

1. Stabilizer

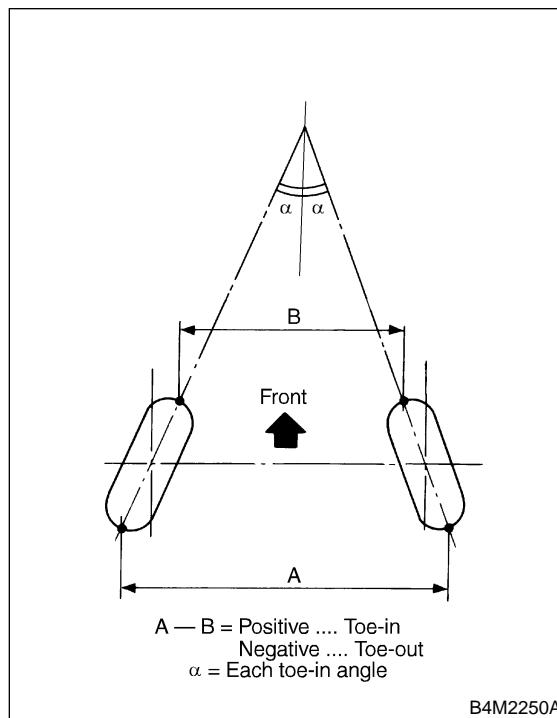
Model	Bar dia.	
	Front	Rear
All models	20 mm (0.79 in)	14 mm (0.55 in)

2. Wheel Alignment

	Model	Sedan	Wagon	OUTBACK
Front	Camber (tolerance: $\pm 0^\circ 30'$)	$-0^\circ 05'$	$-0^\circ 05'$	$0^\circ 20'$
	Caster (common difference: $\pm 0^\circ 45'$)	$3^\circ 05'$	$2^\circ 50'$	$2^\circ 40'$
	Toe-in	0 ± 3 mm (0 ± 0.12 in) Each toe-in angle: $\pm 0^\circ 09'$		
	Kingpin angle	$14^\circ 15'$	$14^\circ 15'$	$13^\circ 30'$
	Wheel arch height [tolerance: $^{+12}_{-24}$ mm ($^{+0.47}_{-0.94}$ in)]	388 mm (15.28 in)	388 mm (15.28 in)	424 mm (16.69 in)
Rear	Camber (tolerance: $\pm 0^\circ 45'$)	$-0^\circ 30'$	$-0^\circ 20'$	$-0^\circ 10'$
	Toe-in	0 ± 3 mm (0 ± 0.12 in) Each toe-in angle: $\pm 0^\circ 09'$		
	Wheel arch height [tolerance: $^{+12}_{-24}$ mm ($^{+0.47}_{-0.94}$ in)]	371 mm (14.61 in)	381 mm (15.00 in)	421 mm (16.57 in)
	Thrust angle	$0^\circ \pm 30'$		

NOTE:

- Front and rear toe-ins and front camber can be adjusted. If toe-in or camber tolerance exceeds specifications, adjust toe-in and camber to the middle value of specification.
- The other items indicated in the specification table cannot be adjusted. If the other items exceeds specifications, check suspension parts and connections for deformities; replace with new ones as required.



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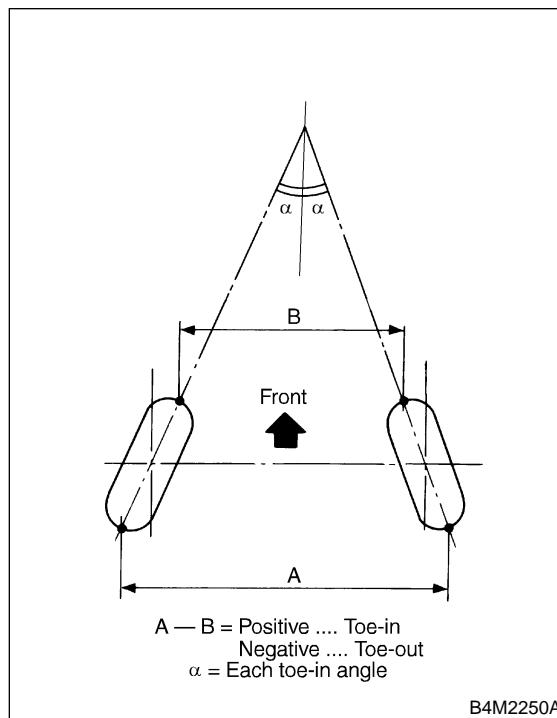
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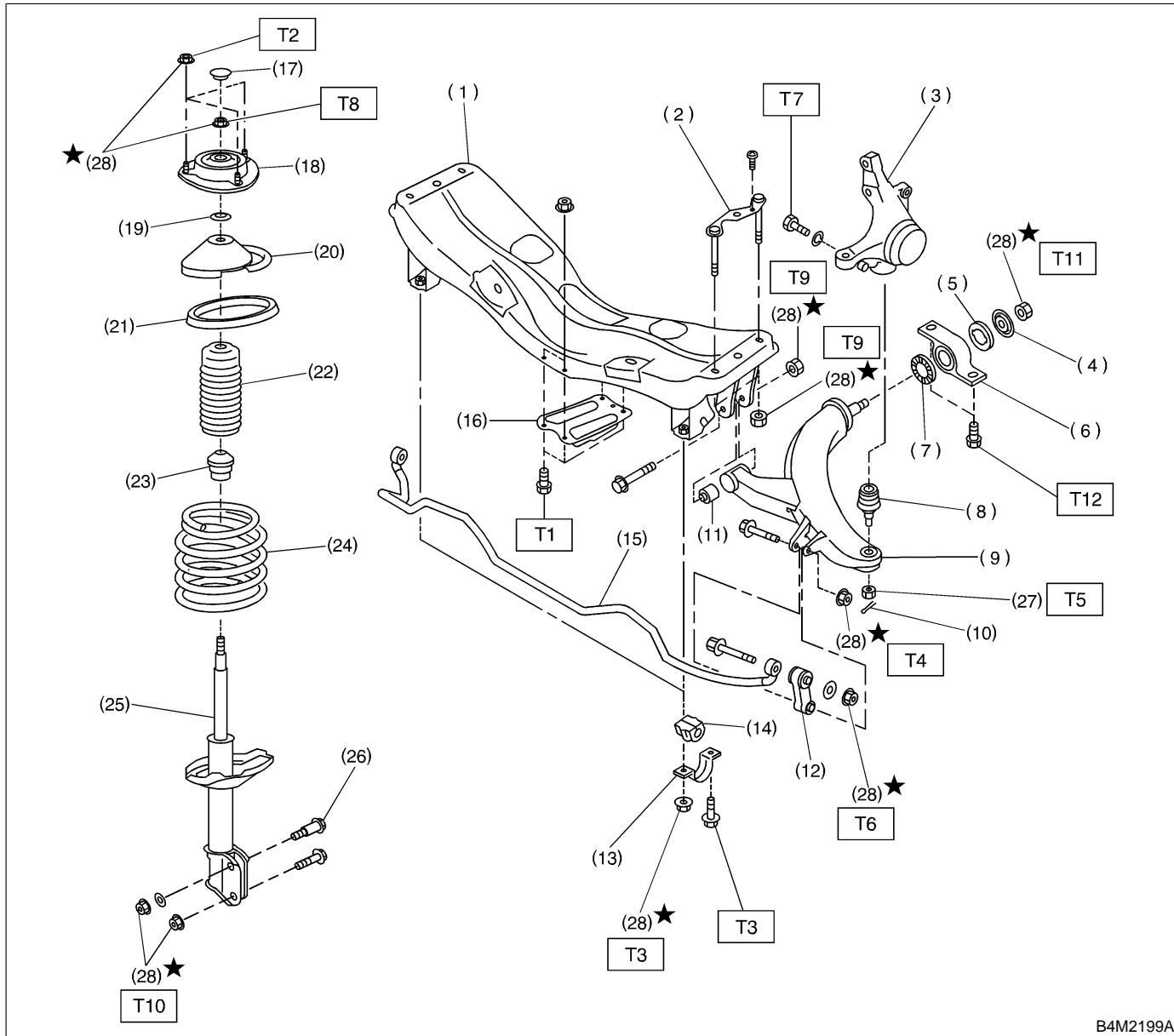
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	Kingpin angle	$14^\circ 15'$	$14^\circ 15'$	$13^\circ 30'$
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	Wheel arch height [tolerance: $^{+12}_{-24}$ mm ($^{+0.47}_{-0.94}$ in)]	371 mm (14.61 in)	381 mm (15.00 in)	421 mm (16.57 in)
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NOTE:

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- The other items indicated in the specification table cannot be adjusted. If the other items exceeds specifications, check suspension parts and connections for deformities; replace with new ones as required.



1. Front Suspension



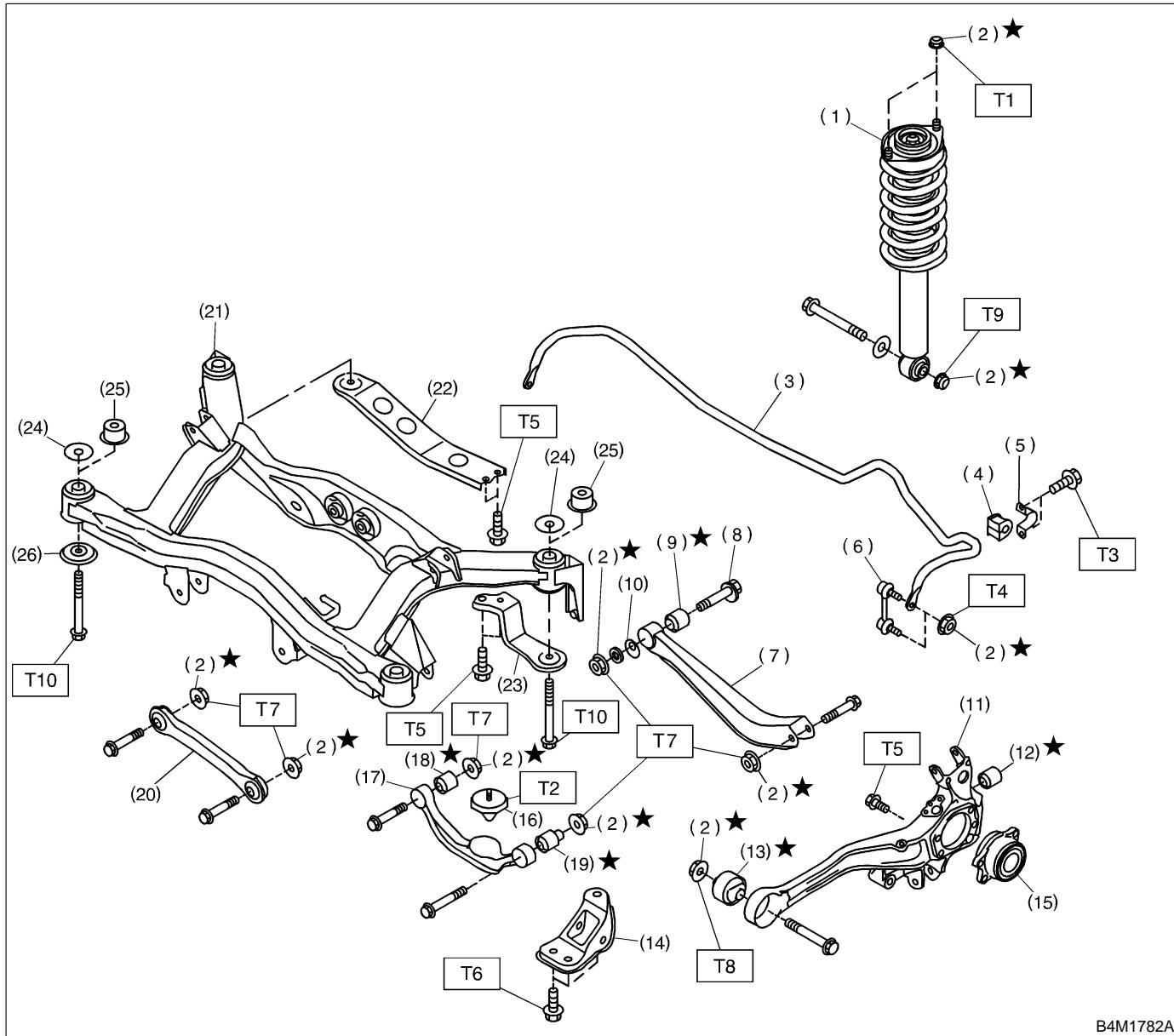
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(1) Front crossmember	(16) Jack-up plate
(2) Bolt ASSY	(17) Dust seal
(3) Housing	(18) Strut mount
(4) Washer	(19) Spacer
(5) Stopper rubber (Rear)	(20) Upper spring seat
(6) Rear bushing	(21) Rubber seat
(7) Stopper rubber (Front)	(22) Dust cover
(8) Ball joint	(23) Helper
(9) Transverse link	(24) Coil spring
(10) Cotter pin	(25) Damper strut
(11) Front bushing	(26) Adjusting bolt
(12) Stabilizer link	(27) Castle nut
(13) Clamp	(28) Self-locking nut
(14) Bushing	
(15) Stabilizer	

Tightening torque: N·m (kg·m, ft·lb)

T1: 18 ± 5 (1.8 ± 0.5 , 13.0 ± 3.6)
 T2: 20 ± 6 (2.0 ± 0.6 , 14.5 ± 4.3)
 T3: 25 ± 4 (2.5 ± 0.4 , 18.1 ± 2.9)
 T4: 29 ± 5 (3.0 ± 0.5 , 21.7 ± 3.6)
 T5: 39 (4 , 29)
 T6: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)
 T7: 49 ± 10 (5.0 ± 1.0 , 36 ± 7)
 T8: 54 ± 5 (5.5 ± 0.5 , 39.8 ± 3.6)
 T9: 98 ± 15 (10.0 ± 1.5 , 72 ± 11)
 T10: 177 ± 20 (18 ± 2 , 130 ± 14)
 T11: 186 ± 10 (19.0 ± 1.0 , 137 ± 7)
 T12: 245 ± 49 (25.0 ± 5.0 , 181 ± 36)

2. Rear Suspension



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(1) Shock absorber	(15) Hub bearing unit
(2) Self-locking nut	(16) Helper
(3) Stabilizer	(17) Link upper
(4) Stabilizer bushing	(18) Link upper bushing (Inside)
(5) Clamp	(19) Link upper bushing (Outside)
(6) Stabilizer link	(20) Link front
(7) Link rear	(21) Rear sub frame
(8) Adjusting bolt	(22) Support sub frame (RH)
(9) Link rear bushing	(23) Support sub frame (LH)
(10) Adjusting washer	(24) Stopper upper (Except OUT- BACK model)
(11) Rear arm	(25) Stopper upper (OUTBACK MODEL)
(12) Rear arm rear bushing	(26) Stopper lower
(13) Rear arm front bushing	
(14) Rear arm bracket	

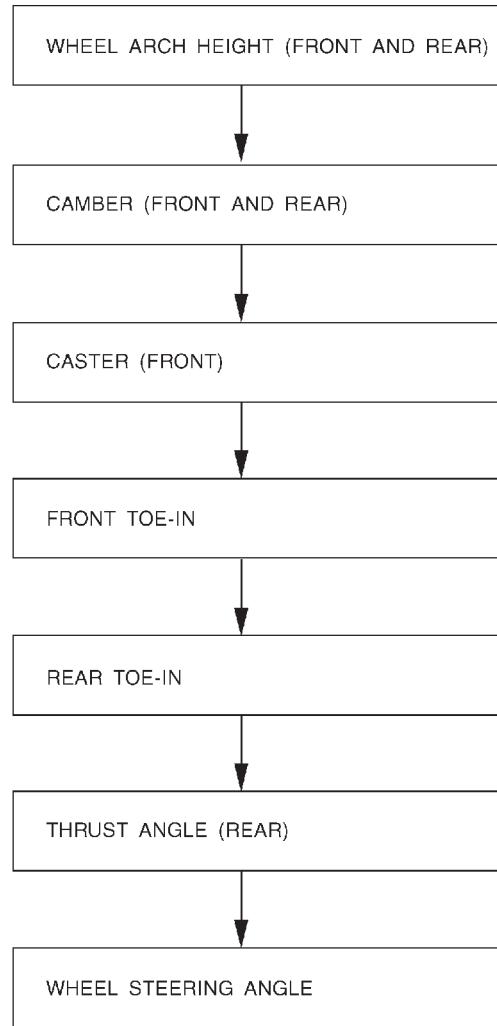
Tightening torque: N·m (kg·m, ft·lb)

T1: 30 ± 7 (3.1 ± 0.7 , 22.4 ± 5.1)
T2: 32 ± 10 (3.3 ± 1.0 , 23.9 ± 7.2)
T3: 39 ± 7 (4.0 ± 0.7 , 28.9 ± 5.1)
T4: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)
T5: 66 ± 10 (6.7 ± 1.0 , 48.5 ± 7.2)
T6: 108 ± 15 (11 ± 1.5 , 80 ± 11)
T7: 123 ± 15 (12.5 ± 1.5 , 90 ± 11)
T8: 147 ± 20 (15 ± 2 , 108 ± 14)
T9: 157 ± 20 (16 ± 2 , 116 ± 14)
T10: 179 ± 20 (17.5 ± 2 , 127 ± 14)

1. On-car Services

A: WHEEL ALIGNMENT PROCEDURES

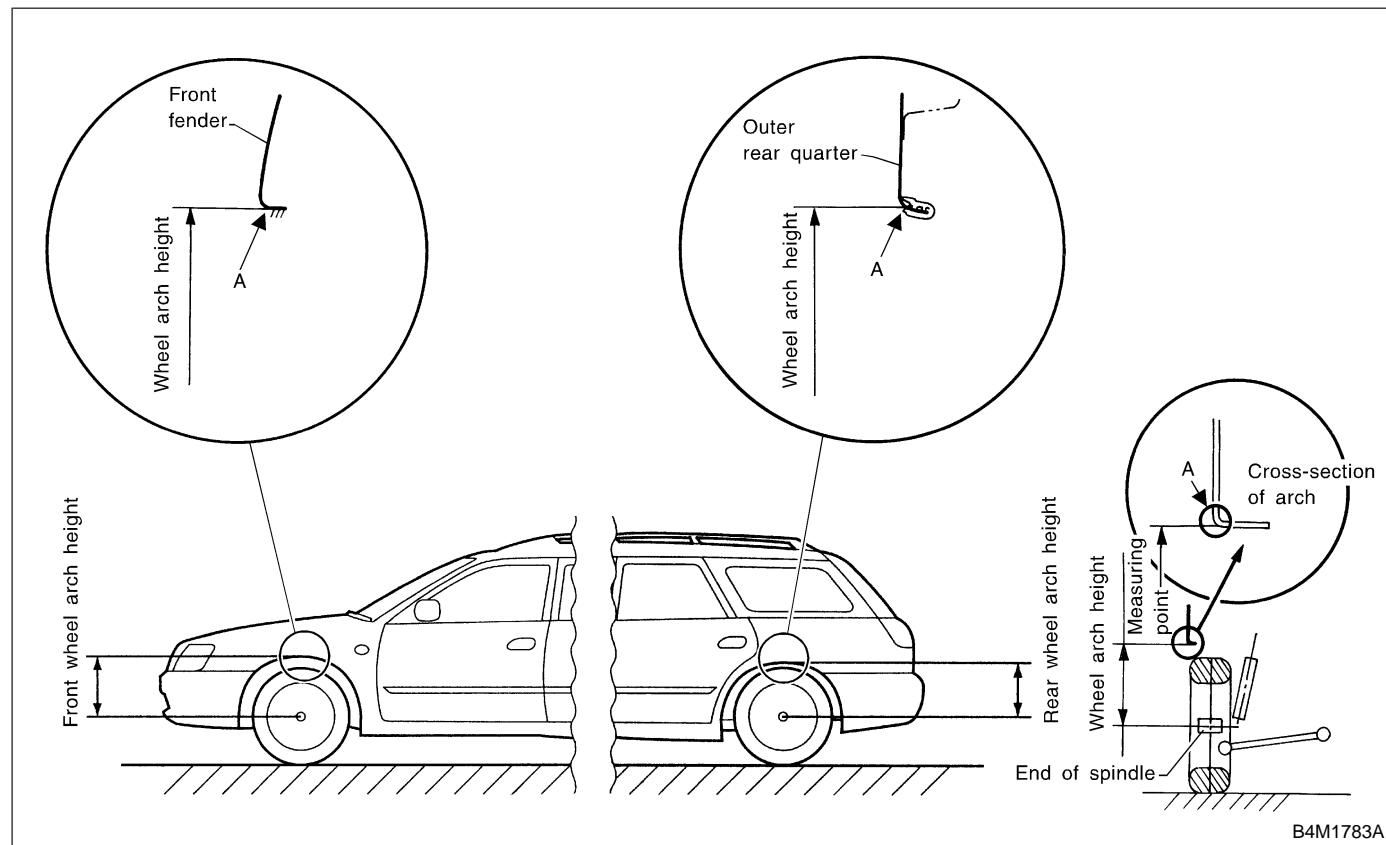
Check, adjust and/or measure wheel alignment in accordance with procedures indicated in figure:



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B: INSPECTION AND ADJUSTMENT**1. WHEEL ARCH HEIGHT (FRONT AND REAR)**

- 1) Adjust tire pressure to specifications.
- 2) Set vehicle under "curb weight" conditions.
(Empty luggage compartment, install spare tire, jack, service tools, and top up fuel tank.)
- 3) Set steering wheel in a wheel-forward position.
- 4) Suspend thread from wheel arch (point "A" in figure below) to determine a point directly above center of spindle.
- 5) Measure distance between measuring point "A" and center of spindle.



Model	Specified wheel arch height	
	Front	Rear
Sedan	$388^{+12/-24}$ mm (15.28 ^{+0.47} / _{-0.94} in)	$371^{+12/-24}$ mm (14.61 ^{+0.47} / _{-0.94} in)
Wagon	$388^{+12/-24}$ mm (15.28 ^{+0.47} / _{-0.94} in)	$381^{+12/-24}$ mm (15.00 ^{+0.47} / _{-0.94} in)
OUTBACK	$424^{+12/-24}$ mm (16.69 ^{+0.47} / _{-0.94} in)	$421^{+12/-24}$ mm (16.57 ^{+0.47} / _{-0.94} in)

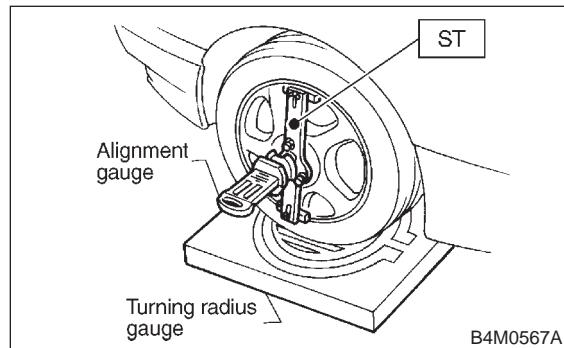
2. CAMBER (FRONT AND REAR)

● Inspection

1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.

2) Set ST into the center of the wheel, and then install the wheel alignment gauge.

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NOTE:

Refer to the "SPECIFICATIONS AND SERVICE DATA" for the camber values. <Ref. to 4-1 [S200].>

● Front Camber Adjustment

1) Loosen two self-locking nuts located at lower front portion of strut.

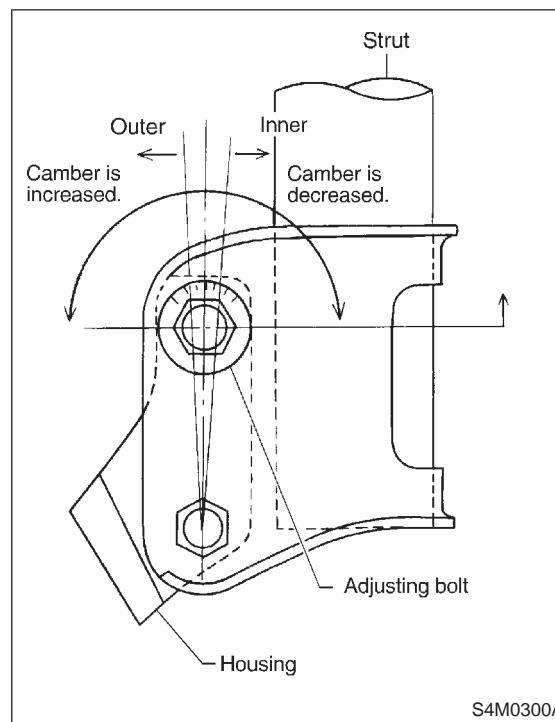
CAUTION:

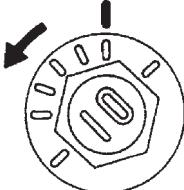
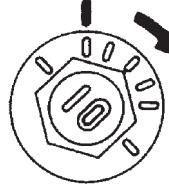
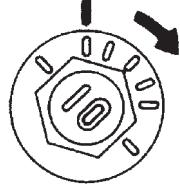
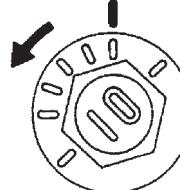
- When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.
- Discard loosened self-locking nut and replace with a new one.

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

NOTE:

Moving the adjusting bolt by one scale graduation changes camber by approximately $0^{\circ}10'$.



	Left side	Right side
Camber is increased.	 Rotate counterclockwise. B4M0190	 Rotate clockwise. B4M0350
Camber is decreased.	 Rotate clockwise. B4M0350	 Rotate counterclockwise. B4M0190

3) Tighten the two self-locking nuts.

Tightening torque:

$177 \pm 20 \text{ N}\cdot\text{m} (18.0 \pm 2.0 \text{ kg}\cdot\text{m}, 130 \pm 14 \text{ ft}\cdot\text{lb})$

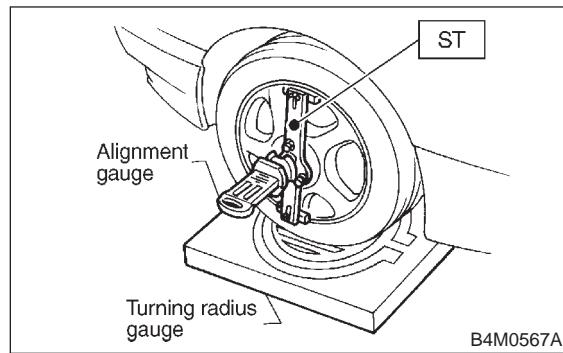
3. CASTER (FRONT)

● Inspection

1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.

2) Set ST into the center of the wheel, and then install the wheel alignment gauge.

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NOTE:

Refer to the "SPECIFICATIONS AND SERVICE DATA" for the caster values. <Ref. to 4-1 [S200].>

4. FRONT WHEEL TOE-IN

● Inspection

1) Using a toe gauge, measure front wheel toe-in.

Toe-in:

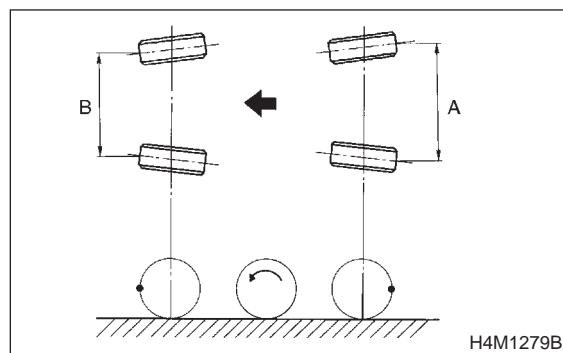
$\pm 3 \text{ mm (0}\pm 0.12 \text{ in)}$

2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance "A" between marks.

3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.

4) Measure distance "B" between left and right marks. Toe-in can then be obtained by the following equation:

$$A - B = \text{Toe-in}$$

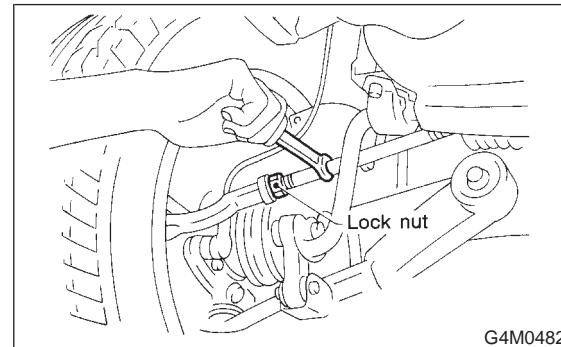


● Adjustment

1) Loosen the left and right side steering tie-rods lock nuts.

2) Turn the left and right tie rods equal amounts until the toe-in is at the specification.

Both the left and right tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise equal amounts (as viewed from the inside of the vehicle).



3) Tighten tie-rod lock nut.

Tightening torque:

$83\pm 5 \text{ N}\cdot\text{m (8.5}\pm 0.5 \text{ kg}\cdot\text{m, 61.5}\pm 3.6 \text{ ft}\cdot\text{lb)}$

CAUTION:

Correct tie-rod boot, if it is twisted.

NOTE:

Check the left and right wheel steering angle is within specifications.

5. REAR WHEEL TOE-IN

● Inspection

1) Using a toe-in gauge, measure rear wheel toe-in.

Toe-in:

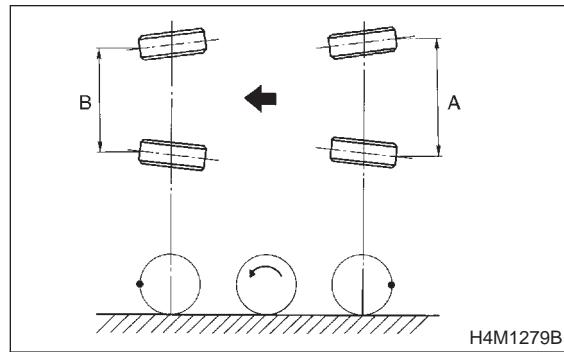
$0\pm3 \text{ mm (}0\pm0.12 \text{ in)}$

2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance "A" between marks.

3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.

4) Measure distance "B" between left and right marks. Toe-in can then be obtained by the following equation:

$$A - B = \text{Toe-in}$$



NOTE:

When left and right wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approximately 3 mm (0.12 in).

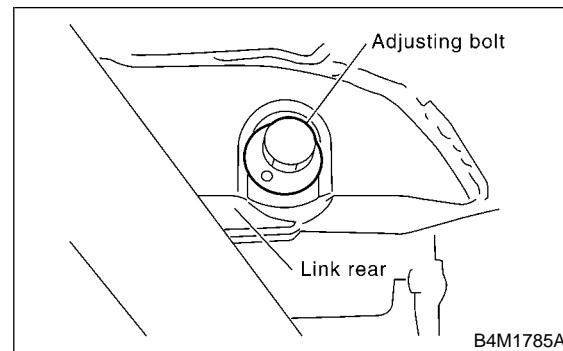
● Adjustment

1) Loosen self-locking nut on inner side of link rear.

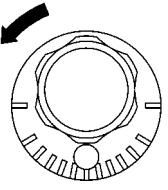
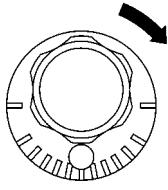
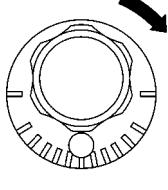
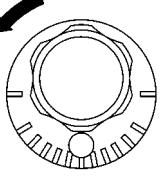
CAUTION:

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

- Discard loosened self-locking nut and replace with a new one.



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

	Left side	Right side
Toe-in is increased.	 <p>Rotate clockwise.</p> <p>B4M1786</p>	 <p>Rotate counterclockwise.</p> <p>B4M1787</p>
Toe-in is decreased.	 <p>Rotate counterclockwise.</p> <p>B4M1787</p>	 <p>Rotate clockwise.</p> <p>B4M1786</p>

3) Tighten self-locking nut.

Tightening torque:

$123\pm15 \text{ N}\cdot\text{m (}12.5\pm1.5 \text{ kg}\cdot\text{m, } 90\pm11 \text{ ft}\cdot\text{lb)}$

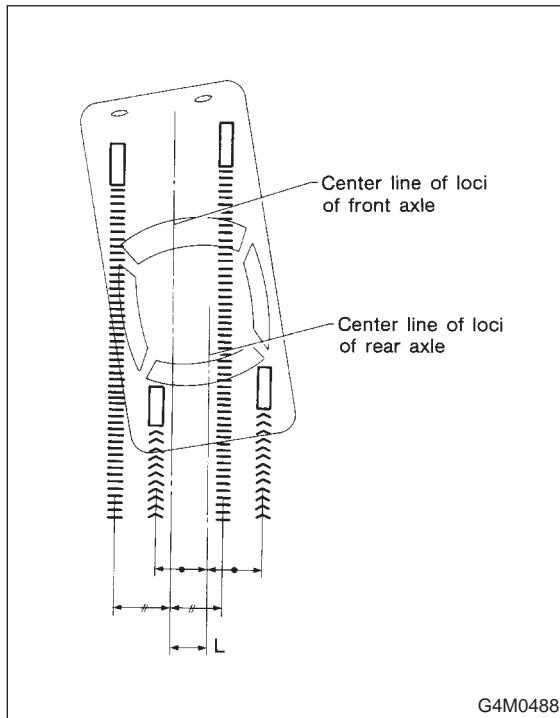
6. THRUST ANGLE

● Inspection

- 1) Position vehicle on a level surface.
- 2) Move vehicle 3 to 4 meters directly forward.
- 3) Determine locus of both front and rear axles.
- 4) Measure distance "L" between center line of loci of the axles.

Thrust angle:

Less than 30' when "L" is equal to or less than 23 mm (0.91 in).



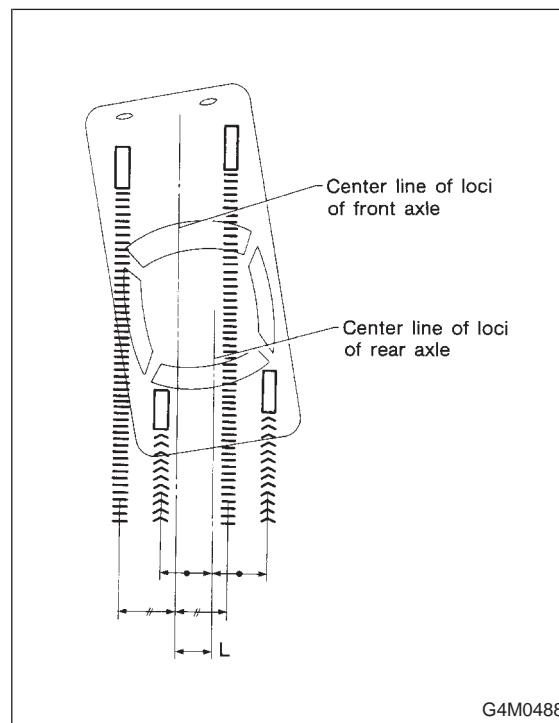
● Adjustment

- 1) Make thrust angle adjustments by turning toe-in adjusting bolts of 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 thrust angle adjustment.

- 3) When left and right adjusting bolts are turned incrementally by one graduation in the same direction, the thrust angle will change approximately 10' ["L" is almost equal to 7.5 mm (0.295 in)].

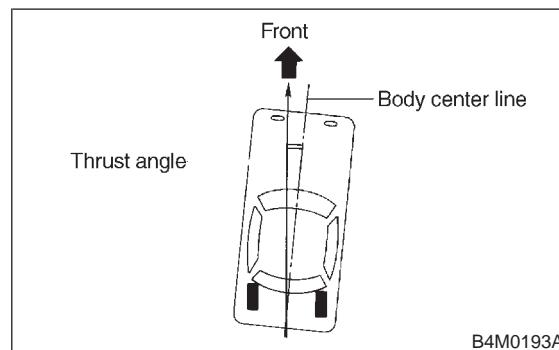
Thrust angle:

$0^\circ \pm 30'$



NOTE:

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



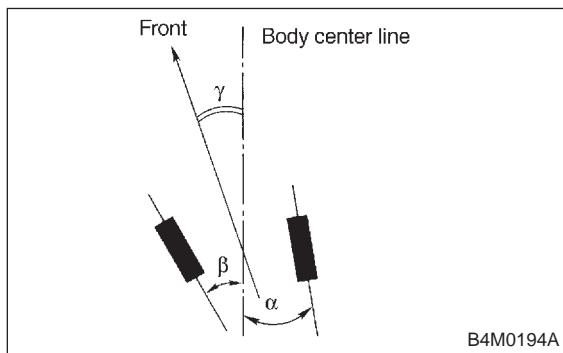
Thrust angle: $r = (\alpha - \beta)/2$

α : Right rear wheel toe angle

β : Left rear wheel toe angle

NOTE:

Here, use only positive toe-in values from each wheel to substitute for α and β in the equation.



7. STEERING ANGLE

● Inspection

1) Place vehicle on a turning radius gauge.

2) While depressing brake pedal, turn steering wheel fully to the left and right. With steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

Steering angle:

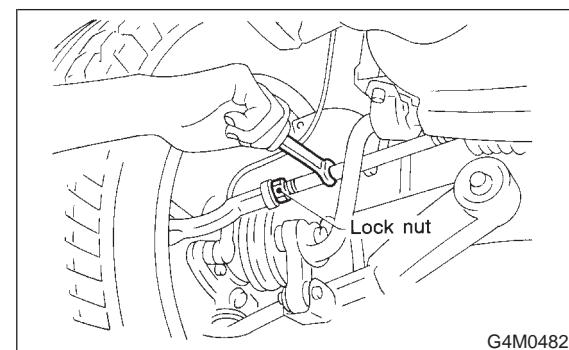
Model	14 & 15 inch wheel	16 inch wheel	OUTBACK
Inner wheel	$37.5^\circ \pm 1.5^\circ$	$36.3^\circ \pm 1.5^\circ$	$34.5^\circ \pm 1.5^\circ$
Outer wheel	$32.6^\circ \pm 1.5^\circ$	$31.6^\circ \pm 1.5^\circ$	$30.3^\circ \pm 1.5^\circ$

● Adjustment

Turn tie-rod to adjust steering angle of both inner and outer wheels.

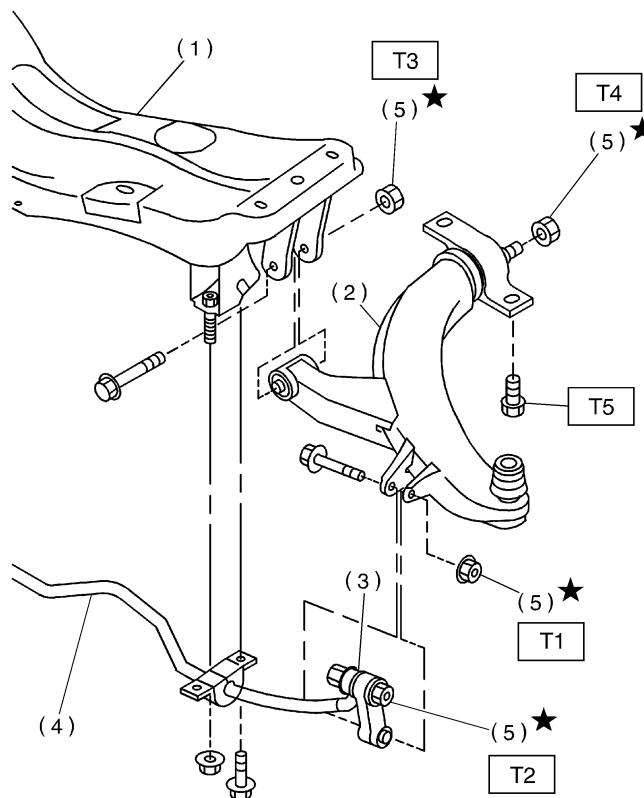
CAUTION:

- Check toe-in.
- Correct boot if it is twisted.



2. Front Transverse Link

A: REMOVAL



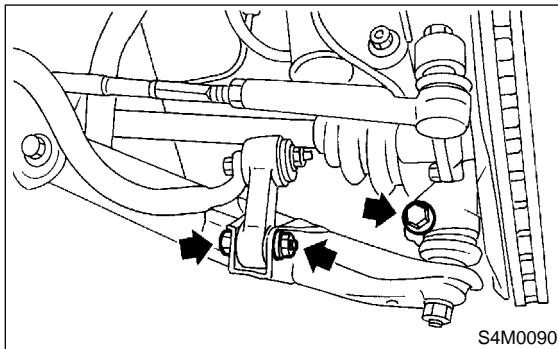
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- (1) Front crossmember
- (2) Transverse link
- (3) Stabilizer link
- (4) Front stabilizer
- (5) Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

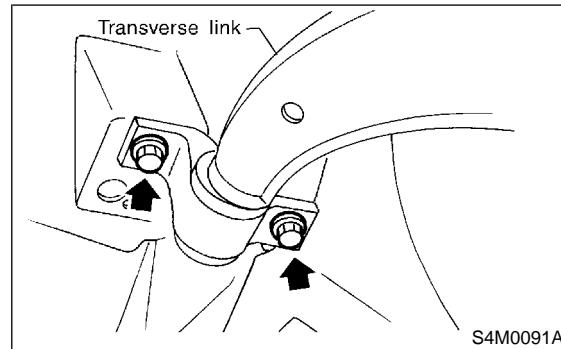
- T1: 29 ± 5 (3.0 ± 0.5 , 21.7 ± 3.6)
- T2: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)
- T3: 98 ± 15 (10.0 ± 1.5 , 72 ± 11)
- T4: 186 ± 10 (19.0 ± 1.0 , 137 ± 7)
- T5: 245 ± 49 (25.0 ± 5.0 , 181 ± 36)

- 1) Disconnect stabilizer link from transverse link.
- 2) Remove bolt securing ball joint of transverse link to housing.



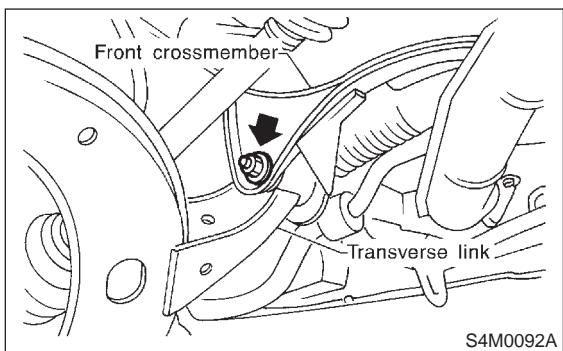
- 3) Remove nut (do not remove bolt.) securing transverse link to crossmember.

- 4) Remove two bolts securing bushing bracket of transverse link to vehicle body at rear bushing location.



- 5) Extract ball joint from housing.

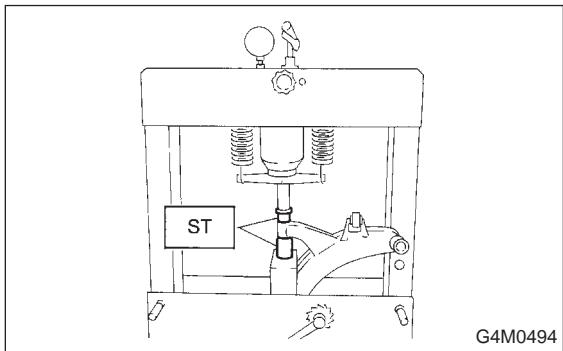
6) Remove bolt securing transverse link to cross-member and extract transverse link from cross-member.



B: DISASSEMBLY

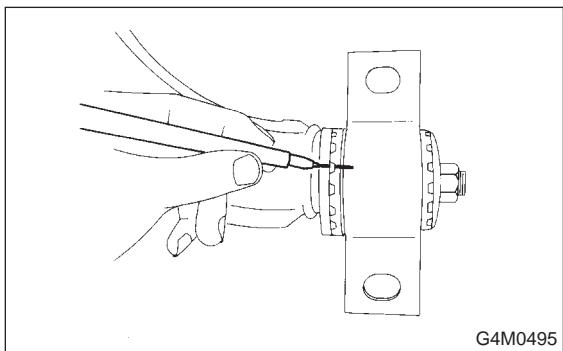
1. FRONT BUSHING

Using ST, press front bushing out of place.
ST 927680000 INSTALLER & REMOVER SET



2. REAR BUSHING

- 1) Scribe an aligning mark on transverse link and rear bushing.
- 2) Loosen nut and remove rear bushing.



C: INSPECTION

- 1) Check transverse link for wear, damage and cracks, and correct or replace if defective.
- 2) Check bushings for cracks, fatigue or damage.
- 3) Check rear bushing for oil leaks.

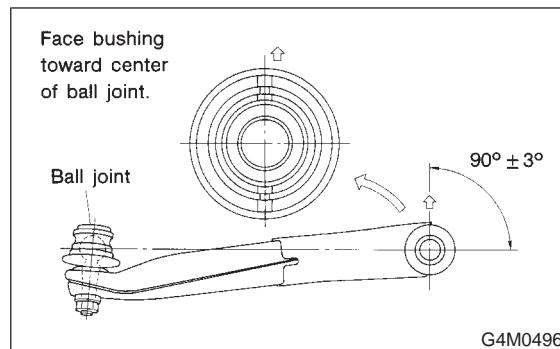
D: ASSEMBLY

1. FRONT BUSHING

To reassemble, reverse disassembly procedures.

CAUTION:

Install front bushing in correct direction, as shown in figure.



2. REAR BUSHING

- 1) Install rear bushing to transverse link and align aligning marks scribed on the two.
- 2) Tighten self-locking nut.

CAUTION:

- Discard loosened self-locking nut and replace with a new one.
- While holding rear bushing so as not to change position of aligning marks, tighten self-locking nut.

Tightening torque:

$186 \pm 10 \text{ N}\cdot\text{m} (19.0 \pm 1.0 \text{ kg}\cdot\text{m}, 137 \pm 7 \text{ ft}\cdot\text{lb})$

E: INSTALLATION

1) Temporarily tighten the two bolts used to secure rear bushing of the transverse link to body.

NOTE:

These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

2) Install bolts used to connect transverse link to crossmember and temporarily tighten with nut.

CAUTION:

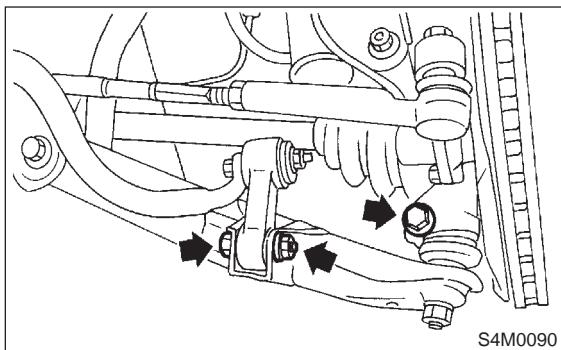
Discard loosened self-locking nut and replace with a new one.

3) Insert ball joint into housing.

4) Connect stabilizer link to transverse link, and temporarily tighten bolts.

CAUTION:

Discard loosened self-locking nut and replace with a new one.



5) Tighten the following points in the order shown below when wheels are in full contact with the ground and vehicle is curb weight.

(1) Transverse link and stabilizer

Tightening torque:

$29 \pm 5 \text{ N}\cdot\text{m}$ (3.0 \pm 0.5 kg-m, 21.7 \pm 3.6 ft-lb)

(2) Transverse link and crossmember

Tightening torque:

$98 \pm 15 \text{ N}\cdot\text{m}$ (10.0 \pm 1.5 kg-m, 72 \pm 11 ft-lb)

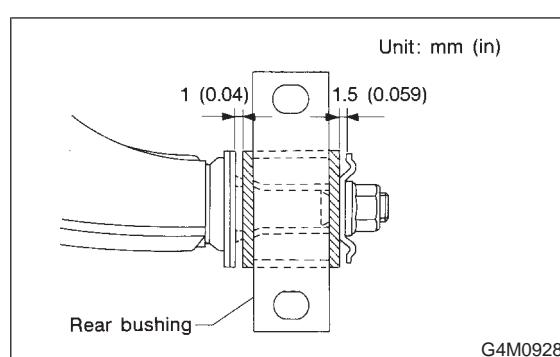
(3) Transverse link rear bushing and body

Tightening torque:

$245 \pm 49 \text{ N}\cdot\text{m}$ (25 \pm 5 kg-m, 181 \pm 36 ft-lb)

NOTE:

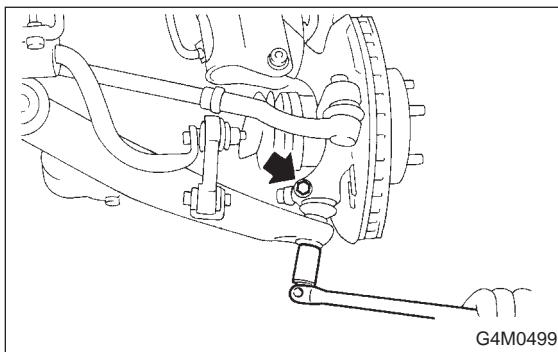
- Move rear bushing back and forth until transverse link-to-rear bushing clearance is established (as indicated in figure.) before tightening.
- Check wheel alignment and adjust if necessary.



3. Front Ball Joint

A: REMOVAL

- 1) Remove the wheel.
- 2) Pull out the cotter pin from the ball stud, remove the castle nut, and extract the ball stud from the transverse link.
- 3) Remove the bolt securing the ball joint to the housing.

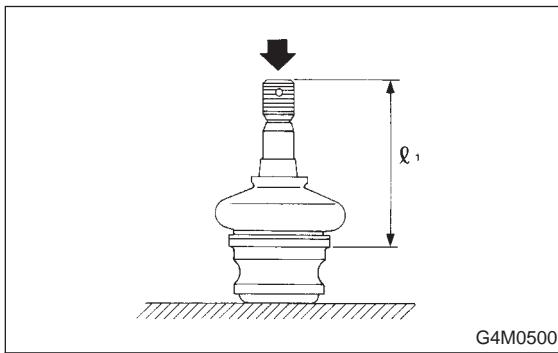


- 4) Extract the ball joint from the housing.

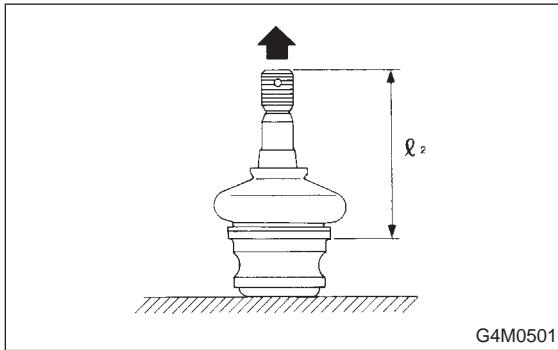
B: INSPECTION

- 1) Measure play of ball joint by the following procedures. Replace with a new one when the play exceeds the specified value.

- (1) With 686 N (70 kg, 154 lb) loaded in the direction shown in the figure, measure dimension ℓ_1 .



- (2) With 686 N (70 kg, 154 lb) loaded in the opposite direction shown in the figure, measure dimension ℓ_2 .



- (3) Calculate plays from the following formula.

$$S = \ell_2 - \ell_1$$

- (4) When plays are larger than the following value, replace with a new one.

FRONT BALL JOINT

**Specified play for replacement: S
Less than 0.3 mm (0.012 in)**

- 2) When play is smaller than the specified value, visually inspect the dust cover.
- 3) The ball joint and cover that have been removed must be checked for wear, damage or cracks, and any defective part must be replaced.
- 4) If the dust cover is damaged, replace with the new ball joint.

C: INSTALLATION

- 1) Install ball joint onto housing.

Torque (Bolt):

49 N·m (5.0 kg·m, 36 ft-lb)

CAUTION:

Do not apply grease to tapered portion of ball stud.

- 2) Connect ball joint to transverse link.

Torque (Castle nut):

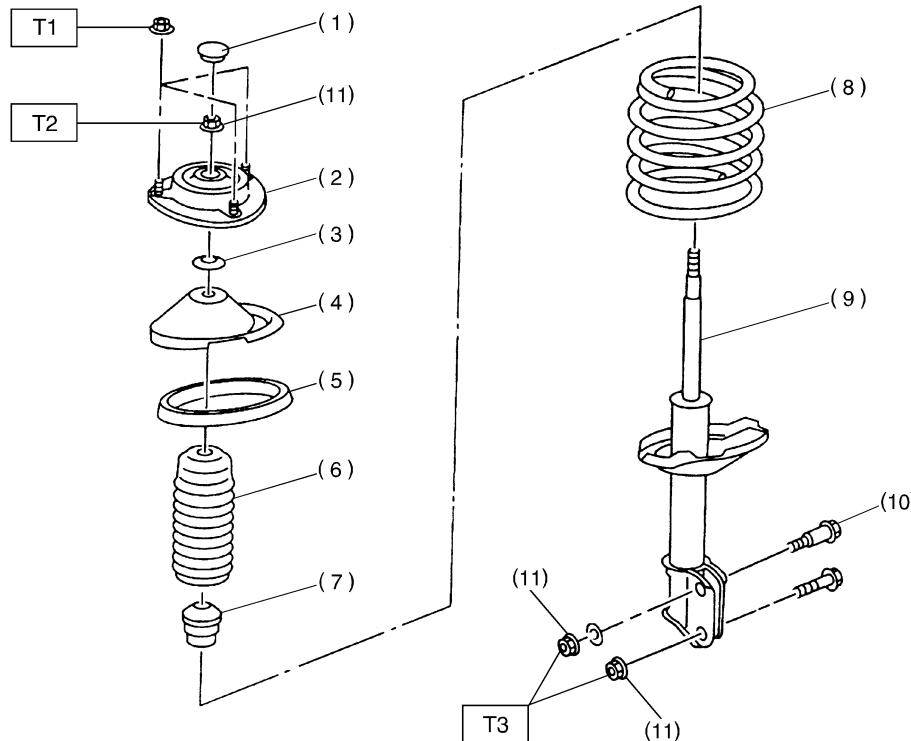
39 N·m (4.0 kg·m, 29 ft-lb)

- 3) Retighten castle nut further within 60° until a slot in castle nut is aligned with the hole in ball stud end, then insert new cotter pin and bend it around castle nut.

- 4) Install front wheel.

4. Front Strut

A: REMOVAL

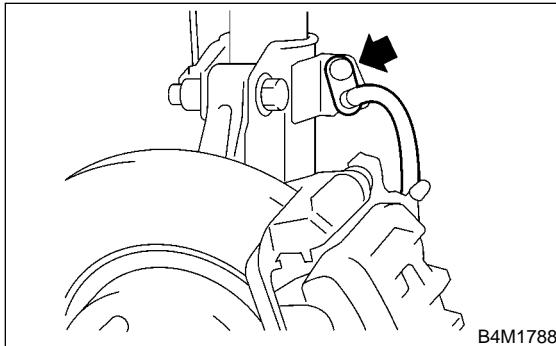


B4M1085B

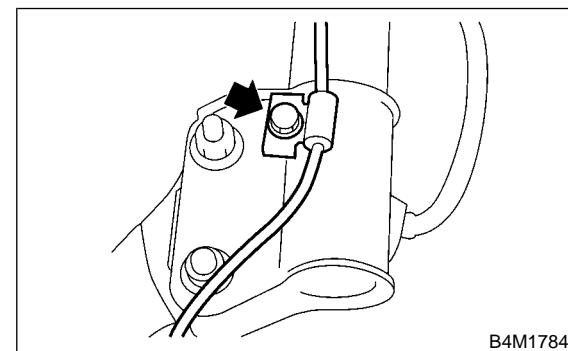
(1) Dust seal	(7) Helper
(2) Strut mount	(8) Coil spring
(3) Spacer	(9) Damper strut
(4) Upper spring seat	(10) Adjusting bolt
(5) Rubber seat	(11) Self-locking nut
(6) Dust cover	

Tightening torque: N·m (kg·m, ft·lb)**T1: 20 ± 6 (2.0 ± 0.6 , 14.5 ± 4.3)****T2: 54 ± 5 (5.5 ± 0.5 , 39.8 ± 3.6)****T3: 177 ± 20 (18.0 ± 2.0 , 130 ± 14)**

- 1) Remove wheel.
- 2) Remove bolt securing brake hose from strut.



B4M1788



B4M1784

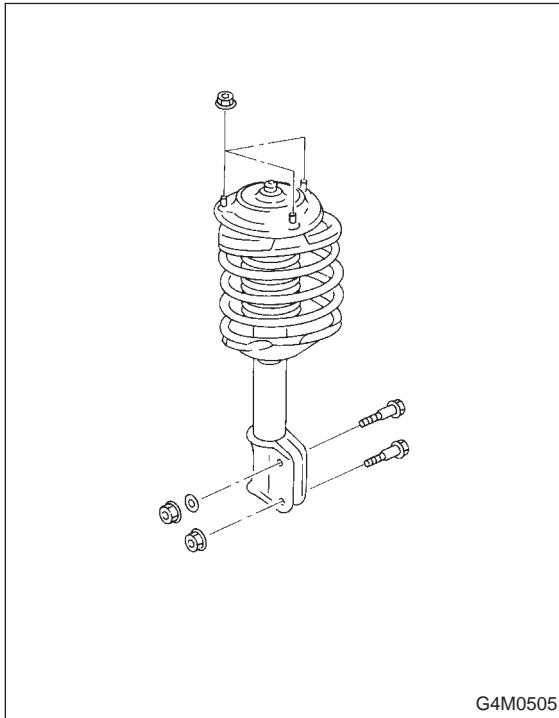
- 3) Scribe an alignment mark on the camber adjusting bolt which secures strut to housing.
- 4) Remove bolt securing the ABS sensor harness.

5) Remove two bolts securing housing to strut.

CAUTION:

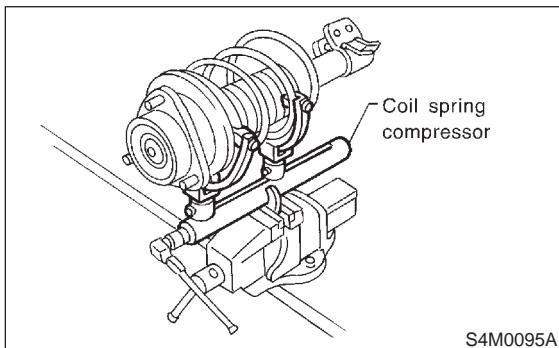
While holding head of adjusting bolt, loosen self-locking nut.

6) Remove the three nuts securing strut mount to body.

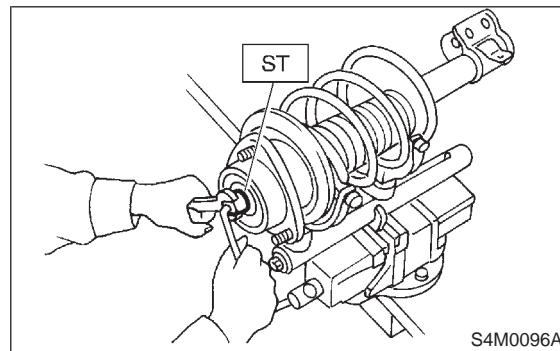


B: DISASSEMBLY

1) Using a coil spring compressor, compress coil spring.



2) Using ST, remove self-locking nut.
ST 927760000 STRUT MOUNT SOCKET



3) Remove strut mount, upper spring seat and rubber seat from strut.
4) Gradually decreasing compression force, and remove coil spring.
5) Remove dust cover and helper spring.

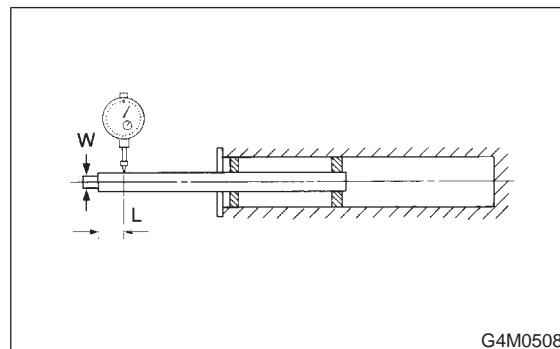
C: INSPECTION

Check the disassembled parts for cracks, damage and wear, and replace with new parts if defective.

1. DAMPER STRUT

1) Check for oil leakage.
2) Move the piston rod up and down to check it operates smoothly without any binding.
3) Play of piston rod
● Measure the play as follows:

Fix outer shell and fully extend the rod. Set a dial gauge at the end of the rod: L [10 mm (0.39 in)], then apply a force of W [20 N (2 kg, 4 lb)] to threaded portion. With the force of 20 N (2 kg, 4 lb) applied, read dial gauge indication: P_1 . Apply a force of 20 N (2 kg, 4 lb) in the opposite direction of "W", then read dial gauge indication: P_2 .



The free play is determined by the following equation:

$$\text{Play} = P_1, P_2$$

Limit of play:

Less than 0.8 mm (0.031 in)

If the play is greater, replace the strut.

2. STRUT MOUNT

Check rubber part for creep, cracks and deterioration, and replace it with new one if defective.

3. DUST COVER

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

4. COIL SPRING

One having permanent strain should be replaced with a new one. When vehicle posture is uneven, although there are no considerable reasons like tire puncture, uneven loading, etc., check coil spring for its free length referring to specifications, cracks, etc., and replace it with a new one if defective.

5. HELPER

Replace it with new one if cracked or damaged.

D: ASSEMBLY

1) Before installing coil spring, strut mount, etc., on the strut, check for the presence of air in the dampening force generating mechanism of the strut since air prevents proper dampening force from being produced.

2) Checking for the presence of air

(1) Place the strut vertically with the piston rod facing up.

(2) Move the piston rod to the center of its entire stroke.

(3) While holding the piston rod end with fingertips, move the rod up and down.

(4) If the piston rod moves at least 10 mm (0.39 in) in the former step, purge air from the strut.

3) Air purging procedure

(1) Place the strut vertically with the piston rod facing up.

(2) Fully extend the piston rod.

(3) With the piston rod fully extended, place the piston rod side down. The strut must stand vertically.

(4) Fully contract the piston rod.

(5) Repeat 3 or 4 times from the first step.

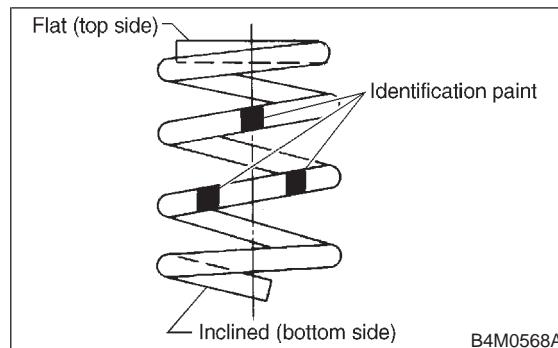
NOTE:

After completely purging air from the strut, be sure to place the strut with the piston rod facing up. If it is laid down, check for entry of air in the strut as outlined under "Checking for the presence of air".

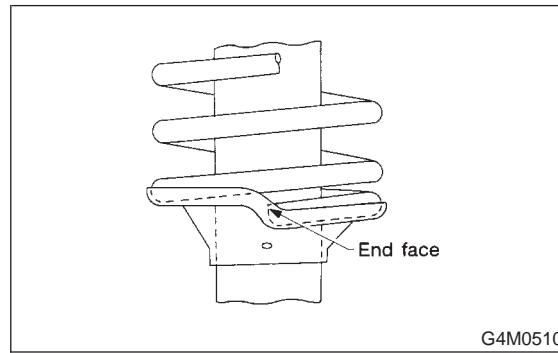
4) Using a coil spring compressor, compress the coil spring.

NOTE:

Make sure that the vertical installing direction of coil spring is as shown in figure.



5) Set the coil spring correctly so that its end face fits well into the spring seat as shown.

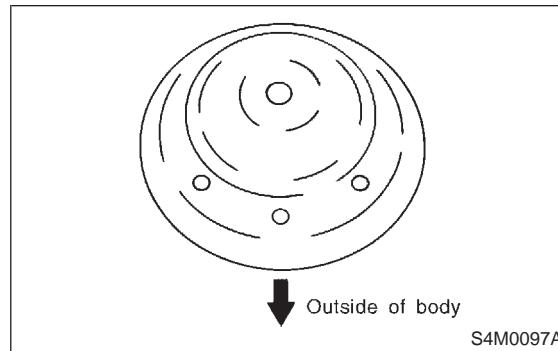


6) Install helper and dust cover to the piston rod.

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

NOTE:

Ensure that upper spring seat is positioned as shown in figure.



8) Install strut mount to the piston rod, and tighten the self-locking nut temporarily.

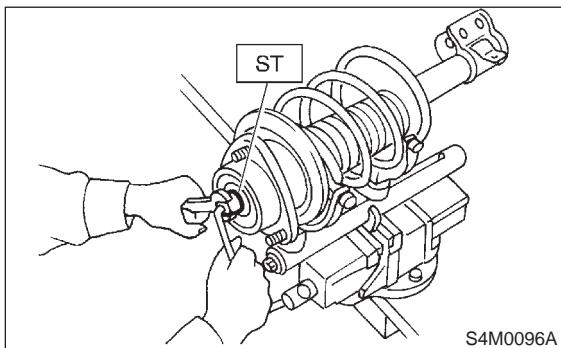
CAUTION:

Be sure to use a new self-locking nut.

9) Using hexagon wrench to prevent strut rod from turning, tighten self-locking nut with ST.
ST 927760000 STRUT MOUNT SOCKET

Tightening torque:

$54 \pm 5 \text{ N}\cdot\text{m}$ ($5.5 \pm 0.5 \text{ kg}\cdot\text{m}$, $39.8 \pm 3.6 \text{ ft-lb}$)



10) Loosen the coil spring carefully.

E: INSTALLATION

1) Install strut mount at upper side of strut to body and tighten with nuts.

Tightening torque:

$20 \pm 6 \text{ N}\cdot\text{m}$ ($2.0 \pm 0.6 \text{ kg}\cdot\text{m}$, $14.5 \pm 4.3 \text{ ft-lb}$)

2) Position aligning mark on camber adjustment bolt with aligning mark on lower side of strut.

CAUTION:

- While holding head of adjusting bolt, tighten self-locking nut.
- Be sure to use new self-locking nut.

Tightening torque:

$177 \pm 20 \text{ N}\cdot\text{m}$ ($18.0 \pm 2.0 \text{ kg}\cdot\text{m}$, $130 \pm 14 \text{ ft-lb}$)

3) Install ABS sensor harness to strut.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $23.9 \pm 7.2 \text{ ft-lb}$)

4) Install bolts which secure brake hose to strut.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $23.9 \pm 7.2 \text{ ft-lb}$)

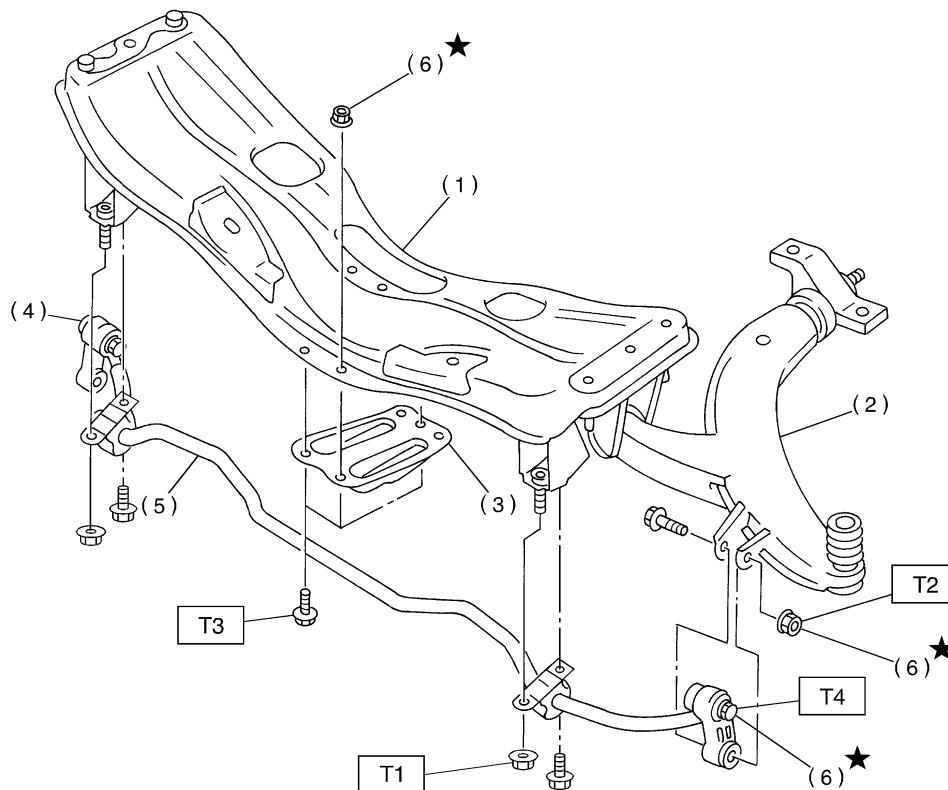
5) Install wheels.

NOTE:

Check wheel alignment and adjust if necessary.

5. Front Stabilizer

A: REMOVAL



B4M2223A

(1) Front crossmember
 (2) Transverse link
 (3) Jack-up plate
 (4) Stabilizer link
 (5) Front stabilizer

(6) Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

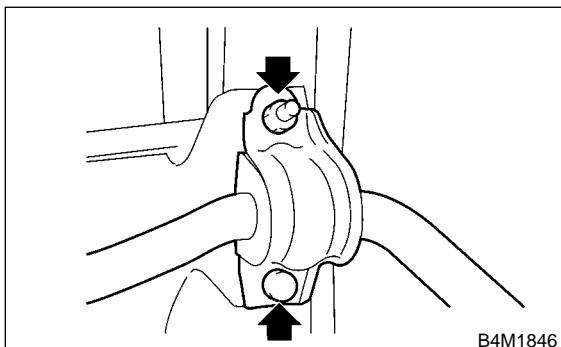
T1: 25 ± 4 (2.5±0.4, 18.1±2.9)

T2: 29 ± 5 (3.0±0.5, 21.7±3.6)

T3: 18 ± 5 (1.8±0.5, 13.0±3.6)

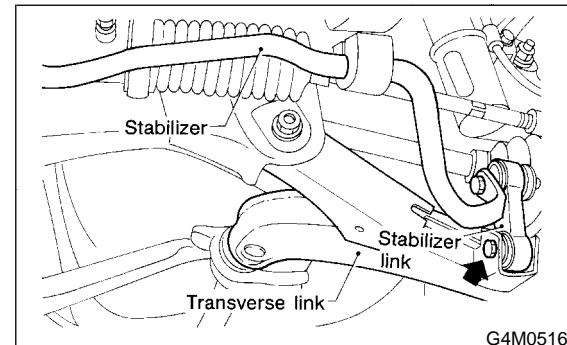
T4: 44 ± 6 (4.5±0.6, 32.5±4.3)

- 1) Jack-up the front part of the vehicle and support it with safety stand (rigid racks).
- 2) Remove jack-up plate from lower part of cross-member.
- 3) Remove bolts which secure stabilizer to cross-member.



B4M1846

- 4) Remove bolts which secure stabilizer link to front transverse link.



G4M0516

B: INSPECTION

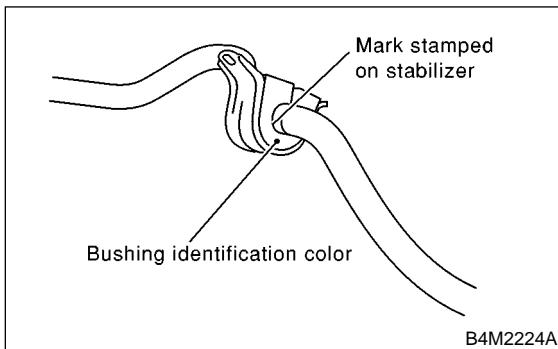
- 1) Check bushing for cracks, fatigue or damage.
- 2) Check stabilizer link for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

C: INSTALLATION

- 1) To install, reverse the removal procedure.

NOTE:

- Install bushing (on front crossmember side) while aligning it with paint mark on stabilizer.
- Ensure that bushing and stabilizer have the same identification colors when installing.



- 2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:**Jack-up plate to crossmember:**

$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft-lb}$)

Stabilizer link to front transverse link:

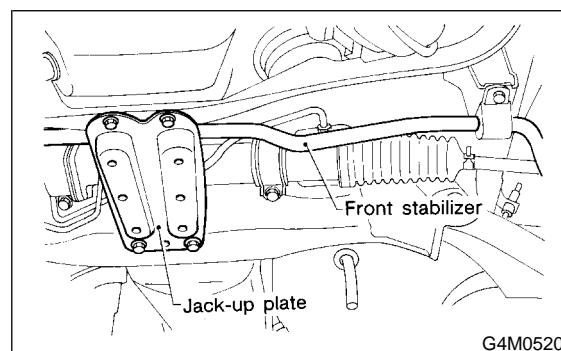
$29 \pm 5 \text{ N}\cdot\text{m}$ ($3.0 \pm 0.5 \text{ kg}\cdot\text{m}$, $21.7 \pm 3.6 \text{ ft-lb}$)

Stabilizer to crossmember:

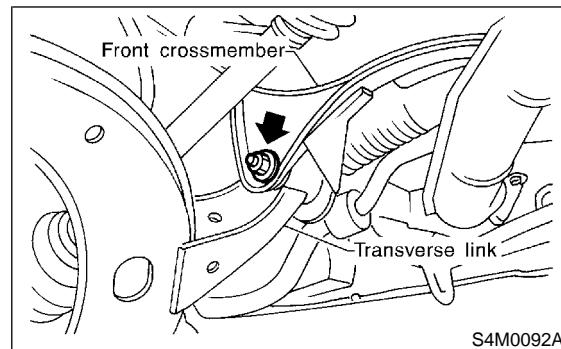
$25 \pm 4 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.4 \text{ kg}\cdot\text{m}$, $18.1 \pm 2.9 \text{ ft-lb}$)

6. Front Crossmember**A: REMOVAL**

- 1) Disconnect ground cable from battery.
- 2) Lift-up vehicle and remove front tires and wheels.
- 3) Remove both stabilizer and jack-up plate.



- 4) Disconnect tie-rod end from housing.
- 5) Remove front exhaust pipe.
- 6) Remove front transverse link from front crossmember and body.



- 7) Remove nuts attaching engine mount cushion rubber to crossmember.
- 8) Remove steering universal joint.
- 9) Disconnect power steering pipe from steering gear box.
- 10) Lift engine by approx. 10 mm (0.39 in) by using chain block.
- 11) Support crossmember with a jack, remove nuts securing crossmember to body and lower crossmember gradually along with steering gearbox.

CAUTION:

When removing crossmember downward, be careful that tie-rod end does not interfere with SFJ boot.

B: INSTALLATION

1) Installation is in the reverse order of removal procedures.

CAUTION:

Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:

Transverse link bushing to crossmember:

$98 \pm 15 \text{ N}\cdot\text{m}$ ($10.0 \pm 1.5 \text{ kg}\cdot\text{m}$, $72 \pm 11 \text{ ft}\cdot\text{lb}$)

Stabilizer to bushing:

$25 \pm 4 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.4 \text{ kg}\cdot\text{m}$, $18.1 \pm 2.9 \text{ ft}\cdot\text{lb}$)

Tie-rod end to housing:

$27.0 \pm 2.5 \text{ N}\cdot\text{m}$ ($2.75 \pm 0.25 \text{ kg}\cdot\text{m}$, $19.9 \pm 1.8 \text{ ft}\cdot\text{lb}$)

Front cushion rubber to crossmember:

$74^{+10/-5} \text{ N}\cdot\text{m}$ ($7.5^{+1.0/-0.5} \text{ kg}\cdot\text{m}$, $54.2^{+7.2/-3.6} \text{ ft}\cdot\text{lb}$)

Universal joint to pinion shaft:

$24 \pm 3 \text{ N}\cdot\text{m}$ ($2.4 \pm 0.3 \text{ kg}\cdot\text{m}$, $17.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)

Crossmember to body:

$98 \pm 15 \text{ N}\cdot\text{m}$ ($10.0 \pm 1.5 \text{ kg}\cdot\text{m}$, $72 \pm 11 \text{ ft}\cdot\text{lb}$)

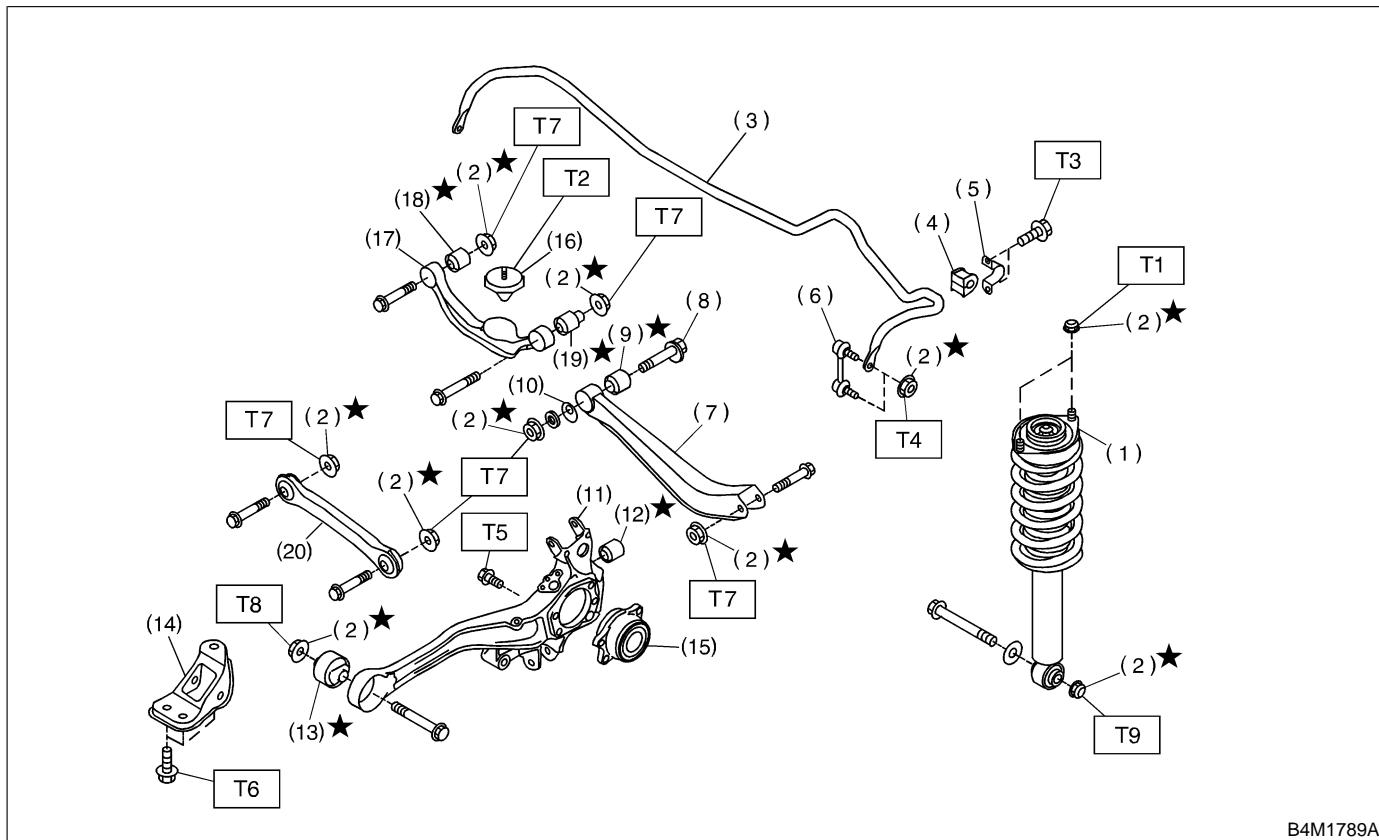
2) Purge air from power steering system.

NOTE:

Check wheel alignment and adjust if necessary.

7. Rear Arm

A: REMOVAL



B4M1789A

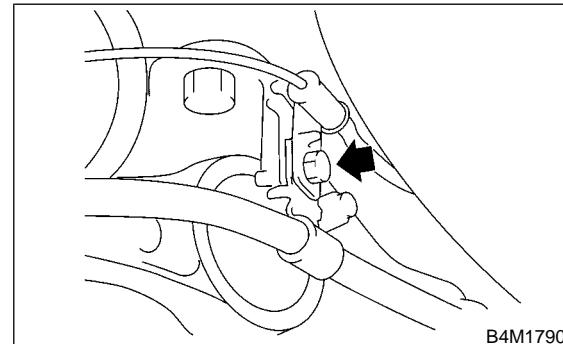
(1) Shock absorber	(12) Rear arm rear bushing
(2) Self-locking nut	(13) Rear arm front bushing
(3) Stabilizer	(14) Rear arm bracket
(4) Stabilizer bushing	(15) Hub bearing unit
(5) Clamp	(16) Helper
(6) Stabilizer link	(17) Link upper
(7) Link rear	(18) Link upper bushing (Inside)
(8) Adjusting bolt	(19) Link upper bushing (Outside)
(9) Link rear bushing	(20) Link front
(10) Adjusting washer	
(11) Rear arm	

Tightening torque: N·m (kg·m, ft·lb)

T1: 30 ± 7 (3.1 ± 0.7 , 22.4 ± 5.1)
T2: 32 ± 10 (3.3 ± 1.0 , 23.9 ± 7.2)
T3: 39 ± 7 (4.0 ± 0.7 , 28.9 ± 5.1)
T4: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)
T5: 66 ± 10 (6.7 ± 1.0 , 48.5 ± 7.2)
T6: 108 ± 15 (11 ± 1.5 , 80 ± 11)
T7: 123 ± 15 (12.5 ± 1.5 , 90 ± 11)
T8: 147 ± 20 (15 ± 2 , 108 ± 14)
T9: 157 ± 20 (16 ± 2 , 116 ± 14)

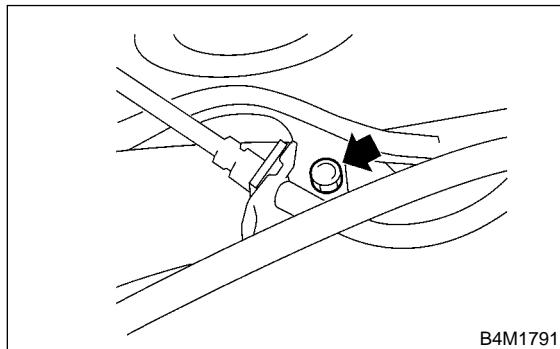
- 1) Lift-up the vehicle and remove rear wheel.
- 2) Remove bearing unit. <Ref. to 4-2 [W2A0].>

- 3) Remove bolt securing parking brake cable clamp to rear arm.



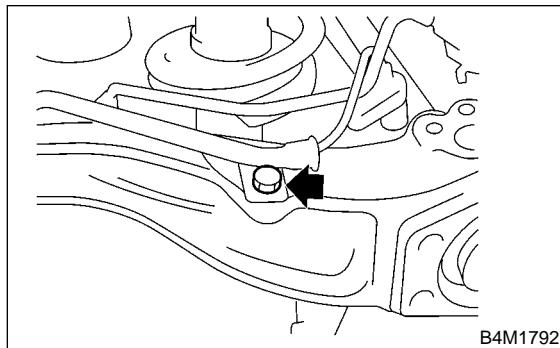
B4M1790

4) Remove bolt securing brake hose to rear arm.



B4M1791

5) Remove bolt securing ABS sensor to rear arm.



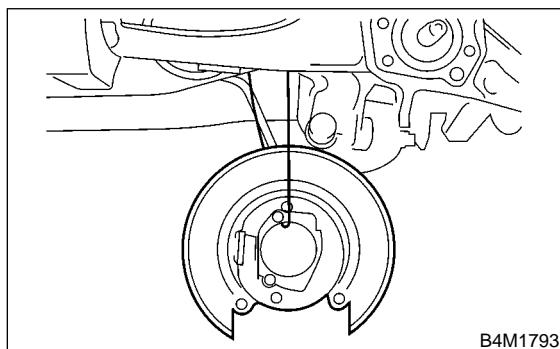
B4M1792

6) Using a flare nut wrench, disconnect brake pipe from wheel cylinder. (Drum brake model only)

CAUTION:

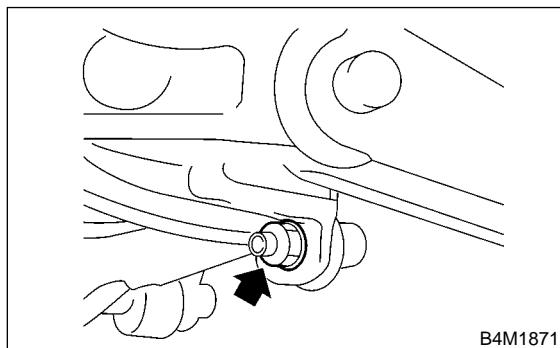
Cover open end of wheel cylinder and pipe to prevent entry of foreign particles.

7) Suspend the back plate from sub frame.



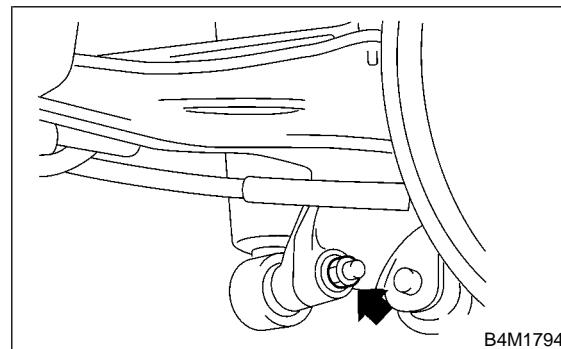
B4M1793

8) Remove nut securing stabilizer link to rear arm.



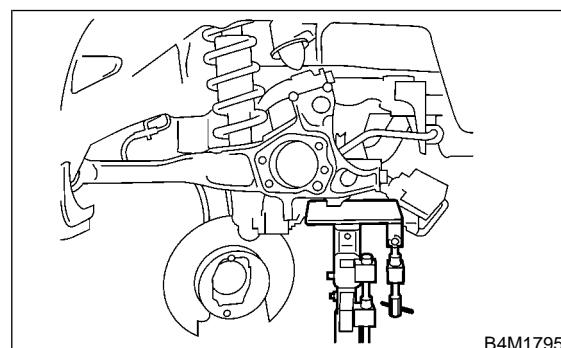
B4M1871

9) Remove bolt securing shock absorber to rear arm.



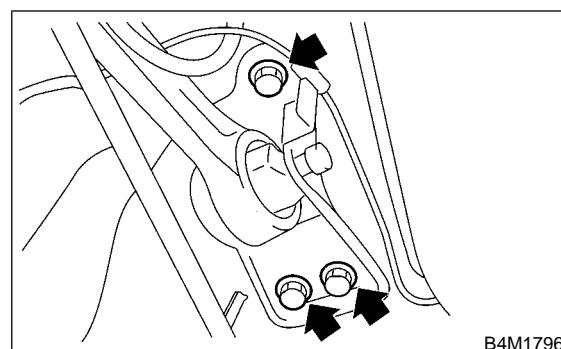
B4M1794

10) Use transmission jack to support rear arm horizontally.



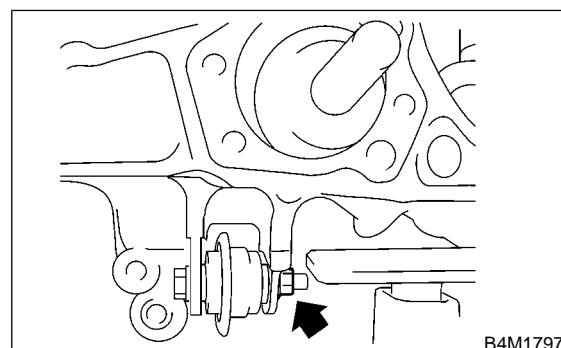
B4M1795

11) Remove bolt securing rear arm to body.



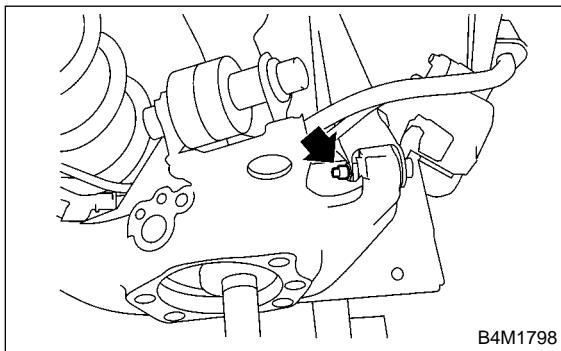
B4M1796

12) Loosen nut securing front link to rear arm.

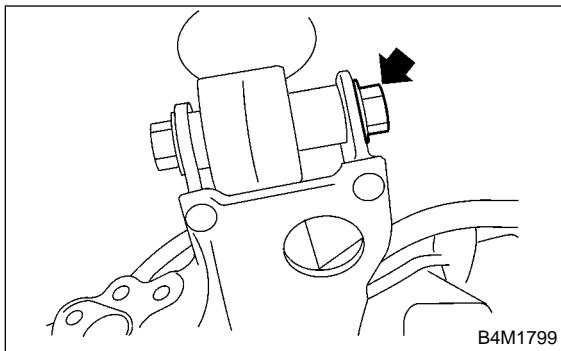


B4M1797

13) Loosen nut securing rear link to rear arm.



14) Loosen nut securing upper link to rear arm.



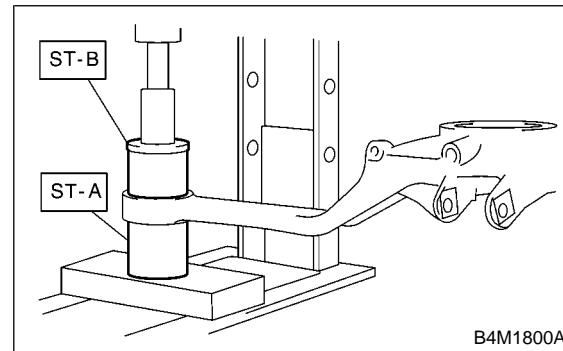
15) Remove bolts securing rear arm to links and remove rear arm.

B: DISASSEMBLY

1. FRONT BUSHING

1) Using ST-A, B, press front bushing out of place.
ST-A, B 20099AE020 INSTALLER & REMOVER SET

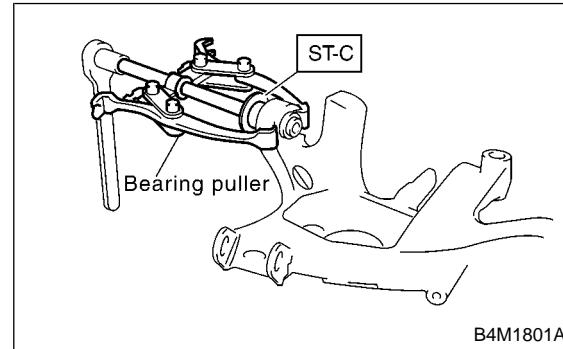
- (1) Set ST-A in position with larger inside diameter side facing up.
- (2) Set rear arm with protruded bushing side facing down.
- (3) Place ST-B on upper side of bushing, then press bushing out of position.



2. REAR BUSHING

Using ST-C and bearing puller, press rear bushing out of place.

ST-C 20099AE040 INSTALLER & REMOVER SET



C: INSPECTION

Check trailing links for bends, corrosion or damage.

D: ASSEMBLY

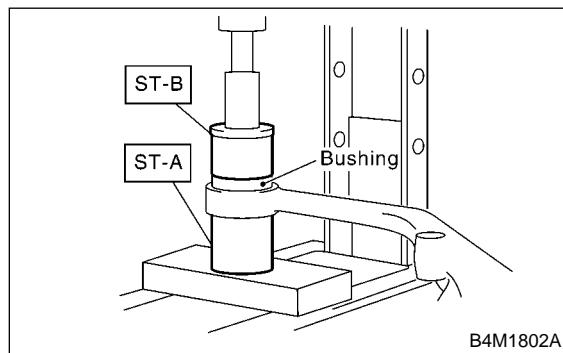
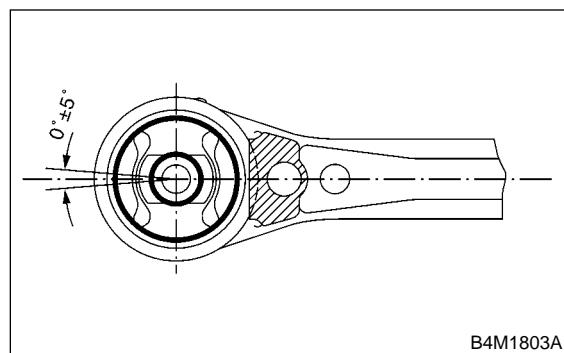
1. FRONT BUSHING

1) Using ST-A, B, press bushing into trailing link.
ST-A, B 20099AE020 INSTALLER &
REMOVER SET

- (1) Set ST-A in position with smaller inside diameter side facing up.
- (2) Set rear arm in position with outer side of vehicle body facing down.
- (3) Place bushing on upper side of rear arm.
- (4) Place ST-B on upper side of bushing, then press bushing into position.

CAUTION:

- Install bushing with painted side facing up.
- Install front bushing in the proper direction, as shown in figure.

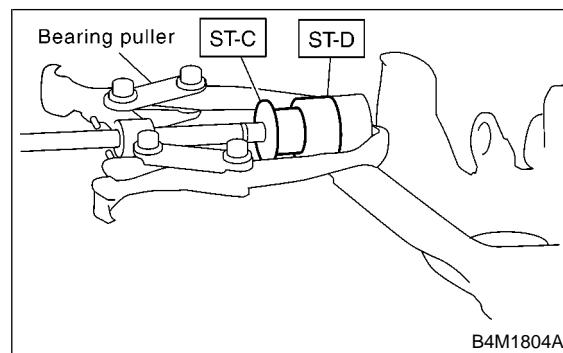


2. REAR BUSHING

1) Using ST-C, D and bearing puller, press bushing into trailing link.

ST-C, D 20099AE040 INSTALLER &
REMOVER SET

- (1) Insert bushing into bore in ST-D.
- (2) Set ST-C, ST-D and bearing puller in position, as shown in the figure, and press bushing into position.

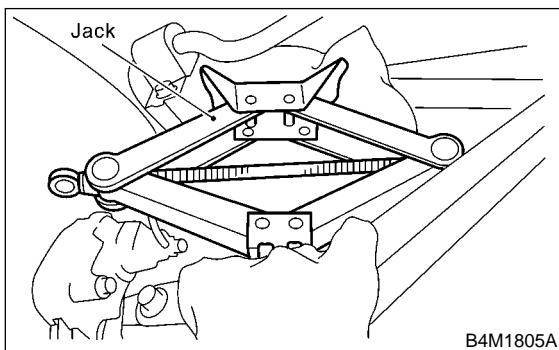


E: INSTALLATION

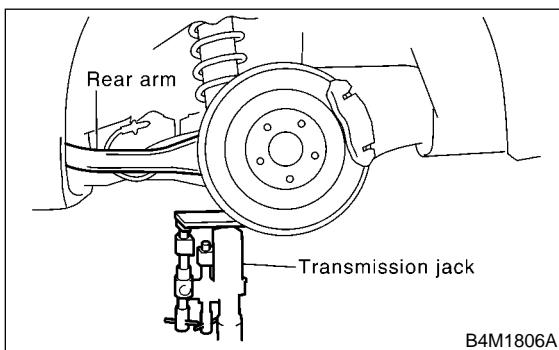
- 1) Use a transmission jack to support the rear arm.
- 2) Install rear arm and temporarily tighten bolts securing rear arm to links.
- 3) Install bearing unit. <Ref. to 4-2 [W2E0].>
- 4) Install bolt securing ABS sensor to rear arm.
- 5) Install bolt securing brake hose to rear arm.
- 6) Install bolt securing parking brake cable clamp to rear arm.
- 7) Place jack (furnished with vehicle) upside down and position it between link rear and sub frame. Adjust jack position so rear shock absorber is aligned with rear arm at their corresponding holes. Install lower shock absorber bolts.

CAUTION:

Put a cloth between jack and its mating area to protect link rear and sub frame from scratches.



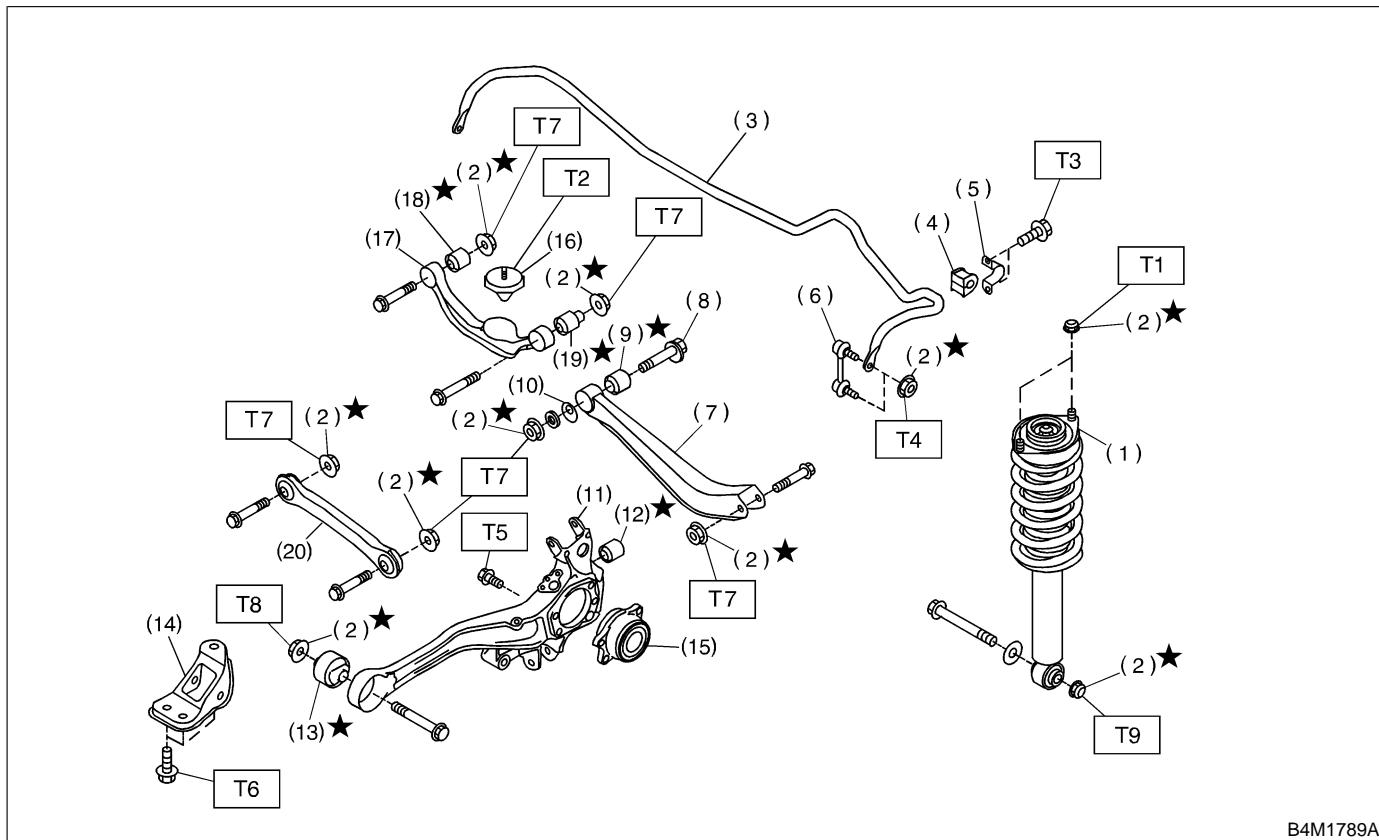
- 8) Using transmission jack, support rear arm horizontally and tighten nuts and bolts securing rear arm, link front, link rear, link upper and shock absorber.

**NOTE:**

Check wheel alignment and adjust if necessary.

8. Link Front

A: REMOVAL



B4M1789A

(1) Shock absorber	(12) Rear arm rear bushing
(2) Self-locking nut	(13) Rear arm front bushing
(3) Stabilizer	(14) Rear arm bracket
(4) Stabilizer bushing	(15) Hub bearing unit
(5) Clamp	(16) Helper
(6) Stabilizer link	(17) Link upper
(7) Link rear	(18) Link upper bushing (Inside)
(8) Adjusting bolt	(19) Link upper bushing (Outside)
(9) Link rear bushing	(20) Link front
(10) Adjusting washer	
(11) Rear arm	

Tightening torque: N·m (kg·m, ft-lb)

T1: 30±7 (3.1±0.7, 22.4±5.1)

T2: 32 ± 10 (3.3 ± 1.0 , 23.9 ± 7.2)

T3: 39 ± 7 (4.0 ± 0.7 , 28.9 ± 5.1)

T4: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)

T5: 66 ± 10 (6.7 ± 1.0 , 48.5 ± 7.0)

T6: 108±15 (11±1.5, 80±11)

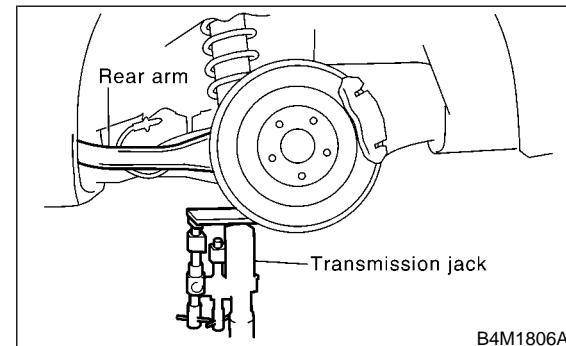
T7: 123 ± 15 (12.5 ± 1.5 , 90 ± 11)

T8: 147±20 (15±2, 108±14)

T9: 157±20 (16±2, 116±14)

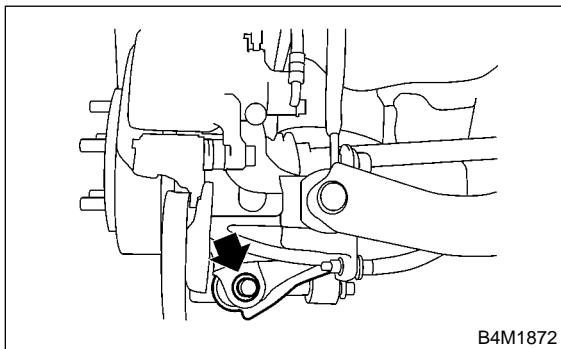
1) Loosen wheel nuts. Lift-up vehicle and remove wheel.

2) Use transmission jack to support rear arm horizontally.

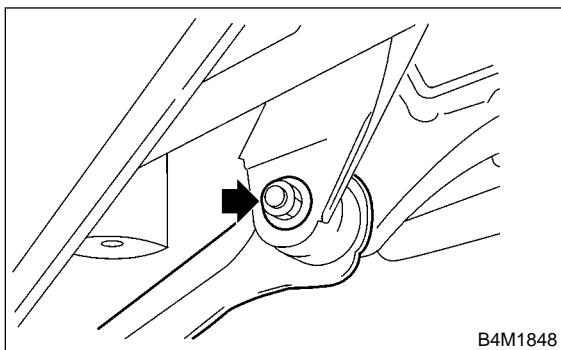


B4M1806A

3) Remove bolt securing link front to sub frame.



4) Remove bolts which secure link front to rear arm and detach link front.



NOTE:

Link front bushing cannot be replaced alone. Always replace link front and bushing as a single unit.

B: INSPECTION

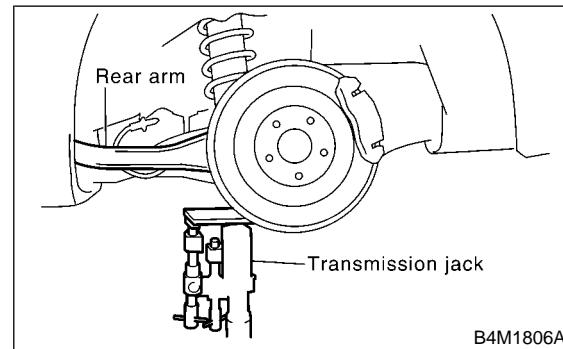
Visually check link front for damage or bends.

C: INSTALLATION

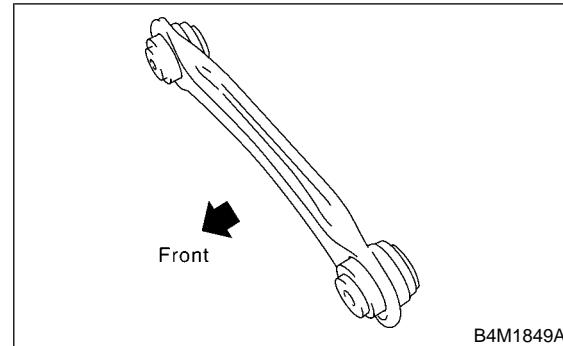
To install, reverse removal procedures, observing the following instructions.

CAUTION:

- Using transmission jack, support rear arm horizontally, install link front and tighten nuts to specified torque.



- Install link front with protruded side facing front.



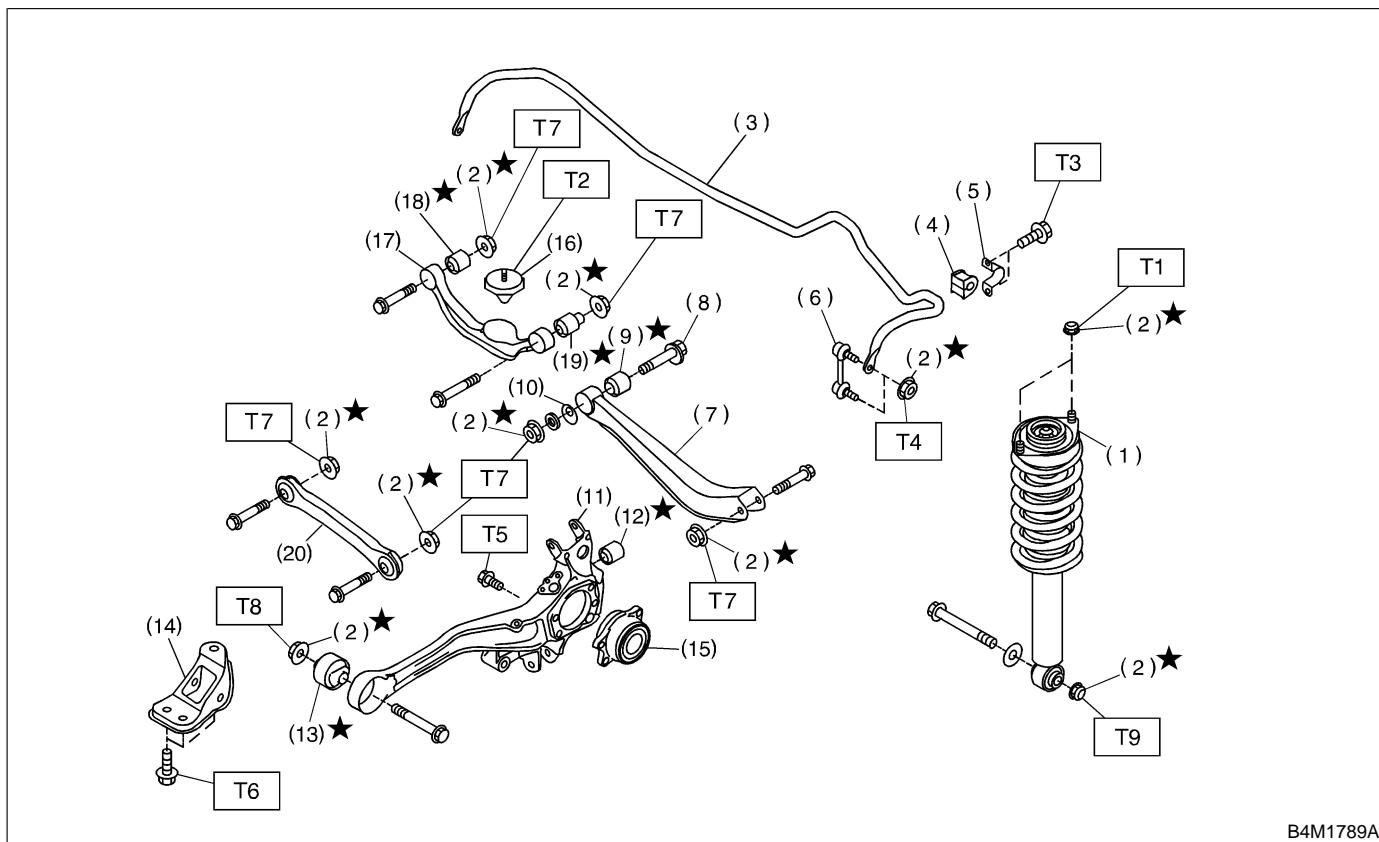
- Replace self-locking nut.

NOTE:

Check wheel alignment and adjust if necessary.

9. Link Rear

A: REMOVAL



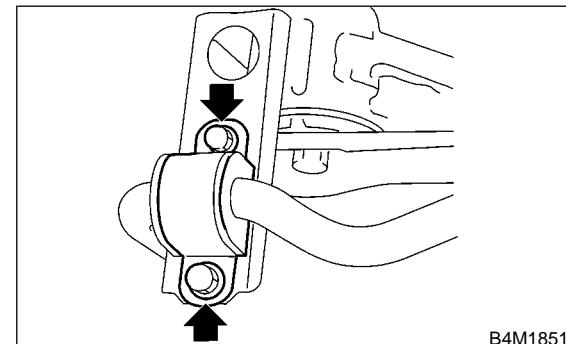
(1) Shock absorber	(12) Rear arm rear bushing
(2) Self-locking nut	(13) Rear arm front bushing
(3) Stabilizer	(14) Rear arm bracket
(4) Stabilizer bushing	(15) Hub bearing unit
(5) Clamp	(16) Helper
(6) Stabilizer link	(17) Link upper
(7) Link rear	(18) Link upper bushing (Inside)
(8) Adjusting bolt	(19) Link upper bushing (Outside)
(9) Link rear bushing	(20) Link front
(10) Adjusting washer	
(11) Rear arm	

Tightening torque: N·m (kg·m, ft·lb)

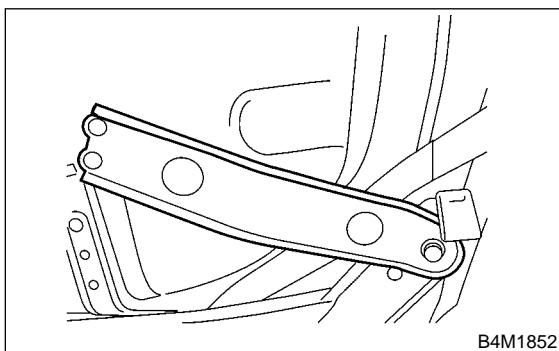
T1: 30 ± 7 (3.1 ± 0.7 , 22.4 ± 5.1)
 T2: 32 ± 10 (3.3 ± 1.0 , 23.9 ± 7.2)
 T3: 39 ± 7 (4.0 ± 0.7 , 28.9 ± 5.1)
 T4: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)
 T5: 66 ± 10 (6.7 ± 1.0 , 48.5 ± 7.2)
 T6: 108 ± 15 (11 ± 1.5 , 80 ± 11)
 T7: 123 ± 15 (12.5 ± 1.5 , 90 ± 11)
 T8: 147 ± 20 (15 ± 2 , 108 ± 14)
 T9: 157 ± 20 (16 ± 2 , 116 ± 14)

1) Loosen wheel nuts. Lift-up vehicle and remove wheel.

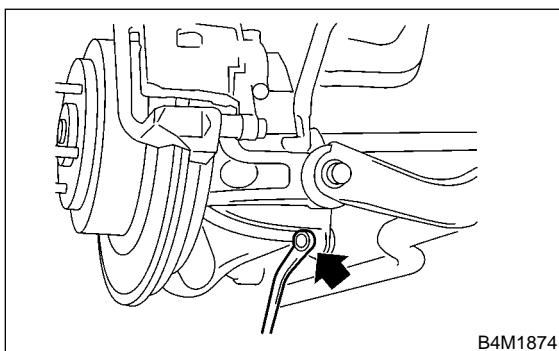
2) Remove bolt securing stabilizer clamps to sub frame.



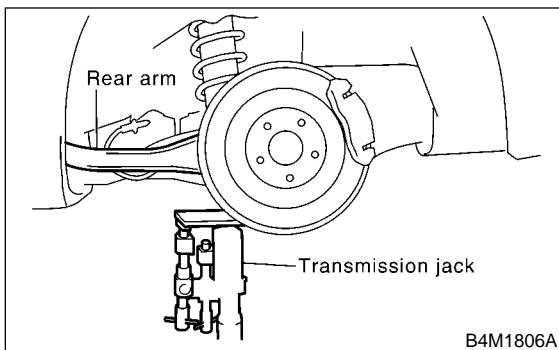
3) Remove support sub frame RH. (When removing RH side link rear.)



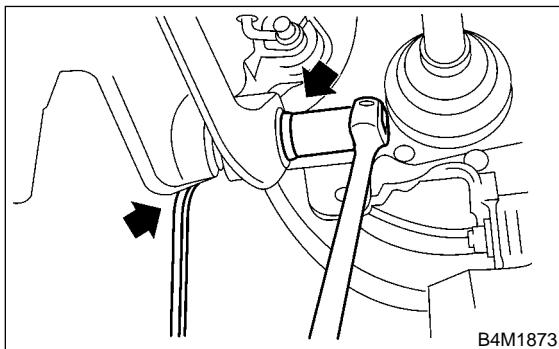
4) Remove stabilizer link.



5) Use transmission jack to support rear arm horizontally.



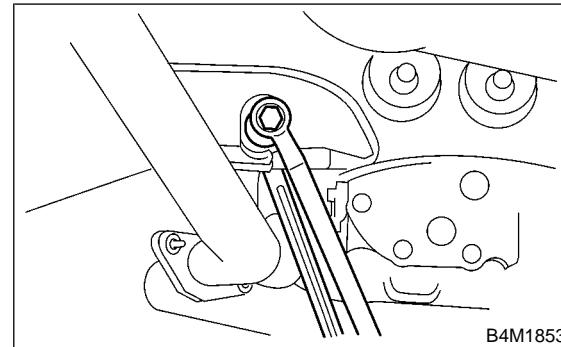
6) Remove bolt securing link rear to rear arm.



7) Scribe an alignment mark on link rear adjusting bolt and sub frame.
8) Remove bolts securing link rear to sub frame, detach link rear.

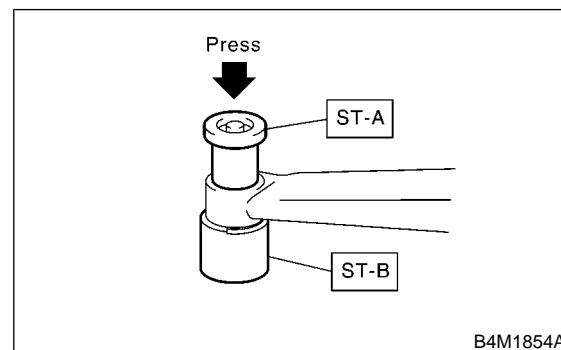
CAUTION:

To loosen adjusting bolt, always loosen nut while holding the head of adjusting bolt.



B: DISASSEMBLY

Using ST-A, B, press bushing out of place.
ST-A, B 20099AE000 INSTALLER & REMOVER

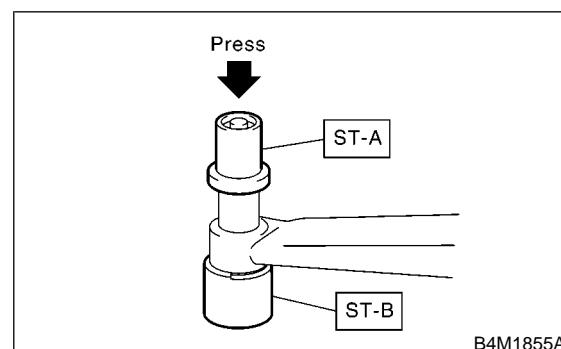


C: INSPECTION

Visually check link rear for damage or bends.

D: ASSEMBLY

Using ST, press bushing into place.
ST-A, B 20099AE000 INSTALLER & REMOVER

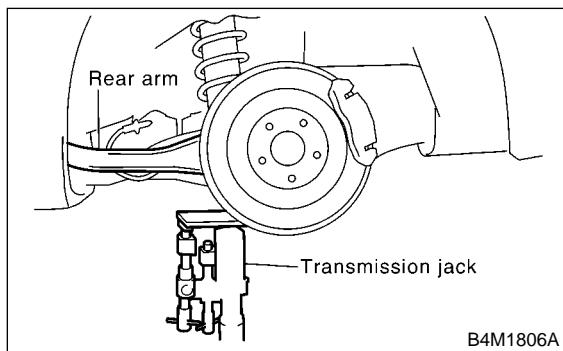


E: INSTALLATION

To install, reverse removal procedures, observing the following instructions.

CAUTION:

- Using transmission jack, support rear arm horizontally, install link rear and tighten nuts to specified torque.



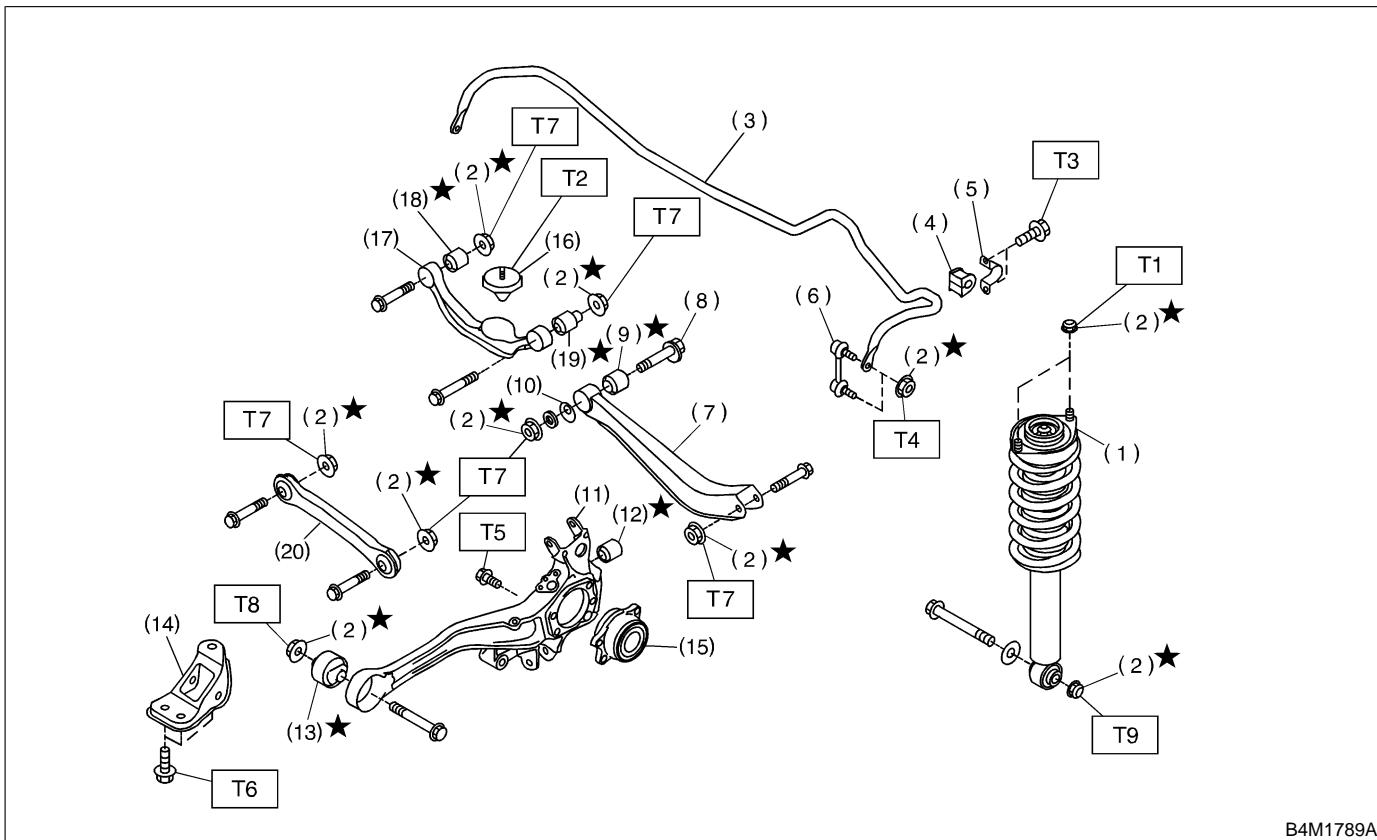
- Tighten nut when installing adjusting bolt.
- Replace self-locking nut.

NOTE:

Check wheel alignment and adjust if necessary.

10. Link Upper

A: REMOVAL



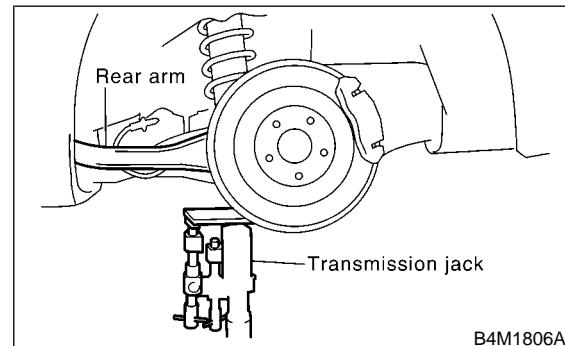
(1) Shock absorber	(12) Rear arm rear bushing
(2) Self-locking nut	(13) Rear arm front bushing
(3) Stabilizer	(14) Rear arm bracket
(4) Stabilizer bushing	(15) Hub bearing unit
(5) Clamp	(16) Helper
(6) Stabilizer link	(17) Link upper
(7) Link rear	(18) Link upper bushing (Inside)
(8) Adjusting bolt	(19) Link upper bushing (Outside)
(9) Link rear bushing	(20) Link front
(10) Adjusting washer	
(11) Rear arm	

Tightening torque: N·m (kg·m, ft·lb)

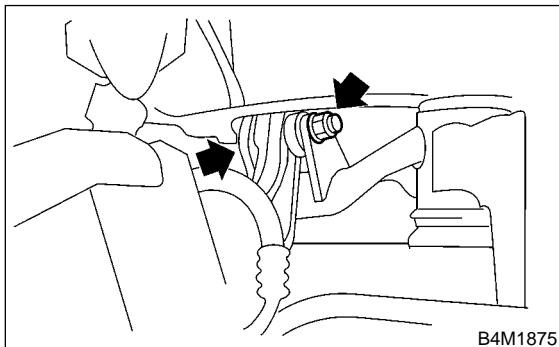
T1: 30 ± 7 (3.1 ± 0.7 , 22.4 ± 5.1)
 T2: 32 ± 10 (3.3 ± 1.0 , 23.9 ± 7.2)
 T3: 39 ± 7 (4.0 ± 0.7 , 28.9 ± 5.1)
 T4: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)
 T5: 66 ± 10 (6.7 ± 1.0 , 48.5 ± 7.2)
 T6: 108 ± 15 (11 ± 1.5 , 80 ± 11)
 T7: 123 ± 15 (12.5 ± 1.5 , 90 ± 11)
 T8: 147 ± 20 (15 ± 2 , 108 ± 14)
 T9: 157 ± 20 (16 ± 2 , 116 ± 14)

1) Loosen wheel nuts. Lift-up vehicle and remove wheel.

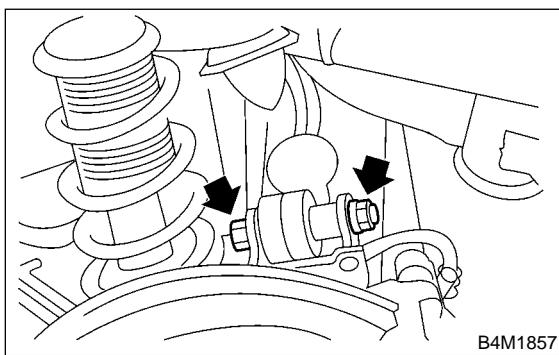
2) Use transmission jack to support rear arm horizontally.



3) Remove bolt securing link upper to sub frame.

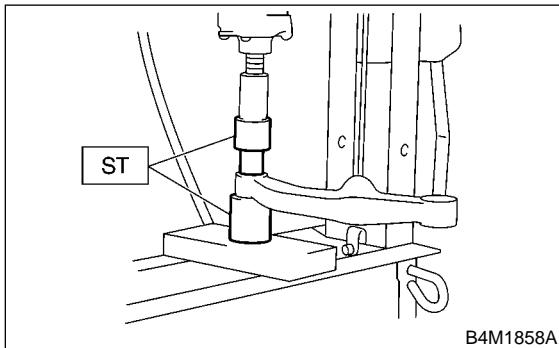


4) Remove bolts which secure link upper to rear arm and detach link upper.



B: DISASSEMBLY

Using ST, press bushing out of place.
ST 20099AE010 INSTALLER & REMOVER



C: INSPECTION

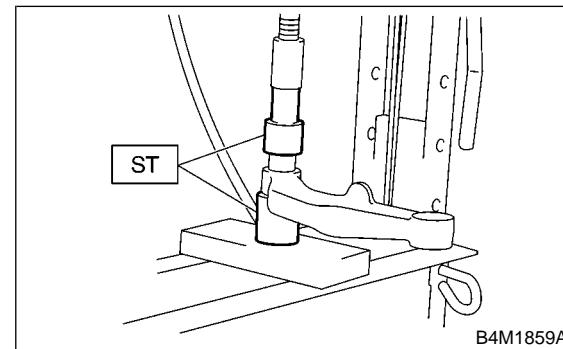
Visually check link upper for damage or bends.

D: ASSEMBLY

1) Using ST, press bushing into place.
ST 20099AE010 INSTALLER & REMOVER

CAUTION:

Outer bushing has a "directional" design. Be sure to install bushing with longer inner housing side facing vehicle rear.

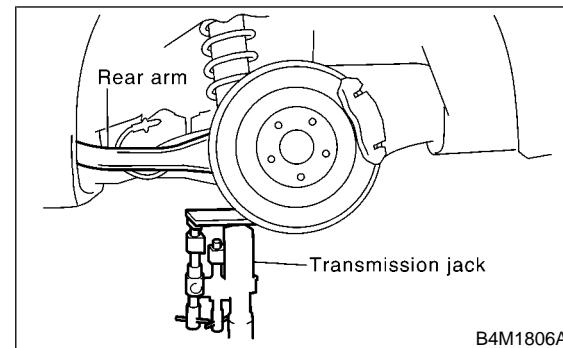


E: INSTALLATION

To install, reverse removal procedures, observing the following instructions.

CAUTION:

- Using transmission jack, support rear arm horizontally, install link upper and tighten nuts to specified torque.



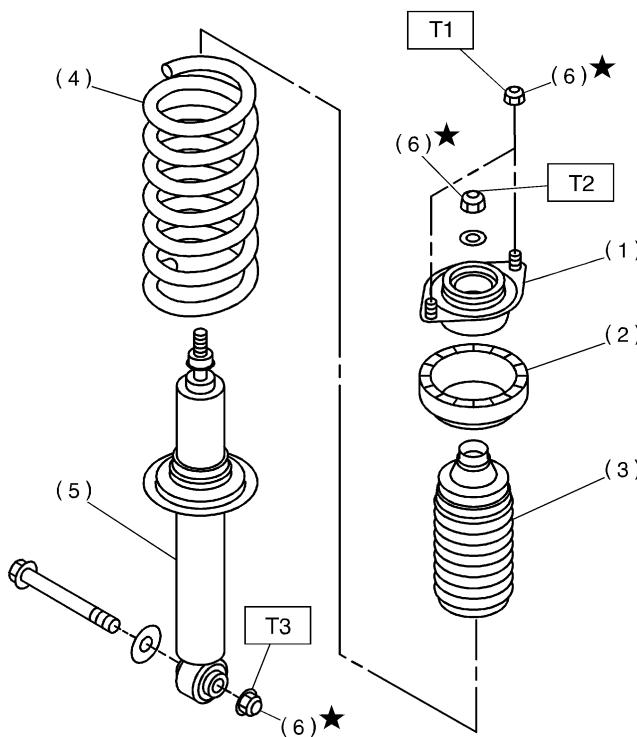
- Tighten nut when installing adjusting bolt.
- Replace self-locking nut.

NOTE:

Check wheel alignment and adjust if necessary.

11. Rear Shock Absorber

A: REMOVAL



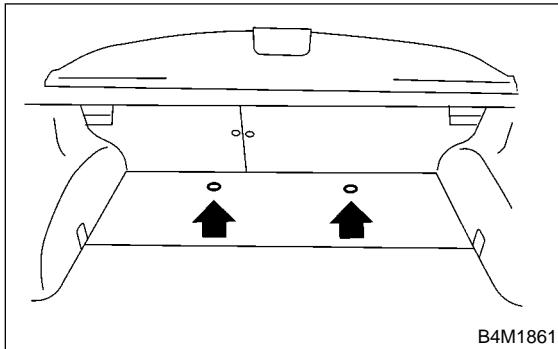
B4M1860A

(1) Mount
 (2) Rubber seat upper
 (3) Dust cover
 (4) Coil spring

(5) Shock absorber
 (6) Self-locking nut

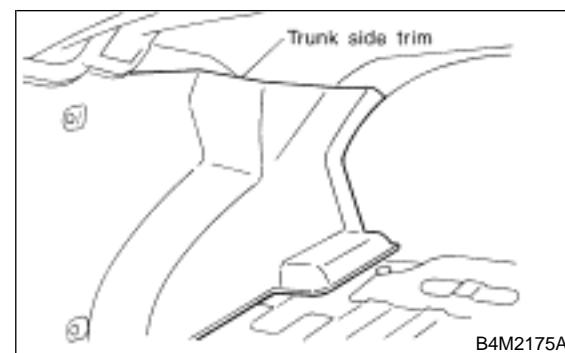
Tightening torque: N·m (kg·m, ft·lb)T1: 30 ± 7 (3.1 ± 0.7 , 22.4 ± 5.1)T2: 34 ± 5 (3.5 ± 0.5 , 25.3 ± 3.6)T3: 157 ± 20 (16 ± 2 , 116 ± 14)

1) Lift-up vehicle and remove rear wheels.
 2) Remove clip and detach floor mat. (Wagon model)



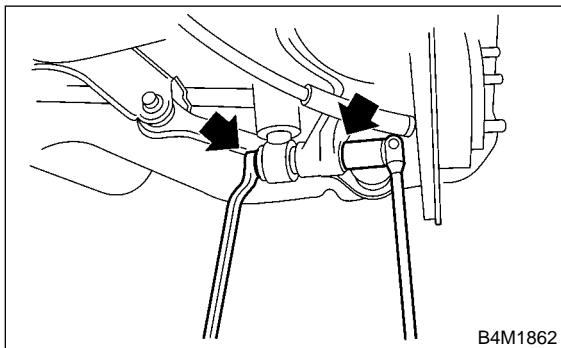
B4M1861

3) Detach trunk mat. (Sedan model)
 4) Roll up the trunk side trim. (Sedan model)

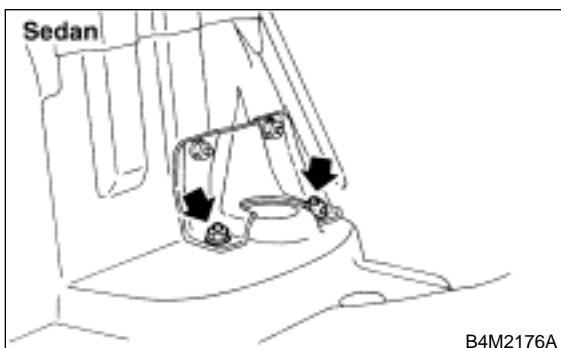
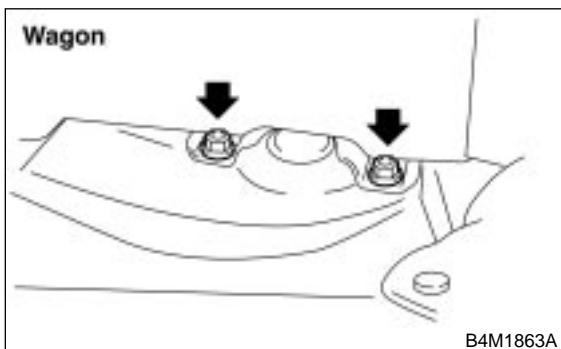


B4M2175A

5) Remove bolt securing shock absorber to rear arm.



6) Use a jack to support the shock absorber.
 7) Remove nuts securing shock absorber mount to body.



8) Remove shock absorber.

B: DISASSEMBLY

For disassembly of shock absorber, refer to procedures outlined under front strut as a guide.

<Ref. to 4-1 [W4B0].>

C: INSPECTION

Refer to Front Strut as a guide for inspection procedures. <Ref. to 4-1 [W4C0].>

D: ASSEMBLY

Refer to Front Strut as a guide for assembly procedures. <Ref. to 4-1 [W4D0].>

E: INSTALLATION

1) Use a jack to support the shock absorber.
 2) Tighten self-locking nut used to secure shock absorber to vehicle body.

CAUTION:

Use a new self-locking nut.

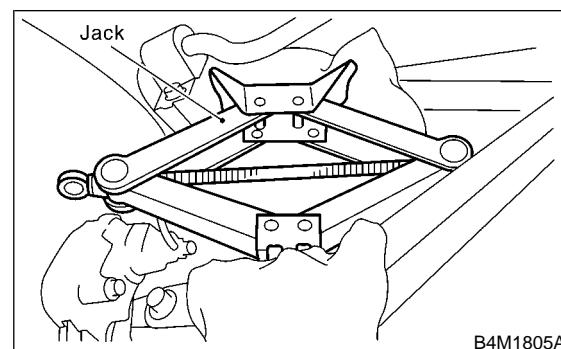
Tightening torque:

$29 \pm 7 \text{ N}\cdot\text{m}$ ($3.0 \pm 0.7 \text{ kg}\cdot\text{m}$, $21.7 \pm 5.1 \text{ ft}\cdot\text{lb}$)

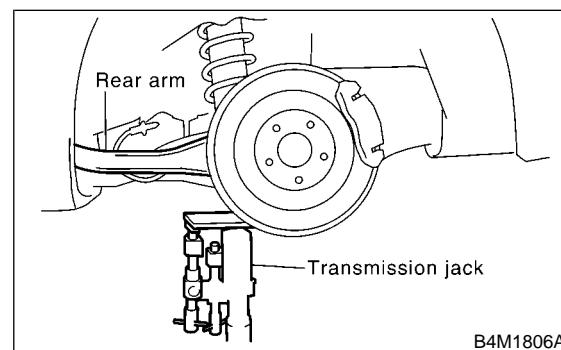
3) Place jack (furnished with vehicle) upside down and position it between link rear and sub frame. Adjust jack position so rear shock absorber is aligned with rear arm at their corresponding holes. Install lower shock absorber bolts.

CAUTION:

Put a cloth between jack and its mating area to protect link rear and sub frame from scratches.



4) Using transmission jack, support rear arm horizontally and tighten shock absorber nuts and bolts to specified torque.



Tightening torque:

$157 \pm 20 \text{ N}\cdot\text{m}$ ($16 \pm 2 \text{ kg}\cdot\text{m}$, $116 \pm 14 \text{ ft}\cdot\text{lb}$)

CAUTION:

Use a new self-locking nut.

5) Install floor mat. (Wagon model)
 6) Set trunk side trim. (Sedan model)
 7) Install trunk mat. (Sedan model)

NOTE:

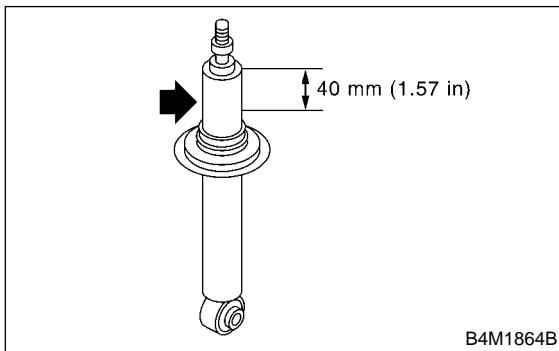
Check wheel alignment and adjust if necessary.

F: DISPOSAL PROCEDURES FOR SHOCK ABSORBER

CAUTION:

- Completely discharge the gas from the shock absorber before disposal. Follow the disposal procedure outlined below.
- Do not disassemble shock absorber or place into a fire.
- Drill holes before disposing of shock absorber.
- Before handling shock absorber, be sure to wear goggles to protect eyes from gas, oil and/or filings.

- 1) Place shock absorber on a flat and level surface with piston rod fully extended.
- 2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, drill 30 mm (1.18 in) deep holes in areas shown in the figure.

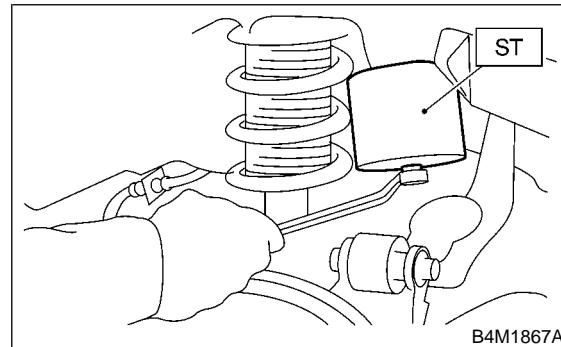


12. Helper

A: REMOVAL

- 1) Jack-up the rear part of the vehicle, support it with safety stands (rigid racks).
- 2) Using ST, remove helper.

ST 20099AE030 HELPER



B: INSPECTION

Check helper for cracks, fatigue or damage.

C: INSTALLATION

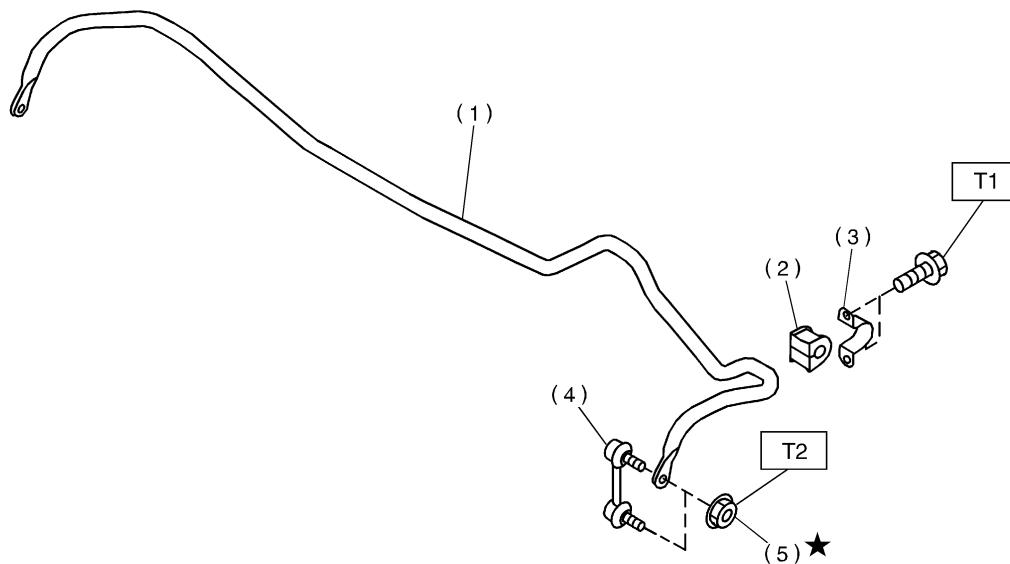
To install, reverse the removal procedure.

Tightening torque:

32±10 N·m (3.3±1.0 kg-m, 23.9±7.2 ft-lb)

13. Rear Stabilizer

A: REMOVAL



B4M1868A

(1) Rear stabilizer
 (2) Stabilizer bushing
 (3) Clamp
 (4) Stabilizer link

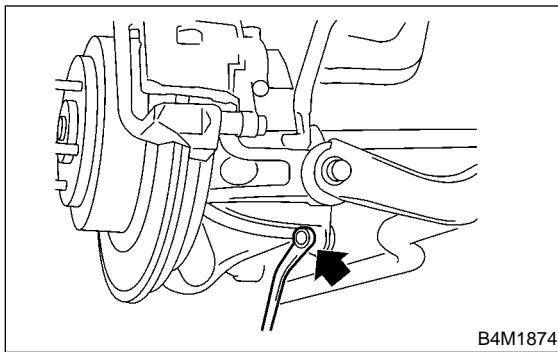
(5) Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

T1: 39 ± 7 (4 ± 0.7 , 28.9 ± 5.1)

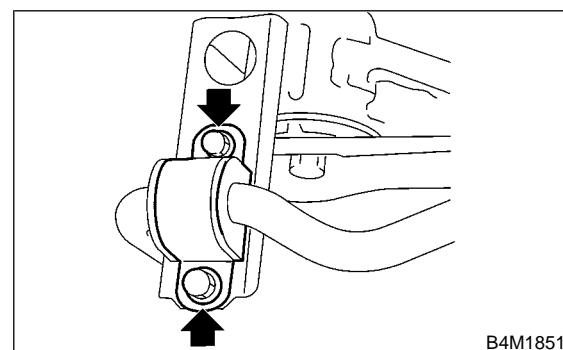
T2: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)

1) Jack-up the rear part of the vehicle, support it with safety stands (rigid racks).
 2) Remove bolts which secure stabilizer link to rear arm.



B4M1874

3) Remove bolts which secure stabilizer to sub frame.



B4M1851

B: INSPECTION

- 1) Check bushing for cracks, fatigue or damage.
- 2) Check stabilizer links for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

C: INSTALLATION

To install, reverse the removal procedure.

Tightening torque:

Stabilizer link to rear arm

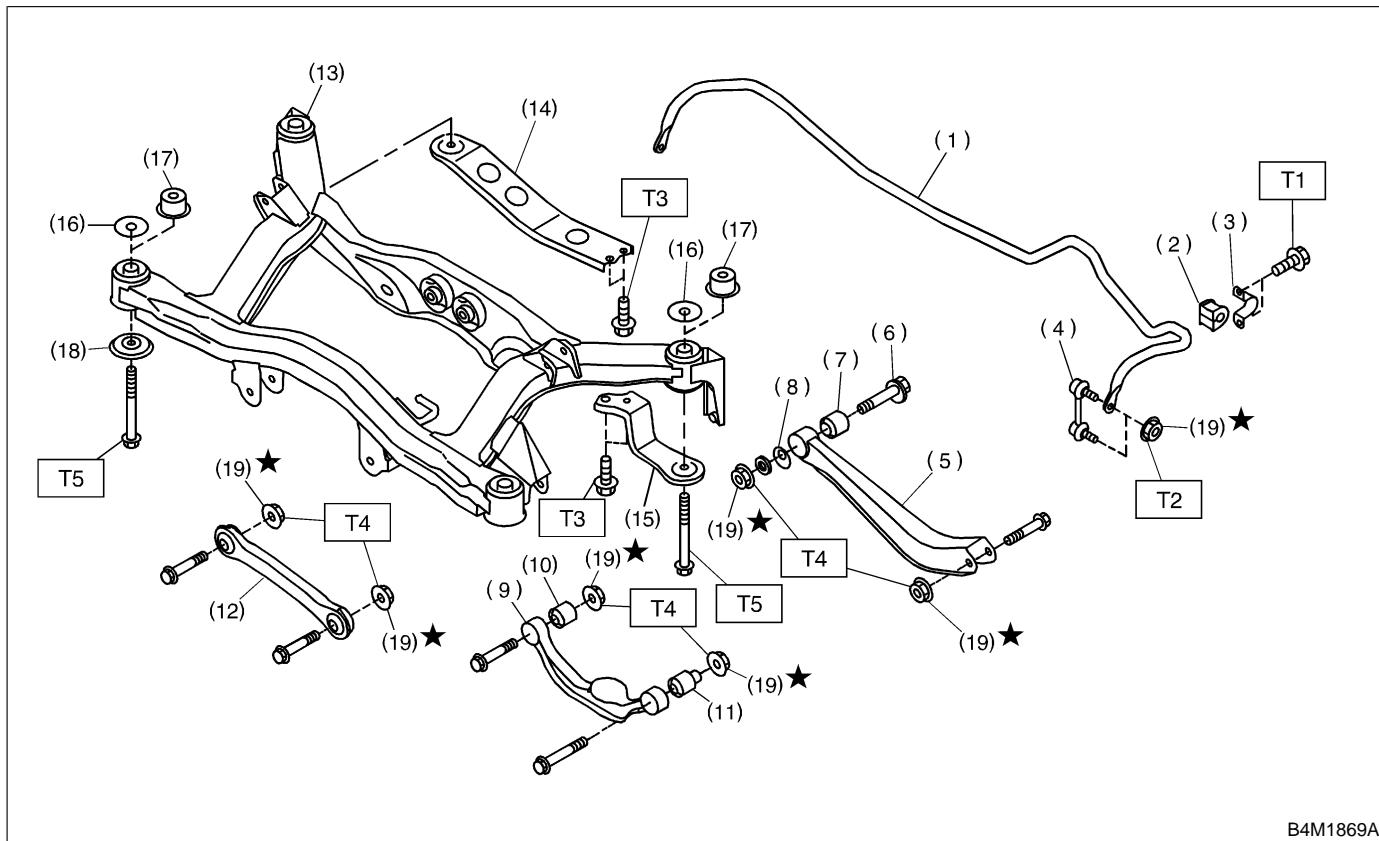
$44 \pm 6 \text{ N}\cdot\text{m}$ ($4.5 \pm 0.6 \text{ kg}\cdot\text{m}$, $32.5 \pm 4.3 \text{ ft-lb}$)

Clamp to sub frame

$39 \pm 7 \text{ N}\cdot\text{m}$ ($4.0 \pm 0.7 \text{ kg}\cdot\text{m}$, $28.9 \pm 5.1 \text{ ft-lb}$)

14. Rear Sub Frame

A: REMOVAL



B4M1869A

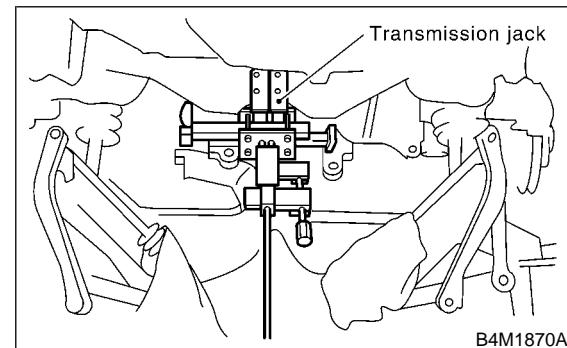
(1) Stabilizer	(11) Link upper bushing (Outside)
(2) Stabilizer bushing	(12) Link front
(3) Clamp	(13) Sub frame
(4) Stabilizer link	(14) Support sub frame (RH)
(5) Link rear	(15) Support sub frame (LH)
(6) Adjusting bolt	(16) Stopper upper (Except OUTBACK model)
(7) Link rear bushing	(17) Stopper (OUTBACK model)
(8) Adjusting washer	(18) Stopper lower
(9) Link upper	(19) Self-locking nut
(10) Link upper bushing (Inside)	

Tightening torque: N·m (kg·m, ft·lb)

T1: 39±7 (4.0±0.7, 28.9±5.1)
 T2: 44±6 (4.5±0.6, 32.5±4.3)
 T3: 66±10 (6.7±1.0, 48.5±7.2)
 T4: 123±15 (12.5±1.5, 90±11)
 T5: 172±20 (17.5±2, 127±14)

- 1) Separate front exhaust pipe and rear exhaust pipe.
- 2) Remove rear exhaust pipe and muffler.
- 3) Remove rear differential. <Ref. to 3-4 [W2B0].>
- 4) Disconnect link front from sub frame. <Ref. to 4-1 [W8A0].>
- 5) Disconnect link rear from sub frame. <Ref. to 4-1 [W9A0].>
- 6) Disconnect link upper from sub frame. <Ref. to 4-1 [W10A0].>

- 7) Place transmission jack under sub frame.



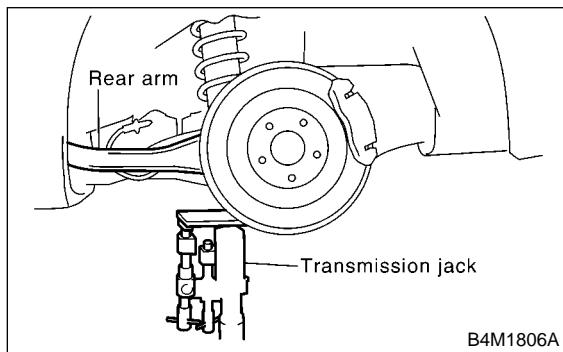
- 8) After removing bolts, remove sub frame and support sub frame from vehicle body.

B: INSPECTION

Check removed parts for wear, damage and cracks, and correct or replace if defective.

C: INSTALLATION

- 1) Install in reverse order of removal.
- 2) For installation and tightening torque of rear differential. <Ref. to 3-4 [W2F0].>
- 3) Using transmission jack, support rear arm horizontally and tighten nuts and bolts securing rear arm, link front, link rear, link upper and shock absorber.



NOTE:

Check wheel alignment and adjust if necessary.

1. Suspension

A: IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible causes	Countermeasures
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Unsmooth operation of damper strut and/or shock absorber	Replace.
(3) Installation of wrong strut and/or shock absorber	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

B: POOR RIDE COMFORT

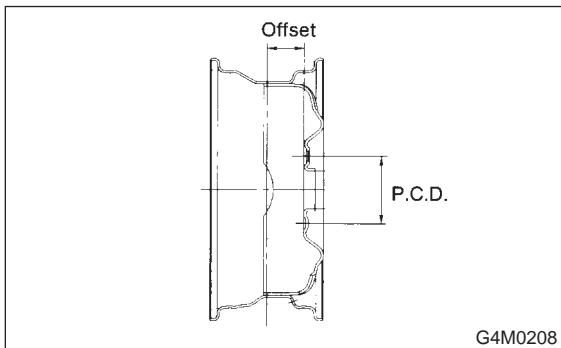
- 1) Large rebound shock
- 2) Rocking of vehicle continues too long after running over bump and/or hump.
- 3) Large shock in bumping

Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Overinflation pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace coil springs with new ones.
(4) Fault in operation of damper strut and/or shock absorber	Replace.
(5) Damage or deformation of strut mount and/or shock absorber mount	Replace.
(6) Unsuitability of maximum and/or minimum length of damper strut and/or shock absorber	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly and/or shock absorber	Replace.
(9) Oil leakage of damper strut and/or shock absorber	Replace.

C: NOISE

Possible causes	Countermeasures
(1) Wear or damage of damper strut and/or shock absorber component parts	Replace.
(2) Loosening of suspension link installing bolt	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum and/or minimum length of damper strut and/or shock absorber	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

1. Tire and Wheel Size



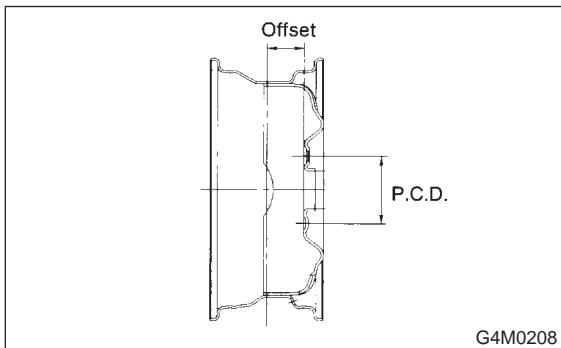
		Tire size	Rim size	Rim offset	P.C.D.
Except OUTBACK	Front and Rear	P195/60R15 87H	15 × 6JJ	55 mm (2.17 in)	100 mm (3.94 in) dia.
		P205/60R15 90H	15 × 6JJ	55 mm (2.17 in)	
		P205/55R16 89H	16 × 6 1/2JJ	55 mm (2.17 in)	
	T-type tire	T135/70D16	16 × 4T	50 mm (1.97 in)	
OUTBACK	Front and Rear	P225/60R16 97H	16 × 6 1/2JJ	48 mm (1.89 in)	
	T-type tire	T145/80R16	16 × 4T	50 mm (1.97 in)	

NOTE: "T-type" tire for temporary use is supplied as a spare tire.

2. Tire Inflation Pressure

		Tire size	Tire inflation pressure kPa (kg/cm ² , psi)			
			Light load	Full load	Trailler towing	
Except OUTBACK	Front and Rear	P195/60R15 87H	Ft: 230 (2.3, 33), Rr: 220 (2.2, 32)		—	
		P205/60R15 90H	Ft: 220 (2.2, 32), Rr: 210 (2.1, 30)			
		P205/55R16 89H				
	T-type tire	T135/70D16	420 (4.2, 60)		—	
OUTBACK model	Front and Rear	225/60R16 97H	Ft: 210 (2.1, 30) Rr: 200 (2.0, 29)	Ft: 220 (2.2, 32) Rr: 250 (2.5, 36)	Ft: 200 (2.0, 2.9) Rr: 220 (2.2, 32)	
	T-type tire	T145/80R16	420 (4.2, 60)		—	

1. Tire and Wheel Size



		Tire size	Rim size	Rim offset	P.C.D.
Except OUTBACK	Front and Rear	P195/60R15 87H	15 × 6JJ	55 mm (2.17 in)	100 mm (3.94 in) dia.
		P205/60R15 90H	15 × 6JJ	55 mm (2.17 in)	
		P205/55R16 89H	16 × 6 1/2JJ	55 mm (2.17 in)	
	T-type tire	T135/70D16	16 × 4T	50 mm (1.97 in)	
OUTBACK	Front and Rear	P225/60R16 97H	16 × 6 1/2JJ	48 mm (1.89 in)	
	T-type tire	T145/80R16	16 × 4T	50 mm (1.97 in)	

NOTE: "T-type" tire for temporary use is supplied as a spare tire.

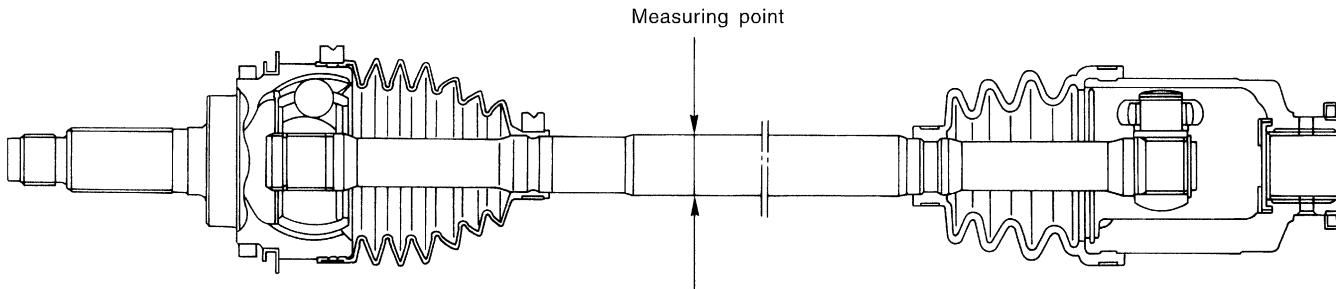
2. Tire Inflation Pressure

		Tire size	Tire inflation pressure kPa (kg/cm ² , psi)			
			Light load	Full load	Trailler towing	
Except OUTBACK	Front and Rear	P195/60R15 87H	Ft: 230 (2.3, 33), Rr: 220 (2.2, 32)		—	
		P205/60R15 90H	Ft: 220 (2.2, 32), Rr: 210 (2.1, 30)			
		P205/55R16 89H				
	T-type tire	T135/70D16	420 (4.2, 60)		—	
OUTBACK model	Front and Rear	225/60R16 97H	Ft: 210 (2.1, 30) Rr: 200 (2.0, 29)	Ft: 220 (2.2, 32) Rr: 250 (2.5, 36)	Ft: 200 (2.0, 2.9) Rr: 220 (2.2, 32)	
	T-type tire	T145/80R16	420 (4.2, 60)		—	

3. Front Drive Shaft Assembly

Type of drive shaft assembly	SHAFT
	Shaft diameter
BJ87+SFJ82	26 mm (1.02 in)

•BJ87+SFJ82

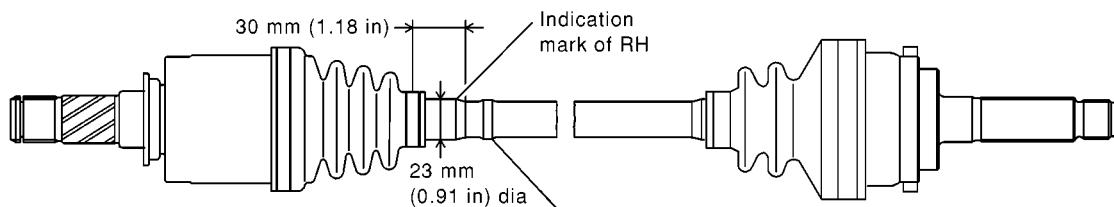


B4M2218A

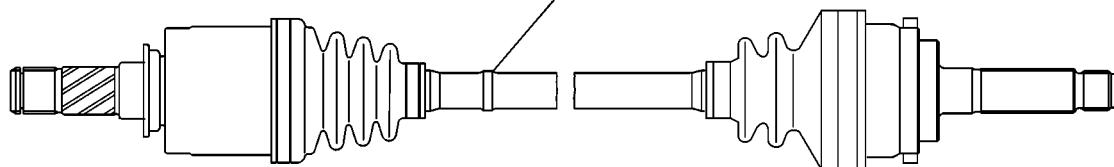
4. Rear Drive Shaft Assembly

Type of axle shaft assembly	SHAFT
	No. of identification, protrusion on shaft
79AC-RH, 79AC-LH	1 (One)

79AC-RH



79AC-LH

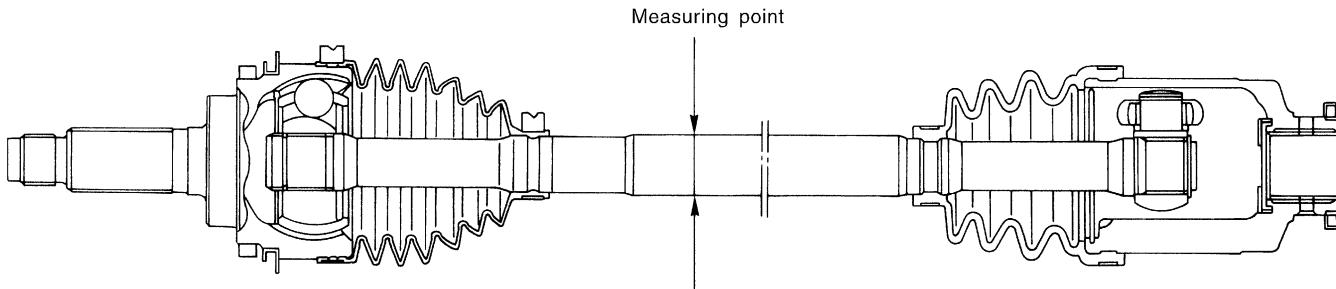


B4M2219A

3. Front Drive Shaft Assembly

Type of drive shaft assembly	SHAFT
	Shaft diameter
BJ87+SFJ82	26 mm (1.02 in)

•BJ87+SFJ82

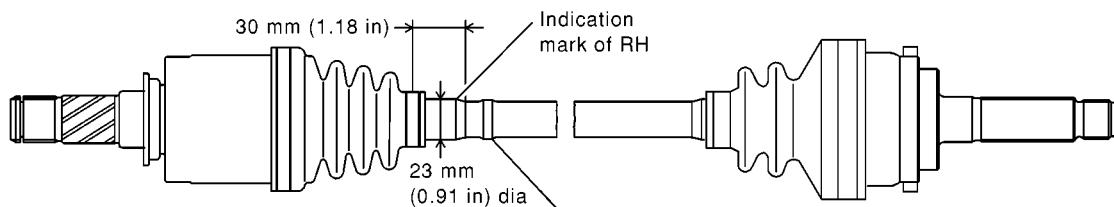


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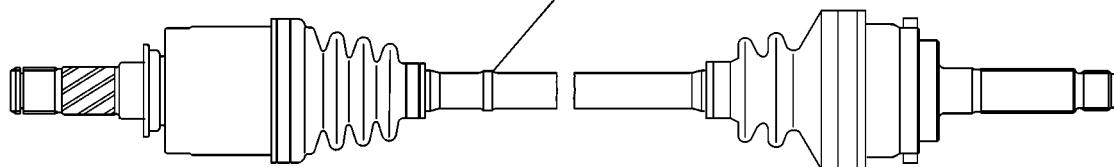
4. Rear Drive Shaft Assembly

Type of axle shaft assembly	SHAFT
	No. of identification, protrusion on shaft
79AC-RH, 79AC-LH	1 (One)

79AC-RH



79AC-LH



B4M2219A

5. Application Table

Front drive shaft	Rear drive shaft
Shaft diameter 26 mm (1.02 in)	
BJ87+SFJ82	79AC-RH, 79AC-LH

6. Wheel Balance

Wheel balancing	Standard	Service limit
Dynamic unbalance	Less than 5 g (0.18 oz)	

Balance weight part number (For steel wheel)	Weight
28101AA001	5 g (0.18 oz)
28101AA011	10 g (0.35 oz)
28101AA021	15 g (0.53 oz)
28101AA031	20 g (0.71 oz)
28101AA041	25 g (0.88 oz)
28101AA051	30 g (1.06 oz)
28101AA061	35 g (1.23 oz)
28101AA071	40 g (1.41 oz)
28101AA081	45 g (1.59 oz)
28101AA091	50 g (1.76 oz)
—	55 g (1.94 oz)
28101AA111	60 g (2.12 oz)

Balance weight part number (For aluminum wheel)	Weight
23141GA462	5 g (0.18 oz)
23141GA472	10 g (0.35 oz)
23141GA482	15 g (0.53 oz)
23141GA492	20 g (0.71 oz)
23141GA502	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

5. Application Table

Front drive shaft	Rear drive shaft
Shaft diameter 26 mm (1.02 in)	
BJ87+SFJ82	79AC-RH, 79AC-LH

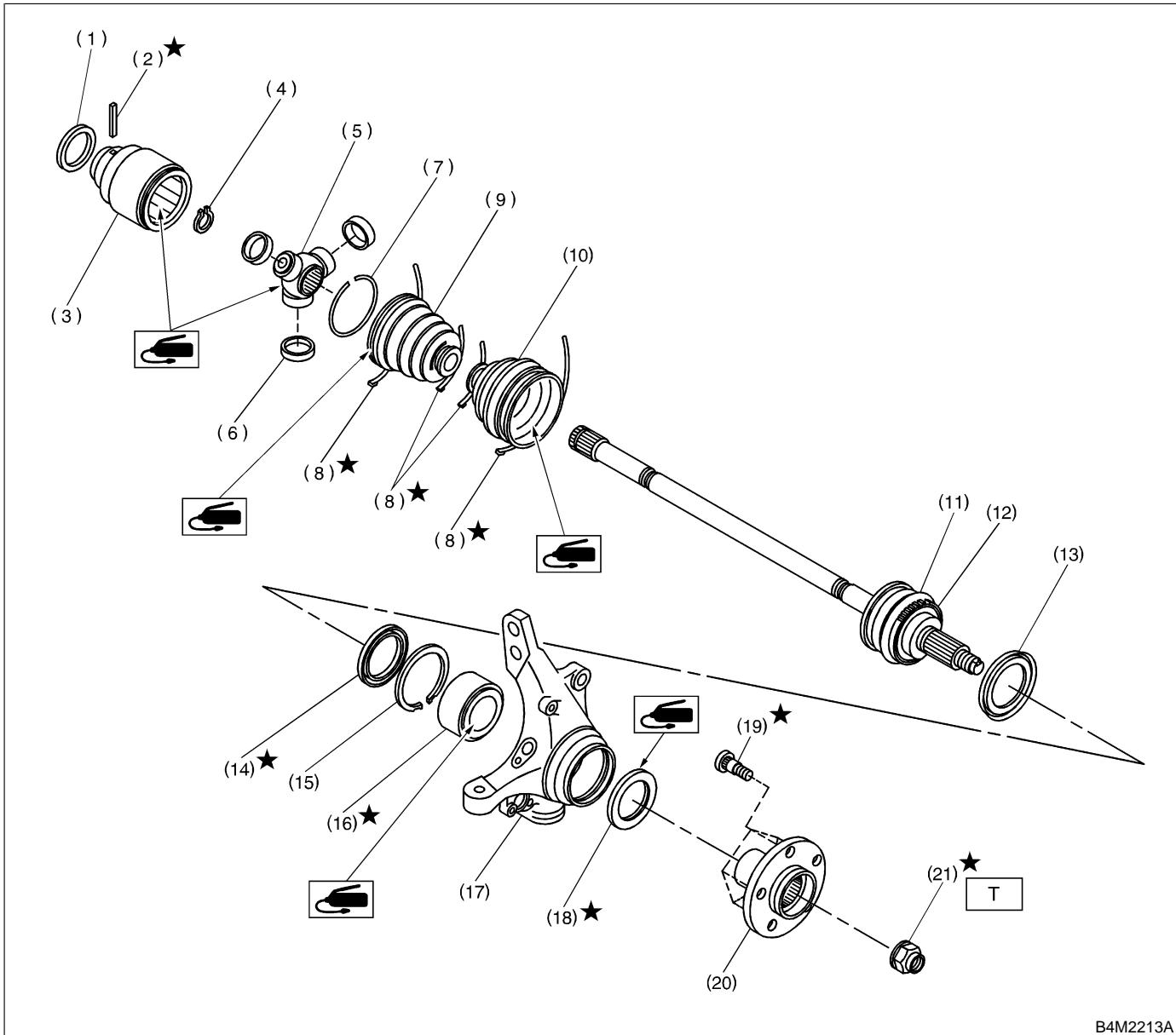
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Wheel balancing	Standard	Service limit
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23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

1. Front Axle



B4M2213A

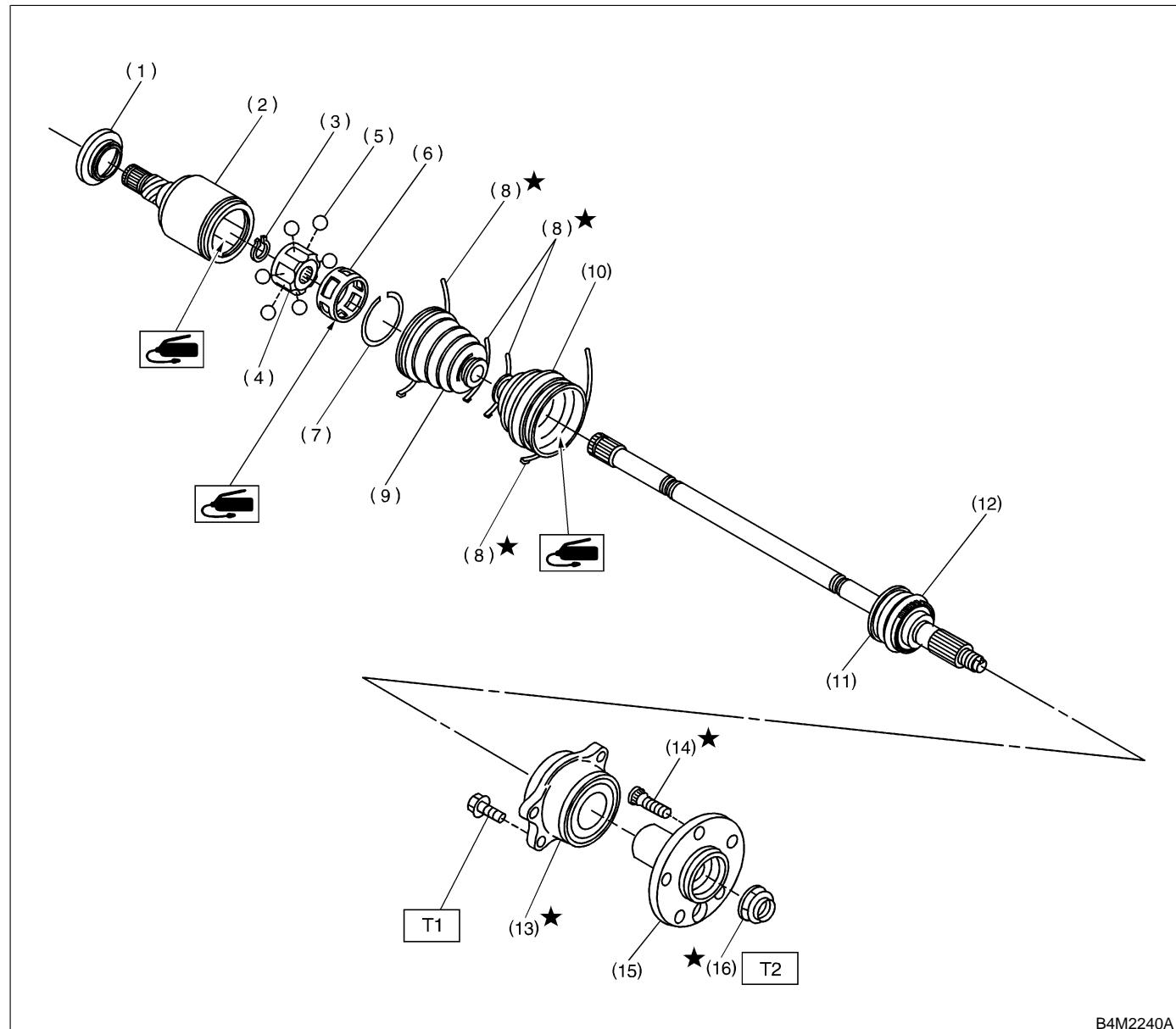
- (1) Baffle plate (SFJ)
- (2) Spring pin
- (3) Outer race (SFJ)
- (4) Snap ring
- (5) Trunnion
- (6) Free ring
- (7) Circlip
- (8) Boot band
- (9) Boot band

- (10) Boot (BJ)
- (11) BJ ASSY
- (12) Tone wheel
- (13) Baffle plate
- (14) Oil seal (IN)
- (15) Snap ring
- (16) Bearing
- (17) Housing
- (18) Oil seal (OUT)

- (19) Hub bolt
- (20) Hub
- (21) Axle nut (Gold color)

Tightening torque: N·m (kg·m, ft·lb)
T: 186±20 (19±2, 137±14)

2. Rear Axle



B4M2240A

- (1) Baffle plate (DOJ)
- (2) Outer race (DOJ)
- (3) Snap ring
- (4) Inner race
- (5) Ball
- (6) Cage
- (7) Circlip

- (8) Boot band
- (9) Boot (DOJ)
- (10) Boot (BJ)
- (11) BJ ASSY
- (12) Tone wheel
- (13) Hub unit bearing
- (14) Hub bolt

- (15) Hub
- (16) Axle nut (Olive color)

Tightening torque: N·m (kg·m, ft·lb)

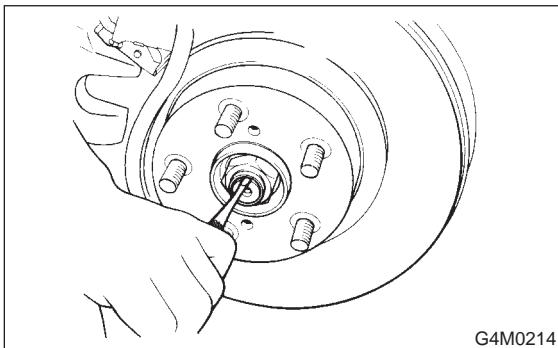
T1: 66 ± 10 (6.7 ± 1.0 , 48.5 ± 7.2)

T2: 235 ± 20 (24 ± 2 , 174 ± 14)

1. Front Axle

A: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, support it with safety stands, and remove front wheels.
- 3) Unlock axle nut.

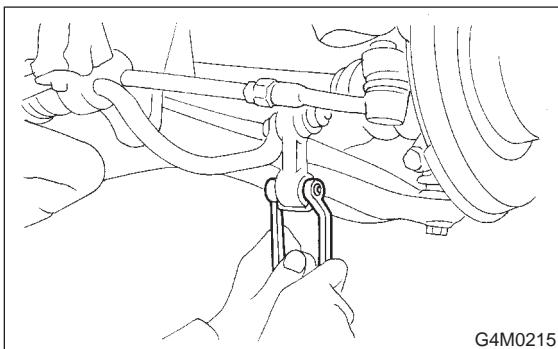


- 4) Remove axle nut using a socket wrench.

CAUTION:

Be sure to loose and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

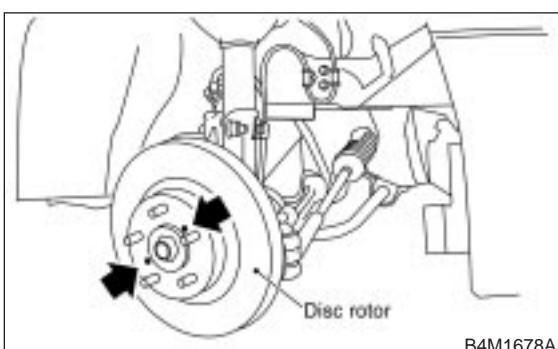
- 5) Remove stabilizer link.



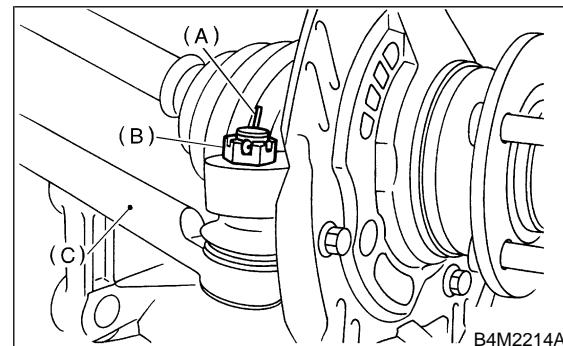
- 6) Remove disc brake caliper from housing, and suspend it from strut using a wire.

- 7) Remove disc rotor from hub.

If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on the rotor.

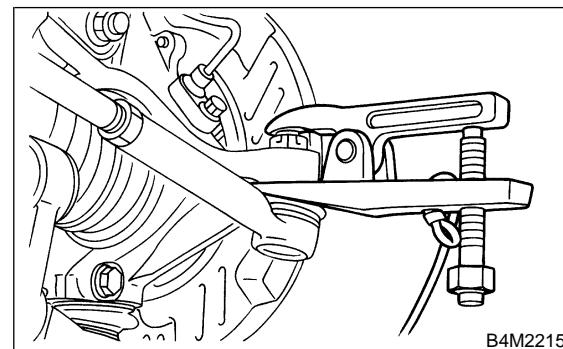


- 8) Remove cotter pin and castle nut which secure tie-rod end to housing knuckle arm.

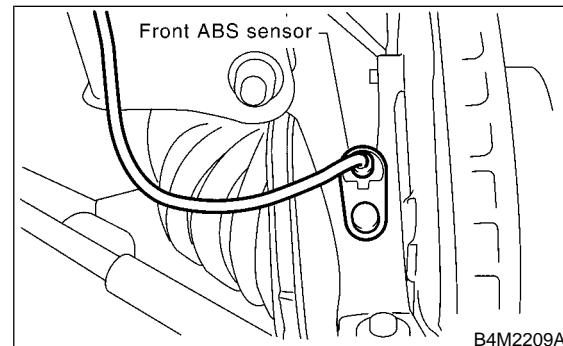


(A) Cotter pin
 (B) Castle nut
 (C) Tie-rod

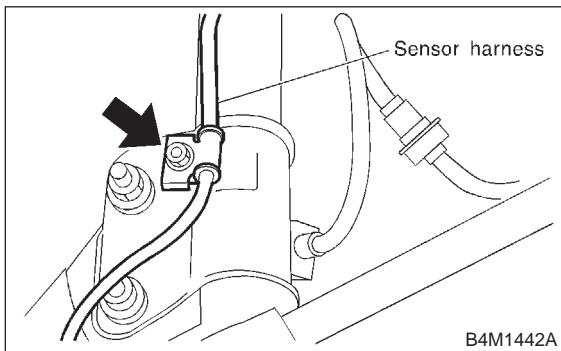
- 9) Using a puller, remove tie-rod ball joint from knuckle arm.



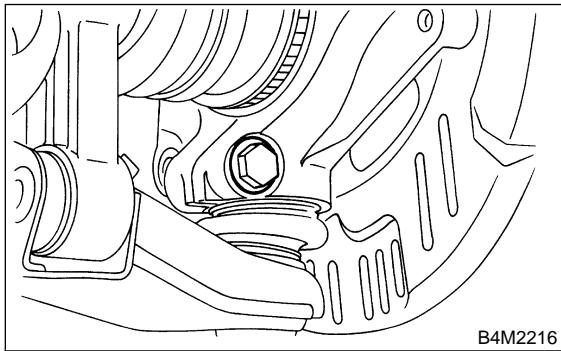
- 10) Remove ABS sensor assembly and harness in advance.



11) Remove bolt which secures sensor harness to strut.



12) Remove transverse link ball joint from housing.

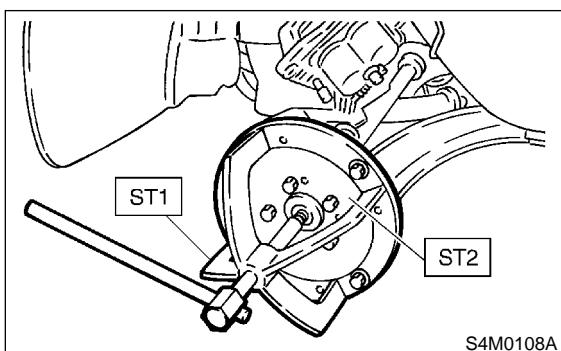


13) Remove SFJ from transmission spindle.
14) Remove front drive shaft assembly from hub.
If it is hard to remove, use STs.

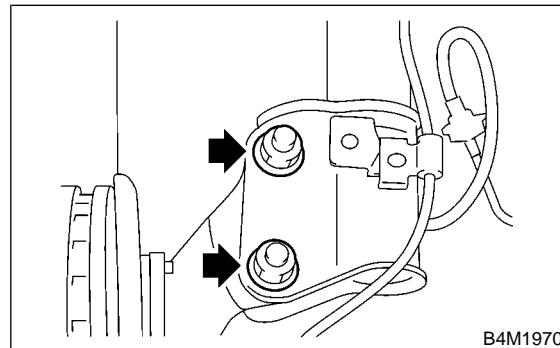
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:

- Be careful not to damage oil seal lip and tone wheel when removing front drive shaft.
- When replacing front drive shaft, also replace inner oil seal.



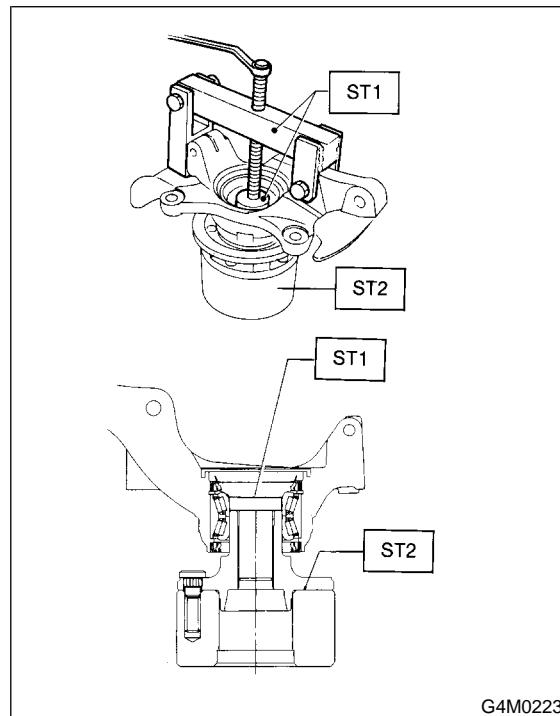
15) After scribing an alignment mark on camber adjusting bolt head, remove bolts which connect housing and strut, and disconnect housing from strut.



B: DISASSEMBLY

1) Using ST1, support housing and hub securely.
2) Attach ST2 to housing and drive hub out.

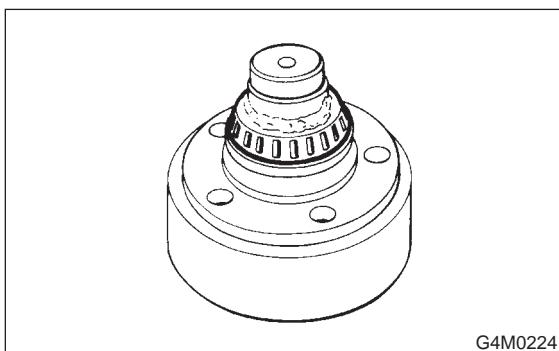
ST1 927060000 HUB REMOVER
ST2 927080000 HUB STAND



If inner bearing race remains in the hub, remove it with a suitable tool (commercially available).

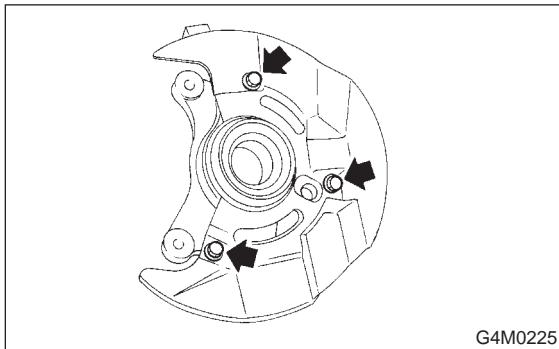
CAUTION:

- Be careful not to scratch polished area of hub.
- Be sure to install inner race on the side of outer race from which it was removed.



G4M0224

3) Remove disc cover from housing.



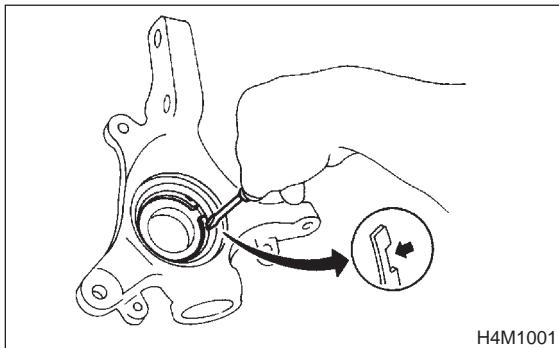
G4M0225

4) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:

Do not use old oil seals.

5) Using flat bladed screwdriver, remove snap ring.



H4M1001

6) Using ST1, support housing securely.

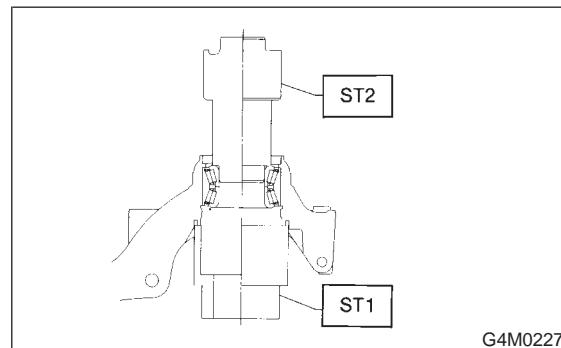
7) Using ST2, press inner race to drive out outer bearing.

ST1 927400000 HOUSING STAND

ST2 927100000 BEARING REMOVER

CAUTION:

- Do not remove outer race unless it is faulty.
- Discard outer race after removal.
- Do not replace inner or outer race separately; always replace as a unit.



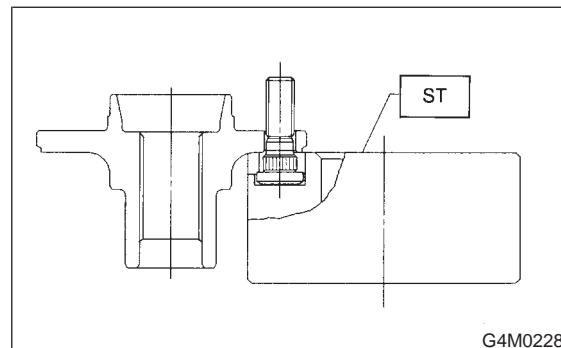
G4M0227

8) Using ST and a hydraulic press, drive hub bolts out.

ST 927080000 HUB STAND

CAUTION:

Be careful not to hammer hub bolts. This may deform hub.



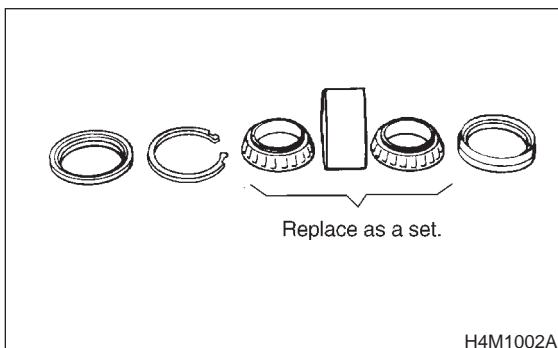
G4M0228

C: INSPECTION

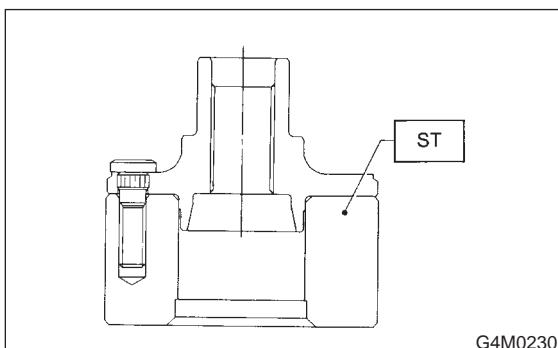
Check the removed parts for wear and damage. If defective, replace with new ones.

CAUTION:

- If bearing is faulty, replace it as the bearing set.
- Be sure to replace oil seal at every overhaul.

**D: ASSEMBLY**

1) Attach hub to ST securely.
ST 927080000 HUB STAND



2) Using a hydraulic press, press new hub bolts into place.

CAUTION:

Be sure to press hub bolts until their seating surfaces contact the hub.

NOTE:

Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

3) Clean dust or foreign particles from inside the housing.

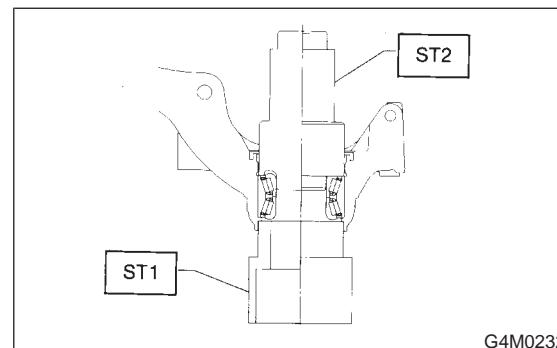
4) Using ST1 and ST2, press a new bearing into place.

ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

CAUTION:

- Always press outer race when installing bearing.
- Be careful not to remove plastic lock from inner race when installing bearing.
- Charge bearing with new grease when outer race is not removed.

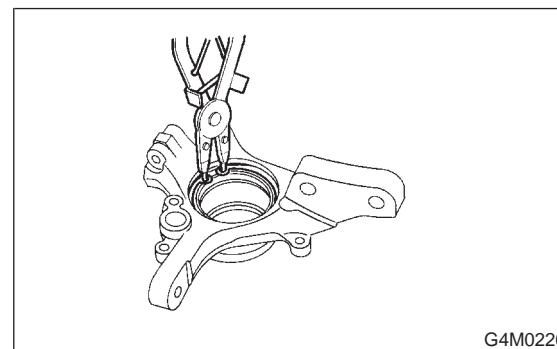
Specified grease:
SHELL 6459N



5) Using pliers, install snap ring in its groove.

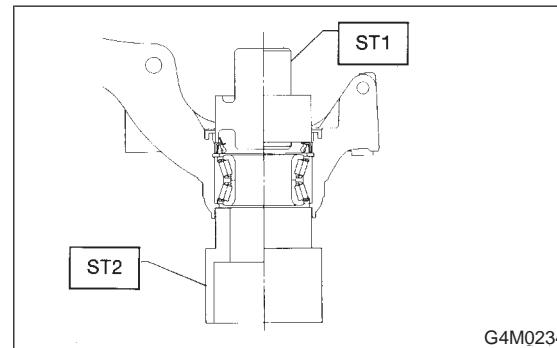
CAUTION:

Make sure to install it firmly to groove.

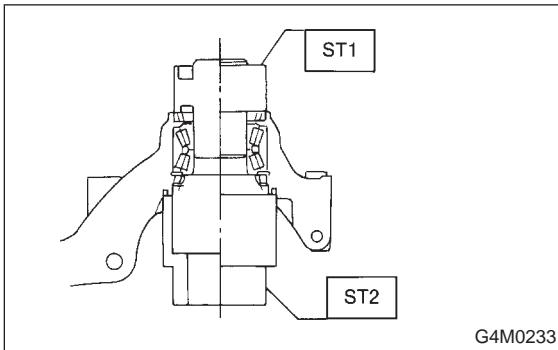


6) Using ST1 and ST2, press inner oil seal until it contacts circlip.

ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



7) Invert ST and housing.
 ST 927400000 HOUSING STAND
 8) Using ST1 and ST2, press outer oil seal until it contacts the bottom of housing.
 ST1 927410000 OIL SEAL INSTALLER
 ST2 927400000 HOUSING STAND



9) Apply sufficient grease to oil seal lip.

Specified grease
SHELL 6459N

CAUTION:

- If specified grease is not available, remove bearing grease and apply Auto Rex A instead.
- Do not mix different types of grease.

10) Install disc cover to housing the three bolts.

Tightening torque:

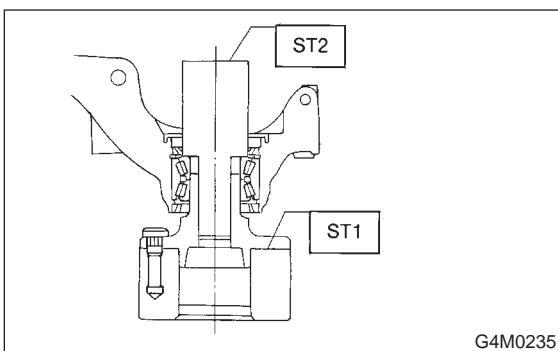
$18 \pm 5 \text{ N}\cdot\text{m} (1.8 \pm 0.5 \text{ kg}\cdot\text{m}, 13.0 \pm 3.6 \text{ ft-lb})$

11) Attach hub to ST1 securely.

12) Clean dust or foreign particles from the polished surface of hub.

13) Using ST2, press bearing into hub by driving inner race.

ST1 927080000 HUB STAND
 ST2 927120000 HUB INSTALLER



E: INSTALLATION

1) Install transverse link ball joint to housing.

Tightening torque:

$49 \pm 10 \text{ N}\cdot\text{m} (5.0 \pm 1.0 \text{ kg}\cdot\text{m}, 36 \pm 7 \text{ ft-lb})$

2) While aligning alignment mark on camber adjusting bolt head, connect housing and strut.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$177 \pm 20 \text{ N}\cdot\text{m} (18.0 \pm 2.0 \text{ kg}\cdot\text{m}, 130 \pm 14 \text{ ft-lb})$

3) Install ABS sensor on housing.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m} (3.3 \pm 1.0 \text{ kg}\cdot\text{m}, 23.9 \pm 7.2 \text{ ft-lb})$

4) Install ABS sensor harness on strut.

5) Install disc rotor on hub.

6) Install disc brake caliper on housing.

Tightening torque:

$78 \pm 10 \text{ N}\cdot\text{m} (8 \pm 1.0 \text{ kg}\cdot\text{m}, 57.9 \pm 7.2 \text{ ft-lb})$

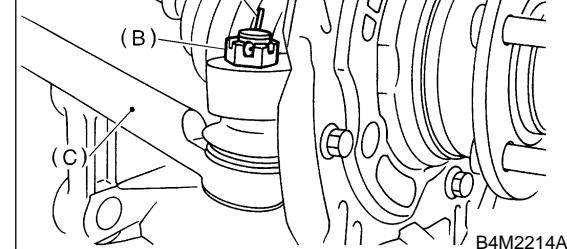
7) Install front drive shaft. <Ref. to 4-2 [W3E1].>

8) Connect stabilizer link.

9) Connect tie-rod end ball joint and knuckle arm with a castle nut, and insert cotter pin into tie-rod end.

Tightening torque:

$27.0 \pm 2.5 \text{ N}\cdot\text{m} (2.75 \pm 0.25 \text{ kg}\cdot\text{m}, 19.9 \pm 1.8 \text{ ft-lb})$



(A) Cotter pin

(B) Castle nut

(C) Tie-rod

10) While depressing brake pedal, tighten axle nut and lock it securely.

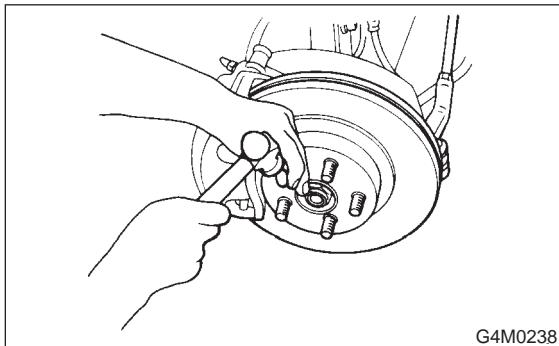
Tightening torque:

$186 \pm 20 \text{ N}\cdot\text{m} (19 \pm 2 \text{ kg}\cdot\text{m}, 137 \pm 14 \text{ ft-lb})$

CAUTION:

- Use a new axle nut for front use only (gold color).
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

11) After tightening axle nut, lock it securely.



12) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ kg}\cdot\text{m}$, $65 \pm 7 \text{ ft}\cdot\text{lb}$)

2. Rear Axle

A: REMOVAL

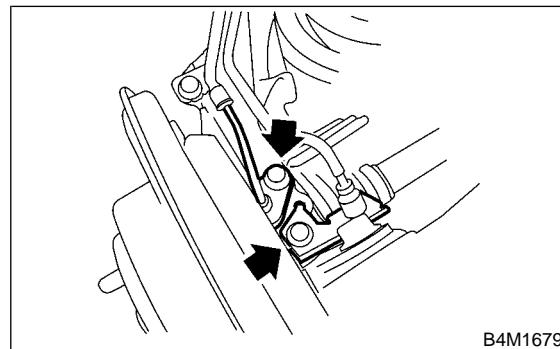
1. DISC BRAKE

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, and remove rear wheel cap and wheels.

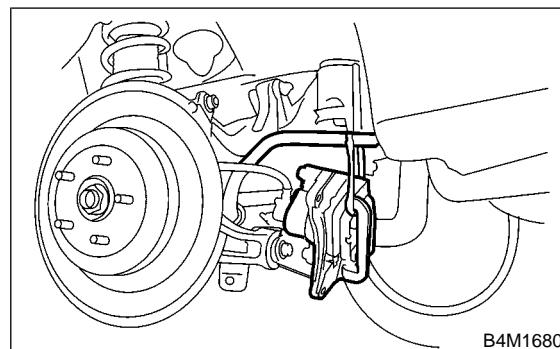
CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.
- 5) Return parking brake lever.
- 6) Remove ABS sensor.



7) Remove brake caliper from back plate and suspend it from stabilizer using a piece of wire.

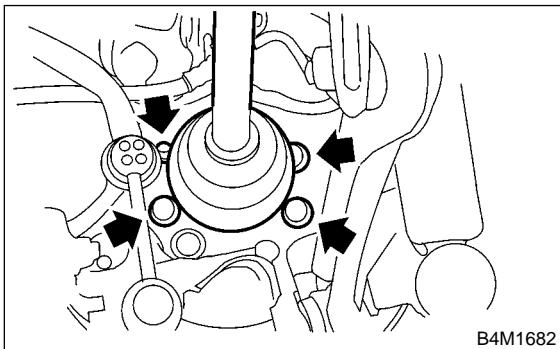


8) Remove disc rotor from hub.

NOTE:

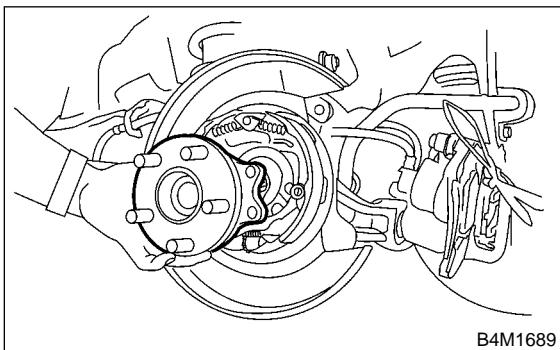
- Before removing disc rotor, mark the matching surface of hub and disc rotor so as not to be confused when installing.
- If disc rotor seizes up within hub, drive it out by installing an 8 mm bolt into disc rotor bolt hole.

9) Remove four bolts from rear arm.



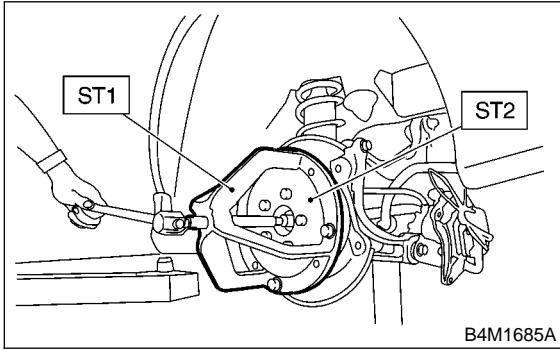
10) Remove hub unit bearing.

CAUTION:
Be careful not to damage tone wheel.



If it is hard to remove, use STs.

ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE



2. DRUM BRAKE

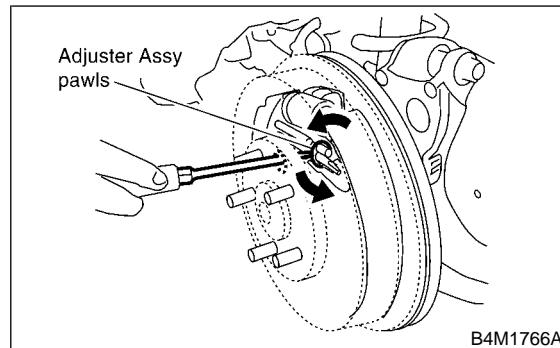
- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, and remove rear wheel cap and wheels.

CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

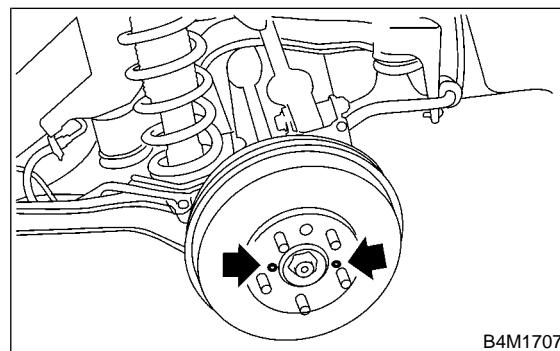
- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.
- 5) Return parking brake lever.
- 6) Remove brake drum from hub.

7) If it is difficult to remove brake drum, turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.

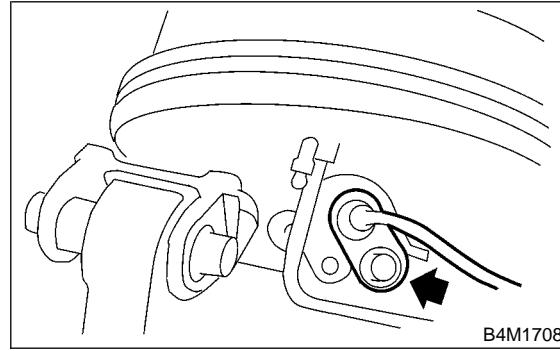


NOTE:

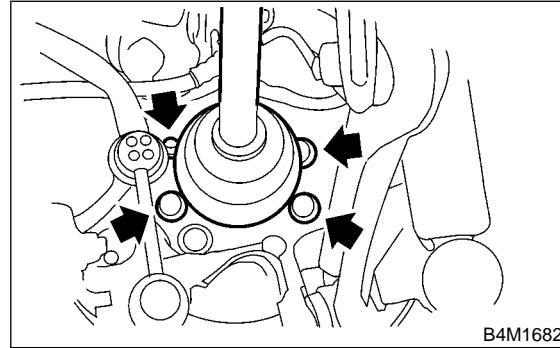
If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.



8) Remove ABS sensor.



9) Remove four bolts from rear arm.



10) Remove hub unit bearing.

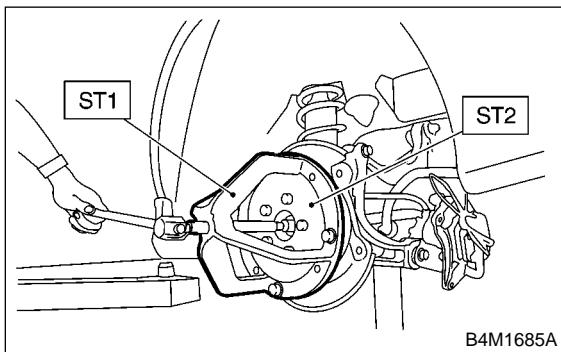
If it is hard to remove, use STs.

ST1 926470000 AXLE SHAFT PULLER

ST2 927140000 PLATE

CAUTION:

Be careful not to damage tone wheel.



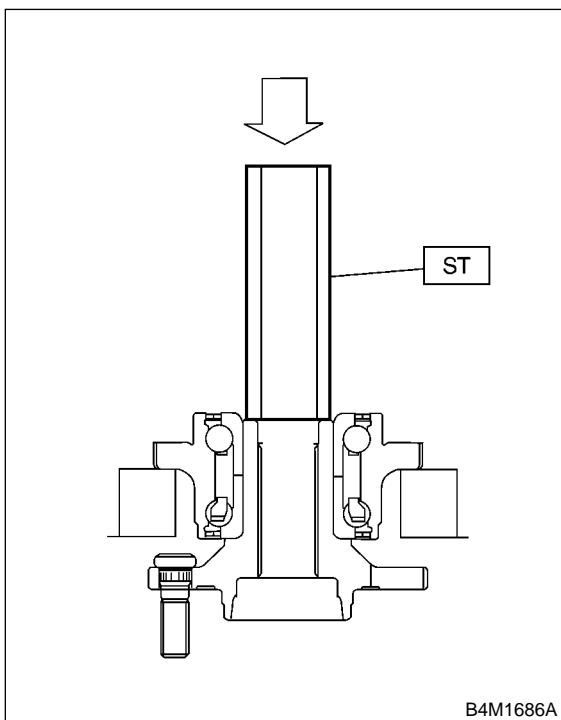
B: DISASSEMBLY

1) Using ST, remove hub unit from hub assembly.

CAUTION:

Securely set hub assembly so that it does not lean.

ST 398507703 DUMMY COLLAR



2) Using ST and a puller (common hand tool), remove bearing inner race.

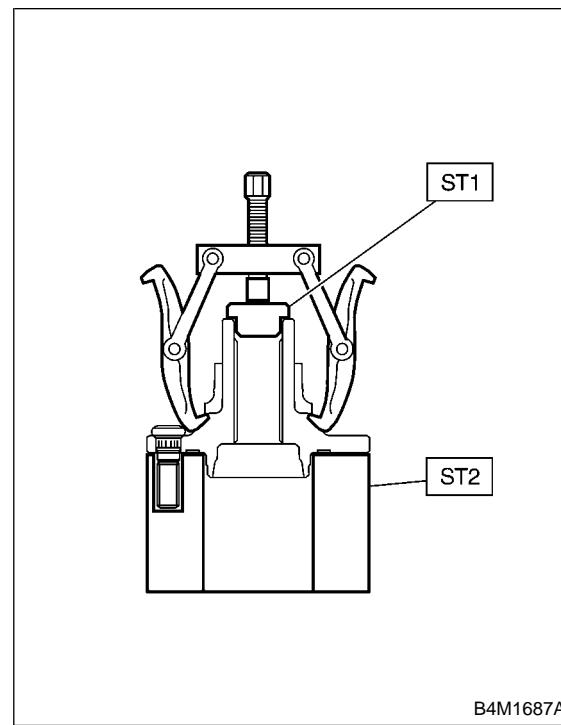
ST1 399520105 SEAT

ST2 927080000 HUB STAND

CAUTION:

- Do not remove hub unit bearing unless damaged.

- Do not re-use hub unit bearing after removal.

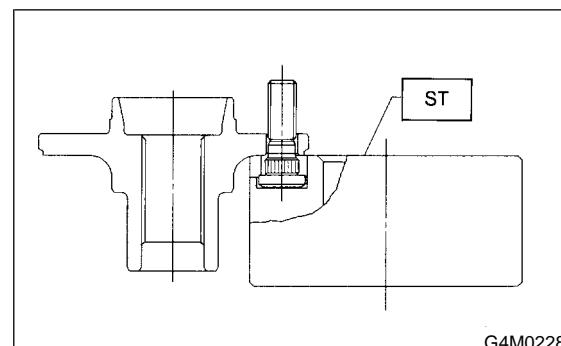


3) Using ST, press hub bolt out.

ST 927080000 HUB STAND

CAUTION:

Be careful not to hammer hub bolts. This may deform hub.



C: INSPECTION

Check the removed parts for wear and damage. If defective, replace with new ones.

CAUTION:

If a bearing is faulty, replace it as a hub unit bearing.

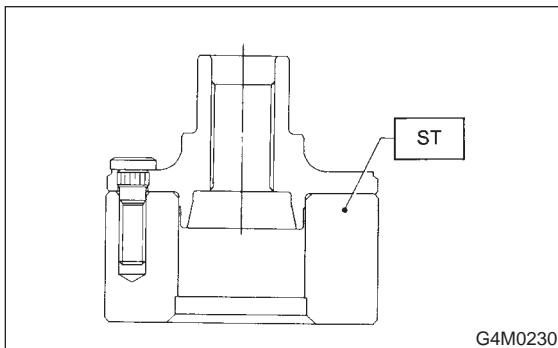
D: ASSEMBLY

1) Using ST, press new hub bolt into place.

CAUTION:

- Ensure hub bolt closely contacts hub.
- Use a 12 mm (0.47 in) hole in the ST to prevent hub bolt from tilting during installation.

ST 927080000 HUB STAND

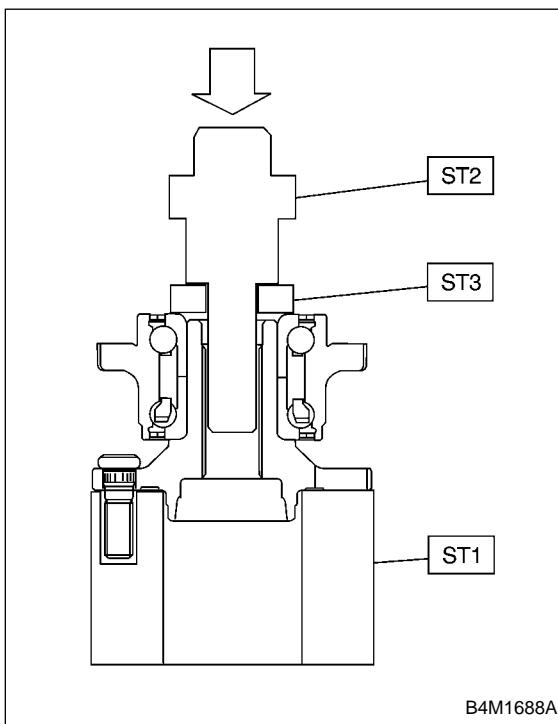


2) Using ST1, ST2 and ST3, press hub unit bearing into hub.

ST1 927080000 HUB STAND

ST2 927450000 HUB INSTALLER

ST3 28499AE000 SPACER

**CAUTION:**

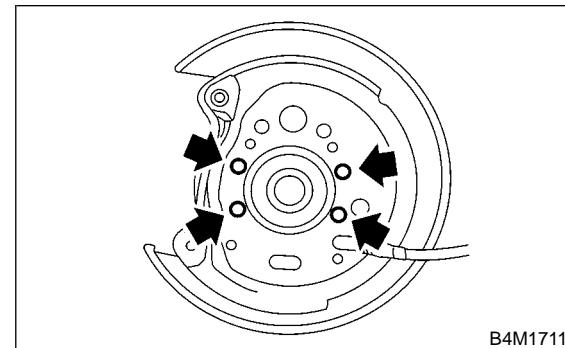
- Always press inner race when installing hub unit bearing.
- Use a new hub unit bearing.

E: INSTALLATION**1. DISC BRAKE**

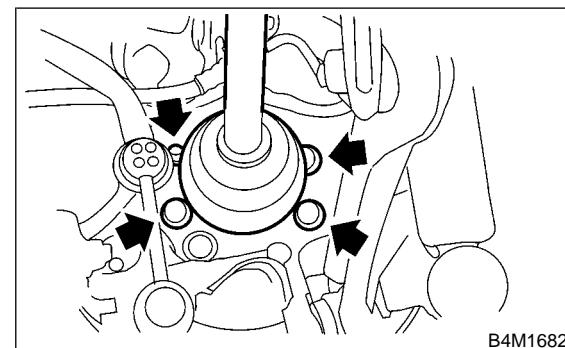
1) Align hub unit bearing with back plate at mounting holes and install hub unit assembly and back plate. Temporarily tighten axle nuts.

CAUTION:

Be careful not to damage tone wheel.



2) Tighten four bolts to back plate.

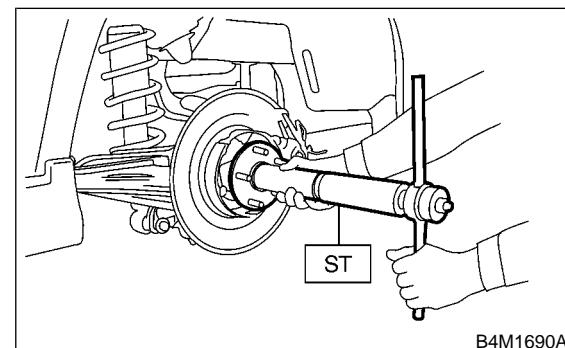


3) Remove axle nut.

4) Using ST1 and ST2, pull axle shaft into place.

ST1 922431000 AXLE SHAFT INSTALLER

ST2 927390000 ADAPTER



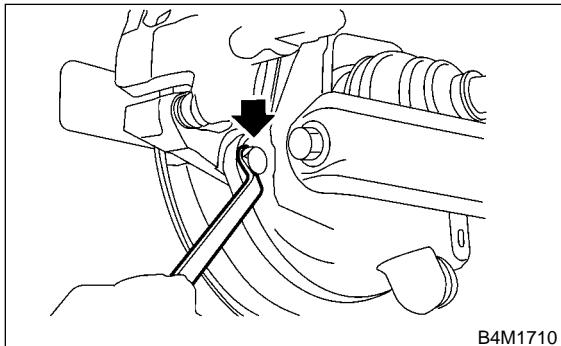
5) Temporarily tighten axle nuts.

6) Install disc rotor on hub.

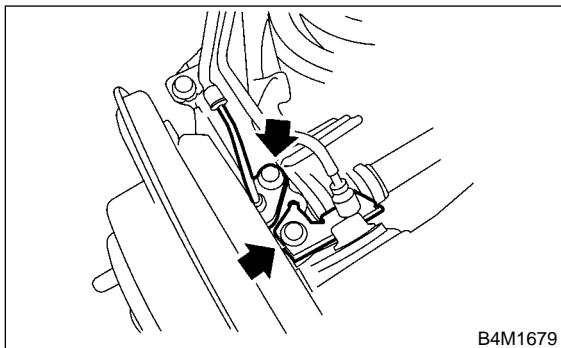
7) Install disc brake caliper on back plate.

Tightening torque:

$52 \pm 6 \text{ N}\cdot\text{m}$ ($5.3 \pm 0.6 \text{ kg}\cdot\text{m}$, $38.3 \pm 4.3 \text{ ft}\cdot\text{lb}$)



8) Install rear ABS sensor and brake cable bracket.



9) Adjust parking brake lever stroke by turning adjuster. *<Ref. to 4-4 [W9B0].>*

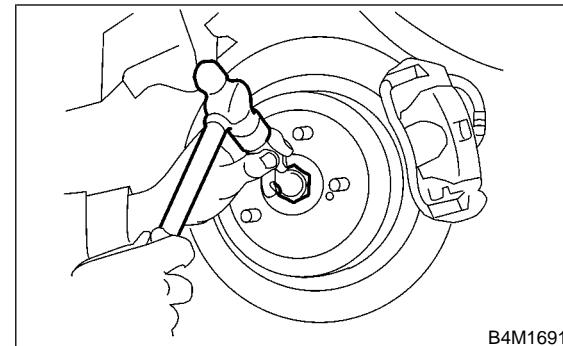
10) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

Tightening torque:

$235 \pm 20 \text{ N}\cdot\text{m}$ ($24 \pm 2 \text{ kg}\cdot\text{m}$, $174 \pm 14 \text{ ft}\cdot\text{lb}$)

CAUTION:

- Use a new axle nut for rear use only (Olive color).
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.



11) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:

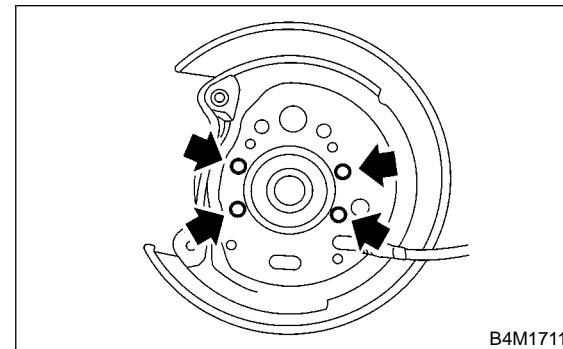
$88 \pm 10 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ kg}\cdot\text{m}$, $65 \pm 7 \text{ ft}\cdot\text{lb}$)

2. DRUM BRAKE

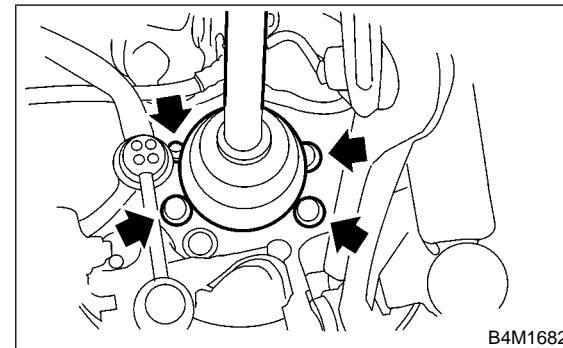
1) Align hub unit bearing with back plate at mounting holes and install hub unit assembly and back plate. Temporarily tighten axle nuts.

CAUTION:

Be careful not to damage tone wheel.

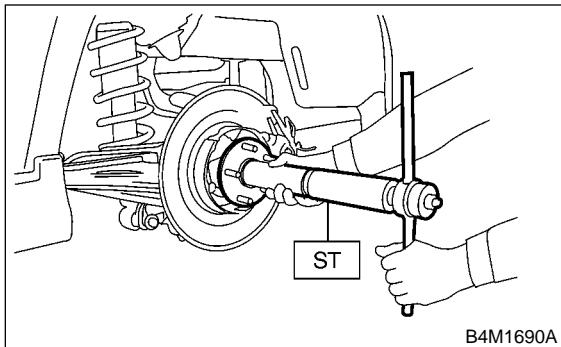


2) Tighten four bolts to back plate.



3) Remove axle nut.

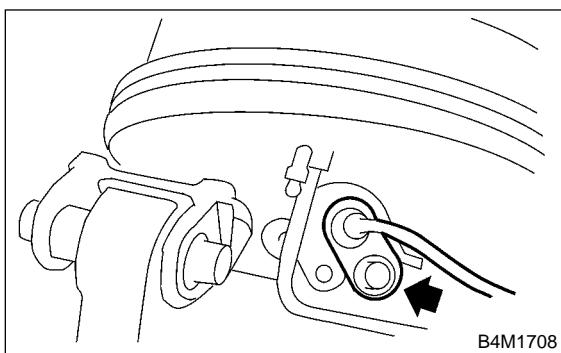
4) Using ST1 and ST2, pull axle shaft into place.
 ST1 922431000 AXLE SHAFT INSTALLER
 ST2 927390000 ADAPTER
 5) Temporarily tighten axle nuts.



6) Install rear ABS sensor.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ (3.3 \pm 1.0 kg-m, 23.9 \pm 7.2 ft-lb)



7) Install brake drum on rear housing assembly.
 8) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

Tightening torque:

$235 \pm 20 \text{ N}\cdot\text{m}$ (24 \pm 2 kg-m, 174 \pm 14 ft-lb)

CAUTION:

- Use a new axle nut for rear use only (Olive color).
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

9) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m}$ (9 \pm 1 kg-m, 65 \pm 7 ft-lb)

3. Front and Rear Drive Shafts

A: REMOVAL

1. FRONT DRIVE SHAFT

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, support it with safety stands (rigid rocks), and remove front wheel cap and wheels.
- 3) Unlock axle nut.
- 4) Depress brake pedal and remove axle nut using a socket wrench.

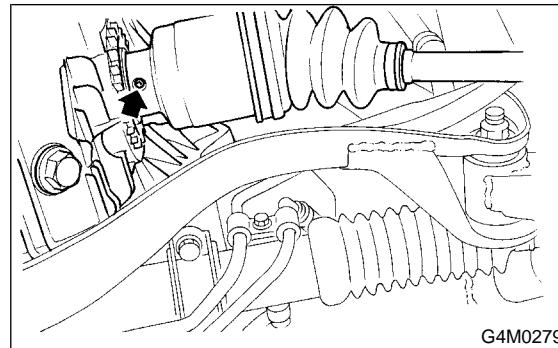
CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 5) Remove stabilizer link from transverse link.
- 6) Disconnect transverse link from housing.
- 7) Remove spring pin which secures transmission spindle to SFJ.

CAUTION:

Use a new spring pin.

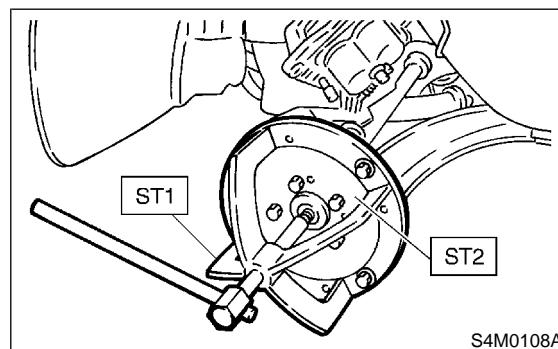


8) Remove front drive shaft assembly. If it is hard to remove, use ST1 and ST2.

ST1 926470000 AXLE SHAFT PULLER
 ST2 927140000 PLATE

CAUTION:

- Be careful not to damage oil seal lip and tone wheel when removing front drive shaft.
- When front drive shaft is to be replaced, also replace inner oil seal.



2. REAR DRIVE SHAFT

- 1) Disconnect ground cable from battery.
- 2) Lift-up vehicle, and remove rear wheel cap and wheels.

CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

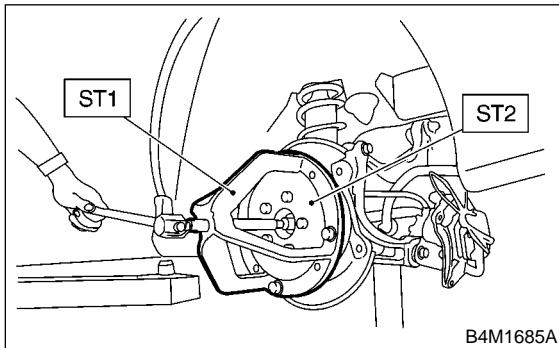
- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.
- 5) Remove rear differential assembly. <Ref. to 3-4 [W2B0].>
- 6) Remove axle nut and drive shaft. If it is hard to remove, use ST1 and ST2.

ST1 926470000 AXLE SHAFT PULLER

ST2 927140000 PLATE

CAUTION:

Be careful not to damage tone wheel when removing rear drive shaft.

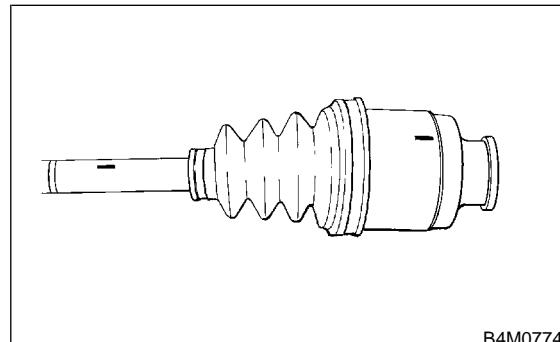


B4M1685A

B: DISASSEMBLY

1. FRONT DRIVE SHAFT

- 1) Place alignment marks on shaft and outer race.

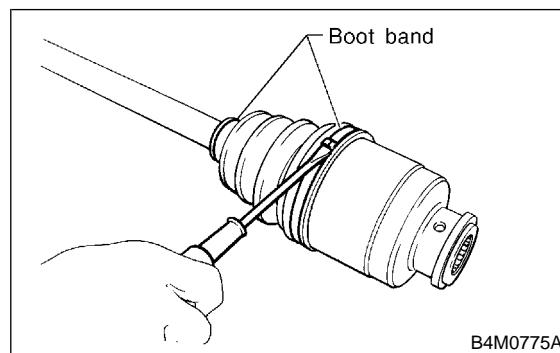


B4M0774

- 2) Remove SFJ boot band and boot.

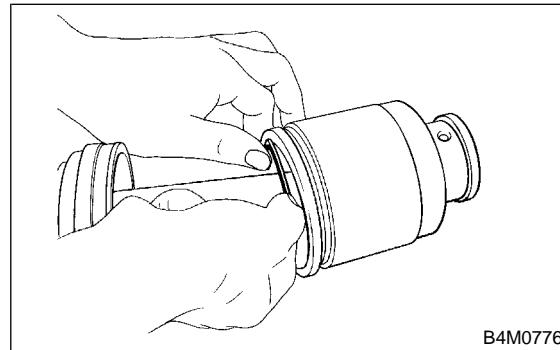
CAUTION:

Be careful not to damage boot.



B4M0775A

- 3) Remove circlip from SFJ outer race using screwdriver.



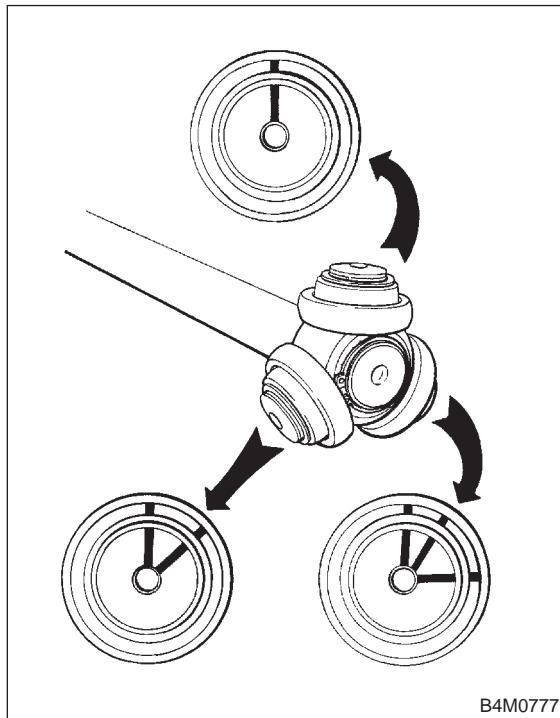
B4M0776

- 4) Remove SFJ outer race from shaft assembly.
- 5) Wipe off grease.

CAUTION:

The grease is a special grease. Do not confuse with other greases.

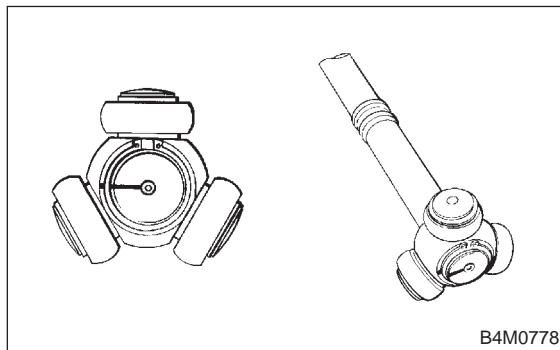
6) Place alignment mark on free ring and trunnion.



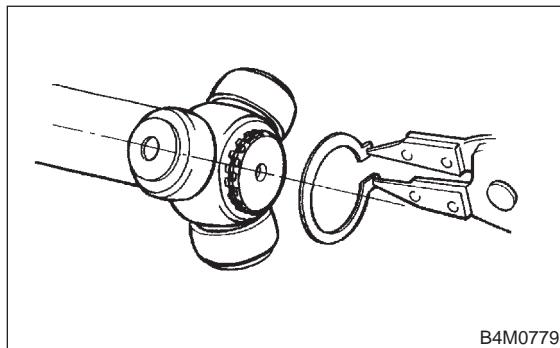
7) Remove free ring from trunnion.

CAUTION:
Be careful with the free ring position.

8) Place alignment mark on trunnion and shaft.



9) Remove snap ring and trunnion.

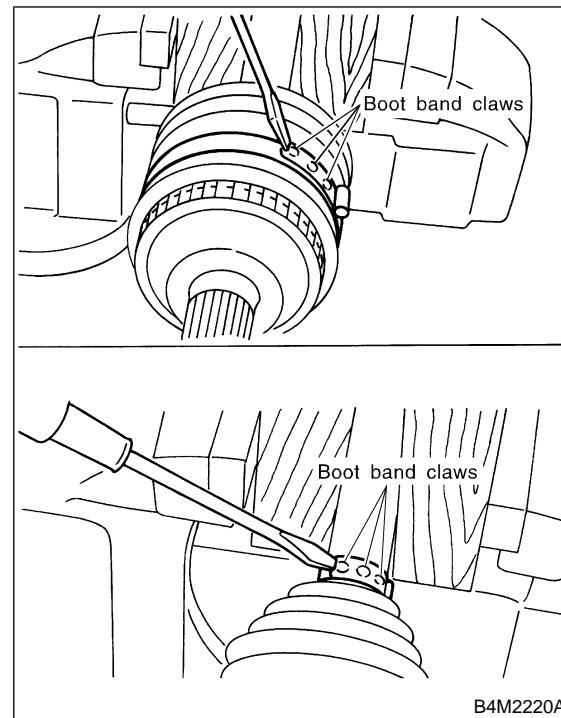


CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

10) Remove SFJ boot.
11) Place drive shaft in a vise between wooden blocks.

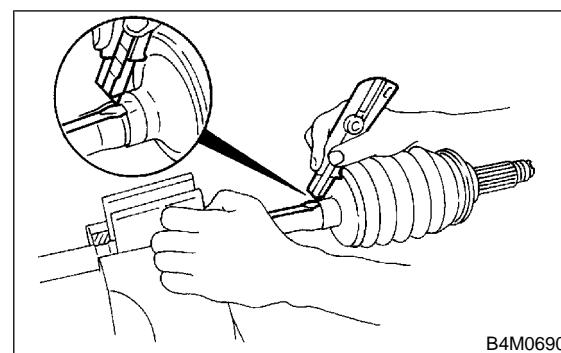
CAUTION:
Do not place drive shaft directly in the vise; use wooden block.

12) Raise boot band claws by means of screwdriver and hammer.



13) Cut and remove the boot.

CAUTION:
The boot must be replaced with a new one whenever it is removed.

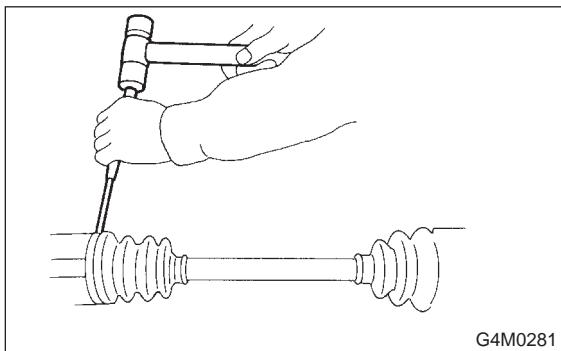


14) Thus, disassembly of axle is completed, but BJ cannot be disassembled.

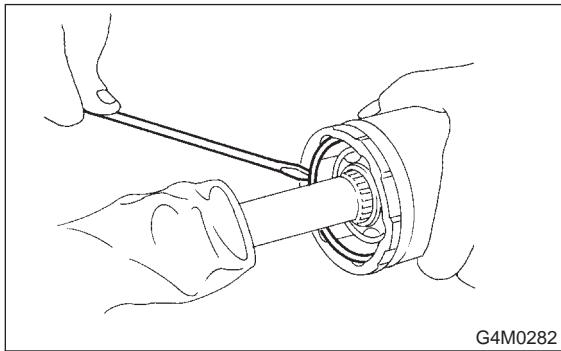
2. REAR DRIVE SHAFT

1) Straighten bent claw of larger end of DOJ boot.

2) Loosen band by means of screwdriver or pliers with care of not damaging boot.



3) Remove boot band on the small end of DOJ boot in the same manner.
 4) Remove the larger end of DOJ boot from DOJ outer race.
 5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.



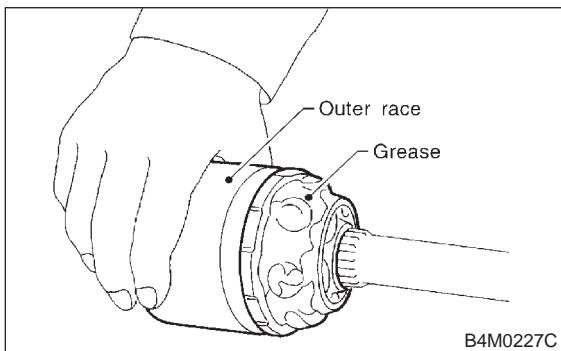
6) Take out DOJ outer race from shaft assembly.
 7) Wipe off grease and take out balls.

CAUTION:

The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.

NOTE:

Disassemble exercising care not to lose balls (6 pcs).



8) To remove the cage from the inner race, turn the cage by a half pitch to the track groove of the inner race and shift the cage.

9) Remove snap ring, which fixes inner race to shaft, by using pliers.
 10) Take out DOJ inner race.
 11) Take off DOJ cage from shaft and remove DOJ boot.

CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

12) Remove BJ boot in the same procedure as DOJ boot.
 13) Thus, disassembly of axle is completed, but BJ is unable to be disassembled.

C: INSPECTION

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.

- 1) DOJ (Double Offset Joint)
 Check seizure, corrosion, damage, wear and excessive play.
- 2) SFJ (Shudder-less Freering tripod Joint)
 Check seizure, corrosion, damage and excessive play.
- 3) Shaft
 Check excessive bending, twisting, damage and wear.
- 4) BJ (Bell Joint)
 Check seizure, corrosion, damage and excessive play.
- 5) Boot
 Check for wear, warping, breakage or scratches.
- 6) Grease
 Check for discoloration or fluidity.

D: ASSEMBLY

1. FRONT DRIVE SHAFT

CAUTION:

Use specified grease.

BJ side:

NTG2218 (Part No. 28093AA000)

SFJ side:

SSG6003 (Part No. 28093TA000)

- 1) Place BJ boot and small boot band on BJ side of shaft.

CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

- 2) Place drive shaft in a vise.

CAUTION:

Do not place drive shaft directly in the vise; use wooden blocks.

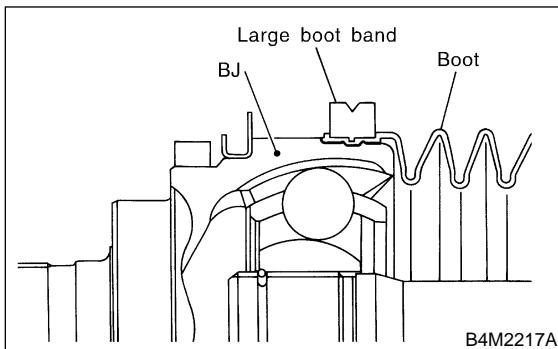
- 3) Apply a coat of specified grease [60 to 70 g (2.12 to 2.47 oz)] to BJ.

4) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.

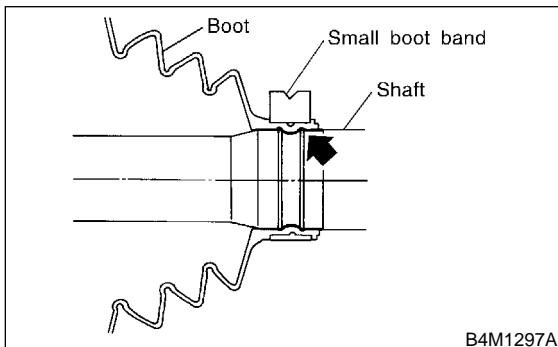
NOTE:

The inside of the larger end of BJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.

5) Install boot projecting portion to BJ groove.

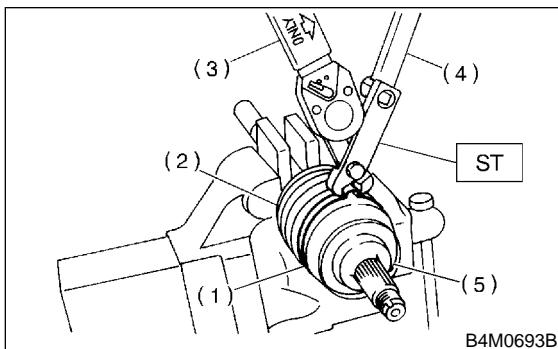


6) Set large boot band in place.
7) Install boot projecting portion to shaft groove.



8) Tighten boot bands using ST, torque wrench and socket flex handle.

ST 28099AC000 BOOT BAND PLIER



- (1) Large boot band
- (2) Boot
- (3) Torque wrench
- (4) Socket flex handle
- (5) BJ

Tightening torque:

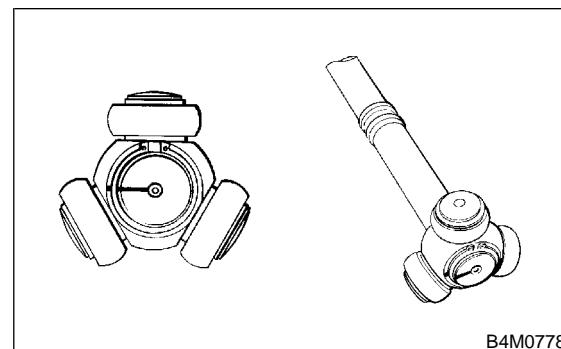
Large boot band

157 N·m (16.0 kg-m, 116 ft-lb) or more

Small boot band

133 N·m (13.6 kg-m, 98 ft-lb) or more

9) Place SFJ boot at the center of shaft.
10) Align alignment marks and install trunnion on shaft.



11) Install snap ring to shaft.

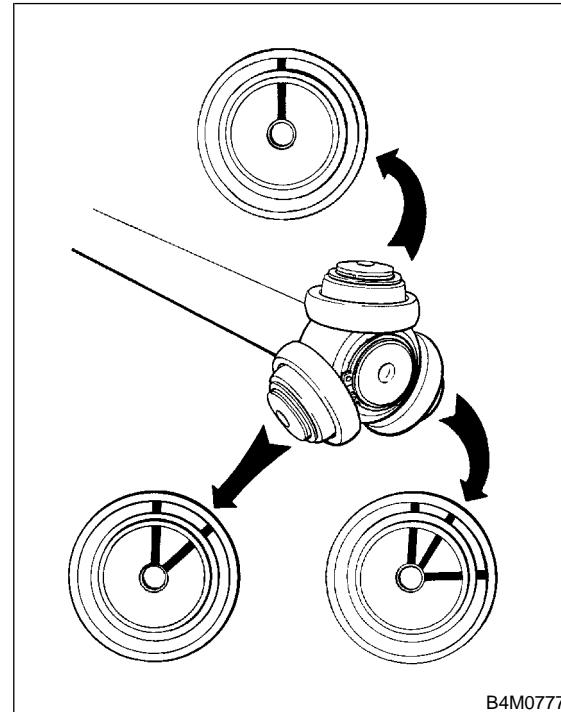
CAUTION:

Confirm that the snap ring is completely fitted in the shaft groove.

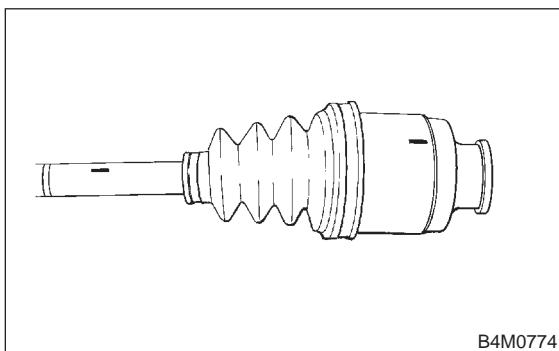
12) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of SFJ outer race.
13) Apply a coat of specified grease to free ring and trunnion.
14) Align alignment marks on free ring and trunnion and install free ring.

CAUTION:

Be careful with the free ring position.



15) Align alignment marks on shaft and outer race, and install outer race.



16) Install circlip in the groove on SFJ outer race.

CAUTION:

Pull the shaft lightly and assure that the circlip is completely fitted in the groove.

17) 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.

18) Install SFJ boot taking care not to twist it.

CAUTION:

- The inside of the larger end of SFJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing SFJ boot, position outer race of SFJ at center of its travel.

19) Put a band through the clip and wind twice in alignment with band groove of boot.

CAUTION:

Use a new band.

20) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:

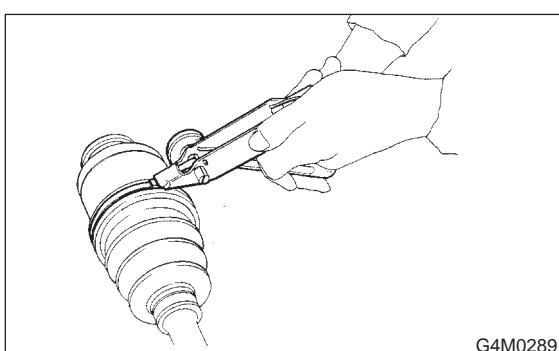
When tightening boot, exercise care so that the air within the boot is appropriate.

21) Tighten band by using ST.

ST 925091000 BAND TIGHTENING TOOL

NOTE:

Tighten band until it cannot be moved by hand.

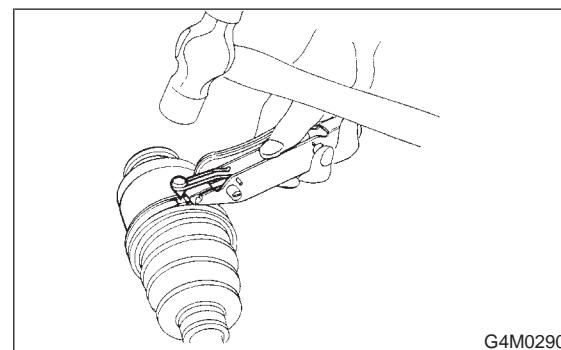


22) Tap on the clip with the punch provided at the end of ST.

ST 925091000 BAND TIGHTENING TOOL

CAUTION:

Tap to an extent that the boot underneath is not damaged.



23) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:

Be careful so that the end of the band is in close contact with clip.

24) Fix up boot on BJ in the same manner.

NOTE:

Extend and retract SFJ to provide equal grease coating.

2. REAR DRIVE SHAFT

CAUTION:

Use specified grease.

BJ side:

Molyplex No. 2 (Part No. 723223010)

DOJ side:

VU-3A702 (Yellow) (Part No. 23223GA050)

1) Install BJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.

2) Place DOJ boot at the center of shaft.

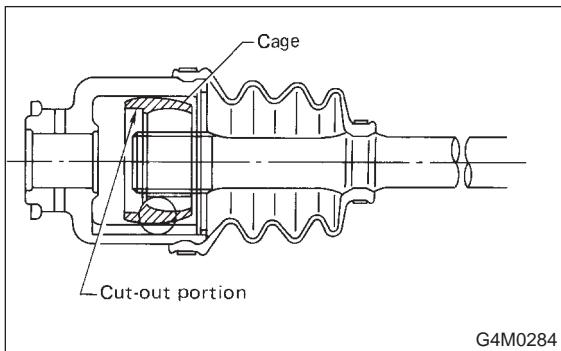
CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

3) Insert DOJ cage onto shaft.

NOTE:

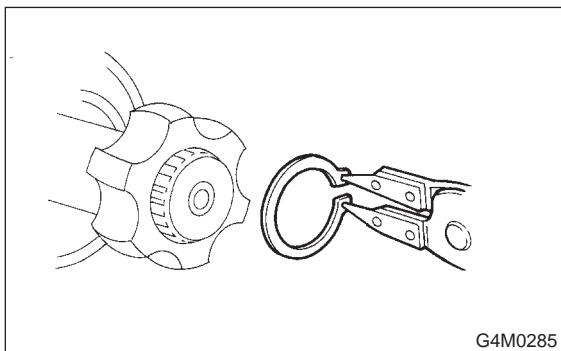
Insert the cage with the cut-out portion facing the shaft end, since the cage has an orientation.



4) Install DOJ inner race on shaft and fit snap ring with pliers.

NOTE:

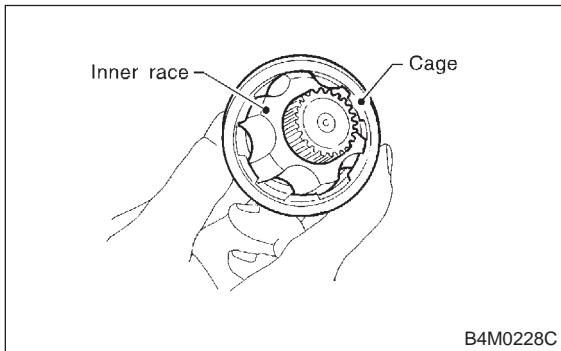
Confirm that the snap ring is completely fitted in the shaft groove.



5) Install cage, which was previously fitted, to inner race fixed upon shaft.

NOTE:

Fit the cage with the protruded part aligned with the track on the inner race and then turn by a half pitch.

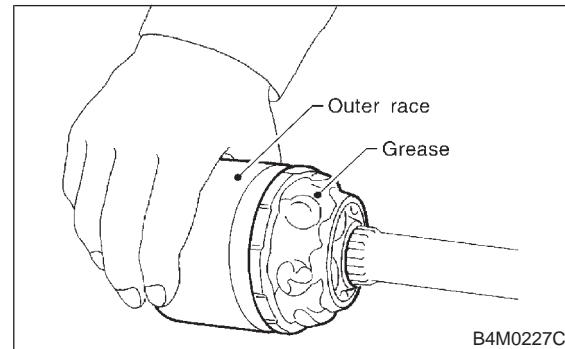


6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.

7) Apply a coat of specified grease to the cage pocket and six balls.

8) Insert six balls into the cage pocket.

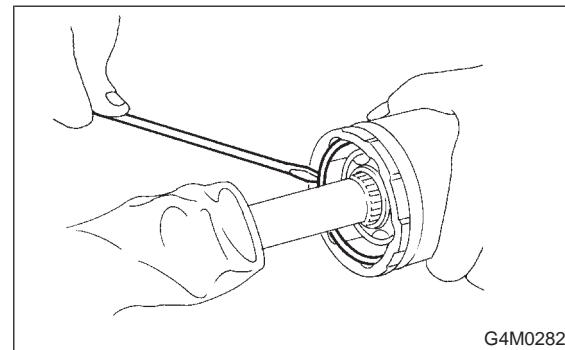
9) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit outer race.



10) Install circlip in the groove on DOJ outer race.

NOTE:

- Assure that the balls, cage and inner race are completely fitted in the outer race of DOJ.
- Exercise care not to place the matched position of circlip in the ball groove of outer race.
- Pull the shaft lightly and assure that the circlip is completely fitted in the groove.



11) 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 shaft.

12) Install DOJ boot taking care not to twist it.

NOTE:

- The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing DOJ boot, position outer race of DOJ at center of its travel.

13) Put a band through the clip and wind twice in alignment with band groove of boot.

CAUTION:
Use a new band.

14) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:

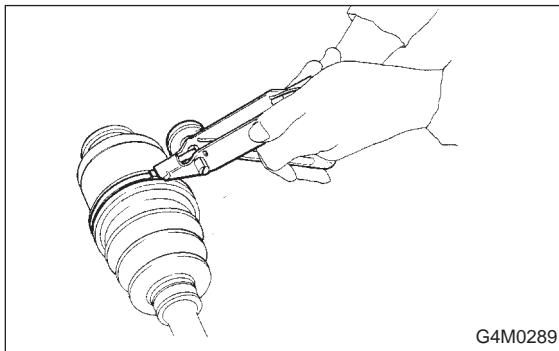
When tightening boot, exercise care so that the air within the boot is appropriate.

15) Tighten band by using ST.

ST 925091000 BAND TIGHTENING TOOL

NOTE:

Tighten band until it cannot be moved by hand.



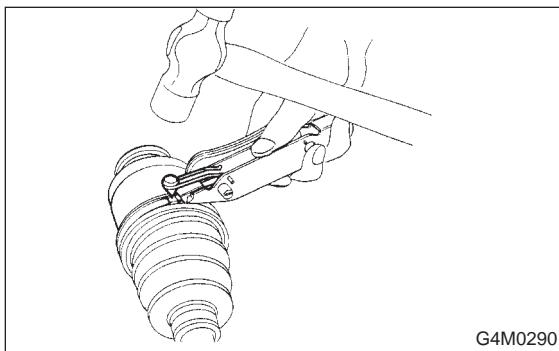
G4M0289

16) Tap on the clip with the punch provided at the end of ST.

ST 925091000 BAND TIGHTENING TOOL

CAUTION:

Tap to an extent that the boot underneath is not damaged.



G4M0290

17) Cut off band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:

Be careful so that the end of the band is in close contact with clip.

18) Fix up boot on BJ in the same manner.

NOTE:

Extend and retract DOJ to provide equal grease coating.

E: INSTALLATION

1. FRONT DRIVE SHAFT

1) Insert BJ into hub splines.

CAUTION:

Be careful not to damage inner oil seal lip and tone wheel.

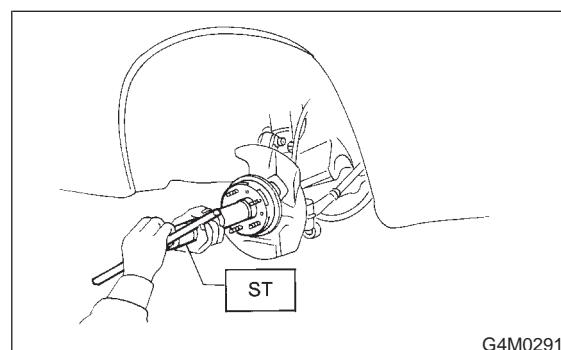
2) Using ST1 and ST2, pull drive shaft into place.

ST1 922431000 AXLE SHAFT INSTALLER

ST2 927390000 ADAPTER

CAUTION:

Do not hammer drive shaft when installing it.



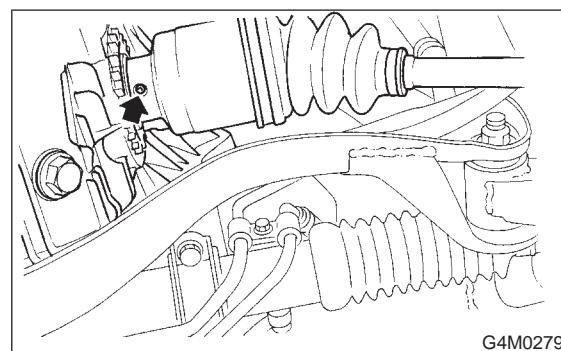
G4M0291

3) Tighten axle nut temporarily.

4) Install SFJ on transmission spindle and drive spring pin into place.

CAUTION:

Always use a new spring pin.



G4M0279

5) Connect transverse link to housing.

Tightening torque (self-locking nut):

$49 \pm 10 \text{ N}\cdot\text{m}$ (5.0 \pm 1.0 kg-m, 36 \pm 7 ft-lb)

CAUTION:

Use a new self-locking nut.

6) Install stabilizer bracket.

7) While depressing brake pedal, tighten axle nut to the specified torque.

Tightening torque:

$186 \pm 20 \text{ N}\cdot\text{m}$ (19 \pm 2 kg-m, 137 \pm 14 ft-lb)

CAUTION:

- Use a new axle nut for front use only (gold color).
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

8) After tightening axle nut, lock it securely.

2. REAR DRIVE SHAFT

1) Insert BJ into rear hub splines.

CAUTION:

Be careful not to damage tone wheel.

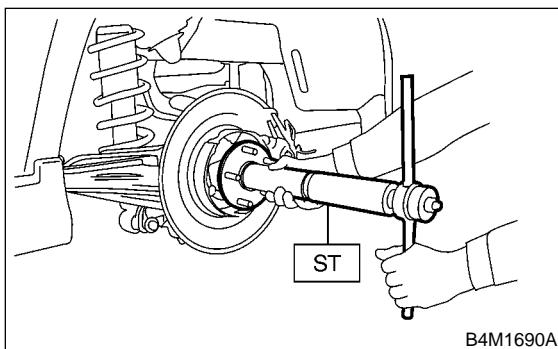
2) Using ST1 and ST2, pull drive shaft into place.

ST1 922431000 AXLE SHAFT INSTALLER

ST2 927390000 ADAPTER

CAUTION:

Do not hammer drive shaft when installing it.



3) Tighten axle nut temporarily.
 4) Install rear differential. <Ref. to 3-4 [W2F0].>
 5) While depressing brake pedal, tighten axle nut using a socket wrench.

Tightening torque:

$235 \pm 20 \text{ N}\cdot\text{m}$ (24 \pm 2 kg-m, 174 \pm 14 ft-lb)

CAUTION:

- Use a new axle nut for rear use only (Olive color).
- Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

6) After tightening axle nut, lock it securely.

4. Replacement of Front BJ and SFJ Boots**A: REMOVAL**

- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, support it with safety stands (rigid rocks), and remove front wheel cap and wheels.
- 3) Unlock axle nut.
- 4) Depress brake pedal and remove axle nut using a socket wrench.

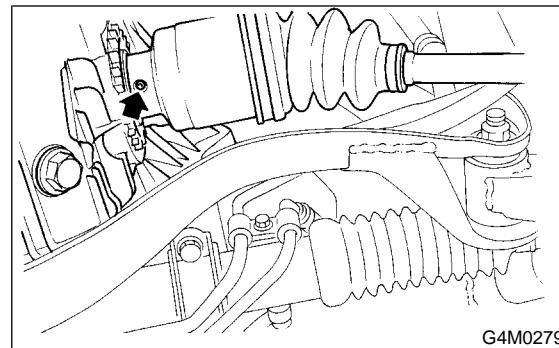
CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 5) Remove stabilizer link.
- 6) Disconnect transverse link from housing.
- 7) Remove spring pin which secures transmission spindle to SFJ.

CAUTION:

Use a new spring pin.



8) Remove front drive shaft. <Ref. to 4-2 [W3A1].>
 9) Remove BJ and SFJ boots from drive shaft. <Ref. to 4-2 [W3B1].>

B: INSTALLATION

- 1) Install BJ and SFJ boots to drive shaft. <Ref. to 4-2 [W3D1].>
- 2) Install front drive shaft. <Ref. to 4-2 [W3E1].>

5. Replacement of Rear DOJ and BJ Boots

A: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Lift-up vehicle, and remove rear wheel cap and wheels.

CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 3) Unlock axle nut.
- 4) Remove axle nut.
- 5) Remove rear differential assembly.
<Ref. to 3-4 [W2B0].>
- 6) Remove rear drive shaft.
<Ref. to 4-2 [W3A2].>
- 7) Remove DOJ and BJ boots from drive shaft.
<Ref. to 4-2 [W3B2].>

B: INSTALLATION

- 1) Install DOJ and BJ boots to drive shaft.
<Ref. to 4-2 [W3D2].>
- 2) Install rear drive shaft.
<Ref. to 4-2 [W3E2].>

6. Steel Wheel and Tire

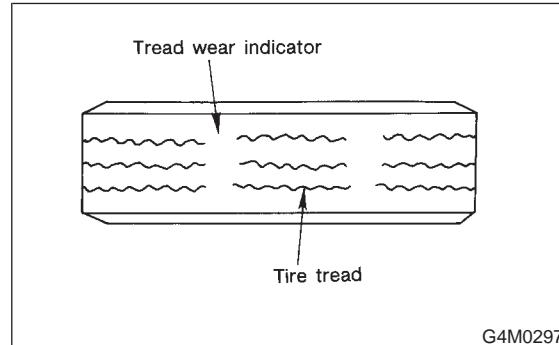
A: INSPECTION

- 1) Deformation or damage on the rim can cause air leakage. Check the rim flange for deformation, crack, or damage, and repair or replace as necessary.
- 2) Take stone, glass, nail etc. off the tread groove.
- 3) Replace tire:

CAUTION:

- When replacing a tire, make sure to use only the same size, construction and load range as originally installed.
- Avoid mixing radial, belted bias or bias tires on the vehicle.

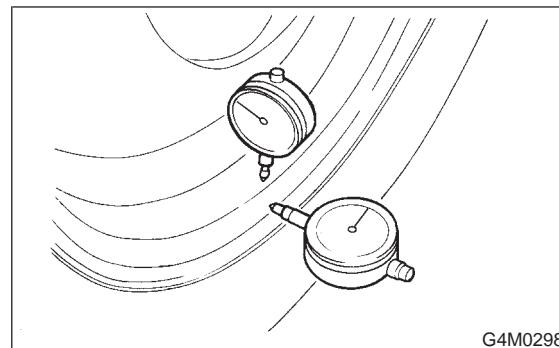
- (1) when large crack on side wall, damage or crack on tread is found.
- (2) when the "tread wear indicator" appears as a solid band across the tread.



G4M0297

1. INSPECTION OF WHEEL RUNOUT

- 1) Jack-up vehicle until wheels clear the floor.
- 2) Slowly rotate wheel to check rim "runout" using a dial gauge.



G4M0298

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

5. Replacement of Rear DOJ and BJ Boots

A: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Lift-up vehicle, and remove rear wheel cap and wheels.

CAUTION:

Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 3) Unlock axle nut.
- 4) Remove axle nut.
- 5) Remove rear differential assembly.

<Ref. to 3-4 [W2B0].>

- 6) Remove rear drive shaft.

<Ref. to 4-2 [W3A2].>

- 7) Remove DOJ and BJ boots from drive shaft.

<Ref. to 4-2 [W3B2].>

B: INSTALLATION

- 1) Install DOJ and BJ boots to drive shaft.

<Ref. to 4-2 [W3D2].>

- 2) Install rear drive shaft.

<Ref. to 4-2 [W3E2].>

6. Steel Wheel and Tire

A: INSPECTION

1) Deformation or damage on the rim can cause air leakage. Check the rim flange for deformation, crack, or damage, and repair or replace as necessary.

- 2) Take stone, glass, nail etc. off the tread groove.
- 3) Replace tire:

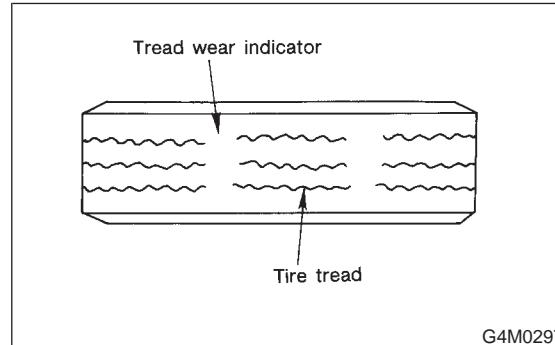
CAUTION:

● When replacing a tire, make sure to use only the same size, construction and load range as originally installed.

● Avoid mixing radial, belted bias or bias tires on the vehicle.

(1) when large crack on side wall, damage or crack on tread is found.

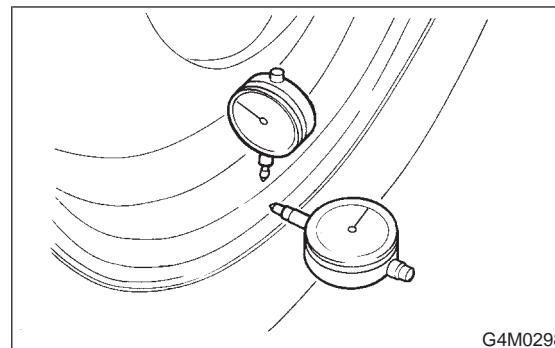
(2) when the "tread wear indicator" appears as a solid band across the tread.



G4M0297

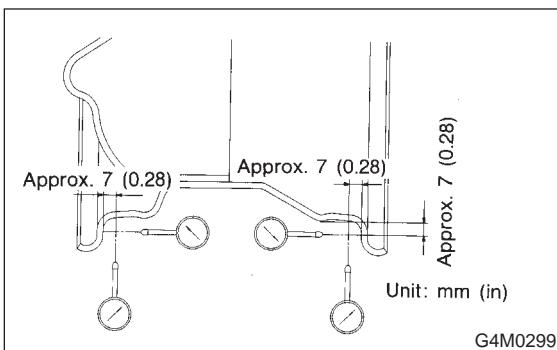
1. INSPECTION OF WHEEL RUNOUT

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G4M0298

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

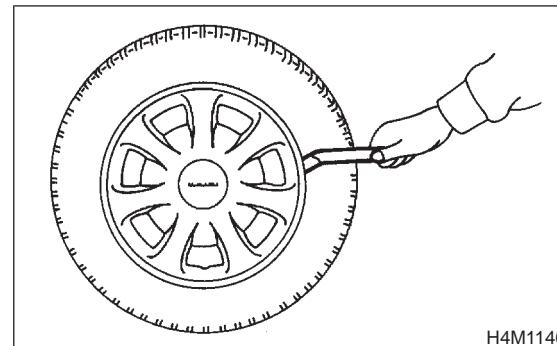


- 3) If rim runout exceeds specifications, remove tire from rim and check runout while attaching dial gauge to positions shown in figure.
- 4) If measured runout still exceeds specifications, replace the wheel.

7. Full Wheel Cap

A: REMOVAL

Pry off the full wheel cap with a wheel cap remover inserted between openings in the cap.



B: INSTALLATION

Align the valve hole in the wheel cap with the valve on the wheel and secure the wheel cap by tapping four points by hand.

8. Aluminum Wheel

A: INSPECTION

Inspection for aluminum wheels is basically the same as the one for steel wheels. However, check the rim flange for cracks or damage, and replace (not repair) aluminum wheel if air leakage is found.

B: PRECAUTIONS

Aluminum wheels are easily scratched. To maintain their appearance and safety, do the following:

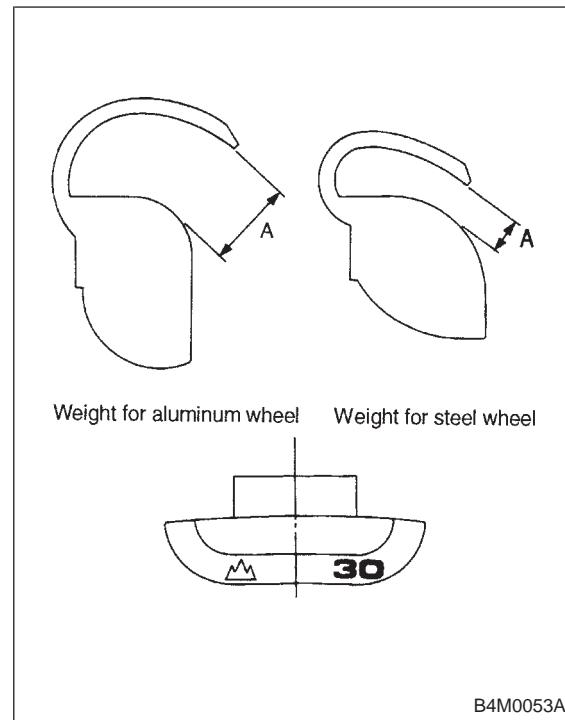
- 1) Do not damage aluminum wheels during removal, disassembly, installation, wheel balancing, etc. After removing aluminum wheels, place them on a rubber mat, etc.
- 2) While vehicle is being driven, be careful not to ride over sharp obstacles or allow aluminum wheels to contact the shoulder of the road.
- 3) When installing tire chain, be sure to install it properly not to have a slack; otherwise it may hit wheel while driving.
- 4) When washing aluminum wheel, use neutral synthetic detergent and water. Avoid using the cleanser including abrasive, hard brushes or an automatic car washer.

9. Wheel Balancing

- 1) Proper wheel balance may be lost if the tire is repaired or if it wears. Check the tire for dynamic balance, and repair as necessary.
- 2) To check for dynamic balance, use a dynamic balancer. Drive in the balance weight on both the top and rear sides of the rim.
- 3) Some types of balancer can cause damage to the wheel. Use an appropriate balancer when adjusting the wheel balance.
- 4) Use genuine balance weights.

CAUTION:

- 55 g (1.94 oz) weight used with aluminum wheel is not available.
- Balance weights are available for use with any of 14- to 16-inch wheels.



B4M0053A

Service limit: A

Weight for steel wheel;
2.16 mm (0.085 in)

Weight for aluminum wheel;
4.5 mm (0.177 in)

8. Aluminum Wheel

A: INSPECTION

Inspection for aluminum wheels is basically the same as the one for steel wheels. However, check the rim flange for cracks or damage, and replace (not repair) aluminum wheel if air leakage is found.

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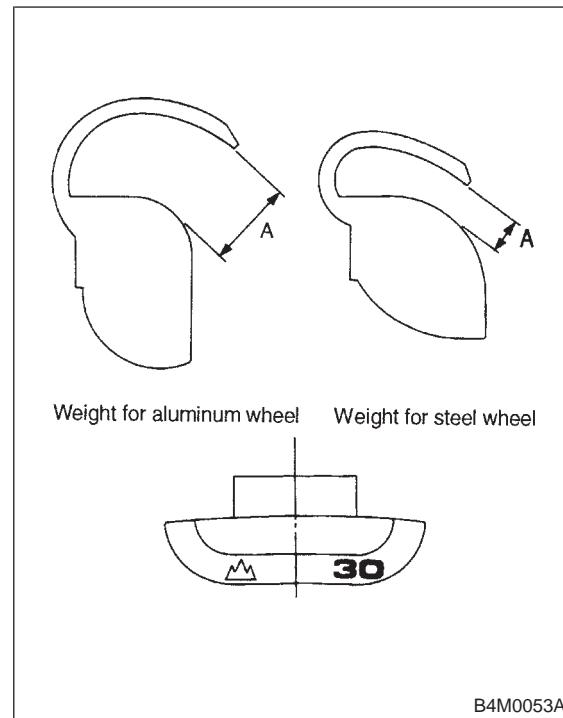
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- 4) Use genuine balance weights.

CAUTION:

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- Balance weights are available for use with any of 14- to 16-inch wheels.



B4M0053A

Service limit: A

Weight for steel wheel;
2.16 mm (0.085 in)

Weight for aluminum wheel;
4.5 mm (0.177 in)

10. Installation of Wheel Assembly to Vehicle

- 1) Attach the wheel to the hub by aligning the wheel bolt hole with the hub bolt.
- 2) Temporarily attach the wheel nuts to the hub bolts. (In the case of aluminum wheel, use SUBARU genuine wheel nut for aluminum wheel.)
- 3) Manually tighten the nuts making sure the wheel hub hole is aligned correctly to the guide portion of hub.
- 4) Tighten the wheel nuts in a diagonal selection to the specified torque. Use a wheel nut wrench.

Wheel nut tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ kg}\cdot\text{m}$, $65 \pm 7 \text{ ft}\cdot\text{lb}$)

CAUTION:

- Tighten the wheel nuts in two or three steps by gradually increasing the torque and working diagonally, until the specified torque is reached. For drum brake models, excess tightening of wheel nuts may cause wheels to "judder".
- Do not depress the wrench with a foot; Always use both hands when tightening.
- Make sure the bolt, nut and the nut seating surface of the wheel are free from oils.

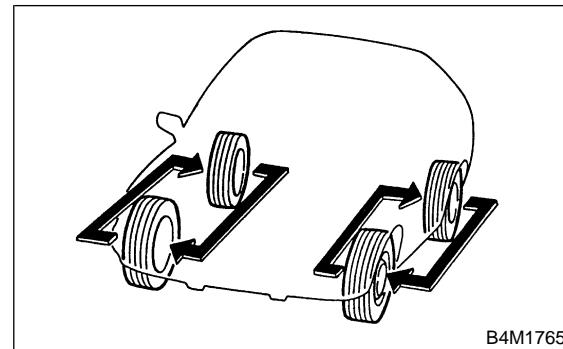
- 5) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

11. Tire Rotation

If tires are maintained at the same positions for a long period of time, uneven wear results. Therefore, they should be periodically rotated. This lengthens service life of tires.

CAUTION:

When rotating tires, replace unevenly worn or damaged tires with new ones.



10. Installation of Wheel Assembly to Vehicle

- 1) Attach the wheel to the hub by aligning the wheel bolt hole with the hub bolt.
- 2) Temporarily attach the wheel nuts to the hub bolts. (In the case of aluminum wheel, use SUBARU genuine wheel nut for aluminum wheel.)
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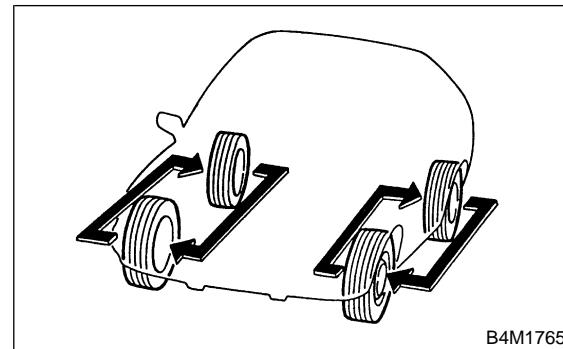
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CAUTION:

When rotating tires, replace unevenly worn or damaged tires with new ones.



12. "T-type" Tire

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

CAUTION:

- Keep the inflation pressure at 412 kPa (4.2 kg/cm², 60 psi) at all times.
- When the wear indicator appears on the tread surface, replace the tire with a new one.
- Do not use a tire chain with the "T-type" tire. Because of the smaller tire size, a tire chain will not fit properly and will result in damage to the vehicle and the tire.
- Do not drive at a speed greater than 80 km/h (50 MPH).
- Drive as slowly as possible and avoid passing over bumps.
- Replace with a conventional tire as soon as possible since this "T-type" tire is only for temporary use.

1. Steering System

A: SPECIFICATIONS

Model		Except OUTBACK	OUTBACK
Whole system	Minimum turning radius m (ft)	5.4±0.5 (17.7±1.6)	5.6±0.5 (18.4±1.6)
	Steering angle (Inside-Outside)	36.3°±1.5° — 31.6°±1.5°	34.5°±1.5° — 30.3°±1.5°
	Steering wheel diameter mm (in)	385 (15.16)	
	Overall gear ratio (Turns, lock to lock)	16.5 (3.2)	19.0 (3.4)
Gearbox	Type	Rack and pinion, Integral	
	Backlash	0 (Automatically adjustable)	
	Valve (Power steering system)	Rotary valve	
Pump (Power steering system)	Type	Vane pump	
	Oil tank	Installed on body	
	Output cm ³ (cu in)/rev.	7.2 — 0.6 (0.439 — 0.037)	
	Relief pressure kPa (kg/cm ² , psi)	9,807 (100, 1,422)	
	Hydraulic fluid control	Dropping in response to increased engine revolutions	
	Hydraulic fluid ℓ (US qt, Imp qt)	1,000 rpm: 6 (6.3, 5.3) 3,000 rpm: 5 (5.3, 4.4)	
	Range of revolution rpm	500 — 9,000	
Working fluid (Power steering system)	Revolving direction	Clockwise	
	Name	ATF DEXRON IIIE or III	
	Capacity	Oil tank ℓ (US qt, Imp qt)	0.3 (0.3, 0.3)
		Total ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)

B: SERVICE DATA

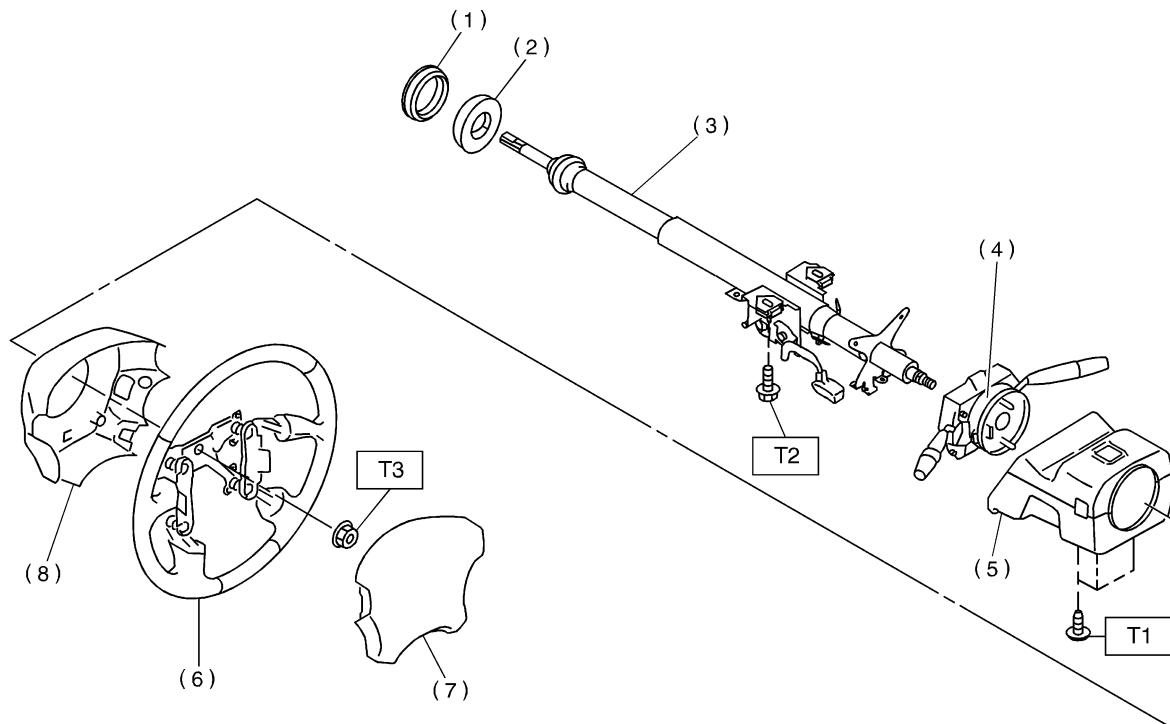
Model		LHD	RHD
Steering wheel	Free play mm (in)	17 (0.67)	
Turning angle	Inner tire & wheel	36.3°±1.5°	
	OUTBACK model	34.5°±1.5°	—
	Outer tire & wheel	31.6°±1.5°	
	OUTBACK model	30.3°±1.5°	—
Steering shaft	Clearance between steering wheel and column cover mm (in)	3.0 (0.118)	
Steering gearbox (Power steering system)	Sliding resistance N (kg, lb)	304.0 (31.0, 68.4) or less	
	Right-turn steering mm (in)	0.15 (0.0059) or less	Horizontal movement: 0.6 (0.024) or less Vertical movement: 0.4 (0.016) or less
	Left-turn steering mm (in)	Horizontal movement: 0.3 (0.012) or less Vertical movement: 0.15 (0.0059) or less	0.4 (0.016) or less
	In radial direction mm (in)	0.18 (0.0071) or less	
	In axial direction mm (in)	0.1 (0.004) or less	
	Turning resistance N (kg, lb)	Within 30 mm (1.18 in) from rack center in straight ahead position: Less than 11.18 (1.14, 2.51) Maximum allowable value: 12.7 (1.3, 2.9)	
	Pulley shaft	Radial play mm (in)	0.4 (0.016) or less
		Axial play mm (in)	0.6 (0.024) or less
	Pulley	Ditch deflection mm (in)	1.0 (0.039) or less
Oil pump (Power steering system)		Resistance to rotation N (kg, lb)	9.22 (0.94, 2.07) or less
		Regular pressure kPa (kg/cm ² , psi)	981 (10, 142) or less
Steering wheel effort (Power steering system)		Relief pressure kPa (kg/cm ² , psi)	9,807 (100, 1,422)
	At standstill with engine idling on a concrete road	N (kg, lb)	29.4 (3.0, 6.6) or less
	At standstill with engine stalled on a concrete road	N (kg, lb)	294.2 (30, 66.2) or less

C: RECOMMENDED POWER STEERING FLUID

Recommended power steering fluid	Manufacturer
ATF DEXRON IIIE or III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

MEMO:

1. Steering Wheel and Column (Tilt)



B4M1649A

(1) Bushing	(6) Steering wheel
(2) Seal	(7) Airbag module
(3) Steering shaft	(8) Lower steering wheel cover
(4) Steering roll connector	
(5) Column cover	

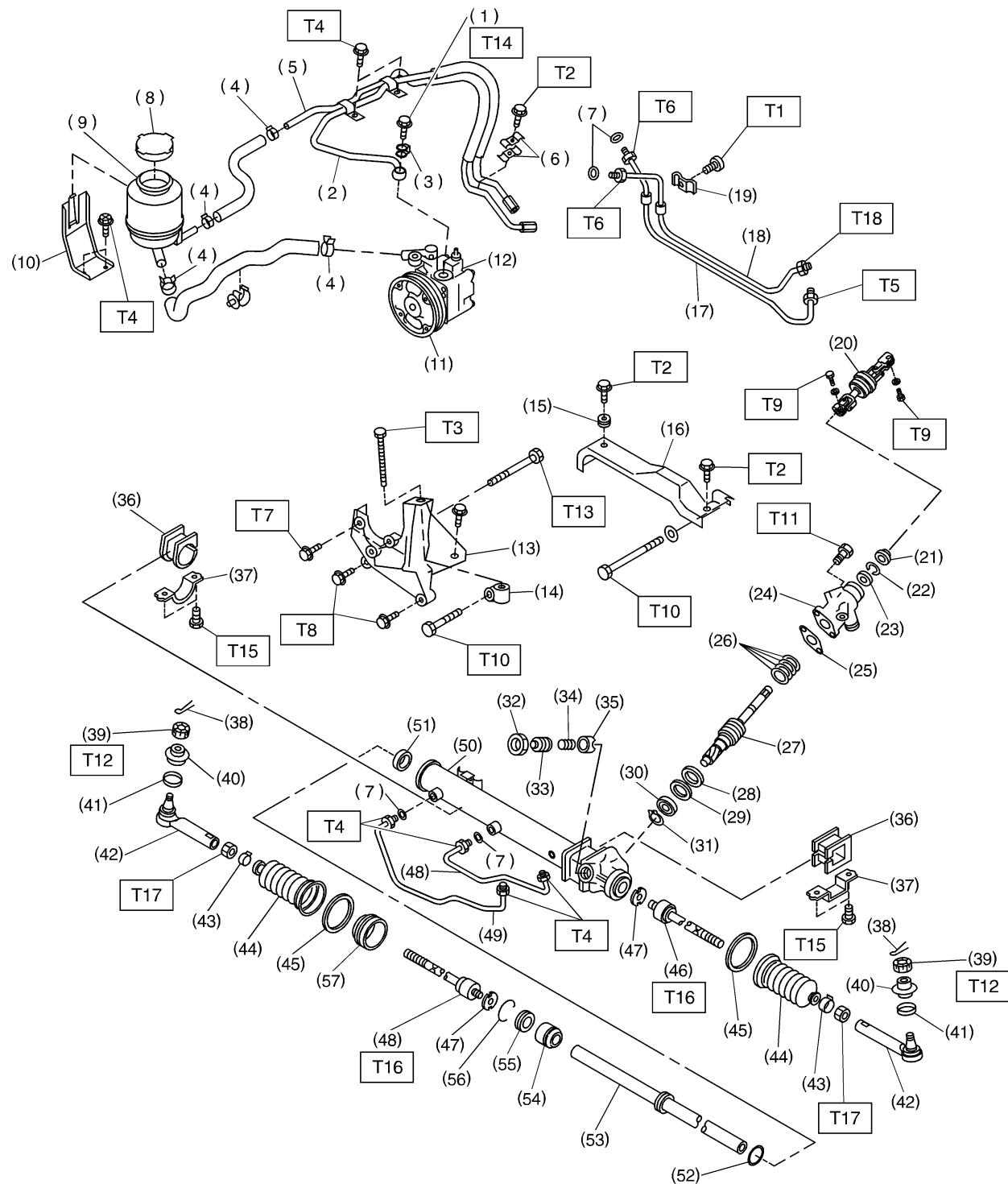
Tightening torque: N·m (kg·m, ft·lb)

T1: 1.2 ± 0.2 (0.12 ± 0.02 , 0.9 ± 0.1)

T2: 25 ± 5 (2.5 ± 0.5 , 18.1 ± 3.6)

T3: 44 ± 6 (4.5 ± 0.6 , 32.5 ± 4.3)

2. Power Steering System



(1) Eye bolt	(28) Oil seal
(2) Pipe C	(29) Back-up washer
(3) Gasket	(30) Ball bearing
(4) Clip	(31) Snap ring
(5) Pipe D	(32) Lock nut
(6) Clamp E	(33) Adjusting screw
(7) O-ring	(34) Spring
(8) Cap	(35) Sleeve
(9) Reservoir tank	(36) Adapter
(10) Reservoir tank bracket	(37) Clamp
(11) Pulley	(38) Cotter pin
(12) Oil pump	(39) Castle nut
(13) Bracket	(40) Dust cover
(14) Belt tension nut	(41) Clip
(15) Bush	(42) Tie-rod end
(16) Belt cover	(43) Clip
(17) Pipe E	(44) Boot
(18) Pipe F	(45) Band
(19) Clamp plate	(46) Tie-rod
(20) Universal joint	(47) Lock washer
(21) Dust seal	(48) Pipe B
(22) C-ring	(49) Pipe A
(23) Oil seal	(50) Steering body
(24) Valve housing	(51) Oil seal
(25) Gasket	(52) Piston ring
(26) Seal ring	(53) Rack
(27) Pinion and valve ASSY	(54) Rack bushing

(55) Rack stopper
(56) Circlip
(57) Spacer

Tightening torque: N·m (kg·m, ft·lb)

<i>T1: 6±1 (0.6±0.1, 4.3±0.7)</i>
<i>T2: 7.4±2.0 (0.75±0.20, 5.4±1.4)</i>
<i>T3: 8±2 (0.8±0.2, 5.8±1.4)</i>
<i>T4: 13±3 (1.3±0.3, 9.4±2.2)</i>
<i>T5: 15±3 (1.5±0.3, 10.8±2.2)</i>
<i>T6: 15±5 (1.5±0.5, 10.8±3.6)</i>
<i>T7: 15.7±2.4 (1.6±0.24, 11.6±1.7)</i>
<i>T8: 22±2 (2.2±0.2, 15.9±1.4)</i>
<i>T9: 24±3 (2.4±0.3, 17.4±2.2)</i>
<i>T10: 25±2 (2.5±0.2, 18.1±1.4)</i>
<i>T11: 25±5 (2.5±0.5, 18.1±3.6)</i>
<i>T12: 27±2 (2.75±0.2, 19.9±1.4)</i>
<i>T13: 37.3±5.9 (3.8±0.6, 27.5±4.3)</i>
<i>T14: 39±5 (4.0±0.5, 28.9±3.6)</i>
<i>T15: 59±12 (6.0±1.2, 43±9)</i>
<i>T16: 78±10 (8.0±1.0, 58±7)</i>
<i>T17: 83±5 (8.5±0.5, 61.5±3.6)</i>
<i>T18: 25±5 (2.5±0.5, 18.1±3.6)</i>

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

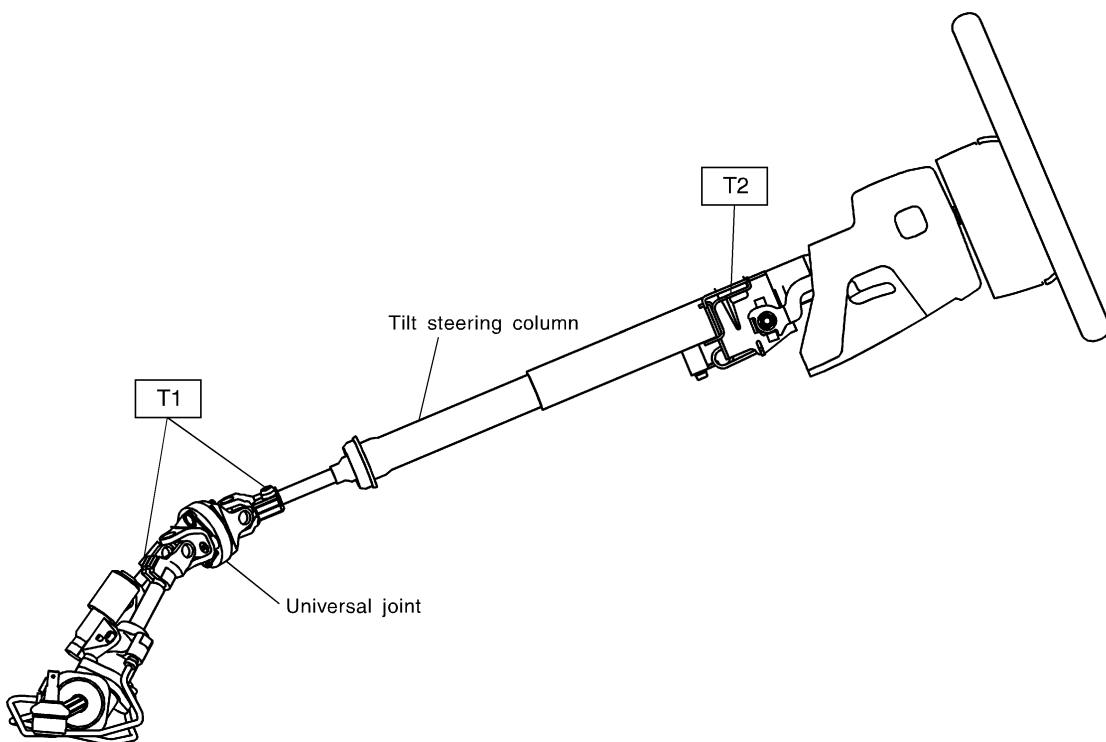
Airbag system wiring harness is routed near the steering wheel, steering shaft and column.

WARNING:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the steering wheel, steering shaft and column.

2. Tilt Steering Column

A: REMOVAL



B4M1652A

Tightening torque: N·m (kg·m, ft·lb)

T1: 24 ± 3 (2.4 ± 0.3 , 17.4 ± 2.2)

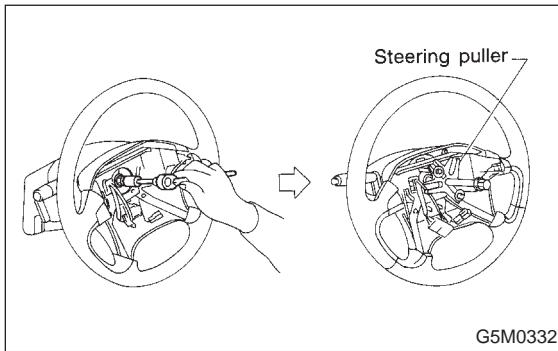
T2: 25 ± 5 (2.5 ± 0.5 , 18.1 ± 3.6)

- 1) Disconnect battery minus terminal.
- 2) Lift-up vehicle.
- 3) Remove airbag module. <Ref. to 5-5 [W3A1].>

WARNING:

Always refer to "5-5 Supplemental Restraint System" before performing airbag module service (if so equipped). <Ref. to 5-5 [W1A0].>

- 4) Remove steering wheel nut, then draw out steering wheel from shaft using steering puller.



- 5) Remove universal joint bolts and then remove universal joint.

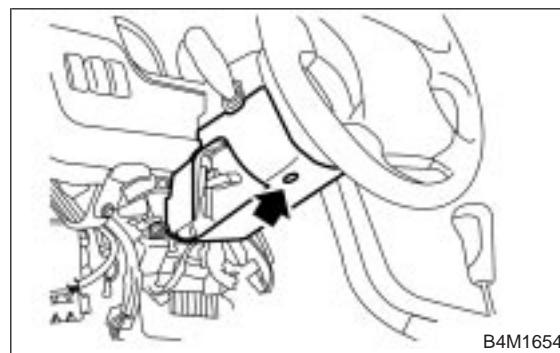
CAUTION:

Scribe alignment marks on universal joint so that it can be reassembled at the original separation.

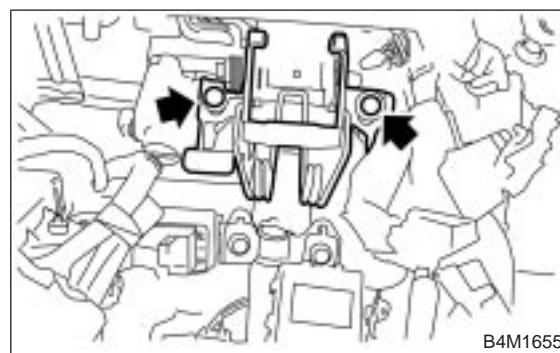


- 6) Remove trim panel under instrument panel.

- 7) Remove the screw securing lower steering column cover.



- 8) Remove all connectors from steering column.
- 9) Remove the two bolts under instrument panel securing steering column.



- 10) Pull out steering shaft assembly from hole on toe board.

CAUTION:

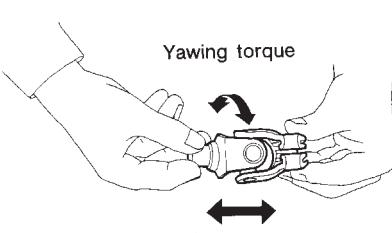
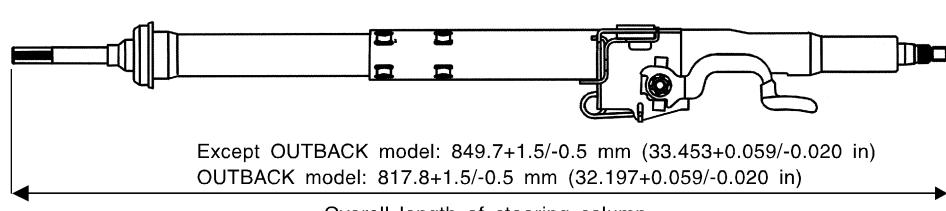
Be sure to remove universal joint before removing steering shaft assembly installing bolts when removing steering shaft assembly or when lowering it for servicing of other parts.

B: DISASSEMBLY

Remove the two screws securing upper steering column covers, and the two screws securing combination switch, then remove related parts.

C: INSPECTION**1. BASIC INSPECTION**

Clean the disassembled parts with a cloth, and check for wear, damage, or any other faults. If necessary, repair or replace faulty parts.

Part name	Inspection	Corrective action
Universal joint	<ul style="list-style-type: none"> • Free play • Swinging torque <p>Yawing torque Looseness</p>  <p>Standard value of universal joint free play: 0 mm (0 in) Max. value of universal joint swinging torque: 0.3 N·m (0.03 kg·m, 0.2 ft·lb)</p> <p style="text-align: right;">G4M0089</p>	Replace if faulty.
Steering column	<ul style="list-style-type: none"> • Overall length of steering column <p>Measure overall length of steering column. Standard overall length of steering column:</p>  <p>Except OUTBACK model: 849.7+1.5/-0.5 mm (33.453+0.059/-0.020 in) OUTBACK model: 817.8+1.5/-0.5 mm (32.197+0.059/-0.020 in)</p> <p style="text-align: right;">B4M1712A</p>	Replace steering column assembly.

2. AIRBAG MODEL INSPECTION**WARNING:**

For airbag model inspection procedures, refer to 5-5 Supplemental Restraint System. <Ref. to 5-5 [W2H0].> and <Ref. to 5-5 [W2G0].>

D: ASSEMBLY

1) Insert combination switch to upper column shaft, and install upper column cover. Then route ignition key harness and combination switch harness between column cover mounting bosses.

Tightening torque:

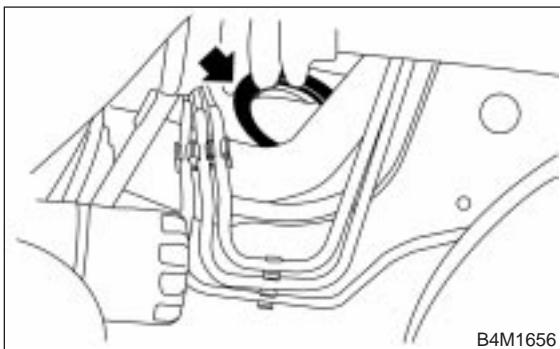
$1.2 \pm 0.2 \text{ N}\cdot\text{m} (0.12 \pm 0.02 \text{ kg}\cdot\text{m}, 0.9 \pm 0.1 \text{ ft}\cdot\text{lb})$

CAUTION:

Don't overtorque screw.

E: INSTALLATION

1) Set grommet to toe board.



2) Insert end of steering shaft into toe board grommet.
 3) Tighten steering shaft mounting bolts under instrument panel.

Tightening torque:

$25 \pm 5 \text{ N}\cdot\text{m} (2.5 \pm 0.5 \text{ kg}\cdot\text{m}, 18.1 \pm 3.6 \text{ ft-lb})$

4) Connect all connectors under instrument panel.
 5) Connect airbag system connector at harness spool.

NOTE:

Make sure to apply double lock.

6) Install lower column cover with tilt lever held in the lowered position.
 7) Install universal joint.
 (1) Align bolt hole on the long yoke side of universal joint with the cutout at the serrated section of shaft end, and insert universal joint.
 (2) Align bolt hole on the short yoke side of universal joint with the cutout at the serrated section of gearbox assembly. Lower universal joint completely.
 (3) Temporarily tighten bolt on the short yoke side. Raise universal joint to make sure the bolt is properly passing through the cutout at the serrated section.
 (4) Tighten bolt on the long yoke side, then that on the short yoke side.

Tightening torque:

$24 \pm 3 \text{ N}\cdot\text{m} (2.4 \pm 0.3 \text{ kg}\cdot\text{m}, 17.4 \pm 2.2 \text{ ft-lb})$

CAUTION:

- Make sure that universal joint bolts is tightened through notch in shaft serration.
- Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox to DOJ:

Over 15 mm (0.59 in)

8) Align center of roll connector. <Ref. to 5-5 [W8B1].>

CAUTION:

Ensure that front wheels are set in straight forward direction.

9) Set steering wheel to neutral and install it onto steering shaft.

Tightening torque:

$44 \pm 6 \text{ N}\cdot\text{m} (4.5 \pm 0.6 \text{ kg}\cdot\text{m}, 32.5 \pm 4.3 \text{ ft-lb})$

Column cover-to-steering wheel clearance:

2 — 4 mm (0.08 — 0.16 in)

CAUTION:

Insert roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage. Draw out airbag system connector, horn connector and cruise control connectors from guide hole of steering wheel lower end.

10) Install airbag module to steering wheel.

WARNING:

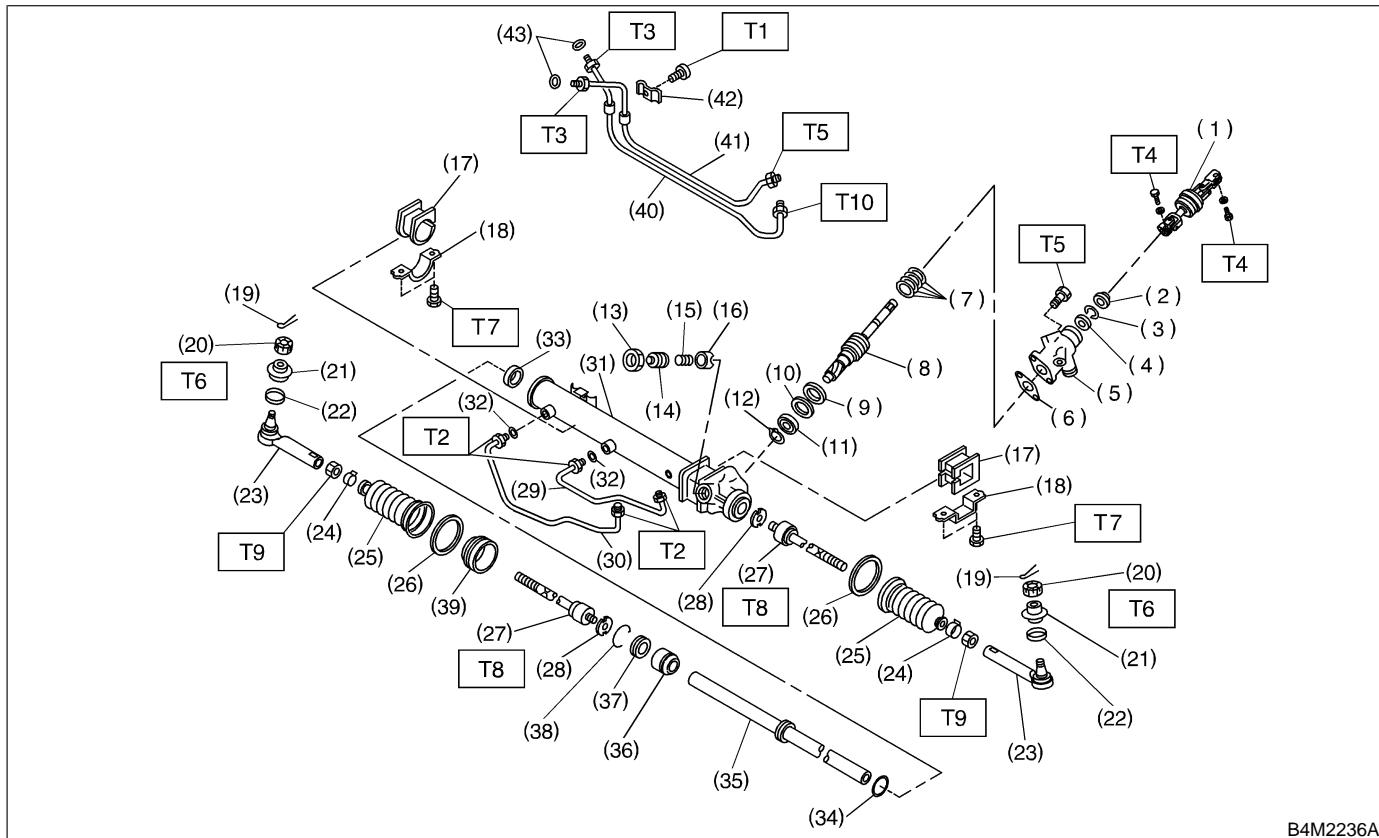
Always refer to 5-5 Supplemental Restraint System before performing the service operation. <Ref. to 5-5 [W3A0].>

3. Steering Gearbox (Power Steering System)

A: REMOVAL

NOTE:

For disassembly and assembly of gearbox unit, refer to section Control Valve (Power Steering Gearbox).
<Ref. to 4-3 [W4B0].> and <Ref. to 4-3 [W4D0].>



B4M2236A

(1) Universal joint	(20) Castle nut	(39) Spacer
(2) Dust seal	(21) Dust cover	(40) Pipe E
(3) C-ring	(22) Clip	(41) Pipe F
(4) Oil seal	(23) Tie-rod end	(42) Clamp
(5) Valve housing	(24) Clip	
(6) Gasket	(25) Boot	
(7) Seal ring	(26) Band	
(8) Pinion and valve ASSY	(27) Tie-rod	
(9) Oil seal	(28) Lock washer	
(10) Back-up washer	(29) Pipe B	
(11) Ball bearing	(30) Pipe A	
(12) Snap ring	(31) Housing ASSY	
(13) Lock nut	(32) O-ring	
(14) Adjusting screw	(33) Oil seal	
(15) Spring	(34) Piston ring	
(16) Sleeve	(35) Rack	
(17) Adapter	(36) Rack bushing	
(18) Clamp	(37) Rack stopper	
(19) Cotter pin	(38) Circlip	

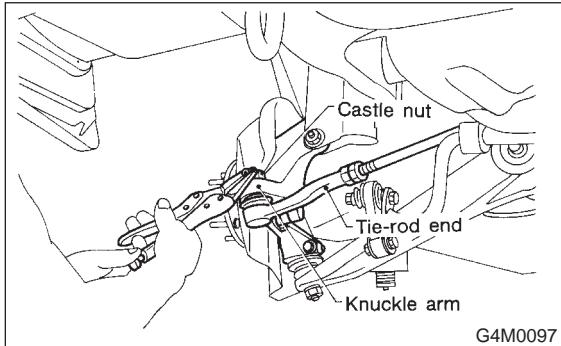
Tightening torque: N·m (kg·m, ft-lb)

T1: 6 ± 1 (0.6 ± 0.1 , 4.3 ± 0.7)
T2: 13 ± 3 (1.3 ± 0.3 , 9.4 ± 2.2)
T3: 15 ± 5 (1.5 ± 0.5 , 10.8 ± 3.6)
T4: 24 ± 3 (2.4 ± 0.3 , 17.4 ± 2.2)
T5: 25 ± 5 (2.5 ± 0.5 , 18.1 ± 3.6)
T6: 27.0 ± 2.5 (2.75 ± 0.25 , 19.9 ± 1.8)
T7: 59 ± 12 (6.0 ± 1.2 , 43 ± 9)
T8: 78 ± 10 (8.0 ± 1.0 , 58 ± 7)
T9: 83 ± 5 (8.5 ± 0.5 , 61.5 ± 3.6)
T10: 15 ± 3 (1.5 ± 0.3 , 10.8 ± 2.2)

- 1) Disconnect battery minus terminal.
- 2) Remove air intake duct.
- 3) Loosen front wheel nut.
- 4) Lift vehicle and remove front wheels.
- 5) Remove front exhaust pipe assembly. <Ref. to 2-9 [W1A0].>

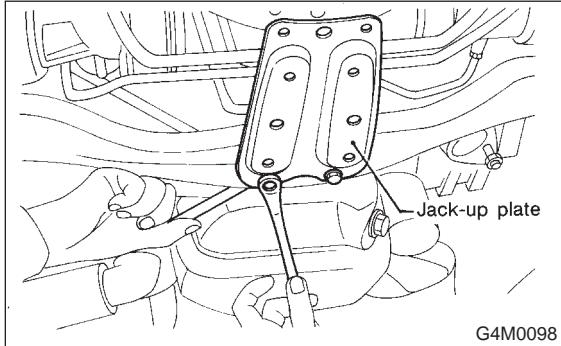
WARNING:**Be careful, exhaust pipe is hot.**

- 6) Using a puller, remove tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



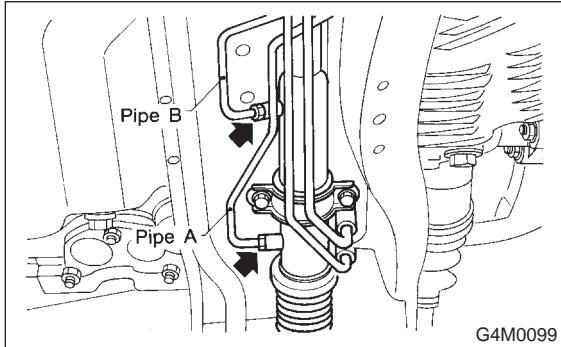
G4M0097

- 7) Remove jack-up plate and front stabilizer.



G4M0098

- 8) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



G4M0099

- 9) Remove lower side bolt of universal joint, then remove upper side bolt and lift the joint upward.

NOTE:

Place a mark on the joint and mating serration so that they can be re-installed at the original position.

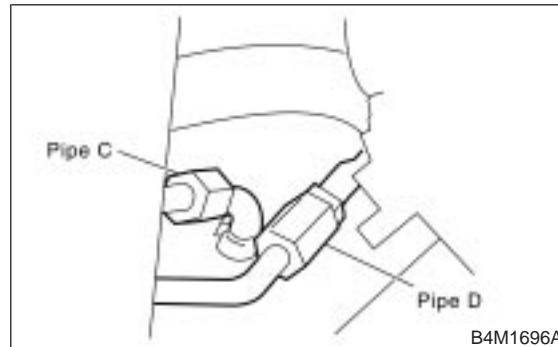


B4M1653

- 10) Disconnect pipes C and D from pipe of gearbox.

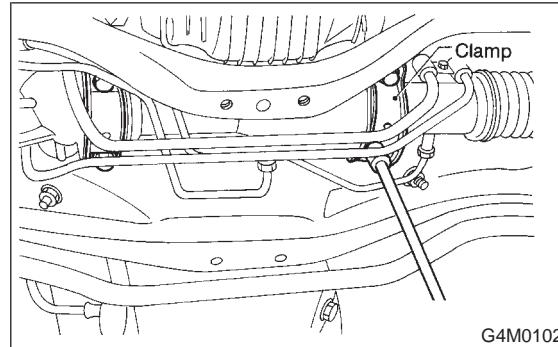
CAUTION:**Be careful not to damage these pipes.****NOTE:**

Disconnect upper pipe D first, and lower pipe C second.



B4M1696A

- 11) Remove clamp bolts securing gearbox to crossmember, and remove gearbox.



G4M0102

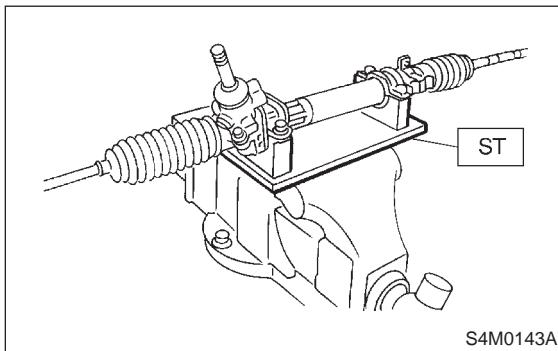
B: DISASSEMBLY

- 1) Disconnect four pipes from gearbox.
- 2) Secure gearbox removed from vehicle in vice using ST.

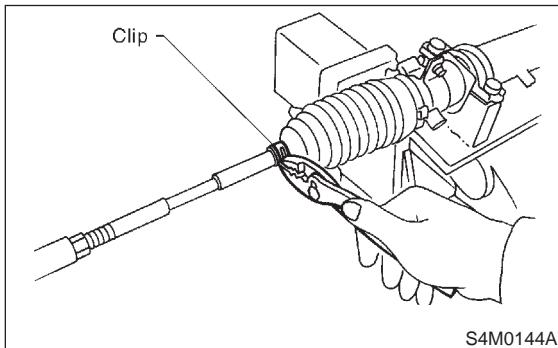
ST 926200000 STAND

CAUTION:

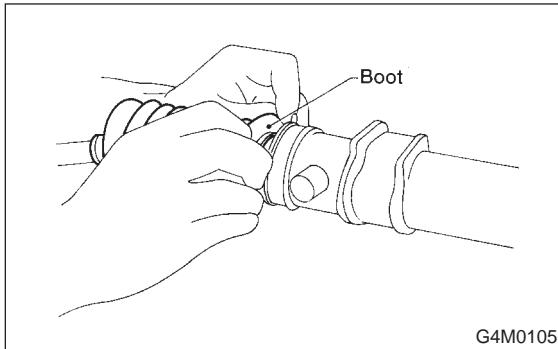
Secure the gearbox in a vice using the ST as shown. Do not attempt to secure it without this ST.



- 3) Remove tie-rod end and lock nut from gearbox.
- 4) Remove small clip from boot using pliers, and move boot to tie-rod end side.



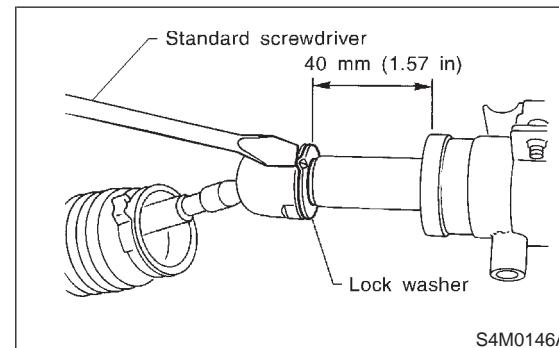
- 5) Remove boot together with large clips.



- 6) Extend rack approximately 40 mm (1.57 in) out. Unlock lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

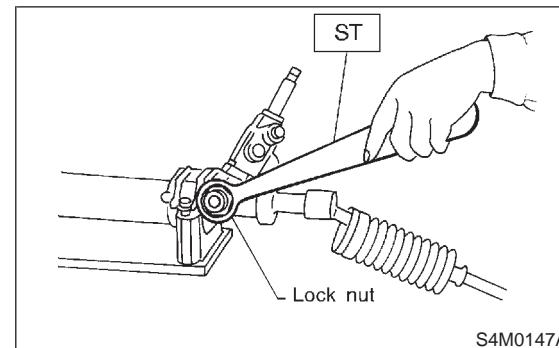
CAUTION:

Be careful not to scratch rack surface as oil leaks may result.

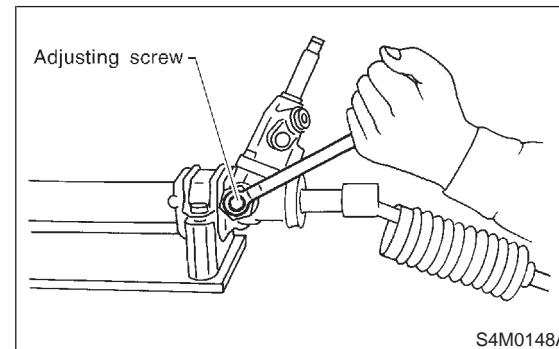


- 7) Using ST, loosen lock nut.

ST 926230000 SPANNER



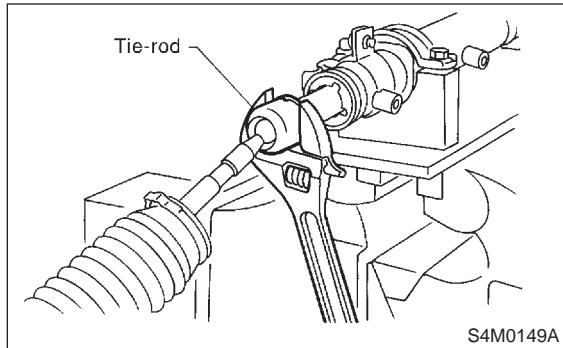
- 8) Tighten adjusting screw until it no longer tightens.



9) Using a wrench [32 mm (1.26 in) width across flats] or adjustable wrench, remove tie-rod.

CAUTION:

- Check ball joint for free play, and tie-rod for bends. Replace if necessary.
- Check dust seals used with tie-rod end ball joint for damage or deterioration. Replace if necessary.



10) Loosen adjusting screw and remove spring and sleeve.

CAUTION:

Replace spring and/or sleeve if damaged.

C: INSPECTION

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.

2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If bend or damage is excessive, replace entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If outer wall slips, lip is worn out or damage is found, replace it with new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust backlash properly. By measuring turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. (Refer to "Service limit"). (2) Keeping rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace gearbox with new one.
		(4) Wear or damage on rack bush	If free play of rack shaft in radial direction is out of the specified range, replace gearbox with new one. (Refer to "Service limit".)
		(5) Wear on input shaft bearing	If free plays of input shaft in radial and axial directions are out of the specified ranges, replace gearbox with new one. (Refer to "Service limit".)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

1. SERVICE LIMIT

Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

NOTE:

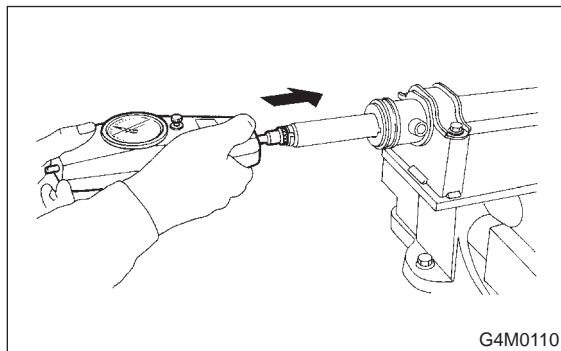
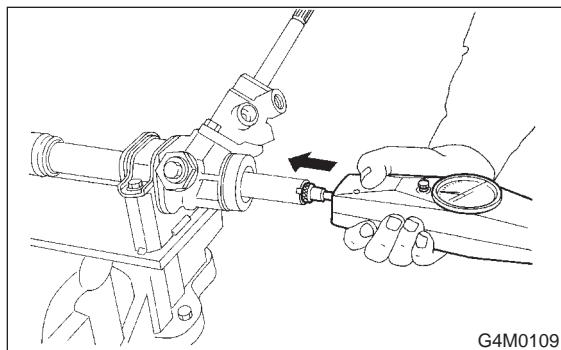
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit

235.0 N (24.0 kg, 52.9 lb) or less



2. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:

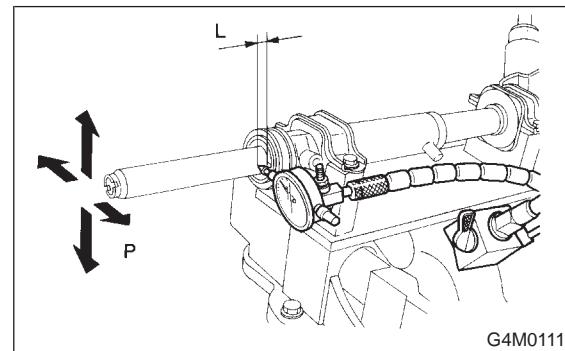
Service limit

0.19 mm (0.0075 in) or less

On condition

L: 5 mm (0.20 in)

P: 122.6 N (12.5 kg, 27.6 lb)

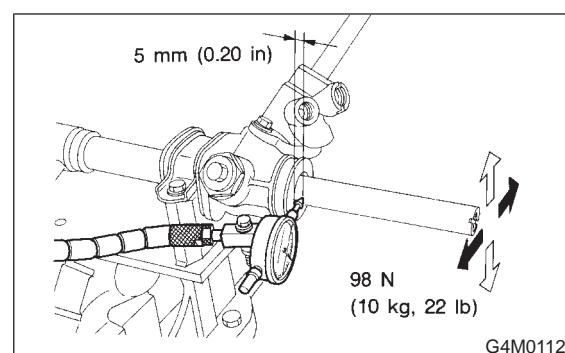


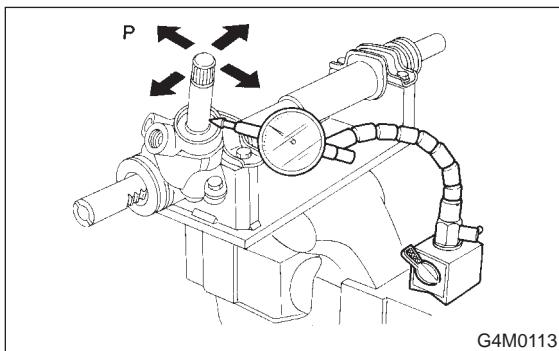
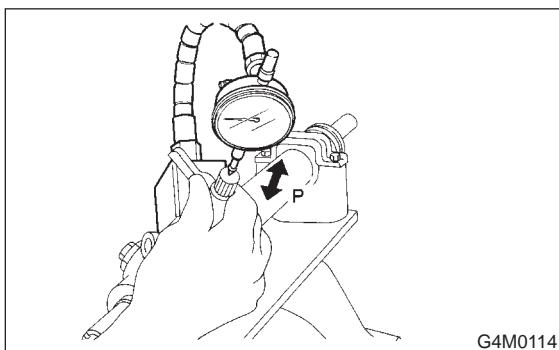
Left-turn steering:

Service limit

Direction \leftrightarrow 0.3 mm (0.012 in) or less

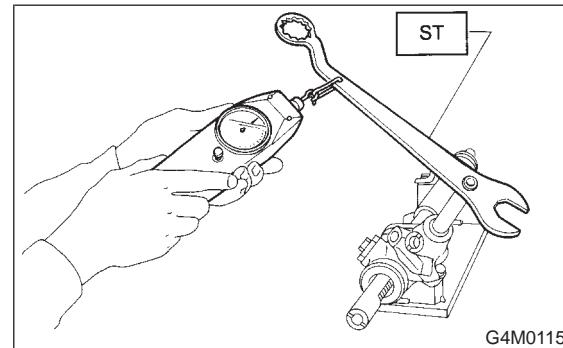
Direction \leftrightarrow 0.15 mm (0.0059 in) or less



3. INPUT SHAFT PLAY***In radial direction:******Service limit******0.18 mm (0.0071 in) or less******On condition******P: 98 N (10 kg, 22 lb)******In axial direction:******Service limit******0.5 mm (0.020 in) or less******On condition******P: 20 — 49 N (2 — 5 kg, 4 — 11 lb)*****4. TURNING RESISTANCE OF GEARBOX**

Using ST, measure gearbox turning resistance.

ST 926230000 SPANNER

Service limit:***Straight-ahead position within 30 mm (1.18 in) from rack center******Less than 11.18 N (1.14 kg, 2.51 lb)******Maximum allowable resistance******12.7 N (1.3 kg, 2.9 lb)*****D: ASSEMBLY****CAUTION:****Use only SUBARU genuine grease for gearbox.*****Grease:******VALIANT GREASE M2******[Part No. 003608001, net 0.5 kg (1.1 lb)]***

- 1) Clean all parts and tools before reassembling.
- 2) Apply grease to teeth of rack so that grease applied is about as high as teeth, and also apply a thin film of grease to sliding portion of rack shaft.

CAUTION:

- When moving rack to stroke end without tie-rod attached, prevent shocks from being applied at the end.
- Do not apply grease to threaded portion at end of rack shaft.
- Move rack shaft to stroke end two (2) or three (3) times to squeeze grease which accumulates on both ends. Remove grease to prevent it from choking air passage hole.

- 3) Apply grease to sleeve insertion hole.
- 4) Apply grease to dust seal insertion hole.

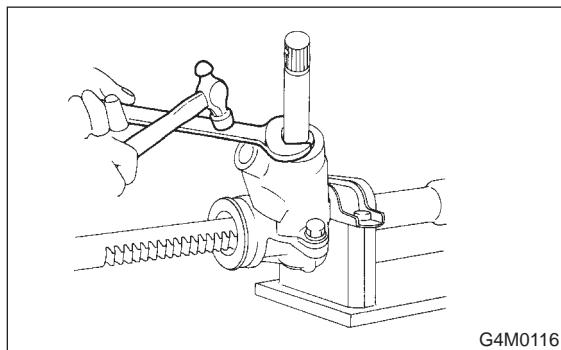
CAUTION:

Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

5) Press-fit dust seal into gearbox housing while tapping it via a spanner or the like so that stepping between gearbox and dust seal is normally 2 mm (0.08 in).

Depth: A

2 mm (0.08 in)



G4M0116

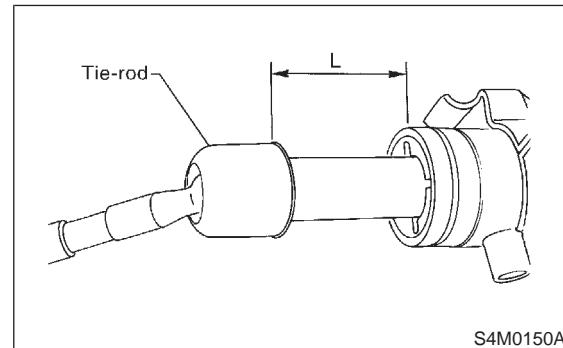
7) Install lock washers and tighten left and right tie-rods into rack ends.

On condition

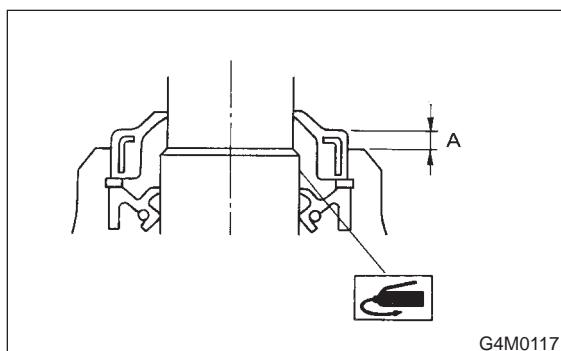
L: Approximately 40 mm (1.57 in)

Tightening torque:

78±10 N·m (8.0±1.0 kg-m, 58±7 ft-lb)

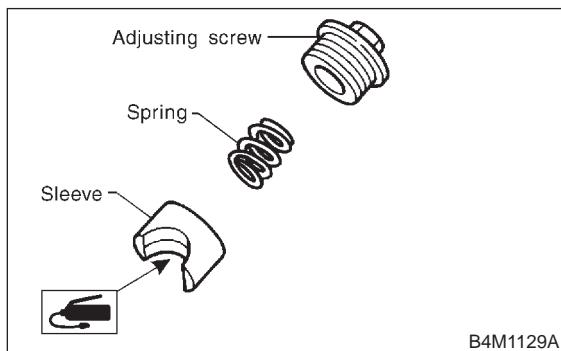


S4M0150A



G4M0117

6) Apply grease to sliding surface of sleeve and spring seat, then insert sleeve into pinion housing. Fit spring into sleeve screw, pack grease inside of screw, then install the screw.

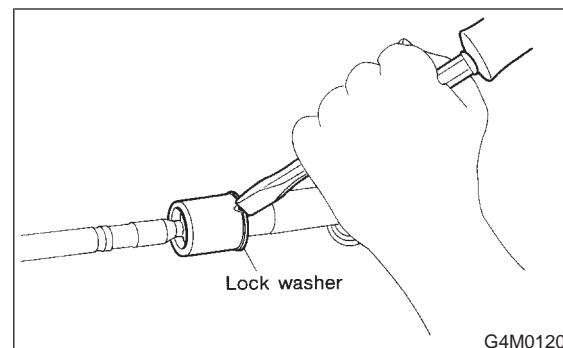


B4M1129A

8) Bend lock washer using a chisel.

CAUTION:

Be careful not to scratch rack when bending lock washer.



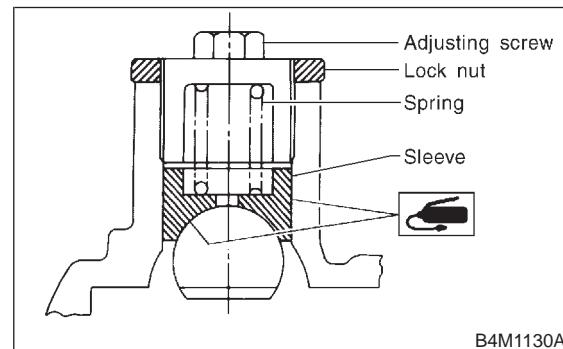
G4M0120

9) Rack and pinion backlash adjustment

(1) Loosen adjusting screw.

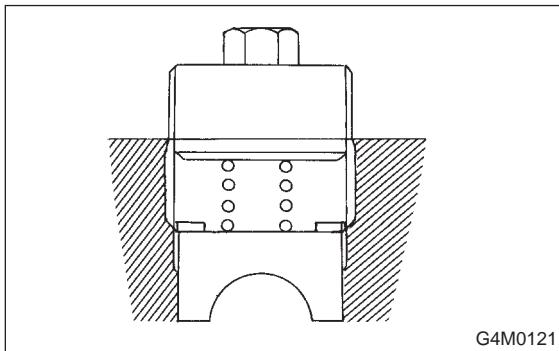
(2) Rotate input shaft so that rack is in the straight ahead direction.

(3) Apply grease to sleeve.



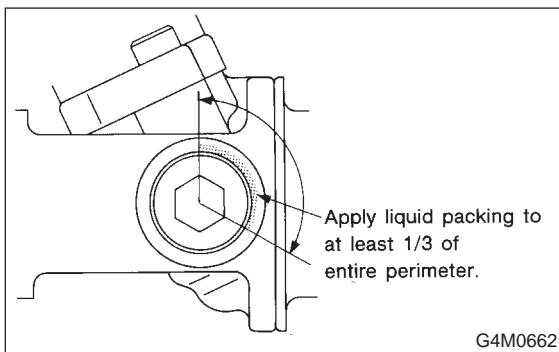
B4M1130A

(4) Tighten adjusting screw by two threads.



(5) Apply liquid packing to at least 1/3 of entire perimeter of adjusting screw thread.

Liquid packing:
THREE BOND 1141



(6) Tighten adjusting screw to 7.4 N·m (0.75 kg·m, 5.4 ft-lb) and back off 25°.

(7) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using ST. 926230000 SPANNER

Tightening torque (Lock nut):

39 ± 10 N·m (4.0 ± 1.0 kg·m, 29 ± 7 ft-lb)

NOTE:

- Hold adjusting screw with a wrench to prevent it from turning while tightening lock nut.
- Make adjustment so that steering wheel can be rotated fully from lock to lock without binding.

(10) Check for service limit as per article of "Service limit". <Ref. to 4-3 [W3C1].> Make replacement and adjustment if necessary.

(11) Install boot to housing.

NOTE:

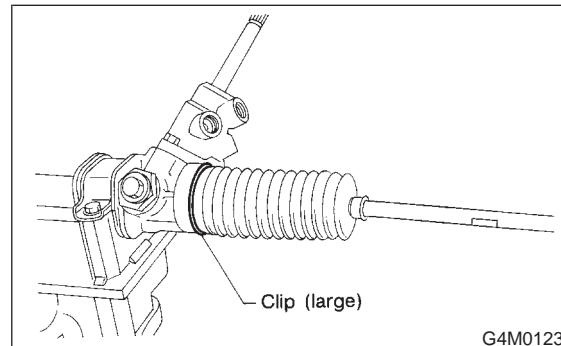
- Before installing boot, be sure to apply grease to the groove of tie-rod.
- Install fitting portions of boots to the following portions in both sides of assembled steering gearbox.

The groove on gearbox

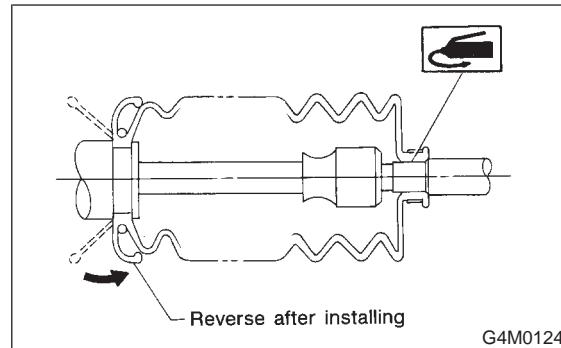
The groove on the rod

- Make sure that boot is installed without unusual inflation or deflation.

(12) Fit clip (large) to boot, and then install boot to gearbox while holding boot flange. After installing boot, fold back boot flange to the extent that large clip cannot be seen.



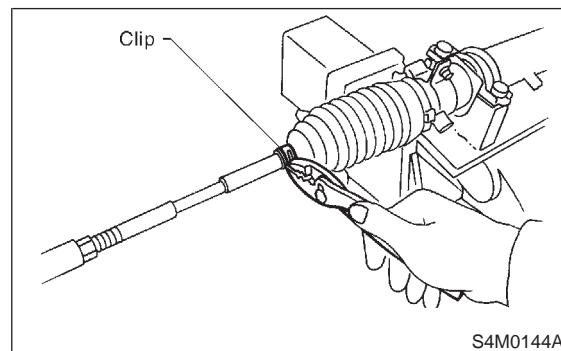
(13) Turn boot until it seats well on gearbox and rubber mounting, then bend boot flange back.



(14) Fix boot end with clip (small).

CAUTION:

After installing, check boot end is positioned into groove on tie-rod.

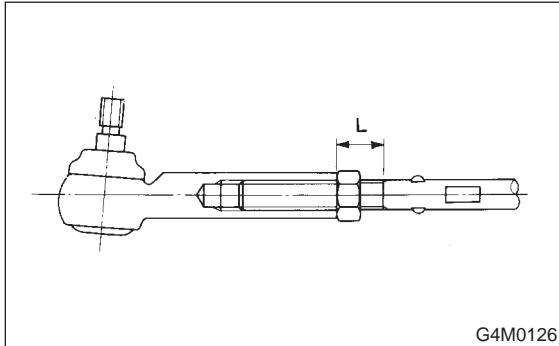


15) If tie-rod end was removed, screw in lock nut and tie-rod end to screwed portion of tie-rod, and tighten lock nut temporarily in a position as shown in figure.

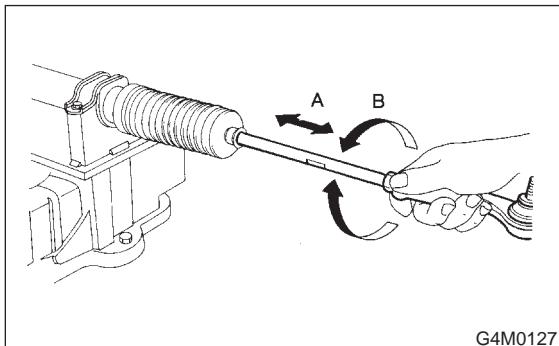
Installed tie-rod length: L
15 mm (0.59 in)

NOTE:

Pay attention to difference between right and left tie-rod ends.



16) Inspect gearbox as follows:
 "A" Holding tie-rod end, repeat lock to lock two or three times as quickly as possible.
 "B" Holding tie-rod end, turn it slowly at a radius one or two times as large as possible.
 After all, make sure that boot is installed in the specified position without deflation.



17) Remove gearbox from ST.
 ST 926200000 STAND
 18) Install four pipes on gearbox.
 (1) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A.

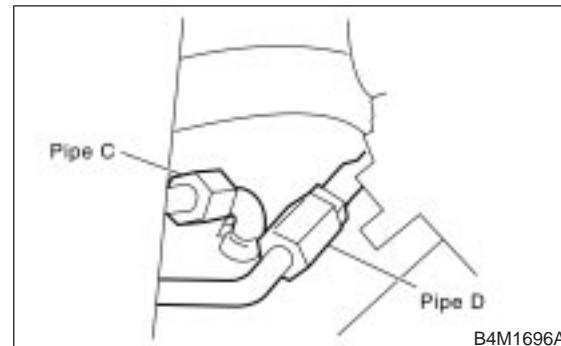
Tightening torque:

13±3 N·m (1.3±0.3 kg·m, 9.4±2.2 ft-lb)

(2) Connect pipes C and D to gearbox.
 Connect lower pipe C first, and upper pipe D second.

Tightening torque:

15±5 N·m (1.5±0.5 kg·m, 10.8±3.6 ft-lb)

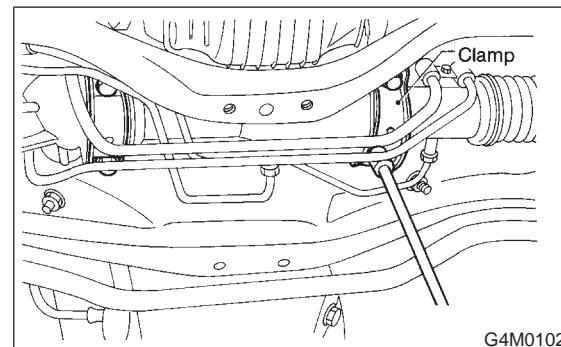


E: INSTALLATION

1) Insert gearbox into crossmember, being careful not to damage gearbox boot.
 2) Tighten gearbox to crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:

59±12 N·m (6.0±1.2 kg·m, 43±9 ft-lb)

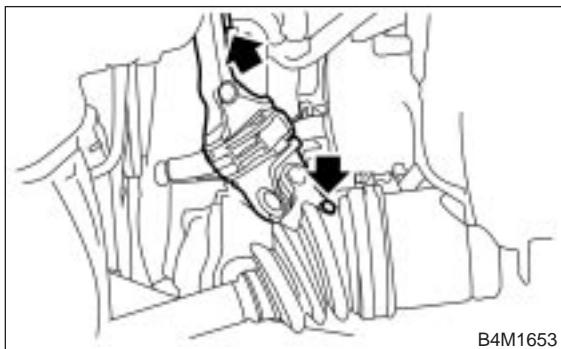


3) How to install the joint.
 (1) Push the long yoke of the joint, all the way into the serrated portion of the steering shaft, setting the bolt hole in the cutout.
 (2) Then pull the short yoke all way out of the serrated portion of the gear box, setting the bolt hole in the cutout.
 (3) Insert the bolt through the short yoke, pull the joint and confirm that the bolt is on cutout of the gearbox.

(4) Fasten the short yoke side with a spring washer and bolt, then fasten the long yoke side.

Tightening torque:

$24 \pm 3 \text{ N}\cdot\text{m} (2.4 \pm 0.3 \text{ kg}\cdot\text{m}, 17.4 \pm 2.2 \text{ ft-lb})$



B4M1653

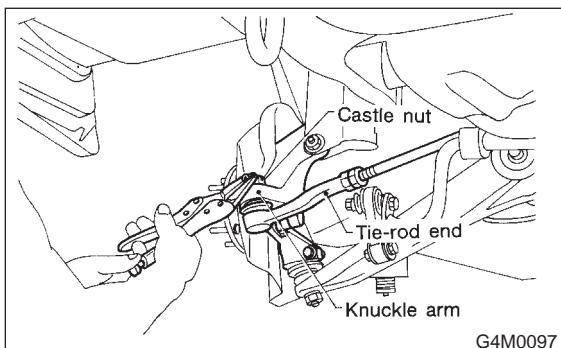
4) Connect tie-rod end and knuckle arm, and tighten with castle nut. Fit cotter pin into the nut and bend the pin to lock.

Castle nut tightening torque:

Tighten to $27.0 \pm 2.5 \text{ N}\cdot\text{m} (2.75 \pm 0.25 \text{ kg}\cdot\text{m}, 19.9 \pm 1.8 \text{ ft-lb})$, and tighten further within 60° until cotter pin hole is aligned with a slot in the nut.

CAUTION:

When connecting, do not hit cap at the bottom of tie-rod end with hammer.



G4M0097

5) Install front stabilizer to vehicle.
 6) Install front exhaust pipe assembly.
 <Ref. to 2-9 [W1B0].>
 7) Install tires.
 8) Tighten wheel nuts to the specified torque.

Tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m} (9.0 \pm 1.0 \text{ kg}\cdot\text{m}, 65 \pm 7 \text{ ft-lb})$

9) Install air intake duct.
 10) Connect ground cable to battery.
 11) Pour fluid into oil tank, and bleed air.
 <Ref. to 4-3 [W7A0].>
 12) Check for fluid leaks.
 13) Install jack-up plate.

WARNING:

Be careful, exhaust manifold is hot.

14) Lower vehicle.

15) Check fluid level in oil tank.

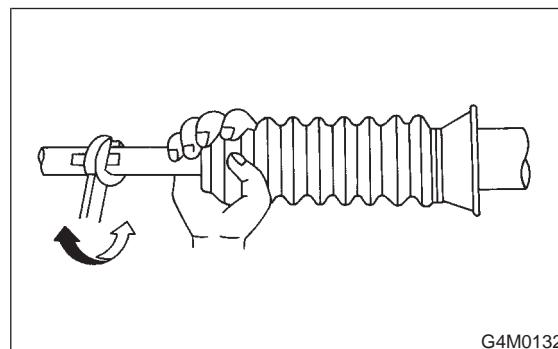
16) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:

$83 \pm 5 \text{ N}\cdot\text{m} (8.5 \pm 0.5 \text{ kg}\cdot\text{m}, 61.5 \pm 3.6 \text{ ft-lb})$

CAUTION:

When adjusting toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.



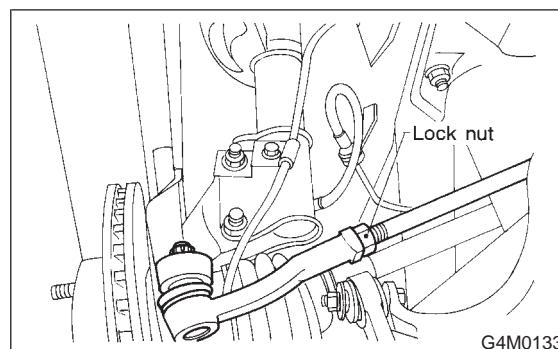
G4M0132

F: ADJUSTMENT

1) Adjust front toe.

Standard of front toe:

IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



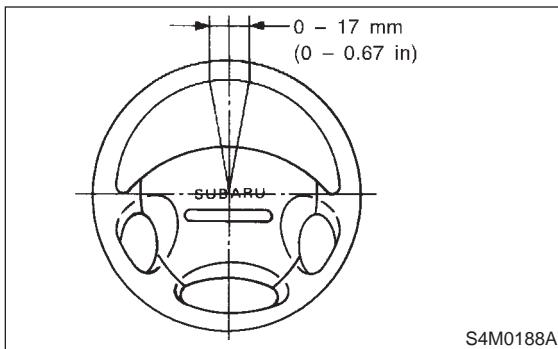
G4M0133

2) Adjust steering angle of wheels.

Standard of steering angle:

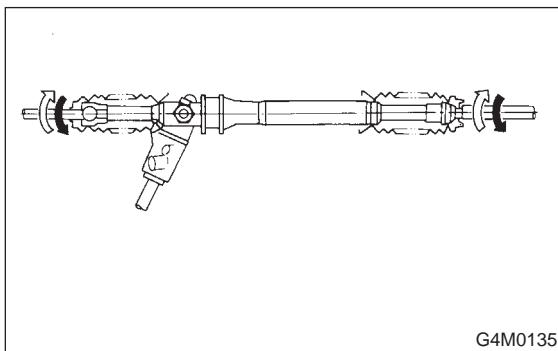
Model	Except OUTBACK	OUTBACK
Inner wheel	$36.3 \pm 1.5^\circ$	$34.5 \pm 1.5^\circ$
Outer wheel	$31.6 \pm 1.5^\circ$	$30.3 \pm 1.5^\circ$

3) If steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



S4M0188A

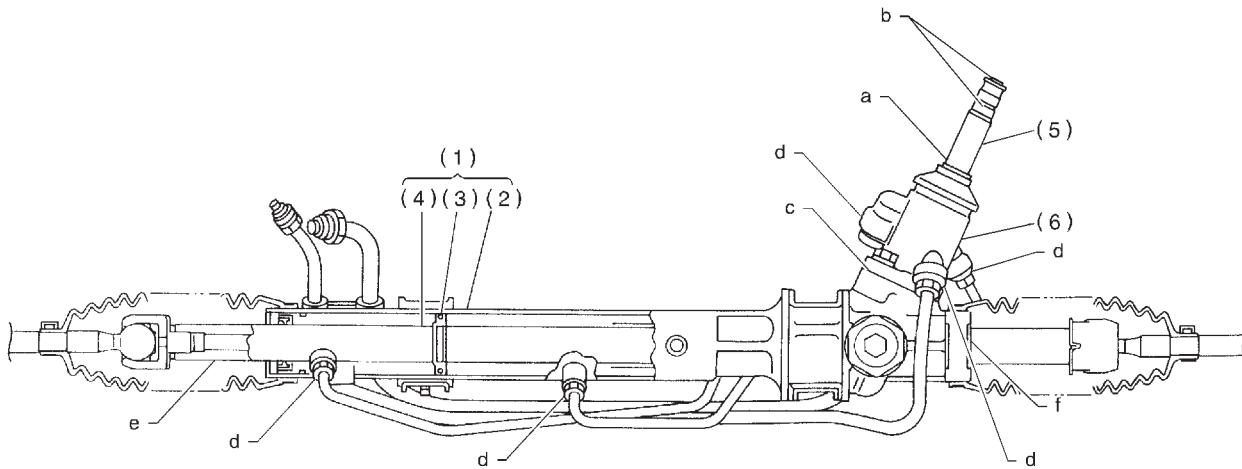
4) If steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the same direction by the same turns.



G4M0135

4. Control Valve (Power Steering Gearbox)

A: CHECKING OIL LEAKING POINTS



S4M0153A

(1) Power cylinder
(2) Cylinder

(3) Rack piston
(4) Rack axle

(5) Input shaft
(6) Valve housing

1. OIL LEAKING POINTS

1) If leak point is other than a, b, c, or d, perform the 5th step in "OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS" before dismounting gearbox from vehicle. <Ref. to 4-3 [W4A2].> If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.

2) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.

3) Before starting oil leak repair work, be sure to clean the gearbox, hoses, pipes, and surrounding parts. After completing repair work, clean these areas again.

2. OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS

NOTE:

Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared. However, it is essential to pinpoint the cause of trouble, and limit the number of replacement parts as much as possible.

1) Leakage from "a"

The oil seal is damaged. Replace valve assembly with a new one.

2) Leakage from "b"

The torsion bar O-ring is damaged. Replace valve assembly with a new one.

3) Leakage from "c"

The oil seal is damaged. Replace valve assembly or oil seal with a new one.

4) Leakage from "d"

The pipe is damaged. Replace the faulty pipe or O-ring.

5) If leak is other than a, b, c, or d, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove oil from the surrounding portions. Then, turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.

(1) Leakage from "e"

The cylinder seal is damaged. Replace rack bush with a new one.

(2) Leakage from "f"

There are two possible causes. Take following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.

ST 926420000 PLUG

Turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion between immediately after and several hours after this operation.

CAUTION:

● If leakage from "f" is noted again:

The oil seal of pinion and valve assembly is damaged. Replace pinion and valve assembly with a new one. Or replace the oil seal and the parts that are damaged during disassembly with new ones.

● If oil stops leaking from "f":

The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

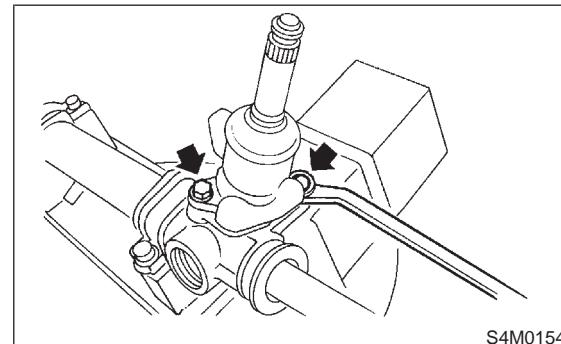
B: DISASSEMBLY

NOTE:

This section focuses on the disassembly and reassembly of control valve. For the inspection and adjustment and the service procedures for associated parts, refer to "Steering Gearbox". <Ref. to 4-3 [W3A0].>

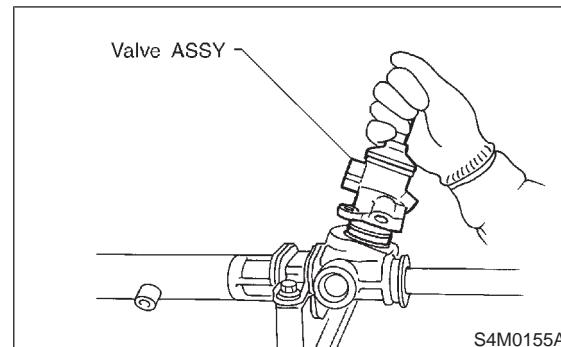
1. VALVE ASSEMBLY

1) Remove two bolts securing valve assembly.



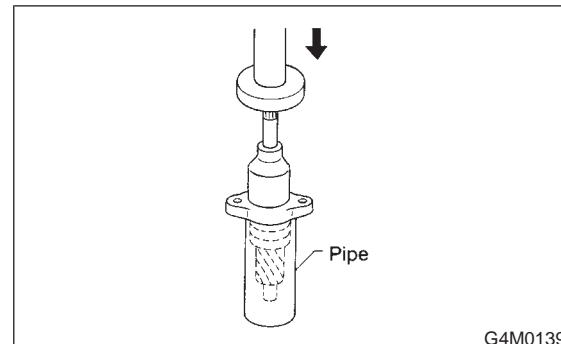
S4M0154

2) Carefully draw out input shaft and remove valve assembly.



S4M0155A

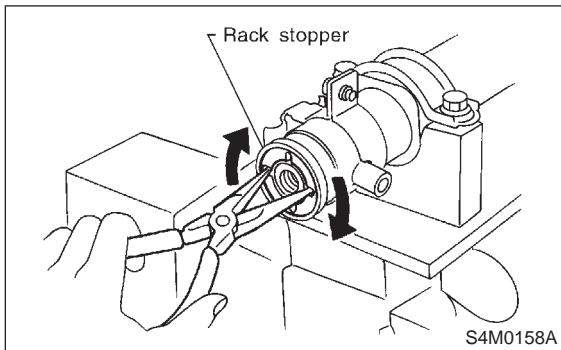
3) Draw out pinion and valve assembly from valve housing, as necessary, using pipe of I.D. 44 to 46 mm (1.73 to 1.81 in) and a press.



G4M0139

2. RACK ASSEMBLY

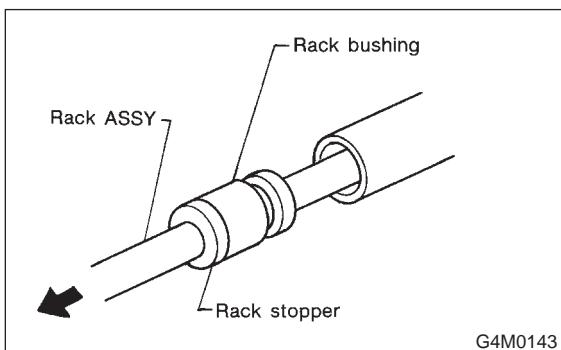
1) Using a sharp pointed pliers, rotate the rack stopper in the direction of the arrow until the end of the circlip comes out of the stopper. Rotate the circlip in the opposite direction and pull it out.



2) Pull rack assembly from cylinder side, and draw out rack bushing and rack stopper together with rack assembly.

CAUTION:

Be careful not to contact rack to inner wall of cylinder when drawing out. Any scratch on cylinder inner wall will cause oil leakage.



3) Remove rack bushing and rack stopper from rack assembly.

CAUTION:

Do not reuse removed rack bushing and circlip.

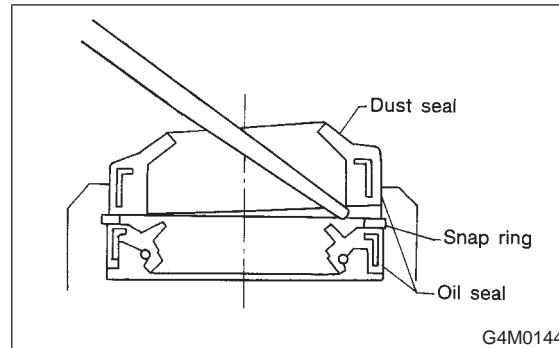
C: REPLACEMENT OF SEAL AND PACKING

1. VALVE HOUSING OIL SEAL

Specified steering grease:

VALIANT GREASE M2 (Part No. 003608001)

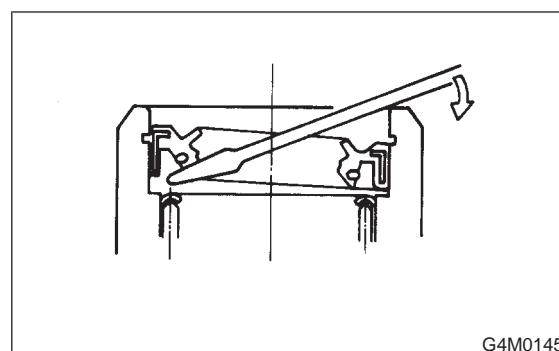
- 1) Pry off dust seal using screwdriver.
- 2) Remove snap ring using snap ring pliers.



- 3) Pry off oil seal using screwdriver.

CAUTION:

After removing, check inside surface of valve housing for damage. If oil seal contacting surface is damaged, replace valve housing with a new one.

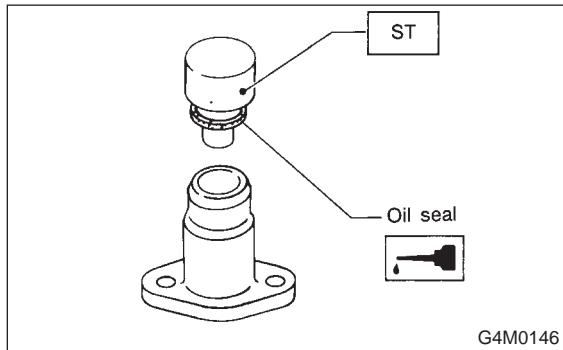


4) Press-fit oil seal into valve housing using ST and press.

ST 927610000 INSTALLER

NOTE:

Before fitting, coat oil seal fully with ATF DEXRON IIE or ATF DEXRON III.



5) Fit snap ring in snap ring groove using snap ring pliers.

CAUTION:

Be careful not to scratch oil seal with snap ring pliers.

NOTE:

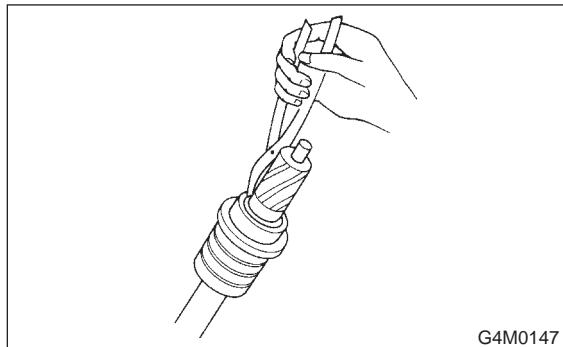
Rotate snap ring to check for proper installation.

2. PINION AND VALVE ASSEMBLY

1) Remove snap ring using snap ring pliers.

CAUTION:

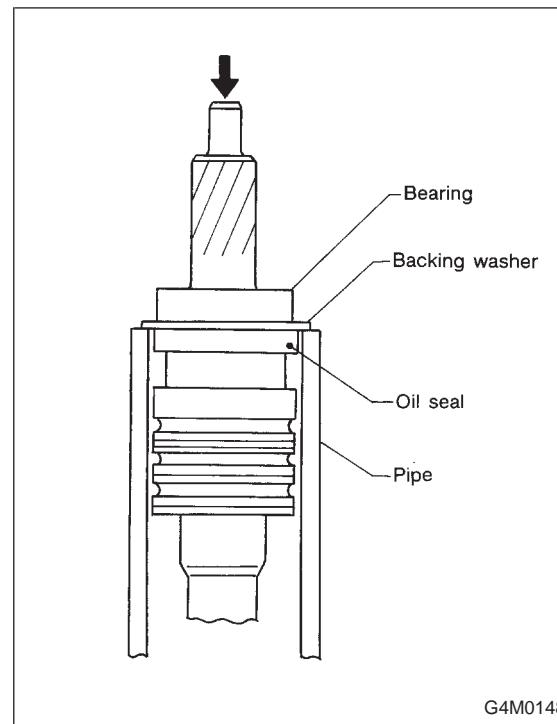
- **Do not reuse removed snap ring.**
- **Be careful not to scratch pinion and valve assembly.**



2) Press out bearing together with backing washer using pipe of I.D. 38.5 to 39.5 mm (1.516 to 1.555 in) and press.

CAUTION:

Do not reuse removed bearing.



3) Remove oil seal.

CAUTION:

Do not reuse removed oil seal.

4) Put vinyl tape around pinion shaft splines to protect oil seal from damage.

5) Fit pinion and valve assembly into valve housing.

NOTE:

Apply specified power steering fluid to outer diameter surface of input shaft and outer surface of valve body seal ring, and pay special attention not to damage seal when inserting pinion and valve assembly.

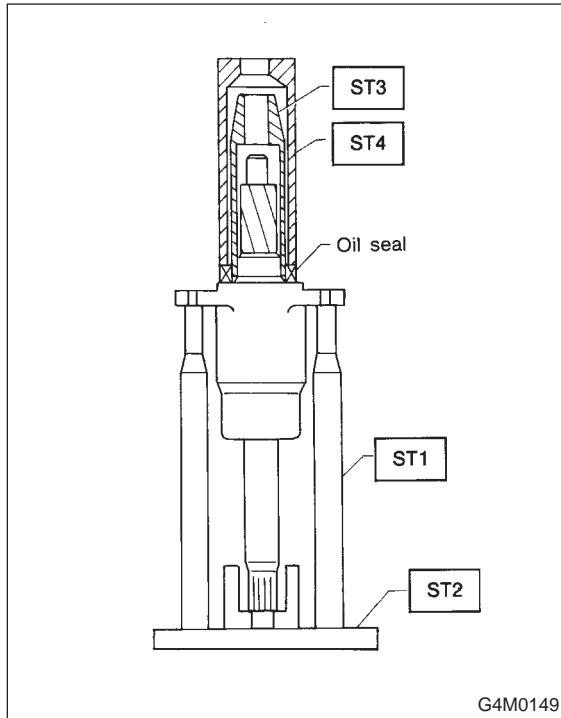
6) Secure valve assembly to ST1 and ST2.
 7) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.

ST1 926370000 INSTALLER A

ST2 927630000 STAND BASE

ST3 926360000 INSTALLER A

ST4 927620000 INSTALLER B



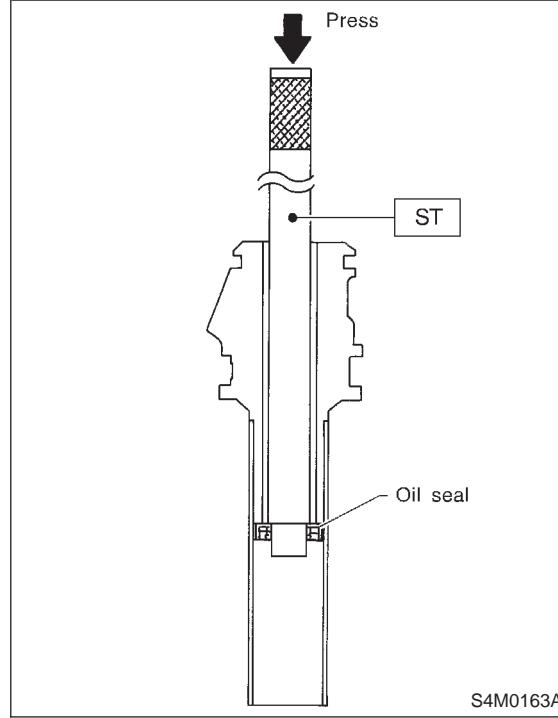
NOTE:

Rotate snap ring to check for proper installation.

3. RACK HOUSING OIL SEAL

1) Insert ST from pinion housing side and remove oil seal using a press.

ST 34199AE050 REMOVER OIL SEAL



NOTE:

- Apply specified power steering fluid to oil seal and ST3, being careful not to damage oil seal lip.
- Push oil seal until ST3 contacts housing end face.

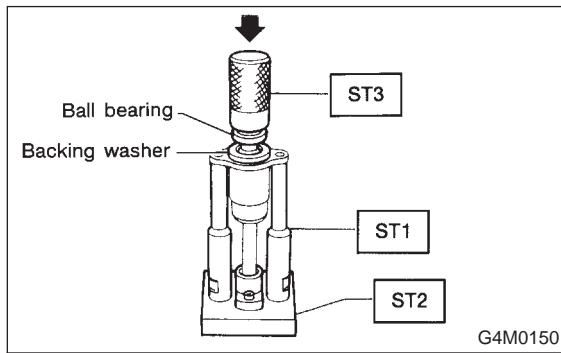
8) Remove ST3, and fit backing washer.

9) Force-fit ball bearing using ST3.

ST1 926370000 INSTALLER A

ST2 927630000 STAND BASE

ST3 927640000 INSTALLER B



NOTE:

Discard removed oil seal.

NOTE:

Be careful not to tilt ball bearing during installation.

10) Install snap ring using snap ring pliers.

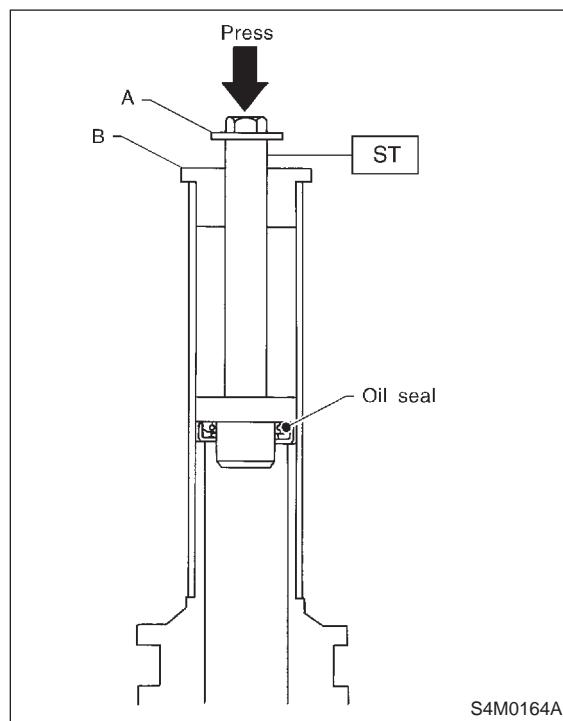
2) Force-fit oil seal using ST.
ST 34199AE060 INSTALLER

CAUTION:

Be careful not to damage or scratch cylinder inner wall.

NOTE:

- Apply specified power steering fluid to oil seal.
- Pay special attention not to install oil seal in wrong direction.
- Push oil seal until the stepped portion of A contacts end face of B.



D: ASSEMBLY

1. RACK ASSEMBLY

CAUTION:

Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:

VALIANT GREASE M2 (Part No. 003608001)

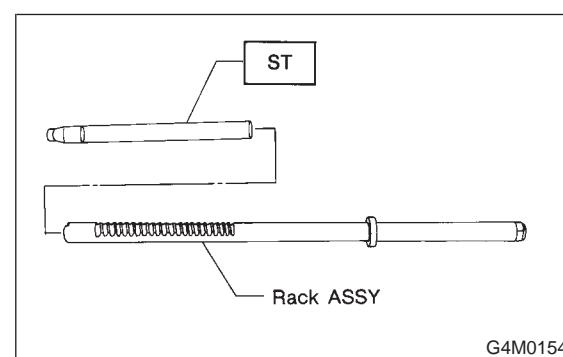
- 1) Fixing rack housing

Fix rack housing in vice using ST.
ST 926200000 STAND

CAUTION:

- When fixing rack housing in vice, be sure to use this special tool. Do not fix rack housing in vice using pad such as aluminum plates, etc.
- When using old rack housing, be sure to clean and remove rust before assembling. Check pinion housing bushing carefully.

- 2) Fit ST over toothed portion of rack assembly, and check for binding or unsmooth insertion. If any deformation is noted on flats at the end of rack, shape by using file, and wash with cleaning fluid.
ST 926390001 COVER & REMOVER



- 3) Apply genuine grease to teeth of thoroughly washed rack assembly, and fit ST over the toothed portion.

CAUTION:

- Be careful not to block air passage with grease. Remove excessive grease.
- After fitting cover, check air passage hole for clogging. If clogged, open by removing grease from the hole.
- Check rack shaft for damage.
- Apply specified power steering fluid to this ST and surface of piston ring to prevent seal from being damaged.

4) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

NOTE:

Before inserting rack assembly, apply a coat of specified power steering fluid to surfaces of ST and rack piston.

ST 926390001 COVER & REMOVER

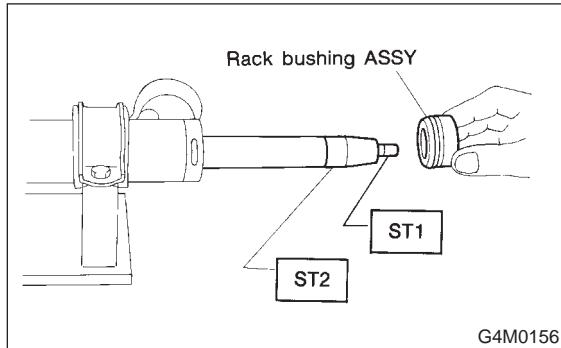
5) Fit ST1 and ST2 over the end of rack, and install rack bushing.

ST1 926400000 GUIDE

ST2 927660000 GUIDE

CAUTION:

- If burrs, or nicks are found on this guide and rack shaft portion, remove by filing.
- Dip rack bushing in specified power steering fluid before installing, and pay attention not to damage O-ring and oil seal.



6) Insert rack stopper into cylinder tube until internal groove (on cylinder side) is aligned with external groove (on rack stopper). Turn rack stopper with ST so that rack stopper hole is seen through cylinder slits.

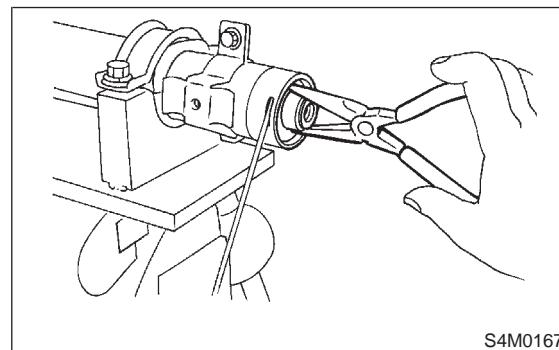
7) Insert rack stopper into rack housing, and wrap circlip using a sharp pointed pliers to secure rack stopper in position.

CAUTION:

Be careful not to scratch rack while winding circlip.

NOTE:

Rotate wrench another 90 to 180° after the end of circlip has been wrapped in.



8) Fit mounting rubber onto rack housing.

2. VALVE ASSEMBLY

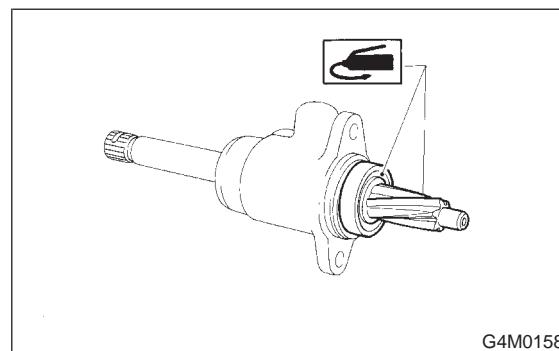
CAUTION:

Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:

VALIANT GREASE M2 (Part No. 003608001)

1) Apply genuine grease to pinion gear and bearing of valve assembly.



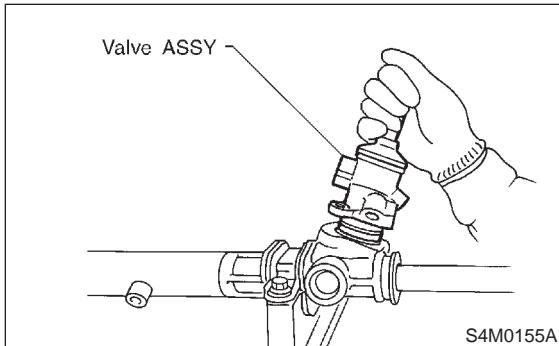
2) Install gasket on valve assembly. Insert valve assembly into place while facing rack teeth toward pinion.

CAUTION:

Be sure to use a new gasket.

NOTE:

Do not allow packing to be caught when installing valve assembly.



3) Tighten bolts alternately to secure valve assembly.

Tightening torque:

$25 \pm 0.5 \text{ N}\cdot\text{m}$ (2.5±0.5 kg-m, 18.1±3.6 ft-lb)

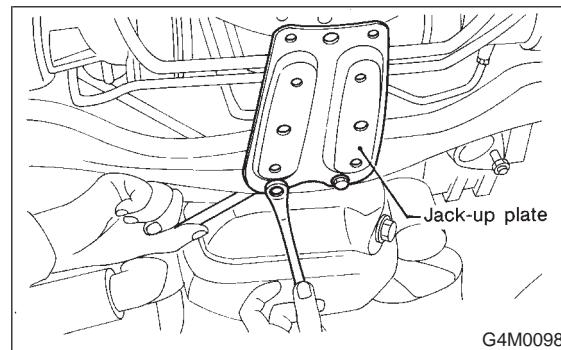
CAUTION:

Be sure to alternately tighten bolts.

5. Pipe Assembly (Power Steering System)

A: REMOVAL

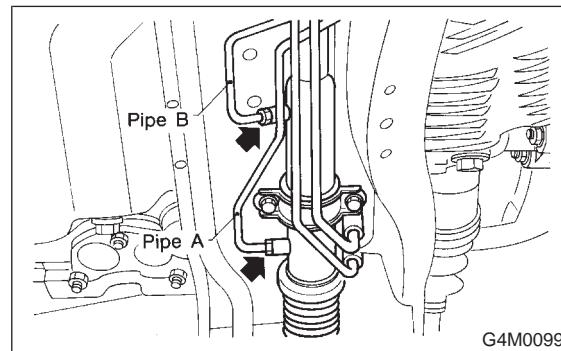
- 1) Disconnect battery minus terminal.
- 2) Lift vehicle and remove jack-up plate.



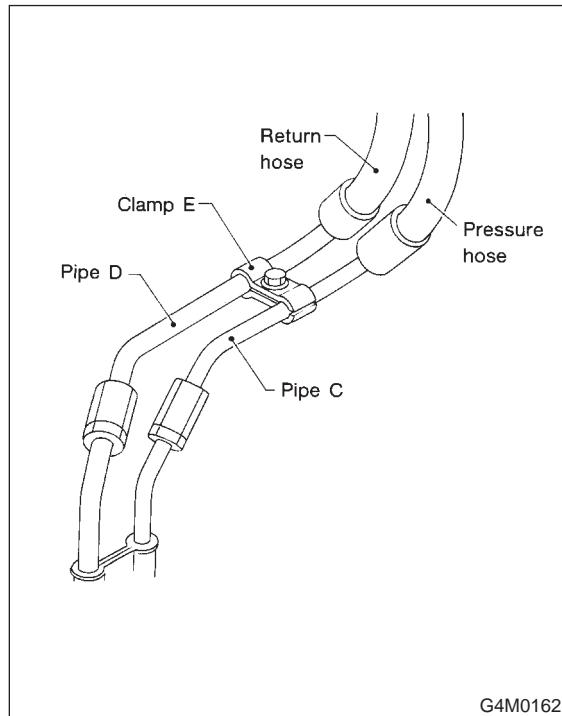
3) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

CAUTION:

Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.



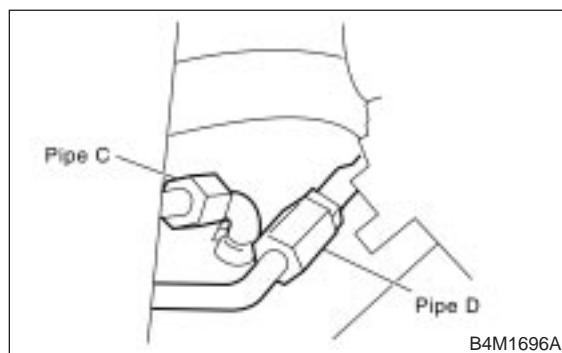
4) Remove clamp E from pipes C and D.



5) Disconnect pipe C-D from pipe (on the gearbox side).

CAUTION:

- When disconnecting pipe C-D, use two wrenches to prevent deformities.
- Be careful to keep pipe connections free from foreign matter.

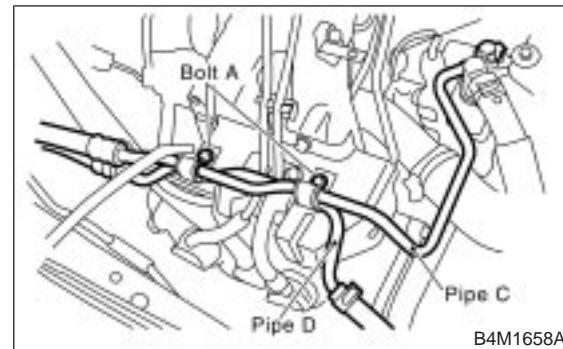


6) Remove bolt A.

Disconnect pipe C from oil pump. Disconnect pipe D from return hose.

CAUTION:

- Do not allow fluid from the hose end to come into contact with pulley belt.
- To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



B: CHECK

Check all disassembled parts for wear, damage or other abnormalities. Repair or replace faulty parts as required.

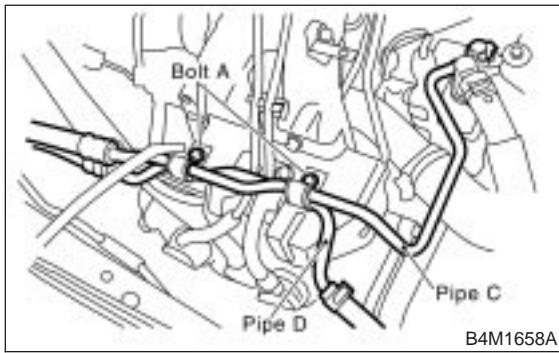
Part name	Inspection	Remedy
Pipe	<ul style="list-style-type: none"> ● O-ring fitting surface for damage ● Nut for damage ● Pipe for damage 	Replace with new one.
Clamp B		
Clamp C		
Clamp E	<ul style="list-style-type: none"> ● Clamps for weak clamping force 	Replace with new one.
Hose	<ul style="list-style-type: none"> ● Flared surface for damage ● Flare nut for damage ● Outer surface for cracks ● Outer surface for wear ● Clip for damage ● End coupling or adapter for degradation 	Replace with new one.

C: INSTALLATION

1) Connect pipes C and D to steering gearbox.

Tightening torque:**Joint nut** **$15 \pm 5 \text{ N}\cdot\text{m} (1.5 \pm 0.5 \text{ kg}\cdot\text{m}, 10.8 \pm 3.6 \text{ ft}\cdot\text{lb})$** **CAUTION:**

Visually check that hose between tank and pipe D is free from bending or twisting.



2) Connect pipe D to oil tank.

3) Connect pipe C to oil pump.

CAUTION:

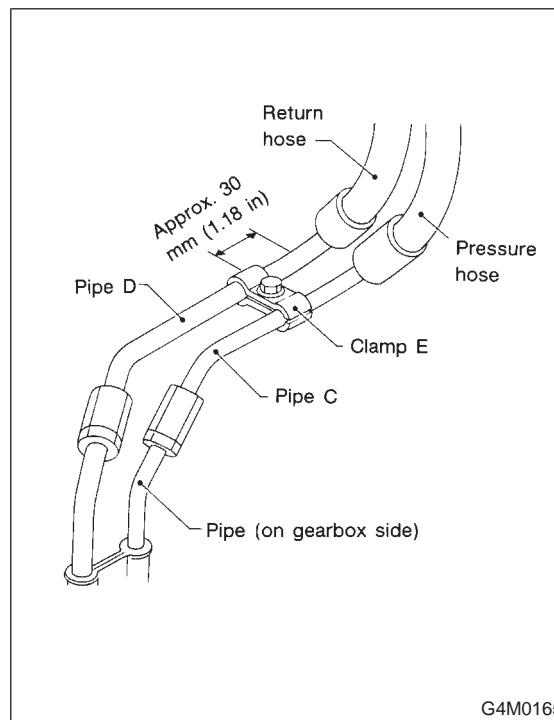
Use a new gasket.

Tightening torque: **$39 \pm 5 \text{ N}\cdot\text{m} (4.0 \pm 0.5 \text{ kg}\cdot\text{m}, 28.9 \pm 3.6 \text{ ft}\cdot\text{lb})$**

4) Tighten bolt A.

Tightening torque: **$13 \pm 3 \text{ N}\cdot\text{m} (1.3 \pm 0.3 \text{ kg}\cdot\text{m}, 9.4 \pm 2.2 \text{ ft}\cdot\text{lb})$**

5) Temporarily connect pipes C and D to pipes (on the gearbox side).

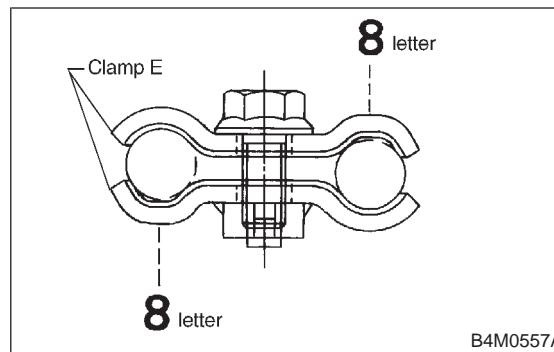


G4M0165

6) Temporarily install clamp E on pipes C and D.

CAUTION:

Ensure that the letter "8" on each clamp are diagonally opposite each other as shown in figure.



B4M0557A

7) Tighten clamp E firmly.

Tightening torque: **$7.4 \pm 2.0 \text{ N}\cdot\text{m} (0.75 \pm 0.20 \text{ kg}\cdot\text{m}, 5.4 \pm 1.4 \text{ ft}\cdot\text{lb})$**

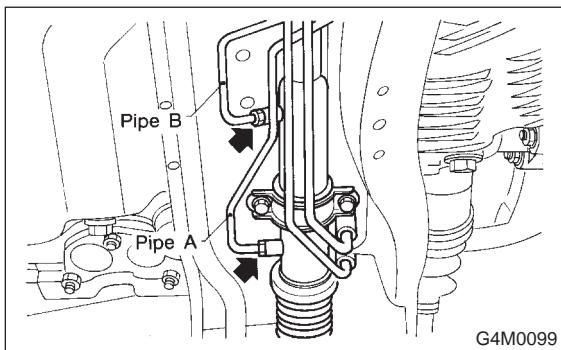
8) Tighten joint nut.

Tightening torque: **$15 \pm 5 \text{ N}\cdot\text{m} (1.5 \pm 0.5 \text{ kg}\cdot\text{m}, 10.8 \pm 3.6 \text{ ft}\cdot\text{lb})$**

9) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A second.

Tightening torque:

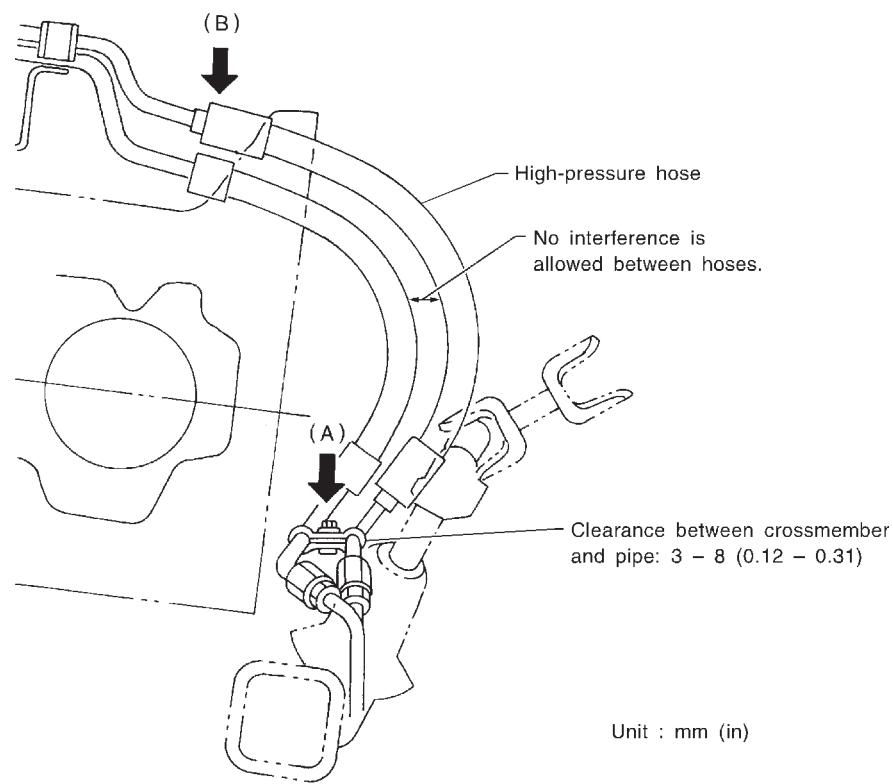
$13 \pm 3 \text{ N}\cdot\text{m} (1.3 \pm 0.3 \text{ kg}\cdot\text{m}, 9.4 \pm 2.2 \text{ ft}\cdot\text{lb})$



10) Install jack-up plate.
11) Connect battery minus terminal.
12) Feed the specified fluid and discharge air.

NOTE:

Never start the engine before feeding the fluid; otherwise vane pump might be seized up.



S4M0272A

13) Finally check clearance between pipes and/or hoses, as shown above.

If clearance between cruise control pump and power steering hose is less than 10 mm (0.39 in), proceed as follows:

(1) Move clamped section (A) (refer to figure above.) down to a point where pipe is close to crossmember.

Pipe-to-crossmember clearance:

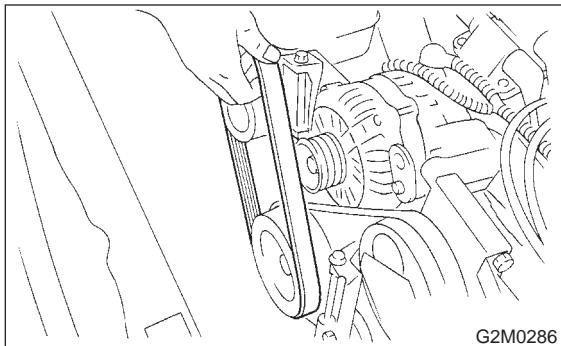
10 mm (0.39 in), min.

(2) Check that clearance between cruise control pump and power steering hose is at least 10 mm (0.39 in). If it is not, bend section (B) down until a clearance of at least 10 mm (0.39 in) is obtained.

6. Oil Pump (Power Steering System)

A: REMOVAL

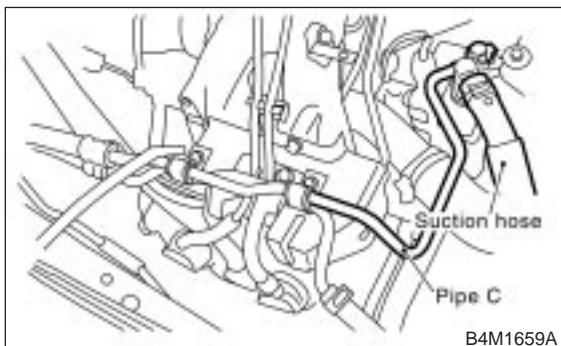
- 1) Remove ground cable from battery.
- 2) Remove pulley belt cover bracket.
- 3) Loosen lock bolt and slider bolt and remove power steering pump drive V-belt.



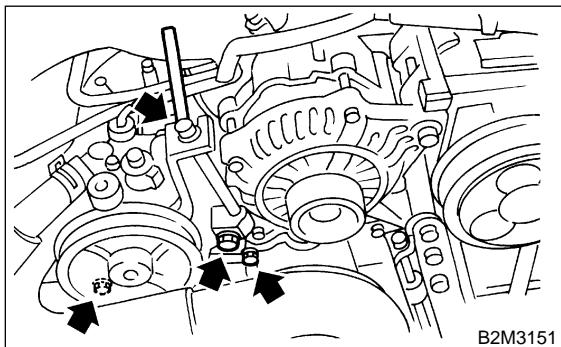
- 4) Disconnect connector from power steering pump switch.
- 5) Disconnect pipe C and suction hose from oil pump.

CAUTION:

- Do not allow fluid from the hose end to come into contact with pulley belt.
- To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



- 6) Remove bolts which install power steering pump bracket.



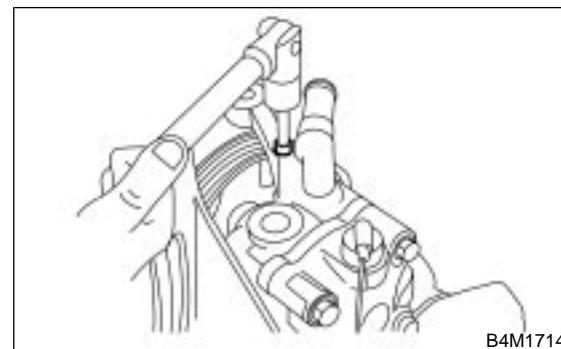
- 7) Place oil pump bracket in a vise, remove two bolts from the front side of oil pump.

CAUTION:

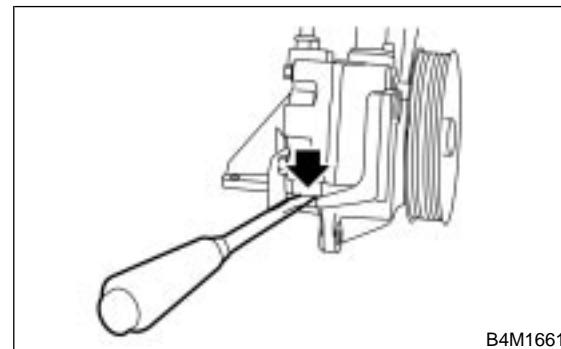
Do not place oil pump bracket directly in the vise; use soft pads and hold oil pump lightly to protect the pump.



- 8) Remove socket from oil pump.



- 9) Remove bolt from the rear side of oil pump.
- 10) Disassemble oil pump and bracket by inserting a screwdriver as shown in the figure.



B: CHECK

- In accordance with the following table, check all removed parts for wear and damage, and make repair or replacement if necessary.

No.	Parts	Inspection	Corrective action
1	Oil pump (Exterior)	(1) Crack, damage or oil leakage	Replace oil pump with a new one.
		(2) Play of pulley shaft	Measure radial play and axial play. If any of these exceeds the service limit, replace oil pump with a new one. <Ref. to 4-3 [W6B1].>
2	Pulley	(1) Damage	Replace it with a new one.
		(2) Bend	Measure V ditch deflection. If it exceeds the service limit, replace pulley with a new one. <Ref. to 4-3 [W6B1].>
3	Oil pump (Interior)	(1) Defect or burning of vane pump	Check resistance to rotation of pulley. If it is past the service limit, replace oil pump with a new one. <Ref. to 4-3 [W6B1].>
		(2) Bend in the shaft or damage to bearing	Oil pump emits a noise that is markedly different in tone and loudness from a sound of a new oil pump when turning with a string put around its pulley, replace oil pump with a new one.
4	O-ring	Crack or deterioration	Replace it with a new one.
5	Bracket	Crack	Replace it with a new one.

1. SERVICE LIMIT

Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

CAUTION:

- Fix oil pump on a vise to make a measurement. At this time, hold oil pump with the least possible force between two wood pieces.
- Do not set outside of flow control valve or pulley on a vise; otherwise outside or pulley might be deformed. Select properly sized wood pieces.

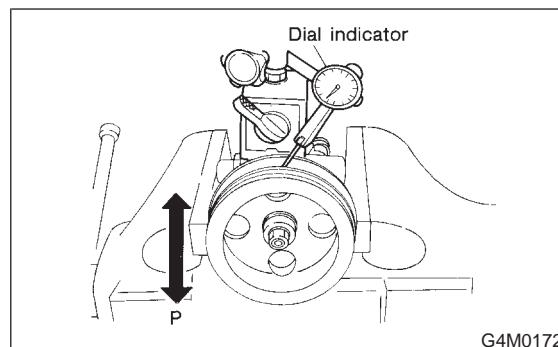
• Play of pulley shaft

On condition:

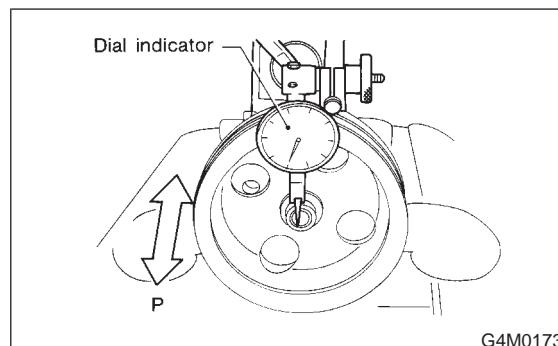
P: 9.8 N (1.0 kg, 2.2 lb)

Service limit:

*Radial play (Direction \leftrightarrow)
0.4 mm (0.016 in) or less*



*Axial play (Direction \leftrightarrow)
0.6 mm (0.024 in) or less*



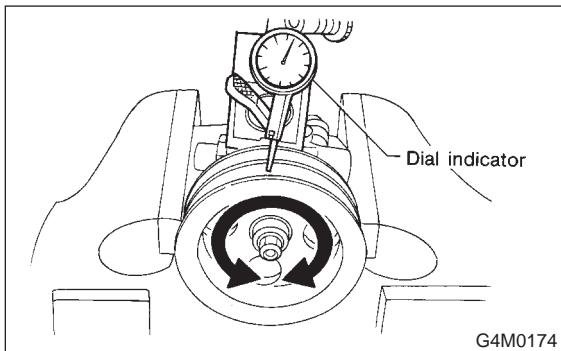
- Ditch deflection of pulley

Service limit:

1.0 mm (0.039 in) or less

NOTE:

Read the value for one surface of V ditch, and then the value for another off the dial.



G4M0174

- Resistance to rotation of pulley

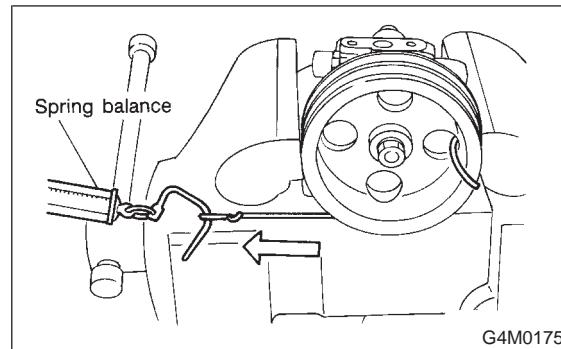
Service limit:

Maximum load; 9.22 N (0.94 kg, 2.07 lb) or less

NOTE:

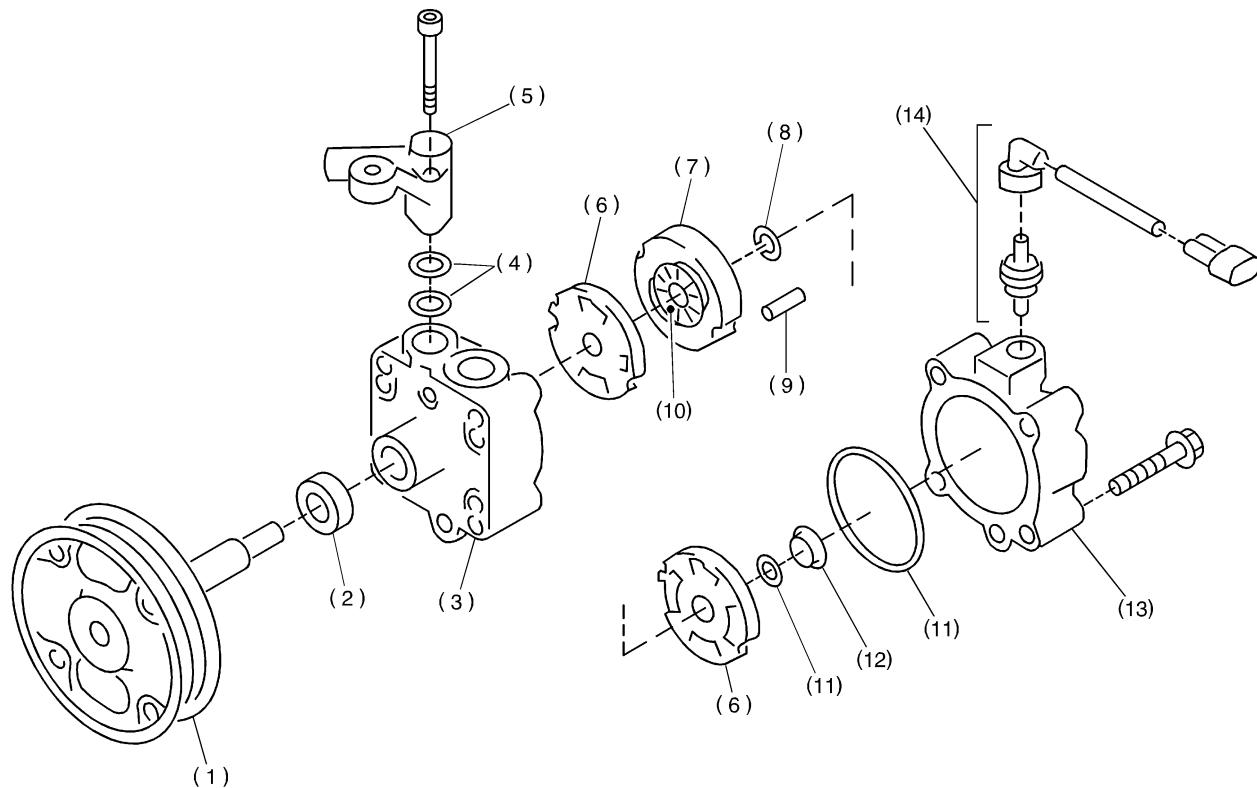
- A rather higher value may be indicated when pulley starts turning.

- Measure the load during rotation and make a judgment.



G4M0175

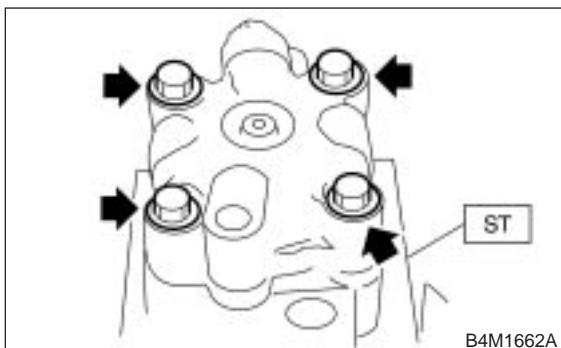
C: DISASSEMBLY



B4M1693A

(1) Pulley	(6) Pressure plate	(11) O-ring
(2) Oil seal	(7) Cam ring	(12) Seal ring
(3) Front casing	(8) Circlip	(13) Rear body
(4) O-ring	(9) Straight pin	(14) Connector
(5) Socket	(10) Rotor	

1) Using ST, place oil pump in a vise and remove four bolts which secure rear cover.
ST 34199AE020 ATTACHMENT

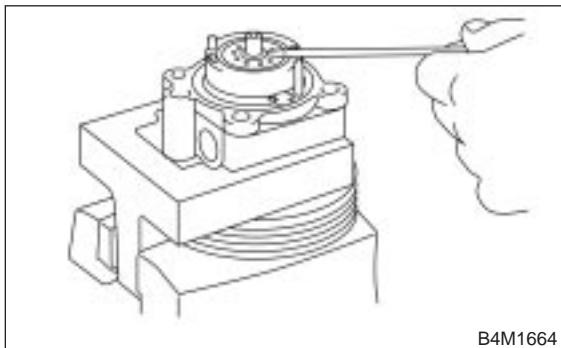


2) Remove pressure plate.



3) Using a screwdriver, pry retaining ring off.

CAUTION:
Do not remove cam ring, rotor, etc.



4) Install pressure plate.

5) Temporarily install rear cover to front casing.

6) Remove oil pump pulley.



7) Place oil pump in a vise.

CAUTION:
Do not place oil pump directly in the vise, use soft pads and hold oil pump lightly to protect the pump.

8) Pry oil seal off using a screwdriver.

CAUTION:
Be careful not to scratch inner surface of casing.



D: INSPECTION

Perform the following inspection procedures and repair or replace defective parts.

Part name	Description	Remedy
1. Front casing	1) Damage on body surfaces 2) Excessive wear on hole, into which spool valve is inserted. 3) Wear and damage on cartridge assembly mounting surface 4) Wear and damage on surfaces in contact with shaft and oil seal	Replace with a new one together with spool valve as selective fit is made.
2. Rear cover	1) Damage on body surfaces 2) Wear and damage on sliding surfaces	Replace with a new one.
3. Shaft	1) Shaft bend 2) Wear and damage on surfaces in contact with bushing and oil seal 3) Wear and damage on rotor mounting surfaces 4) Bearing damage	Replace with a new one.
4. Pressure plate	Wear and damage on sliding surfaces	Replace with a new one.
5. Cam ring	Ridge wear on sliding surfaces	
6. Vane	Excessive wear on nose radius and side surfaces	
7. Rotor	1) Wear and damage on sliding surfaces 2) Ridge wear on vane sliding grooves (If light leaks with vane in slit against light source)	If damage is serious, replace with a new cartridge assembly.
	3) Damage resulting from snap ring removal	Correct with oil stone. If damage is serious, replace with a new cartridge assembly.
8. Connector	Damage on threads	Replace with a new one.
9. Spring	Damage	Replace with a new one.
10. Bolts and nuts	Damage on threads	Replace with a new one.

E: ASSEMBLY

1) Reassembly precautions

- (1) Whenever O-rings, oil seals, and snap rings are removed, they must be replaced with new ones.
- (2) Thoroughly wash parts and allow to dry. They must be kept free from cleaning oil and dust.
- (3) Reassembly procedure must be performed in clean place. Ensure that parts are kept away from waste threads or other dust particles.
- (4) Cleaning oil tends to stay inside the front casing. Remove it completely by blowing compressed air.
- (5) Ensure that parts are free from rust. (Use specified hydraulic oil for rust prevention after cleaning and drying.)
- (6) Reverse the sequence of disassembly procedures.

2) Apply grease to oil seal and inner surface of front casing (at bearing location).

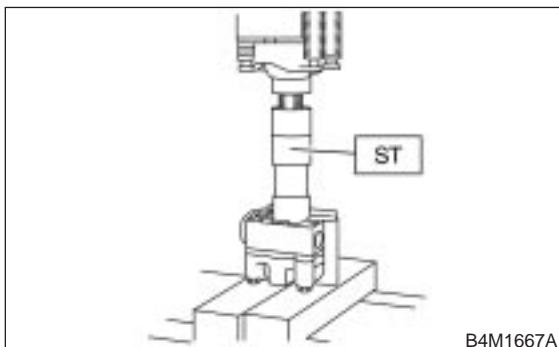
CAUTION:

Make sure that the front body internal surfaces are free from damage.

3) Temporarily install rear cover to front body.

4) Attach ST to front body. Using a press, install oil seal.

ST 34199AE030 INSTALLER



B4M1667A

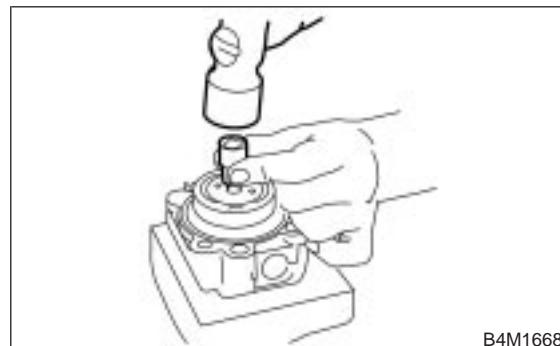
5) Install pump pulley to front body.

6) Using ST, place oil pump in a vise.

ST 34199AE020 ATTACHMENT

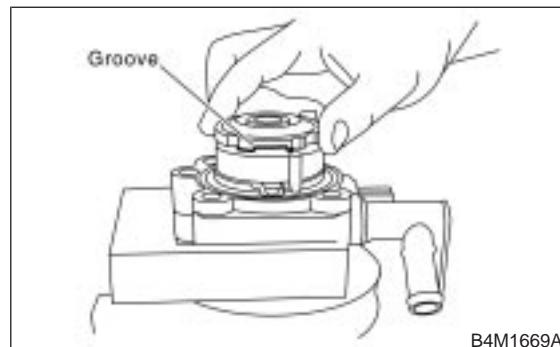
7) Remove rear cover.

8) Using 10-mm box wrench, tap retaining ring into shaft groove.



B4M1668

9) Install pressure plate as shown in the figure.



B4M1669A

10) Apply specified hydraulic oil to O-rings and fit them into front casing and pressure plate.

11) Install seal ring to pressure plate.

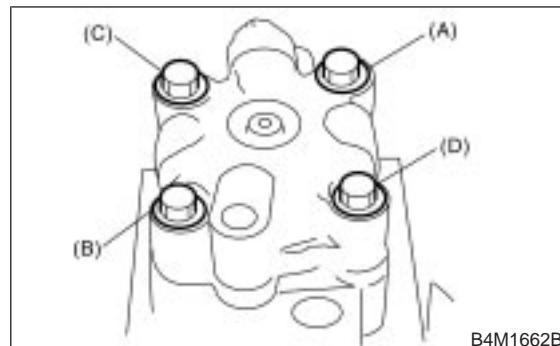
12) With knock pin positions aligned, install rear cover.

Tightening torque:

$27.5 \pm 2.0 \text{ N}\cdot\text{m}$ ($2.8 \pm 0.2 \text{ kg}\cdot\text{m}$, $20.3 \pm 1.4 \text{ ft}\cdot\text{lb}$)

CAUTION:

Loosely tighten bolts in the sequence (A), (B), (C), and (D) shown in figure. Then, tighten in the same sequence.



B4M1662B

13) When reassembly procedures have been completed, turn shaft by hand to ensure it turns smoothly. If it binds or other unusual conditions are evident, disassemble again and check for foreign matter trapped on sliding surfaces and improper installation. Eliminate the cause of trouble.

14) Check followings by referring to "CHECK" article.

- Excessive play in pulley shaft
- Ditch deflection of pulley
- Resistance to rotation of pulley
- Measurement of generated oil pressure

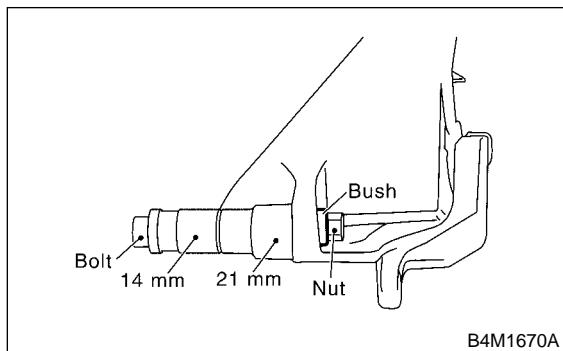
F: INSTALLATION

1) Install oil pump to bracket.

(1) Place oil pump bracket in a vise. Tighten bushing using a 12.7 mm (1/2") type 14- and 21-mm box wrench until it is in contact with oil pump mounting surface.

CAUTION:

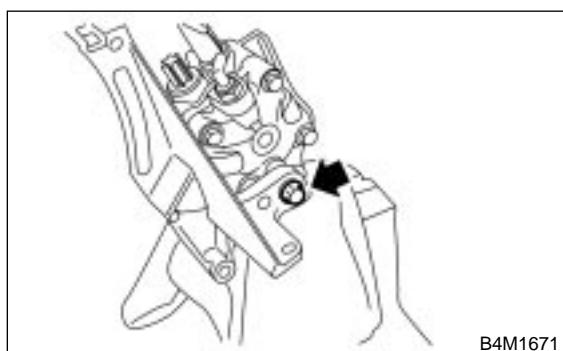
Do not place oil pump bracket directly in the vise, use soft pads and hold oil pump lightly to protect the pump.



(2) Tighten bolt which installs oil pump to bracket.

Tightening torque:

$37.3 \pm 5.9 \text{ N}\cdot\text{m} (3.8 \pm 0.6 \text{ kg}\cdot\text{m}, 27.5 \pm 4.3 \text{ ft-lb})$



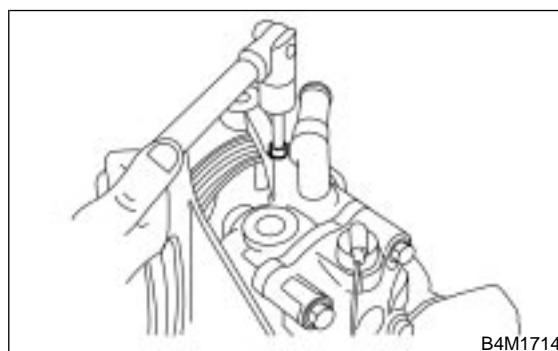
Tightening torque:

$15.7 \pm 2.4 \text{ N}\cdot\text{m} (1.6 \pm 0.24 \text{ kg}\cdot\text{m}, 11.6 \pm 1.7 \text{ ft-lb})$



B4M1660

2) Install socket to oil pump.

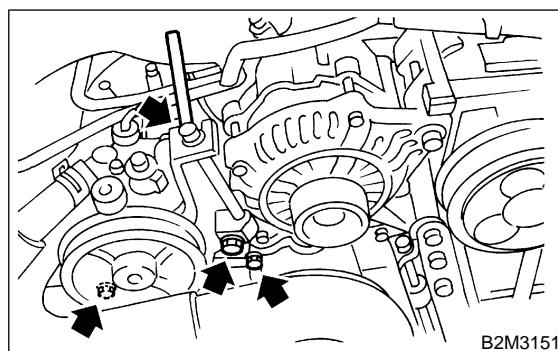


B4M1714

3) Tighten bolt which install power steering pump bracket.

Tightening torque:

$22 \pm 2 \text{ N}\cdot\text{m} (2.2 \pm 0.2 \text{ kg}\cdot\text{m}, 15.9 \pm 1.4 \text{ ft-lb})$



B2M3151

4) Interconnect pipes C and suction hose.

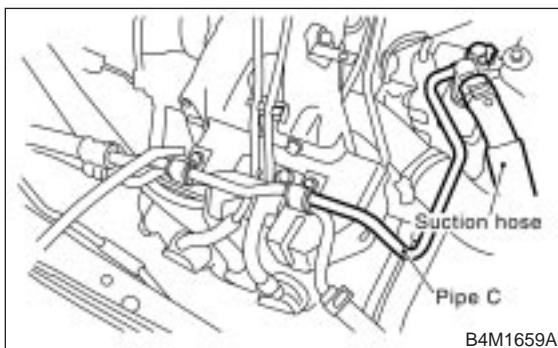
Tightening torque:

Joint nut

$39.2 \pm 4.9 \text{ N}\cdot\text{m} (4 \pm 0.5 \text{ kg}\cdot\text{m}, 28.9 \pm 3.6 \text{ ft-lb})$

CAUTION:

If a hose is twisted at this step, the hose may come into contact with some other parts.



5) Connect connector to power steering oil pressure switch.
 6) Install pulley belt to oil pump.
 7) Check pulley belt tension. <Ref. to 1-5 [G2A0].>
 8) Tighten bolt belt tension.

Tightening torque:

$8 \pm 2 \text{ N}\cdot\text{m} (0.8 \pm 0.2 \text{ kg}\cdot\text{m}, 5.8 \pm 1.4 \text{ ft-lb})$

9) Install pulley belt cover bracket.
 10) Connect minus terminal of battery.
 11) Feed the specified power steering fluid and discharge air. <Ref. to 4-3 [W8A0].>

CAUTION:

Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

7. Reservoir Tank

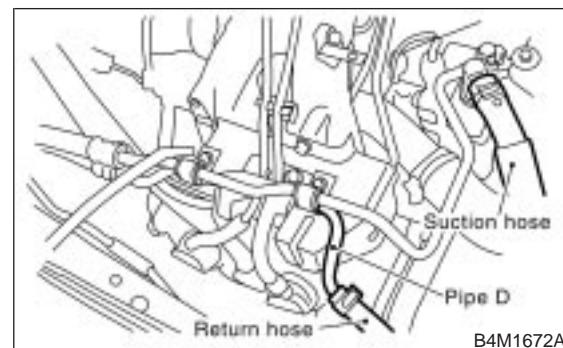
A: REMOVAL

1) Drain about 0.3 ℥ (0.3 US qt, 0.3 Imp qt) of working fluid from the reservoir tank.

2) Disconnect pipe D from return hose and suction hose from oil pump.

CAUTION:

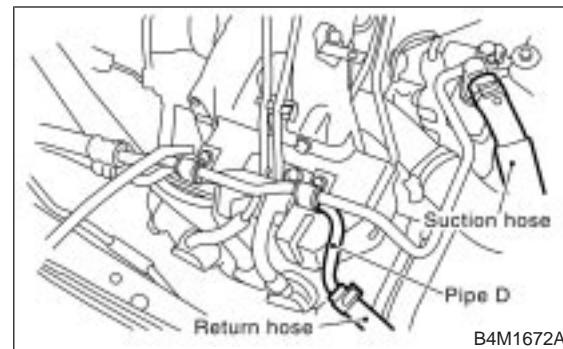
- Do not allow fluid from the hose end to come into contact with pulley belt.
- To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



3) Remove reservoir tank from bracket by pulling it upwards.

B: INSTALLATION

1) Install reservoir tank to bracket.
 2) Connect pipes D to return hose and suction hose to oil pump.



3) Feed the specified power steering fluid and discharge air. <Ref. to 4-3 [W8A0].>

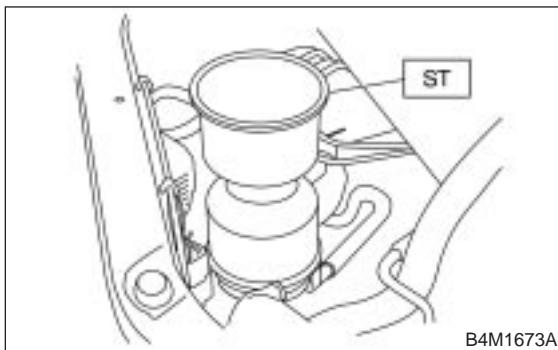
8. Power Steering Fluid

A: RECOMMENDED POWER STEERING FLUID AND AIR BLEEDING

Recommended power steering fluid	Manufacturer
DEXRON IIE or III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

1) Set ST on top of reservoir tank and fill it about half way with the specified fluid.

ST 34199AE040 OIL CHARGE



2) Continue to turn steering wheel slowly from lock to lock until bubbles stop appearing in the tank while keeping the fluid at that level.

3) In case air is absorbed to deliver bubbles into piping because the fluid level is lower, leave it about half an hour and then do the step 2) all over again.

4) Start, and idle the engine.

5) Continue to turn steering wheel slowly from lock to lock again until bubbles stop appearing in the tank while keeping the fluid at that level.

It is normal that bubbles stop appearing after three times turning of steering wheel.

6) In case bubbles do not stop appearing in the tank, leave it about half an hour and then do the step 5) all over again.

7) Stop the engine, and take out safety stands after jacking up vehicle again.

Then lower the vehicle, and idle the engine.

8) Continue to turn steering wheel from lock to lock until bubbles stop appearing and change of the fluid level is within 3 mm (0.12 in).

9) In case the following happens, leave it about half an hour and then do step 8) again.

(1) The fluid level changes over 3 mm (0.12 in).

(2) Bubbles remain on the upper surface of the fluid.

(3) Grinding noise is generated from oil pump.

10) Check the fluid leakage at flare nuts after turning steering wheel from lock to lock with engine running.

CAUTION:

- Before checking, wipe off any fluid on flare nuts and piping.

- In case the fluid leaks from flare nut, it is caused by dust (or the like) and/or damage between flare and tapered seat in piping.

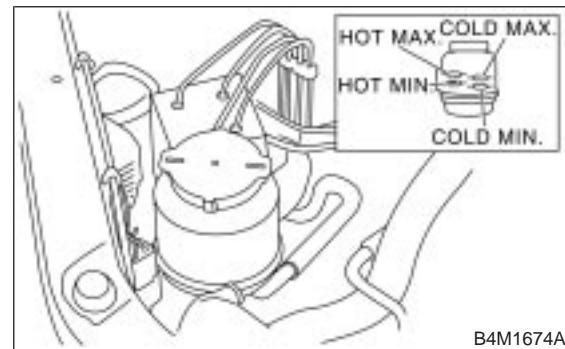
- So remove the flare nut, tighten again it to the specified torque after cleaning flare and tapered seat. If flare or tapered seat is damaged, replace it with a new one.

11) Inspect fluid level on flat and level surface with engine "OFF" by indicator of reservoir tank.

If the level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like.

(1) Check at temperature 20°C (68°F) on reservoir surface of oil pump; read the fluid level on the "COLD" side.

(2) Check at temperature 80°C (176°F) on reservoir surface of oil pump; read the fluid level on the "HOT" side.



1. Power Steering

A: STEERING CONDITION

Trouble	Possible cause	Corrective action
<ul style="list-style-type: none"> Heavy steering effort in all ranges Heavy steering effort at stand still Steering wheel surges when turning. 	<ol style="list-style-type: none"> 1. Pulley belt <ul style="list-style-type: none"> Unequal length of pulley belts Adhesion of oil and grease Loose or damage of pulley belt Poor uniformity of pulley belt cross section Pulley belt touches to pulley bottom Poor revolution of pulleys except oil pump pulley Poor revolution of oil pump pulley 2. Tire and rim <ul style="list-style-type: none"> Improper tires out of specification Improper rims out of specification Tires not properly inflated*1 3. Fluid <ul style="list-style-type: none"> Low fluid level Aeration Dust mix Deterioration of fluid Poor warming-up of fluid *2 4. Idling speed <ul style="list-style-type: none"> Lower idling speed Excessive drop of idling speed at start or at turning steering wheel *3 5. Measure hydraulic pressure. <Ref. to 4-3 [K1B0].> 6. Measure steering effort. <Ref. to 4-3 [K1C0].> 	<p>Adjust or replace.</p> <p>Replace or reinflate.</p> <p>Refill, bleed air, replace or instruct customer.</p> <p>Adjust or instruct customer.</p> <p>Replace problem parts.</p> <p>Adjust or replace.</p>
<ul style="list-style-type: none"> Vehicle leads to one side or the other. Poor return of steering wheel to center Steering wheel surges when turning. 	<ol style="list-style-type: none"> 1. Fluid line <ul style="list-style-type: none"> Folded hose Flattened pipe 2. Tire and rim <ul style="list-style-type: none"> Flat tire Mix use of different tires Mix use of different rims Abnormal wear of tire Unbalance of remained grooves Unbalance of tire pressure 3. Front alignment <ul style="list-style-type: none"> Improper or unbalance caster Improper or unbalance toe-in Loose connection of suspension 4. Others <ul style="list-style-type: none"> Damaged joint assembly Unbalanced height One-sided weight 5. Measure steering effort. <Ref. to 4-3 [K1C0].> 	<p>Reform or replace.</p> <p>Fix or replace.</p> <p>Adjust or retighten.</p> <p>Replace, adjust or instruct customer.</p> <p>Adjust or replace.</p>

*1 If tires and/or rims are wider, the load to power steering system is the more. Accordingly, in a condition, for example before fluid warms-up, relief valve may work before maximum turning angle. In this case, steering effort may be heavy. When measured hydraulic pressure is normal, there is no abnormal thing.

*2 In cold weather, steering effort may be heavy due to increased flow resistance of cold fluid. After warming-up engine, turn steering wheel from stop to stop several times to warm-up fluid. Then if steering effort reduces normally, there is no abnormal thing.

*3 In cold weather or with insufficient warm-up of engine, steering effort may be heavy due to excessive drop of idling when turning steering wheel. In this case, it is recommended to start the vehicle with increasing engine speed than usual. Then if steering effort reduces normally, there is no abnormal thing.

B: MEASUREMENT OF HYDRAULIC PRESSURE

CAUTION:

- Be sure to complete all items aforementioned in "STEERING CONDITION", prior to measuring hydraulic pressure. Otherwise, pressure can not be measured correctly. <Ref. to 4-3 [K1A0].>
- Do not leave the valve of pressure gauge closed or hold the steering wheel at stop end for 5 seconds or more in any case, as the oil pump may be damaged due to long keep of these conditions.
- Put cotton cloth waste at a place where fluid drops before pressure gauge is installed. Wipe off split fluid thoroughly after the measurement.

NOTE:

Keep engine idling during the measurement.

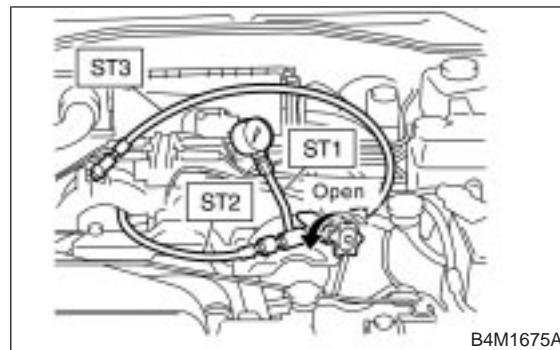
1B1 : MEASURE REGULAR PRESSURE.

- 1) Install STs to power steering pump.
 - (1) Drain the power steering fluid about 0.35 ℥ (0.4 US qt, 0.3 Imp qt) from oil tank.
 - (2) Remove two bolts securing power steering pipes to engine.
 - (3) Install ST1, 2 and 3 between power steering pump and pipes using gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010).

ST1 925711000 PRESSURE GAUGE

ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A



- (4) Replenish power steering fluid up to specified level.
- 2) Open valve, and start the engine.
- 3) Measure regular pressure.

CHECK

: *Is pressure 981 kPa (10 kg/cm², 142 psi) or less?*

YES

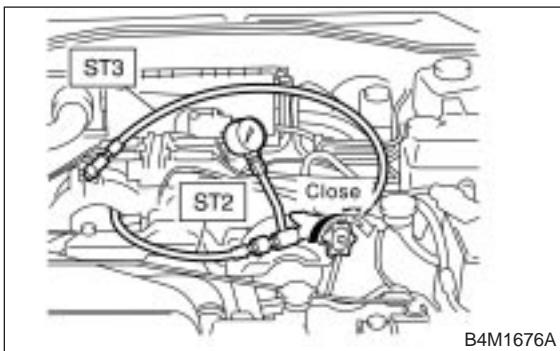
: Go to step 1B2.

NO

: Trouble may be due to crushed pipe or hose, leakage from fluid line, foreign particles in fluid line, etc. Replace faulty parts with new ones.

1B2 : MEASURE RELIEF PRESSURE.

1) Using STs, measure relief pressure.
 ST1 925711000 PRESSURE GAUGE
 ST2 34099AC020 ADAPTER HOSE B
 ST3 34099AC010 ADAPTER HOSE A



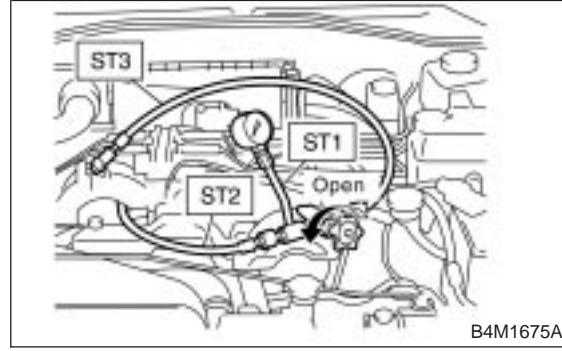
B4M1676A

2) Close valve.

CHECK : Is pressure 9,611 — 10,199 kPa (98 — 104 kg/cm², 1,394 — 1,479 psi)?
YES : Go to step 1B3.
NO : Trouble may be due to malfunctioning relief valve, fluid leaking into oil pump interior, abnormal wear of pump vanes, etc. Replace with new oil pump.

1B3 : MEASURE WORKING PRESSURE.

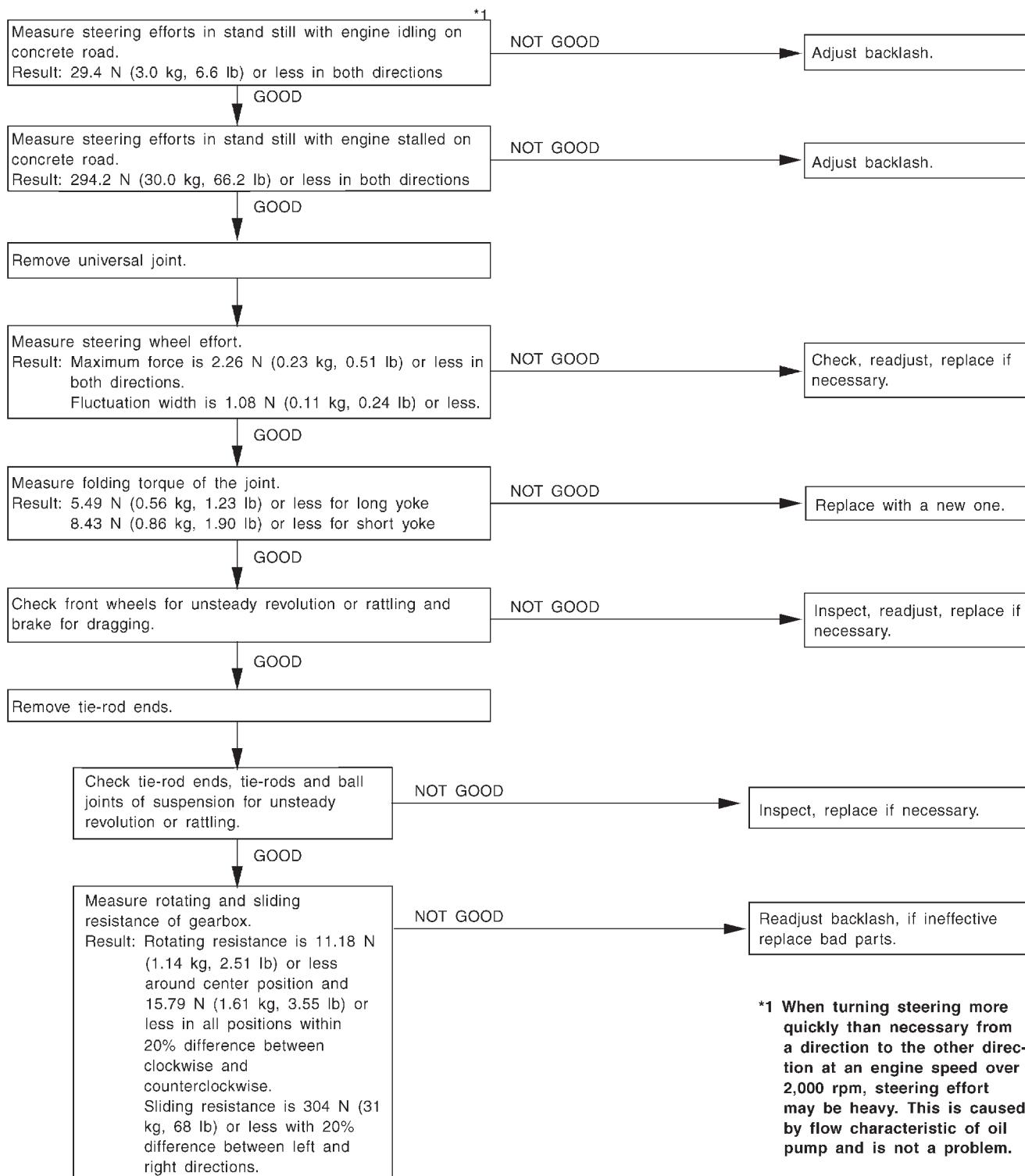
1) Using STs, measure working pressure.
 ST1 925711000 PRESSURE GAUGE
 ST2 34099AC020 ADAPTER HOSE B
 ST3 34099AC010 ADAPTER HOSE A



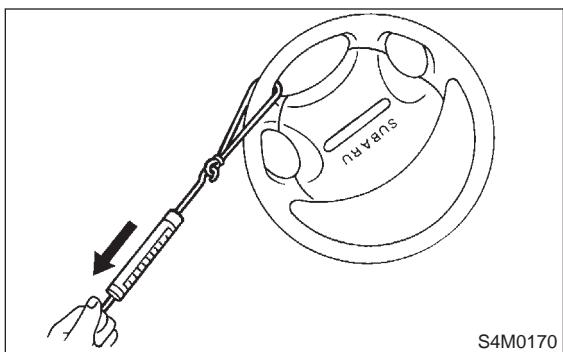
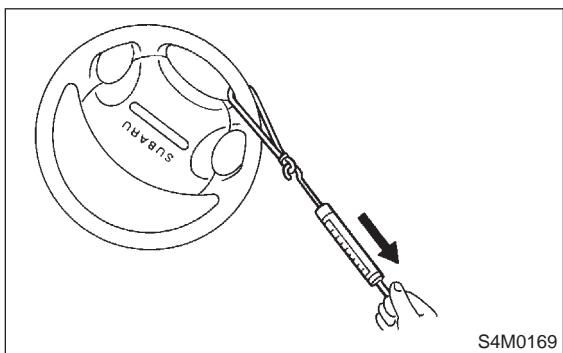
B4M1675A

2) Open valve.
 3) Measure working pressure of control valve by turning wheel from stop to stop.
CHECK : Is pressure 9,611 — 10,199 kPa (98 — 104 kg/cm², 1,394 — 1,479 psi)?
YES : Measure steering force. <Ref. to 4-3 [K1C0].>
NO : Control valve is inoperative. Replace control valve itself or control valve and pinion as a single unit with new ones.

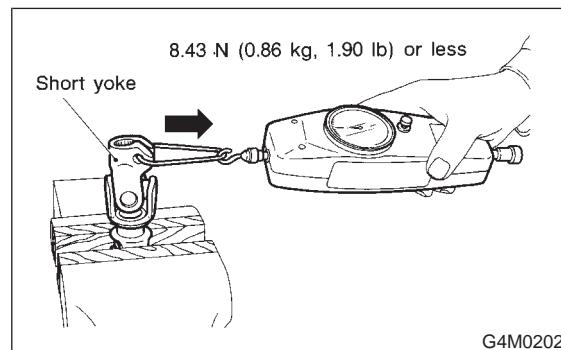
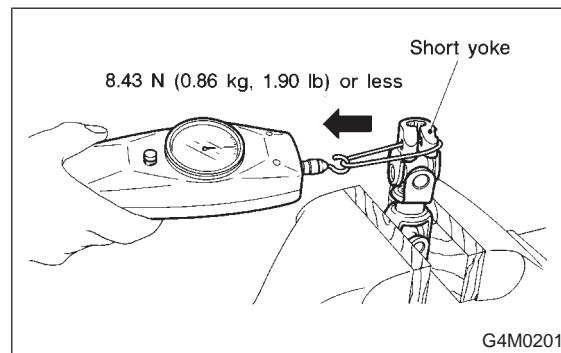
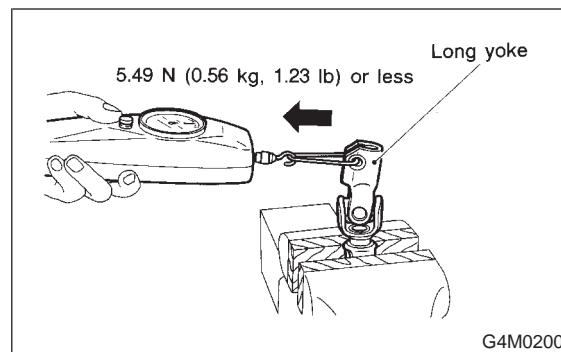
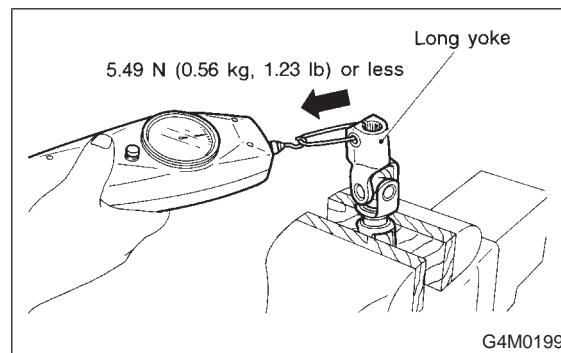
C: MEASUREMENT OF STEERING EFFORT



1) Measurement of steering effort is as shown in the figures.



2) Measurement of folding torque of universal joint is as shown in the figures.



3) Using ST, measure resistances of gearbox.

ST 926230000 SPANNER

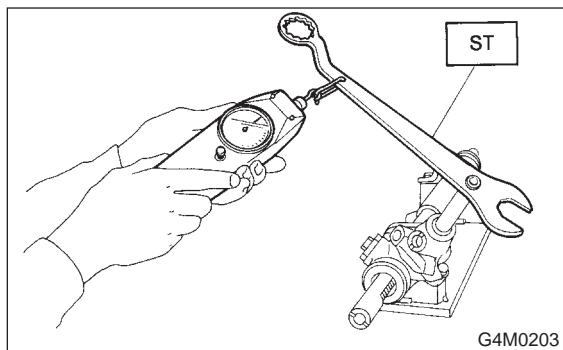
Rotating resistance:

Straight-ahead position within 30 mm (1.18 in) from rack center;

Less than 11.18 N (1.14 kg, 2.51 lb)

Maximum allowable torque;

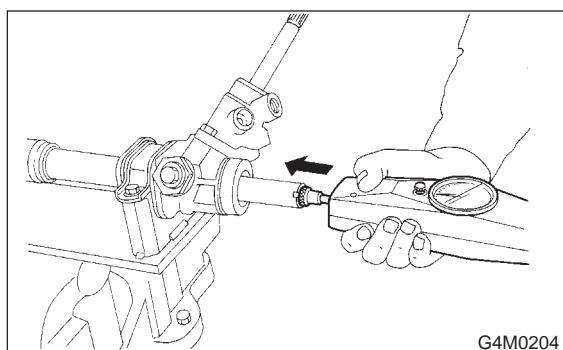
15.7 N (1.6 kg, 3.5 lb)



Sliding resistance:

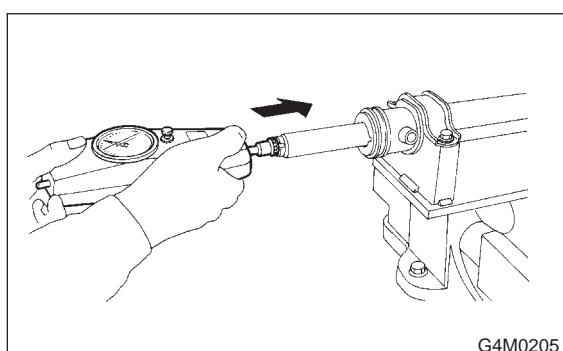
Right-turn steering;

304 N (31 kg, 68 lb) or less



Left-turn steering;

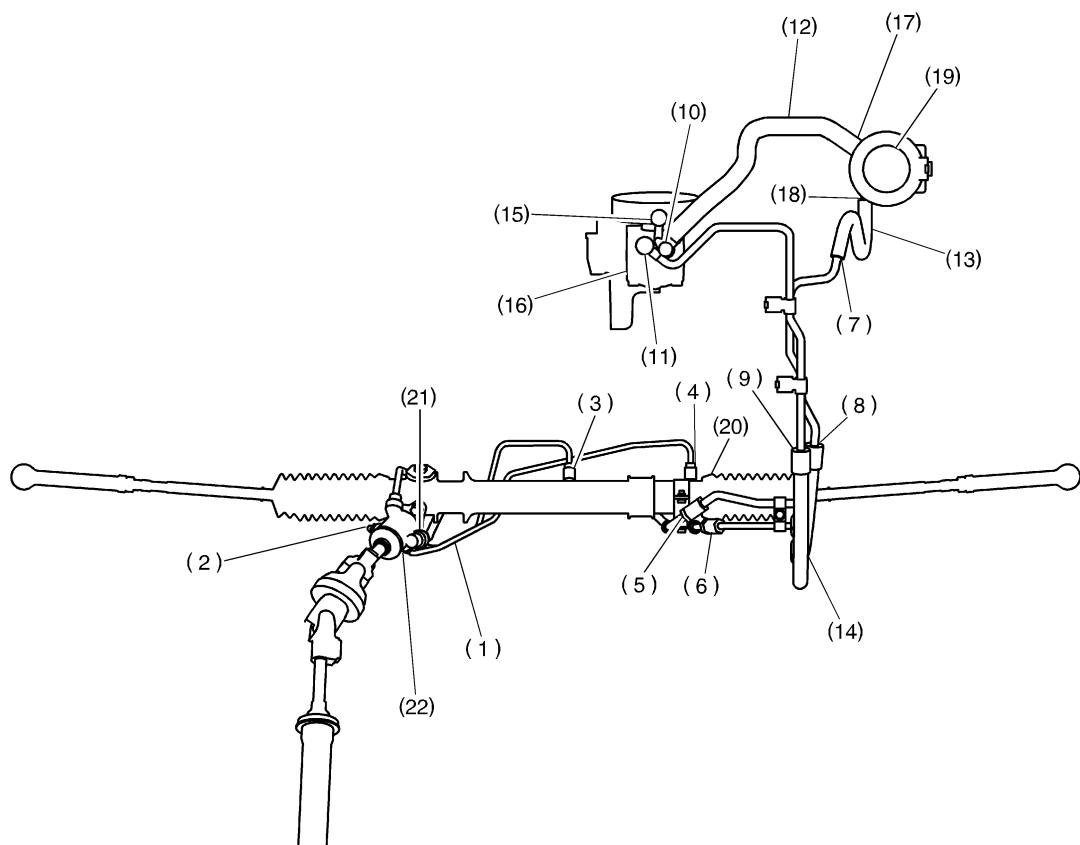
304 N (31 kg, 68 lb) or less



D: FLUID LEAKAGE

CAUTION:

It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



B4M1695A

Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (11) in figure	Insufficient tightening of flare nut, catching dirt or the like, damage to flare or flare nut or eye bolt	Loosen and retighten, if ineffective, replace.
	Poor insertion of hose, poor clamping	Retighten or replace clamp.
	Damaged O-ring or gasket	Replace O-ring or gasket pipe or hose with new one, if ineffective, replace gearbox also.
Leakage from hose (12), (13) and (14) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (15) and (16) in figure	Damaged O-ring	Replace oil pump.
	Damaged gasket	Replace oil pump.
Leakage from oil tank (17) and (18) in figure	Crack in oil tank	Replace oil tank.
Leakage from filler neck (19)	Damaged cap packing	Replace cap.
	Crack in root of filler neck	Replace oil tank.
	High fluid level *1	Adjust fluid level.
Leakage from surrounding of power cylinder of gearbox (20) in figure	Damaged oil seal	Replace oil seal.
Leakage from control valve of gearbox (21) and (22) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

NOTE:

Fluid level is specified at optimum position (range) for ordinary use. Accordingly, if the vehicle is used often under hard conditions such as on very rough roads or in mountainous areas, fluid may bleed out from cap air vent hole. This is not a problem. If a customer complains strongly and is not likely to be satisfied with the leakage, lower the fluid level to the extent that fluid will not bleed out under the conditions described, and have the customer check the fluid level and its quality more frequency than usual.

E: NOISE AND VIBRATION

CAUTION:

Don't keep the relief valve operated over 5 seconds at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.

NOTE:

- Grinding noise may be heard immediately after the engine start in extremely cold condition. In this case, if the noise goes off during warm-up there is no abnormal function in the system. This is due to the fluid characteristic in extremely cold condition.
- Oil pump makes whine or growl noise slightly due to its mechanism. Even if the noise can be heard when steering wheel is turned at stand still there is no abnormal function in the system provided that the noise eliminates when the vehicle is running.
- When stopping with service brake and/or parking brake applied, power steering can be operated easily due to its light steering effort. If doing so, the disk rotates slightly and makes creaking noise. The noise is generated by creaking between the disk and pads. If the noise goes off when the brake is released, there is no abnormal function in the system.
- There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts are properly adjusted and have no defects.

Hydraulic systems are likely to generate this kind of vibration as well as working noise and fluid noise because of combined conditions, i.e., road surface and tire surface, engine speed and turning speed of steering wheel, fluid temperature and braking condition.

This phenomena does not indicate there is some abnormal function in the system.

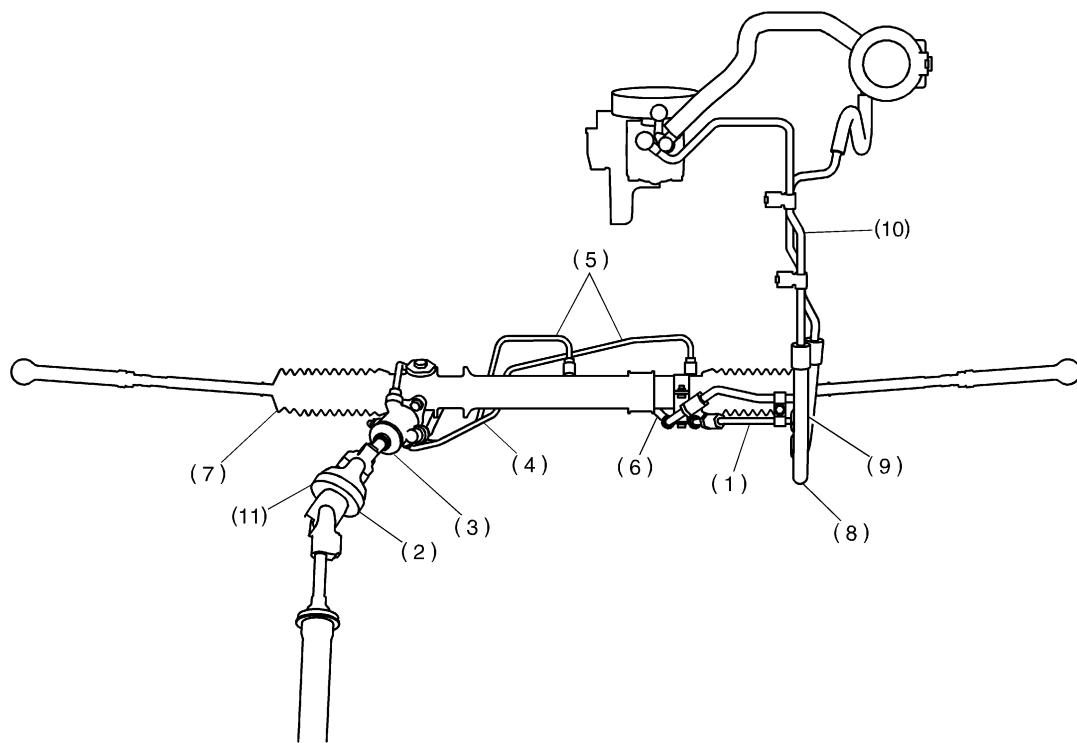
The vibration can be known when steering wheel is turned repeatedly at various speeds from slow to rapid step by step with parking brake applied on concrete road and in "D" range for automatic transmission vehicle.

Trouble	Possible cause	Corrective action
Hiss noise (continuous) While engine is running.	Relief valve emits operating sound when steering wheel is completely turned in either direction. (Don't keep this condition over 5 seconds.)	Normal
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is faulty.	Defective Replace oil pump.
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check clearance. Correct if necessary. <Ref. to 4-3 [K1F0].>
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loosened installation of oil pump pulley or other pulley(s)	Retighten.
	Loosened linkage or play of steering or suspension Loosened tightening of joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace bad parts of the gearbox or oil pump.
Knocking When turning steering wheel in both direction with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust and retighten.
	Loosened tightening or play of tie-rod, tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running.	Vane pump aeration	Inspect and retighten fluid line connection. Refill fluid and vent air.
	Vane pump seizing	Replace oil pump.
	Pulley bearing seizing of oil pump	Replace oil pump.
	Folded hose, flat pipe	Replace.
Squeal, squeak (intermittent or continuous) While engine is running.	Maladjustment of pulley belt Damaged or charged pulley belt Unequal length of pulley belts	Adjust or replace. (Replace two belts as a set.)
	Run out or soilage of V-groove surface of oil pump pulley	Clean or replace.
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix wrong part causing aeration. Replace fluid and vent air.
	Damaged pipe of gearbox	Replace pipe.
	Abnormal inside of hose or pipe Flat hose or pipe	Rectify or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install cap.
Whistle (continuous) While engine is running.	Abnormal pipe of gearbox or abnormal inside of hose	Replace bad parts of gearbox or hose.
Whine or growl (continuous or intermittent) While engine is running with/without steering turned.	Loosened installation of oil pump, oil pump bracket	Retighten.
	Abnormal inside of oil pump, hose	Replace oil pump, hose, if the noise can be heard when running as well as stand still.
	Torque converter growl, air conditioner compression growl	Remove power steering pulley belt and confirm.
Creaking noise (intermittent) While engine is running with steering turned.	Abnormal inside of gearbox	Replace bad parts of gearbox.
	Abnormal bearing for steering shaft	Apply grease or replace.
	Generates when turning steering wheel with brake (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.	Too low engine speed at start	Adjust and instruct customers.
	Vane pump aeration	Fix wrong part. Vent air.
	Damaged valve in oil pump, gearbox	Replace oil pump, bad parts of gearbox.
	Looseness of play of steering, suspension parts	Retighten.

F: CLEARANCE TABLE**CAUTION:**

This table lists various clearances that must be correctly adjusted to ensure normal vehicle driving without interfering noise, or any other faults.

Location	Minimum allowance
(1) Crossmember — Pipe	5 mm (0.20 in)
(2) DOJ — Shaft or joint	14 mm (0.55 in)
(3) DOJ — Valve housing	11 mm (0.43 in)
(4) Pipe — Pipe	2 mm (0.08 in)
(5) Stabilizer — Pipe	5 mm (0.20 in)
(6) Exhaust pipe — Pipe	15 mm (0.59 in)
(7) Exhaust pipe — Gearbox bolt	15 mm (0.59 in)
(8) Side frame — Hose A and B	15 mm (0.59 in)
(9) Cruise control pump — Hose A and B	15 mm (0.59 in)
(10) Pipe portion of hose A — Pipe portion of hose B	1.5 mm (0.059 in)
(11) AT cooling hose — Joint	20 mm (0.79 in)



G: BREAKAGE OF HOSES

CAUTION:

Although surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. It is very important to keep the hoses free from before mentioned fluids and to wipe out immediately when the hoses are adhered with the fluids.

Since resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for

the hoses and their service lives are shortening accordingly, it is necessary to perform careful inspection frequently when the vehicle is used in hot weather areas, cold weather area and/or a driving condition in which many steering operations are required in short time.

Particularly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

So, avoid to keep this kind of condition when servicing as well as driving.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct customers.
	Malfunction of relief valve	Replace oil pump.
	Poor cold characteristic of fluid	Replace fluid.
Forced out return hose	Poor connection	Correct.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace defective parts.
	Improper stop position of pitching stopper	Replace defective parts.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customer.
	Excessive tightening torque for return hose clip	Replace.
	Power steering fluid, brake fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct customers.

1. Brakes

A: SPECIFICATIONS

Model		POST and BRIGHTON	EXCEPT POST and BRIGHTON
Front disc brake	Size	14 inch type	15 inch type
	Type	Disc (Floating type, ventilated)	
	Effective disc diameter mm (in)	210 (8.27)	228 (8.98)
	Disc thickness × Outer diameter mm (in)	24 × 260 (0.94 × 10.24)	24 × 277 (0.94 × 10.91)
	Effective cylinder diameter mm (in)	57.2 (2.252)	42.8 (1.685) × 2
	Pad dimensions (length × width × thickness) mm (in)	112.4 × 44.3 × 11.0 (4.425 × 1.744 × 0.433)	112.3 × 50.0 × 11.0 (4.421 × 1.969 × 0.433)
Clearance adjustment		Automatic adjustment	
Rear disc brake	Type	—	Disc (Floating type)
	Effective disc diameter mm (in)	—	254 (10.0)
	Disc thickness × Outer diameter mm (in)	—	10 × 290 (0.39 × 11.42)
	Effective cylinder diameter mm (in)	—	38.1 (1.500)
	Pad dimensions (length × width × thickness) mm (in)	—	82.4 × 33.7 × 9.0 (3.244 × 1.327 × 0.354)
	Clearance adjustment	—	Automatic adjustment
Rear drum brake	Type	Drum (Leading-Trailing type)	—
	Effective drum diameter mm (in)	228.6 (9)	—
	Effective cylinder diameter mm (in)	20.6 (0.811)	—
	Lining dimensions (length × width × thickness) mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	—
	Clearance adjustment	Automatic adjustment	—
Parking brake	Type	Mechanical on rear brakes, drum in disc	
	Effective drum diameter mm (in)	228.6 (9)	170 (6.69)
	Lining dimensions (length × width × thickness) mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	162.6 × 30.0 × 3.2 (6.40 × 1.181 × 0.126)
	Clearance adjustment	Automatic adjustment	Manual adjustment
Master cylinder	Type	Tandem	
	Effective diameter mm (in)	25.4 (1)	26.99 (1-1/16)
	Reservoir type	Sealed type	
	Brake fluid reservoir capacity cm ³ (cu in)	205 (12.51)	
Brake booster	Type	Vacuum suspended	
	Effective diameter mm (in)	180 + 205 (7.09 + 8.07)	205 + 230 (8.07 + 9.06)
Proportioning valve	Split point kPa (kg/cm ² , psi)	3,678 (37.5, 533)	
	Reducing ratio	0.3	
Brake line		Dual circuit system	

B: SERVICE DATA

ITEM		STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	17 mm (0.67 in)	7.5 mm (0.295 in)
	Disc thickness	24 mm (0.94 in)	22 mm (0.87 in)
	Disc runout	—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness (including back metal)	14 mm (0.55 in)	6.5 mm (0.256 in)
	Disc thickness	10 mm (0.39 in)	8.5 mm (0.335 in)
	Disc runout	—	0.075 mm (0.0030 in)
Rear brake (Drum type)	Inside diameter	228.6 mm (9 in)	230.6 mm (9.08 in)
	Lining thickness	4.1 mm (0.161 in)	1.5 mm (0.059 in)
Rear brake (Disc type parking)	Inside diameter	170 mm (6.69 in)	171 mm (6.73 in)
	Lining thickness	3.2 mm (0.126 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke	7 to 8 notches/196 N (20 kg, 44 lb)	

		Brake pedal force	Fluid pressure	
			14 inch type	15 inch type
Brake booster	Brake fluid pressure without engine running	147 N (15 kg, 33 lb)	785 kPa (8 kg/cm ² , 114 psi)	686 kPa (7 kg/cm ² , 100 psi)
		294 N (30 kg, 66 lb)	1,961 kPa (20 kg/cm ² , 284 psi)	1,765 kPa (18 kg/cm ² , 256 psi)
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 N (15 kg, 33 lb)	6,375 kPa (65 kg/cm ² , 924 psi)	5,688 kPa (58 kg/cm ² , 825 psi)
		294 N (30 kg, 66 lb)	9,121 kPa (93 kg/cm ² , 1,322 psi)	9,905 kPa (101 kg/cm ² , 1,436 psi)

C: RECOMMENDED BRAKE FLUID

FMVSS No. 116, fresh DOT3 or 4 brake fluid

CAUTION:

- Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading.
- When brake fluid is supplemented, be careful not to allow any dust into the reservoir.
- Use fresh DOT3 or 4 brake fluid when replacing or refilling the fluid.

D: BRAKE FLUID LEVEL INDICATOR

Reserve tank with level indicator:

Residual fluid quantity at light ON

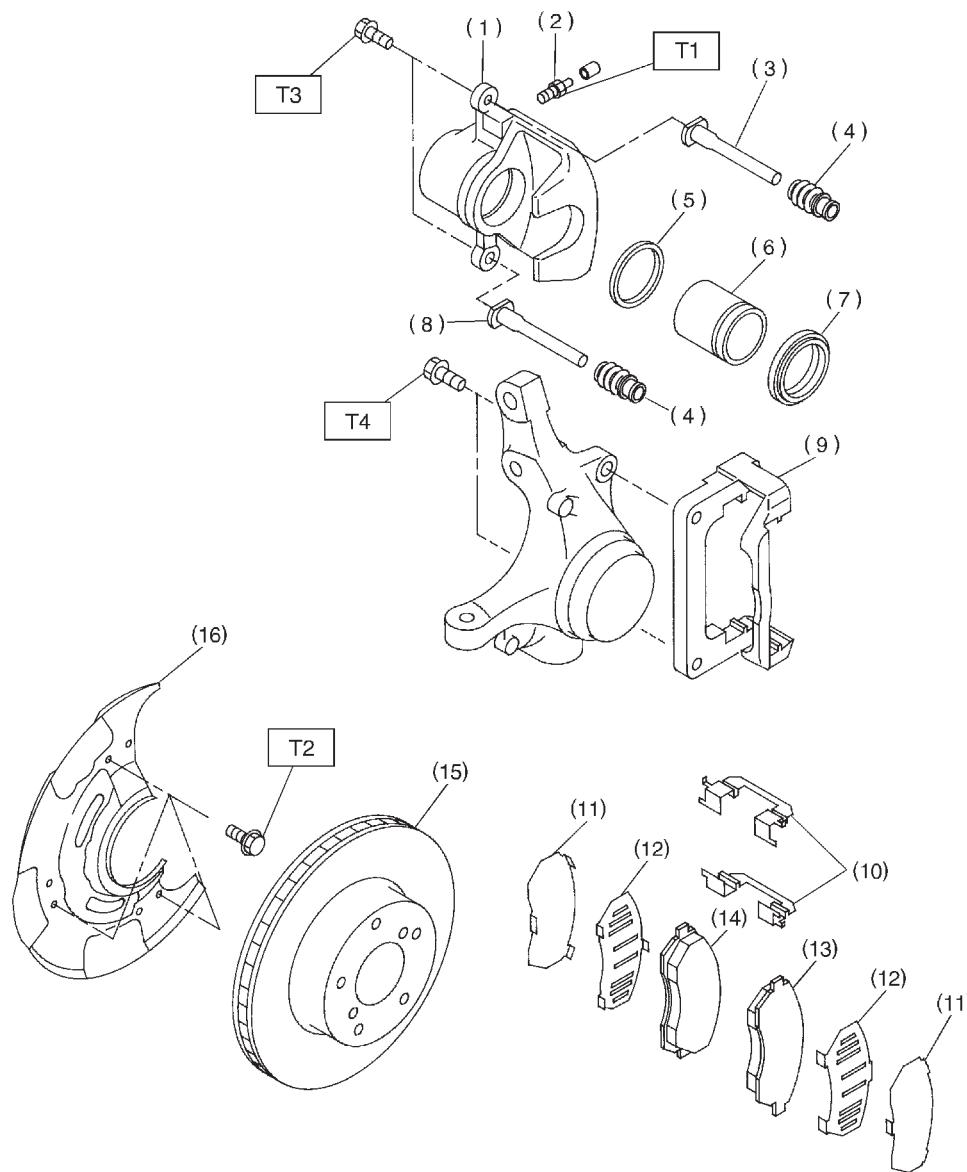
Approx. 80 cm³ (4.88 cu in)

Tank capacity

205 cm³ (12.51 cu in)

1. Front Disc Brake

A: 14 inch TYPE



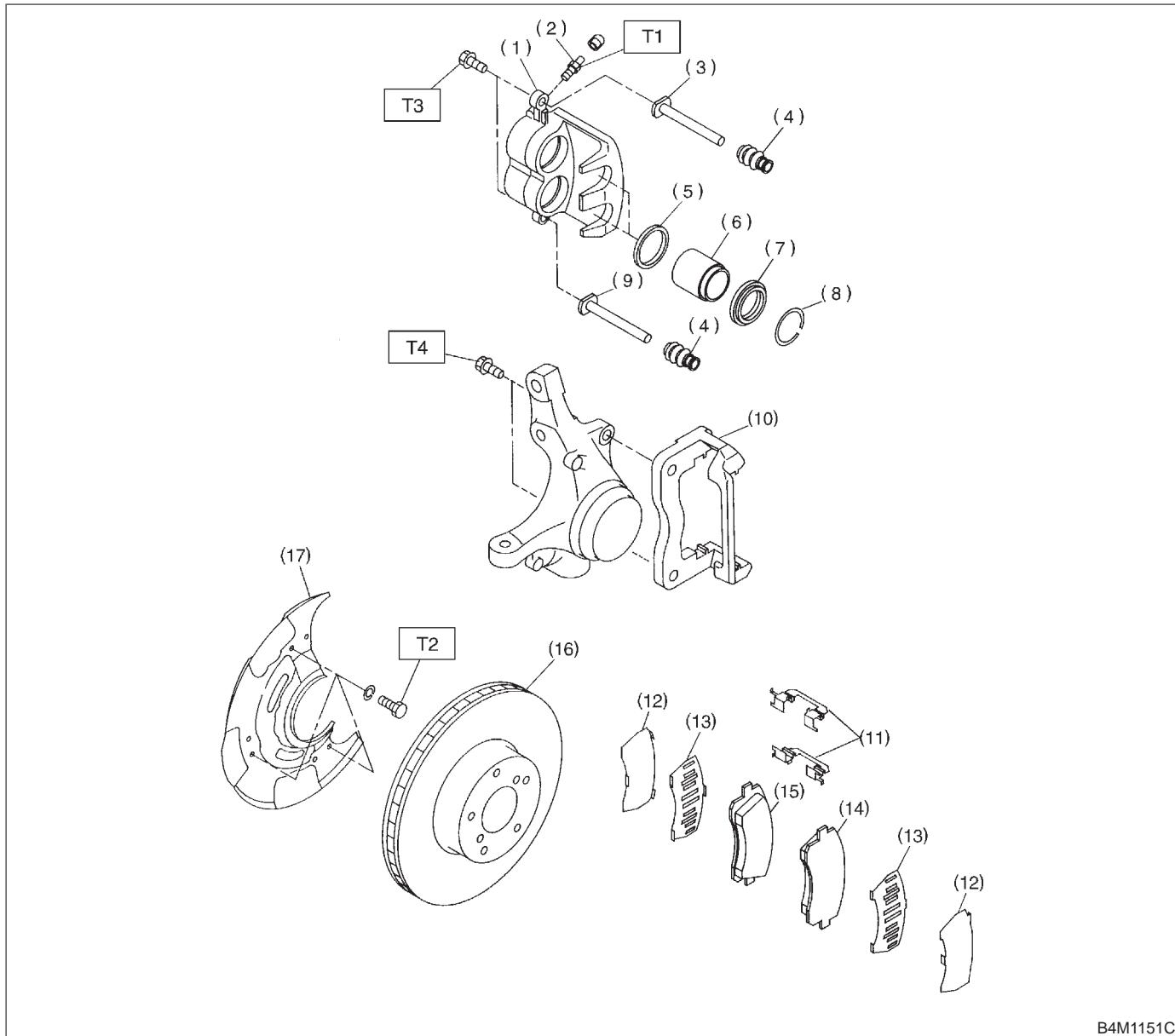
B4M1208C

- (1) Caliper body
- (2) Air bleeder screw
- (3) Guide pin (Green)
- (4) Pin boot
- (5) Piston seal
- (6) Piston
- (7) Piston boot
- (8) Lock pin (Yellow)

- (9) Support
- (10) Pad clip
- (11) Outer shim
- (12) Inner shim
- (13) Pad (Outside)
- (14) Pad (Inside)
- (15) Disc rotor
- (16) Disc cover

Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 1 (0.8 ± 0.1 , 5.8 ± 0.7)****T2: 18 ± 5 (1.8 ± 0.5 , 13.0 ± 3.6)****T3: 37 ± 5 (3.8 ± 0.5 , 27.5 ± 3.6)****T4: 78 ± 10 (8.0 ± 1.0 , 58 ± 7)**

B: 15 inch TYPE



B4M1151C

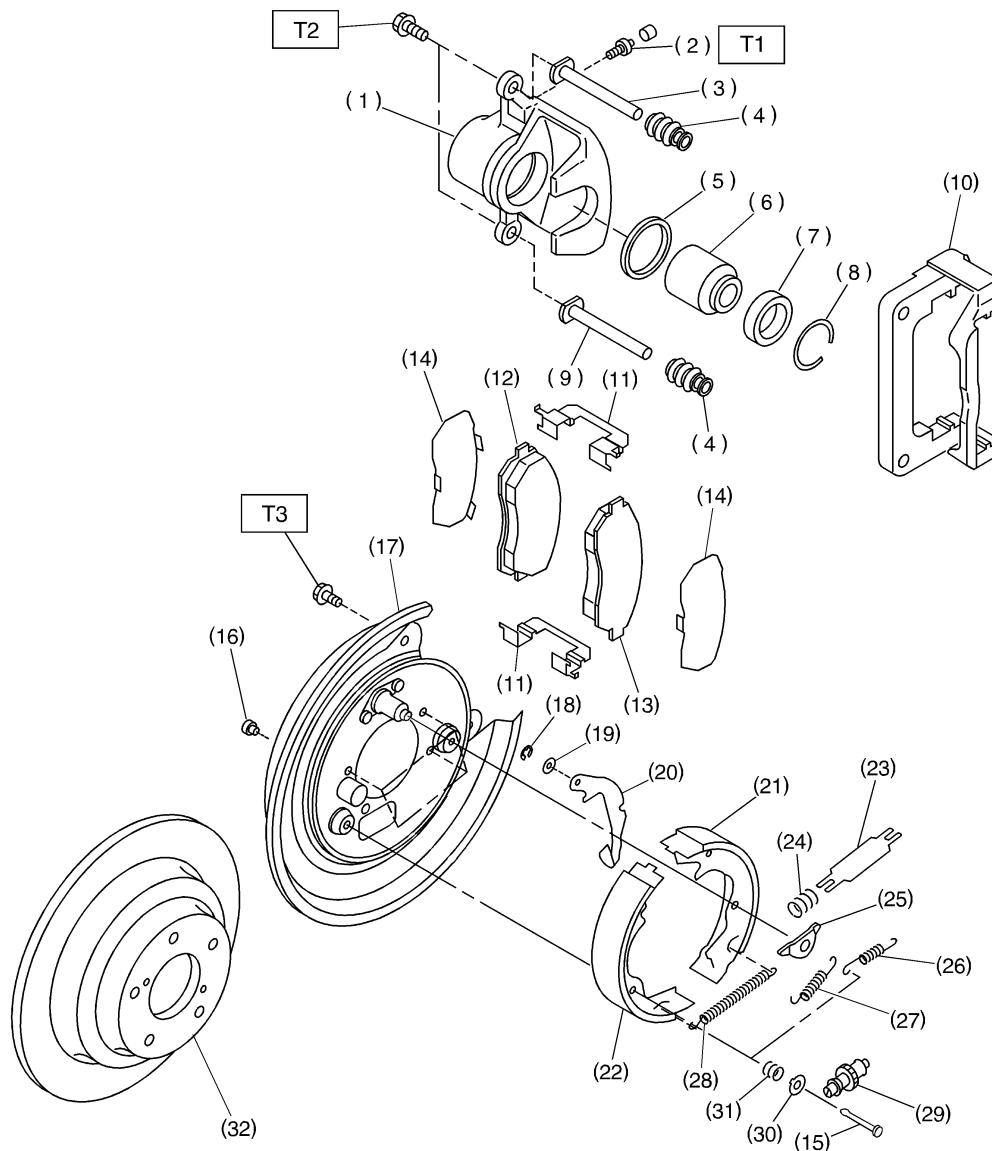
- (1) Caliper body
- (2) Air bleeder screw
- (3) Guide pin (Green)
- (4) Pin boot
- (5) Piston seal
- (6) Piston
- (7) Piston boot
- (8) Boot ring

- (9) Lock pin (Yellow)
- (10) Support
- (11) Pad clip
- (12) Outer shim
- (13) Inner shim
- (14) Pad (Outside)
- (15) Pad (Inside)
- (16) Disc rotor

- (17) Disc cover

Tightening torque: N·m (kg-m, ft-lb)**T1: 8 ± 1 (0.8±0.1, 5.8±0.7)****T2: 18 ± 5 (1.8±0.5, 13.0±3.6)****T3: 39 ± 5 (4.0±0.5, 28.9±3.6)****T4: 78 ± 10 (8.0±1.0, 58±7)**

2. Rear Disc Brake

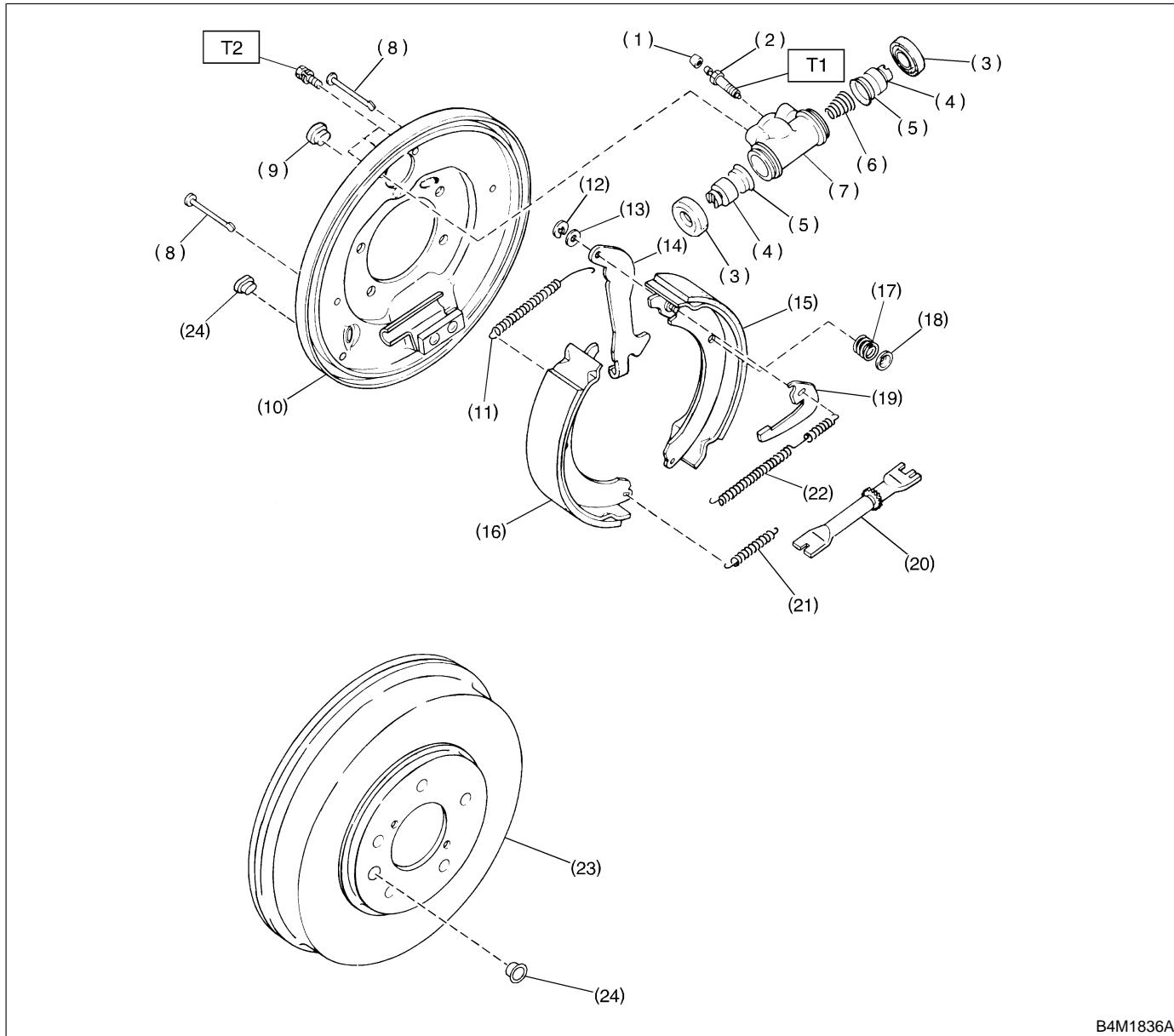


B4M1835A

(1) Caliper body	(14) Shim	(27) Primary shoe return spring
(2) Air bleeder screw	(15) Shoe hold-down pin	(28) Adjusting spring
(3) Guide pin (Green)	(16) Cover	(29) Adjuster
(4) Pin boot	(17) Back plate	(30) Shoe hold-down cup
(5) Piston seal	(18) Retainer	(31) Shoe hold-down spring
(6) Piston	(19) Spring washer	(32) Disc rotor
(7) Piston boot	(20) Parking brake lever	
(8) Boot ring	(21) Parking brake shoe (Secondary)	
(9) Lock pin (Yellow)	(22) Parking brake shoe (Primary)	
(10) Support	(23) Strut	
(11) Pad clip	(24) Strut shoe spring	
(12) Inner pad	(25) Shoe guide plate	
(13) Outer pad	(26) Secondary shoe return spring	

Tightening torque: N·m (kg·m, ft·lb)T1: 8 ± 1 (0.8±0.1, 5.8±0.7)T2: 39 ± 5 (4.0±0.5, 28.9±3.6)T3: 52 ± 6 (5.3±0.6, 38.3±4.3)

3. Rear Drum Brake



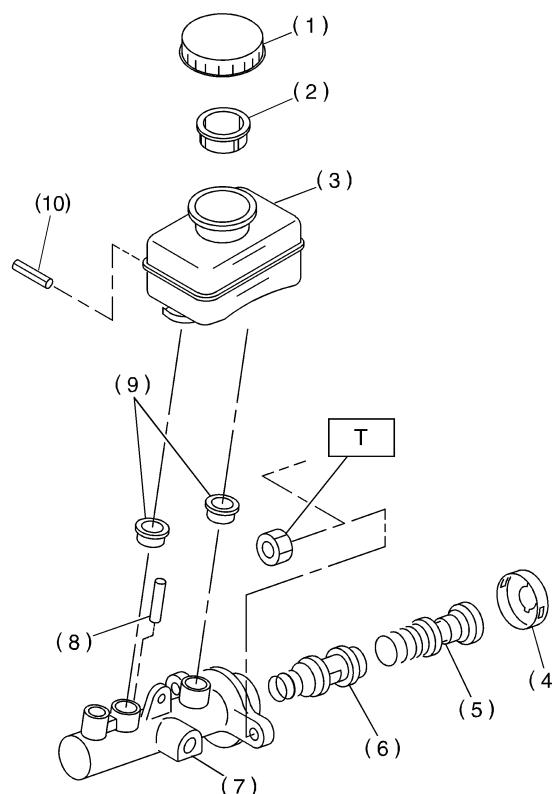
B4M1836A

(1) Air bleeder cap	(11) Upper shoe return spring	(21) Lower shoe return spring
(2) Air bleeder screw	(12) Retainer	(22) Adjusting spring
(3) Boot	(13) Washer	(23) Drum
(4) Piston	(14) Parking brake lever	(24) Plug
(5) Cup	(15) Brake shoe (Trailing)	
(6) Spring	(16) Brake shoe (Leading)	
(7) Wheel cylinder body	(17) Shoe hold-down spring	
(8) Pin	(18) Cup	
(9) Plug	(19) Adjusting lever	
(10) Back plate	(20) Adjuster	

Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 1 (0.8±0.1, 5.8±0.7)****T2: 10 ± 2 (1.0±0.2, 7.2±1.4)**

4. Master Cylinder

A: LHD MODEL

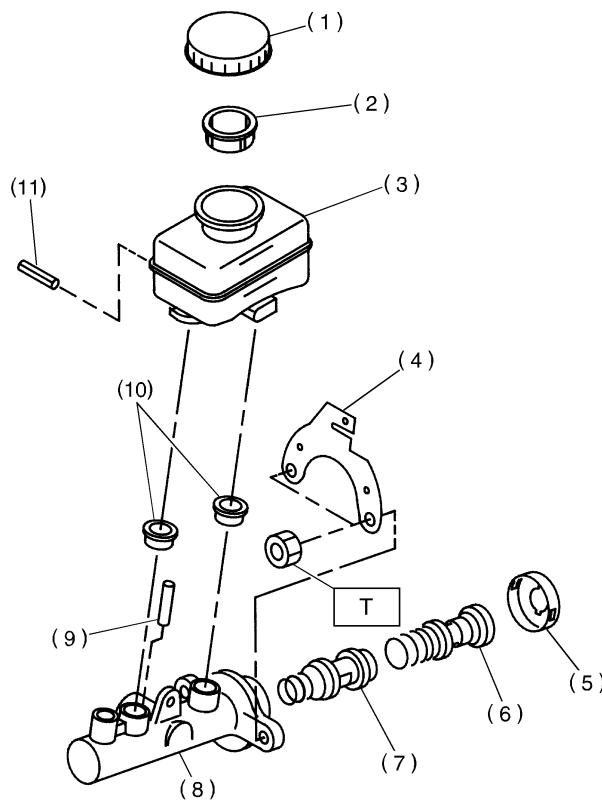


S4M0325B

(1) Cap	(6) Secondary piston
(2) Filter	(7) Cylinder body
(3) Reservoir tank	(8) Cylinder pin (With ABS)
(4) Piston retainer	(9) Seal
(5) Primary piston	(10) Pin

*Tightening torque: N·m (kg·m, ft·lb)**T: 14±4 (1.4±0.4, 10.1±2.9)*

B: RHD MODEL



B4M1155D

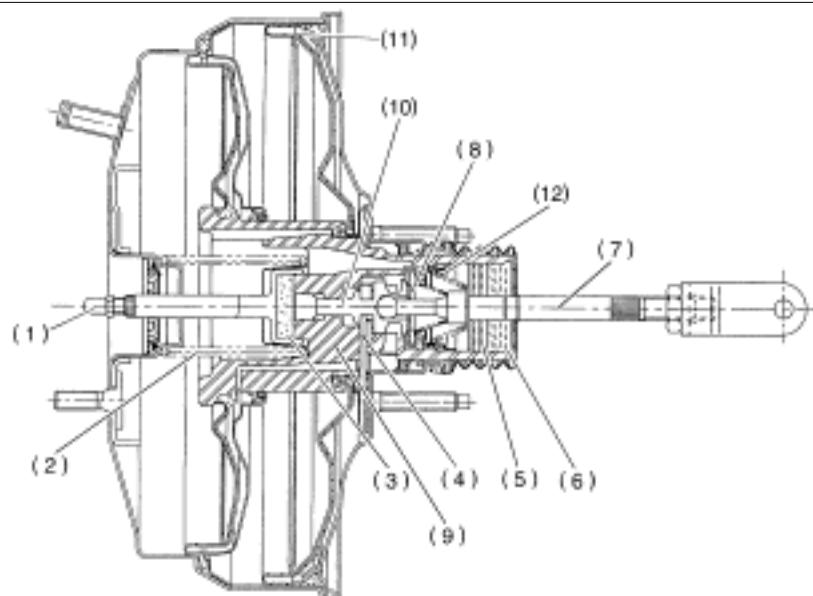
(1) Cap
 (2) Filter
 (3) Reservoir tank
 (4) Bracket
 (5) Piston retainer

(6) Primary piston
 (7) Secondary piston
 (8) Cylinder body
 (9) Cylinder pin (With ABS)
 (10) Seal

(11) Pin

Tightening torque: N·m (kg·m, ft·lb)
T: 14±4 (1.4±0.4, 10.1±2.9)

5. Brake Booster

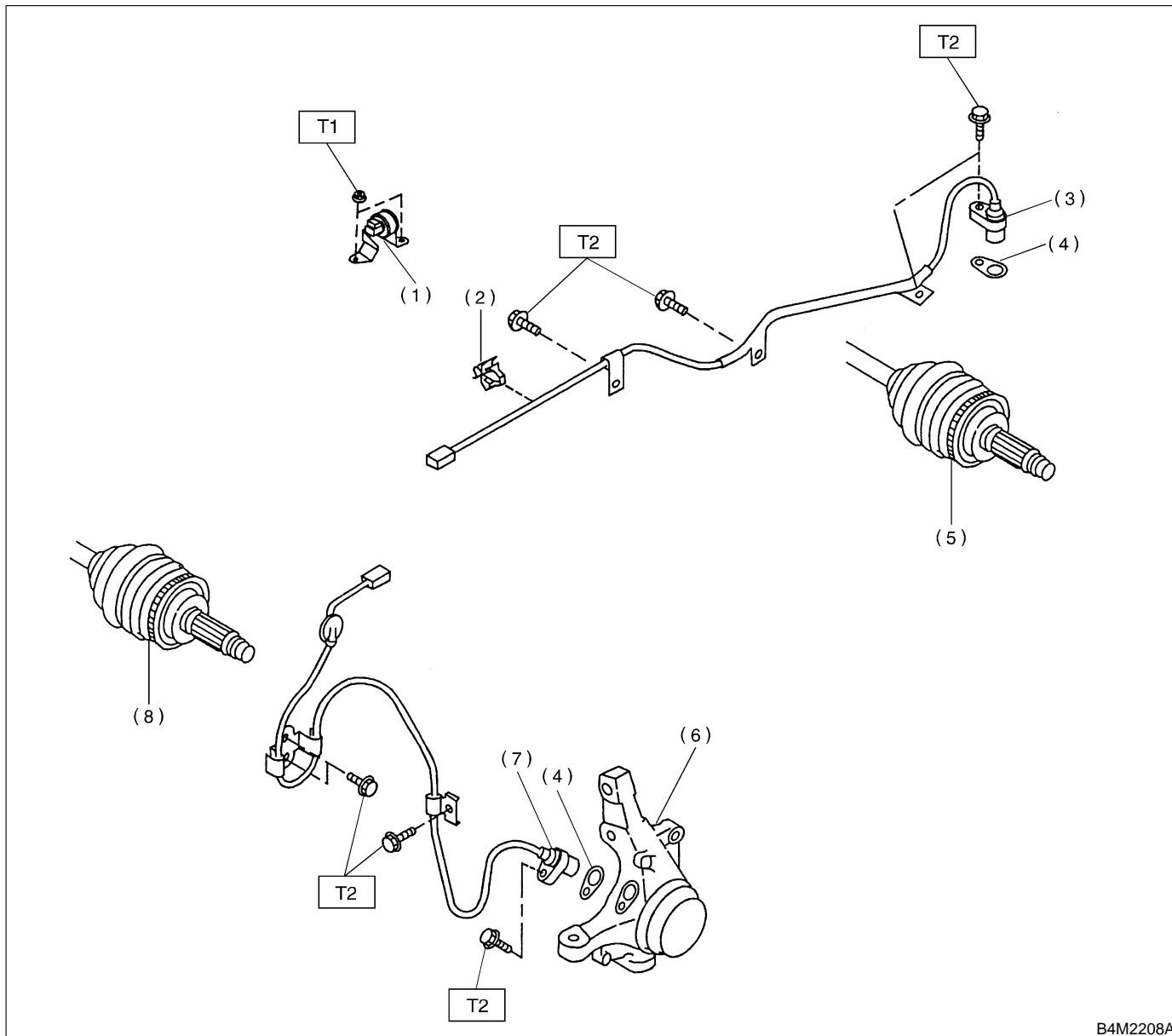


B4M1974A

(1) Push rod	(5) Filter	(9) Valve body
(2) Return spring	(6) Silencer	(10) Plunger valve
(3) Reaction disc	(7) Operating rod	(11) Diaphragm plate
(4) Key	(8) Poppet valve	(12) Valve return spring

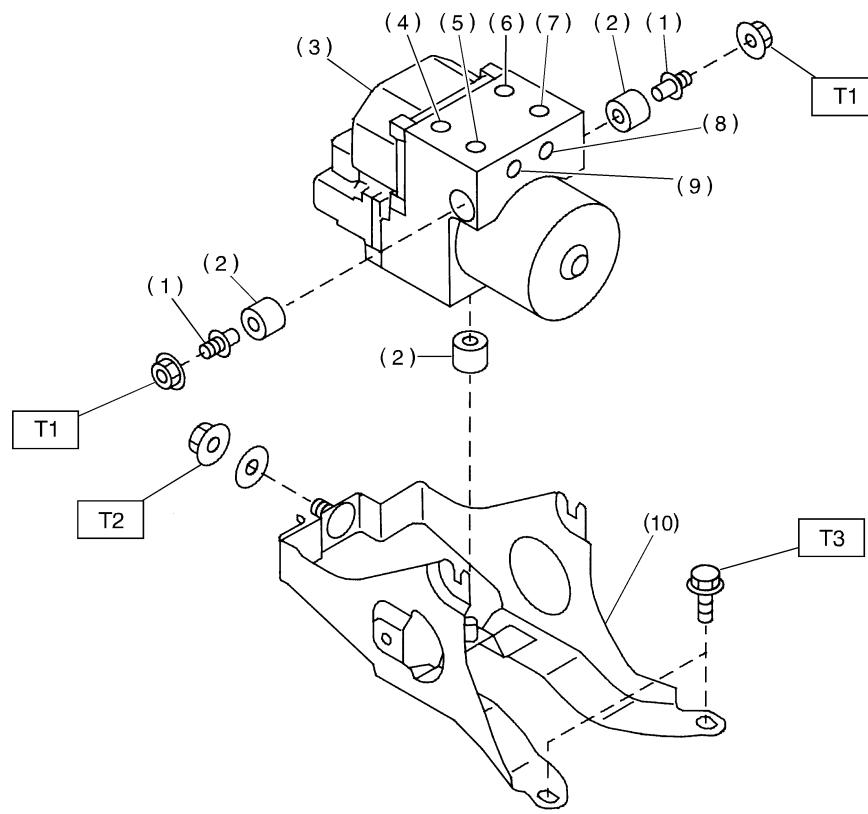
6. ABS System

A: SENSOR



(1) G sensor	(6) Housing
(2) Clip	(7) Front ABS sensor LH
(3) Rear ABS sensor LH	(8) Tone wheel (Front)
(4) ABS spacer	
(5) Tone wheel (Rear)	

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 \pm 0.2, 5.4 \pm 1.4)
T2: 32 ± 10 (3.3 \pm 1.0, 24 \pm 7)

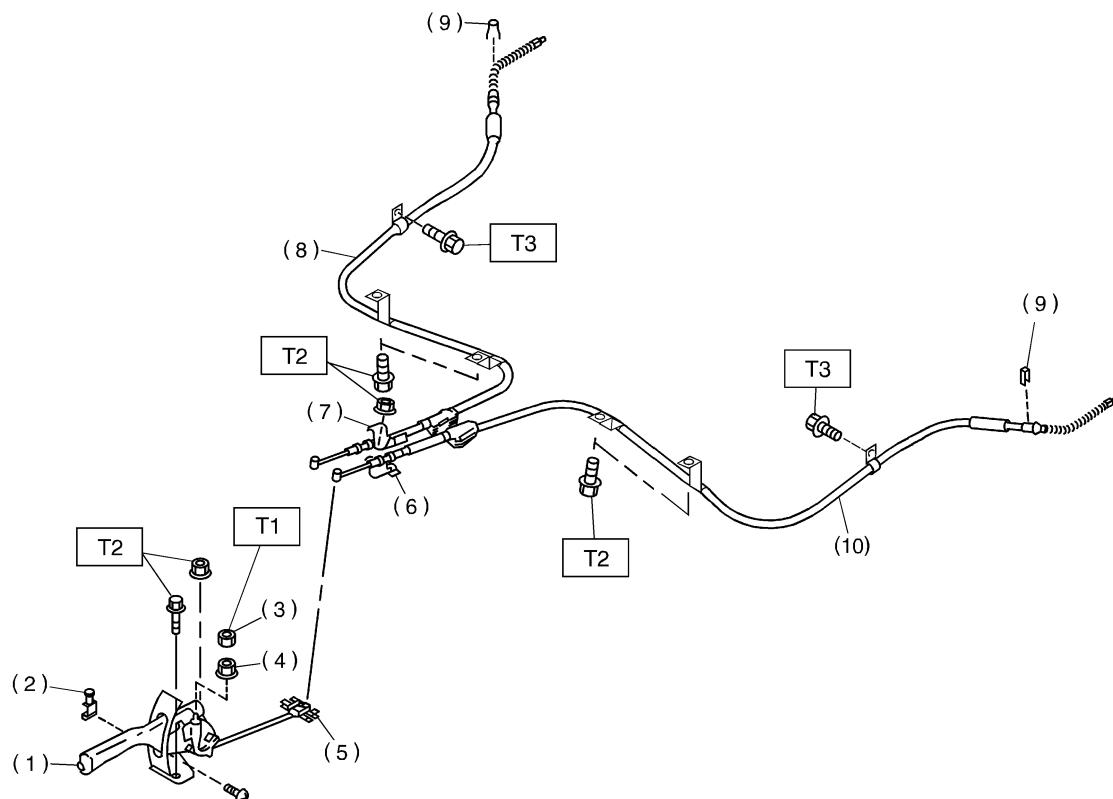
B: ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT
(ABSCM&H/U)

B4M1220C

(1) Stud bolt	(6) Front-RH outlet
(2) Damper	(7) Primary inlet
(3) ABS control module and hydraulic control unit	(8) Rear-LH outlet
(4) Front-LH outlet	(9) Rear-RH outlet
(5) Secondary inlet	(10) Bracket

Tightening torque: N·m (kg·m, ft·lb)**T1: 18 ± 5 (1.8±0.5, 13.0±3.6)****T2: 29 ± 7 (3.0±0.7, 21.7±5.1)****T3: 32 ± 10 (3.3±1.0, 24±7)**

7. Parking Brake



B4M1975A

(1) Parking brake lever	(7) Clamp
(2) Parking brake switch	(8) Parking brake cable RH
(3) Lock nut	(9) Clamp (Rear disc brake model only)
(4) Adjusting nut	(10) Parking brake cable LH
(5) Equalizer	
(6) Bracket	

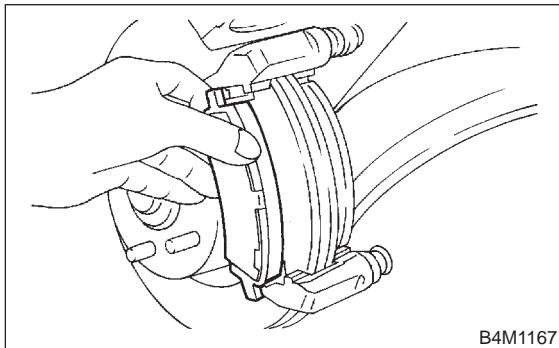
Tightening torque: N·m (kg·m, ft·lb)T1: 5.9 ± 1.5 (0.60 ± 0.15 , 4.3 ± 1.1)T2: 18 ± 5 (1.8 ± 0.5 , 13.0 ± 3.6)T3: 32 ± 10 (3.3 ± 1.0 , 24 ± 7)

1. Front Disc Brake

A: ON-CAR SERVICE

1. PAD

- 1) Remove lock pin.
- 2) Raise caliper body.
- 3) Remove pad.

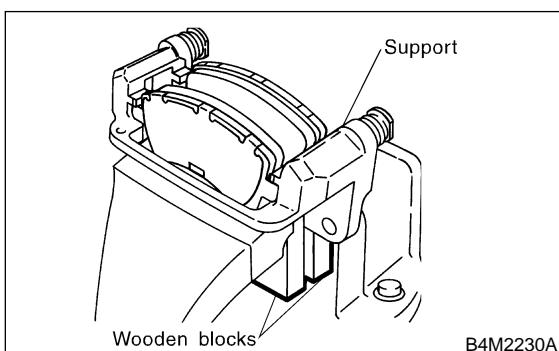


B4M1167

NOTE:

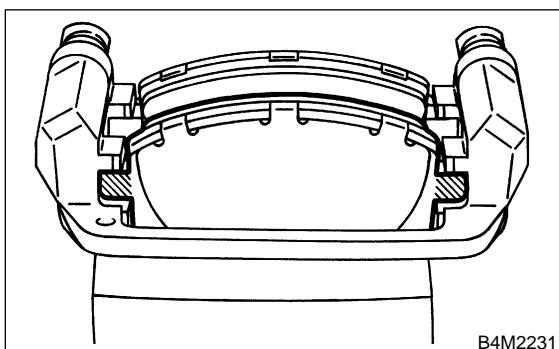
If brake pad is difficult to remove, proceed as follows:

- (1) Remove caliper body and fasten it provisionally to coil spring.
- (2) Remove support.
- (3) Place a support in a vise between wooden blocks.



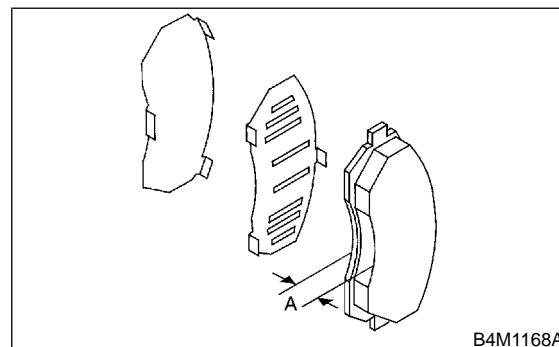
B4M2230A

- (4) Attach a rod of less than 12 mm (0.47 in) dia. to the shaded area of brake pad, and strike the rod with a hammer to drive brake pad out of place.



B4M2231

- 4) Check pad thickness A.



B4M1168A

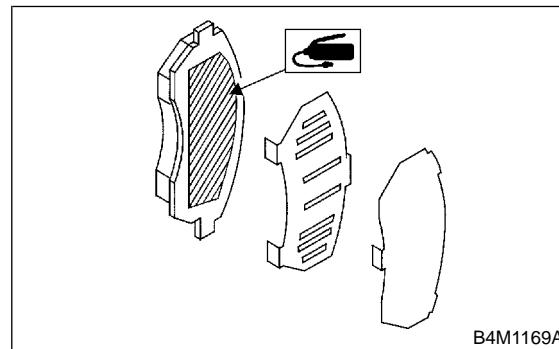
Pad thickness (including back metal)	Standard value	17 mm (0.67 in)
	Wear limit	7.5 mm (0.295 in)

CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace pad if there is oil or grease on it.

5) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.

6) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad inner shim.



B4M1169A

- 7) Install pads on support.

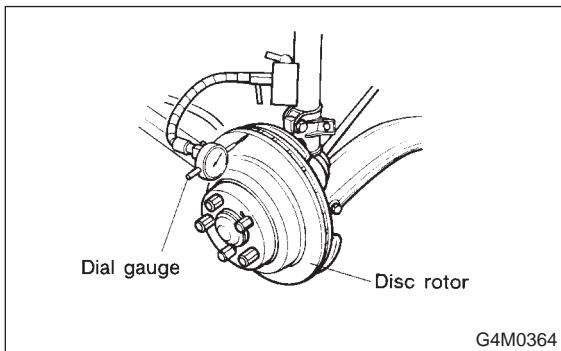
- 8) Install caliper body on support.

NOTE:

If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

2. DISC ROTOR

- 1) Install disc rotor by tightening the five wheel nuts.
- 2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

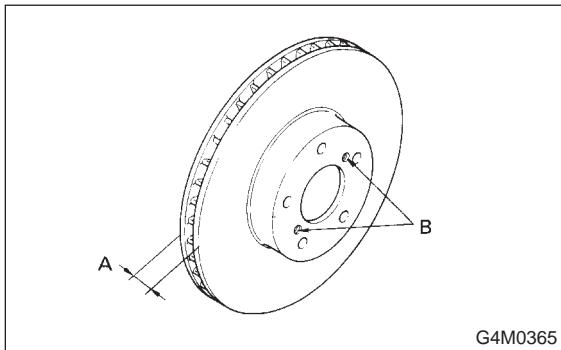
**NOTE:**

Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:

0.075 mm (0.0030 in)

- 3) Measure disc rotor thickness.

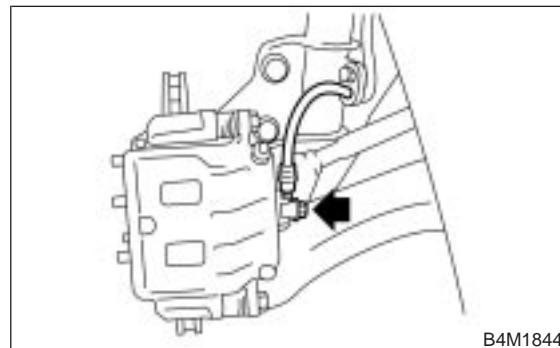
**NOTE:**

Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

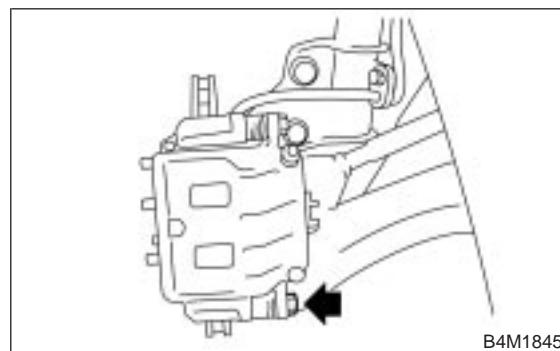
		Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	14"	24.0 mm (0.945 in)	22.0 mm (0.866 in)	260 mm (10.24 in)
	15"	24.0 mm (0.945 in)	22.0 mm (0.866 in)	277 mm (10.91 in)

B: REMOVAL

- 1) Remove union bolt and disconnect brake hose from caliper body assembly.



- 2) Remove bolt securing lock pin to caliper body.

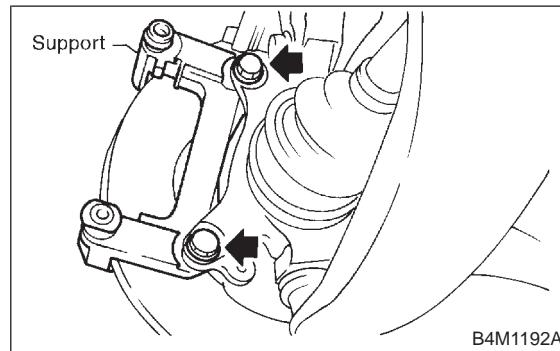


- 3) Raise caliper body and move it toward vehicle center to separate it from support.

- 4) Remove support from housing.

NOTE:

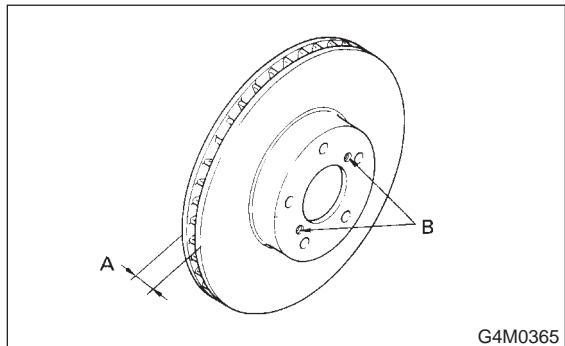
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



- 5) Remove disc rotor from hub.

NOTE:

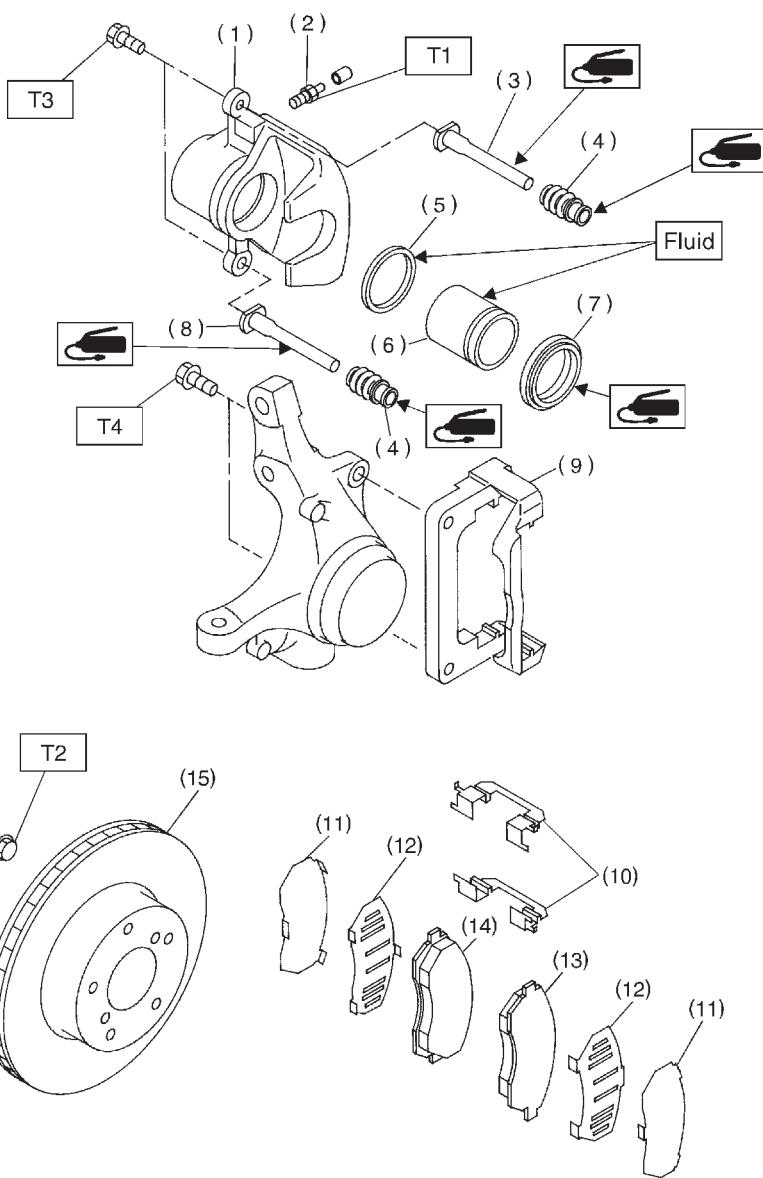
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



- 6) Clean mud and foreign particles from caliper body assembly and support.

C: DISASSEMBLY

1. 14 inch TYPE



B4M1208D

(1) Caliper body	(9) Support
(2) Air bleeder screw	(10) Pad clip
(3) Guide pin (Green)	(11) Outer shim
(4) Pin boot	(12) Inner shim
(5) Piston seal	(13) Pad (Inside)
(6) Piston	(14) Pad (Outside)
(7) Piston boot	(15) Disc rotor
(8) Lock pin (Yellow)	(16) Disc cover

Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 1 (0.8±0.1, 5.8±0.7)****T2: 18 ± 5 (1.8±0.5, 13.0±3.6)****T3: 37 ± 5 (3.8±0.5, 27.5±3.6)****T4: 78 ± 10 (8.0±1.0, 58±7)**

1) Clean mud and foreign particles from caliper body assembly and support.

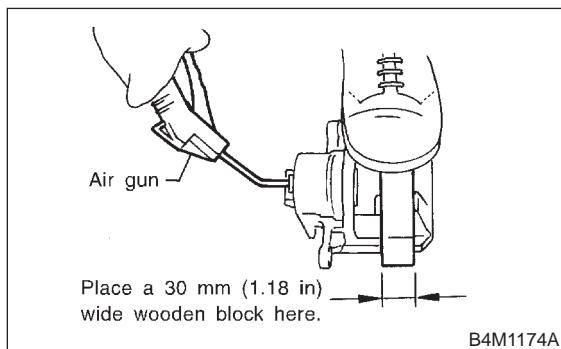
CAUTION:

Be careful not to allow foreign particles to enter inlet (at brake hose connector).

2) Gradually supply compressed air via caliper body brake hose to force piston out.

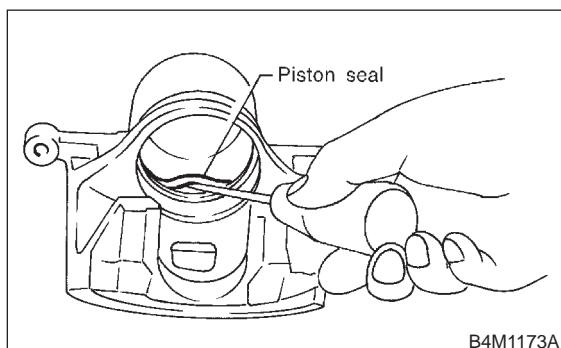
CAUTION:

- Place a wooden block as shown in Figure to prevent damage to piston.
- Do not apply excessively high-pressure.



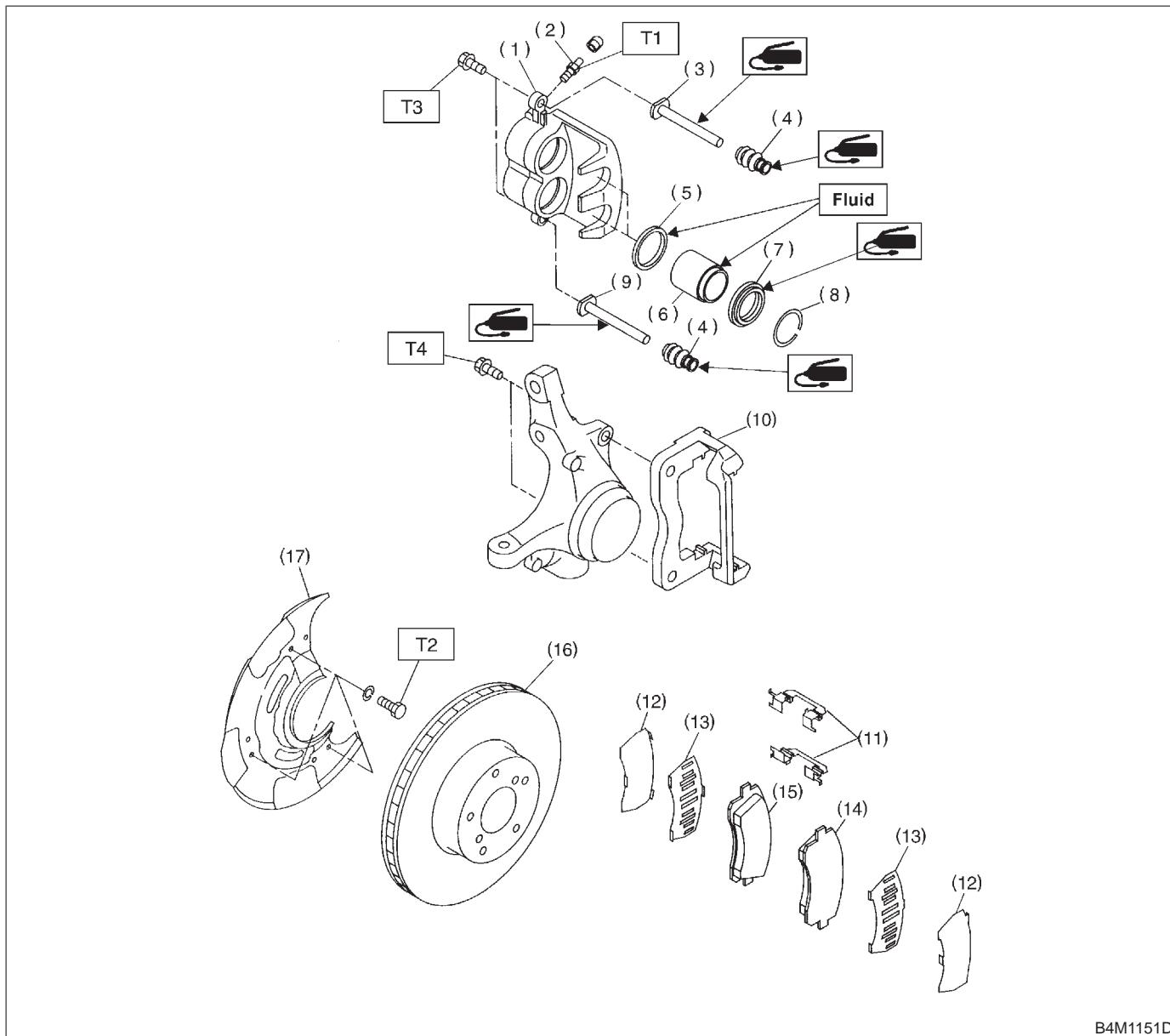
3) Remove piston boot.

4) Remove piston seal from caliper body cylinder.



5) Remove guide pin and boot from caliper body.

2. 15 inch TYPE



B4M1151D

- (1) Caliper body
- (2) Air bleeder screw
- (3) Guide pin (Green)
- (4) Pin boot
- (5) Piston seal
- (6) Piston
- (7) Piston boot
- (8) Boot ring

- (9) Lock pin (Yellow)
- (10) Support
- (11) Pad clip
- (12) Outer shim
- (13) Inner shim
- (14) Pad (Outside)
- (15) Pad (Inside)
- (16) Disc rotor

- (17) Disc cover

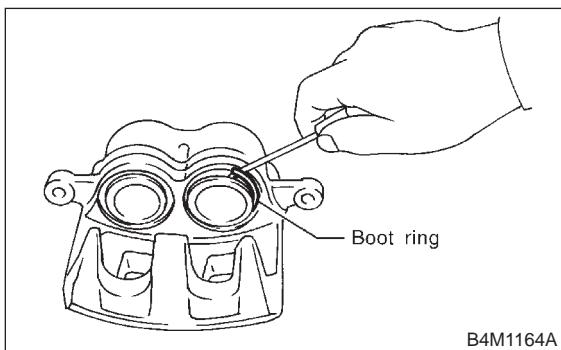
Tightening torque: N·m (kg·m, ft·lb)T1: 8 ± 1 (0.8±0.1, 5.8±0.7)T2: 18 ± 5 (1.8±0.5, 13.0±3.6)T3: 39 ± 5 (4.0±0.5, 28.9±3.6)T4: 78 ± 10 (8.0±1.0, 58±7)

1) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:

Be careful not to allow foreign particles to enter inlet (at brake hose connector).

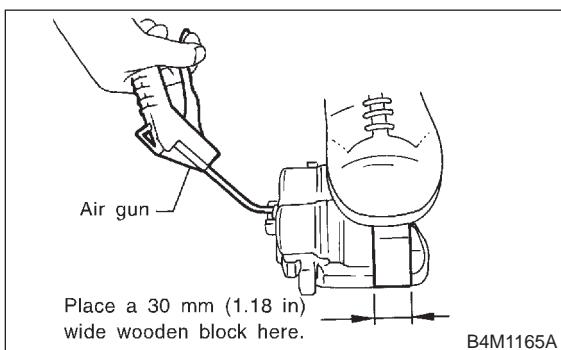
2) Using a standard screwdriver, remove boot ring from piston.



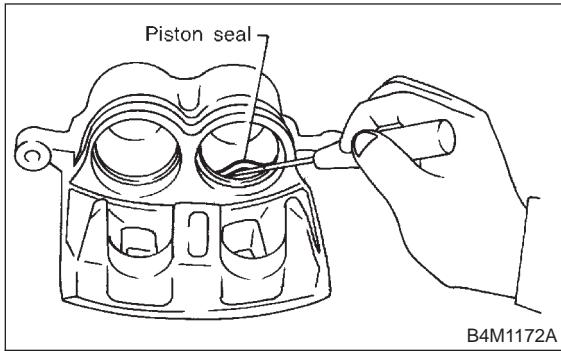
3) Remove boot from piston end.
4) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:

Place a wooden block as shown in Figure to prevent damage to piston.



5) Remove piston seal from caliper body cylinder.



6) Remove lock pin boot and guide pin boot.

D: INSPECTION

- 1) Repair or replace faulty parts.
- 2) Check caliper body and piston for uneven wear, damage or rust.
- 3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

1. 14 inch TYPE

- 1) Clean caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and install piston boot onto cylinder.

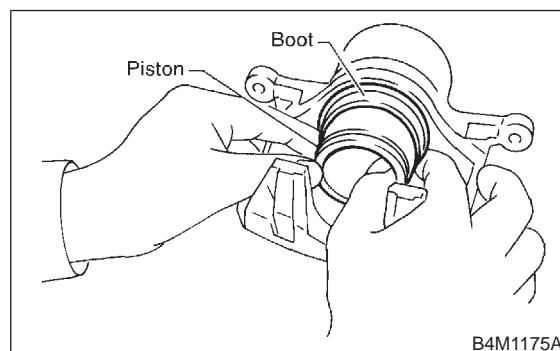
Grease:

NIGLUBE RX-2 (Part No. 003606000)

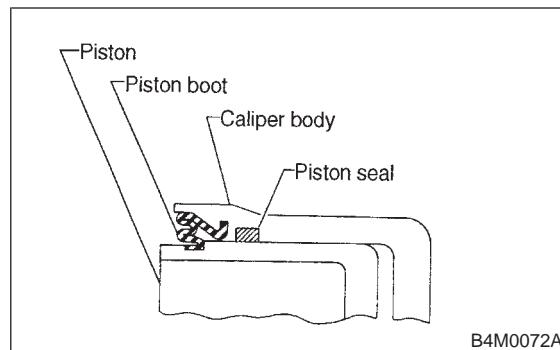
5) Insert piston into cylinder.

CAUTION:

Do not force piston into cylinder.



6) Position boot in grooves on cylinder and piston.

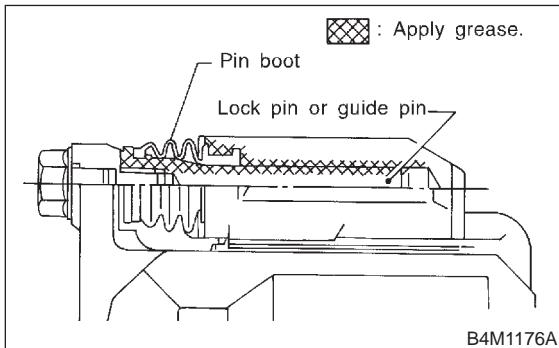


7) Apply a coat of specified grease to lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

Grease:

NIGLUBE RX-2 (Part No. 003606000)

8) Install lock and guide pin boot on support.

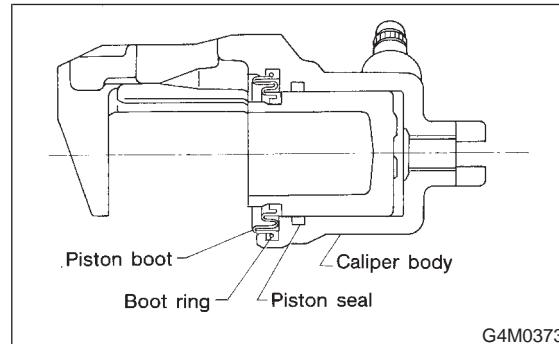


5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

Grease:

NIGLUBE RX-2 (Part No. 003606000)

To facilitate installation, fit boot starting with piston end.

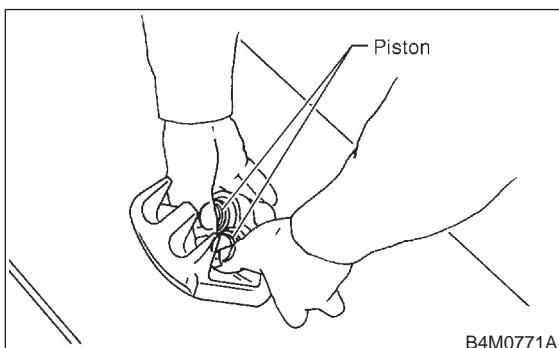


2. 15 inch TYPE

- 1) Clean caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Insert piston into cylinder.

CAUTION:

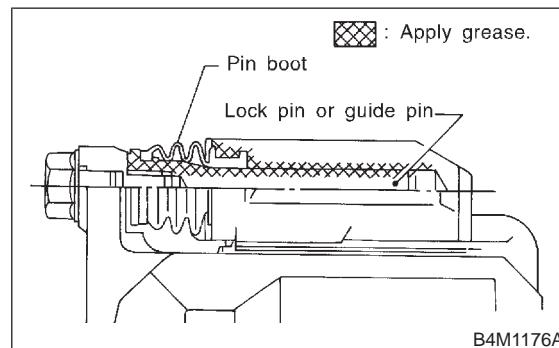
Do not force piston into cylinder.



- 6) Position boot in grooves on cylinder and piston.
- 7) Install boot ring. Be careful not scratch boot.
- 8) Apply a coat of specified grease to lock pin and guide pin, outer surface, cylinder inner surface, and boot grooves.

Grease:

NIGLUBE RX-2 (Part No. 003606000)



- 9) Install lock pin boot and guide pin boot on support.

F: INSTALLATION

- 1) Install disc rotor on hub.
- 2) Install support on housing.

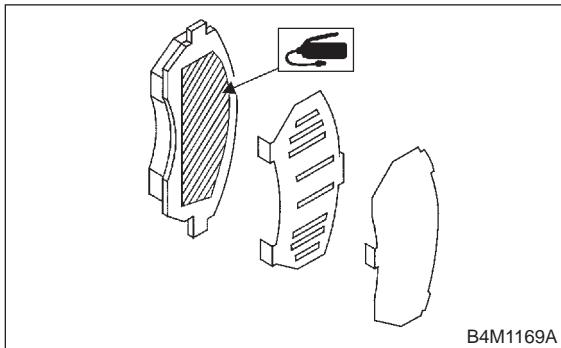
Tightening torque:

$78 \pm 10 \text{ N}\cdot\text{m} (8 \pm 1 \text{ kg}\cdot\text{m}, 58 \pm 7 \text{ ft}\cdot\text{lb})$

CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- When replacing the pad, replace pads of the right and left wheels at the same time.

- 3) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.
- 4) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and inner shim.



B4M1169A

- 5) Install pads on support.
- 6) Install caliper body on support.

Tightening torque:

$39 \pm 5 \text{ N}\cdot\text{m} (4.0 \pm 0.5 \text{ kg}\cdot\text{m}, 28.9 \pm 3.6 \text{ ft}\cdot\text{lb})$

- 7) Connect brake hose.

Tightening torque:

$18 \pm 3 \text{ N}\cdot\text{m} (1.8 \pm 0.3 \text{ kg}\cdot\text{m}, 13.0 \pm 2.2 \text{ ft}\cdot\text{lb})$

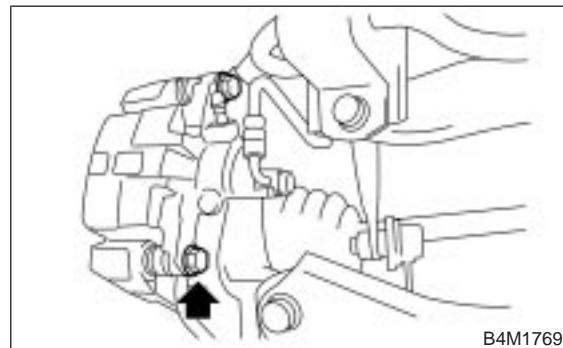
CAUTION:

Replace brake hose gaskets with new ones.

- 8) Bleed air from brake system.

2. Rear Disc Brake**A: ON-CAR SERVICE****1. PAD**

- 1) Remove lock pin.

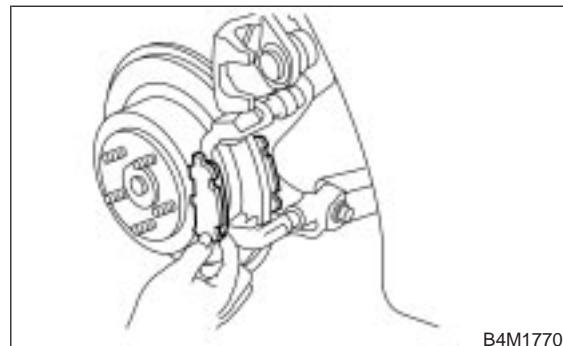


B4M1769

- 2) Raise caliper body.
- 3) Remove pad from support.

NOTE:

If brake pad is difficult to remove, use the same procedure as for front disc brake pad. <Ref. to 4-4 [W1A1].>



B4M1770

4) Check pad thickness (including back metal).

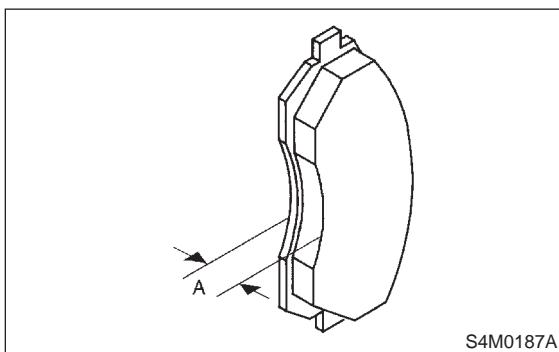
Pad thickness: A

Standard value

14.0 mm (0.551 in)

Wear limit

6.5 mm (0.256 in)



CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace pad if there is oil or grease on it.

5) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.

6) Install pad on support.

7) Install caliper body on support.

Tightening torque:

$39 \pm 5 \text{ N}\cdot\text{m (4.0} \pm 0.5 \text{ kg}\cdot\text{m, 28.9} \pm 3.6 \text{ ft}\cdot\text{lb)}$

NOTE:

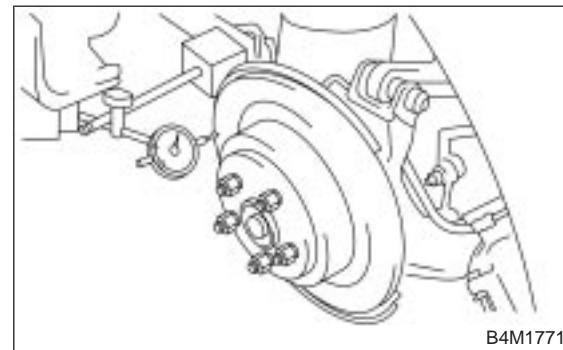
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

2. DISC ROTOR

1) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

CAUTION:

Securely adjust disc rotor to hub.



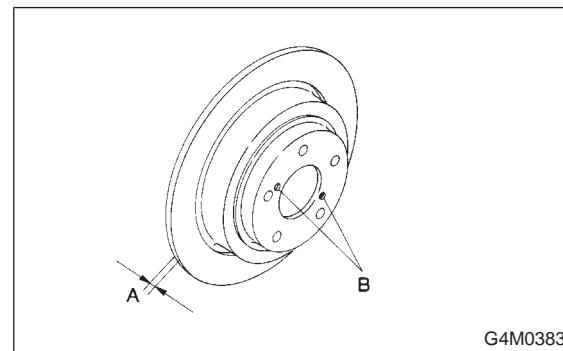
NOTE:

Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:

0.075mm (0.0030 in)

2) Measure disc rotor thickness.



NOTE:

Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor thickness: A

Standard value

10 mm (0.39 in)

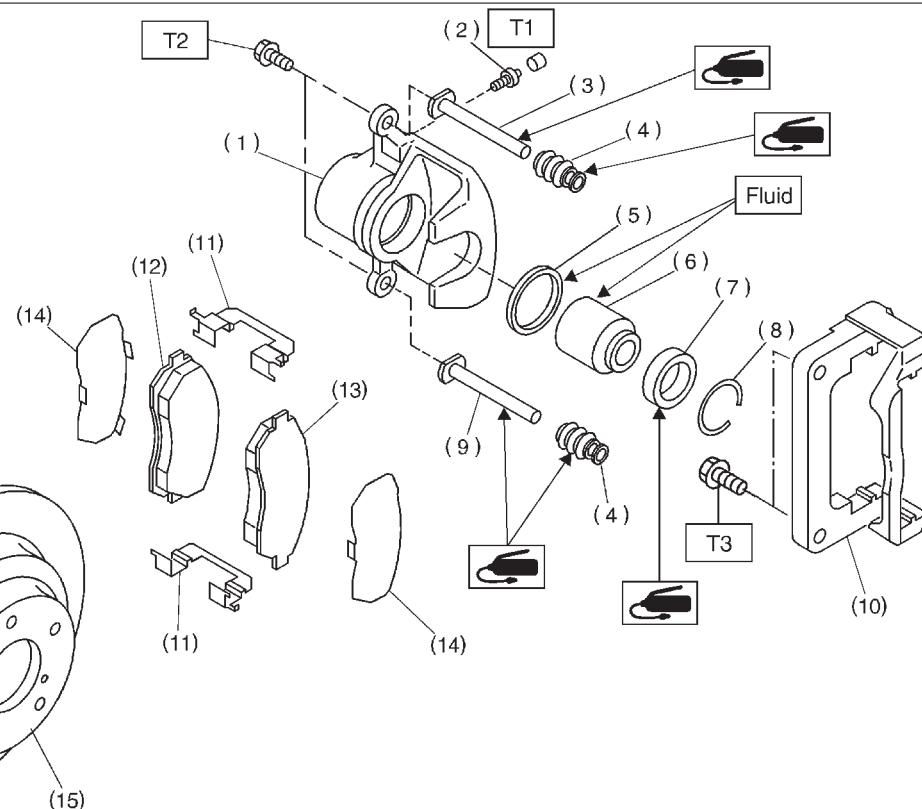
Service limit

8.5 mm (0.335 in)

NOTE:

When removing disc rotor, refer to instructions under Parking Brake. <Ref. to 4-4 [W4A0].>

B: REMOVAL



H4M1356A

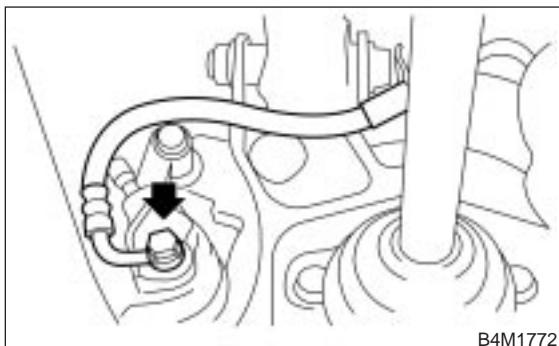
(1) Caliper body	(8) Boot ring	(15) Disc rotor
(2) Air bleeder screw	(9) Lock pin (Yellow)	
(3) Guide pin (Green)	(10) Support	
(4) Pin boot	(11) Pad clip	
(5) Piston seal	(12) Inner pad	
(6) Piston	(13) Outer pad	
(7) Piston boot	(14) Shim	

Tightening torque: N·m (kg·m, ft·lb)**T1: 8±1 (0.8±0.1, 5.8±0.7)****T2: 39±5 (4.0±0.5, 28.9±3.6)****T3: 52±6 (5.3±0.6, 38.3±4.3)**

- 1) Lift-up vehicle and remove wheels.
- 2) Disconnect brake hose from caliper body assembly.

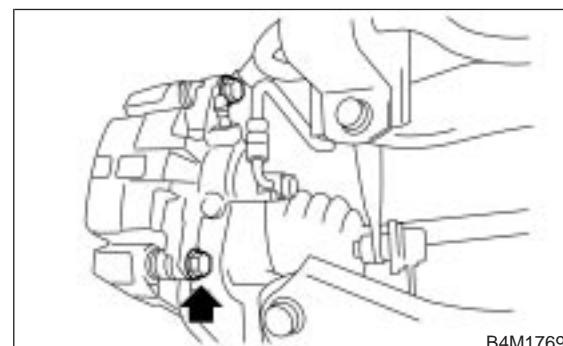
CAUTION:

Do not allow brake fluid to come in contact with vehicle body; wipe off completely if spilled.



B4M1772

- 3) Remove lock pin.



B4M1769

- 4) Raise caliper body and move it toward vehicle center to separate it from support.
- 5) Remove support from back plate.

NOTE:

Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.

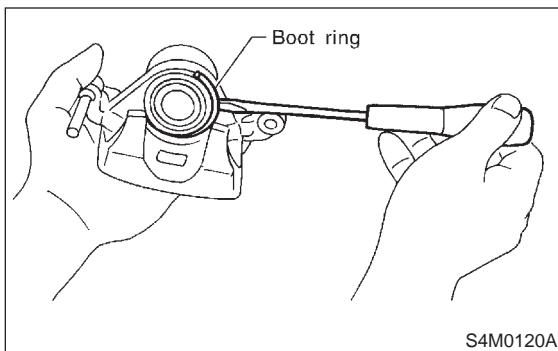
6) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:

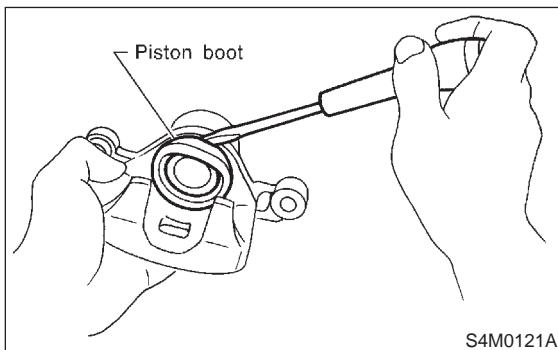
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

C: DISASSEMBLY

1) Remove the boot ring.



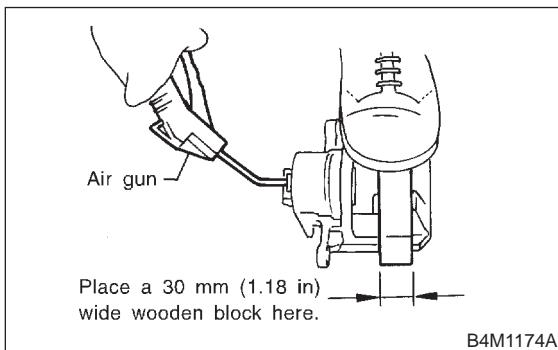
2) Remove the piston boot.



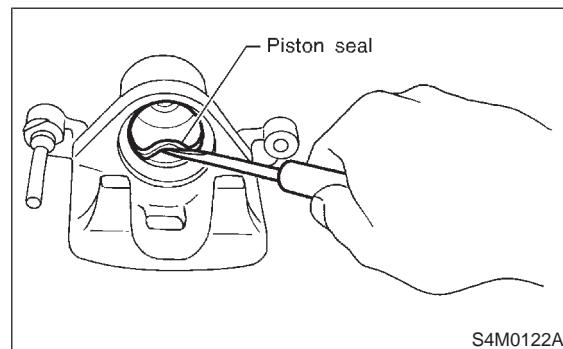
3) Gradually supply compressed air via inlet of caliper body to force piston out.

CAUTION:

- Place a wooden block as shown in Figure to prevent damage to piston.
- Do not apply excessively high-pressure.



4) Remove piston seal from caliper body cylinder.



5) Remove lock pin sleeve and boot from caliper body.

6) Remove guide pin boot.

D: INSPECTION

- 1) Repair or replace faulty parts.
- 2) Check caliper body and piston for uneven wear, damage or rust.
- 3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

- 1) Clean caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Insert piston into cylinder.

CAUTION:

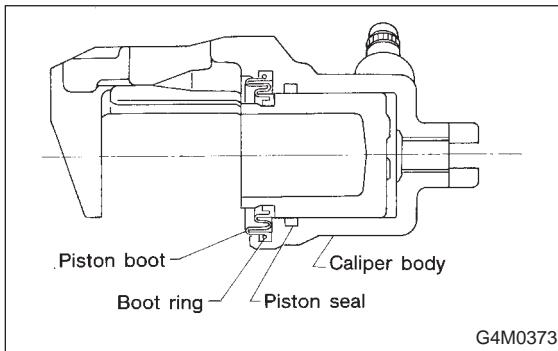
Do not force piston into cylinder.

- 5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

Grease:

NIGLUBE RX-2 (Part No. 003606000)

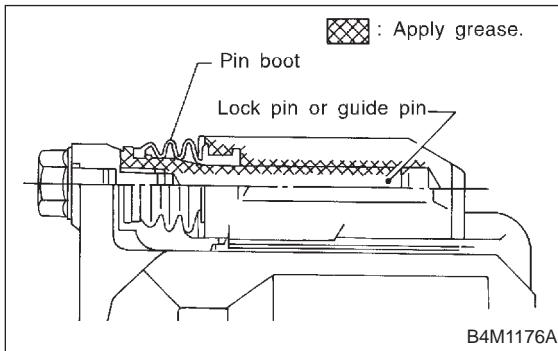
- 6) Install the piston boot to the caliper body, and attach boot ring.



- 7) Apply a coat of specified grease to guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease:

NIGLUBE RX-2 (Part No. 003606000)



- 8) Install guide pin boot on caliper body.
- 9) Install lock pin boot on caliper body and insert lock pin sleeve into place.

F: INSTALLATION

- 1) Install disc rotor on hub.
- 2) Install support on back plate.

Tightening torque:

$78 \pm 10 \text{ N}\cdot\text{m} (8.0 \pm 1.0 \text{ kg}\cdot\text{m}, 58 \pm 7 \text{ ft}\cdot\text{lb})$

CAUTION:

- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace pads if there is oil or grease on them.

- 3) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.
- 4) Install pads on support.
- 5) Install caliper body on support.

Tightening torque:

$39 \pm 5 \text{ N}\cdot\text{m} (4.0 \pm 0.5 \text{ kg}\cdot\text{m}, 28.9 \pm 3.6 \text{ ft}\cdot\text{lb})$

- 6) Connect brake hose.

Tightening torque:

$18 \pm 3 \text{ N}\cdot\text{m} (1.8 \pm 0.3 \text{ kg}\cdot\text{m}, 13.0 \pm 2.2 \text{ ft}\cdot\text{lb})$

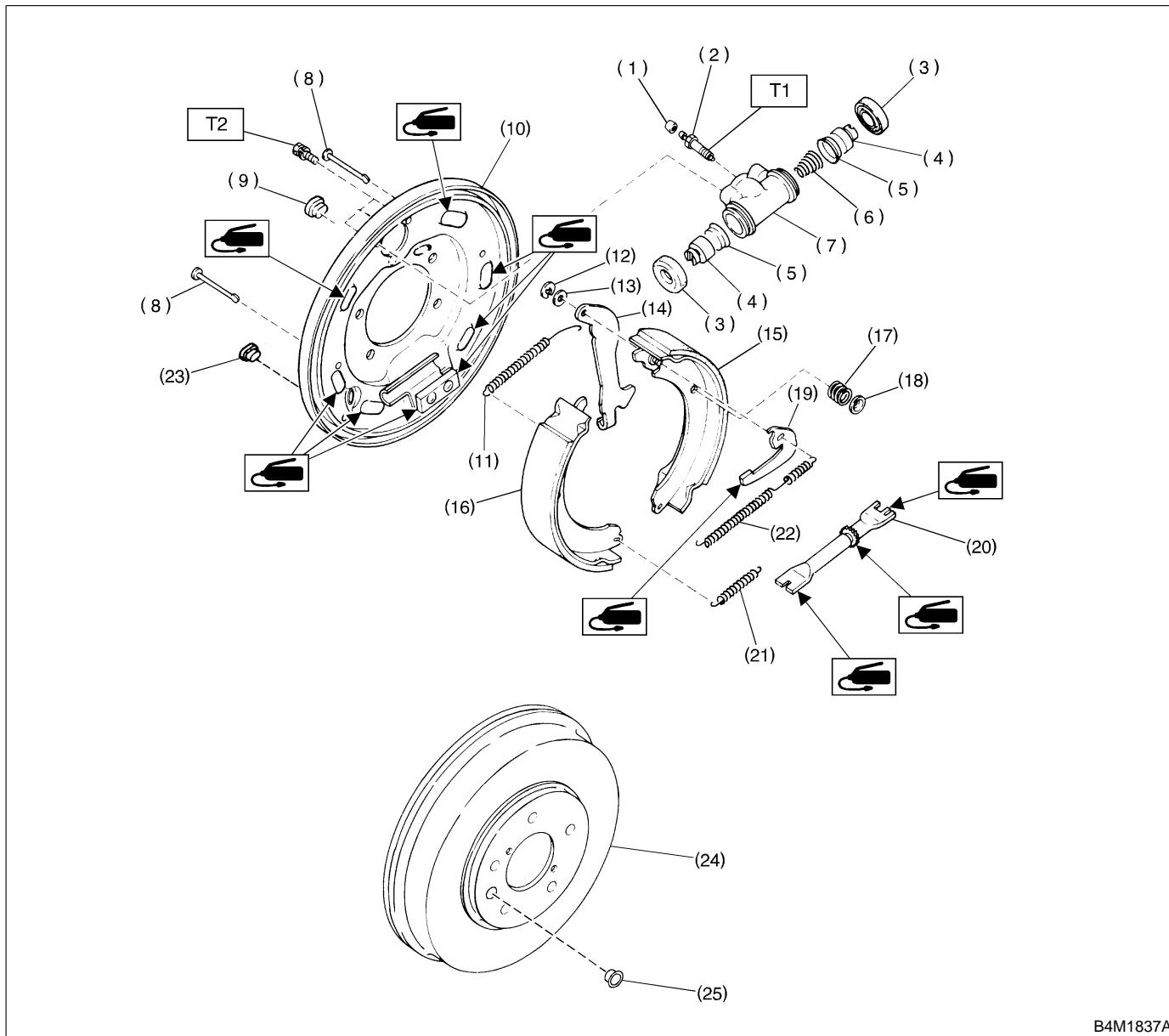
CAUTION:

- The brake hose must be connected without any twist.
- Replace brake hose gaskets with new ones.

- 7) Bleed air from brake system.

3. Rear Drum Brake

A: REMOVAL



B4M1837A

(1) Air bleeder cap	(11) Upper shoe return spring	(21) Lower shoe return spring
(2) Air bleeder screw	(12) Retainer	(22) Adjusting spring
(3) Boot	(13) Washer	(23) Plug
(4) Piston	(14) Parking brake lever	(24) Drum
(5) Cup	(15) Brake shoe (Trailing)	(25) Plug
(6) Spring	(16) Brake shoe (Leading)	
(7) Wheel cylinder body	(17) Shoe hold-down spring	
(8) Pin	(18) Cup	
(9) Plug	(19) Adjusting lever	
(10) Back plate	(20) Adjuster	

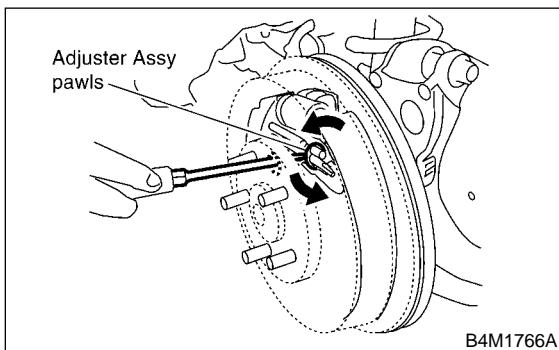
Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 1 (0.8±0.1, 5.8±0.7)****T2: 10 ± 2 (1.0±0.2, 7.2±1.4)**

1. BRAKE DRUM AND SHOE

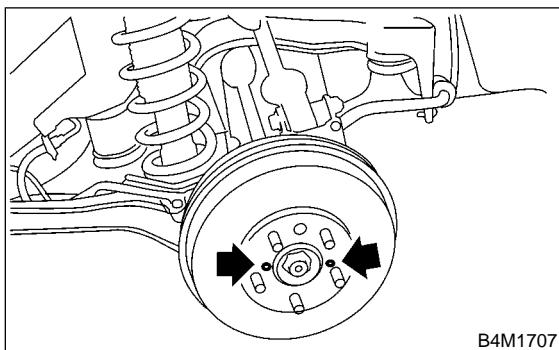
- 1) Loosen wheel nuts, jack-up vehicle, support it with rigid racks, and remove wheel.
- 2) Release parking brake.
- 3) Remove brake drum from brake assembly.

NOTE:

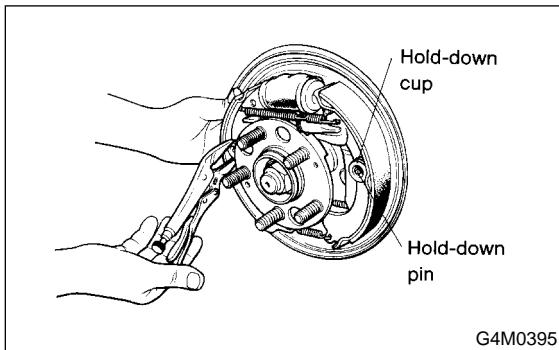
- If it is difficult to remove brake drum, remove adjusting hole cover from drum, and then turn adjuster assembly pawls using a slot-type screwdriver until brake shoe separates from the drum.



- If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

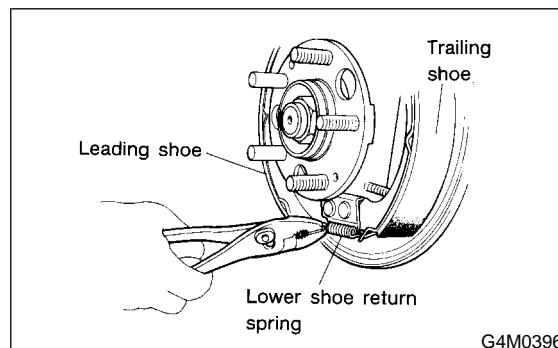


- 4) Hold hold-down pin by securing rear of back plate with your hand.



- 5) Disconnect hold-down cup from hold-down pin by rotating hold-down cup.

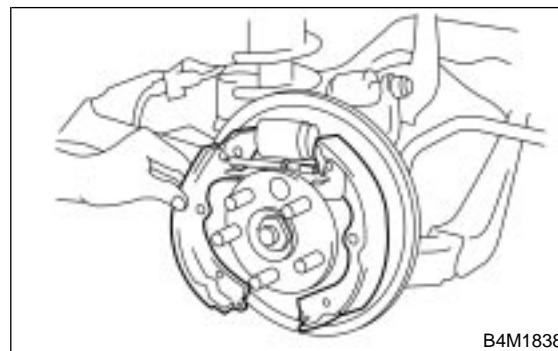
- 6) Disconnect lower shoe return spring from shoes.



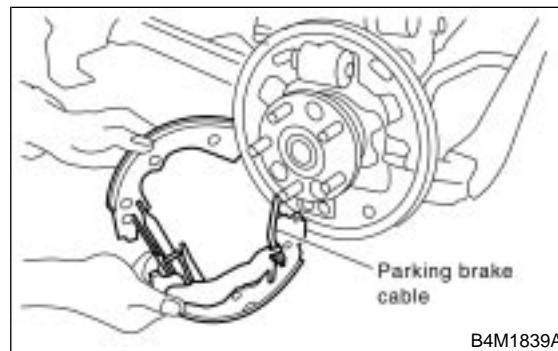
- 7) Remove shoes one by one from back plate with adjuster.

CAUTION:

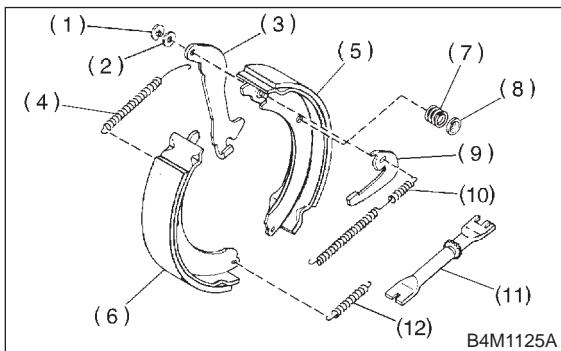
Be careful not to bend parking brake cable excessively when removing brake shoes.



- 8) Disconnect parking brake cable from parking lever.



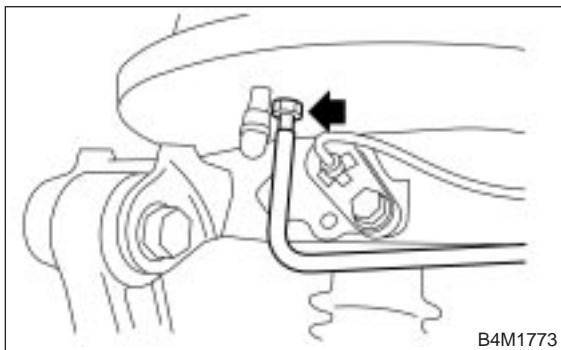
9) Remove the following:



- (1) Retainer
- (2) Washer
- (3) Parking lever
- (4) Upper shoe return spring
- (5) Trailing shoe
- (6) Leading shoe
- (7) Shoe hold-down spring
- (8) Shoe hold-down cup
- (9) Adjusting lever
- (10) Adjusting spring
- (11) Adjuster
- (12) Lower shoe return spring

2. BRAKE ASSEMBLY

- 1) Remove wheel.
- 2) Remove axle nut.
- 3) Remove brake drums and shoes.
- 4) Unscrew the brake pipe flare nut and disconnect brake pipe.

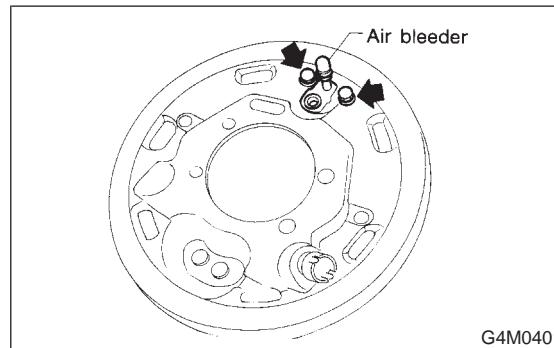


- 5) Remove hub. <Ref. to 4-2 [W2A0].>
- 6) Remove brake assembly.

3. WHEEL CYLINDER

- 1) Remove brake drum and shoes.
- 2) Unscrew brake pipe flare nut; and disconnect brake pipe.

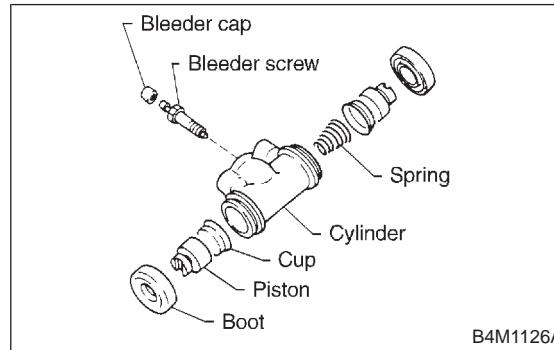
3) Remove the bolts installing wheel cylinder on back plate, and remove it.



B: DISASSEMBLY

1. WHEEL CYLINDER

- 1) Remove right and left dust boots from wheel cylinder.



- 2) Remove piston, cup, spring and air bleeder screw and cap.

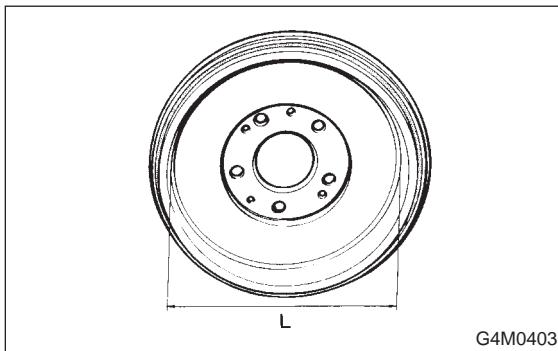
C: INSPECTION

- 1) If the inside surface of brake drum is streaked, correct the surface. And, if it is unevenly worn, taperingly streaked, or the outside surface of brake drum is damaged, correct or replace it.
- 2) Measure the drum inner diameter.

Drum inner diameter: "L"

Standard 228.6 mm (9 in)

Service limit 230.6 mm (9.08 in)



- 3) Measure the lining thickness.

Lining thickness:

Standard 4.1 mm (0.161 in)

Service limit 1.5 mm (0.059 in)

- 4) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
- 5) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

D: ASSEMBLY

1. WHEEL CYLINDER

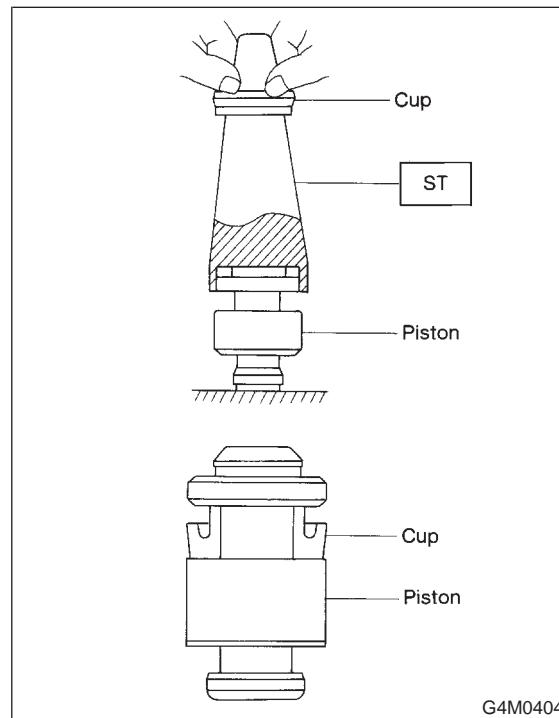
- 1) Clean all parts in brake fluid. Check and replace faulty parts.
 - Cup and boot for damage or fatigue
 - Cylinder, piston and spring or damage or rust formation
- 2) Assembly is the reverse order of disassembly.
 - (1) When installing the cup, use ST, apply brake fluid to the frictional surface for smooth installation and pay attention to cup direction.
 - (2) STs are available in different sizes.

CAUTION:

- When replacing the repair kit, make sure that the sizes of cylinder and cup are the same as those which were replaced.
- Use only the tool of the correct size.

CAUTION:

While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.



G4M0404

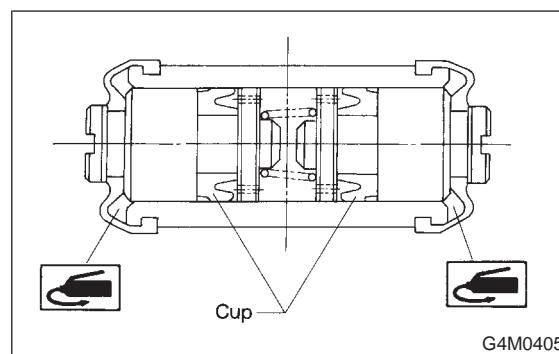
- 3) Apply rubber grease to the boot inside as shown in Figure.

CAUTION:

Never use brake grease.

Grease:

NIGLUBE RX-2 (Part No. 003606000)



G4M0405

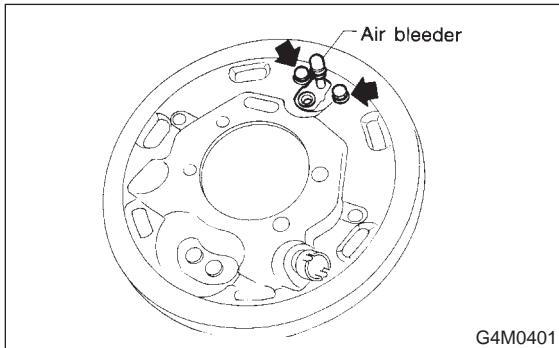
ST: ADAPTER	
Applicable size	Part No.
20.6 mm (13/16 in)	926460000

E: INSTALLATION**1. WHEEL CYLINDER**

Install wheel cylinder on back plate, and tighten bolts.

Tightening torque:

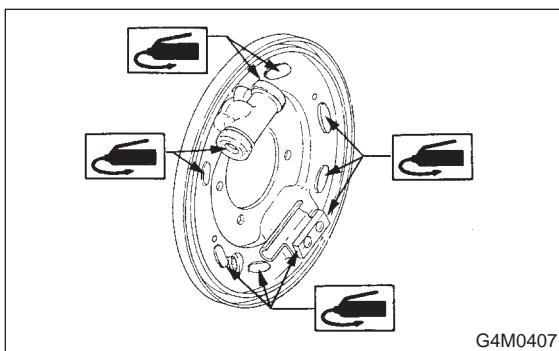
$10\pm2\text{ N}\cdot\text{m}$ ($1.0\pm0.2\text{ kg}\cdot\text{m}$, $7.2\pm1.4\text{ ft}\cdot\text{lb}$)

**2. BRAKE DRUM AND SHOE**

- 1) Clean back plate and wheel cylinder.
- 2) Apply grease to portions indicated by arrows in Figure.

Brake grease:

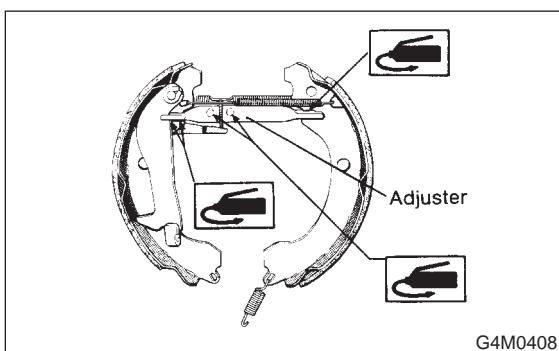
Dow Corning Molykote No. 7439 (Part No. 725191460)



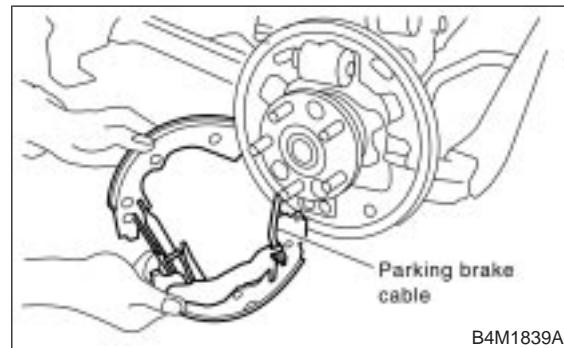
- 3) Apply grease to adjusting screw and both ends of adjuster.

Brake grease:

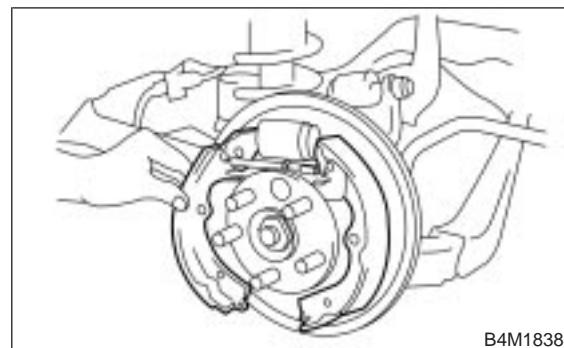
Dow Corning Molykote No. 7439 (Part No. 725191460)



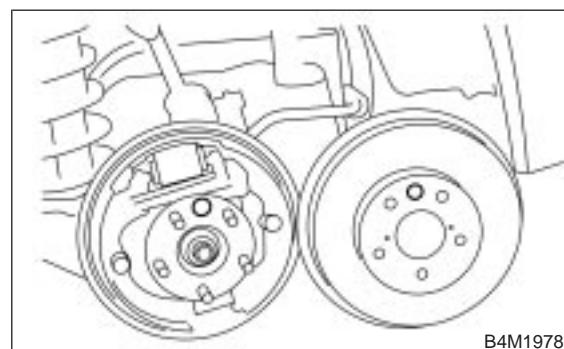
- 4) Connect upper shoe return spring to shoes.
- 5) Connect parking brake cable to parking lever.



- 6) While positioning shoes (one at a time) in groove on wheel cylinder, secure shoes.



- 7) Fix shoes by connecting hold-down cup to hold-down pin.
- 8) Connect lower shoe return spring.
- 9) Set the outside diameter of brake shoes less than 0.5 to 0.8 mm (0.020 to 0.031 in) in comparison with the inside diameter of brake drum.
- 10) Match the holes on hub and drum and install drum on hub.

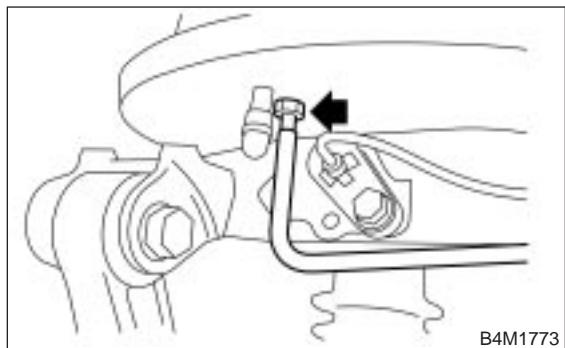


3. BRAKE ASSEMBLY

- 1) Install hub. <Ref. to 4-2 [W2E2].>
- 2) Connect brake pipe, and tighten brake pipe flange nut.

Tightening torque:

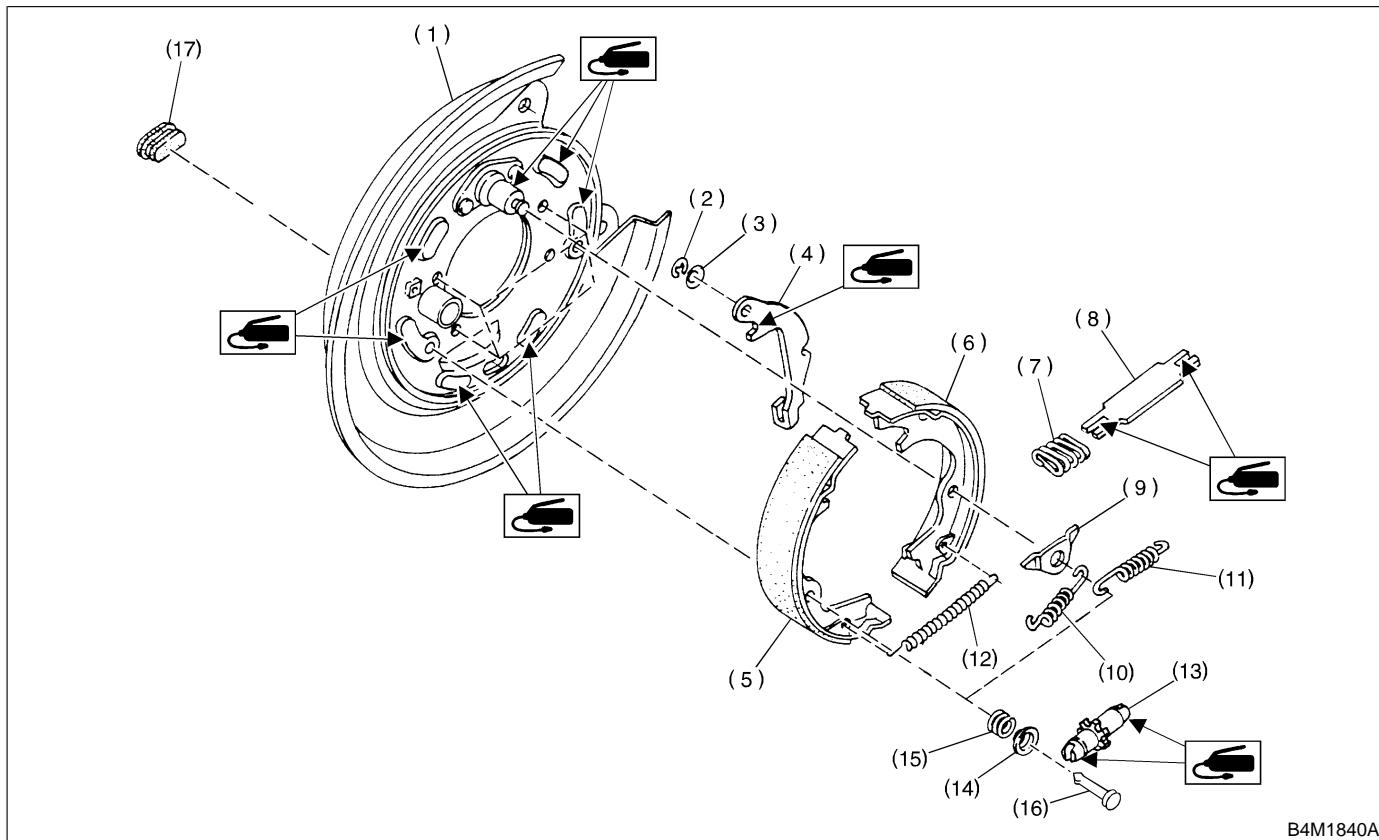
$15^{+3/-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3/-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2/-1.4} \text{ ft}\cdot\text{lb}$)



- 3) Install brake drum and shoes. <Ref. to 4-4 [W3E2].>
- 4) Install brake drum.
- 5) After installing brake assembly, bleed air from brake line.

4. Parking Brake (Rear Disc Brake)

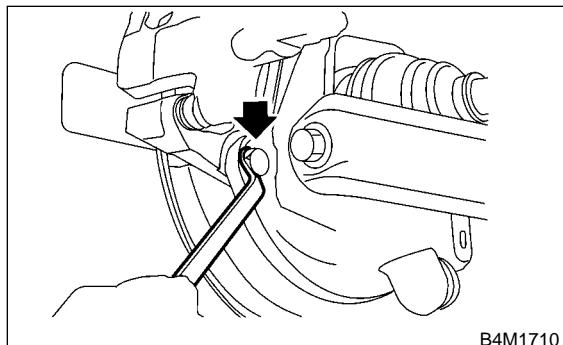
A: REMOVAL



B4M1840A

(1) Back plate	(7) Strut spring	(13) Adjuster
(2) Retainer	(8) Strut	(14) Shoe hold-down cup
(3) Spring washer	(9) Shoe guide plate	(15) Shoe hold down spring
(4) Lever	(10) Primary return spring	(16) Shoe hold down pin
(5) Parking brake shoe (Primary)	(11) Secondary return spring	
(6) Parking brake shoe (Secondary)	(12) Adjusting spring	

1) Remove the two mounting bolts and remove the disc brake assembly.

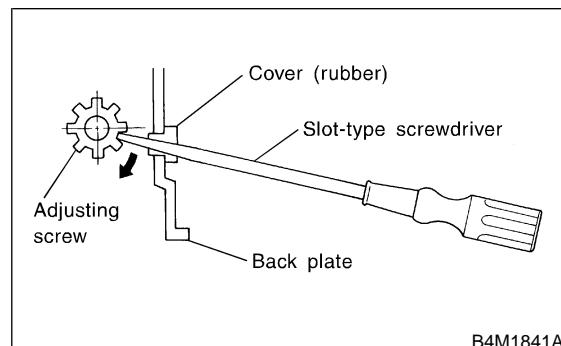


2) Suspend the disc brake assembly so that the hose is not stretched.
 3) Pull down and release parking brake.
 4) Remove the disc rotor.

NOTE:

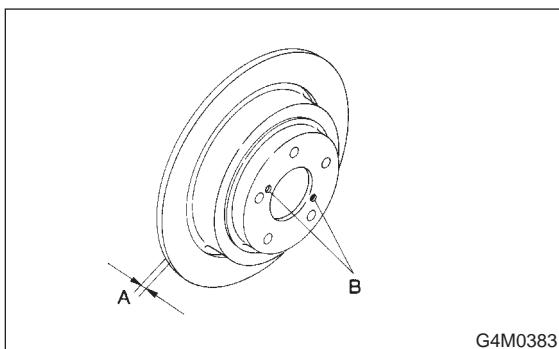
If the disc rotor is difficult to remove try the following two methods in order.

(1) Turn adjusting screw using a slot-type screwdriver until brake shoe gets away enough from the disc rotor.

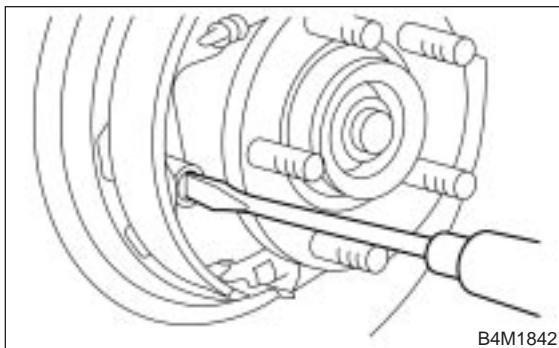


B4M1841A

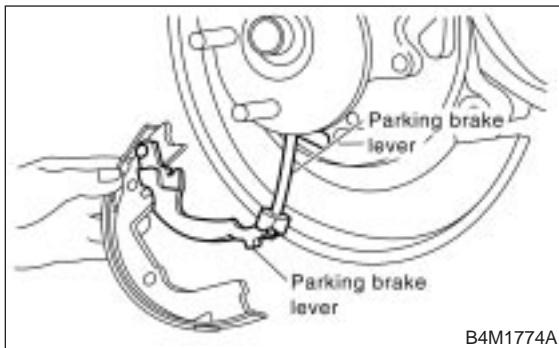
(2) If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



5) Remove shoe return spring from parking brake assembly.
 6) Using a standard screwdriver, remove front shoe hold down spring and pin.



7) Remove strut and strut spring.
 8) Remove adjuster assembly from parking brake assembly.
 9) Using a standard screwdriver, remove rear shoe hold-down spring and pin.
 10) Remove brake shoe.
 11) Remove parking cable from parking lever.



12) Using a standard screwdriver, raise retainer. Remove parking lever and washer from brake shoe.

B: INSPECTION

1) Measure brake disc inside diameter. If the disc is scored or worn, replace the brake disc.

Disc inside diameter:

Standard

170 mm (6.69 in)

Service limit

171 mm (6.73 in)

2) Measure the lining thickness. If it exceeds the limit, replace shoe assembly.

Lining thickness:

Standard

3.2 mm (0.126 in)

Service limit

1.5 mm (0.059 in)

CAUTION:

Replace the brake shoes on the right and left brake assembly at the same time.

C: INSTALLATION

CAUTION:

Be sure lining surface is free from oil contamination.

Brake grease:

Dow Corning Molykote No. 7439 (Part No. 725191460)

1) Apply brake grease to the following places.

- Six contact surfaces of shoe rim and back plate packing
- Contact surface of shoe wave and anchor pin
- Contact surface of lever and strut
- Contact surface of shoe wave and adjuster assembly
- Contact surface of shoe wave and strut
- Contact surface of lever and shoe wave

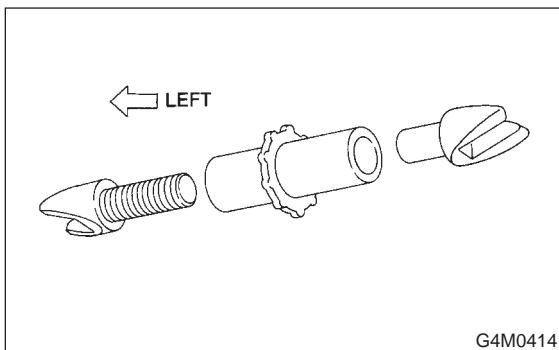
2) Installation is in reverse order of removal.

CAUTION:

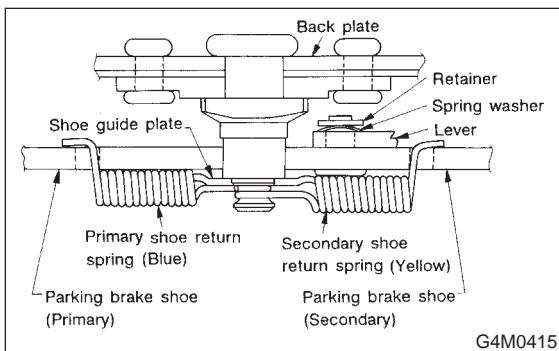
- Use new retainers and clinch them when installing brake shoes to levers.
- Ensure that parking lever moves smoothly.
- Do not confuse left parking lever with right one.
- Do not confuse left strut with right one.

NOTE:

Ensure that adjuster assembly is securely installed with screw in the left side, facing vehicle front.

**NOTE:**

Ensure that shoe return spring is installed as shown in Figure.



3) Adjust parking brakes. <Ref. to 4-4 [W4D1].>

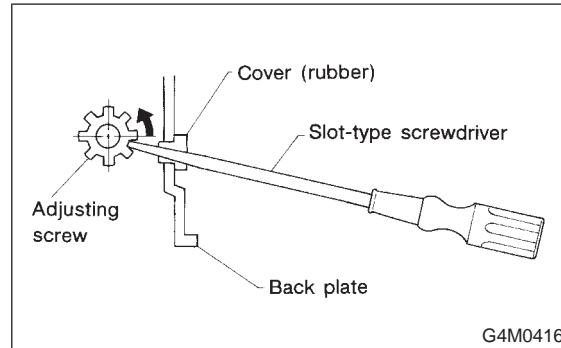
CAUTION:

After replacing parking brake lining, be sure to drive vehicle for "break-in" purposes.

- (1) Drive the vehicle about 35 km/h (22 MPH).
- (2) With the parking brake release button pushed in, pull the parking brake lever gently.
- (3) Drive the vehicle for about 200 meter (0.12 mile) in this condition.
- (4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat this procedure once more.
- (5) After breaking-in, re-adjust parking brakes.

D: ADJUSTMENT**1. SHOE CLEARANCE**

- 1) Remove adjusting hole cover from back plate.
- 2) Turn adjusting screw using a slot-type screwdriver until brake shoe is in close contact with disc rotor.

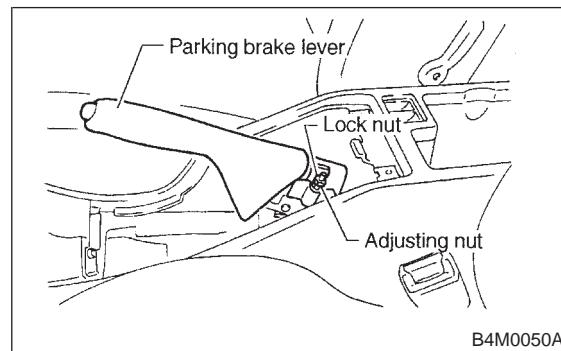


3) Turn back (downward) adjusting screw 3 or 4 notches.

4) Install adjusting hole cover to back plate.

2. LEVER STROKE

- 1) Remove console box lid.
- 2) Forcibly pull parking brake lever 3 to 5 times.
- 3) Adjust parking brake lever by turning adjuster until parking brake lever stroke is set at 6 notches with operating force of 196 N (20 kg, 44 lb).



4) Tighten lock nut.

5) Install console box lid.

Lever stroke:

7 to 8 notches when pulled with a force of 196 N (20 kg, 44 lb)

Tightening torque (Adjuster lock nut):

5.9±1.5 N·m (0.60±0.15 kg·m, 4.3±1.1 ft-lb)

5. Master Cylinder

A: REMOVAL

- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Disconnect fluid level indicator harness connector.
- 3) Remove brake pipes from master cylinder.
- 4) Remove master cylinder mounting nuts, and take out master cylinder from brake booster.

CAUTION:

Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wipe it off quickly if spilt.

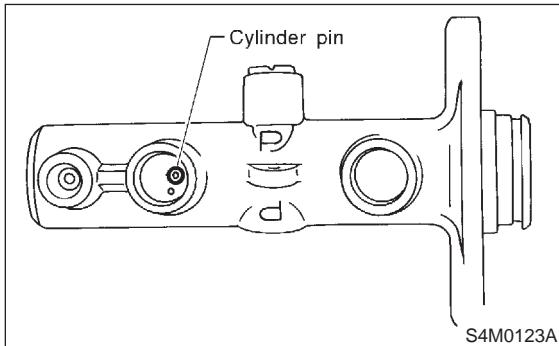
B: DISASSEMBLY

1. PRECAUTIONS FOR DISASSEMBLING

- 1) Remove mud and dirt from the surface of brake master cylinder.
- 2) Prepare tools necessary for disassembly operation, and arrange them neatly on work bench.
- 3) Clean work bench.

2. DISASSEMBLING PROCEDURE

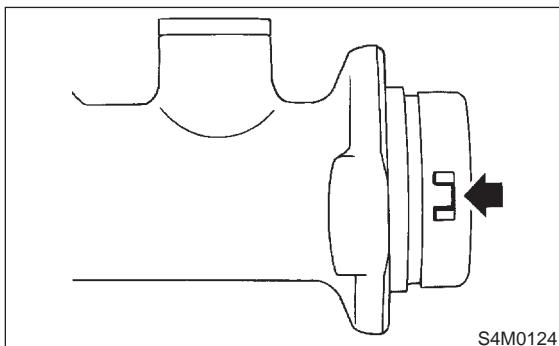
- 1) Remove pin with drift pin which secures reserve tank to master cylinder.
- 2) Remove cylinder pin with magnetic pick-up tool while pushing in primary piston. (only vehicle equipped with ABS)



- 3) Pry up the pawl and remove the piston retainer.

NOTE:

Piston may jump out from master cylinder.



- 4) Extract primary piston assembly and secondary piston assembly.

CAUTION:

- Do not disassemble the piston assembly; otherwise, the spring set value may be changed.
- Use brake fluid or methanol to wash inside wall of cylinder, pistons and piston cups. Be careful not to damage parts when washing. If methanol is used for washing, do not dip rubber parts, such as piston cups, in it for more than 30 seconds; otherwise, they may become swelled.

C: INSPECTION

If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

CAUTION:

- The primary and secondary pistons must be replaced as complete assemblies.
- The service limit of the clearance between each piston and the master cylinder inner dia. is 0.11 mm (0.0043 in).
- When handling parts, be extremely careful not to damage or scratch the parts, or let any foreign matter get on them.

D: ASSEMBLY

1. PRECAUTIONS FOR ASSEMBLING

- 1) When assembling, be sure to use recommended brake fluid.
- 2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
- 3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
- 4) Do not drop parts. Never attempt to use any part that has been dropped accidentally.

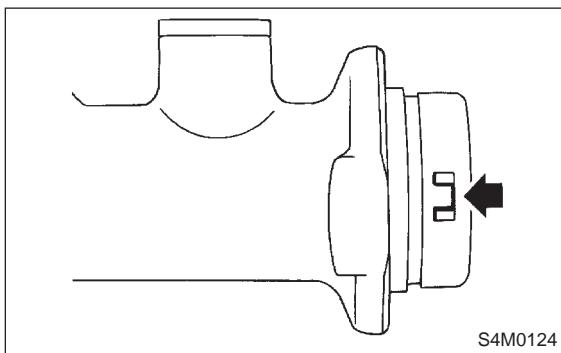
2. ASSEMBLING OPERATION

- 1) Assembling piston assembly:

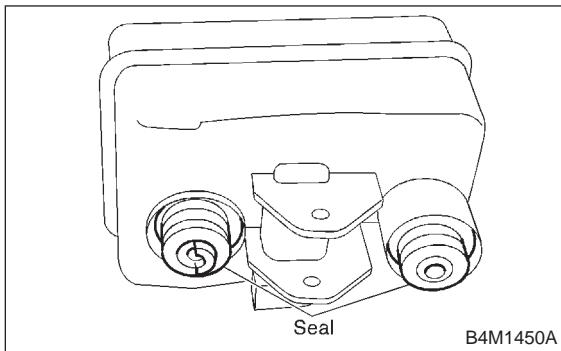
Apply recommended brake fluid to inside wall of cylinder, and to outer surface of piston assembly, and install piston assemblies carefully into cylinder.

- 2) Assembling cylinder pin:

3) Press the pawl and install the piston retainer into the master cylinder.



4) Install seal to reservoir tank.



5) Install pin with drift pins which secures reservoir tank to master cylinder.

E: INSTALLATION

To install the master cylinder to the body, reverse the sequence of removal procedure.

Tightening torque:

Master cylinder mounting nut

$14 \pm 4 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.4 \text{ kg}\cdot\text{m}$, $10.1 \pm 2.9 \text{ ft-lb}$)

Piping flare nut

$15^{+3/-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3/-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2/-1.4} \text{ ft-lb}$)

CAUTION:

Be sure to use recommended brake fluid.

6. Brake Booster

A: REMOVAL

1) Remove or disconnect the following parts at engine compartment.

- (1) Disconnect connector for brake fluid level indicator.
- (2) Remove brake pipes from master cylinder.
- (3) Remove master cylinder installing nuts.
- (4) Disconnect vacuum hose from brake booster.

2) Remove the following parts from the pedal bracket.

- (1) Snap pin and clevis pin
- (2) Four brake booster installing nuts

3) Remove brake booster while shunning brake pipes.

B: HANDLING PRECAUTIONS

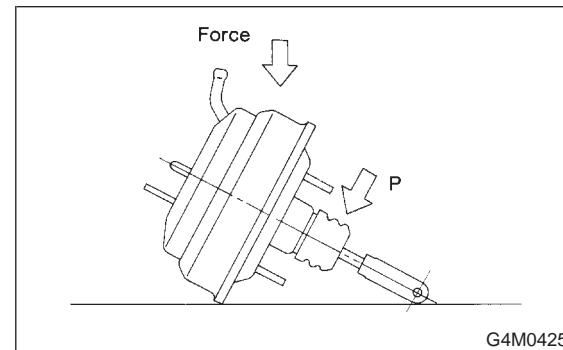
1) Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.

2) Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of $\pm 3^\circ$, it may result in damage to the power piston cylinder.

3) Use care when placing brake booster on the floor.

CAUTION:

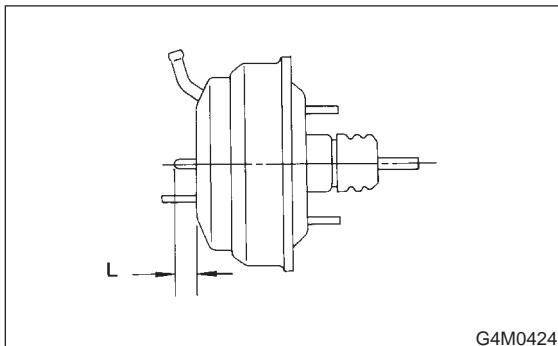
If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.



4) Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

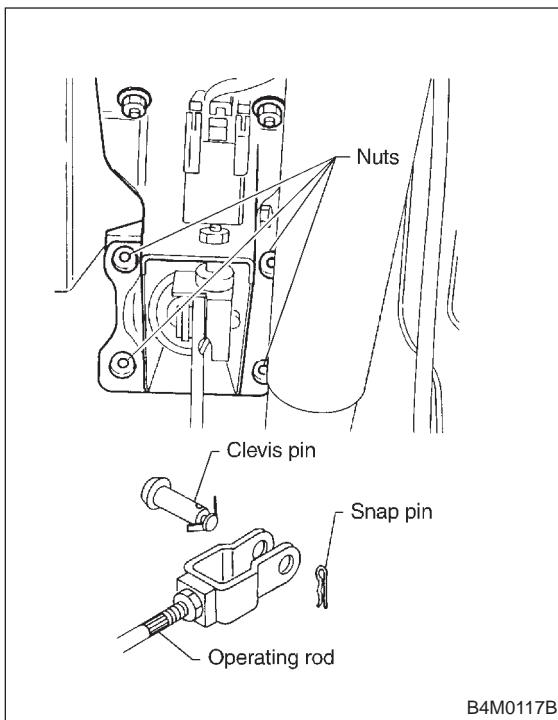
Standard:

$L = 10 \text{ mm (0.39 in)}$

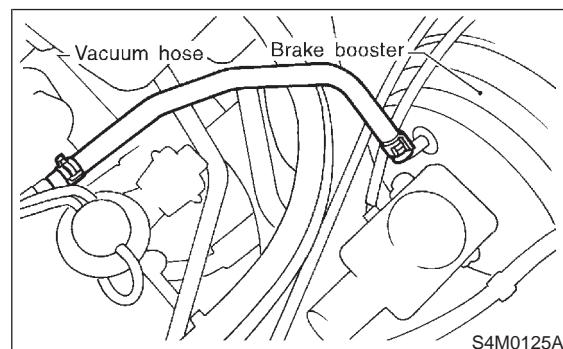


C: INSTALLATION

- 1) Mount brake booster in position.
- 2) Connect operating rod to brake pedal with clevis pin and snap pin.



- 3) Connect vacuum hose to brake booster.

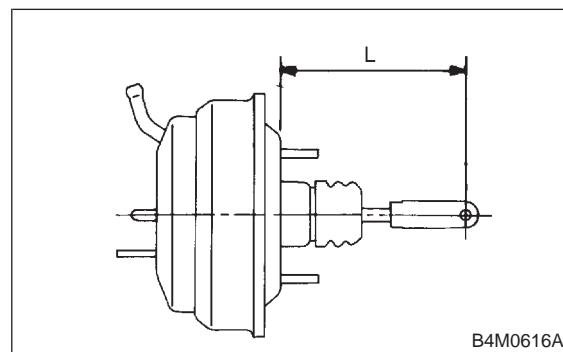


- 4) Mount master cylinder onto brake booster.
- 5) Connect brake pipes to master cylinder.
- 6) Connect electric connector for brake fluid level indicator.
- 7) Adjust operating rod of brake booster.

Standard: L

$145.3 \text{ mm (5.72 in)}$

If it is not in specified value, adjust it by adjusting brake booster operating rod.

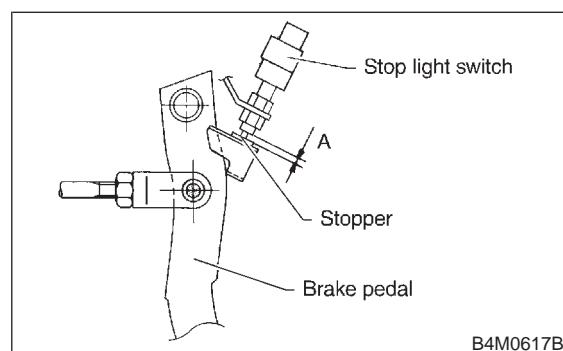


- 8) Measure the clearance between threaded end of stop light switch and stopper. If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:

Be careful not to rotate stop light switch.

Stop light switch clearance: A
 $0.3 \text{ mm (0.012 in)}$



- 9) Apply grease to operating rod connecting pin to prevent it from wearing.

10) Bleed air from brake system.

Tightening torque (Air bleeder screw):

$8\pm1\text{ N}\cdot\text{m}$ ($0.8\pm0.1\text{ kg}\cdot\text{m}$, $5.8\pm0.7\text{ ft-lb}$)

11) Conduct road tests to ensure brakes do not drag.

D: OPERATION CHECK (WITHOUT GAUGES)

CAUTION:

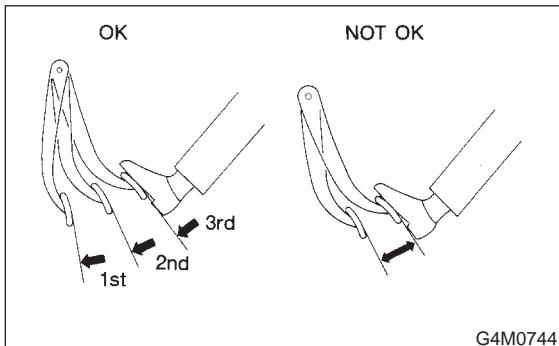
When checking operation, be sure to securely apply the hand brake.

1. CHECKING WITHOUT GAUGES

This method cannot determine the exact portion which has failed, but it can provide a rough understanding of the nature of the failure if checking is conducted in accordance with the following procedures.

2. AIR TIGHTNESS CHECK

Start engine, and run it for 1 to 2 minutes, then turn it off. Depress brake pedal several times applying the same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on the 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, brake booster is faulty.

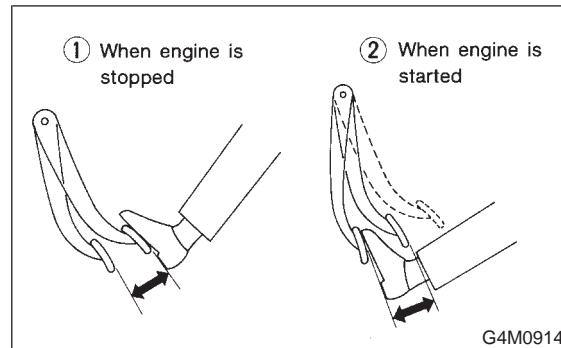


NOTE:

- In the event of defective operation, inspect the condition of the check valve and vacuum hose.
- Replace them if faulty and conduct the test again.
- If no improvement is observed, check precisely with gauges.

3. OPERATION CHECK

1) With engine off, depress brake pedal several times applying the same pedal force and make sure that the pedal height does not vary with each depression of the pedal.



2) With brake pedal depressed, start engine.

3) As engine starts, brake pedal should move slightly toward the floor. If no change occurs in the pedal height, brake booster is faulty.

NOTE:

If faulty, check precisely with gauges.

4. LOADED AIR TIGHTNESS CHECK

Depress brake pedal while engine is running, and turn off engine while the pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, brake booster is functioning normally; if the pedal height increases, it is faulty.

NOTE:

If faulty, check precisely with gauges.

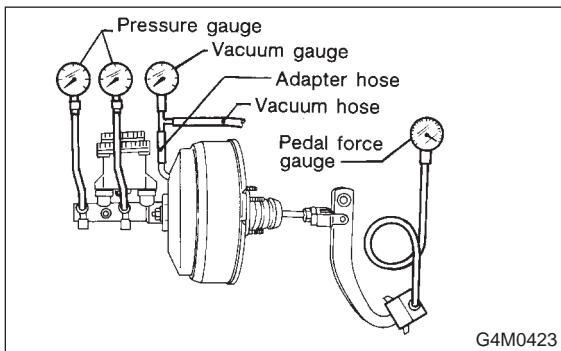
E: OPERATION CHECK (WITH GAUGES)

CAUTION:

When checking operation, be sure to securely apply the hand brake.

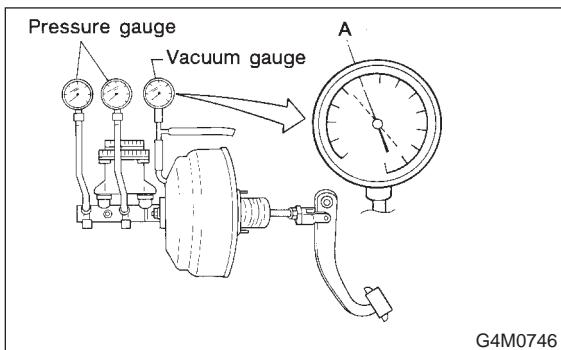
1. CHECKING WITH GAUGES

Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.



2. AIR TIGHTNESS CHECK

1) Start engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress brake pedal.

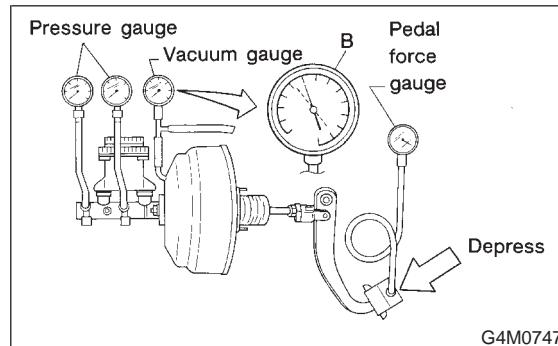


2) Stop engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly. If defective, the cause may be one of those listed below.

- Check valve malfunction
- Leak from vacuum hose
- Leak from the shell jointed portion or stud bolt welded portion
- Damaged diaphragm
- Leak from valve body seal and bearing portion
- Leak from plate and seal assembly portion
- Leak from poppet valve assembly portion

3. LOADED AIR TIGHTNESS CHECK

1) Start engine and depress brake pedal with pedal force of 196 N (20 kg, 44 lb). Keep engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.



2) Stop engine and watch vacuum gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly. If defective, refer to "AIR TIGHTNESS CHECK".
<Ref. to 4-4 [W6E2].>

4. LACK OF BOOSTING ACTION CHECK

Turn off engine, and set the vacuum gauge reading at "0". Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force	147 N (15 kg, 33 lb)	294 N (30 kg, 66 lb)
Fluid pressure	14" 785 kPa (8 kg/cm ² , 114 psi)	1,961 kPa (20 kg/cm ² , 284 psi)
	15" 686 kPa (7 kg/cm ² , 100 psi)	1,765 kPa (18 kg/cm ² , 256 psi)

5. BOOSTING ACTION CHECK

Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

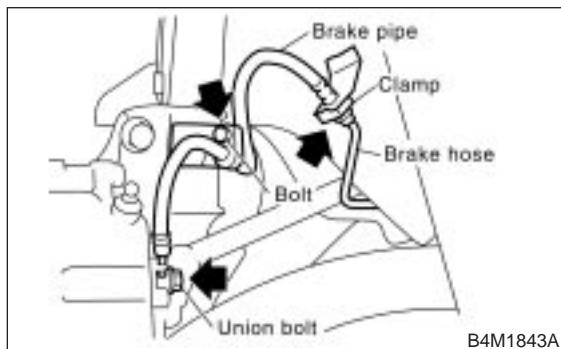
Brake pedal force	147 N (15 kg, 33 lb)	294 N (30 kg, 66 lb)
Fluid pressure	14" 6,375 kPa (65 kg/cm ² , 924 psi)	9,121 kPa (93 kg/cm ² , 1,322 psi)
	15" 5,688 kPa (58 kg/cm ² , 825 psi)	9,905 kPa (101 kg/cm ² , 1,436 psi)

7. Brake Hose

A: REMOVAL

1. FRONT BRAKE HOSE

- 1) Separate brake pipe from brake hose.
(Always use flare nut wrench and be careful not to deform flare nut.)



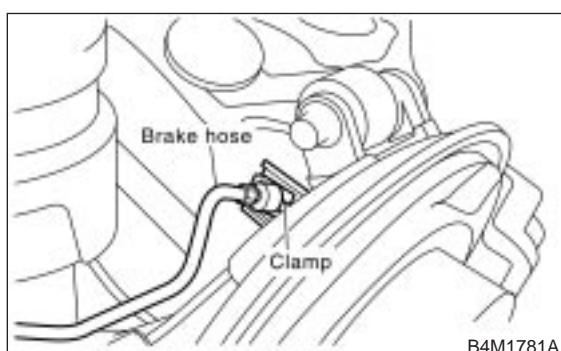
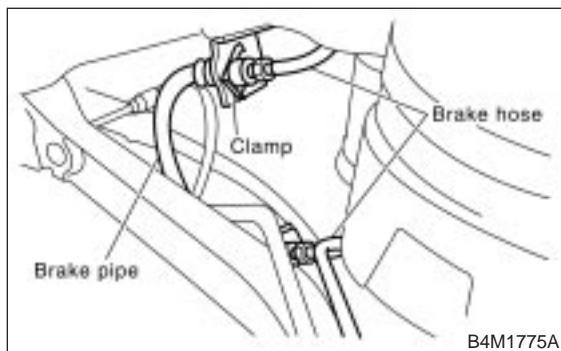
- 2) Pull out clamp to remove brake hose.
- 3) Remove bolt at strut and union bolt.

2. REAR BRAKE HOSE

- 1) Separate brake pipe from brake hose.

NOTE:

Always use flare nut wrench and be careful not to deform flare nut.



- 2) Pull out clamp to remove brake hose.

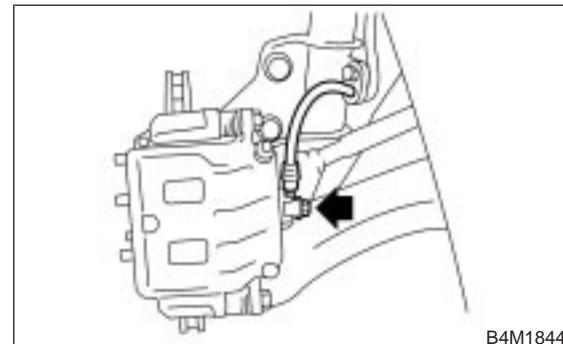
B: INSTALLATION

1. FRONT BRAKE HOSE

- 1) Route end of brake hose (on caliper side) through hole in brake hose bracket at strut location.
- 2) Tighten end of brake hose at caliper using a union bolt.

Tightening torque (Union bolt):

$18 \pm 3 \text{ N}\cdot\text{m} (1.8 \pm 0.3 \text{ kg}\cdot\text{m}, 13.0 \pm 2.2 \text{ ft-lb})$



- 3) Secure middle fitting of brake hose to bracket at strut location using a clamp.
- 4) Position disc in straight-forward direction and route brake hose through hole in bracket on wheel apron side.

CAUTION:

Be sure brake hose is not twisted.

- 5) Temporarily tighten flare nut to connect brake pipe and hose.
- 6) Fix brake hose with clamp at wheel apron bracket.
- 7) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

Tightening torque (Brake pipe flare nut):

$15^{+3}_{-2} \text{ N}\cdot\text{m} (1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}, 10.8^{+2.2}_{-1.4} \text{ ft-lb})$

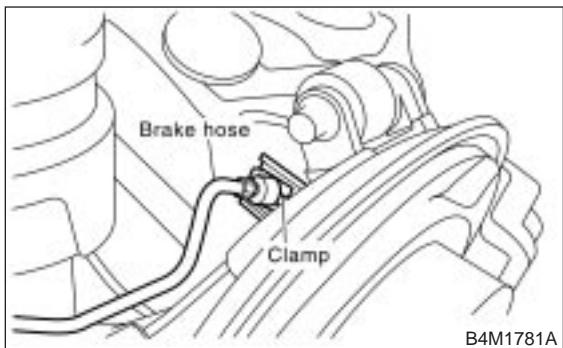
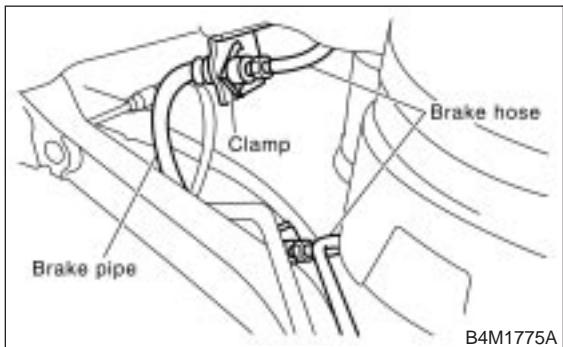
- 8) Bleed air from the brake system.

2. REAR BRAKE HOSE

- 1) Pass brake hose through the hole of bracket, and lightly tighten flare nut to connect brake pipe.
- 2) Insert clamp upward to fix brake hose.

3) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

Tightening torque (Brake pipe flare nut):
 $15^{+3/-2} \text{ N}\cdot\text{m} (1.5^{+0.3/-0.2} \text{ kg}\cdot\text{m}, 10.8^{+2.2/-1.4} \text{ ft-lb})$



4) Bleed air from the brake system.

8. Parking Brake Lever

A: REPLACEMENT

- 1) Remove console box from front floor.
- 2) Disconnect electric connector for parking brake switch.
- 3) Loosen parking brake adjuster, and remove inner cable end from equalizer.
- 4) Remove parking brake lever.
- 5) Install parking brake lever in the reverse order of removal.

Tightening torque (Lever installing bolt):
 $18 \pm 5 \text{ N}\cdot\text{m} (1.8 \pm 0.5 \text{ kg}\cdot\text{m}, 13.0 \pm 3.6 \text{ ft-lb})$

- 6) Adjust parking brake lever. <Ref. to 4-4 [W8B1].>

B: PARKING BRAKE ADJUSTMENT

1. LEVER STROKE ADJUSTMENT

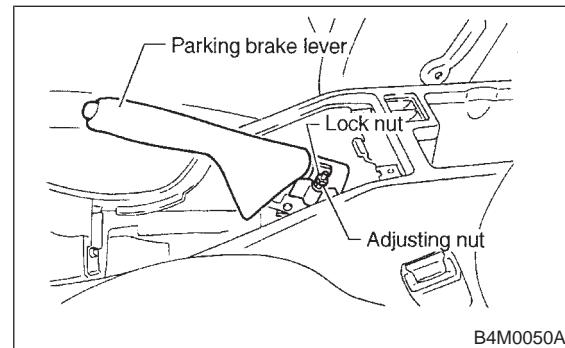
- 1) Remove console cover.
- 2) Forcibly pull parking brake lever 3 to 5 times.
- 3) Adjust parking brake lever by turning adjuster until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
- 4) Tighten lock nut.

Lever stroke:

7 to 8 notches when pulled with a force of 196 N (20 kg, 44 lb)

Tightening torque (Lock nut):

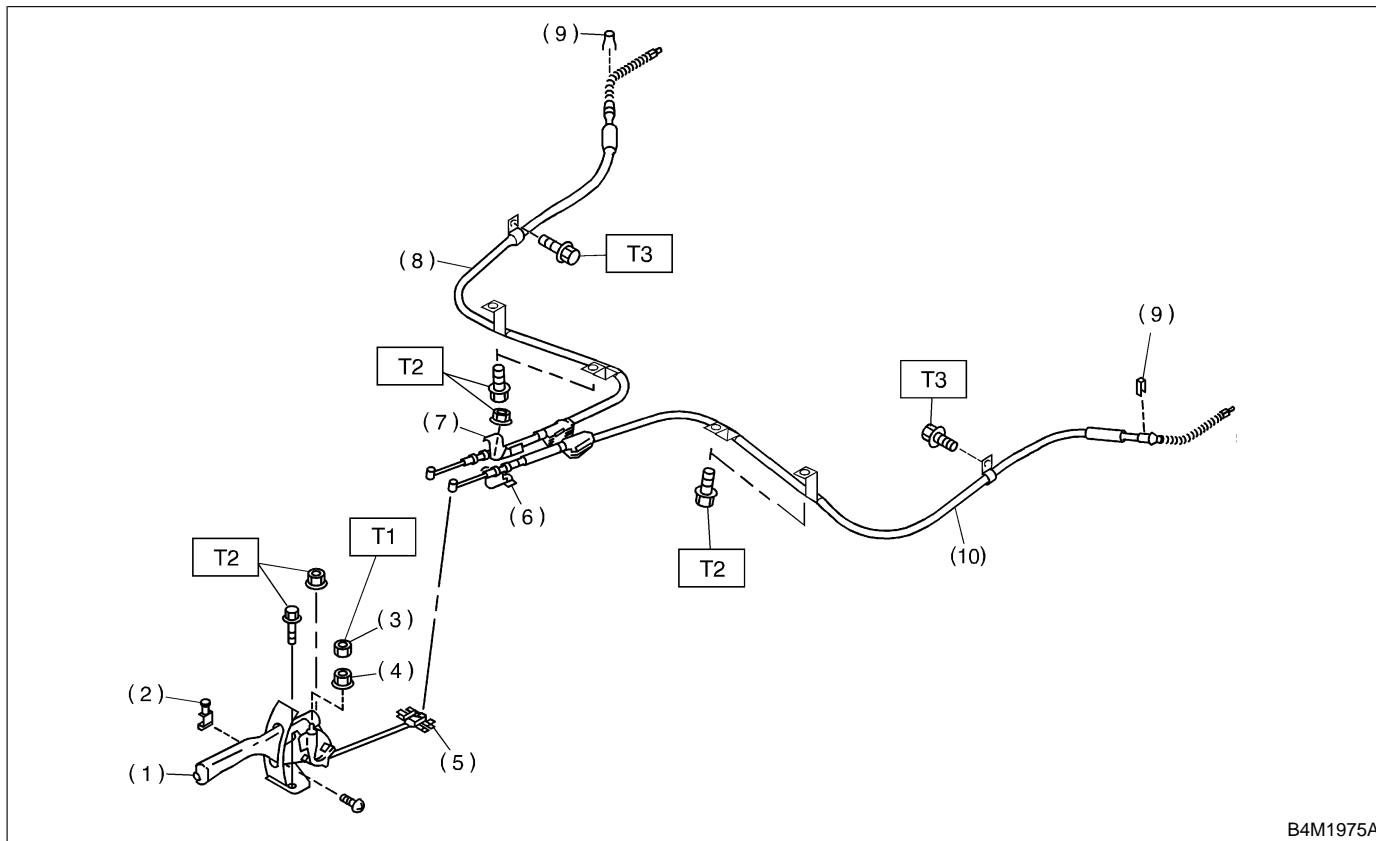
$5.9 \pm 1.5 \text{ N}\cdot\text{m} (0.60 \pm 0.15 \text{ kg}\cdot\text{m}, 4.3 \pm 1.1 \text{ ft-lb})$



- 5) Install console cover.

9. Parking Brake Cable

A: REPLACEMENT



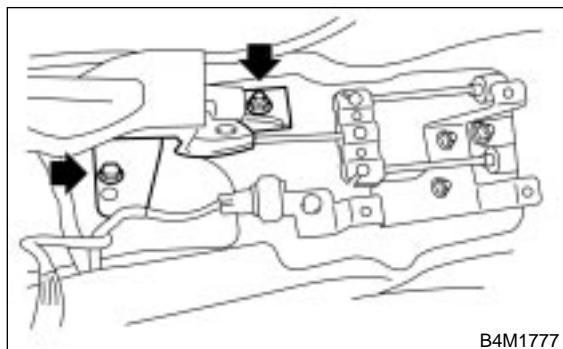
B4M1975A

(1) Parking brake lever	(7) Clamp
(2) Parking brake switch	(8) Parking brake cable RH
(3) Lock nut	(9) Clamp (Rear disc brake model only)
(4) Adjusting nut	(10) Parking brake cable LH
(5) Equalizer	
(6) Bracket	

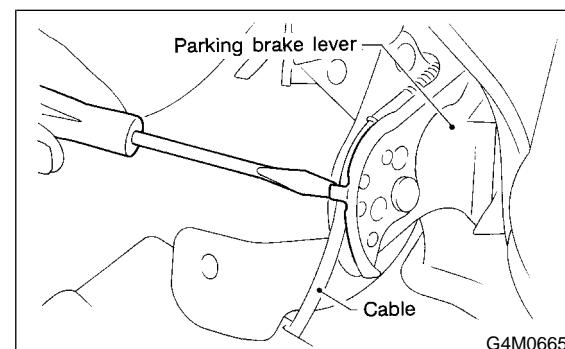
Tightening torque: N·m (kg·m, ft·lb)

T1: 5.9 ± 1.5 (0.60 ± 0.15 , 4.3 ± 1.1)T2: 18 ± 5 (1.8 ± 0.5 , 13.0 ± 3.6)T3: 32 ± 10 (3.3 ± 1.0 , 24 ± 7)

- 1) Lift-up vehicle.
- 2) Remove rear tires and wheels.
- 3) Remove rear cushion.
- 4) Remove console box from front floor.
- 5) Loosen parking cable adjusting nut and console bracket.
- 6) Remove parking brake lever.



- 7) Unbend parking brake lever pawls and remove cable.

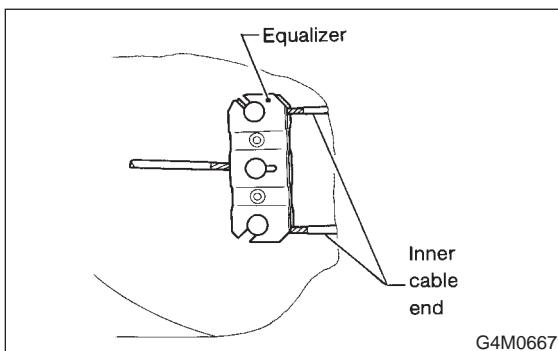


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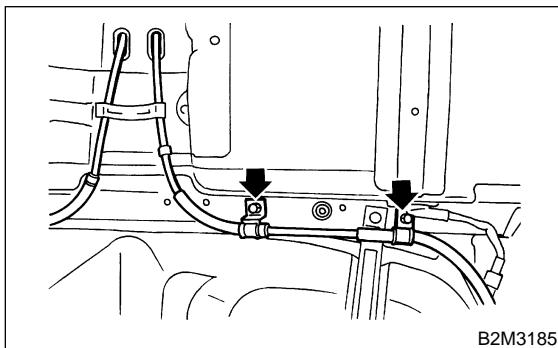
8) Roll up floor mat and remove clamps.



9) Remove equalizer cover.
10) Remove inner cable end from equalizer.



11) Pull out parking brake cable from rear brake.
<Ref. to 4-4 [W3A0].> or <Ref. to 4-4 [W4A0].>
12) Pull out clamp from rear brake.
13) Remove bolt and bracket from trailing link bracket.
14) Remove bolt and clamp from rear floor.



15) Detach grommet from rear floor.
16) Remove cable assembly from cabin by forcibly pulling it backward.
17) Detach parking brake cable from cable guide at rear trailing link.
18) Install (new) parking brake assembly in the reverse order of removal.

NOTE:

- Be sure to pass cable through cable guide inside the tunnel.
- Be sure to adjust the lever stroke. <Ref. to 4-4 [W8B1].>

10. Air Bleeding

A: GENERAL RULES FOR EFFECTIVE BLEEDING

- 1) Start with the brakes (wheels) connecting to the secondary chamber of the master cylinder.
- 2) The time interval between two brake pedal operations (from the time when the pedal is released to the time when it is depressed another time) shall be approximately 3 seconds.
- 3) The air bleeder on each brake shall be released for 1 to 2 seconds.

B: BLEEDING PROCEDURE

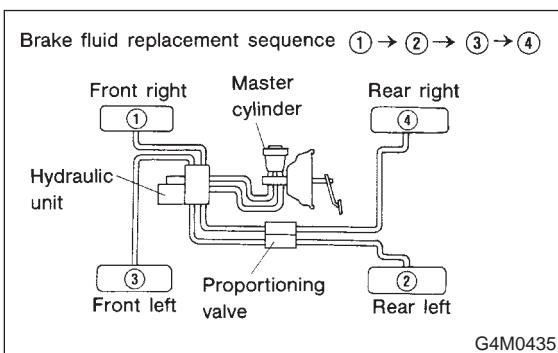
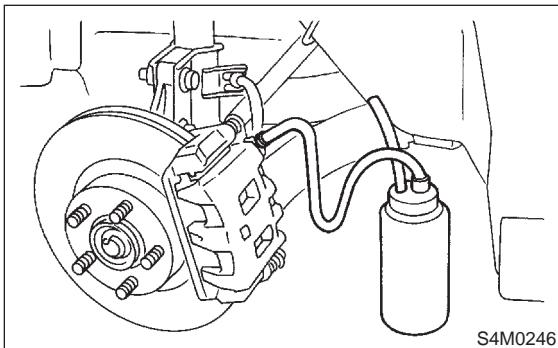
CAUTION:

- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

- During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, it is advisable to have two man working.

- 1) Make sure that there is no leak from joints and connections of the brake system.
- 2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.



- 3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.

Release air bleeder for 1 to 2 seconds.

Next, with the bleeder closed, slowly release the brake pedal.

Repeat these steps until there are no more air bubbles in the vinyl tube.

Allow 3 to 4 seconds between two brake pedal operations.

CAUTION:

Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

NOTE:

Brake pedal operating must be very slow.

- 4) Tighten air bleeder securely when no air bubbles are visible.

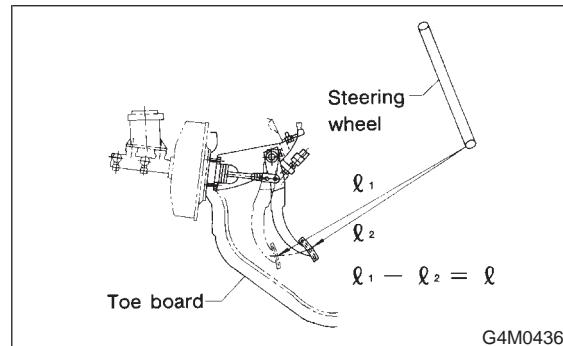
Air bleeder tightening torque:

$8\pm1\text{ N}\cdot\text{m}$ (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

- 5) Perform these steps for the brakes connecting to the secondary chamber of master cylinder, first, and then for the ones connecting to primary chamber. With all procedures completed, fully depress the brake pedal and keep it in that position for approximately 20 seconds to make sure that there is no leak evident in the entire system.

- 6) Check the pedal stroke.

While the engine is idling, depress the brake pedal with a 490 N (50 kg, 110 lb) load and measure the distance between the brake pedal and steering wheel. With the brake pedal released, measure the distance between the pedal and steering wheel again. The difference between the two measurements must be more than specified.



Specified pedal stroke:

Without ABS

90 mm (3.54 in)

With ABS

95 mm (3.74 in)

When depressing brake pedal with a 490 N (50 kg, 110 lb) load.

- 1) Models without ABS

If the distance is more than specifications, there is a possibility that air is in the brake line. Bleed air from the brake line.

- 2) Models with ABS

If the distance is more than specifications, there is a possibility air is in the inside of the hydraulic unit. Therefore, air must be bled from the inside of the hydraulic unit to the brake pipes in accordance with the bleeding sequence control.

<Ref. to 4-4 [W15D0].>

- 7) Add brake fluid to the required level (MAX. level) of reservoir tank.

- 8) As a final step, test run the vehicle at low speed and apply brakes relatively hard 2 to 3 times to ensure that brakes provide normal braking action on all four wheels without dragging and uneven braking.

11. Brake Fluid

A: REPLACEMENT

CAUTION:

- To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

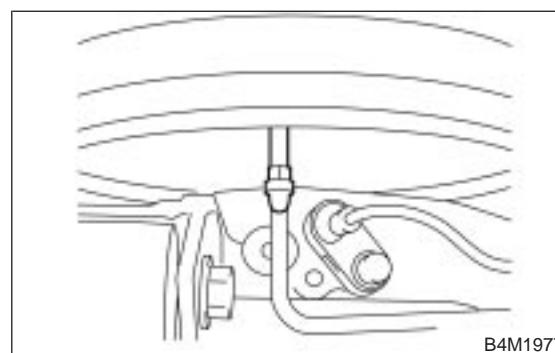
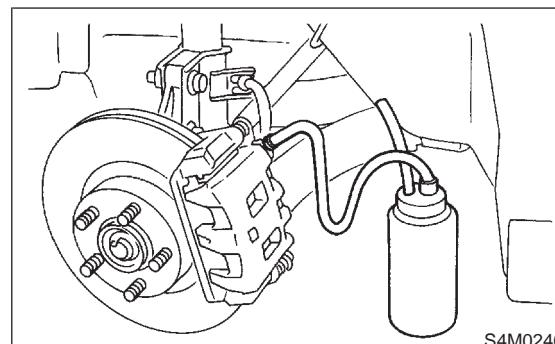
- During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, it is advisable to have two man working.
- The amount of brake fluid required is approximately 500 ml (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

- 1) Either jack-up vehicle and place a safety stand under it, or lift up vehicle.
- 2) Remove both front and rear wheels.
- 3) Draw out the brake fluid from master cylinder with syringe.
- 4) Refill reservoir tank with recommended brake fluid.

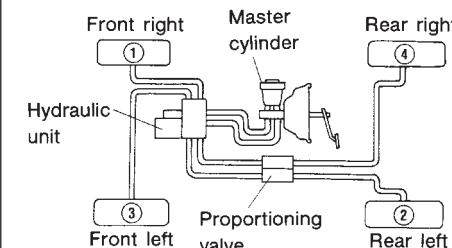
Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

- 5) Install one end of a vinyl tube onto the air bleeder of and insert the other end of the tube into a container to collect the brake fluid.



Brake fluid replacement sequence ① → ② → ③ → ④



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- 6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
- 7) Loosen bleeder screw approximately 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten screw.
- 8) Repeat steps 6) and 7) above until there are no air bubbles in drained brake fluid and new fluid flows through vinyl tube.

NOTE:

Add brake fluid as necessary while performing the air bleed operation, in order to prevent the tank from running short of brake fluid.

9) After completing the bleeding operation, hold brake pedal depressed and tighten screw and install bleeder cap.

Tightening torque (Bleeder screw):

$8\pm1\text{ N}\cdot\text{m}$ ($0.8\pm0.1\text{ kg}\cdot\text{m}$, $5.8\pm0.7\text{ ft}\cdot\text{lb}$)

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 7) above.

11) Depress brake pedal with a force of approximately 294 N (30 kg, 66 lb) and hold it there for approximately 20 seconds. At this time check pedal to see if it shows any unusual movement.

Visually inspect bleeder screws and brake pipe joints to make sure that there is no fluid leakage.

12) Install wheels, and drive vehicle for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

12. Proportioning Valve

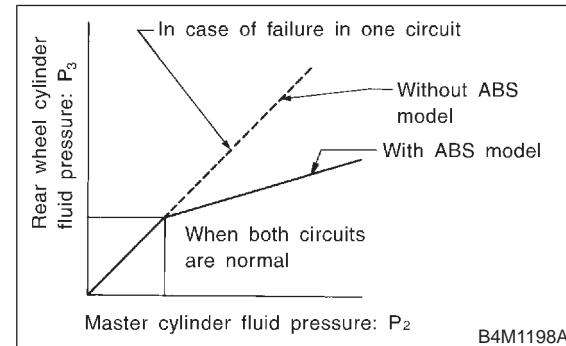
A: INSPECTION

1) Install the oil pressure gauges to measure the master cylinder fluid pressure (front wheel brake fluid pressure) and rear wheel cylinder fluid pressure.

2) Bleed air from the oil pressure gauges.

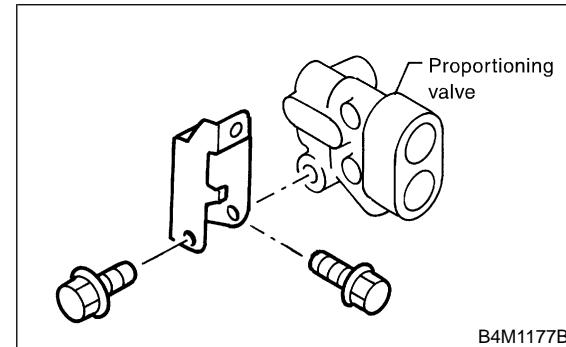
3) Check the master cylinder fluid pressure and rear wheel cylinder fluid pressure.

The standard values are shown in Figure.



4) For the oil pressure in case of split point, refer to "SPECIFICATIONS". <Ref. to 4-4 [S1A0].>

B: REMOVAL



1) Remove brake pipe from proportioning valve at four places.

2) Remove proportioning valve from its bracket.

CAUTION:

Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

C: INSTALLATION

- 1) Install proportioning valve to bracket.
- 2) Connect brake pipes correctly to proportioning valve.
- 3) Bleed air, then check each joint of brake pipe for oil leaks.

Tightening torque:

Proportioning valve to brake pipe flare nut:
 $15^{+3/-2}$ N·m ($1.5^{+0.3/-0.2}$ kg·m, $10.8^{+2.2/-1.4}$ ft-lb)

Proportioning valve to bracket:

*Without ABS model; $22^{+4.4}$ N·m
 $(2.25^{+0.45}$ kg·m, $16.3^{+3.3}$ ft-lb)*

*With ABS model; 18^{+5} N·m ($1.8^{+0.5}$ kg·m,
 $13.0^{+3.6}$ ft-lb)*

13. Brake Pipe AIRBAG**A: SUPPLEMENTAL RESTRAINT SYSTEM “AIRBAG”**

Airbag system wiring harness is routed near the center brake pipe.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage Airbag system wiring harness when servicing the center brake pipe.

B: REMOVAL AND INSTALLATION**CAUTION:**

- When removing and installing the brake pipe, make sure that it is not bent.
- After installing the brake pipe and hose, bleed the air.
- After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

Brake pipe tightening torque:

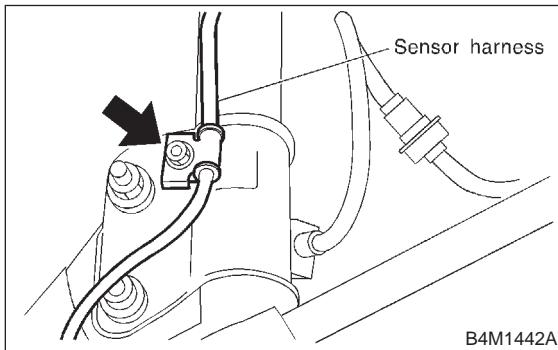
$15^{+3/-2}$ N·m ($1.5^{+0.3/-0.2}$ kg·m, $10.8^{+2.2/-1.4}$ ft-lb)

14. ABS Sensor

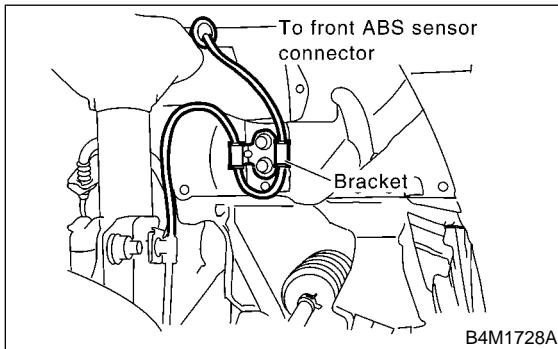
A: REMOVAL

1. FRONT ABS SENSOR

- 1) Disconnect battery ground cable.
- 2) Disconnect front ABS sensor connector located next to front strut mounting house in engine compartment.
- 3) Remove bolts which secure sensor harness to strut.



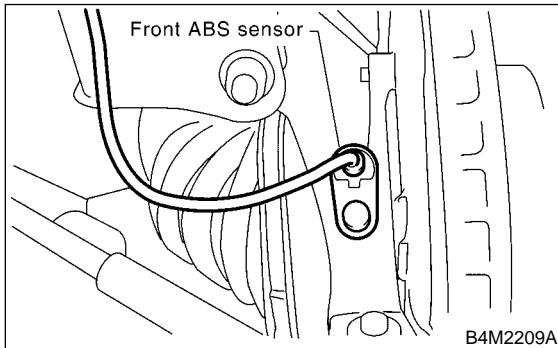
- 4) Remove bolts which secure sensor harness to body.



- 5) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

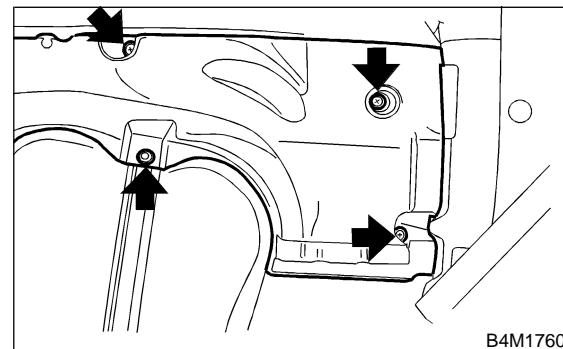
CAUTION:

- Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.
- Do not pull sensor harness during removal.

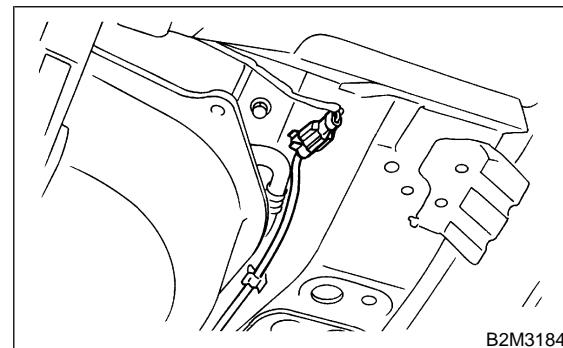


2. REAR ABS SENSOR

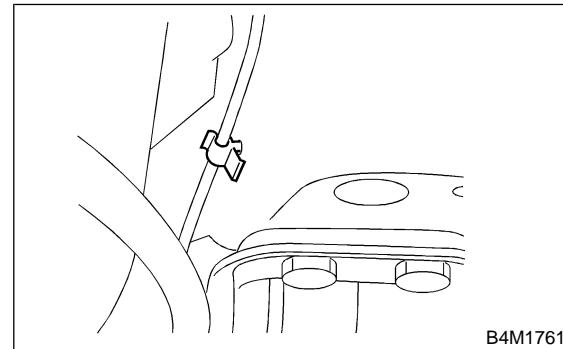
- 1) Disconnect battery ground cable.
- 2) Lift-up the vehicle.
- 3) Remove fuel tank cover.



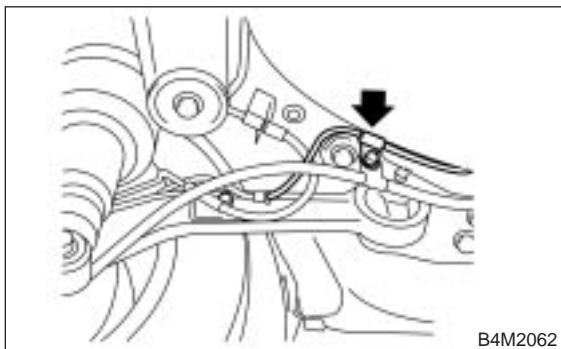
- 4) Disconnect rear ABS sensor connector.



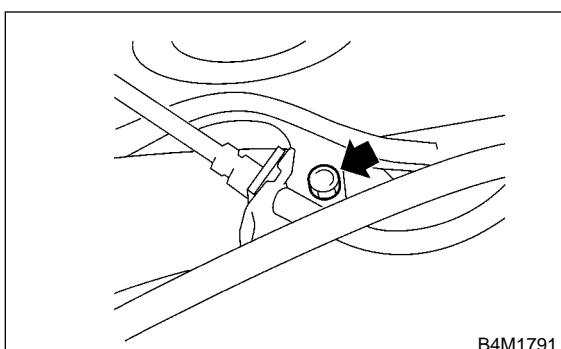
- 5) Remove rear sensor harness from clip on body side.



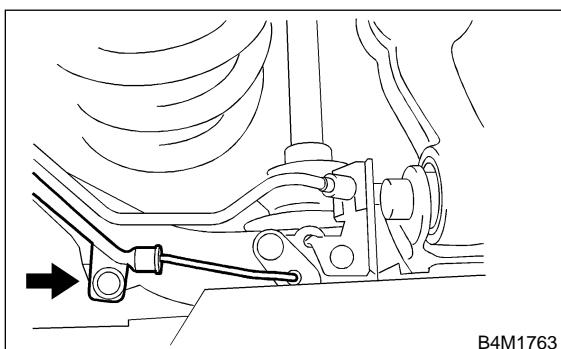
6) Remove bolts which hold rear sensor harness brackets.



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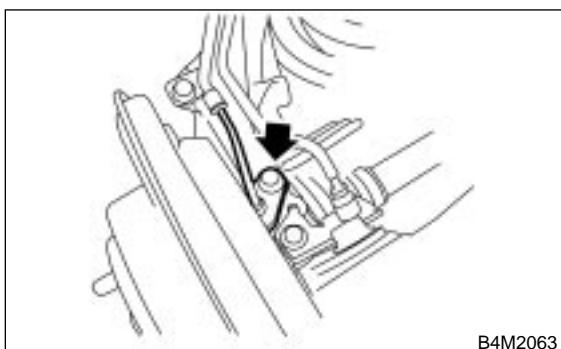


B4M1791



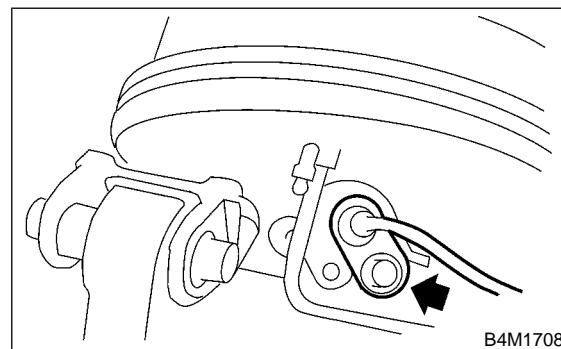
B4M1763

7) Remove rear ABS sensor from rear arm.
With disc brake model:



B4M2063

With drum brake model:



B4M1708

8) When inspecting rear tone wheel, remove rear drive shaft as rear tone wheel is unitized with BJ assembly of rear drive shaft. <Ref. to 4-2 [W3A2].>

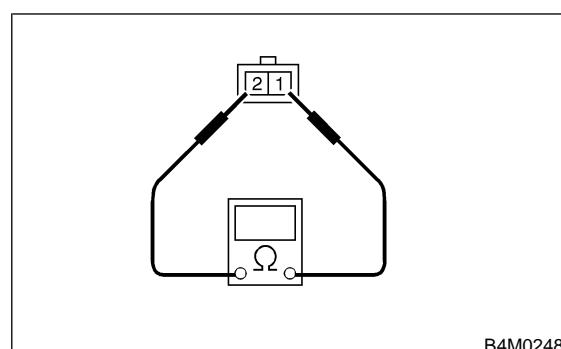
CAUTION:

- Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.
- Do not pull sensor harness during removal.

B: INSPECTION

1. ABS SENSOR

- 1) Check pole piece of ABS sensor for foreign particles or damage. If necessary, clean pole piece or replace ABS sensor.
- 2) Measure ABS sensor resistance.



B4M0248

ABS sensor	Terminal No.	Standard
Front - LH	1 and 2	1.0±0.25 kΩ
Front - RH	1 and 2	
Rear - LH	1 and 2	
Rear - RH	1 and 2	

CAUTION:
If resistance is outside the standard value, replace ABS sensor with new one.

NOTE:

Check ABS sensor cable for discontinuity. If necessary, replace with a new one.

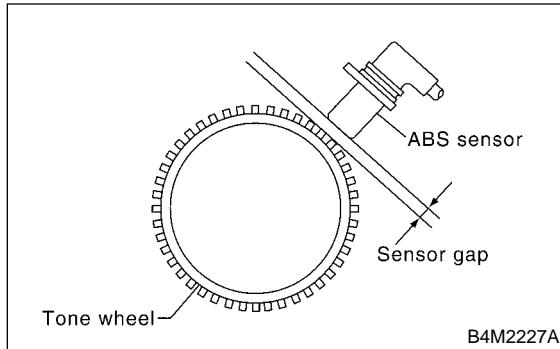
2. TONE WHEEL

1) Visually check tone wheel's teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.

NOTE:

Replace BJ assembly with new one as a single unit if there are any defects found on tone wheel as the rear tone wheel is unitized with BJ assembly of drive shaft.

2) Clearances (sensor gaps) should be measured one by one to ensure tone wheel and speed sensor are installed correctly.



ABS sensor clearance:

Front

0.3 — 0.8 mm (0.012 — 0.031 in)

Rear

0.44 — 0.94 mm (0.0173 — 0.0370 in)

NOTE:

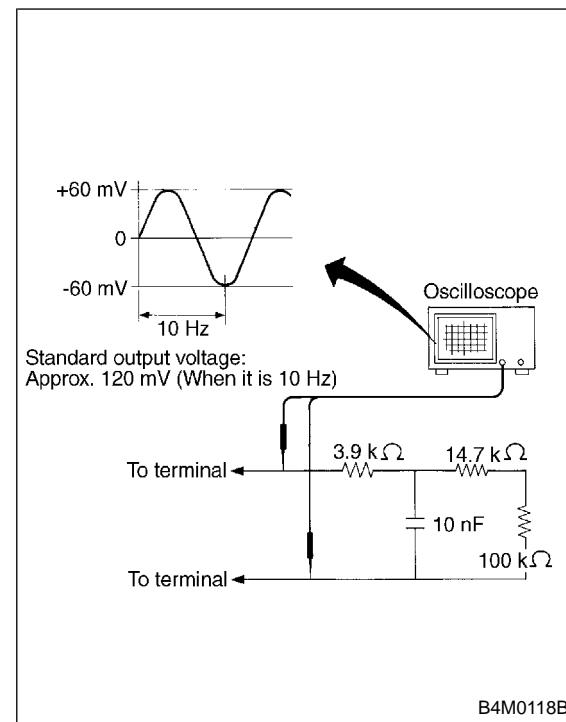
- If clearance is narrow, adjust the gap using spacer (Part No. 26755AA000).
- If clearance is wide, check the outputted voltage then replace ABS sensor or tone wheel if the outputted voltage is outside the specification.

3. OUTPUT VOLTAGE

Output voltage can be checked by the following method. Install resistor and condenser, then rotate wheel about 2.75 km/h (2 MPH) or equivalent.

NOTE:

Regarding terminal No., please refer to item 1. ABS SENSOR.

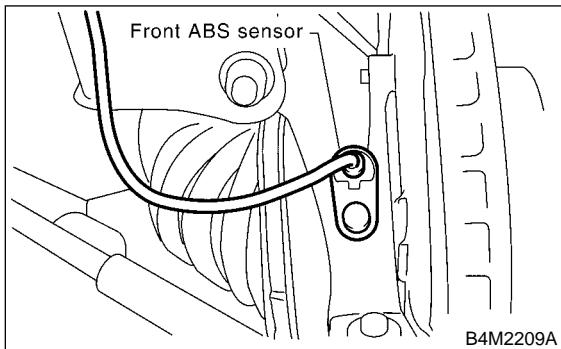


C: INSTALLATION**1. FRONT ABS SENSOR**

1) Temporarily install front ABS sensor on housing.

CAUTION:

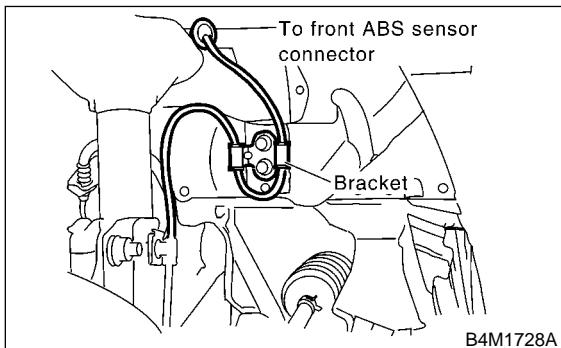
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



2) Install front ABS sensor on strut and wheel apron bracket.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft-lb}$)



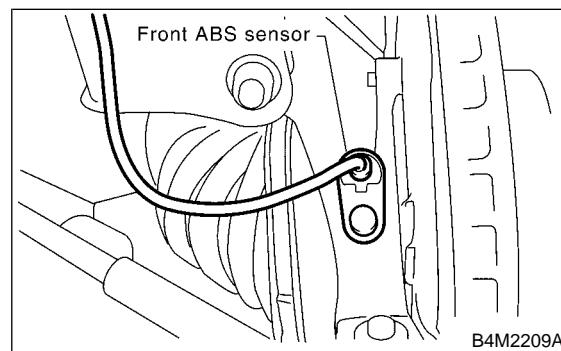
3) Place a thickness gauge between ABS sensor's and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on housing to specified torque.

ABS sensor standard clearance:

$0.3 - 0.8 \text{ mm}$ ($0.012 - 0.031 \text{ in}$)

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft-lb}$)

**CAUTION:**

Check the marks on the harness to make sure that no distortion exists.

Model	LH	RH
Except OUTBACK	Yellow	White
OUTBACK	Brown	Light blue

NOTE:

If the clearance is outside specifications, readjust.

4) After confirmation of the ABS sensor clearance, connect connector to ABS sensor.

5) Connect connector to battery ground cable.

2. REAR ABS SENSOR

- 1) Install rear drive shaft to the vehicle. <Ref. to 4-2 [W3E2].>
- 2) Temporarily install rear ABS sensor on rear arm.

CAUTION:

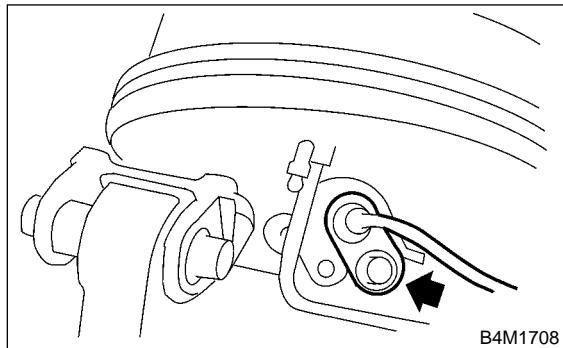
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.

With disc brake model:



B4M2063

With drum brake model:

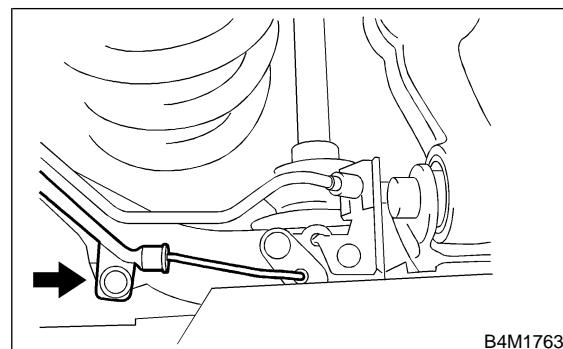


B4M1708

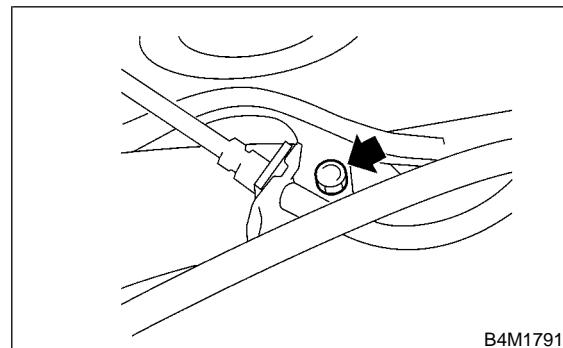
- 3) Install rear sensor harness brackets in the original positions and install harness on the clip.

Tightening torque:

$32\pm10\text{ N}\cdot\text{m}$ ($3.3\pm1.0\text{ kg}\cdot\text{m}$, $24\pm7\text{ ft}\cdot\text{lb}$)



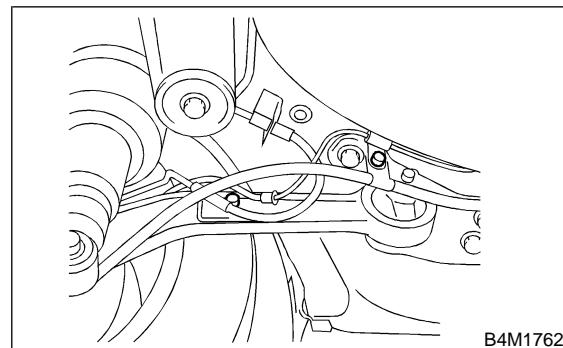
B4M1763



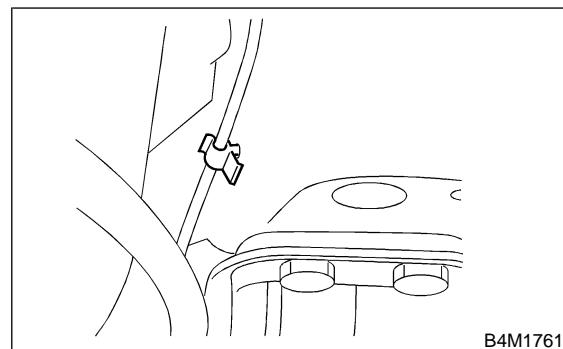
B4M1791

Tightening torque:

$32\pm10\text{ N}\cdot\text{m}$ ($3.3\pm1.0\text{ kg}\cdot\text{m}$, $24\pm7\text{ ft}\cdot\text{lb}$)



B4M1762



B4M1761

4) Place a thickness gauge between ABS sensor's and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on rear arm to specified torque.

ABS sensor standard clearance:

0.44 — 0.94 mm (0.0173 — 0.0370 in)

Tightening torque:

32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

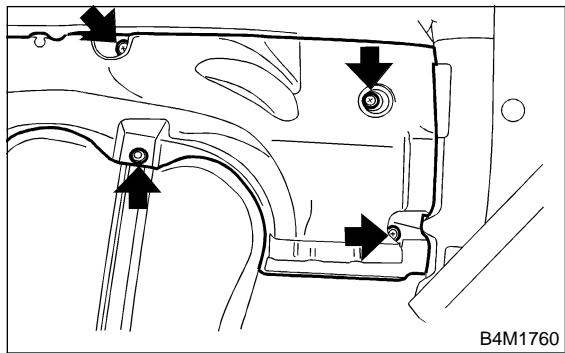
CAUTION:

Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:

If the clearance is outside specifications, readjust.

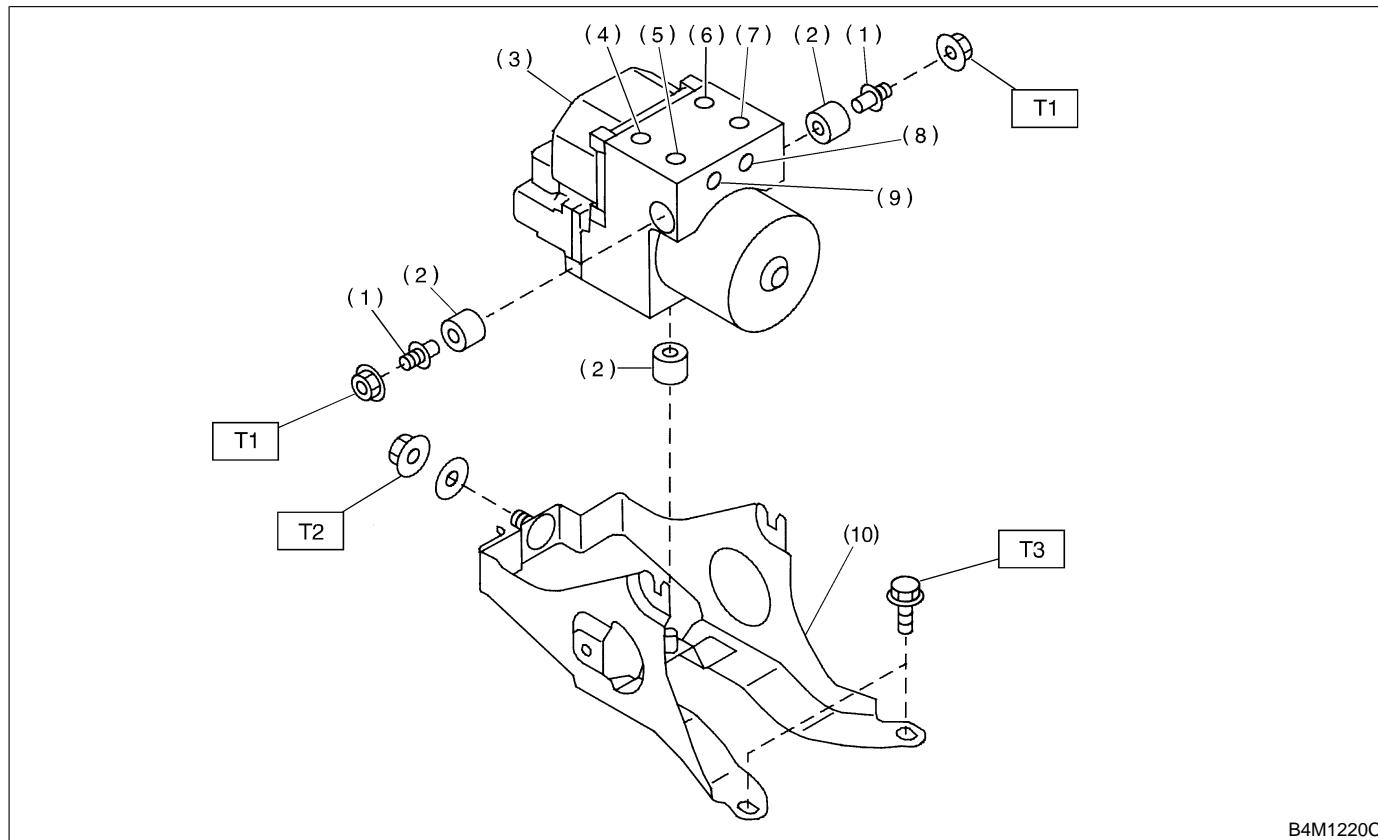
5) After confirmation of the ABS sensor clearance, connect connector to ABS sensor and install fuel tank cover.



6) Connect connector to battery ground cable.

15. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)

A: REMOVAL



- (1) Stud bolt
- (2) Damper
- (3) ABS control module and hydraulic control unit
- (4) Front-LH outlet
- (5) Secondary inlet

- (6) Front-RH outlet
- (7) Primary inlet
- (8) Rear-LH outlet
- (9) Rear-RH outlet
- (10) Bracket

Tightening torque: N·m (kg·m, ft·lb)

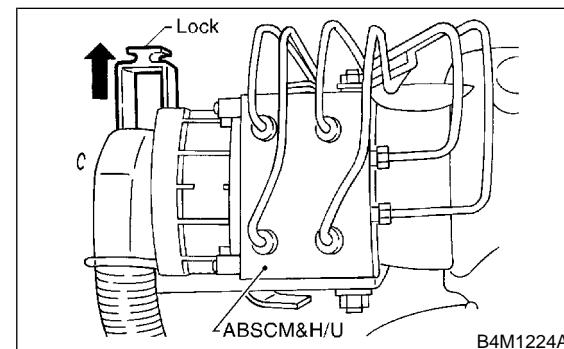
T1: 18 ± 5 (1.8±0.5, 13.0±3.6)

T2: 29 ± 7 (3.0±0.7, 21.7±5.1)

T3: 32 ± 10 (3.3±1.0, 24±7)

- 1) Disconnect ground cable from battery.
- 2) Remove air intake duct from engine compartment to facilitate removal of ABSCM&H/U.
- 3) Use an air gun to get rid of water around the ABSCM&H/U.

- 4) Pull off the lock of the ABSCM&H/U connector to remove it.



- 5) Disconnect connector from ABSCM&H/U.

CAUTION:
Be careful not to let water or other foreign matter contact the ABSCM&H/U terminal.

- 6) Unlock cable clip.

7) Disconnect brake pipes from ABSCM&H/U.

CAUTION:

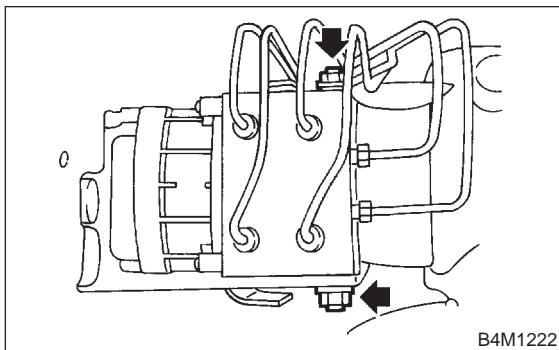
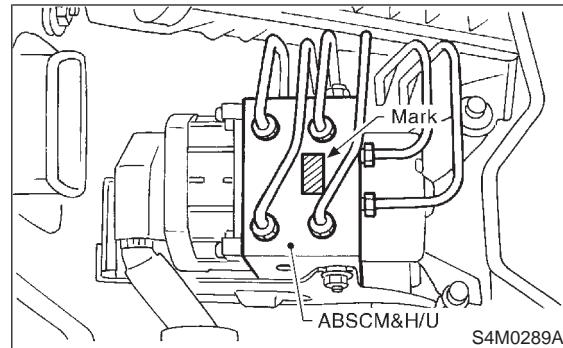
Wrap brake pipes with vinyl bag to avoid spilling brake fluid on vehicle body.

8) Remove ABSCM&H/U ground terminal from bracket.

9) Remove ABSCM&H/U from engine compartment.

CAUTION:

- ABSCM&H/U cannot be disassembled. Do not attempt to loosen bolts and nuts.
- Do not drop or bump ABSCM&H/U.
- Do not turn the ABSCM&H/U upside down or place it on its side.
- Be careful to prevent foreign particles from getting into ABSCM&H/U.
- Apply a coat of rust-preventive wax (Nippeco LT or GB) to bracket attaching bolt after tightening.
- Do not pull harness when disconnecting connector.



B: INSPECTION

1) Check connected and fixed condition of connector.

2) Check specifications of the mark with ABSCM&H/U.

Mark	Model
C5	AT (Except OUTBACK)
C6	MT (Except OUTBACK)
CE	AT (OUTBACK)
CF	MT (OUTBACK)

C: CHECKING THE HYDRAULIC UNIT ABS OPERATION

1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

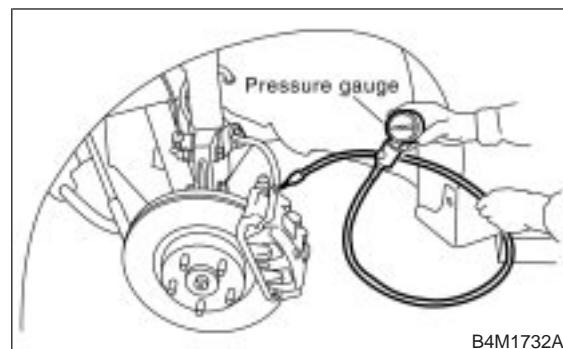
- 1) Lift-up vehicle and remove wheels.
- 2) Disconnect the air bleeder screws from the FL and FR caliper bodies.
- 3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:

- Pressure gauges used exclusively for brake fluid must be used.
- Do not employ pressure gauge previously used for transmission since the piston seal is expanded which may lead to malfunction of the brake.

NOTE:

Wrap sealing tape around the pressure gauge.



4) Bleed air from the pressure gauges.

5) Perform ABS sequence control.

<Ref. to 4-4 [W15D0].>

6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.

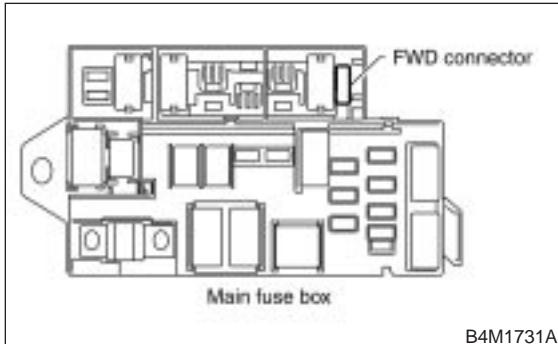
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Also check if any irregular brake pedal tightness is felt.

	Front wheel	Rear wheel
Initial value	3,432 kPa (35 kg/cm ² , 498 psi)	3,432 kPa (35 kg/cm ² , 498 psi)
When decompressed	490 kPa (5 kg/cm ² , 71 psi) or less	490 kPa (5 kg/cm ² , 71 psi) or less
When compressed	3,432 kPa (35 kg/cm ² , 498 psi) or more	3,432 kPa (35 kg/cm ² , 498 psi) or more

- 8) Remove pressure gauges from FL and FR caliper bodies.
- 9) Remove air bleeder screws from the RL and RR caliper bodies.
- 10) Connect the air bleeder screws to the FL and FR caliper bodies.
- 11) Connect two pressure gauges to the RL and RR caliper bodies.
- 12) Bleed air from the pressure gauges and the FL and FR caliper bodies.
- 13) Perform ABS sequence control.
<Ref. to 4-4 [W15D0].>
- 14) When the hydraulic unit begins to work, at first the RR side performs decompression, holding, and compression, and then the RL side performs decompression, holding, and compression.
- 15) Read values indicated on the pressure gauges and check if they meet the standard value.
- 16) After checking, remove the pressure gauges from caliper bodies.
- 17) Connect the air bleeder screws to RL and RR caliper bodies.
- 18) Bleed air from brake line.

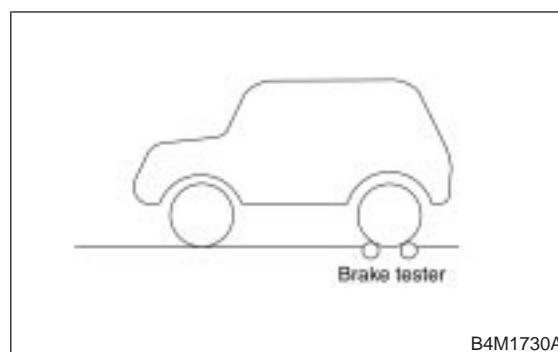
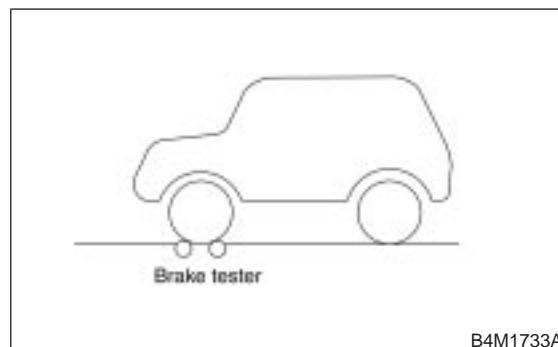
2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

- 1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the main fuse box to simulate FWD vehicles.



- 2) Prepare for operating ABS sequence control.
<Ref. to 4-4 [W15D1].> or <Ref. to 4-4 [W15D2].>

- 3) Set the front wheels or rear wheels on the brake tester and set the select lever's position at "neutral".



- 4) Operate the brake tester.
- 5) Perform ABS sequence control. <Ref. to 4-4 [W15D1].> or <Ref. to 4-4 [W15D2].>
- 6) Hydraulic unit begins to work; and check the following working sequence.

- (1) The FL wheel performs decompression, holding, and compression in sequence, and subsequently the FR wheel repeats the cycle.
- (2) The RR wheel performs decompression, holding, 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 values, when decompressed and compressed, meet the standard values.

	Front wheel	Rear wheel
Initial value	981 N (100 kg, 221 lb)	981 N (100 kg, 221 lb)
When decompressed	490 N (50 kg, 110 lb) or less	490 N (50 kg, 110 lb) or less
When compressed	981 N (100 kg, 221 lb) or more	981 N (100 kg, 221 lb) or more

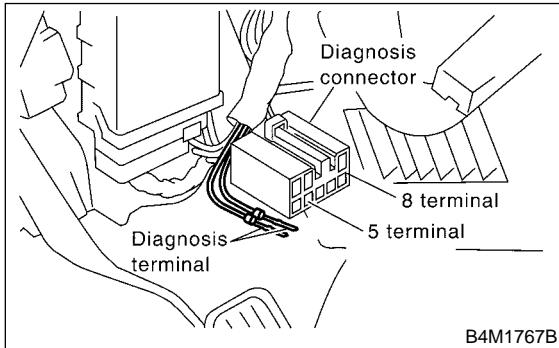
- 8) After checking, also check if any irregular brake pedal tightness is felt.

D: ABS SEQUENCE CONTROL

- 1) Under the ABS sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or pressure gauge.
- 2) ABS sequence control can be started by diagnosis connector or select monitor.

1. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR

- 1) Connect diagnosis terminals to terminals No. 5 and No. 8 of the diagnosis connector beside driver's seat heater unit.



- 2) Set the speed of all wheels at 2.75 km/h (2 MPH) or less.
- 3) Turn ignition switch OFF.
- 4) Within 0.5 seconds after the ABS warning light goes out, depress the brake pedal and hold it immediately after ignition switch is turned to ON.

CAUTION:
Do not depress the clutch pedal.

NOTE:

- When the ignition switch is set to on, the brake pedal must not be depressed.
- Engine must not operate.

- 5) After completion of ABS sequence control, turn ignition switch OFF.

2. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH SELECT MONITOR

NOTE:

- In the event of any trouble, the sequence control may not be operative. In such a case, activate the sequence control, referring to "OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR". <Ref. to 4-4 [W15D1].>
- When the diagnosis terminal is connected to the diagnosis connector, the sequence control will not operate.

- 1) Connect select monitor to data link connector under driver's seat instrument panel lower cover.
- 2) Turn ignition switch ON.
- 3) Turn select monitor switch ON.
- 4) Put select monitor to {BRAKE CONTROL} mode.
- 5) When {Function check sequence} is selected, 'ABS sequence control' will start.
- 6) The message 'Press Brake Pedal Firmly' is displayed as follows:
 - (1) When using the brake tester, depress brake pedal with braking force of 981 N (100 kg, 221 lb).
 - (2) When using the pressure gauge, depress brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kg/cm², 498 psi).

CAUTION:
Do not depress the clutch pedal.

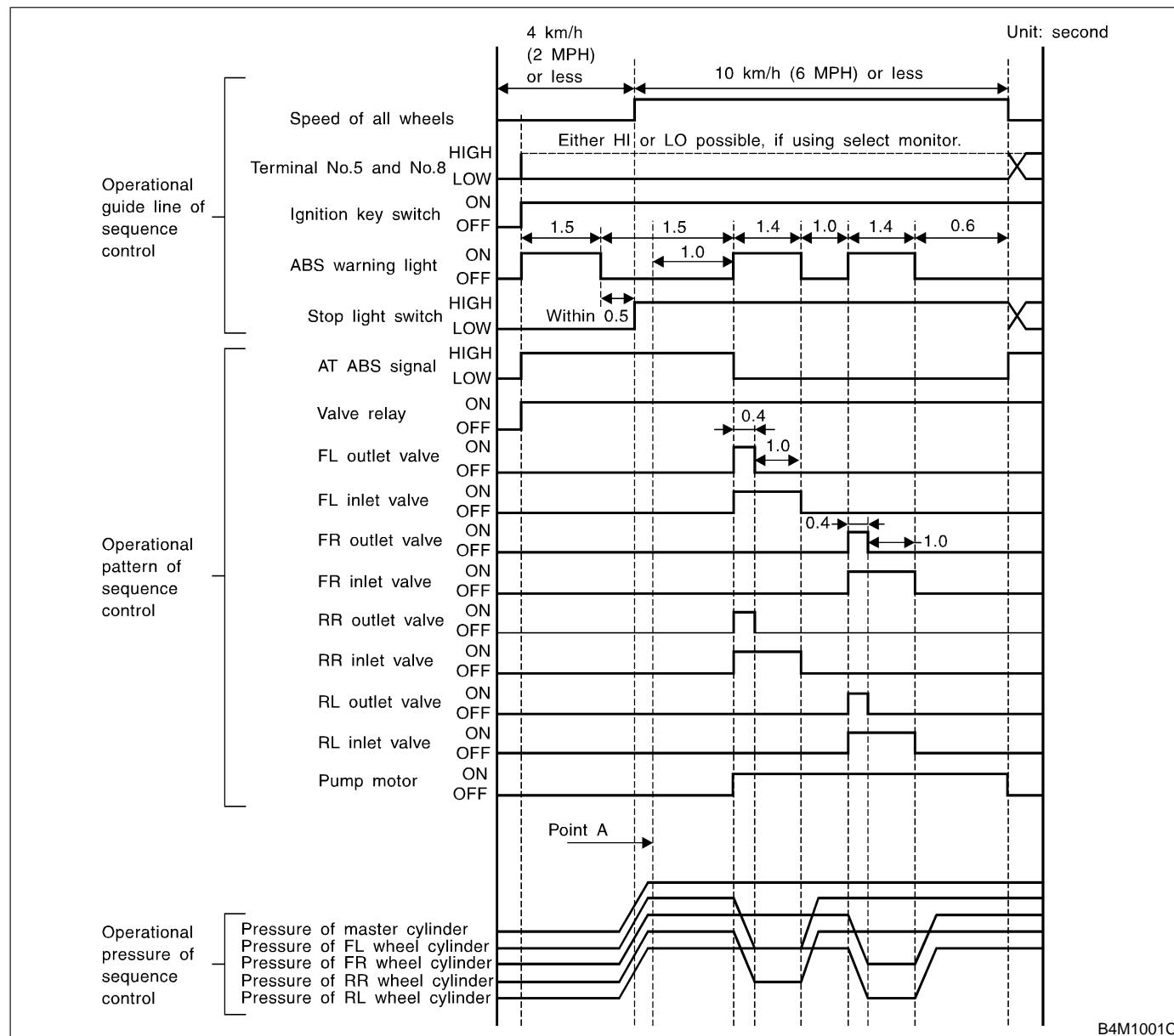
- 7) When the message "Press YES" is displayed, press YES key.
- 8) Operation points will be displayed on select monitor.

3. 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.

- 1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
- 2) When terminal No. 5 or No. 8 are separated from diagnosis terminals. (When select monitor is not used.)
- 3) When the brake pedal is released during sequence control and the braking lamp switch is set to off.
- 4) When brake pedal is depressed after ignition key is turned to ON, and before ABS warning light goes out. (When select monitor is not used.)
- 5) When brake pedal is not depressed after ignition key is turned to ON, and within 0.5 seconds after ABS warning light goes out. (When select monitor is not used.)
- 6) After completion of the sequence control.
- 7) When malfunction is detected. (When select monitor is used.)

4. CONDITIONS FOR ABS SEQUENCE CONTROL



B4M1001C

NOTE:

- When select monitor is used, control operation starts at point A. The patterns from IGN key ON to the point A show that operation is started by diagnosis connector.
- HIGH means high voltage.
- LOW means low voltage.

E: INSTALLATION

- 1) Install ABSCM&H/U.

CAUTION:

Confirm that the specifications of the ABSCM&H/U conforms to the vehicle specifications.

Tightening torque:

$18 \pm 0.5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)

- 2) Install ABSCM&H/U ground terminal to bracket.

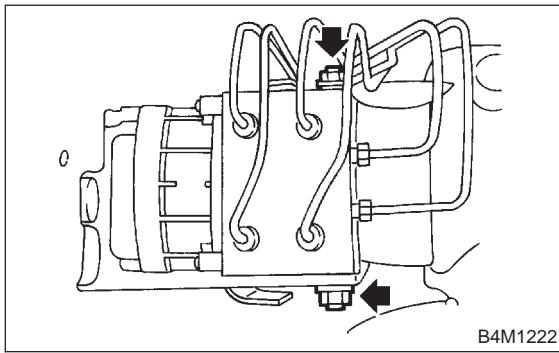
Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

- 3) Connect brake pipes to their correct ABSCM&H/U connections.

Tightening torque:

$15^{+3/-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3/-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2/-1.4} \text{ ft}\cdot\text{lb}$)



- 4) Using cable clip, secure ABSCM&H/U harness to bracket.

- 5) Connect connector to ABSCM&H/U.

CAUTION:

- Be sure to remove all foreign matter from inside the connector before connecting.
- Ensure that the ABSCM&H/U connector is securely locked.

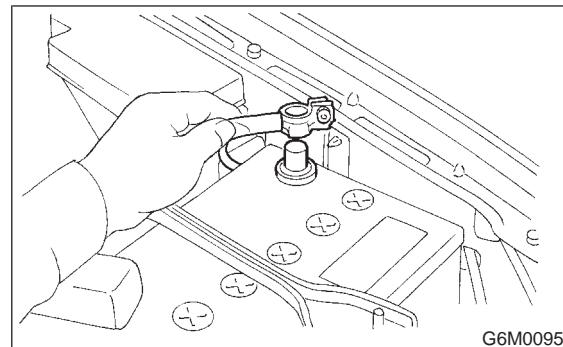
- 6) Install air intake duct.

- 7) Connect ground cable to battery.

- 8) Bleed air from the brake system.

16. G Sensor**A: REMOVAL AND INSTALLATION**

- 1) Disconnect battery ground cable.



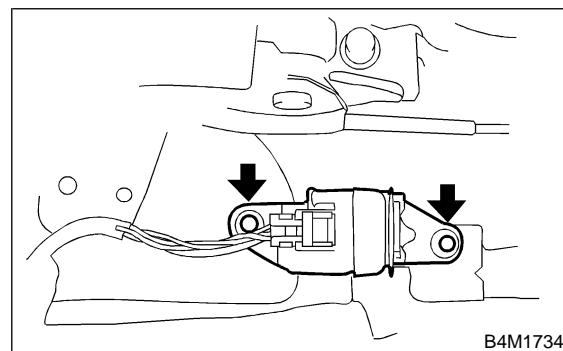
- 2) Remove console cover. <Ref. to 5-4 [W1A0].>

- 3) Disconnect connector from G sensor.

- 4) Remove G sensor from body.

CAUTION:

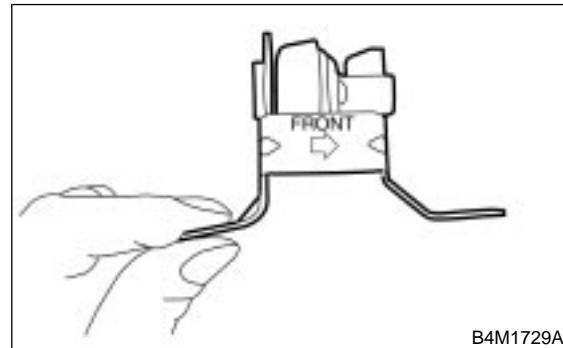
Do not drop or bump G sensor.



- 5) To install, reverse the removal procedure.

NOTE:

Do not install G sensor in the wrong direction. There is an arrow mark on the sensor showing which side faces the vehicle front.



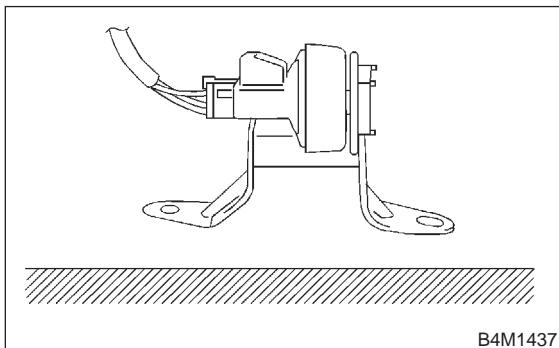
B: INSPECTION WITH CIRCUIT TESTER

16B1 : CHECK G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between G sensor connector terminals.

Connector & terminal:

(R70) No. 2 (+) — No. 3 (-)

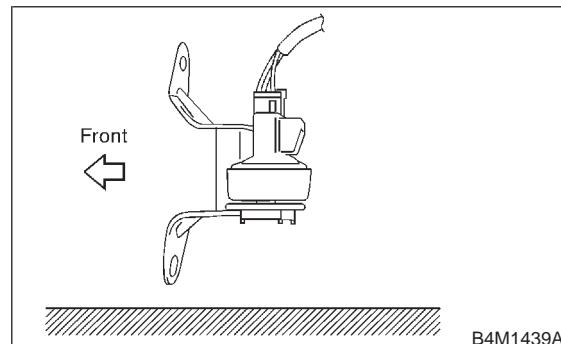


16B3 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal:

(R70) No. 2 (+) — No. 3 (-)



CHECK : Is the voltage 0.7 ± 0.2 V when G sensor is inclined backwards to 90°?

YES : G sensor is normal.

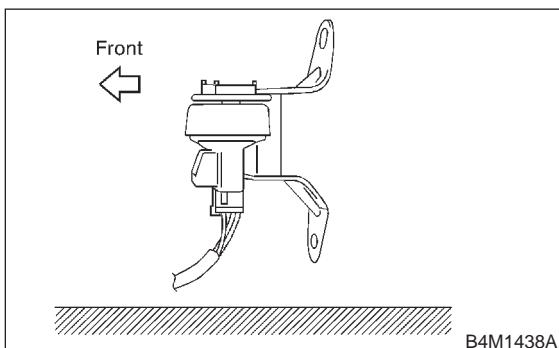
NO : Replace G sensor.

16B2 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal:

(R70) No. 2 (+) — No. 3 (-)



CHECK : Is the voltage 3.9 ± 0.2 V when G sensor is inclined forwards to 90°?

YES : Go to step 16B3.

NO : Replace G sensor.

C: INSPECTION WITH SELECT MONITOR

16C1 : CHECK G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Connect select monitor connector to data link connector.
- 3) Turn select monitor into {BRAKE CONTROL} mode.
- 4) Set the display in the {Current Data Display & Save} mode.
- 5) Read the G sensor output voltage.

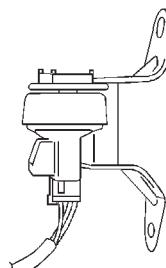
CHECK : *Is the indicated reading 2.3 ± 0.2 V when the vehicle is in horizontal position?*

YES : Go to step 16C2.

NO : Replace G sensor.

16C2 : CHECK G SENSOR.

- 1) Remove console box.
- 2) Remove G sensor from vehicle. (Do not disconnect connector.)
- 3) Read the select monitor display.



B4M1438A

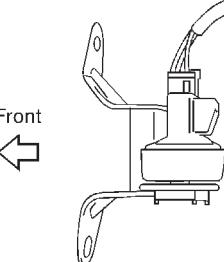
CHECK : *Is the indicated reading 0.7 ± 0.2 V when G sensor is inclined backwards to 90°?*

YES : Go to step 16C3.

NO : Replace G sensor.

16C3 : CHECK G SENSOR.

Read the select monitor display.



B4M1439A

CHECK : *Is the indicated reading 3.9 ± 0.2 V when G sensor is inclined forwards to 90°?*

YES : G sensor is normal.

NO : Replace G sensor.

1. Entire Brake System

	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 the air.
	(3) Excessively wide shoe clearance	Adjust the clearance.
	(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
	(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
	(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
	(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
	(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
	(5) Deformed back plate	Correct or replace.
	(6) Improper tire inflation	Inflate to correct pressure.
	(7) Disordered wheel alignment	Adjust alignment.
	(8) Loosened back plate or the support installing bolts	Retighten.
	(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
	(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
	(11) Uneven effect 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 the 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) Improperly adjusted shoe clearance	Adjust.
	(5) Improper lining contact or worn lining	Correct 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	Correct or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Excessively narrow shoe clearance	Adjust the clearance.
	(7) Improper disc caliper operation	Correct or replace.
	(8) Improper adjusted wheel bearing	Adjust or replace.
5. Brake noise (1) (creak sound)	(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
	(2) Worn lining	Replace the shoe assembly or pad.
	(3) Loosened back plate or the support installing bolts	Retighten.
	(4) Loose wheel bearing	Retighten to normal tightening torque.
	(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.
6. Brake noise (2) (hissing sound)	(1) Worn lining	Replace the shoe assembly or pad.
	(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
	(3) Loose or bent drum or rotor	Retighten or replace.

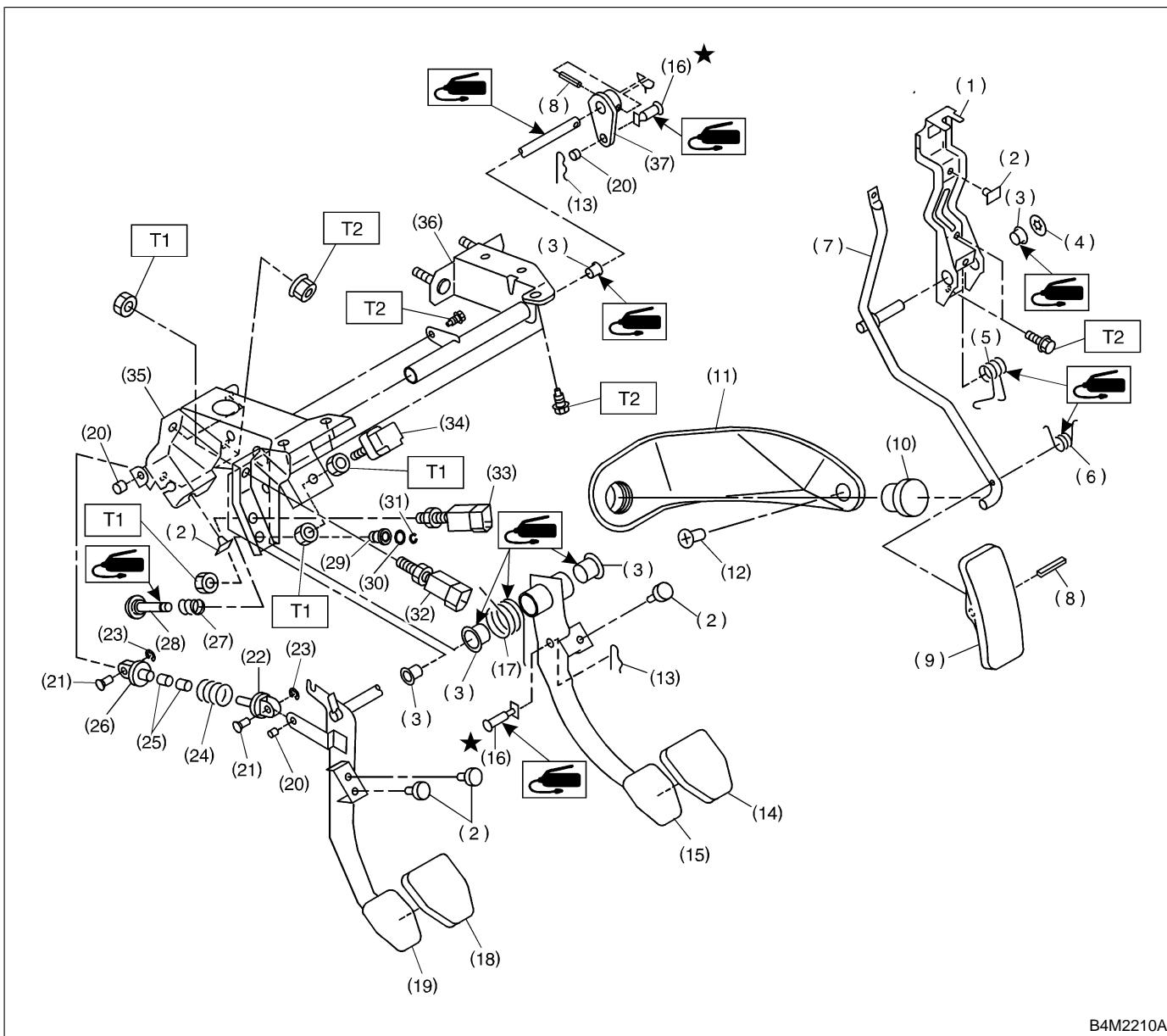
	Trouble and possible cause	Corrective action
7. Brake noise (3) (click sound)	In the case of the disc brake: (1) Excessively worn pad or the support	Replace the pad or the support.
	In the case of the drum brake: (1) Excessively worn shoe ridge	Replace the back plate.
	(2) Lack of oil on the shoe ridge surface and anchor	Add more grease.

1. Pedal System

Brake pedal	Free play		1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]
Clutch pedal	Free play	At clutch pedal pad	4 — 13 mm (0.16 — 0.51 in)
	Full stroke	At clutch pedal pad	130 — 135 mm (5.12 — 5.31 in)
Accelerator pedal	Free play	At pedal pad	1 — 4 mm (0.04 — 0.16 in)
	Stroke	At pedal pad	50 — 55 mm (1.97 — 2.17 in)

1. Pedal

A: MT MODEL

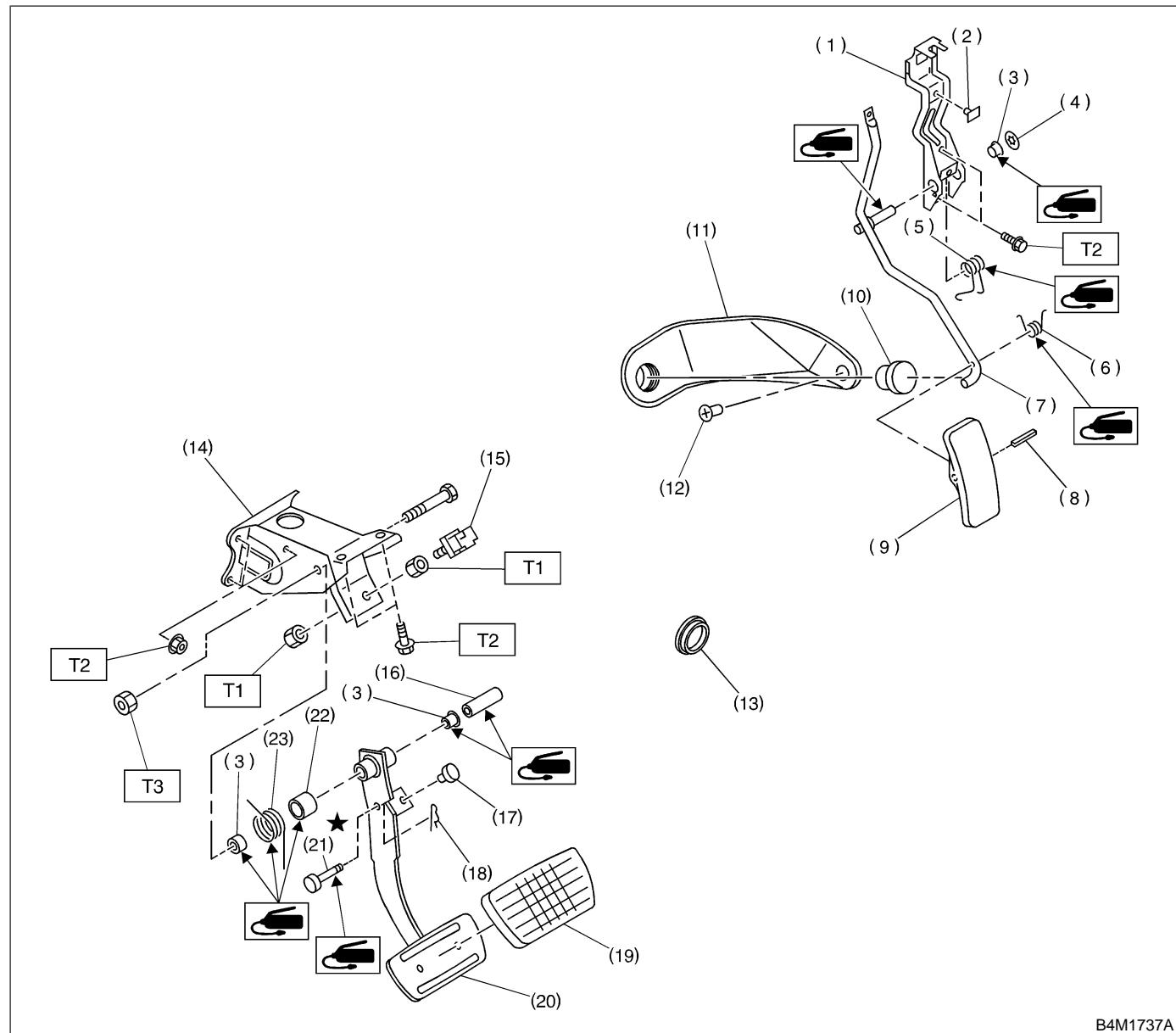


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(1) Accelerator bracket	(16) Clevis pin	(31) Clip
(2) Stopper	(17) Brake pedal spring	(32) Clutch switch (Starter interlock)
(3) Bushing	(18) Clutch pedal pad	(33) Clutch switch (With cruise control)
(4) Clip	(19) Clutch pedal	(34) Stop light switch
(5) Accelerator spring	(20) Bushing C	(35) Pedal bracket
(6) Accelerator pedal spring	(21) Clutch clevis pin	(36) Clutch master cylinder bracket
(7) Accelerator pedal lever	(22) Assist rod A	(37) Lever
(8) Spring pin	(23) Clip	
(9) Accelerator pedal	(24) Assist spring	
(10) Accelerator stopper	(25) Assist bushing	
(11) Accelerator plate	(26) Assist rod B	
(12) Clip	(27) Spring S	
(13) Snap pin	(28) Rod S	
(14) Brake pedal pad	(29) Bushing S	
(15) Brake pedal	(30) O-ring	

Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 2 (0.8±0.2, 5.8±1.4)****T2: 18 ± 5 (1.8±0.5, 13.0±3.6)**

B: AT MODEL



B4M1737A

(1) Accelerator bracket	(11) Accelerator plate	(21) Clevis pin
(2) Stopper	(12) Clip	(22) Brake spacer
(3) Bushing	(13) Plug	(23) Brake pedal spring
(4) Clip	(14) Pedal bracket	
(5) Accelerator spring	(15) Stop light switch	
(6) Accelerator pedal spring	(16) Spacer	
(7) Accelerator pedal lever	(17) Stopper	
(8) Spring pin	(18) Snap pin	
(9) Accelerator pedal	(19) Brake pedal pad	
(10) Accelerator stopper	(20) Brake pedal	

Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 2 (0.8±0.2, 5.8±1.4)****T2: 18 ± 5 (1.8±0.5, 13.0±3.6)****T3: 29 ± 7 (3.0±0.7, 21.7±5.1)**

1. Pedal and Accelerator Pedal

A: ON-CAR SERVICE

1. BRAKE PEDAL

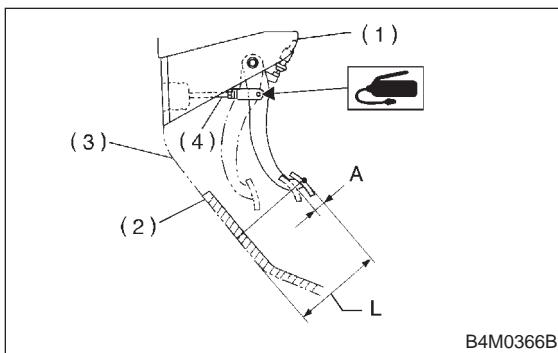
- 1) Check position of pedal pad.

Pedal height: L

148 mm (5.83 in)

Brake pedal free play: A

1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]



- (1) Stop light switch
- (2) Mat
- (3) Toe board
- (4) Brake booster operating rod

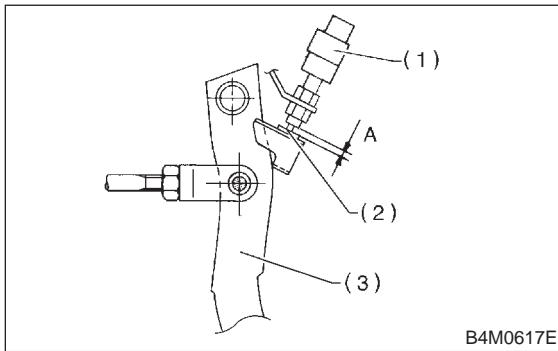
- 2) If it is not in specified value, adjust it by adjusting brake booster operating rod length.
- 3) Measure the clearance between threaded end of stop light switch and stopper.

CAUTION:

Be careful not to rotate stop light switch.

Stop light switch clearance: A

0.3 mm (0.012 in)



- (1) Stop light switch
- (2) Stopper
- (3) Brake pedal

- 4) If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:

Be careful not to rotate stop light switch.

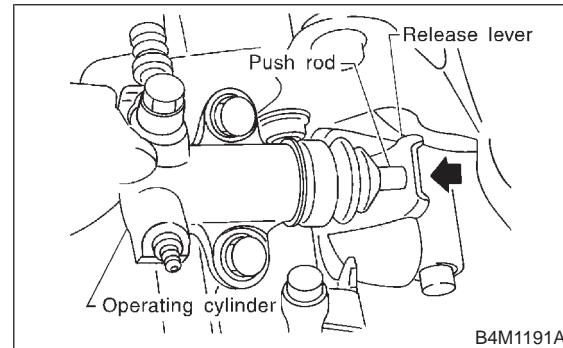
Stop light switch lock nut tightening torque:

8 ± 2 N·m (0.8±0.2 kg·m, 5.8±1.4 ft·lb)

- 5) Apply grease to operating rod connecting pin to prevent it from wearing.

2. CLUTCH PEDAL

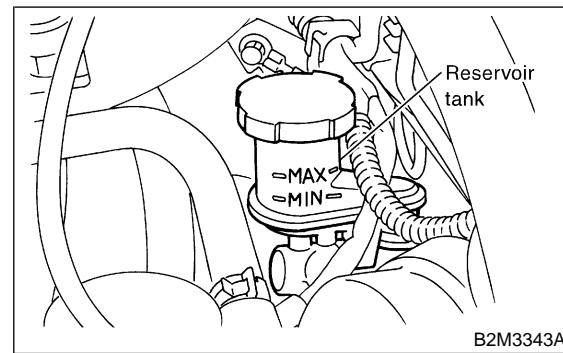
- 1) Push release fork until operating cylinder push rod retracts. Check that clutch fluid level in reservoir tank increases.



- 2) If clutch fluid level increases, hydraulic clutch play is correct.
- 3) If clutch fluid level does not increase or push rod does not retract, clutch pedal must be adjusted. <Ref. to 4-5 [W1F1].>
- 4) Check the fluid level on the outside of the clutch master cylinder tank. If the level is below "MIN", add clutch fluid to bring it up to "MAX".

Recommended clutch fluid:

**FMVSS No. 116, fresh DOT 3 or DOT 4
brake fluid**



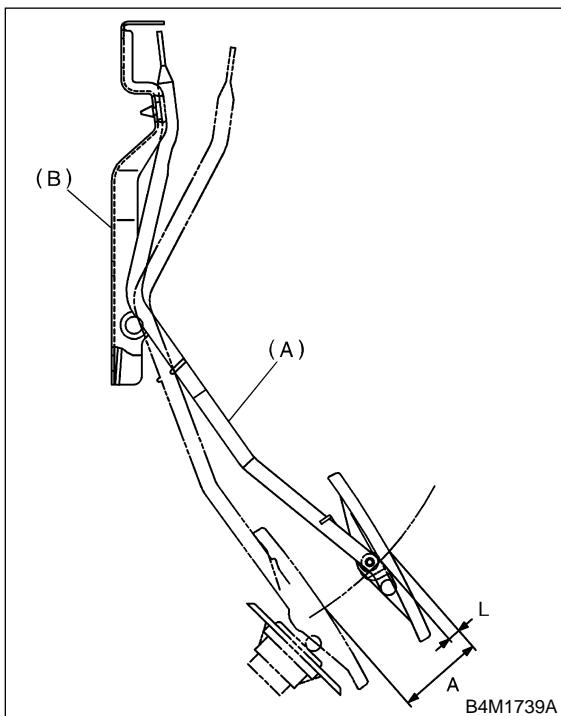
3. ACCELERATOR PEDAL

Check pedal stroke and free play by operating accelerator pedal by hand.

If it is not within specified value, adjust it by turning nut connecting accelerator cable to throttle body.

Free play at pedal pad: L
 $1 - 4 \text{ mm (0.04 - 0.16 in)}$

Stroke at pedal pad: A
 $50 - 55 \text{ mm (1.97 - 2.17 in)}$



(A) Accelerator pedal
(B) Accelerator pedal bracket

Accelerator cable lock nut tightening torque:
 $14 \pm 4 \text{ N}\cdot\text{m (1.4} \pm 0.4 \text{ kg}\cdot\text{m, 10.1} \pm 2.9 \text{ ft}\cdot\text{lb)}$

B: REMOVAL

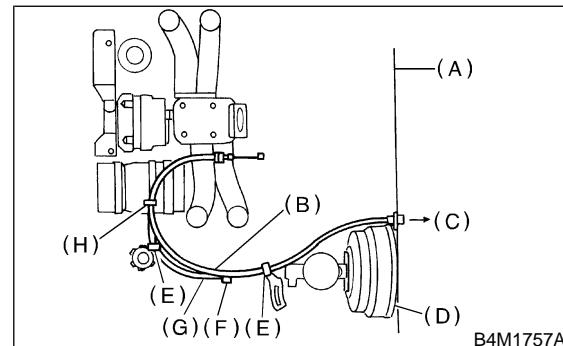
1. ACCELERATOR PEDAL

- 1) Disconnect ground cable from battery.
- 2) Remove lock nut from accelerator cable bracket.
- 3) Separate accelerator cable from bracket.
- 4) Remove accelerator cable end from throttle cam.
- 5) Disconnect accelerator cable from throttle body.

CAUTION:

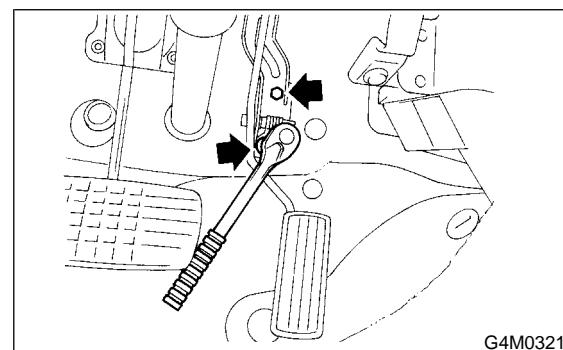
Be careful not to kink accelerator cable.

- 6) Remove clip inside engine compartment.



(A) Toe board
(B) Accelerator cable (With A/C)
(C) To accelerator cable
(D) Brake booster
(E) Clip
(F) Clip (Only model without A/C)
(G) Accelerator cable (Without A/C)
(H) Clip (Only model with A/C)

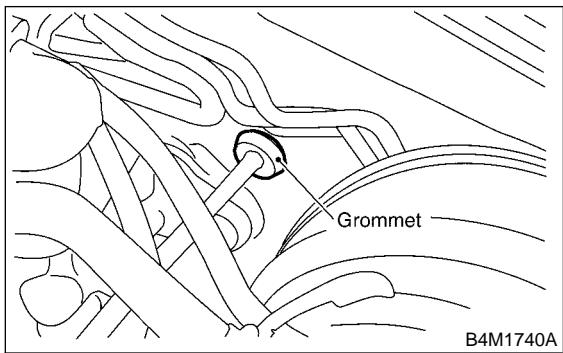
- 7) Remove instrument panel lower cover from instrument panel, and connector.
- 8) Remove brake and clutch pedal bracket. (MT model) <Ref. to 4-5 [W1B2].>
- 9) Remove accelerator pedal connecting bolt from accelerator pedal bracket.



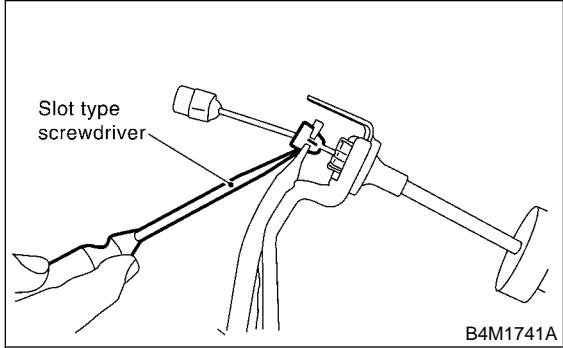
10) Disconnect grommet from toe board.

NOTE:

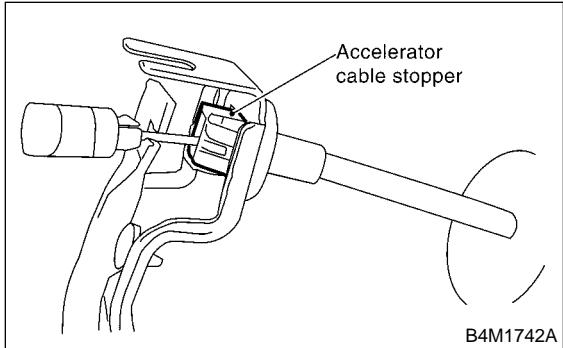
From inside compartment, push grommet into hole.



11) Pull out the cable from the toe board hole.
 12) Disconnect accelerator cable bushing from accelerator pedal lever.



13) Disconnect accelerator cable stopper from bracket.

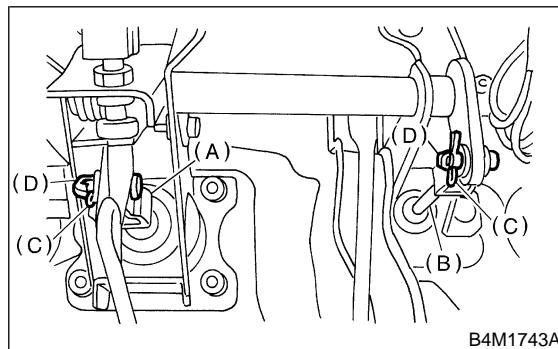


14) Separate accelerator cable and bracket.

2. BRAKE AND CLUTCH PEDAL (MT MODEL)

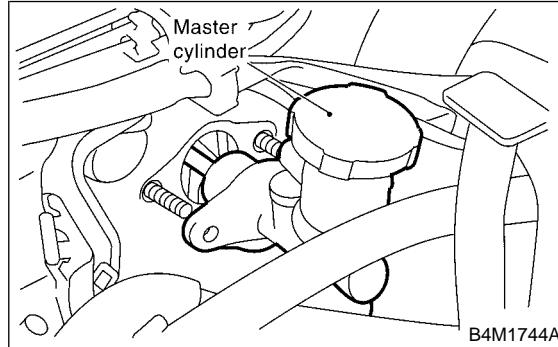
- 1) Remove steering column. <Ref. to 4-3 [W2A0].>
- 2) Disconnect connectors from stop light and clutch switches.
- 3) Remove snap pins which secure lever to push rod and operating rod.

4) Remove clevis pins which secure lever to push rod and operating rod.



(A) Operating rod
 (B) Push rod
 (C) Snap pin
 (D) Clevis pin

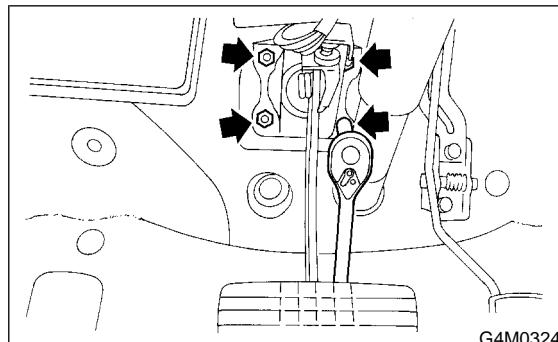
5) Remove nut which secures clutch master cylinder.



6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

3. BRAKE PEDAL (AT MODEL)

- 1) Disconnect ground cable from battery.
- 2) Remove instrument panel lower cover from instrument panel.
- 3) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect stop light switch connector.
- 4) Remove two bolts and four nuts which secure brake pedal to pedal.



C: INSPECTION**1. BRAKE AND CLUTCH PEDALS**

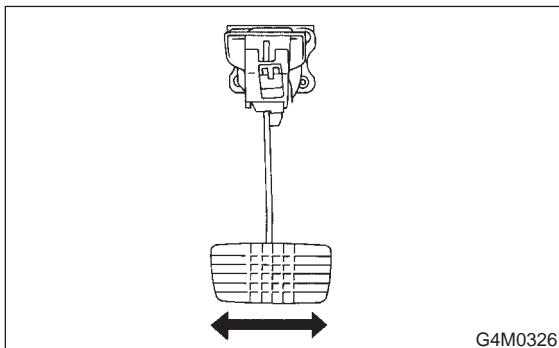
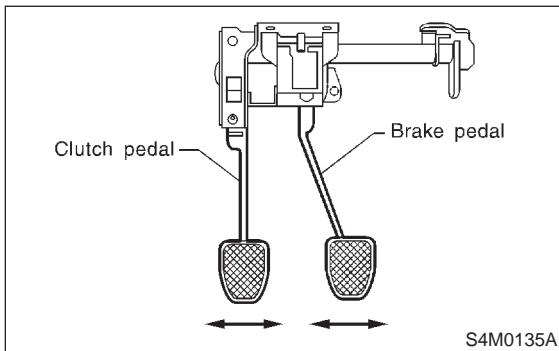
Move brake and clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kg, 2 lb) to ensure pedal deflection is in specified range.

CAUTION:

If excessive deflection is noted, replace bushings with new ones.

Deflection of brake and clutch pedal:**Service limit**

5.0 mm (0.197 in) or less

**2. ACCELERATOR PEDAL**

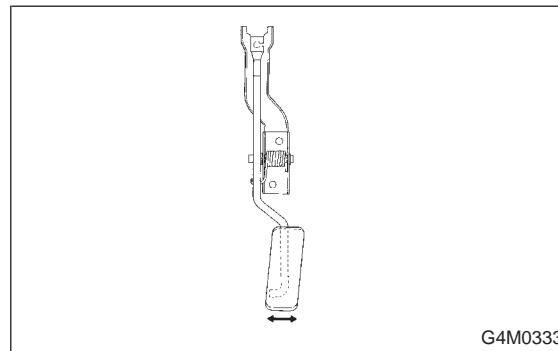
Lightly move pedal pad in lateral the direction to ensure pedal deflection is in specified range.

CAUTION:

If excessive deflection is noted, replace bushing and clip with new ones.

Deflection of accelerator pedal:**Service limit**

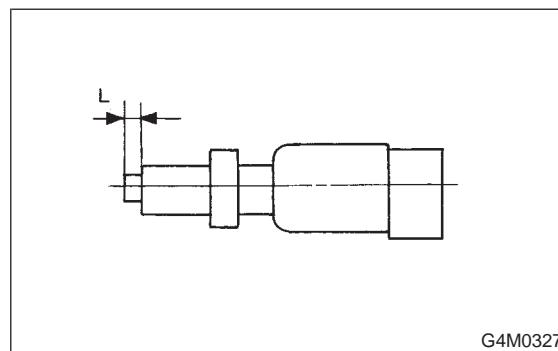
5.0 mm (0.197 in) or less

**3. STOP LIGHT SWITCH**

If stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L

$2^{+1.5}/_{-0}$ mm (0.079 $^{+0.059}/_{-0}$ in)



D: ASSEMBLY

1. BRAKE AND CLUTCH PEDALS

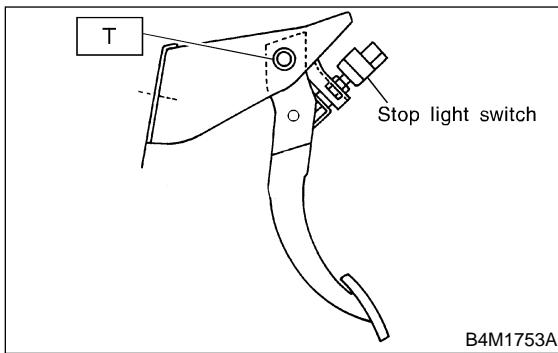
- 1) Attach stop light switch, etc. to pedal bracket temporarily.
- 2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
- 3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring and clutch pedal effort reducing spring (vehicle with hill holder), and then install pedal bolt.

NOTE:

Clean up inside of bushings and apply grease before installing spacer.

Tightening torque:

T: $29 \pm 7 \text{ N}\cdot\text{m}$ ($3.0 \pm 0.7 \text{ kg}\cdot\text{m}$, $21.7 \pm 5.1 \text{ ft}\cdot\text{lb}$)



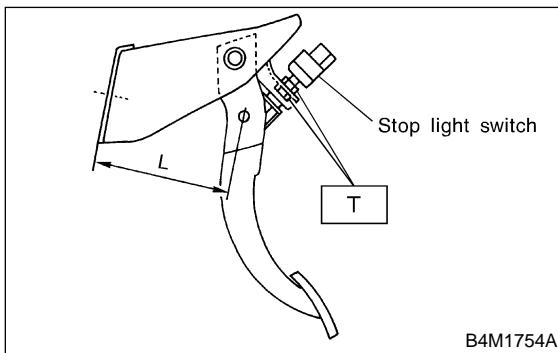
- 4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L

125.9 mm (4.96 in)

Tightening torque:

T: $8 \pm 2 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.8 \pm 1.4 \text{ ft}\cdot\text{lb}$)



2. ACCELERATOR PEDAL

Clean and apply grease to spacer and inside bore of accelerator pedal. Install accelerator pedal onto pedal bracket.

E: INSTALLATION

- 1) Installation is in the reverse order of removal procedures.

CAUTION:

- If cable clamp is damaged, replace it with a new one.
- Never fail to cover outer cable end with boot.
- Be careful not to kink accelerator cable.
- Always use new clevis pins.

- 2) Adjustment of clutch pedal <Ref. to 4-5 [W1F1].>

- 3) Adjustment after pedal installation <Ref. to 4-5 [W1A0].>

F: ADJUSTMENT

1. CLUTCH PEDAL

- 1) Turn cruise control clutch switch lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:

Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

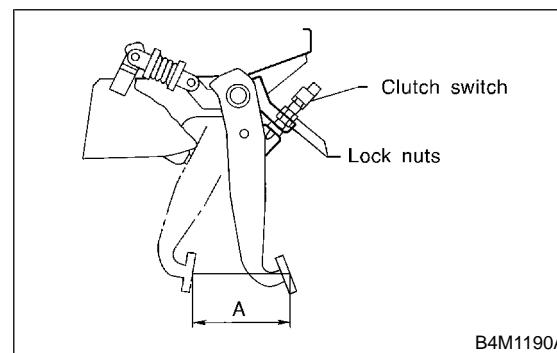
NOTE:

If lock nuts cannot adjust clutch pedal full stroke length to specifications, turn master cylinder push rod to adjust it.

**Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)**

Tightening torque (Clutch switch lock nut):

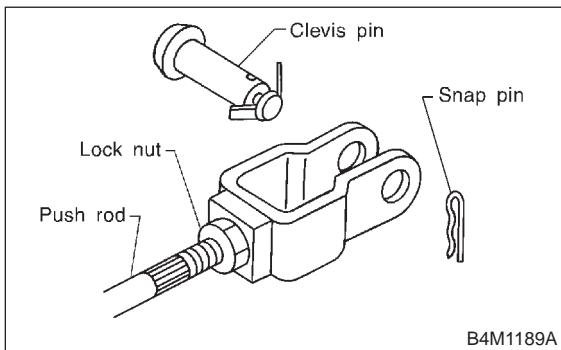
$8 \pm 2 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.8 \pm 1.4 \text{ ft}\cdot\text{lb}$)



2) Turn master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

Tightening torque (Push rod lock nut):

$8\pm2\text{ N}\cdot\text{m}$ ($0.8\pm0.2\text{ kg}\cdot\text{m}$, $5.8\pm1.4\text{ ft-lb}$)



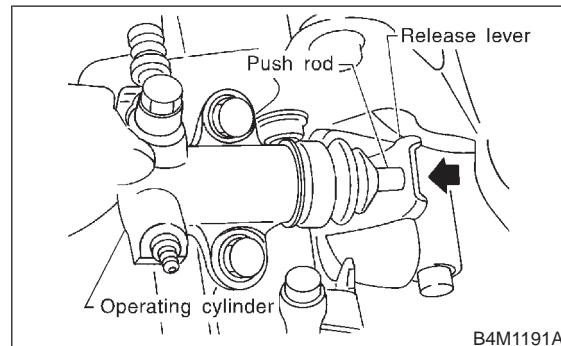
3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to 2-10 [W2A0].>
 4) Measure clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:

130 — 135 mm (5.12 — 5.31 in)

5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

6) Push release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace master cylinder with new one. <Ref. to 2-10 [W600].>



1. Pedal System and Control Cables

Trouble	Corrective action
Excessively worn brake pedal pad	Replace.
Failure of accelerator pedals to operate	Connect cables correctly.
Stop light switch does not light up.	Adjust position of stop light switch.
Stop light switch is not smooth and/or stroke is not correct.	Replace.
Insufficient pedal play	Adjust pedal play.
Clutch and/or brake pedal free play insufficient	Adjust pedal free play.
Maladjustment of brake pedal or booster push rod	Inspect and adjust.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

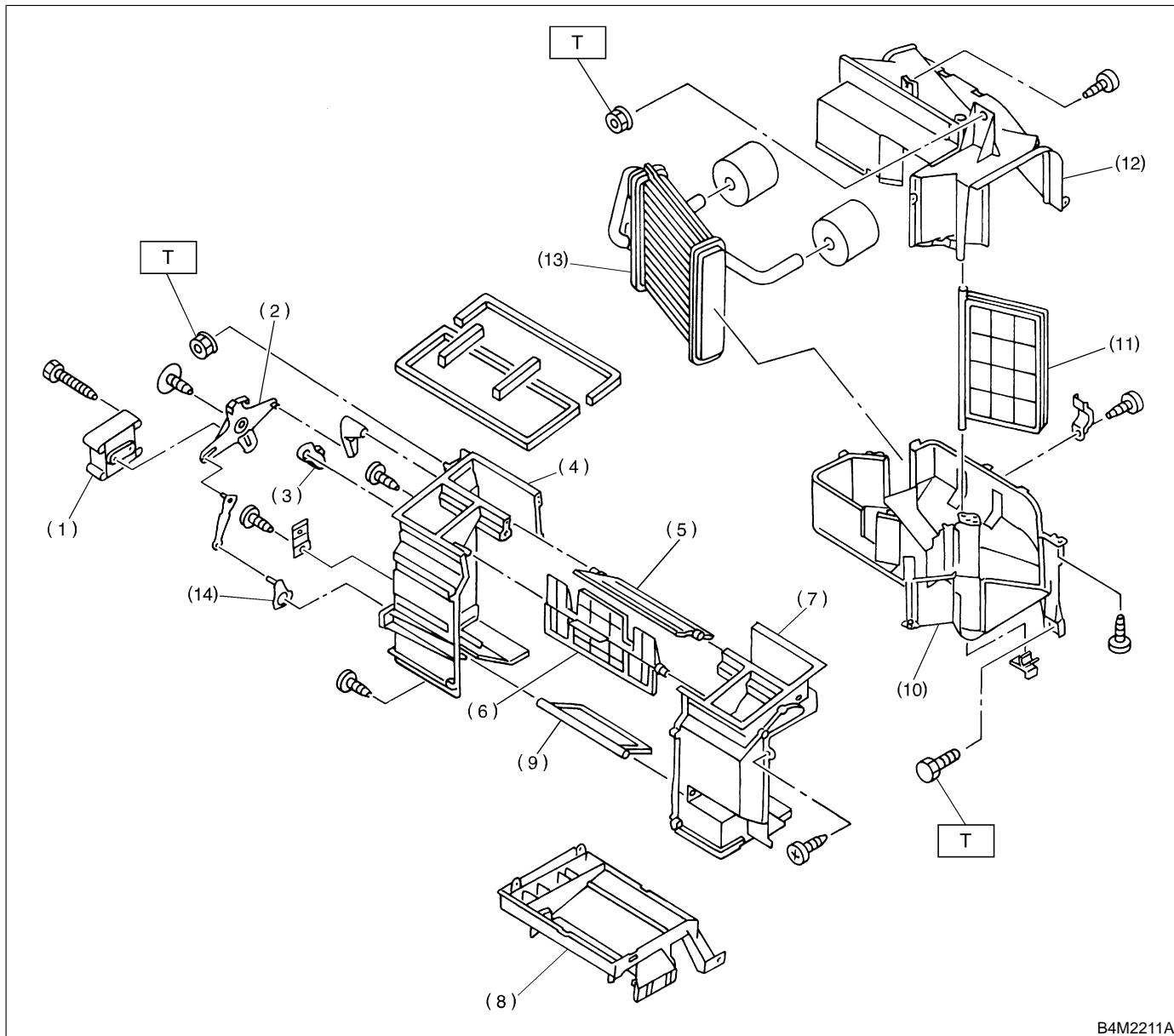
MEMO:

1. Specifications

A: HEATER SYSTEM

Item	Specifications		Condition						
Heating capacity	5.0 kW (4,300 kcal/h, 17,062 BTU/h) or more		<ul style="list-style-type: none"> ● Mode selector switch: HEAT ● Temperature control switch: FULL HOT ● Temperature difference between hot water and inlet air: 65°C (149°F) ● Hot water flow rate: 360 ℥ (95.1 US gal, 79.2 Imp gal)/h 						
Air flow rate	300 m ³ (10,593 cu ft)/h		Heat mode (FRESH), FULL HOT at 12.5 V						
Max air flow rate	500 m ³ (17,655 cu ft)/h		<ul style="list-style-type: none"> ● Temperature control switch: FULL COLD ● Blower fan speed: 4th position ● Mode selector lever: RECIRC 						
Heater core size (height × length × width)	193.5 × 152 × 35.0 mm (7.62 × 5.98 × 1.378 in)		—						
Blower motor	<table border="1"> <tr> <td>Type</td> <td>Magnet motor 220 W or less</td> <td>at 12 V</td> </tr> <tr> <td>Fan type and size (diameter × width)</td> <td>Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)</td> <td>—</td> </tr> </table>	Type	Magnet motor 220 W or less	at 12 V	Fan type and size (diameter × width)	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—		
Type	Magnet motor 220 W or less	at 12 V							
Fan type and size (diameter × width)	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—							

1. Heater Unit



B4M2211A

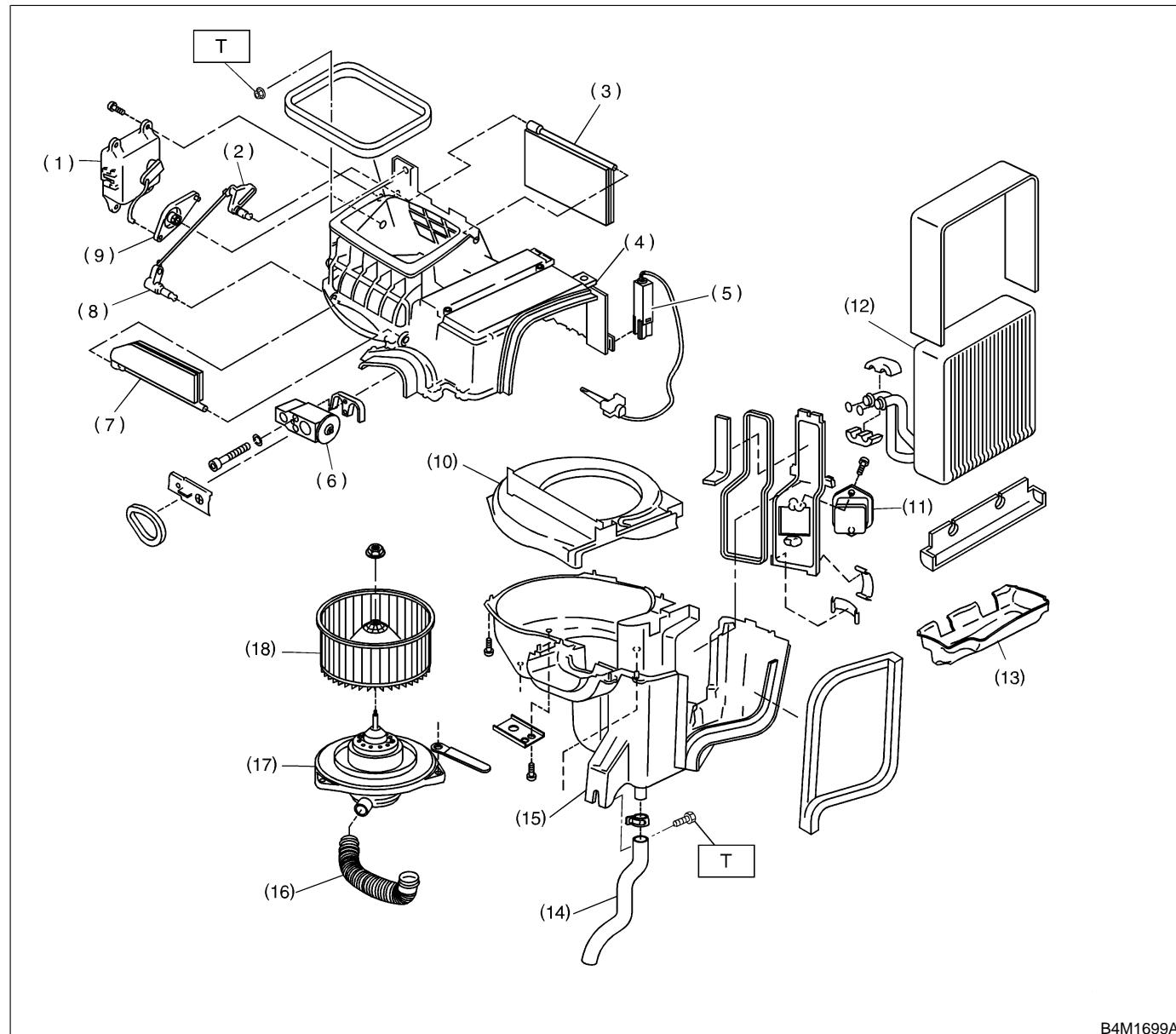
- (1) Vent door actuator
- (2) Side link
- (3) Vent door lever
- (4) Case A
- (5) DEF door
- (6) Vent door

- (7) Case B
- (8) Foot duct
- (9) Foot door
- (10) Case D
- (11) Mix door
- (12) Case C

- (13) Heater core
- (14) Foot door lever

Tightening torque: N·m (kg·m, ft·lb)
T: 7.35 ± 1.96
(0.750 ± 0.200 , 5.421 ± 1.446)

2. Intake Unit

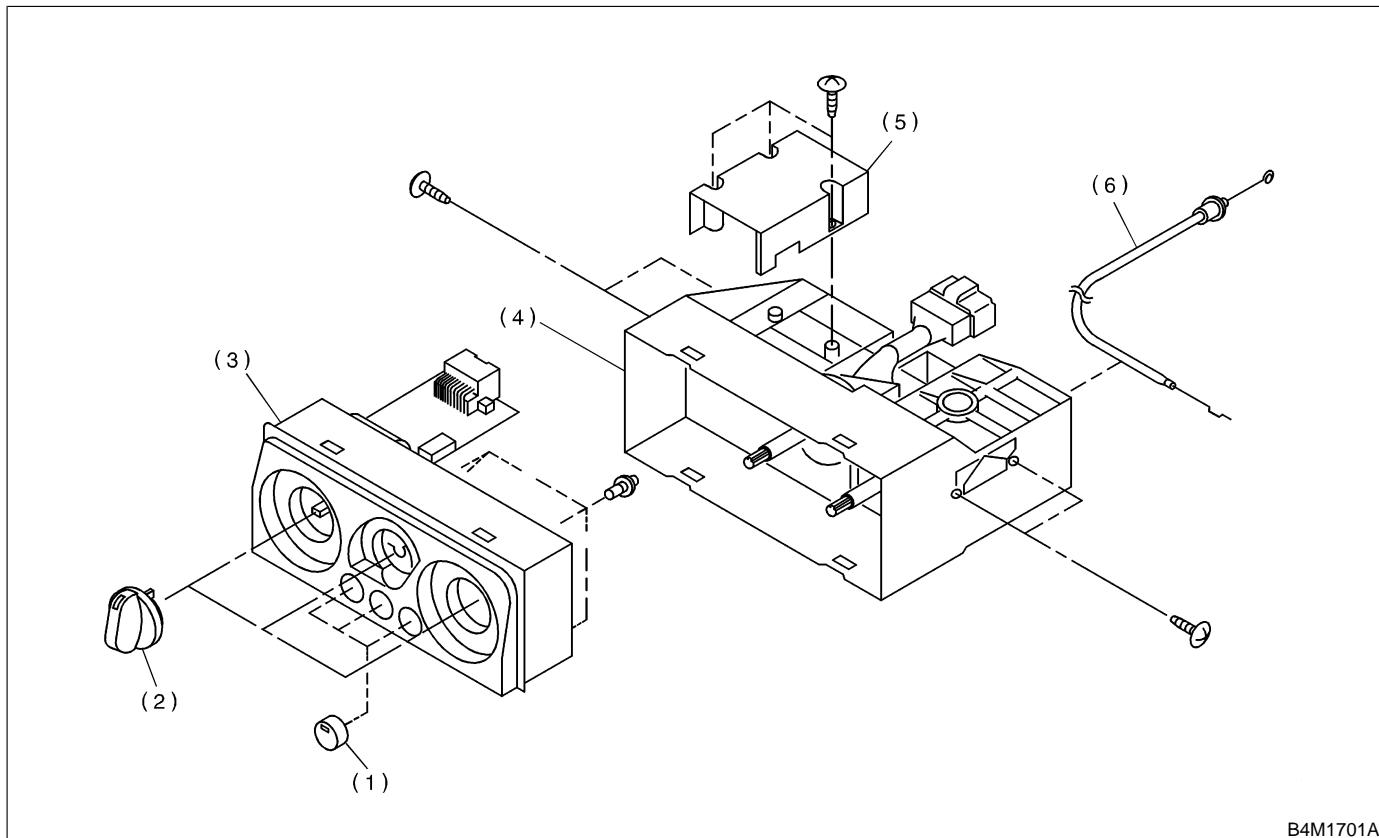


B4M1699A

(1) Intake door actuator	(8) Lever (B)	(15) Intake unit case lower
(2) Lever (A)	(9) Lever (C)	(16) Aspirator pipe
(3) Door (A)	(10) Blower plate	(17) Blower motor
(4) Intake unit case upper	(11) Resistor	(18) Fan
(5) Thermistor (With A/C model)	(12) Evaporator (With A/C model)	
(6) Block expansion valve (With A/C model)	(13) Evaporator case (With A/C model)	
(7) Door (B)	(14) Drain hose	

Tightening torque: N·m (kg·m, ft·lb)**T: 7.35 ± 1.96** **(0.750 ± 0.200 , 5.421 ± 1.446)**

3. Control Unit



B4M1701A

(1) Switch

(2) Control dial knob

(3) Control panel ASSY

(4) Base unit

(5) Cover

(6) Temperature control cable

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the instrument panel, heater unit, blower motor and control unit.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage Airbag system wiring harness when servicing the instrument panel, heater unit, blower motor and control unit.

2. Heater Unit

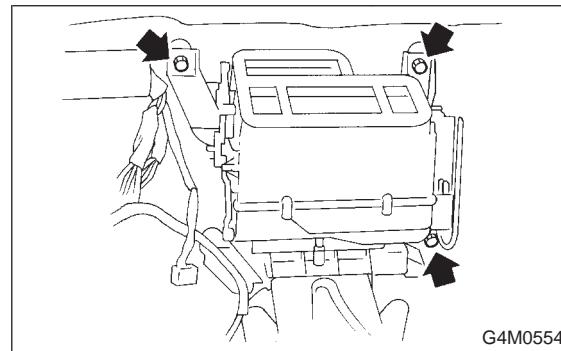
A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove heater hoses (inlet, outlet) in engine compartment.

NOTE:

Drain as much coolant from heater unit as possible, and plug disconnected hose with cloth.

- 3) Remove instrument panel.
<Ref. to 5-4 [W1A0].>
- 4) Remove steering support beam.
<Ref. to 5-1 [C500].>
- 5) Remove cooling unit.
<Ref. to 4-7 [W14A0].>
- 6) Remove heater unit.



- 7) Installation is in the reverse order of removal.

Fitted length of heater hose over pipe:
 $27.5 \pm 2.5 \text{ mm (1.083} \pm 0.098 \text{ in)}$

- 8) Pour coolant.

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the instrument panel, heater unit, blower motor and control unit.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage Airbag system wiring harness when servicing the instrument panel, heater unit, blower motor and control unit.

2. Heater Unit

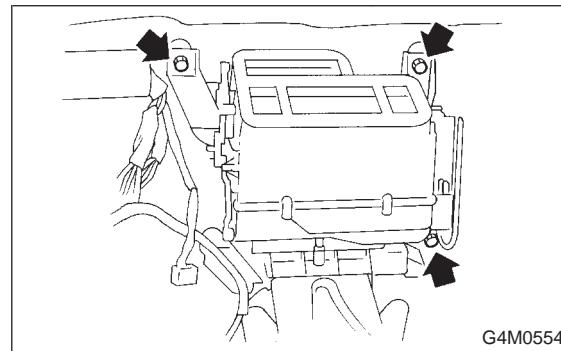
A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove heater hoses (inlet, outlet) in engine compartment.

NOTE:

Drain as much coolant from heater unit as possible, and plug disconnected hose with cloth.

- 3) Remove instrument panel.
<Ref. to 5-4 [W1A0].>
- 4) Remove steering support beam.
<Ref. to 5-1 [C500].>
- 5) Remove cooling unit.
<Ref. to 4-7 [W14A0].>
- 6) Remove heater unit.



- 7) Installation is in the reverse order of removal.

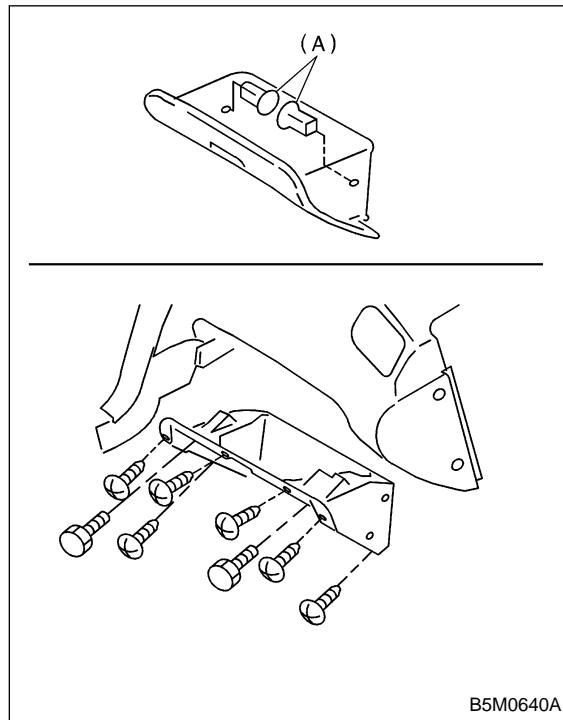
Fitted length of heater hose over pipe:
 $27.5 \pm 2.5 \text{ mm (1.083} \pm 0.098 \text{ in)}$

- 8) Pour coolant.

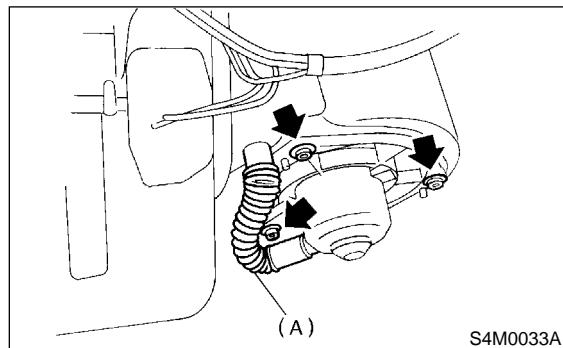
3. Blower Motor Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove stopper (A) and then remove glove box.



- 3) Disconnect blower motor harness connector.
- 4) Disconnect aspirator pipe (A).
- 5) Remove blower motor mounting screw.



- 6) Remove blower motor assembly.
- 7) Installation is in the reverse order of removal.

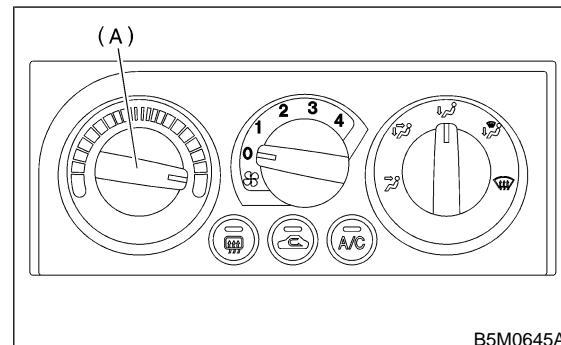
4. Control Unit

A: REMOVAL AND INSTALLATION

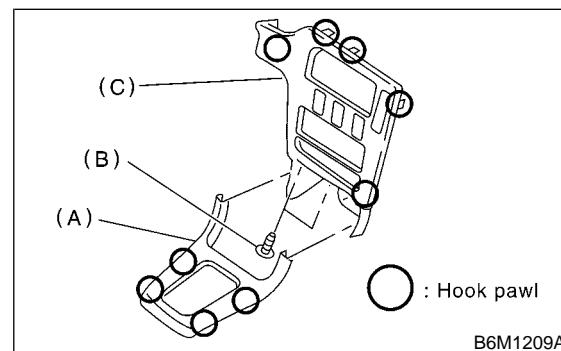
- 1) Disconnect GND cable from battery.
- 2) Remove console box. <Ref. to 5-4 [W1A0].>
- 3) Set temperature control switch (A) to "FULL HOT" and then disconnect temperature control cable from bottom of heater unit.

NOTE:

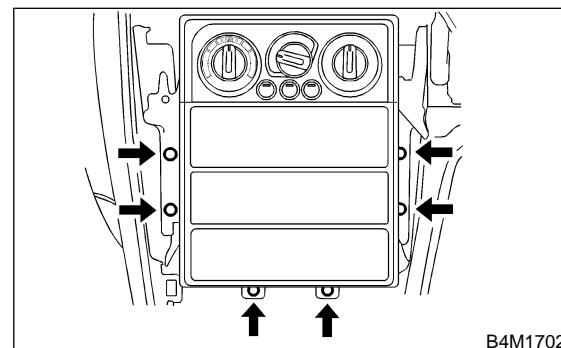
Do not attempt to move switch and link during installation.



- 4) Remove front cover (A) while disconnecting connector.
- 5) Remove two screws (B) and then remove center panel (C) while disconnecting connector.



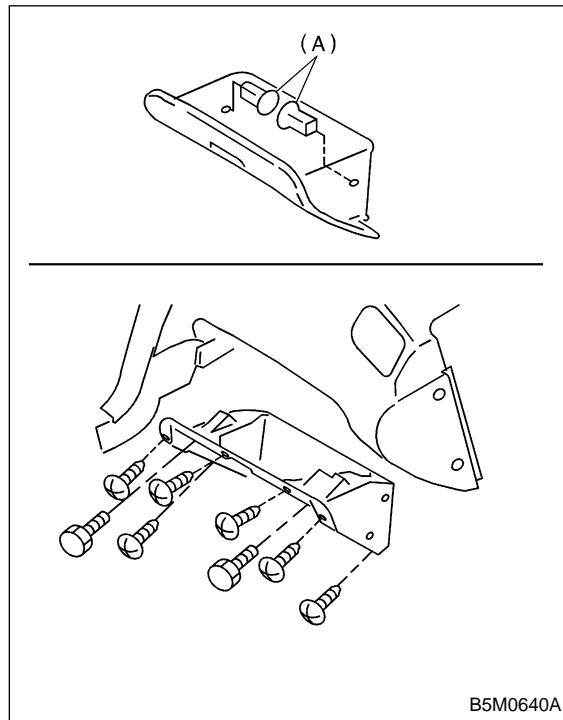
- 6) Remove fitting screws, and slightly pull radio bracket out from center console while disconnecting connector.



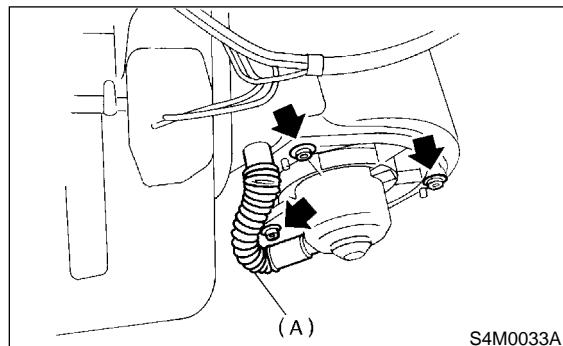
3. Blower Motor Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove stopper (A) and then remove glove box.



- 3) Disconnect blower motor harness connector.
- 4) Disconnect aspirator pipe (A).
- 5) Remove blower motor mounting screw.



- 6) Remove blower motor assembly.
- 7) Installation is in the reverse order of removal.

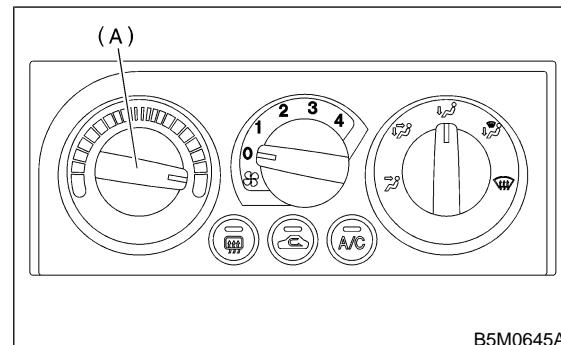
4. Control Unit

A: REMOVAL AND INSTALLATION

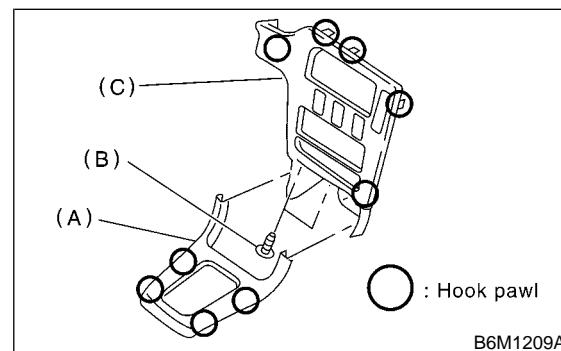
- 1) Disconnect GND cable from battery.
- 2) Remove console box. <Ref. to 5-4 [W1A0].>
- 3) Set temperature control switch (A) to "FULL HOT" and then disconnect temperature control cable from bottom of heater unit.

NOTE:

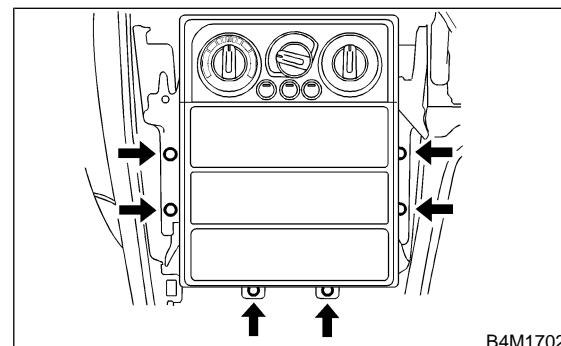
Do not attempt to move switch and link during installation.



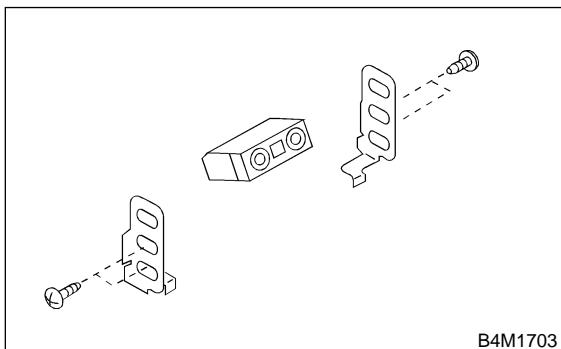
- 4) Remove front cover (A) while disconnecting connector.
- 5) Remove two screws (B) and then remove center panel (C) while disconnecting connector.



- 6) Remove fitting screws, and slightly pull radio bracket out from center console while disconnecting connector.



7) Disassemble radio bracket.



8) Installation is in the reverse order of removal.

NOTE:

Before installing control unit, set temperature control switch to "FULL HOT" position.

B: INSPECTION

1. FAN SWITCH

Check continuity between terminals at each switch position.

Switch position	Terminals					
	4	5	6	3	1	2
OFF						
1				○	○	○
2			○		○	○
3	○				○	○
4	○				○	○

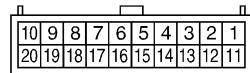


B4M2243

2. MODE ACTUATOR SWITCH

Check continuity between terminals at each switch position.

Switch position	Terminals					
	1	13	3	12	2	11
1		○	○	○	○	○
2	●	●	○	○	○	○
3	●	●	●	○	○	○
4	●	●	●	●	○	○
5	●	●	●	●	●	

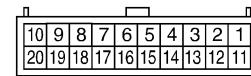


B4M2244

3. FRESH/RECIRC SWITCH

Check continuity between terminals at each switch position.

Switch position	Terminals			
	6	7	8	10
Fresh	●		○	●
Recirc	○		○	●

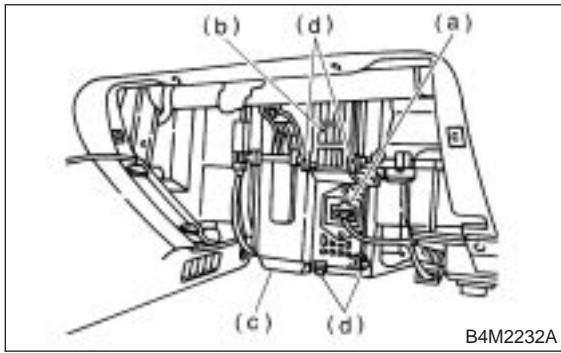


B4M2245

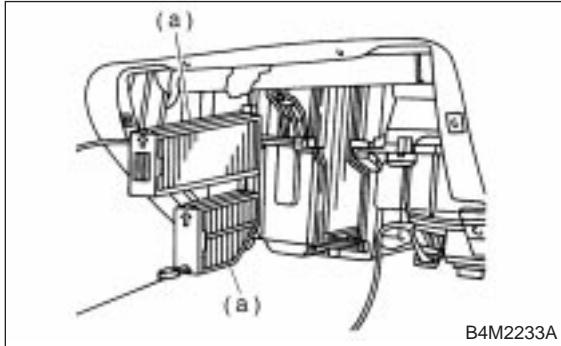
5. Filter

A: REMOVAL AND INSTALLATION

- 1) Remove glove box. <Ref. to 5-4 [W1A0].>
- 2) Disconnect resistor connector (a) and then remove cover (b) from the cooling unit (c) by removing the four clips (d).



- 3) Pull out filter (a).



- 4) Installation is in the reverse order of removal.

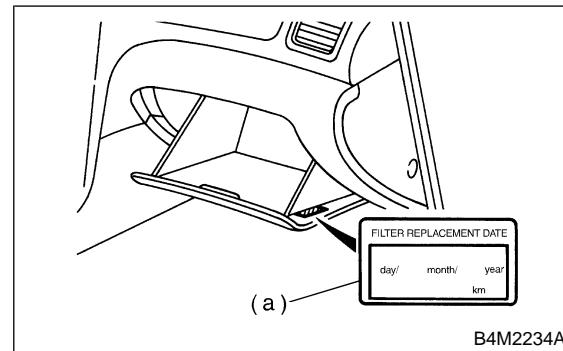
NOTE:

- The passenger compartment side of each filter is marked with an arrow. Ensure the arrow points up.
- Ensure each filter assembly's tongues and grooves fit the corresponding cooling unit and matching filter tongues and grooves.
- Ensure no air leaks from the cooling unit through the cover.

- 5) Fill in the maintenance label with the replacement date and mileage.

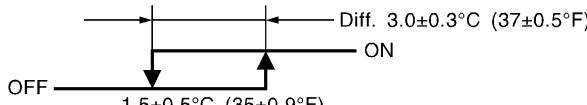
NOTE:

Install maintenance label (a) on the outside of the glove box as shown.



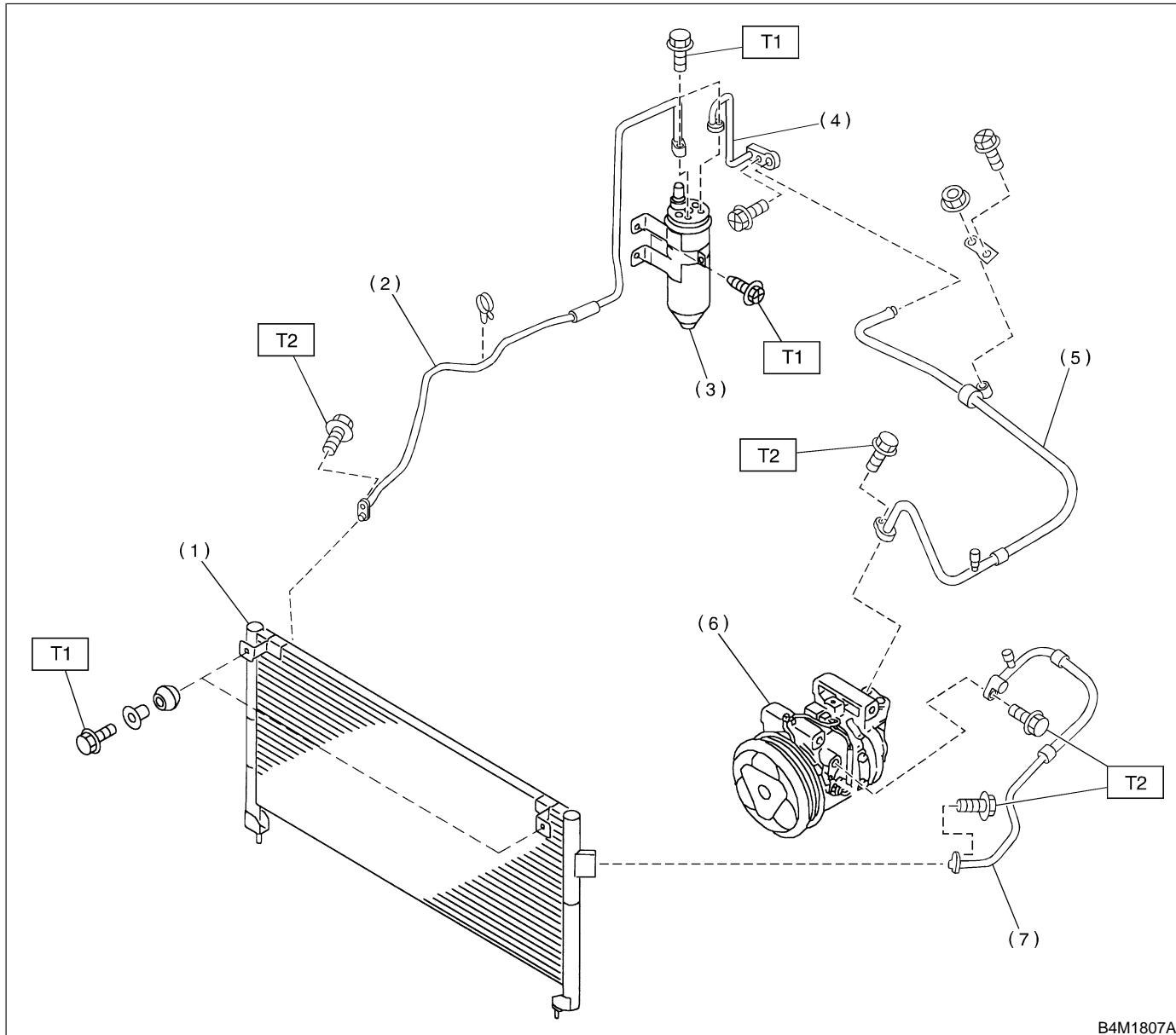
MEMO:

1. Specifications

Item	Specifications	
Type of air conditioner	Reheat air-mix type	
Cooling capacity	5.2 kW (4,471 kcal/h, 17,741 BTU/h)	
Refrigerant	HFC-134a (CH_2FCF_3) [0.65±0.05 kg (1.43±0.11 lb)]	
Compressor	Type	5-vane rotary, fix volume (DKV-14G)
	Discharge	140 cm^3 (8.54 cu in)/rev
	Max. permissible speed	7,000 rpm
Magnet clutch	Type	Dry, single-disc type
	Power consumption	38 W
	Type of belt	V-Ribbed 4 PK
	Pulley dia. (effective dia.)	125 mm (4.92 in)
	Pulley ratio	1.064
Condenser	Type	Corrugated fin (Multi-flow)
	Core face area	0.241 m^2 (2.59 sq ft)
	Core thickness	19 mm (0.75 in)
	Radiation area	6.52 m^2 (70 sq ft)
Receiver drier	Effective inner capacity	250 cm^3 (15.26 cu in)
Expansion valve	Type	Internal equalizing
Evaporator	Type	Single tank
	Dimensions (W × H × T)	235 × 224 × 60 mm (9.25 × 8.82 × 2.36 in)
Blower fan	Fan type	Sirocco fan
	Outer diameter × width	150 × 75 mm (5.91 × 2.95 in)
	Power consumption	220 W at 12 V
Condenser fan (Sub fan)	Motor type	Magnet
	Power consumption	75 W at 12 V
	Fan outer diameter	300 mm (11.81 in)
Radiator fan (Main fan)	Motor type	Magnet
	Power consumption	75 W at 12 V
	Fan outer diameter	300 mm (11.81 in)
Idling speed (A/C ON)	MPFI model	850±100 rpm
Dual switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF 177±25 kPa (1.80±0.25 kg/cm ² , 25.6±3.6 psi)
		OFF → ON 216 ⁺³⁹ / ₋₂₅ kPa (2.2 ^{+0.4} / _{-0.25} kg/cm ² , 31 ^{+5.7} / _{-3.6} psi)
Thermo control amplifier working temperature (Evaporator outlet air)	High-pressure switch operating pressure	ON → OFF 2,942±196 kPa (30±2 kg/cm ² , 427±28 psi)
		DIFF 588±196 kPa (6±2 kg/cm ² , 85±28 psi)
		1.5±0.5°C (35±0.9°F)

B4M2237A

1. Air Conditioning System



B4M1807A

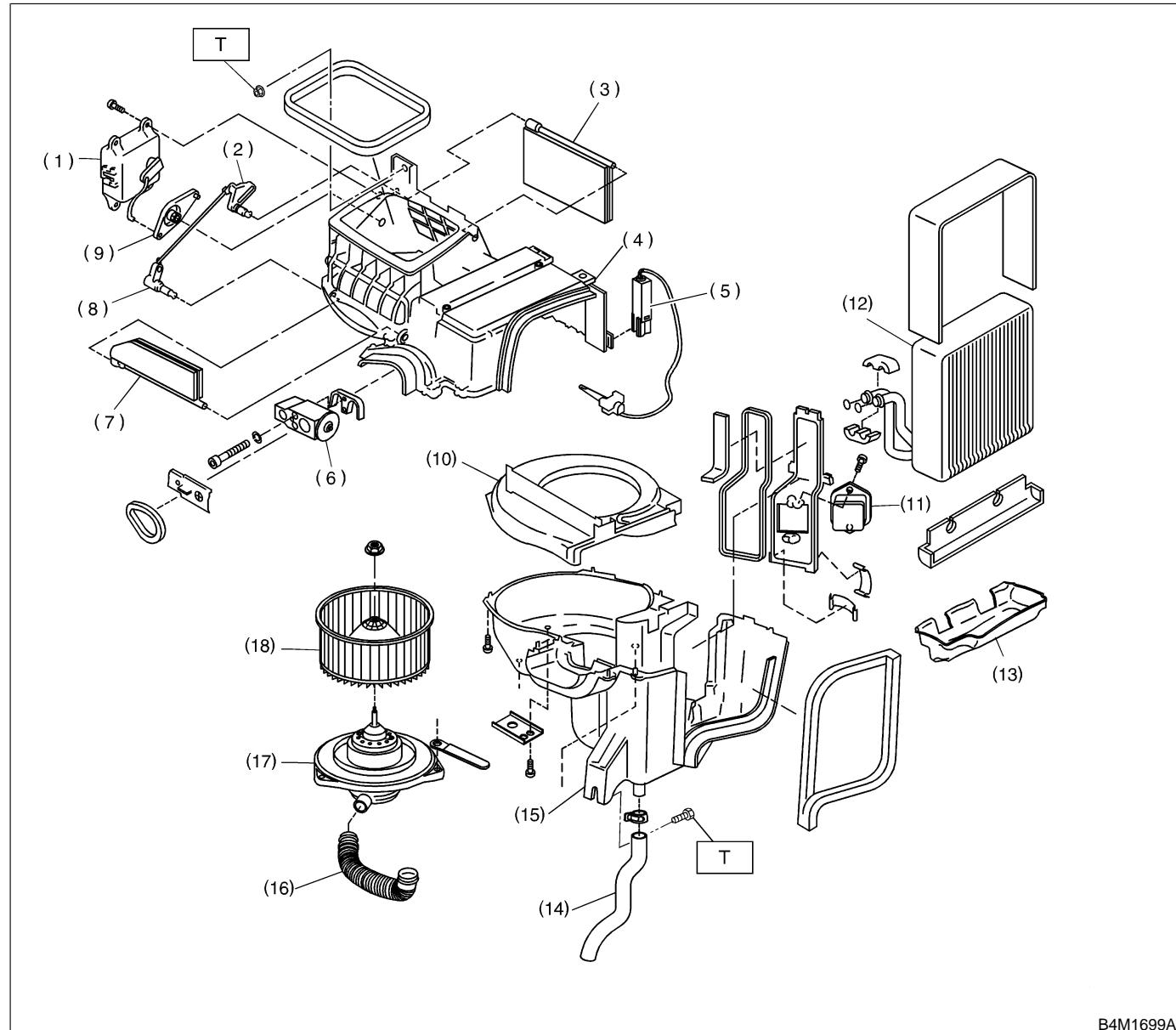
(1) Condenser	(5) Hose (Low-pressure)
(2) Pipe (Condenser — Receiver drier)	(6) Compressor
(3) Receiver drier	(7) Hose (High-pressure)
(4) Pipe (Receiver drier — C/unit)	

Tightening torque: N·m (kg·m, ft·lb)

T1: 7.4 ± 2.0 (0.75±0.2, 5.4±1.4)

T2: 15 ± 5 (1.5±0.5, 10.8±3.6)

2. Intake Unit with Evaporator

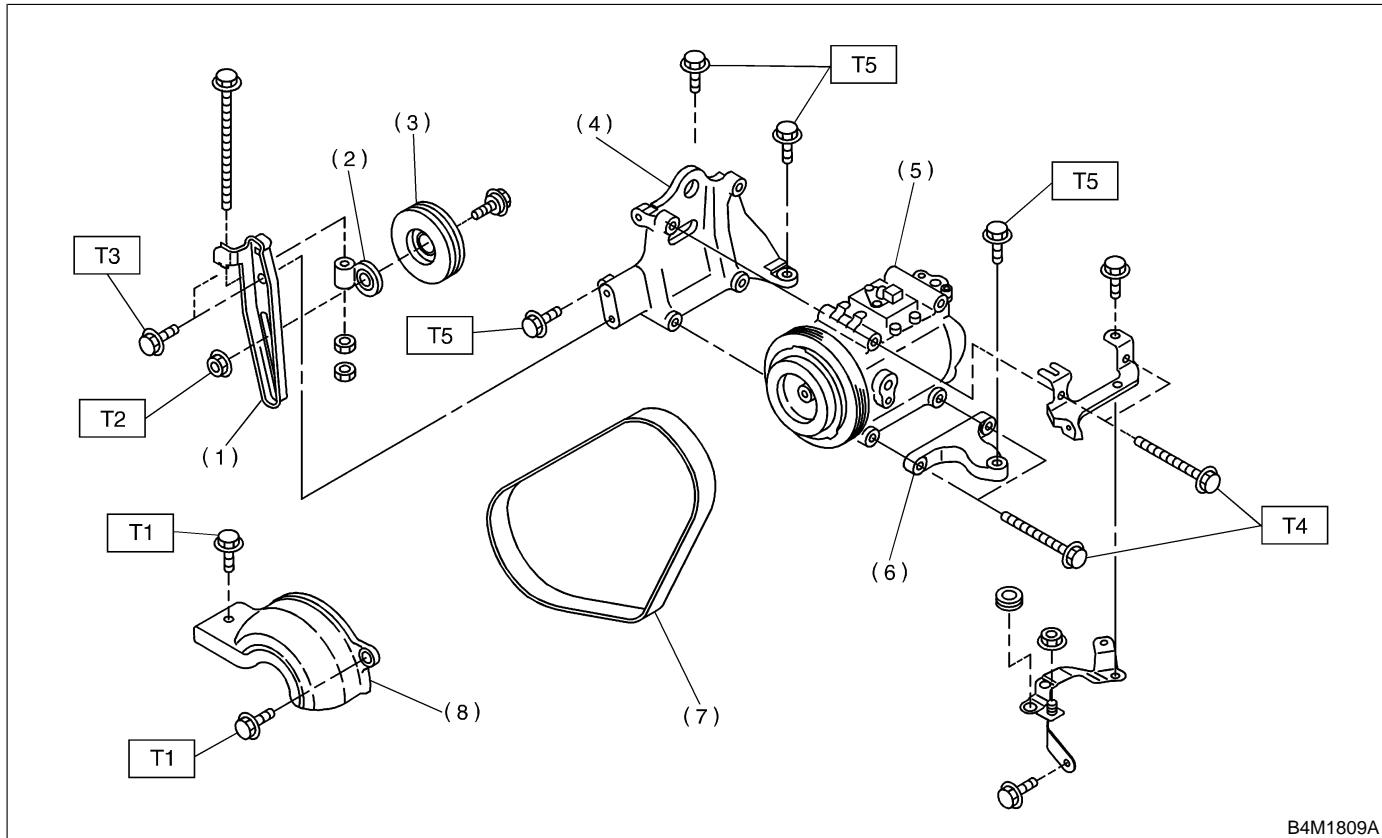


B4M1699A

(1) Intake door actuator	(8) Lever (B)	(15) Intake unit case lower
(2) Lever (A)	(9) Lever (C)	(16) Aspirator pipe
(3) Door (A)	(10) Blower plate	(17) Blower motor
(4) Intake unit case upper	(11) Resistor	(18) Fan
(5) Thermistor (With A/C model)	(12) Evaporator (With A/C model)	
(6) Block expansion valve (With A/C model)	(13) Evaporator case (With A/C model)	
(7) Door (B)	(14) Drain hose	

Tightening torque: N·m (kg·m, ft·lb)**T: 7.4±2.0 (0.75±0.2, 5.4±1.4)**

3. Compressor



B4M1809A

(1) Idler pulley bracket	(7) V-belt
(2) Idler pulley adjuster	(8) Compressor belt cover
(3) Idler pulley	
(4) Compressor bracket upper	
(5) Compressor	
(6) Compressor bracket lower	

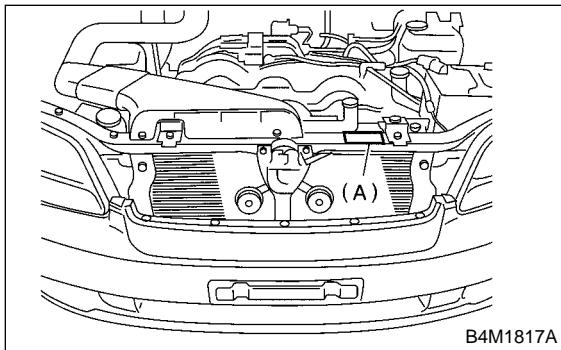
Tightening torque: N·m (kg·m, ft·lb)

T1: 7.4 ± 2 (0.75 ± 0.2 , 5.4 ± 1.4)T2: 23 ± 3 (2.3 ± 0.3 , 17 ± 2.2)T3: 23.0 ± 3 (2.35 ± 0.3 , 17.0 ± 2.2)T4: 28.9 ± 4.4 (2.95 ± 0.45 , 21.3 ± 3.3)T5: 35 ± 4 (3.6 ± 0.4 , 26 ± 2.9)

1. Safety Precautions

A: HFC-134a AIR CONDITIONING SYSTEM

Component parts of the cooling system, refrigerant, compressor oil, and other parts are not the same for the HFC-134a system and the older CFC-12 system. Do not interchange parts or liquid. Vehicles with HFC-134a air conditioning systems, use only HFC-134a parts that are indicated on a label (A) attached to the vehicle. Before performing any maintenance, verify the type of air conditioning system installed in the vehicle.



B: COMPRESSOR OIL

Do not use any compressor oil that is not specifically designated for the HFC-134a air conditioning system; only use ZXL200PG. Also, do not use HFC-134a compressor oil in the CFC-12 air conditioning system. If compression oils are mixed, poor lubrication will result and the compressor itself may be damaged.

Because HFC-134a compressor oil is very hygroscopic (easily absorbs moisture), when parts of the air conditioning system are being removed, quickly install a blind plug to prevent contact with the outside air. Also, always make sure that the service container for compressor oil is tightly closed except when in use. Store compressor oil in a tightly closed steel container.

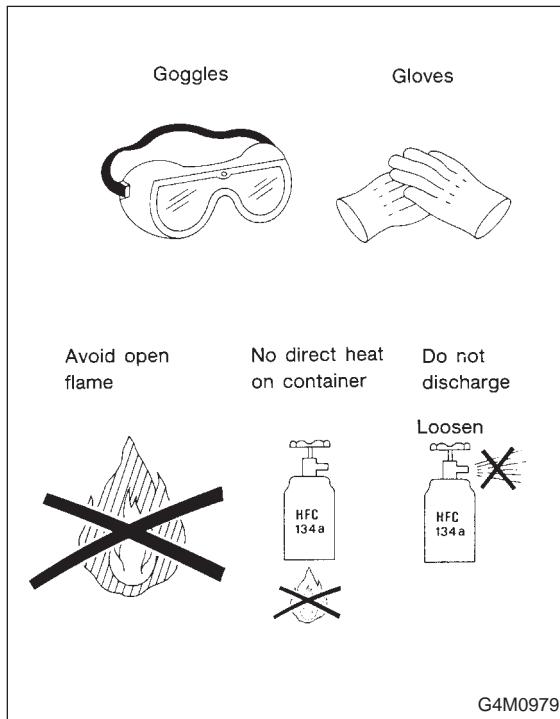
C: REFRIGERANT

Do not put CFC-12 refrigerant into a HFC-134a air conditioning system. Also, do not put HFC-134a refrigerant into a CFC-12 air conditioning system. If the wrong refrigerant is used, poor lubrication will result and the compressor itself may be destroyed.

D: HANDLING OF REFRIGERANT

Because refrigerant boils at approx. -30°C (-22°F) at sea level, it is cold enough to give you severe frostbite. Always wear goggles to protect your eyes and gloves to protect your hands. Also, even under the pressures normally found in CFC-12 containers, refrigerant will boil with the addition of heat. This could raise the pressure inside the container to a dangerous level.

Never expose a can of HFC-134a to direct sunlight, or to temperatures over 40°C (104°F). One more thing to remember about HFC-134a is that when it is exposed to an open flame or to hot metal, it forms phosgene, a deadly gas. Do not discharge HFC-134a into the atmosphere on purpose. Always read and follow the precautions on the HFC-134a bottle.



2. Basic Information

- 1) The combination of moisture and refrigerant forms acid, therefore, moisture should not be allowed to enter the refrigerant.
- 2) Refrigerant oil readily absorbs moisture, therefore, keep refrigerant oil containers tightly capped.
- 3) The process of evacuating the system is performed to remove small amounts of moisture. This is accomplished by lowering the pressure inside the system, which allows the moisture to boil off, in much the same way that a pot of water will boil away to nothing given enough time. The evacuation process does not suck the moisture out of the system.
- 4) A minimum level of vacuum must be reached to satisfactorily evacuate the system. This minimum level of vacuum depends on the temperature inside the system. The chart below shows the level of vacuum required to boil water at various temperatures.

Additionally, the vacuum level shown on a gauge will read approx. 3.3 kPa (25 mmHg, 1 inHg) less for each 304.8 m (1,000 ft) above sea level, due to the decrease in atmospheric pressure at altitude.

Vacuum level required to boil water (at sea level)	
Temperature	Vacuum
1.7°C (35°F)	100.9 kPa (757 mmHg, 29.8 inHg)
7.2°C (45°F)	100.6 kPa (754 mmHg, 29.7 inHg)
12.8°C (55°F)	99.9 kPa (749 mmHg, 29.5 inHg)
18.3°C (65°F)	99.2 kPa (744 mmHg, 29.3 inHg)
23.9°C (75°F)	98.5 kPa (739 mmHg, 29.1 inHg)
29.4°C (85°F)	97.2 kPa (729 mmHg, 28.7 inHg)
35°C (95°F)	95.8 kPa (719 mmHg, 28.3 inHg)

3. Tools and Equipment

The following section provides information about the tools and equipment that will be necessary to properly service the A/C system.

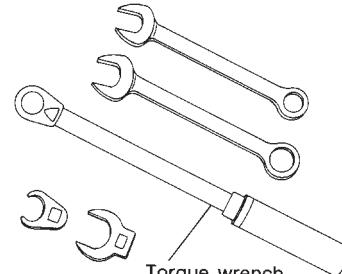
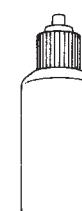
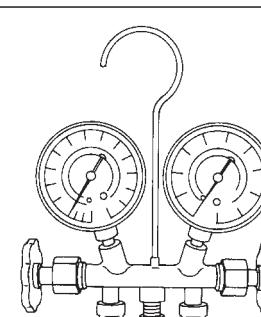
Since equipment may vary slightly depending on the manufacturer, it is important to always read and follow the manufacturer's instructions.

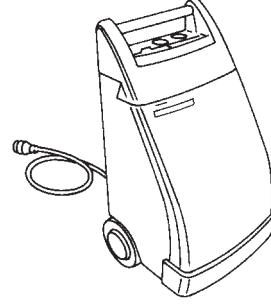
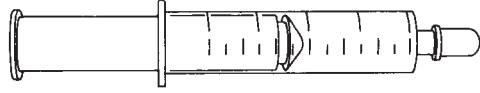
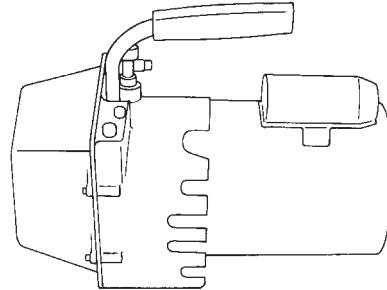
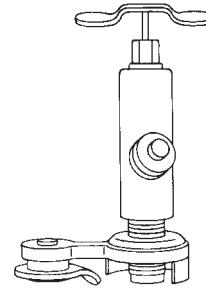
CAUTION:

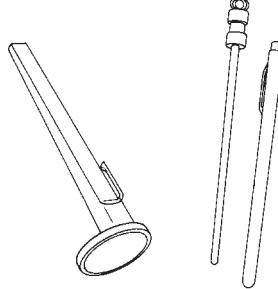
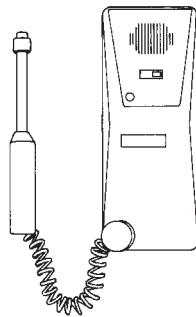
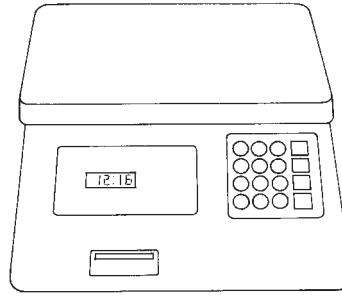
When working on vehicles with the HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, poor lubrication will result and the compressor itself may be destroyed.

In order to help prevent mixing HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Tools and Equipment	Description
• WRENCH	<p>Various WRENCHES will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kg-m, 5 to 30 ft-lb) torque wrench with various crowfoot wrenches will be needed. Open end or flare nut wrenches will be needed for back-up on the tube and hose fittings.</p>  <p>G4M0571</p>
• APPLICATOR BOTTLE	<p>A small APPLICATOR BOTTLE is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.</p>  <p>G4M0572</p>
• MANIFOLD GAUGE SET	<p>A MANIFOLD GAUGE SET (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.</p>  <p>G4M0573</p>

Tools and Equipment	Description
<ul style="list-style-type: none"> • REFRIGERANT RECOVERY SYSTEM <p>A REFRIGERANT RECOVERY SYSTEM is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.</p>	 <p>G4M0574</p>
<ul style="list-style-type: none"> • SYRINGE <p>A graduated plastic SYRINGE will be needed to add oil back into the system. The syringe can be found at a pharmacy or drug store.</p>	 <p>G4M0575</p>
<ul style="list-style-type: none"> • VACUUM PUMP <p>A VACUUM PUMP (in good working condition) is necessary, and may be obtained from either a commercial refrigeration supply house or an automotive equipment supplier.</p>	 <p>G4M0576</p>
<ul style="list-style-type: none"> • CAN TAP <p>A CAN TAP for the 397 g (14 oz) can is available from an auto supply store.</p>	 <p>G4M0577</p>

Tools and Equipment	Description
<ul style="list-style-type: none"> • THERMOMETER <p>Pocket THERMOMETERS are available from either industrial hardware store or commercial refrigeration supply houses.</p>	 <p>G4M0578</p>
<ul style="list-style-type: none"> • ELECTRONIC LEAK DETECTOR <p>An ELECTRONIC LEAK DETECTOR can be obtained from either a specialty tool supply or an A/C equipment supplier.</p>	 <p>G4M0579</p>
<ul style="list-style-type: none"> • WEIGHT SCALE <p>A WEIGHT SCALE such as an electronic charging scale or a bathroom scale with digital display will be needed if a 13.6 kg (30 lb) refrigerant container is used.</p>	 <p>G4M0580</p>

4. O-ring Connections

A: GENERAL

The following points should be kept in mind when assembling O-ring connections:

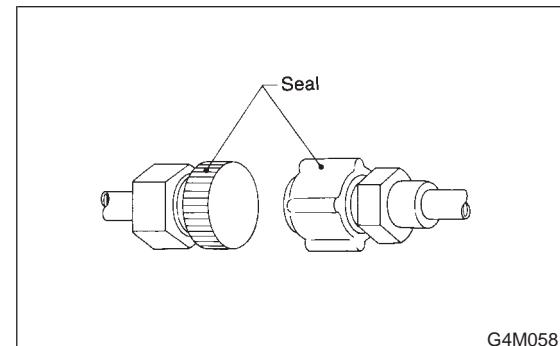
- 1) Avoid unnecessary handling and contact of O-rings with your hands, since even clean fingers contain body acids, which can contaminate the O-ring surface.
- 2) Do not handle O-rings with gloves, shop towels, etc., since lint particles may cling to the O-ring, possibly causing a leak upon assembly.
- 3) Always lubricate O-rings before assembly to allow the O-ring to seat itself properly.
- 4) Be certain to use torque wrenches when tightening O-ring fittings, because overtightening can not only damage the O-ring, but it can distort the tube end as well.

B: REMOVE PROTECTIVE SEALS

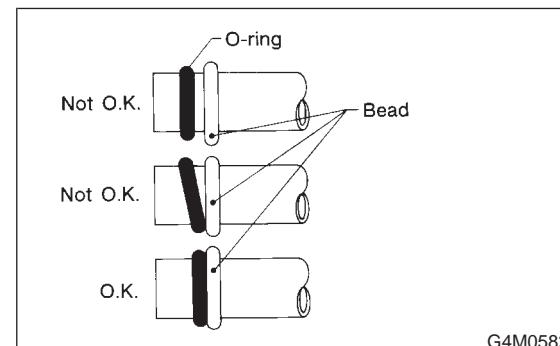
- 1) Just prior to making the connection, remove the protective seals.

CAUTION:

If for any reason you have to stop before making a connection, recap the tube, component or fitting.



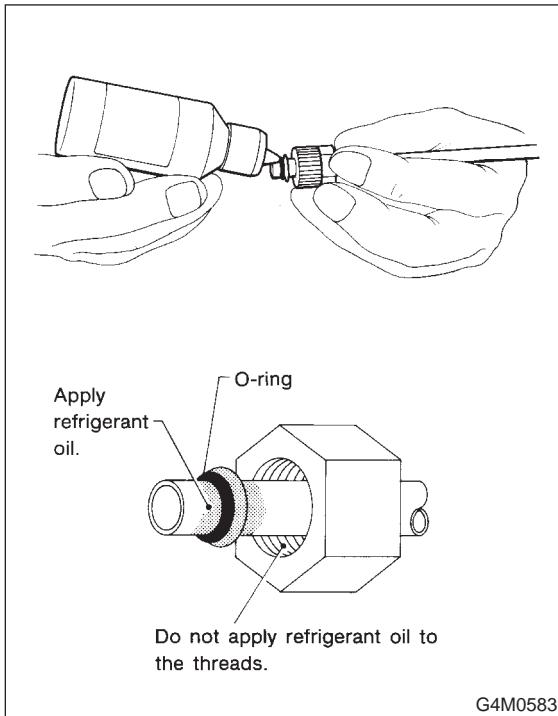
- 2) Visually inspect the O-ring surface, the O-ring mating surface, the threads and the connection points. If a defective part is found, replace it. The O-ring must sit square against the tube bead. If necessary, slide the O-ring into proper position with clean hands.



C: LUBRICATE THE COMPONENTS

For lubrication of the components, use only refrigerant oil as described in the appropriate service manual. Apply oil from an oil squirt gun or other closed container. Do not use your finger to spread the oil over the O-ring.

Apply a small amount of refrigerant oil to the top and sides of the O-ring. The area covered by oil should include the O-ring and the tube bead.



G4M0583

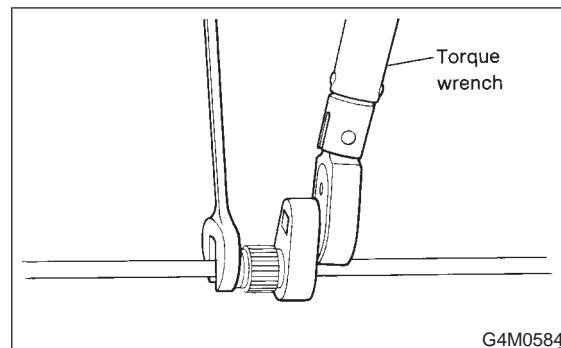
D: TORQUE THE FITTING

Using a back-up wrench in conjunction with a calibrated torque wrench, torque the connection to the midrange of the specification.

After completion of torquing, use a clean shop towel to remove any excess oil from the connection or any oil that may have dripped on the vehicle body or other parts.

CAUTION:

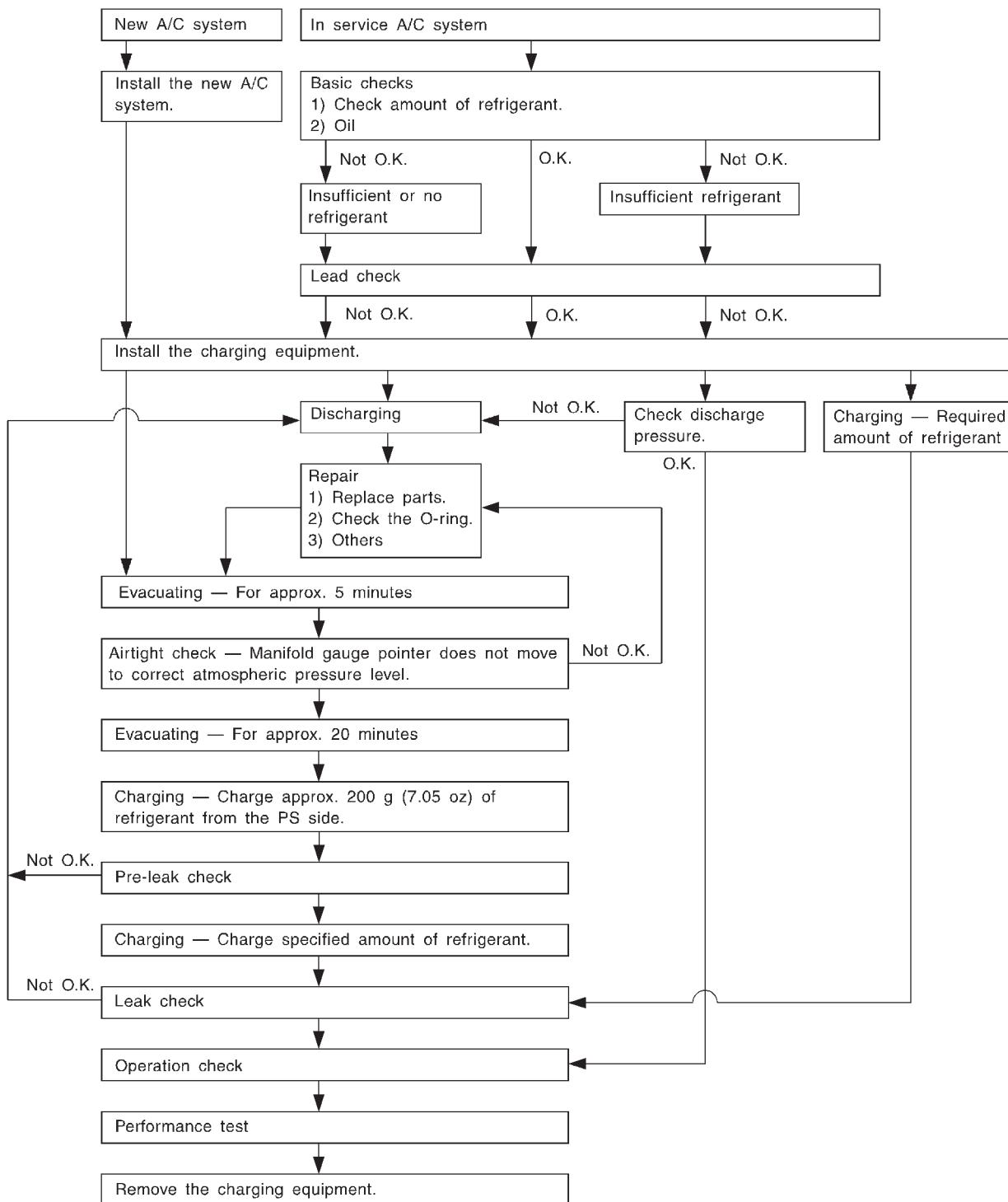
If a leak is suspected after torquing, do not retighten or retorque the connection. Instead, disassemble the connection, remove the O-ring, and inspect the O-ring, threads, joints and seating surfaces.



G4M0584

5. Refrigerant Service Procedure

A: WORK FLOW



6. Discharge the System

CAUTION:

The following points must be kept in mind when discharging the system.

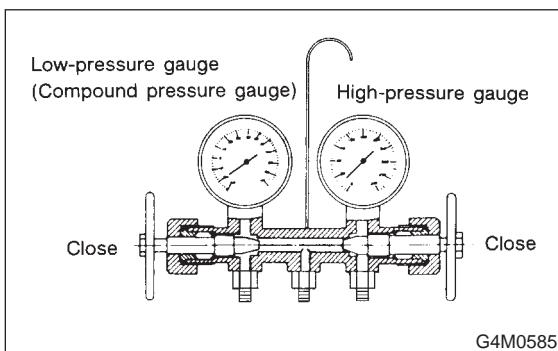
- Be certain that goggles and gloves are worn.
- Connect refrigerant recovery system to manifold gauge set and remove recycled refrigerant from the A/C system.

NOTE:

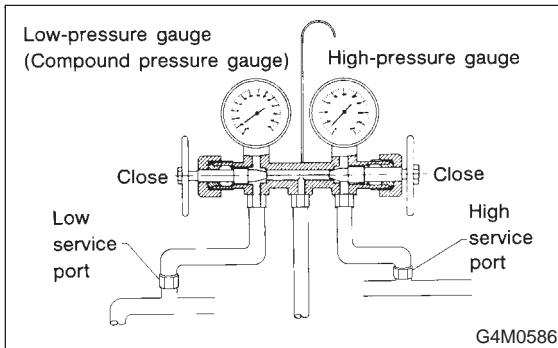
Refer to the relevant refrigerant recovery system instruction manual for operating procedures.

A: CONNECTING THE MANIFOLD GAUGE SET

- 1) Close the high and low side manifold valves.



- 2) Turn the A/C system ON and turn the IG switch OFF.
- 3) Attach the high- and low-pressure manifolds to the high and low service ports on the vehicle.



B: PREPARE FOR DISCHARGING

Connect center manifold hose to refrigerant recovery system to recycle refrigerant.

7. Evacuating and Charging

The following points should be kept in mind when evacuating and charging with a manifold gauge set:

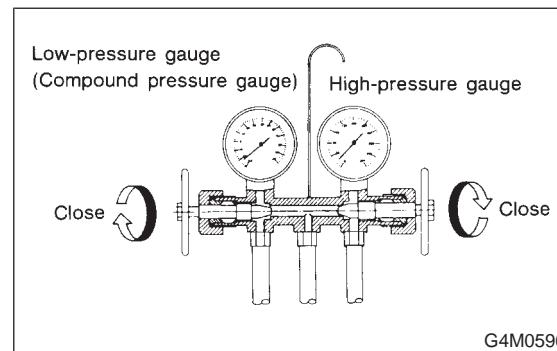
- 1) Be certain that goggles and gloves are worn.
- 2) If bulk refrigerant [13.6 kg (30 lb) canister] is used, be certain to weigh the charge amount carefully, using the correct equipment, to avoid overcharging the system.
- 3) The charging procedure described in this section begins by charging liquid refrigerant into the high-pressure side of the system with the engine off. The procedure is completed by charging refrigerant vapor into the low-pressure side of the system with the engine running.

CAUTION:

Never open the high-pressure manifold valve when the engine is running.

A: CONNECT THE GAUGE SET

- 1) Close the high- and low-pressure manifold valves.



- 2) Attach the low-pressure manifold hose to the low-pressure service port on the vehicle. Check the low-pressure gauge. If more than 68.6 kPa (0.70 kg/cm², 10 psi) is indicated, discharge the system prior to charging.
- 3) Attach the high-pressure manifold hose to the high-pressure service port on the vehicle.
- 4) Connect the center hose from the manifold to the vacuum pump.
- 5) Turn on the vacuum pump.

6. Discharge the System

CAUTION:

The following points must be kept in mind when discharging the system.

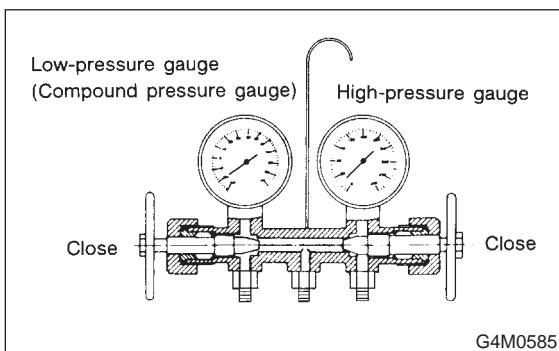
- Be certain that goggles and gloves are worn.
- Connect refrigerant recovery system to manifold gauge set and remove recycled refrigerant from the A/C system.

NOTE:

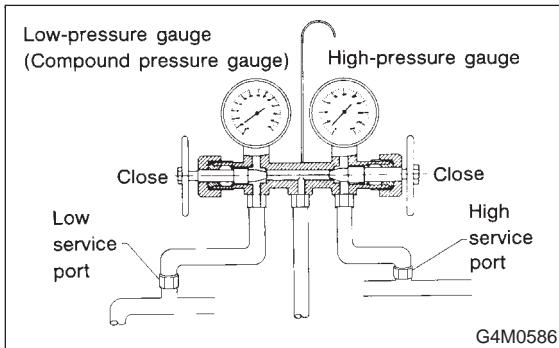
Refer to the relevant refrigerant recovery system instruction manual for operating procedures.

A: CONNECTING THE MANIFOLD GAUGE SET

- 1) Close the high and low side manifold valves.



- 2) Turn the A/C system ON and turn the IG switch OFF.
- 3) Attach the high- and low-pressure manifolds to the high and low service ports on the vehicle.



B: PREPARE FOR DISCHARGING

Connect center manifold hose to refrigerant recovery system to recycle refrigerant.

7. Evacuating and Charging

The following points should be kept in mind when evacuating and charging with a manifold gauge set:

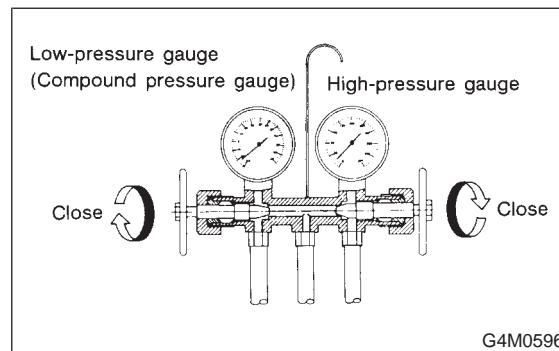
- 1) Be certain that goggles and gloves are worn.
- 2) If bulk refrigerant [13.6 kg (30 lb) canister] is used, be certain to weigh the charge amount carefully, using the correct equipment, to avoid overcharging the system.
- 3) The charging procedure described in this section begins by charging liquid refrigerant into the high-pressure side of the system with the engine off. The procedure is completed by charging refrigerant vapor into the low-pressure side of the system with the engine running.

CAUTION:

Never open the high-pressure manifold valve when the engine is running.

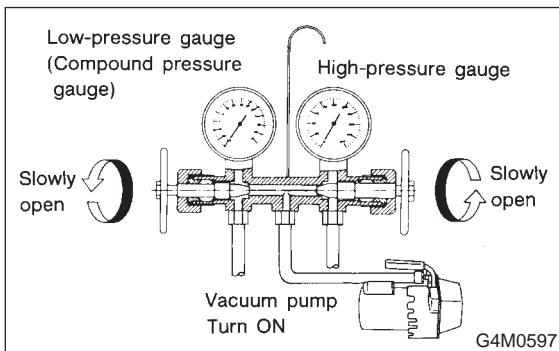
A: CONNECT THE GAUGE SET

- 1) Close the high- and low-pressure manifold valves.



- 2) Attach the low-pressure manifold hose to the low-pressure service port on the vehicle. Check the low-pressure gauge. If more than 68.6 kPa (0.70 kg/cm², 10 psi) is indicated, discharge the system prior to charging.
- 3) Attach the high-pressure manifold hose to the high-pressure service port on the vehicle.
- 4) Connect the center hose from the manifold to the vacuum pump.
- 5) Turn on the vacuum pump.

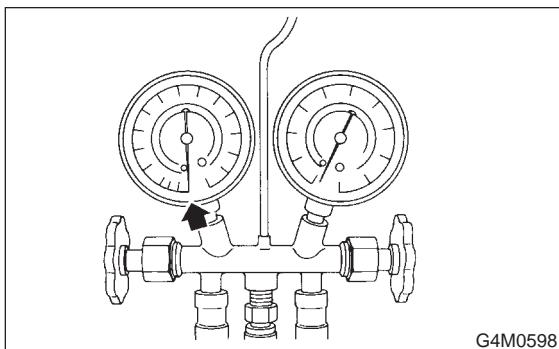
6) Slowly open the low-pressure manifold valve.



7) When the low-pressure gauge reaches approximately 66.43 kPa (498.3 mmHg, 19.62 inHg), slowly open the high-pressure manifold valve.
 8) Maintain a minimum vacuum level of 100.56 kPa (754.4 mmHg, 29.70 inHg) for a minimum of 15 minutes on a new system or 30 minutes for an in-service system.

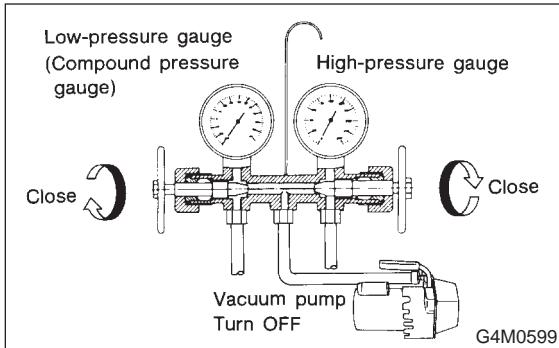
NOTE:

The gauge will read 3.3 kPa (25 mmHg, 1 inHg) less for every 304.8 m (1,000 ft) above sea level.



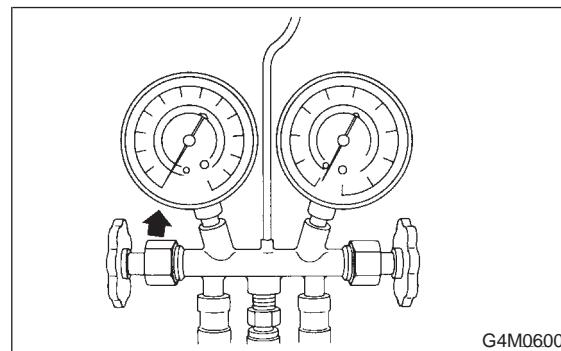
B: PERFORM A VACUUM LEAK TEST

1) After 15 minutes (or more) of evacuation, close the high-pressure manifold valve.
 2) Close the low-pressure manifold valve.

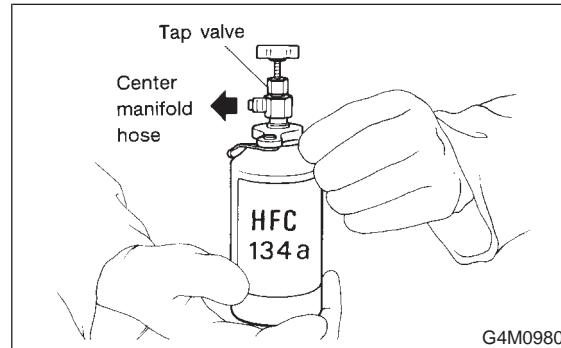


3) Turn off the vacuum pump.

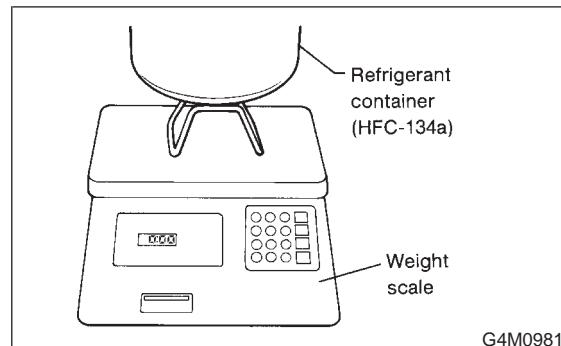
4) Note the low side gauge reading.



5) After 5 minutes, re-check the low-pressure gauge reading.
 If the vacuum level has changed more than 3.3 kPa (25 mmHg, 1 inHg), perform an HFC-134a leak test.
 If the vacuum reading is about the same as noted in step 4), continue on to next step.
 6) Carefully attach the can tap to the refrigerant can by following the can tap manufacturer's instructions.

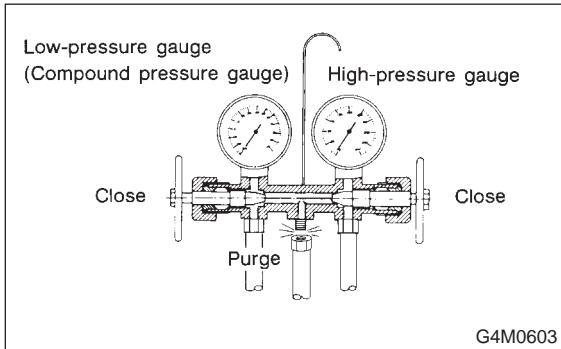


7) Disconnect the center manifold hose from the vacuum pump and connect the hose to the tap valve.
 8) If a 13.6 kg (30 lb) container of refrigerant is used a weight scale will be needed. This scale is to determine the amount of refrigerant that is used. Connect the center hose from the manifold to the valve. Place the 13.6 kg (30 lb) container on the scale, valve end down.



C: PURGE THE CENTER HOSE**CAUTION:****Be certain that goggles and gloves are worn.**

- 1) Verify that all three hose connections are tight at the manifold gauge set.



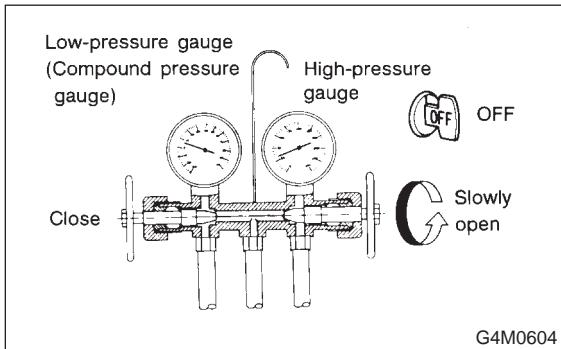
- 2) Open the valve on the HFC-134a source.
- 3) Loosen the center hose connection at the manifold and allow the HFC-134a to escape for no more than two or three seconds, then quickly retighten the hose fitting at the manifold.

D: INITIAL CHARGING THROUGH THE HIGH SIDE

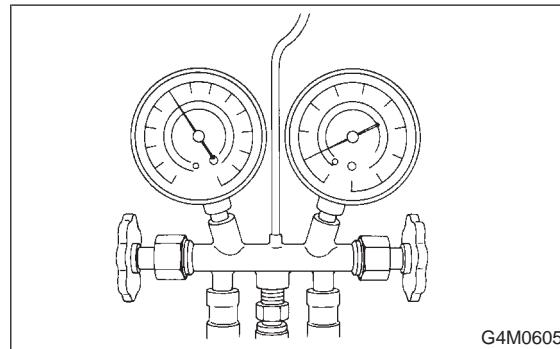
- 1) Connect a tachometer to the engine.
- 2) With the engine off, start charging by slowly opening the high-pressure manifold valve.

NOTE:

The initial charge rate can be increased by immersing the can in lukewarm [Below 38°C (100°F)] water for a short time.

**E: CHECK THE GAUGE READINGS**

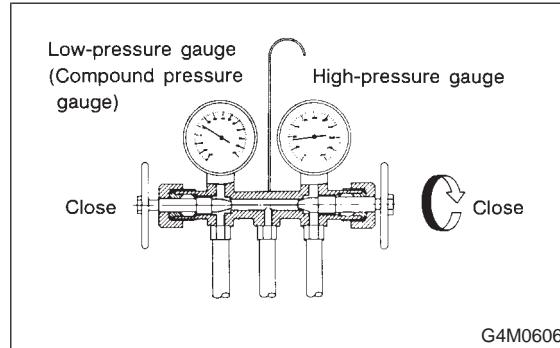
When both the high- and low-pressure gauge readings are about equal, or the HFC-134a source is empty, or the system has been filled to specifications, close the high-pressure manifold valve.

**F: ADD ADDITIONAL CANS**

If the HFC-134a source is exhausted, first close the high-pressure manifold valve, second, close the can tap valve, then slowly purge the refrigerant from the service hose by loosening the fitting at the can tap.

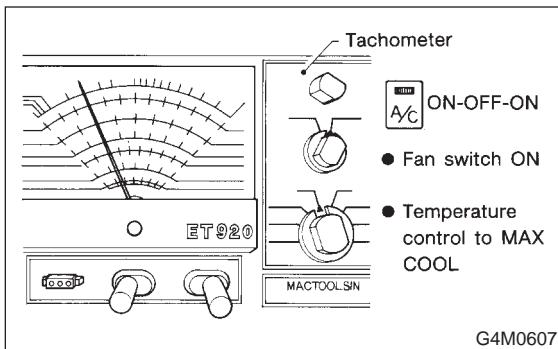
G: COMPLETE CHARGING THROUGH THE LOW SIDE

- 1) Verify that the high-pressure manifold valve is closed (should have already been closed).
- 2) Verify that the low-pressure manifold valve is closed (should have already been closed).



- 3) With the A/C switch off and the windows rolled down, start the engine and run at idle rpm.
- 4) Set the A/C controls on maximum cool and set the blower speed on the highest setting.

5) Quickly turn the A/C switch on-off-on-off a few times to prevent initial compressor damage due to "load shock". Finish this operation with the A/C switch in the ON position.



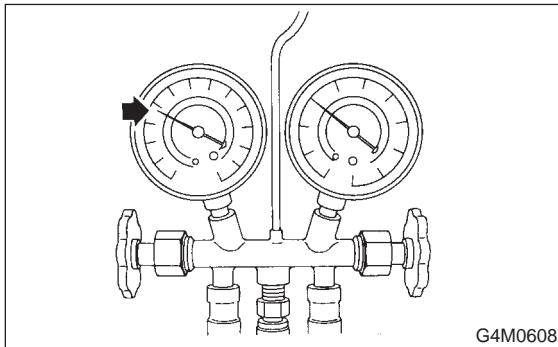
6) Raise engine rpm to approximately 1,500 rpm.

H: CHARGE THE SYSTEM

1) With the refrigerant source connected and the service hose purged, slowly open the low-pressure manifold valve, while checking the low-pressure gauge reading.

CAUTION:

The refrigerant source must be positioned for vapor (valve up).



2) Keep the low side pressure below 276 kPa (2.81 kg/cm², 40 psi) by using the low-pressure manifold valve to regulate the flow of refrigerant into the system.
 3) When the system is fully charged, close the low-pressure manifold valve.
 4) Close the valve at the refrigerant source.

Refrigerant capacity		
Refrigerant	Minimum	Maximum
HFC-134a	0.6 kg (1.3 lb)	0.7 kg (1.5 lb)

I: COMPLETE ALL SYSTEM CHECKS

1) Evaluate the system performance. <Ref. to 4-7 [K200].>
 2) Perform leak detection test. <Ref. to 4-7 [W800].>

CAUTION:

**Always perform leak checking in an environment free of refrigerant pollution.
 Do not disconnect the high- or low-pressure hoses from the vehicle before leak checking.**

J: DISCONNECT THE MANIFOLD GAUGE SET

1) Remove the high- or low-pressure hoses from the service ports and install the service port caps.

8. Leak Testing

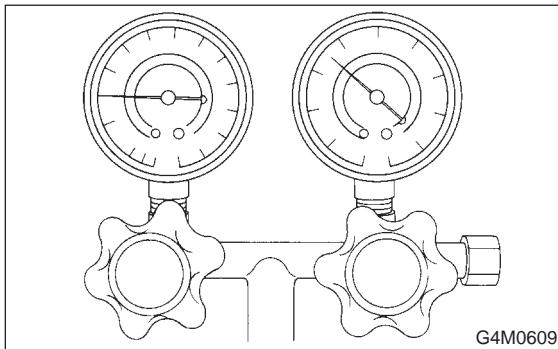
A: INSPECTION

The following points should be kept in mind when conducting a refrigerant leak test.

- 1) The A/C system to be tested must have an adequate refrigerant charge to begin with.
- 2) The area where the leak test is conducted must be free of wind and drafts, with still air being the ideal condition.
- 3) The atmosphere where the leak test is conducted must be free of refrigerant contamination.
- 4) Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.
- 5) Refrigerant gas is heavier than air, therefore always hold the probe below the connection being tested.
- 6) When checking for a leak along a length of hose or tube, the leak detector probe must be moved slowly, approx. 25 mm (1 in) per second making sure probe does not come in contact with the component being tested.
- 7) When checking for a leak at a certain point, the leak detector probe must be held at that point for at least 5 seconds.

1. CHECK THE SYSTEM PRESSURE

With gauges connected to the A/C system, operate the A/C and confirm that the high side pressure is above 690 kPa (7.03 kg/cm², 100 psi). If not, evacuate and charge the system before leak checking. <Ref. to 4-7 [W700].>



2. CLEAN CONNECTIONS BEFORE TESTING

Before testing, use a clean shop towel to wipe off refrigerant oil, dirt, or foreign material from all of the connections and components to be tested.

NOTE:

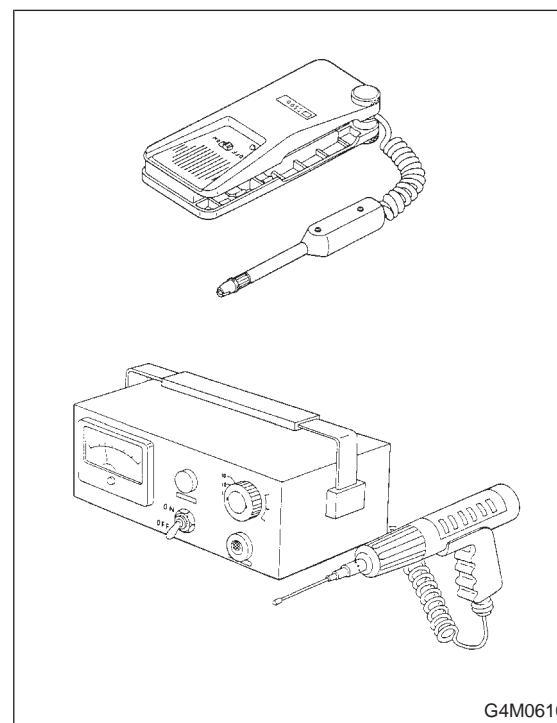
Since refrigerant oil absorbs refrigerant, excess oil on or near a connection may falsely signal a leak.

3. CALIBRATE LEAK DETECTOR

Refer to the manufacturer's instructions for the particular type of detector used and calibrate the instrument.

CAUTION:

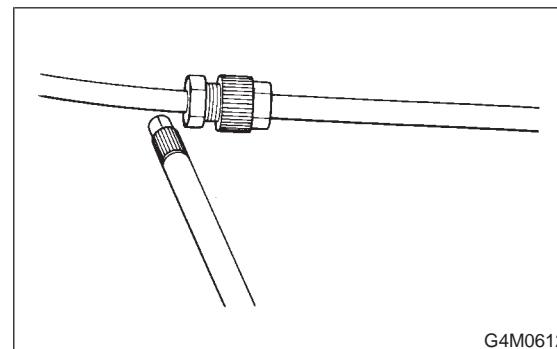
Always make sure that the probe tip filter is clean and free of contamination.



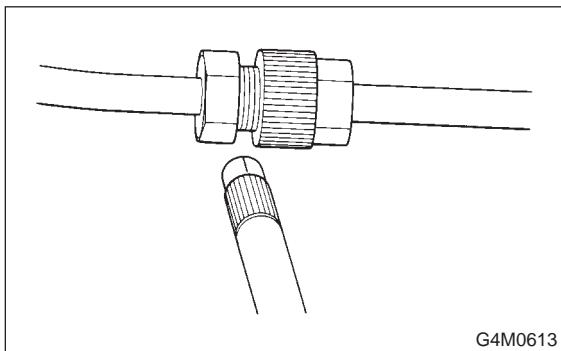
4. LEAK TEST — HIGH-PRESSURE SIDE

Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.

- 1) Begin at the connection of the high-pressure tube to the evaporator, and work your way along the high-pressure side of the system to the compressor. There are three places to check each tube connection.
- 2) Check the area:
 - Check the area where the fitting meets the tube.

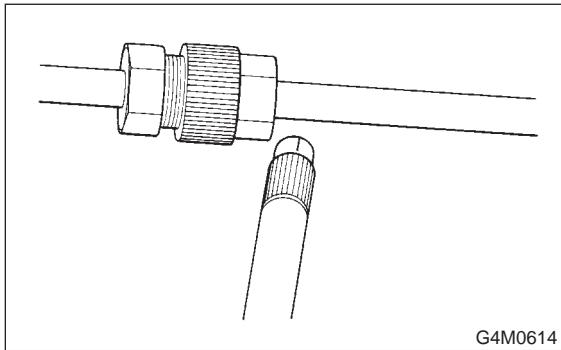


- Check the area where the two parts of the fitting join each other.



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- Check the area where the nut meets the tube.



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- Check the area of the pressure switch (dual switch), and also check the seams of the receiver drier.
- Check the connections of the tubes to the condenser, and also check any welded joints on the condenser.

CAUTION:

An oily area on the fins of the condenser may indicate a leak.

- Check the area where the hoses attach to the compressor.
- Check around the machined portions of the compressor (where the compressor sections join each other).
- If equipped, check the thermal limiter on the compressor housing.
- Check the compressor shaft seal by probing near the center of the compressor clutch pulley.

NOTE:

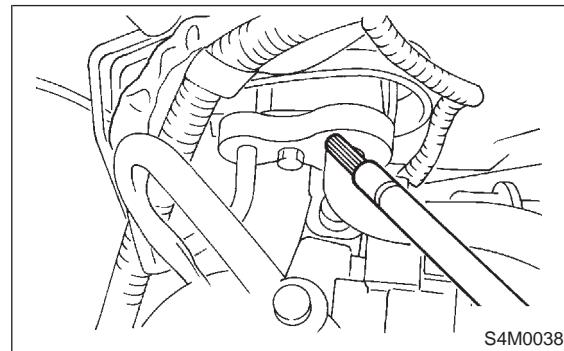
Some shaft seals have a very slight amount of normal leakage [approximately 28 g (1.0 oz) per year].

5. LEAK TEST — LOW-PRESSURE SIDE

- Begin at the connection of the low-pressure tube to the evaporator, and work your way along the low-pressure of the system to the compressor. There are three places to check on each tube connection.

- Check the area:

- Check the area where the fitting joins the tube.
- Check the area where the two parts of the fitting join each other.



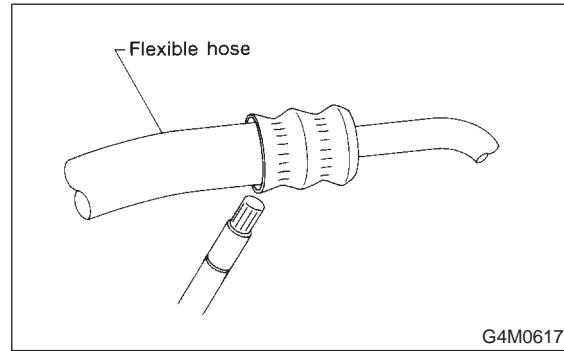
S4M0038

6. CHECK THE FLEXIBLE HOSES

- Visually inspect the rubber portions of the flexible hoses for cracking. Probe the rubber section, including the ends of any insulators or protectors which may cover sections of the rubber hose, and near the ends where the rubber meets the metal collar.

NOTE:

Be certain to move the probe slowly [approximately 25 mm (1 in) per second] when probing along any length of hose or tube.

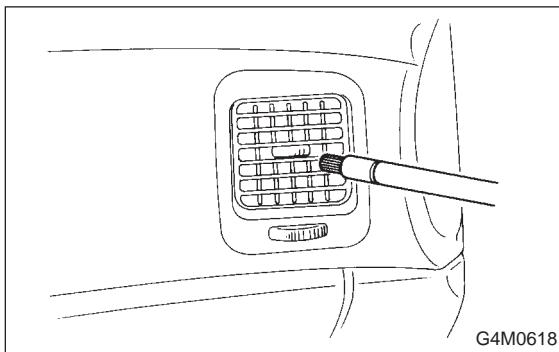


G4M0617

7. CHECK THE EVAPORATOR ASSEMBLY

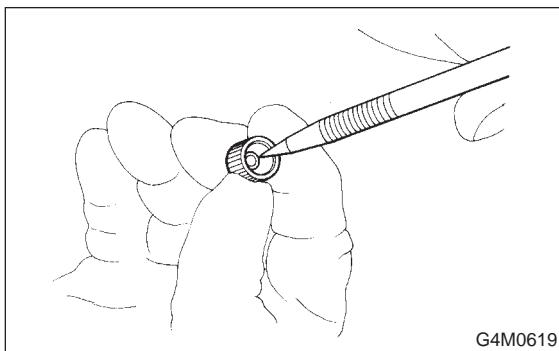
- Use one or both of the following methods to check the evaporator assembly.
- Remove the drain hose from the case drain nipple. Hold the probe at the end of the case drain nipple for at least 10 seconds. Be certain to reconnect the drain hose when finished.

3) With the ignition key in the "ACC" position, run the blower on high speed for 1 minute, then turn the blower off. Place the probe in the center instrument panel vent, and turn the blower on low speed for 1 to 2 seconds, then turn the blower off. Leave the probe in the vent for at least 10 seconds.



8. CHECK THE SERVICE PORT CAPS

Visually inspect the inside of the service port caps. Make sure the rubber seal is in place on the inside of the caps. Disconnect the gauges from the vehicle and install the service port caps.



9. Lubrication

A: ADJUSTMENT

1. SYSTEM OIL STABILIZATION

- 1) Prior to opening the refrigerant system for repairs (except compressor seizure) the system must be stabilized for correct oil replenishment.
- 2) Follow these procedures:
 - (1) Engine speed set to 1,500 rpm
 - (2) A/C "ON"
 - (3) Air source to recirculate
 - (4) Blower 4th or high speed position
 - Make sure the air entering the evaporator is above 26.7°C (80°F).
 - The discharge (high) side pressure must be above 588 kPa (6 kg/cm², 85 psi).- (5) Operate the A/C for 10 minutes.

2. SYSTEM DISCHARGE

Slowly, discharge the system starting with the high-pressure side until the pressure drops below 345 kPa (3.52 kg/cm², 50 psi), then open the low-pressure side.

B: REPLACEMENT

1. OIL REPLACEMENT

- 1) After stabilization and discharge, replace the component, adding the appropriate amount of oil (ZXL200PG) to the new component before installation.

Evaporator	50 ml (1.7 US fl oz, 1.8 Imp fl oz)
Receiver drier	10 ml (0.3 US fl oz, 0.4 Imp fl oz)
Condenser	30 ml (1.0 US fl oz, 1.1 Imp fl oz)
Hose	10 ml (0.3 US fl oz, 0.4 Imp fl oz)

- 2) If the compressor is replaced (after stabilization):

- (1) Drain and measure the oil from the original compressor.
- (2) Drain the oil from the replacement compressor and refill with the same amount that was drained from the original [20 ml (0.7 US fl oz, 0.7 Imp fl oz) minimum]. Always use ZXL200PG for the replacement oil.

10. Performance Test

A: INSPECTION

1. VEHICLE SET UP

In order to obtain meaningful test results, the vehicle must be set up to meet the following conditions:

- Vehicle in shade
- No wind
- All vehicle doors closed
- Front windows open
- Hood open
- Engine speed set at 1,500 rpm.
- A/C ON
- Temperature control switch — Maximum cold
- Air source — Recirculation
- Blower speed — 4th position (High)
- Operate A/C for 10 minutes (Minimum) before taking measurement.

2. MEASUREMENTS

After 10 minutes (Minimum) of A/C operation and using accurate test equipment, take the following measurements (in order):

- 1) Evaporator intake air temperature at recirculation door.
- 2) Evaporator discharge air temperature at center grill.
- 3) Condenser (Ambient) intake air temperature measured 0.9 m (3 ft) in front and in line with the center of the condenser
- 4) Suction (Low) side pressure
- 5) Discharge (High) side pressure

NOTE:

If only one thermometer is available; 1) take the ambient measurement first; then 2) the intake air; and 3) discharge air temperature.

11. Compressor

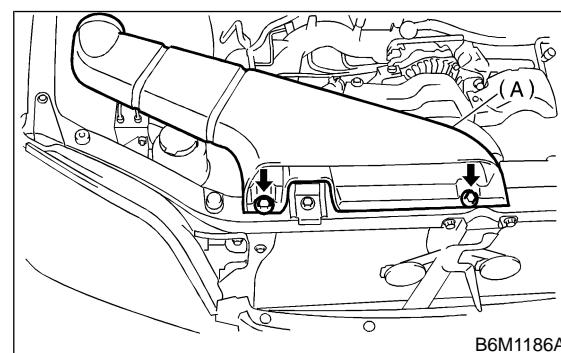
A: INSPECTION

1. COMPRESSOR CLUTCH

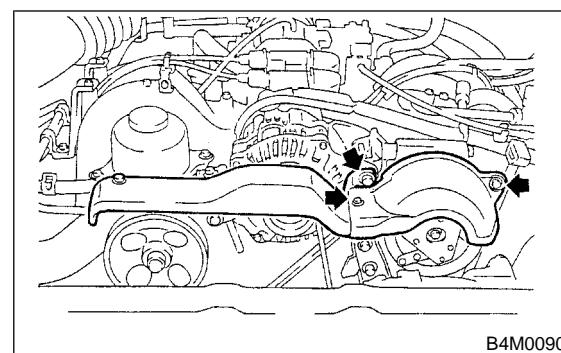
NOTE:

Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.

- 1) Remove duct (A).



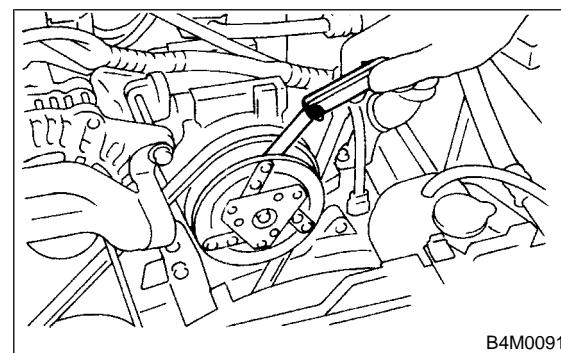
- 2) Remove belt cover.



- 3) Check that clearance between drive plate and pulley over the entire perimeter is within specifications.

Clearance:

$0.45 \pm 0.15 \text{ mm (0.0177} \pm 0.0059 \text{ in)}$



- 4) Check that voltage applied to magnetic coil is at least 10.5 volts.
- 5) When noise is noted, check that it originates in either compressor or pulley bearing.

10. Performance Test

A: INSPECTION

1. VEHICLE SET UP

In order to obtain meaningful test results, the vehicle must be set up to meet the following conditions:

- Vehicle in shade
- No wind
- All vehicle doors closed
- Front windows open
- Hood open
- Engine speed set at 1,500 rpm.
- A/C ON
- Temperature control switch — Maximum cold
- Air source — Recirculation
- Blower speed — 4th position (High)
- Operate A/C for 10 minutes (Minimum) before taking measurement.

2. MEASUREMENTS

After 10 minutes (Minimum) of A/C operation and using accurate test equipment, take the following measurements (in order):

- 1) Evaporator intake air temperature at recirculation door.
- 2) Evaporator discharge air temperature at center grill.
- 3) Condenser (Ambient) intake air temperature measured 0.9 m (3 ft) in front and in line with the center of the condenser
- 4) Suction (Low) side pressure
- 5) Discharge (High) side pressure

NOTE:

If only one thermometer is available; 1) take the ambient measurement first; then 2) the intake air; and 3) discharge air temperature.

11. Compressor

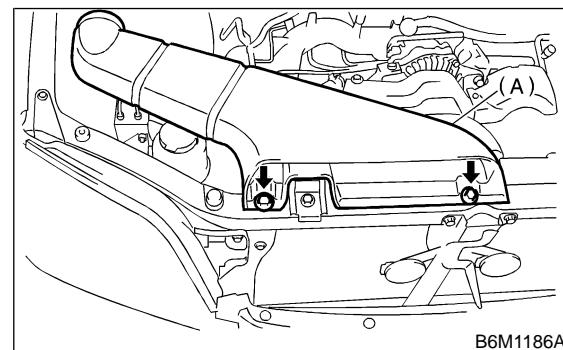
A: INSPECTION

1. COMPRESSOR CLUTCH

NOTE:

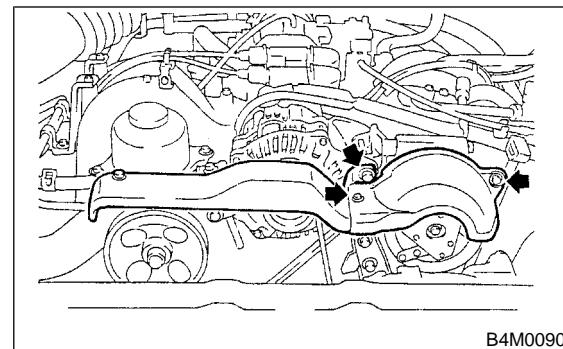
Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.

- 1) Remove duct (A).



B6M1186A

- 2) Remove belt cover.

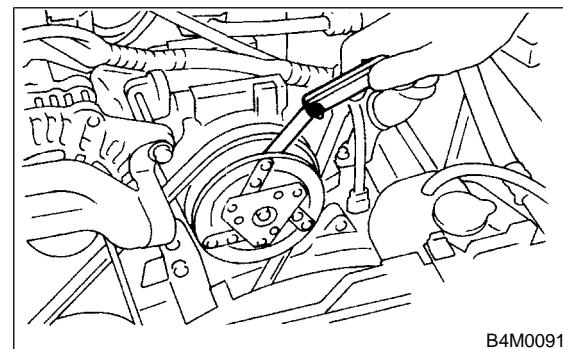


B4M0090

- 3) Check that clearance between drive plate and pulley over the entire perimeter is within specifications.

Clearance:

$0.45 \pm 0.15 \text{ mm (0.0177} \pm 0.0059 \text{ in)}$

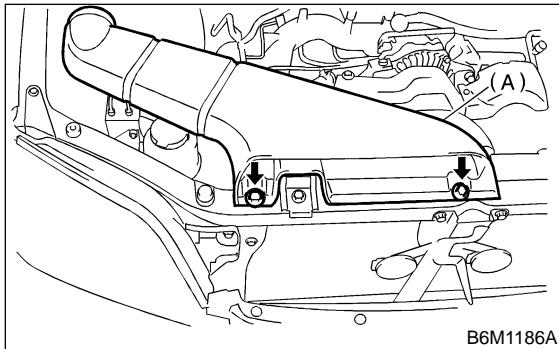


B4M0091

- 4) Check that voltage applied to magnetic coil is at least 10.5 volts.
- 5) When noise is noted, check that it originates in either compressor or pulley bearing.

B: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Remove duct (A).

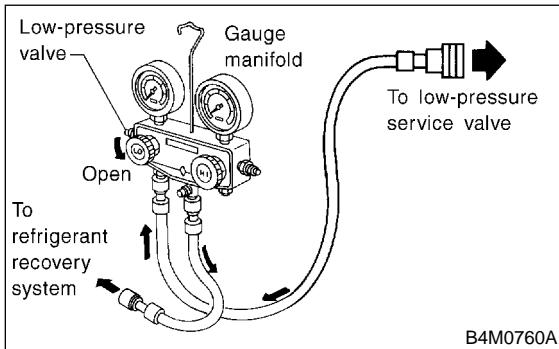


- 3) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>

- (1) Fully close low-pressure valve of manifold gauge.
- (2) Connect low-pressure charging hose of manifold gauge to low-pressure service valve.
- (3) Open low-pressure manifold gauge valve slightly, and slowly discharge refrigerant from system.

CAUTION:

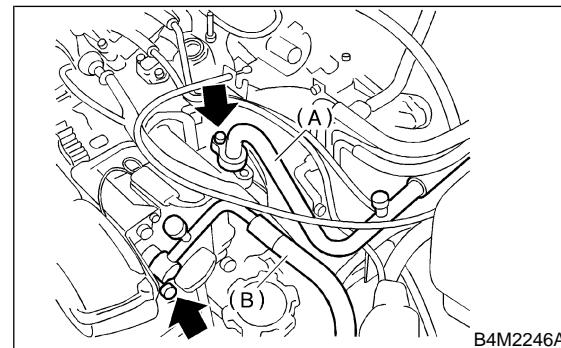
Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.



- 4) Remove low-pressure hose (A) (Flexible hose Ps) and high-pressure hose (B) (Flexible hose Pd).

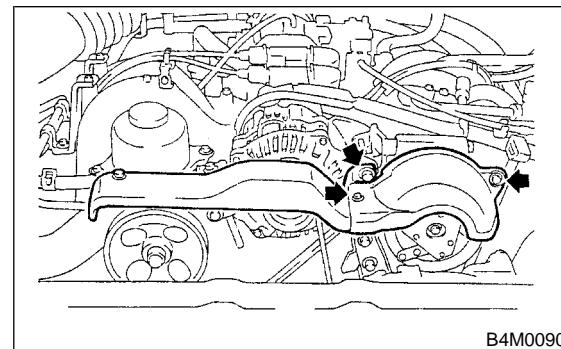
CAUTION:

- Be careful not to lose O-ring of low-pressure hose.
- Plug the opening to prevent foreign matter from entering.



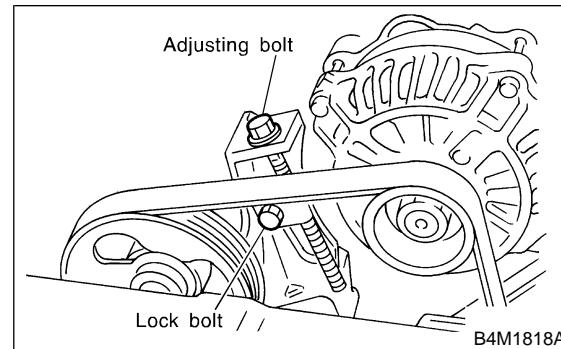
- 5) Compressor belt cover and alternator belt cover:

- (1) Remove bolts which secure belt covers.

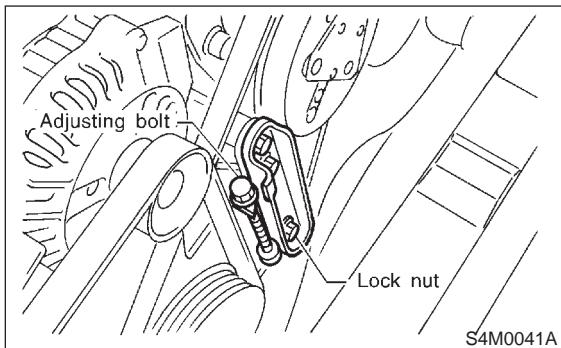


- 6) Remove alternator V-belt:

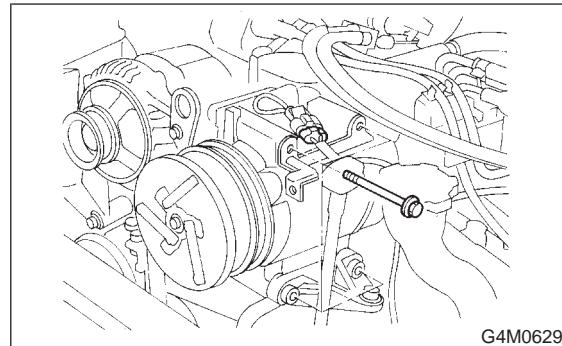
- (1) Loosen lock bolt on alternator bracket.
- (2) Turn adjusting bolt and remove V-belt.



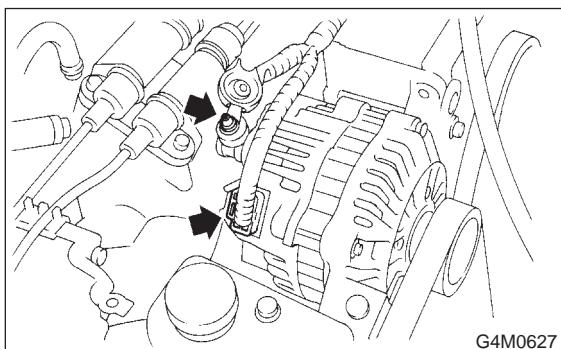
7) Remove compressor V-belt:
 (1) Loosen lock bolt on idler pulley.
 (2) Turn adjusting bolt and remove V-belt.



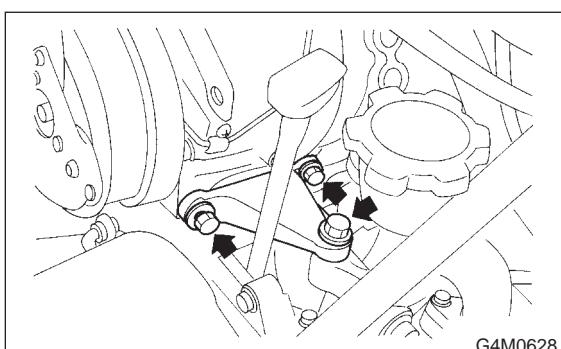
11) Remove compressor:
 (1) Remove bolts which secure compressor.
 (2) Remove compressor from bracket.



8) Disconnect alternator harness.

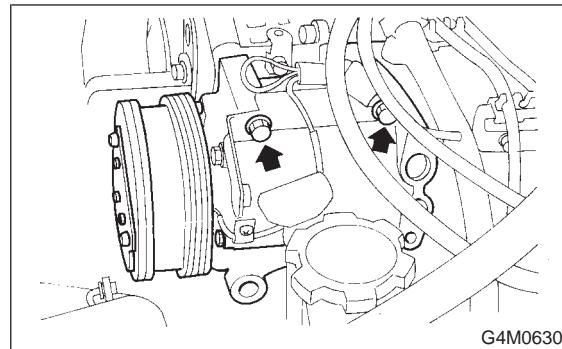


9) Disconnect compressor harness:
 (1) Disconnect compressor harness from body harness.
 10) Remove lower bracket:
 (1) Remove bolts which secure lower compressor bracket.

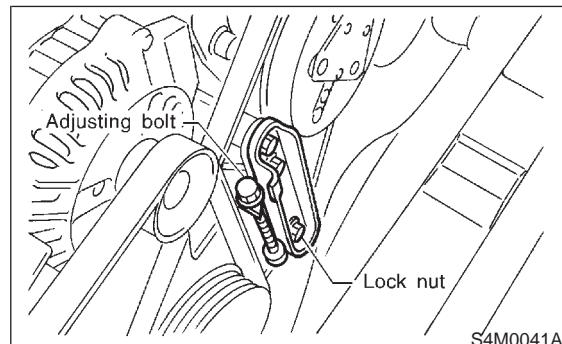


C: INSTALLATION

1) Install compressor:
 (1) Install compressor on bracket.

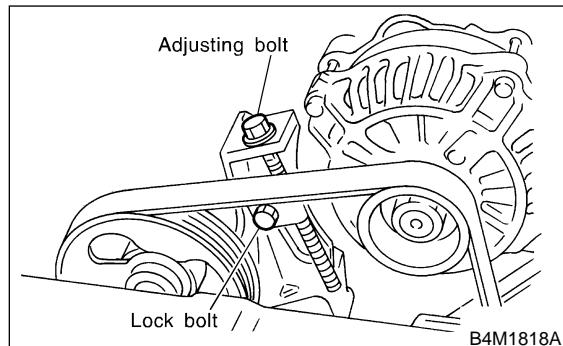


2) Connect compressor harness.
 3) Connect alternator harness.
 4) Install compressor V-belt (Rear):
 (1) After adjusting belt tension, tighten tension pulley lock bolt securely.



5) Install alternator V-belt:

(1) After adjusting V-belt tension, tighten alternator bracket lock bolt securely.



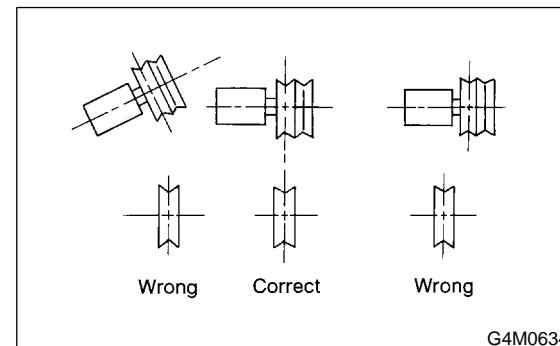
6) Check drive belt tension and adjust it if necessary by changing alternator position and/or idler pulley position.

CAUTION:

- Ensure that the V-belt is aligned correctly. If it is not, check for loose bolts.
- The V-belt should not be too tight or too loose.

A belt which is too tight may break bearing or cause gas to leak from the shaft seal. A belt which is too loose slips, thereby causing the belt cut.

- After completing the compressor installation and testing the system operation, check and adjust the tension of both V-belts again.



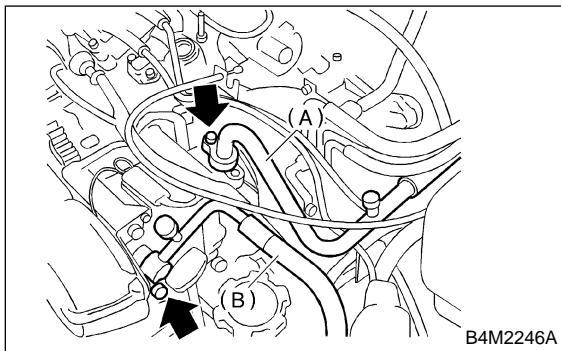
Pulley arrangement	Tension mm (in)/98N (10 kg, 22 lb)	
	(A)	(B)
<p>Figures in table refer to the number of grooves in pulleys. C/P: Crankshaft pulley ALT: Alternator pulley P/S: Power steering oil pump pulley A/C: Air conditioner compressor pulley I/P: Idler pulley</p>	*New belt: 7.0 – 9.0 (0.276 – 0.354) Existing belt: 9.0 – 11.0 (0.354 – 0.433)	*New belt: 7.5 – 8.5 (0.295 – 0.335) Existing belt: 9.0 – 10.0 (0.354 – 0.394)
*When replacing belts with new ones, adjust tensions to specification and then readjust to the same specification after running engine for 5 minutes.		

B4M1098A

7) Install high-pressure hose (B) (Flexible hose Pd) and low-pressure hose (A) (Flexible hose Ps): Connect high-pressure hose (B) and low-pressure hose (A) with compressor.

CAUTION:

Be sure to apply compressor oil to the periphery of O-ring.



8) Install belt cover.

CAUTION:

- After installing belt cover, make sure it is not misaligned or twisted.
- After installing belt cover, check the clearance between pulley and belt cover.

9) Connect ground cable to negative terminal of battery.

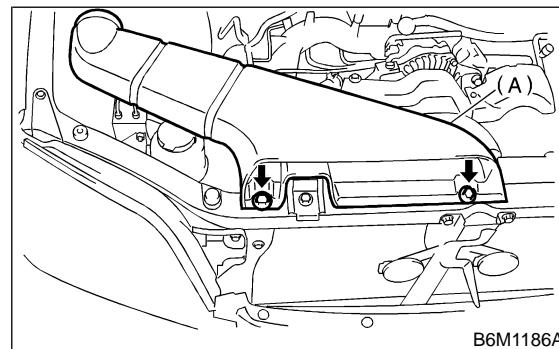
10) Charging refrigerant. <Ref. to 4-7 [W700].>

11) Install duct.

12. Condenser

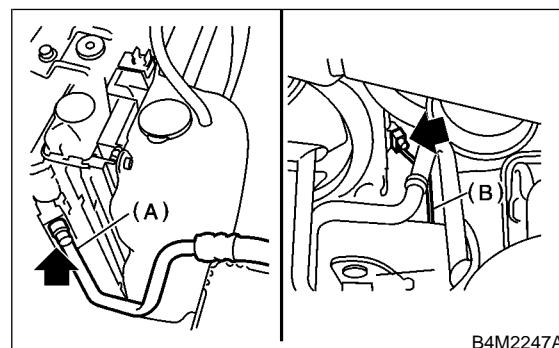
A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Remove duct (A).

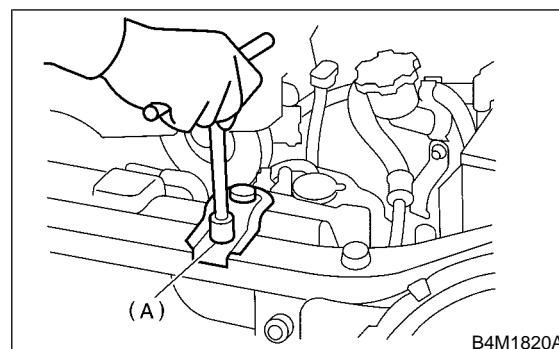


3) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>

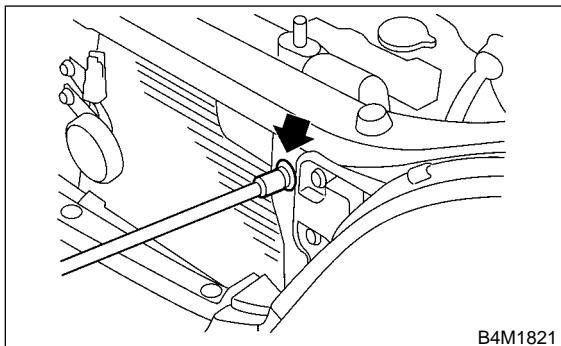
4) Disconnect high-pressure hose (A) and high-pressure pipe (B) from condenser.



5) Remove the radiator bracket (A).



6) Remove the two bolts which secure condenser. While lifting condenser, remove it through space between radiator and radiator panel.



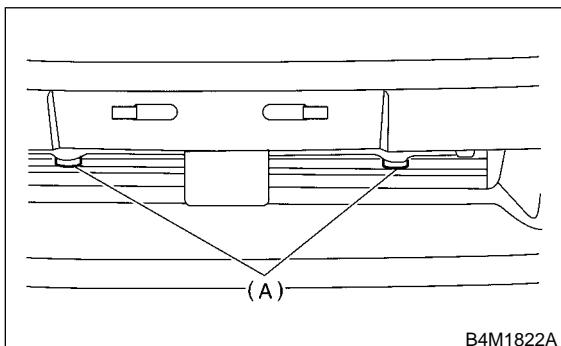
7) The condenser should be installed in the reverse order in which it was removed. When installing the condenser, pay attention to the following:

CAUTION:

Before connecting the pipe, be sure to apply oil to the periphery of O-ring.

NOTE:

After installing condenser, ensure that guide (A) on lower side of condenser is inserted into hole in radiator panel. Tighten attaching bolts.



8) Charge refrigerant. <Ref. to 4-7 [W700].>

B: INSPECTION

1) Make sure the condenser fins are free from dust and insects. If the fins are clogged, clean by blowing air or water through them.

NOTE:

To prevent dust and water from getting into the condenser, this work must be done when the condenser is installed in an actual vehicle.

2) Check the condenser to see if it shows any sign of oil. Should oil ooze or gas leak from the condenser replace it with a new one.

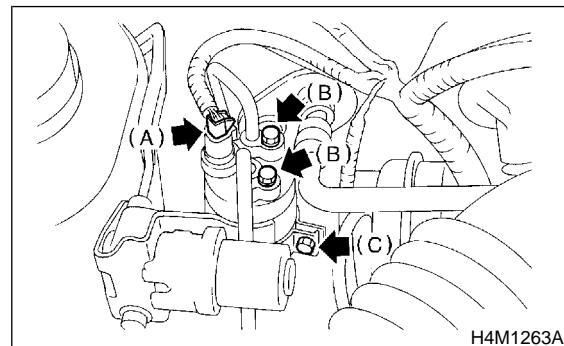
13. Receiver Drier

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Disconnect pressure switch harness (A).
- 4) Disconnect pipes (B).
- 5) Remove mounting bolt (C) and remove receiver drier.

CAUTION:

The receiver drier contains a desiccant. Be sure to put a blind plug in the detached receiver drier to protect it from moisture.

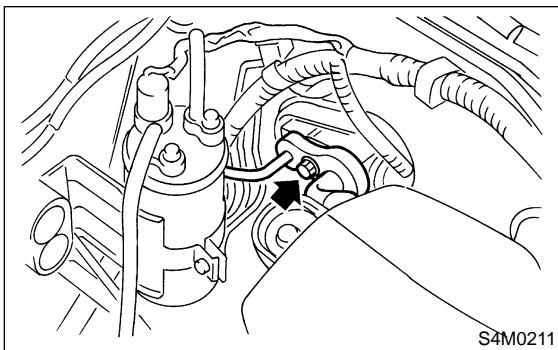


- 6) Install the receiver drier in the reverse order of removal.
- 7) Charge refrigerant. <Ref. to 4-7 [W700].>

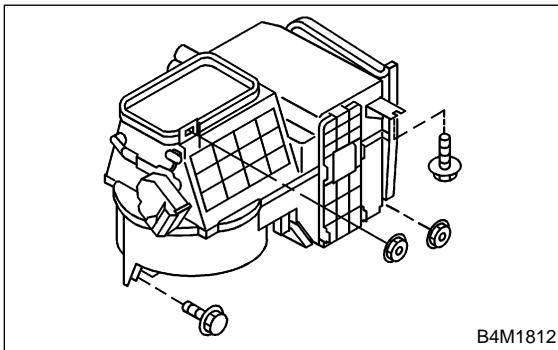
14. Intake Unit with Evaporator

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Remove bolt then disconnect discharge pipe and suction pipe.



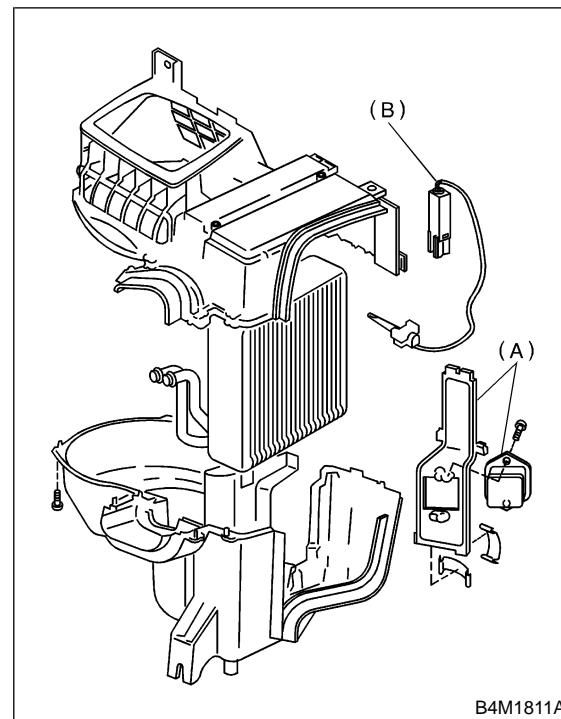
- 4) Remove glove box. <Ref. to 5-4 [W1A0].>
- 5) Disconnect the harness connector from intake unit.
- 6) Disconnect drain hose.
- 7) Remove intake unit mounting bolt and nut.



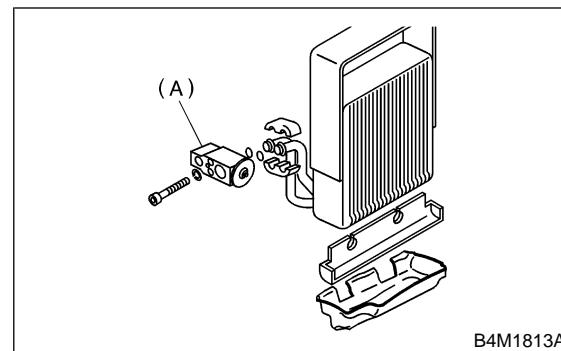
- 8) Install the intake unit in the reverse order of removal.
- 9) Charge refrigerant. <Ref. to 4-7 [W700].>

B: DISASSEMBLY AND ASSEMBLY

- 1) Remove resistor assembly (A) and remove thermo control amplifier (B) from intake unit case.
- 2) Remove some screws and clips then separate intake unit case.



- 3) Remove the block expansion valve (A) from evaporator.



- 4) Check to see if the evaporator fins are clogged. If they are, clean them with compressed air.

CAUTION:

Water must never be used to clean the evaporator.

- 5) Check parts that have been removed for cracks or scratches, and repair or replace them with new ones, if necessary.
- 6) Reassemble the intake unit in the reverse order of disassembly.

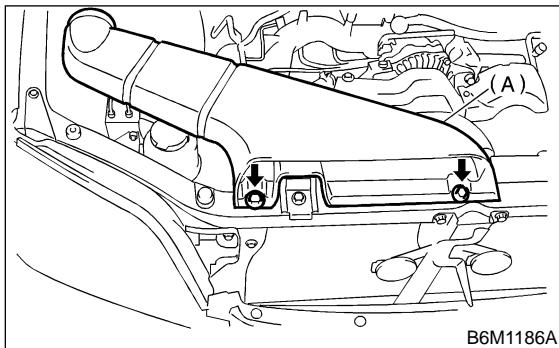
NOTE:

Confirm that the O-ring is inserted in the specified position.

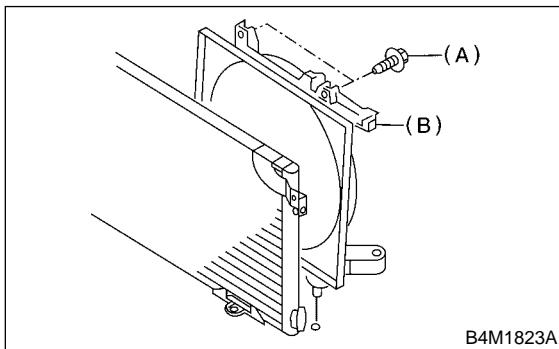
15. Condenser Fan Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Remove duct (A).



- 3) Disconnect harness connector from fan motor.
- 4) Remove condenser fan bolt (A) from radiator.
- 5) Pull condenser fan assembly (B).



- 6) Install the condenser fan assembly in the reverse order of removal.

16. Flexible Hose

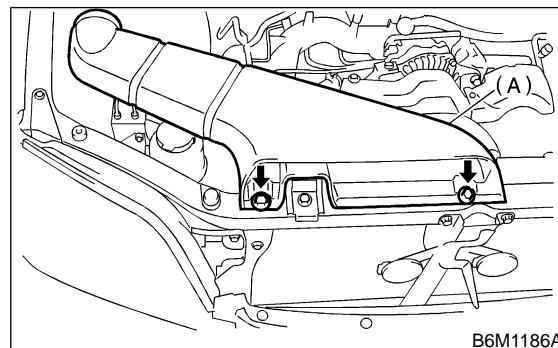
A: REMOVAL AND INSTALLATION

CAUTION:

With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.

- The flexible hoses should be free from twists and tension after they have been connected.
- The flexible hoses must not be bent or twisted forcibly.

- 1) Disconnect battery negative terminal.
- 2) Remove duct (A).



- 3) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 4) Remove low-pressure hose (A):

CAUTION:

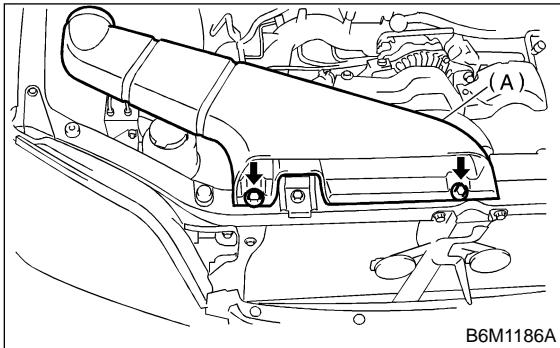
Plug the opening to prevent foreign matter from getting in.

- (1) Remove hose attaching bolts (C).
- (2) Remove hose clip.
- (3) Remove the hose assembly from evaporator unit.
- (4) Disconnect the low-pressure hose from the hose assembly.

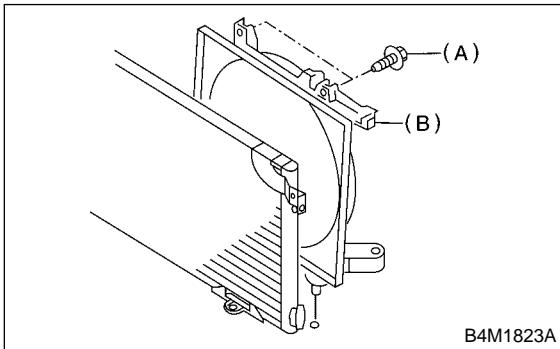
15. Condenser Fan Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Remove duct (A).



- 3) Disconnect harness connector from fan motor.
- 4) Remove condenser fan bolt (A) from radiator.
- 5) Pull condenser fan assembly (B).



- 6) Install the condenser fan assembly in the reverse order of removal.

16. Flexible Hose

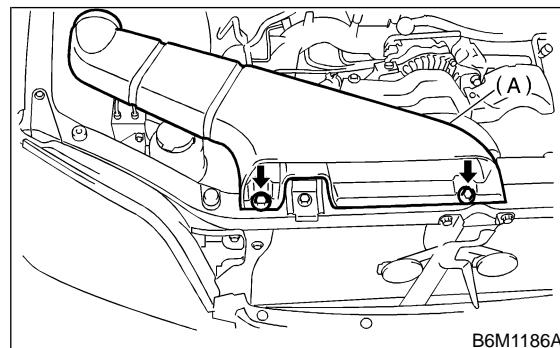
A: REMOVAL AND INSTALLATION

CAUTION:

With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.

- The flexible hoses should be free from twists and tension after they have been connected.
- The flexible hoses must not be bent or twisted forcibly.

- 1) Disconnect battery negative terminal.
- 2) Remove duct (A).



- 3) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 4) Remove low-pressure hose (A):

CAUTION:

Plug the opening to prevent foreign matter from getting in.

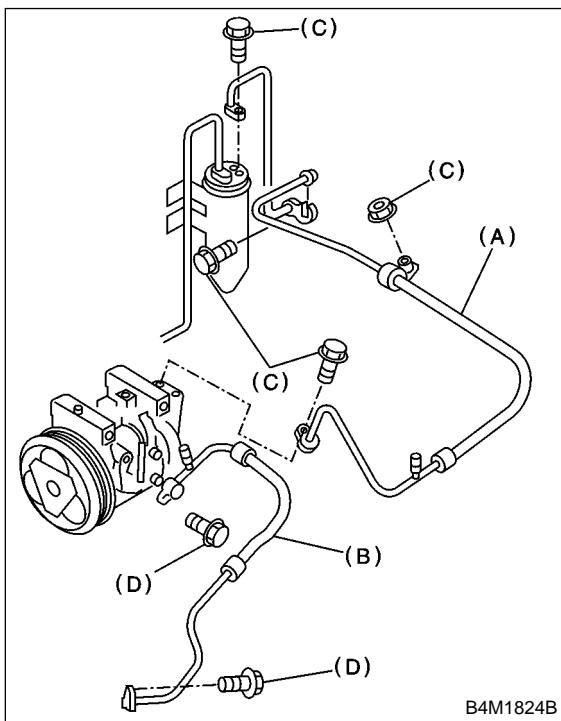
- (1) Remove hose attaching bolts (C).
- (2) Remove hose clip.
- (3) Remove the hose assembly from evaporator unit.
- (4) Disconnect the low-pressure hose from the hose assembly.

5) Remove high-pressure hose (B):

CAUTION:

Plug the opening to prevent foreign matter from getting in.

Remove hose attaching bolt (D).



6) Installation is in the reverse order of removal.

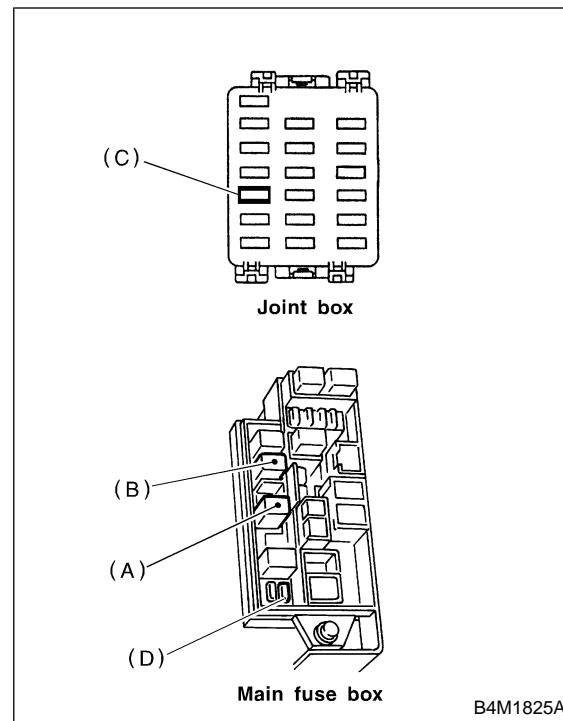
7) Charge refrigerant. <Ref. to 4-7 [W700].>

17. Relay and Fuse

A: LOCATION

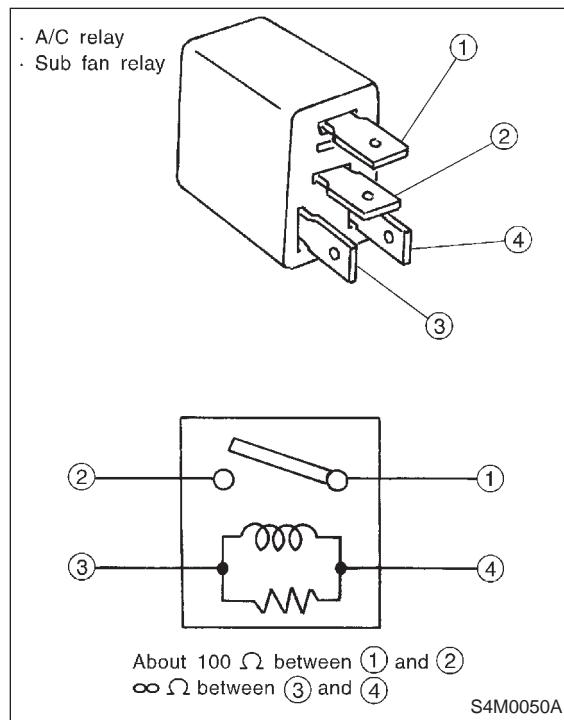
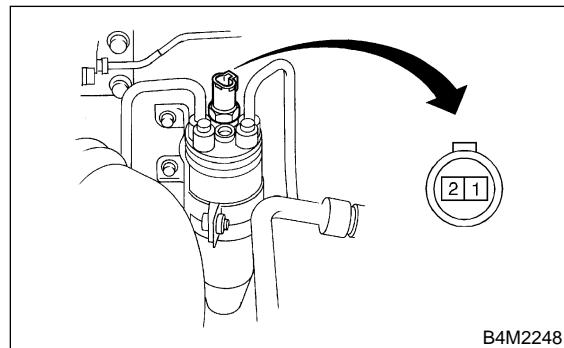
Relays used with A/C system are located as shown in figure.

- A/C relay (A)
- Sub fan (condenser fan) relay (B)
- A/C fuse 15 A (C) and sub fan fuse 20 A (D)



B: INSPECTION

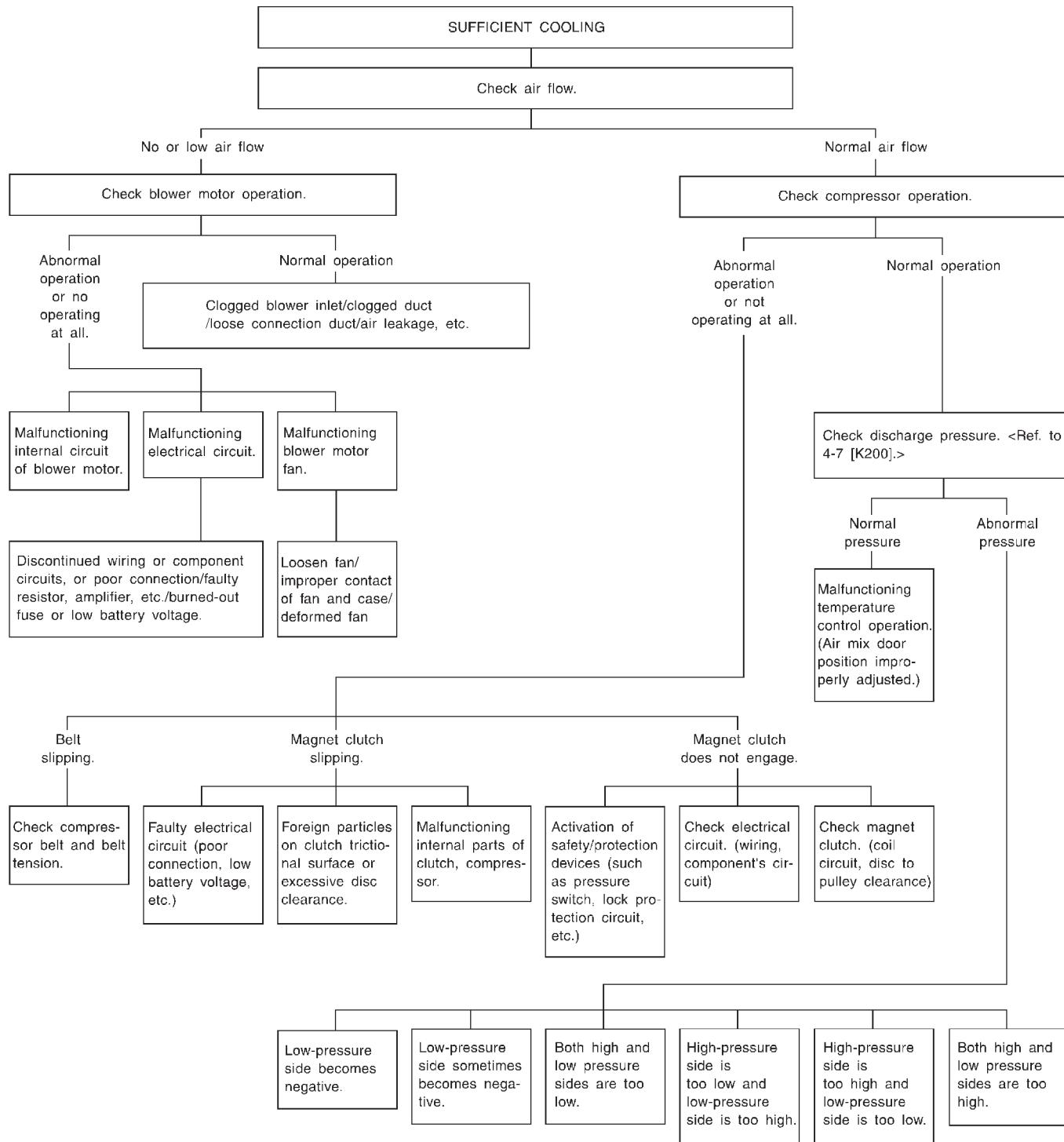
Check conduction with a circuit tester (ohm range) according to the following table in figure.

**18. Pressure Switch (Dual Switch)****A: INSPECTION**

- 1) Remove cap from high-pressure line service valve, and connect gauge manifold to service valve.
- 2) Disconnect pressure switch harness connector, and check pressure switch for proper ON-OFF operation. Use a circuit tester.

	Terminal	Operation	High-pressure side line pressure
High and low pressure switch	1 — 2	Turns OFF.	Increasing to 2,942 \pm 196 kPa (30 \pm 2 kg/cm 2 , 427 \pm 28 psi)
			Decreasing to 177 \pm 25 kPa (1.8 \pm 0.25 kg/cm 2 , 25.6 \pm 3.6 psi)
	1 — 2	Turns ON.	Increasing to 216 $^{+39}_{-25}$ kPa (2.2 $^{+0.4}_{-0.25}$ kg/cm 2 , 31 $^{+5.7}_{-3.6}$ psi)
			Decreasing to 2,354 \pm 196 kPa (24 \pm 2 kg/cm 2 , 341 \pm 28 psi)

1. Air Conditioning System Diagnosis

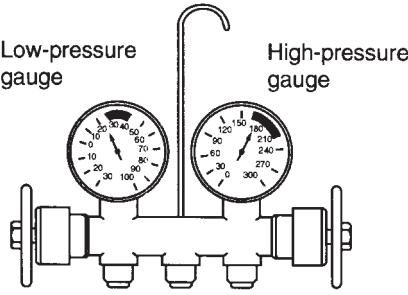
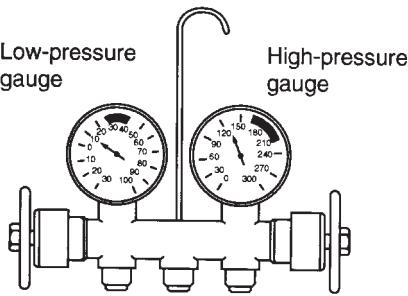
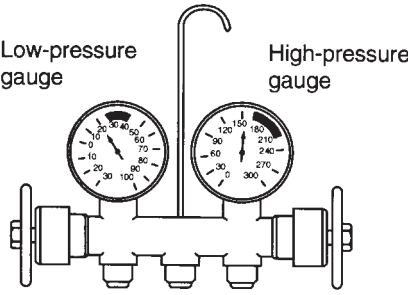


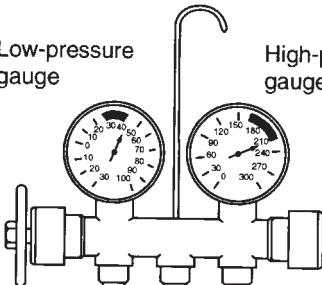
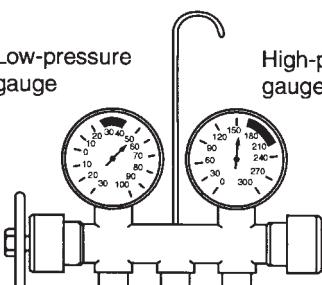
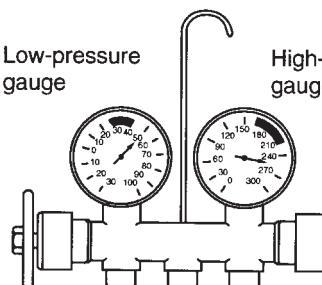
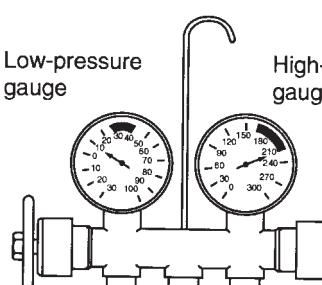
2. Performance Test Diagnosis

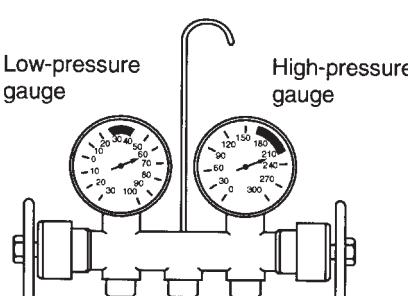
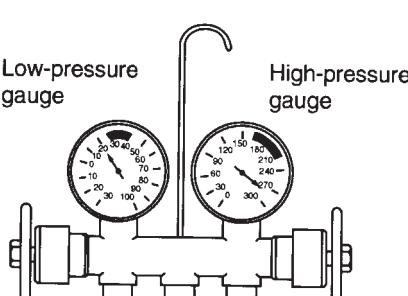
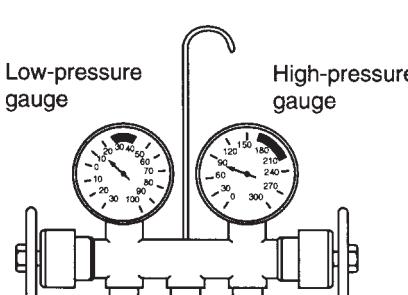
If various conditions caused to other air conditioning system, the characteristics revealed on manifold gauge reading are shown in the following.

As to the method of a performance test, refer to the item of "Performance Test".

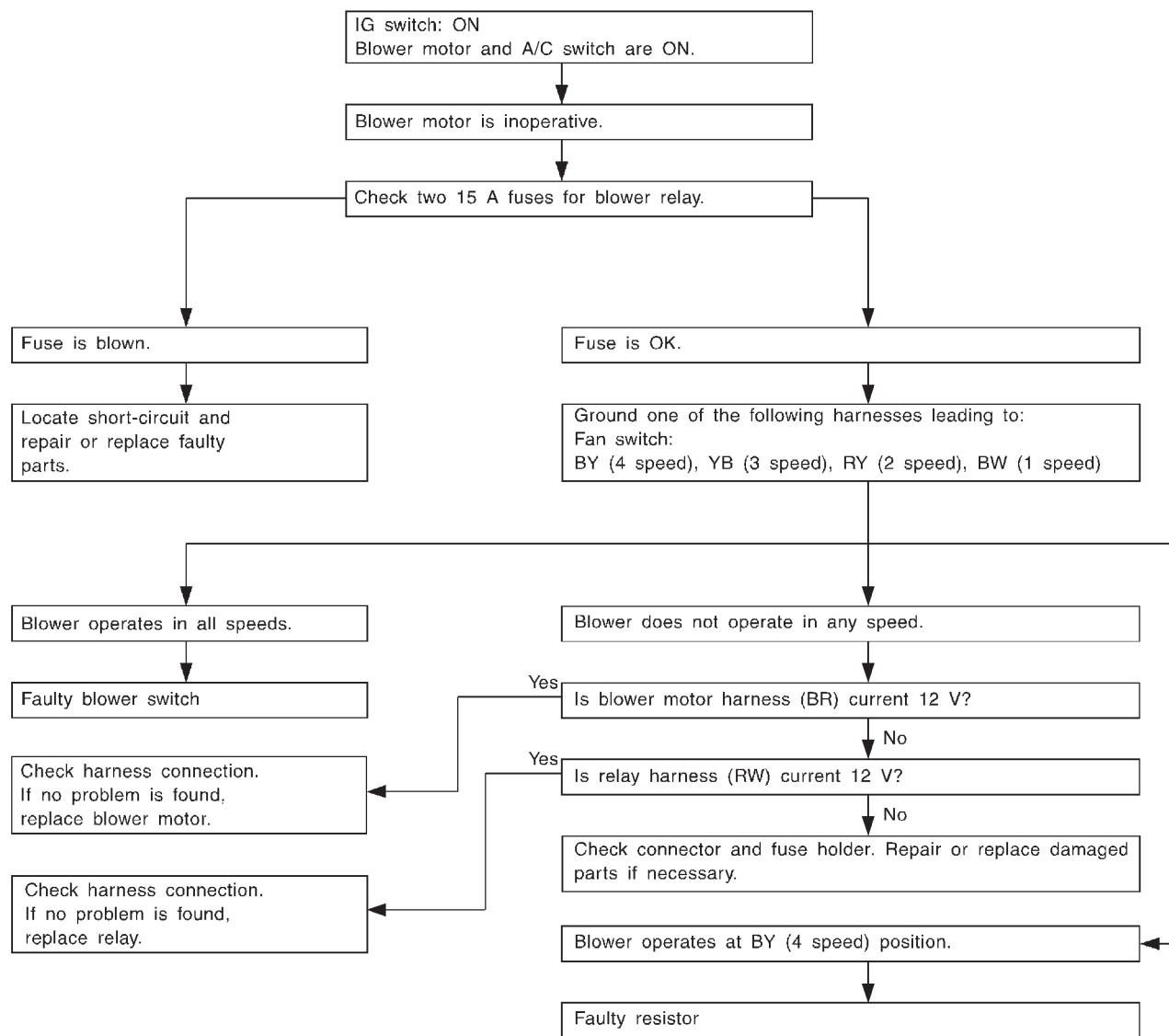
Each shaded area on the following tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (91°F).

Condition	Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE  G4M0673	Insufficient cooling. Refrigerant is small, or leaking a little.	1. Leak test. 2. Repair leak. 3. Charge system. Evacuate, as necessary, and recharge system.
ALMOST NO REFRIGERANT  G4M0674	No cooling action. Serious refrigerant leak.	Stop compressor immediately. 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
FAULTY EXPANSION VALVE  G4M0675	Slight cooling. Sweating or frosted expansion valve inlet. Expansion valve restricts refrigerant flow. ● Expansion valve is clogged. ● Expansion valve is inoperative. ● Valve stuck closed. Thermal bulb has lost charge.	● If valve inlet reveals sweat or frost: 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. ● If valve does not operate: 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

Condition	Probable cause	Corrective action
 <p>Low-pressure gauge High-pressure gauge</p> <p>G4M0676</p>	<p>Insufficient cooling. Sweated suction line. No cooling. Sweating or frosted suction line.</p> <p>Expansion valve allows too much refrigerant through evaporator. Faulty seal of O-ring in expansion valve.</p>	<p>Check valve for operation. If suction side does not show a pressure decrease, replace valve.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Remove expansion valve and replace O-ring. 3. Evacuate and replace system.
 <p>Low-pressure gauge High-pressure gauge</p> <p>G4M0677</p>		
AIR IN SYSTEM  <p>Low-pressure gauge High-pressure gauge</p> <p>G4M0678</p>	<p>Insufficient cooling.</p>	<p>Air mixed with refrigerant in system.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.
MOISTURE IN SYSTEM  <p>Low-pressure gauge High-pressure gauge</p> <p>G4M0679</p>	<p>After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As warning of this, reading shows 39 kPa (0.4 kg/cm², 6 psi) vibration.</p>	<p>Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat 30 minute evacuating three times.) 4. Recharge system.

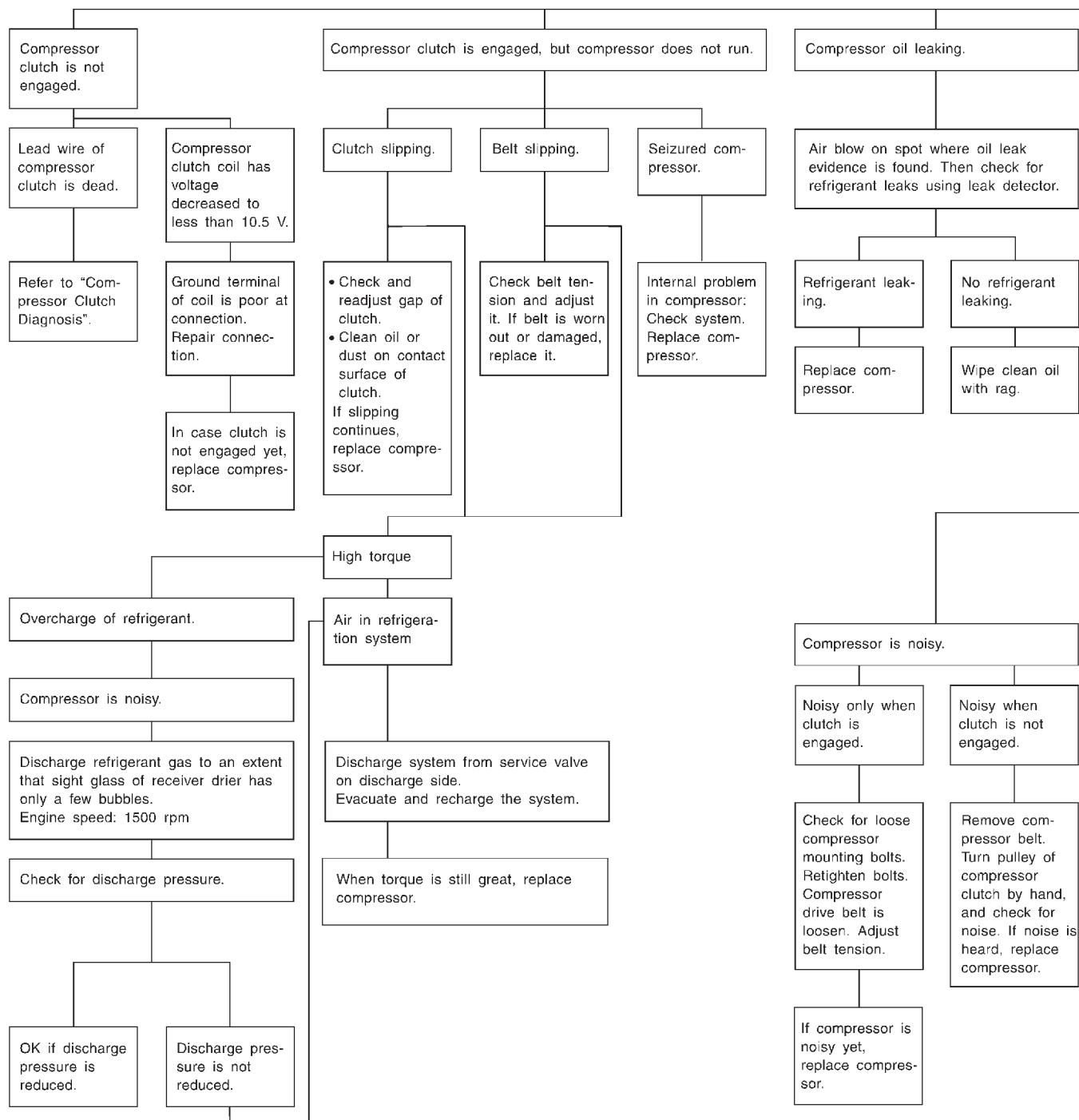
Condition	Probable cause	Corrective action
FAULTY CONDENSER  G4M0680	No cooling action. Engine may overheat. Suction line is very hot.	Condenser is often found not functioning well. <ul style="list-style-type: none"> Check condenser cooling fan. Check condenser for dirt accumulation. Check engine cooling system for overheat. Check for refrigerant overcharge. If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.
HIGH-PRESSURE LINE BLOCKED  G4M0681	Insufficient cooling. Frosted high-pressure liquid line.	Drier clogged, or restriction in high-pressure line. <ol style="list-style-type: none"> Discharge system. Remove receiver drier or strainer and replace it. Evacuate and charge system.
FAULTY COMPRESSOR  G4M0682	Insufficient cooling.	Internal problem in compressor, or damaged gasket and valve. <ol style="list-style-type: none"> Discharge system. Remove and check compressor. Repair or replace compressor. Check oil level. Replace receiver drier. Evacuate and charge system.

3. Blower Motor Diagnosis

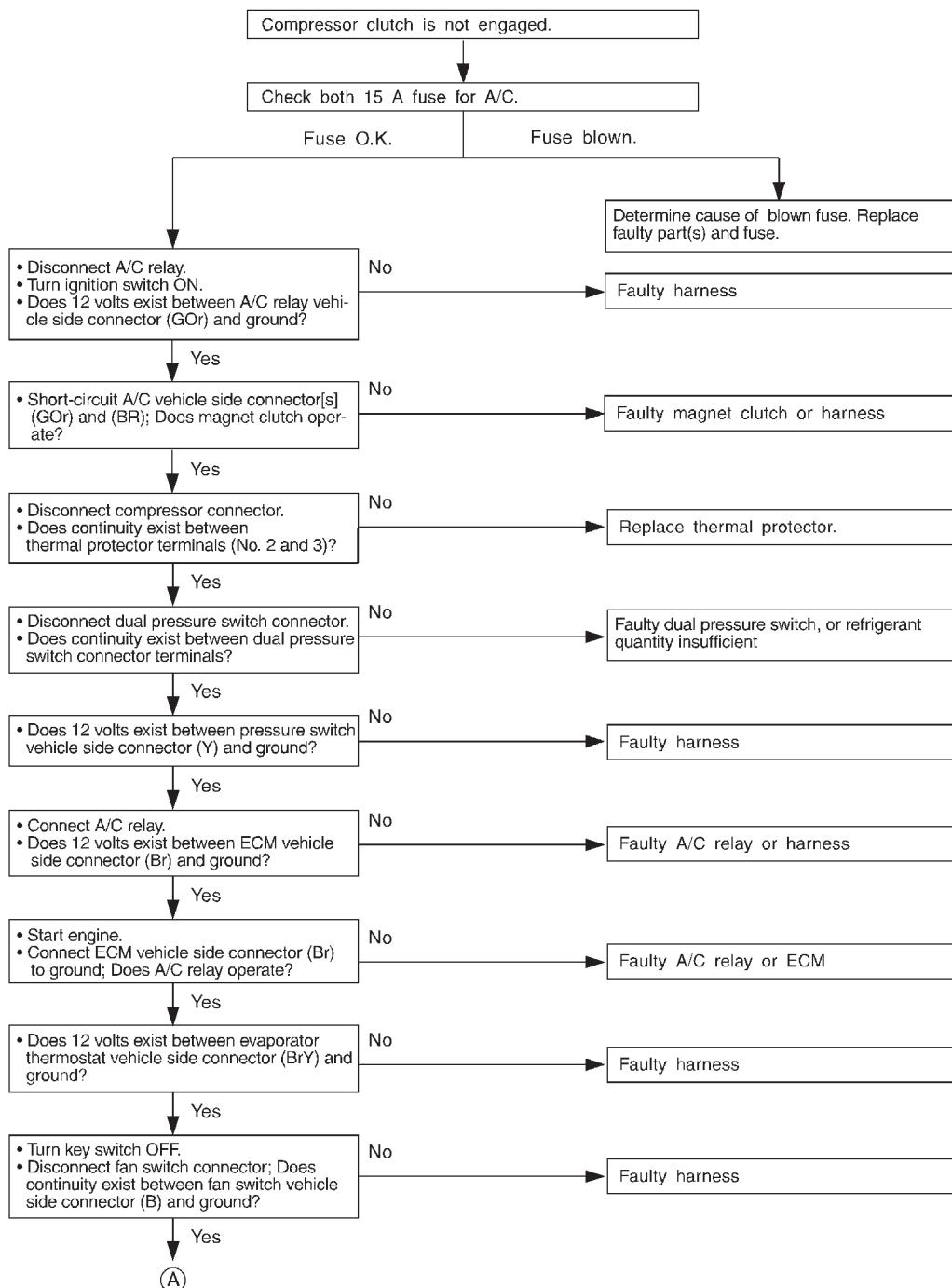


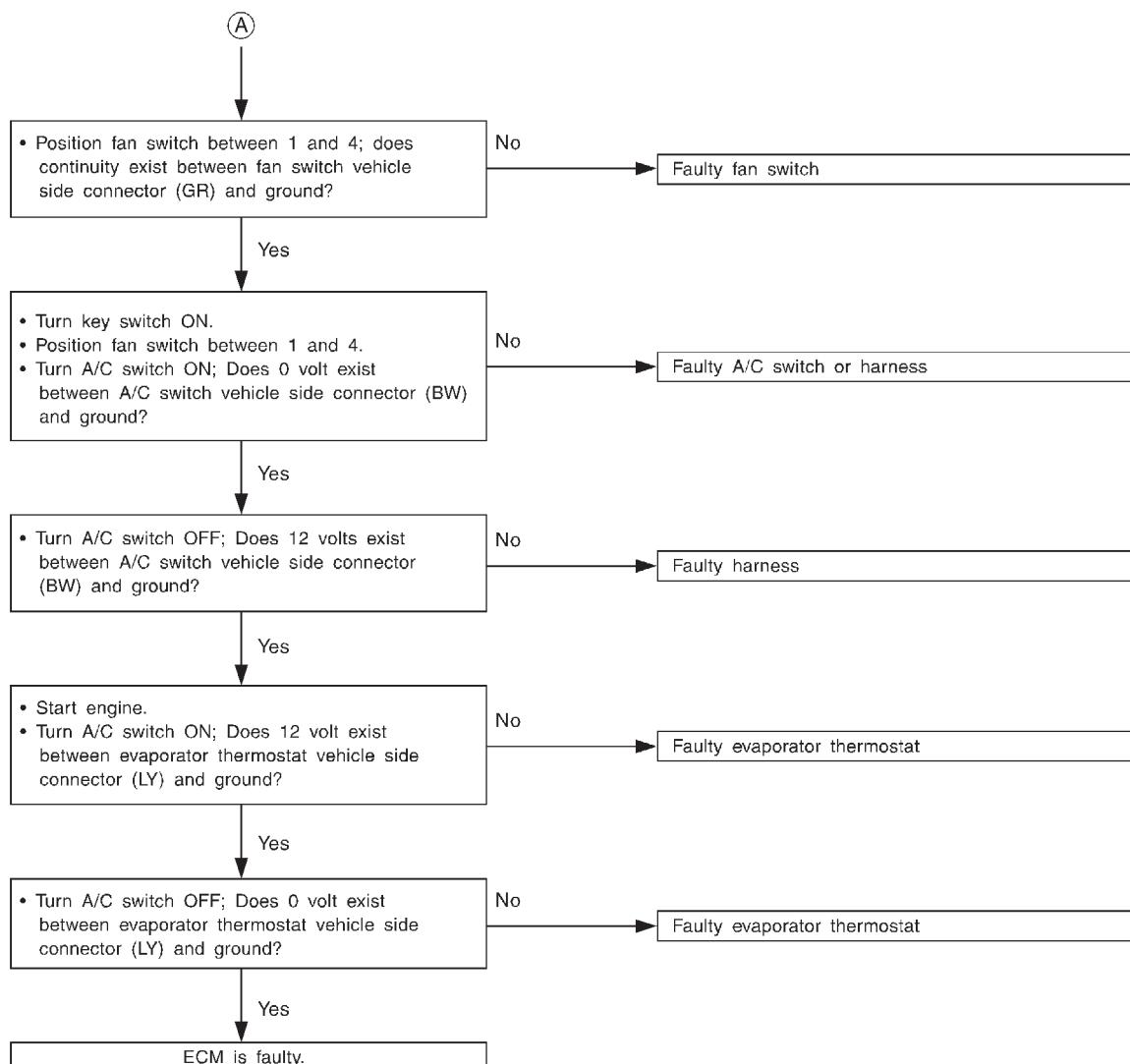
S4M0294A

4. Compressor Diagnosis



5. Compressor Clutch Diagnosis





S4M0296A

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the ABS sensor, ABS control module and hydraulic control unit.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the ABS sensor, ABS control module and hydraulic control unit.

2. Pre-inspection

Before performing diagnostics, check the following items which might affect ABS problems:

A: MECHANICAL INSPECTION

1. POWER SUPPLY

- 1) Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V, or more

Specific gravity: Above 1.260

- 2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. BRAKE FLUID

- 1) Check brake fluid level.
- 2) Check brake fluid leakage.

3. BRAKE DRAG

Check brake drag. <Ref. to 4-4 [K100].>

4. BRAKE PAD AND ROTOR

Check brake pad and rotor. <Ref. to 4-4 [K100].>

5. TIRE SPECIFICATIONS, TIRE WEAR AND AIR PRESSURE

Check tire specifications, tire wear and air pressure. <Ref. to 4-2 [S100].>, <Ref. to 4-2 [S200].>

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Check brake drag. <Ref. to 4-4 [K100].>

4. BRAKE PAD AND ROTOR

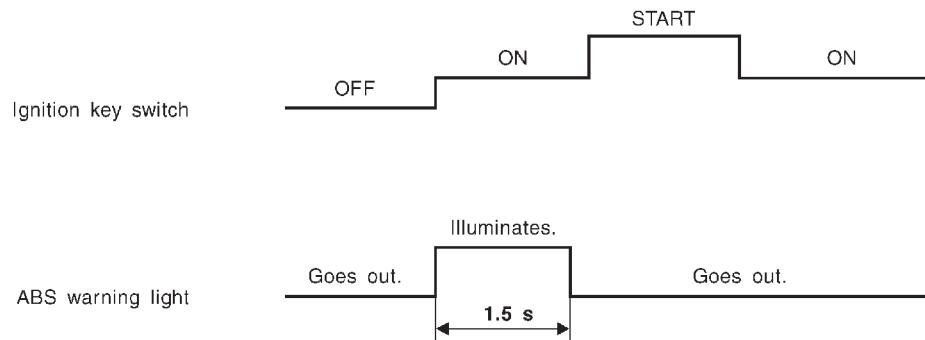
Check brake pad and rotor. <Ref. to 4-4 [K100].>

5. TIRE SPECIFICATIONS, TIRE WEAR AND AIR PRESSURE

Check tire specifications, tire wear and air pressure. <Ref. to 4-2 [S100].>, <Ref. to 4-2 [S200].>

B: ELECTRICAL INSPECTION

1. WARNING LIGHT ILLUMINATION PATTERN



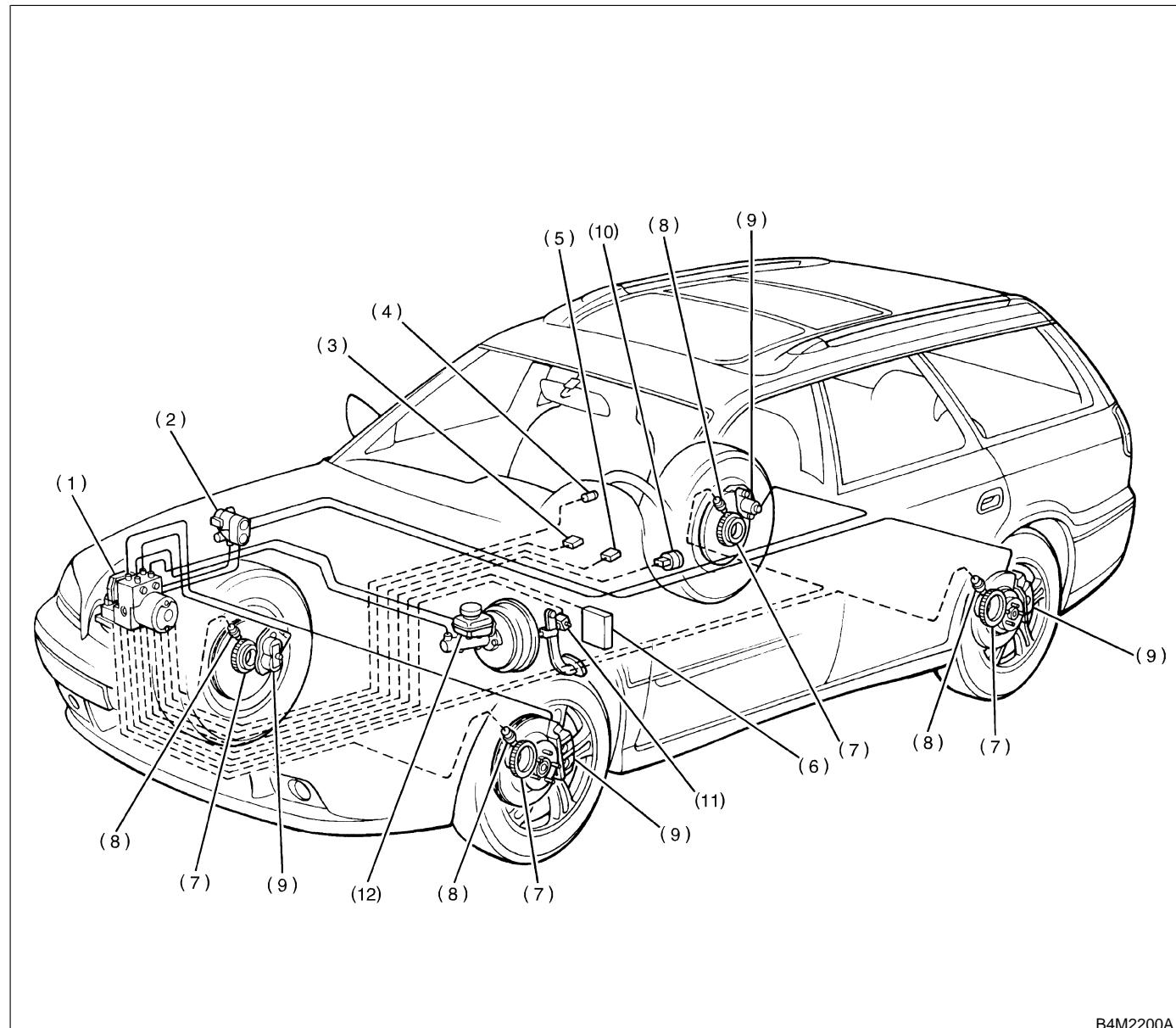
B4M0781A

- 1) When the ABS warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
- 2) When the ABS warning light remains constantly OFF, repair the ABS warning light circuit or diagnosis circuit. <Ref. to 4-4 [T7A0].>

NOTE:

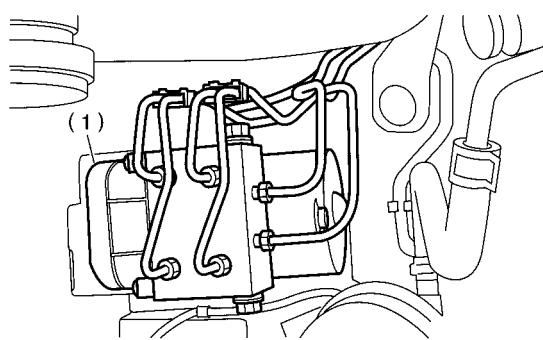
Even though the ABS warning light does not go out 1.5 seconds after it illuminates, the ABS system operates normally when the warning light goes out while driving at approximately 12 km/h (7 MPH). However, the Anti-lock brakes do not work while the ABS warning light is illuminated.

3. Electrical Components Location

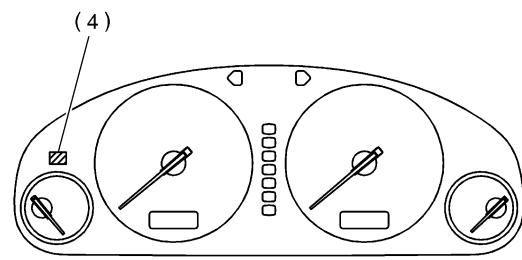


B4M2200A

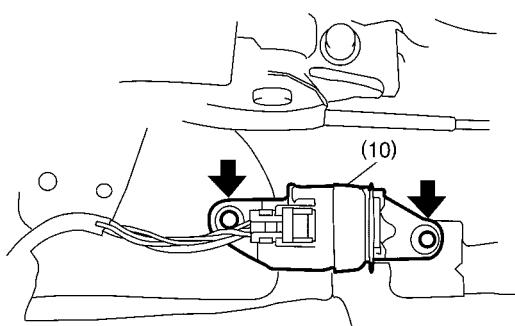
(1) ABS control module and hydraulic control unit (ABSCM&H/U)	(5) Data link connector (for Subaru select monitor)	(8) ABS sensor
(2) Proportioning valve	(6) Transmission control module (only AT vehicle)	(9) Wheel cylinder
(3) Diagnosis connector	(7) Tone wheel	(10) G sensor
(4) ABS warning light	(11) Stop light switch	(12) Master cylinder



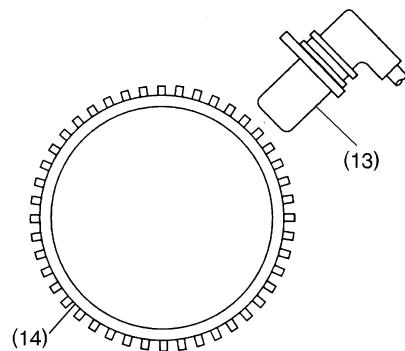
B4M1646A



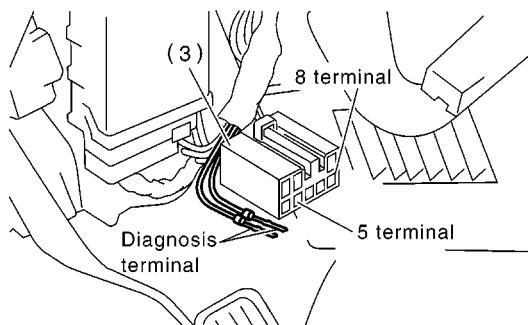
B4M2225A



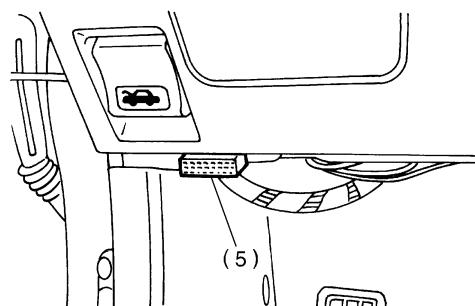
B4M1734A



B4M2201A

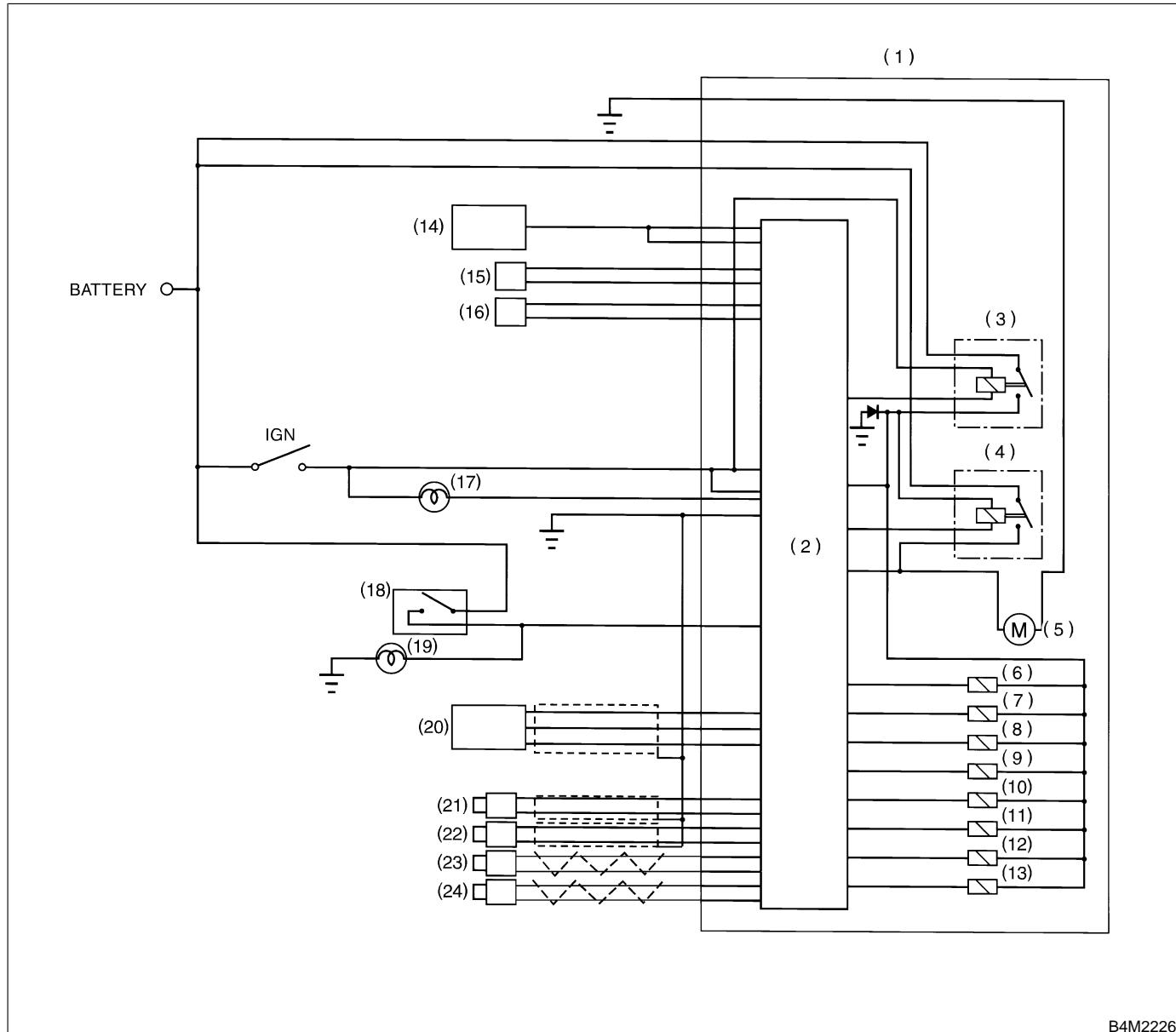


B4M1767A



B2M2960D

4. Schematic



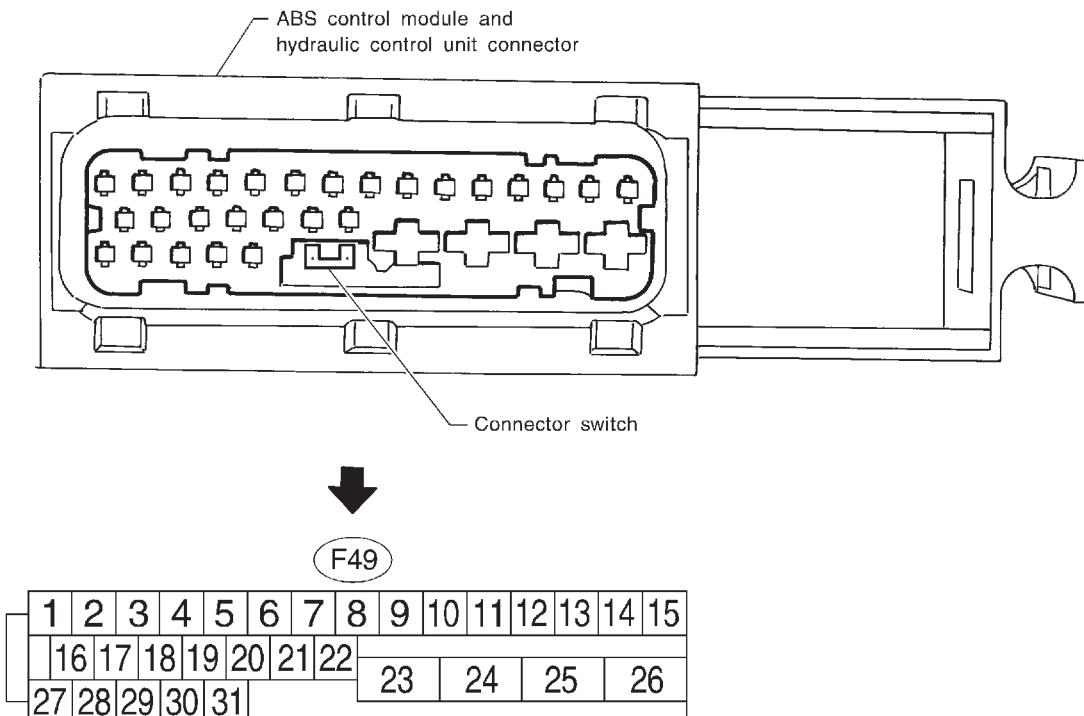
B4M2226

(1) ABS control module and hydraulic control unit (ABSCM&H/U)	(9) Front right outlet solenoid valve	(17) ABS warning light
(2) ABS control module area	(10) Rear left inlet solenoid valve	(18) Stop light switch
(3) Valve relay	(11) Rear left outlet solenoid valve	(19) Stop light
(4) Motor relay	(12) Rear right inlet solenoid valve	(20) G sensor
(5) Motor	(13) Rear right outlet solenoid valve	(21) Front left ABS sensor
(6) Front left inlet solenoid valve	(14) Transmission control module (only AT model)	(22) Front right ABS sensor
(7) Front left outlet solenoid valve	(15) Diagnosis connector	(23) Rear left ABS sensor
(8) Front right inlet solenoid valve	(16) Data link connector	(24) Rear right ABS sensor

MEMO:

5. Control Module I/O Signal

A: I/O SIGNAL VOLTAGE



B4M1228A

NOTE:

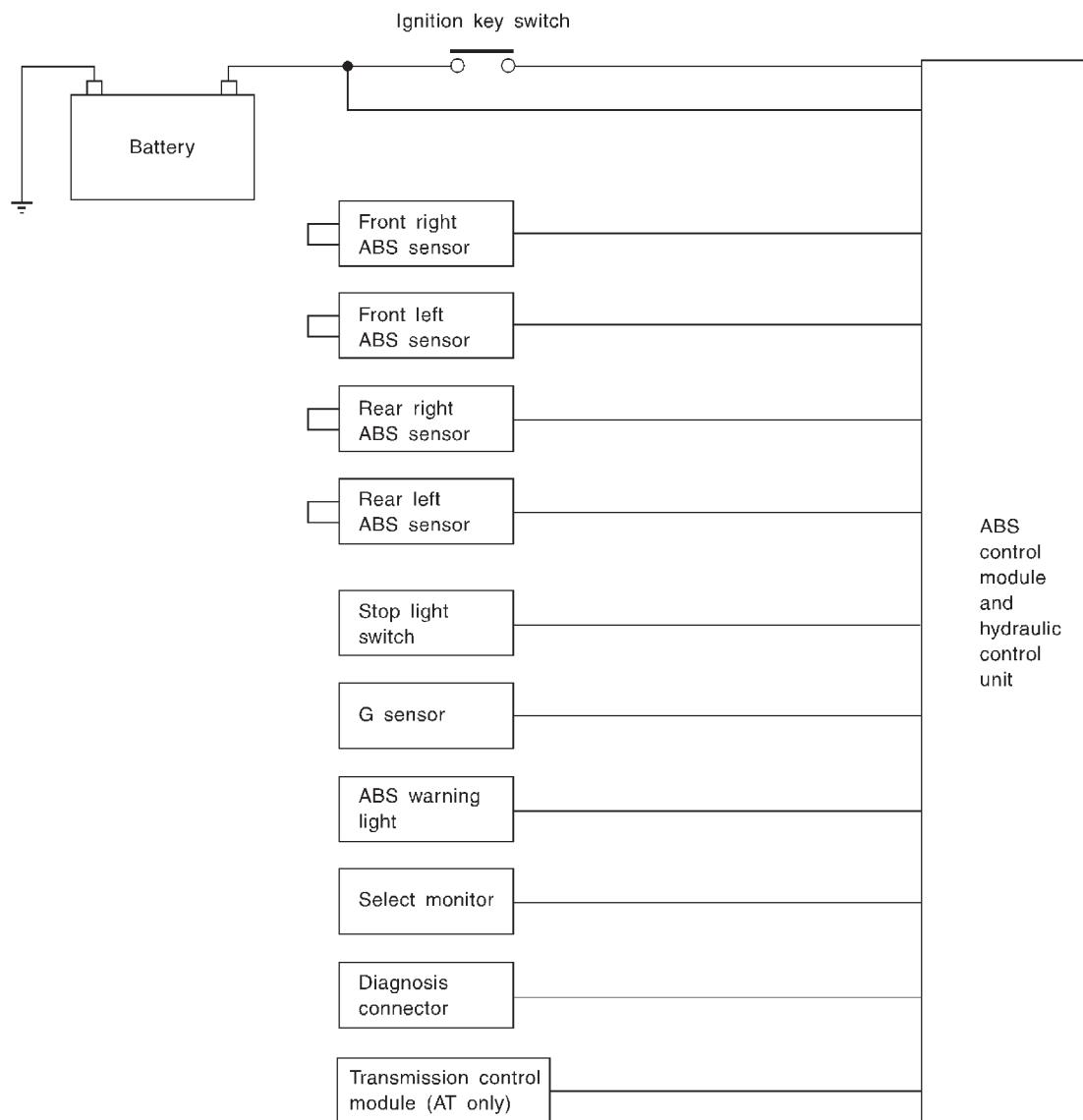
- The terminal numbers in the ABS control module and hydraulic control unit connector are as shown in the figure.
- When the connector is removed from the ABSCM&H/U, the connector switch closes the circuit between terminal No. 21 and No. 23. The ABS warning light illuminates.

Contents		Terminal No. (+)(-)	Input/Output signal
			Measured value and measuring conditions
ABS sensor*2 (Wheel speed sensor)	Front left wheel	9—10	0.12 — 1 V (When it is 20 Hz.)
	Front right wheel	11—12	
	Rear left wheel	7—8	
	Rear right wheel	14—15	
Valve relay power supply		24—23	10 — 15 V
Motor relay power supply		25—23	10 — 15 V
G sensor*2 (AWD model only)	power supply	30—28	4.75 — 5.25 V
	ground	28	—
	output	6—28	2.3±0.2 V when vehicle is in horizontal position.
Stop light switch*1		2—23	Less than 1.5 V when the stop light is OFF and, 10 — 15 V when the stop light is ON.
ABS warning light*2		21—23	Less than 1.5 V during 1.5 seconds when ignition switch is ON, and 10 — 15 V after 1.5 seconds.
AT ABS signal*2 (AT model only)		31—23	Less than 1.5 V when the ABS control still operates and more than 5.5 V when ABS does not operate.
ABS operation signal monitor*2		3—23	Less than 1.5 V when the ABS control still operates and more than 5.5 V when ABS does not operate.
Select monitor*2	Data is received.	20—23	Less than 1.5 V when no data is received.
	Data is sent.	5—23	4.75 — 5.25 V when no data is sent.
ABS diagnosis connector*2	Terminal No. 3	29—23	10 — 15 V when ignition switch is ON.
	Terminal No. 6	4—23	10 — 15 V when ignition switch is ON.
Power supply*1		1—23	10 — 15 V when ignition switch is ON.
Grounding line		23	—
Grounding line		26	—

*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.

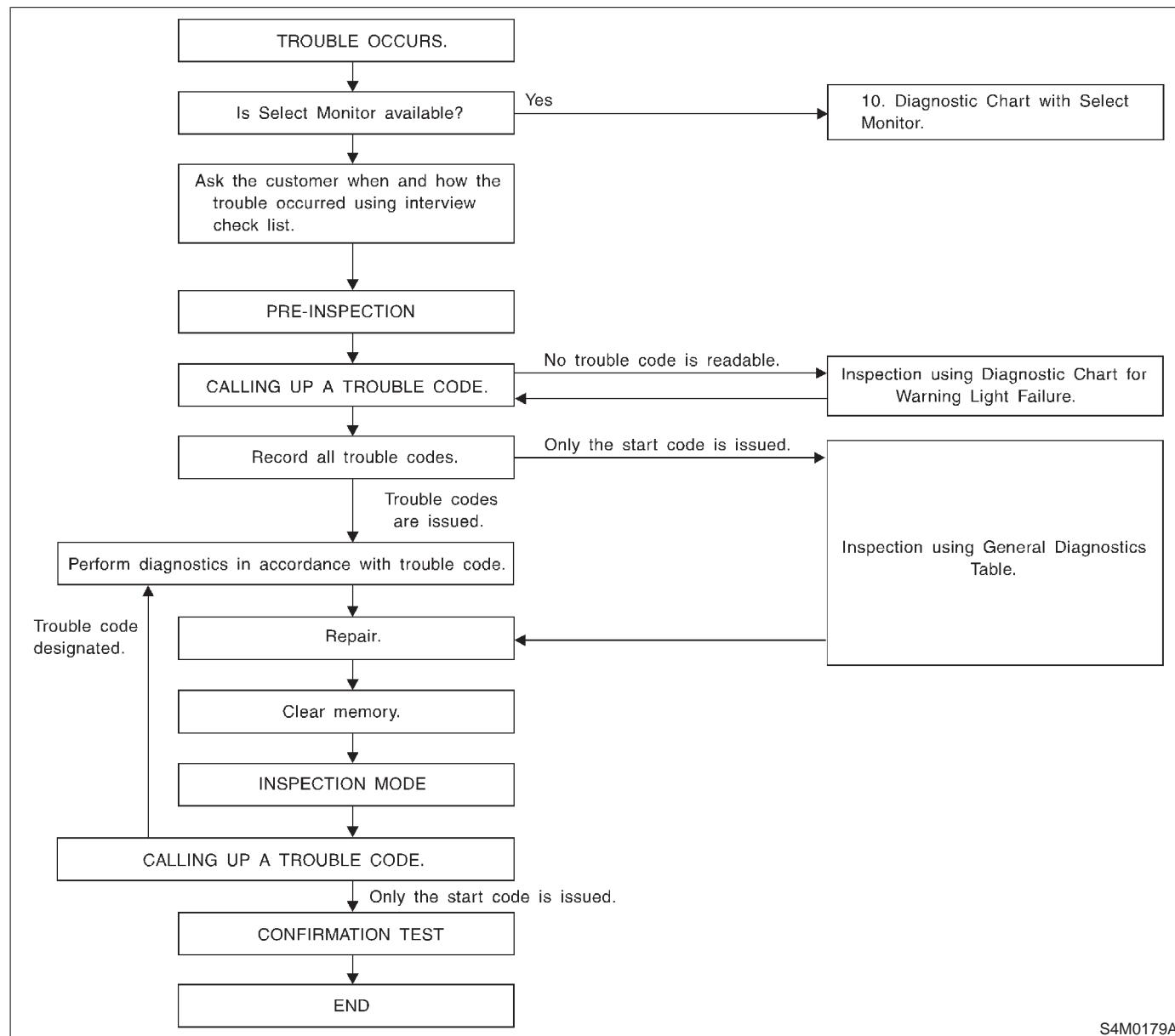
*2: Measure the I/O signal voltage at connector (B62) or (F55).

B: I/O SIGNAL DIAGRAM



6. Diagnostics Chart for On-board Diagnosis System

A: BASIC DIAGNOSTICS PROCEDURE



CAUTION:

Remove foreign matter (dust, water, etc.) from the ABS CM&H/U connector during removal and installation.

NOTE:

- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- When ABS warning light illuminates, read and record trouble code indicated by ABS warning light.

B: CHECK LIST FOR INTERVIEW

Check the following items about the vehicle's state.

1. THE STATE OF THE ABS WARNING LIGHT

ABS warning light comes on.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not come on ● When / how long does it come on?:		
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> On after starting (Engine is running) <input type="checkbox"/> On after starting (Engine is stop)		
Timing	<input type="checkbox"/> Immediately after ignition is ON. <input type="checkbox"/> Immediately after ignition starts. <input type="checkbox"/> When advancing <input type="checkbox"/> While traveling at a constant speed <input type="checkbox"/> When decelerating <input type="checkbox"/> When turning to right <input type="checkbox"/> When turning to left <input type="checkbox"/> When moving other electrical parts ● Parts name : ● Operating condition :		
	<input type="checkbox"/> km/h to km/h <input type="checkbox"/> MPH to MPH		
	<input type="checkbox"/> km/h <input type="checkbox"/> MPH		
	<input type="checkbox"/> km/h to km/h <input type="checkbox"/> MPH to MPH		
	<input type="checkbox"/> Steering angle : deg <input type="checkbox"/> Steering time : sec		
	<input type="checkbox"/> Steering angle : deg <input type="checkbox"/> Steering time : sec		
	<input type="checkbox"/> Steering angle : deg <input type="checkbox"/> Steering time : sec		

2. SYMPTOMS

ABS operating condition	<input type="checkbox"/> Performs no work. <input type="checkbox"/> Operates only when abruptly applying brakes.		
	<input type="checkbox"/> Vehicle speed : km/h <input type="checkbox"/> MPH		
	● How to step on brake pedal : a) Operating time : sec		
	b) Operating noise : <input type="checkbox"/> Produce / <input type="checkbox"/> Does not produce ● What kind of noise?		
	<input type="checkbox"/> Knock <input type="checkbox"/> Gong gong <input type="checkbox"/> Bong <input type="checkbox"/> Buzz <input type="checkbox"/> Gong gong buzz <input type="checkbox"/> Others :		
	c) Reaction force of brake pedal <input type="checkbox"/> Stick <input type="checkbox"/> Press down once with a clunk <input type="checkbox"/> Press and released <input type="checkbox"/> Others :		

Behavior of vehicle	a) Directional stability cannot be obtained or steering arm refuses to work when applying brakes : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● When :	<input type="checkbox"/> Vehicle turns to right <input type="checkbox"/> Vehicle turns to left <input type="checkbox"/> Spins <input type="checkbox"/> Others :
	b) Directional stability cannot be obtained or steering arm refuses to work when accelerating : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● When :	<input type="checkbox"/> Vehicle turns to right <input type="checkbox"/> Vehicle turns to left <input type="checkbox"/> Spins <input type="checkbox"/> Others :
	c) Brakes are out of order : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● What :	<input type="checkbox"/> Braking distance is long <input type="checkbox"/> Brakes lock or drag <input type="checkbox"/> Pedal stroke is long <input type="checkbox"/> Pedal sticks <input type="checkbox"/> Others :
	d) Poor acceleration : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	● What :	<input type="checkbox"/> Fails to accelerate <input type="checkbox"/> Engine stalls <input type="checkbox"/> Others :
	e) Occurrence of vibration : <input type="checkbox"/> Yes / <input type="checkbox"/> No	
● Where		
● What kind :		
f) Occurrence of abnormal noise : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
● Where		
● What kind :		
g) Occurrence of other phenomena : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
● What kind :		

3. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	
		<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Others :
	b) Ambient temperature	°F (°C)
	c) Road	<input type="checkbox"/> Urban area <input type="checkbox"/> Suburbs <input type="checkbox"/> Highway <input type="checkbox"/> General road <input type="checkbox"/> Ascending slope <input type="checkbox"/> Descending slope <input type="checkbox"/> Paved road <input type="checkbox"/> Gravel road <input type="checkbox"/> Muddy road <input type="checkbox"/> Sandy place <input type="checkbox"/> Others :
d) Road surface	<input type="checkbox"/> Dry <input type="checkbox"/> Wet <input type="checkbox"/> New-fallen snow <input type="checkbox"/> Compressed snow <input type="checkbox"/> Frozen slope <input type="checkbox"/> Others :	

Condition	a) Brakes	Deceleration : <input type="checkbox"/> Continuous / <input type="checkbox"/> Intermittent	g
	b) Accelerator	Acceleration : <input type="checkbox"/> Continuous / <input type="checkbox"/> Intermittent	g
	c) Vehicle speed	km/h	MPH
		<input type="checkbox"/> Advancing <input type="checkbox"/> Accelerating <input type="checkbox"/> Reducing speed <input type="checkbox"/> Low speed <input type="checkbox"/> Turning <input type="checkbox"/> Others :	
	d) Tire inflation pressure	Front RH tire : Front LH tire : Rear RH tire : Rear LH tire :	kPa
	e) Degree of wear	Front RH tire : Front LH tire : Rear RH tire : Rear LH tire :	
	f) Genuine parts are used. : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
	g) Chain is passed around tires. : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
	h) T tire is used. : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
	i) Condition of suspension alignment :		
	j) Loading state :		
	k) Repair parts are used. : <input type="checkbox"/> Yes / <input type="checkbox"/> No		
	• What :		
	l) Others :		

C: INSPECTION MODE

Reproduce the condition under which the problem has occurred as much as possible.

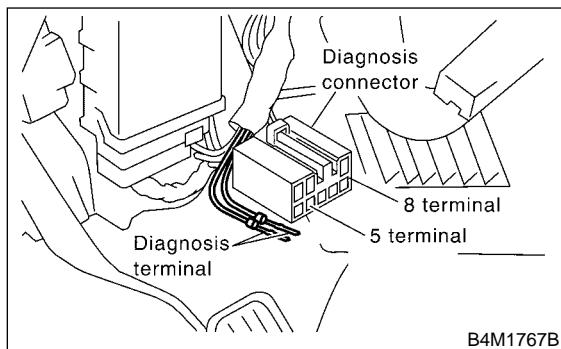
Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least one minute.

D: TROUBLE CODES

When on-board diagnosis of the ABS control module detects a problem, the information (up to a maximum of three) will be stored in the EEPROM as a trouble code. When there are more than three, the most recent three will be stored. (Stored codes will stay in memory until they are cleared.)

1. CALLING UP A TROUBLE CODE

1) Take out diagnosis connector from side of driver's seat heater unit.



- 2) Turn ignition switch OFF.
- 3) Connect diagnosis connector terminal 8 to diagnosis terminal.
- 4) Turn ignition switch ON.
- 5) ABS warning light is set in the diagnostic mode and blinks to identify trouble code.

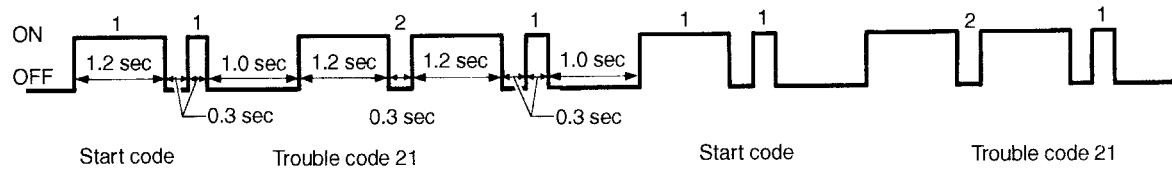
6) After the start code (11) is shown, the trouble codes will be shown in order of the last information first. These repeat for a maximum of 3 minutes.

NOTE:

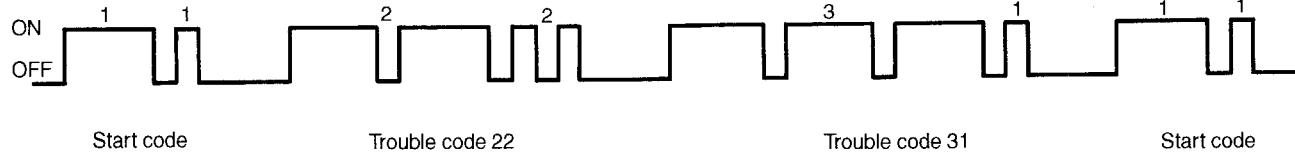
When there are no trouble codes in memory, only the start code (11) is shown.

Example of code indication

Trouble code: 21



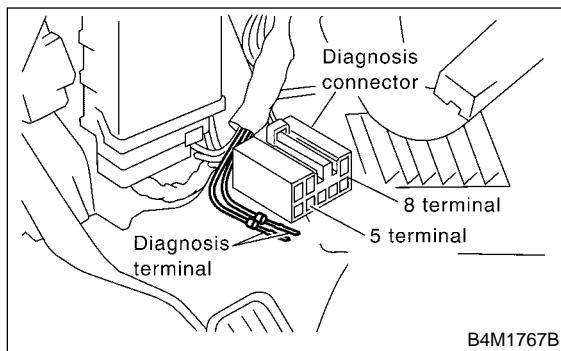
Trouble code: 22, 31



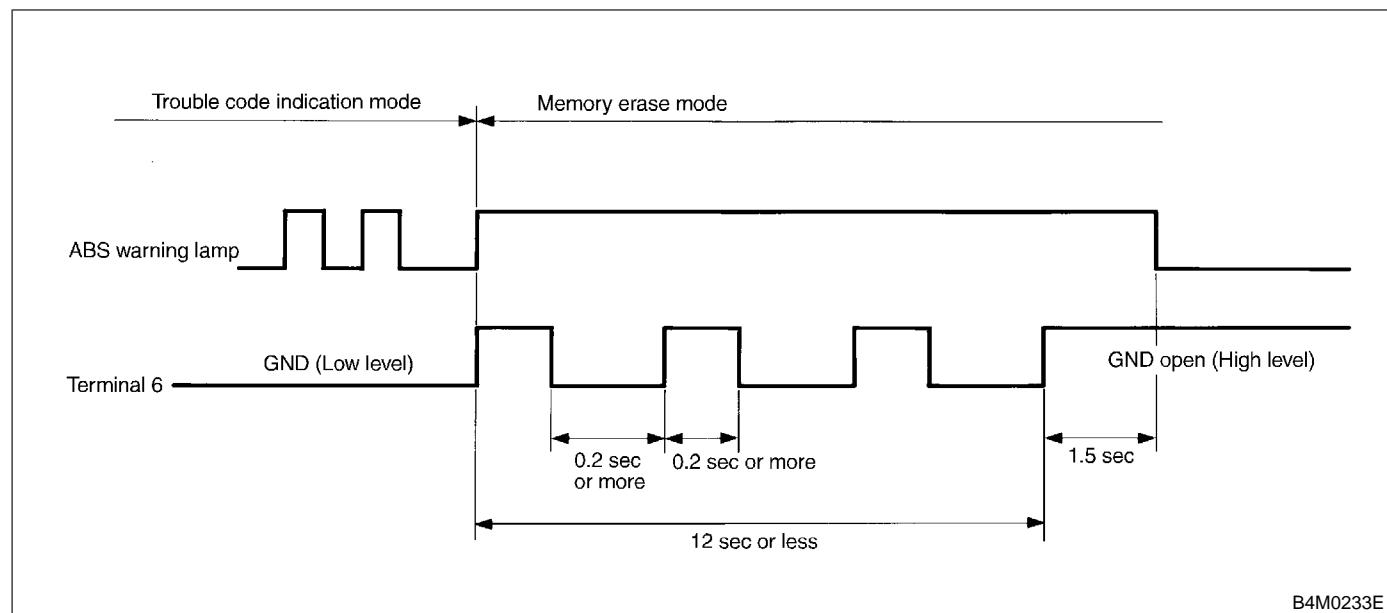
B4M0232A

2. CLEARING MEMORY

1) After calling up a trouble code, disconnect diagnosis connector terminal 8 from diagnosis terminal.



2) Repeat 3 times within approx. 12 seconds; connecting and disconnecting terminal 8 and diagnosis terminal for at least 0.2 seconds each time.



NOTE:

After diagnostics is completed, make sure to clear memory. Make sure only start code (11) is shown after memory is cleared.

MEMO:

7. Diagnostics Chart for ABS Warning Light Circuit and Diagnosis Circuit Failure

A: ABS WARNING LIGHT DOES NOT COME ON.

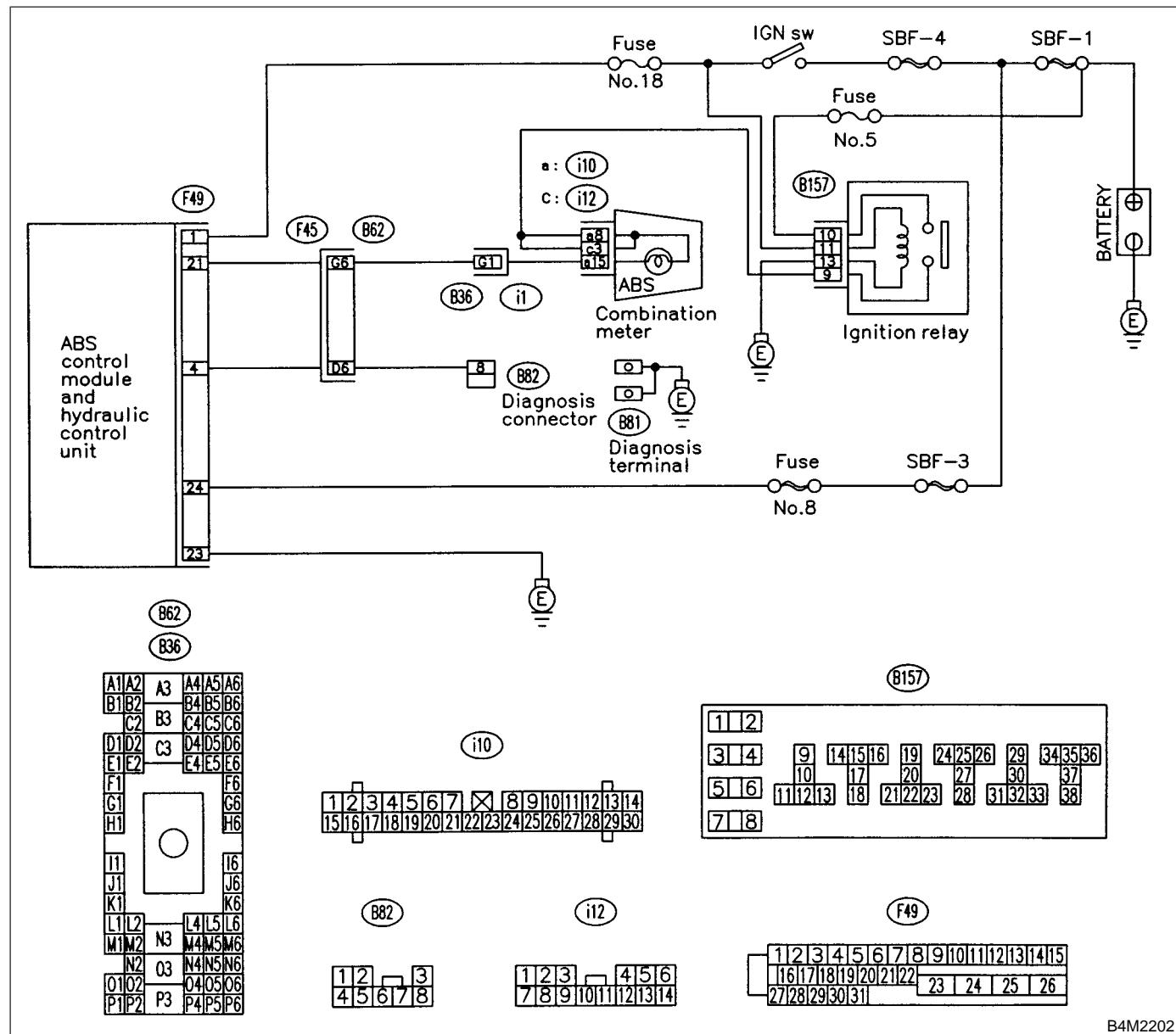
DIAGNOSIS:

- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When ignition switch is turned ON (engine OFF), ABS warning light does not come on

WIRING DIAGRAM:



7A1 : CHECK IF OTHER WARNING LIGHTS TURN ON.

Turn ignition switch to ON (engine OFF).

CHECK : *Do other warning lights turn on?*

YES : Go to step **7A2**.

NO : Repair combination meter. <Ref. to 6-2 [W8B0].>

7A2 : CHECK ABS WARNING LIGHT BULB.

- 1) Turn ignition switch to OFF.
- 2) Remove combination meter.
- 3) Remove ABS warning light bulb from combination meter.

CHECK : *Is ABS warning light bulb OK?*

YES : Go to step **7A3**.

NO : Replace ABS warning light bulb. <Ref. to 6-2 [W8B0].>

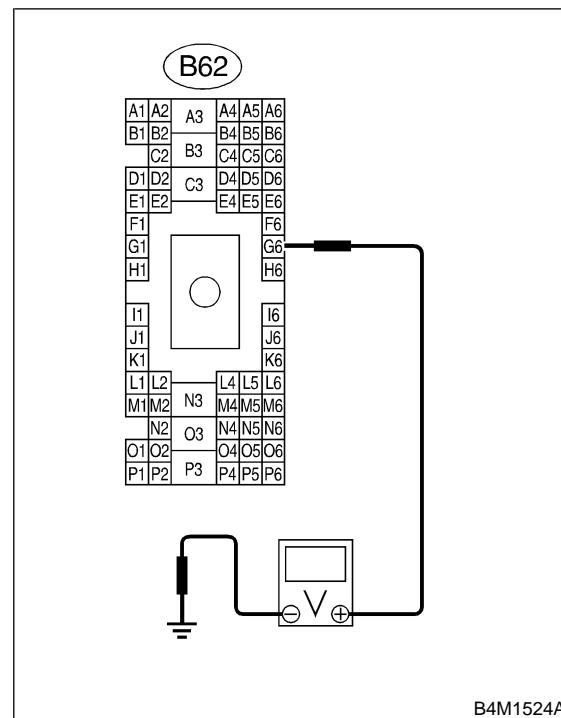
7A3 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

1) Disconnect connector (B62) from connector (F45).

2) Measure voltage between connector (B62) and chassis ground.

Connector & terminal

(B62) No. G6 (+) — Chassis ground (-):



B4M1524A

CHECK : *Is the voltage less than 3 V?*

YES : Go to step **7A4**.

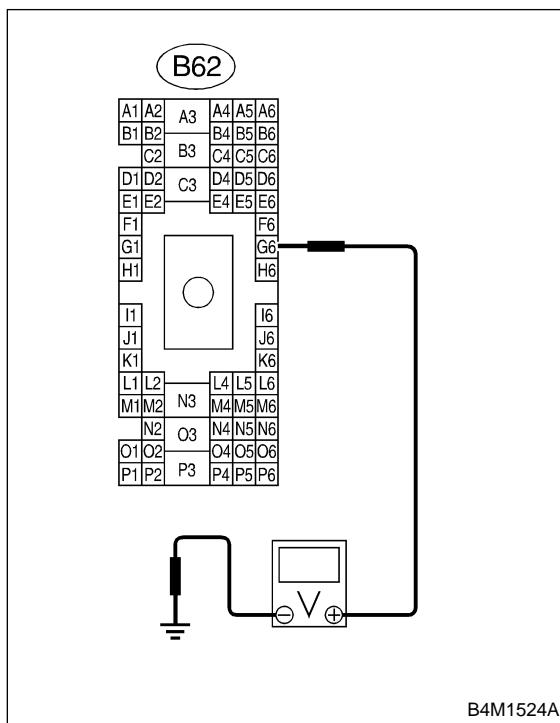
NO : Repair warning light harness.

**7A4 : CHECK BATTERY SHORT OF ABS
WARNING LIGHT HARNESS.**

- 1) Turn ignition switch to ON.
- 2) Measure voltage between connector (B62) and chassis ground.

Connector & terminal

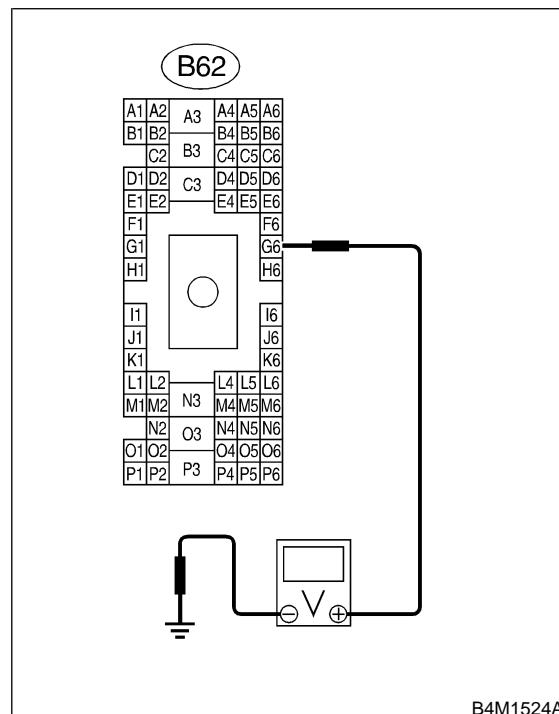
(B62) No. G6 (+) — Chassis ground (-):


7A5 : CHECK WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Install ABS warning light bulb from combination meter.
- 3) Install combination meter.
- 4) Turn ignition switch to ON.
- 5) Measure voltage between connector (B62) and chassis ground.

Connector & terminal

(B62) No. G6 (+) — Chassis ground (-):



CHECK : Is voltage less than 3 V?

YES : Go to step 7A5.

NO : Repair warning light harness.

CHECK : Is voltage between 10 and 15 V?

YES : Go to step 7A6.

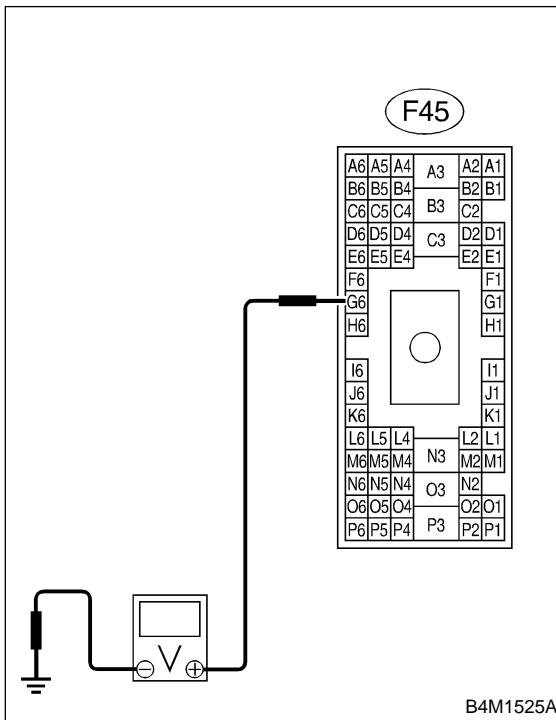
NO : Repair wiring harness.

7A6 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Measure voltage between connector (F45) and chassis ground.

Connector & terminal

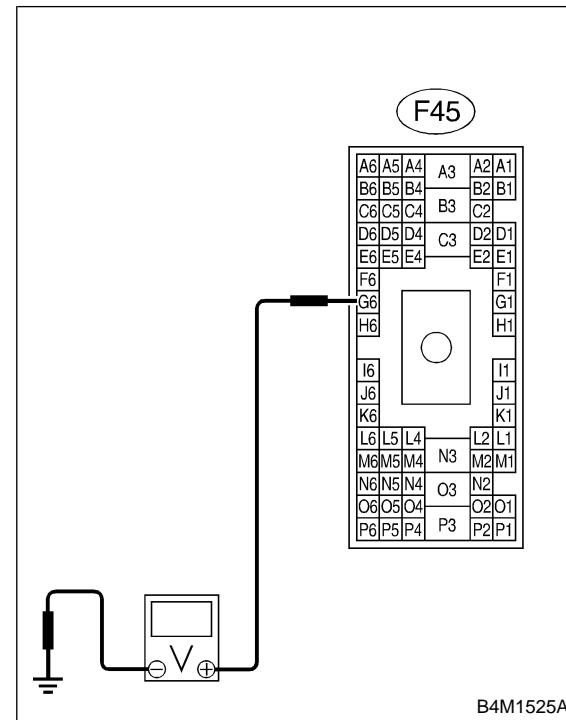
(F45) No. G6 (+) — Chassis ground (-):


7A7 : CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between connector (F45) and chassis ground.

Connector & terminal

(F45) No. G6 (+) — Chassis ground (-):



CHECK : Is the voltage less than 3 V?

YES : Go to step 7A7.

NO : Repair wiring harness.

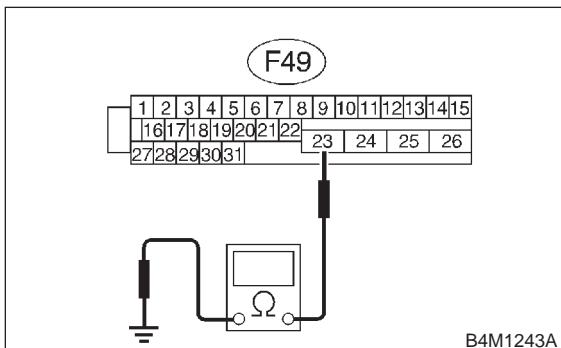
CHECK : Is voltage less than 3 V?

YES : Go to step 7A8.

NO : Repair wiring harness.

7A8 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — GND:


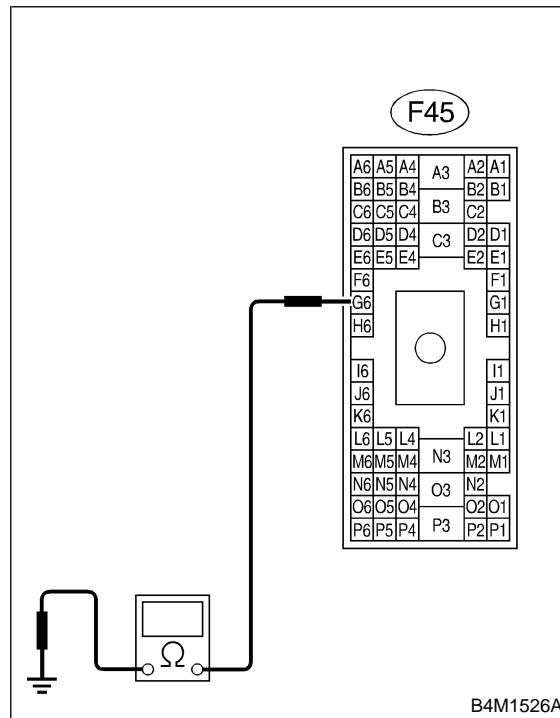
CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 7A9.

NO : Repair ABSCM&H/U ground harness.

7A9 : CHECK WIRING HARNESS.

Measure resistance between connector (F45) and chassis ground.

Connector & terminal
(F45) No. G6 — Chassis ground:


CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 7A10.

NO : Repair harness/connector.

7A10 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connectors between combination meter and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

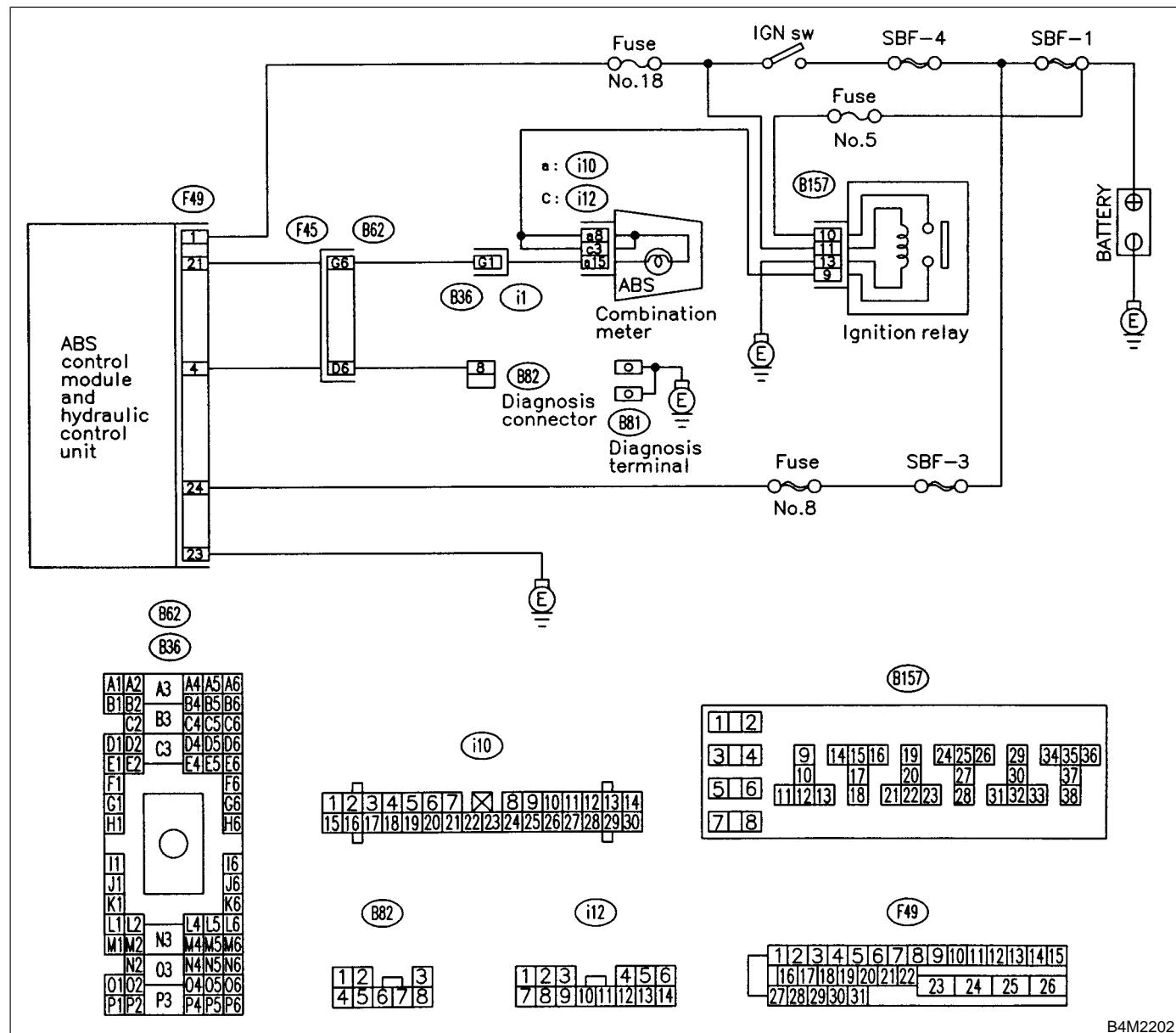
MEMO:

B: ABS WARNING LIGHT DOES NOT GO OFF.**DIAGNOSIS:**

- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When starting the engine and while ABS warning light is kept ON.

WIRING DIAGRAM:

B4M2202

7B1 : CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.

Turn ignition switch to OFF.

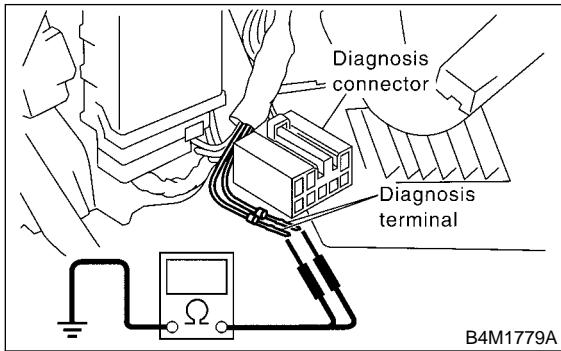
CHECK : Is ABSCM&H/U connector inserted into ABSCM until the clamp locks onto it?

YES : Go to step 7B2.

NO : Insert ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.

7B2 : CHECK DIAGNOSIS TERMINAL.

Measure resistance between diagnosis terminals (B81) and chassis ground.



Terminals

Diagnosis terminal (A) — Chassis ground:

Diagnosis terminal (B) — Chassis ground:

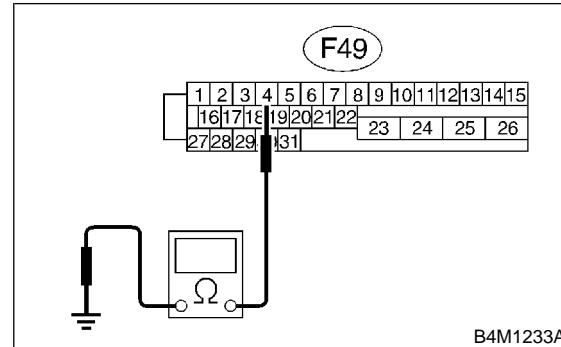
CHECK : Is the resistance less than 0.5Ω ?

YES : Go to step 7B3.

NO : Repair diagnosis terminal harness.

7B3 : CHECK DIAGNOSIS LINE.

- 1) Turn ignition switch to OFF.
- 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 8.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.



Connector & terminal

(F49) No. 4 — Chassis ground:

CHECK : Is the resistance less than 0.5Ω ?

YES : Go to step 7B4.

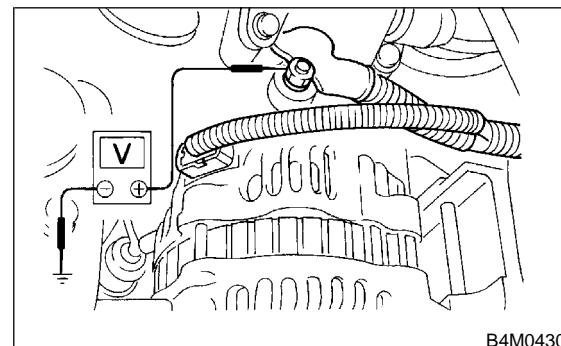
NO : Repair harness connector between ABSCM&H/U and diagnosis connector.

7B4 : CHECK GENERATOR.

- 1) Start the engine.
- 2) Idle the engine.
- 3) Measure voltage between generator and chassis ground.

Terminal

Generator B terminal (+) — Chassis ground (-):



CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 7B5.

NO : Repair generator. <Ref. to 6-1 [W2A0].>

7B5 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

CHECK : *Is there poor contact at battery terminal?*

YES : Repair battery terminal.

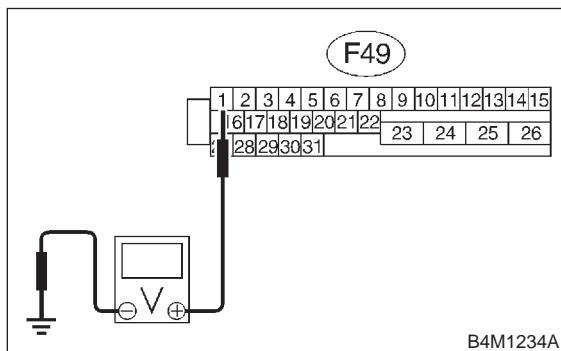
NO : Go to step 7B6.

7B6 : CHECK POWER SUPPLY OF ABSCM.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Start engine.
- 3) Idle the engine.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



CHECK : *Is the voltage between 10 and 15 V?*

YES : Go to step 7B7.

NO : Repair ABSCM&H/U power supply circuit.

7B7 : CHECK WIRING HARNESS.

- 1) Disconnect connector (F45) from connector (B62).
- 2) Turn ignition switch to ON.

CHECK : *Does the ABS warning light remain off?*

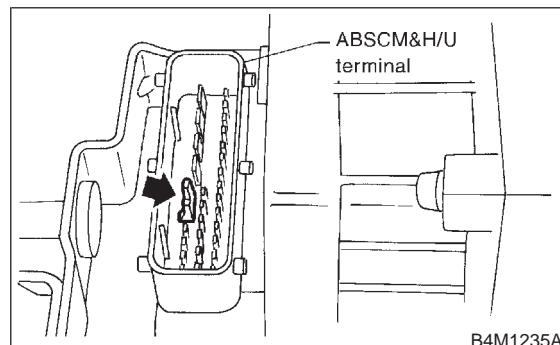
YES : Go to step 7B8.

NO : Repair front wiring harness.

7B8 : CHECK PROJECTION AT ABSCM&H/U.

1) Turn ignition switch to OFF.

2) Check for broken projection at the ABSCM&H/U terminal.



CHECK : *Are the projection broken?*

YES : Go to step 7B9.

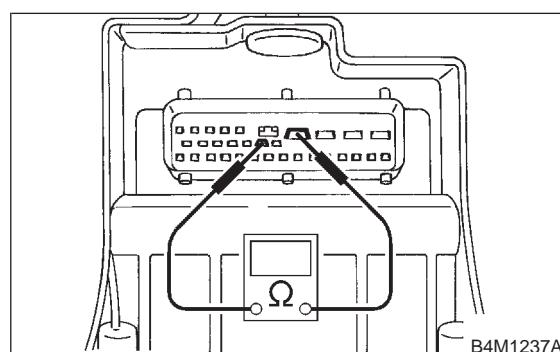
NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

7B9 : CHECK ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminal

No. 21 — No. 23:



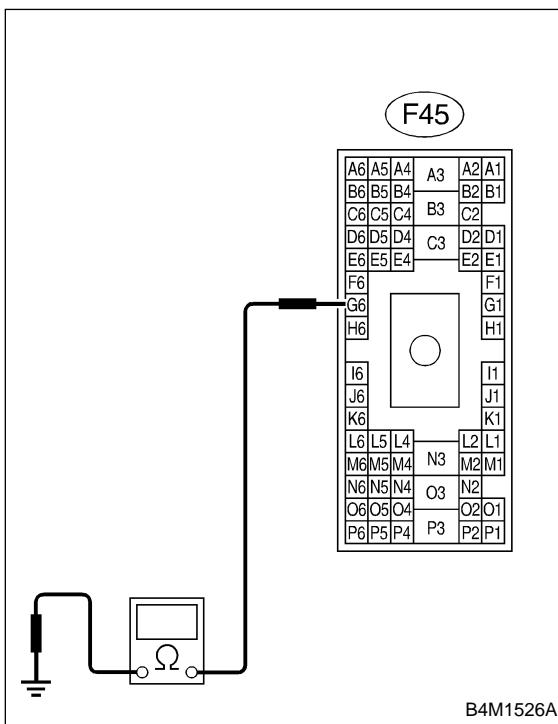
CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 7B10.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

7B10 : CHECK WIRING HARNESS.

Measure resistance between connector (F45) and chassis ground.

Connector & terminal**(F45) No. G6 — Chassis ground:**

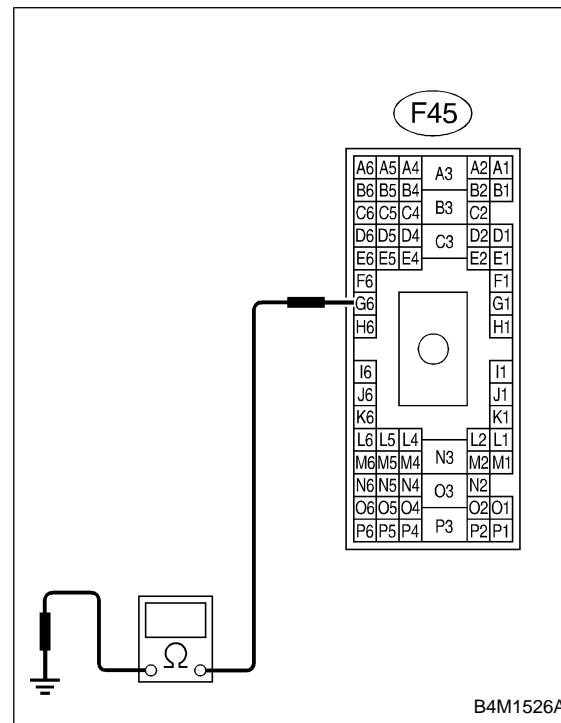
CHECK : Is the resistance less than 0.5Ω ?

YES : Go to step 7B11.

NO : Repair harness.

7B11 : CHECK WIRING HARNESS.

- 1) Connect connector to ABSCM&H/U.
- 2) Measure resistance between connector (F45) and chassis ground.

Connector & terminal**(F45) No. G6 — Chassis ground:**

CHECK : Is the resistance more than $1 M\Omega$?

YES : Go to step 7B12.

NO : Repair harness.

7B12 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

CHECK : Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

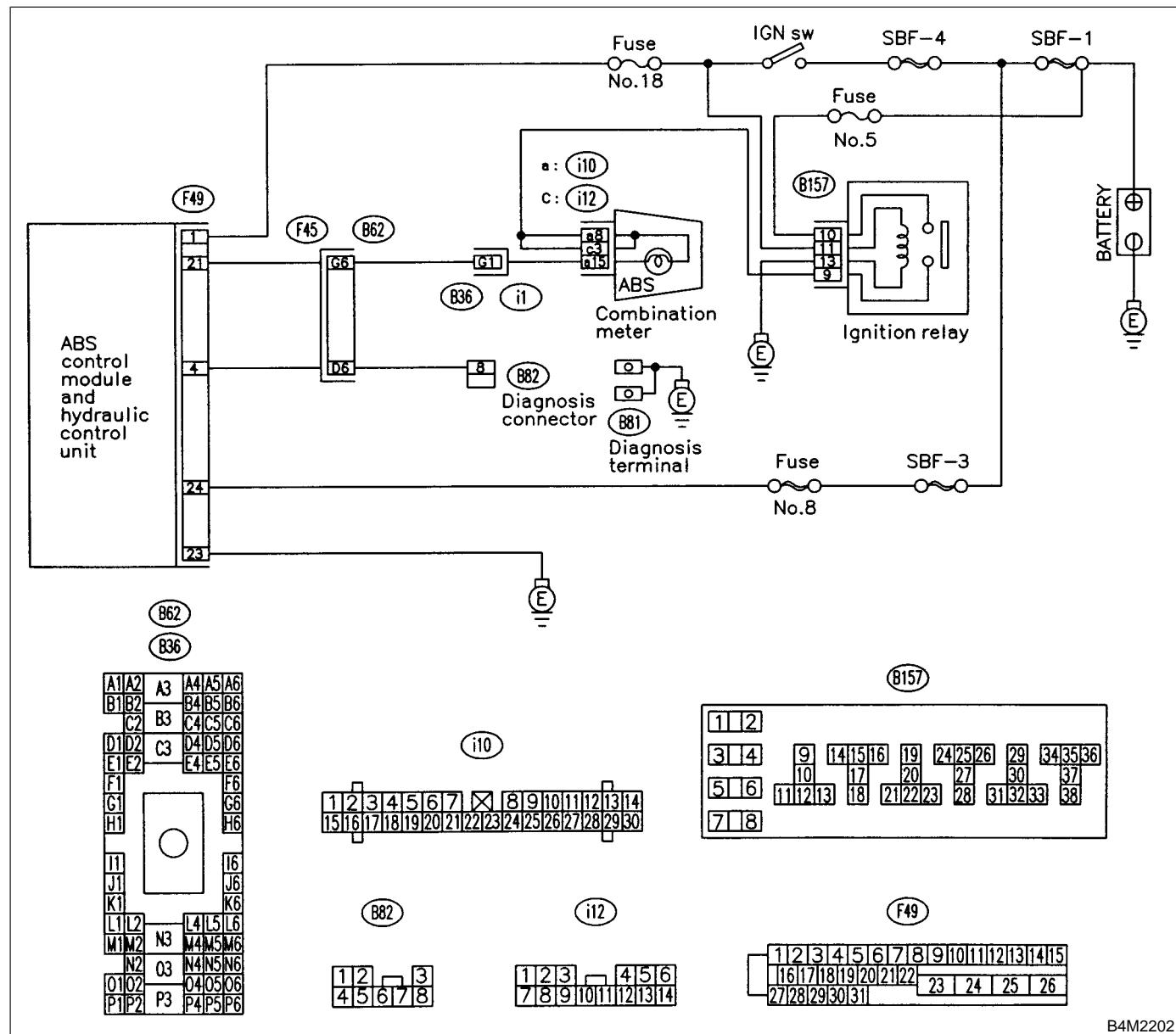
NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

C: TROUBLE CODE DOES NOT APPEAR.**DIAGNOSIS:**

- Diagnosis circuit is open.

TROUBLE SYMPTOM:

- The ABS warning light turns on or off normally but the start code cannot be read out in the diagnostic mode.

WIRING DIAGRAM:

B4M2202

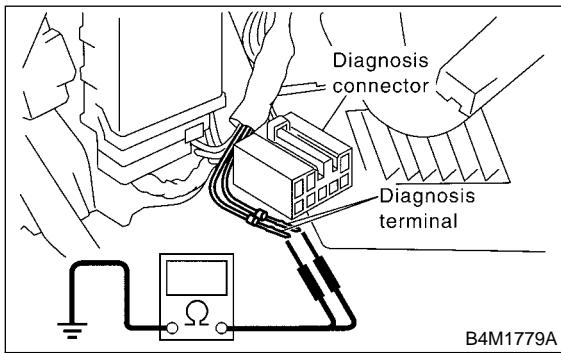
7C1 : CHECK DIAGNOSIS TERMINAL.

Measure resistance between diagnosis terminals (B81) and chassis ground.

Terminals

Diagnosis terminal (A) — Chassis ground:

Diagnosis terminal (B) — Chassis ground:



CHECK : Is the resistance less than 0.5Ω ?

YES : Go to step **7C2**.

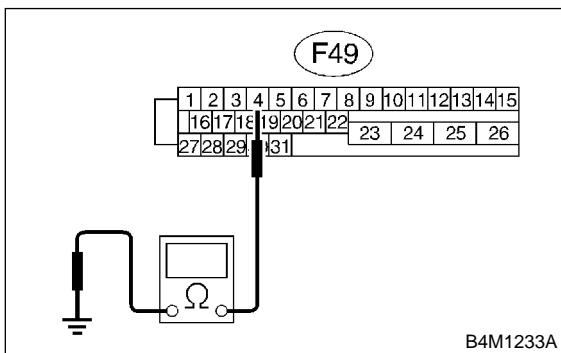
NO : Repair diagnosis terminal harness.

7C2 : CHECK DIAGNOSIS LINE.

- 1) Turn ignition switch to OFF.
- 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 8.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 4 — Chassis ground:



CHECK : Is the resistance less than 0.5Ω ?

YES : Go to step **7C3**.

NO : Repair harness connector between ABSCM&H/U and diagnosis connector.

7C3 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

CHECK : Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

MEMO:

8. Diagnostics Chart with Trouble Code by ABS Warning Light

A: LIST OF TROUBLE CODE

Trouble code	Contents of diagnosis	Index No.
11	Start code ● Trouble code is shown after start code. ● Only start code is shown in normal condition.	—
21		Front right ABS sensor <Ref. to 4-4 [T8B0].>
23		Front left ABS sensor <Ref. to 4-4 [T8C0].>
25	Abnormal ABS sensor (Open circuit or input voltage too high)	Rear right ABS sensor <Ref. to 4-4 [T8D0].>
27		Rear left ABS sensor <Ref. to 4-4 [T8E0].>
22		Front right ABS sensor <Ref. to 4-4 [T8F0].>
24		Front left ABS sensor <Ref. to 4-4 [T8G0].>
26	Abnormal ABS sensor (Abnormal ABS sensor signal)	Rear right ABS sensor <Ref. to 4-4 [T8H0].>
28		Rear left ABS sensor <Ref. to 4-4 [T8I0].>
29		Any one of four <Ref. to 4-4 [T8J0].>
31		Front right inlet valve <Ref. to 4-4 [T8K0].>
32		Front right outlet valve <Ref. to 4-4 [T8O0].>
33		Front left inlet valve <Ref. to 4-4 [T8L0].>
34	Abnormal solenoid valve circuit(s) in ABS control module and hydraulic unit	Front left outlet valve <Ref. to 4-4 [T8P0].>
35		Rear right inlet valve <Ref. to 4-4 [T8M0].>
36		Rear right outlet valve <Ref. to 4-4 [T8Q0].>
37		Rear left inlet valve <Ref. to 4-4 [T8N0].>
38		Rear left outlet valve <Ref. to 4-4 [T8R0].>
41	Abnormal ABS control module	<Ref. to 4-4 [T8S0].>
42	Source voltage is abnormal.	<Ref. to 4-4 [T8T0].>
44	A combination of AT control abnormal	<Ref. to 4-4 [T8U0].>
51	Abnormal valve relay	<Ref. to 4-4 [T8V0].>
52	Abnormal motor and/or motor relay	<Ref. to 4-4 [T8W0].>
54	Abnormal stop light switch	<Ref. to 4-4 [T8X0].>
56	Abnormal G sensor output voltage	<Ref. to 4-4 [T8Y0].>

B: TROUBLE CODE 21 (FRONT RH)

C: TROUBLE CODE 23 (FRONT LH)

D: TROUBLE CODE 25 (REAR RH)

E: TROUBLE CODE 27 (REAR LH)

— ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) —

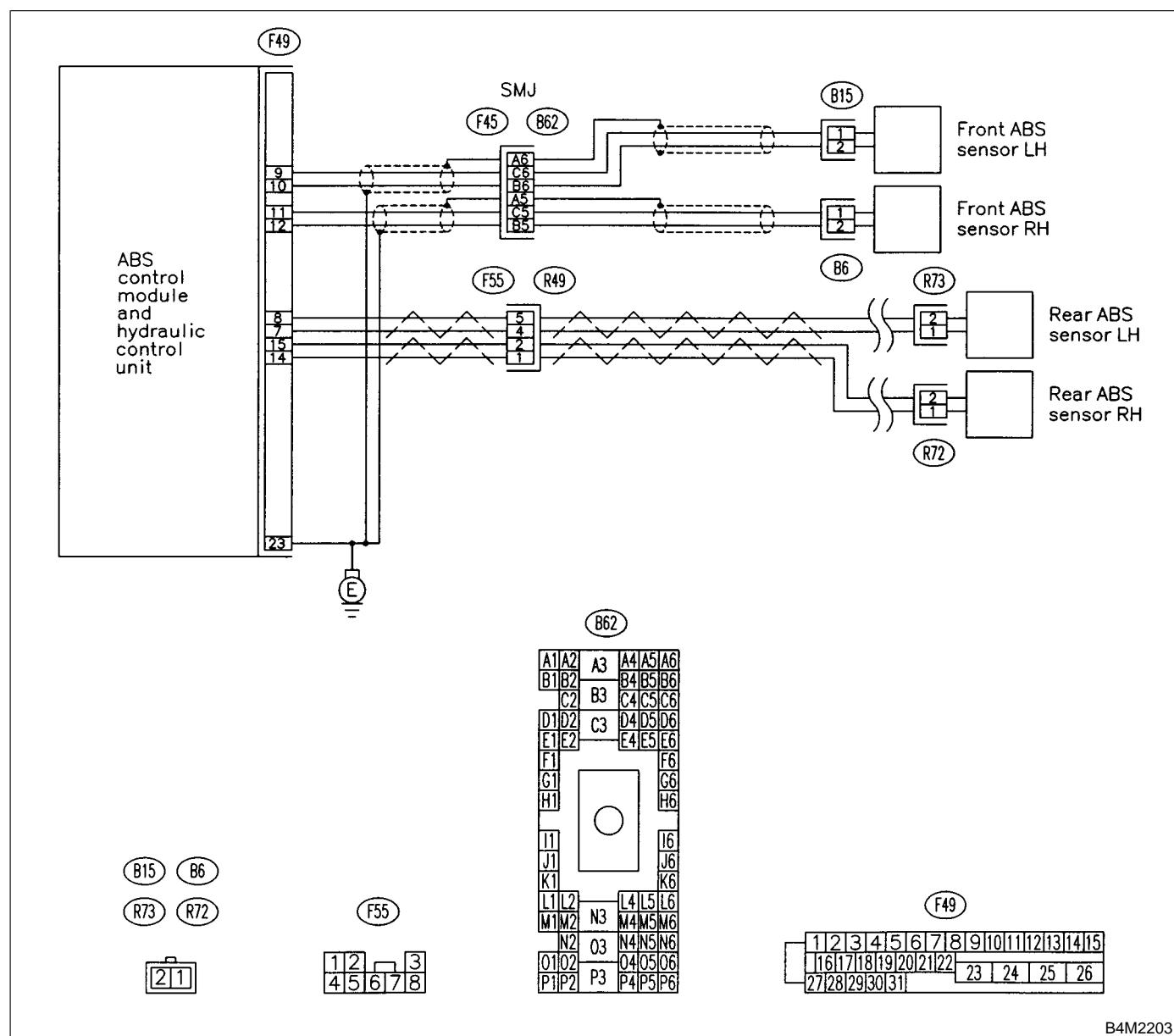
DIAGNOSIS:

- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:

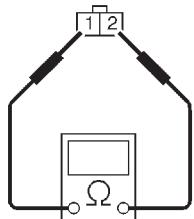
- ABS does not operate.

WIRING DIAGRAM:



8E1 : CHECK ABS SENSOR.

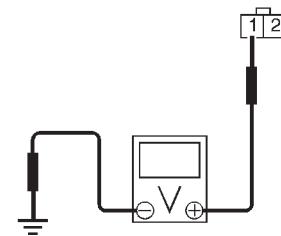
- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance of ABS sensor connector terminals.

Terminal*Front RH No. 1 — No. 2:**Front LH No. 1 — No. 2:**Rear RH No. 1 — No. 2:**Rear LH No. 1 — No. 2:*

B4M0806

8E2 : CHECK BATTERY SHORT OF ABS SENSOR.

- 1) Disconnect connector from ABS CM&H/U.
- 2) Measure voltage between ABS sensor and chassis ground.

Terminal*Front RH No. 1 (+) — Chassis ground (-):**Front LH No. 1 (+) — Chassis ground (-):**Rear RH No. 1 (+) — Chassis ground (-):**Rear LH No. 1 (+) — Chassis ground (-):*

B4M0807

CHECK : *Is the resistance between 1 and 1.5 kΩ?*

YES : Go to step **8E2**.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

CHECK : *Is the voltage less than 1 V?*

YES : Go to step **8E3**.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

8E3 : CHECK BATTERY SHORT OF ABS SENSOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABS sensor and chassis ground.

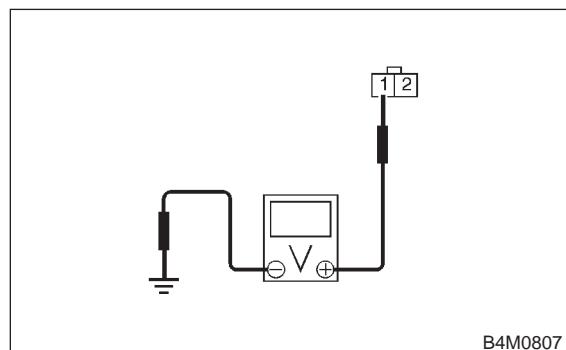
Terminal

Front RH No. 1 (+) — Chassis ground (-):

Front LH No. 1 (+) — Chassis ground (-):

Rear RH No. 1 (+) — Chassis ground (-):

Rear LH No. 1 (+) — Chassis ground (-):



B4M0807

: *Is the voltage less than 1 V?*

: Go to step **8E4**.

: Replace ABS sensor. <Ref. to 4-4 [W14A0].>

8E4 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminals.

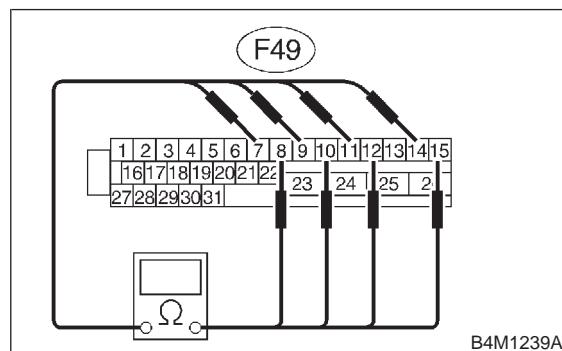
Connector & terminal

Trouble code 21 / (F49) No. 11 — No. 12:

Trouble code 23 / (F49) No. 9 — No. 10:

Trouble code 25 / (F49) No. 14 — No. 15:

Trouble code 27 / (F49) No. 7 — No. 8:



B4M1239A

: *Is the resistance between 1 and 1.5 kΩ?*

: Go to step **8E5**.

: Repair harness/connector between ABSCM&H/U and ABS sensor.

8E5 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

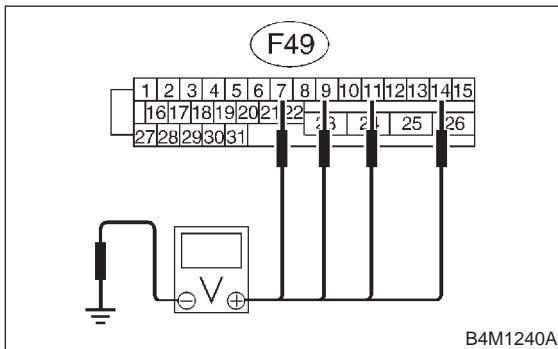
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 8E6.

NO : Repair harness between ABSCM&H/U and ABS sensor.

8E6 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.

2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

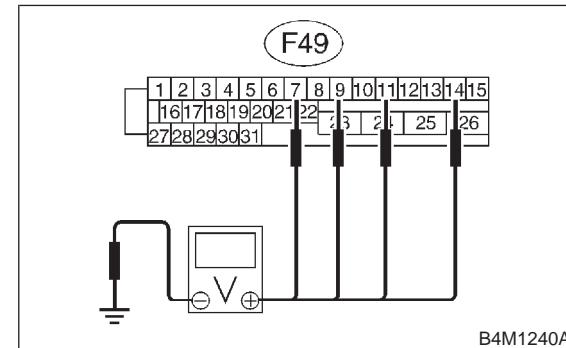
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 8E7.

NO : Repair harness between ABSCM&H/U and ABS sensor.

8E7 : CHECK INSTALLATION OF ABS SENSOR.
Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft-lb}$)

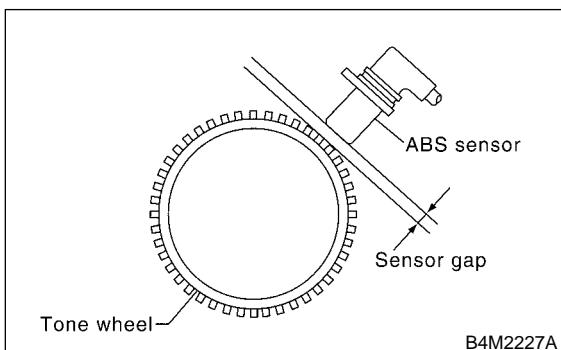
CHECK : Are the ABS sensor installation bolts tightened securely?

YES : Go to step 8E8.

NO : Tighten ABS sensor installation bolts securely.

8E8 : CHECK ABS SENSOR GAP.

Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel.



Specifications	Front wheel	Rear wheel
	0.3 — 0.8 mm (0.012 — 0.031 in)	0.44 — 0.94 mm (0.0173 — 0.0370 in)

- CHECK** : *Is the gap within the specifications?*
- YES** : Go to step 8E9.
- NO** : Adjust the gap.

NOTE:

Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8E9 : CHECK TONE WHEEL RUNOUT.

Measure tone wheel runout.

- CHECK** : *Is the runout less than 0.05 mm (0.0020 in)?*
- YES** : Go to step 8E10.
- NO** : Replace tone wheel. <Ref. to 4-2 [W3A0].>

8E10 : CHECK GROUND SHORT OF ABS SENSOR.

- 1) Turn ignition switch to ON.
- 2) Measure resistance between ABS sensor and chassis ground.

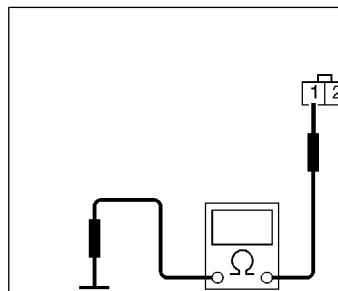
Terminal

Front RH No. 1 — Chassis ground:

Front LH No. 1 — Chassis ground:

Rear RH No. 1 — Chassis ground:

Rear LH No. 1 — Chassis ground:



B4M0818

- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8E11.
- NO** : Replace ABS sensor and ABS CM&H/U. <Ref. to 4-4 [W14A0].> and <Ref. to 4-4 [W15A0].>

8E11 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminal and chassis ground.

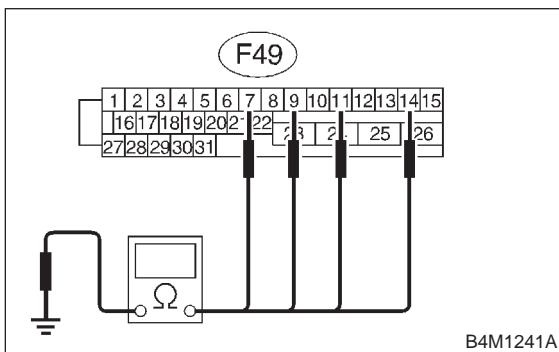
Connector & terminal

Trouble code 21 / (F49) No. 11 — Chassis ground:

Trouble code 23 / (F49) No. 9 — Chassis ground:

Trouble code 25 / (F49) No. 14 — Chassis ground:

Trouble code 27 / (F49) No. 7 — Chassis ground:



CHECK : *Is the resistance more than $1 M\Omega$?*

YES : Go to step 8E12.

NO : Repair harness between ABSCM&H/U and ABS sensor.
Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

8E12 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step 8E13.

8E13 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 8E14.

8E14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

NOTE:

Check harness and connectors between ABSCM&H/U and ABS sensor.

F: TROUBLE CODE 22 (FRONT RH)

G: TROUBLE CODE 24 (FRONT LH)

H: TROUBLE CODE 26 (REAR RH)

I: TROUBLE CODE 28 (REAR LH)

— ABNORMAL ABS SENSOR (ABNORMAL ABS SENSOR SIGNAL) —

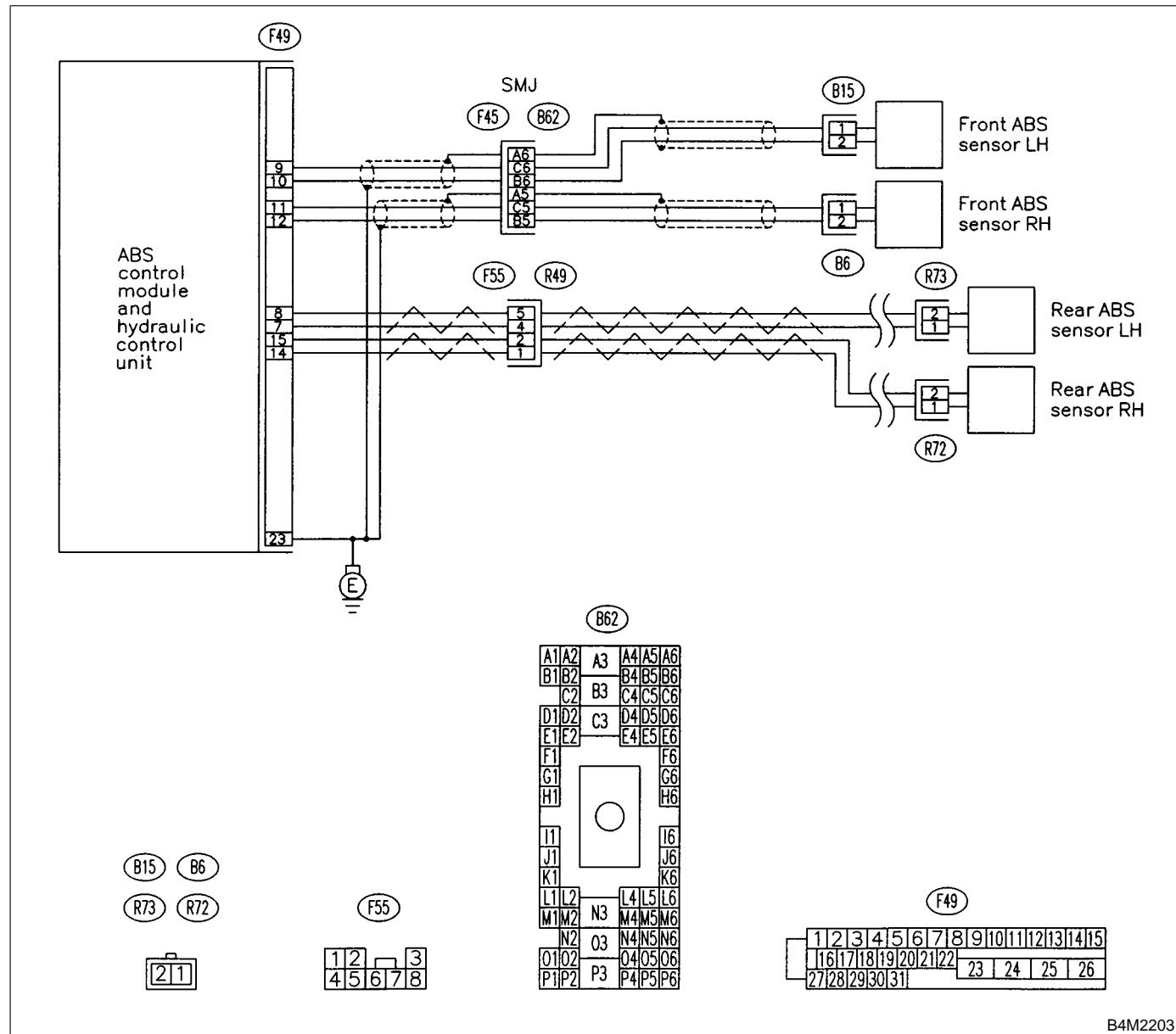
DIAGNOSIS:

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



8I1 : CHECK INSTALLATION OF ABS SENSOR.

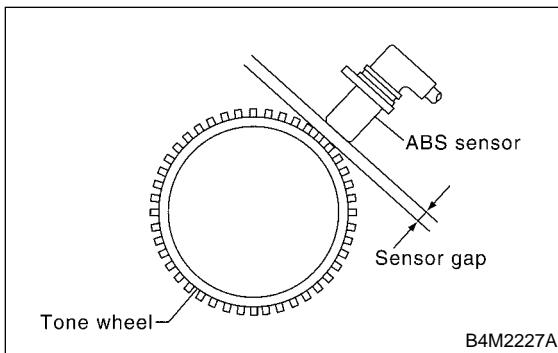
Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

CHECK : Are the ABS sensor installation bolts tightened securely?
YES : Go to step 8I2.
NO : Tighten ABS sensor installation bolts securely.

8I2 : CHECK ABS SENSOR GAP.

Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel.



Specifications	Front wheel	Rear wheel
	0.3 — 0.8 mm (0.012 — 0.031 in)	0.44 — 0.94 mm (0.0173 — 0.0370 in)

CHECK : Is the gap within the specifications?
YES : Go to step 8I3.
NO : Adjust the gap.

NOTE:
 Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8I3 : PREPARE OSCILLOSCOPE.

CHECK : Is an oscilloscope available?
YES : Go to step 8I4.
NO : Go to step 8I5.

8I4 : CHECK ABS SENSOR SIGNAL.

- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABS control module sometimes stores the trouble code 29.

Connector & terminal

Trouble code 22 / (B62) No. C5 (+) — No.

B5 (-):

Trouble code 24 / (B62) No. C6 (+) — No.

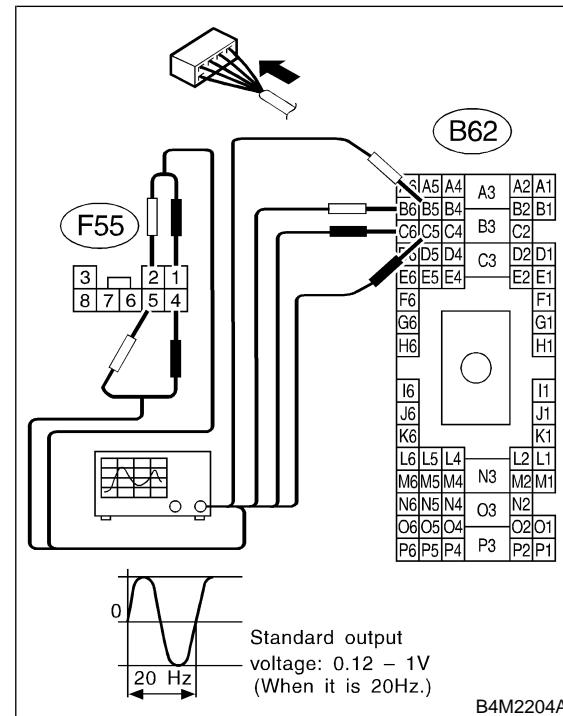
B6 (-):

Trouble code 26 / (F55) No. 1 (+) — No. 2

(-):

Trouble code 28 / (F55) No. 4 (+) — No. 5

(-):



CHECK : Is oscilloscope pattern smooth, as shown in figure?

YES : Go to step 8I8.
NO : Go to step 8I7.

8I5 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor or drum from hub in accordance with trouble code.

CHECK : *Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?*

YES : Thoroughly remove dirt or other foreign matter.

NO : Go to step 8I6.

8I6 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : *Are there broken or damaged in the ABS sensor piece or the tone wheel?*

YES : Replace ABS sensor or tone wheel. <Ref. to 4-4 [W14A0].> and <Ref. to 4-2 [W3A0].>

NO : Go to step 8I7.

8I7 : CHECK TONE WHEEL RUNOUT.

Measure tone wheel runout.

CHECK : *Is the runout less than 0.05 mm (0.0020 in)?*

YES : Go to step 8I8.

NO : Replace tone wheel. <Ref. to 4-2 [W3A0].>

8I8 : CHECK RESISTANCE OF ABS SENSOR.

- 1) Turn ignition switch OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance between ABS sensor connector terminals.

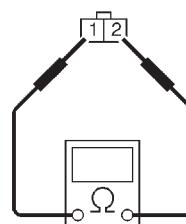
Terminal

Front RH No. 1 — No. 2:

Front LH No. 1 — No. 2:

Rear RH No. 1 — No. 2:

Rear LH No. 1 — No. 2:



B4M0806

CHECK : *Is the resistance between 1 and 1.5 kΩ?*

YES : Go to step 8I9.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

8I9 : CHECK GROUND SHORT OF ABS SENSOR.

Measure resistance between ABS sensor and chassis ground.

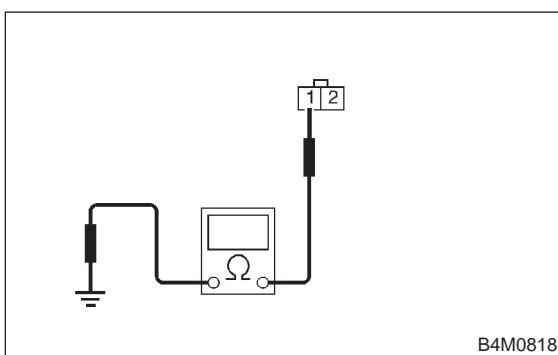
Terminal

Front RH No. 1 — Chassis ground:

Front LH No. 1 — Chassis ground:

Rear RH No. 1 — Chassis ground:

Rear LH No. 1 — Chassis ground:


8I10 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

- 1) Connect connector to ABS sensor.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance at ABSCM&H/U connector terminals.

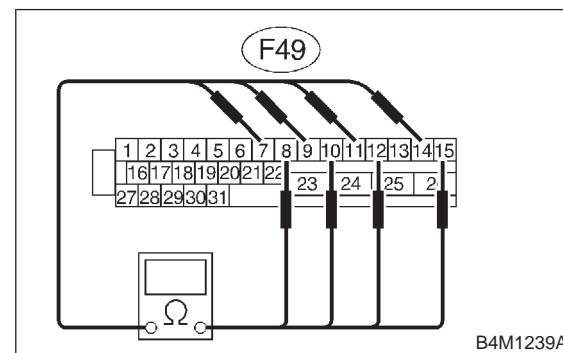
Connector & terminal

Trouble code 22 / (F49) No. 11 — No. 12:

Trouble code 24 / (F49) No. 9 — No. 10:

Trouble code 26 / (F49) No. 14 — No. 15:

Trouble code 28 / (F49) No. 7 — No. 8:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 8I10.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

CHECK : *Is the resistance between 1 and 1.5 kΩ?*

YES : Go to step 8I11.

NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8I11 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

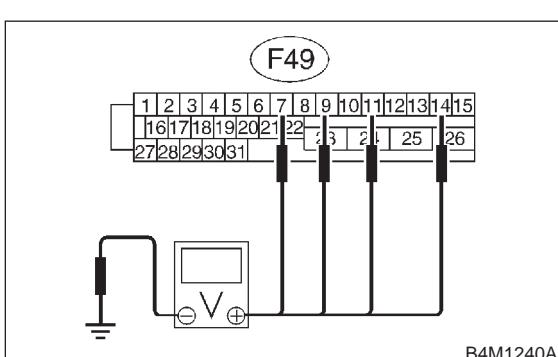
Connector & terminal

Trouble code 22 / (F49) No. 11 — Chassis ground:

Trouble code 24 / (F49) No. 9 — Chassis ground:

Trouble code 26 / (F49) No. 14 — Chassis ground:

Trouble code 28 / (F49) No. 7 — Chassis ground:



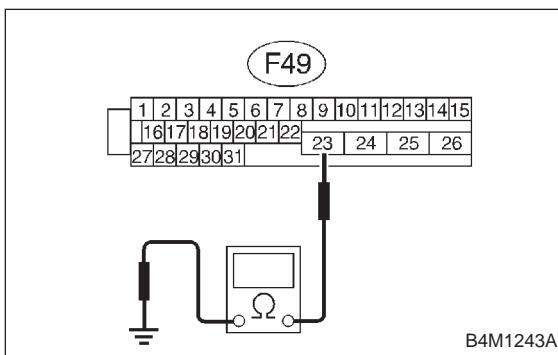
CHECK : Is the resistance more than $1 M\Omega$?
YES : Go to step 8I12.
NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

8I12 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal

(F49) No. 23 — GND:



CHECK : Is the resistance less than 0.5Ω ?
YES : Go to step 8I13.
NO : Repair ABSCM&H/U ground harness.

8I13 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 8I14.

8I14 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Is the car telephone or the wireless transmitter properly installed?

YES : Go to step 8I15.

NO : Properly install the car telephone or the wireless transmitter.

8I15 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Are noise sources (such as an antenna) installed near the sensor harness?

YES : Install the noise sources apart from the sensor harness.

NO : Go to step 8I16.

8I16 : CHECK SHIELD CIRCUIT.

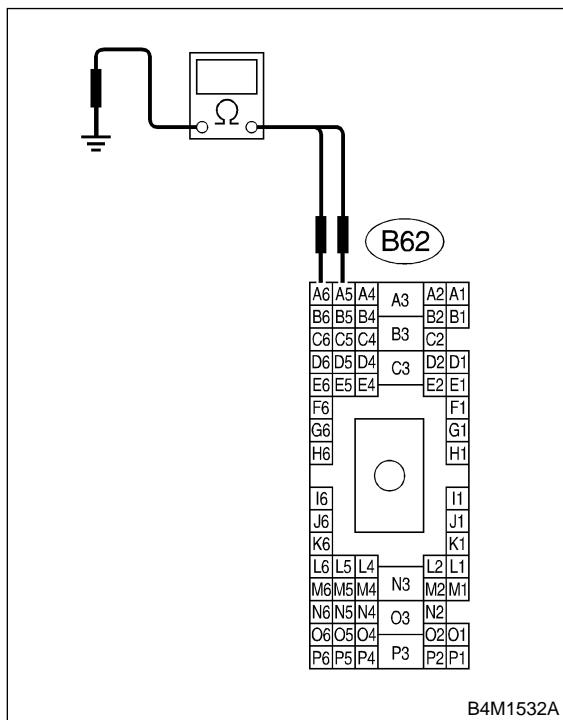
- 1) Connect all connectors.
- 2) Measure resistance between shield connector and chassis ground.

Connector & terminal

Trouble code 22 / (B62) No. A5 — Chassis ground:

Trouble code 24 / (B62) No. A6 — Chassis ground:

NOTE:

For the **Trouble code 26 and 28**:Go to step **8I17**.

8I18 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary noise interference.

8I17 : CHECK ABS CM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABS CM&H/U. <Ref. to 4-4 [W15A0].>

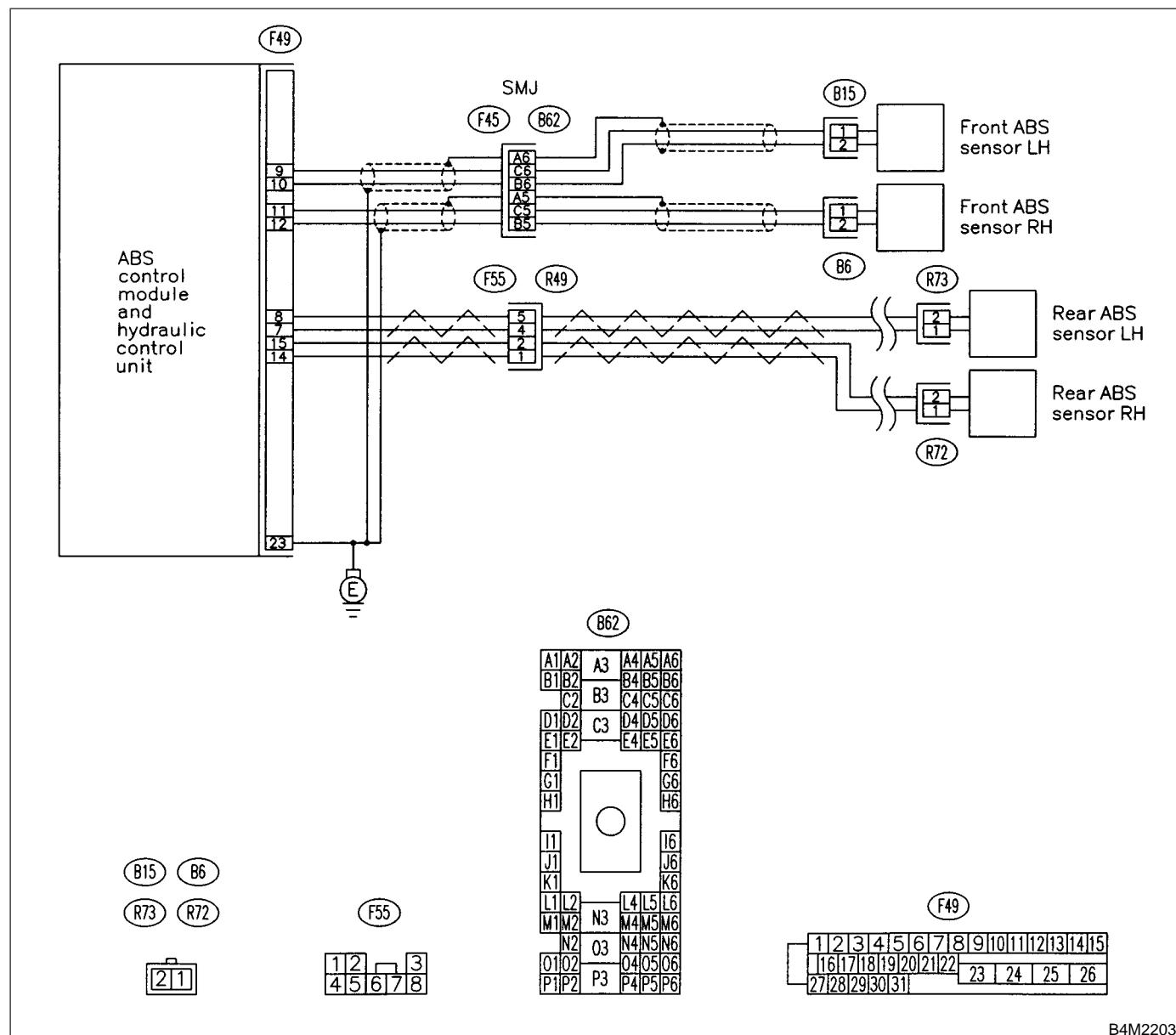
NO : Go to step **8I18**.

J: TROUBLE CODE 29**— ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) —****DIAGNOSIS:**

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

B4M2203

8J1 : CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.

CHECK : *Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.*

YES : The ABS is normal. Erase the trouble code.

NOTE:

When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.

NO : Go to step 8J2.

8J2 : CHECK TIRE SPECIFICATIONS.

CHECK : *Are the tire specifications correct?*

YES : Go to step 8J3.

NO : Replace tire.

8J3 : CHECK WEAR OF TIRE.

CHECK : *Is the tire worn excessively?*

YES : Replace tire.

NO : Go to step 8J4.

8J4 : CHECK TIRE PRESSURE.

CHECK : *Is the tire pressure correct?*

YES : Go to step 8J5.

NO : Adjust tire pressure.

8J5 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ (3.3 $\pm 1.0 \text{ kg}\cdot\text{m}$, 24 $\pm 7 \text{ ft-lb}$)

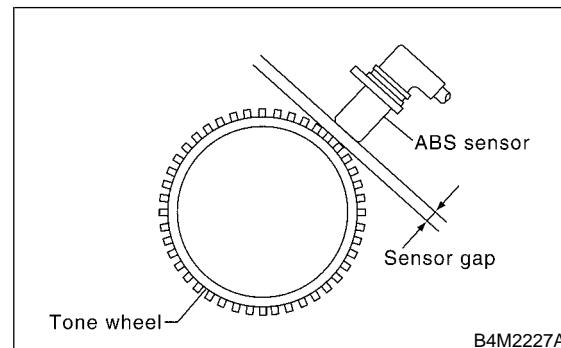
CHECK : *Are the ABS sensor installation bolts tightened securely?*

YES : Go to step 8J6.

NO : Tighten ABS sensor installation bolts securely.

8J6 : CHECK ABS SENSOR GAP.

Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel.



Specifications	Front wheel	Rear wheel
	0.3 — 0.8 mm (0.012 — 0.031 in)	0.44 — 0.94 mm (0.0173 — 0.0370 in)

CHECK : *Is the gap within the specifications?*

YES : Go to step 8J7.

NO : Adjust the gap.

NOTE:

Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

8J7 : PREPARE OSCILLOSCOPE.

CHECK : *Is an oscilloscope available?*

YES : Go to step 8J8.

NO : Go to step 8J9.

8J8 : CHECK ABS SENSOR SIGNAL.

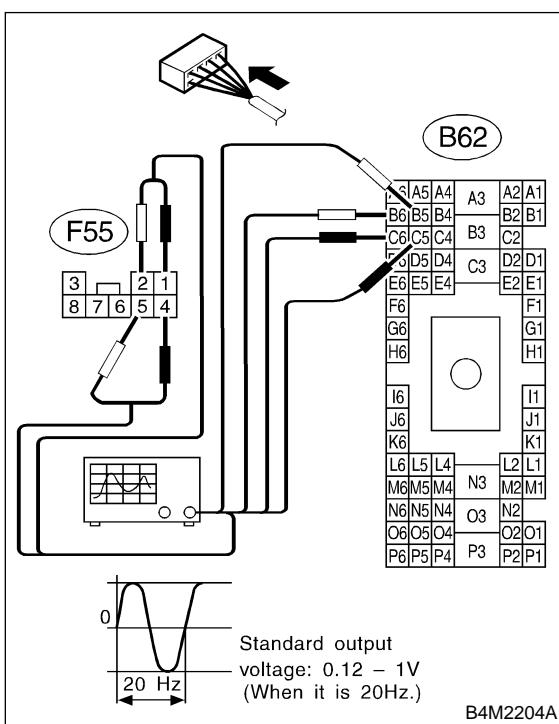
- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

Connector & terminal

(B62) No. C5 (+) — No. B5 (-) (Front RH):
 (B62) No. C6 (+) — No. B6 (-) (Front LH):
 (F55) No. 1 (+) — No. 2 (-) (Rear RH):
 (F55) No. 4 (+) — No. 5 (-) (Rear LH):



CHECK : Is oscilloscope pattern smooth, as shown in figure?

YES : Go to step 8J12.

NO : Go to step 8J9.

8J9 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor from hub.

CHECK : Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?

YES : Thoroughly remove dirt or other foreign matter.

NO : Go to step 8J10.

8J10 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : Are there broken or damaged teeth in the ABS sensor piece or the tone wheel?

YES : Replace ABS sensor or tone wheel. <Ref. to 4-4 [W14A0].> and <Ref. to 4-2 [W3A0].>

NO : Go to step 8J11.

8J11 : CHECK TONE WHEEL RUNOUT.

Measure tone wheel runout.

CHECK : Is the runout less than 0.05 mm (0.0020 in)?

YES : Go to step 8J12.

NO : Replace tone wheel. <Ref. to 4-2 [W3A0].>

8J12 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 8J13.

8J13 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

K: TROUBLE CODE 31 (FRONT RH)

L: TROUBLE CODE 33 (FRONT LH)

M: TROUBLE CODE 35 (REAR RH)

N: TROUBLE CODE 37 (REAR LH)

— ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U —

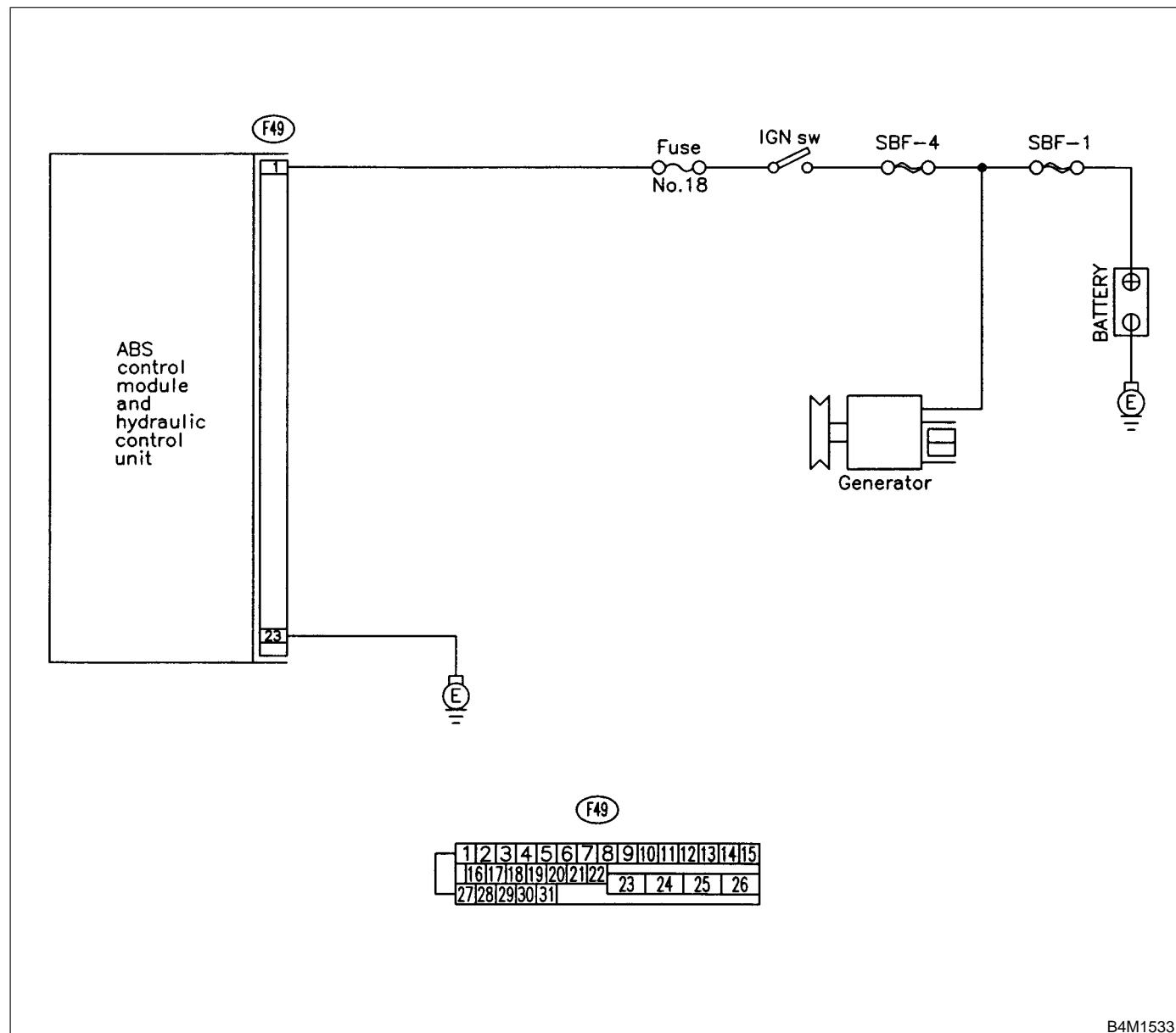
DIAGNOSIS:

- Faulty harness/connector
- Faulty inlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

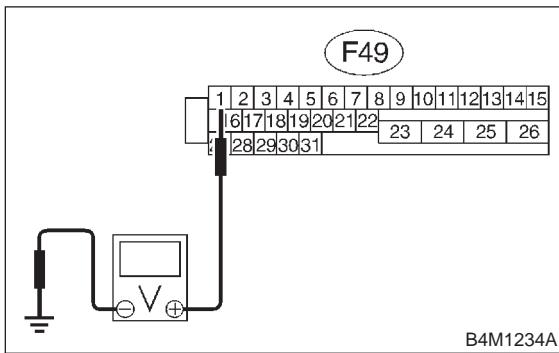


8N1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 8N2.

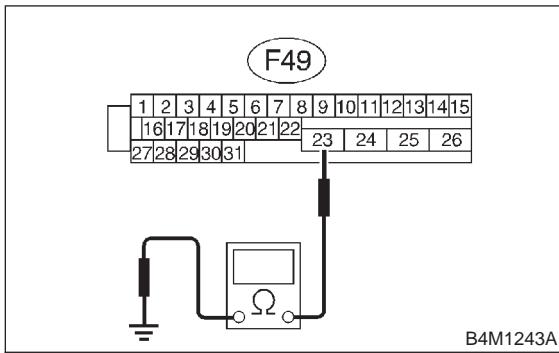
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8N2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 8N3.

NO : Repair ABSCM&H/U ground harness.

8N3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 8N4.

8N4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.

- 2) Erase the memory.

- 3) Perform inspection mode.

- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 8N5.

8N5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

O: TROUBLE CODE 32 (FRONT RH)

P: TROUBLE CODE 34 (FRONT LH)

Q: TROUBLE CODE 36 (REAR RH)

R: TROUBLE CODE 38 (REAR LH)

— ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U —

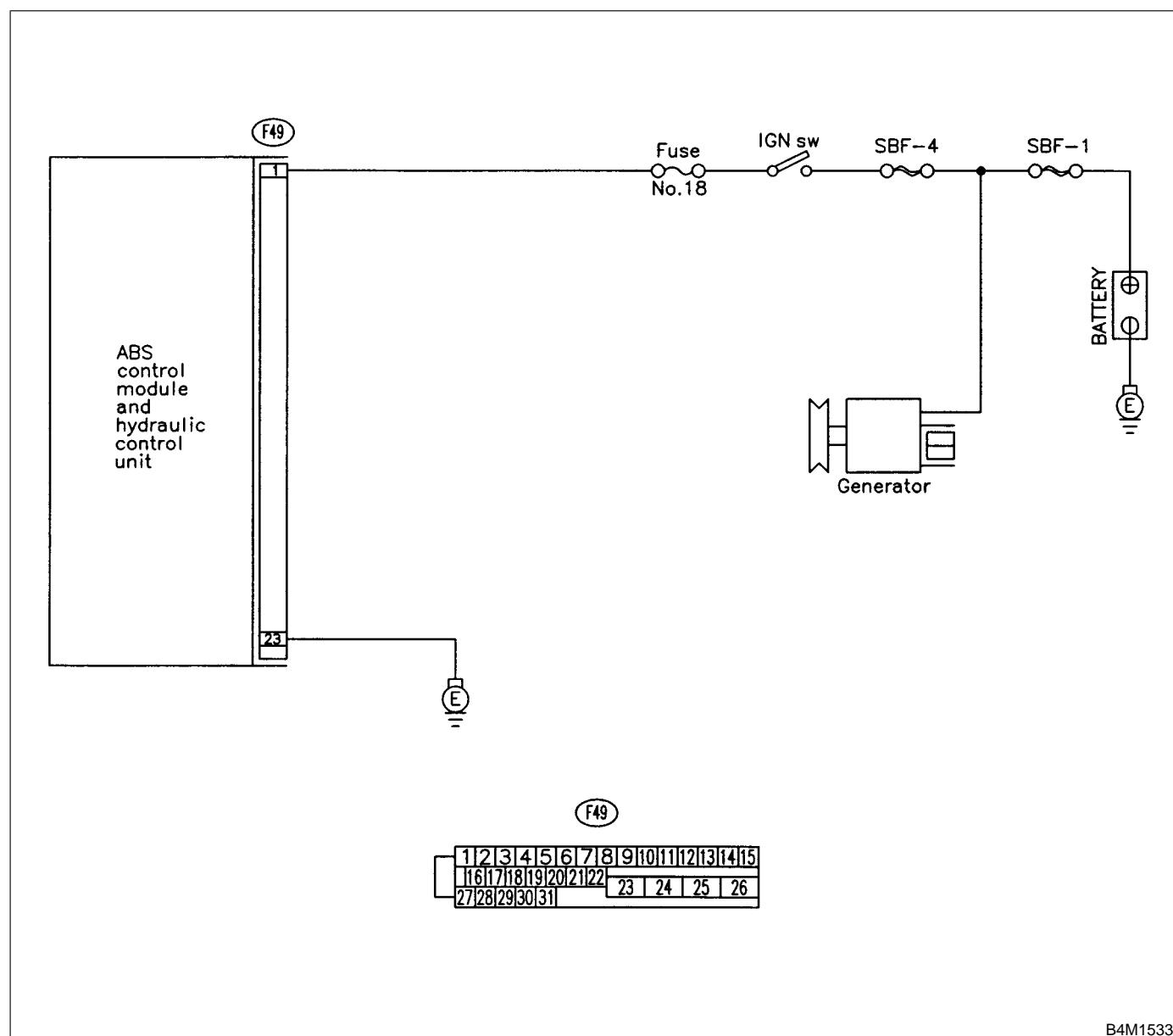
DIAGNOSIS:

- Faulty harness/connector
- Faulty outlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

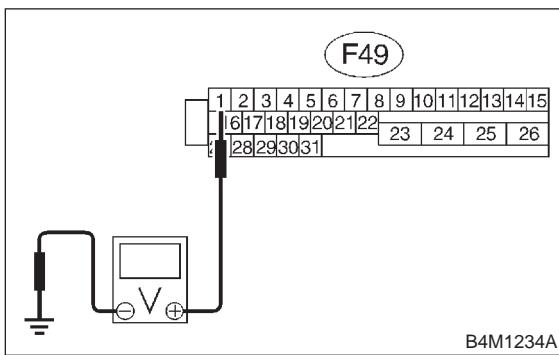


8R1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 8R2.

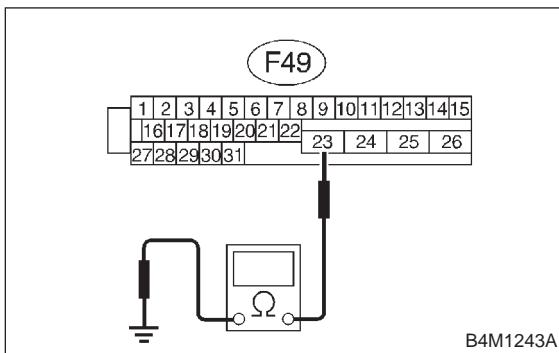
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8R2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 8R3.

NO : Repair ABSCM&H/U ground harness.

8R3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 8R4.

8R4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 8R5.

8R5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

S: TROUBLE CODE 41 — ABNORMAL ABS CONTROL MODULE —

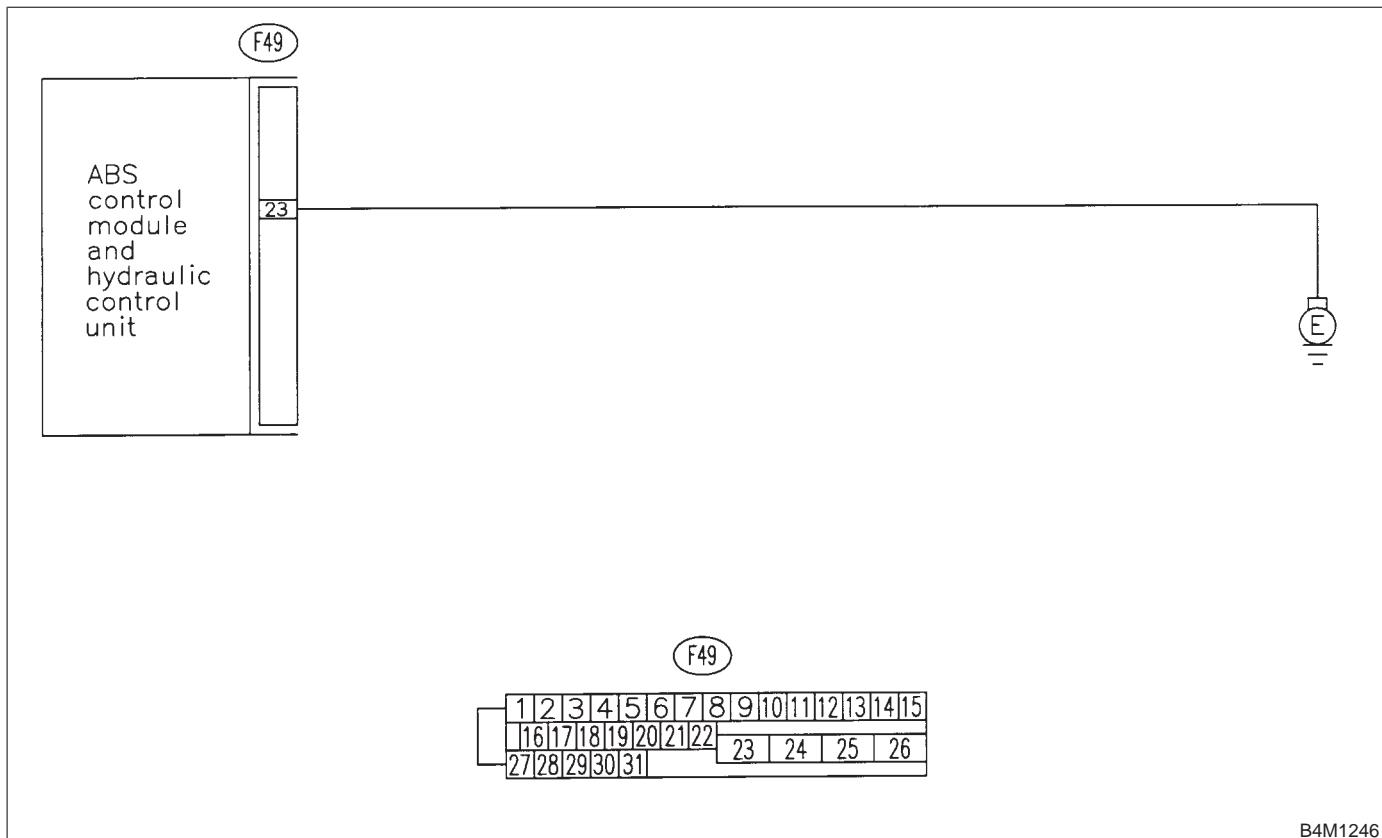
DIAGNOSIS:

- Faulty ABSCM&H/U.

TROUBLE SYMPTOM:

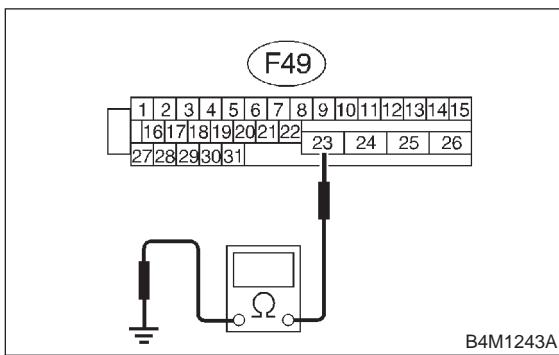
- ABS does not operate.

WIRING DIAGRAM:



8S1 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:


CHECK : *Is the resistance less than 0.5 Ω?*

YES : Go to step 8S2.

NO : Repair ABSCM&H/U ground harness.

8S2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step 8S3.

8S3 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : *Is the car telephone or the wireless transmitter properly installed?*

YES : Go to step 8S4.

NO : Properly install the car telephone or the wireless transmitter.

8S4 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : *Are noise sources (such as an antenna) installed near the sensor harness?*

YES : Install the noise sources apart from the sensor harness.

NO : Go to step 8S5.

8S5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.

- 2) Erase the memory.

- 3) Perform inspection mode.

- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 8S6.

8S6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

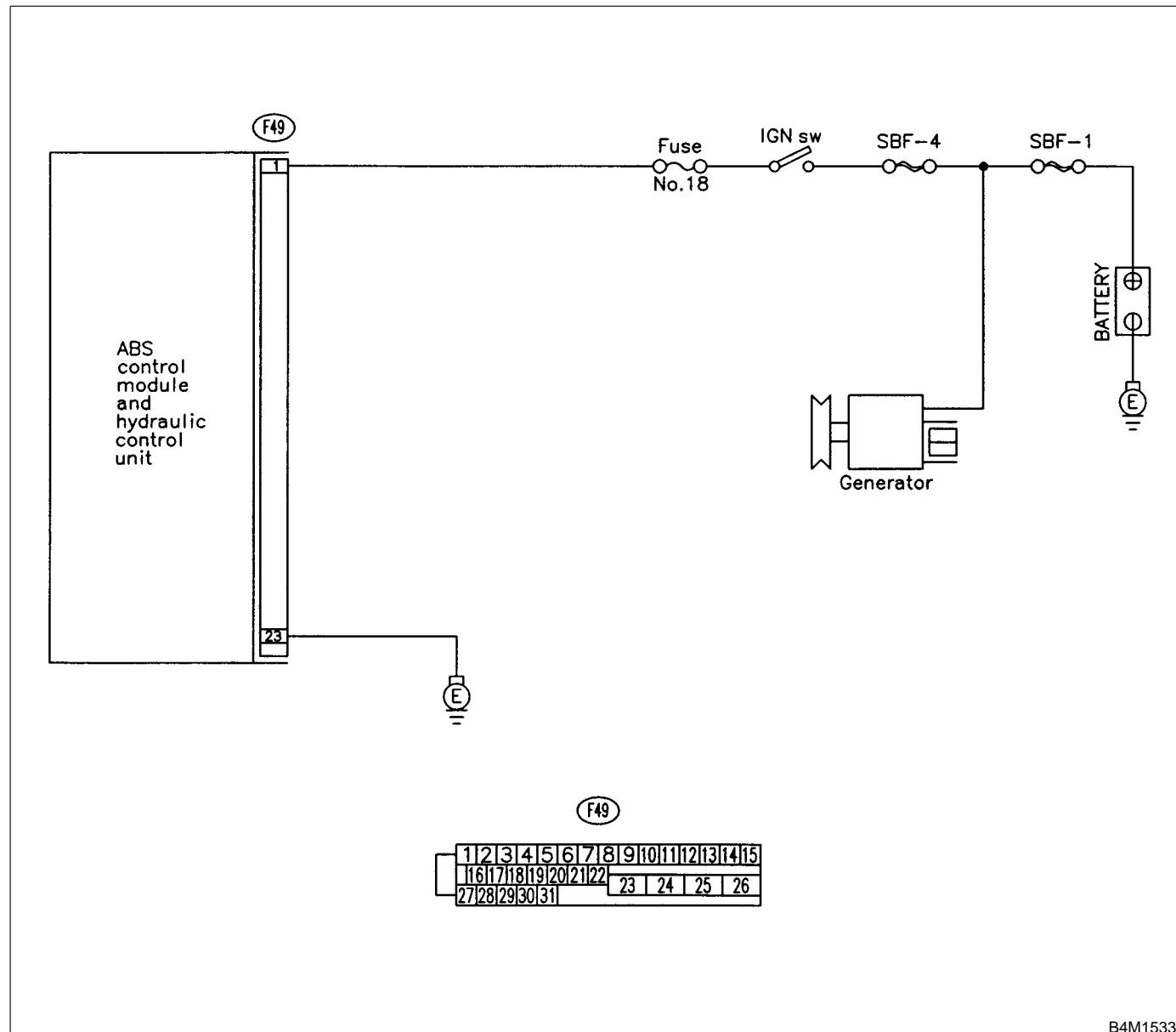
NO : A temporary poor contact.

T: TROUBLE CODE 42**— SOURCE VOLTAGE IS ABNORMAL. —****DIAGNOSIS:**

- Power source voltage of the ABSCM&H/U is low or high.

TROUBLE SYMPTOM:

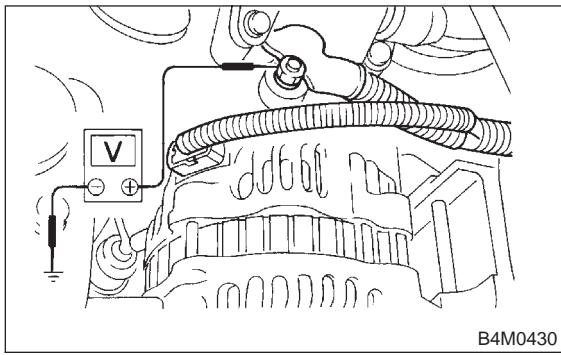
- ABS does not operate.

WIRING DIAGRAM:

B4M1533

8T1 : CHECK GENERATOR.

- 1) Start engine.
- 2) Idling after warm-up.
- 3) Measure voltage between generator B terminal and chassis ground.

Terminal**Generator B terminal — Chassis ground:**

CHECK : Is the voltage between 10 and 17 V?
YES : Go to step 8T2.
NO : Repair generator. <Ref. to 6-1 [W2A0].>

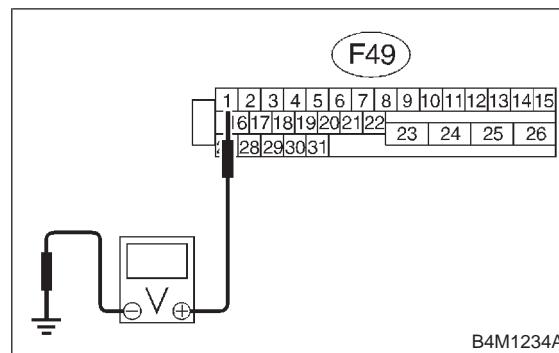
8T2 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

CHECK : Are the positive and negative battery terminals tightly clamped?
YES : Go to step 8T3.
NO : Tighten the clamp of terminal.

8T3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

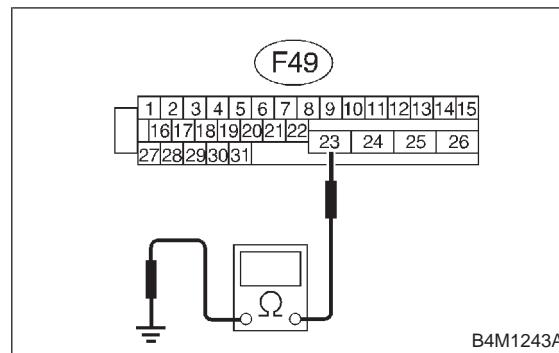
- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 1 (+) — Chassis ground (-):**

CHECK : Is the voltage between 10 and 17 V?
YES : Go to step 8T4.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8T4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 23 — Chassis ground:**

CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 8T5.
NO : Repair ABSCM&H/U ground harness.

8T5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.
NO : Go to step **8T6**.

8T6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step **8T7**.

8T7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

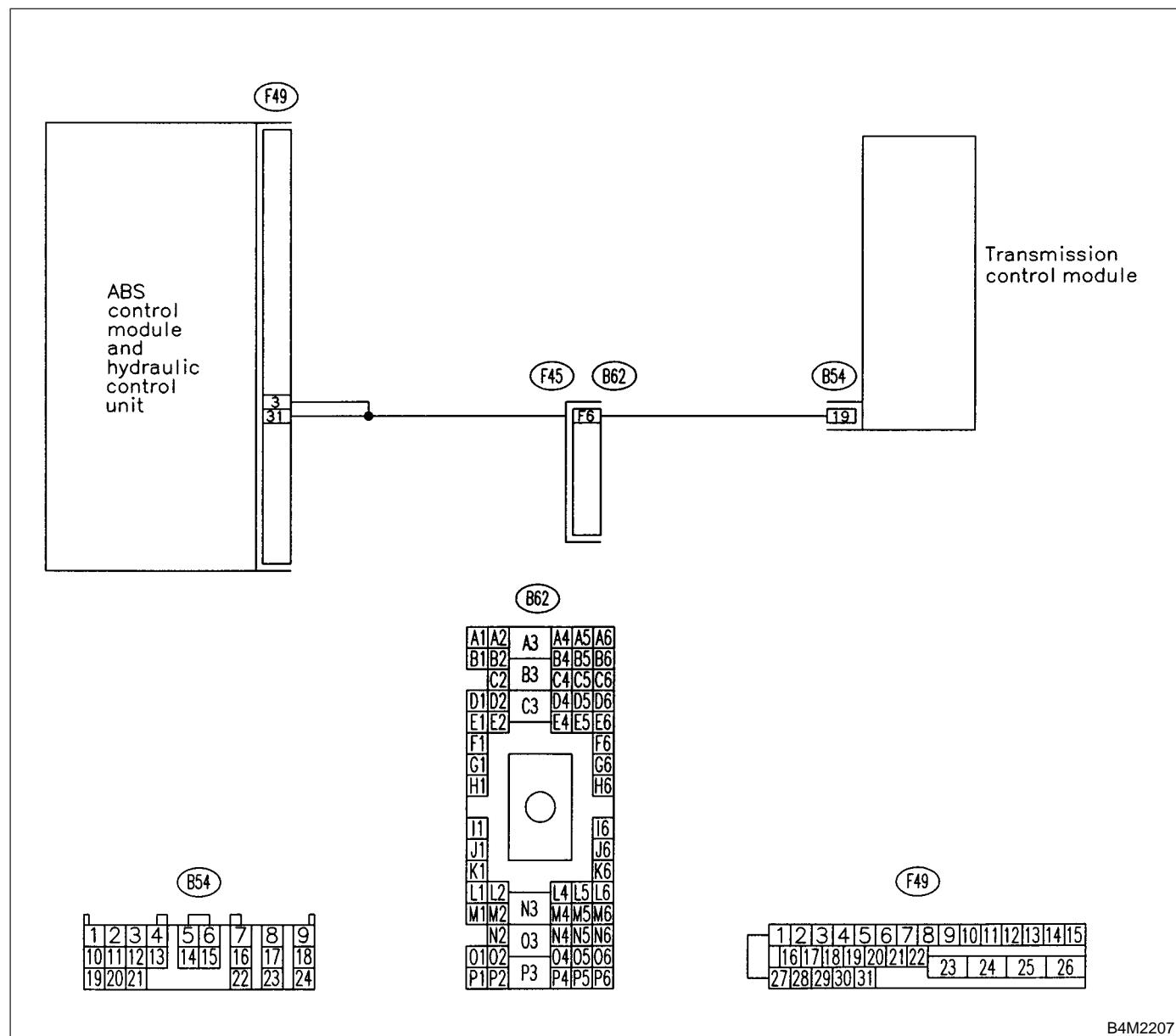
MEMO:

U: TROUBLE CODE 44**— A COMBINATION OF AT CONTROL ABNORMAL —****DIAGNOSIS:**

- Combination of AT control faults

TROUBLE SYMPTOM:

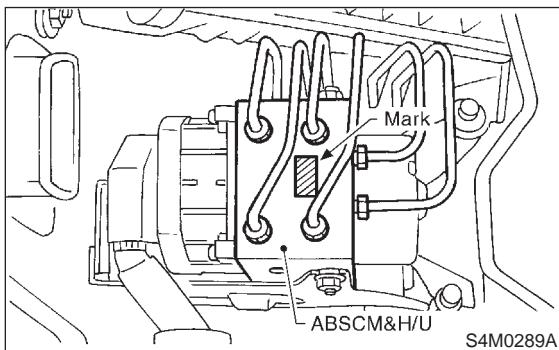
- ABS does not operate.

WIRING DIAGRAM:

B4M2207

8U1 : CHECK SPECIFICATIONS OF THE ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C5	AT (Except OUTBACK)
C6	MT (Except OUTBACK)
CE	AT (OUTBACK)
CF	MT (OUTBACK)

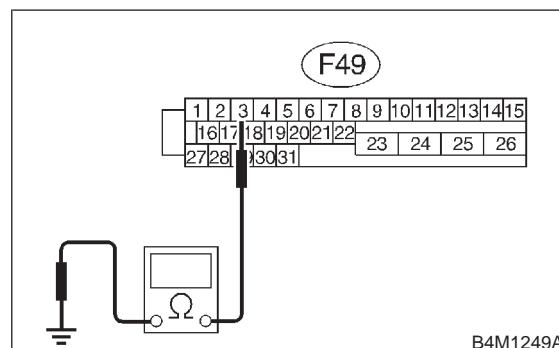
CHECK : Is an ABSCM&H/U for AT model installed on a MT model?
YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 8U2.

8U2 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect two connectors from TCM.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 — Chassis ground:



CHECK : Is the resistance more than $1 M\Omega$?

YES : Go to step 8U3.

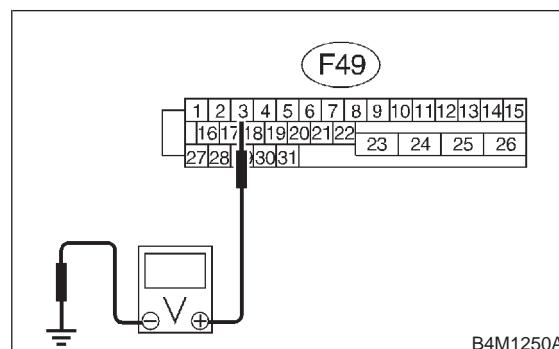
NO : Repair harness between TCM and ABSCM&H/U.

8U3 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 8U4.

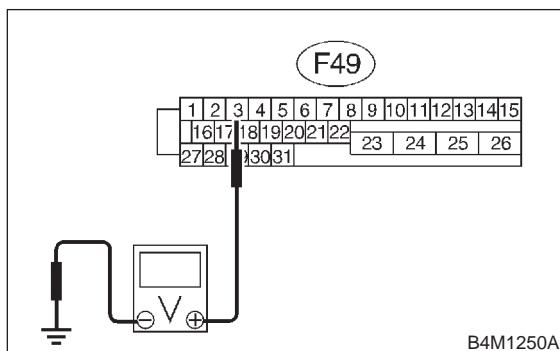
NO : Repair harness between TCM and ABSCM&H/U.

8U4 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 8U5.

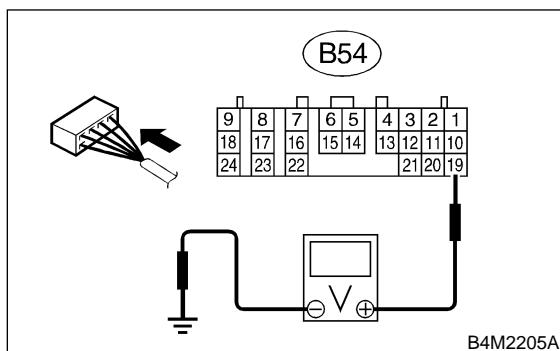
NO : Repair harness between TCM and ABSCM&H/U.

8U5 : CHECK TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors to TCM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM connector terminal and chassis ground.

Connector & terminal

(B54) No. 19 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 8U7.

NO : Go to step 8U6.

8U6 : CHECK AT.

CHECK : Is the AT functioning normally?

YES : Replace TCM.

NO : Repair AT.

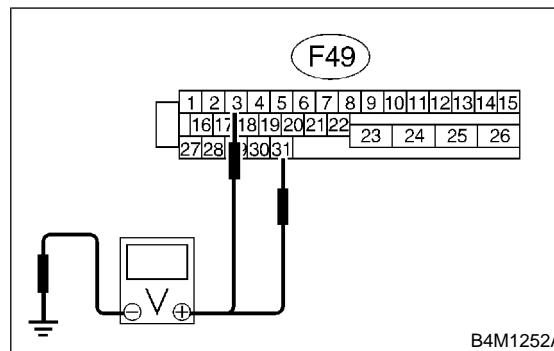
8U7 : CHECK OPEN CIRCUIT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):

(F49) No. 31 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 8U8.

NO : Repair harness/connector between TCM and ABSCM&H/U.

8U8 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between TCM and ABSCM&H/U?
<Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 8U9.

8U9 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step **8U10**.

8U10 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

V: TROUBLE CODE 51

— ABNORMAL VALVE RELAY —

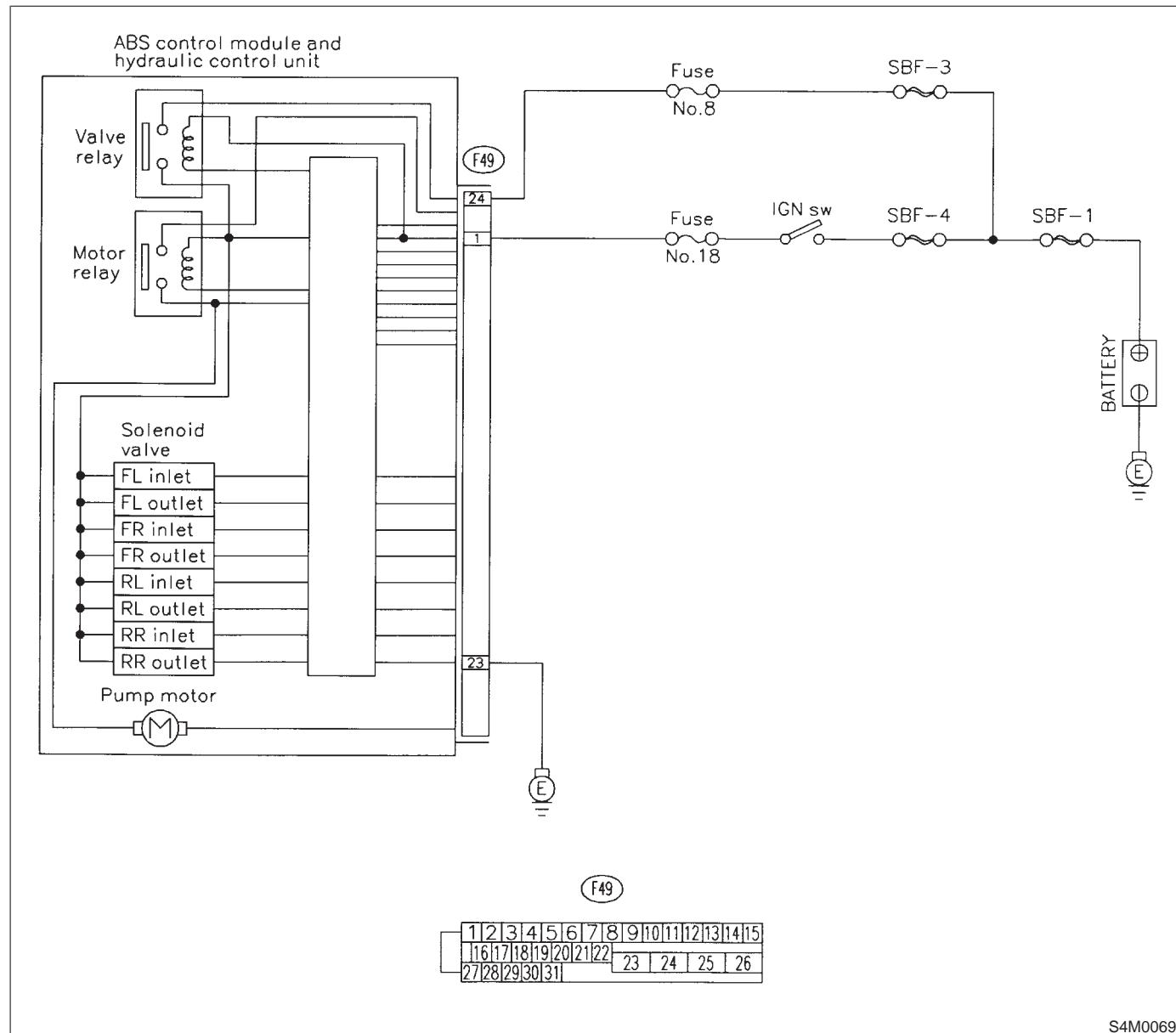
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

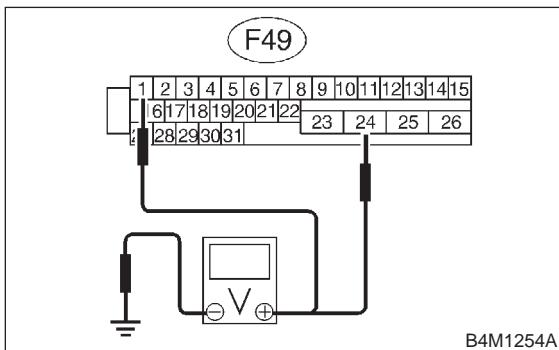


8V1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):
 (F49) No. 24 (+) — Chassis ground (-):



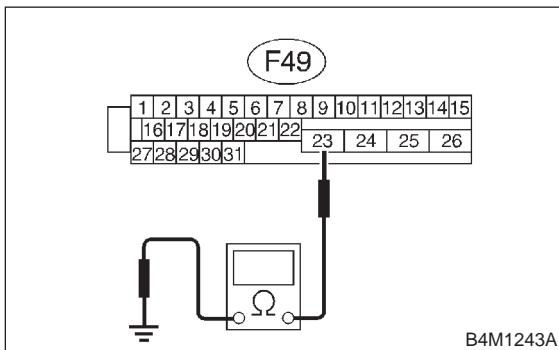
CHECK : Is the voltage between 10 and 15 V?
YES : Go to step 8V2.
NO : Repair harness connector between battery and ABSCM&H/U.

8V2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



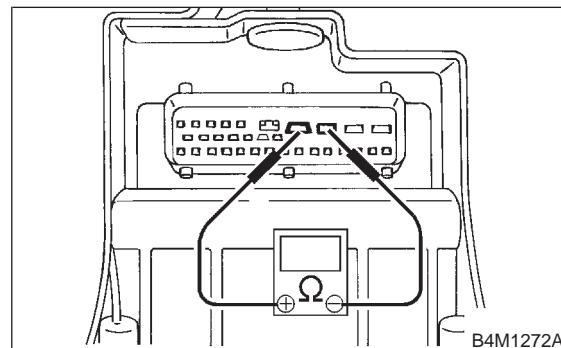
CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 8V3.
NO : Repair ABSCM&H/U ground harness.

8V3 : CHECK VALVE RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U and terminals.

Terminals

No. 23 (+) — No. 24 (-):



CHECK : Is the resistance more than 1 MΩ?
YES : Go to step 8V4.
NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

8V4 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>
YES : Repair connector.
NO : Go to step 8V5.

8V5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?
YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 8V6.

8V6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

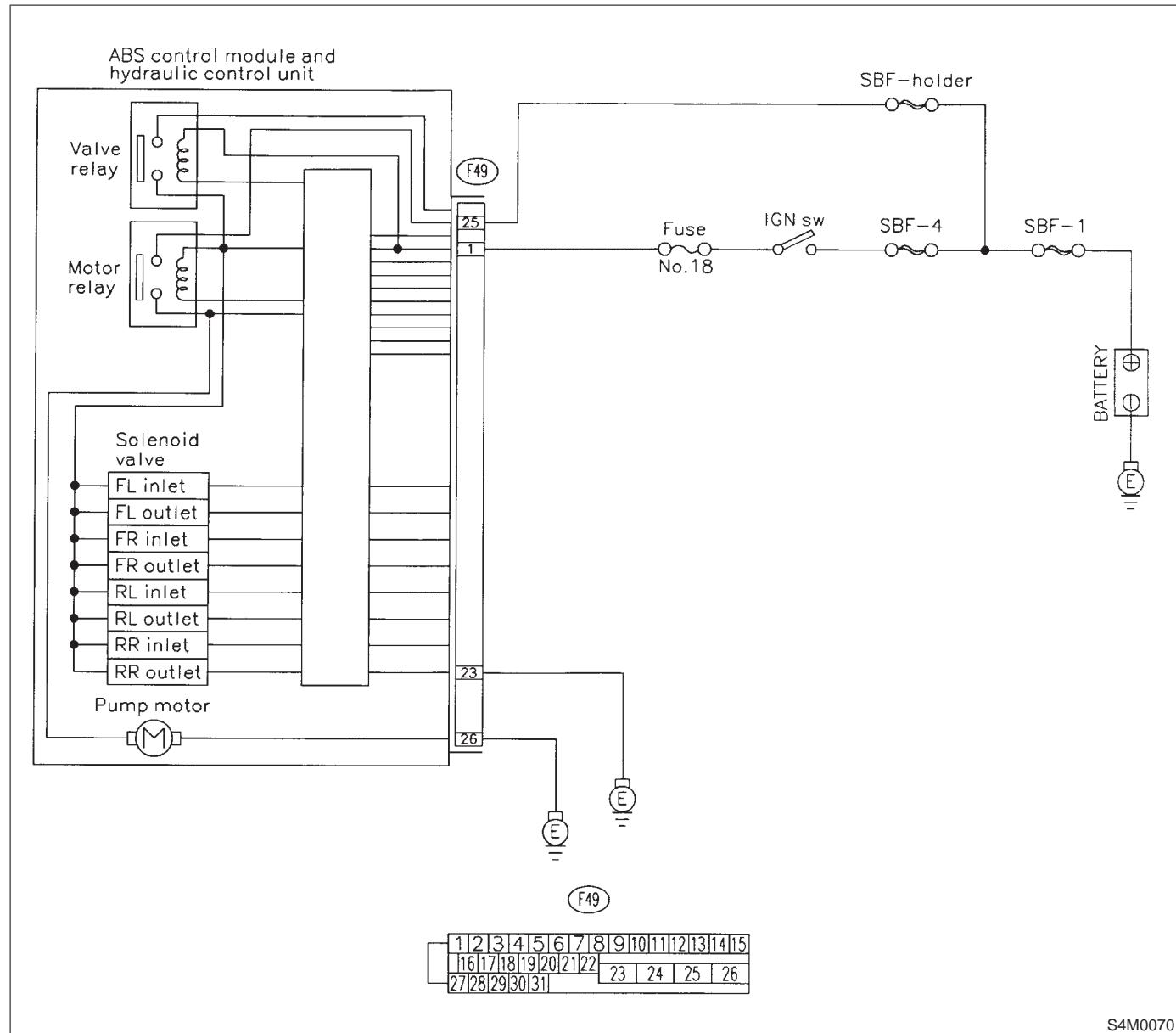
MEMO:

W: TROUBLE CODE 52**— ABNORMAL MOTOR AND/OR MOTOR RELAY —****DIAGNOSIS:**

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

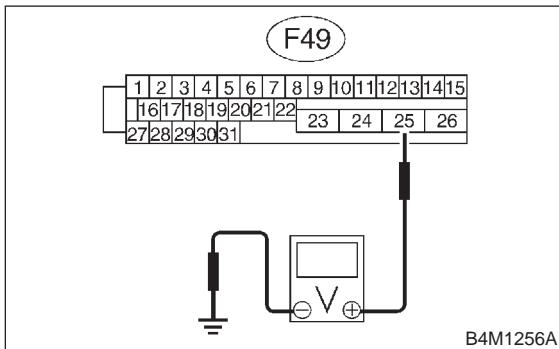
WIRING DIAGRAM:

8W1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 25 (+) — Chassis ground (-):



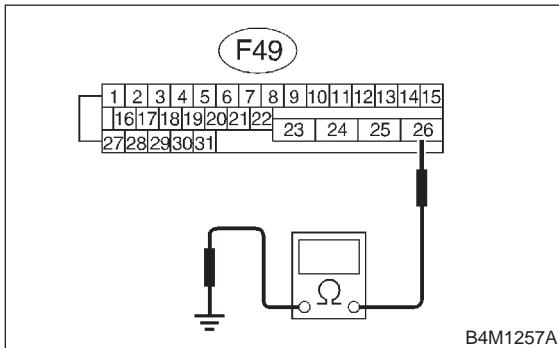
CHECK : Is the voltage between 10 and 15 V?
YES : Go to step 8W2.
NO : Repair harness/connector between battery, ignition switch and ABSCM&H/U and check fuse SBF-holder.

8W2 : CHECK GROUND CIRCUIT OF MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 26 — Chassis ground:



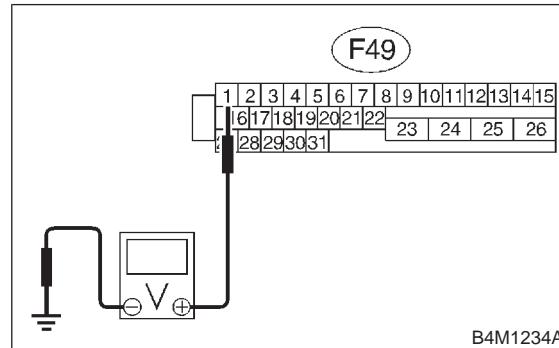
CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 8W3.
NO : Repair ABSCM&H/U ground harness.

8W3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Run the engine at idle.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



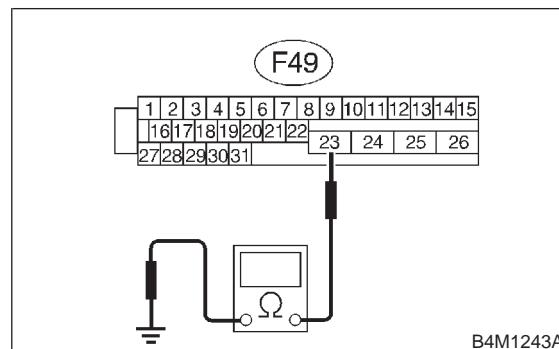
CHECK : Is the voltage between 10 and 15 V?
YES : Go to step 8W4.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

8W4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 8W5.
NO : Repair ABSCM&H/U ground harness.

8W5 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:

Use the diagnosis connector to operate the sequence control.

 : *Can motor revolution noise (buzz) be heard when carrying out the sequence control?*

 : Go to step 8W6.

 : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

8W6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

 : *Is there poor contact in connector between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

 : Repair connector.

 : Go to step 8W7.

8W7 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

 : *Is the same trouble code as in the current diagnosis still being output?*

 : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

 : Go to step 8W8.

8W8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

 : *Are other trouble codes being output?*

 : Proceed with the diagnosis corresponding to the trouble code.

 : A temporary poor contact.

MEMO:

X: TROUBLE CODE 54 — ABNORMAL STOP LIGHT SWITCH —

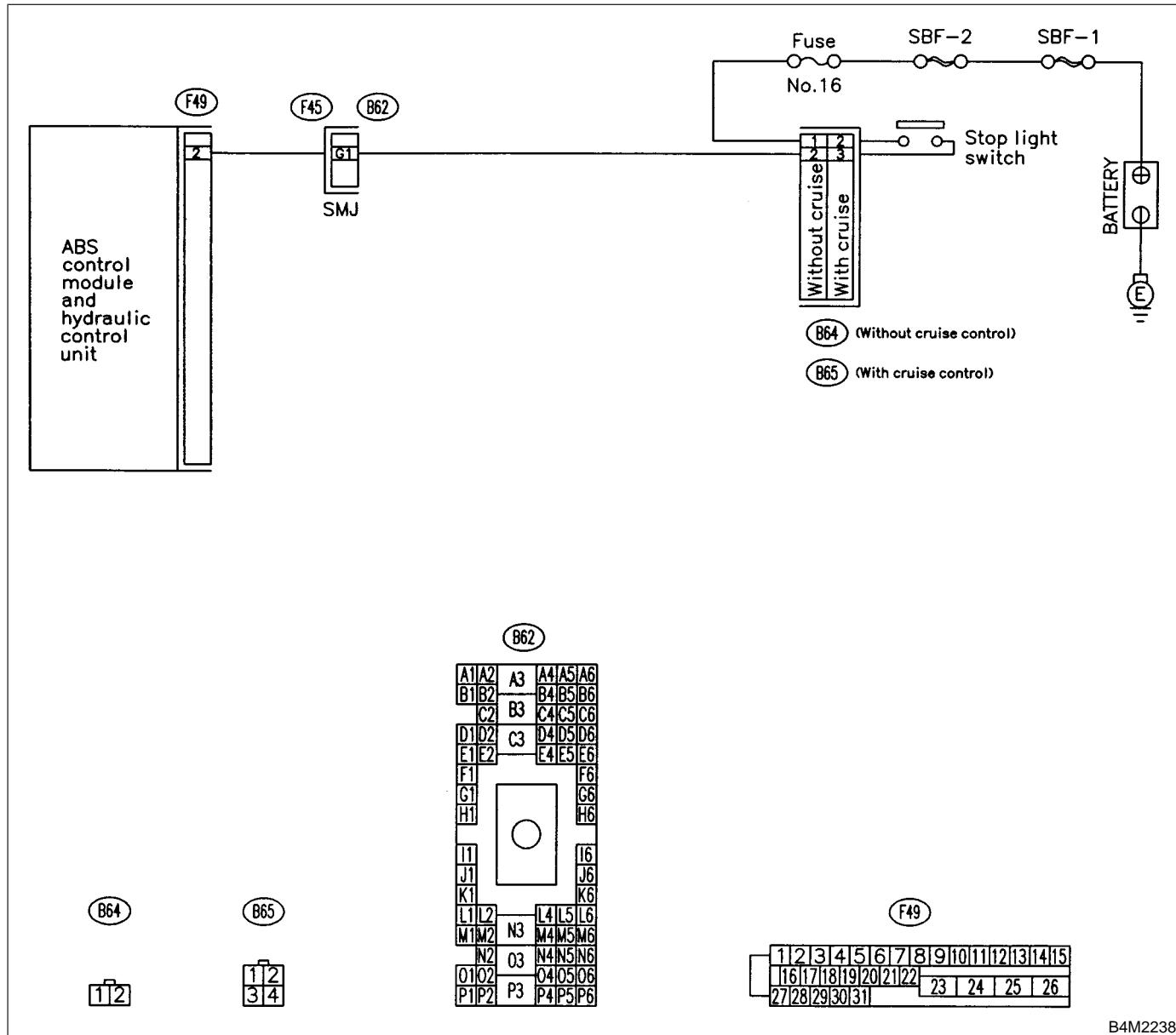
DIAGNOSIS:

- Faulty stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



8X1 : CHECK STOP LIGHTS COME ON.

Depress the brake pedal.

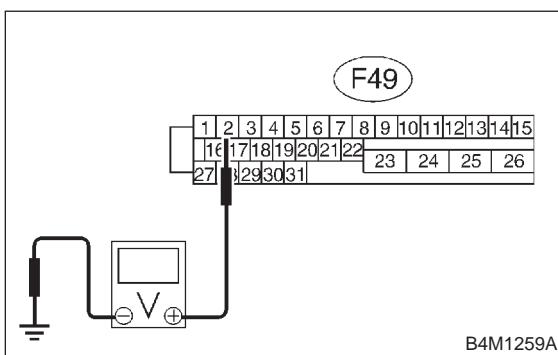
CHECK : *Do stop lights come on?*
YES : Go to step 8X2.
NO : Repair stop lights circuit.

8X2 : CHECK OPEN CIRCUIT IN HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Depress brake pedal.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 2 (+) — Chassis ground (-):



CHECK : *Is the voltage between 10 and 15 V?*
YES : Go to step 8X3.
NO : Repair harness between stop light switch and ABSCM&H/U.

8X3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between stop light switch and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*
YES : Repair connector.
NO : Go to step 8X4.

8X4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*
YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 8X5.

8X5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

Y: TROUBLE CODE 56

— ABNORMAL G SENSOR OUTPUT VOLTAGE —

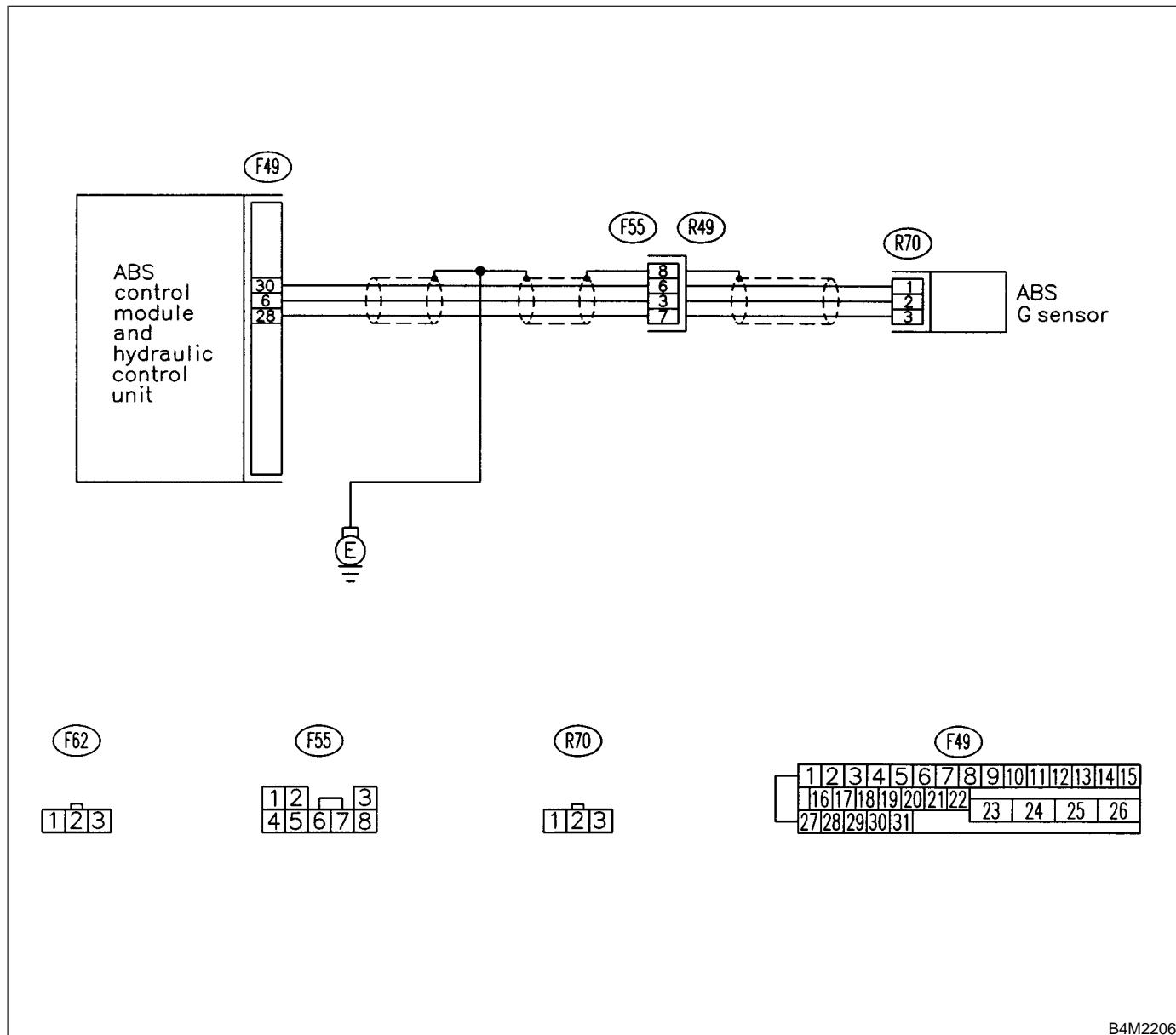
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

• ABS does not operate.

WIRING DIAGRAM:



8Y1 : CHECK ALL FOUR WHEELS FOR FREE TURNING.

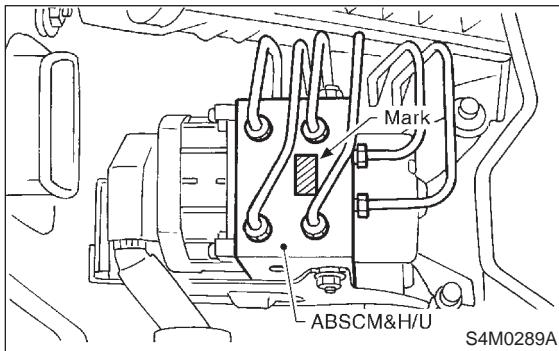
CHECK : *Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?*

YES : The ABS is normal. Erase the trouble code.

NO : Go to step 8Y2.

8Y2 : CHECK SPECIFICATIONS OF ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C5	AT (Except OUTBACK)
C6	MT (Except OUTBACK)
CE	AT (OUTBACK)
CF	MT (OUTBACK)

CHECK : *Does the vehicle specification and the ABSCM&H/U specification match?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

CAUTION:

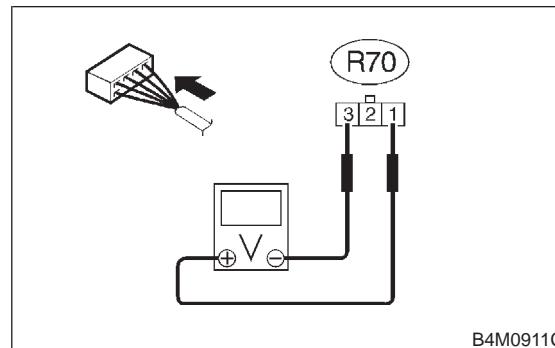
Be sure to turn ignition switch to OFF when removing ABSCM&H/U.

NO : Go to step 8Y3.

8Y3 : CHECK INPUT VOLTAGE OF G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Disconnect G sensor from body. (Do not disconnect connector.)
- 4) Turn ignition switch to ON.
- 5) Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 1 (+) — No. 3 (-):



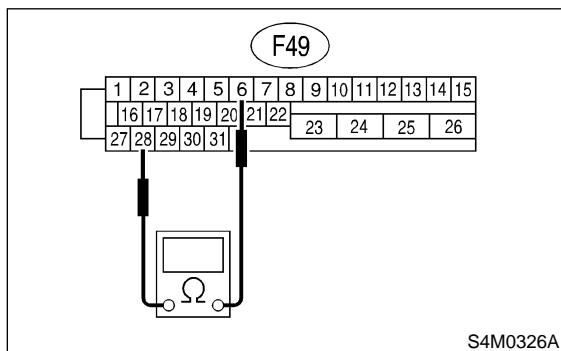
CHECK : *Is the voltage between 4.75 and 5.25 V?*

YES : Go to step 8Y4.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

8Y4 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 6 — No. 28:


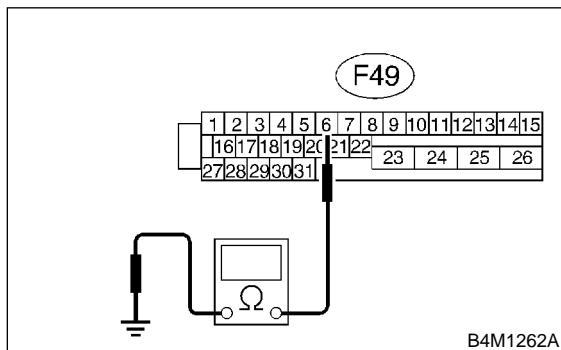
CHECK : *Is the resistance between 4.3 and 4.9 kΩ?*

YES : Go to step **8Y5**.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

8Y5 : CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.

- 1) Disconnect connector from G sensor.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 — Chassis ground:


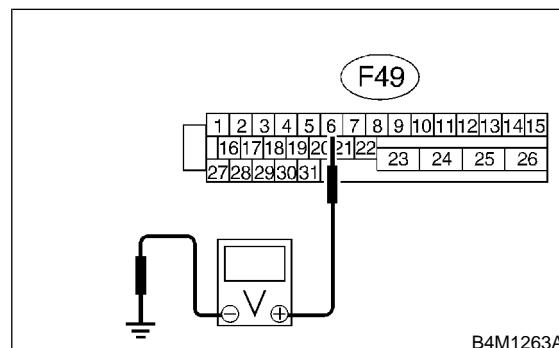
CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step **8Y6**.

NO : Repair harness between G sensor and ABSCM&H/U.

8Y6 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (-):


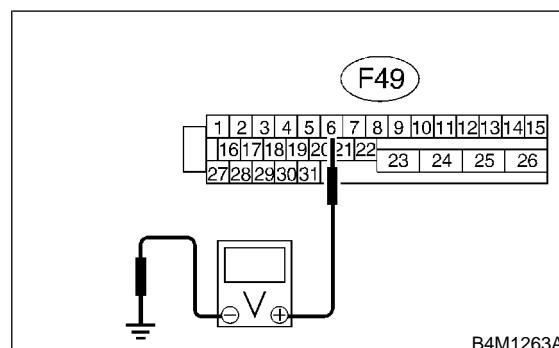
CHECK : *Is the voltage less than 1 V?*

YES : Go to step **8Y7**.

NO : Repair harness between G sensor and ABSCM&H/U.

8Y7 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (-):


CHECK : *Is the voltage less than 1 V?*

YES : Go to step **8Y8**.

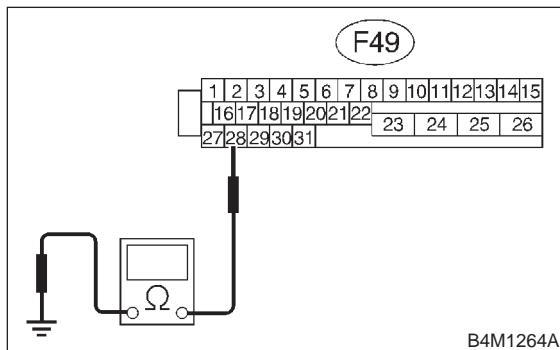
NO : Repair harness between G sensor and ABSCM&H/U.

8Y8 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 28 — *Chassis ground*:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 8Y9.

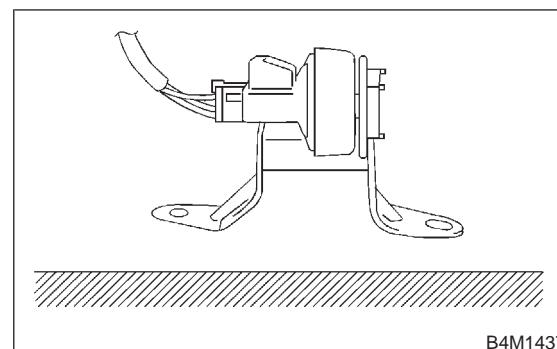
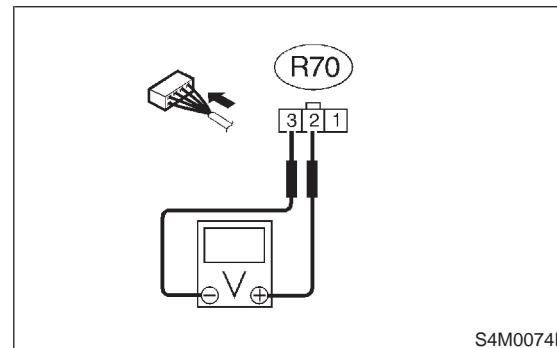
NO : Repair harness between G sensor and ABSCM&H/U.
Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

8Y9 : CHECK G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Connect connector to ABSCM&H/U.
- 5) Turn ignition switch to ON.
- 6) Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : *Is the voltage between 2.1 and 2.4 V when G sensor is horizontal?*

YES : Go to step 8Y10.

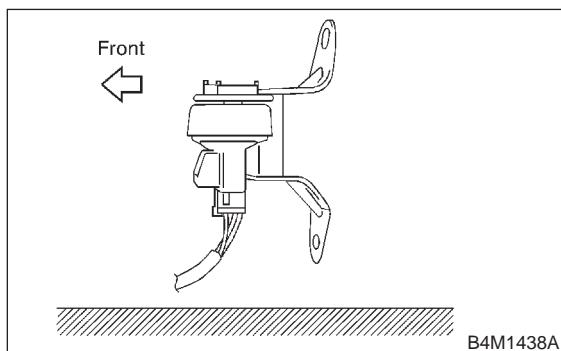
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

8Y10 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?

YES : Go to step 8Y11.

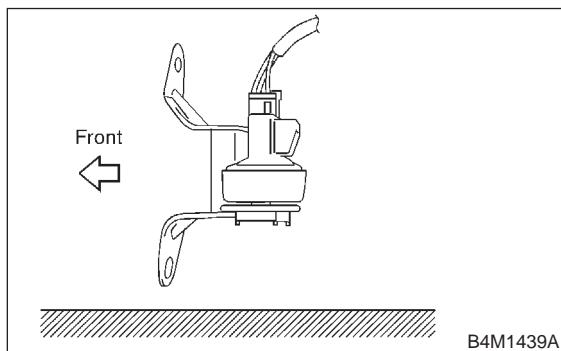
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

8Y11 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?

YES : Go to step 8Y12.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

8Y12 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connector between ABS CM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 8Y13.

8Y13 : CHECK ABS CM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABS CM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 8Y14.

8Y14 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

9. Select Monitor Function Mode

Applicable cartridge of select monitor: <Ref. to 1-6 [G1100].>

NOTE:

For basic handling of the select monitor, refer to its Operation Manual.

A: LIST OF FUNCTION MODE

1. ANALOG DATA ARE DISPLAYED.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
Stop light switch	Stop light switch monitor voltage is displayed.
G sensor output voltage	Refers to vehicle acceleration detecting by the analog G sensor. It appears on the select monitor display in volts.

2. ON/OFF DATA ARE DISPLAYED.

Display screen	Contents to be monitored
Stop light switch	Stop light switch signal
Valve relay signal	Valve relay signal
Motor relay signal	Motor relay signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS warning light	ABS warning light
Valve relay monitor	Valve relay operation monitor signal
Motor relay monitor	Motor relay operation monitor signal
CCM signal	ABS operation signal from ABS control module to TCM

3. TROUBLE CODES ARE DISPLAYED.

A maximum of 3 trouble codes are displayed in order of occurrence.

- If a particular trouble code is not properly stored in memory (due to a drop in ABS/CM&H/U power supply, etc.) when a problem occurs, the trouble code, followed by a question mark "?", appears on the select monitor display. This shows it may be an unreliable reading.

21 Front Right ABS Sensor Circuit

Open or Shorted Battery

(*a*)/?



S4M0076A

- *a* refers to the troubles in order of occurrence (Latest, Old, Older and Reference).

Display screen	Contents to be monitored
Latest	The most recent trouble code appears on the select monitor display.
Old	The second most recent trouble code appears on the select monitor display.
Older	The third most recent trouble code appears on the select monitor display.
Reference	A specified period of time proceeding trouble code appears on the select monitor display.

4. CLEAR MEMORY

Display screen	Contents to be monitored
Clear memory?	Function of clearing trouble code and freeze frame data.

5. ABS SEQUENCE CONTROL

Display screen	Contents to be monitored	Index No.
ABS sequence control	Perform ABS sequence control by operating valve and pump motor sequentially.	<Ref. to 4-4 [W15D0].>

6. FREEZE FRAME DATA

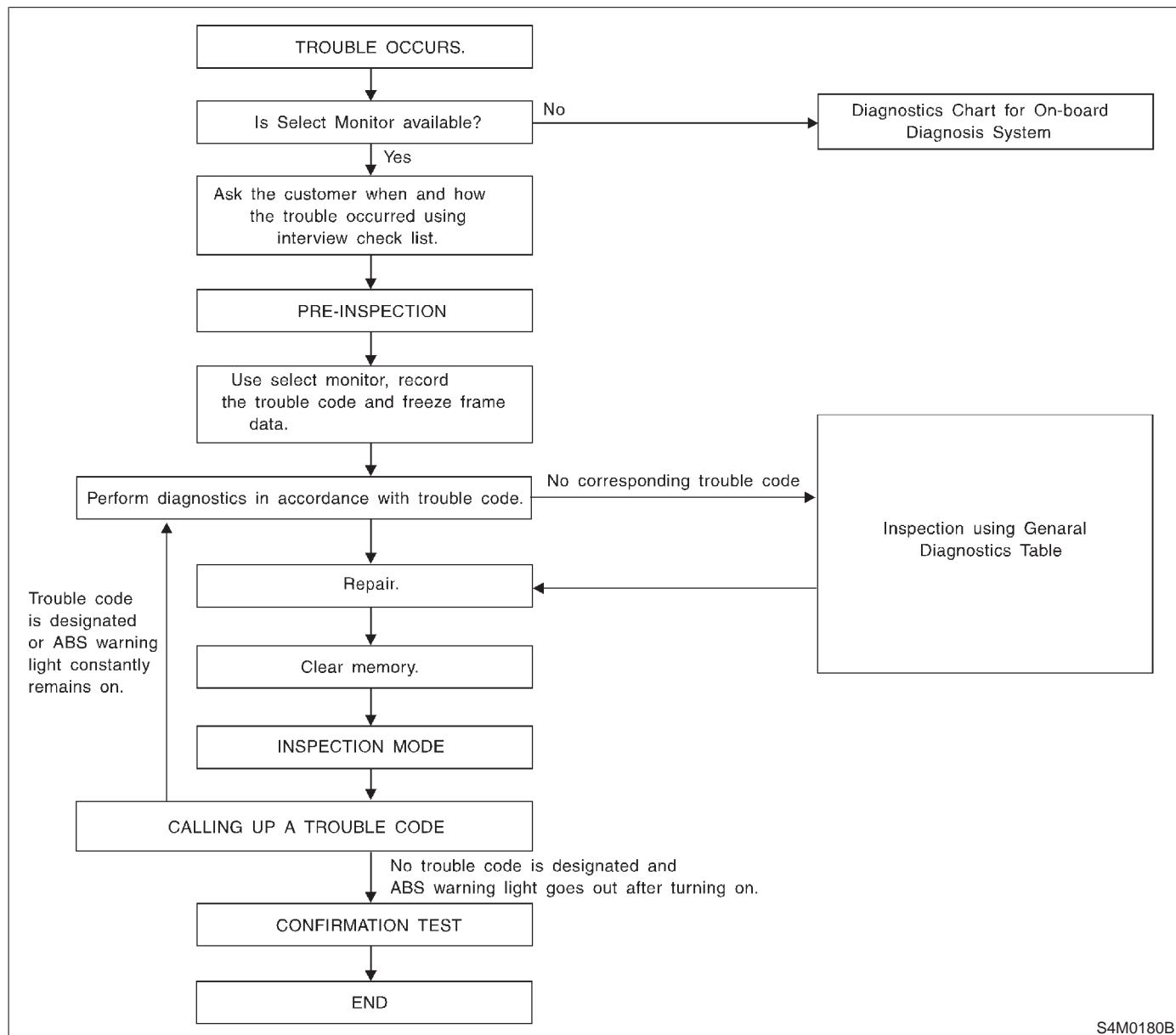
NOTE:

- Data stored at the time of trouble occurrence is shown on display.
- Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
- If freeze frame data is not properly stored in memory (due to a drop in ABSCM power supply, etc.), a trouble code, preceded by a question mark "?", appears on the select monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by the Front Right ABS sensor is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by the Front Left ABS sensor is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by the Rear Right ABS sensor is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by the Rear Left ABS sensor is displayed in km/h or mile/h.
ABSCM power voltage	Power (in volts) supplied to ABSCM&H/U appears on the select monitor display.
G sensor output voltage	Refers to vehicle acceleration detected by the analog G sensor. It appears on the select monitor display in volts.
Motor relay monitor	Motor relay operation monitor signal
Stop light switch	Stop light switch signal
ABS signal to TCM	ABS operation signal from ABS control module to TCM
ABS-AT control	ABS operation signal from ABS control module to TCM
ABS operation signal	ABS operation signal

10. Diagnostics Chart with Select Monitor

A: BASIC DIAGNOSTIC CHART



CAUTION:

Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:

- To check harness for broken wires or short circuits, shake it while holding it or the connector.
- Check list for interview. <Ref. to 4-4 [T6B0].>

B: LIST OF DIAGNOSTIC TROUBLE CODE

Code	Display screen	Contents of diagnosis	Index No.
—	Communication for initializing impossible	Select monitor communication failure	<Ref. to 4-4 [T10C0].>
—	No trouble code	Although no trouble code appears on the select monitor display, the ABS warning light remains on.	<Ref. to 4-4 [T10D0].>
21	Open or short circuit in front right ABS sensor circuit	Open or short circuit in front right ABS sensor circuit	<Ref. to 4-4 [T10E0].>
22	Front right ABS sensor abnormal signal	Front right ABS sensor abnormal signal	<Ref. to 4-4 [T10I0].>
23	Open or short circuit in front left ABS sensor circuit	Open or short circuit in front left ABS sensor circuit	<Ref. to 4-4 [T10F0].>
24	Front left ABS sensor abnormal signal	Front left ABS sensor abnormal signal	<Ref. to 4-4 [T10J0].>
25	Open or short circuit in rear right ABS sensor circuit	Open or short circuit in rear right ABS sensor circuit	<Ref. to 4-4 [T10K0].>
26	Rear right ABS sensor abnormal signal	Rear right ABS sensor abnormal signal	<Ref. to 4-4 [T10C0].>
27	Open or short circuit in rear left ABS sensor circuit	Open or short circuit in rear left ABS sensor circuit	<Ref. to 4-4 [T10H0].>
28	Rear left ABS sensor abnormal signal	Rear left ABS sensor abnormal signal	<Ref. to 4-4 [T10L0].>
29	Abnormal ABS sensor signal on any one of four sensor	Abnormal ABS sensor signal on any one of four	<Ref. to 4-4 [T10M0].>
31	Front right inlet valve malfunction	Front right inlet valve malfunction	<Ref. to 4-4 [T10N0].>
32	Front right outlet valve malfunction	Front right outlet valve malfunction	<Ref. to 4-4 [T10R0].>
33	Front left inlet valve malfunction	Front left inlet valve malfunction	<Ref. to 4-4 [T10O0].>
34	Front left outlet valve malfunction	Front left outlet valve malfunction	<Ref. to 4-4 [T10S0].>
35	Rear right inlet valve malfunction	Rear right inlet valve malfunction	<Ref. to 4-4 [T10P0].>
36	Rear right outlet valve malfunction	Rear right outlet valve malfunction	<Ref. to 4-4 [T10T0].>
37	Rear left inlet valve malfunction	Rear left inlet valve malfunction	<Ref. to 4-4 [T10Q0].>
38	Rear left outlet valve malfunction	Rear left outlet valve malfunction	<Ref. to 4-4 [T10U0].>
41	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to 4-4 [T10V0].>
42	Power supply voltage too low	Power supply voltage too low	<Ref. to 4-4 [T10W0].>
42	Power supply voltage too high	Power supply voltage too high	<Ref. to 4-4 [T10X0].>
44	ABS-AT control (Non Controlled)	ABS-AT control (Non Controlled)	<Ref. to 4-4 [T10Y0].>
44	ABS-AT control (Controlled)	ABS-AT control (Controlled)	<Ref. to 4-4 [T10Z0].>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to 4-4 [T10AA0].>
51	Valve relay ON failure	Valve relay ON failure	<Ref. to 4-4 [T10AB0].>
52	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to 4-4 [T10AC0].>
52	Motor relay ON failure	Motor relay ON failure	<Ref. to 4-4 [T10AD0].>
52	Motor malfunction	Motor malfunction	<Ref. to 4-4 [T10AE0].>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to 4-4 [T10AF0].>
56	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to 4-4 [T10AG0].>
56	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to 4-4 [T10AH0].>
56	Abnormal G sensor high μ output	Abnormal G sensor high μ output	<Ref. to 4-4 [T10AI0].>
56	Detection of G sensor stick	Detection of G sensor stick	<Ref. to 4-4 [T10AJ0].>

NOTE:

High μ means high friction coefficient against road surface.

C: COMMUNICATION FOR INITIALIZING IMPOSSIBLE — SELECT MONITOR COMMUNICATION FAILURE —

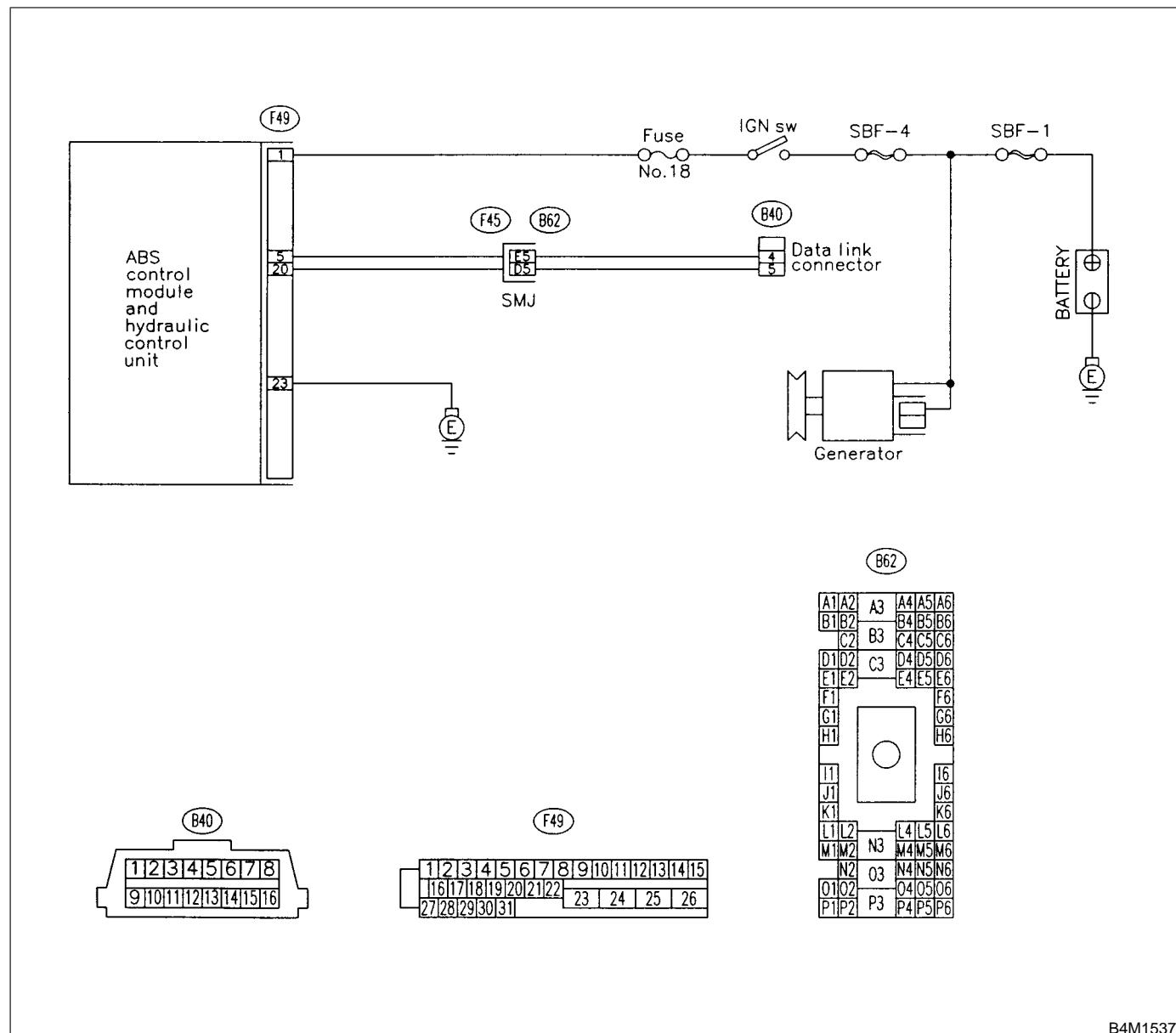
DIAGNOSIS:

- Faulty harness connector

TROUBLE SYMPTOM:

- ABS warning light remains on.

WIRING DIAGRAM:



B4M1537

10C1 : CHECK IGNITION SWITCH.

CHECK : *Is ignition switch ON?*

YES : Go to step 10C2.

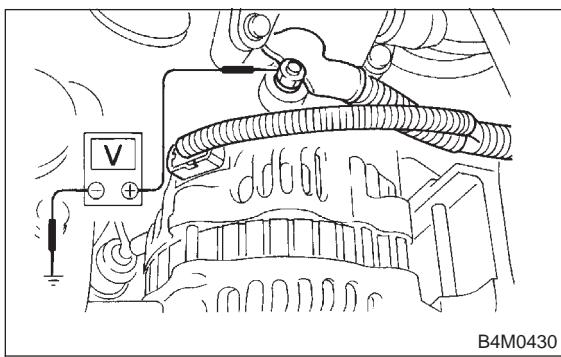
NO : Turn ignition switch ON, and select ABS/TCS mode using the select monitor.

10C2 : CHECK GENERATOR.

- 1) Start the engine.
- 2) Idle the engine.
- 3) Measure voltage between generator and chassis ground.

Terminal

Generator B terminal (+) — Chassis ground (-):



CHECK : *Is the voltage between 10 and 15 V?*

YES : Go to step 10C3.

NO : Repair generator. <Ref. to 6-1 [W2A0].>

10C3 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

CHECK : *Is there poor contact at battery terminal?*

YES : Repair battery terminal.

NO : Go to step 10C4.

10C4 : CHECK COMMUNICATION OF SELECT MONITOR.

Using the select monitor, check whether communication to other system (such as engine, AT, etc.) can be executed normally.

CHECK : *Are the name and year of the system displayed on the select monitor?*

YES : Go to step 10C5.

NO : Repair select monitor communication cable and connector.

10C5 : CHECK INSTALLATION OF ABS/CM&H/U CONNECTOR.

Turn ignition switch to OFF.

CHECK : *Is ABS/CM&H/U connector inserted into ABS/CM&H/U until the clamp locks onto it?*

YES : Go to step 10C6.

NO : Insert ABS/CM&H/U connector into ABS/CM&H/U until the clamp locks onto it.

10C6 : CHECK POWER SUPPLY OF ABS/CM&H/U.

1) Disconnect connector from ABS/CM&H/U.

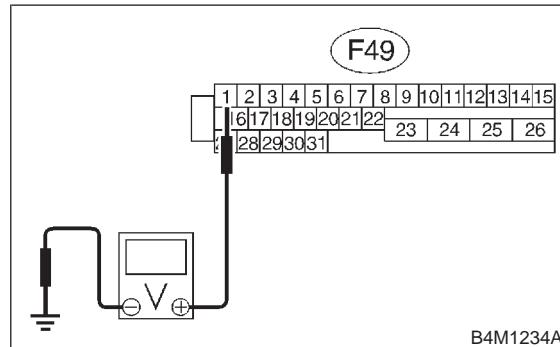
2) Start engine.

3) Idle the engine.

4) Measure voltage between ABS/CM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):



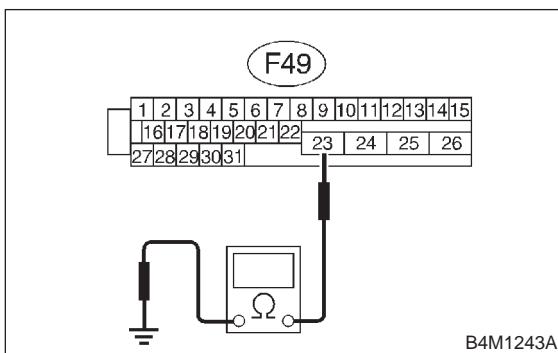
CHECK : *Is the voltage between 10 and 15 V?*

YES : Go to step 10C7.

NO : Repair ABS/CM&H/U power supply circuit.

10C7 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 23 — Chassis ground:**

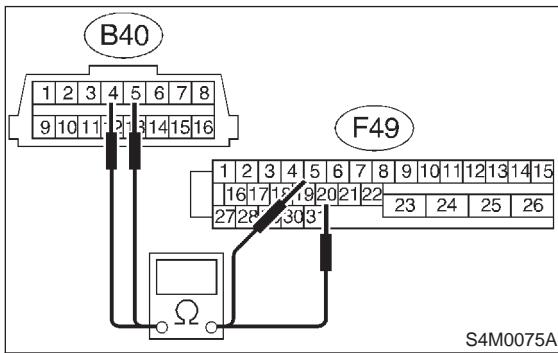
CHECK : *Is the resistance less than 0.5 Ω?*

YES : Repair harness/connector between ABSCM&H/U and select monitor.

NO : Go to step 10C8.

10C8 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.

- 1) Turn ignition switch OFF.
- 2) Measure resistance between ABSCM&H/U connector and data link connector.

Connector & terminal**(F49) No. 20 — (B40) No. 5:****(F49) No. 5 — (B40) No. 4:**

CHECK : *Is the resistance less than 0.5 Ω?*

YES : Repair harness and connector between ABSCM&H/U and data link connector.

NO : Go to step 10C9.

10C9 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between ABSCM&H/U and data link connector? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

MEMO:

D: NO TROUBLE CODE

— ALTHOUGH NO TROUBLE CODE APPEARS ON THE SELECT MONITOR DISPLAY, THE ABS WARNING LIGHT REMAINS ON. —

DIAGNOSIS:

- ABS warning light circuit is shorted.

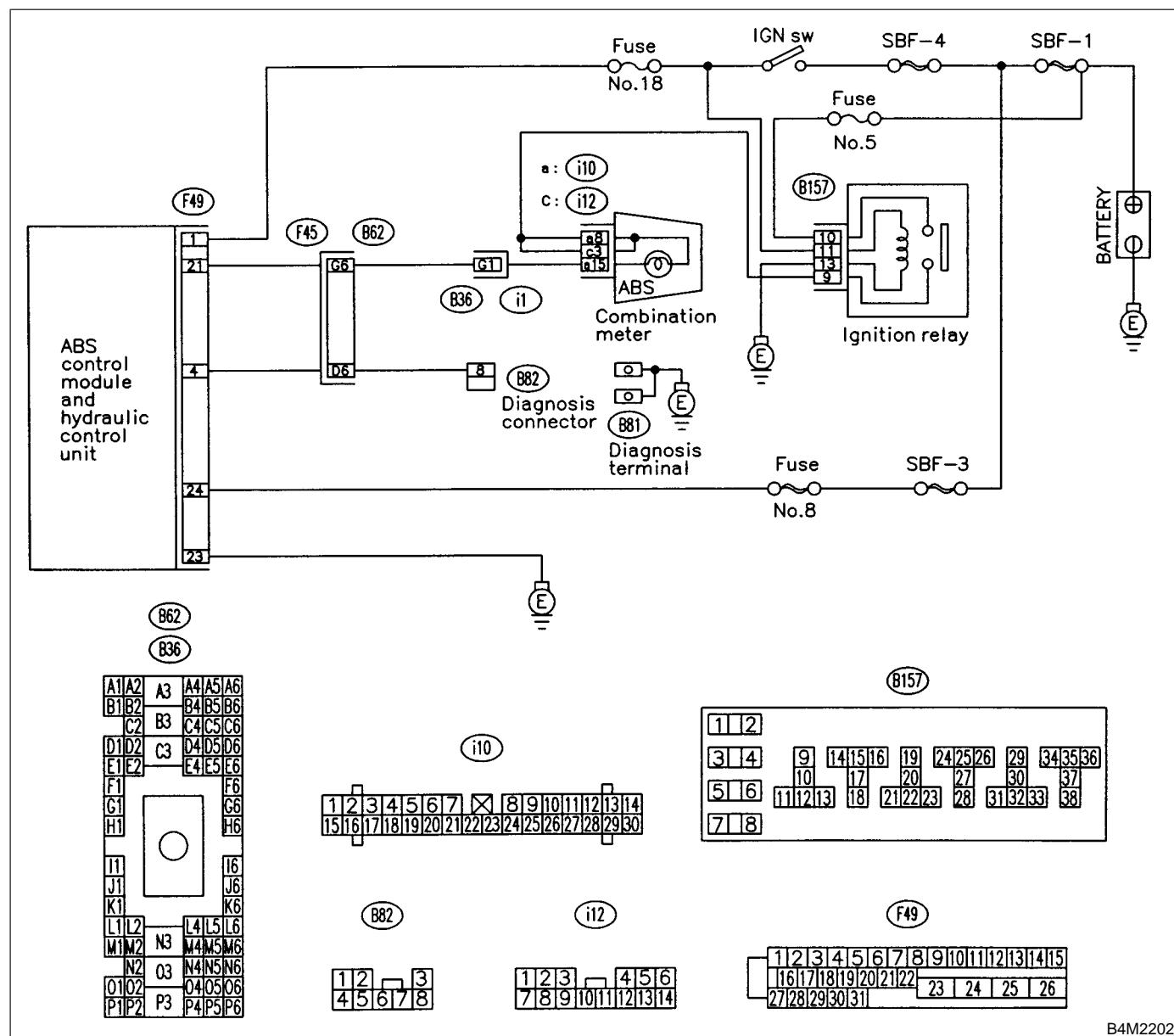
TROUBLE SYMPTOM:

- ABS warning light remains on.
- NO TROUBLE CODE displayed on the select monitor.

NOTE-

When the ABS warning light is OFF and "NO TROUBLE CODE" is displayed on the select monitor, the system is in normal condition.

WIRING DIAGRAM:



10D1 : CHECK WIRING HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector (F45) from connector (B62).
- 3) Turn ignition switch to ON.

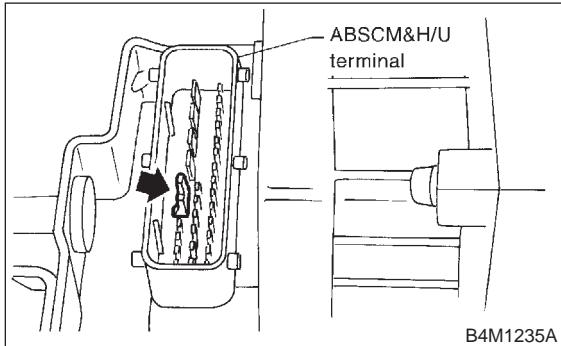
CHECK : *Does the ABS warning light remain off?*

YES : Go to step 10D2.

NO : Repair front wiring harness.

10D2 : CHECK PROJECTION AT ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Check for broken projection at the ABSCM&H/U terminal.



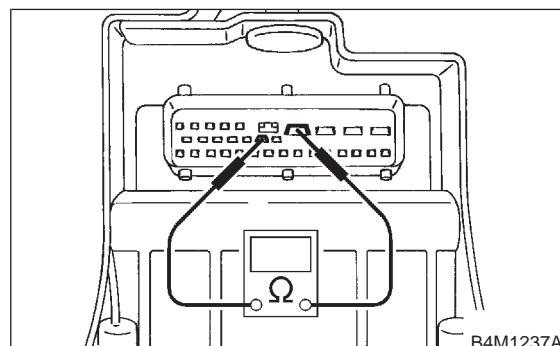
CHECK : *Are the projection broken?*

YES : Go to step 10D3.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10D3 : CHECK ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals**No. 21 — No. 23:**

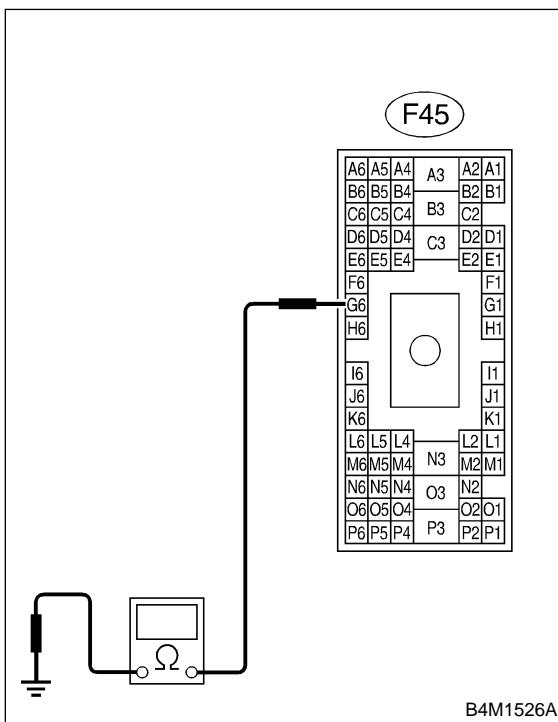
CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 10D4.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

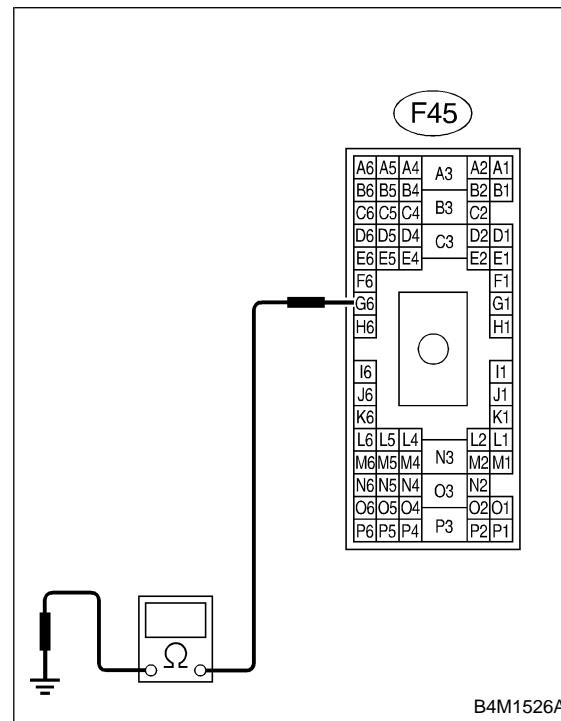
10D4 : CHECK WIRING HARNESS.

Measure resistance between connector (F45) and chassis ground.

Connector & terminal**(F45) No. G6 — Chassis ground:**

10D5 : CHECK WIRING HARNESS.

- 1) Connect connector to ABSCM&H/U.
- 2) Measure resistance between connector (F45) and chassis ground.

Connector & terminal**(F45) No. G6 — Chassis ground:**

CHECK : Is the resistance less than 0.5Ω ?

YES : Go to step 10D5.

NO : Repair harness.

CHECK : Is the resistance more than $1 M\Omega$?

YES : Go to step 10D6.

NO : Repair harness.

10D6 : CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.

CHECK : Is there poor contact in ABSCM&H/U connector? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

MEMO:

E: TROUBLE CODE 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT

F: TROUBLE CODE 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT

G: TROUBLE CODE 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT

H: TROUBLE CODE 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT

— ABNORMAL ABS SENSOR (OPEN OR SHORT CIRCUIT IN ABS SENSOR CIRCUIT) —

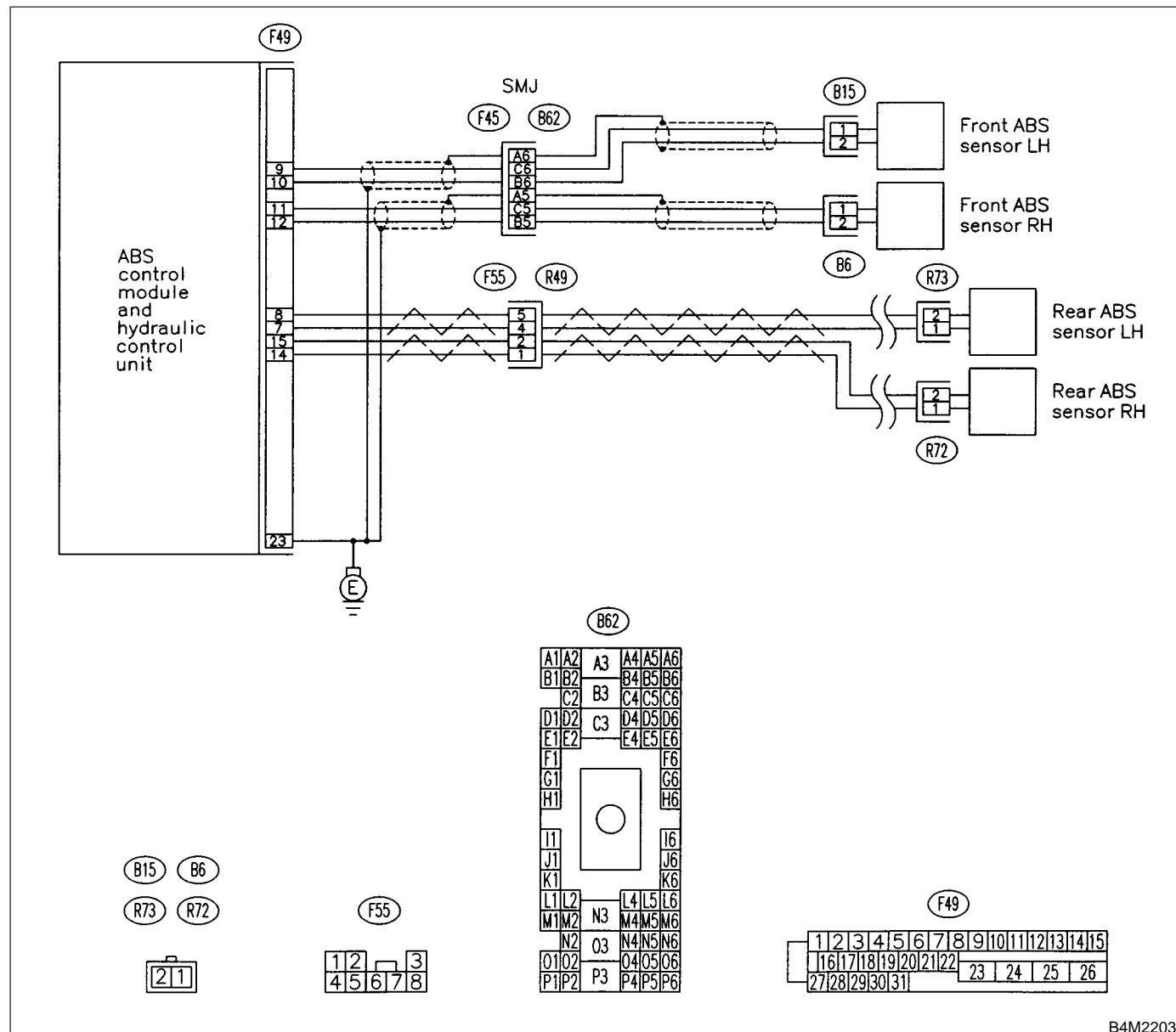
DIAGNOSIS:

- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



10H1 : CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.

CHECK : 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?

YES : Go to step 10H2.
NO : Go to step 10H8.

10H2 : CHECK INSTALLATION OF ABS SENSOR.

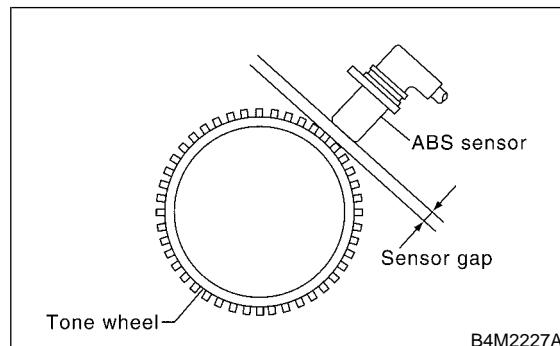
Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft-lb}$)

CHECK : Are the ABS sensor installation bolts tightened securely?
YES : Go to step 10H3.
NO : Tighten ABS sensor installation bolts securely.

10H3 : CHECK ABS SENSOR GAP.

Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel.



Specifications	Front wheel	Rear wheel
	0.3 — 0.8 mm (0.012 — 0.031 in)	0.44 — 0.94 mm (0.0173 — 0.0370 in)

CHECK : Is the gap within the specifications?
YES : Go to step 10H4.
NO : Adjust the gap.

NOTE:

Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10H4 : CHECK TONE WHEEL RUNOUT.

Measure tone wheel runout.

CHECK : Is the runout less than 0.05 mm (0.0020 in)?
YES : Go to step 10H5.
NO : Replace tone wheel. <Ref. to 4-2 [W3A0].>

10H5 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [W3C1].>
YES : Repair connector.
NO : Go to step 10H6.

10H6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10H7.

10H7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

NOTE:

Check harness and connectors between ABSCM&H/U and ABS sensor.

10H8 : CHECK ABS SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance of ABS sensor connector terminals.

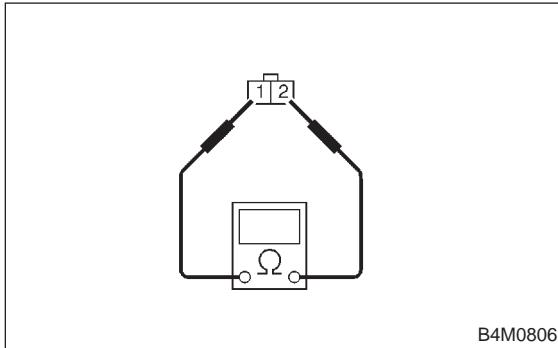
Terminal

Front RH No. 1 — No. 2:

Front LH No. 1 — No. 2:

Rear RH No. 1 — No. 2:

Rear LH No. 1 — No. 2:



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CHECK : *Is the resistance between 1 and 1.5 kΩ?*

YES : Go to step 10H9.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

10H9 : CHECK BATTERY SHORT OF ABS SENSOR.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Measure voltage between ABS sensor and chassis ground.

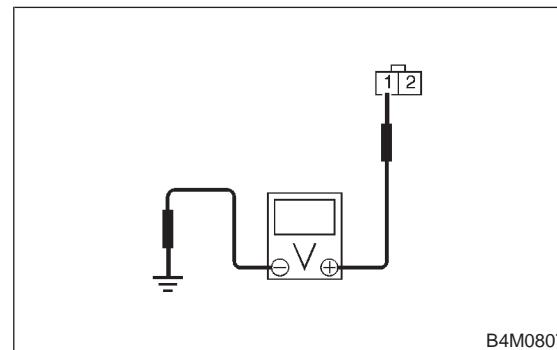
Terminal

Front RH No. 1 (+) — Chassis ground (-):

Front LH No. 1 (+) — Chassis ground (-):

Rear RH No. 1 (+) — Chassis ground (-):

Rear LH No. 1 (+) — Chassis ground (-):



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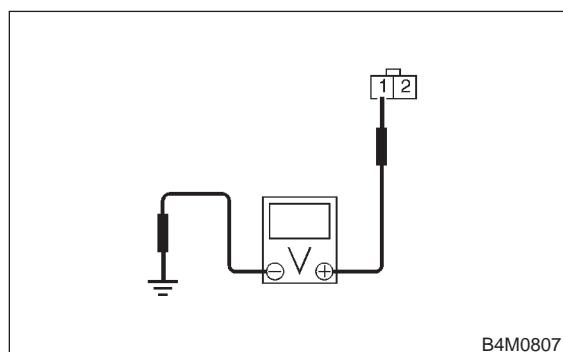
CHECK : *Is the voltage less than 1 V?*

YES : Go to step 10H10.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

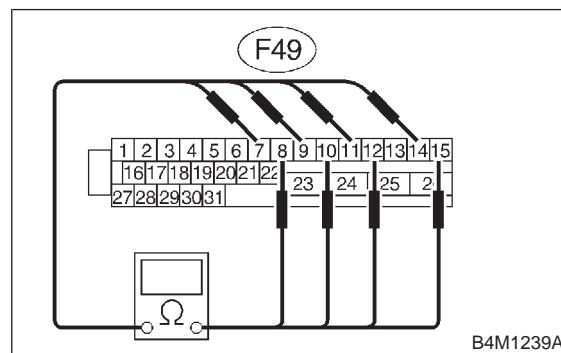
10H10 : CHECK BATTERY SHORT OF ABS SENSOR.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABS sensor and chassis ground.

Terminal*Front RH No. 1 (+) — Chassis ground (-):**Front LH No. 1 (+) — Chassis ground (-):**Rear RH No. 1 (+) — Chassis ground (-):**Rear LH No. 1 (+) — Chassis ground (-):*

10H11 : CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal*Trouble code 21 / (F49) No. 11 — No. 12:**Trouble code 23 / (F49) No. 9 — No. 10:**Trouble code 25 / (F49) No. 14 — No. 15:**Trouble code 27 / (F49) No. 7 — No. 8:*

CHECK : Is the voltage less than 1 V?

YES : Go to step 10H11.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

CHECK : Is the resistance between 1 and 1.5 kΩ?

YES : Go to step 10H12.

NO : Repair harness/connector between ABSCM&H/U and ABS sensor.

10H12 : CHECK BATTERY SHORT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

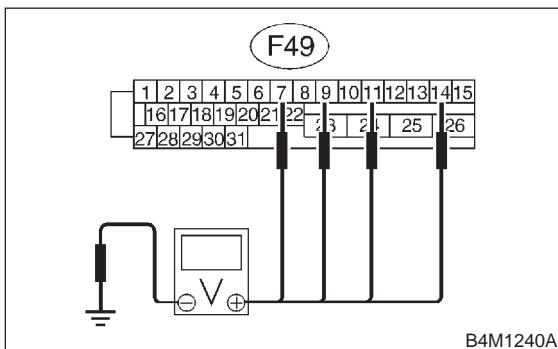
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 10H13.

NO : Repair harness between ABSCM&H/U and ABS sensor.

10H13 : CHECK BATTERY SHORT OF HARNESS.

1) Turn ignition switch to ON.

2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

Trouble code 21 / (F49) No. 11 (+) —

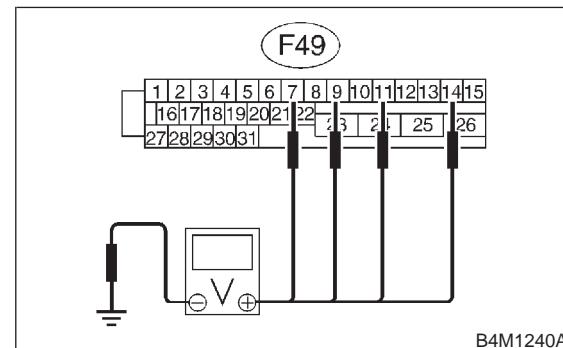
Chassis ground (-):

Trouble code 23 / (F49) No. 9 (+) — Chassis ground (-):

Trouble code 25 / (F49) No. 14 (+) —

Chassis ground (-):

Trouble code 27 / (F49) No. 7 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 10H14.

NO : Repair harness between ABSCM&H/U and ABS sensor.

10H14 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft-lb}$)

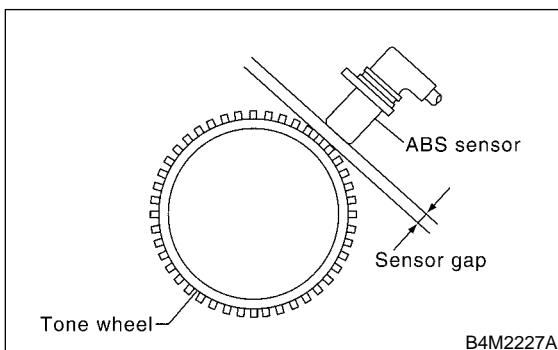
CHECK : Are the ABS sensor installation bolts tightened securely?

YES : Go to step 10H15.

NO : Tighten ABS sensor installation bolts securely.

10H15 : CHECK ABS SENSOR GAP.

Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel.



Specifications	Front wheel	Rear wheel
	0.3 — 0.8 mm (0.012 — 0.031 in)	0.44 — 0.94 mm (0.0173 — 0.0370 in)

- CHECK** : *Is the gap within the specifications?*
- YES** : Go to step 10H16.
- NO** : Adjust the gap.

NOTE:

Adjust the gap using spacers (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10H16 : CHECK TONE WHEEL RUNOUT.

Measure tone wheel runout.

- CHECK** : *Is the runout less than 0.05 mm (0.0020 in)?*
- YES** : Go to step 10H17.
- NO** : Replace tone wheel. <Ref. to 4-2 [W3A0].>

10H17 : CHECK GROUND SHORT OF ABS SENSOR.

- 1) Turn ignition switch to ON.
- 2) Measure resistance between ABS sensor and chassis ground.

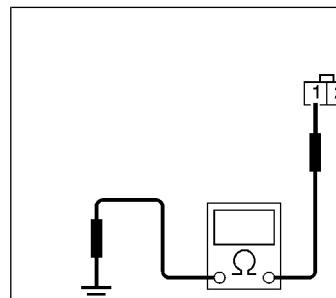
Terminal

Front RH No. 1 — Chassis ground:

Front LH No. 1 — Chassis ground:

Rear RH No. 1 — Chassis ground:

Rear LH No. 1 — Chassis ground:



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- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 10H18.
- NO** : Replace ABS sensor and ABS CM&H/U. <Ref. to 4-4 [W14A0].> and <Ref. to 4-4 [W15A0].>

10H18 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to ABS sensor.
- 3) Measure resistance between ABSCM&H/U connector terminal and chassis ground.

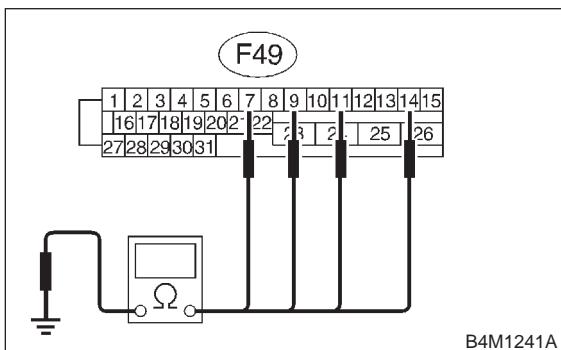
Connector & terminal

Trouble code 21 / (F49) No. 11 — Chassis ground:

Trouble code 23 / (F49) No. 9 — Chassis ground:

Trouble code 25 / (F49) No. 14 — Chassis ground:

Trouble code 27 / (F49) No. 7 — Chassis ground:



CHECK : Is the resistance more than $1 M\Omega$?

YES : Go to step 10H19.

NO : Repair harness between ABSCM&H/U and ABS sensor.
And replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10H19 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10H20.

10H20 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U.

NO : Go to step 10H21.

10H21 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

NOTE:

Check harness and connectors between ABSCM&H/U and ABS sensor.

I: TROUBLE CODE 22 FRONT RIGHT ABS SENSOR ABNORMAL SIGNAL

J: TROUBLE CODE 24 FRONT LEFT ABS SENSOR ABNORMAL SIGNAL

K: TROUBLE CODE 26 REAR RIGHT ABS SENSOR ABNORMAL SIGNAL

L: TROUBLE CODE 28 REAR LEFT ABS SENSOR ABNORMAL SIGNAL

— ABNORMAL ABS SENSOR (ABS SENSOR ABNORMAL SIGNAL) —

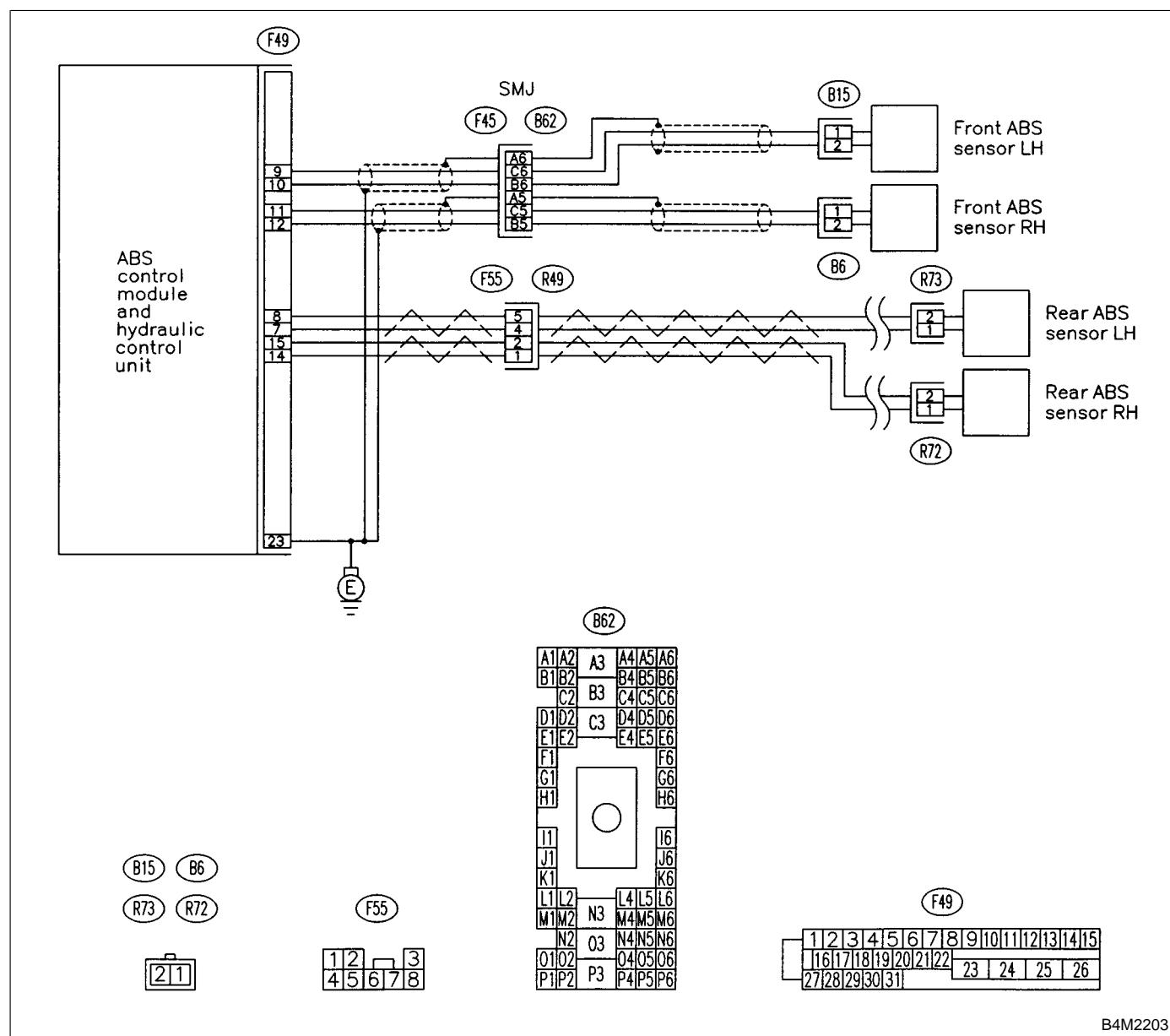
DIAGNOSIS:

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



10L1 : CHECK OUTPUT OF ABS SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the ABS sensor output corresponding to the faulty system in the select monitor data display mode.

CHECK : 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?

YES : Go to step 10L2.

NO : Go to step 10L8.

10L2 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connectors between ABSCM&H/U and ABS sensor?

YES : Repair connector.

NO : Go to step 10L3.

10L3 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Is the car telephone or the wireless transmitter properly installed?

YES : Go to step 10L4.

NO : Properly install the car telephone or the wireless transmitter.

10L4 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Are noise sources (such as an antenna) installed near the sensor harness?

YES : Install the noise sources apart from the sensor harness.

NO : Go to step 10L5.

10L5 : CHECK SHIELD CIRCUIT.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Measure resistance between shield connector and chassis ground.

Connector & terminal

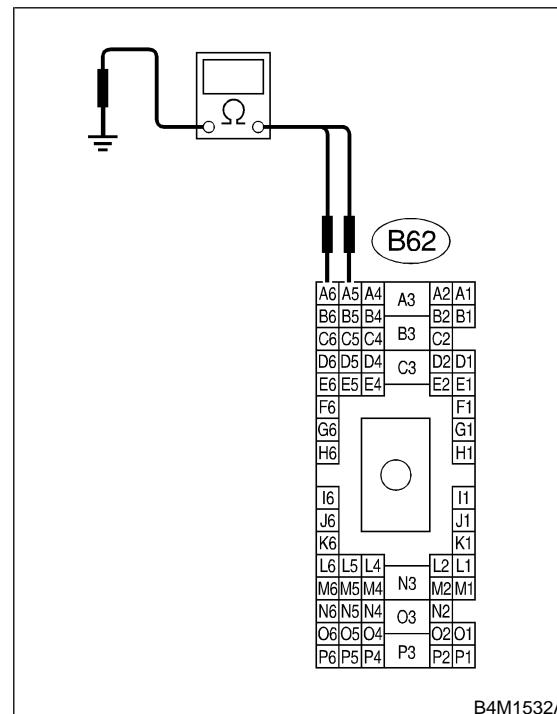
Trouble code 22 / (B62) No. A5 — Chassis ground:

Trouble code 24 / (B62) No. A6 — Chassis ground:

NOTE:

For the **Trouble code 26** and **28**:

Go to step 10L6.



B4M1532A

CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 10L6.

NO : Repair shield harness.

10L6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10L7.

10L7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

: Are other trouble codes being output?
 : Proceed with the diagnosis corresponding to the trouble code.
 : A temporary noise interference.

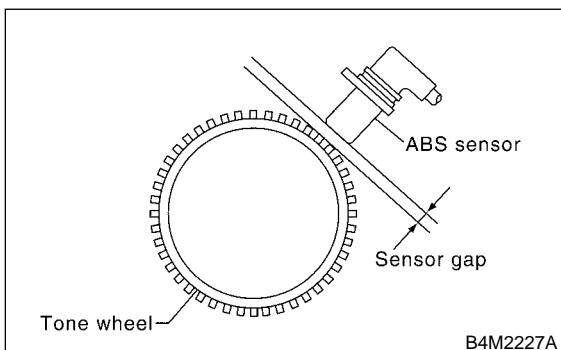
10L8 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque: $32 \pm 10 \text{ N}\cdot\text{m} (3.3 \pm 1.0 \text{ kg}\cdot\text{m}, 24 \pm 7 \text{ ft-lb})$

: Are the ABS sensor installation bolts tightened securely?
 : Go to step 10L9.
 : Tighten ABS sensor installation bolts securely.

10L9 : CHECK ABS SENSOR GAP.

Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel.



Specifications	Front wheel	Rear wheel
	0.3 — 0.8 mm (0.012 — 0.031 in)	0.44 — 0.94 mm (0.0173 — 0.0370 in)

: Is the gap within the specifications?
 : Go to step 10L10.
 : Adjust the gap.

NOTE:

Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10L10 : PREPARE OSCILLOSCOPE.

: Is an oscilloscope available?
 : Go to step 10L11.
 : Go to step 10L12.

10L11 : CHECK ABS SENSOR SIGNAL.

- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

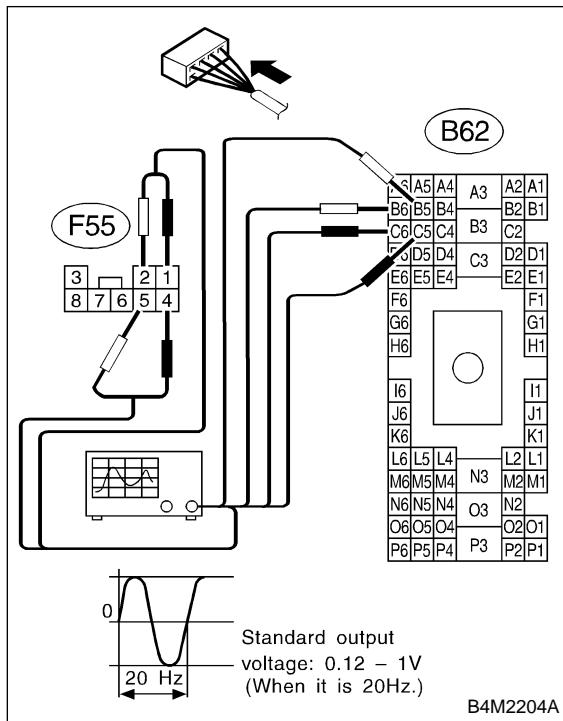
Connector & terminal

Trouble code 22 / (B62) No. C5 (+) — No. B5 (-):

Trouble code 24 / (B62) No. C6 (+) — No. B6 (-):

Trouble code 26 / (F55) No. 1 (+) — No. 2 (-):

Trouble code 28 / (F55) No. 4 (+) — No. 5 (-):



10L12 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor or drum from hub in accordance with trouble code.

CHECK : *Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?*

YES : Thoroughly remove dirt or other foreign matter.

NO : Go to step 10L13.

10L13 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : *Are there broken or damaged in the ABS sensor piece or the tone wheel?*

YES : Replace ABS sensor or tone wheel. <Ref. to 4-4 [W14A0].> and <Ref. to 4-2 [W3A0].>

NO : Go to step 10L14.

10L14 : CHECK TONE WHEEL RUNOUT.

Measure tone wheel runout.

CHECK : *Is the runout less than 0.05 mm (0.0020 in)?*

YES : Go to step 10L15.

NO : Replace tone wheel. <Ref. to 4-2 [W3A0].>

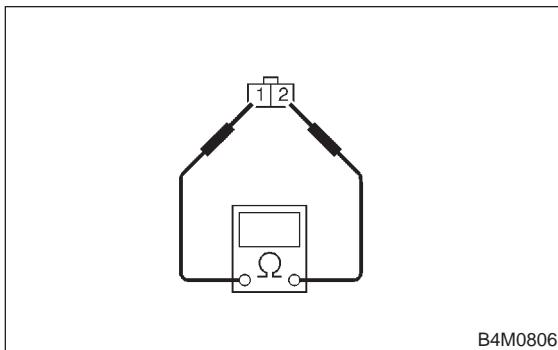
CHECK : *Is oscilloscope pattern smooth, as shown in figure?*

YES : Go to step 10L15.

NO : Go to step 10L12.

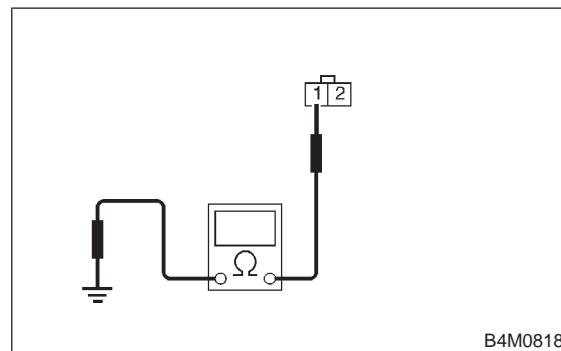
10L15 : CHECK RESISTANCE OF ABS SENSOR.

- 1) Turn ignition switch OFF.
- 2) Disconnect connector from ABS sensor.
- 3) Measure resistance between ABS sensor connector terminals.

Terminal**Front RH No. 1 — No. 2:****Front LH No. 1 — No. 2:****Rear RH No. 1 — No. 2:****Rear LH No. 1 — No. 2:**

10L16 : CHECK GROUND SHORT OF ABS SENSOR.

Measure resistance between ABS sensor and chassis ground.

Terminal**Front RH No. 1 — Chassis ground:****Front LH No. 1 — Chassis ground:****Rear RH No. 1 — Chassis ground:****Rear LH No. 1 — Chassis ground:**

CHECK : Is the resistance between 1 and 1.5 k Ω ?

YES : Go to step 10L16.

NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

CHECK : Is the resistance more than 1 M Ω ?

YES : Go to step 10L17.

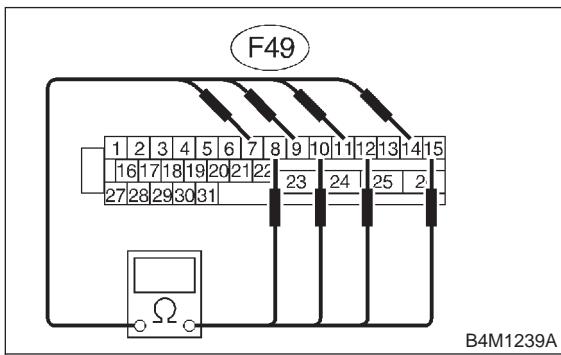
NO : Replace ABS sensor. <Ref. to 4-4 [W14A0].>

10L17 : CHECK HARNESS/CONNECTOR BETWEEN ABS CM&H/U AND ABS SENSOR.

- 1) Connect connector to ABS sensor.
- 2) Disconnect connector from ABS CM&H/U.
- 3) Measure resistance at ABS CM&H/U connector terminals.

Connector & terminal

Trouble code 22 / (F49) No. 11 — No. 12:
Trouble code 24 / (F49) No. 9 — No. 10:
Trouble code 26 / (F49) No. 14 — No. 15:
Trouble code 28 / (F49) No. 7 — No. 8:



CHECK : Is the resistance between 1 and 1.5 kΩ?
YES : Go to step 10L18.
NO : Repair harness/connector between ABS CM&H/U and ABS sensor.

10L18 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABS CM&H/U connector and chassis ground.

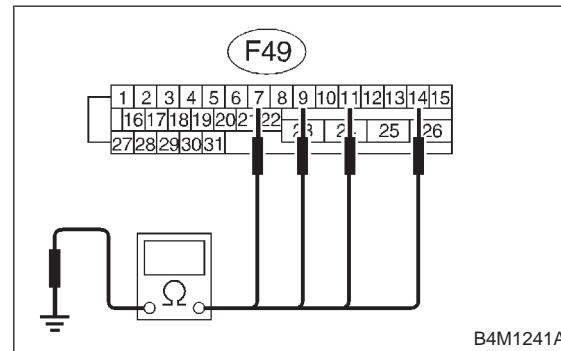
Connector & terminal

Trouble code 22 / (F49) No. 11 — Chassis ground:

Trouble code 24 / (F49) No. 9 — Chassis ground:

Trouble code 26 / (F49) No. 14 — Chassis ground:

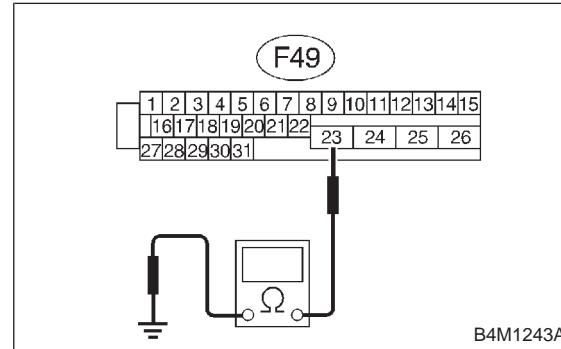
Trouble code 28 / (F49) No. 7 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?
YES : Go to step 10L19.
NO : Repair harness/connector between ABS CM&H/U and ABS sensor.

10L19 : CHECK GROUND CIRCUIT OF ABS CM&H/U.

Measure resistance between ABS CM&H/U and chassis ground.

Connector & terminal
(F49) No. 23 — GND:


CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 10L20.
NO : Repair ABS CM&H/U ground harness.

10L20 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between ABSCM&H/U and ABS sensor? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10L21.

10L21 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Is the car telephone or the wireless transmitter properly installed?

YES : Go to step 10L22.

NO : Properly install the car telephone or the wireless transmitter.

10L22 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Are noise sources (such as an antenna) installed near the sensor harness?

YES : Install the noise sources apart from the sensor harness.

NO : Go to step 10L23.

10L23 : CHECK SHIELD CIRCUIT.

1) Connect all connectors.

2) Measure resistance between shield connector and chassis ground.

Connector & terminal

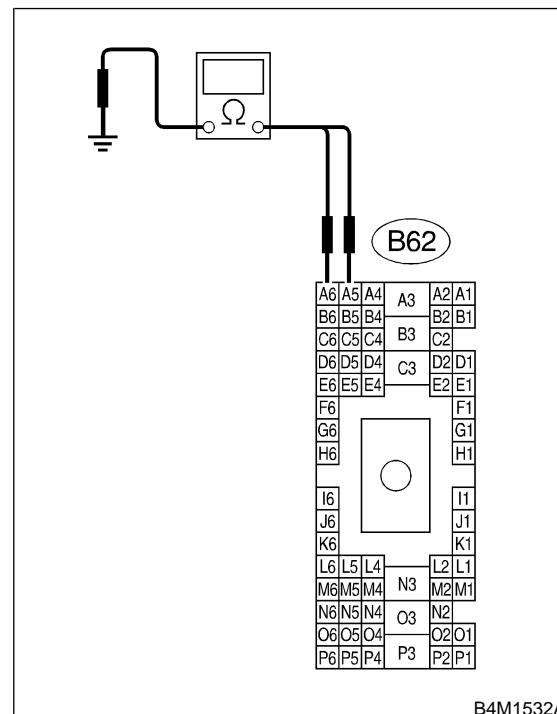
Trouble code 22 / (B62) No. A5 — Chassis ground:

Trouble code 24 / (B62) No. A6 — Chassis ground:

NOTE:

For the Trouble code 26 and 28:

Go to step 10L24.



B4M1532A

CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 10L24.

NO : Repair shield harness.

10L24 : CHECK ABSCM&H/U.

1) Connect all connectors.

2) Erase the memory.

3) Perform inspection mode.

4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10L25.

10L25 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

: *Are other trouble codes being output?*

: Proceed with the diagnosis corresponding to the trouble code.

: A temporary noise interference.

M: TROUBLE CODE 29 ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR

— ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR —

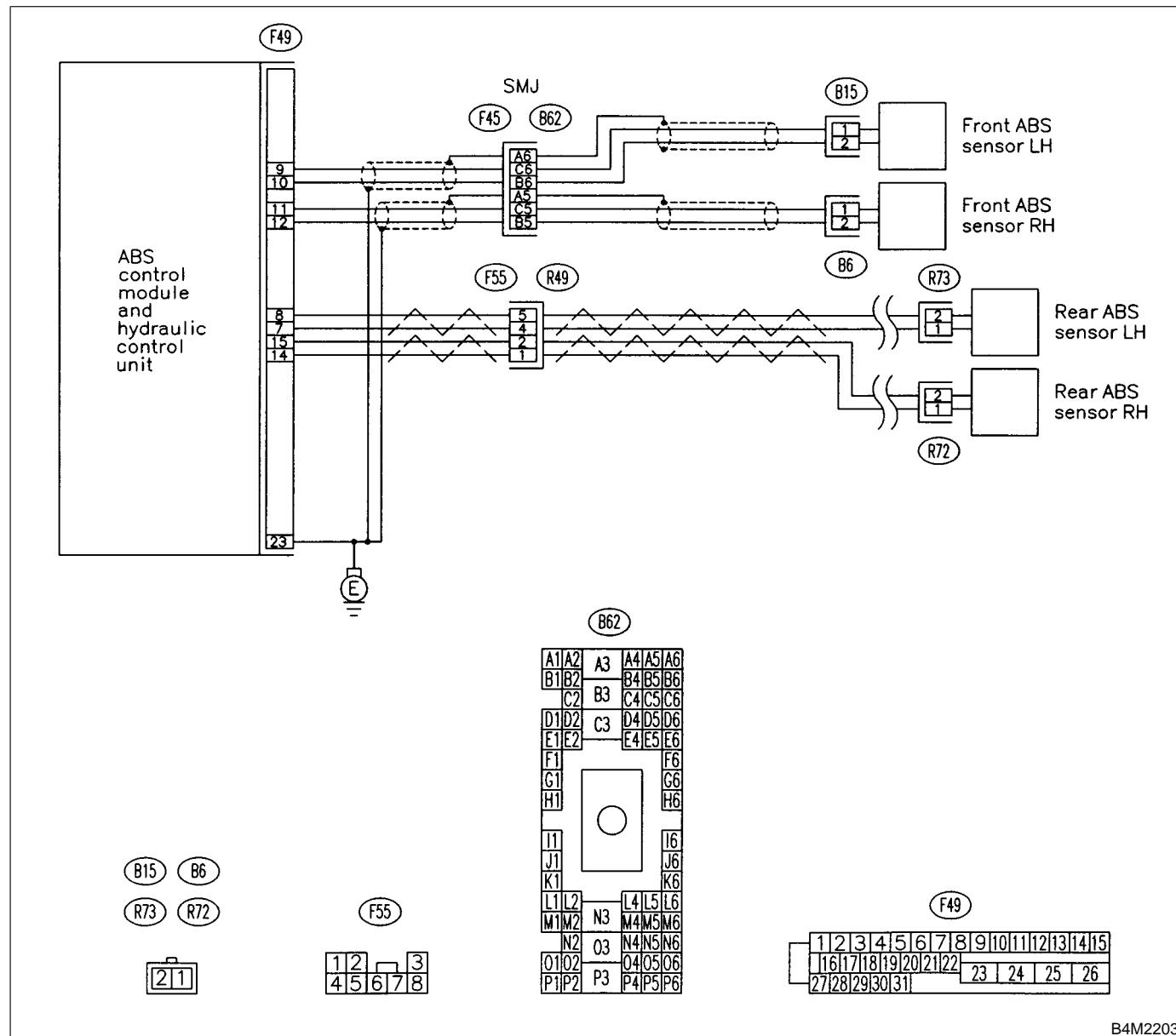
DIAGNOSIS:

- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



B4M2203

10M1 : CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.

CHECK : *Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.*

YES : The ABS is normal. Erase the trouble code.

NOTE:

When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this trouble code may sometimes occur.

NO : Go to step **10M2**.

10M2 : CHECK TIRE SPECIFICATIONS.

Turn ignition switch to OFF.

CHECK : *Are the tire specifications correct?*

YES : Go to step **10M3**.

NO : Replace tire.

10M3 : CHECK WEAR OF TIRE.

CHECK : *Is the tire worn excessively?*

YES : Replace tire.

NO : Go to step **10M4**.

10M4 : CHECK TIRE PRESSURE.

CHECK : *Is the tire pressure correct?*

YES : Go to step **10M5**.

NO : Adjust tire pressure.

10M5 : CHECK INSTALLATION OF ABS SENSOR.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft-lb}$)

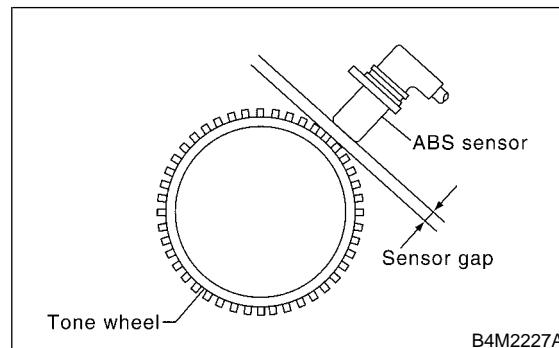
CHECK : *Are the ABS sensor installation bolts tightened securely?*

YES : Go to step **10M6**.

NO : Tighten ABS sensor installation bolts securely.

10M6 : CHECK ABS SENSOR GAP.

Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel.



Specifications	Front wheel	Rear wheel
	0.3 — 0.8 mm (0.012 — 0.031 in)	0.44 — 0.94 mm (0.0173 — 0.0370 in)

CHECK : *Is the gap within the specifications?*

YES : Go to step **10M7**.

NO : Adjust the gap.

NOTE:

Adjust the gap using spacer (Part No. 26755AA000). If spacers cannot correct the gap, replace worn sensor or worn tone wheel.

10M7 : PREPARE OSCILLOSCOPE.

CHECK : *Is an oscilloscope available?*

YES : Go to step **10M8**.

NO : Go to step **10M9**.

10M8 : CHECK ABS SENSOR SIGNAL.

- 1) Raise all four wheels of ground.
- 2) Turn ignition switch OFF.
- 3) Connect the oscilloscope to the connector (B62) in accordance with trouble code.
- 4) Turn ignition switch ON.
- 5) Rotate wheels and measure voltage at specified frequency.

NOTE:

When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29.

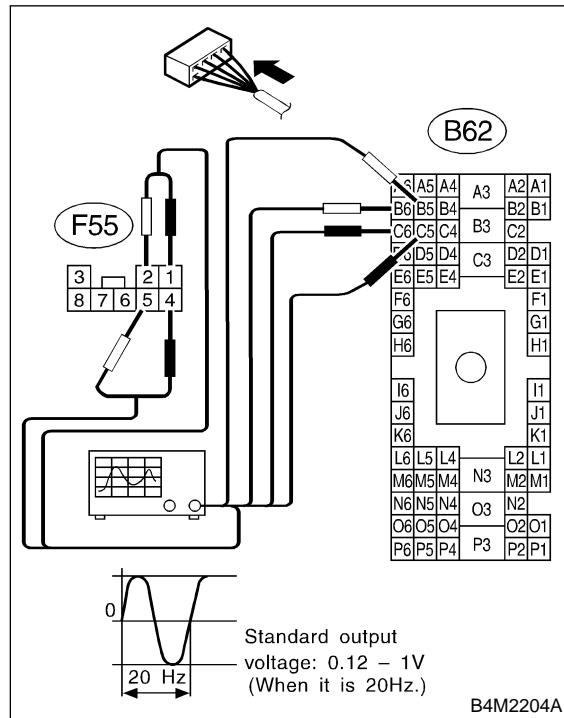
Connector & terminal

(B62) No. C5 (+) — No. B5 (-) (Front RH):

(B62) No. C6 (+) — No. B6 (-) (Front LH):

(F55) No. 1 (+) — No. 2 (-) (Rear RH):

(F55) No. 4 (+) — No. 5 (-) (Rear LH):



CHECK : Is oscilloscope pattern smooth, as shown in figure?

YES : Go to step 10M12.

NO : Go to step 10M9.

10M9 : CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.

Remove disc rotor from hub.

CHECK : Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?

YES : Thoroughly remove dirt or other foreign matter.

NO : Go to step 10M10.

10M10 : CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.

CHECK : Are there broken or damaged teeth in the ABS sensor piece or the tone wheel?

YES : Replace ABS sensor or tone wheel. <Ref. to 4-4 [W14A0].> and <Ref. to 4-2 [W3A0].>

NO : Go to step 10M11.

10M11 : CHECK TONE WHEEL RUNOUT.

Measure tone wheel runout.

CHECK : Is the runout less than 0.05 mm (0.0020 in)?

YES : Go to step 10M12.

NO : Replace tone wheel. <Ref. to 4-2 [W3A0].>

10M12 : CHECK ABSCM&H/U.

1) Turn ignition switch to OFF.

2) Connect all connectors.

3) Erase the memory.

4) Perform inspection mode.

5) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10M13.

10M13 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

N: TROUBLE CODE 31 FRONT RIGHT INLET VALVE MALFUNCTION

O: TROUBLE CODE 33 FRONT LEFT INLET VALVE MALFUNCTION

P: TROUBLE CODE 35 REAR RIGHT INLET VALVE MALFUNCTION

Q: TROUBLE CODE 37 REAR LEFT INLET VALVE MALFUNCTION

— INLET SOLENOID VALVE MALFUNCTION —

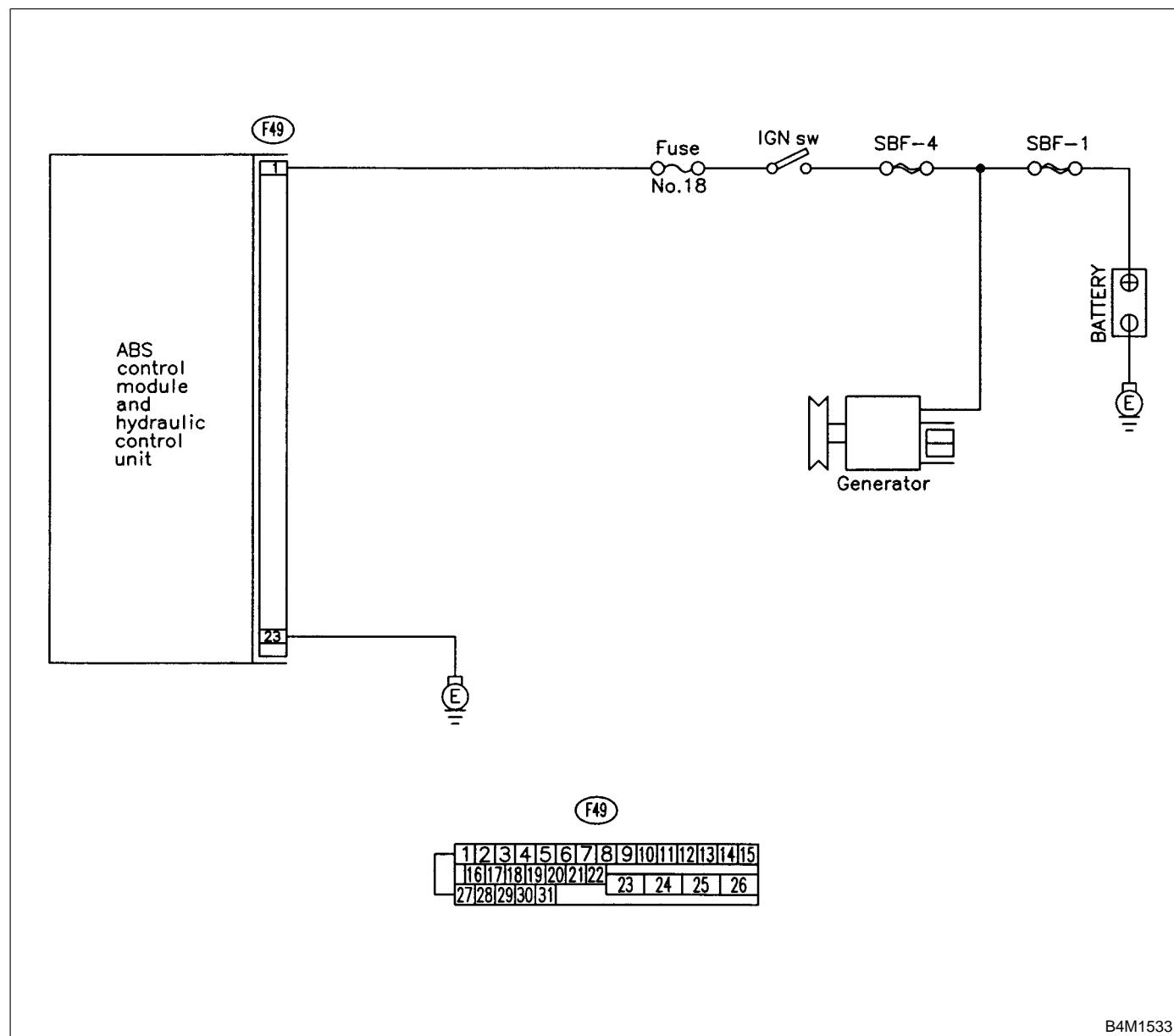
DIAGNOSIS:

- Faulty harness/connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:

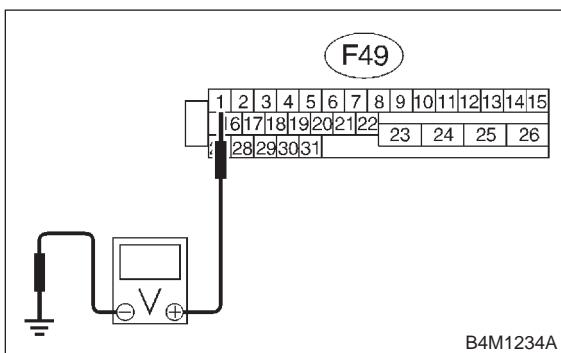
- ABS does not operate.

WIRING DIAGRAM:



10Q1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 1 (+) — Chassis ground (-):**

B4M1234A

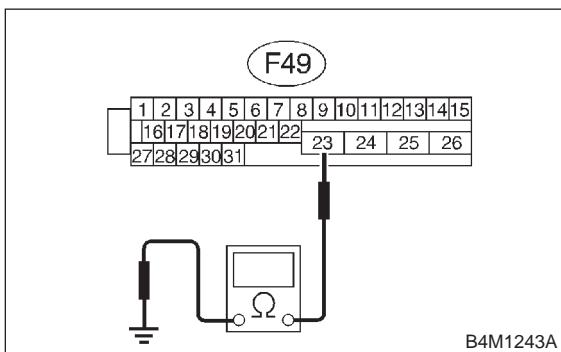
CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 10Q2.

NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10Q2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 23 — Chassis ground:**

B4M1243A

CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 10Q3.

NO : Repair ABSCM&H/U ground harness.

10Q3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10Q4.

10Q4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10Q5.

10Q5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

R: TROUBLE CODE 32 FRONT RIGHT OUTLET VALVE MALFUNCTION

S: TROUBLE CODE 34 FRONT LEFT OUTLET VALVE MALFUNCTION

T: TROUBLE CODE 36 REAR RIGHT OUTLET VALVE MALFUNCTION

U: TROUBLE CODE 38 REAR LEFT OUTLET VALVE MALFUNCTION
— OUTLET SOLENOID VALVE MALFUNCTION —

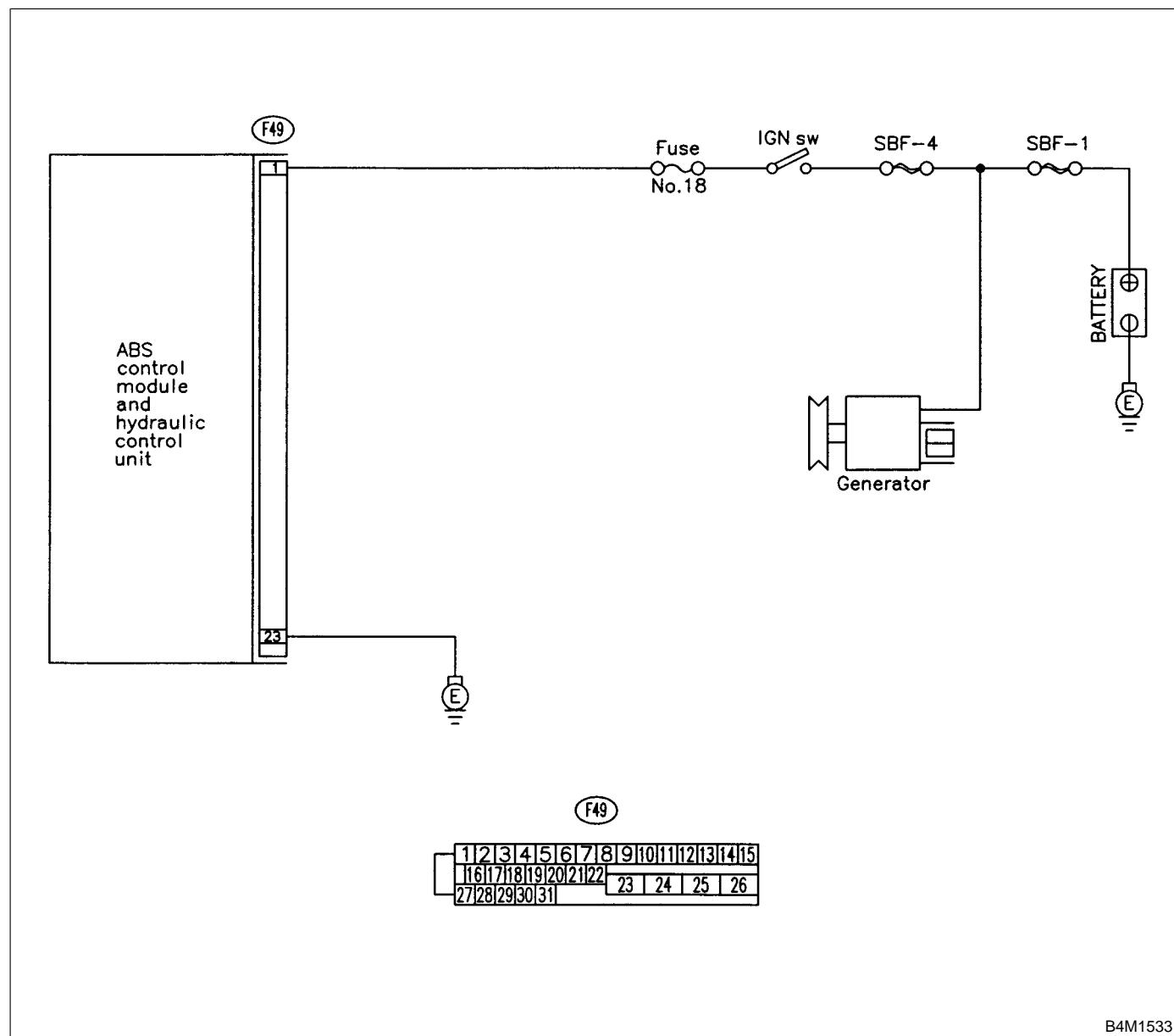
DIAGNOSIS:

- Faulty harness/connector
- Faulty outlet solenoid valve

TROUBLE SYMPTOM:

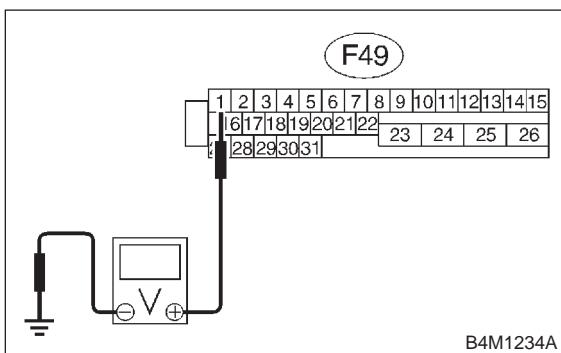
- ABS does not operate.

WIRING DIAGRAM:



10U1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 1 (+) — Chassis ground (-):**

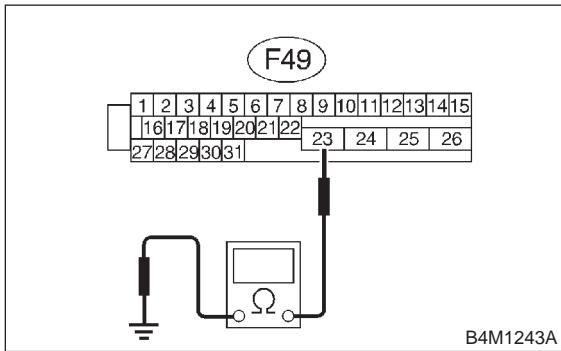
CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 10U2.

NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10U2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 23 — Chassis ground:**

CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 10U3.

NO : Repair ABSCM&H/U ground harness.

10U3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10U4.

10U4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10U5.

10U5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

V: TROUBLE CODE 41 ABS CONTROL MODULE MALFUNCTION — ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT MALFUNCTION —

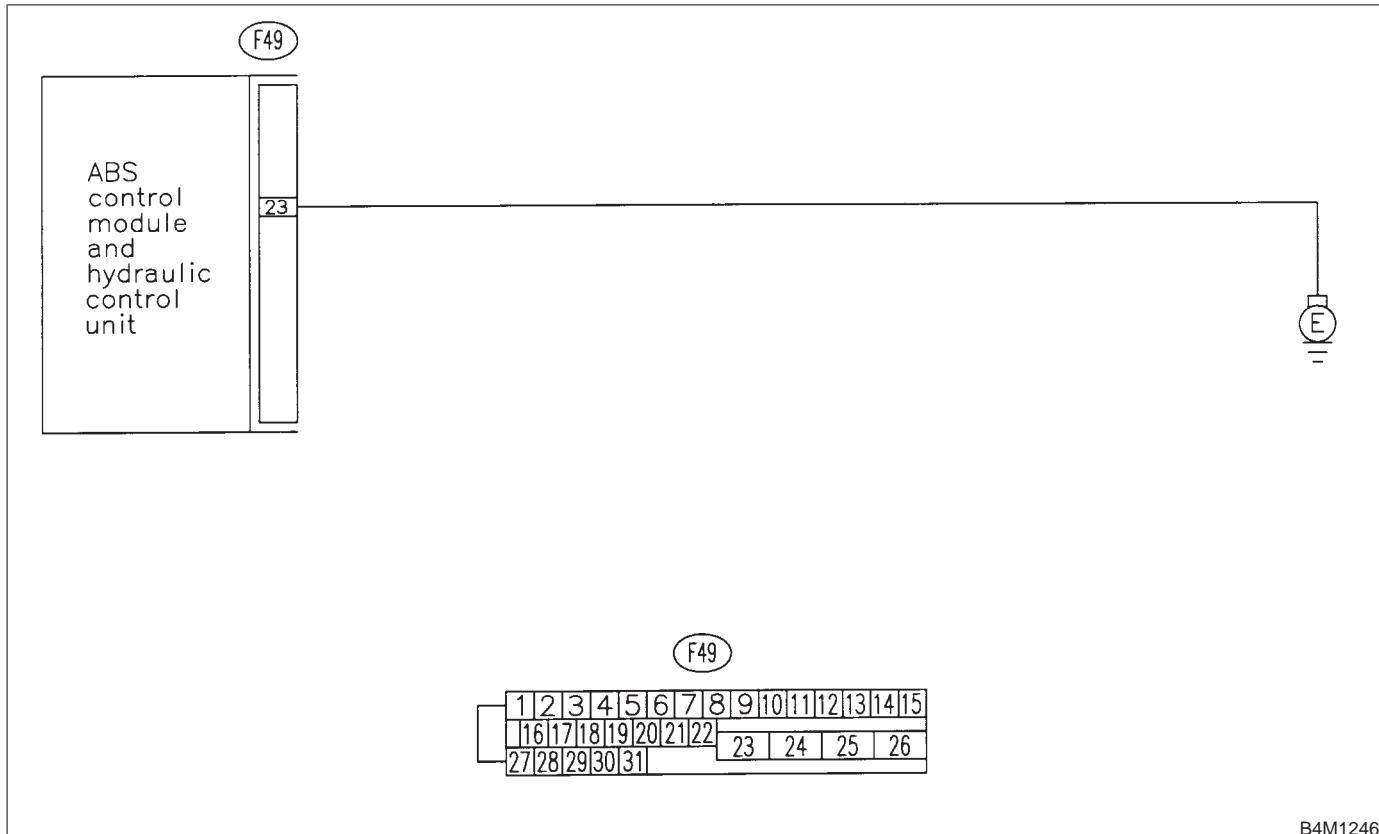
DIAGNOSIS:

- Faulty ABSCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



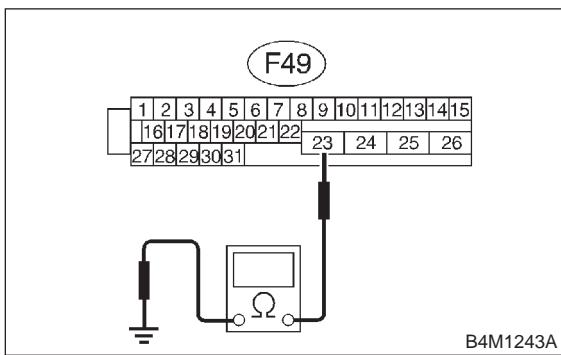
B4M1246

10V1 : CHECK GROUND CIRCUIT OF ABS CM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABS CM&H/U.
- 3) Measure resistance between ABS CM&H/U and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 10V2.

NO : Repair ABS CM&H/U ground harness.

10V2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between battery, ignition switch and ABS CM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10V3.

10V3 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Is the car telephone or the wireless transmitter properly installed?

YES : Go to step 10V4.

NO : Properly install the car telephone or the wireless transmitter.

10V4 : CHECK SOURCES OF SIGNAL NOISE.

CHECK : Are noise sources (such as an antenna) installed near the sensor harness?

YES : Install the noise sources apart from the sensor harness.

NO : Go to step 10V5.

10V5 : CHECK ABS CM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABS CM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10V6.

10V6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

W: TROUBLE CODE 42 POWER SUPPLY VOLTAGE TOO LOW — POWER SUPPLY VOLTAGE TOO LOW —

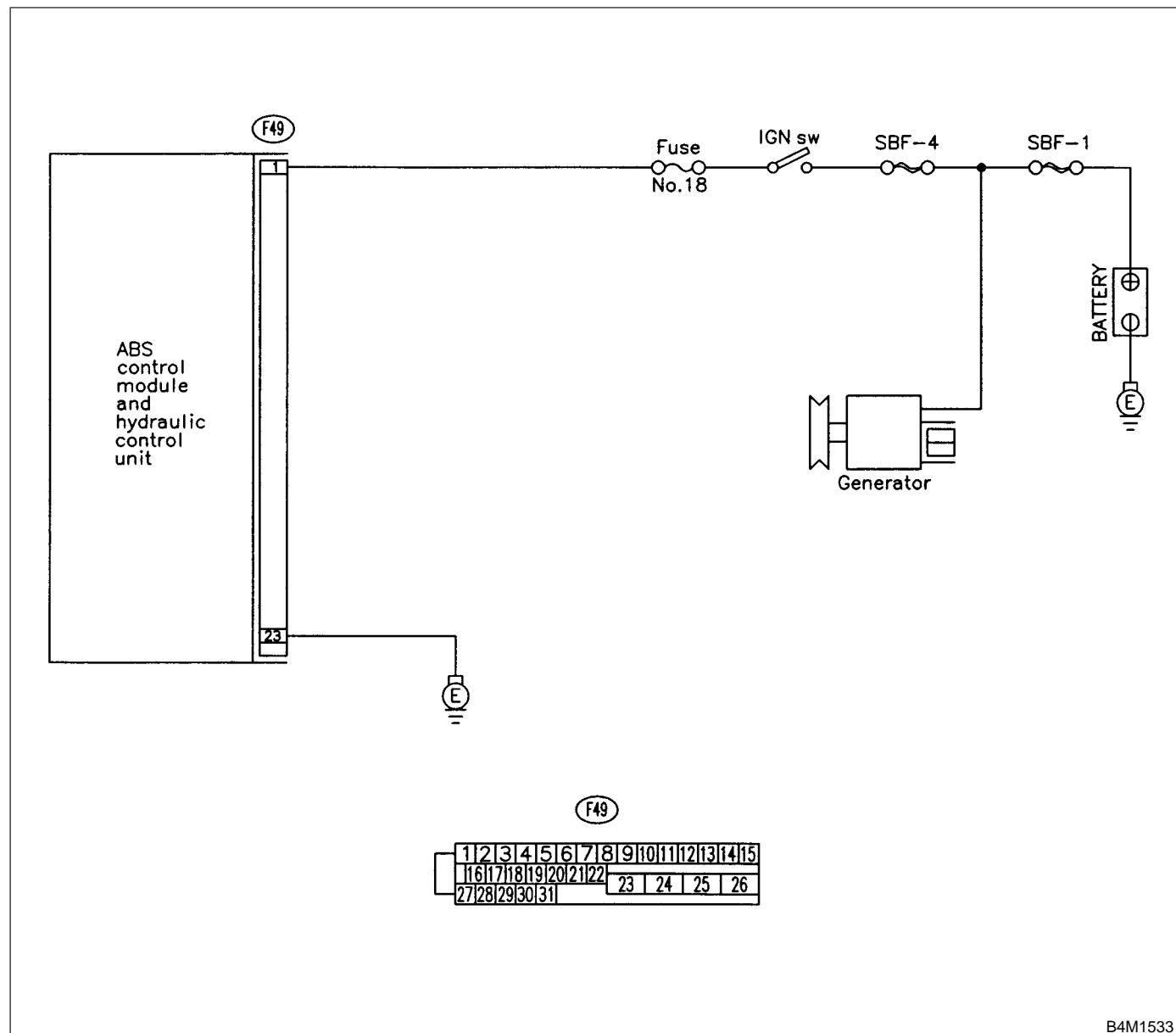
DIAGNOSIS:

- Power source voltage of the ABSCM&H/U is low.

TROUBLE SYMPTOM:

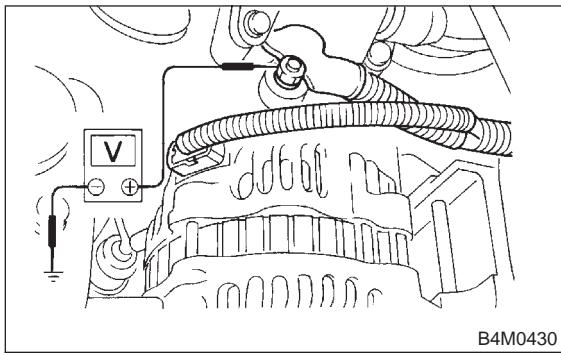
- ABS does not operate.

WIRING DIAGRAM:



10W1 : CHECK GENERATOR.

- 1) Start engine.
- 2) Idling after warm-up.
- 3) Measure voltage between generator B terminal and chassis ground.

Terminal**Generator B terminal — Chassis ground:**

B4M0430

CHECK : Is the voltage between 10 and 15 V?
YES : Go to step 10W2.
NO : Repair generator. <Ref. to 6-1 [W2A0].>

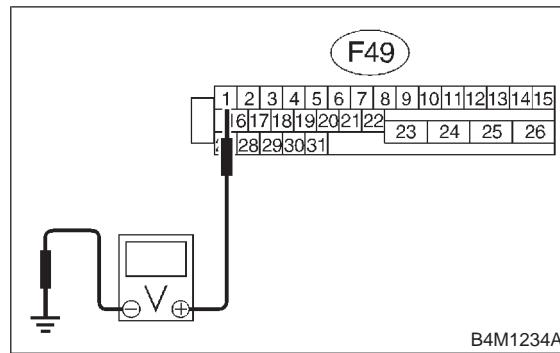
10W2 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

CHECK : Are the positive and negative battery terminals tightly clamped?
YES : Go to step 10W3.
NO : Tighten the clamp of terminal.

10W3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

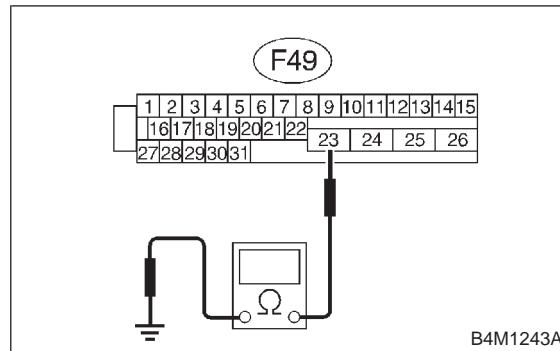
Connector & terminal**(F49) No. 1 (+) — Chassis ground (-):**

B4M1234A

CHECK : Is the voltage between 10 and 15 V?
YES : Go to step 10W4.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10W4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 23 — Chassis ground:**

B4M1243A

CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 10W5.
NO : Repair ABSCM&H/U ground harness.

10W5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.
NO : Go to step **10W6**.

10W6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step **10W7**.

10W7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

MEMO:

X: TROUBLE CODE 42 POWER SUPPLY VOLTAGE TOO HIGH

— POWER SUPPLY VOLTAGE TOO HIGH —

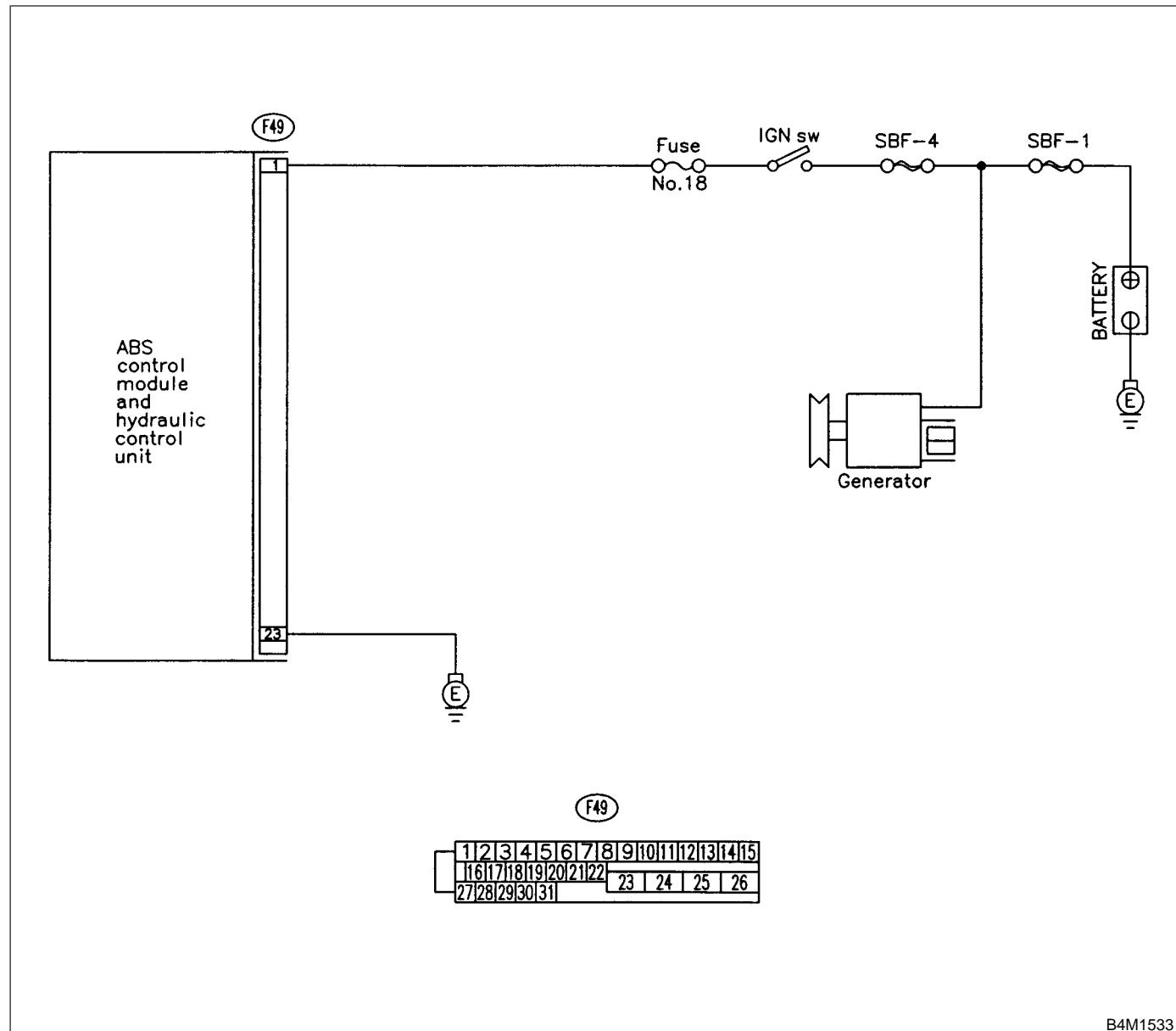
DIAGNOSIS:

- Power source voltage of the ABSCM&H/U is high.

TROUBLE SYMPTOM:

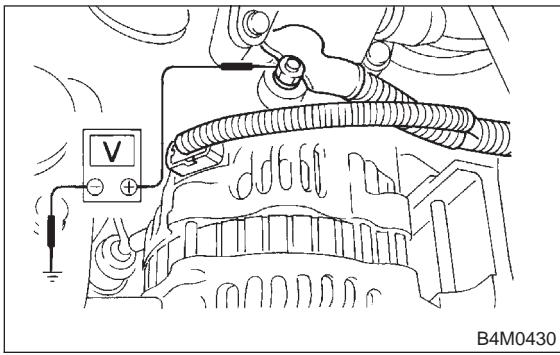
- ABS does not operate.

WIRING DIAGRAM:



10X1 : CHECK GENERATOR.

- 1) Start engine.
- 2) Idling after warm-up.
- 3) Measure voltage between generator B terminal and chassis ground.

Terminal**Generator B terminal — Chassis ground:**

CHECK : Is the voltage between 10 and 17 V?
YES : Go to step 10X2.
NO : Repair generator. <Ref. to 6-1 [W2A0].>

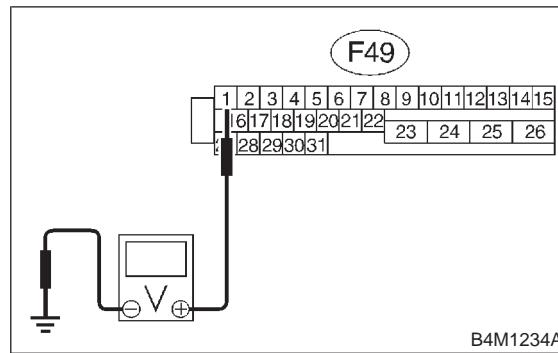
10X2 : CHECK BATTERY TERMINAL.

Turn ignition switch to OFF.

CHECK : Are the positive and negative battery terminals tightly clamped?
YES : Go to step 10X3.
NO : Tighten the clamp of terminal.

10X3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

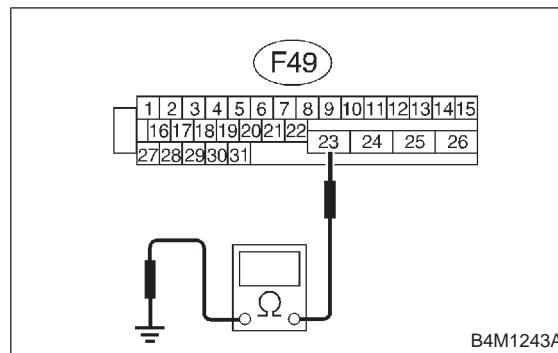
- 1) Disconnect connector from ABSCM&H/U.
- 2) Run the engine at idle.
- 3) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 1 (+) — Chassis ground (-):**

CHECK : Is the voltage between 10 and 17 V?
YES : Go to step 10X4.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10X4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal**(F49) No. 23 — Chassis ground:**

CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 10X5.
NO : Repair ABSCM&H/U ground harness.

10X5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.
NO : Go to step **10X6**.

10X6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step **10X7**.

10X7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

MEMO:

Y: TROUBLE CODE 44 ABS-AT CONTROL (NON CONTROLLED) — ABS-AT CONTROL (NON CONTROLLED) —

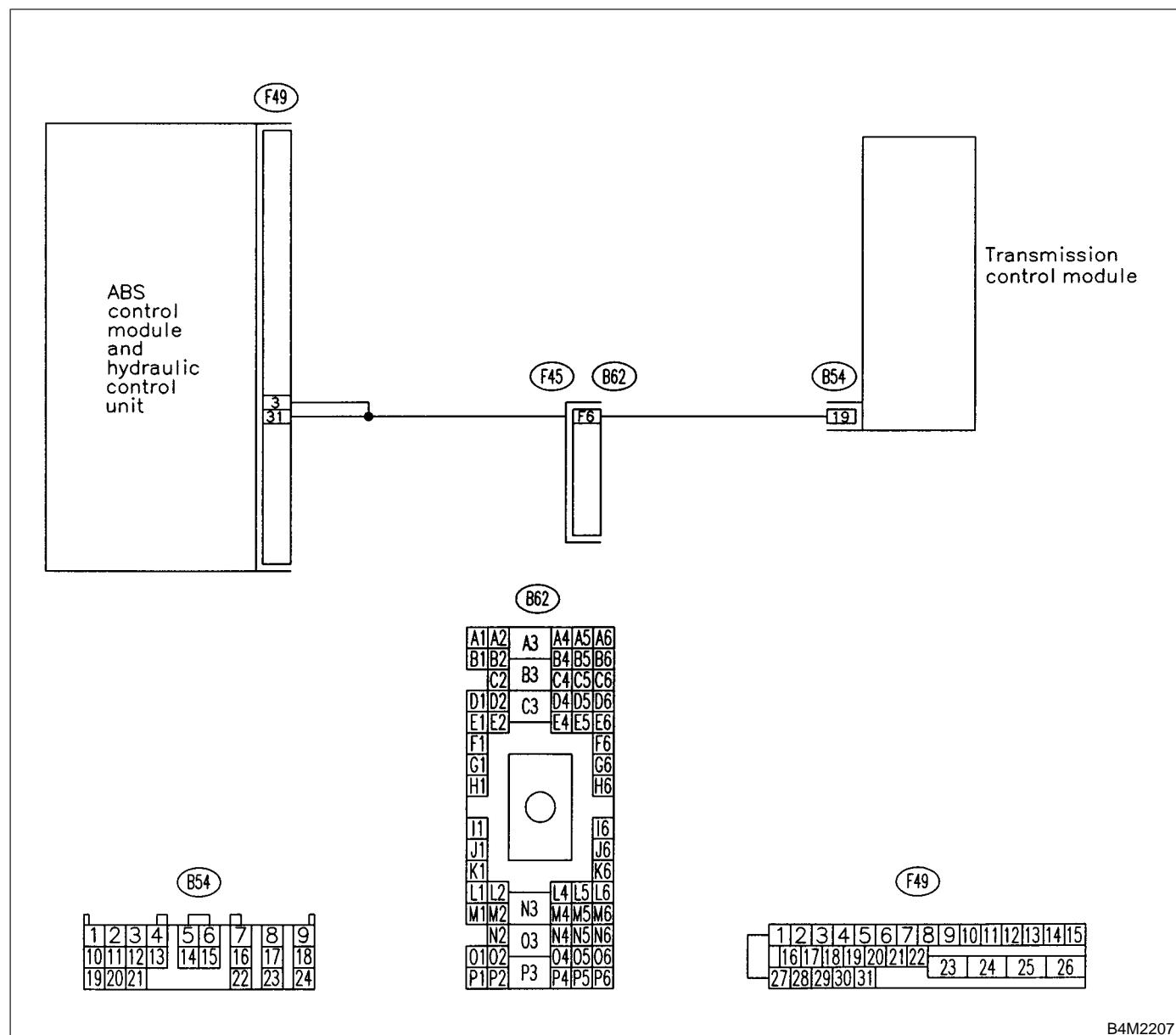
DIAGNOSIS:

- Combination of AT control faults

TROUBLE SYMPTOM:

- ABS does not operate.

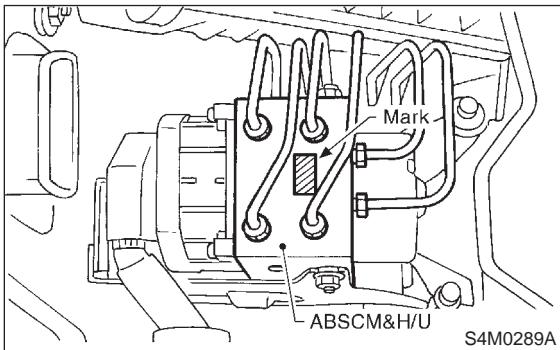
WIRING DIAGRAM:



B4M2207

10Y1 : CHECK SPECIFICATIONS OF THE ABSCM&H/U.

Check specifications of the mark to the ABSCM&H/U.



Mark	Model
C5	AT (Except OUTBACK)
C6	MT (Except OUTBACK)
CE	AT (OUTBACK)
CF	MT (OUTBACK)

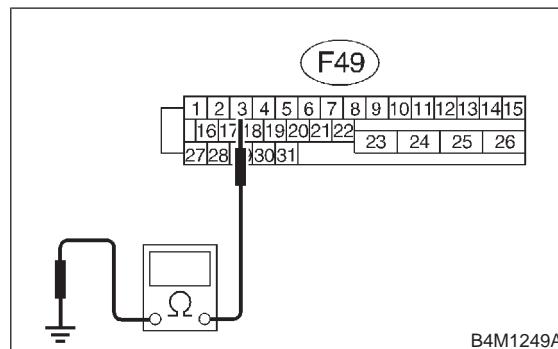
CHECK : Is an ABSCM&H/U for AT model installed on a MT model?
YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 10Y2.

10Y2 : CHECK GROUND SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect two connectors from TCM.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 — Chassis ground:



CHECK : Is the resistance more than 1 MΩ?

YES : Go to step 10Y3.

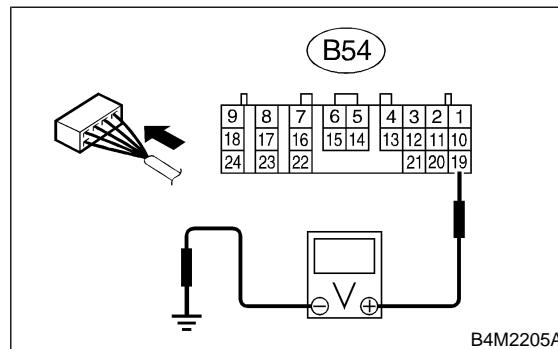
NO : Repair harness between TCM and ABSCM&H/U.

10Y3 : CHECK TCM.

- 1) Connect all connectors to TCM.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between TCM connector terminal and chassis ground.

Connector & terminal

(B54) No. 19 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 and 15 V?

YES : Go to step 10Y5.

NO : Go to step 10Y4.

10Y4 : CHECK AT.

CHECK : *Is the AT functioning normally?*

YES : Replace TCM.

NO : Repair AT.

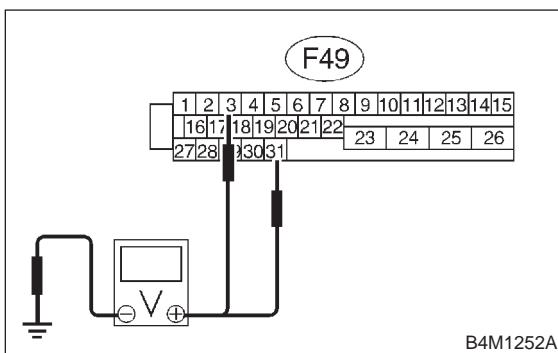
10Y5 : CHECK OPEN CIRCUIT OF HARNESS.

Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):

(F49) No. 31 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 10 V?*

YES : Go to step 10Y6.

NO : Repair harness/connector between AT control module and ABSCM&H/U.

10Y6 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between AT control module and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step 10Y7.

10Y7 : CHECK ABSCM&H/U.

1) Connect all connectors.

2) Erase the memory.

3) Perform inspection mode.

4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10Y8.

10Y8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

Z: TROUBLE CODE 44 ABS-AT CONTROL (CONTROLLED)

— ABS-AT CONTROL (CONTROLLED) —

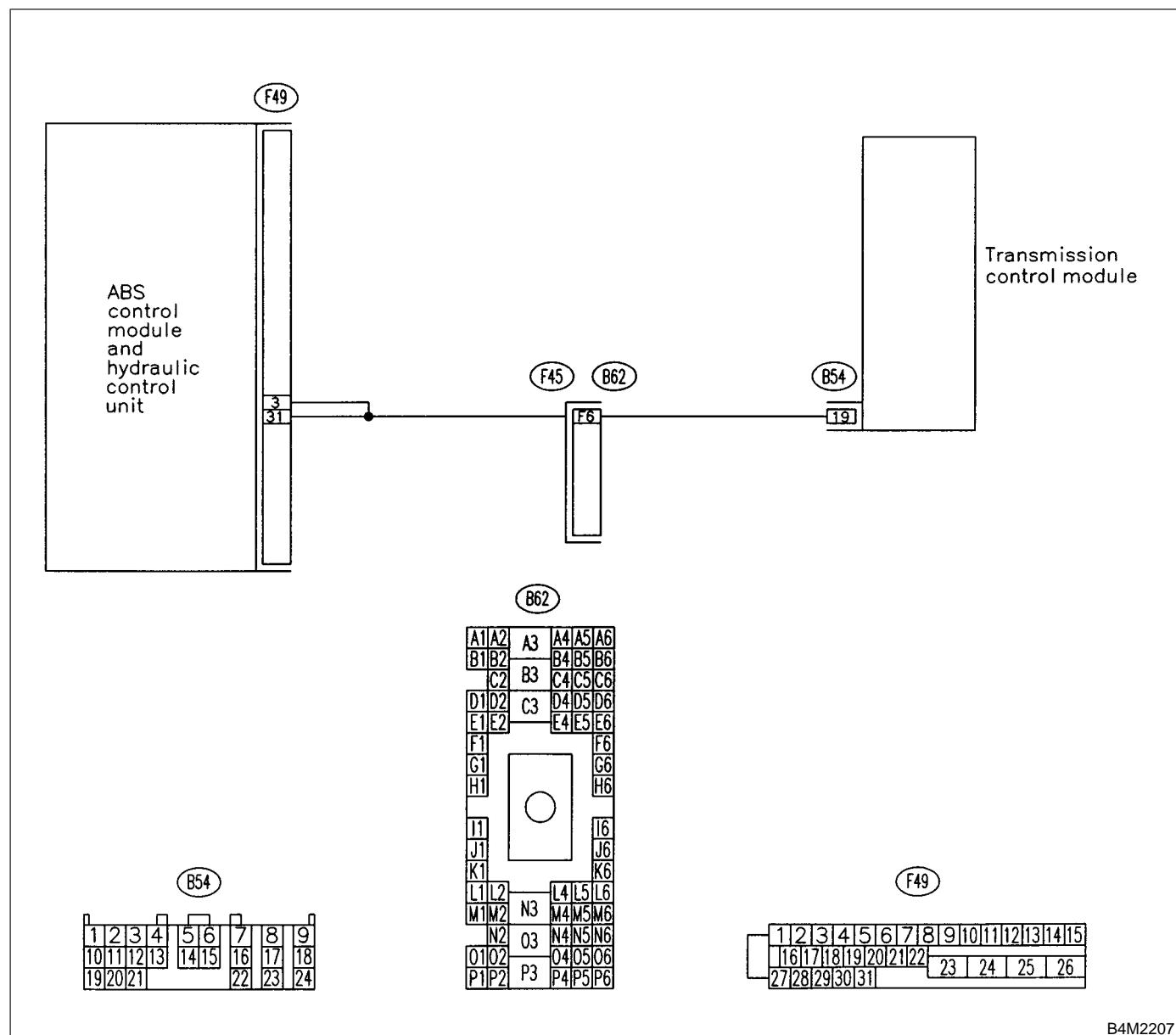
DIAGNOSIS:

- Combination of AT control faults

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

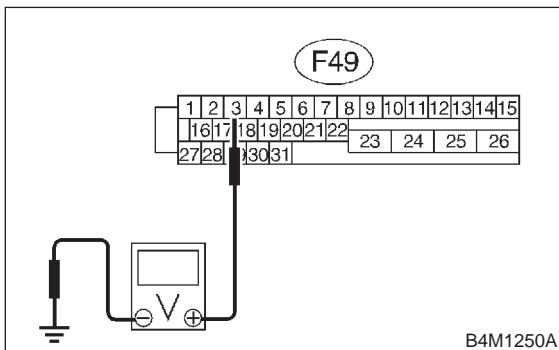


10Z1 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect two connectors from AT control module.
- 3) Disconnect connector from ABSCM&H/U.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 10Z2.

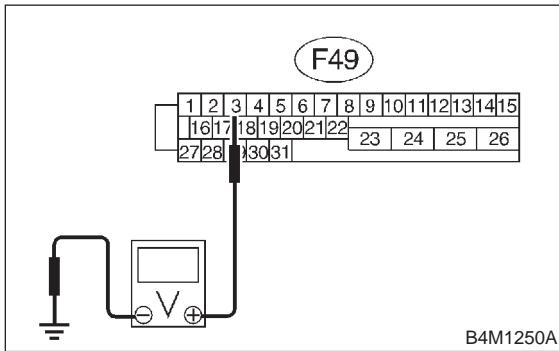
NO : Repair harness between AT control module and ABSCM&H/U.

10Z2 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):



CHECK : Is the voltage less than 1 V?

YES : Go to step 10Z3.

NO : Repair harness between AT control module and ABSCM&H/U.

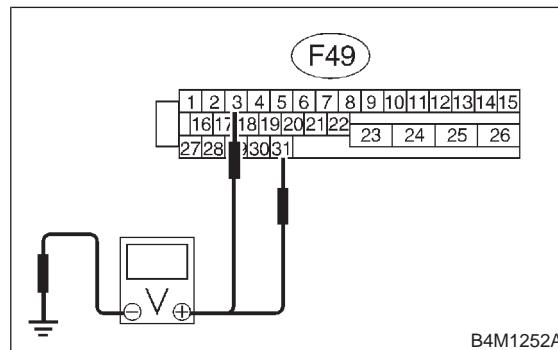
10Z3 : CHECK OPEN CIRCUIT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors to TCM.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 3 (+) — Chassis ground (-):

(F49) No. 31 (+) — Chassis ground (-):



CHECK : Is the voltage between 10 and 13 V?

YES : Go to step 10Z4.

NO : Repair harness/connector between TCM and ABSCM&H/U.

10Z4 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connectors between AT control module and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10Z5.

10Z5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10Z6.

10Z6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

AA: TROUBLE CODE 51 VALVE RELAY MALFUNCTION

— VALVE RELAY MALFUNCTION —

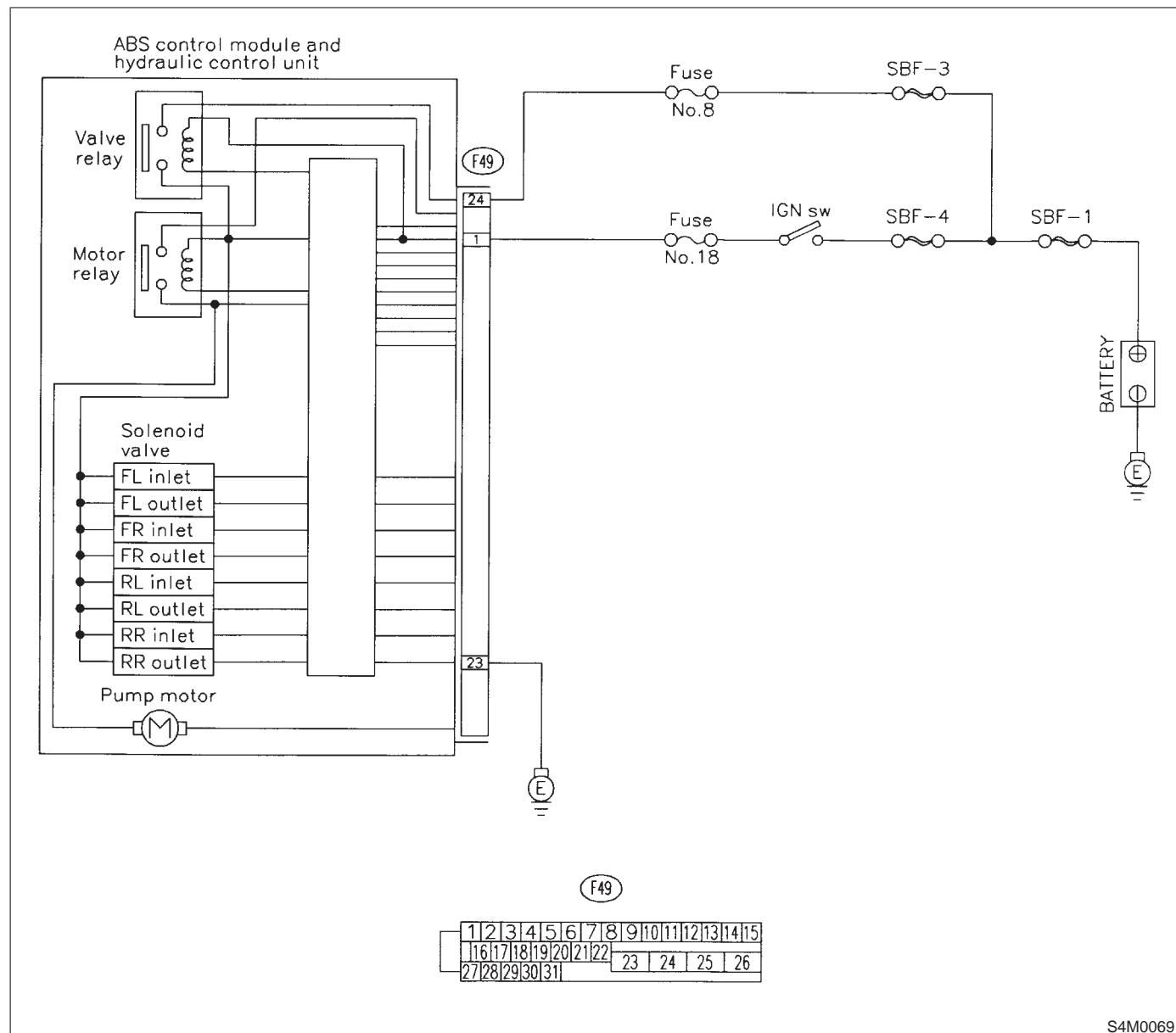
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

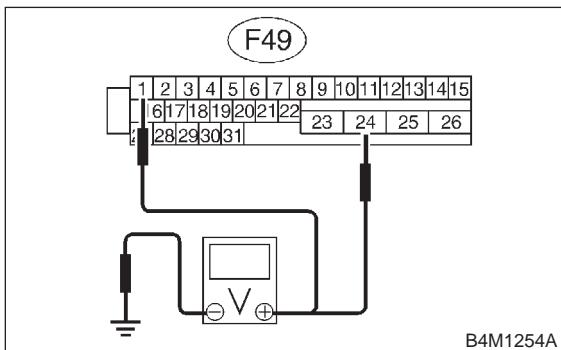


10AA1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Run the engine at idle.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 1 (+) — Chassis ground (-):
 (F49) No. 24 (+) — Chassis ground (-):



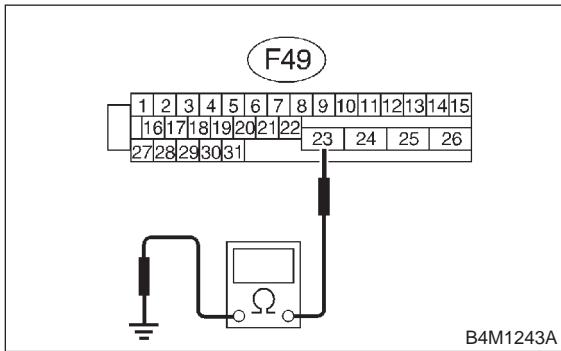
CHECK : Is the voltage between 10 and 15 V?
YES : Go to step 10AA2.
NO : Repair harness connector between battery and ABSCM&H/U.

10AA2 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 23 — Chassis ground:



CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 10AA3.
NO : Repair ABSCM&H/U ground harness.

10AA3 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>
YES : Repair connector.
NO : Go to step 10AA4.

10AA4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?
YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 10AA5.

10AA5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

AB: TROUBLE CODE 51 VALVE RELAY ON FAILURE

— VALVE RELAY ON FAILURE —

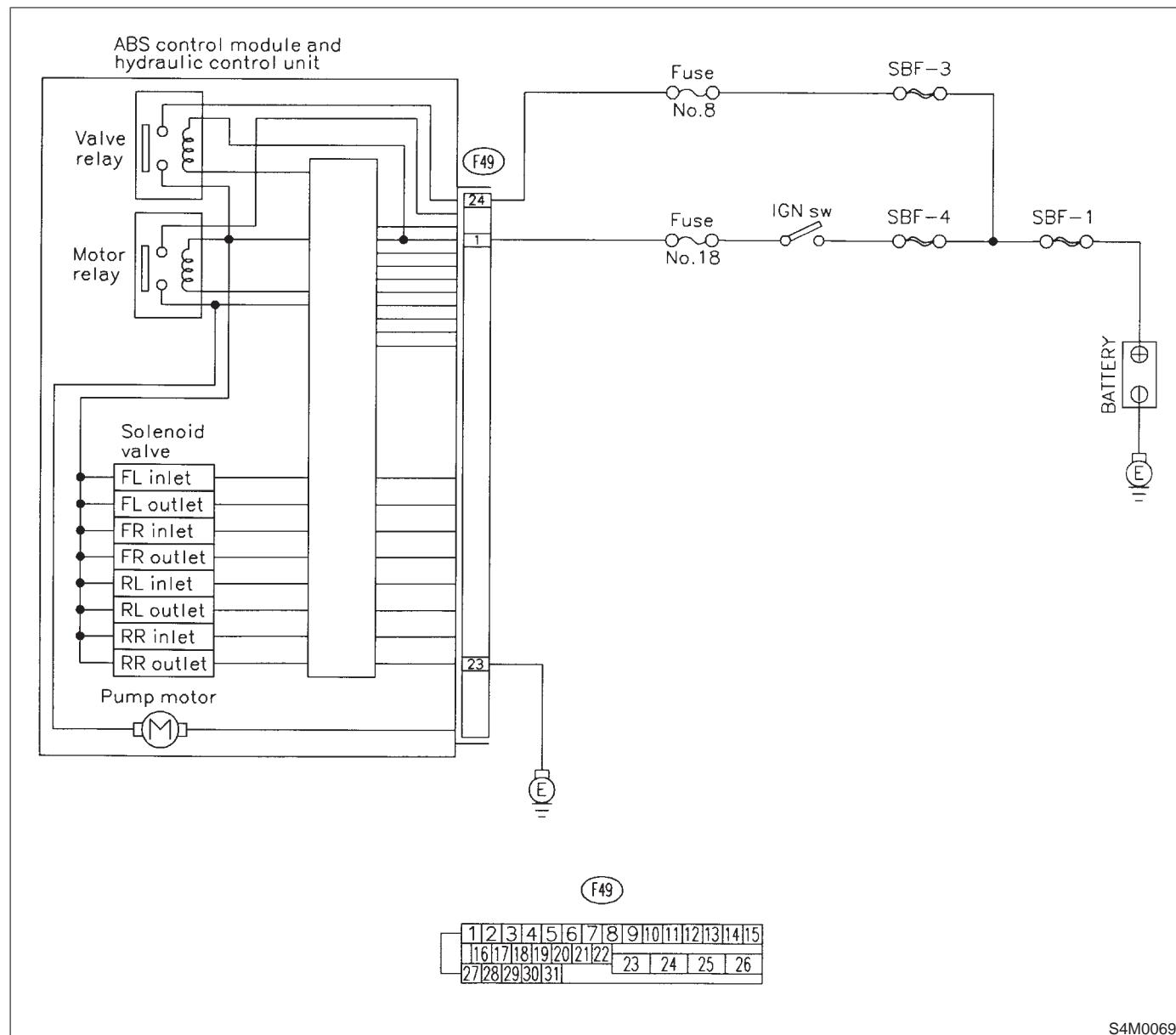
DIAGNOSIS:

- Faulty valve relay

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

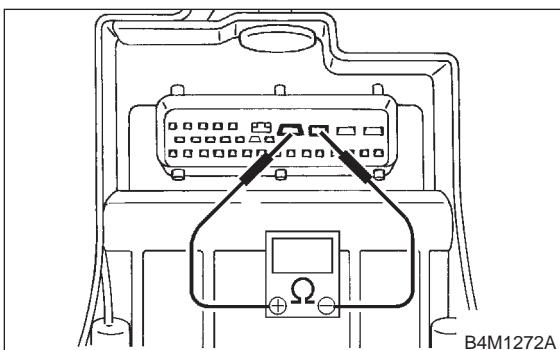


10AB1 : CHECK VALVE RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals

No. 23 (+) — No. 24 (-):



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 10AB2.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10AB2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connectors between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step 10AB3.

10AB3 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AB4.

10AB4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AC: TROUBLE CODE 52 OPEN CIRCUIT IN MOTOR RELAY CIRCUIT

— OPEN CIRCUIT IN MOTOR RELAY CIRCUIT —

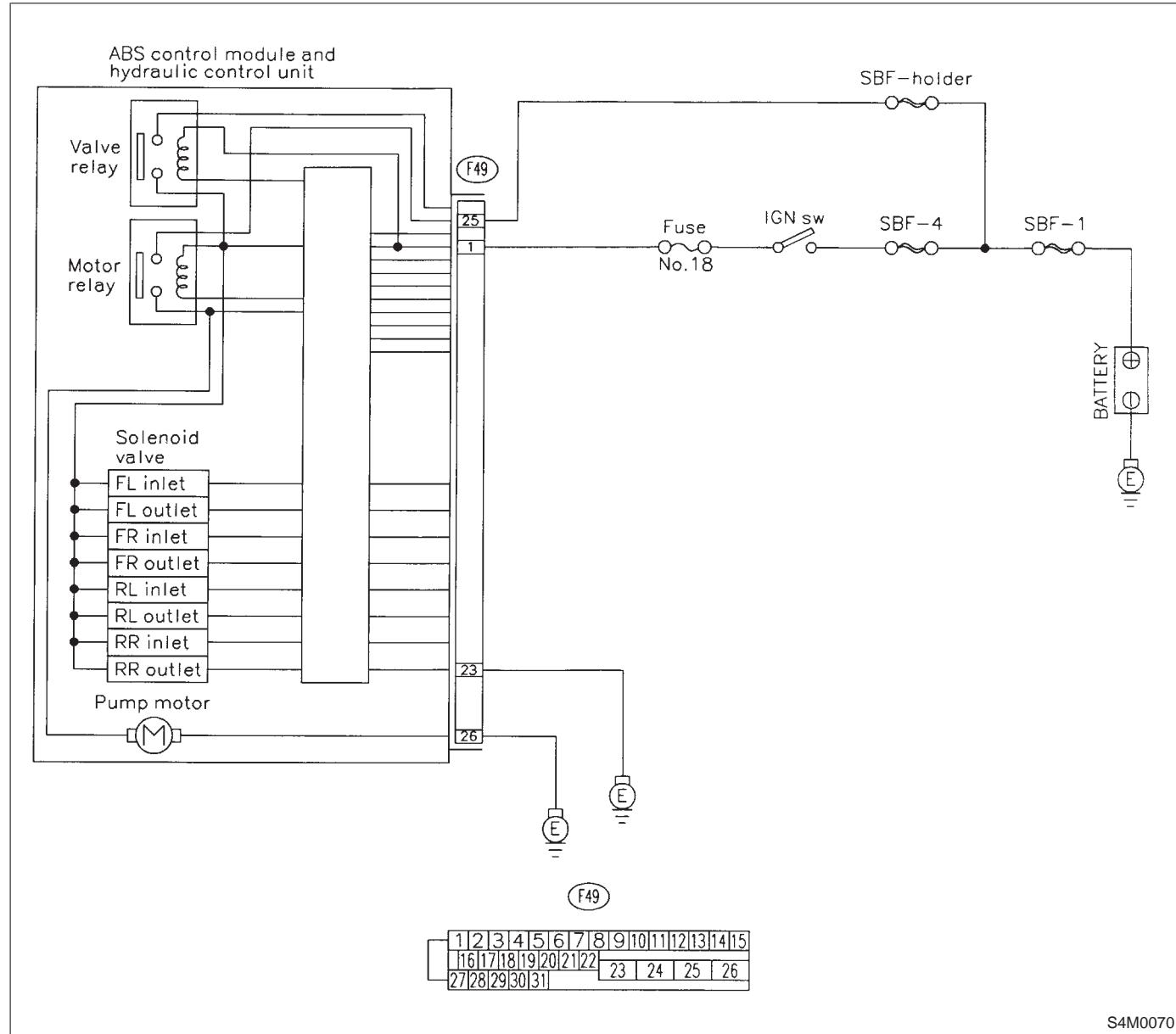
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

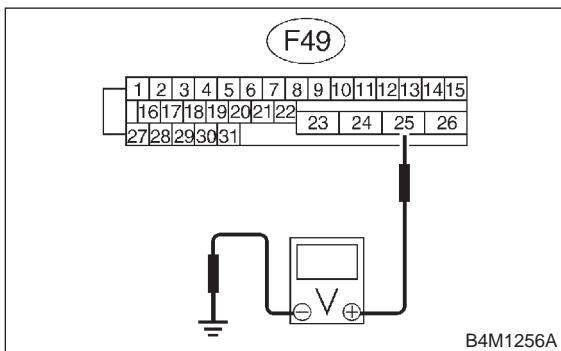
WIRING DIAGRAM:



S4M0070

10AC1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 25 (+) — Chassis ground (-):


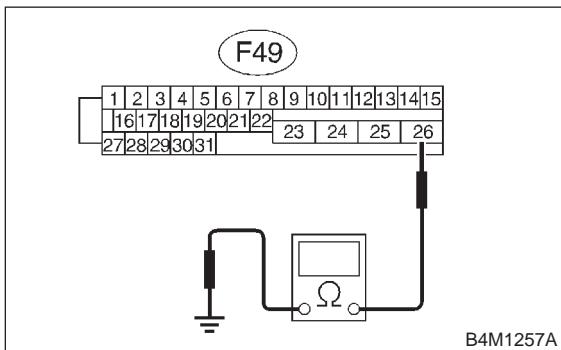
CHECK : Is the voltage between 10 and 13 V?

YES : Go to step 10AC2.

NO : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF6.

10AC2 : CHECK GROUND CIRCUIT OF MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 26 — Chassis ground:


CHECK : Is the resistance less than 0.5 Ω?

YES : Go to step 10AC3.

NO : Repair ABSCM&H/U ground harness.

10AC3 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:

Use the diagnosis connector to operate the sequence control.

CHECK : Can motor revolution noise (buzz) be heard when carrying out the check sequence?

YES : Go to step 10AC4.

NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10AC4 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10AC5.

10AC5 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AC6.

10AC6 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AD: TROUBLE CODE 52 MOTOR RELAY ON FAILURE

— MOTOR RELAY ON FAILURE —

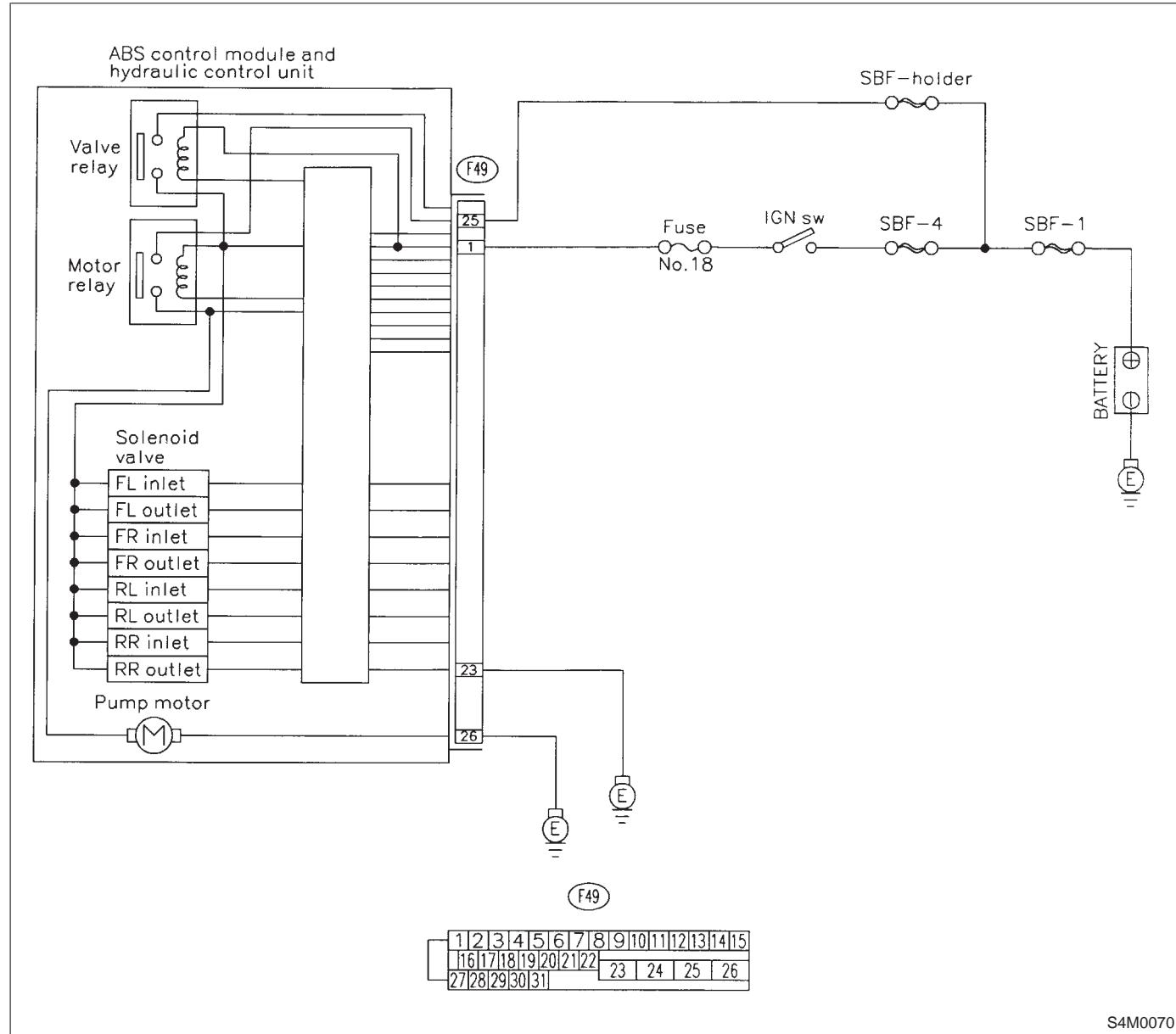
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

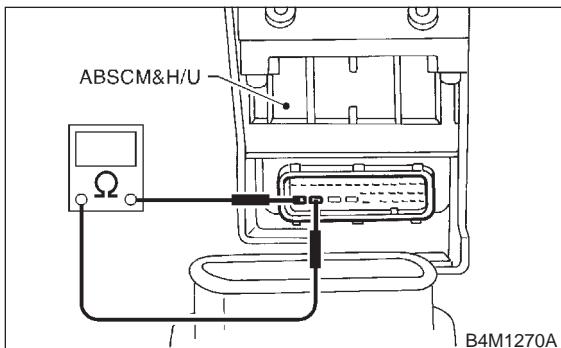


10AD1 : CHECK MOTOR RELAY IN ABSCM&H/U.

Measure resistance between ABSCM&H/U terminals.

Terminals

No. 25 — No. 26:



CHECK : Is the resistance more than $1\text{ M}\Omega$?
YES : Go to step 10AD2.
NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10AD2 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:

Use the diagnosis connector to operate the sequence control.

CHECK : Can motor revolution noise (buzz) be heard when carrying out the sequence control?
YES : Go to step 10AD3.
NO : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10AD3 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>
YES : Repair connector.
NO : Go to step 10AD4.

10AD4 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?
YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 10AD5.

10AD5 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?
YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

AE: TROUBLE CODE 52 MOTOR MALFUNCTION

— MOTOR MALFUNCTION —

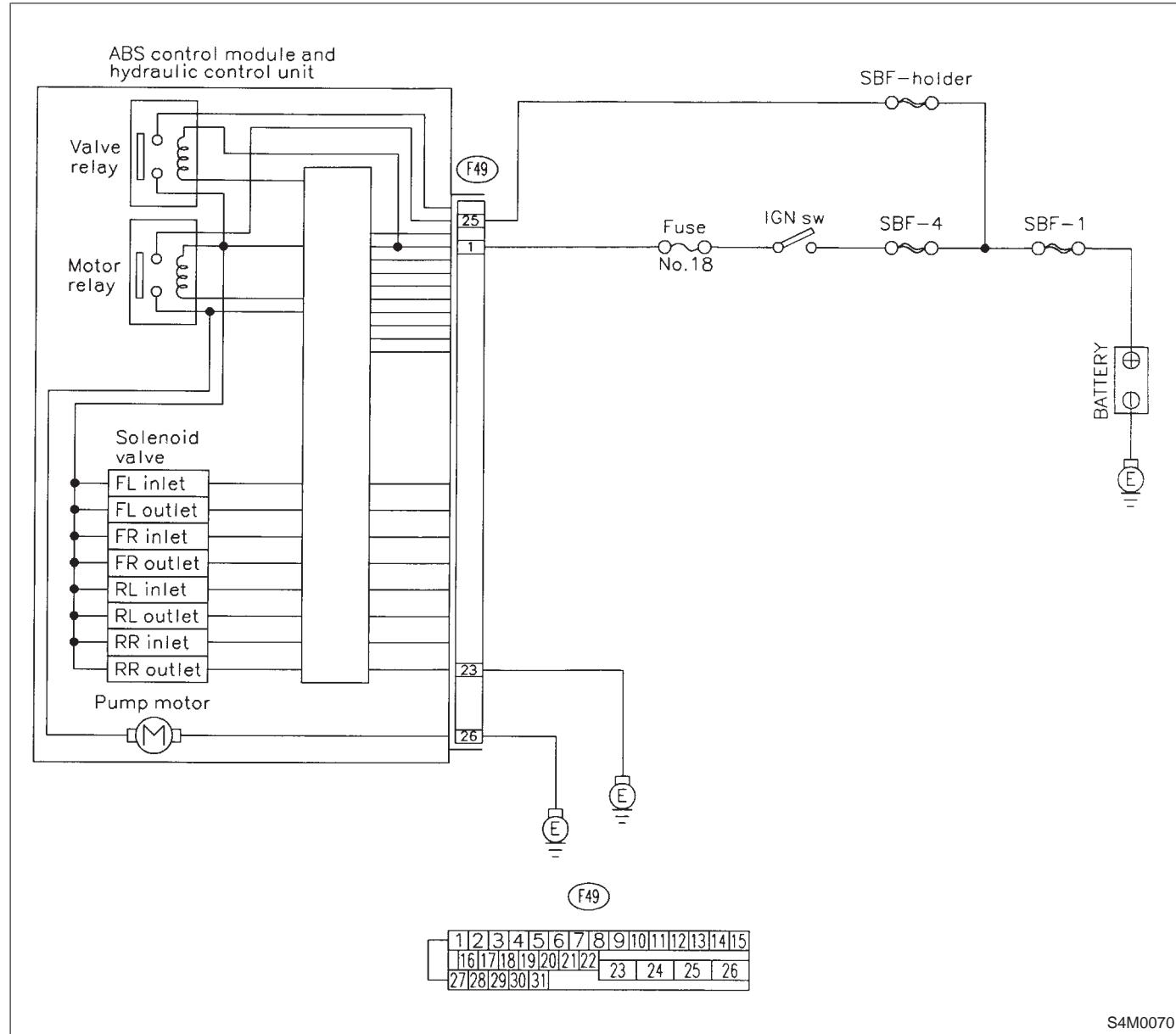
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

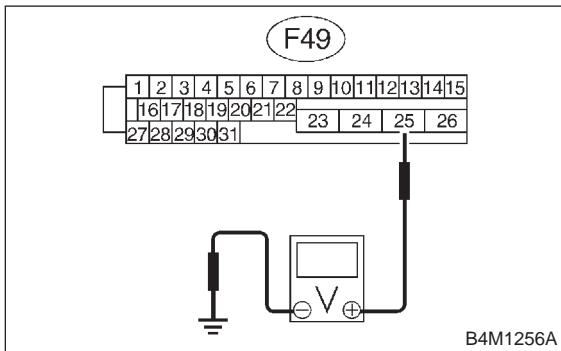
- ABS does not operate.

WIRING DIAGRAM:



10AE1 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

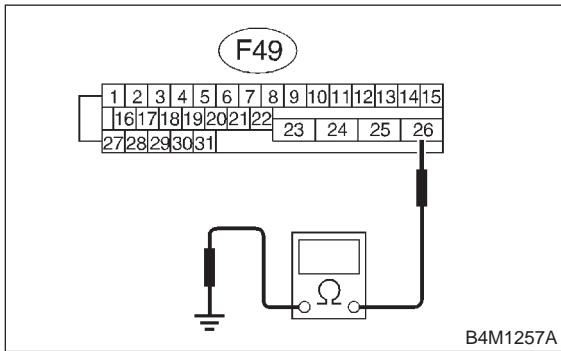
- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 25 (+) — Chassis ground (-):


CHECK : Is the voltage between 10 and 13 V?
YES : Go to step 10AE2.
NO : Repair harness/connector between battery and ABSCM&H/U and check fuse SBF6.

10AE2 : CHECK GROUND CIRCUIT OF MOTOR.

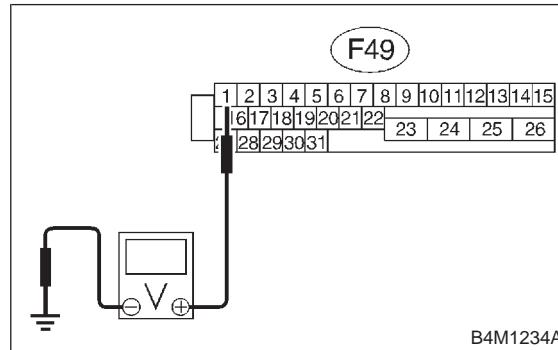
- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 26 — Chassis ground:


CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 10AE3.
NO : Repair ABSCM&H/U ground harness.

10AE3 : CHECK INPUT VOLTAGE OF ABSCM&H/U.

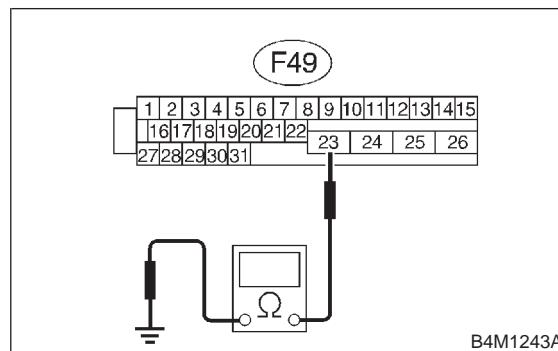
- 1) Run the engine at idle.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 1 (+) — Chassis ground (-):


CHECK : Is the voltage between 10 and 15 V?
YES : Go to step 10AE4.
NO : Repair harness connector between battery, ignition switch and ABSCM&H/U.

10AE4 : CHECK GROUND CIRCUIT OF ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 23 — Chassis ground:


CHECK : Is the resistance less than 0.5 Ω?
YES : Go to step 10AE5.
NO : Repair ABSCM&H/U ground harness.

10AE5 : CHECK MOTOR OPERATION.

Operate the sequence control. <Ref. to 4-4 [W15D0].>

NOTE:

Use the diagnosis connector to operate the sequence control.

 : *Can motor revolution noise (buzz) be heard when carrying out the sequence control?*

 : Go to step **10AE6**.

 : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10AE6 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

 : *Is there poor contact in connector between generator, battery and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

 : Repair connector.

 : Go to step **10AE7**.

10AE7 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

 : *Is the same trouble code as in the current diagnosis still being output?*

 : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

 : Go to step **10AE8**.

10AE8 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

 : *Are other trouble codes being output?*

 : Proceed with the diagnosis corresponding to the trouble code.

 : A temporary poor contact.

MEMO:

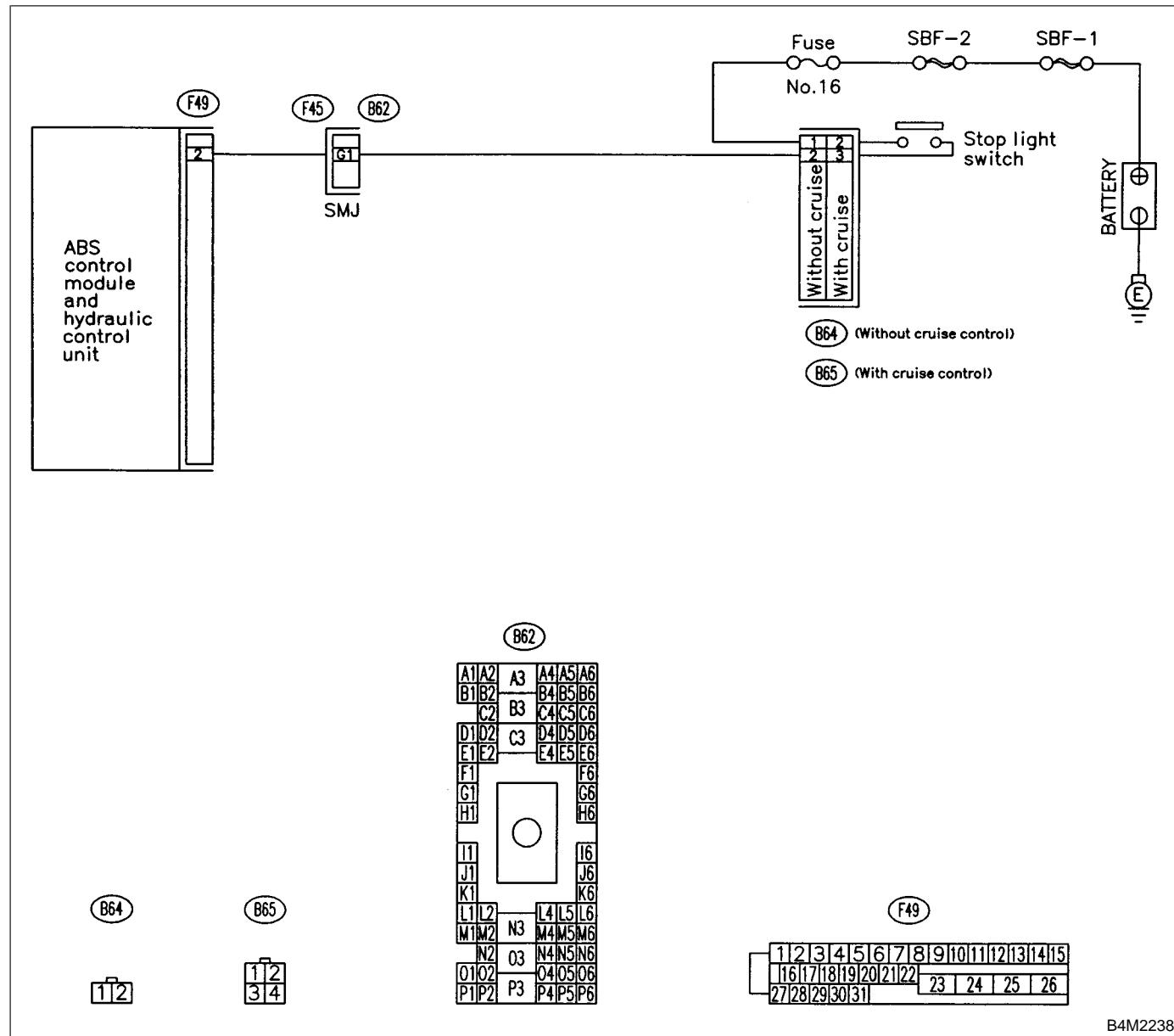
AF: TROUBLE CODE 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION
— STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION —

DIAGNOSIS:

- Faulty stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:

B4M2238

10AF1 : CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Release the brake pedal.
- 3) Read the stop light switch output in the select monitor data display.

CHECK : *Is the reading indicated on monitor display less than 1.5 V?*

YES : Go to step 10AF2.

NO : Go to step 10AF3.

10AF2 : CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.

- 1) Depress the brake pedal.
- 2) Read the stop light switch output in the select monitor data display.

CHECK : *Is the reading indicated on monitor display between 10 and 15 V?*

YES : Go to step 10AF5.

NO : Go to step 10AF3.

10AF3 : CHECK IF STOP LIGHTS COME ON.

Depress the brake pedal.

CHECK : *Do stop lights turn on?*

YES : Go to step 10AF4.

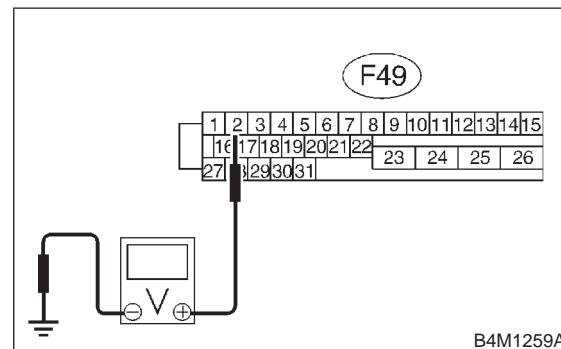
NO : Repair stop lights circuit.

10AF4 : CHECK OPEN CIRCUIT IN HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Depress brake pedal.
- 4) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal

(F49) No. 2 — Chassis ground:



CHECK : *Is the voltage between 10 and 15 V?*

YES : Go to step 10AF5.

NO : Repair harness between stop light switch and ABSCM&H/U connector.

10AF5 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between stop light switch and ABSCM&H/U? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step 10AF6.

10AF6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AF7.

10AF7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

MEMO:

AG: TROUBLE CODE 56 OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT — OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT —

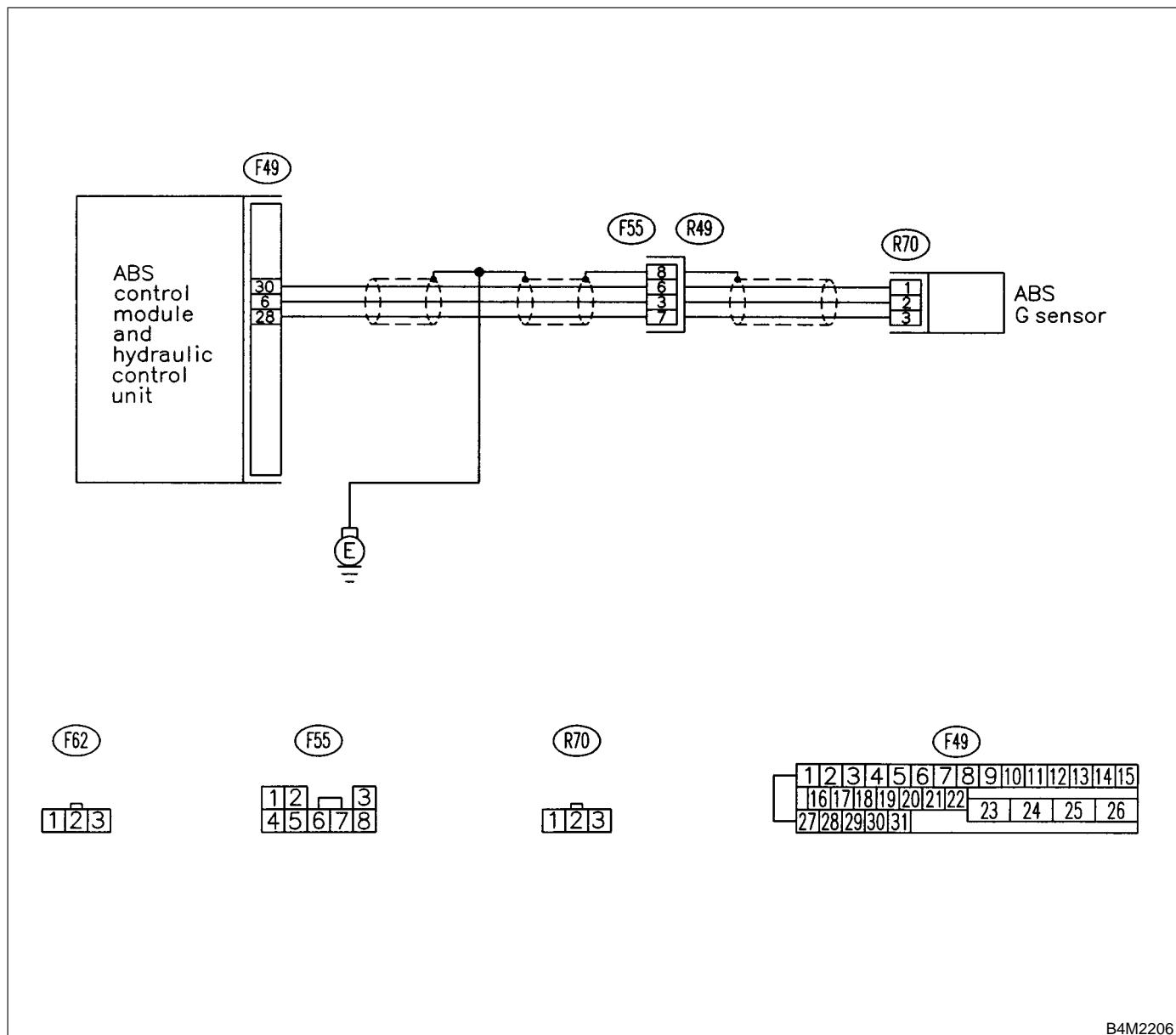
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



10AG1 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the G sensor output in select monitor data display.

CHECK : *Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?*

YES : Go to step **10AG2**.

NO : Go to step **10AG5**.

10AG2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step **10AG3**.

10AG3 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step **10AG4**.

10AG4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

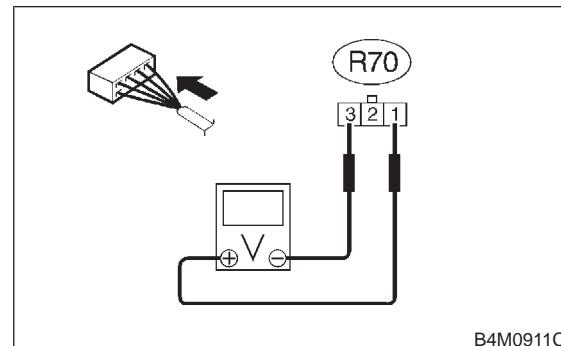
NO : A temporary poor contact.

10AG5 : CHECK INPUT VOLTAGE OF G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Disconnect G sensor from body. (Do not disconnect connector.)
- 4) Turn ignition switch to ON.
- 5) Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 1 (+) — No. 3 (-):



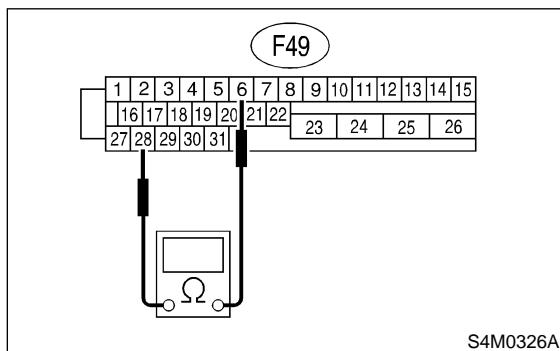
CHECK : *Is the voltage between 4.75 and 5.25 V?*

YES : Go to step **10AG6**.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AG6 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 6 — No. 28:


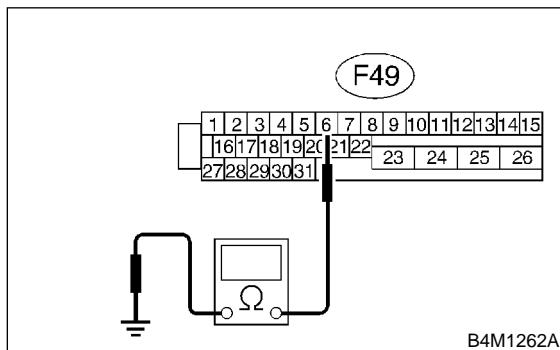
CHECK : Is the resistance between 4.3 and 4.9 k Ω ?

YES : Go to step 10AG7.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AG7 : CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.

- 1) Disconnect connector from G sensor.
- 2) Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 — Chassis ground:


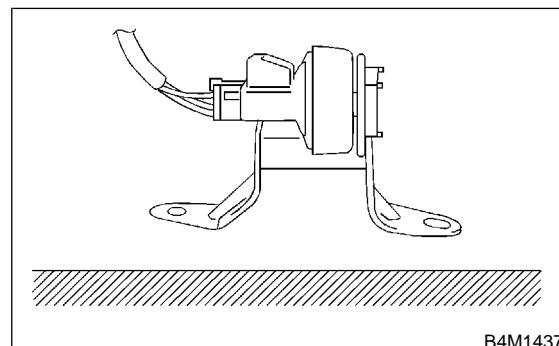
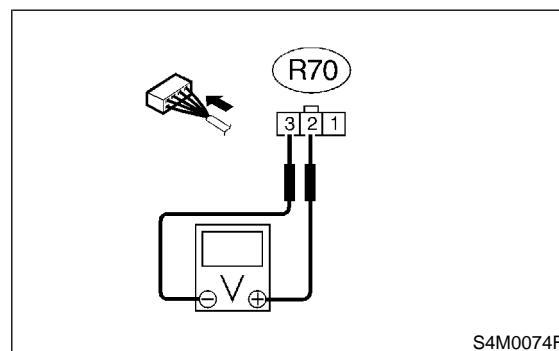
CHECK : Is the resistance more than 1 M Ω ?

YES : Go to step 10AG8.

NO : Repair harness between G sensor and ABSCM&H/U.

10AG8 : CHECK G SENSOR.

- 1) Connect connector to G sensor.
- 2) Connect connector to ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (-):


CHECK : Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?

YES : Go to step 10AG9.

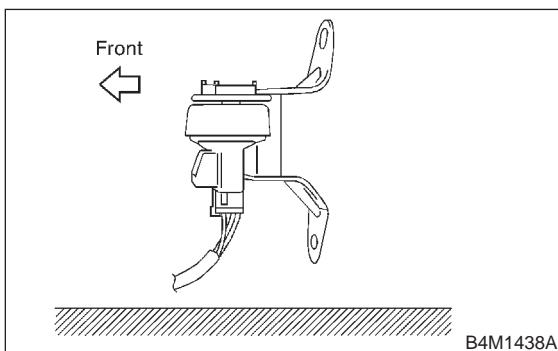
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AG9 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?

YES : Go to step 10AG10.

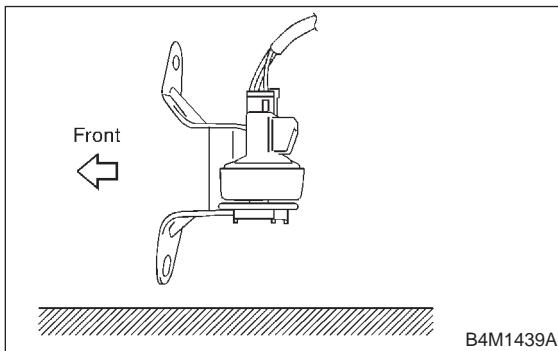
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AG10 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?

YES : Go to step 10AG11.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AG11 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10AG12.

10AG12 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AG13.

10AG13 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AH: TROUBLE CODE 56 BATTERY SHORT IN G SENSOR CIRCUIT

— BATTERY SHORT IN G SENSOR CIRCUIT —

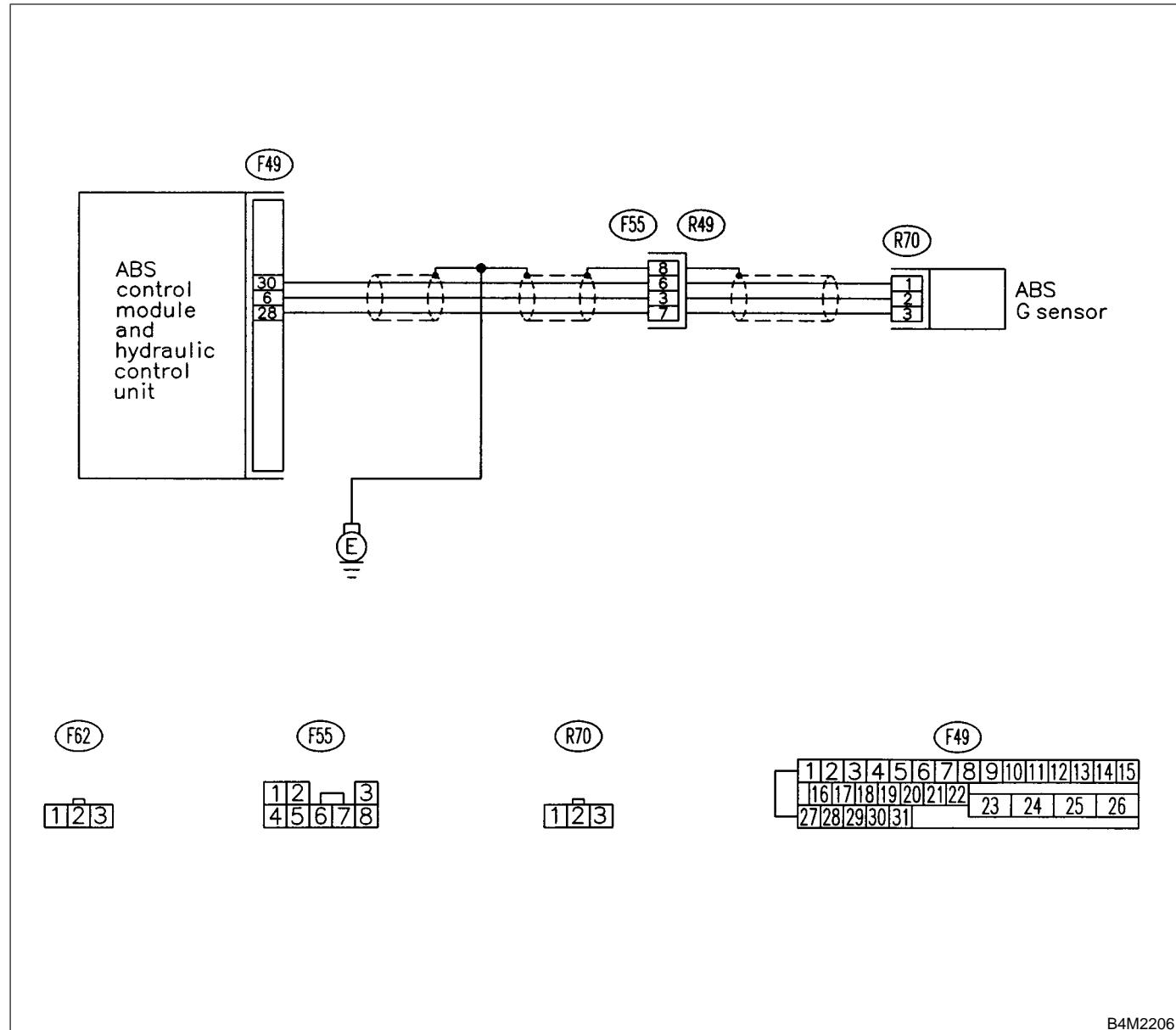
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



B4M2206

10AH1 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the G sensor output in select monitor data display.

CHECK : *Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?*

YES : Go to step 10AH2.
NO : Go to step 10AH5.

10AH2 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between ABS/CM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.
NO : Go to step 10AH3.

10AH3 : CHECK ABS/CM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABS/CM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 10AH4.

10AH4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

10AH5 : CHECK FREEZE FRAME DATA.

- 1) Select "Freeze frame data" on the select monitor.
- 2) Read front right wheel speed on the select monitor display.

CHECK : *Is the front right wheel speed on monitor display 0 km?*

YES : Go to step 10AH6.
NO : Go to step 10AH16.

10AH6 : CHECK FREEZE FRAME DATA.

Read front left wheel speed on the select monitor display.

CHECK : *Is the front left wheel speed on monitor display 0 km?*

YES : Go to step 10AH7.
NO : Go to step 10AH16.

10AH7 : CHECK FREEZE FRAME DATA.

Read rear right wheel speed on the select monitor display.

CHECK : *Is the rear right wheel speed on monitor display 0 km?*

YES : Go to step 10AH8.
NO : Go to step 10AH16.

10AH8 : CHECK FREEZE FRAME DATA.

Read rear left wheel speed on the select monitor display.

CHECK : *Is the rear left wheel speed on monitor display 0 km?*

YES : Go to step 10AH9.
NO : Go to step 10AH16.

10AH9 : CHECK FREEZE FRAME DATA.

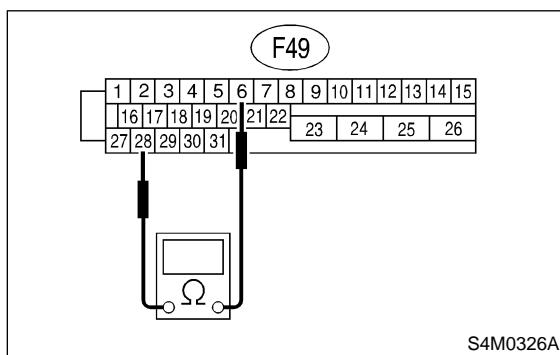
Read G sensor output on the select monitor display.

CHECK : *Is the G sensor output on monitor display more than 3.65 V?*

YES : Go to step 10AH10.
NO : Go to step 10AH16.

10AH10 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 6 — No. 28:


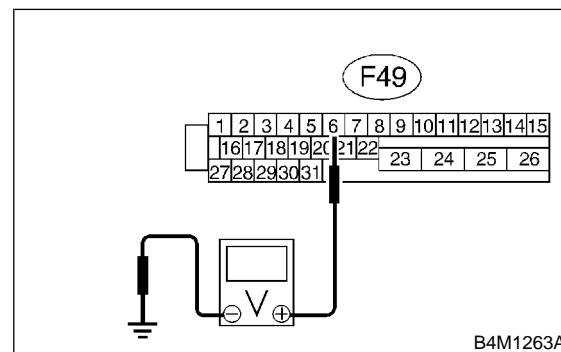
CHECK : Is the resistance between 4.3 and 4.9 kΩ?

YES : Go to step 10AH11.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AH11 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Disconnect connector from G sensor.
- 4) Disconnect connector from ABSCM&H/U.
- 5) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (-):


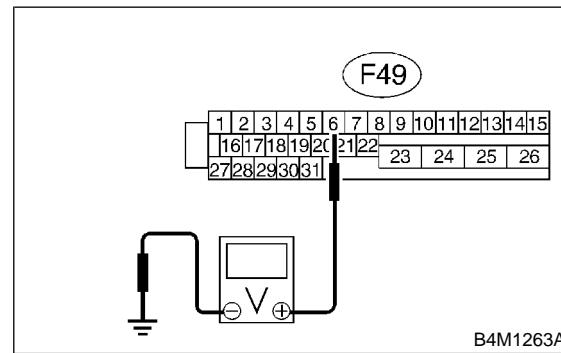
CHECK : Is the voltage less than 1 V?

YES : Go to step 10AH12.

NO : Repair harness between G sensor and ABSCM&H/U.

10AH12 : CHECK BATTERY SHORT OF HARNESS.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 6 (+) — Chassis ground (-):


CHECK : Is the voltage less than 1 V?

YES : Go to step 10AH13.

NO : Repair harness between G sensor and ABSCM&H/U.

10AH13 : CHECK POOR CONTACT IN CONNECTORS.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step 10AH14.

10AH14 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AH15.

10AH15 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

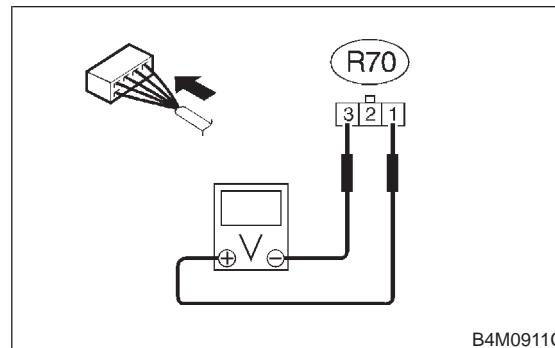
NO : A temporary poor contact.

10AH16 : CHECK INPUT VOLTAGE OF G SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Disconnect G sensor from body. (Do not disconnect connector.)
- 4) Turn ignition switch to ON.
- 5) Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 1 (+) — No. 3 (-):



B4M0911C

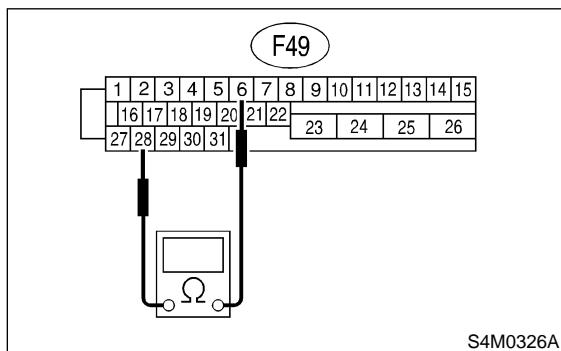
CHECK : *Is the voltage between 4.75 and 5.25 V?*

YES : Go to step 10AH17.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AH17 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 6 — No. 28:


S4M0326A

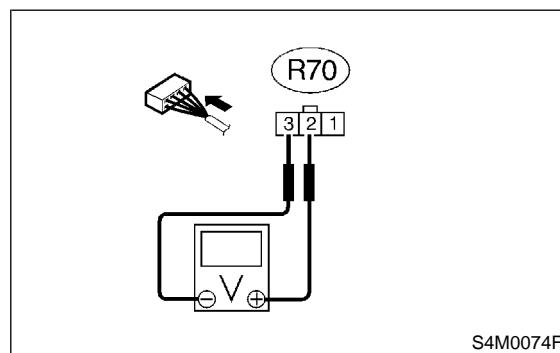
CHECK : Is the resistance between 4.3 and 4.9 kΩ?

YES : Go to step 10AH18.

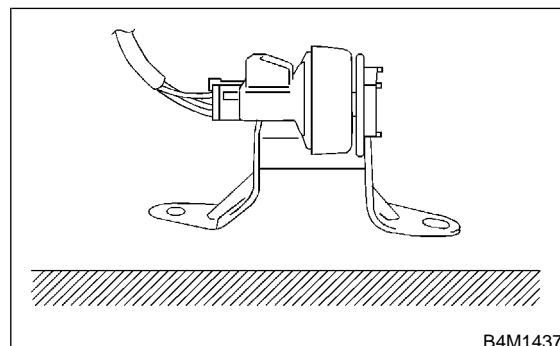
NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AH18 : CHECK G SENSOR.

- 1) Connect connector to G sensor.
- 2) Connect connector to ABSCM&H/U.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (-):


S4M0074F



B4M1437

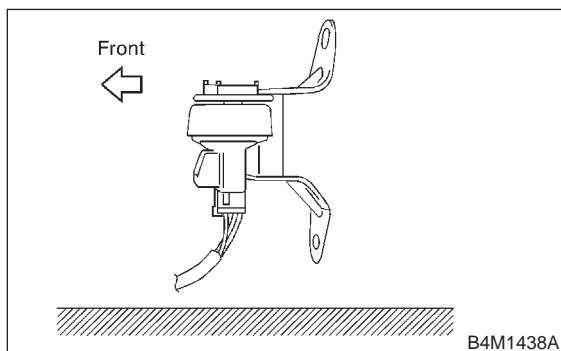
CHECK : Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?

YES : Go to step 10AH19.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AH19 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

B4M1438A

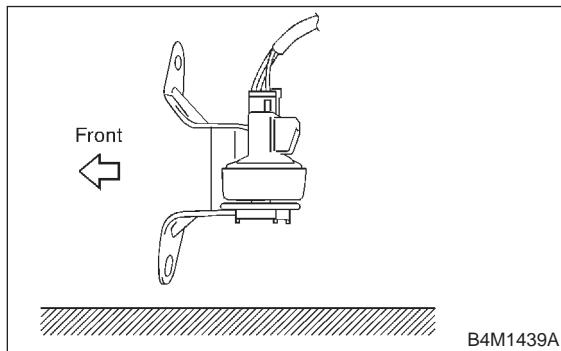
CHECK : Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?

YES : Go to step 10AH20.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AH20 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal**(R70) No. 2 (+) — No. 3 (-):**

B4M1439A

CHECK : Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?

YES : Go to step 10AH21.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AH21 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>

YES : Repair connector.

NO : Go to step 10AH22.

10AH22 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AH23.

10AH23 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AI: TROUBLE CODE 56 ABNORMAL G SENSOR HIGH μ OUTPUT — ABNORMAL G SENSOR HIGH μ OUTPUT —

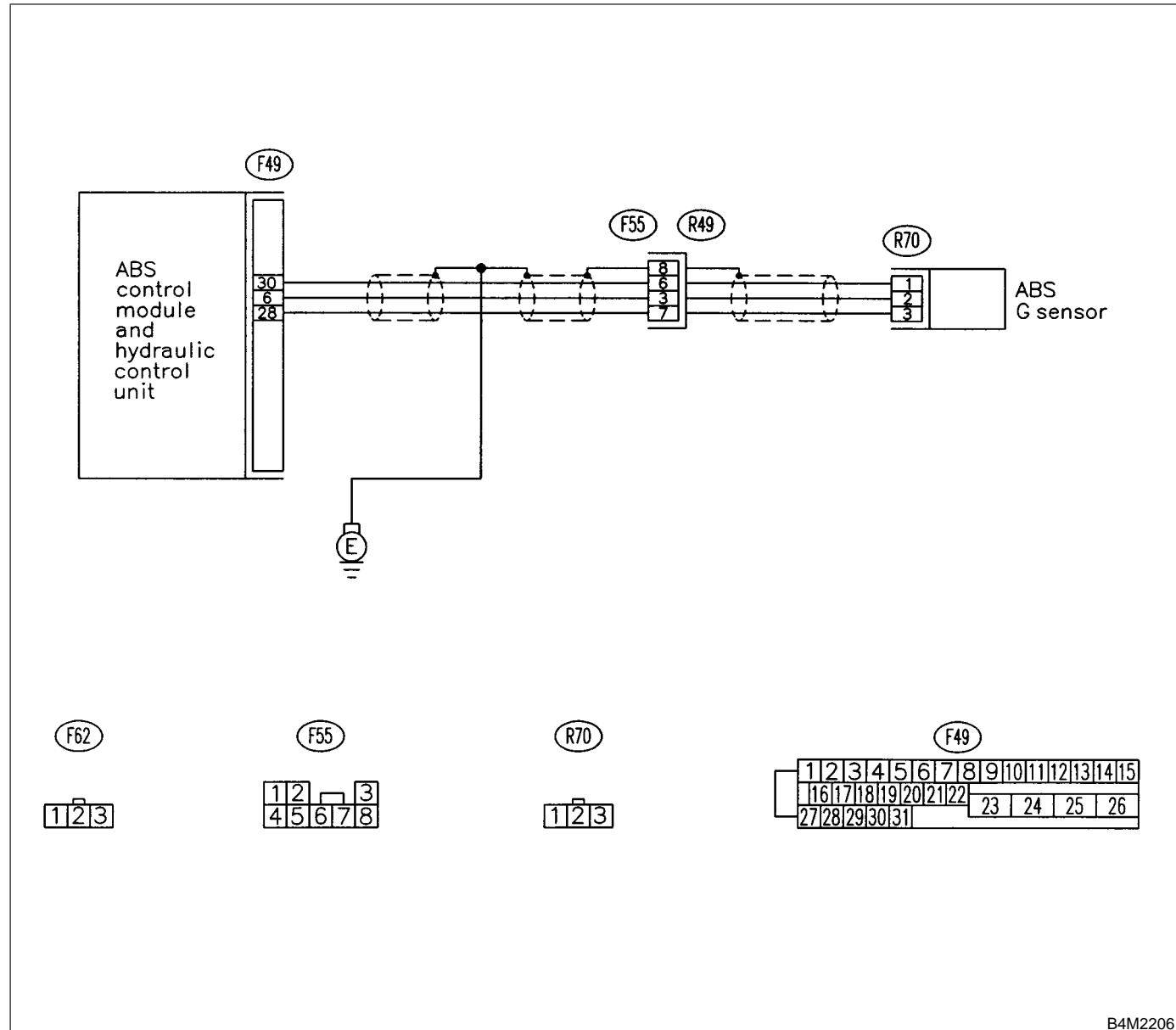
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



B4M2206

10AI1 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read G sensor output on the select monitor display.

CHECK : *Is the G sensor output on monitor display 2.3 ± 0.2 V when the G sensor is in horizontal position?*

YES : Go to step 10AI2.
NO : Go to step 10AI6.

10AI2 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.
NO : Go to step 10AI3.

10AI3 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>
NO : Go to step 10AI4.

10AI4 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

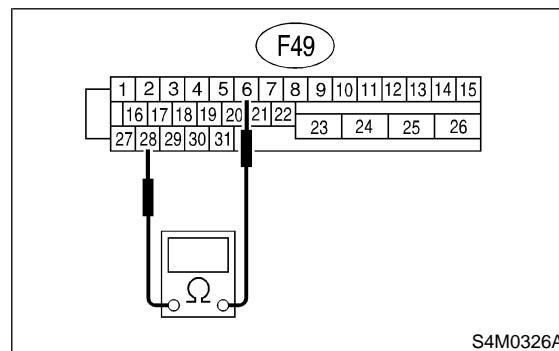
CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.
NO : A temporary poor contact.

10AI5 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal
(F49) No. 6 — No. 28:



S4M0326A

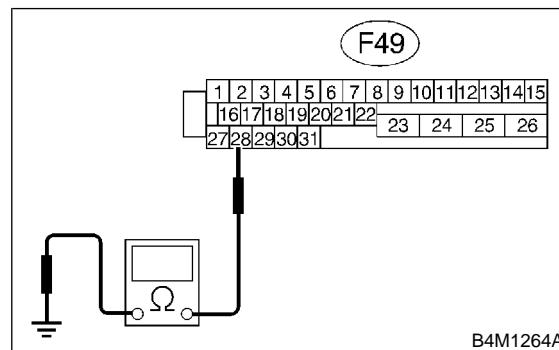
CHECK : *Is the resistance between 4.3 and 4.9 kΩ?*

YES : Go to step 10AI6.
NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AI6 : CHECK GROUND SHORT OF HARNESS.

Measure resistance between ABSCM&H/U connector and chassis ground.

Connector & terminal
(F49) No. 28 — Chassis ground:



B4M1264A

CHECK : *Is the resistance more than 1 MΩ?*

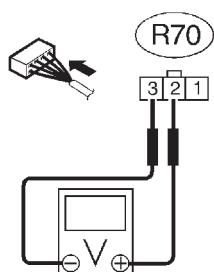
YES : Go to step 10AI7.
NO : Repair harness between G sensor and ABSCM&H/U.
 Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

10AI7 : CHECK G SENSOR.

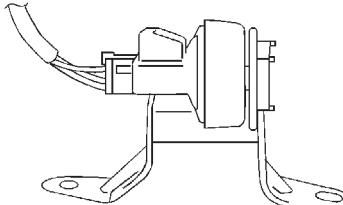
- 1) Remove console box.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Connect connector to ABSCM&H/U.
- 5) Turn ignition switch to ON.
- 6) Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



S4M0074F



B4M1437

CHECK : Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?

YES : Go to step 10AI8.

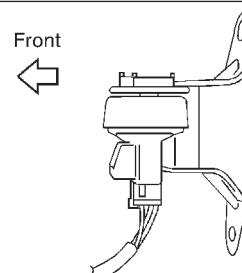
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AI8 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



B4M1438A

CHECK : Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?

YES : Go to step 10AI9.

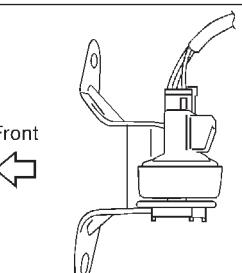
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AI9 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



B4M1439A

CHECK : Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?

YES : Go to step 10AI10.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AI10 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AI11.

10AI11 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : *Are other trouble codes being output?*

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

AJ: TROUBLE CODE 56 DETECTION OF G SENSOR STICK

— DETECTION OF G SENSOR STICK —

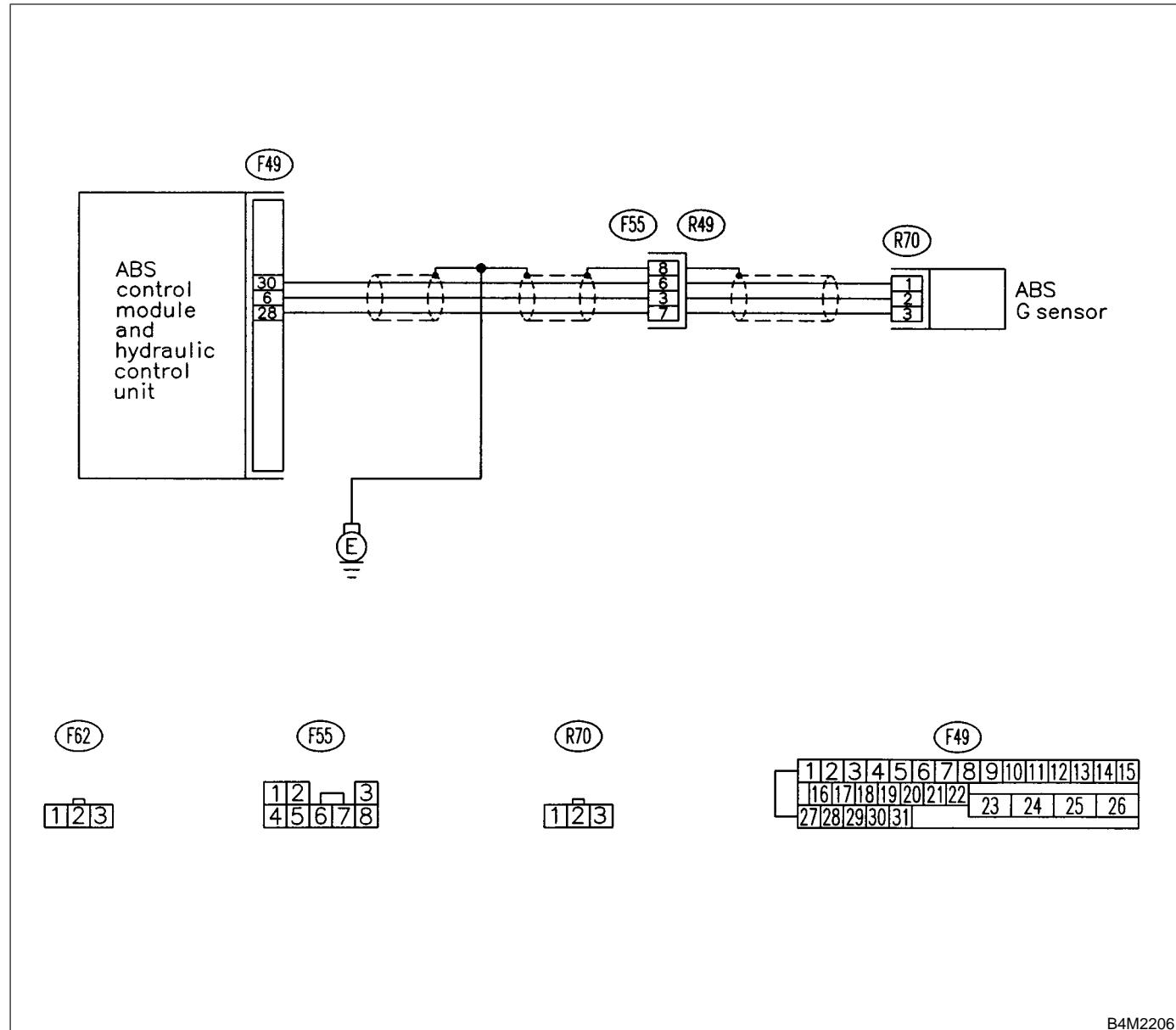
DIAGNOSIS:

- Faulty G sensor output voltage

TROUBLE SYMPTOM:

- ABS does not operate.

WIRING DIAGRAM:



B4M2206

10AJ1 : CHECK ALL FOUR WHEELS FOR FREE TURNING.

CHECK : *Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?*

YES : The ABS is normal. Erase the trouble code.

NO : Go to step 10AJ2.

10AJ2 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Select "Current data display & Save" on the select monitor.
- 2) Read the select monitor display.

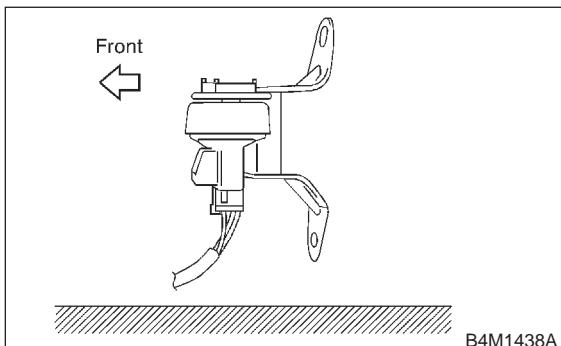
CHECK : *Is the G sensor output on the monitor display between 2.1 and 2.5 V when the vehicle is in horizontal position?*

YES : Go to step 10AJ3.

NO : Go to step 10AJ8.

10AJ3 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

- 1) Turn ignition switch to OFF.
- 2) Remove console box.
- 3) Remove G sensor from vehicle. (Do not disconnect connector.)
- 4) Turn ignition switch to ON.
- 5) Select "Current data display & Save" on the select monitor.
- 6) Read the select monitor display.



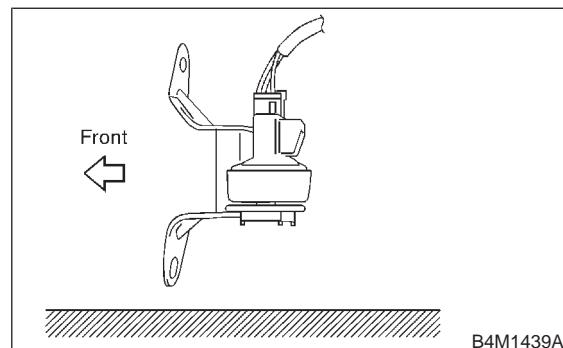
CHECK : *Is the G sensor output on the monitor display between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?*

YES : Go to step 10AJ4.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AJ4 : CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.

Read the select monitor display.



CHECK : *Is the G sensor output on the monitor display between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?*

YES : Go to step 10AJ5.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AJ5 : CHECK POOR CONTACT IN CONNECTORS.

Turn ignition switch to OFF.

CHECK : *Is there poor contact in connector between ABSCM&H/U and G sensor? <Ref. to FOREWORD [W3C1].>*

YES : Repair connector.

NO : Go to step 10AJ6.

10AJ6 : CHECK ABSCM&H/U.

- 1) Connect all connectors.
- 2) Erase the memory.
- 3) Perform inspection mode.
- 4) Read out the trouble code.

CHECK : *Is the same trouble code as in the current diagnosis still being output?*

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AJ7.

10AJ7 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

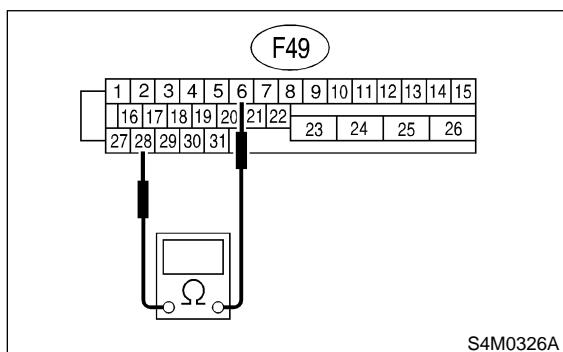
NO : A temporary poor contact.

10AJ8 : CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ABSCM&H/U.
- 3) Measure resistance between ABSCM&H/U connector terminals.

Connector & terminal

(F49) No. 6 — No. 28:



CHECK : Is the resistance between 4.3 and 4.9 kΩ?

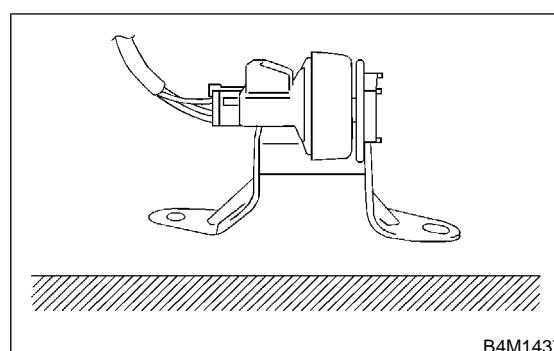
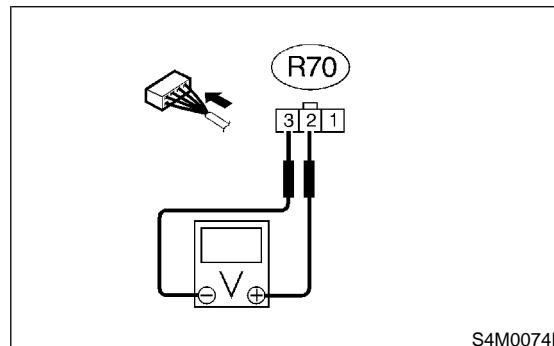
YES : Go to step 10AJ9.

NO : Repair harness/connector between G sensor and ABSCM&H/U.

10AJ9 : CHECK G SENSOR.

- 1) Remove console box.
- 2) Remove G sensor from vehicle.
- 3) Connect connector to G sensor.
- 4) Connect connector to ABSCM&H/U.
- 5) Turn ignition switch to ON.
- 6) Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?

YES : Go to step 10AJ10.

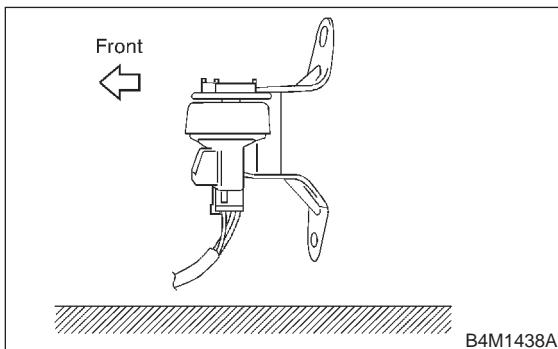
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AJ10 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?

YES : Go to step 10AJ11.

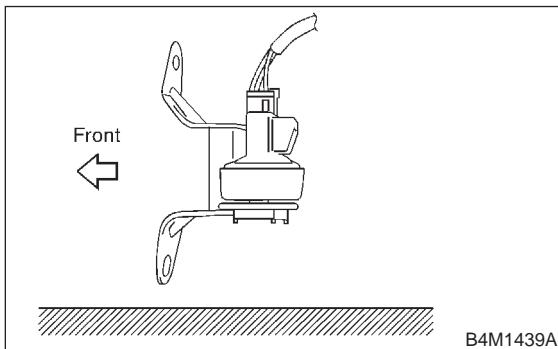
NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AJ11 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal

(R70) No. 2 (+) — No. 3 (-):



CHECK : Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?

YES : Go to step 10AJ12.

NO : Replace G sensor. <Ref. to 4-4 [W16A0].>

10AJ12 : CHECK ABSCM&H/U.

- 1) Turn ignition switch to OFF.
- 2) Connect all connectors.
- 3) Erase the memory.
- 4) Perform inspection mode.
- 5) Read out the trouble code.

CHECK : Is the same trouble code as in the current diagnosis still being output?

YES : Replace ABSCM&H/U. <Ref. to 4-4 [W15A0].>

NO : Go to step 10AJ13.

10AJ13 : CHECK ANY OTHER TROUBLE CODES APPEARANCE.

CHECK : Are other trouble codes being output?

YES : Proceed with the diagnosis corresponding to the trouble code.

NO : A temporary poor contact.

11. General Diagnostics Table

A: SYMPTOMS AND PROBABLE CAUSES

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (caliper & piston, pads) ● Wheel alignment ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections ● Road surface (uneven, camber)
	Vehicle spins.	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (pads) ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections
Poor braking	Long braking/stopping distance	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● Brake (pads) ● Air in brake line ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections
	Wheel locks.	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve, motor) ● ABS sensor ● Incorrect wiring or piping connections
	Brake dragging	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Master cylinder ● Brake (caliper & piston) ● Parking brake ● Axle & wheels ● Brake pedal play
	Long brake pedal stroke	<ul style="list-style-type: none"> ● Air in brake line ● Brake pedal play
	Vehicle pitching	<ul style="list-style-type: none"> ● Suspension play or fatigue (reduced damping) ● Incorrect wiring or piping connections ● Road surface (uneven)
	Unstable or uneven braking	<ul style="list-style-type: none"> ● ABSCM&H/U (solenoid valve) ● ABS sensor ● Brake (caliper & piston, pads) ● Tire specifications, tire wear and air pressures ● Incorrect wiring or piping connections ● Road surface (uneven)
Vibration and/or noise (while driving on slippery roads)	Excessive pedal vibration	<ul style="list-style-type: none"> ● Incorrect wiring or piping connections ● Road surface (uneven)
	Noise from ABSCM&H/U	<ul style="list-style-type: none"> ● ABSCM&H/U (mount bushing) ● ABS sensor ● Brake piping
	Noise from front of vehicle	<ul style="list-style-type: none"> ● ABSCM&H/U (mount bushing) ● ABS sensor ● Master cylinder ● Brake (caliper & piston, pads, rotor) ● Brake piping ● Brake booster & check valve ● Suspension play or fatigue
	Noise from rear of vehicle	<ul style="list-style-type: none"> ● ABS sensor ● Brake (caliper & piston, pads, rotor) ● Parking brake ● Brake piping ● Suspension play or fatigue

B: CHECKING THE HYDRAULIC UNIT OPERATION

11B1 : PREPARING THE BRAKE TESTER.

-  : ***Is the brake tester available?***
-  : CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER. <Ref. to 4-4 [W15D2].>
-  : CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE. <Ref. to 4-4 [W15D1].>

MEMO: