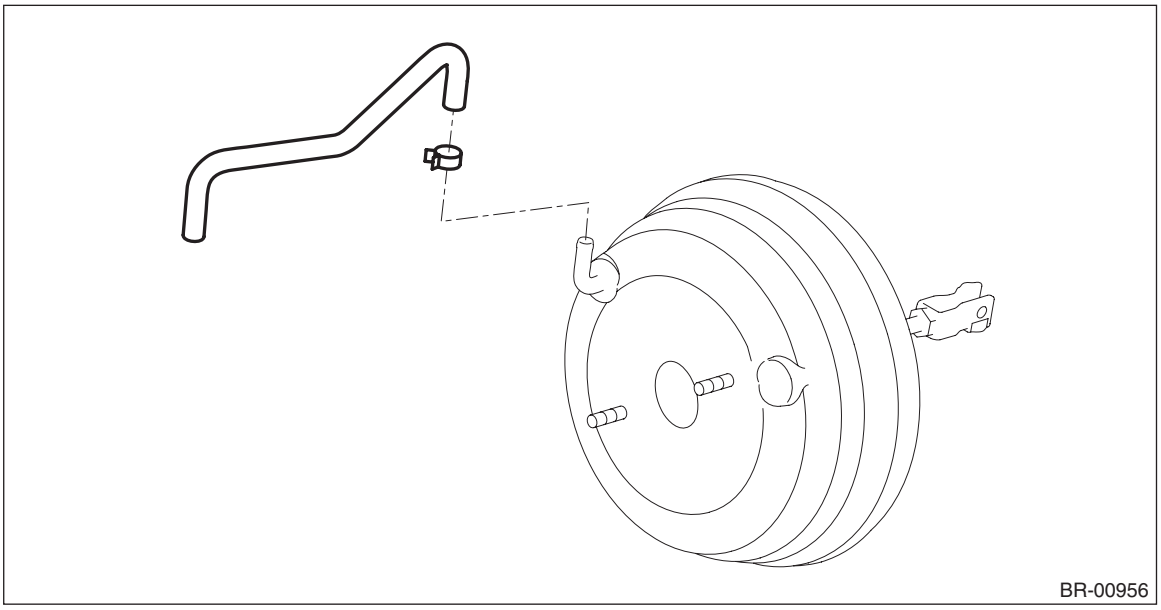
A: REMOVAL

CAUTION:
Do not allow brake fluid to come in contact with the painted surface of the vehicle body. If it does, wash off with water and wipe away completely.

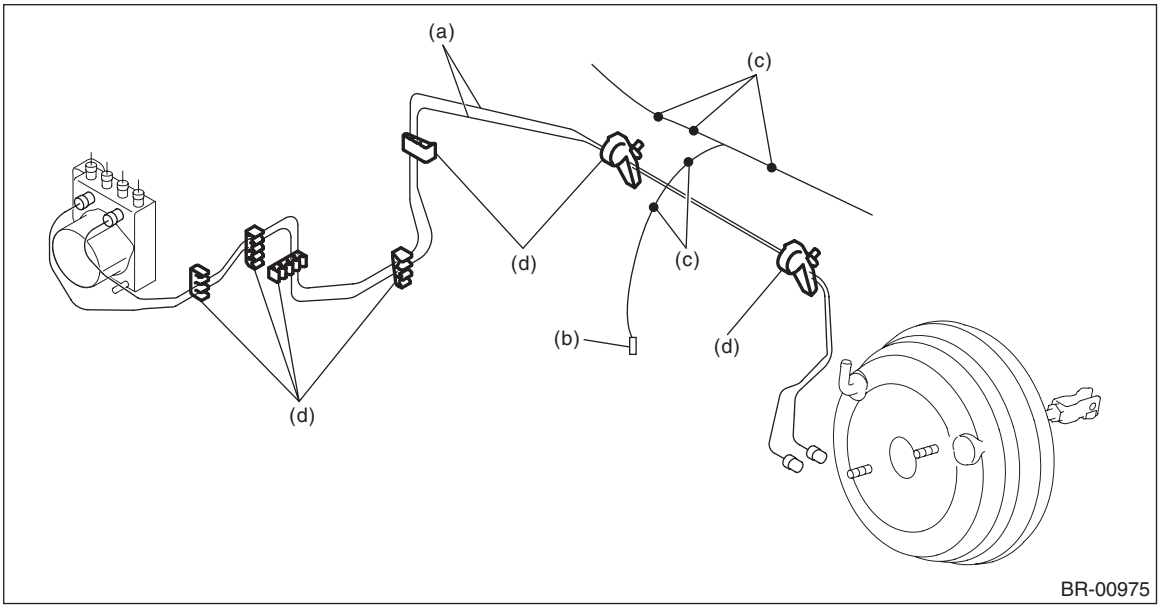
1) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
2) Drain brake fluid from the reservoir tank completely.
3) Disconnect the air conditioner pipe. <Ref. to AC-71, REMOVAL, Hose and Pipe.>
4) Remove the power steering control module. <Ref. to PS-42, REMOVAL, Power Steering Control Module.>
5) Remove the master cylinder assembly.
   (1) Disconnect the fluid level gauge connector (a).
   (2) Disconnect the clutch hose (b). (MT model)
   (3) Disconnect the brake pipe (c).
   (4) Remove the nut (d), and slowly remove the master cylinder assembly from the vacuum booster assembly.



6) Remove the clamp and remove the vacuum hose.

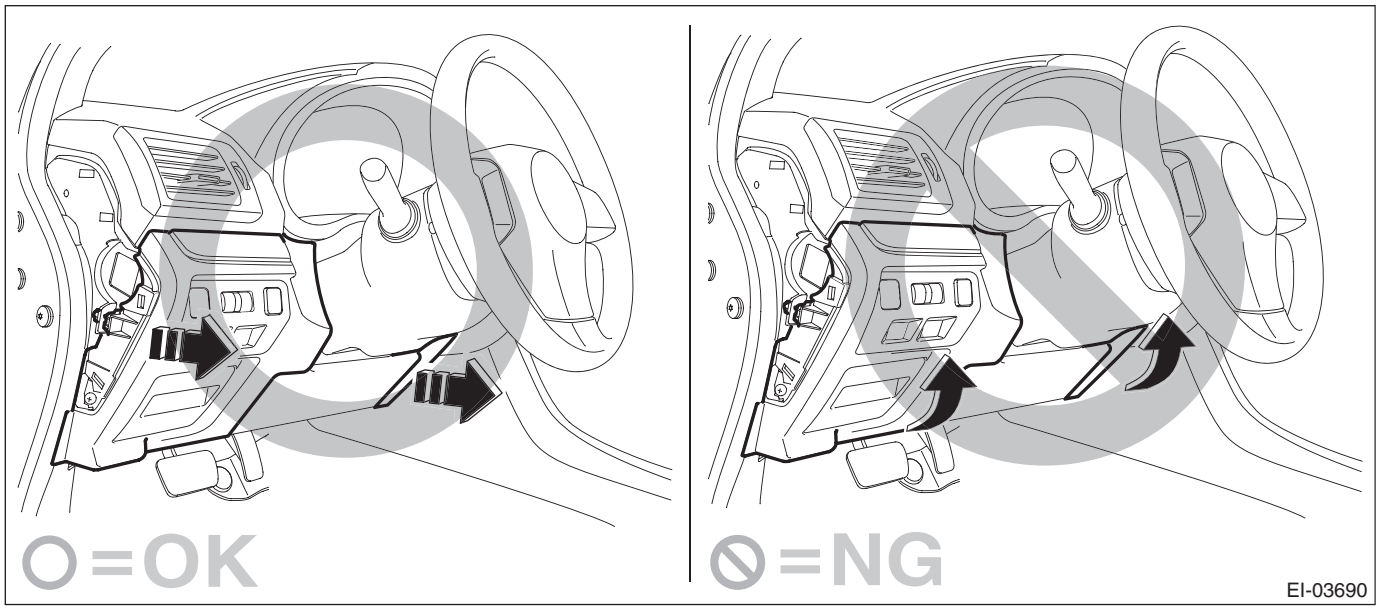


7) Remove the brake pipe assembly (a).
   (1) Disconnect the starter connector (b) and harness clip (c).
   (2) Remove the brake pipe assembly (a) from the pipe clip (d).

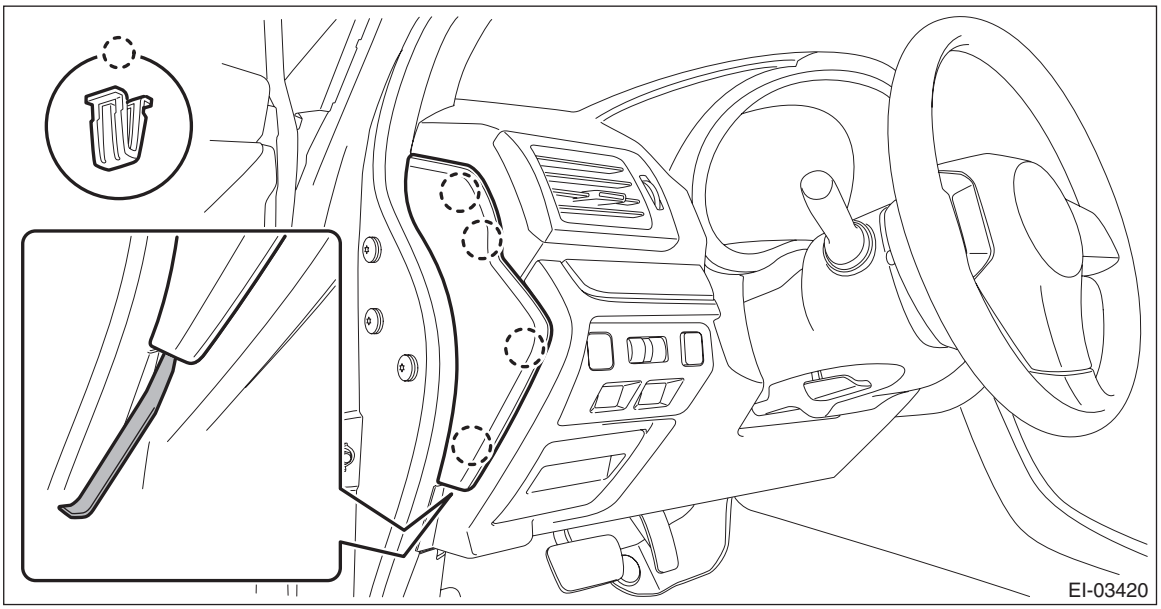


8) Remove the cover assembly - instrument panel LWR driver.

CAUTION:
When removing the cover assembly - instrument panel LWR driver, be sure to pull it toward you. If attempting to remove by turning it upward, the claws may be damaged.



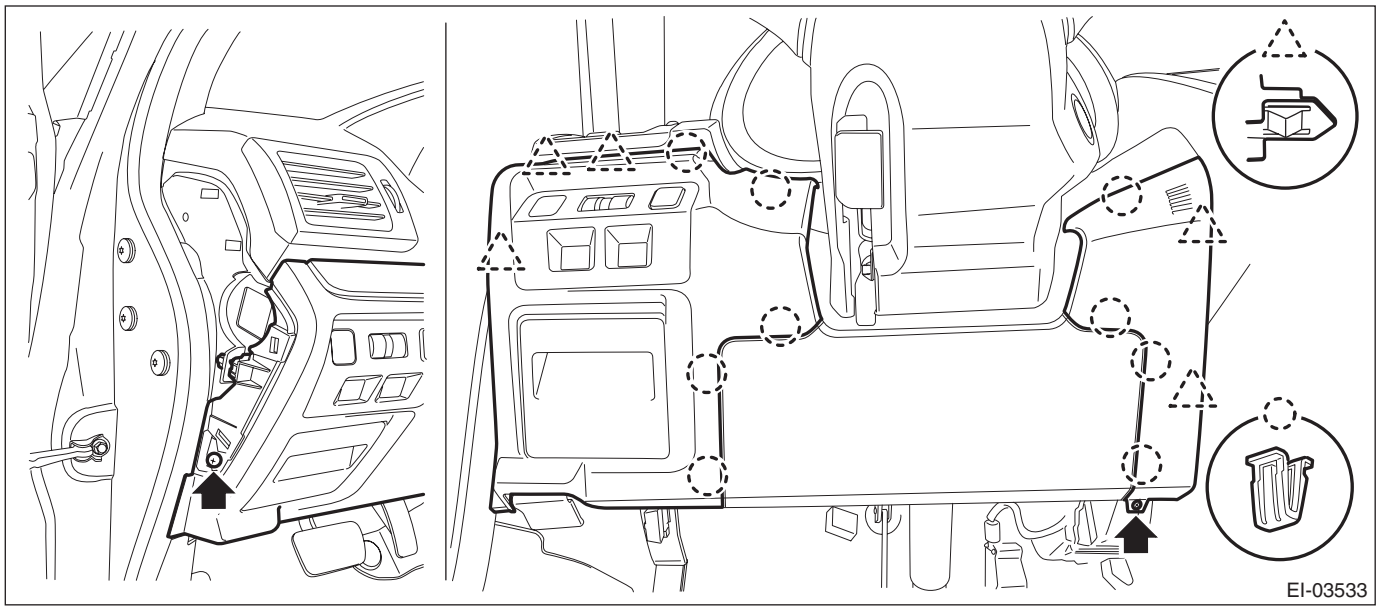
(1) Remove the clips, and remove the cover - instrument panel side LH.



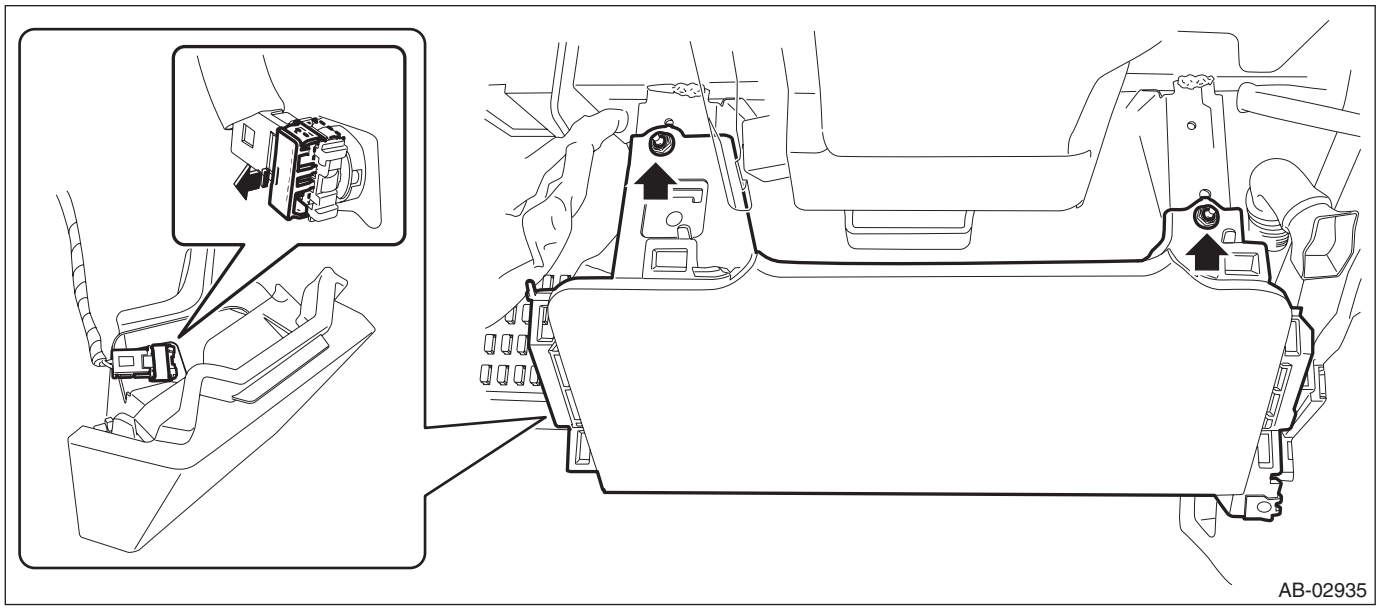
NOTE:
Using a plastic remover, open the cover - instrument panel side LH.

(2) Remove the screws and release the clips and claws.

(3) Disconnect the harness connectors, and remove the cover assembly - instrument panel LWR driver INN and OUT.

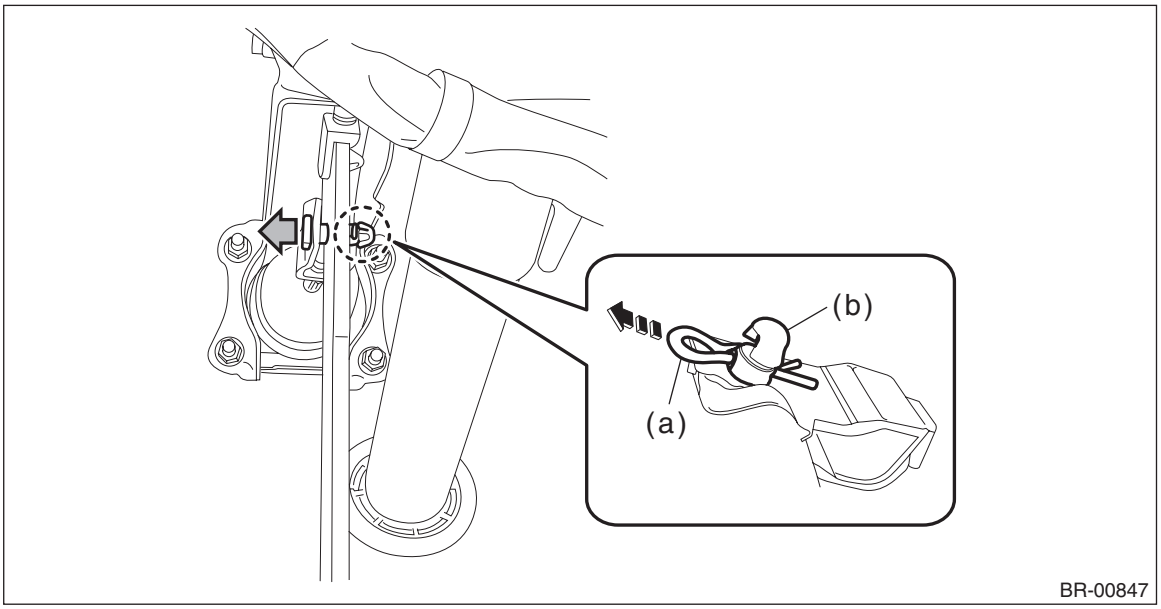


9) Remove the nuts to remove the knee airbag module and disconnect the harness connector. <Ref. to AB-33, KNEE AIRBAG MODULE, PROCEDURE, Airbag Connector.>



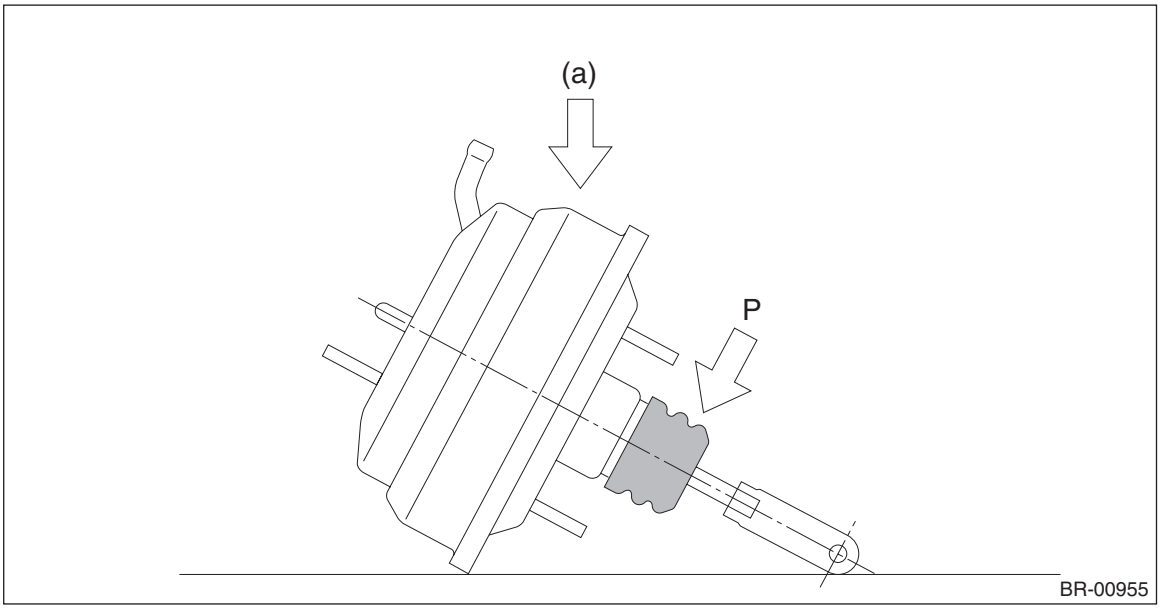
10) Remove the snap pin (a) and clevis pin (b), and remove the operating rod from the brake pedal.

CAUTION:
• Be careful not to apply excessive force to the operating rod when handling the operating rod. The angle may change by ±3°, and it may result in damage to power piston cylinder.
• Do not change the push rod length.

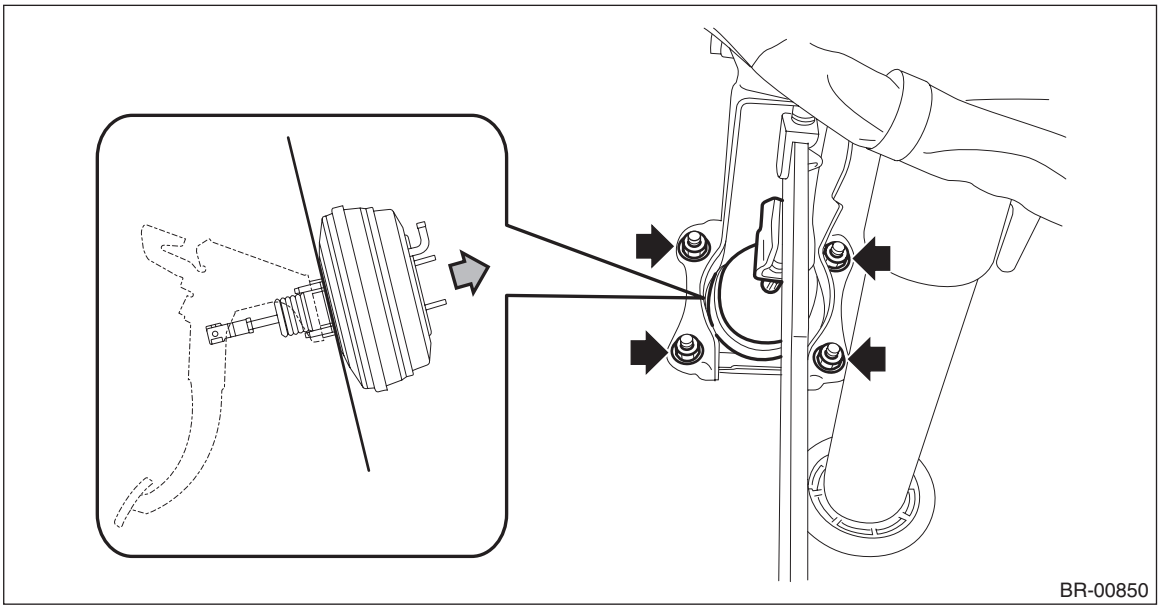


11) Remove the vacuum booster assembly.

CAUTION:
• Do not disassemble the vacuum booster assembly.
• Make sure that the booster shell and vacuum pipe are not subject to strong impacts.
• Be careful not to drop the vacuum booster assembly. If the vacuum booster assembly is dropped accidentally, replace it.
• Be careful when placing the vacuum booster assembly on floor.
• If external force (a) is applied from above when the vacuum booster assembly is placed in this position, the resin portion as indicated by "P" may become damaged.



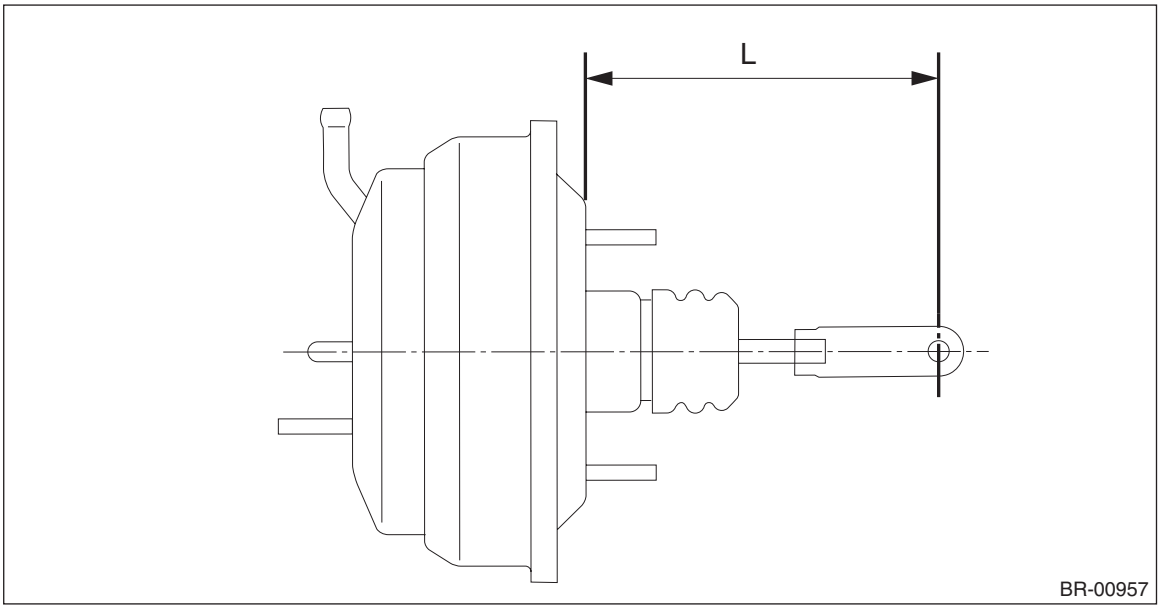
(1) Remove the nuts, and then remove the vacuum booster assembly.



B: INSTALLATION

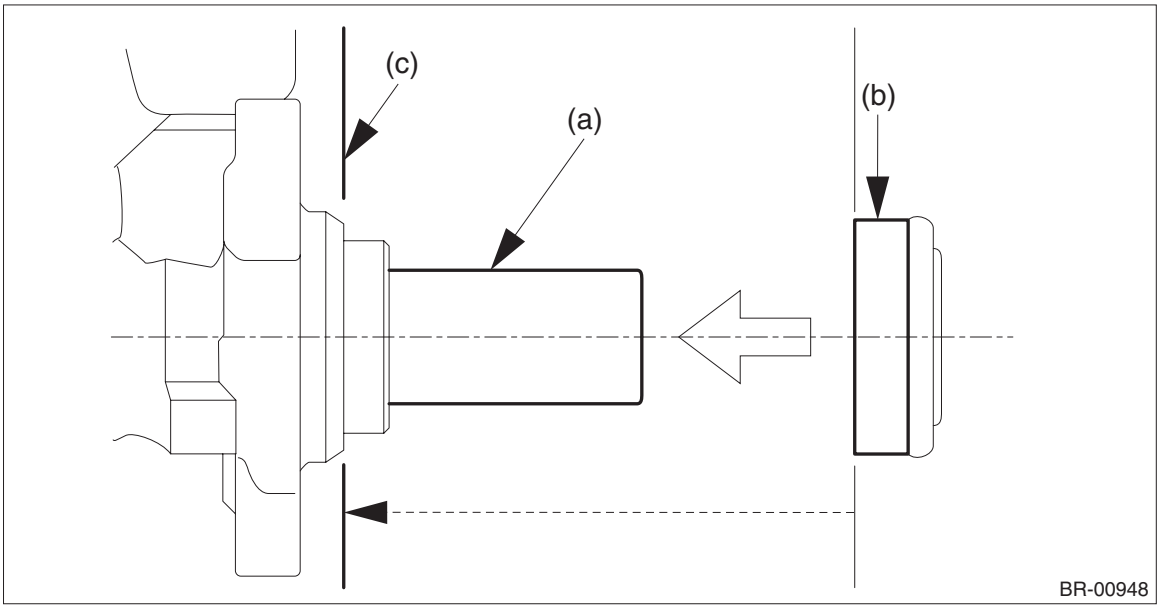
1) Check and adjust the operating rod of the vacuum booster assembly.
   (1) Measure the length between the vacuum booster assembly mounting surface and clevis pin hole.
   (2) If it is not within the specification, loosen the lock nut, rotate the vacuum booster assembly operating rod to adjust the rod length.

Specification L:
136.3 mm (5.37 in)



2) Install each part in the reverse order of removal.

CAUTION:
• Apply grease to the snap pin to prevent the operating rod from wear.
• Replace the clevis pin with new parts, and apply thin coat of NIGTIGHT LYW No. 2 grease to the clevis pin.
• When installing the master cylinder assembly, replace the seal sub assembly with a new part, and install it to the vacuum booster assembly.



(a) Primary piston
(b) Seal sub ASSY
(c) Install the seal sub assembly to this surface.

Tightening torque:
Vacuum booster assembly: 18 N·m (1.84 kgf-m, 13.3 ft-lb)
Master cylinder assembly: 13 N·m (1.33 kgf-m, 9.6 ft-lb)
Brake pipe flare nut: 19 N·m (1.94 kgf-m, 14.0 ft-lb)
Operating lock nut: 22 N·m (2.24 kgf-m, 16.2 ft-lb)
Knee airbag module: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

3) Install the air conditioner pipe. <Ref. to AC-12, AIR CONDITIONING UNIT, COMPONENT, General Description.>
4) Bleed air from the brake system. <Ref. to BR-59, PROCEDURE, Air Bleeding.>
5) Perform a road test to make sure the brakes do not drag.

C: INSPECTION

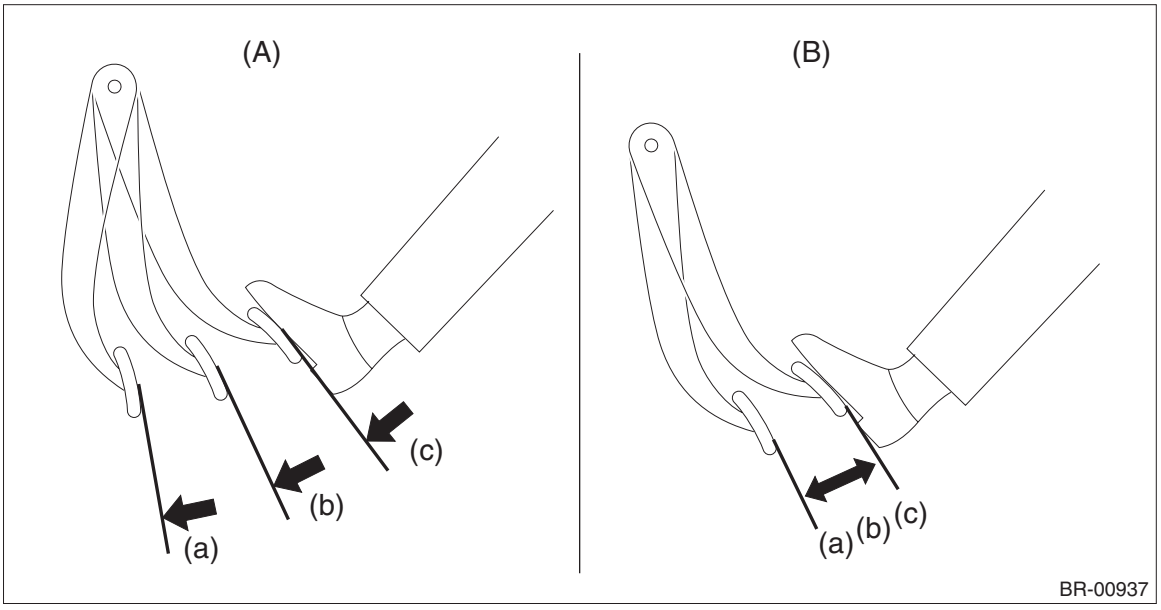
1. OPERATION CHECK WHEN NOT USING MEASURING DEVICES

CAUTION:
When checking operation, be sure to apply the parking brake securely.
When an operation check is performed with no measuring devices, a faulty part cannot be identified correctly. But it is possible to identify the outline of the defect by performing the check according to the following procedures.

- **Air tightness check**

1) Start the engine, and idle it for 1 to 2 minutes, then turn it OFF.
2) Depress the brake pedal several times applying the normal pedal force.

NOTE:
The pedal stroke should be the longest at the 1st depression, and it should become shorter at each successive depression.
3) If no change occurs in the pedal height when pressed, the vacuum booster assembly is faulty.



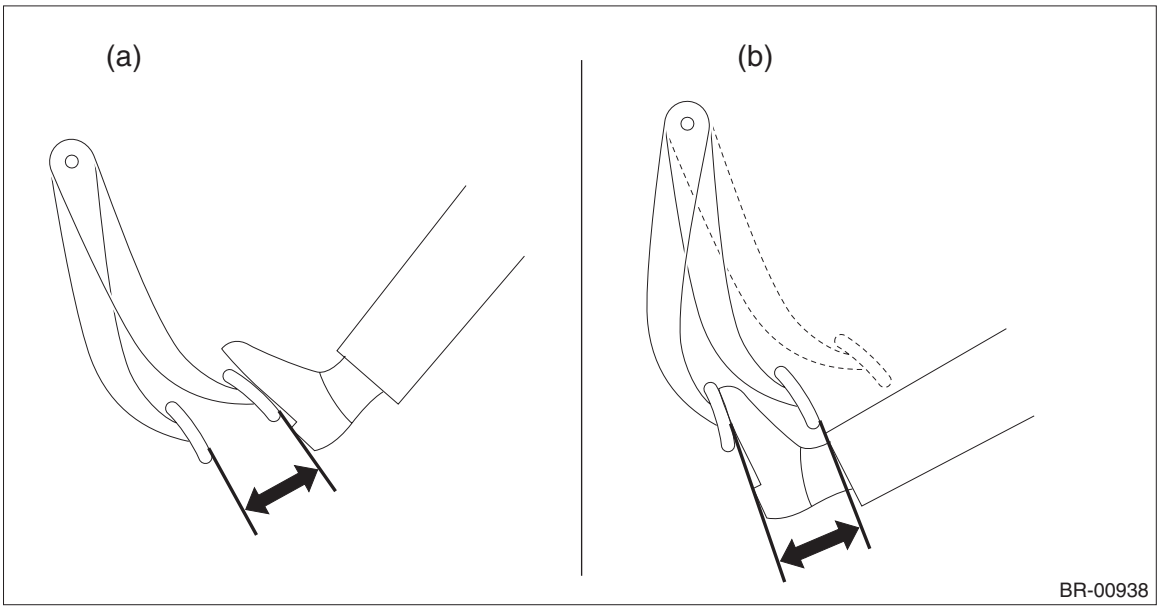
(A) Normal (B) Not OK

(a) 1st (b) 2nd (c) 3rd

NOTE:
- In case of defective operation, inspect the condition of the check valve and vacuum hose as well.
- Replace them if faulty, and perform the test again.
- If no improvement is observed, check precisely with gauges.

- **Check operation**

1) While the engine is OFF, depress the brake pedal several times applying the same pedal force, to check for a change in pedal height.



(a) When engine is stopped (b) When engine is started

2) With the brake pedal depressed, start the engine.
3) As the engine starts, the brake pedal should move slowly toward the floor. If the pedal height does not change, the vacuum booster assembly is faulty.

NOTE:
If a faulty part is detected after inspection, check precisely with measuring devices.

- **Loaded air tightness check**

Depress the brake pedal while the engine is running, and turn the engine to OFF while the pedal is depressed.
Keep the pedal depressed for 30 seconds. If the pedal height does not change, the function of vacuum booster assembly is normal. If the pedal height increases, it is faulty.

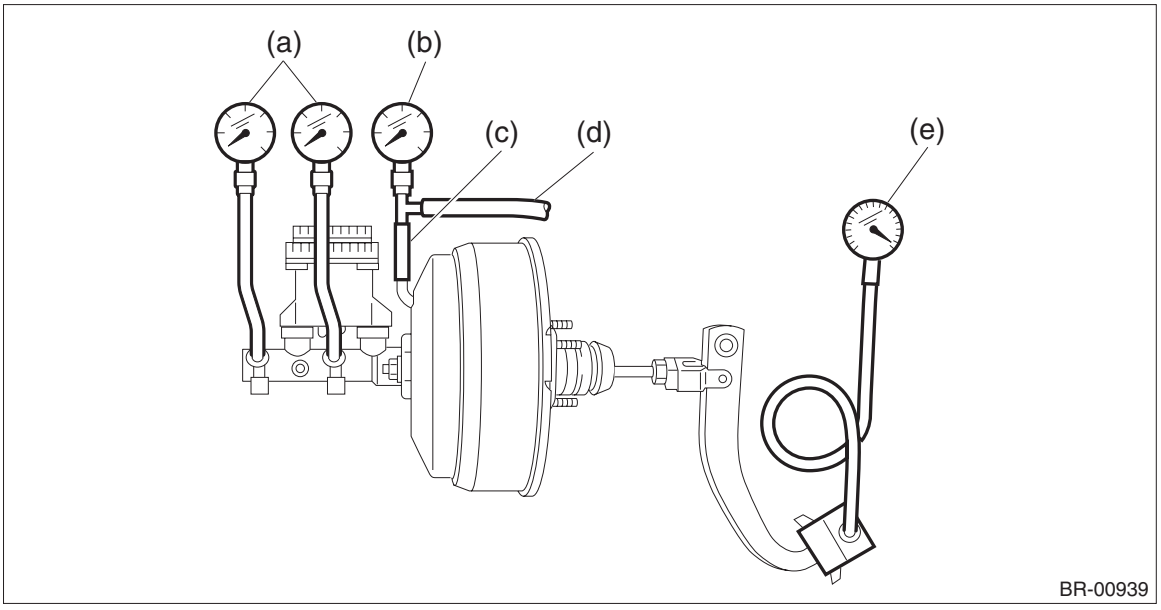
NOTE:
If a faulty part is detected after inspection, check precisely with measuring devices.

2. OPERATION CHECK WHEN USING MEASURING DEVICES

CAUTION:
When checking operation, be sure to apply the parking brake securely.

• Check with measuring devices

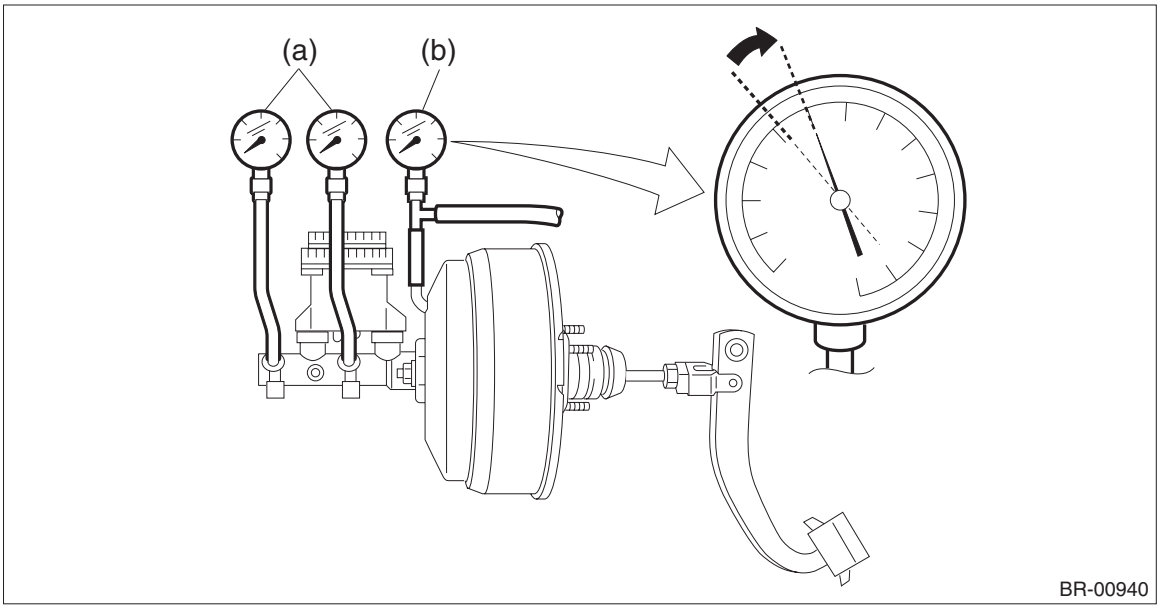
Connect a measuring device as shown in the figure. After bleeding air from the pressure gauge, perform each check.



(a) Pressure gauge
(b) Vacuum gauge
(c) Adapter hose
(d) Vacuum hose
(e) Pedal force gauge

• Air tightness check

1) Start the engine and keep it running at idle until vacuum pressure indicates 66.7 kPa (500 mmHg, 19.69 inHg) while the brake pedal is not depressed.



(a) Pressure gauge
(b) Vacuum gauge

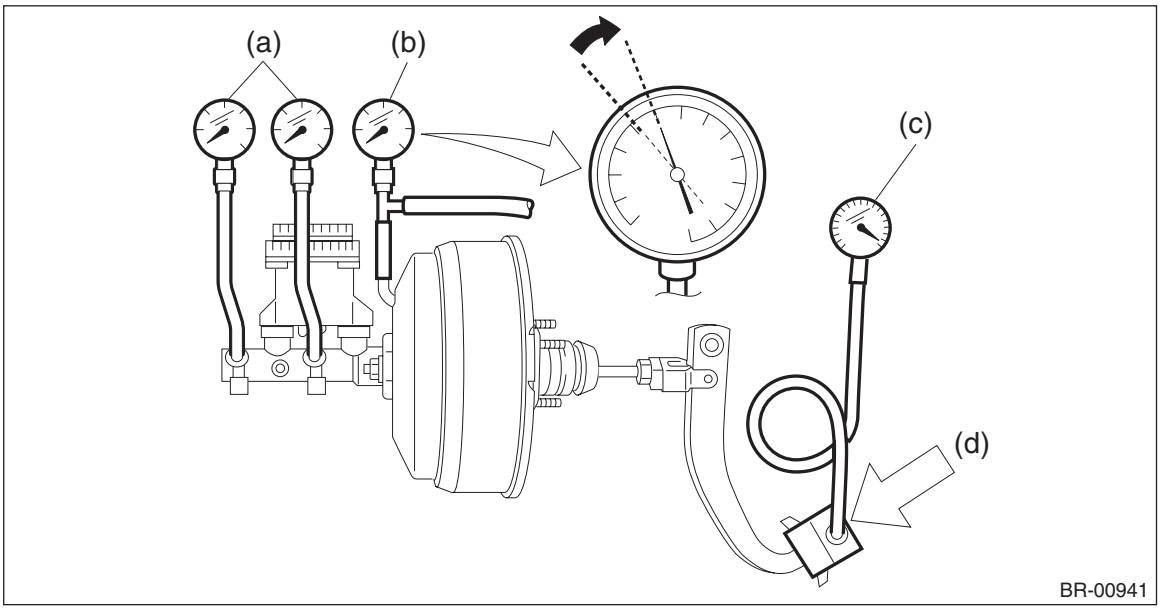
2) Stop the engine and check the vacuum pressure.
If the value matches the following standard, the vacuum booster assembly function is normal.

Vacuum pressure: standard
The range of vacuum pressure drop within 15 seconds after stopping the engine is 3.3 kPa (25 mmHg, 0.98 inHg) or less.

If a faulty part is detected after inspection, it may results from one of the following causes.
- Check valve malfunction
- Leak from vacuum hose
- Leak from shell joint section or stud bolt welded section
- Damaged diaphragm
- Leak from valve body seal and bearing section
- Leak from plate and seal assembly section
- Leak from poppet valve assembly section

• Loaded air tightness check

1) Start the engine and depress the brake pedal with a pedal force of 196 N (20 kgf, 44 lbf).
2) Keep the engine running at idle and the pedal depressed until vacuum pressure of the vacuum gauge indicates 66.7 kPa (500 mmHg, 19.69 inHg).



(a) Pressure gauge
(b) Vacuum gauge
(c) Pedal force gauge
(d) Depressed

3) Stop the engine and check the vacuum gauge.
If the value matches the following standard, the vacuum booster function is normal.

Vacuum pressure: standard
The range of vacuum pressure drop within 15 seconds after stopping the engine is 3.3 kPa (25 mmHg, 0.98 inHg) or less.

If a faulty part is detected after inspection, refer to “AIR TIGHTNESS CHECK”.
<Ref. to BR-53, INSPECTION, Brake Booster.>
4) If the vacuum booster assembly is faulty, replace it with a new part.

• Lack of boost action check

1) Turn the engine OFF, and set the value of the vacuum gauge to “0”.
2) Check the fluid pressure when the brake pedal is depressed. The pressure must be greater than the specification listed.

Brake pedal force: N (kgf, lbf)	147 (15, 33)	294 (30, 66)
Fluid pressure: kPa (kgf/cm^2, psi)	533 (5, 77)	1,551 (16, 225)

• Boosting action check

1) Set the vacuum gauge reading to 66.7 kPa (500 mmHg, 19.69 inHg) with the engine running.
2) Check the fluid pressure when the brake pedal is depressed. The pressure must be greater than the specification listed.

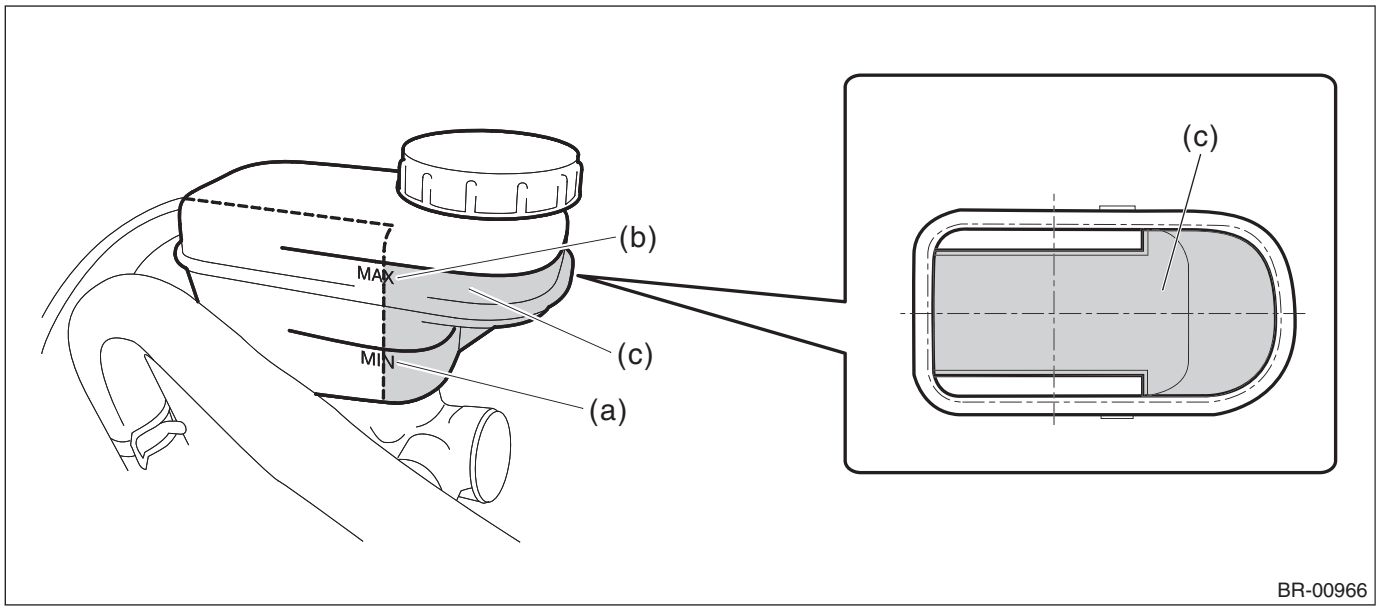
Brake pedal force: N (kgf, lbf)	147 (15, 33)	294 (30, 66)
Fluid pressure: kPa (kgf/cm^2, psi)	6,177 (63, 896)	11,273 (115, 1,635)

10.Brake Fluid

A: INSPECTION

1) Check that the amount of brake fluid is between the lines of “MIN” (a) and “MAX” (b) from a straight view or within 90° to the right and left forward.
If out of the specified range, refill with brake fluid (c) or drain it.
If the brake fluid level is close to “MIN”, check the brake pad for wear and refill with brake fluid.

CAUTION:
Always check the level using the specified direction because there is a partition in the reservoir tank.



2) Check the fluid for discoloration. If the fluid is extremely discolored, replace with the new fluid.

B: REPLACEMENT

CAUTION:
• Do not let brake fluid come into contact with the painted surface of the vehicle body. Wash away with water immediately and wipe off if it is spilled by accident.
• Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.
• Be careful not to allow dirt or dust to enter the reservoir tank.

NOTE:
• During the operation, keep the reservoir tank filled with brake fluid to prevent entry of air.
• Operate the brake pedal slowly.
• For convenience and safety, perform the work with 2 people.
• The required amount of brake fluid is approximately 500 mL (16.9 US fl oz, 17.6 Imp fl oz) for the entire brake system.
1) Lift up the vehicle and set rigid racks at the specified locations, or keep the vehicle lifted.
2) Remove both the front and rear wheels.
3) Drain brake fluid from the reservoir tank.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, DOT3, or DOT4

Perform the same procedure as for bleeding the brake line, until new brake fluid comes out from vinyl tube. <Ref. to BR-59, PROCEDURE, Air Bleeding.>

11.Air Bleeding

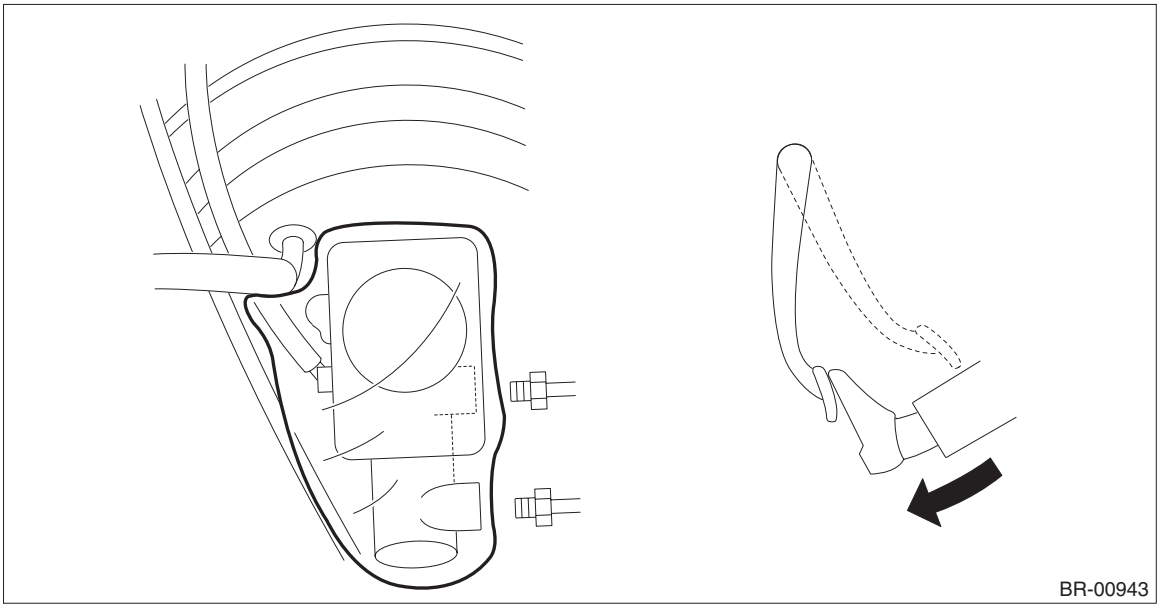
A: PROCEDURE

CAUTION:
• Do not let brake fluid come into contact with the painted surface of the vehicle body. Wash away with water immediately and wipe off if it is spilled by accident.
• Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.
• Be careful not to allow dirt or dust to enter the reservoir tank.

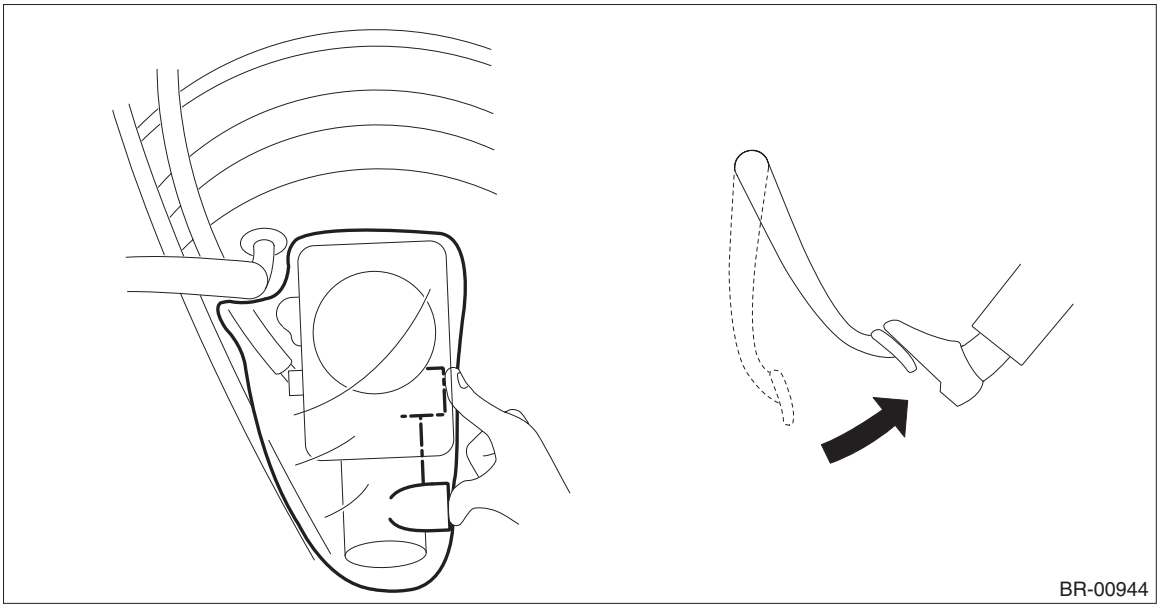
1. MASTER CYLINDER

NOTE:
• When the master cylinder assembly is replaced or the reservoir tank is empty, bleed the brake master cylinder and the clutch master cylinder (MT model).
• If bleeding of the master cylinder assembly is not necessary, omit the following procedures, and perform bleeding of the brake line. <Ref. to BR-60, BRAKE LINE, PROCEDURE, Air Bleeding.>
1) Add the brake fluid to the reservoir tank of the master cylinder assembly.

NOTE:
• MT model: Add the brake fluid until it flows out from the clutch hose nipple.
• Except for MT model: Add the brake fluid up to the “MAX” level.
• While bleeding air, keep the reservoir tank filled with brake fluid at MIN level or higher to prevent entry of air.
2) Disconnect the brake line at primary and secondary sides.
3) Wrap the master cylinder assembly with a plastic bag.
4) Depress the brake pedal slowly and hold it.



5) Plug the outlet plug with your finger, and then release the brake pedal.



6) Repeat the step 4) and 5) several times.
7) Remove the plastic bag.
8) Install the brake pipe to the master cylinder assembly.

Tightening torque:
Brake pipe flare nut: 19 N·m (1.94 kgf-m, 14.0 ft-lb)

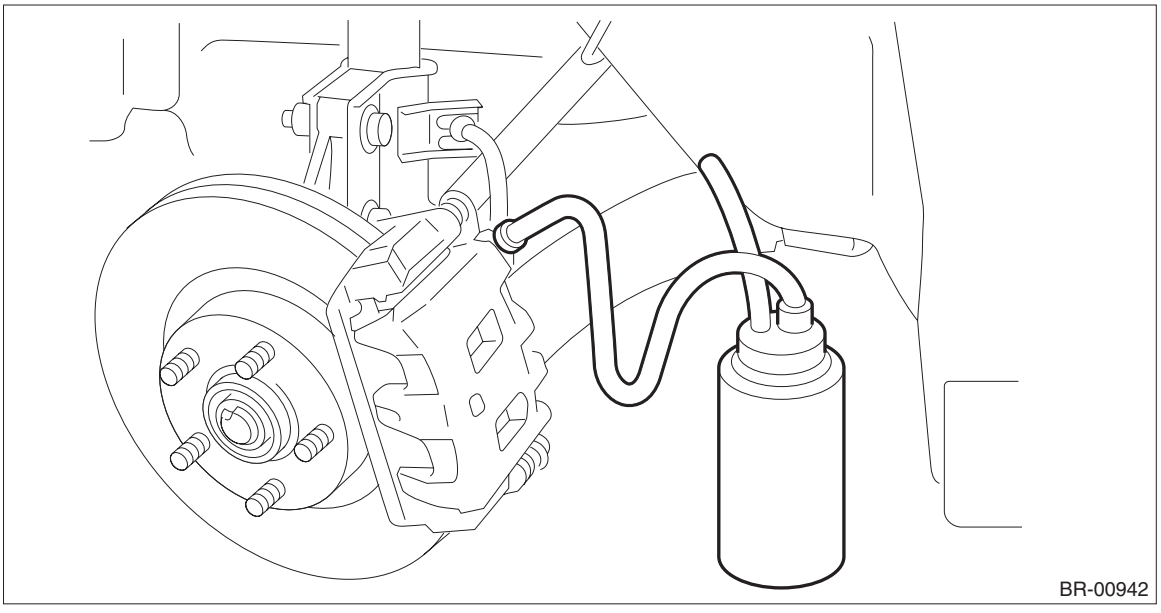
9) Bleed air from the brake line. <Ref. to BR-60, BRAKE LINE, PROCEDURE, Air Bleeding.>

2. BRAKE LINE

1) When the master cylinder assembly is replaced or the reservoir tank is empty, bleed the master cylinder assembly before bleeding the brake line. <Ref. to BR-59, MASTER CYLINDER, PROCEDURE, Air Bleeding.>
2) Fill the reservoir tank of the master cylinder assembly with brake fluid.

NOTE:
While bleeding air, keep the reservoir tank filled with brake fluid to prevent entry of air.

3) Attach one end of the vinyl tube to the bleeder - screw and the other end to the brake fluid container.

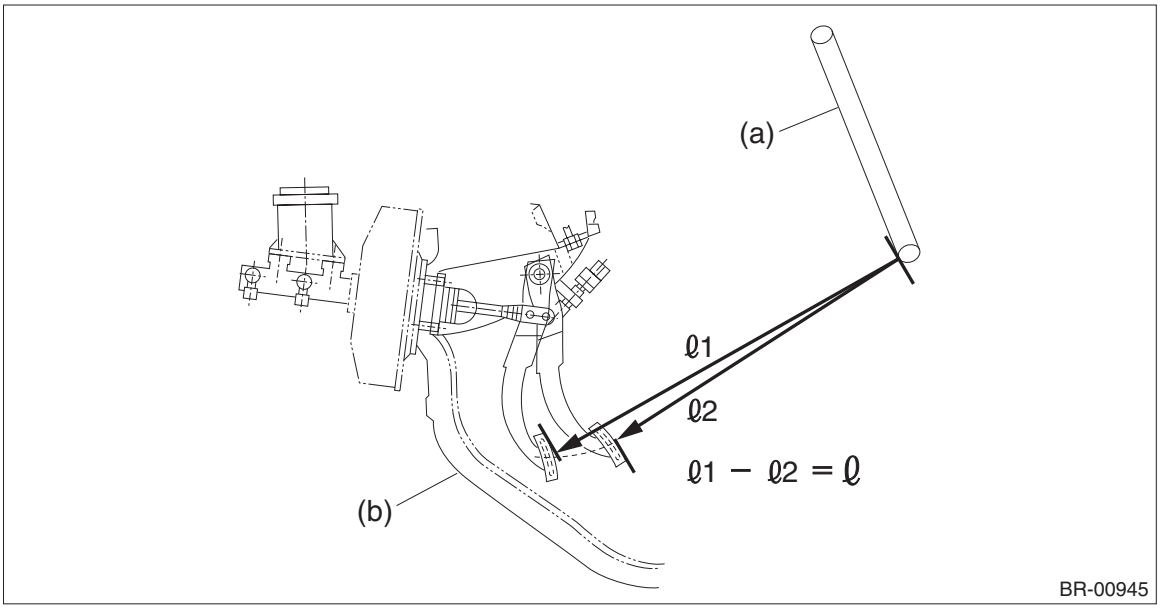


4) Depress the brake pedal several times, and hold it.

5) Loosen the bleeder - screw to drain brake fluid. Tighten the bleeder - screw quickly, and release the brake pedal.
6) Repeat the steps 4) to 5) until there are no more air bubbles in the vinyl tube.
7) Repeat the steps from 2) to 6) above to bleed air from each wheel.

NOTE:
Perform air bleed starting in the order from the farthest wheel cylinder from the master cylinder assembly.
8) Securely tighten the bleeder - screw.

Tightening torque:
Bleeder - screw: 8 N·m (0.82 kgf-m, 5.9 ft-lb)
9) Check that there are no brake fluid leaks in the entire brake system.
10) Check the pedal stroke.
(1) Warm up the engine until the engine speed stabilizes.
(2) Depress and hold the brake pedal with a force of 500 N (51 kgf, 112 lbf).
(3) Adjust the tilt position of the steering wheel to the lowest position.
(4) Measure the distance between brake pedal and steering wheel.
(5) Release the pedal, and measure the distance between pedal and steering wheel again.



(a) Steering wheel (b) Toe board

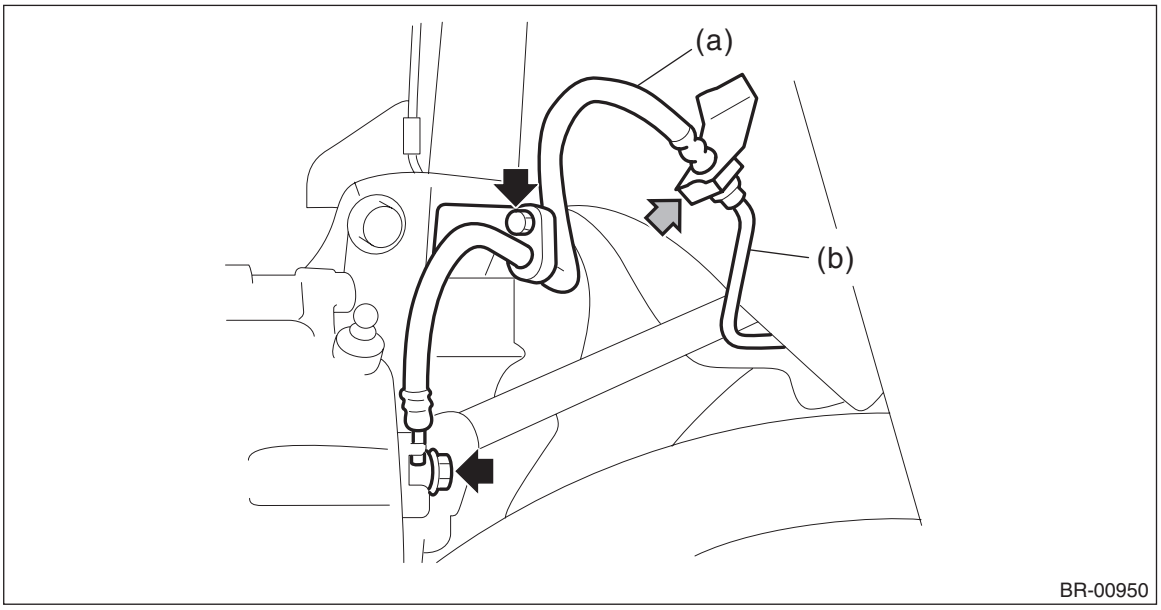
Specification of pedal stroke:
110 mm (4.33 in) or less when depressing the pedal with a force of 500 N (51 kgf, 112 lbf)
11) If the distance is more than specification, there is a possibility of air being caught in the brake line. Bleed the brake line of all air until the pedal stroke meets the specification.
12) Operate the hydraulic control unit in the sequence control mode. <Ref. to VDC-20, ABS Sequence Control.>
13) Check the pedal stroke again.
14) If the distance is more than specification, there is a possibility of air being caught in the hydraulic unit. Repeat above steps 2) to 9) until the pedal stroke meets the specification.
15) Fill the reservoir tank with brake fluid up to the “MAX” level.
16) Perform a road test and ensure that the brakes operate normally.

12.Brake Hose

A: REMOVAL

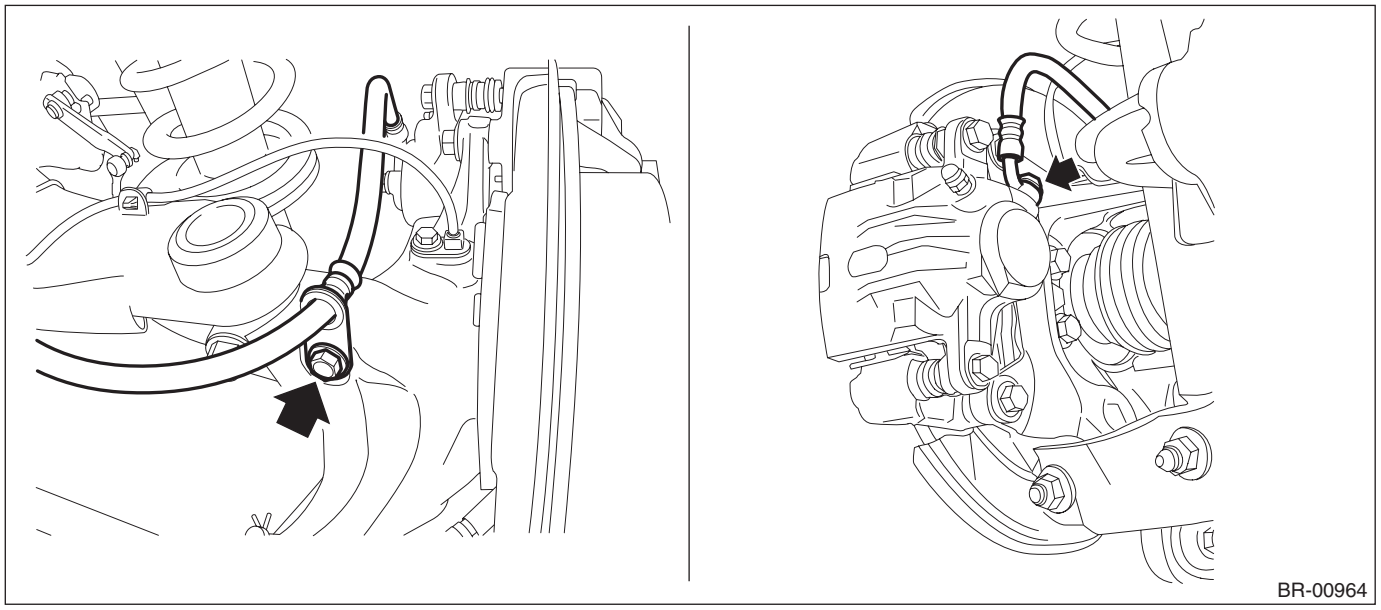
1. FRONT BRAKE HOSE

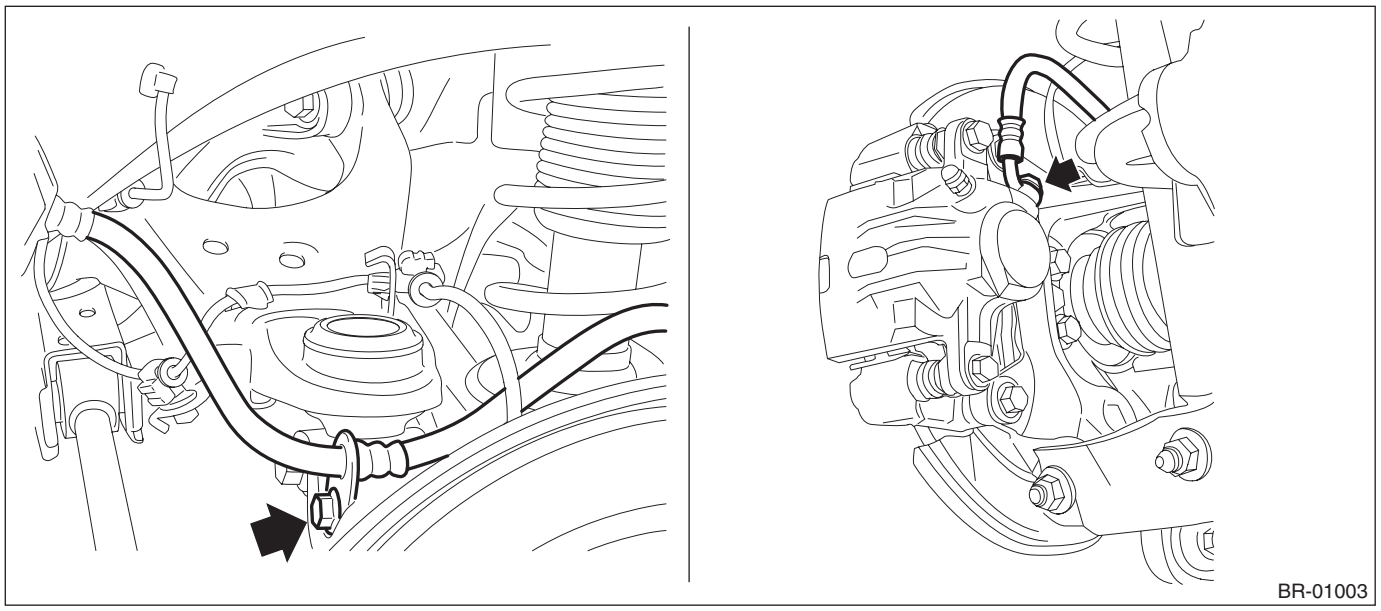
1) Separate the brake pipe (b) from brake hose (a) using a flare nut wrench.
2) Remove the clamp, strut mounting bolt and union bolt, and remove the front brake hose.



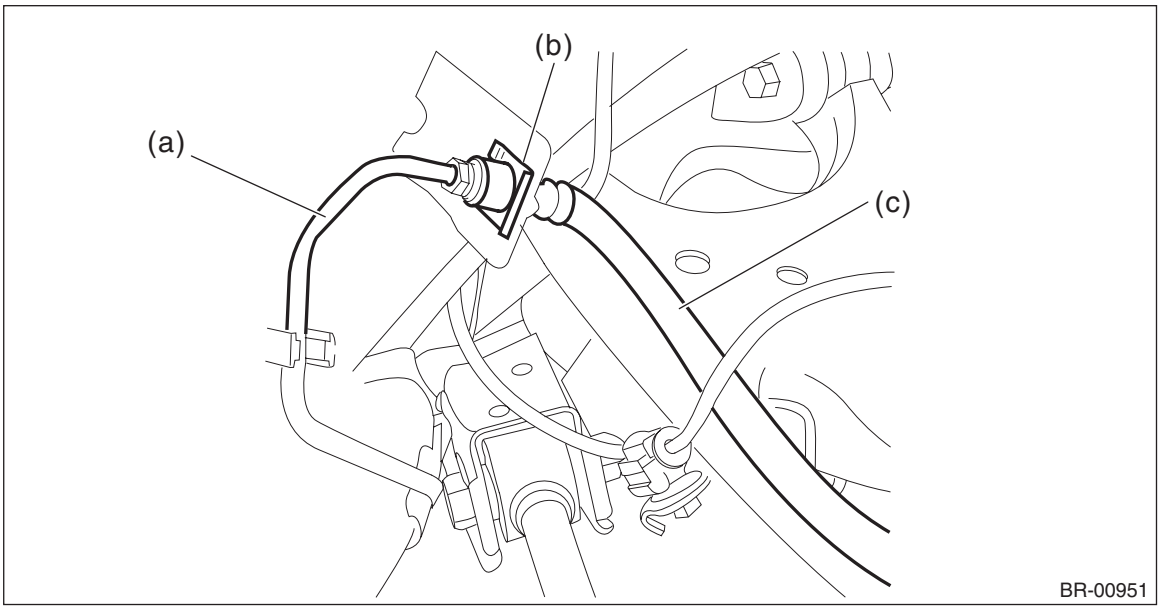
2. REAR BRAKE HOSE

1) Remove the brake hose bracket bolt and union bolt.





2) Separate the brake pipe (a) using a flare nut wrench.
3) Remove the brake hose clamp (b), and remove the rear brake hose (c).



B: INSTALLATION

1. FRONT BRAKE HOSE

1) Secure the brake hose to strut mount.

Tightening torque:
Brake hose: 33 N·m (3.36 kgf-m, 24.3 ft-lb)

2) Connect the brake hose to the front caliper body assembly using a new gasket.

Tightening torque:
Union bolt: 18 N·m (1.84 kgf-m, 13.3 ft-lb)

3) Position the disc in straight position and route the brake hose through the hole in the bracket on the wheel apron side.

CAUTION:
Do not twist the brake hose.

4) Temporarily tighten the flare nut which connects brake pipe and hose.
5) Secure the brake hose to wheel apron bracket with clamp.
6) Tighten the flare nut to the specified torque.

Tightening torque:
Brake pipe flare nut: 15 N·m (1.53 kgf-m, 11.1 ft-lb)

7) Bleed air from the brake system. <Ref. to BR-59, PROCEDURE, Air Bleeding.>

2. REAR BRAKE HOSE

1) Route the brake hose through the hole of bracket, and lightly tighten the flare nut to connect brake pipe.
2) Insert the clamp to secure brake hose.

Tightening torque:
Brake hose bracket: 33 N·m (3.36 kgf-m, 24.3 ft-lb)

3) Install the brake hose to rear caliper body using a new gasket.

Tightening torque:
Union bolt: 18 N·m (1.84 kgf-m, 13.3 ft-lb)

4) Tighten the flare nut to the specified torque.

Tightening torque:
Brake pipe flare nut: 15 N·m (1.53 kgf-m, 11.1 ft-lb)

5) Bleed air from the brake system. <Ref. to BR-59, PROCEDURE, Air Bleeding.>

C: INSPECTION

Check the hose for crack, interference with other parts, damage, and fluid leakage on connecting sections. If any faulty is found, repair or replace the relevant part.

13.Brake Pipe

A: REMOVAL

CAUTION:
• Yellow connectors and harnesses with yellow tapes around them are the connectors and harnesses for the airbag system. Using a tester above such circuits may cause malfunction of airbag system. Follow the cautions for "AIRBAG SYSTEM" in this case. <Ref. to AB-11, CAUTION, General Description.>
• Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
• When removing the brake pipe, do not bend.

NOTE:
The airbag system wiring harness is routed near the center brake pipe.

B: INSTALLATION

CAUTION:
• Yellow connectors and harnesses with yellow tapes around them are the connectors and harnesses for the airbag system. Using a tester above such circuits may cause malfunction of airbag system. Follow the cautions for "AIRBAG SYSTEM" in this case. <Ref. to AB-11, CAUTION, General Description.>
• Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
• When installing the brake pipe, do not bend.
• After installing the brake pipe and hose, perform air bleed.
• After installing the brake hoses, make sure that they do not contact the tires or suspension assembly, etc.

NOTE:
The airbag system wiring harness is routed near the center brake pipe.

Tightening torque:
Front brake pipes & hoses: <Ref. to BR-8, FRONT BRAKE PIPES AND HOSES, COMPONENT, General Description.>
Center & rear brake pipes and hoses: <Ref. to BR-9, CENTER AND REAR BRAKE PIPES AND HOSES, COMPONENT, General Description.>

C: INSPECTION

Check the pipe for crack and damage, and also check the connection for fluid leakage. If any faulty is found, repair or replace the relevant part.

NOTE:
Use a mirror when inspecting back sides and other locations which are hard to see.

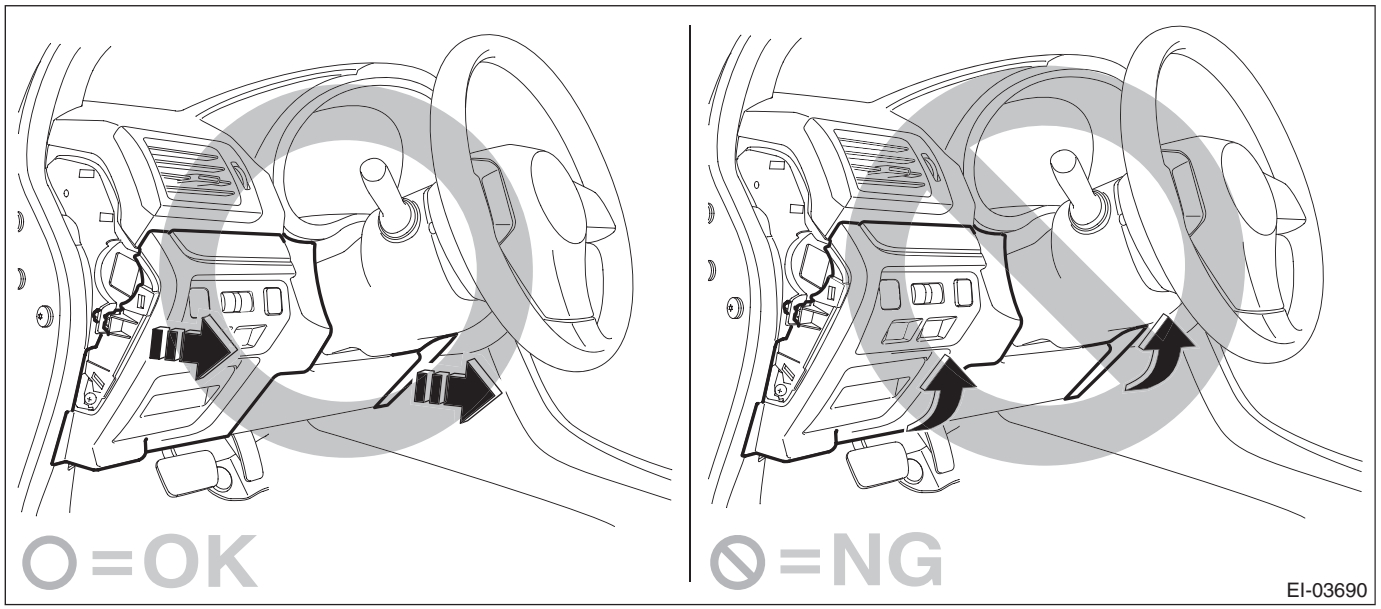
14.Brake Pedal

A: REMOVAL

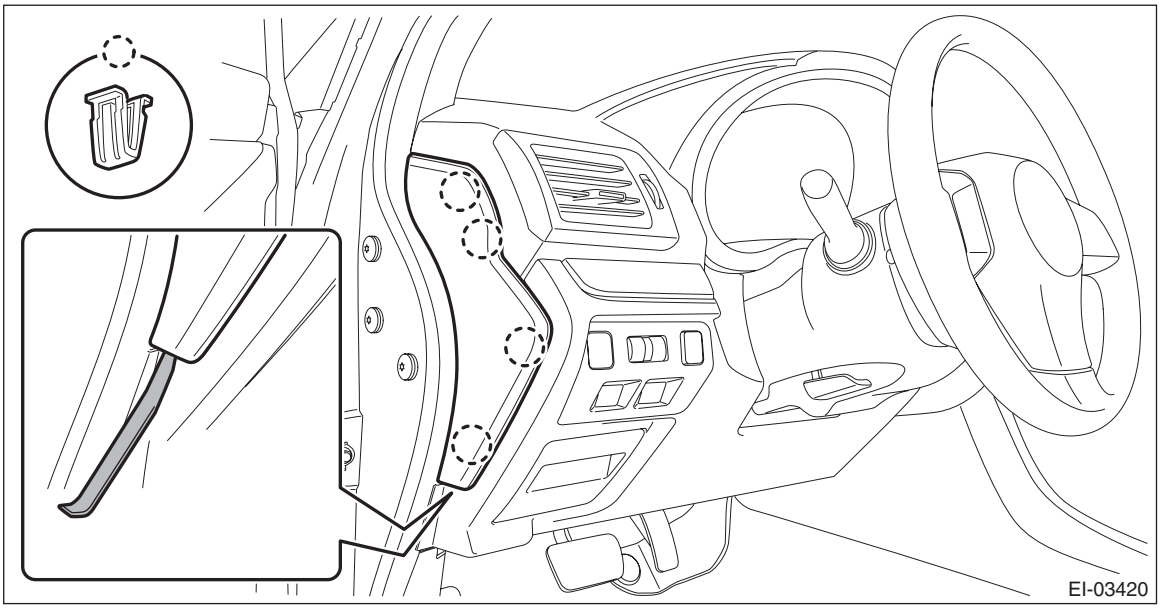
1. CVT MODEL

1) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
2) Remove the cover assembly - instrument panel LWR driver.

CAUTION:
When removing the cover assembly - instrument panel LWR driver, be sure to pull it toward you. If attempting to remove by turning it upward, the claws may be damaged.



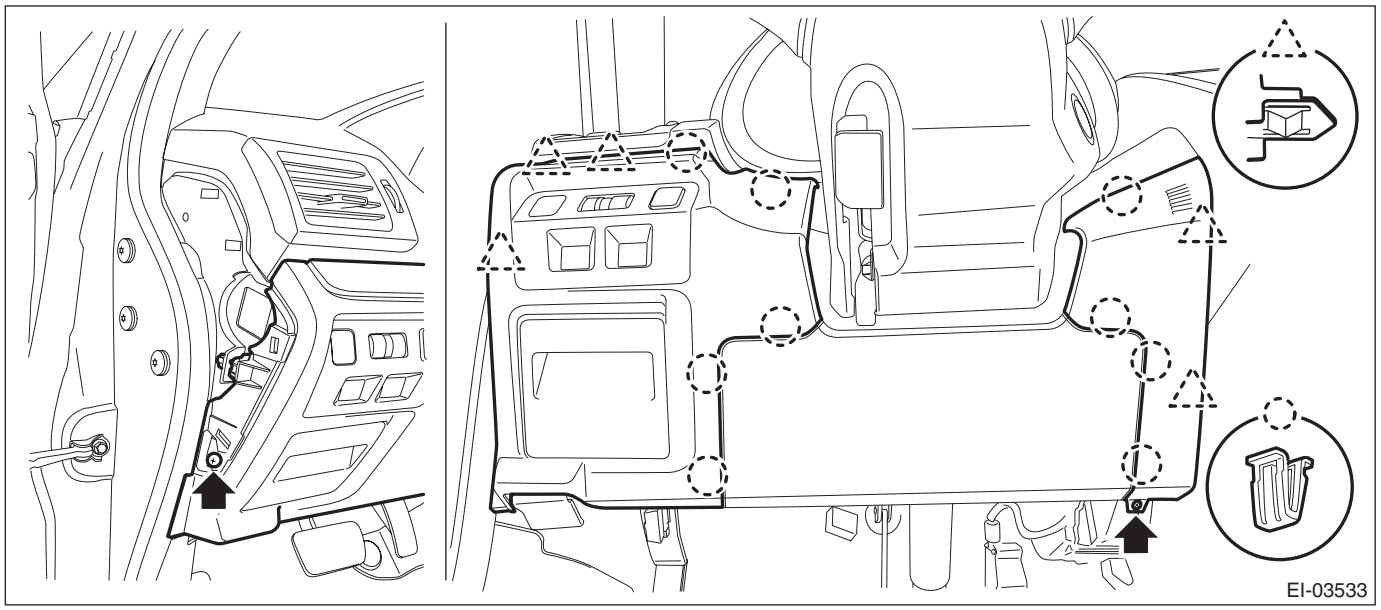
(1) Remove the clips, and remove the cover - instrument panel side LH.



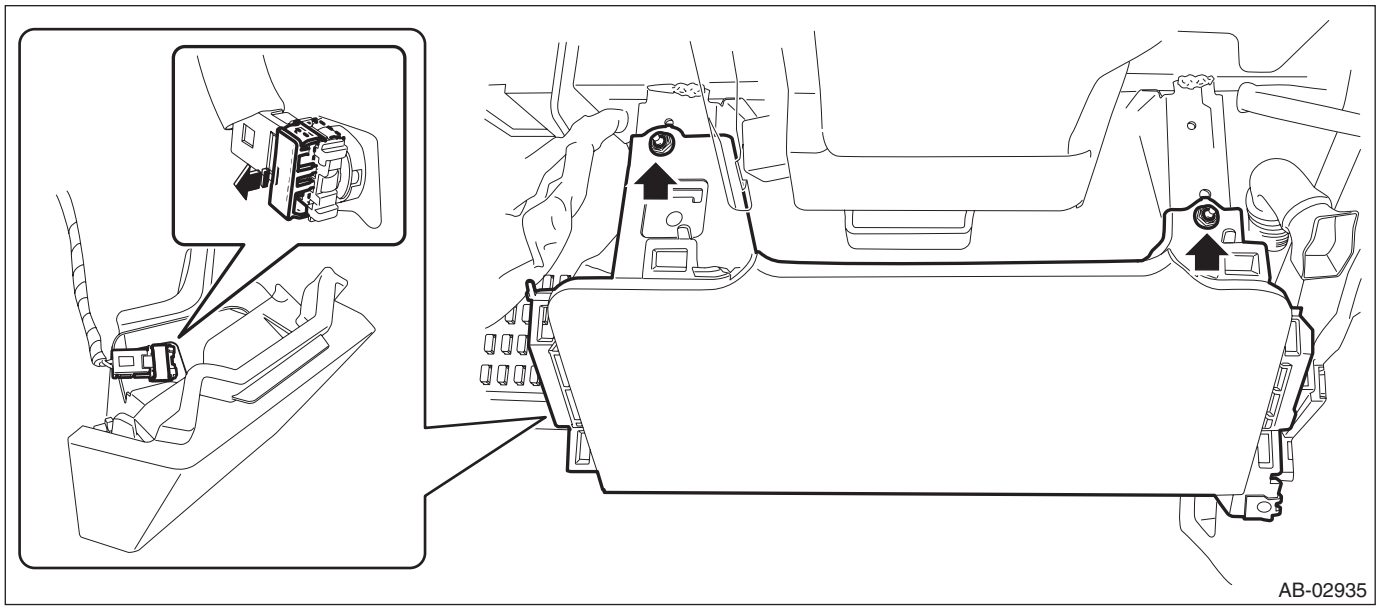
NOTE:
Using a plastic remover, open the cover - instrument panel side LH.

(2) Remove the screws and release the clips and claws.

(3) Disconnect the harness connectors, and remove the cover assembly - instrument panel LWR driver INN and OUT.

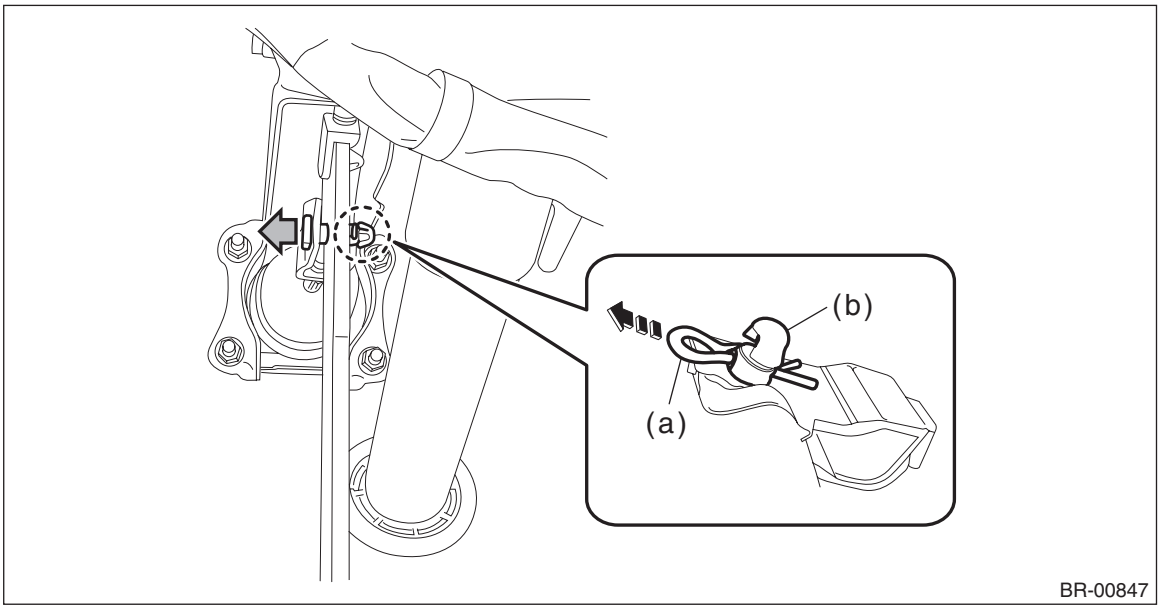


3) Remove the nuts to remove the knee airbag module and disconnect the harness connector. <Ref. to AB-33, KNEE AIRBAG MODULE, PROCEDURE, Airbag Connector.>

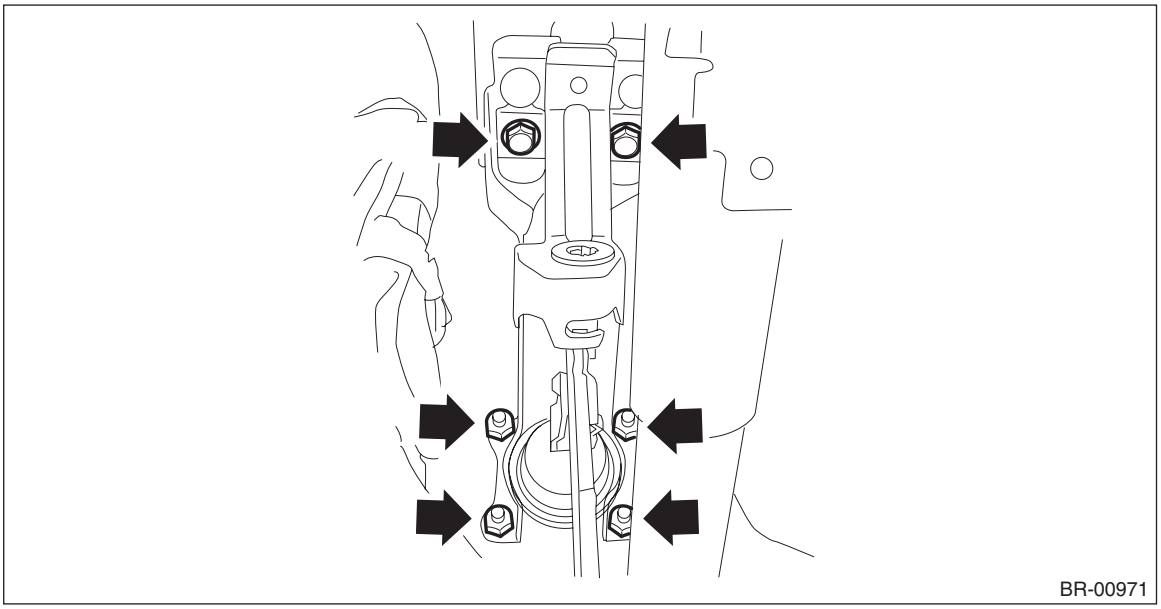


4) Remove the brake pedal assembly.
(1) Disconnect the switch - stop light connector.
(2) Remove the snap pin (a) and clevis pin (b), and remove the operating rod from the brake pedal.

CAUTION:
• Be careful not to apply excessive force to the operating rod when handling the operating rod. The angle may change by ±3°, and it may result in damage to power piston cylinder.
• Do not change the push rod length.



(3) Remove the bolt and nut, and then detach the brake pedal assembly.



2. MT MODEL

NOTE:
Brake pedal is integrated with the clutch pedal.
For removal procedures of the brake pedal, refer to Clutch section. <Ref. to CL-22, REMOVAL, Clutch Pedal.>

B: INSTALLATION

1) Install each part in the reverse order of removal.

CAUTION:
- **Apply grease to the snap pin to prevent the operating rod from wear.**
- **Replace the clevis pin with new parts, and apply thin coat of NIGTIGHT LYW No. 2 grease to the clevis pin.**

Tightening torque:
Brake pedal: 18 N·m (1.84 kgf-m, 13.3 ft-lb)
Knee airbag module: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

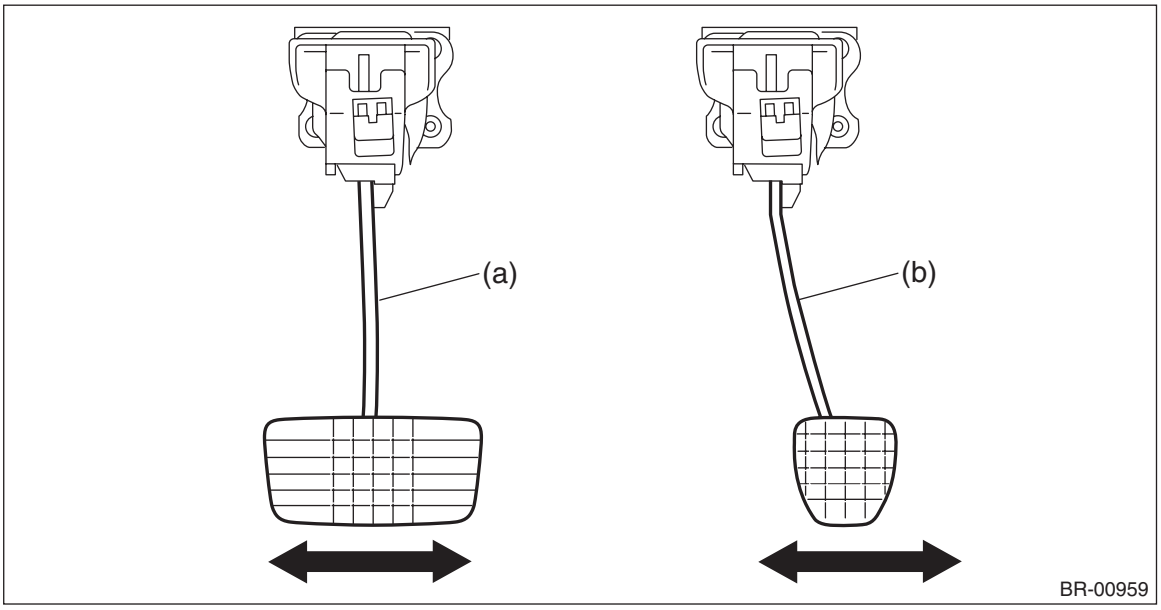
2) Check that the brake light operate properly.
3) Check the brake pedal after installation. <Ref. to BR-69, INSPECTION, Brake Pedal.>

C: INSPECTION

1) Move the pad - brake pedal in a horizontal direction with a force of approx. 10 N (1 kgf, 2 lbf), and check that the pedal deflection is in the range of specifications.

CAUTION:
If excessive deflection is noted, replace with a new bushing.

Deflection of brake pedal:
Wear limit: 5.0 mm (0.197 in) or less

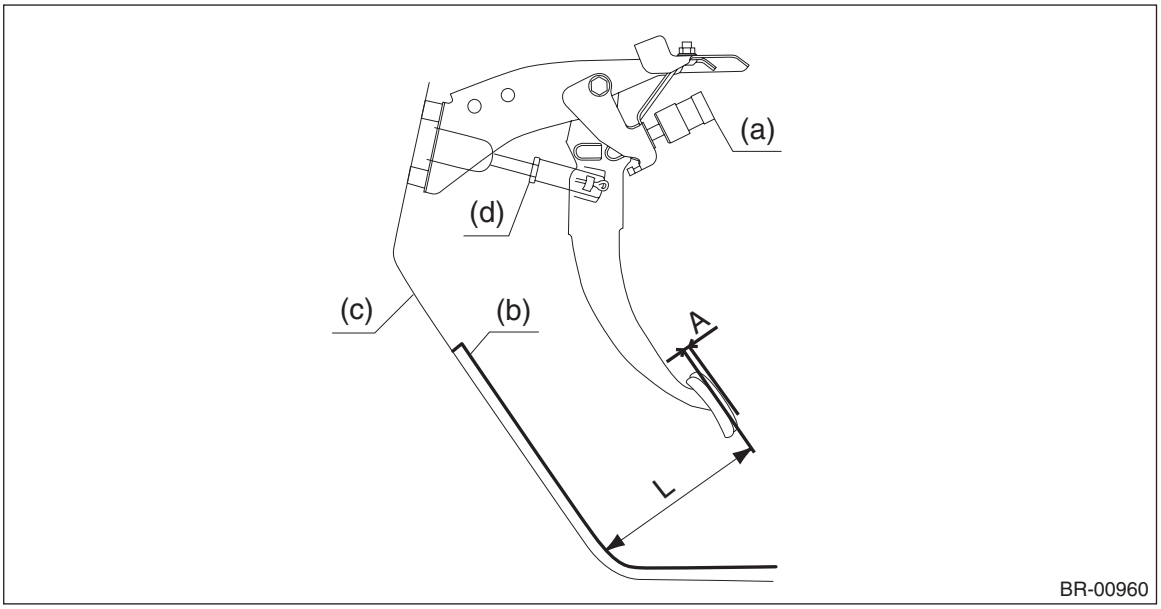


(a) Brake pedal (except for MT model) (b) Brake pedal (MT model)

2) Check the position of the pedal pad.

Pedal height L:
140 — 150 mm (5.51 — 5.91 in)

Brake pedal free play A:
0.5 — 2 mm (0.020 — 0.079 in) [When pulling the brake pedal upward with a force of less than 10 N (1 kgf, 2 lbf).]



(a) Switch - stop light
(b) Mat
(c) Toe board
(d) Brake booster operating rod

3) If it is not within the specification, loosen the lock nuts of vacuum booster operating rod, and rotate the rod to adjust the pedal height L within the specification.
4) Tighten the lock nut.

Tightening torque:
Operating lock nut: 22 N·m (2.24 kgf-m, 16.2 ft-lb)

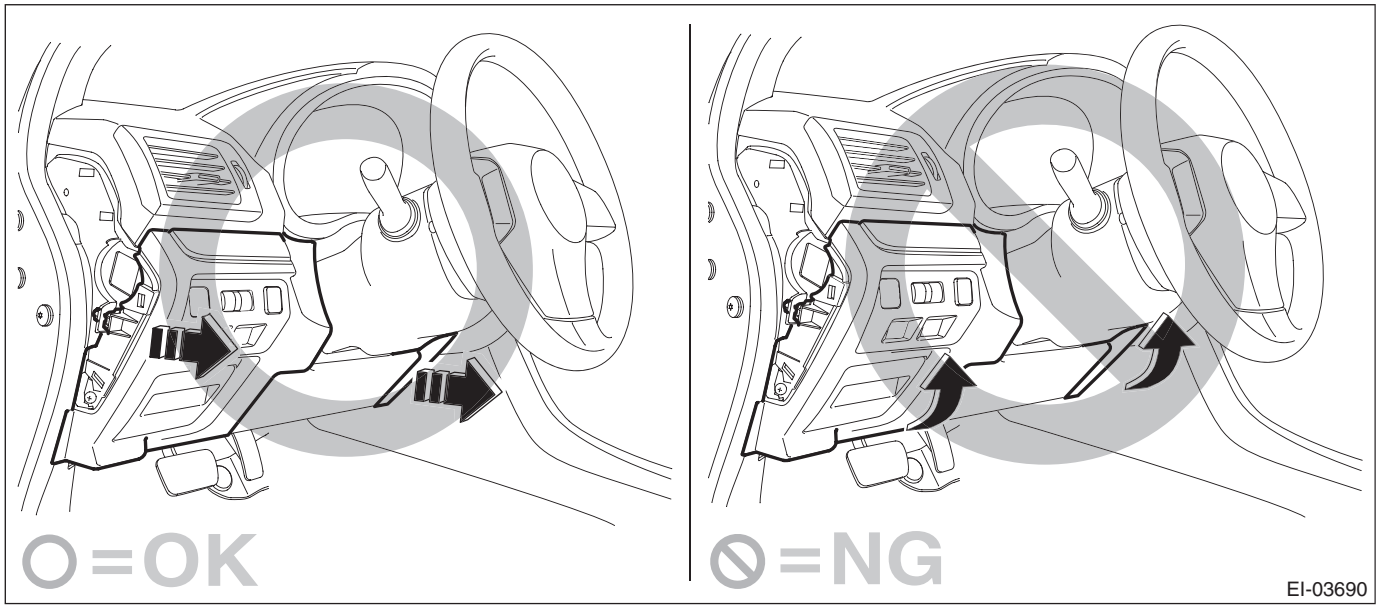
NOTE:
Check the brake pedal height. When adjusting, also adjust the switch - stop light.

15.Stop Light Switch

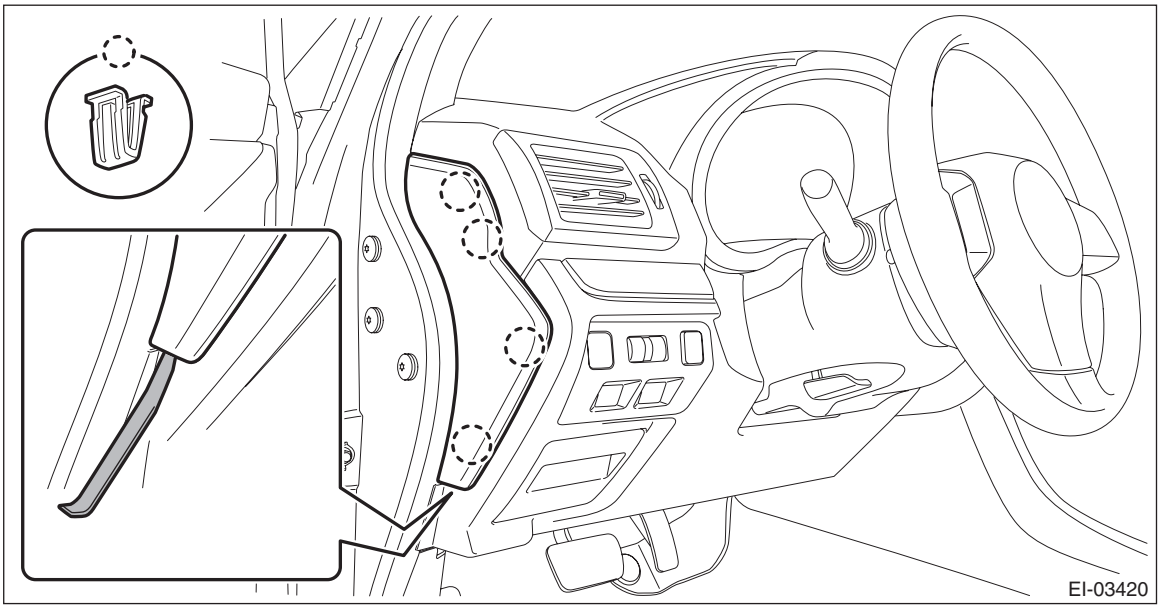
A: REMOVAL

1) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
2) Remove the cover assembly - instrument panel LWR driver.

CAUTION:
When removing the cover assembly - instrument panel LWR driver, be sure to pull it toward you. If attempting to remove by turning it upward, the claws may be damaged.



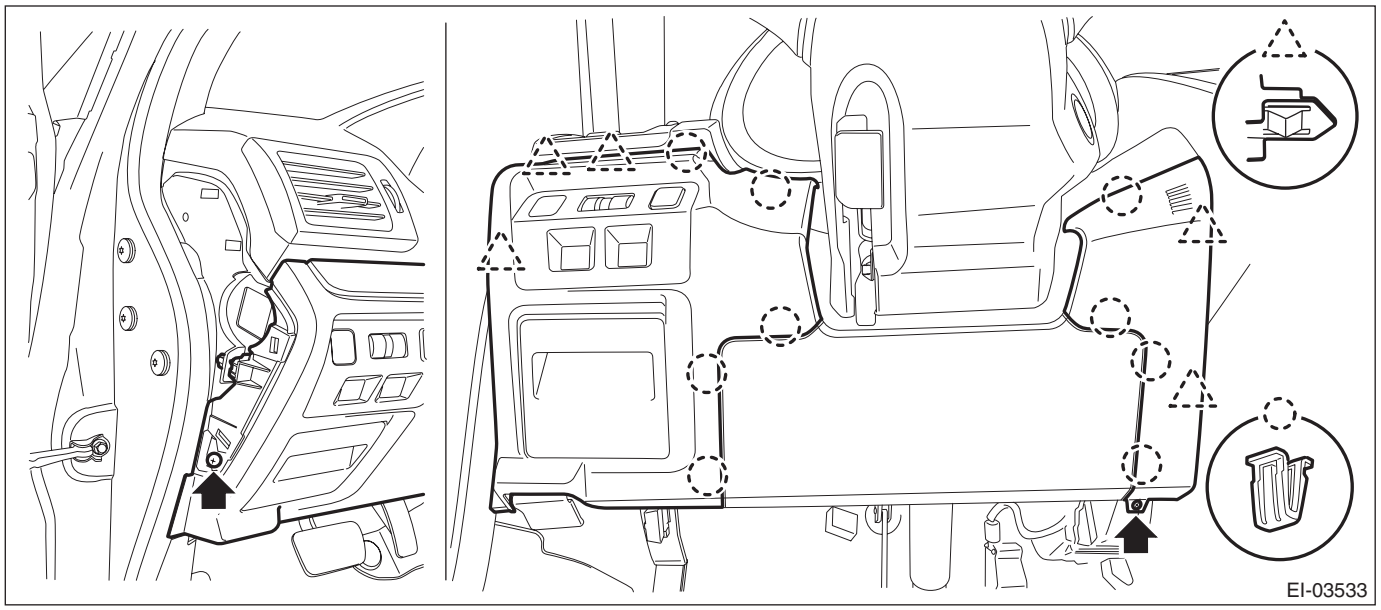
(1) Remove the clips, and remove the cover - instrument panel side LH.



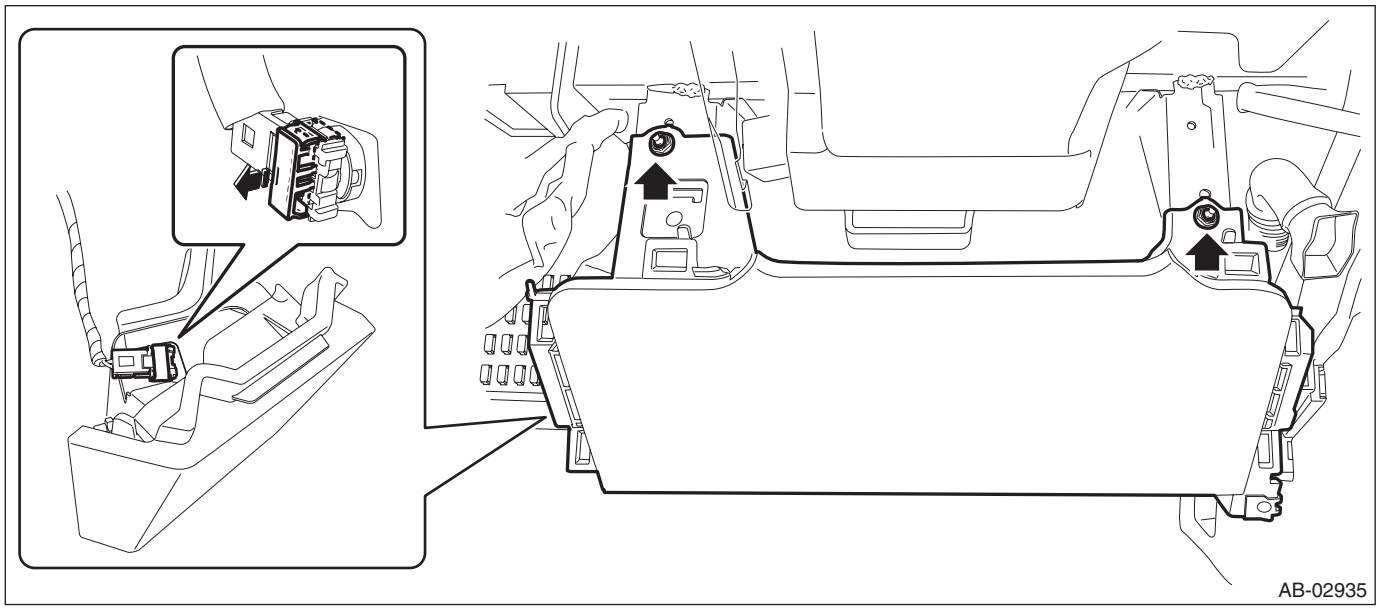
NOTE:
Using a plastic remover, open the cover - instrument panel side LH.

(2) Remove the screws and release the clips and claws.

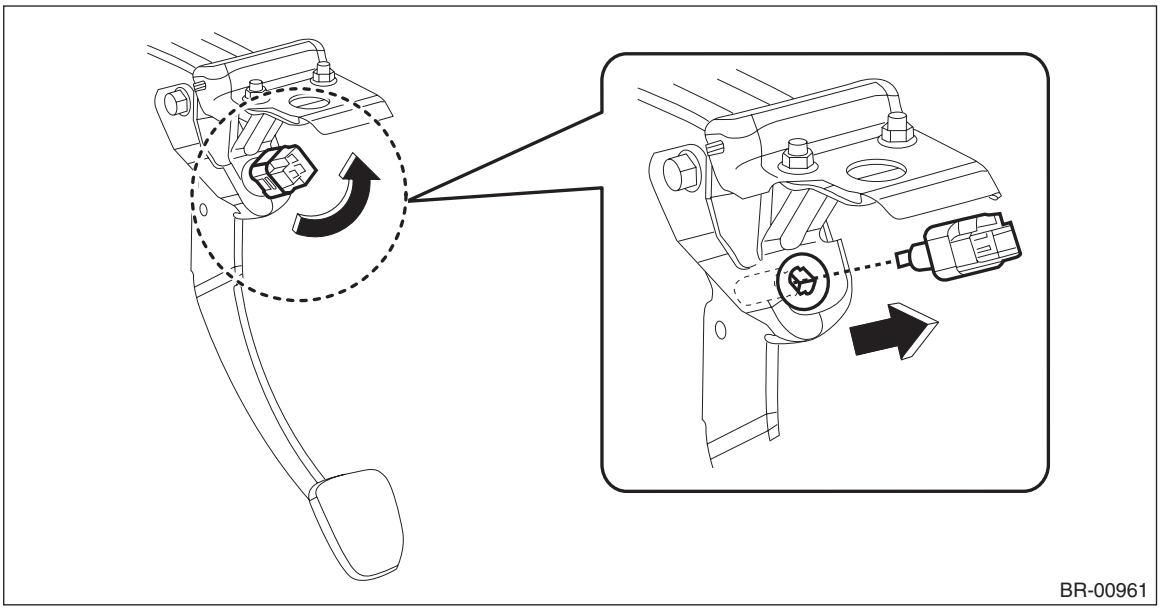
(3) Disconnect the harness connectors, and remove the cover assembly - instrument panel LWR driver INN and OUT.



3) Remove the nuts to remove the knee airbag module and disconnect the harness connector. <Ref. to AB-33, KNEE AIRBAG MODULE, PROCEDURE, Airbag Connector.>



4) Remove the switch - stop light.
   (1) Disconnect the switch - stop light connector.
   (2) Remove the switch - stop light by turning it counterclockwise.



B: INSTALLATION

1) Adjust the position of the switch - stop light, and then secure the stop light switch by turning it clockwise. <Ref. to BR-76, ADJUSTMENT, Stop Light Switch.>
2) Install each part in the reverse order of removal.

Tightening torque:
Knee airbag module: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

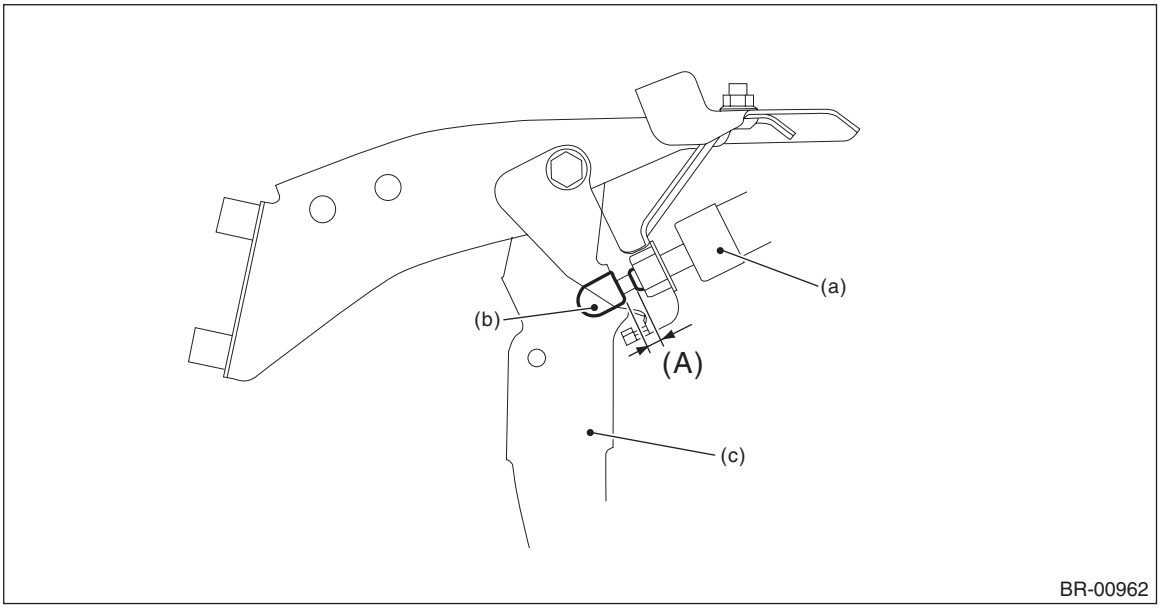
C: INSPECTION

1. CLEARANCE CHECK

1) Measure the clearance between the end of the switch - stop light and the stopper.

Specification:

Clearance (A) of the switch - stop light: 1 mm — 2 mm (0.04 in — 0.08 in)



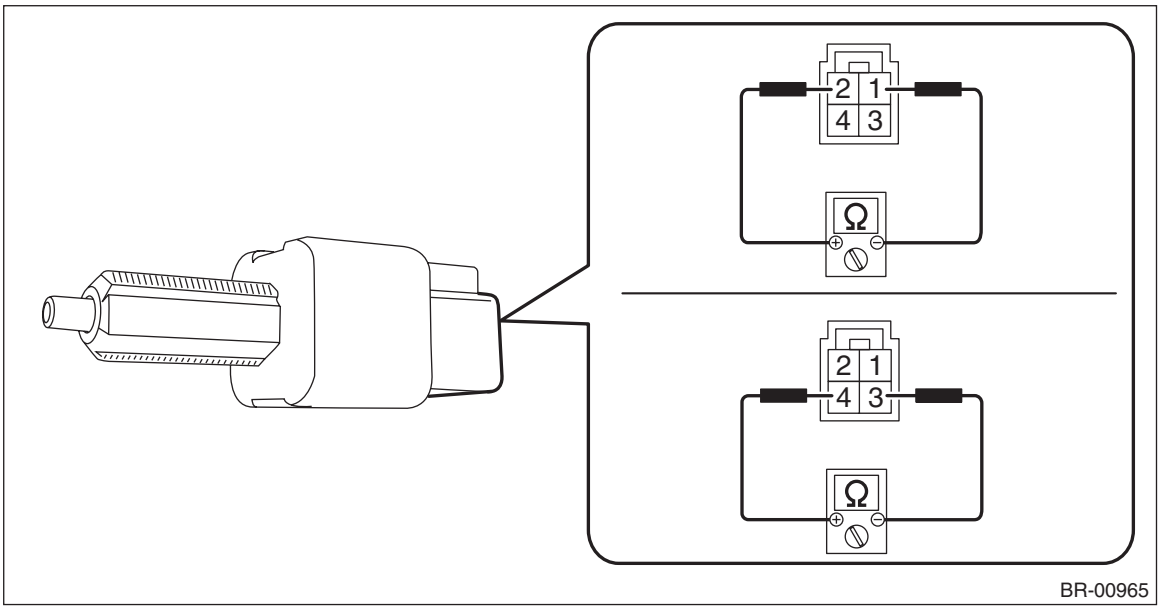
(a) Switch - stop light (b) Stopper (c) Brake pedal

2) Adjust the position of the switch - stop light if the inspection result is not within the standard value. <Ref. to BR-76, ADJUSTMENT, Stop Light Switch.>

2. CHECK RESISTANCE

1) Disconnect the switch - stop light connector.
2) Check the resistance between the terminals of switch - stop light.

Preparation tool:
Circuit tester



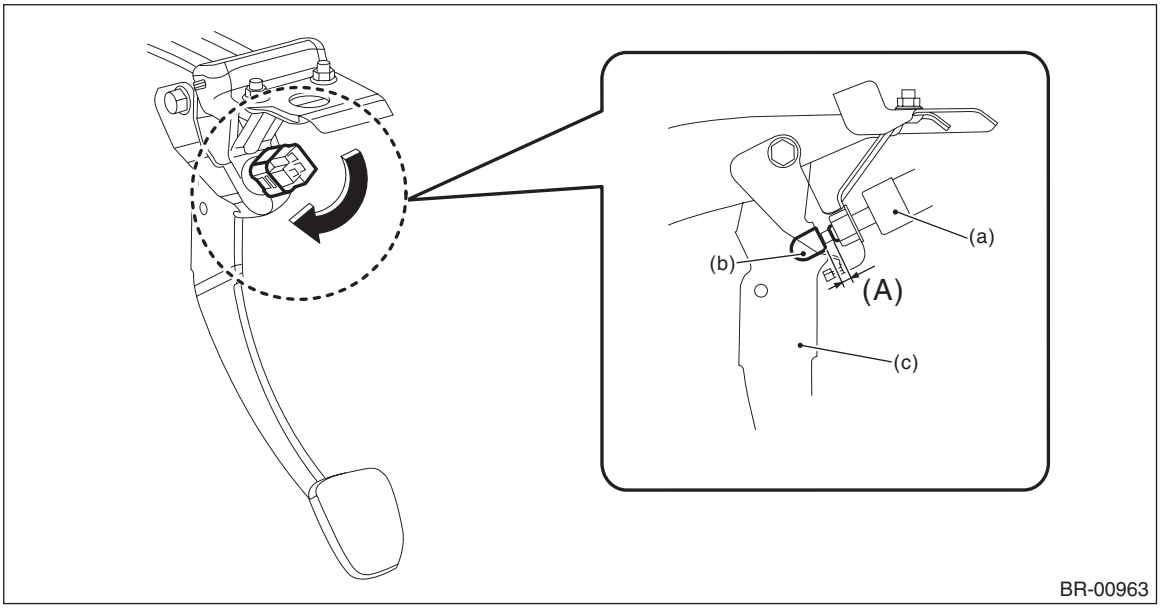
Terminal No.	Inspection conditions	Standard
1 — 2	When brake pedal is depressed	1 MΩ or more
	When brake pedal is released	Less than 1 Ω
3 — 4	When brake pedal is depressed	Less than 1 Ω
	When brake pedal is released	1 MΩ or more

3) Replace the switch - stop light if the inspection result is not within the standard value.

D: ADJUSTMENT

1) While pulling up the brake pedal (c) toward you, insert the switch - stop light (a) until it reaches the stopper (b).
2) Install the switch - stop light by turning it clockwise.

CAUTION:
Turn the switch - stop light clockwise when installing so that it can return backward by approximately 1 mm (0.04 in) and clearance is automatically adjusted.
Insert until it contacts the stopper, and make sure that clearance (A) of the end of switch - stop light and the stopper is 1 mm — 2 mm (0.04 in — 0.08 in).



(a) Switch - stop light (b) Stopper (c) Brake pedal

16.General Diagnostic Table

A: INSPECTION

	Trouble and possible cause	Corrective action
1. Insufficient braking	(1) Fluid leakage from the hydraulic mechanism	Repair or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(2) Entry of air into the hydraulic mechanism	Bleed air.
	(3) Wear, deteriorated surface material, water or fluid on lining	Replace, grind or clean.
	(4) Improper operation of master cylinder assembly, disc caliper, vacuum booster assembly or check valve	Repair or replace.
2. Unstable or uneven braking	(1) Fluid on lining or rotor	Correct the cause of fluid leakage, and clean or replace.
	(2) Rotor defective	Repair or replace the rotor.
	(3) Improper lining contact, deteriorated surface, deteriorated or worn lining material	Repair by grinding, or replace.
	(4) Deformed back plate	Repair or replace.
	(5) Overinflation of tires	Adjust the air pressure.
	(6) Defective wheel alignment	Adjust alignment.
	(7) Loose back plate or support installation bolt	Tighten to the specified torque.
	(8) Defective hub unit COMPL	Replace.
	(9) Defective hydraulic system	Replace the cylinder, brake pipe or hose.
	(10) Unstable performance of the parking brake	Check, adjust or replace the rear brake and cable system.
3. Excessive pedal stroke	(1) Entry of air into the hydraulic mechanism	Bleed air.
	(2) Excessive play in the master cylinder push rod	Adjust.
	(3) Fluid leakage from the hydraulic mechanism	Repair or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(4) Improper lining contact or worn lining	Repair or replace.
4. Brake dragging or improper brake return	(1) Insufficient pedal play	Adjust play.
	(2) Improper master cylinder return	Clean or replace the cylinder.
	(3) Clogged hydraulic system	Replace.
	(4) Improper return or adjustment of parking brake	Repair or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Improper disc caliper operation	Repair or replace.
	(7) Faulty wheel bearing	Replace.
5. Brake noise (1) (creaking sound)	(1) Hardened or deteriorated brake pad	Replace the pad.
	(2) Worn brake pad	Replace the pad.
	(3) Loose back plate or support installation bolt	Tighten to the specified torque.
	(4) Loose hub unit COMPL	Tighten to the specified torque.
	(5) Dirty rotor	Clean the rotor, or clean and replace brake assembly.
6. Brake noise (2) (hissing sound)	(1) Worn brake pad	Replace the pad.
	(2) Improperly installed pad	Correct or replace the pad.
	(3) Loose or bent rotor	Retighten or replace.
7. Brake noise (3) (click sound)	Excessively worn pad or support	Replace the pad or the support.

PARKING BRAKE

PB

Page

1. General Description 2
2. Parking Brake Lever 4
3. Parking Brake Cable 9
4. Parking Brake Assembly (Rear Disc Brake) 15
5. General Diagnostic Table 24

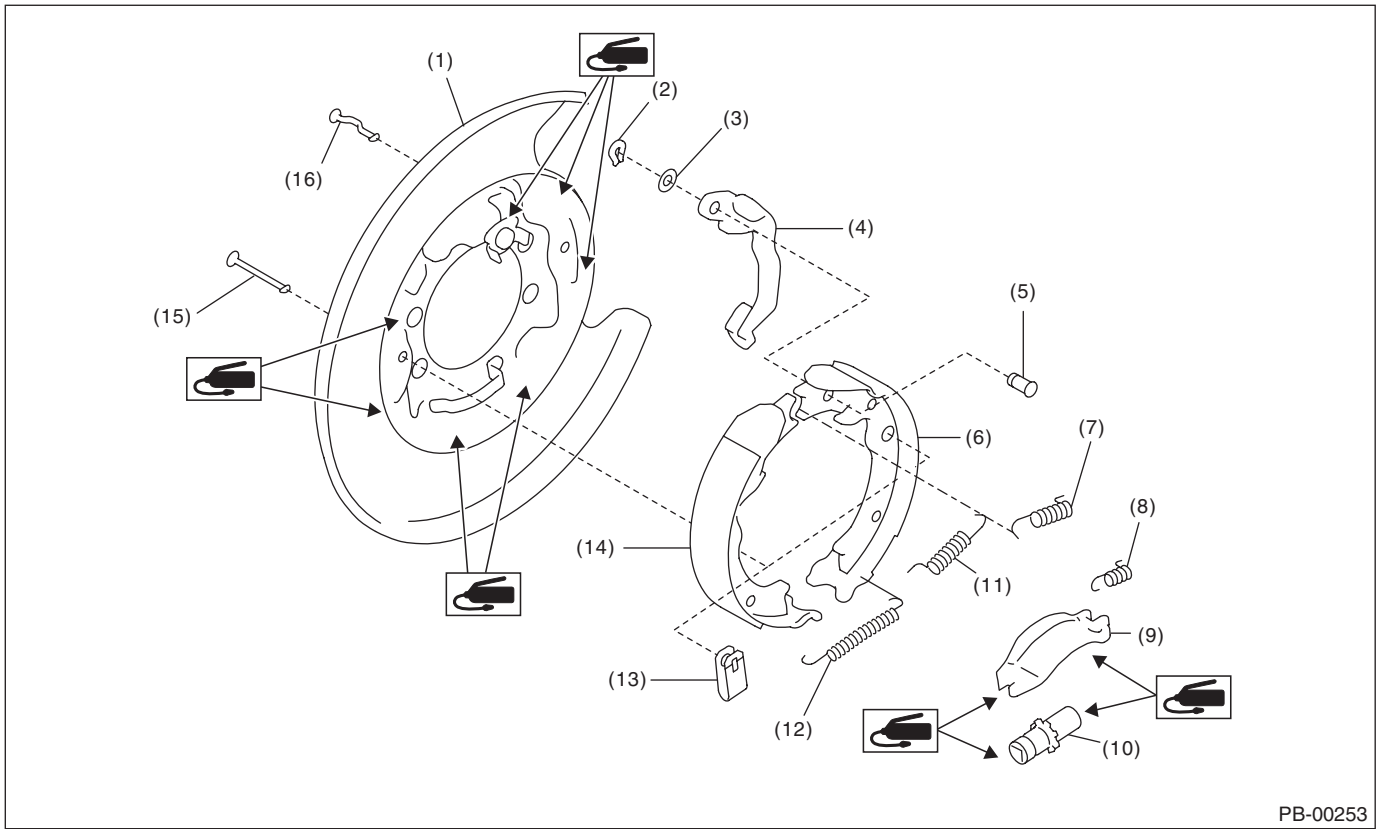
1. General Description

A: SPECIFICATION

Model		Rear disc brake
Type		Mechanical, drum in disc rear brakes
Effective drum diameter	mm (in)	170 (6.69)
Lining dimensions (Length × Width × Thickness)	mm (in)	147.7 × 30.0 × 3.5 (5.81 × 1.181 × 0.14)
Clearance adjustment		Manual adjustment
Lever stroke	Notches/N (kgf, lbf)	7 — 8/200 (20.4, 45)

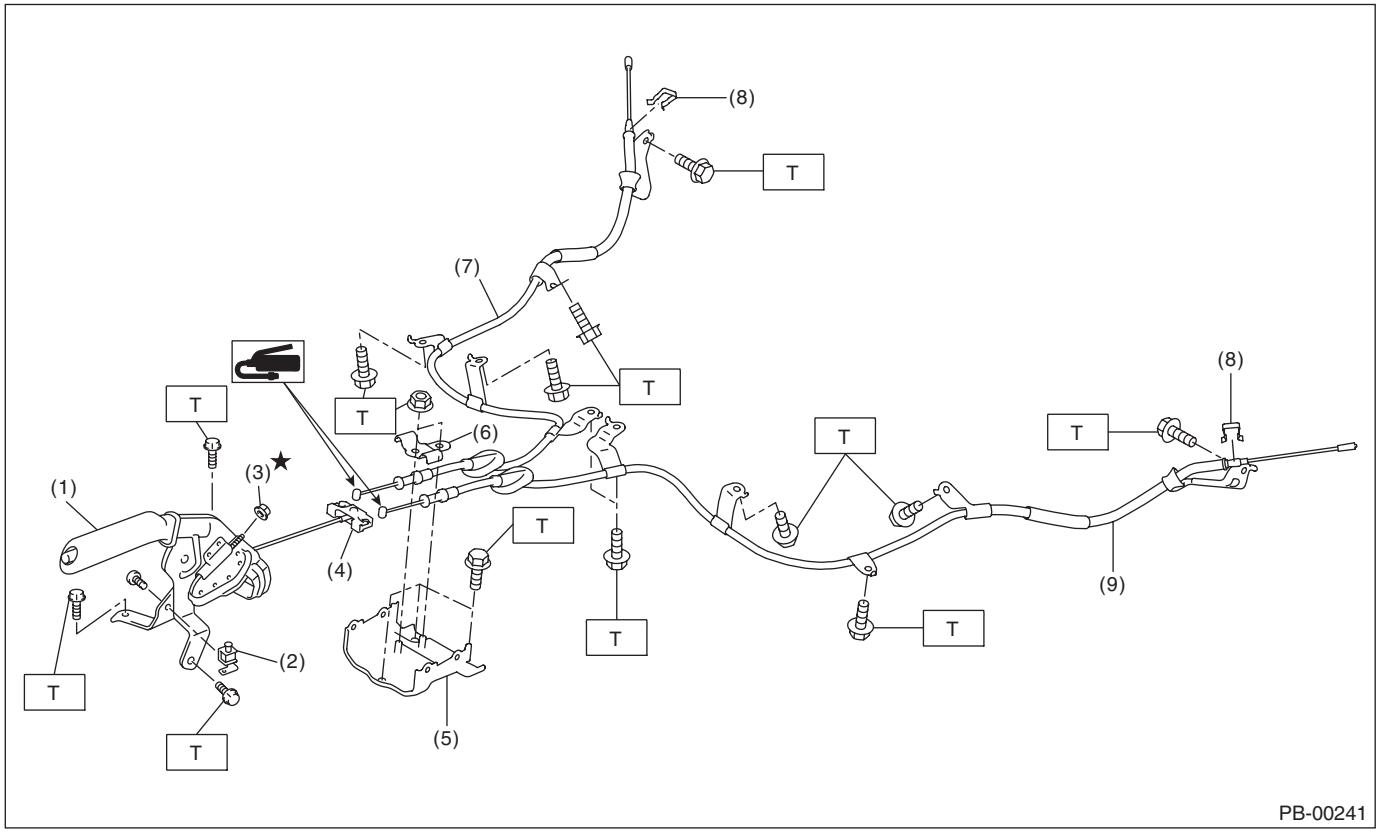
B: COMPONENT

1. PARKING BRAKE (REAR DISC BRAKE)



(1) Back plate - rear brake
(2) Retainer - rear brake
(3) Spring washer - rear brake
(4) Parking lever - rear
(5) Pin - parking lever
(6) Parking brake shoe (secondary)
(7) Spring - secondary shoe return
(8) Spring - strut
(9) Strut - brake
(10) Adjuster ASSY - rear brake
(11) Spring - primary shoe return
(12) Spring - adjuster
(13) Cup - shoe hold-down
(14) Parking brake shoe (primary)
(15) Pin - primary shoe hold-down
(16) Pin - secondary shoe hold-down

2. PARKING BRAKE LEVER & CABLE



(1) Lever assembly - hand brake
(2) Switch ASSY - hand brake
(3) Adjusting nut (self-locking nut)
(4) Equalizer
(5) Bracket
(6) Clamp A - hand brake cable
(7) Cable ASSY - parking brake RH
(8) Clamp B - hand brake cable
(9) Cable ASSY - parking brake LH

Tightening torque: N·m (kgf-m, ft-lb)
T: 18 (1.84, 13.3)

C: CAUTION

- Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Make sure grease does not come into contact with the parking shoes.

D: PREPARATION TOOL

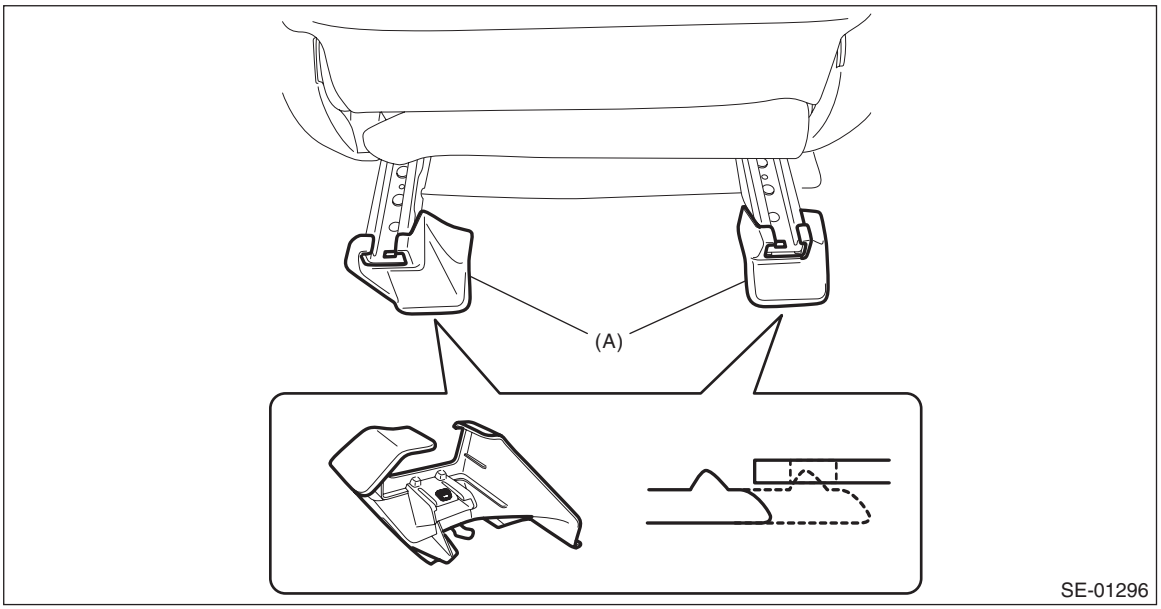
1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Parking Brake Lever

A: REMOVAL

1) Set the wheel stoppers to tires.
2) Remove the headrest assembly - front.
3) Move the passenger's seat towards the front.
4) Remove the driver's seat outside the vehicle.
   (1) Tilt the backrest assembly forward and move the front seat to the front most position.
   (2) Remove the cover - bolt rear (A) and remove the bolts.



   (3) Move the front seat to the rearmost position, and remove the bolts.
5) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.

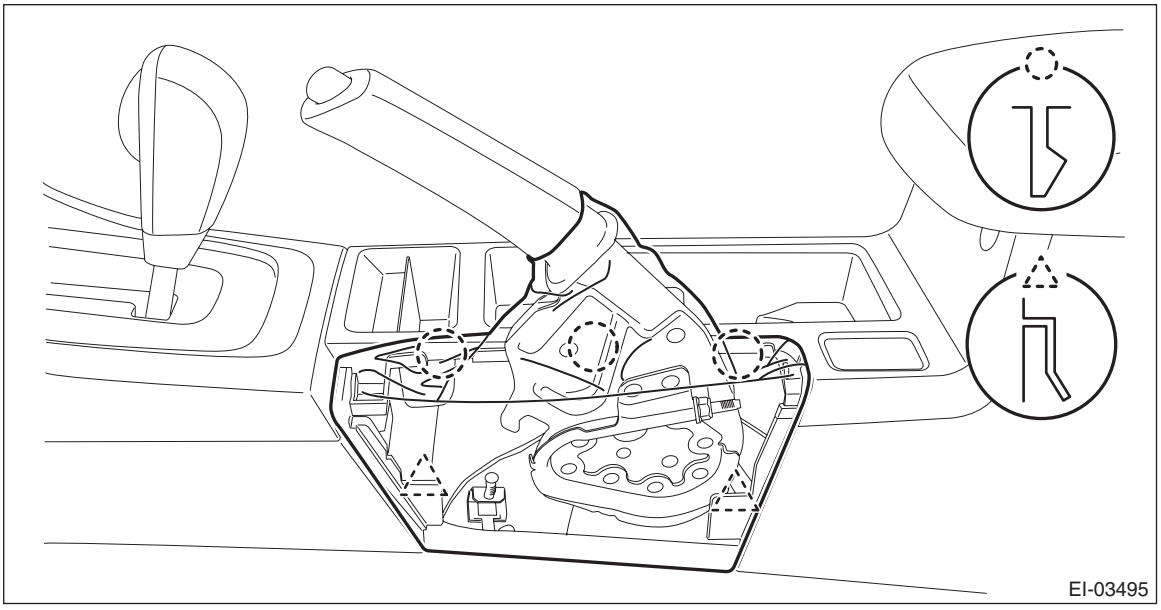
CAUTION:
The airbag system is fitted with a backup power supply. After disconnecting the battery ground cable, the airbag may operate if you do not wait for 60 seconds before starting the service of airbag system.

6) Disconnect the connector under the front seat.
- Seat belt warning light connector (driver's seat)
- Side airbag connector <Ref. to AB-31, SIDE AIRBAG MODULE, PROCEDURE, Airbag Connector.>
- Seat heater connector (model with seat heater)

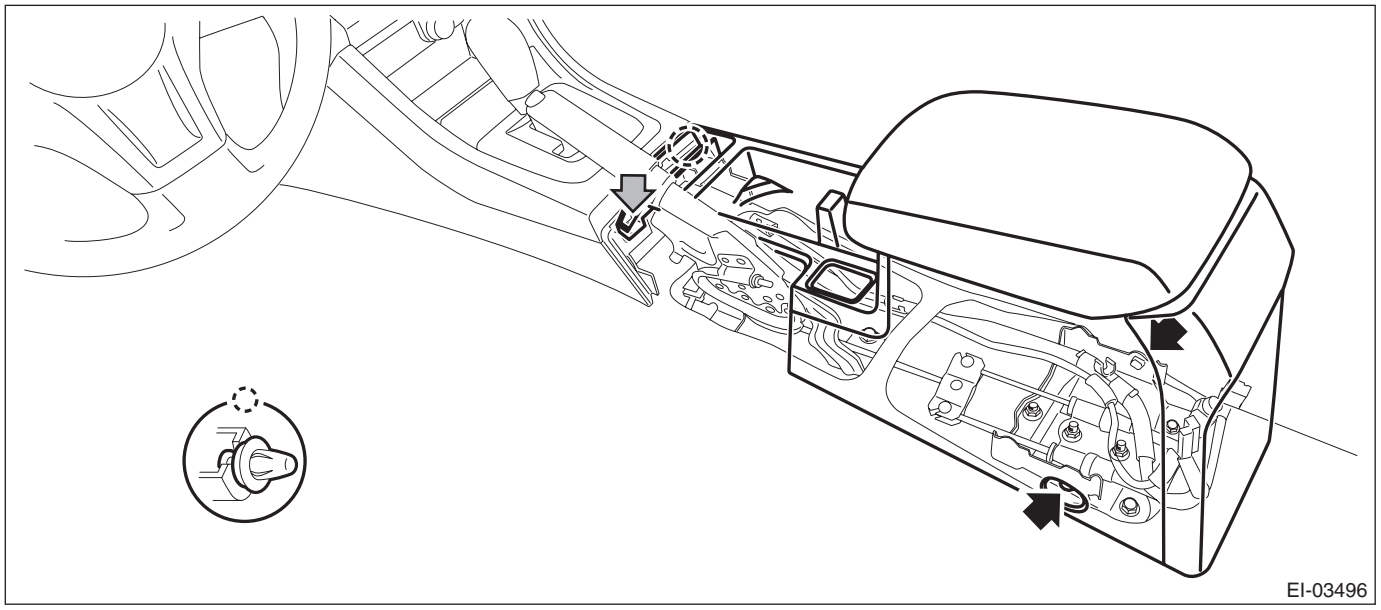
7) Take out the front seat from the vehicle.

CAUTION:
Be careful not to damage the body.

8) Remove the console box assembly.
(1) Release the claws, and then remove the boot - parking brake.

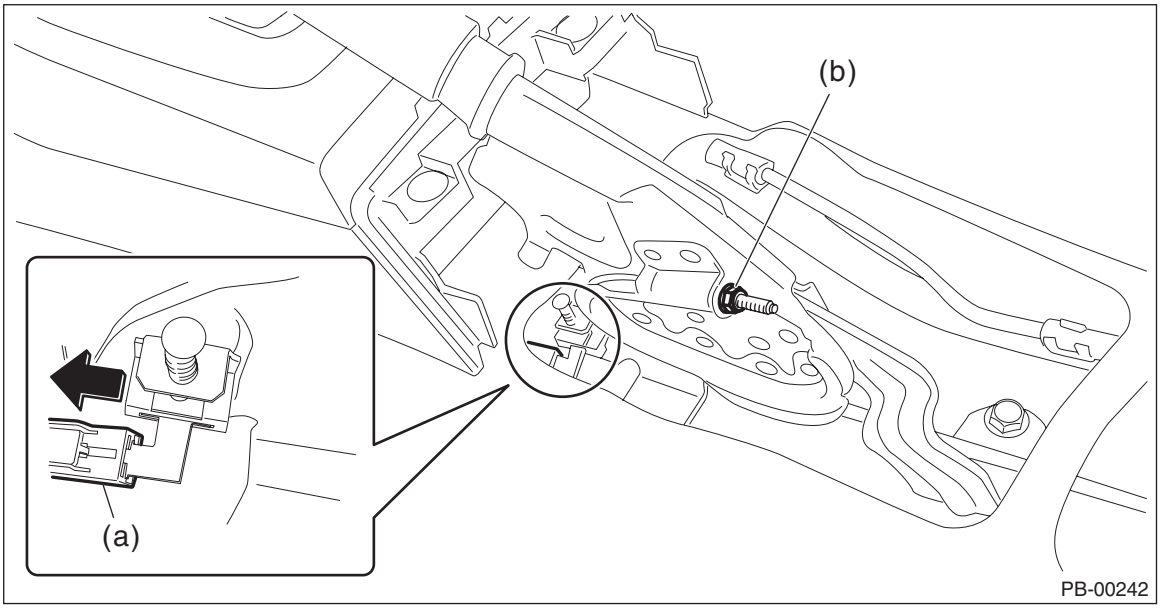


(2) Move the seat forward, and remove the bolts after detaching the left and right caps.
(3) Remove the screws and clips, disconnect the harness connector and remove the console box assembly.

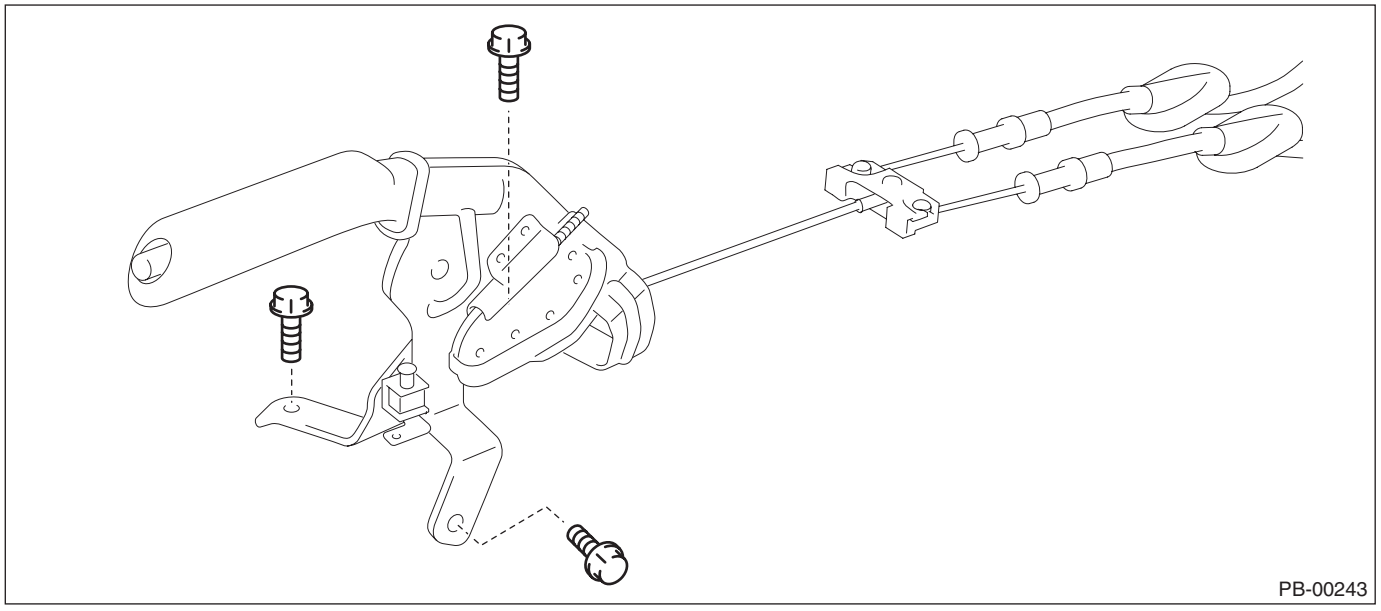


9) Remove the lever assembly - hand brake.
(1) Disconnect the connector (a) of the switch assembly - hand brake.
(2) Remove the adjusting nut (b).

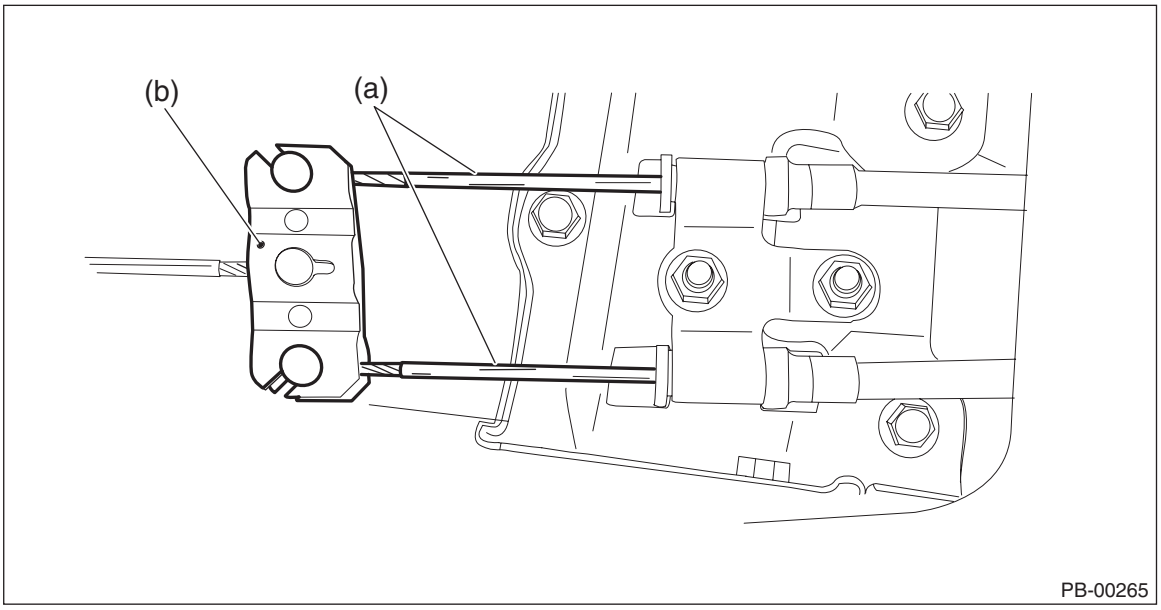
CAUTION:
A self-locking nut is used for the adjusting nut of parking cable. Therefore, replace the self-locking nut with a new one when disassembling.



(3) Remove the bolt, and then remove the lever assembly - hand brake.



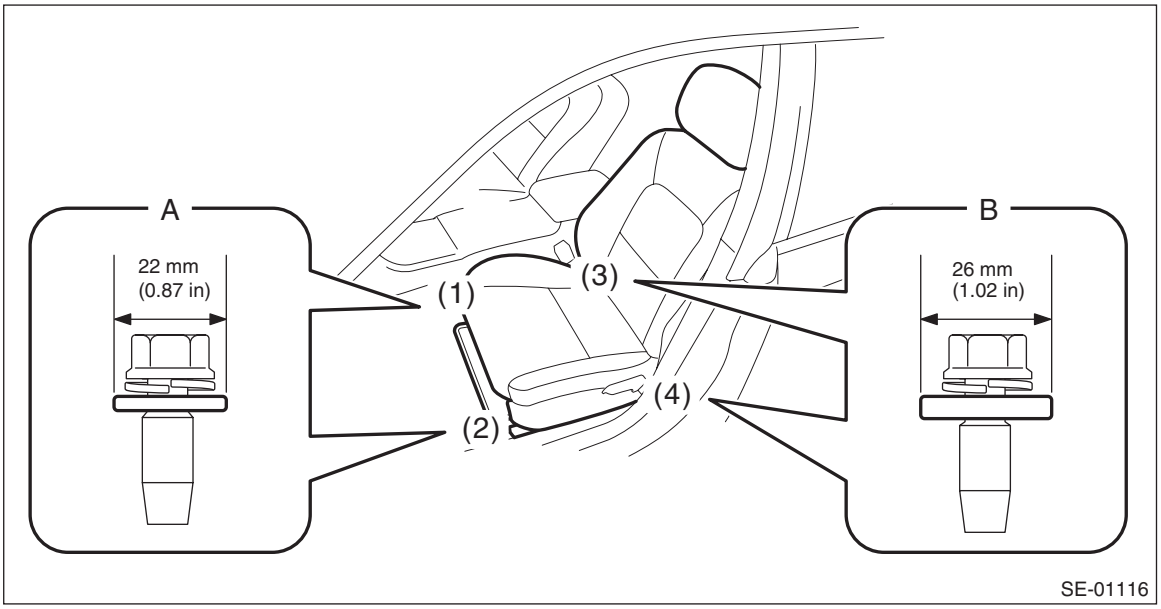
10) Remove the inner cable end (a) from the equalizer (b).



B: INSTALLATION

1) Install each part in the reverse order of removal.

CAUTION:
• The front seat mounting bolts differ between the front mounting points and the rear mounting points. When installing the front seat, make sure that you are using correct bolts at correct positions.
• Tighten the slide rail assembly installing bolts in the order as shown in the figure, in several steps by gradually increasing the torque until they reach the specified torque.



- **Front (bolt A): Washer diameter 22 mm (0.87 in)**
- **Rear (bolt B): Washer diameter 26 mm (1.02 in)**

Tightening torque:
Front seat assembly: 53 N·m (5.40 kgf-m, 39.1 ft-lb)

Tightening torque:
Lever assembly - hand brake: 18 N·m (1.84 kgf-m, 13.3 ft-lb)
Console box assembly: 6.5 N·m (0.66 kgf-m, 4.8 ft-lb)

2) Install a new adjusting nut (self-locking nut).
3) Be sure to adjust the lever stroke. <Ref. to PB-8, ADJUSTMENT, Parking Brake Lever.>

C: INSPECTION

1. LEVER ASSY

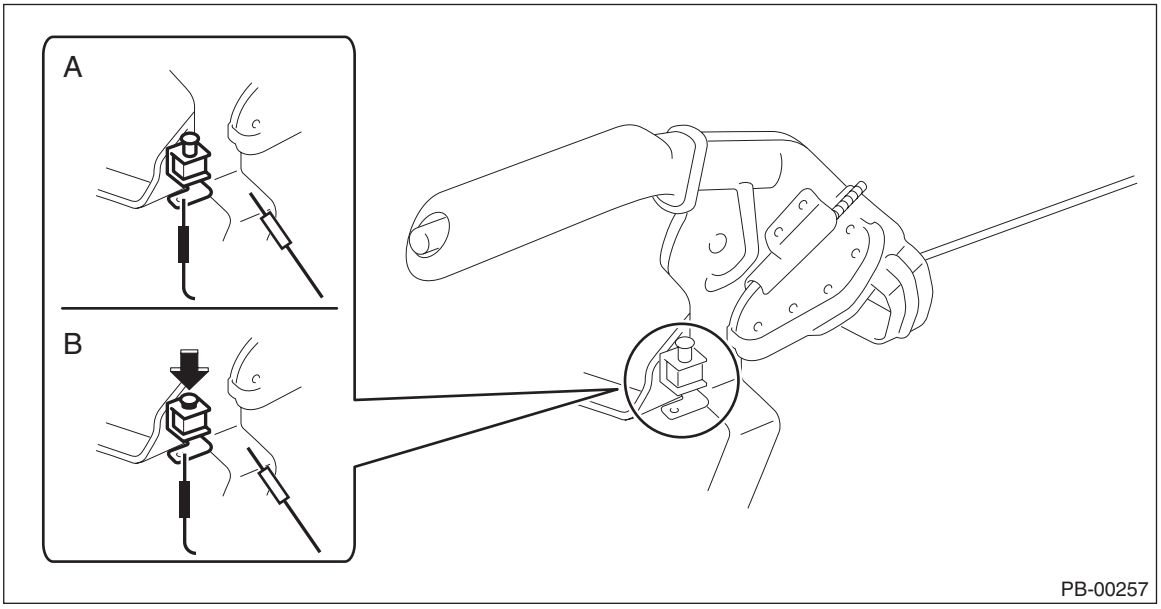
1) Operate the lever assembly - hand brake 3 to 4 times and fully return the lever assembly - hand brake.
2) While slowly pulling up the lever assembly - hand brake, count the notches.

Lever stroke:
7 to 8 notches when pulled with a force of 200 N (20.4 kgf, 45 lbf)
If it is not within the specified value, adjust the parking brake. <Ref. to PB-22, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

2. SWITCH ASSEMBLY

1) Measure the resistance between the switch assembly - hand brake and chassis ground.

Preparation tool:
Circuit tester



	Switch position	Standard
A	When shaft is free (ON)	Less than 1 Ω
B	When shaft is pressed in (OFF)	10 kΩ or more

If it is not within the specified value, replace the switch assembly - hand brake.

D: ADJUSTMENT

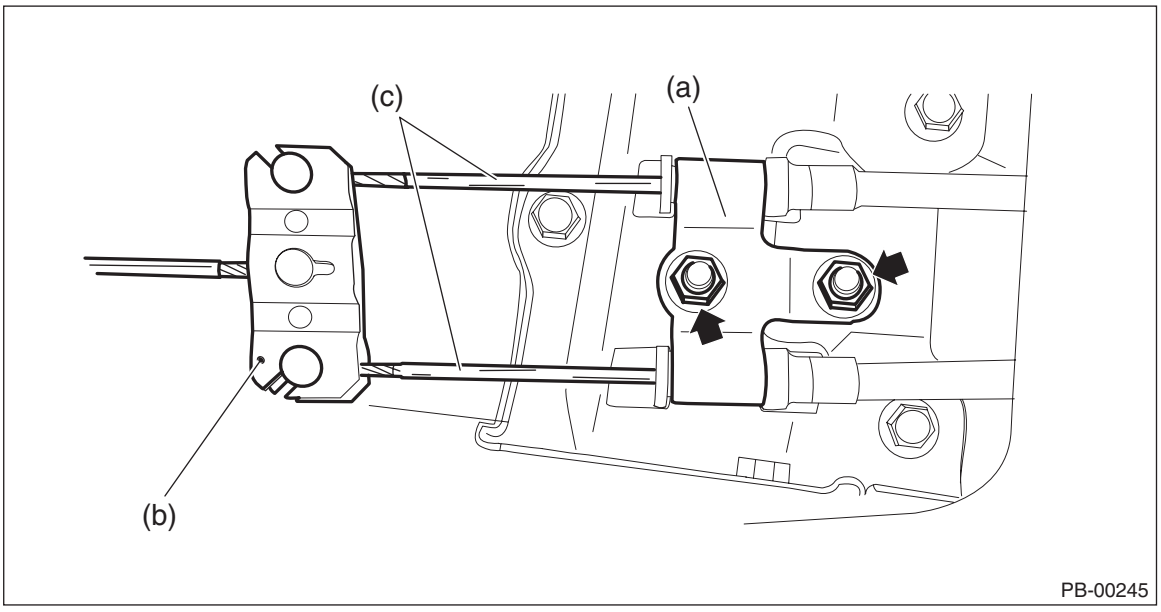
Adjust the parking lever stroke. <Ref. to PB-23, LEVER STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

3. Parking Brake Cable

A: REMOVAL

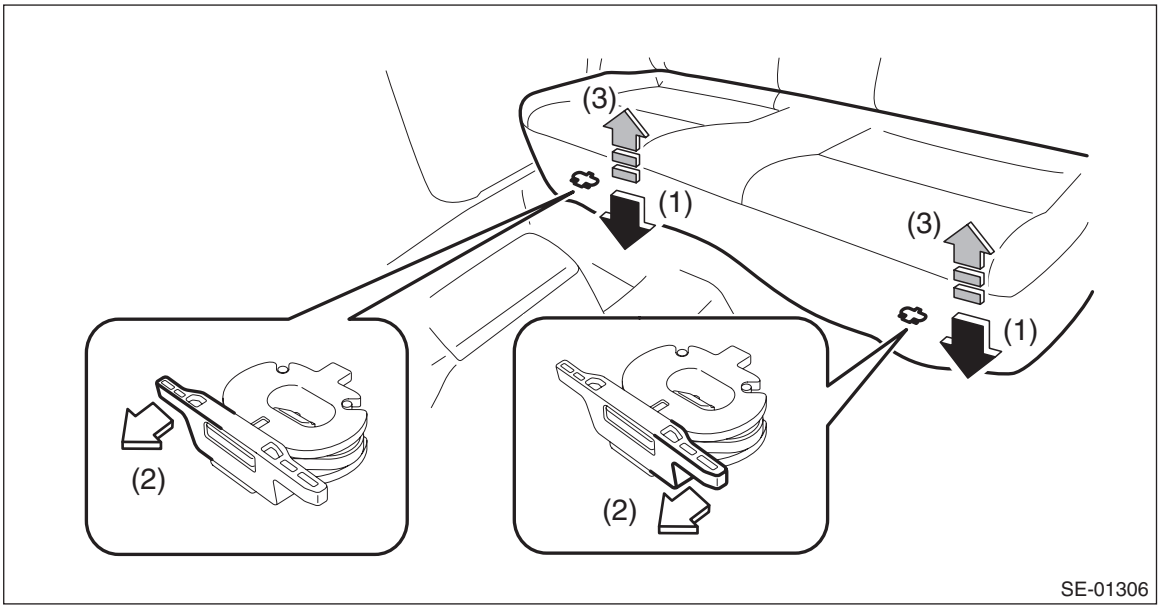
CAUTION:
• Airbag system satellite safing sensor is located in the lower of the rear seat cushion center. Before removing the rear seat, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM" section. <Ref. to AB-11, CAUTION, General Description.>
• The airbag system is fitted with a backup power supply. After disconnecting the battery ground cable, the airbag may operate if you do not wait for 60 seconds before starting the service of airbag system.

1) Remove the lever assembly - hand brake. <Ref. to PB-4, REMOVAL, Parking Brake Lever.>
2) Remove the nut and remove the clamp A - hand brake cable (a).
3) Remove the inner cable end (c) from the equalizer (b).

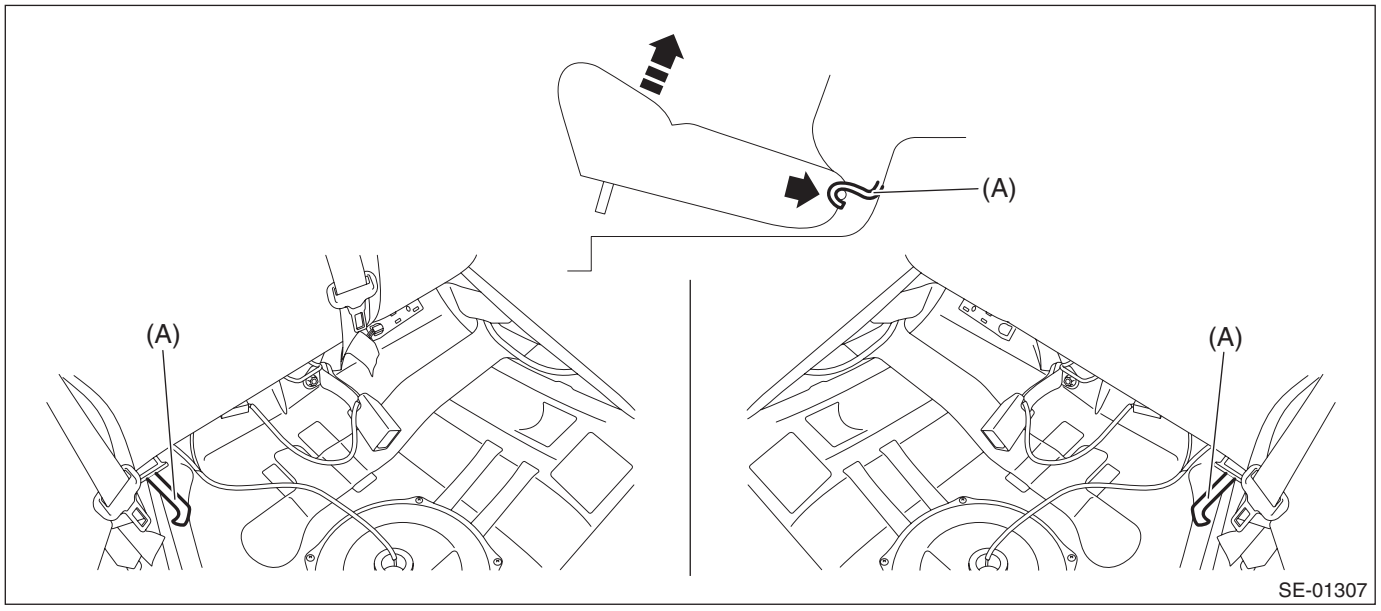


4) Remove the rear seat cushion assembly.
(1) Push the corners of the rear seat cushion from above.
(2) While pushing the corners of the rear seat cushion from above, pull the knob of the hook - seat cushion rear towards yourself.
(3) While pulling the knob towards yourself, disconnect the hooks by lifting up the rear seat cushion.

NOTE:
Pull the left side of the knob to disconnect the LH side hook, and pull the right side of the knob to disconnect the RH side hook.

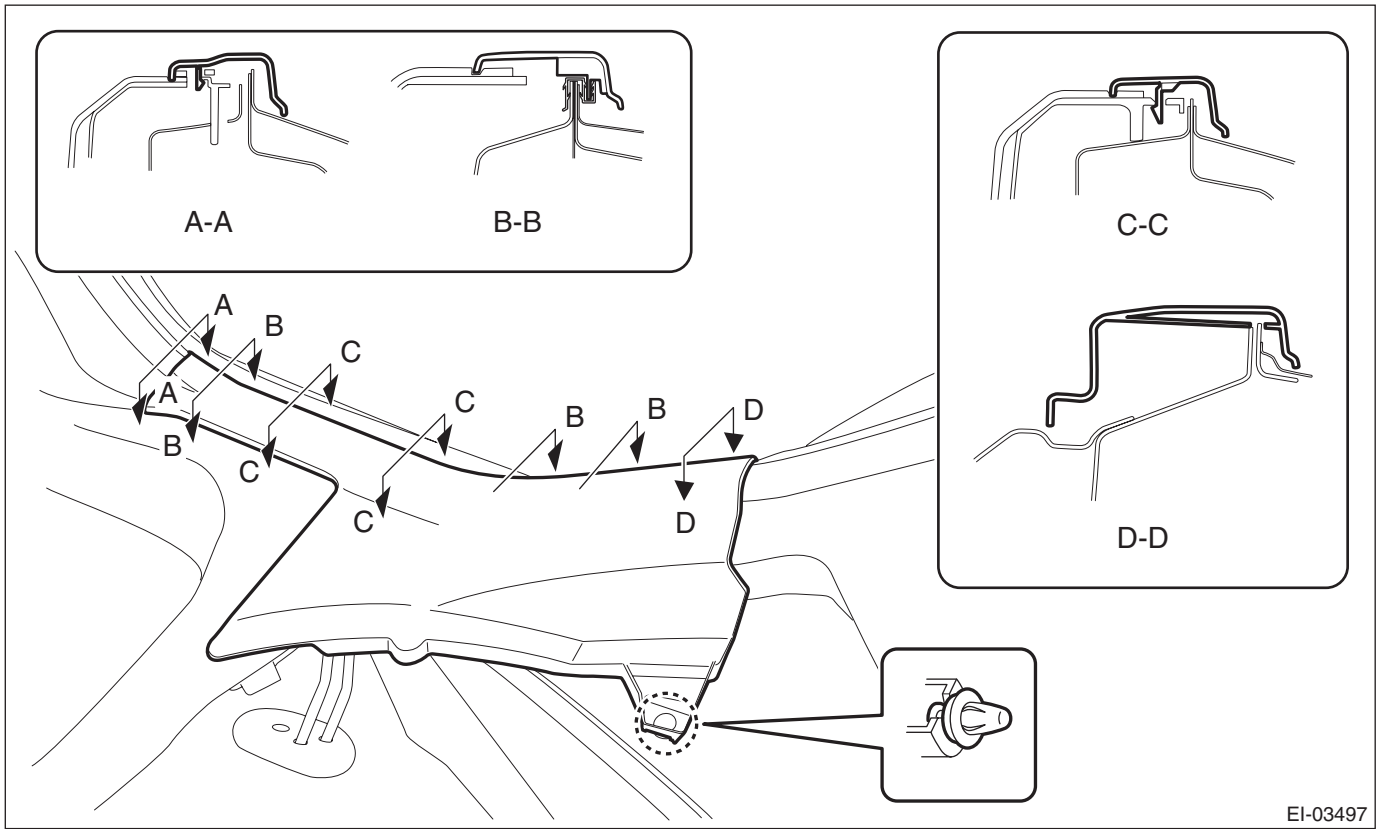


(4) Remove the hook (A) by pushing it back while lifting the front side of the rear seat cushion, and remove the rear seat cushion.

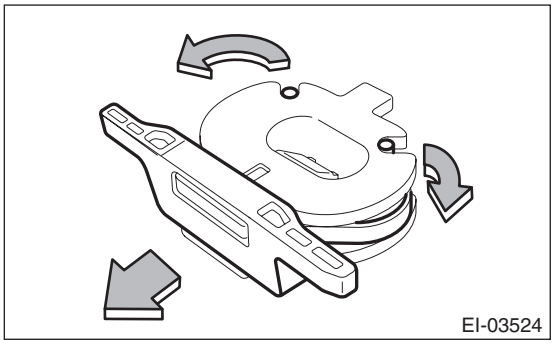


5) Release the clips and claws, and remove the side sill covers - rear INN on the left and right sides.

CAUTION:
Do not pull with excessive force. Doing so may damage the claws of the side sill cover - rear INN.

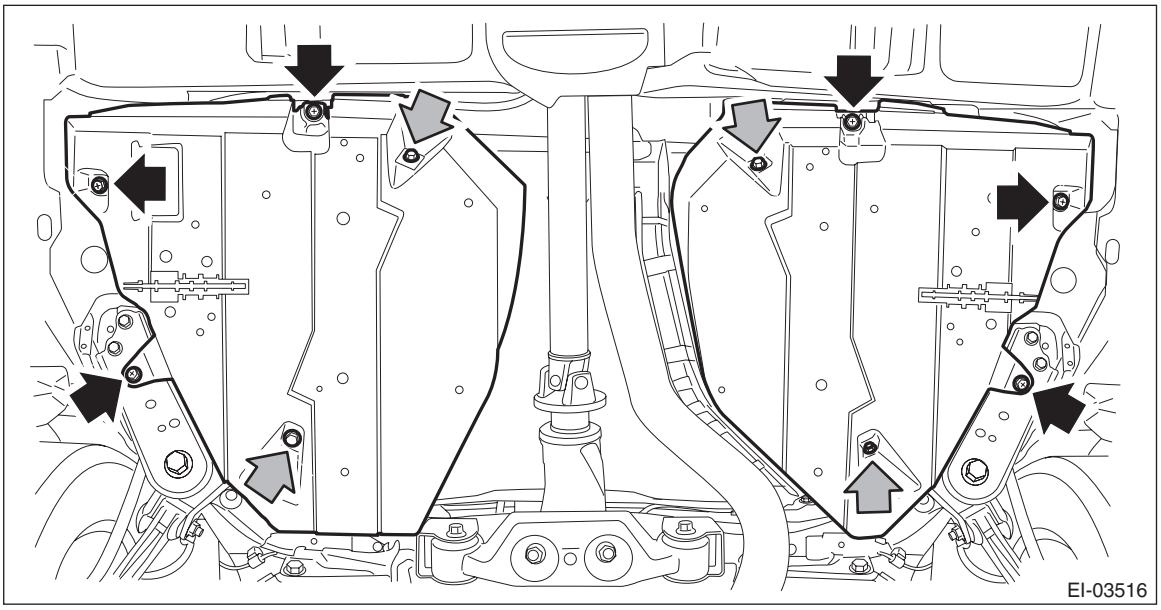


6) Remove the clips and knobs of the hook - seat cushion rear.



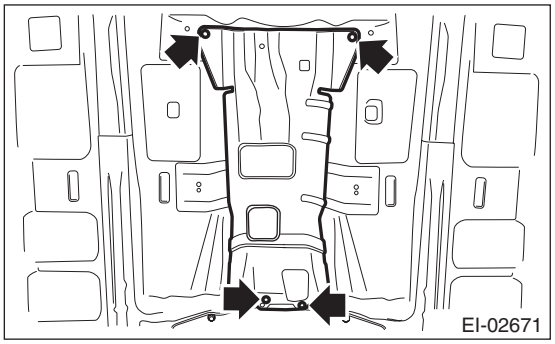
7) Turn over the floor carpet and remove the grommet of the cable assembly - parking brake from the rear floor.
8) Lift up the vehicle, and then remove the rear wheels.

9) Remove the bolt and nuts and remove the fuel tank protector.



10) Remove the cable assembly - parking brake from the lever section of parking brake shoe. <Ref. to PB-15, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
11) Remove the center exhaust pipe, rear exhaust pipe, and muffler.
- Center exhaust pipe & rear exhaust pipe: <Ref. to EX(H4DO)-15, REMOVAL, Rear Exhaust Pipe.>
- Muffler: <Ref. to EX(H4DO)-19, REMOVAL, Muffler.>

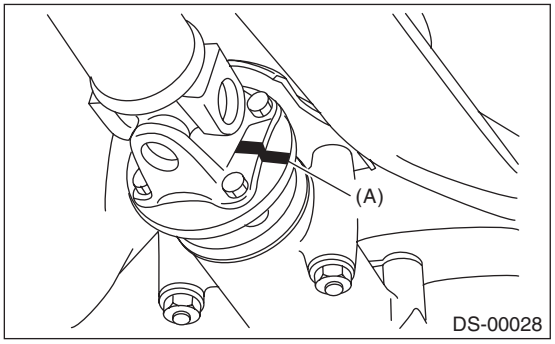
12) Remove the bolts to remove the front heat shield cover.



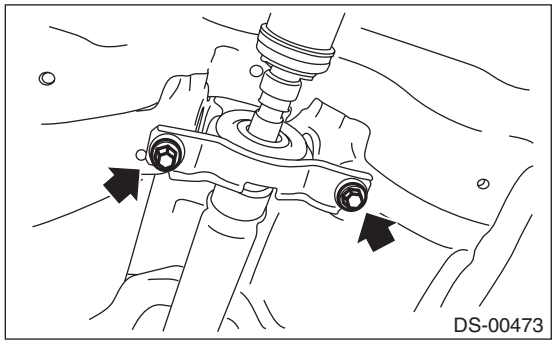
13) Remove the propeller shaft assembly.

CAUTION:
Do not disassemble the propeller shaft.

(1) Place alignment marks (A) on the flange yoke and rear differential.
(2) Remove four bolts holding the propeller shaft to the rear differential.



(3) Remove the center bearing.

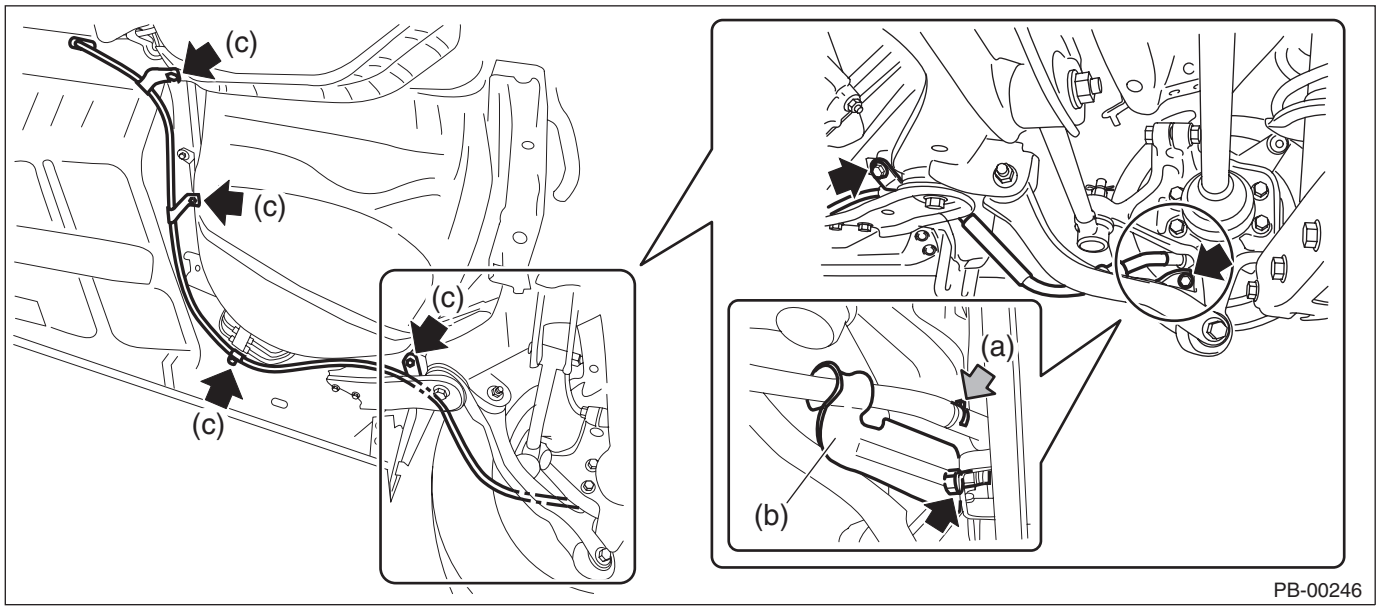


(4) Remove the propeller shaft from transmission.

CAUTION:
Be careful not to damage oil seals and contact surface of the sleeve yoke.

NOTE:
- Use a container to catch ATF or oil flowing from propeller shaft.
- To prevent ATF from leaking, install extension cap etc. to the transmission.

14) Remove the clamp B - hand brake cable (a) from the rear brake.
15) Remove the cable clamp (b) from the back plate - rear brake.
16) Remove the cable clamp (c) from the rear floor, and remove the cable assembly - parking brake.



B: INSTALLATION

1) Install each part in the reverse order of removal.

CAUTION:
Do not reuse the nut (self locking nut). Always replace with a new part.

Tightening torque:
Protector - fuel tank nut: 9 N·m (0.92 kgf-m, 6.6 ft-lb)
Protector - fuel tank bolt: 18 N·m (1.84 kgf-m, 13.3 ft-lb)
Cable clamp: 18 N·m (1.84 kgf-m, 13.3 ft-lb)
Rear wheel: 120 N·m (12.24 kgf-m, 88.5 ft-lb)

NOTE:
- Apply grease to the cable guide inside the tunnel, and pass the cable through.
- After installing the backrest assembly, make sure that each seat belt operates normally.
- Make sure that they are properly secured on each hook on the vehicle side.

2) Be sure to adjust the lever stroke. <Ref. to PB-8, ADJUSTMENT, Parking Brake Lever.>

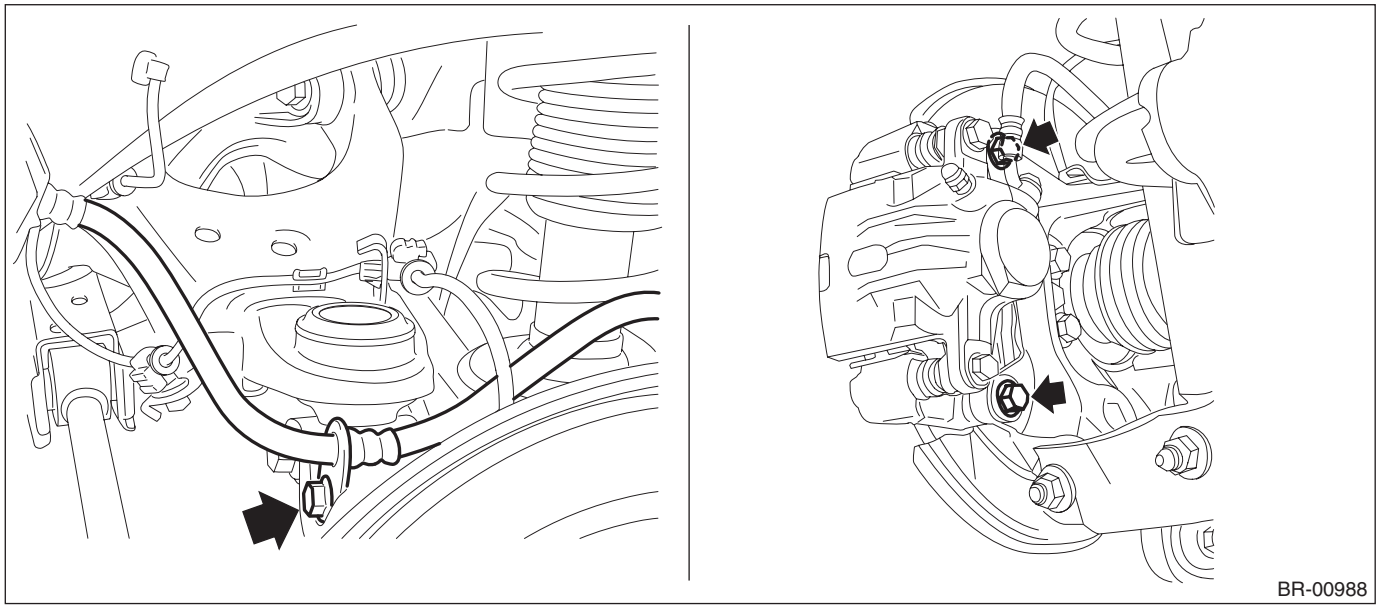
C: INSPECTION

Check the removed cable and replace if damaged, rusty or malfunctioning.
1) Check the cable for smooth operation.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends and cracks.

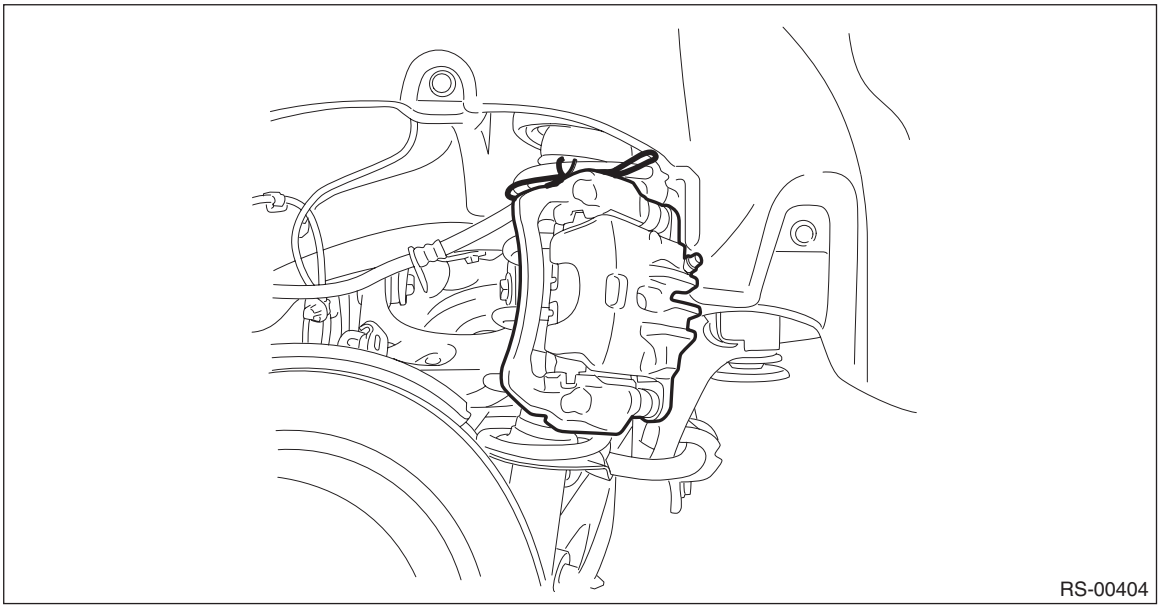
4. Parking Brake Assembly (Rear Disc Brake)

A: REMOVAL

1) Release the parking brake.
2) Lift up the vehicle, and then remove the rear wheels.
3) Remove the brake hose bracket.
4) Remove the attachment bolts and remove the rear disc brake caliper assembly.



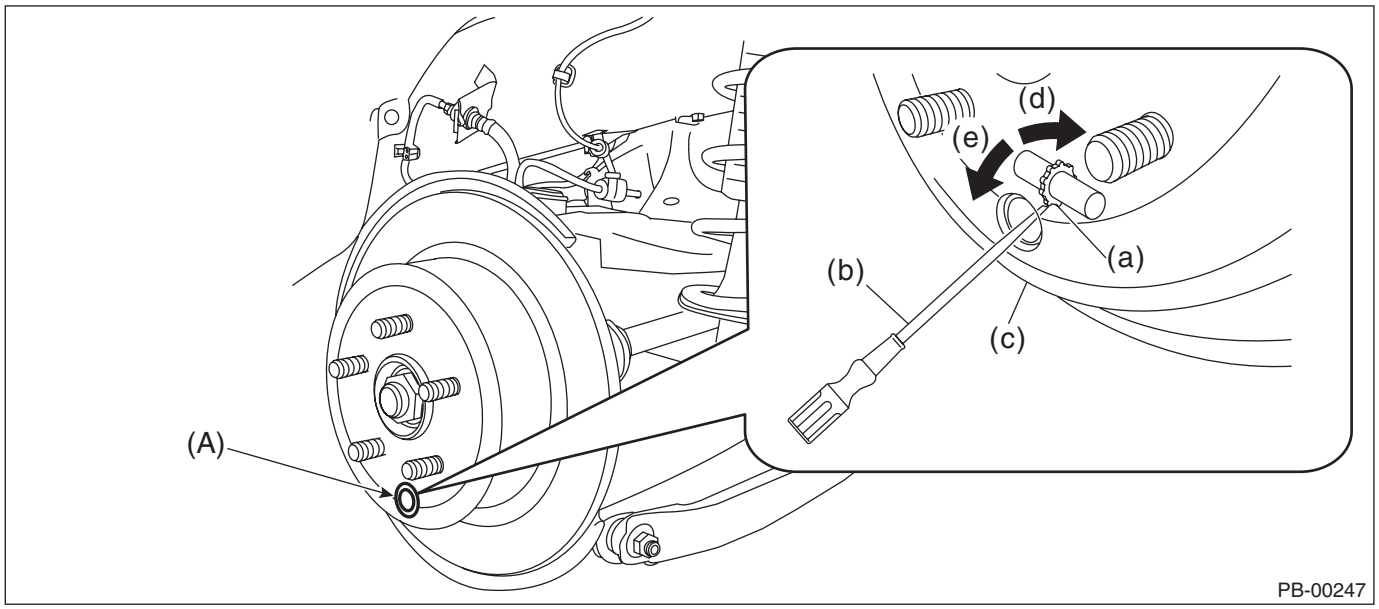
5) Suspend the rear disc brake caliper assembly so that the brake hose is not stretched.



6) Mark an alignment mark on the rear disc brake rotor and the hub unit COMPL - rear axle, and then remove the rear disc rotor.

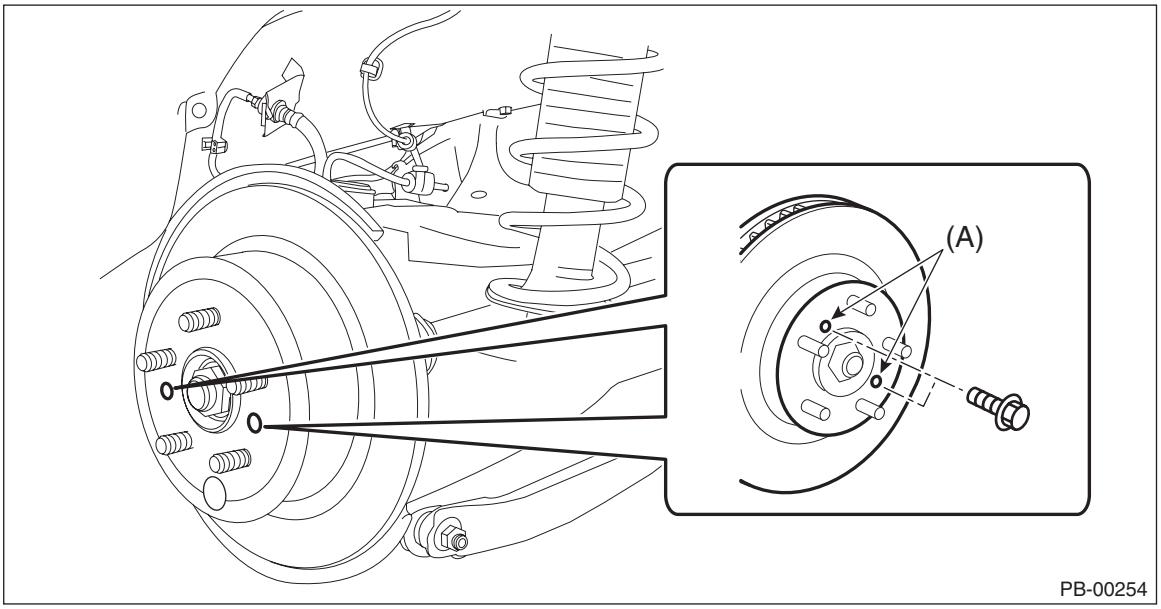
NOTE:
If the rear disc rotor is difficult to remove, try the following two methods in order.

(1) Remove the adjusting hole cover (A) for the disc rotor, and rotate the adjuster assembly - rear brake using a flat tip screwdriver until the brake shoe moves far enough from the disc rotor.

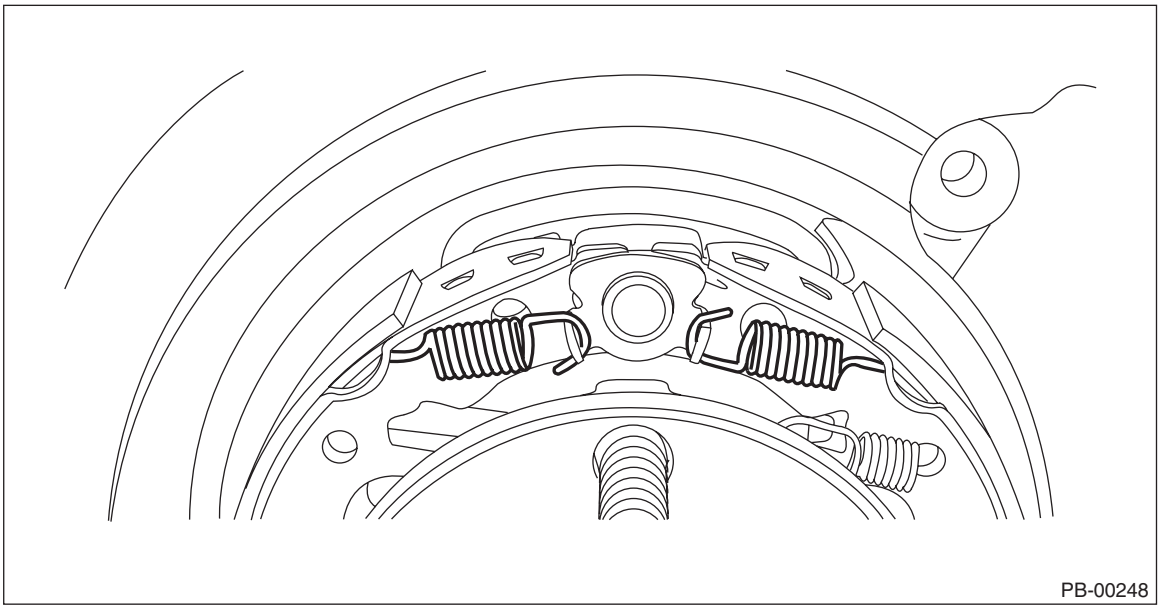


(a)	Adjuster ASSY - rear brake	(c)	Rear disc rotor	(e)	Shorten the adjuster ASSY - rear brake
(b)	Flat tip screwdriver	(d)	Extend the adjuster ASSY - rear brake		

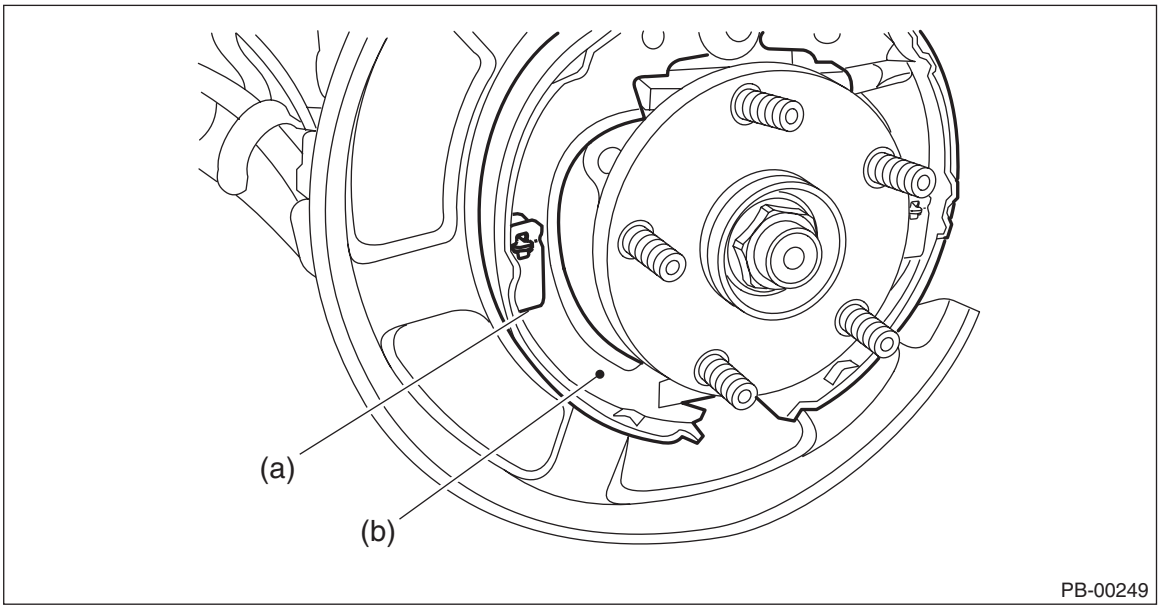
(2) If the rear disc rotor is seized on the hub unit COMPL - rear axle, drive the rear disc rotor out by pushing it with two 8 mm bolts inserted through the holes (A) on the rotor.



7) Remove the spring - primary shoe return and the spring - secondary shoe return.

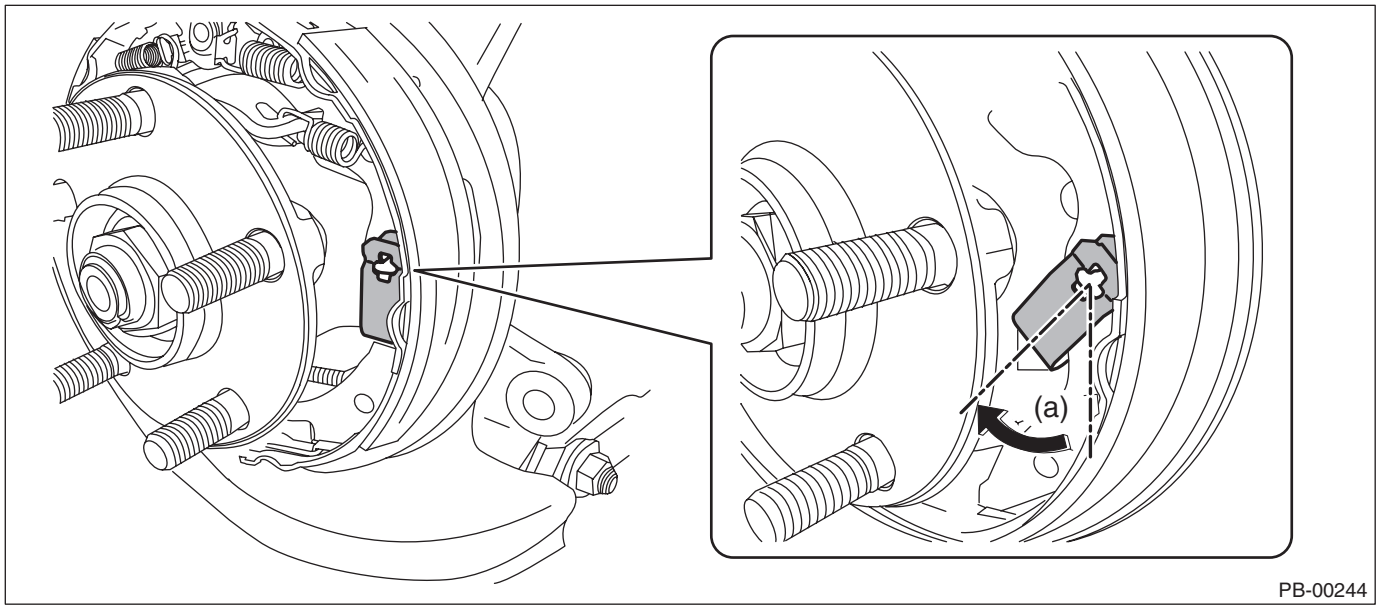


8) Remove the parking brake shoe on the primary side.
   (1) Remove the cup - shoe hold-down (a) and the spring - adjuster, and remove the parking brake shoe (b).



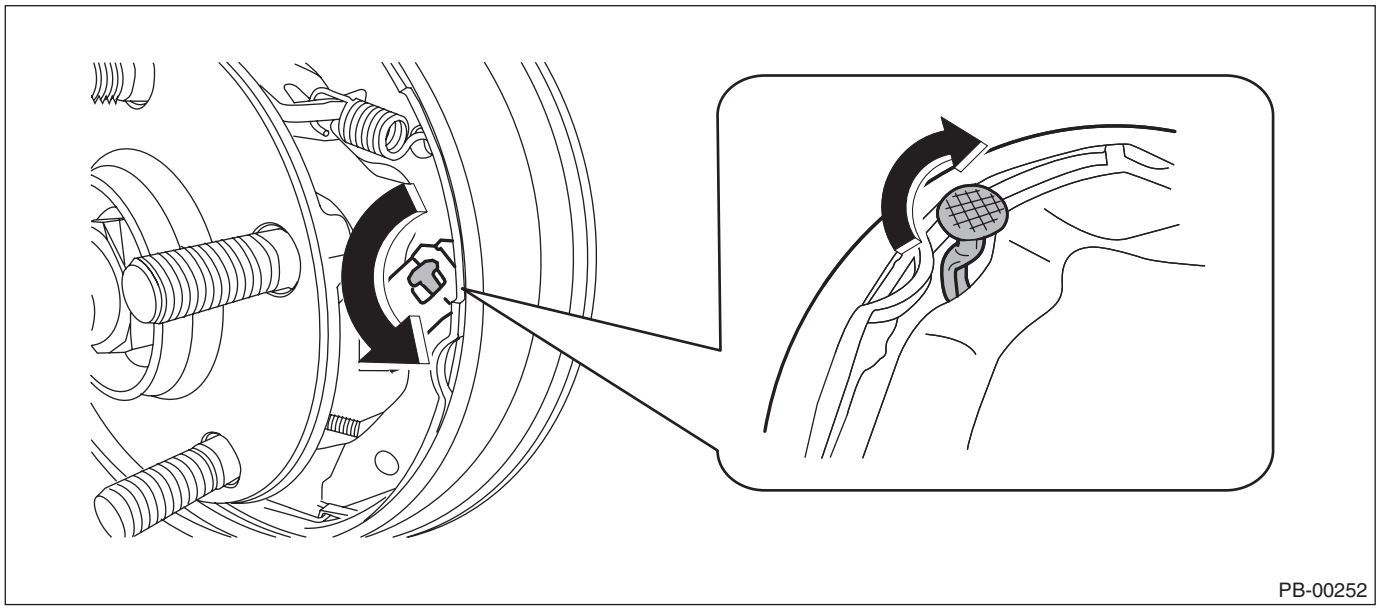
   (2) Remove the strut - brake and the spring - strut.
   (3) Remove the adjuster assembly - rear brake.

9) Remove the parking brake shoe on the secondary side.
(1) Rotate the cup - shoe hold-down in the direction of the front side of the vehicle.

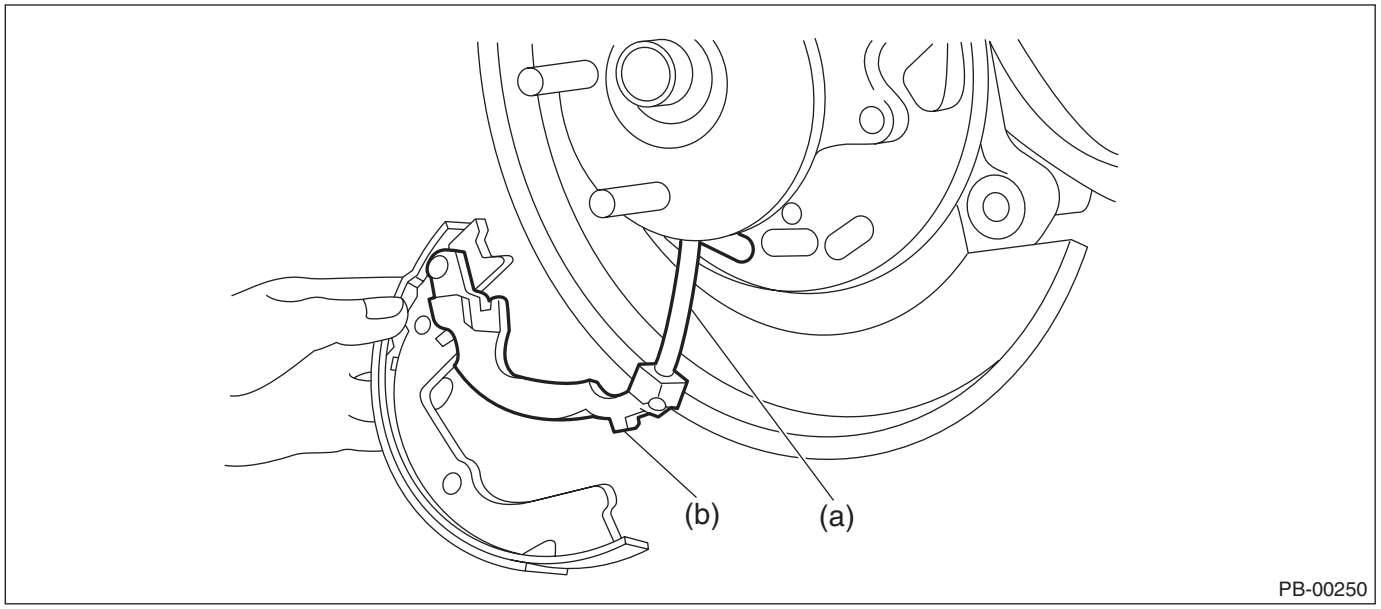


(a) Approx. 45°

(2) Press and shorten the cup - shoe hold-down.
(3) Rotate the pin - secondary shoe hold-down in the opposite direction, and pull out the pin - shoe hold-down.



10) Remove the cable assembly - hand brake cable (a) from the parking lever - rear (b).



11) Remove the retainer - rear brake from the secondary side parking brake shoe. Remove the parking lever - rear from the brake shoe.

B: INSTALLATION

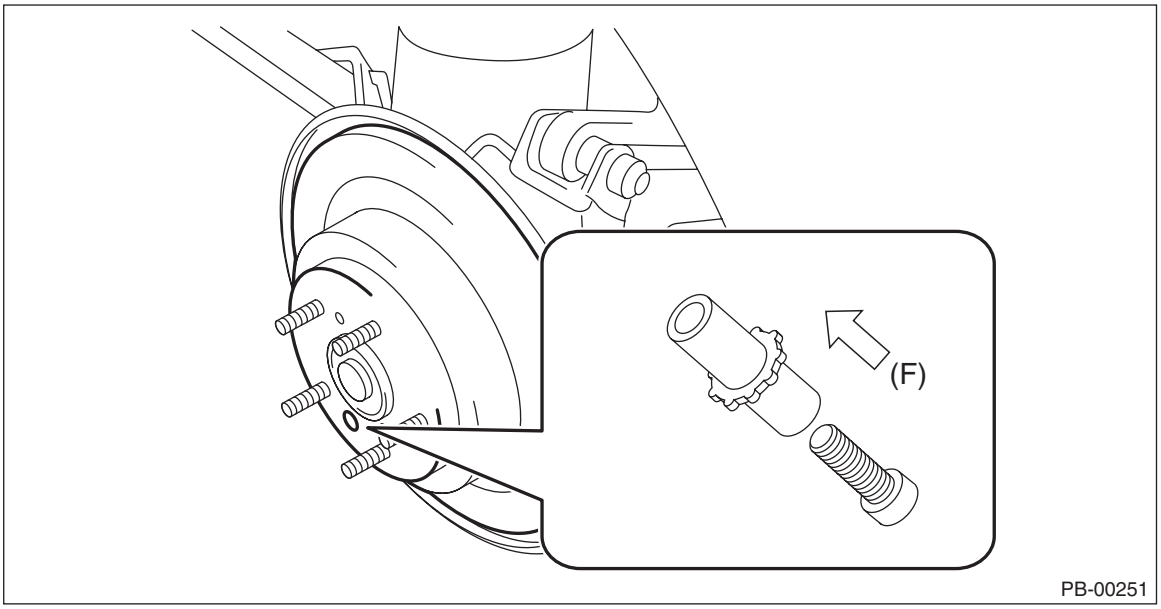
CAUTION:
Be sure the lining surface is free from brake fluid and grease.
1) Apply brake grease to the following locations.

Brake grease:
Molykote 44MA (Part No. 26648FJ000)
- Six contact surfaces of the parking brake shoe rim and back plate - rear brake
- Contact surface of the parking brake shoe and the anchor pin
- Contact surface of the parking lever assembly - rear and the strut - brake
- Contact surface of the parking brake shoe and the adjuster assembly - rear brake
- Contact surface of the parking brake shoe and the strut - brake
- Contact surface of the parking lever - rear and the parking brake shoe

2) Install the spring washer - rear brake and the lever to the secondary side parking brake shoe pin, and lock the retainer - rear brake securely.
3) Install the cable assembly - parking brake to the lever.

4) Attach the adjuster assembly - rear brake and the spring - adjuster to the parking brake shoe.

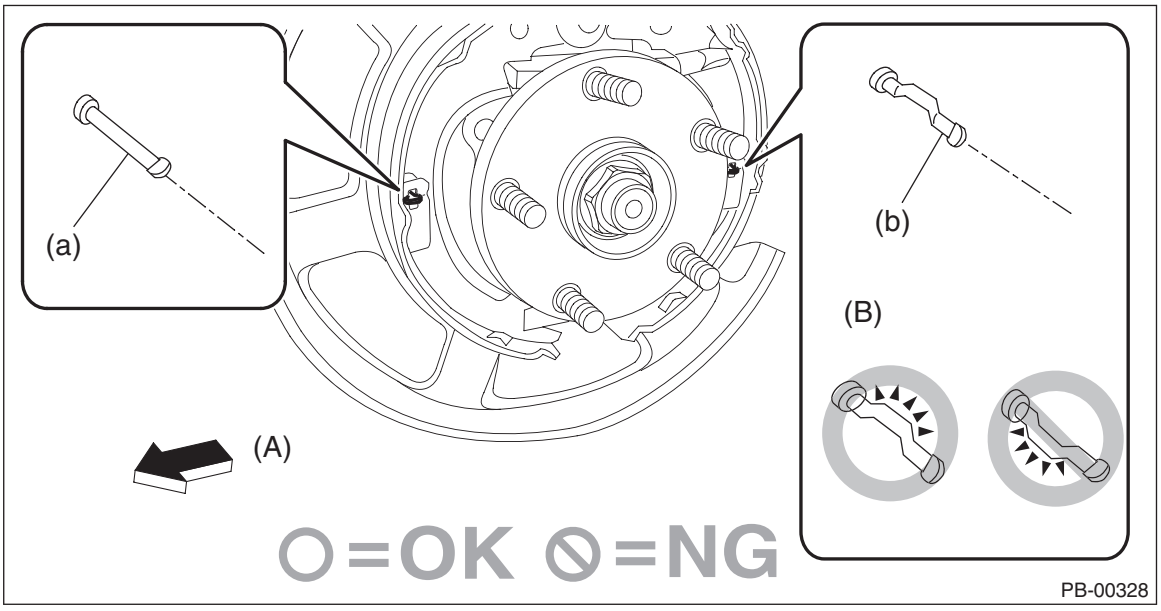
NOTE:
Install the adjuster assembly - rear brake with the screw section facing to the direction shown in the figure below.



(F) Left wheel: front side of vehicle, right wheel: rear side of vehicle

5) Check that the cable assembly - parking brake does not fall from the cable guide.
6) Install the parking brake shoes to the back plate - rear brake with the pins - shoe hold-down and the cups - shoe hold-down.

NOTE:
- Do not reversely install the pin - primary shoe hold-down (a) and the pin - secondary shoe hold-down (b).
- When installing the pin - secondary shoe hold-down (b), face the convex portion to the rear of the vehicle not to contact with the parking lever - rear.



(A) Front side of vehicle

(B) Orientation of pin - shoe hold-down relative to the front of the vehicle

7) Install the strut - brake and the spring - strut to the parking brake shoes.

NOTE:
Install the spring - strut so that it comes towards the front side of the vehicle.
8) Install the return springs on the primary side first, and then the secondary side.
9) Install the brake disc rotor and the brake caliper assembly.
10) Install the brake hose bracket.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to BR-4, COMPONENT, General Description.>
11) Adjust the parking brake. <Ref. to PB-22, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
12) Install the rear wheels.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)
13) If new parking brake shoes are replaced, drive the vehicle to break-in the parking brake lining.
(1) Drive the vehicle at approximately 35 km/h (22 MPH) or more.
(2) While pressing the button of lever assembly - hand brake, pull the lever assembly - hand brake with a force of 150 N (15.3 kgf, 33.7 lbf).
(3) Drive the vehicle for about 200 m (0.12 mile) in this condition.
(4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat steps (1) through (3) again.
(5) After breaking-in, re-adjust the parking brakes.

C: INSPECTION

1) Measure the inner diameter of the rear disc rotor. If scoring or worn is found on the disc, replace the rear disc rotor.

Disc rotor inner diameter:
Specification: 170 mm (6.69 in)
Service limit: 171 mm (6.73 in)
2) Measure the lining thickness. If it exceeds the limit, replace the brake shoe.

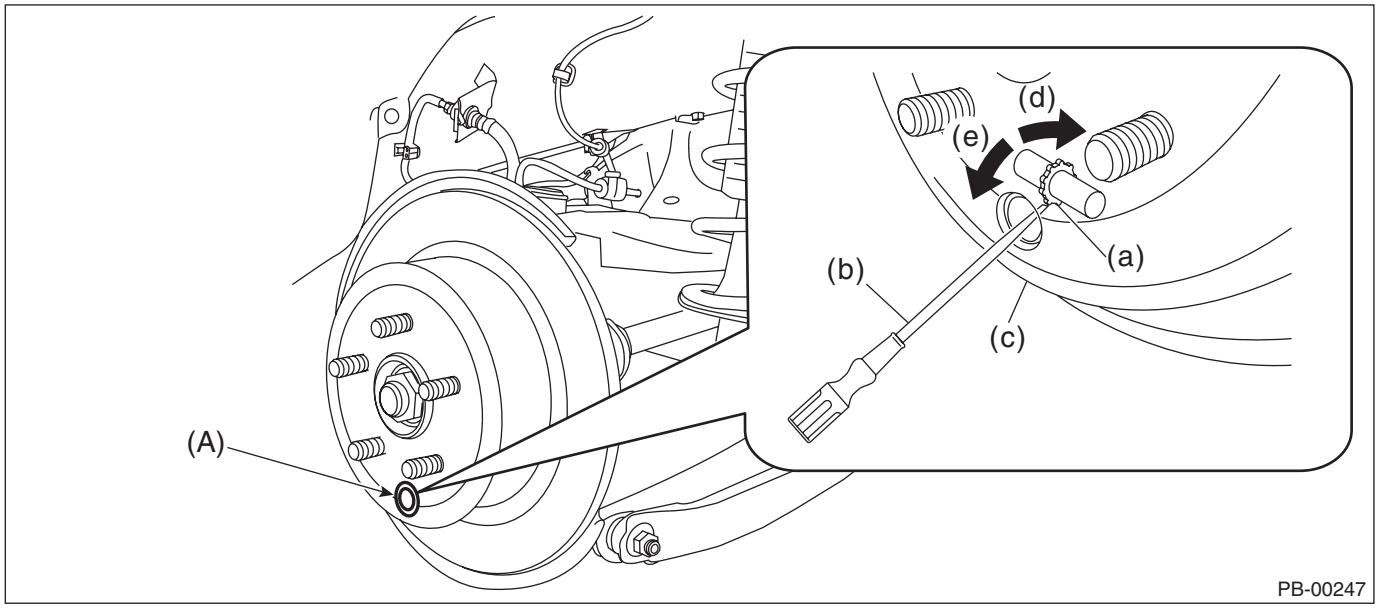
Lining thickness:
Specification: 3.5 mm (0.14 in)
Service limit: 1.5 mm (0.059 in)

NOTE:
Replace the right and left parking brake shoe as a set.

D: ADJUSTMENT

1. SHOE CLEARANCE

1) Return the lever assembly - hand brake completely.
2) Loosen the adjusting nut, and make the cable free.
3) Remove the adjusting hole cover (A) from the rear disc rotor.
4) Insert the flat tip screwdriver (B) into the brake adjustment hole (A), and rotate the adjuster assembly - rear brake (a) until the parking brake shoe contacts the rear disc rotor.



(a)	Adjuster ASSY - rear brake	(c)	Disc rotor	(e)	Shorten the adjuster ASSY - rear brake
(b)	Flat tip screwdriver	(d)	Extend the adjuster ASSY - rear brake		

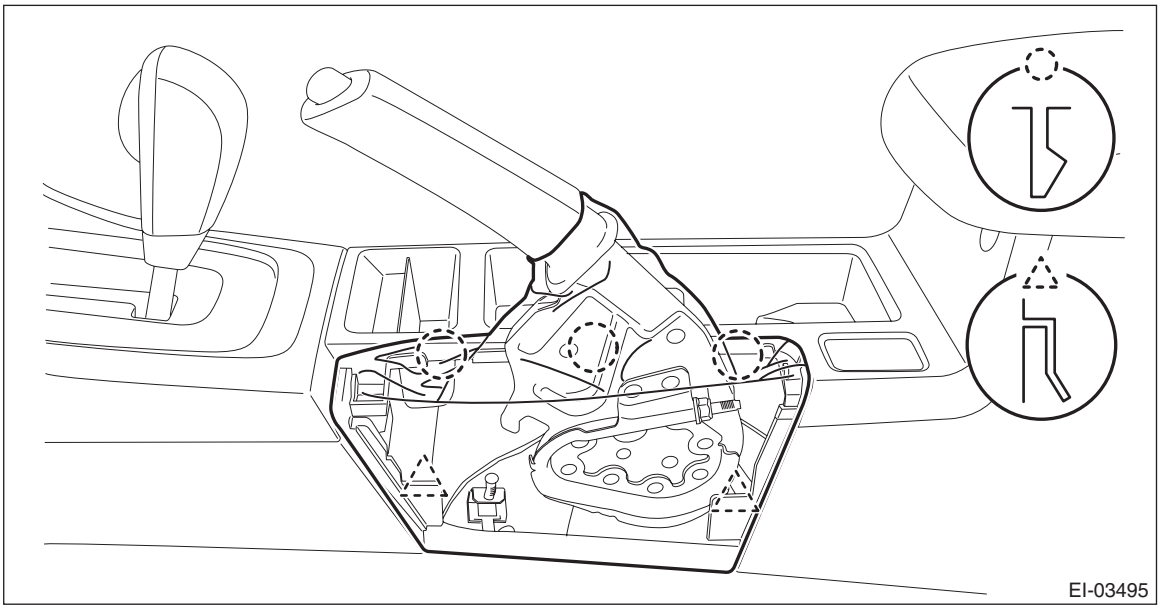
5) Loosen the adjuster assembly - rear brake by 8 notches in the direction of the arrow (e).

CAUTION:
- **Check there is no brake drag.**
- **Make sure that the adjuster assembly - rear brake is loosened by 8 notches. If it is not loosened sufficiently, dragging may occur.**

6) Install the adjusting hole cover to the disc rotor.
7) Adjust the parking lever stroke. <Ref. to PB-23, LEVER STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

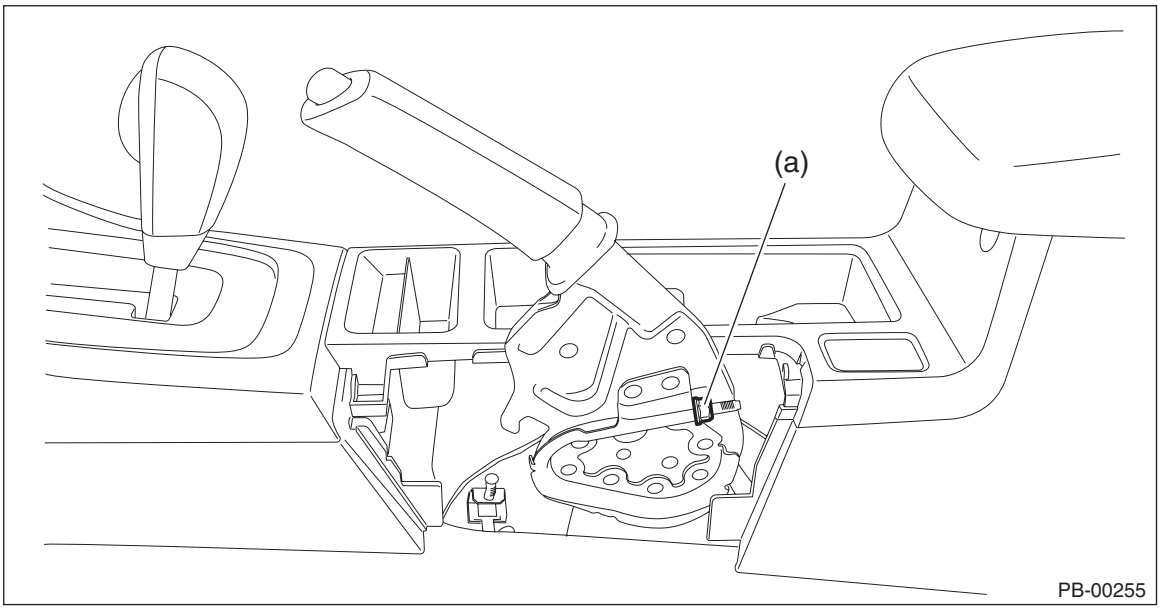
2. LEVER STROKE

1) Adjust the shoe clearance before adjusting lever stroke. <Ref. to PB-22, SHOE CLEARANCE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
2) Release the claws, and then remove the boot - parking brake.



3) Pull the lever assembly - hand brake hard 3 to 5 times.
4) Turn the adjusting nut (a) until the lever stroke is at the specified value.

Lever stroke:
7 to 8 notches when pulled with a force of 200 N (20.4 kgf, 45 lbf)



5) Check there is no brake drag.
6) Check that the brake warning light illuminates when the lever assembly - hand brake is operated.

NOTE:
The light must illuminate when the first notch is reached after pulling the lever.
7) Install the boot - parking brake.

5. General Diagnostic Table

A: INSPECTION

Symptoms	Possible cause	Corrective action
Brake dragging	Lever assembly - hand brake is maladjusted.	Adjust.
	Parking brake cable does not move.	Repair or replace.
	Parking brake shoe clearance is maladjusted.	Adjust.
	Spring - shoe return is faulty.	Replace.
Noise from brake	Spring - shoe return is faulty.	Replace.
	Cup - shoe hold-down is faulty.	Replace.

POWER ASSISTED SYSTEM (POWER STEERING)

PS

		Page
1.	General Description	2
2.	Power Steering System	7
3.	Steering Wheel	8
4.	Universal Joint	13
5.	Steering Column	18
6.	Electric Power Steering Gearbox	26
7.	Power Steering Control Module	42
8.	General Diagnostic Table	43

1. General Description

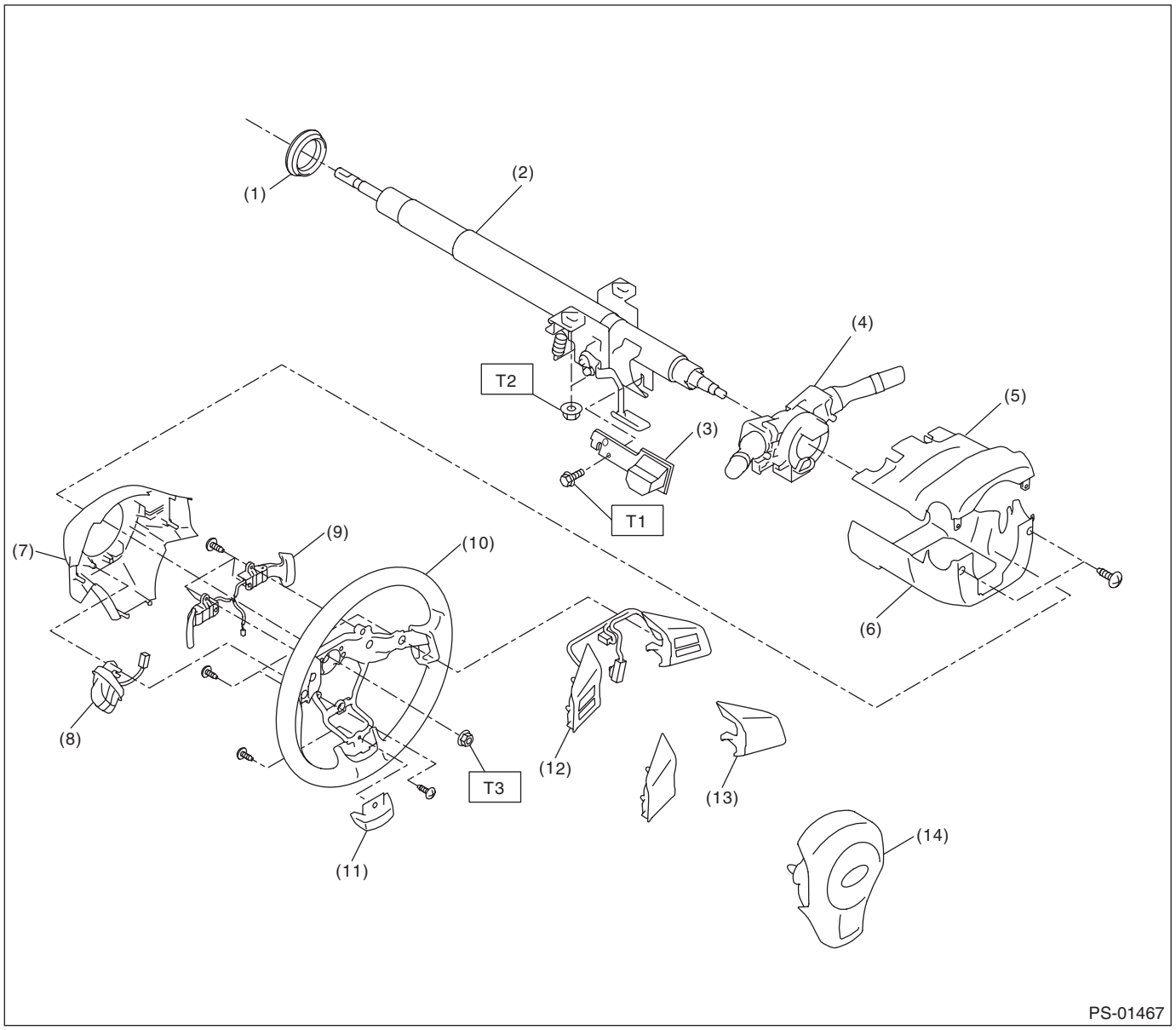
A: SPECIFICATION

Model				Except for XV model	XV model
Whole system	Minimum turning radius		m (ft)	5.3 (17.39)	
	Steering angle	Inner wheel		38.3°±1.5°	38.5°±1.5°
		Outer wheel		33.7°±1.5°	34.0°±1.5°
	Steering wheel diameter		mm (in)	375 (14.76)	
	Lock-to-lock revolution number			3.2	3.1
Gearbox	Type			Rack & pinion type	
	Backlash			0 (Automatic adjusting)	
Motor (Temperature 20°C (68°F))	Rated voltage		V	12	
	Rated torque		N·m (kgf-m, ft-lb)	4.5 (0.46, 3.31)	
	Rated revolution speed		rpm	1,140	
	Rated current		A	85	
	Rated output		W	561	

Model				Except for XV model	XV model
Steering wheel	Free play		mm (in)	17 (0.67) or less	
Steering shaft	Clearance between the steering wheel and column cover		mm (in)	4 — 6 (0.16 — 0.24)	
Steering gearbox (Power steering system)	Sliding resistance		N (kgf, lbf)	350 (36, 79) or less Difference between right and left sliding resistance: 20% or less	333 (34, 75) or less Difference between right and left sliding resistance: 20% or less
	Rack shaft play in the radial direction	Right-turn steering	mm (in)	Horizontal play: 0.6 (0.024) or less Vertical play: 0.4 (0.016) or less	
		Left-turn steering	mm (in)	0.4 (0.016) or less	
	Input shaft play	In radial direction	mm (in)	0.18 (0.0071) or less	
		In axial direction	mm (in)	0.27 (0.0106) or less	
	Rotational resistance		N (kgf, lbf)	Maximum allowable value: 18.3 (1.9, 4.1) or less Difference between right and left sliding resistance: 20% or less	Maximum allowable value: 17.7 (1.8, 4.0) or less Difference between right and left sliding resistance: 20% or less
Steering wheel effort (Power steering system)	At standstill with engine idling on paved road		N (kgf, lbf)	29.4 (3.0, 6.6) or less	
	At standstill with engine stalled on paved road		N (kgf, lbf)	294.2 (30, 66.2) or less	

B: COMPONENT

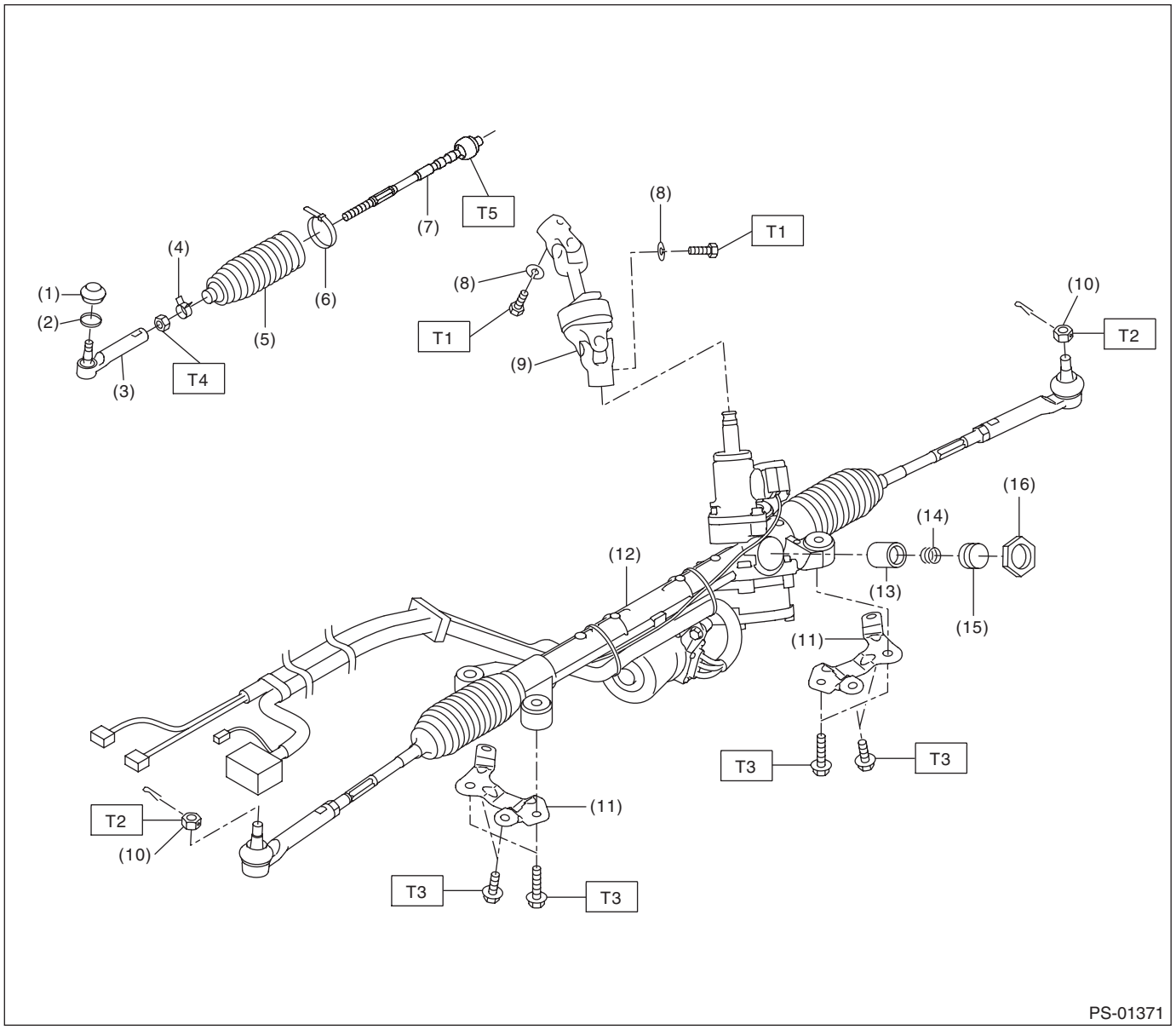
1. STEERING WHEEL AND COLUMN



(1)	Bushing	(8)	Satellite switch
(2)	Column ASSY - steering	(9)	Paddle shift
(3)	Dynamic damper	(10)	Steering wheel
(4)	Switch ASSY - combination	(11)	Cover - spoke
(5)	Cover ASSY - column UPR	(12)	Switch
(6)	Cover ASSY - column LWR	(13)	Cover - switch
(7)	Cover - steering wheel LWR	(14)	Airbag module

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 20 (2.04, 14.8)
T3: 39 (3.98, 28.8)

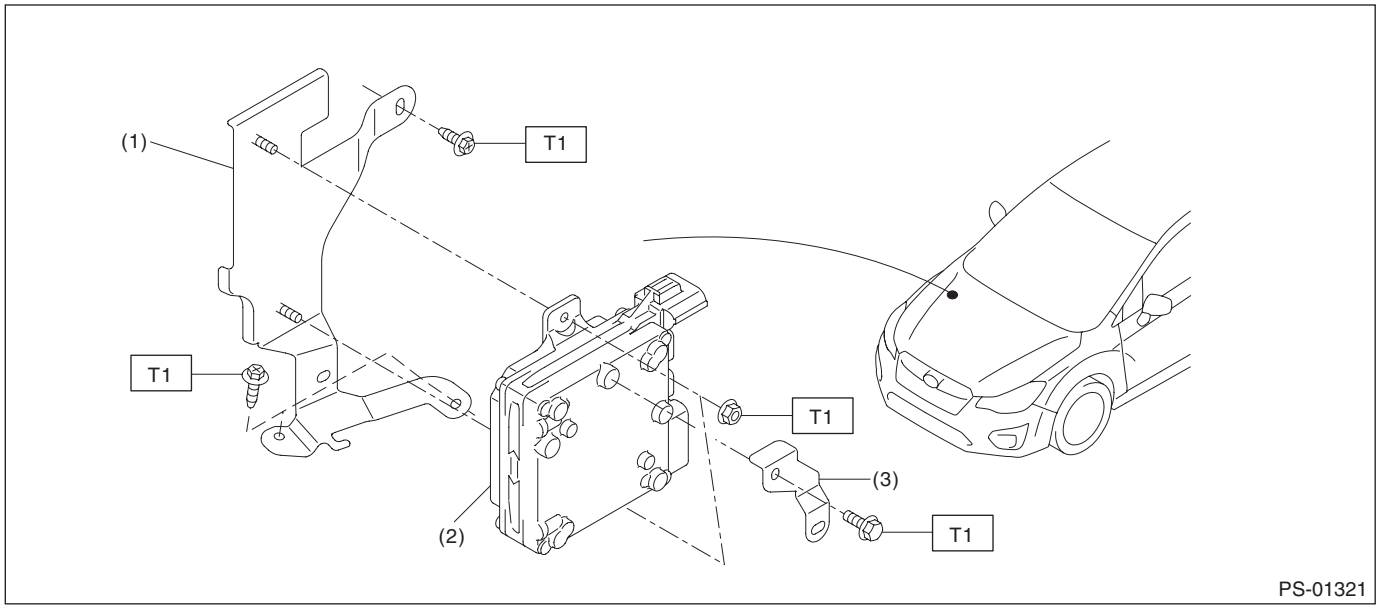
2. STEERING GEARBOX



(1)	Dust seal	(9)	Universal joint ASSY - steering
(2)	Clip - boot tie-rod end B	(10)	Castle nut
(3)	Tie-rod end	(11)	Stiffener
(4)	Clip - boot tie-rod end A	(12)	Steering gearbox ASSY
(5)	Boot - steering gearbox	(13)	Pad - pressure
(6)	Band - boot	(14)	Spring - gearbox
(7)	Tie-rod	(15)	Adjusting screw
(8)	Spring washer	(16)	Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 24 (2.45, 17.7)
T2: 27 (2.75, 19.9)
T3: 60 (6.12, 44.3)
T4: 85 (8.67, 62.7)
T5: 90 (9.18, 66.4)

3. ELECTRIC POWER STEERING CONTROL MODULE



(1) Bracket - control module
(2) Power steering control module
(3) Harness bracket

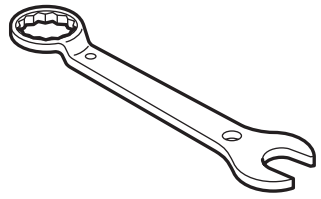
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

C: CAUTION

• Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
• Use grease and oil of Subaru genuine or the equivalent products. Do not mix them of different grades or manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before securing a part on a vise, place cushioning material such as wooden blocks, aluminum plate or cloth between the part and the vise.

D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34099PA100	34099PA100	SPANNER	Used when measuring the rotating resistance of gearbox assembly.

2. GENERAL TOOL

TOOL NAME	REMARKS
Steering wheel puller	Used for removing the steering wheel.

2. Power Steering System

A: WIRING DIAGRAM

Refer to “Electric Power Steering System” in the wiring diagram. <Ref. to WI-152, WIRING DIAGRAM, Vehicle Dynamics Control System.>

B: ELECTRICAL SPECIFICATION

Refer to Control Module I/O Signal of “POWER ASSISTED SYSTEM (POWER STEERING) (DIAGNOSTICS)”. <Ref. to PS(diag)-10, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>

C: INSPECTION

Refer to “POWER ASSISTED SYSTEM (POWER STEERING) (DIAGNOSTICS)”. <Ref. to PS(diag)-2, Basic Diagnostic Procedure.>

D: NOTE

For procedure of each component in the power steering system, refer to the respective section.

- Steering wheel: <Ref. to PS-8, Steering Wheel.>
- Universal joint assembly - steering: <Ref. to PS-13, Universal Joint.>
- Steering column: <Ref. to PS-18, Steering Column.>
- Electric power steering gearbox: <Ref. to PS-26, Electric Power Steering Gearbox.>
- Power steering control module: <Ref. to PS-42, Power Steering Control Module.>

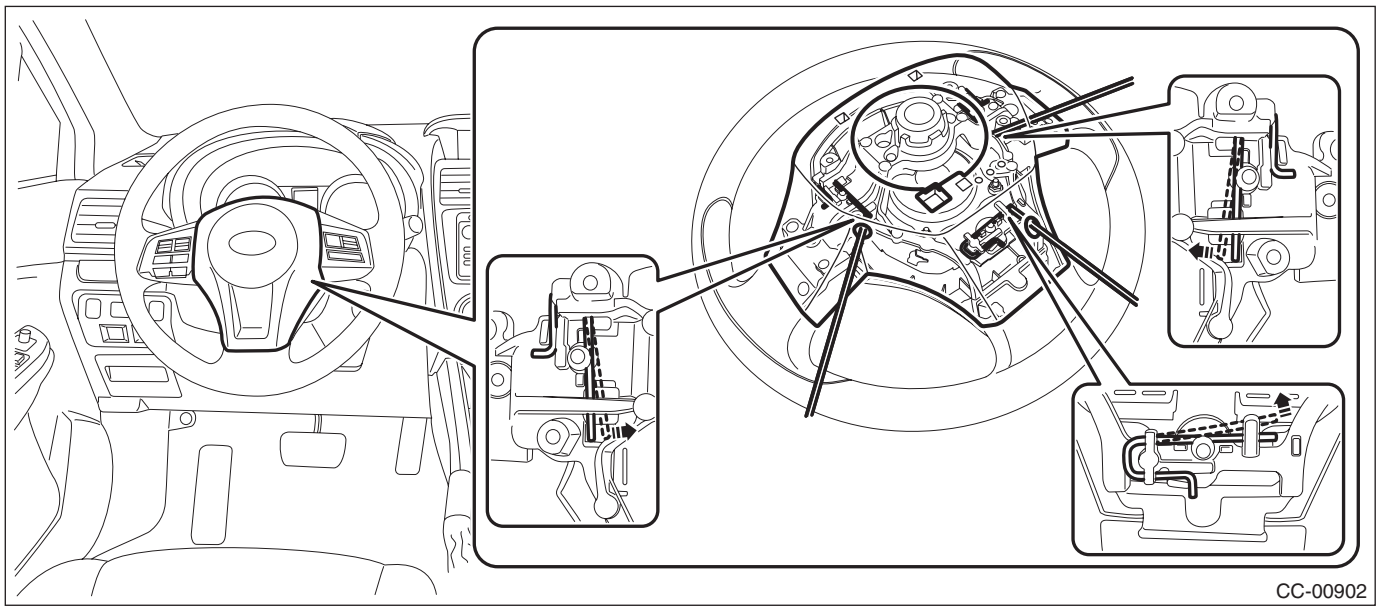
3. Steering Wheel

A: REMOVAL

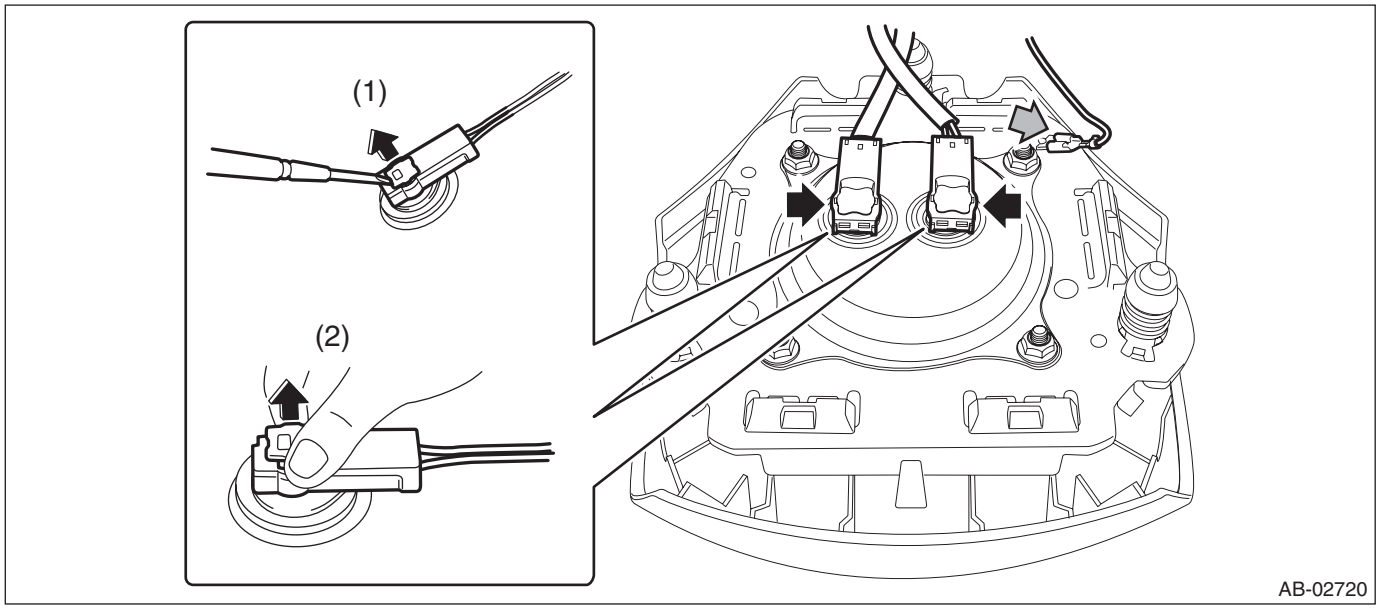
1) Disconnect the negative terminal from the battery, and wait for 60 seconds or more.
2) Set the tire to the straight-ahead position.
3) Remove the driver's airbag module.

CAUTION:
Before performing service on the airbag module, always refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM" section. <Ref. to AB-11, CAUTION, General Description.>

(1) Using a hexagon wrench wrapped with protective tape, push in the snap pins to disengage the locks (3 places).



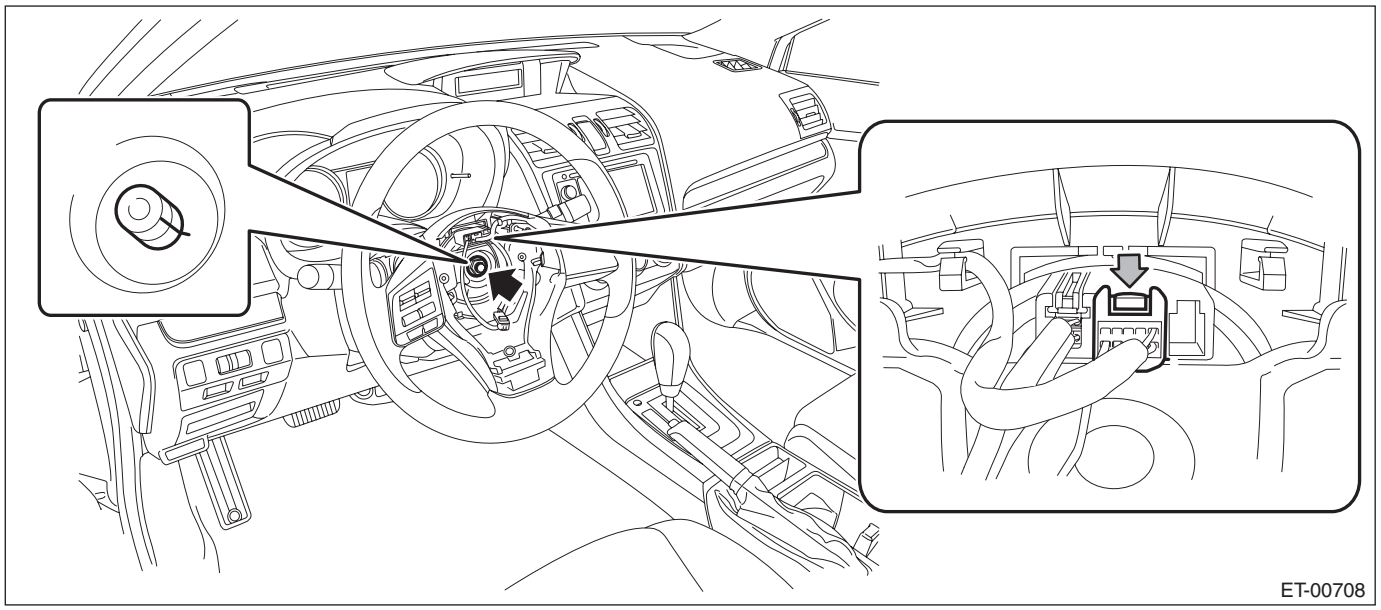
(2) Disconnect the horn harness and airbag connector, and remove the airbag module. <Ref. to AB-24, DRIVER'S AIRBAG MODULE, CURTAIN AIRBAG MODULE & PRETENSIONER, PROCEDURE, Airbag Connector.>



4) Remove the steering wheel.

CAUTION:
• Always use the steering wheel puller for removal to avoid deforming the steering wheel.
• If the steering wheel has been removed, make sure that the steering roll connector is not turned from the original position.

PREPARATION TOOL:
Steering wheel puller
(1) Disconnect the connector and remove the nut.
(2) Put alignment marks and remove the steering wheel.



B: INSTALLATION

CAUTION:
• Before handling the airbag module, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". <Ref. to AB-11, CAUTION, General Description.>
• Be careful not to damage the curtain airbag module during removal.
• If the steering wheel and steering angle sensor are removed, perform "VDC sensor midpoint setting mode" of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
1) Align the center position of the roll connector. <Ref. to AB-109, ADJUSTMENT, Roll Connector.>
2) Install each part in the reverse order of removal.

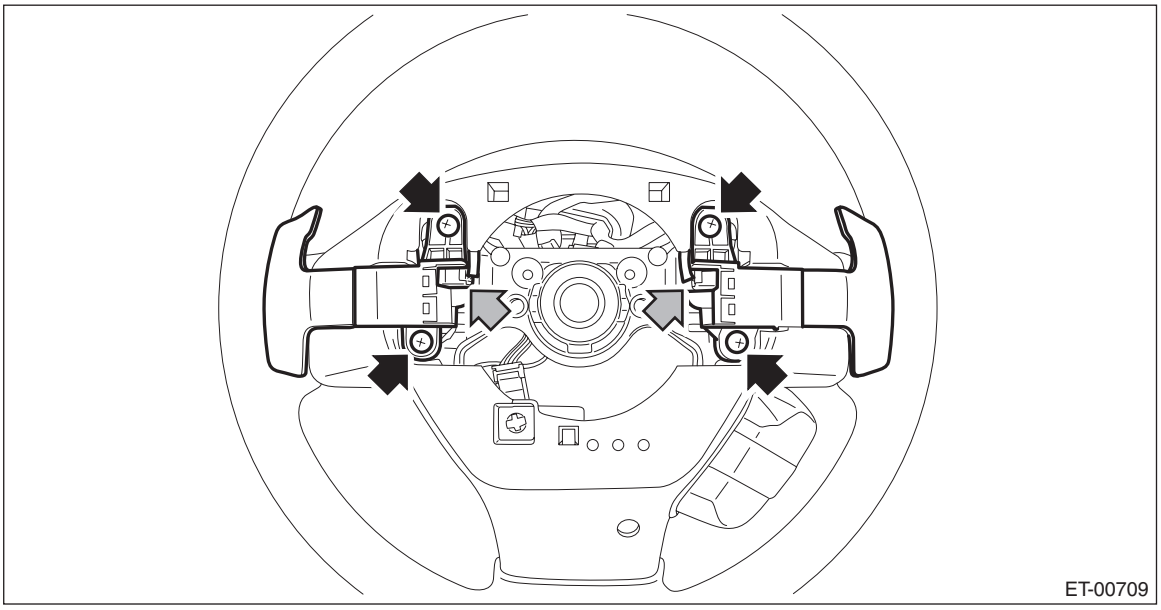
NOTE:
Align the alignment marks on the steering wheel and the column assembly - steering.

Tightening torque:
Steering wheel: 39 N·m (3.98 kgf-m, 28.8 ft-lb)

Clearance:
Cover assembly - column to Steering wheel: 4 — 6 mm (0.16 — 0.24 in)

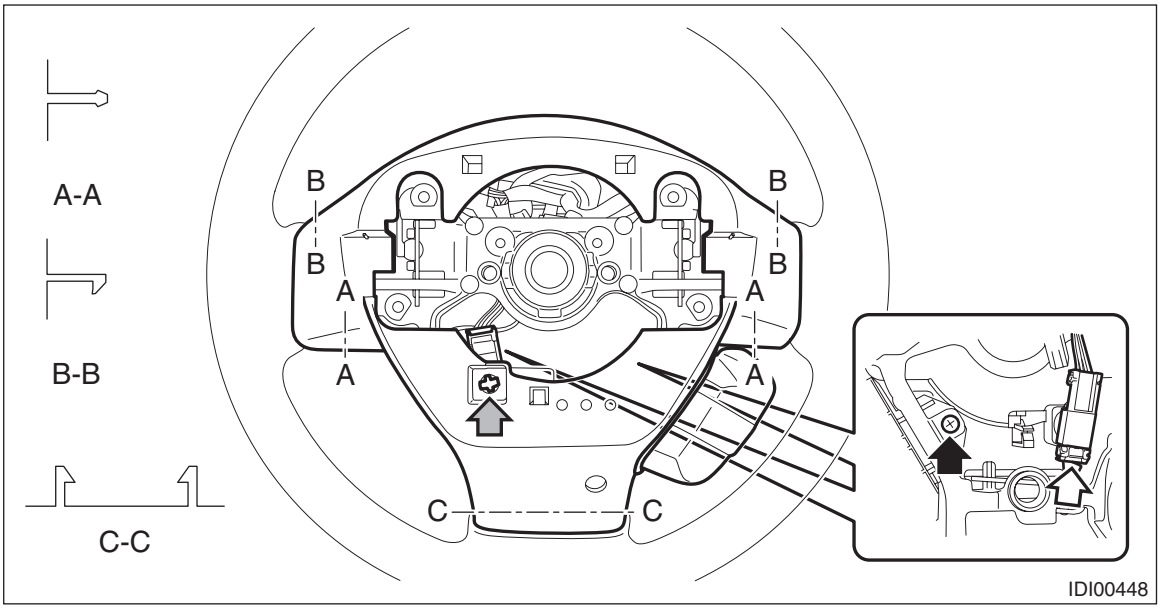
C: DISASSEMBLY

1) Remove the screw, disconnect the connector and remove the paddle shift switch. (Model with paddle shift)

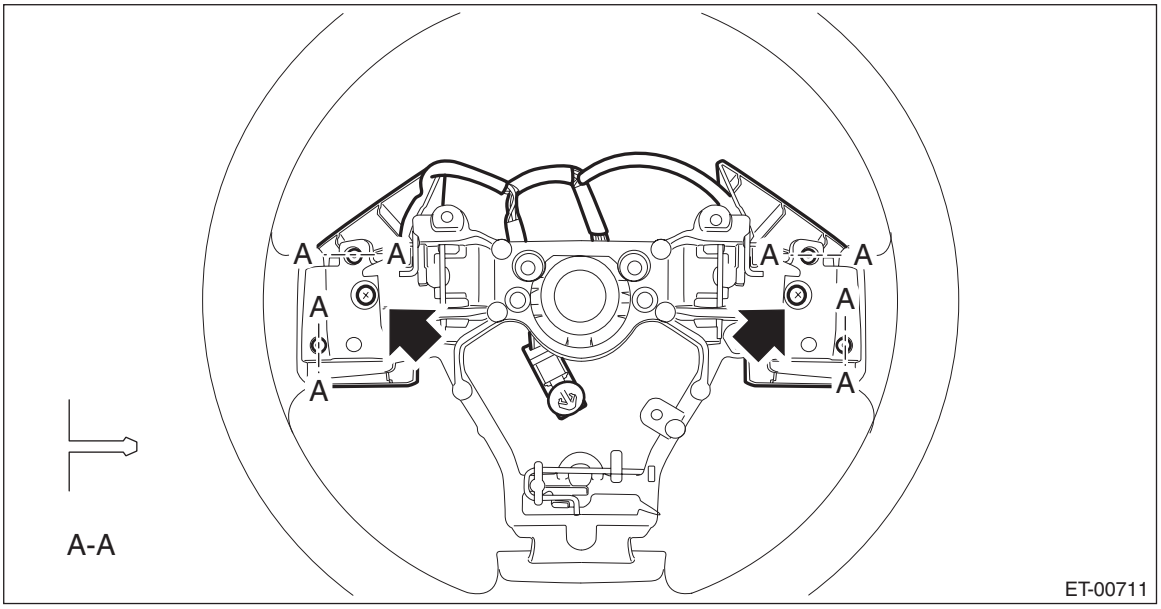


2) Release the claws and clips, and remove the cover - steering wheel LWR.

NOTE:
For model with steering switch, remove the connector and screw.



3) Remove the screws and then remove the satellite switch assembly.

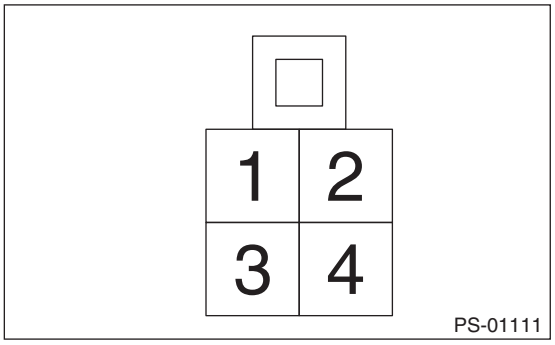


D: ASSEMBLY

Assemble each part in the reverse order of disassembly.

E: INSPECTION

Check the resistance of paddle switch.



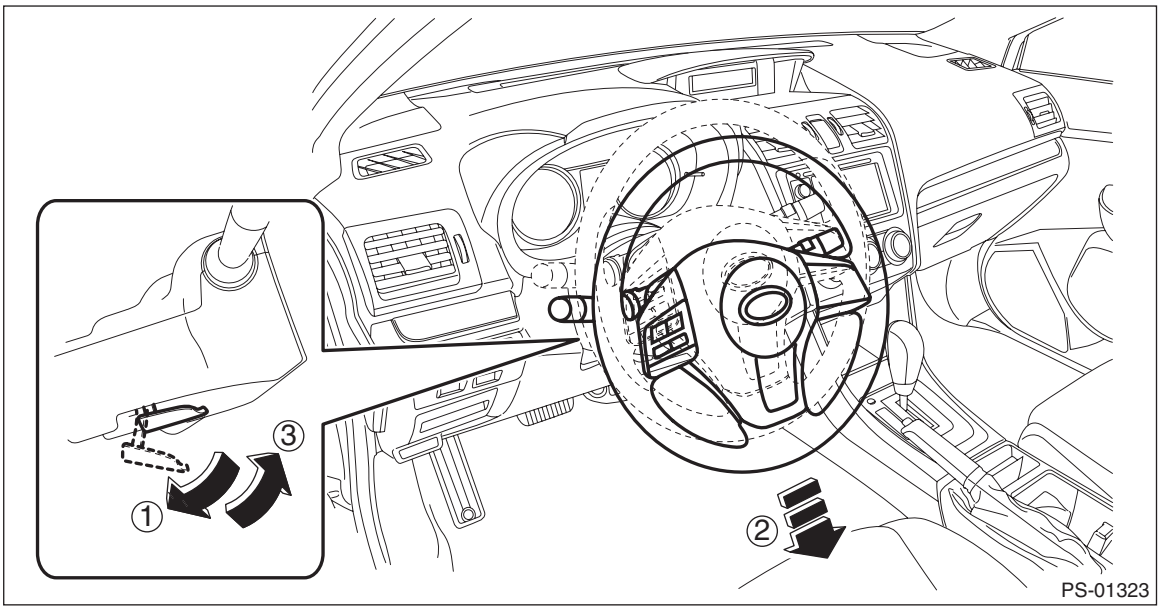
Step		Check	Yes	No
1	**SHIFT-UP SWITCH CONTINUITY CHECK.** 1) Operate the + side of paddle shift assembly and hold it. 2) Measure the resistance between the paddle shift assembly connectors. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace the paddle shift assembly.
2	**SHIFT-DOWN SWITCH CONTINUITY CHECK.** 1) Operate the – side of paddle shift assembly and hold it. 2) Measure the resistance between the paddle shift assembly connectors. ***Terminals*** ***No. 1 — No. 4:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the paddle shift assembly.
3	**CHECK SHIFT SWITCH INSULATION.** 1) Do not operate the paddle shift assembly. 2) Measure the resistance between the paddle shift assembly connectors. ***Terminals*** ***No. 1 — No. 3:*** ***No. 1 — No. 4:***	Is the resistance 1 MΩ or more?	Paddle shift assembly is normal.	Replace the paddle shift assembly.

Replace the paddle switch if the inspection result is not within the standard.

4. Universal Joint

A: REMOVAL

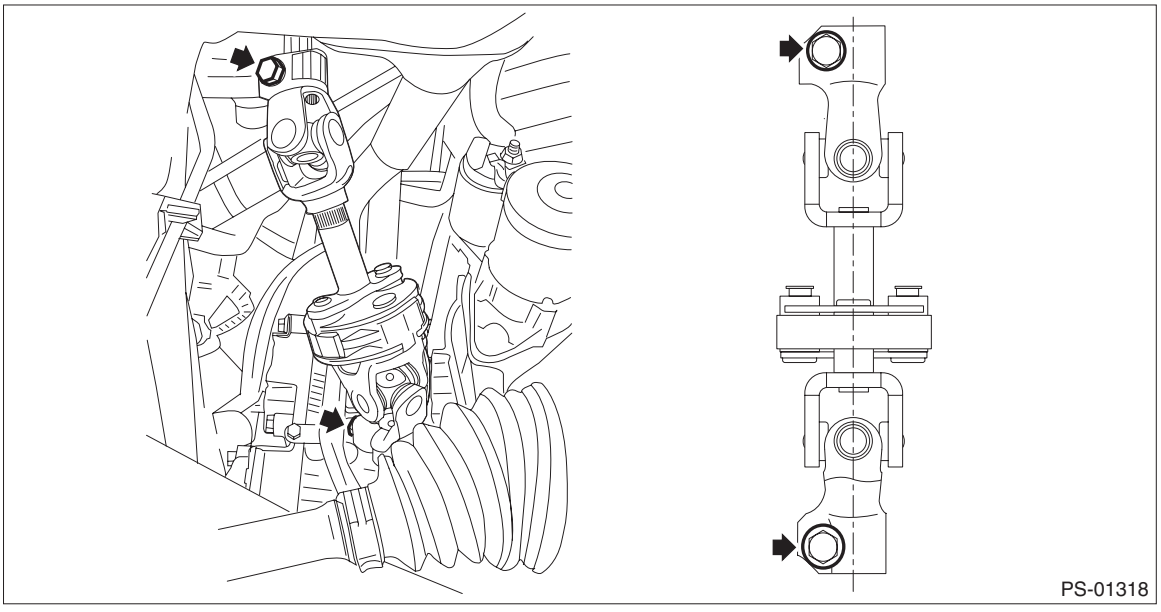
1) Adjust the tilt position of the column assembly - steering to the lowest position and lock the tilt lever.



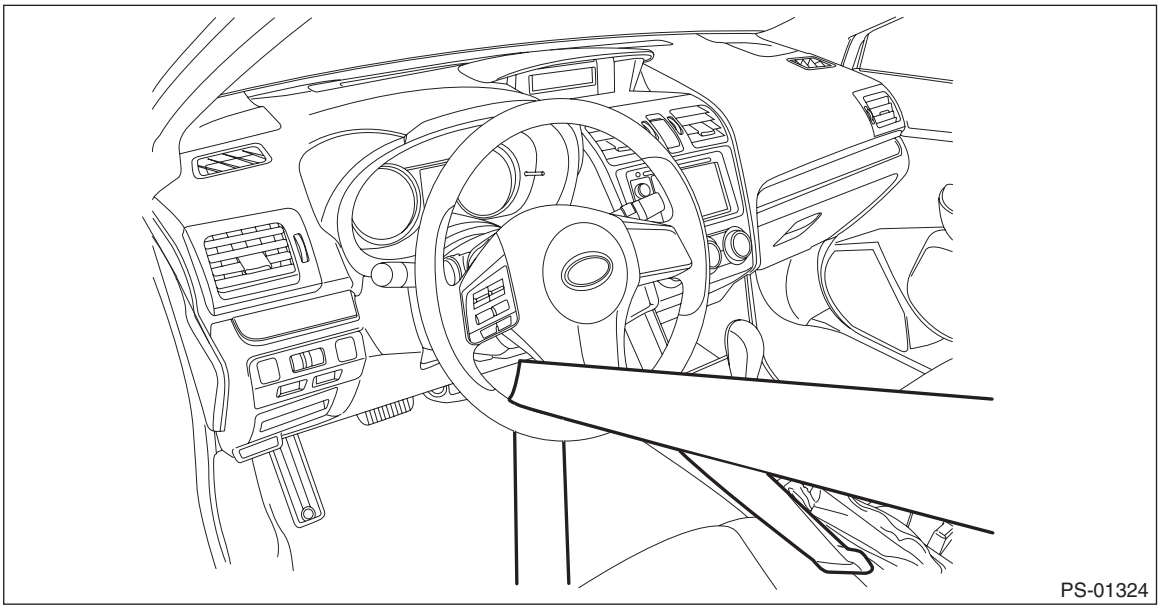
2) Remove the universal joint assembly - steering.
   (1) Place alignment marks on the universal joint assembly - steering.

NOTE:
Place alignment marks on the following positions.
- Between the column assembly - steering and the universal joint assembly - steering
- Between the steering gearbox assembly and the universal joint assembly - steering

   (2) Remove the bolt, and remove the universal joint assembly - steering.

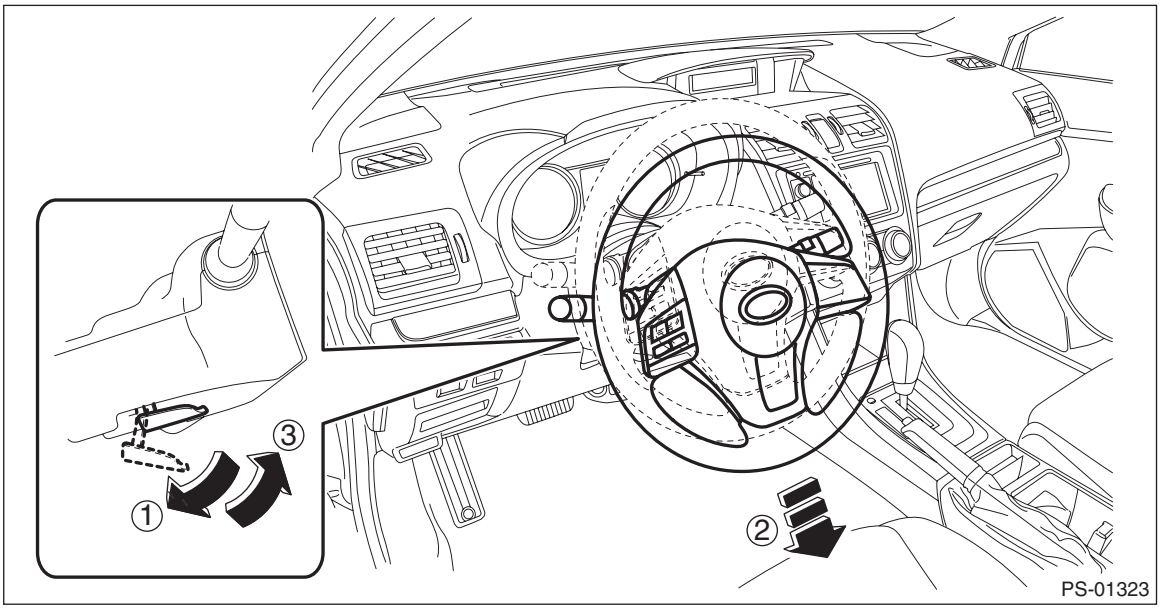


3) Prevent the steering wheel from turning using the seat belt.



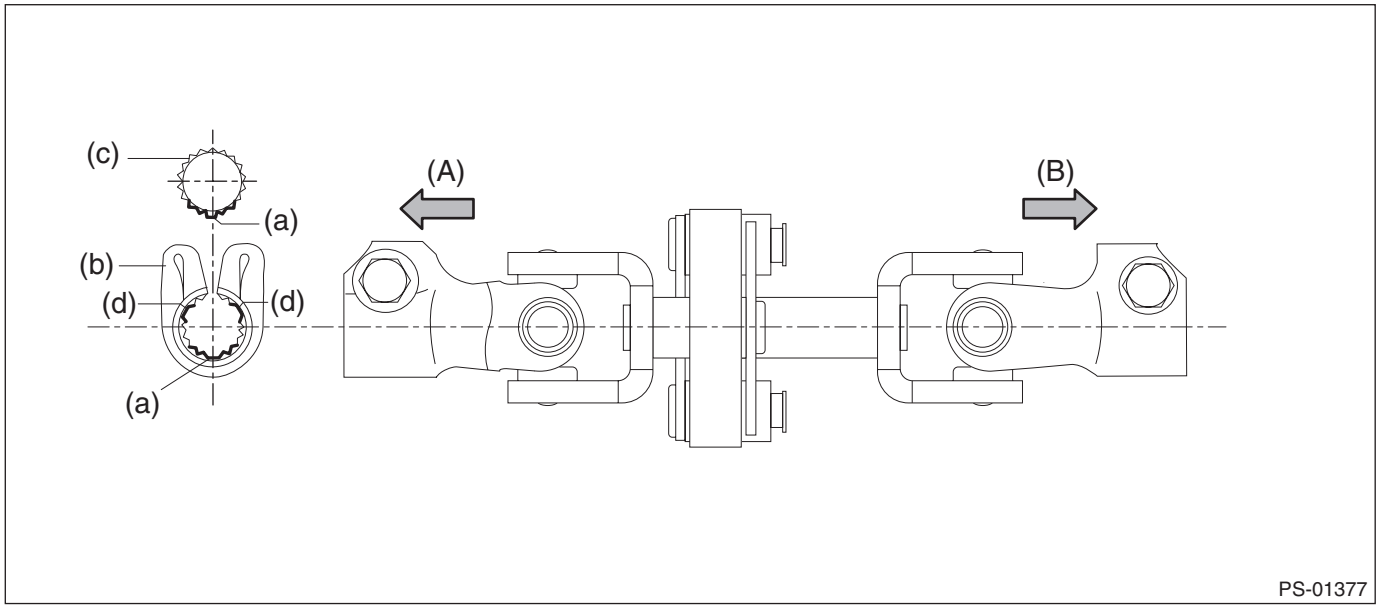
B: INSTALLATION

1) Before installation, check the universal joint assembly - steering. <Ref. to PS-16, INSPECTION, Universal Joint.>
2) Adjust the tilt position of the column assembly - steering to the neutral position and lock the tilt lever.



3) Align the cutout portion (a) at serrated section of the column shaft (c) and yoke (b), then install the universal joint assembly - steering into column shaft.

CAUTION:
Be sure to align the protruded portion (a) of the column shaft with the cutout portion (a) at serrated section. If another cutout portions (d) are used for alignment, the bolt of the universal joint assembly - steering cannot be assembled.



(A) Column shaft side (B) Gearbox side

4) Install the universal joint assembly - steering to the serrations of the gearbox assembly by matching the alignment marks.
5) Tighten the bolts on the gearbox side first, and then the column shaft side.

CAUTION:
Be sure to follow the tightening order and tightening torque of the universal joint assembly - steering to avoid the steering effort from becoming heavy.

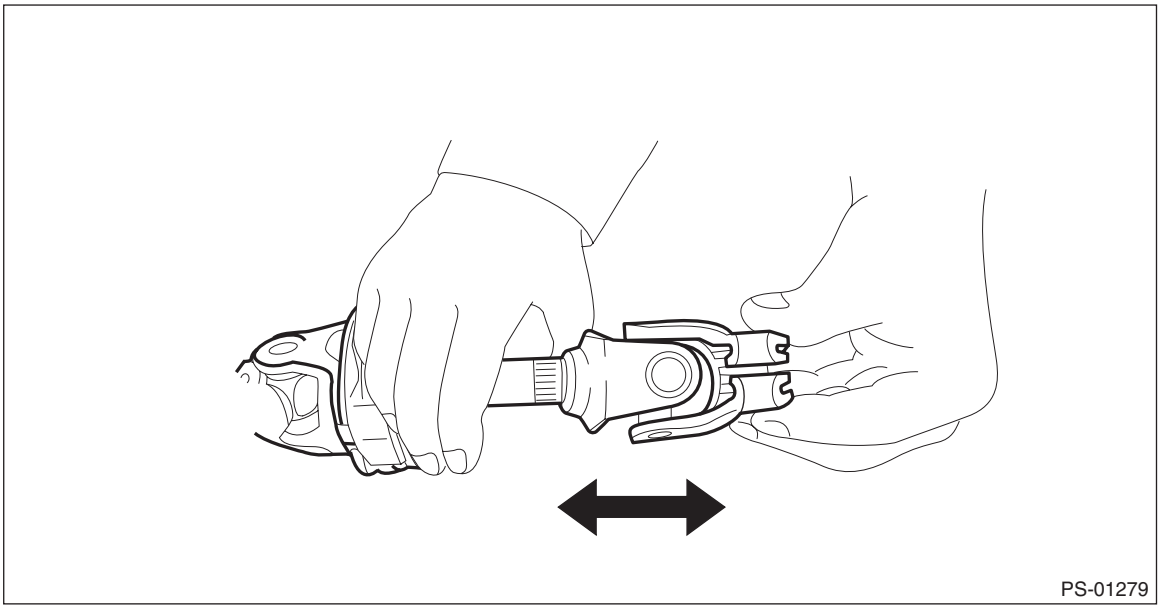
Tightening torque:
24 N·m (2.45 kgf-m, 17.7 ft-lb)

Clearance:
Universal joint assembly - steering coupling to adjacent parts: 15 mm (0.59 in) or more

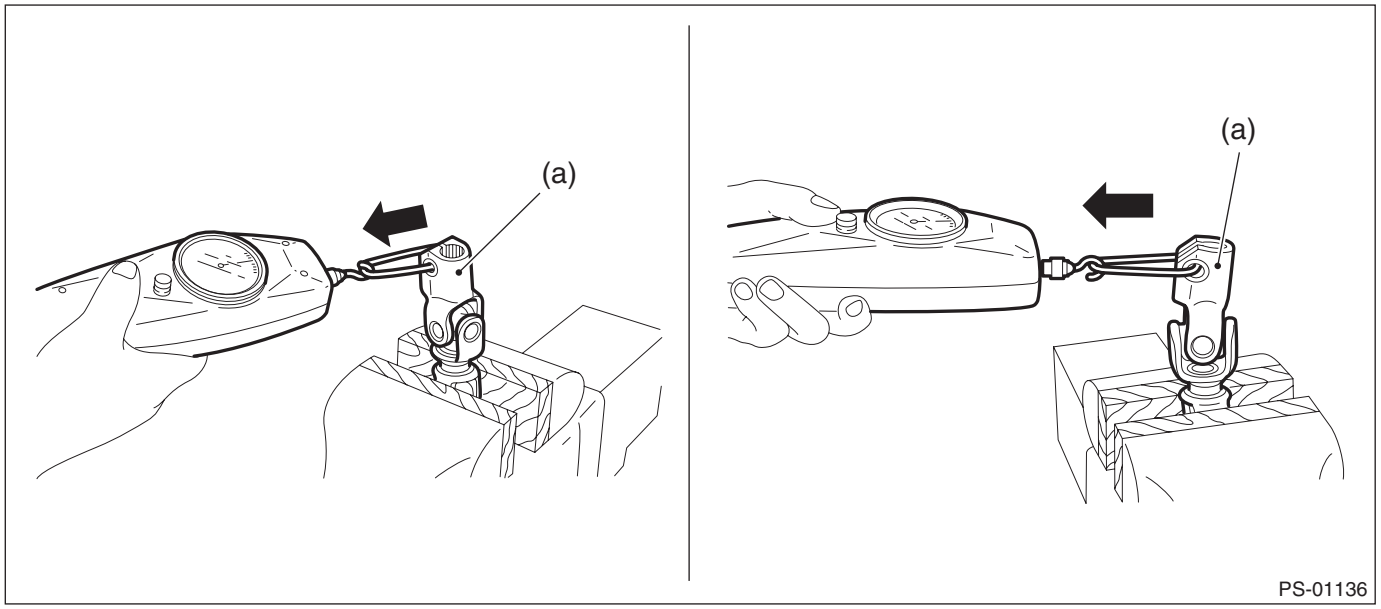
C: INSPECTION

Check for wear, damage or any other faults.
1) Check the universal joint assembly - steering for excessive looseness.

Service limit:
Play of the universal joint assembly - steering: 0 mm (0 in)

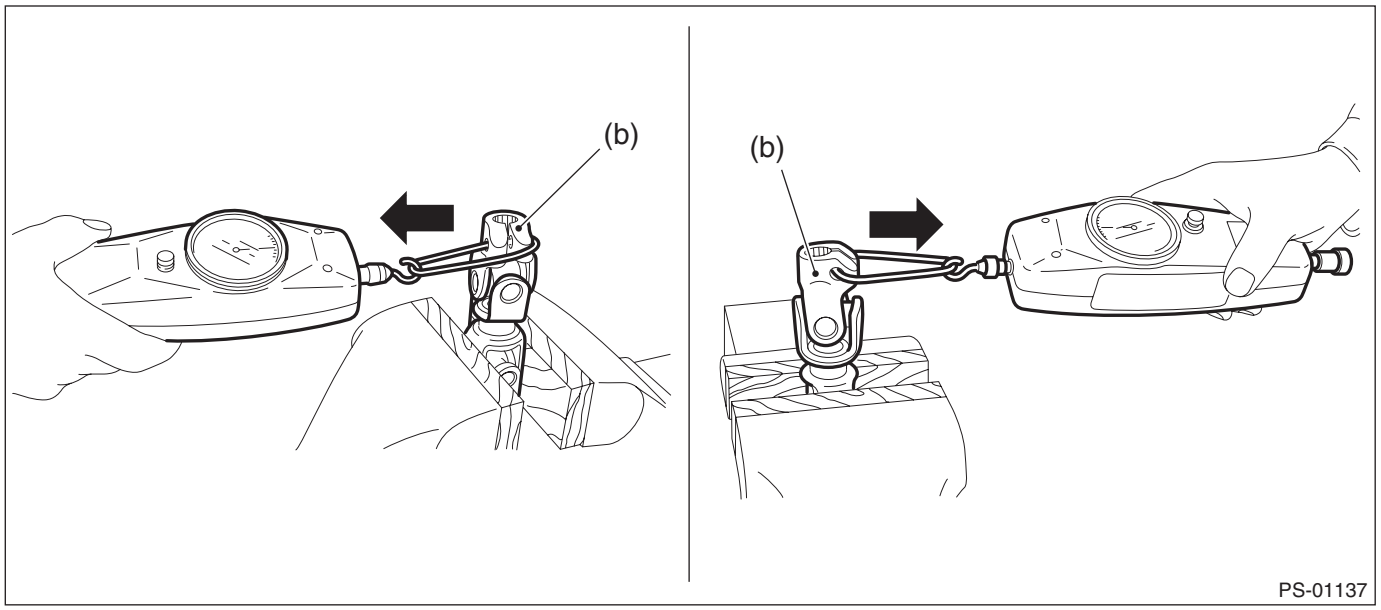


2) Measure the swing torque of the universal joint assembly - steering.
(1) Place the universal joint assembly - steering between wooden blocks and fix it on a vise.
(2) With the yoke (a) of gearbox side facing up, measure the swing torque in two directions.



Service limit:
Maximum load: 3.8 N (0.39 kgf, 0.86 lbf) or less

(3) With the yoke (b) of column assembly - steering side facing up, measure the swing torque in two directions.



Service limit:

Maximum load: 7.3 N (0.74 kgf, 1.64 lbf) or less

(4) Replace as necessary, if it is found defective.

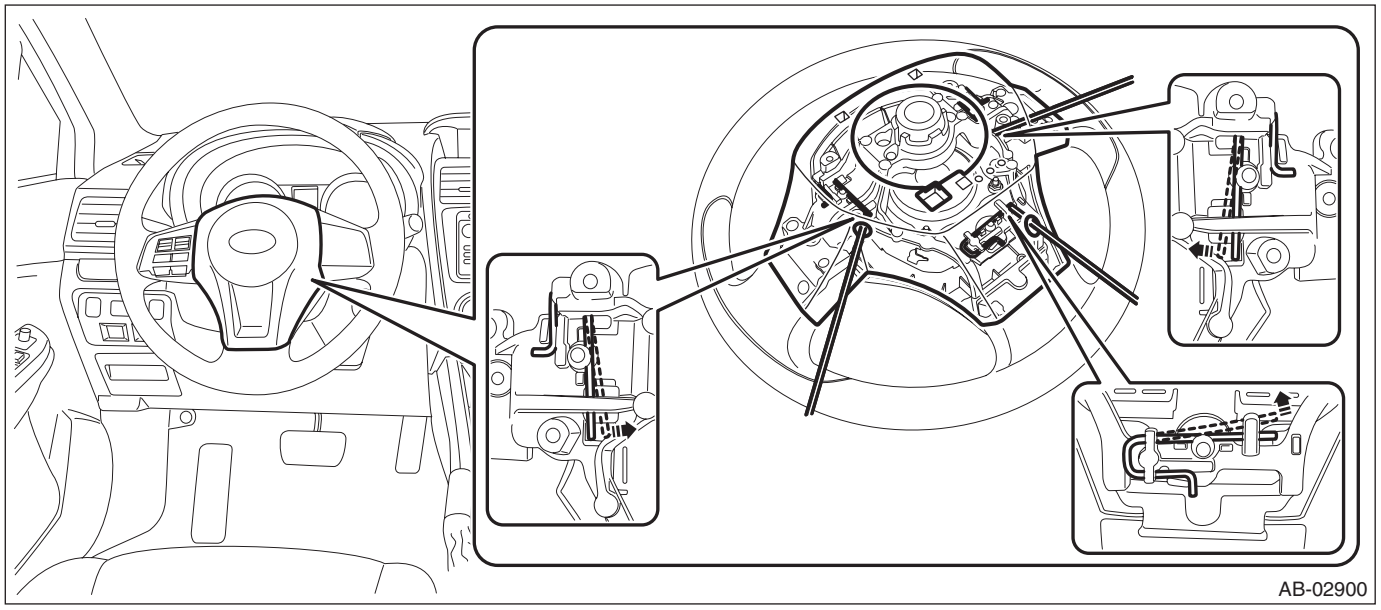
5. Steering Column

A: REMOVAL

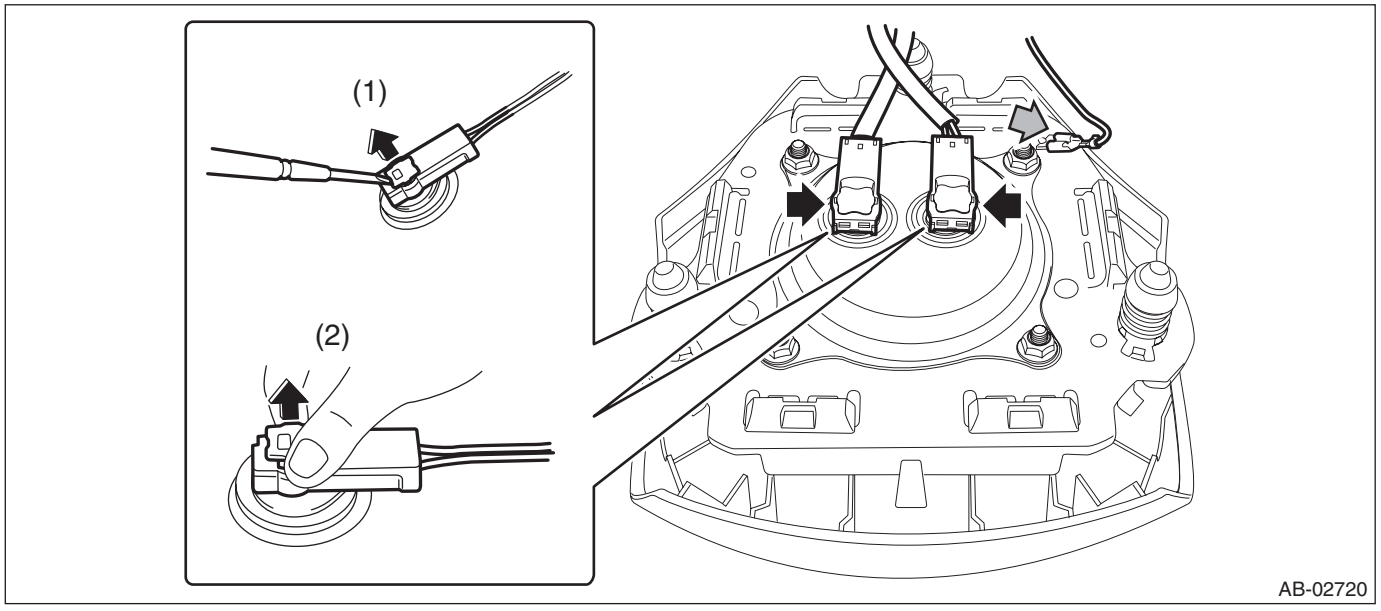
1) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
2) Remove the driver's airbag module.

CAUTION:
Before performing service on the airbag module, always refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM" section. <Ref. to AB-11, CAUTION, General Description.>

(1) Using a hexagon wrench etc. wrapped by protective tape, insert the snap pins and release the locks (3 locations).



(2) Disconnect the horn harness and airbag connector, and remove the airbag module. <Ref. to AB-24, DRIVER'S AIRBAG MODULE, CURTAIN AIRBAG MODULE & PRETENSIONER, PROCEDURE, Airbag Connector.>

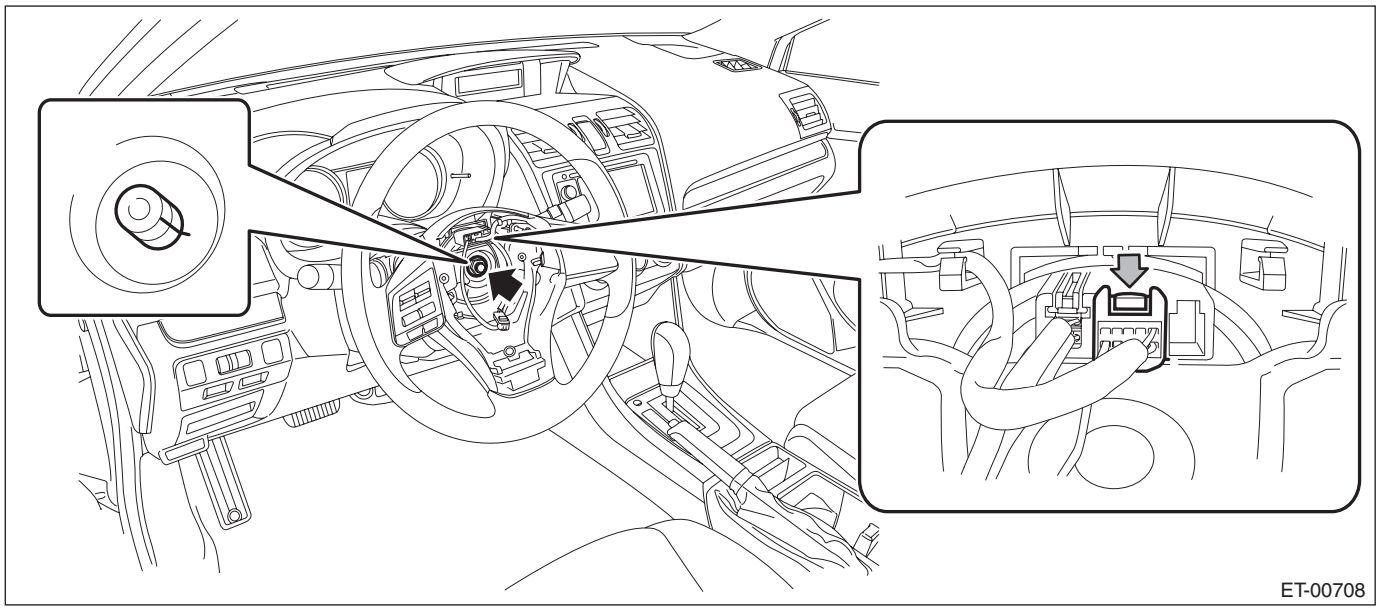


3) Remove the steering wheel.

CAUTION:
• Always use the steering wheel puller for removal to avoid deforming the steering wheel.
• If the steering wheel has been removed, make sure that the steering roll connector is not turned from the original position.

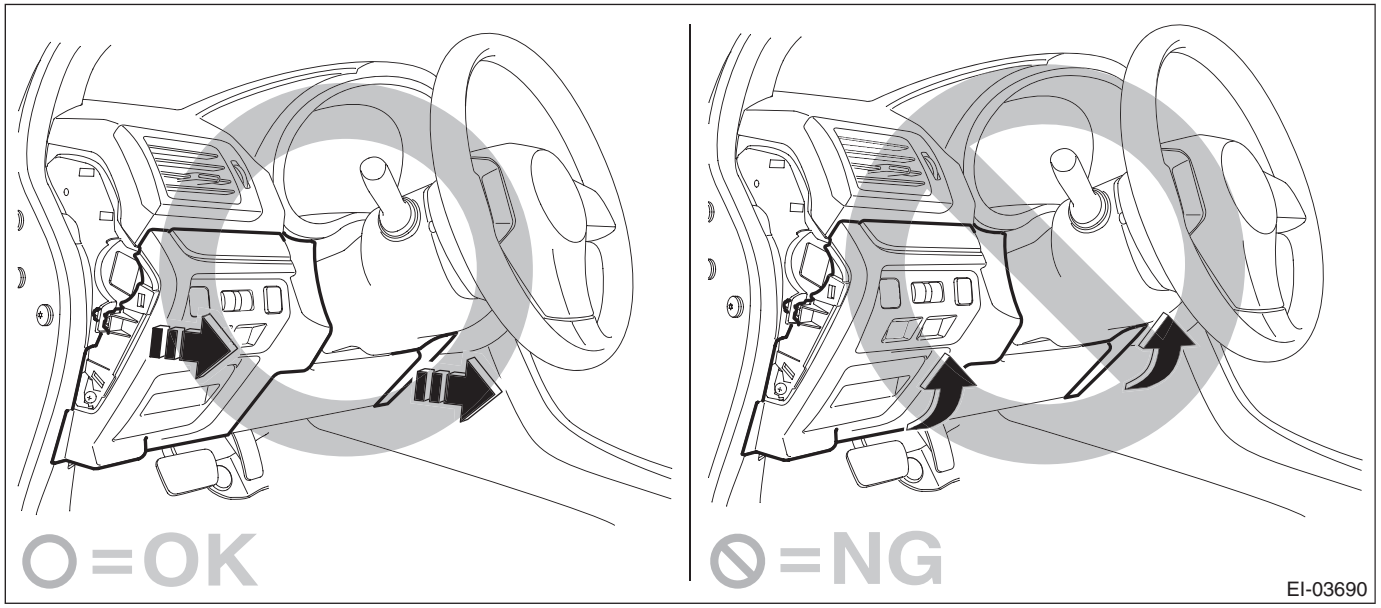
Preparation tool:
Steering wheel puller

(1) Disconnect the connector and remove the nut.
(2) Put alignment marks and remove the steering wheel.

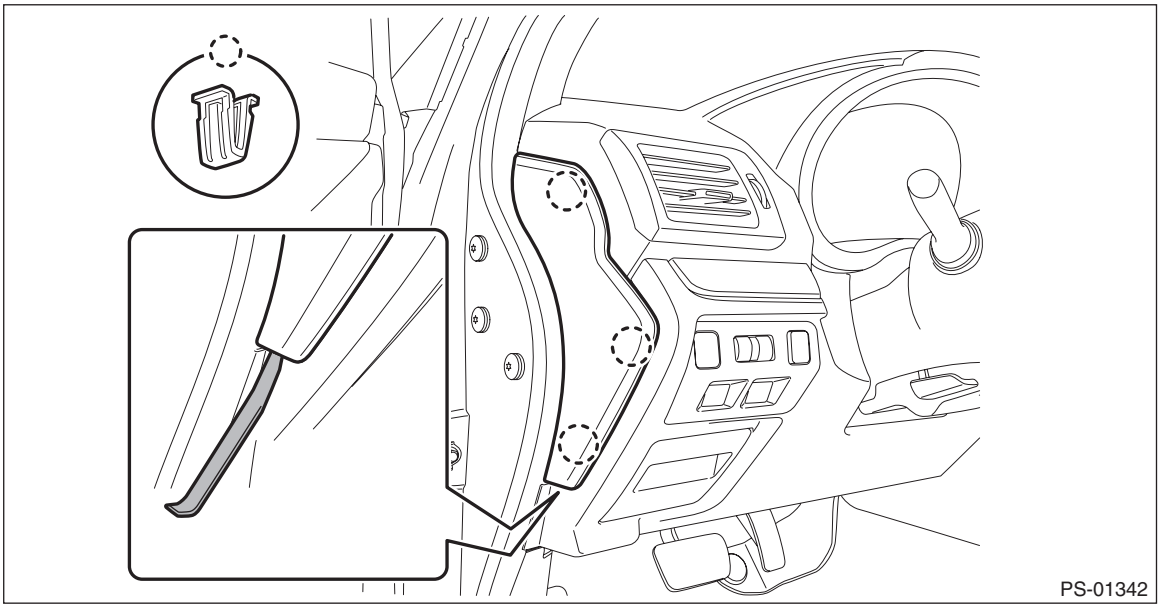


4) Remove the cover assembly - instrument panel LWR driver.

CAUTION:
When removing the cover assembly - instrument panel LWR driver, be sure to pull it toward you. If attempting to remove by turning it upward, the claws may be damaged.



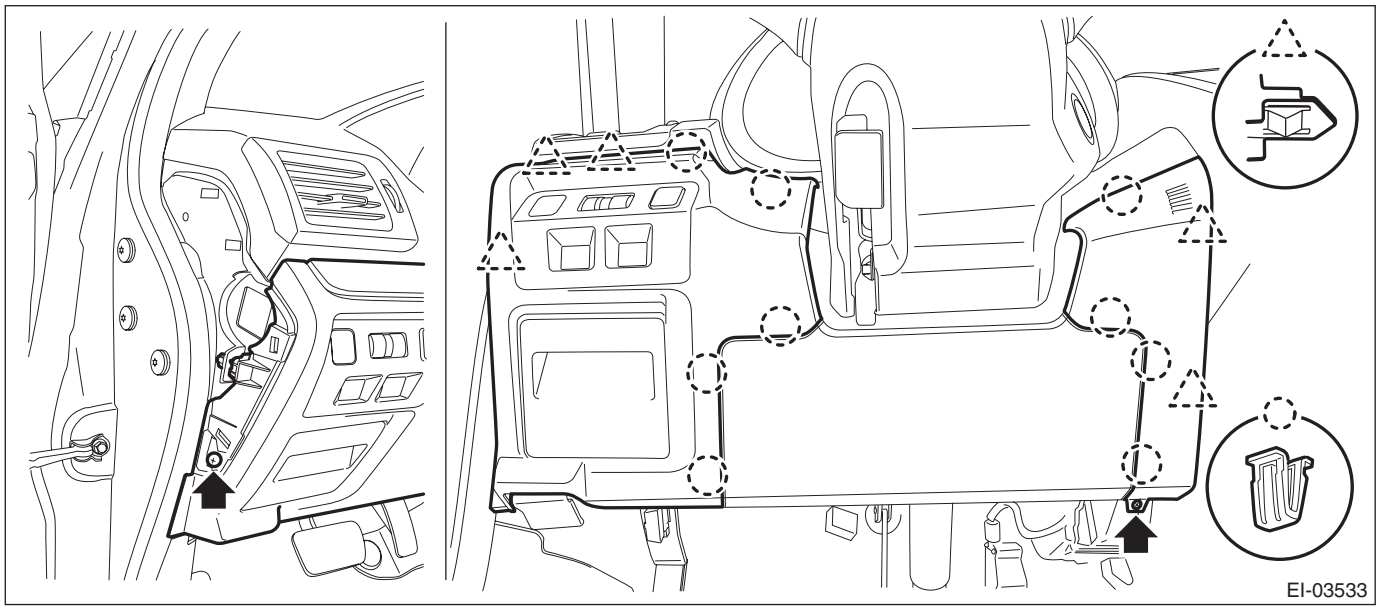
(1) Remove the clips, and remove the cover - instrument panel side LH.



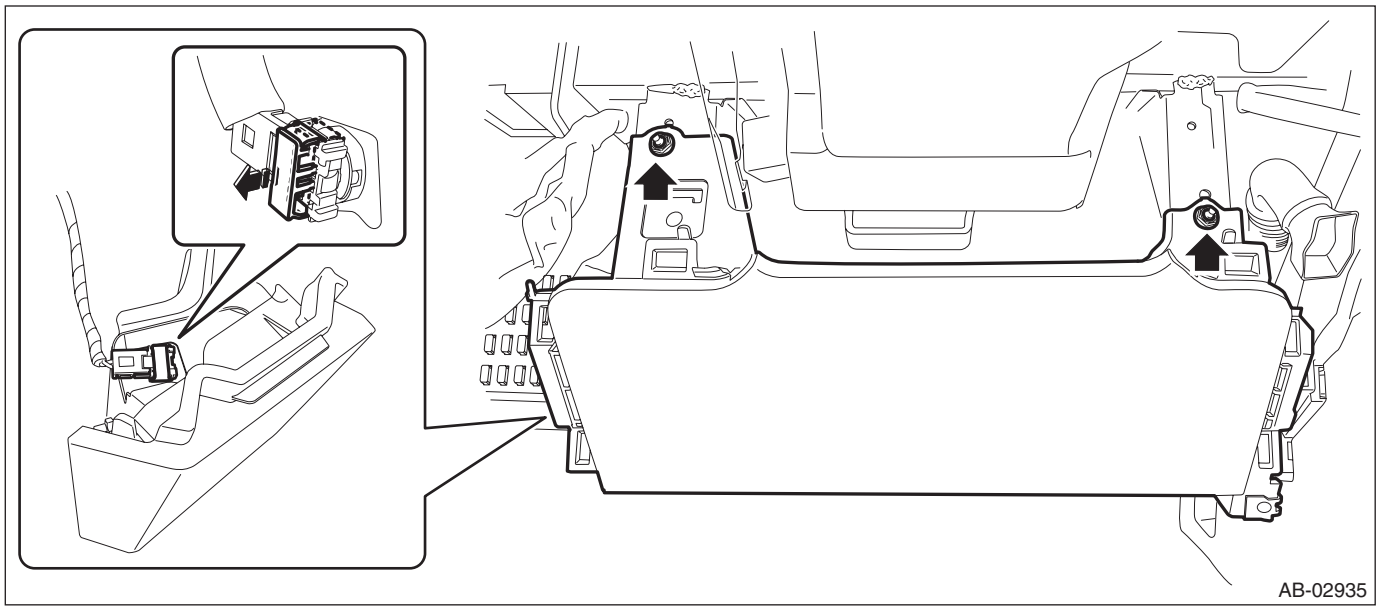
NOTE:
Using a plastic remover, open the cover - instrument panel side LH.

(2) Remove the screws and release the clips and claws.

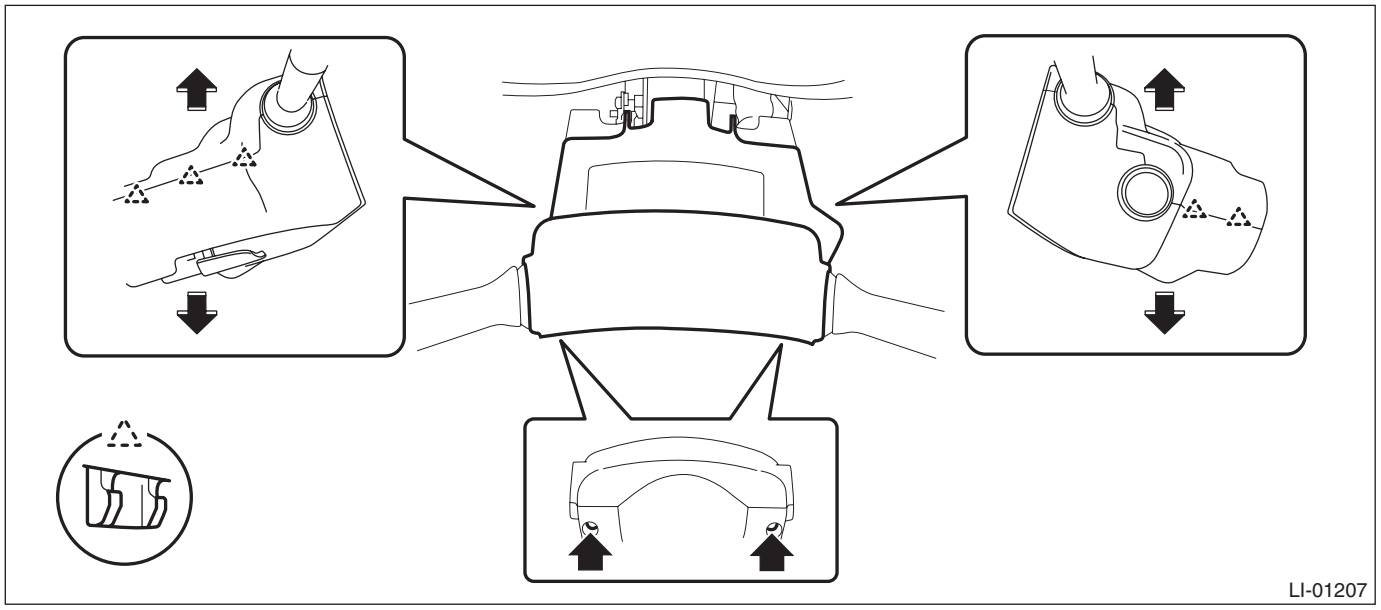
(3) Disconnect the harness connectors, and remove the cover assembly - instrument panel LWR driver INN and the cover assembly - instrument panel LWR driver OUT.



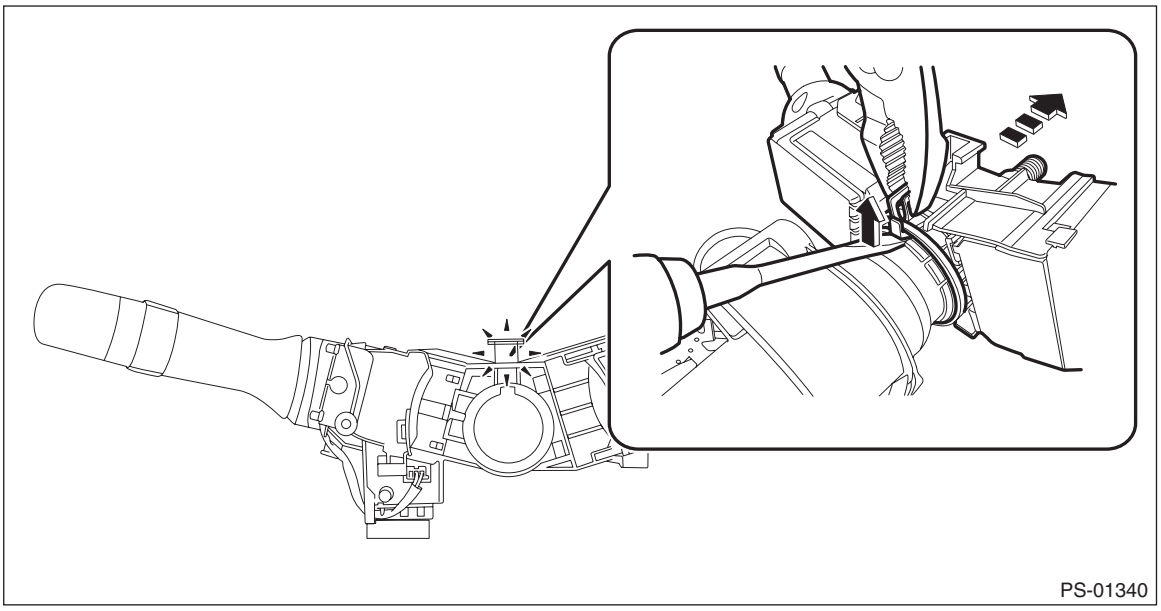
5) Remove the nuts to remove the knee airbag module and disconnect the harness connector. <Ref. to AB-33, KNEE AIRBAG MODULE, PROCEDURE, Airbag Connector.>



6) Remove the cover assembly - column.
(1) Remove the screws.
(2) Release the claw, and remove the cover assembly - column UPR and the cover assembly - column LWR.



7) Remove the switch assembly - combination.
   (1) Disconnect the connector, and loosen the clamp to release the claws.
   (2) Pull out the switch assembly - combination from the column assembly - steering.

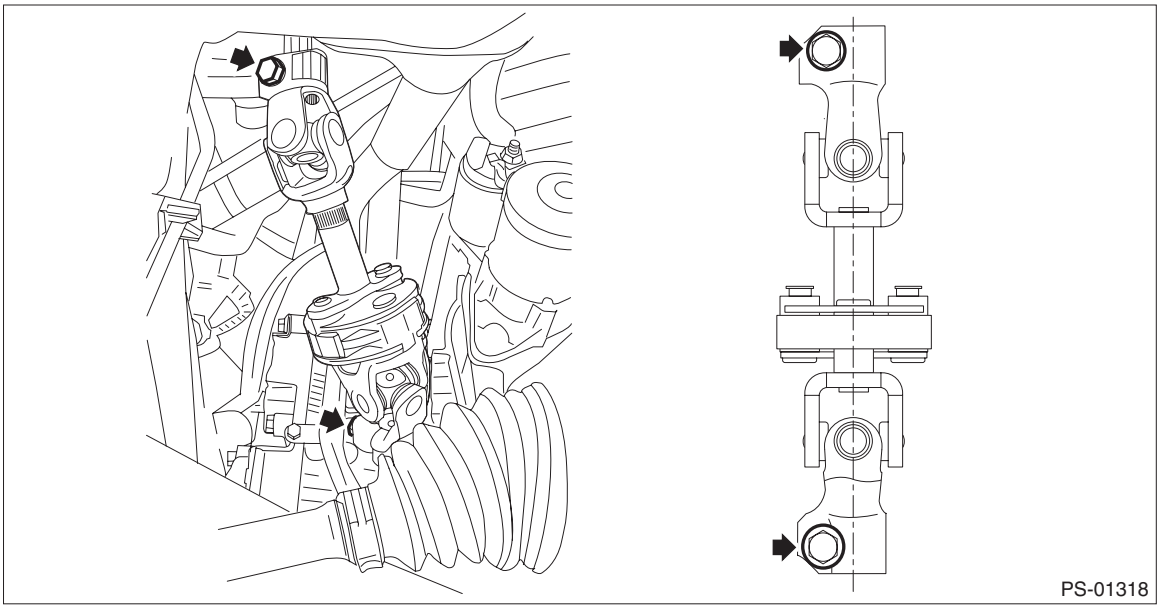


8) Remove all connectors from the column assembly - steering.
9) Remove the universal joint assembly - steering.

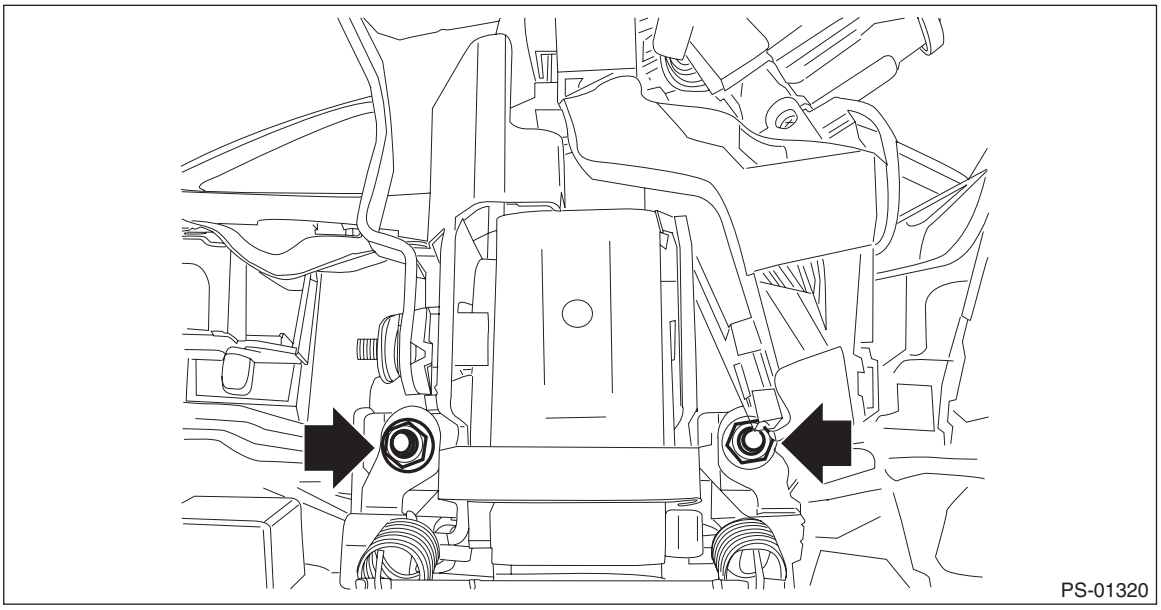
CAUTION:
To prevent damage to the universal joint assembly - steering and error of handling force, make sure to remove the universal joint assembly - steering.
   (1) Place alignment marks on the universal joint assembly - steering.

NOTE:
Place alignment marks on the following positions.
- Between the column assembly - steering and the universal joint assembly - steering
- Between the steering gearbox assembly and the universal joint assembly - steering

   (2) Remove the bolt, and remove the universal joint assembly - steering.



10) Remove the two nuts under the beam COMPL - steering securing the column assembly - steering.



11) Pull out the column assembly - steering from the hole on toe board.

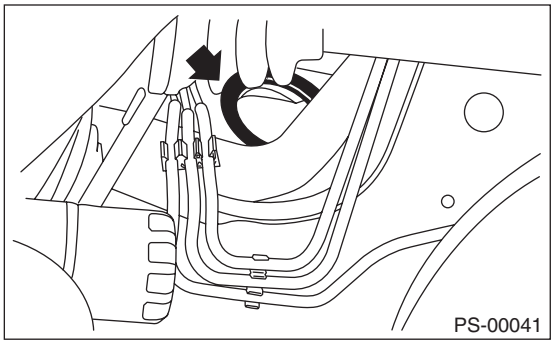
CAUTION:
Do not loosen the tilt lever when the column assembly - steering is not secured to the vehicle.

12) Remove the ignition key lock from the column assembly - steering. <Ref. to SL-61, REPLACEMENT, Ignition Key Lock.>

B: INSTALLATION

CAUTION:
If the steering wheel and steering angle sensor are removed, perform "VDC sensor midpoint setting mode" of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

1) Install the grommet to the toe board.



2) Insert the end of the column assembly - steering into the toe board grommet.
3) Tighten the column assembly - steering installation bolt located under the beam COMPL - steering with the tilt lever fixed.

Tightening torque:
20 N·m (2.04 kgf-m, 14.8 ft-lb)

4) Connect all connectors located under the beam COMPL - steering.
5) Connect the horn harness and airbag connector, and install the airbag module.
6) Install the knee airbag module.
7) Install the cover assembly - instrument panel LWR driver INN and OUT.

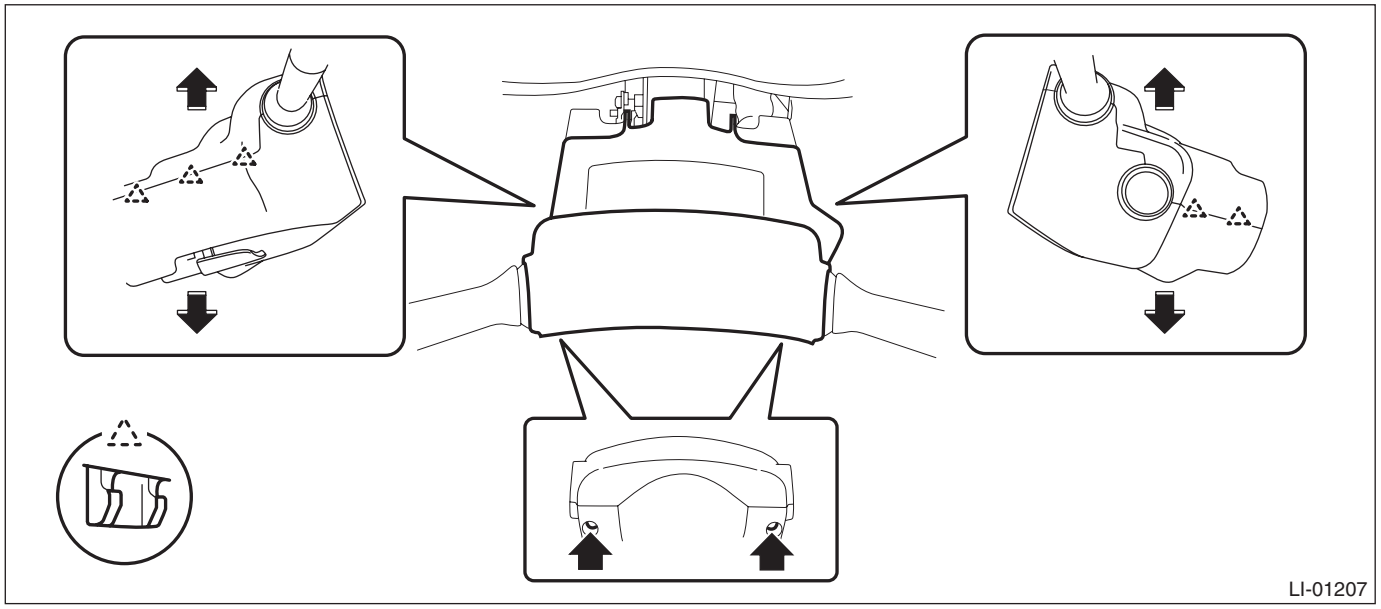
8) Install the universal joint assembly - steering. <Ref. to PS-14, INSTALLATION, Universal Joint.>

CAUTION:
• Always install the universal joint assembly - steering after installing the steering column to avoid damage to the universal joint assembly - steering.
• Be sure to follow the tightening order and tightening torque of the universal joint assembly - steering to avoid the steering effort from becoming heavy.

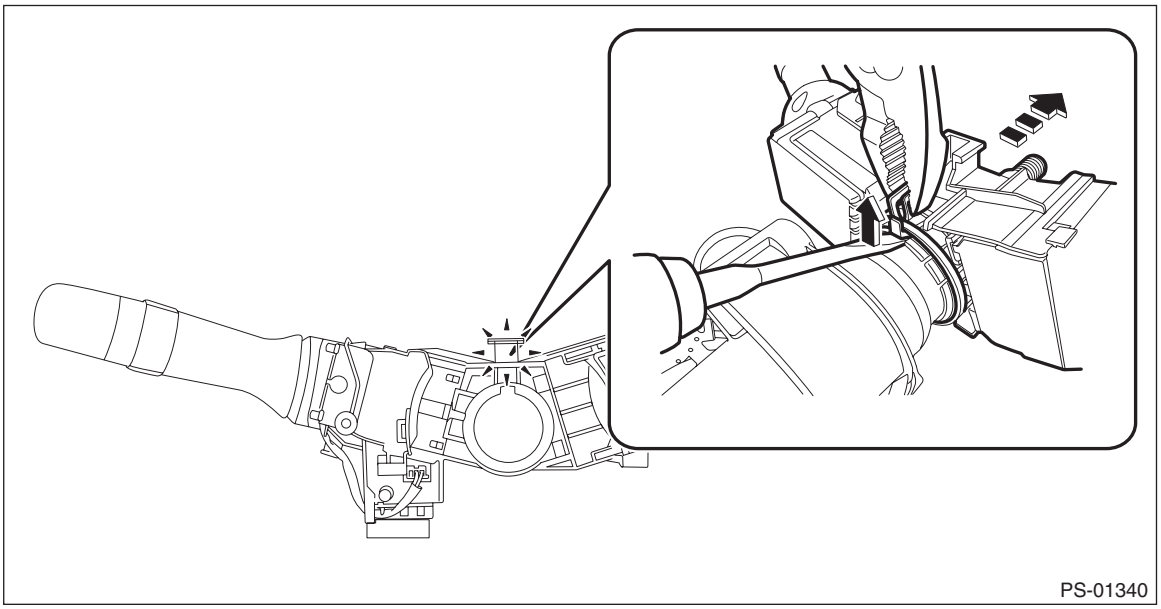
9) Align the center position of the steering roll connector. <Ref. to AB-109, ADJUSTMENT, Roll Connector.>
10) Install the steering wheel. <Ref. to PS-10, INSTALLATION, Steering Wheel.>

C: DISASSEMBLY

1) Remove the cover assembly - column.
   (1) Lower the lever of the steering column.
   (2) Release the screw and claw, and remove the cover assembly - column UPR and the cover assembly - column LWR.



2) Remove the switch assembly - combination.
   (1) Disconnect the connector, and loosen the clamp to release the claws.
   (2) Pull out the switch assembly - combination from the column assembly - steering.



D: ASSEMBLY

Assemble each part in the reverse order of disassembly.

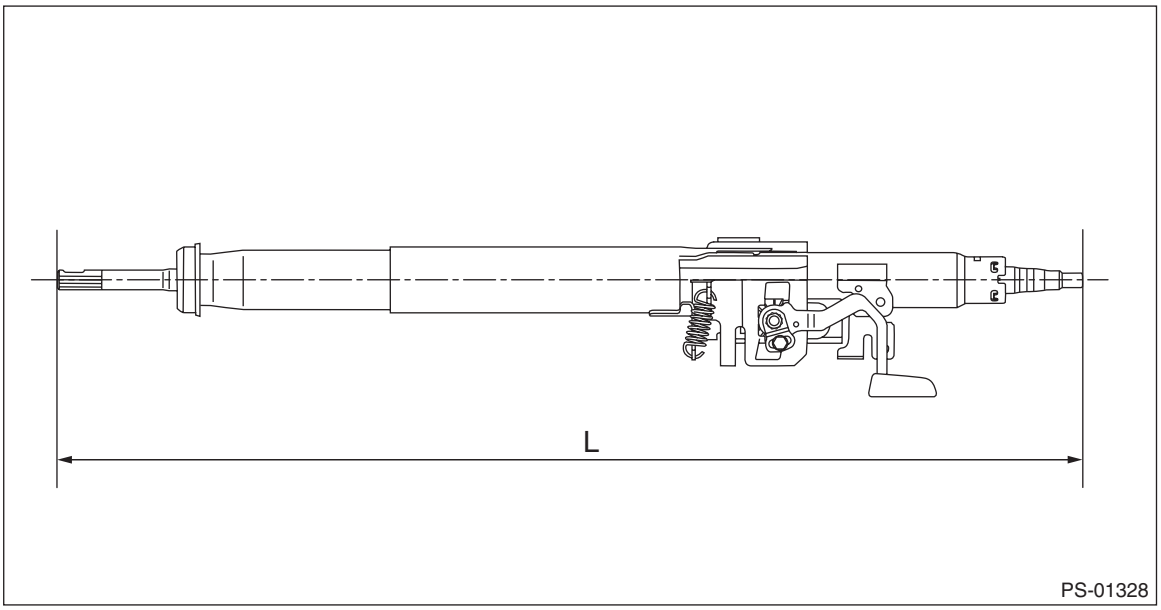
E: INSPECTION

1. UNIT INSPECTION

Measure the overall length of the column assembly - steering. If not within specification, replace it.

Standard: Overall length L

Tilt and telescopic column (measure while minimized):
$819.7^{+1.5}_{-1.5}$ mm ($32.3^{+0.059}_{-0.059}$ in)



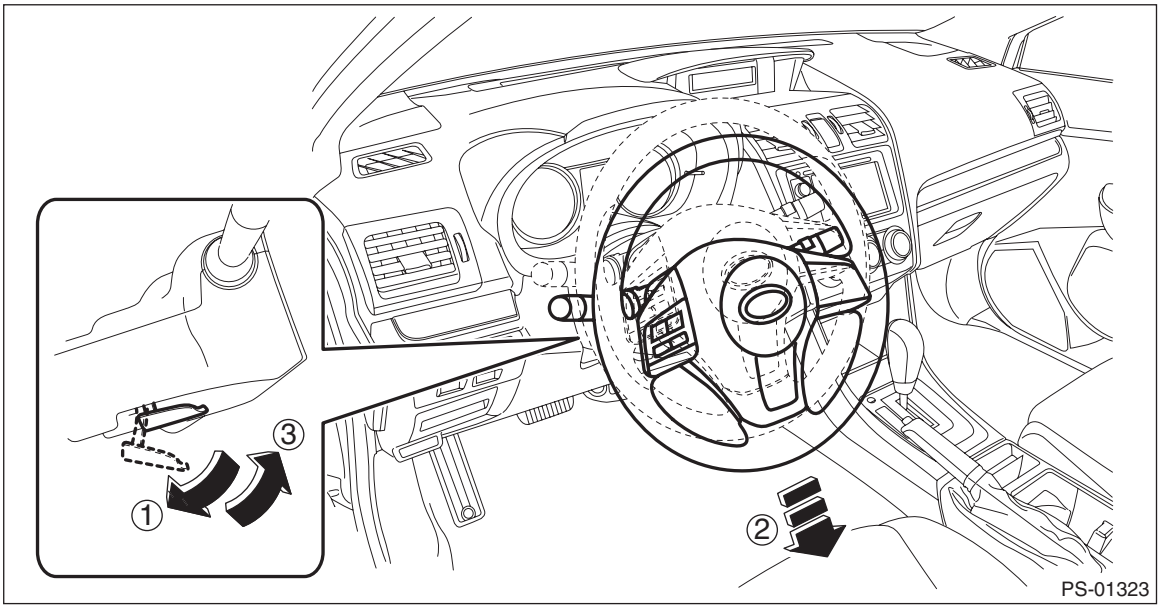
2. INSPECTION OF AIRBAG SYSTEM

Refer to “Airbag System” for airbag inspection procedure. <Ref. to AB-43, INSTALLATION, Driver’s Airbag Module.>

6. Electric Power Steering Gearbox

A: REMOVAL

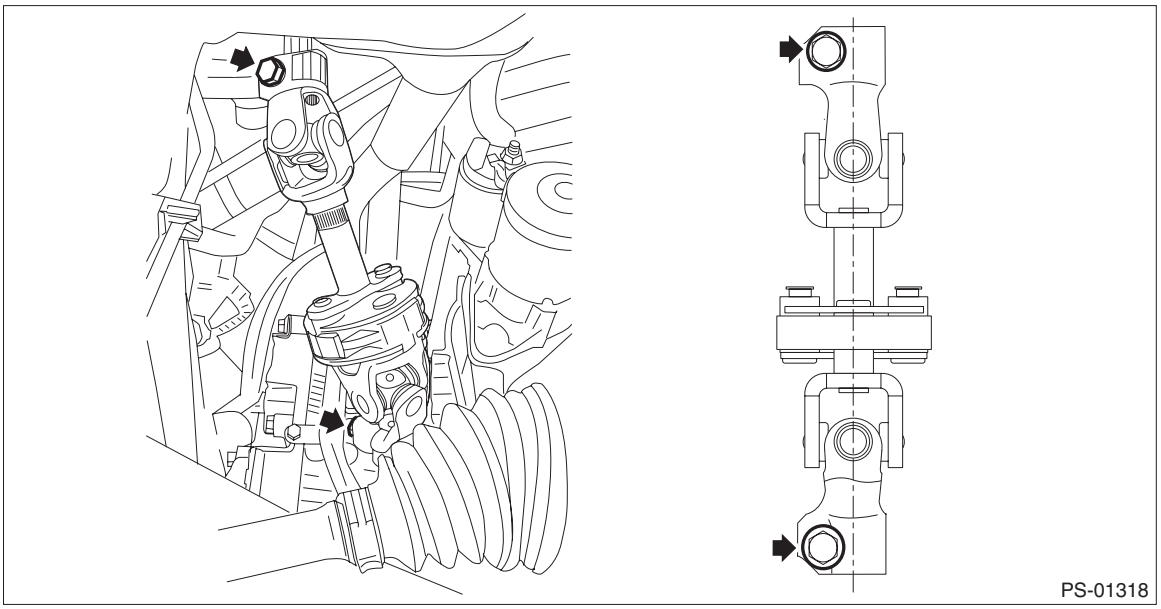
CAUTION:
• The power steering control module continues to operate after the engine stops and calculate the temperature in the control module. Therefore, before starting service of the power steering system which requires disconnection of the connector, stop the engine and allow approx. 30 minutes until the control module becomes cold.
• Before removal or installation, be sure to remove any foreign matter (dust, moisture, oil, etc.) from the power steering control module connector.
1) Disconnect the ground cable from battery.
2) Adjust the tilt position of the column assembly - steering to the lowest position and lock the tilt lever.



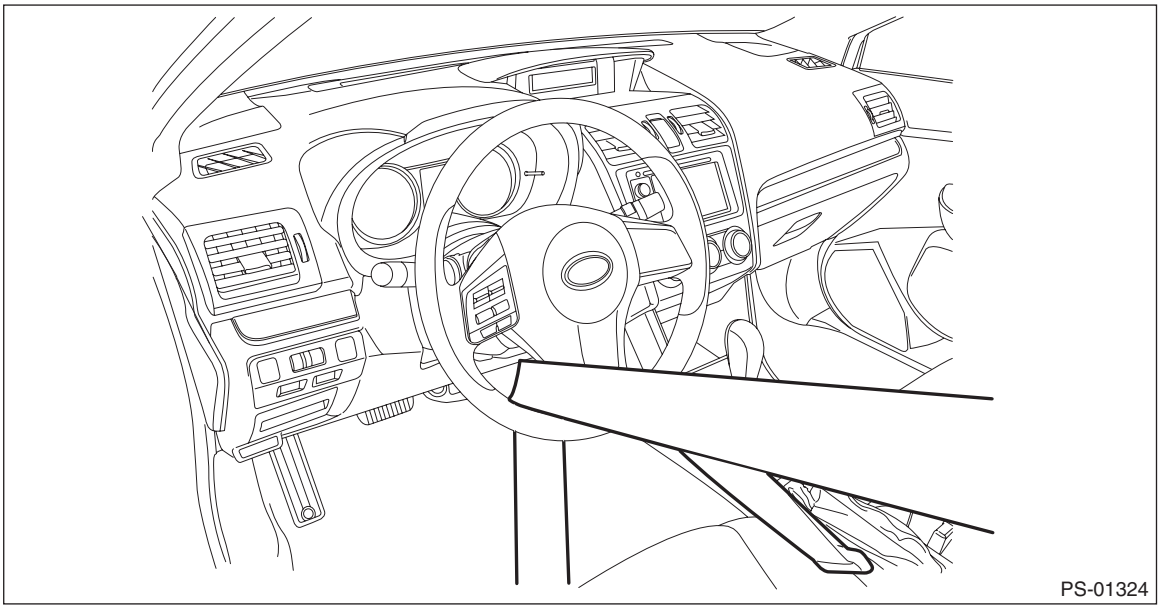
3) Remove the universal joint assembly - steering.
(1) Place alignment marks on the universal joint assembly - steering.

NOTE:
Place alignment marks on the following positions.
- Between the column assembly - steering and the universal joint assembly - steering
- Between the steering gearbox assembly and the universal joint assembly - steering

(2) Remove the bolt, and remove the universal joint assembly - steering.

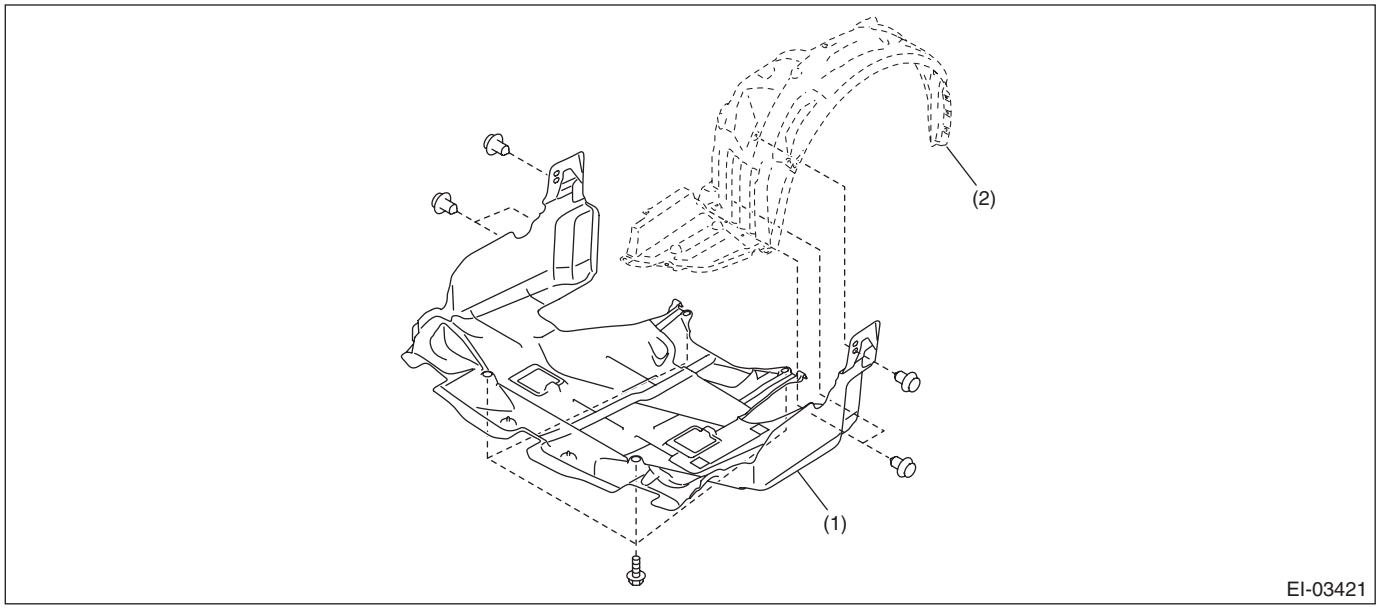


4) Prevent the steering wheel from turning using the seat belt.



5) Disconnect the connector and harness clamp from power steering control module.

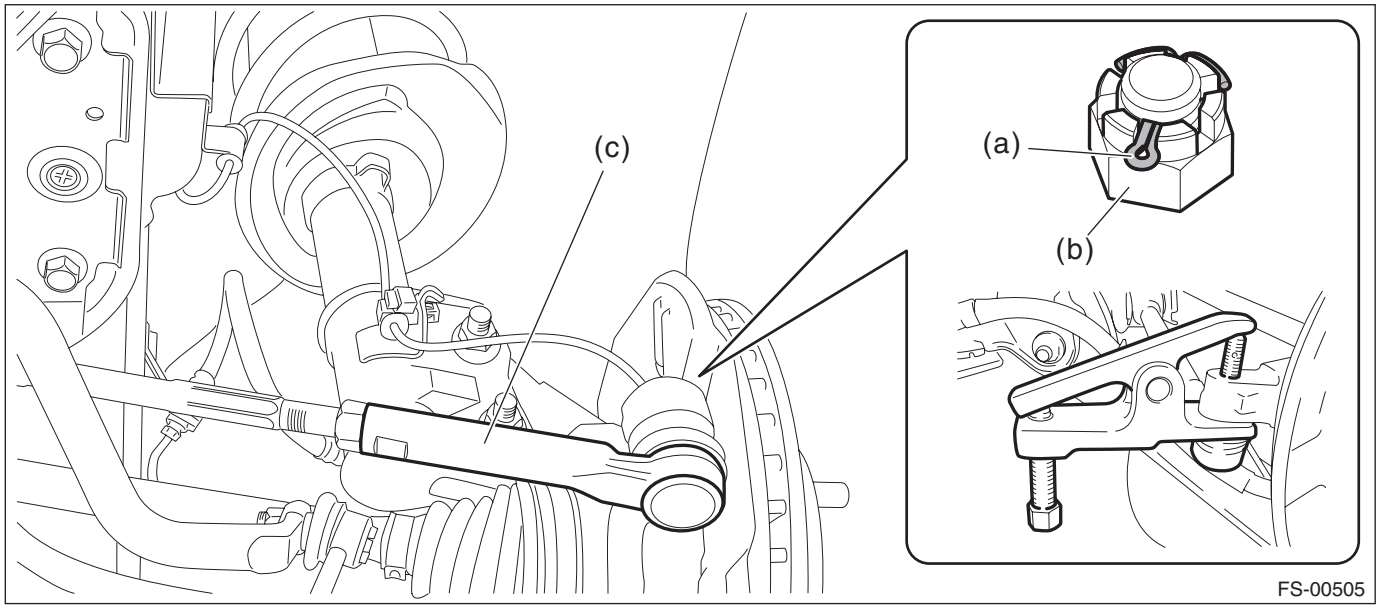
6) Remove the bolts and clips, and remove the under cover - front.



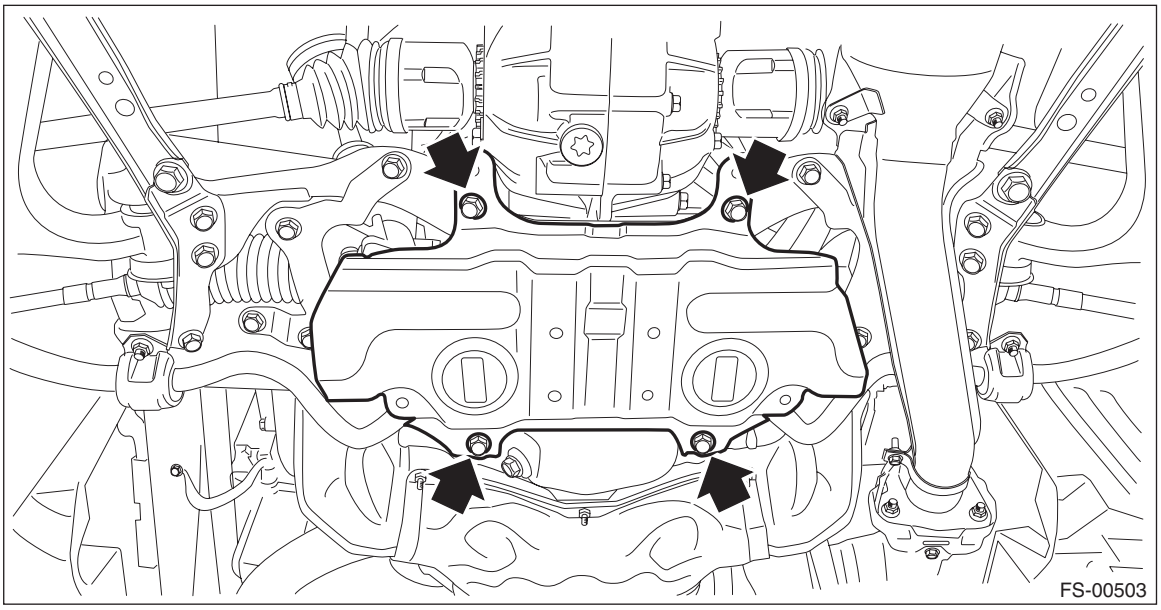
(1) Under cover - front (2) Mud guard - front

7) Remove the front wheels.
8) Disconnect the tie-rod end.
   (1) Pull out the cotter pin (a).
   (2) Remove the castle nut (b).
   (3) Using a tie-rod ball joint puller, remove the tie-rod end (c).

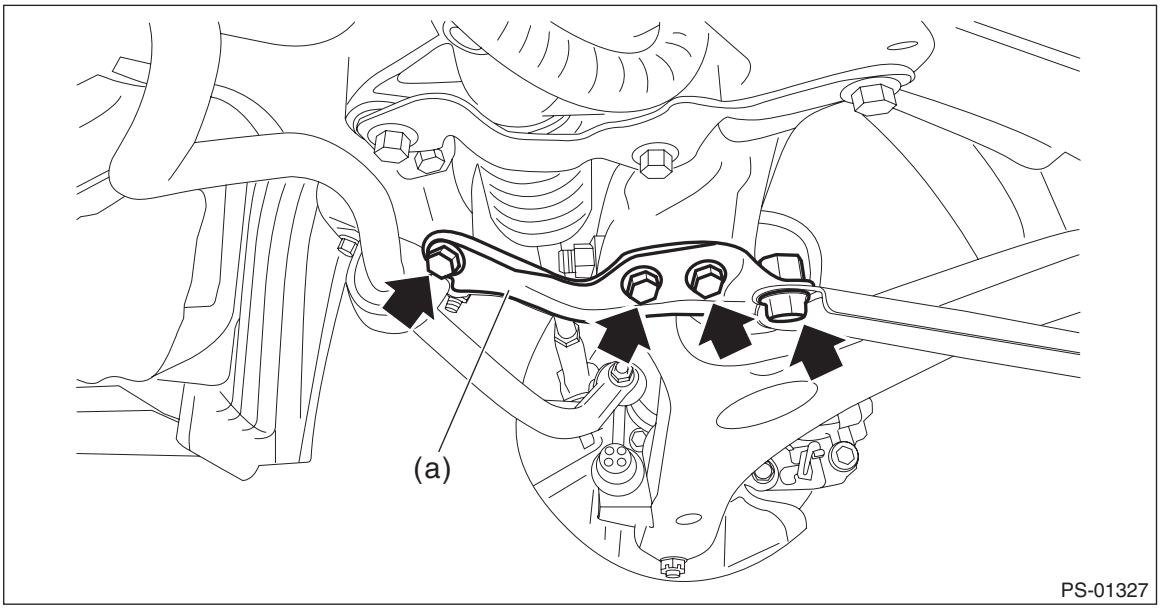
Preparation tool:
Tie-rod ball joint puller



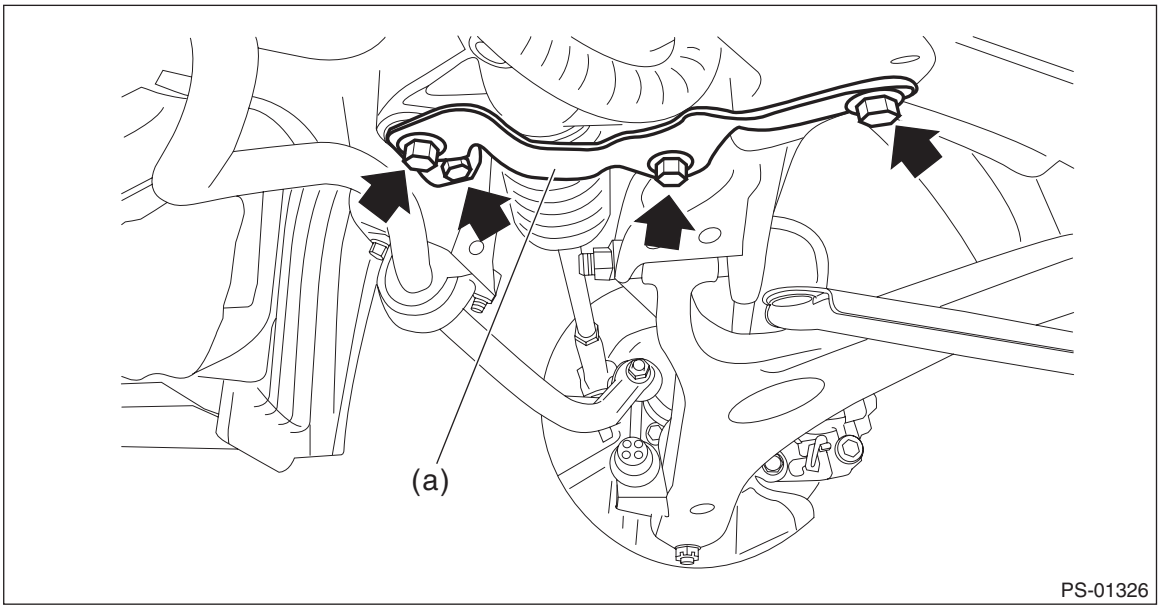
9) Remove the front crossmember support.



10) Remove the front exhaust pipe assembly. <Ref. to EX(H4DO)-7, REMOVAL, Front Exhaust Pipe.>
11) Remove the support plate - front crossmember (a).



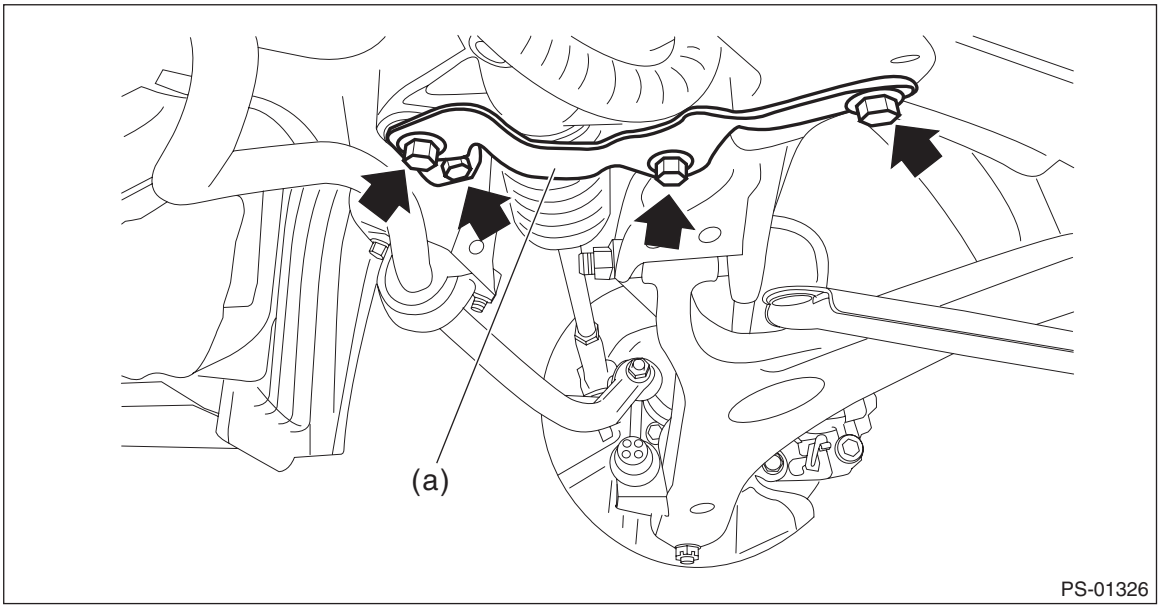
12) Remove the bolts securing the steering gearbox assembly, and remove the stiffener (a) and steering gearbox assembly.



B: INSTALLATION

1) Insert the steering gearbox assembly into crossmember, being careful not to damage the boot of the steering gearbox assembly.
2) Install the steering gearbox assembly to the crossmember by tightening the bolts through the stiffener (a) to the specified torque.

Tightening torque:
60 N·m (6.12 kgf-m, 44.3 ft-lb)

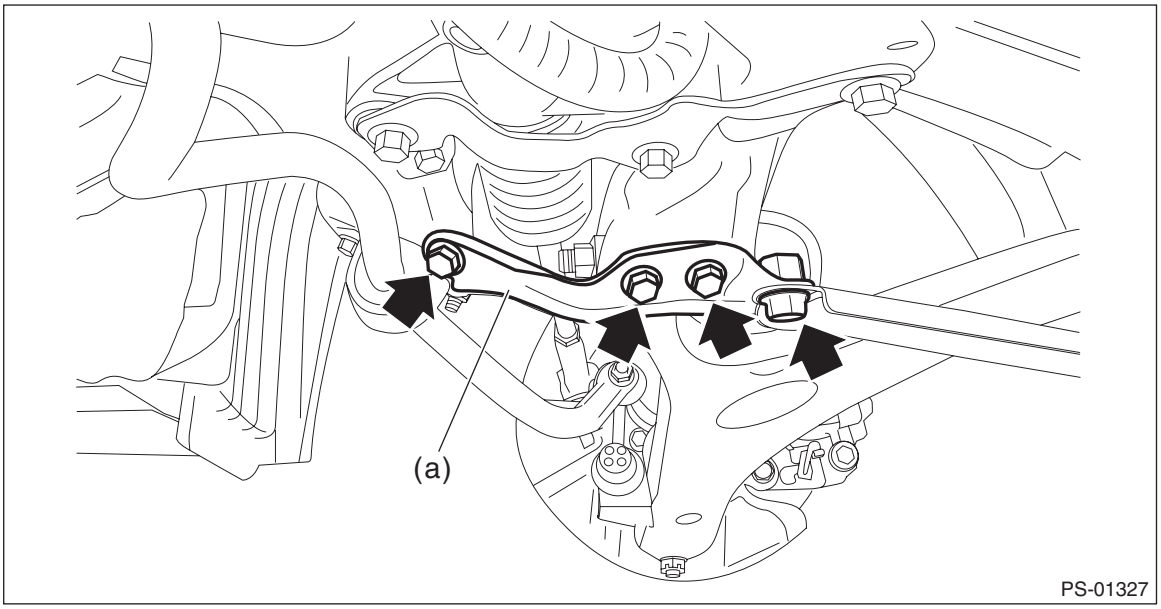


3) Install the universal joint assembly - steering. <Ref. to PS-14, INSTALLATION, Universal Joint.>

CAUTION:
Tighten the bolts of the universal joint assembly - steering in the order of steering gearbox side and column shaft side.

4) Install the support plate - front crossmember (a).

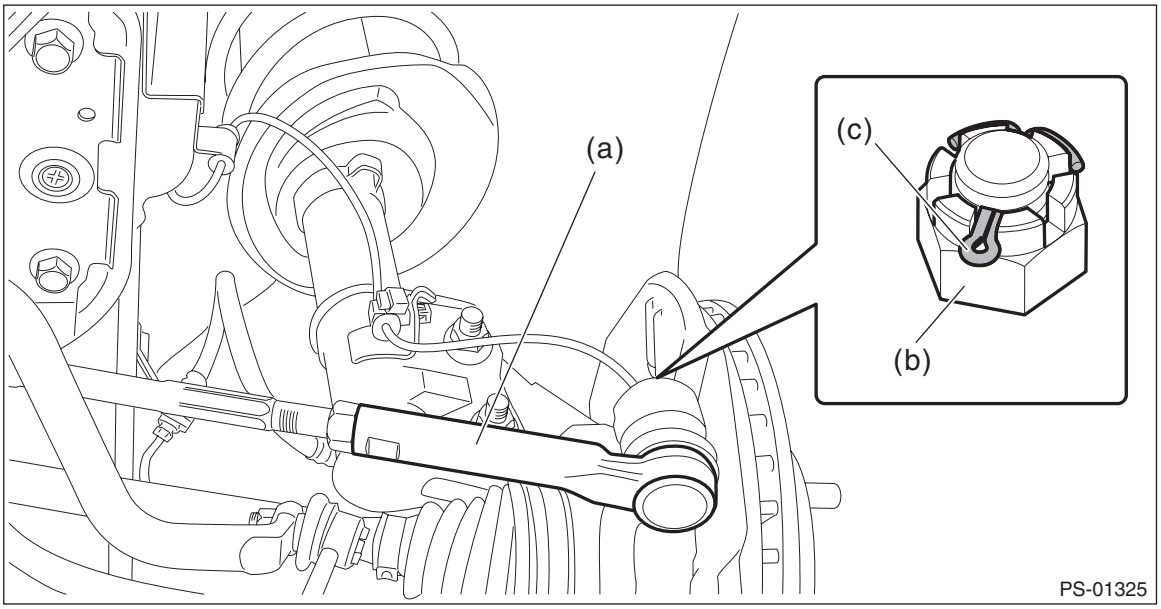
Tightening torque:
Support plate - front crossmember: 60 N·m (6.12 kgf-m, 44.3 ft-lb)
Front support: 100 N·m (10.20 kgf-m, 73.8 ft-lb)



5) Connect the tie-rod ends and knuckle arm.
(1) Connect the tie-rod end (a) to the housing assembly - front axle.
(2) Tighten the castle nuts (b) to the specified torque.

CAUTION:
During connection, do not hit the cap at bottom of tie-rod end with a hammer.

Castle nut tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)
(3) Tighten within the range of 60° so that the cotter pin hole and cutout portion of the castle nut (b) are aligned.
(4) Insert the cotter pin (c), and bend the tip of the pin to fix it.



6) Install the front crossmember - support.

Tightening torque:
60 N·m (6.12 kgf-m, 44.3 ft-lb)

7) Install the front exhaust pipe assembly. <Ref. to EX(H4DO)-10, INSTALLATION, Front Exhaust Pipe.>
8) Install the under cover - front. <Ref. to EI-27, INSTALLATION, Front Under Cover.>
9) Install the front wheels.
10) Lower the vehicle.
11) Tighten the wheel nuts to the specified torque.

Tightening torque:
120 N·m (12.24 kgf-m, 88.5 ft-lb)

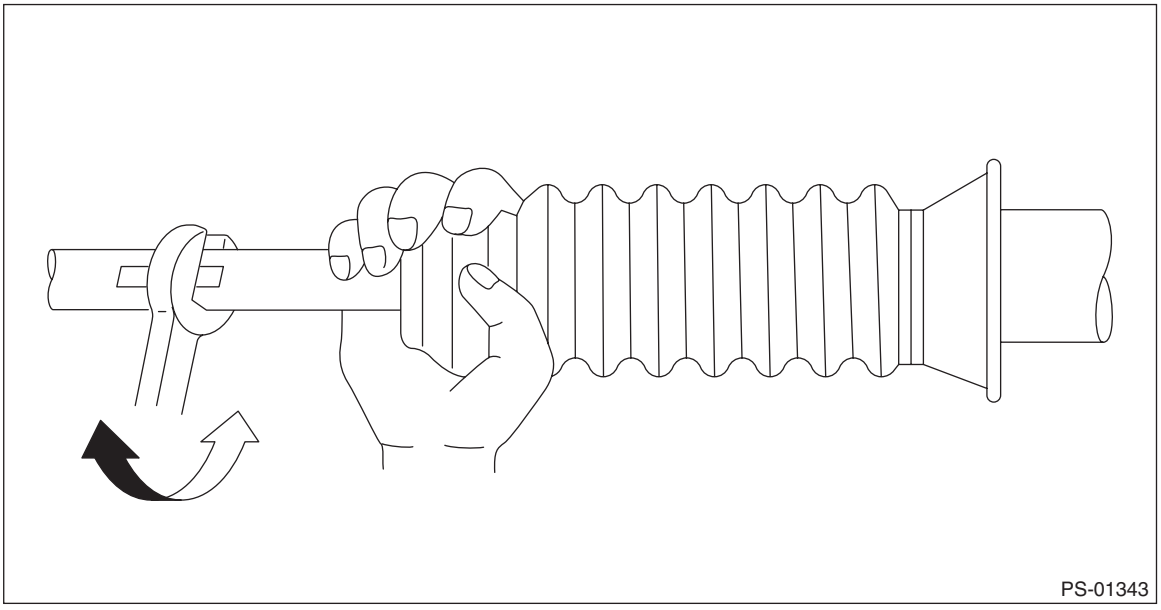
12) Connect the power steering control module harness connector.
13) Connect the battery ground terminal.

CAUTION:
When the wheel alignment has been adjusted, perform the adjustment of the steering angle sensor. <Ref. to VDC-19, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

14) After adjusting toe-in and steering angle, tighten the lock nut on tie-rod end.

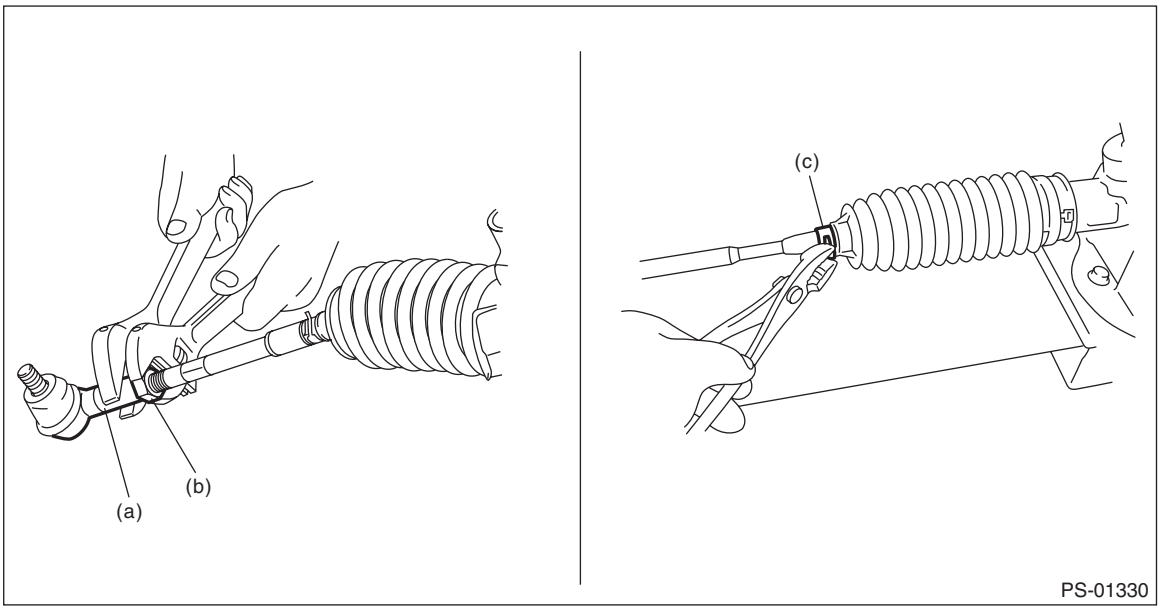
Tightening torque:
85 N·m (8.67 kgf-m, 62.7 ft-lb)

NOTE:
When adjusting toe-in, hold the boot - steering gearbox as shown to prevent it from being rotated or twisted. If it becomes twisted, straighten it.



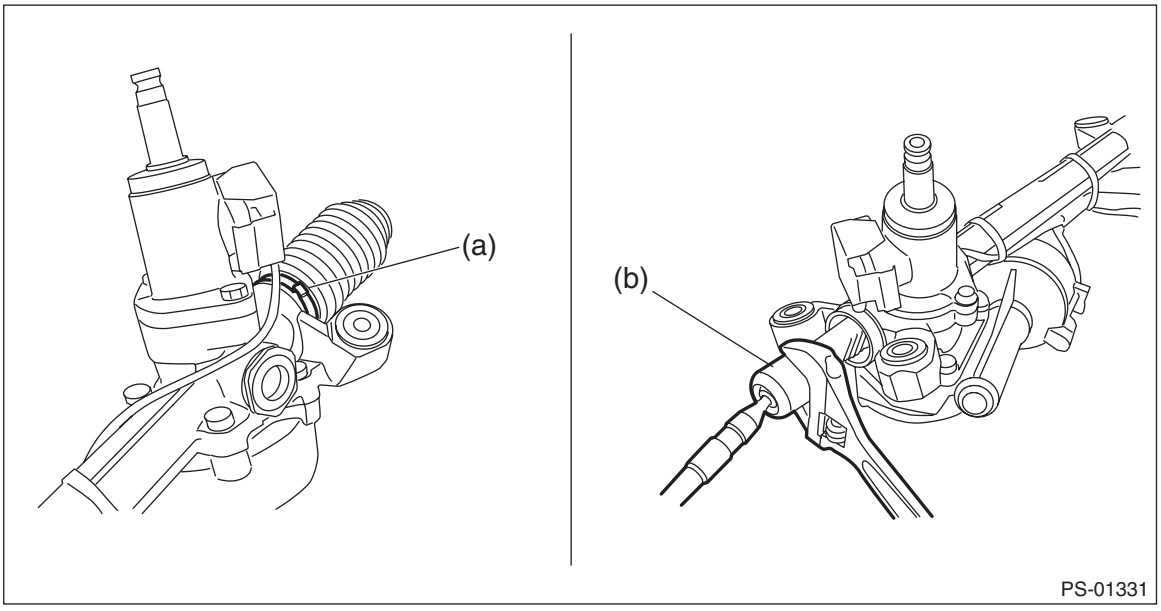
C: DISASSEMBLY

CAUTION:
• Nut for fixing the rack is on the driver's side only. When removing the tie-rod on the passenger's side, turn over the boot - steering gearbox on the driver's side, and fix the rack during operation.
• When fixing the steering gearbox assembly in a vise, apply a wooden piece on the flange portion.
1) Remove the tie-rod end (a) and lock nut (b) from the steering gearbox assembly.
2) Remove the clip - boot tie-rod (c) located outside the boot - steering gearbox using the pliers, and then slide the boot - steering gearbox to the tie-rod end side.



3) Remove the tie-rod (b) from the gearbox assembly.
(1) Using a flat tip screwdriver, remove the band - boot (a) from the boot - steering gearbox.

NOTE:
Replace the boot - steering gearbox or the band - boot (a) if there is damage, cracks or deterioration.
(2) Remove the tie-rod (b).



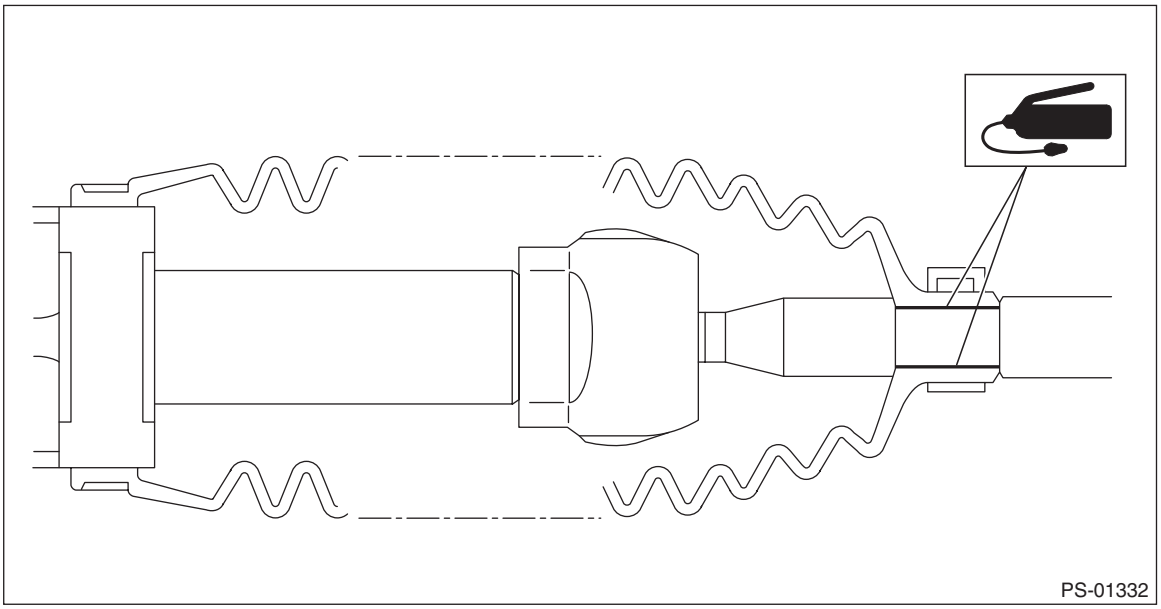
D: ASSEMBLY

1) Install the tie-rod into rack.

Tightening torque:
90 N·m (9.18 kgf-m, 66.4 ft-lb)

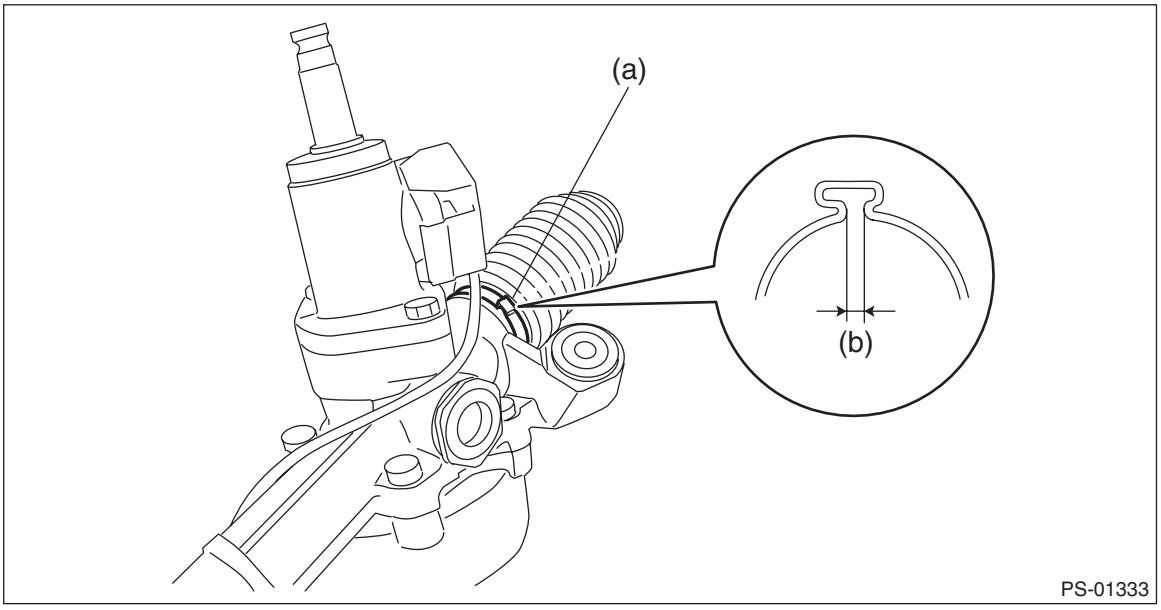
NOTE:
Check the mating face of rack and tie-rod for foreign matter such as dust etc.
2) Apply a coat of grease to the tie-rod groove, and then install the boot - steering gearbox to the housing.

NOTE:
Make sure that the boot - steering gearbox is installed without unusual inflation or deflation.



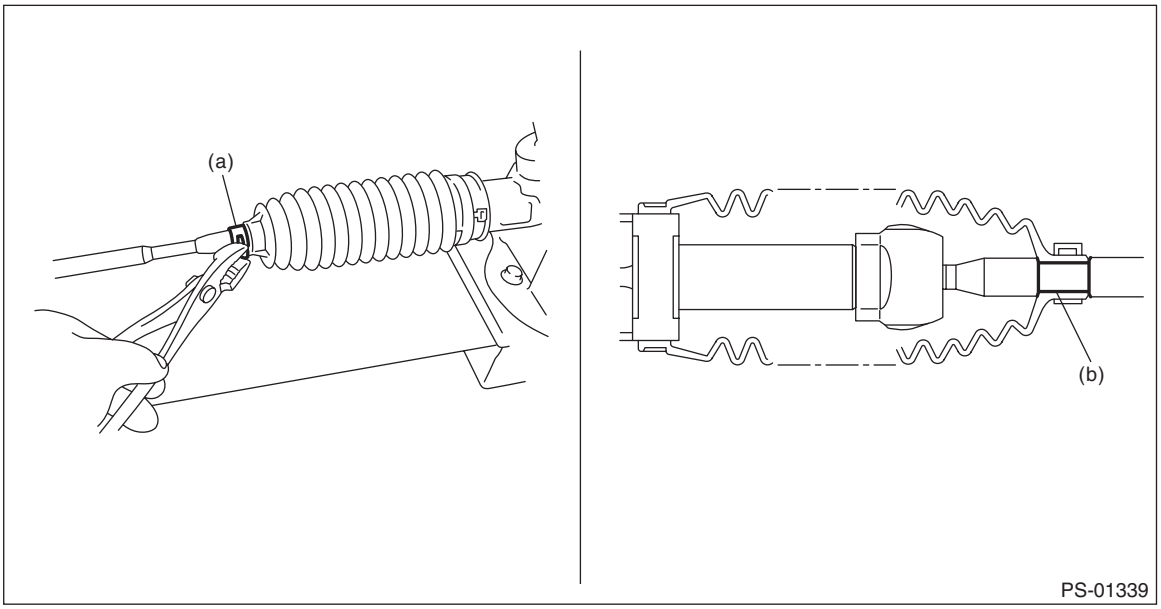
3) Using the boot clamp pliers, crimp the boot so that the clearance (b) of the band - boot (a) crimp portion becomes 2 mm (0.08 in) or less.

NOTE:
Use a new band - boot.



4) Fix the end of the boot - steering gearbox with clip - boot tie-rod (a).

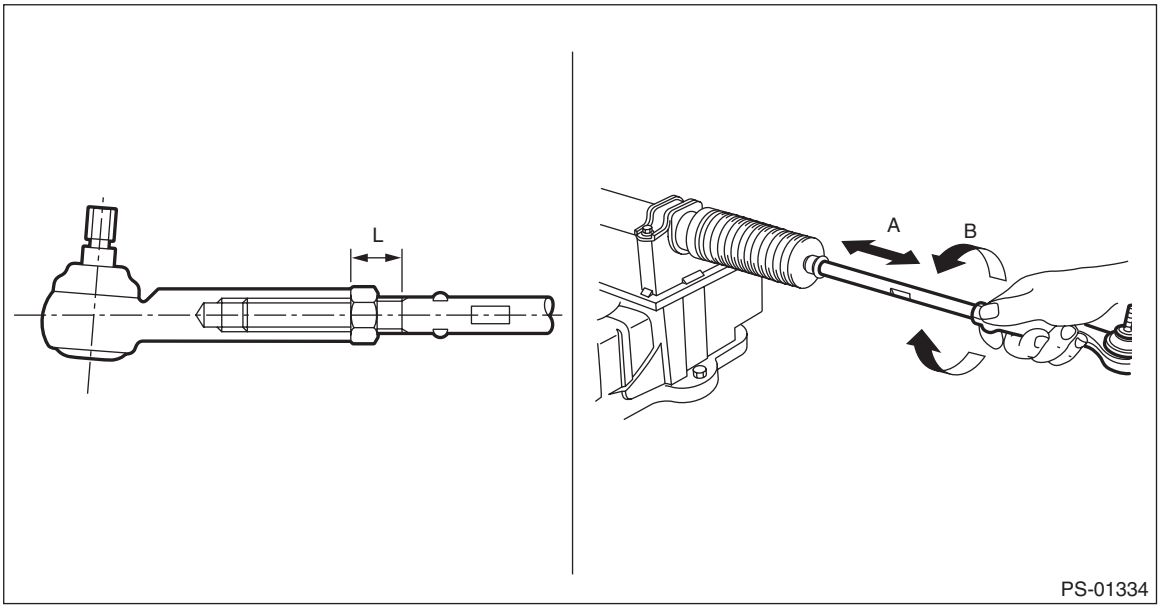
5) After installation, check that the end of the boot - steering gearbox is installed to the groove (b) of the tie-rod.



6) If the tie-rod end has been removed, screw in lock nut and tie-rod end to the screwed portion of tie-rod, and tighten the lock nut temporarily in a position as shown in the figure.

Installed tie-rod length L:
33 mm (1.3 in)

7) Inspect the steering gearbox assembly as follows:
1. "A" Holding the tie-rod end, repeat lock to lock several times as quickly as possible.
2. "B" Holding the tie-rod end, turn it slowly at a radius several times as large as possible.
3. Finally, make sure that the boot - steering gearbox is installed in the specified position without inflating.



8) Remove the steering gearbox assembly from ST.

E: INSPECTION

1. UNIT INSPECTION

Check components for wear, damage or other faults. Adjust or replace if necessary.

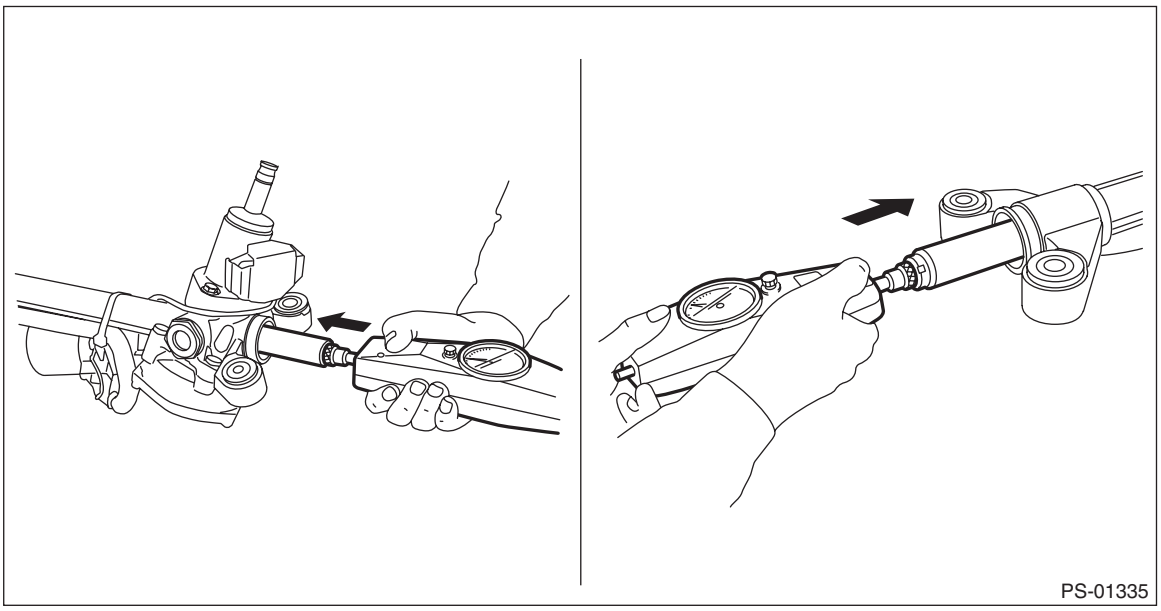
2. LIMIT

Make a measurements as follows. If it exceeds the specified service limits, adjust or replace.

NOTE:
When fixing the steering gearbox assembly in a vise, apply a wooden piece on the flange portion.

Rack shaft sliding resistance (Except for XV model):
Limit: 350 N (36 kgf, 79 lbf) or less
Left/right differential of sliding resistance: 20% or less

Rack shaft sliding resistance (XV model):
Limit: 333 N (34 kgf, 75 lbf) or less
Left/right differential of sliding resistance: 20% or less

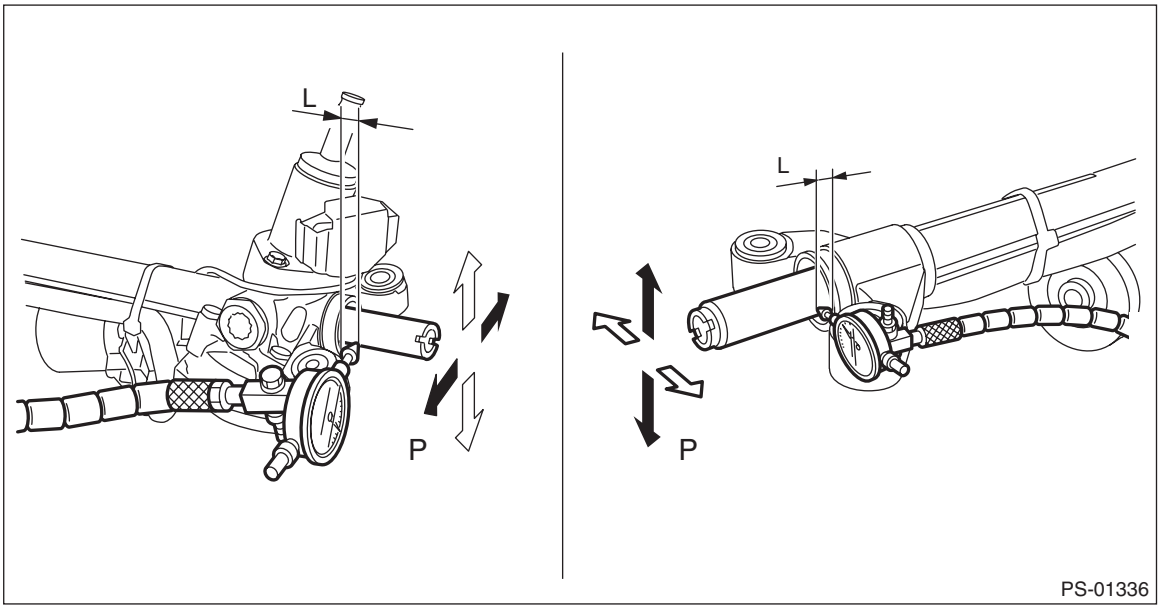


3. RACK SHAFT PLAY IN THE RADIAL DIRECTION

Right-turn steering:
Service limit:
Direction ⬅ ➡: 0.4 mm (0.016 in) or less
Direction ⇦ ⇨: 0.6 mm (0.024 in) or less

Left-turn steering:
Service limit:
Direction ⇦ ⇨ ⬅ ➡: 0.4 mm (0.016 in) or less

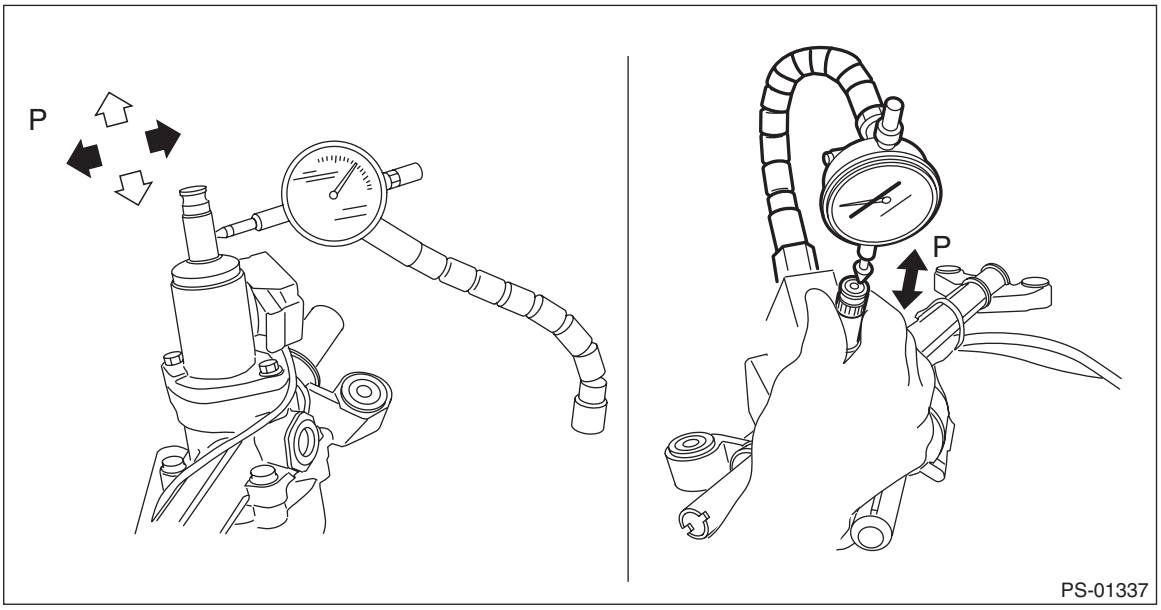
Condition:
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lbf)



4. INPUT SHAFT PLAY

In radial direction:
Wear limit: 0.18 mm (0.0071 in) or less
Condition: P = 98 N (10 kgf, 22 lbf)

In axial direction:
Service limit: 0.27 mm (0.0106 in) or less
Condition: P = 20 — 49 N (2 — 5 kgf, 4 — 11 lbf)



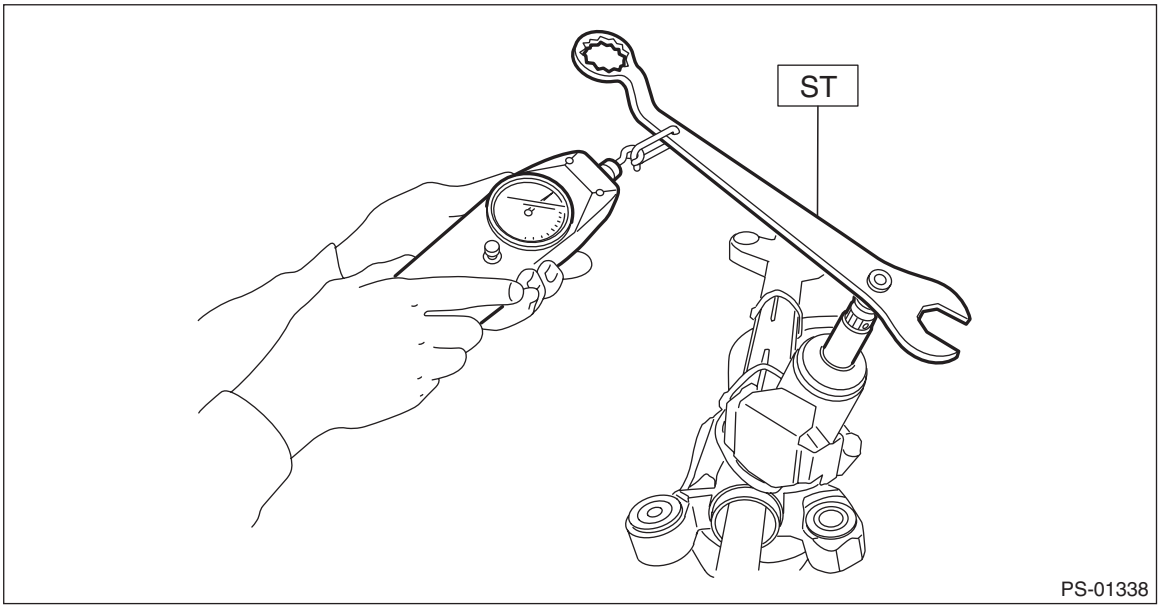
5. TURNING RESISTANCE OF GEARBOX

1) Using the ST, measure the rotational resistance of the steering gearbox assembly.

Preparation tool:
ST: SPANNER (34099PA100)

Service limit (Except for XV model):
Maximum allowable resistance: 18.3 N (1.9 kgf, 4.1 lbf) or less
Difference between right and left rotational resistance: 20% or less

Service limit (XV model):
Maximum allowable resistance: 17.7 N (1.8 kgf, 4.0 lbf) or less
Difference between right and left rotational resistance: 20% or less



F: ADJUSTMENT

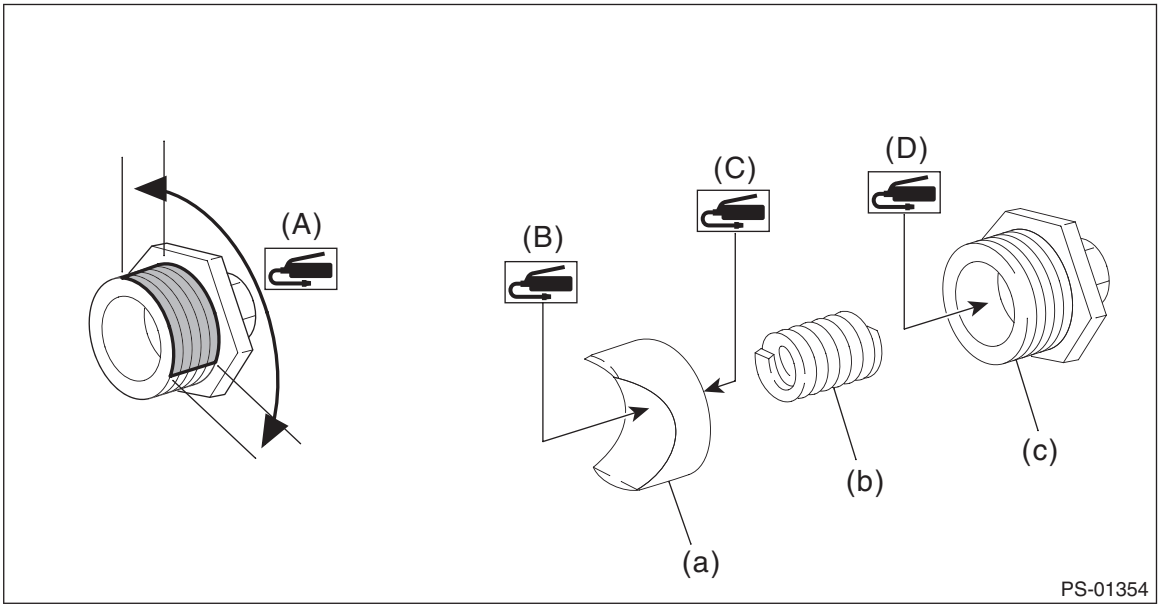
1. GEARBOX BACKLASH ADJUSTMENT

1) Remove the steering gearbox assembly. <Ref. to PS-26, REMOVAL, Electric Power Steering Gearbox.>
2) Loosen the lock nut and adjusting screw.
3) Apply a coat of grease to the sliding surface (B) of the pad - pressure (a) and seating surface (C) of spring - gearbox (b), and then insert the pad - pressure (a) into steering body.
4) Charge the adjusting screw (c) with grease (D), and then insert the spring - gearbox (b) into adjusting screw. Then install on the steering body.

Grease:
Multemp AC-P

5) Apply liquid gasket to 1/3 or more (A) of entire perimeter of adjusting screw thread (c).

Liquid gasket:
THREE BOND TB-1111B



6) Tighten the adjusting screw to 9.8 N·m (1.0 kgf-m, 7.2 ft-lb), then loosen it.
7) Tighten the adjusting screw to 6 N·m (0.6 kgf-m, 4.4 ft-lb).
8) Loosen the adjusting screw by 20°.
9) While fixing the adjusting screw, tighten the lock nuts.

Tightening torque:
49.4 N·m (5.04 kgf-m, 36.4 ft-lb)

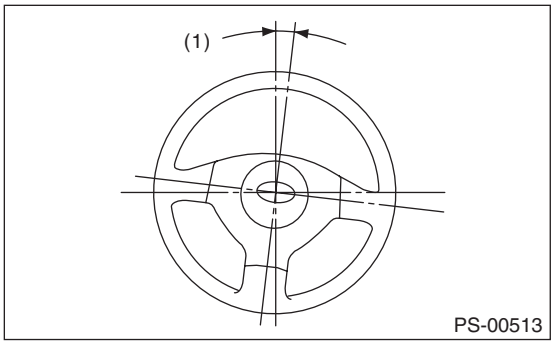
2. FRONT WHEEL ALIGNMENT ADJUSTMENT

1) Adjust the front toe. <Ref. to FS-15, FRONT WHEEL TOE-IN, ADJUSTMENT, Wheel Alignment.>
2) Check the steering angle of the wheels.

Standard of steering angle:

Model	*Except for XV model*	*XV model*
Inner wheel	*38.3°±1.5°*	*38.5°±1.5°*
Outer wheel	*33.7°±1.5°*	*34.0°±1.5°*

3) When the steering wheel is in the following condition, perform the steering wheel installation over again.
- When wheels are set in the straight ahead position, the steering wheel spokes are not horizontal.
- Error is more than 5° on the periphery of the steering wheel.



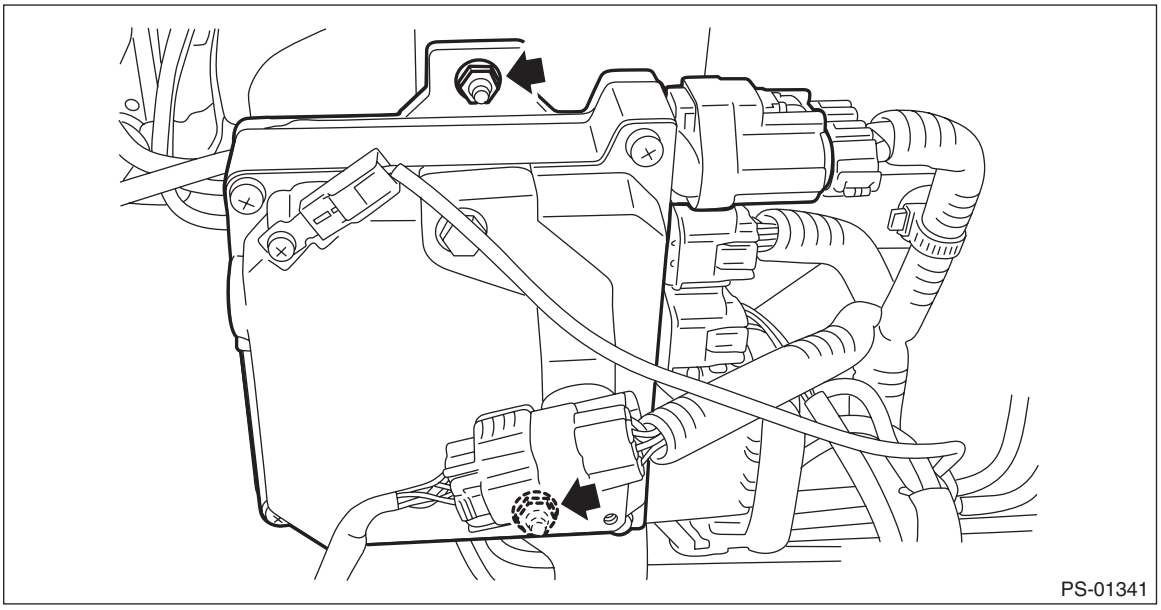
(1) 5° or less

4) If the steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the opposite direction from each other by the same angle. Also check that there are no abnormal steering force, failure of the steering wheel to return or other faults.

7. Power Steering Control Module

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the power steering control module.
   (1) Disconnect the connector of the power steering control module.
   (2) Remove the nuts, and remove the power steering control module.



B: INSTALLATION

1) Install the power steering control module.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

2) Connect the harness connector.

CAUTION:
Make sure that the connector is securely locked.

3) Attach the harness bracket.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

8. General Diagnostic Table

A: INSPECTION

Trouble	Possible cause	Corrective action
• Steering effort is heavy in all ranges. • Steering effort is heavy at stand still. • Steering wheel vibrates when turning.	1. Tire and wheel • Improper tire out of specifications • Improper wheel out of specification • Tires not properly inflated	Replace or reinflate.
	2. Measure the steering wheel effort. <Ref. to PS-39, TURNING RESISTANCE OF GEARBOX, INSPECTION, Electric Power Steering Gearbox.>	Adjust or replace.
• Vehicle leads to one side or the other. • Returning force of steering wheel to center is poor. • Steering wheel vibrates when turning.	1. Tire and wheel • Flat tire • Mixed use of different tires • Mixed use of different wheels • Abnormal wear of tire • Unequal tread remaining • Unequal pressure of tire	Adjust, fix or replace.
	2. Front wheel alignment • Improper or unequal caster • Improper or unequal toe-in • Loose suspension connections	Adjust or retighten.
	3. Measure the steering wheel effort. <Ref. to PS-39, TURNING RESISTANCE OF GEARBOX, INSPECTION, Electric Power Steering Gearbox.>	Adjust or replace.

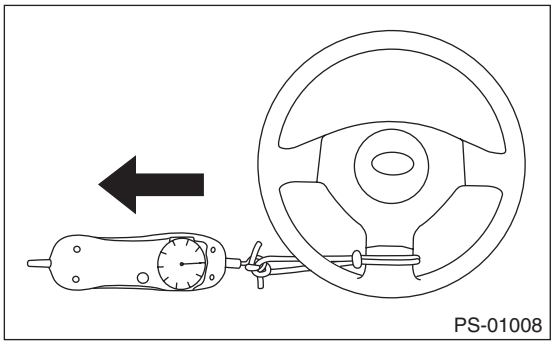
NOTE:
When performing repeated steering operation with the vehicle at standstill, the steering effort may be temporarily heavy because the heat generated in the system activates the power steering protection control. This is not a malfunction caused by the steering system. After a while, it will return to normal steering effort. (In this case, the steering warning light will not come on and there will be no DTC.)

1. NOISE AND VIBRATION

NOTE:
• When turning the steering wheel with the brake applied when the vehicle is parked, a screeching noise may be generated by the brake disc and pads. This is not a fault in the steering system.
• There may be a small vibration around the steering devices when turning the steering wheel at standstill, even though the component parts are operating properly.

Trouble	Possible cause	Corrective action
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check the clearance. Correct if necessary.
	Looseness of linkage, play of steering, improper tightening (looseness) of suspension joint or column assembly - steering	Retighten or replace.
	Noise emitted from inside of the gearbox	Replace the gearbox assembly.
Knocking When turning steering wheel in both directions with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust the backlash. When the noise remains after adjustment, replace the gearbox assembly.
	Insufficient tightening or play in the tie-rod or tie-rod end	Retighten or replace.
Grinding noise (intermittent) While engine is running. (While operating the steering.)	Fault inside of gearbox	Replace the gearbox assembly.
	Faulty bearing of the column assembly - steering	Apply grease or replace.
	Occurs when turning the steering wheel with brakes (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running. (with/without steering turned)	Excessive play in steering, looseness of suspension parts	Retighten.

2. MEASUREMENT OF STEERING EFFORT

	Step	Check	Yes	No
1	**CHECK STEERING WARNING LIGHT.**	Does the STEERING warning light illuminate?	Read the DTC, and inspect according to it.	Go to step **2**.
2	**CHECK STEERING WARNING LIGHT.** 1) Connect the Subaru Select Monitor, and turn the steering wheel. (one lock to lock) 2) Check the “EPS operation flag” in the current data.	Is the EPS operation flag normal without displaying any DTC code?	Go to step **3**.	If the EPS operation flag is “Assist limitation”, stop the engine for approx. 10 minutes and perform the procedures from step 1 again.
3	**CHECK STEERING EFFORT.** 1) Stop the vehicle on paved road. 2) Set the tire air pressure to the specification. 3) Start the engine. 4) Run the engine at idle. 5) Install a spring scale on the steering wheel. 6) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts.  PS-01008	Is the steering effort less than 29.4 N (3.0 kgf, 6.6 lbf)?	Go to step **4**.	Go to step **8**.
4	**CHECK STEERING EFFORT.** 1) Stop the engine. 2) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts.	Is the steering effort less than 294.2 N (30 kgf, 66.2 lbf)?	Go to step **5**.	Perform the inspection or adjustment around the suspension part.
5	**CHECK TORQUE SENSOR OUTPUT VALUE.** 1) Connect the Subaru Select Monitor. 2) Read the output of torque sensor voltage. NOTE: When measuring, place the steering wheel at the center position.	Is the voltage 2.425 — 2.575 V?	Go to step **6**.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>
6	**CHECK TORQUE SENSOR OUTPUT VALUE.** 1) Remove the universal joint assembly - steering. 2) Connect the Subaru Select Monitor. 3) Read the output of torque sensor voltage.	Is the voltage 2.425 — 2.575 V?	Go to step **7**.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>

Step		Check	Yes	No
7	**CHECK TORQUE SENSOR OUTPUT VALUE.** 1) Remove the universal joint assembly - steering. NOTE: Check that the universal joint assembly - steering moves up and down smoothly without installing the bolt. Then tighten the bolts first on the gearbox side and then on the column shaft side. 2) Connect the Subaru Select Monitor. 3) Read the output of torque sensor voltage.	Is the voltage 2.425 — 2.575 V?	Go to step **8**.	Check the universal joint assembly - steering. <Ref. to PS-26, Electric Power Steering Gearbox.>
8	**CHECK STEERING WHEEL EFFORT.** 1) Remove the universal joint assembly - steering. 2) Measure the steering wheel effort.	Is the steering effort less than 2.26 N (0.23 kgf, 0.51 lbf)?	Go to step **9**.	Replace the column assembly - steering. <Ref. to PS-26, Electric Power Steering Gearbox.>
9	**CHECK STEERING WHEEL EFFORT.** Measure the steering wheel effort.	Is the difference of steering effort between right and left less than 20%?	Go to step **10**.	Replace the column assembly - steering. <Ref. to PS-18, Steering Column.>
10	**CHECK UNIVERSAL JOINT ASSEMBLY - STEERING.** Measure the swing torque of joint. (Yoke of column assembly - steering side) <Ref. to PS-16, INSPECTION, Universal Joint.>	Is the swing torque of the universal joint assembly - steering less than 7.3 N (0.74 kgf, 1.64 lbf)?	Go to step **11**.	Replace the universal joint assembly - steering with a new part. <Ref. to PS-13, Universal Joint.>
11	**CHECK UNIVERSAL JOINT ASSEMBLY - STEERING.** Measure the swing torque of joint. (Yoke of gearbox side) <Ref. to PS-16, INSPECTION, Universal Joint.>	Is the swing torque of the universal joint assembly - steering less than 3.8 N (0.39 kgf, 0.86 lbf)?	Go to step **12**.	Replace the universal joint assembly - steering with a new part. <Ref. to PS-13, Universal Joint.>
12	**CHECK FRONT WHEEL.** Check the front wheels.	Does the front wheels have unsteady revolution or rattling, or does the brake drag?	Inspect, readjust and replace if necessary.	Go to step **13**.
13	**CHECK TIE-ROD ENDS.** Remove the tie-rod ends.	Does the tie-rod ends of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **14**.
14	**CHECK BALL JOINT.** Remove the ball joint.	Does the ball joints of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **15**.
15	**CHECK GEARBOX.** Measure the rotating of gearbox. <Ref. to PS-36, LIMIT, INSPECTION, Electric Power Steering Gearbox.>	Except for XV model: Is the turn resistance of the steering gearbox less than 18.3 N (1.9 kgf, 4.1 lbf)? Is the difference between the right and left rotational resistances less than 20%? XV model: Is the turn resistance of the steering gearbox less than 17.7 N (1.8 kgf, 4.0 lbf)? Is the difference between the right and left rotational resistances less than 20%?	Go to step **16**.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>

Step		Check	Yes	No
16	**CHECK GEARBOX.** Measure the sliding of gearbox.	Except for XV model: Is the sliding resistance of the steering gearbox less than 350 N (35 kgf, 79 lbf)? Is the difference between the right and left sliding resistances less than 20%? XV model: Is the sliding resistance of the steering gearbox less than 333 N (34 kgf, 75 lbf)? Is the difference between the right and left sliding resistances less than 20%?	Steering effort is normal.	Replace the gearbox assembly. <Ref. to PS-26, Electric Power Steering Gearbox.>

POWER ASSISTED SYSTEM (POWER STEERING) (DIAGNOSTICS)

PS(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	4
3.	General Description	7
4.	Electrical Component Location	8
5.	Control Module I/O Signal	10
6.	Subaru Select Monitor	12
7.	Read Diagnostic Trouble Code (DTC)	18
8.	Inspection Mode	19
9.	Clear Memory Mode	20
10.	STEERING Warning Light	21
11.	List of Diagnostic Trouble Code (DTC)	24
12.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	26

1. Basic Diagnostic Procedure

A: PROCEDURE

CAUTION:
• The power steering control module continues to operate after the engine stops and calculate the temperature in the control module. Therefore, before starting service of the power steering system which requires disconnection of the connector, stop the engine and allow approx. 10 minutes until the control module becomes cold.
• Before removal or installation, be sure to remove any foreign matter (dust, moisture, oil, etc.) from the power steering control module connector.

NOTE:
• Shake the connector at the suspected trouble location to check for open or short circuits of the harness.
• Refer to “Check List for Interview”. <Ref. to PS(diag)-4, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to PS(diag)-4, Check List for Interview.> 2) Check the illumination status of the steering warning light while the engine is running. 3) Before performing diagnostics, check components which might affect power steering problems. <Ref. to PS(diag)-7, INSPECTION, General Description.> 4) Save the data of «Overheating protection intervention history» «IGN count from overheating protection (most recent) (previous) (before previous)» «Assist limit history (low voltage, high voltage)» using Subaru Select Monitor. <Ref. to PS(diag)-13, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Are components that might influence the power steering problem operating properly?	Go to step **2**.	Repair or replace each component.
2	**CHECK INDICATION OF DTC.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. 4) Read the DTC using the Subaru Select Monitor. <Ref. to PS(diag)-18, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the Subaru Select Monitor cannot be executed properly, check the communication circuit. <Ref. to PS(diag)-14, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>	Is DTC displayed?	Record the DTC. Go to step **4**.	Go to step **3**.
3	**PERFORM GENERAL DIAGNOSTICS.** 1) If the steering warning light is illuminated while the engine is running, perform the Clear Memory Mode. <Ref. to PS(diag)-20, OPERATION, Clear Memory Mode.> 2) Perform the Inspection Mode. <Ref. to PS(diag)-19, Inspection Mode.> 3) Read the DTC. <Ref. to PS(diag)-18, OPERATION, Read Diagnostic Trouble Code (DTC).> Check the DTC is not displayed.	Does the steering warning light illuminate at ignition switch ON, and turn off two seconds after the engine is started?	Finish the diagnosis.	<Ref. to PS(diag)-17, WITHOUT DTC, INSPECTION, Subaru Select Monitor.>

Step		Check	Yes	No
4	**CHECK FREEZE FRAME DATA.** Using the Subaru Select Monitor, check the freeze frame data for the power steering control module.	Are freeze frame data recorded?	Record the freeze frame data. Go to step **5**.	Go to step **5**.
5	**PERFORM DIAGNOSIS.** 1) Refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to PS(diag)-24, LIST, List of Diagnostic Trouble Code (DTC).> 2) Correct the cause of trouble. 3) Check the illumination status of the steering warning light while the engine is running, and if the warning light is lit, perform Clear Memory Mode. <Ref. to PS(diag)-20, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to PS(diag)-19, Inspection Mode.> 5) Read the DTC. <Ref. to PS(diag)-18, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repeat step 5 until DTC is not shown.	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items regarding condition of the vehicle.

1. TROUBLE STATUS

Phenomenon of the vehicle	❑ Steering is heavy ❑ Steering is not smooth ❑ Steering is unstable (wondering) ❑ Steering does not return to center ❑ Steering is not straight
	❑ Steering force required is not the same for right and left turn ❑ Steering force required is not even ❑ Steering is too light
	❑ Noise ❑ Vibration ❑ STEERING warning light illuminates ❑ Other
Frequency	❑ Always ❑ Sometimes ❑ Immediately after starting the engine ❑ Only once ❑ Other
	❑ Recovers after leaving it for minutes
Steering wheel operation	❑ Dry steering ❑ When turning ❑ Quick steering ❑ Slow steering ❑ Returning the steering wheel
	❑ Releasing the steering wheel ❑ Only supporting the steering wheel by hand ❑ Repetitive dry steering
Steering wheel status / direction	❑ Around center position ❑ Near end of lock to lock
	❑ When turning the steering to right ❑ When turning the steering to left ❑ Both to right and to left ❑ (1) Steering angle: degrees ❑ (2) Maneuvering time: minutes
	❑ Slow steering ❑ Quick steering ❑ While holding the steering ❑ When repeating the dry wheel operation
Vehicle speed	❑ Stall 0 km/h (0 MPH) ❑ Very low speed — 20 km/h (— 12 MPH) ❑ Low speed — 40 km/h (— 25 MPH) ❑ Medium speed — 80 km/h (— 50 MPH) ❑ High speed — 80 km/h or more (— 50 MPH or more)
	❑ At starting ❑ While accelerating ❑ While decelerating ❑ When accelerating rapidly ❑ When decelerating rapidly
	❑ Other
Engine speed	❑ Idling ❑ (1) Around rpm ❑ (2) rpm — rpm ❑ (3) rpm or more / or less

2. STATE OF STEERING WARNING LIGHT

STEERING warning light illuminates	❑ Always ❑ Sometimes ❑ Only once ❑ Does not illuminate ❑ Other
Ignition key position	❑ LOCK ❑ ACC ❑ ON (when starting engine) ❑ START ❑ ON (when starting engine, while engine is running) ❑ ON (when starting engine, when engine is at a standstill)
Timing	❑ Immediately after turning the ignition ON ❑ Immediately after turning the ignition to START
	❑ Idling ❑ While accelerating ❑ While decelerating ❑ When cruising at — km/h (MPH)
	❑ When other electrical parts are operating (parts name: operating condition:)

3. ENVIRONMENT

a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:
b) Outside temperature	❑ °C (°F)
c) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ Local street ❑ Alley way ❑ Private road ❑ Parking lot ❑ Mountain road ❑ Paved road ❑ Unpaved road ❑ Gravel road ❑ Sandy place ❑ Muddy road ❑ Concrete road ❑ Stone pavement ❑ Racetrack ❑ Others:
d) Road surface	❑ Dry ❑ Wet ❑ Covered with fresh snow ❑ Covered with hardened snow ❑ Others:
e) Tire	❑ Tire chain ❑ Studless tire ❑ T-type tire (front RH, front LH, rear RH, rear LH)
f) Tire inflation pressure	Front RH: kPa Front LH: kPa Rear RH: kPa Rear LH: kPa
g) Degree of wear	Front RH: mm (in) Front LH: mm (in) Rear RH: mm (in) Rear LH: mm (in)
h) Genuine part	❑ Yes ❑ No Record after-market parts if any. (Steering wheel, audio, tires, and similar parts)
i) Condition of suspension alignment	
j) Electrical load conditions	❑ Audio ❑ Air conditioner ❑ Other
k) Loaded state	Condition:
l) Repair parts	❑ None ❑ Provided Contents:
m) Others	

3. General Description

A: CAUTION

1. SRS AIRBAG SYSTEM

The airbag system wiring harness is routed near the power steering control module.

CAUTION:
• Do not use the electrical test equipment on the airbag system wiring harnesses or connector circuits.
• Be careful not to damage the airbag system wiring harness during maintenance of the power steering control module.

B: INSPECTION

Before performing diagnosis, check the following items which might be affecting the power steering problem.

1. BATTERY

Measure the battery voltage and check electrolyte.

Standard voltage: 12 V or higher (must not drop below 10 V during operation under electrical load)

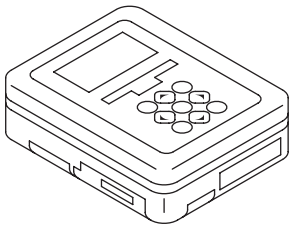
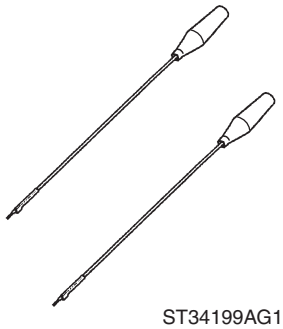
Specific gravity: 1.260 or more

2. TIRES

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

C: PREPARATION TOOL

1. SPECIAL TOOL

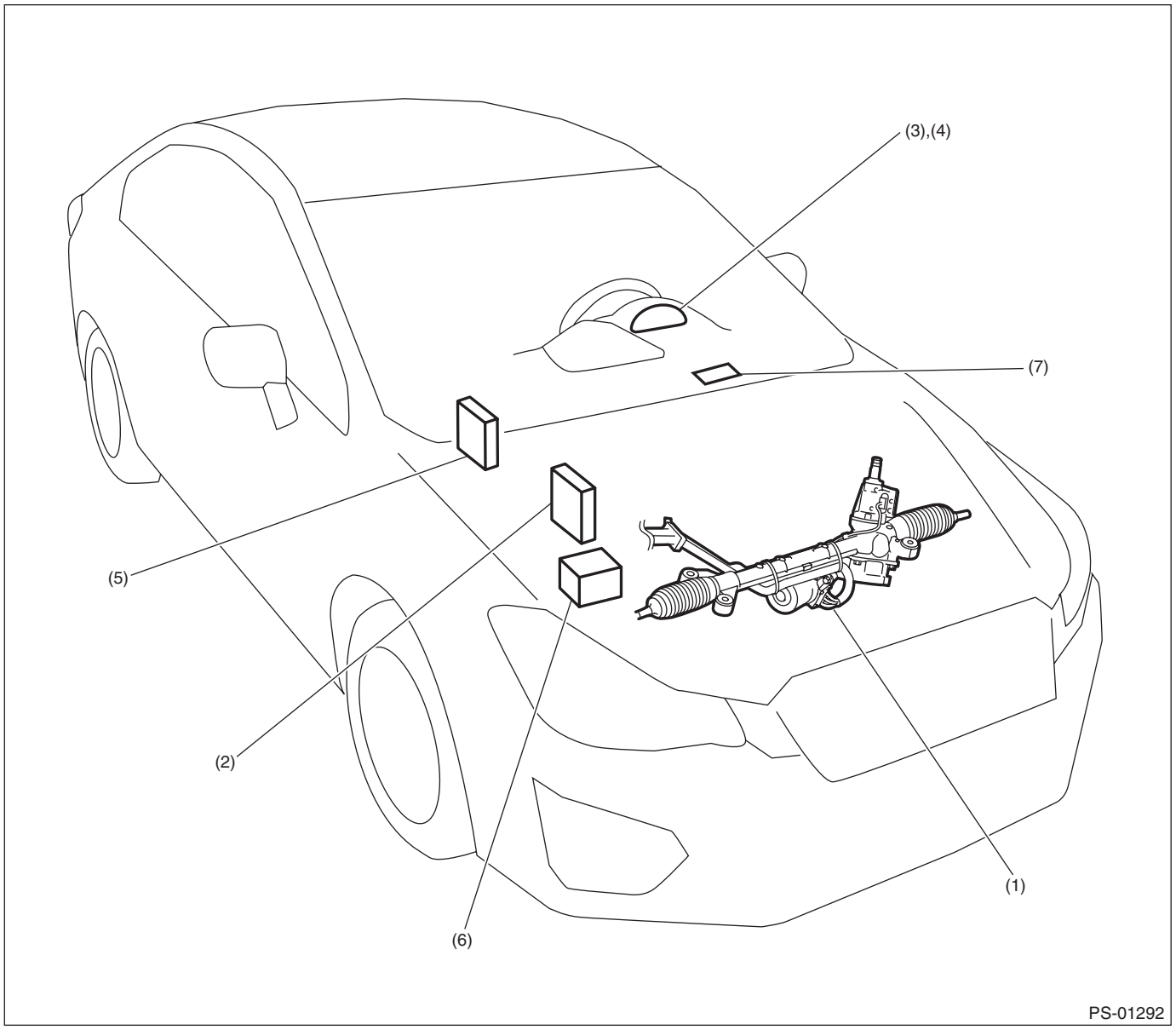
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.
 ST34199AG100	34199AG100	SPECIAL TOOL HARNESS	Used for troubleshooting the electrical system.

2. GENERAL TOOL

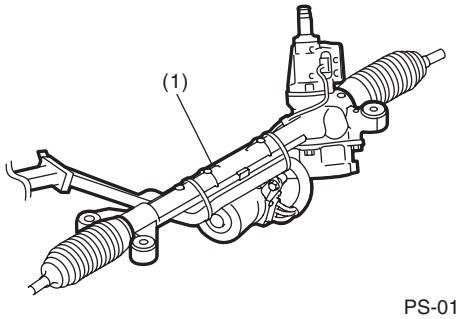
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

4. Electrical Component Location

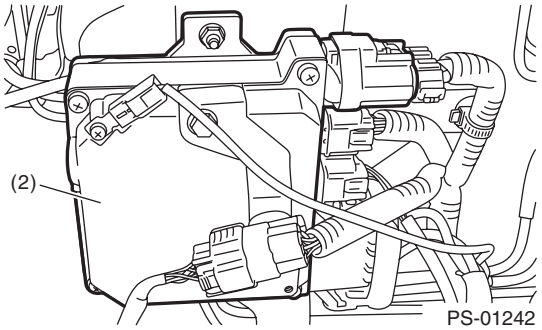
A: LOCATION



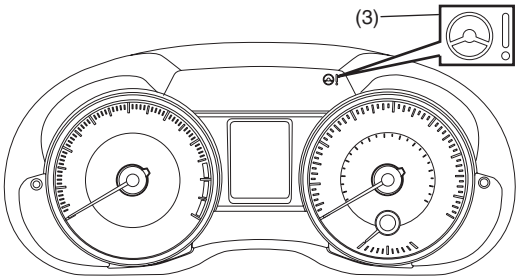
(1) Steering gearbox
(2) Power steering control module
(3) STEERING warning light (U5, U6 model)
(4) STEERING warning light (C0 model)
(5) Engine control module (ECM)
(6) VDCCM&H/U
(7) Data link connector (For Subaru Select Monitor)



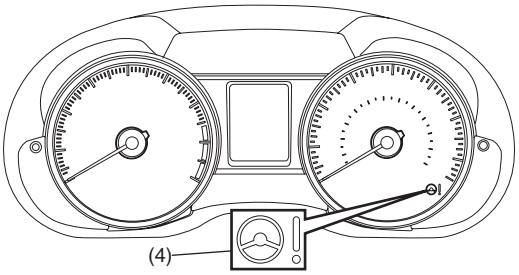
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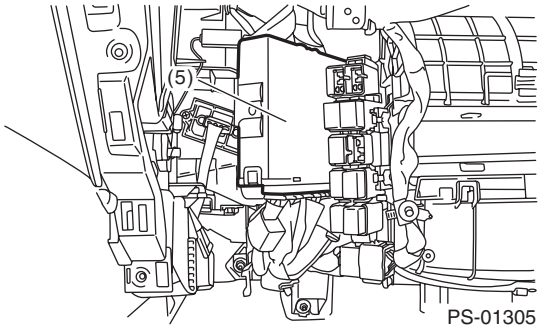
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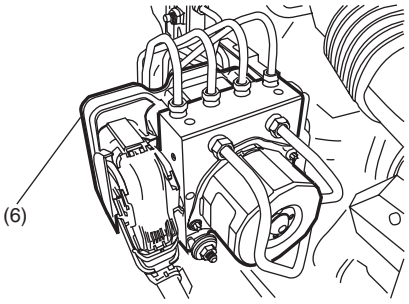
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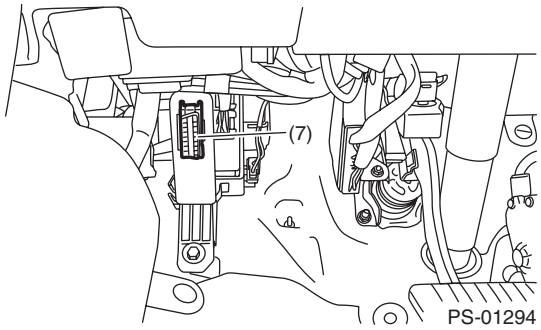
PS-01297



PS-01305



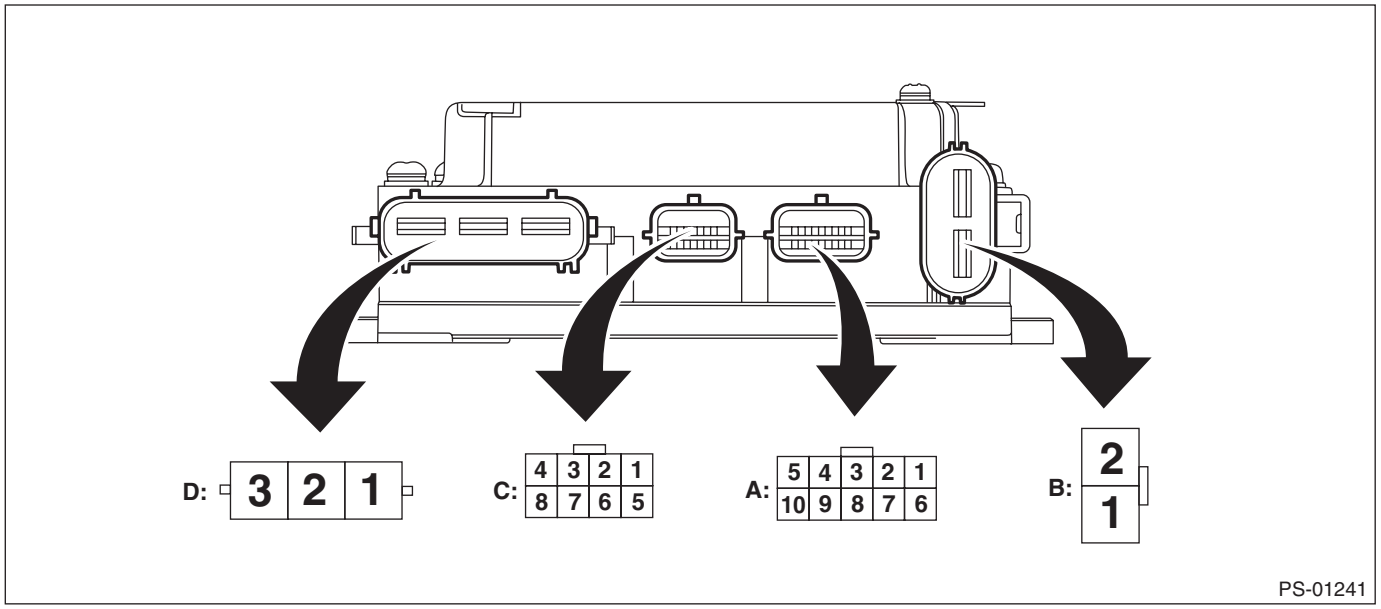
PS-01293



PS-01294

5. Control Module I/O Signal

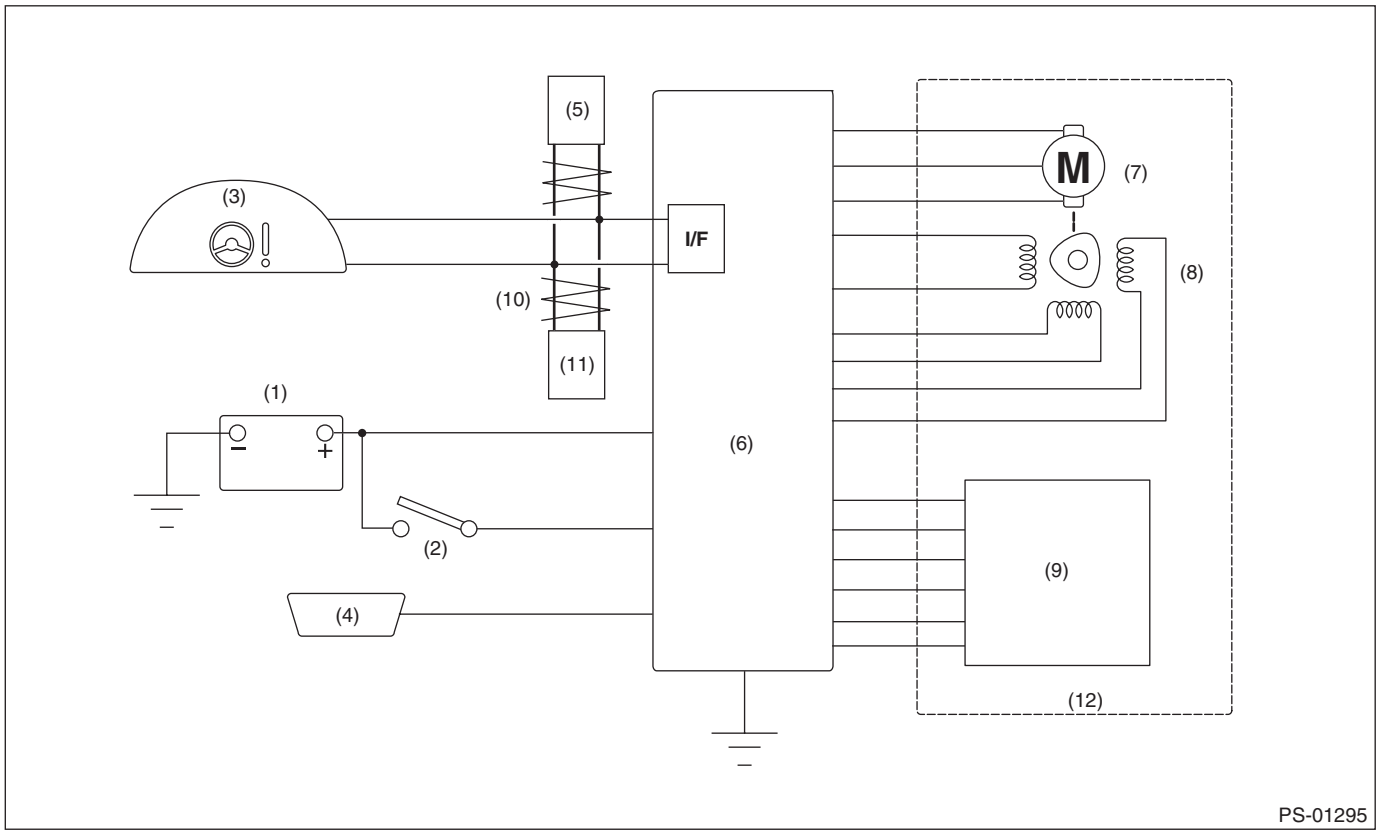
A: ELECTRICAL SPECIFICATION



NOTE:
The terminal numbers of the power steering control module connectors are as indicated in the figure.

Description	Terminal No.	Input/output signal
		Measured value and measuring conditions
Power supply (IG SW)	A1	Battery voltage is detected with the ignition switch ON when measuring between A1 — B1.
Subaru Select Monitor communication line	A2	Digital signal; can not be measured
Shield GND	A3	0 V is constantly detected.
Main torque sensor	A4	The voltage changes when the steering is operated to the right or left with the ignition switch ON.
Sub torque sensor	A5	The voltage changes when the steering is operated to the right or left with the ignition switch ON.
CAN communication	A6	Digital signal; can not be measured
CAN communication	A7	Digital signal; can not be measured
Torque sensor operating power supply	A8	Approximately 8 V is detected with ignition switch ON.
Torque sensor ground	A9	0 V is constantly detected.
Torque sensor standard power supply	A10	Approximately 3 V is detected with ignition switch ON.
Ground	B1	Battery voltage is constantly detected when measuring between B1 — B2.
Power supply	B2	
Resolver S1	C1	Varies depending on the operational status of the motor.
Resolver S3	C2	
Resolver S2	C3	
Resolver S4	C4	
Excitation power supply for resolver	C5	
Common output	C6	
Motor U phase	D1	Varies depending on the motor output.
Motor V phase	D2	
Motor W phase	D3	

B: WIRING DIAGRAM



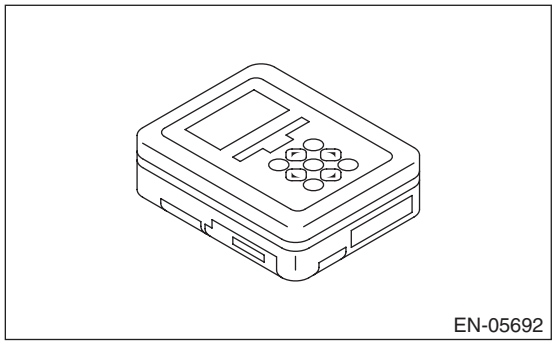
(1) Battery
(2) Ignition switch
(3) STEERING warning light (combination meter)
(4) Data link connector (for Subaru Select Monitor)
(5) Engine control module (ECM)
(6) Power steering control module
(7) Motor
(8) Resolver sensor
(9) Torque sensor (main & sub)
(10) CAN communication
(11) VDC CM
(12) Steering gearbox

6. Subaru Select Monitor

A: OPERATION

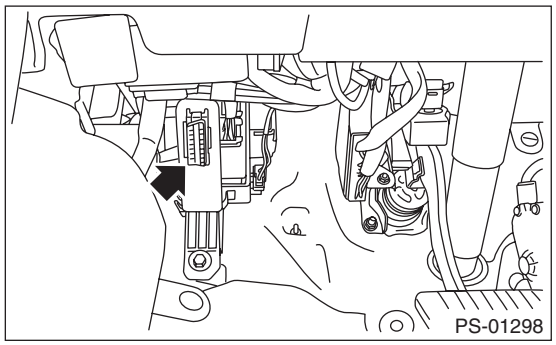
1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to PS(diag)-7, SPECIAL TOOL, PREPARATION TOOL, General Description.>


EN-05692

2) Prepare PC with Subaru Select Monitor installed.
3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

NOTE:
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.
4) Connect the diagnosis cable to SDI.
5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).


PS-01298

CAUTION:
Do not connect scan tools other than the Subaru Select Monitor.

6) Start the PC.
7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".
8) Record the DTC and data.

NOTE:
For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".
9) If the power steering control module and Subaru Select Monitor can not communicate, check the communication circuit. <Ref. to PS(diag)-14, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

2. READ CURRENT DATA

1) On «Main Menu» display, select {Each System Check}.
2) On «System Selection Menu» display, select {Power Steering System}.
3) On «Power Steering Diagnosis» display, select {Current Data Display & Save}.
4) Using the scroll key, scroll the display screen up or down until the desired data is shown.
The list is indicated in the following table.

Display	Contents to be displayed	Range	Unit
Torque sensor main output	Main torque sensor output voltage is displayed.	0 — 5	V
Torque sensor sub output	Sub torque sensor output voltage is displayed.	0 — 5	V
Torque sensor reference voltage	Torque sensor standard voltage is displayed.	0 — 5	V
Power current	The current flowing to CM is displayed.	–128 — 127	A
Vehicle speed	Vehicle speed is displayed. (CAN communication data)	0 — 255	km/h
Engine speed	Engine speed is displayed. (CAN communication data)	0 — 12750	rpm
Detection current at ECM	The current flowing to the motor relay is displayed.	–128 — 127	A
3-phase motor current (U-phase)	The U phase actual current value as calculated by the micro-computer from the torque sensor input is displayed.	–128 — 127	A
3-phase motor current (V-phase)	The V phase actual current value as calculated by the micro-computer from the torque sensor input is displayed.	–128 — 127	A
Motor angular speed	Data from the resolver sensor is displayed.	–4096 — 4064	rpm
ECM Temperature	The thermistor temperature of the steering control module is displayed.	–50 — 205	°C
Power supply voltage	Battery voltage is displayed.	0 — 25.5	V
Torque sensor power supply voltage	The power supply voltage output to the torque sensor is displayed.	0 — 10.2	V
IG voltage	The power supply voltage supplied to the ECM is displayed.	0 — 25.5	V
CAN bus status	Either Active/Passive/Bus Off is displayed.	Active	—
EPS operating condition	Either Normal/Assist Stop/Assist Limitation is displayed.	Normal	—
Target Current at ECM	The motor target current value required for assist is displayed.	–128 — 127	A
Steering angle	Steering angle of steering wheel is displayed.	–640 — 635	deg
Reading assist MAP	Either MAP1/MAP2/MAP3 is displayed.	MAP1	—
Overheating protection intervention history	Number of interventions to the overheat protection control (assist limitation for protecting the power steering from overheating) *1	0 — 250	times
IGN count from overheating protection (most recent)	Number of times the ignition switch is ON from the intervention to overheat protection control (most recent) until now *2	0 — 65000	times
IGN count from overheating protection (previous)	Number of times the ignition switch is ON from the intervention to overheat protection control (previous) until now *2	0 — 65000	times
IGN count from overheating protection (before previous)	Number of times the ignition switch is ON from the intervention to overheat protection control (before previous) until now *2	0 — 65000	times
Assist limit history (low voltage, high voltage)	Number of intervention to assist limit when the power supply voltage is low or high *1	0 — 250	times

NOTE:
- *1 When the value exceeds the maximum of 250 times, 250 is displayed.
- *2 When there is no intervention of the overheating protection control, “65535” is displayed. If an error such as control unit memory error, etc. occurs, “65534” is displayed.

3. FREEZE FRAME DATA

NOTE:
- Freeze frame data stored at the time of trouble occurrence is shown on the display.
- Each time a trouble occurs, the latest information is stored in the freeze frame data in memory.
- One freeze frame data will be stored.

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:

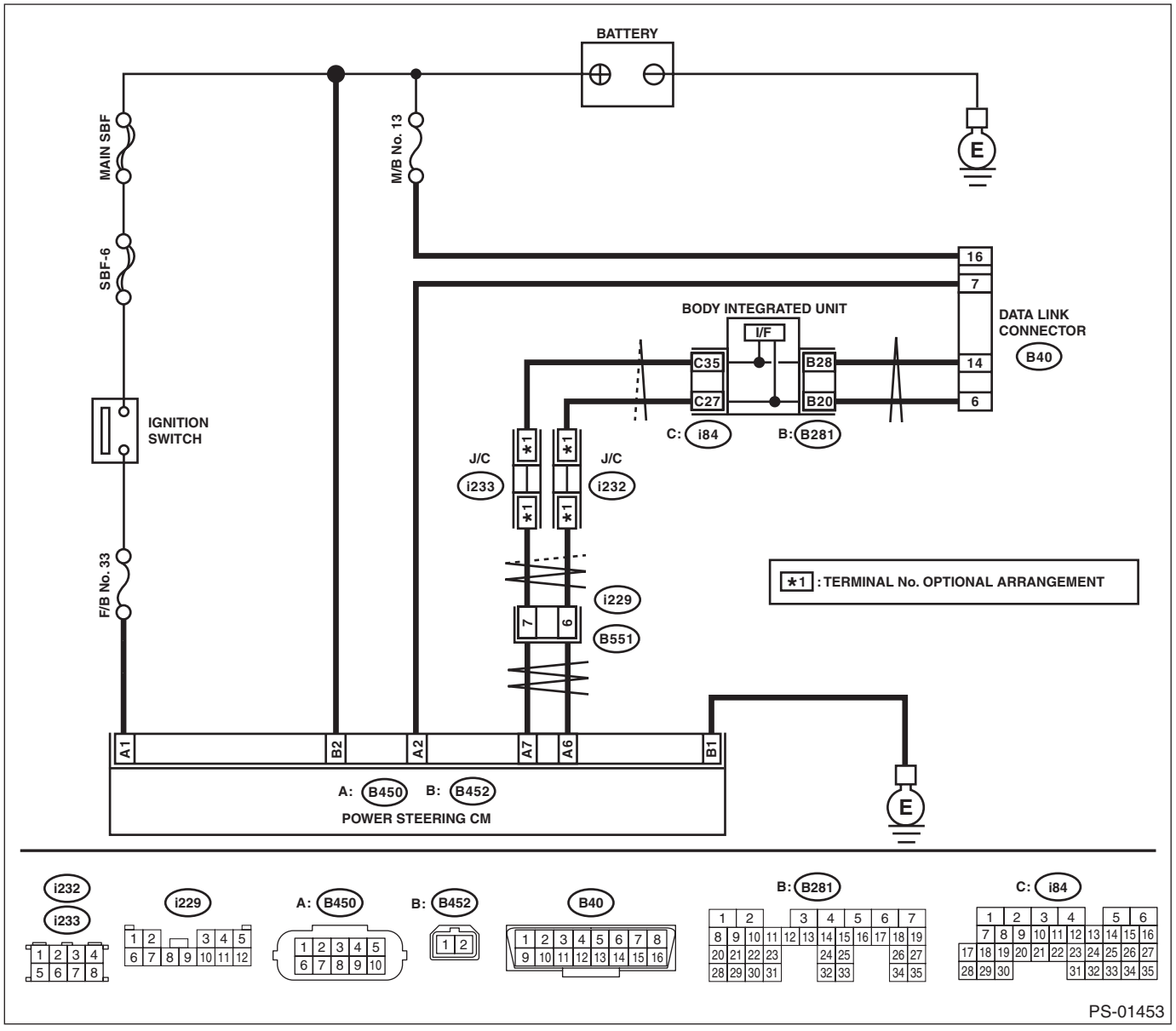
- Defective harness connector
- Defective power steering control module

TROUBLE SYMPTOM:

- Communication is impossible between the power steering control module and Subaru Select Monitor.
- After starting the engine, the STEERING warning light does not illuminate but steering effort is heavy.

WIRING DIAGRAM:

Electric Power Steering System <Ref. to WI-73, Electric Power Steering System.>



	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2**.	Turn the ignition switch to ON, and select the power steering mode using the Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage 12 V or more?	Go to step **3**.	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Go to step **8**.	Go to step **5**.
5	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the power steering control module connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>	Go to step **6**.
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM, VDC CM, airbag CM and body integrated unit. **CAUTION:** **When disconnecting the connector from airbag CM, always follow the precautions on AB section. <Ref. to AB-11, CAUTION, General Description.>** 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the short circuit to ground in harness and connector between each control module and data link connector.
7	**CHECK HARNESS CONNECTOR BETWEEN POWER STEERING CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between the power steering control module and chassis ground. ***Connector & terminal*** ***(B40) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8**.	Repair the short circuit to power supply in harness and connector between each control module and data link connector.
8	**CHECK HARNESS CONNECTOR BETWEEN POWER STEERING CONTROL MODULE AND DATA LINK CONNECTOR.** Measure the resistance between the power steering control module connector and the data link connector. ***Connector & terminal*** ***(B450) No. 2 — (B40) No. 7:***	Is the resistance less than 0.5 Ω?	Go to step **9**.	Repair the open circuit or poor contact of harness and connectors between the power steering control module and data link connector.

	Step	Check	Yes	No
9	**CHECK POWER STEERING CONTROL MODULE CONNECTOR INSTALLATION.** Turn the ignition switch to OFF.	Is the power steering control module connector inserted into the power steering control module until the clamp locks?	Go to step **10**.	Insert the power steering control module connector into the power steering control module.
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the power steering control module connector (B452). 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the ignition power supply voltage between the power steering control module connector and chassis ground. ***Connector & terminal*** ***(B450) No. 1 (+) — Chassis ground (–):*** ***(B452) No. 2 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **11**.	Repair the open circuit of harness or the poor contact of connector between the power steering control module and the battery.
11	**CHECK HARNESS CONNECTOR BETWEEN POWER STEERING CONTROL MODULE AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the power steering control module. 3) Measure the resistance in the harness between the power steering control module and chassis ground. ***Connector & terminal*** ***(B452) No. 1 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12**.	Repair the open circuit or poor contact of the harness between the power steering control module and chassis ground.
12	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact of control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>

2. WITHOUT DTC

DETECTING CONDITION:

- Defective combination meter
- Open circuit of harness

TROUBLE SYMPTOM:

- The steering warning light will not turn off.
- “No diagnostic Code Present” will be displayed on the Subaru Select Monitor.

NOTE:
When the steering warning light is OFF and “No diagnostic Code Present” is displayed on Subaru Select Monitor when all DTCs are read, the system is operating properly.

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system using the Subaru Select Monitor. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is DTC U0131 detected?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK COMBINATION METER.** Check the steering warning light when the ignition is turned from OFF to ON.	Does the steering warning light illuminate at ignition switch ON, and turn off two seconds after the engine is started?	Finish the diagnosis.	Replace the combination meter. <Ref. to IDI-17, Combination Meter.>

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

• For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
• For details concerning the DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to PS(diag)-24, List of Diagnostic Trouble Code (DTC).>

8. Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as much as possible.

9. Clear Memory Mode

A: OPERATION

• For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
• Before performing memory clear, check the current data, and if there are any data of DTC, trouble status information, overheating protection intervention history, IGN count from overheating protection and assist limit history, save them.

10.STEERING Warning Light

A: STEERING WARNING LIGHT DOES NOT COME ON

1. POWER STEERING ASSIST ENABLED

DETECTING CONDITION:

- Defective combination meter
- Defective harness

TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), the steering warning light does not illuminate.

NOTE:
It is operating normally if the warning light illuminates when the ignition switch is turned to ON (engine OFF), and turns off approximately two seconds after engine start.

	Step	Check	Yes	No
1	**CHECK ILLUMINATION OF OTHER LIGHTS.** Turn the ignition switch to ON. (engine OFF)	Do other warning lights illuminate?	Go to step **2**.	Check the combination meter. <Ref. to IDI-10, INSPECTION, Combination Meter System.>
2	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system using the Subaru Select Monitor. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is DTC related to CAN displayed?	Perform the diagnosis according to DTC. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter. <Ref. to IDI-7, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is the self diagnosis normal?	The combination meter is normal.	Check the combination meter. <Ref. to IDI-10, INSPECTION, Combination Meter System.>

2. POWER STEERING ASSIST DISABLED

DETECTING CONDITION:
CAN communication error (Engine rpm signal not received)
TROUBLE SYMPTOM:
The STEERING warning light is normal but there is no power steering assist (steering feels heavy).

NOTE:
• Power steering assist is not started unless an ignition switch ON signal or engine speed signal is input.
• In any of the following cases, the power steering assist is limited and steering wheel operation may become heavy.
If the steering wheel is held to an end for a long time, or the steering wheel turning to right and left at slow speed is repeated during parking, the assist limitation (overheat protection control) may operate to prevent failures by overheat.
In this case, by stopping the engine for approx. 10 minutes for cooling, the assist will start operating. While assist limitation (overheat protection control) is in active, “Assist limitation” is displayed in the «EPS operating condition» in the Subaru Select Monitor “Current Data Display & Save”.
• History can be confirmed on «Overheating protection intervention history» or «IGN count from overheating protection» of “Current Data Display & Save”.
• The overheat protection control system is normal operation, therefore, the STEERING warning light will not come on and there will be no DTC displayed.
• If the power steering system connector is disconnected while cooling under the overheat protection control, different DTC may be recorded. If there is no DTC and assist limitation is in active, stop the engine for approx. 10 minutes for cooling.

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** Using the Subaru Select Monitor, display «EPS operating condition». <Ref. to PS(diag)-13, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is “Assist limitation” displayed?	Stop the engine for approx. 10 minutes, and cool down the power steering control module. After cooling down, perform the step 1 again.	Go to step **2**.
2	**CHECK DTC.** Read the DTC of the power steering control module using Subaru Select Monitor. <Ref. to PS(diag)-18, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to PS(diag)-24, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK CURRENT DATA.** 1) Using the Subaru Select Monitor, display «Torque sensor main output» and «Torque sensor sub output». 2) Move the steering wheel to the left and right.	Do the torque sensor values change?	Go to step **4**.	Check the torque sensor circuit. <Ref. to PS(diag)-26, DTC C2511 TORQUE SENSOR FAILURE 1 (MAIN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
4	**CHECK CURRENT DATA.** 1) Start the engine. 2) Using the Subaru Select Monitor, display «Engine Speed».	Is the engine speed signal the same as that in the combination meter?	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>	Check the CAN communication. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

B: STEERING WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

- Defective combination meter
- Open circuit of harness

TROUBLE SYMPTOM:

When starting the engine, the steering warning light continues to illuminate.

	Step	Check	Yes	No
1	**CHECK DTC.** Read the DTC of the power steering control module using the Subaru Select Monitor. <Ref. to PS(diag)-18, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to PS(diag)-24, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system using the Subaru Select Monitor. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is a DTC related to CAN detected?	Perform the diagnosis according to DTC. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Check the combination meter. <Ref. to IDI-10, INSPECTION, Combination Meter System.>

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Note
None	Without DTC	Normal	<Ref. to PS(diag)-17, WITHOUT DTC, INSPECTION, Subaru Select Monitor.>
	"Assist limitation" is displayed in the current data «EPS operating condition».	Assist limitation is performed due to overheat protection control.	<Ref. to PS(diag)-22, POWER STEERING ASSIST DISABLED, STEERING WARNING LIGHT DOES NOT COME ON, STEERING Warning Light.>
	The current data «Overheating protection intervention history» is more than once.	There are previous records of intervention to overheat protection control.	<Ref. to PS(diag)-22, POWER STEERING ASSIST DISABLED, STEERING WARNING LIGHT DOES NOT COME ON, STEERING Warning Light.>
C2511	Torque Sensor Failure 1 (Main)	• Poor connector contact • Forgot to connect connector • Faulty torque sensor section circuit • Faulty torque sensor coil	<Ref. to PS(diag)-26, DTC C2511 TORQUE SENSOR FAILURE 1 (MAIN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2512	Torque Sensor Failure 2 (Sub)		<Ref. to PS(diag)-27, DTC C2512 TORQUE SENSOR FAILURE 2 (SUB), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2513	Torque Sensor Failure 3 (Much Tolerance)		<Ref. to PS(diag)-27, DTC C2513 TORQUE SENSOR FAILURE 3 (MUCH TOLERANCE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2514	Torque Sensor Power Supply Failure		<Ref. to PS(diag)-28, DTC C2514 TORQUE SENSOR POWER SUPPLY FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2521	Motor Failure 1 (Motor)	• Poor connector contact • Forgot to connect connector • Harness open/short circuit • Motor open circuit • Power transistor shorted/open • Terminal power supply or ground short	<Ref. to PS(diag)-29, DTC C2521 MOTOR FAILURE 1 (MOTOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2522	Motor Failure 2 (Angle Abnormal)		<Ref. to PS(diag)-30, DTC C2522 MOTOR FAILURE 2 (ANGLE ABNORMAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2531	ECU Failure 1 (CPU Failure)	Faulty main unit of power steering control module	<Ref. to PS(diag)-31, DTC C2531 ECU FAILURE 1 (CPU FAILURE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2532	ECU Failure 2 (Peripheral Circuit Failure)	Faulty main unit of power steering control module	<Ref. to PS(diag)-31, DTC C2532 ECU FAILURE 2 (PERIPHERAL CIRCUIT FAILURE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2533	ECM Failure 3 (Board Temperature Sensor Failure)	Faulty main unit of power steering control module	<Ref. to PS(diag)-31, DTC C2533 ECM FAILURE 3 (BOARD TEMPERATURE SENSOR FAILURE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2541	Vehicle Speed Is Abnormal	• Poor connector contact • Forgot to connect connector • Harness open/short circuit	<Ref. to PS(diag)-32, DTC C2541 VEHICLE SPEED IS ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2543	Error Passive Status	Defective CAN communication	<Ref. to PS(diag)-32, DTC C2543 ERROR PASSIVE STATUS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C2551	Power Supply Relay Failure	• Power supply voltage malfunction • Faulty relay contact	<Ref. to PS(diag)-33, DTC C2551 POWER SUPPLY RELAY FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Note
C2552	Motor Relay Abnormal	Faulty relay	<Ref. to PS(diag)-34, DTC C2552 MOTOR RELAY ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0073	Control Module Communication Bus “A” Off	Defective CAN communication	<Ref. to PS(diag)-34, DTC U0073 CONTROL MODULE COMMUNICATION BUS “A” OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0122	Lost Communication With Vehicle Dynamics Control Module	Defective CAN communication	<Ref. to PS(diag)-34, DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0416	Invalid Data Received From Vehicle Dynamics Control Module	Defective CAN communication	<Ref. to PS(diag)-34, DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1120	Lost Communication With Autostart Stop Control Module	Defective CAN communication	<Ref. to PS(diag)-34, DTC U1120 LOST COMMUNICATION WITH AUTOSTART STOP CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

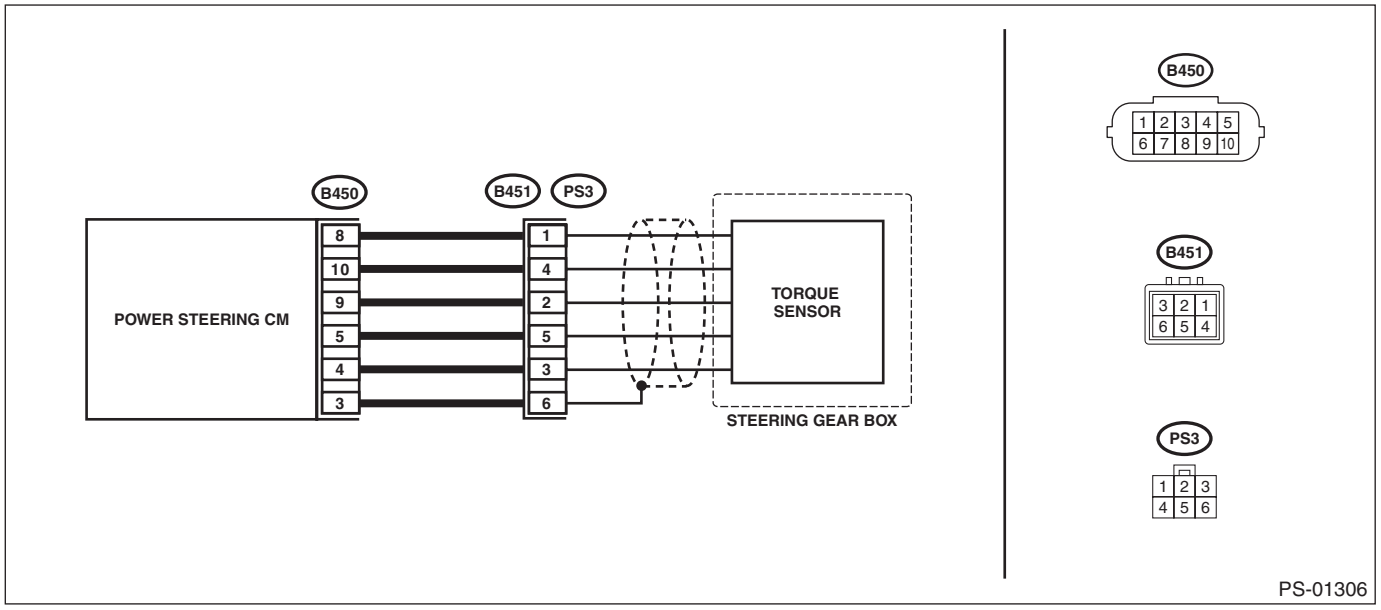
A: DTC C2511 TORQUE SENSOR FAILURE 1 (MAIN)

TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

WIRING DIAGRAM:

Electric Power Steering System <Ref. to WI-73, Electric Power Steering System.>



Step		Check	Yes	No
1	**CHECK TORQUE SENSOR SIGNAL.** 1) Display the current data of the power steering control module using the Subaru Select Monitor. 2) Check the voltage of «Torque sensor main output», «Torque sensor sub output», «Torque sensor reference voltage» and «Torque sensor power supply voltage».	Are the voltage of «Torque sensor main output» and «Torque sensor sub output» 2.5±0.1 V? Is the voltage of «Torque sensor reference voltage» 3±0.1 V? Is the voltage of «Torque sensor power supply voltage» 8±0.4 V?	Check for poor contact of the connector, and check the conditions again. If the condition recur, go to the next step. Go to step **2**. If it does not recur, complete the inspection.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B450, B451). 3) Using a tester and test harness, check the internal resistance of the harness terminals. ***Connector & terminal*** ***(B450) No. 4 — (B451) No. 3:*** ***(B450) No. 5 — (B451) No. 5:*** ***(B450) No. 8 — (B451) No. 1:*** ***(B450) No. 9 — (B451) No. 2:*** ***(B450) No. 10 — (B451) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair or replace the harness.

	Step	Check	Yes	No
3	**CHECK POWER STEERING CONTROL MODULE.** 1) Connect the connector (B450) to the power steering control module. 2) Turn the ignition switch to ON. 3) Short circuit between the terminals of the connector (B451). ***Terminals*** ***No. 4 — No. 3:*** ***No. 4 — No. 5:*** 4) Using the Subaru Select Monitor, check the voltage of «Torque sensor main output», «Torque sensor sub output».	Are the voltages of «Torque sensor main output», «Torque sensor sub output» before short circuit 0±0.1 V? Are the voltages of «Torque sensor main output», «Torque sensor sub output» after short circuit 3±0.1 V?	Replace the steering gearbox. <Ref. to PS-26, Electric Power Steering Gearbox.>	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>

B: DTC C2512 TORQUE SENSOR FAILURE 2 (SUB)

NOTE:
For the diagnostic procedures, refer to “DTC 2511 TORQUE SENSOR FAILURE 1 (MAIN)”. <Ref. to PS(diag)-26, DTC C2511 TORQUE SENSOR FAILURE 1 (MAIN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC C2513 TORQUE SENSOR FAILURE 3 (MUCH TOLERANCE)

NOTE:
For the diagnostic procedures, refer to “DTC 2511 TORQUE SENSOR FAILURE 1 (MAIN)”. <Ref. to PS(diag)-26, DTC C2511 TORQUE SENSOR FAILURE 1 (MAIN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

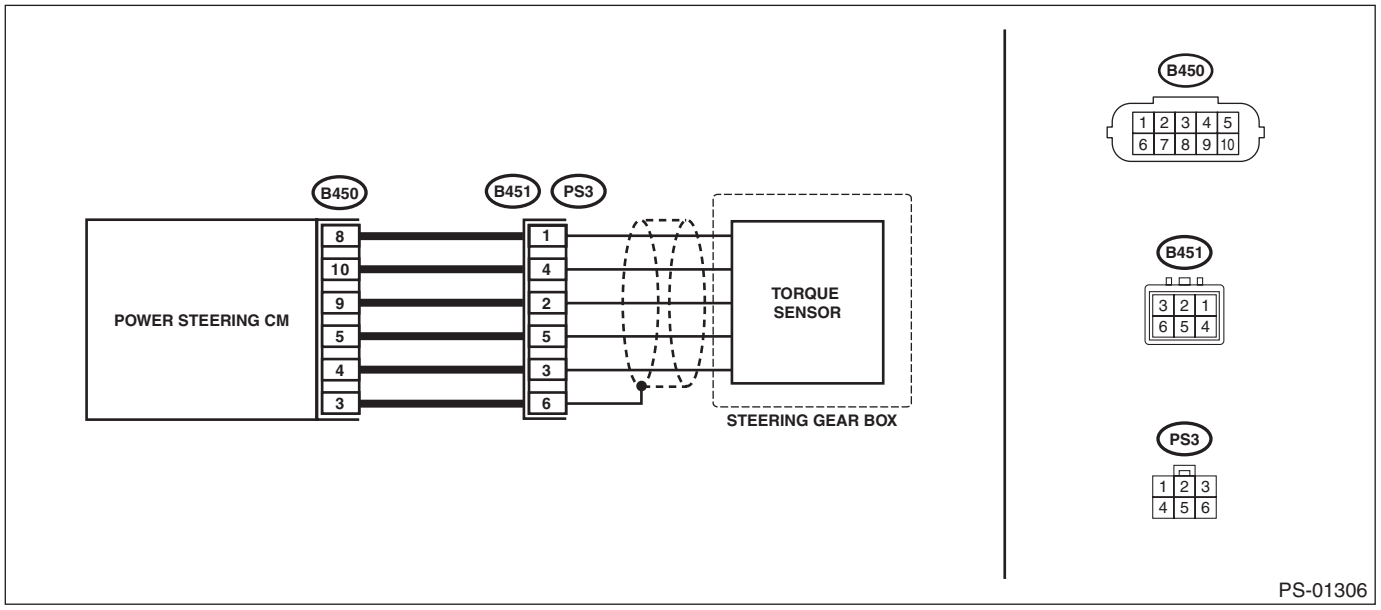
D: DTC C2514 TORQUE SENSOR POWER SUPPLY FAILURE

TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

WIRING DIAGRAM:

Electric Power Steering System <Ref. to WI-73, Electric Power Steering System.>



Step		Check	Yes	No
1	**CHECK TORQUE SENSOR SIGNAL.** 1) Display the current data of the power steering control module using the Subaru Select Monitor. 2) Check the voltage of «Torque sensor main output», «Torque sensor sub output», «Torque sensor reference voltage» and «Torque sensor power supply voltage».	Are the voltage of «Torque sensor main output» and «Torque sensor sub output» 2.5±0.1 V? Is the voltage of «Torque sensor reference voltage» 3±0.1 V? Is the voltage of «Torque sensor power supply voltage» 8±0.4 V?	Check for poor contact of the connector, and check the conditions again. If the condition recur, go to the next step. Go to step **2**. If it does not recur, complete the inspection.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B451). 3) Using a tester and test harness, check the internal resistance of the harness terminals. ***Connector & terminal*** ***(B450) No. 4 — (B451) No. 3:*** ***(B450) No. 5 — (B451) No. 5:*** ***(B450) No. 8 — (B451) No. 1:*** ***(B450) No. 9 — (B451) No. 2:*** ***(B450) No. 10 — (B451) No. 4:***	Is the resistance less than 10 Ω?	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>	Repair or replace the harness.

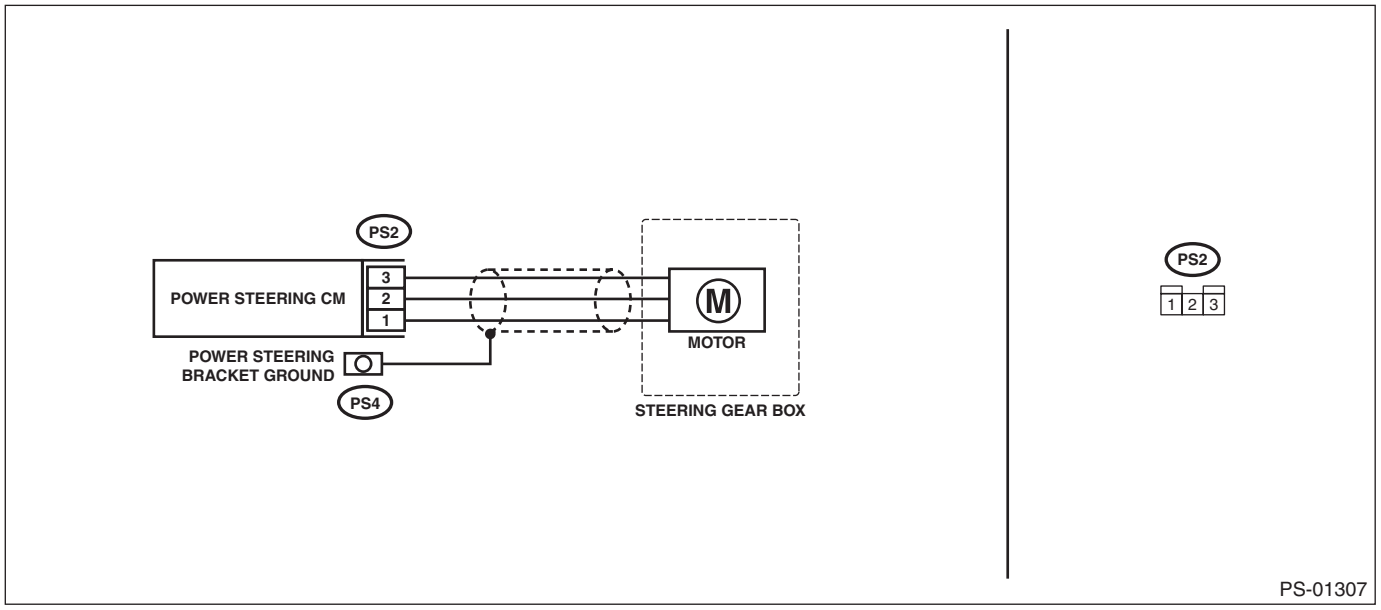
E: DTC C2521 MOTOR FAILURE 1 (MOTOR)

TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

WIRING DIAGRAM:

Electric Power Steering System <Ref. to WI-73, Electric Power Steering System.>



Step		Check	Yes	No
1	**CHECK MOTOR UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (PS2) from the power steering control module. 3) Use a tester to check for continuity in the motor. ***Connector & terminal*** ***(PS2) No. 1 — No. 2:*** ***(PS2) No. 1 — No. 3:*** ***(PS2) No. 2 — No. 3:***	Is there continuity?	Go to step **2**.	Replace the steering gearbox. <Ref. to PS-26, Electric Power Steering Gearbox.>
2	**CHECK MOTOR INSULATION.** Use a tester to check for short circuits in the motor. ***Connector & terminal*** ***(PS2) No. 1 — Steering gearbox body:*** ***(PS2) No. 2 — Steering gearbox body:*** ***(PS2) No. 3 — Steering gearbox body:***	Is the resistance 1 MΩ or more?	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>	Replace the steering gearbox. <Ref. to PS-26, Electric Power Steering Gearbox.>

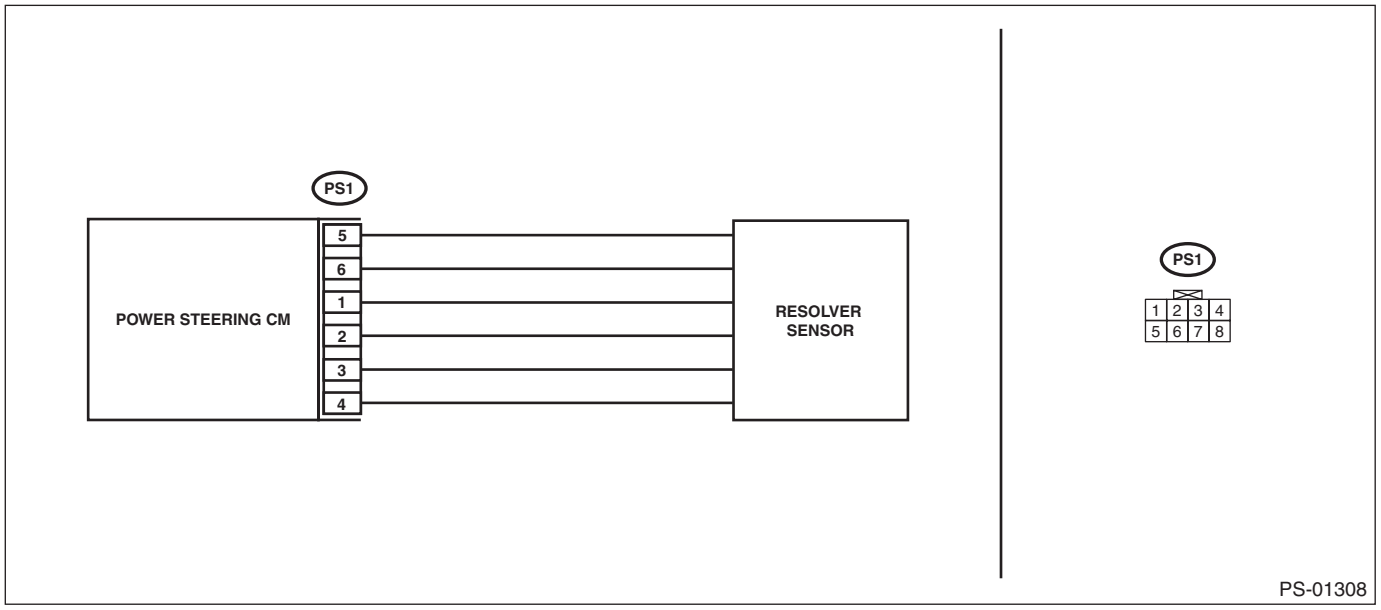
F: DTC C2522 MOTOR FAILURE 2 (ANGLE ABNORMAL)

TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

WIRING DIAGRAM:

Electric Power Steering System <Ref. to WI-73, Electric Power Steering System.>



	Step	Check	Yes	No
1	**CHECK MOTOR UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (PS1) from the power steering control module. 3) Use a tester to check for continuity in the resolver sensor. ***Connector & terminal*** ***(PS1) No. 1 — No. 2 :*** ***(PS1) No. 3 — No. 4 :*** ***(PS1) No. 5 — No. 6 :***	Is there continuity?	Go to step **2**.	Replace the steering gearbox. <Ref. to PS-26, Electric Power Steering Gearbox.>
2	**CHECK RESOLVER SENSOR INSULATION.** Using a tester, check for short circuits in the resolver sensor. ***Connector & terminal*** ***(PS1) No. 1 — Steering gearbox body:*** ***(PS1) No. 2 — Steering gearbox body:*** ***(PS1) No. 3 — Steering gearbox body:*** ***(PS1) No. 4 — Steering gearbox body:*** ***(PS1) No. 5 — Steering gearbox body:*** ***(PS1) No. 6 — Steering gearbox body:***	Is the resistance 1 MΩ or more?	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>	Replace the steering gearbox. <Ref. to PS-26, Electric Power Steering Gearbox.>

G: DTC C2531 ECU FAILURE 1 (CPU FAILURE)

TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

NOTE:
When this code is displayed, replace the power steering control module with new parts. <Ref. to PS-42, Power Steering Control Module.>

H: DTC C2532 ECU FAILURE 2 (PERIPHERAL CIRCUIT FAILURE)

TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

NOTE:
When this code is displayed, replace the power steering control module with new parts. <Ref. to PS-42, Power Steering Control Module.>

I: DTC C2533 ECM FAILURE 3 (BOARD TEMPERATURE SENSOR FAILURE)

TROUBLE SYMPTOM:
The steering wheel operation feels heavy.

NOTE:
When this code is displayed, replace the power steering control module with new parts. <Ref. to PS-42, Power Steering Control Module.>

J: DTC C2541 VEHICLE SPEED IS ABNORMAL

TROUBLE SYMPTOM:
The steering wheel operation feels heavy.

	Step	Check	Yes	No
1	**CHECK DTC.** Read all DTCs using the Subaru Select Monitor.	Are VDC CM or vehicle speed-related DTCs detected?	Perform the diagnosis according to the DTC.	Go to step **2**.
2	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system using the Subaru Select Monitor. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is a DTC of the body integrated unit displayed?	Perform the diagnosis according to the DTC. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK VEHICLE SPEED SIGNAL.** 1) Use the Subaru Select Monitor, display the current data [Vehicle Speed] of the power steering control module. 2) Lift up the vehicle (so that the wheels turn freely), start the engine, and raise engine speed in gear. **CAUTION:** **Be careful that no one is near the spinning tires and nothing gets caught in them.** 3) Check for whether the data changes according to vehicle speed.	Is the data in sync with the vehicle speed?	It is possible that temporary poor communication occurs. Perform memory clear.	Replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>

K: DTC C2543 ERROR PASSIVE STATUS

TROUBLE SYMPTOM:
The steering wheel operation feels heavy.

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system using the Subaru Select Monitor. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is a DTC of the CAN communication displayed?	Perform the diagnosis according to the DTC. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).>	Check for poor contact of the connector, and check the conditions again. If the condition recurs, perform the diagnosis according to the DTC. <Ref. to LAN(diag)-51, List of Diagnostic Trouble Code (DTC).> If it does not recur, complete the inspection.

L: DTC C2551 POWER SUPPLY RELAY FAILURE

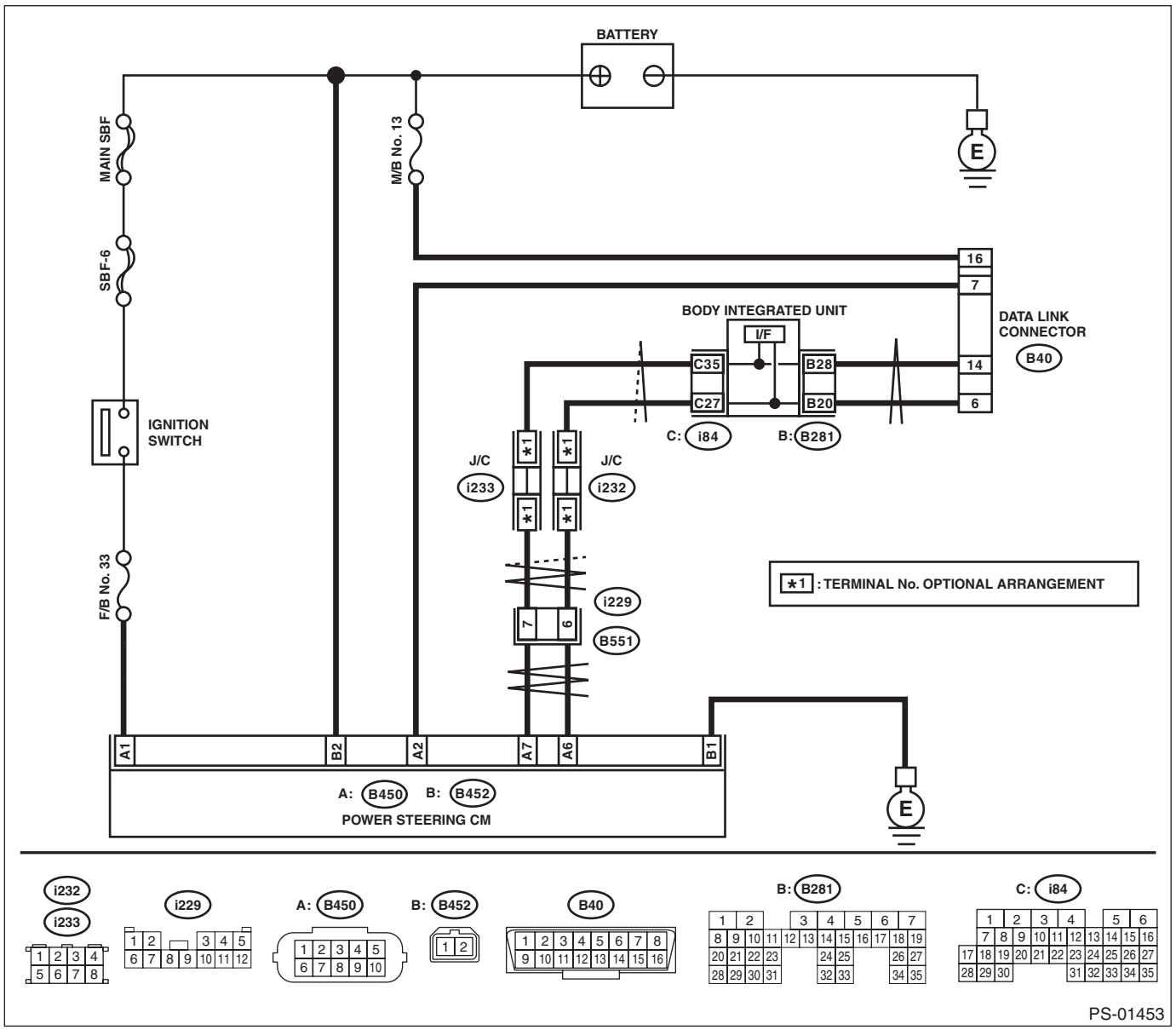
TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

NOTE:
If power supply voltage failure exists at the vehicle side, the warning light goes off if the normal voltage returns.

WIRING DIAGRAM:

Electric Power Steering System <Ref. to WI-73, Electric Power Steering System.>



	Step	Check	Yes	No
1	**CHECK BATTERY.** 1) Measure the battery voltage. 2) Measure the battery specific gravity.	Is the voltage 12 V or more? Is the specific gravity 1.260 or more?	Go to step **2**.	Charge or replace the battery.
2	**CHECK WIRING HARNESS.** 1) Disconnect the connector of the power steering control module. 2) Turn the ignition switch to ON. 3) Using a tester and test harness, check the voltage between terminals. ***Connector & terminal*** ***(B452) No. 2 (+) — Chassis ground (–):***	Is the voltage 12 V or more?	Go to step **3**.	Repair the open circuit of harness or the poor contact of connector between the power steering control module and the battery.
3	**CHECK GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Using a tester and test harness, check the resistance between terminals. ***Connector & terminal*** ***(B452) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Check for poor contact of terminals in the power steering control module, and if there are no malfunctions, replace the power steering control module. <Ref. to PS-42, Power Steering Control Module.>	Repair the open circuit or poor contact of the harness between the power steering control module and chassis ground.

M: DTC C2552 MOTOR RELAY ABNORMAL

TROUBLE SYMPTOM:

- The steering wheel operation feels heavy.
- STEERING warning light illuminates.

NOTE:
When this code is displayed, replace the power steering control module with new parts. <Ref. to PS-42, Power Steering Control Module.>

N: DTC U0073 CONTROL MODULE COMMUNICATION BUS “A” OFF

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

O: DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

P: DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

Q: DTC U1120 LOST COMMUNICATION WITH AUTOSTART STOP CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

BODY 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.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)	OD(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
AUTO HEADLIGHT BEAM LEVELER SYSTEM (DIAGNOSTICS)	AL(diag)
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
INSTRUMENTATION/DRIVER INFO (DIAGNOSTICS)	IDI(diag)
SEATS	SE
SECURITY AND LOCKS	SL

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BODY SECTION

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB
CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)
BODY CONTROL SYSTEM (DIAGNOSTICS)	BC(diag)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

AC

		Page
1.	General Description	2
2.	Air Conditioning System	21
3.	Refrigerant Pressure with Manifold Gauge Set	22
4.	Refrigerant Recovery Procedure	26
5.	Refrigerant Charging Procedure	27
6.	Refrigerant Leak Check	30
7.	Relay and Fuse	32
8.	Compressor Oil	34
9.	Blower Motor Unit Assembly	35
10.	Blower Motor	37
11.	Power Transistor (Auto A/C Model)	38
12.	Blower Resistor (Manual A/C Model)	39
13.	Heater Core	41
14.	Control Panel	47
15.	Compressor	51
16.	Condenser	55
17.	Heater and Cooling Unit	59
18.	Evaporator	63
19.	Expansion Valve	69
20.	Hose and Pipe	71
21.	Pressure Switch (Triple Pressure Switch)	72
22.	Ambient Sensor	73
23.	Sunload Sensor (Auto A/C Model)	76
24.	In-Vehicle Sensor (Auto A/C Model)	78
25.	Evaporator Sensor	82
26.	FRESH/RECIRC Door Actuator	85
27.	Mode Door Actuator	90
28.	Air Mix Door Actuator	92
29.	Air Vent Grille	94
30.	Heater Duct	97
31.	Heater Vent Duct	98
32.	A/C Filter	99
33.	Diagnostics with Phenomenon	100