CHASSIS SECTION

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

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

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

FUJI HEAVY INDUSTRIES LTD.

G8050GE5

FRONT SUSPENSION

FS

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1. General Description S202001

A: SPECIFICATIONS S202001E49

1. STABILIZER S202001E4901

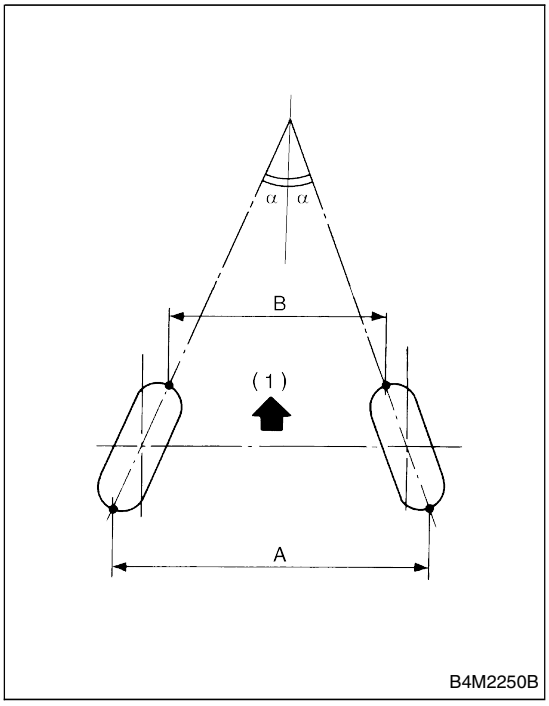
Model	Bar dia.	
	Front	Rear
NON-TURBO	19 mm (0.75 in)	13 mm (0.51 in)
TURBO	20 mm (0.79 in)	15 mm (0.59 in)

2. WHEEL ALIGNMENT S202001E4902

Model	NON-TURBO	TURBO
Camber (tolerance: ±0°30′)	–0°15′	–0°20′
Caster (common difference: ±0°45′)	–0°37′	–0°57′
Toe-in	0±3 mm (0±0.12 in)* Each toe angle: ±0°09′	
Kingpin angle	13°25′	13°40′
Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)	432 mm (17.01 in)	422 mm (16.61 in)

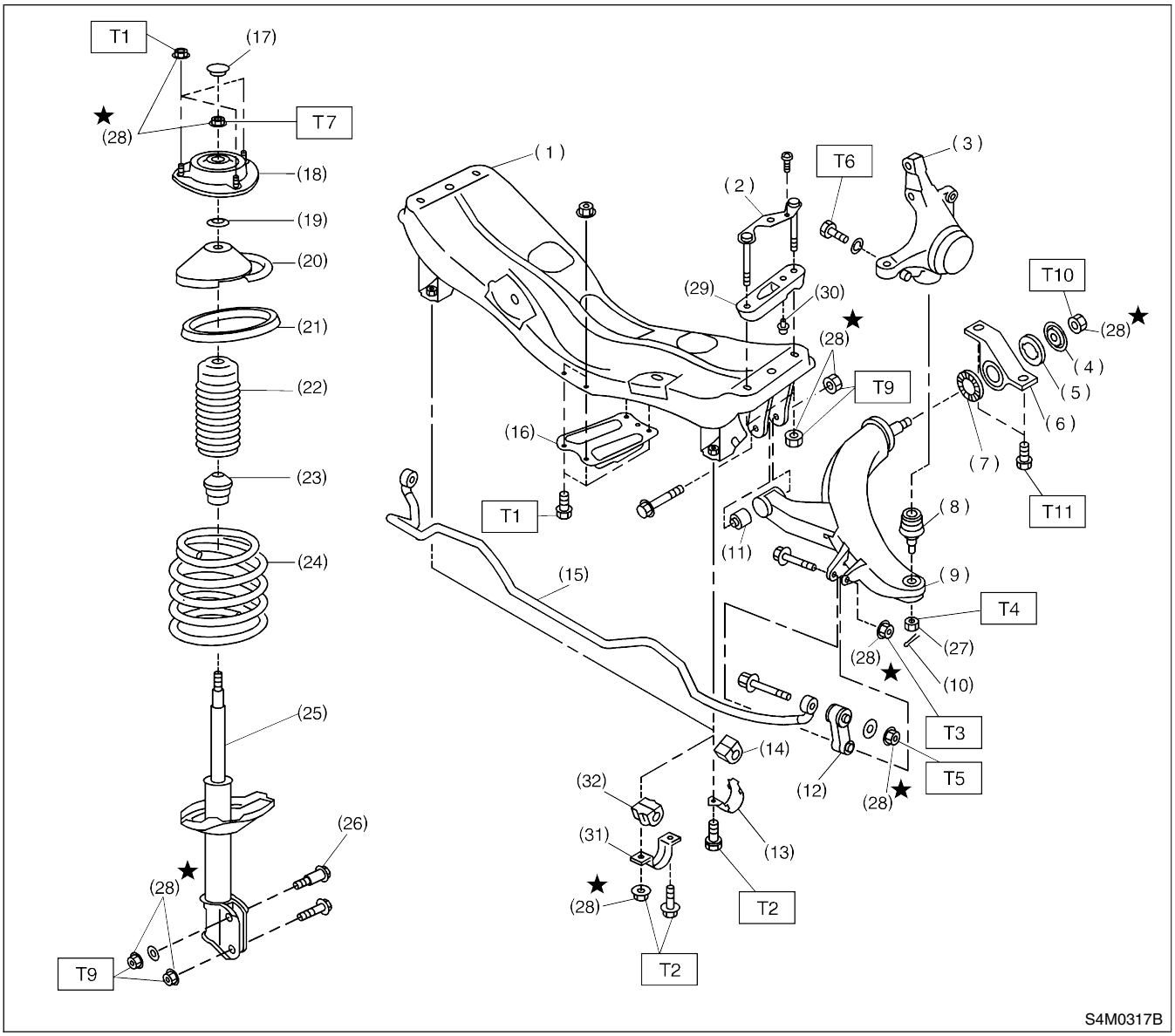
*: When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.

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.



(1) Front
A – B = Positive: Toe-in, Negative: Toe-out
α = Each toe angle

B: COMPONENT S202001A05



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

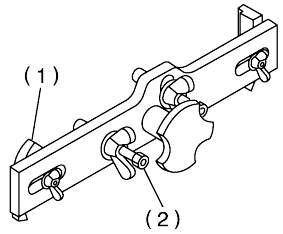
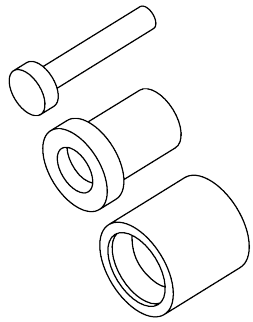
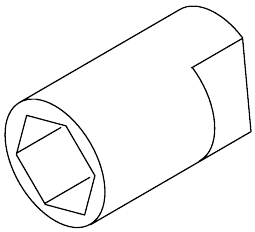
Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 25 (2.5, 18.1)
T3: 30 (3.1, 22)
T4: 40 (4.1, 30)
T5: 45 (4.6, 33)
T6: 50 (5.1, 37)
T7: 55 (5.6, 41)
T8: 100 (10.2, 74)
T9: 175 (17.8, 129)
T10: 190 (19.4, 140)
T11: 245 (25.0, 181)

C: CAUTION S202001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL S202001A17

1. SPECIAL TOOLS S202001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2378A	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 B4M2385	927680000	INSTALLER & REMOVER SET	Used for replacing transverse link bushing.
 B4M2384	927760000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut and shock mount.

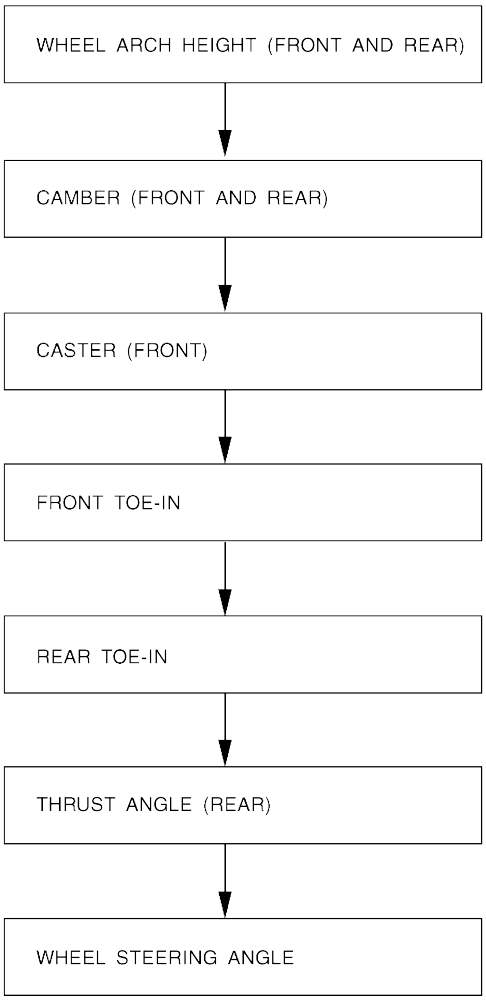
2. GENERAL PURPOSE TOOLS S202001A1702

TOOL NAME	REMARKS
Alignment Gauge	Used for wheel alignment measurement.
Turning Radius Gauge	Used for wheel alignment measurement.
Toe-in Gauge	Used for toe-in measurement.
Dial Gauge	Used for damper strut measurement.

2. Wheel Alignment S202116

A: INSPECTION S202116A10

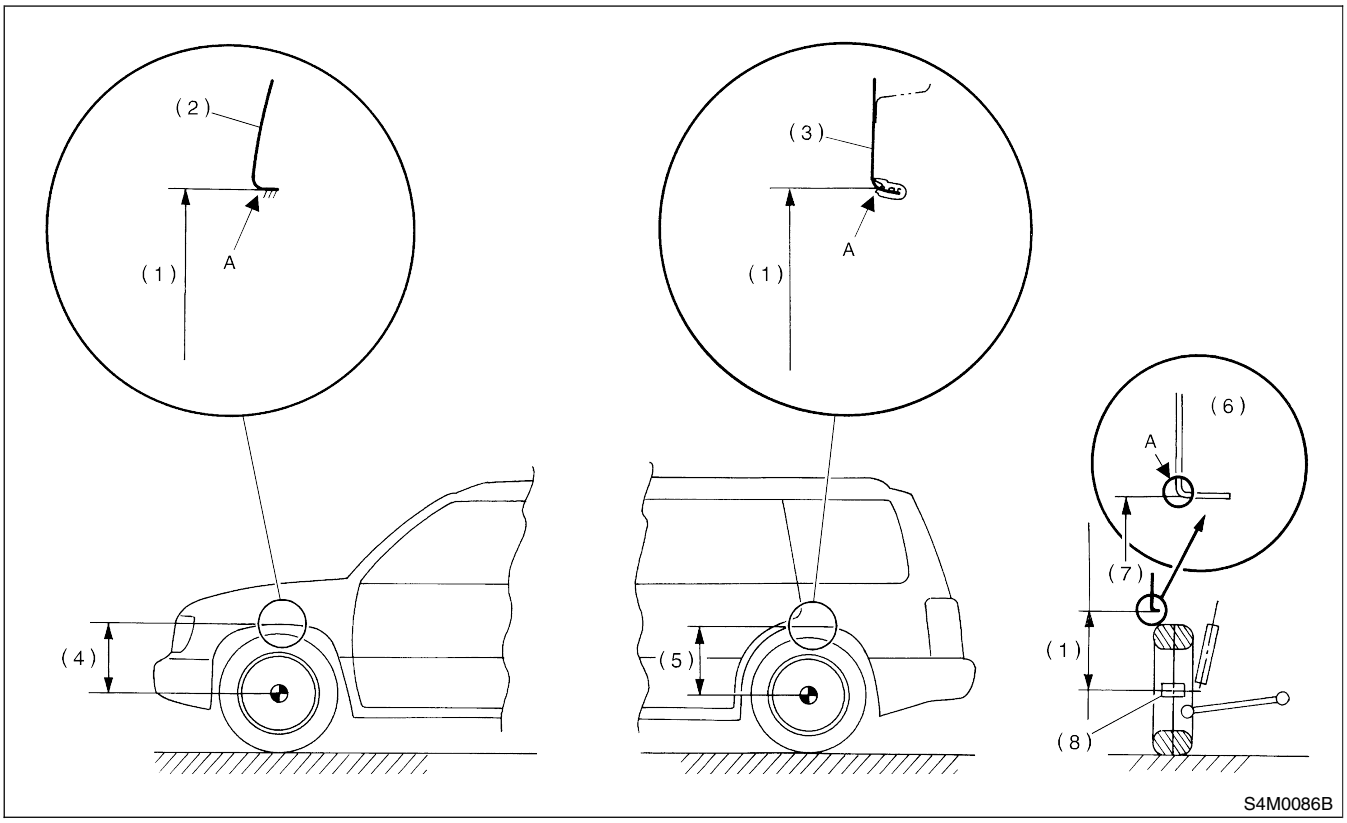
Check, adjust and/or measure wheel alignment in accordance with procedures indicated in figure:



B4M1088A

1. WHEEL ARCH HEIGHT S202116A1006

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.



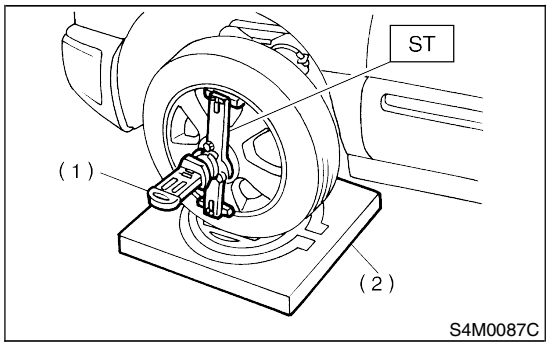
(1) Wheel arch height
(2) Front fender
(3) Outer rear quarter
(4) Front wheel arch height
(5) Rear wheel arch height
(6) Cross-section of arch
(7) Measuring point
(8) End of spindle

Model	Specified wheel arch height	
	Front	Rear
Non-Turbo	$432^{+12}/_{-24}$ mm ($17.01^{+0.47}/_{-0.94}$ in)	$435^{+12}/_{-24}$ mm ($17.13^{+0.47}/_{-0.94}$ in)
Turbo	$422^{+12}/_{-24}$ mm ($16.61^{+0.47}/_{-0.94}$ in)	$425^{+12}/_{-24}$ mm ($16.73^{+0.47}/_{-0.94}$ in)

2. CAMBER S202116A1002

● 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.
ST 927380002 ADAPTER



(1) Alignment gauge
(2) Turning radius gauge

NOTE:
Refer to the “SPECIFICATIONS” for the camber values.
Front
<Ref. to FS-2, SPECIFICATIONS, General Description.>
Rear
<Ref. to RS-2, SPECIFICATIONS, General Description.>

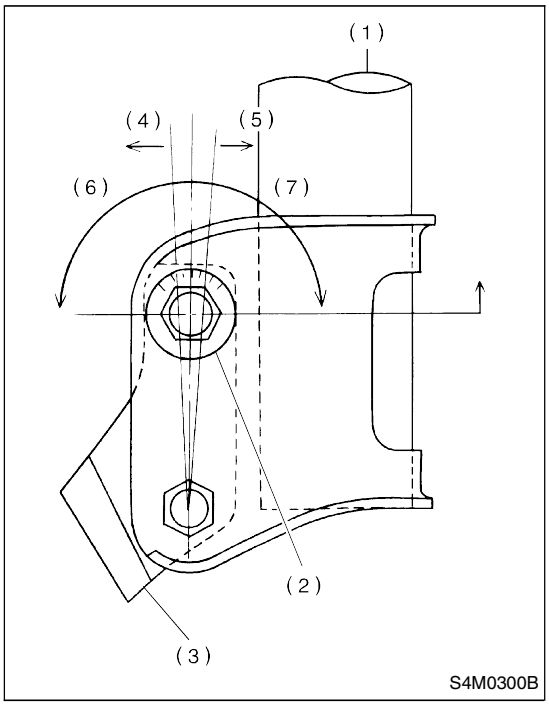
● Front Camber Adjustment

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

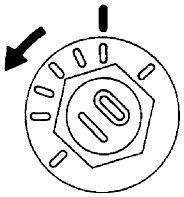
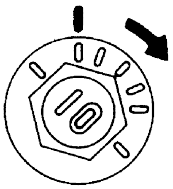
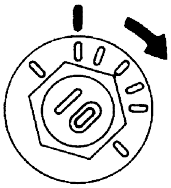
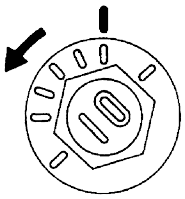
CAUTION:
● When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.
● When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.

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°10′.



(1) Strut
(2) Adjusting bolt
(3) Housing
(4) Outer
(5) Inner
(6) Camber is increased.
(7) Camber is decreased.

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

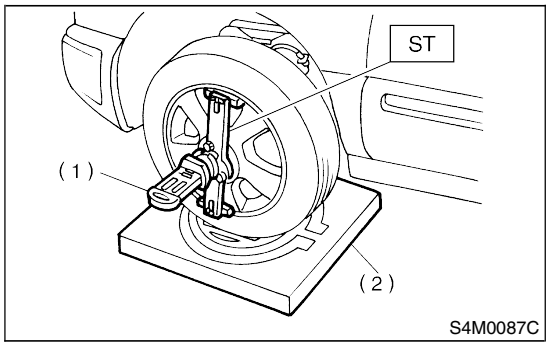
3) Tighten the two self-locking nuts.

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

3. CASTER S202116A1003

• 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.
ST 927380002 ADAPTER



(1) Alignment gauge
(2) Turning radius gauge

NOTE:
Refer to the “SPECIFICATIONS” for the caster values. <Ref. to FS-2 SPECIFICATIONS, General Description.>

4. FRONT WHEEL TOE-IN S202116A1004

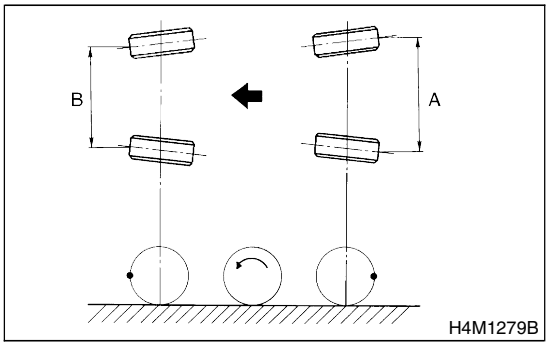
• Inspection

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

Toe-in:
0±3 mm (0±0.12 in)

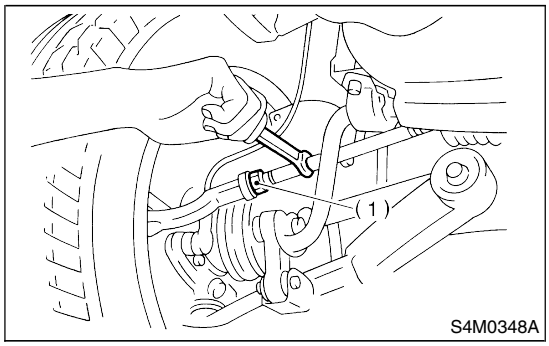
2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance “A” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.
4) Measure distance “B” between left and right marks. Toe-in can then be obtained by the following equation:

A – B = 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).



(1) Lock nut

3) Tighten tie-rod lock nut.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-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 *S202116A1007*

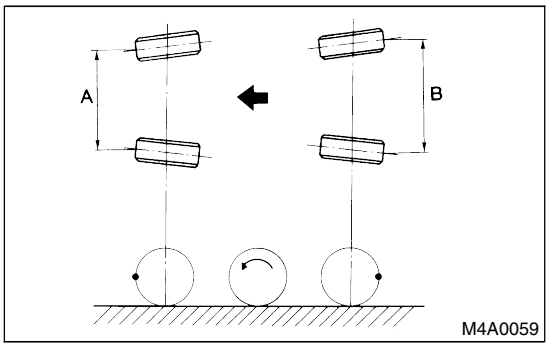
● Inspection

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

Toe-in: 2±3 mm (0.08±0.12 in)

2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance “B” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.
4) Measure distance “A” between left and right marks. Toe-in can then be obtained by the following equation:

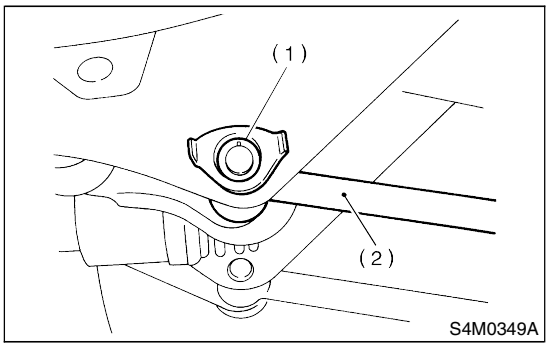
B – A = Toe-in



● Adjustment

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

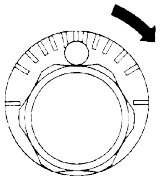
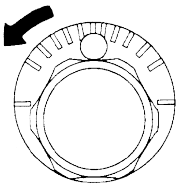
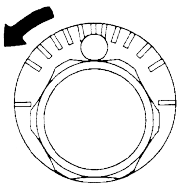
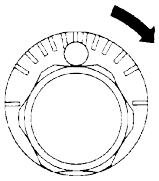
CAUTION:
● When loosening or tightening adjusting bolt, hold bolt head and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.
● When performing toe-in adjustment, align as close to 0 mm (0 in) as possible.



(1) Adjusting scale
(2) Rear lateral link

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

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).

	Left side	Right side
Toe-in is increased.	 Rotate clockwise. B4M0192	 Rotate counter-clockwise. B4M0352
Toe-in is decreased.	 Rotate counter-clockwise. B4M0352	 Rotate clockwise. B4M0192

3) Tighten self-locking nut.

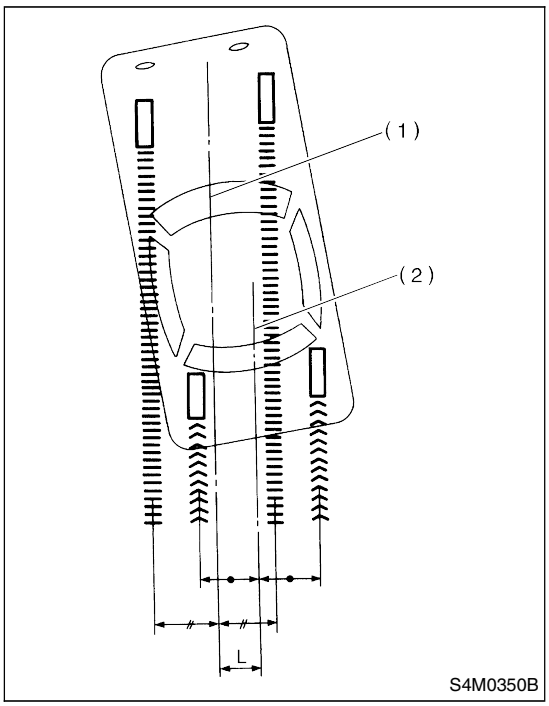
Tightening torque:
100 N·m (10.2 kgf-m, 74 ft-lb)

6. THRUST ANGLE S202116A1008

• 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 20′ when “L” is equal to or less than 15 mm (0.59 in).

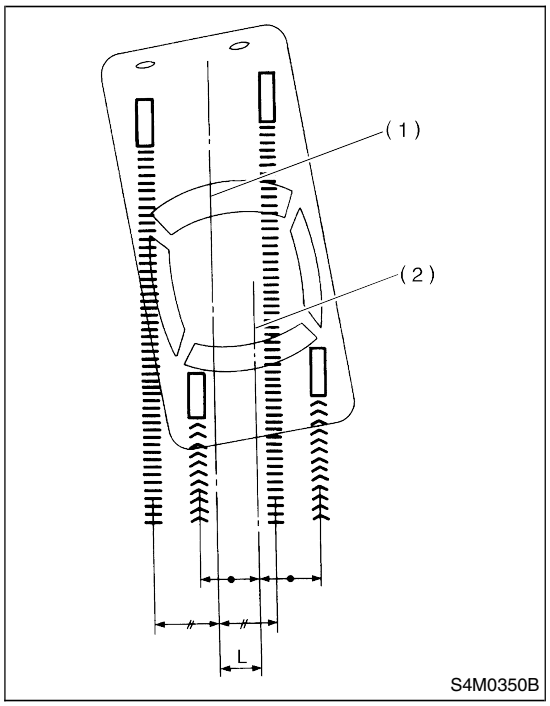


(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

● Adjustment

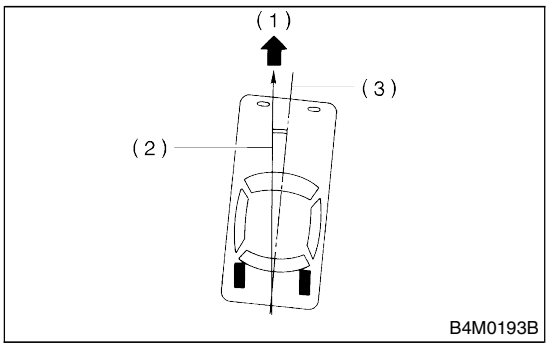
1) Make thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.
2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make thrust angle adjustment.
3) When left and right adjusting 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°±20′



(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

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.

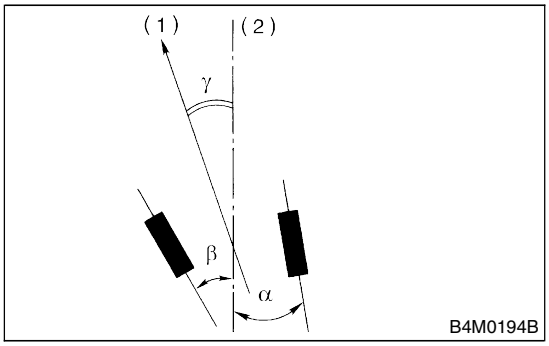


(1) Front
(2) Thrust angle
(3) Body center line

Thrust angle: r = (α – β)/2

α: Right rear wheel toe-in angle
β: Left rear wheel toe-in angle

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



(1) Front
(2) Body center line

7. STEERING ANGLE S202116A1005

● Inspection

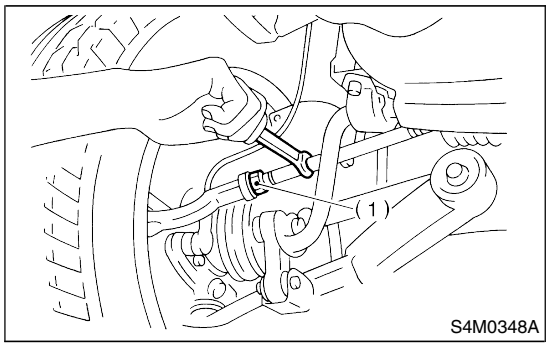
1) Place vehicle on a turning radius gauge.
2) While depressing brake pedal, turn steering wheel fully to the left and right. With steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

Steering angle:
Inner wheel
34.4°±1.5°
Outer wheel
30.2°±1.5°

● Adjustment

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

CAUTION:
- **Check toe-in.**
- **Correct boot if it is twisted.**

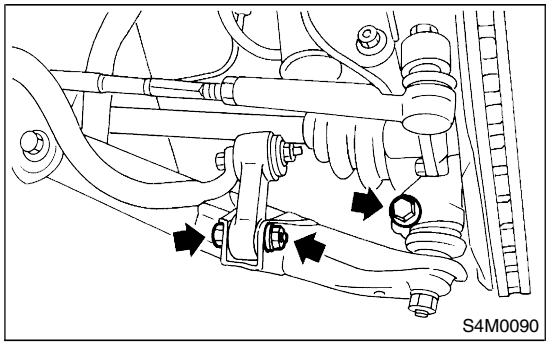


(1) Lock nut

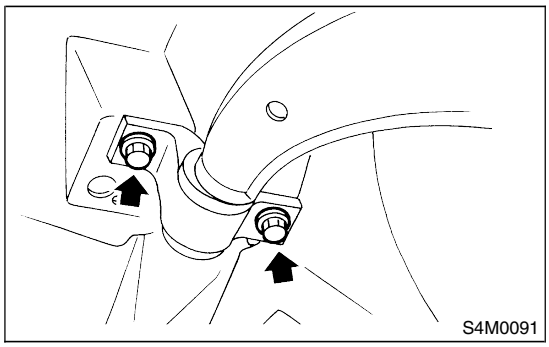
3. Front Transverse Link S202113

A: REMOVAL S202113A18

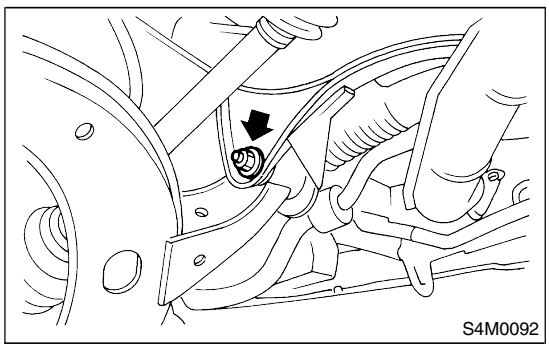
1) Set the vehicle on the lift.
2) Disconnect ground terminal from the battery.
3) Lift-up the vehicle and remove the wheel.
4) Disconnect stabilizer link from transverse link.
5) Remove bolt securing ball joint of transverse link to housing.


S4M0090

6) Remove nut (do not remove bolt.) securing transverse link to crossmember.
7) Remove two bolts securing bushing bracket of transverse link to vehicle body at rear bushing location.


S4M0091

8) Extract ball joint from housing.
9) Remove bolt securing transverse link to crossmember and extract transverse link from crossmember.


S4M0092

B: INSTALLATION S202113A11

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

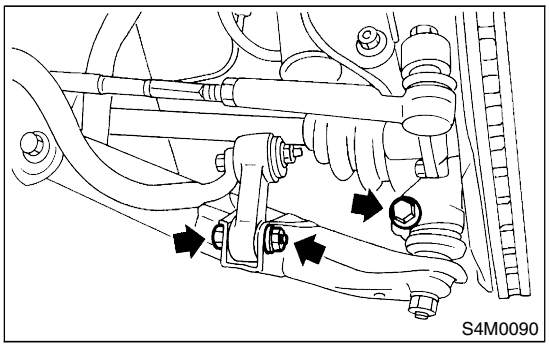
NOTE:
These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

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.


S4M0090

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:
30 N·m (3.1 kgf-m, 22 ft-lb)

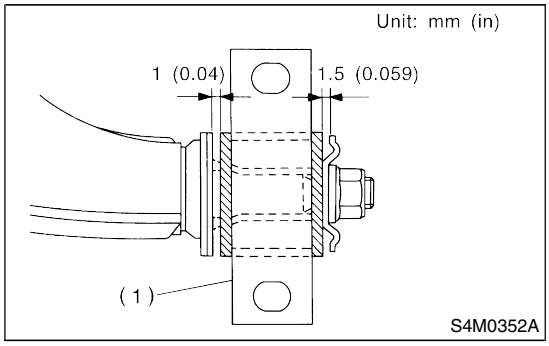
(2) Transverse link and crossmember

Tightening torque:
100 N·m (10.2 kgf-m, 74 ft-lb)

(3) Transverse link rear bushing and body

Tightening torque:
245 N·m (25 kgf-m, 181 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.

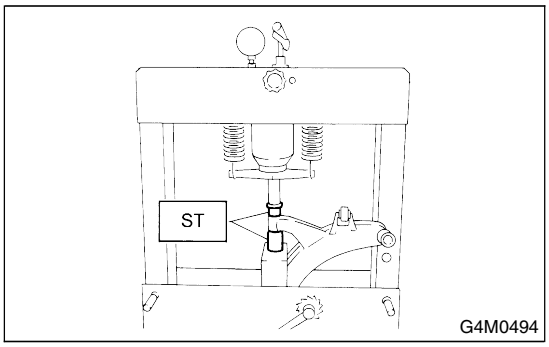


(1) Rear bushing

C: DISASSEMBLY S202113A06

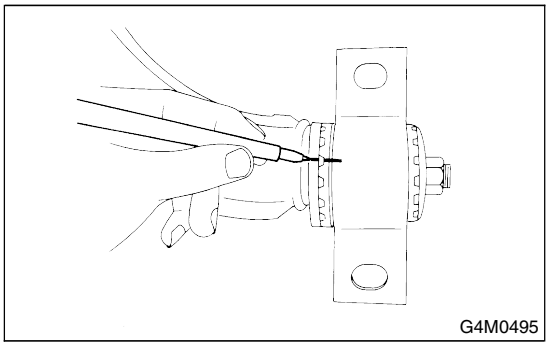
1. FRONT BUSHING S202113A0601

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



2. REAR BUSHING S202113A0602

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

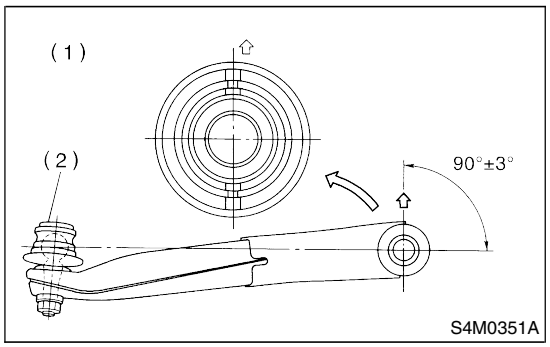


D: ASSEMBLY S202113A02

1. FRONT BUSHING S202113A0201

To reassemble, reverse disassembly procedures.

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



(1) Face bushing toward center of ball joint
(2) Ball joint

2. REAR BUSHING S202113A0202

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:
190 N·m (19.4 kgf-m, 140 ft-lb)

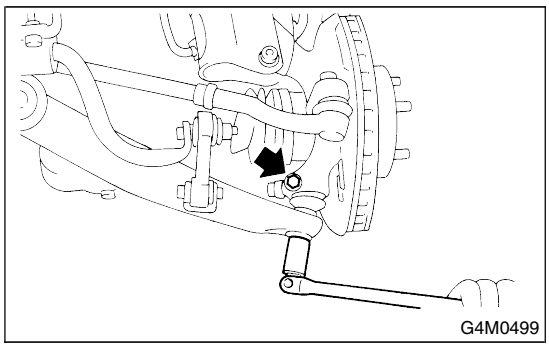
E: INSPECTION S202113A10

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.

4. Front Ball Joint S202114

A: REMOVAL S202114A18

1) Set the vehicle on the lift.
2) Disconnect ground terminal from the battery.
3) Lift-up the vehicle and remove the wheel.
4) Pull out the cotter pin from the ball stud, remove the castle nut, and extract the ball stud from the transverse link.
5) Remove the bolt securing the ball joint to the housing.


G4M0499

6) Extract the ball joint from the housing.

B: INSTALLATION S202114A11

1) Install ball joint onto housing.

Torque (Bolt):
50 N·m (5.1 kgf-m, 37 ft-lb)

CAUTION:
Do not apply grease to tapered portion of ball stud.

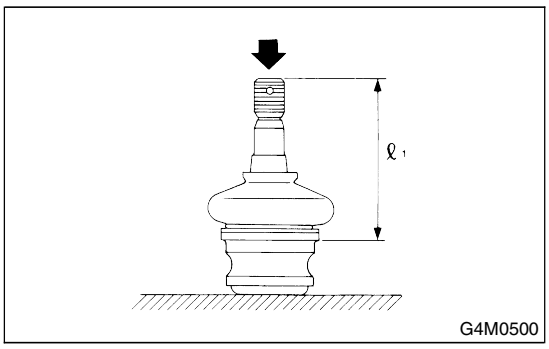
2) Connect ball joint to transverse link.

Torque (Castle nut):
40 N·m (4.1 kgf-m, 30 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.

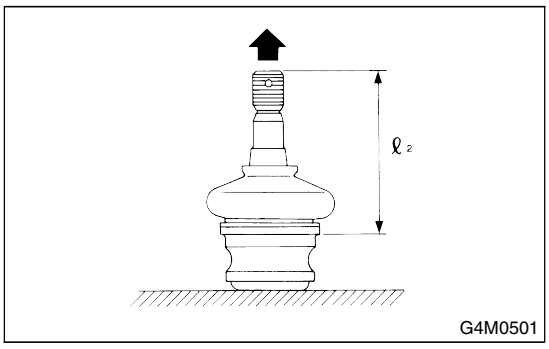
C: INSPECTION S202114A10

1) Measure play of ball joint by the following procedures. Replace with a new one when the play exceeds the specified value.
(1) With 690 N (70.4 kgf, 155 lb) loaded in the direction shown in the figure, measure dimension ℓ_1.



G4M0500

(2) With 690 N (70.4 kgf, 155 lb) loaded in the opposite direction shown in the figure, measure dimension ℓ_2.



G4M0501

(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)

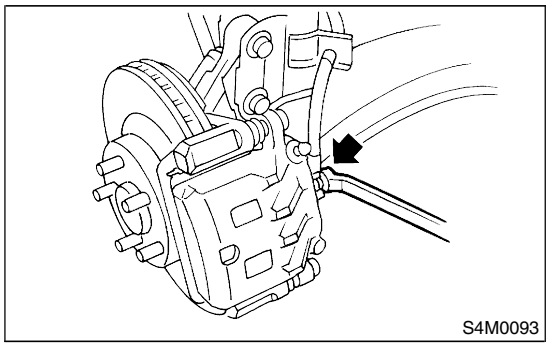
2) When play is smaller than the specified value, visually inspect the dust cover.
3) The ball joint and cover that have been removed must be checked for wear, damage or cracks, and any defective part must be replaced.
4) If the dust cover is damaged, replace with the new ball joint.

5. Front Strut S202115

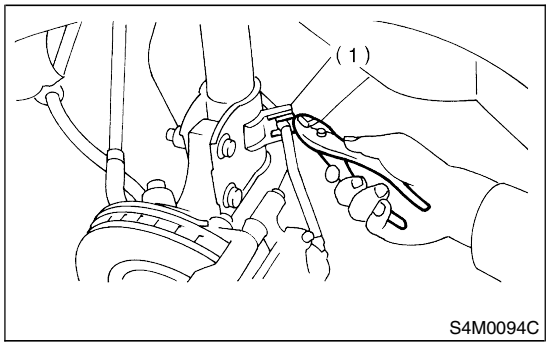
A: REMOVAL S202115A18

1) Set the vehicle on the lift.
2) Disconnect ground terminal from the battery.
3) Lift-up the vehicle and remove the wheel.
4) Depress brake pedal and hold it down using a wooden block etc.
5) Remove union bolts from caliper.

CAUTION:
Use brake hose cap to prevent brake fluid from escaping.


S4M0093

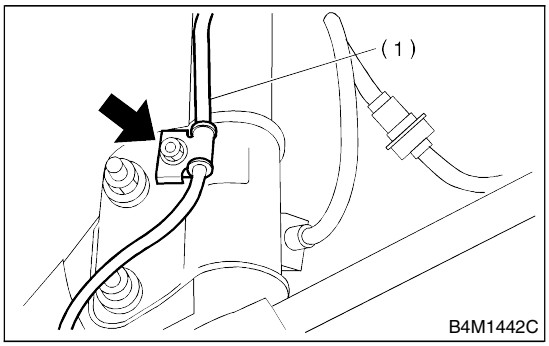
6) Remove brake hose clamp and disconnect brake hose from strut. Attach brake hose to body using gum tape.



S4M0094C

(1) Clamp

7) Scribe an alignment mark on the camber adjusting bolt which secures strut to housing.
8) Remove bolt securing the ABS sensor harness on models equipped with ABS.



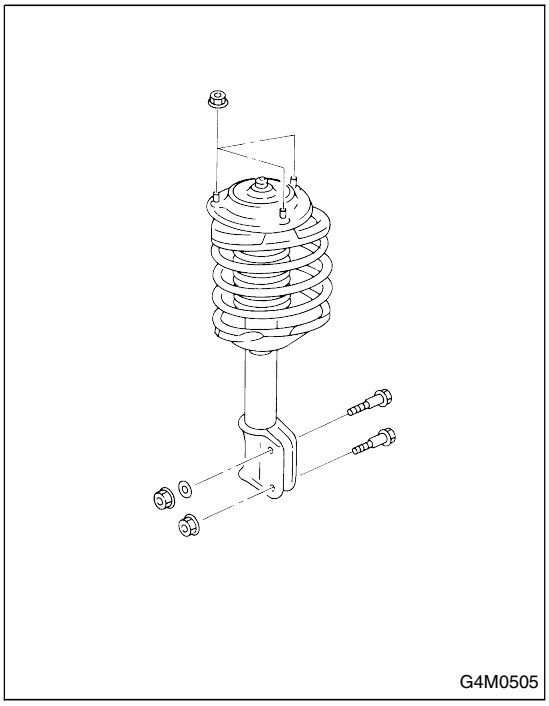
B4M1442C

(1) Sensor harness

9) Remove two bolts securing housing to strut.

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

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


G4M0505

B: INSTALLATION S202115A11

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

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

2) Install ABS sensor harness to strut. (ABS equipped models)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

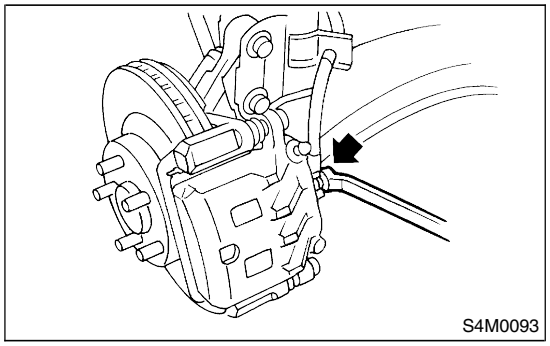
3) Position aligning mark on camber adjustment bolt with aligning mark on lower side of strut.

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

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

4) Install brake hose at lower side of strut with clamp.
5) Install union bolts which secure brake caliper to brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)


S4M0093

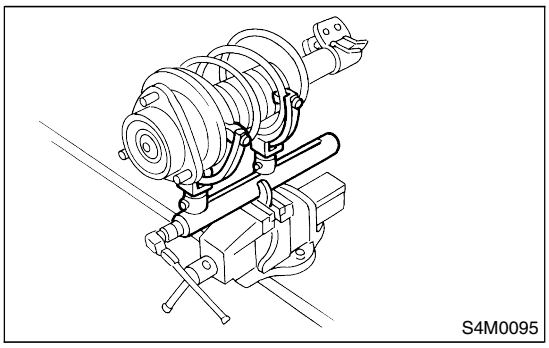
CAUTION:
Be sure to bleed air from brake system.

6) Install wheels.

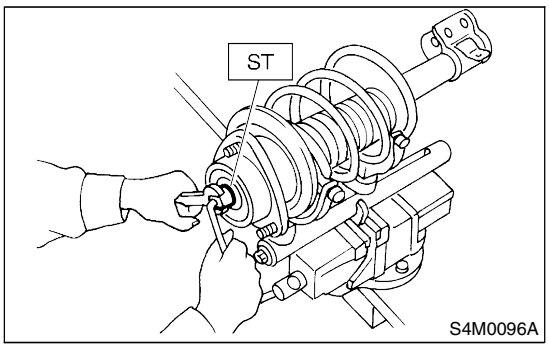
NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S202115A06

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


S4M0095

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



S4M0096A

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.

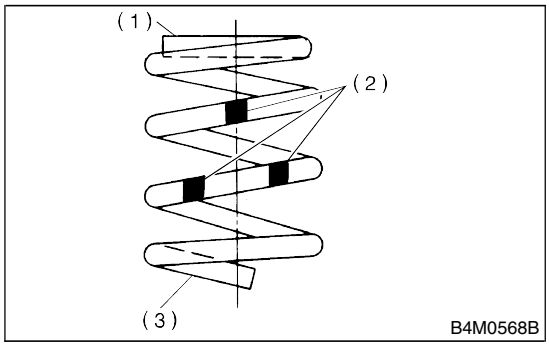
D: ASSEMBLY S202115A02

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”.

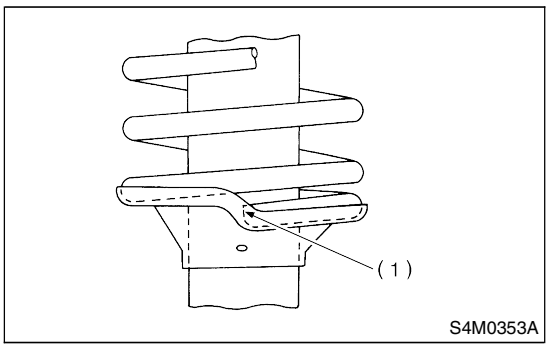
4) Using a coil spring compressor, compress the coil spring.

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



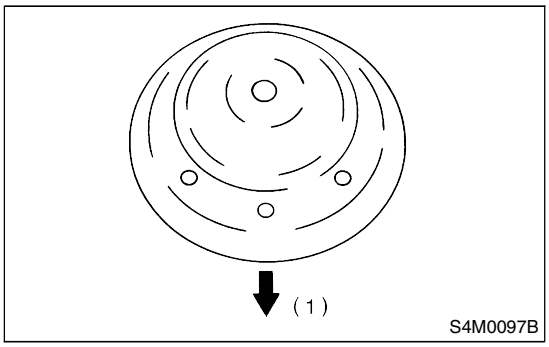
(1) Flat (top side)
(2) Identification paint
(3) Inclined (bottom side)

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.



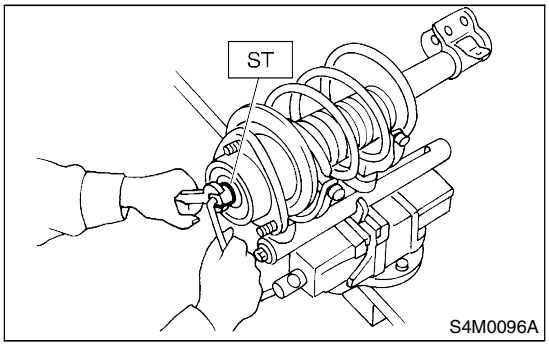
(1) Outside of body

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:
55 N·m (5.6 kgf-m, 41 ft-lb)



10) Loosen the coil spring carefully.

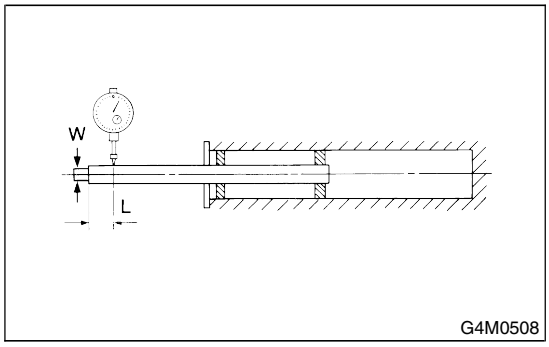
E: INSPECTION S202115A10

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

1. DAMPER STRUT S202115A1001

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 kgf, 4 lb)] to threaded portion. With the force of 20 N (2 kgf, 4 lb) applied, read dial gauge indication: P_1. Apply a force of 20 N (2 kgf, 4 lb) in the opposite direction of "W", then read dial gauge indication: P_2.



The free play is determined by the following equation:

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 S202115A1002

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

3. DUST COVER S202115A1003

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

4. COIL SPRING S202115A1004

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.

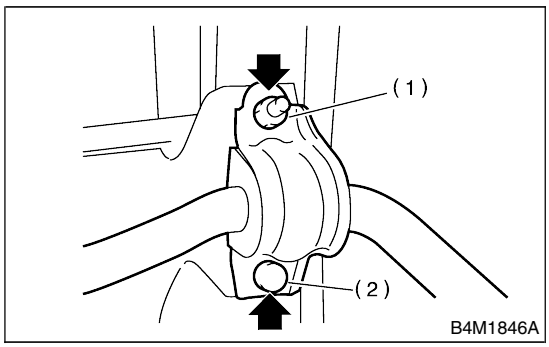
5. HELPER S202115A1005

Replace it with new one if cracked or damaged.

6. Front Stabilizer S202119

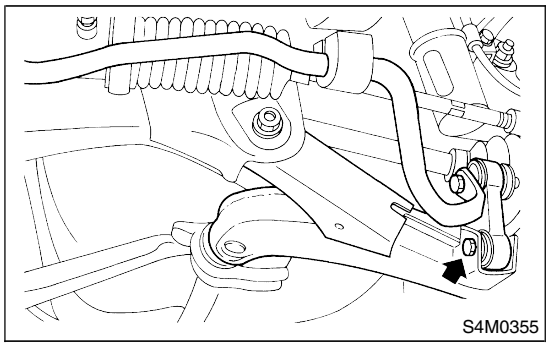
A: REMOVAL S202119A18

1) Set the vehicle on the lift.
2) Disconnect ground terminal from the battery.
3) Jack-up the front part of the vehicle and support it with safety stand (rigid racks).
4) Remove jack-up plate from lower part of crossmember.
5) Remove bolts which secure stabilizer to crossmember.



(1) Nut (Turbo model)
(2) Bolt

6) Remove bolts which secure stabilizer link to front transverse link.

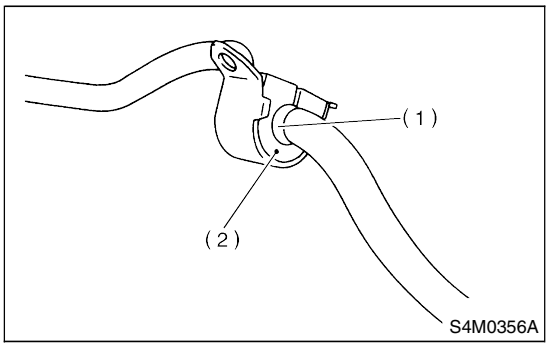


7) Remove front stabilizer.

B: INSTALLATION S202119A11

1) Install in the reverse order of removal.

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.



(1) Mark stamped on stabilizer
(2) Bushing identification color

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:
20 N·m (2.0 kgf-m, 14 ft-lb)
Stabilizer link to front transverse link:
30 N·m (3.1 kgf-m, 22 ft-lb)
Stabilizer to crossmember:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

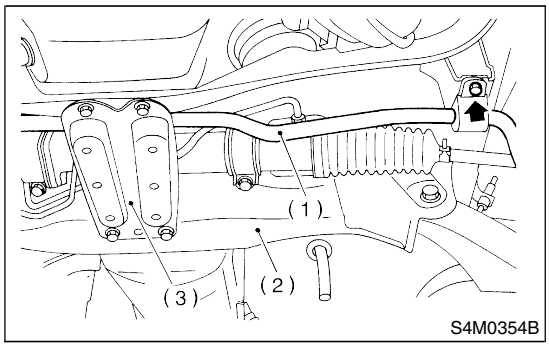
C: INSPECTION S202119A10

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.

7. Front Crossmember S202108

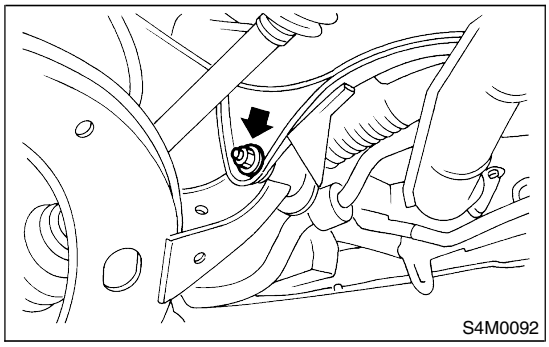
A: REMOVAL S202108A18

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



(1) Front stabilizer
(2) Front crossmember
(3) Jack-up plate

5) Disconnect tie-rod end from housing.
6) Remove front exhaust pipe. (Non-turbo model)
With OBD
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
7) Remove front transverse link from front crossmember and body.



8) Remove nuts attaching engine mount cushion rubber to crossmember.
9) Remove steering universal joint. <Ref. to PS-28, REMOVAL, Universal Joint.>
10) Disconnect power steering pipe from steering gear box.
11) Lift engine by approx. 10 mm (0.39 in) by using chain block.
12) Support crossmember with a jack, remove nuts securing crossmember to body and lower crossmember gradually along with steering gear-box.

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

B: INSTALLATION S202108A11

1) Install in the reverse order of removal.

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:
100 N·m (10.2 kgf-m, 74 ft-lb)
Stabilizer to bushing:
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Tie-rod end to housing:
27.0 N·m (2.75 kgf-m, 19.9 ft-lb)
Front cushion rubber to crossmember:
85 N·m (8.7 kgf-m, 63 ft-lb)
Universal joint to pinion shaft:
24 N·m (2.4 kgf-m, 17.4 ft-lb)
Crossmember to body:
100 N·m (10.2 kgf-m, 74 ft-lb)

2) Purge air from power steering system. <Ref. to PS-102, INSTALLATION, Power Steering Fluid.>

NOTE:
Check wheel alignment and adjust if necessary.

C: INSPECTION S202108A10

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

8. General Diagnostic Table S202121

A: INSPECTION S202121A10

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT S202121A1001

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.

2. POOR RIDE COMFORT S202121A1002

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.

3. NOISE S202121A1003

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.

REAR SUSPENSION

RS

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2. Wheel Alignment....7
3. Rear Stabilizer....8
4. Rear Trailing Link....9
5. Lateral link....12
6. Rear Strut....16
7. Rear Crossmember....20
8. General Diagnostic Table....21

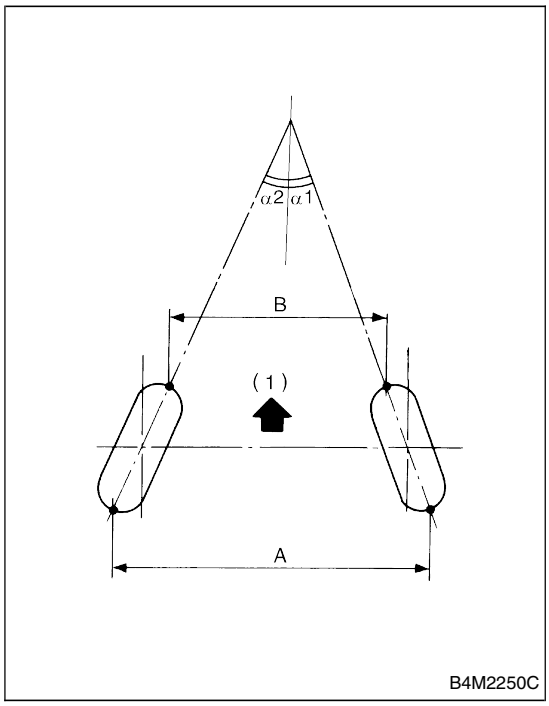
1. General Description S201001

A: SPECIFICATIONS S201001E49

Item	Non-turbo	Turbo
Camber (tolerance: ±0°45′)	–0°35′	–0°45′
Toe-in	2±3 mm (0.08±0.12 in)* Each toe-in angle: 0°06′±0°09′	
Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)]	435 mm (17.13 in)	425 mm (16.73 in)
Thrust angle	0°±20′	
Diameter of stabilizer	13 mm (0.51 in)	15 mm (0.59 in)

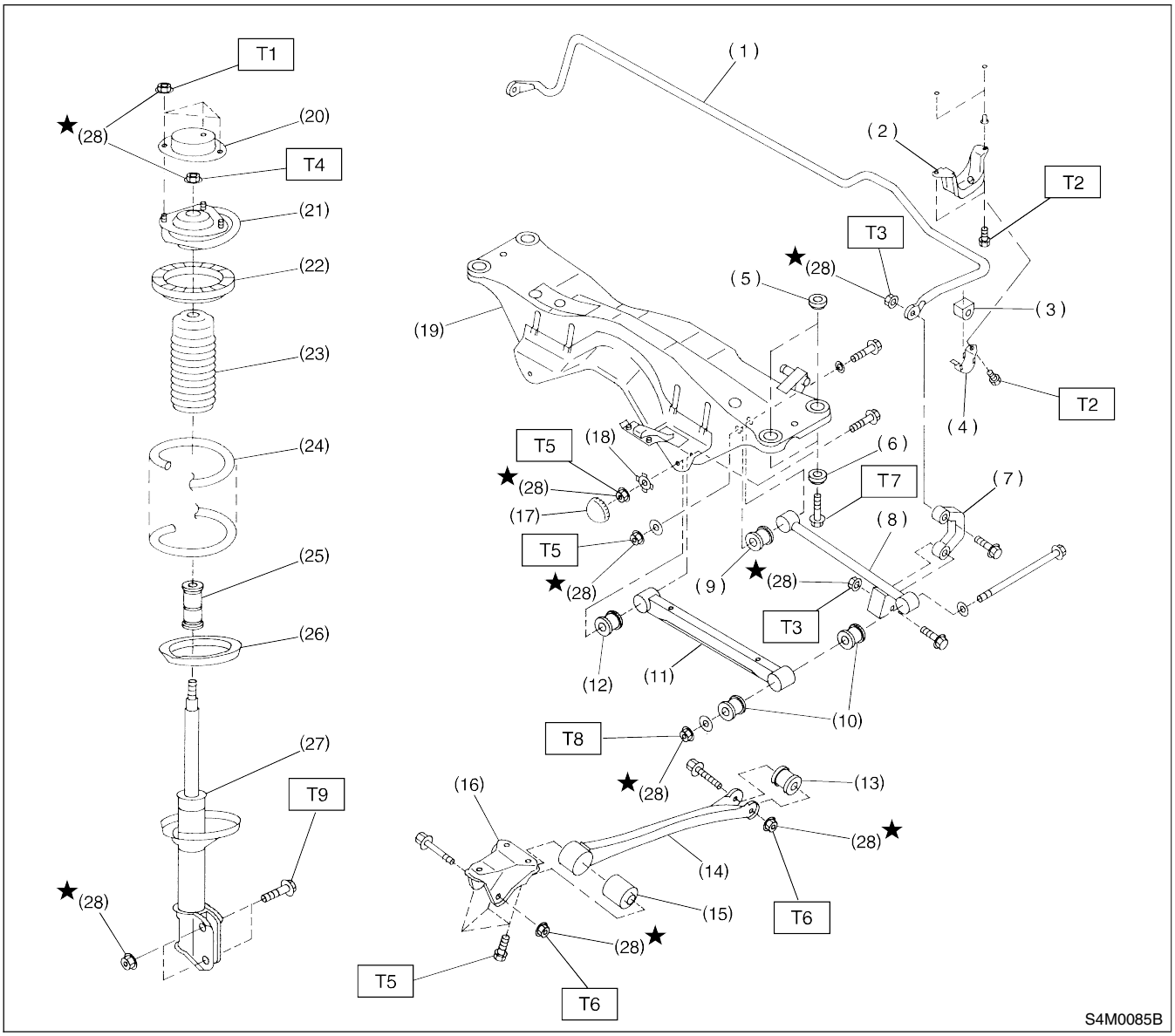
*: When performing toe-in adjustment, align as close to 2 mm (0.08 in) as possible.

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.



(1) Front
A – B = Positive: Toe-in, Negative: Toe-out
α1, α2: Each toe-in angle

B: COMPONENT S201001A05



(1) Stabilizer
(2) Stabilizer bracket
(3) Stabilizer bushing
(4) Clamp
(5) Floating bushing
(6) Stopper
(7) Stabilizer link
(8) Rear lateral link
(9) Bushing (C)
(10) Bushing (A)
(11) Front lateral link
(12) Bushing (B)
(13) Trailing link rear bushing
(14) Trailing link
(15) Trailing link front bushing
(16) Trailing link bracket
(17) Cap (Protection)
(18) Washer
(19) Rear crossmember
(20) Strut mount cap
(21) Strut mount
(22) Rubber seat upper
(23) Dust cover
(24) Coil spring
(25) Helper
(26) Rubber seat lower
(27) Damper strut
(28) Self-locking nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 25 (2.5, 18.1)
T3: 45 (4.6, 33)
T4: 60 (6.1, 44)
T5: 100 (10.2, 74)
T6: 115 (11.7, 85)
T7: 130 (13.3, 96)
T8: 140 (14.3, 103)
T9: 200 (20.4, 148)

C: CAUTION S201001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Before disposing shock absorbers, be sure to bleed gas completely. Also, do not throw away in fire.

D: PREPARATION TOOL S201001A17

1. SPECIAL TOOL S201001A1701

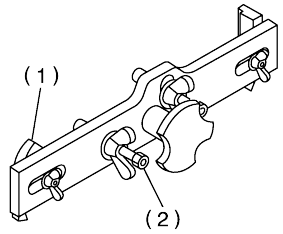
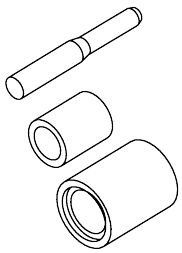
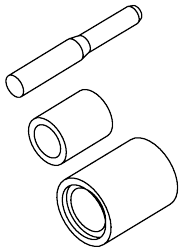
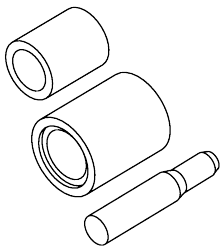
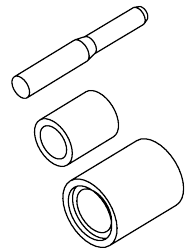
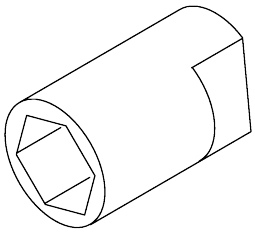
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2378A	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 H5M0979	927690000	INSTALLER & REMOVER SET	Used for replacing lateral link bushing (12 dia.).
 H5M0979	927700000	INSTALLER & REMOVER SET	Used for replacing lateral link bushing (14 dia.).
 H5M0980	927720000	INSTALLER & REMOVER SET	Used for replacing trailing link bushing.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H5M0979	927730000	INSTALLER & REMOVER SET	Used for replacing rear housing bushing.
 B4M2384	927760000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut mount.

2. GENERAL TOOL S201001A1704

TOOL NAME	REMARKS
Alignment Gauge	Used for wheel alignment measurement.
Turning Radius Gauge	Used for wheel alignment measurement.
Toe-in Gauge	Used for toe-in measurement.
Transmission Jack	Used for suspension assembly/disassembly.
Bearing Puller	Used for removing bushings.

2. Wheel Alignment S201116

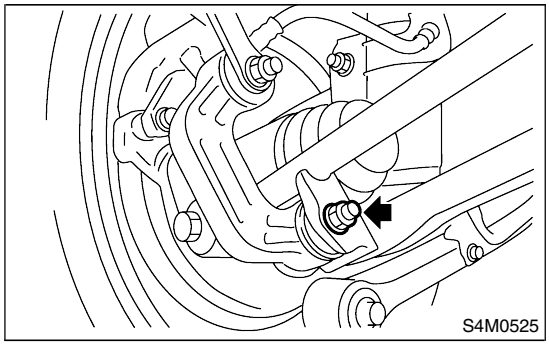
A: INSPECTION S201116A10

NOTE:
The front and rear wheel alignment must be measured and/or adjusted at once to obtain accuracy. Measure and/or adjust the rear wheel alignment together with the front. Follow the procedure in “FS” section “Wheel Alignment” for measurement and/or adjustment of wheel alignment. <Ref. FS-6, INSPECTION, Wheel Alignment.>

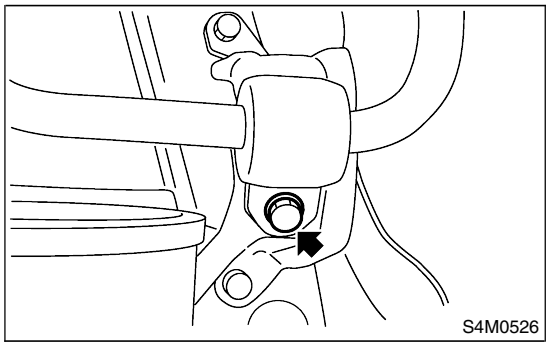
3. Rear Stabilizer S201118

A: REMOVAL S201118A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Jack-up the rear part of the vehicle, support it with safety stands (rigid racks).
4) Remove bolts which secure stabilizer link to rear lateral link.



5) Remove bolts which secure stabilizer to stabilizer bracket.

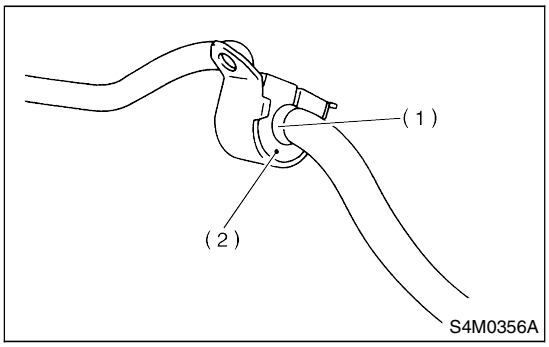


6) Separate rear stabilizer and stabilizer link.

B: INSTALLATION S201118A11

1) Install in the reverse order of removal.

NOTE:
- Install bushing while aligning it with paint mark on stabilizer.
- Ensure that bushing and stabilizer have the same identification colors when installing.



(1) Mark stamped on stabilizer
(2) Bushing identification color

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

Stabilizer to stabilizer link:
45 N·m (4.6 kgf-m, 33 ft-lb)

Stabilizer link to rear lateral link:
45 N·m (4.6 kgf-m, 33 ft-lb)

Stabilizer to stabilizer bracket:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

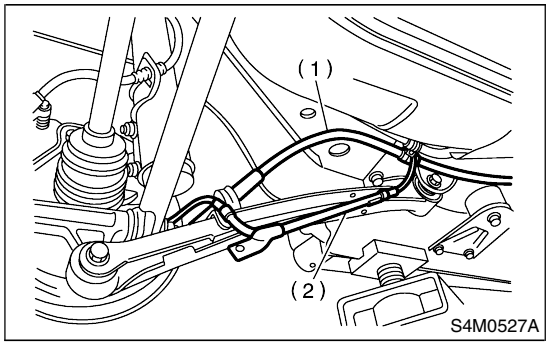
C: INSPECTION S201118A10

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.

4. Rear Trailing Link S201107

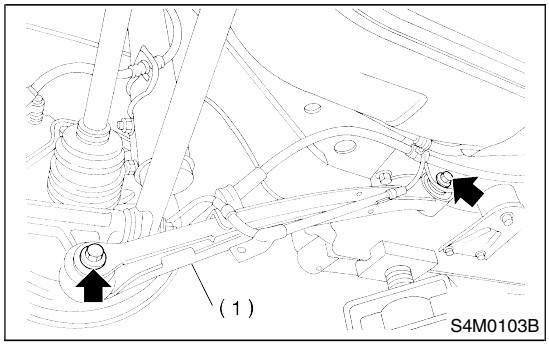
A: REMOVAL S201107A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Loosen rear wheel nuts.
4) Jack-up vehicle, and remove rear wheels.
5) Remove both rear parking brake clamp and ABS sensor harness. (Models equipped with ABS)



(1) Parking brake cable
(2) ABS sensor harness

6) Remove bolt which secure trailing link to trailing link bracket.



(1) Trailing link

7) Remove bolt which secure trailing link to rear housing.

B: INSTALLATION S201107A11

Install in the reverse order of removal.

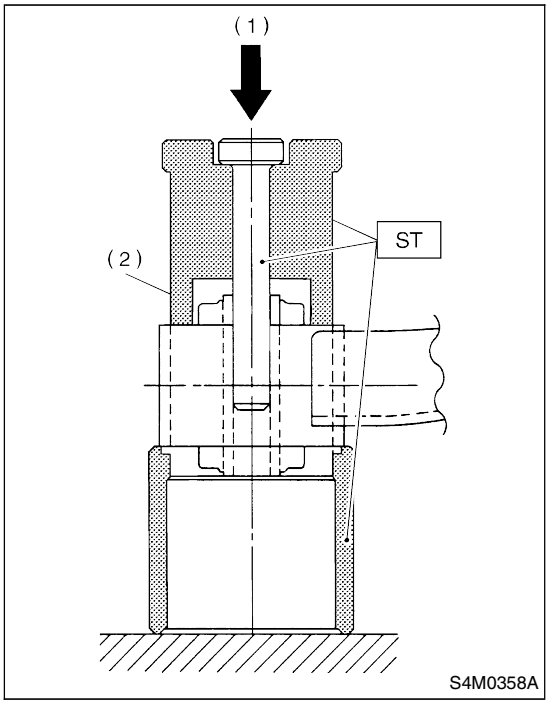
CAUTION:
Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is at curb weight condition.

NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S201107A06

1. FRONT BUSHING S201107A0601

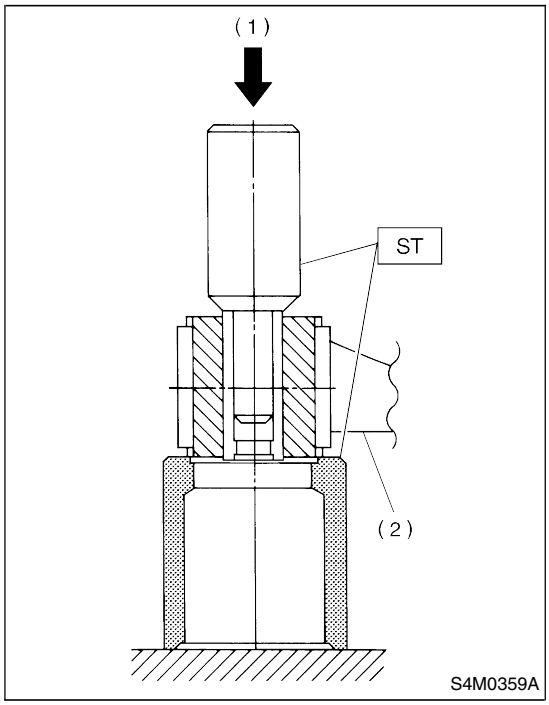
Using ST, press front bushing out of place.
ST 927720000 INSTALLER & REMOVER SET



(1) Press
(2) Trailing link

2. REAR BUSHING S201107A0602

1) Remove housing. <Ref. to DS-23, REMOVAL, Rear Axle.> for removal procedures.
2) Using ST, press rear bushing out of place.
ST 927730000 INSTALLER & REMOVER SET



(1) Press
(2) Housing

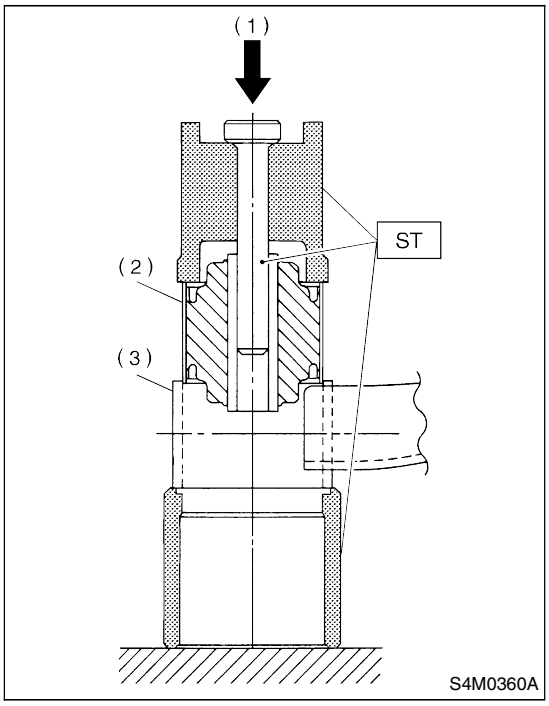
D: ASSEMBLY S201107A02

Assemble in the reverse order of disassembly.

1. FRONT BUSHING S201107A0201

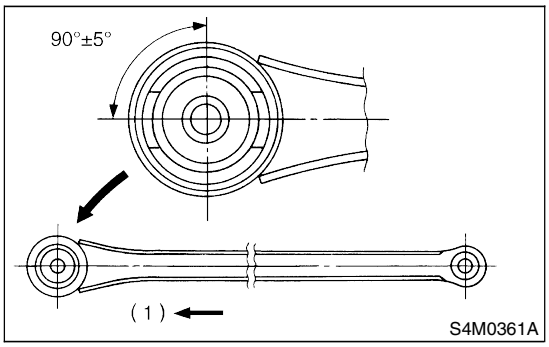
Using ST, press bushing into trailing link.
ST 927720000 INSTALLER & REMOVER SET

CAUTION:
When installing bushing, turn ST plunger upside down and press it until plunger end surface contacts trailing link end surface.



(1) Press
(2) Front bushing
(3) Trailing link

CAUTION:
Install front bushing in the proper direction, as shown in figure.



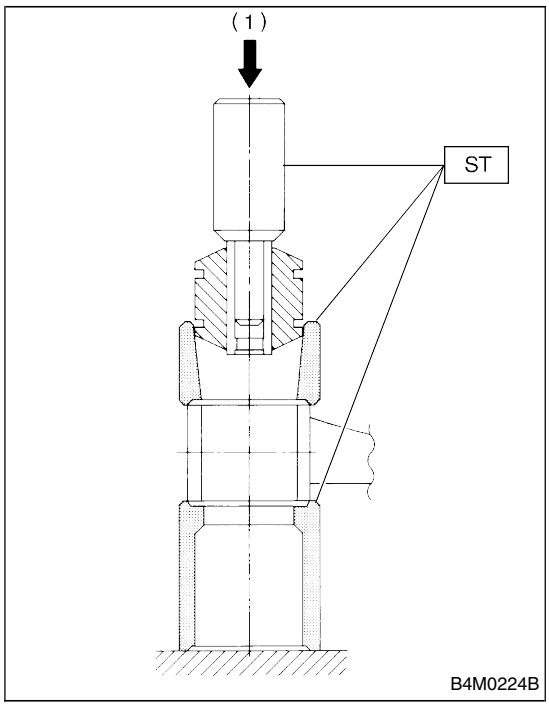
(1) Front

2. REAR BUSHING S201107A0202

1) Using ST, press bushing into trailing link.
ST 927730000 INSTALLER & REMOVER SET

NOTE:
If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

Specified lubricant:
TIRE LUBE : water = 1 : 3



(1) Press

2) Install housing. <Ref. to DS-26, INSTALLATION, Rear Axle.>

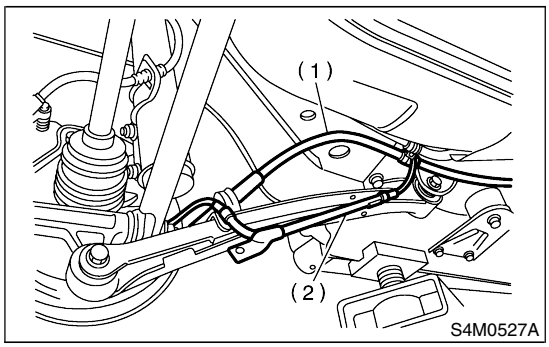
E: INSPECTION S201107A10

Check trailing links for bends, corrosion or damage.

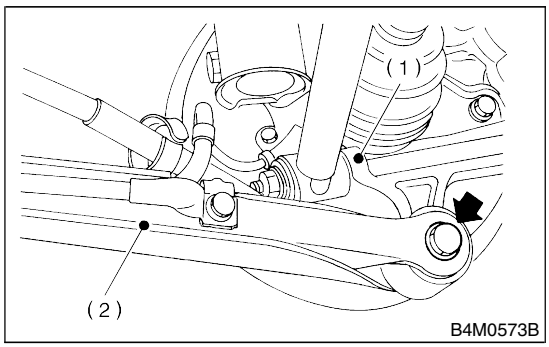
5. Lateral link S201576

A: REMOVAL S201576A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Loosen wheel nuts. Jack-up vehicle and remove wheel.
4) Remove stabilizers. <Ref. to RS-8, REMOVAL, Rear Stabilizer.>
5) Remove ABS sensor harness from trailing link. (Models equipped with ABS)



6) Remove bolt securing trailing link to housing.

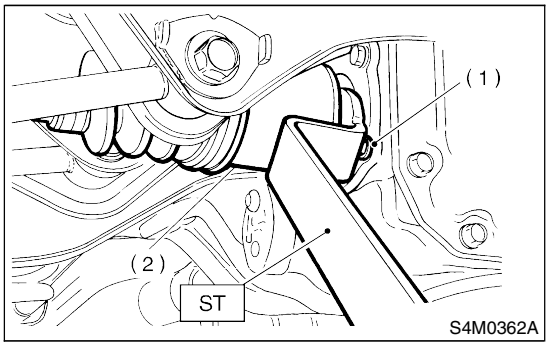


(1) Rear housing
(2) Trailing link

7) Remove bolts which secure lateral link assembly to rear housing.

8) Remove DOJ from rear differential using ST. (Except Non-TURBO AT model)
ST 28099PA100 DRIVE SHAFT REMOVER

NOTE:
The side spline shaft circlip comes out together with the shaft.

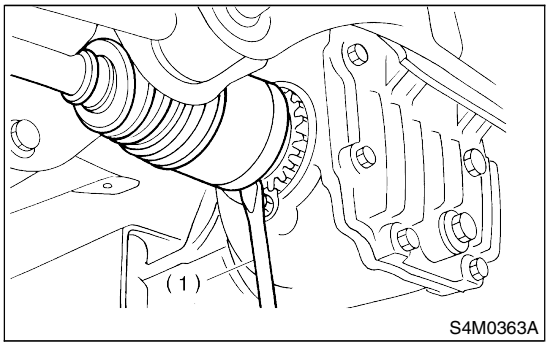


(1) Bolt
(2) DOJ

CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

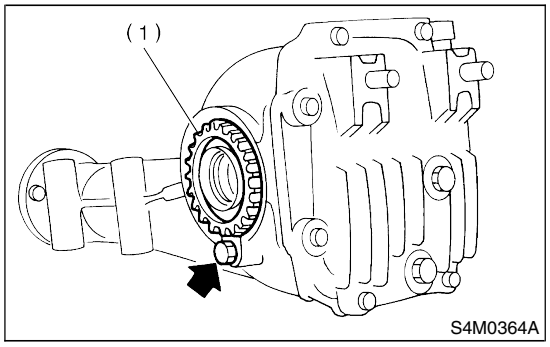
9) Remove DOJ from rear differential using tire lever. (Non-TURBO AT model)

NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Tire lever

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



(1) Axle shaft holder

10) Scribe an alignment mark on rear lateral link adjusting bolt and crossmember.
11) Remove bolts securing front and rear lateral links to crossmember, detach lateral links.

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

B: INSTALLATION S201576A11

Install in the reverse order of removal, observing the following instructions.

NOTE:
Installation of DOJ to differential; <Ref. to DS-39, INSTALLATION, Rear Drive Shaft.>

CAUTION:
- **Always tighten rubber bushing when wheels are in full contact with the ground and vehicle is curb weight.**
- **Tighten nut when installing adjusting bolt.**
- **Replace self-locking nut.**

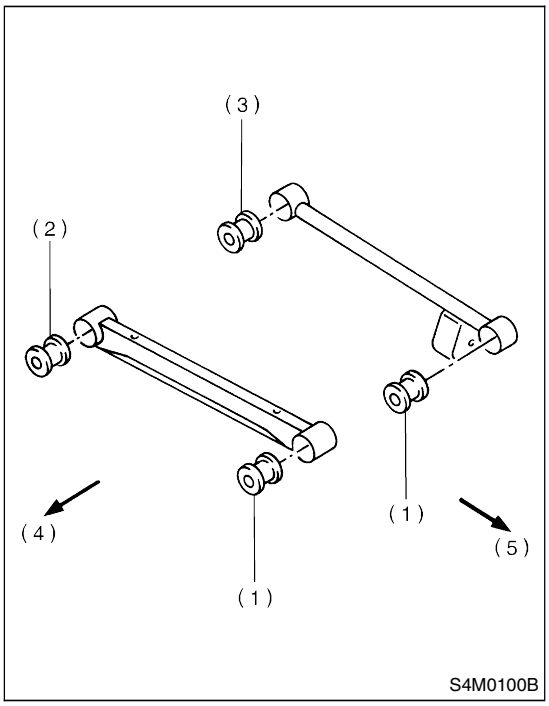
NOTE:
Check wheel alignment and adjust if necessary.

C: DISASSEMBLY S201576A06

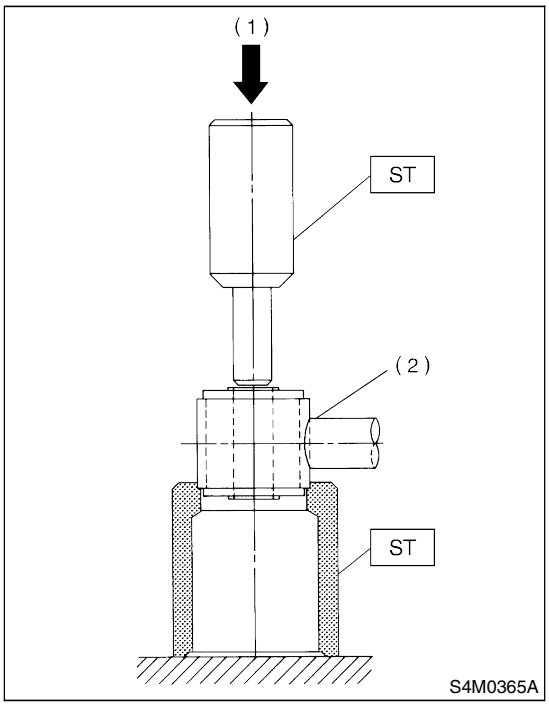
Using ST, press bushing out of place.

NOTE:
- Using the following table as a guide, verify the type of bushings.
- Select ST according to the type of bushings used.

Bushing	ST: INSTALLER & REMOVER SET
Bushing A	927700000
Bushing B	927690000
Bushing C	927700000



(1) Bushing A
(2) Bushing B
(3) Bushing C
(4) Front
(5) Outside of body



(1) Press
(2) Lateral link

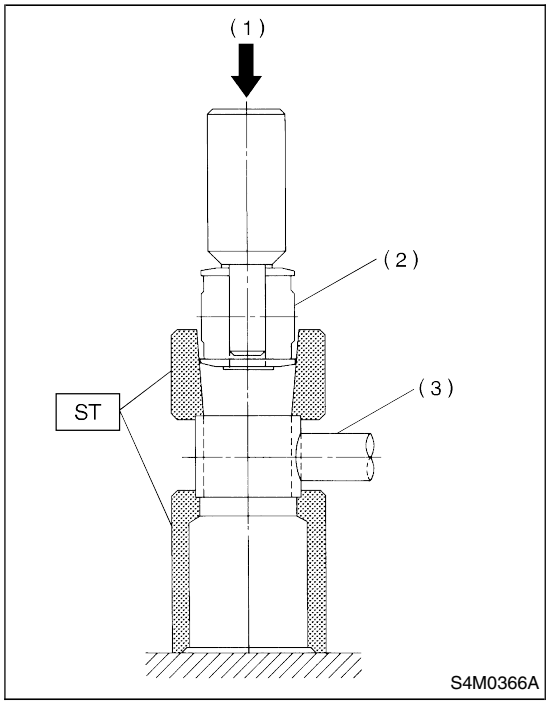
D: ASSEMBLY S201576A02

1) Using ST, press bushing into place.

CAUTION:
Select ST according to the type of bushings used.

NOTE:
● Use the same ST as that used during disassembly.
● If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

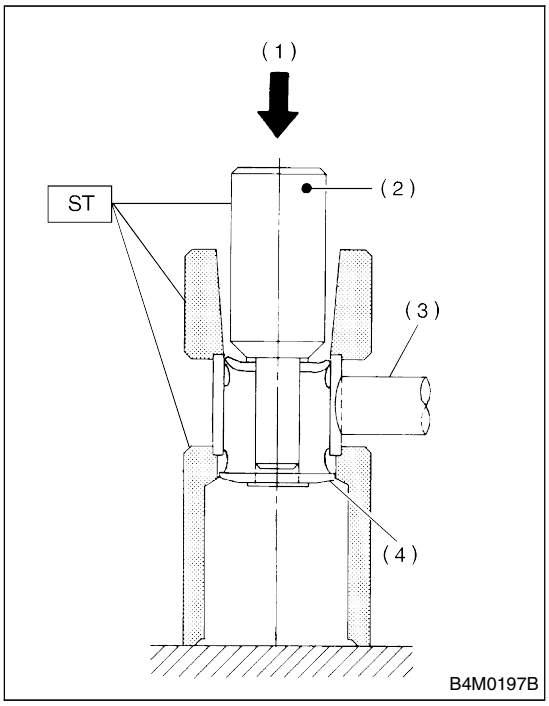
Specified lubricant:
TIRE LUBE : water = 1 : 3



(1) Press
(2) Bushing
(3) Lateral link

2) Press ST plunger until bushing flange protrudes beyond lateral link.

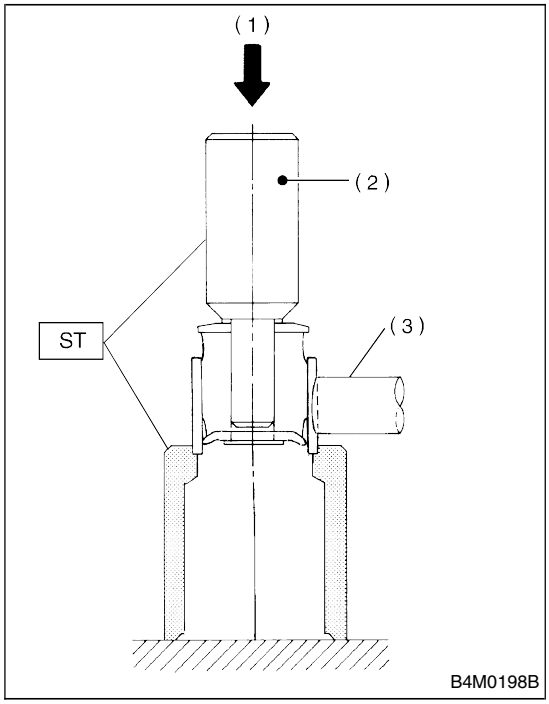
NOTE:
Use the same ST as that used during disassembly.



(1) Press
(2) Plunger
(3) Lateral link
(4) Flange

3) Turn lateral link upside down. Press ST plunger in the direction opposite that outlined in the former procedure until bushing is correctly positioned in trailing link.

NOTE:
Use the same ST as that used during disassembly.



(1) Press
(2) Plunger
(3) Lateral link

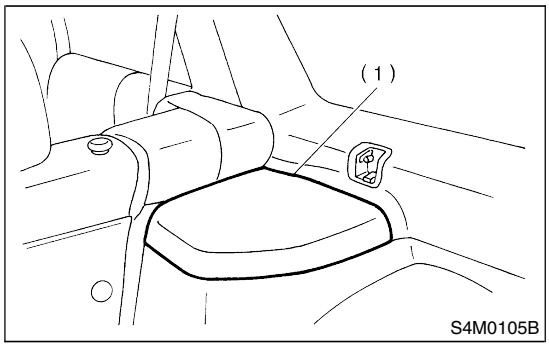
E: INSPECTION S201576A10

Visually check lateral links for damage or bends.

6. Rear Strut S201132

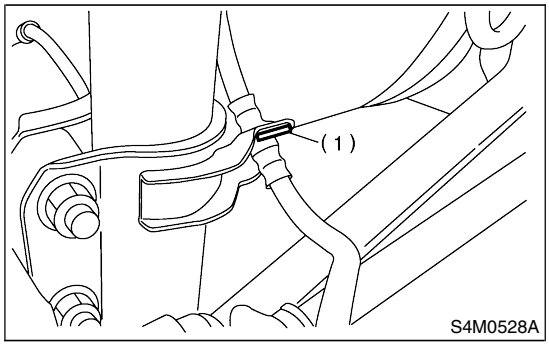
A: REMOVAL S201132A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Depress brake pedal and secure it in that position using a wooden block, etc.
4) Remove strut cap of rear quarter trim.



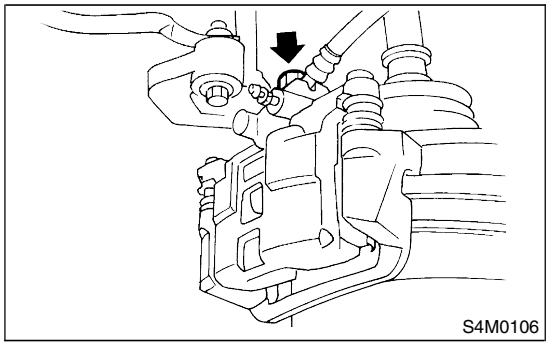
(1) Strut cap

5) Loosen rear wheel nuts.
6) Jack-up vehicle, and remove rear wheels.
7) Remove brake hose clip.



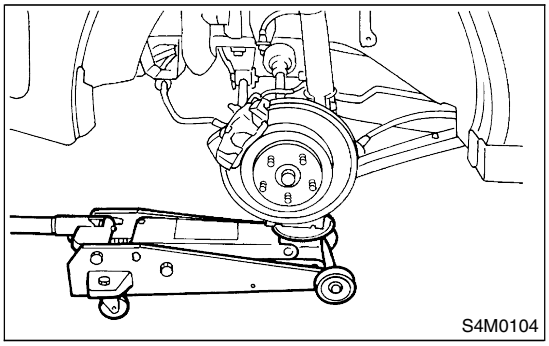
(1) Clip

8) Models equipped with rear disc brakes:
Remove union bolt from brake caliper.

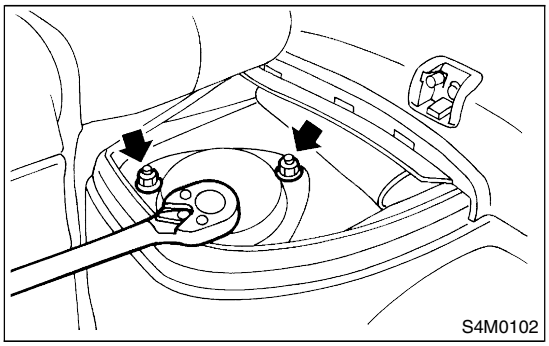


9) Models equipped with rear drum brakes:
Disconnect brake hose from brake pipe from strut, and disconnect brake pipe from drum brake.

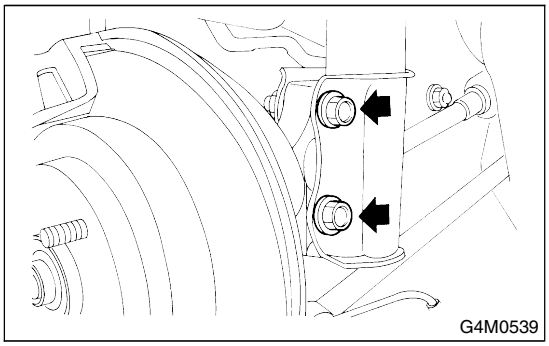
10) Use a garage jack to support the rear housing.



11) Remove nuts securing strut mount to body.



12) Remove bolts which secure rear strut to housing.



13) Remove strut mount.

B: INSTALLATION S201132A11

1) Install strut mount cap.
2) Tighten self-locking nut used to secure strut mount to vehicle body.

CAUTION:
Use a new self-locking nut.

NOTE:
Tighten strut mount and cap as a unit.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

3) Tighten bolts securing rear strut to housing.

Tightening torque:
200 N·m (20.4 kgf-m, 148 ft-lb)

CAUTION:
Use a new self-locking nut.

4) Models with rear disc brakes:
Tighten brake hose union bolt on brake caliper.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

Models with rear drum brakes:
Connect brake hose to brake pipe.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

5) Insert brake hose clip between brake hose and lower side of strut.

CAUTION:
• Check that hose clip is positioned properly.
• Check brake hose for twisting, or excessive tension.
• Models equipped with ABS:
Do not subject ABS sensor harness to excessive tension.

6) Be sure to bleed air from brake system.
7) Lower vehicle and tighten wheel nut.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

8) Install strut cap of rear quarter trim.

NOTE:
Check wheel alignment and adjust if necessary.

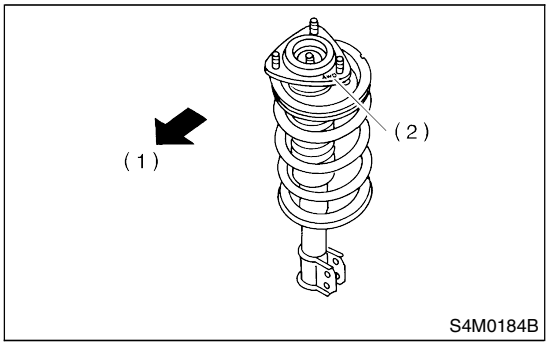
C: DISASSEMBLY S201132A06

For disassembly of rear strut, refer to procedures outlined under front strut as a guide. <Ref. to FS-19, DISASSEMBLY, Front Strut.>

D: ASSEMBLY S201132A02

Refer to Front Strut as a guide for assembly procedures. <Ref. to FS-20, ASSEMBLY, Front Strut.>

CAUTION:
• Install rear strut with "4WD" mark on strut mount facing outside of vehicle body.
• Insert the protrusion of lower rubber seat into the strut spring seat hole.



(1) Front of vehicle
(2) "4WD" mark

E: INSPECTION S201132A10

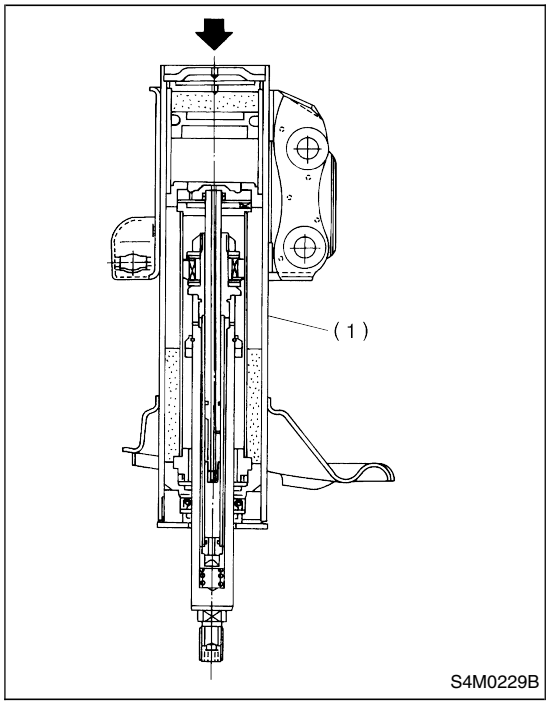
1) Refer to Front Strut as a guide for inspection procedures. <Ref. to FS-21, INSPECTION, Front Strut.>
2) For models equipped with self leveling struts: Inspect the following.

No.	Step	Check	Yes	No
1	**CHECK WHEEL ARCH HEIGHT.** 1) Remove all cargo from the vehicle. 2) Fill gasoline tank completely. 3) Drive vehicle (only the driver aboard) for at least 1 km (0.6 mile). 4) Measure the rear wheel arch height. This is value “A” in the equation. <Ref. to FS-6, Wheel Alignment.> 5) Put 4 people in the vehicle. NOTE: The total weight of the 4 people should be approximately 300 kg (662 lb). 6) Drive the vehicle for at least 5 km (3 miles). 7) Stop the vehicle. With the 4 people in the vehicle, measure the rear wheel arch height. This value is “B” in the equation. 8) A – B = C	Is C less than 30 mm (1.18 in)?	Go to step **2**.	Replace damper strut.
2	**CHECK WHEEL ARCH HEIGHT.** 1) Let the 4 people get off of the vehicle. 2) Drive the vehicle (only the driver aboard) for at least 1 km (0.6 mile). 3) Measure the rear wheel arch height. This is value “D” in the equation. 4) A – D = E	Is E less than ±10 mm (0.39 in)?	Go to step **3**.	Replace damper strut.
3	**CHECK VEHICLE.**	Is it a non-turbo vehicle?	Go to step **4**.	Go to step **5**.
4	**CHECK WHEEL ARCH HEIGHT.**	Is E less than $435^{+12}/_{-24}$ mm ($17.13^{+0.47}/_{-0.94}$ in)?	Correct.	Replace coil spring.
5	**CHECK WHEEL ARCH HEIGHT.**	Is E less than $425^{+12}/_{-24}$ mm ($16.73^{+0.47}/_{-0.94}$ in)?	Correct.	Replace coil spring.

F: DISPOSAL S201132A07

CAUTION:
• Completely discharge the gas from the green-painted struts on outer housings, before disposal. Follow the disposal procedure outlined below.
• Do not disassemble strut damper or place into a fire.
• Drill holes before disposing of self leveling struts.
• Before handling self leveling struts, be sure to wear goggles to protect eyes from gas, oil and/or filings.

1) Place self leveling strut upside-down (the opposite of its installation position on the vehicle) on a flat surface.
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.



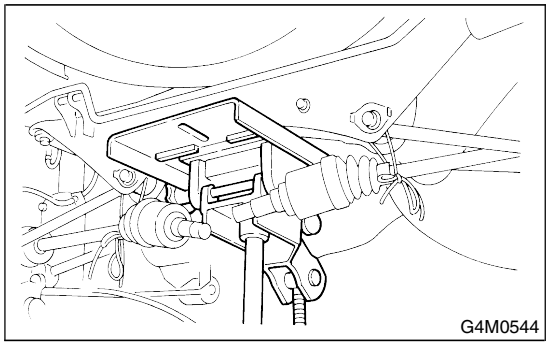
(1) Self leveling strut

7. Rear Crossmember S201133

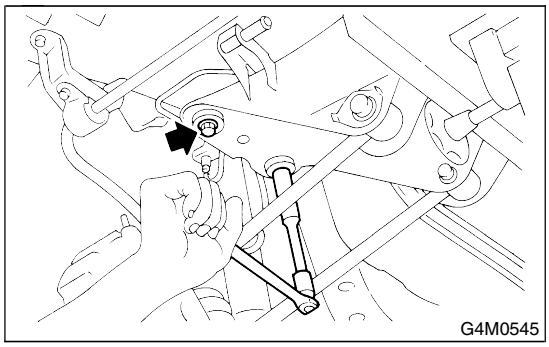
A: REMOVAL S201133A18

CAUTION:
Do not subject ABS sensor harness to excessive tension. (Models equipped with ABS)

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Loosen wheel nuts. Jack-up vehicle and remove wheels.
4) Separate front exhaust pipe and rear exhaust pipe. (Non-turbo model)
5) Separate center exhaust pipe (rear) and rear exhaust pipe. (Turbo model)
6) Remove rear exhaust pipe and muffler.
7) Remove rear differential.
T-Type: <Ref. to DI-25, Rear Differential for T-type.>
VA-Type: <Ref. to DI-42, Rear Differential for VA-type.>
8) Place transmission jack under rear crossmember.


G4M0544

9) Remove bolts securing crossmember to vehicle body, and remove crossmember.


G4M0545

10) Scribe an alignment mark on rear lateral link cam bolt and crossmember.
11) Remove front and rear lateral links by loosening nuts.

B: INSTALLATION S201133A11

1) Install in the reverse order of removal.
2) For installation and tightening torque of rear differential, always tighten rubber bushing when wheels are in full contact with the ground and vehicle is curb weight.

NOTE:
Check wheel alignment and adjust if necessary.

C: INSPECTION S201133A10

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

8. General Diagnostic Table S201257

A: INSPECTION S201257A10

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT S201257A1001

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

2. POOR RIDE COMFORT S201257A1002

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	Replace.
(5) Damage or deformation of strut mount	Replace.
(6) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly	Replace.
(9) Oil leakage of damper strut	Replace.

3. NOISE S201257A1003

Possible causes	Countermeasures
(1) Wear or damage of damper strut 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	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

GENERAL DIAGNOSTIC TABLE

MEMO:

WHEEL AND TIRE SYSTEM

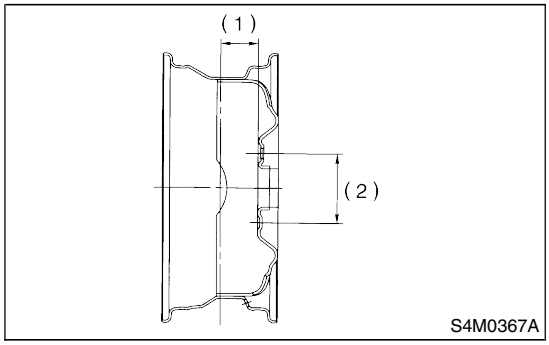
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3. Steel Wheel....5
4. Aluminum Wheel 6
5. Wheel Balancing 7
6. General Diagnostics Table 8

1. General Description S204001

A: SPECIFICATIONS S204001E49



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

	Model	Tire size	Rim size	Rim offset	P.C.D.
Front and Rear	Australia model	P205/70R15 95S	15 × 6J	48 mm (1.89 in)	100 mm (3.94 in) dia.
		P215/60R16 94H	16 × 6 1/2JJ		
	Except Australia model	205/70R15 95H	15 × 6J	48 mm (1.89 in)	
		215/60R16 95V	16 × 6 1/2JJ		

Model	Tire size	Tire inflation pressure	
		Light load	Full load
Australia model	P205/70R15 95S P215/60R16 94H	Ft: 200 kPa (2.0 kg/cm^2, 29 psi) Rr: 190 kPa (1.9 kg/cm^2, 28 psi)	Ft: 200 kPa (2.0 kg/cm^2, 29 psi) Rr: 250 kPa (2.5 kg/cm^2, 36 psi)
Except Australia model	205/70R15 95H 215/60R16 95V		

NOTE:
- Spare tires are the same for both front and rear.
- At trailer towing, rear inflation pressure is 280 kPa (2.8 kg/cm^2, 41 psi).

1. SERVICE DATA S204001E4901

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

2. ADJUSTING PARTS S204001E4902

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

Balance weight part number (For steel wheel)	Weight
28101FC000	5 g (0.18 oz)
28101FC010	10 g (0.35 oz)
28101FC020	15 g (0.53 oz)
723141320	20 g (0.71 oz)
723141330	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	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)

B: PREPARATION TOOL S204001A17

1. GENERAL PURPOSE TOOLS S204001A1701

TOOL NAME	REMARKS
Air Pressure Gauge	Used for measuring tire air pressure.
Dial Gauge	Used for measuring wheel runout.

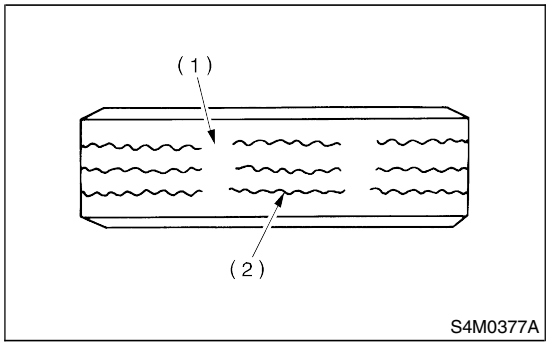
2. Tire S204125

A: INSPECTION S204125A10

1) Take stone, glass, nail etc. off the tread groove.
2) 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.

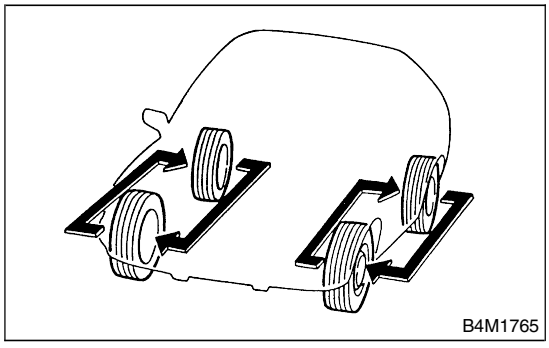


(1) Tread wear indicator
(2) Tire tread

1. TIRE ROTATION S204125A1001

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.



3. Steel Wheel S204131

A: REMOVAL S204131A18

1) Apply parking brake, and position select lever to “P” or “LOW”.
2) Set shop jacks or a lift to the specified point, and support the vehicle with its wheels slightly contacting the floor.
3) Loosen wheel nuts.
4) Raise the vehicle until its wheels take off the ground using a jack or a lift.
5) Remove wheel nuts and wheels.

NOTE:
● While removing wheels, prevent hub bolts from damage.
● Place wheels with their outer sides facing upward to prevent wheels from damage.

B: INSTALLATION S204131A11

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.

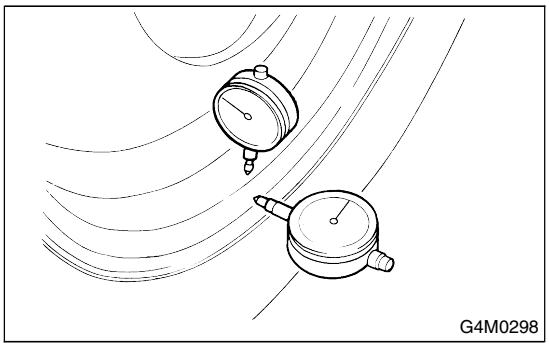
Wheel nut tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

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.

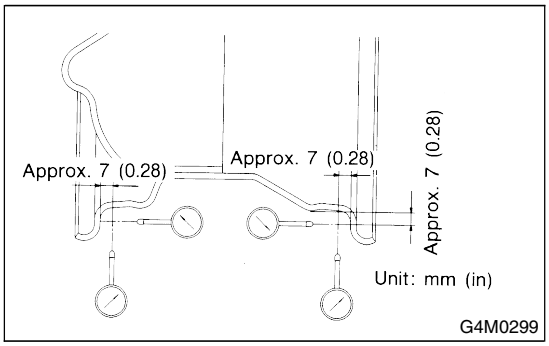
5) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

C: INSPECTION S204131A10

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) Jack-up vehicle until wheels clear the floor.
3) Slowly rotate wheel to check rim “runout” using a dial gauge.



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



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

4. Aluminum Wheel S204130

A: REMOVAL S204130A18

Refer to Steel Wheel for removal procedure of aluminum wheels. <Ref. to WT-5 REMOVAL Steel Wheel.>

B: INSTALLATION A204130A11

Refer to Steel Wheel for installation procedure of aluminum wheels. <Ref. to WT-5 INSTALLATION, Steel Wheel.>

C: INSPECTION S204130A10

Refer to Steel Wheel for inspection procedure of aluminum wheels. <Ref. to WT-5 INSPECTION, Steel Wheel.>

Rim runout:

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

D: CAUTION S204130A03

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.

5. Wheel Balancing S204127

A: REPLACEMENT S204127A20

1) Remove balance weights.
2) Using dynamic balancing, measure wheel balance.
3) Select a weight close to the value measured by dynamic balancing.

Balance weight part number (For steel wheel)	Weight
28101FC000	5 g (0.18 oz)
28101FC010	10 g (0.35 oz)
28101FC020	15 g (0.53 oz)
723141320	20 g (0.71 oz)
723141330	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	60 g (2.12 oz)

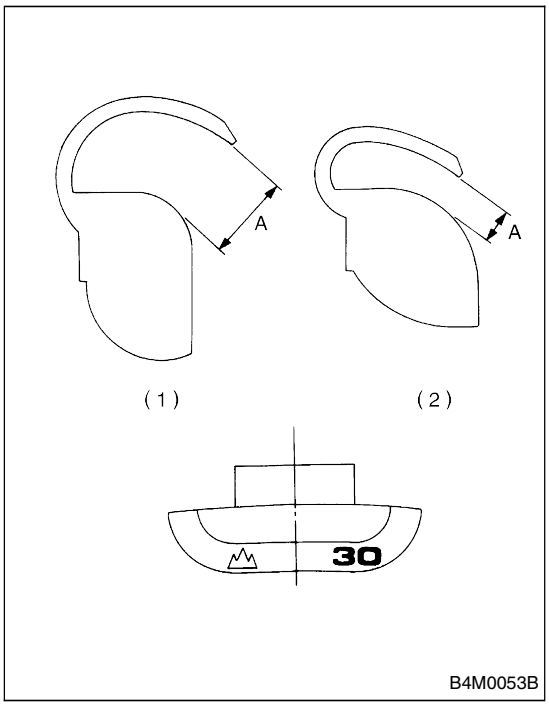
Balance weight part number (For aluminum wheel)	Weight
23141GA462	5 g (0.18 oz)
23141GA472	10 g (0.35 oz)
23141GA482	15 g (0.53 oz)
23141GA492	20 g (0.71 oz)
23141GA502	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50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

4) Install the selected weight to the point designated by dynamic balancing.
5) Using dynamic balancing, measure wheel balance again. Check that wheel balance is correctly adjusted.

B: INSPECTION S204127A10

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.



(1) Weight for aluminum wheel
(2) Weight for steel wheel

Service limit: A
Weight for steel wheel;
1.8 — 2.0 mm (0.071 — 0.079 in)
Weight for aluminum wheel;
4.6 — 5.4 mm (0.181 — 0.213 in)

6. General Diagnostics Table S204121

A: INSPECTION S204121A10

Symptom	Possible cause	Remedy
Front wheel shimmy	● Worn or improperly inflated of tire.	Replace
	● Wheel is out of balance.	Adjustment
Abnormal tire wear	● Improperly inflated of tire.	Replace
Sways/pitches	● Worn or improperly inflated of tire.	Replace
Wander/pulls	● Worn or improperly inflated of tire.	Replace

DIFFERENTIALS

DI

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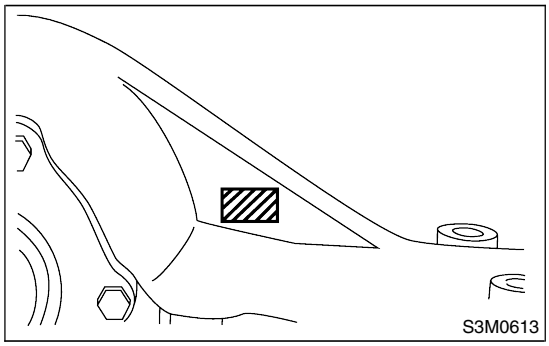
1. General Description S303001

A: SPECIFICATIONS S303001E49

Model	Non-Turbo		Turbo		
	MT	AT	Europe	Except Europe	
				MT	AT
	T type	VA type	T type (with LSD)		
Rear differential type	T2	XH	HP (with oil temperature sensor)	CF	JP
Gear	Hypoid gear				
Gear ratio	4.111 (37/9)	4.444 (40/9)			
Oil capacity	0.8 L (0.8 US qt, 0.7 Imp qt)				
Rear differential gear oil	GL-5				

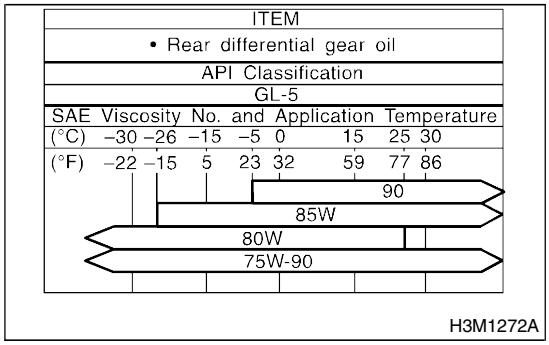
● **Identification**
When replacing a rear differential assembly, select the correct one according to the following table.

CAUTION:
Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise when AWD is selected.



● **Rear differential gear oil**
Recommended oil

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



1. SERVICE DATA *S303001E4901*

Front and rear bearing preload at companion flange bolt hole N (kgf, lb)	New bearing	T-type	19.6 — 28.4 (2.0 — 2.9, 4.4 — 6.4)
		VA-type	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
	Used bearing	T-type	8.34 — 16.67 (0.85 — 1.7, 1.87 — 3.75)
Side gear backlash mm (in)		T-type	0.10 — 0.20 (0.0039 — 0.0079)
		VA-type	0.05 — 0.15 (0.0020 — 0.0059)
Side bearing standard width mm (in)			20.00 (0.7874)
Crown gear to drive pinion backlash mm (in)		T-type	0.10 — 0.20 (0.0039 — 0.0079)
		VA-type	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface mm (in)			Less than 0.05 (0.0020)

2. ADJUSTING PARTS S303001E4902

• VA-type

Item	Part No.	Length or thickness
Preload adjusting spacer	32288AA040	52.3 mm (2.059 in)
	32288AA050	52.5 mm (2.067 in)
	31454AA100	52.6 mm (2.071 in)
	32288AA060	52.7 mm (2.075 in)
	31454AA110	52.8 mm (2.079 in)
	32288AA070	52.9 mm (2.083 in)
	31454AA120	53.0 mm (2.087 in)
	32288AA080	53.1 mm (2.091 in)
	32288AA090	53.3 mm (2.098 in)
Preload adjusting washer	38336AA000	1.500 mm (0.0591 in)
	38336AA120	1.513 mm (0.0596 in)
	38336AA010	1.525 mm (0.0600 in)
	38336AA130	1.538 mm (0.0606 in)
	38336AA020	1.550 mm (0.0610 in)
	38336AA140	1.563 mm (0.0615 in)
	38336AA030	1.575 mm (0.0620 in)
	38336AA150	1.588 mm (0.0625 in)
	38336AA040	1.600 mm (0.0630 in)
	38336AA160	1.613 mm (0.0635 in)
	38336AA050	1.625 mm (0.0640 in)
	38336AA170	1.638 mm (0.0645 in)
	38336AA060	1.650 mm (0.0650 in)
	38336AA180	1.663 mm (0.0655 in)
	38336AA070	1.675 mm (0.0659 in)
	38336AA190	1.688 mm (0.0665 in)
	38336AA080	1.700 mm (0.0669 in)
	38336AA200	1.713 mm (0.0674 in)
	38336AA090	1.725 mm (0.0679 in)
	38336AA210	1.738 mm (0.0684 in)
	38336AA100	1.750 mm (0.0689 in)
	38336AA220	1.763 mm (0.0694 in)
	38336AA110	1.775 mm (0.0699 in)
Pinion height adjusting shim	32295AA200	0.150 mm (0.0059 in)
	32295AA210	0.175 mm (0.0069 in)
	32295AA220	0.200 mm (0.0079 in)
	32295AA230	0.225 mm (0.0089 in)
	32295AA240	0.250 mm (0.0098 in)
	32295AA250	0.275 mm (0.0108 in)
Side gear thrust washer	803135011	0.925 — 0.950 mm (0.0364 — 0.0374 in)
	803135012	0.950 — 0.975 mm (0.0374 — 0.0384 in)
	803135013	0.975 — 1.000 mm (0.0384 — 0.0394 in)
	803135014	1.000 — 1.025 mm (0.0394 — 0.0404 in)
	803135015	1.025 — 1.050 mm (0.0404 — 0.0413 in)

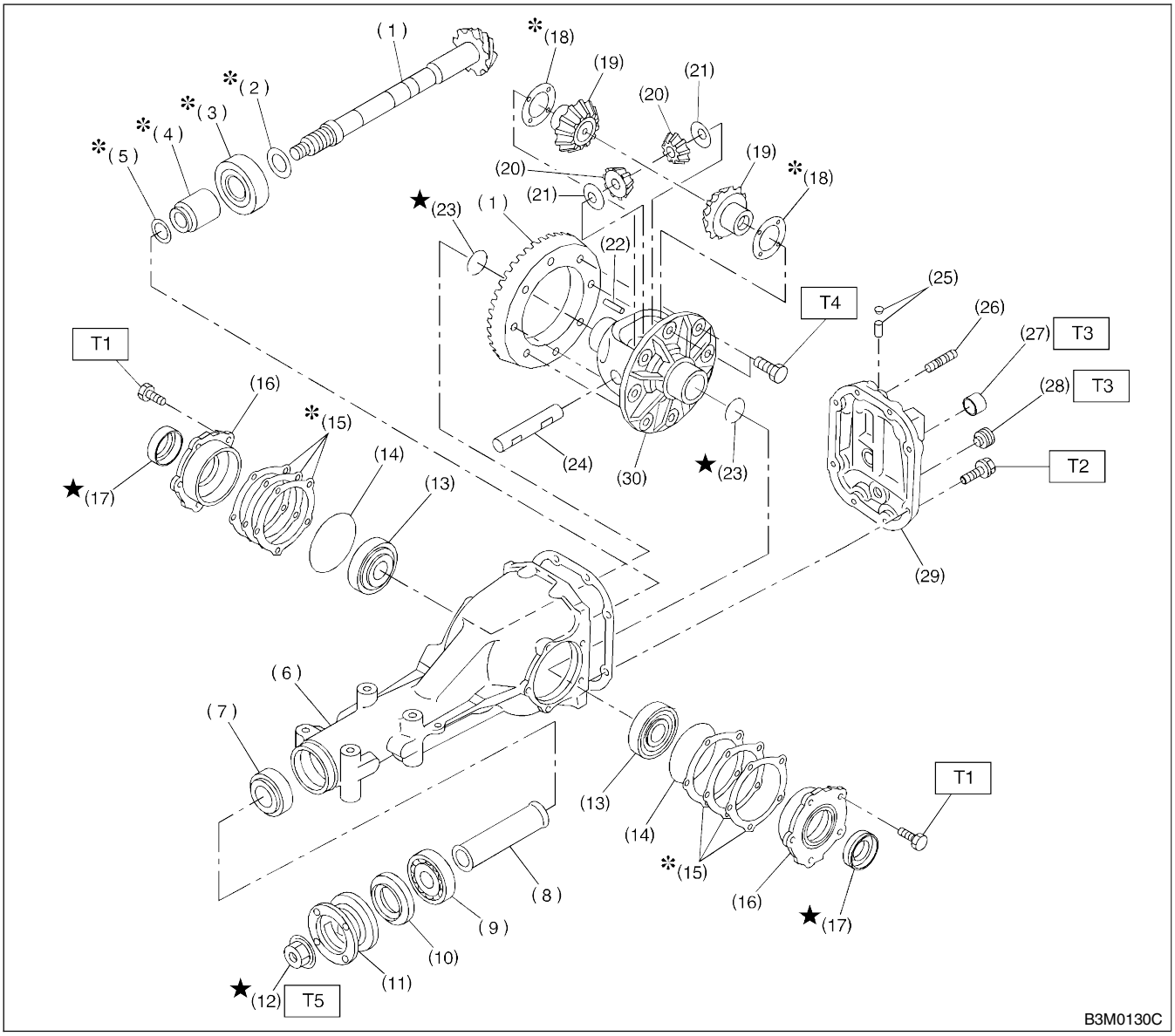
● **T-type**

Item	Part No.	Length or thickness
Preload adjusting spacer	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
	383845200	2.31 mm (0.0909 in)
Pinion height adjusting shim	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
	383655200	3.57 mm (0.1406 in)
	383665200	3.60 mm (0.1417 in)
	383675200	3.63 mm (0.1429 in)
	383685200	3.66 mm (0.1441 in)
Side gear thrust washer	383445201	0.75 — 0.80 mm (0.0295 — 0.0315 in)
	383445202	0.80 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.90 mm (0.0335 — 0.0354 in)
	383445204	0.90 — 0.95 mm (0.0354 — 0.0374 in)
	383445205	0.95 — 1.0 mm (0.0374 — 0.0394 in)

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

B: COMPONENT S303001A05

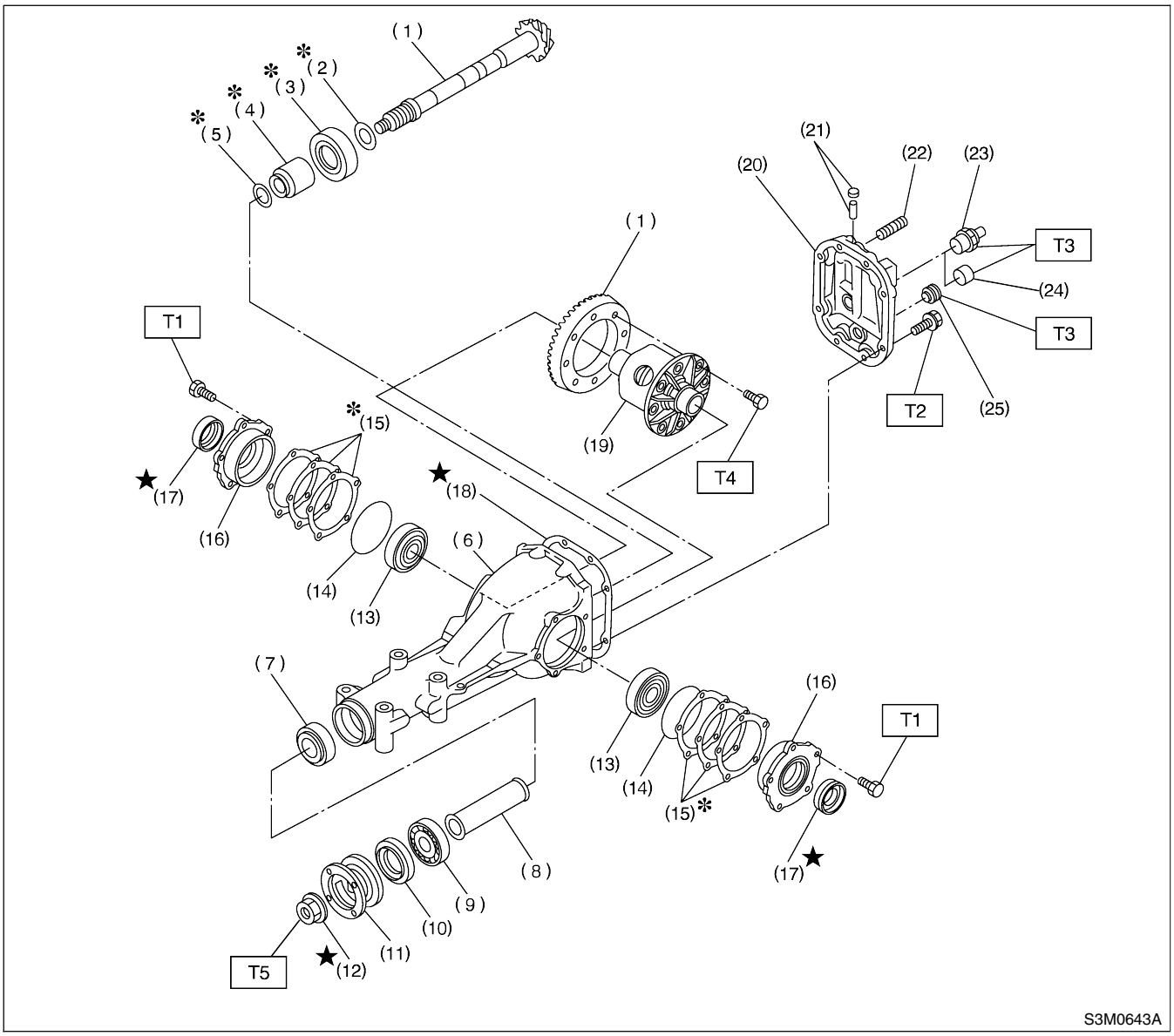
1. REAR DIFFERENTIAL FOR T-TYPE WITHOUT LSD S303001A0501



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10.3 (1.05, 7.6)
T2: 29.4 (3.00, 21.7)
T3: 49.0 (5.0, 36.2)
T4: 103.0 (10.50, 75.9)
T5: 181.4 (18.50, 133.8)

2. REAR DIFFERENTIAL FOR T-TYPE WITH LSD S303001A0502

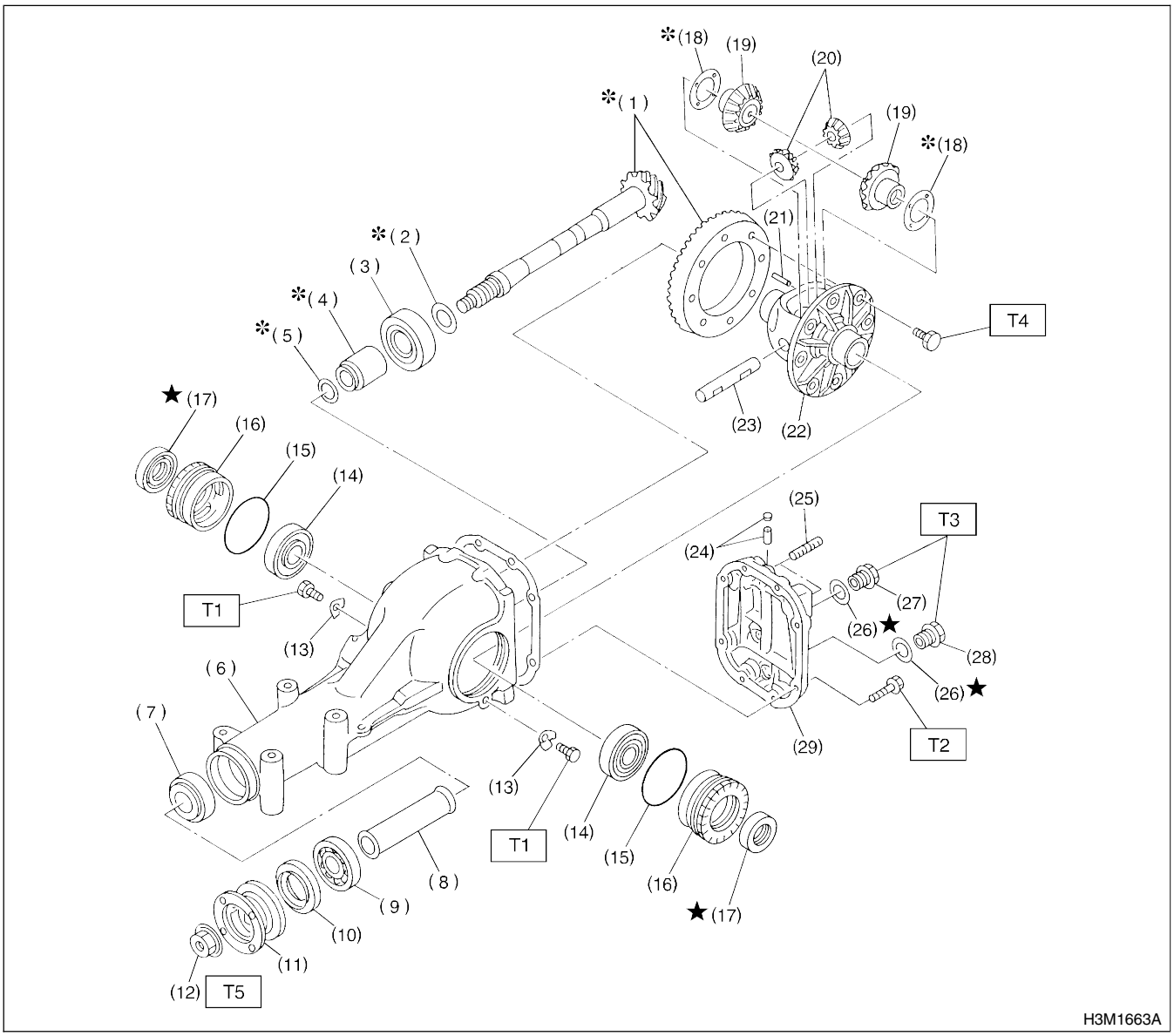


(1) Pinion crown gear set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Gasket
(19) Differential case
(20) Rear cover
(21) Air breather cap
(22) Stud bolt
(23) Oil filler plug (With oil temperature sensor)
(24) Oil filler plug (Without oil temperature sensor)
(25) Oil drain plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10.3 (1.05, 7.6)
T2: 29 (3.0, 21.7)
T3: 49.0 (5.0, 36.2)
T4: 103 (10.5, 76)
T5: 181 (18.5, 134)

3. REAR DIFFERENTIAL FOR VA-TYPE

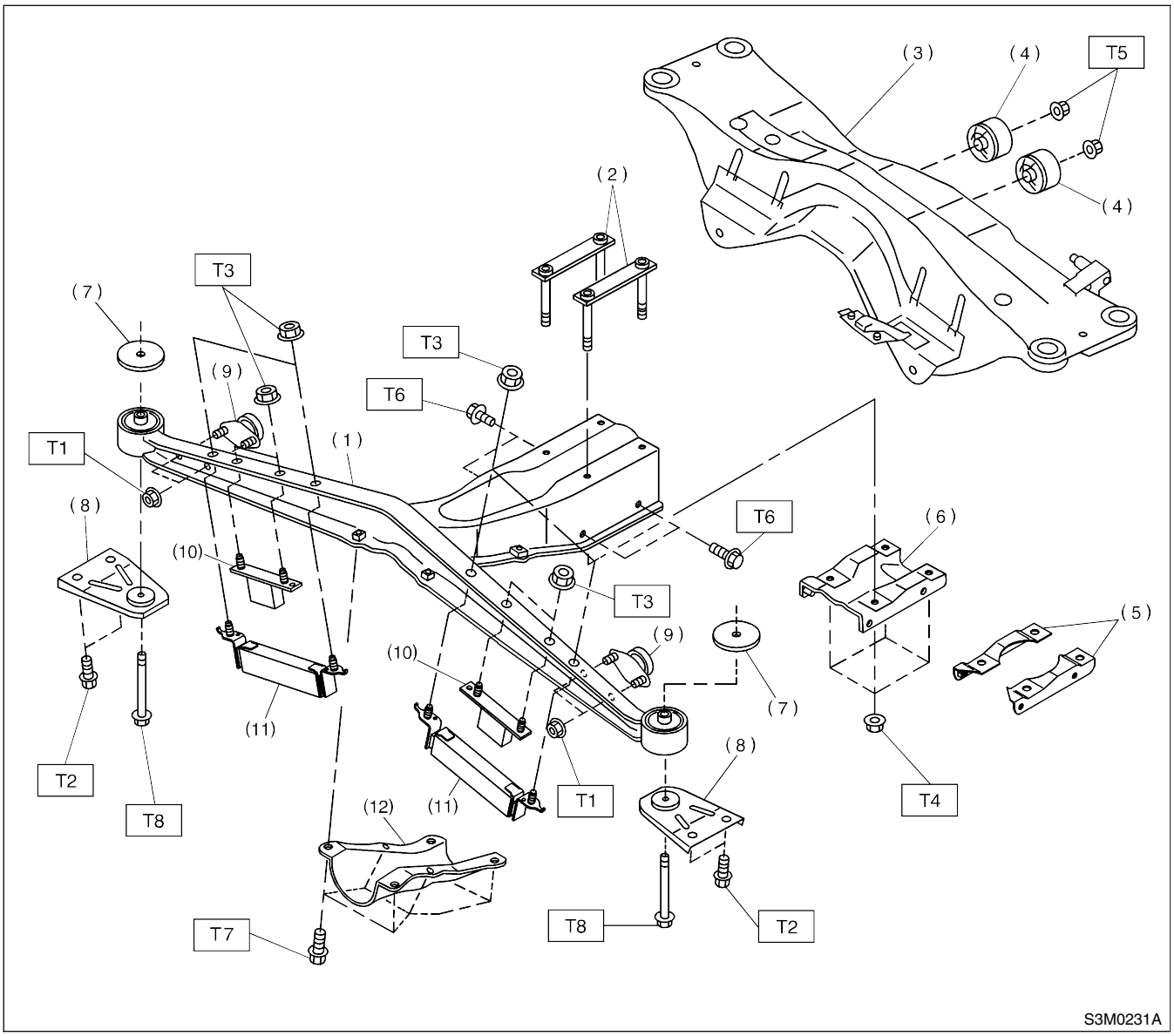
S303001A0503



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 25 (2.5, 18.1)
T3: 34 (3.5, 25.3)
T4: 62 (6.3, 45.6)
T5: 188 (19.2, 139)

4. REAR DIFFERENTIAL MOUNTING SYSTEM S303001A0504



(1) Differential front member
(2) Plate
(3) Crossmember
(4) Rear bushing
(5) Differential mount lower bracket (Non-Turbo model)
(6) Differential mount lower bracket (Turbo model)
(7) Stopper
(8) Differential mount bracket
(9) Dynamic damper A
(10) Mass damper (Turbo model)
(11) Dynamic damper B (Non-Turbo model)
(12) Differential mount front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 32 (3.3, 23.9)
T3: 40 (4.1, 30)
T4: 64 (6.5, 47.0)
T5: 69 (7.0, 50.6)
T6: 69 (7.0, 50.6)
T7: 88 (9.0, 65)
T8: 98 (10.0, 72)

C: CAUTION S303001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of gear oil to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating face of the case.

D: PREPARATION TOOL S303001A17

1. SPECIAL TOOLS S303001A1701

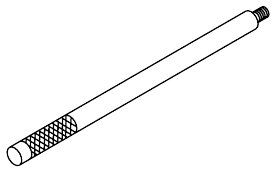
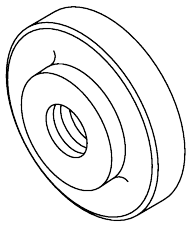
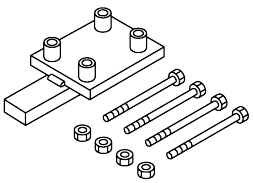
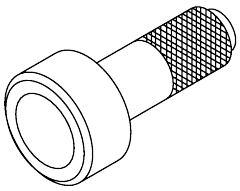
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1893	398477701	HANDLE	Used for installing front and rear bearing cone.
 B3M1894	398477702	DRIFT	Used press-fitting the bearing cone of differential carrier (rear).
 B3M1895	398217700	ATTACHEMENT SET	Stand for rear differential carrier disassembly and assembly.
 B3M1896	498447120	OIL SEAL INSTALLER	Used for installing front oil seal.

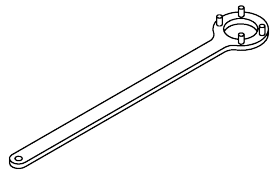
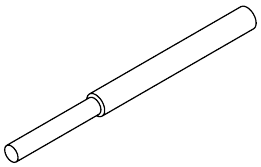
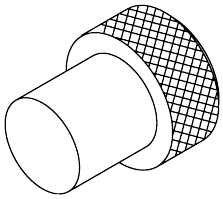
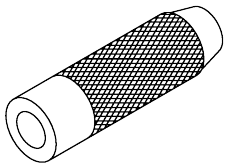
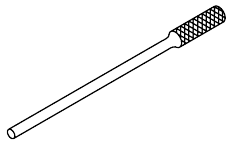
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1897	498427200	FLANGE WRENCH	Used for stopping rotaiotn of companion flange when loosening and tightening self-lock nut.
 B3M1898	398467700	DRIFT	Used for removing pinion, pilot bearing and front bearing cone.
 B3M1899	399780104	WEIGHT	Used for installing front bearing cone, pilot bearing companion flange.
 B3M1900	899580100	INSTALLER	Used for press-fitting the front bearing cone, pilot bearing.
 B3M1901	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.

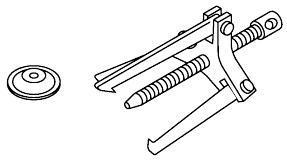
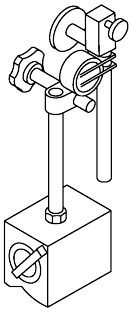
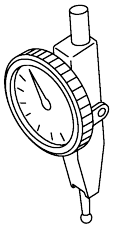
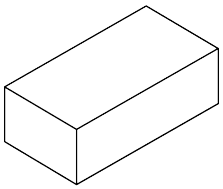
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1930	399703600	PULLEY ASSY	• Used for removing companion flange.
 B3M1902	498247001	MAGENT BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear.. • Used with DIAL GAUGE (498247100).
 B3M1903	498247100	DAIL GAUGE	• Used measurng backlash between side gear and pinion, hypoid gear. • Used with MAGNET BASE (498247001).
 B3M1904	398507704	BLOCK	Used for adjusting pinion height and preload.

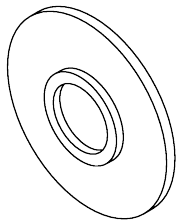
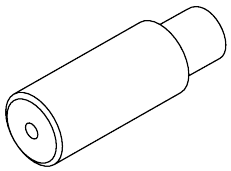
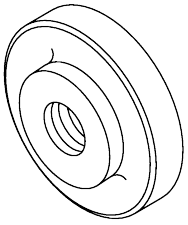
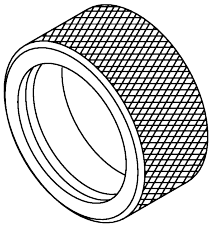
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1905	398177700	INSTALLER	• Used for installing rear bearing cone. • For T-type.
 B3M1906	398457700	ATTACHMENT	• Used for removing side bearing retainer. • For T-type.
 B3M1907	398477703	DRIFT2	• Used forpress-fitting the bearing race (rear) of differential carrier. • For T-type.
 B3M1908	398437700	DRIFT	• Used for installing said oil seal. • For T-type.

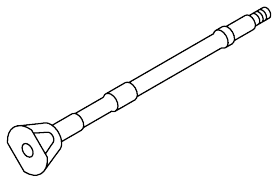
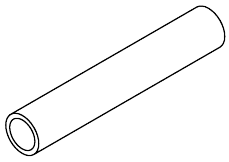
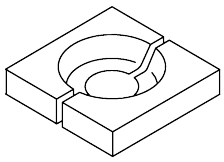
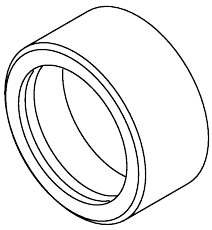
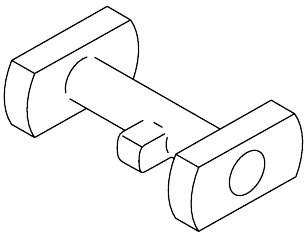
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1909	398507702	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For T-type.
 B3M1910	398507703	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For T-type.
 B3M1911	398517700	REPLACER	• Used for removing rear bearing cone. • For T-type.
 B3M1912	398487700	DRIFT	• Used for press-fitting the side bearing cone. • For T-type.
 B3M1913	398507701	GAUGE	• Used for adjusting pinion height. • For T-type.

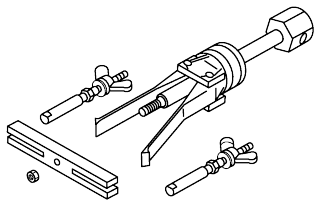
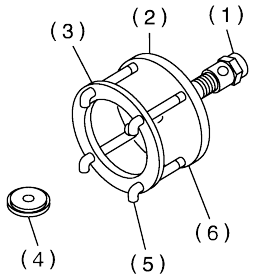
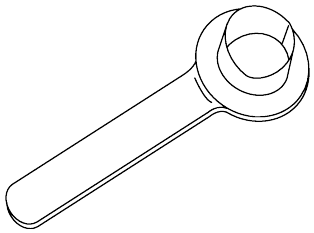
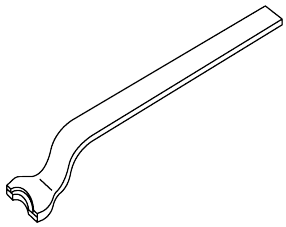
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1914	398527700	PULLEY ASSY	• Used for removing oil seal and side bearing cup. • For T-type.
 B3M1915A	398527700	PULLER SET	• Used for extracking side bearing cone. (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000) • For T-type.
 B3M1917	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal. • For T-type.
 B3M1919	28099PA100	DRIVE SHAFT REMOVER	• Used for removing rear drive shaft from rear differential. • For T-type.

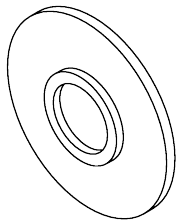
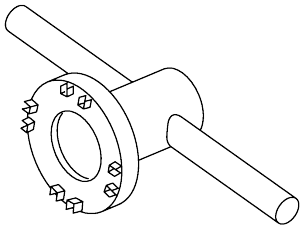
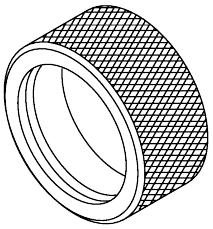
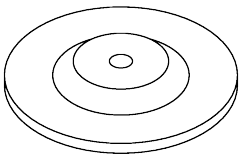
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1920	498175500	INSTALLER	• Used for installing rear bearing cone. • For VA-type.
 B3M1921	399780111	WRENCH ASSY	• Used for removing and installing side oil seal holder. • For VA-type.
 B3M1922	498447100	INSTALLER	• Used for installing oil seal. • For VA-type.
 B3M1923	399520105	SEAT	• Used for removing side bearing cone. • Used with PULLER SET (899524100). • For VA-type.

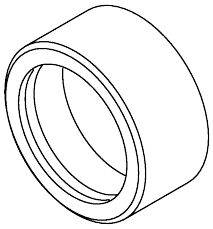
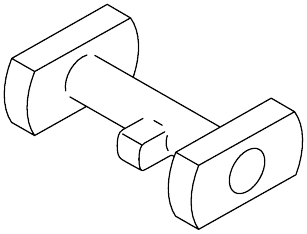
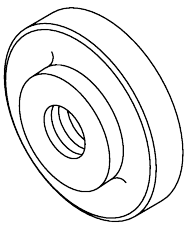
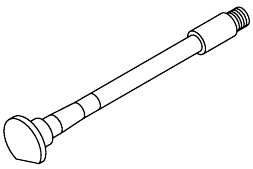
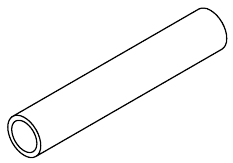
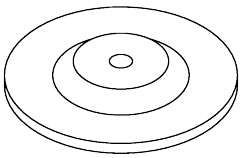
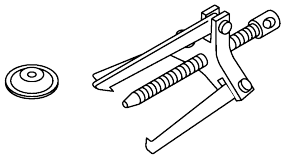
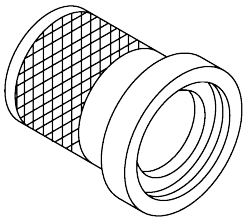
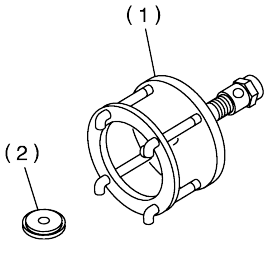
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1924	498485400	DRIFT	• UUsed for installing side bearing cone. • For VA-type.
 B3M1925	498505501	GAUGE	• Used for adjusting pinion height. • For VA-type.
 B3M1926	498447110	BEARING OUTER RACE DRIFT	• Used for press-fitting the bearing race (front) of differential carrier. • For VA-type.
 B3M1927	498447150	DUMMY SHAFT	• Used for adjusting pinion height and Pre-load. • For VA-type.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1928	32285AA000	DUMMY COLLAR	• Used for adjusting pinion height and Pre-load. • For VA-type.
 B3M1929	499705404	SEAT	• Used for removing side bearing race. • Used with PULLEY ASSY (499705401). • For VA-type.
 B3M1930	499705401	PULLEY ASSY	• Used for removing side bearing race. • Used with SEAT (499705404). • For VA-type.
 B3M1931	899874100	INSTALLER	• Used for installing companion flange. • For VA-type.
 B3M1932A	899524100	DIFFERENTIAL BEARING PULLER SET	• Used for removing side bearing cone of differential. • For VA-type. (1) Puller (2) Cap • Used with SEAT (399520105)

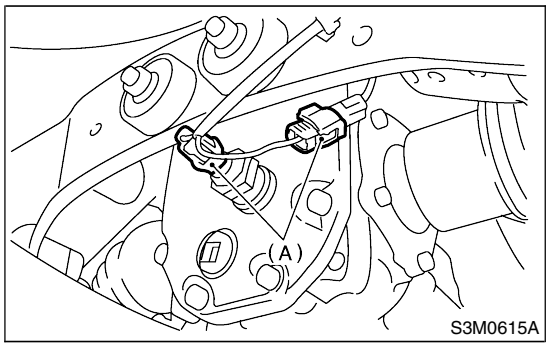
2. GENERAL PURPOSE TOOLS S301001A1702

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

2. Differential Gear Oil S303150

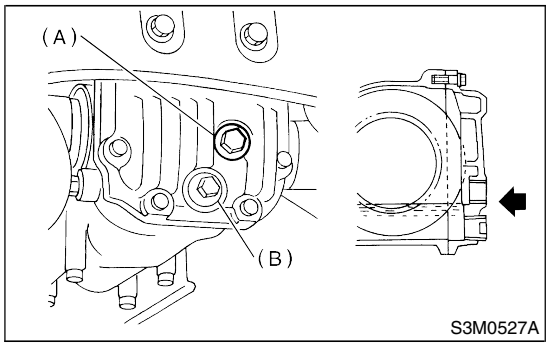
A: INSPECTION S303150A10

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Lift vehicle.
4) Disconnect oil temperature sensor connector (Turbo model for Europe).



(A) Connector

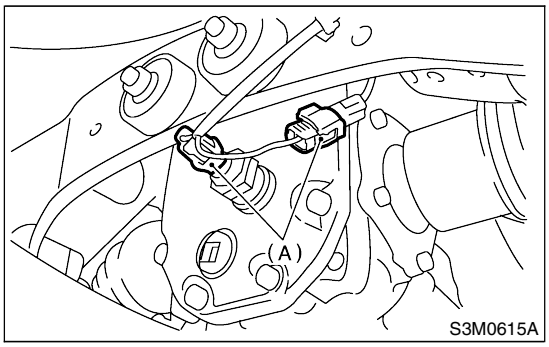
5) Take out filler plug, and replace gear oil if it is contaminated or deteriorated. <Ref. to DI-22 REPLACEMENT, Differential Gear Oil.>
6) Check gear oil level is up to the bottom part of filler bolt. If the level is low, refill up to the bottom of filler bolt.



(A) Filler plug
(B) Drain plug

B: REPLACEMENT S303150A20

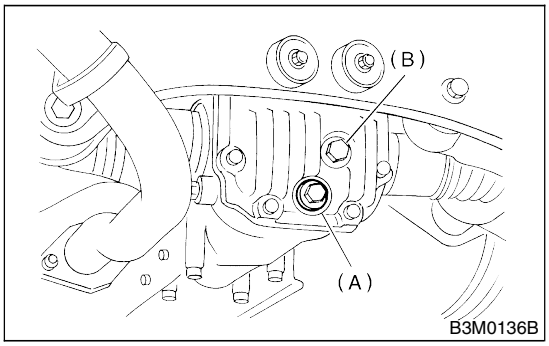
1) Disconnect ground terminal from battery.
2) Jack-up vehicle and support it with sturdy racks.
3) Disconnect oil temperature sensor connector (Turbo model for Europe).



(A) Connector

4) Remove the oil drain plug and filler plug, and drain the gear oil.

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



(A) Filler plug
(B) Drain plug

5) Tighten oil drain plug.

CAUTION:
- **Apply fluid packing to drain plug in T-type.**
- **VA-type uses a new aluminum gasket.**

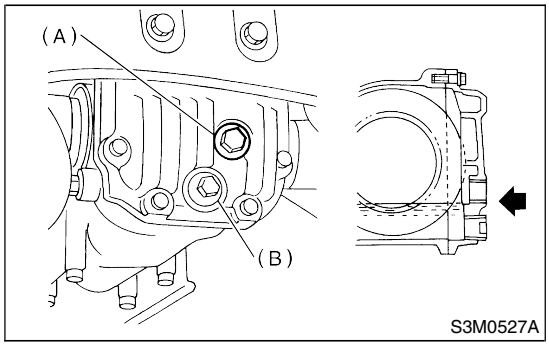
Fluid packing:
THREE BOND 1105 or equivalent

Tightening torque:
T-type;
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

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

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

Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)



(A) Filler plug
(B) Drain plug

7) Install filler plug.

CAUTION:
- **Apply fluid packing to drain plug in T-type.**
- **VA-type uses a new aluminum gasket.**

Fluid packing:
THREE BOND 1105 or equivalent

Tightening torque:
T-type;
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

8) Connector oil temperature sensor connector.

3. Front Differential S303152

A: NOTE S303152A15

1. AT MODEL S303152A1501

Refer to AUTOMATIC TRANSMISSION in separate publication “AUTOMATIC TRANSMISSION for Front Differential. (Pub No. G0853ZE)

2. MT MODEL S303152A1502

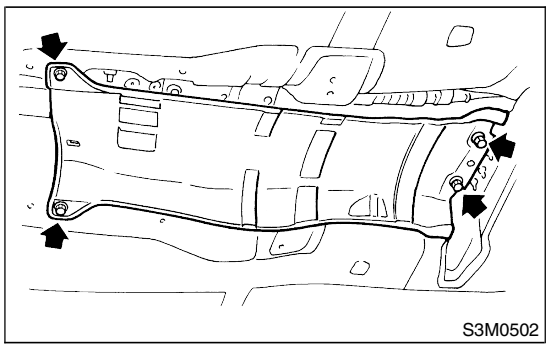
For front differential of manual transmission, refer to “MT” section. <Ref. to MT-92, Front Differential Assembly.>

4. Rear Differential for T-type

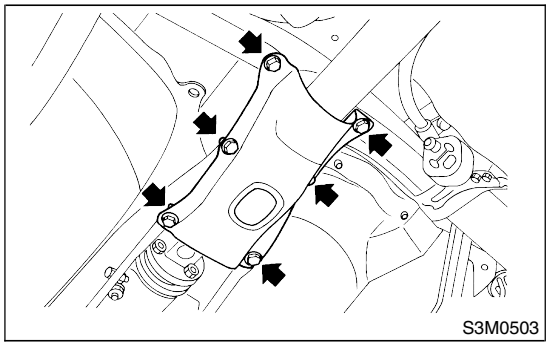
S303145

A: REMOVAL S303145A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen wheel nuts.
6) Jack-up vehicle and support it with sturdy racks.
7) Remove wheels.
8) Remove rear exhaust pipe and muffler.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
9) Remove front exhaust cover. (Non-Turbo model)

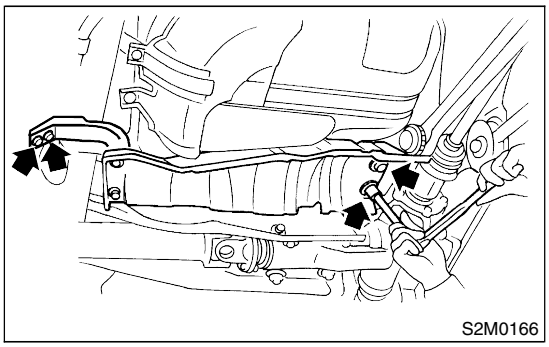

S3M0502

10) Remove front cover of rear differential mount.

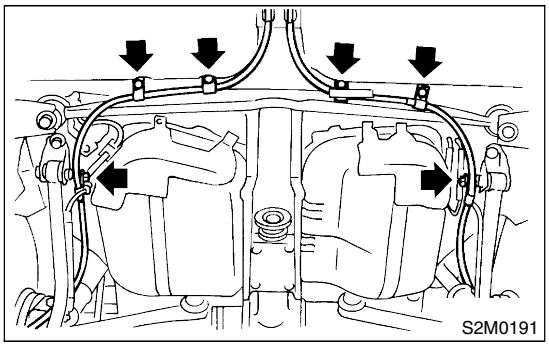

S3M0503

11) Remove propeller shaft.
<Ref. to DS-14, REMOVAL, Propeller Shaft.>

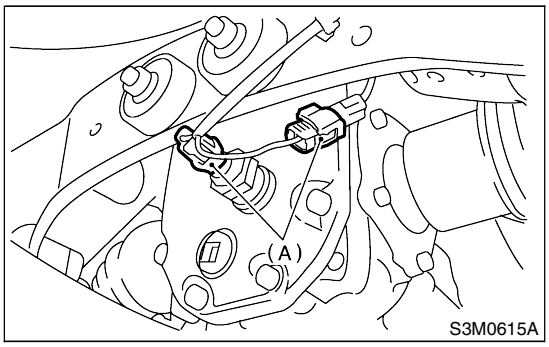
12) Remove heat sealed cover.


S2M0166

13) Remove clamps and bracket of parking brake cable.


S2M0191

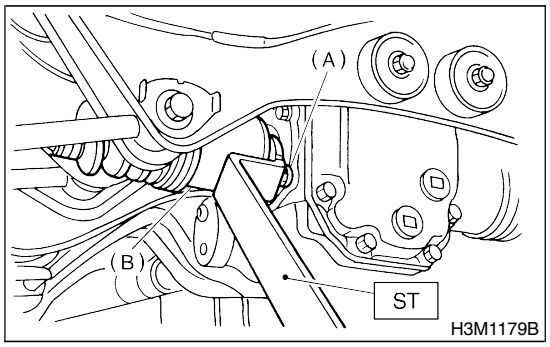
14) Disconnect connector from oil temperature sensor. (Turbo model for Europe)



S3M0615A

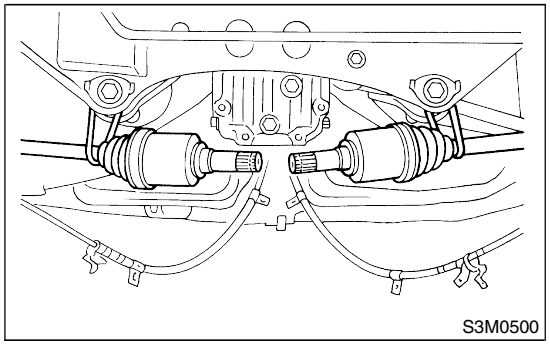
(A) Connector

15) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to DS-38, REMOVAL, Rear Drive Shaft.>
ST 28099PA100 DRIVE SHAFT REMOVER

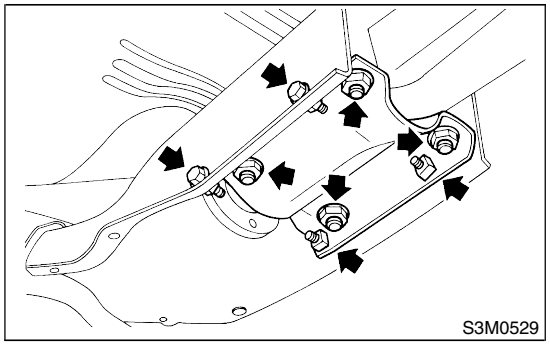


(A) Bolt
(B) DOJ

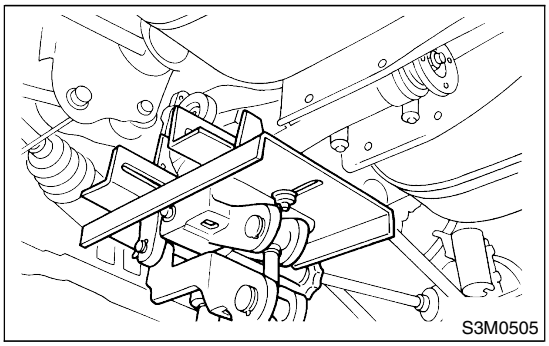
16) Secure rear drive shaft to rear crossmember using wire.



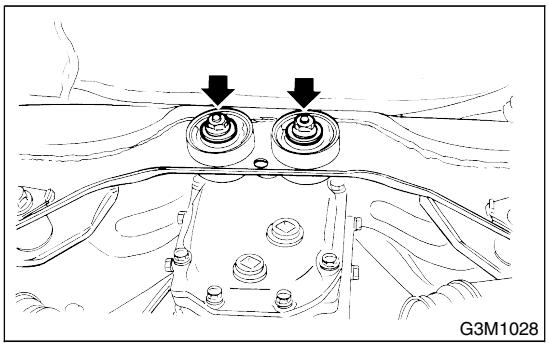
17) Remove lower differential bracket.



18) Support rear differential with transmission jack.

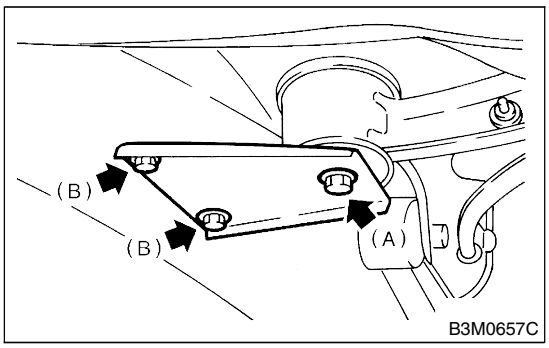


19) Remove self-locking nuts connecting rear differential to rear crossmember.



20) Remove bolts which secure rear differential front member to body.
(1) Loosen bolt A first, then remove bolts B.

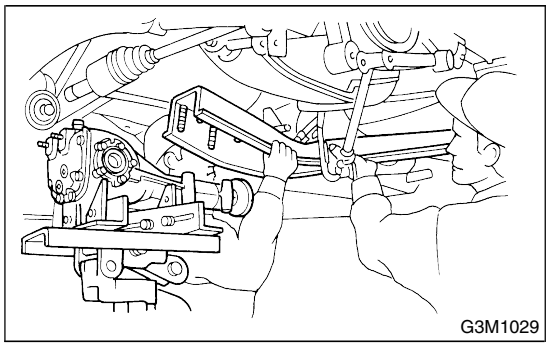
NOTE:
Support front member with a help of an assistant to prevent it from dropping.



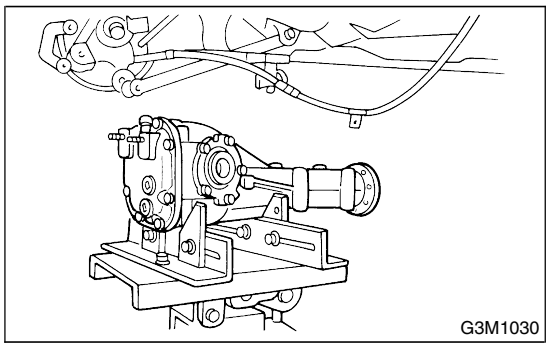
(A) Bolt A
(B) Bolt B

(2) Remove bolt A.

21) While slowly lowering transmission jack, move rear differential forward and remove bolts from rear crossmember.
22) Remove front member from body.


G3M1029

23) Remove rear differential from body.


G3M1030

B: INSTALLATION S303145A11

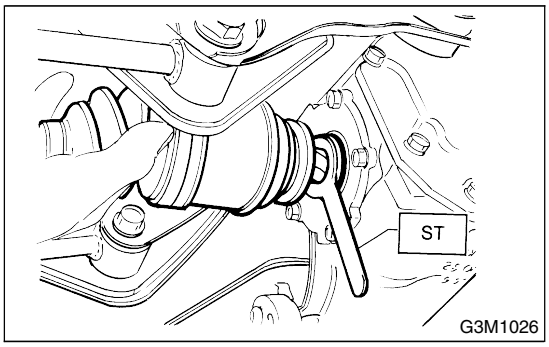
To install, reverse the removal sequence.
1) Install the air breather cap tapping with a plastic hammer.

CAUTION:
Be sure to install new air breather cap.

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

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

3) Install DOJ of rear drive shaft into rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



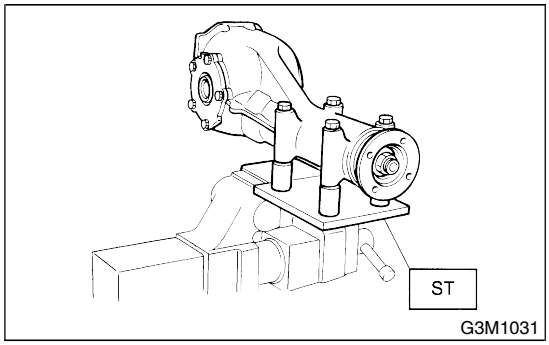
G3M1026

4) Install in the reverse order of removal.
5) After installing rear differential carrier on vehicle, remove filler plug and replenish gear oil up. <Ref. to DI-22, Differential Gear Oil.>
6) Connect connector to rear differential temperature sensor. (Turbo model for Europe)
7) If the results of the following inspections are not satisfactory, check rear differential temperature sensor and circuit. Then repair or replace if necessary.
(1) Check that rear differential temperature sensor warning light lights up when ignition switch is turned to on (engine stopped).
(2) Start engine, then check that the warning light goes off after a few seconds.

C: DISASSEMBLY S303145A06

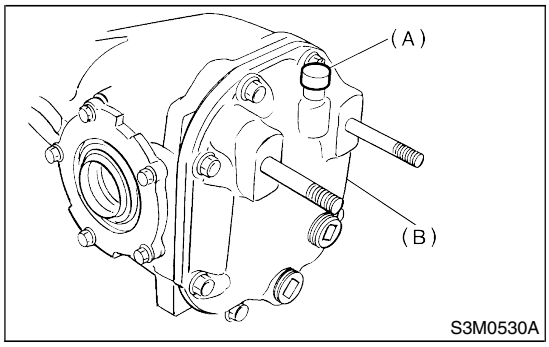
To detect real cause of trouble, inspect the following items before disassembling.
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

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



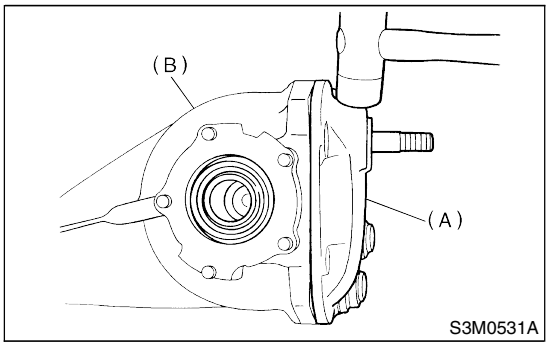
2) Drain gear oil by removing plug.
3) Remove the air breather cap.

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



(A) Air breather cap
(B) Rear cover

4) Remove rear cover by loosening retaining bolts.

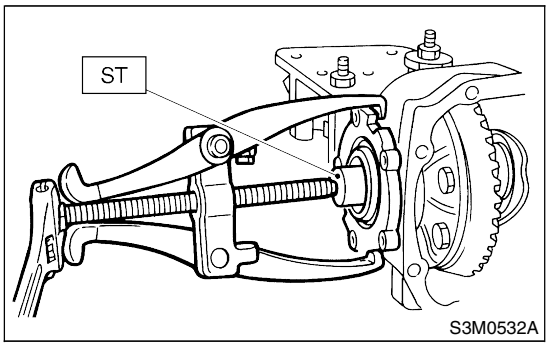


(A) Rear cover
(B) Differential carrier

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

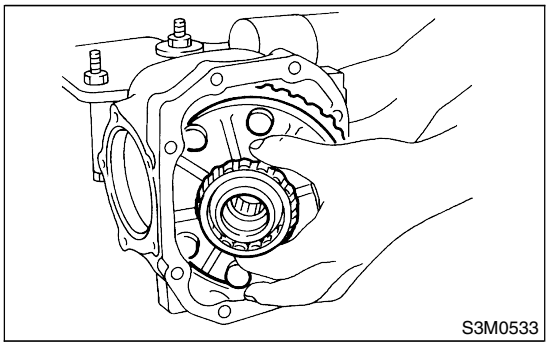
CAUTION:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT

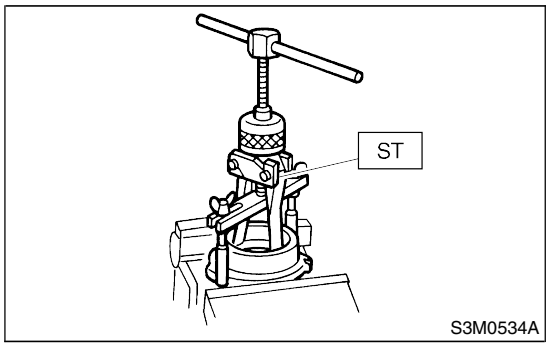


6) Pull out differential case assembly from differential carrier.

CAUTION:
Be careful not to hit the teeth against the case.



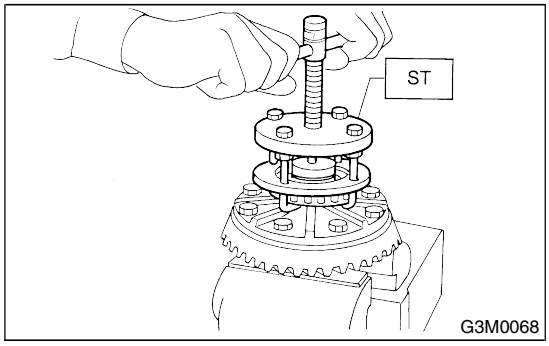
7) When replacing side bearing, pull bearing cup from side bearing retainer using ST.
ST 398527700 PULLER ASSY



8) Extract bearing cone with ST.

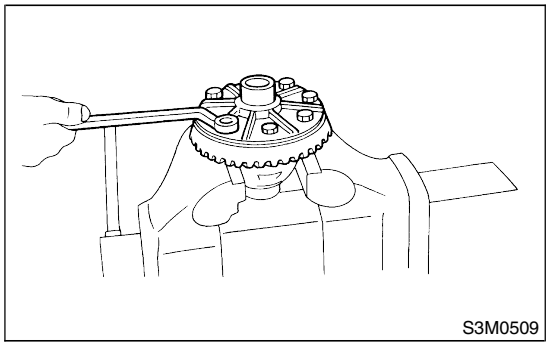
CAUTION:
Do not attempt to disassemble the parts unless necessary.

NOTE:
● Set puller so that its claws catch the edge of the bearing cone.
● Never mix up the right and left hand bearing races and cones.
ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

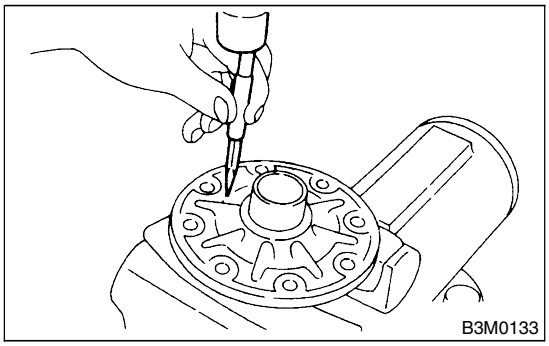
CAUTION:
Further disassembling is not allowed.



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

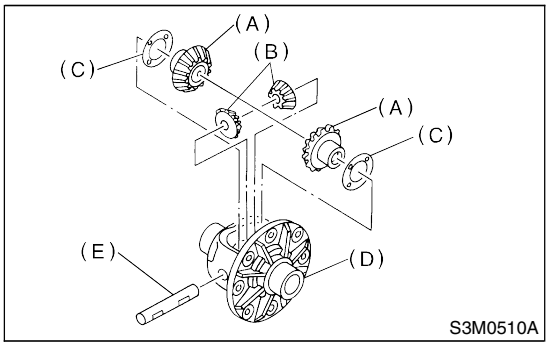
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



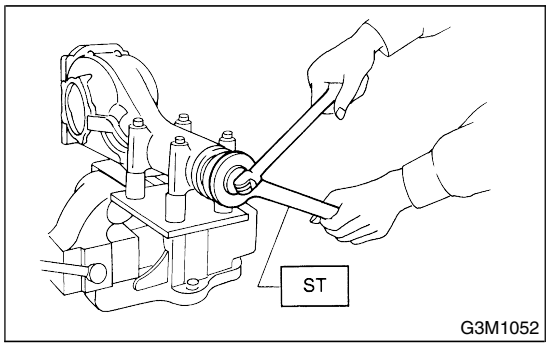
11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

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

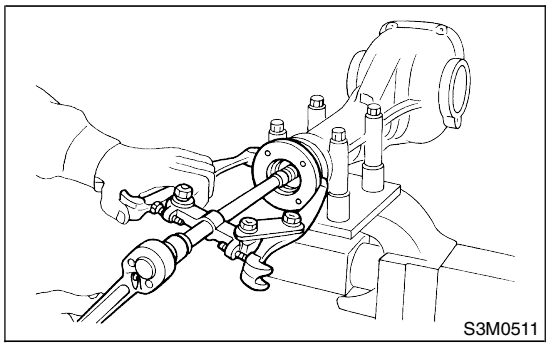


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

12) Hold companion flange with ST and remove drive pinion nut.
ST 498427200 FLANGE WRENCH



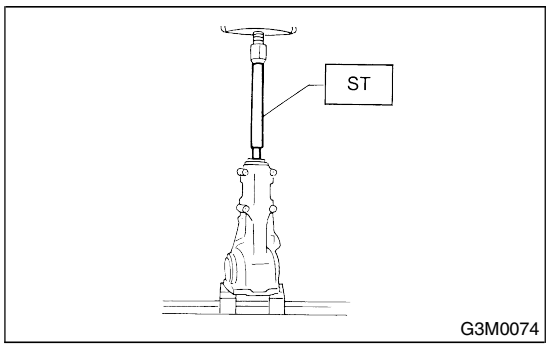
13) Extract the companion flange with a puller.



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

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

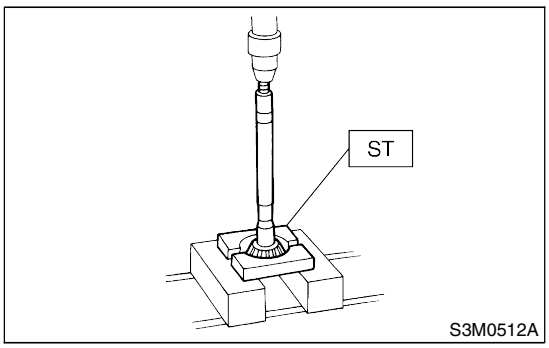
ST 398467700 DRIFT



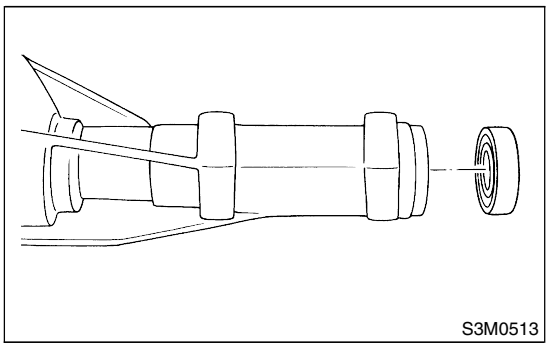
15) Remove rear bearing cone from drive pinion by supporting cone with ST.

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

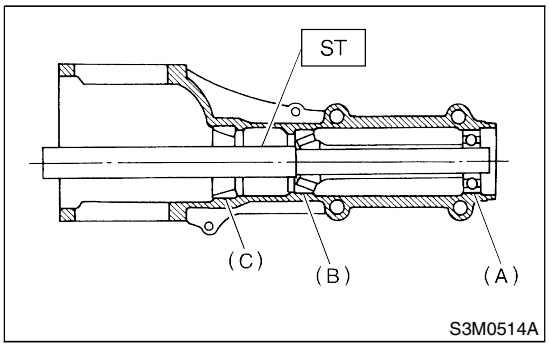
ST 398517700 REPLACER



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

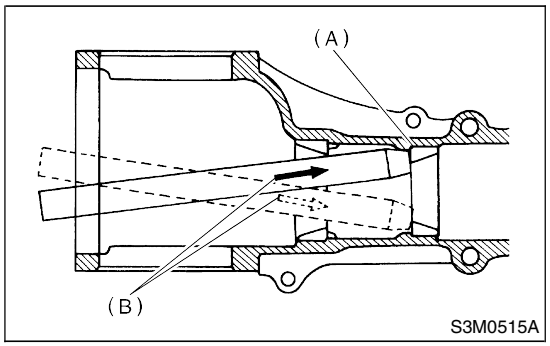


17) Remove pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



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

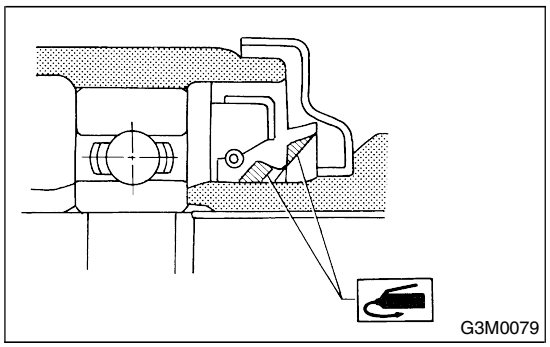
18) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



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

D: ASSEMBLY S303145A02

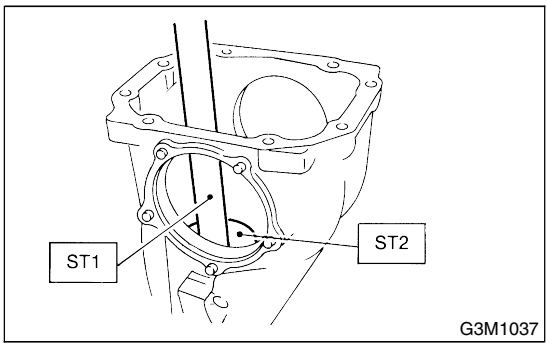
1) Precautions for assembling
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- For correct installation, keep the shims and washers in order.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil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



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

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

ST1 398477701 HANDLE
ST2 398477703 DRIFT 2

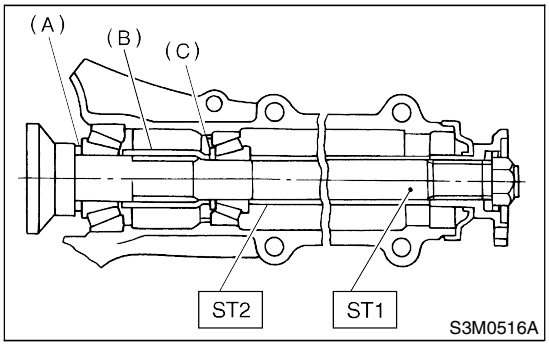


(2) Insert ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

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

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

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



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

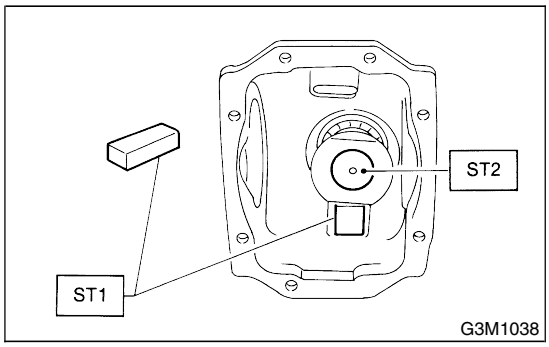
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

CAUTION:
Use a new lock nut.

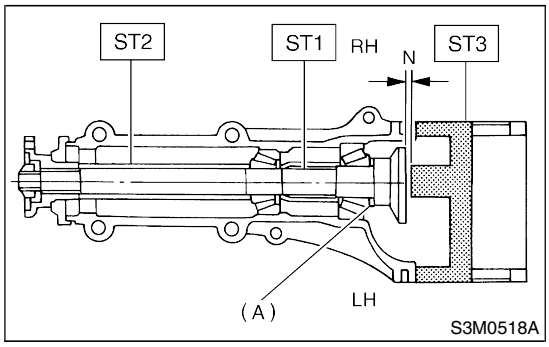
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kgf, 4.4 — 6.4 lb) at companion flange bolt hole
For used bearing: 8.34 — 16.67 N (0.85 — 1.7 kgf, 1.87 — 3.75 lb) at companion flange bolt hole



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

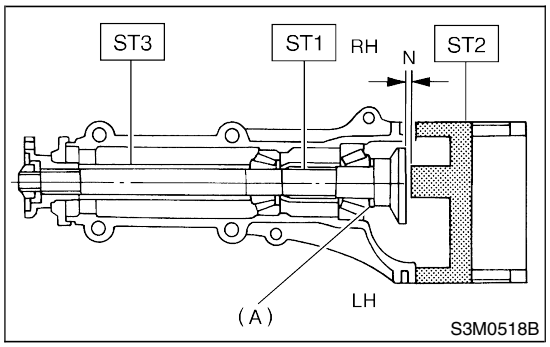
3) Adjusting drive pinion height
Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kgf, 4.4 — 6.4 lb) at companion flange bolt hole
For used bearing: 8.34 — 16.67 N (0.85 — 1.7 kgf, 1.87 — 3.75 lb) at companion flange bolt hole

Adjusting preload for front and rear bearings

NOTE:
At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before. Measure and record the thickness.
ST1 398507702 DUMMY SHAFT
ST2 398507701 GAUGE
ST3 398507703 DUMMY COLLAR

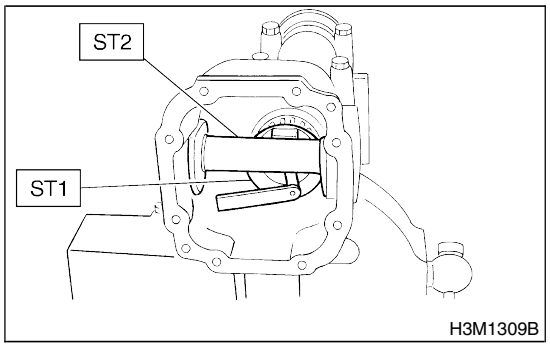


(A) Pinion height adjusting shim

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

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

ST1 398507702 DUMMY SHAFT
ST2 398507701 GAUGE



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

T = To + N − (H x 0.01) − 0.20 mm (0.0079 in)

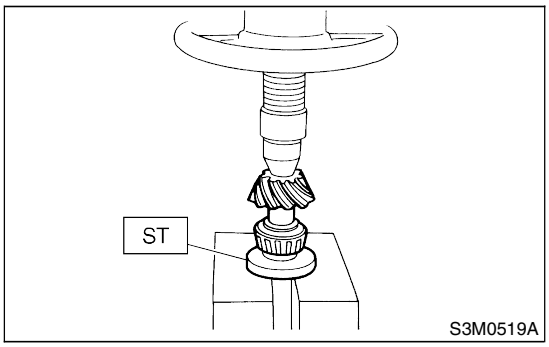
NOTE:
Use copies of this page.

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

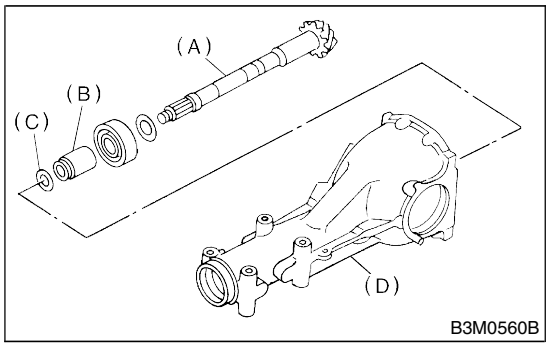
(Example of calculation)
To = 2.20 + 1.20 = 3.40 mm
N = 0.23 mm H = + 1,
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42
Result: Thickness = 3.42 mm
Therefore use the shim 383605200.

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

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER

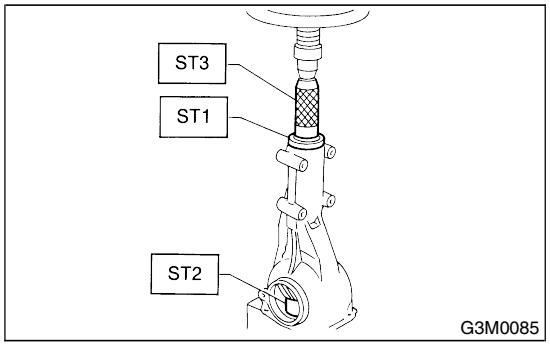


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

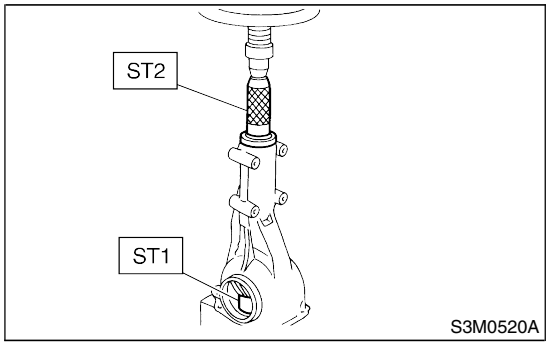


(A) Drive pinion
(B) Bearing adjusting spacer
(C) Washer
(D) Differential carrier

6) Press-fit front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



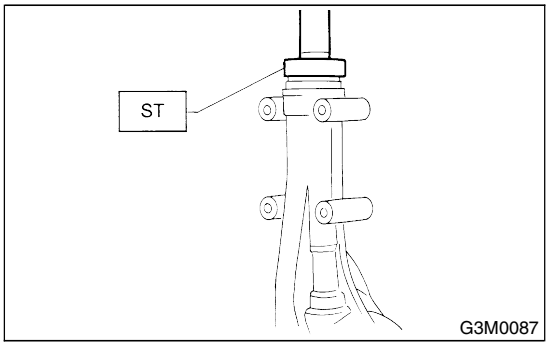
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

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

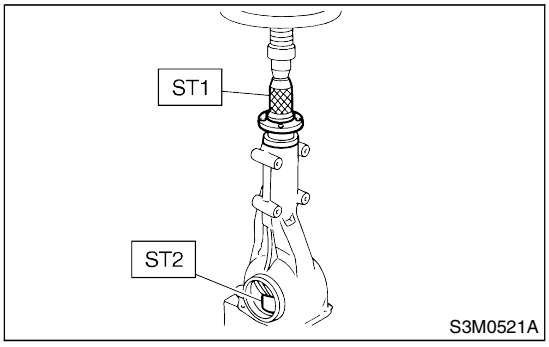
ST 498447120 INSTALLER



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

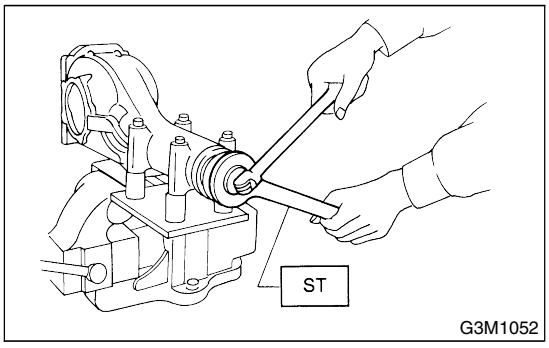
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



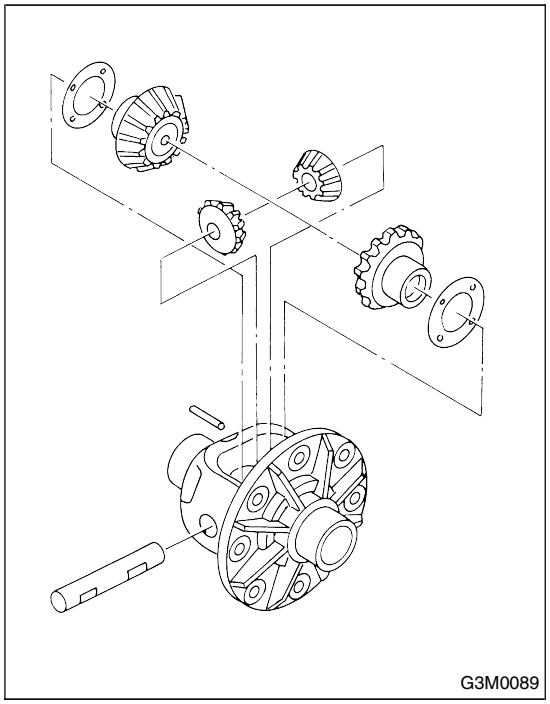
10) Install self-locking nut. Then tighten it with ST.
ST 498427200 FLANGE WRENCH

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



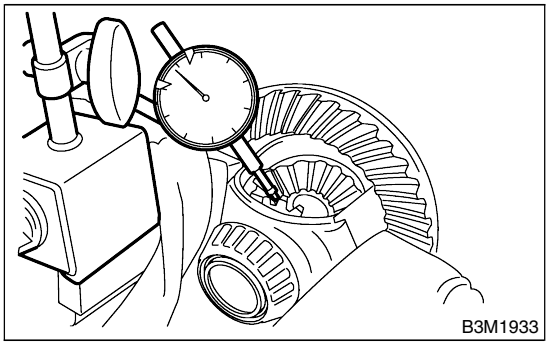
11) Assembling differential case
Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

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


G3M0089

(1) Measure the side gear backlash.

Side gear back clearance:
0.10 — 0.20 mm (0.0039 — 0.0079 in)


B3M1933

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

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)
383445204	0.90 — 0.95 (0.0354 — 0.0374)
383445205	0.95 — 1.00 (0.0374 — 0.0394)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After inserting pinion shaft lock pin into differential case, stake the both sides of the hole to prevent pin from falling off.

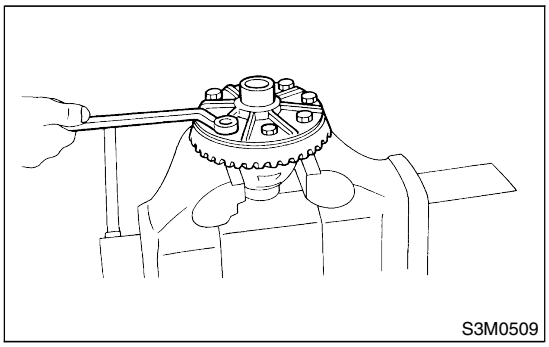
12) Install crown gear on differential case.

CAUTION:
Before installing bolts, apply Lock Tite to bolt threads.

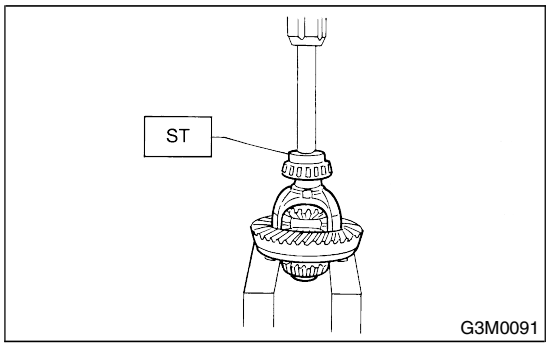
Lock Tite:
THREE BOND 1324 or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

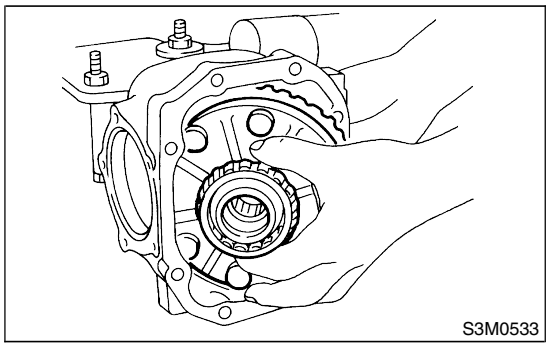
Tightening torque:
103 N·m (10.5 kgf-m, 76 ft-lb)


S3M0509

13) Press side bearing cone onto differential case with ST.
ST 398487700 DRIFT



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



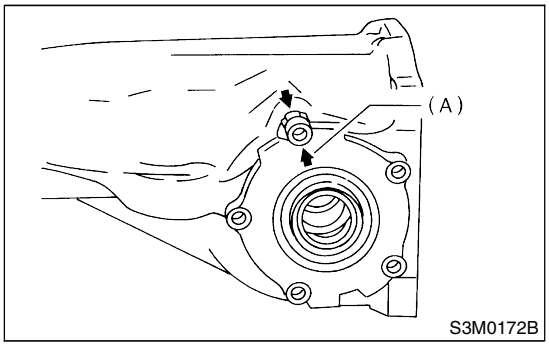
(3) Install side retainer shims and O-rings to the left and right retainers from which they were removed.

NOTE:
- Replace broken or cracked O-ring with new one.
- Replace broken or corroded side retainer shim with new one of same thickness.

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

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

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



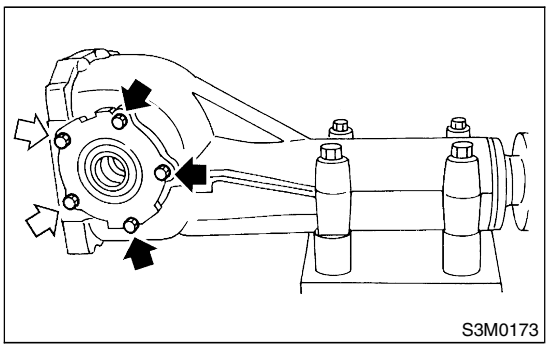
(A) Arrow mark

(5) Tighten side bearing retainer bolts.

CAUTION:
Before tightening the two side bearing retainer bolts, apply Lock Tite to bolt threads.

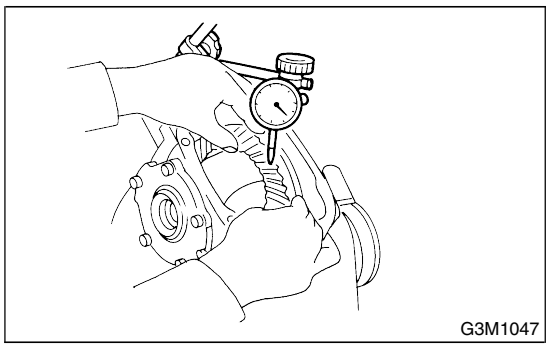
⇨ ***Lock Tite:***
THREE BOND 1105 or equivalent

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



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

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

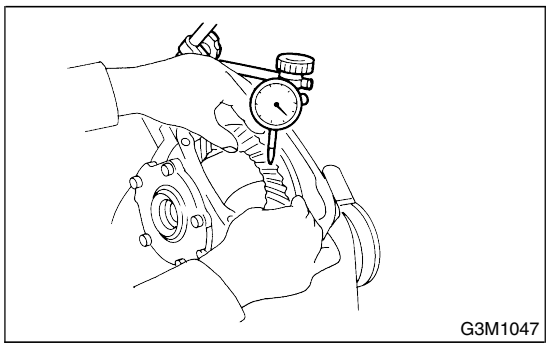

G3M1047

(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

Turning resistance increase:
2.9 — 10.8 N (0.3 — 1.1 kgf, 0.7 — 2.4 lb)

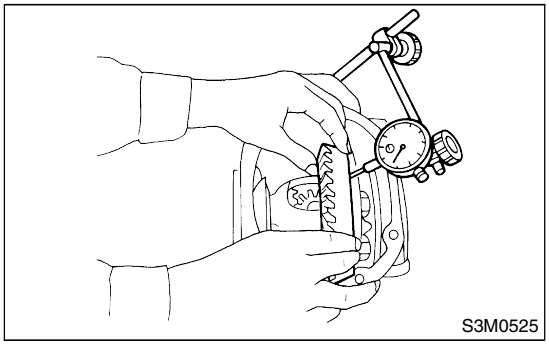
15) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)


G3M1047

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

Limit of runout:
Less than 0.05 mm (0.0020 in)


S3M0525

17) Checking and adjusting tooth contact of crown gear

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

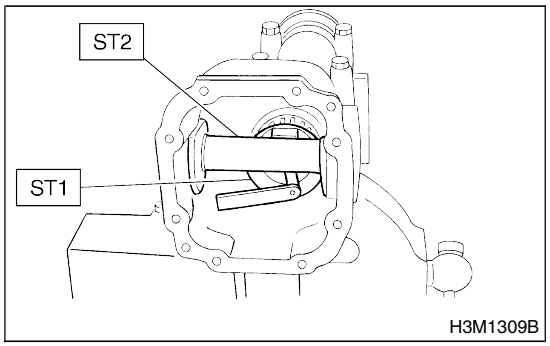
(2) When the contact pattern is incorrect, readjust according to the instructions given in “TOOTH CONTACT PATTERN”.

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

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

(1) Drive pinion height

ST1 398507702 DUMMY SHAFT
ST2 398507701 GAUGE



T = To + N − (H x 0.01) − 0.20 (mm)

Where:

T = Thickness of pinion height adjusting shim (mm)

To = Thickness of shim temporarily inserted (mm)

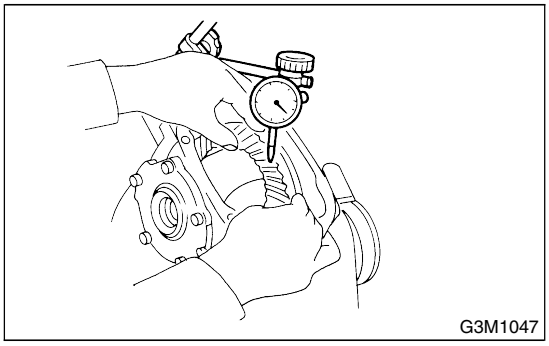
N = Reading of thickness gauge (mm)

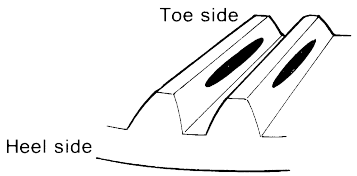
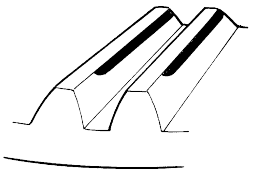
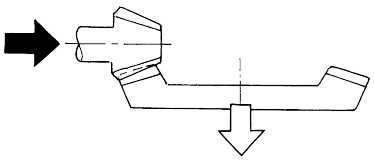
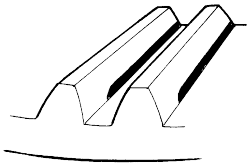
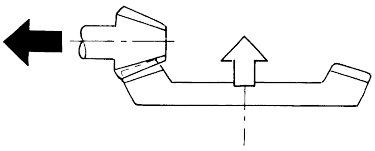
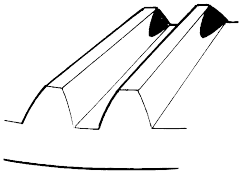
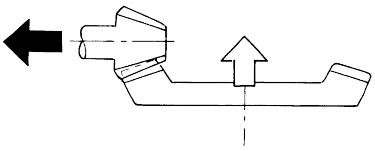
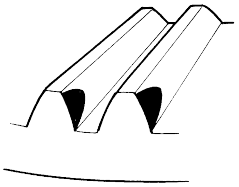
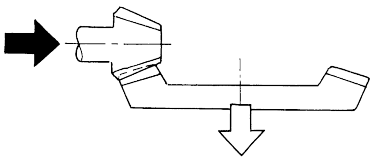
H = Figure marked on drive pinion head

(2) Hypoid gear backlash

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



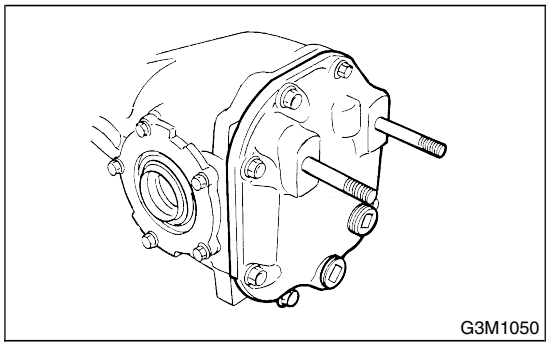
TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 G3M0098A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  G3M0098B	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.  G3M0098F
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  G3M0098C	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  G3M0098G
Toe contact Contact area is small.	This may cause chipping at toe ends.  G3M0098D	Adjust as for flank contact.  G3M0098G
Heel contact Contact area is small.	This may cause chipping at heel ends.  G3M0098E	Adjust as for face contact.  G3M0098F

➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear

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

CAUTION:
Securely connect ground terminal of rear differential temperature sensor.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)


G3M1050

E: INSPECTION S303145A10

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.
1) Crown gear and drive pinion
● If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.
● If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
● Replace if crack, score, or other defects are evident on tooth surface.
● Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.
3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.
4) Thrust washers of side gear and pinion mate gear
Replace if seizure, flaw, abnormal wear or other defect is evident.
5) Oil seal
Replace if deformed or damaged, and at every disassembling.
6) Differential carrier
Replace if the bearing bores are worn or damaged.
7) Differential case
Replace if its sliding surfaces are worn or cracked.
8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.
9) Rear differential oil temperature sensor (Turbo model for Europe)
If the results of the following inspections are not satisfactory, replace rear differential temperature sensor.
(1) At room temperature, check for continuity between the sensor terminal and body.
(2) Soak the sensor in oil, then raise the oil temperature. Check that the continuity is cut off when the oil temperature is between 144°C (291°F) and 156°C (313°F). Then, check that the continuity resumes by the time the oil temperature drops to 135°C (275°F).

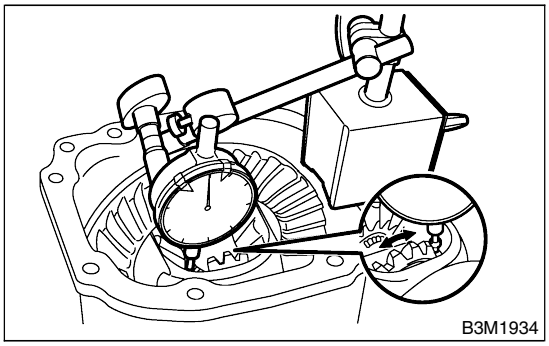
CAUTION:
The oil is hot, so be careful not to burn yourself when inspecting.

1. SIDE GEAR BACKLASH S303145A1001

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

Side gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

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

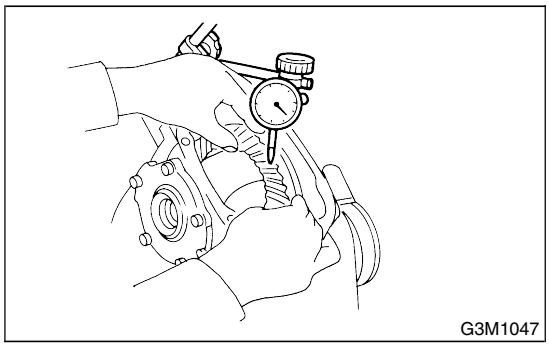

B3M1934

2. CROWN GEAR BACKLASH S303145A1002

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

Crown gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

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

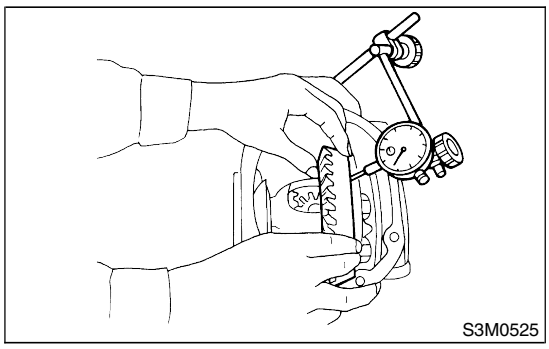

G3M1047

3. CROWN GEAR RUNOUT S303145A1003

Using a dial gauge, check the crown gear runout.

Crown gear runout:
Less than 0.05 mm (0.0020 in)

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


S3M0525

4. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION S303145A1004

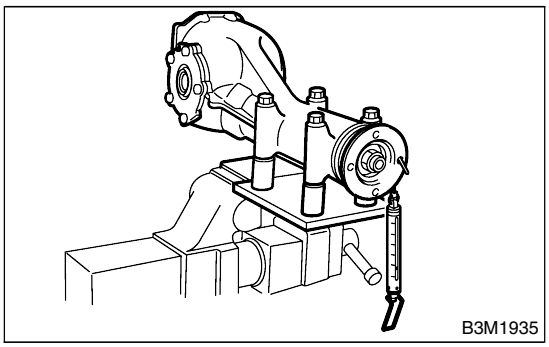
Inspect tooth contact between crown gear and driven pinion. <Ref. to DI-31 ASSEMBLY, Differential for T-type.>

5. TOTAL PRELOAD S303145A1005

Using a gauge, check the turning resistance increase.

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

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


B3M1935

F: ADJUSTMENT S303145A01

1. SIDE GEAR BACKLASH A303145A0101

Adjust side gear backlash.
<Ref. to DI-31 ASSEMBLY, Differential for T-type.>

2. CROWN GEAR BACKLASH A303145A0102

Adjust crown gear backlash.
<Ref. to DI-31 ASSEMBLY, Differential for T-type.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION A303145A0103

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

4. TOTAL PRELOAD A303145A0104

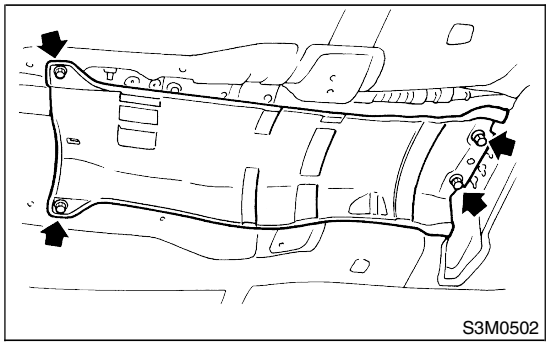
Adjust side bearing shim.
<Ref. to DI-31 ASSEMBLY, Differential for T-type.>

5. Rear Differential for VA-type

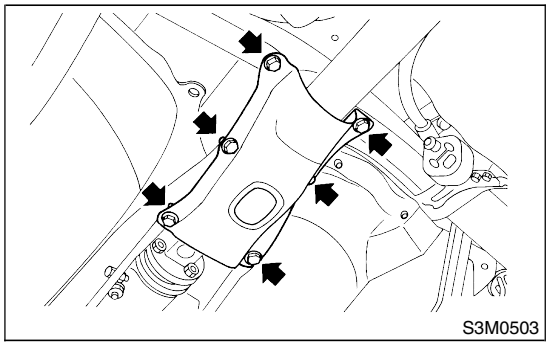
S303151

A: REMOVAL S303151A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen wheel nuts.
6) Jack-up vehicle and support it with sturdy racks.
7) Remove wheels.
8) Remove rear exhaust pipe and muffler.
With OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
9) Remove front exhaust cover.

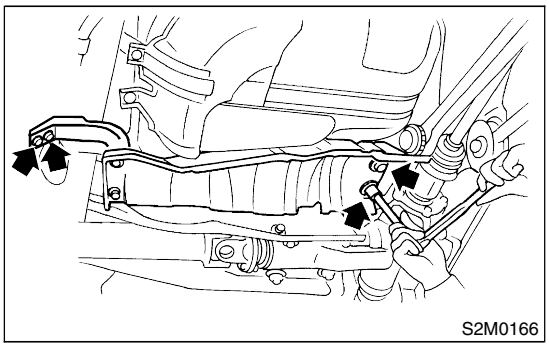

S3M0502

10) Remove front cover of rear differential mount.

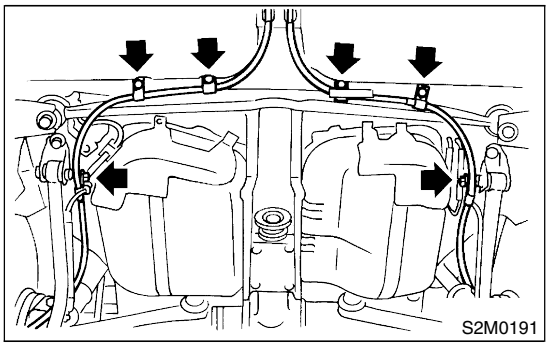

S3M0503

11) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>

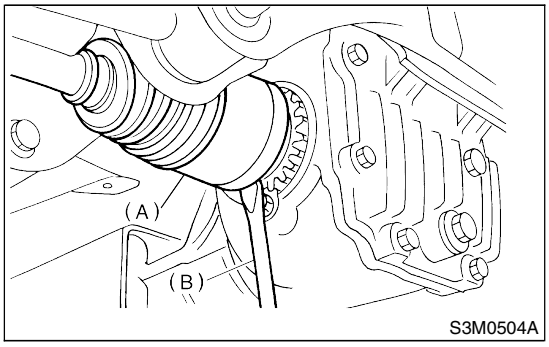
12) Remove heat sealed cover.


S2M0166

13) Remove clamps and bracket of parking brake cable.


S2M0191

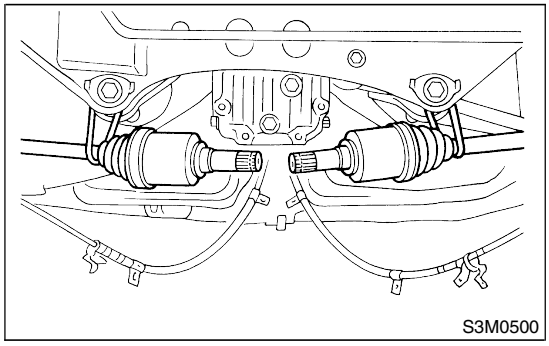
14) Remove DOJ of rear drive shaft from rear differential. <Ref. to DS-38, REMOVAL, Rear Drive Shaft.>



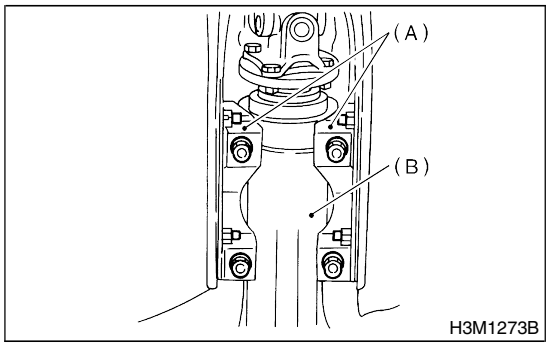
S3M0504A

(A) DOJ
(B) Tire lever

15) Secure rear drive shaft to rear crossmember using wire.


S3M0500

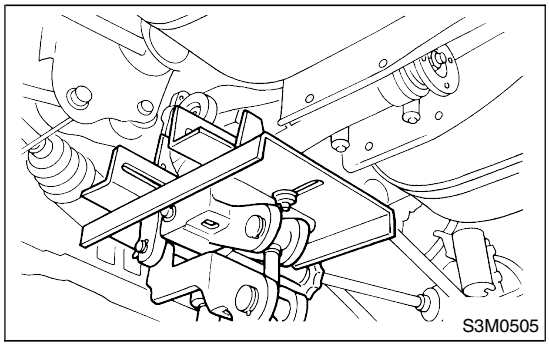
16) Remove lower differential bracket.



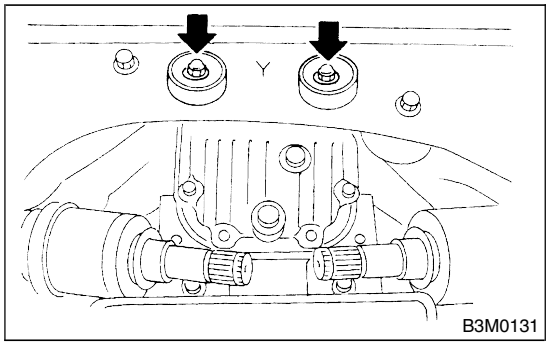
H3M1273B

(A) Lower differential bracket
(B) Rear differential

17) Support rear differential with transmission jack.

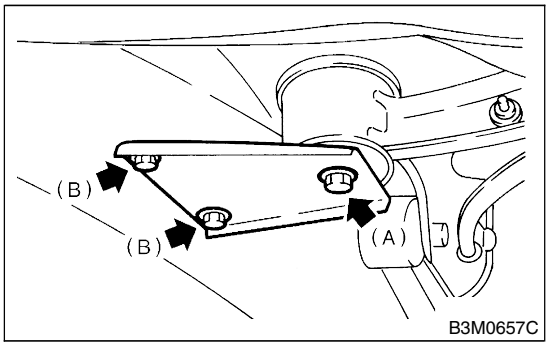

S3M0505

18) Remove self-locking nuts connecting rear differential to rear crossmember.


B3M0131

19) Remove bolts which secure rear differential front member to body.
(1) Loosen bolt A first, then remove bolts B.

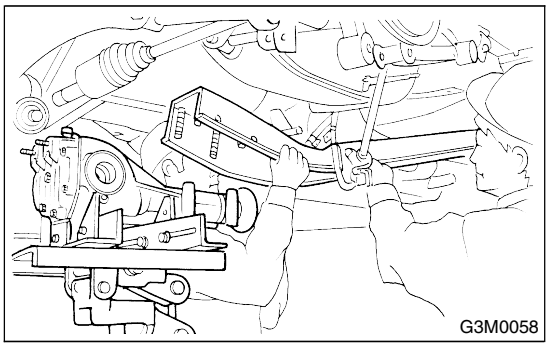
NOTE:
Support front member with a help of an assistant to prevent it from dropping.



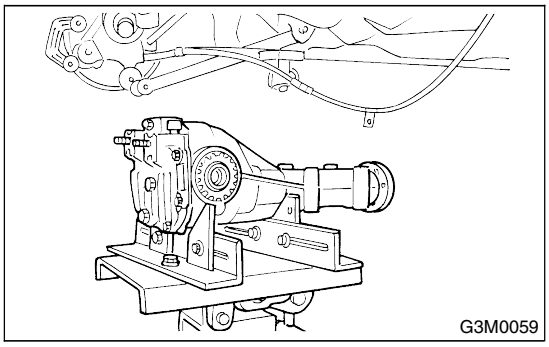
B3M0657C

(A) Bolt A
(B) Bolt B

(2) Remove bolt A.
20) While slowly lowering transmission jack, move rear differential forward and remove bolts from rear crossmember.
21) Remove front member from body.


G3M0058

22) Remove rear differential from body.

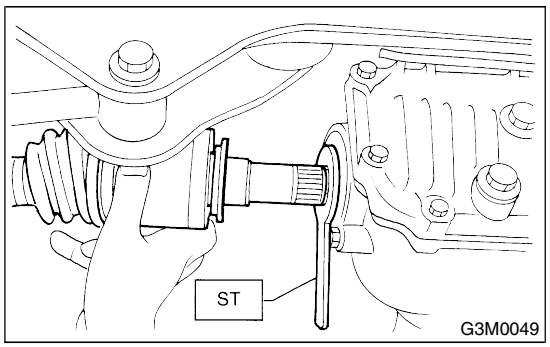

G3M0059

B: INSTALLATION S303151A11

To install, reverse the removal sequence.
1) Position front member on body by passing it under parking brake cable and securing to rear differential.

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

2) Install DOJ of rear drive shaft into rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

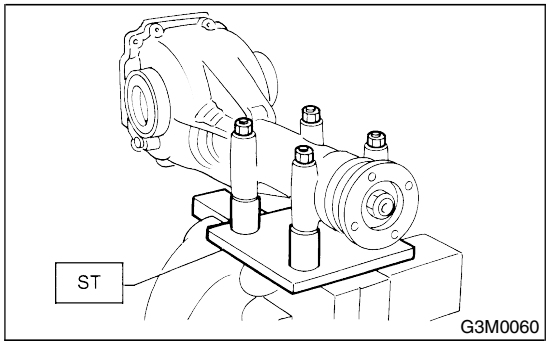


3) Install in the reverse order of removal.
4) After installation, fill differential carrier with gear oil. <Ref. to DI-22, Differential Gear Oil.>

C: DISASSEMBLY S303151A06

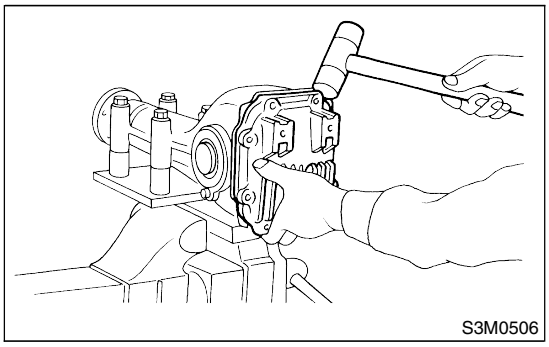
To detect real cause of trouble, inspect the following items before disassembling.
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

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



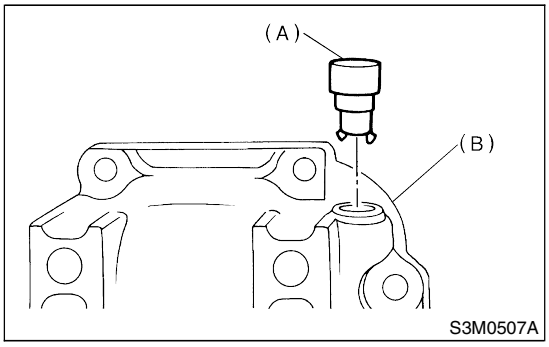
2) Drain gear oil by removing plug.

3) Remove rear cover by loosening retaining bolts.



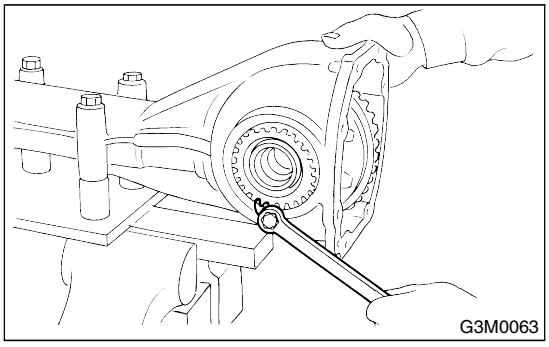
4) Replace air breather cap.

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

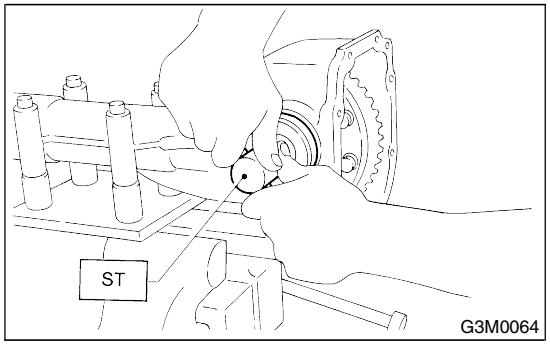


(A) Air breather cap
(B) Rear cover

5) Remove right and left lock plates.

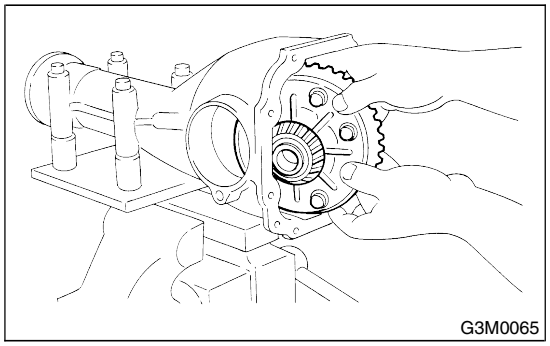


6) Remove right and left holders with ST.
ST 399780111 WRENCH

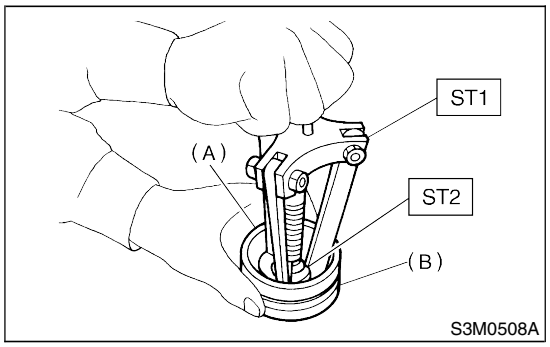


7) Pull out differential assembly from differential case.

CAUTION:
Be careful not to hit the teeth against the case.



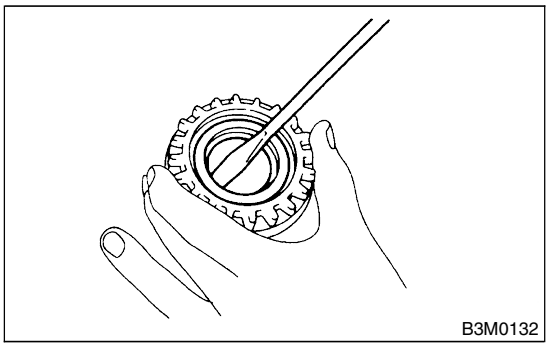
8) Remove bearing race from right and left holders with ST1 and ST2.
ST1 499705401 PULLER ASSY
ST2 499705404 OUTER RACE PULLER SEAT



(A) Bearing race
(B) Holder

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

CAUTION:
Perform this operation only when changing oil seal.

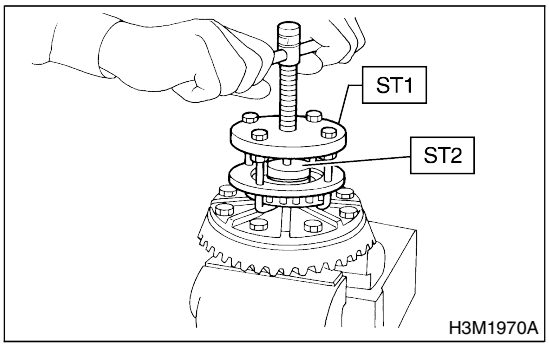


10) Extract bearing cone with ST1 and ST2.

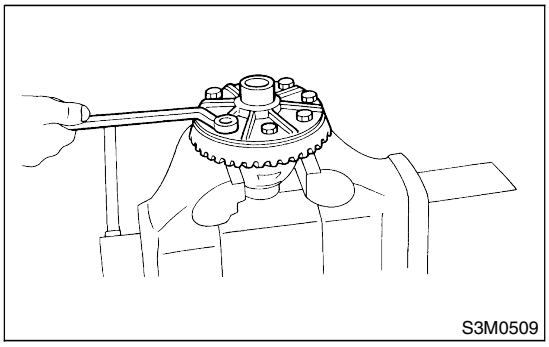
CAUTION:
Do not attempt to disassemble the parts unless necessary.

NOTE:
● Set Puller so that its claws catch the edge of the bearing cone.
● Never mix up the right and left hand bearing races and cones.

ST1 899524100 PULLER SET
ST2 399520105 SEAT



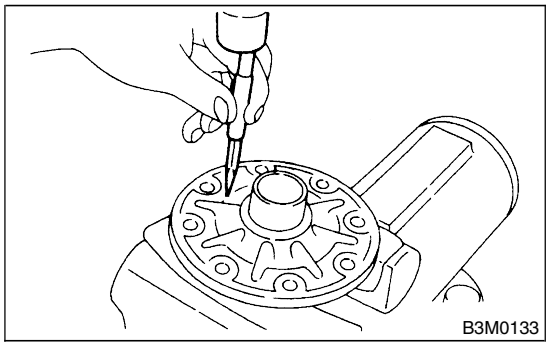
11) Remove crown gear by loosening crown gear bolts.



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

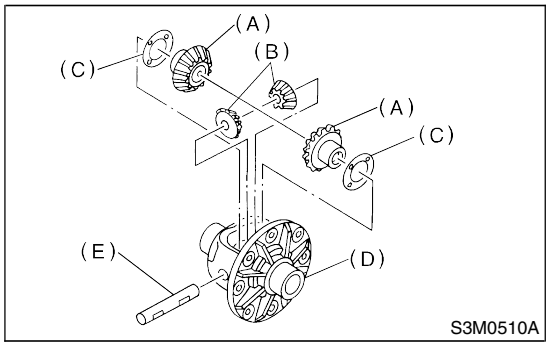
NOTE:
The lock pin is staked at the pin hole end on the differential case; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



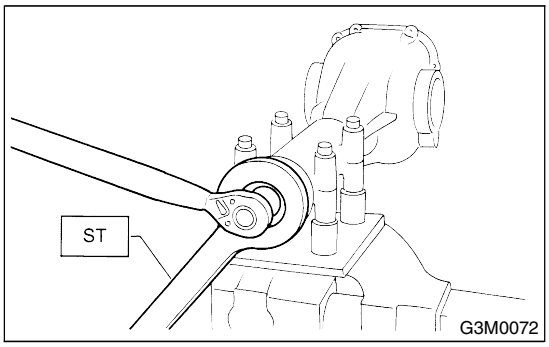
13) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

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

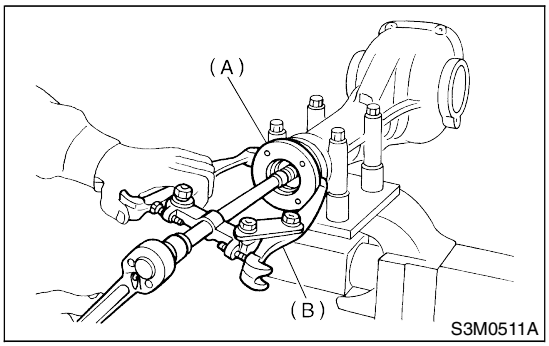


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

14) Hold companion flange with ST and remove self-locking nut.
ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.

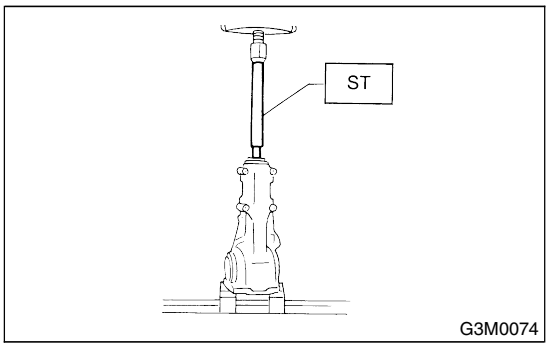


(A) Companion
(B) Puller

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

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

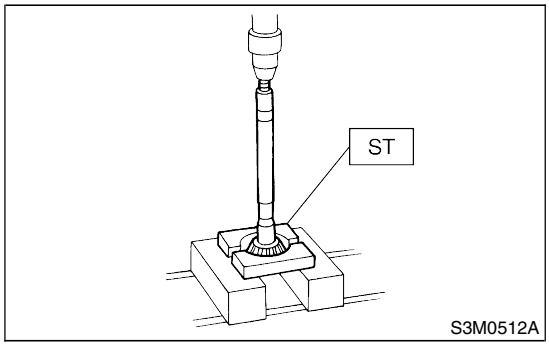
ST 398467700 DRIFT



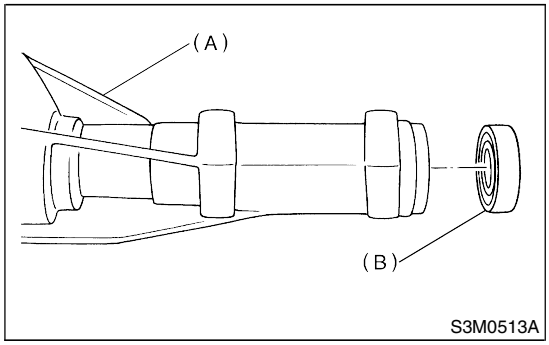
17) Remove rear bearing cone from drive pinion by supporting cone with ST.

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

ST 498515500 REPLACER

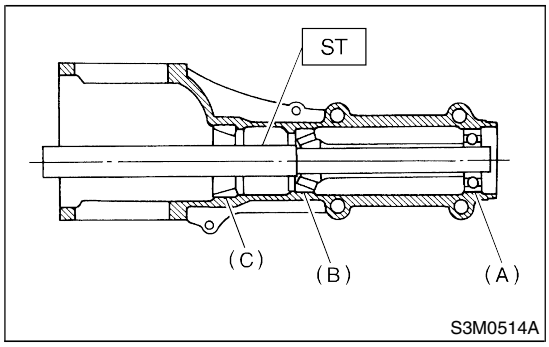


18) Remove front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



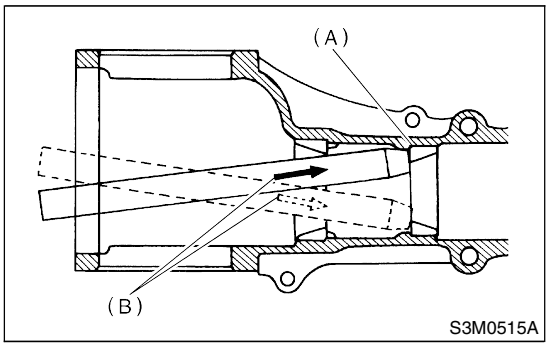
(A) Differential carrier
(B) Front oil seal

19) Remove pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



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

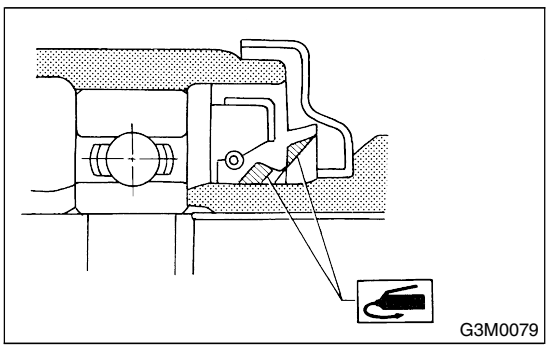
20) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



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

D: ASSEMBLY S303151A02

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



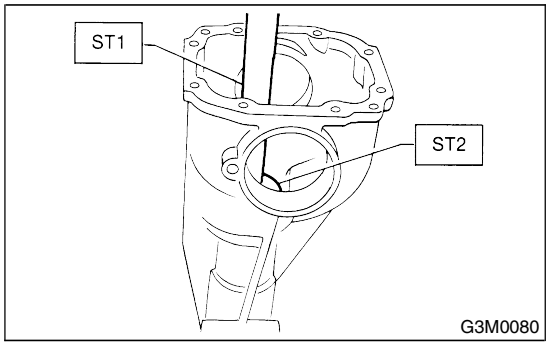
2) Adjust preload for front and rear bearings.
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

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

ST1 398477701 HANDLE
ST2 398477702 DRIFT

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

ST1 398477701 HANDLE
ST2 498447110 DRIFT



(3) Insert front bearing cone.

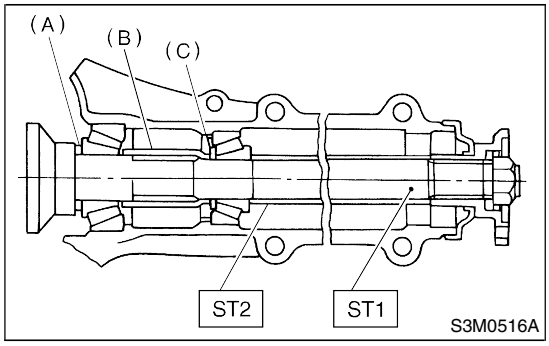
CAUTION:
Use a new front bearing cone.

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

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

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

ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR



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

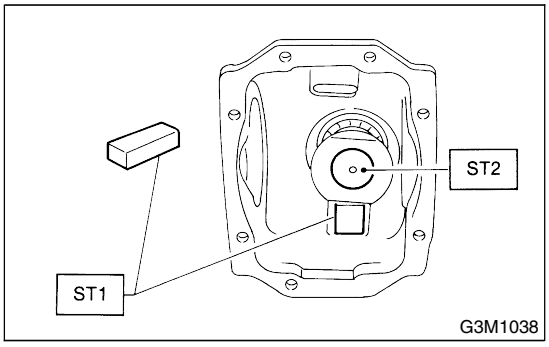
(6) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

CAUTION:
Use a new self-locking nut.

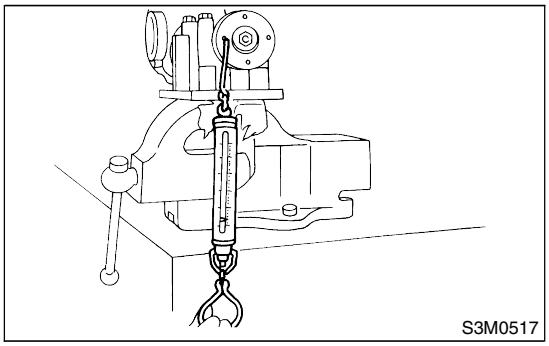
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

ST1 398507704 BLOCK
ST2 498447150 DUMMY SHAFT

Tightening torque:
188 N·m (19.2 kgf-m, 139 ft-lb)



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



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

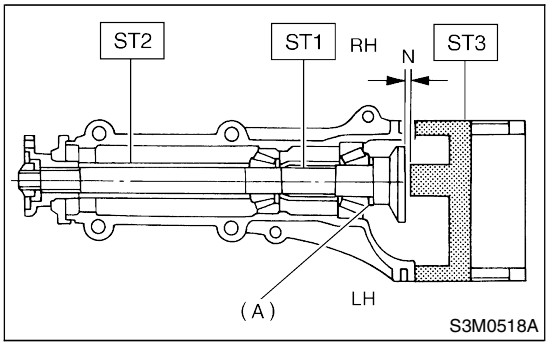
3) Adjusting drive pinion height
Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings

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

Adjusting preload for front and rear bearings

NOTE:
At this time, install an original pinion height adjusting shim.
ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR
ST3 498505501 DIFFERENTIAL CARRIER GAUGE

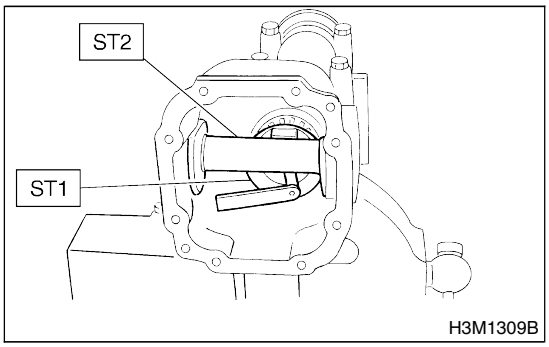


(A) Pinion height adjusting shim

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

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

ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE



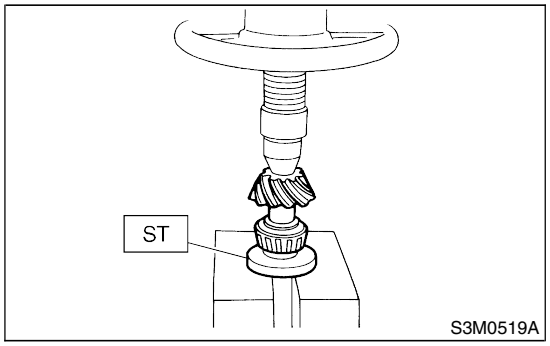
(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed shim with this one.

NOTE:
Use 1 to 3 shims as required for adjustment.

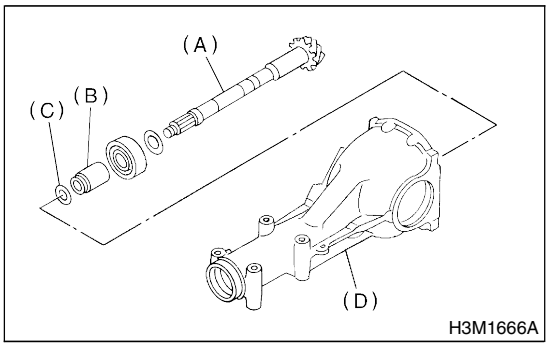
T = To + N – 0.05 (mm)
where
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim originally installed (mm)
N = Reading of thickness gauge (mm)
H = Figure marked on drive pinion head
(Example of calculation)
To = 0.15 mm
N = 0.1 mm
T = 0.15 + 0.1 – 0.05 = 0.2 mm
Result: Thickness = 0.2 mm
Therefore use the 32295AA220.

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

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 498175500 INSTALLER

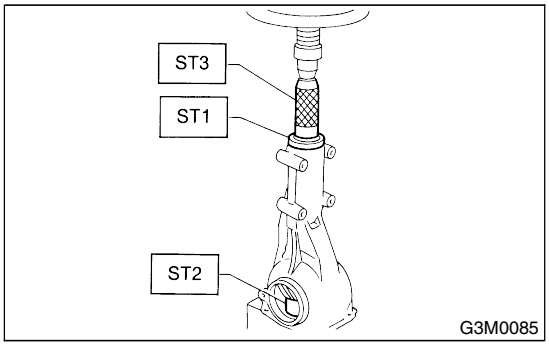


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

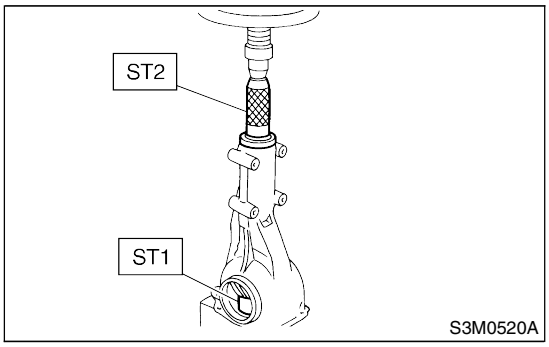


(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Bearing preload adjusting washer
(D) Differential carrier

6) Press-fit front bearing cone into carrier with ST1, ST2 and ST3.
ST1 32285AA000 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



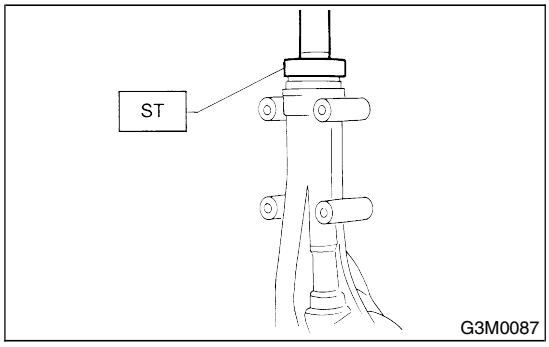
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

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

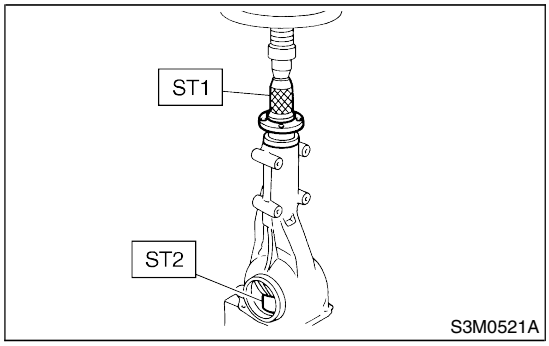
ST 498447120 OIL SEAL INSTALLER



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

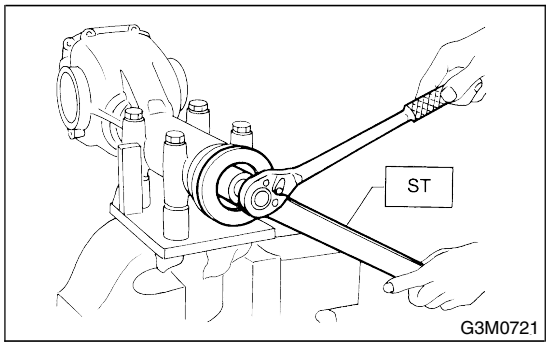
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



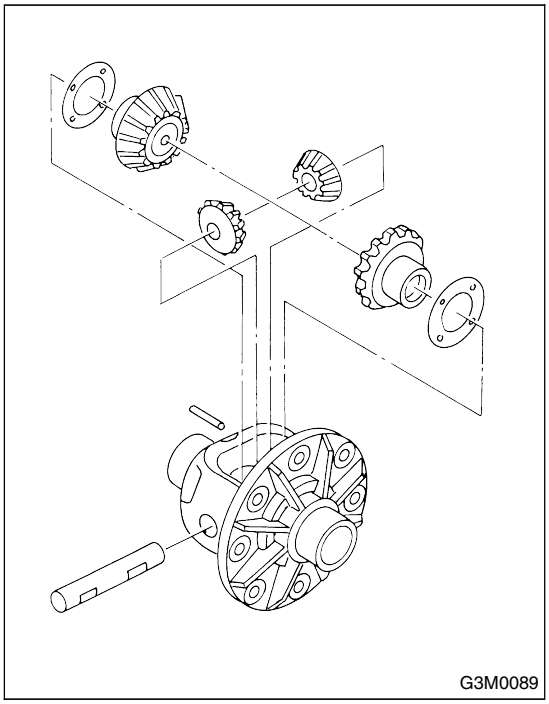
10) Install self-locking nut. Then tighten it with ST.
ST 398427200 FLANGE WRENCH

Tightening torque:
188 N·m (19.2 kgf-m, 139 ft-lb)



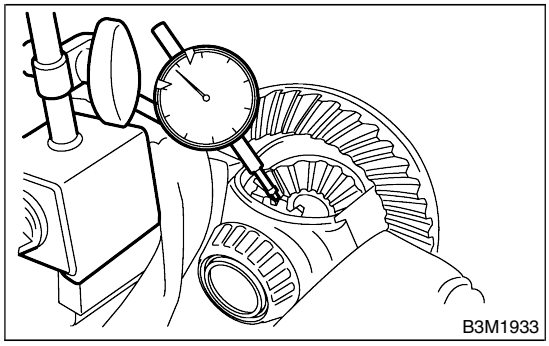
11) Assembling differential case
Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

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



(1) Measure the side gear backlash.

Side gear back clearance:
0.05 — 0.15 mm (0.0020 — 0.0059 in)



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

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

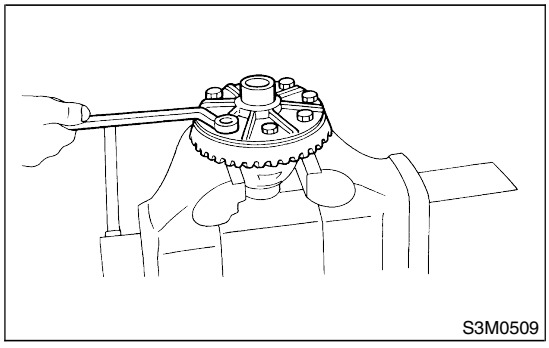
(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.
(5) Install crown gear on differential case.

CAUTION:
Before installing bolts, apply Lock Tite to bolt threads.

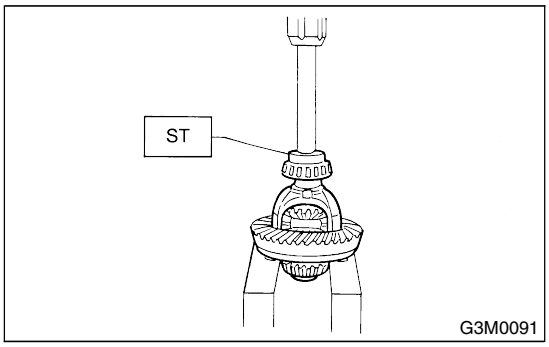
Lock Tite
THREE BOND 1324 or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

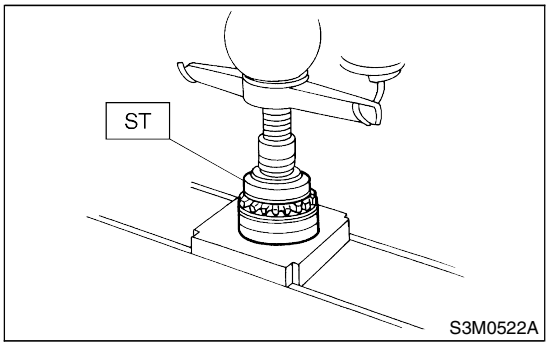
Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)



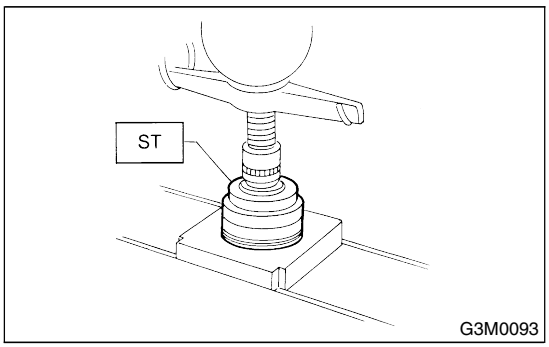
12) Press side bearing cone onto differential case with ST.
ST 498485400 DRIFT



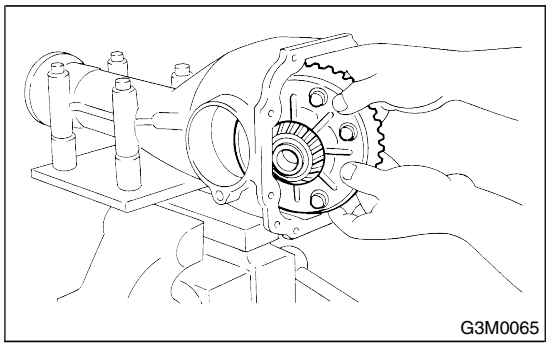
13) Assemble holders.
(1) Install oil seal into right and left holders.
ST 498447100 INSTALLER



(2) Install bearing race into right and left holders.
ST 398477702 DRIFT



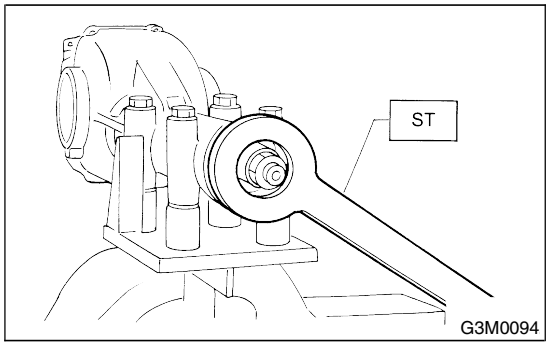
(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.


G3M0065

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

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

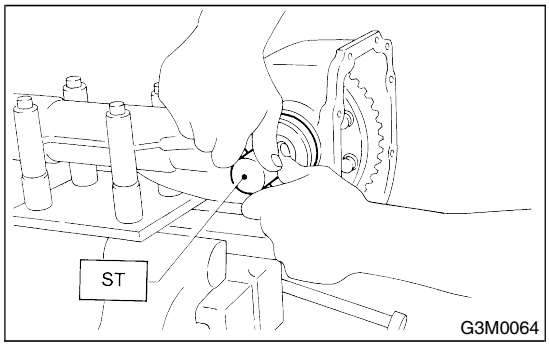
ST 498427200 FLANGE WRENCH



G3M0094

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

ST 399780111 WRENCH



G3M0064

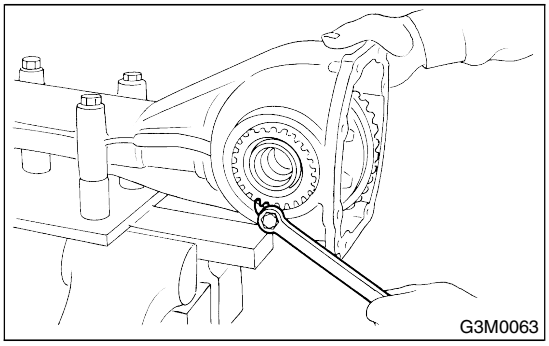
(3) Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth).

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

This + 1/2 tooth gives preload.

(4) Temporarily tighten lock plate.

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

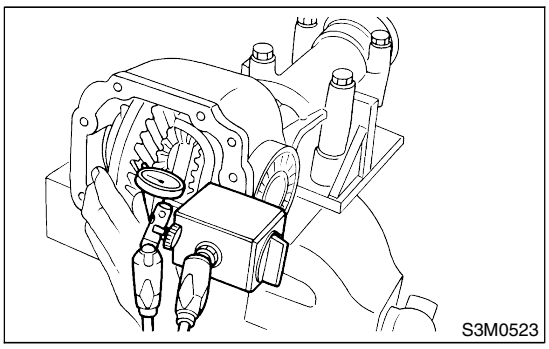

G3M0063

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

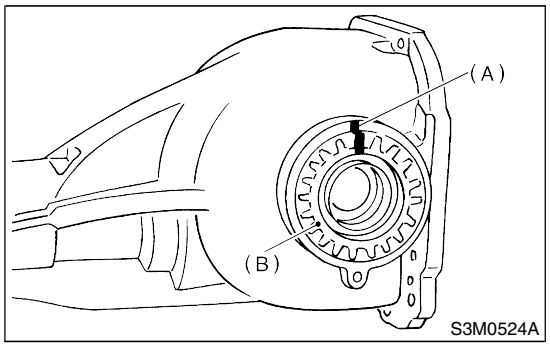
NOTE:
If measured backlash is not within specified range, repeat procedures for pinion crown gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)


S3M0523

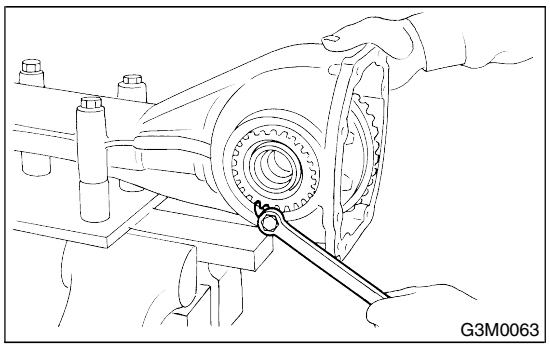
15) Draw a matching mark on both differential carrier and holder. Remove holder one side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



(A) Matching mark
(B) Holder

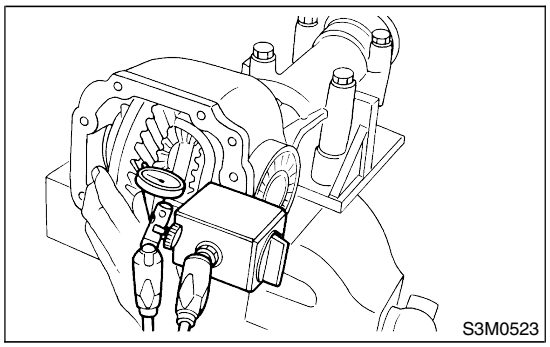
16) Tighten bolt of lock plate to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



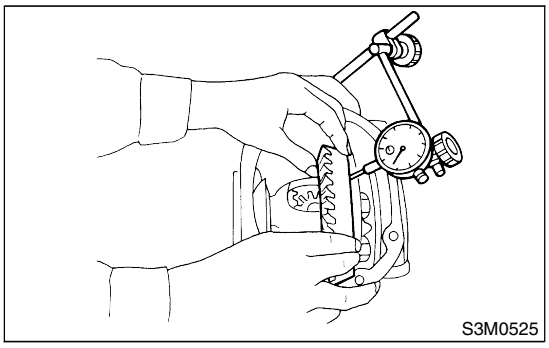
17) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



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

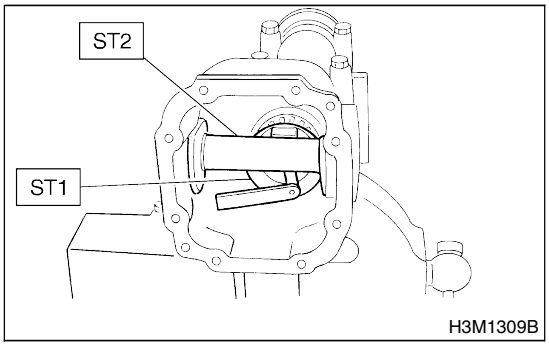
Limit of runout:
0.05 mm (0.0020 in)



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

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

20) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.
(1) Drive pinion height
ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL GAUGE



T = To + N − 0.05 (mm)
where
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim originally installed (mm)

N = Reading of thickness gauge (mm)

(2) Differential side bearing preload

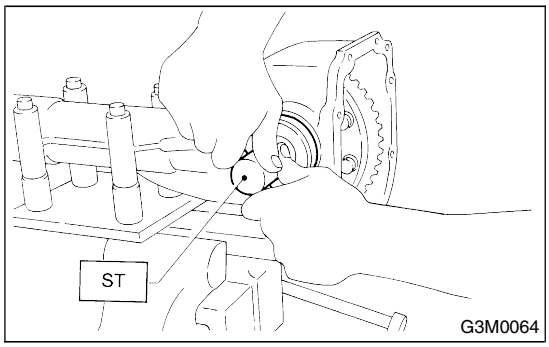
Screw in side (left-side) holder until light contact is made with ST.

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

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

This + 1/2 tooth gives preload.

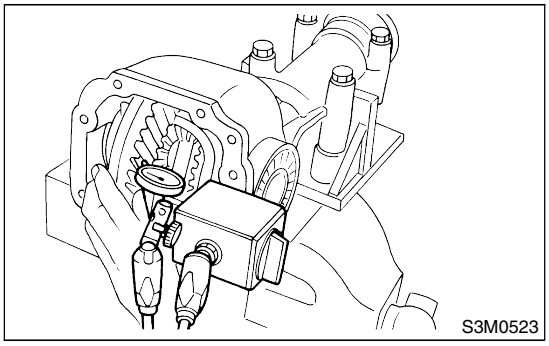
ST 399780111 WRENCH

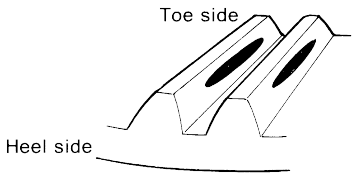
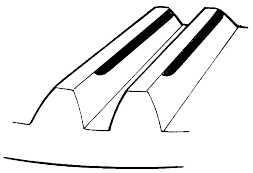
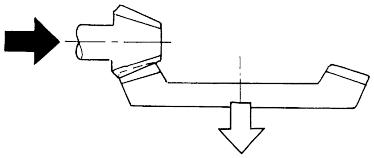
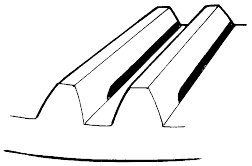
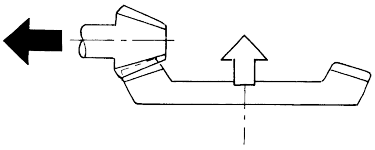
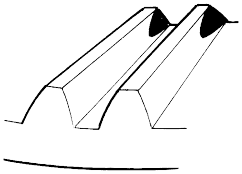
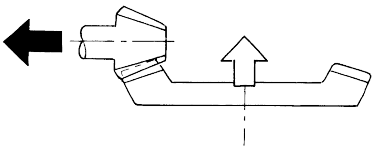
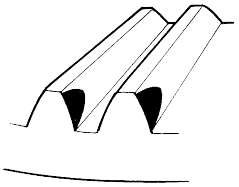
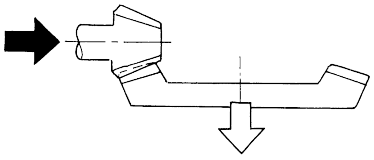


(3) Hypoid gear backlash

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)

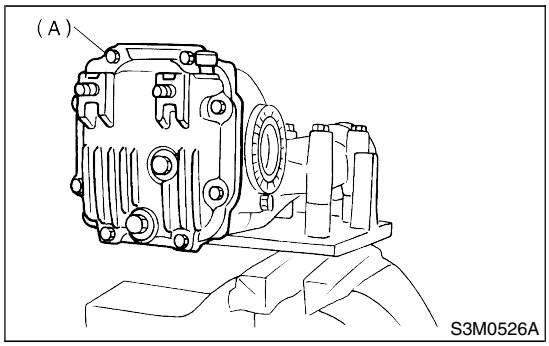


TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 G3M0098A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  G3M0098B	Increase thickness of drive pinion height adjusting washer in order to bring drive pinion closer to crown gear center.  G3M0098F
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  G3M0098C	Reduce thickness of drive pinion height adjusting washer in order to move drive pinion away from crown gear.  G3M0098G
Toe contact	Contact area is small. This may cause chipping at toe ends.  G3M0098D	Adjust as for flank contact.  G3M0098G
Heel contact	Contact area is small. This may cause chipping at heel ends.  G3M0098E	Adjust as for face contact.  G3M0098F

➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear

21) Install rear cover and tighten bolts to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Rear cover

E: INSPECTION S303151A10

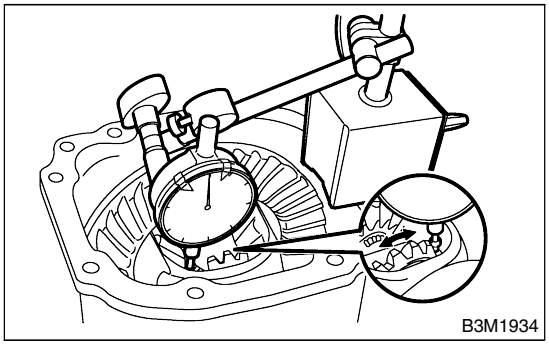
Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.
1) Crown gear and drive pinion
● If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.
● If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
● Replace if crack, score, or other defects are evident on tooth surface.
● Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.
3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.
4) Thrust washers of side gear and pinion mate gear
Replace if seizure, flaw, abnormal wear or other defect is evident.
5) Oil seal
Replace if deformed or damaged, and at every disassembling.
6) Differential carrier
Replace if the bearing bores are worn or damaged.
7) Differential case
Replace if its sliding surfaces are worn or cracked.
8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.

1. SIDE GEAR BACKLASH S303151A1001

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

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

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

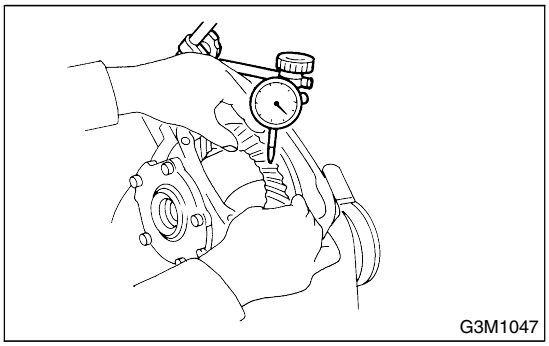


2. CROWN GEAR BACKLASH S303151A1002

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

Crown gear backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

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

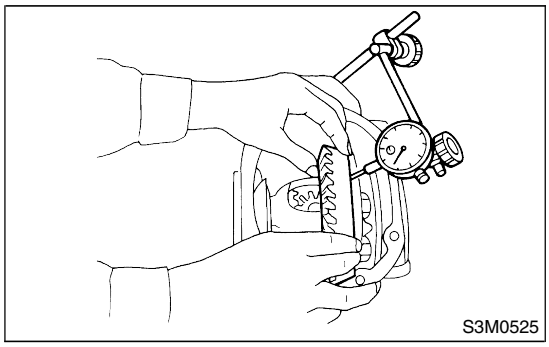


3. CROWN GEAR RUNOUT S303151A1003

Using a dial gauge, check the crown gear runout.

Crown gear runout:
Less than 0.05 mm (0.0020 in)

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



4. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION S303151A1004

Inspect tooth contact between crown gear and drive pinion.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

F: ADJUSTMENT S303151A01

1. SIDE GEAR BACKLASH A303151A0101

Adjust side gear backlash.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

2. CROWN GEAR BACKLASH A303151A0102

Adjust crown gear backlash.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

3. TOOTH CONTACT BETWEEN CROWN GEAR AND DRIVE PINION A303151A0103

Adjust the tooth contact between crown gear and drive pinion gear.
<Ref. to DI-47 ASSEMBLY Rear Differential for VA-type.>

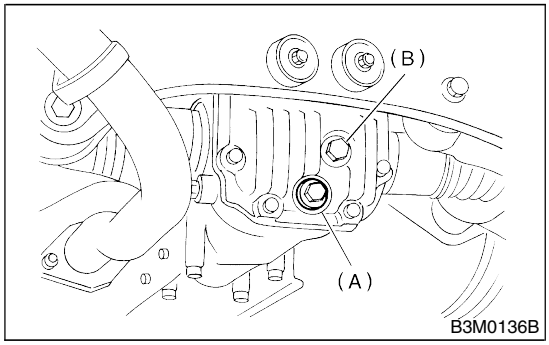
6. Rear Differential Front Oil Seal S303139

A: INSPECTION S303139A10

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

B: REPLACEMENT S303139A20

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Lift the vehicle.
6) Remove oil drain plug, and drain gear oil.



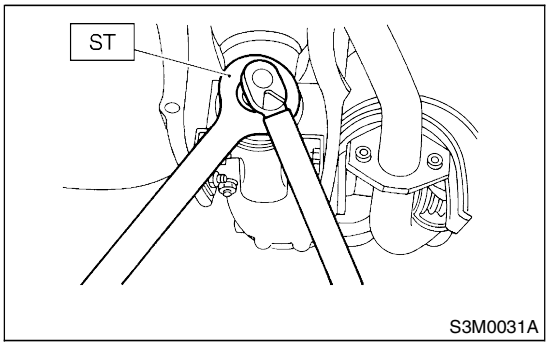
(A) Drain plug
(B) Filler plug

7) Install oil drain plug.

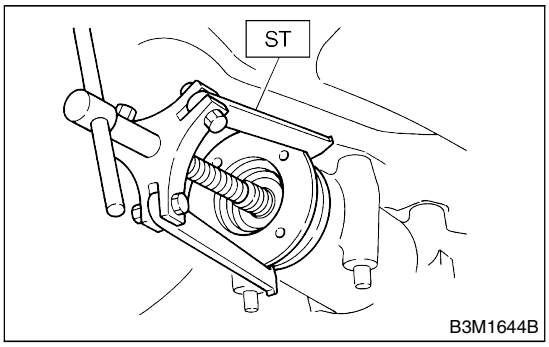
CAUTION:
- **Apply fluid packing to drain plug in T-type.**
- **VA-type uses a new aluminum gasket.**

Tightening torque:
T-type;
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

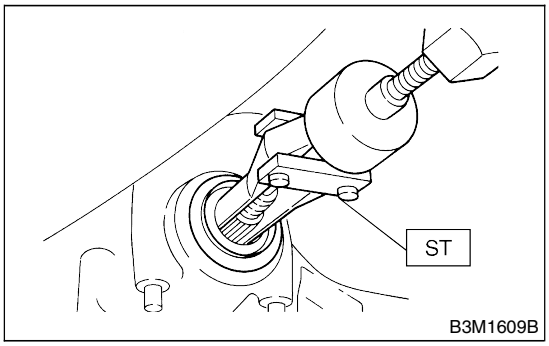
8) Remove rear exhaust pipe and muffler.
9) Remove propeller shaft from body. <Ref. to DS-17 REMOVAL, Propeller Shaft.>
10) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



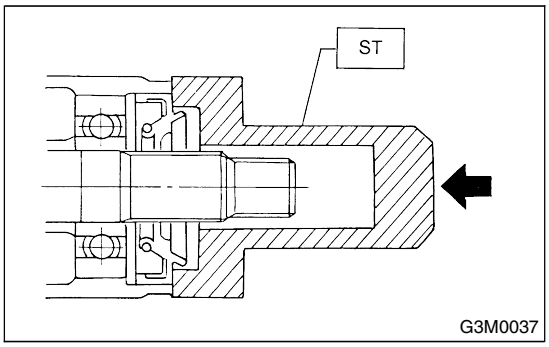
11) Extract companion flange using ST.
ST 399703600 PULLEY ASSY



12) Remove oil seal using ST.
ST 499705401 PULLER ASSY



13) Fit a new oil seal using ST.
ST 498447120 OIL SEAL INSTALLER



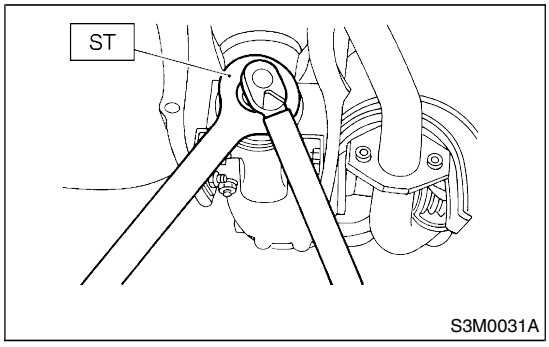
14) Install companion flange.

NOTE:
Use a plastic hammer to install companion flange.

15) Tighten self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.
ST 498427200 FLANGE WRENCH

CAUTION:
Use a new self-locking nut.

Tightening torque:
181.4 N·m (18.50 kgf-m, 133.8 ft-lb)



16) Install in the reverse order of removal.
17) Fill differential carrier with gear oil. <Ref. to DI-22 Differential Gear Oil.>

7. Rear Differential Side Oil Seal S303137

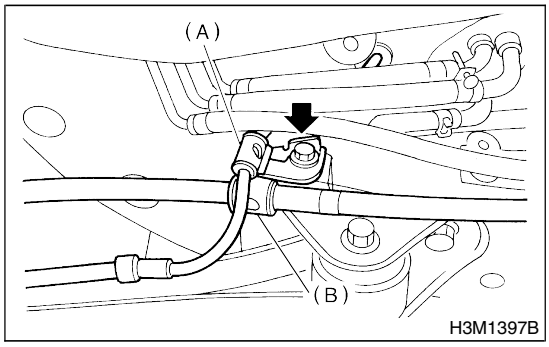
A: INSPECTION S303137A10

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

B: REPLACEMENT S303137A20

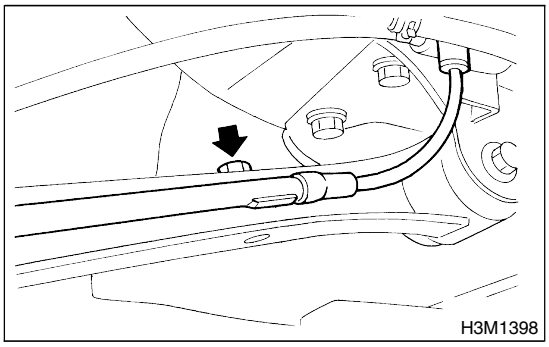
1. VA-TYPE S303137A2002

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen both wheel nuts.
6) Jack-up the vehicle and support it with rigid racks.
7) Remove wheels.
8) Remove rear exhaust pipe and muffler.
With OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
9) Remove the DOJ of rear drive shaft from rear differential.
(1) Remove the ABS sensor cable clamp and parking brake cable guide from bracket.

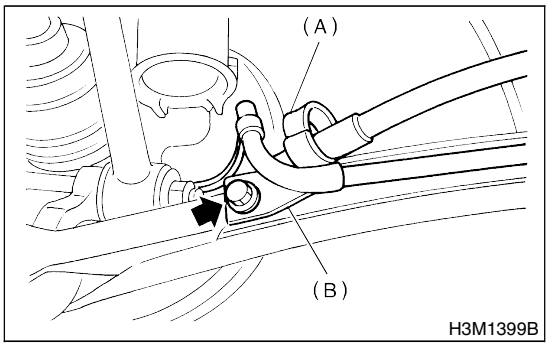


(A) ABS sensor cable clamp
(B) Parking brake cable guide

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

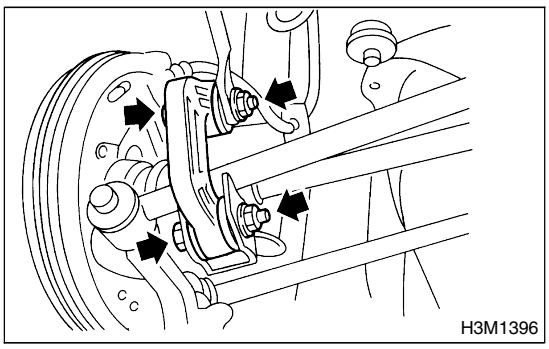


(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.

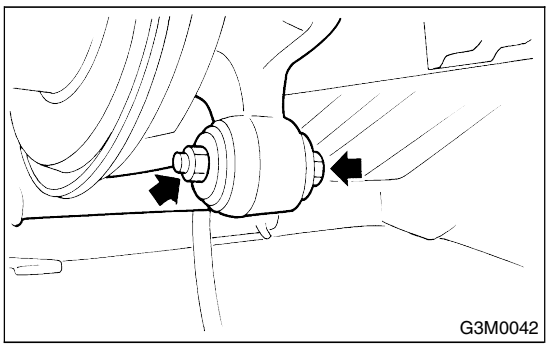


(A) Parking brake cable guide
(B) ABS sensor cable clamp

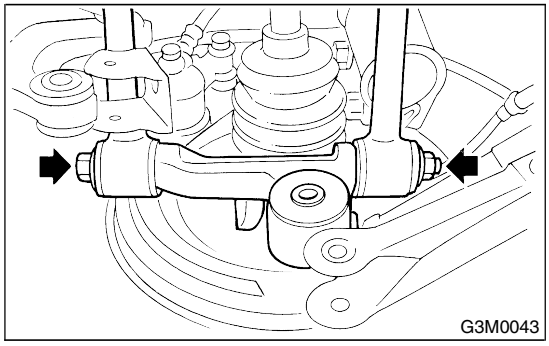
(4) Remove the rear stabilizer link.



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



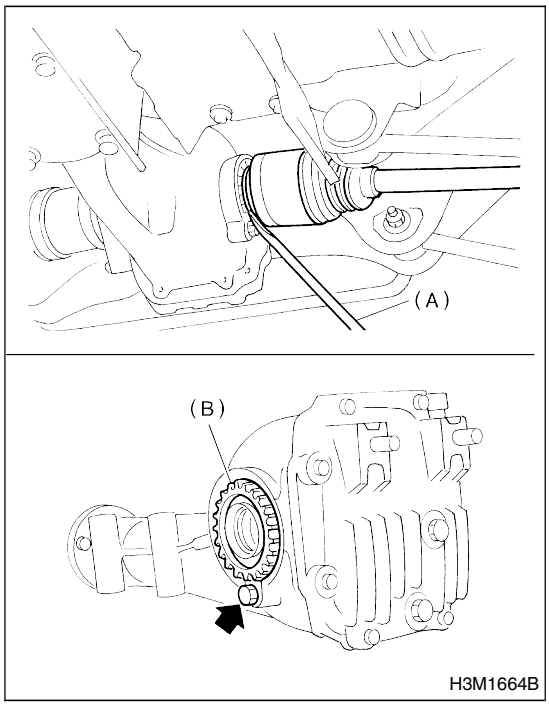
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.


G3M0043

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

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

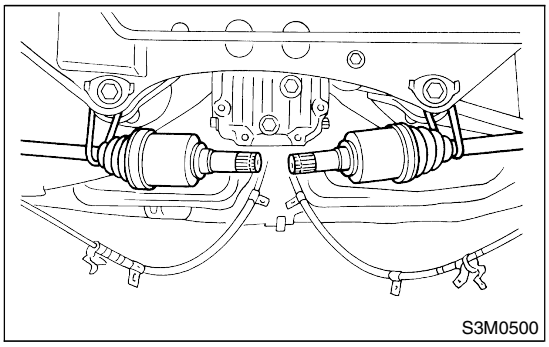
NOTE:
The side spline shaft circlip comes out together with the shaft.



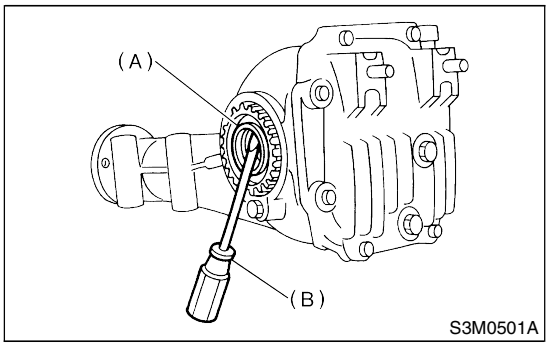
H3M1664B

(A) Tire lever
(B) Axle shaft holder

10) Secure rear drive shaft to rear crossmember using wire.


S3M0500

11) Remove oil seal with screwdriver.

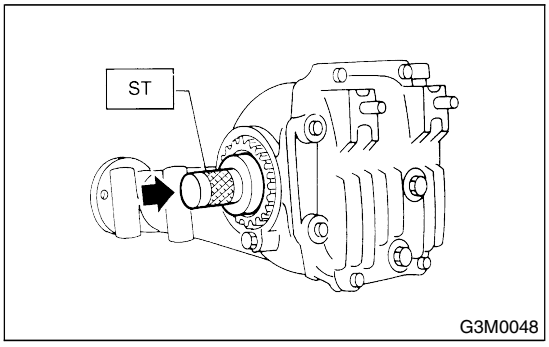


S3M0501A

(A) Side oil seal
(B) Screwdriver

12) Drive in a new side oil seal with ST.

CAUTION:
Apply chassis grease between the oil seal lips.
ST 498447100 OIL SEAL INSTALLER



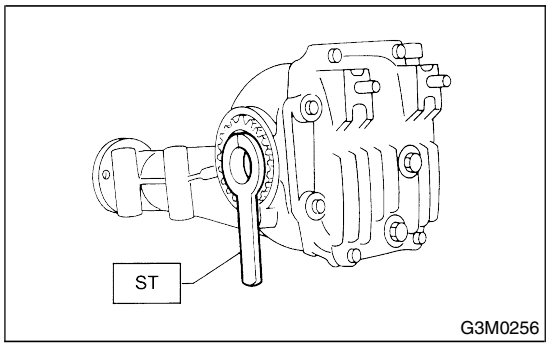
G3M0048

13) Insert the DOJ into rear differential.

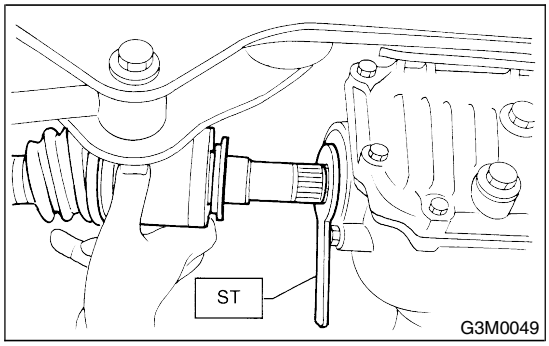
CAUTION:
Before inserting, replace the circlip at the end of the spline shaft with a new one.

(1) Install ST to rear differential.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



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

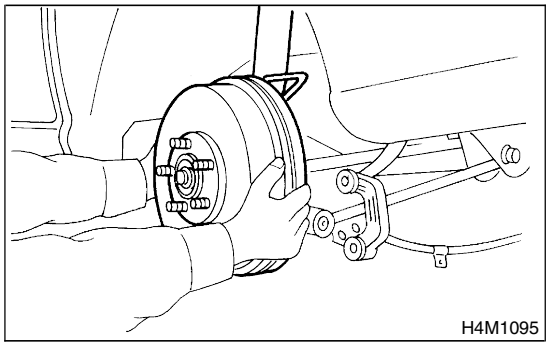


(3) Remove ST.

ST 28099PA090 SIDE OIL SEAL PROTECTOR

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

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



14) Install in the reverse order of removal.

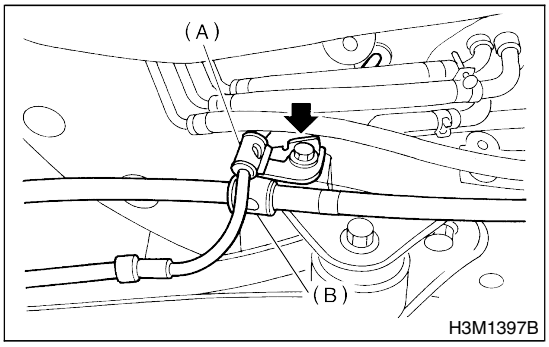
2. T-TYPE *S303137A2001*

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

Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

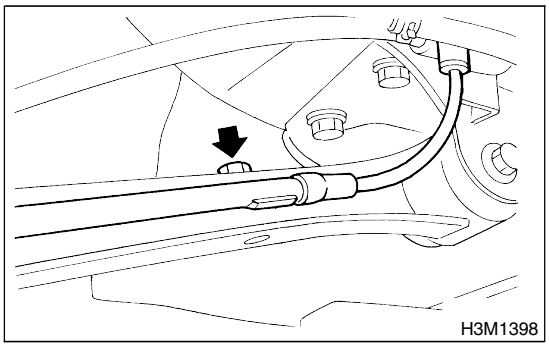
9) Remove the DOJ of rear drive shaft from rear differential.

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

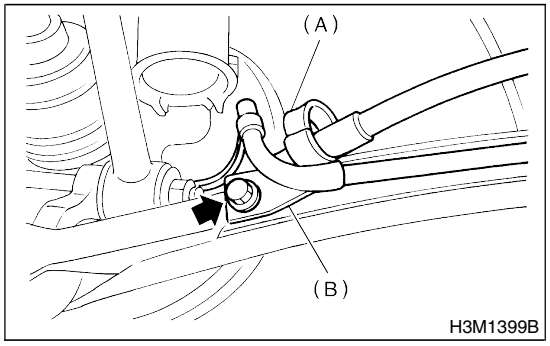


(A) ABS sensor cable clamp
(B) Parking brake cable guide

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

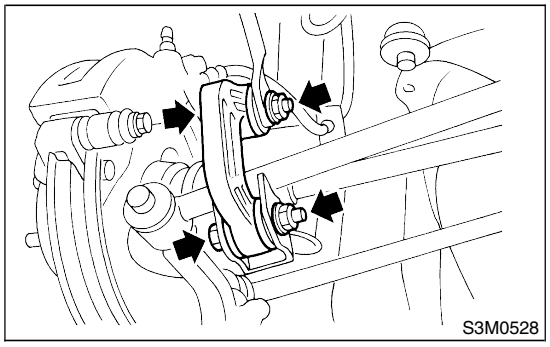


(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.

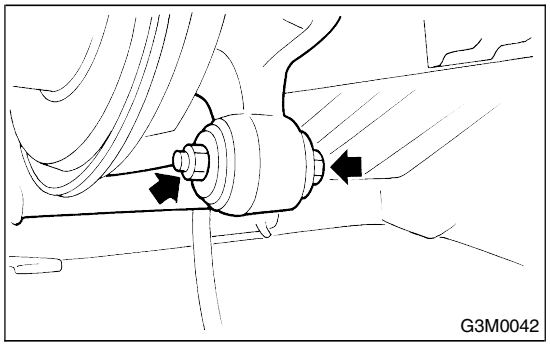


(A) ABS sensor cable clamp
(B) Parking brake cable guide

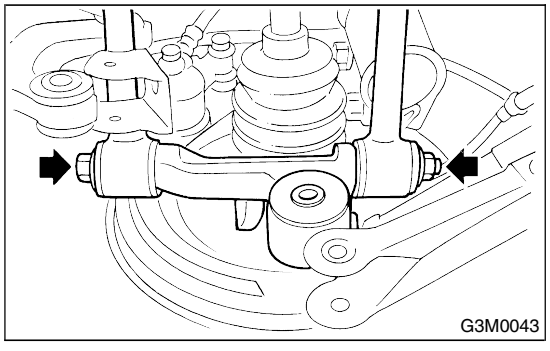
(4) Remove the rear stabilizer link.



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



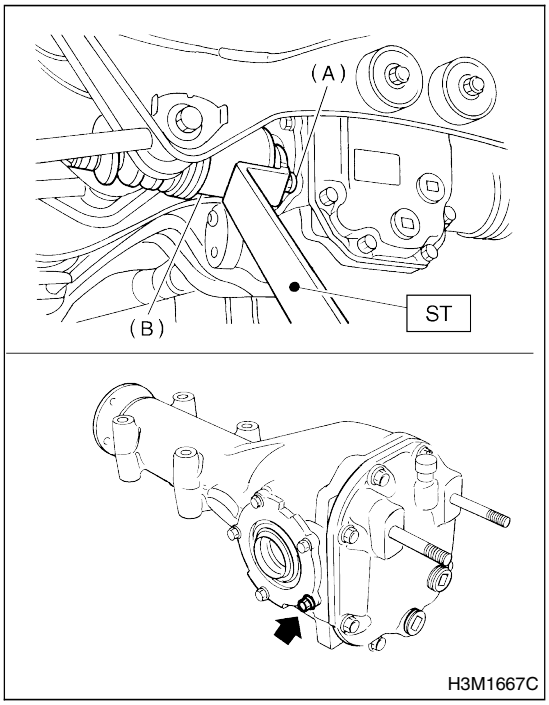
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



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

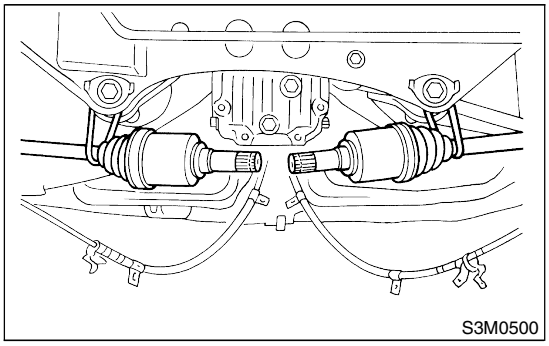
CAUTION:
When removing the DOJ from the rear differential, fit ST to the bolt as shown in figure so as not to damage the side bearing retainer.

ST 208099PA100 DRIVE SHAFT REMOVER

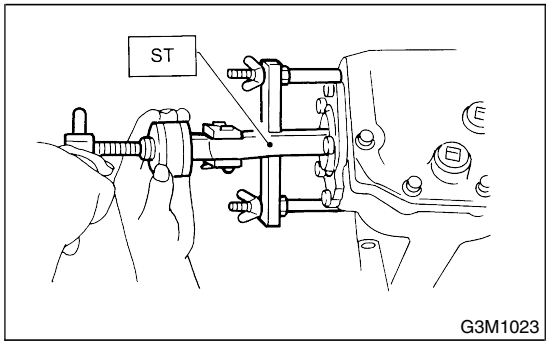


(A) Bolt
(B) DOJ

10) Secure rear drive shaft to rear crossmember using wire.

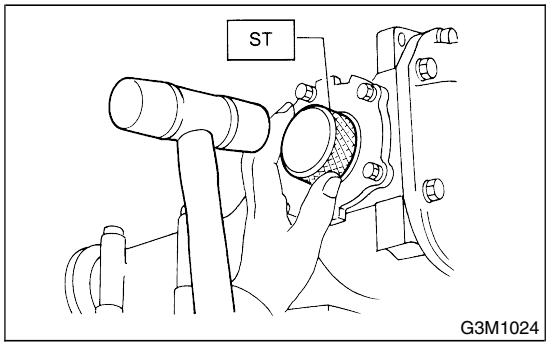


11) Remove side oil seal with ST.
ST 398527700 PULLER ASSY

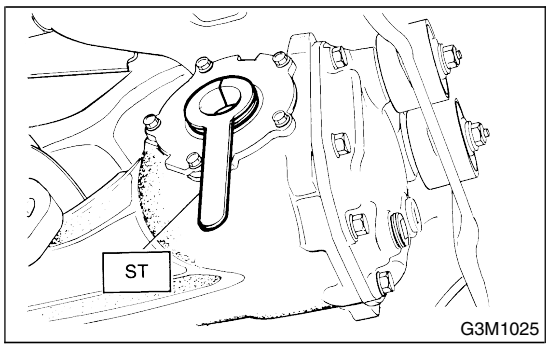


12) Drive in a new side oil seal with ST.

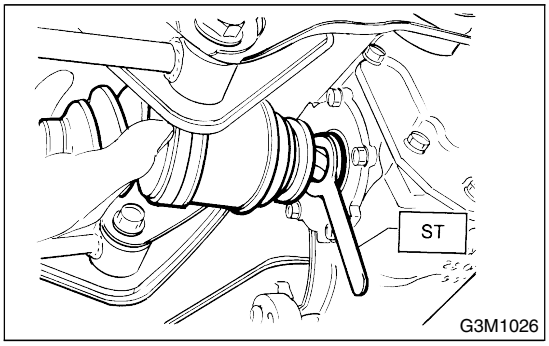
CAUTION:
Apply chassis grease between the oil seal lips.
ST 398437700 DRIFT



13) Insert the DOJ into rear differential.
(1) Install ST to rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

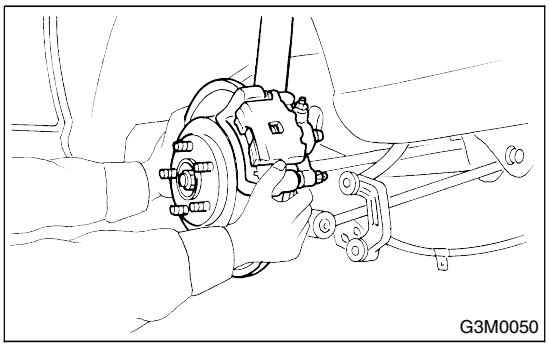


(2) Insert the spline shaft until the spline portion is inside the side oil seal.
(3) Remove ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



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

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



14) Install in the reverse order of removal.

8. Rear Differential Member S303135

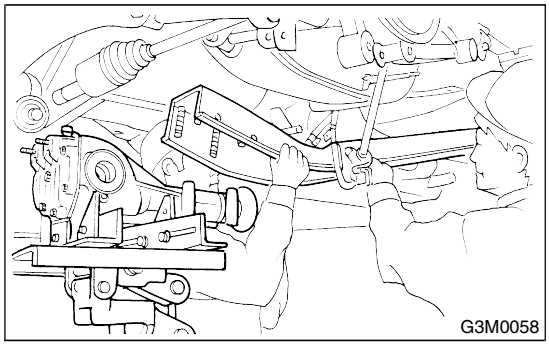
A: REMOVAL S303135A18

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen wheel nuts.
6) Jack-up vehicle and support it with sturdy racks.
7) Remove wheels.
8) Remove rear exhaust pipe and muffler.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11 REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
9) Remove rear differential front member.
VA-type:
<Ref. to DI-42, REMOVAL, Rear Differential for VA-type.>
T-type:
<Ref. to DI-25, REMOVAL, Rear Differential for T-type.>

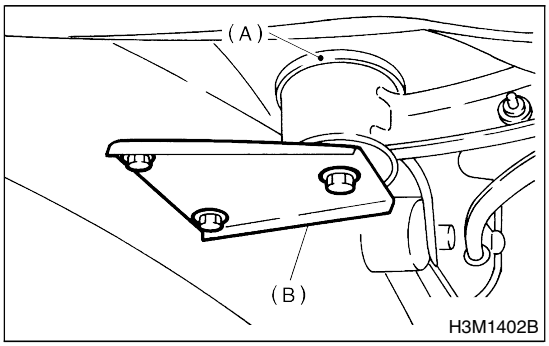
NOTE:
When removing rear differential front member, work the removal procedure as rear differential.

B: INSTALLATION S303135A11

To install, reverse the removal sequence.
1) Position front member on body by passing it under parking brake cable and securing to rear differential.



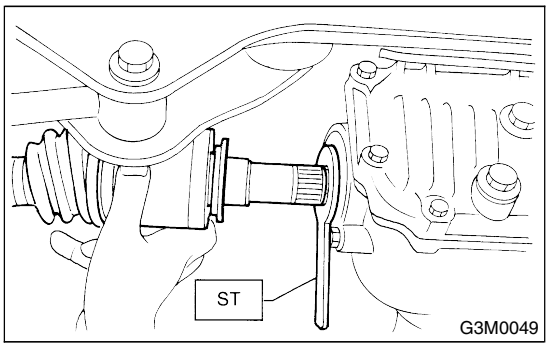
NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.



(A) Stopper
(B) Differential mount bracket

2) Insert DOJ of rear drive shaft into rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

CAUTION:
Before inserting, replace the differential side oil seal and the circlip at the end of the spline shaft with a new one.



3) Install in the reverse order of removal.

C: INSPECTION S303135A10

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

9. General Diagnostic Table S303257

A: INSPECTION S303257A10

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

MEMO:

TRANSFER CASE

TC

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8. Reduction Driven Gear without VTD....9
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10. Oil Pump....11
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1. General Description S302001

A: NOTE S302001A15

For removal, installation and inspection work, refer to “AT” section or “MT” section.
AT model:
<Ref. to AT-2, General Description.>
MT model:
<Ref. to MT-2, General Description.>

2. Transfer Case and Extension for MT S302138

A: NOTE S302138A15

For removal, installation and inspection work, refer to “MT” section. <Ref. to MT-46, Transfer Case and Extension Case Assembly.>

3. Transfer Clutch and Extension for AT S302142

A: NOTE S302142A15

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE).

4. Oil Seal S302143

A: NOTE S302143A15

For removal, installation and inspection work, refer to “AT” section or “MT” section.
AT model:
<Ref. to AT-27, Extension Case Oil Seal.>
MT model:
<Ref. to MT-41, Oil Seal.>

5. Transfer Drive Gear (MT) S302146

A: NOTE S302146A15

For removal, installation and inspection work, refer to “MT” section. <Ref. to MT-52, Transfer Drive Gear.>

6. Transfer Driven Gear (MT) S302141

A: NOTE S302141A15

For removal, installation and inspection work, refer to “MT” section. <Ref. to MT-54, Transfer Driven Gear .>

7. Reduction Drive Gear without VTD S302144

A: NOTE S302144A15

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE).

8. Reduction Driven Gear without VTD S302147

A: NOTE S302147A15

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE).

9. Center Differential S302158

A: NOTE S302158A15

For removal, installation and inspection work, refer to “AUTOMATIC TRANSMISSION” (a separate publication: Pub. No. G0853ZE) or “MT” section. <Ref. to MT-56, Center Differential.>

10. Oil Pump S302070

A: NOTE S302070A15

For removal, installation and inspection work, refer to “MT”section. <Ref. to MT-50, Oil Pump.>

11. Transfer Clutch Pressure Test S302159

A: NOTE S302159A15

For removal, installation and inspection work, refer to “AT” section <Ref. to AT-18, Transfer Clutch Pressure Test.>

12. Transfer Duty Solenoid and Valve Body S302161

A: NOTE S302161A15

For removal, installation and inspection work, refer to “AT” section. <Ref. to AT-41, TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY, REMOVAL, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

MEMO:

DRIVE SHAFT SYSTEM

DS

Page

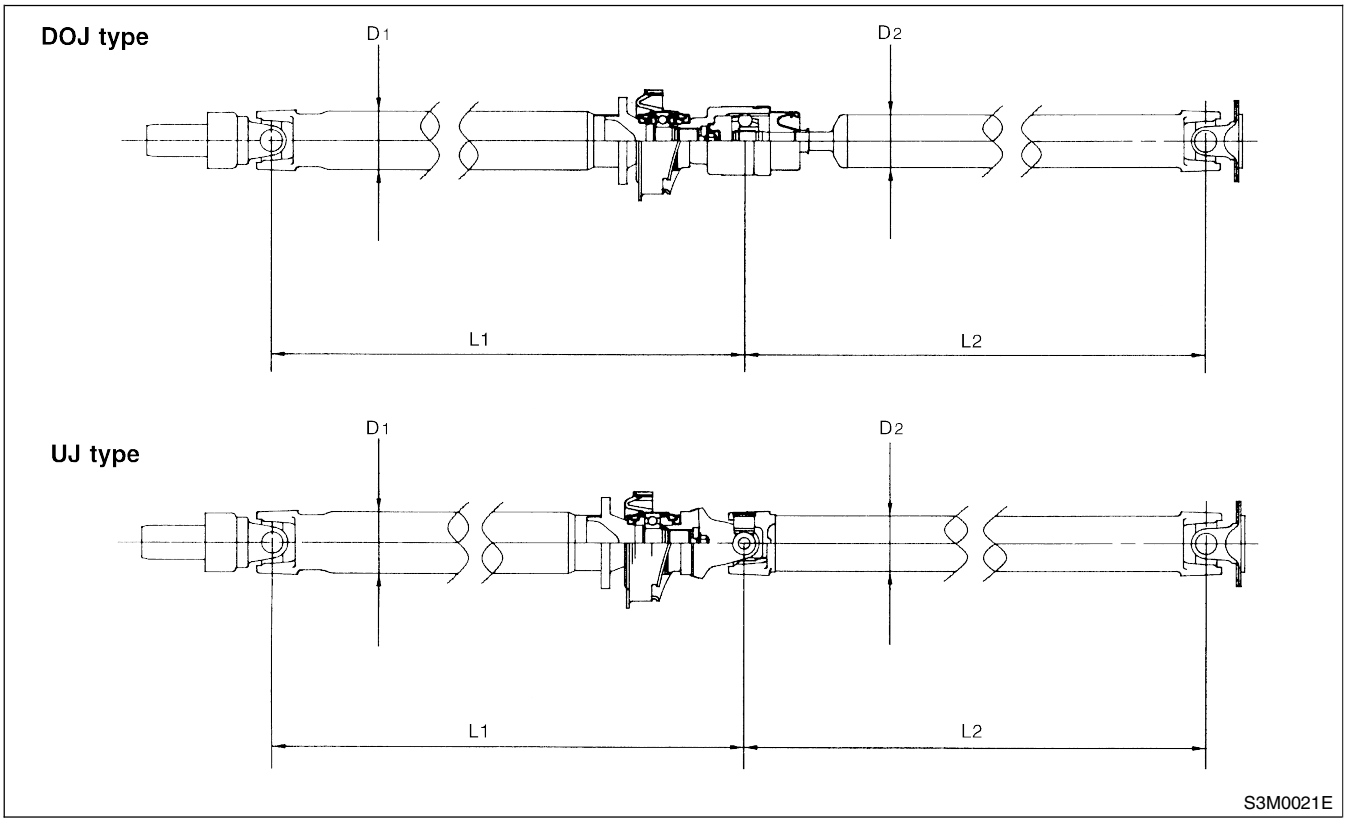
1. General Description....2
2. Propeller Shaft....14
3. Front Axle....17
4. Rear Axle....23
5. Front Drive Shaft....32
6. Front Drive Shaft Boot....37
7. Rear Drive Shaft....38
8. Rear Drive Shaft Boot....44
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1. General Description S301001

A: SPECIFICATIONS S301001E49

1. PROPELLER SHAFT S301001E4901

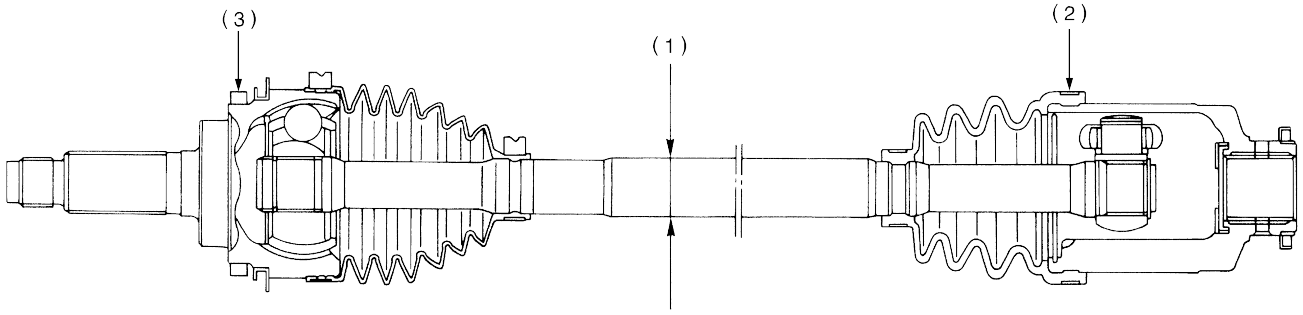
		Non-Turbo model	Turbo model
Propeller shaft type		UJ type	DOJ type
Front propeller shaft Joint-to-joint length: mm (in) L_1	AT	585 (23.03)	580 (22.83)
	MT	644 (25.35)	639 (25.16)
Rear propeller shaft Joint-to-joint length: mm (in) L_2		707 (27.83)	712 (28.03)
Outside dia. of tube mm (in)	D_1	63.5 (2.500)	
	D_2	57.0 (2.244)	



2. FRONT DRIVE SHAFT ASSEMBLY S301001E4902

Model	Tone wheel	Type of drive shaft assembly	SHAFT	Boot band identification color
			Shaft diameter	
Non-TURBO MT (With ABS)	○	BJ87L+SFJ82	28 mm (1.10 in)	Pink
Non-TURBO MT (With ABS)	—	BJ87L+SFJ82	28 mm (1.10 in)	Purple
Non-TURBO AT (With ABS)	○	BJ87L+SFJ82	26 mm (1.02 in)	—
TURBO				
Non-TURBO AT (Without ABS)	—	BJ87L+SFJ82	26 mm (1.02 in)	Brown

•BJ87+SFJ82

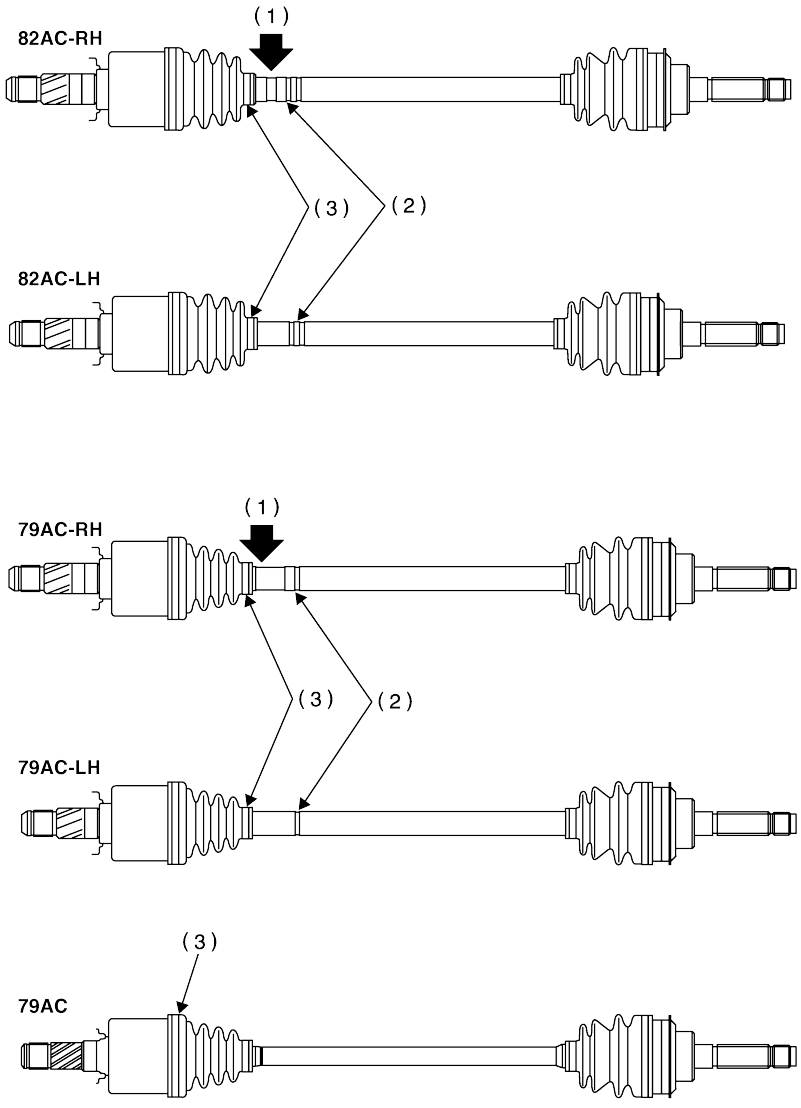


B4M2218C

(1) Measuring point
(2) Boot band identification color
(3) Tone wheel

3. REAR DRIVE SHAFT ASSEMBLY S301001E4903

Model	Type of axle shaft assembly	SHAFT	Boot band identification color
		No. of identification grooves on shaft	
TURBO	82AC-RH, 82AC-LH	2 (Two)	Auburn
NON-TURBO MT	79AC-RH, 79AC-LH	1 (One)	White
NON-TURBO AT	79AC	None	Orange

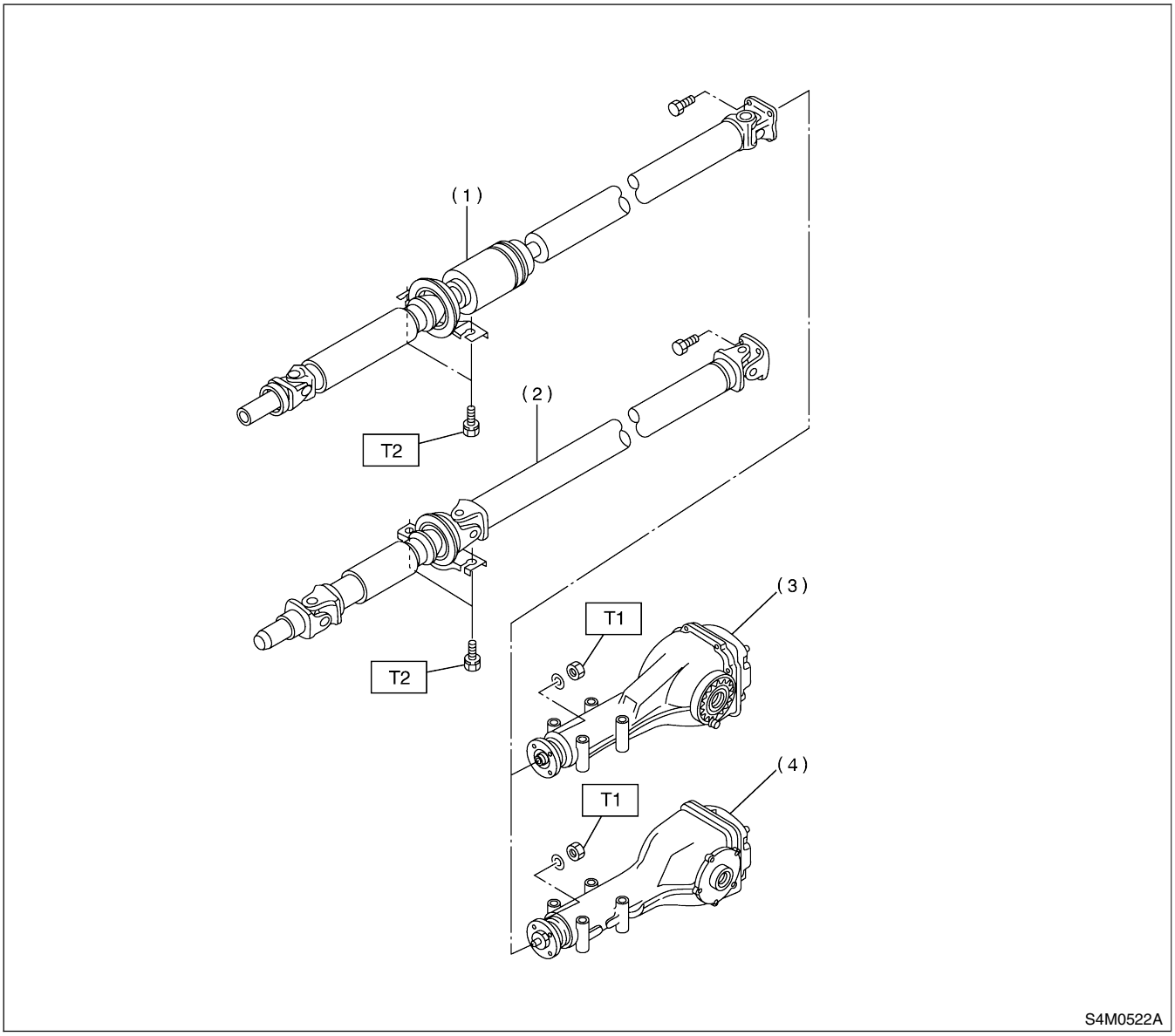


S4M0521A

(1) Indication mark of RH (2) Identification padding (3) Boot band Identification

B: COMPONENT S301001A05

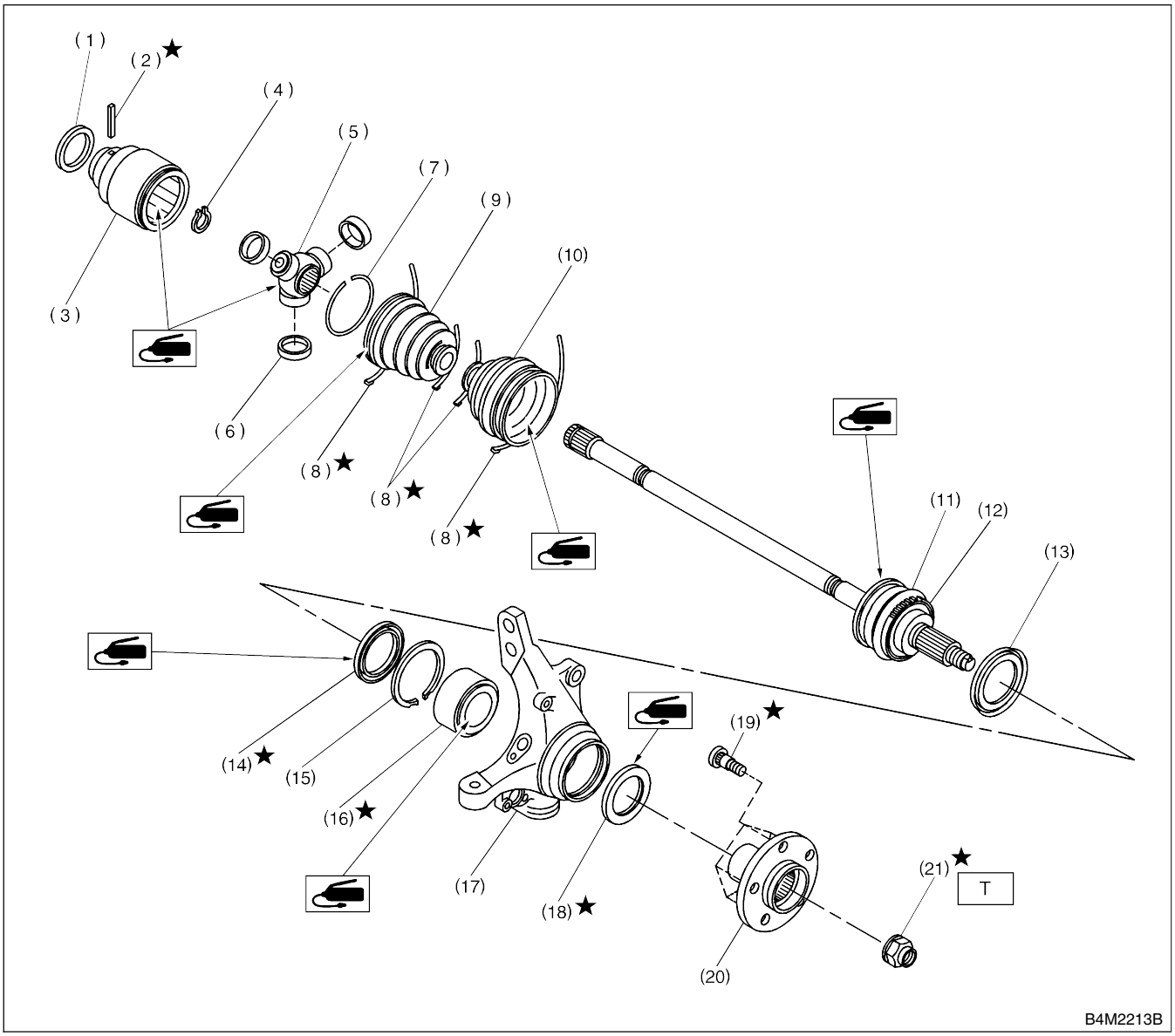
1. PROPELLER SHAFT S301001A0501



(1) Propeller shaft (Turbo model)
(2) Propeller shaft (Non-Turbo model)
(3) Rear differential (VA-type)
(4) Rear differential (T-type)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 31 (3.2, 23.1)
T2: 52 (5.3, 38.3)

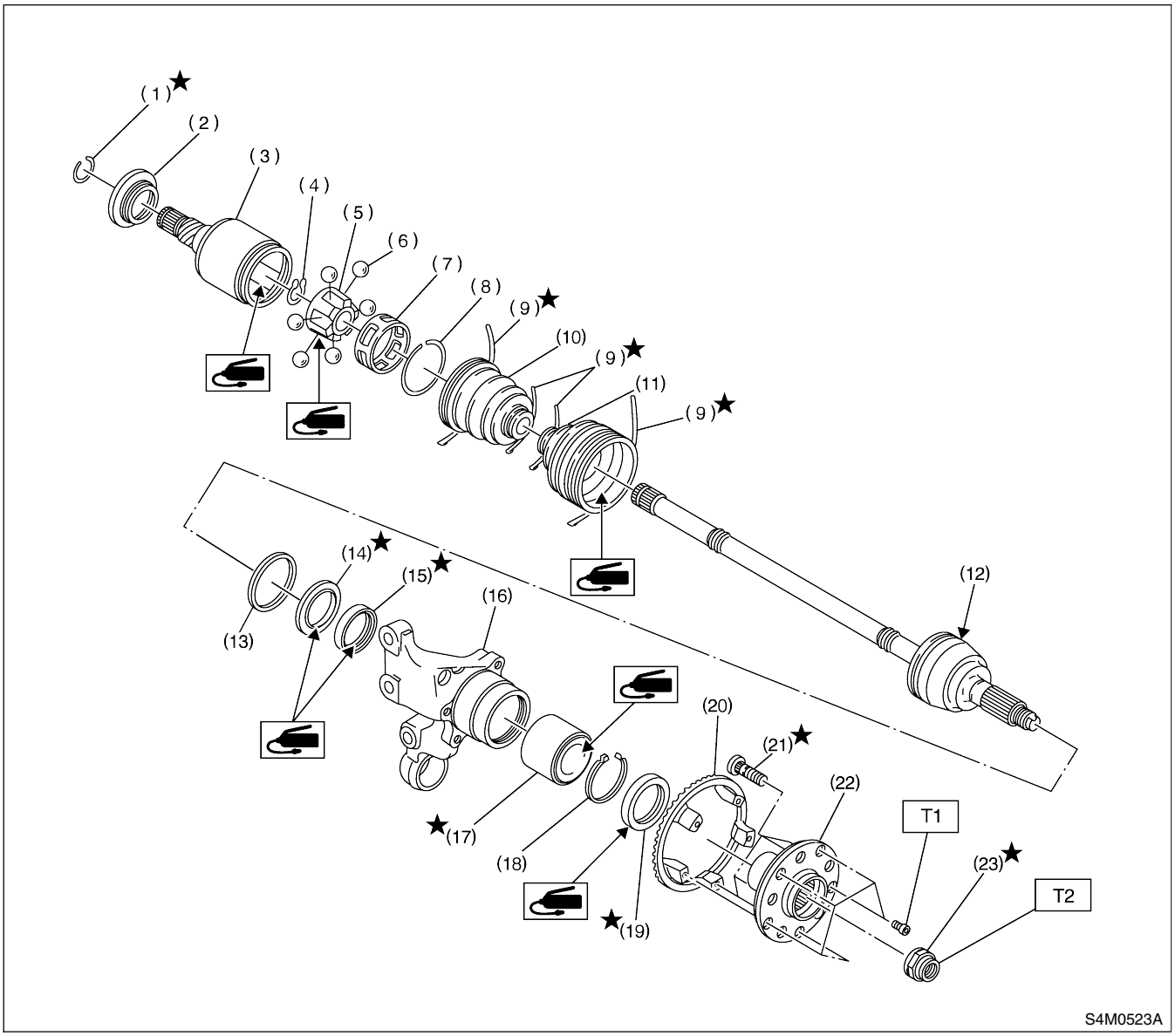
2. FRONT AXEL S301001A0502



(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 (SFJ)
(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

Tightening torque: N·m (kgf-m, ft-lb)
T: 186 (19, 137)

3. REAR AXLE S301001A0503



(1) Circlip (Non-turbo AT vehicle)
(2) Baffle plate (DOJ)
(3) Outer race (DOJ)
(4) Snap ring
(5) Inner race
(6) Ball
(7) Cage
(8) Circlip
(9) Boot band
(10) Boot (DOJ)
(11) Boot (BJ or EBJ)
(12) BJ or EBJ ASSY
(13) Oil seal (IN. No. 2)
(14) Baffle palte
(15) Oil seal (IN)
(16) Housing
(17) Bearing
(18) Snap ring
(19) Oil seal (OUT)
(20) Tone wheel
(21) Hub bolt
(22) Hub
(23) Axle nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 186 (19, 137)

C: CAUTION S301001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL S301001A17

1. SPECIAL TOOLS S301001A1701

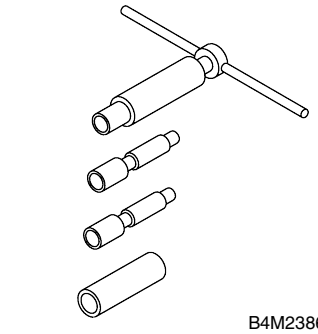
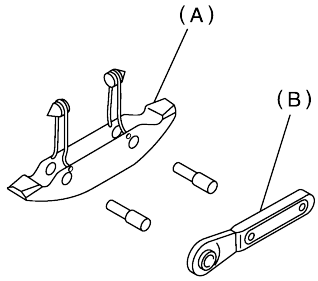
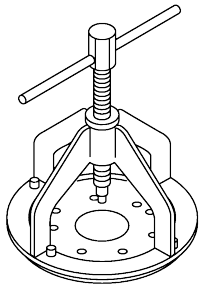
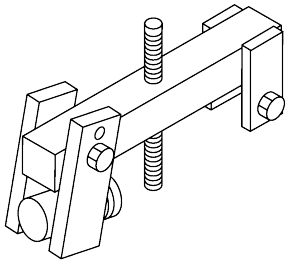
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2386	922431000	AXLE SHAFT INSTALLER	• Used for installing axle shaft into housing. • Used with ADAPTER (927390000).
 B4M2387A	925091000	BAND TIGHTENING TOOL	• Used for tightening boot band. Except front axle housing side) (A) Jig for band (B) Ratchet wrench
 B4M2388	926470000	AXLE SHAFT PULLER	Used for removing axle shaft.
 B4M2389	927060000	HUB REMOVER	• Used for removing front hub. • Used with HUB STAND (927080000).

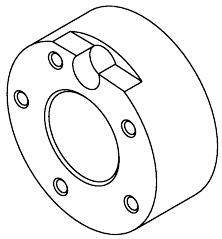
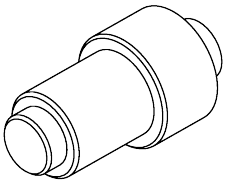
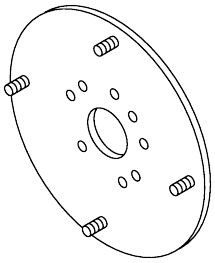
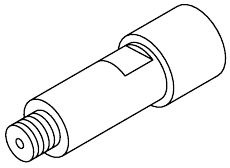
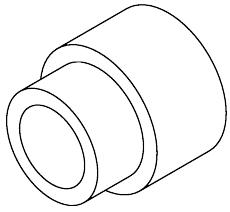
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2390	927080000	HUB STAND	Used for disassembling and assembling hub bolt in hub.
 B4M2391	927100000	BEARING REMOVER	• Used for disassembling and assembling front housing bearing. • Used with HOUSING STAND (927400000).
 B4M2392	927140000	PLATE	Same as plate 2 included in AXLE SHAFT PULLER (926470000).
 B4M2393	927390000	ADAPTER	Used as an adapter for AXLE SHAFT INSTALLER (922431000).
 B4M2394	927400000	HOUSING STAND	• Used for disassembling and assembling front housing bearing. • Used with BEARING PULLER (927100000).

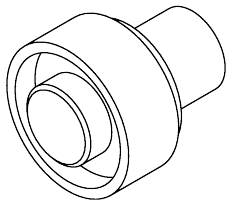
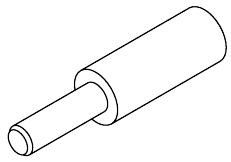
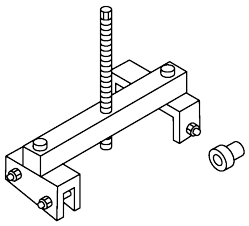
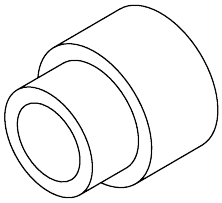
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2395	927410000	OIL SEAL INSTALLER	• Used for installing oil seal into front housing. • Used with HOUSING STAND (927400000).
 B4M2399	927120000	HUB INSTALLER	Used for installing hub.
 H5M0981	927420000	HUB REMOVER	• Used for removing rear hub. • Used with HUB STAND (927080000).
 H5M0982	927430000	HOUSING STAND	• Used for disassembling and assembling rear housing bearing. • Used with BEARING PULLER (927440000).

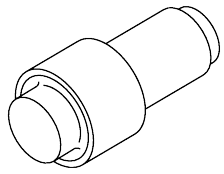
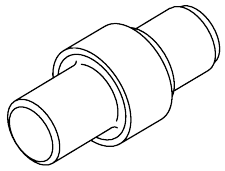
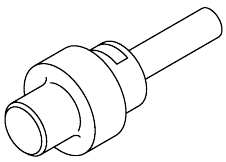
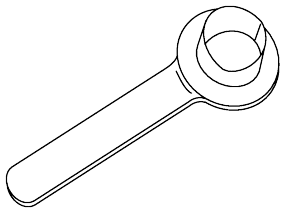
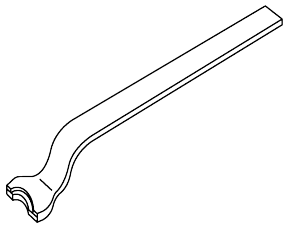
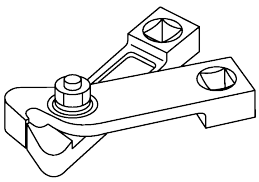
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 H5M0983	927440000	BEARING REMOVER	• Used for disassembling and assembling rear housing bearing. • Used with HOUSING STAND (927430000).
 H5M0984	927460000	OIL SEAL INSTALLER	• Used for installing outer bearing and sub bearing into housing. • Used with HOUSING STAND (927430000).
 B4M2400	927450000	HUB INSTALLER	• Used for installing rear hub into hub ASSY. • Used with HUB STAND (927080000).
 B4M2401	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2402	28099PA100	DRIVE SHAFT REMOVER	Used for removing rear drive shaft from rear differential.
 B4M2403	28099AC000	BOOT BAND PLIERS	Used for tightening front BJ boot band. (Front axle housing side)

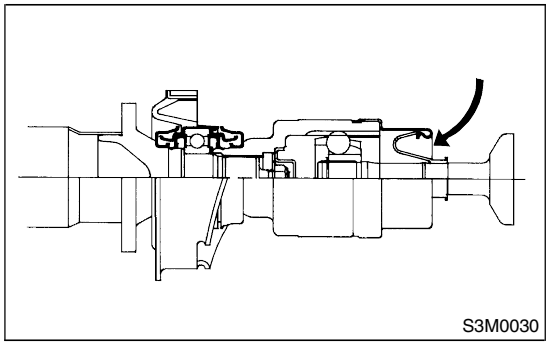
2. GENERAL PURPOSE TOOLS S301001A1702

TOOL NAME	REMARKS
Puller	Used for removing ball joint from knuckle arm.
Dial Gauge	Used for inspecting propeller shaft run-out.
Snap Ring Pliers	Used for installing and removing snap ring.

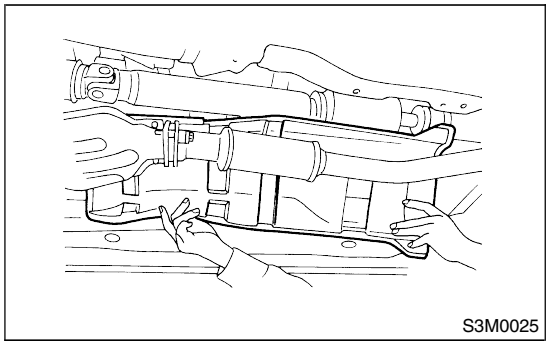
2. Propeller Shaft S301160

A: REMOVAL S301160A18

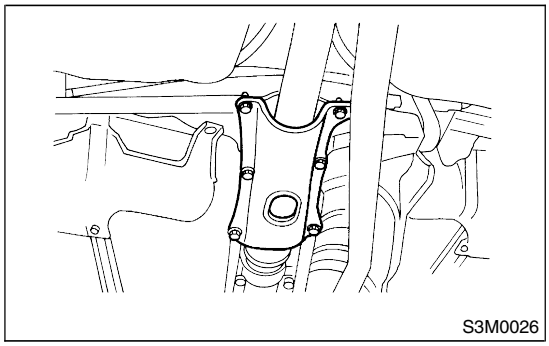
NOTE:
● Before removing propeller shaft, wrap metal parts with a cloth or rubber material.
● In case of DOJ type, before removing propeller shaft, wrap metal parts (installed at the rubber boot of center DOJ) with a cloth or rubber material, as shown in the figure. Rubber boot may be damaged due to interference with adjacent metal parts while bending the DOJ during removal.


S3M0030

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Move select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove front exhaust cover. (Non-Turbo model)

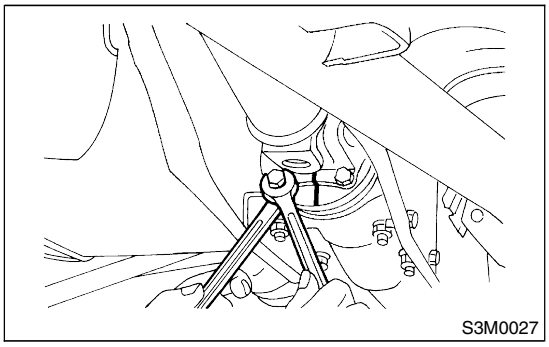

S3M0025

7) Remove differential mount front cover.

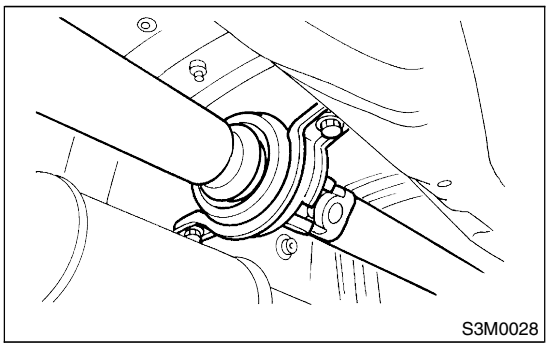

S3M0026

8) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:
● Put matching mark on affected parts before removal.
● Remove all but one bolt.


S3M0027

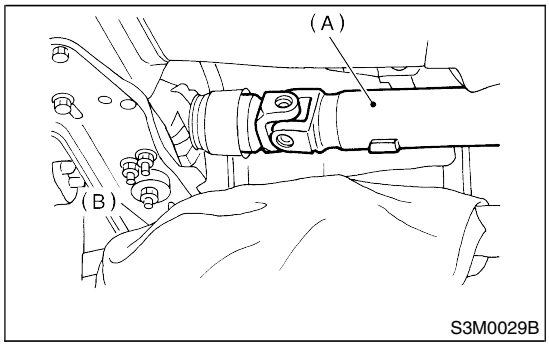
9) Remove the two bolts which hold center bearing to car body.


S3M0028

10) Remove propeller shaft from transmission.

CAUTION:
● Be sure not to damage oil seals and the frictional surface of sleeve yoke.
● Cover the center exhaust pipe with a cloth to keep off any ATF or oil spilled from transmission when removing propeller shaft.

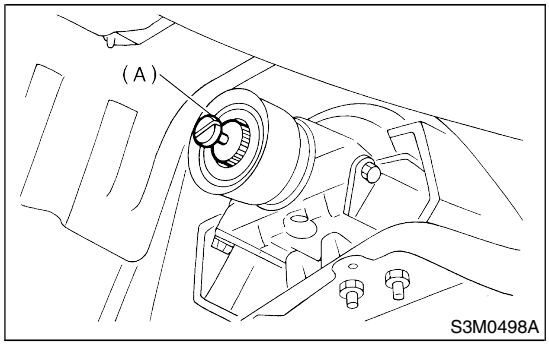
NOTE:
● Be sure to use an empty oil can to catch oil flowing out when removing propeller shaft.
● Be sure to plug the opening in transmission after removal of propeller shaft.



(A) Propeller shaft
(B) Cloth

11) Install the extension cap to transmission.

NOTE:
If extension cap is not available, place vinyl bag over opening and fasten with string to prevent gear oil or ATF from leaking.

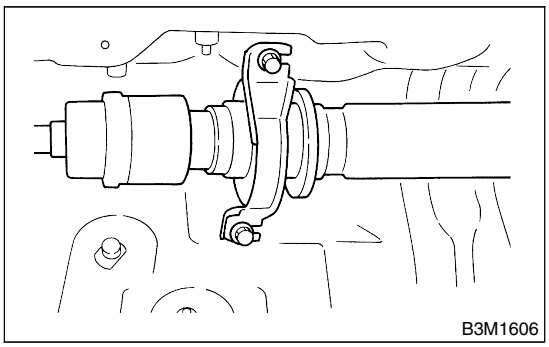


(A) Extension cap

B: INSTALLATION S301160A11

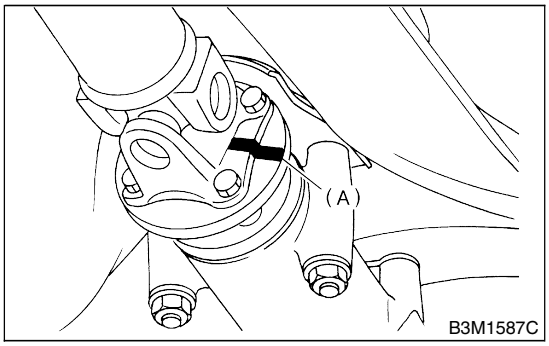
1) Insert sleeve yoke into transmission and attach center bearing to body.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)



2) Align matching marks and connect flange yoke and rear differential.

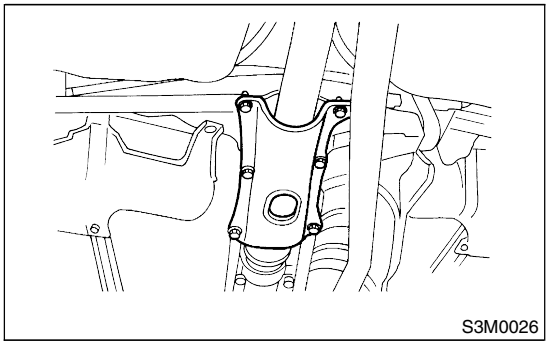
Tightening torque:
31 N·m (3.2 kgf-m, 23.1 ft-lb)



(A) Matching mark

3) Install front exhaust cover. (Non-turbo model)
4) Install differential mount front cover.

Tightening torque:
88 N·m (9.0 kgf-m, 65 ft-lb)



C: INSPECTION S301160A10

NOTE:
Do not disassemble propeller shaft. Check the following and replace if necessary.

1) Tube surfaces for dents or cracks
2) Splines for deformation or abnormal wear
3) Joints for non-smooth operation or abnormal noise
4) Center bearing for free play, noise or non-smooth operation
5) Oil seals for abnormal wear or damage
6) Center bearing for breakage

Check the following points with propeller shaft installed in vehicle.

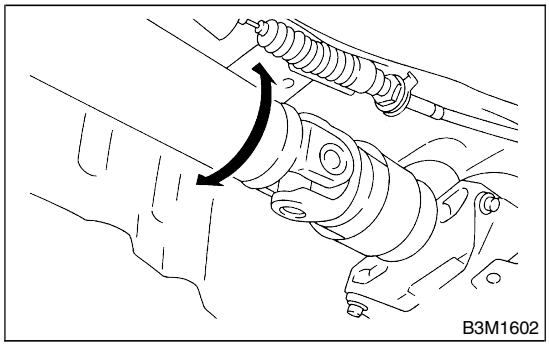
1. JOINTS AND CONNECTIONS S301160A1001

1) Remove center exhaust pipes.
2) Remove heat shield cover.
3) Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.

2. SPLINES AND BEARING LOCATIONS

S301160A1002

1) Remove front exhaust cover. (Non-turbo model)
2) Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.



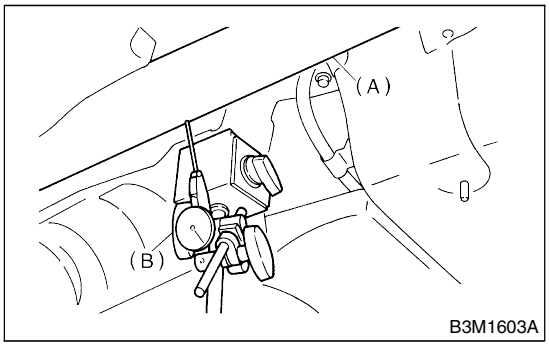
3. RUNOUT OF PROPELLER SHAFT

S301160A1003

1) Remove front exhaust cover. (Non-turbo model)
2) Turn rear wheels by hand to check for “runout” of propeller shaft.

NOTE:
Measure runout with a dial gauge at the center of front and rear propeller shaft tubes.

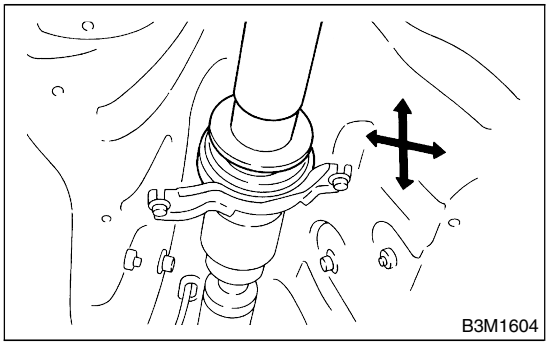
Runout:
Limit 0.6 mm (0.024 in)



(A) Propeller shaft
(B) Dial gauge

4. CENTER BEARING FREE PLAY S301160A1004

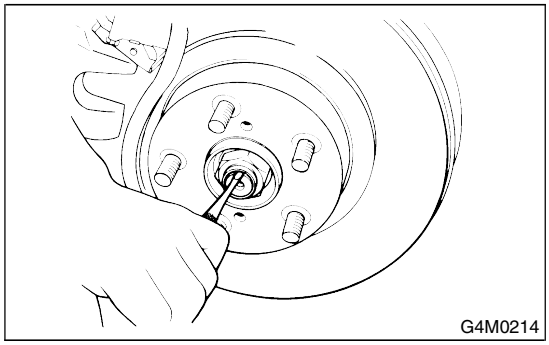
1) Remove front exhaust cover. (Non-turbo model)
2) While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.



3. Front Axle S301148

A: REMOVAL S301148A18

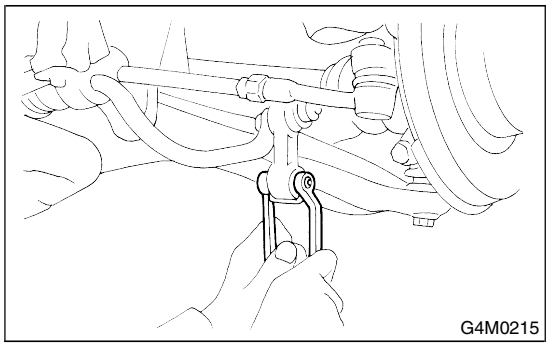
1) Disconnect ground terminal from battery.
2) Jack-up vehicle, support it with safety stands, and remove front wheels.
3) Unlock axle nut.


G4M0214

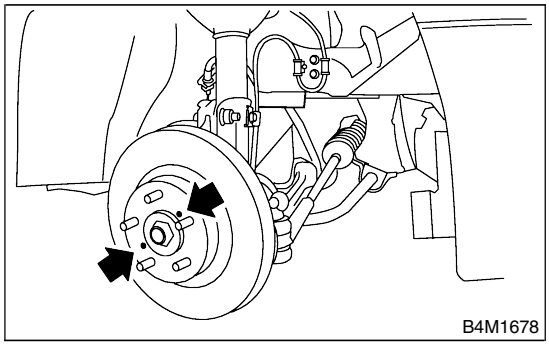
4) Remove axle nut using a socket wrench.

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

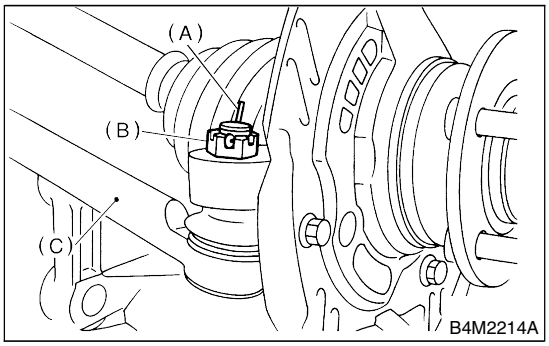
5) Remove stabilizer link.


G4M0215

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.


B4M1678

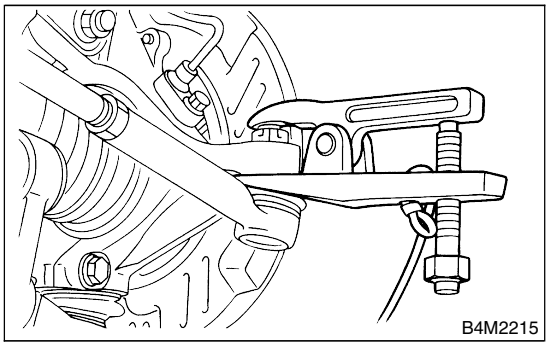
8) Remove cotter pin and castle nut which secure tie-rod end to housing knuckle arm.



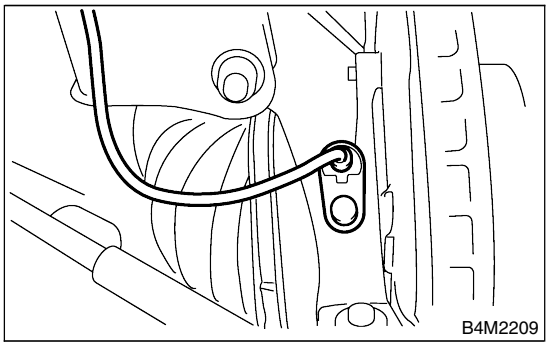
B4M2214A

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

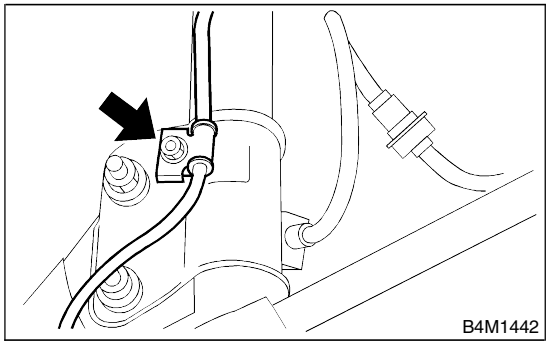
9) Using a puller, remove tie-rod ball joint from knuckle arm.


B4M2215

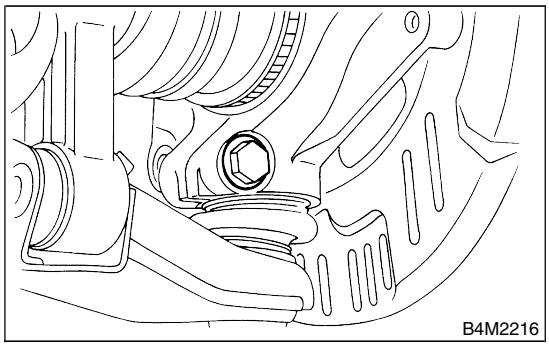
10) Remove ABS sensor assembly and harness in advance. (ABS equipped model)


B4M2209

11) Remove bolt which secures sensor harness to strut. (ABS equipped model)

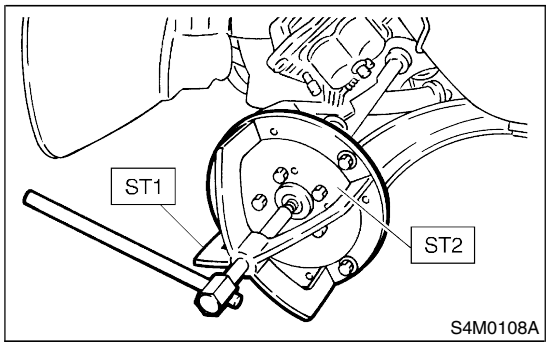

B4M1442

12) Remove transverse link ball joint from housing.


B4M2216

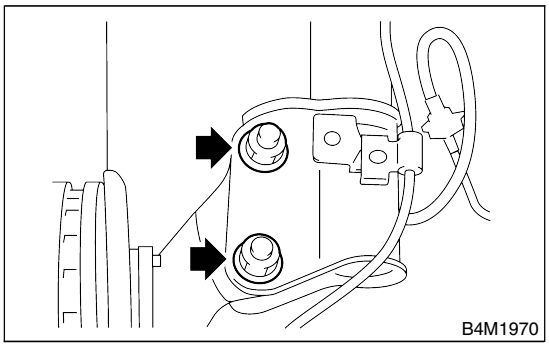
13) Remove SFJ from transmission spindle.
14) Remove front drive shaft assembly from hub. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

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.



S4M0108A

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


B4M1970

B: INSTALLATION S301148A11

1) Install transverse link ball joint to housing.

Tightening torque:
49 N·m (5.0 kgf-m, 36 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:
155 N·m (15.8 kgf-m, 114 ft-lb)

3) Install ABS sensor on housing.

Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

4) Install ABS sensor harness on strut.
5) Install disc rotor on hub.
6) Install disc brake caliper on housing.

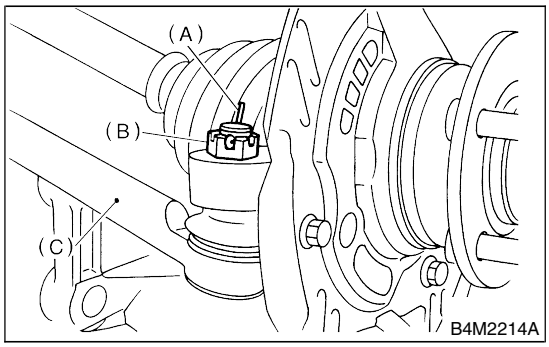
Tightening torque:
78 N·m (8 kgf-m, 57.9 ft-lb)

7) Install front drive shaft. <Ref. to DS-32 INSTALLATION, Front Drive Shaft.>
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.

Castle nut tightening torque:
Tighten to 27.0 N·m (2.75 kgf-m, 19.9 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.



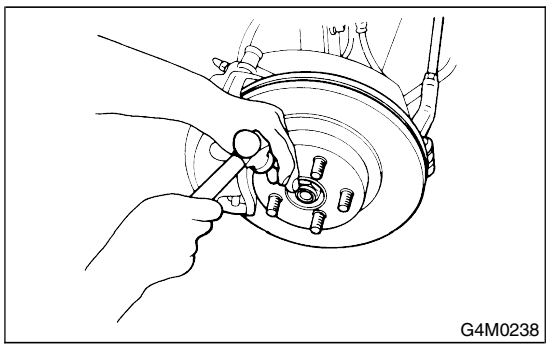
(A) Cotter pin
(B) Castle nut
(C) Tie-rod

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

Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
• Use a new axle nut.
• 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.

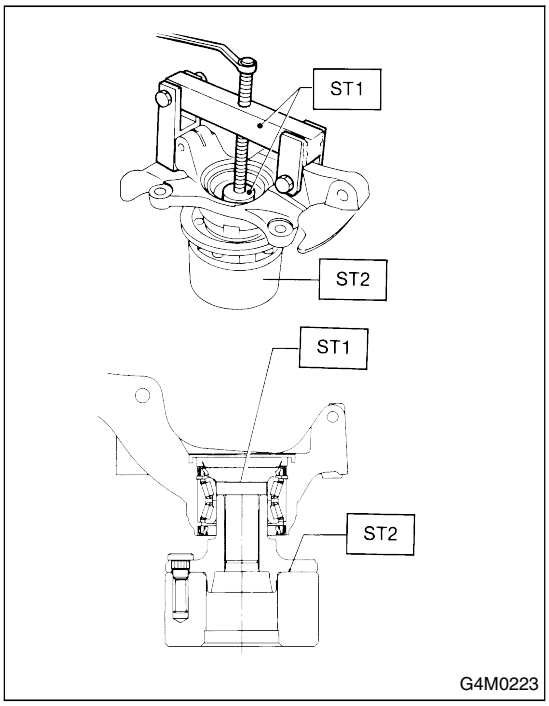


12) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

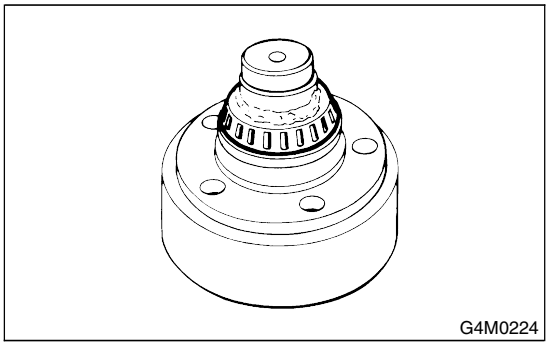
C: DISASSEMBLY S301148A06

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

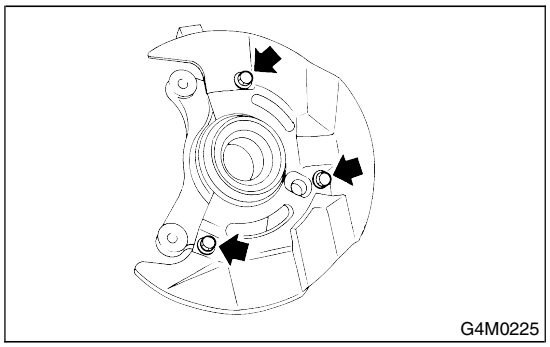


If inner bearing race remains in the hub, remove it with a suitable tool (commercially available).

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.



3) Remove disc cover from housing.

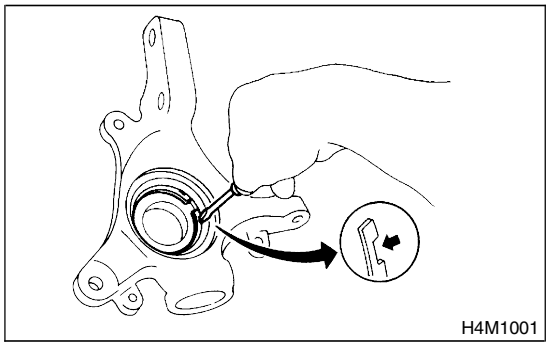


4) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:
Do not use old oil seals.

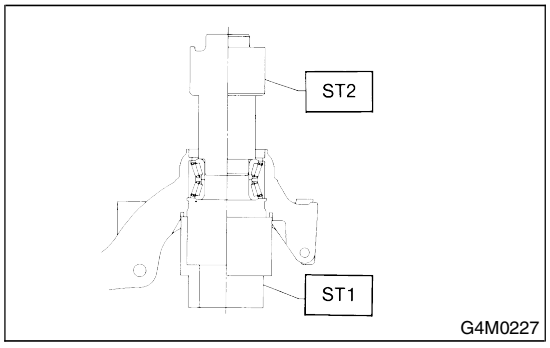
5) Using flat bladed screwdriver, remove snap ring.

CAUTION:
Remove without scratching axle housing.



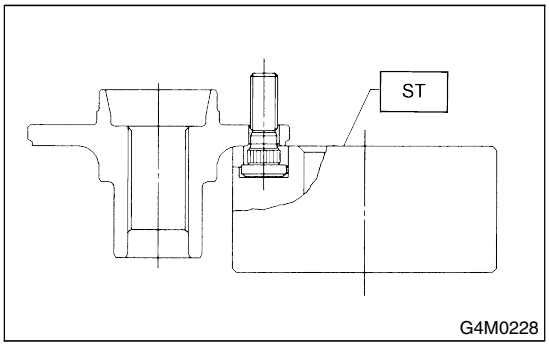
6) Using ST1, support housing securely.
7) Using ST2, press inner race to drive out outer bearing.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

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.**



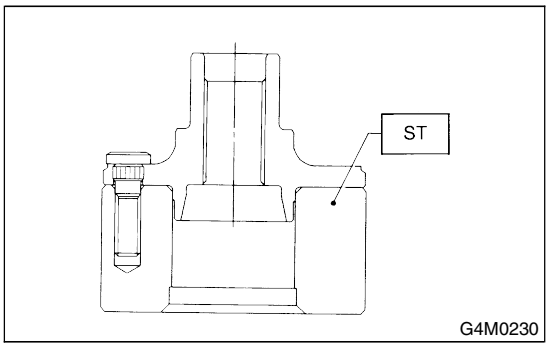
8) Using ST and a hydraulic press, drive hub bolts out.
ST 927080000 HUB STAND

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



D: ASSEMBLY S301148A02

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



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

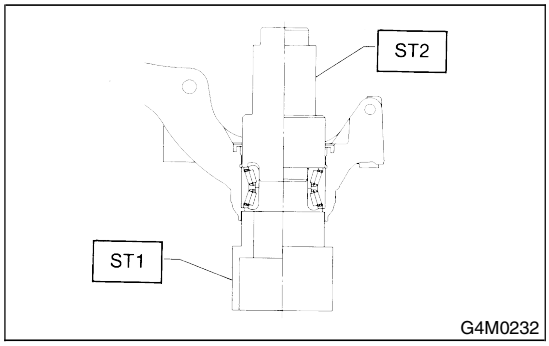
CAUTION:
Be sure to press hub bolts until their seating surfaces contact the hub.

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

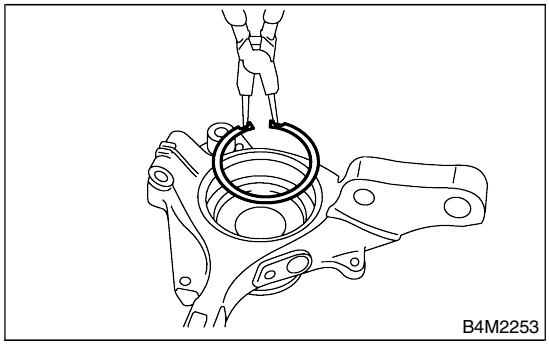
CAUTION:
• Always press outer race when installing bearing.
• Be careful not to remove plastic lock from inner race when installing bearing.
• Charge bearing with new grease when outer race is not removed.

Specified grease:
SHELL 6459N

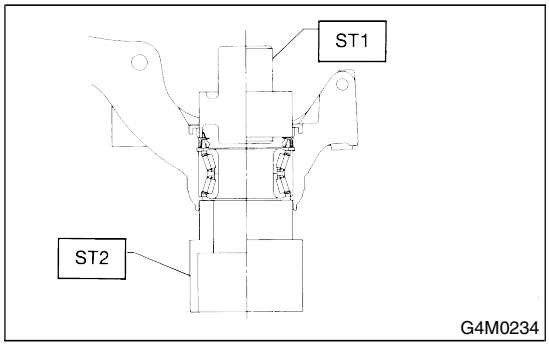


5) Using pliers, install snap ring in its groove.

CAUTION:
• Make sure to install it firmly to groove.
• Install without scratching axle housing.

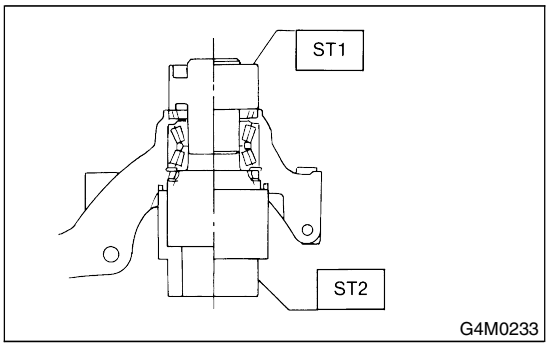


6) Using ST1 and ST2, press inner oil seal until it contacts circlip.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



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.

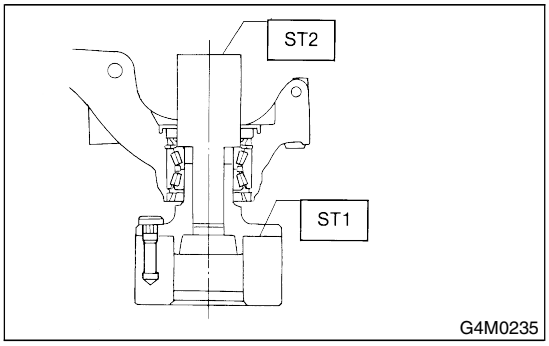
Specified grease
SHELL 6459N

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.

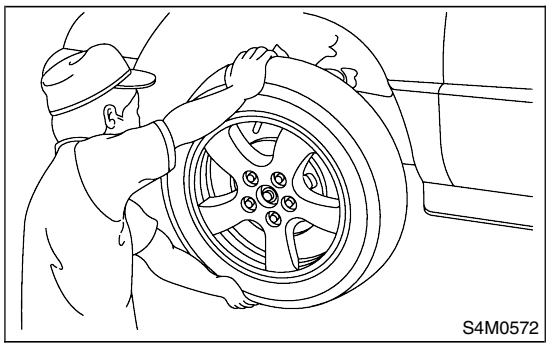
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

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



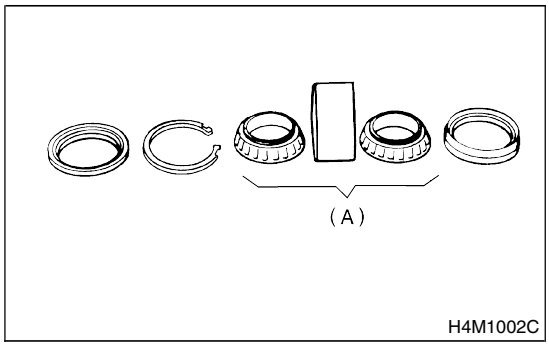
E: INSPECTION S301148A10

1) Moving front tire up and down by hand, check that there is no backlash in the bearing. And check that wheel rotates smoothly.



2) Inspect 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.**



(A) Replace as a set.

4. Rear Axle S301154

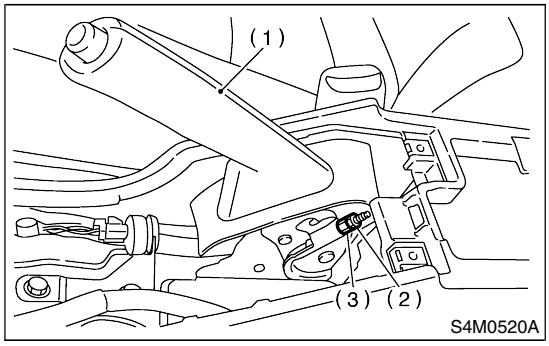
A: REMOVAL S301154A18

1. DISC BRAKE S301154A1802

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

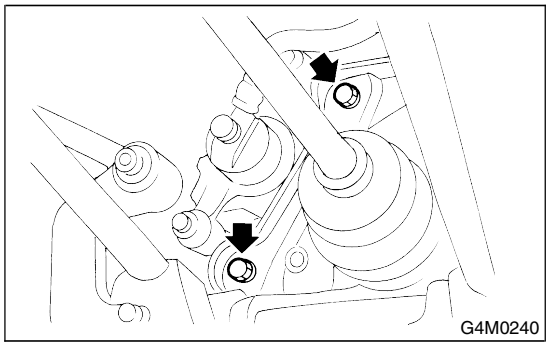
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

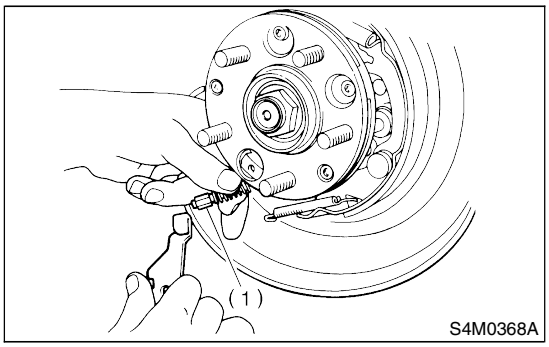
6) Remove disc brake caliper from back plate, and suspend it from strut using a piece of wire.



7) Remove disc rotor from hub.

NOTE:
If disc rotor seizes up within hub, drive it out by installing an 8-mm bolt into bolt hole in disc rotor.

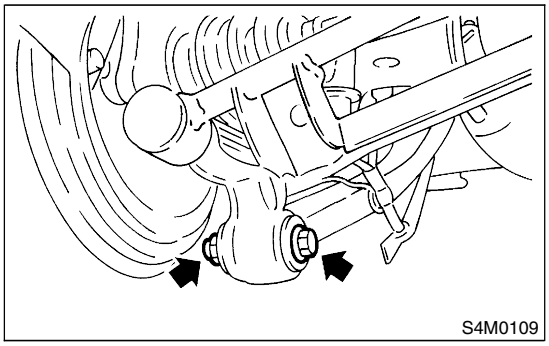
8) Disconnect parking brake cable end.



(1) Cable end

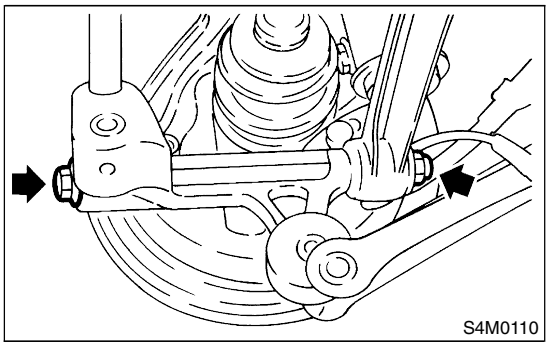
9) Disconnect rear stabilizer from rear lateral link.
10) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.



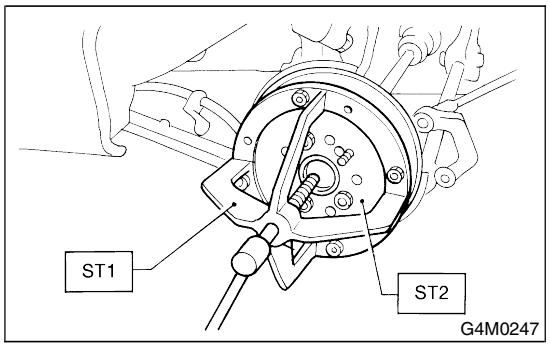
11) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

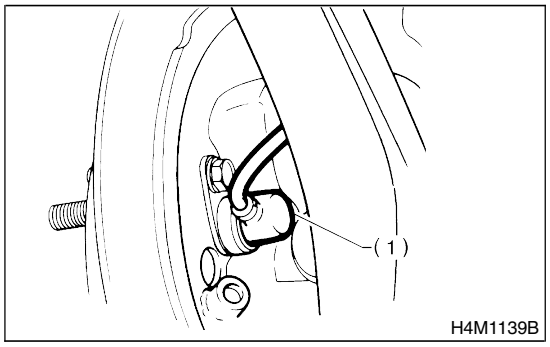


12) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
• Be careful not to damage oil seal lip when removing rear drive shaft.
• When rear drive shaft is to be replaced, also replace inner oil seal with a new one.

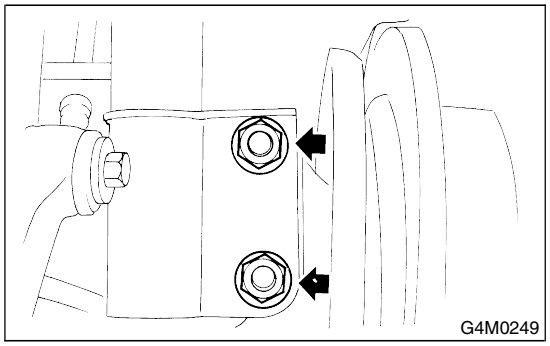


13) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



(1) ABS sensor

14) Remove bolts which secure rear housing to strut, and separate the two.

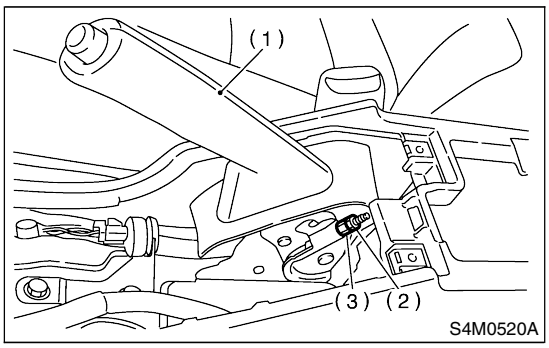


2. DRUM BRAKE S301154A1803

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

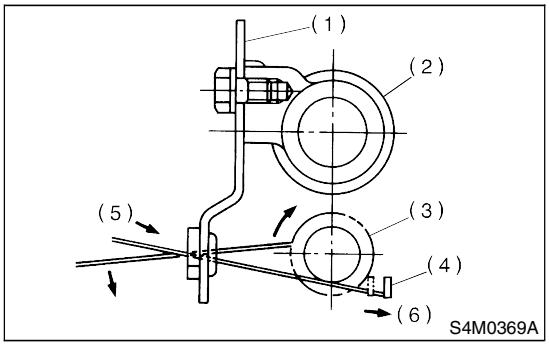
CAUTION:
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



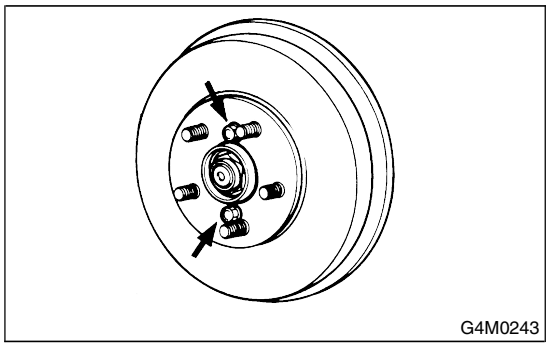
(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

6) Remove brake drum from hub.
7) If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.



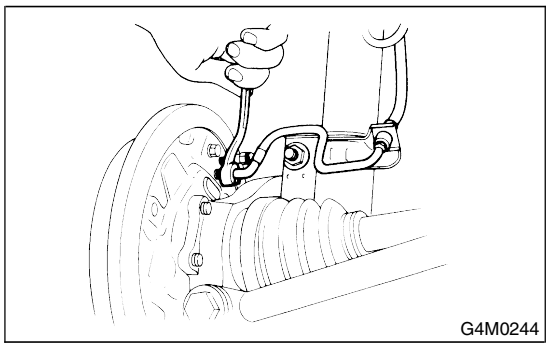
(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push

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

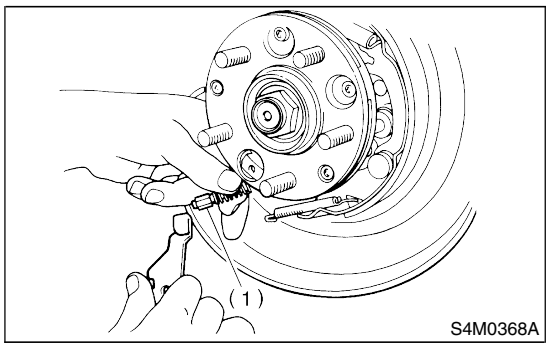

G4M0243

8) Using a flare-nut wrench, disconnect brake pipe from wheel cylinder.

CAUTION:
Cover open end of wheel cylinder to prevent entry of foreign particles.


G4M0244

9) Disconnect parking brake cable end.



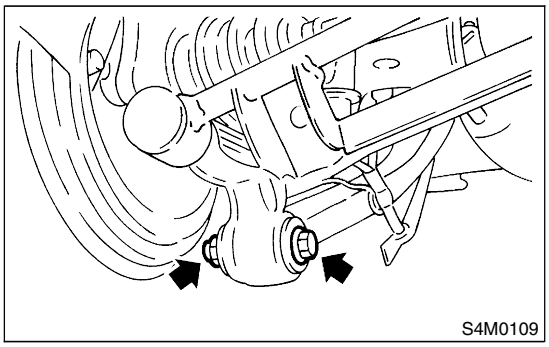
S4M0368A

(1) Cable end

10) Disconnect rear stabilizer from rear lateral link.

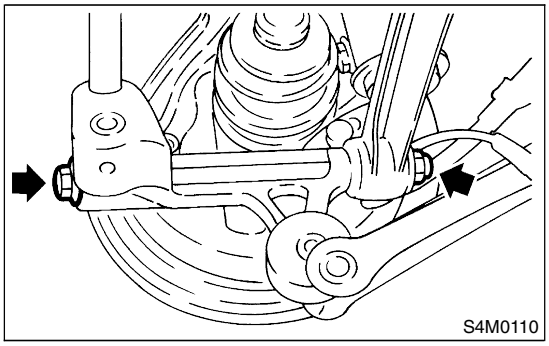
11) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.


S4M0109

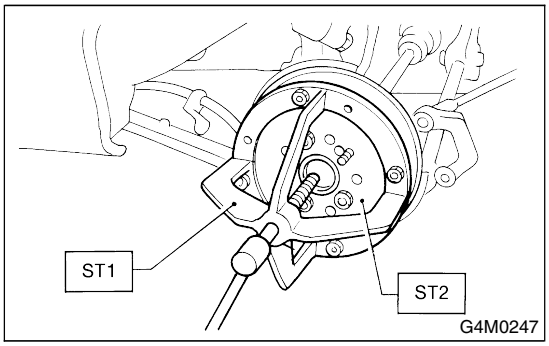
12) Remove bolts which secure lateral link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.


S4M0110

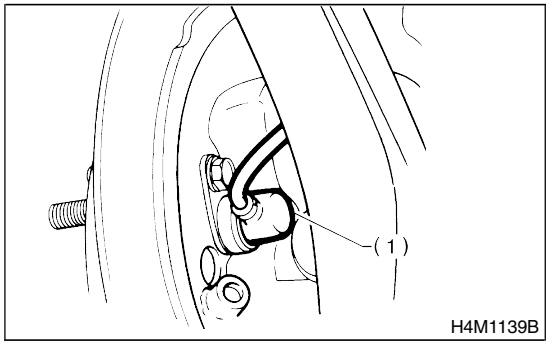
13) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

CAUTION:
- **Be careful not to damage oil seal lip when removing rear drive shaft.**
- **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**



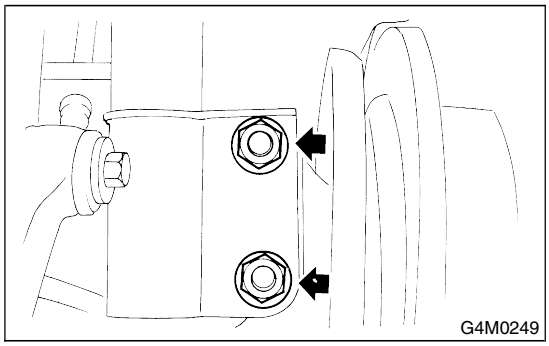
G4M0247

14) Remove rear ABS sensor from back plate (only vehicle equipped with ABS).



(1) ABS sensor

15) Remove bolts which secure rear housing to strut, and separate the two.



B: INSTALLATION S301154A11

1. DISC BRAKE S301154A1102

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
196 N·m (20 kgf-m, 145 ft-lb)

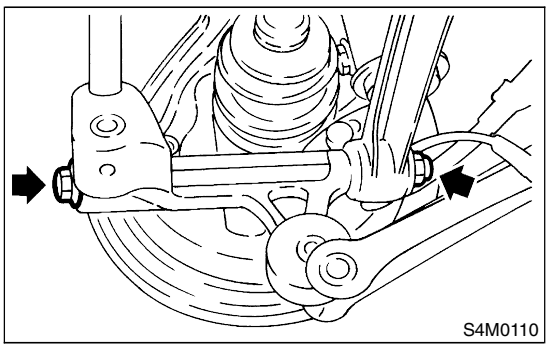
2) Fit BJ (bell joint) to rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

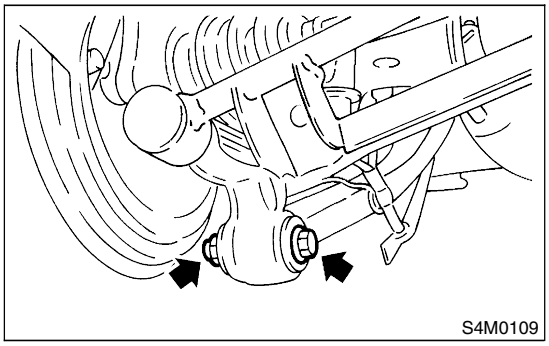
Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)



4) Connect rear housing assembly to trailing link assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
113 N·m (11.5 kgf-m, 83 ft-lb)



5) Connect rear stabilizer to rear lateral link.

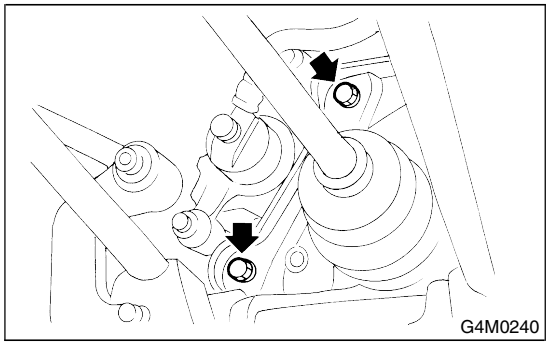
CAUTION:
Use a new self-locking nut.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

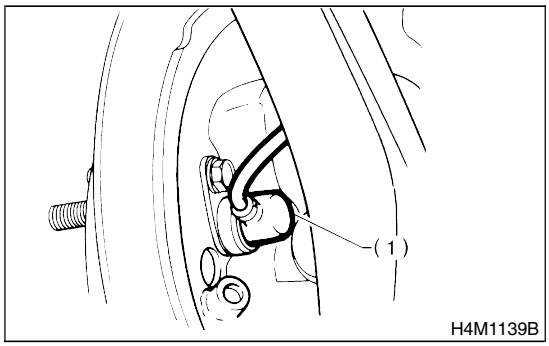
6) Connect parking brake cable to parking brake.
7) Install disc rotor on rear housing assembly.

8) Install disc brake caliper on back plate.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)


G4M0240

9) Install rear ABS sensor to back plate (only vehicle equipped with ABS).



(1) ABS sensor

10) Bleed air from brake system. <Ref. to BR-47, Air Bleeding.>
11) Adjust parking brake lever stroke by turning adjuster.
12) 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:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
• Use a new axle nut.
• 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.

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

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

2. DRUM BRAKE *S301154A1103*

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
196 N·m (20 kgf-m, 145 ft-lb)

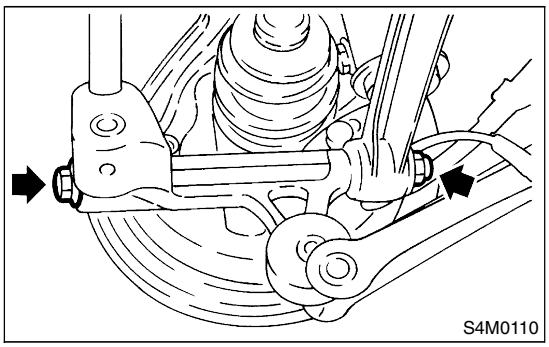
2) Fit BJ (bell joint) to rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

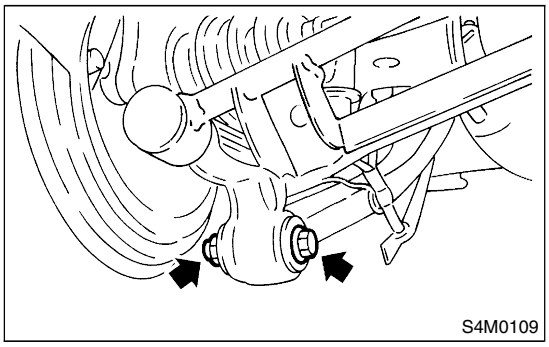
Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)


S4M0110

4) Connect rear housing assembly to trailing link assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
113 N·m (11.5 kgf-m, 83 ft-lb)


S4M0109

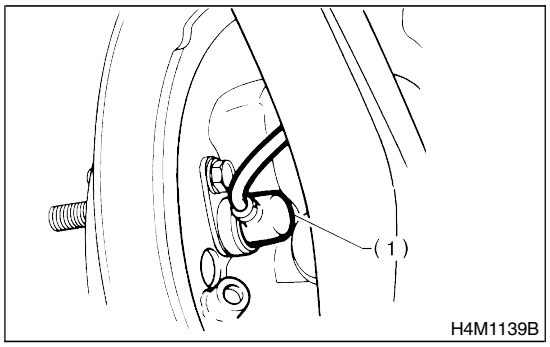
5) Connect rear stabilizer to rear lateral link.

CAUTION:
Use a new self-locking nut.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

6) Connect parking brake cable to parking brake.

7) Clean brake pipe connection. Using a flare-nut wrench, connect brake pipe to wheel cylinder.
8) Connect rear ABS sensor to back plate (only vehicle equipped with ABS).



(1) ABS sensor

9) Connect parking brake cable to lever.
10) Install brake drum on rear housing assembly.
11) Bleed air from brake system. <Ref. to BR-47, Air Bleeding.>
12) Adjust parking brake lever stroke by turning adjuster.
13) 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:
186 N·m (19 kgf-m, 137 ft-lb)

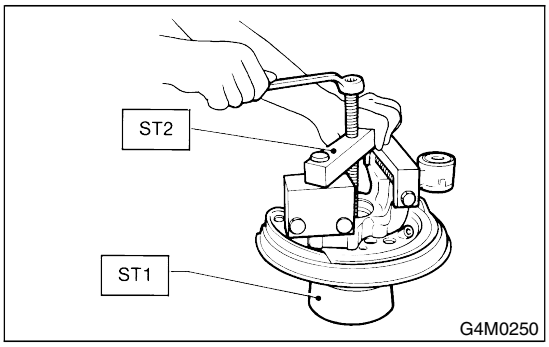
CAUTION:
• Use a new axle nut.
• Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
• Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

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

Tightening torque:
88 N·m (9 kgf-m, 65 ft-lb)

C: DISASSEMBLY S301154A06

1) Using ST1 and ST2, remove hub from rear housing.
ST1 927080000 HUB STAND
ST2 927420000 HUB REMOVER

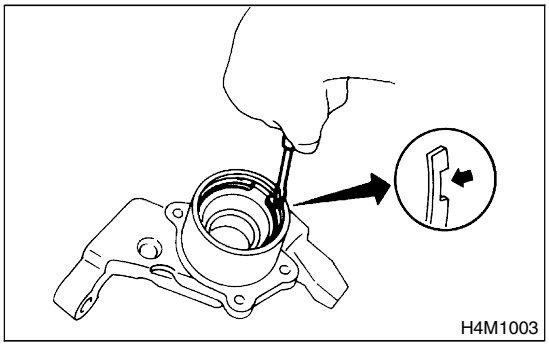


2) Remove back plate from rear housing.
3) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:
Use new oil seals.

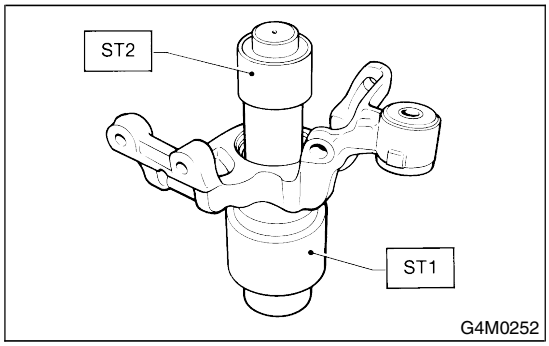
4) Using flat bladed screwdriver, remove snap ring.

CAUTION:
Remove without scratching axle housing.



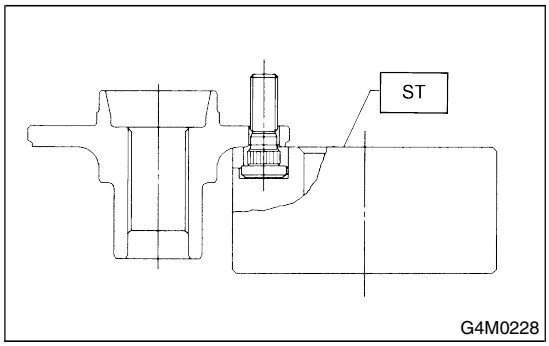
5) Using ST1 and ST2, remove bearing by pressing inner race.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

CAUTION:
- **Do not remove bearing unless damaged.**
- **Do not re-use bearing after removal.**



6) Remove tone wheel bolts and remove tone wheel from hub (only vehicle equipped with ABS).
7) Using ST, press hub bolt out.
ST 927080000 HUB STAND

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

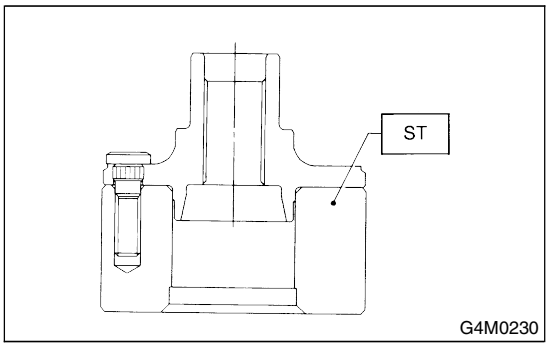


D: ASSEMBLY S301154A02

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

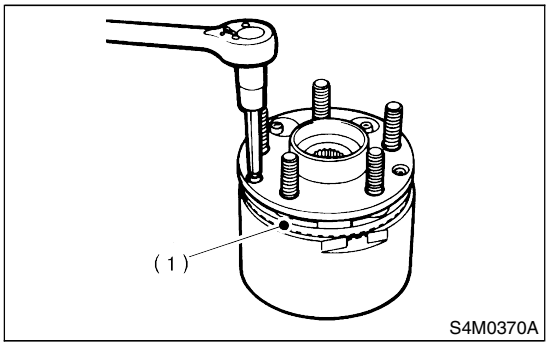
CAUTION:
- **Ensure hub bolt closely contacts hub.**
- **Use a 12 mm (0.47 in) hole in the ST to prevent hub bolt from tilting during installation.**

ST 927080000 HUB STAND



2) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

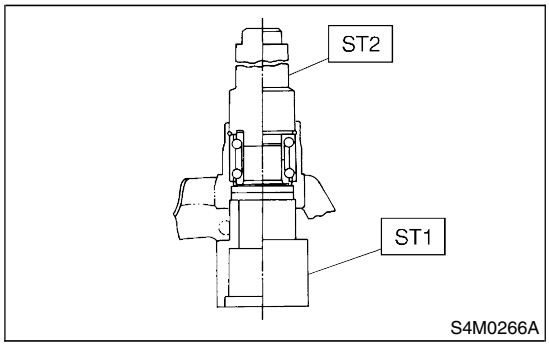
CAUTION:
- **Ensure tone wheel closely contacts hub.**
- **Be careful not to damage tone wheel teeth.**



(1) Tone wheel

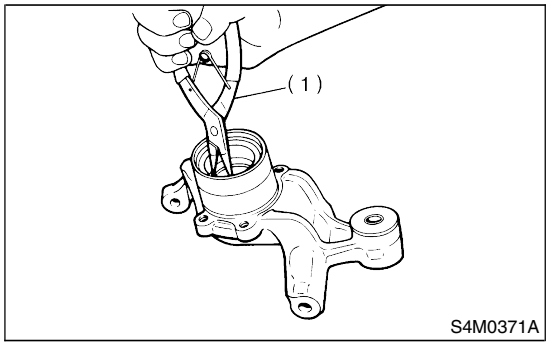
3) Clean housing interior completely. Using ST1 and ST2, press bearing into housing.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

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.



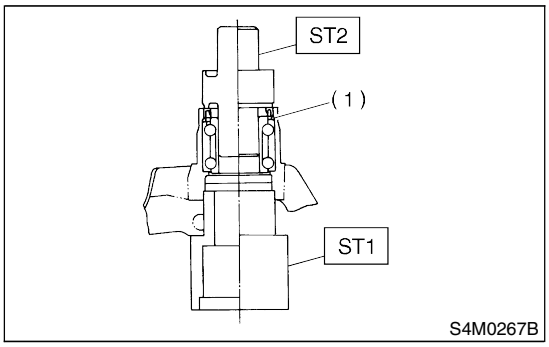
4) Using plier, install snap ring.

CAUTION:
• Ensure snap ring fits in groove properly.
• Install without scratching axle housing.



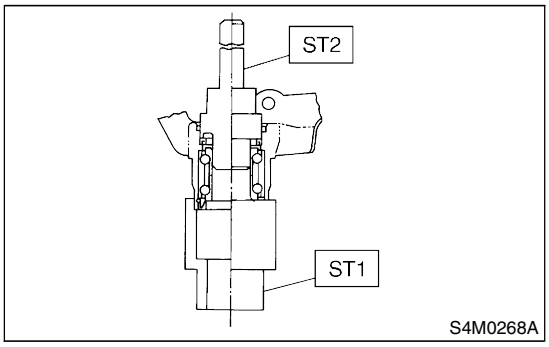
(1) Plier

5) Using ST1 and ST2, press outer oil seal until it comes in contact with snap ring.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER

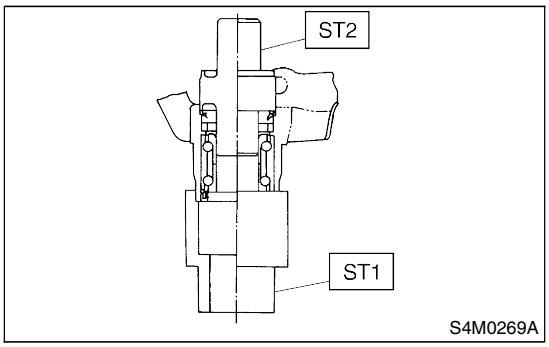


(1) Snap ring

6) Invert both ST1 and housing.
7) Using ST2, press inner oil seal into housing until it touches bottom.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



8) Using ST1 and ST2, press sub seal into place.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



9) Apply sufficient grease to oil seal lip.

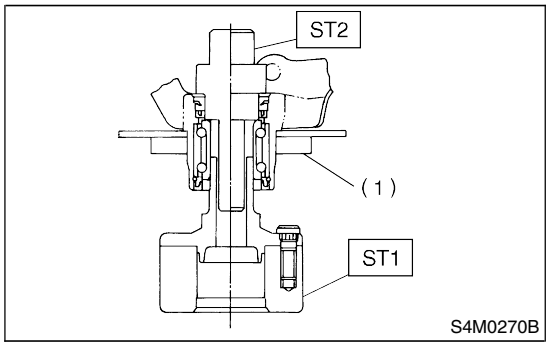
Specified grease:
SHELL 6459N

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 back plate to rear housing.

Tightening torque:
52 N·m (5.3 kgf-m, 38 ft-lb)

11) Using ST1 and ST2, press bearing into hub.
ST1 927080000 HUB STAND
ST2 927450000 HUB INSTALLER

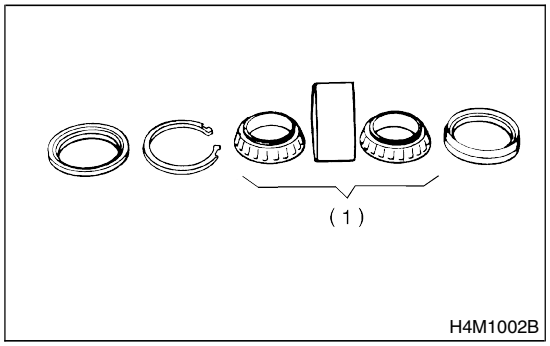


(1) Back plate

E: INSPECTION *S301154A10*

1) Check that there is no backlash in the rear bearing as well as front. And check that wheel rotates smoothly. <Ref. to DS-22, INSPECTION, Front Axle.>
2) Inspect the removed parts for wear and damage. If defective, replace with a new one.

CAUTION:
• If a bearing is faulty, replace it as the bearing set.
• Be sure to replace oil seal at every overhaul.



(A) Replace as a set.

5. Front Drive Shaft S301153

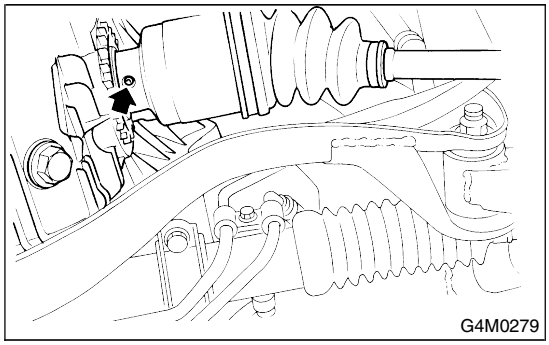
A: REMOVAL S301153A18

1) Disconnect ground terminal 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.

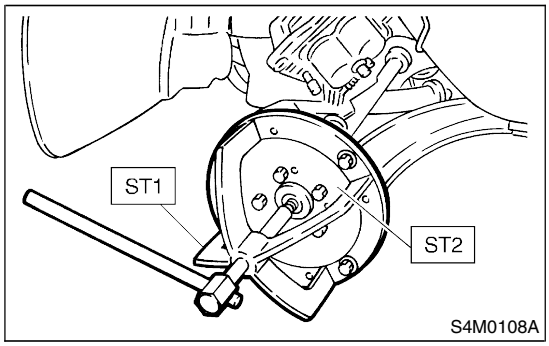
5) Remove stabilizer link from transverse link.
6) Disconnect transverse link from housing.
7) Remove spring pin which secures transmission spindle to SFJ.

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.**



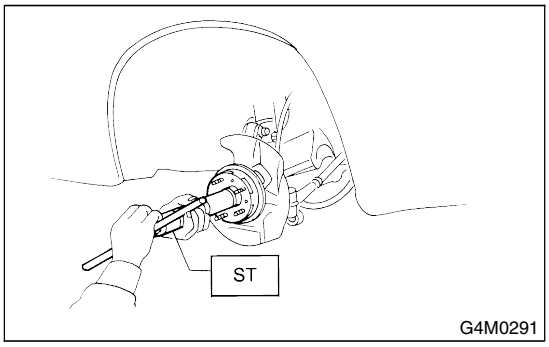
B: INSTALLATION S301153A11

1) Insert BJ into hub splines.

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

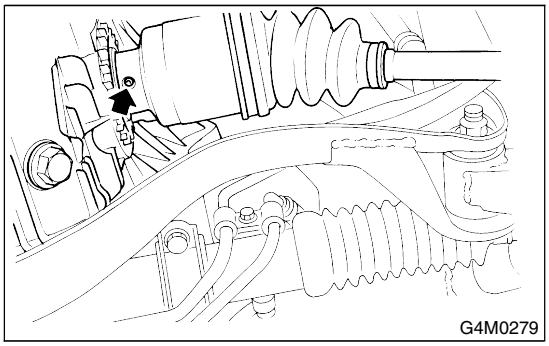
2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

CAUTION:
Do not hammer drive shaft when installing it.



3) Tighten axle nut temporarily.
4) Install SFJ on transmission spindle and drive spring pin into place.

CAUTION:
Always use a new spring pin.



5) Connect transverse link to housing.

Tightening torque (self-locking nut):
49 N·m (5.0 kgf-m, 36 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.

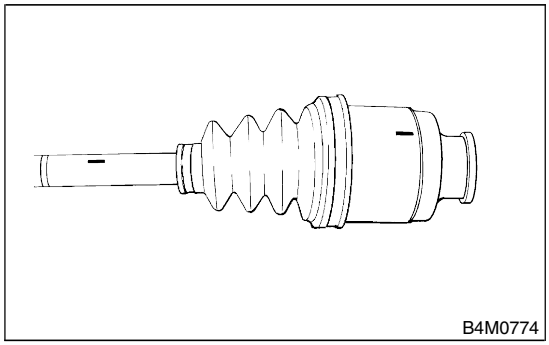
Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
• Use a new axle nut.
• 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.

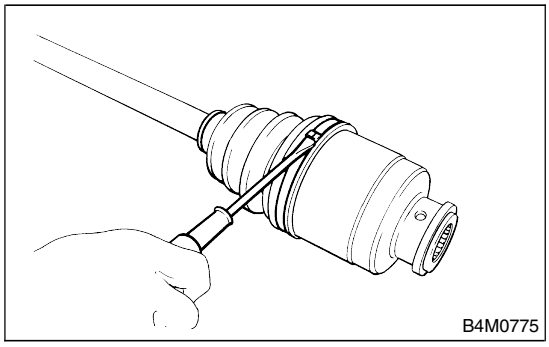
C: DISASSEMBLY S301153A06

1) Place alignment marks on shaft and outer race.

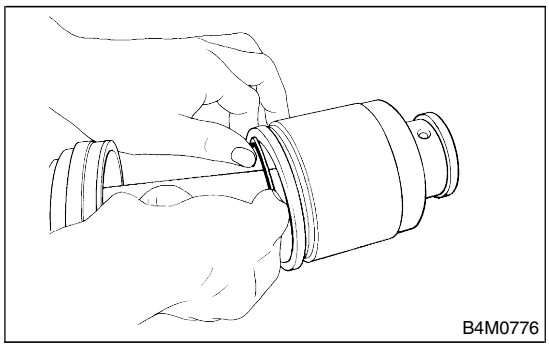

B4M0774

2) Remove SFJ boot band and boot.

CAUTION:
Be careful not to damage boot.


B4M0775

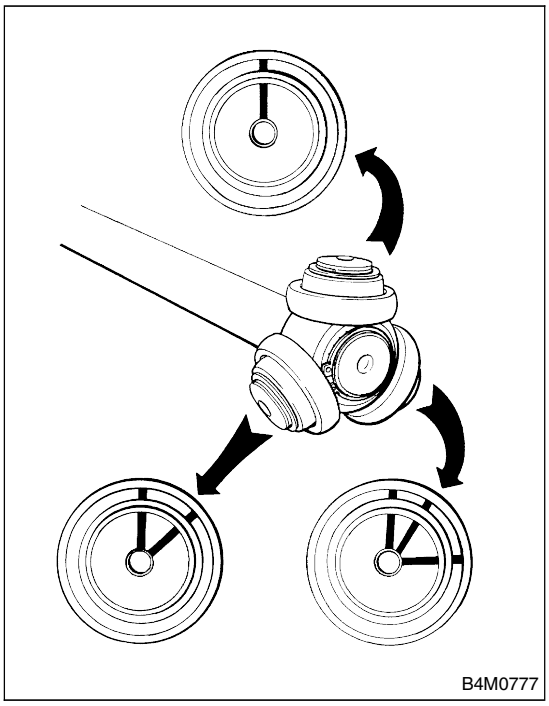
3) Remove circlip from SFJ outer race using screwdriver.


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.

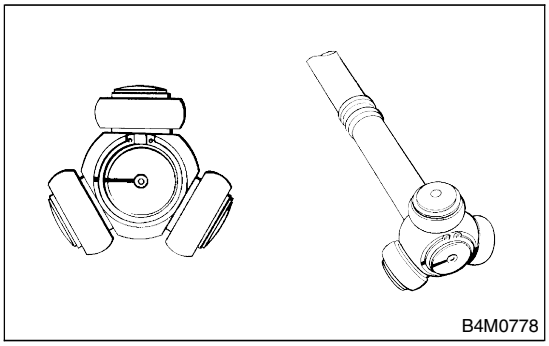
6) Place alignment mark on free ring and trunnion.


B4M0777

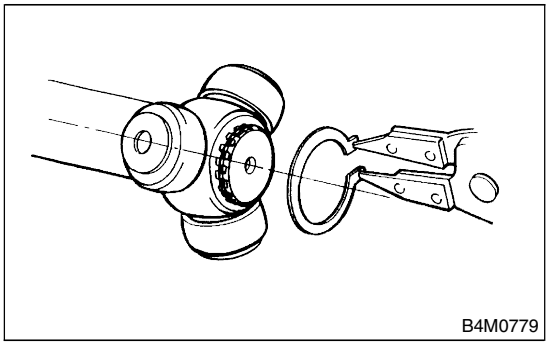
7) Remove free ring from trunnion.

CAUTION:
Be careful with the free ring position.

8) Place alignment mark on trunnion and shaft.


B4M0778

9) Remove snap ring and trunnion.

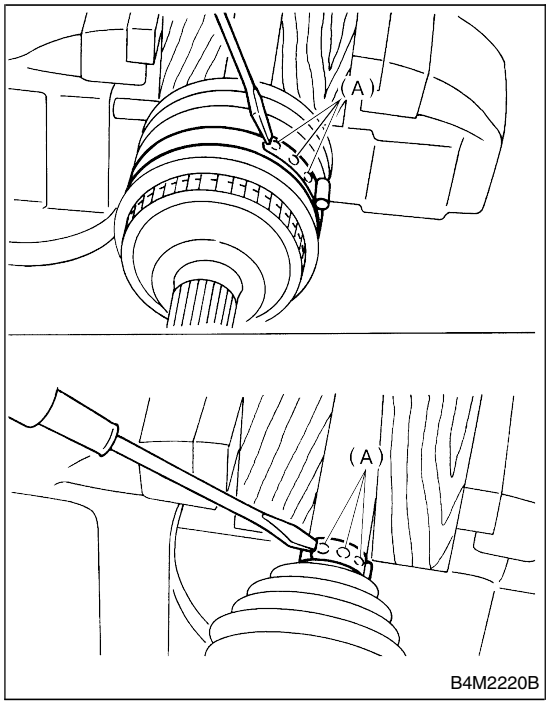

B4M0779

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.

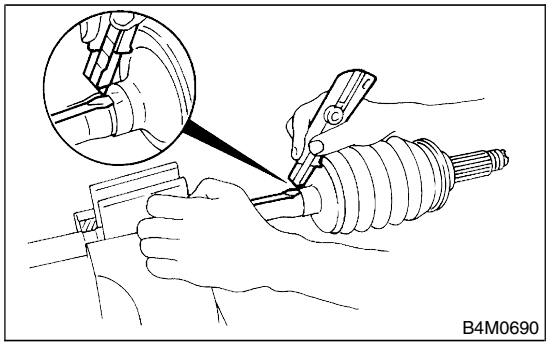
12) Raise boot band claws by means of screwdriver and hammer.



(A) Boot band claws

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.

D: ASSEMBLY S301153A02

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.

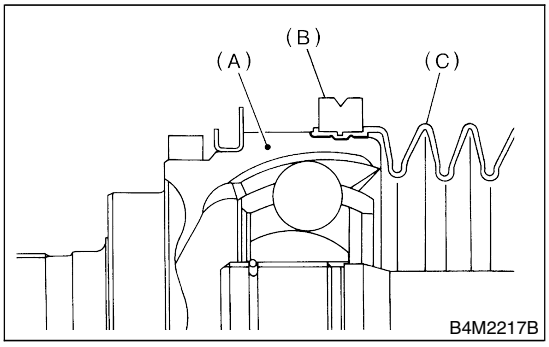
2) Place drive shaft in a vise.

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.

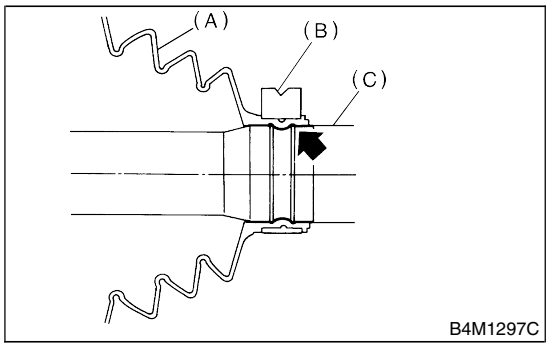
5) Install boot projecting portion to BJ groove.



(A) BJ
(B) Lorge boot band
(C) Boot

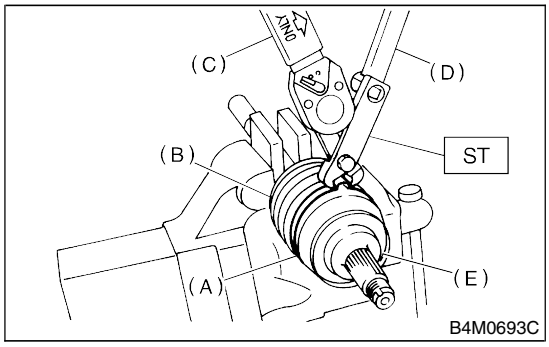
6) Set large boot band in place.

7) Install boot projecting portion to shaft groove.



(A) Boot
(B) Small boot band
(C) Shaft

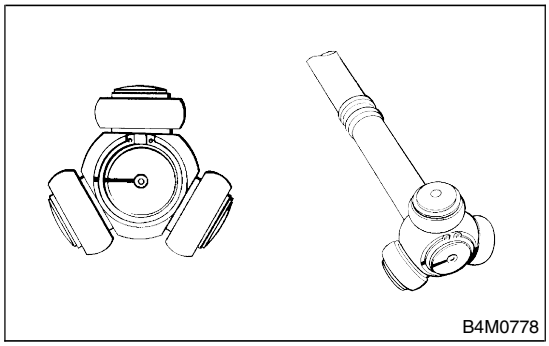
8) Tighten boot bands using ST, torque wrench and socket flex handle.
ST 28099AC000 BOOT BAND PLIER



(A) Large boot band
(B) Boot
(C) Torque wrench
(D) Socket flex handle
(E) BJ

Tightening torque:
Large boot band
157 N·m (16.0 kgf-m, 116 ft-lb) or more
Small boot band
133 N·m (13.6 kgf-m, 98 ft-lb) or more

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

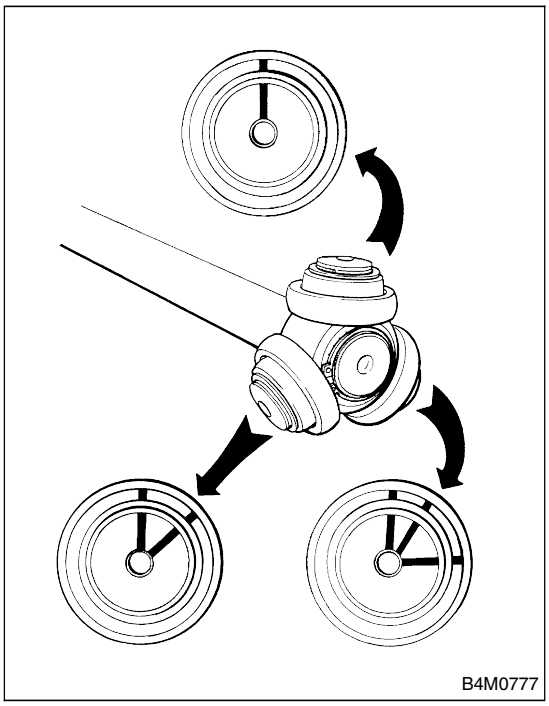


11) Install snap ring to shaft.

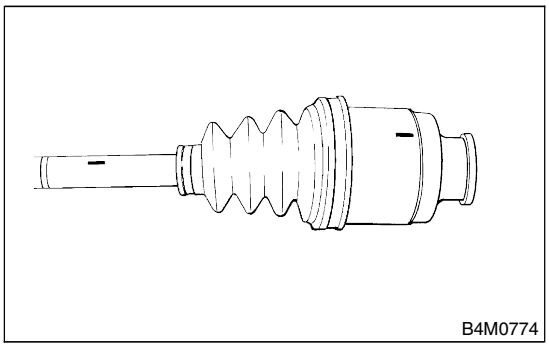
CAUTION:
Confirm that the snap ring is completely fitted in the shaft groove.

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.

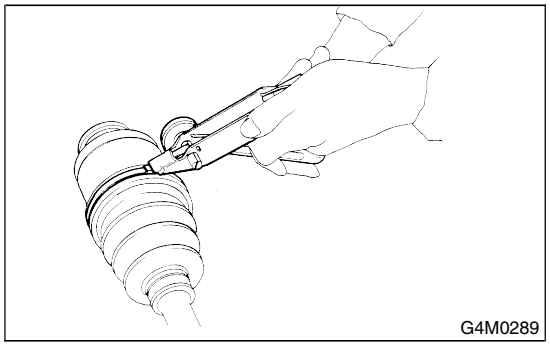
CAUTION:
Use a new band.

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.

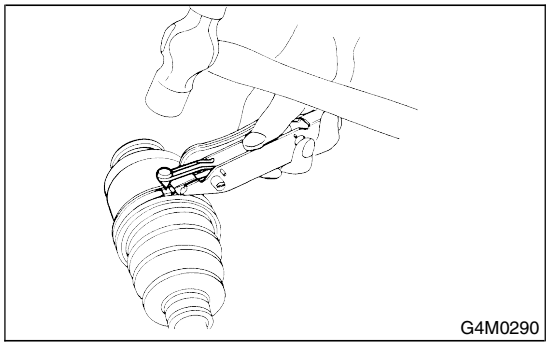
21) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten band until it cannot be moved by hand.


G4M0289

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.


G4M0290

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.

E: INSPECTION S301153A10

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.

6. Front Drive Shaft Boot S301755

A: INSPECTION S301755A10

Check boot for deterioration, deform and damage.
If any fault is found, replace the boot.

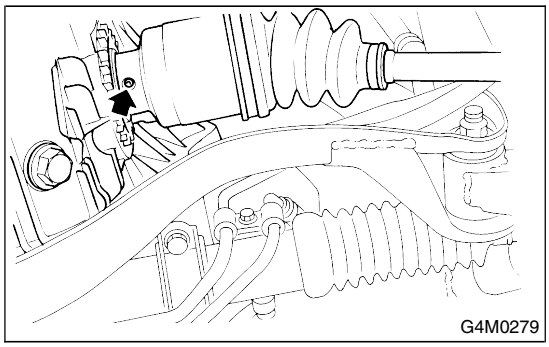
B: REPLACEMENT S301755A20

1) Set vehicle on a lift.
2) Disconnect ground terminal from battery.
3) Jack-up vehicle, support it with safety stands (rigid rocks), and remove front wheel cap and wheels.

NOTE:
Do not remove axle nut.

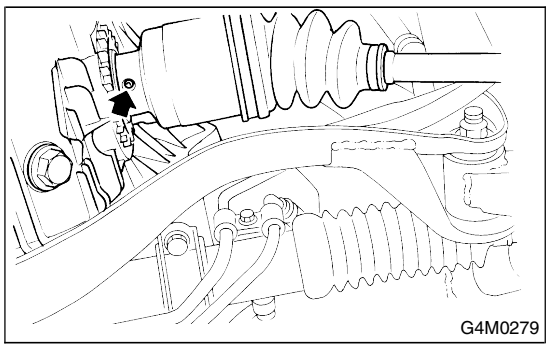
4) Remove stabilizer link.
5) Disconnect transverse link from housing.
6) Remove spring pin which secures transmission spindle to SFJ.

CAUTION:
Use a new spring pin.



7) Remove BJ and SFJ boots from drive shaft. <Ref. to DS-33, DISASSEMBLY, Front Drive Shaft.>
8) Install BJ and SFJ boots to drive shaft.
<Ref. to DS-34, ASSEMBLY, Front Drive Shaft.>
9) Install SFJ on transmission spindle and drive spring pin into place.

CAUTION:
Always use a new spring pin.



10) Connect transverse link to housing.
11) Install stabilizer link.

7. Rear Drive Shaft S301156

A: REMOVAL S301156A18

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Lift vehicle. 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.

4) Unlock axle nut.
5) Loosen axle nut using a socket wrench.

CAUTION:
Do not remove axle nut.

6) Remove ABS sensor clamps and parking brake cable bracket.
7) Remove bolts which secure lateral link assembly to rear housing.

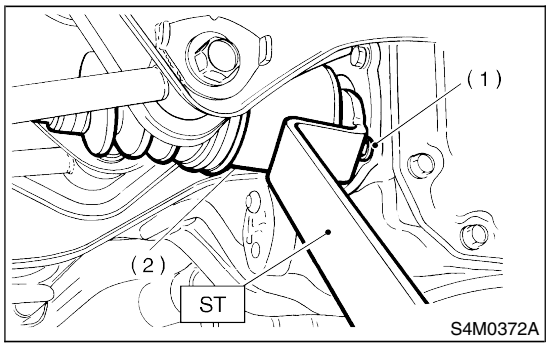
CAUTION:
Discard old self-locking nut. Replace with a new one.

8) Remove bolts which secure trailing link assembly to rear housing.

CAUTION:
Discard old self-locking nut. Replace with a new one.

9) Remove DOJ from rear differential using ST. (Except Non-TURBO AT vehicle)
ST 28099PA100 DRIVE SHAFT REMOVER

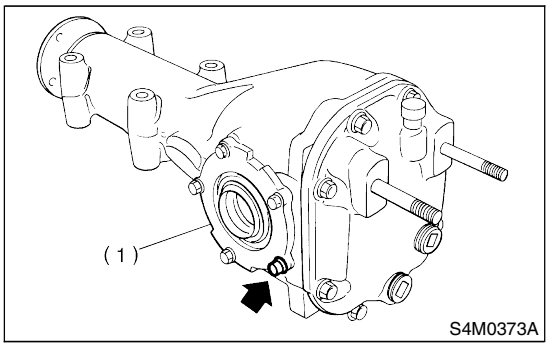
CAUTION:
Do not remove circlip attached to inside of differential.



(1) Bolt
(2) DOJ

CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

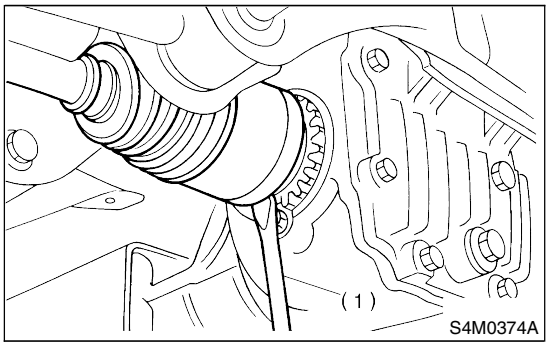
ST 28099PA100 DRIVE SHAFT REMOVER



(1) Side bearing retainer

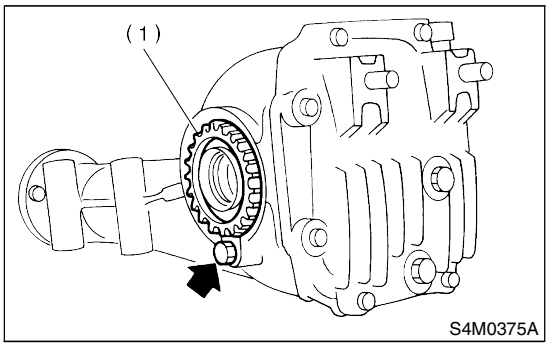
10) Remove DOJ from rear differential using tire lever. (Non-TURBO AT vehicles)

NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Tire lever

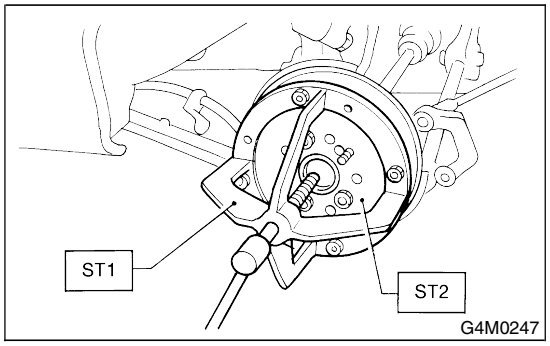
CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



(1) Axle shaft holder

11) 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 oil seal lip when removing rear drive shaft.
• When rear drive shaft is to be replaced, also replace inner oil seal with a new one.



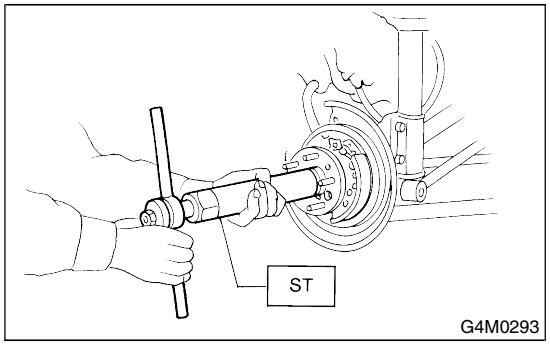
B: INSTALLATION S301156A11

1) Insert BJ into rear housing splines.

CAUTION:
Be careful not to damage inner oil seal lip.

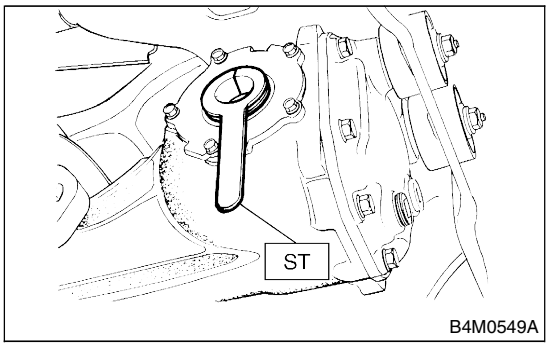
2) Using ST1 and ST2, pull drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

CAUTION:
Do not hammer drive shaft when installing it.



3) Tighten axle nut temporarily.
4) Replace circlips from DOJ spline with new one.

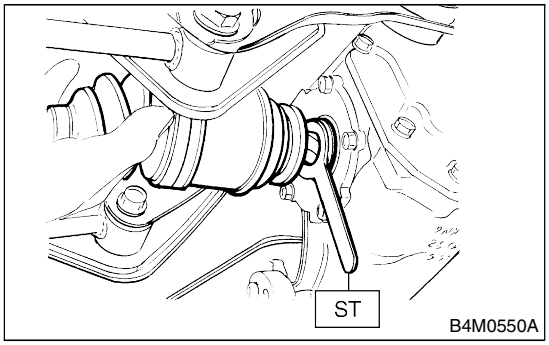
5) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



6) Insert DOJ spline end into bore of side oil seal, and remove ST.

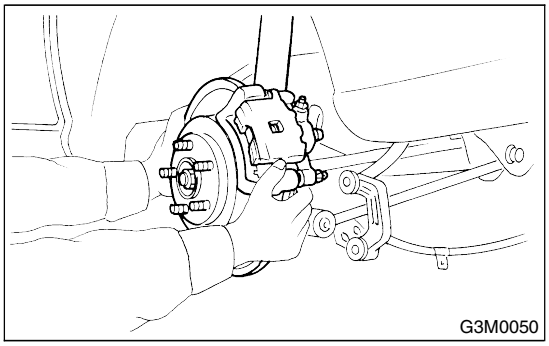
CAUTION:
Do not allow DOJ splines to damage side oil seal.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



7) Align DOJ and differential splines.
8) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.



9) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.

Tightening torque:
113 N·m (11.5 kgf-m, 83 ft-lb)

10) Connect rear housing assembly to lateral link assembly, and tighten self-locking nut.

Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)

11) Install stabilizer bracket.
12) While depressing brake pedal, tighten axle nut using a socket wrench.

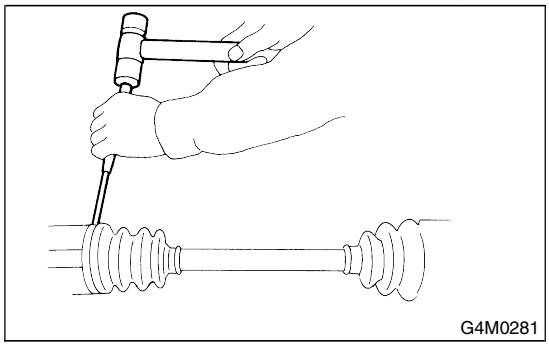
Tightening torque:
186 N·m (19 kgf-m, 137 ft-lb)

CAUTION:
• Use a new axle nut.
• 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.

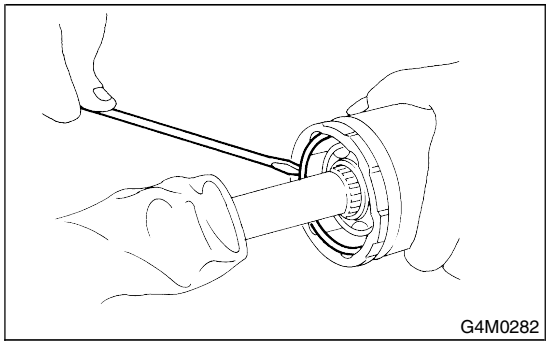
13) After tightening axle nut, lock it securely.

C: DISASSEMBLY S301156A06

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.


G4M0281

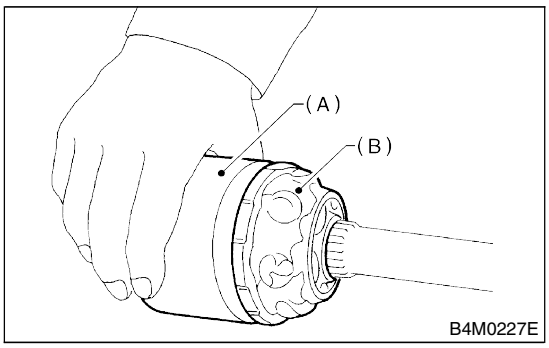
3) Remove boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.


G4M0282

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).



B4M0227E

(A) Outer race
(B) Grease

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.

D: ASSEMBLY S301156A02

CAUTION:
Use specified grease.

BJ side (Non-turbo model):
Molylex No. 2 (Part No. 723223010)

EBJ side (Turbo model):
NTG 2218 (Part No. 28093AA000)

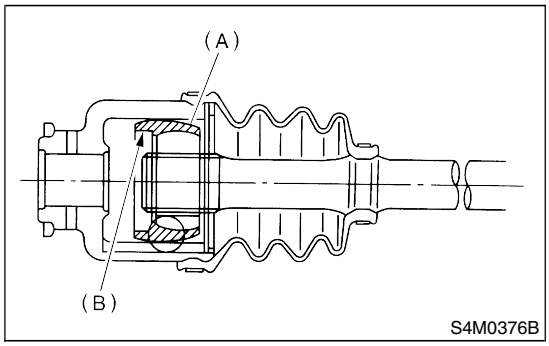
DOJ side:
VU-3A702 (Yellow) (Part No. 23223GA050)

1) Install BJ or EBJ 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.

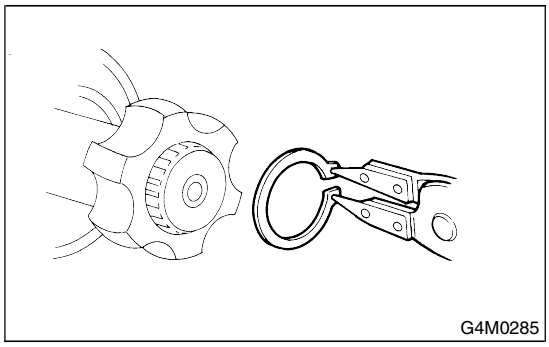
NOTE:
Insert the cage with the cut-out portion facing the shaft end, since the cage has an orientation.



(A) Cage
(B) Cut-out portion

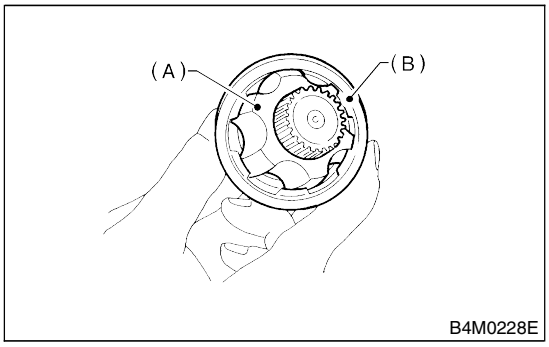
4) Install DOJ inner race on shaft and fit snap ring with pliers.

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



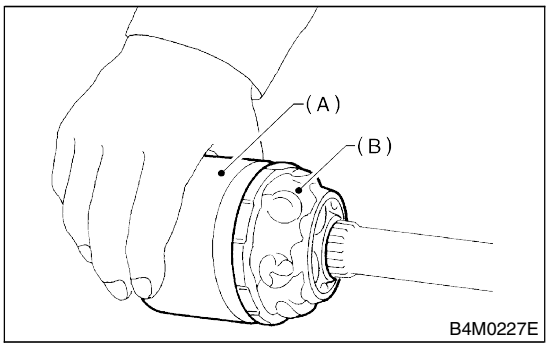
5) Install cage, which was previously fitted, to inner race fixed upon shaft.

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



(A) Inner race
(B) Cage

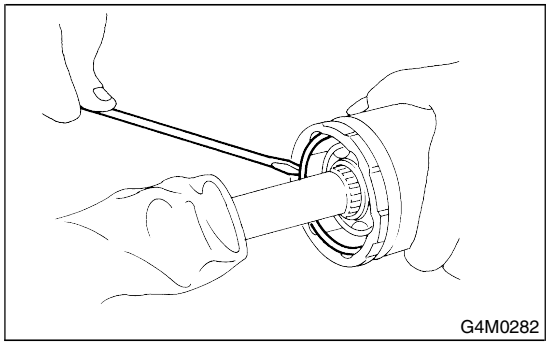
6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
7) Apply a coat of specified grease to the cage pocket and six balls.
8) Insert six balls into the cage pocket.
9) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit outer race.



(A) Outer race
(B) Grease

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.


G4M0282

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.

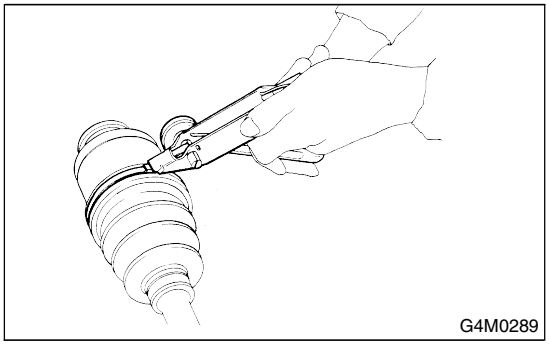
CAUTION:
Use a new band.

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.

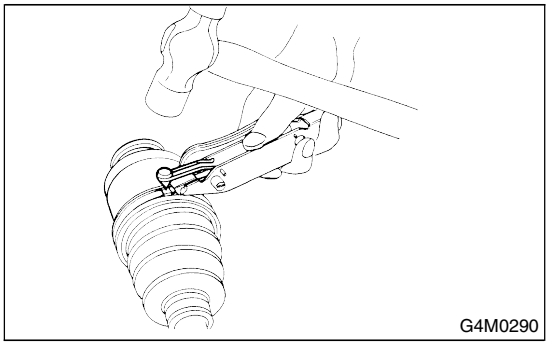
15) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

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 or EBJ in the same manner.

NOTE:
Extend and retract DOJ to provide equal grease coating.

E: INSPECTION S301156A10

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) or EBJ (High efficiency compact ball fixed joint)
Check seizure, corrosion, damage and excessive play.
5) Boot
Check for wear, warping, breakage or scratches.
6) Grease
Check for discoloration or fluidity.

8. Rear Drive Shaft Boot S301756

A: INSPECTION S301756A10

Check boot for deterioration, deform and damage. If any fault is found, replace the boot.

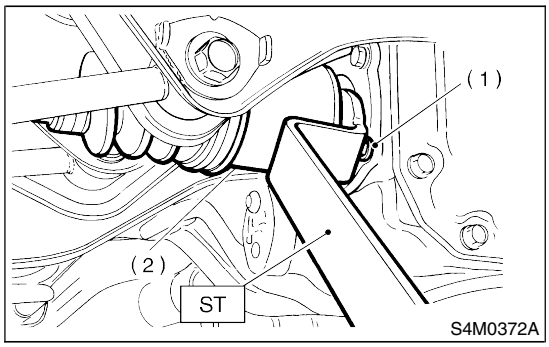
B: REPLACEMENT S301756A20

1) Set vehicle on a lift.
2) Disconnect ground cable from battery.
3) Lift vehicle. Remove rear wheel cap and wheels.

NOTE:
Axle nut need not be removed.

4) Remove ABS sensor clamps and parking brake cable bracket.
5) Disconnect stabilizer link from lateral link.
6) Remove bolts which secure lateral link assembly to rear housing.
7) Remove bolts which secure trailing link assembly to rear housing.
8) Remove DOJ from rear differential using ST.
ST 28099PA100 DRIVE SHAFT REMOVER

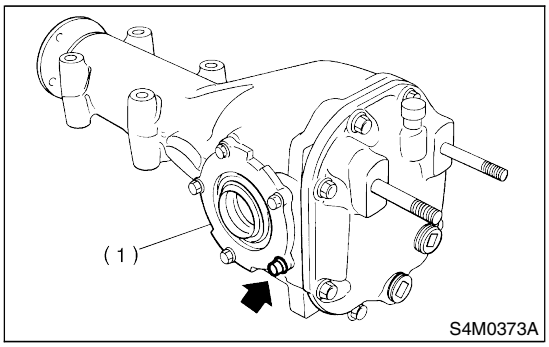
NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Bolt
(2) DOJ

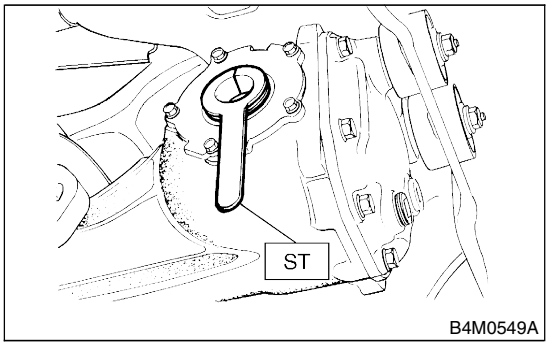
CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER



(1) Side bearing retainer

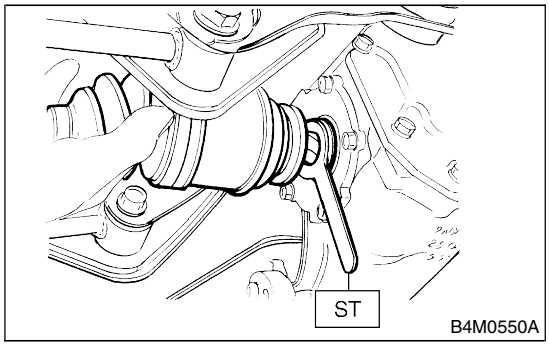
9) Remove DOJ and BJ or EBJ boots from drive shaft. <Ref. to DS-40, DISASSEMBLY, Front Drive Shaft.>
10) Install DOJ and BJ or EBJ boots to drive shaft. <Ref. to DS-40, ASSEMBLY, Rear Drive Shaft.>
11) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



12) Insert DOJ spline end into bore of side oil seal, and remove ST.

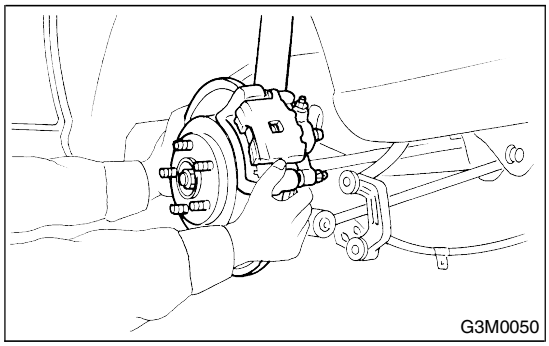
CAUTION:
Do not allow DOJ splines to damage side oil seal.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



13) Align DOJ and differential splines.
14) Push housing to insert DOJ into differential.

NOTE:
Make sure DOJ is inserted properly.



CAUTION:
Discard old self-locking nut. Replace with a new one.

15) Connect rear housing assembly to trailing link assembly, and tighten self-locking nut.
16) Connect rear housing assembly to lateral link assembly, and tighten self-locking nut.
17) Connect stabilizer link to lateral link.
18) Install ABS sensor clamps and parking brake cable bracket.

9. General Diagnostic Table S301257

A: INSPECTION S301257A10

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom	Possible cause	Remedy
1. Vibration of propeller shaft NOTE: Vibration is caused by propeller shaft during operation and is transferred to vehicle body. Generally vibration increase in proportion to vehicle speed.	(1) Worn or damaged universal joint.	Replace.
	(2) Unbalanced propeller shaft due to bend or dent.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
2. Tapping when starting and noise while cruising, caused by propeller shaft.	(1) Worn or damaged universal joint.	Replace.
	(2) Worn spline of sleeve yoke.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Loose installation of joint.	Replace.
	(5) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
3. Front wheel shimmy	(1) Worn or damaged hub bearing	Repair or replace.
4. Wander or pulling	(1) Worn or damaged hub bearing	Repair or replace.

ABS

Page

1. General Description....2
2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)....7
3. ABS Sequence Control....11
4. Front ABS Sensor....14
5. Rear ABS Sensor....18
6. Front Tone Wheel....21
7. Rear Tone Wheel....22
8. G Sensor....23

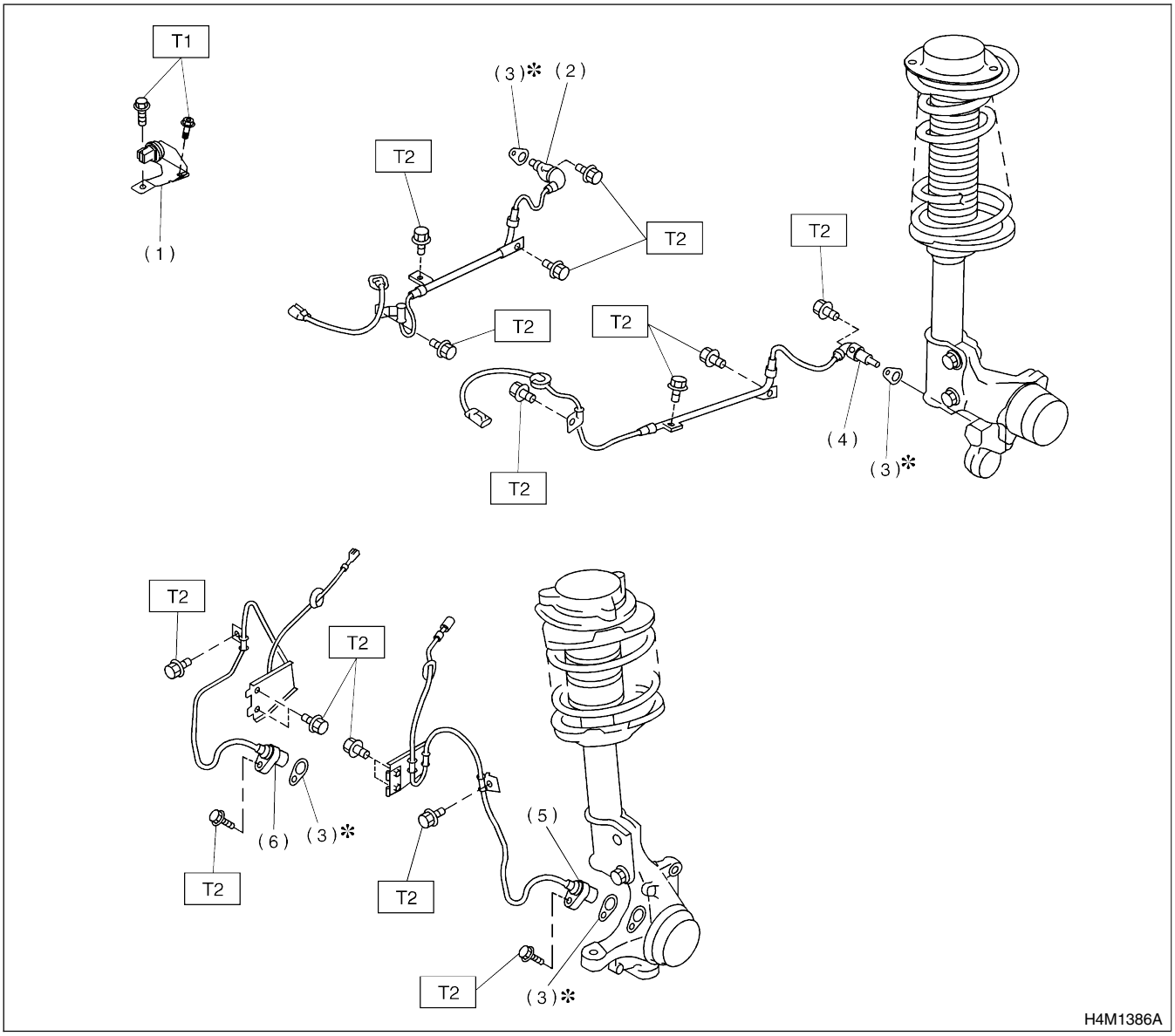
1. General Description S401001

A: SPECIFICATIONS S401001E49

Item			Standard or remarks
ABS sensor	ABS sensor gap	Front	0.3 — 0.8 mm (0.012 — 0.031 in)
		Rear	0.7 — 1.2 mm (0.028 — 0.047 in)
	ABS sensor resistance	Front	1.25±0.25 kΩ
		Rear	1.0±0.2 kΩ
	Marks of the harness	Front LH	Brown
		Front RH	Blue
		Rear LH	Yellow
		Rear RH	White
G sensor	G sensor voltage		2.3±0.2 V
ABS control module and hydraulic control unit (ABSCM&H/U) marks	AT		C7
	MT		C8

B: COMPONENT S401001A05

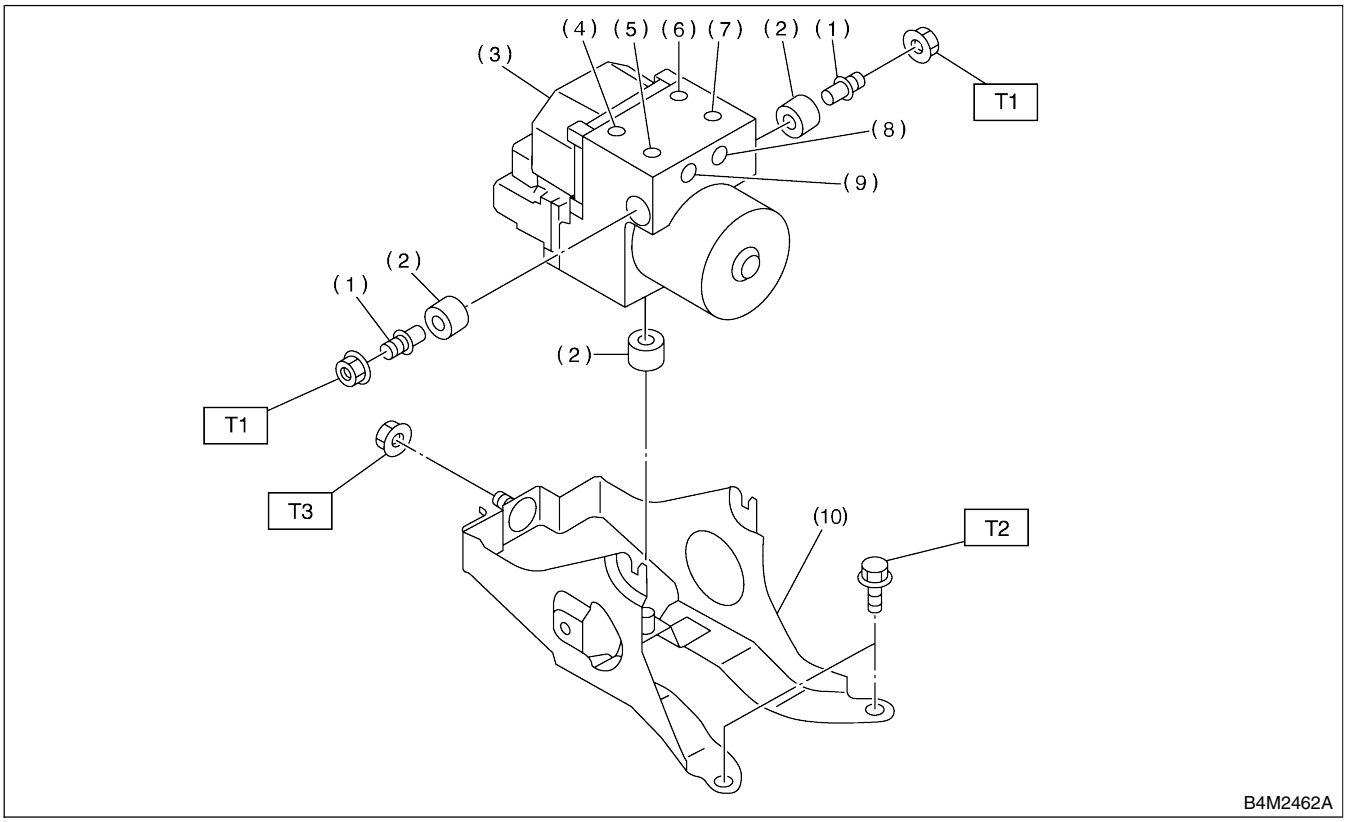
1. SENSOR S401001A0501



(1) G sensor
(2) Rear ABS sensor RH
(3) ABS spacer
(4) Rear ABS sensor LH
(5) Front ABS sensor LH
(6) Front ABS sensor RH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 32 (3.3, 24)

2. ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U) S401001A0502



(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

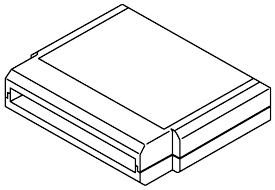
Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.06)
T2: 32 (3.3, 24)
T3: 38 (3.8, 28)

C: CAUTION S401001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect negative terminal from battery.

D: PREPARATION TOOL S401001A17

1. SPECIAL TOOLS S401001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (Newly adapted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS S401001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Pressure Gauge	Used for measuring oil pressure.
Oscilloscope	Used for measuring sensor.

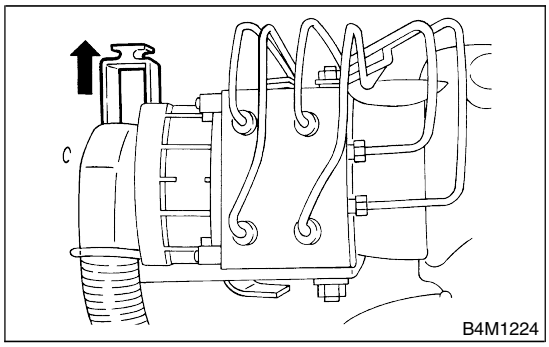
2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U) S401543

A: REMOVAL S401543A18

1) Disconnect ground terminal 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.

CAUTION:
The contact will be insufficient if the terminal gets wet.

4) Pull off the lock of the ABSCM&H/U connector to remove it.


B4M1224

5) Disconnect connector from ABSCM&H/U.

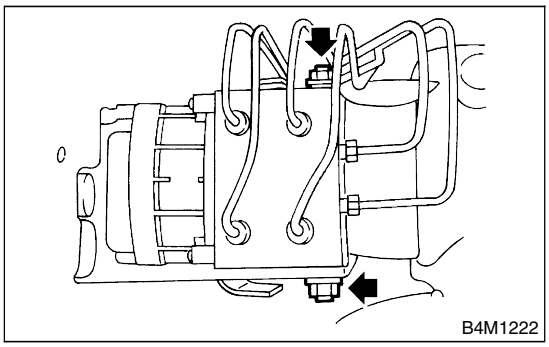
CAUTION:
Be careful not to let water or other foreign matter contact the ABSCM&H/U terminal.

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.**


B4M1222

B: INSTALLATION S401543A11

1) Install ABSCM&H/U.

CAUTION:
Confirm that the specifications of the ABSCM&H/U conforms to the vehicle specifications.

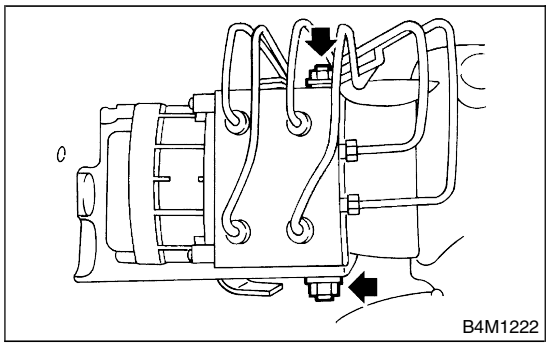
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Install ABSCM&H/U ground terminal to bracket.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

3) Connect brake pipes to their correct ABSCM&H/U connections.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)


B4M1222

4) Using cable clip, secure ABSCM&H/U harness to bracket.
5) Connect connector to ABSCM&H/U.

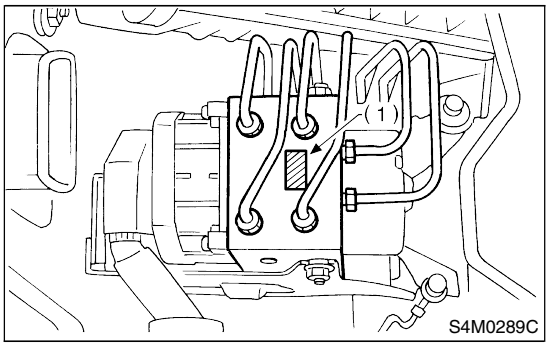
CAUTION:
• Be sure to remove all foreign matter from inside the connector before connecting.
• Ensure that the ABSCM&H/U connector is securely locked.

6) Install air intake duct.
7) Connect ground terminal to battery.
8) Bleed air from the brake system.

C: INSPECTION S401543A10

1) Check connected and fixed condition of connector.
2) Check specifications of the mark with ABSCM&H/U.

Mark	Model
C7	AT
C8	MT



(1) Mark

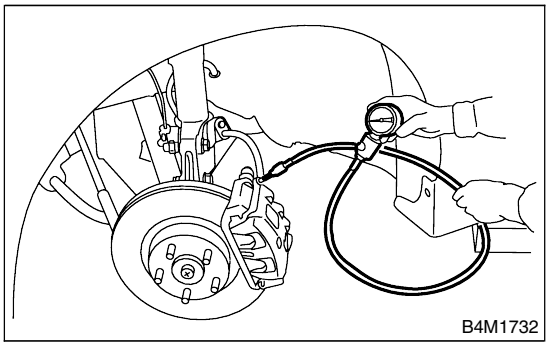
1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

S401543A1001

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.


B4M1732

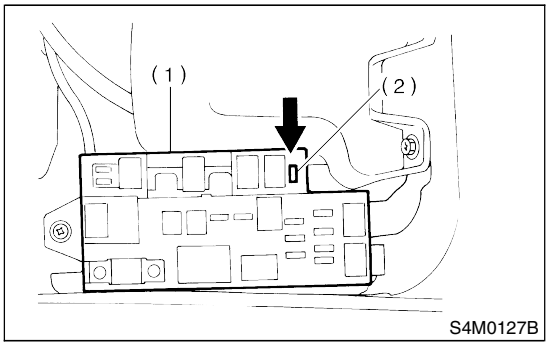
4) Bleed air from the pressure gauges.
5) Perform ABS sequence control.
<Ref. to ABS-11 ABS Sequence Control.>
6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.
7) Read 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 ABS-11 ABS Sequence Control.>
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.

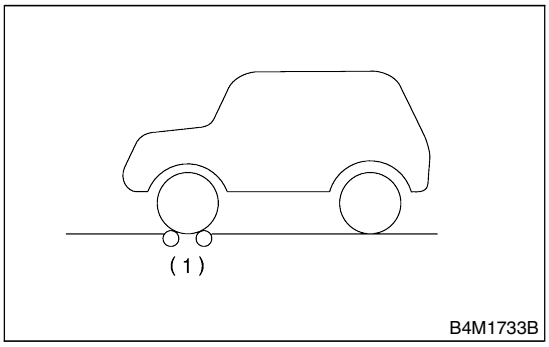
2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER S401543A1002

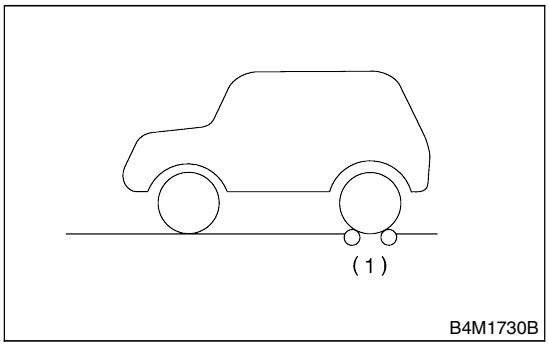
1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the main fuse box to simulate FWD vehicles.



(1) Main fuse box
(2) FWD connector

2) Prepare for operating ABS sequence control.
<Ref. to ABS-11 ABS Sequence Control.>
3) Set the front wheels or rear wheels on the brake tester and set the select lever's position at "neutral".





(1) Brake tester

4) Operate the brake tester.
5) Perform ABS sequence control.
<Ref. to ABS-11 ABS Sequence Control.>

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 kgf, 221 lb)	981 N (100 kgf, 221 lb)
When decompressed	490 N (50 kgf, 110 lb) or less	490 N (50 kgf, 110 lb) or less
When compressed	981 N (100 kgf, 221 lb) or more	981 N (100 kgf, 221 lb) or more

8) After checking, also check if any irregular brake pedal tightness is felt.

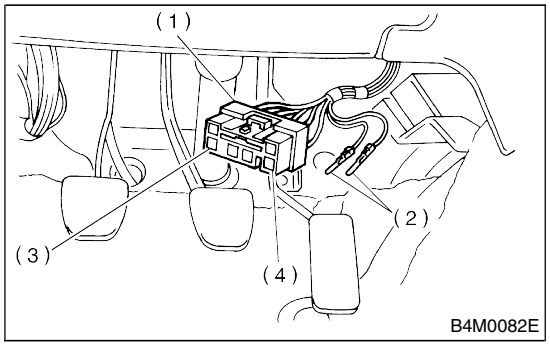
3. ABS Sequence Control S401187

A: OPERATION S401187A16

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. ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR S401187A1601

1) Connect diagnosis terminals to terminals No. 5 and No. 8 of the diagnosis connector beside driver's seat heater unit.



(1) Diagnosis connector
(2) Diagnosis terminals
(3) 3 terminal
(4) 6 terminal

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. ABS SEQUENCE CONTROL WITH SELECT MONITOR S401187A1602

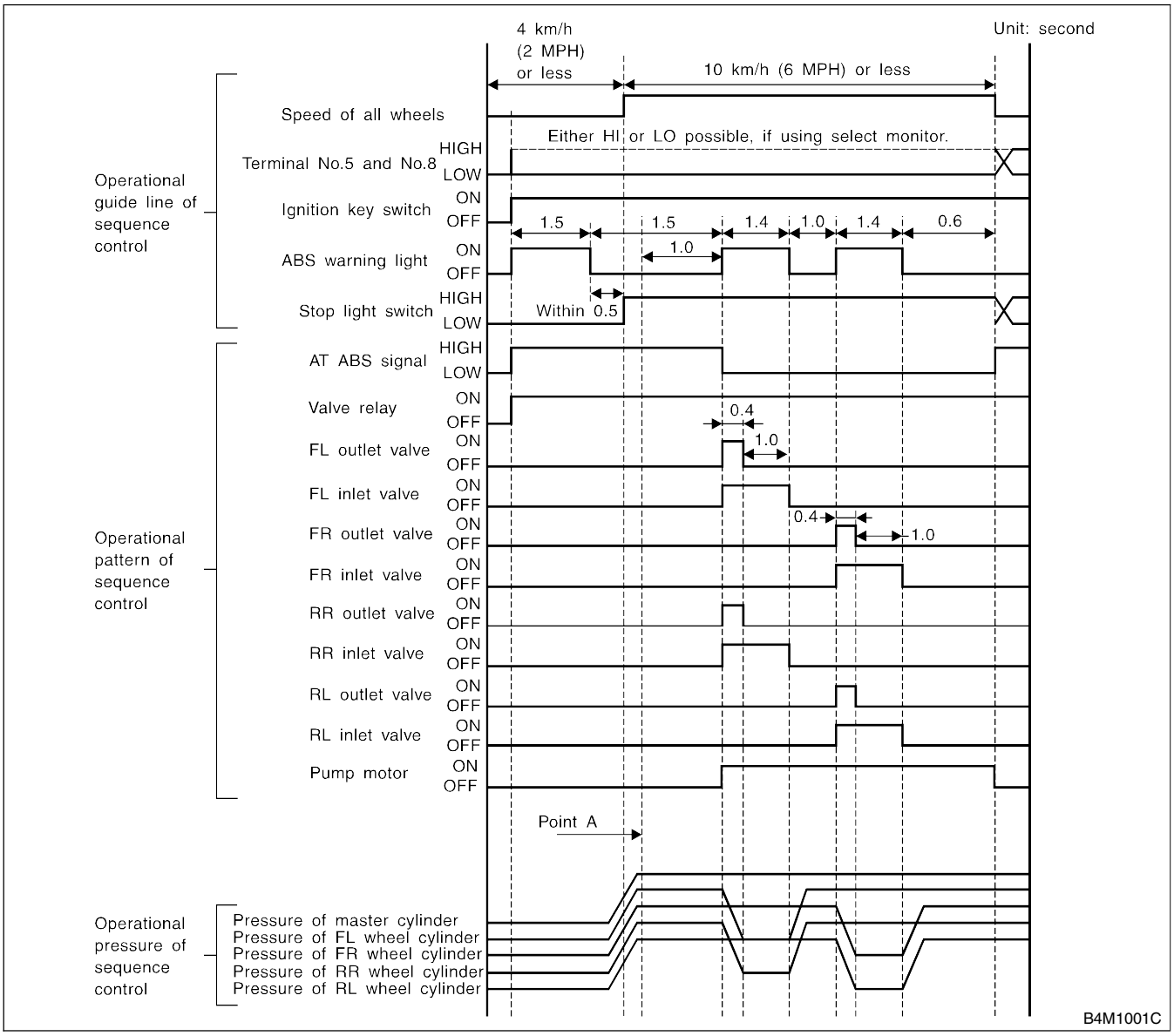
NOTE:
● In the event of any trouble, the sequence control may not be operative. In such a case, activate the sequence control, referring to "ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR".
<Ref. to ABS-11 ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR, OPERATION, ABS Sequence Control.>
● When the diagnosis 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/cm^2, 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 ABS SEQUENCE CONTROL S401187A1603



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.

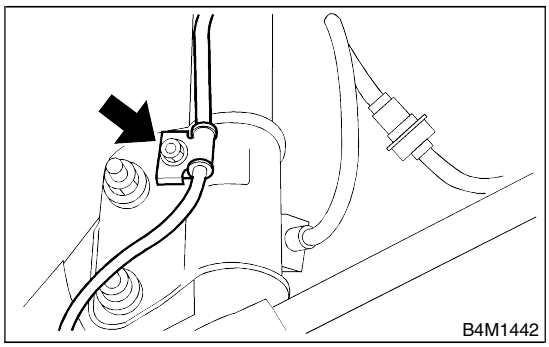
4. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL S401187A1604

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.)

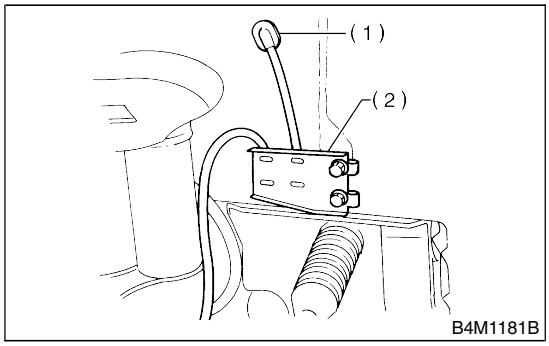
4. Front ABS Sensor S401190

A: REMOVAL S401190A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal.
3) Loosen the wheel nuts.
4) Lift vehicle and remove wheels.
5) Disconnect front ABS sensor connector located next to front strut mounting house in engine compartment.
6) Remove bolts which secure sensor harness to strut.



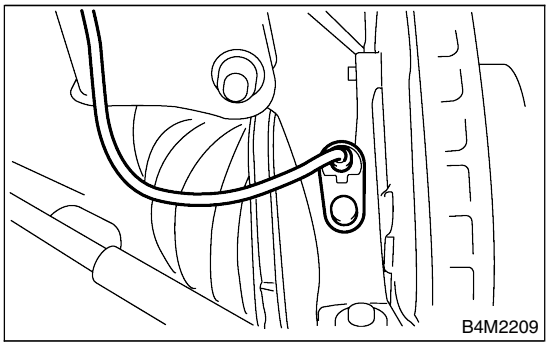
7) Remove bolts which secure sensor harness to body.



(1) To front ABS sensor connector
(2) Bracket

8) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

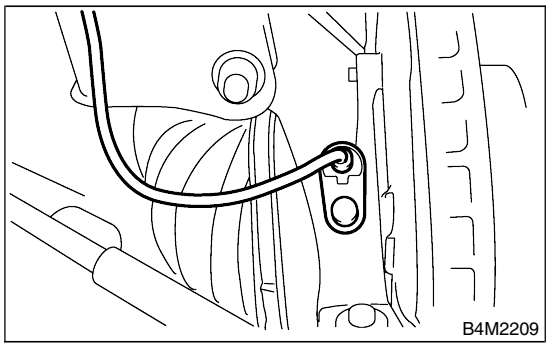
CAUTION:
- **Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.**
- **Do not pull sensor harness during removal.**



B: INSTALLATION S401190A11

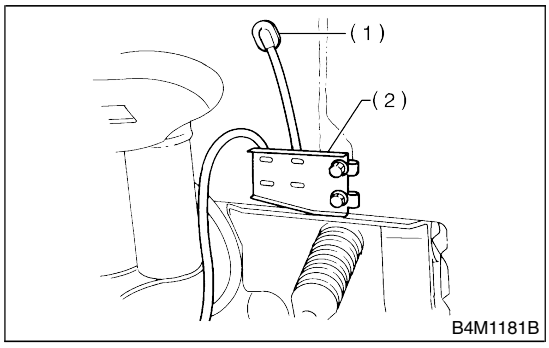
1) Temporarily install front ABS sensor on housing.

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 N·m (3.3 kgf-m, 24 ft-lb)

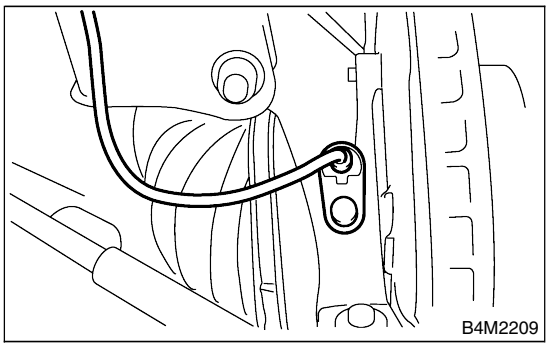


(1) To front ABS sensor connector
(2) Bracket

3) Place a thickness gauge between ABS sensor's pole piece 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 mm (0.012 — 0.031 in)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)



CAUTION:
Check the marks on the harness to make sure that no distortion exists.

	LH	RH
Mark	Brown	Light blue

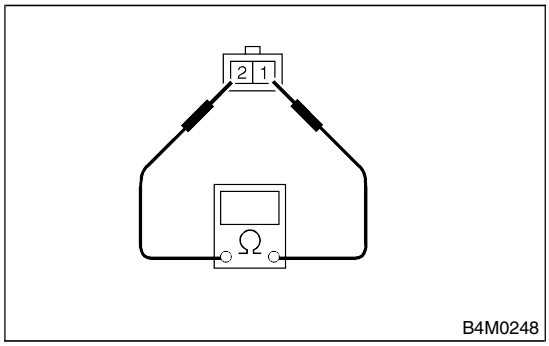
NOTE:
If the clearance is outside specifications, readjust.

4) After confirmation of the ABS sensor clearance, connect connector to ABS sensor.
5) Install the wheels.
6) Connect connector to battery ground terminal.

C: INSPECTION S401190A10

1. ABS SENSOR S401190A1001

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.



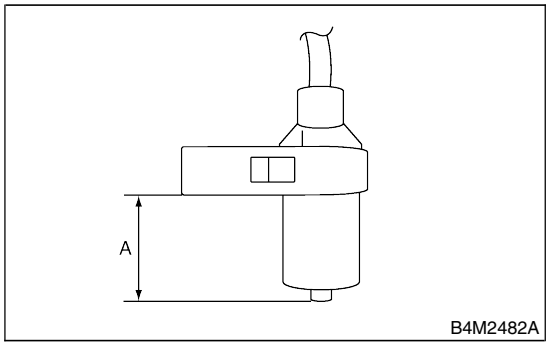
Terminal No.	Standard
1 and 2	1.25±0.25 kΩ

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.

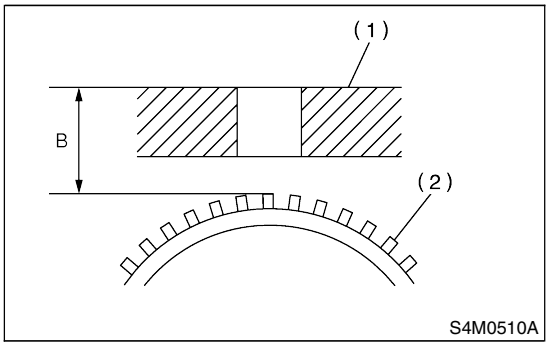
2. SENSOR GAP S401190A1002

1) Measure the distance “A” between ABS sensor surface and sensor pole face.



2) Measure the distance “B” between surface where the front axle housing meets the ABS sensor, and the tone wheel.

NOTE:
Measure so that the gauge touches the tone wheel teeth top.



(1) Axle housing
(2) Tone wheel

3) Find the gap between the ABS sensor pole face and the surface of the tone wheel teeth by putting the measured valves in the formula below and calculating.

ABS sensor clearance = B – A

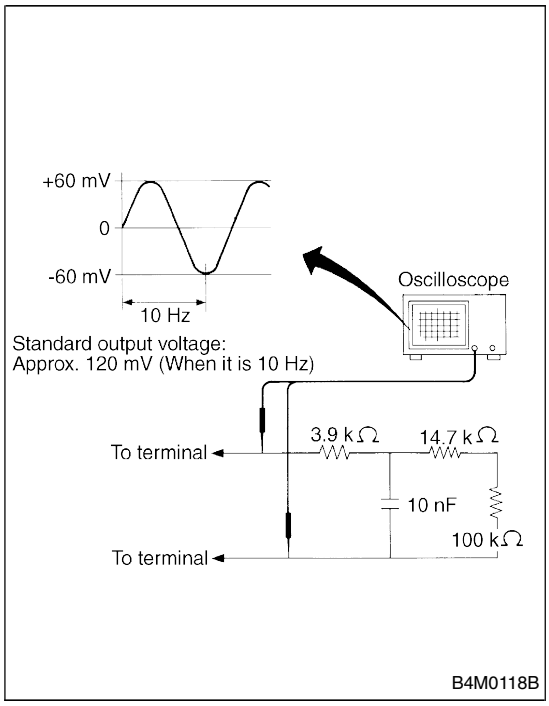
ABS sensor standard clearance:
0.3 — 0.8 mm (0.012 — 0.031 in)

NOTE:
If the clearance is outside specifications, readjust.

3. OUTPUT VOLTAGE S401190A1003

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.



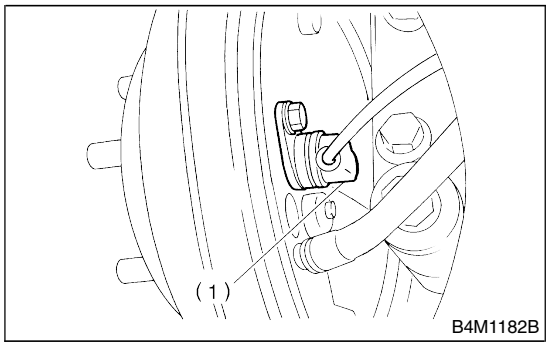
D: ADJUSTMENT S401190A01

Adjust the gap using spacer (Part No. 26755A000).

5. Rear ABS Sensor S401185

A: REMOVAL S401185A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal.
3) Loosen wheel nuts.
4) Lift vehicle, and remove wheels.
5) Remove rear seat and disconnect rear ABS sensor connector.
6) Remove rear sensor harness bracket from rear trailing link and bracket.
7) Remove rear ABS sensor from rear back plate.

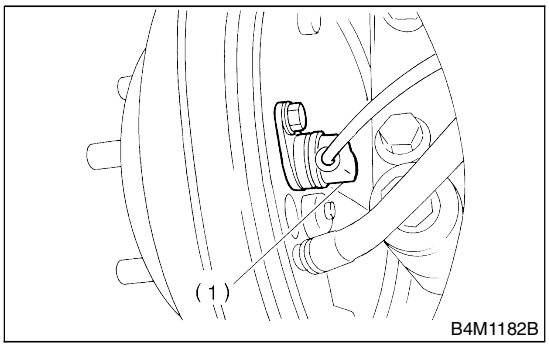


(1) Rear ABS sensor

B: INSTALLATION S401185A11

1) Temporarily install rear ABS sensor on back plate.

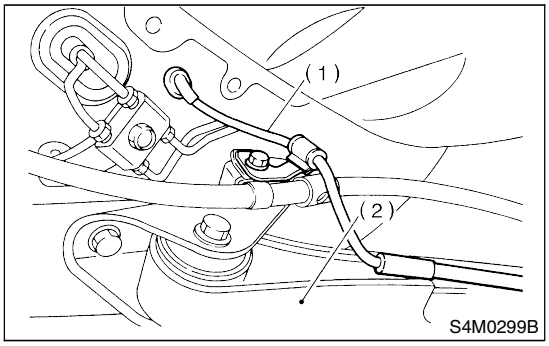
CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



(1) Rear ABS sensor

2) Install rear sensor harness on rear trailing link.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)



(1) Rear sensor harness
(2) Trailing link

3) Place a thickness gauge between ABS sensor's pole piece and tone wheel's tooth face. After standard clearance is obtained over the entire perimeter, tighten ABS sensor on back plate to specified torque.

ABS sensor standard clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

CAUTION:
Check the marks on the harness to make sure that no distortion exists.

	LH	RH
Mark	Blue	Pink

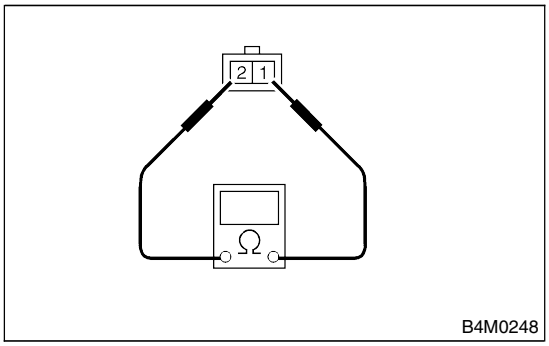
NOTE:
If the clearance is outside specifications, readjust.

4) Connect rear ABS sensor connector.
5) Install rear seat.
6) Install wheels.
7) Connect battery ground terminal.

C: INSPECTION S401185A10

1. ABS SENSOR S401185A1001

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.



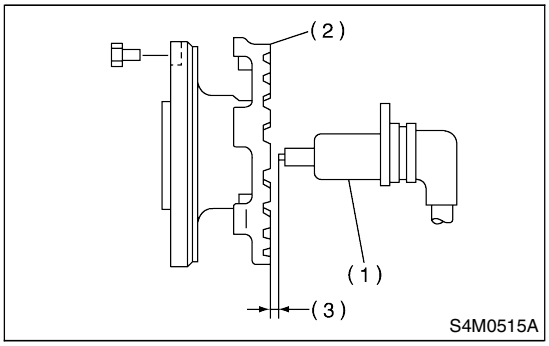
Terminal No.	Standard
1 and 2	1.0±0.2 kΩ

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. SENSOR GAP S401185A1002

Clearances (sensor gaps) should be measured one by one to ensure tone wheel and speed sensor are installed correctly.



(1) Rear ABS sensor
(2) Rear tone wheel
(3) Sensor gap

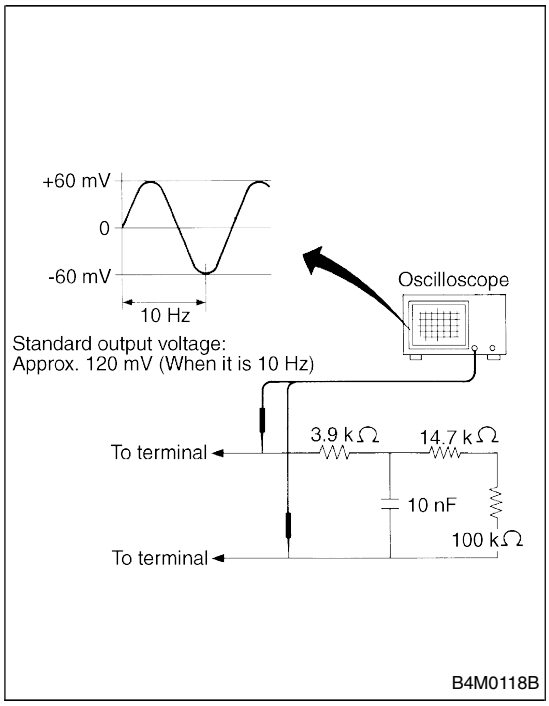
ABS sensor clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)

NOTE:
• If clearance is narrow, adjust by using a 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 S401185A1003

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., refer to item 1. ABS SENSOR.



D: ADJUSTMENT S401185A01

Adjust the gap using spacer (Part No. 26755AA000).

6. Front Tone Wheel S401184

A: REMOVAL S401184A18

Refer to Front Drive Shaft, because front tone wheel is integrated with front drive shaft.
<Ref. to DS-32 REMOVAL, Front Drive Shaft.>

B: INSTALLATION S401184A11

Refer to Front Drive Shaft, because front tone wheel is integrated with front drive shaft.
<Ref. to DS-32 INSTALLATION, Front Drive Shaft.>

C: INSPECTION S401184A10

Visually check tone wheels 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 is unitized with BJ assembly of drive shaft.

7. Rear Tone Wheel S401182

A: REMOVAL S401182A18

For removal procedures of rear tone wheel, refer to “Rear Axle”. <Ref. to DS-23, Rear Axle.>

B: INSTALLATION S401182A11

For installation procedures of rear tone wheel, refer to “Rear Axle”. <Ref. to DS-23, Rear Axle.>

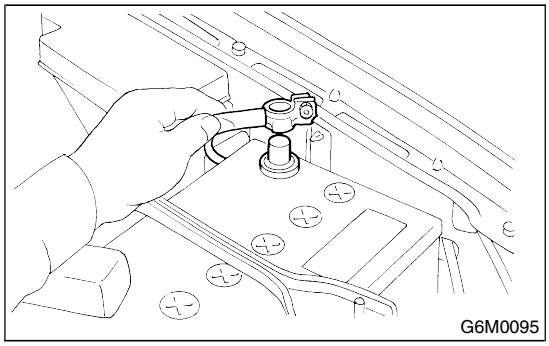
C: INSPECTION S401182A10

Visually check tone wheels teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.

8. G Sensor S401183

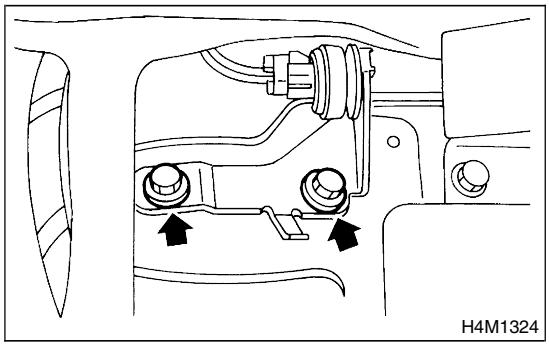
A: REMOVAL S401183A18

1) Disconnect battery ground terminal.


G6M0095

2) Remove console cover.
<Ref. to EI-30 Console Box.>
3) Disconnect connector from G sensor.
4) Remove G sensor from body.

CAUTION:
Do not drop or bump G sensor.


H4M1324

B: INSTALLATION S401183A11

Install in the reverse order of removal.

Tightening torque (G sensor):
18 N·m (1.8 kgf-m, 13.0 ft-lb)

C: INSPECTION S401183A10

No.	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR.**	Do you have SUBARU SELECT MONITOR?	Go to step **5**.	Go to step **2**.
2	**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 (–)***	Is the voltage 2.3±0.2 V when G sensor is horizontal?	Go to step **3**.	Replace G sensor.
3	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal:*** ***(R70) No. 2 (+) — No. 3 (–)***	Is the voltage 3.9±0.2 V when G sensor is inclined forwards to 90°?	Go to step **4**.	Replace G sensor.
4	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal:*** ***(R70) No. 2 (+) — No. 3 (–)***	Is the voltage 0.7±0.2 V when G sensor is inclined backwards to 90°?	G sensor is normal.	Replace G sensor.
5	**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.	Is the indicated reading 2.3±0.2 V when the vehicle is in horizontal position?	Go to step **6**.	Replace G sensor.
6	**CHECK G SENSOR.** 1) Remove console box. 2) Remove G sensor from vehicle. (Do not disconnect connector.) 3) Read the select monitor display.	Is the indicated reading 3.9±0.2 V when G sensor is inclined forwards to 90°?	Go to step **7**.	Replace G sensor.
7	**CHECK G SENSOR.** Read the select monitor display.	Is the indicated reading 0.7±0.2 V when G sensor is inclined backwards to 90°?	G sensor is normal.	Replace G sensor.

BRAKE

BR

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1. General Description S405001

A: SPECIFICATIONS S405001E49

Engine (cc)			2000		
Driving system			AWD		
Model			Others	Non-TURBO Australia	TURBO
Front disc brake	Type		Disc (Floating type, ventilated)		
	Effective disc diameter	mm (in)	228 (8.98)		
	Disc thickness × Outer diameter	mm (in)	24 × 277 (0.94 × 10.91)		
	Effective cylinder diameter	mm (in)	42.8 (1.685) × 2		
	Pad dimensions (length × width × thickness*)	mm (in)	112.3 × 50.0 × 17.0 (4.42 × 1.969 × 0.669)		
	Clearance adjustment		Automatic adjustment		
Rear disc brake	Type		—	Disc (Floating type)	
	Effective disc diameter	mm (in)	—	230 (9.06)	
	Disc thickness × Outer diameter	mm (in)	—	10 × 266 (0.39 × 10.47)	
	Effective cylinder diameter	mm (in)	—	38.1 (1.500)	
	Pad dimensions (length × width × thickness*)	mm (in)	—	82.4 × 33.7 × 14.0 (3.244 × 1.327 × 0.551)	
	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)	19.0 (0.748)	—	
	Lining dimensions (length × width × thickness)	mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	—	
	Clearance adjustment		Automatic adjustment	—	
Master cylinder	Type		Tandem		
	Effective diameter	mm (in)	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)	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		
ABS			OP		STD
Brake fluid			FMVSS No. 116, DOT3 or DOT4		

*: Including back metal

NOTE:
Refer to “PB section” for parking brake SPECIFICATIONS. <Ref. to PB-2, General Description.>

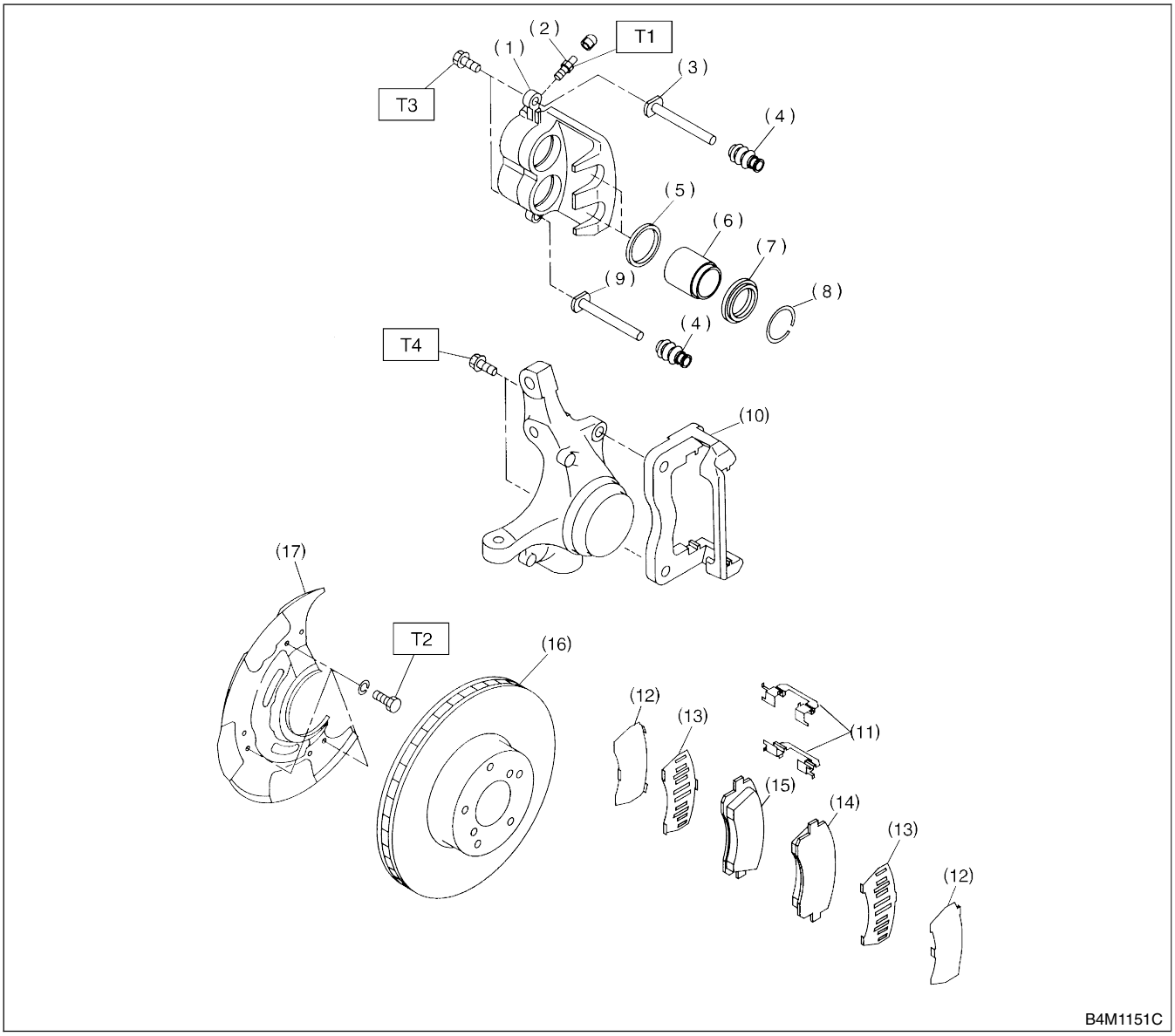
ITEM		STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	17 mm (0.67 in)	7.5 mm (0.295 in)
	Disc thickness	24 mm (0.94 in)	22 mm (0.87 in)
	Disc runout	—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness (including back metal)	14 mm (0.55 in)	6.5 mm (0.256 in)
	Disc thickness	10 mm (0.39 in)	8.5 mm (0.335 in)
	Disc runout	—	0.070 mm (0.0028 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 kgf, 44 lb)	

		Brake pedal force	Fluid pressure
Brake booster	Brake fluid pressure without engine running	147 N (15 kgf, 33 lb)	588 kPa (6 kg/cm^2, 85 psi)
		294 N (30 kgf, 66 lb)	1,667 kPa (17 kg/cm^2, 242 psi)
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 N (15 kgf, 33 lb)	5,394 kPa (55 kg/cm^2, 782 psi)
		294 N (30 kgf, 66 lb)	10,003 kPa (102 kg/cm^2, 1,450 psi)

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 kgf, 2 lb).]

B: COMPONENT S405001A05

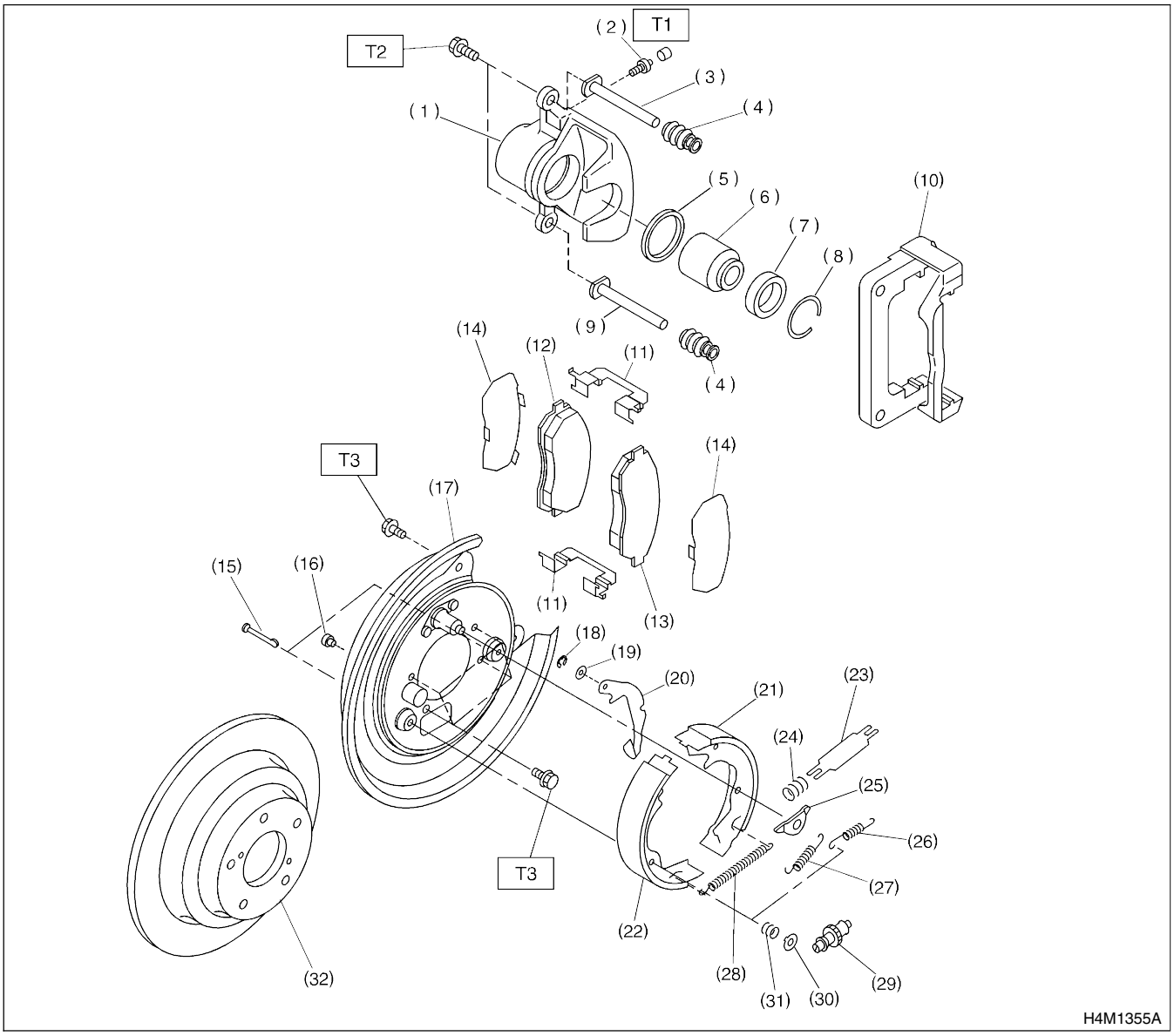
1. FRONT DISC BRAKE S405001A0511



(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 (For Australia)
(13) Inner shim (For Australia)
(14) Pad (Outside)
(15) Pad (Inside)
(16) Disc rotor
(17) Disc cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 39 (4.0, 28.9)
T4: 78 (8.0, 58)

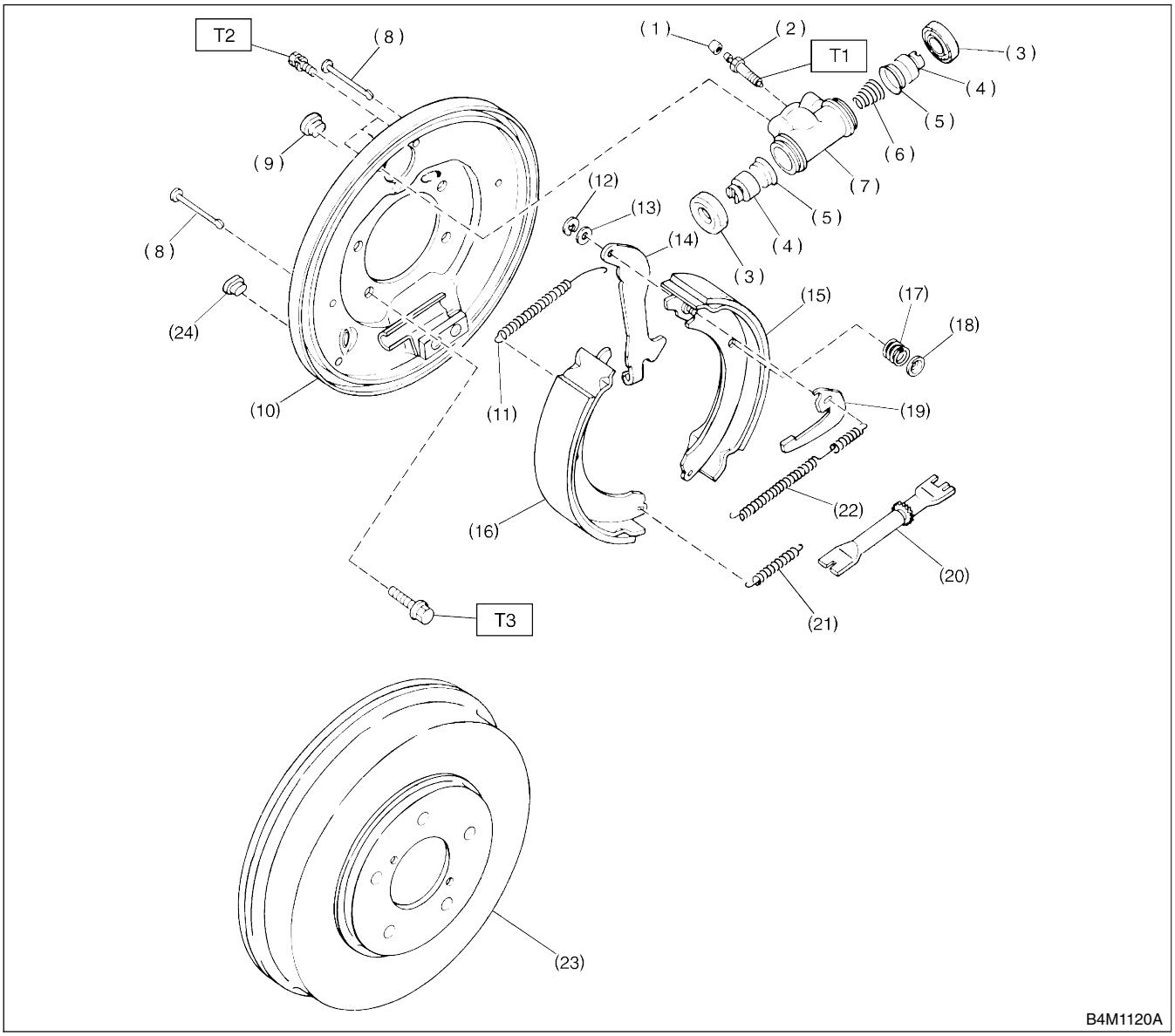
2. REAR DISC BRAKE S405001A0503



(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) Inner pad
(13) Outer pad
(14) Shim
(15) Shoe hold-down pin
(16) Cover
(17) Back plate
(18) Retainer
(19) Spring washer
(20) Parking brake lever
(21) Parking brake shoe (Secondary)
(22) Parking brake shoe (Primary)
(23) Strut
(24) Strut shoe spring
(25) Shoe guide plate
(26) Secondary shoe return spring
(27) Primary shoe return spring
(28) Adjusting spring
(29) Adjuster
(30) Shoe hold-down cup
(31) Shoe hold-down spring
(32) Disc rotor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 39 (4.0, 28.9)
T3: 52 (5.3, 38.3)

3. REAR DRUM BRAKE S405001A0504

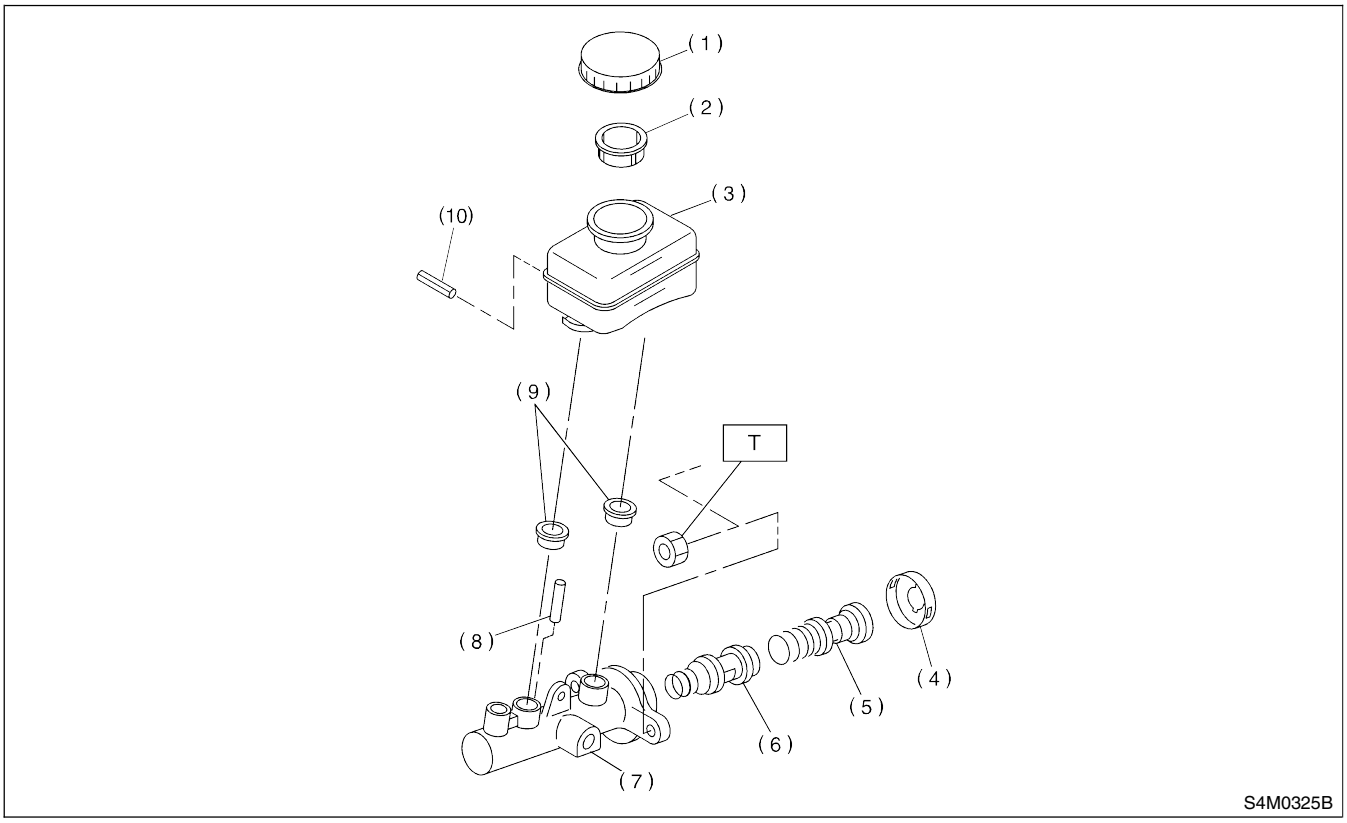


(1) Air bleeder cap
(2) Air bleeder screw
(3) Boot
(4) Piston
(5) Cup
(6) Spring
(7) Wheel cylinder body
(8) Pin
(9) Plug
(10) Back plate
(11) Upper shoe return spring
(12) Retainer
(13) Washer
(14) Parking brake lever
(15) Brake shoe (Trailing)
(16) Brake shoe (Leading)
(17) Shoe hold-down spring
(18)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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 10 (1.0, 7.2)
T3: 52 (5.3, 38.3)

4. MASTER CYLINDER S405001A0505

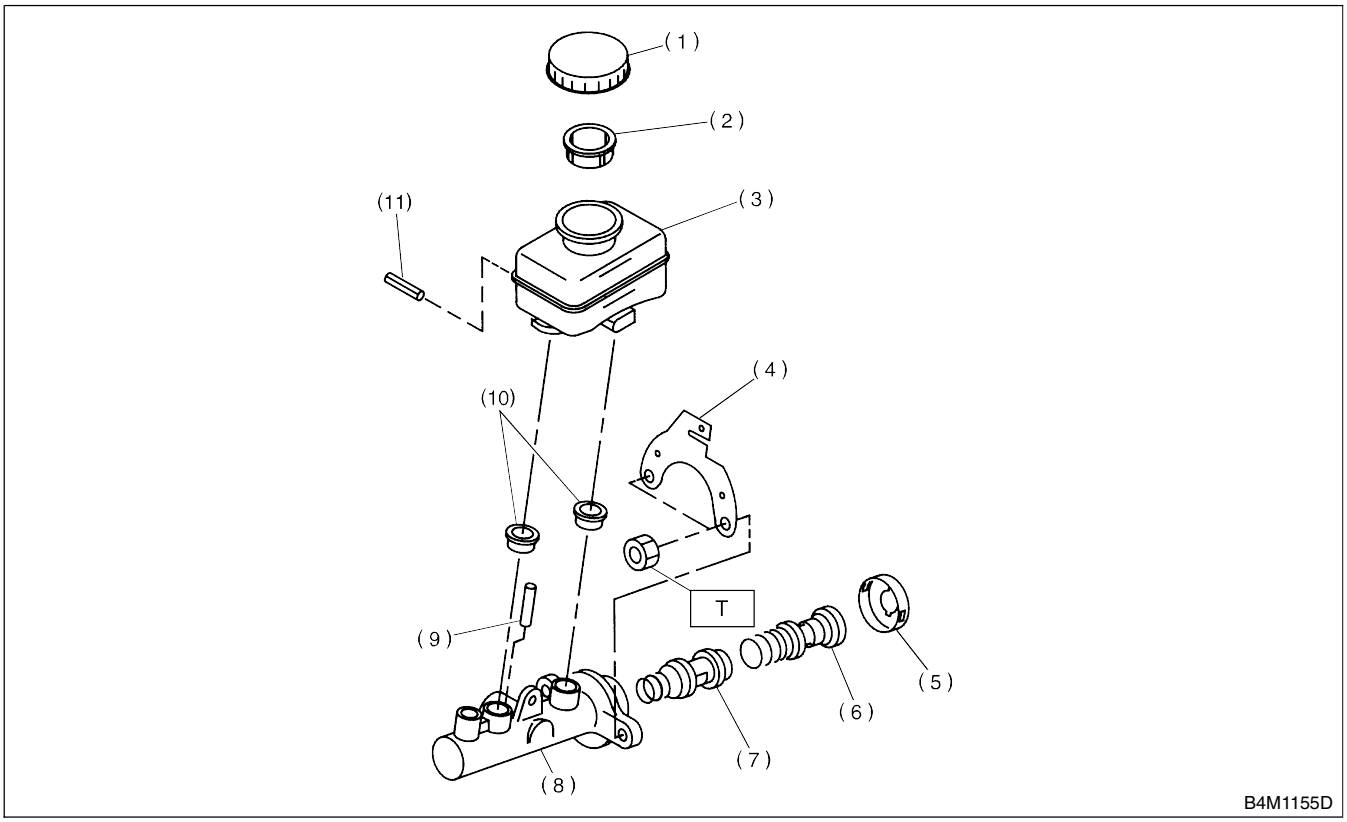
● LHD model



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

Tightening torque: N·m (kgf-m, ft-lb)
T: 14 (1.4, 10.1)

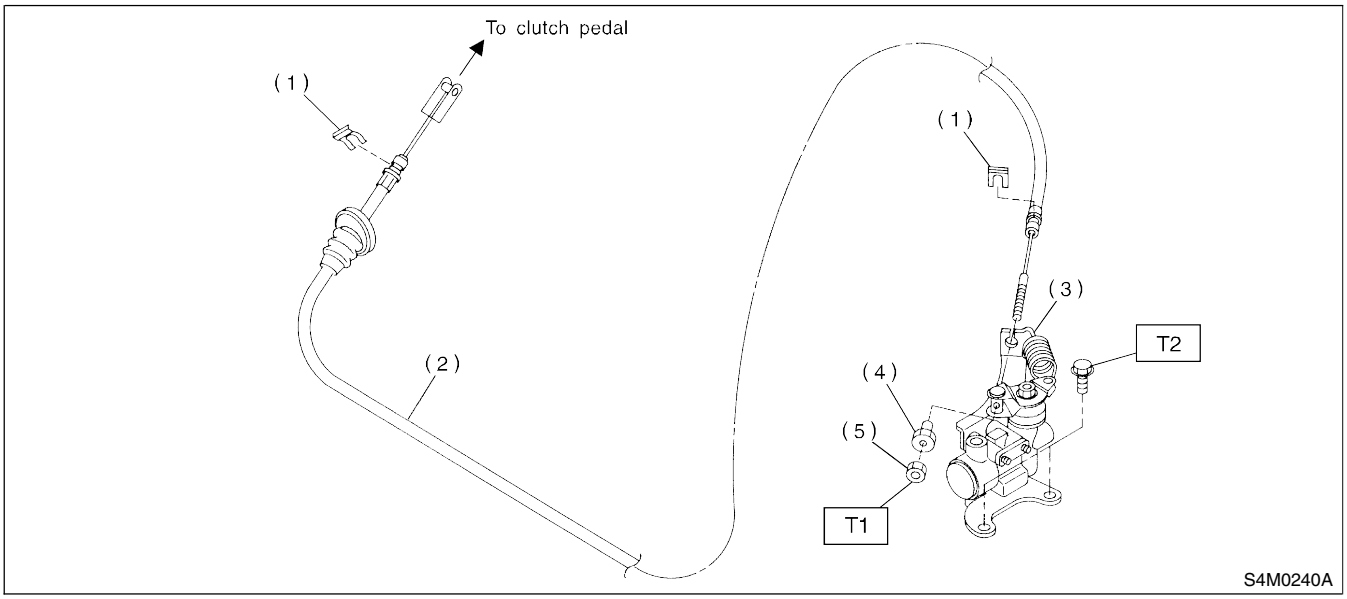
● RHD model



(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 (kgf-m, ft-lb)
T: 14 (1.4, 10.1)

5. HILL HOLDER S405001A0510

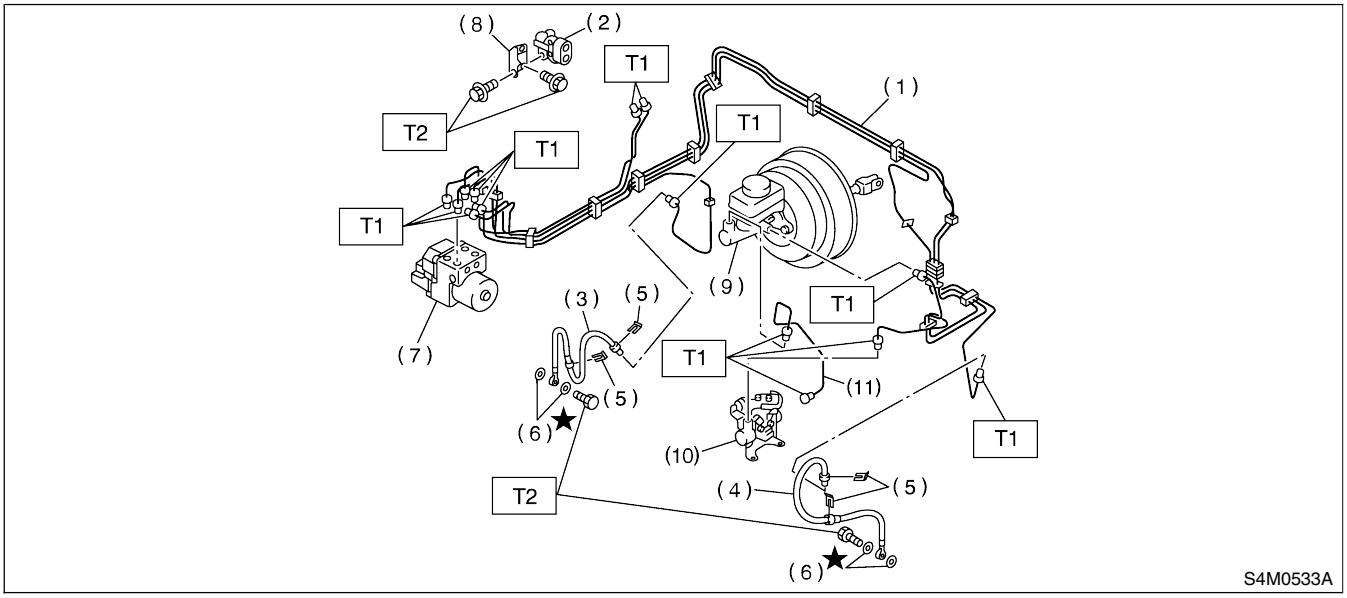


(1) Clamp
(2) PHV cable
(3) PHV (Pressure hold valve)
(4) Adjusting nut
(5) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.5 (0.35, 2.5)
T2: 18 (1.8, 13.0)

6. BRAKE PIPES AND HOSE S405001A0506

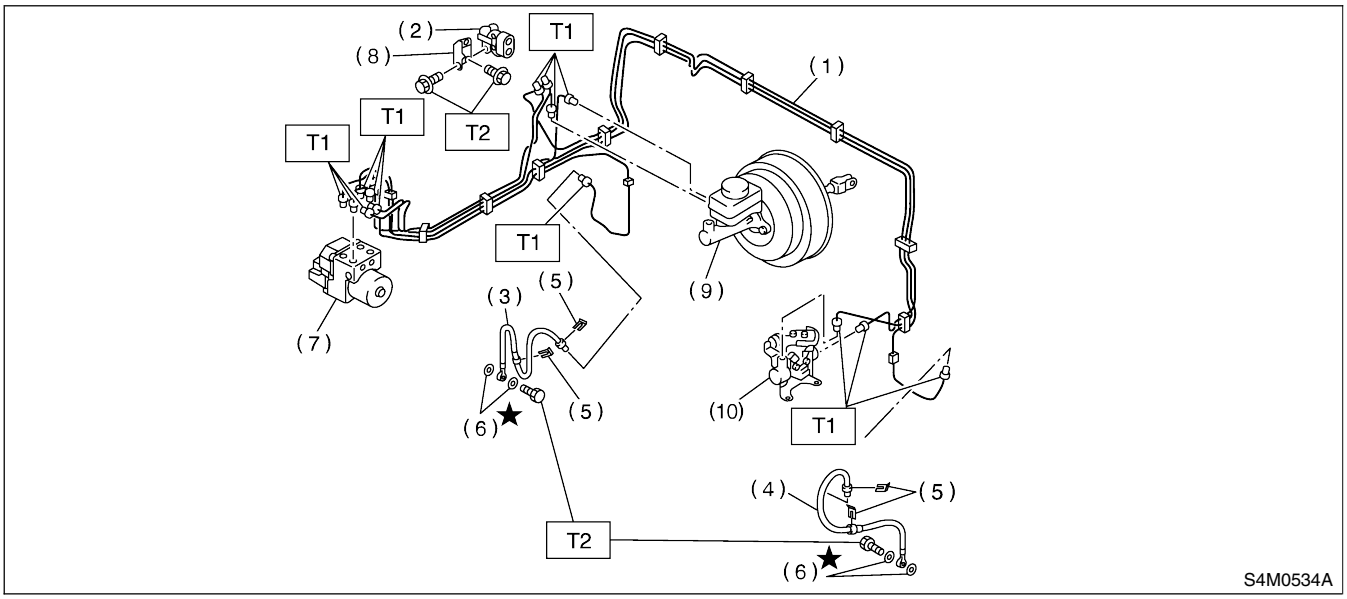
● Front brake pipe for model with ABS (LHD)



(1) Front brake pipe assembly
(2) Proportioning valve
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) ABS control module and hydraulic control unit
(8) Bracket
(9) Master cylinder
(10) Hill holder
(11) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

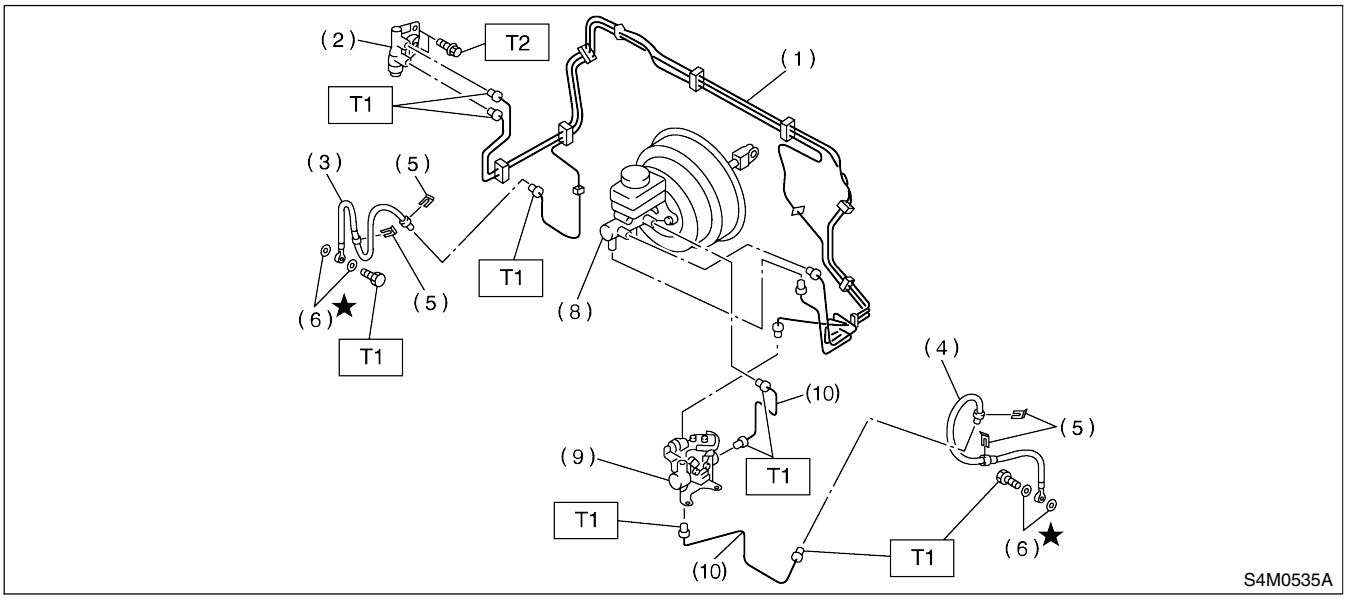
● Front brake pipe for model with ABS (RHD)



(1) Front brake pipe assembly
(2) Proportioning valve
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) ABS control module and hydraulic control unit
(8) Bracket
(9) Master cylinder
(10) Hill holder
(11) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

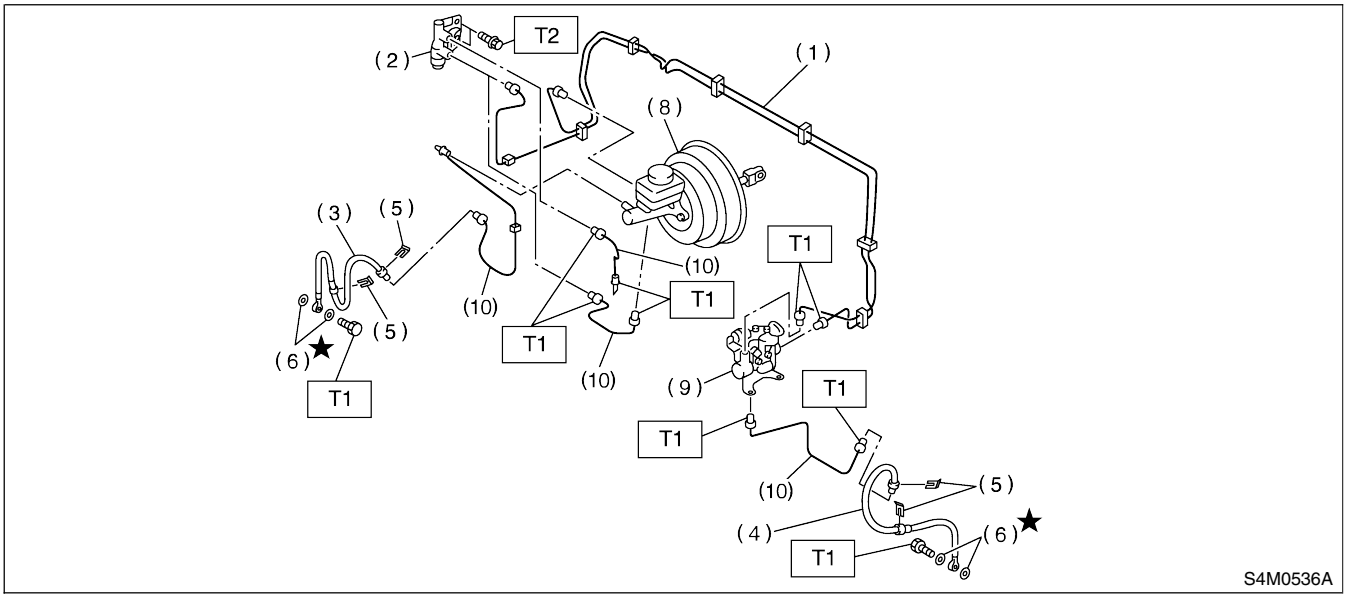
● Front brake pipe for model without ABS (LHD)



(1) Front brake pipe assembly
(2) Proportioning valve
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) Bracket
(8) Master cylinder
(9) Hill holder
(10) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

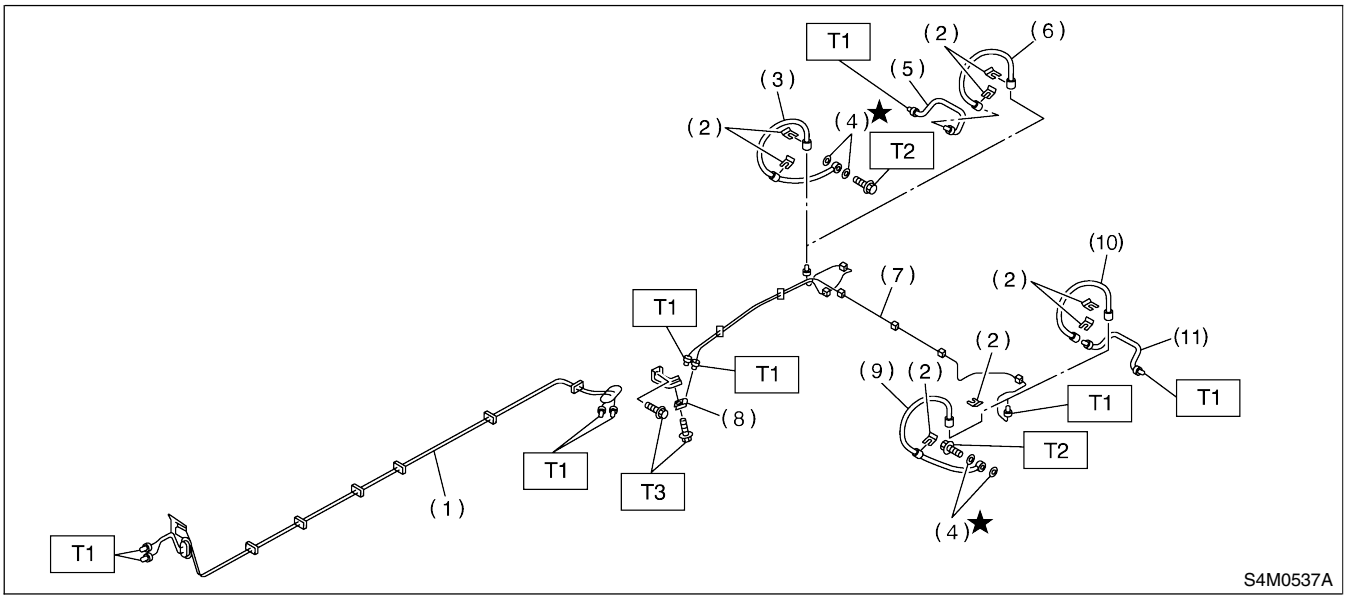
● Front brake pipe for model without ABS (RHD)



(1) Front brake pipe assembly
(2) Proportioning valve
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) Bracket
(8) Master cylinder
(9) Hill holder
(10) Adapter pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)

● Center and rear brake pipe

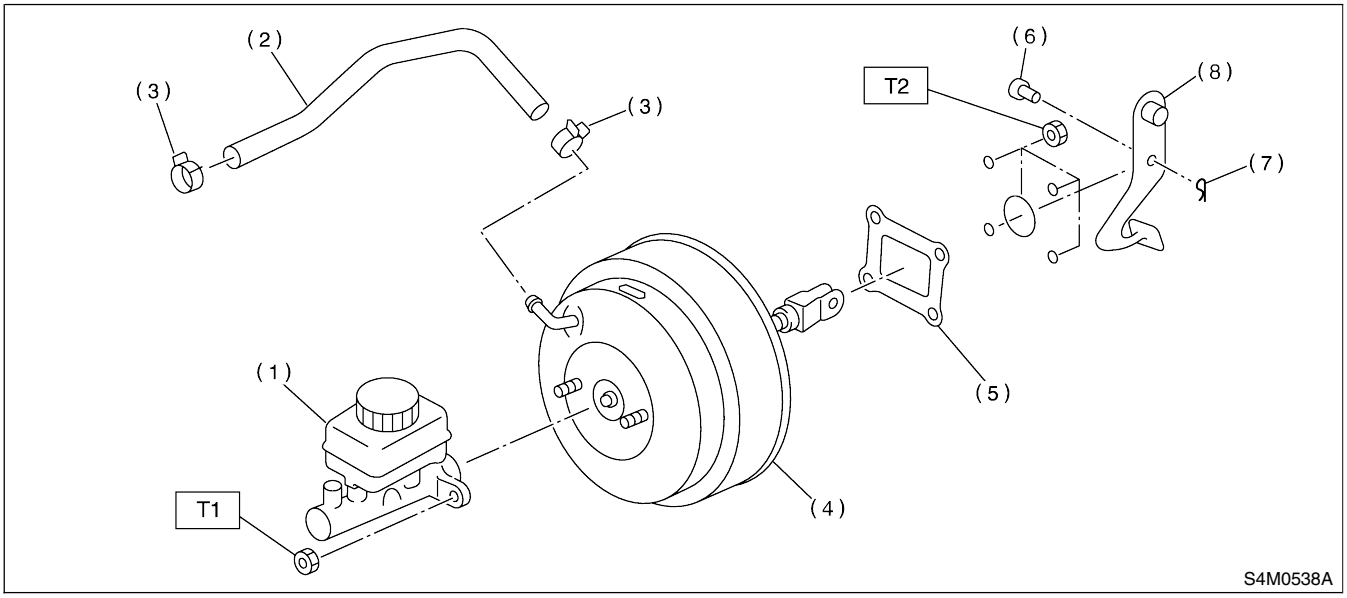


(1) Center brake pipe assembly
(2) Clamp
(3) Rear brake hose RH (With ABS)
(4) Gasket
(5) Rear brake pipe RH (Without ABS)
(6) Rear brake hose RH (Without ABS)
(7) Rear brake pipe assembly
(8) Two-way connector
(9) Rear brake hose LH (With ABS)
(10) Rear brake hose LH (Without ABS)
(11) Rear brake pipe LH (Without ABS)

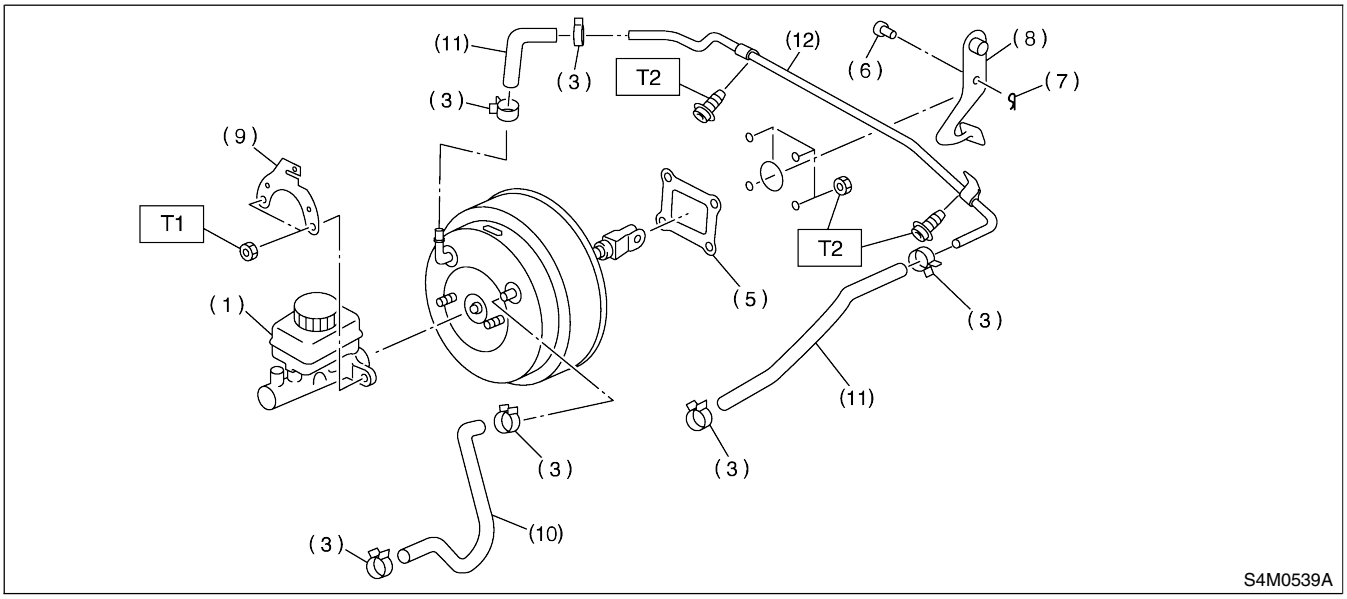
Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 23.6)

7. BRAKE BOOSTER S405001A0507

● LHD model



● RHD model

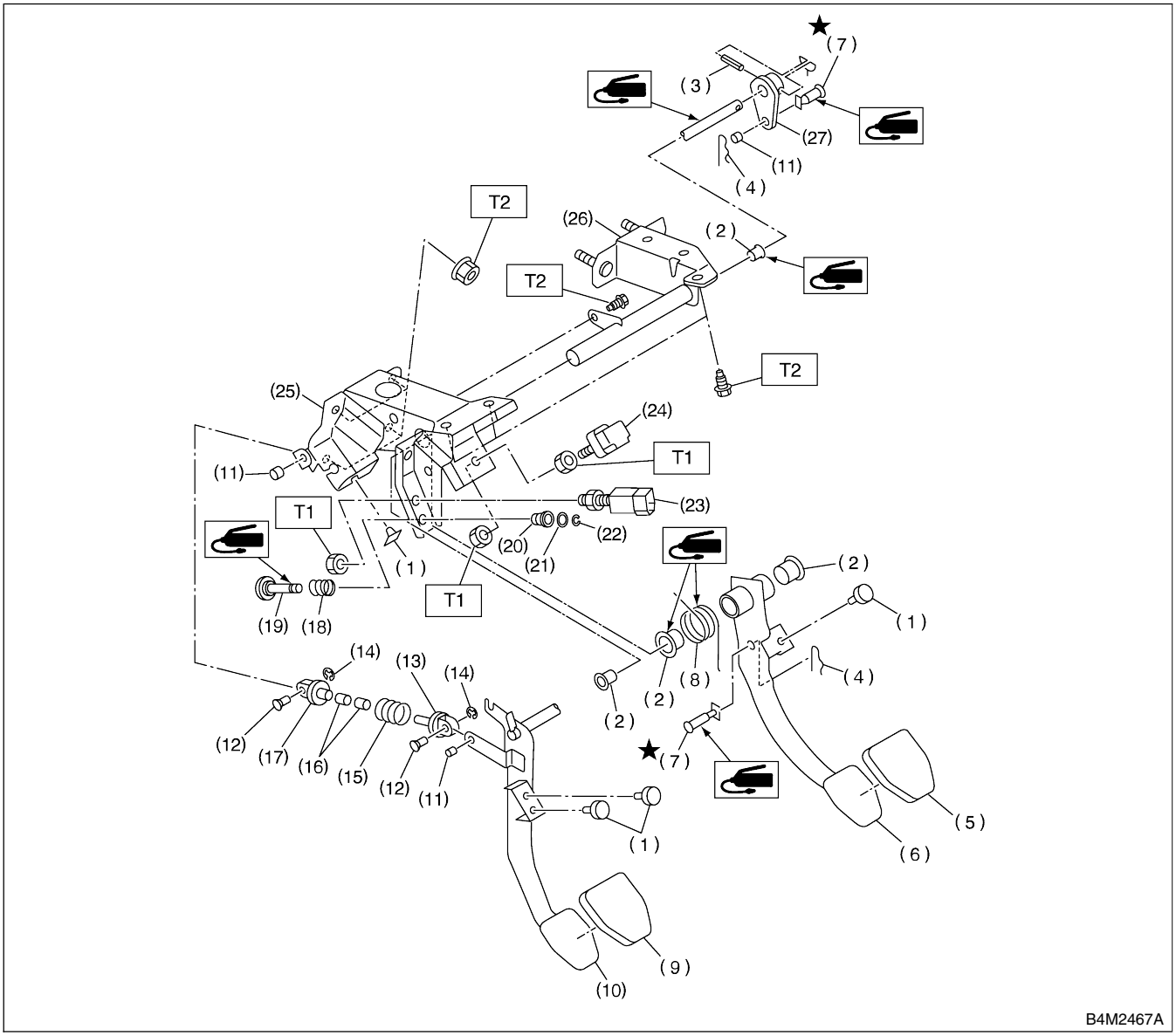


(1) Brake master cylinder
(2) Vacuum hose
(3) Clip
(4) Brake booster assembly
(5) Seal
(6) Clevis pin
(7) Snap pin
(8) Brake pedal
(9) Bracket
(10) Vacuum hose (Non-turbo model)
(11) Vacuum hose (Turbo model)
(12) Vacuum pipe (Turbo model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 14 (1.4, 10.1)
T2: 18 (1.8, 13.0)

8. BRAKE PEDAL FOR MT MODEL S405001A0508

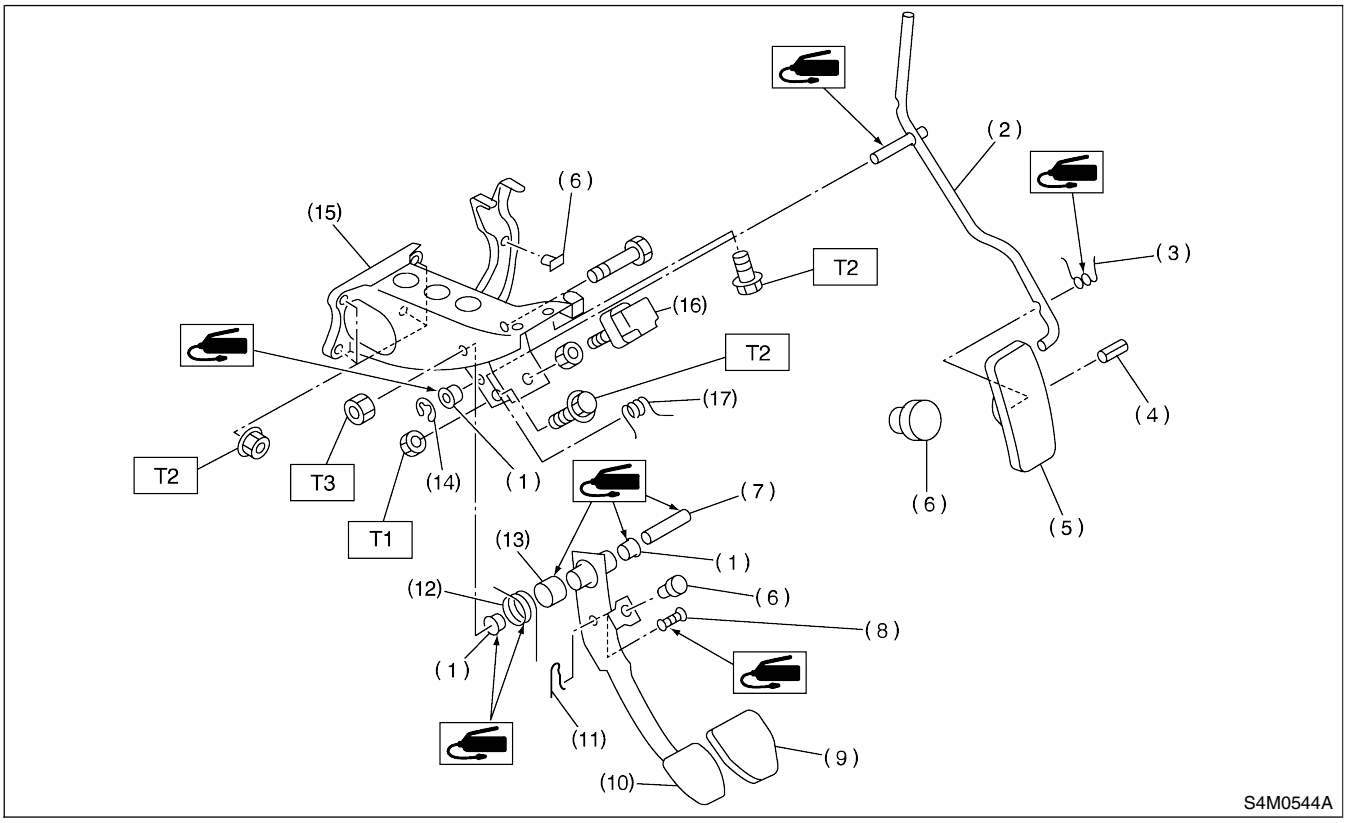
● LHD model



(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Brake pedal spring
(9) Clutch pedal pad
(10) Clutch pedal
(11) Bushing C
(12) Clutch clevis pin
(13) Assist rod A
(14) Clip
(15) Assist spring
(16) Assist bushing
(17) Assist rod B
(18) Spring S
(19) Rod S
(20) Bushing S
(21) O-ring
(22) Clip
(23) Clutch switch (With cruise control)
(24) Stop light switch
(25) Pedal bracket
(26) Clutch master cylinder bracket
(27) Lever

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

● RHD model

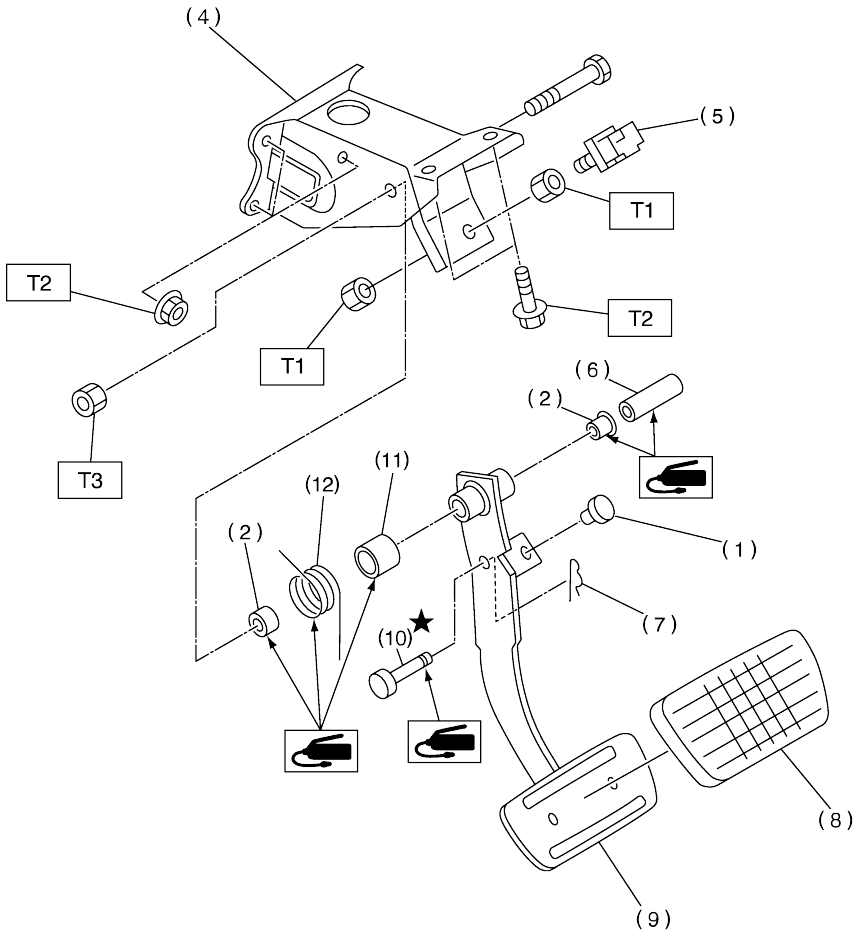


(1) Bushing
(2) Accelerator pedal
(3) Accelerator pedal spring
(4) Spring pin
(5) Accelerator pedal pad
(6) Stopper
(7) Spacer
(8) Clevis pin
(9) Brake pedal pad
(10) Brake pedal
(11) Snap pin
(12) Brake pedal spring
(13) Brake spacer
(14) Clip
(15) Pedal bracket
(16) Stop light switch
(17) Accelerator spring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 29 (3.0, 21.7)

9. BRAKE PEDAL FOR AT MODEL S405001A0509

- **LHD model**

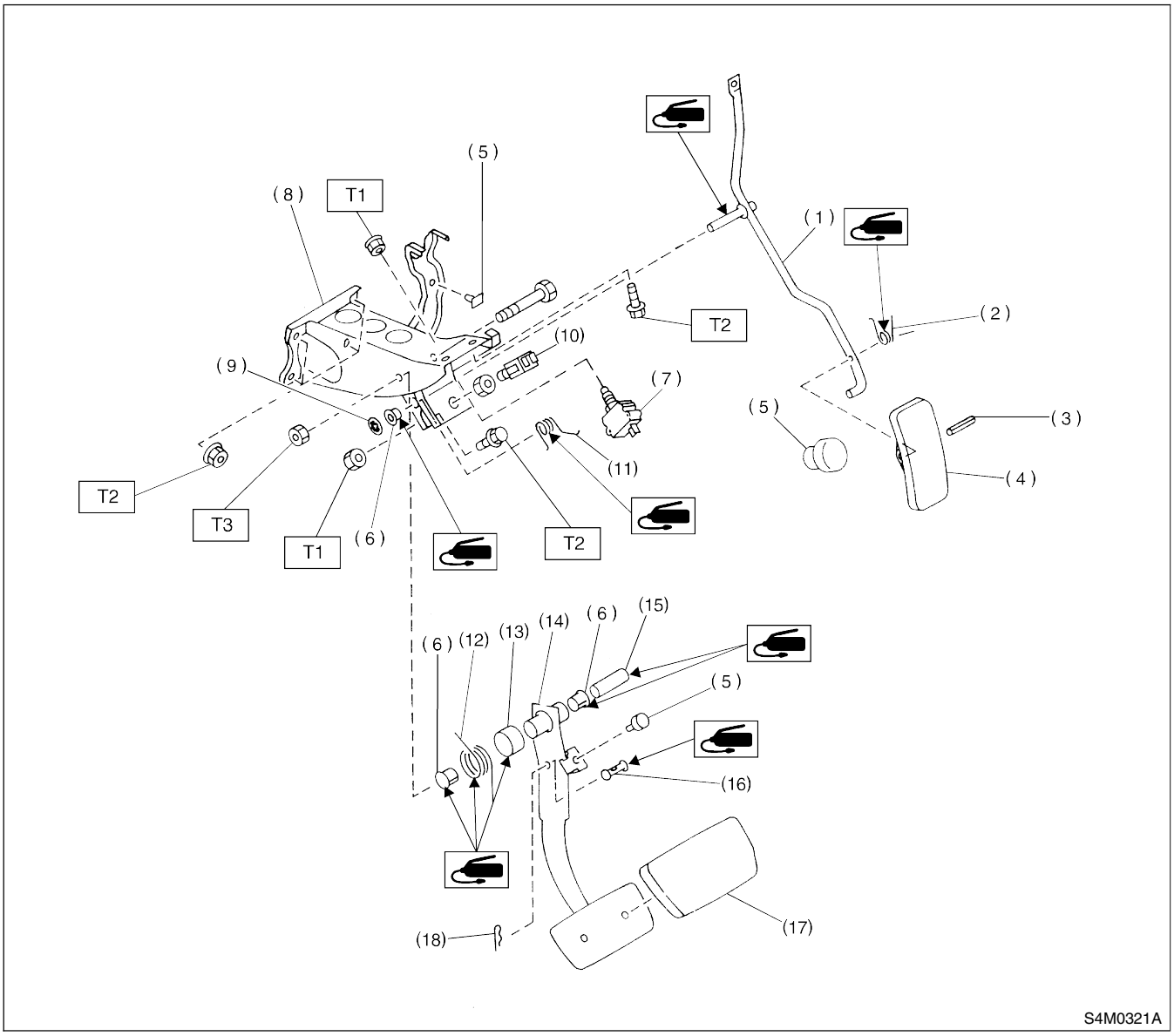


B4M2346A

(1) Stopper
(2) Bushing
(3) Plug
(4) Pedal bracket
(5) Stop light switch
(6) Spacer
(7) Snap pin
(8) Brake pedal pad
(9) Brake pedal
(10) Clevis pin
(11) Brake spacer
(12) Brake pedal spring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)

● RHD model



(1) Accelerator pedal
(2) Accelerator pedal spring
(3) Spring pin
(4) Accelerator pedal pad
(5) Stopper
(6) Bushing
(7) Kick-down switch
(8) Pedal bracket
(9) Clip
(10) Stop light switch
(11) Accelerator spring
(12) Brake pedal spring
(13) Brake spacer
(14) Brake pedal
(15) Spacer
(16) Clevis pin
(17) Brake pedal pad
(18) Snap pin

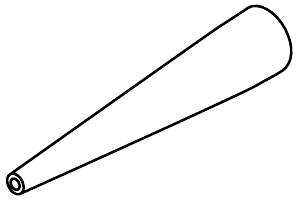
Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 29 (3.0, 21.7)

C: CAUTION S405001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part in the vehicle is hot after running.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Do not put fluid on body. If the body is tainted, wash away with water.

D: PREPARATION TOOL S405001A17

1. SPECIAL TOOLS S405001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2406	926460000	WHEEL CYLINDER 3/4″ ADAPTER	Used for installing cup onto wheel cylinder piston (Size 3/4 in).

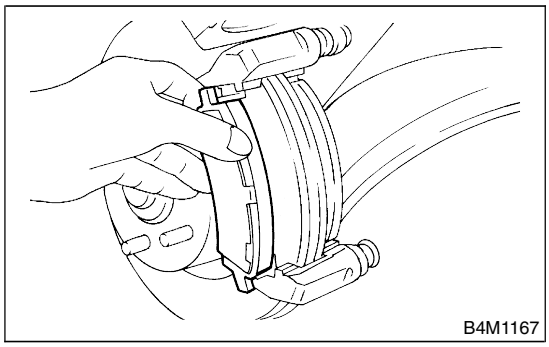
2. GENERAL PURPOSE TOOLS S405001A1702

TOOL NAME	REMARKS
Snap Ring Pliers	Used for removing and installing snap ring.

2. Front Brake Pad S405178

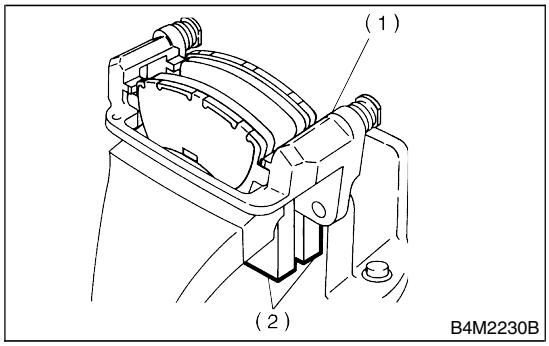
A: REMOVAL S405178A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove lock pin.
3) Raise caliper body.
4) Remove pad.


B4M1167

NOTE:
If brake pad is difficult to remove, proceed as follows:

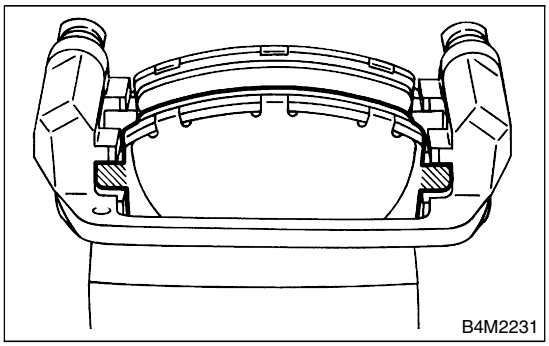
(1) Remove caliper body and fasten it provisionally to coil spring.
(2) Remove support.
(3) Place a support in a vise between wooden blocks.



B4M2230B

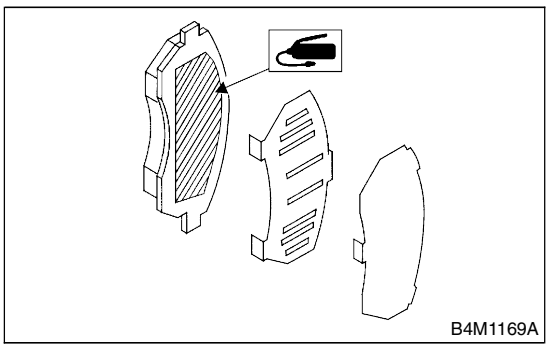
(1) Support
(2) Wooden blocks

(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

B: INSTALLATION S405178A11

1) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.
2) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad inner shim. (Australia model)


B4M1169A

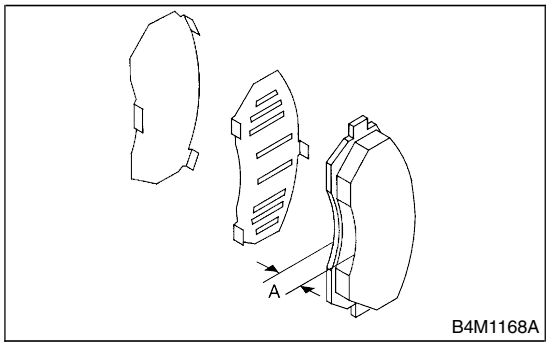
3) Install pads on support.
4) Install caliper body on support.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

C: INSPECTION S405178A10

Check pad thickness A.



Pad thickness (including back metal)	Standard value	17 mm (0.67 in)
	Wear limit	7.5 mm (0.295 in)

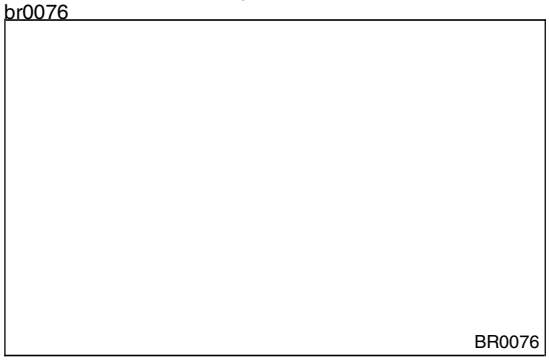
CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a 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.

3. Front Disc Rotor S405173

A: REMOVAL S405173A18

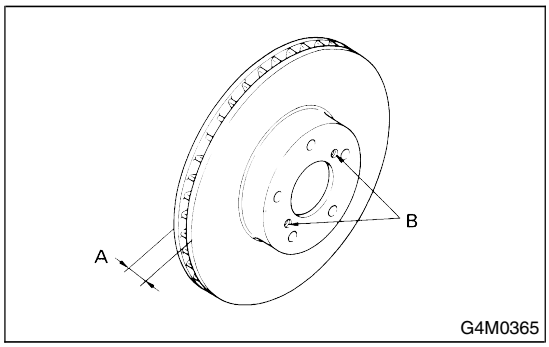
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove caliper body from housing, and suspend it from strut using a wire.

br0076



3) Remove the disc rotor.

NOTE:
If disc rotor seizes up within the hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



4) Clean mud and foreign particles from caliper body assembly and support.

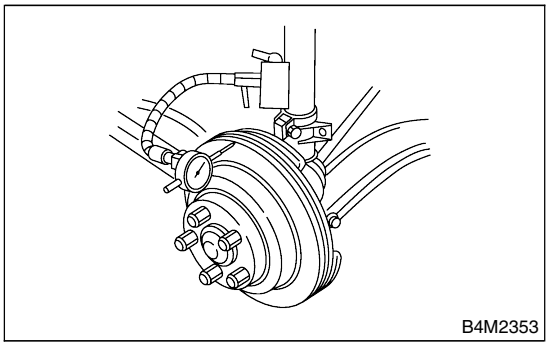
B: INSTALLATION S405173A11

1) Install the disc rotor.
2) Install the caliper body to housing.

Tightening torque:
78 N·m (8 kgf-m, 58 ft-lb)

C: INSPECTION S405173A10

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.

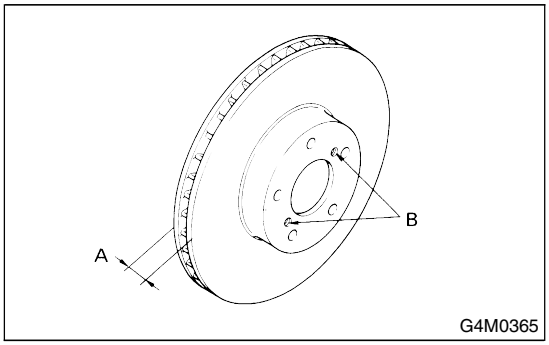


NOTE:
- Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.
- If disc rotor runout is above standard value, inspect play of hub bearing axial direction and runout of axle hub. <Ref. to DS-22, INSPECTION, Front Axle.>

If bearing and hub are normal, replace disc rotor.

Disc rotor runout limit:
0.075 mm (0.0030 in)

3) Measure disc rotor thickness.
If thickness of disc rotor is outside the standard value, replace disc rotor.



NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

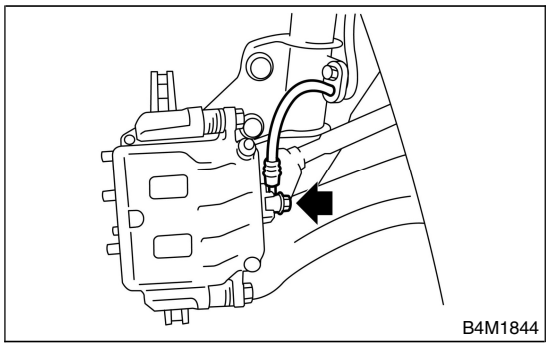
	Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	24.0 mm (0.945 in)	22.0 mm (0.866 in)	277 mm (10.91 in)

4. Front Disc Brake Assembly

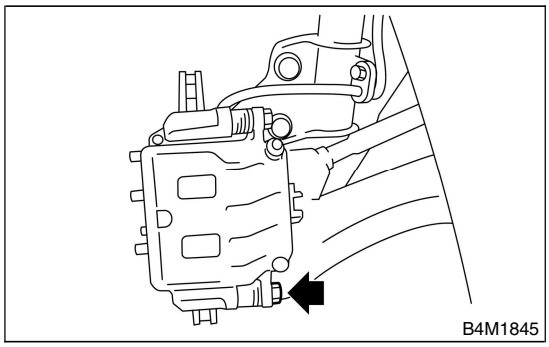
S405176

A: REMOVAL S405176A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove union bolt and disconnect brake hose from caliper body assembly.

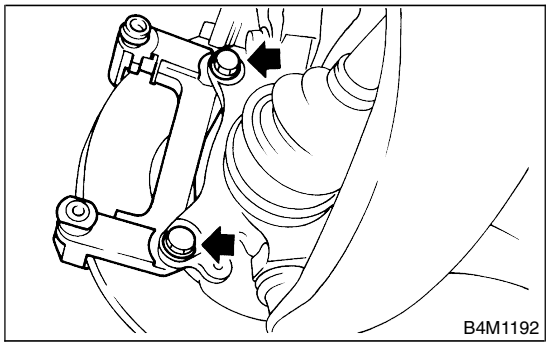


3) Remove bolt securing lock pin to caliper body.



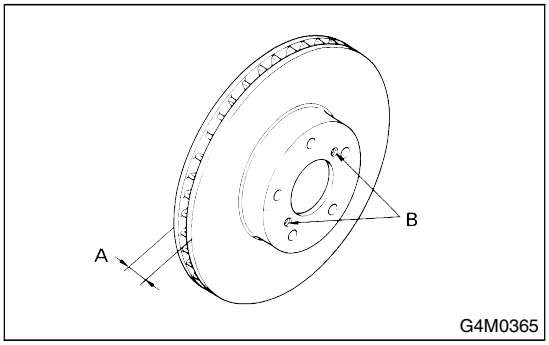
4) Raise caliper body and move it toward vehicle center to separate it from support.
5) Remove support from housing.

NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



6) 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.



7) Clean mud and foreign particles from caliper body assembly and support.

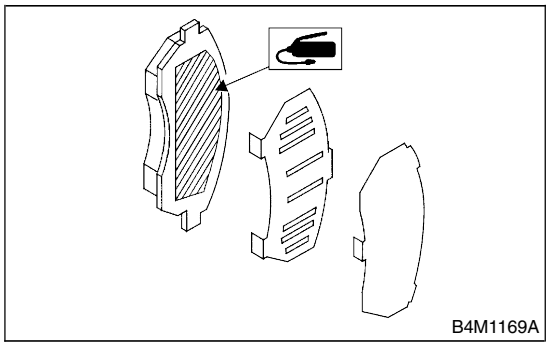
B: INSTALLATION S405176A11

1) Install disc rotor on hub.
2) Install support on housing.

Tightening torque:
78 N·m (8 kgf-m, 58 ft-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 pads, 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. (Australia model)


B4M1169A

5) Install pads on support.
6) Install caliper body on support.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

7) Connect brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

CAUTION:
Replace brake hose gaskets with new ones.

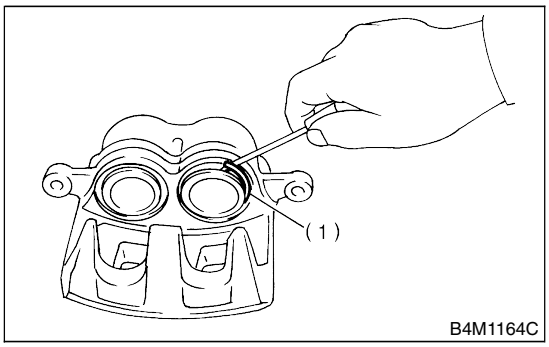
8) Bleed air from brake system.
<Ref. to BR-47, Air Bleeding.>

C: DISASSEMBLY S405176A06

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.

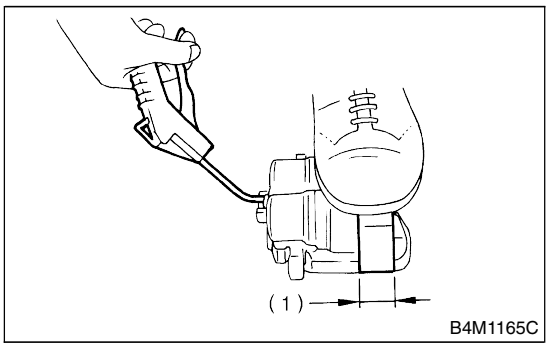


B4M1164C

(1) Boot ring

3) Remove boot from piston end.
4) Gradually supply compressed air via caliper body brake hose to force piston out.

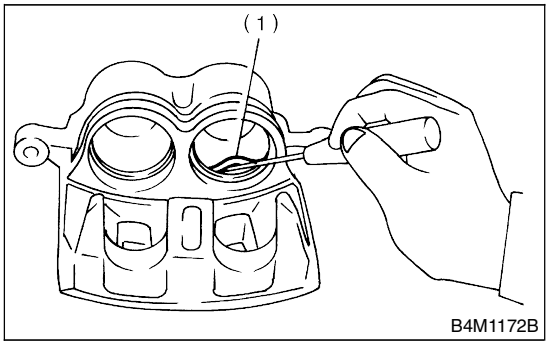
CAUTION:
Place a wooden block as shown in Figure to prevent damage to piston.



B4M1165C

(1) Place a 30 mm (1.18 in) wide wooden block here.

5) Remove piston seal from caliper body cylinder.



B4M1172B

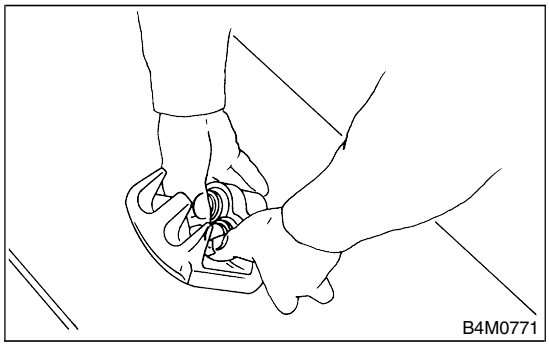
(1) Piston pin

6) Remove lock pin boot and guide pin boot.

D: ASSEMBLY S405176A02

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.

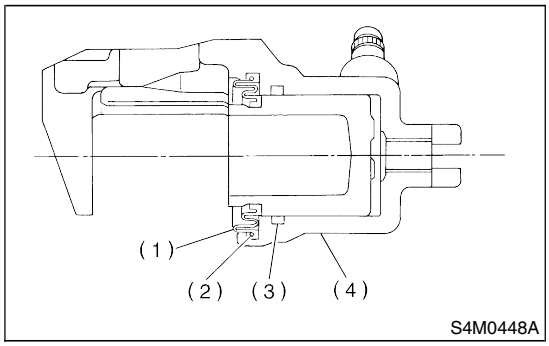
CAUTION:
Do not force piston into cylinder.



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)

To facilitate installation, fit boot starting with piston end.

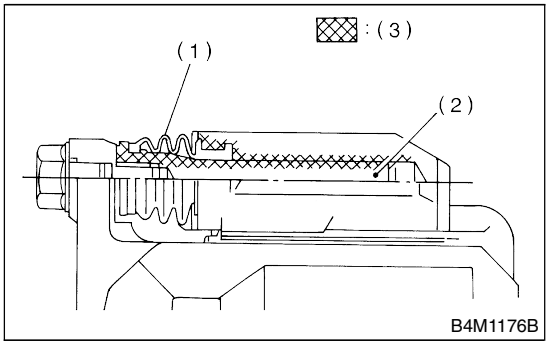


(1) Piston boot
(2) Boot ring
(3) Piston seal
(4) Caliper body

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)



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

9) Install lock pin boot and guide pin boot on support.

E: INSPECTION S405176A10

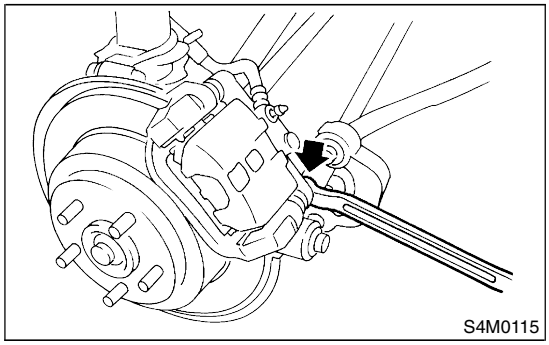
NOTE:
Repair or replace faulty parts.

1) Check caliper body and piston for uneven wear, damage or rust.
2) Check rubber parts for damage or deterioration.

5. Rear Brake Pad S405175

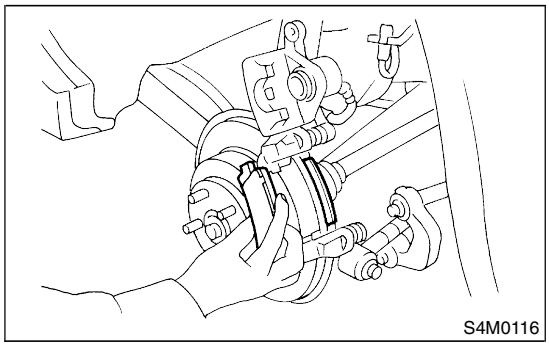
A: REMOVAL S405175A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Remove lock pin.



3) Raise caliper body.
4) Remove pad from support.

NOTE:
If brake pad is difficult to remove, use the same procedure as for front disc brake pad.
<Ref. to BR-20 REMOVAL, Front Brake Pad.>



B: INSTALLATION S405175A11

1) Apply thin coat of Molykote AS880N (Part No. 26298AC000) to the frictional portion between pad and pad clip.
2) Install pad on support.
3) Install caliper body on support.

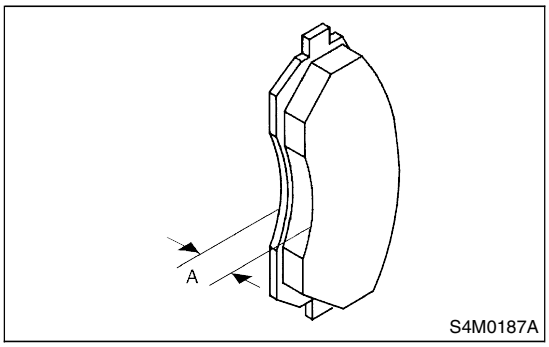
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

C: INSPECTION S405175A10

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)

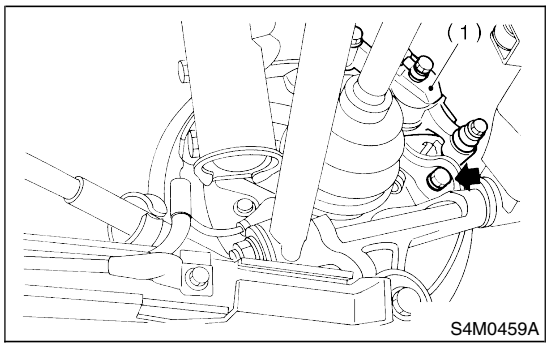


CAUTION:
• Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a 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.

6. Rear Disc Rotor S405177

A: REMOVAL S405177A18

1) Disconnect battery ground terminal from battery.
2) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
3) Remove the two mounting bolts and remove the disc brake assembly.

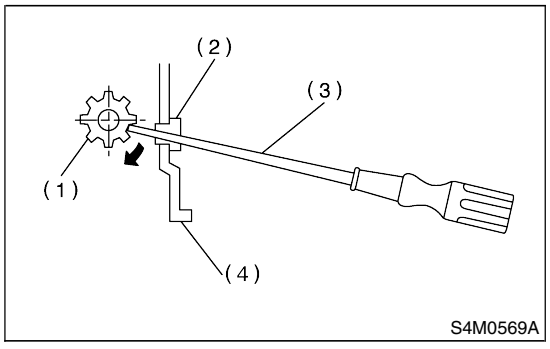


(1) Disc brake

4) Suspend the disc brake assembly so that the hose is not stretched.
5) Pull down and release parking brake.
6) Remove the disc rotor.

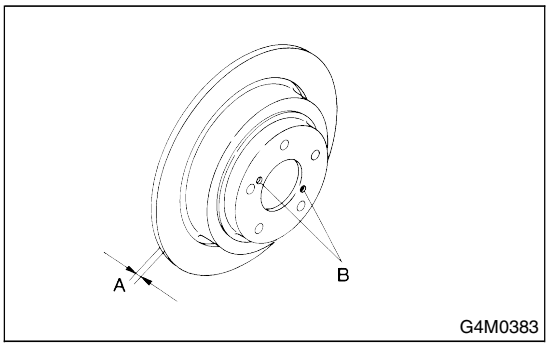
NOTE:
If the disc rotor is difficult to remove try the following two methods in order.

(1) Turn adjusting screw using a slot-type screwdriver until brake shoe gets away enough from the disc rotor.



(1) Adjusting screw
(2) Cover
(3) Slot-type screwdriver
(4) Back plate

(2) If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



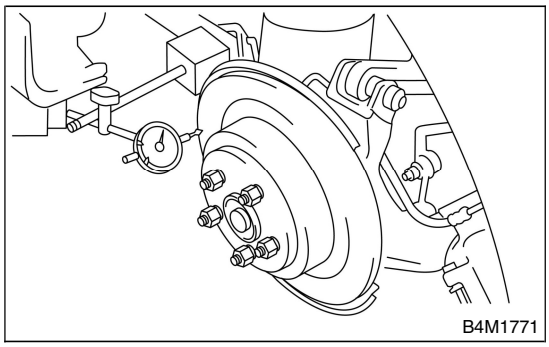
B: INSTALLATION S405177A11

1) Install in the reverse order of removal.
2) Adjust parking brake. <Ref. to PB-11 ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

C: INSPECTION S405177A10

1) Secure disc rotor by tightening the five wheel nuts.
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

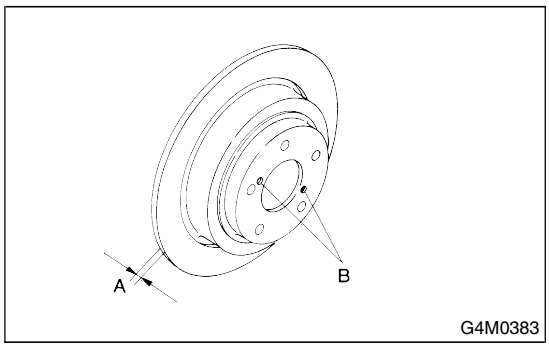
CAUTION:
Securely adjust disc rotor to hub.



NOTE:
● Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.
● If disc rotor runout is above standard value, inspect play of hub bearing axial direction and runout of axle hub. <Ref. to DS-31, INSPECTION, Rear Axle.>

Disc rotor runout limit:
0.070 mm (0.0028 in)

3) Measure disc rotor thickness.
If thickness of disc rotor is outside the standard value, replace disc rotor.



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)

7. Rear Disc Brake Assembly

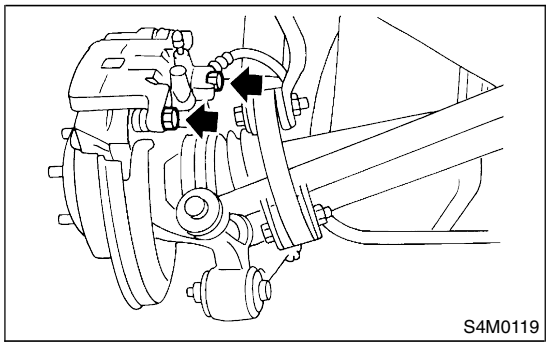
S405172

A: REMOVAL S405172A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
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.

3) Remove lock pin.



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).

B: INSTALLATION S405172A11

1) Install disc rotor on hub.
2) Install support on back plate.

Tightening torque:
78 N·m (8.0 kgf-m, 58 ft-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 N·m (4.0 kgf-m, 28.9 ft-lb)

6) Connect brake hose.

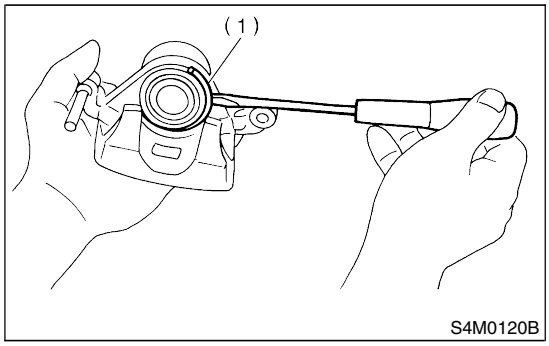
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

CAUTION:
- **The brake hose must be connected without any twist.**
- **Replace brake hose gaskets with new ones.**

7) Bleed air from brake system.
<Ref. to BR-47, Air Bleeding.>

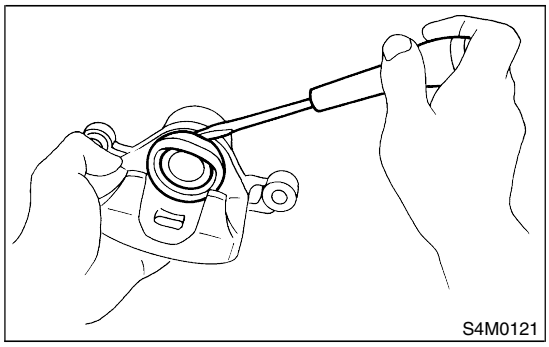
C: DISASSEMBLY S405172A06

1) Remove the boot ring.



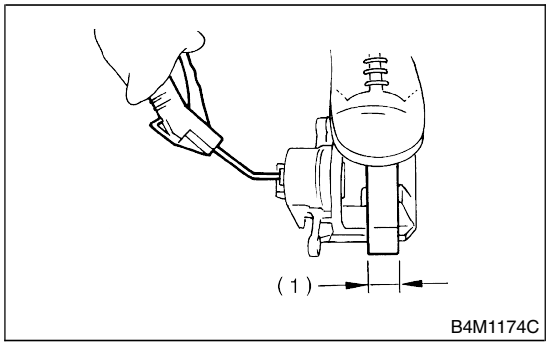
(1) Boot ring

2) Remove the piston boot.



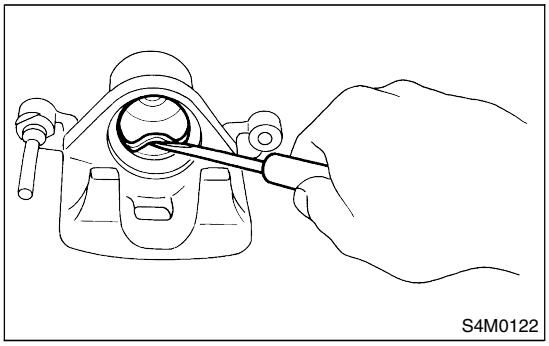
3) Gradually supply compressed air via inlet of caliper body to force piston out.

CAUTION:
● Place a wooden block as shown in Figure to prevent damage to piston.
● Do not apply excessively high-pressure.



(1) Place a 30 mm (1.18 in) wide wooden block here.

4) Remove piston seal from caliper body cylinder.



5) Remove lock pin sleeve and boot from caliper body.
6) Remove guide pin boot.

D: ASSEMBLY S405172A02

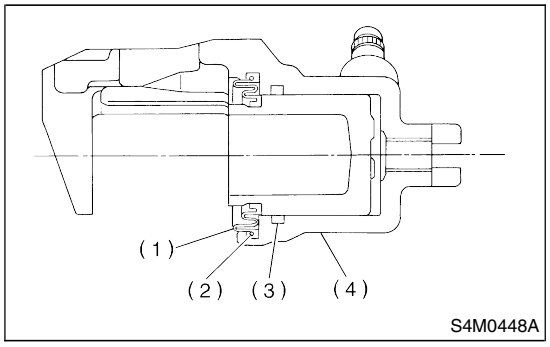
1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

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)

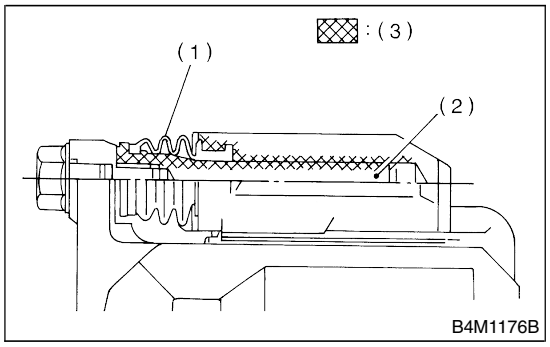
6) Install the piston boot to the caliper body, and attach boot ring.



(1) Piston boot
(2) Boot ring
(3) Piston seal
(4) Caliper body

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)



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

8) Install guide pin boot on caliper body.
9) Install lock pin boot on caliper body and insert lock pin sleeve into place.

E: INSPECTION S405172A10

NOTE:
Repair or replace faulty parts.

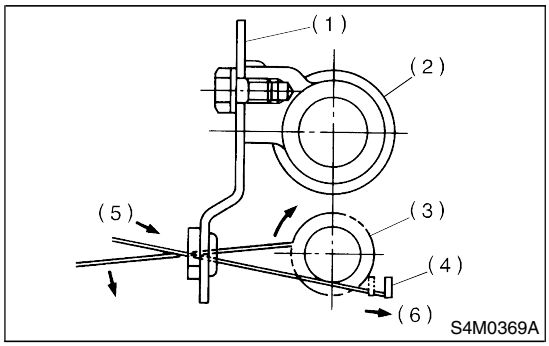
1) Check caliper body and piston for uneven wear, damage or rust.
2) Check rubber parts for damage or deterioration.

8. Rear Drum Brake Shoe S405174

A: REMOVAL S405174A18

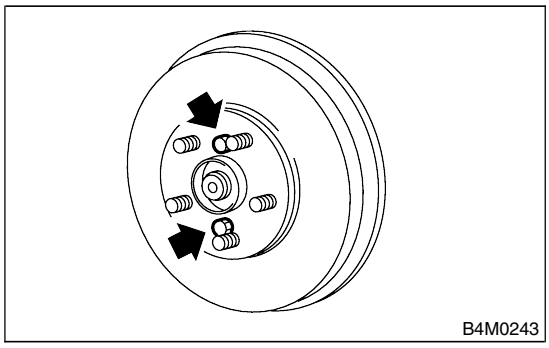
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.

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.

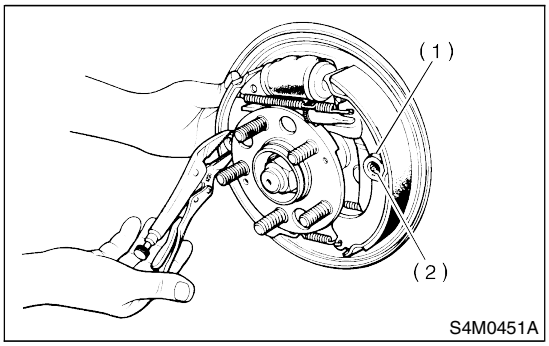


(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push.

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

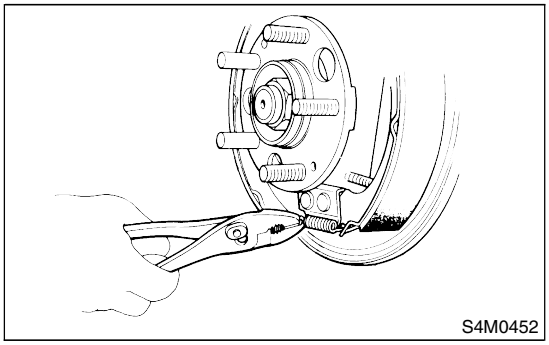


4) Hold hold-down pin by securing rear of back plate with your hand.



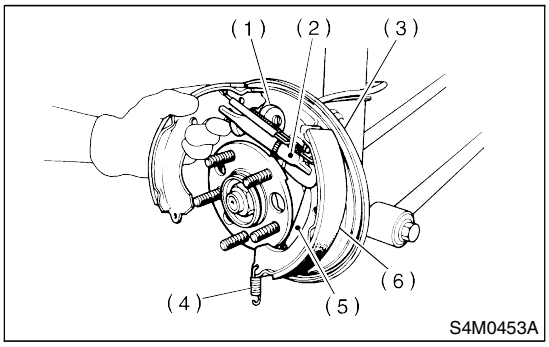
(1) Hold-down cup
(2) Hold-down pin

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.



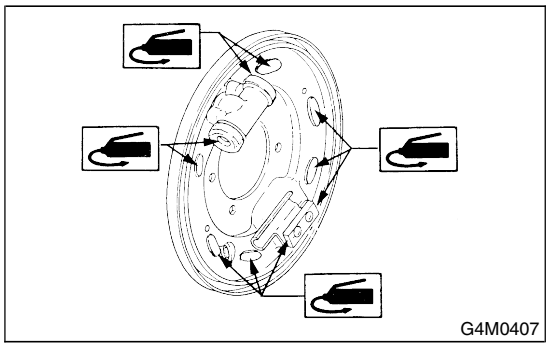
(1) Wheel cylinder
(2) Adjuster
(3) Back plate
(4) Lower shoe return spring
(5) Parking lever
(6) Trailing shoe

8) Disconnect parking brake cable from parking lever.

B: INSTALLATION S405174A11

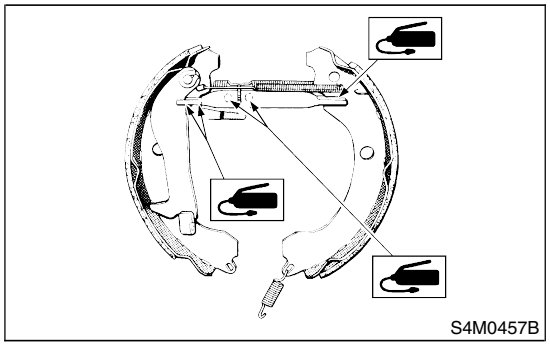
1) Clean back plate and wheel cylinder.
2) Apply grease to portions indicated by arrows in Figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

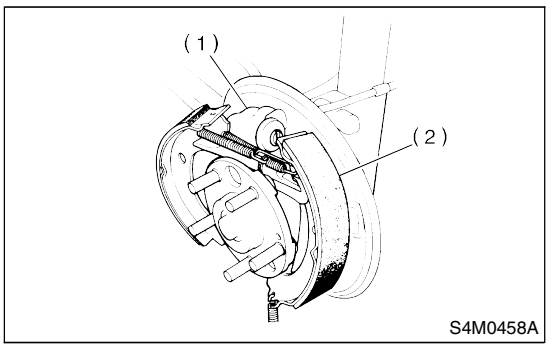


3) Apply grease to adjusting screw and both ends of adjuster.

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.



(1) Wheel cylinder
(2) Shoe (Trailing)

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) Install drum.

C: INSPECTION S405174A10

1) Measure the lining thickness.

Lining thickness:
Standard 4.1 mm (0.161 in)
Service limit 1.5 mm (0.059 in)

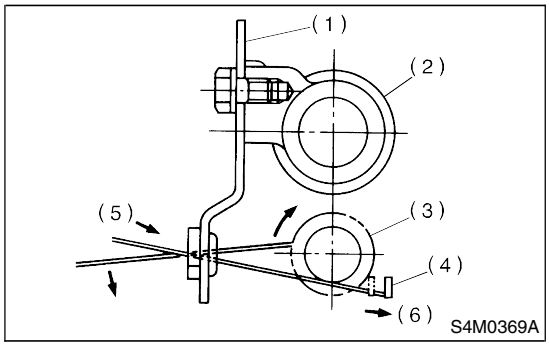
2) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
3) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

9. Rear Drum Brake Drum S405180

A: REMOVAL S405180A18

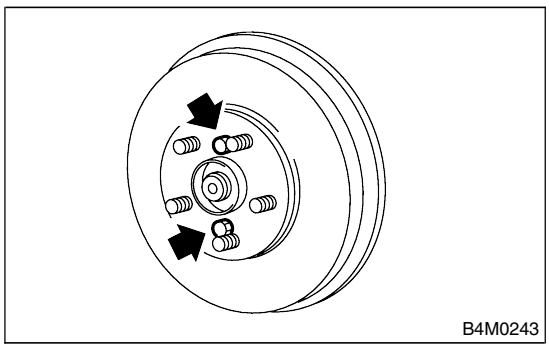
1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.

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.



(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push.

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



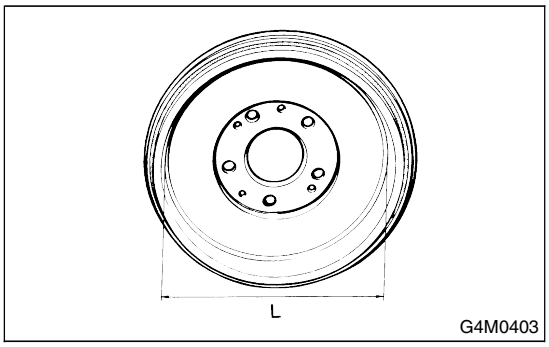
B: INSTALLATION S405180A11

1) 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.
2) Install drum.

C: INSPECTION S405180A10

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)

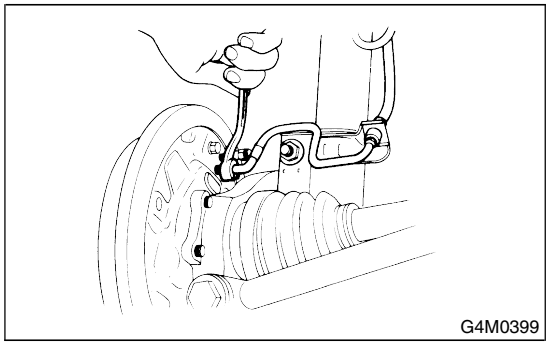


10. Rear Drum Brake Assembly

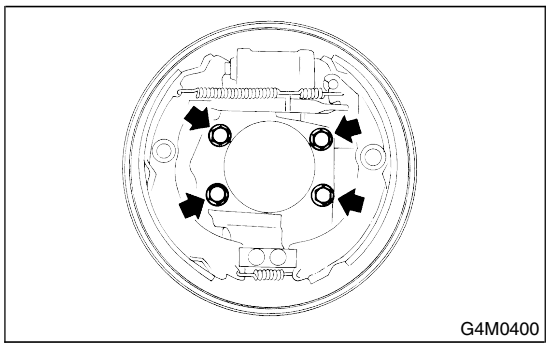
S405179

A: REMOVAL S405179A18

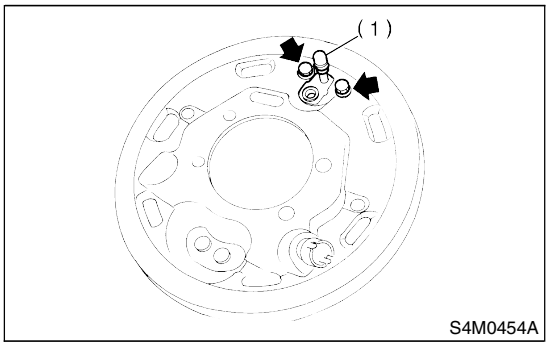
1) Disconnect battery ground terminal from battery.
2) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
3) Release parking brake.
4) Remove brake drum from brake assembly. <Ref. to BR-34, REMOVAL, Rear Drum Brake Drum.>
5) Remove brake shoe. <Ref. to BR-32, REMOVAL, Rear Drum Brake Shoe.>
6) Unscrew the brake pipe flare nut and disconnect brake pipe.


G4M0399

7) Disconnect ABS sensor from back plate. (only vehicle equipped with ABS)
8) Remove hub. <Ref. to DS-23, Rear Axle.>
9) Remove the bolts installing back plate, and then, remove brake assembly.


G4M0400

10) Remove the bolts installing wheel cylinder on back plate, and remove it.



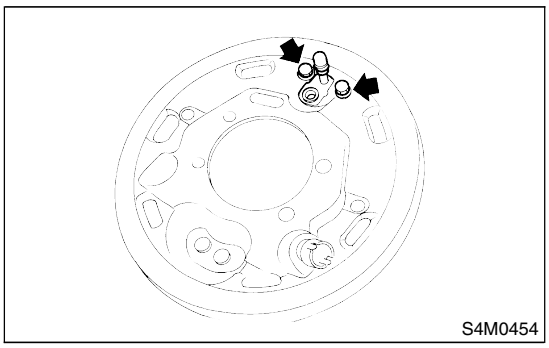
S4M0454A

(1) Air bleeder

B: INSTALLATION S405179A11

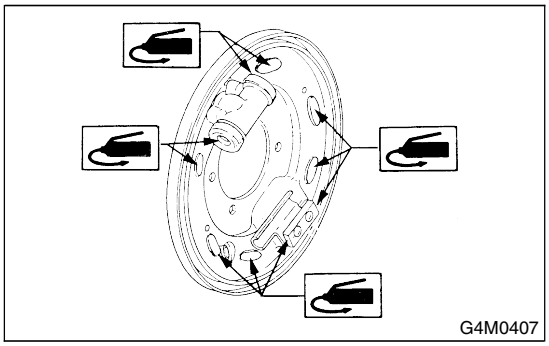
1) Clean back plate and wheel cylinder.
2) Install wheel cylinder on back plate, and tighten bolts.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)


S4M0454

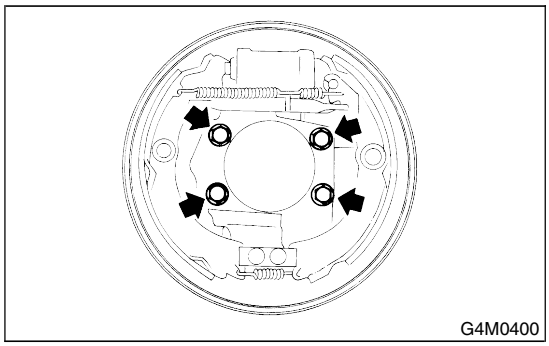
3) Apply grease to portions indicated by arrows in Figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)


G4M0407

4) Install brake assembly on housing, and tighten bolts to install back plate.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)


G4M0400

5) Install hub. <Ref. to DS-23, Rear Axle.>
6) Connect brake pipe, and tighten brake pipe flange nut.

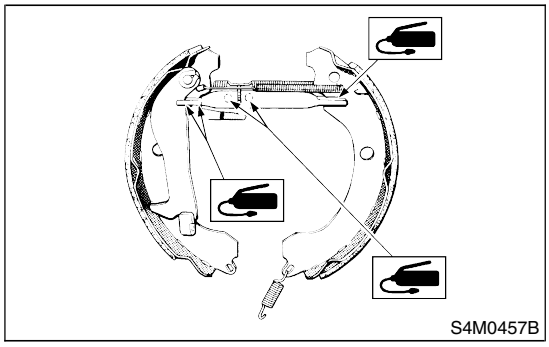
Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Connect ABS sensor to back plate. (only vehicle equipped with ABS)

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

8) Apply grease to adjusting screw and both ends of adjuster.

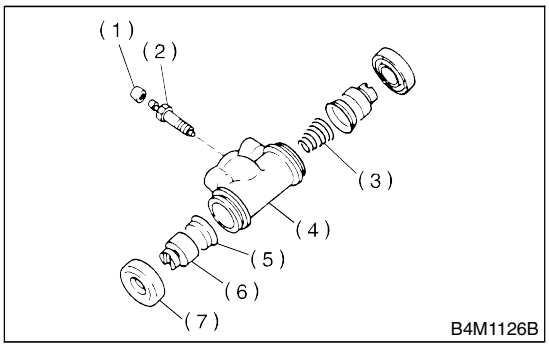
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)


S4M0457B

9) Install brake shoe. <Ref. to BR-33, INSTALLATION, Rear Drum Brake Shoe.>
10) Install drum. <Ref. to BR-34, INSTALLATION, Rear Drum Brake Drum.>
11) Bleed air from brake system. <Ref. to BR-47, Air Bleeding.>

C: DISASSEMBLY S405179A06

1) Remove right and left dust boots from wheel cylinder.



B4M1126B

(1) Bleeder cap
(2) Bleeder screw
(3) Spring
(4) Cylinder
(5) Cup
(6) Piston
(7) Boot

2) Remove piston, cup, spring and air bleeder screw and cap.

D: ASSEMBLY S405179A02

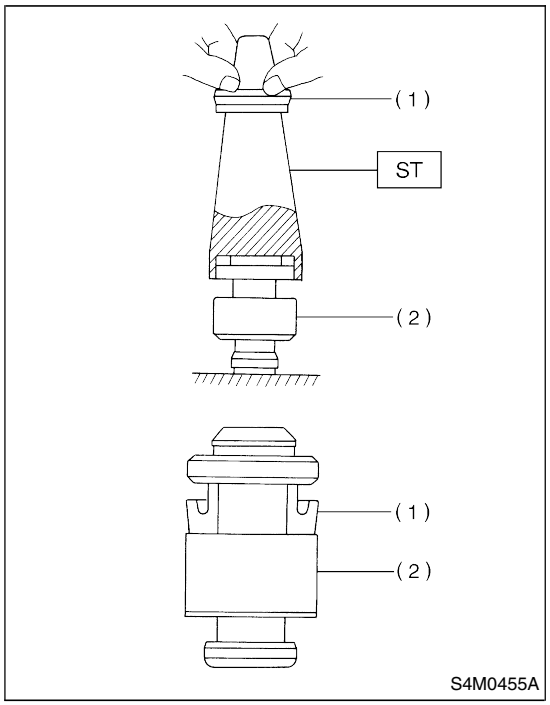
1) Clean all parts in brake fluid. Check and replace faulty parts.
- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

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.**

ST: ADAPTER	
Applicable size	Part No.
19.0 mm (3/4 in)	926460000

CAUTION:
While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.

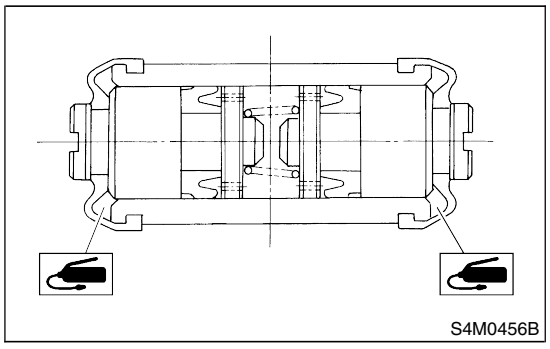


(1) Cup
(2) Piston

3) Apply rubber grease to the boot inside as shown in Figure.

CAUTION:
Never use brake grease.

Grease:
NIGLUBE RX-2 (Part No. 003606000)



E: INSPECTION S405179A10

1) Check wheel cylinder for leakage.
2) Inspect the disassembled parts for wear, rust or damage.
3) Inspect lining thickness. <Ref. to BR-33, INSPECTION, Rear Drum Brake Shoe.>
4) Inspect brake drum. <Ref. to BR-34, INSPECTION, Rear Drum Brake Drum.>

11. Master Cylinder S405168

A: REMOVAL S405168A18

1) Pull up parking brake lever, and block the tires.
2) Disconnect battery ground terminal from battery.
3) Thoroughly drain brake fluid from reservoir tank.
4) Disconnect fluid level indicator harness connector.
5) Remove brake pipes from master cylinder.
6) 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: INSTALLATION S405168A11

1) Install in the reverse order of removal.

Tightening torque:
Master cylinder mounting nut
14 N·m (1.4 kgf-m, 10.1 ft-lb)
Piping flare nut
15 N·m (1.5 kgf-m, 10.8 ft-lb)

CAUTION:
Be sure to use recommended brake fluid.

2) Bleed air from brake system. <Ref. to BR-47, Air Bleeding.>

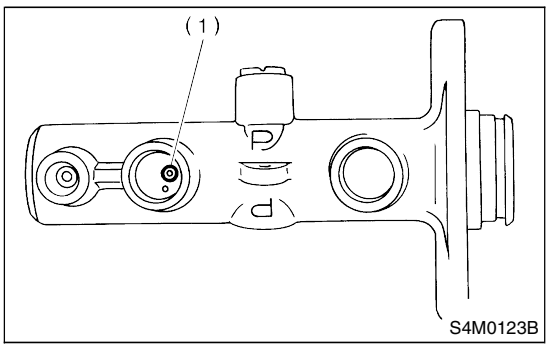
C: DISASSEMBLY S405168A06

1. PRECAUTIONS FOR DISASSEMBLING S405168A0602

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 S405168A0603

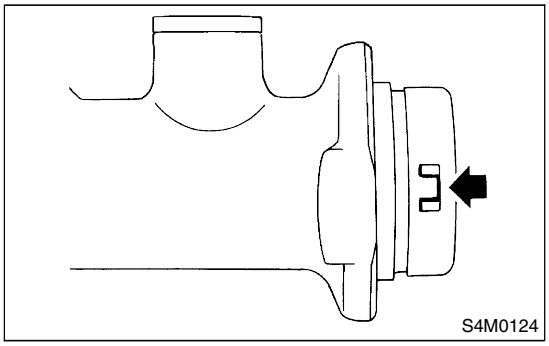
1) Remove pin with drift pin which secures reserve tank to master cylinder.
2) Remove cylinder pin with magnetic pick-up tool while pushing in primary piston. (Only vehicle equipped with ABS)



(1) Cylinder pin

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.

D: ASSEMBLY S405168A02

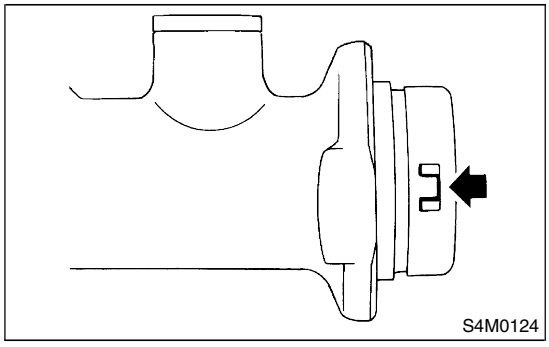
1. PRECAUTIONS FOR ASSEMBLING

S405168A0201

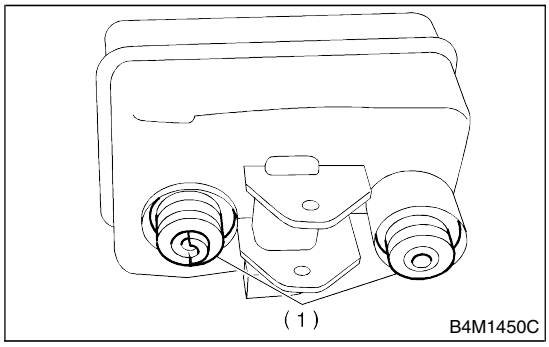
1) When assembling, be sure to use recommended brake fluid.
2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
4) Do not drop parts. Never attempt to use any part that has been dropped accidentally.

2. ASSEMBLING PROCEDURE S405168A0202

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) Press the pawl (only vehicle equipped with ABS) and install the piston retainer into the master cylinder.



3) Install seal to reservoir tank.



(1) Seal

4) Install pin with drift pins which secures reservoir tank to master cylinder.

E: INSPECTION S405168A10

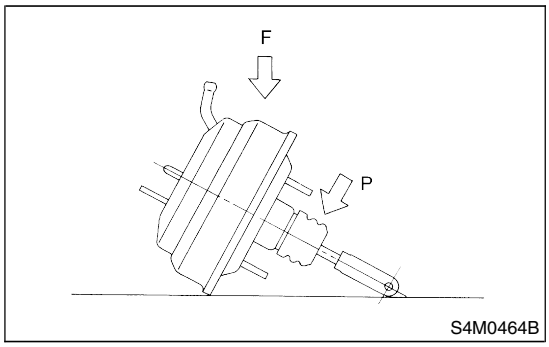
If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

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.

12. Brake Booster S405166

A: REMOVAL S405166A18

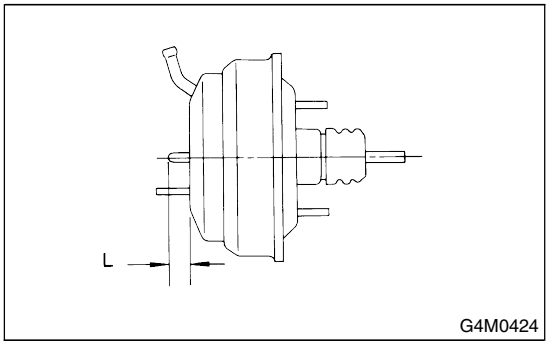
CAUTION:
If external force "F" is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.



1) Pull up parking brake lever, and block the tires.
2) Disconnect battery ground terminal from battery.
3) 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.
4) Remove the following parts from the pedal bracket.
   (1) Snap pin and clevis pin
   (2) Four brake booster installing nuts
5) Remove brake booster while shunning brake pipes.

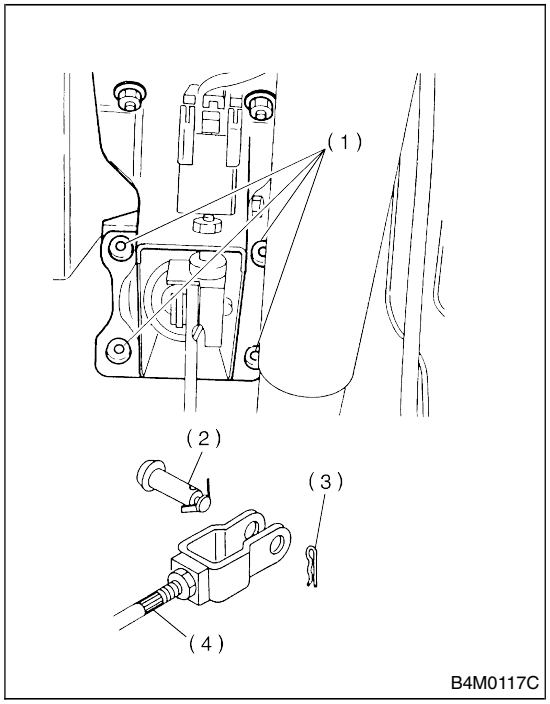
NOTE:
● Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.
● Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston cylinder.
● Use care when placing brake booster on the floor.
● Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

Standard:
L = 10 mm (0.39 in)



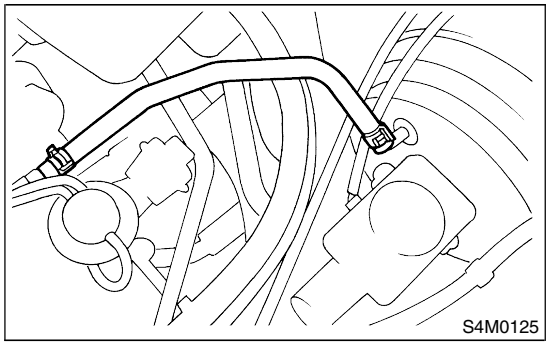
B: INSTALLATION S405166A11

1) Mount brake booster in position.
2) Connect operating rod to brake pedal with clevis pin and snap pin.



(1) Nuts
(2) Clevis pin
(3) Snap pin
(4) Operating rod

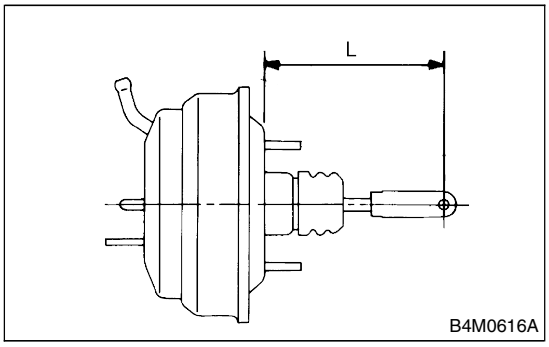
3) Connect vacuum hose to brake booster.



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
LHD:
144.6 mm (5.69 in)
RHD:
173.2 mm (6.82 in)

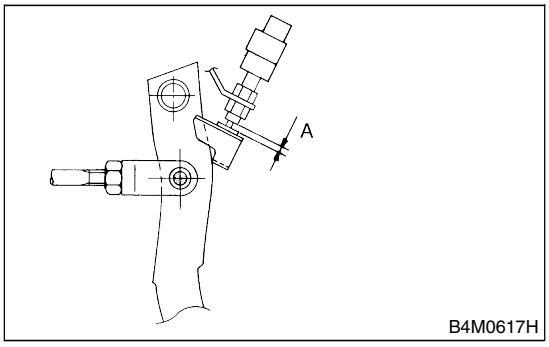
If it is not in specified value, adjust it by adjusting brake booster operating rod.



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 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 N·m (0.8 kgf-m, 5.8 ft-lb)

11) Conduct road tests to ensure brakes do not drag.

C: INSPECTION S405166A10

1. OPERATION CHECK (WITHOUT GAUGES) S405166A1001

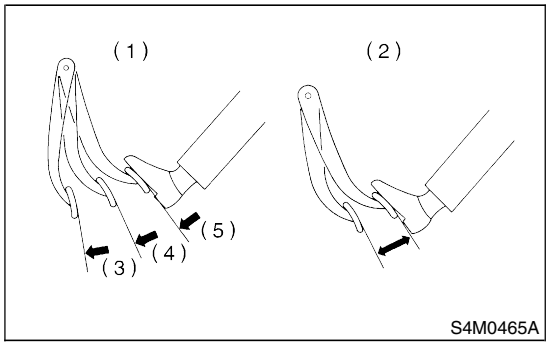
CAUTION:
When checking operation, be sure to securely apply the hand brake.

• 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.

• 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.

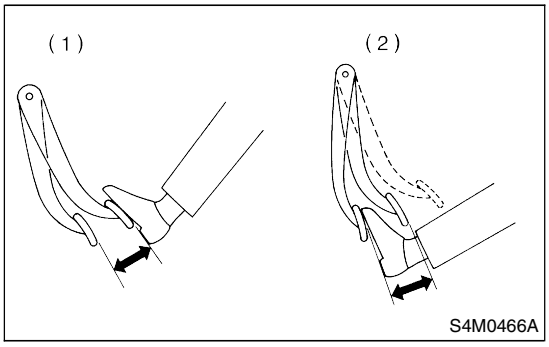


(1) OK
(2) NOT OK
(3) 1st
(4) 2nd
(5) 3rd

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.

• 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.



(1) When engine is stopped
(2) When engine is started

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.

• 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.

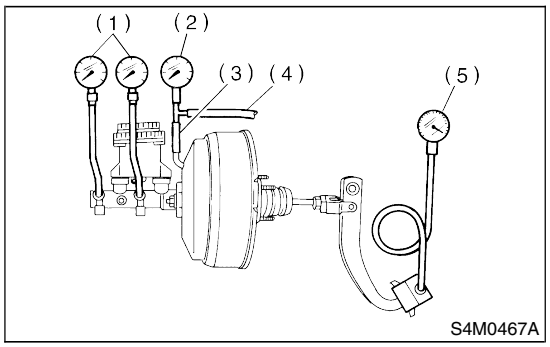
2. OPERATION CHECK (WITH GAUGES)

S405166A1002

CAUTION:
When checking operation, be sure to securely apply the hand brake.

• Checking with gauges

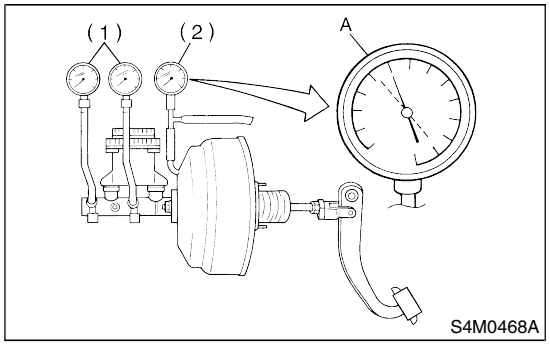
Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.



(1) Pressure gauge
(2) Vacuum gauge
(3) Adapter hose
(4) Vacuum hose
(5) Pedal force gauge

• 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.



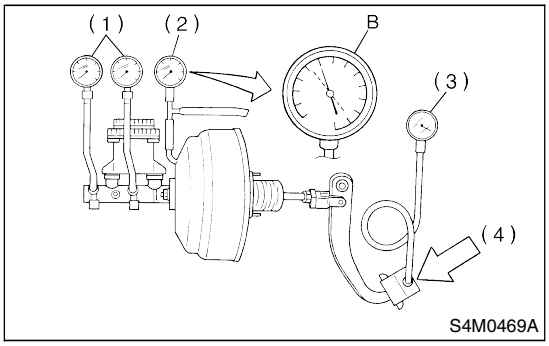
(1) Pressure gauge
(2) Vacuum gauge

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

• 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.



(1) Pressure gauge
(2) Vacuum gauge
(3) Pedal force gauge
(4) Depress

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 BR-42 INSPECTION, Brake Booster.>

• 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 kgf, 33 lb)	294 N (30 kgf, 66 lb)
Fluid pressure	588 kPa (6 kg/cm^2, 85 psi)	1,667 kPa (17 kg/cm^2, 242 psi)

• Boosting action check

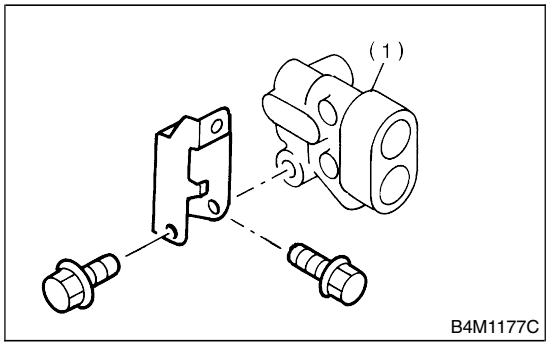
Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force	147 N (15 kgf, 33 lb)	294 N (30 kgf, 66 lb)
Fluid pressure	5,394 kPa (55 kg/cm^2, 782 psi)	10,003 kPa (102 kg/cm^2, 1,450 psi)

13. Proportioning Valve S405167

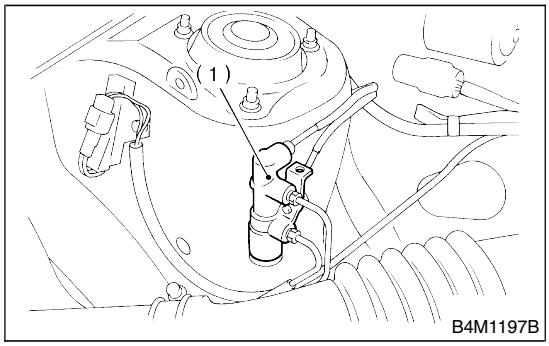
A: REMOVAL S405167A18

With ABS model



(1) Proportioning valve

Without ABS model



(1) Proportioning valve

1) Pull up parking brake lever, and block the tires.
2) Remove brake pipe from proportioning valve at four places.
3) Remove proportioning valve from its bracket.

CAUTION:
Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

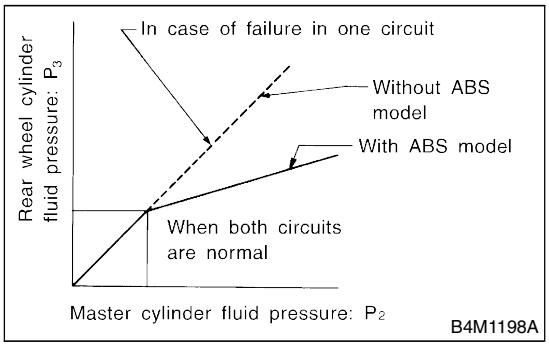
B: INSTALLATION S405167A11

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 N·m (1.5 kgf-m, 10.8 ft-lb)
Proportioning valve to bracket:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

C: INSPECTION S405167A10

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 BR-2 SPECIFICATIONS, General Description.>

14. Brake Fluid S405162

A: INSPECTION S405162A10

1) Check that brake fluid level remains between "MIN" and "MAX". If out of the specified range, refill or drain fluid. If fluid level becomes close to "MIN", refill fluid.
2) Check fluid for discoloration. If fluid color has excessively changed, drain the fluid and refill with new fluid.

B: REPLACEMENT S405162A20

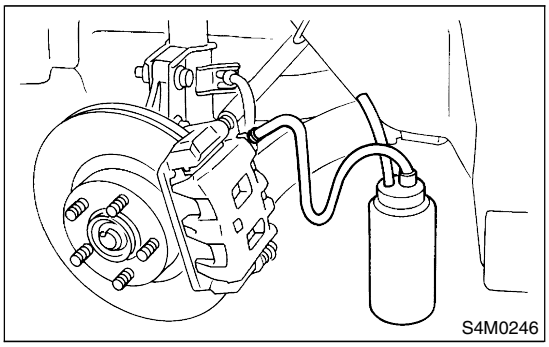
CAUTION:
• To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
• The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
• Cover bleeder with waste cloth, when loosening it, to prevent brake 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.

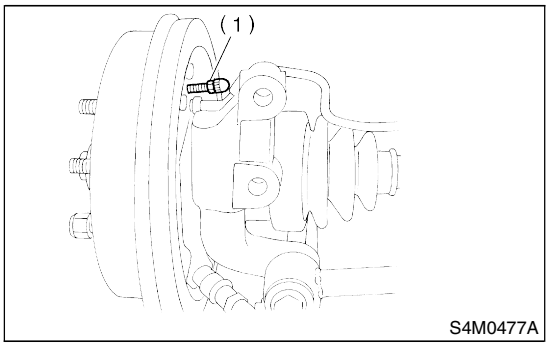
NOTE:
• During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• Brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.
• The amount of brake fluid required is approximately 500 mℓ (16.9 US fl oz, 17.6 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

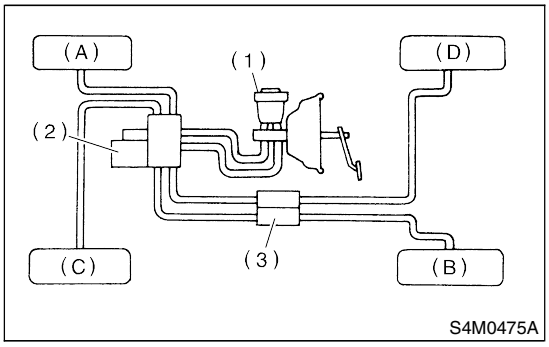
5) Install one end of a vinyl tube onto the air bleeder of and insert the other end of the tube into a container to collect the brake fluid.


S4M0246



S4M0477A

CAUTION:
Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right



S4M0475A

(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

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 N·m (0.8 kgf-m, 5.8 ft-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 kgf, 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.

15. Air Bleeding S405163

A: PROCEDURE S405163E45

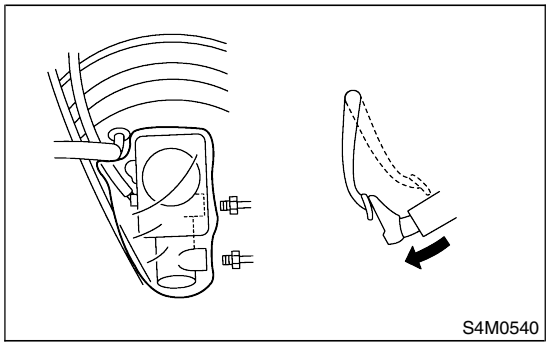
CAUTION:
● The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
● Cover bleeder with waste cloth when loosening it to prevent brake fluid from being splashed over surrounding parts.
● Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
● Start with the brakes (wheels) connected to the secondary chamber of the master cylinder.
● 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.
● The air bleeder on each brake shall be released for 1 to 2 seconds.

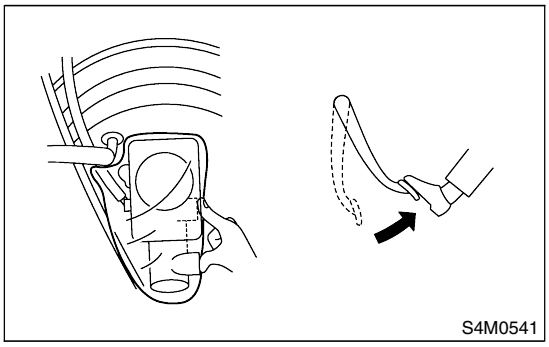
1. MASTER CYLINDER S405163E4501

NOTE:
● If master cylinder is disassembled or reservoir tank is empty, bleed master cylinder.
● 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, two people should do the work.

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Disconnect brake line at primary and secondary sides.
3) Put plastic bag cover on the master cylinder.
4) Carefully depress and hold brake pedal.


S4M0540

5) Close outlet plug with your finger, and release brake pedal.


S4M0541

6) Repeat items 3) and 4), until brake fluid come out of all outlet port.
7) Remove the plastic bag cover.
8) Install brake pipes to master cylinder.

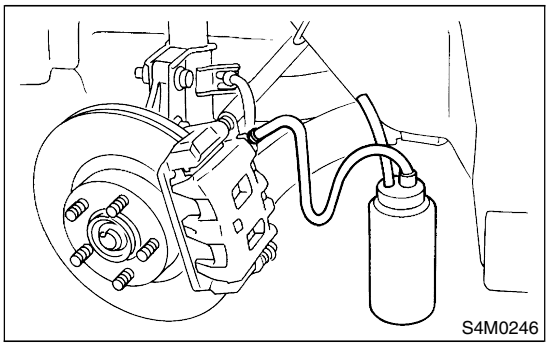
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

9) Cleanly wash away brake fluid spill on master cylinder etc.
10) Bleed air from brake system. <Ref. to BR-47, BRAKE LINE, PROCEDURE, Air Bleeding.>

2. BRAKE LINE S405163E4502

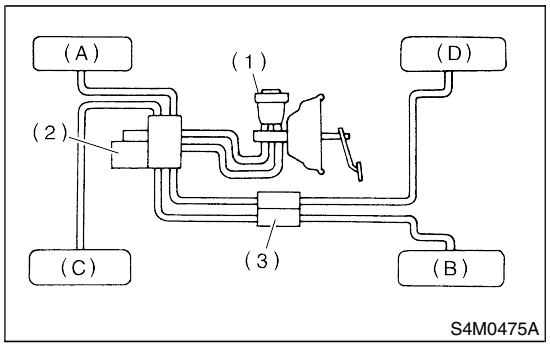
NOTE:
● During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
● Brake pedal operating must be very slow.
● For convenience and safety, two people should do the work.

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.


S4M0246

AIR BLEEDING

CAUTION:
Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right



(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

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.

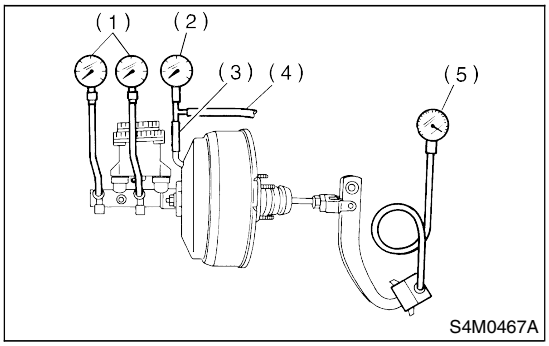
NOTE:
Brake pedal operating must be very slow.

4) Tighten air bleeder securely when no air bubbles are visible.

Air bleeder tightening torque:
8 N·m (0.8 kgf-m, 5.8 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 kgf, 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.



(1) Steering wheel
(2) Toe board

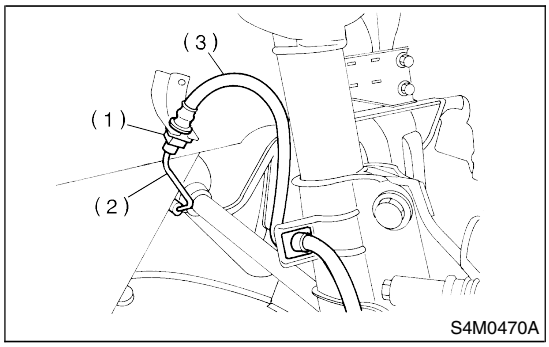
Specified pedal stroke:
Without ABS
90 mm (3.54 in)
With ABS
95 mm (3.74 in)
When depressing brake pedal with a 490 N (50 kgf, 110 lb) load.

7) If the distance is more than specifications, there is a possibility that air is in the brake line. Bleed brake line until pedal stroke meets the specification.
8) Operate hydraulic control unit in the sequence control mode. (Only vehicle equipped with ABS)
<Ref. to ABS-11 ABS Sequence Control.>
9) Recheck the brake stroke.
10) If the distance is more than specifications, there is a possibility air is in the inside of the hydraulic unit. Repeat above steps 2) to 9) above until pedal stroke meets the specification.
11) Add brake fluid to the required level (MAX. level) of reservoir tank.
12) 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.

16. Brake Hose S405164

A: REMOVAL S405164A18

1) Loosen wheel nuts, jack-up vehicle, support it with safety stands, and remove wheel.
2) Separate brake pipe from brake hose.
(Always use flare nut wrench and be careful not to deform flare nut.)



(1) Clamp
(2) Brake pipe
(3) Brake hose

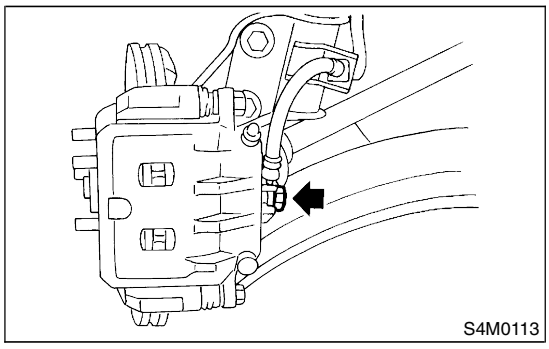
3) Pull out clamp to remove brake hose.
4) Remove clamp at strut and union bolt.

B: INSTALLATION S405164A11

1. FRONT BRAKE HOSE S405164A1101

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:
18 N·m (1.8 kgf-m, 13.0 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 N·m (1.5 kgf-m, 10.8 ft-lb)

8) Bleed air from the brake system. <Ref. to BR-47, Air Bleeding.>

2. REAR BRAKE HOSE S405164A1102

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 N·m (1.5 kgf-m, 10.8 ft-lb)

4) Bleed air from the brake system. <Ref. to BR-47, Air Bleeding.>

C: INSPECTION S405164A10

Ensure there are no cracks, breakage, or damage on hoses. Check joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace hose.

17. Brake Pipe S405165

A: REMOVAL S405165A18

NOTE:
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.
• When removing the brake pipe, make sure that it is not bent.

B: INSTALLATION S405165A11

NOTE:
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.
• When 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 N·m (1.5 kgf-m, 10.8 ft-lb)

C: INSPECTION S405165A10

Ensure there are no cracks, breakage, or damage on pipes. Check joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace pipe.

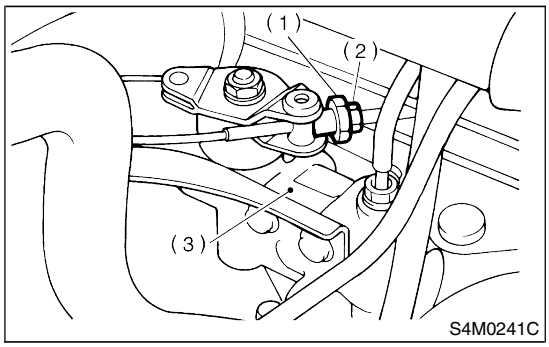
NOTE:
Use a mirror when inspecting low-visible part or back side.

18. Hill Holder S405661

A: REMOVAL S405661A18

1. PHV (PRESSURE HOLD VALVE) S405661A1801

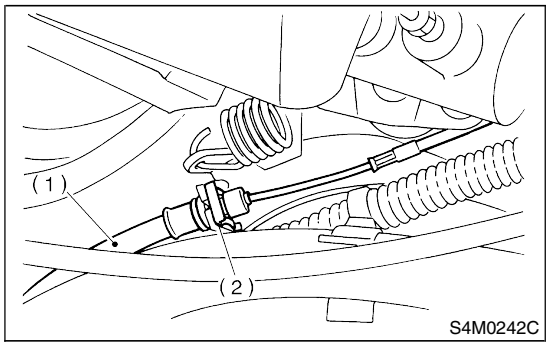
1) Remove air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
3) Drain brake fluid from reservoir of master cylinder.
4) Remove adjusting nut and lock nut.



(1) Adjusting nut
(2) Lock nut
(3) PHV

5) Remove cable clamp, and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boots and inner cable from damage when disconnecting PHV cable.



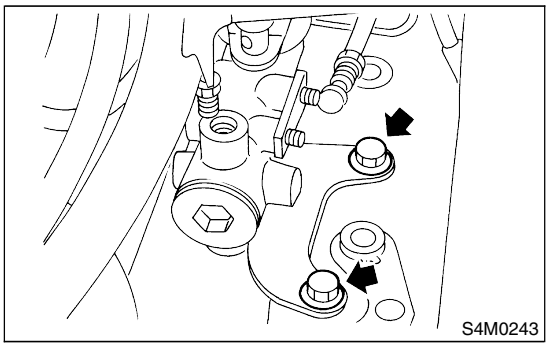
(1) PHV cable
(2) Clamp

6) Disconnect brake pipes from PHV.

CAUTION:
• Pay attention not to drop brake fluid onto body painting since it may dissolve paint.
• Pay attention not to damage hexagonal head of flare nut by using pipe wrench without fail.

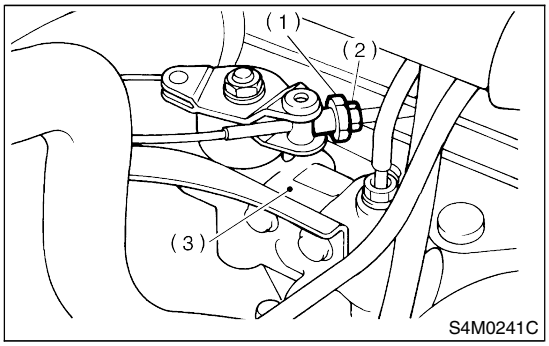
7) Detach PHV along with support from side frame.

CAUTION:
Exercise utmost care to prevent foreign matter from entering into PHV when removing it.



2. PHV CABLE S405661A1802

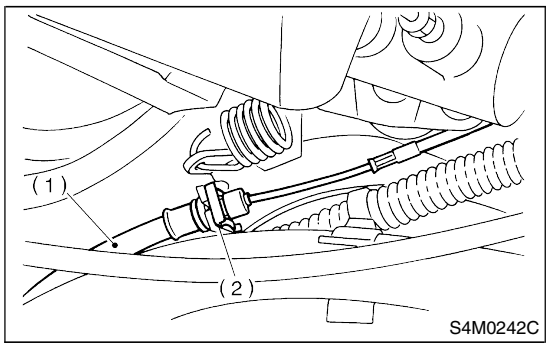
1) Remove air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
3) Remove adjusting nut and lock nut.



(1) Adjusting nut
(2) Lock nut
(3) PHV

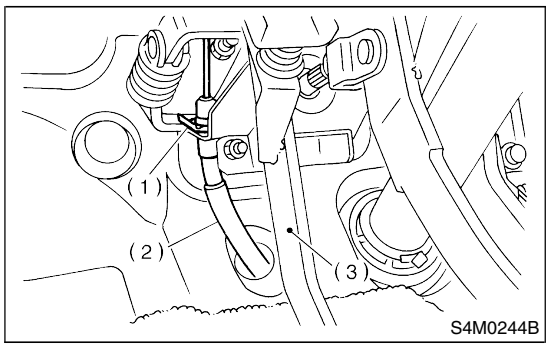
4) Remove cable clamp, and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boot and inner cable from damage when disconnecting PHV cable.



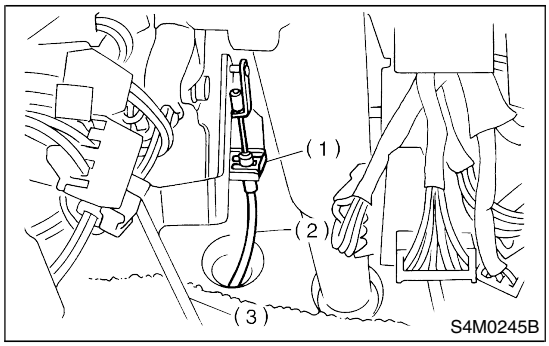
(1) PHV cable
(2) Clamp

5) Remove cable clamp from clutch pedal bracket.
LHD model



(1) Clamp
(2) PHV cable
(3) Clutch pedal

RHD model



(1) Clamp
(2) PHV cable
(3) Clutch pedal

6) Remove PHV cable.

B: INSTALLATION S405661A11

1. PHV (PRESSURE HOLD VALVE) S405661A1101

1) Install PHV onto side frame.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Connect brake pipes to PHV.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

CAUTION:
Confirm that brake pipes are not deformed and/or damaged. Replace them with new ones if necessary.

3) Install PHV cable to PHV.

CAUTION:
If cable clamp (and clips) is damaged, replace it with a new one.

4) Connect PHV cable with clips.

NOTE:
Avoid sharp bending of PHV cable as it may cause breakage.

5) Apply grease to the following points.
- Hook portion of return spring
- Cable end portion of lever

Grease:
SUNLIGHT 2 (Part No. 003602010)

6) Be sure to bleed air from the brake system.
7) Adjust PHV cable. <Ref. to BR-53 ADJUSTMENT, Hill Holder.>

CAUTION:
After replacing PHV cable with new one, operate clutch pedal about 30 times as a running-in operation prior to adjustment.

8) Install air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
9) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

2. PHV CABLE S405661A1102

1) Install PHV cable in the reverse order of removal.

CAUTION:
- **If cable clamp is damaged, replace it with a new one.**
- **Avoid sharp bending of PHV cable as it may cause breakage.**

2) Apply grease to the following points.
- Hook portion of return spring
- Cable end portion of lever

Grease:
SUNLIGHT 2 (Part No. 003602010)

3) Adjust PHV cable. <Ref. to BR-53 ADJUSTMENT, Hill Holder.>

CAUTION:
After replacing PHV cable with new one, operate clutch pedal about 30 times as a running-in operation prior to adjustment.

4) Install air cleaner case. (Non-turbo model) <Ref. to IN (SOHC)-7, INSTALLATION, Air Cleaner Case.>
5) Install intercooler. (Turbo model) <Ref. to IN (DOHC TURBO)-10, INSTALLATION, Intercooler.>

C: INSPECTION S405661A10

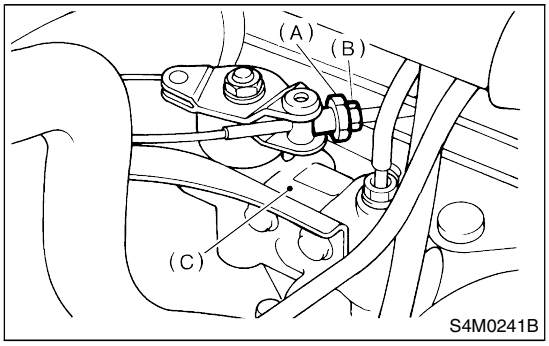
Check up removed parts as follows, and replace defective ones.
1) Check if boots of PHV cable are damaged or degraded, and if inner cable is damaged or corroded.
2) Check if return spring is worn out, damaged or corroded.
3) Confirm that rolling sound of ball is heard with PHV inclined and lever rotates smoothly.

CAUTION:
Never disassemble PHV. Replace entire PHV assembly if necessary.

D: ADJUSTMENT S405661A01

Confirm stopping and starting performances by activating hill holder on an uphill road of 3° or higher inclination.
1) If vehicle does not stop;
Tighten adjusting nut of PHV cable.
2) If vehicle does not start properly;
● Case A — When hill holder is released later than engagement of clutch pedal (Engine tends to stall.):
Loosen adjusting nut gradually until smooth starting is enabled.
● Case B — When hill holder is released earlier than engagement of clutch pedal (Vehicle slips down slightly.):
Tighten adjusting nut so that hill holder is released later than engagement of clutch pedal (status in Case A). Then make adjustment the same as in Case A.

CAUTION:
Whenever turning adjusting nut, prevent PHV cable from revolving.



(1) Adjusting nut
(2) Lock nut
(3) PHV

3) Tighten lock nut.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

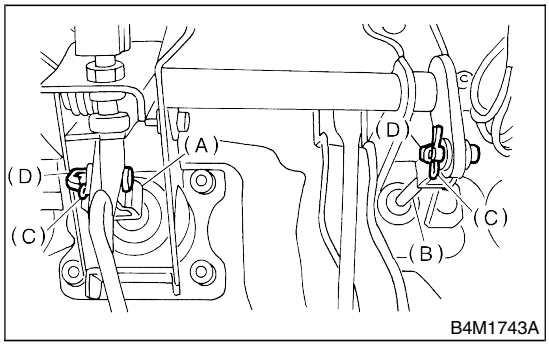
19. Brake Pedal S405541

A: REMOVAL S405541A18

1. MT MODEL S405541A1801

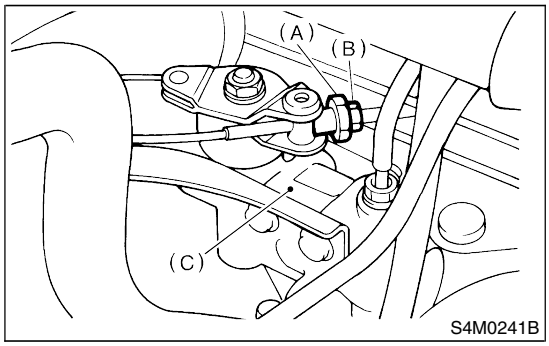
- **LHD model**

1) Pull up parking brake lever and block tires.
2) Disconnect battery ground terminal from battery.
3) Remove steering column.
<Ref. to PS-30 REMOVAL, Tilt Steering Column.>
4) Disconnect connectors from stop light and clutch switches.
5) Remove snap pins which secure lever to push rod and operating rod.
6) Remove clevis pins which secure lever to push rod and operating rod.



(A) Operating rod
(B) Push rod
(C) Snap pin
(D) Clevis pin

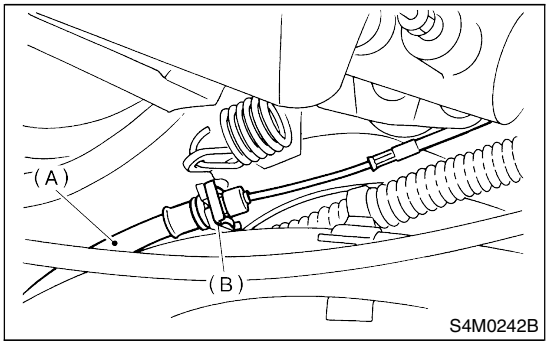
7) Remove PHV adjusting nut and lock nut.



(A) Adjusting nut
(B) Lock nut
(C) PHV

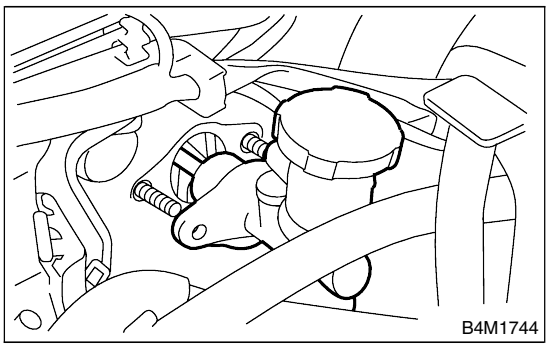
8) Remove cable clamp, and disconnect PHV cable from PHV.

CAUTION:
Carefully protect boot and inner cable from damage when disconnecting PHV cable.



(A) PHV cable
(B) Clamp

9) Remove nut which secures clutch master cylinder.



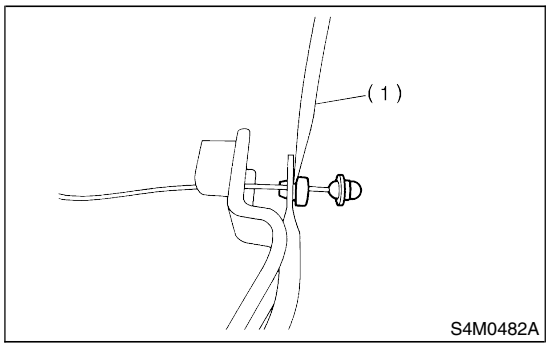
10) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

● RHD model

1) Pull up parking brake lever.
2) Disconnect battery ground terminal from battery.
3) Disconnect accelerator cable from throttle body.

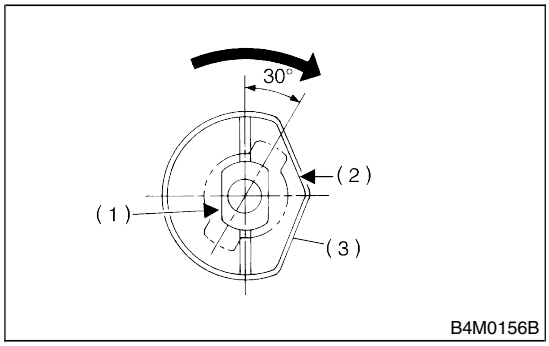
CAUTION:
Be careful not to kink accelerator cable.

4) Remove instrument panel lower cover from instrument panel.
5) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect electrical connectors (for stop light switch, etc.).
6) Disconnect accelerator cable from accelerator pedal lever.



(1) Slot type screwdriver

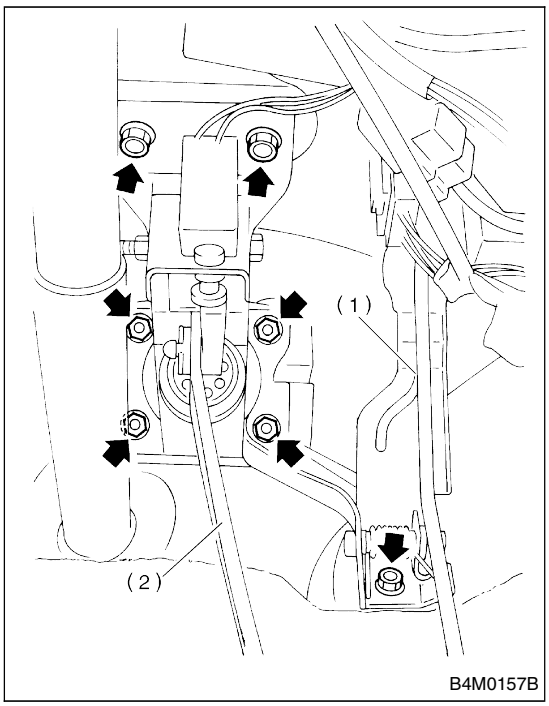
7) Remove the casing cap out of the toe board by turning it clockwise.



(1) Accelerator cable
(2) Toe board hole
(3) Casing cap

8) Pull out the cable from the toe board hole.
9) Disconnect stop light switch connector.

10) Remove nuts and bolts which secure pedal bracket.

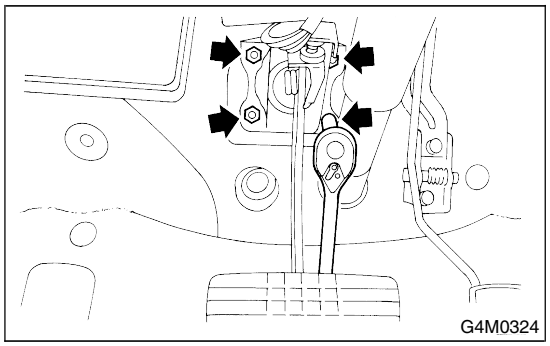


(1) Accelerator pedal
(2) Brake pedal

2. AT MODEL S405541A1802

● LHD model

1) Pull up parking brake lever.
2) Disconnect battery ground terminal from battery.
3) Remove instrument panel lower cover from instrument panel.
4) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect stop light switch connector.
5) Remove two bolts and four nuts which secure brake pedal to pedal.



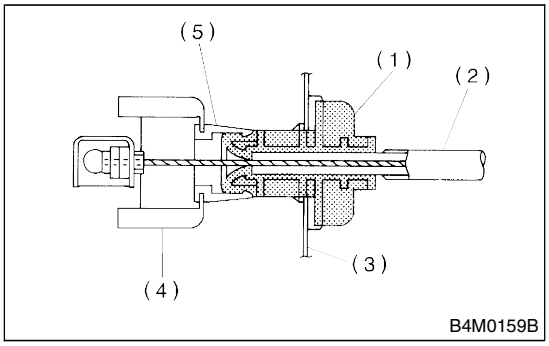
● RHD model

NOTE:
For removal procedures, refer to “MT MODEL”. <Ref. to BR-54 MT MODEL, REMOVAL, Brake Pedal.>

B: INSTALLATION S405541A11

1) Install in the reverse order of removal.

CAUTION:
● Be careful not to bend clutch cable too much.
● Never fail to cover outer cable end with boot.
● Be careful not to kink accelerator cable.
● Make sure that holder and casing cap are securely connected. (LHD model only)



(1) Casing cap
(2) Accelerator cable
(3) Toe board
(4) Accelerator pedal bracket
(5) Holder

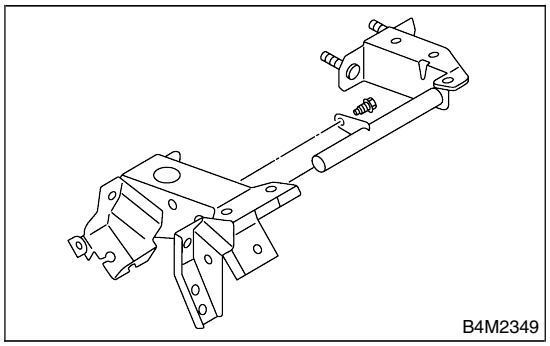
2) Adjustment of clutch pedal <Ref. to BR-58 ASSEMBLY, Brake Pedal.>
3) Inspect after pedal installation <Ref. to BR-59 INSPECTION, Brake Pedal.>

C: DISASSEMBLY S405541A06

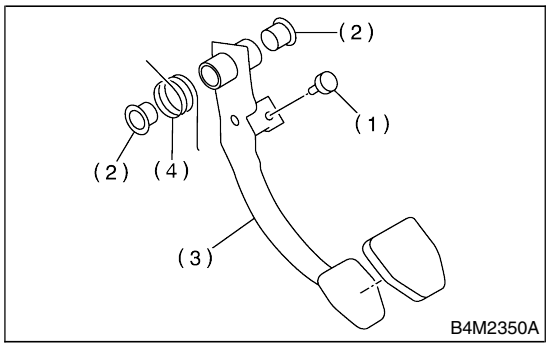
1. MT MODEL S405541A0601

• LHD model

1) Remove the stop light switch.
<Ref. to BR-60 REMOVAL, Stop Light Switch.>
2) Remove the clutch pedal.
<Ref. to CL-38 DISASSEMBLY, Clutch Pedal.>
3) Remove the clutch master cylinder bracket.



4) Remove bushing, spring and stopper.

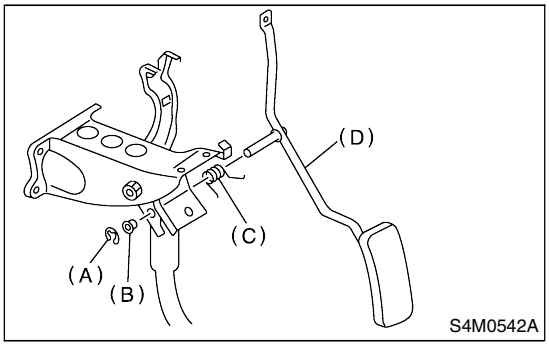


(1) Stopper
(2) Bushing
(3) Brake pedal
(4) Brake pedal spring

5) Remove the brake pedal pad.

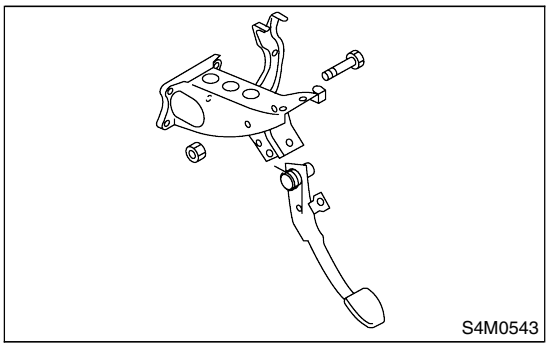
• RHD model

1) Remove the stop light switch and kick-down switch.
2) Remove clip, bushing, accelerator spring and accelerator pedal.

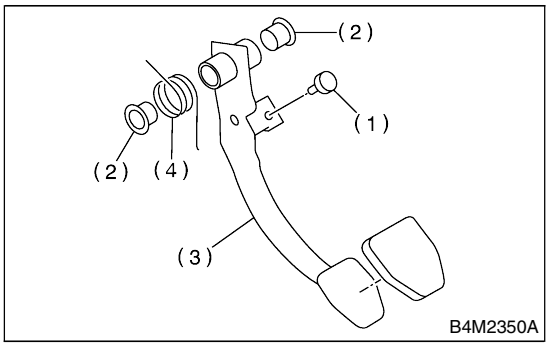


(1) Clip
(2) Bushing
(3) Accelerator spring
(4) Accelerator pedal

3) Unbolt, and then remove the brake pedal.



4) Remove spacer, bushing, brake pedal spring and brake pedal.

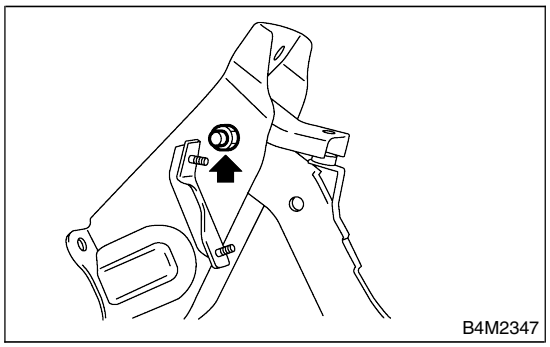


(1) Stopper
(2) Bushing
(3) Brake pedal
(4) Brake pedal spring

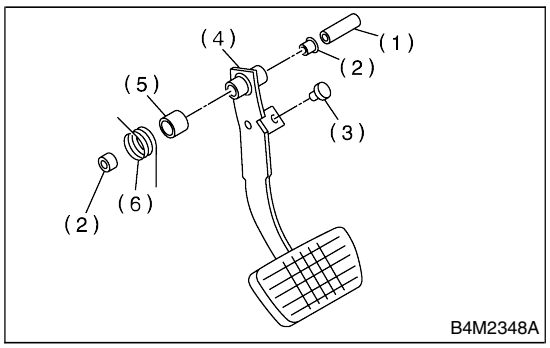
5) Remove the brake pedal pad.

2. AT MODEL S405541A0602

1) Remove the brake switch.
2) Unbolt, and then remove the brake pedal.



3) Remove bushing, spacer and spring.



(1) Spacer
(2) Bushing
(3) Stopper
(4) Brake pedal
(5) Brake spacer
(6) Brake pedal spring

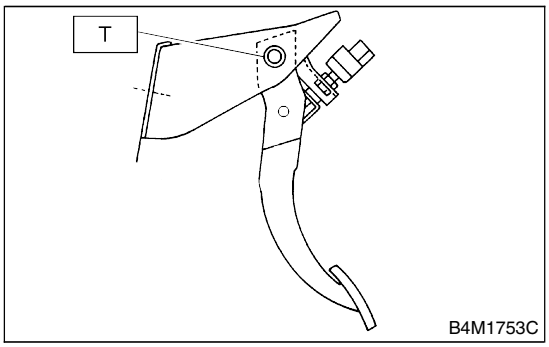
4) Remove the brake pedal pad.

D: ASSEMBLY S405541A02

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.

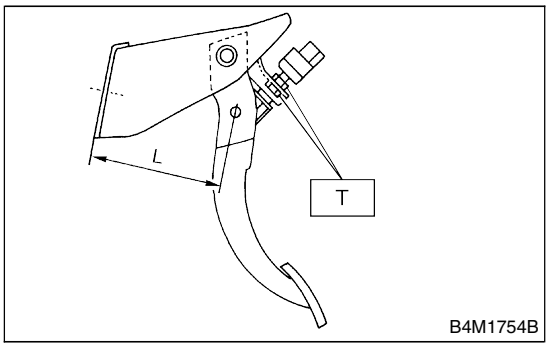
Tightening torque:
T: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L
LHD model
125.9 mm (4.96 in)
RHD model
154.9 mm (6.10 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

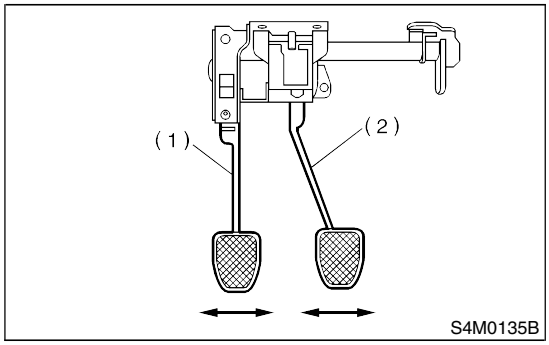


E: INSPECTION S405541A10

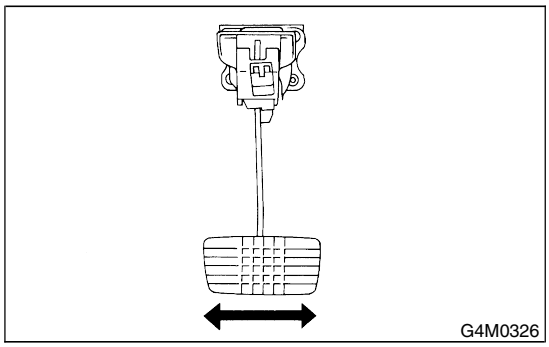
1) Move brake and clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

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



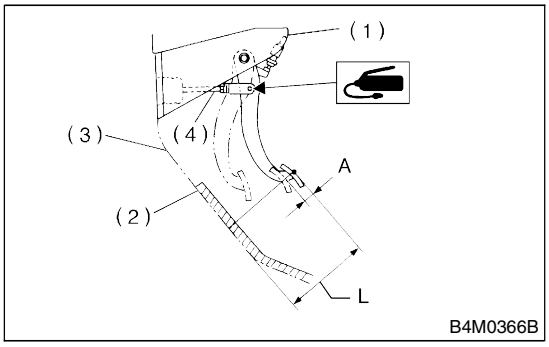
(1) Clutch pedal
(2) Brake pedal



2) 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 kgf, 2 lb).]



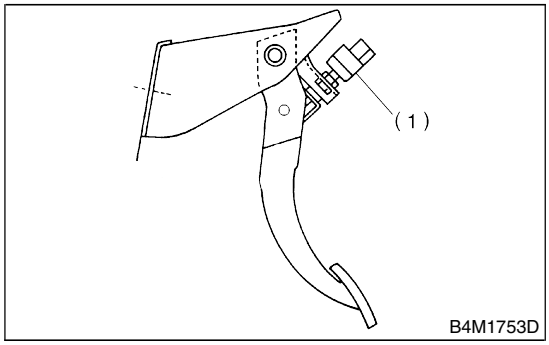
(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

3) If it is not in specified value, adjust it by adjusting brake booster operating rod length.

20. Stop Light Switch S405542

A: REMOVAL S405542A18

1) Disconnect ground terminal from battery.
2) Disconnect stop light switch connector.
3) Loosen nuts, and unscrew stop light switch to remove.

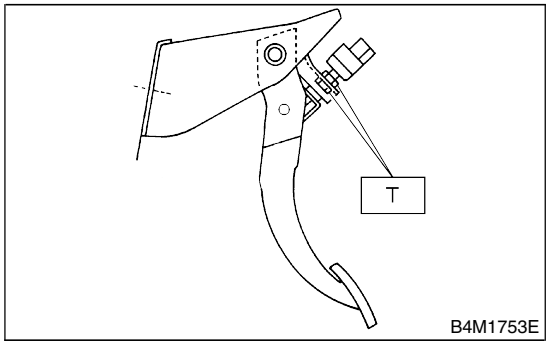


(1) Stop light switch

B: INSTALLATION S405542A11

1) Screw the stop light switch onto a bracket and secure it temporarily with a nut.
2) Adjust stop light switch position, and then tighten the nut.
<Ref. to BR-61 ADJUSTMENT, Stop Light Switch.>

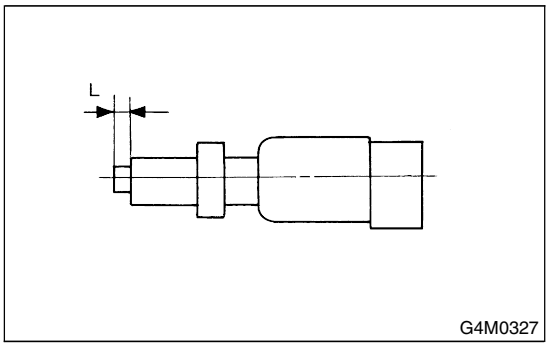
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



C: INSPECTION S405542A10

1) If stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

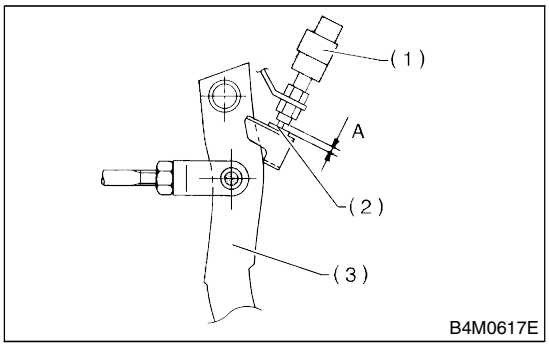
Specified position: L
$2^{+1.5}_{0}$ mm ($0.079^{+0.059}_{0}$ in)



2) 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)



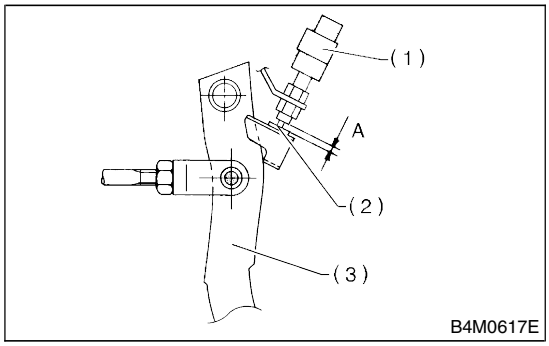
(1) Stop light switch
(2) Stopper
(3) Brake pedal

3) 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.

D: ADJUSTMENT S405542A01

Loosen the lock nut, and adjust stop light switch position until the clearance between threaded end of the stop light switch and the stopper becomes 0.3 mm (0.012 in). Then, tighten the lock nut.



21. General Diagnostics S405278

A: INSPECTION S405278A10

1. BRAKE SYSTEM S405278A1001

	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.

	Trouble and possible cause	Corrective action
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.
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.

2. HILL HOLDER S405278A1002

CAUTION:
• Description in parentheses is a characteristic of hill holder and does not indicate abnormality.
Depressing force required for clutch pedal equipped to hill holder specifications is 20 to 29 N (2 to 3 kg, 4 to 7 lb) larger than the conventional specifications, which does not constitute abnormality.
• When vehicle cannot travel (brake cannot be released) because return spring is broken, remove adjust nut, disconnect clutch and PHV, and then return PHV lever to release the brake. (Be sure to apply the parking brake before starting this operation.)
• The hill holder may not be activated on a slope of an extremely small inclination.

	Trouble and possible cause	Corrective action
1. Counterforce of clutch pedal is too strong.	(1) PHV cable is damaged or does not operate properly.	Repair or replace.
	(2) Lever of PHV is defective.	Replace entire PHV assembly.
	(3) Clutch system is anomalous.	Replace clutch system.
2. Vehicle does not stop on uphill road of 3° or higher inclination.	(1) Front side of vehicle is lowered.	Replace suspension.
	(2) PHV cable is broken.	Replace.
	(3) Play of clutch is excessive.	Adjust.
	(4) PHV cable is elongated.	Adjust.
	(5) Sealing of PHV is poor.	Replace entire PHV assembly.
3. Shock is felt when starting.	(1) Poor adjustment of starting performance.	Adjust.
	(2) When depressing the brake pedal strongly:	(The stronger brake pedal depressing force, the later hill holder releases.)
	(3) When starting on flat road after stopping reverse movement:	(Because hill holder is activated.)
4. Vehicle slips down when starting.	(1) PHV cable is elongated.	Adjust.
	(2) Clutch facing is worn out.	Adjust or replace.
	(3) Bracket (cable) or stay (PHV) is deformed.	Repair or replace.
5. Vehicle cannot start after stoppage.	(1) Return spring is fatigued or broken.	Replace.
	(2) PHV lever won't return.	Replace entire PHV assembly.
	(3) When intentionally depressing brake pedal strongly:	[When the brake pedal is depressed by a force of 1,177 N (120 kgf, 265 lb) or more.]
6. Abnormal sound is generated upon releasing brake pedal when stopping.	(1) Rotor and pad matched with each other due to inadequate depressing force to brake pedal.	(Abnormal sound is not generated when depressing brake pedal a little stronger.)
7. Abnormal sound is generated when operating clutch pedal.	(1) Grease is inadequate for the hook of return spring and sliding portion of PHV cable end.	Apply grease.
	(2) When releasing after maintaining high fluid pressure:	(Flowing sound of fluid when releasing high fluid pressure.)
	(3) Clutch system is anomalous.	Replace clutch system.

MEMO:

MEMO:

PARKING BRAKE

PB

Page

1. General Description....2
2. Parking Brake Lever....6
3. Parking Brake Cable....7
4. Parking Brake Assembly (Rear Disc Brake)....9
5. General Diagnostic Table....12

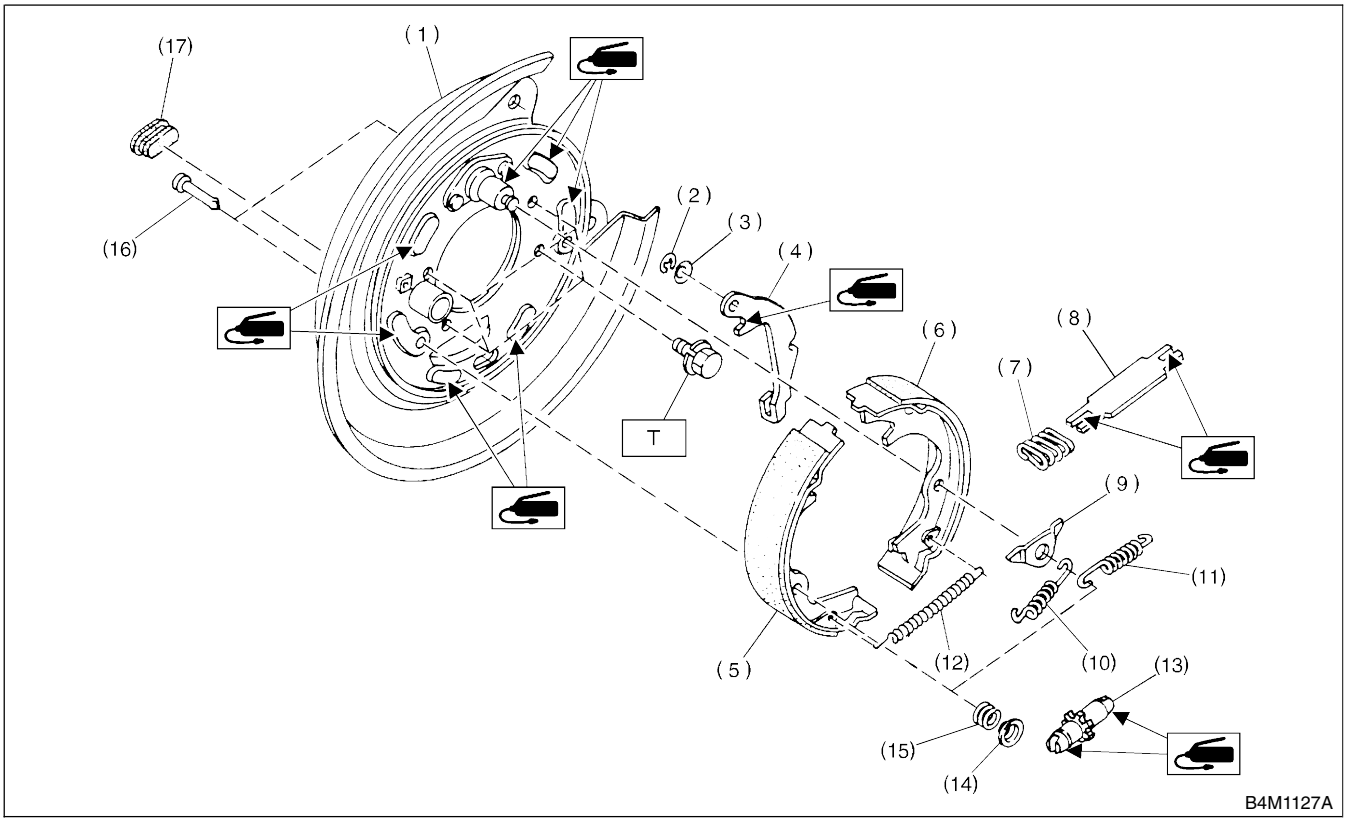
1. General Description S404001

A: SPECIFICATIONS S404001E49

Model		Rear drum brake	Rear disc 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
Lever stroke	noches/N (kgf, lb)	7 to 8/196 (20, 44)	

B: COMPONENT S404001A05

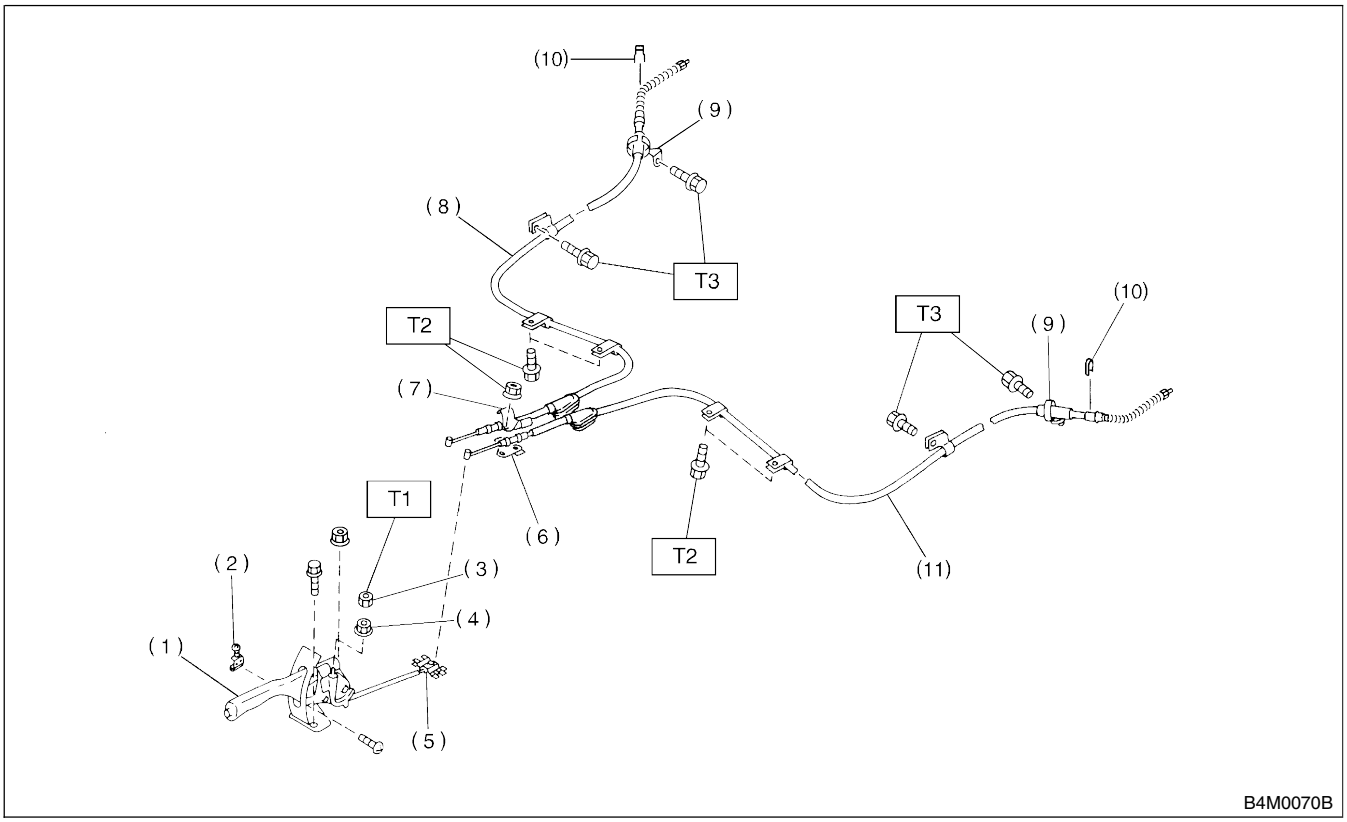
1. PARKING BRAKE (REAR DISC BRAKE) S404001A0501



(1) Back plate
(2) Retainer
(3) Spring washer
(4) Lever
(5) Parking brake shoe (Primary)
(6) Parking brake show (Secondary)
(7) Strut spring
(8) Strut
(9) Shoe guide plate
(10) Primary return spring
(11) Secondary return spring
(12) Adjusting spring
(13) Adjuster
(14) Shoe hold-down cup
(15) Shoe hold down spring
(16) Shoe hold down pin
(17) Adjusting hole cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 52 (5.3, 38.3)

2. PARKING BRAKE CABLE S404001A0502



(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model only)
(11) Parking brake cable LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5.9 (0.60, 4.3)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 24)

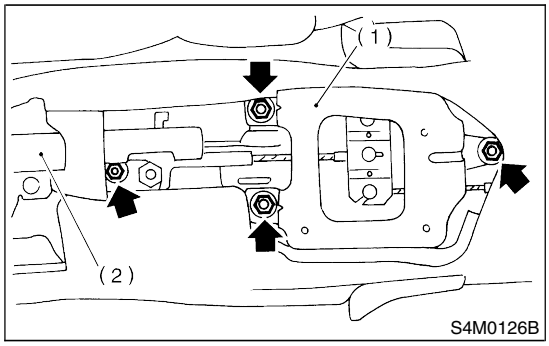
C: CAUTION S404001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Keep grease etc. away from parking brake shoes.

2. Parking Brake Lever S404171

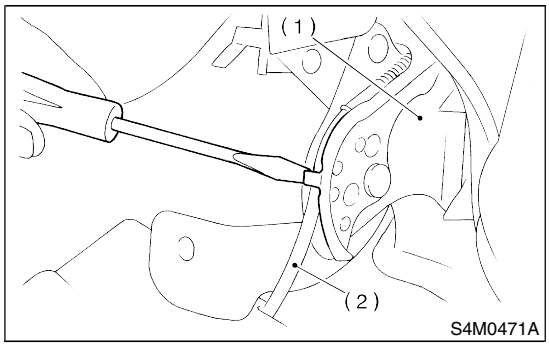
A: REMOVAL S404171A18

1) To immobilize vehicle, put the select lever in "1st " or "P" position, and lock the tires.
2) Disconnect ground terminal connector from battery.
3) Remove console cover. <Ref. to EI-30, Console Box.>
4) Disconnect connector parking brake switch.
5) Loosen parking cable adjusting nut and remove inner cable end from equalizer.
6) Remove parking brake lever.



(1) Console bracket
(2) Parking brake lever

7) Unbend parking brake lever pawls and remove cable.



(1) Parking brake lever
(2) Cable

B: INSTALLATION S404171A11

Install in the reverse order of removal.

Tightening torque:
Parking brake lever;
18 N·m (1.8 kgf-m, 13.0 ft-lb)
Adjusting nut;
5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

NOTE:
● Be sure to pass cable through guide inside the tunnel.
● Be sure to adjust the lever stroke. <Ref. to PB-6 ADJUSTMENT, Parking Brake Lever.>

C: INSPECTION S404171A10

While pulling parking brake lever upward, count the notches.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lb)

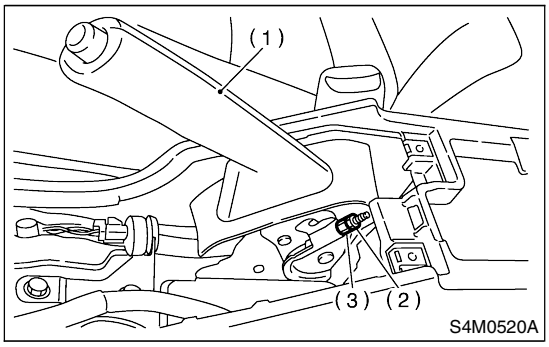
Incorrect, adjust the parking brake. <Ref. to PB-11 ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

D: ADJUSTMENT S404171A01

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 kgf, 44 lb).
4) Tighten lock nut.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lb)

Tightening torque (Lock nut):
5.9 N·m (0.60 kgf-m, 4.3 ft-lb)



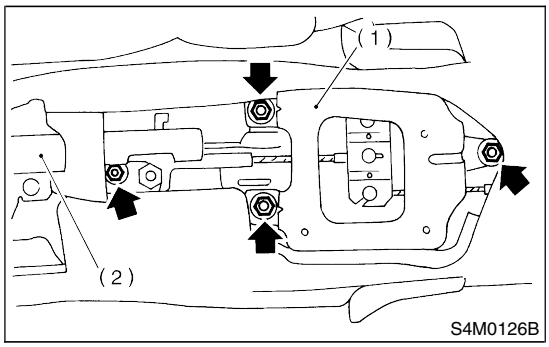
(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

5) Install console cover.

3. Parking Brake Cable S404170

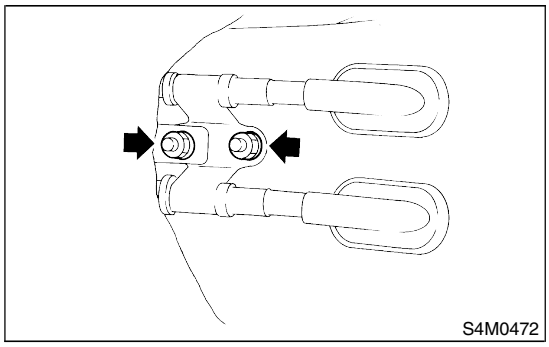
A: REMOVAL S404170A18

1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Lift-up vehicle.
4) Remove rear tires and wheels.
5) Remove rear cushion.
6) Remove console box. <Ref. to EI-30, Console Box.>
7) Loosen parking cable adjusting nut and console bracket.
8) Remove parking brake lever.

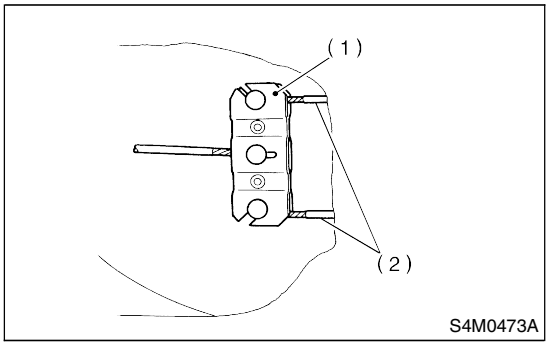


(1) Console bracket
(2) Parking brake lever

9) Roll up floor mat and remove clamps.

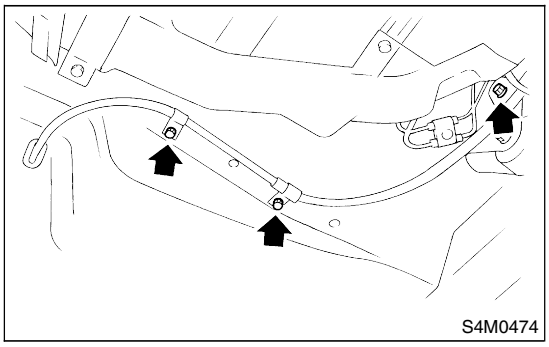


10) Remove equalizer cover.
11) Remove inner cable end from equalizer.



(1) Equalizer
(2) Inner cable end

12) Pull out parking brake cable from rear brake.
Disc brake: <Ref. to PB-9 REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
Dram brake: <Ref. to BR-35, Rear Drum Brake Assembly.>
13) Pull out clamp from rear brake.
14) Remove bolt and bracket from trailing link bracket.
15) Remove bolt and clamp from rear floor.



16) Detach grommet from rear floor.
17) Remove cable assembly from cabin by forcibly pulling it backward.
18) Detach parking brake cable from cable guide at rear trailing link.

B: INSTALLATION S404170A11

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 PB-6 ADJUSTMENT, Parking Brake Lever.>

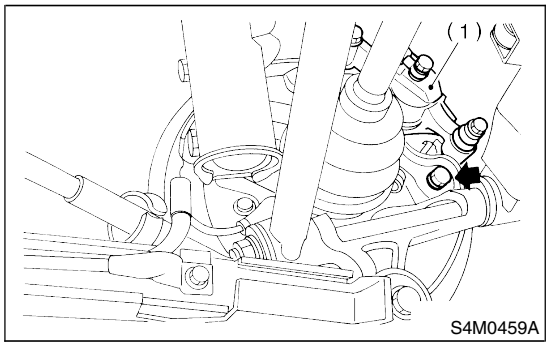
C: INSPECTION S404170A10

Check the removed cable and replace if damaged, rusty, or malfunctioning.
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends, and cracks.
4) Check the boot for damage, cracks, and deterioration.

4. Parking Brake Assembly (Rear Disc Brake) S404552

A: REMOVAL S404552A18

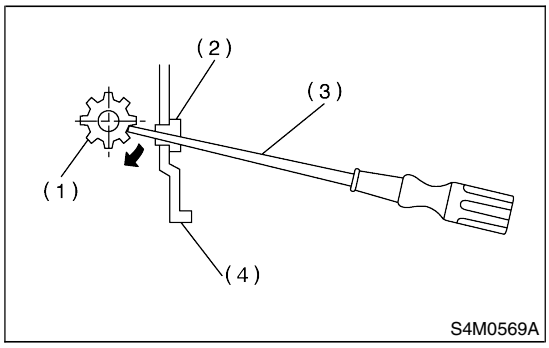
1) Set vehicle on a lift.
2) Disconnect battery ground terminal from battery.
3) Loosen wheel nuts.
4) Lift-up vehicle, and remove wheels.
5) Remove the two mounting bolts and remove the disc brake assembly.



6) Suspend the disc brake assembly so that the hose is not stretched.
7) Pull down and release parking brake.
8) Remove the disc rotor.

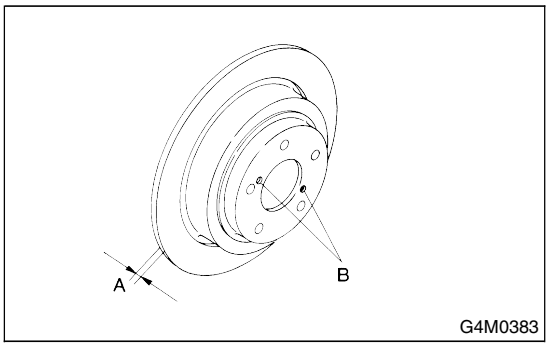
NOTE:
If the disc rotor is difficult to remove try the following two methods in order.

(1) Turn adjusting screw using a slot-type screwdriver until brake shoe gets away enough from the disc rotor.

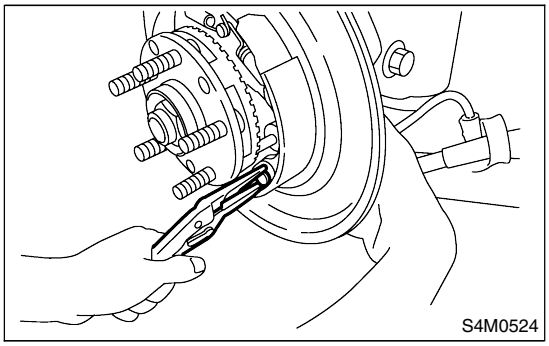


(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Slot-type screwdriver
(4) Back plate

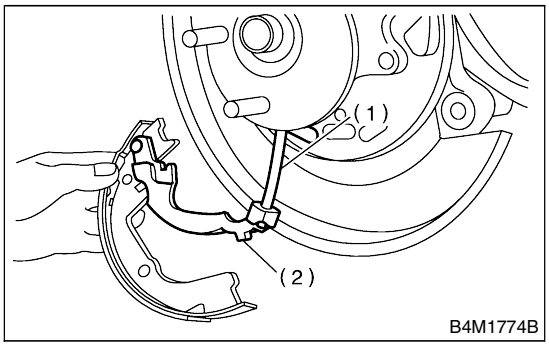
(2) If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



9) Remove shoe return spring from parking brake assembly.
10) Remove front shoe hold down spring and pin with pliers.



11) Remove strut and strut spring.
12) Remove adjuster assembly from parking brake assembly.
13) Remove brake shoe.
14) Remove rear shoe hold-down spring and pin with pliers.
15) Remove parking cable from parking lever.



(1) Parking brake cable
(2) Parking brake lever

16) Using a standard screwdriver, raise retainer. Remove parking lever and washer from brake shoe.

B: INSTALLATION S404552A11

CAUTION:
Be sure lining surface is free from oil contamination.

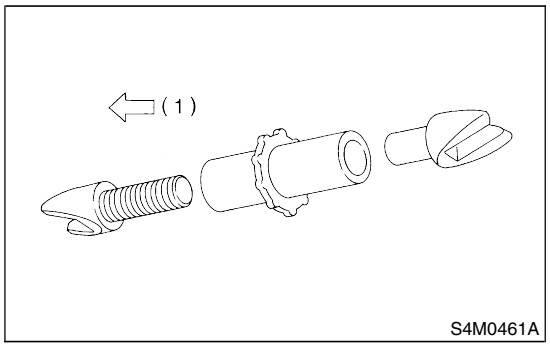
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

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) Install in reverse order of removal.

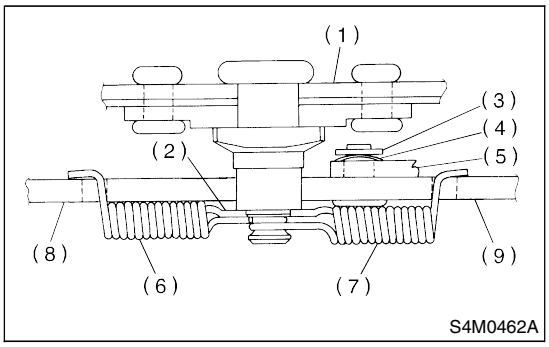
CAUTION:
- **Use new retainers and clinch them when installing brake shoes to levers.**
- **Ensure that parking lever moves smoothly.**
- **Do not confuse left parking lever with right one.**
- **Do not confuse left strut with right one.**

NOTE:
Ensure that adjuster assembly is securely installed with screw in the left side, facing vehicle front.



(1) LEFT

NOTE:
Ensure that shoe return spring is installed as shown in Figure.



(1) Back plate
(2) Shoe guide plate
(3) Retainer
(4) Spring washer
(5) Lever
(6) Primary shoe return spring (Blue)
(7) Secondary shoe return spring (Yellow)
(8) Parking brake shoe (Primary)
(9) Parking brake shoe (Secondary)

3) Adjust parking brakes. <Ref. to PB-11 ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

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.

C: INSPECTION S404552A10

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.

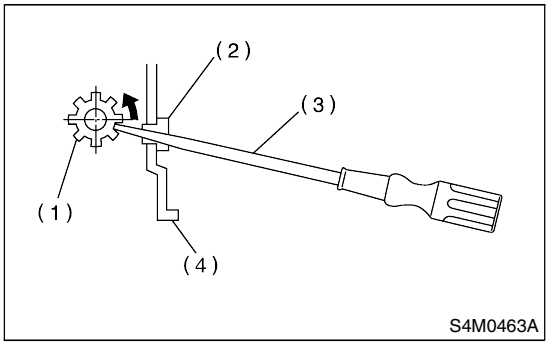
Lining thickness:
Standard
3.2 mm (0.126 in)
Service limit
1.5 mm (0.059 in)

CAUTION:
Replace the brake shoes on the right and left brake assembly at the same time.

D: ADJUSTMENT S404552A01

1. SHOE CLEARANCE S404552A0101

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.

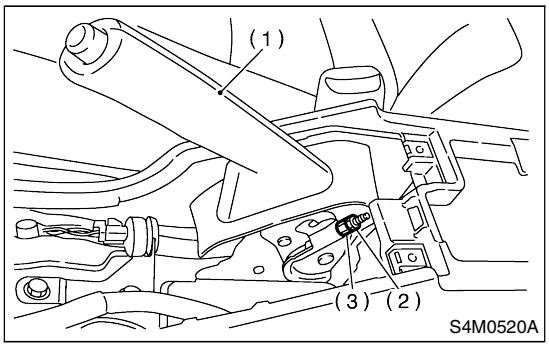


(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Slot-type screwdriver
(4) Back plate

3) Turn back (downward) adjusting screw 3 or 4 notches.
4) Install adjusting hole cover to back plate.

2. LEVER STROKE S404552A0102

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 kgf, 44 lb).



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

4) Tighten lock nut.
5) Install console box lid.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lb)

Tightening torque (Adjuster lock nut):
5.9 N·m (0.60 kgf-m, 4.3 ft-lb)

5. General Diagnostic Table S404257

A: INSPECTION S404257A10

Symptom	Possible cause	Remedy
Brake drag	● Parking brake lever is maladjusted.	● Adjustment.
	● Parking brake cable does not move.	● Repair or replace.
	● Parking brake shoe clearance is maladjusted.	● Adjustment.
	● Return spring is faulty.	● Replace.
Noise from brake	● Return spring is faulty.	● Replace.
	● Shoe hold down spring is faulty.	● Replace.

POWER ASSISTED SYSTEM (POWER STEERING)

PS

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1. General Description S601001

A: SPECIFICATIONS S601001E49

Model				LHD	RHD
Steering wheel	Free play		mm (in)	17 (0.67)	
Turning angle	Inner tire & wheel			34.4°±1.5°	
	Outer tire & wheel			30.2°±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 (kgf, lb)	304.0 (31.0, 68.4) or less	
	Rack shaft play in radial direction	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
	Input shaft play	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 (kgf, 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)	
Oil pump [Non-turbo model (Power steering system)]	Pulley shaft	Radial play	mm (in)	0.4 (0.016) or less	
		Axial play	mm (in)	0.9 (0.035) or less	
	Pulley	Ditch deflection	mm (in)	1.0 (0.039) or less	
		Resistance to rotation	N (kgf, lb)	9.22 (0.94, 2.07) or less	
	Regular pressure		kPa (kg/cm^2, psi)	981 (10, 142) or less	
	Relief pressure		kPa (kg/cm^2, psi)	7,355 (75, 1,067)	
Oil pump [Turbo model (Power steering system)]	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	
		Resistance to rotation	N (kgf, lb)	9.22 (0.94, 2.07) or less	
	Regular pressure		kPa (kg/cm^2, psi)	981 (10, 142) or less	
	Relief pressure		kPa (kg/cm^2, psi)	9,807 (100, 1,422)	
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road		N (kgf, lb)	29.4 (3.0, 6.6) or less	
	At standstill with engine stalled on a concrete road		N (kgf, lb)	294.2 (30, 66.2) or less	

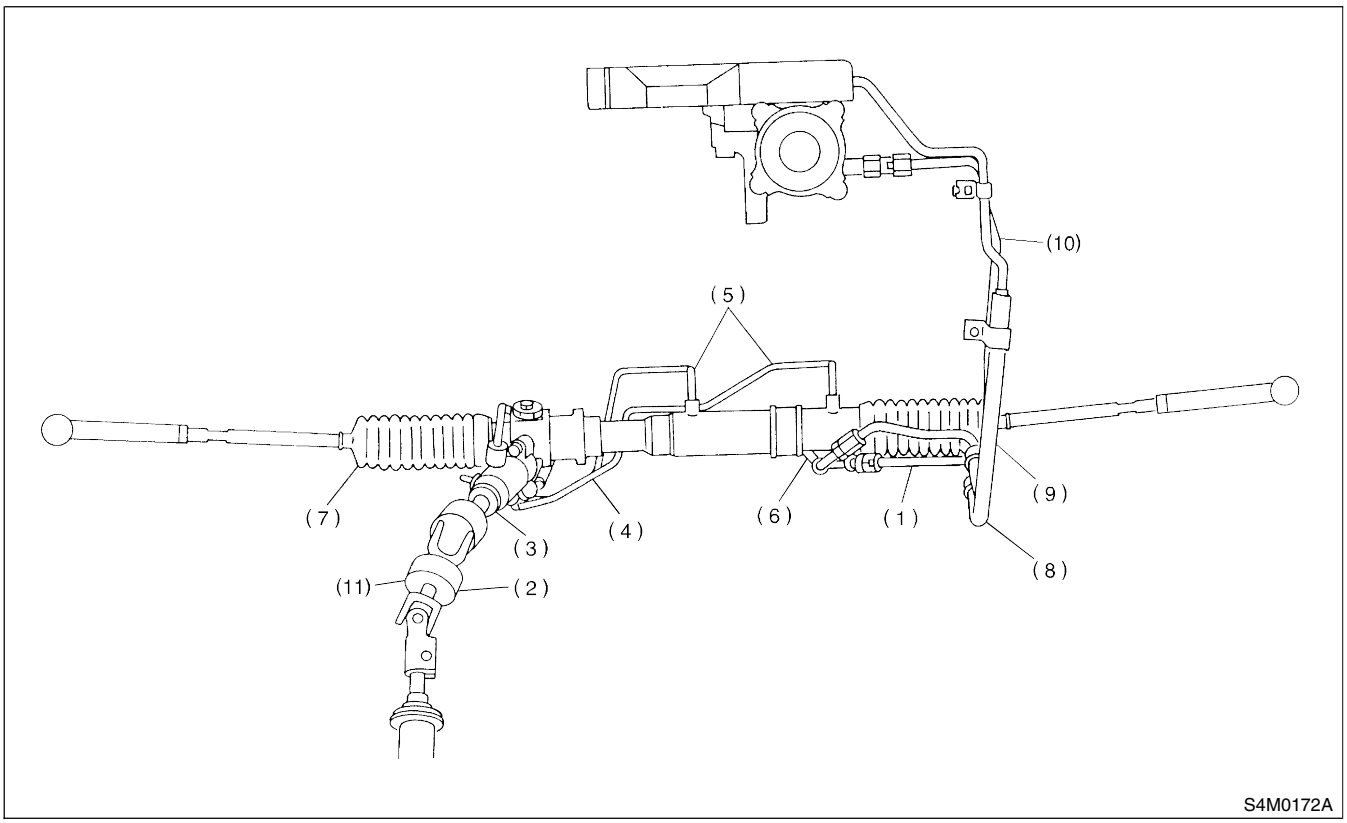
Recommended power steering fluid	Manufacturer
ATF DEXRON IIE or III	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

Model				Non-turbo	Turbo
Whole system	Minimum turning radius m (ft)			5.4 (17.7)	
	Steering angle (Inside-Outside)			34.4°±1.5° — 30.2°±1.5°	
	Steering wheel diameter mm (in)			With AIRBAG: 385 (15.16) Without AIRBAG: 385 (15.16)	
	Overall gear ratio (Turns, lock to lock)			LHD: 19.0 (3.4) RHD: 16.7 (3.0)	
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 pump	
	Output		cm^3 (cu in)/ rev.	7.2 — 0.6 (0.439 — 0.037)	9.6 — 0.65 (0.586— 0.040)
	Relief pressure		kPa (kg/cm^2, psi)	7,355 (75, 1,067)	7,846 (80, 1,138)
	Hydraulic fluid control			Drooping in response to increased engine revolutions	
	Hydraulic fluid		ℓ (US qt, Imp qt)	1,000 rpm: 7 (7.4, 6.2) 3,000 rpm: 5 (5.3, 4.4)	
	Range of revolution		rpm	500 — 7,500	500 — 8,000
	Revolving direction			Clockwise	
Working fluid (Power steering system)	Name			ATF DEXRON IIE 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)	

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

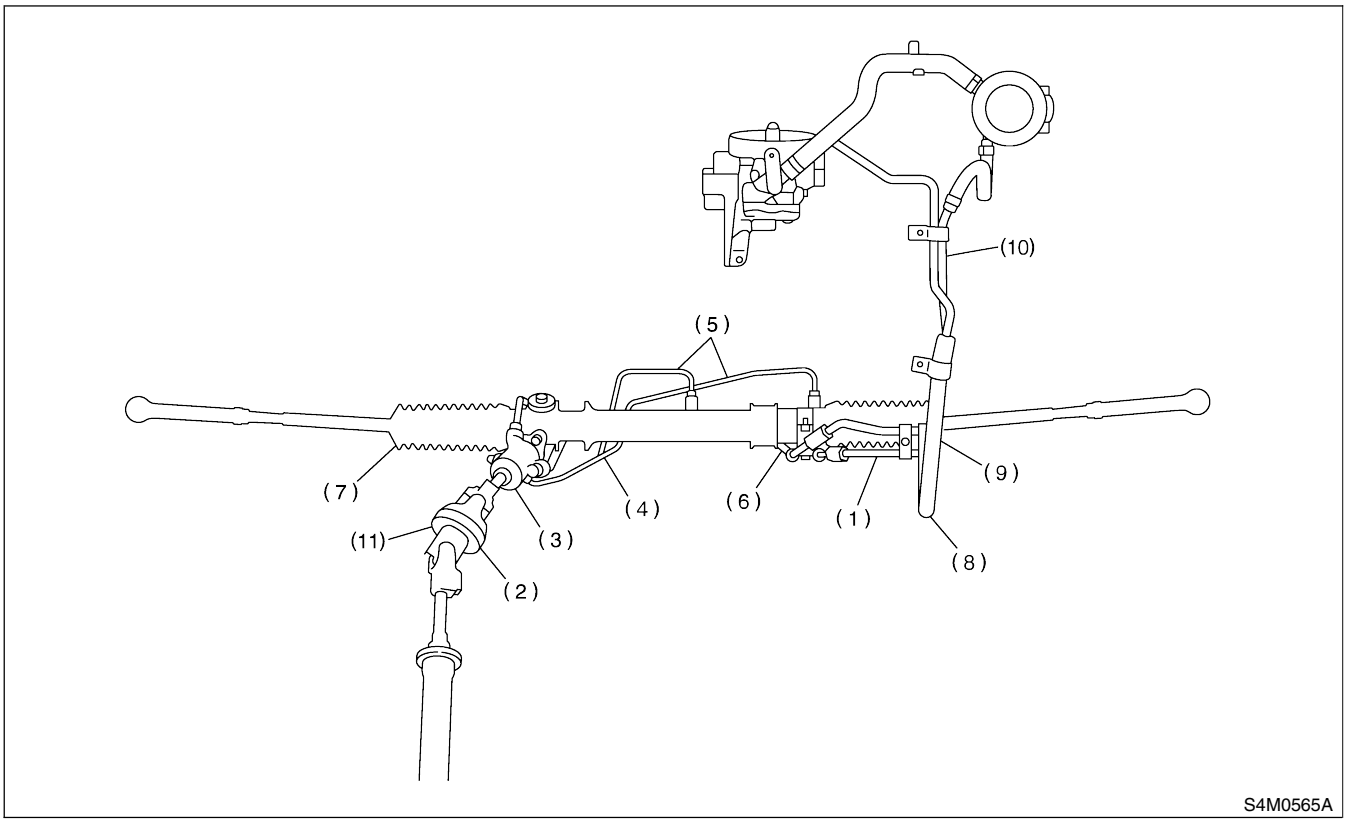
Location	Minimum allowance
(1) Crossmember — Pipe	5 mm (0.20 in)
(2) DOJ — Shaft or joint	14 mm (0.55 in)
(3) DOJ — Valve housing	11 mm (0.43 in)
(4) Pipe — Pipe	2 mm (0.08 in)
(5) Stabilizer — Pipe	5 mm (0.20 in)
(6) Exhaust pipe — Pipe	15 mm (0.59 in)
(7) Exhaust pipe — Gearbox bolt	15 mm (0.59 in)
(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 (LHD model)	20 mm (0.79 in)

- **Non-turbo model**



S4M0172A

- **Turbo model**

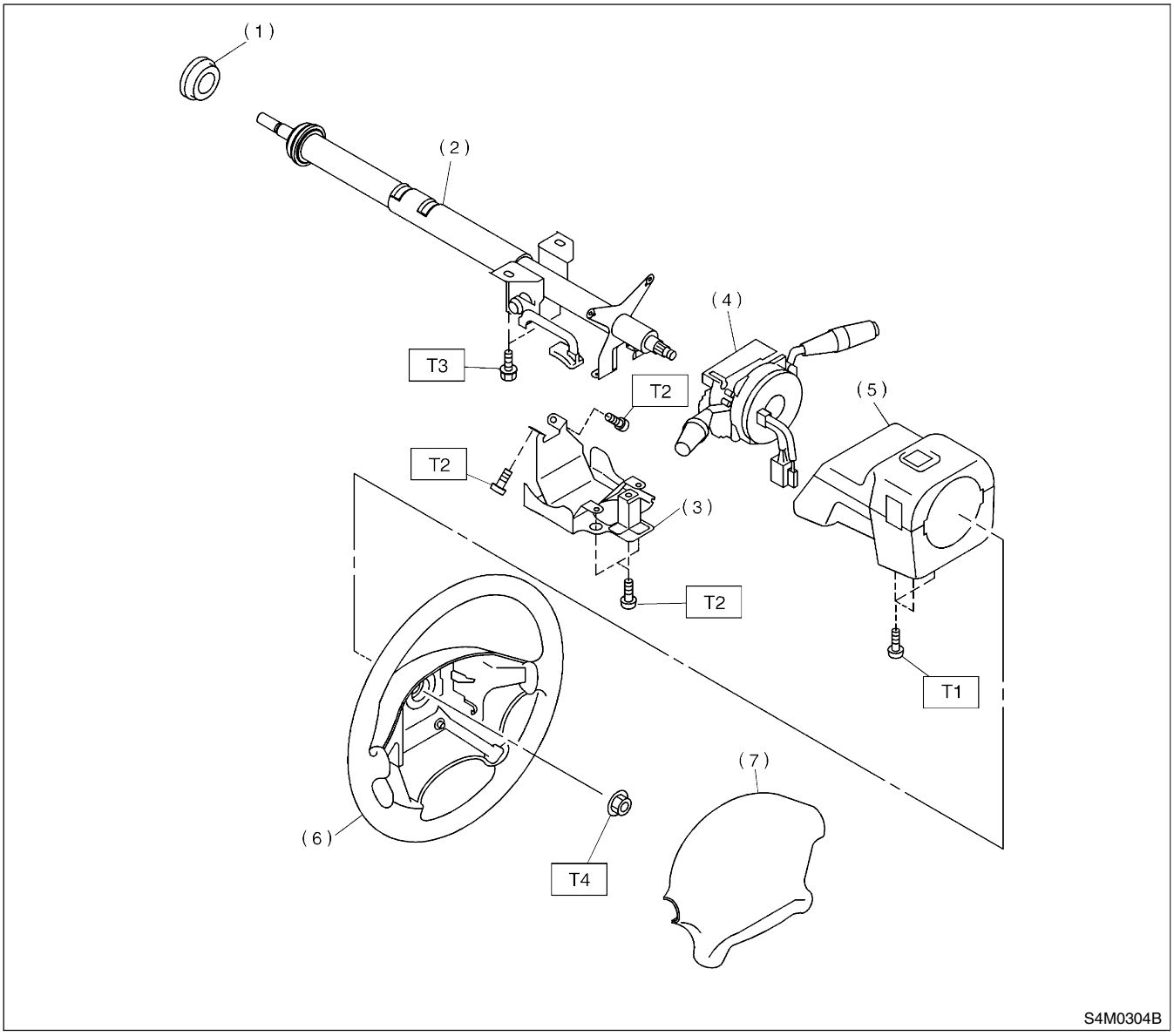


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B: COMPONENT S601001A05

1. STEERING WHEEL AND COLUMN S601001A0501

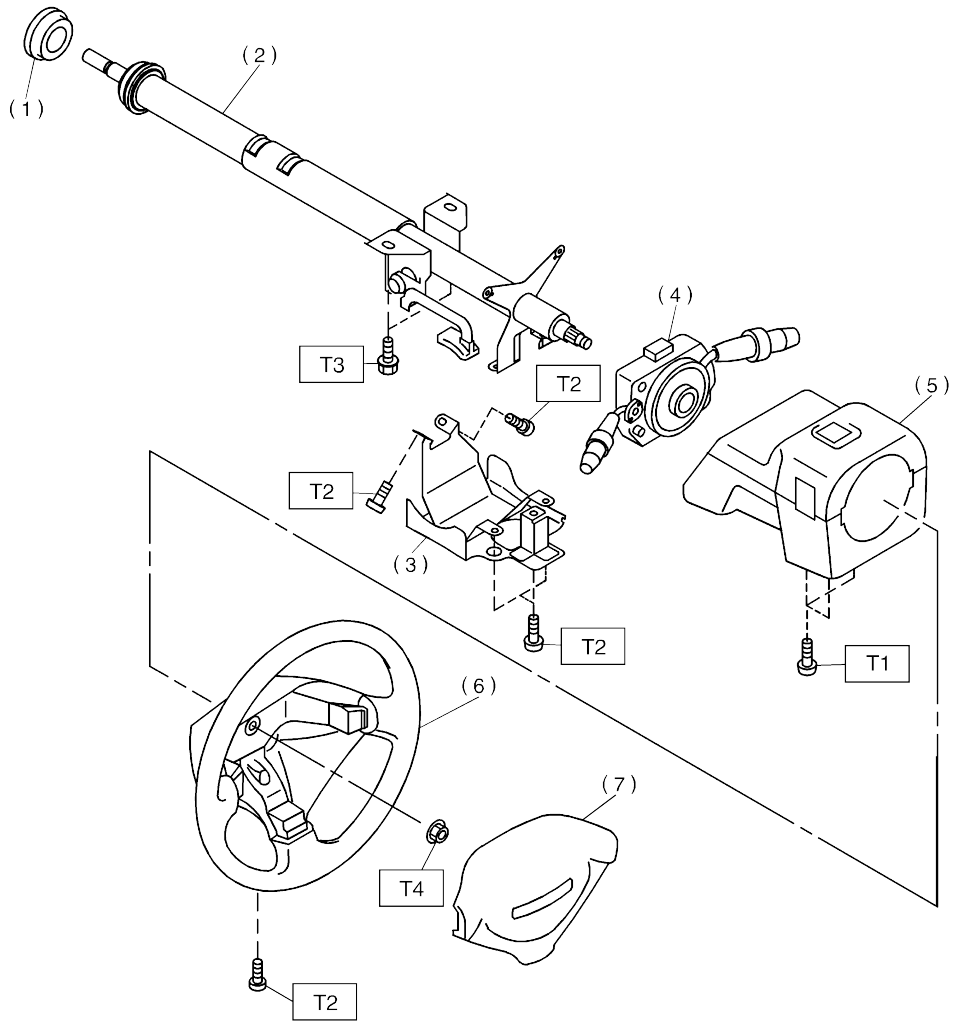
- **With Airbag Model**



(1) Bushing
(2) Steering shaft
(3) Knee protector
(4) Steering roll connector
(5) Column cover
(6) Steering wheel
(7) Airbag module

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.2 (0.12, 0.9)
T2: 3.4 (0.35, 2.5)
T3: 25 (2.5, 18.1)
T4: 44 (4.5, 32.5)

● Without Airbag Model



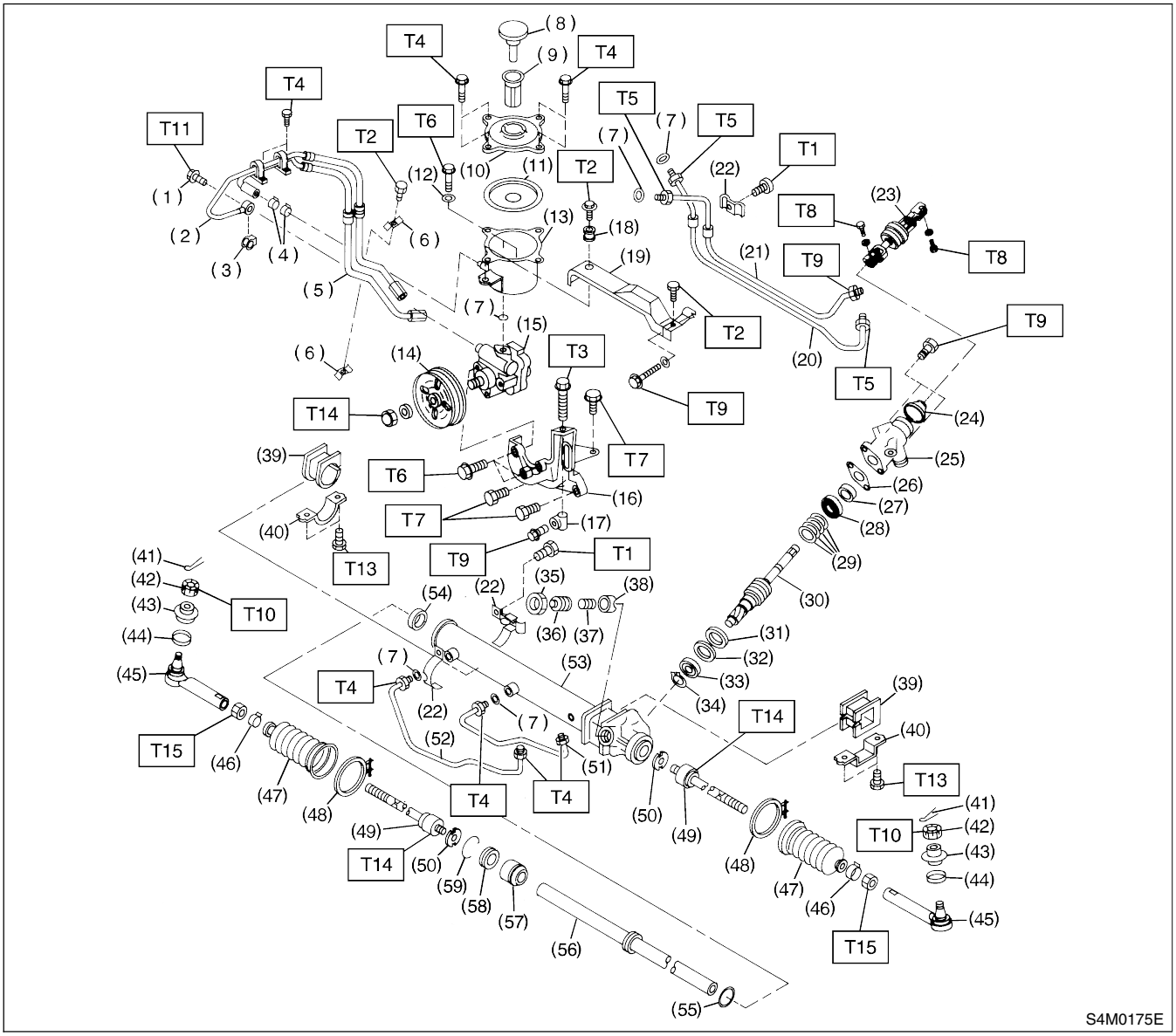
(1) Bushing
(2) Steering shaft
(3) Knee protector
(4) Combination switch
(5) Column cover
(6) Steering wheel
(7) Pad ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.2 (0.12, 0.9)
T2: 3.4 (0.35, 2.5)
T3: 25 (2.5, 18.1)
T4: 44 (4.5, 32.5)

MEMO:

2. POWER ASSISTED SYSTEM FOR NON-TURBO MODEL S601001A0504

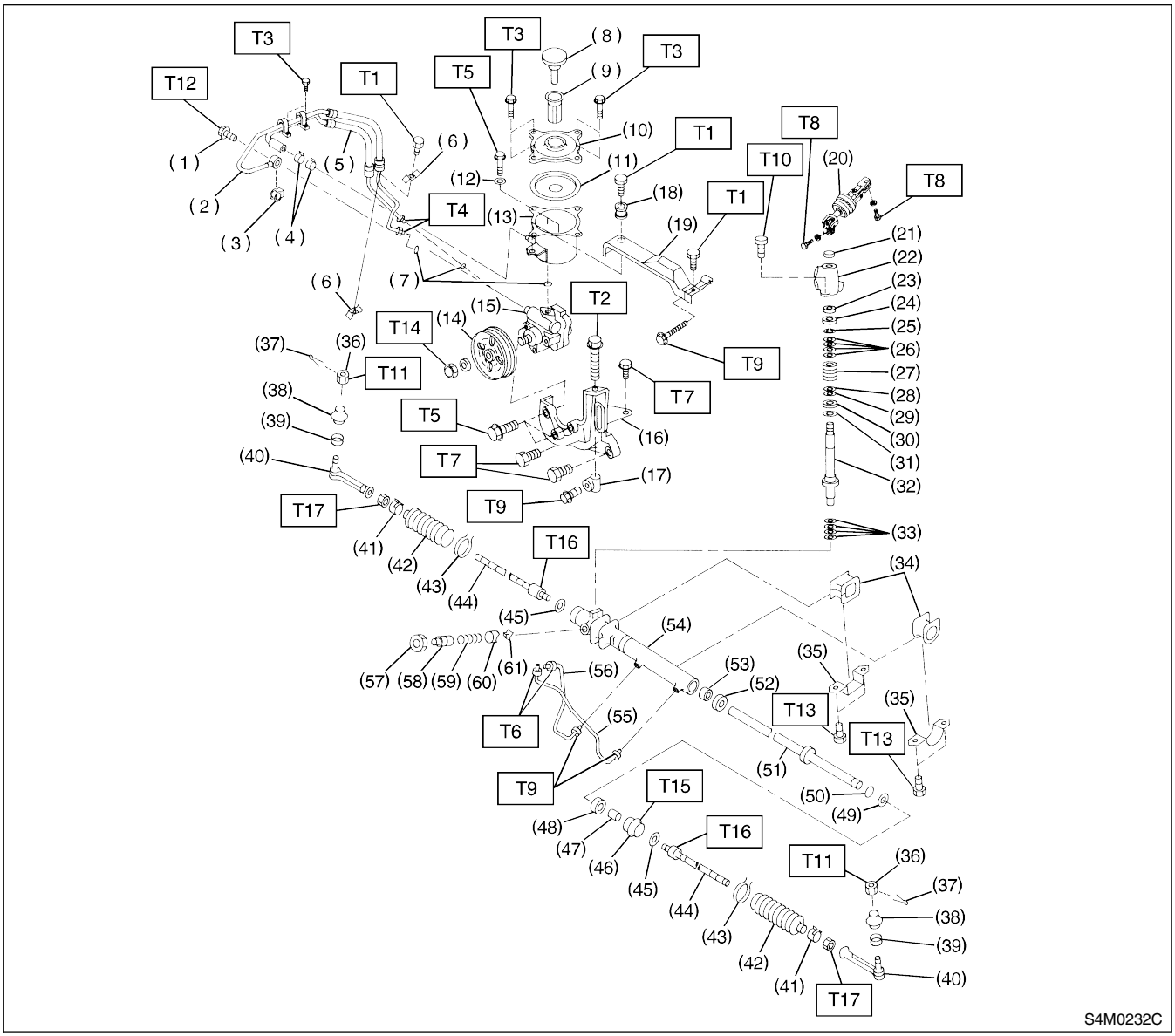
- **LHD Model**



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.3)
T2: 7.4 (0.75, 5.4)
T3: 8 (0.8, 5.8)
T4: 13 (1.3, 9.4)
T5: 15 (1.5, 10.8)
T6: 18 (1.8, 13.0)
T7: 22 (2.2, 15.9)
T8: 24 (2.4, 17.4)
T9: 25 (2.5, 18.1)
T10: 27.0 (2.75, 19.9)
T11: 39 (4.0, 28.9)
T12: 52 (5.3, 38)
T13: 59 (6.0, 43)
T14: 78 (8.0, 58)
T15: 83 (8.5, 61.5)

● RHD Model

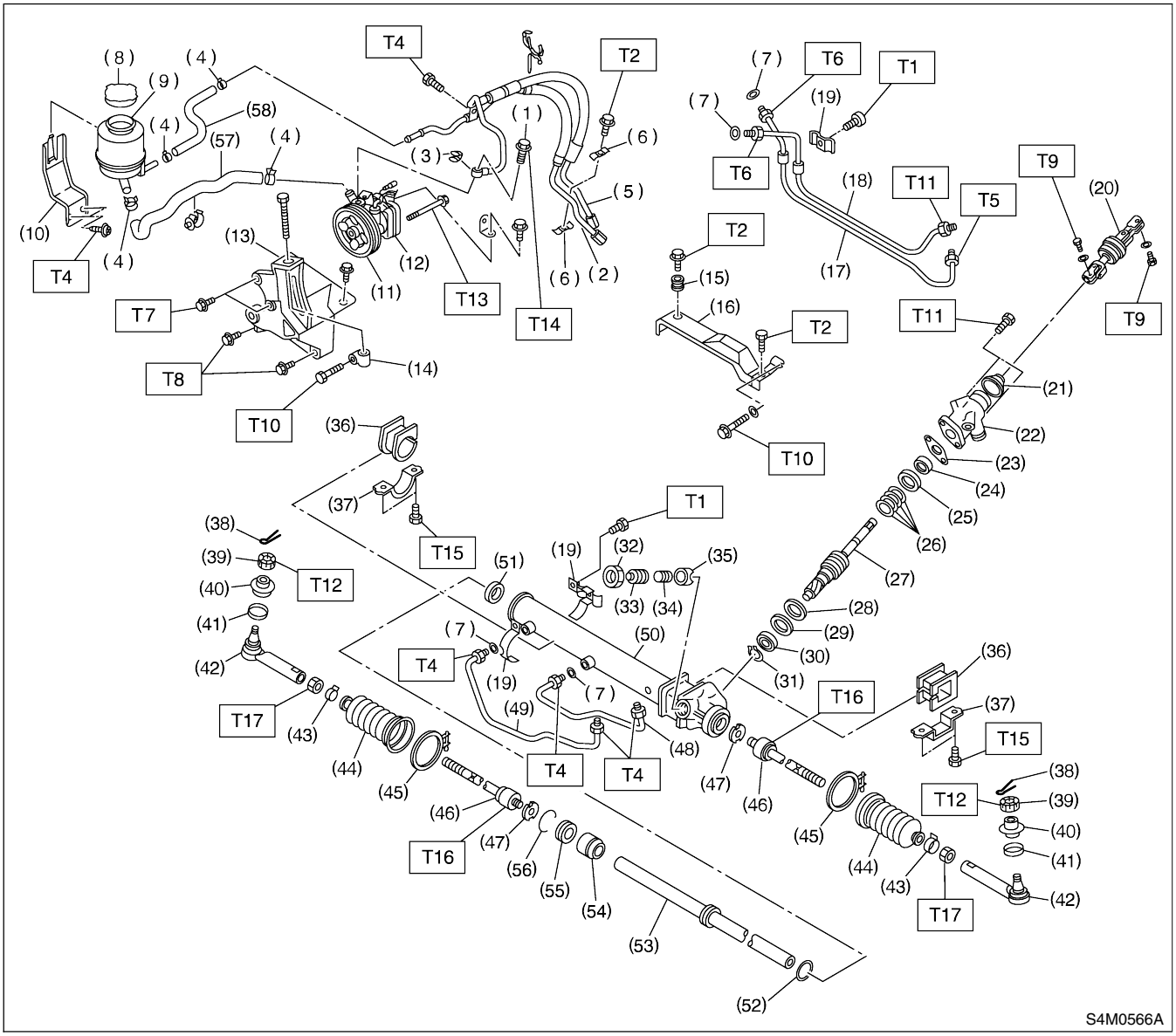

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(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) O-ring
(8) Cap
(9) Strainer
(10) Upper shell
(11) Buffle
(12) Seal washer
(13) Lower shell
(14) Pulley
(15) Oil pump
(16) Bracket
(17) Belt tension nut
(18) Bushing
(19) Belt cover
(20) Universal joint
(21) Dust cover
(22) Valve housing
(23) Oil seal
(24) Ball bearing
(25) Retaining ring
(26) Seal ring
(27) Valve sleeve
(28) Seal ring
(29) O-ring
(30) Oil seal
(31) Spacer
(32) Pinion
(33) Shim
(34) Adapter
(35) Clamp
(36) Castle nut
(37) Cotter pin
(38) Dust seal
(39) Clip
(40) Tie-rod end
(41) Clip
(42) Boot
(43) Wire
(44) Tie-rod
(45) Lock washer
(46) Holder
(47) Bushing
(48) Oil seal
(49) Oil seal
(50) O-ring
(51) Rack
(52) Oil seal
(53) Back-up washer
(54) Steering body
(55) Pipe A
(56) Pipe B
(57) Lock nut
(58) Adjusting screw
(59) Spring
(60) Sleeve
(61) Seat pad

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 8 (0.8, 5.8)
T3: 13 (1.3, 9.4)
T4: 15 (1.5, 10.8)
T5: 18 (1.8, 13.0)
T6: 20 (2.0, 14.5)
T7: 22 (2.2, 15.9)
T8: 24 (2.4, 17.4)
T9: 24.5 (2.50, 18.1)
T10: 25 (2.5, 18.1)
T11: 27.0 (2.75, 19.9)
T12: 39 (4.0, 28.9)
T13: 59 (6.0, 43)
T14: 52 (5.3, 38)
T15: 64 (6.5, 47)
T16: 78 (8.0, 58)
T17: 83 (8.5, 61.5)

3. POWER ASSISTED SYSTEM FOR TURBO MODEL S601001A0505

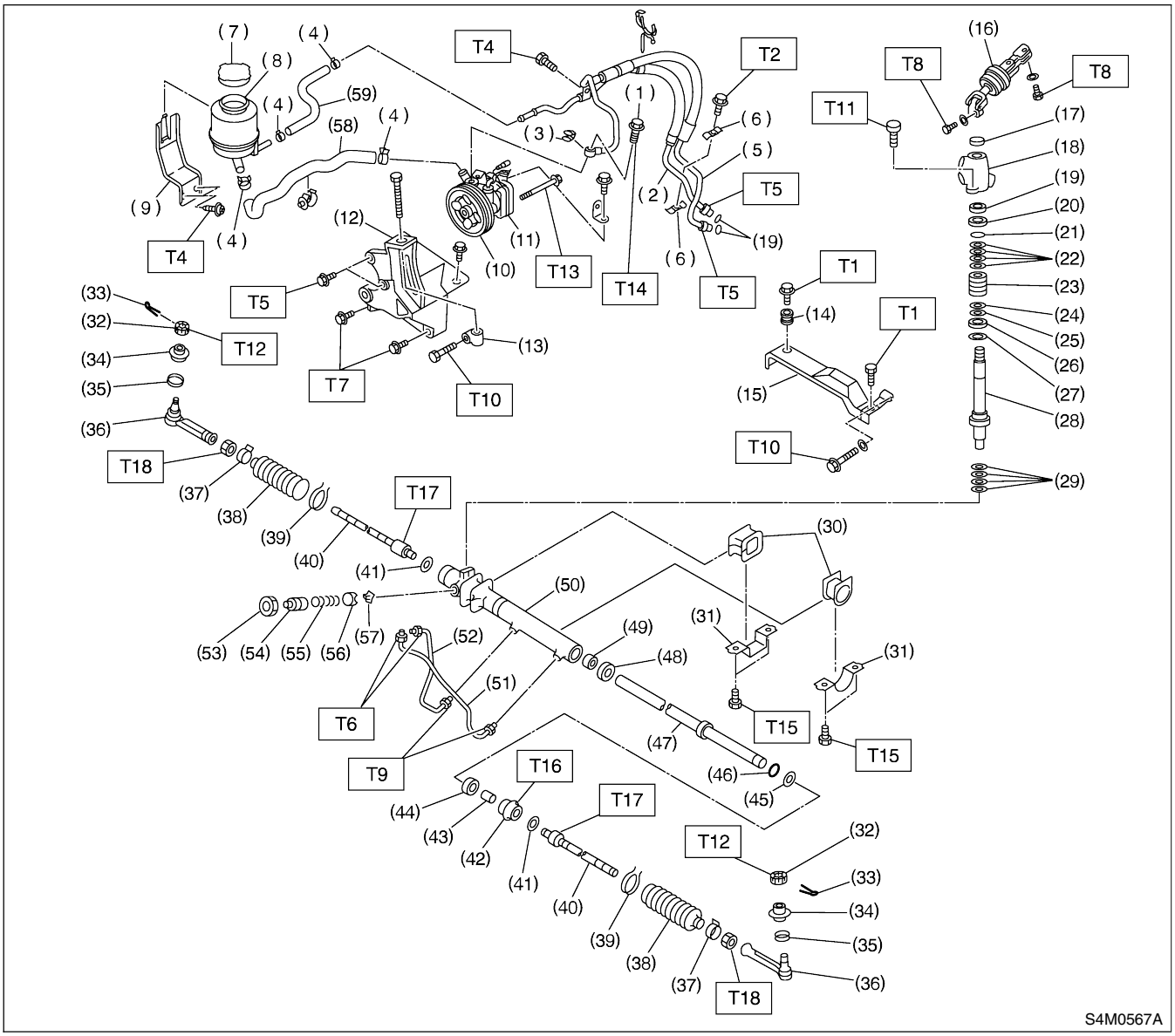
- **LHD Model**



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.3)
T2: 7.4 (0.75, 5.4)
T3: 8 (0.8, 5.8)
T4: 13 (1.3, 9.4)
T5: 15 (1.5, 10.8)
T6: 15 (1.5, 10.8)
T7: 15.7 (1.6, 11.6)
T8: 22 (2.2, 15.9)
T9: 24 (2.4, 17.4)
T10: 25 (2.5, 18.1)
T11: 25 (2.5, 18.1)
T12: 27 (2.75, 19.9)
T13: 37.3 (3.8, 27.5)
T14: 39 (4.0, 28.9)
T15: 59 (6.0, 43)
T16: 78 (8.0, 58)
T17: 83 (8.5, 61.5)
T18: 25 (2.5, 18.1)

● RHD Model


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(40)
(39)
(38)
(37)
T12
T18
(32)
(33)
(34)
(35)
(36)
S4M0567A

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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 8 (0.8, 5.8)
T3: 13 (1.3, 9.4)
T4: 15 (1.5, 10.8)
T5: 15.7 (1.6, 11.6)
T6: 20 (2.0, 14.5)
T7: 22 (2.2, 15.9)
T8: 24 (2.4, 17.4)
T9: 24 (2.4, 17.4)
T10: 24.5 (2.50, 18.1)
T11: 25 (2.5, 18.1)
T12: 27.0 (2.75, 19.9)
T13: 37.3 (3.8, 27.5)
T14: 39 (4.0, 28.9)
T15: 59 (6.0, 43)
T16: 64 (6.5, 47)
T17: 78 (8.0, 58)
T18: 83 (8.5, 61.5)

C: CAUTION S601001A03

- This section includes Airbag related repair works. For those corresponding to the repair procedures, read carefully CAUTION items in AB section before working and be sure to follow the instructions.
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine steering fluid, grease etc. or the equivalent. Do not mix steering fluid, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply steering fluid onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of steering fluid to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL S601001A17

1. SPECIAL TOOLS S601001A1701

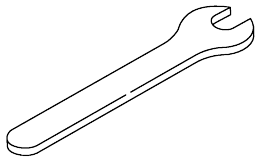
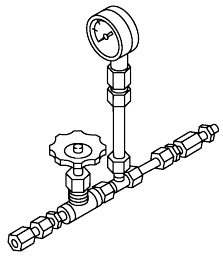
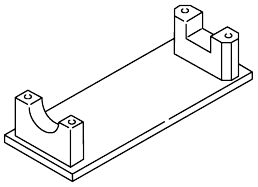
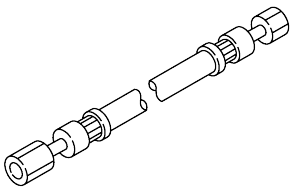
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2411	925700000	WRENCH	• Used for removing and installing tie-rod. • Apply this tool to rack.
 B4M2412	925711000	PRESSURE GAUGE	Used for measuring oil pump pressure.
 B4M2413	926200000	STAND	Used when inspecting characteristic of gearbox assembly and disassembling it.
 B4M2414	34099AC010	ADAPTER HOSE A	Used with PRESSURE GAUGE (925711000).

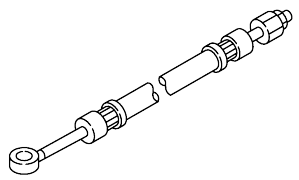
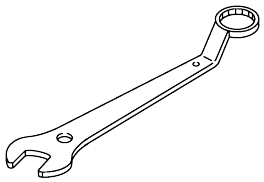
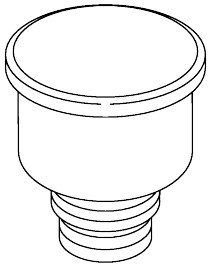
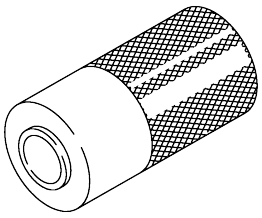
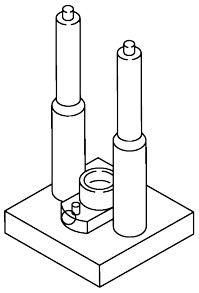
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 B4M2415	34099AC020	ADAPTER HOSE B	Used with PRESSURE GAUGE (925711000).
 B4M2416	926230000	SPANNER	• For the lock nut when adjusting backlash of gearbox. • Measurement of rotating resistance of gearbox assembly.
 B4M2419	34199AE040	OIL CHARGE GUIDE	• Used for charging power steering oil. • For TURBO model
 B4M2420	927640000	INSTALLER B	• Used for installing ball bearing into housing. • For LHD model
 B4M2421	926370000	INSTALLER A	• Used for installing valve assembly into valve housing assembly. • Used with STAND BASE (927630000). • For LHD model

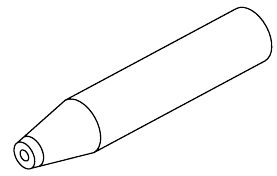
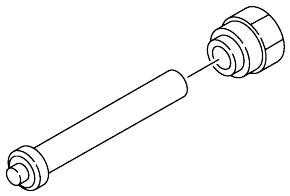
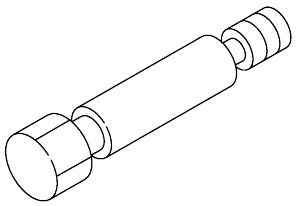
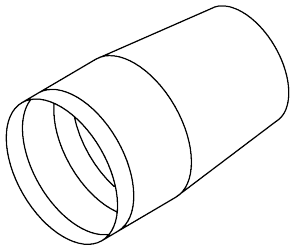
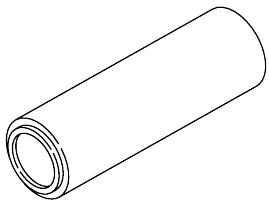
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2422	926390001	COVER & REMOVER ASSY	• Used for assembling rack assembly. • For LHD model
 B4M2423	926420000	PLUG	• When oil leaks from pinion side of gearbox assembly, remove pipe B from valve housing, attach this tool and check oil leaking points. • For LHD model
 B4M2424	926400000	GUIDE	• Right side of rack when installing rack bush. • Used with GUIDE (927660000). • For LHD model
 B4M2425	927660000	GUIDE	• Right side of rack when installing rack bush. • Used with GUIDE (926400000). • For LHD model
 B4M2426	927620000	INSTALLER B	• Used for installing oil seal of valve housing. • Used with INSTALLER A (926360000). • For LHD model

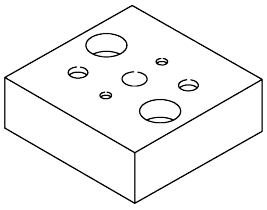
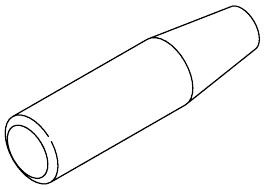
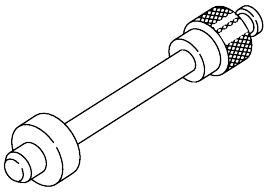
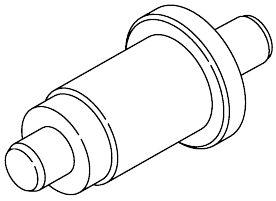
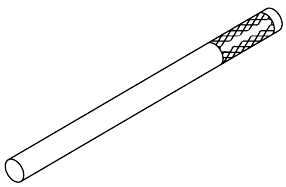
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2427	34099FA100	STAND BASE	• Used for assembling power steering gearbox. • For LHD model
 B4M2428	926360000	INSTALLER A	• Used as a guide to install oil seal. • Used with INSTALLER B (927620000). • For LHD model
 B4M2429	34199AE050	INSTALLER	• Used for installing oil seal. • For LHD model
 B4M2430	34099FA120	INSTALLER	• Used for installing valve housing oil seal. • For LHD model
 B4M2432	34199AE050	REMOVER OIL SEAL	• Used for removing back-up ring and oil seal. • For LHD model

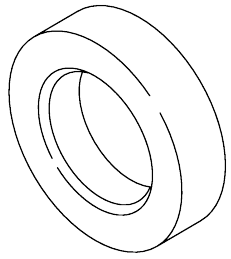
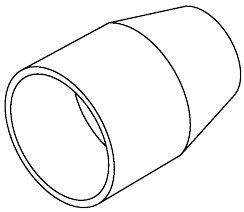
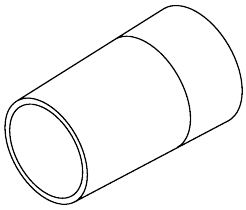
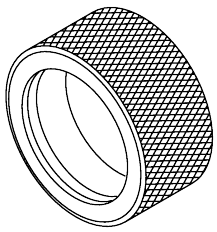
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2431	34099FA130	INSTALLER SEAL	• Used for installing valve housing oil seal. • Used with INSTALLER AND REMOVER SEAL (34099FA120). • For LHD model
 B4M2488	926250000	GUIDE	• Used for installing holder ASSY into rack hous-ing. • For RHD model
 B4M2489	926270000	COVER	• Used for installing oil seal to pinion. • For RHD model
 B4M2490	926280000	FORMER	• Used for installing seal ring to pinion. • For RHD model

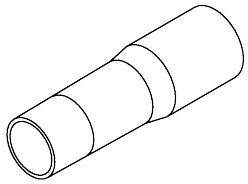
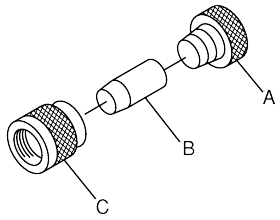
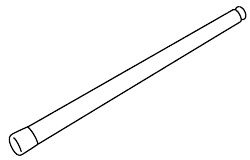
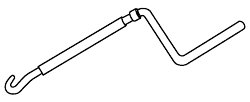
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2491	926450000	COVER	• Used for installing oil seal to pinion. • For RHD model
 B4M2492A	927490000	INSTALLER A, B, C	• Used for installing oil seal into rack ASSY. • For RHD model
 B4M2493	927580000	REMOVER	• Used for removing back-up ring and oil seal. • For RHD model
 B4M2494	927590000	WRENCH	• Used for removing wire from boot. • For RHD model

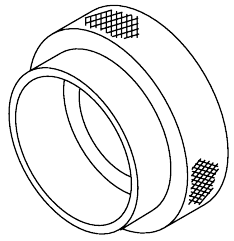
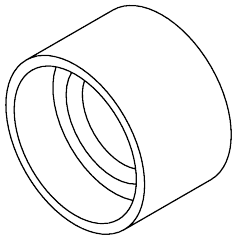
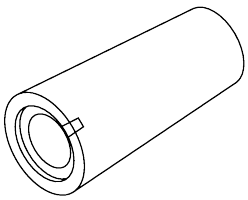
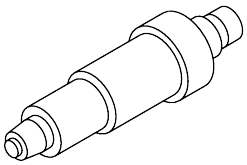
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2495	927600000	FORMER	• Used for installing seal ring to rack pinion. • For RHD model
 B4M2496	927520000	INSTALLER D	• Used for installing pinion bearing. • For RHD model
 B4M2497	927530000	INSTALLER E	• Used for installing pinion bearing. • For RHD model
 B4M2499	34099FA000	INSTALLER & REMOVER	• Used for removing and installing Y-packing. • For RHD model

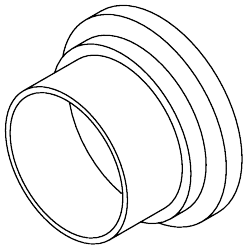
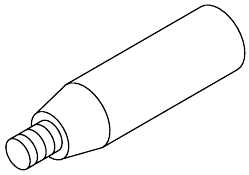
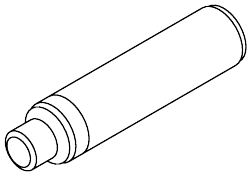
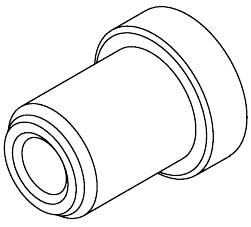
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2500	34099FA010	GUIDE	• Used for installing rack and seal into housing assembly. • For RHD model
 B4M2501	34099FA020	GUIDE	• Used for installing valve assembly into valve housing assembly. • For RHD model
 B4M2502	34099FA030	INSTALLER & REMOVER	• Used for removing and installing rack oil seal (outer & inner). • For RHD model
 B4M2503	34099FA040	INSTALLER	• Used for installing rack oil seal (outer). • For RHD model

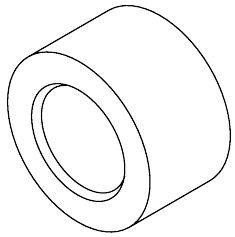
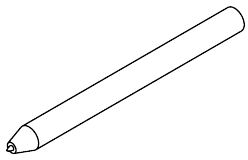
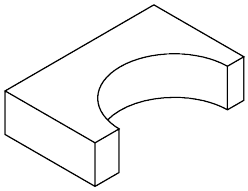
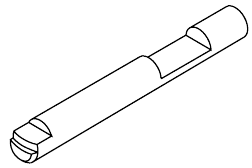
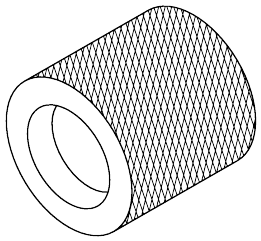
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2504	34099FA050	SPACER	• Used for installing bearing into valve housing. • For RHD model
 B4M2505	34099FA060	PUNCH	• Used for caulking. • For RHD model
 B4M2506	34099FA070	BASE	• Used for supporting housing assembly. • For RHD model
 B4M2507	34099FA080	PUNCH	• Used for removing caulking. • For RHD model

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B4M2508	926050000	FORMER	• Used for installing seal ring to rack pinion. • For RHD model

2. GENERAL PURPOSE TOOLS S601001A1702

TOOL NAME	REMARKS
Spring scale	Used for measuring tightening torque.
Snap ring pliers	Used for removing and installing snap ring.
Dial gauge	Used for measuring steering gearbox.

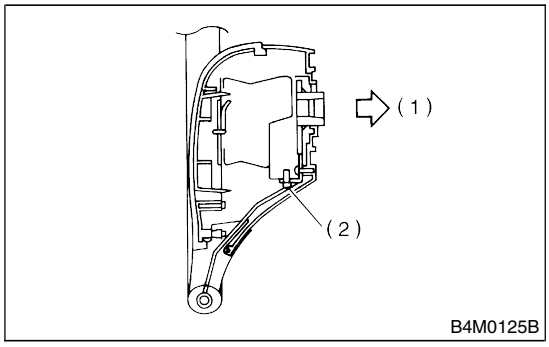
2. Steering Wheel S601274

A: REMOVAL S601274A18

1) Disconnect ground terminal from battery.
2) Set tires to straight-ahead position.
3) Remove airbag module. (with airbag model) <Ref. to AB-12 REMOVAL, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing airbag module service (if so equipped). <Ref. to AB-12 CAUTION, Driver's Airbag Module.>

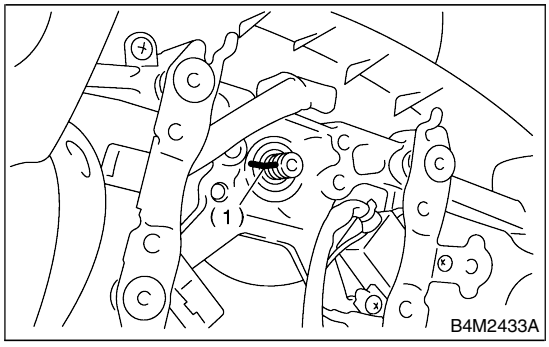
4) Remove lower screw and slide horn pad assembly forward, then disconnect connector. (without airbag model)
5) Remove horn pad by pulling on it. (without airbag model)



(1) Front
(2) Screw

6) Remove steering wheel nut, and then draw out steering wheel from shaft using steering puller.

NOTE:
Make matching marks on steering wheel and steering column in advance.



(1) Matching mark

B: INSTALLATION S601274A11

1) Align center of roll connector. <Ref. to AB-20 ADJUSTMENT, Roll Connector.>
2) Install in the reverse order of removal.

NOTE:
Align matching marks on steering wheel and steering column.

Tightening torque:
4.5 N·m (4.5 kgf-m, 32.5 ft-lb)

Column cover-to-steering wheel clearance:
2 — 4 mm (0.08 — 0.16 in)

WARNING:
Always refer to "Airbag System" before performing airbag module service (if so equipped). (with airbag model) <Ref. to AB-12 CAUTION, Driver's Airbag Module.>

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. (with airbag model)

C: INSPECTION S601274A10

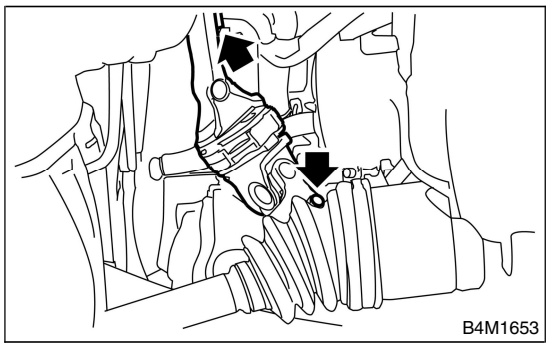
1) Check steering wheel for deformation. If the deformation is excessive, replace steering wheel.
2) Check splines on steering wheel for damage. If the damage is excessive, replace steering wheel.

3. Universal Joint S601273

A: REMOVAL S601273A18

1) Set the vehicle on the lift.
2) Remove the steering wheel. <Ref. to PS-27 REMOVAL, Steering Wheel.>
3) Lift-up the vehicle.
4) 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 serration.



B: INSTALLATION S601273A11

1) Install universal joint.
   (1) Align bolts 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, then that on the short yoke side.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

CAUTION:
• Make sure that universal joint bolt 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)

2) Lower the vehicle.
3) Align center of roll connector. (with airbag model) <Ref. to AB-20 ADJUSTMENT, Roll Connector.>

CAUTION:
Ensure that front wheel are set straight forward direction.

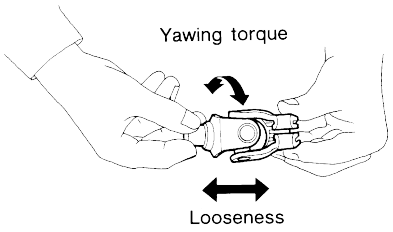
4) Install steering wheel and airbag module. (with airbag model) <Ref. to PS-27 INSPECTION, Steering Wheel.>

WARNING:
Always refer to "Airbag System" before performing airbag module service (if so equipped). <Ref. to AB-12 CAUTION, Driver's Airbag Module.> and <Ref. to AB-13 INSTALLATION, Driver's Airbag Module.>

5) Install horn pad to steering wheel. (without airbag model)

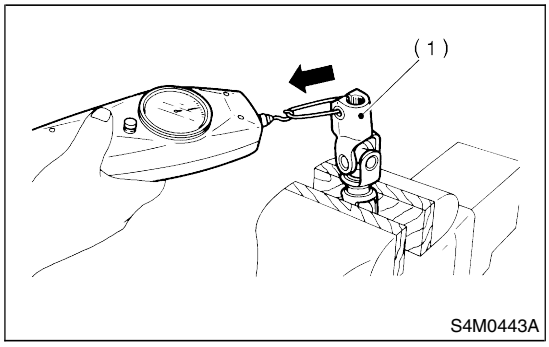
C: INSPECTION S601273A10

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

Inspection	Corrective action
• Free play • Swinging torque Yawing torque Looseness  G4M0089 **Standard value of universal joint free play: 0 mm (0 in)** **Max. value of universal joint swinging torque: 0.3 N·m (0.03 kgf-m, 0.2 ft-lb)**	Replace if faulty.

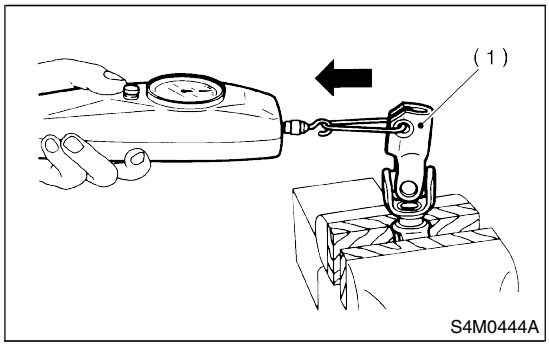
Measurement of folding torque of universal joint is as shown in the figures.

Service limit:
Maximum load; 5.49 N (0.56 kgf, 1.23 lb) or less



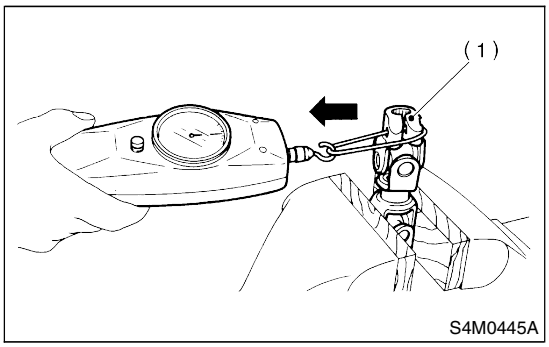
(1) Long yoke

Service limit:
Maximum load; 5.49 N (0.56 kgf, 1.23 lb) or less



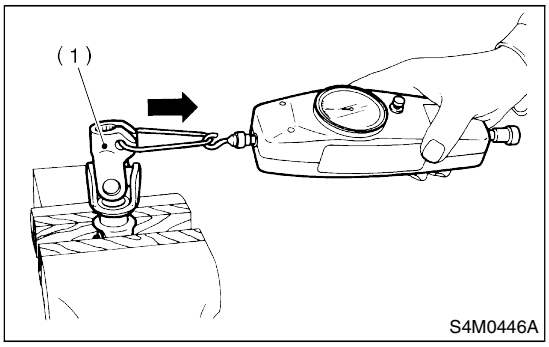
(1) Long yoke

Service limit:
Maximum load; 8.43 N (0.86 kgf, 1.90 lb) or less



(1) Short yoke

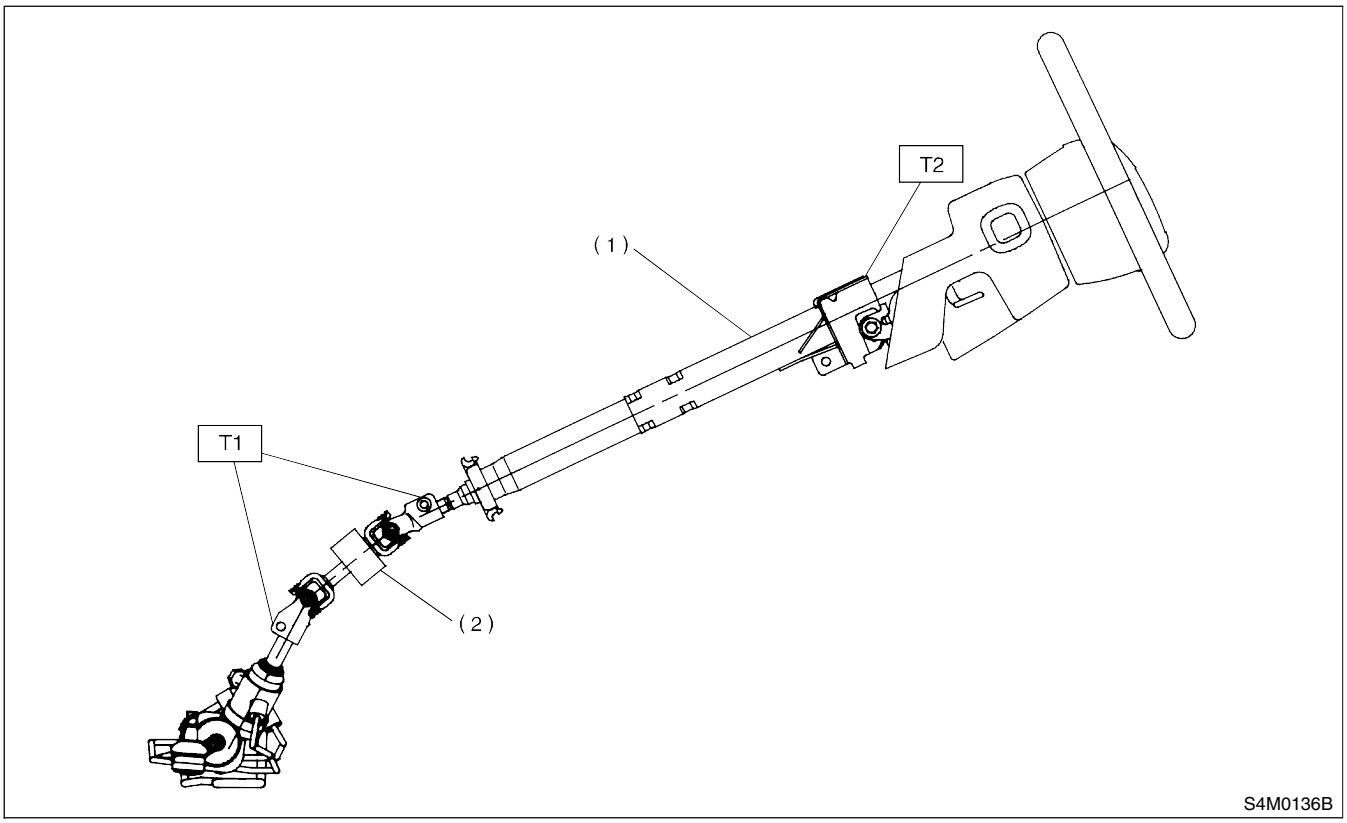
Service limit:
Maximum load; 8.43 N (0.86 kgf, 1.90 lb) or less



(1) Short yoke

4. Tilt Steering Column S601544

A: REMOVAL S601544A18



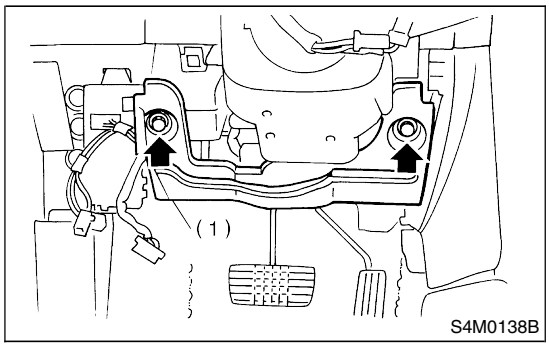
(1) Tilt steering column
(2) Universal joint

Tightening torque: N·m (kgf-m, ft-lb)
T1: 24 (2.4, 17.4)
T2: 25 (2.5, 18.1)

1) Set the vehicle on the lift.
2) Disconnect battery minus terminal.
3) Remove airbag module. <Ref. to AB-12 REMOVAL, Driver's Airbag Module.>

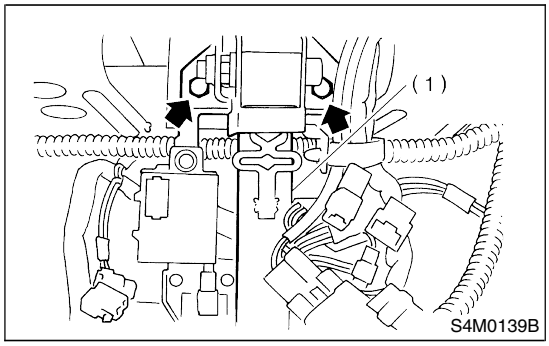
WARNING:
Always refer to "Airbag System" before performing airbag module service (if so equipped). <Ref. to AB-12 CAUTION, Driver's Airbag Module.>

4) Remove steering wheel. <Ref. to PS-27 REMOVAL, Steering Wheel.>
5) Lift-up the vehicle.
6) Remove universal joint. <Ref. to PS-28 REMOVAL, Universal Joint.>
7) Lower the vehicle.
8) Remove trim panel under instrument panel.
9) Remove knee bolster.



(1) Knee bolster

10) Disconnect connectors for ignition switch and combination switch wiring harness under instrument panel.
11) Remove the two bolts under instrument panel securing steering column.



(1) Steering column

12) 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: INSTALLATION S601544A11

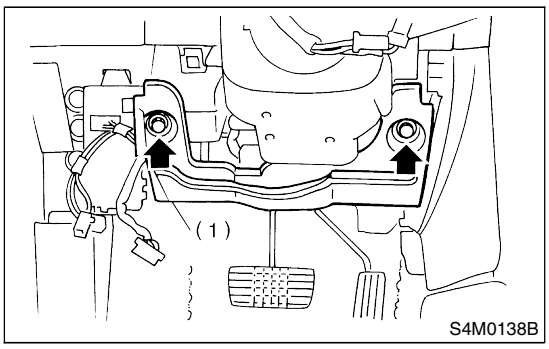
1) Insert end of steering shaft into toe board grommet.
2) Tighten steering shaft mounting bolts under instrument panel.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

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

NOTE:
Make sure to apply double lock.

5) Install lower column cover with tilt lever held in the lowered position.
6) Install universal joint. <Ref. to PS-28 INSTALLATION, Universal Joint.>
7) Install knee bolster.



(1) Knee bolster

8) Align center of roll connector. <Ref. to AB-20 ADJUSTMENT, Roll Connector.>

CAUTION:
Ensure that front wheels are set in straight forward direction.

9) Install steering wheel. <Ref. to PS-27 INSTALLATION, Steering Wheel>
Set steering wheel to neutral and install it onto steering shaft.

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. (with airbag model) <Ref. to AB-13, INSTALLATION, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing the service operation. <Ref. to AB-12 CAUTION, Driver's Airbag Module.>

11) Install horn pad to steering wheel. (without air-bag model)

C: DISASSEMBLY S601544A06

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

D: ASSEMBLY S601544A02

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.

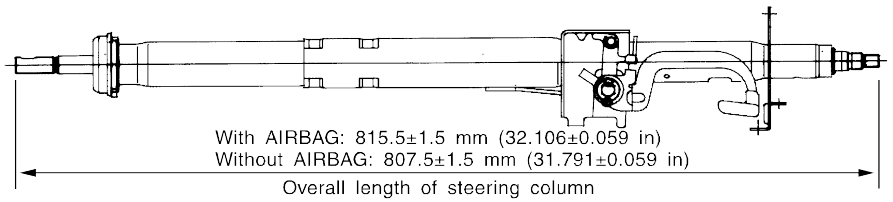
Tightening torque:
1.2 N·m (0.12 kgf-m, 0.9 ft-lb)

CAUTION:
Don't overtorque screw.

E: INSPECTION S601544A10

1. BASIC INSPECTION S601544A1001

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

Inspection	Corrective action
• Overall length of steering column Measure overall length of steering column. Standard overall length of steering column:  S4M0141B	Replace steering column assembly.

2. AIRBAG MODEL INSPECTION S601544A1002

WARNING:
For airbag model inspection procedures, refer to "Airbag System". <Ref. to AB-12 CAUTION, Airbag Module.> and <Ref. to AB-13 INSPECTION, Driver's Airbag Module.>

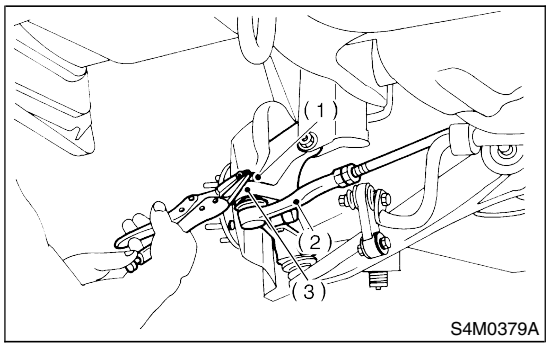
5. Steering Gearbox [LHD Model] S601272

A: REMOVAL S601272A18

1) Disconnect battery ground terminal.
2) Loosen front wheel nut.
3) Lift vehicle and remove front wheels.
4) Remove front exhaust pipe assembly. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>

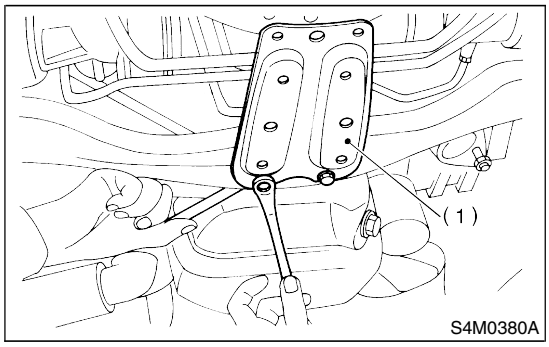
WARNING:
Be careful, exhaust pipe is hot.

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



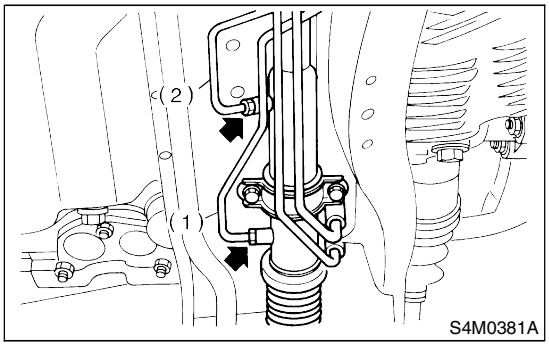
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

6) Remove jack-up plate and front stabilizer.



(1) Jack-up plate

7) 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.

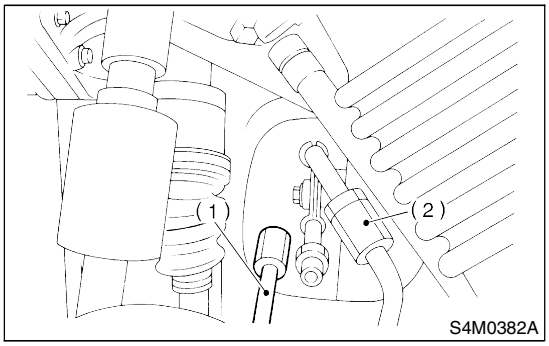


(1) Pipe A
(2) Pipe B

8) Remove universal joint. <Ref. to PS-28, REMOVAL, Universal Joint.>
9) Disconnect pipes C and D from pipe of gearbox.

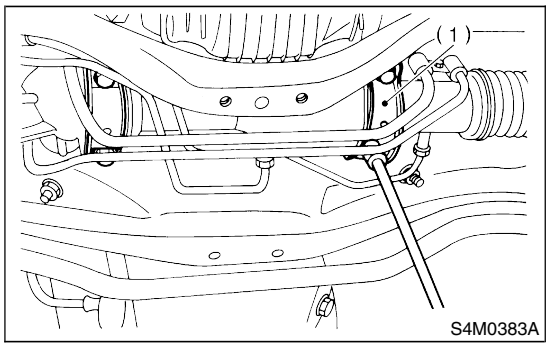
CAUTION:
Be careful not to damage these pipes.

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



(1) Pipe C
(2) Pipe D

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

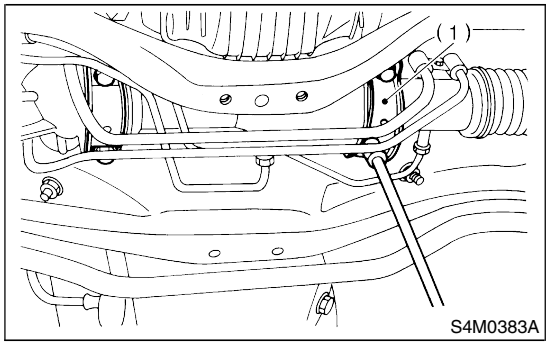


(1) Clamp

B: INSTALLATION S601272A11

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 N·m (6.0 kgf-m, 43 ft-lb)



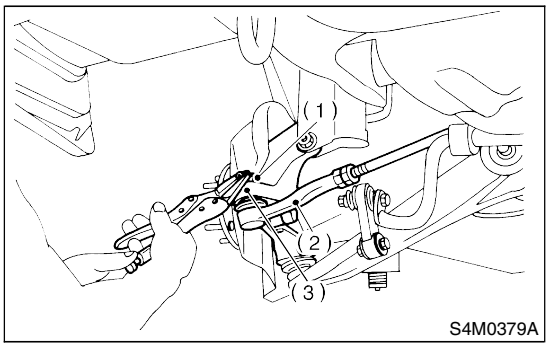
(1) Clamp

3) Install universal joint. <Ref. to PS-28, INSTALLATION, Universal Joint.>

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 N·m (2.75 kgf-m, 19.9 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.



(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

5) Install front stabilizer to vehicle. <Ref. to FS-22, INSTALLATION, Front Stabilizer.>
6) Install front exhaust pipe assembly. (Non-turbo model)
With OBD: <Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD: <Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
7) Install tires.
8) Tighten wheel nuts to the specified torque.

Tightening torque:
88 N·m (9.0 kgf-m, 65 ft-lb)

9) Connect ground terminal to battery.
10) Pour fluid into oil tank, and bleed air.
<Ref. to PS-101, Power Steering Fluid.>
11) Check for fluid leaks. <Ref. to PS-51, OIL LEAKING, INSPECTION, Steering Gearbox [LHD Model].>
12) Install jack-up plate.

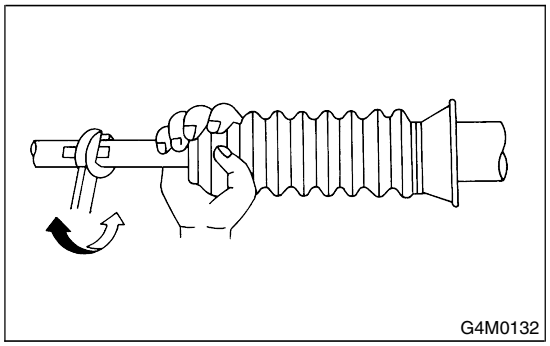
WARNING:
Be careful, exhaust manifold is hot.

13) Lower vehicle.
14) Check fluid level in oil tank.

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

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

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

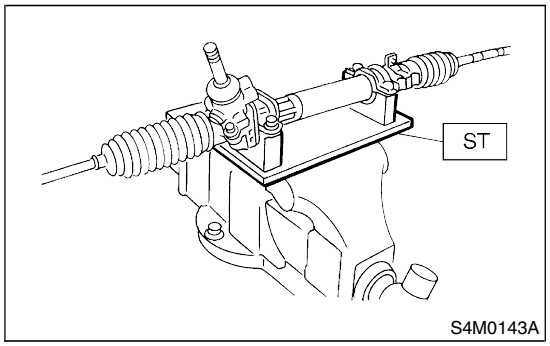

G4M0132

C: DISASSEMBLY S601272A06

1. RACK HOUSING ASSEMBLY S601272A0601

1) Disconnect four pipes from gearbox.
2) Secure gearbox removed from vehicle in vise using ST.
ST 926200000 STAND

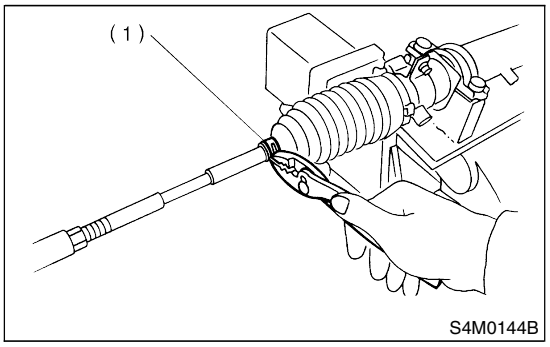
CAUTION:
Secure the gearbox in a vise using the ST as shown. Do not attempt to secure it without this ST.



S4M0143A

3) Remove tie-rod end and lock nut from gearbox.

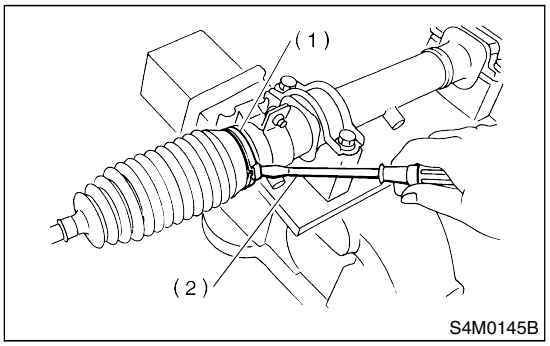
4) Remove small clip from boot using pliers, and move boot to tie-rod end side.



S4M0144B

(1) Clip

5) Using standard screwdriver, remove band from boot.

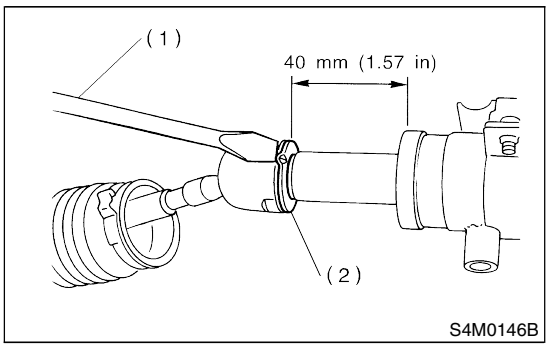


S4M0145B

(1) Band
(2) Standard screwdriver

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.

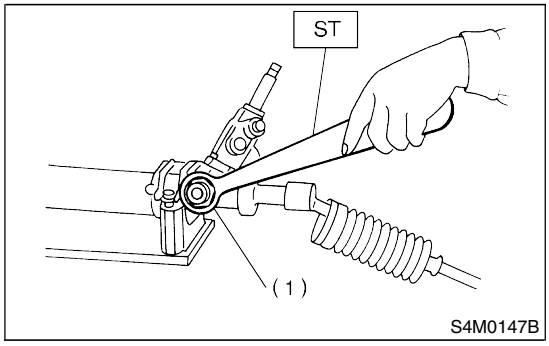
CAUTION:
Be careful not to scratch rack surface as oil leaks may result.



S4M0146B

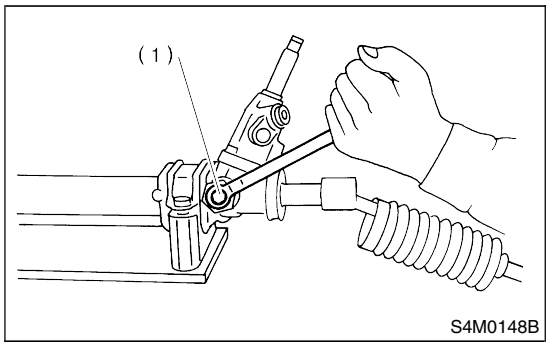
(1) Standard screwdriver
(2) Lock washer

7) Using ST, loosen lock nut.
ST 926230000 SPANNER



(1) Lock nut

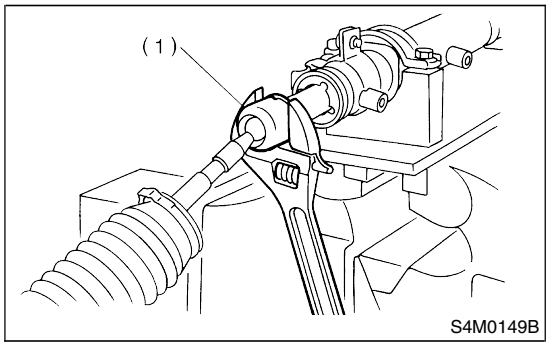
8) Tighten adjusting screw until it no longer tightens.



(1) Adjusting screw

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.

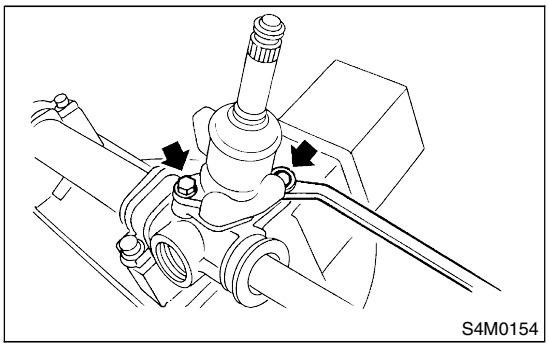


(1) Tie-rod

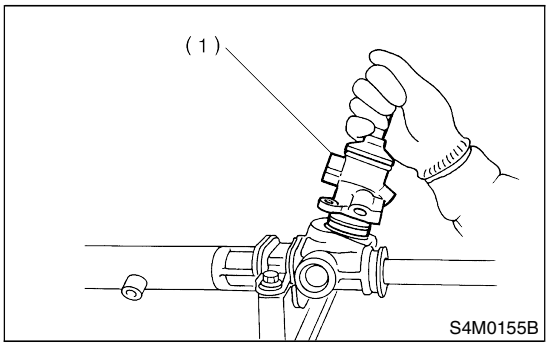
10) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

11) Remove two bolts securing valve assembly.

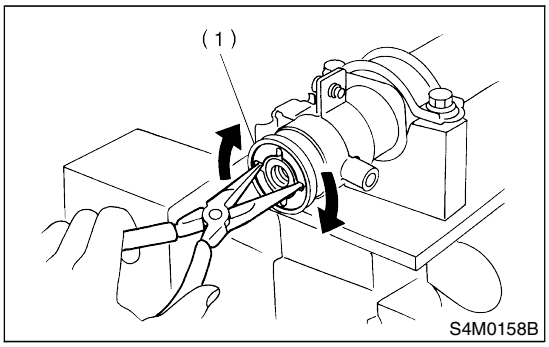


12) Carefully draw out input shaft and remove valve assembly.



(1) Valve ASSY

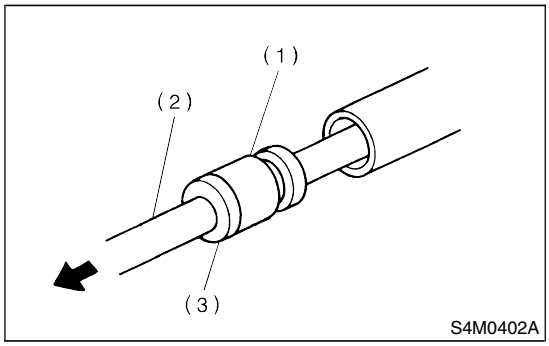
13) Using a sharp pointed pliers, rotate the rack stopper in the direction of the arrow until the end of the circlip comes out of the stopper. Rotate the circlip in the opposite direction and pull it out.



(1) Rack stopper

14) 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.

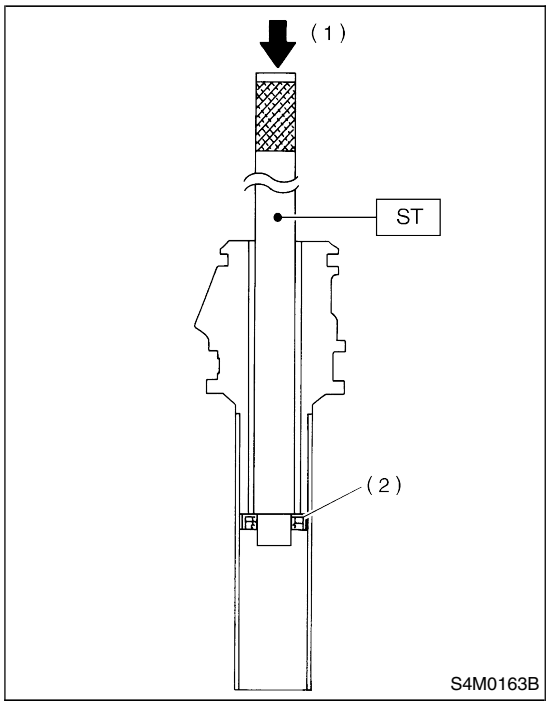


(1) Rack bushing
(2) Rack ASSY
(3) Rack stopper

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

CAUTION:
Do not reuse removed rack bushing and circlip.

16) Insert ST from pinion housing side and remove oil seal using a press.
ST 34199AE050 OIL SEAL REMOVER



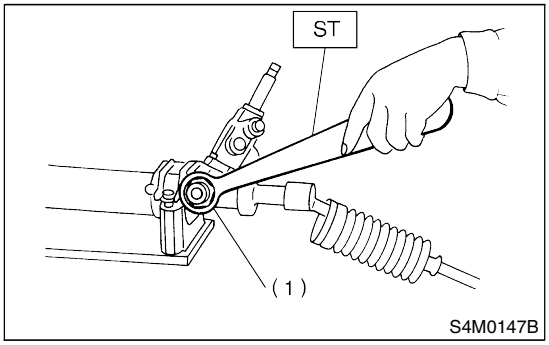
(1) Press
(2) Oil seal

NOTE:
Discard removed oil seal.

2. CONTROL VALVE ASSEMBLY S601272A0602

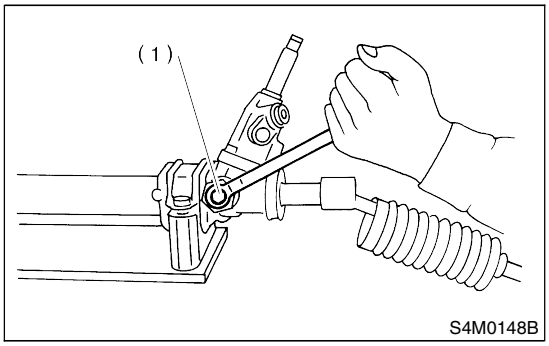
NOTE:
Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared.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

1) Using ST, loosen lock nut.
ST 926230000 SPANNER



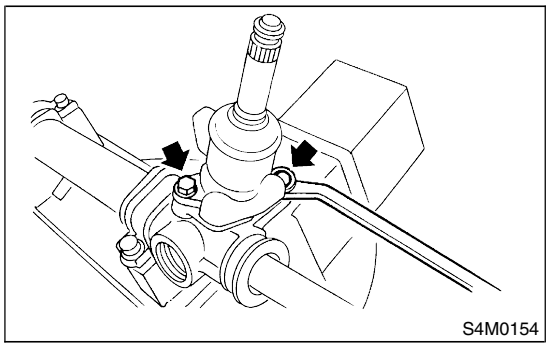
(1) Lock nut

2) Tighten adjusting screw until it no longer tightens.

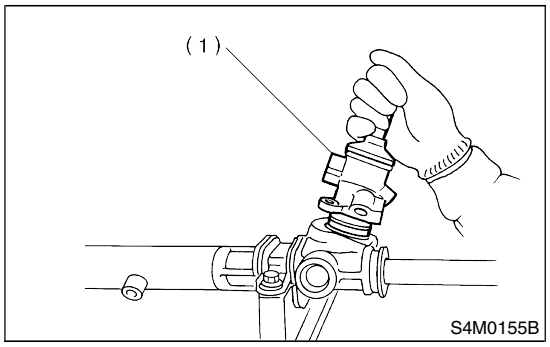


(1) Adjusting screw

3) Remove two bolts securing valve assembly.

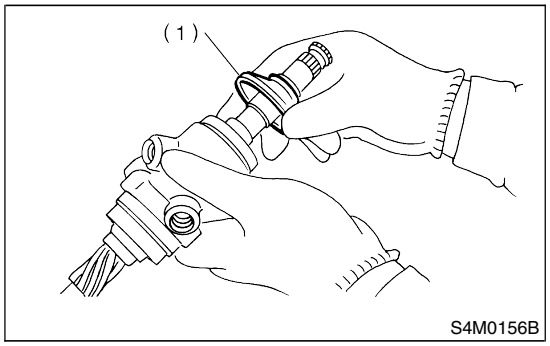


4) Carefully draw out input shaft and remove valve assembly.



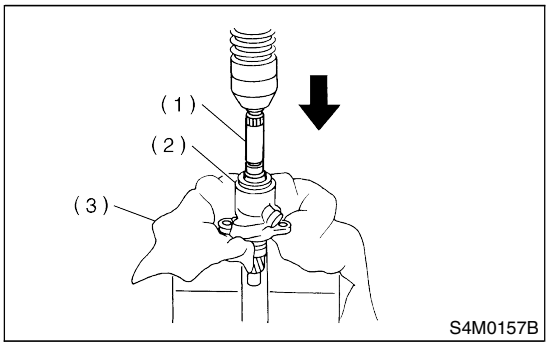
(1) Valve ASSY

5) Slide dust cover out.



(1) Dust cover

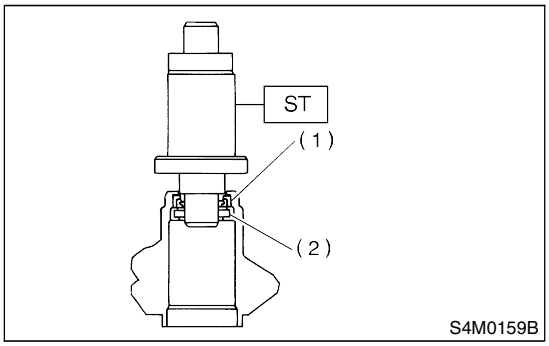
6) Using a press remove pinion and valve assembly from valve housing.



(1) Valve ASSY
(2) Valve housing
(3) Cloth

7) Using ST and press, remove dust seal, oil seal and special bearing from valve housing.
ST 34099FA120 SEAL INSTALLER & REMOVER

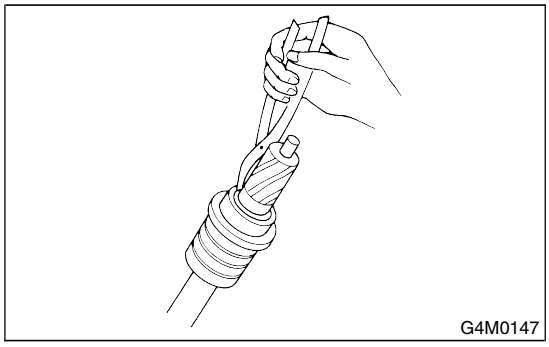
CAUTION:
- **Do not apply a force to end surface of valve housing.**
- **Do not reuse oil seal after removal.**



(1) Oil seal
(2) Special bearing

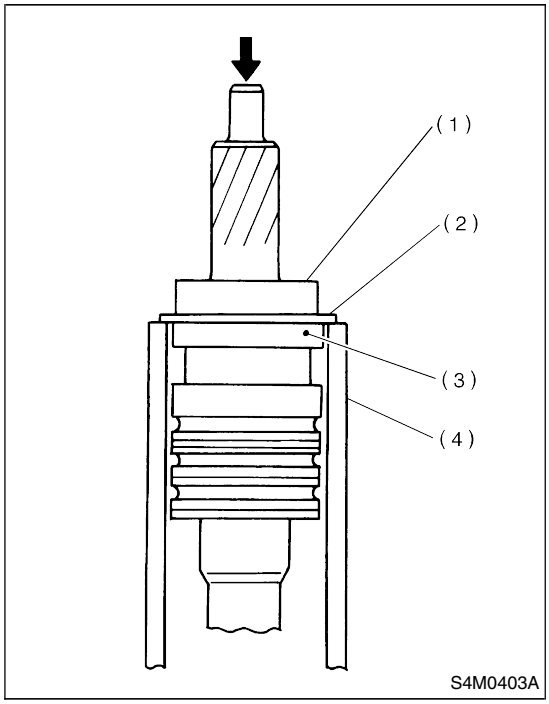
8) Remove snap ring using snap ring pliers.

CAUTION:
• Do not reuse removed snap ring.
• Be careful not to scratch pinion and valve assembly.



9) 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.



(1) Bearing
(2) Backing washer
(3) Oil seal
(4) Pipe

10) Remove oil seal.

CAUTION:
Do not reuse removed oil seal.

D: ASSEMBLY S601272A02

1. RACK HOUSING ASSEMBLY S601272A0201

CAUTION:
Use only SUBARU genuine grease for gearbox.

Grease:
VALIANT GREASE M2
[Part No. 003608001, net 0.5 kg (1.1 lb)]

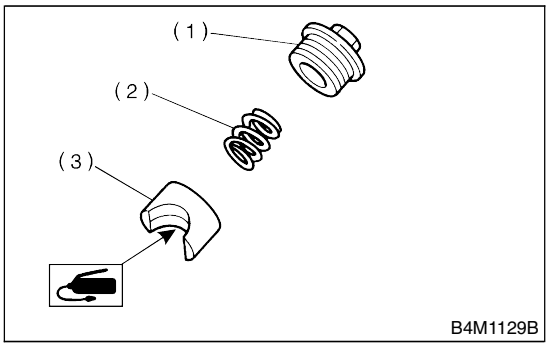
1) Clean all parts and tools before reassembling.
2) Apply grease to teeth of rack so that grease applied is about as high as teeth, and also apply a thin film of grease to sliding portion of rack shaft.

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) 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.



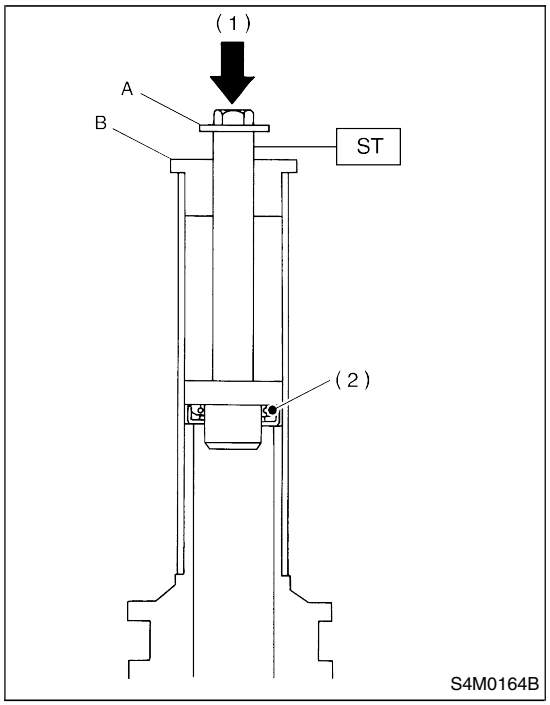
(1) Adjusting screw
(2) Spring
(3) Sleeve

6) Force-fit oil seal using ST.
ST 34099FA110 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.

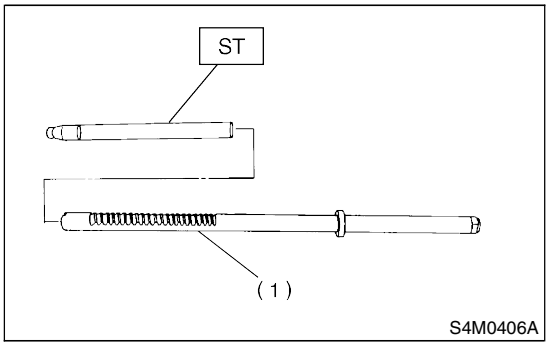


(1) Press
(2) Oil seal

7) Fixing rack housing
Fix rack housing in vise using ST.
ST 926200000 STAND

CAUTION:
● When fixing rack housing in vise, be sure to use this special tool. Do not fix rack housing in vise 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.

8) 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



(1) Rack ASSY

9) 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.

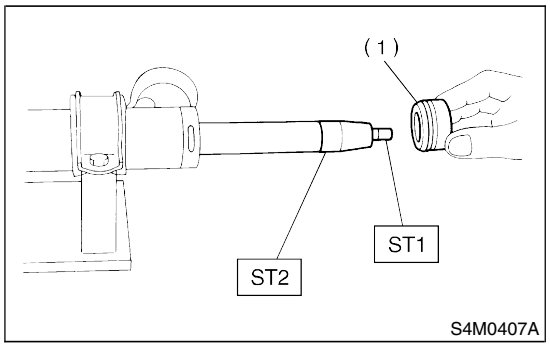
10) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

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

ST 926390001 COVER & REMOVER

11) 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.

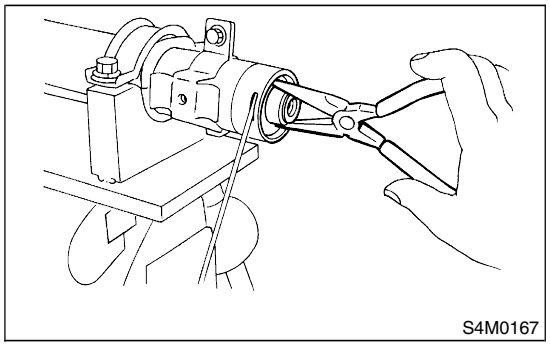


(1) Rack bushing ASSY

12) 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.
13) Insert rack stopper into rack housing, and wrap circlip using a sharp pointed pliers to secure rack stopper in position.

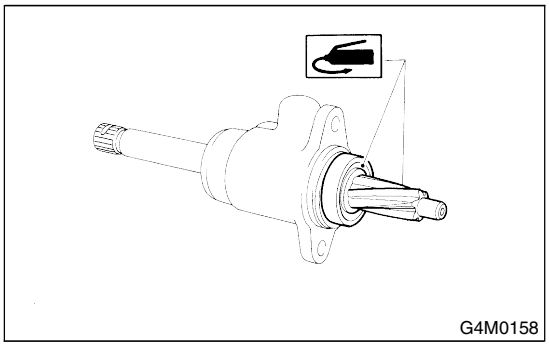
CAUTION:
Be careful not to scratch rack while winding circlip.

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



14) Fit mounting rubber onto rack housing.

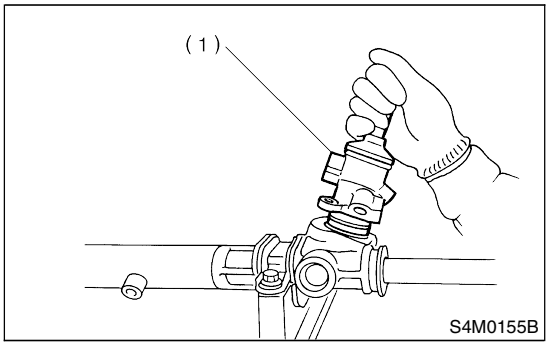
15) Apply genuine grease to pinion gear and bearing of valve assembly.



16) 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.



(1) Valve ASSY

17) Tighten bolts alternately to secure valve assembly.

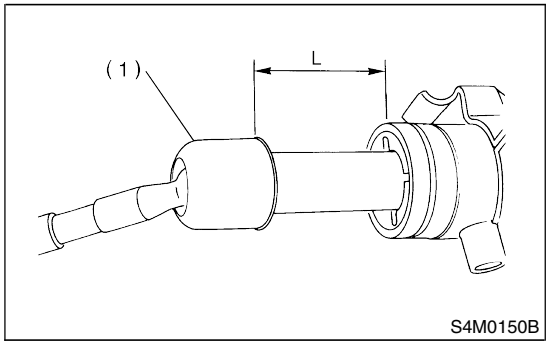
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten bolts.

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

On condition
L: Approximately 40 mm (1.57 in)

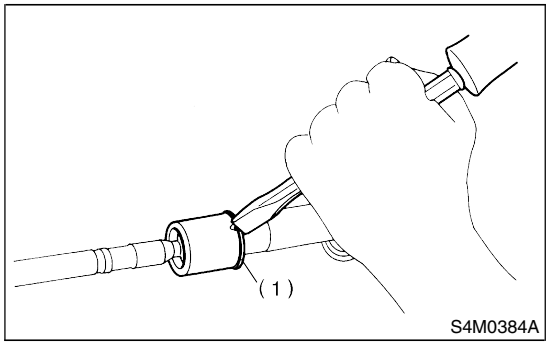
Tightening torque:
78 N·m (8.0 kgf-m, 58 ft-lb)



(1) Tie-rod

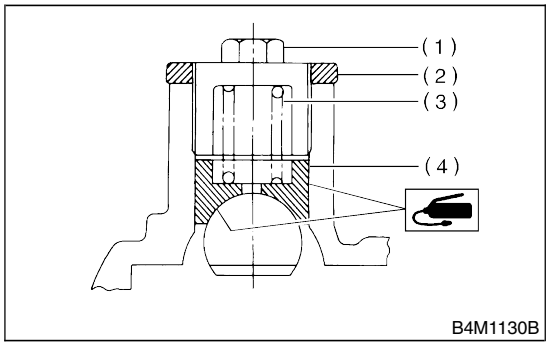
19) Bend lock washer using a chisel.

CAUTION:
Be careful not to scratch rack when bending lock washer.



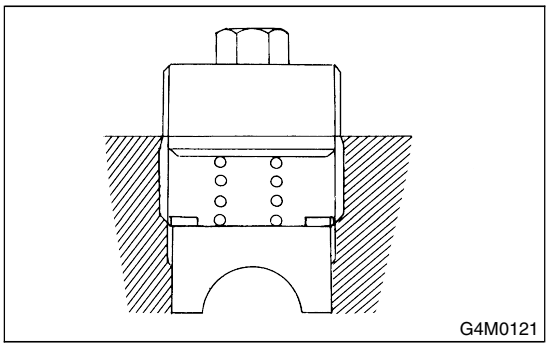
(1) Lock washer

20) 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.



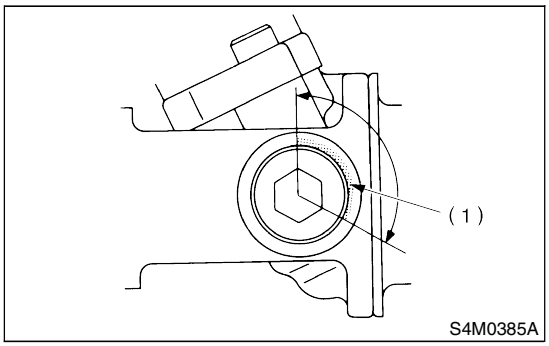
(1) Adjusting screw
(2) Lock nut
(3) Spring
(4) Sleeve

(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



(1) Apply liquid packing to at least 1/3 of entire perimeter.

(6) Tighten adjusting screw to 7.4 N·m (0.75 kgf-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.
ST 926230000 SPANNER

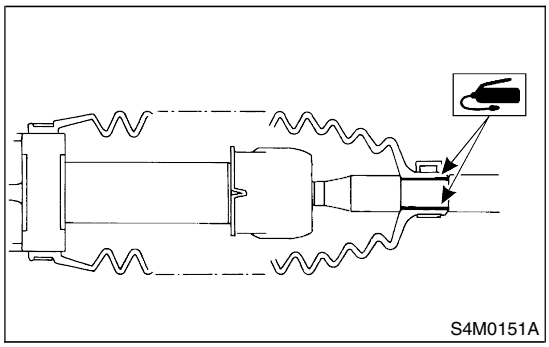
Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

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.

21) Inspect for service limit as per article of “Service limit”. <Ref. to PS-49, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].> Make replacement and adjustment if necessary.

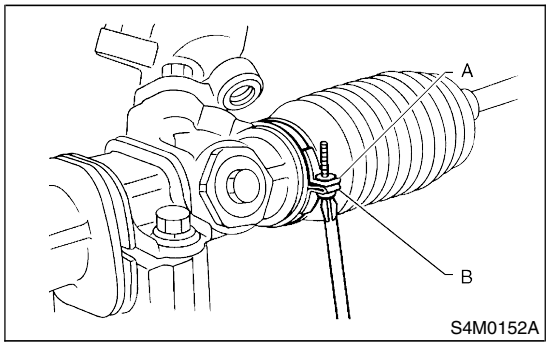
22) Install boot to housing.

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.


S4M0151A

23) Using a screwdriver, tighten the screw until the ends “A” and “B” of the band come into contact with each other.

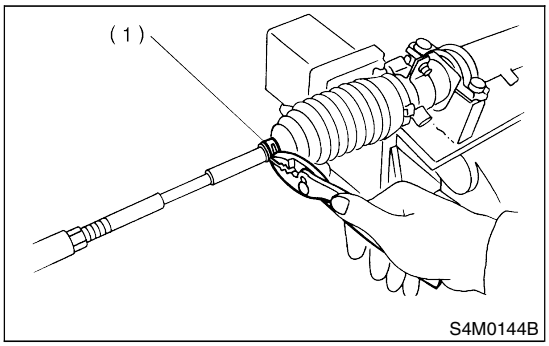
NOTE:
Always tighten the band from the underside of the gearbox.



S4M0152A

24) Fix boot end with clip (small).

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



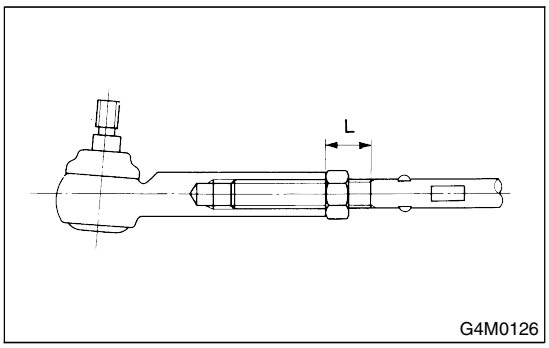
S4M0144B

(1) Clip

25) 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.

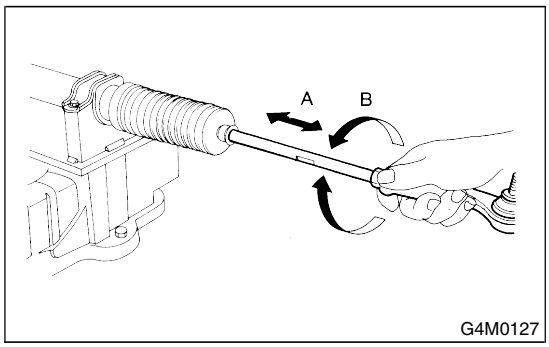
Installed tie-rod length: L
15 mm (0.59 in)

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



G4M0126

26) 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.



27) Remove gearbox from ST.
ST 926200000 STAND
28) 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 N·m (1.3 kgf-m, 9.4 ft-lb)

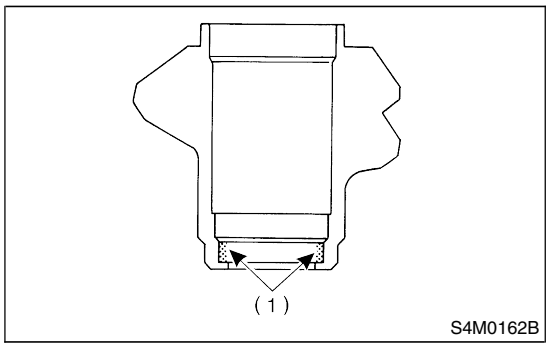
(2) Connect pipes C and D to gearbox.
Connect lower pipe C first, and upper pipe D second.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

2. CONTROL VALVE ASSEMBLY S601272A0202

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

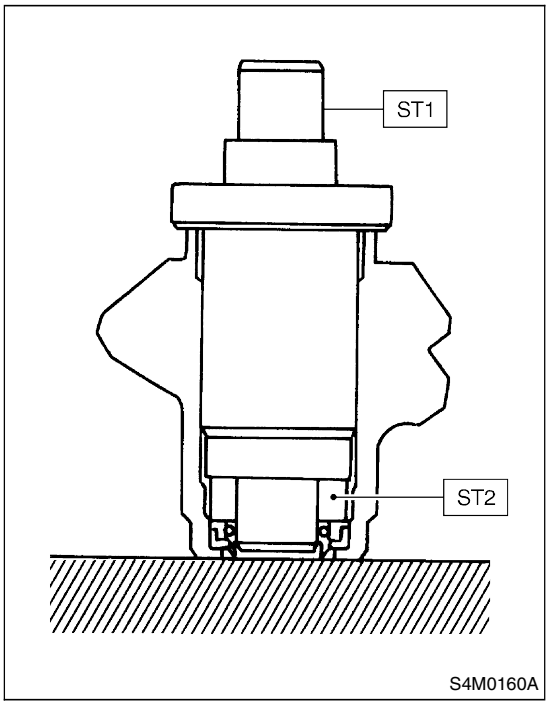
1) Clean all parts and tools before reassembling.
2) Apply a coat of specified power steering fluid to inner wall of valve housing.



(1) Fluid

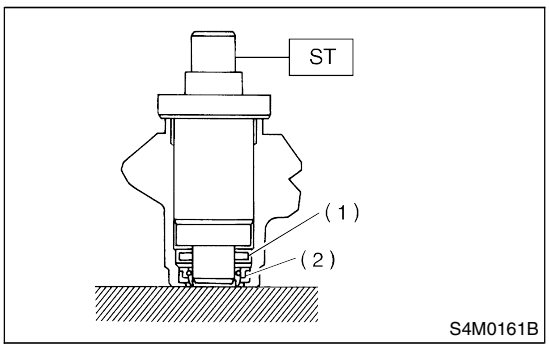
3) Attach ST2 to ST1, and press oil seal into place using a press.

ST1 34099FA120 SEAL INSTALLER & REMOVER
ST2 34099FA130 SEAL INSTALLER
(1) Face oil seal in the direction shown in figure when installing.
(2) To avoid scratching oil seal, apply a coat of grease to contact surface of installer and oil seal.
(3) To facilitate installation, attach oil seal to installer and position in valve housing before pressing into place.



4) Using ST and press, install special bearing in valve housing.
ST 34099FA120 SEAL INSTALLER & REMOVER

NOTE:
To facilitate installation, attach ball bearing to remover and position in valve housing before pressing it into place.

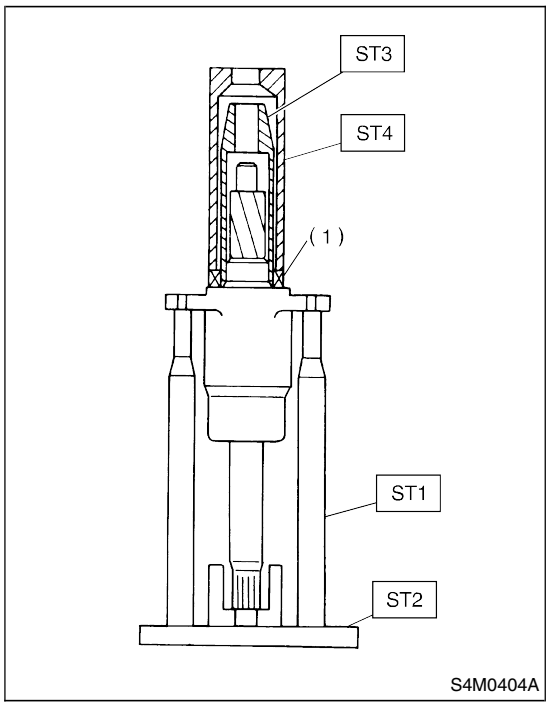


(1) Special bearing
(2) Oil seal

5) Put vinyl tape around pinion shaft splines to protect oil seal from damage.
6) 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.

7) Secure valve assembly to ST1 and ST2.
8) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 926360000 INSTALLER A
ST4 927620000 INSTALLER B

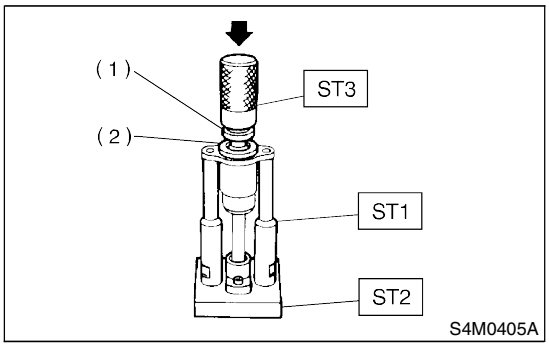


(1) Oil seal

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.

9) Remove ST3, and fit backing washer.

10) Force-fit ball bearing using ST3.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 927640000 INSTALLER B



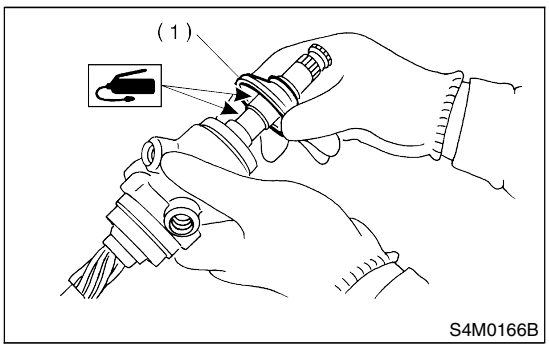
(1) Ball bearing
(2) Backing washer

NOTE:
Be careful not to tilt ball bearing during installation.

11) Install snap ring using snap ring pliers.

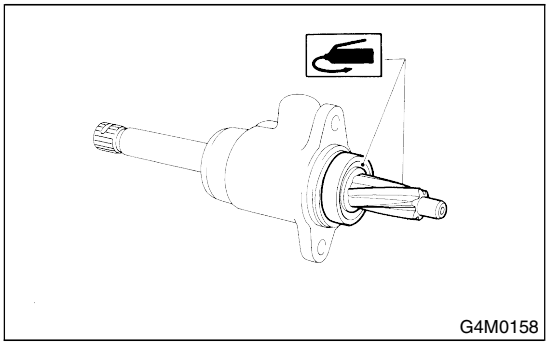
NOTE:
Rotate snap ring to check for proper installation.

12) Apply specified grease to dust cover.



(1) Dust cover

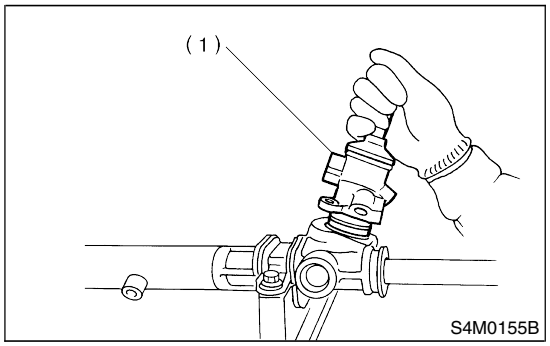
13) Install dust cover on valve assembly.
14) Apply genuine grease to pinion gear and bearing of valve assembly.



15) 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.



(1) Valve ASSY

16) Tighten bolts alternately to secure valve assembly.

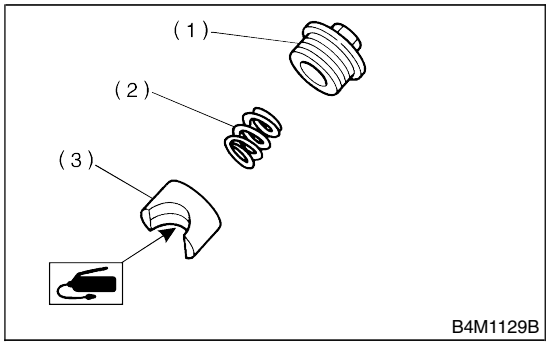
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten bolts.

17) Apply grease to sleeve insertion hole.
18) Apply grease to dust seal insertion hole.

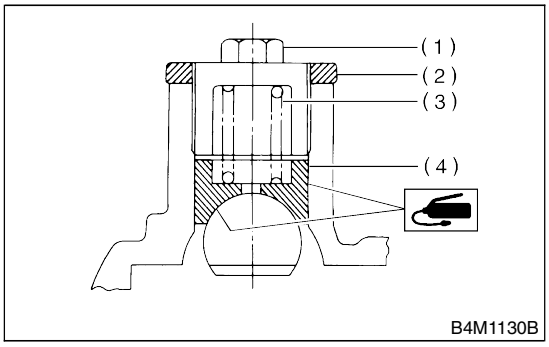
CAUTION:
Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.

19) 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.



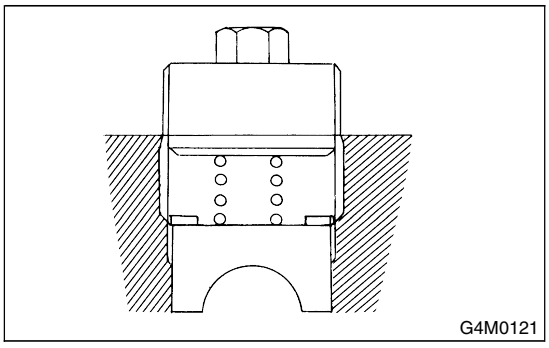
(1) Adjusting screw
(2) Spring
(3) Sleeve

20) 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.



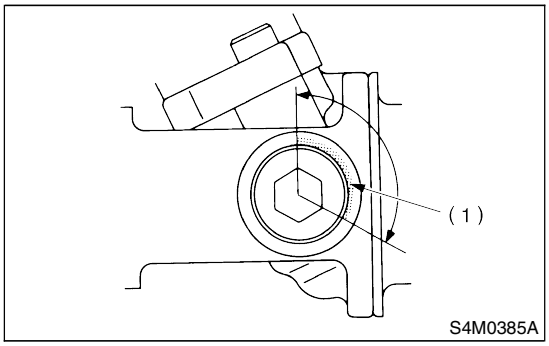
(1) Adjusting screw
(2) Lock nut
(3) Spring
(4) Sleeve

(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



(1) Apply liquid packing to at least 1/3 of entire perimeter.

(6) Tighten adjusting screw to 7.4 N·m (0.75 kgf-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.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 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.

21) Check for service limit as per article of “Service limit”. <Ref. to PS-49, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].> Make replacement and adjustment if necessary.

E: INSPECTION S601272A10

1. BASIC INSPECTION S601272A1001

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.

2. SERVICE LIMIT S601272A1002

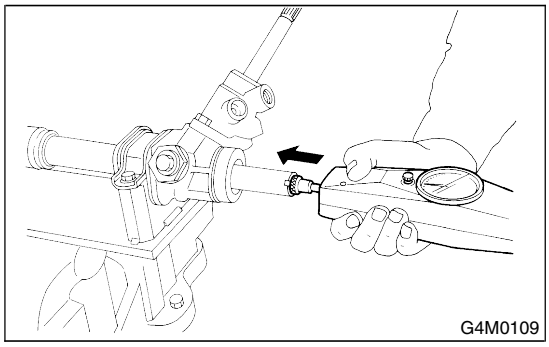
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

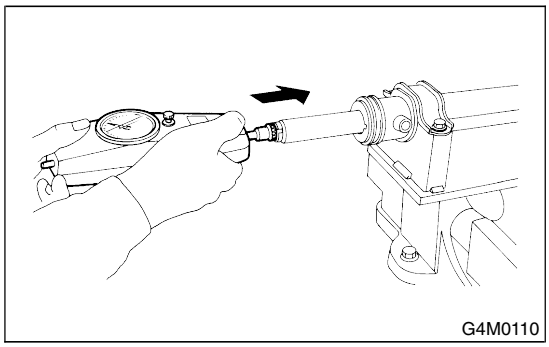
NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
304 N (31 kgf, 68 lb) or less



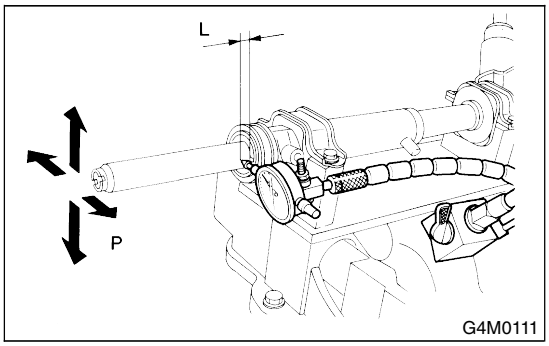


3. RACK SHAFT PLAY IN RADIAL DIRECTION S601272A1003

Right-turn steering:

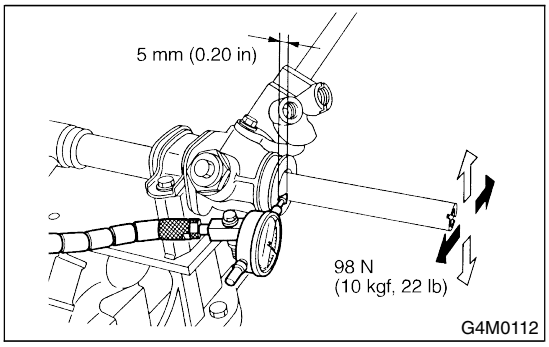
Service limit
0.19 mm (0.0075 in) or less

On condition
L: 5 mm (0.20 in)
P: 122.6 N (12.5 kgf, 27.6 lb)



Left-turn steering:

Service limit
Direction ⇦ ⇨
0.3 mm (0.012 in) or less
Direction ⬅ ➡
0.15 mm (0.0059 in) or less

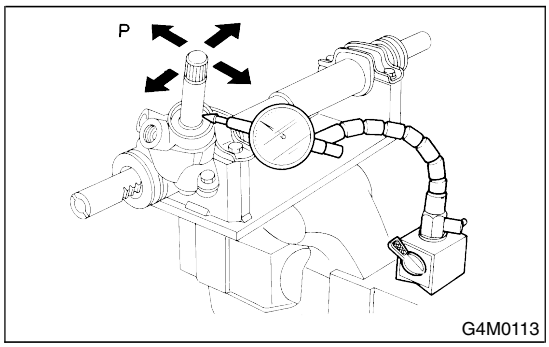


4. INPUT SHAFT PLAY S601272A1004

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

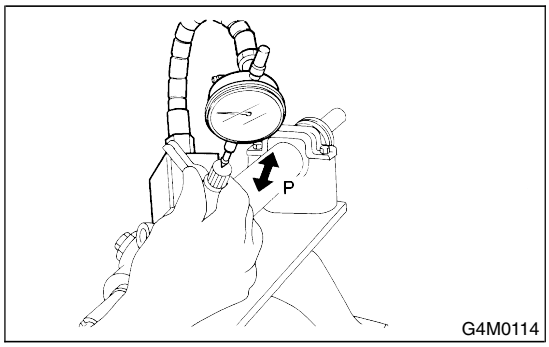
On condition
P: 98 N (10 kgf, 22 lb)



In axial direction:

Service limit
0.5 mm (0.020 in) or less

On condition
P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)



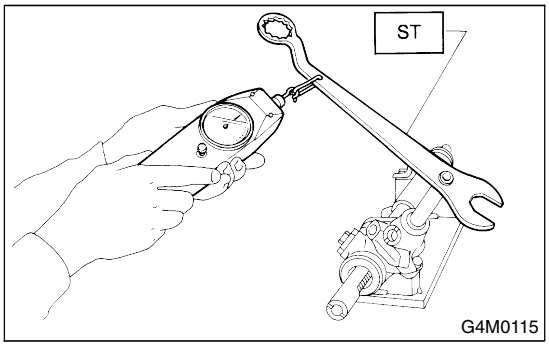
5. TURNING RESISTANCE OF GEARBOX

S601272A1005

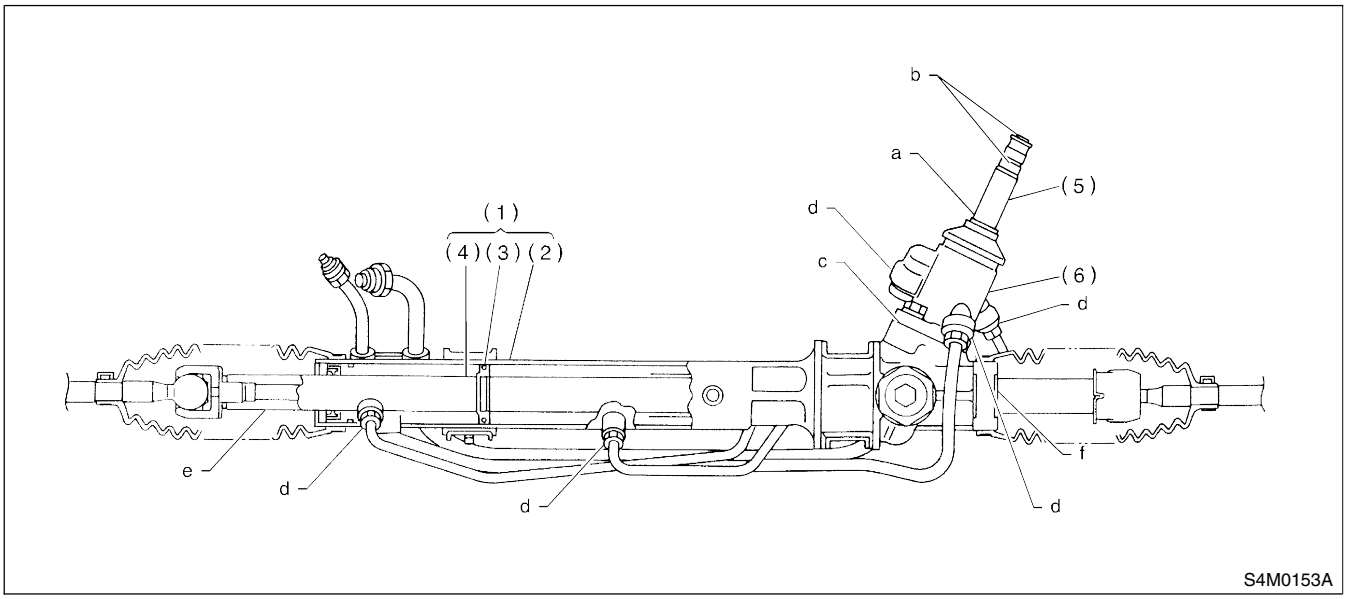
Using ST, measure gearbox turning resistance.

ST 926230000 SPANNER

Service limit:
Straight-ahead position within 30 mm (1.18 in) from rack center
Less than 11.18 N (1.14 kgf, 2.51 lb)
Maximum allowable resistance
12.7 N (1.3 kgf, 2.9 lb)



6. OIL LEAKING S601272A1006



(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack axle
(5) Input shaft
(6) Valve housing

NOTE:
If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.

1) 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.
2) Inspect leakage from “a”.
The oil seal is damaged. Replace valve assembly with a new one.
3) Inspect leakage from “b”.
The torsion bar O-ring is damaged. Replace valve assembly with a new one.
4) Inspect leakage from “c”.
The oil seal is damaged. Replace valve assembly or oil seal with a new one.
5) Inspect leakage from “d”.
The pipe is damaged. Replace the faulty pipe or O-ring.
6) 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) Inspect leakage from “e”.
The cylinder seal is damaged. Replace rack bushing with a new one.
(2) Inspect 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.

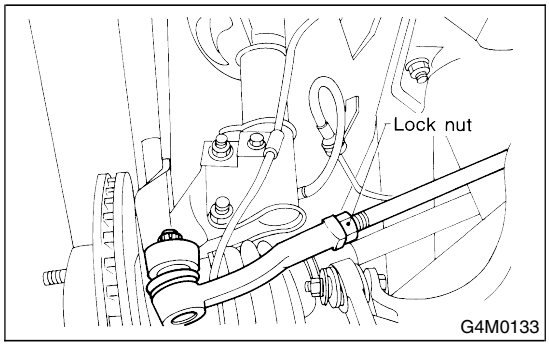
ST 926420000 PLUG

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.

F: ADJUSTMENT S601272A01

1) Adjust front toe.

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



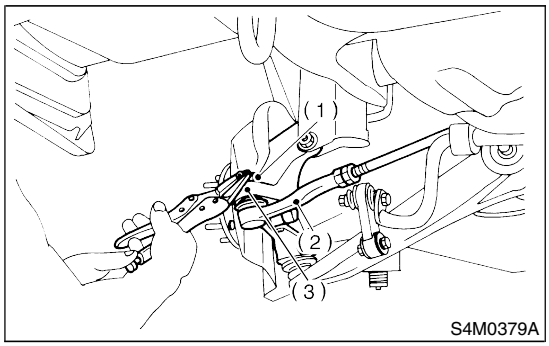
2) Adjust steering angle of wheels.

Standard of steering angle:
Inner wheel: 37.4°±1.5°
Outer wheel: 32.5°±1.5°

6. Steering Gearbox [RHD Model] S601276

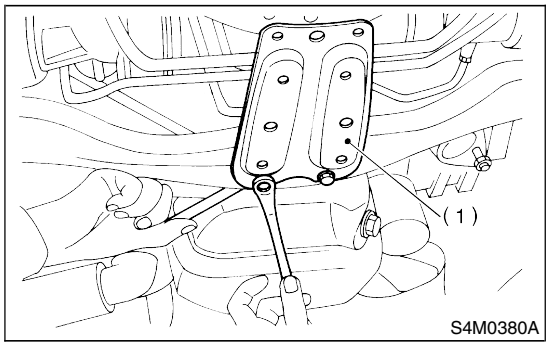
A: REMOVAL S601276A18

1) Disconnect battery minus terminal.
2) Lift vehicle with a jack and remove front wheel.
3) Disconnect front exhaust pipe assembly. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
4) Remove universal joint. <Ref. to PS-28, REMOVAL, Universal Joint.>
5) Remove cotter pin and castle nut. Using a puller, remove tie-rod end from knuckle arm.



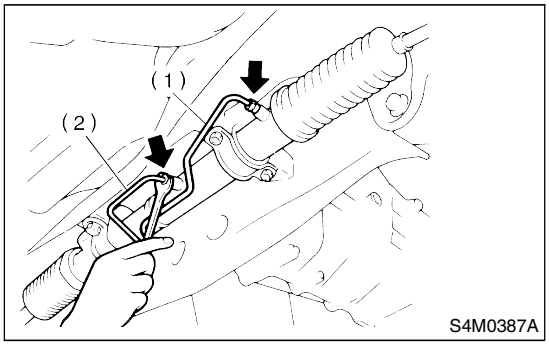
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

6) Remove jack-up plate and stabilizer.



(1) Jack-up plate

7) Disconnect one pipe joint A from center of gearbox assembly, and connect a vinyl hose to it. While turning steering wheel to the left and right, drain fluid through the hose. Similarly, drain fluid from the other pipe joint B.



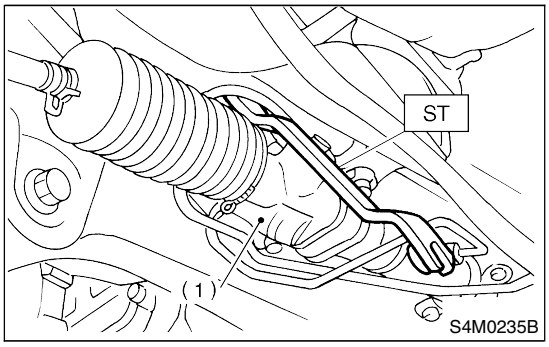
(1) Pipe A
(2) Pipe B

8) Remove lower and upper bolts from universal joint, and remove universal joint in the upward direction.

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

9) Using ST, remove flare nuts from control valve of gearbox assembly, and disconnect upper and lower hoses.
ST 34099AC050 GEARBOX SPANNER

CAUTION:
• Always disconnect hoses B and A in that order.
• Be careful not to damage the hoses during removal.



(1) Steering gearbox

10) Remove bolts securing gearbox to crossmember, and detach gearbox.

B: INSTALLATION S601276A11

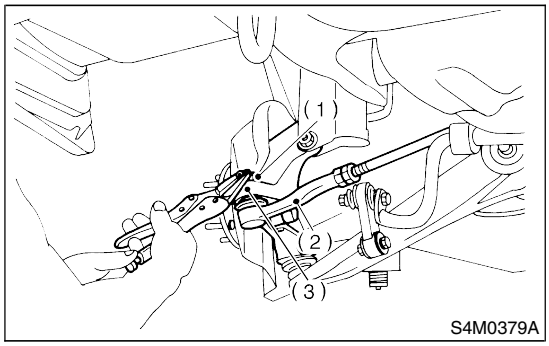
1) Insert gearbox into crossmember, being careful not to damage gearbox boot.
2) Tighten gearbox to crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:
59 N·m (6.0 kgf-m, 43 ft-lb)

3) Install the universal joint. <Ref. to PS-28, INSTALLATION, Universal Joint.>
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 N·m (2.75 kgf-m, 19.9 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.



(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

5) Install front stabilizer to vehicle. <Ref. to FS-22, INSTALLATION, Front Stabilizer.>
6) Install front exhaust pipe assembly. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
7) Install tires.
8) Tighten wheel nuts to the specified torque.

Tightening torque:
88 N·m (9.0 kgf-m, 65 ft-lb)

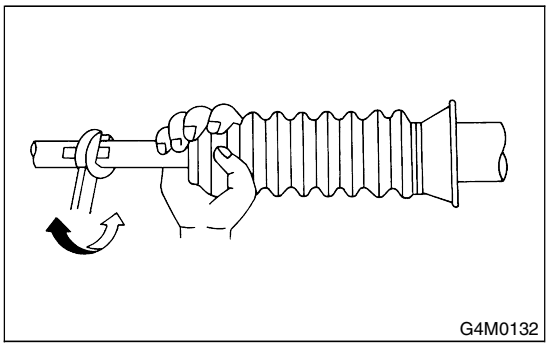
9) Connect ground terminal to battery.
10) Pour fluid into oil tank, and bleed air.
<Ref. to PS-101, Power Steering Fluid.>
11) Check for fluid leaks. <Ref. to PS-76, OIL LEAKING, INSPECTION, Steering Gearbox [RHD Model].>
12) Install jack-up plate.

WARNING:
Be careful, exhaust manifold is hot.

13) Lower vehicle.
14) Check fluid level in oil tank.
15) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

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



C: DISASSEMBLY S601276A06

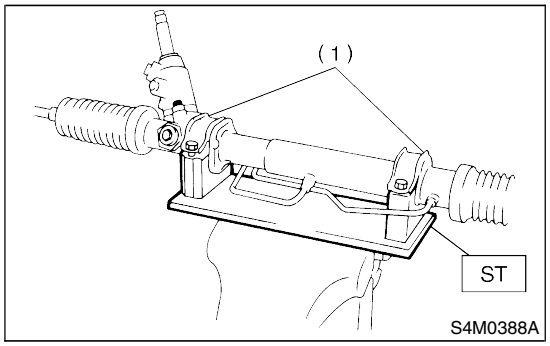
1. RACK HOUSING ASSEMBLY S601276A0601

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) Disconnect four pipes from gearbox.

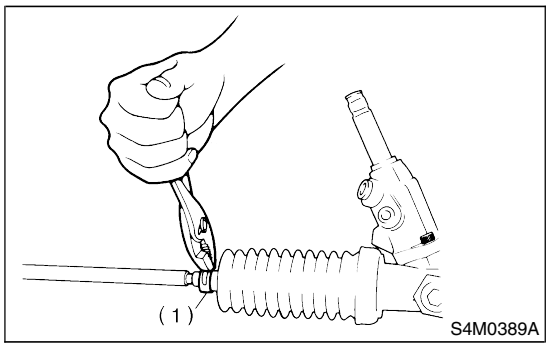
2) Secure gearbox removed from vehicle in vise using ST.
ST 926200000 STAND

CAUTION:
Secure the gearbox assembly in a vise using the ST as shown. Do not attempt to secure it without this ST.



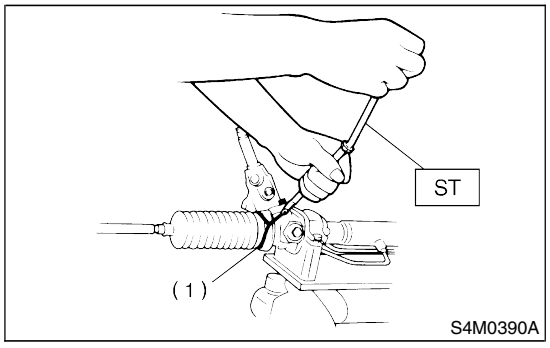
(1) Clamp

3) Pry off clip from outer end of boot, and slide boot toward tie-rod end.



(1) Clip

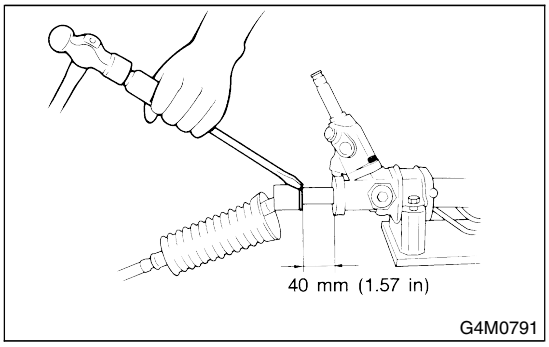
4) Using ST, remove lock wire from inner end of boot, and remove boot.
ST 927590000 WRENCH



(1) Wire

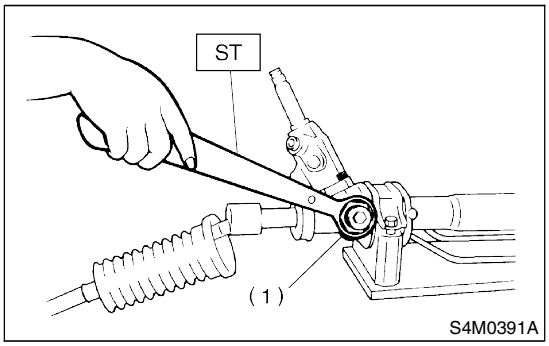
5) Extend rack approximately 40 mm (1.57 in) out. Unlock lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

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



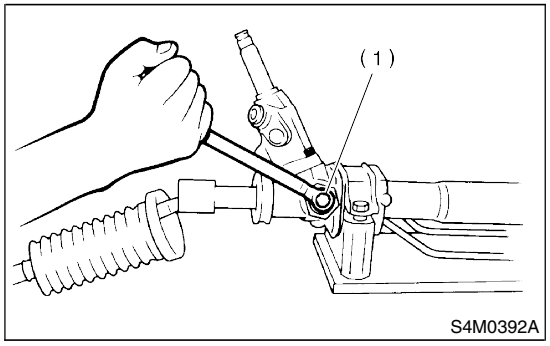
NOTE:
Parts requiring replacement are described in the smallest unit of spare parts including damaged parts and spare parts damaged. In actual disassembly work, accidental damage as well as inevitable damage to some related parts must be taken into account, and spare parts for them must also be prepared.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

6) Using ST, loosen lock nut.
ST 926230000 SPANNER



(1) Lock nut

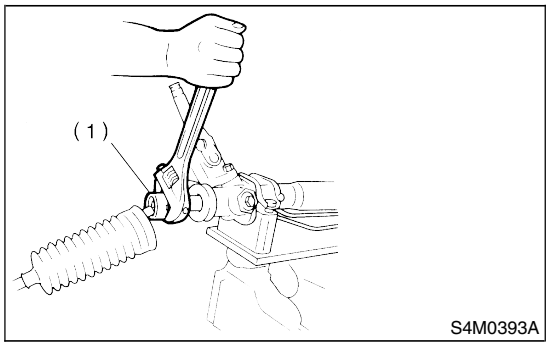
7) Tighten adjusting screw until it no longer tightens.



(1) Adjusting screw

8) Using a wrench (32 mm 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.



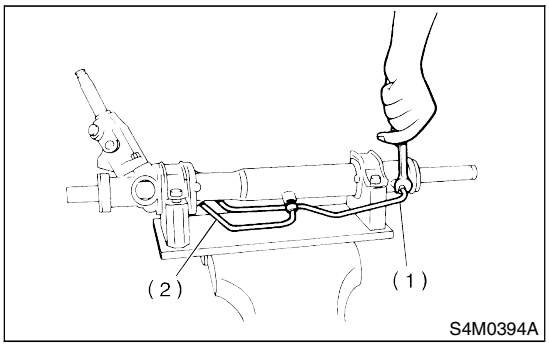
(1) Tie-rod

9) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

10) Disconnect pipes A and B from steering body and control valve housing.

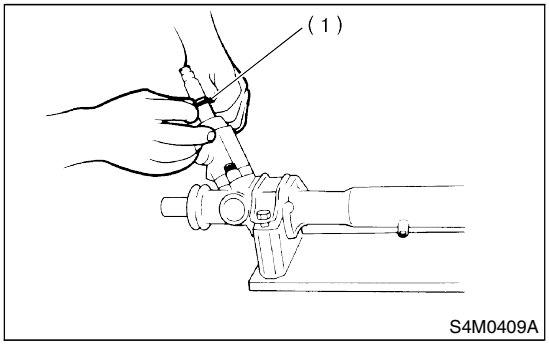
CAUTION:
Replace pipes and/or flare nuts if damaged.



(1) Pipe A
(2) Pipe B

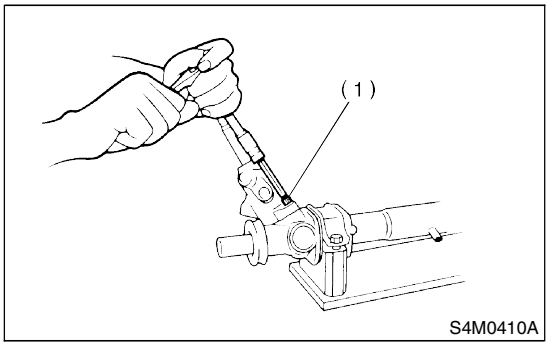
11) Slide dust cover out.

CAUTION:
• Be careful not to scratch housing or input shaft during dust cover removal. Also do not allow foreign matter to enter housing interior.
• Replace dust cover with a new one if its inside bore or lips are worn or damaged.



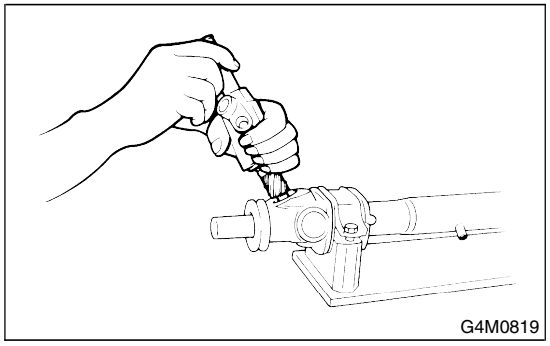
(1) Dust cover

12) Remove the two bolts securing valve housing.



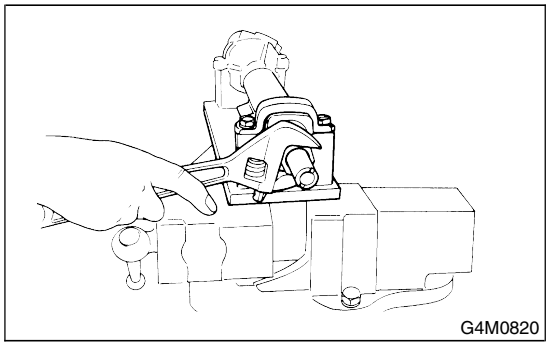
(1) Socket bolt

13) Remove valve housing, pinion and valve as a unit.



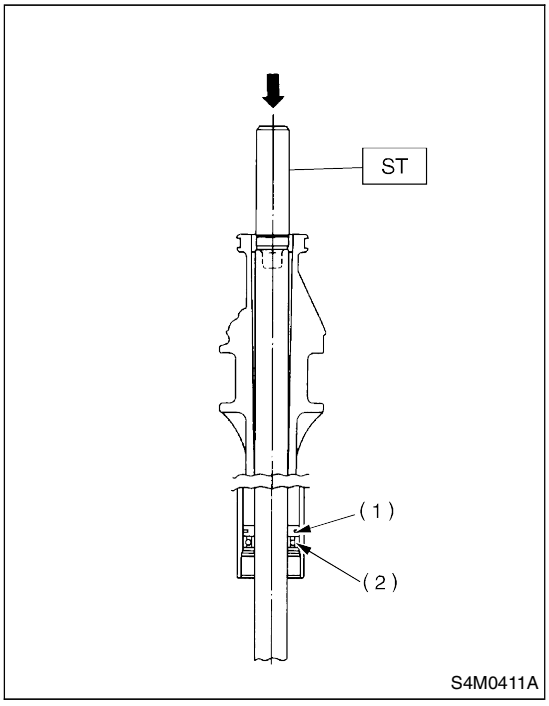
14) Remove holder using a 32 mm wrench or adjustable wrench.

CAUTION:
Discard old holder and replace with new one.



15) Install ST on valve side of rack and press outer side oil seal out.
ST 34099FA030 INSTALLER & REMOVER

CAUTION:
• Block pipe connection of steering body to prevent fluid from flowing out.
• Do not allow rack to come in contact with inner wall of cylinder. Otherwise, cylinder wall may be scratched, resulting in oil leaks.
• Remove holder and rack as a unit.
• Check rack and steering body for bends or cracks; replace as required.
• Discard oil seal after removal and replace with new ones.

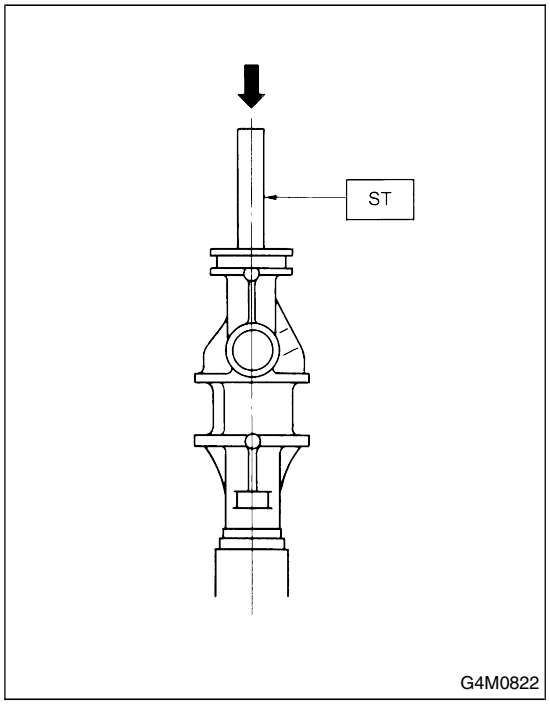


(1) Rack piston
(2) Outer side oil seal

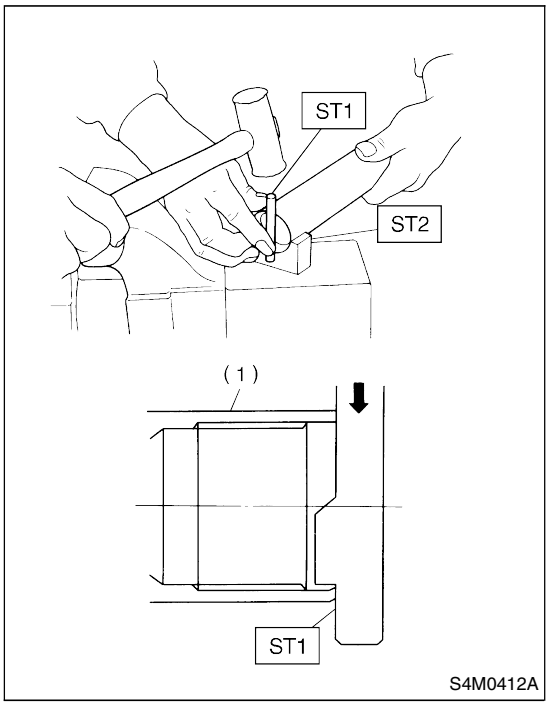
16) Insert ST from valve side and press back-up ring and oil seal out.

CAUTION:
Discard back-up ring and oil seal after removal and replace with new ones.

ST 927580000 REMOVER

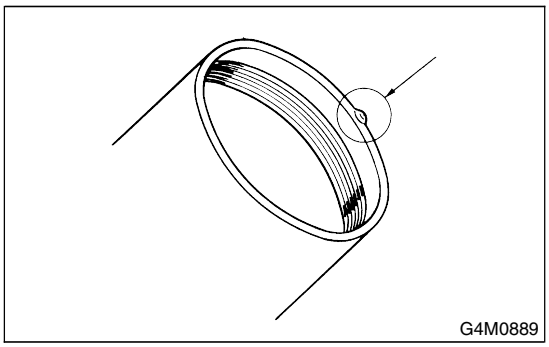


17) Using ST1 and ST2, repair cylinder's clinched sections.
ST1 34099FA080 PUNCH
ST2 34099FA070 BASE



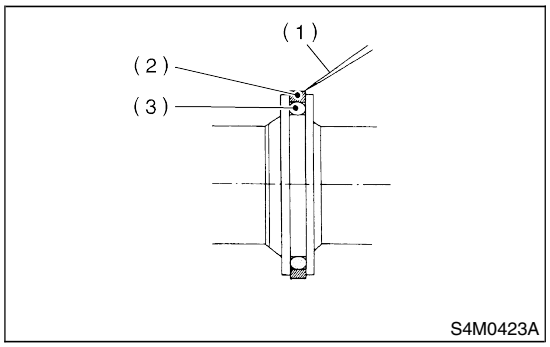
(1) Cylinder

18) If cylinder edge is deformed in a convex shape, repair using an oil stone.



19) Using a sharp-edged, long rod, remove seal ring and O-ring from rack piston.

CAUTION:
Be careful not to scratch outer surface of rack piston and seal ring groove. A scratch may reduce the sealing effect, resulting in faulty piston operation.

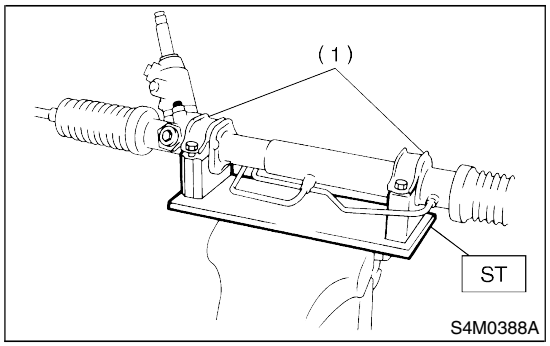


(1) Sharp-edged, long rod
(2) Seal ring
(3) O-ring

2. CONTROL VALVE ASSEMBLY *S601276A0602*

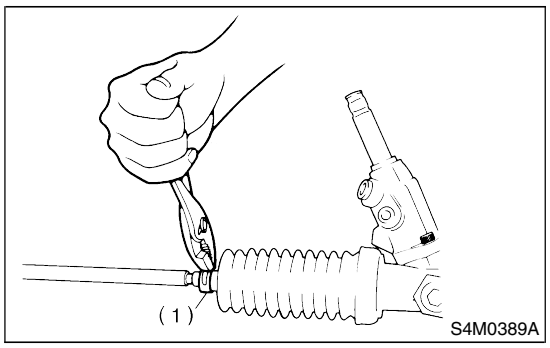
1) Disconnect four pipes from gearbox.
2) Secure gearbox removed from vehicle in vice using ST.
ST 926200000 STAND

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



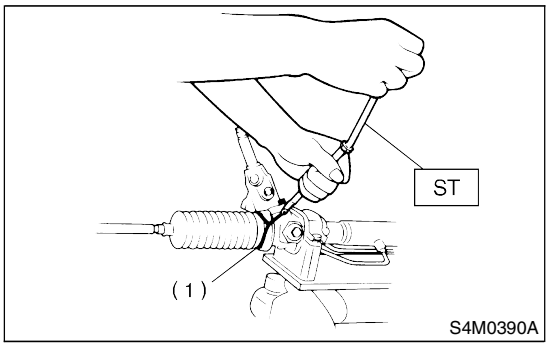
(1) Clamp

3) Pry off clip from outer end of boot, and slide boot toward tie-rod end.



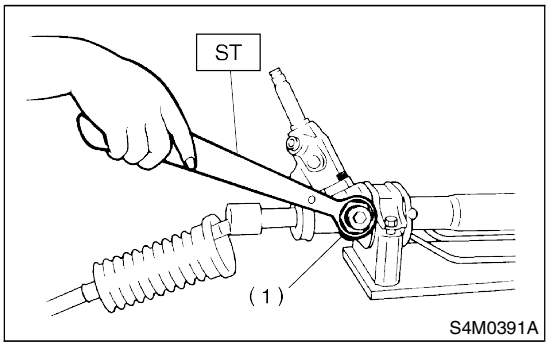
(1) Clip

4) Using ST, remove lock wire from inner end of boot, and remove boot.
ST 927590000 WRENCH



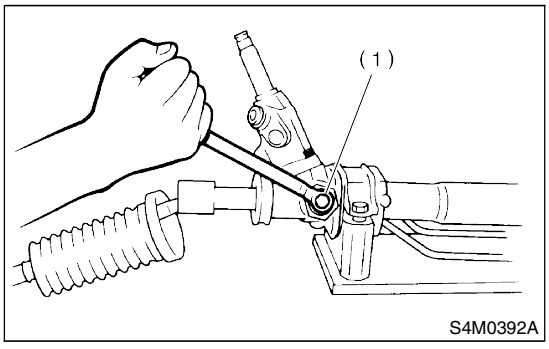
(1) Wire

5) Using ST, loosen lock nut.
ST 926230000 SPANNER



(1) Lock nut

6) Tighten adjusting screw until it no longer tightens.



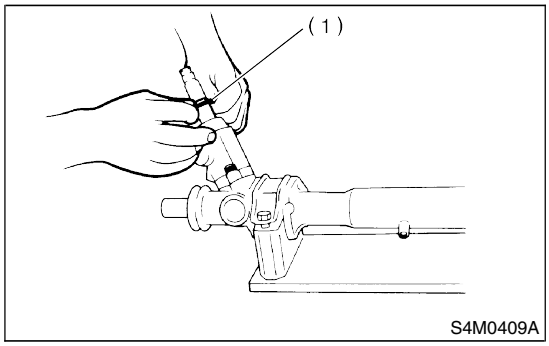
(1) Adjusting screw

7) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

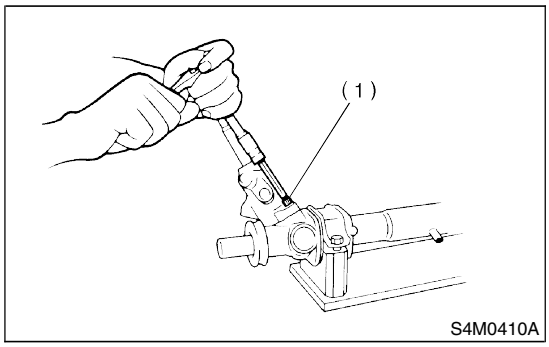
8) Slide dust cover out.

CAUTION:
• Be careful not to scratch housing or input shaft during dust cover removal. Also do not allow foreign matter to enter housing interior.
• Replace dust cover with a new one if its inside bore or lips are worn or damaged.



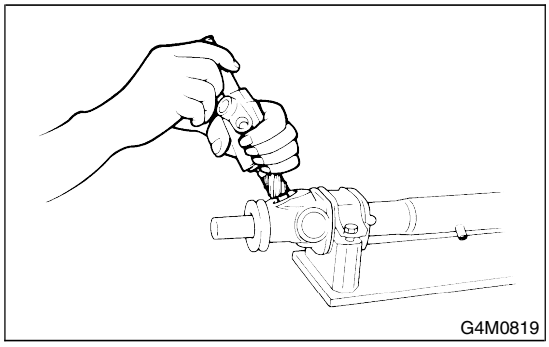
(1) Dust cover

9) Remove the two bolts securing valve housing.



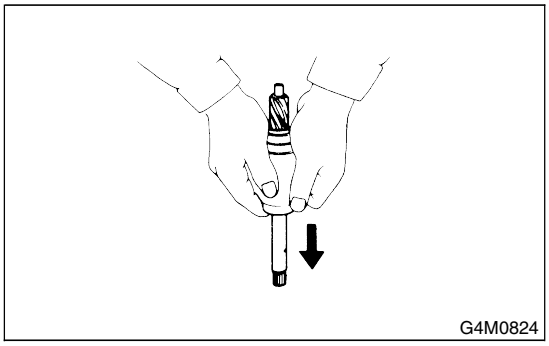
(1) Socket bolt

10) Remove valve housing, pinion and valve as a unit.



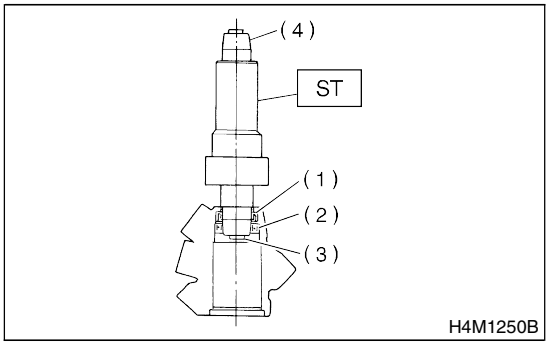
11) After removing dust cover, extract pinion and valve from valve housing.

CAUTION:
• If pinion and valve is difficult to remove, use a press.
• Discard oil seal after removal and replace with a new one.
• Check rotor for bends and serrations for damage and replace as required.



12) Using ST and press, remove dust seal, back-up washer, oil seal and ball bearing from valve housing.

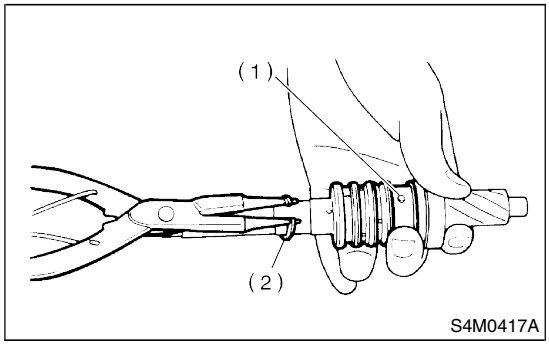
CAUTION:
• Use the "A" end of remover.
• Do not apply a force to end surface of valve housing.
• Do not reuse oil seal after removal.
ST 34099FA000 INSTALLER & REMOVER



(1) Oil seal
(2) Ball bearing
(3) A side
(4) B side

13) Remove snap ring securing valve sleeve to pinion and valve, and remove valve sleeve.

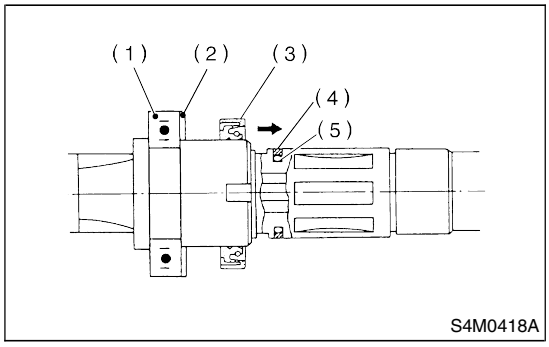
CAUTION:
Be careful not to scratch pinion and valve when removing snap ring.



(1) Valve sleeve
(2) Retaining ring

14) Remove oil seal and spacer.
15) Using a long rod, remove seal ring and O-ring from pinion.

CAUTION:
Be careful not to scratch outer surface and seal ring groove of input shaft. If scratched, sealing effect will be lost, resulting in a malfunctioning valve.



(1) Ball bearing
(2) Spacer
(3) Oil seal
(4) Seal ring
(5) O-ring

D: ASSEMBLY S601276A02

CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

1. RACK HOUSING ASSEMBLY S601276A0201

1) Clean all parts and tools before reassembling.
2) Move rack shaft fully to the left and right two or three times to lubricate shaft ends with grease. Remove excess grease, being careful not to block air vent hole.

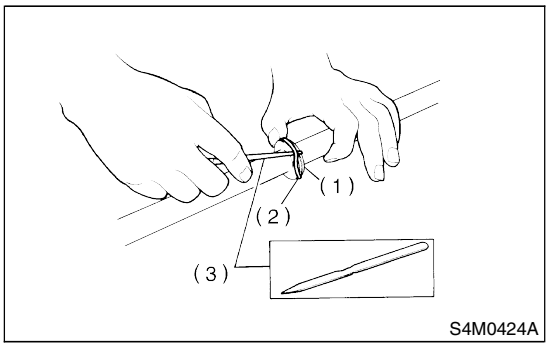
CAUTION:
• When rack is fully moved to its stroke ends with tie-rod removed, be careful not to bump rack ends.
• Ensure that screw located at end of rack shaft is free from grease.

3) Apply grease to bore wall which accommodates sleeve.

CAUTION:
Ensure that hands are clean when applying grease.

4) Install O-ring and seal ring in groove on rack piston.

CAUTION:
• Do not expand O-ring and seal ring more than necessary.
• To facilitate installation of seal ring, first position one half of entire seal ring in groove. Then slowly position the second half using a spatula, as shown.

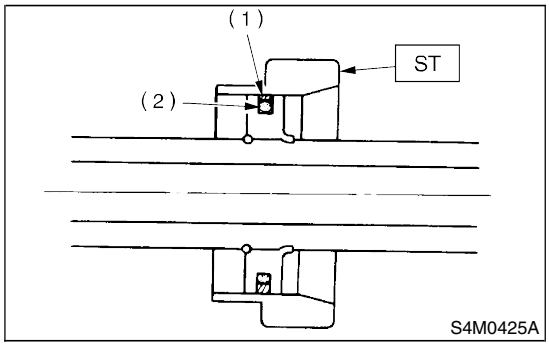


(1) O-ring
(2) Seal ring
(3) Spatula

5) Apply a coat of grease to inner surface of ST and insert rack piston into it. Leave ST at least 10 minutes until seal ring settles down in place.

CAUTION:
Be careful not to scratch rack, piston and seal ring during installation.

ST 927600000 FORMER

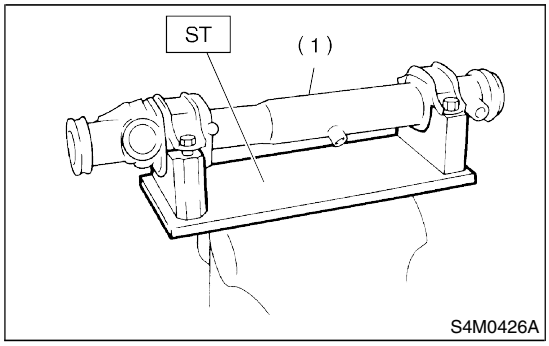


(1) Seal ring
(2) O-ring

6) Attach steering body to ST as shown. Apply a coat of grease to needle bearing.
ST 926200000 STAND

CAUTION:
- **Use a ST to support steering body.**
- **Ensure that needle bearing is free from defects. If it is faulty, replace steering body with a new one.**

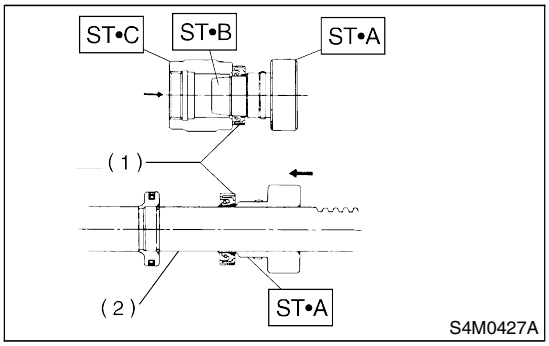
NOTE:
If steering body is removed from vehicle, be sure to remove rust and clean.



(1) Steering body

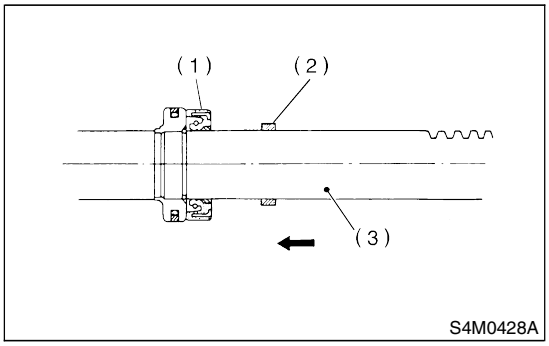
7) Using ST·B and ST·C, attach oil seal to ST·A. Insert ST·A into rack from gear side. Remove oil seal from ST·A when it approaches piston and remove STs from rack.
ST 927490000 INSTALLER; A·B·C

NOTE:
Face oil seal in the direction shown in figure.



(1) Oil-seal
(2) Rack

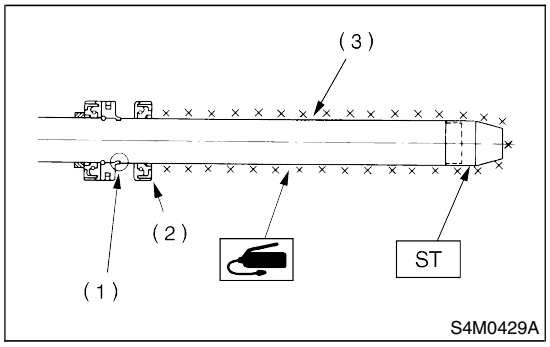
8) Install back-up ring from gear side of rack.



(1) Oil seal
(2) Back-up ring
(3) Rack

9) Install ST on rack and equally apply a thin coat of grease to rack and ST, then install oil seal.
ST 926250000 GUIDE

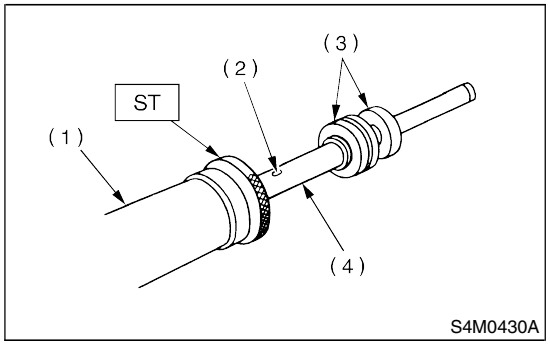
CAUTION:
Be careful not to scratch oil seal lips with piston's knurl section.



(1) Rack piston inner ring
(2) Outer side oil seal
(3) Rack

10) Apply a coat of grease to grooves in rack, sliding surface of sleeve and sealing surface of piston. Install ST on the end of steering body cylinder. Then insert rack into steering body from cylinder side.
ST 34099FA010 GUIDE (Oil seal)

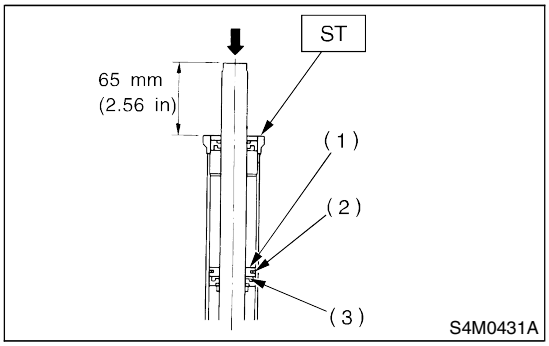
CAUTION:
- **Be sure to apply grease so that it covers the entire surface of rack gear teeth.**
- **Do not allow grease to block air vent hole on rack.**



(1) Cylinder side of steering body
(2) Air vent hole
(3) Oil seal
(4) Rack

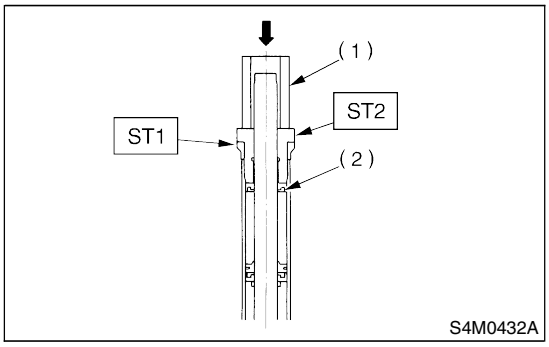
11) Slowly press inner side oil seal until distance between ST and end of rack is 65 mm (2.56 in).
ST 34099FA010 GUIDE (Oil seal)

CAUTION:
Ensure ST's inner wall is free of scratches. Otherwise, it may damage oil seal during installation.



(1) Rack piston
(2) Inner side oil seal
(3) Back-up ring

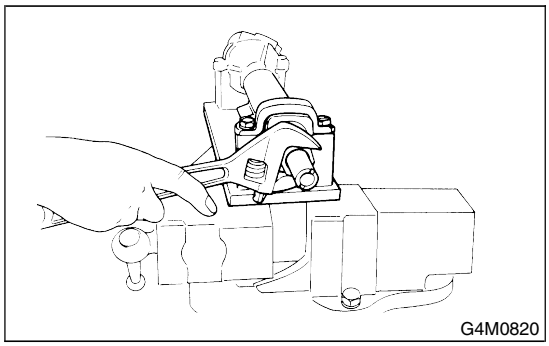
12) Pass ST2 and pipe through rack and press outer side oil seal until ST1 is in contact with ST2.
ST1 34099FA010 GUIDE (Oil seal)
ST2 34099FA040 INSTALLER (Oil seal)



(1) Pipe
(2) Outer side oil seal

13) Install holder from cylinder side of steering body.

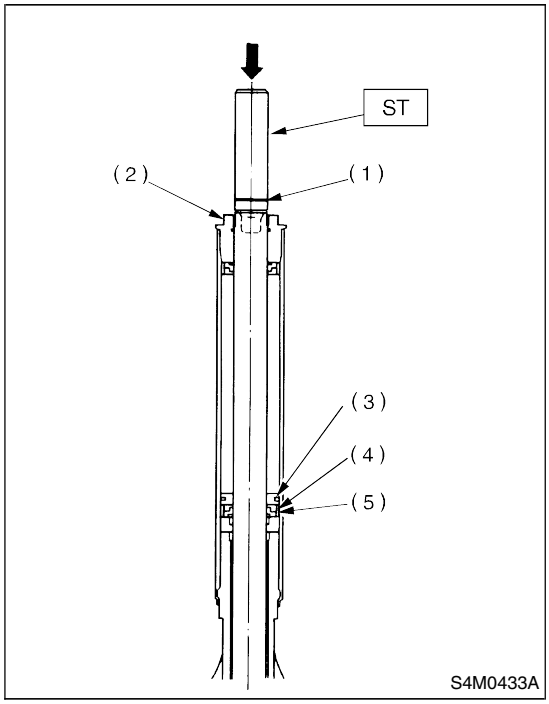
Tightening torque:
64 N·m (6.5 kgf-m, 47.0 ft-lb)



14) Attach ST to rack cylinder. Using a press, install back-up ring and oil seal.

NOTE:
Press ST until its groove is aligned with end of holder.

ST 34099FA030 INSTALLER & REMOVER

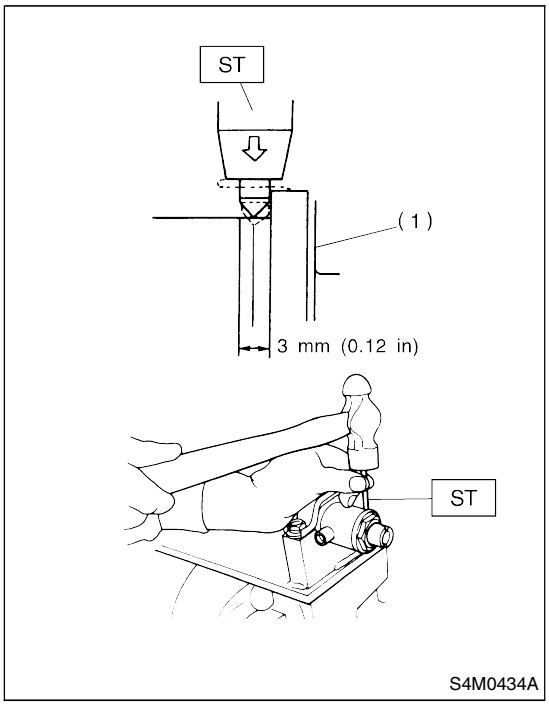


(1) Installer guide
(2) Holder
(3) Rack piston
(4) Oil seal
(5) Back-up ring

15) Using ST, clinch steering body cylinder at a point less than 3 mm (0.12 in) from holder.

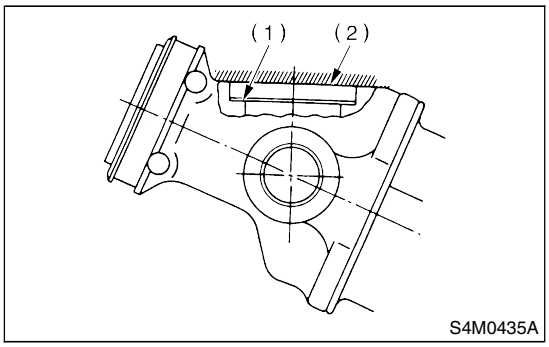
CAUTION:
Be careful not to deform holder.

ST 34099FA060 PUNCH



(1) Holder

16) Remove traces of sealer, oil, rust, etc., from mating surfaces of valve housing and steering body.
17) Position a shim in graded portion of steering body pinion housing, and apply an even coat of sealer (Fuji Bond C: 004403004) to end of pinion housing.

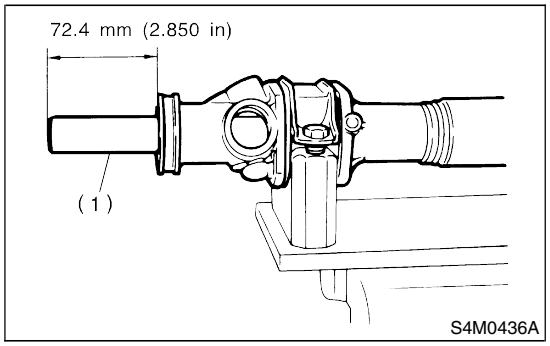


(1) Shim
(2) Fuji Bond C (004403004)

18) Use the same number of shims as that used when steering body was removed.
19) If steering body, valve housing or pinion and valve is replaced with a new one, add two or three shims, install valve on pinion housing and tighten

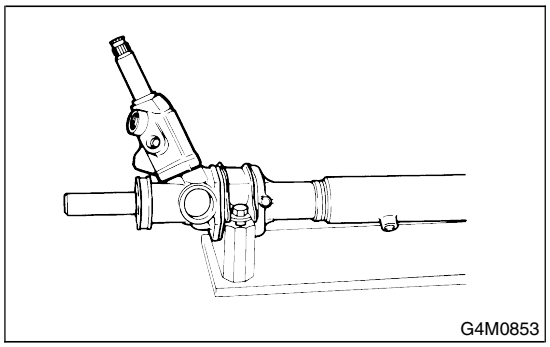
with two bolts to 25 N·m (2.5 kgf-m, 18.1 ft-lb). Then, measure clearance between steering body and valve housing using a thickness gauge. Remove shims so that the clearance is zero.

20) Extend rack 72.4 mm (2.850 in) beyond pinion side of steering body.



(1) Rack

21) Apply grease to pinion gear teeth and ball bearing. Insert valve into place.

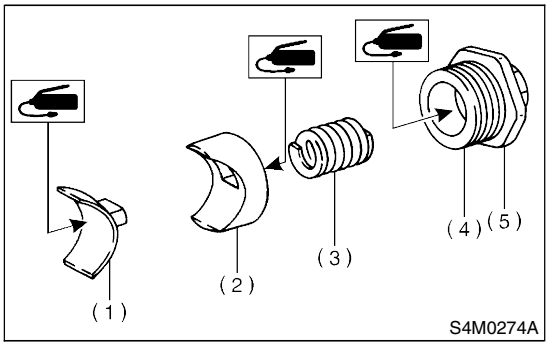


22) Alternately and slowly tighten socket bolts.

NOTE:
Replace faulty parts before installing valve. Otherwise, valve may not be installed properly.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

23) Apply a coat of grease to sliding surface of seat pad, sleeve and seating surface of spring, and insert sleeve into steering body. Charge adjusting screw with grease, insert spring into adjusting screw and install on steering body.

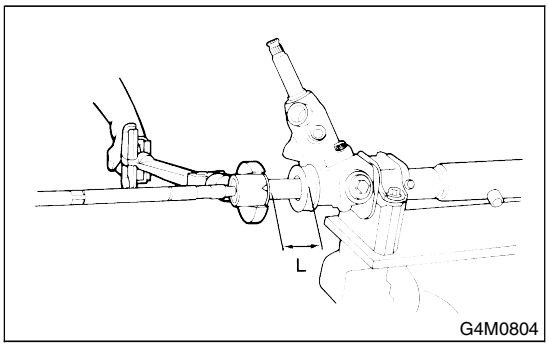


(1) Seat pad
(2) Sleeve
(3) Spring
(4) Adjusting screw
(5) Lock nut

24) Installation of tie-rod
(1) Tighten adjusting screw until it will no longer tighten.
(2) Install lock washers and tighten left and right tie-rods into rack ends.

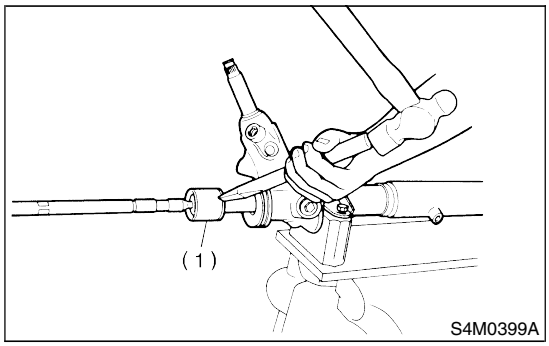
On condition
L: Approximately 40 mm (1.57 in)

Tightening torque:
78 N·m (8.0 kgf-m, 58 ft-lb)



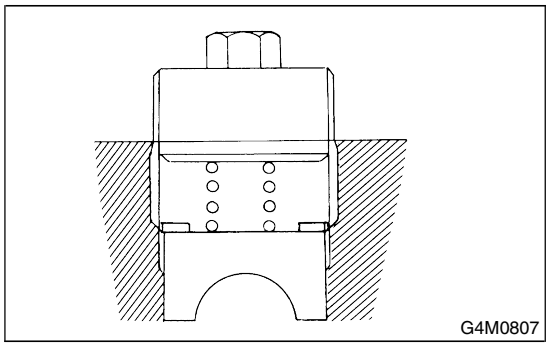
25) Using a chisel and hammer, bend lock washers (at two places).

CAUTION:
Be careful not to scratch rack.



(1) Lock washer

26) Rack and pinion backlash adjustment
(1) Loosen adjusting plug.
(2) Rotate input shaft so that rack is in the straight ahead direction. [Ensure that distance between rack end and stopper is 70.8 mm (2.787 in).]
(3) Tighten adjusting plug by two threads.



(4) Turn adjusting screw so that the entire thread area is coated with liquid packing.

Liquid packing:
THREE BOND 1102 or equivalent

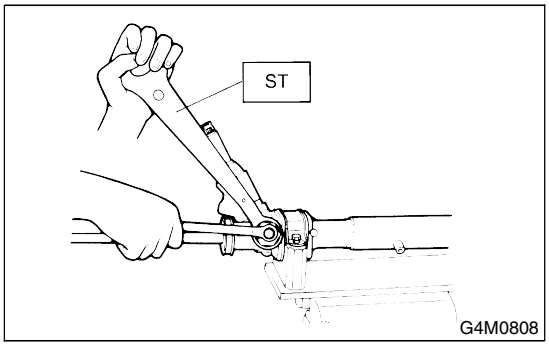
NOTE:
● Apply liquid packing of approximately 1.5 g (0.053 oz) to adjusting screw thread area.
● Also turn plug to ensure that its entire contact area is coated with liquid packing.

(5) Tighten adjusting plug to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, then tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, and finally tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen 30°.
(6) While holding adjusting plug using a closed wrench, tighten lock nut using ST.

ST 926300000 SPANNER

Tightening torque:
39 N·m (4 kgf-m, 29 ft-lb)

CAUTION:
● Do not allow liquid packing to come in contact with sleeve.
● While rotating input shaft to fully move rack shaft to the left and right, ensure that rack moves smoothly without binding, and that rotating torque is constant.

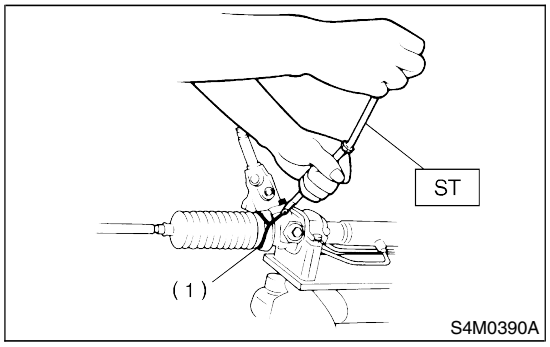


27) Installation of boot
(1) Apply a coat of grease to inner wall of boot small end.
(2) Position boot large end in rubber mount groove and gearbox, and small end in groove of tie-rod.

CAUTION:
● Ensure that both ends of boot are properly situated in grooves.
● Ensure that boot is free from abnormal swelling or dents.

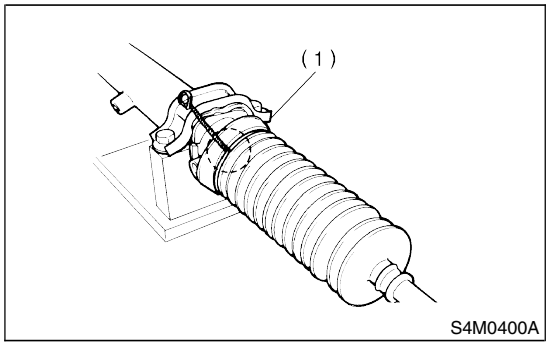
28) Attach lock wire to boot large end, and twist it while pulling it upward (with a force of approximately 39 N (4 kgf, 9 lb).
ST 927590000 WRENCH

CAUTION:
Ensure that lock wire is not loose.



(1) Wire

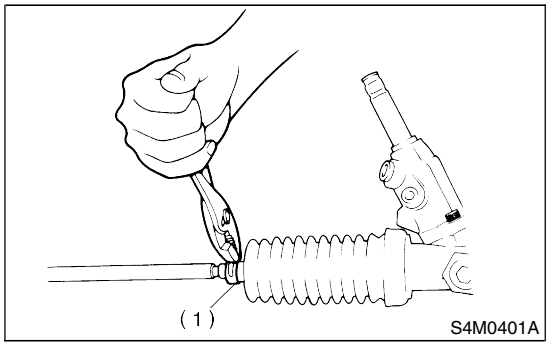
29) Then bend wire end along boot as shown.



(1) Twist wire up to this point.

30) Install clip using pliers.

CAUTION:
After installing clip, ensure that boot's small end is properly positioned in groove on tie-rod.



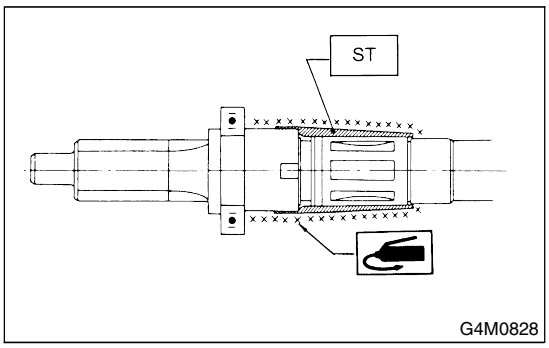
(1) Clip

31) Install pipes A and B.

Tightening torque:
Valve housing side
20 N·m (2.0 kgf-m, 14.5 ft-lb)
Steering body side
24 N·m (2.4 kgf-m, 17.4 ft-lb)

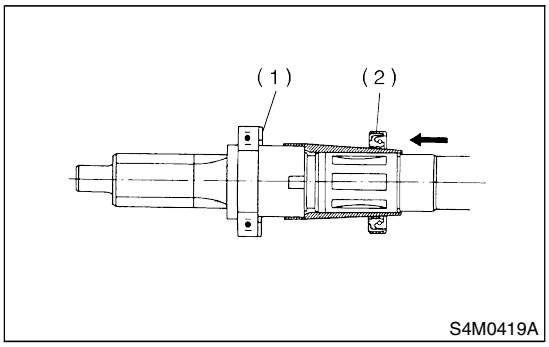
2. CONTROL VALVE ASSEMBLY *S601276A0202*

1) Clean all parts and tools before reassembling.
2) Attach ST to pinion, and apply grease to outer perimeter of the cover and mating surface of oil seal.
ST 926270000 COVER



3) Apply a coat of grease to spacer and sealing lips of oil seal, and install spacer and oil seal.

CAUTION:
- **Face chamfered side of spacer toward oil seal.**
- **Face oil seal in correct direction.**

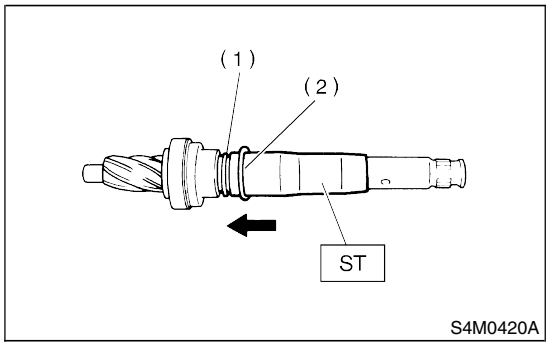


(1) Spacer
(2) Oil seal

4) Install ST to input shaft, and apply a coat of grease to the cover surface. Install O-ring and seal ring.

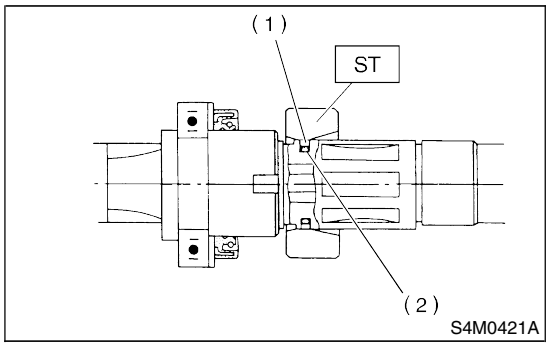
CAUTION:
Do not expand O-ring and seal ring more than necessary.

ST 926450000 COVER



(1) O-ring
(2) Seal ring

5) Apply a coat of grease to inner wall of ST, and secure seal ring assembled in the former procedure as shown. Leave seal ring unattended for approximately 10 minutes until it settles down.
ST 926280000 FORMER



(1) Seal ring
(2) O-ring

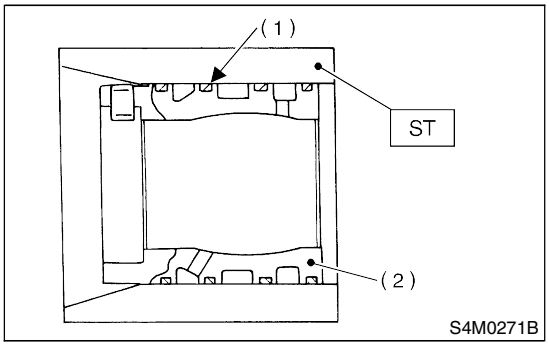
6) Remove the four seal rings from the valve sleeve using a sharp-pointed tool.

CAUTION:
Be careful not to scratch seal ring grooves on the valve sleeve. A scratch may reduce the sealing effect, resulting in faulty valve operation.

7) Clean the valve sleeve.
8) Attach the four seal rings to the valve sleeve grooves.

CAUTION:
Do not expand the seal rings more than necessary.

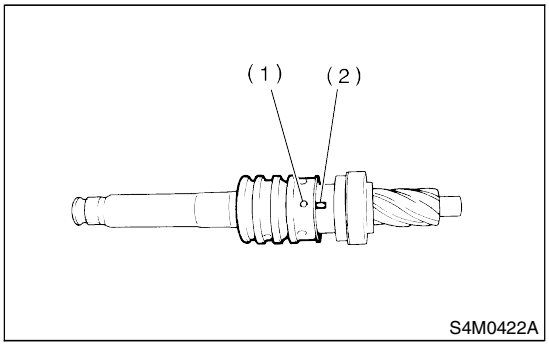
9) Apply a coat of grease to the inner wall of the ST. Secure the four seal rings (installed in the former procedure) using the ST as shown in the figure. Leave the seal rings for approximately 10 minutes until they have properly set.
ST 926050000 FORMER



(1) Seal ring
(2) Valve sleeve

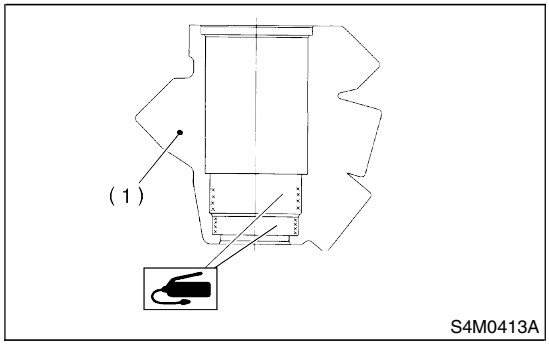
10) While aligning valve sleeve pin with groove on pinion, secure with snap ring.

CAUTION:
• Be careful not to damage inner wall of valve sleeve and contact surface of pinion.
• Before assembling valve sleeve and pinion, clean in kerosene and dry with compressed air.



(1) Pin
(2) Groove on pinion

11) Apply a coat of grease to inner wall of valve housing, oil seal and outer perimeter of dust seal.



(1) Valve housing

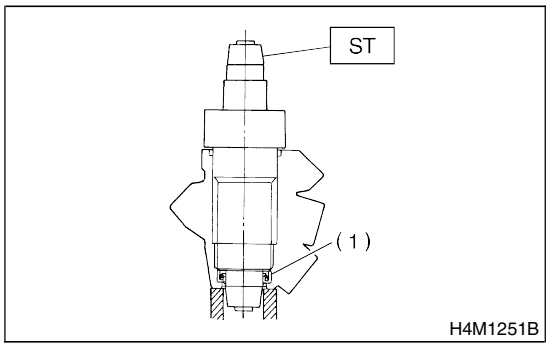
12) Using ST and press, install oil seal in valve housing.

(1) Face oil seal in the direction shown in figure when installing.

(2) To avoid scratching oil seal, apply a coat of grease to contact surface of installer and oil seal.

(3) To facilitate installation, attach oil seal to installer and position in valve housing before pressing into place.

ST 34099FA000 INSTALLER & REMOVER



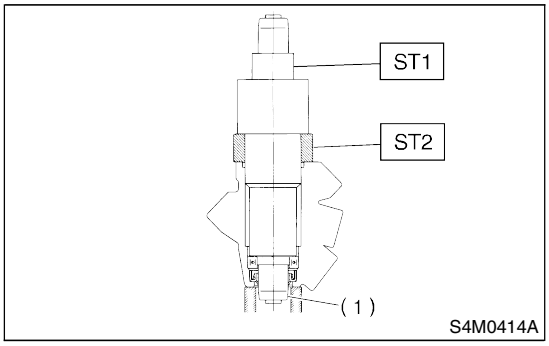
(1) Oil seal

13) Attach ST2 to ST1, and press ball bearing into place using a press.

NOTE:

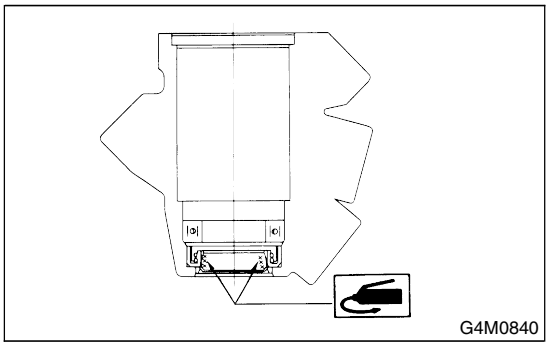
- To facilitate installation, attach ball bearing to remover and position in valve housing before pressing it into place.
- Use the “B” end of remover.

ST1 34099FA000 INSTALLER & REMOVER
ST2 34099FA050 SPACER



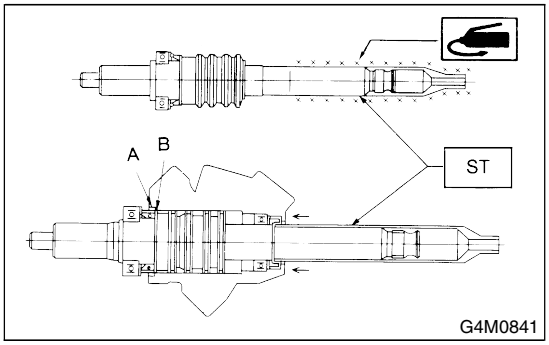
(1) B side

14) Charge oil seal with specified steering grease.



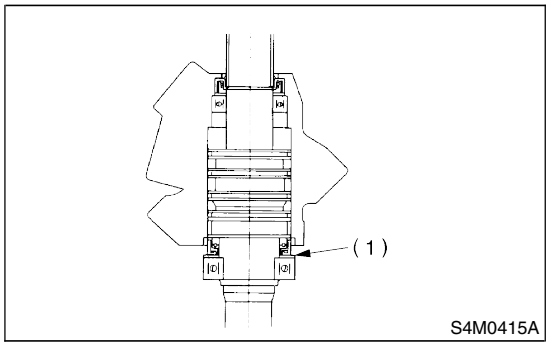
15) Apply a coat of specified steering grease to ST surface, and install ST onto end of input shaft. Insert pinion and valve until “A” of oil seal contacts “B” of valve housing. The ST is used to prevent scratching oil seal.

ST 34099FA020 GUIDE



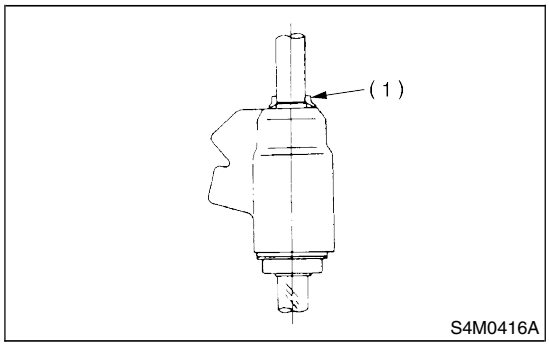
16) While supporting pinion and valve, push end of pinion until bearing contacts brazed end of valve housing.

CAUTION:
Do not allow spacer to extend beyond brazed end. Otherwise, pinion cannot be inserted properly.



(1) Spacer

17) Apply a coat of grease to sealing lips of dust cover, and insert dust cover until it contacts staged portion of input shaft.



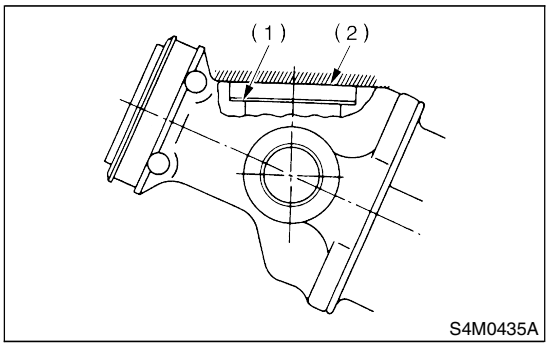
(1) Dust cover

18) Adjust sealing lip-to-housing end clearance to 0 to 0.5 mm (0 to 0.020 in). If sealing lip is too close to housing end, steering wheel will not return smoothly; if it is too far from housing end, dust or dirt will enter the clearance.

NOTE:
Ensure that pinion and valve is properly positioned in valve housing before adjustment.

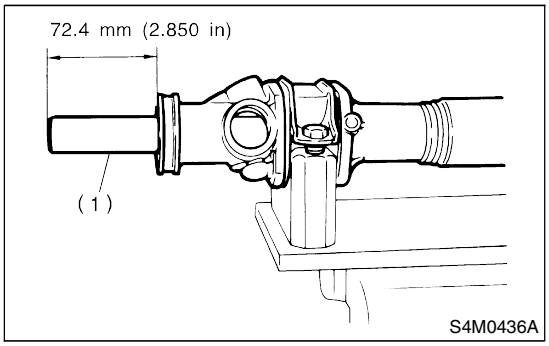
19) Remove traces of sealer, oil, rust, etc., from mating surfaces of valve housing and steering body.

20) Position a shim in graded portion of steering body pinion housing, and apply an even coat of sealer (Fuji Bond C: 004403004) to end of pinion housing.



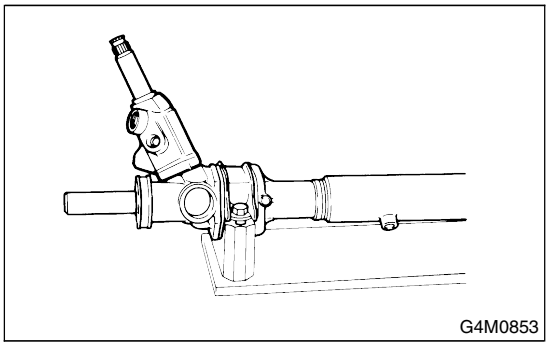
(1) Shim
(2) Fuji Bond C (004403004)

21) Use the same number of shims as that used when steering body was removed.
22) If steering body, valve housing or pinion and valve is replaced with a new one, add two or three shims, install valve on pinion housing and tighten with two bolts to 25 N·m (2.5 kgf-m, 18.1 ft-lb). Then, measure clearance between steering body and valve housing using a thickness gauge. Remove shims so that the clearance is zero.
23) Extend rack 72.4 mm (2.850 in) beyond pinion side of steering body.



(1) Rack

24) Apply grease to pinion gear teeth and ball bearing. Insert valve into place.

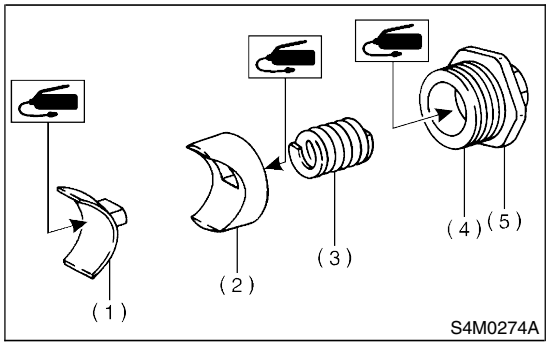


25) Alternately and slowly tighten socket bolts.

NOTE:
Replace faulty parts before installing valve. Otherwise, valve may not be installed properly.

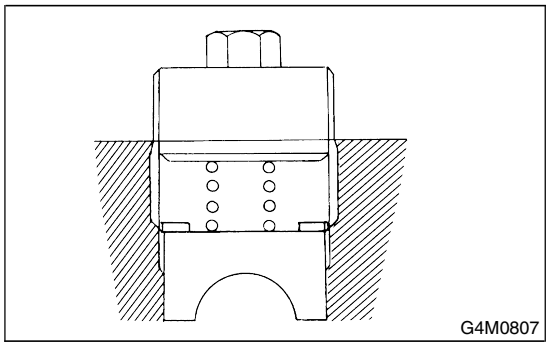
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

26) Apply a coat of grease to sliding surface of seat pad, sleeve and seating surface of spring, and insert sleeve into steering body. Charge adjusting screw with grease, insert spring into adjusting screw and install on steering body.



(1) Seat pad
(2) Sleeve
(3) Spring
(4) Adjusting screw
(5) Lock nut

27) Rack and pinion backlash adjustment
(1) Loosen adjusting plug.
(2) Rotate input shaft so that rack is in the straight ahead direction. [Ensure that distance between rack end and stopper is 70.8 mm (2.787 in).]
(3) Tighten adjusting plug by two threads.



(4) Turn adjusting screw so that the entire thread area is coated with liquid packing.

Liquid packing:
THREE BOND 1102 or equivalent

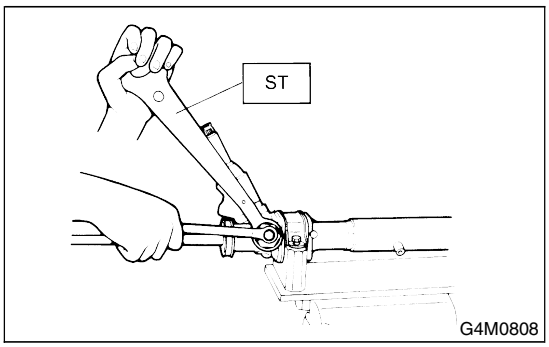
NOTE:
• Apply liquid packing of approximately 1.5 grams (0.053 oz) to adjusting screw thread area.
• Also turn plug to ensure that its entire contact area is coated with liquid packing.

(5) Tighten adjusting plug to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, then tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen, and finally tighten to 5 N·m (0.5 kgf-m, 3.6 ft-lb) and loosen 30°.
(6) While holding adjusting plug using a closed wrench, tighten lock nut using ST.

ST 926300000 SPANNER

Tightening torque:
39 N·m (4 kgf-m, 29 ft-lb)

CAUTION:
• Do not allow liquid packing to come in contact with sleeve.
• While rotating input shaft to fully move rack shaft to the left and right, ensure that rack moves smoothly without binding, and that rotating torque is constant.

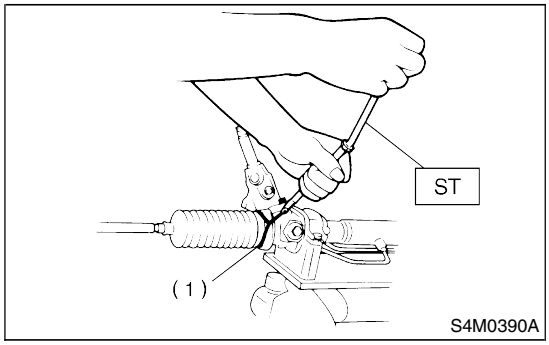


28) Installation of boot
(1) Apply a coat of grease to inner wall of boot small end.
(2) Position boot large end in rubber mount groove and gearbox, and small end in groove of tie-rod.

CAUTION:
• Ensure that both ends of boot are properly situated in grooves.
• Ensure that boot is free from abnormal swelling or dents.

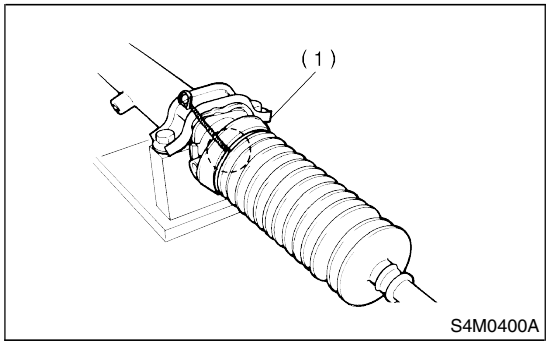
29) Attach lock wire to boot large end, and twist it while pulling it upward (with a force of approximately 39 N (4 kgf, 9 lb).
ST 927590000 WRENCH

CAUTION:
Ensure that lock wire is not loose.



(1) Wire

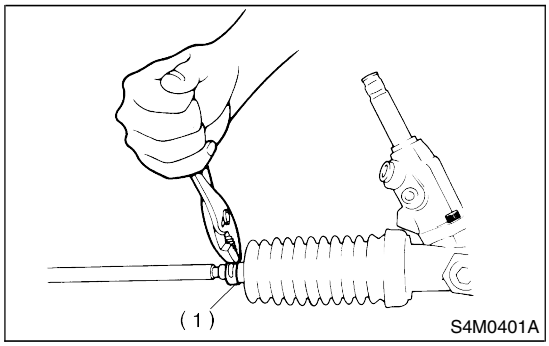
30) Then bend wire end along boot as shown.



(1) Twist wire up to this point.

31) Install clip using pliers.

CAUTION:
After installing clip, ensure that boot's small end is properly positioned in groove on tie-rod.



(1) Clip

E: INSPECTION S601276A10

1. BASIC INSPECTION S601276A1001

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.

2. SERVICE LIMIT S601276A1002

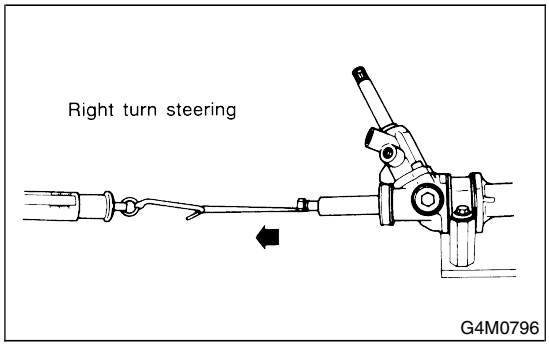
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

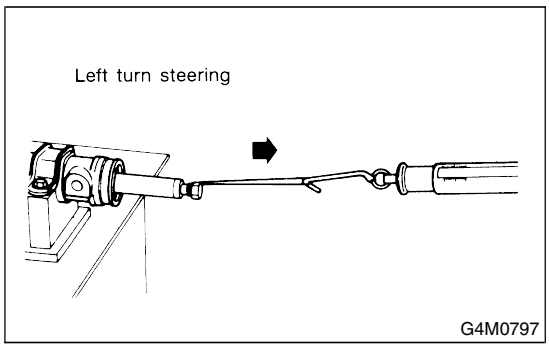
NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.
ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
304 N (31 kgf, 68 lb) or less

Difference between left and right sliding resistance
Less than 20%



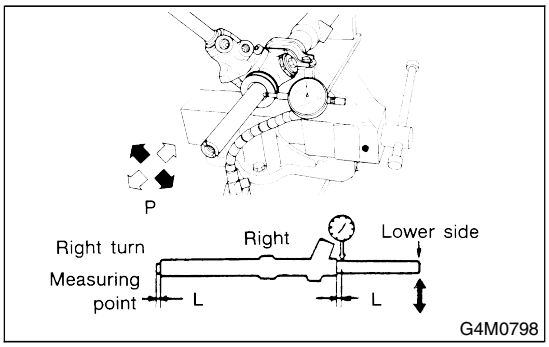


3. RACK SHAFT PLAY IN RADIAL DIRECTION S601276A1003

Right-turn steering:

Service limit
Less than 0.4 mm (0.016 in) (direction ⬅ ➡)
Less than 0.6 mm (0.024 in) (direction ⇦ ⇨)

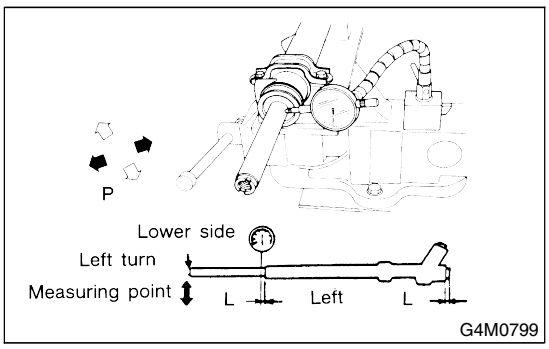
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lb)



Left-turn steering:

Service limit
Less than 0.4 mm (0.016 in) (direction ⬅ ➡ and ⇦ ⇨)

On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lb)

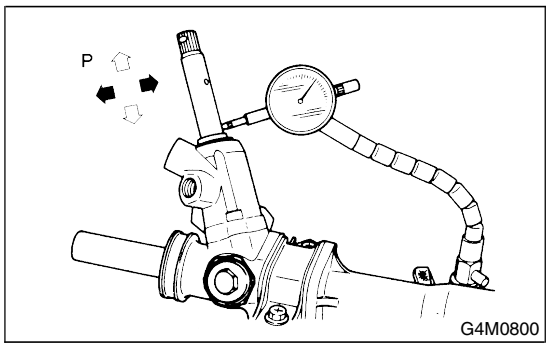


4. INPUT SHAFT PLAY S601276A1004

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

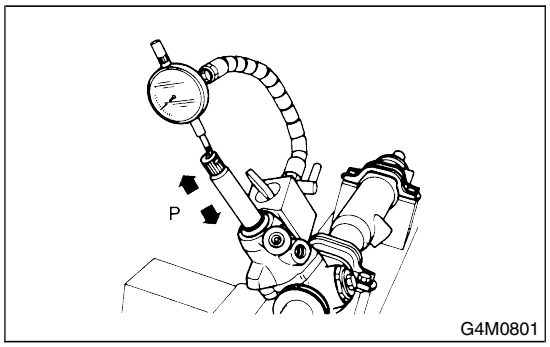
On condition
P: 98 N (10 kgf, 22 lb)



In axial direction:

Service limit
0.27 mm (0.0106 in) or less

On condition
P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)



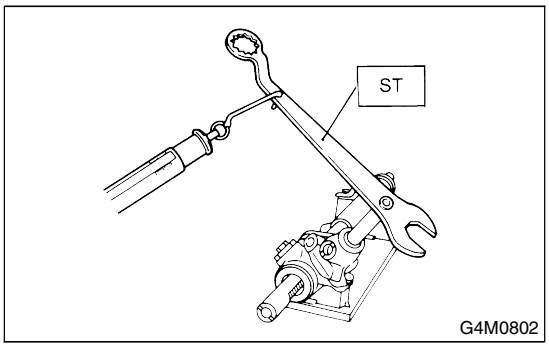
5. TURNING RESISTANCE OF GEARBOX

S601276A1005

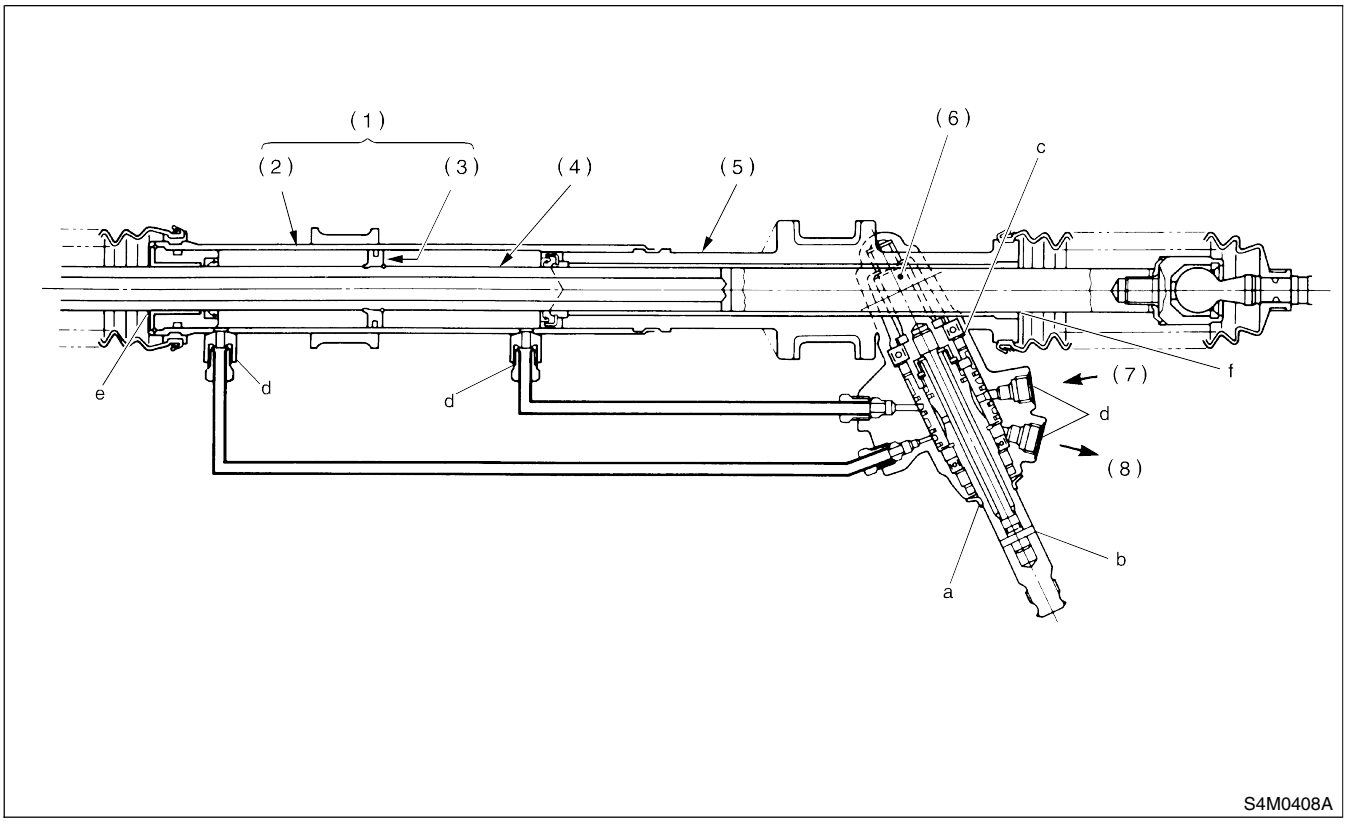
Using ST, measure gearbox turning resistance.
ST 926230000 SPANNER

Service limit:
Straight-ahead position within 30 mm (1.18 in) from rack center
Less than 11.18 N (1.14 kgf, 2.51 lb)
Maximum allowable resistance
15.79 N (1.61 kgf, 3.55 lb) or less

Difference between left and right sliding resistance:
Less than 20%



6. OIL LEAKING S601276A1006



(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack shaft
(5) Gearbox
(6) Pinion shaft
(7) From pump
(8) To tank

NOTE:
If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.

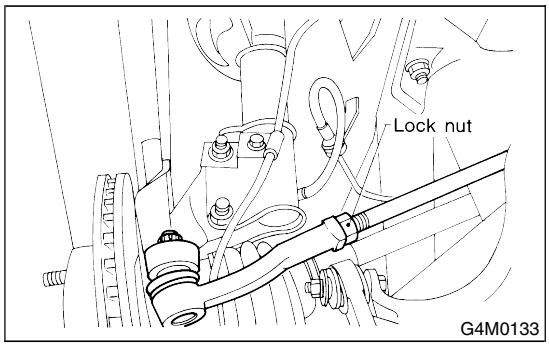
1) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.
2) Inspect leakage from “a”.
The oil seal is damaged. Replace valve assembly with a new one.
3) Inspect leakage from “b”.
The torsion bar O-ring is damaged. Replace valve assembly with a new one.
4) Inspect leakage from “c”.
The oil seal is damaged. Replace valve assembly with a new one.
5) Inspect leakage from “d”.
The pipe is damaged. Replace the faulty pipe or O-ring.
6) 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) Inspect leakage from “e”.
The cylinder seal is damaged. Replace rack bushing with a new one.
(2) Inspect 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

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.

F: ADJUSTMENT S601276A01

1) Adjust front toe.

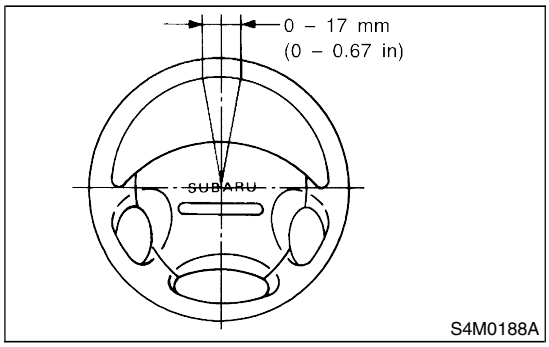
Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



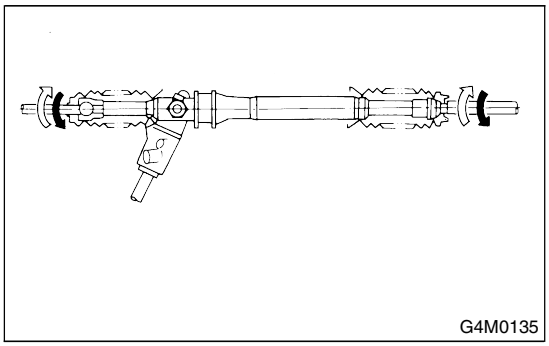
2) Adjust steering angle of wheels.

Standard of steering angle:
Inner wheel: 37.4°±1.5°
Outer wheel: 32.5°±1.5°

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.



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 amount.

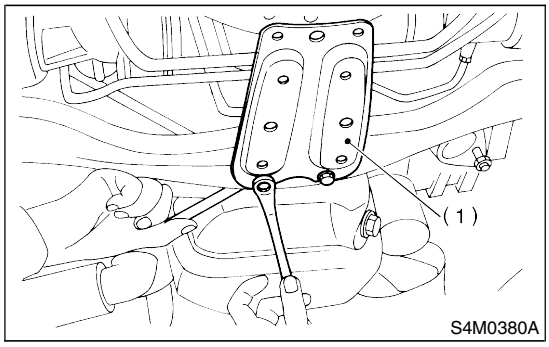


7. Pipe Assembly S601277

A: REMOVAL S601277A18

1. NON-TURBO MODEL S601277A1803

1) Set the vehicle on the lift.
2) Disconnect battery minus terminal.
3) Lift vehicle and remove jack-up plate.

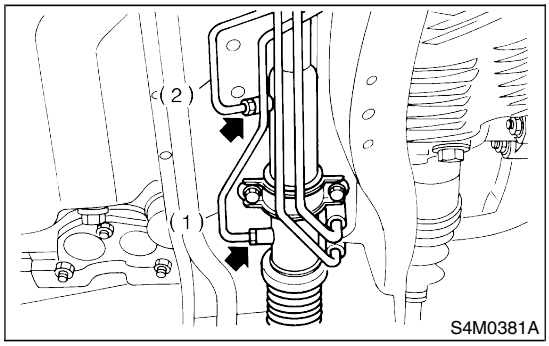


(1) Jack-up plate

4) 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.

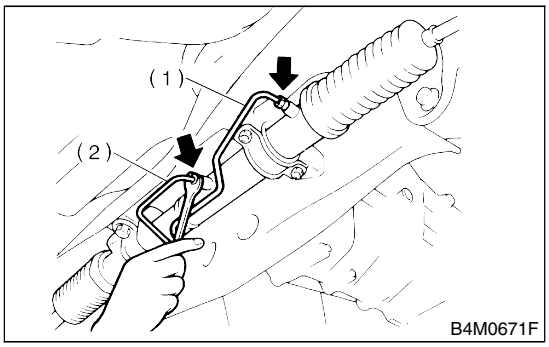
CAUTION:
Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.

LHD model



(1) Pipe A
(2) Pipe B

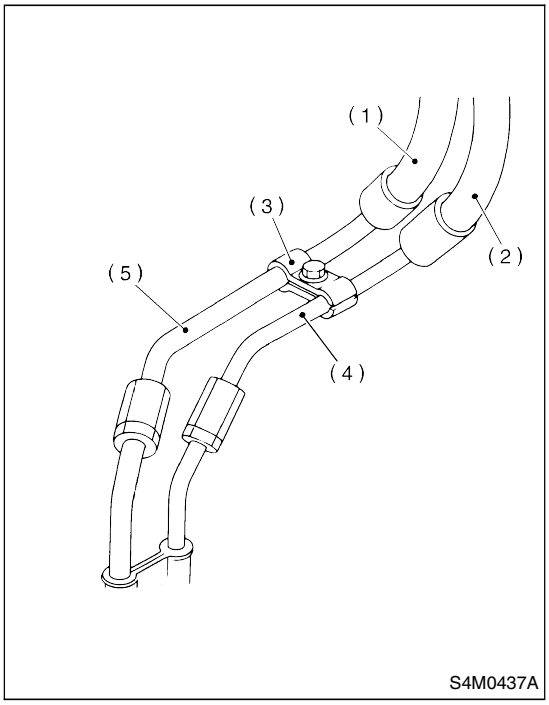
RHD model



(1) Pipe A
(2) Pipe B

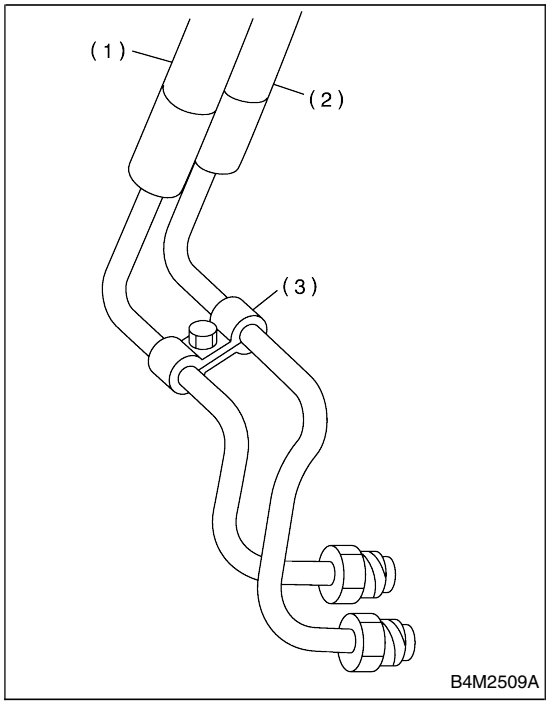
5) Remove clamp E from pipes.

LHD model



(1) Return hose
(2) Pressure hose
(3) Clamp E
(4) Pipe C
(5) Pipe D

RHD model



6) Disconnect pipe C·D.

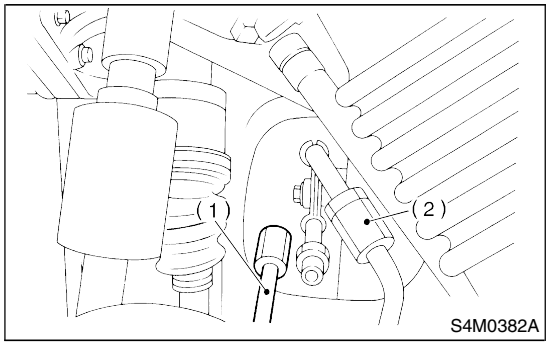
(1) LHD model

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.



(1) Pipe C
(2) Pipe D

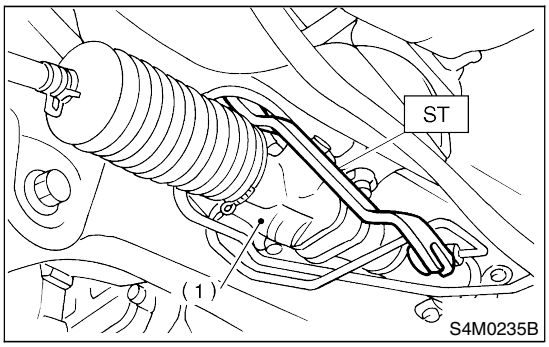
(2) RHD model

Using ST, remove flare nuts from control valve of gearbox assembly, and then disconnect pipe.
ST 34099AC050 GEARBOX SPANNER

CAUTION:

• When disconnecting pipes, use two wrenches to prevent deformities.

• Be careful to keep pipe connections free from foreign matter.



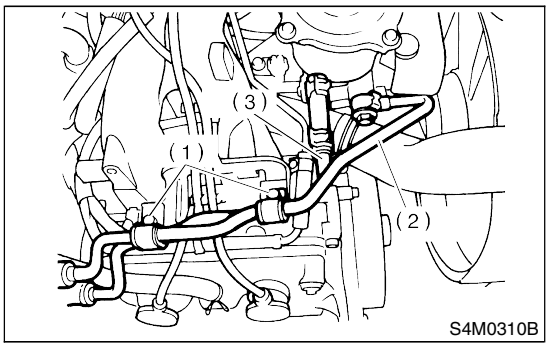
(1) Steering gearbox

7) Lower the vehicle.
8) Remove intake duct and cleaner case. <Ref. IN(SOHC)-8, INSTALLATION, Air Intake Duct.> and <Ref. IN(SOHC)-7, Air Cleaner Case.>
9) Remove bolt A.
10) 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.

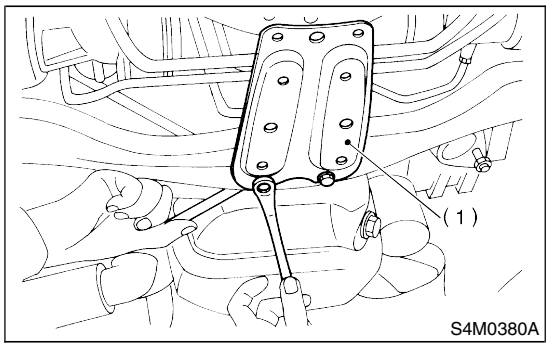


(1) Bolt A
(2) Pipe C
(3) Pipe D

2. TURBO MODEL *S601277A1804*

1) Set the vehicle on the lift.
2) Disconnect battery minus terminal.

3) Lift vehicle and remove jack-up plate.

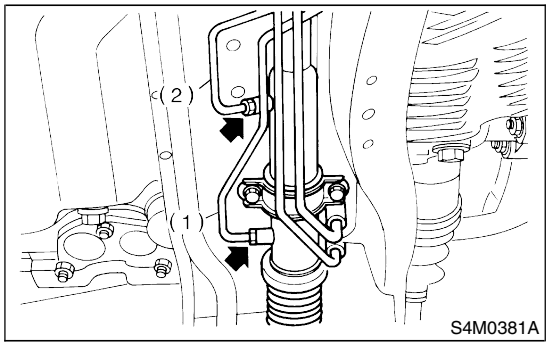


(1) Jack-up plate

4) 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.

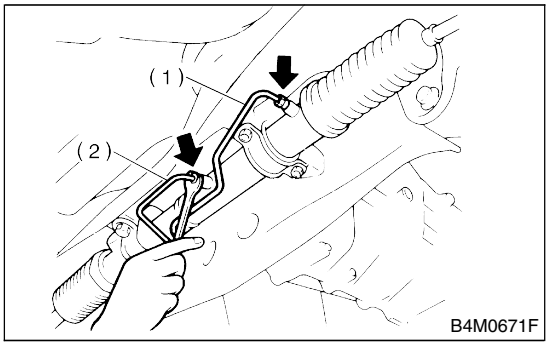
CAUTION:
Improper removal and installation of parts often causes fluid leak trouble. To prevent this, clean the surrounding portions before disassembly and reassembly, and pay special attention to keep dirt and other foreign matter from mating surfaces.

LHD model



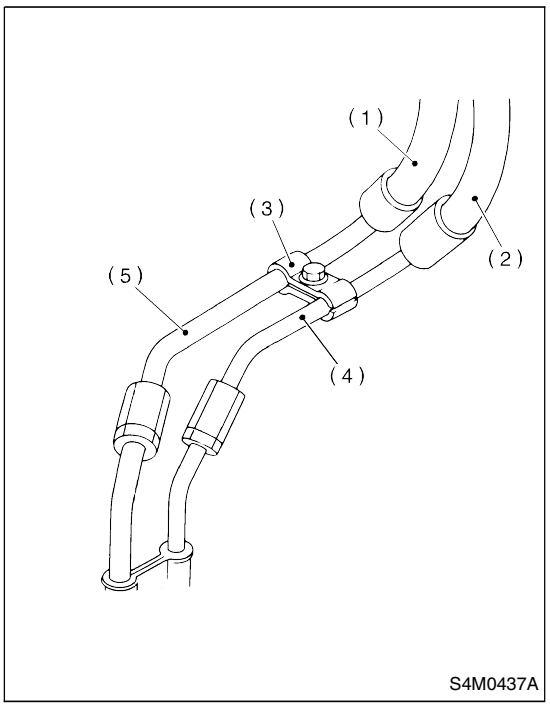
(1) Pipe A
(2) Pipe B

RHD model



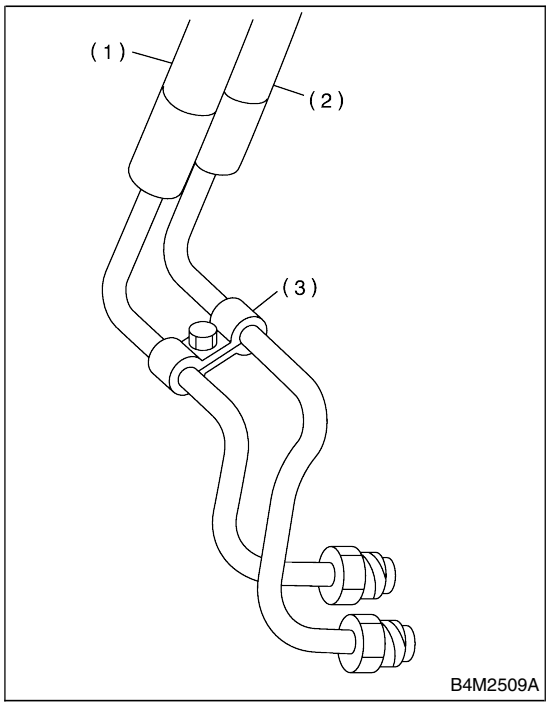
(1) Pipe A
(2) Pipe B

5) Remove clamp E from pipes.
LHD model



(1) Return hose
(2) Pressure hose
(3) Clamp E
(4) Pipe C
(5) Pipe D

RHD model



6) Disconnect pipe C·D.

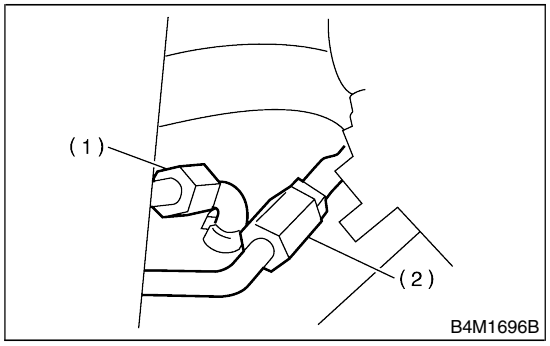
(1) LHD model

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.



(1) Pipe C
(2) Pipe D

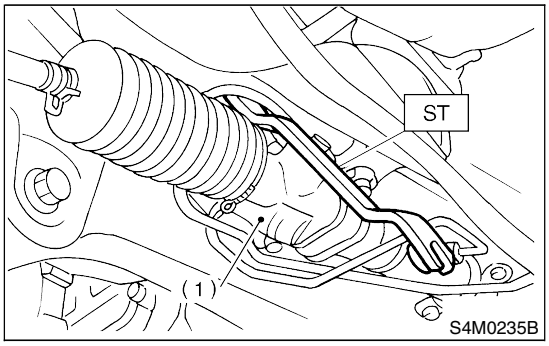
(2) RHD model

Using ST, remove flare nuts from control valve of gearbox assembly, and then disconnect pipe.
ST 34099AC050 GEARBOX SPANNER

CAUTION:

● When disconnecting pipes, use two wrenches to prevent deformities.

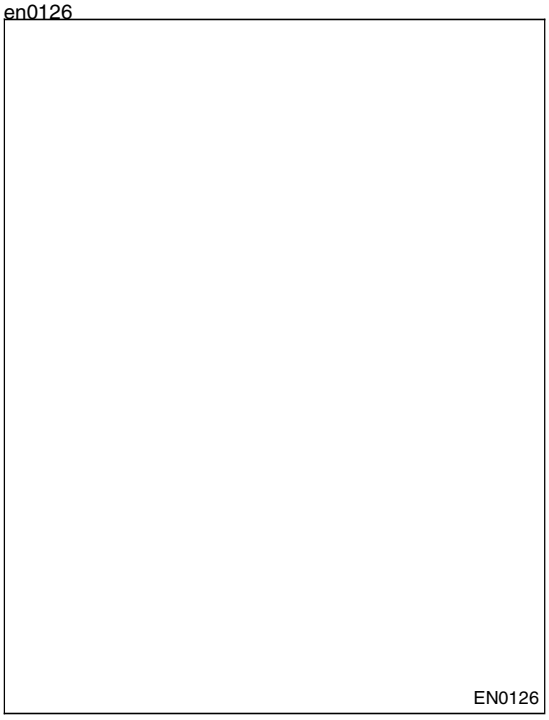
● Be careful to keep pipe connections free from foreign matter.



(1) Steering gearbox

7) Lower the vehicle.
8) Remove intake duct.
9) Remove bolt A.
(1) Remove air intake duct, air cleaner upper cover and air intake boot.
<Ref. to IN(DOHC TURBO)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(DOHC TURBO)-9, REMOVAL, Intake Duct.>
(2) Remove two bolts fixing pipe C and D.
(3) Remove coolant filler tank.

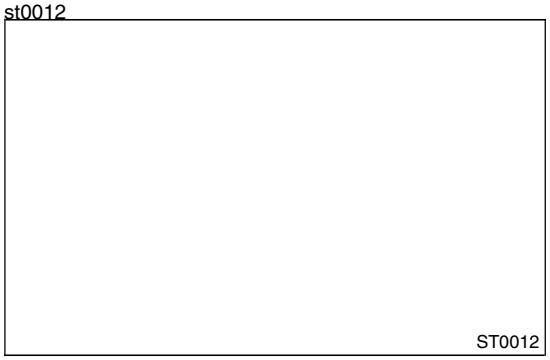
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(4) Disconnect pipe C from oil pump. Disconnect pipe D from return hose.

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.

st0012



(1) Pipe C
(2) Pipe D

B: INSTALLATION S601277A11

1. NON-TURBO MODEL S601277A1103

1) Tighten bolt A.

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

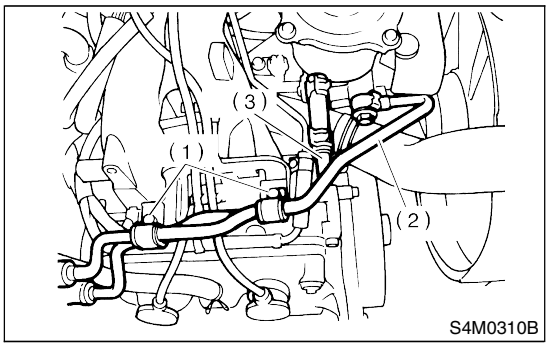
(1) Connect pipe D to oil tank.
(2) Connect pipe C or pressure hose to oil pump.

CAUTION:
Use a new gasket.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

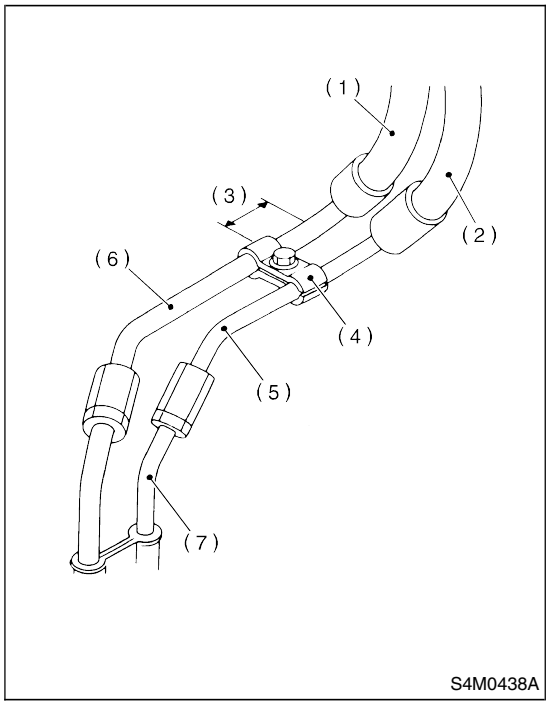
(3) Tighten bolt A.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Bolt A
(2) Pipe C
(3) Pipe D

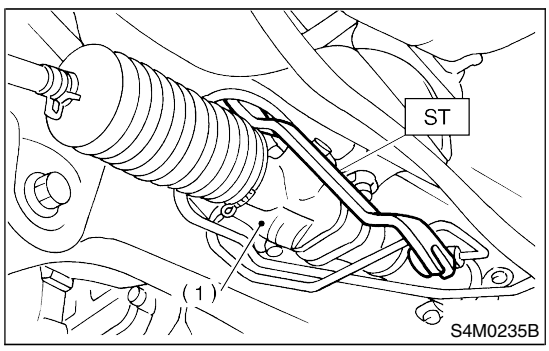
2) Temporarily connect pipes C and D. (LHD model)



(1) Return hose
(2) Pressure hose
(3) Approx. 30 mm (1.18 in)
(4) Clamp E
(5) Pipe C
(6) Pipe
(7) Pipe (on gearbox side)

3) Using ST, remove flare nuts from control valve of gearbox assembly, and disconnect upper and lower hoses.
ST 34099AC050 GEARBOX SPANNER

CAUTION:
• Always disconnect hoses B and A in that order.
• Be careful not to damage the hoses during removal.

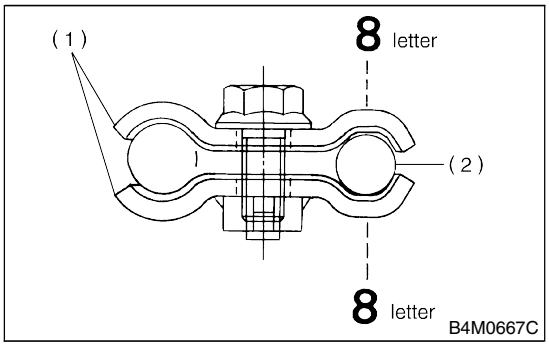


(1) Steering gearbox

4) Temporarily install clamp E on pipes C and D, and tighten clamp E firmly.

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

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



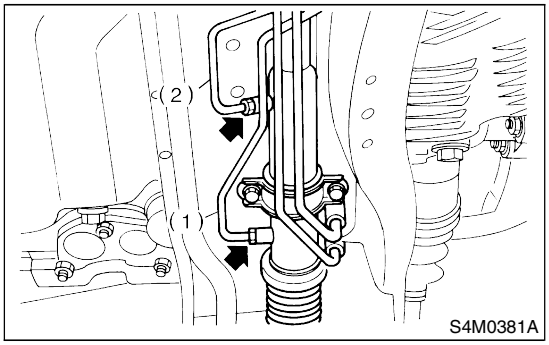
(1) Clamp E
(2) Pipe C

5) Tighten joint nut.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

6) Connect pipe A and B.
(1) LHD model
Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A second.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

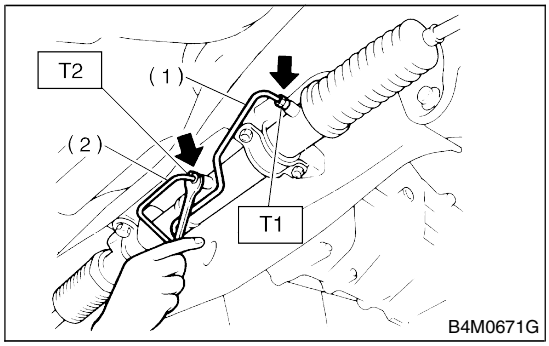


(1) Pipe A
(2) Pipe B

(2) RHD model

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

Tightening torque:
T1: 20 N·m (2.0 kgf-m, 14.5 ft-lb)
T2: 24 N·m (2.4 kgf-m, 17.4 ft-lb)

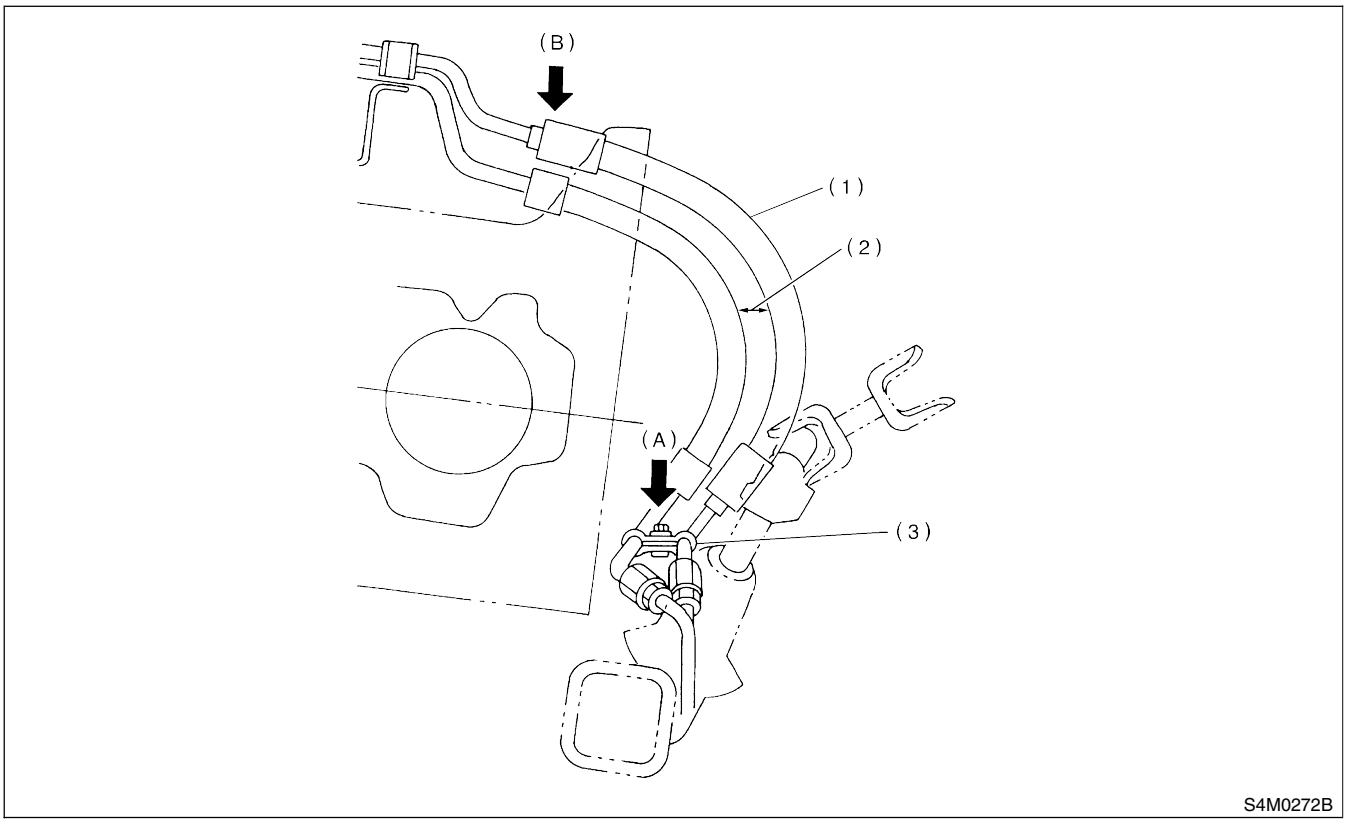


(1) Pipe A
(2) Pipe B

7) Install jack-up plate.
8) Connect battery ground terminal.
9) Feed the specified fluid.

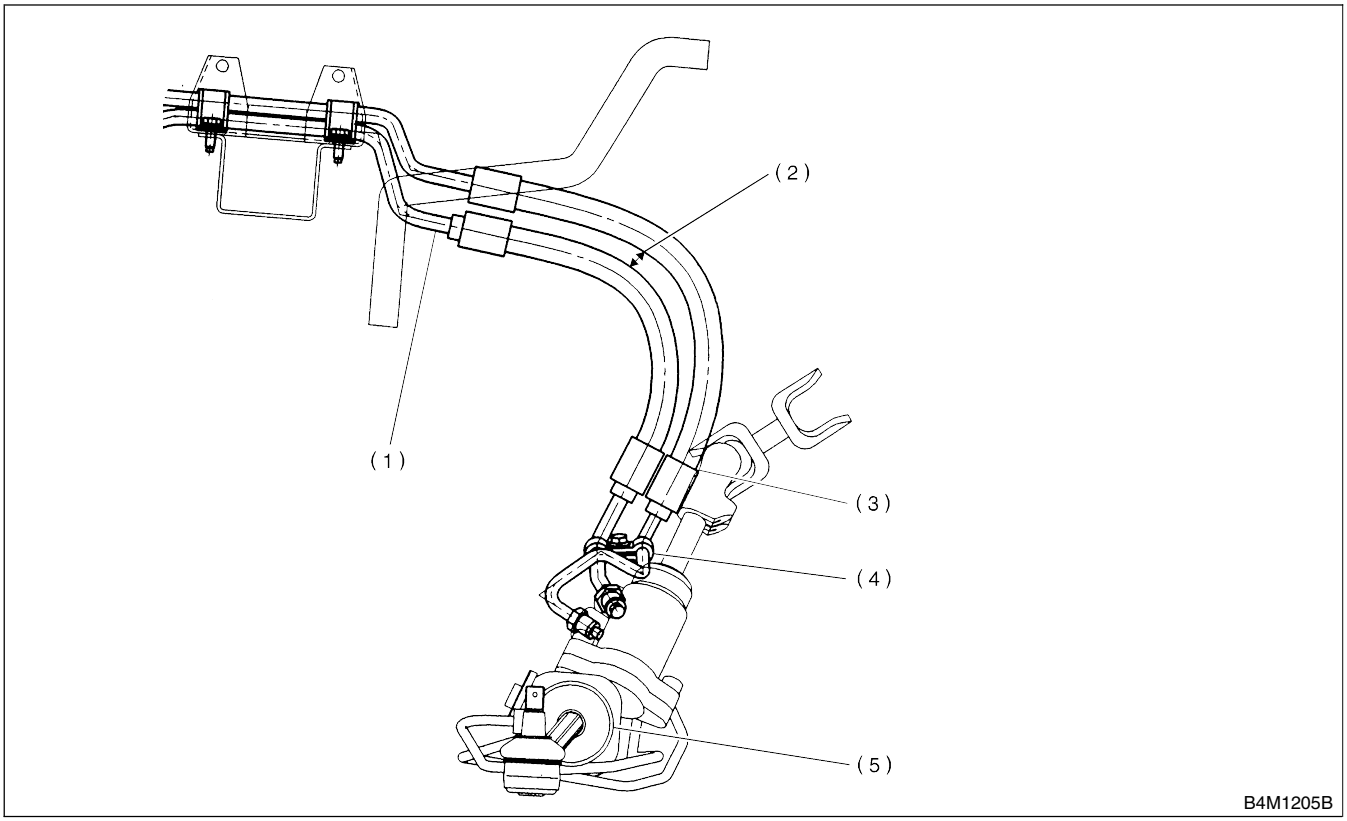
NOTE:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

LHD model



(1) High-pressure hose
(2) No interference is allowed between hoses.
(3) Clearance between crossmember and pipe: 3 — 8 mm (0.12 — 0.31 in)

RHD model



(1) Clearance between blow-by hose and pipe: 3 — 5 mm (0.12 — 0.20 in)
(2) No interference is allowed between hoses
(3) Clearance between side frame and hose: 15 mm (0.59 in) or more
(4) Clearance between crossmember and pipe: 5 — 13 mm (0.20 — 0.51 in)
(5) Steering gearbox

10) 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.

2. TURBO MODEL S601277A1104

1) Tighten bolt A.

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

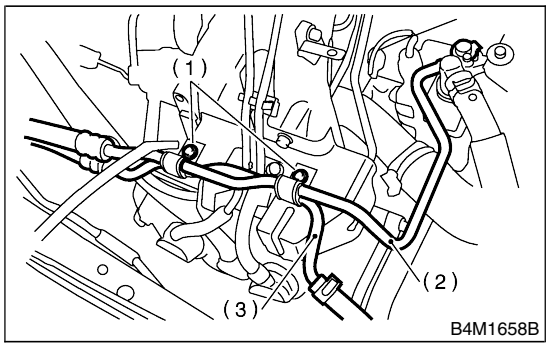
(1) Connect pipe D to oil tank.
(2) Connect pipe C or pressure hose to oil pump.

CAUTION:
Use a new gasket.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

(3) Tighten bolt A.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

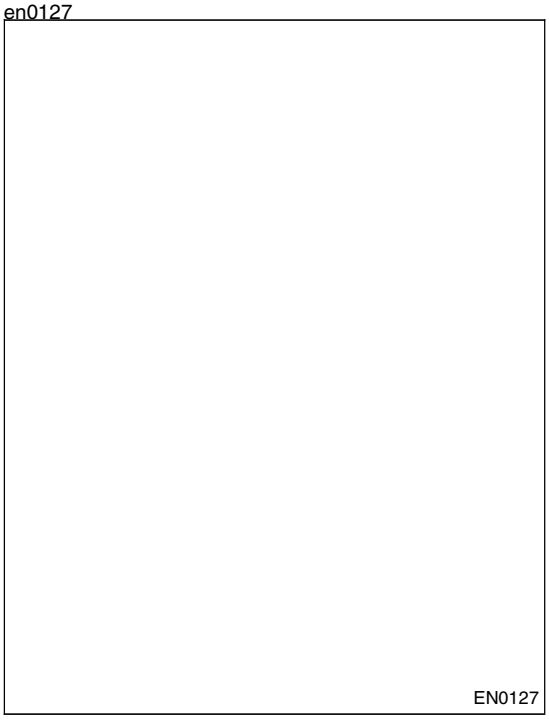


(1) Bolt A
(2) Pipe C
(3) Pipe D

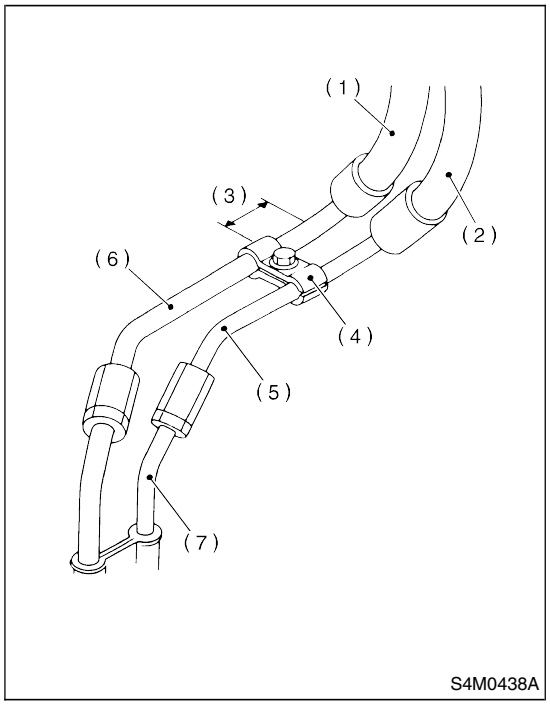
2) Install coolant filler tank. (Turbo model)

Tightening torque:
T1: 19 N·m (1.9 kgf-m, 13.7 ft-lb)
T2: 21 N·m (2.1 kgf-m, 15.2 ft-lb)

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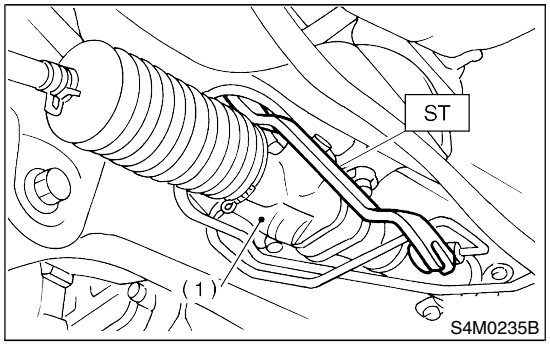


3) Temporarily connect pipes C and D. (LHD model)



(1) Return hose
(2) Pressure hose
(3) Approx. 30 mm (1.18 in)
(4) Clamp E
(5) Pipe C
(6) Pipe
(7) Pipe (on gearbox side)

4) Using ST, temporarily connect pipes to control valve of gearbox. (RHD model)
ST 34099AC050 GEARBOX SPANNER

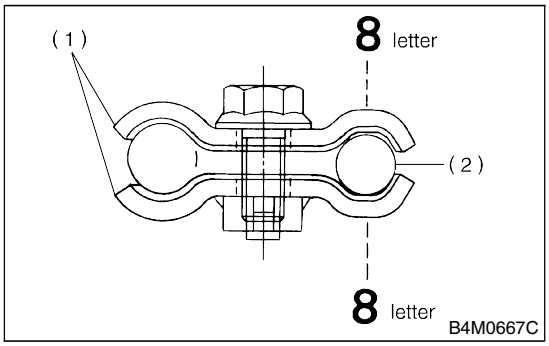


(1) Steering gearbox

5) Temporarily install clamp E on pipes C and D, and tighten clamp E firmly.

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

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



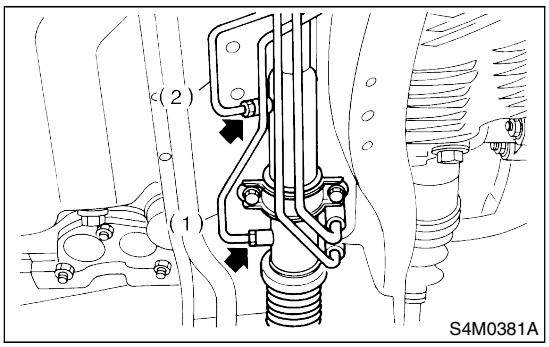
(1) Clamp E
(2) Pipe C

6) Tighten joint nut.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Connect pipe A and B.
(1) LHD model
Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A second.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

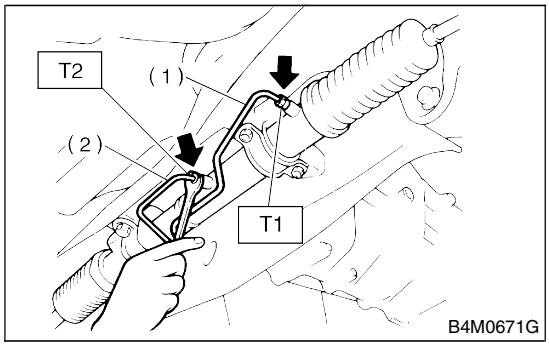


(1) Pipe A
(2) Pipe B

(2) RHD model

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

Tightening torque:
T1: 20 N·m (2.0 kgf-m, 14.5 ft-lb)
T2: 24 N·m (2.4 kgf-m, 17.4 ft-lb)

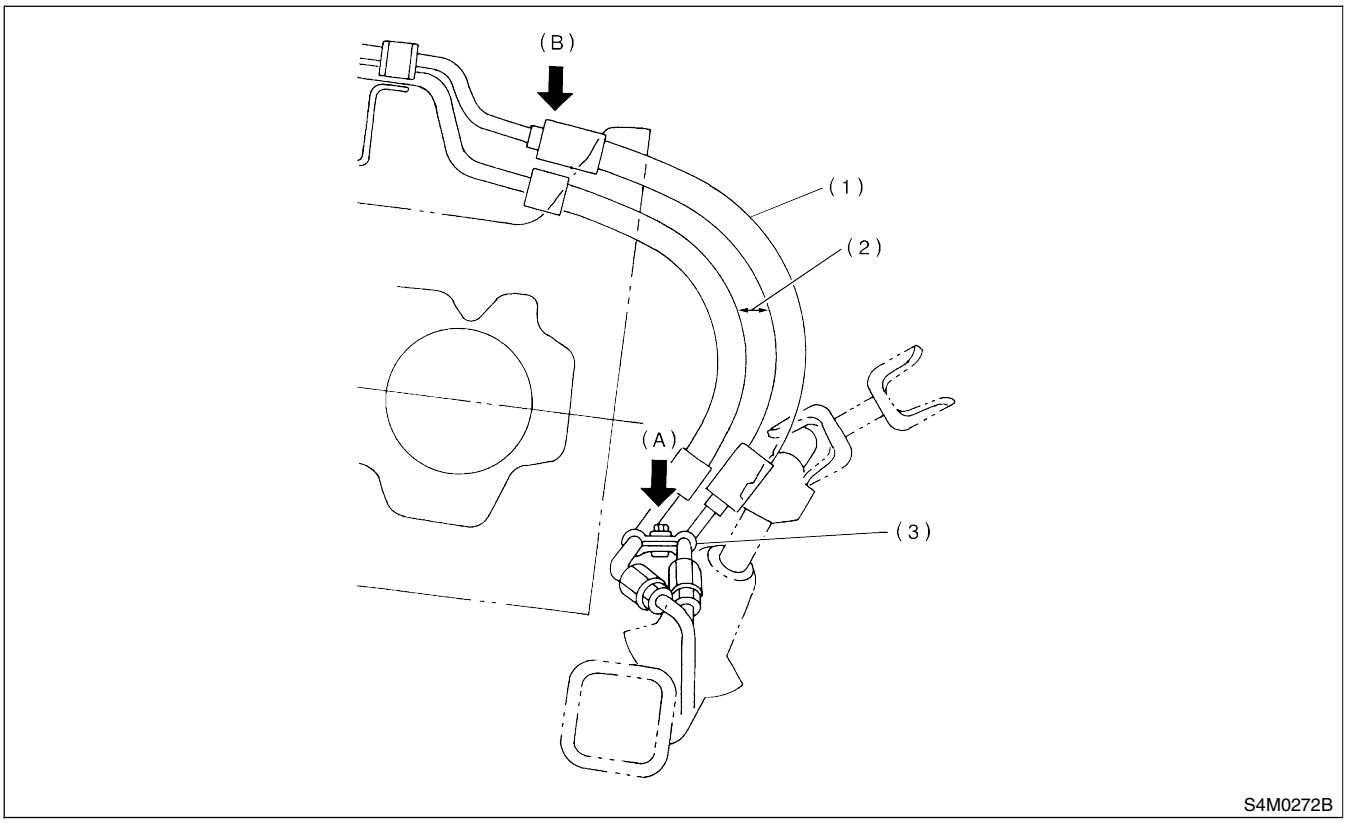


(1) Pipe A
(2) Pipe B

8) Install jack-up plate.
9) Connect battery ground terminal.
10) Feed the specified fluid.

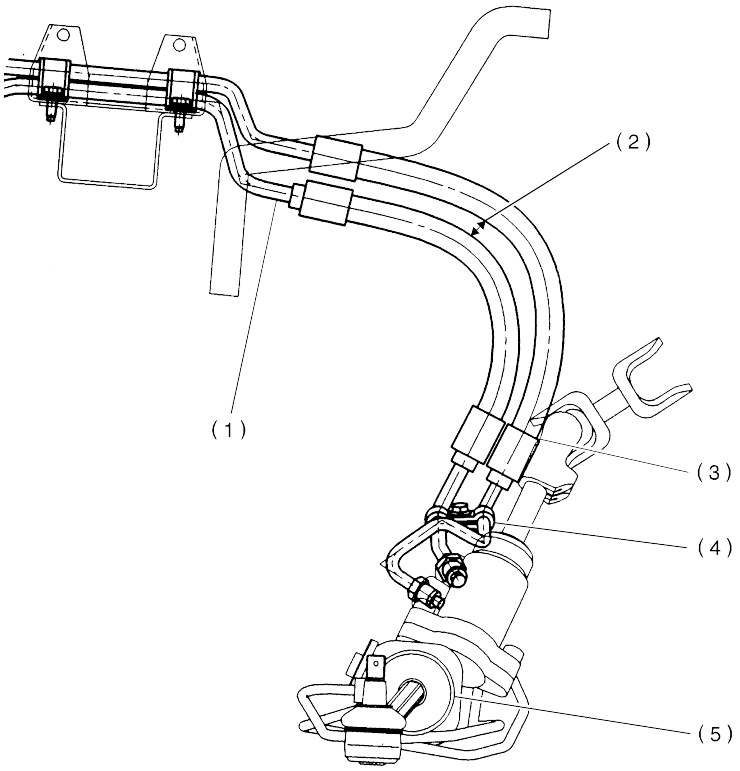
NOTE:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

LHD model



(1) High-pressure hose
(2) No interference is allowed between hoses.
(3) Clearance between crossmember and pipe: 3 — 8 mm (0.12 — 0.31 in)

RHD model



(1) Clearance between blow-by hose and pipe: 3 — 5 mm (0.12 — 0.20 in)
(2) No interference is allowed between hoses
(3) Clearance between side frame and hose: 15 mm (0.59 in) or more
(4) Clearance between crossmember and pipe: 5 — 13 mm (0.20 — 0.51 in)
(5) Steering gearbox

11) 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.

C: INSPECTION S601277A10

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

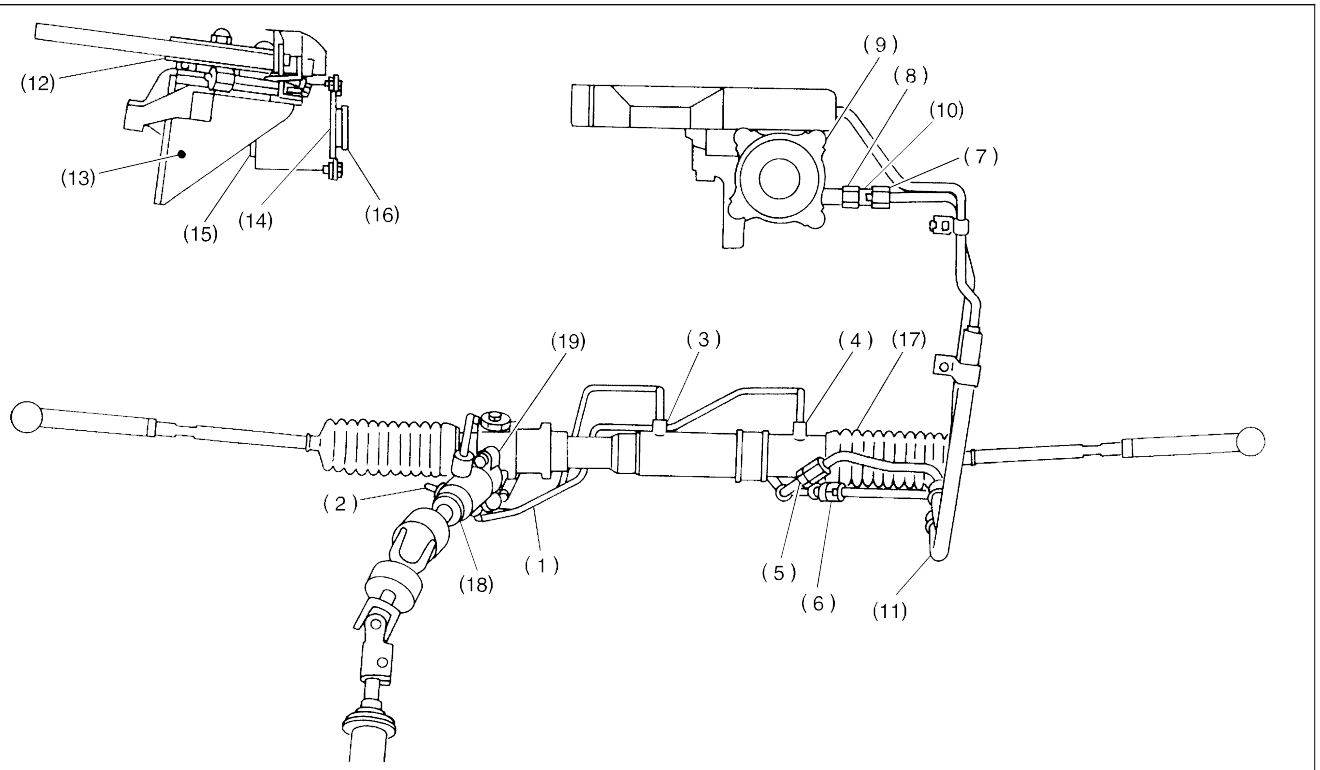
Part name	Inspection	Remedy
Pipe	• O-ring fitting surface for damage • Nut for damage • Pipe for damage	Replace with new one.
Clamp B Clamp C Clamp E	• Clamps for weak clamping force	Replace with new one.
Hose	• Flared surface for damage • Flare nut for damage • Outer surface for cracks • Outer surface for wear • Clip for damage • End coupling or adapter for degradation	Replace with new one.

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.

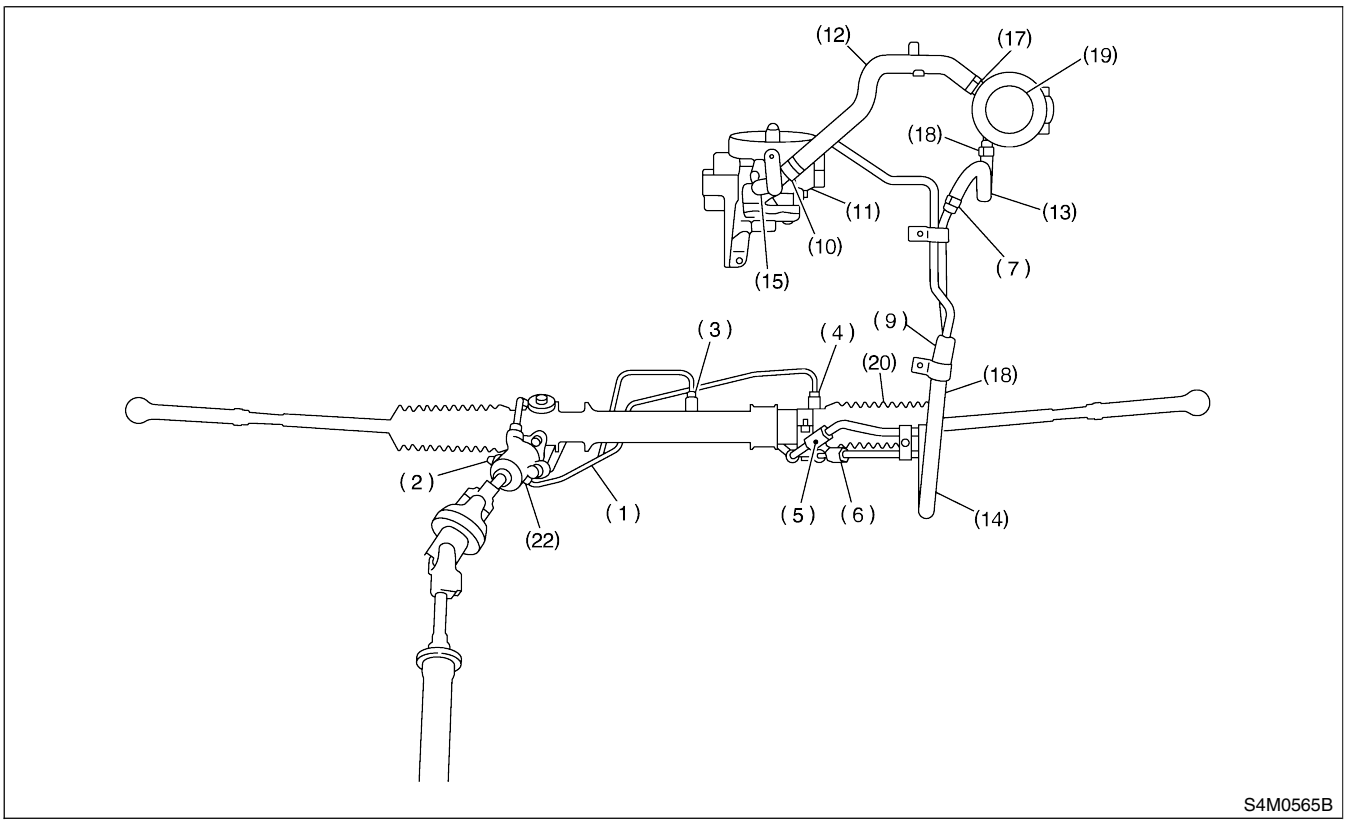
CAUTION:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.

Non-turbo model



Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (9) 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 (10) and (11) 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 (12) and (13) in figure	Damaged O-ring	Replace oil pump.
	Damaged gasket	Replace oil pump.
Leakage from oil tank (14) and (15) in figure	Crack in oil tank, (14)	Replace oil tank.
	Damaged O-ring, (15)	Replace O-ring.
Leakage from filler neck (16)	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 (17) in figure	Damaged oil seal	Replace oil seal.
Leakage from control valve of gearbox (18) and (19) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

Turbo model



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 gear-box 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 gear-box (21) and (22) in figure	Damaged packing or oil seal	Replace problem parts.
	Damage in control valve	Replace control valve.

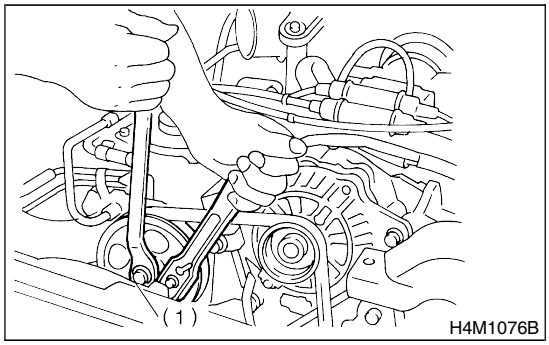
NOTE:
Fluid level is specified at optimum position (range) for ordinary use. Accordingly, if the vehicle is used often under hard conditions such as on very rough roads or in mountainous areas, fluid may bleed out from cap air vent hole. This is not a problem. If a customer complains strongly and is 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.

8. Oil Pump S601070

A: REMOVAL S601070A18

1. NON-TURBO MODEL S601070A1804

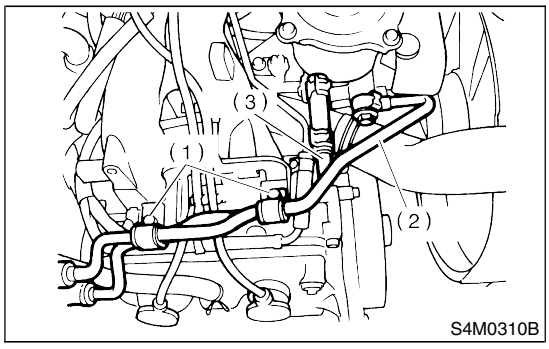
1) Remove ground cable from battery.
2) Drain the working fluid about 0.3 ℓ (0.3 US qt, 0.3 Imp qt) from oil tank.
3) Remove pulley belt cover bracket.
4) Loosen oil pump pulley nut, then remove bolts which secure alternator.



(1) Oil pump pulley nut

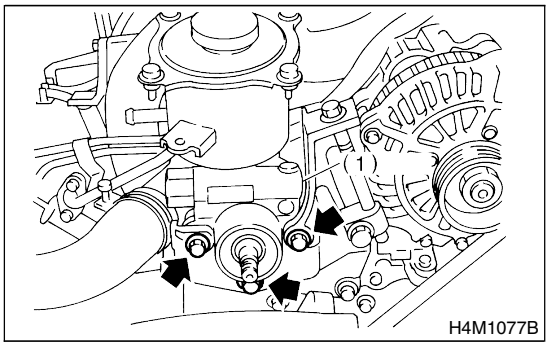
5) Loosen pulley belt(s).
6) Remove the nut and detach oil pump pulley.
7) Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

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.
● Except when only oil tank needs to be inspected, detach oil tank and oil pump as a unit. Then separate one from the other on a work bench to prevent oil from spilling on any part of the engine.



(1) Bolt A
(2) Pipe C
(3) Pipe D

8) Remove three bolts from the front side of oil pump and detach the pump.



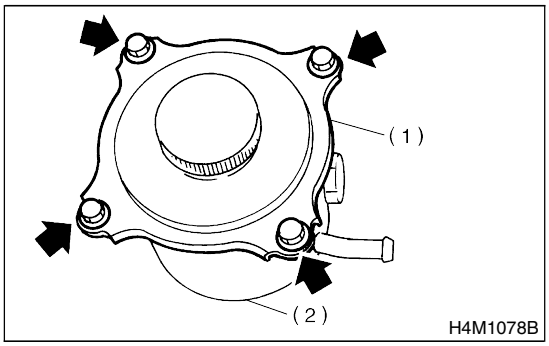
(1) Oil pump

9) Remove three bolts from the lower side of bracket and detach the bracket.

CAUTION:
The bracket does not need to be removed unless it is damaged.

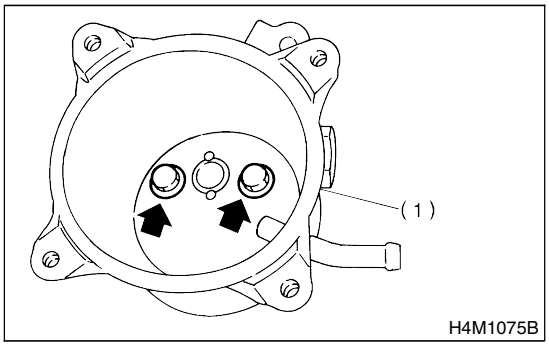
10) Place oil pump in a vise, and remove upper shell and baffle from lower shell.

CAUTION:
Do not clamp oil pump too hard; otherwise oil pump may be dented.



(1) Upper shell
(2) Lower shell

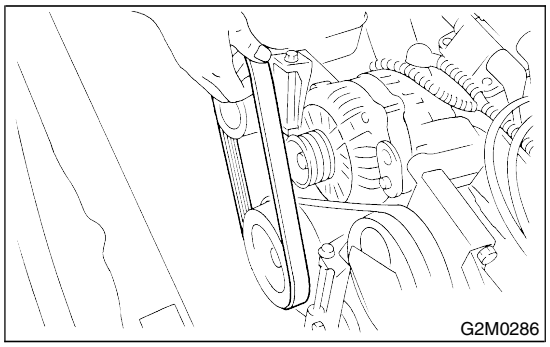
11) Remove lower shell from oil pump.



(1) Lower shell

2. TURBO MODEL S601070A1805

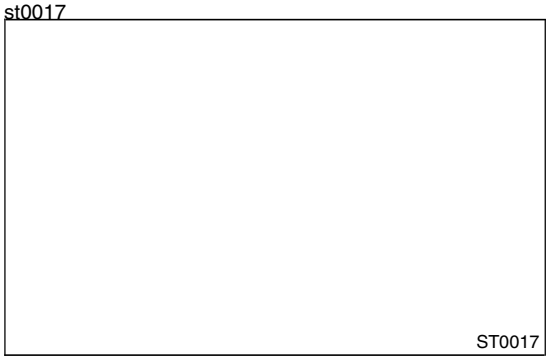
1) Remove ground terminal from battery.
2) Remove intake duct. <Ref. to IN(DOHC TURBO)-8, REMOVAL, Air Intake Duct.>
3) Remove pulley belt cover.
4) Loosen lock bolt and slider bolt and remove power steering pump drive V-belt.


G2M0286

5) Disconnect connector from power steering pressure switch.
6) Remove intake boot and air cleaner upper. <Ref. to IN(DOHC TURBO)-7, REMOVAL, Air Cleaner.>
7) Disconnect pipe C and suction hose from oil pump.

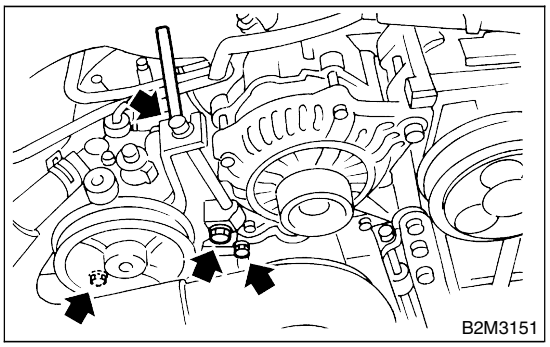
CAUTION:
● Do not allow fluid from the hose end to come into contact with pulley belt.
● To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.

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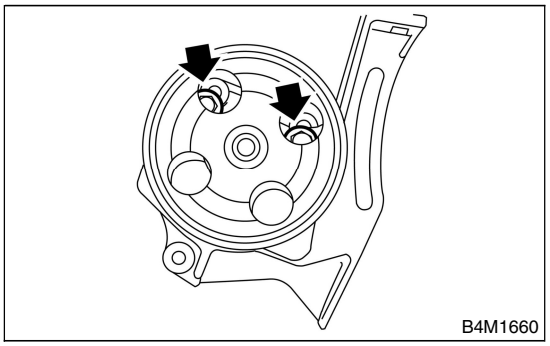
(1) Suction hose
(2) Pipe C

8) Remove bolts which install power steering pump bracket.

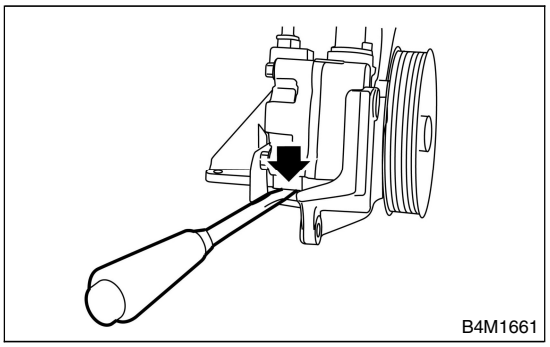

B2M3151

9) 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.


B4M1660

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


B4M1661

B: INSTALLATION S601070A11

1. NON-TURBO MODEL S601070A1104

1) Install bracket on engine.

Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)

2) Install oil pump on oil tank as follows outside the vehicle:

NOTE:
Prior to installation, make sure that all oil is removed from oil pump, oil tank and pipe.

3) Place oil pump in a vise and install stay to oil pump.

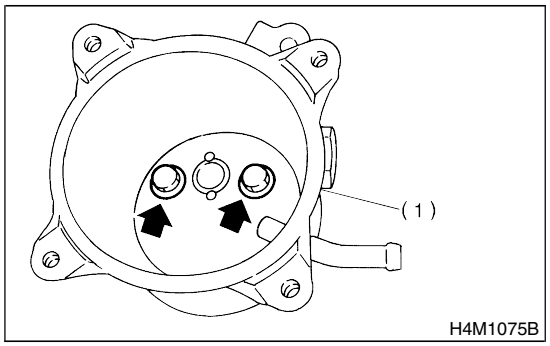
CAUTION:
Do not place oil pump directly in vise; use soft pads and hold oil pump lightly to protect it.

Tightening torque:
15.7 N·m (1.60 kgf-m, 11.6 ft-lb)

4) Install lower shell to oil pump.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

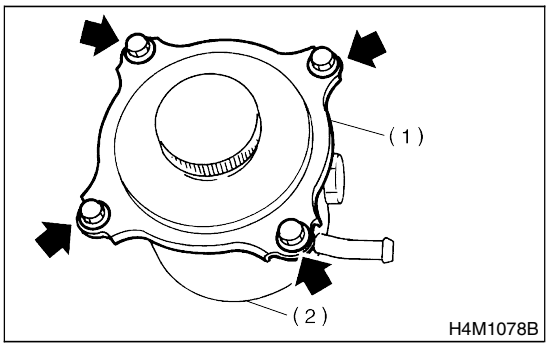
CAUTION:
Be sure to use a new seal washer.



(1) Lower shell

5) Install upper shell and baffle to lower shell.

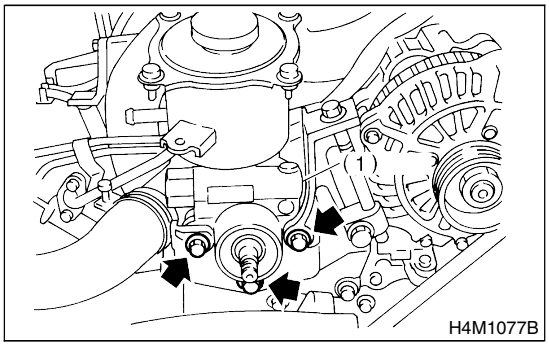
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Upper shell
(2) Lower shell

6) Install oil pump, previously assembled to oil tank, on bracket.

Tightening torque:
18 N·m (1.8kgf-m, 13.0 ft-lb)



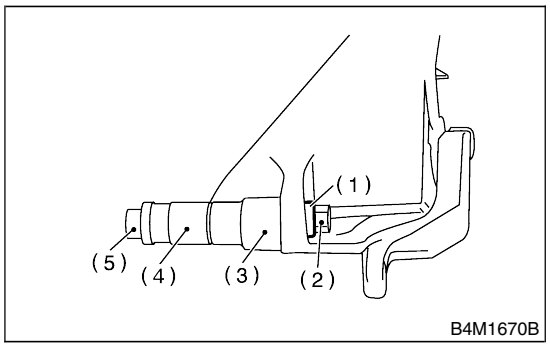
(1) Oil pump

7) Install in the reverse order of removal.
8) Inspect pulley belt tension. <Ref. to ME(SOHC)-43, INSPECTION, V-belt.>
9) Feed the specified power steering fluid. <Ref. to PS-101, Power Steering Fluid.>

2. TURBO MODEL S601070A1105

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.

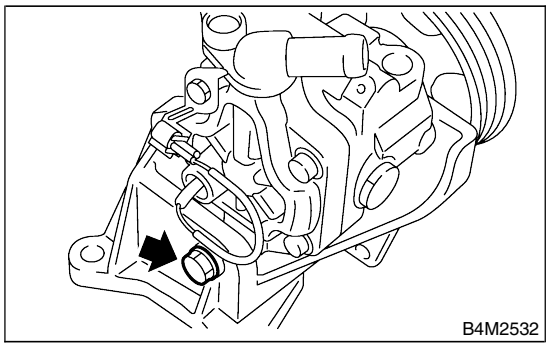
CAUTION:
Do not place oil pump bracket directly in the vise; use soft pads and hold oil pump lightly to protect the pump.



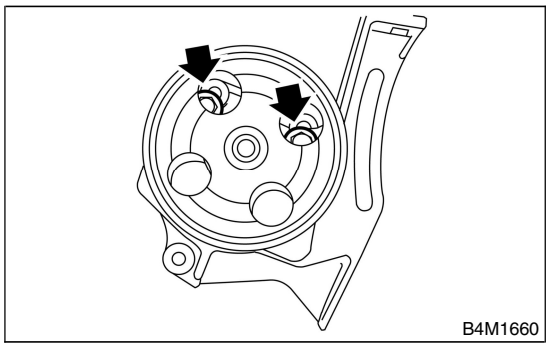
(1) Bush
(2) Nut
(3) 21 mm
(4) 14 mm
(5) Bolt

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

Tightening torque:
37.3 N·m (3.8 kgf-m, 27.5 ft-lb)

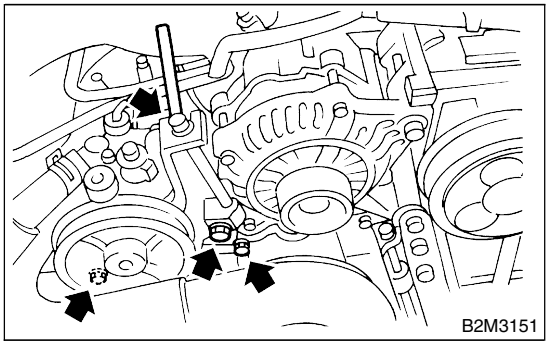


Tightening torque:
15.7 N·m (1.6 kgf-m, 11.6 ft-lb)



2) Tighten bolt which install power steering pump bracket.

Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)

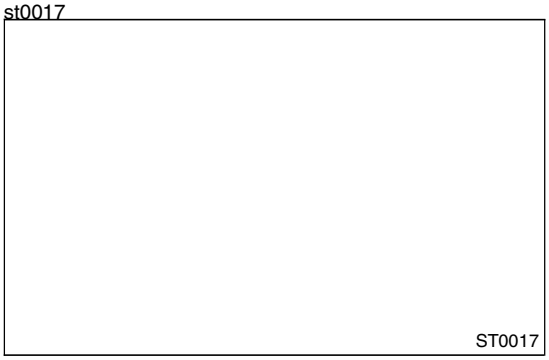


3) Interconnect pipes C and suction hose.

Tightening torque:
Joint nut
39.2 N·m (4 kgf-m, 28.9 ft-lb)

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

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(1) Suction hose
(2) Pipe C

4) Connect connector to power steering oil pressure switch.
5) Install pulley belt to oil pump.
6) Check pulley belt tension. <Ref. to ME(DOHC TURBO)-45, INSPECTION, V-belt.>
7) Tighten bolt belt tension.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

8) Install pulley belt cover.
9) Install air intake boot.
10) Connect ground terminal of battery.
11) Feed the specified power steering fluid. <Ref. to PS-101, Power Steering Fluid.>

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

C: INSPECTION S601070A10

1. BASIC INSPECTION S601070A1002

● 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.
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.
3	Cap	Crack or damage	Replace it with a new one.
4	Strainer	(1) Clogging with dirt	Wash it.
		(2) Breakage	Replace it with a new one.
5	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.
		(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.
6	O-ring	Crack or deterioration	Replace it with a new one.
7	Oil tank	Crack, damage or oil leakage	Replace it with a new one.
8	Bracket	Crack	Replace it with a new one.

2. SERVICE LIMIT S601070A1001

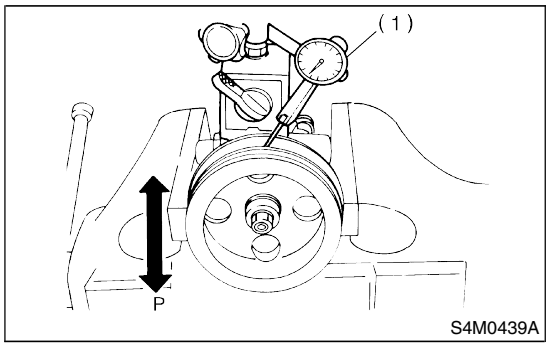
Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

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.

1) Play of pulley shaft

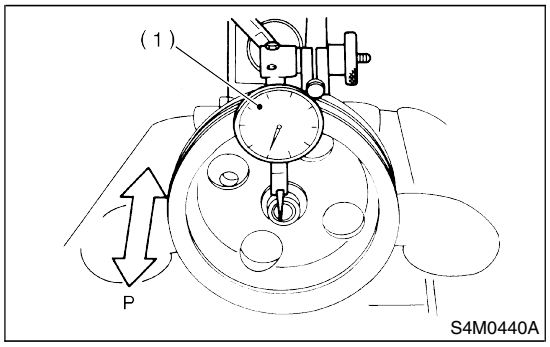
On condition:
P: 9.8 N (1.0 kgf, 2.2 lb)

Service limit:
Radial play (Direction ⟷)
0.4 mm (0.016 in) or less



(1) Dial indicator

Axial play (Direction ⟺)
Non-turbo model:
0.9 mm (0.035 in) or less
Turbo model:
0.6 mm (0.024 in) or less

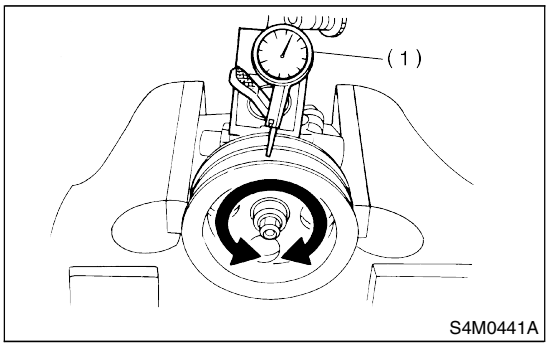


(1) Dial indicator

2) 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.

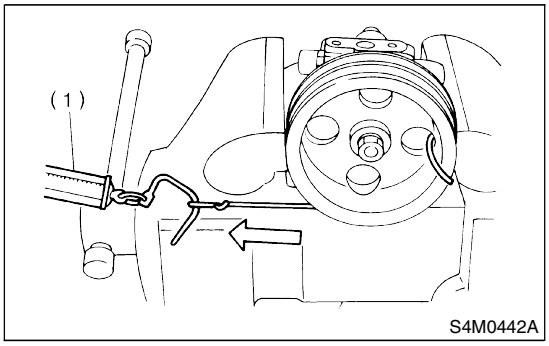


(1) Dial indicator

3) Resistance to rotation of pulley

Service limit:
Maximum load; 9.22 N (0.94 kgf, 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.



(1) Spring balance

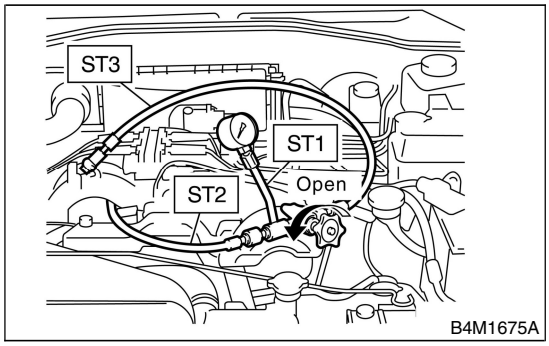
3. HYDRAULIC PRESSURE S601070A1003

CAUTION:
• Be sure to complete all items aforementioned in "INSPECTION", prior to measuring hydraulic pressure. Otherwise, pressure can not be measured correctly. <Ref. to PS-103 INSPECTION, General Diagnostic Table.>
• 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.

1) MEASURE REGULAR PRESSURE.
   (1) Remove two bolts securing power steering pipes to engine.
   (2) Install ST1, 2 and 3 between power steering pump and pipes using gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010).
   (3) Replenish power steering fluid up to specified level.
   (4) Open valve, and start the engine.
   (5) Measure regular pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

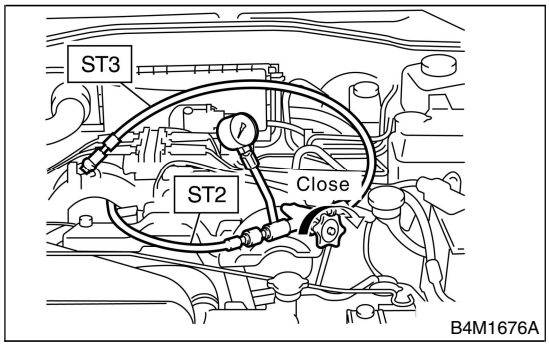


Service limit:
981 kPa (10 kg/cm^2, 142 psi) or less

   (6) If it is not within the specified value, replace the troubled part caused by the following symptoms; pipe or hose clogged, leaks from fluid line, and mix of foreign objects in fluid line.

2) Measure relief pressure.
   (1) Using STs, measure relief pressure.
   (2) Close valve.
   (3) Measure relief pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

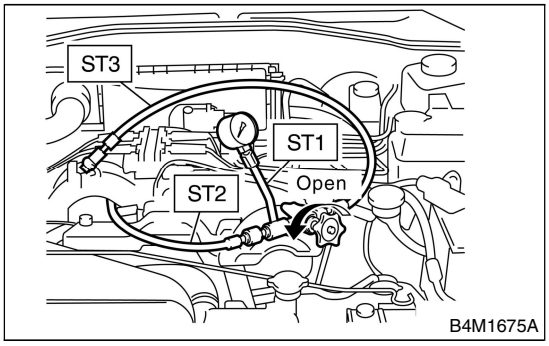


Service limit:
Non-turbo model:
7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)
Turbo model:
9,611 — 10,199 kPa (98 — 104 kg/cm^2, 1,394 — 1,479 psi)

   (4) If it is not within the specified value, replace the oil pump.

3) Measure working pressure.
   (1) Using STs, measure working pressure.
   (2) Open valve.
   (3) Measure working pressure of control valve by turning wheel from stop to stop.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



Service limit:
Non-turbo model:
7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)
Turbo model:
9,611 — 10,199 kPa (98 — 104 kg/cm^2, 1,394 — 1,479 psi)

   (4) If it is within the specified value, measure steering effort. <Ref. to PS-106 MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.> If it is not within specified value, replace control valve itself or control valve and pinion as a single unit with new ones.

9. Reservoir Tank S601075

A: REMOVAL S601075A18

1. NON-TURBO MODEL S601075A1804

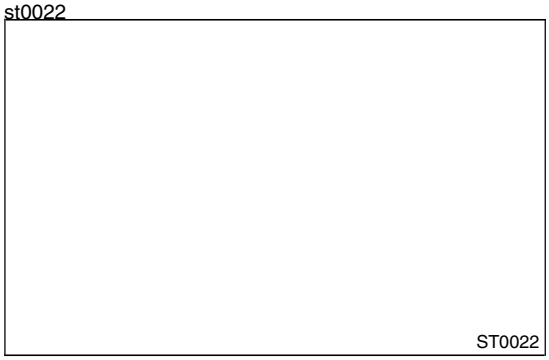
Refer to “Oil Pump” section for details of reservoir tank removal order. <Ref. to PS-93, NON-TURBO MODEL, REMOVAL, Oil Pump.>

2. TURBO MODEL S601075A1805

1) Remove air intake duct. <Ref. to IN(DOHC TURBO)-8, REMOVAL, Air Intake Duct.>
2) Drain fluid from the reservoir tank.
3) Disconnect return hose and suction hose from reservoir tank.

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

st0022



(1) Suction hose
(2) Pipe D
(3) Return hose

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

B: INSTALLATION S601075A11

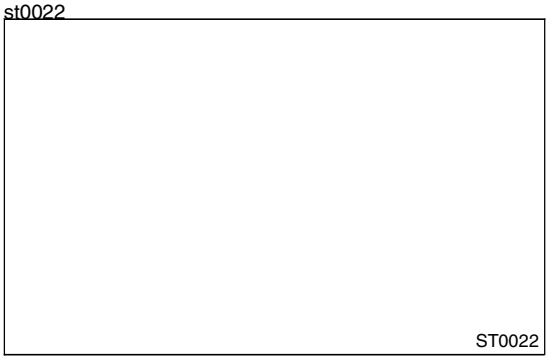
1. NON-TURBO MODEL S601075A1104

Refer to “Oil Pump” section for details of reservoir tank installation order. <Ref. to PS-95, NON-TURBO MODEL, INSTALLATION, Oil Pump.>

2. TURBO MODEL S601075A1105

1) Install reservoir tank to bracket.
2) Connect return hose and suction hose to reservoir tank.

st0022



(1) Suction hose
(2) Pipe D
(3) Return hose

3) Feed the specified power steering fluid. <Ref. to PS-101, Power Steering Fluid.>

C: INSPECTION S601075A10

Check reservoir tank for cracks, breakage, or damage. If any cracks, breakage, or damage is found, replace reservoir tank.

10. Power Steering Fluid S601275

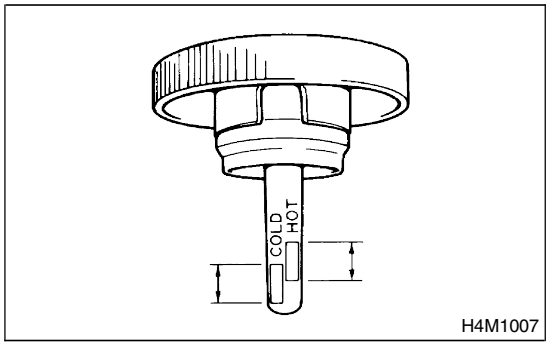
A: SPECIFICATION S601275A22

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

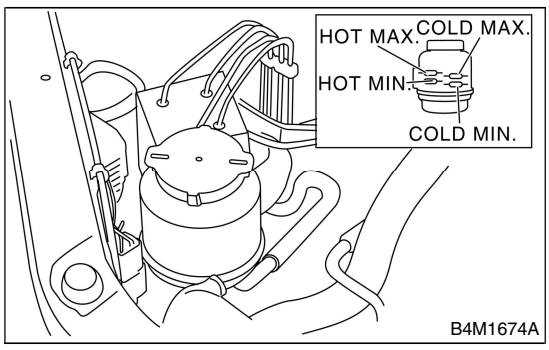
B: INSPECTION S601275A10

1) Check power steering fluid for deterioration or contamination. If the fluid is highly deteriorated or contaminated, drain it and refill with new fluid.
2) Check joints and units for oil leakage. If any oil leaks are found, repair or replace the applicable part.
3) 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.

Non-turbo model

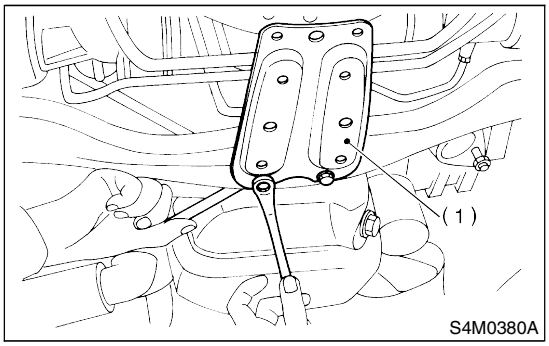


Turbo model



C: REMOVAL S601275A18

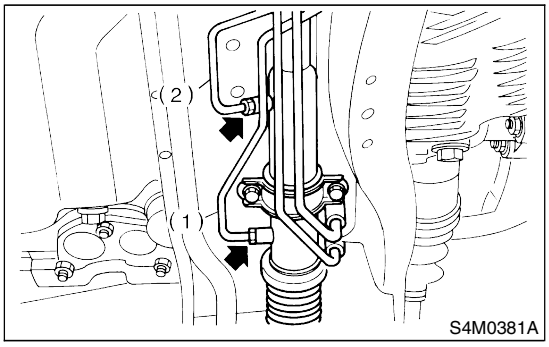
1) Set the vehicle on the lift.
2) Disconnect battery minus terminal.
3) Remove air intake duct.
4) Drain fluid from the reservoir tank.
5) Lift-up the vehicle.
6) Remove under cover.
7) Remove jack-up plate.



(1) Jack-up plate

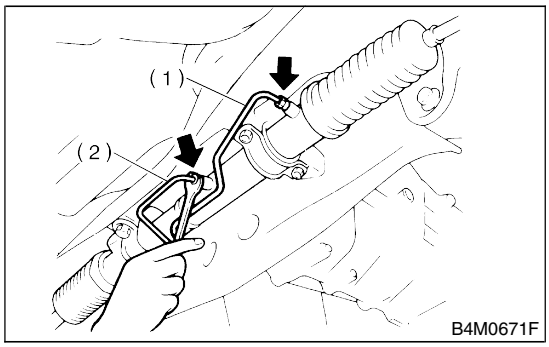
8) Disconnect one pipe joint A from center of gearbox assembly, and connect a vinyl hose to it. While turning steering wheel to the left and right, drain fluid through the hose. Similarly, drain fluid from the other pipe joint B.

LHD model



(1) Pipe A
(2) Pipe B

RHD model

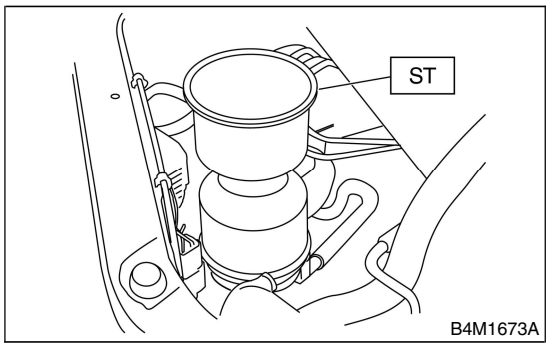


(1) Pipe A
(2) Pipe B

9) Connect pipe joint A and B.
10) When pouring power steering fluid, refer to "Installation" under "Power Steering Fluid". <Ref. to PS-102 INSTALLATION, Power Steering Fluid.>
11) Install in the reverse order of removal.

D: INSTALLATION S601275A11

1) Feed the specified fluid with its level being about 4 cm (1.6 in) lower than the mouth of tank.
2) Set ST on top of reservoir tank and fill it about half way with the specified fluid. (Turbo model)
ST 34199AE040 OIL CHARGE



3) Continue to turn steering wheel slowly from lock to lock until bubbles stop appearing in the tank while keeping the fluid at that level.
4) 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.
5) Start, and idle the engine.
6) 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.
7) 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.
8) Stop the engine, and take out safety stands after jacking up vehicle again.
Then lower the vehicle, and idle the engine.
9) 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).
10) 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.
11) 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. General Diagnostic Table

S601257

A: INSPECTION S601257A10

Trouble	Possible cause	Corrective action
• Heavy steering effort in all ranges • Heavy steering effort at stand still • Steering wheel surges when turning.	1. Pulley belt • 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	Adjust or replace.
	2. Tire and rim • Improper tires out of specification • Improper rims out of specification • Tires not properly inflated*1	Replace or reinflate.
	3. Fluid • Low fluid level • Aeration • Dust mix • Deterioration of fluid • Poor warming-up of fluid *2	Refill, bleed air, replace or instruct customer.
	4. Idling speed • Lower idling speed • Excessive drop of idling speed at start or at turning steering wheel *3	Adjust or instruct customer.
	5. Measure hydraulic pressure. <Ref. to PS-97 INSPECTION, Oil Pump.>	Replace problem parts.
	6. Measure steering effort. <Ref. PS-103 INSPECTION, General Diagnostic Table.>	Adjust or replace.
• Vehicle leads to one side or the other. • Poor return of steering wheel to center • Steering wheel surges when turning.	1. Fluid line • Folded hose • Flattened pipe	Reform or replace.
	2. Tire and rim • Flat tire • Mix use of different tires • Mix use of different rims • Abnormal wear of tire • Unbalance of remained grooves • Unbalance of tire pressure	Fix or replace.
	3. Front alignment • Improper or unbalance caster • Improper or unbalance toe-in • Loose connection of suspension	Adjust or retighten.
	4. Others • Damaged joint assembly • Unbalanced height • One-sided weight	Replace, adjust or instruct customer.
	5. Measure steering effort. <Ref. to PS-103 INSPECTION, General Diagnostic Table.>	Adjust or replace.

*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.

1. NOISE AND VIBRATION S601257A1001

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 PS-90 INSPECTION, Pipe Assembly.>
	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.

2. MEASUREMENT OF STEERING EFFORT S601257A1002

No.	Step	Check	Yes	No
1	**CHECK STEERING EFFORT.** 1) Stop the vehicle on a concrete road. 2) Start the engine. 3) Idle the engine. 4) Install spring scale on the steering wheel. 5) Pull spring scale at an right angle to the steering wheel, and measure both right and left steering wheel effort. NOTE: When turning steering more quickly than necessary from a direction to the other direction at an engine speed over 2,000 rpm, steering effort may be heavy. This is caused by flow characteristic of oil pump and is not a problem.	Is the steering effort 29.4 N (3.0 kgf, 6.6 lb) or less?	Go to step **2**.	Adjustment backlash.
2	**CHECK STEERING EFFORT.** 1) Stop the engine. 2) Pull spring scale at an right angle to the steering wheel, and measure both right and left steering wheel effort.	Is the steering effort 29.4 N (3.0 kgf, 6.6 lb) or less?	Go to step **3**.	Adjustment.
3	**CHECK STEERING WHEEL EFFORT.** 1) Remove universal joint. 2) Measure steering wheel effort.	Is the maximum force steering wheel effort 2.26 N (0.23 kgf, 0.51 lb) or less?	Go to step **4**.	Check, adjust and replace if necessary.
4	**CHECK STEERING WHEEL EFFORT.** Measure steering wheel effort.	Is the fluctuation width 1.08 N (0.11 kgf, 0.24 lb) or less?	Go to step **5**.	Check, adjust and replace if necessary.
5	**CHECK UNIVERSAL JOINT.** Measure folding torque of the joint (short yoke). <Ref. to PS-29 INSPECTION, Universal Joint.>	Is the folding torque 8.43 N (0.86 kgf, 1.90 lb) or less?	Go to step **6**.	Replace with new one.
6	**CHECK UNIVERSAL JOINT.** Measure folding torque of the joint (long yoke). <Ref. to PS-29 INSPECTION, Universal Joint.>	Is the folding torque 5.49 N (0.56 kgf, 1.23 lb) or less?	Go to step **7**.	Replace with new one.
7	**CHECK FRONT WHEEL.**	Are front wheels for unsteady revolution or rattling and brake for dragging?	Inspect, readjust and replace if necessary.	Go to step **8**.
8	**CHECK TIE-ROD ENDS.** Remove the tie-rod ends.	Are tie-rod ends of suspension for unsteady revolution or ratting?	Inspect and replace if necessary.	Go to step **9**.
9	**CHECK BALL JOINT.**	Are ball joints of suspension for unsteady revolution or ratting?	Inspect and replace if necessary.	Go to step **10**.
10	**CHECK GEARBOX.** Measure rotating of gearbox. <Ref. to PS-50 TURNING RESISTANCE OF GEAR BOX, INSPECTION, Steering Gearbox.>	Is rotating resistance is 11.18 N (1.14 kgf, 2.51 lb) or less around center position and 15.79 N (1.61 kgf, 3.55 lb) or less in all positions within 20% difference between clockwise and counterclockwise?	Go to step **11**.	Readjust backlash, and if ineffective, replace bad parts.
11	**CHECK GEARBOX.** Measure sliding of gearbox. <Ref. to PS-49 SERVICE LIMIT, INSPECTION, Steering Gearbox.>	Is rotating resistance is 304 N (31 kgf, 68 lb) or less with 20% difference between left and right direction?	Steering effort is normal.	Readjust backlash, and if ineffective, replace bad parts.

ABS (DIAGNOSTICS)

ABS

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1. Basic Diagnostic Procedure S006501

A: PROCEDURE S006501E45

1. WITHOUT SUBARU SELECT MONITOR S006501E4501

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.
- When ABS warning light illuminates, read and record trouble code indicated by ABS warning light.

No.	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to ABS-6, Check List for Interview.> 2) Before performing diagnosis, inspect unit which might influence the ABS problem. <Ref. to ABS-9, INSPECTION, General Description.>	Is unit that might influence the ABS problem normal?	Go to step **2**.	Repair or replace each unit.
2	**CHECK INDICATION OF TROUBLE CODE.** Calling up trouble code. <Ref. to ABS-20, Read Diagnostic Trouble Code.>	Is trouble code readable?	Go to step **3**.	Inspect using diagnostic chart for ABS warning light failure.<Ref. to ABS-28, Diagnostics Chart with Diagnosis Connector.> NOTE: Call up trouble code again after inspecting ABS warning light. <Ref. to ABS-20, Read Diagnostic Trouble Code.>
3	**CHECK TROUBLE CODE.** NOTE: Record all trouble codes.	Is only the start code issued?	Go to step **4**.	Go to step **5**.
4	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostics Table”. <Ref. to ABS-174, General Diagnostics Table.> 2) Perform the clear memory mode. <Ref. to ABS-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> Calling up the trouble code. <Ref. to ABS-20, Read Diagnostic Trouble Code.>	Is only the start code issued?	Complete the diagnosis.	Go to step **5**.

No.	Step	Check	Yes	No
5	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Chart with Diagnostic Connector”.<Ref. to ABS-28, Diagnostics Chart with Diagnosis Connector.> NOTE: For trouble code list, refer to “List of Diagnostics Trouble Code”.<Ref. to ABS-24, WITHOUT SUBARU SELECT MONITOR, LIST, List of Diagnostics Trouble Code.> 2) Repair trouble cause. 3) Perform the clear memory mode. <Ref. to ABS-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> 5) Calling up the trouble code. <Ref. to ABS-20, Read Diagnostic Trouble Code.>	Is only the start code issued?	Complete the diagnosis.	Inspect using “Diagnostics Chart with Diagnostic Connector”. <Ref. to ABS-28, Diagnostics Chart with Diagnosis Connector.>

2. WITH SUBARU SELECT MONITOR S006501E4502

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 ABS-26, WITH SUBARU SELECT MONITOR, LIST, List of Diagnostics Trouble Code.>

No.	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to ABS-6, Check List for Interview.> 2) Before performing diagnosis, inspect unit which might influence the ABS problem. <Ref. to ABS-9, INSPECTION, General Description.>	Is unit that might influence the ABS problem normal?	Go to step **2**.	Repair or replace each unit.
2	**CHECK INDICATION OF TROUBLE CODE DISPLAY.** 1) Turn ignition switch to OFF. 2) Connect the SUBARU SELECT MONITOR to data link connector. 3) Turn ignition switch to ON and SUBARU SELECT MONITOR to ON. NOTE: If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to ABS-90, COMMUNICATION FOR INITIALIZING IMPOSSIBLE , Diagnostics Chart with Subaru Select Monitor.> 4) Read diagnostic trouble code. <Ref. to ABS-18, OPERATION, Subaru Select Monitor.> 5) Record all trouble codes and frame data.	Is the corresponding trouble encoding?	Go to step **3**.	Go to step **4**.
3	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostics Table”. <Ref. to ABS-174, General Diagnostics Table.> 2) Perform the clear memory mode. <Ref. to ABS-19, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> 4) Calling up the trouble code. <Ref. to ABS-18, READ DIAGNOSTIC TROUBLE CODE, OPERATION, Subaru Select Monitor.>	Is no trouble code designated and ABS warning light goes out after turning on?	Complete the diagnosis.	Go to step **4**.

No.	Step	Check	Yes	No
4	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Chart with Subaru Select Monitor”.<Ref. to ABS-90, Diagnostics Chart with Subaru Select Monitor.> NOTE: For trouble code list, refer to “List of Diagnostics Trouble Code”.<Ref. to ABS-24, WITHOUT SUBARU SELECT MONITOR, LIST, List of Diagnostics Trouble Code.> 2) Repair trouble cause. 3) Perform the clear memory mode. <Ref. to ABS-19, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Perform the inspection mode. <Ref. to ABS-21, Inspection Mode.> 5) Calling up the trouble code. <Ref. to ABS-18, READ DIAGNOSTIC TROUBLE CODE, OPERATION, Subaru Select Monitor.>	Is no trouble code designated and does ABS warning light go out after turning on?	Complete the diagnosis.	Inspect using “Diagnostics Chart with Subaru Select Monitor”. <Ref. to ABS-90, Diagnostics Chart with Subaru Select Monitor.>

2. Check List for Interview S006502

A: CHECK S006502A04

Check the following items about the vehicle's state.

1. STATE OF ABS WARNING LIGHT S006502A0401

ABS warning light comes on.	☐ Always ☐ Sometimes ☐ Only once ☐ Does not come on ● When / how long does it come on?:		
Ignition key position	☐ LOCK ☐ ACC ☐ ON (before starting engine) ☐ START ☐ On after starting (Engine is running) ☐ On after starting (Engine is stop)		
Timing	☐ Immediately after ignition is ON. ☐ Immediately after ignition starts.		
	☐ When advancing		km/h to km/h
			MPH to MPH
	☐ While traveling at a constant speed	km/h	MPH
	☐ When decelerating		km/h to km/h
			MPH to MPH
	☐When turning to right	Steering angle :	deg
		Steering time :	sec
	☐ When turning to left	Steering angle :	deg
		Steering time :	sec
	☐ When moving other electrical parts		
	● Parts name : ● Operating condition :		

2. SYMPTOMS S006502A0402

<table>
<tr><td rowspan="11">ABS operating condition</td><td colspan="3">☐ Performs no work.</td></tr>
<tr><td>☐ Operates only when abruptly applying brakes.</td><td>Vehicle speed :</td><td>km/h
MPH</td></tr>
<tr><td colspan="3">● How to step on brake pedal :</td></tr>
<tr><td>a) Operating time :</td><td colspan="2">sec</td></tr>
<tr><td colspan="3">b) Operating noise : ☐ Produce / ☐ Does not produce</td></tr>
<tr><td>● What kind of noise?</td><td colspan="2">☐ Knock
☐ Gong gong
☐ Bong
☐ Buzz
☐ Gong gong buzz
☐ Others :</td></tr>
<tr><td colspan="3">c) Reaction force of brake pedal</td></tr>
<tr><td></td><td colspan="2">☐ Stick
☐ Press down once with a clunk
☐ Press and released
☐ Others :</td></tr>
<tr><td rowspan="15">Behavior of vehicle</td><td colspan="3">a) Directional stability cannot be obtained or steering arm refuses to work when applying brakes :
☐ Yes / ☐ No</td></tr>
<tr><td>● When :</td><td colspan="2">☐ Vehicle turns to right
☐ Vehicle turns to left
☐ Spins
☐ Others :</td></tr>
<tr><td colspan="3">b) Directional stability cannot be obtained or steering arm refuses to work when accelerating :
☐ Yes / ☐ No</td></tr>
<tr><td>● When :</td><td colspan="2">☐ Vehicle turns to right
☐ Vehicle turns to left
☐ Spins
☐ Others :</td></tr>
<tr><td colspan="3">c) Brakes are out of order : ☐ Yes / ☐ No</td></tr>
<tr><td>● What :</td><td colspan="2">☐ Braking distance is long
☐ Brakes lock or drag
☐ Pedal stroke is long
☐ Pedal sticks
☐ Others :</td></tr>
<tr><td colspan="3">d) Poor acceleration : ☐ Yes / ☐ No</td></tr>
<tr><td>● What :</td><td colspan="2">☐ Fails to accelerate
☐ Engine stalls
☐ Others :</td></tr>
<tr><td colspan="3">e) Occurrence of vibration : ☐ Yes / ☐ No</td></tr>
<tr><td colspan="3">● Where
● What kind :</td></tr>
<tr><td colspan="3">f) Occurrence of abnormal noise : ☐ Yes / ☐ No</td></tr>
<tr><td colspan="3">● Where
● What kind :</td></tr>
<tr><td colspan="3">g) Occurrence of other phenomena : ☐ Yes / ☐ No</td></tr>
<tr><td colspan="3">● What kind :</td></tr>
</table>

CHECK LIST FOR INTERVIEW

3. CONDITIONS UNDER WHICH TROUBLE OCCURS S006502A0403

Environment	a) Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others :
	b) Ambient temperature	°F (°C)
	c) Road	☐ Urban area ☐ Suburbs ☐ Highway ☐ General road ☐ Ascending slope ☐ Descending slope ☐ Paved road ☐ Gravel road ☐ Muddy road ☐ Sandy place ☐ Others :
	d) Road surface	☐ Dry ☐ Wet ☐ New-fallen snow ☐ Compressed snow ☐ Frozen slope ☐ Others :
Condition	a) Brakes	Deceleration : g
		☐ Continuous / ☐ Intermittent
	b) Accelerator	Acceleration : g
		☐ Continuous / ☐ Intermittent
	c) Vehicle speed	km/h | MPH
		☐ Advancing ☐ Accelerating ☐ Reducing speed ☐ Low speed ☐ Turning ☐ Others :
	d) Tire inflation pressure	Front RH tire : kPa
		Front LH tire : kPa
		Rear RH tire : kPa
		Rear LH tire : kPa
	e) Degree of wear	Front RH tire :
		Front LH tire :
		Rear RH tire :
		Rear LH tire :
	f) Genuine parts are used. : ☐ Yes / ☐ No	
	g) Chain is passed around tires. : ☐ Yes / ☐ No	
	h) T tire is used. : ☐ Yes / ☐ No	
	i) Condition of suspension alignment :	
	j) Loading state :	
	k) Repair parts are used. : ☐ Yes / ☐ No	
	● What :	
	l) Others :	

3. General Description S006001

A: CAUTION S006001A03

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG" S006001A0301

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.

B: INSPECTION S006001A10

Before performing diagnostics, check the following items which might affect ABS problems:

1. BATTERY S006001A1001

Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V, or more

Specific gravity: Above 1.260

2. BRAKE FLUID S006001A1002

1) Check brake fluid level.
2) Check brake fluid leakage.

3. HYDRAULIC UNIT S006001A1006

Check the hydraulic unit.
● With brake tester <Ref. to ABS-9, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
● Without brake tester <Ref. to ABS-8, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

4. BRAKE DRAG S006001A1003

Check brake drag.

5. BRAKE PAD AND ROTOR S006001A1004

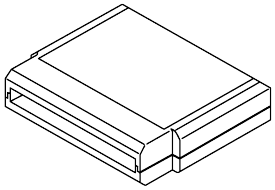
Check brake pad and rotor.
● Front <Ref. to BR-21, INSPECTION, Front Brake Pad.> and <Ref. to BR-22, INSPECTION, Front Disc Rotor.>
● Rear <Ref. to BR-26, INSPECTION, Rear Brake Pad.> and <Ref. to BR-28, INSPECTION, Rear Disc Rotor.> or <Ref. to BR-33, INSPECTION, Rear Drum Brake Shoe.> and <Ref. to BR-34, INSPECTION, Rear Drum Brake Drum.>

6. TIRE S006001A1005

Check tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATIONS, General Description.>

C: PREPARATION TOOL S006001A17

1. SPECIAL TOOLS S006001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

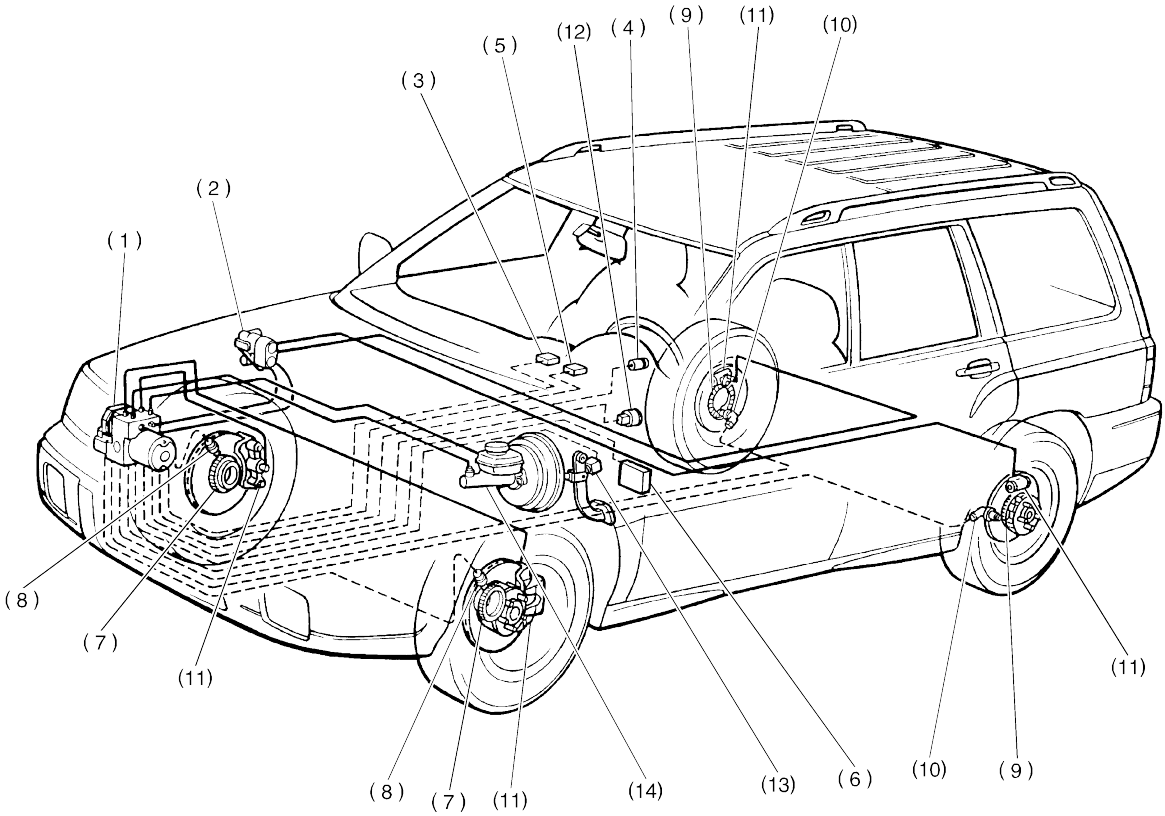
2. GENERAL PURPOSE TOOLS S006001A1702

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

MEMO:

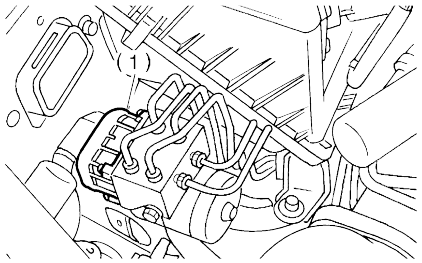
4. Electrical Components Location S006507

A: LOCATION S006507A13

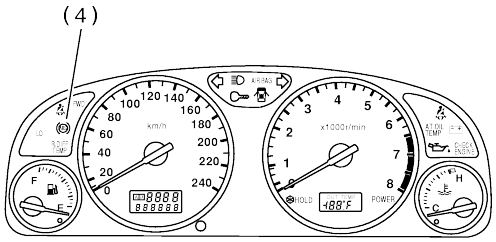


S4M0478A

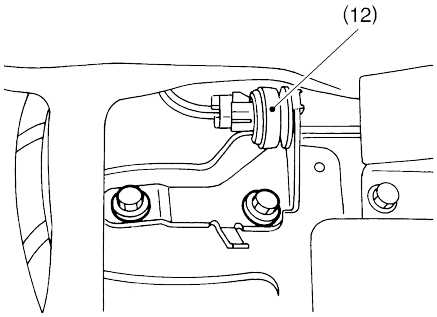
(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) Proportioning valve
(3) Diagnosis connector
(4) ABS warning light
(5) Data link connector (for SUBARU select monitor)
(6) Automatic transmission control module
(7) Front tone wheel
(8) Front ABS sensor
(9) Rear tone wheel
(10) Rear ABS sensor
(11) Wheel cylinder
(12) G sensor
(13) Stop light switch
(14) Master cylinder



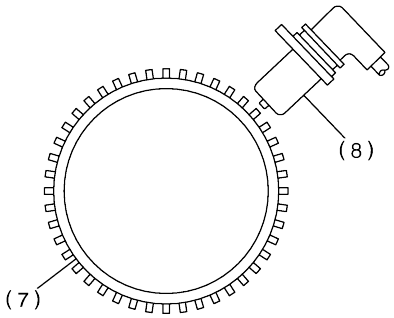
B4M1226B



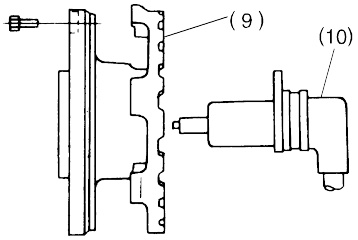
S2M2018B



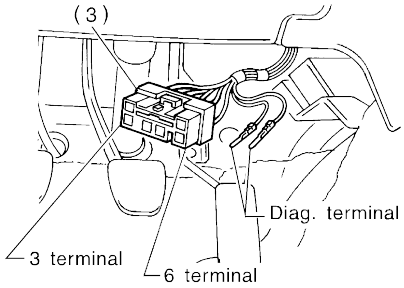
H4M1328B



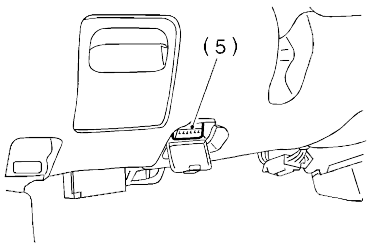
B4M2285A



B4M0646H



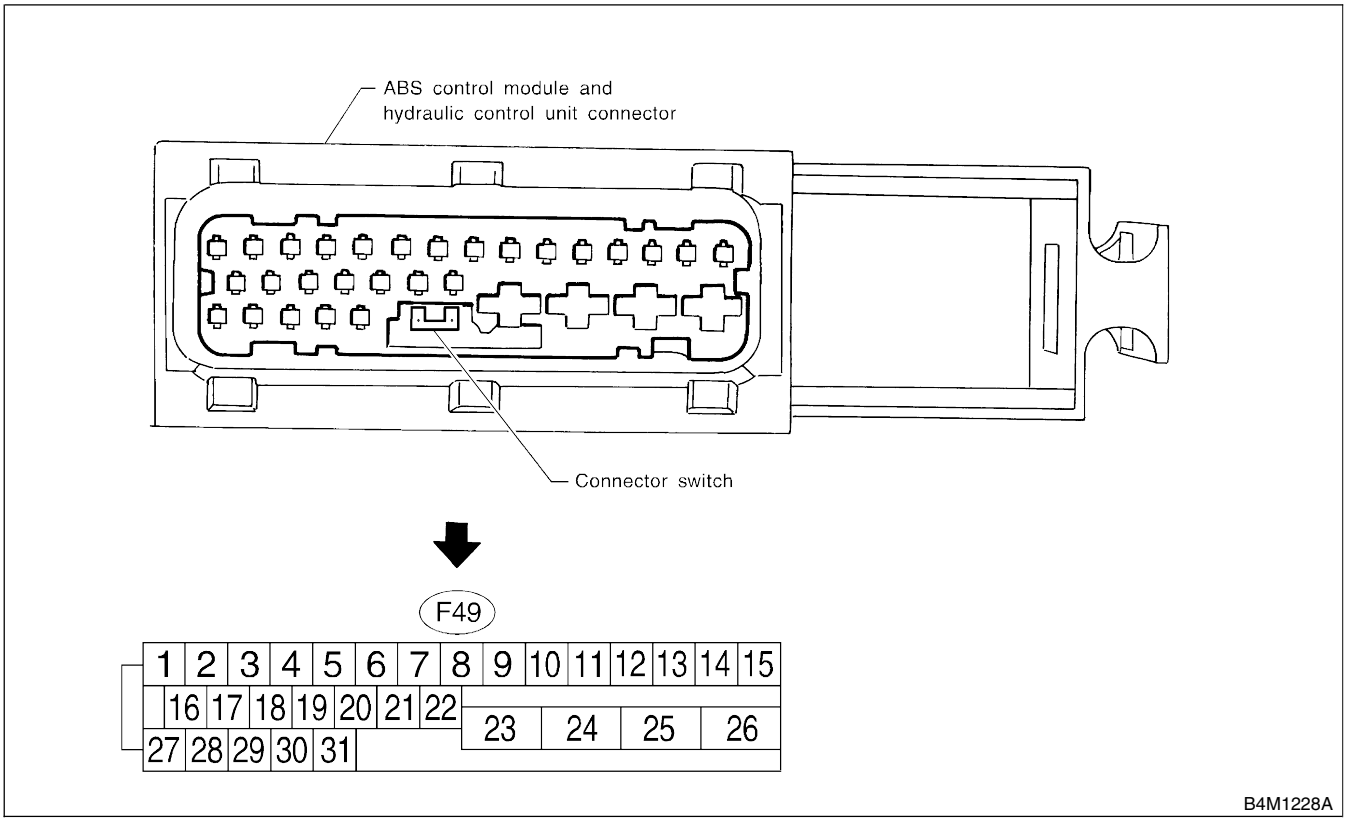
B4M0231E



S4M0056A

5. Control Module I/O Signal S006524

A: ELECTRICAL SPECIFICATION S006524A08



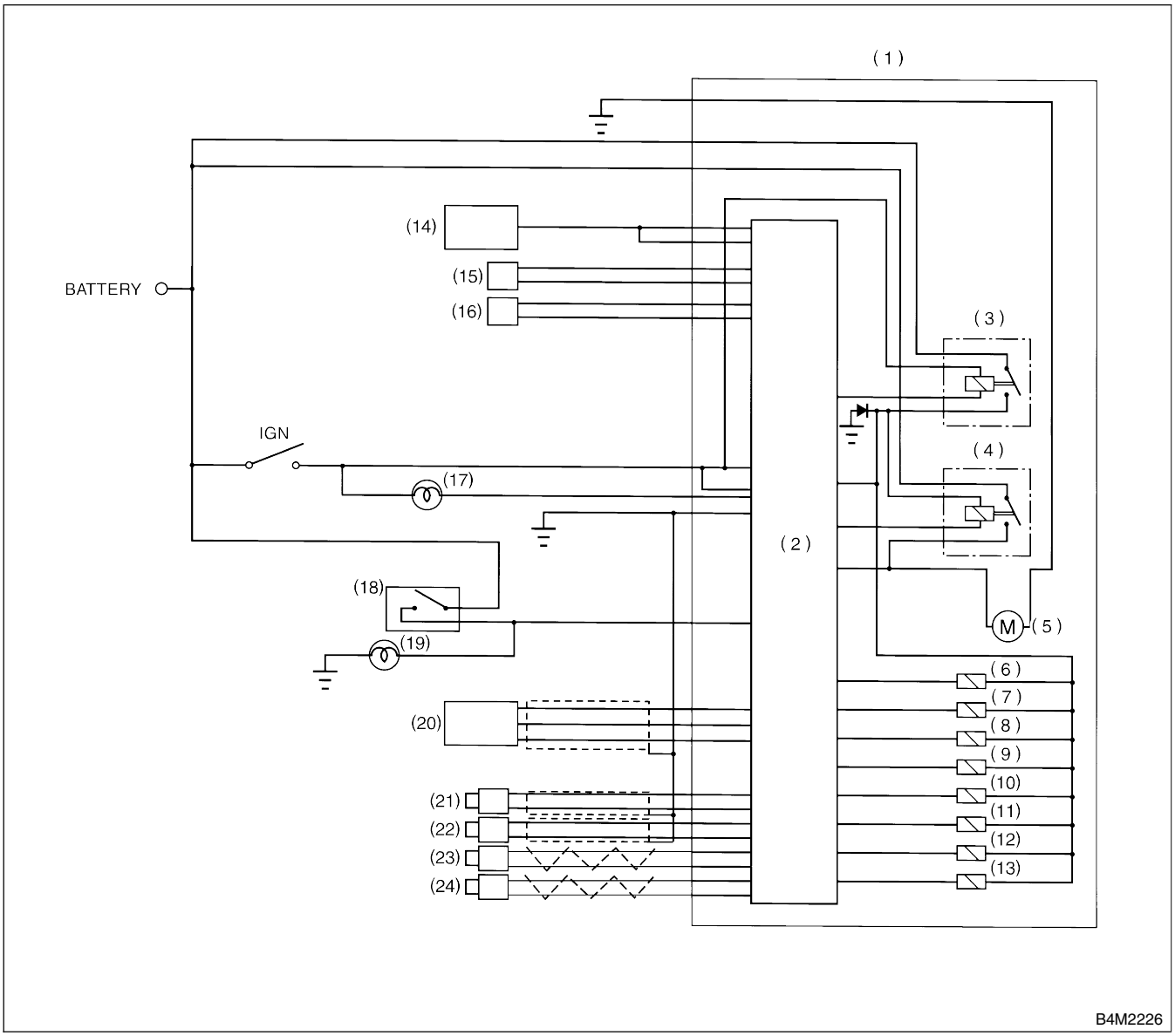
NOTE:
- The terminal numbers in the ABS control module and hydraulic control unit connector are as shown in the figure.
- When the connector is removed from the ABSCM&H/U, the connector switch closes the circuit between terminal No. 21 and No. 23. The ABS warning light illuminates.

CONTROL MODULE I/O SIGNAL

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	13—15	
Valve relay power supply		24—23	10 — 15 V
Motor relay power supply		25—23	10 — 15 V
G sensor*2	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	—

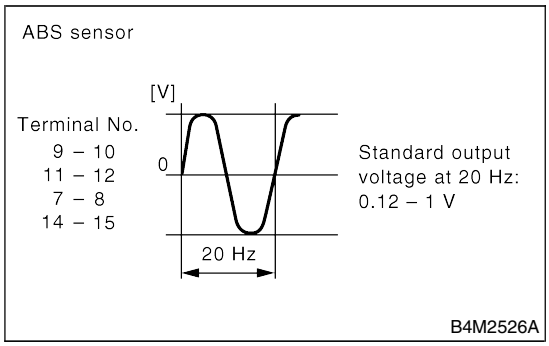
*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.
*2: Measure the I/O signal voltage at connector (B62) and (R48) of LHD model or (B100) of RHD model.

B: SCHEMATIC S006524A21



(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) ABS control module area
(3) Valve relay
(4) Motor relay
(5) Motor
(6) Front left inlet solenoid valve
(7) Front left outlet solenoid valve
(8) Front right inlet solenoid valve
(9) Front right outlet solenoid valve
(10) Rear left inlet solenoid valve
(11) Rear left outlet solenoid valve
(12) Rear right inlet solenoid valve
(13) Rear right outlet solenoid valve
(14) Transmission control module (only AT model)
(15) Diagnosis connector
(16) Data link connector
(17) ABS warning light
(18) Stop light switch
(19) Stop light
(20) G sensor
(21) Front left ABS sensor
(22) Front right ABS sensor
(23) Rear left ABS sensor
(24) Rear right ABS sensor

C: WAVEFORM S006524G79



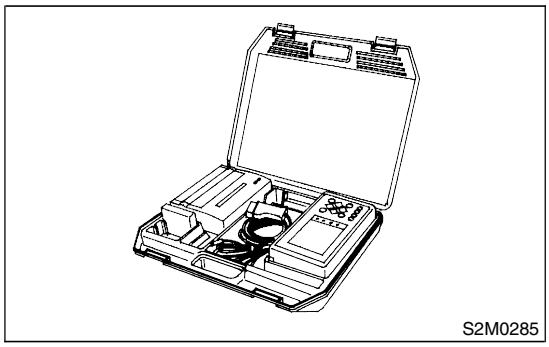
6. Subaru Select Monitor S006503

A: OPERATION S006503A16

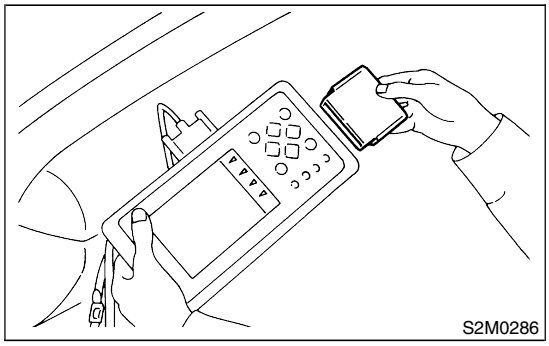
1. READ DIAGNOSTIC TROUBLE CODE

S006503A1601

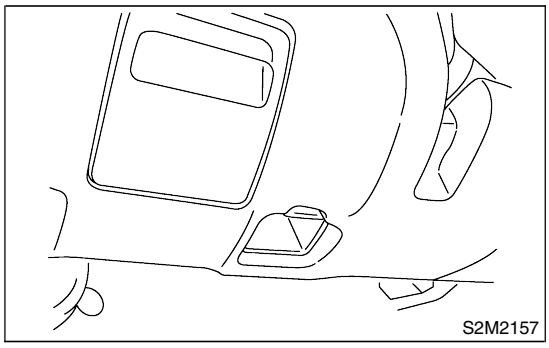
1) Prepare Subaru Select Monitor kit.


S2M0285

2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor. <Ref. to ABS-10, SPECIAL TOOLS, PREPARATION TOOL, General Description.>

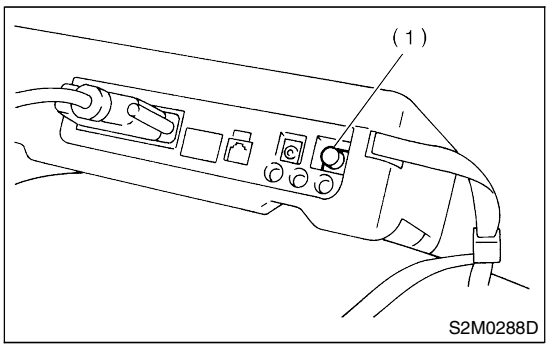

S2M0286

4) Connect Subaru Select Monitor to data link connector.
(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).


S2M2157

(2) Connect diagnosis cable to data link connector.

5) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



S2M0288D

(1) Power switch

6) On the ≪Main Menu≫ display screen, select the {Each System Check} and press the [YES] key.
7) On the ≪System Selection Menu≫ display screen, select the {Brake Control System} and press the [YES] key.
8) Press the [YES] key after displayed the information of engine type.
9) On the ≪ABS Diagnosis≫ display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
10) On the ≪Diagnostic Code(s) Display≫ display screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)} and press the [YES] key.

NOTE:
● For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
● For detailed concerning diagnostic trouble codes, refer to the LIST OF DIAGNOSTICS TROUBLE CODE. <Ref. to ABS-24, List of Diagnostics Trouble Code.>

2. READ CURRENT DATA S006503A1602

1) On the ≪Main Menu≫ display screen, select the {Each System Check} and press the ≪YES≫ key.
2) On the ≪System Selection Menu≫ display screen, select the {Brake Control System} and press the ≪YES≫ key.
3) Press the ≪YES≫ key after displayed the information of ABS type.
4) On the ≪Brake Control Diagnosis≫ display screen, select the {Current Data Display & Save} and press the ≪YES≫ key.
5) On the ≪Data Display Menu≫ display screen, select the {Data Display} and press the ≪YES≫ key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

- A list of the support data is shown in the following table.

Display screen	Contents to be monitored	Unit of measure
FR Wheel Speed	Wheel speed detected by the Front Right ABS sensor is displayed	km/h or MPH
FL Wheel Speed	Wheel speed detected by the Front Left ABS sensor is displayed	km/h or MPH
RR Wheel Speed	Wheel speed detected by the Rear Right ABS sensor is displayed	km/h or MPH
RL Wheel Speed	Wheel speed detected by the Rear Left ABS sensor is displayed	km/h or MPH
Stop Light Switch	Stop light switch signal	ON or OFF
Stop Light Switch	Stop light switch monitor voltage is displayed.	V
G sensor output Signal	Refers to vehicle acceleration detecting by the analog G sensor. It appears on the select monitor display in volts.	V
Valve Relay Signal	Valve Relay Signal	ON or OFF
Motor Relay Signal	Motor Relay Signal	ON or OFF
ABS Signal to TCM	ABS operation signal from ABS control module to TCM	ON or OFF
ABS Warning Lamp	ON operation of the ABS warning light is displayed.	ON or OFF
Motor Relay Monitor	Operating condition of the motor relay is displayed.	High or Low
Valve Relay Monitor	Operating condition of the valve relay is displayed.	ON or OFF
CCM Signal	ABS operation signal from ABS control module to TCM	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. CLEAR MEMORY MODE S006503A1603

1) On the ≪Main Menu≫ display screen, select the {2. Each System Check} and press the ≪YES≫ key.
2) On the ≪System Select Menu≫ display screen, select {Brake System} and press the ≪YES≫ key.
3) Press the ≪YES≫ key after displayed the information of engine type.
4) On the ≪Brake Control Diagnosis≫ display screen, select the {Clear Memory} and press the ≪YES≫ key.
5) When the “Done” and “turn ignition switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

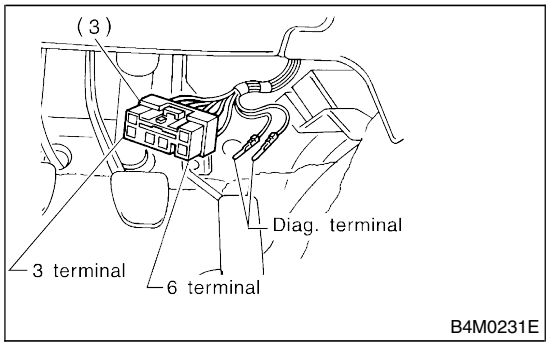
7. Read Diagnostic Trouble Code S006508

A: OPERATION S006508A16

1. WITHOUT SUBARU SELECT MONITOR

S006508A1602

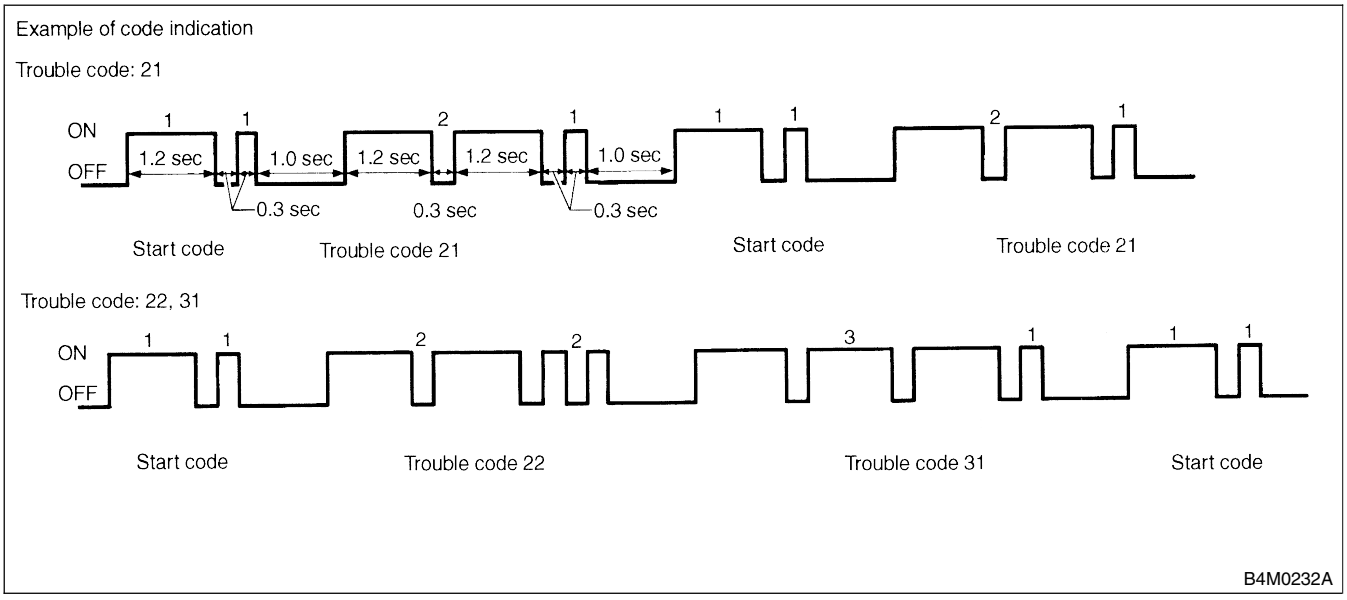
1) Take out diagnosis connector from side of driver's seat heater unit.



2) Turn ignition switch OFF.
3) Connect diagnosis connector terminal 6 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.
- 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.)



2. WITH SUBARU SELECT MONITOR S006508A1601

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to ABS-18, Subaru Select Monitor.>

8. Inspection Mode S006510

A: OPERATION S006510A16

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.

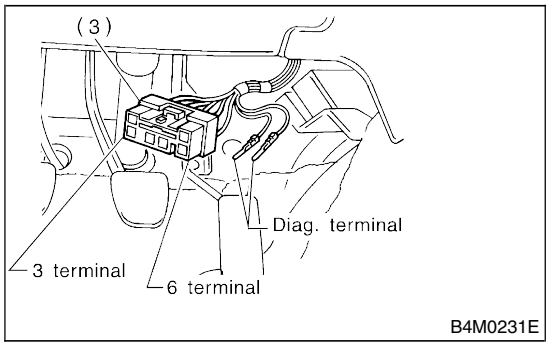
9. Clear Memory Mode S006513

A: OPERATION S006513A16

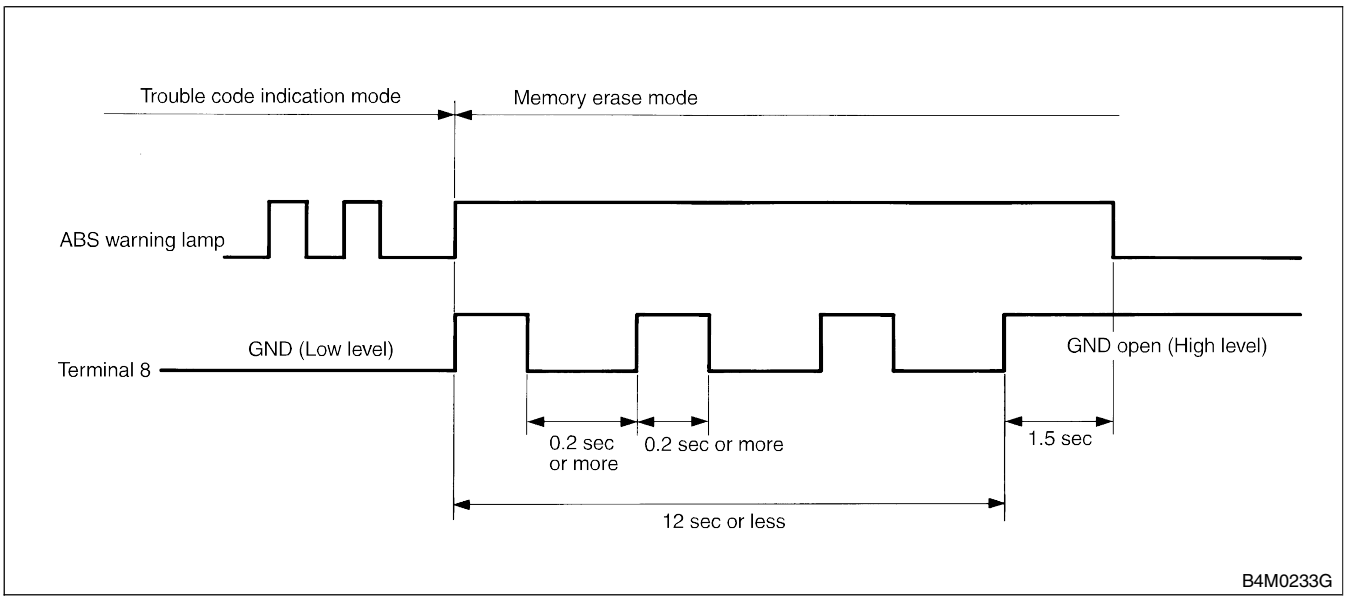
1. WITHOUT SUBARU SELECT MONITOR

S006513A1602

1) After calling up a trouble code, disconnect diagnosis connector terminal 6 from diagnosis terminal.



2) Repeat 3 times within approx. 12 seconds; connecting and disconnecting terminal 6 and diagnosis terminal for at least 0.2 seconds each time.



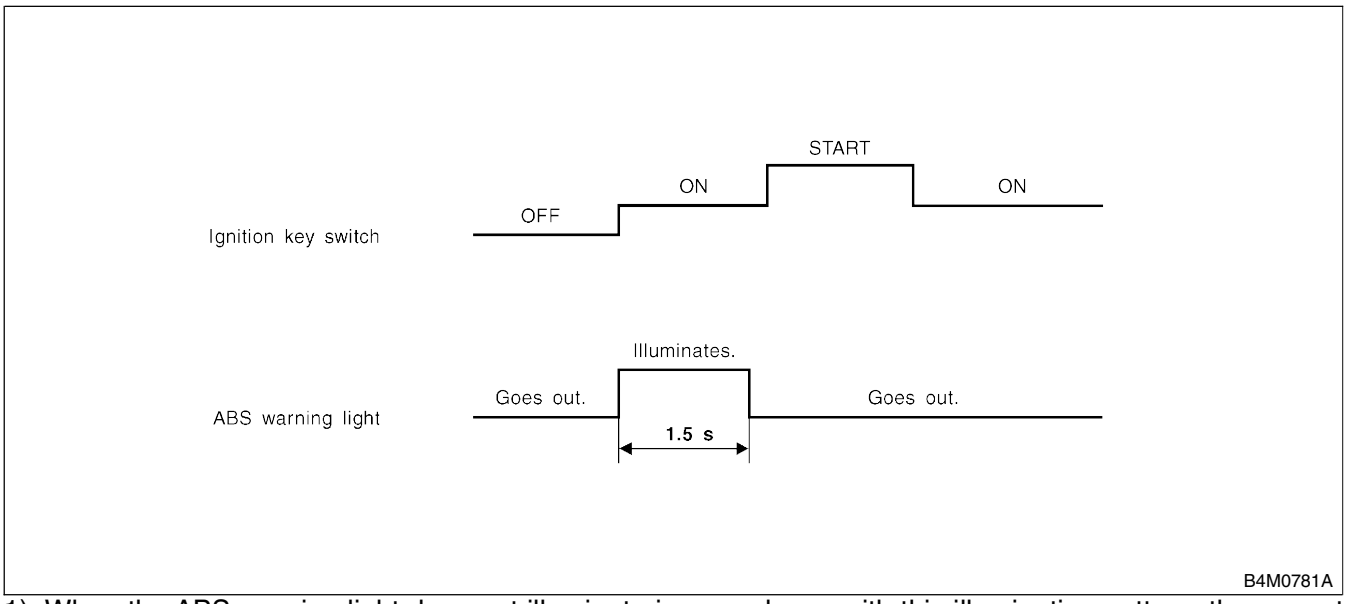
NOTE:
After diagnostics is completed, make sure to clear memory. Make sure only start code (11) is shown after memory is cleared.

2. WITH SUBARU SELECT MONITOR S006513A1601

Refer to SUBARU SELECT MONITOR for information about how to clear trouble codes. <Ref. to ABS-18, Subaru Select Monitor.>

10. ABS Warning Light Illumination Pattern S006581

A: INSPECTION S006581A10



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 ABS-28, Diagnostics Chart with Diagnosis Connector.>

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.

11. List of Diagnostics Trouble Code S006511

A: LIST S006511A12

1. WITHOUT SUBARU SELECT MONITOR S006511A1201

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	Abnormal ABS sensor (Open circuit or input voltage too high)	Front right ABS sensor	<Ref. to ABS-42, TROUBLE CODE 21— ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
23		Front left ABS sensor	<Ref. to ABS-42, TROUBLE CODE 23 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
25		Rear right ABS sensor	<Ref. to ABS-42, TROUBLE CODE 25 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
27		Rear left ABS sensor	<Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
22	Abnormal ABS sensor (Abnormal ABS sensor signal)	Front right ABS sensor	<Ref. to ABS-48, TROUBLE CODE 22 — ABNORMAL ABS SENSOR (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
24		Front left ABS sensor	<Ref. to ABS-48, TROUBLE CODE 24 — ABNORMAL ABS SENSOR (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
26		Rear right ABS sensor	<Ref. to ABS-48, TROUBLE CODE 26 — ABNORMAL ABS SENSOR (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
28		Rear left ABS sensor	<Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
29		Any one of four	<Ref. to ABS-56, TROUBLE CODE 29 — ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) —, Diagnostics Chart with Diagnosis Connector.>

LIST OF DIAGNOSTICS TROUBLE CODE

Trouble code	Contents of diagnosis		Index No.
31	Abnormal solenoid valve circuit(s) in ABS control module and hydraulic unit	Front right inlet valve	<Ref. to ABS-62, TROUBLE CODE 31 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
32		Front right outlet valve	<Ref. to ABS-66, TROUBLE CODE 32 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —, Diagnostics Chart with Diagnosis Connector.>
33		Front left inlet valve	<Ref. to ABS-62, TROUBLE CODE 33 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
34		Front left outlet valve	<Ref. to ABS-66, TROUBLE CODE 34 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —, Diagnostics Chart with Diagnosis Connector.>
35		Rear right inlet valve	<Ref. to ABS-62, TROUBLE CODE 35 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
36		Rear right outlet valve	<Ref. to ABS-66, TROUBLE CODE 36 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —, Diagnostics Chart with Diagnosis Connector.>
37		Rear left inlet valve	<Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
38		Rear left outlet valve	<Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>
41	Abnormal ABS control module		<Ref. to ABS-70, TROUBLE CODE 41 — ABNORMAL ABS CONTROL MODULE —, Diagnostics Chart with Diagnosis Connector.>
42	Source voltage is abnormal.		<Ref. to ABS-72, TROUBLE CODE 42 — SOURCE VOLTAGE IS ABNORMAL. —, Diagnostics Chart with Diagnosis Connector.>
44	A combination of AT control abnormal		<Ref. to ABS-74, TROUBLE CODE 44 — A COMBINATION OF AT CONTROL ABNORMAL —, Diagnostics Chart with Diagnosis Connector.>
51	Abnormal valve relay		<Ref. to ABS-76, TROUBLE CODE 51 — ABNORMAL VALVE RELAY —, Diagnostics Chart with Diagnosis Connector.>
52	Abnormal motor and/or motor relay		<Ref. to ABS-78, TROUBLE CODE 52 — ABNORMAL MOTOR AND/OR MOTOR RELAY —, Diagnostics Chart with Diagnosis Connector.>
54	Abnormal stop light switch		<Ref. to ABS-82, TROUBLE CODE 54 — ABNORMAL STOP LIGHT SWITCH —, Diagnostics Chart with Diagnosis Connector.>
56	Abnormal G sensor output voltage		<Ref. to ABS-84, TROUBLE CODE 56 — ABNORMAL G SENSOR OUTPUT VOLTAGE —, Diagnostics Chart with Diagnosis Connector.>

LIST OF DIAGNOSTICS TROUBLE CODE

2. WITH SUBARU SELECT MONITOR S006511A1202

Code	Display screen	Contents of diagnosis	Index No.
—	Communication for initializing impossible	Select monitor communication failure	<Ref. to ABS-90, COMMUNICATION FOR INITIALIZING IMPOSSIBLE , Diagnostics Chart with Subaru Select Monitor.>
—	No trouble code	Although no trouble code appears on the select monitor display, the ABS warning light remains on.	<Ref. to ABS-94, NO TROUBLE CODE, Diagnostics Chart with Subaru Select Monitor.>
21	Open or short circuit in front right ABS sensor circuit	Open or short circuit in front right ABS sensor circuit	<Ref. to ABS-98, TROUBLE CODE 21 — OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
22	Front right ABS sensor abnormal signal	Front right ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 22 — FRONT RIGHT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
23	Open or short circuit in front left ABS sensor circuit	Open or short circuit in front left ABS sensor circuit	<Ref. to ABS-98, TROUBLE CODE 23 — OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
24	Front left ABS sensor abnormal signal	Front left ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 24 — FRONT LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
25	Open or short circuit in rear right ABS sensor circuit	Open or short circuit in rear right ABS sensor circuit	<Ref. to ABS-98, TROUBLE CODE 25 — OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
26	Rear right ABS sensor abnormal signal	Rear right ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 26 — REAR RIGHT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
27	Open or short circuit in rear left ABS sensor circuit	Open or short circuit in rear left ABS sensor circuit	<Ref. to ABS-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
28	Rear left ABS sensor abnormal signal	Rear left ABS sensor abnormal signal	<Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>
29	Abnormal ABS sensor signal on any one of four sensor	Abnormal ABS sensor signal on any one of four	<Ref. to ABS-114, TROUBLE CODE 29 — ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR —, Diagnostics Chart with Subaru Select Monitor.>
31	Front right inlet valve malfunction	Front right inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 31 — FRONT RIGHT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
32	Front right outlet valve malfunction	Front right outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 32 — FRONT RIGHT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
33	Front left inlet valve malfunction	Front left inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 33 — FRONT LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
34	Front left outlet valve malfunction	Front left outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 34 — FRONT LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
35	Rear right inlet valve malfunction	Rear right inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 35 — REAR RIGHT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
36	Rear right outlet valve malfunction	Rear right outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 36 — REAR RIGHT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
37	Rear left inlet valve malfunction	Rear left inlet valve malfunction	<Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

LIST OF DIAGNOSTICS TROUBLE CODE

Code	Display screen	Contents of diagnosis	Index No.
38	Rear left outlet valve malfunction	Rear left outlet valve malfunction	<Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
41	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to ABS-128, TROUBLE CODE 41 — ABS CONTROL MODULE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
42	Power supply voltage too low	Power supply voltage too low	<Ref. to ABS-130, TROUBLE CODE 42 — POWER SUPPLY VOLTAGE TOO LOW —, Diagnostics Chart with Subaru Select Monitor.>
42	Power supply voltage too high	Power supply voltage too high	<Ref. to ABS-132, TROUBLE CODE 42 — POWER SUPPLY VOLTAGE TOO HIGH —, Diagnostics Chart with Subaru Select Monitor.>
44	ABS-AT control (Non Controlled)	ABS-AT control (Non Controlled)	<Ref. to ABS-134, TROUBLE CODE 44 — ABS-AT CONTROL (NON CONTROLLED) —, Diagnostics Chart with Subaru Select Monitor.>
44	ABS-AT control (Controlled)	ABS-AT control (Controlled)	<Ref. to ABS-136, TROUBLE CODE 44 — ABS-AT CONTROL (CONTROLLED) —, Diagnostics Chart with Subaru Select Monitor.>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to ABS-138, TROUBLE CODE 51 — VALVE RELAY MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
51	Valve relay ON failure	Valve relay ON failure	<Ref. to ABS-140, TROUBLE CODE 51 — VALVE RELAY ON FAILURE —, Diagnostics Chart with Subaru Select Monitor.>
52	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to ABS-142, TROUBLE CODE 52 — OPEN CIRCUIT IN MOTOR RELAY CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
52	Motor relay ON failure	Motor relay ON failure	<Ref. to ABS-146, TROUBLE CODE 52 — MOTOR RELAY ON FAILURE —, Diagnostics Chart with Subaru Select Monitor.>
52	Motor malfunction	Motor malfunction	<Ref. to ABS-150, TROUBLE CODE 52 — MOTOR MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to ABS-154, TROUBLE CODE 54 — STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>
56	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to ABS-156, TROUBLE CODE 56 — OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
56	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to ABS-160, TROUBLE CODE 56 — BATTERY SHORT IN G SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>
56	Abnormal G sensor high μ output	Abnormal G sensor high μ output	<Ref. to ABS-166, TROUBLE CODE 56 — ABNORMAL G SENSOR HIGH μ OUTPUT —, Diagnostics Chart with Subaru Select Monitor.>
56	Detection of G sensor stick	Detection of G sensor stick	<Ref. to ABS-170, TROUBLE CODE 56 — DETECTION OF G SENSOR STICK —, Diagnostics Chart with Subaru Select Monitor.>

NOTE:
High μ means high friction coefficient against road surface.

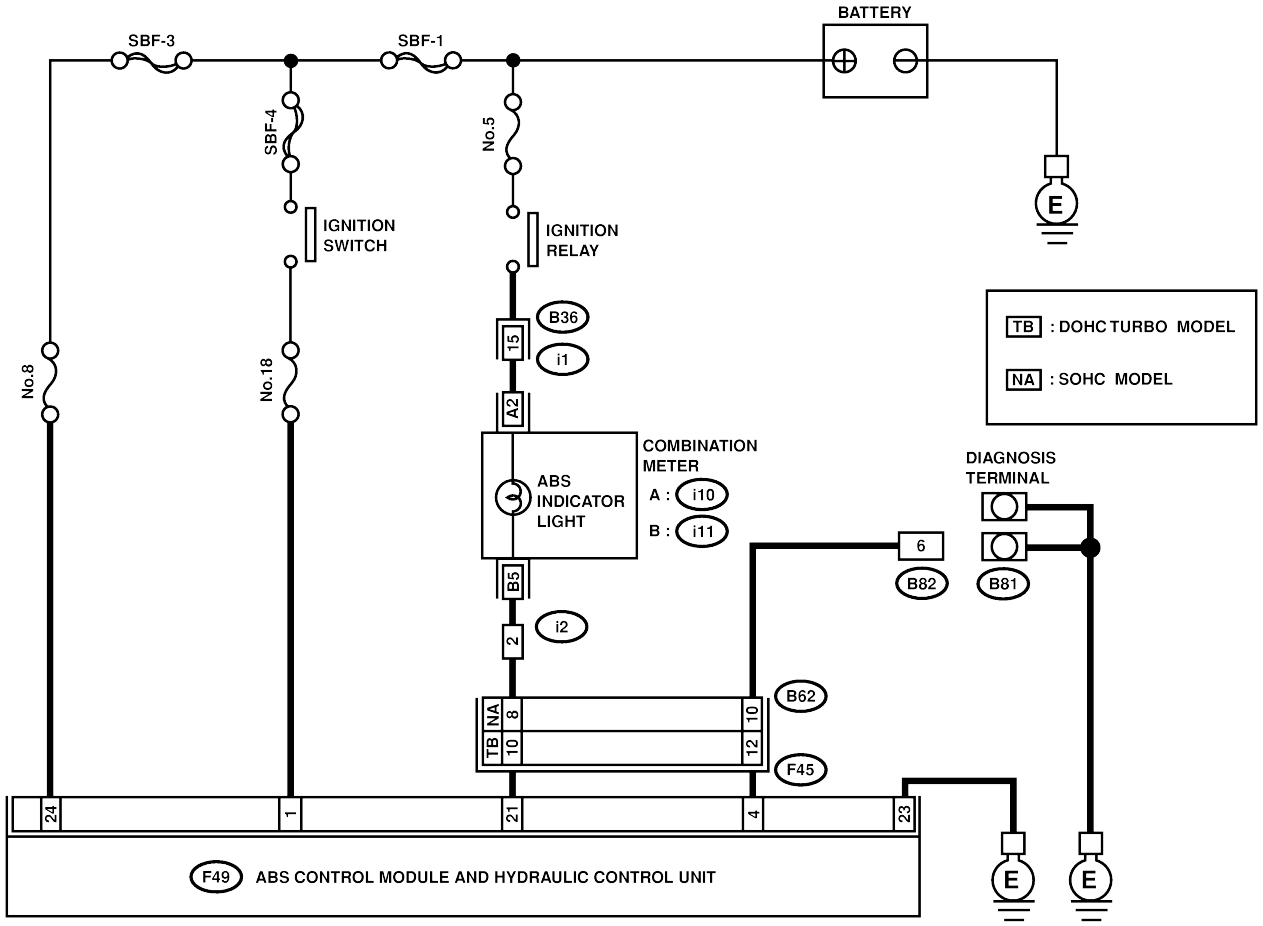
12. Diagnostics Chart with Diagnosis Connector S006522

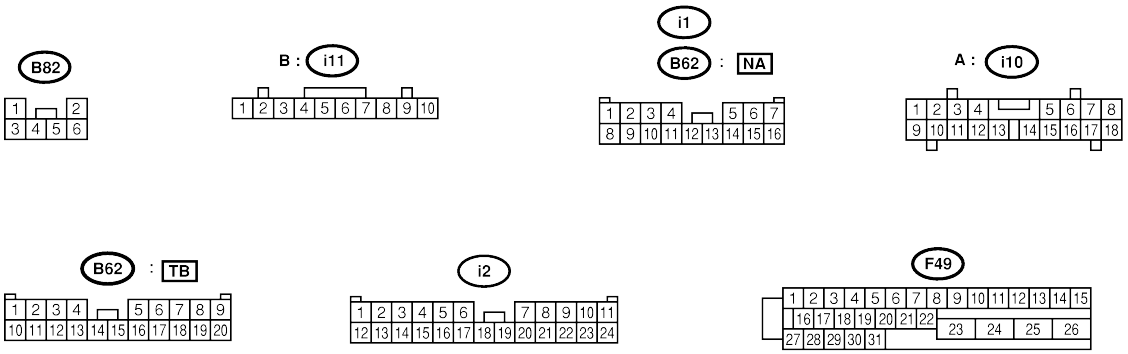
A: ABS WARNING LIGHT DOES NOT COME ON. S006522E24

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.

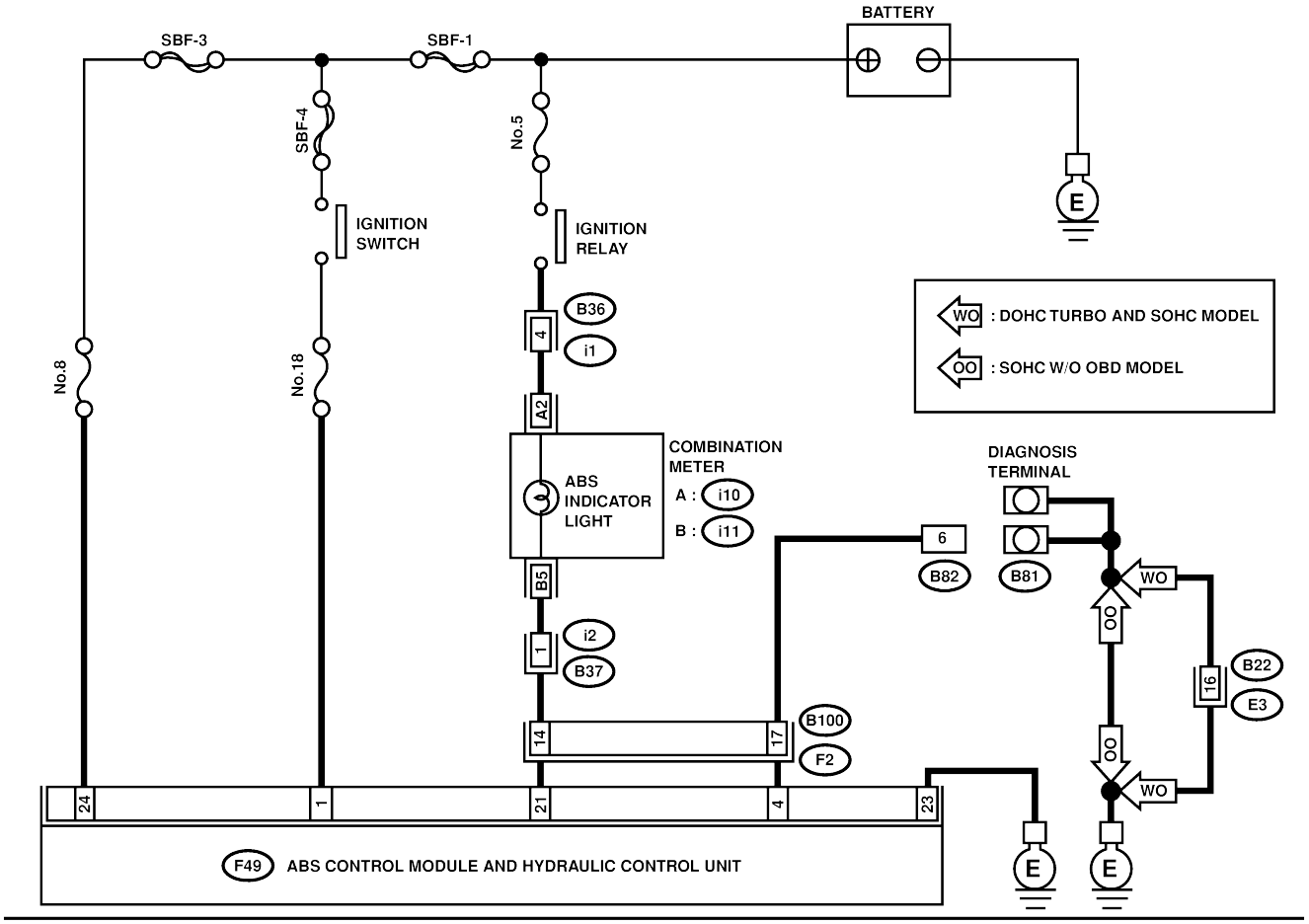
WIRING DIAGRAM: LHD MODEL

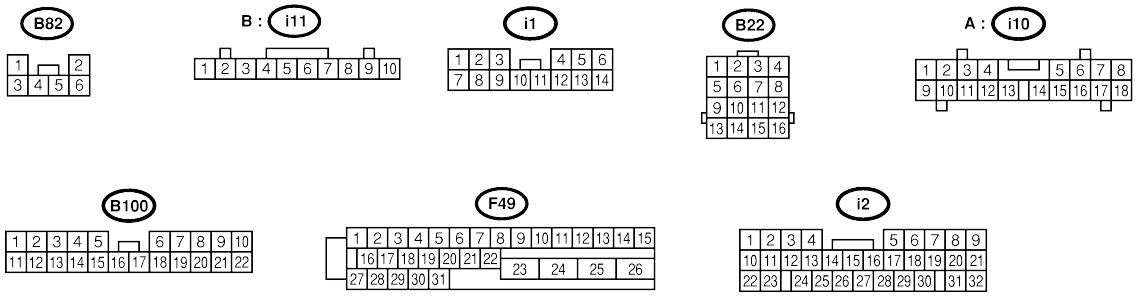




S4M0553

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**CHECK IF OTHER WARNING LIGHTS TURN ON.** Turn ignition switch to ON (engine OFF).	Do other warning lights turn on?	Go to step **2**.	Repair combination meter. <Ref. to IDI-15, Combination Meter Assembly.>
2	**CHECK ABS WARNING LIGHT BULB.** 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove ABS warning light bulb from combination meter.	Is ABS warning light bulb OK?	Go to step **3**.	Replace ABS warning light bulb. <Ref. to IDI-15, Combination Meter Assembly.>
3	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Disconnect connector (B62) or (B100) from connector (F45) or (F2). 2) Measure voltage between connector (B200) and chassis ground. ***Connector & terminal*** ***LHD turbo: (B62) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (B62) No. 8 (+) — Chassis ground (–):*** ***RHD: (B100) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 3 V?	Go to step **4**.	Repair warning light harness.
4	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between connector (B62) or (B100) and chassis ground. ***Connector & terminal*** ***LHD turbo: (B62) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (B62) No. 8 (+) — Chassis ground (–):*** ***RHD: (B100) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 3 V?	Go to step **5**.	Repair warning light harness.
5	**CHECK WIRING HARNESS.** 1) Turn ignition switch to OFF. 2) Install ABS warning light bulb to combination meter. 3) Install combination meter. 4) Turn ignition switch to ON. 5) Measure voltage between connector (B62) or (B100) and chassis ground. ***Connector & terminal*** ***LHD turbo: (B62) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (B62) No. 8 (+) — Chassis ground (–):*** ***RHD: (B100) No. 14 (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **6**.	Repair wiring harness.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
6	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Turn ignition switch to OFF. 2) Measure voltage between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (F45) No. 8 (+) — Chassis ground (–):*** ***RHD: (F2) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 3 V?	Go to step **7**.	Repair wiring harness.
7	**CHECK BATTERY SHORT OF ABS WARNING LIGHT HARNESS.** 1) Turn ignition switch to ON. 2) Measure voltage between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (F45) No. 8 (+) — Chassis ground (–):*** ***RHD: (F2) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 3 V?	Go to step **8**.	Repair wiring harness.
8	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — GND:***	Is the resistance less than 0.5 Ω?	Go to step **9**.	Repair ABSCM&H/U ground harness.
9	**CHECK WIRING HARNESS.** Measure resistance between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 (+) — Chassis ground (–):*** ***LHD non-turbo: (F45) No. 8 (+) — Chassis ground (–):*** ***RHD: (F2) No. 14 (+) — Chassis ground (–):***	Is the resistance less than 0.5 Ω?	Go to step **10**.	Repair harness/ connector.
10	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between combination meter and ABSCM&H/U?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

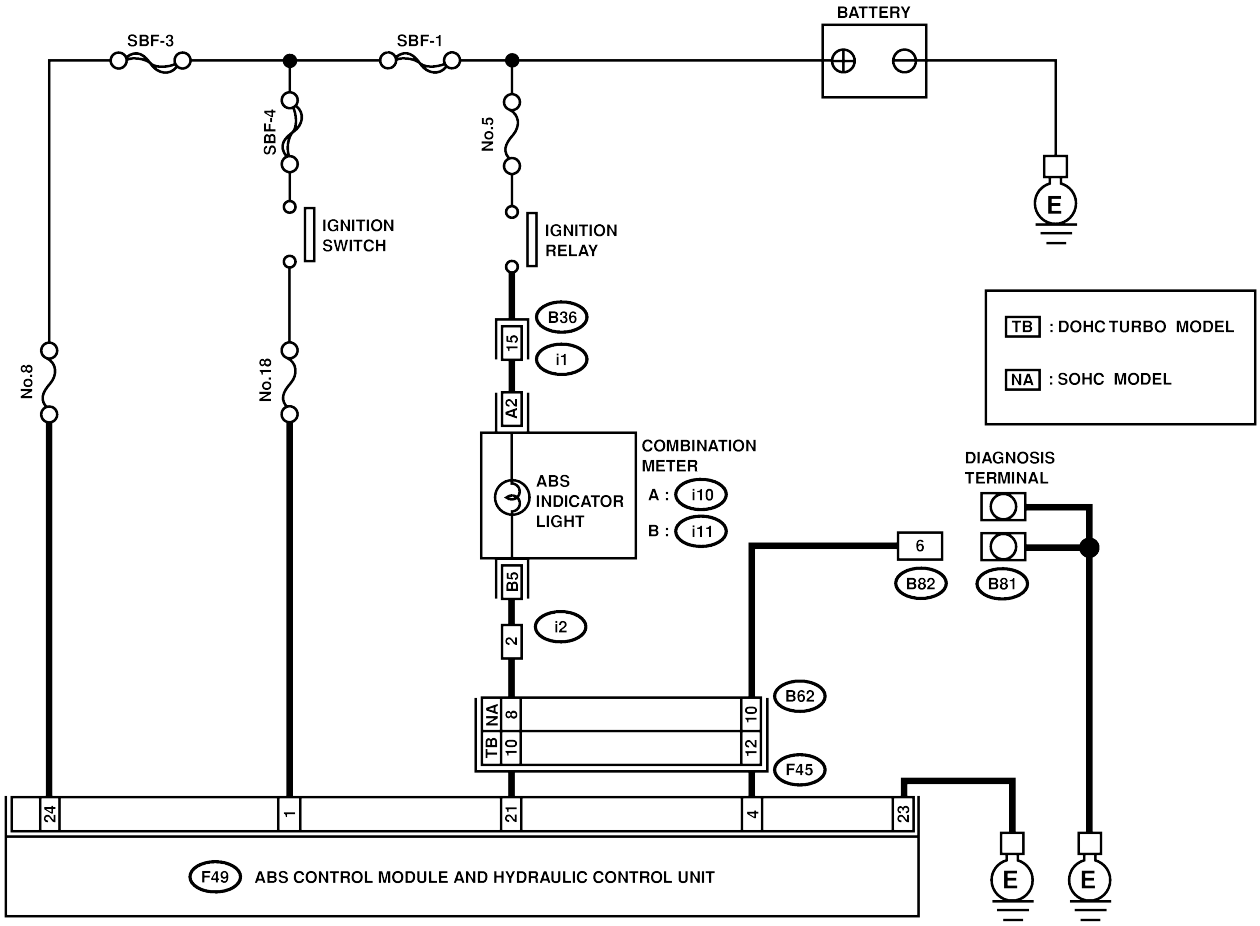
MEMO:

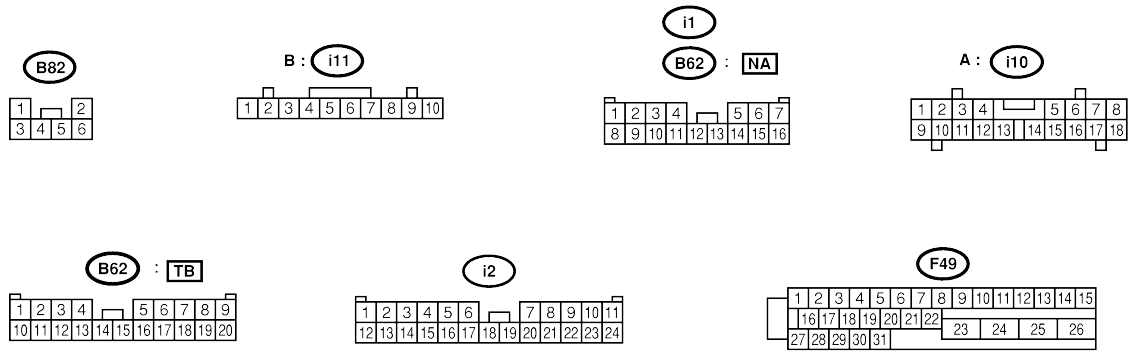
B: ABS WARNING LIGHT DOES NOT GO OFF. S006522E25

DIAGNOSIS:
- ABS warning light circuit is open or shorted.

TROUBLE SYMPTOM:
- When starting the engine and while ABS warning light is kept ON.

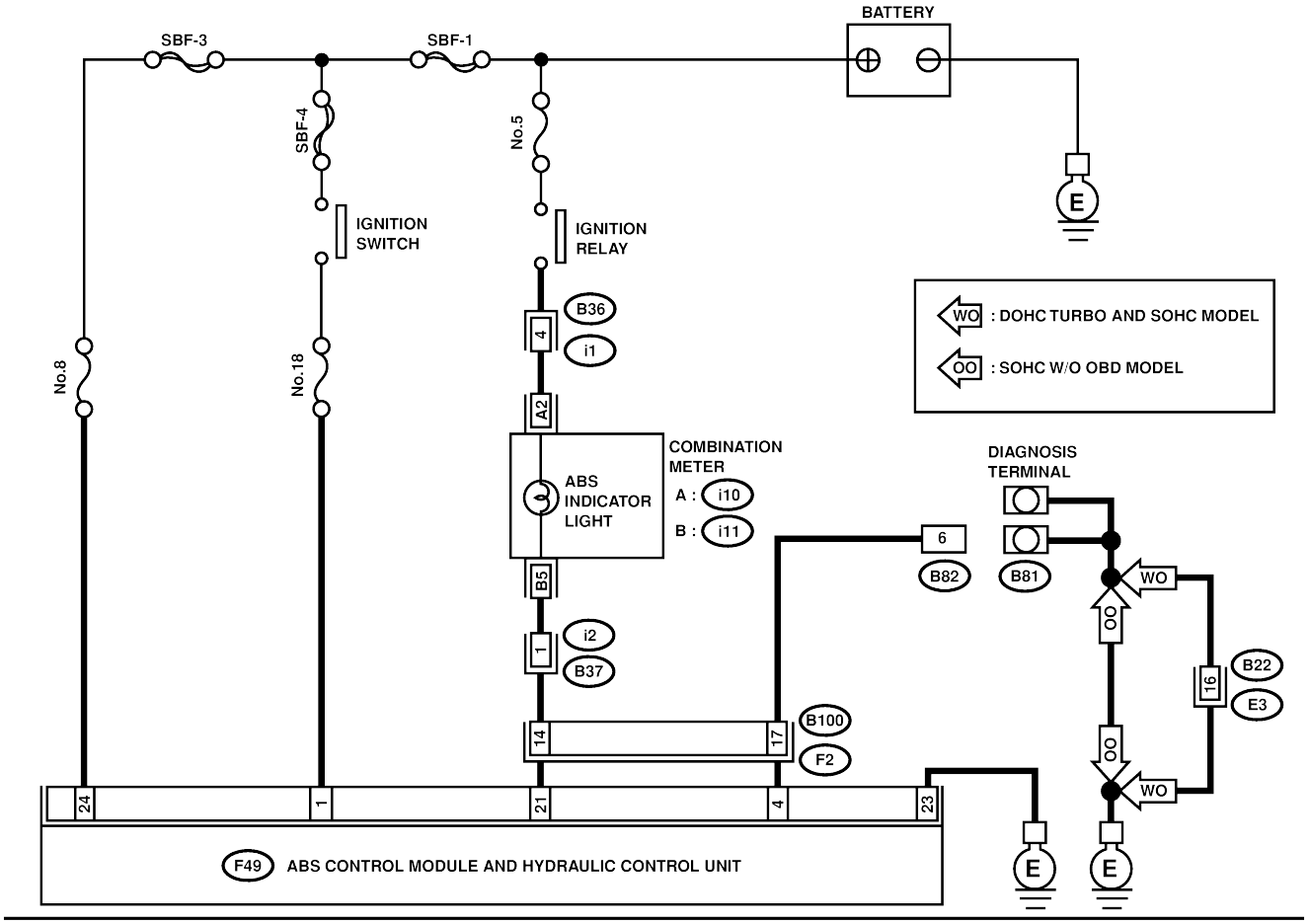
WIRING DIAGRAM: LHD MODEL

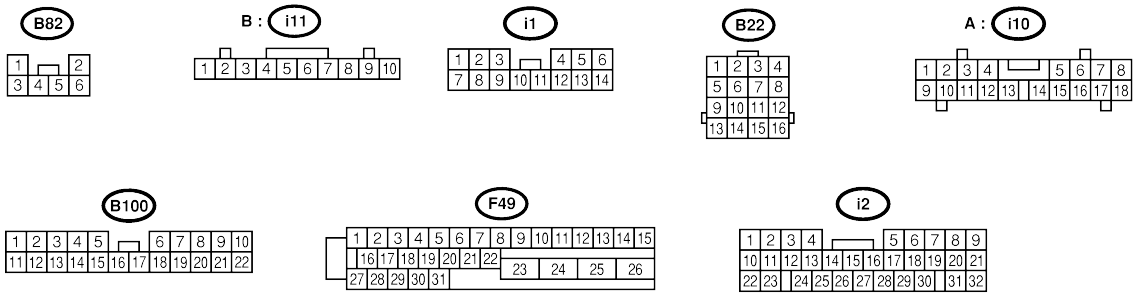




S4M0553

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn ignition switch to OFF.	Is ABSCM&H/U connector inserted into ABSCM until the clamp locks onto it?	Go to step **2**.	Insert ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.
2	**CHECK DIAGNOSIS TERMINAL.** Measure resistance between diagnosis terminals (B81) and chassis ground. ***Terminals*** ***Diagnosis terminal (A) — Chassis ground:*** ***Diagnosis terminal (B) — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair diagnosis terminal harness.
3	**CHECK DIAGNOSIS LINE.** 1) Turn ignition switch to OFF. 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6. 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:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair harness connector between ABSCM&H/U and diagnosis connector.
4	**CHECK GENERATOR.** 1) Start the engine. 2) Idle the engine. 3) Measure voltage between generator and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **5**.	Repair generator. <Ref. to SC-12, Generator.>
5	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Is there poor contact at battery terminal?	Repair battery terminal.	Go to step **6**.
6	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **7**.	Repair ABSCM&H/U power supply circuit.
7	**CHECK WIRING HARNESS.** 1) Disconnect connector (F45) or (F2) from connector (B62) or (B100). 2) Turn ignition switch to ON.	Does the ABS warning light remain off?	Go to step **8**.	Repair front wiring harness.
8	**CHECK PROJECTION AT ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Check for broken projection at the ABSCM&H/U terminal.	Are the projection broken?	Go to step **9**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
9	**CHECK ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminal*** ***No. 21 — No. 23:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

No.	Step	Check	Yes	No
10	**CHECK WIRING HARNESS.** Measure resistance between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **11**.	Repair harness.
11	**CHECK WIRING HARNESS.** 1) Connect connector to ABSCM&H/U. 2) Measure resistance between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair harness.
12	**CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.**	Is there poor contact in ABSCM&H/U connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

C: TROUBLE CODE DOES NOT APPEAR. S006522E50

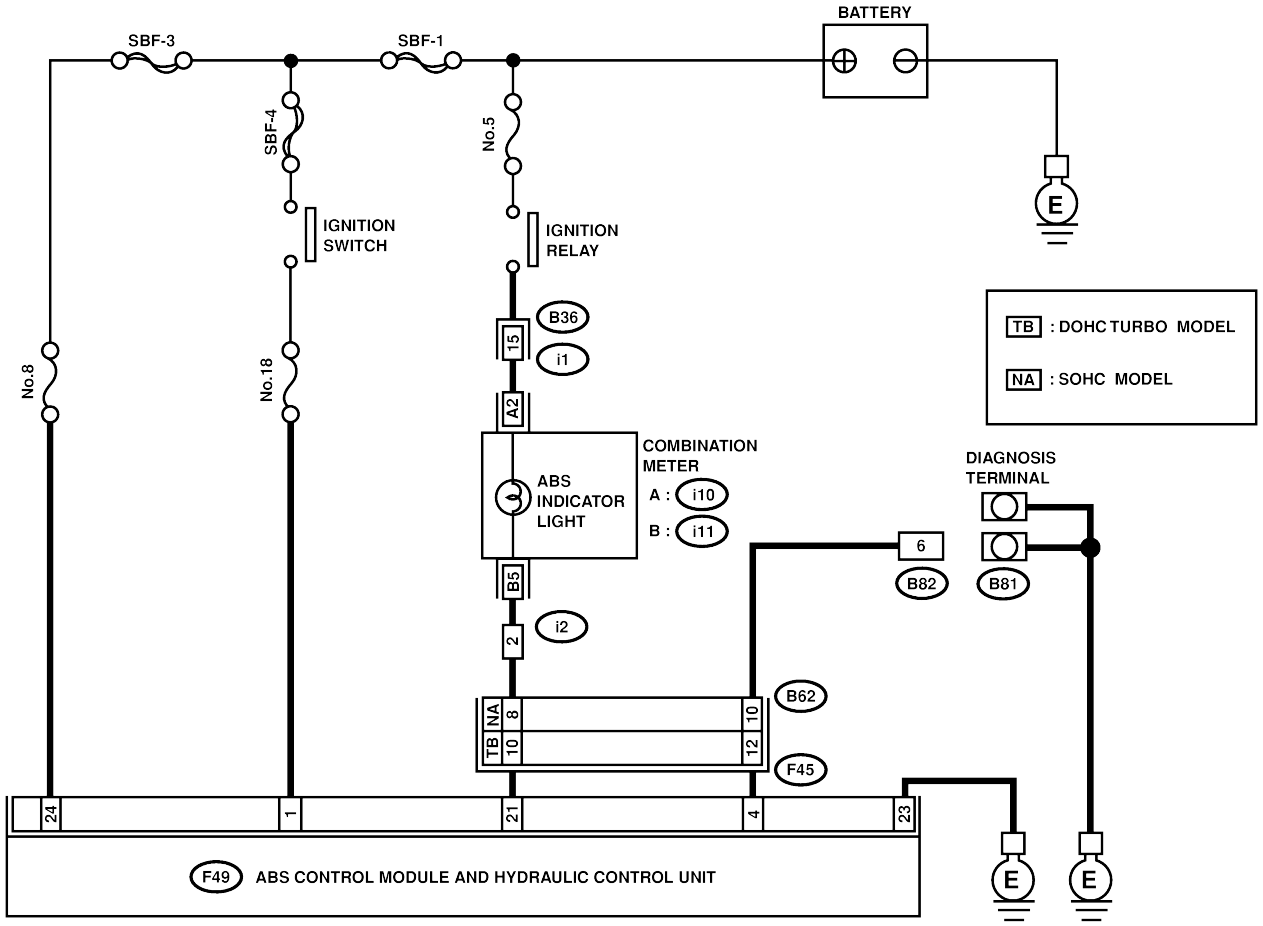
DIAGNOSIS:

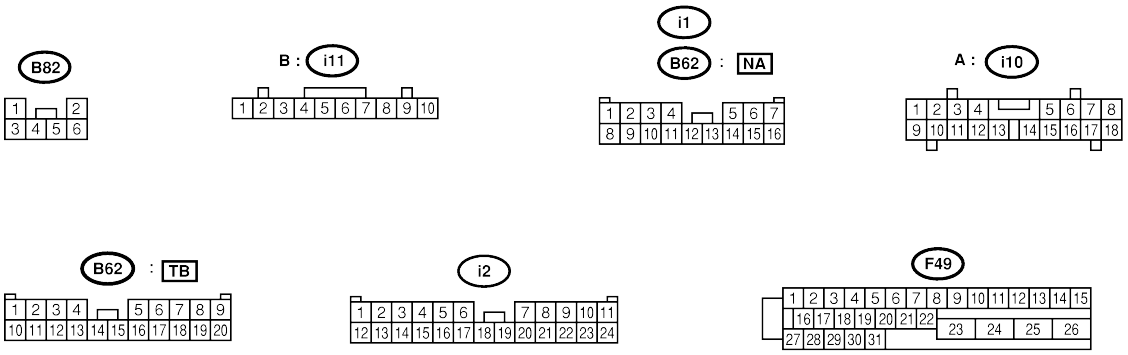
- Diagnosis circuit is open.

TROUBLE SYMPTOM:

- The ABS warning light turns on or off normally but the start code cannot be read out in the diagnostic mode.

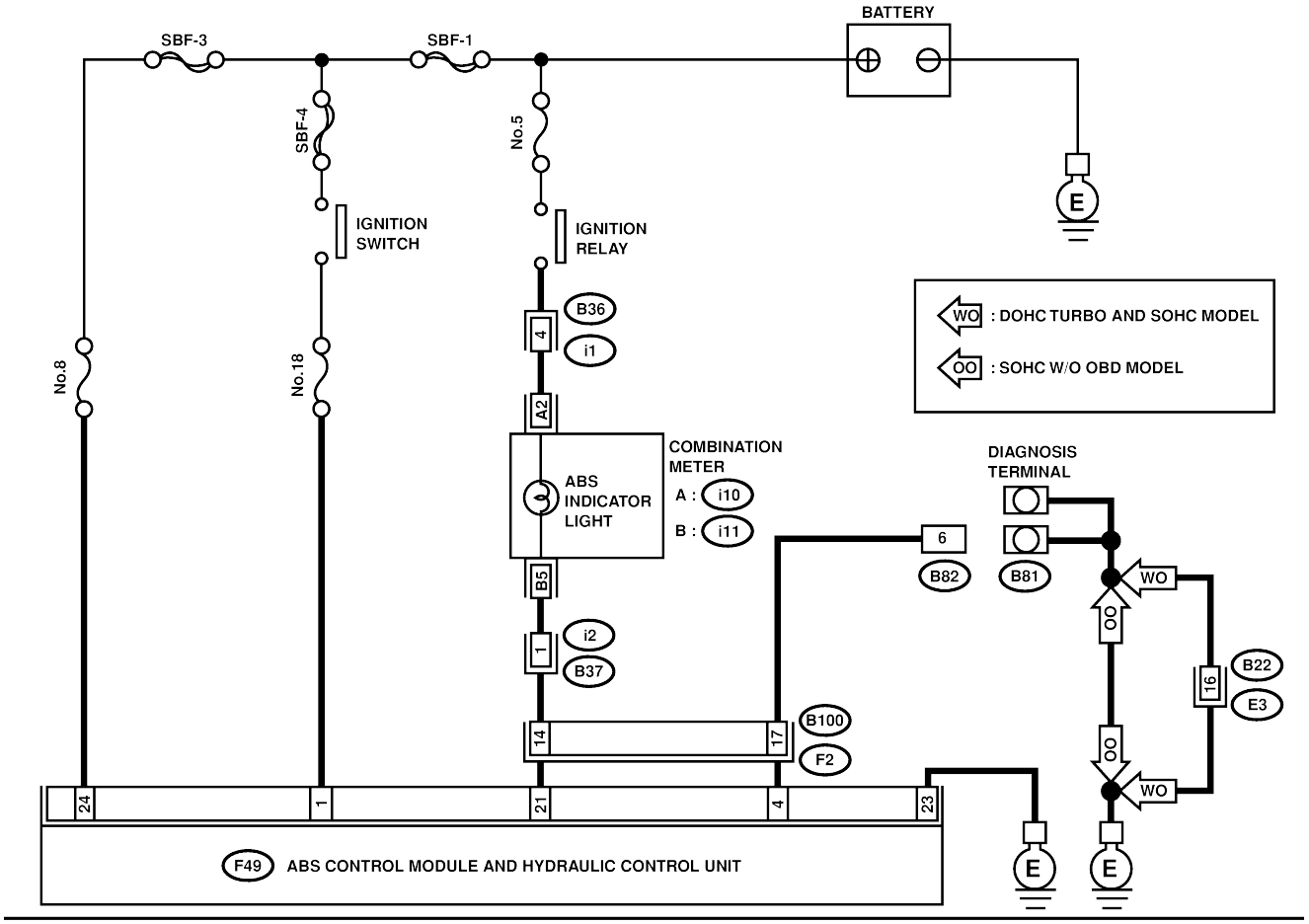
WIRING DIAGRAM: LHD MODEL

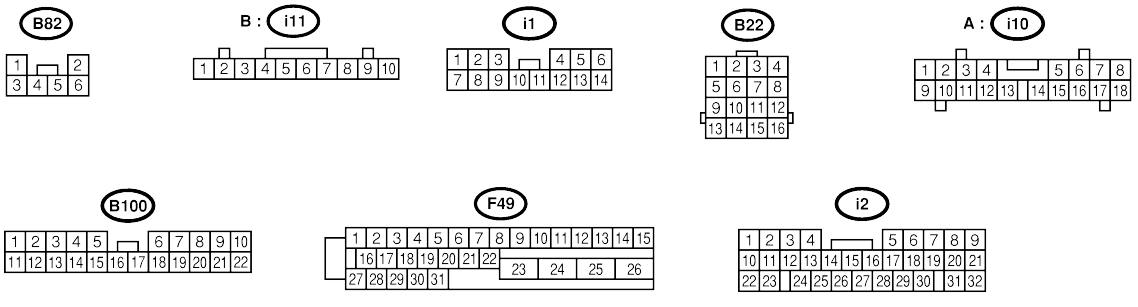




S4M0553

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**CHECK DIAGNOSIS TERMINAL.** 1) Turn ignition switch to OFF. 2) Measure resistance between diagnosis terminals (B81) and chassis ground. ***Terminals*** ***Diagnosis terminal (A) — Chassis ground:*** ***Diagnosis terminal (B) — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2**.	Repair diagnosis terminal harness.
2	**CHECK DIAGNOSIS LINE.** 1) Turn ignition switch to OFF. 2) Connect diagnosis terminal (B81) to diagnosis connector (B82) No. 6. 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:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair harness connector between ABSCM&H/U and diagnosis connector.
3	**CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.**	Is there poor contact in ABSCM&H/U connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

D: TROUBLE CODE 21 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT RH) —

S006522E60

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

E: TROUBLE CODE 23 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (FRONT LH) —

S006522E61

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

F: TROUBLE CODE 25 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR RH) —

S006522E62

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-42, TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

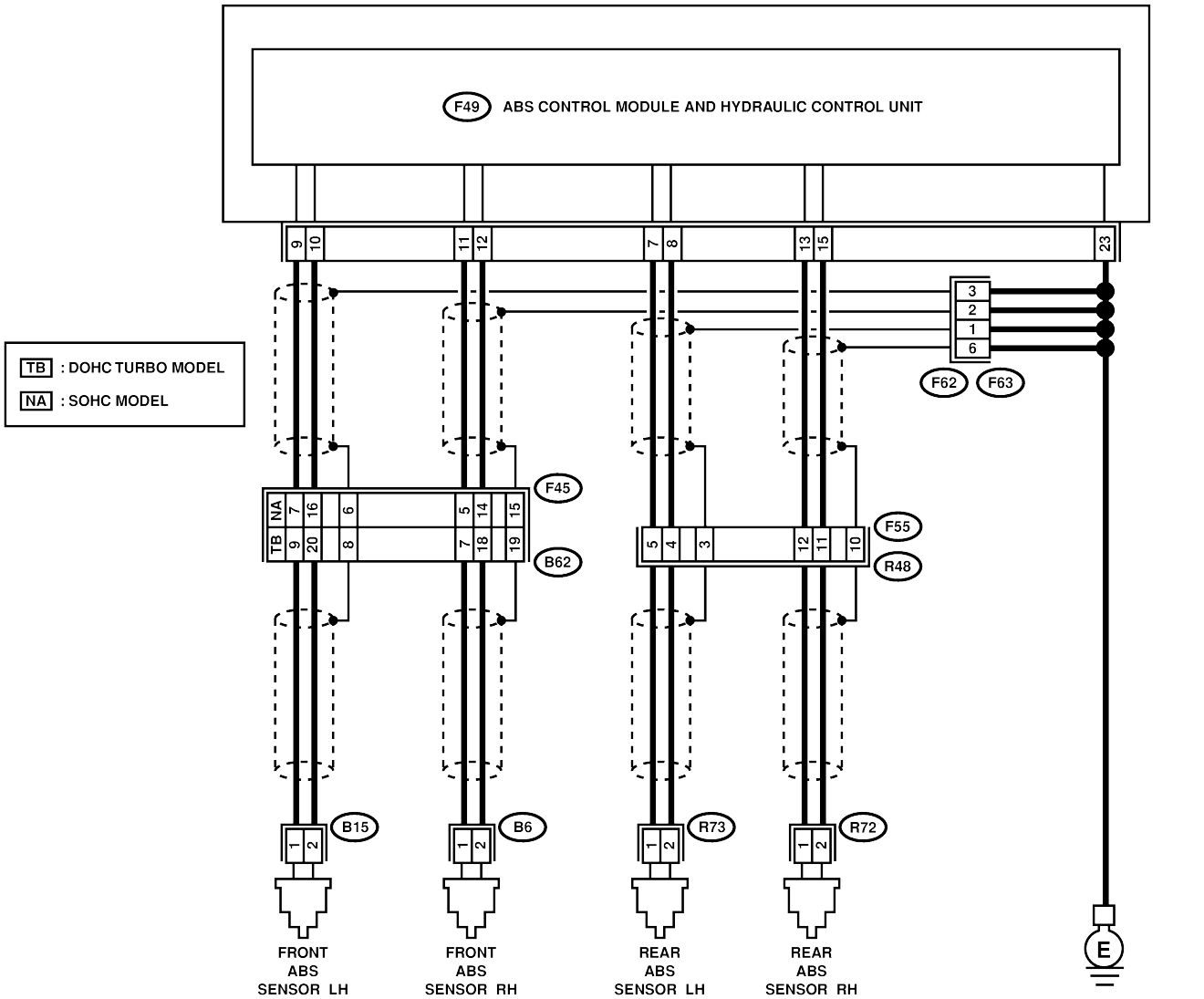
G: TROUBLE CODE 27 — ABNORMAL ABS SENSOR (OPEN CIRCUIT OR INPUT VOLTAGE TOO HIGH) (REAR LH) —

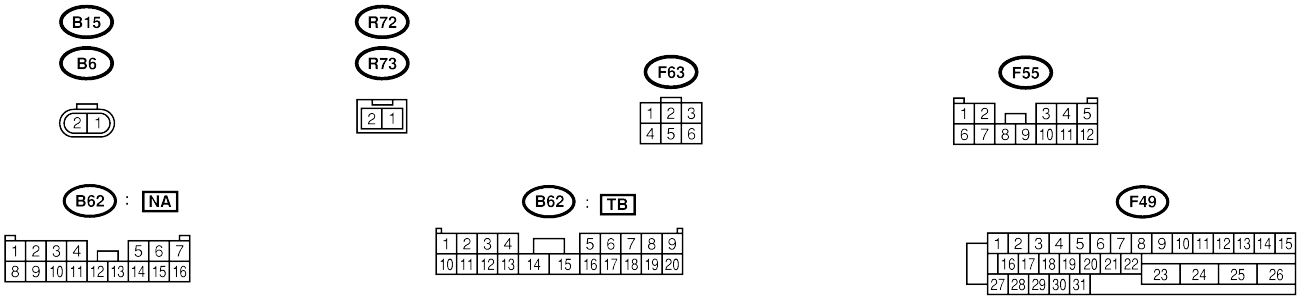
S006522E63

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

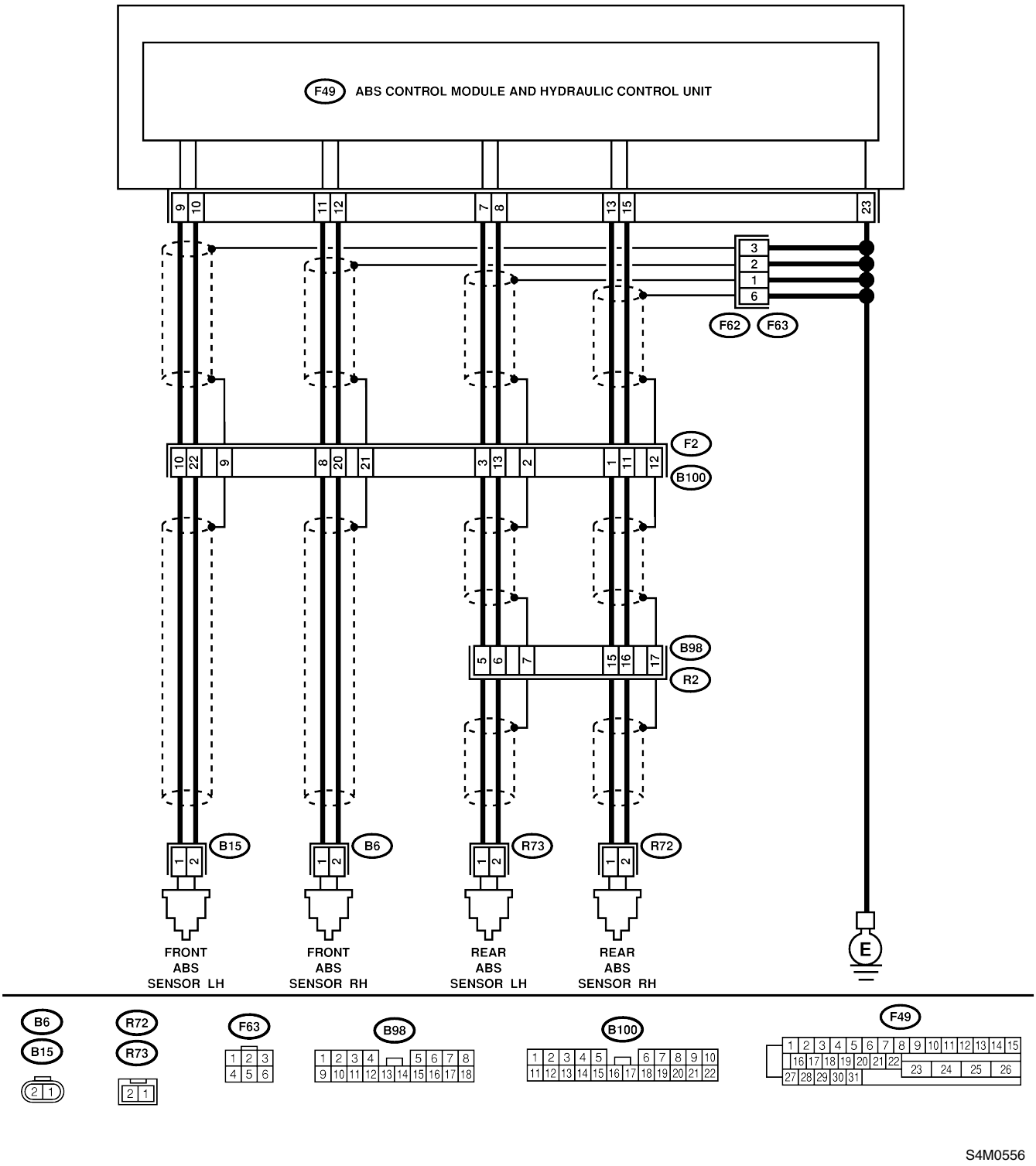
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**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:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **2**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
2	**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 (–):***	Is the voltage less than 1 V?	Go to step **3**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
3	**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 (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
4	**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. 13 — No. 15:*** ***Trouble code 27 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **5**.	Repair harness/ connector between ABSCM&H/U and ABS sensor.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
5	**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. 13 (+) — Chassis ground (–):*** ***Trouble code 27 / (F49) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6**.	Repair harness between ABSCM&H/U and ABS sensor.
6	**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. 13 (+) — Chassis ground (–):*** ***Trouble code 27 / (F49) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Repair harness between ABSCM&H/U and ABS sensor.
7	**CHECK INSTALLATION OF ABS SENSOR.** Turn ignition switch to OFF. ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **8**.	Tighten ABS sensor installation bolts securely.
8	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **9**.	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.
9	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **10**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>

No.	Step	Check	Yes	No
10	**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:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Replace ABS sensor and ABSCM&H/U. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
11	**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. 13 — Chassis ground:*** ***Trouble code 27 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair harness between ABSCM&H/U and ABS sensor. Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **13**.
13	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **14**.
14	**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. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.

H: TROUBLE CODE 22 — ABNORMAL ABS SENSOR (FRONT RH) — S006522E64

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

I: TROUBLE CODE 24 — ABNORMAL ABS SENSOR (FRONT LH) — S006522E65

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

J: TROUBLE CODE 26 — ABNORMAL ABS SENSOR (REAR RH) — S006522E66

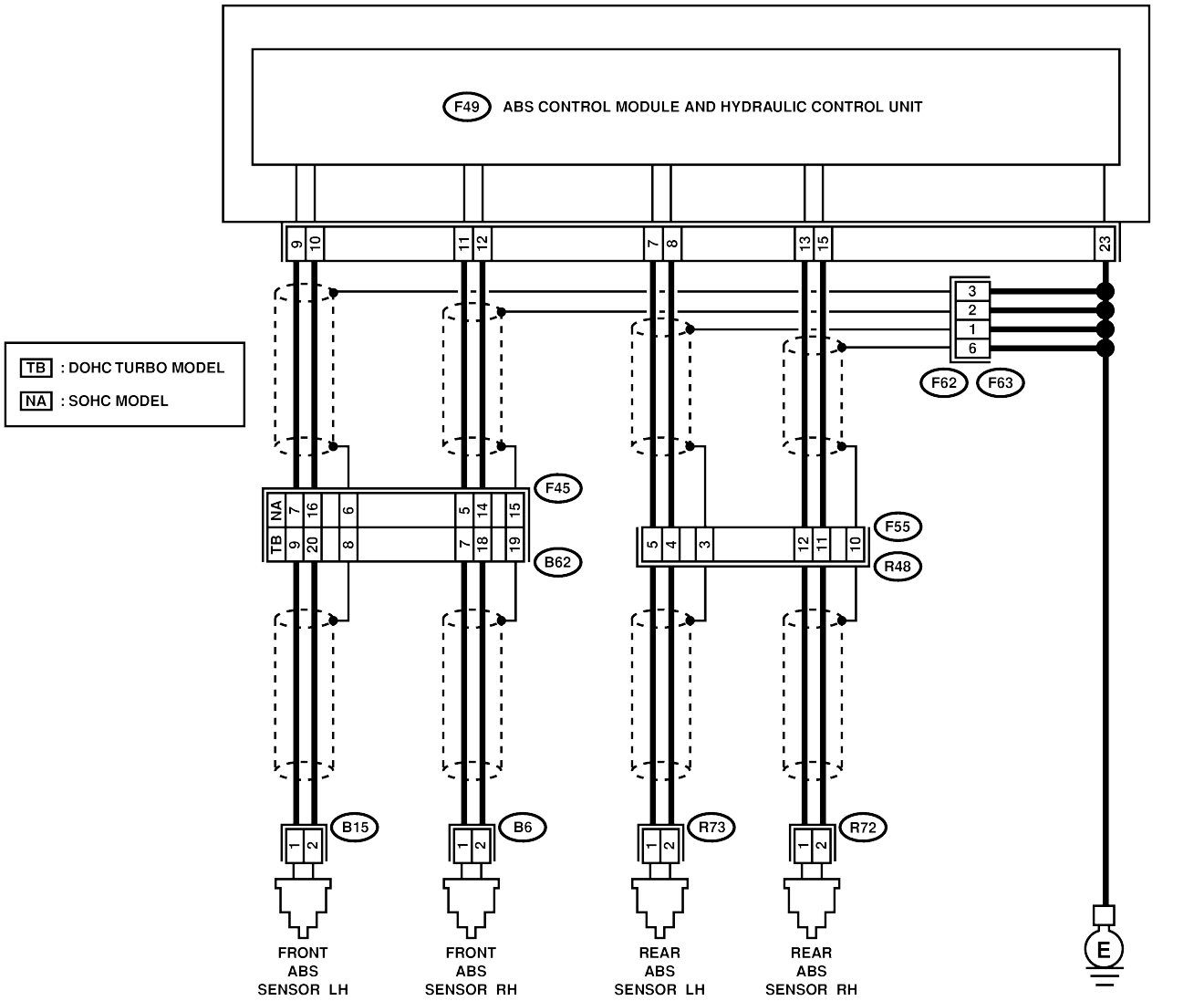
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-48, TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

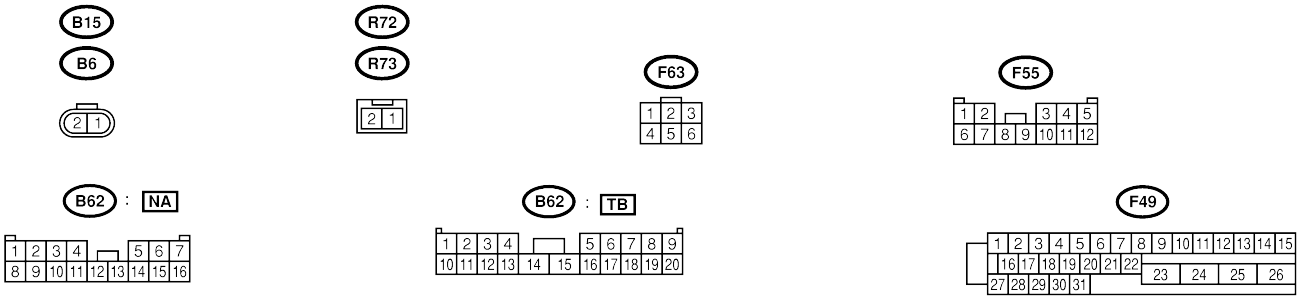
K: TROUBLE CODE 28 — ABNORMAL ABS SENSOR (REAR LH) — S006522E67

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:
- ABS does not operate.

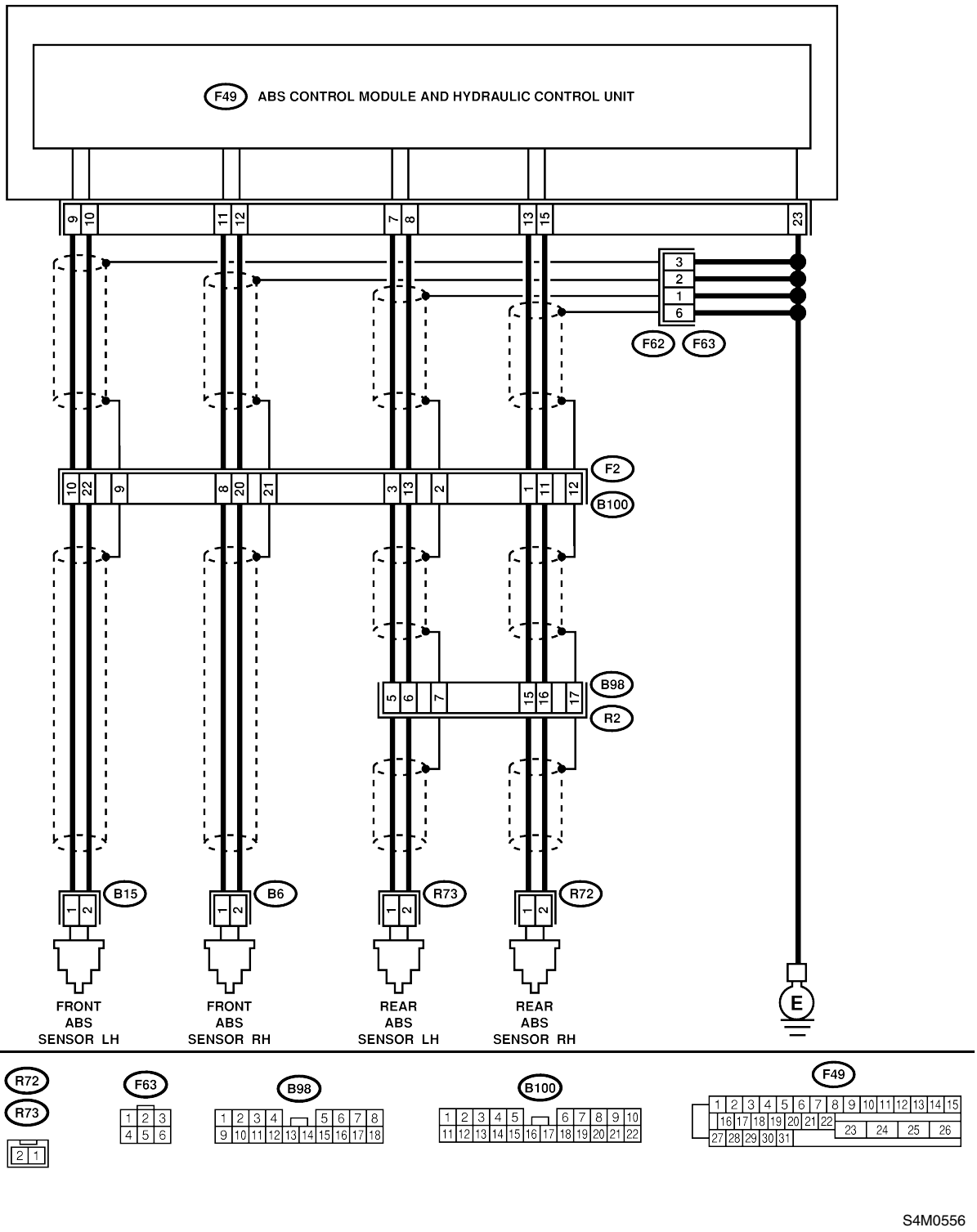
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**CHECK INSTALLATION OF ABS SENSOR.** Turn ignition switch to OFF. ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **2**.	Tighten ABS sensor installation bolts securely.
2	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **3**.	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.
3	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **4**.	Go to step **5**.
4	**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. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABS control module sometimes stores the trouble code 29. ***Connector & terminal*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD: (B100) No. 10 (+) — No. 22 (–):*** ***Trouble code 26 /*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Trouble code 28 /*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **8**.	Go to step **7**.
5	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor or drum from hub in accordance with trouble code.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **6**.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
6	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **7**.
7	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **8**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
8	**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:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **9**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
9	**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:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
10	**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. 13 — No. 15:*** ***Trouble code 28 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **11**.	Repair harness/ connector between ABSCM&H/U and ABS sensor.

No.	Step	Check	Yes	No
11	**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. 13 — Chassis ground:*** ***Trouble code 28 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair harness/ connector between ABSCM&H/U and ABS sensor.
12	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — GND:***	Is the resistance less than 0.5 Ω?	Go to step **13**.	Repair ABSCM&H/U ground harness.
13	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **14**.
14	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **15**.	Properly install the car telephone or the wireless transmitter.
15	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **16**.
16	**CHECK SHIELD CIRCUIT.** 1) Connect all connectors. 2) Measure resistance between shield connector and chassis ground. ***Connector & terminal*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 19 — Chassis ground:*** ***LHD non-turbo: (B62) No. 15 — Chassis ground:*** ***RHD: (B100) No. 21 — Chassis ground:*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 8 — Chassis ground:*** ***LHD non-turbo: (B62) No. 6 — Chassis ground:*** ***RHD: (B100) No. 9 — Chassis ground:*** ***Trouble code 26 /*** ***LHD: (F55) No. 10 — Chassis ground:*** ***RHD: (B100) No. 12 — Chassis ground:*** ***Trouble code 28 /*** ***LHD: (F55) No. 3 — Chassis ground:*** ***RHD: (B100) No. 2 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **17**.	Repair shield harness.
17	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **18**.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
18	**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.

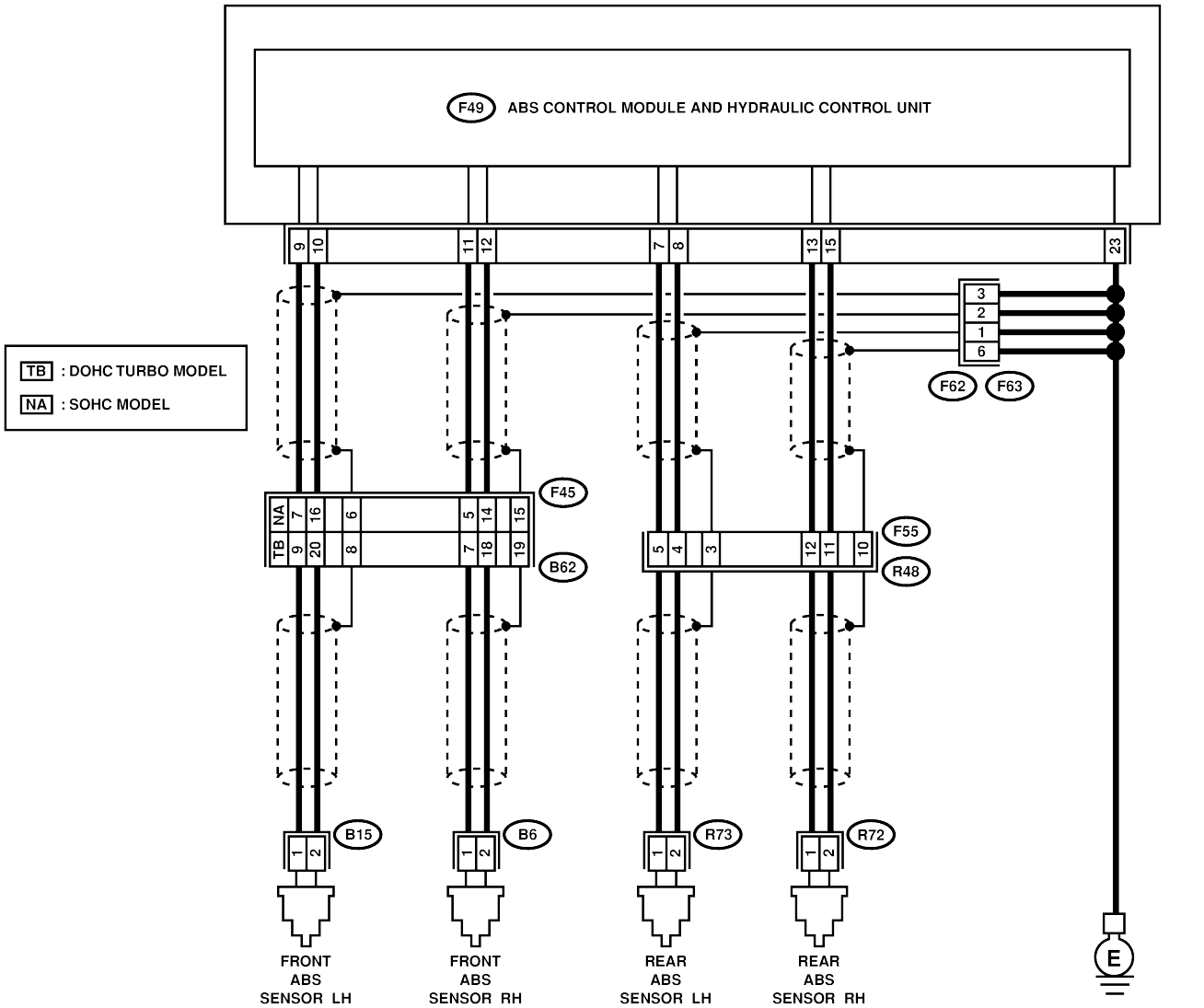
MEMO:

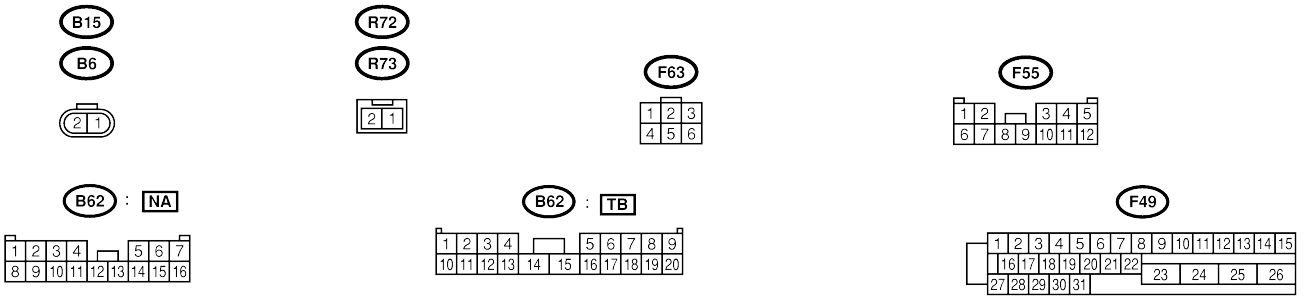
L: TROUBLE CODE 29 — ABNORMAL ABS SENSOR SIGNAL (ANY ONE OF FOUR) — S006522E68

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.

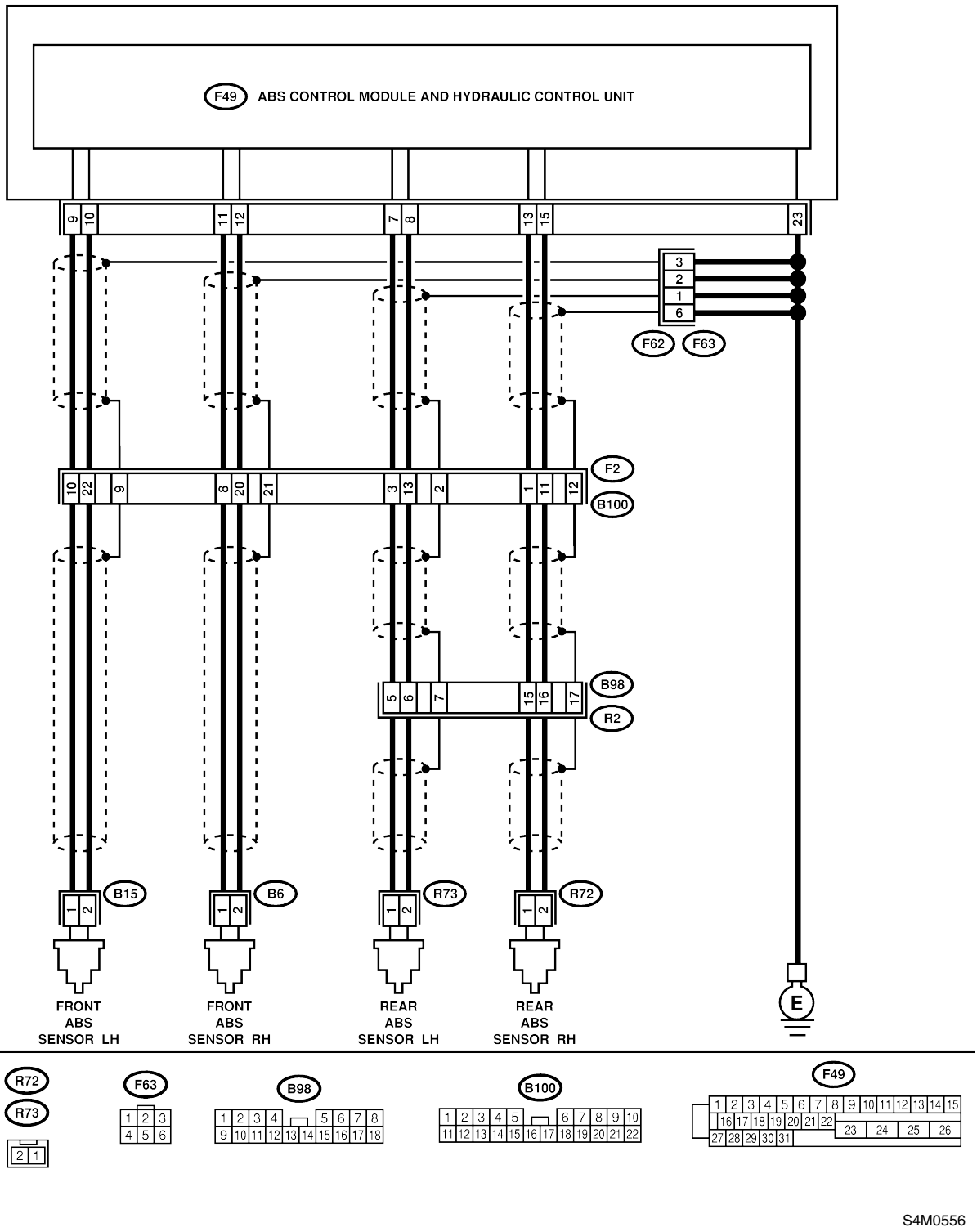
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

No.	Step	Check	Yes	No
1	**CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.**	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.	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.	Go to step **2**.
2	**CHECK TIRE SPECIFICATIONS.** Turn ignition switch to OFF.	Are the tire specifications correct?	Go to step **3**.	Replace tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace tire.	Go to step **4**.
4	**CHECK TIRE PRESSURE.**	Is the tire pressure correct?	Go to step **5**.	Adjust tire pressure.
5	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **6**.	Tighten ABS sensor installation bolts securely.
6	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Specifications*** ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **7**.	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.
7	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **8**.	Go to step **9**.

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
8	**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. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29. ***Connector & terminal*** ***Front RH*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Front LH*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD: (B100) No. 10 (+) — No. 22 (–):*** ***Rear RH*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Rear LH*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **12**.	Go to step **9**.
9	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor from hub.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **10**.
10	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged teeth in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **11**.
11	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **12**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>

No.	Step	Check	Yes	No
12	**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.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**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.

M: TROUBLE CODE 31 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) —

S006522E69

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

N: TROUBLE CODE 33 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) —

S006522E70

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

O: TROUBLE CODE 35 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) —

S006522E71

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-62, TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

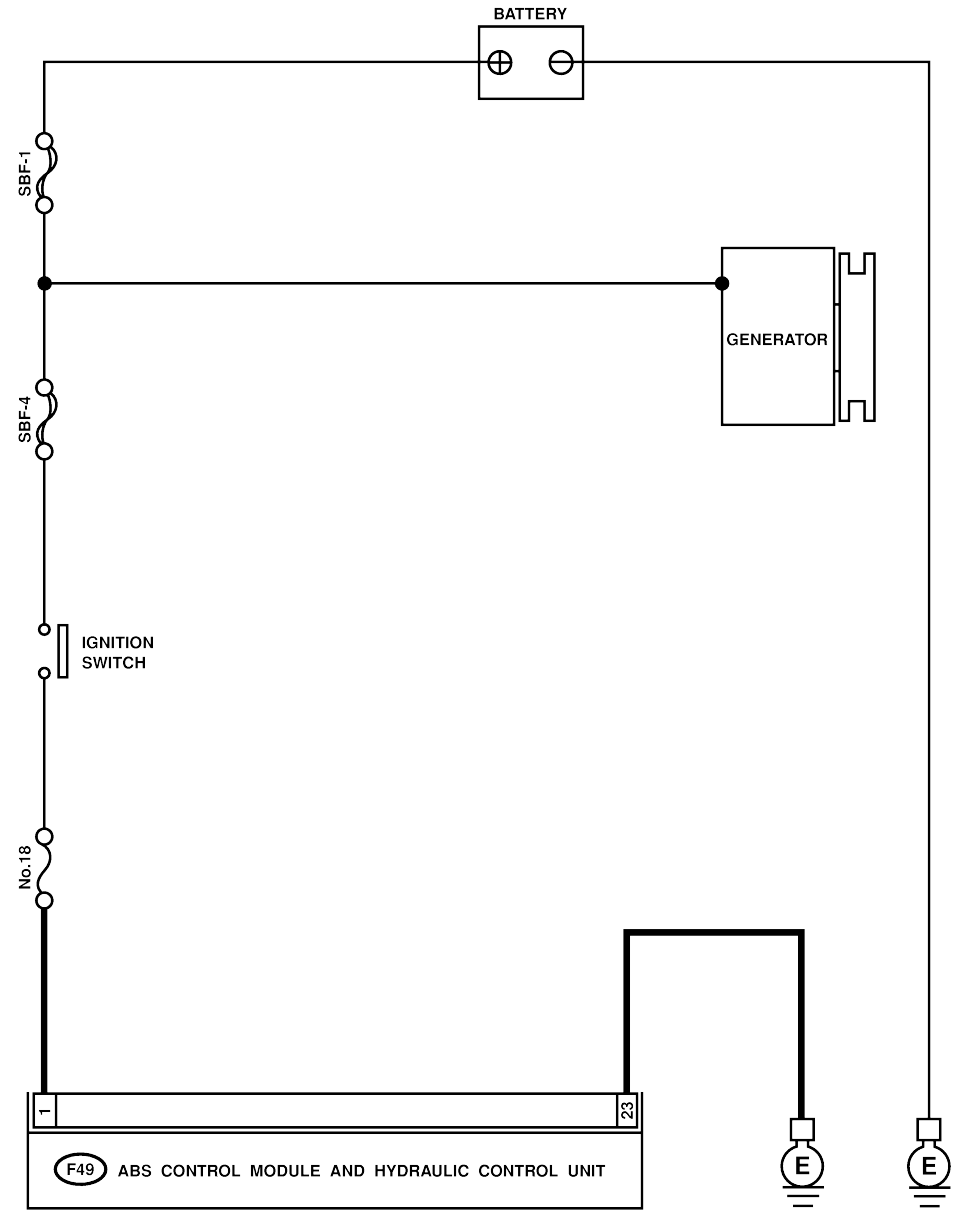
P: TROUBLE CODE 37 — ABNORMAL INLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —

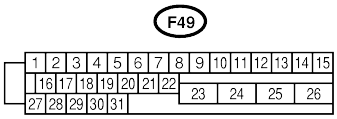
S006522E72

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**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:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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:

Q: TROUBLE CODE 32 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT RH) — S006522E73

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

R: TROUBLE CODE 34 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (FRONT LH) — S006522E74

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

S: TROUBLE CODE 36 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR RH) — S006522E75

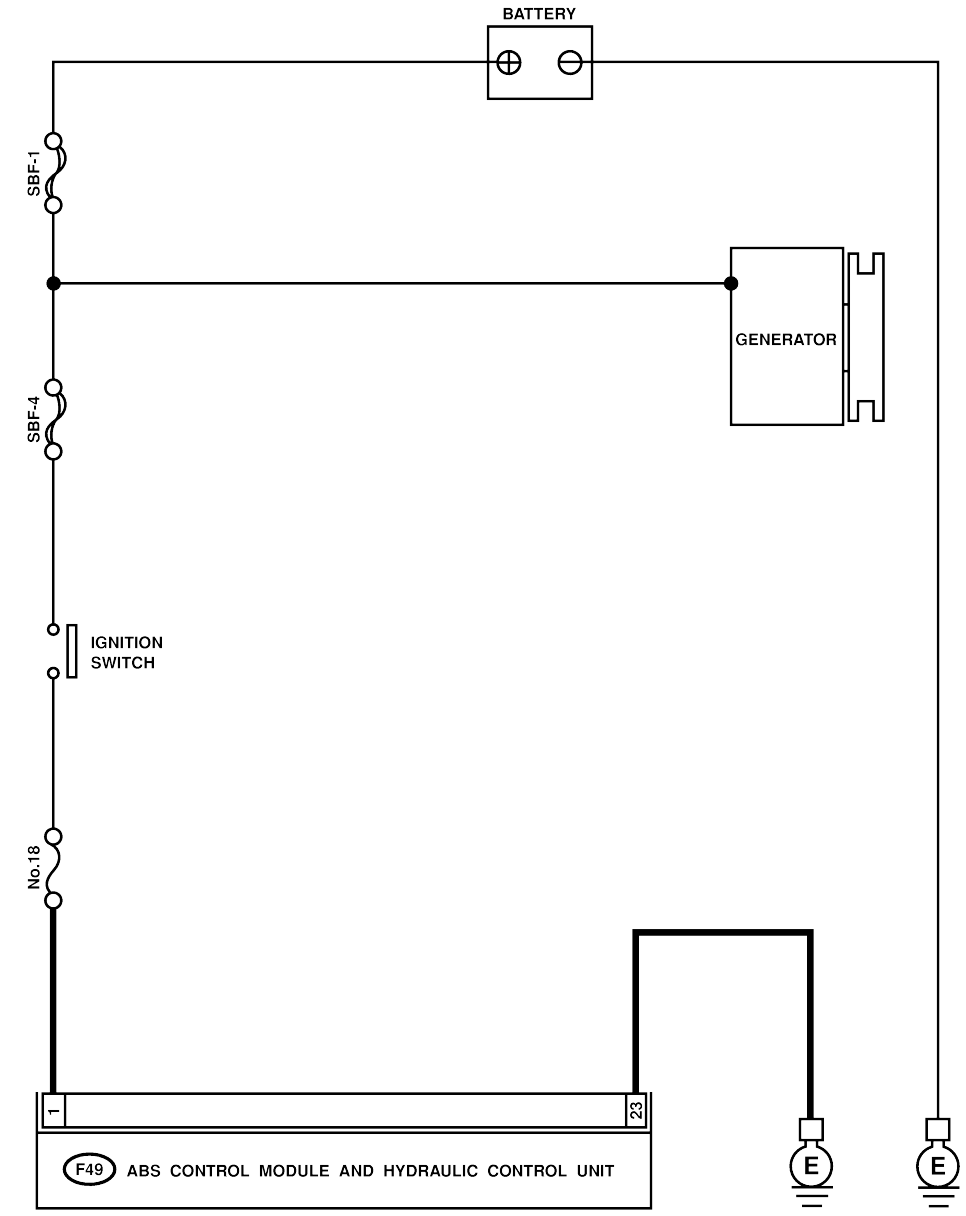
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-66, TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>

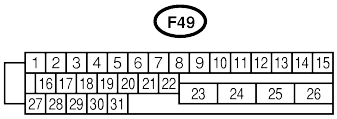
T: TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) — S006522E76

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve in ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**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:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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.

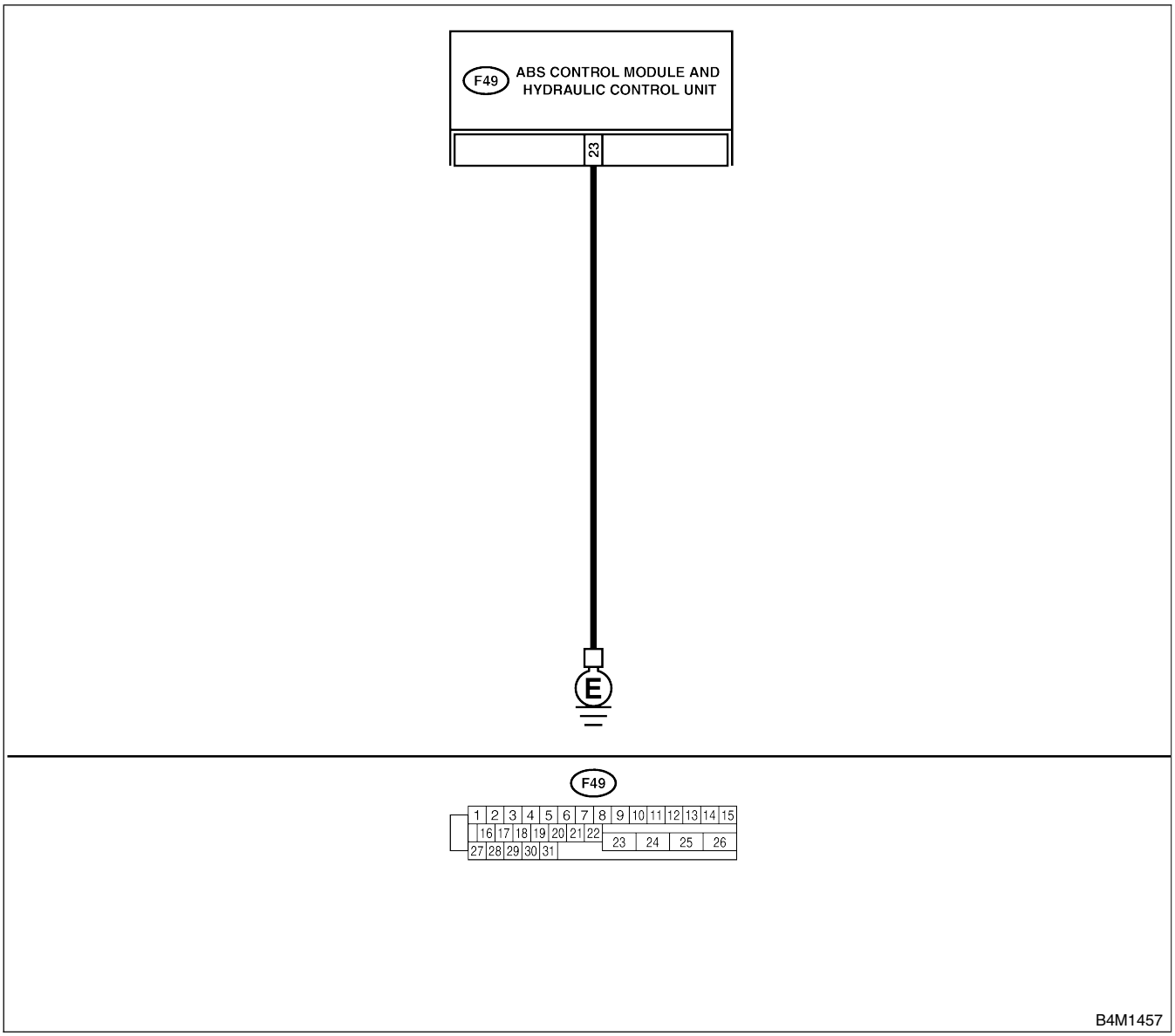
MEMO:

U: TROUBLE CODE 41
— ABNORMAL ABS CONTROL MODULE — S006522D29

DIAGNOSIS:
- Faulty ABSCM&H/U.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

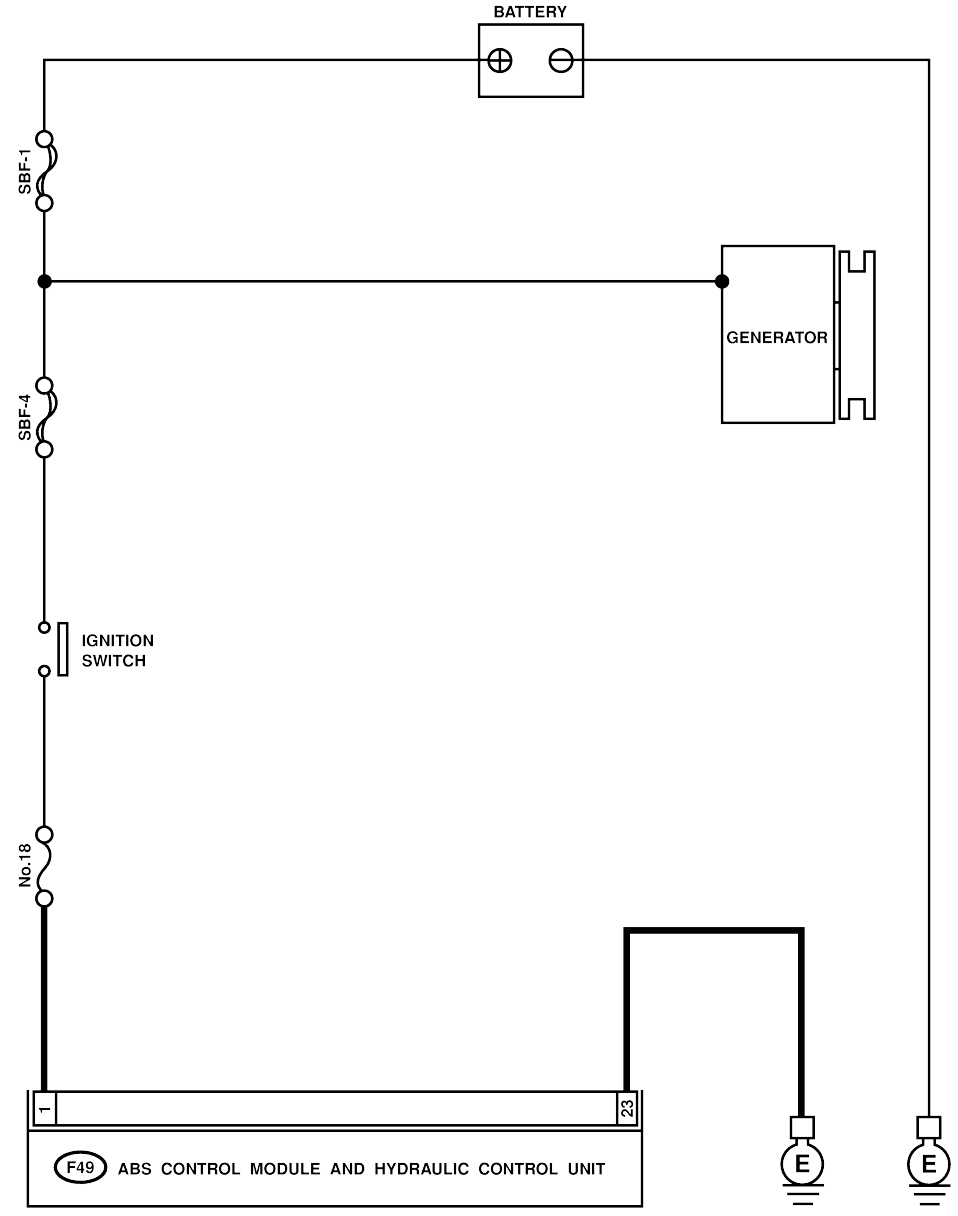
No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2**.	Repair ABSCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U?	Repair connector.	Go to step **3**.
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **4**.	Properly install the car telephone or the wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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.

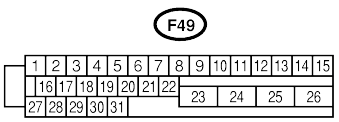
V: TROUBLE CODE 42
— SOURCE VOLTAGE IS ABNORMAL. — S006522D37

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is low or high.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

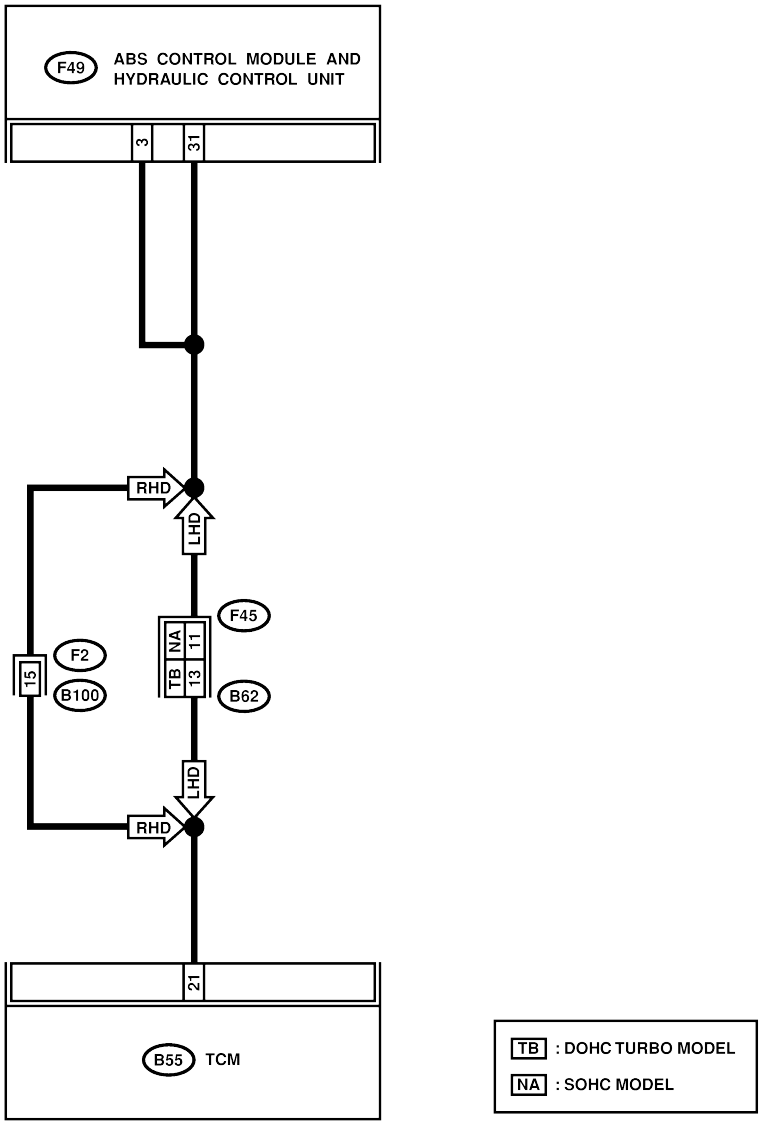
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 17 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3**.	Tighten the clamp of terminal.
3	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **4**.
4	**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 (–):***	Is the voltage between 10 and 17 V?	Go to step **5**.	Repair harness connector between fuse and ABSCM&H/U.
5	**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:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair ABSCM&H/U ground harness.
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**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.

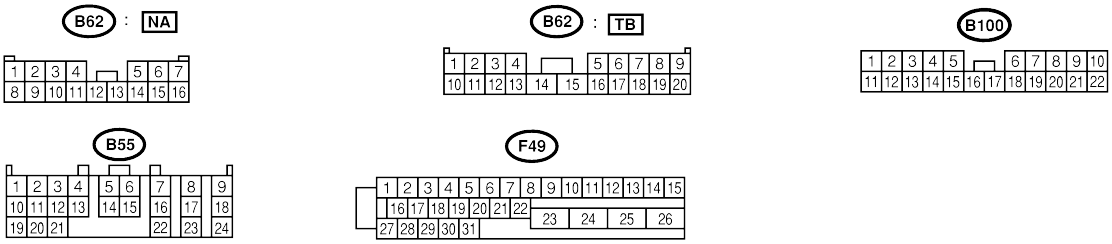
W: TROUBLE CODE 44
— A COMBINATION OF AT CONTROL ABNORMAL — S006522D42

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0558

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

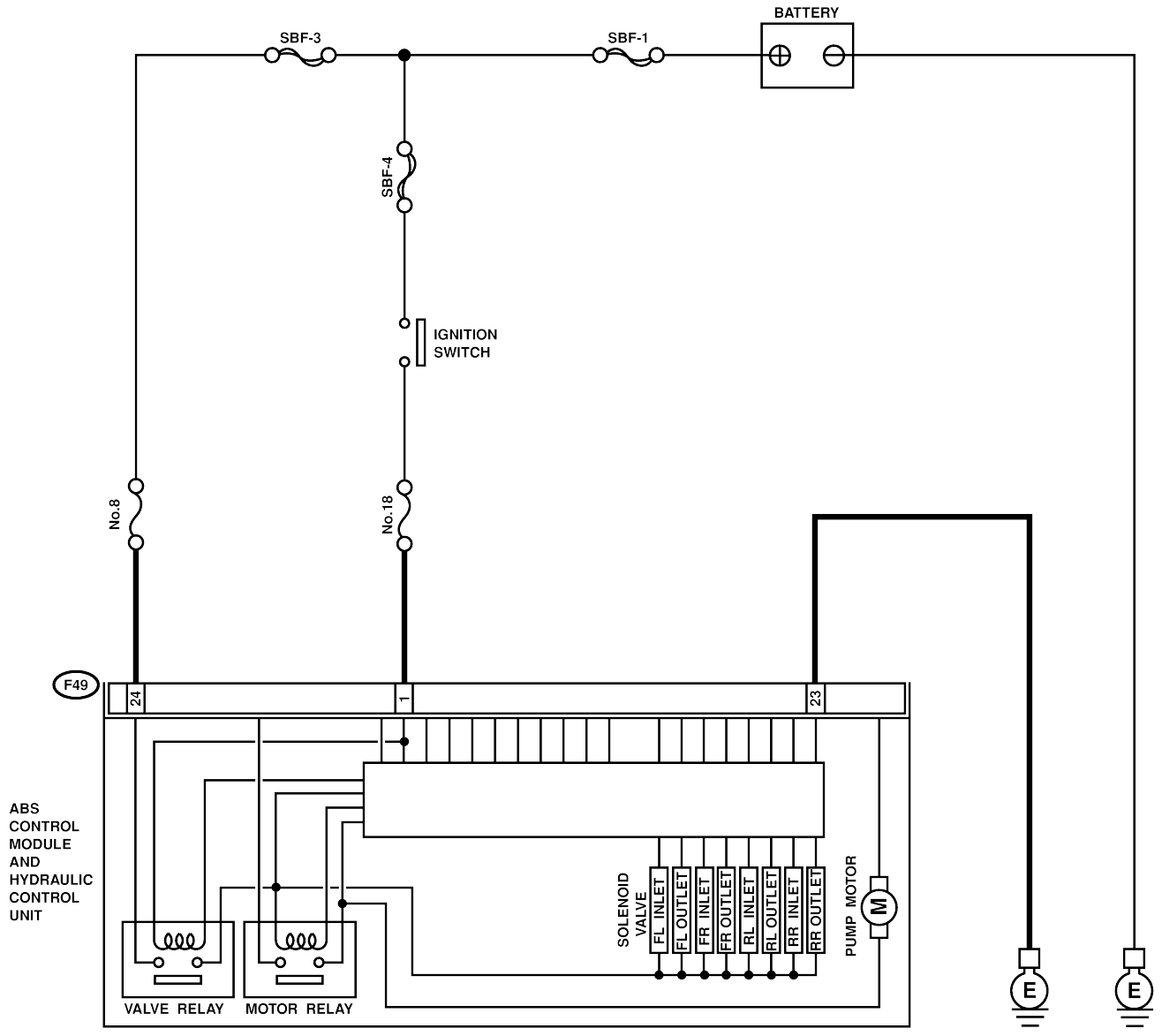
No.	Step	Check	Yes	No
1	**CHECK SPECIFICATIONS OF THE ABSCM&H/U.** Check specifications of the mark to the ABSCM&H/U. ***C7: AT*** ***C8: MT***	Is an ABSCM&H/U for AT model installed on a MT model?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **2**.
2	**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:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair harness between TCM and ABSCM&H/U.
3	**CHECK BATTERY SHORT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Repair harness between TCM and ABSCM&H/U.
4	**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 (–):***	Is the voltage less than 1 V?	Go to step **5**.	Repair harness between TCM and ABSCM&H/U.
5	**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*** ***(B55) No. 21 (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **7**.	Go to step **6**.
6	**CHECK AT.**	Is the AT functioning normally?	Replace TCM.	Repair AT.
7	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **8**.	Repair harness/ connector between TCM and ABSCM&H/U.
8	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between TCM and ABSCM&H/U?	Repair connector.	Go to step **9**.
9	**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.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **10**.
10	**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.

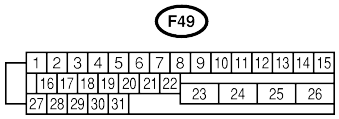
X: TROUBLE CODE 51
— ABNORMAL VALVE RELAY — S006522D61

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0559

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

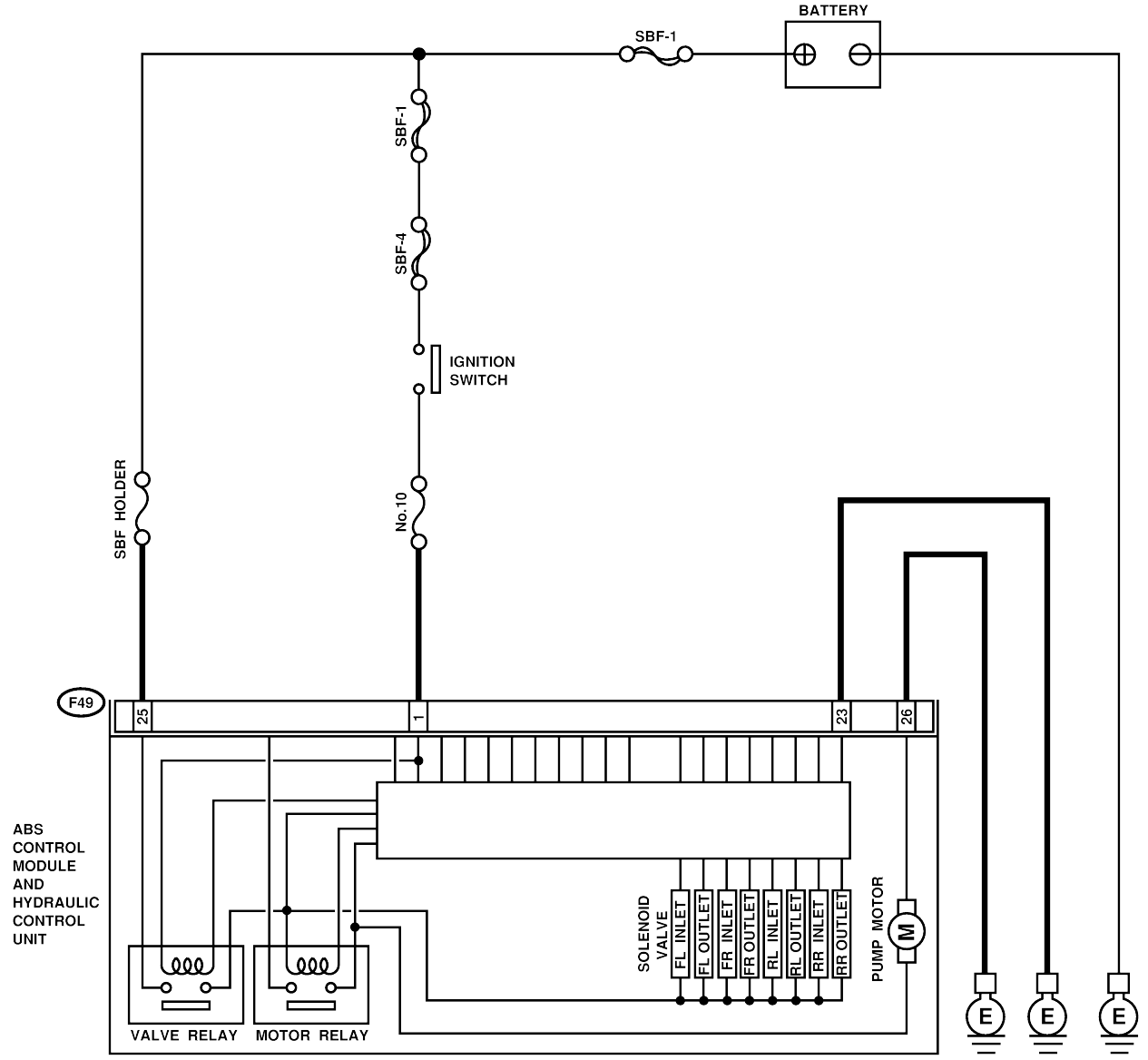
No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (–):*** ***(F49) No. 24 (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**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:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK VALVE RELAY IN ABSCM&H/U.** Measure resistance between ABSCM&H/U and terminals. ***Terminals*** ***No. 23 (+) — No. 24 (–):***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **6**.
6	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**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.

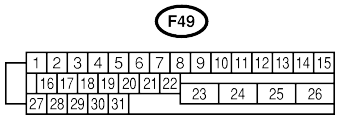
Y: TROUBLE CODE 52 — ABNORMAL MOTOR AND/OR MOTOR RELAY — S006522D65

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **2**.	Repair harness/ connector between battery and ABSCM&H/U and check fuse SBF-holder.
2	**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:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair ABSCM&H/U ground harness.
3	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **4**.
4	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **5**.	Repair harness connector between fuse and ABSCM&H/U.
5	**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:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair ABSCM&H/U ground harness.
6	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> 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 **7**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
7	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **8**.
8	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **9**.
9	**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.

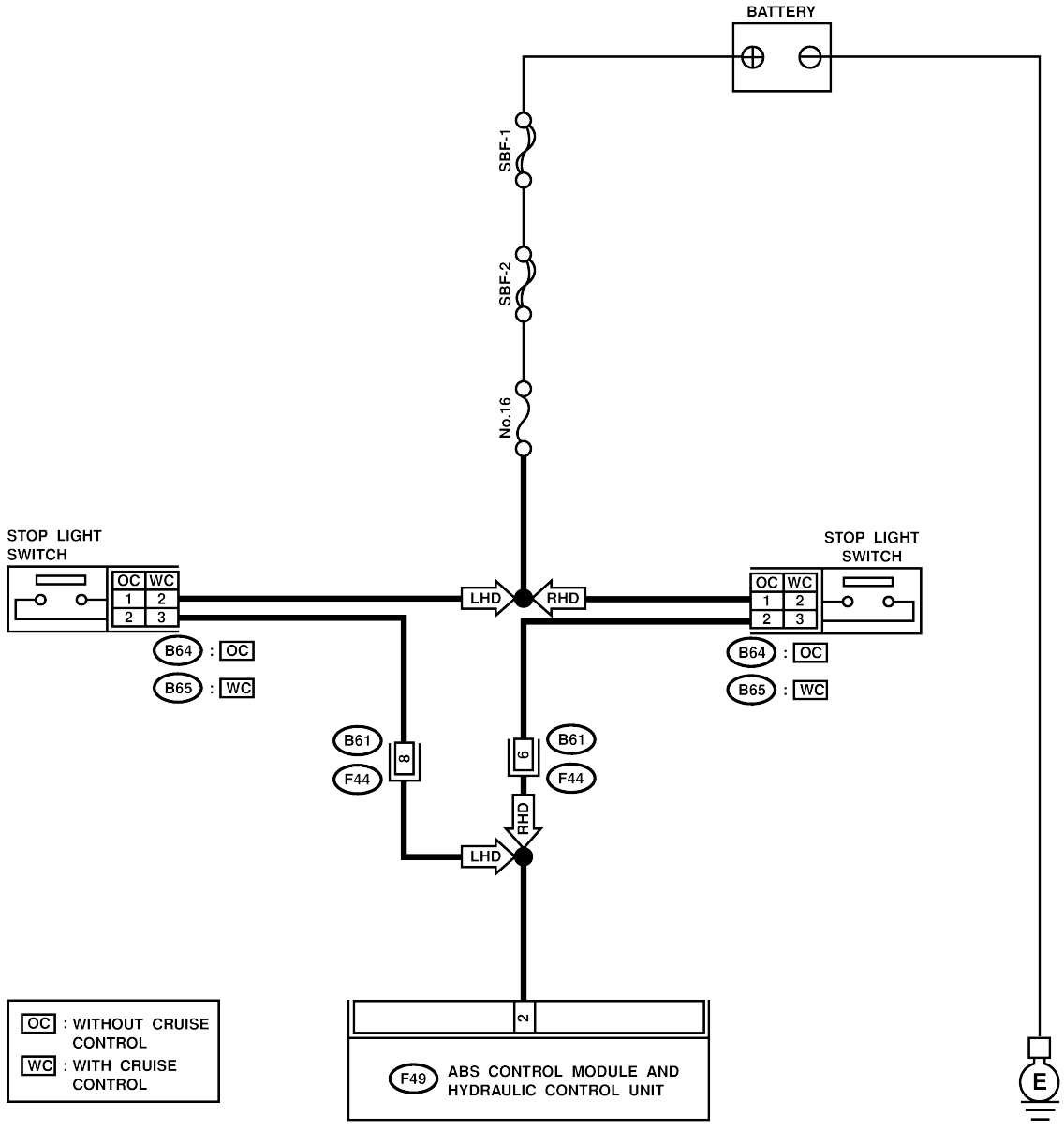
MEMO:

Z: TROUBLE CODE 54
— ABNORMAL STOP LIGHT SWITCH — S006522D72

DIAGNOSIS:
- Faulty stop light switch

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0561

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

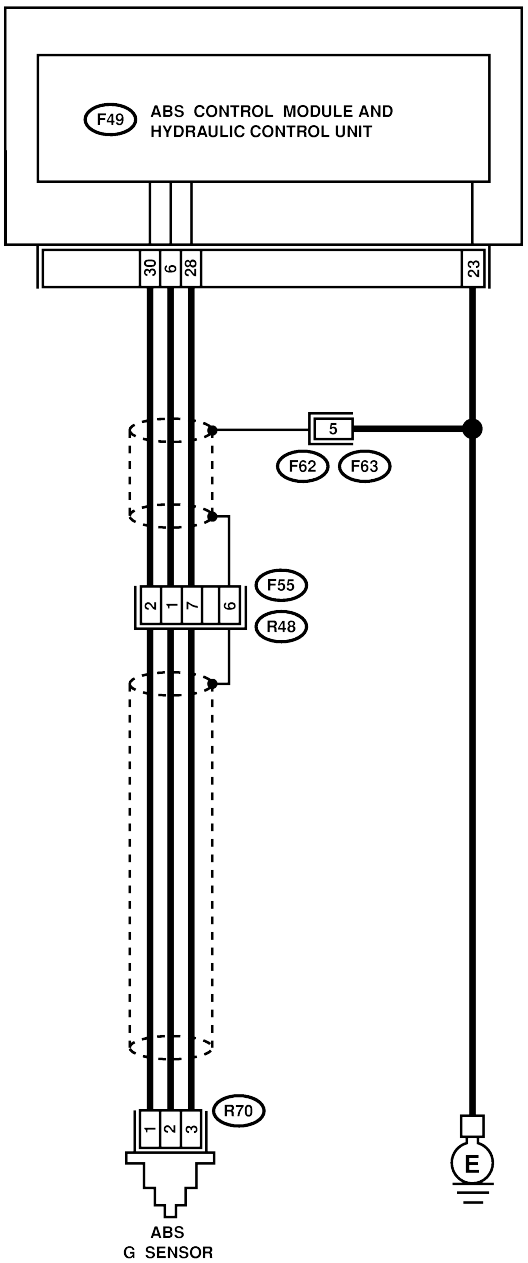
No.	Step	Check	Yes	No
1	**CHECK STOP LIGHTS COME ON.** Depress the brake pedal.	Do stop lights come on?	Go to step **2**.	Repair stop lights circuit.
2	**CHECK OPEN CIRCUIT IN HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Depress brake pedal. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 2 (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness between stop light switch and ABSCM&H/U.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between stop light switch and ABSCM&H/U?	Repair connector.	Go to step **4**.
4	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5**.
5	**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.

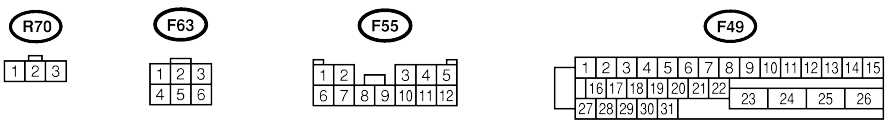
AA: TROUBLE CODE 56
— ABNORMAL G SENSOR OUTPUT VOLTAGE — S006522E77

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

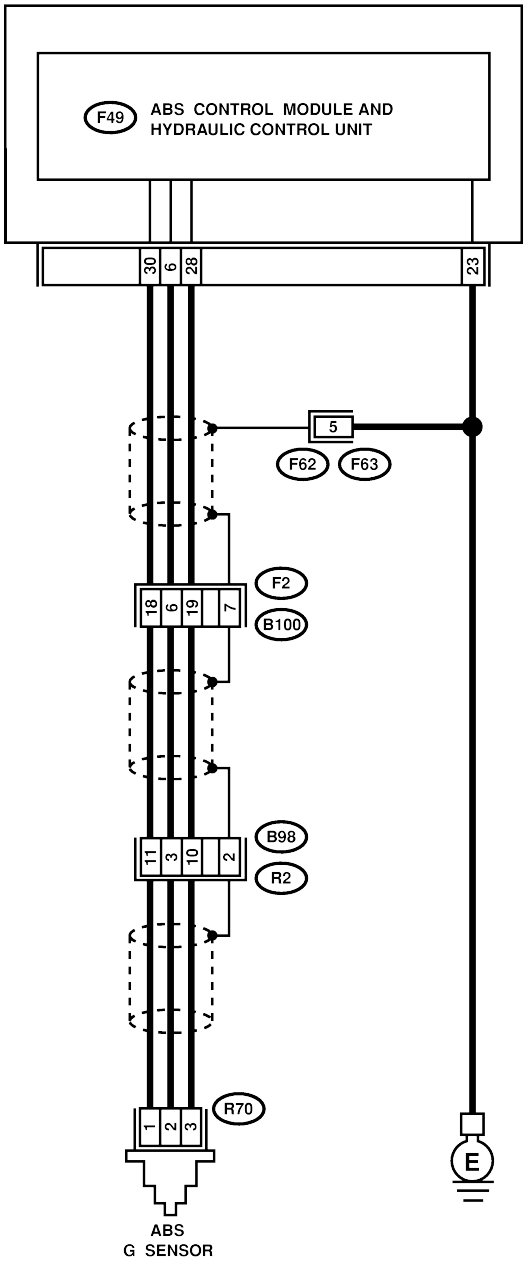
WIRING DIAGRAM: LHD MODEL

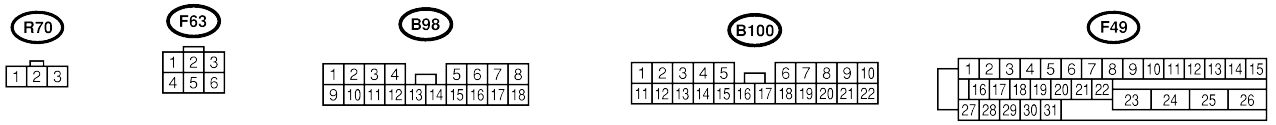




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH DIAGNOSIS CONNECTOR

No.	Step	Check	Yes	No
1	**CHECK ALL FOUR WHEELS FOR FREE TURNING.**	Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the trouble code.	Go to step **2**.
2	**CHECK SPECIFICATIONS OF ABSCM&H/U.** Check specifications of the mark to the ABSCM&H/U. ***C7: AT*** ***C8: MT***	Does the vehicle specification and the ABSCM&H/U specification match?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> **CAUTION:** **Be sure to turn ignition switch to OFF when removing ABSCM&H/U.**	Go to step **3**.
3	**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 (–):***	Is the voltage between 4.75 and 5.25 V?	Go to step **4**.	Repair harness/ connector between G sensor and ABSCM&H/U.
4	**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:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **5**.	Repair harness/ connector between G sensor and ABSCM&H/U.
5	**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:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair harness between G sensor and ABSCM&H/U.
6	**CHECK BATTERY SHORT OF HARNESS.** Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 6 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Repair harness between G sensor and ABSCM&H/U.
7	**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 (–):***	Is the voltage less than 1 V?	Go to step **8**.	Repair harness between G sensor and ABSCM&H/U.

No.	Step	Check	Yes	No
8	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair harness between G sensor and ABSCM&H/U. Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
9	**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 (–):***	Is the voltage between 2.1 and 2.4 V when G sensor is horizontal?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
10	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **11**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
11	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **12**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **13**.
13	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **14**.
14	**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.

AB: SELECT MONITOR S006522E48

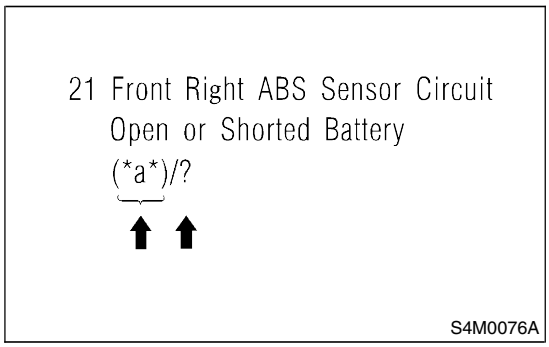
Applicable cartridge of select monitor: <Ref. to ABS-10, Special Tools, PREPARATION TOOL, General Description.>

NOTE:
For basic handling of the select monitor, refer to its Operation Manual.

AC: TROUBLE CODES ARE DISPLAYED. S006522E51

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 ABSCM&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.



- *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.

AD: CLEAR MEMORY S006522E33

Display screen	Contents to be monitored
Clear memory?	Function of clearing trouble code and freeze frame data.

AE: ANALOG DATA ARE DISPLAYED. S006522E29

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.

AF: ON/OFF DATA ARE DISPLAYED. S006522E43

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

AG: ABS SEQUENCE CONTROL

S006522E23

Display screen	Contents to be monitored	Index No.
ABS sequence control	Perform ABS sequence control by operating valve and pump motor sequentially.	<Ref. to ABS-11, ABS Sequence Control.>

AH: FREEZE FRAME DATA S006522E39

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

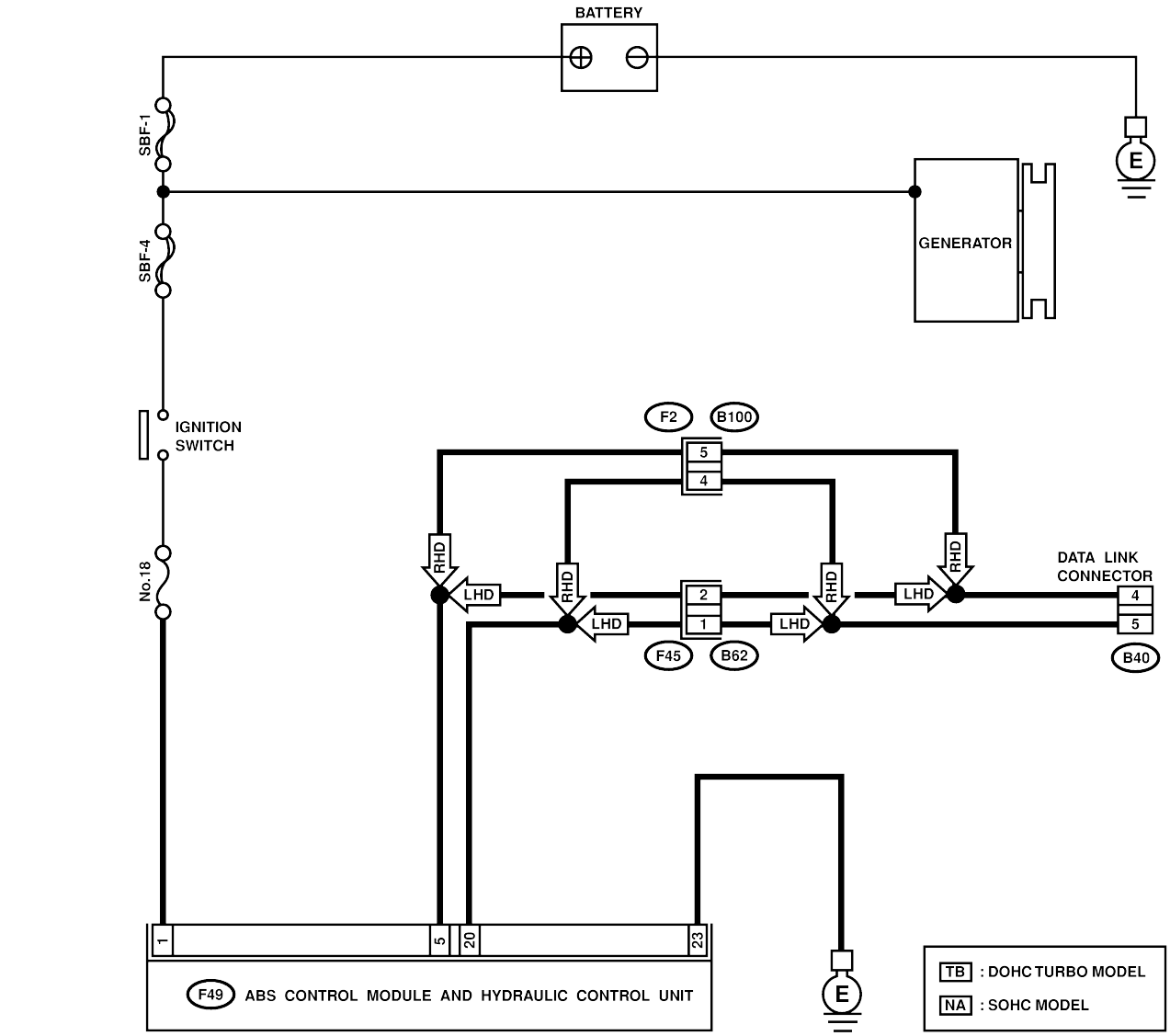
13. Diagnostics Chart with Subaru Select Monitor S006583

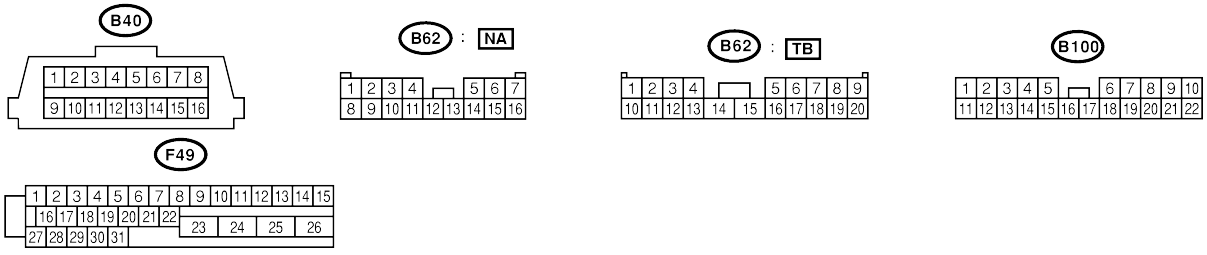
A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE S006583E34

DIAGNOSIS:
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS warning light remains on.

WIRING DIAGRAM:





S4M0564

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is ignition switch ON?	Go to step **2**.	Turn ignition switch to ON, and select ABS mode using the select monitor.
2	**CHECK BATTERY.** 1) Turn ignition switch to OFF. 2) Measure battery voltage.	Is voltage more than 11 V?	Go to step **3**.	Charge or replace battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten battery terminal.	Go to step **4**.
4	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Using the select monitor, check whether communication to other system (such as engine, TCM, etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step **10**.	Go to step **5**.
5	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Disconnect ABSCM&H/U connector. 3) Check whether communication to other systems (such as TCM, engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step **10**.	Go to step **6**.
6	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect ABSCM&H/U connector. 3) Disconnect ECM connector. 4) Check whether communication to other systems (such as TCM, engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect ECM.	Go to step **7**.
7	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect ECM connector. 3) Disconnect TCM connector. 4) Check whether communication to other systems (such as engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect TCM.	Go to step **8**.
8	**CHECK COMMUNICATION OF SELECT MONITOR.** 1) Turn ignition switch to OFF. 2) Connect TCM connector. 3) Disconnect cruise control module connector. 4) Check whether communication to other systems (such as engine, TCM etc.) can be executed normally. NOTE: If the vehicle is not equipped with cruise control: Go to step **9**.	Are the name and year of the system displayed on the select monitor?	Inspect cruise control module.	Go to step **9**.

No.	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect TCM, ECM, ABSCM&H/U, and, cruise control module connectors. 3) Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B40) No. 5 — Chassis ground:*** ***(B40) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair harness and connector between each control module and data link connector.
10	**CHECK OUTPUT SIGNAL FOR ABSCM&H/U.** 1) Turn ignition switch to ON. 2) Measure voltage between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(B40) No. 5 (+) — Chassis ground (–):*** ***(B40) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 1 V?	Repair harness and connector between each control module and data link connector.	Go to step **11**.
11	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.** 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:***	Is the resistance less than 0.5 Ω?	Repair harness and connector between ABSCM&H/U and data link connector.	Go to step **12**.
12	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn ignition switch to OFF.	Is ABSCM&H/U connector inserted into ABSCM&H/U until the clamp locks onto it?	Go to step **13**.	Insert ABSCM&H/U connector into ABSCM&H/U.
13	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **14**.
14	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **15**.	Repair open circuit in harness between ABSCM&H/U and fuse.
15	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND CHASSIS GROUND.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U and transmission. 3) Measure resistance of harness between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **16**.	Repair open circuit in harness between ABSCM&H/U and inhibitor side connector, and poor contact in coupling connector.
16	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply, ground line and data link connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

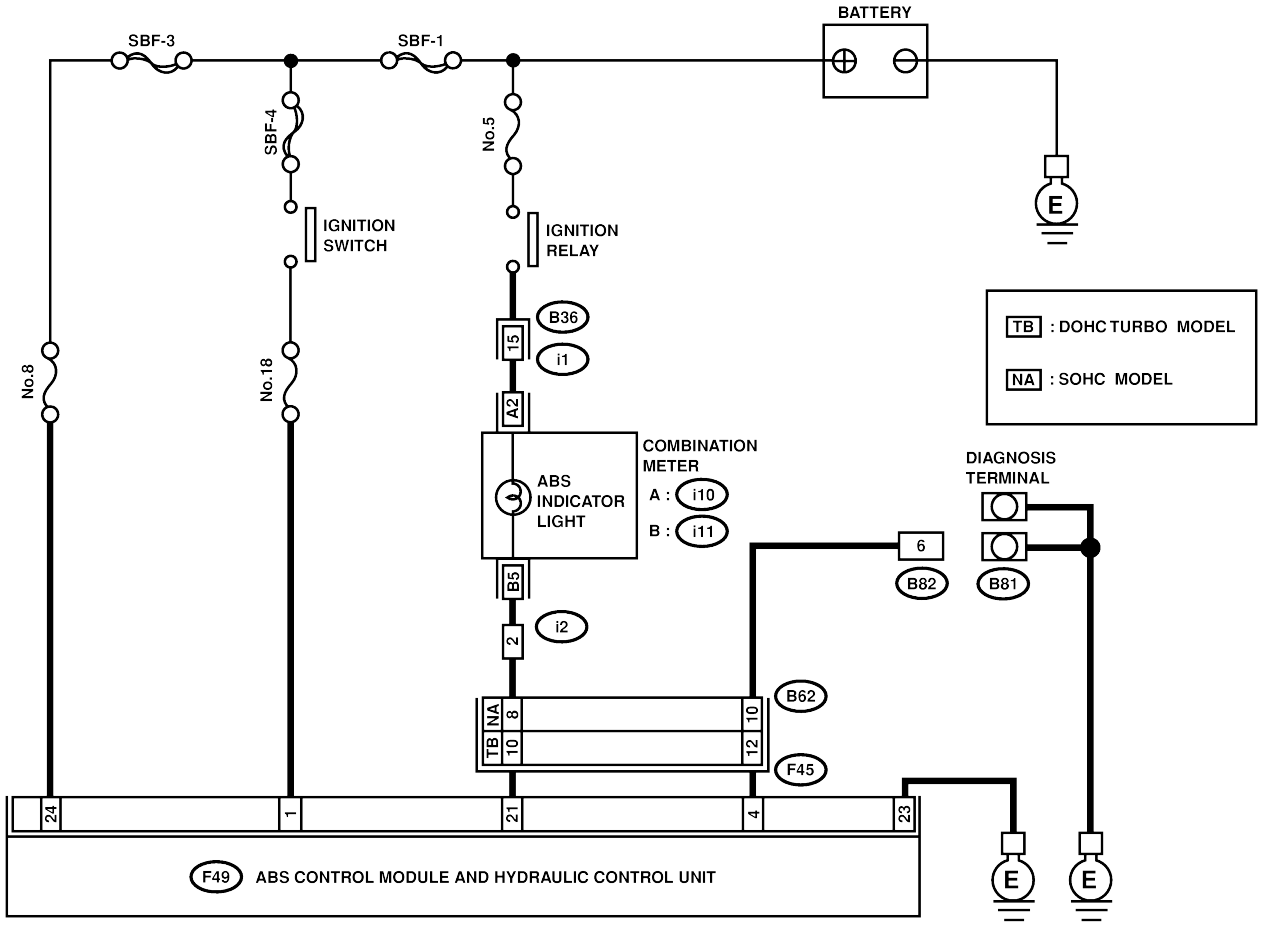
B: NO TROUBLE CODE S006583E41

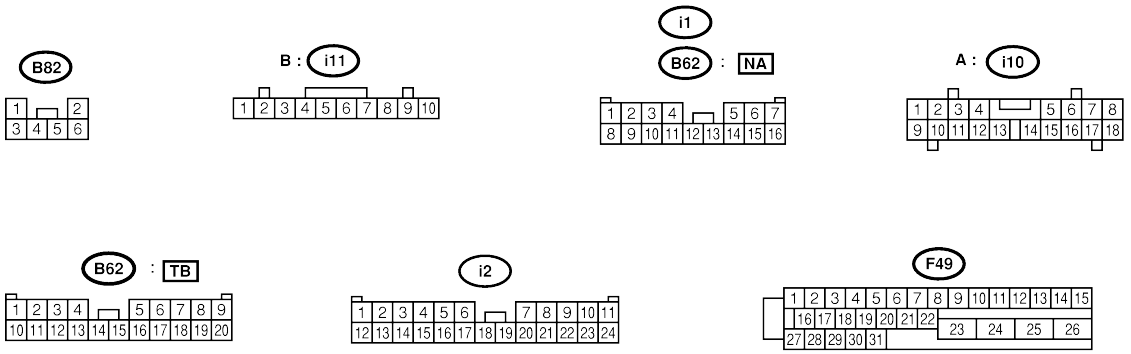
DIAGNOSIS:
- ABS warning light circuit is shorted.

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: LHD MODEL

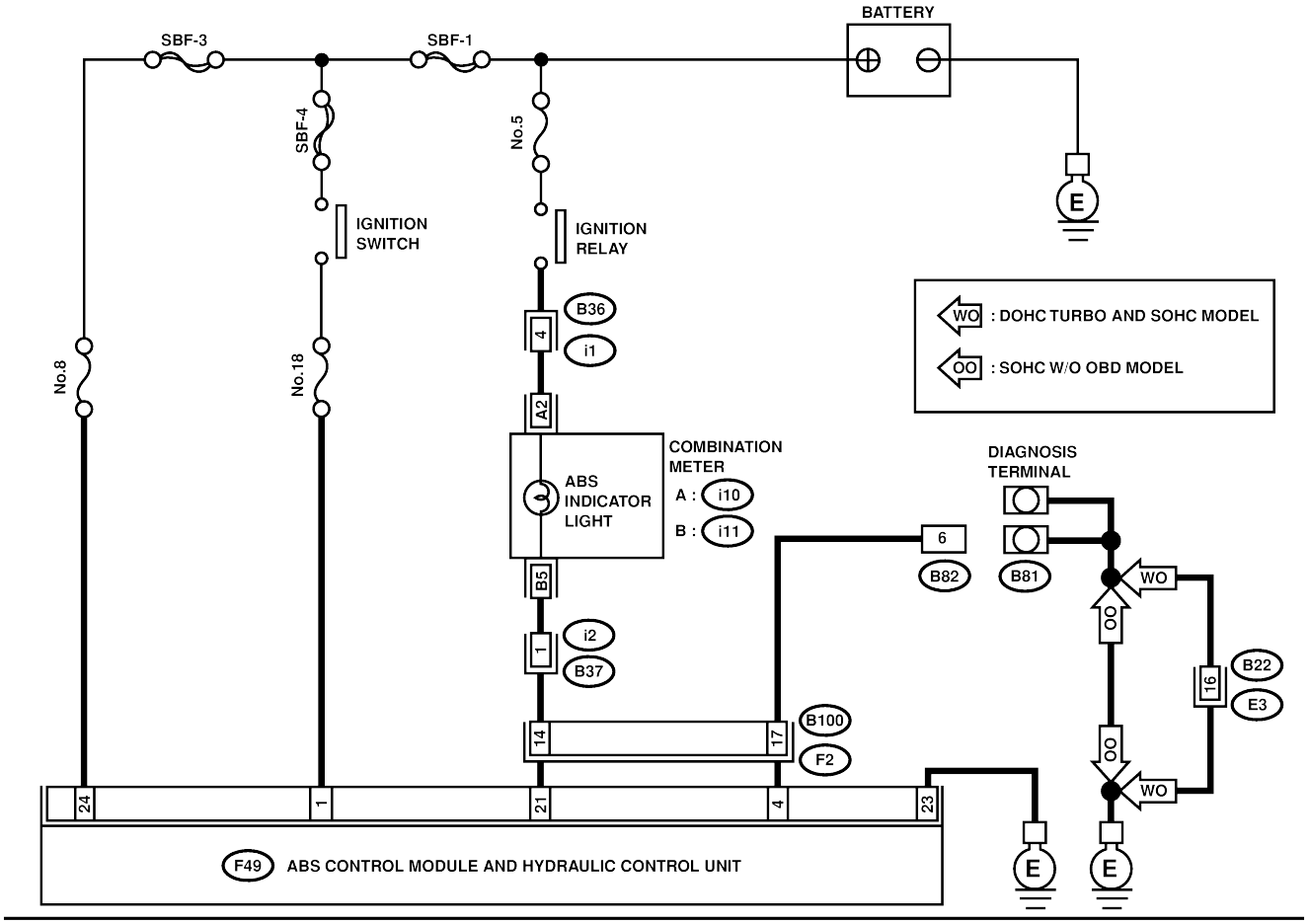


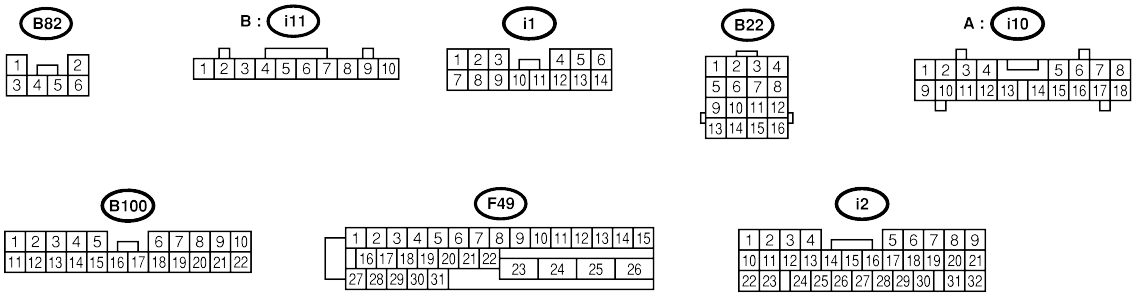


S4M0553

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

WIRING DIAGRAM: RHD MODEL





S4M0554

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK WIRING HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect connector (F45) or (F2) from connector (B62) or (B100). 3) Turn ignition switch to ON.	Does the ABS warning light remain off?	Go to step **2**.	Repair front wiring harness.
2	**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.	Are the projection broken?	Go to step **3**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
3	**CHECK ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 21 — No. 23:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
4	**CHECK WIRING HARNESS.** Measure resistance between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair harness.
5	**CHECK WIRING HARNESS.** 1) Connect connector to ABSCM&H/U. 2) Measure resistance between connector (F45) or (F2) and chassis ground. ***Connector & terminal*** ***LHD turbo: (F45) No. 10 — Chassis ground:*** ***LHD non-turbo: (F45) No. 8 — Chassis ground:*** ***RHD: (F2) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair harness.
6	**CHECK POOR CONTACT IN ABSCM&H/U CONNECTOR.**	Is there poor contact in ABSCM&H/U connector?	Repair connector.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

C: TROUBLE CODE 21
— OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS SENSOR CIRCUIT — S006583C50

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>

D: TROUBLE CODE 23
— OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS SENSOR CIRCUIT — S006583C60

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>

E: TROUBLE CODE 25
— OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS SENSOR CIRCUIT — S006583C69

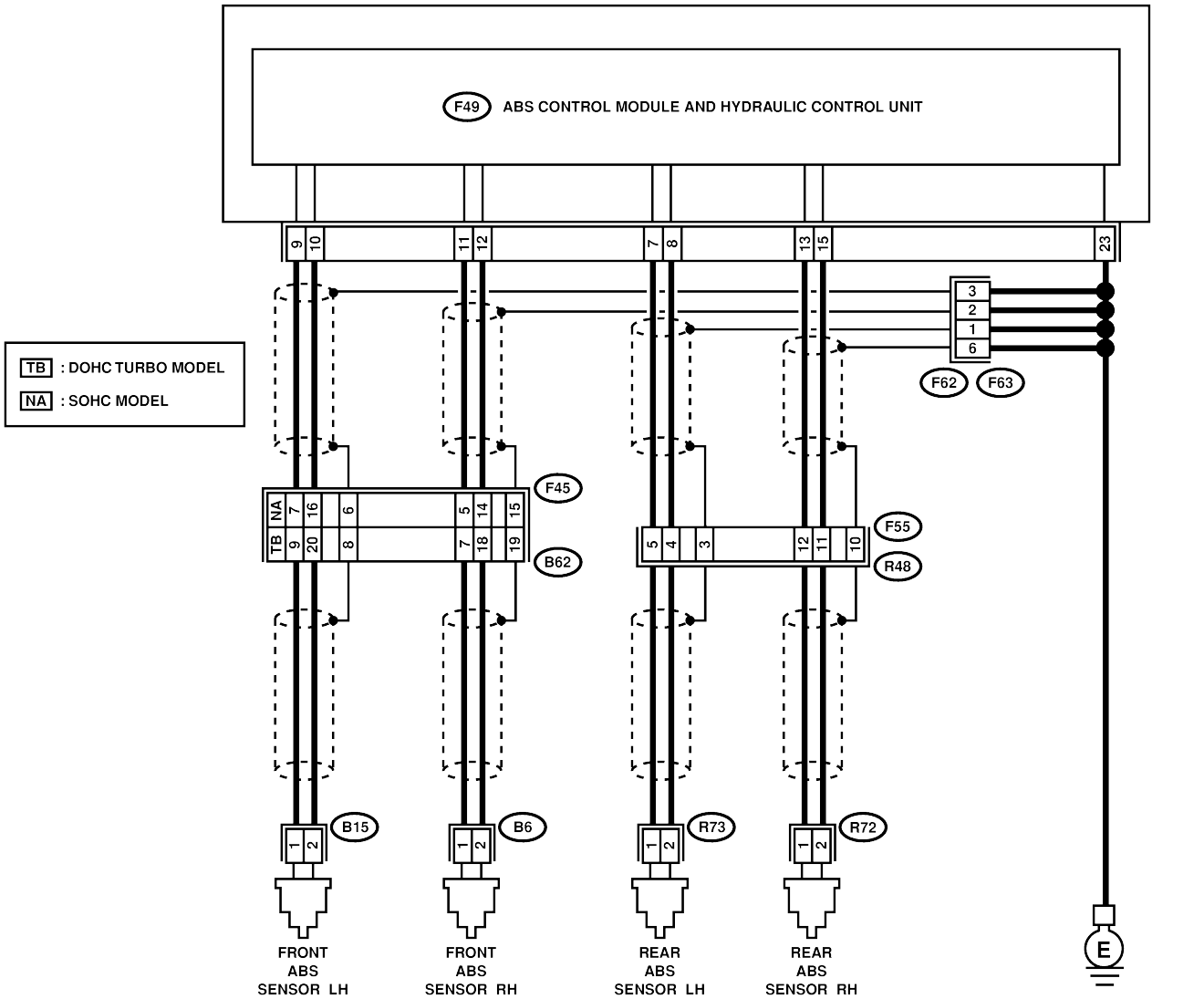
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 27. <Ref. to ABS-98, TROUBLE CODE 27 — OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT —, Diagnostics Chart with Subaru Select Monitor.>

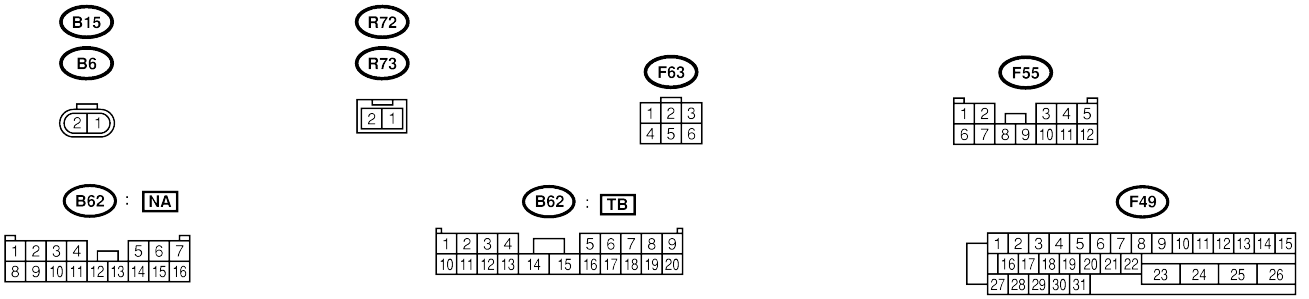
F: TROUBLE CODE 27
— OPEN OR SHORT CIRCUIT IN REAR LEFT ABS SENSOR CIRCUIT — S006583C78

DIAGNOSIS:
- Faulty ABS sensor (Broken wire, input voltage too high)
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

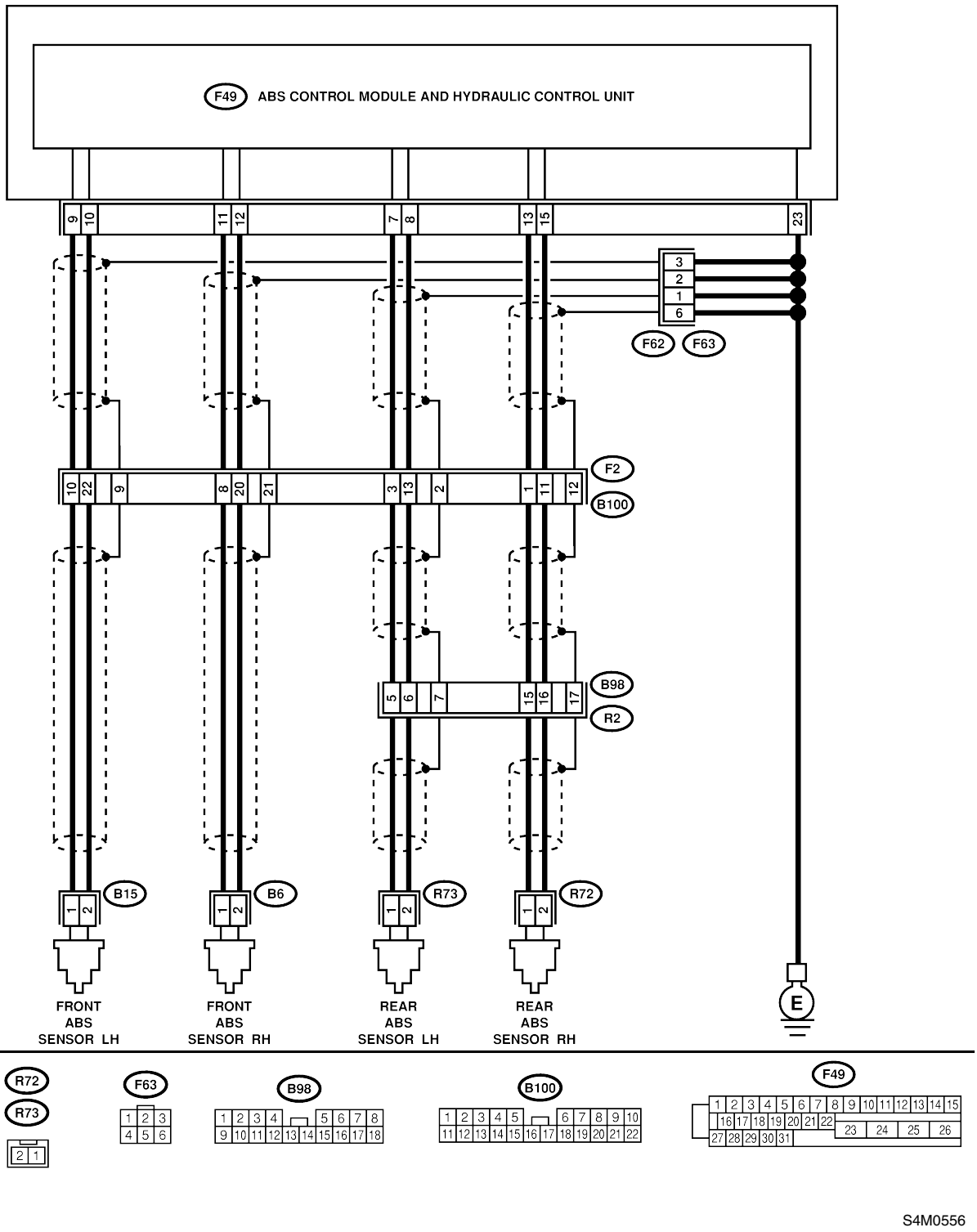
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**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.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **2**.	Go to step **8**.
2	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **3**.	Tighten ABS sensor installation bolts securely.
3	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **4**.	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.
4	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **5**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **6**.
6	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**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. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.
8	**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:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **9**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>

No.	Step	Check	Yes	No
9	**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 (–):***	Is the voltage less than 1 V?	Go to step **10**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
10	**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 (–):***	Is the voltage less than 1 V?	Go to step **11**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
11	**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. 13 — No. 15:*** ***Trouble code 27 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **12**.	Repair harness/ connector between ABSCM&H/U and ABS sensor.
12	**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. 13 (+) — Chassis ground (–):*** ***Trouble code 27 / (F49) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **13**.	Repair harness between ABSCM&H/U and ABS sensor.

No.	Step	Check	Yes	No
13	**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. 13 (+) — Chassis ground (–):*** ***Trouble code 27 / (F49) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **14**.	Repair harness between ABSCM&H/U and ABS sensor.
14	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **15**.	Tighten ABS sensor installation bolts securely.
15	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **16**.	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.
16	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **17**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
17	**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:***	Is the resistance more than 1 MΩ?	Go to step **18**.	Replace ABS sensor and ABSCM&H/U. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
18	**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. 13 — Chassis ground:*** ***Trouble code 27 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19**.	Repair harness between ABSCM&H/U and ABS sensor. And replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
19	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **20**.
20	**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.	Go to step **21**.
21	**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. NOTE: Check harness and connectors between ABSCM&H/U and ABS sensor.

MEMO:

G: TROUBLE CODE 22 — FRONT RIGHT ABNORMAL ABS SENSOR SIGNAL — S006583C54

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>

H: TROUBLE CODE 24 — FRONT LEFT ABNORMAL ABS SENSOR SIGNAL — S006583C64

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>

I: TROUBLE CODE 26 — REAR RIGHT ABNORMAL ABS SENSOR SIGNAL — S006583C73

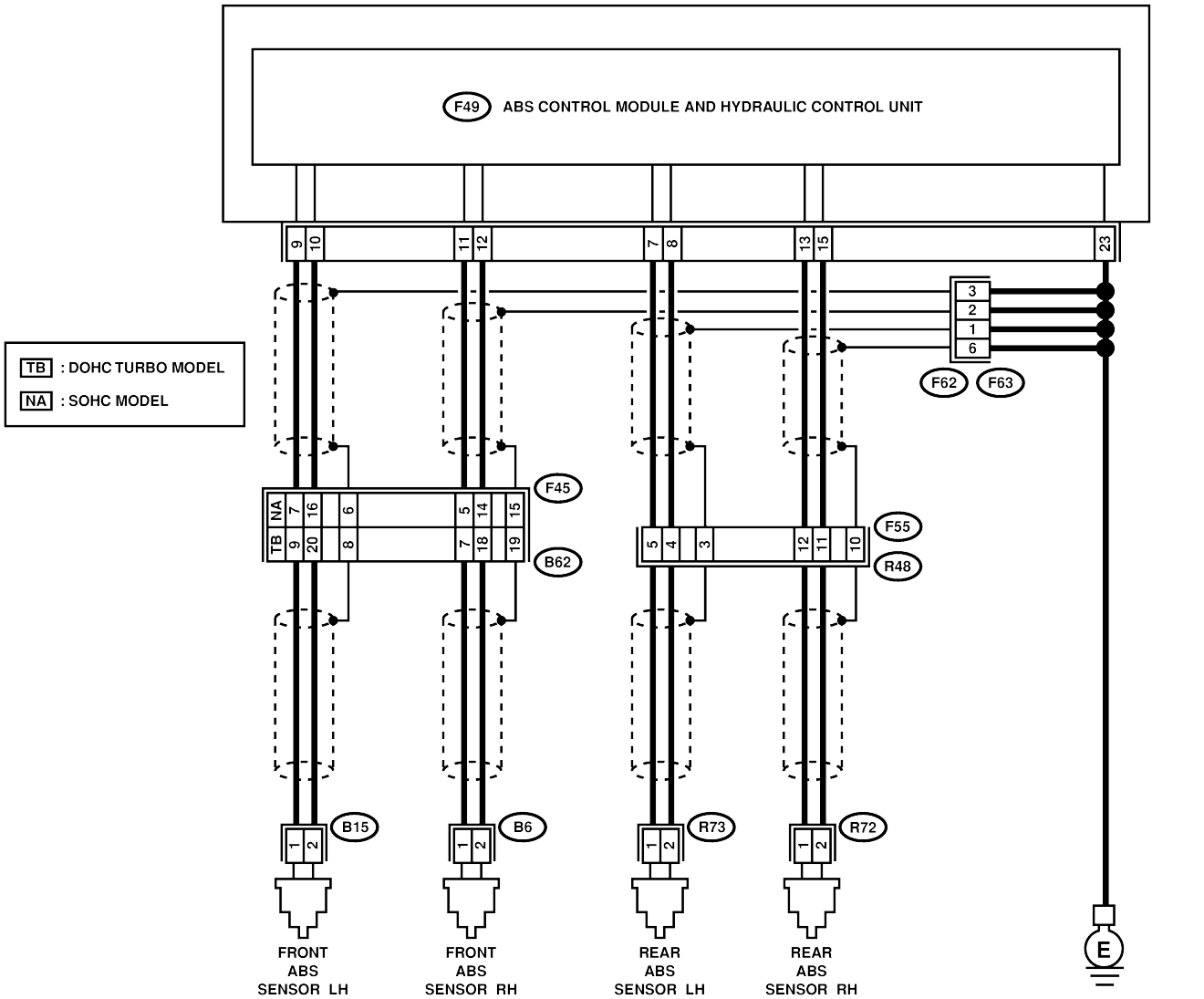
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 28. <Ref. to ABS-106, TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL —, Diagnostics Chart with Subaru Select Monitor.>

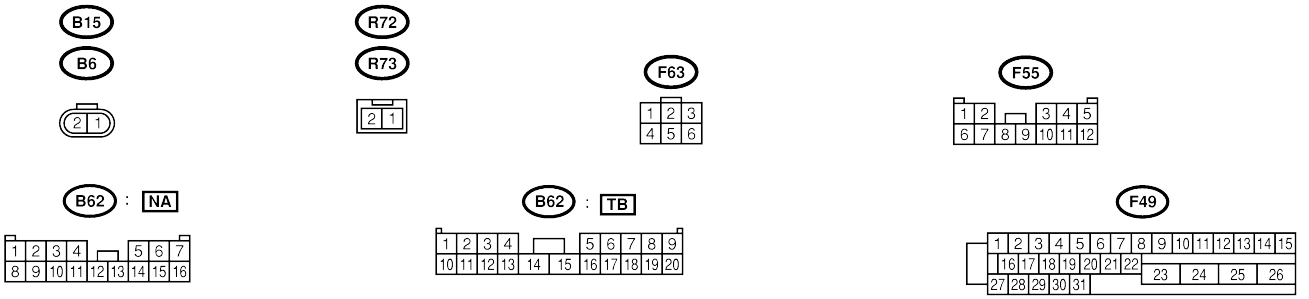
J: TROUBLE CODE 28 — REAR LEFT ABNORMAL ABS SENSOR SIGNAL — S006583C82

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

TROUBLE SYMPTOM:
- ABS does not operate.

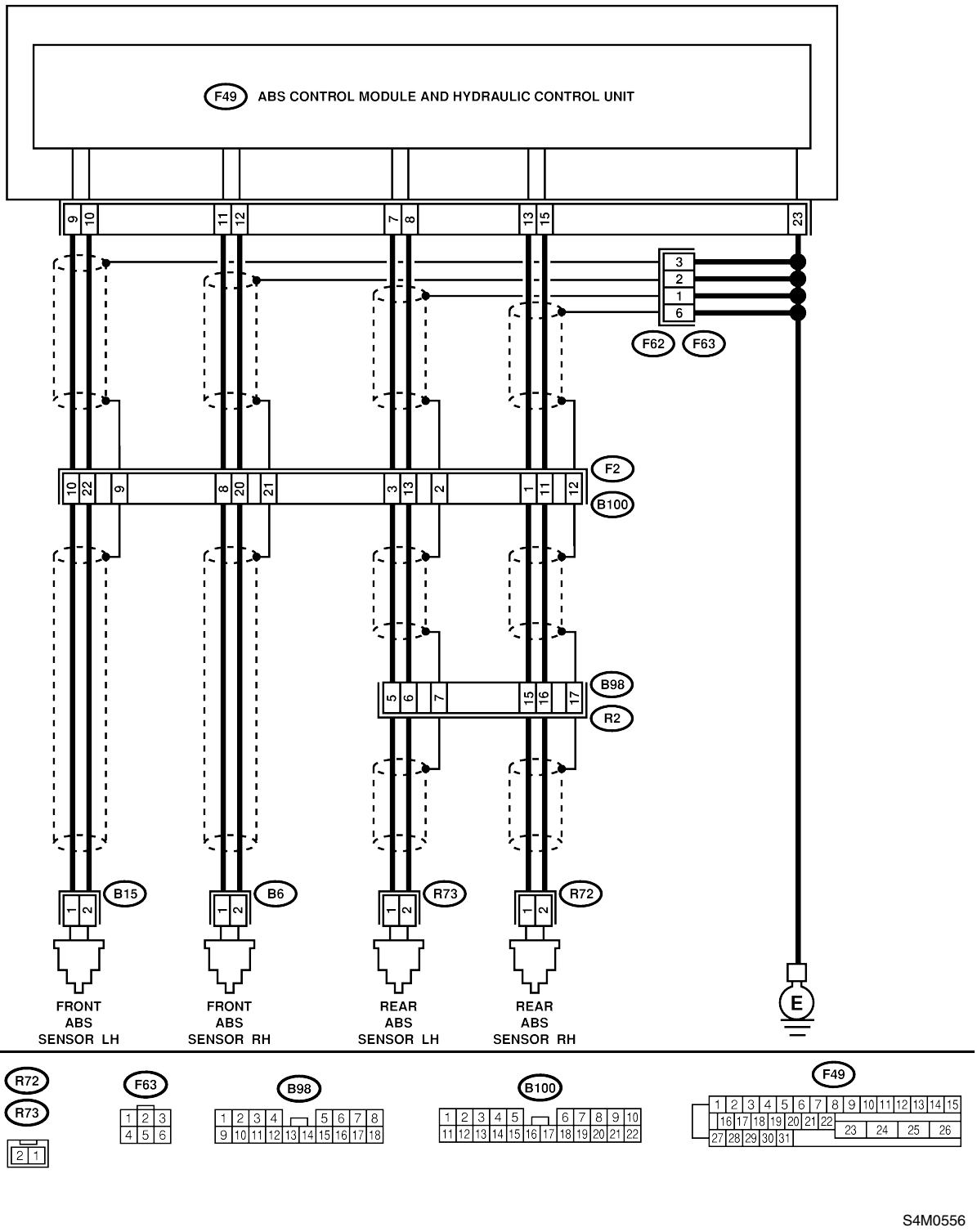
WIRING DIAGRAM: LHD MODEL





S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**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.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **2**.	Go to step **8**.
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **3**.
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **4**.	Properly install the car telephone or the wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5**.
5	**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 /*** ***LHD turbo: (B62) No. 19 — Chassis ground:*** ***LHD non-turbo: (B62) No. 15 — Chassis ground:*** ***RHD: (B100) No. 21 — Chassis ground:*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 8 — Chassis ground:*** ***LHD non-turbo: (B62) No. 6 — Chassis ground:*** ***RHD: (B100) No. 9 — Chassis ground:*** ***Trouble code 26 /*** ***LHD: (F55) No. 10 — Chassis ground:*** ***RHD: (B100) No. 12 — Chassis ground:*** ***Trouble code 28 /*** ***LHD: (F55) No. 3 — Chassis ground:*** ***RHD: (B100) No. 2 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair shield harness.
6	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**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.
8	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **9**.	Tighten ABS sensor installation bolts securely.

No.	Step	Check	Yes	No
9	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **10**.	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.
10	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **11**.	Go to step **12**.
11	**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. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29. ***Connector & terminal*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD turbo: (B100) No. 10 (+) — No. 22 (–):*** ***Trouble code 26 /*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Trouble code 28 /*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **15**.	Go to step **12**.
12	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor or drum from hub in accordance with trouble code.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **13**.

No.	Step	Check	Yes	No
13	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **14**.
14	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **15**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>
15	**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:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **16**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
16	**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:***	Is the resistance more than 1 MΩ?	Go to step **17**.	Replace ABS sensor. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.>
17	**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. 13 — No. 15:*** ***Trouble code 28 / (F49) No. 7 — No. 8:***	Is the resistance between 1 and 1.5 kΩ?	Go to step **18**.	Repair harness/ connector between ABSCM&H/U and ABS sensor.

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
18	**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. 13 — Chassis ground:*** ***Trouble code 28 / (F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19**.	Repair harness/ connector between ABSCM&H/U and ABS sensor.
19	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — GND:***	Is the resistance less than 0.5 Ω?	Go to step **20**.	Repair ABSCM&H/U ground harness.
20	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS sensor?	Repair connector.	Go to step **21**.
21	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **22**.	Properly install the car telephone or the wireless transmitter.
22	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **23**.
23	**CHECK SHIELD CIRCUIT.** 1) Connect all connectors. 2) Measure resistance between shield connector and chassis ground. ***Connector & terminal*** ***Trouble code 22 /*** ***LHD turbo: (B62) No. 19 — Chassis ground:*** ***LHD non-turbo: (B62) No. 15 — Chassis ground:*** ***RHD: (B100) No. 21 — Chassis ground:*** ***Trouble code 24 /*** ***LHD turbo: (B62) No. 8 — Chassis ground:*** ***LHD non-turbo: (B62) No. 6 — Chassis ground:*** ***RHD: (B100) No. 9 — Chassis ground:*** ***Trouble code 26 /*** ***LHD: (F55) No. 10 — Chassis ground:*** ***RHD: (B100) No. 12 — Chassis ground:*** ***Trouble code 28 /*** ***LHD: (F55) No. 3 — Chassis ground:*** ***RHD: (B100) No. 2 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **24**.	Repair shield harness.
24	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **25**.

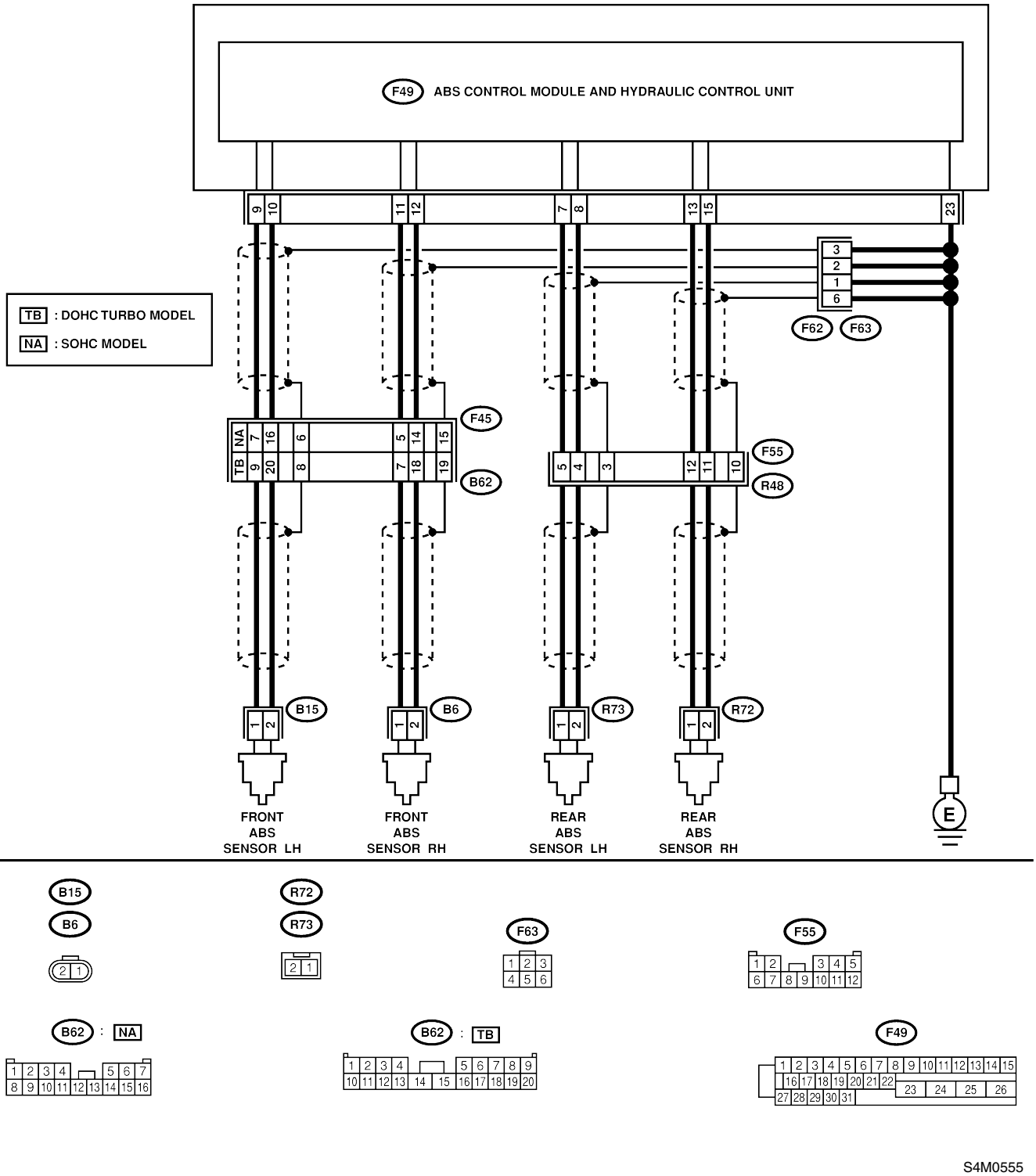
No.	Step	Check	Yes	No
25	**CHECK ANY OTHER TROUBLE CODES APPEARANCE.**	Are other trouble codes being output?	Proceed with the diagnosis corresponding to the trouble code.	A temporary noise interference.

K: TROUBLE CODE 29
— ABNORMAL ABS SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR — S006583E78

DIAGNOSIS:
- Faulty ABS sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

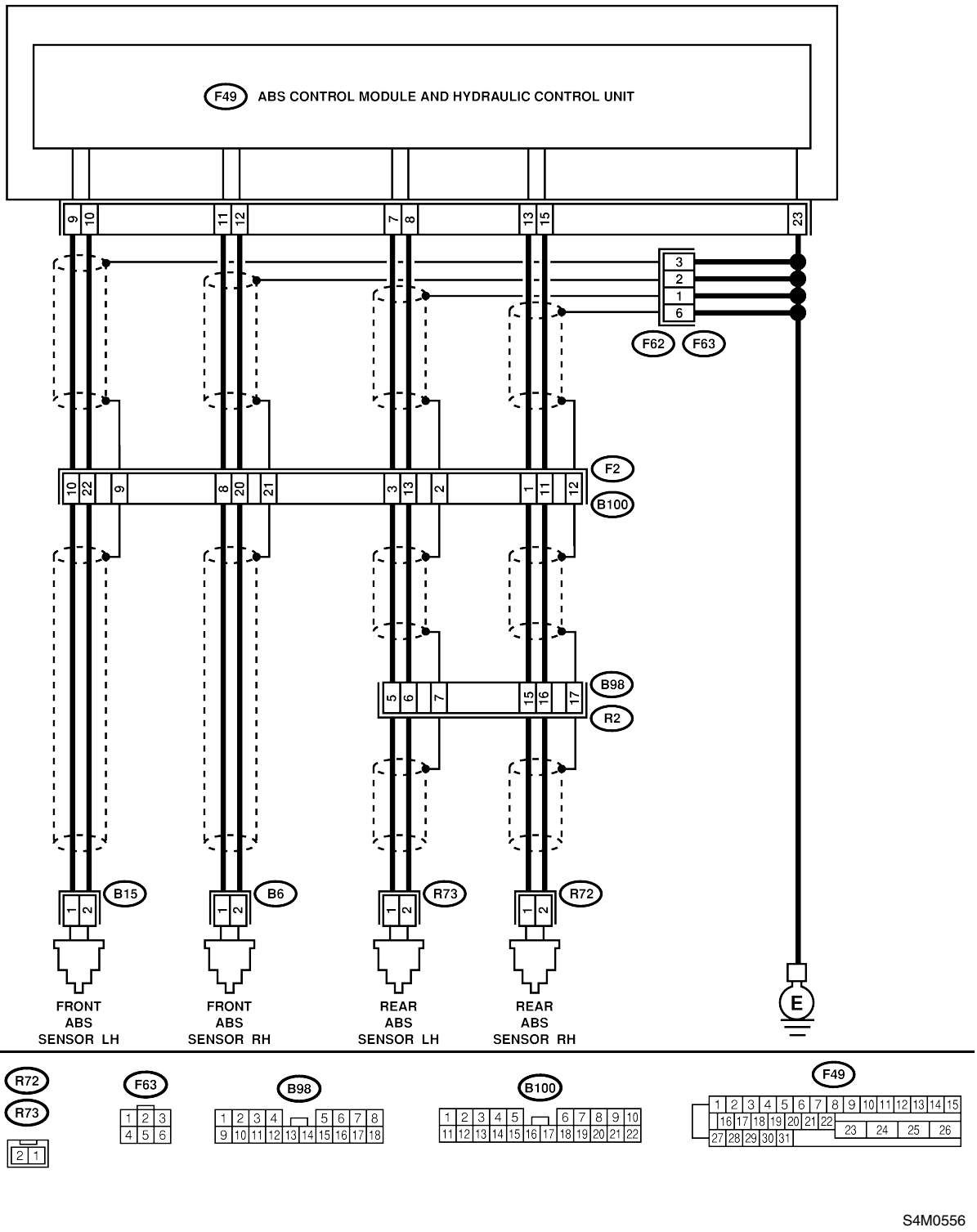
TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM: LHD MODEL



S4M0555

WIRING DIAGRAM: RHD MODEL



S4M0556

No.	Step	Check	Yes	No
1	**CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.**	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.	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.	Go to step **2**.
2	**CHECK TIRE SPECIFICATIONS.** Turn ignition switch to OFF.	Are the tire specifications correct?	Go to step **3**.	Replace tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace tire.	Go to step **4**.
4	**CHECK TIRE PRESSURE.**	Is the tire pressure correct?	Go to step **5**.	Adjust tire pressure.
5	**CHECK INSTALLATION OF ABS SENSOR.** ***Tightening torque:*** ***32±10 N·m (3.3±1.0 kgf-m, 24±7 ft-lb)***	Are the ABS sensor installation bolts tightened securely?	Go to step **6**.	Tighten ABS sensor installation bolts securely.
6	**CHECK ABS SENSOR GAP.** Measure tone wheel to ABS sensor piece gap over entire perimeter of the wheel. ***Front wheel*** ***0.3 — 0.8 mm (0.012 — 0.031 in)*** ***Rear wheel*** ***0.7 — 1.2 mm (0.028 — 0.047 in)***	Is the gap within the specifications?	Go to step **7**.	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.
7	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **8**.	Go to step **9**.

No.	Step	Check	Yes	No
8	**CHECK ABS SENSOR SIGNAL.** 1) Raise all four wheels of ground. 2) Turn ignition switch OFF. 3) Connect the oscilloscope to the connector (B99), (F95) or (F94) in accordance with trouble code. 4) Turn ignition switch ON. 5) Rotate wheels and measure voltage at specified frequency. <Ref. to ABS-17, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores the trouble code 29. ***Connector & terminal*** ***Front RH*** ***LHD turbo: (B62) No. 7 (+) — No. 18 (–):*** ***LHD non-turbo: (B62) No. 5 (+) — No. 14 (–):*** ***RHD: (B100) No. 8 (+) — No. 20 (–):*** ***Front LH*** ***LHD turbo: (B62) No. 9 (+) — No. 20 (–):*** ***LHD non-turbo: (B62) No. 7 (+) — No. 16 (–):*** ***RHD: (B100) No. 10 (+) — No. 22 (–):*** ***Rear RH*** ***LHD: (F55) No. 12 (+) — No. 11 (–):*** ***RHD: (B98) No. 15 (+) — No. 16 (–):*** ***Rear LH*** ***LHD: (F55) No. 5 (+) — No. 4 (–):*** ***RHD: (B98) No. 5 (+) — No. 6 (–):***	Is oscilloscope pattern smooth, as shown in figure?	Go to step **12**.	Go to step **9**.
9	**CHECK CONTAMINATION OF ABS SENSOR OR TONE WHEEL.** Remove disc rotor from hub.	Is the ABS sensor piece or the tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **10**.
10	**CHECK DAMAGE OF ABS SENSOR OR TONE WHEEL.**	Are there broken or damaged teeth in the ABS sensor piece or the tone wheel?	Replace ABS sensor or tone wheel. Front: <Ref. to ABS-14, Front ABS Sensor.> Rear: <Ref. to ABS-18, Rear ABS Sensor.> and Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>	Go to step **11**.
11	**CHECK TONE WHEEL RUNOUT.** Measure tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **12**.	Replace tone wheel. Front: <Ref. to ABS-21, Front Tone Wheel.> Rear: <Ref. to ABS-22, Rear Tone Wheel.>

No.	Step	Check	Yes	No
12	**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.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**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.

L: TROUBLE CODE 31 — FRONT RIGHT INLET VALVE MALFUNCTION — S006583C93

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

M: TROUBLE CODE 33 — FRONT LEFT INLET VALVE MALFUNCTION — S006583D03

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

N: TROUBLE CODE 35 — REAR RIGHT INLET VALVE MALFUNCTION — S006583D11

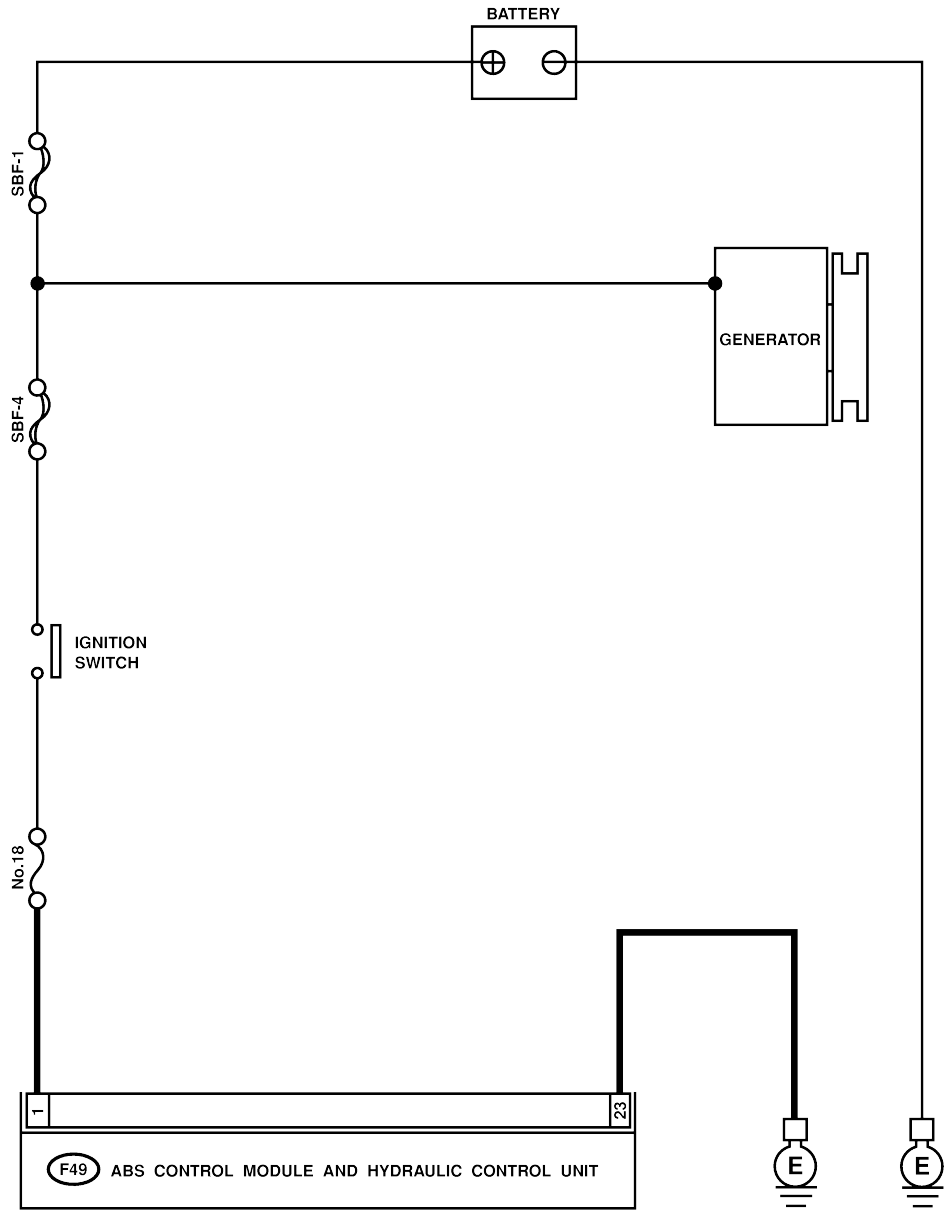
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 37. <Ref. to ABS-120, TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

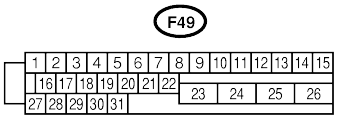
O: TROUBLE CODE 37 — REAR LEFT INLET VALVE MALFUNCTION — S006583D20

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**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:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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:

P: TROUBLE CODE 32 — FRONT RIGHT OUTLET VALVE MALFUNCTION — S006583C99

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

Q: TROUBLE CODE 34 — FRONT LEFT OUTLET VALVE MALFUNCTION — S006583D08

NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

R: TROUBLE CODE 36 — REAR RIGHT OUTLET VALVE MALFUNCTION — S006583D15

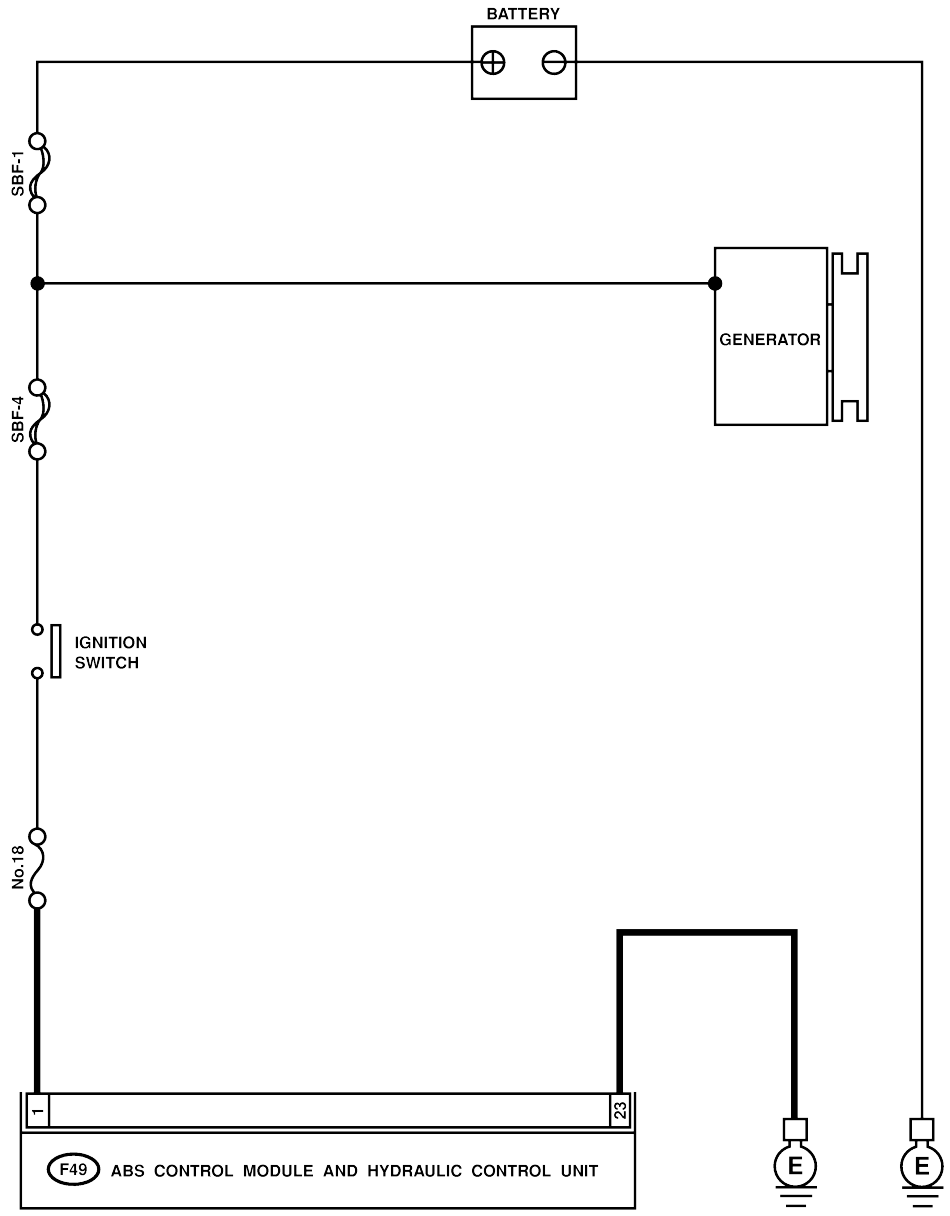
NOTE:
For the diagnostic procedure, refer to TROUBLE CODE 38. <Ref. to ABS-124, TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION —, Diagnostics Chart with Subaru Select Monitor.>

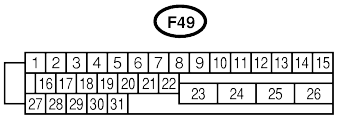
S: TROUBLE CODE 38 — REAR LEFT OUTLET VALVE MALFUNCTION — S006583D24

DIAGNOSIS:
- Faulty harness/connector
- Faulty outlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**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:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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:

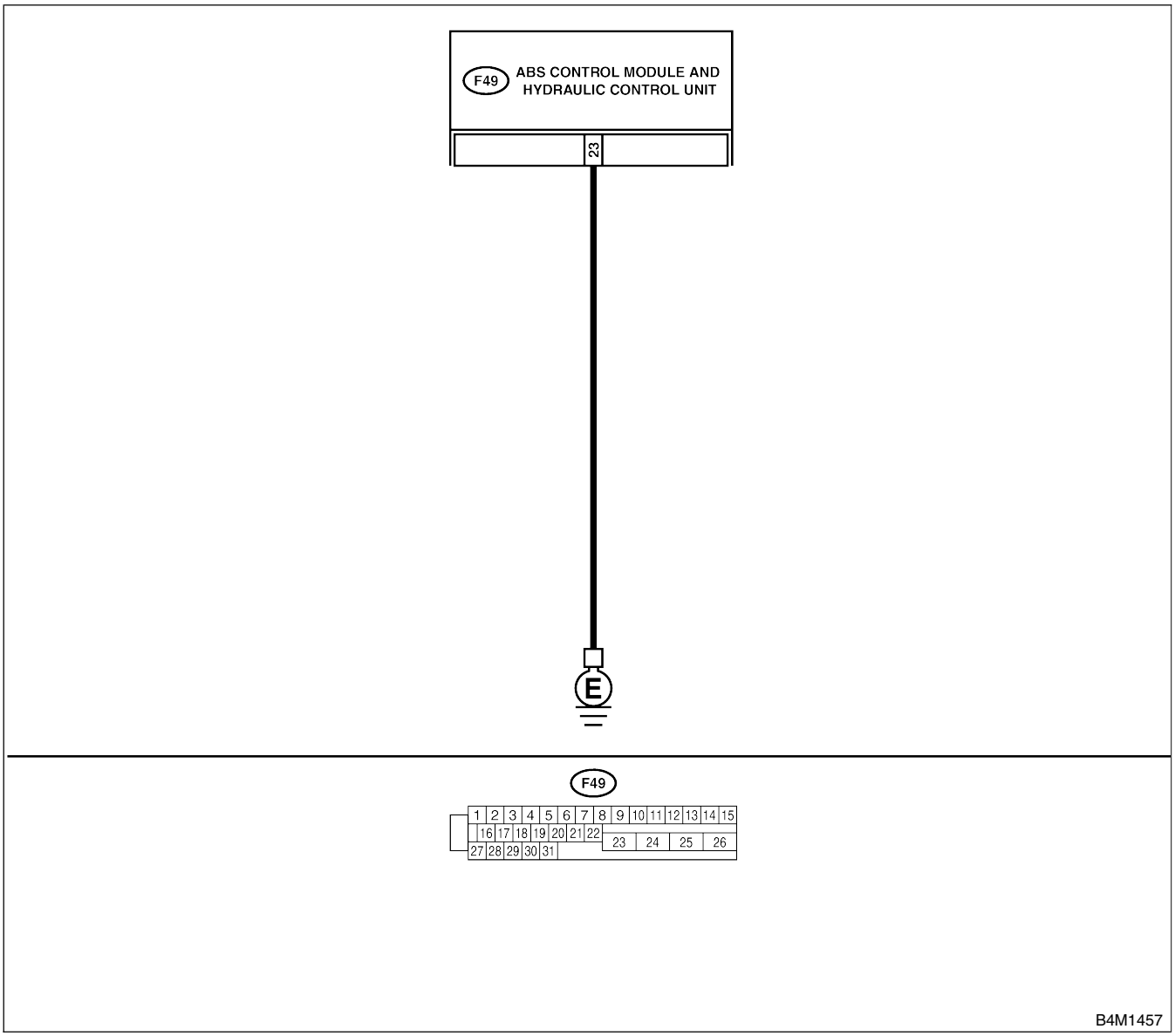
T: TROUBLE CODE 41
— ABS CONTROL MODULE MALFUNCTION —

S006583D31

DIAGNOSIS:
- Faulty ABSCM&H/U

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:



DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

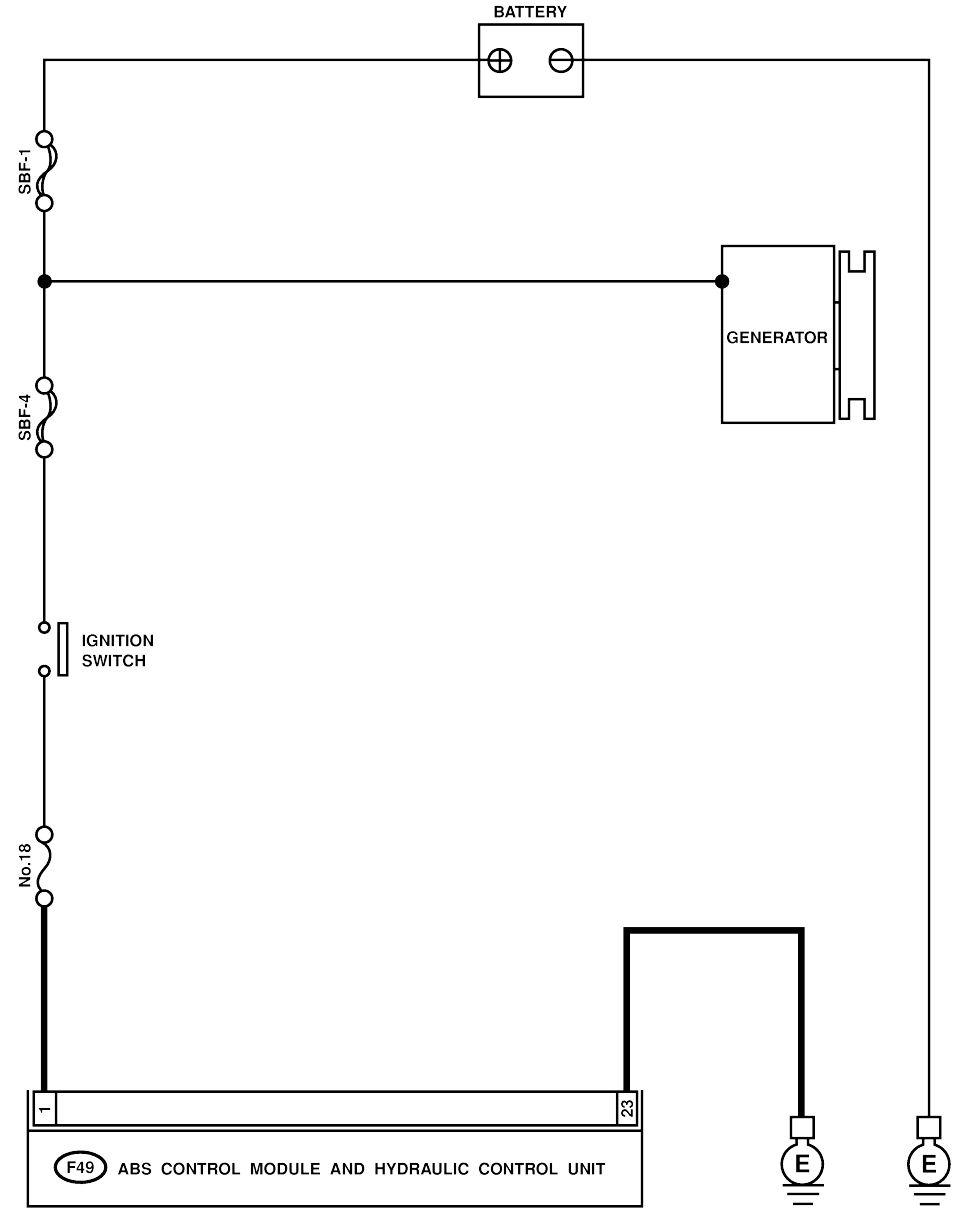
No.	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Measure resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2**.	Repair ABSCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U?	Repair connector.	Go to step **3**.
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the wireless transmitter properly installed?	Go to step **4**.	Properly install the car telephone or the wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5**.
5	**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.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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.

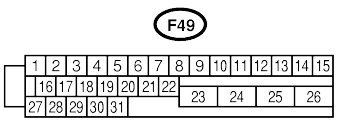
U: TROUBLE CODE 42
— POWER SUPPLY VOLTAGE TOO LOW — S006583D36

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is low.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

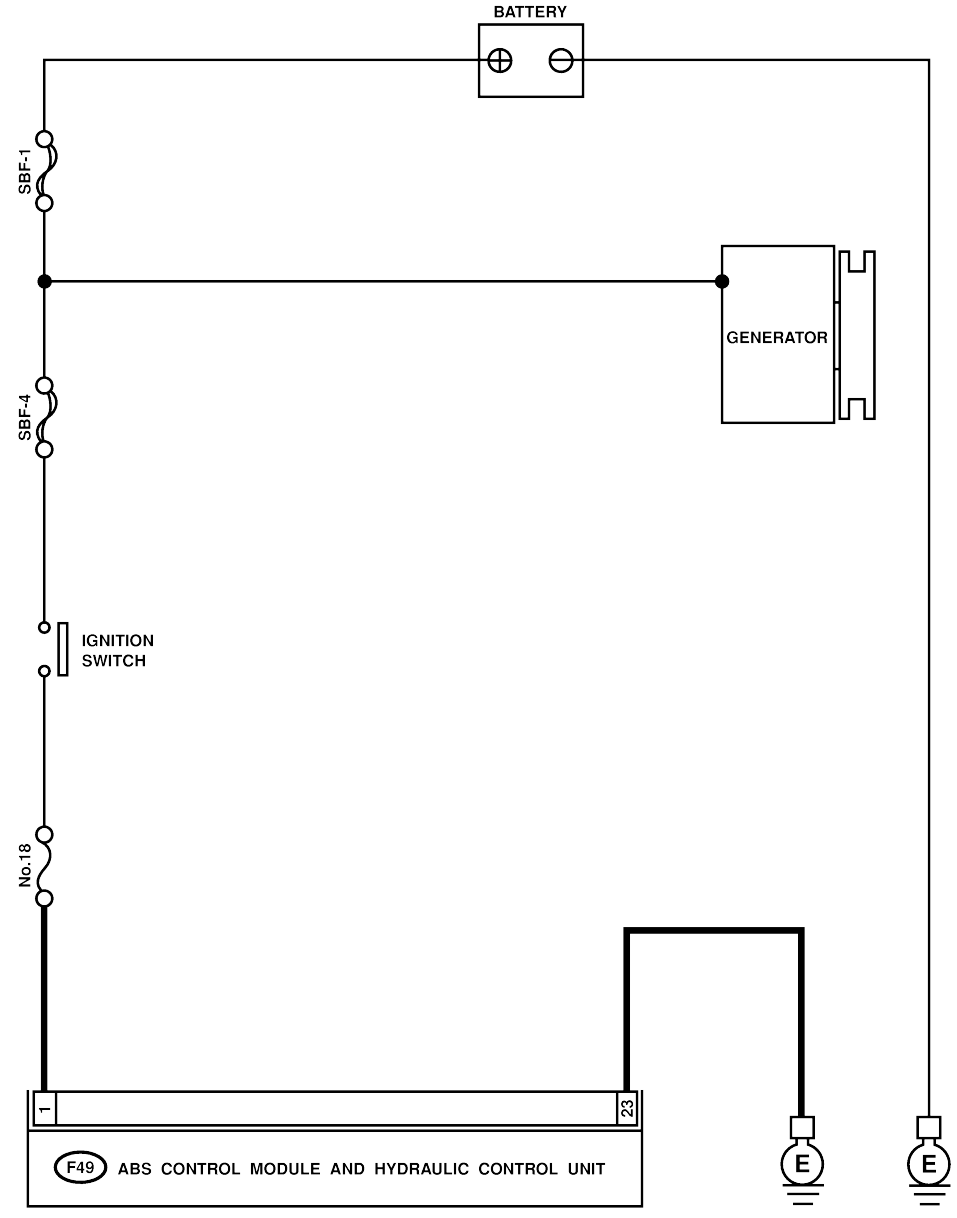
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 15 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3**.	Tighten the clamp of terminal.
3	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **4**.	Repair harness connector between battery, ignition switch and ABSCM&H/U.
4	**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:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **6**.
6	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**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.

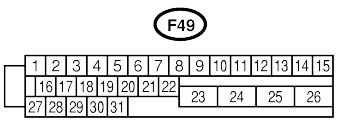
V: TROUBLE CODE 42
— POWER SUPPLY VOLTAGE TOO HIGH — S006583D35

DIAGNOSIS:
- Power source voltage of the ABSCM&H/U is high.

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0557

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

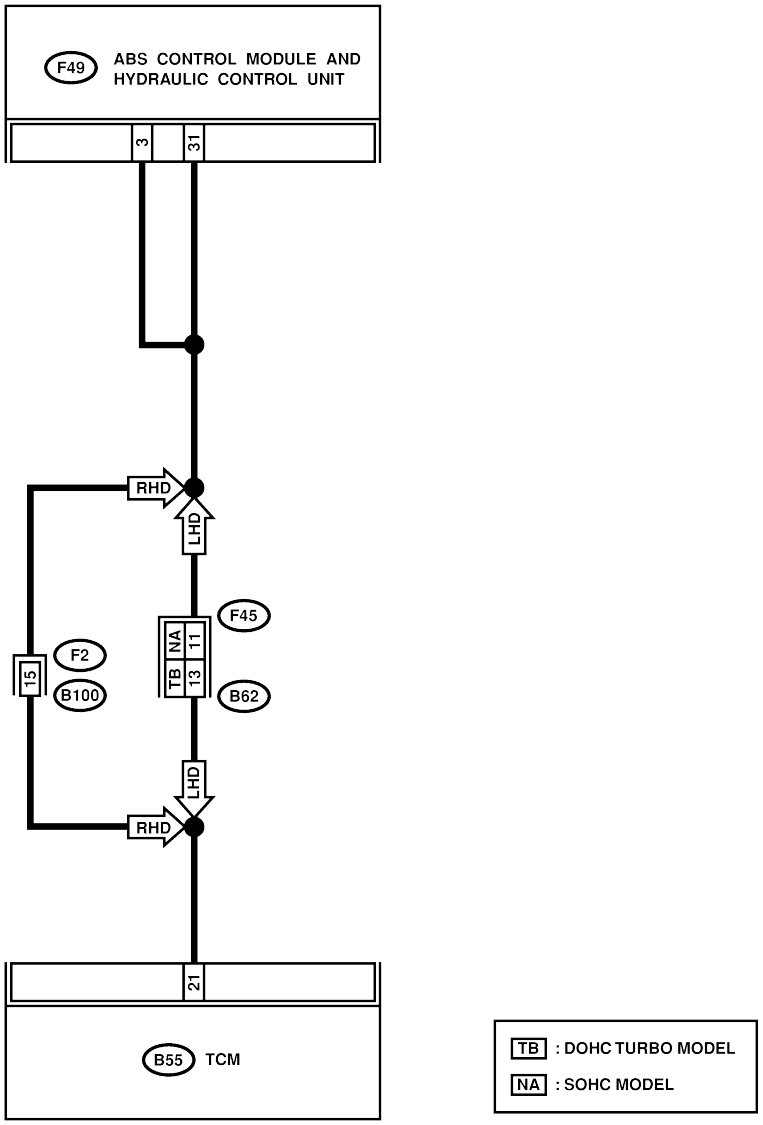
No.	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start engine. 2) Idling after warm-up. 3) Measure voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal — Chassis ground:***	Is the voltage between 10 and 17 V?	Go to step **2**.	Repair generator. <Ref. to SC-12, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3**.	Tighten the clamp of terminal.
3	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **4**.
4	**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 (–):***	Is the voltage between 10 and 17 V?	Go to step **5**.	Repair harness connector between fuse and ABSCM&H/U.
5	**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:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Repair ABSCM&H/U ground harness.
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**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.

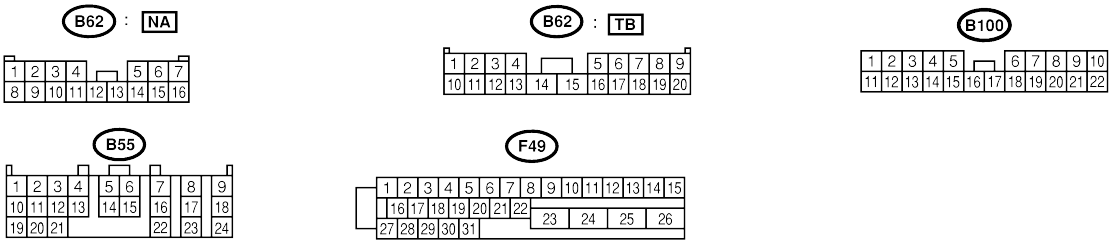
W: TROUBLE CODE 44
— ABS-AT CONTROL (NON CONTROLLED) — S006583E79

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0558

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK SPECIFICATIONS OF THE ABSCM&H/U.** Check specifications of the mark to the ABSCM&H/U. ***C7: AT*** ***C8: MT***	Is an ABSCM&H/U for AT model installed on a MT model?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **2**.
2	**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:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair harness between TCM and ABSCM&H/U.
3	**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*** ***(B55) No. 21 (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **5**.	Go to step **4**.
4	**CHECK AT.**	Is the AT functioning normally?	Replace TCM.	Repair AT.
5	**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 (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair harness/ connector between TCM and ABSCM&H/U.
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between TCM and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**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.

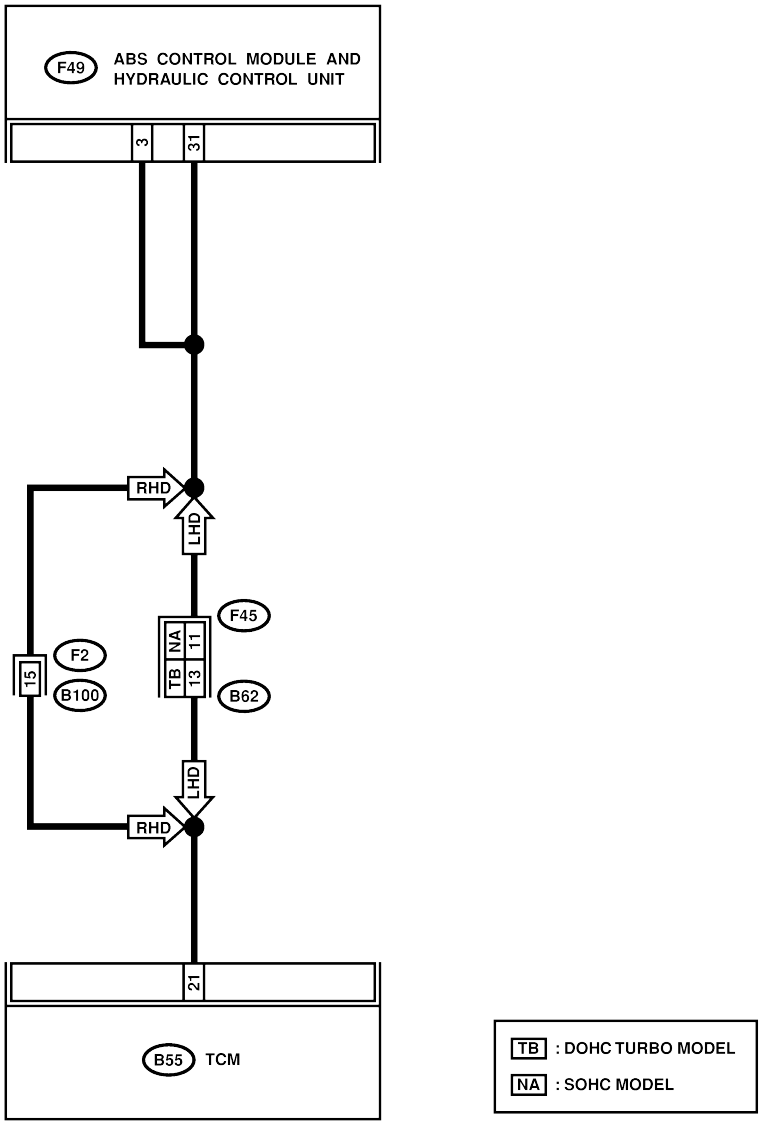
X: TROUBLE CODE 44
— ABS-AT CONTROL (CONTROLLED) —

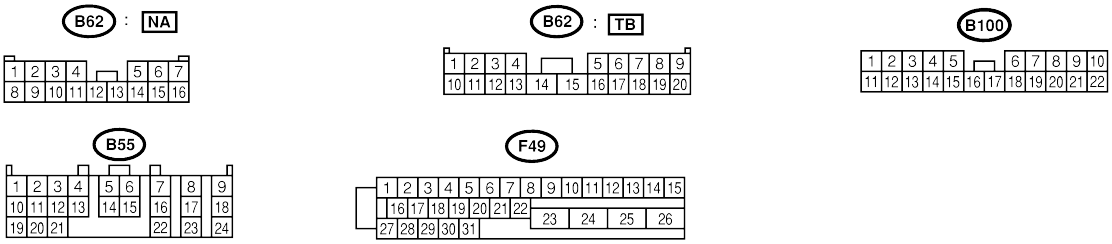
S006583E80

DIAGNOSIS:
- Combination of AT control faults

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0558

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

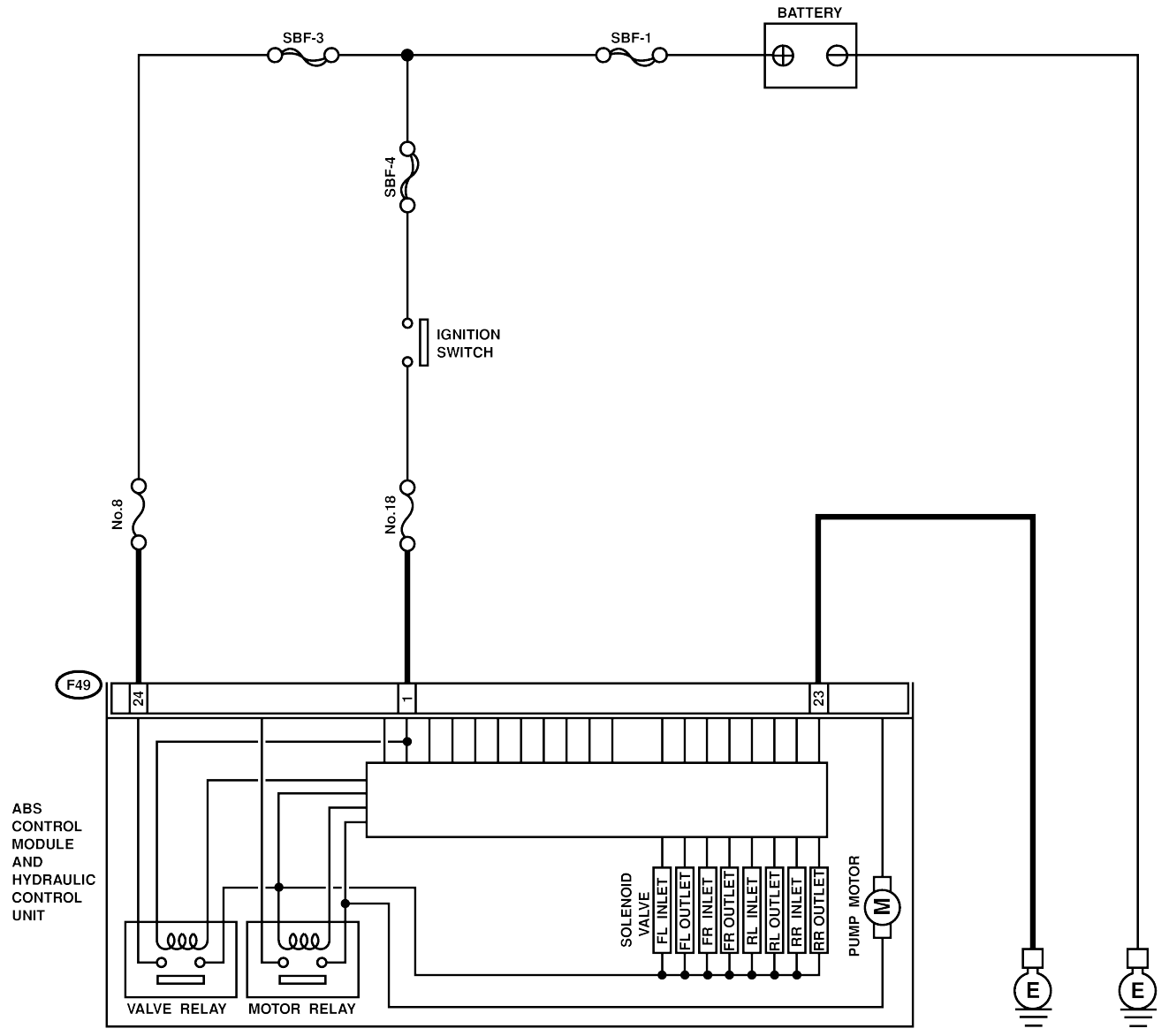
No.	Step	Check	Yes	No
1	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn ignition switch to OFF. 2) Disconnect two connectors from TCM. 3) Disconnect connector from ABSCM&H/U. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **2**.	Repair harness between TCM and ABSCM&H/U.
2	**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 (–):***	Is the voltage less than 1 V?	Go to step **3**.	Repair harness between TCM and ABSCM&H/U.
3	**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 (–):***	Is the voltage between 10 and 13 V?	Go to step **4**.	Repair harness/ connector between TCM and ABSCM&H/U.
4	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connectors between TCM and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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.

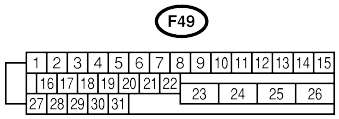
Y: TROUBLE CODE 51
— VALVE RELAY MALFUNCTION — S006583E81

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0559

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

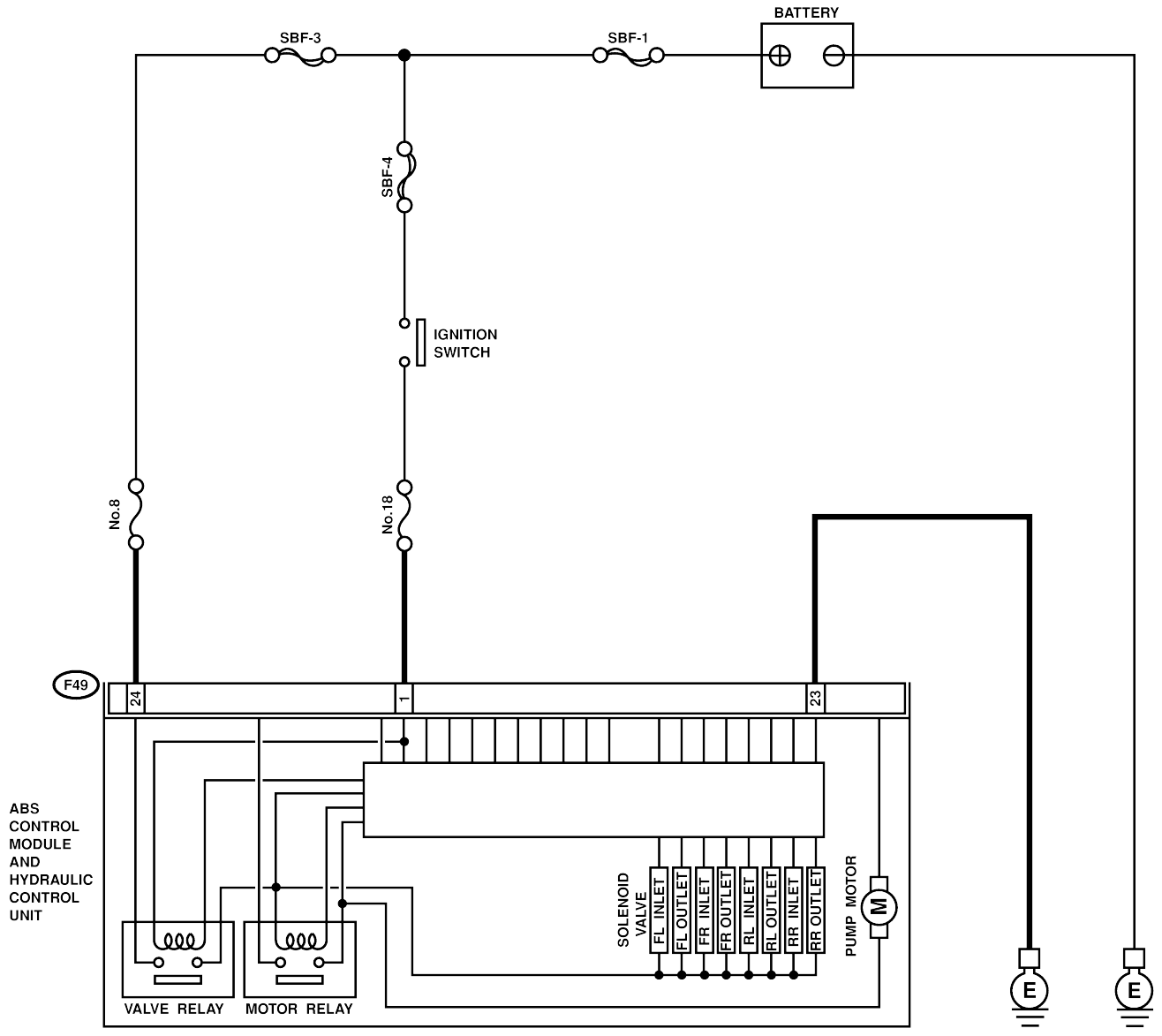
No.	Step	Check	Yes	No
1	**CHECK FUSE.**	Is the fuse blown out?	Replace fuse.	Go to step **2**.
2	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 1 (+) — Chassis ground (–):*** ***(F49) No. 24 (+) — Chassis ground (–):***	Is the voltage between 10 and 15 V?	Go to step **3**.	Repair harness connector between fuse and ABSCM&H/U.
3	**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:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ABSCM&H/U ground harness.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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.

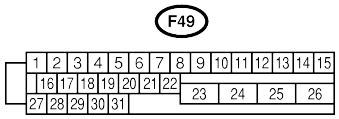
Z: TROUBLE CODE 51
— VALVE RELAY ON FAILURE — S006583D63

DIAGNOSIS:
- Faulty valve relay

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0559

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

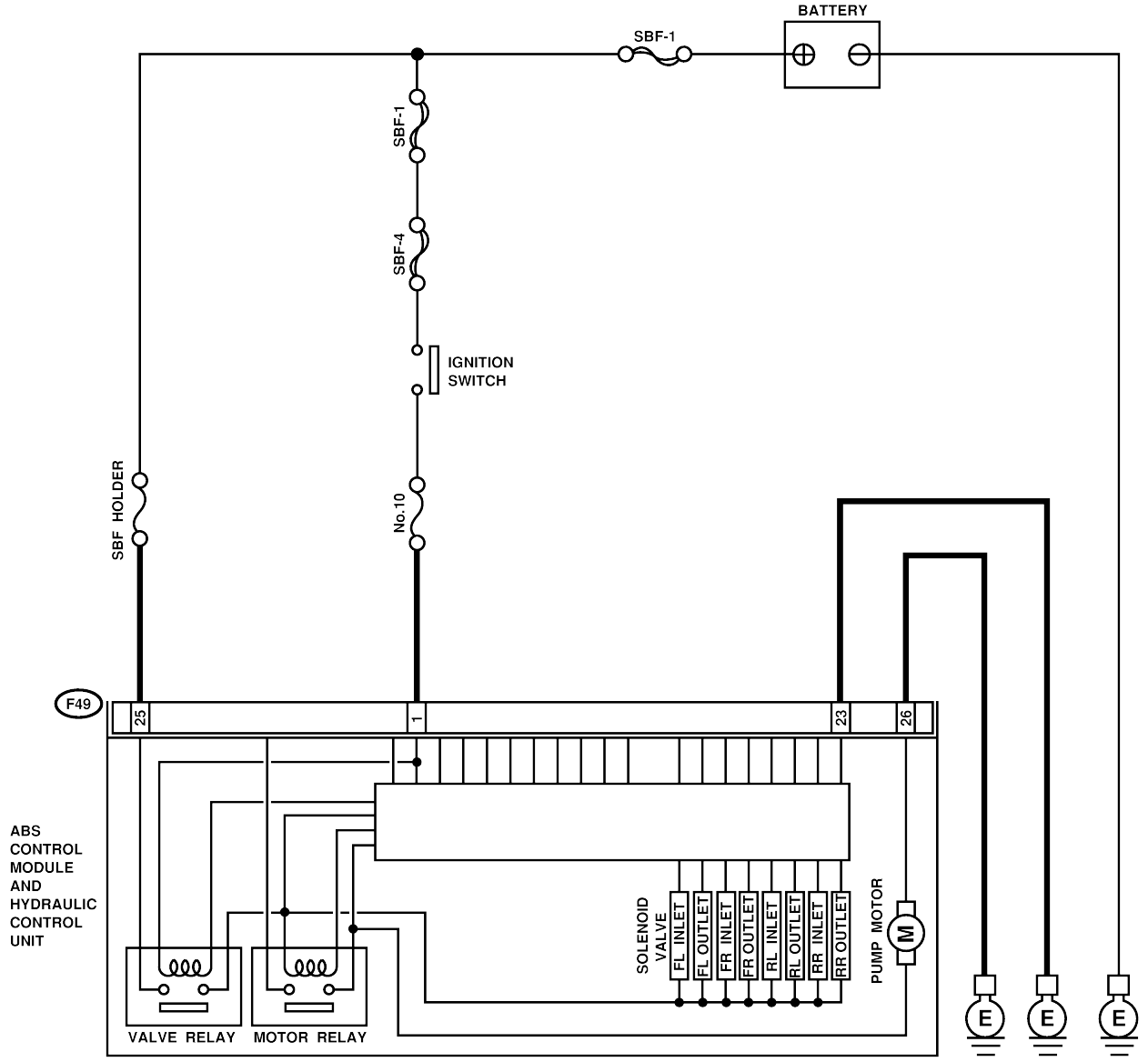
No.	Step	Check	Yes	No
1	**CHECK VALVE RELAY IN ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 23 (+) — No. 24 (–):***	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **3**.
3	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**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.

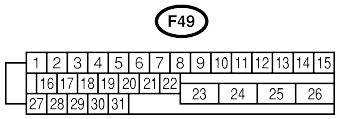
AA: TROUBLE CODE 52 — OPEN CIRCUIT IN MOTOR RELAY CIRCUIT — S006583E82

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**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 (–):***	Is the voltage between 10 and 13 V?	Go to step **2**.	Repair harness/ connector between battery and ABSCM&H/U and check fuse SBF6.
2	**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:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair ABSCM&H/U ground harness.
3	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> NOTE: Use the diagnosis connector to operate the sequence control.	Can motor revolution noise (buzz) be heard when carrying out the check sequence?	Go to step **4**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
4	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U?	Repair connector.	Go to step **5**.
5	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6**.
6	**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.

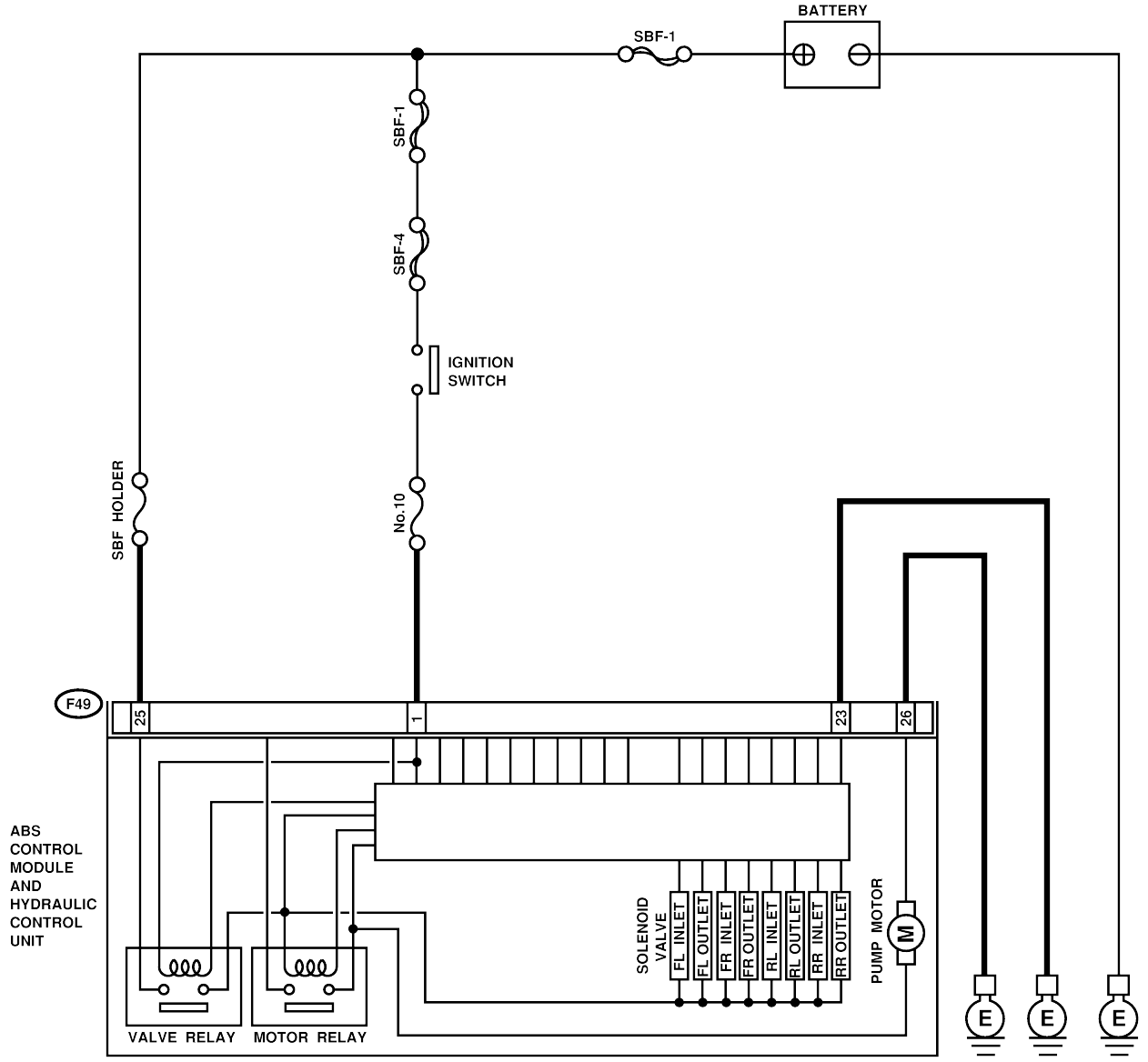
MEMO:

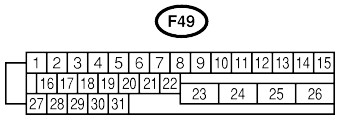
AB: TROUBLE CODE 52 — MOTOR RELAY ON FAILURE — S006583E83

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK MOTOR RELAY IN ABSCM&H/U.** Measure resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 25 — No. 26:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> 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 **3**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
3	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between hydraulic unit, relay box and ABSCM&H/U?	Repair connector.	Go to step **4**.
4	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5**.
5	**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.

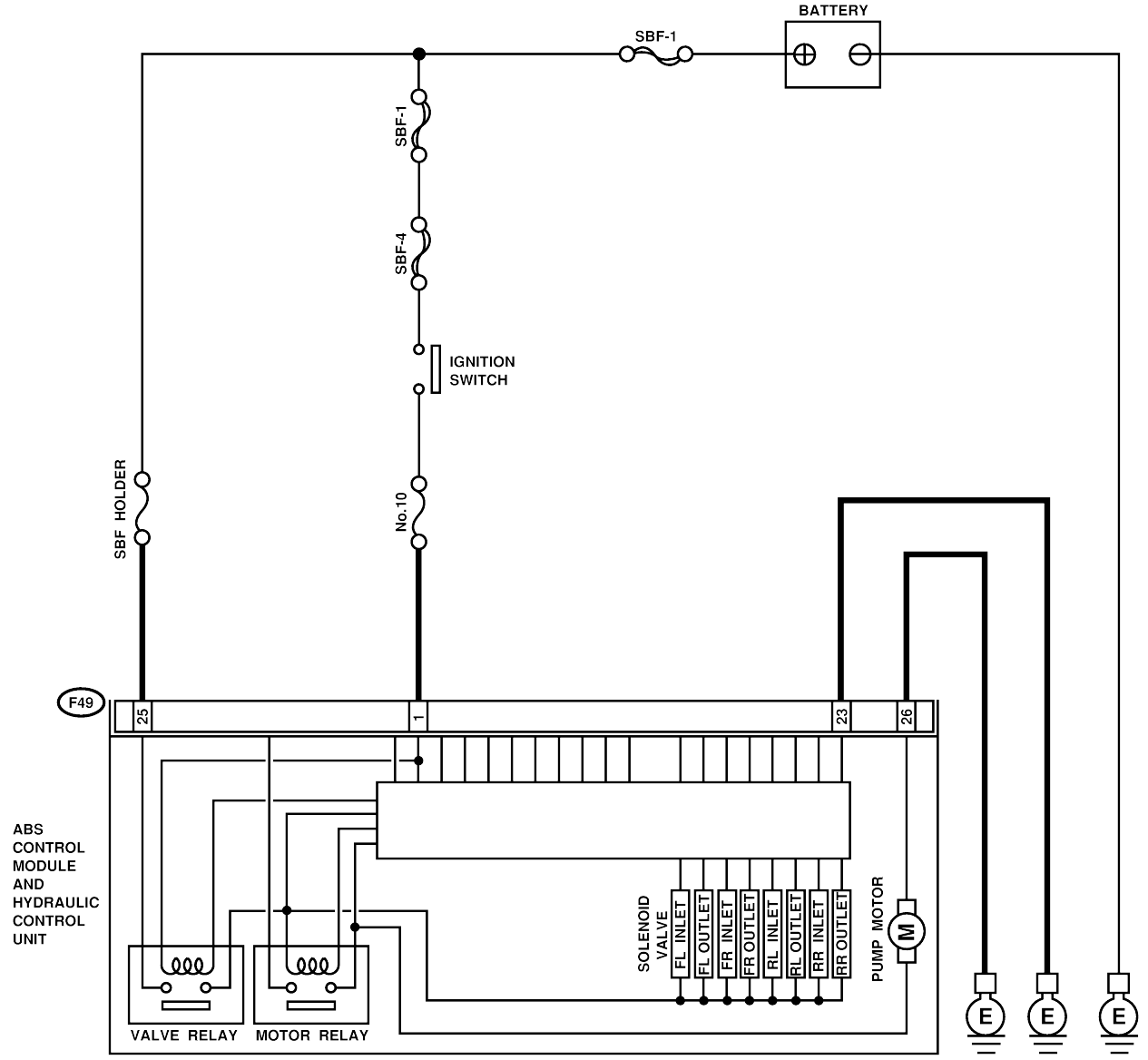
MEMO:

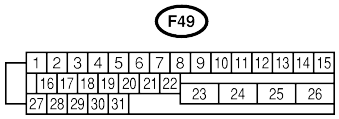
AC: TROUBLE CODE 52 — MOTOR MALFUNCTION — S006583D68

DIAGNOSIS:
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0560

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**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 (–):***	Is the voltage between 10 and 13 V?	Go to step **2**.	Repair harness/ connector between battery and ABSCM&H/U and check fuse SBF6.
2	**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:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair ABSCM&H/U ground harness.
3	**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 (–):***	Is the voltage between 10 and 15 V?	Go to step **4**.	Repair harness connector between battery, ignition switch and ABSCM&H/U.
4	**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:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair ABSCM&H/U ground harness.
5	**CHECK MOTOR OPERATION.** Operate the sequence control. <Ref. to ABS-11, ABS Sequence Control.> 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 **6**.	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
6	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair connector.	Go to step **7**.
7	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8**.
8	**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.

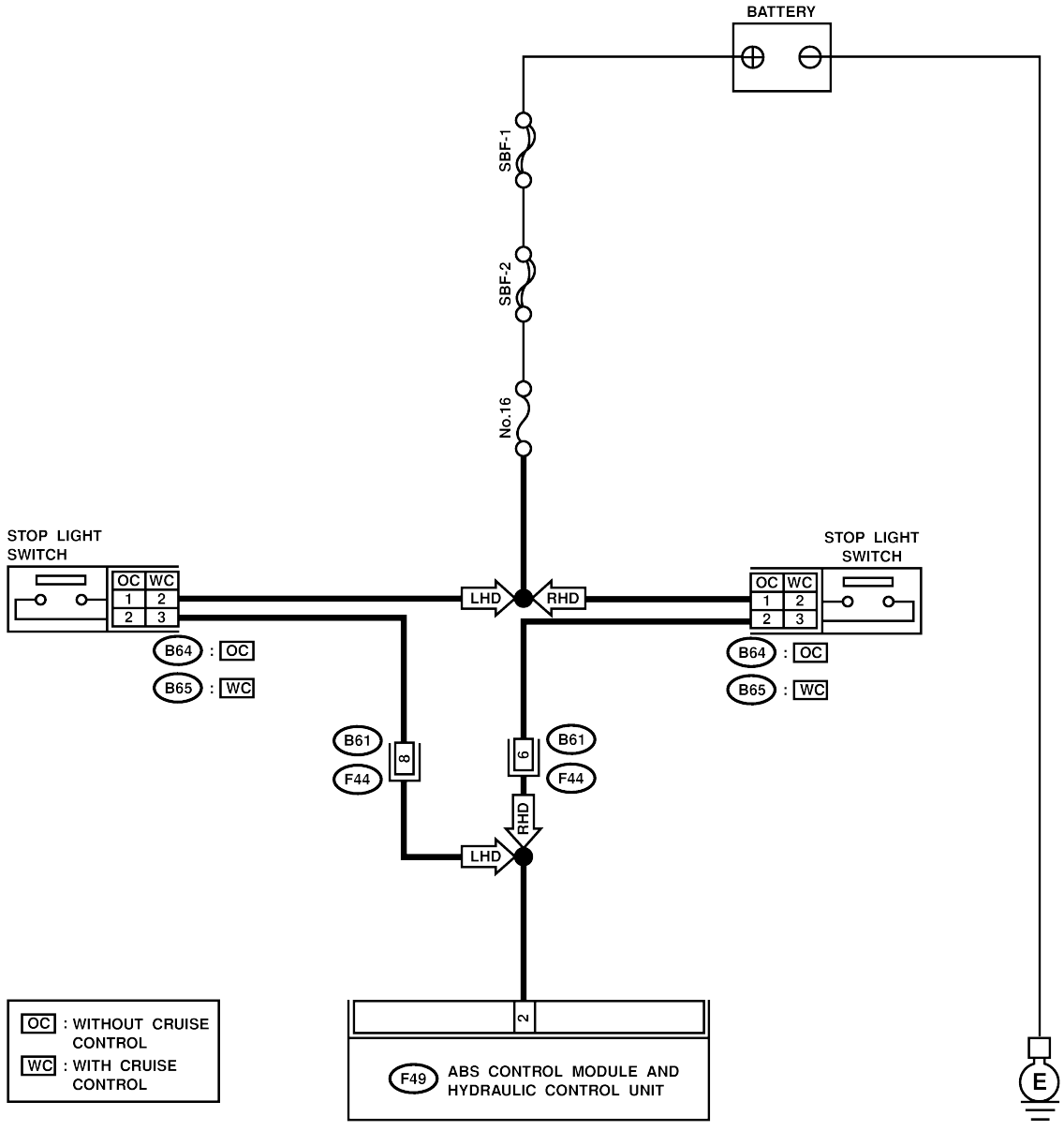
MEMO:

AD: TROUBLE CODE 54
— STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION — S006583E84

DIAGNOSIS:
- Faulty stop light switch

TROUBLE SYMPTOM:
- ABS does not operate.

WIRING DIAGRAM:





S4M0561

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

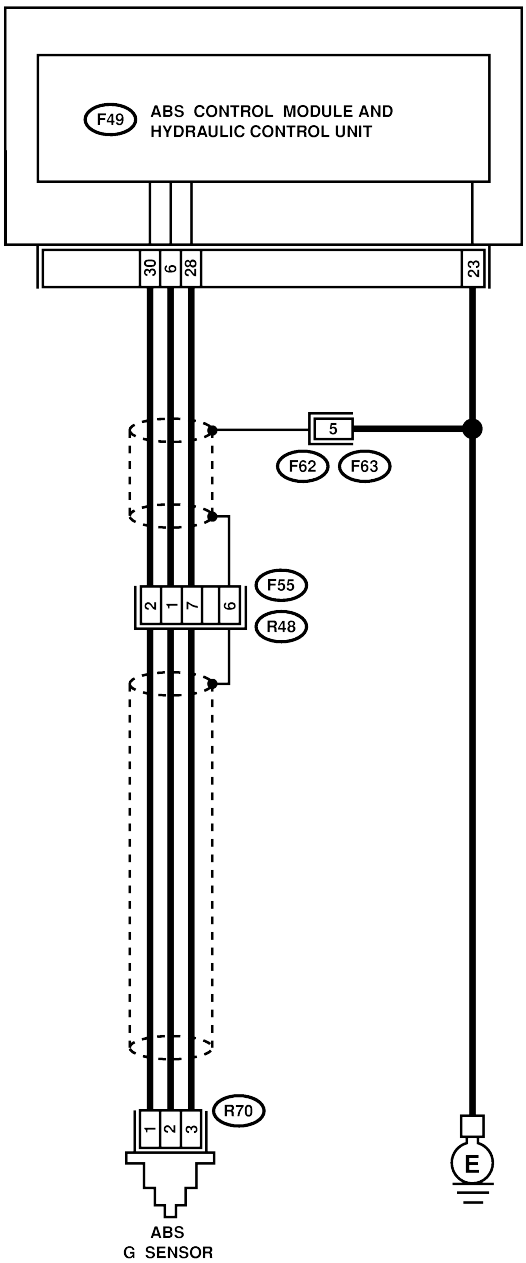
No.	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Release the brake pedal. 3) Read the stop light switch output in the select monitor data display.	Is the reading indicated on monitor display less than 1.5 V?	Go to step **2**.	Go to step **3**.
2	**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.	Is the reading indicated on monitor display between 10 and 15 V?	Go to step **5**.	Go to step **3**.
3	**CHECK IF STOP LIGHTS COME ON.** Depress the brake pedal.	Do stop lights turn on?	Go to step **4**.	Repair stop lights circuit.
4	**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:***	Is the voltage between 10 and 15 V?	Go to step **5**.	Repair harness between stop light switch and ABSCM&H/U connector.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between stop light switch and ABSCM&H/U?	Repair connector.	Go to step **6**.
6	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**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.

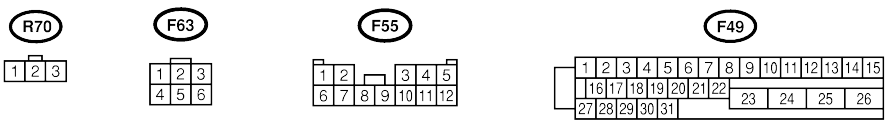
AE: TROUBLE CODE 56
— OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT — S006583E85

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

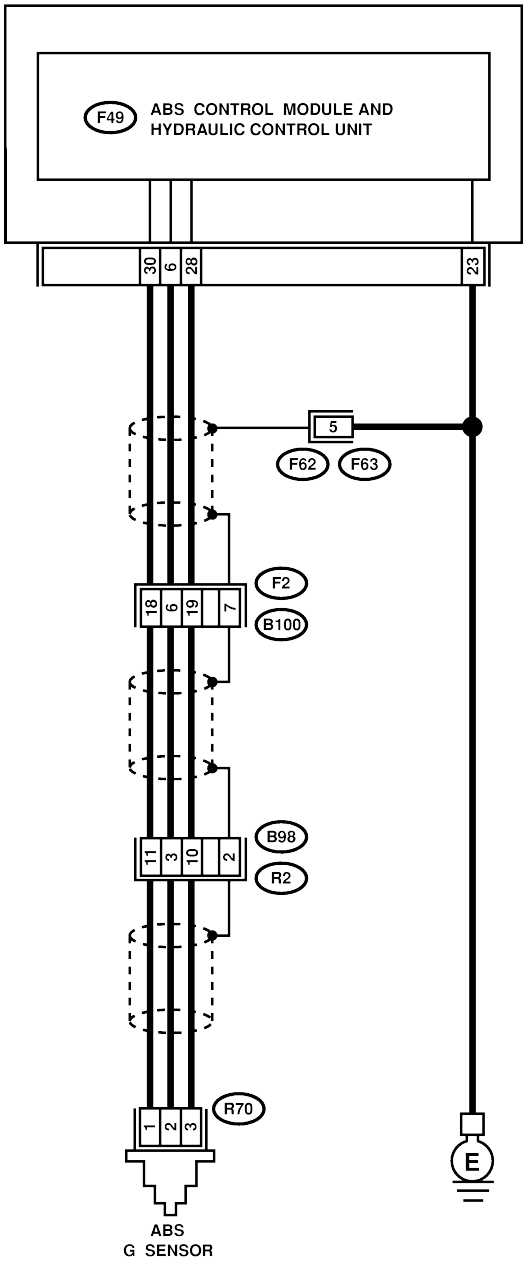
WIRING DIAGRAM: LHD MODEL

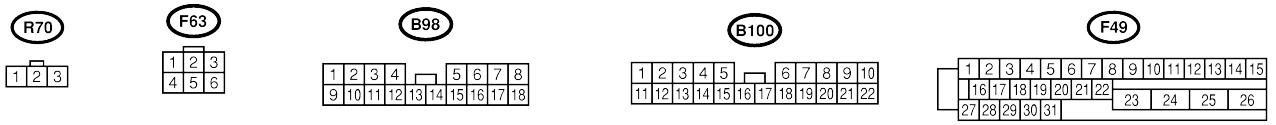




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**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.	Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?	Go to step **2**.	Go to step **5**.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **3**.
3	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**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.
5	**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 (–):***	Is the voltage between 4.75 and 5.25 V?	Go to step **6**.	Repair harness/ connector between G sensor and ABSCM&H/U.
6	**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:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **7**.	Repair harness/ connector between G sensor and ABSCM&H/U.
7	**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:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair harness between G sensor and ABSCM&H/U.
8	**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 (–):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **9**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
9	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

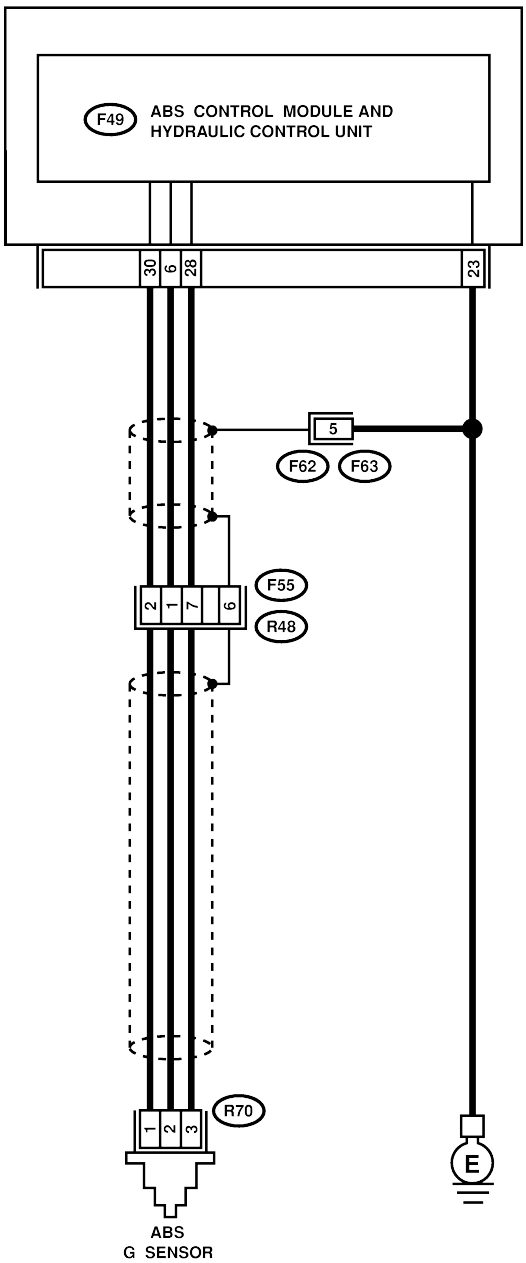
No.	Step	Check	Yes	No
10	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **11**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
11	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **12**.
12	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**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.

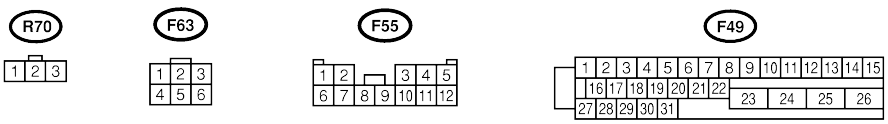
AF: TROUBLE CODE 56
— BATTERY SHORT IN G SENSOR CIRCUIT — S006583E86

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

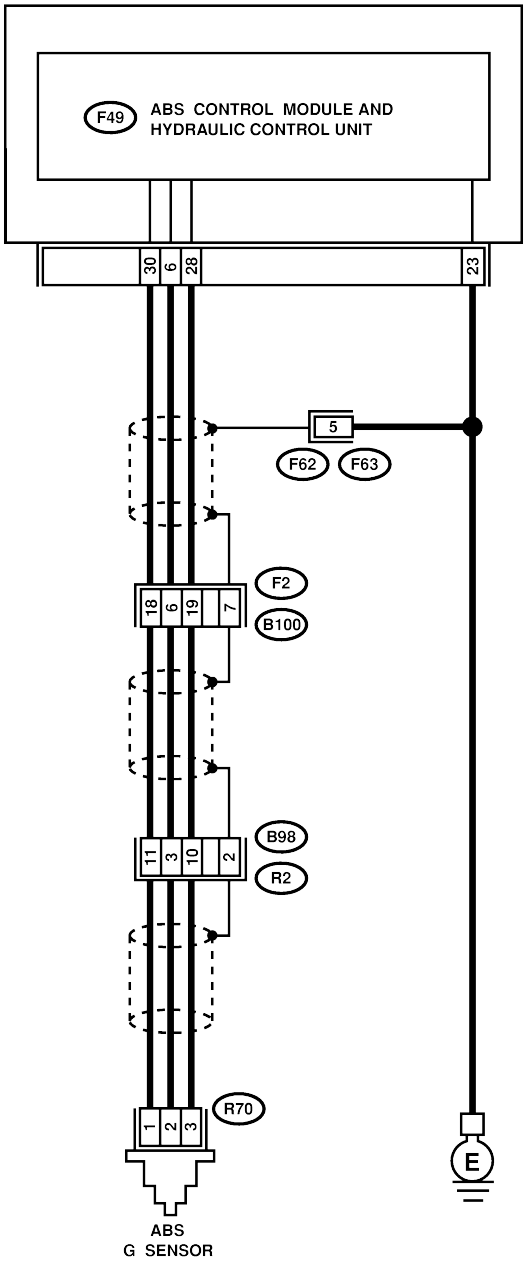
WIRING DIAGRAM: LHD MODEL

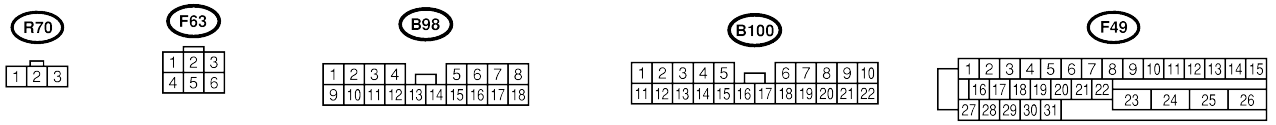




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**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.	Is the G sensor output on the monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?	Go to step **2**.	Go to step **5**.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **3**.
3	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**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.
5	**CHECK FREEZE FRAME DATA.** 1) Select “Freeze frame data” on the select monitor. 2) Read front right wheel speed on the select monitor display.	Is the front right wheel speed on monitor display 0 km?	Go to step **6**.	Go to step **16**.
6	**CHECK FREEZE FRAME DATA.** Read front left wheel speed on the select monitor display.	Is the front left wheel speed on monitor display 0 km?	Go to step **7**.	Go to step **16**.
7	**CHECK FREEZE FRAME DATA.** Read rear right wheel speed on the select monitor display.	Is the rear right wheel speed on monitor display 0 km?	Go to step **8**.	Go to step **16**.
8	**CHECK FREEZE FRAME DATA.** Read rear left wheel speed on the select monitor display.	Is the rear left wheel speed on monitor display 0 km?	Go to step **9**.	Go to step **16**.
9	**CHECK FREEZE FRAME DATA.** Read G sensor output on the select monitor display.	Is the G sensor output on monitor display more than 3.65 V?	Go to step **10**.	Go to step **16**.
10	**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:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **11**.	Repair harness/ connector between G sensor and ABSCM&H/U.
11	**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 (–):***	Is the voltage less than 1 V?	Go to step **12**.	Repair harness between G sensor and ABSCM&H/U.

No.	Step	Check	Yes	No
12	**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 (–):***	Is the voltage less than 1 V?	Go to step **13**.	Repair harness between G sensor and ABSCM&H/U.
13	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **14**.
14	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **15**.
15	**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.
16	**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 (–):***	Is the voltage between 4.75 and 5.25 V?	Go to step **17**.	Repair harness/ connector between G sensor and ABSCM&H/U.
17	**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:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **18**.	Repair harness/ connector between G sensor and ABSCM&H/U.
18	**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 (–):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **19**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
19	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **20**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
20	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **21**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
21	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **22**.
22	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **23**.
23	**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.

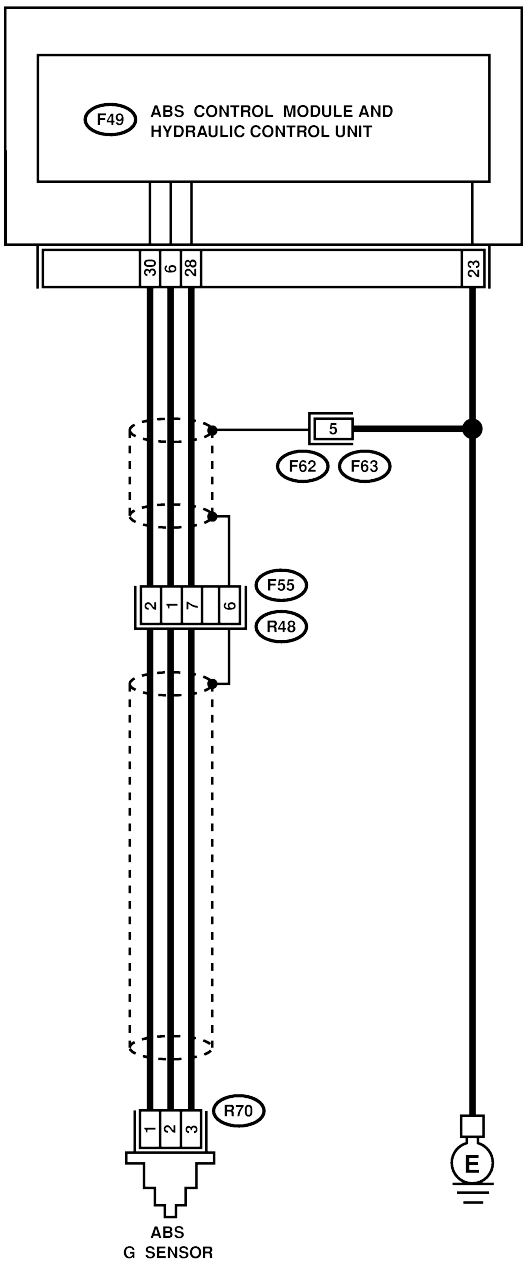
MEMO:

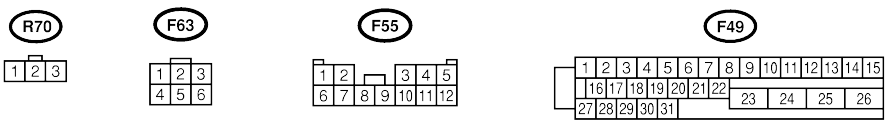
AG: TROUBLE CODE 56
— ABNORMAL G SENSOR HIGH μ OUTPUT — S006583E87

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

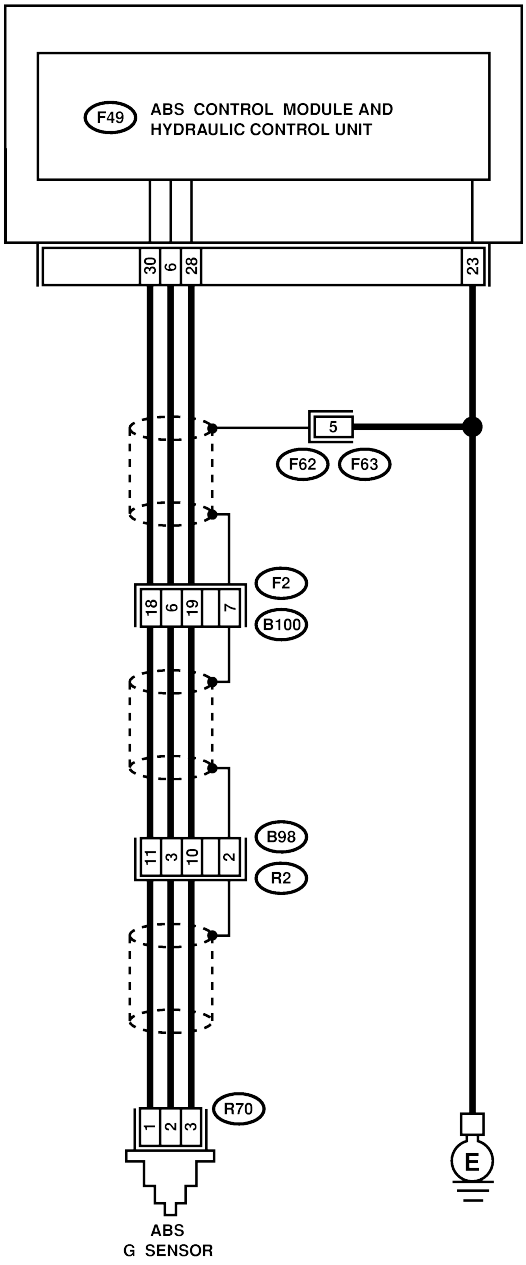
WIRING DIAGRAM: LHD MODEL

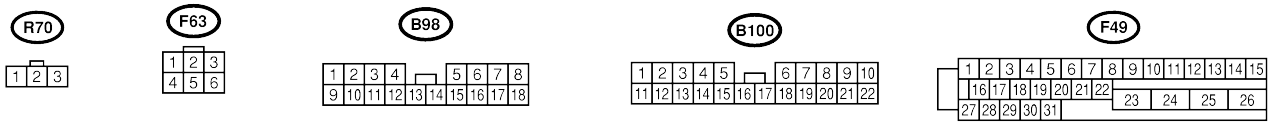




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**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.	Is the G sensor output on monitor display between 2.1 and 2.5 V when the G sensor is in horizontal position?	Go to step **2**.	Go to step **6**.
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **3**.
3	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4**.
4	**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.
5	**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:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **6**.	Repair harness/ connector between G sensor and ABSCM&H/U.
6	**CHECK GROUND SHORT OF HARNESS.** Measure resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(F49) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair harness between G sensor and ABSCM&H/U. Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
7	**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 (–):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **8**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
8	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **9**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
9	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

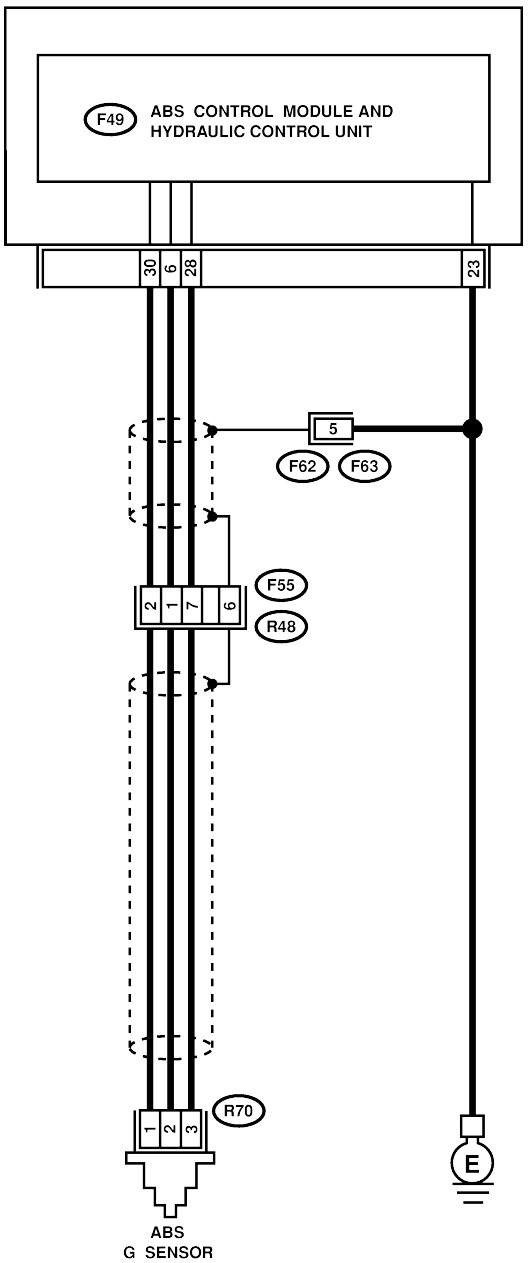
No.	Step	Check	Yes	No
10	**CHECK ABSCM&H/U.** 1) Turn ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform inspection mode. 5) Read out the trouble code.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **11**.
11	**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.

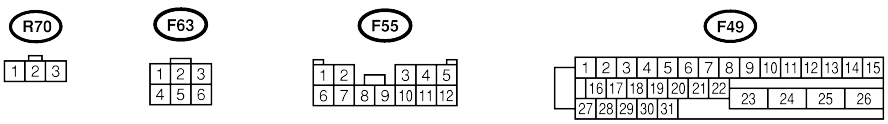
AH: TROUBLE CODE 56
— DETECTION OF G SENSOR STICK — S006583E88

DIAGNOSIS:
- Faulty G sensor output voltage

TROUBLE SYMPTOM:
- ABS does not operate.

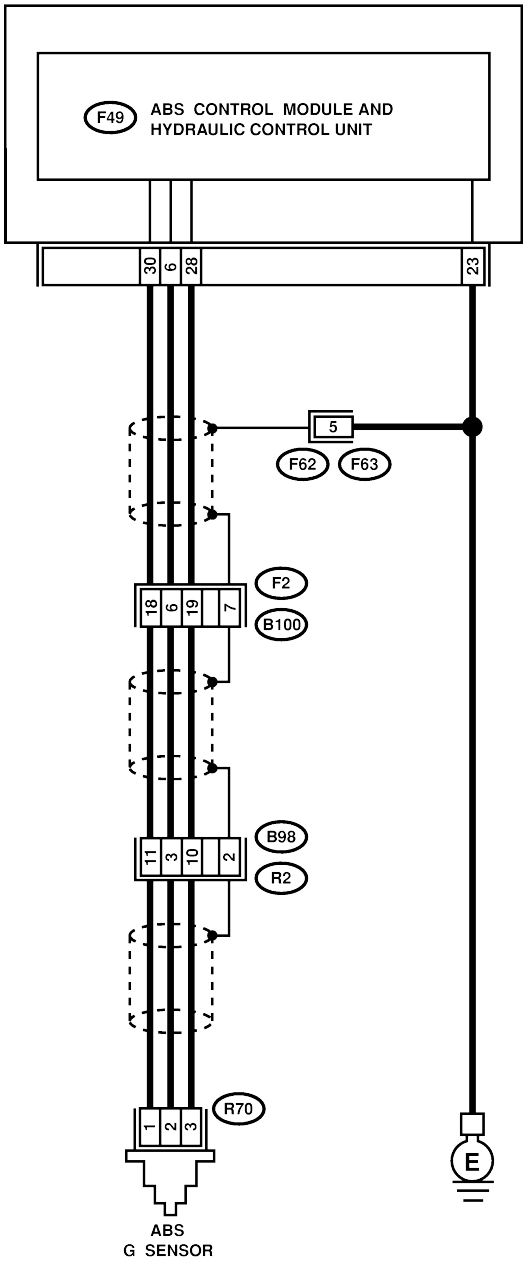
WIRING DIAGRAM: LHD MODEL

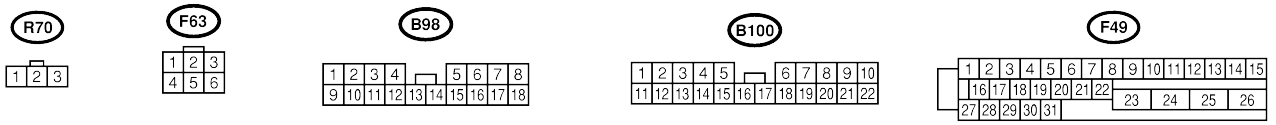




S4M0562

WIRING DIAGRAM: RHD MODEL





S4M0563

DIAGNOSTICS CHART WITH SUBARU SELECT MONITOR

No.	Step	Check	Yes	No
1	**CHECK ALL FOUR WHEELS FOR FREE TURNING.**	Have the wheels been turned freely such as when the vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the trouble code.	Go to step **2**.
2	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** 1) Select “Current data display & Save” on the select monitor. 2) Read the select monitor display.	Is the G sensor output on the monitor display between 2.1 and 2.5 V when the vehicle is in horizontal position?	Go to step **3**.	Go to step **8**.
3	**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.	Is the G sensor output on the monitor display between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **4**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
4	**CHECK OUTPUT OF G SENSOR USING SELECT MONITOR.** Read the select monitor display.	Is the G sensor output on the monitor display between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **5**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair connector.	Go to step **6**.
6	**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 ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7**.
7	**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.
8	**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:***	Is the resistance between 4.3 and 4.9 kΩ?	Go to step **9**.	Repair harness/ connector between G sensor and ABSCM&H/U.
9	**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 (–):***	Is the voltage between 2.1 and 2.5 V when G sensor is horizontal?	Go to step **10**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>

No.	Step	Check	Yes	No
10	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 3.7 and 4.1 V when G sensor is inclined forwards to 90°?	Go to step **11**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
11	**CHECK G SENSOR.** Measure voltage between G sensor connector terminals. ***Connector & terminal*** ***(R70) No. 2 (+) — No. 3 (–):***	Is the voltage between 0.5 and 0.9 V when G sensor is inclined backwards to 90°?	Go to step **12**.	Replace G sensor. <Ref. to ABS-23, G Sensor.>
12	**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.	Is the same trouble code as in the current diagnosis still being output?	Replace ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13**.
13	**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.

14. General Diagnostics Table S006121

A: INSPECTION S006121A10

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	• 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.	• 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	• 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.	• ABSCM&H/U (solenoid valve, motor) • ABS sensor • Incorrect wiring or piping connections
	Brake dragging	• ABSCM&H/U (solenoid valve) • ABS sensor • Master cylinder • Brake (caliper & piston) • Parking brake • Axle & wheels • Brake pedal play
	Long brake pedal stroke	• Air in brake line • Brake pedal play
	Vehicle pitching	• Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections • Road surface (uneven)
	Unstable or uneven braking	• 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	• Incorrect wiring or piping connections • Road surface (uneven)
	Noise from ABSCM&H/U	• ABSCM&H/U (mount bushing) • ABS sensor • Brake piping
	Noise from front of vehicle	• 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	• ABS sensor • Brake (caliper & piston, pads, rotor) • Parking brake • Brake piping • Suspension play or fatigue