





TRANSMISSION AND DIFFERENTIAL SECTION

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MANUAL TRANSMISSION AND DIFFERENTIAL

3-1

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1. Specifications

A: MANUAL TRANSMISSION AND DIFFERENTIAL

Item		Model		
		AWD		
		1800 cc	2200 cc	
Type		5-forward speeds with synchromesh and 1-reverse		
Transmission gear ratio		1st	3.545	
		2nd	2.111	
		3rd	1.448	
		4th	1.088	
		5th	0.825	0.780
		Reverse	3.416	
Front reduction gear	Final	Type of gear	Hypoid	
		Gear ratio	3.900	
Rear reduction gear	Transfer	Type of gear	Helical	
		Gear ratio	1.000	
	Final	Type of gear	Hypoid	
		Gear ratio	3.900	
Front differential	Type and number of gear	Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)		
Center differential	Type and number of gear	Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)		
Transmission gear oil		GL-5		
Transmission oil capacity		3.5 ℓ (3.7 US qt, 3.1 Imp qt)		

2. Service Data

A: TRANSMISSION GEAR OIL

Recommended oil

ITEM	
• Transmission gear oil	
API Classification	
GL - 5	
SAE Viscosity No. and Applicable Temperature	
(°C)	-30 -26 -15 -5 0 15 25 30
(°F)	-22 -15 5 23 32 59 77 86

B1H0024

B: TRANSMISSION CASE ASSEMBLY

Drive pinion shim adjustment

Drive pinion shim			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Hypoid gear backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension "A" mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

C: DRIVE PINION ASSEMBLY

Preload adjustment of thrust bearing

Starting torque

0.3 — 0.8 N·m (3 — 8 kg·cm, 2.6 — 6.9 in·lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

Assemble a driven shaft and 1st driven gear that are selected for the proper radial clearance adjustment.

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA270
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA260

D: REVERSE IDLER GEAR

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance
6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA000	0	Further from case wall
32820AA010	No mark	Standard
32820AA020	2	Closer to the case wall

After installing a suitable reverse shifter lever, adjust reverse idler gear to transmission case wall clearance to within 0 to 0.5 mm (0 to 0.020 in) using washers.

Washer (20.5 x 26 x t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

2. Service Data

E: SHIFTER FORK AND ROD

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA060	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA070	No mark	Standard
32810AA100	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork		
Part No.	Mark	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)

Rod end clearance

1st-2nd — 3rd-4th:

0.4 — 1.4 mm (0.016 — 0.055 in)

3rd-4th — 5th:

0.5 — 1.3 mm (0.020 — 0.051 in)

F: TRANSFER CASE

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA040	1	Neutral position is closer to 1st.
32188AA011	No mark or 2	Standard
32188AA050	3	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

G: EXTENSION

Snap ring (Inner-72) to ball bearing side clearance

0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-72)	
Part No.	Thickness mm (in)
805172071	1.78 (0.0701)
805172072	1.90 (0.0748)
805172073	2.02 (0.0795)

Snap ring (Outer-30) to ball bearing side clearance

0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

H: EXTENSION ASSEMBLY

Thrust washer (52 x 61 x t) to ball bearing side clearance

0.05 — 0.30 mm (0.0020 — 0.0118 in)

Thrust washer (52 x 61 x t)	
Part No.	Thickness mm (in)
803052021	0.50 (0.0197)
803052022	0.75 (0.0295)
803052023	1.00 (0.0394)

I: FRONT DIFFERENTIAL

Bevel gear to pinion backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 x 50 x t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

Pinion shaft to axle drive shaft clearance
0 — 0.2 mm (0 — 0.008 in)

Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

J: CENTER DIFFERENTIAL

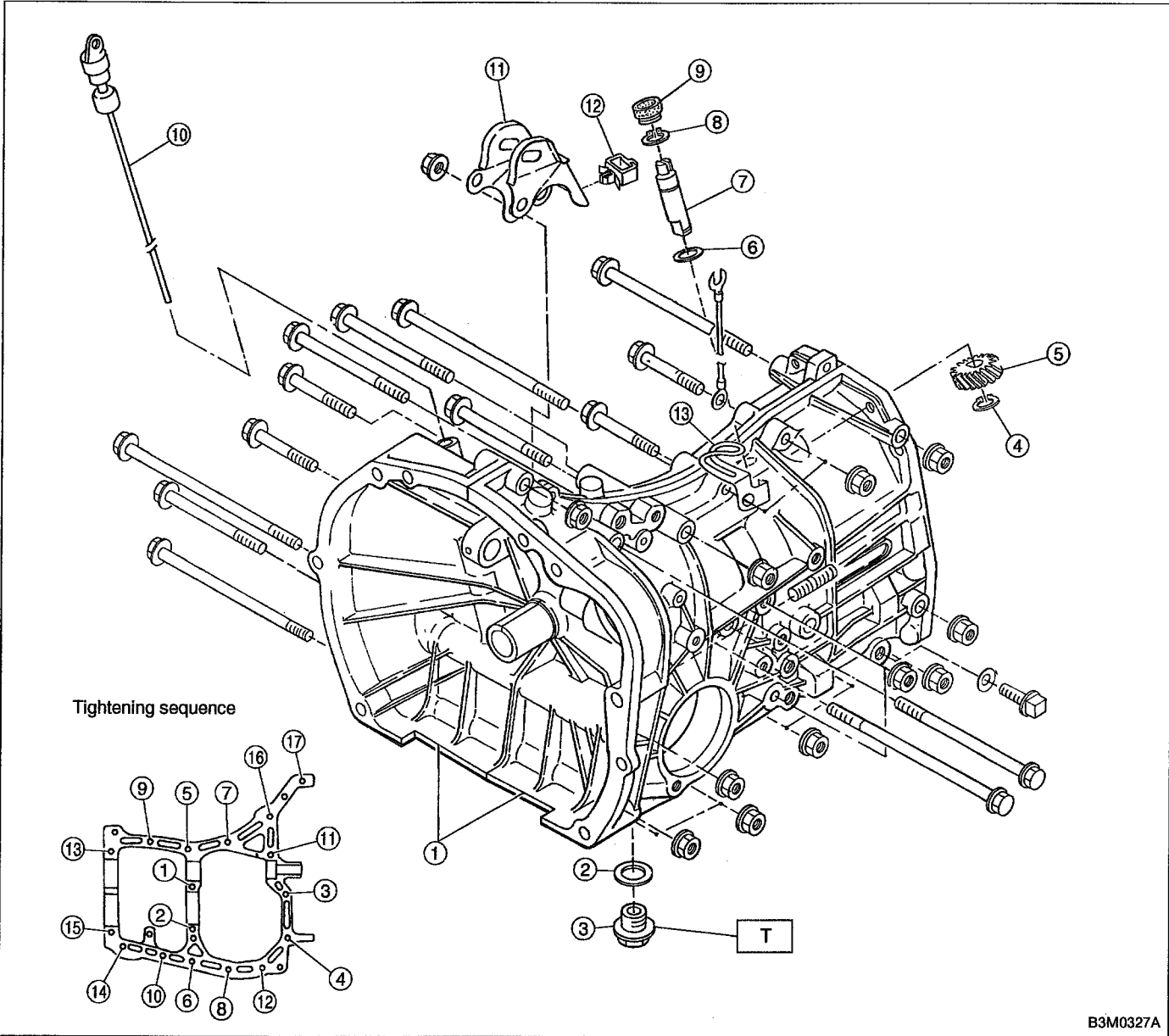
Snap ring (Inner-110) to center differential case clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-110)	
Part No.	Thickness mm (in)
805100061	2.10 (0.0827)
805100062	2.21 (0.0870)
805100063	2.32 (0.0913)

Backlash adjustment axial movement
0.62 — 0.86 mm (0.0244 — 0.0339 in)

Adjusting washer (45 x 62 x t)	
Part No.	Thickness mm (in)
803045041	1.60 (0.0630)
803045042	1.80 (0.0709)
803045043	2.00 (0.0787)
803045044	2.20 (0.0866)
803045045	2.40 (0.0945)

1. Transmission Case



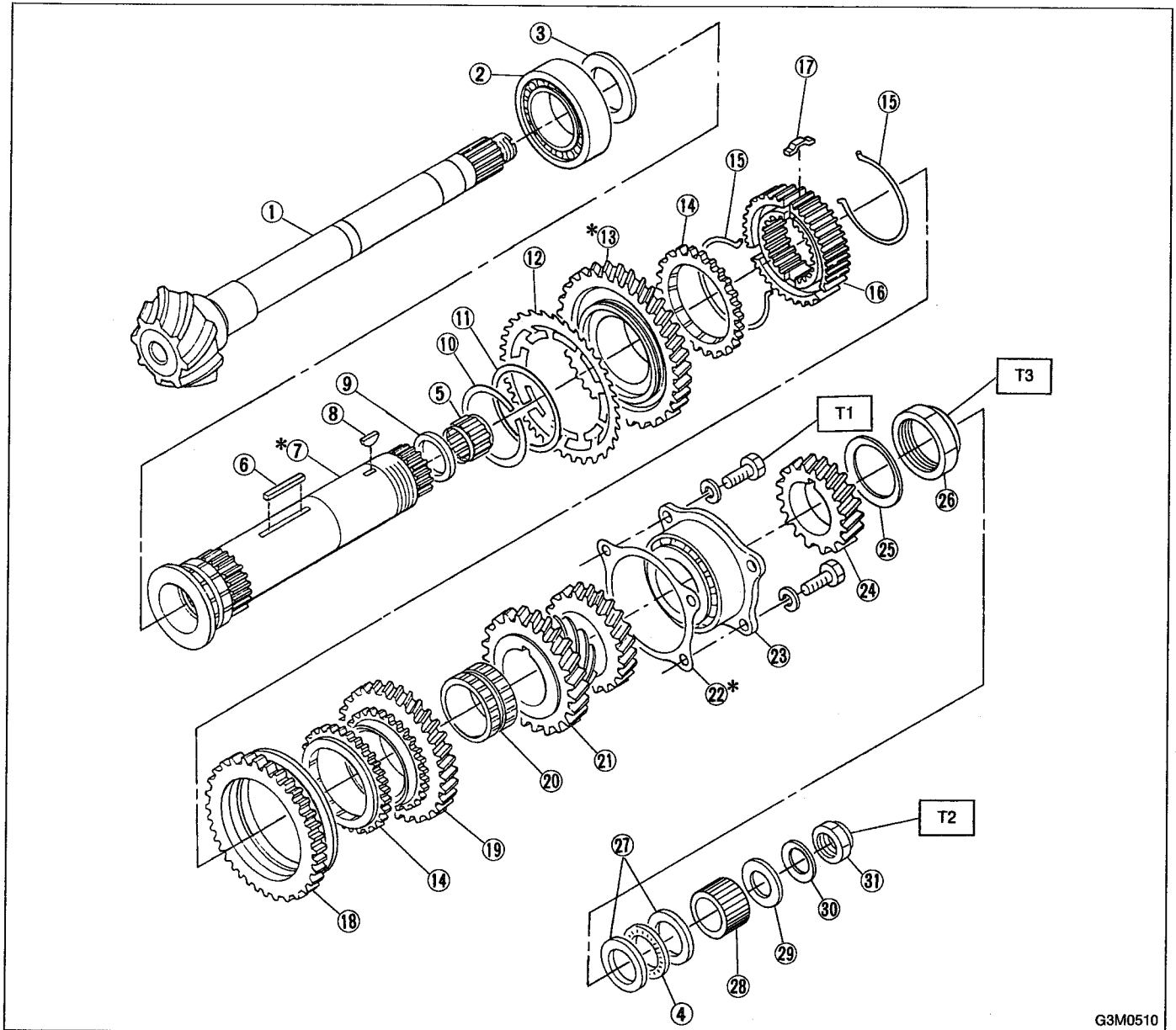
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- ① Transmission case ASSY
- ② Gasket
- ③ Drain plug
- ④ Snap ring (Outer)
- ⑤ Speedometer driven gear
- ⑥ Washer
- ⑦ Speedometer shaft
- ⑧ Snap ring (Outer)
- ⑨ Oil seal
- ⑩ Oil level gauge
- ⑪ Pitching stopper bracket
- ⑫ Clamp
- ⑬ Clip

Tightening torque: N·m (kg·m, ft·lb)
T: 44 ± 3 (4.5 ± 0.3, 32.5 ± 2.2)

Size	All models	Torque
8 mm bolt	⑤ — ⑮	25 ± 2 N·m (2.5 ± 0.2 kg·m, 18.1 ± 1.4 ft·lb)
10 mm bolt	① — ④ ⑯ — ⑰	39 ± 2 N·m (4.0 ± 0.2 kg·m, 28.9 ± 1.4 ft·lb)

2. Drive Pinion Assembly

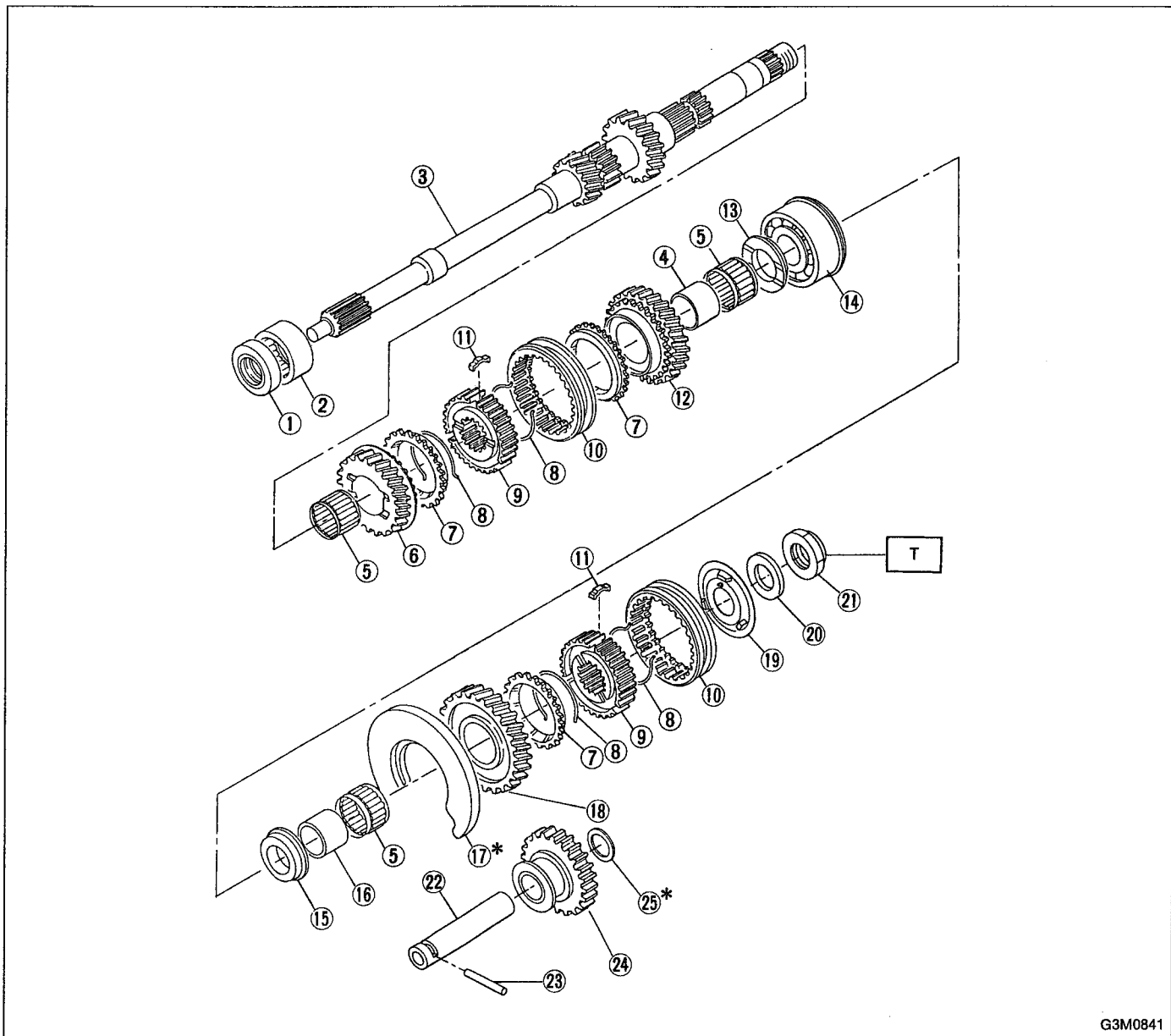


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- | | | |
|-----------------------|----------------------------|----------------------------------|
| ① Drive pinion shaft | ⑬ 1st driven gear | ⑳ Lock washer |
| ② Roller bearing | ⑭ Baulk ring | ㉑ Lock nut |
| ③ Washer | ⑮ Spring | ㉒ Washer |
| ④ Thrust bearing | ⑯ 1st-2nd synchronizer hub | ㉓ Differential bevel gear sleeve |
| ⑤ Needle bearing | ⑰ Insert | ㉔ Washer |
| ⑥ Key | ⑱ Reverse driven gear | ㉕ Lock washer |
| ⑦ Driven shaft | ⑲ 2nd driven gear | ㉖ Lock nut |
| ⑧ Woodruff key | ⑳ 2nd driven gear bush | |
| ⑨ Drive pinion collar | ㉑ 3rd-4th driven gear | |
| ⑩ Snap ring (Outer) | ㉒ Driven pinion shim | |
| ⑪ Washer | ㉓ Roller bearing | |
| ⑫ Sub gear | ㉔ 5th driven gear | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 29 ± 3 (3.0 ± 0.3, 21.7 ± 2.2)
T2: 118 ± 8 (12.0 ± 0.8, 86.8 ± 5.8)
T3: 265 ± 10 (27 ± 1, 195 ± 7)

3. Main Shaft Assembly



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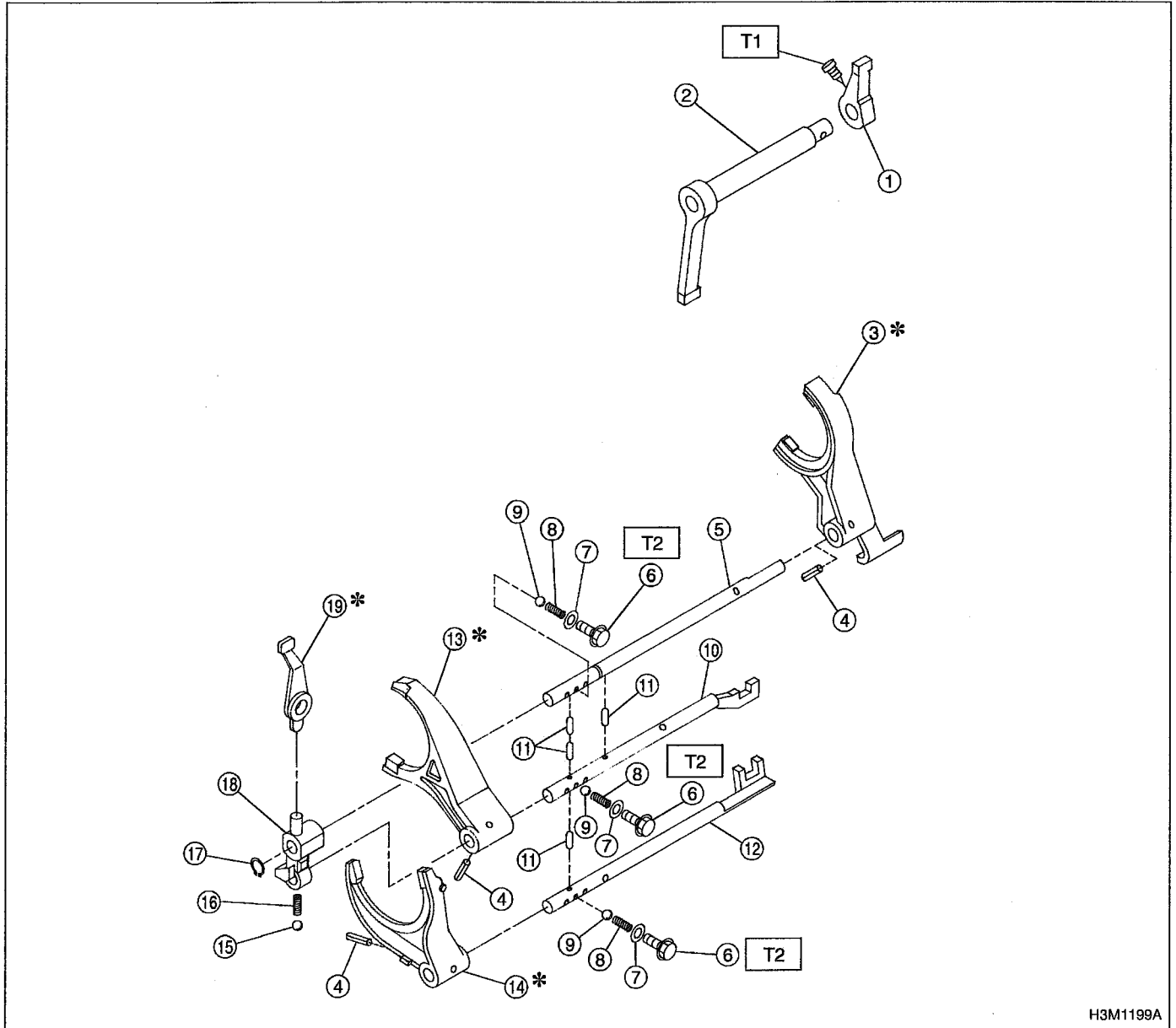
- ① Oil seal
- ② Needle bearing
- ③ Transmission main shaft
- ④ 4th needle bearing race
- ⑤ Needle bearing
- ⑥ 3rd drive gear
- ⑦ Baulk ring
- ⑧ Synchronizer spring
- ⑨ Synchronizer hub
- ⑩ Coupling sleeve

- ⑪ Shifting insert
- ⑫ 4th drive gear
- ⑬ 4th gear thrust washer
- ⑭ Ball bearing
- ⑮ 5th gear thrust washer
- ⑯ 5th needle bearing race
- ⑰ Main shaft rear plate
- ⑱ 5th drive gear
- ⑲ Insert stopper plate
- ⑳ Lock washer

- ㉑ Lock nut
- ㉒ Reverse idler gear shaft
- ㉓ Straight pin
- ㉔ Reverse idler gear
- ㉕ Washer

Tightening torque: N·m (kg-m, ft-lb)
T: 118 ± 6 (12.0 ± 0.6, 86.8 ± 4.3)

4. Shifter Fork and Shifter Rod



H3M1199A

- ① Selector arm
- ② Shifter arm
- ③ 5th shifter fork
- ④ Straight pin
- ⑤ Reverse fork rod
- ⑥ Checking ball plug
- ⑦ Gasket
- ⑧ Checking ball spring
- ⑨ Ball
- ⑩ 3rd-4th fork rod
- ⑪ Interlock plunger
- ⑫ 1st-2nd fork rod
- ⑬ 3rd-4th shifter fork

- ⑭ 1st-2nd shifter fork
- ⑮ Ball
- ⑯ Spring
- ⑰ Snap ring (Outer)
- ⑱ Reverse shifter lever

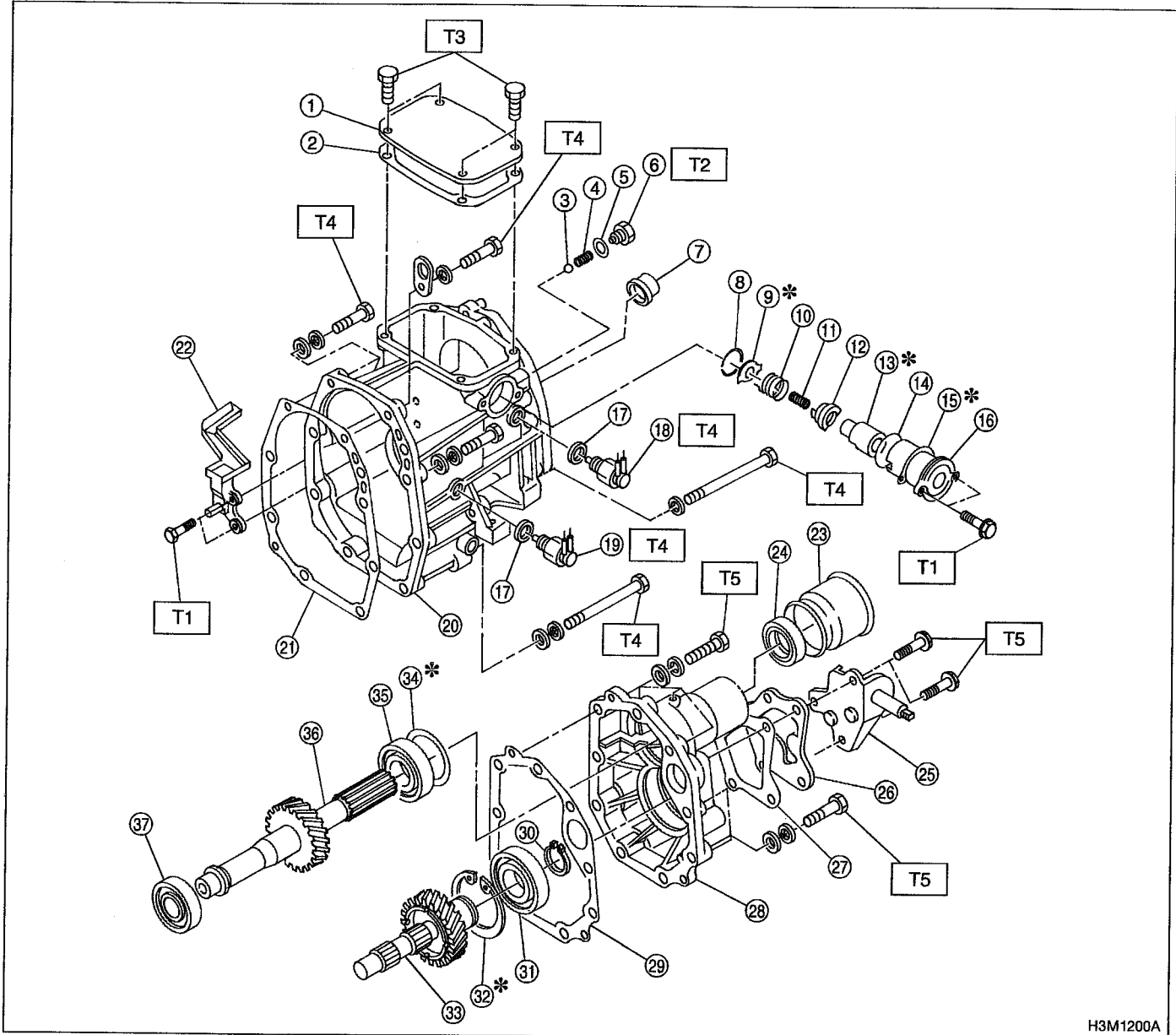
Tightening torque: N·m (kg·m, ft·lb)

T1: 10 ± 1 (1.0 ± 0.1, 7.2 ± 0.7)

T2: 19.6 ± 1.5

(2.00 ± 0.15, 14.5 ± 1.1)

5. Transfer Case and Extension



- ① Transfer cover
- ② Cover gasket
- ③ Ball
- ④ Reverse accent spring
- ⑤ Gasket
- ⑥ Plug
- ⑦ Oil seal
- ⑧ Snap ring (Inner)
- ⑨ Reverse check plate
- ⑩ Reverse check spring
- ⑪ Reverse return spring
- ⑫ Reverse check cam
- ⑬ Reverse accent shaft
- ⑭ O-ring
- ⑮ Adjusting select shim

- ⑯ Reverse check sleeve
- ⑰ Gasket
- ⑱ Neutral switch
- ⑲ Back-up light switch
- ⑳ Transfer case
- ㉑ Gasket
- ㉒ Oil guide
- ㉓ Dust cover
- ㉔ Oil seal
- ㉕ Shift bracket
- ㉖ Extension cover
- ㉗ Gasket
- ㉘ Extension
- ㉙ Gasket
- ㉚ Snap ring (Outer-30)

- ㉛ Ball bearing
- ㉜ Snap ring (Inner-72)
- ㉝ Transfer drive gear
- ㉞ Adjusting washer
- ㉟ Ball bearing
- ㊱ Transfer driven gear
- ㊲ Ball bearing

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

T1: 5 ± 1 (0.5 ± 0.1, 3.6 ± 0.7)

T2: 10 ± 1 (1.0 ± 0.1, 7.2 ± 0.7)

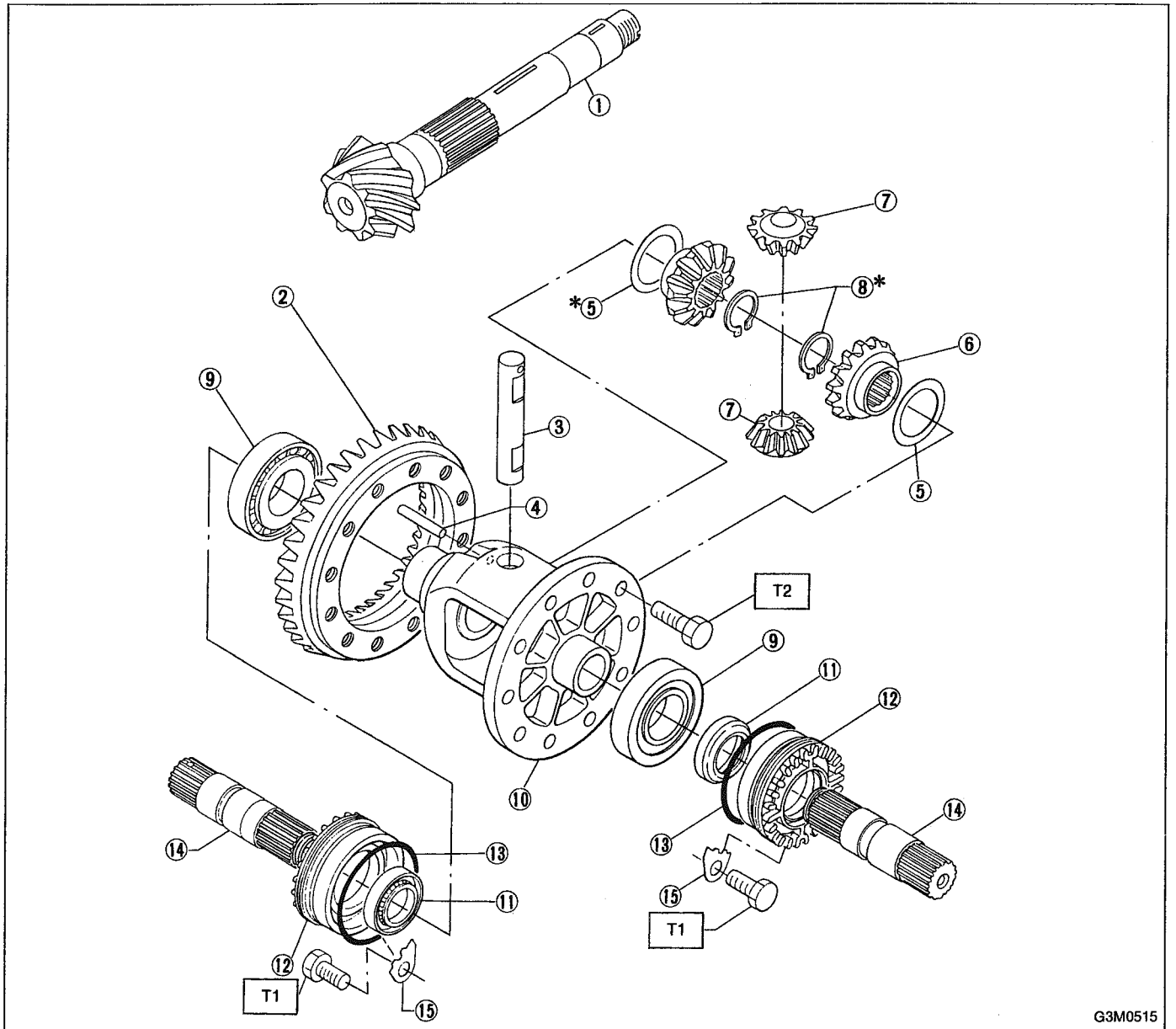
T3: 15.7 ± 1.5

(1.6 ± 0.15, 11.6 ± 1.1)

T4: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)

T5: 37 ± 3 (3.8 ± 0.3, 27.5 ± 2.2)

6. Front Differential



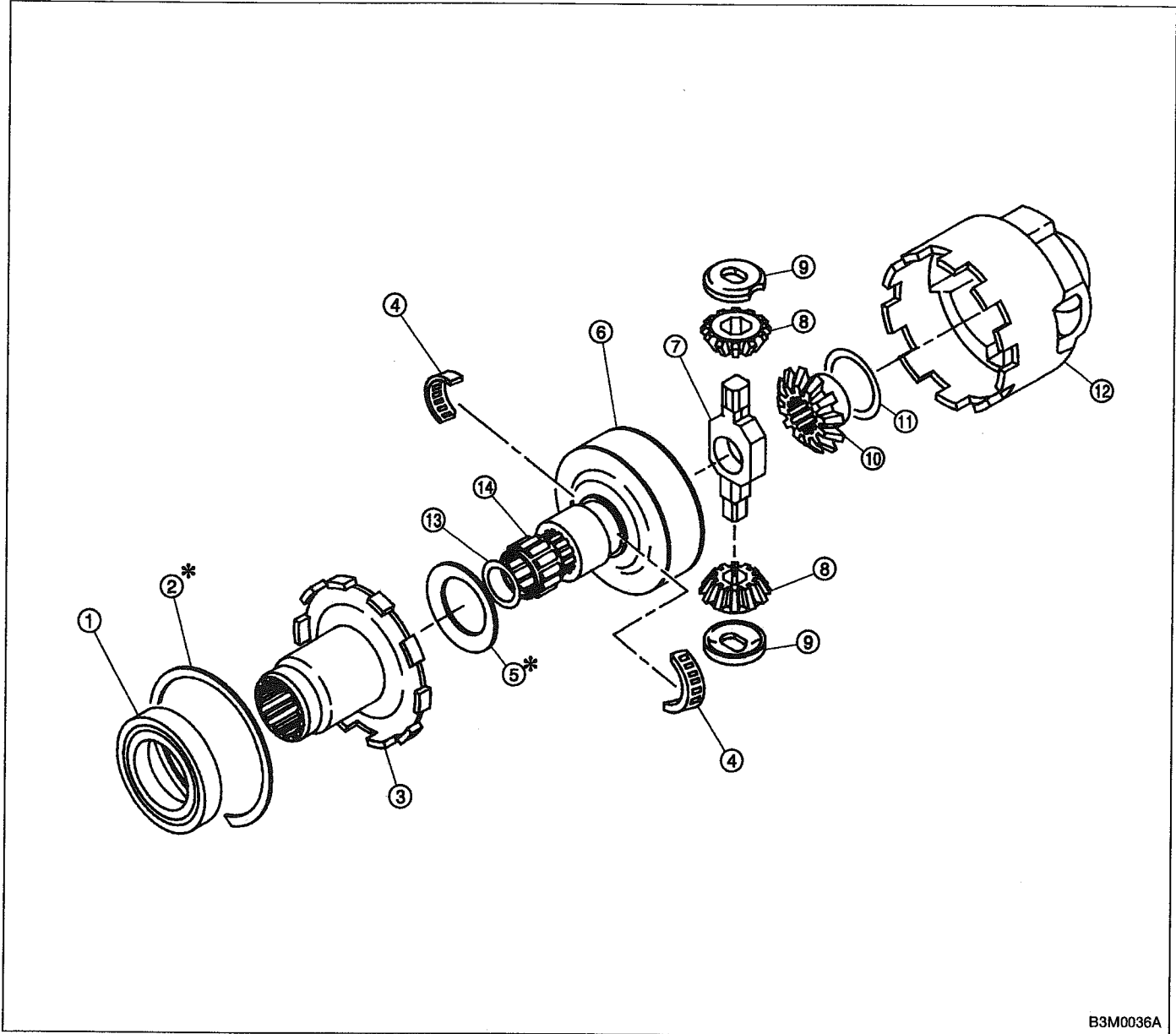
G3M0515

- ① Drive pinion shaft
- ② Hypoid driven gear
- ③ Pinion shaft
- ④ Straight pin
- ⑤ Washer
- ⑥ Differential bevel gear
- ⑦ Differential bevel pinion
- ⑧ Snap ring (Outer)
- ⑨ Roller bearing
- ⑩ Differential case

- ⑪ Oil seal
- ⑫ Differential side retainer
- ⑬ O-ring
- ⑭ Axle drive shaft
- ⑮ Retainer lock plate

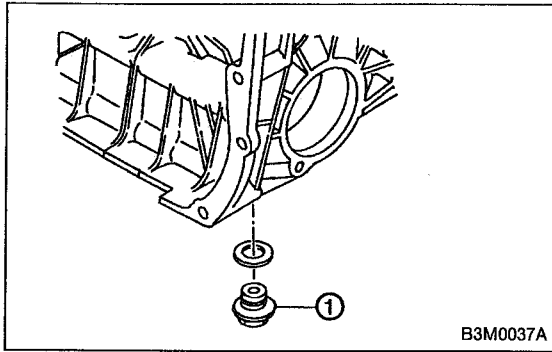
Tightening torque: N·m (kg·m, ft·lb)
T1: 25 ± 5 (2.5 ± 0.5, 18.1 ± 3.6)
T2: 62 ± 5 (6.3 ± 0.5, 45.6 ± 3.6)

7. Center Differential



B3M0036A

- | | |
|-----------------------------|-----------------------------|
| ① Ball bearing | ⑧ Differential bevel pinion |
| ② Snap ring (Inner-110) | ⑨ Retainer |
| ③ Center differential cover | ⑩ Differential bevel gear |
| ④ Needle bearing | ⑪ Washer |
| ⑤ Adjusting washer | ⑫ Center differential case |
| ⑥ Viscous coupling | ⑬ Snap ring |
| ⑦ Pinion shaft | ⑭ Roller bearing |



1. General

A: PRECAUTIONS

1) The following job should be followed before disassembly:

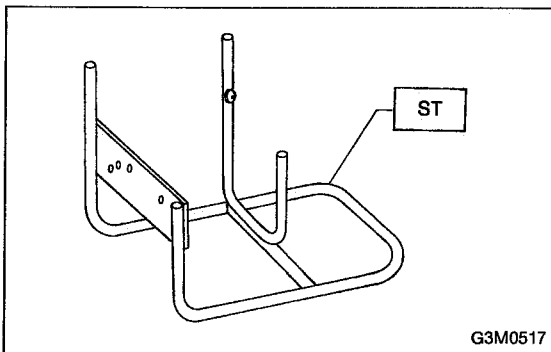
- (1) Clean oil, grease, dirt and dust from transmission.
- (2) Remove drain plug ① to drain oil. After draining, retighten it as before.

CAUTION:

Replace gasket with a new one.

Tightening torque:

$44 \pm 3 \text{ N}\cdot\text{m}$ ($4.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $32.5 \pm 2.2 \text{ ft}\cdot\text{lb}$)



(3) Attach transmission to ST.

ST 499937100 TRANSMISSION STAND SET

- 2) Rotating parts should be coated with oil prior to assembly.
- 3) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 4) Gaskets and lock washers must be replaced with new ones.
- 5) Liquid gasket should be used where specified to prevent leakage.
- 6) Fill transmission gear oil through the oil level gauge hole up to upper point level gauge. <Ref. to 1-5 [09A1].>

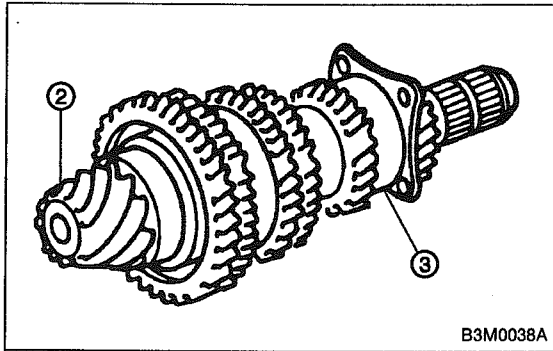
B: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.



The ball bearing ③ on the rear side of the drive pinion shaft ② should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.

- Bearings having other defects

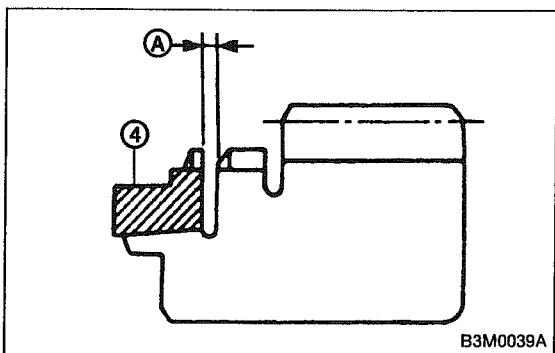
2) Bushing (each gear)

Replace the bushing in the following cases:

- (1) When the sliding surface is damaged or abnormally worn.
- (2) When the inner wall is abnormally worn.

3) Gears

- (1) Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- (2) Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- (3) Correct or replace if the inner surface or end face is damaged.



4) Baulk ring

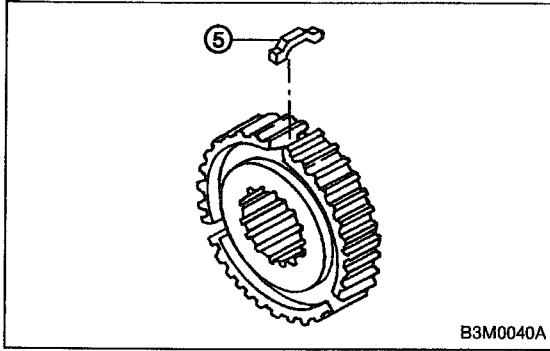
Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance A:

0.5 — 1.0 mm (0.020 — 0.040 in)

- When the contact surface of the synchronizer ring ④ insert is scored or abnormally worn down.



5) Insert ⑤ (shifting)

Replace the insert if deformed, excessively worn, or defective in any way.

6) Oil seal

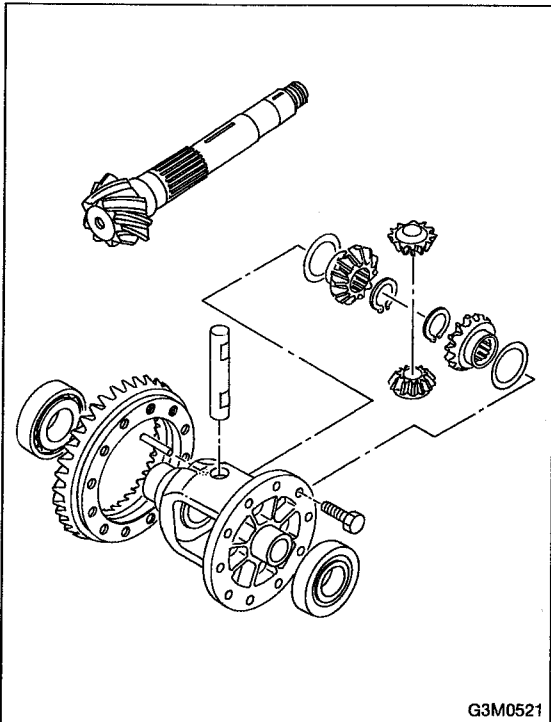
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

8) Gearshift mechanism

Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.



9) Differential gear

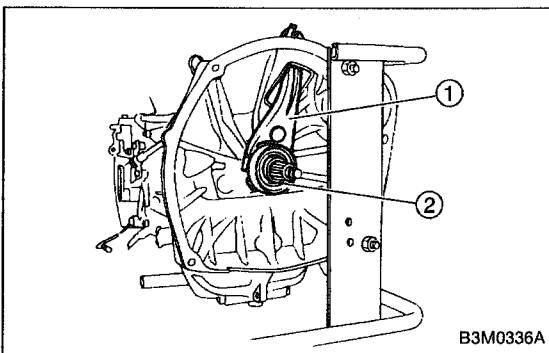
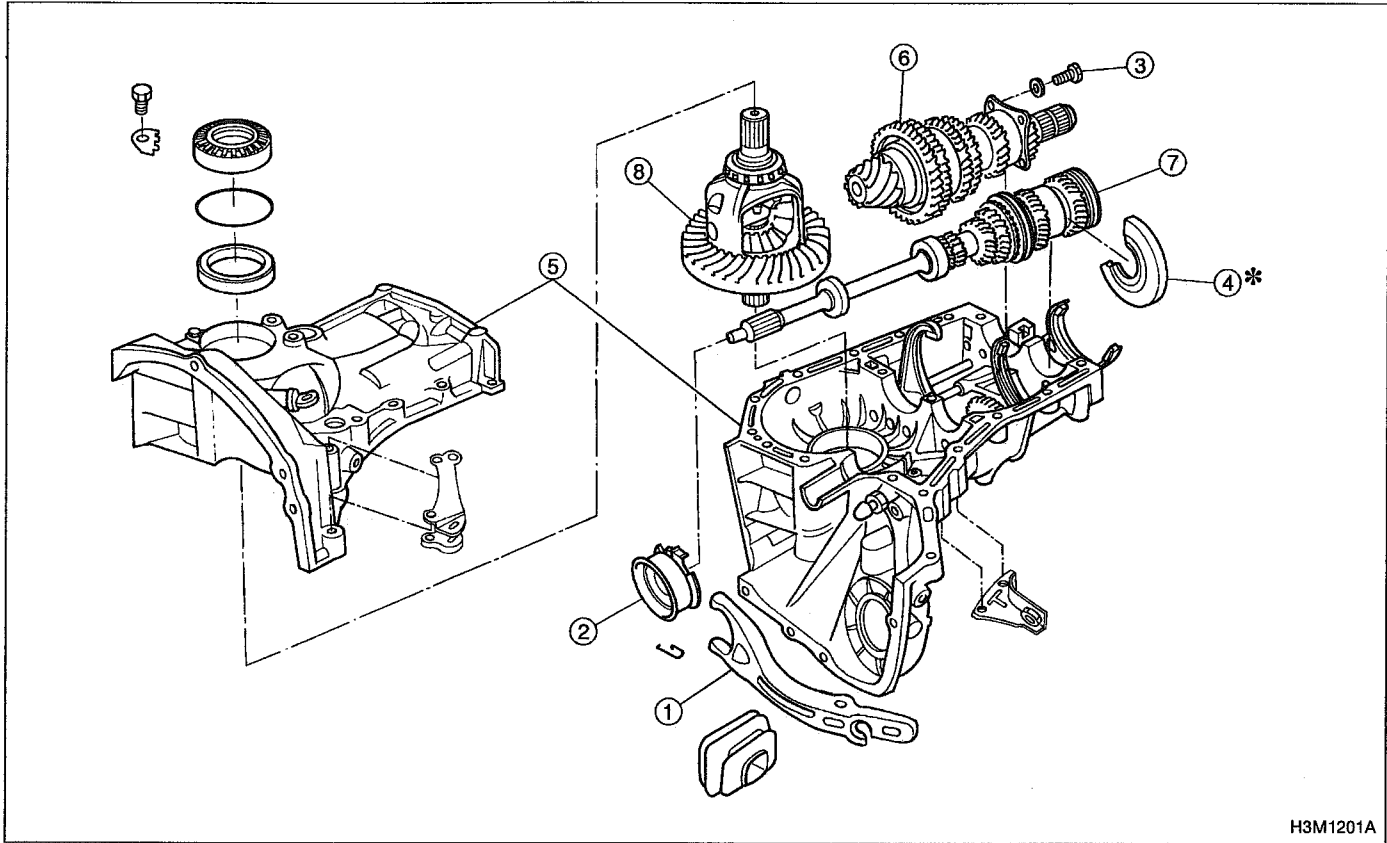
Repair or replace the differential gear in the following cases:

- (1) The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- (2) The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- (3) There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- (4) The differential case has worn or damaged sliding surfaces.

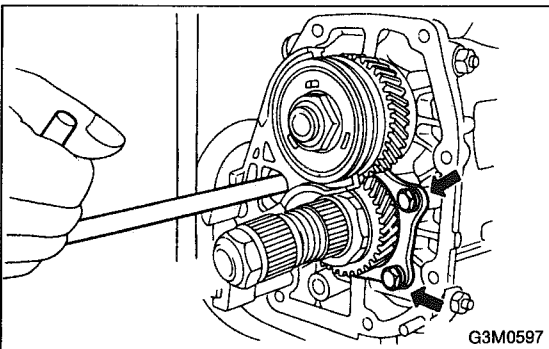
2. Transmission Case

A: DISASSEMBLY

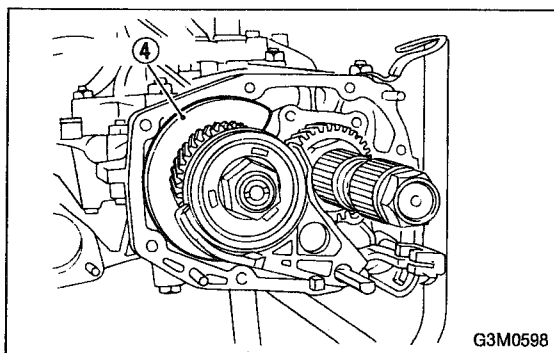
1. SEPARATION OF TRANSMISSION



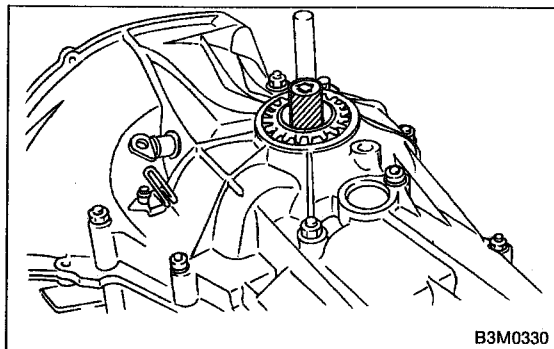
- 1) Remove transfer cover.
- 2) Remove shifter fork screw which secures selector arm to shifter arm.
- 3) Remove transfer case with extension assembly.
- 4) Remove clutch release lever ① and bearing ②. <Ref. to 2-10 [W3A1].>



- 5) Remove bearing mounting bolts.

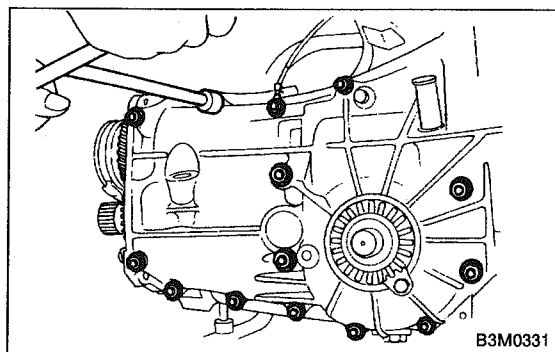


6) Remove main shaft rear plate ④.

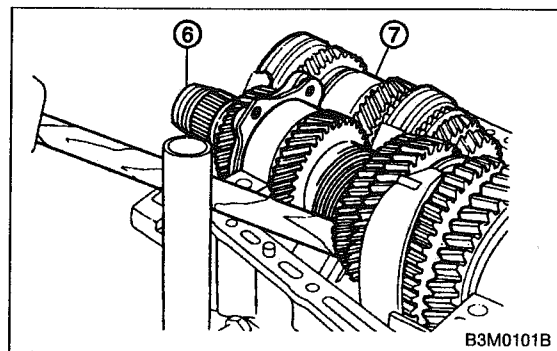


7) Separating transmission case

(1) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seals.



(2) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.

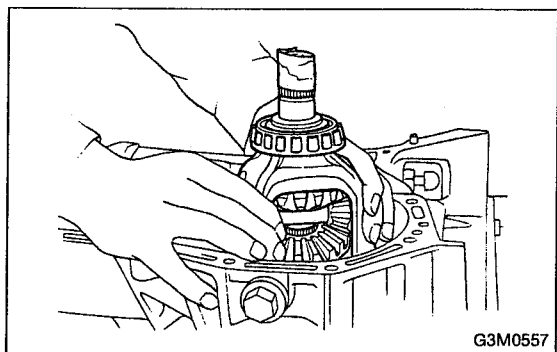


8) Remove drive pinion shaft assembly ⑥ from left side transmission case.

NOTE:

Use a hammer handle, etc. to remove if too tight.

9) Remove main shaft assembly ⑦.



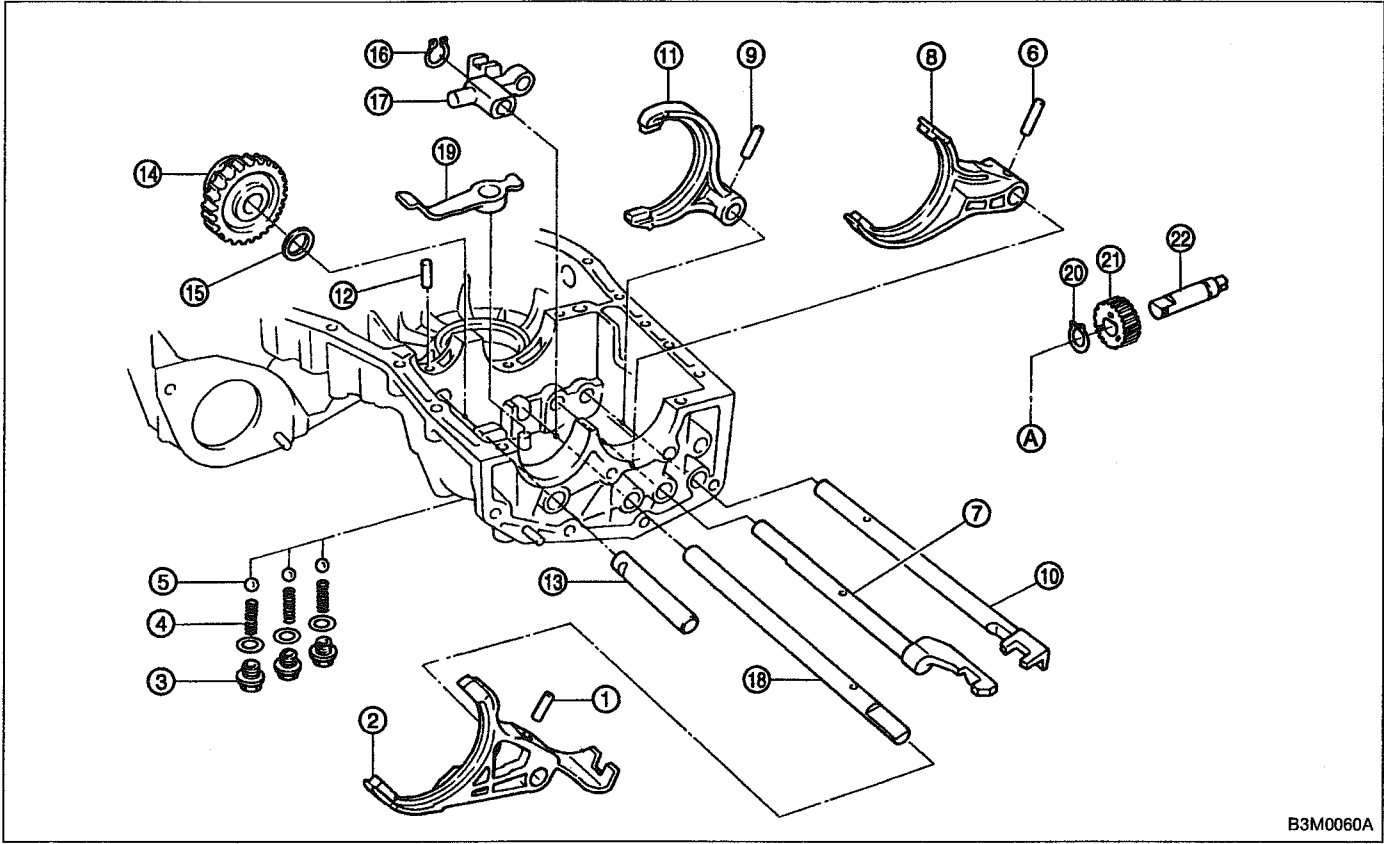
10) Remove differential assembly.

CAUTION:

- Be careful not to confuse right and left roller bearing outer races.

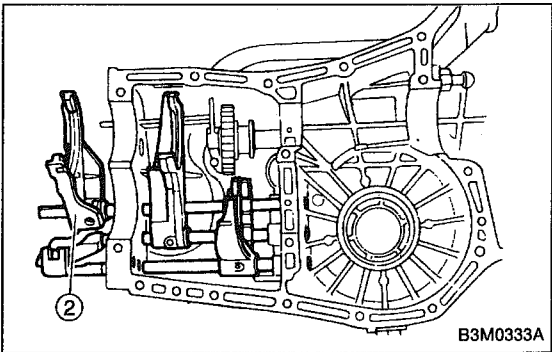
- Be careful not to damage retainer oil seal.

2. TRANSMISSION CASE



B3M0060A

Ⓐ: Front right hand transmission case

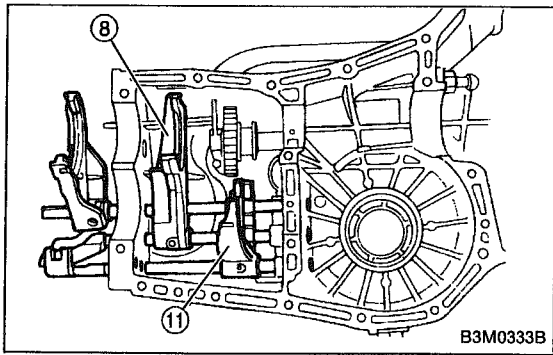


B3M0333A

1) Drive out spring pin ① with ST, and remove 5th shifter fork ②.

ST 398791700 STRAIGHT PIN REMOVER

2) Remove plugs ③, springs ④ and checking balls ⑤.

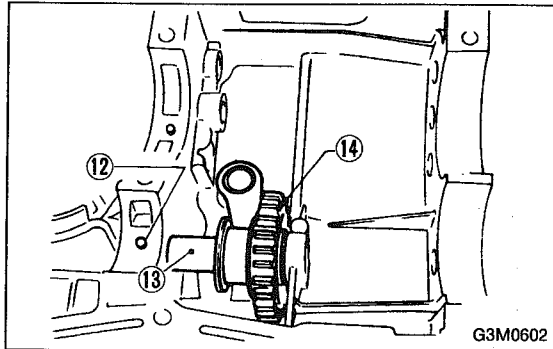


3) Drive out spring pin ⑥, and pull out 3-4 fork rod ⑦ and shifter fork ⑧.

NOTE:

When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward inside of case so that it may not hit against case.

4) Drive out straight pin ⑨, and pull out 1-2 fork rod ⑩ and shifter fork ⑪.



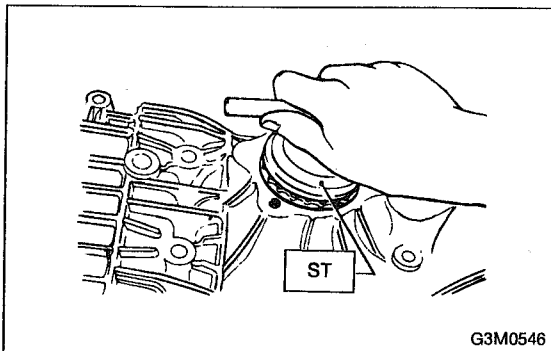
5) Pull out straight pin ⑫, and remove idler gear shaft ⑬, reverse idler gear ⑭ and washer ⑮.

6) Remove outer snap ring ⑯, and pull out reverse shifter rod arm ⑰ from reverse fork rod ⑱. Then take out ball, spring and interlock plunger from rod. And then remove rod.

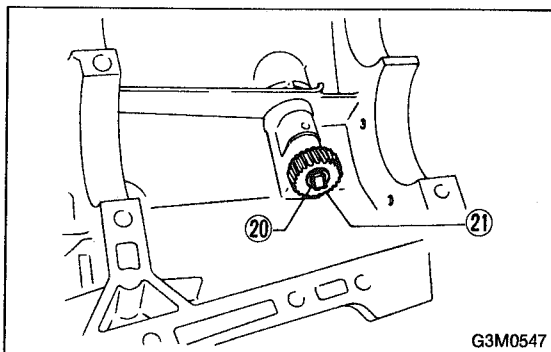
NOTE:

When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

7) Remove reverse shifter lever ⑲.



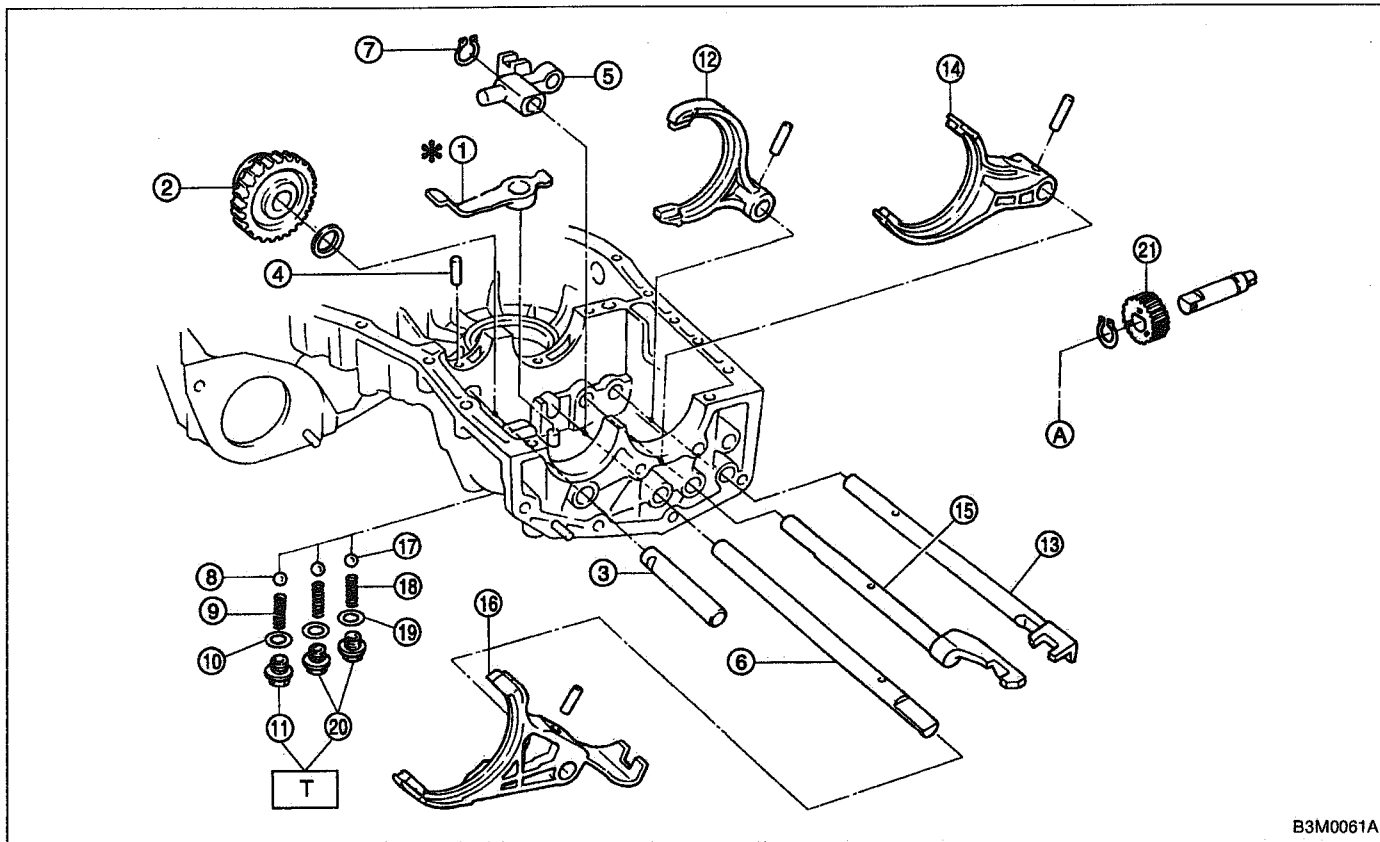
8) Remove differential side retainers using ST.
 ST 499787000 WRENCH ASSY



9) Remove outer snap ring ⑳ and pull out speedometer driven gear ㉑. Next, remove vehicle speed sensor 2, oil seal, speedometer shaft ㉒ and washer.

B: ASSEMBLY

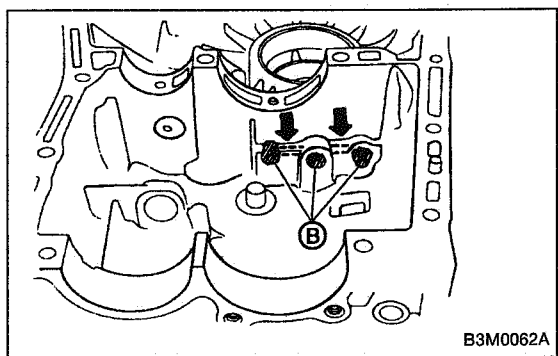
1. TRANSMISSION CASE



B3M0061A

Ⓐ: To right hand transmission case

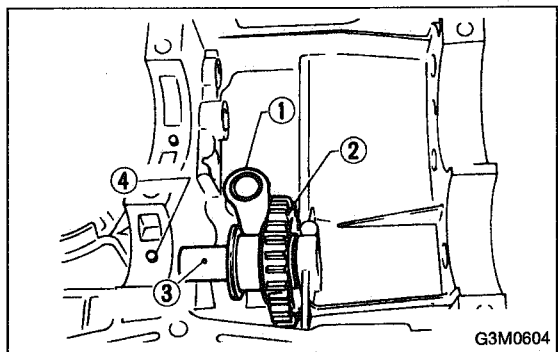
Tightening torque: N·m (kg·m, ft·lb)
T: 19.6 ± 0.1 (2.00 ± 0.015, 14.5 ± 0.1)



B3M0062A

1) Position interlock plungers (5.56 x 19.6), one plunger in hole between 1-2 and 3-4 fork rod holes, and one plunger in hole between 3-4 and reverse fork rod holes.

Ⓑ: Rod holes



G3M0604

2) Install reverse shifter lever ①, reverse idler gear ② and reverse idler gear shaft ③, and secure with straight pin ④.

NOTE:

Be sure to install reverse idler shaft from the rear side.

3) Install reverse arm fork spring, ball and interlock plunger (5.56 x 19.6) to reverse fork rod arm ⑤. Insert reverse fork rod ⑥ into hole in reverse fork rod arm ⑤, and hold it with outer snap ring ⑦ using ST.

ST 399411700 ACCENT BALL INSTALLER

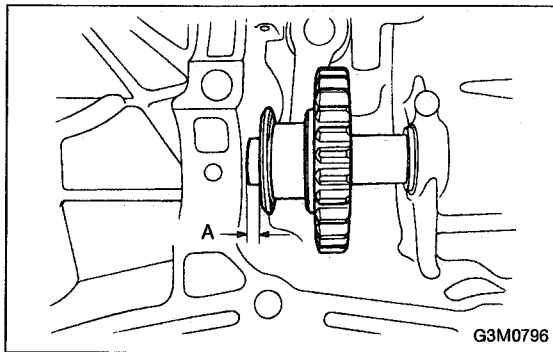
CAUTION:

Apply grease to plunger to prevent it from falling.

4) Position ball ⑧ (7.1438), spring ⑨ and gasket ⑩ in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug ⑪.

CAUTION:

Replace gasket with a new one.



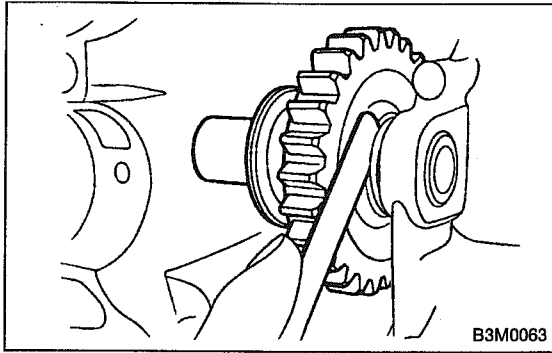
5) Adjustment of reverse idler gear position

(1) Move reverse shifter rod toward REV side. Adjust clearance between reverse idler gear and transmission case wall, using reverse shifter lever ①.

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	No.	Remarks
32820AA000	0	Further from case wall
32820AA010	No mark	Standard
32820AA020	2	Closer to case wall

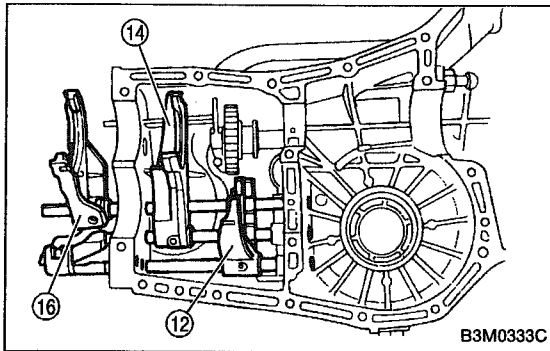


(2) After installing a suitable reverse shifter lever, shift into neutral. Using a thickness gauge, measure clearance between reverse idler gear and transmission case wall and adjust with washer(s).

Clearance:

0 — 0.5 mm (0 — 0.020 in)

Washer (20.5 x 26 x t)	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)



6) Installation of 1-2 shifter fork ⑫ and rod ⑬

(1) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.

(2) Align the holes in rod and fork, and drive straight pin (6 x 22) into these holes using ST.

ST 398791700 STRAIGHT PIN REMOVER

NOTE:

- Set other rods to neutral.
- Make sure interlock plunger (5.56 x 19.6) is on the 3-4 fork rod side.

7) Installation of 3-4 shifter fork ⑭ and rod ⑮

(1) Install interlock plunger (3 x 11.9) onto 3-4 fork rod.

CAUTION:

Apply a coat of grease to plunger to prevent it from falling.

(2) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

(3) Align the holes in rod and fork, and drive straight pin (6 x 22) into these holes.

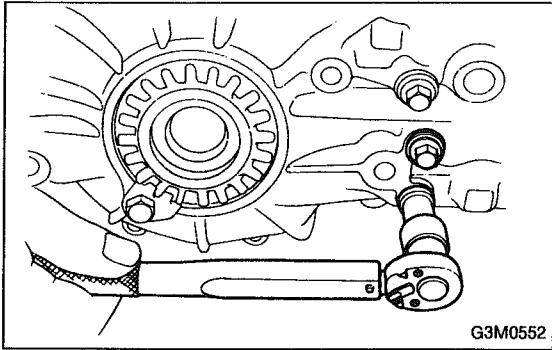
ST 398791700 STRAIGHT PIN REMOVER

NOTE:

- Set reverse fork rod to neutral.
- Make sure interlock plunger (installed before) is on the reverse fork rod side.

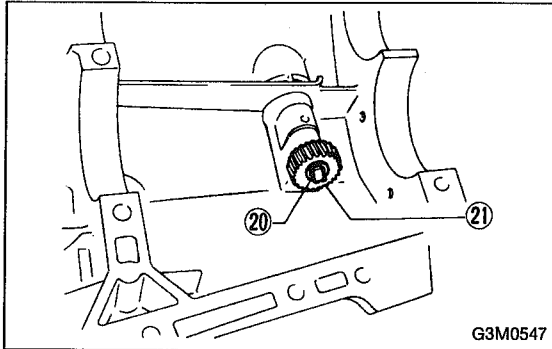
8) Install 5th shifter fork ⑯ onto the rear of reverse fork rod ⑥. Align holes in the two parts and drive straight pin into place.

ST 398791700 STRAIGHT PIN REMOVER



9) Position balls ⑰, checking ball springs ⑱ and gaskets ⑲ into 3-4 and 1-2 rod holes, and install plugs ⑳.

CAUTION:
Replace gasket with a new one.



10) Installation of speedometer driven gear ⑳

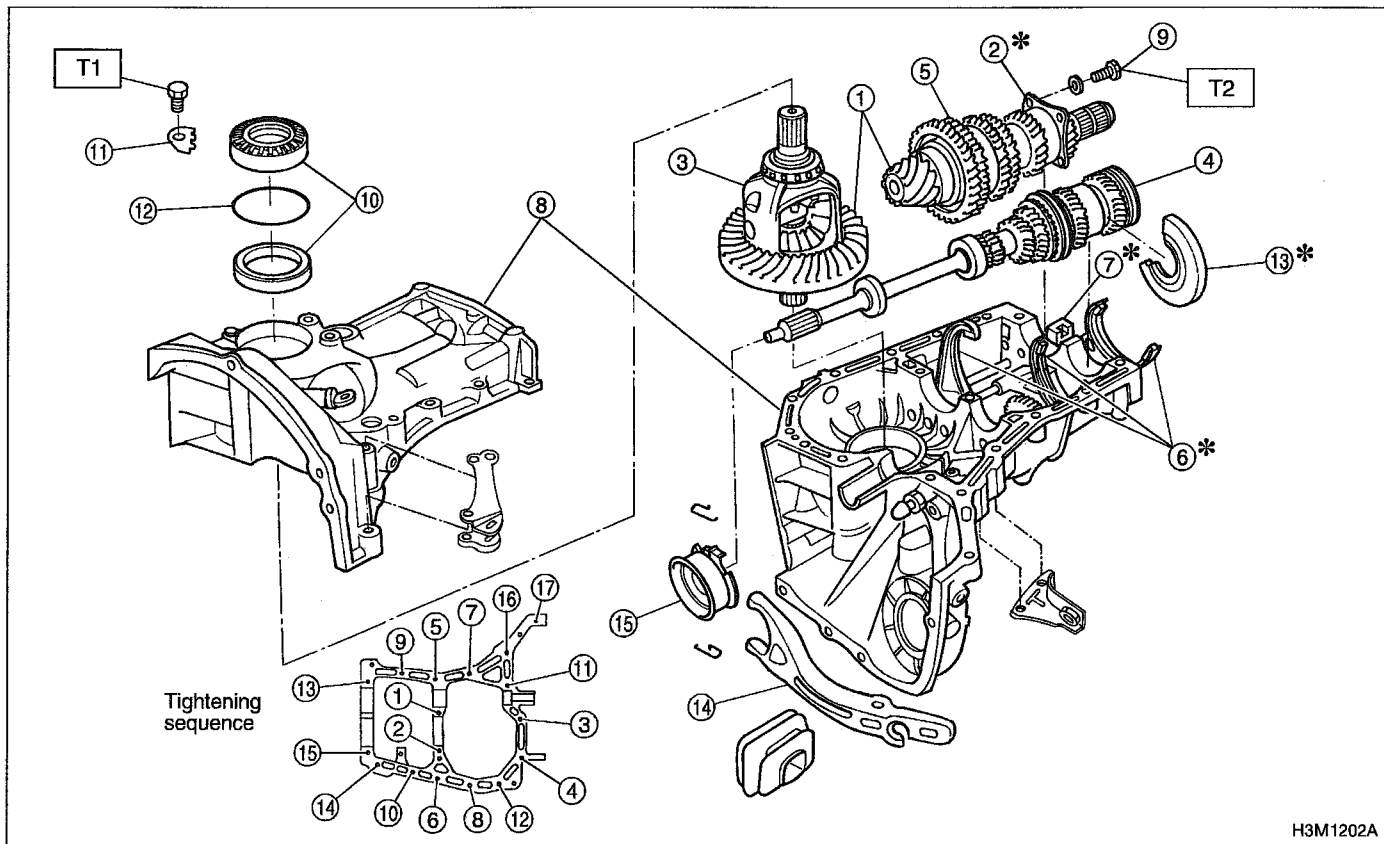
(1) Install washer and speedometer shaft, and press fit oil seal with ST.

ST 899824100 or 499827000 PRESS

CAUTION:
Use new oil seal, if it has been removed.

(2) Install speedometer driven gear and snap ring.

2. COMBINATION OF TRANSMISSION CASE

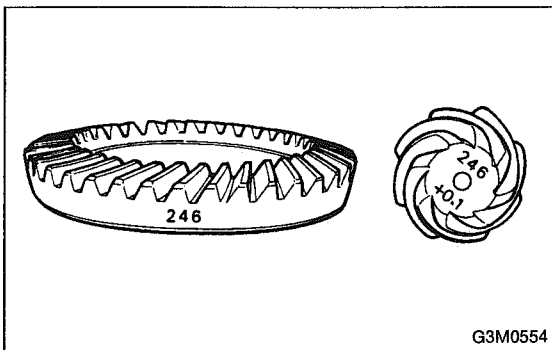


H3M1202A

Tightening torque: N·m (kg·m, ft·lb)

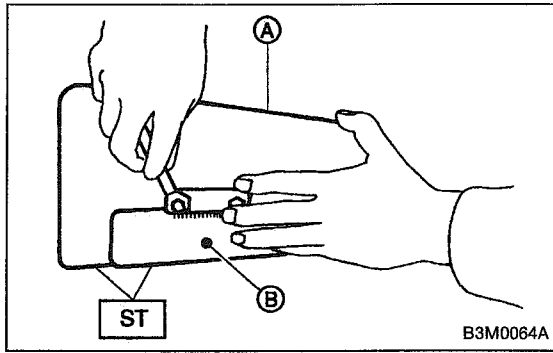
T1: 25 (2.5, 18)

T2: 29 ± 3 (3.0 ± 0.3, 21.7 ± 2.2)



G3M0554

1) Alignment marks/numbers on hypoid gear set ①
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



2) Adjustment of drive pinion shim ②

(1) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

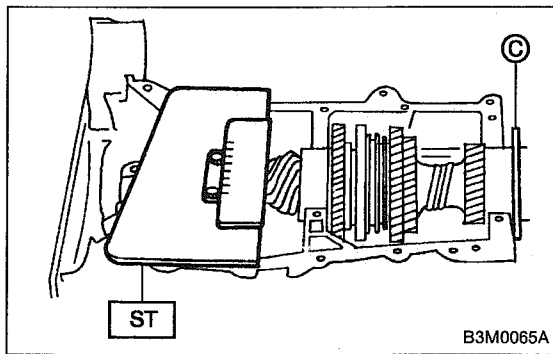
(2) Inspection and adjustment of ST

NOTE:

- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
- Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY

- Ⓐ : Plate
- Ⓑ : Scale



(3) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

(4) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

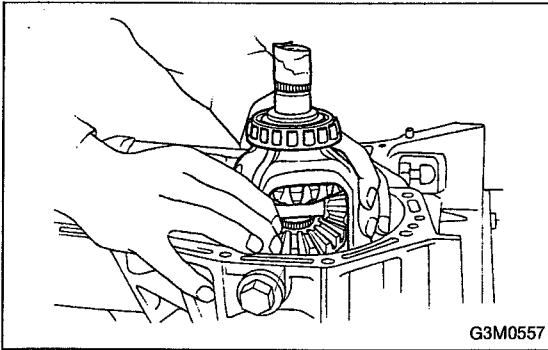
Ⓒ : Adjust clearance to zero without shim.

(5) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)



G3M0557

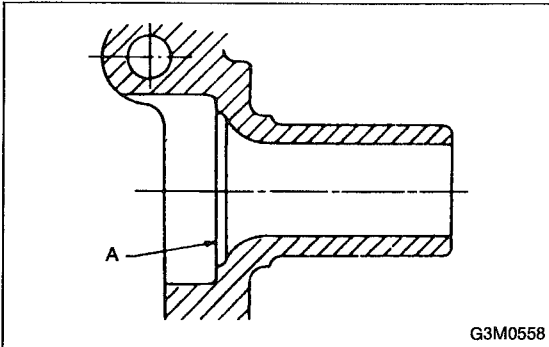
3) Install differential assembly ③ on left hand transmission case.

CAUTION:

Be careful not to fold the sealing lip of oil seal.

NOTE:

Wrap the left and right splined sections of axle shaft with vinyl tape to prevent scratches.



G3M0558

4) Install needle bearing and oil seal onto the front of transmission main shaft assembly ④, and position in left side transmission case.

CAUTION:

- Wrap clutch splined section with vinyl tape to prevent damage to oil seal.

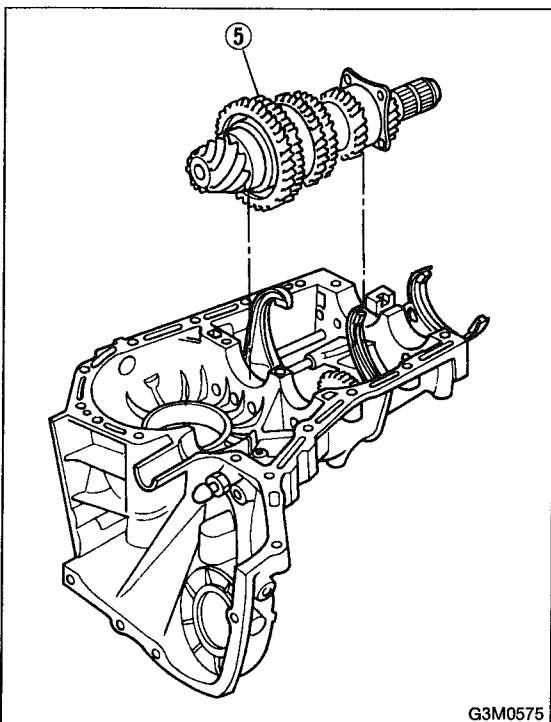
- Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.

NOTE:

- Align the end face of seal with surface A of left side transmission main case when installing oil seal.

- Be careful not to drop oil seal when installing right side transmission main case.

- Make sure straight pin is positioned in hole in needle bearing's outer race.

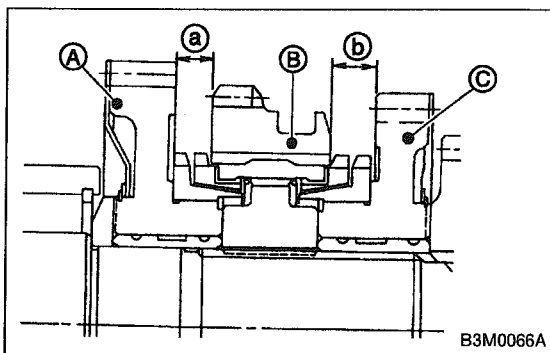


G3M0575

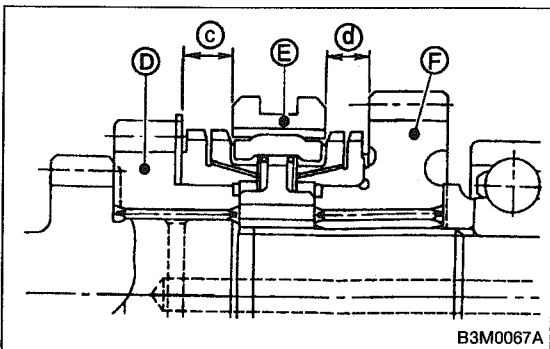
5) Install drive pinion shaft assembly ⑤ with shims selected before into transmission case.

NOTE:

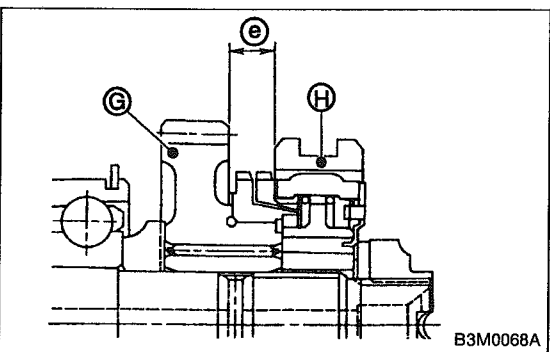
Ensure that the knock pin of the case is fitted into the hole in the bearing outer race.



B3M0066A



B3M0067A



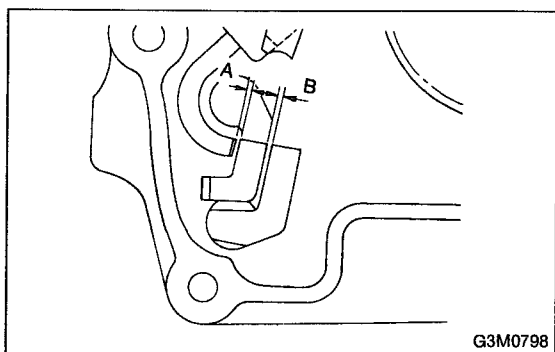
B3M0068A

6) Selection of suitable 1st-2nd, 3rd-4th and 5th shifter fork

Set transmission main shaft assembly and drive pinion shaft assembly in position (so there is no clearance between the two when moved all the way to the front). Select suitable 1st-2nd, 3rd-4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms.

	Clearance mm (in)
1st driven gear (A) to reverse driven gear (B)	(a): 9.5 (0.374)
2nd driven gear (C) to reverse driven gear (B)	(b): 9.5 (0.374)
3rd drive gear (D) to coupling sleeve (E)	(c): 9.3 (0.366)
4th drive gear (F) to coupling sleeve (E)	(d): 9.3 (0.366)
5th drive gear (G) to coupling sleeve (H)	(e): 9.3 (0.366)

1st-2nd shifter fork		
Part No.	No.	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)
3rd-4th shifter fork		
Part No.	No.	Remarks
32810AA060	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA070	No mark	Standard
32810AA100	3	Approach to 3rd gear by 0.2 mm (0.008 in)
5th shifter fork		
Part No.	No.	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)



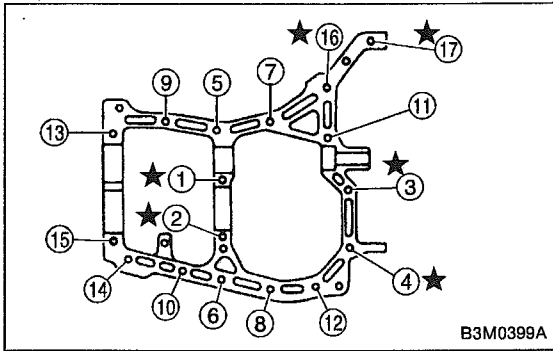
G3M0798

7) Inspection of rod end clearance

Measure rod end clearances A and B. If any clearance is not within specifications, replace rod or fork as required.

A: 1st-2nd to 3rd-4th	0.4 — 1.4 mm (0.016 — 0.055 in)
B: 3rd-4th to 5th	0.5 — 1.3 mm (0.020 — 0.051 in)

2. Transmission Case



8) Combination of transmission case

(1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline, and apply liquid gasket, and then put case right side and left side together.

Liquid gasket:

THREE BOND 1215 or equivalent

(2) Tighten 17 bolts with bracket, clip, etc. as shown in the figure.

Tightening torque:

8 mm bolt

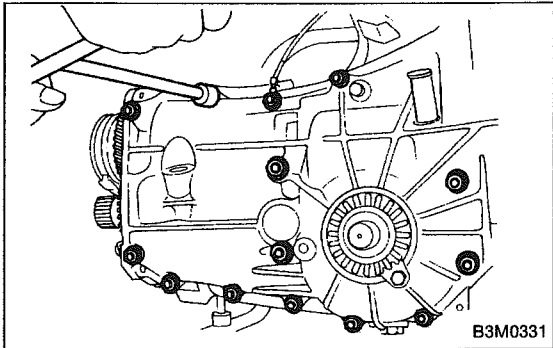
$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

★ 10 mm bolt

$39 \pm 3 \text{ N}\cdot\text{m}$ ($4.0 \pm 0.3 \text{ kg}\cdot\text{m}$, $28.9 \pm 2.2 \text{ ft}\cdot\text{lb}$)

NOTE:

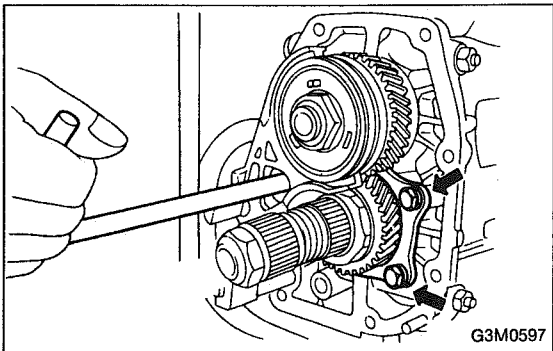
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that counter gear and speedometer gear are meshed.



9) Tighten ball bearing attachment bolts.

Tightening torque:

$29 \pm 3 \text{ N}\cdot\text{m}$ ($3.0 \pm 0.3 \text{ kg}\cdot\text{m}$, $21.7 \pm 2.2 \text{ ft}\cdot\text{lb}$)

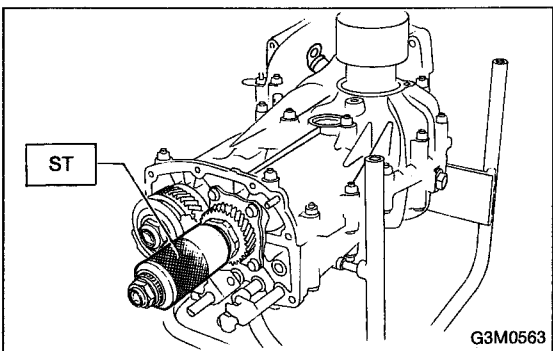


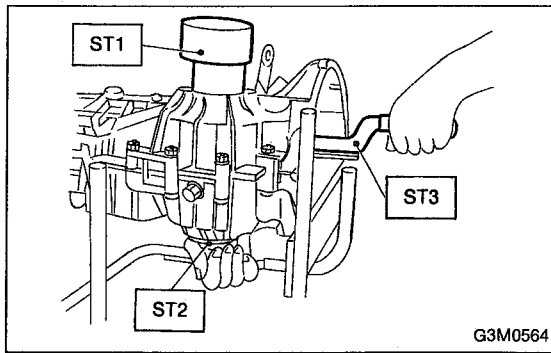
10) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



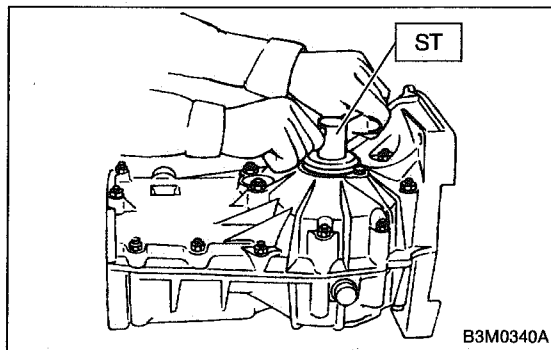


(1) Place the transmission with case left side facing downward and put ST1 on bearing cup.

(2) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2.

This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

ST1	399780104	WEIGHT
ST2	499787000	WRENCH ASSY
ST3	499927100	HANDLE

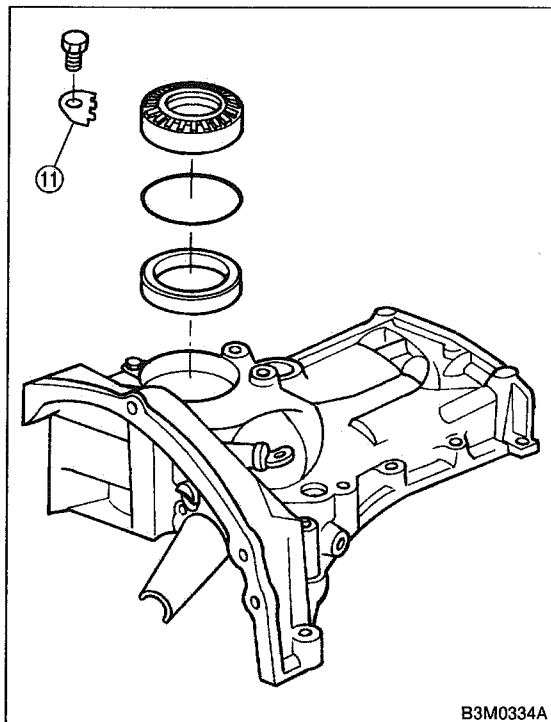


(3) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:

At this point, the backlash between the hypoid gear and drive pinion shaft is zero.

ST	499787000	WRENCH ASSY
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(4) Fit lock plate ⑪. Loosen the retainer on the lower side by 1-1/2 teeth of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:

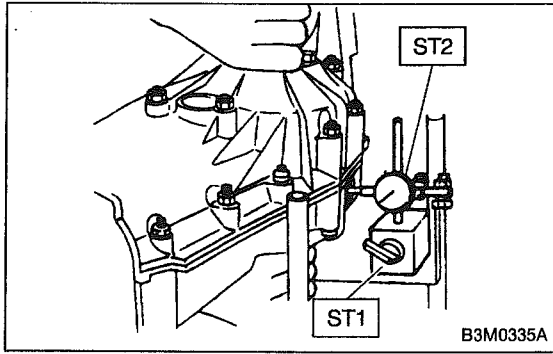
The notch on the lock plate moves by 1/2 tooth if the plate is turned upside down.

(5) Turn in the retainer on the upper side additionally by 1 tooth in order to apply preload on taper roller bearing.

(6) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

(7) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.

(8) Set ST1 and ST2. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.



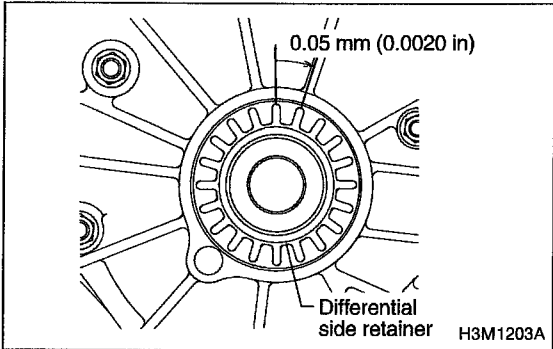
ST1 498247001 MAGNET BASE
 ST2 498247100 DIAL GAUGE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

NOTE:

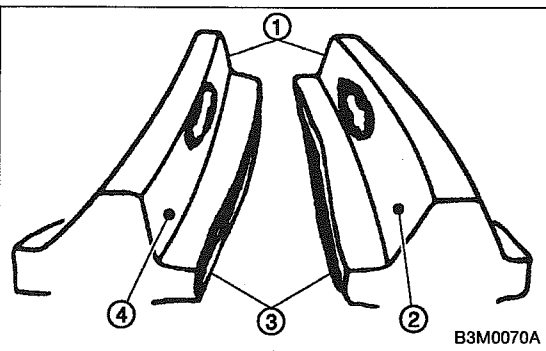
- If backlash is outside specified range, adjust it by turning holder in right side case.
- Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



(9) Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is incorrect, make the following correction.

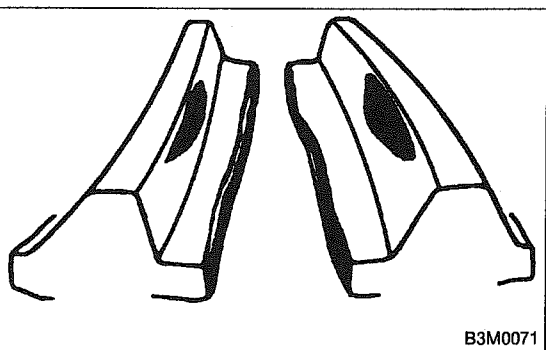
- Tooth contact is correct.

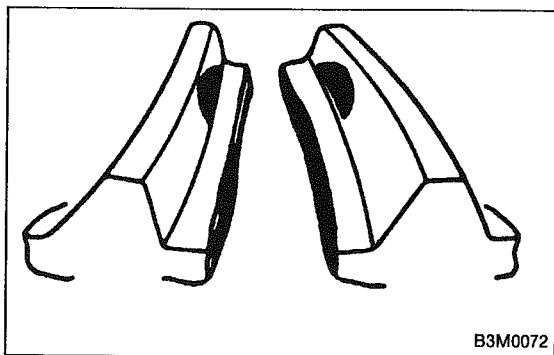
- ① Toe
- ② Coast side
- ③ Heel
- ④ Drive side



- Backlash is excessive.

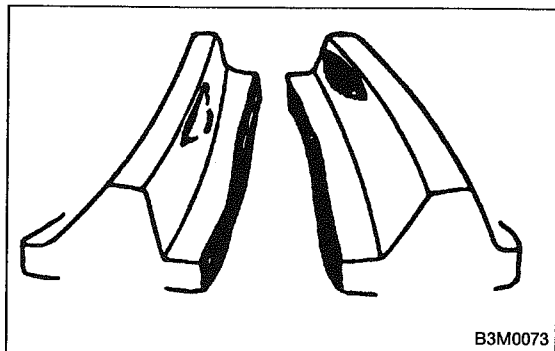
To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.





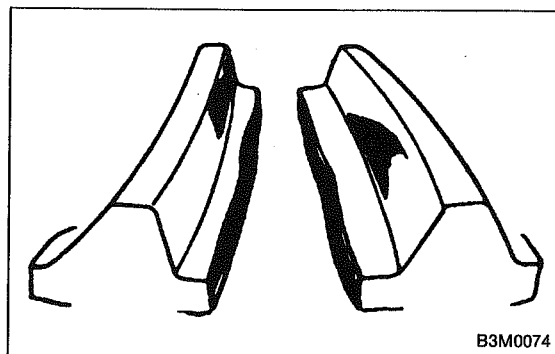
B3M0072

- Backlash is insufficient.
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



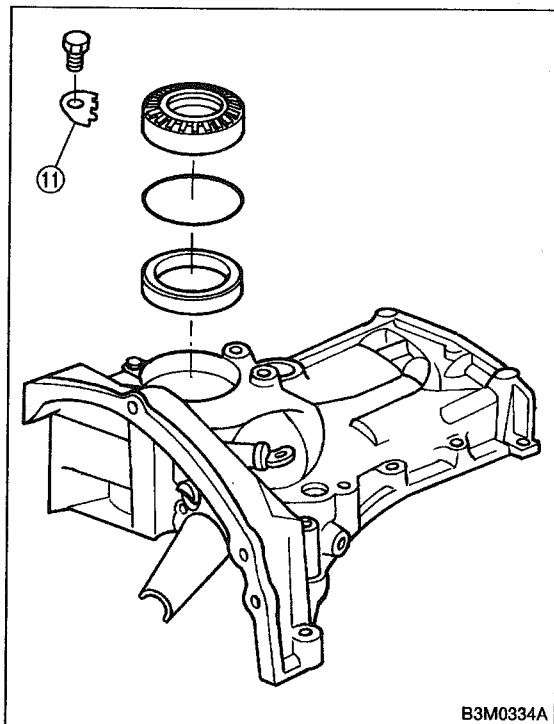
B3M0073

- The drive pinion shim selected before is too thick. Reduce its thickness.



B3M0074

- The drive pinion shim selected before is too thin. Increase its thickness.



B3M0334A

11) After checking the tooth contact of hypoid gears, remove the lock plate ⑪. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in.

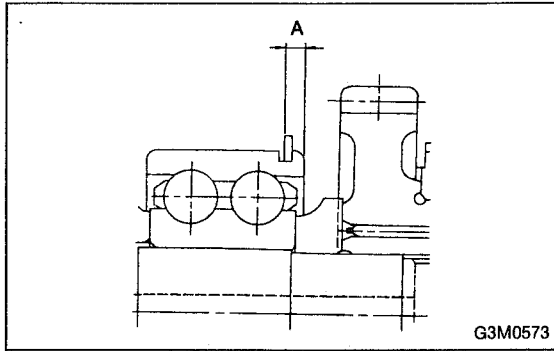
Tighten lock plate ⑪.

Tightening torque:

$25 \pm 3 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $18.1 \pm 2.2 \text{ ft}\cdot\text{lb}$)

NOTE:

Carry out this job on both upper and lower retainers.



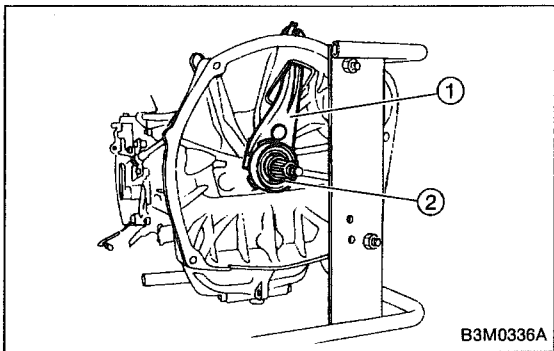
12) Selecting of main shaft rear plate
Using ST, measure the amount A of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

ST 498147000 DEPTH GAUGE

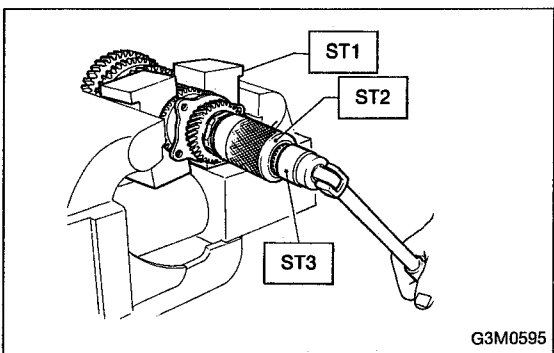
Dimension "A" mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

NOTE:

Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.



13) Install clutch release lever ① and bearing ②. <Ref. to 2-10 [W3C1].>



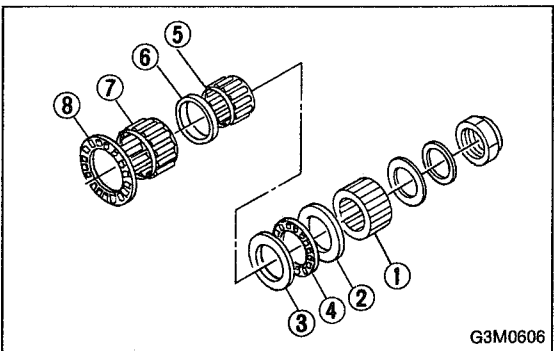
3. Drive Pinion Assembly

A: DISASSEMBLY

1. DRIVE PINION SHAFT

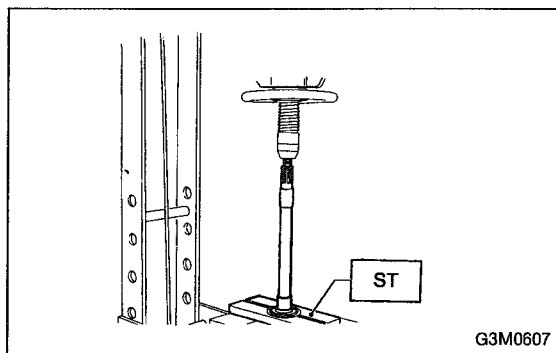
1) Straighten lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.

- ST1 899884100 HOLDER
- ST2 498427100 STOPPER
- ST3 89988608 SOCKET WRENCH



2) Withdraw drive pinion from driven shaft.

Remove differential bevel gear sleeve ①, adjusting washer No. 1 ② (25 x 37.5 x t), adjusting washer No. 2 ③ (25 x 37.5 x 4), thrust bearing ④ (25 x 37.5 x 3), needle bearing ⑤ (25 x 30 x 20), drive pinion collar ⑥, needle bearing ⑦ (30 x 37 x 23) and thrust bearing ⑧ (33 x 50 x 3).

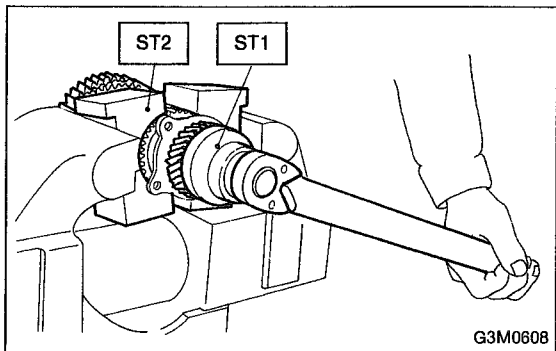


3) Remove roller bearing and washer (33 x 50 x 5) using ST and press.

ST 498077000 REMOVER

CAUTION:

Do not reuse roller bearing.



2. DRIVEN GEAR ASSEMBLY

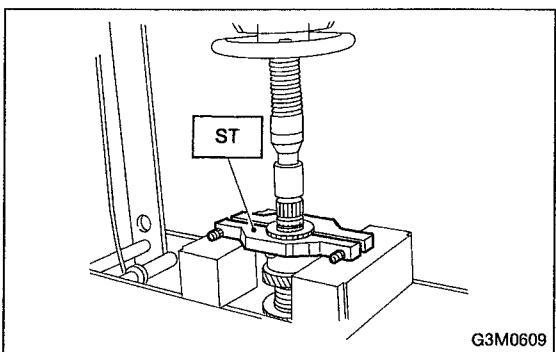
CAUTION:

Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

1) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.

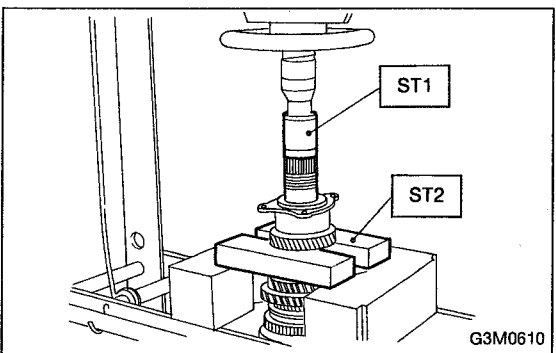
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



2) Remove 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

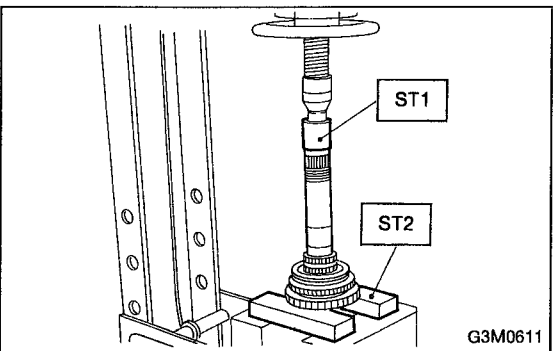


3) Remove woodruff key.

4) Remove roller bearing (42 x 74 x 40), 3rd and 4th driven gear using ST1 and ST2.

ST1 499757002 SNAP RING PRESS

ST2 899714110 REMOVER



5) Remove the key.

6) Remove 2nd driven gear assembly.

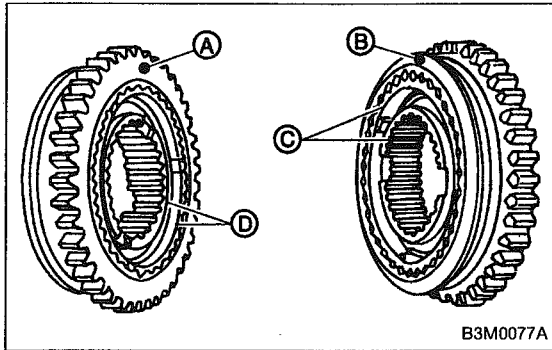
7) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 SNAP RING PRESS

ST2 899714110 REMOVER

8) Remove sub gears for 1st and 2nd driven gear.



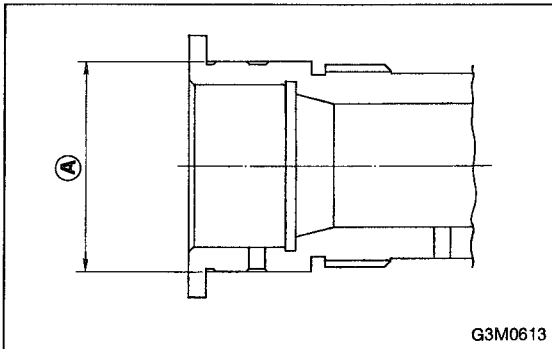
B: ASSEMBLY

1. GEAR AND HUB ASSEMBLY

NOTE:

Position open ends of springs 120° apart.

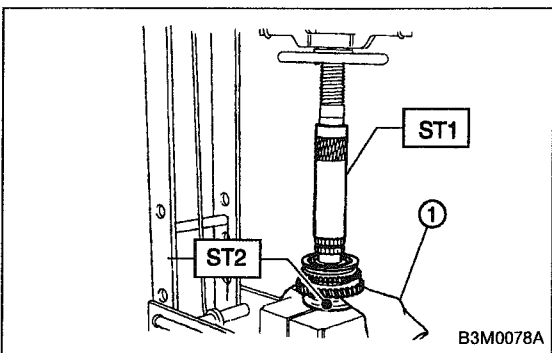
- Ⓐ : 1st gear side
- Ⓑ : 2nd gear side
- Ⓒ : Flush surface
- Ⓓ : Stepped surface



2. DRIVEN GEAR ASSEMBLY

Assemble a driven shaft and 1st driven gear that select for adjustment the proper radial clearance.

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA270
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA260



1) Install 1st driven gear, 1st-2nd baulk ring and gear and hub assembly onto driven shaft.

NOTE:

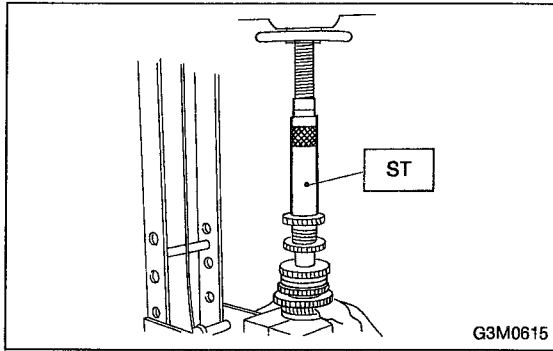
Take care to install gear hub in proper direction.

2) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

- ST1 499277200 INSTALLER
- ST2 499587000 INSTALLER

CAUTION: ,

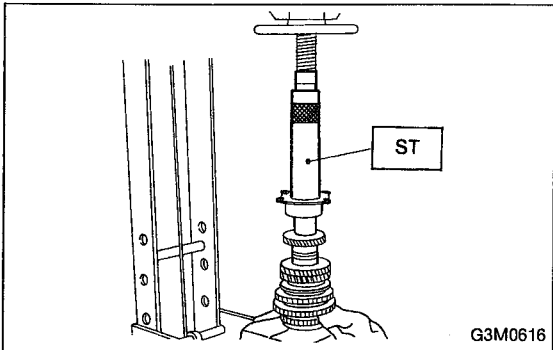
Attach a cloth ① to the end of driven shaft to prevent damage.



3) Install 2nd driven gear, 1st-2nd baulk ring and insert onto driven shaft. After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

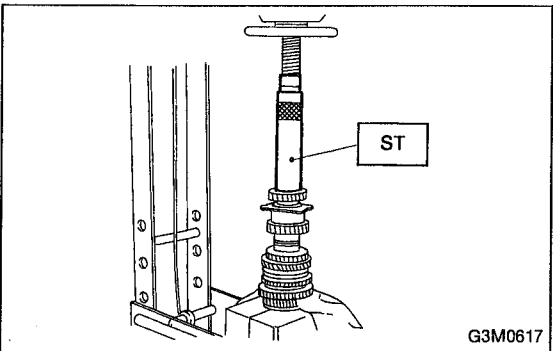
ST 499277200 INSTALLER

Align groove in baulk ring with insert.



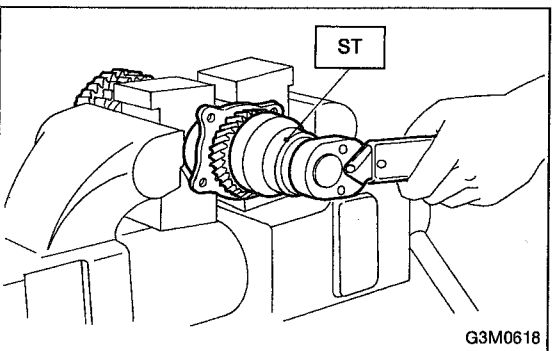
4) Install a set of roller bearings (42 x 74 x 40) onto the driven shaft using ST and press.

ST 499277200 INSTALLER



5) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

ST 499277200 INSTALLER

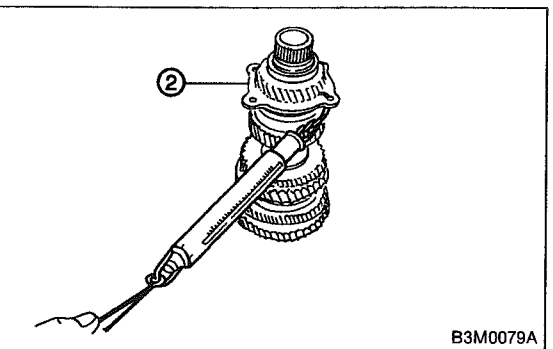


6) Install lock washer (42 x 53 x 2). Install lock nut (42 x 13) and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

Tightening torque:

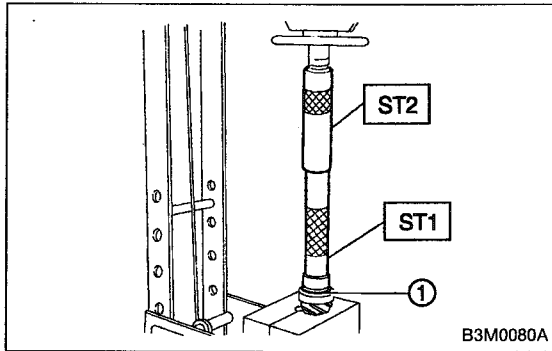
265 ± 10 N·m (27 ± 1 kg-m, 195 ± 7 ft-lb)



NOTE:

- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing ② is 0.1 to 1.5 N·m (1 to 15 kg-cm, 0.9 to 13.0 in-lb).

3. Drive Pinion Assembly

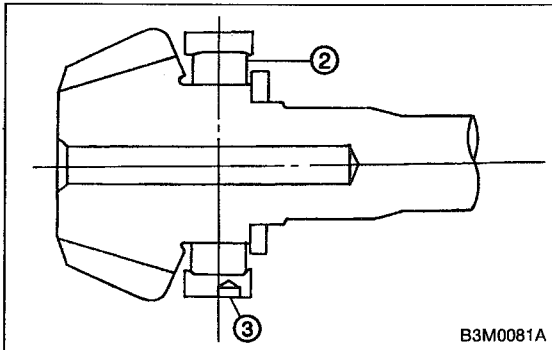


3. DRIVE PINION SHAFT

1) Install roller bearing onto drive pinion. Install washer (1) (33 x 50 x 5) using ST1, ST2 and press.

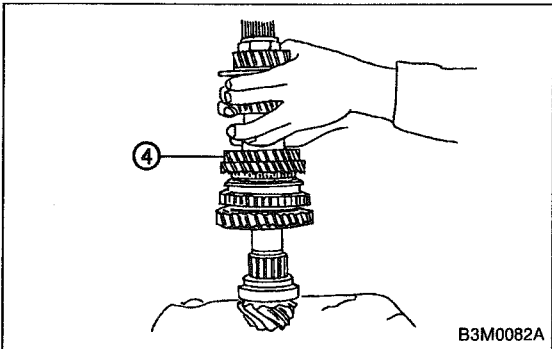
ST1 499277100 BUSH 1-2 INSTALLER

ST2 499277200 INSTALLER

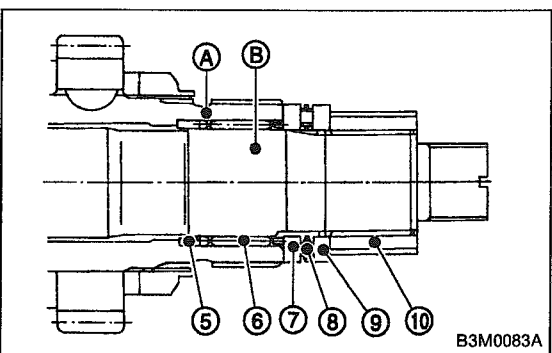


NOTE:

When installing roller bearing (2), note its directions (front and rear) because knock pin hole (3) in outer race is off-set.



2) Install thrust bearing (33 x 50 x 3) and needle bearing (30 x 37 x 23). Install driven shaft assembly (4).



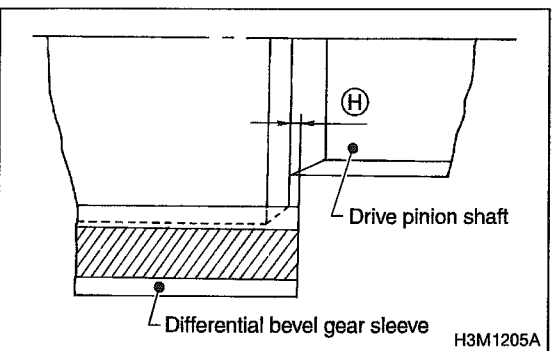
3) Install drive pinion collar (5), needle bearing (6) (25 x 30 x 20), adjusting washer No. 2 (7) (25 x 36 x 4), thrust bearing (8) (25 x 37.5 x 3), adjusting washer No. 1 (9) (25 x 36 x t) and differential bevel gear sleeve (10) in that order.

NOTE:

Be careful because spacer must be installed in proper direction.

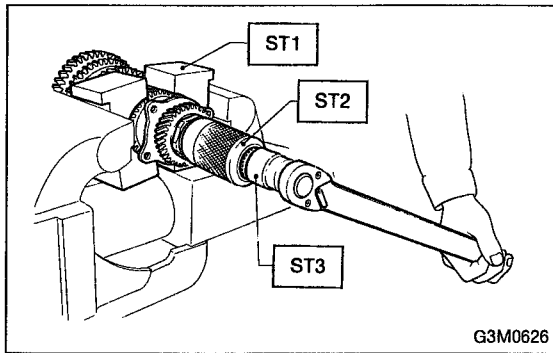
(A) : Driven shaft

(B) : Driven pinion shaft



4. ADJUSTMENT OF THRUST BEARING PRELOAD

1) After completing the preceding steps 1) through 3), select adjusting washer No. 2 so that dimension (H) is zero through visual check. Position washer (18.3 x 30 x 4) and lock washer (18 x 30 x 2) and install lock nut (18 x 13.5).

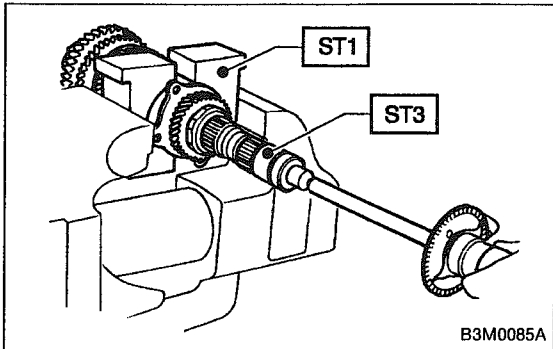


2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.

- ST1 899884100 HOLDER
- ST2 498427100 STOPPER
- ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

118 ± 8 N·m (12 ± 0.8 kg·m, 86.8 ± 5.8 ft·lb)

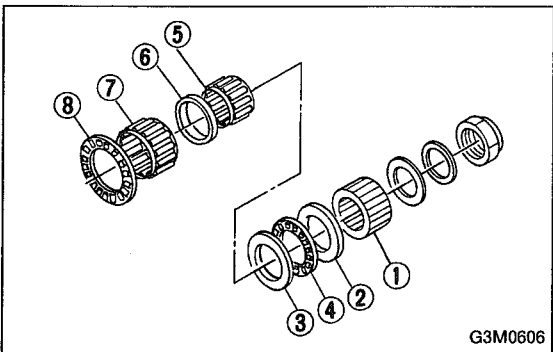


3) After removing ST2, measure starting torque using torque driver.

- ST1 899884100 HOLDER
- ST3 899988608 SOCKET WRENCH (27)

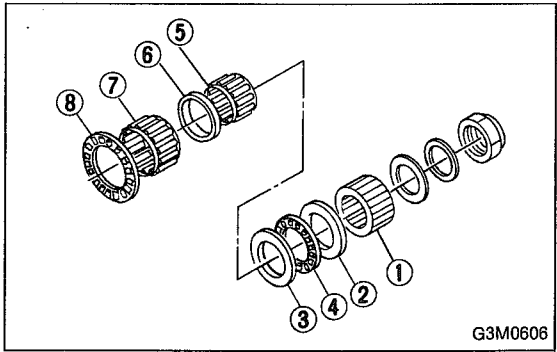
Starting torque:

0.5 ± 0.2 N·m (0.055 ± 0.025 kg·m, 0.4 ± 0.2 ft·lb)



4) If starting torque is not within specified limit, select new adjusting washer No. 1 ② and recheck starting torque.

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

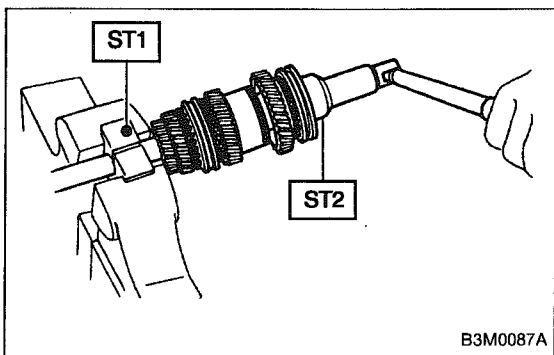


5) If specified starting torque range cannot be obtained when a No. 1 ② adjusting washer is used, then select a suitable No. 2 ③ adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

6) Recheck that starting torque is within specified range, then clinch lock nut at four positions.



4. Main Shaft Assembly

A: DISASSEMBLY

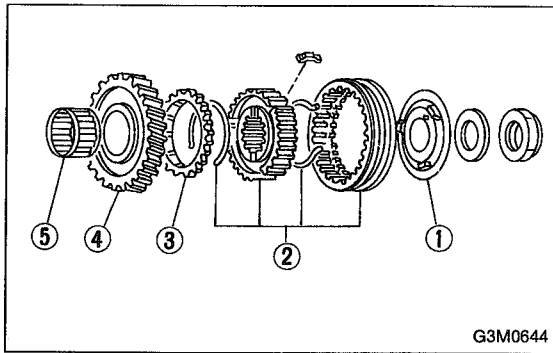
- 1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
- 2) Remove lock nut from transmission main shaft assembly.

NOTE:

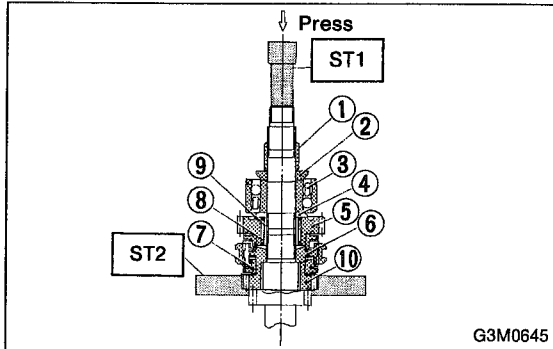
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER

ST2 499987003 SOCKET WRENCH (35)



3) Remove insert stopper plate ①, sleeve and hub assembly No. 2, baulk ring ③, 5th drive gear ④, and needle bearing ⑤ (32 x 36 x 25.7).



4) Using ST1, ST2 and a press, remove:

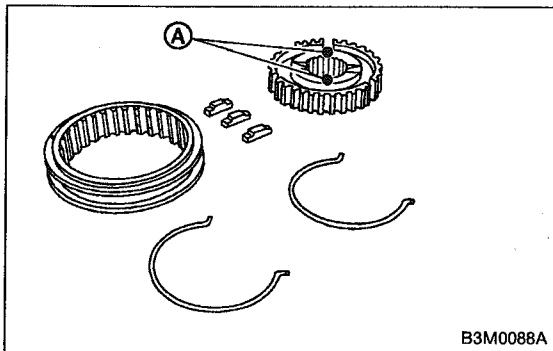
- 5th needle bearing inner race ①
- 5th gear thrust washer ②
- Ball bearing ③ (25.5 x 65 x 31)
- 4th gear thrust washer ④
- 4th drive gear ⑤
- Sleeve and hub assembly ⑥
- Baulk ring ⑦
- 4th needle bearing ⑧
- 4th needle bearing inner race ⑨
- 3rd drive gear ⑩

ST1 899864100 REMOVER

ST2 899714110 REMOVER

NOTE:

Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.



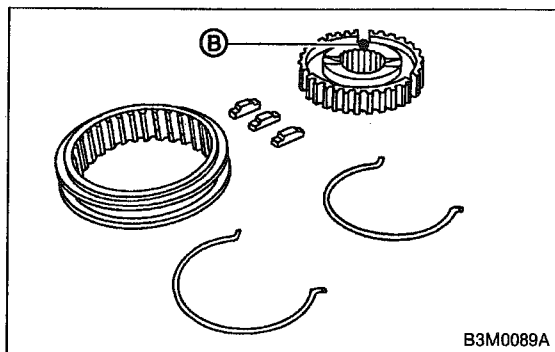
B: ASSEMBLY

1) Assemble sleeve and hub assembly for 3rd-4th and, 5th and high-low synchronizing.

NOTE:

Position open ends of spring 120° apart.

Ⓐ: Two holes for discrimination (3rd-4th hub)

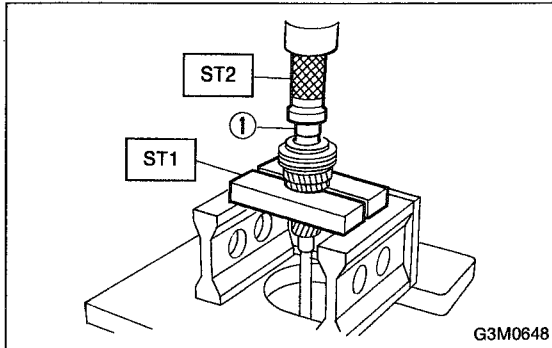


Ⓑ: One hole for discrimination (5th hub)

2) Install 3rd drive gear, baulk ring, and sleeve and hub assembly for 3rd-4th needle bearing (32 x 36 x 25.7) on transmission main shaft.

NOTE:

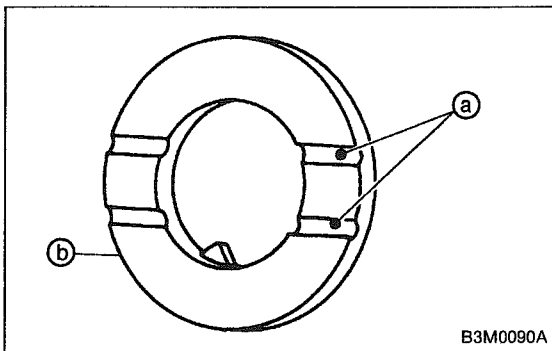
Align groove in baulk ring with shifting insert.



3) Install 4th needle bearing race ① onto transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



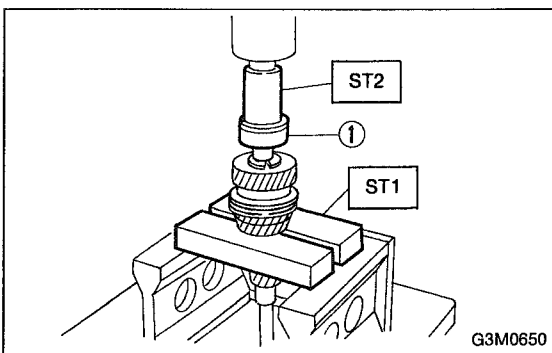
4) Install baulk ring, needle bearing (32 x 30 x 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:

Face thrust washer in the correct direction.

Ⓐ: Groove

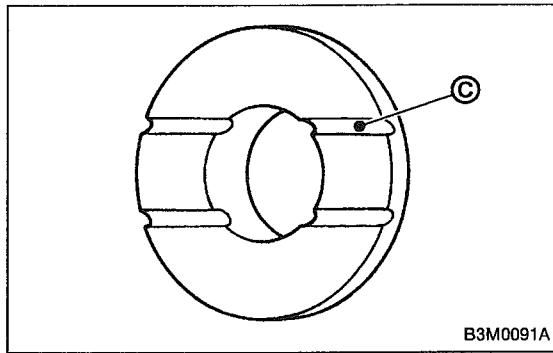
Ⓑ: 4th gear side



5) Drive ball bearing ① onto the rear section of transmission main shaft using ST1, ST2 and a press.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



6) Using the same tools as in step 5) above, install the following parts onto the rear section of transmission main shaft.

- 5th gear thrust washer

NOTE:

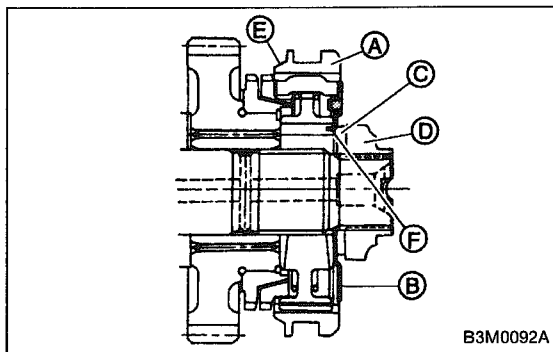
Face thrust washer in the correct direction.

Ⓒ: Face this surface to 5th gear side.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

- 5th needle bearing race



7) Install the following parts to the rear section of transmission main shaft.

- Needle bearing (32 x 36 x 25.7)
- 5th drive gear
- Baulk ring
- Sleeve **A** and hub assembly
- Insert stopper plate **B**
- Lock washer **C** (22 x 38 x 2)
- Tighten lock nuts **D** (22 x 13) to the specified torque using ST1 and ST2.

ST1 499987003 SOCKET WRENCH (35)

ST2 498937000 TRANSMISSION HOLDER

NOTE:

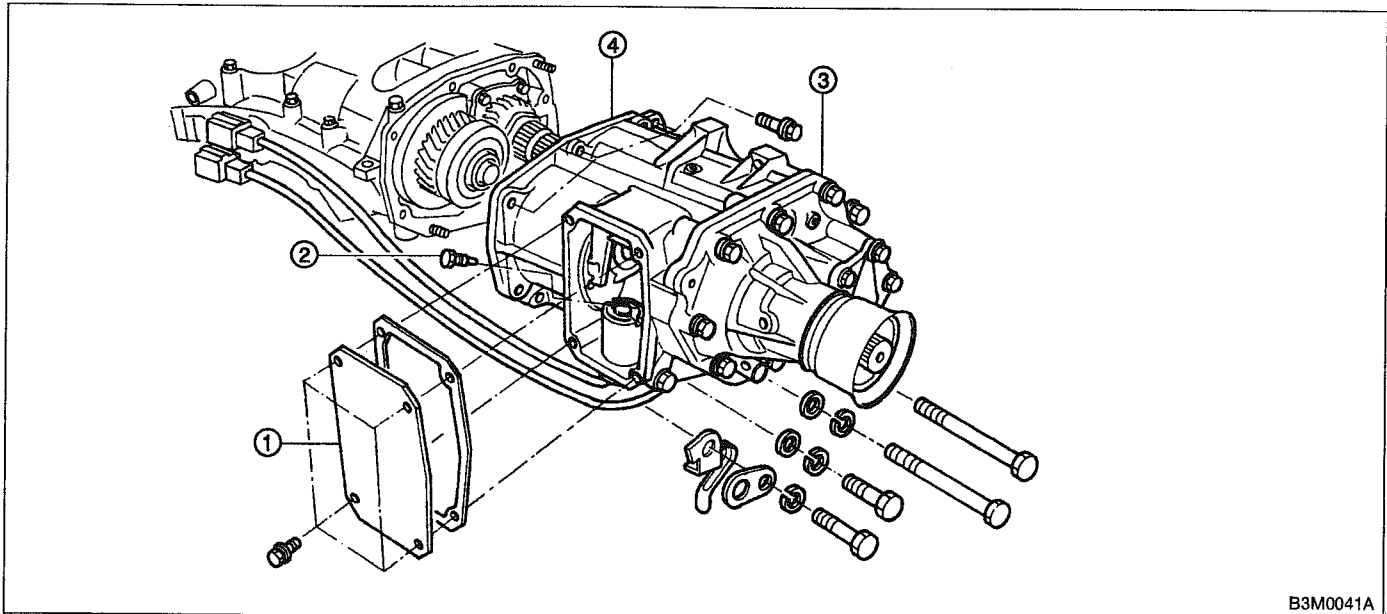
- Align groove **E** in baulk ring with shifting insert.
- Be sure to fit pawl **F** of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.
- Secure lock nuts in two places after tightening.

Tightening torque:

118 ± 6 N·m (12.0 ± 0.6 kg-m, 86.8 ± 4.3 ft-lb)

5. Transfer Case and Extension

A: REMOVAL

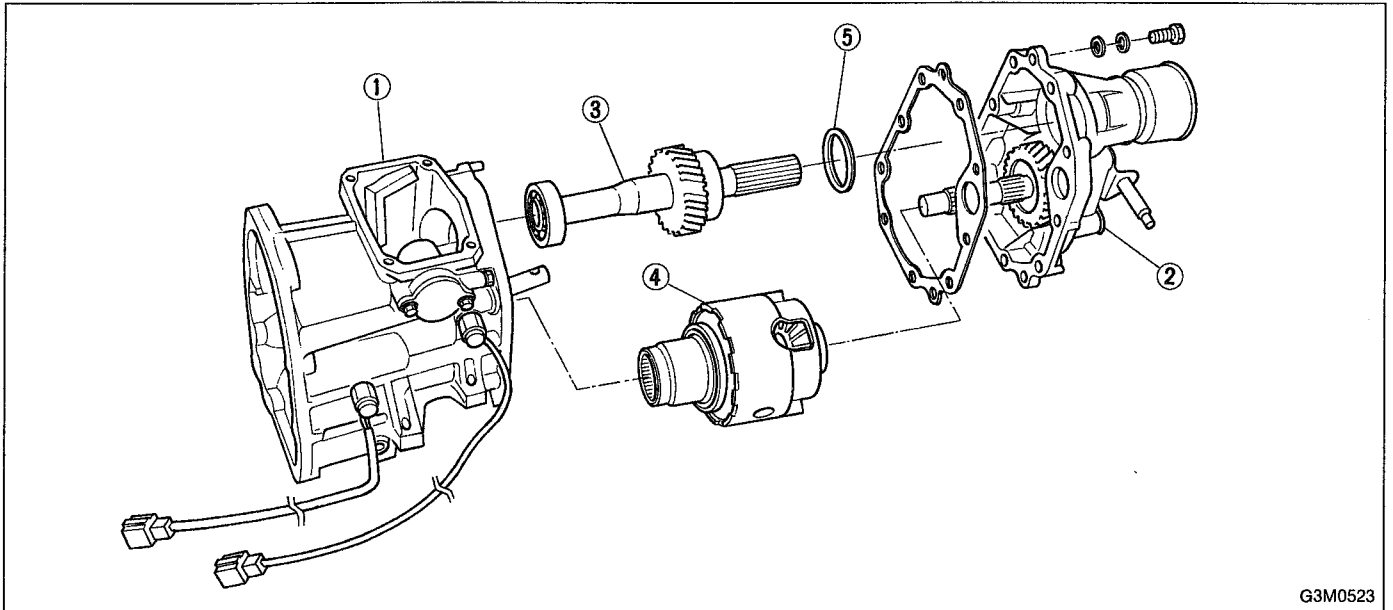


B3M0041A

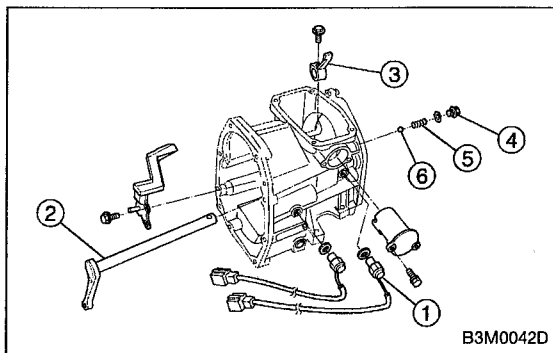
- 1) Remove transfer cover ①.
- 2) Remove shifter fork screw ② which secures selector arm to shifter arm.
- 3) Remove transfer case ④ with extension assembly ③.

B: DISASSEMBLY

1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY



- 1) Separate transfer case ① and extension assembly ②.
- 2) Remove transfer driven gear ③ and center differential ④ as a set.
- 3) Remove thrust washer ⑤ (52 x 61 x t).



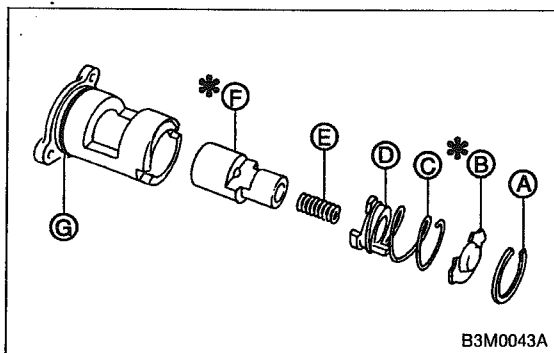
2. TRANSFER CASE

- 1) Remove neutral switch ①.

NOTE:

Before removing shifter arm, disconnect neutral switch.

- 2) Draw out shifter arm ② and remove selector arm ③.
- 3) Remove plug ④, spring ⑤ and reverse check ball ⑥.



4) Remove reverse check sleeve.

Disassembly procedure is as follows:

- (1) Using a standard screwdriver, remove snap ring (A) (Inner-28).

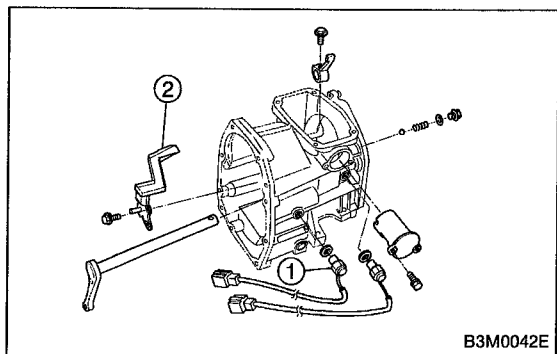
NOTE:

Replace snap ring with a new one if deformed or weakened.

- (2) Remove reverse check plate (B).
- (3) Remove reverse check spring (C) with cam (D).
- (4) Remove reverse return spring (E).
- (5) Remove reverse accent shaft (F).
- (6) Remove O-ring (G).

NOTE:

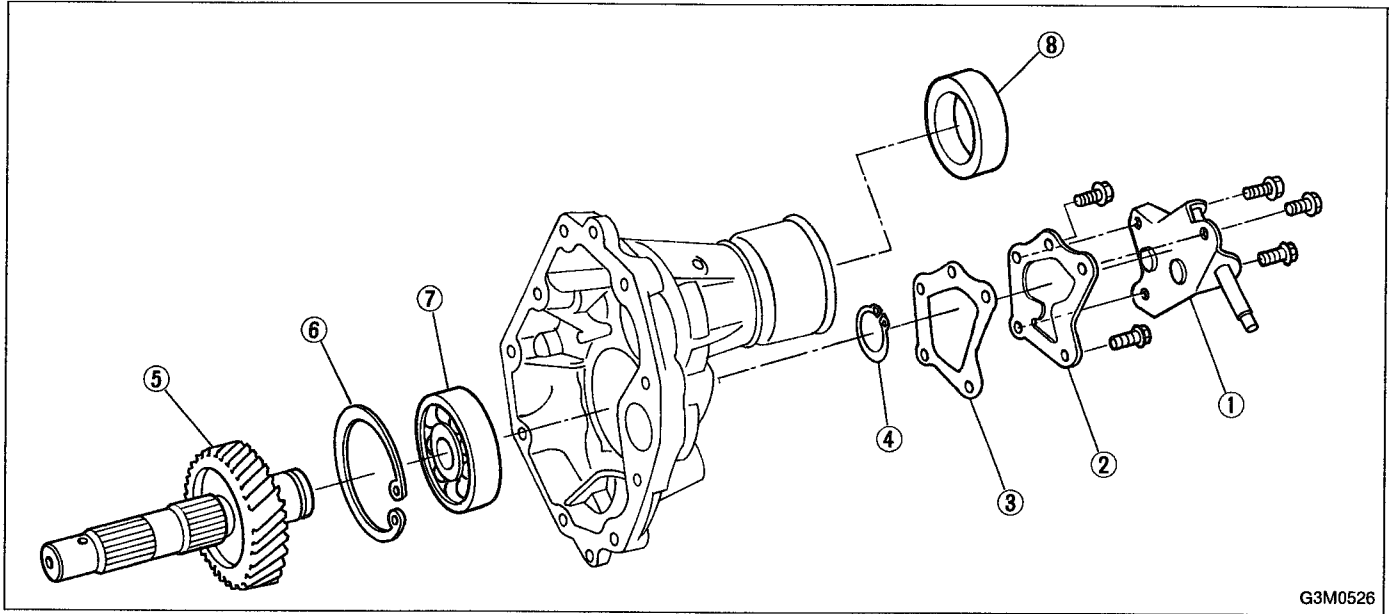
- Reverse check sleeve assembly uses an O-ring which should not be scratched.
- Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.



5) Remove back-up light switch (1).

6) Remove oil guide (2).

3. EXTENSION



G3M0526

- 1) Remove extension cover ② and shift bracket ①.
- 2) Remove snap ring ④ (Outer-30).
- 3) Remove transfer drive gear ⑤.

CAUTION:**Do not remove ball bearing unless replacing.**

- 4) Remove snap ring ⑥ (Inner-72).
- 5) Remove ball bearing ⑦.

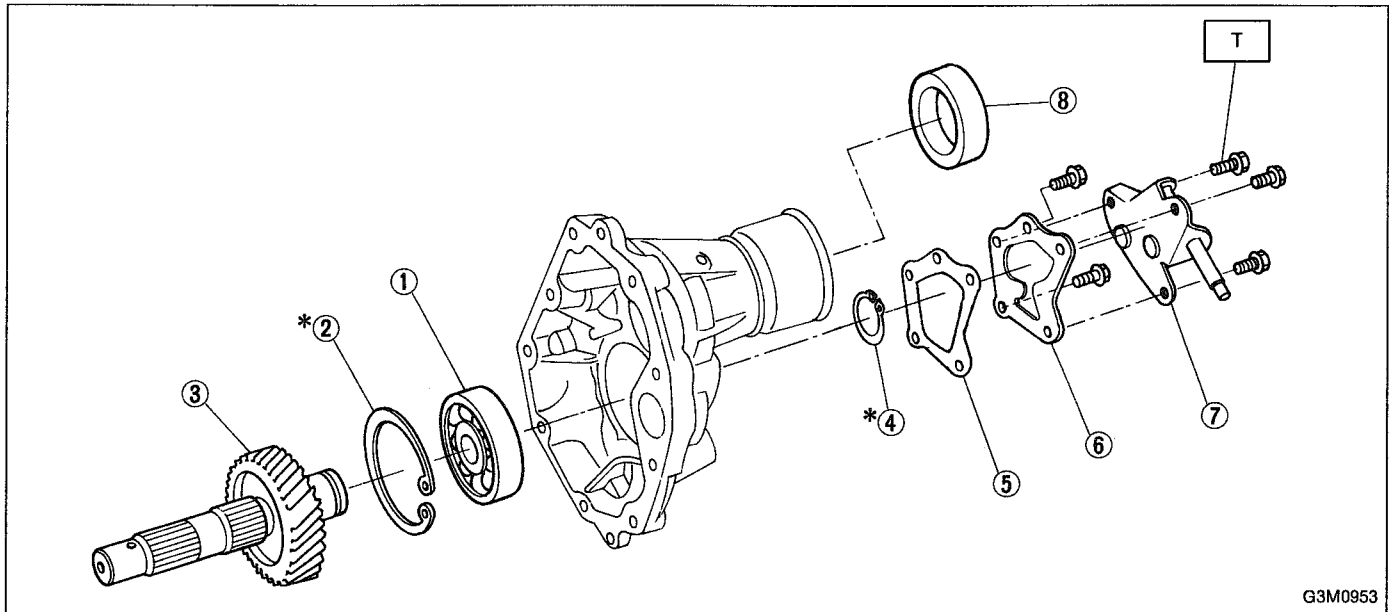
CAUTION:**Do not reuse ball bearing.**

- 6) Remove oil seal ⑧.

CAUTION:**Do not reuse oil seal.**

C: ASSEMBLY

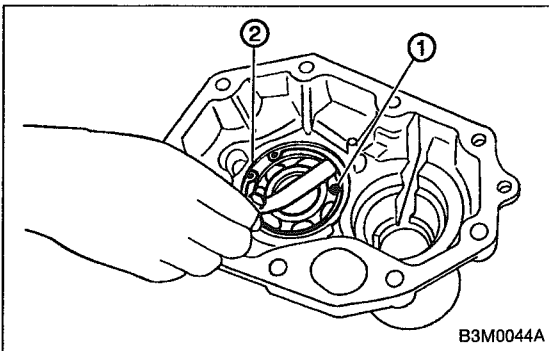
1. EXTENSION



Tightening torque: N·m (kg·m, ft·lb)
T: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)

1) Installation of ball bearing ① and selection of snap ring ② (Inner-72)

(1) Attach ball bearing ① (30 x 72 x 17) to extension and install snap ring ②.



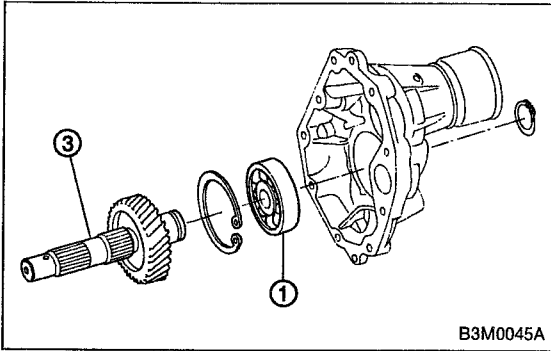
(2) Measure clearance between snap ring ② and outer race of ball bearing ① with a thickness gauge.

CAUTION:
Replace ball bearing with a new one.

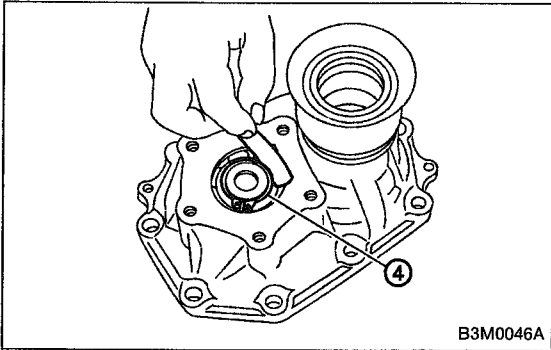
Clearance;
0 — 0.15 mm (0 — 0.0059 in)

(3) If the measurement is not within the specification, select suitable snap ring ②.

Snap ring (Inner-72)	
Part No.	Thickness mm (in)
805172071	1.78 (0.0701)
805172072	1.90 (0.0748)
805172073	2.02 (0.0795)



- 2) Installation of transfer drive gear ③
Press transfer drive gear into inner race of ball bearing.



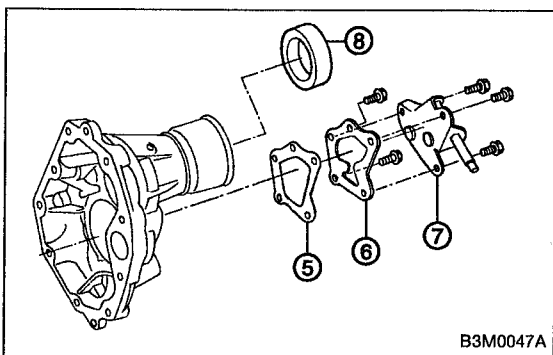
- 3) Selection of snap ring ④ (Outer-30)
(1) Install snap ring ④ on transfer drive shaft.
(2) Measure clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:

0 — 0.15 mm (0 — 0.0059 in)

- (3) If the measurement is not within the specification, select suitable snap ring.

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)



- 4) Install extension cover ⑥, gasket ⑤ and shift bracket ⑦.

CAUTION:

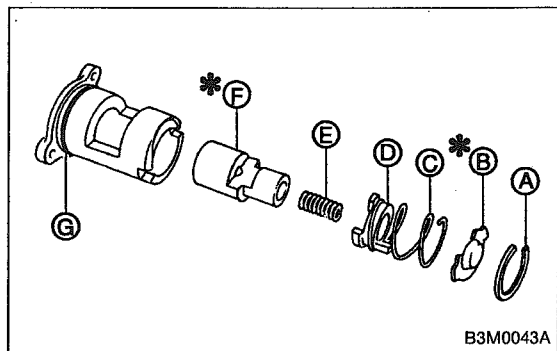
Use new gasket.

- 5) Install oil seal ⑧ with ST.

ST 498057300 INSTALLER

CAUTION:

Use new oil seal.



2. TRANSFER CASE

Assembly of transfer case is in the reverse order of disassembly. Do the following:

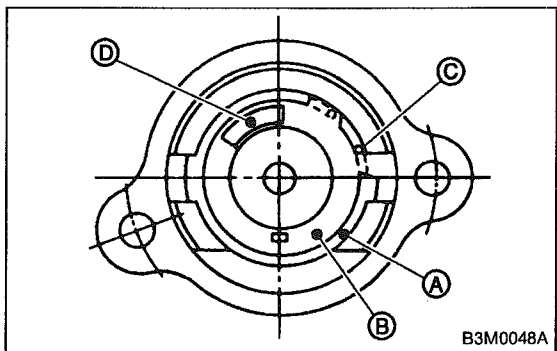
1) Assembly of reverse check sleeve

- (1) Install reverse accent shaft **F**, check cam **D**, return spring **E** and check spring **C** onto reverse check sleeve.

NOTE:

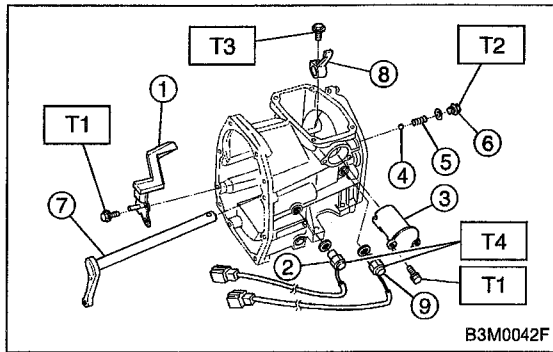
Be sure the bent section of reverse check spring is positioned in the groove in check cam.

- (2) Hook the bent section of reverse check spring over reverse check plate **B**.
- (3) Rotate cam so that the protrusion of reverse check cam is at the opening in plate.
- (4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring **A** (Inner-28).
- (5) Position O-ring **G** (35.4 x 1.5) in groove in sleeve.



CAUTION:

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
 - Spin cam by hand for smooth rotation.
- If it does not return properly, replace reverse check spring.
- Move cam and shaft all the way toward plate and release.
- If cam does not return properly, replace reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace spring.
- Select a suitable reverse accent shaft and reverse check plate by referring to "Neutral Position Adjustment."



2) Installation of shifter arm ⑦ and selector arm ⑧
 Install shifter arm into the partition from the front while inserting selector arm into the opening in reverse check sleeve. Pass shaft through hole in selector arm until its end comes out of the rear of transfer case.

NOTE:

Apply a coat of gear oil to shifter arm. Also make sure oil seal is positioned properly.

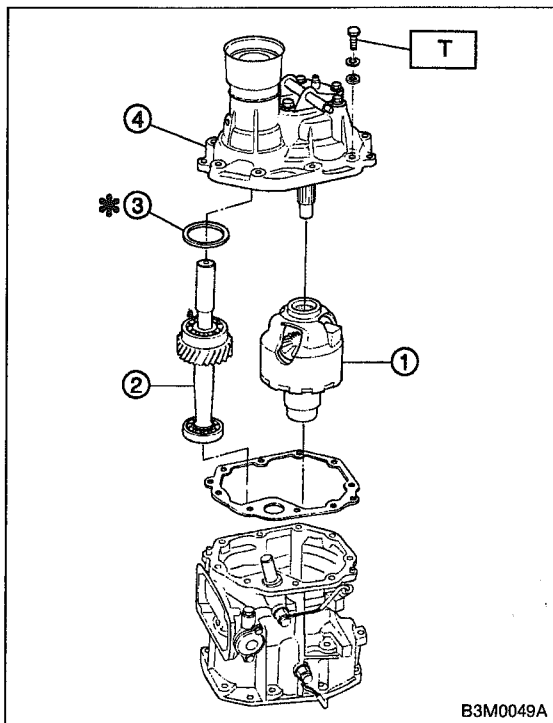
Tightening torque:

T1: $6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)

T2: $10 \pm 1 \text{ N}\cdot\text{m}$ ($1.0 \pm 0.1 \text{ kg}\cdot\text{m}$, $7.2 \pm 0.7 \text{ ft}\cdot\text{lb}$)

T3: $19.6 \pm 1.5 \text{ N}\cdot\text{m}$ ($2.00 \pm 0.15 \text{ kg}\cdot\text{m}$, $14.5 \pm 1.1 \text{ ft}\cdot\text{lb}$)

T4: $25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

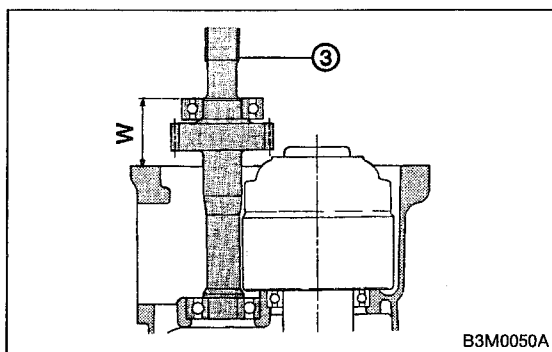


3. COMBINATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

1) Install center differential ① and transfer driven gear ② into transfer case.

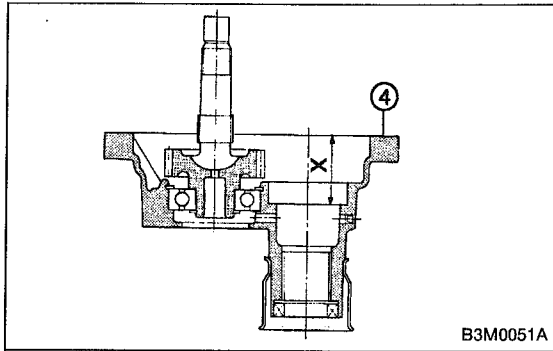
Tightening torque:

T: $37 \pm 3 \text{ N}\cdot\text{m}$ ($3.8 \pm 0.3 \text{ kg}\cdot\text{m}$, $27.5 \pm 2.2 \text{ ft}\cdot\text{lb}$)



2) Selection of thrust washer (52 x 61 x t)

(1) Measure height "W" between transfer case and ball bearing on the transfer driven gear ③.



(2) Measure depth "X" as shown in figure.

④ Extension

(3) Calculate space "Y" using the following equation:
 $Y = X - W + 0.24 \text{ mm (0.0094 in)}$ [Thickness of gas-
 ket]

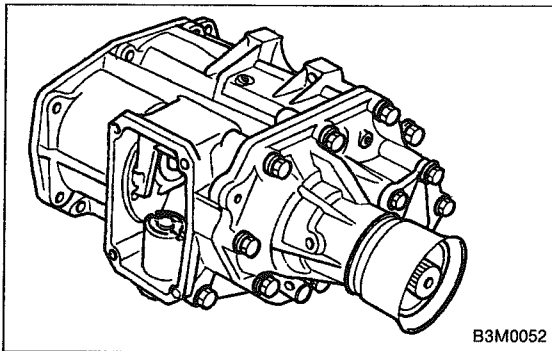
(4) Select suitable washer in the following table:

Space "Y" mm (in)	Thrust washer (52 x 61 x t)	
	Part No.	Thickness mm (in)
0.55 — 0.79 (0.0217 — 0.0311)	803052021	0.50 (0.0197)
0.80 — 1.04 (0.0315 — 0.0409)	803052022	0.75 (0.0295)
1.05 — 1.30 (0.0413 — 0.0512)	803052023	1.00 (0.0394)

Standard clearance between thrust washer and ball bearing:

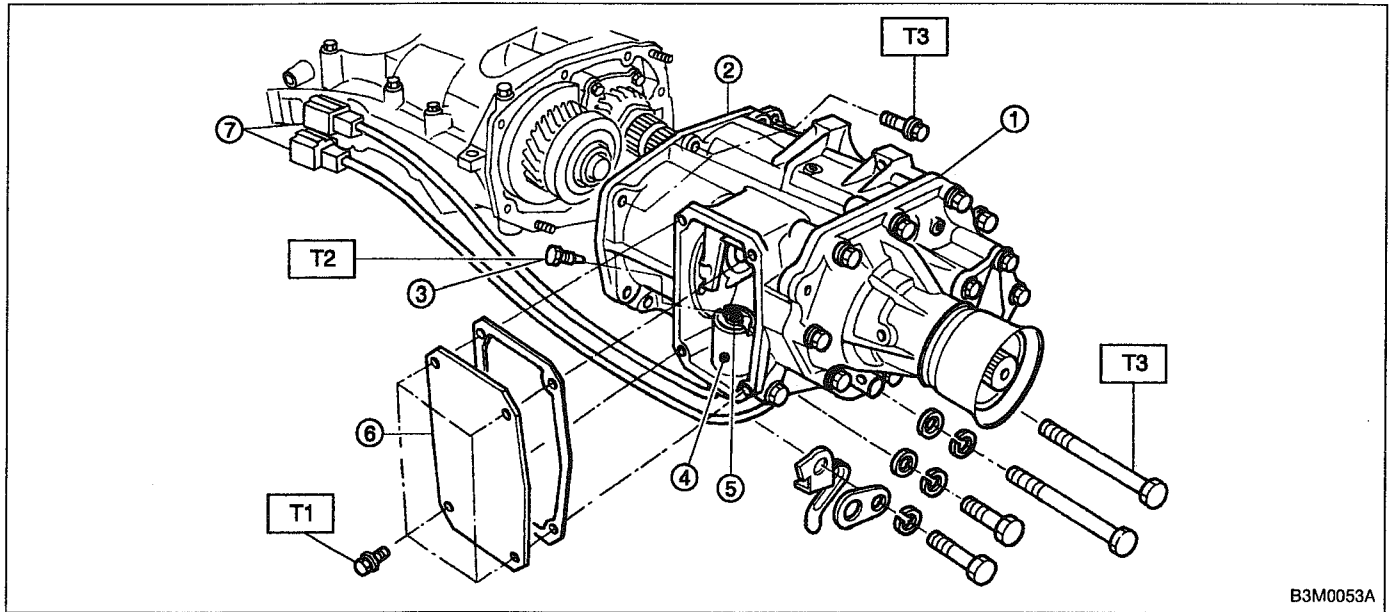
0.05 — 0.30 mm (0.0020 — 0.0118 in)

(5) Fit thrust washers on transfer drive shaft.



3) Install extension assembly into transfer case.

D: INSTALLATION

**Tightening torque: N·m (kg·m, ft·lb)**

T1: 15.7 ± 1.5 (1.6 ± 0.15, 11.6 ± 1.1)

T2: 19.6 ± 1.5 (2.00 ± 0.15, 14.5 ± 1.1)

T3: 24.5 ± 2.0 (2.50 ± 0.20, 18.1 ± 1.4)

- 1) Install transfer case ② with extension assembly ①.
- 2) Secure selector arm to shifter arm with shifter fork screw ③. Shifter arm should be caught by pawl of rod. Selector arm must be engaged with reverse check sleeve assembly.
- 3) Adjustment of neutral position
 - (1) Shift gear into 3rd gear position.
 - (2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
 - (3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
 - (4) To adjust, remove bolts holding reverse check sleeve assembly ④ to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

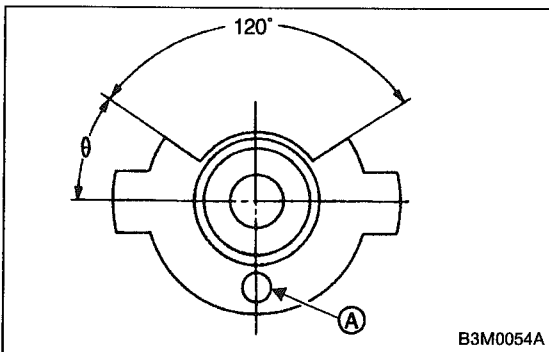
CAUTION:

Be careful not to break O-ring when placing shim(s).

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

- When shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
- If shims alone cannot adjust the clearance, replace reverse accent shaft and re-adjust.

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA040	1	Neutral position is closer to 1st gear.
32188AA011	No mark or 2	Standard
32188AA050	3	Neutral position is closer to reverse gear.

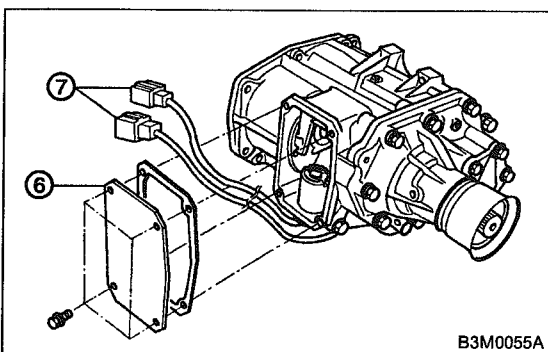


B3M0054A

4) Reverse check plate ⑤ adjustment

Shift shifter arm to "5th" and then to reverse to see if reverse check mechanism operates properly. Also check to see if arm returns to neutral when released from the reverse position. If arm does not return properly, replace reverse check plate.

Reverse check plate			
Part No.	Ⓐ: No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



B3M0055A

5) Install transfer ⑥ cover and gasket.

6) Connect each connector ⑦.

6. Front Differential

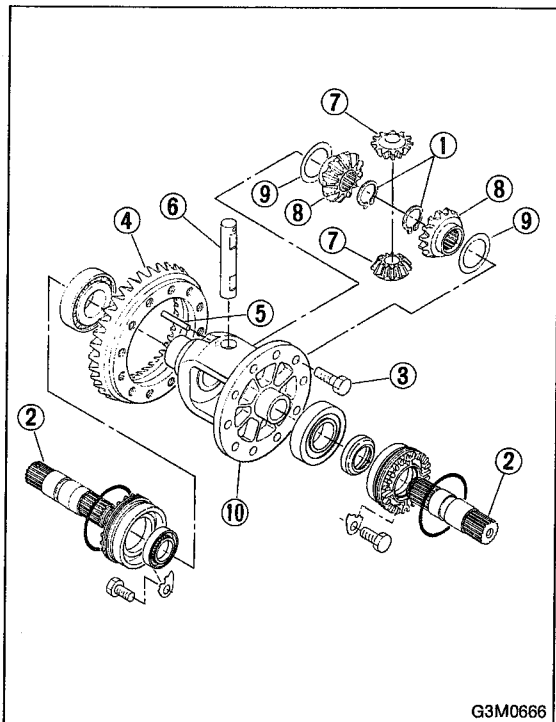
A: DISASSEMBLY

1) Remove right and left snap rings ① from differential, and then remove two axle drive shafts ②.

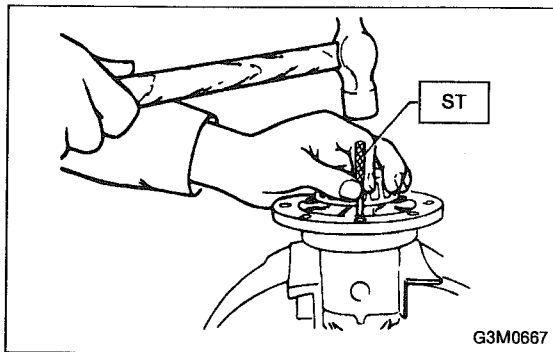
NOTE:

During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts ③ and remove hypoid drive gear ④.



G3M0666

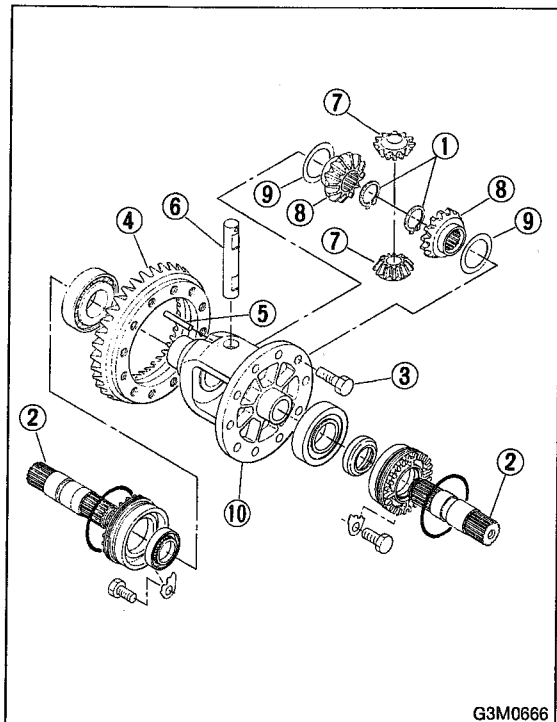


G3M0667

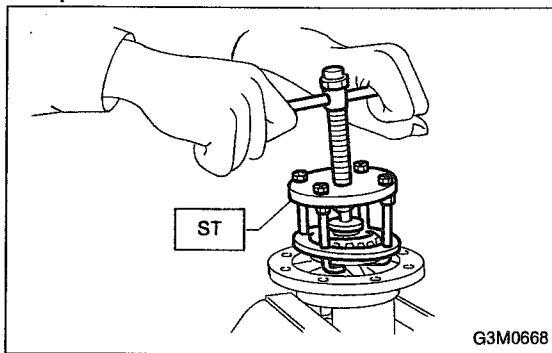
3) Drive out straight pin ⑤ from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER

4) Pull out pinion shaft ⑥, and remove differential bevel pinion ⑦ and gear ⑧ and washer ⑨.

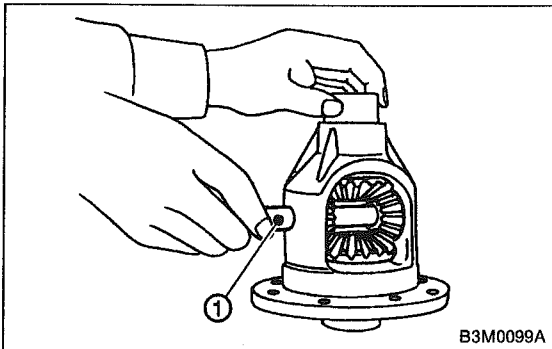


G3M0666



5) Remove roller bearing using ST.

ST 399527700 PULLER SET

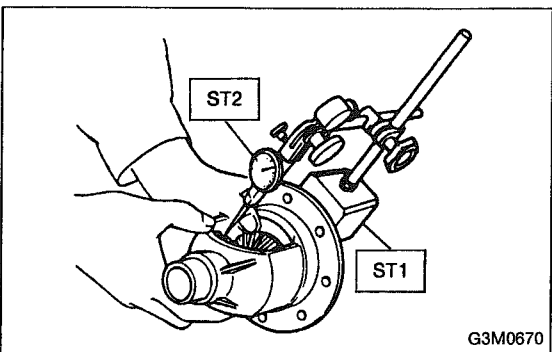


B: ASSEMBLY

1) Install bevel gear and bevel pinion together with washers, and insert pinion shaft ①.

NOTE:

Face the chamfered side of washer toward gear.



2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

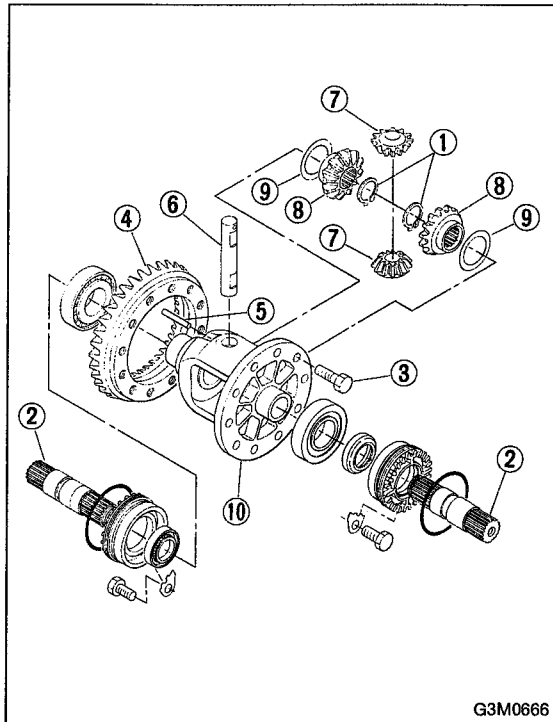
ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

NOTE:

Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

Washer (38.1 x 50 x t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

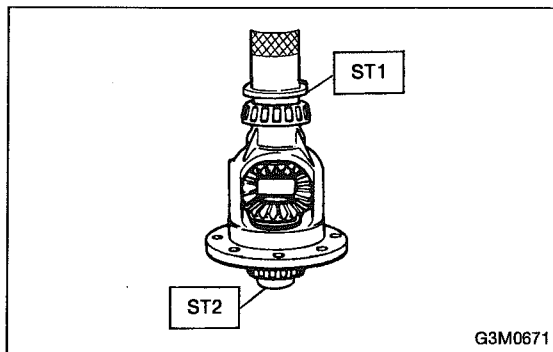


3) Align pinion shaft and differential case at their holes, and drive straight pin ⑤ into holes from the hypoid driven gear side, using ST.

ST 899904100 REMOVER

NOTE:

Lock straight pin after installing.



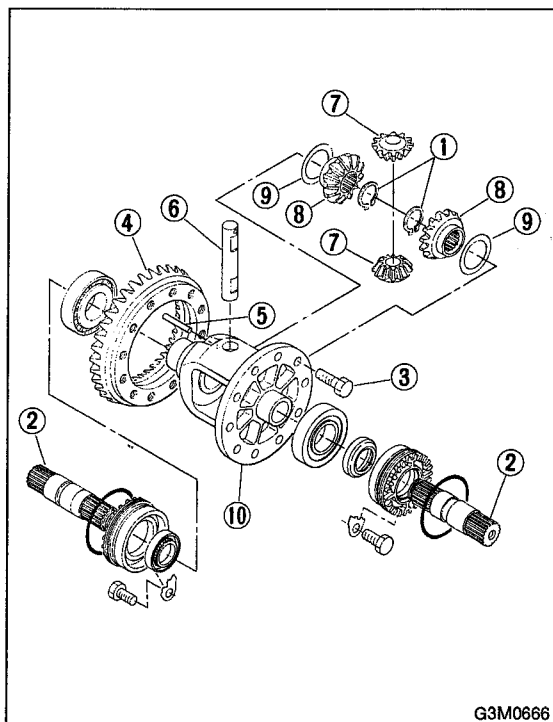
4) Install roller bearing (40 x 80 x 19.75) to differential case.

NOTE:

Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER

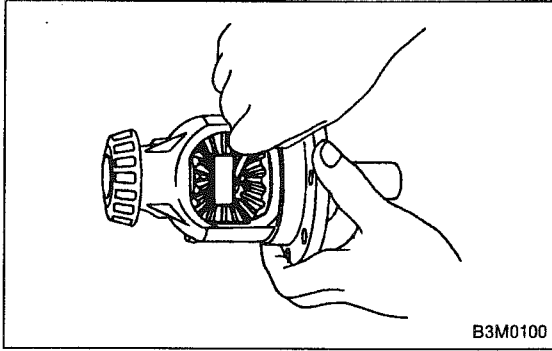
ST2 398497701 ADAPTER



5) Install hypoid driven gear ④ to differential case ⑩ using twelve bolts ③.

Tightening torque:

62 ± 5 N·m (6.3 ± 0.5 kg·m, 45.6 ± 3.6 ft·lb)



6) Position drive axle shaft in differential case and hold it with outer snap ring (28). Using a thickness gauge, measure clearance between the shaft and case is within specifications.

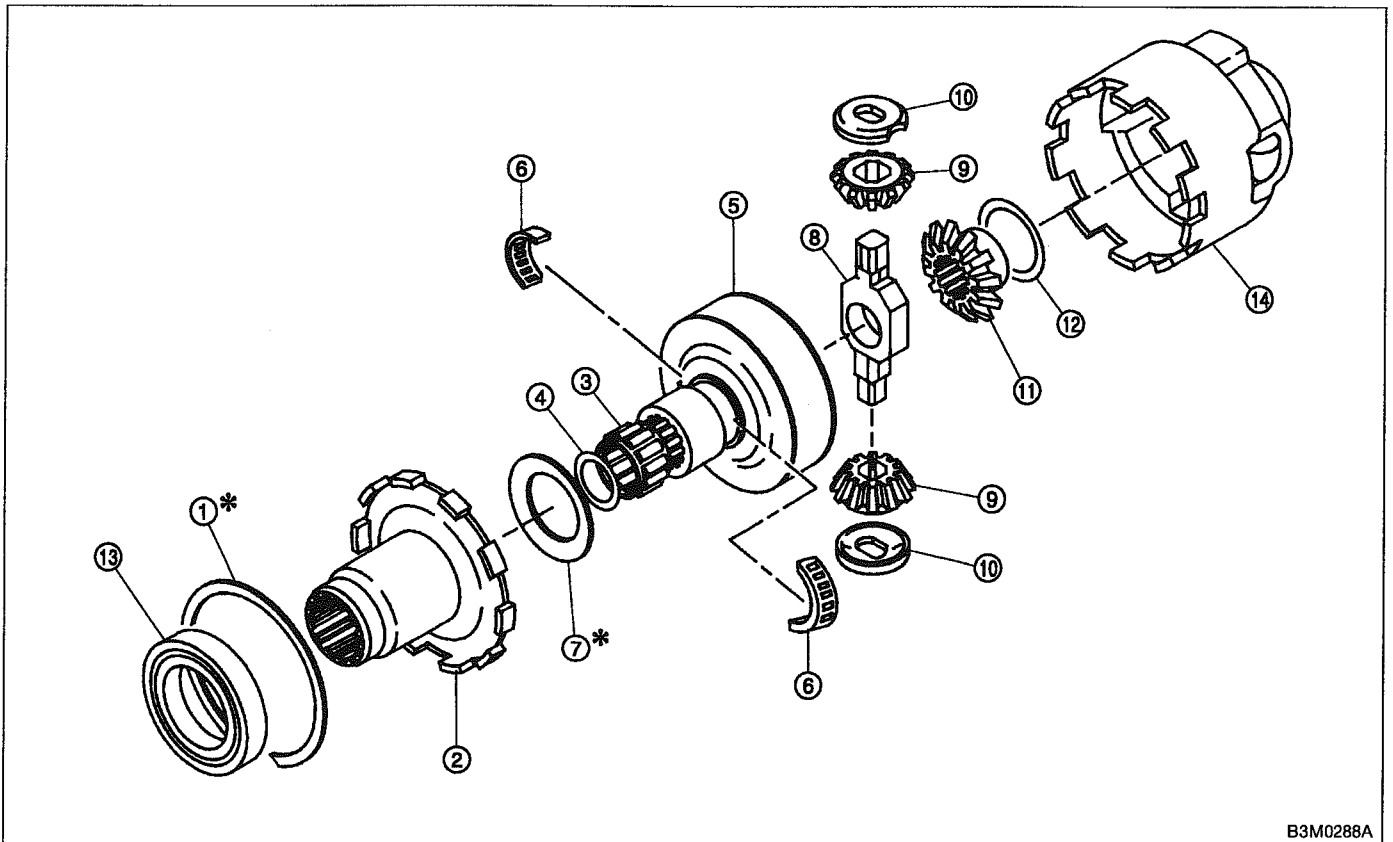
Clearance:

0 — 0.2 mm (0 — 0.008 in)

If it is not within specifications, replace snap ring with a suitable one.

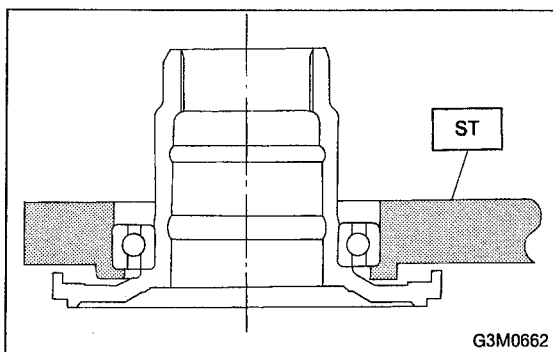
Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028011	1.05 (0.0413)
805028012	1.20 (0.0472)

7. Center Differential
A: DISASSEMBLY



B3M0288A

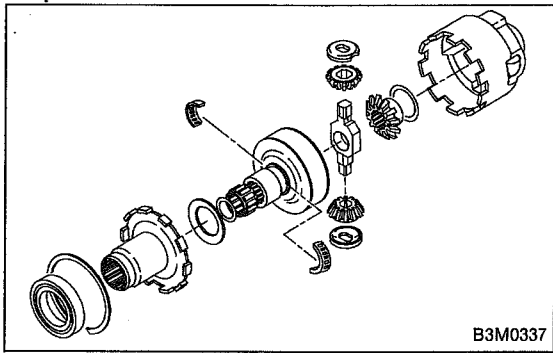
- 1) Remove snap ring ① (Inner-110) using flat bladed screwdriver.
- 2) Remove center differential cover ②.
- 3) Remove snap ring ④ and roller bearing ③.
- 4) Remove viscous coupling ⑤.
- 5) Remove needle bearings ⑥.
- 6) Remove adjusting washer ⑦ (45 x 62 x t).
- 7) Remove pinion shaft ⑧, bevel pinions ⑨ and retainers ⑩.
- 8) Remove side gear ⑪.
- 9) Remove thrust washer ⑫.



G3M0662

- 10) Remove ball bearing ⑬ using ST.
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER

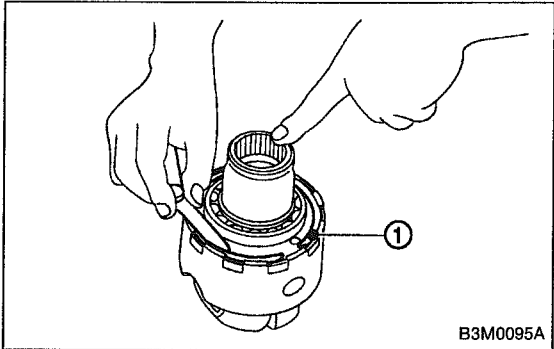
CAUTION:
Do not reuse ball bearing.

**B: ASSEMBLY**

Assembly is in the reverse order of disassembly.
Do the following:

- Install thrust washer with chamfered side of inner perimeter facing the side gear.
- Install adjusting washer with chamfered side of inner perimeter facing the viscous coupling using ST.

ST 499547300 INSTALLER SET



1) Selection of snap ring (Inner-110)

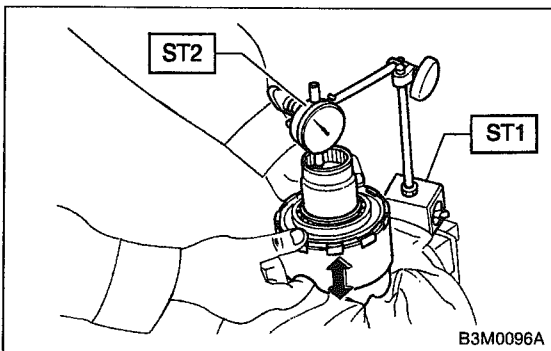
- (1) After assembling, using a thickness gauge measure clearance between snap ring ① and center differential case.

Clearance:

0 — 0.15 mm (0 — 0.0059 in)

- (2) If the measurement is not within the specification, select suitable snap ring.

Snap ring (Inner-110)	
Part No.	Thickness mm (in)
805100061	2.10 (0.0827)
805100062	2.21 (0.0870)
805100063	2.32 (0.0913)



2) Selection of adjusting washer (Backlash adjustment)

- (1) After assembling, set up a ST1 and ST2 to end of viscous coupling shaft. Move viscous coupling up and down, and measure backlash in the axial direction.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Backlash:

0.62 — 0.86 mm (0.0244 — 0.0339 in)

- (2) If the measurement is not within the specification, select suitable washer.

Adjusting washer (45 x 62 x t)	
Part No.	Thickness mm (in)
803045041	1.60 (0.0630)
803045042	1.80 (0.0709)
803045043	2.00 (0.0787)
803045044	2.20 (0.0866)
803045045	2.40 (0.0945)

1. Manual Transmission and Differential

Symptom and possible cause	Remedy
<p>1. Gears are difficult to intermesh. The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.</p>	
<p>(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear (b) Worn, damaged or burred chamfer of spline of gears (c) Worn or scratched bushings (d) Incorrect contact between synchronizer ring and gear cone or wear</p>	<p>Replace. Replace. Replace. Correct or replace.</p>
<p>2. Gear slips out. (1) Gear slips out when coasting on rough road. (2) Gear slips out during acceleration.</p>	
<p>(a) Defective pitching stopper adjustment (b) Loose engine mounting bolts (c) Worn fork shifter, broken shifter fork rail spring (d) Worn or damaged ball bearing (e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve (f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear) (g) Worn 1st driven gear, needle bearing and race (h) Worn 2nd driven gear, needle bearing and race (i) Worn 3rd drive gear and bushing (j) Worn 4th drive gear and bushing (k) Worn reverse idler gear and bushing</p>	<p>Adjust. Tighten or replace. Replace. Replace. Replace. Replace. Replace. Replace. Replace. Replace.</p>
<p>3. Unusual noise comes from transmission. If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.</p>	
<p>(a) Insufficient or improper lubrication (b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.</p>	<p>Lubricate or replace with specified oil. Replace.</p>

Symptom and possible cause	Remedy
<p>4. Broken differential (case, gear, bearing, etc.) Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.</p>	
<p>(a) Insufficient or improper oil</p> <p>(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch</p> <p>(c) Improper adjustment of taper roller bearing</p> <p>(d) Improper adjustment of drive pinion and hypoid driven gear</p> <p>(e) Excessive backlash due to worn differential side gear, washer or differential pinion</p> <p>(f) Loose hypoid driven gear clamping bolts</p>	<p>Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.</p> <p>Readjust bearing preload and backlash and face contact of gears.</p> <p>Adjust.</p> <p>Adjust.</p> <p>Add recommended oil to specified level. Do not use vehicle under severe operating conditions.</p> <p>Tighten.</p>
<p>5. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises.</p> <p>(1) Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc.</p> <p>(2) Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment</p> <p>(3) Bearing noise when driving or when coasting: Cracked, broken or damaged bearings</p> <p>(4) Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.</p>	
<p>(a) Insufficient oil</p> <p>(b) Improper adjustment of hypoid driven gear and drive pinion</p> <p>(c) Worn teeth of hypoid driven gear and drive pinion</p> <p>(d) Loose roller bearing</p> <p>(e) Distorted hypoid driven gear or differential case</p> <p>(f) Worn washer and differential pinion shaft</p>	<p>Lubricate.</p> <p>Check tooth contact.</p> <p>Replace as a set. Readjust bearing preload.</p> <p>Readjust hypoid driven gear to drive pinion backlash and check tooth contact.</p> <p>Replace.</p> <p>Replace.</p>

AUTOMATIC TRANSMISSION AND DIFFERENTIAL

3-2

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1. Automatic Transmission and Differential

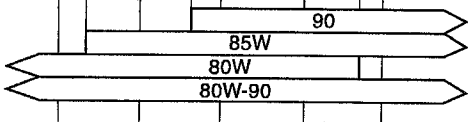
A: SPECIFICATIONS

Torque converter clutch	Type		Symmetric, 3 element, single stage, 2 phase torque converter clutch coupling	
	Stall torque ratio		2.1 — 2.3	
	Nominal diameter		236 mm (9.29 in)	
	Stall speed (at sea level)		2,300 — 2,700 rpm	
	One-way clutch		Sprague type one-way clutch	
Automatic transmission	Transmission	Type	4-forward, 1-reverse, double-row planetary gears	
		Control element	Multi-plate clutch	4 sets
			Multi-plate brake	1 set
			Band brake	1 set
			One-way clutch (sprague type)	2 sets
		Gear ratio	1st	2.785
			2nd	1.545
			3rd	1.000
			4th	0.694
			Reverse	2.272
		Tooth number of planetary gear	Front sun gear	33
			Front pinion	21
			Front internal gear	75
			Rear sun gear	42
			Rear pinion	17
			Rear internal gear	75
		Clutch number of reverse clutch	Drive plate & driven plate	2
		Clutch number of high clutch	Drive plate & driven plate	4
		Clutch number of forward clutch	Drive plate & driven plate	5
		Clutch number of overrunning clutch	Drive plate & driven plate	3
		Clutch number of low & reverse brake	Drive plate & driven plate	5
		Selector position	P (Park)	Transmission in neutral, output member immovable, and engine start possible
			R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral, and engine start possible			
D (Drive)	Automatic gear change 1st ↔ 2nd ↔ 3rd ↔ 4th			
3 (3rd)	Automatic gear change 1st ↔ 2nd ↔ 3rd ← 4th			
2 (2nd)	2nd gear locked (Deceleration possible 4th → 3rd → 2nd)			
1 (1st)	1st gear locked (Deceleration possible 4th → 3rd → 2nd → 1st)			
Control method	Hydraulic remote control			

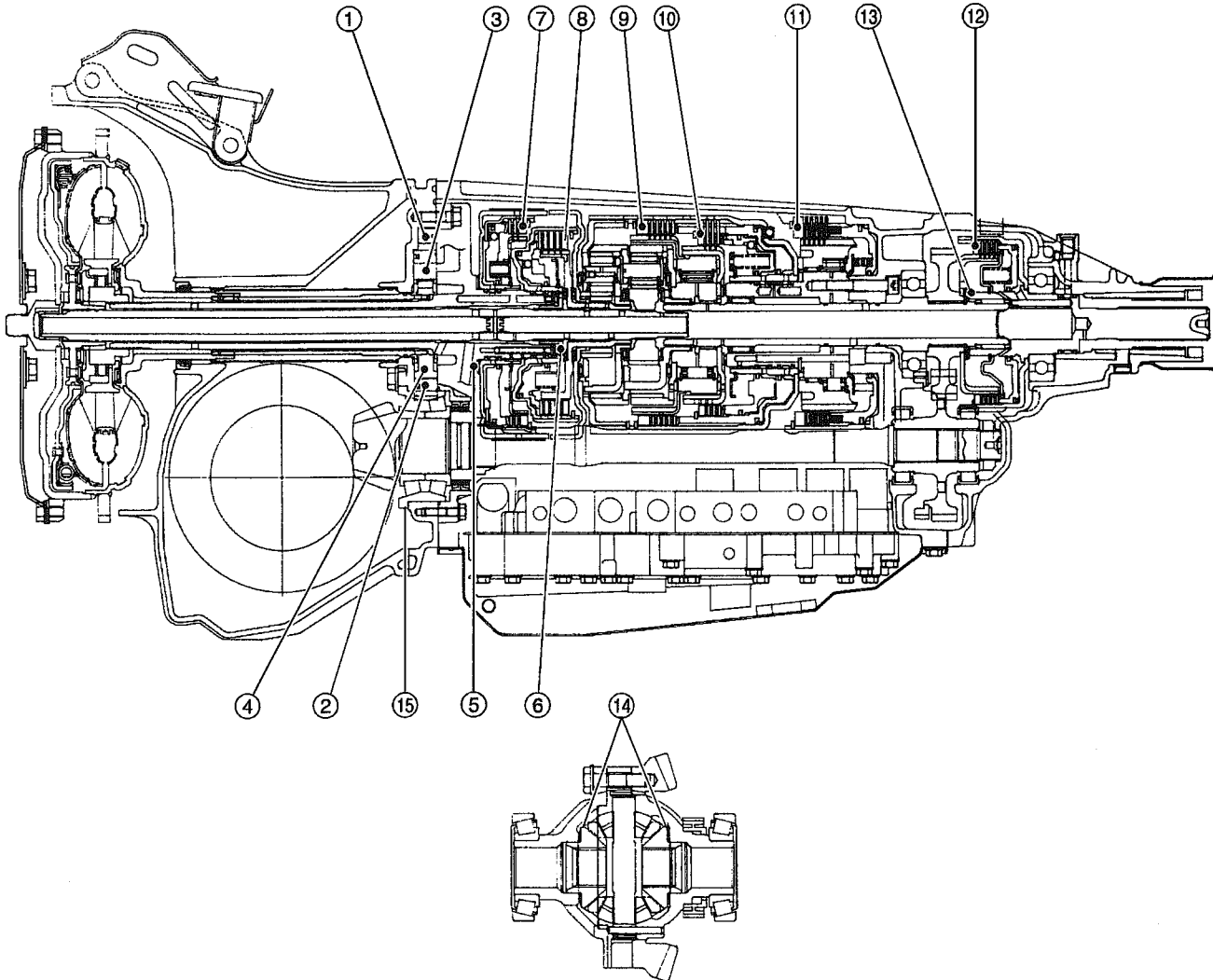
SPECIFICATIONS AND SERVICE DATA

[S1A0] 3-2

1. Automatic Transmission and Differential

Automatic transmission	Oil pump	Type	Variable-capacity type vane pump																				
		Driving method	Driven by engine																				
		Number of vanes	9 pieces																				
	Hydraulic control	Type	Electronic/hydraulic control [Four forward speed changes by electrical signals of car speed and accelerator (throttle) opening]																				
		Fluid	Dexron II or Dexron III type Automatic transmission fluid																				
		Fluid capacity	7.9 ℓ (8.4 US qt, 7.0 Imp qt)																				
	Lubrication	Lubrication system	Forced feed lubrication with oil pump																				
		Oil	Automatic transmission fluid (above mentioned.)																				
	Cooling	Cooling system	Liquid-cooled cooler incorporated in radiator																				
	Harness	Inhibitor switch	12 poles																				
		Transmission harness	13 poles																				
	Transfer	Transfer clutch	Hydraulic multi-plate clutch																				
		Clutch number of transfer clutch	Drive plate & driven plate	5																			
		Control method	Electronic, hydraulic type																				
		Lubricant	The same Automatic Transmission Fluid used in automatic transmission.																				
1st reduction gear ratio		1.000 (53/53)																					
Final reduction	Final gear ratio	Front drive	4.111 (37/9)																				
	Speedometer gear ratio		0.83 (19/23)																				
	Recommended oil		<div style="text-align: center;"> <p>ITEM</p> <ul style="list-style-type: none"> • Front differential gear oil <p>API Classification</p> <p>GL - 5</p> <p>SAE Viscosity No. and Applicable Temperature</p> <table style="margin: 0 auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">(°C)</th> <th style="text-align: center;">-30</th> <th style="text-align: center;">-26</th> <th style="text-align: center;">-15</th> <th style="text-align: center;">-5</th> <th style="text-align: center;">0</th> <th style="text-align: center;">15</th> <th style="text-align: center;">25</th> <th style="text-align: center;">30</th> </tr> </thead> <tbody> <tr> <th style="text-align: left;">(°F)</th> <th style="text-align: center;">-22</th> <th style="text-align: center;">-15</th> <th style="text-align: center;">-5</th> <th style="text-align: center;">23</th> <th style="text-align: center;">32</th> <th style="text-align: center;">59</th> <th style="text-align: center;">77</th> <th style="text-align: center;">86</th> </tr> </tbody> </table>  <p style="text-align: right; margin-top: 10px;">H3M1235A</p> </div>			(°C)	-30	-26	-15	-5	0	15	25	30	(°F)	-22	-15	-5	23	32	59	77	86
	(°C)	-30	-26	-15	-5	0	15	25	30														
	(°F)	-22	-15	-5	23	32	59	77	86														
Oil capacity	Front drive	1.2 ℓ (1.3 US qt, 1.1 Imp qt)																					
ATF cooling system	Radiation capacity	1.97 kW (1,700 kcal/h, 6,746 BTU/h)																					

B: ADJUSTING PARTS



H3M1236A

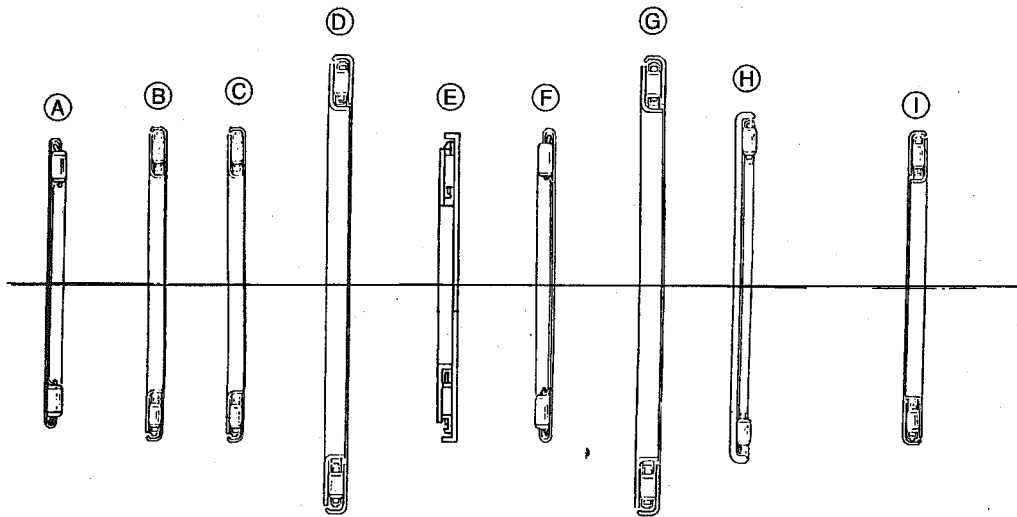
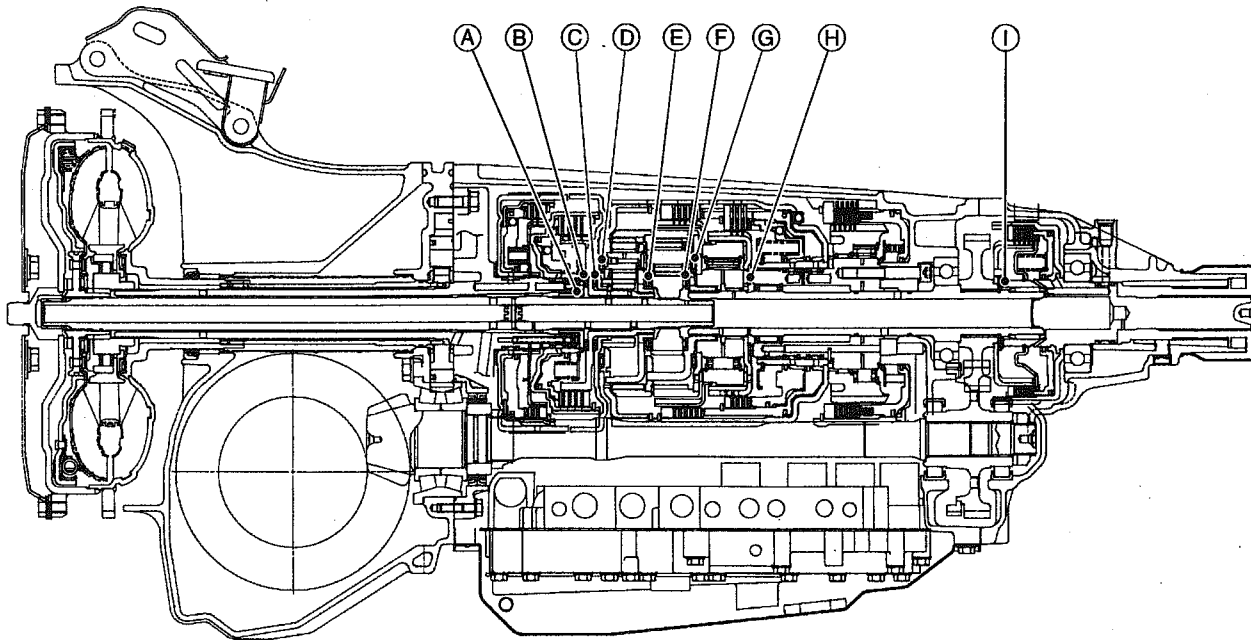
SPECIFICATIONS AND SERVICE DATA

[S1B0] 3-2

1. Automatic Transmission and Differential

No.	Part Name	Part Number	Dimension mm (in)	Application
1	Control piston	31235AA000 — 030	13.5 ^{-0.030} / _{-0.037} (0.5315 ^{-0.0012} / _{-0.0015}), 13.5 ^{-0.023} / _{-0.030} (0.5315 ^{-0.0009} / _{-0.0012}), 13.5 ^{-0.016} / _{-0.023} (0.5315 ^{+0.0006} / _{-0.0009}), 13.5 ^{-0.009} / _{-0.016} (0.5315 ^{+0.0004} / _{-0.0006})	Adjusting side clearance of oil pump
2	Cam ring	31241AA001 — 031	17 ^{-0.010} / _{-0.017} (0.6693 ^{-0.0004} / _{-0.0007}), 17 ^{-0.003} / _{-0.010} (0.6693 ^{-0.0001} / _{-0.0004}), 17 ^{+0.004} / _{-0.003} (0.6693 ^{+0.0002} / _{-0.0001}), 17 ^{+0.011} / _{+0.004} (0.6693 ^{+0.0002} / _{+0.0002})	Adjusting side clearance of oil pump
3	Vane (Oil pump)	31243AA000 — 030	17 ^{-0.030} / _{-0.037} (0.6693 ^{-0.0012} / _{-0.0015}), 17 ^{-0.023} / _{-0.030} (0.6693 ^{-0.0009} / _{-0.0012}), 17 ^{-0.016} / _{-0.023} (0.6693 ^{-0.0006} / _{-0.0009}), 17 ^{+0.009} / _{+0.016} (0.6693 ^{+0.0004} / _{+0.0006})	Adjusting side clearance of oil pump
4	Rotor (Oil pump)	31240AA000 — 030	17 ^{-0.030} / _{-0.037} (0.6693 ^{-0.0012} / _{-0.0015}), 17 ^{-0.023} / _{-0.030} (0.6693 ^{-0.0009} / _{-0.0012}), 17 ^{-0.016} / _{-0.023} (0.6693 ^{-0.0006} / _{-0.0009}), 17 ^{+0.009} / _{+0.016} (0.6693 ^{+0.0004} / _{+0.0006})	Adjusting side clearance of oil pump
5	Thrust washer (Reverse clutch)	31299AA000 — 060	0.7, 0.9, 1.1, 1.3, 1.5, 1.7, 1.9 (0.028, 0.035, 0.043, 0.051, 0.059, 0.067, 0.075)	Adjusting end play of reverse clutch drum
6	Bearing race	803031021 — 027	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0 (0.031, 0.039, 0.047, 0.055, 0.063, 0.071, 0.079)	Adjusting total end play
7	Retaining plate	31567AA350 — 400	4.6, 4.8, 5.0, 5.2, 5.4, 5.6 (0.181, 0.189, 0.197, 0.205, 0.213, 0.220)	Adjusting clearance of reverse clutch
8	Retaining plate	31567AA190 — 260	3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 (0.142, 0.150, 0.157, 0.165, 0.173, 0.181, 0.189, 0.197)	Adjusting clearance of high clutch
9	Retaining plate	31567AA010, 31567AA060 — 110	4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2 (0.157, 0.165, 0.173, 0.181, 0.189, 0.197, 0.205)	Adjusting clearance of forward clutch
10	Retaining plate	31567AA410 — 470	8.0, 8.2, 8.4, 8.6, 8.8, 9.0, 9.2 (0.315, 0.323, 0.331, 0.339, 0.346, 0.354, 0.362)	Adjusting clearance of overrunning clutch
11	Retaining plate No. 2	31667AA180 — 250 31667AA310	6.5, 6.8, 7.1, 7.4, 7.7, 8.0, 8.2, 8.4, 8.6 (0.256, 0.268, 0.280, 0.291, 0.303, 0.315, 0.323, 0.331, 0.339)	Adjusting clearance of low and reverse brake
12	Pressure plate (Front)	31593AA151 — 181	3.3, 3.7, 4.1, 4.5 (0.130, 0.146, 0.161, 0.177)	Adjusting clearance of transfer clutch
13	Thrust bearing (35 x 53 x T)	806536020, 806535030 — 070, 090	3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 (0.150, 0.157, 0.165, 0.173, 0.181, 0.189, 0.197)	Adjusting end play of transfer clutch
14	Washer (38.1 x 50 x T)	803038021 — 023	0.95, 1.00, 1.05 (0.0374, 0.0394, 0.0413)	Adjusting backlash of differential bevel gear
15	Drive pinion shim	31451AA050 — 100	0.150, 0.175, 0.200, 0.225, 0.250, 0.275 (0.0059, 0.0069, 0.0079, 0.0089, 0.0098, 0.0108)	Adjusting drive pinion height

C: LOCATION AND INSTALLING DIRECTION OF THRUST NEEDLE BEARING



H3M1237A

SPECIFICATIONS AND SERVICE DATA

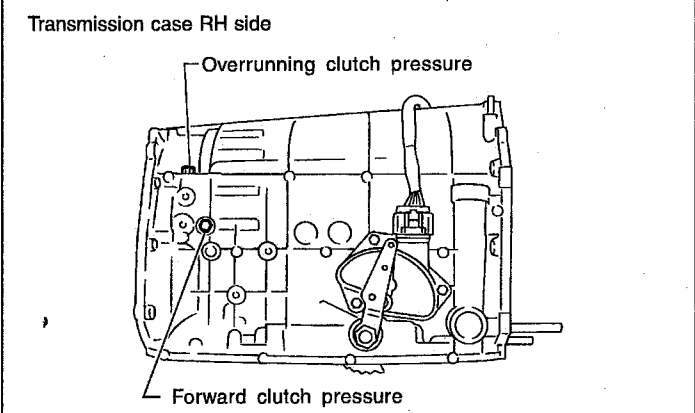
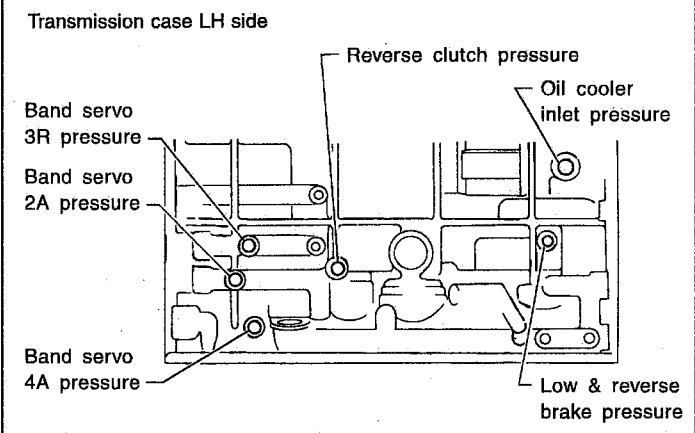
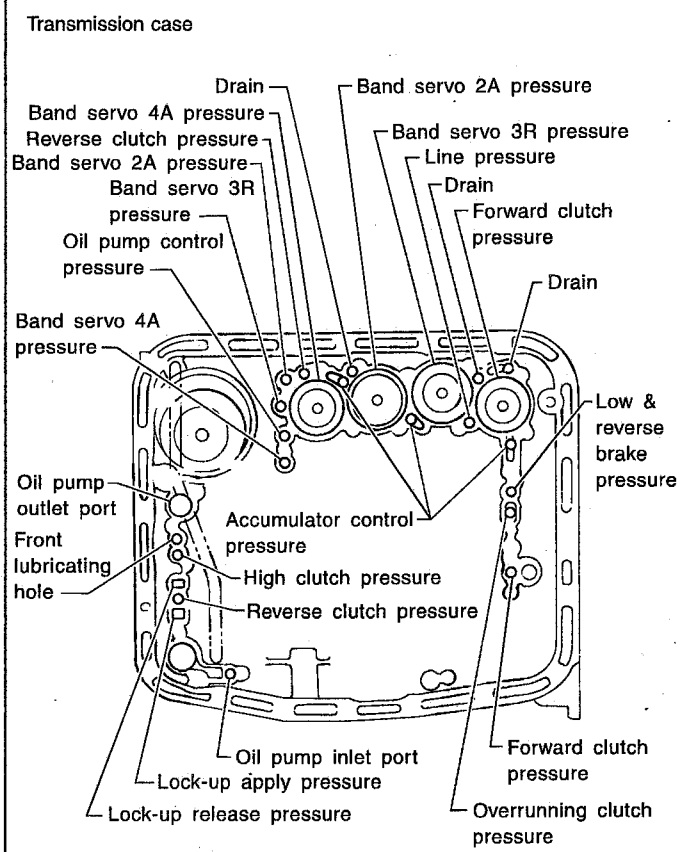
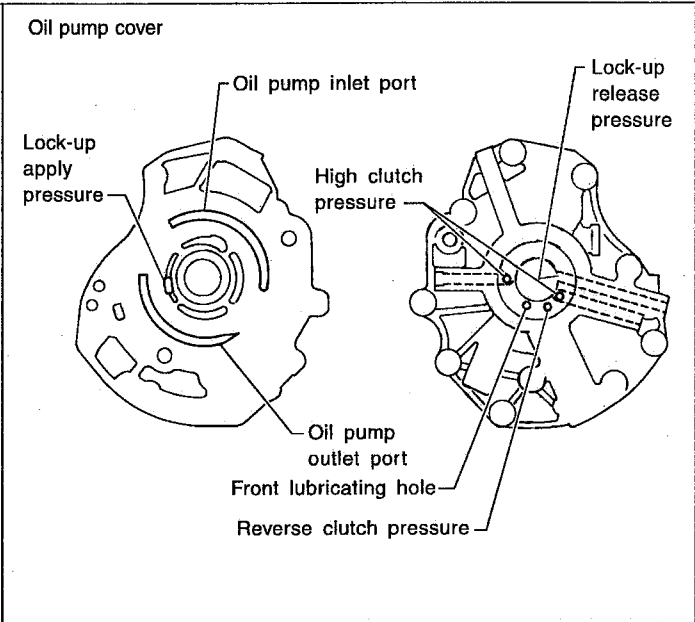
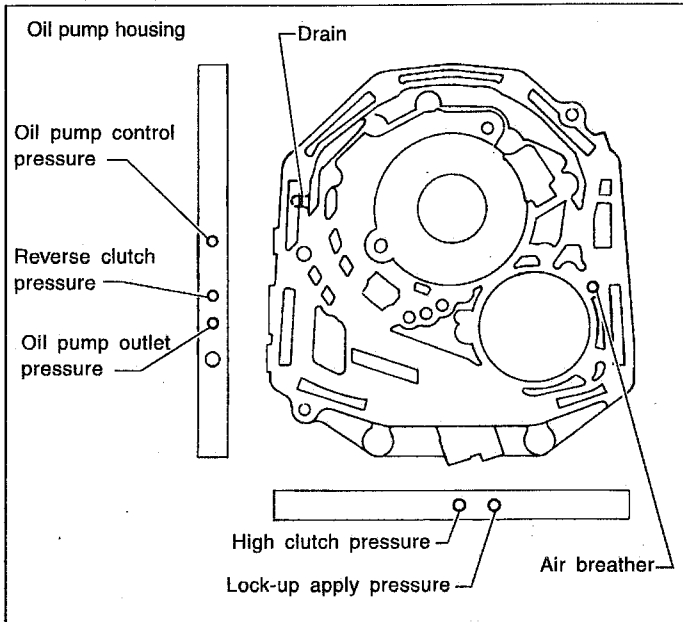
[S1C0] 3-2

1. Automatic Transmission and Differential

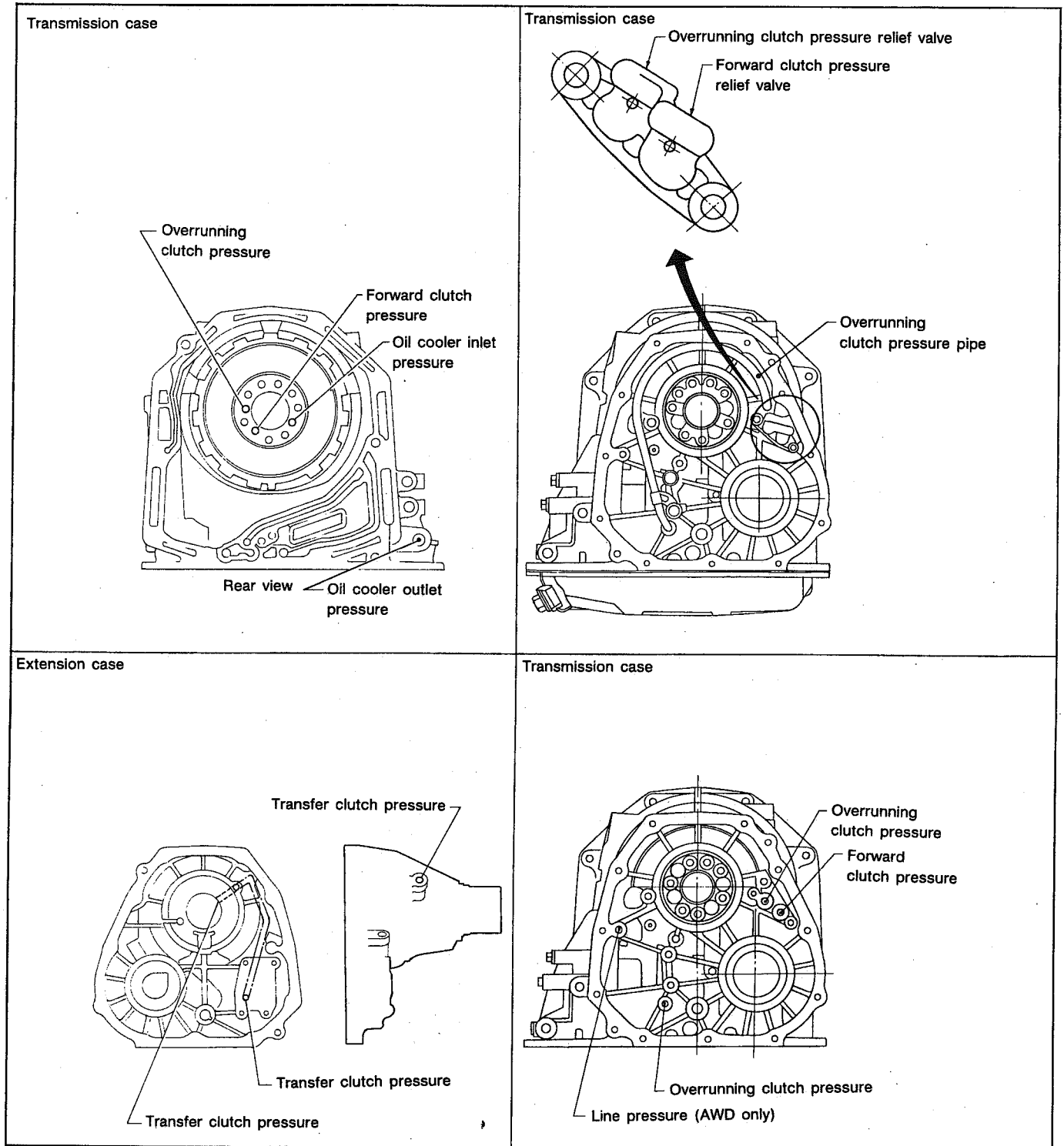
Unit: mm (in)

No.	Part Name	Part Number	Inside diameter	Outside diameter	Dimension	Application
A	Thrust needle bearing	806530020	30 (1.18)	47 (1.85)	3.3 (0.130)	A place of high clutch
B	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of high clutch hub
C	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of front sun gear
D	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of front planetary carrier
E	Thrust needle bearing	806535120	35 (1.38)	53 (2.09)	4.8 (0.189)	A place of rear sun gear
F	Thrust needle bearing	806534010	34 (1.34)	53 (2.09)	3.37 (0.1327)	A place of rear internal gear
G	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of overrunning clutch hub
H	Thrust needle bearing	806542010	42 (1.65)	59 (2.32)	3.6 (0.142)	A place of low & reverse brake
I	Thrust needle bearing	806536020 806535030 ~ 806535070 806535090	36 (1.42)	53 (2.09)	3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 (0.150, 0.157, 0.165, 0.173, 0.181, 0.189, 0.197)	Adjusting end play of transfer clutch

D: FLUID PASSAGES

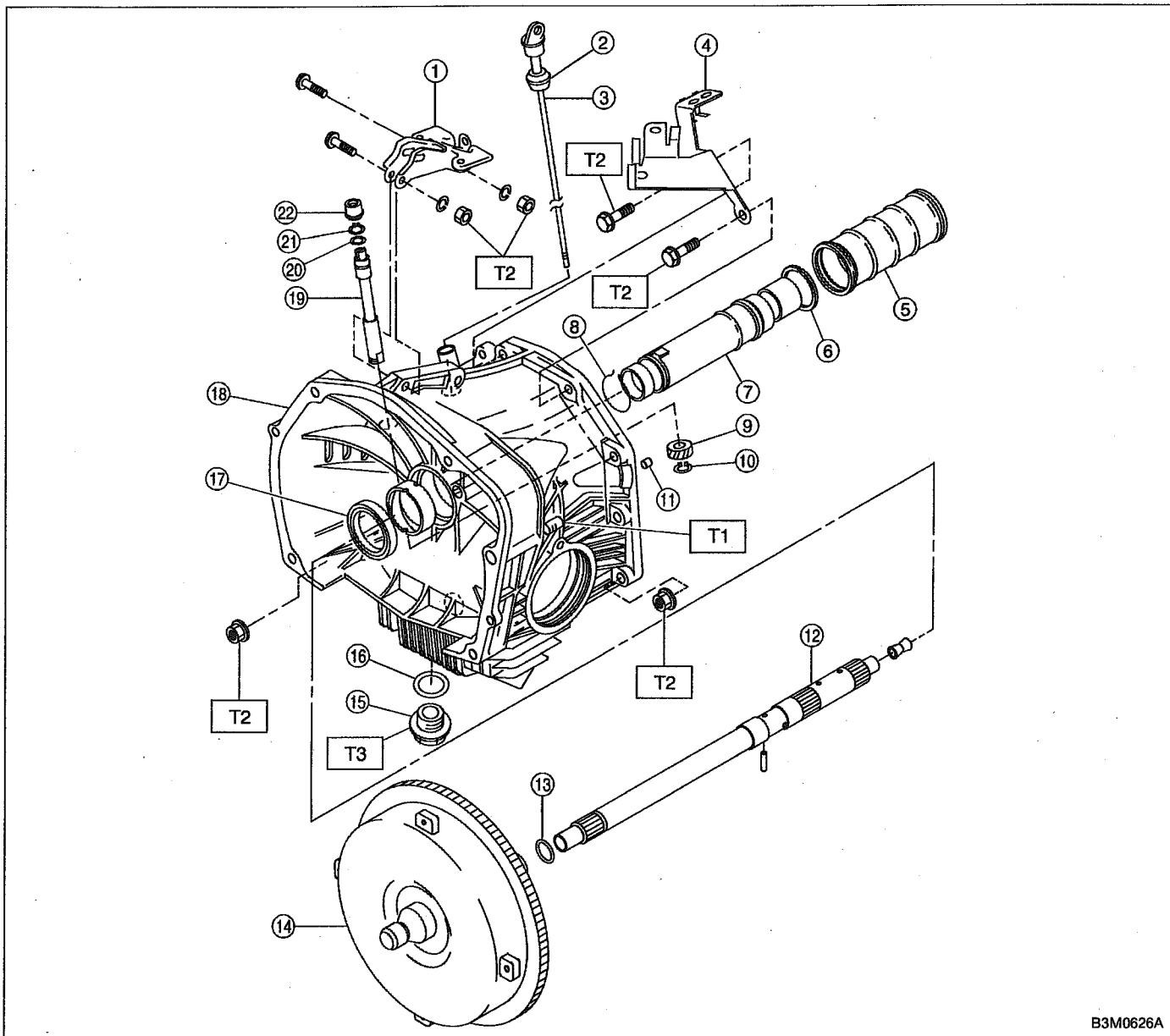


H3M1238A



G3M0777

1. Torque Converter Clutch and Case



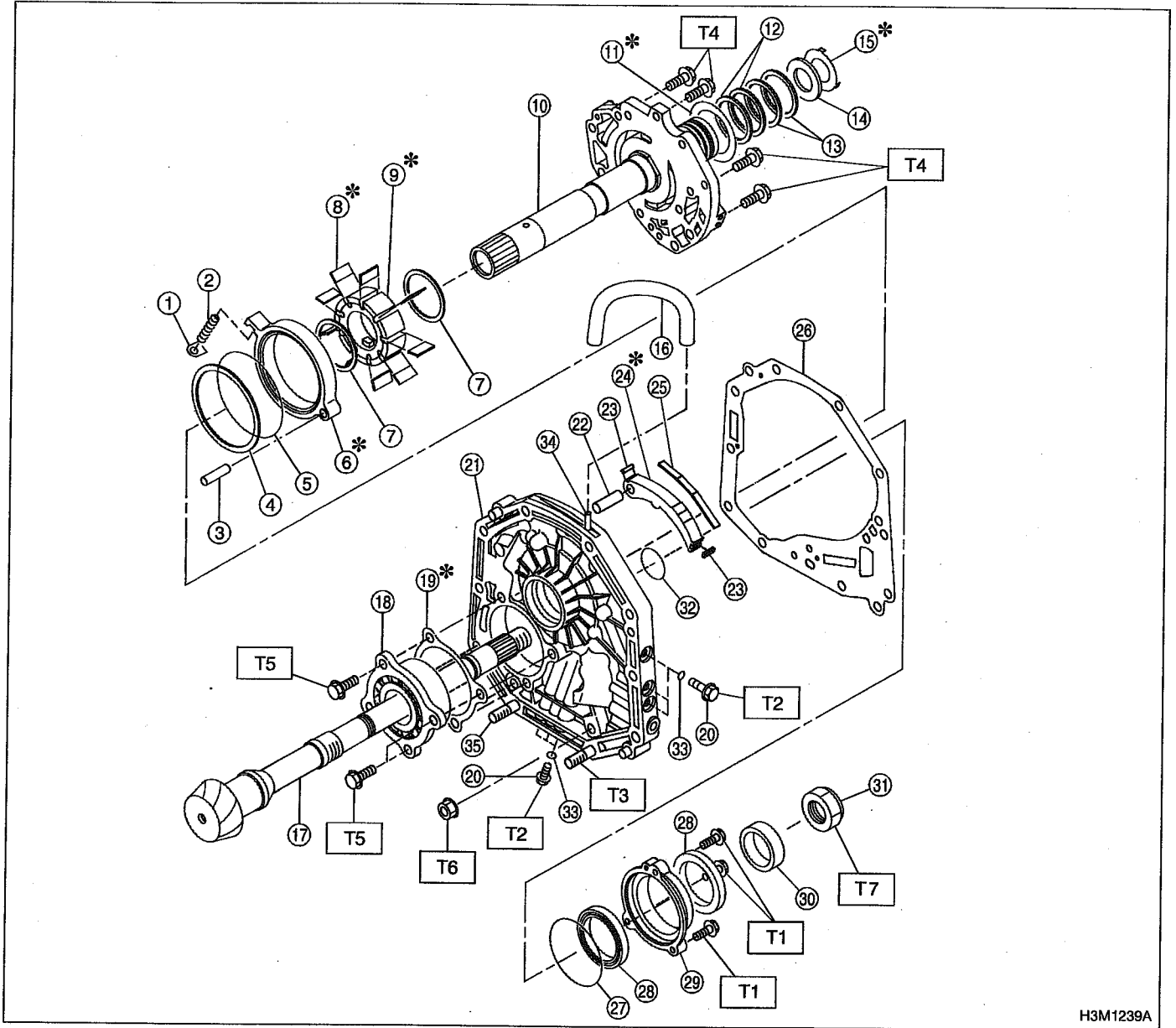
B3M0626A

- ① Pitching stopper bracket
- ② O-ring
- ③ Oil level gauge
- ④ Stay
- ⑤ Seal pipe
- ⑥ Seal ring
- ⑦ Oil pump shaft
- ⑧ Clip
- ⑨ Speedometer driven gear
- ⑩ Snap ring
- ⑪ Oil drain pipe
- ⑫ Input shaft
- ⑬ O-ring
- ⑭ Torque converter clutch

- ⑮ Drain plug
- ⑯ Gasket
- ⑰ Oil seal
- ⑱ Torque converter clutch case
- ⑲ Speedometer shaft
- ⑳ Washer
- ㉑ Snap ring
- ㉒ Oil seal

Tightening torque: N·m (kg·m, ft·lb)**T1: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)****T2: 41 ± 3 (4.2 ± 0.3, 30.4 ± 2.2)****T3: 44 ± 3 (4.5 ± 0.3, 32.5 ± 2.2)**

2. Oil Pump



H3M1239A

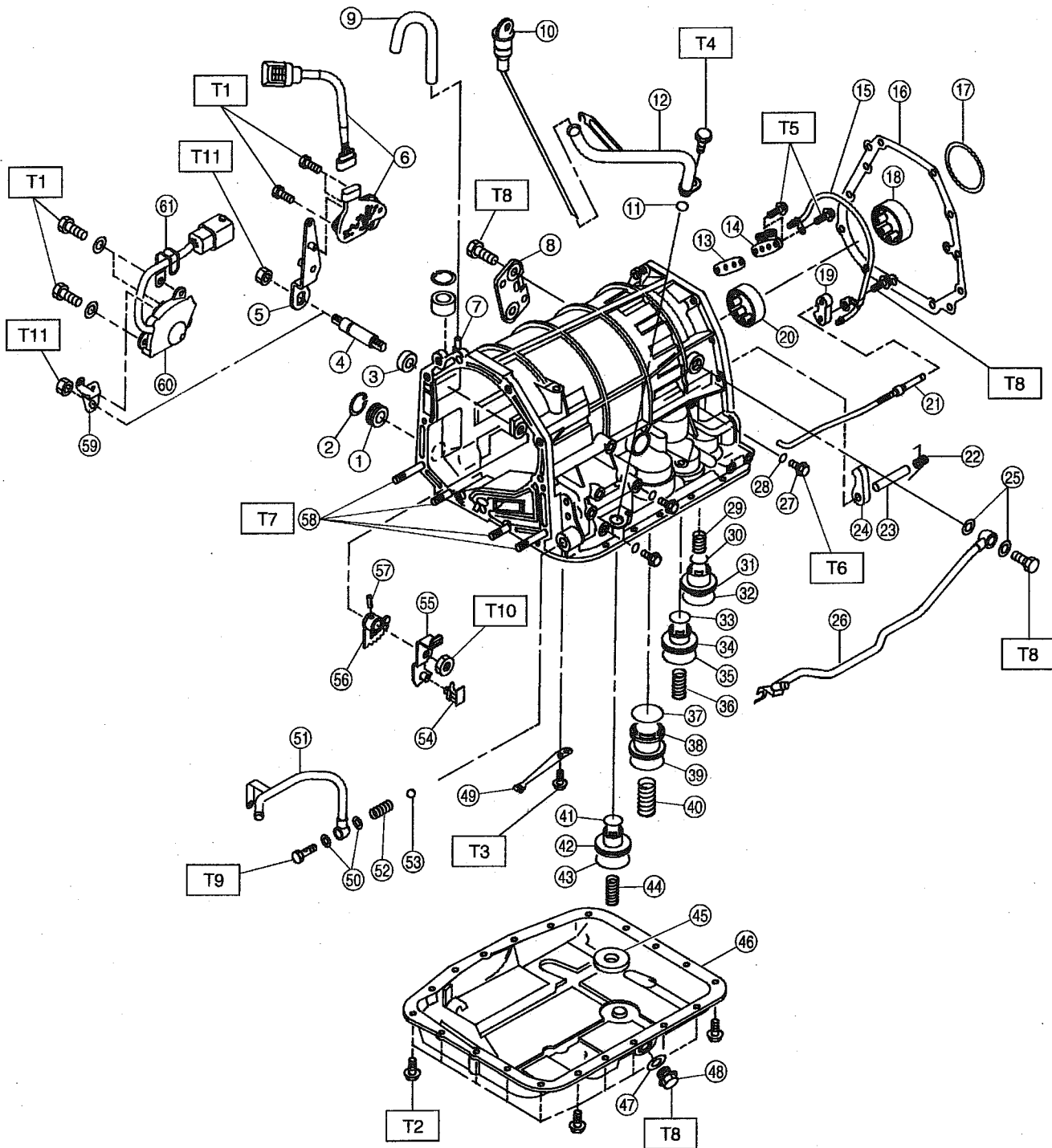
- ① Retainer
- ② Return spring
- ③ Pin
- ④ Friction ring
- ⑤ O-ring
- ⑥ Cam ring
- ⑦ Vane ring
- ⑧ Vane
- ⑨ Rotor
- ⑩ Oil pump cover
- ⑪ Thrust washer
- ⑫ Seal ring (R)
- ⑬ Seal ring (H)
- ⑭ Thrust needle bearing
- ⑮ Thrust washer

- ⑯ Air breather hose
- ⑰ Drive pinion shaft
- ⑱ Roller bearing
- ⑲ Shim
- ⑳ Test plug
- ㉑ Oil pump housing
- ㉒ Pin
- ㉓ Side seal
- ㉔ Control piston
- ㉕ Plane seal
- ㉖ Gasket
- ㉗ O-ring
- ㉘ Oil seal
- ㉙ Oil seal retainer
- ㉚ Drive pinion collar

- ㉛ Lock nut
- ㉜ O-ring
- ㉝ O-ring
- ㉞ Nipple
- ㉟ Stud bolt

Tightening torque: N·m (kg·m, ft·lb)
T1: 7 ± 1 (0.7 ± 0.1, 5.1 ± 0.7)
T2: 13 ± 1 (1.3 ± 0.1, 9.4 ± 0.7)
T3: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)
T4: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)
T5: 39 ± 3 (4.0 ± 0.3, 28.9 ± 2.2)
T6: 41 ± 3 (4.2 ± 0.3, 30.4 ± 2.2)
T7: 113 ± 5 (11.5 ± 0.5, 83.2 ± 3.6)

3. Transmission Case, Transmission Cover and Control Device



H3M1240A

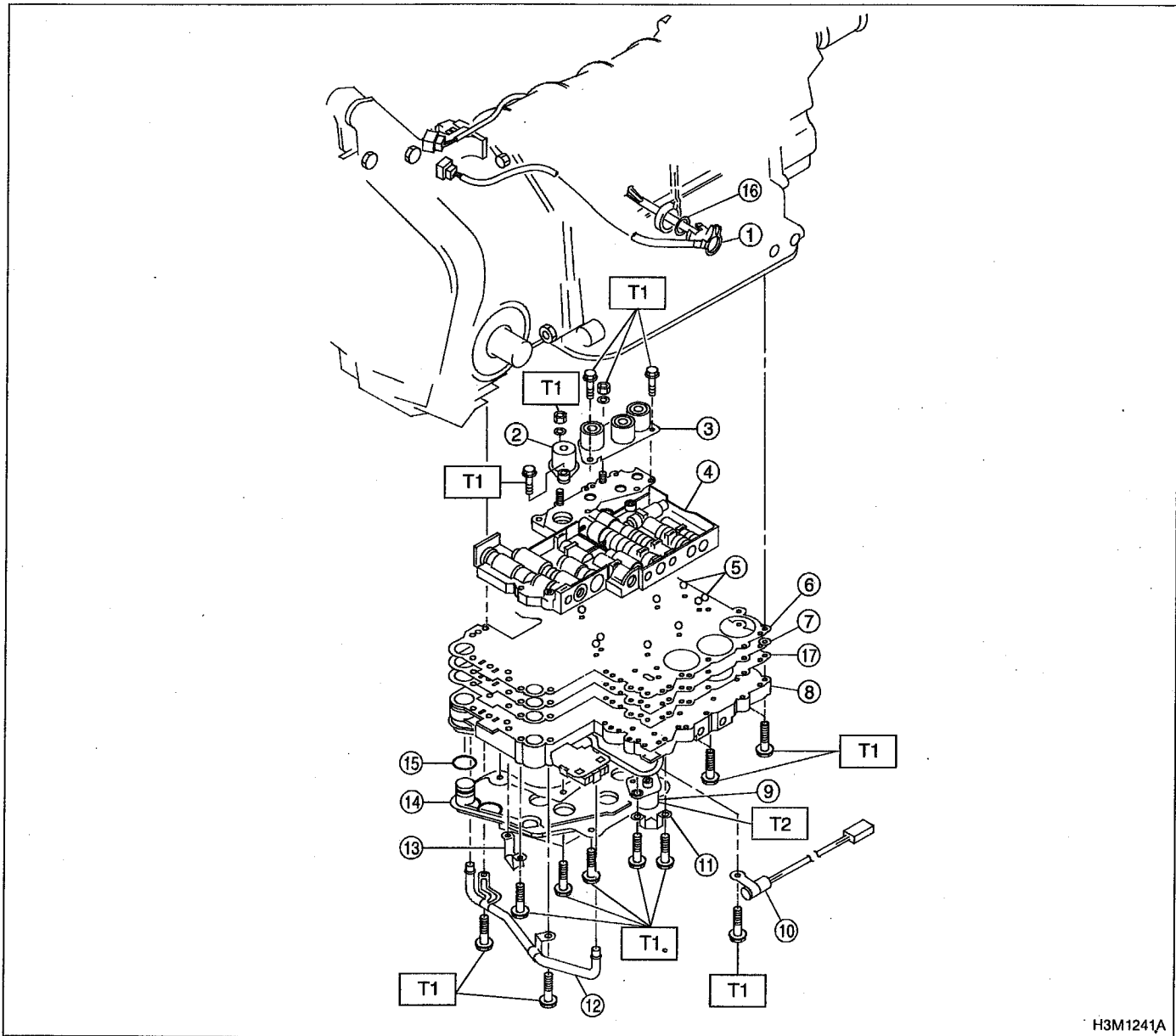
- ① Plug
- ② Snap ring
- ③ Oil seal
- ④ Manual shaft
- ⑤ Range select lever (Plastic body type)
- ⑥ Inhibitor switch ASSY (Plastic body type)
- ⑦ Nipple
- ⑧ Plate ASSY
- ⑨ Air breather hose
- ⑩ Oil level gauge
- ⑪ O-ring
- ⑫ Oil charger pipe
- ⑬ Gasket
- ⑭ Relief valve
- ⑮ Pipe
- ⑯ Gasket
- ⑰ Shim
- ⑱ Roller bearing
- ⑲ Parking support
- ⑳ Ball bearing
- ㉑ Parking rod
- ㉒ Return spring
- ㉓ Shaft
- ㉔ Parking pawl
- ㉕ Gasket
- ㉖ Inlet pipe
- ㉗ Test plug
- ㉘ O-ring
- ㉙ Spring
- ㉚ O-ring
- ㉛ Accumulator piston (N-D)
- ㉜ O-ring
- ㉝ O-ring
- ㉞ Accumulator piston (2-3)
- ㉟ O-ring
- ⓪ Spring
- ⓫ O-ring
- ⓬ Accumulator piston (1-2)

- ⓭ O-ring
- ⓮ Spring
- ⓯ O-ring
- ⓰ Accumulator piston (3-4)
- ⓱ O-ring
- ⓲ Spring
- ⓳ Magnet
- ⓴ Oil pan
- ⓵ Gasket
- ⓶ Drain plug
- ⓷ Detention spring
- ⓸ Gasket
- ⓹ Outlet pipe
- ⓺ Spring
- ⓻ Ball
- ⓼ Stopper
- ⓽ Manual lever
- ⓾ Manual plate
- ⓿ Spring pin
- ⓿ Stud bolt
- ⓿ Range select lever (Aluminum body type)
- ⓿ Inhibitor switch (Aluminum body type)
- ⓿ Clip (Aluminum body type)

Tightening torque: N·m (kg-m, ft-lb)

- T1: 3.4 ± 0.5 (0.35 ± 0.05, 2.5 ± 0.4)**
 - T2: 4.9 ± 0.5 (0.50 ± 0.05, 3.6 ± 0.4)**
 - T3: 5.9 ± 1.0 (0.60 ± 0.10, 4.3 ± 0.7)**
 - T4: 6.4 ± 0.5 (0.65 ± 0.05, 4.7 ± 0.4)**
 - T5: 7.8 ± 1.0 (0.80 ± 0.10, 5.8 ± 0.7)**
 - T6: 12.7 ± 1.0 (1.30 ± 0.10, 9.4 ± 0.7)**
 - T7: 17.7 ± 2.9 (1.80 ± 0.30, 13.0 ± 2.2)**
 - T8: 24.5 ± 2.0 (2.50 ± 0.20, 18.1 ± 1.4)**
 - T9: 34.3 ± 2.9 (3.50 ± 0.30, 25.3 ± 2.2)**
 - T10: 47.1 ± 2.0 (4.80 ± 0.20, 34.7 ± 1.4)**
 - T11: 47.1 ± 4.9 (4.80 ± 0.50, 34.7 ± 3.6)**
-

4. Control Valve and Harness Routing



H3M1241A

- ① Transmission harness
- ② Duty solenoid A (Line pressure)
- ③ Shift solenoid ASSY
- ④ Upper valve body
- ⑤ Ball
- ⑥ Upper separator gasket
- ⑦ Lower separator gasket
- ⑧ Lower valve body
- ⑨ Duty solenoid B (Lock-up)
- ⑩ ATF temperature sensor
- ⑪ Bracket

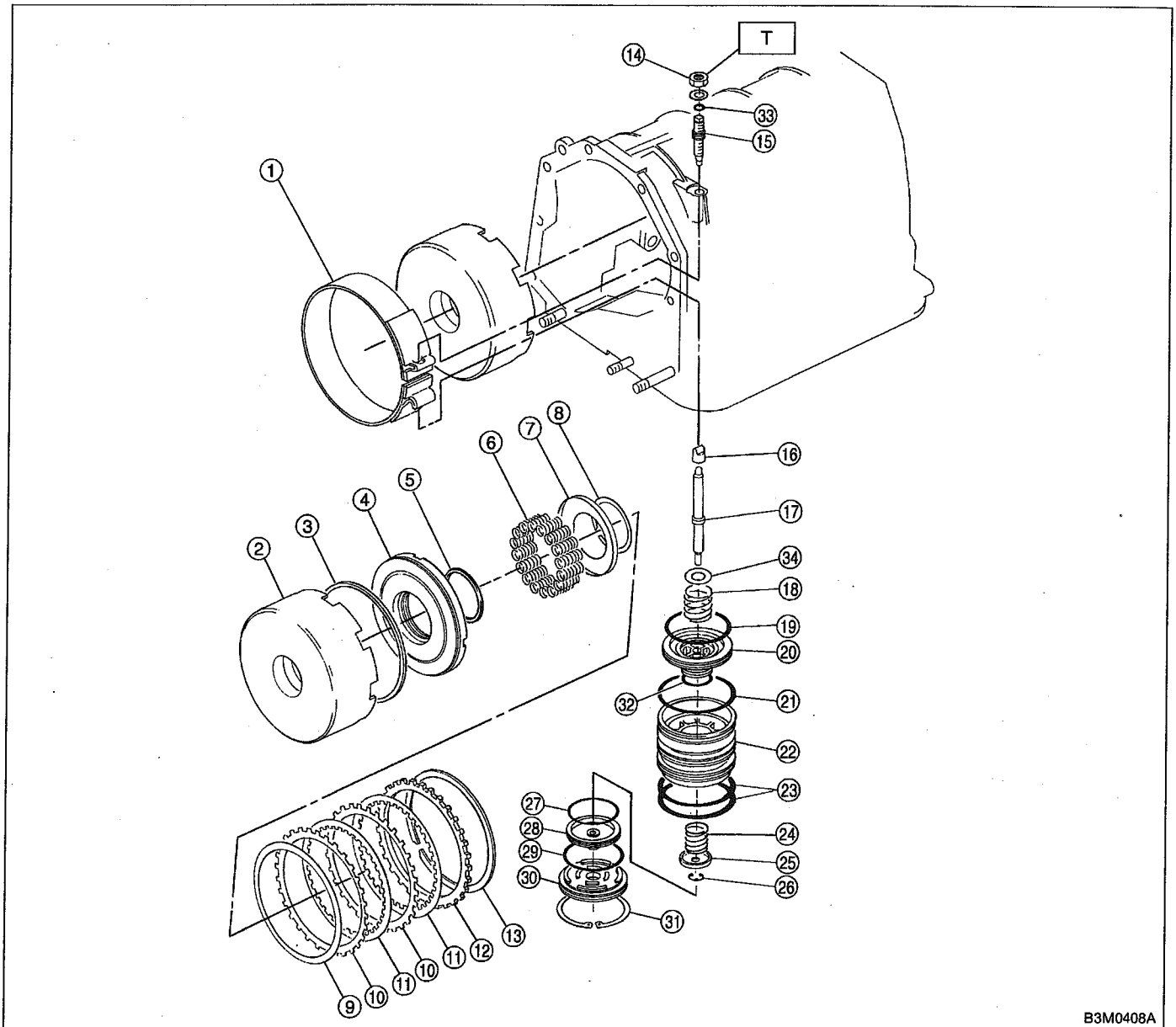
- ⑫ Pipe
- ⑬ Bracket
- ⑭ Oil strainer
- ⑮ O-ring
- ⑯ O-ring
- ⑰ Separator plate

Tightening torque: N·m (kg·m, ft·lb)

T1: 8 ± 1 (0.8 ± 0.1 , 5.8 ± 0.7)

T2: 11.3 ± 1.5 (1.15 ± 0.15 , 8.3 ± 1.1)

5. Reverse Clutch and Brake Band



B3M0408A

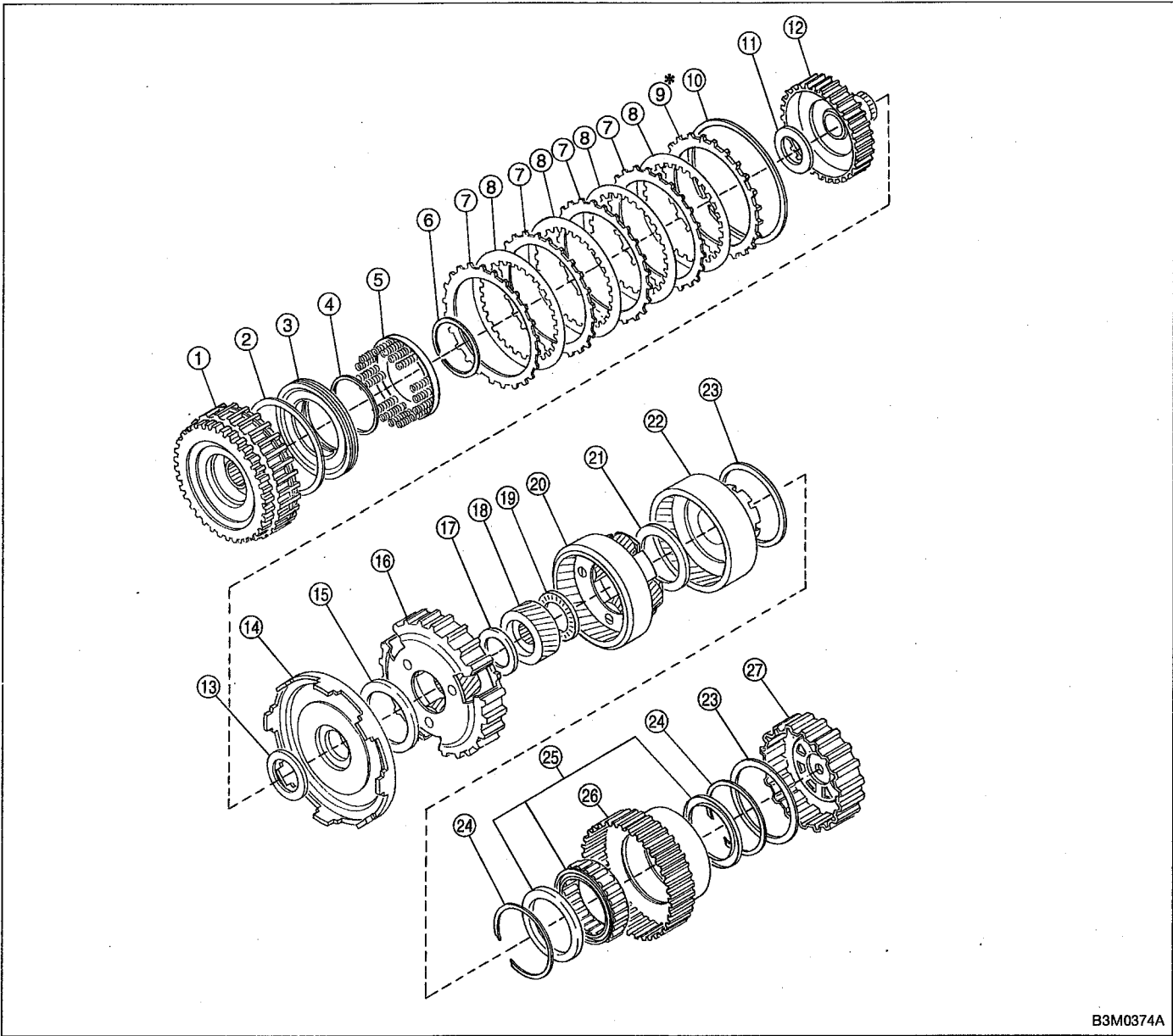
- ① Brake band
- ② Reverse clutch drum
- ③ Lip seal
- ④ Piston
- ⑤ Lathe cut seal ring
- ⑥ Spring
- ⑦ Spring retainer
- ⑧ Snap ring
- ⑨ Dish plate
- ⑩ Driven plate
- ⑪ Drive plate
- ⑫ Retaining plate
- ⑬ Snap ring

- ⑭ Lock nut
- ⑮ Brake band adjusting screw
- ⑯ Strut
- ⑰ Band servo piston stem
- ⑱ Spring
- ⑲ Lathe cut seal ring
- ⑳ Band servo piston (1-2)
- ㉑ O-ring
- ㉒ Retainer
- ㉓ O-ring
- ㉔ Spring
- ㉕ Retainer
- ㉖ Circlip

- ㉗ Lathe cut seal ring
- ㉘ Band servo piston (3-4)
- ㉙ O-ring
- ㉚ O.D. servo retainer
- ㉛ Snap ring
- ㉜ Lathe cut seal ring
- ㉝ O-ring
- ㉞ Washer

Tightening torque: N·m (kg·m, ft·lb)
T: 26 ± 2 (2.7 ± 0.2, 19.5 ± 1.4)

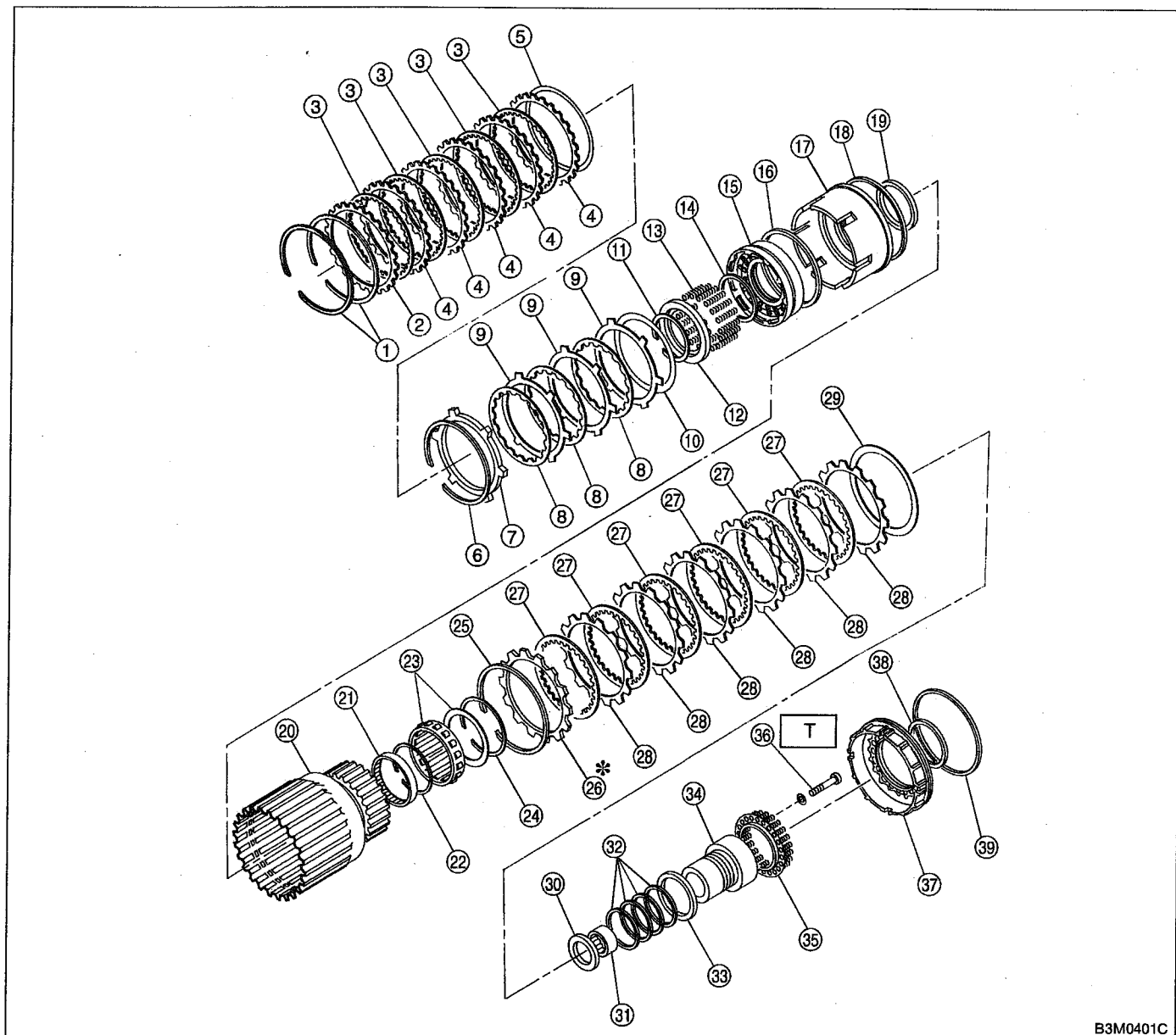
6. High Clutch and Planetary Gear



B3M0374A

- | | |
|-------------------------|-----------------------------------|
| ① High clutch drum | ⑮ Thrust needle bearing |
| ② Lathe cut seal ring | ⑯ Front planetary carrier |
| ③ Piston | ⑰ Thrust needle bearing |
| ④ Lathe cut seal ring | ⑱ Rear sun gear |
| ⑤ Spring retainer | ⑲ Thrust needle bearing |
| ⑥ Snap ring | ⑳ Rear planetary carrier |
| ⑦ Driven plate | ㉑ Thrust needle bearing |
| ⑧ Drive plate | ㉒ Rear internal gear |
| ⑨ Retaining plate | ㉓ Thrust washer |
| ⑩ Snap ring | ㉔ Snap ring |
| ⑪ Thrust needle bearing | ㉕ One-way clutch (3-4) |
| ⑫ High clutch hub | ㉖ One-way clutch outer race (3-4) |
| ⑬ Thrust needle bearing | ㉗ Overrunning clutch hub |
| ⑭ Front sun gear | |

7. Forward Clutch and Low & Reverse Brake

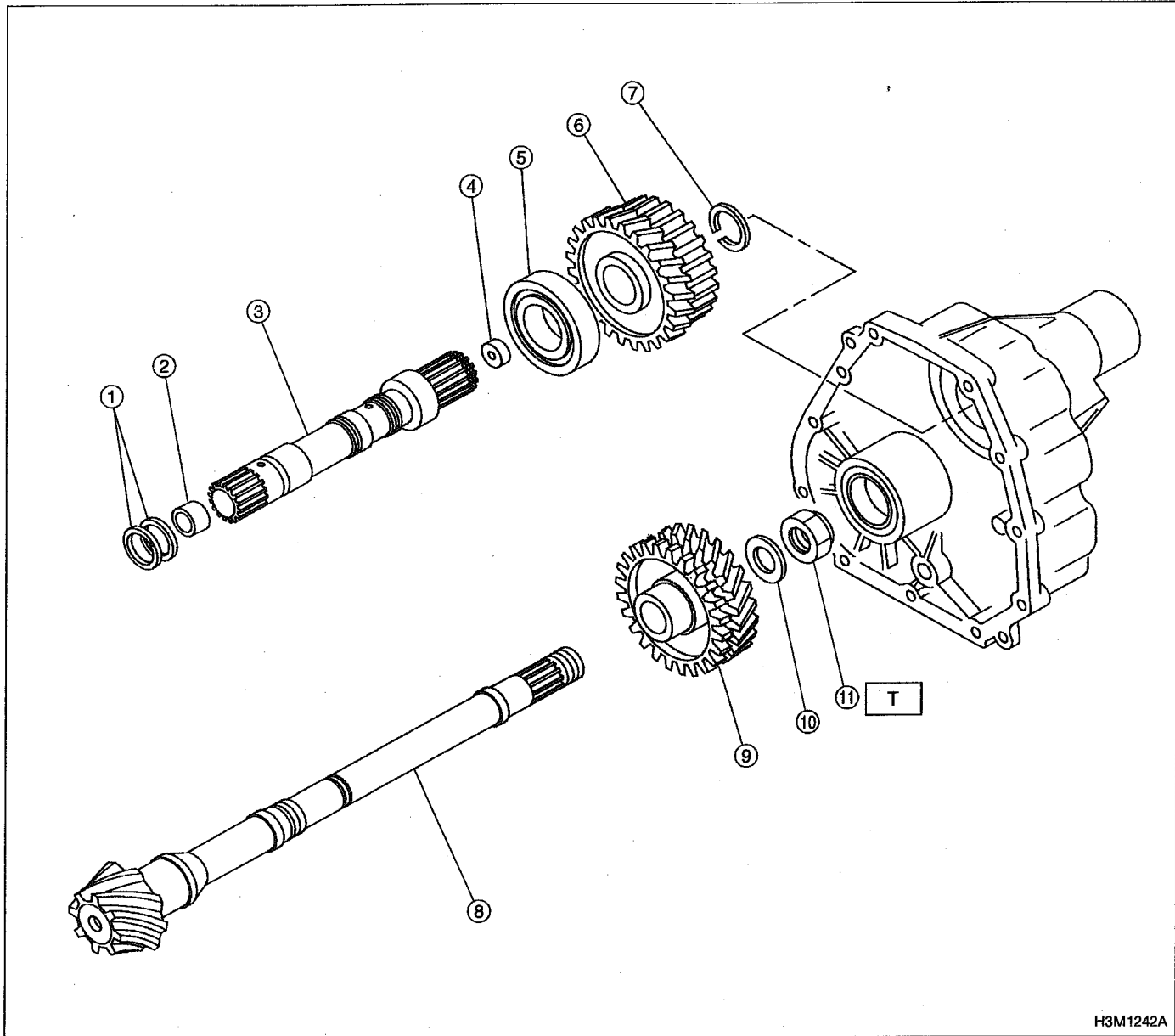


B3M0401C

- | | | | |
|--------------------|-----------------------|-----------------------------------|------------------------|
| ① Snap ring | ⑩ Dish plate | ⑲ Lathe cut seal ring | ⑳ Forward clutch drum |
| ② Retaining plate | ⑪ Snap ring | ⑳ Forward piston | ㉑ Needle bearing |
| ③ Drive plate (5) | ⑫ Spring retainer | ㉑ Lip seal | ㉒ Snap ring |
| ④ Driven plate (5) | ⑬ Spring | ㉒ Lathe cut seal ring | ㉓ One-way clutch (1-2) |
| ⑤ Dish plate | ⑭ Lathe cut seal ring | ㉓ Lathe cut seal ring | ㉔ Snap ring |
| ⑥ Snap ring | ⑮ Overrunning piston | ㉔ Lathe cut seal ring | ㉕ Snap ring |
| ⑦ Retaining plate | | ㉕ One-way clutch inner race (1-2) | ㉖ Retaining plate |
| ⑧ Drive plate | | ㉖ Spring retainer | ㉗ Drive plate (6) |
| ⑨ Driven plate | | ㉗ Socket bolt | ㉗ Driven plate (6) |
| | | ㉘ Low & reverse piston | ㉘ Dish plate |
| | | ㉘ Lathe cut seal ring | ㉘ Lathe cut seal ring |
| | | ㉙ Needle bearing | |
| | | ㉙ Seal ring | |
| | | ㉙ Thrust washer | |
| | | ㉙ One-way clutch inner race (1-2) | |
| | | ㉙ Spring retainer | |
| | | ㉙ Socket bolt | |
| | | ㉙ Low & reverse piston | |
| | | ㉙ Lathe cut seal ring | |
| | | ㉙ Lathe cut seal ring | |

Tightening torque: N·m (kg·m, ft·lb)
T: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)

8. Reduction Gear



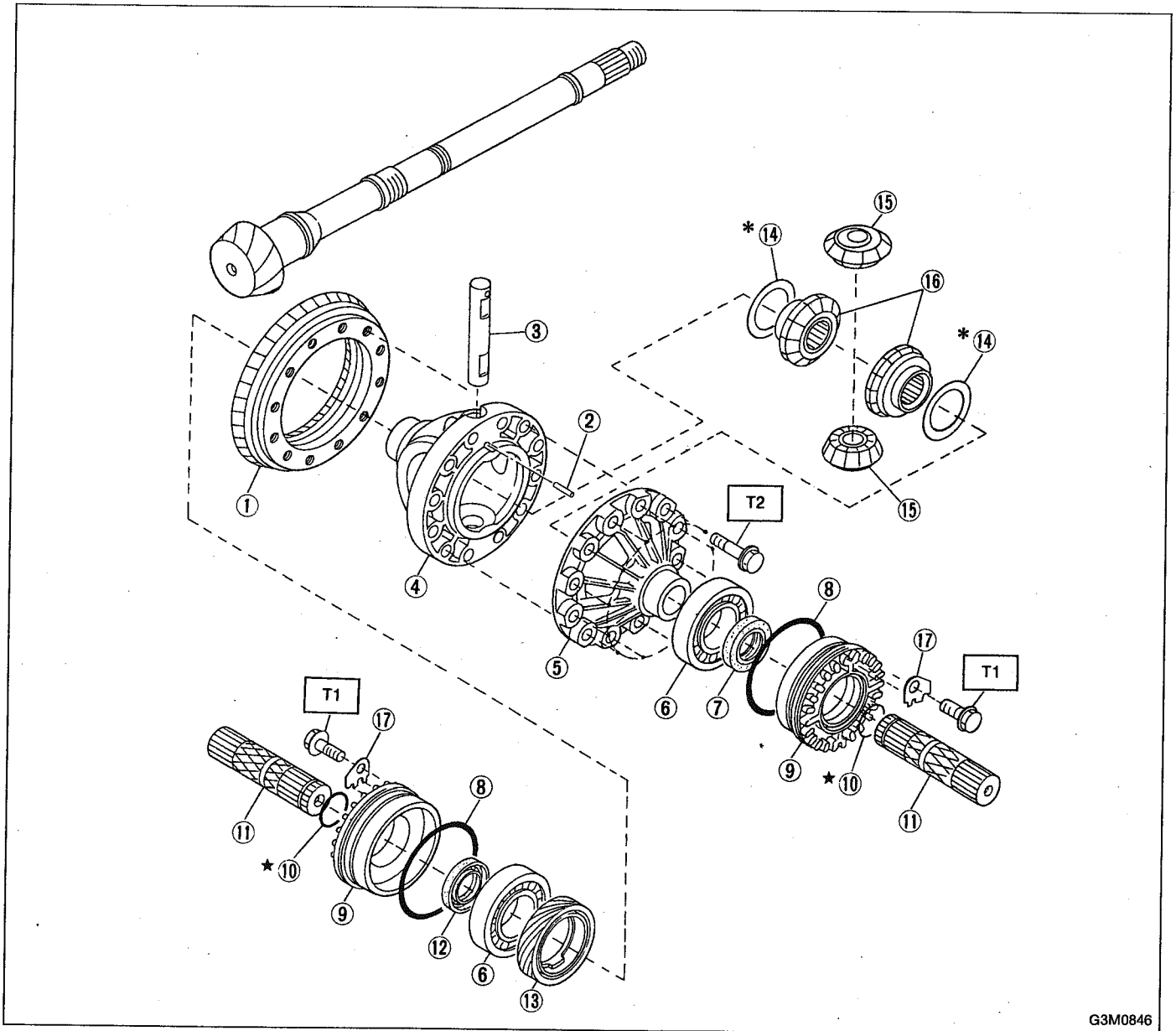
H3M1242A

- ① Seal ring
- ② Bushing
- ③ Reduction drive shaft
- ④ Plug
- ⑤ Ball bearing
- ⑥ Reduction drive gear
- ⑦ Snap ring
- ⑧ Drive pinion shaft

- ⑨ Reduction driven gear
- ⑩ Washer
- ⑪ Lock nut

Tightening torque: N·m (kg-m, ft-lb)
T: 98 ± 5 (10.0 ± 0.5, 72.3 ± 3.6)

9. Differential Case



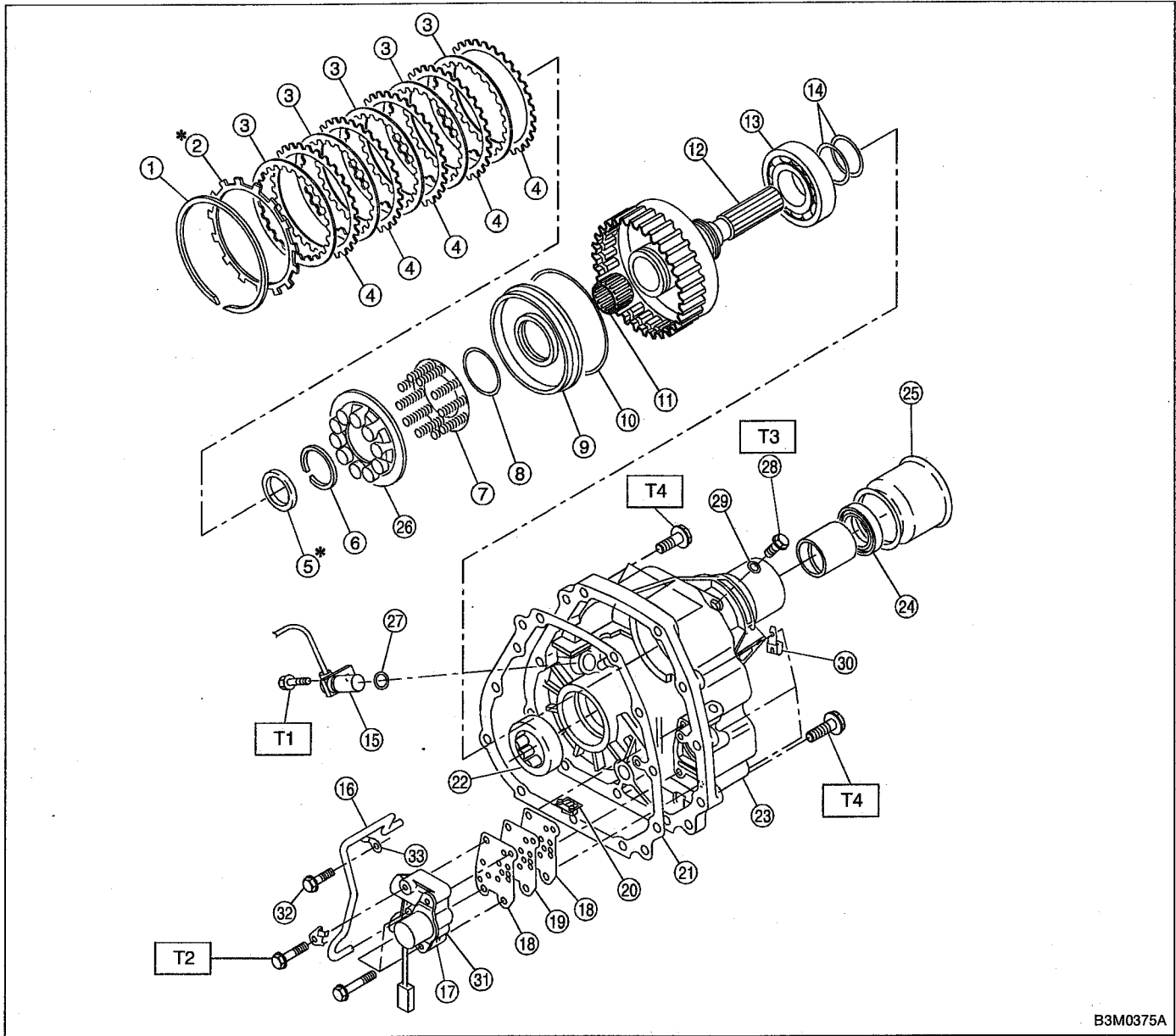
G3M0846

- ① Crown gear
- ② Straight pin
- ③ Pinion shaft
- ④ Differential case (RH)
- ⑤ Differential case (LH)
- ⑥ Taper roller bearing
- ⑦ Oil seal (LH)
- ⑧ O-ring
- ⑨ Differential side retainer
- ⑩ Circlip
- ⑪ Axle shaft

- ⑫ Oil seal (RH)
- ⑬ Speedometer drive gear
- ⑭ Washer
- ⑮ Differential bevel pinion
- ⑯ Differential bevel gear
- ⑰ Lock plate

Tightening torque: N·m (kg·m, ft·lb)
T1: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)
T2: 62 ± 5 (6.3 ± 0.5, 45.6 ± 3.6)

10. Transfer and Extension



B3M0375A

- | | | |
|--------------------------|-------------------------------------|-----------------------|
| ① Snap ring | ⑭ Seal ring | ⑳ O-ring |
| ② Pressure plate | ⑮ Vehicle speed sensor 1 | ㉑ Test plug |
| ③ Drive plate | ⑯ Transfer clutch pipe | ㉒ O-ring |
| ④ Driven plate | ⑰ Duty solenoid C (Transfer clutch) | ㉓ Clip |
| ⑤ Thrust needle bearing | ⑱ Gasket | ㉔ Transfer valve body |
| ⑥ Snap ring | ⑲ Plate | ㉕ Clip |
| ⑦ Spring retainer | ⑳ Filter | ㉖ Stay |
| ⑧ Lathe cut seal ring | ㉑ Gasket | |
| ⑨ Transfer clutch piston | ㉒ Roller bearing | |
| ⑩ Lathe cut seal ring | ㉓ Extension case | |
| ⑪ Needle bearing | ㉔ Oil seal | |
| ⑫ Rear drive shaft | ㉕ Dust seal | |
| ⑬ Ball bearing | ㉖ Seal transfer piston | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 7 ± 1 (0.7 ± 0.1, 5.1 ± 0.7)
T2: 8 ± 1 (0.8 ± 0.1, 5.8 ± 0.7)
T3: 13 ± 1 (1.3 ± 0.1, 9.4 ± 0.7)
T4: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)

1. General

A: PRECAUTION

When disassembling or assembling the automatic transmission, observe the following instructions.

1) Workshop

Provide a place that is clean and free from dust. Principally the conventional workshop is suitable except for a dusty place. In a workshop where grinding work, etc. which produces fine particles is done, make independent place divided by the vinyl curtain or the equivalent.

2) Work table

The size of 1 x 1.5 m (40 x 60 in) is large enough to work, and it is more desirable that its surface be covered with flat plate like iron plate which is not rusted too much.

3) Cleaning of exterior

(1) Clean the exterior surface of transmission with steam and/or kerosene prior to disassembly, however it should be noted that vinyl tape be placed on the air breather or oil level gauge to prevent infiltration of the steam into the transmission and also the cleaning job be done away from the place of disassembly and assembly.

(2) Partial cleaning will do, depending on the extent of disassembly (such as when disassembly is limited to some certain parts).

4) Disassembly, assembly and cleaning

(1) Disassemble and assemble the transmission while inspecting the parts in accordance with the Diagnostics.

(2) During job, don't use gloves. Don't clean the parts with rags: Use chamois or nylon cloth.

(3) Pay special attention to the air to be used for cleaning. Get the moisture and the dust rid of the air as much as possible. Be careful not to scratch or dent any part while checking for proper operation with an air gun.

(4) Complete the job from cleaning to completion of assembly as continuously and speedily as possible in order to avoid occurrence of secondary troubles caused by dust. When stopping the job unavoidably cover the parts with clean chamois or nylon cloth to keep them away from any dust.

(5) Use kerosene, white gasoline or the equivalent as washing fluid. Use always new fluid for cleaning the automatic transmission parts and never reuse. The used fluid is usable in disassemble and assemble work of engine and manual transmission.

(6) Although the cleaning should be done by dipping into the washing fluid or blowing of the pressurized washing fluid, the dipping is more desirable. (Do not rub with a brush.) Assemble the parts immediately

after the cleaning without exposure to the air for a while. Besides in case of washing rubber parts, perform the job quickly not to dip them into the washing fluid for long time.

(7) Apply the automatic transmission fluid (ATF) onto the parts immediately prior to assembly, and the specified tightening torque should be observed carefully.

(8) Use vaseline if it is necessary to hold parts in the position when assembling.

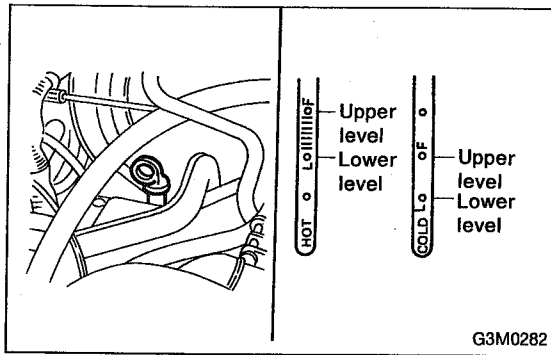
(9) Drain ATF and differential gear oil into a saucer so that the conditions of fluid and oil can be inspected.

(10) Do not support axle drive shaft, stator shaft, input shaft or various pipes when moving transmission from one place to another.

(11) Always discard old oil seals and O-ring, and install new ones.

(12) Do not reuse old aluminum (overrunning clutch pipes, etc.) pipes, gaskets, spring pins. Install new ones.

(13) Be sure to replace parts which are damaged, worn, scratched, discolored, etc.



B: INSPECTION

1. ATF LEVEL

1) Raise ATF temperature to 60 to 80°C (140 to 176°F) from 40 to 60°C (104 to 140°F) (when cold) by driving a distance of 5 to 10 km (3 to 6 miles).

NOTE:

The level of ATF varies with fluid temperature. Pay attention to the fluid temperature when checking oil level.

2) Make sure the vehicle is level. After selecting all positions (P, R, N, D, 3, 2, 1), set the selector lever in "P" range. Measure fluid level with the engine idling.

NOTE:

After running, idle the engine for one or two minutes before measurement.

3) If the fluid level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found within the specified range (above the center between upper and lower marks). When the transmission is hot, the level should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

CAUTION:

- Use care not to exceed the upper limit level.
- ATF level varies with temperature. Remember that the addition of fluid to the upper limit mark when the transmission is cold will result in the overfilling of fluid.

4) Fluid temperature rising speed

- By idling the engine

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 25 minutes
<Reference>

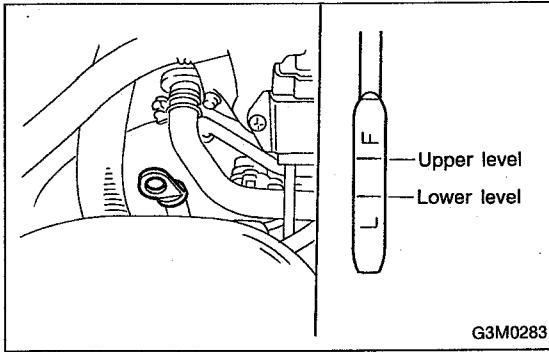
Time for temperature rise to 30°C (86°F) with atmospheric temperature of 0°C (32°F): Approx. 8 minutes

- By running the vehicle

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 10 minutes

5) Method for checking fluid level upon delivery or at periodic inspection

Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions can also be checked.



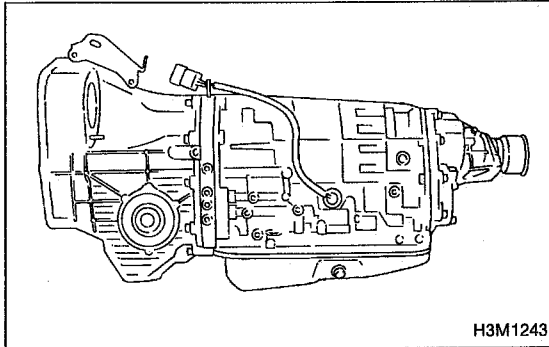
2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

NOTE:

Do not check the oil level nor add oil to the case with the front end of the vehicle jacked-up; this will result in an incorrect reading of the oil level.

2) Check whether the oil level is between the upper (F) and lower (L) marks. If it is below the lower limit mark, add oil until the level reaches the upper mark.

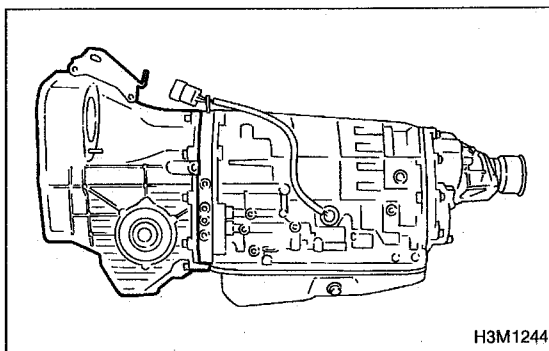


3. OIL LEAKAGE

It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil. The places where oil seals and gaskets are used are as follows:

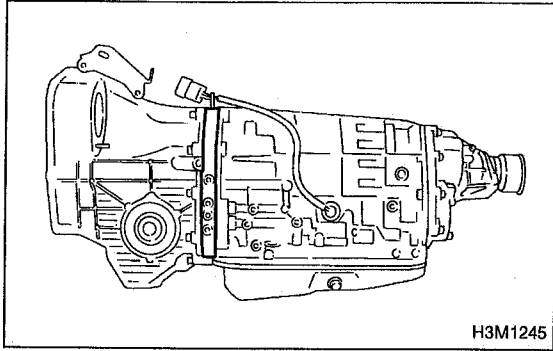
1) Jointing portion of the case

- Transmission case and oil pump housing jointing portion
- Torque converter clutch case and oil pump housing jointing portion
- Transmission case and extension case jointing portion



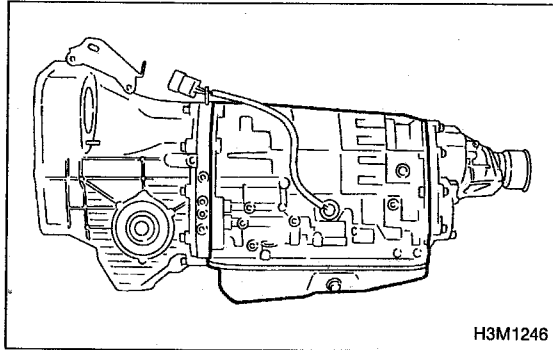
2) Torque converter clutch case

- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal
- O-ring on the outside diameter of axle shaft oil seal holder
- O-ring on the differential oil gauge
- Differential oil drain plug
- Speedometer cable mounting portion
- Location of steel balls



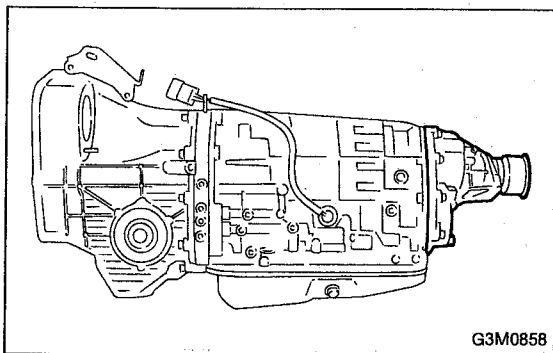
H3M1245

- 3) Oil pump housing
- Oil pump housing (Defective casting)
 - O-ring on the test plugs
 - Checking blind plugs
 - Differential gear breather



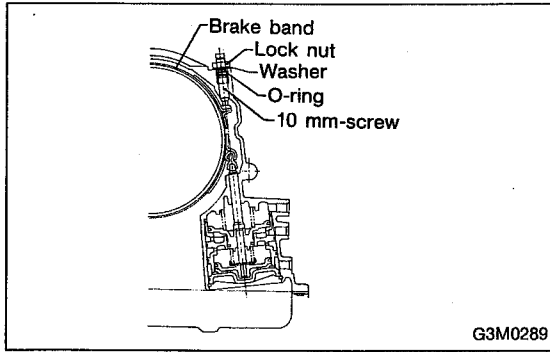
H3M1246

- 4) Automatic transmission case
- Transmission case (Defective casting)
 - Mating surface of oil pan
 - O-ring on the test plugs
 - Checking blind plugs (Steel balls)
 - Oil supply pipe connector
 - ATF cooler pipe connector and gasket
 - Oil pan drain plug
 - O-ring on the transmission harness holder
 - Oil pump plugs
 - ATF breather
 - Shift lever oil seal



G3M0858

- 5) Extension case
- Extension case (Defective casting)
 - O-ring on the vehicle speed sensor
 - Rear drive shaft oil seal
 - Checking blind plugs (Steel ball)
 - O-ring on the test plugs

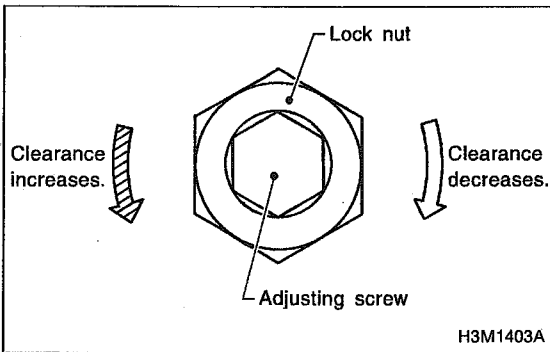


2. Brake Band

A: INSPECTION

If the following abnormal shifting conditions are noted in a road test, the brake band must be adjusted.

Improper brake band clearances and their symptoms	
Clearance	Problem
1. Too wide	Upshift from 1st directly to 3rd gear occurs.
2. Wide	<ul style="list-style-type: none"> ● Engine rpm increases abruptly while upshifting from 1st to 2nd gear or 3rd to 4th gear. ● Time lag of at least one second occurs during kick-down operation from 3rd to 2nd gear.
3. Small	"Braking" symptom occurs while upshifting from 2nd to 3rd gear.
4. Too small	Upshifts from 2nd to 4th gear and downshifts from 4th to 2nd gear occur repeatedly.



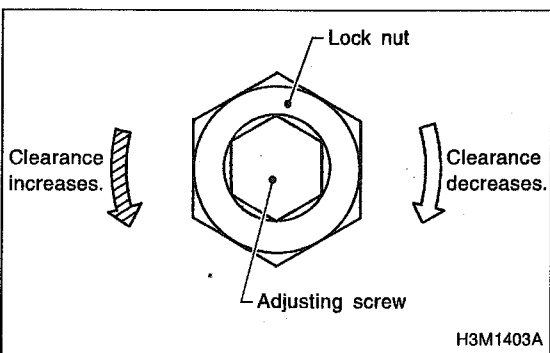
B: ADJUSTMENT

1) Immobilize the end of the 10 mm-screw projecting on the left side of the transmission case, and loosen the nut with a double-end wrench.

In the case of occurrence of problems 2. and 3. mentioned previously, perform the adjustment by loosening or tightening the nut within a range of 3/4 turn from this state.

CAUTION:

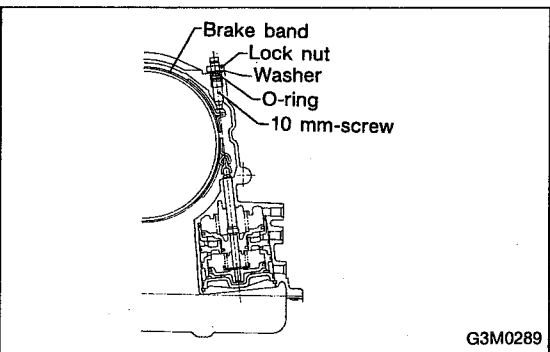
Do not loosen excessively; otherwise, the band strut on the servo piston will drop off.



2) In case of the occurrence of problems 1. and 4. mentioned previously, perform the adjustment as follows:
Adjusting procedure: Tighten adjust screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, then back off three turns.

CAUTION:

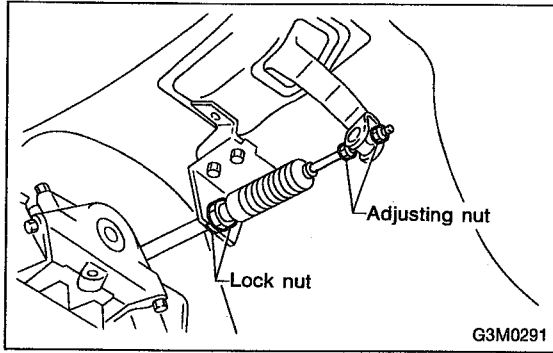
Do not tighten the adjusting screw with an excessively large torque.



3) With the adjusting screw immobilized, tighten the lock nut.

Tightening torque:

26 ± 2 N·m (2.7 ± 0.2 kg-m, 19.5 ± 1.4 ft-lb)



3. Inhibitor Switch

A: INSPECTION

When driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

- 1) Disconnect cable end from select lever.
- 2) Disconnect inhibitor switch side connector.
- 3) Check continuity in inhibitor switch circuits with select lever moved to each position.

CAUTION:

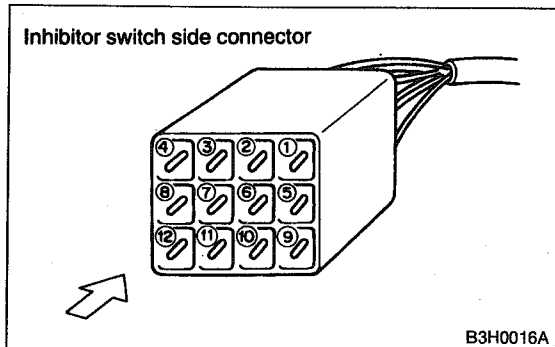
Also check that continuity in ignition circuit does not exist when selector lever is in R, D, 3, 2 and 1 ranges.

NOTE:

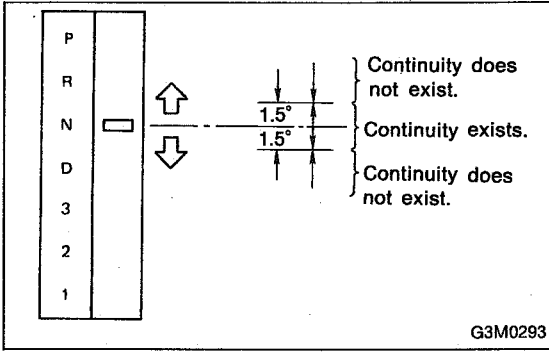
If inhibitor switch is inoperative, check for poor contact of connector on transmission side. (Plastic body type inhibitor switch)

Pin No.	4	3	2	1	8	7	6	5	12	11	10	9
Lead color	B	Y	Br	YG	W	BY	R	GW	BY	BW	BW	RW
Position												
P	○	○							○	○		
R	○		○								○	○
N	○			○					○	○		
D	○				○							
3	○					○						
2	○						○					
1	○							○				
	Signal sent to AT control unit								Ignition circuit		Back-up light circuit	

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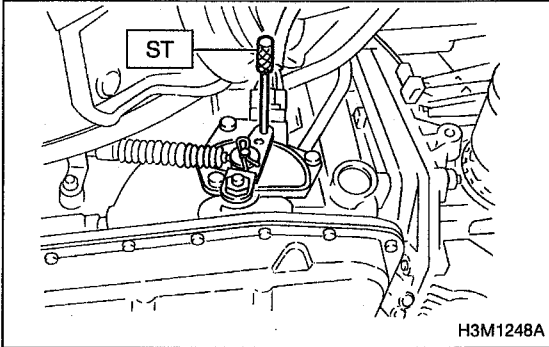


3. Inhibitor Switch - 4. Sensor (in transmission)



4) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.

If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.

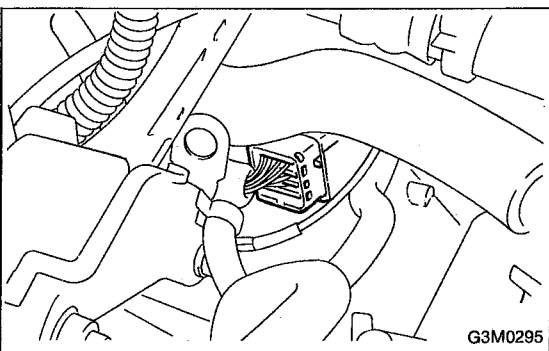
**B: ADJUSTMENT**

- 1) Loosen the three inhibitor switch securing bolts.
 - 2) Shift the select lever to the N range.
 - 3) Insert ST as vertical as possible into the holes in the inhibitor switch lever and switch body.
- ST 499267300 STOPPER PIN
- 4) Tighten the three inhibitor switch bolts.

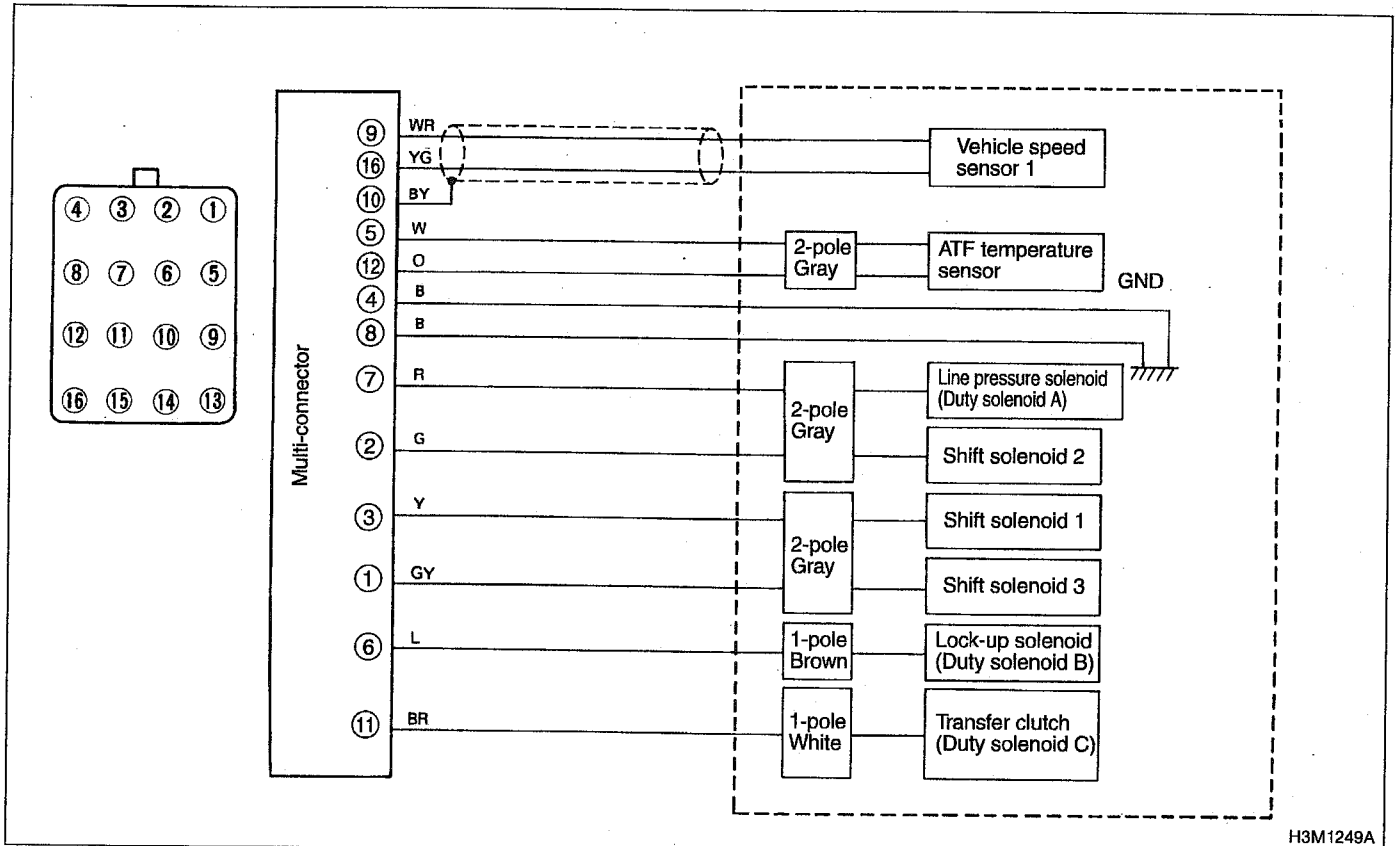
Tightening torque:

$3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)

- 5) Repeat the above checks. If the inhibitor switch is determined to be "faulty", replace it.

**4. Sensor (in transmission)****A: INSPECTION**

Check each sensor, solenoid and ground system for short circuits.

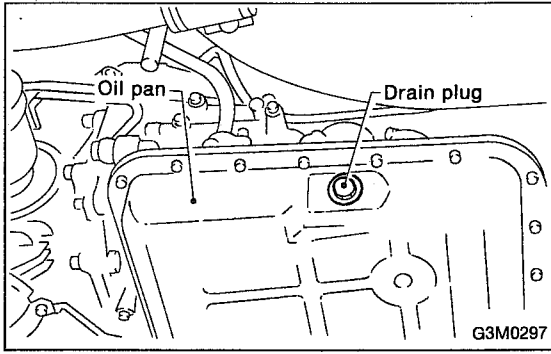


1. EVALUATION

NOTE:

If part is faulty, its resistance value will be different from the standard value indicated below.

Part name	Terminal	Resistance (Ω)
Vehicle speed sensor 1	9 — 16	450 — 720
ATF temperature sensor	5 — 12	[2,100 — 2,900/20°C (68°F) 275 — 375/80°C (176°F)]
Duty solenoid A (Line pressure solenoid)	7 — 4, 8	1.5 — 4.5
Duty solenoid B (Lock-up solenoid)	6 — 4, 8	9 — 17
Shift solenoid 1	3 — 4, 8	20 — 32
Shift solenoid 2	2 — 4, 8	20 — 32
Shift solenoid 3	1 — 4, 8	20 — 32
Duty solenoid C (Transfer clutch solenoid)	11 — 4, 8	9 — 17



5. Shift Solenoid, Duty Solenoid and Valve Body

A: REMOVAL

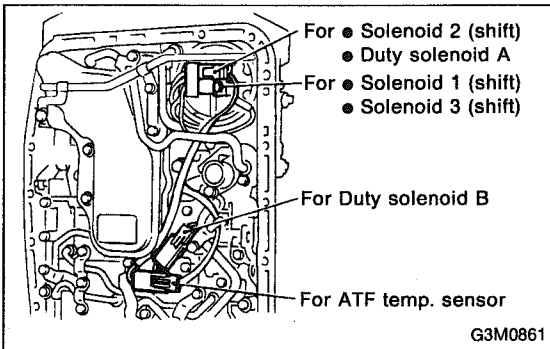
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



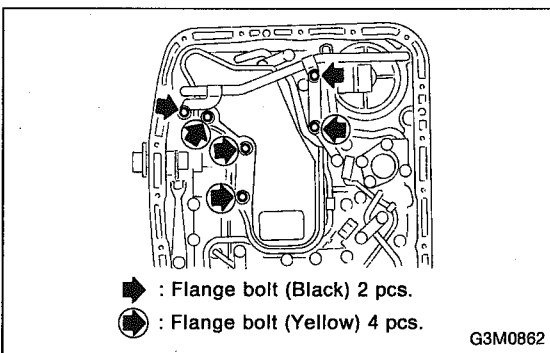
- 3) Remove oil pan and gasket.

NOTE:

Drain oil into a container.

- 4) Disconnect solenoid valve connectors.

Remove connectors from clips and disconnect connectors at 4 places.

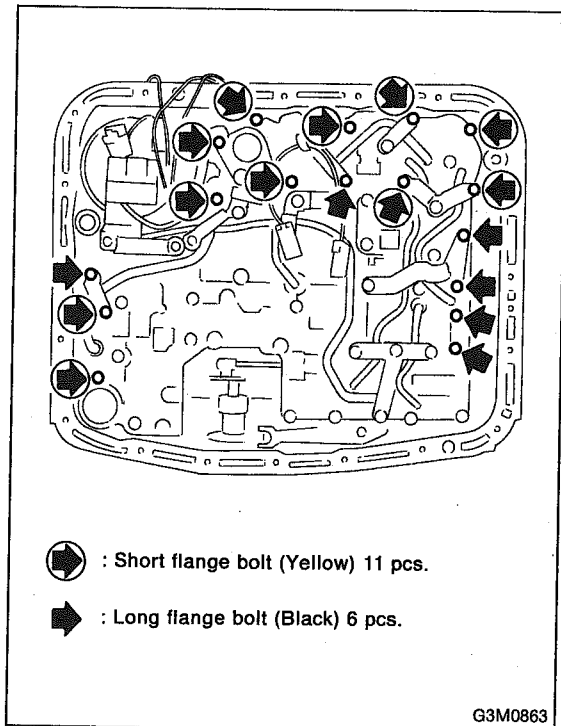


- 5) Remove oil strainer.

Disconnect oil pipe by removing the two bolts, and remove four bolts and oil strainer.

NOTE:

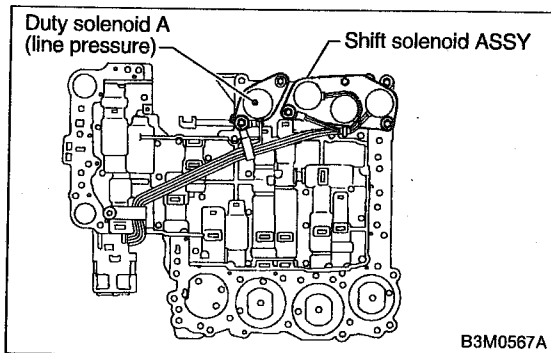
Be careful because oil flows from oil strainer.



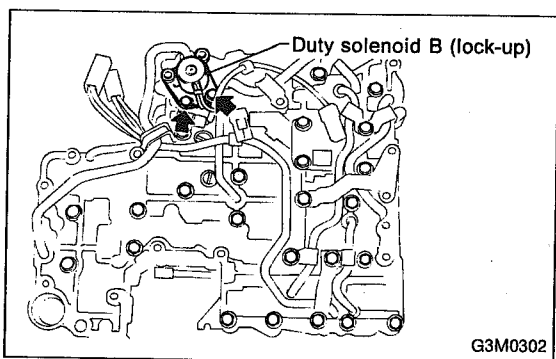
- 6) Remove control valve body and two brackets.
Remove 6 long bolts (Black) and 11 short bolts (Yellow).

NOTE:

- Be careful because oil flows from valve body.
- Be careful not to damage accumulator spring at rear of control valve.



- 7) Remove shift solenoid assembly, and duty solenoid A.
8) Remove duty solenoid B.

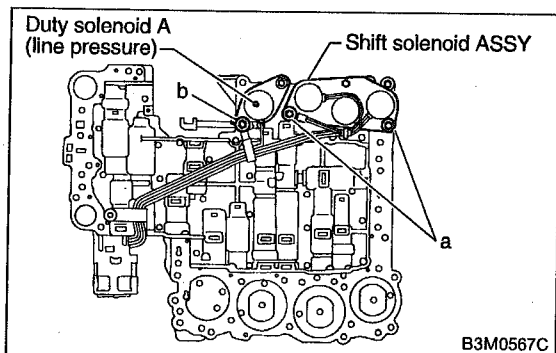


B: INSTALLATION

- 1) Install duty solenoid B (lock-up).

Tightening torque:

11.3 ± 1.5 N·m (1.15 ± 0.15 kg·m, 8.3 ± 1.1 ft·lb)



- 2) Install solenoid valves.
Shift solenoid assembly, and duty solenoid A (line pressure).

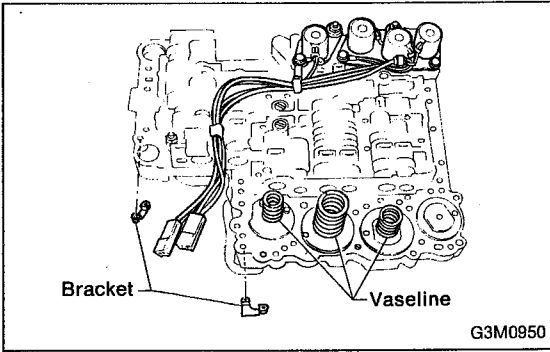
a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

Tightening torque:

8 ± 1 N·m (0.8 ± 0.1 kg·m, 5.8 ± 0.7 ft·lb)

5. Shift Solenoid, Duty Solenoid and Valve Body



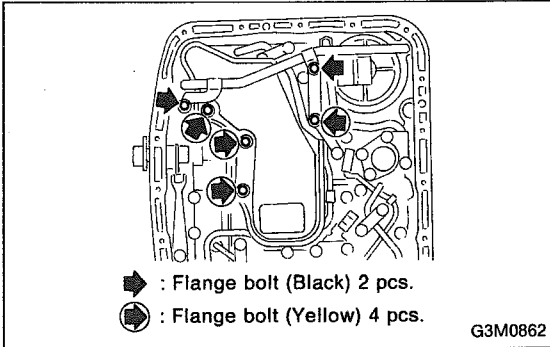
3) Install valve body and two brackets.

Tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

NOTE:

- Secure accumulator springs using vaseline.
- Align manual valve connections.

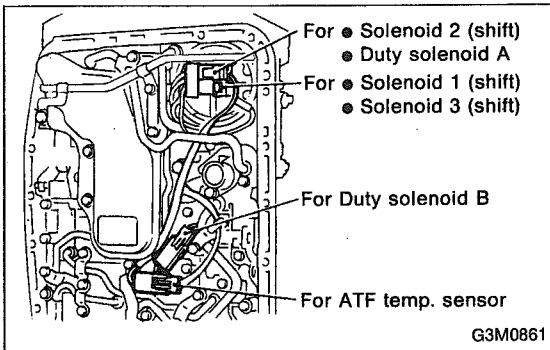


4) Install oil strainer.

Also install oil pipe and harness connector bracket.

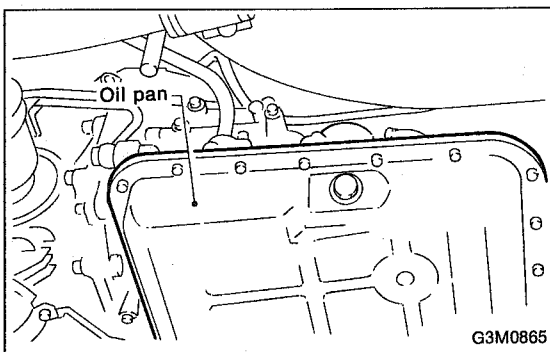
Tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)



5) Connect harness connectors at 4 places.

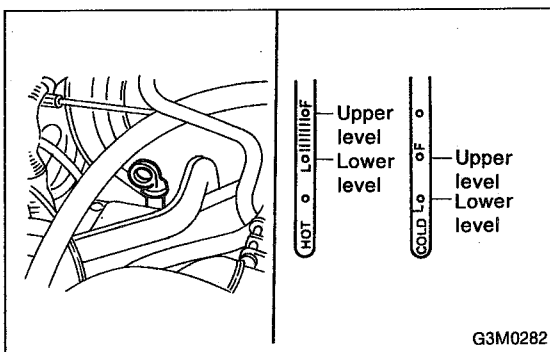
Connect connectors of same color, and secure connectors to valve body using clips.



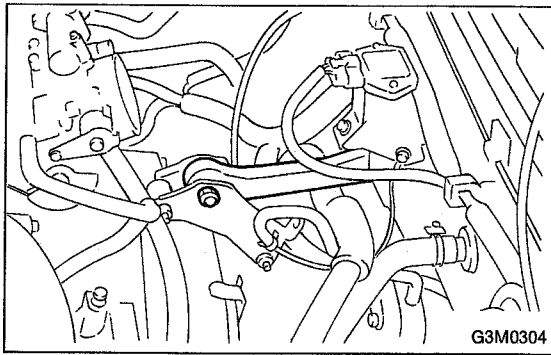
6) Install oil pan and gasket.

Tightening torque:

$4.9 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.50 \pm 0.05 \text{ kg}\cdot\text{m}$, $3.6 \pm 0.4 \text{ ft}\cdot\text{lb}$)



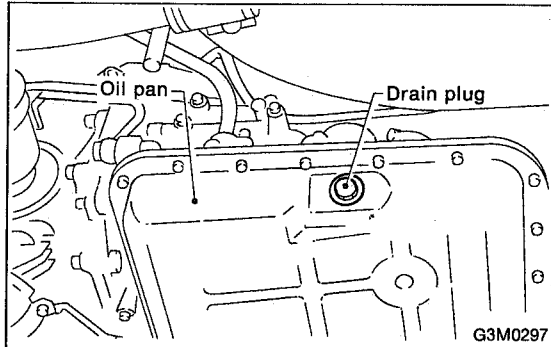
7) Add ATF and check level.



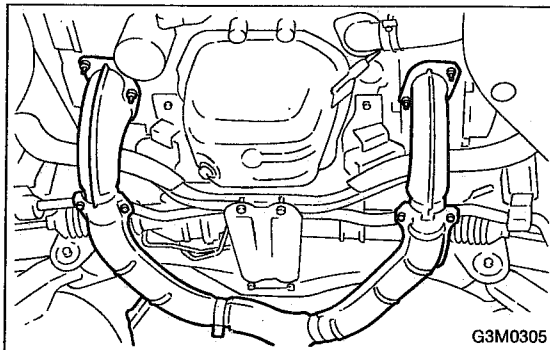
6. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

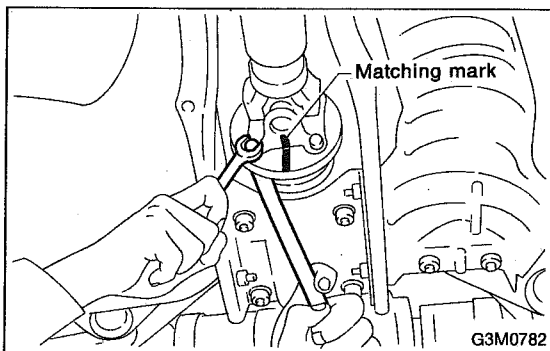
1) Remove pitching stopper.



2) Raise vehicle and drain ATF.



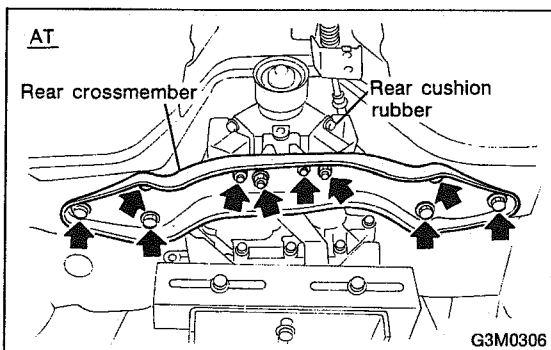
3) Remove front exhaust pipe.
Disconnect oxygen sensor connector, and remove exhaust pipe.



4) Remove propeller shaft.

NOTE:

Before removing propeller shaft, scribe matching marks on propeller shaft and rear differential coupling.

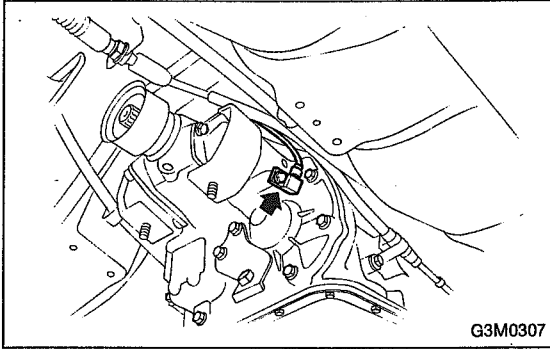


5) Remove rear crossmember.

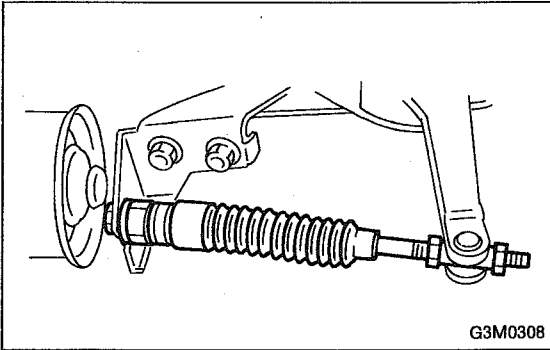
(1) Support transmission using a transmission jack and raise slightly:

(2) Remove bolts and nuts as shown in Figure.

6. Duty Solenoid C and Transfer Valve Body



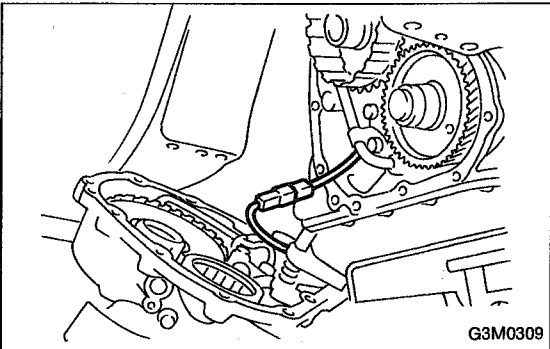
6) Remove vehicle speed sensor 1.



7) Remove extension and gasket.

(1) Remove gear select cable nut.

(2) Move gear select cable so that extension bolts can be removed.



(3) Remove bolts.

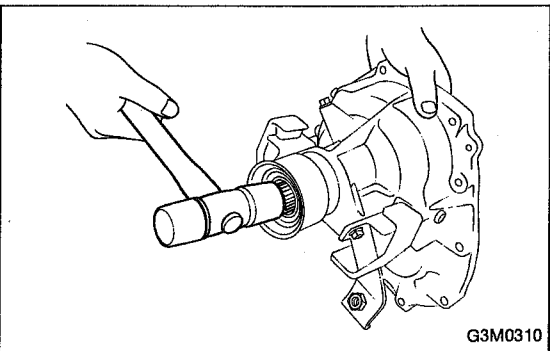
(4) Remove extension and disconnect duty solenoid C connector.

CAUTION:

Do not force extension back before disconnecting solenoid connector. Otherwise, harness may be damaged.

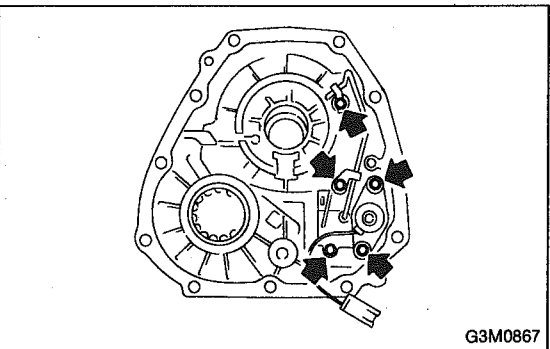
NOTE:

Use a container to catch oil flowing from extension.



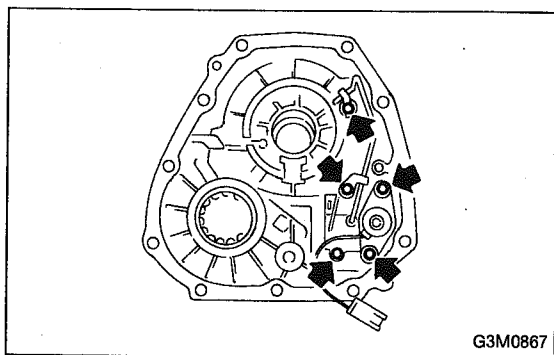
8) Remove duty solenoid C and transfer valve body from extension.

(1) Remove transfer clutch drum.



(2) Remove clamp which secures pipe.

(3) Remove bolts.



G3M0867

B: INSTALLATION

- 1) Install duty solenoid C and transfer valve body.
 - (1) Install duty solenoid C and transfer valve body.

Tightening torque:
 $8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

- (2) Install pipe and clamp.

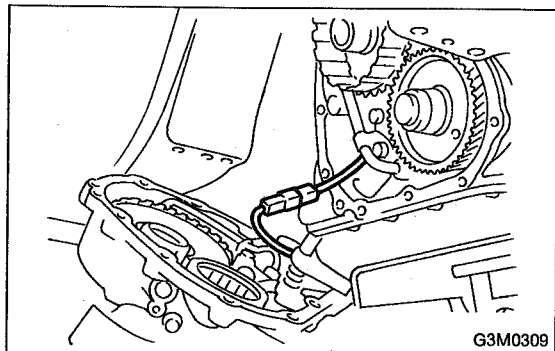
Tightening torque:
 $8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

- (3) Install clutch drum.

- 2) Install extension.

- (1) Connect connector.
- (2) Tighten 11 bolts.

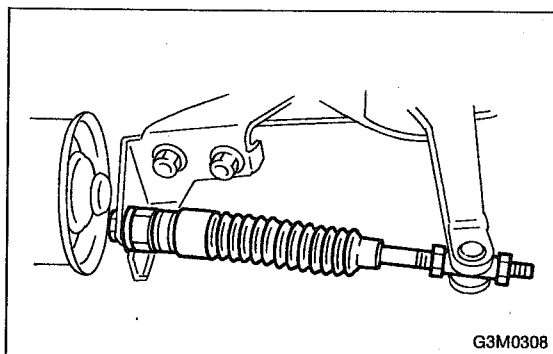
Tightening torque:
 $25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



G3M0309

- (3) Install gear select cable.

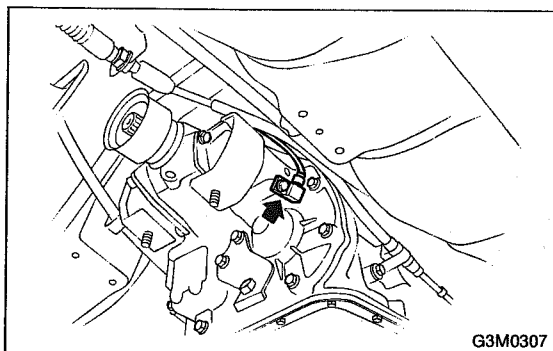
Tightening torque:
 $14 \pm 4 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.4 \text{ kg}\cdot\text{m}$, $10.1 \pm 2.9 \text{ ft}\cdot\text{lb}$)



G3M0308

- 3) Install vehicle speed sensor 1.

Tightening torque:
 $7 \pm 1 \text{ N}\cdot\text{m}$ ($0.7 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.1 \pm 0.7 \text{ ft}\cdot\text{lb}$)



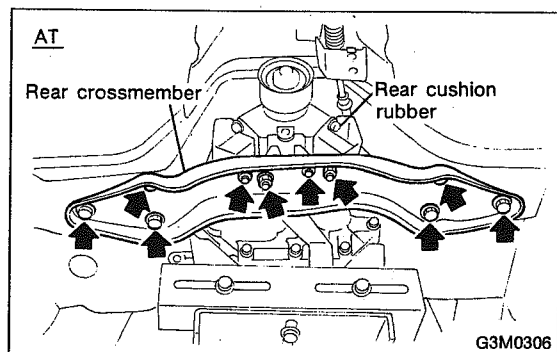
G3M0307

- 4) Install rear crossmember.

- (1) Tighten bolts.

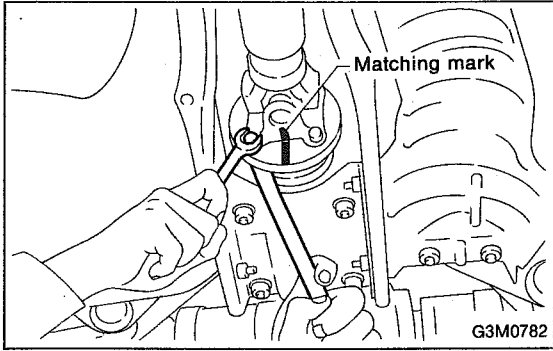
Tightening torque:
Crossmember to body
 $69 \pm 15 \text{ N}\cdot\text{m}$ ($7.0 \pm 1.5 \text{ kg}\cdot\text{m}$, $51 \pm 11 \text{ ft}\cdot\text{lb}$)
Crossmember to cushion
 $18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)

- (2) Lower and remove transmission jack.



G3M0306

6. Duty Solenoid C and Transfer Valve Body



5) Install propeller shaft.

Tightening torque:

At rear differential

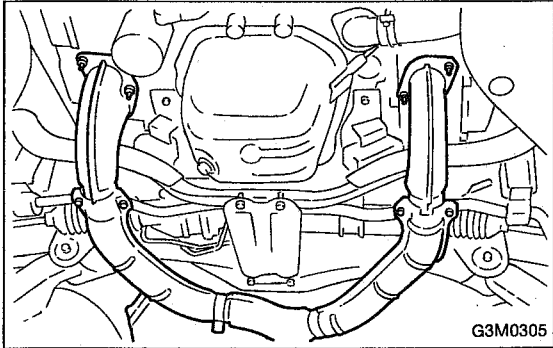
$23 \pm 5 \text{ N}\cdot\text{m}$ ($2.3 \pm 0.5 \text{ kg}\cdot\text{m}$, $16.6 \pm 3.6 \text{ ft}\cdot\text{lb}$)

At center bearing

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

NOTE:

Align matching marks on propeller shaft and rear differential coupling.



6) Install front exhaust pipe.

Tightening torque:

At engine

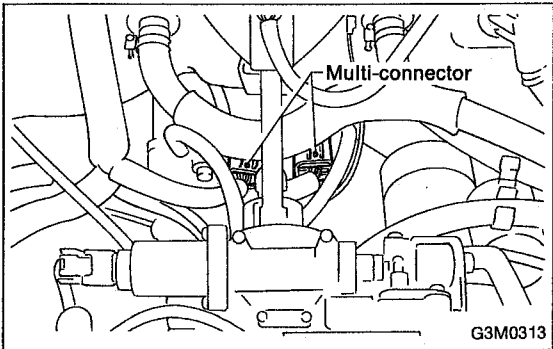
$29 \pm 5 \text{ N}\cdot\text{m}$ ($3.0 \pm 0.5 \text{ kg}\cdot\text{m}$, $21.7 \pm 3.6 \text{ ft}\cdot\text{lb}$)

At hanger

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

At front and rear connections

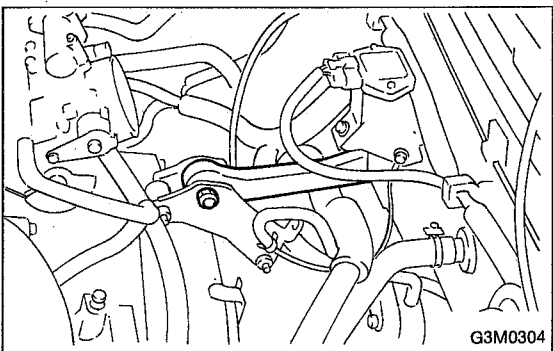
$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)



7) Lower and remove jack.

8) Connect the following parts:

- (1) Oxygen sensor connector
- (2) Multi-connector



9) Install pitching stopper.

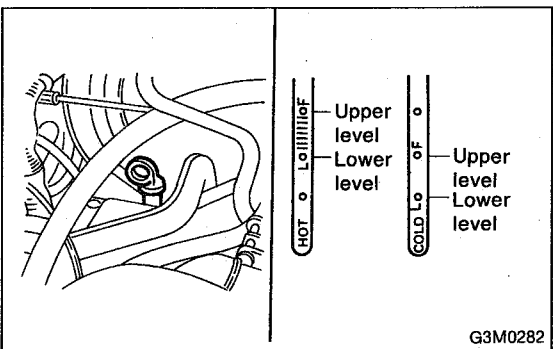
Tightening torque:

Body side

$57 \pm 10 \text{ N}\cdot\text{m}$ ($5.8 \pm 1.0 \text{ kg}\cdot\text{m}$, $42 \pm 7 \text{ ft}\cdot\text{lb}$)

Engine side

$49 \pm 5 \text{ N}\cdot\text{m}$ ($5.0 \pm 0.5 \text{ kg}\cdot\text{m}$, $36.2 \pm 3.6 \text{ ft}\cdot\text{lb}$)



10) Replenish ATF and check oil level. Check for leaks.

7. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of the automatic transmission.

CAUTION:

When performing test, do not exceed posted speed limit.

2. SHIFT PATTERNS

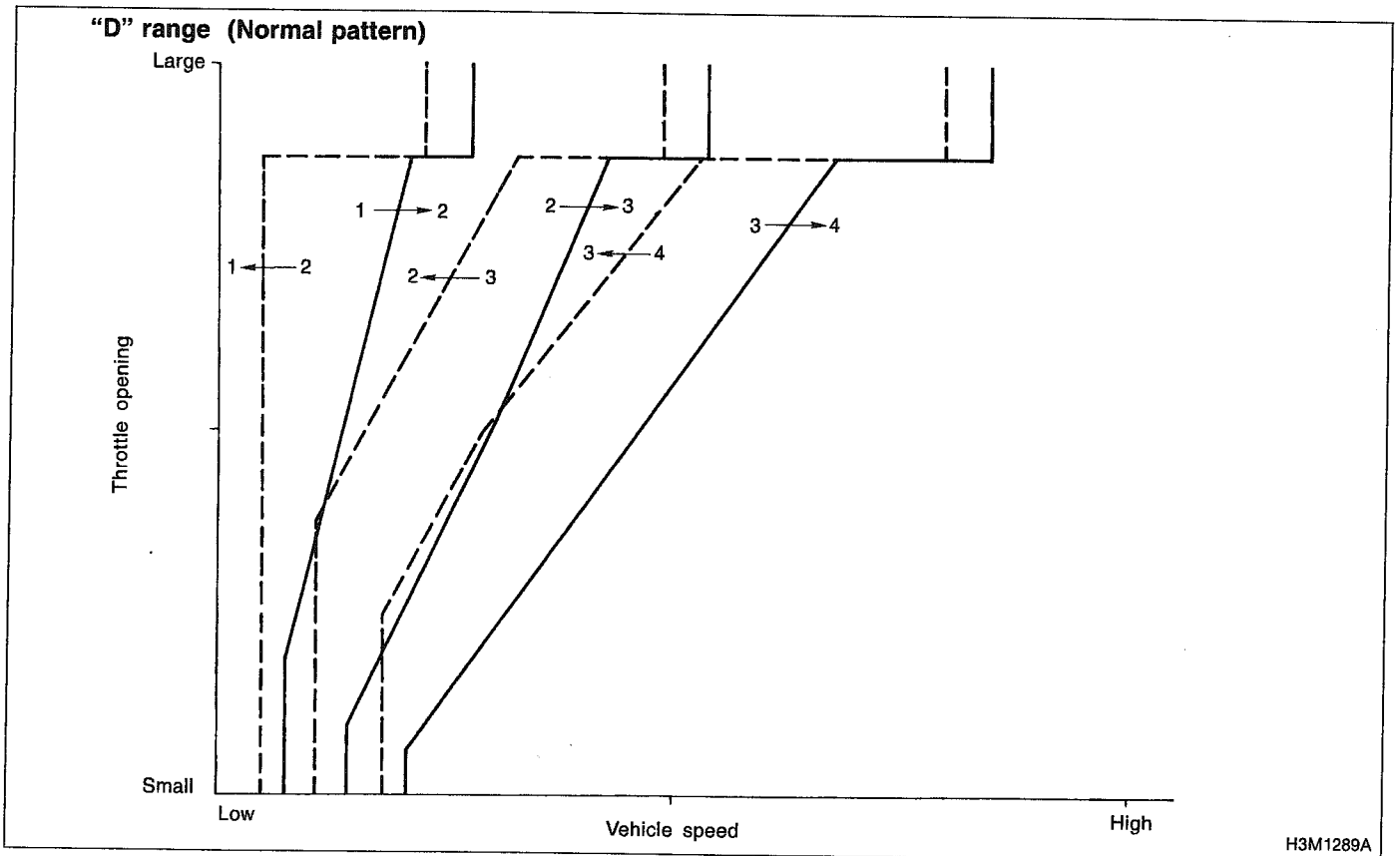
Check "kick-down".

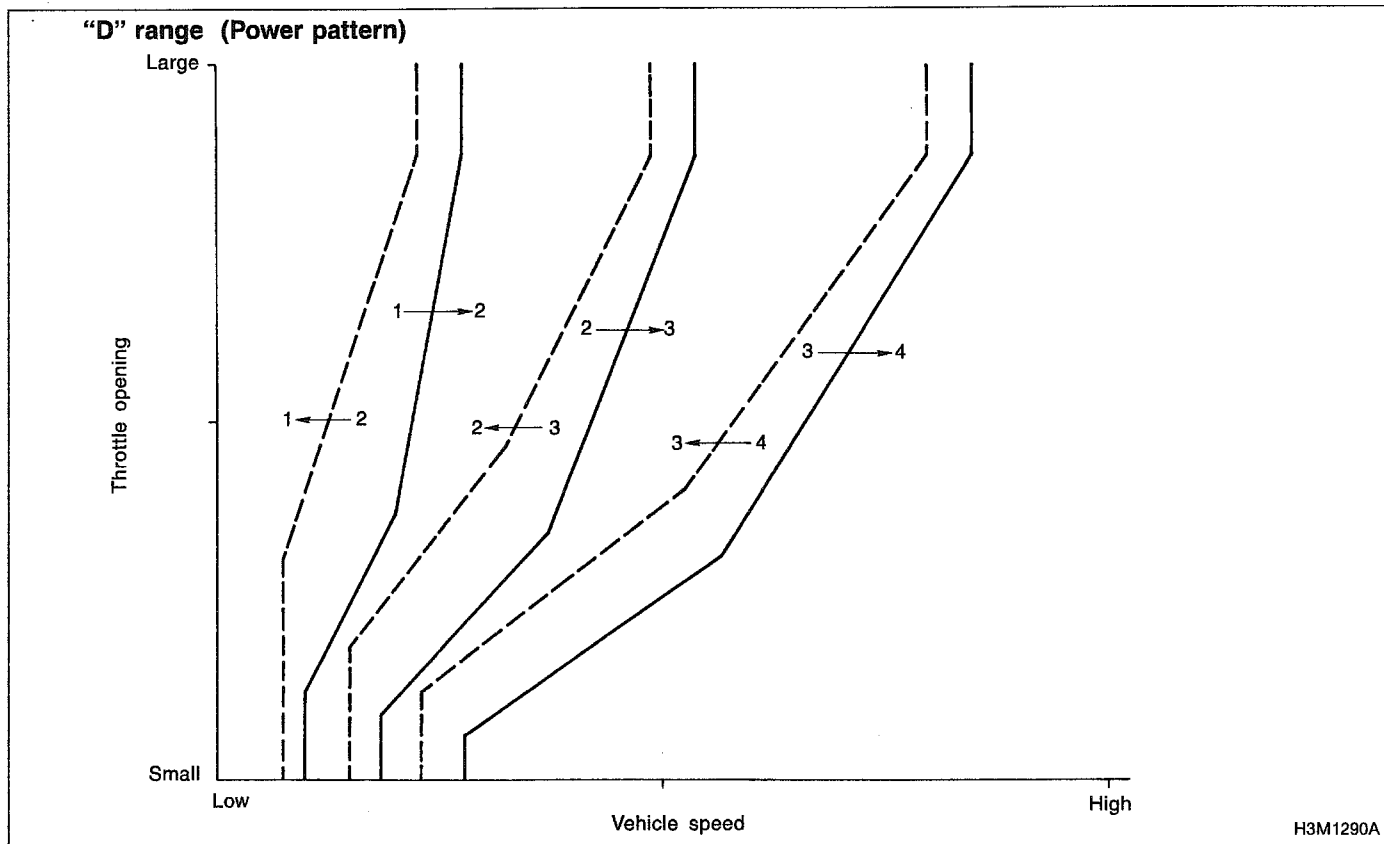
D range: 1st ↔ 2nd ↔ 3rd ↔ 4th

3 range: 1st ↔ 2nd ↔ 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th





H3M1290A

3. ENGINE BRAKE OPERATION

Engine brake operation:

D range → 4th gear

3 range → 3rd gear

2 range → 2nd gear

1 range → 1st gear

4. AWD FUNCTION

If "tight-corner braking" occurs when the steering wheel is fully turned at low speed:

1) Determine the applicable trouble code and check the corresponding duty solenoid C (transfer) for improper operation.

2) If the solenoid is operating properly, check transfer clutch pressure.

3) If oil pressure is normal but "tight-corner braking" occurs:

Check the transfer control valve for sticking, and the transfer clutch facing for wear.

<Ref. to 3-2 [W23A0].>

8. Stall Speed Test

A: MEASUREMENT

1. GENERAL INFORMATION

The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in all shift ranges except the P and N ranges.

Purposes of the stall test:

- 1) To check the operation of the automatic transmission clutch.
- 2) To check the operation of the torque converter clutch.
- 3) To check engine performance.

2. TEST METHODS

1) Preparations before test:

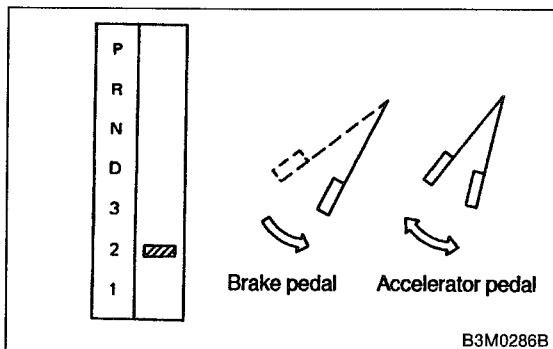
- (1) Check that throttle valve opens fully.
- (2) Check that engine oil level is correct.
- (3) Check that coolant level is correct.
- (4) Check that ATF level is correct.
- (5) Check that differential gear oil level is correct.
- (6) Increase ATF temperature to 60 to 80°C (140 to 176°F) by idling the engine for approximately 30 minutes (with select lever set to "N" or "P").

2) Install an engine tachometer at a location visible from the driver's compartment and mark the stall speed range on the tachometer scale.

3) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.

4) Move the manual linkage to ensure it operates properly, and shift the select lever to the 2 range.

5) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



SERVICE PROCEDURE

- 6) When the engine speed is stabilized, read that speed quickly and release the accelerator pedal.
- 7) Shift the select lever to Neutral, and cool down the engine by idling it for more than one minute.
- 8) Record the stall speed.
- 9) If stall speed in 2 range is higher than specifications, forward clutch slipping on brake band slipping may occur. To identify it, conduct the same test as above in D range.
- 10) Perform the stall tests with the select lever in the R range.

CAUTION:

- Do not continue the stall test for **MORE THAN FIVE SECONDS** at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake band to be adversely affected. Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the P or N range and with the idle speed lower than 1,200 rpm.
- If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Specifications

Stall speed (at sea level):
2,300 — 2,700 rpm

3. EVALUATION

Stall speed (at sea level)	Position	Cause
Less than specifications	2 R	<ul style="list-style-type: none"> ● Throttle valve not fully open ● Erroneous engine operation ● Torque converter clutch's one-way clutch slipping
Greater than specifications	D	<ul style="list-style-type: none"> ● Forward clutch slipping ● One-way clutch (1-2) malfunctioning
	R	<ul style="list-style-type: none"> ● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	<ul style="list-style-type: none"> ● Line pressure too low ● Forward clutch slipping ● Brake band slipping ● One-way clutch (3-4) malfunctioning

9. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

If the shift lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the forward clutch, reverse clutch, low & reverse brake, forward one-way clutch and low one-way clutch.

CAUTION:

- Perform the test at normal operation fluid temperature 60 to 80°C (140 to 176°F).
- Be sure to allow a one minute interval between tests.
- Make three measurements and take the average value.

2. TEST METHODS

- 1) Fully apply the parking brake.
- 2) Start the engine.
Check idling speed (A/C OFF).
"N" range: 800 ± 100 rpm
- 3) Shift the shift lever from "N" to "D" range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: Less than 1.2 seconds
- 4) In same manner, measure the time lag for "N" → "R".
Time lag: Less than 1.5 seconds

3. EVALUATION

- 1) If "N" → "D" time lag is longer than specified:
 - Line pressure too low
 - Forward clutch worn
 - Low one-way clutch not operating properly
- 2) If "N" → "R" time lag is longer than specified:
 - Line pressure too low
 - Reverse clutch worn
 - Low & reverse brake worn
 - Forward one-way clutch not operating properly

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake band shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake band or control valve.

1) Line pressure measurement (under no load)

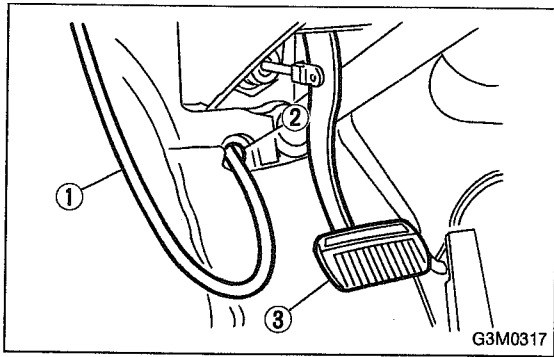
CAUTION:

- Before measuring line pressure, jack-up all wheels.
- Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in "N" or "P".)

2) Line pressure measurement (under heavy load)

CAUTION:

- Before measuring line pressure, apply both foot and parking brakes with all wheels chocked (Same as for "stall" test conditions).
- Measure line pressure when select lever is in "R", "2" with engine under stall conditions.
- Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)
- Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in "N" or "P".)

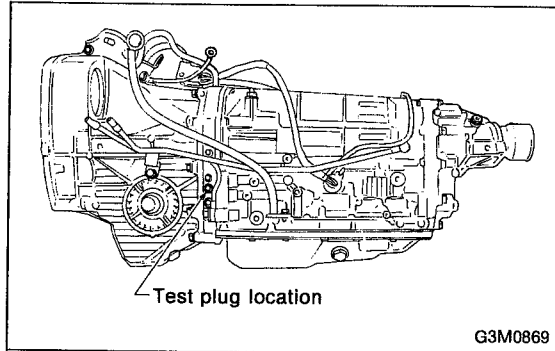


2. TEST METHODS

1) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to the engine compartment.

ST 498575400 OIL PRESSURE GAUGE ASSY

- ① Pressure gauge hose
- ② Hole in toe board (blank cap hole)
- ③ Brake pedal



2) Remove the test plug and install ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER

3) Connect ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

ST2 498575400 OIL PRESSURE GAUGE ASSY

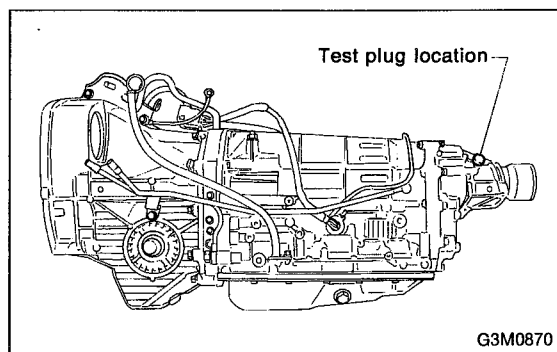
- 4) Check for duty ratio changes by opening and closing throttle valve using select monitor. <Ref. to 3-2 [T9K0].>
- 5) Check line pressure in accordance with the following chart.

3. EVALUATION

NOTE:

- Under no load: "D"
 - Under full load: "R", "2"
- (With engine running at stall speed)

Standard line pressure			
Duty ratio (%)	"2" range kPa (kg/cm ² , psi)	"R" range kPa (kg/cm ² , psi)	"D" range kPa (kg/cm ² , psi)
5	1,167 — 1,363 (11.9 — 13.9, 169 — 198)	1,432 — 1,569 (14.6 — 16.0, 208 — 228)	—
22	—	—	765 — 902 (7.8 — 9.2, 111 — 131)
100	—	—	235 — 481 (2.4 — 4.9, 34 — 70)



11. Transfer Clutch Pressure Test

A: MEASUREMENT

1. TEST METHODS

Check transfer clutch pressure in accordance with the following chart in the same manner as with line pressure.

ST 499897700 OIL PRESSURE ADAPTER SET

ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

FWD mode: "P" range, engine speed 2000 rpm

CAUTION:

Before setting in FWD mode, install spare fuse on FWD mode switch.

2. EVALUATION

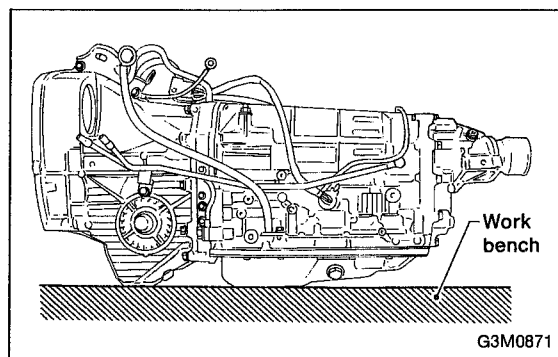
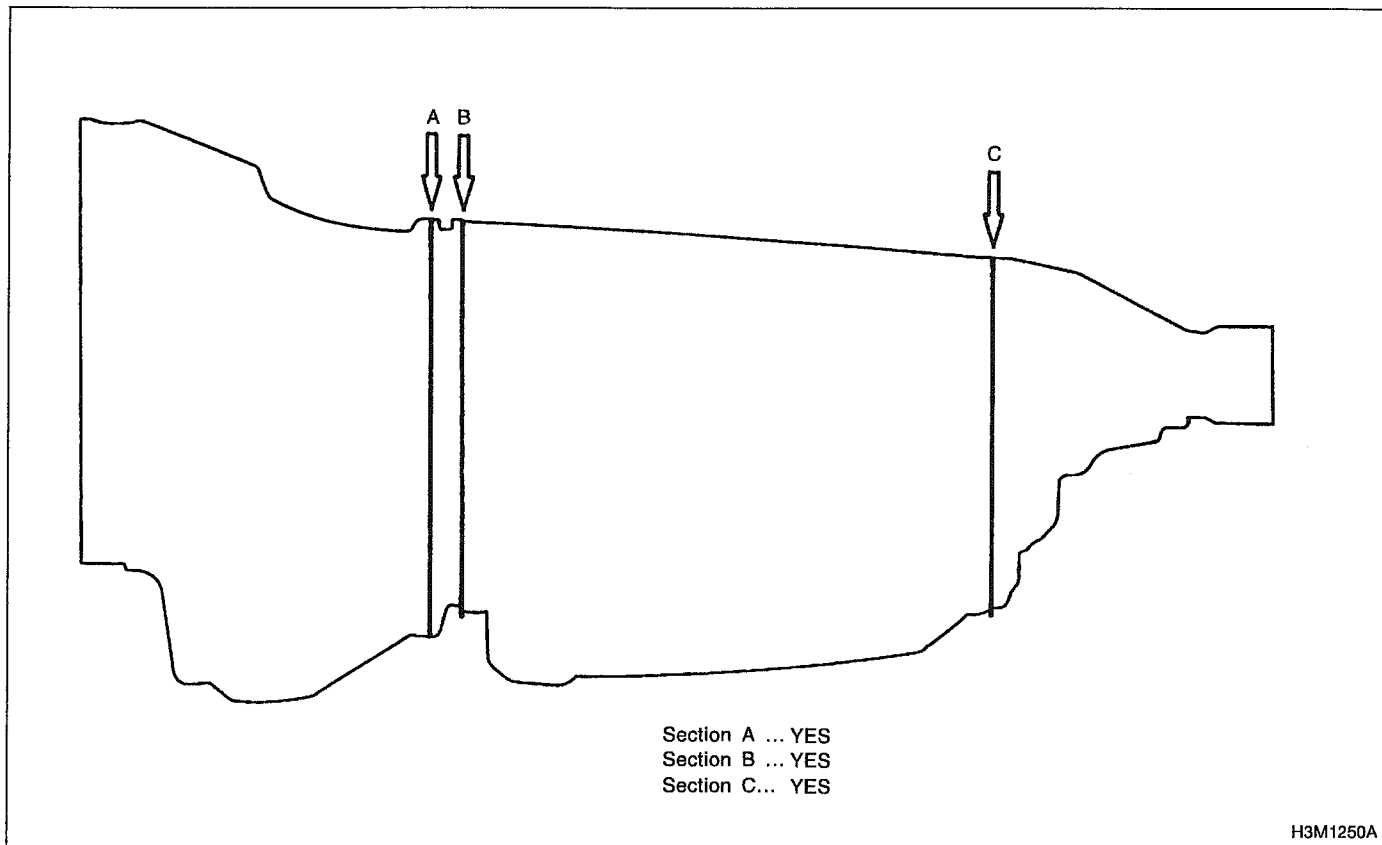
NOTE:

If oil pressure is not produced or if it does not change in the AWD mode, the duty solenoid C or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

Standard transfer clutch pressure		
Duty ratio (%)	AWD mode kPa (kg/cm ² , psi)	FWD mode kPa (kg/cm ² , psi)
5	667 — 804 (6.8 — 8.2, 97 — 117)	667 — 804 (6.8 — 8.2, 97 — 117)
40	137 — 226 (1.4 — 2.3, 20 — 33)	—
95	0 (0, 0)	—

12. Overall Transmission

A: SECTIONS THAT CAN BE DETACHED/ASSEMBLED



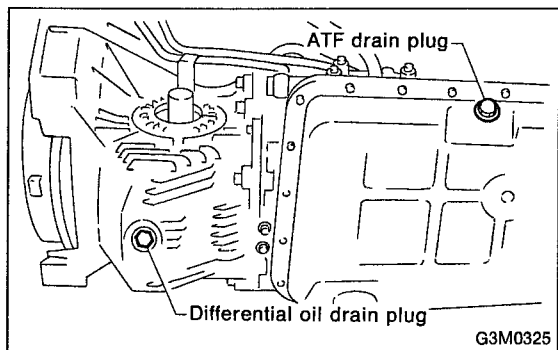
B: DISASSEMBLY

1. EXTERNAL PARTS

1) Place the transmission unit on a work bench, with the oil pan facing down.

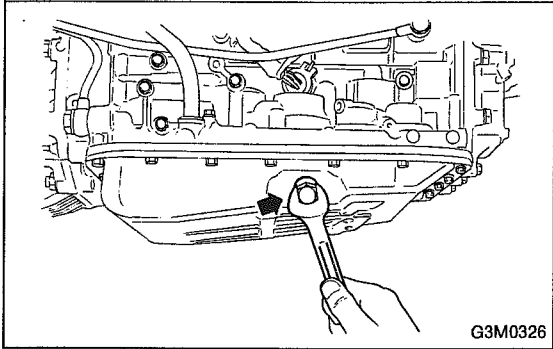
CAUTION:

Be careful not to bend or damage external parts.

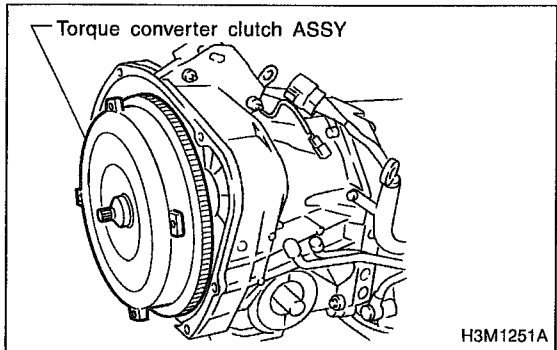


2) Remove the drain plug, and drain differential oil. Tighten the plug temporarily after draining.

12. Overall Transmission



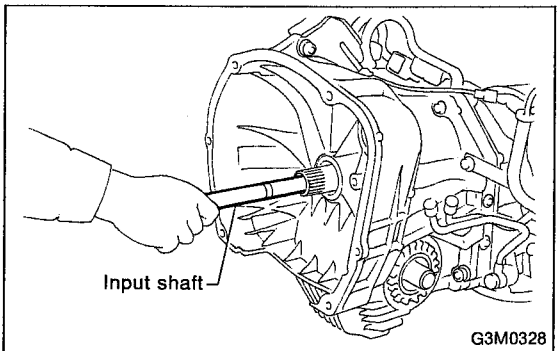
3) Remove the drain plug, and drain automatic transmission fluid (ATF). Tighten the plug temporarily after draining.



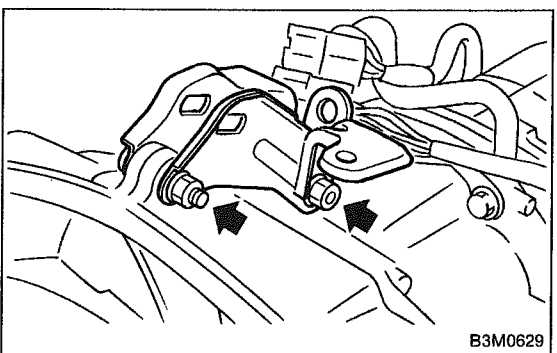
4) Extract the torque converter clutch assembly.

NOTE:

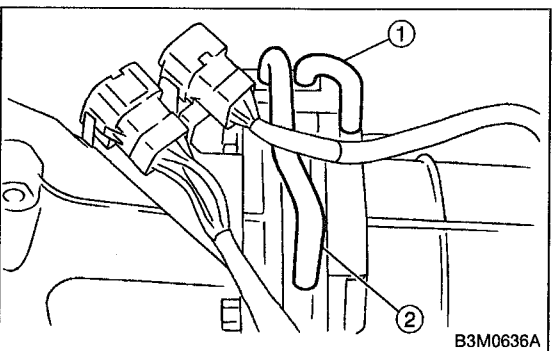
- Extract the torque converter clutch horizontally. Be careful not to scratch the bushing inside the oil pump shaft.
- Note that oil pump shaft also comes out.



5) Remove the input shaft.

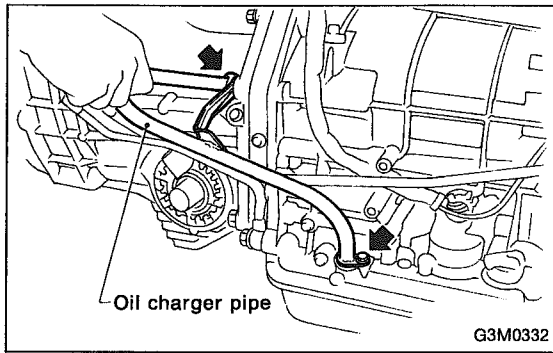


6) Remove the pitching stopper bracket.

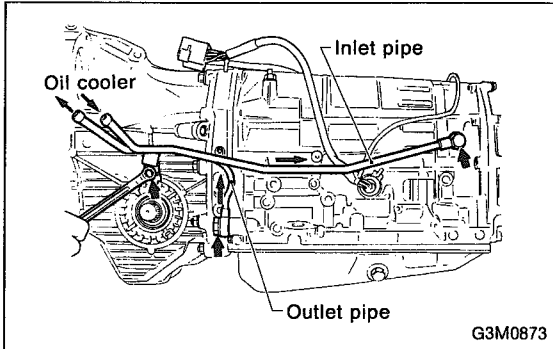


7) Disconnect the air breather hose.

- ① Air breather hose (Transmission case)
- ② Air breather hose (Oil pump housing)



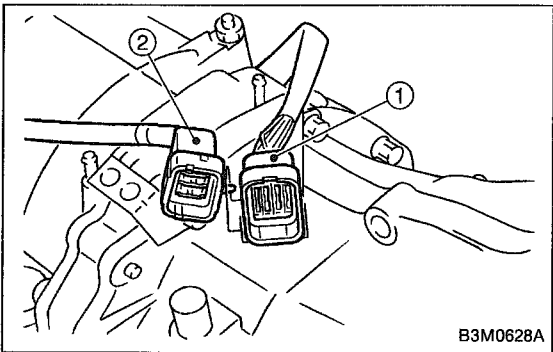
8) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe.



9) Remove the oil cooler inlet and outlet pipes.

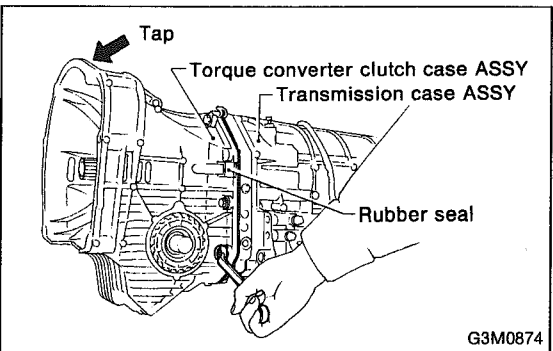
CAUTION:

When removing outlet pipes, be careful not to lose balls and springs used with retaining screws.



10) Remove harnesses from bracket.

- ① Transmission harness
- ② Inhibitor switch cord



2. SEPARATION OF EACH SECTION

1) Separation of torque converter clutch case and transmission case sections

CAUTION:

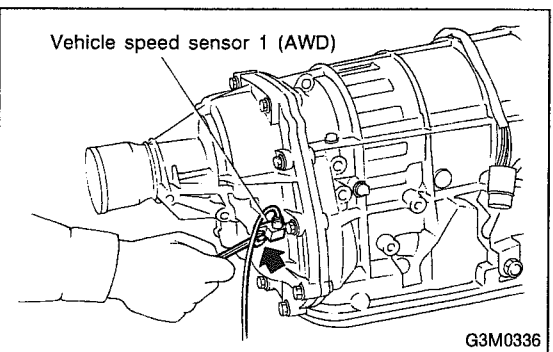
● Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.

● Be careful not to lose the rubber seal.

NOTE:

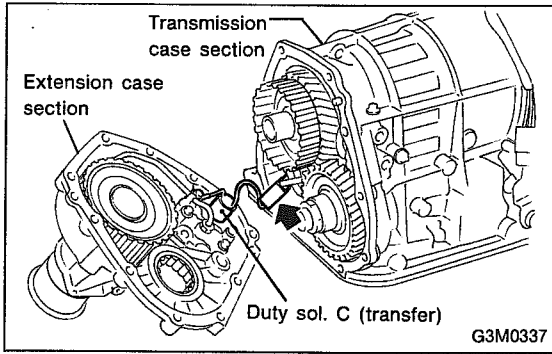
Separate these cases while tapping lightly on the housing.

2) Separation of transmission case and extension sections



(1) Remove vehicle speed sensor 1.

12. Overall Transmission



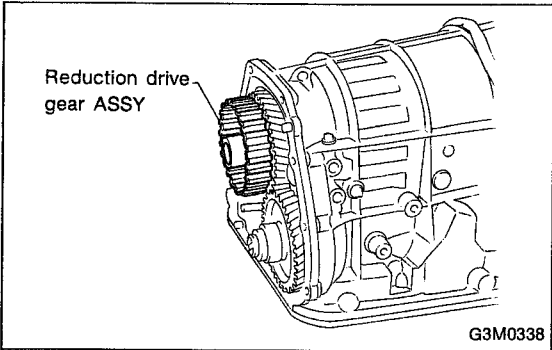
(2) While pulling the extension slightly, disconnect the connector for the duty solenoid C (transfer).

CAUTION:
Be careful not to cut the harness.

3) Separate both sections.

3. TRANSMISSION CASE SECTION

1) Remove the reduction drive gear assembly.

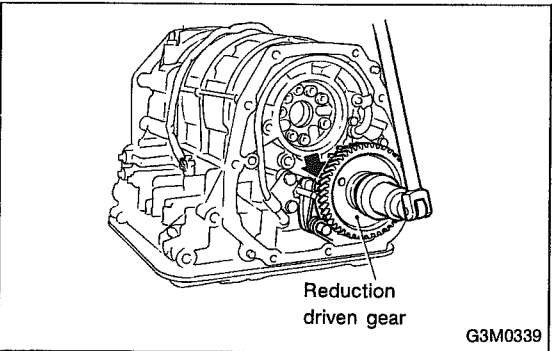


2) Remove the reduction driven gear.

(1) Straighten the staked portion, and remove the lock nut.

NOTE:

Set the range selector lever to "P".

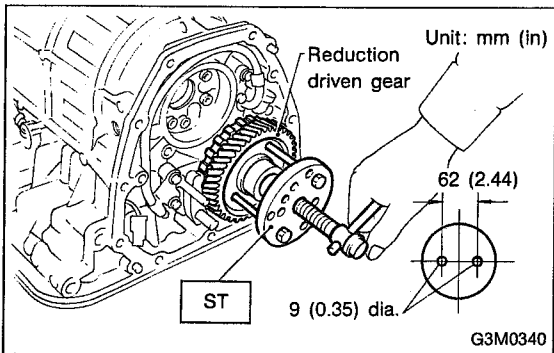


(2) Using the ST, extract the reduction driven gear.

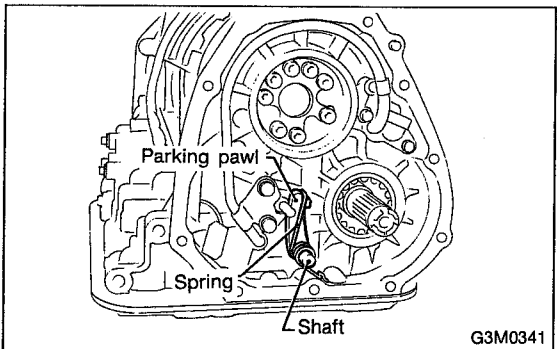
ST 899524100 PULLER SET

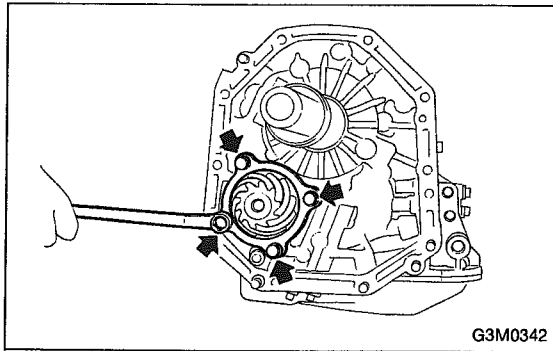
NOTE:

Drill two holes in the puller.

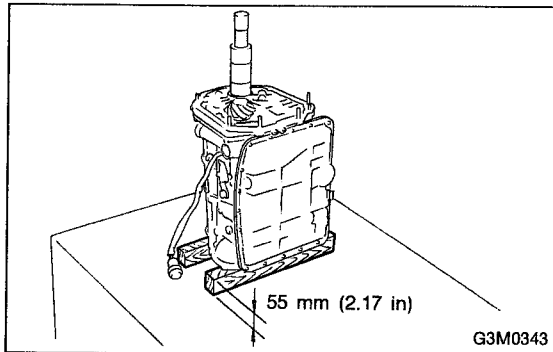


3) Remove the parking pawl, return spring and shaft.





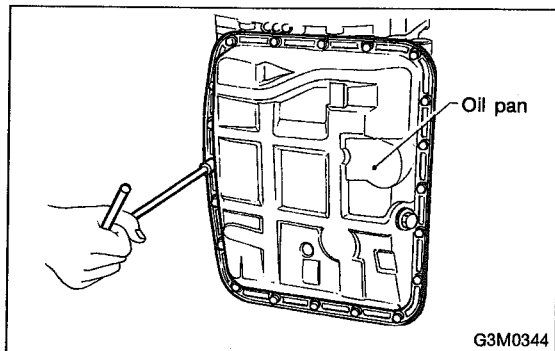
4) Loosen the taper roller bearing mounting bolts.



5) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

CAUTION:

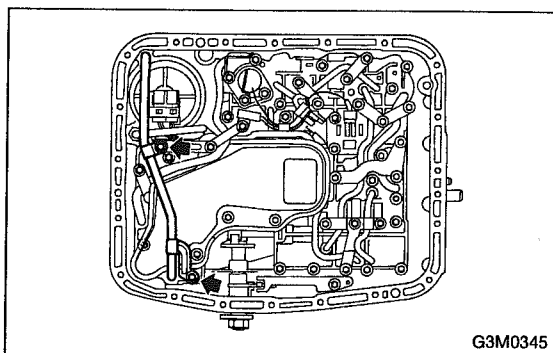
- Be careful not to scratch the rear mating surface of the transmission case.
- Note that the parking rod and drive pinion protrude from the mating surface.



6) Remove the oil pan.

NOTE:

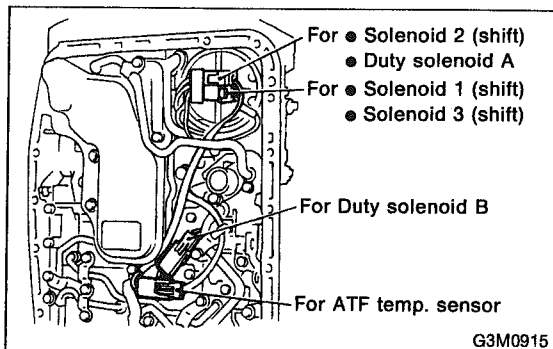
Tap the corners of the oil pan when removing.



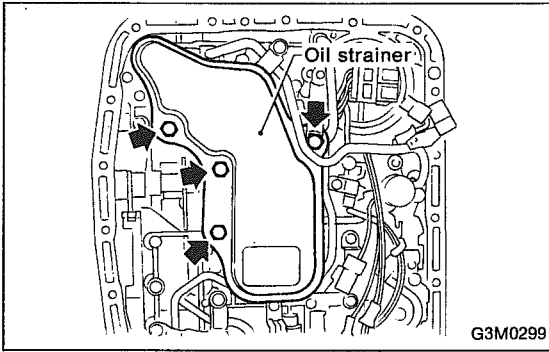
7) Remove the oil cooler outlet pipe.

CAUTION:

Be careful not to twist the pipe.

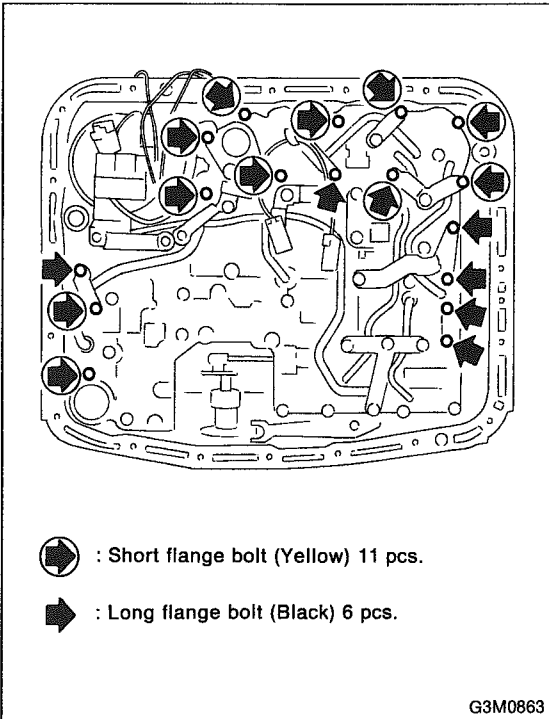


8) Disconnect the harness connectors for the solenoids and duty solenoids and the ground cord.

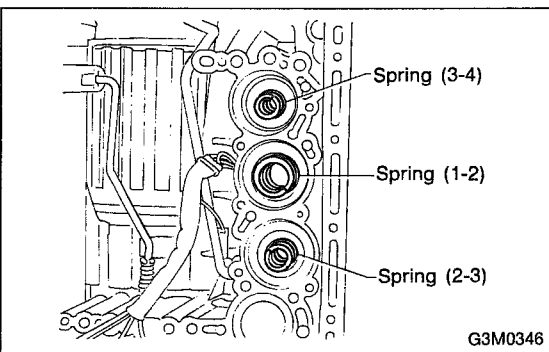


9) Remove the oil strainer.

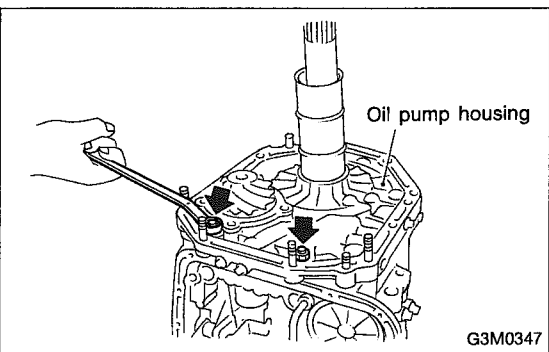
CAUTION:
Be careful not to damage O-ring on oil strainer.



10) Remove the control valve body and the two brackets.

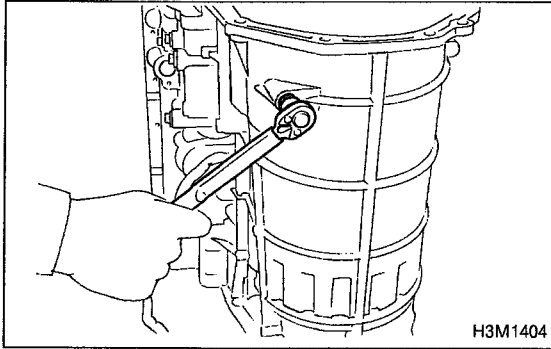


11) Remove the three accumulator springs.

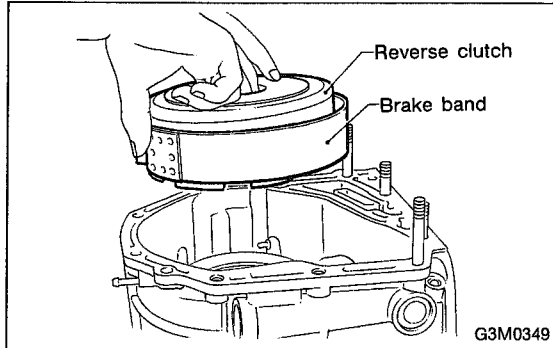


12) Loosen the reverse clutch drum lightly by turning the adjusting screw. Then remove the oil pump housing.

CAUTION:
Be careful not to lose the total end play adjusting thrust washer.

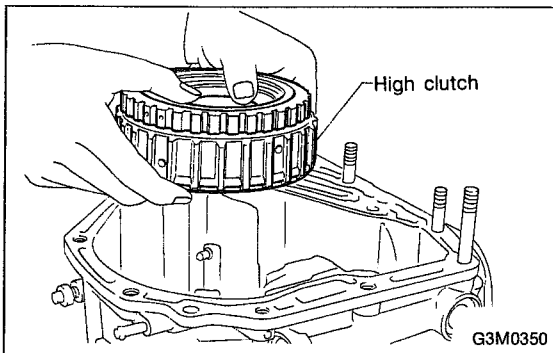


13) Loosen the brake band adjusting screw and take out the strut.



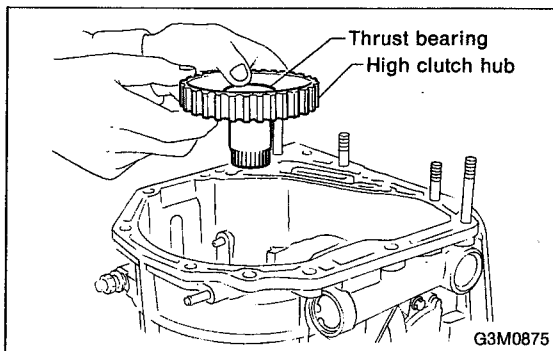
14) Remove the brake band and reverse clutch.

NOTE:
Contract the brake band with a clip.

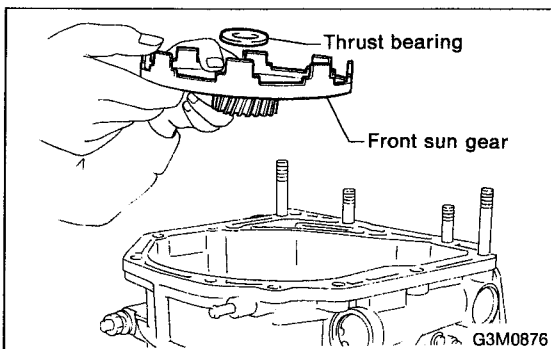


15) Take out the high clutch.

CAUTION:
Thrust needle bearing and bearing race are removed together with high clutch. Be careful not to lose them.

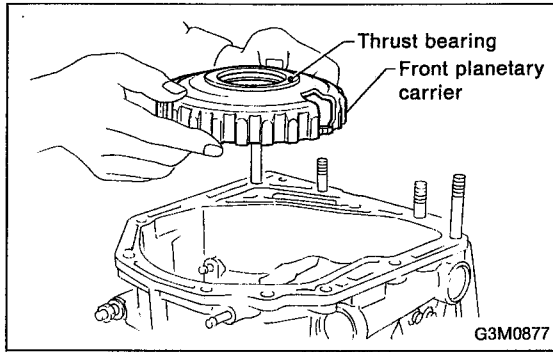


16) Take out the high clutch hub and the thrust bearing.

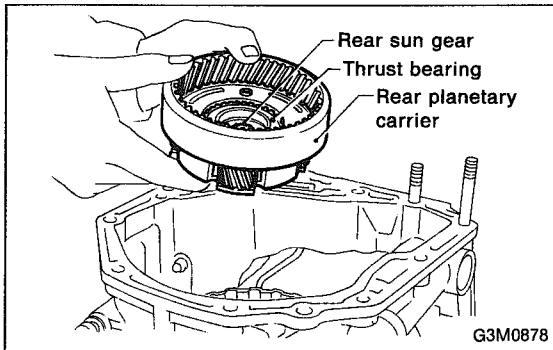


17) Take out the front sun gear and the thrust bearing.

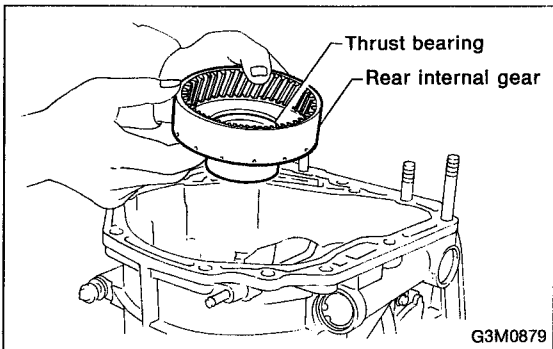
12. Overall Transmission



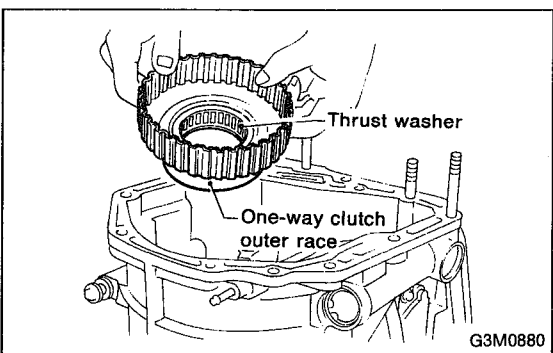
18) Take out the front planetary carrier and the thrust bearing.



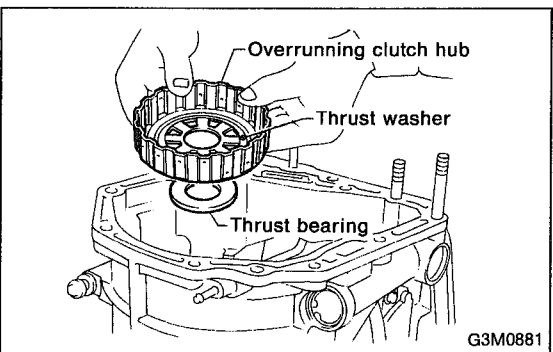
19) Take out the rear planetary carrier, rear sun gear and the thrust bearing.



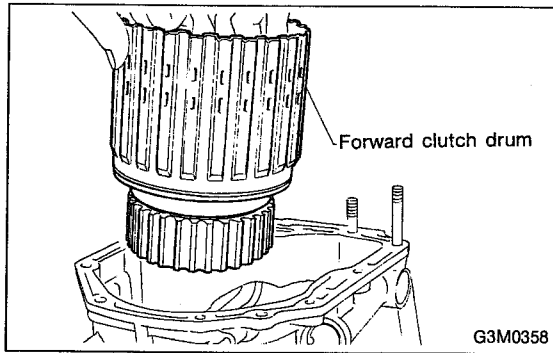
20) Take out the rear internal gear and the thrust bearing.



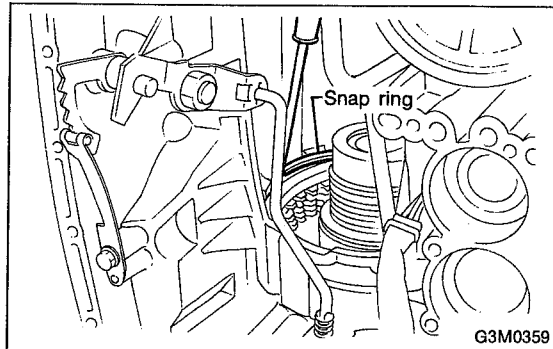
21) Take out the one-way clutch outer race and the thrust washer.



22) Take out the overrunning clutch hub, the thrust washer and the thrust bearing.

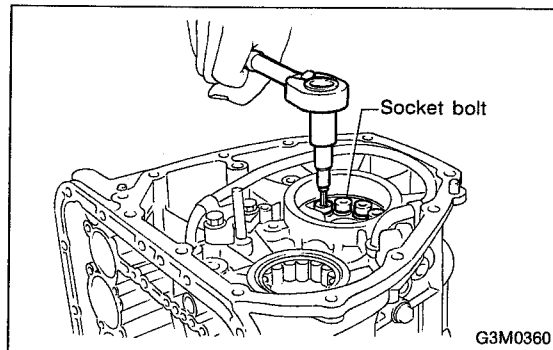


23) Take out the forward clutch drum.

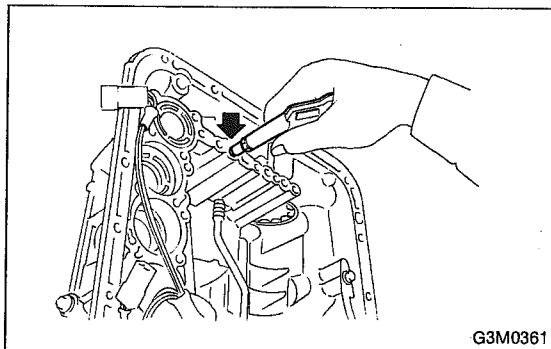


24) Take out the low & reverse brake section.

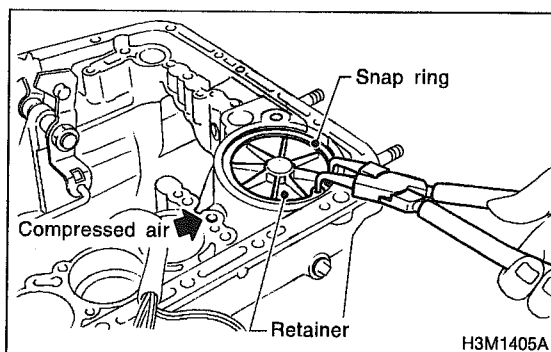
(1) Remove the snap ring. Then remove the retaining plate, drive plates, driven plates, and dish plates as a unit.



(2) Turning the case upside down, take out the one-way clutch inner race and spring retainer.



(3) Take out the low & reverse piston by applying compressed air.

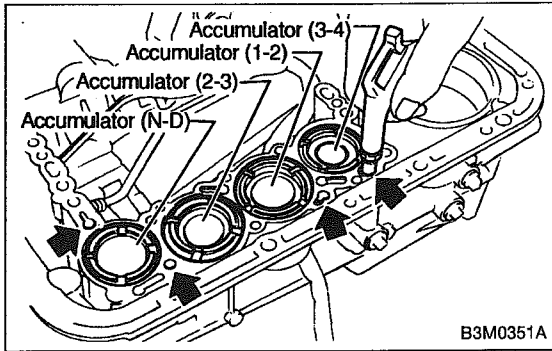


25) After removing the snap ring (inner), take out the servo piston by applying compressed air from the release pressure side.

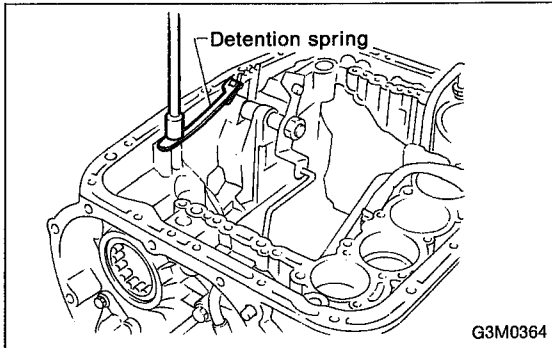
CAUTION:

Hold the servo piston with a rag so that it will not be ejected with the air pressure. In this case, do not allow your finger to be pinched between the pipe and retainer.

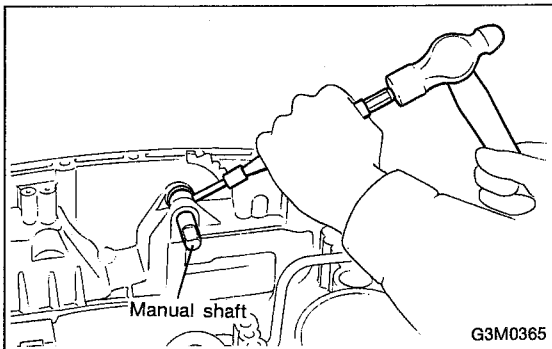
12. Overall Transmission



26) Apply compressed air from the operating pressure side, and take out accumulator (3-4), accumulator (1-2), accumulator (2-3), accumulator and spring (N-D).



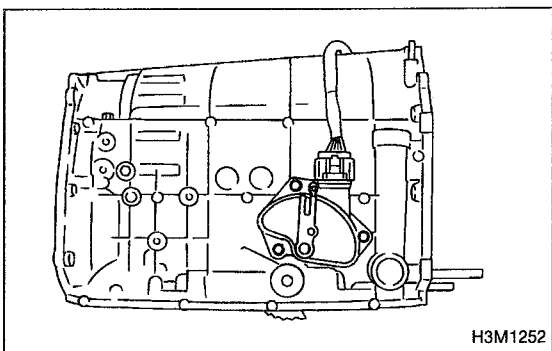
27) Remove the range select lever.
28) Remove the detention spring.



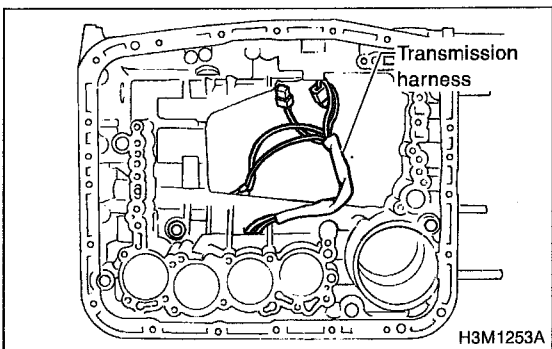
29) Remove the parking rod together with the manual lever. Then remove the manual shaft by pulling off the straight pin.

CAUTION:

Be careful not to damage the lips of the press-fitted oil seal in the case.



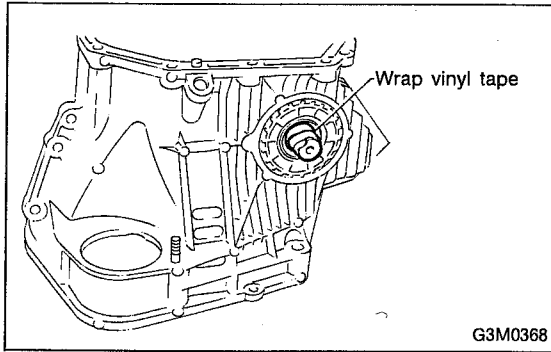
30) Remove the inhibitor switch.



31) Remove the transmission harness.

CAUTION:

Be careful not to damage the cord insulation.

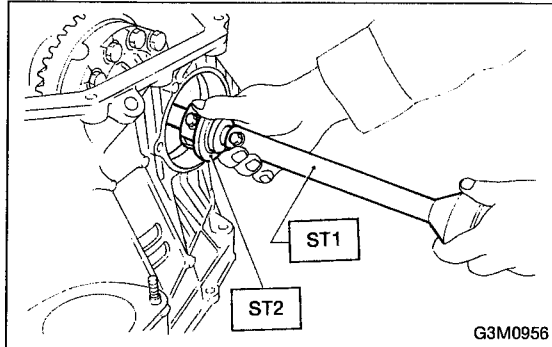


4. TORQUE CONVERTER CLUTCH CASE SECTION

- 1) Wrap the axle shaft serration with vinyl tape.
 - 2) Remove the differential side retainer with ST.
- ST 499787000 WRENCH ASSY

CAUTION:

Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case and speedometer gears.

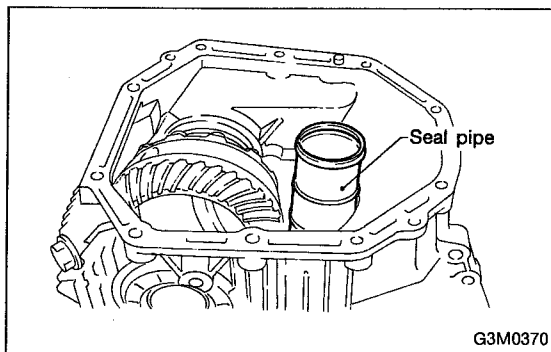


- 3) Extract the axle shaft with ST1 and ST2.

ST1 499095500 REMOVER
ST2 499247300 INSTALLER

CAUTION:

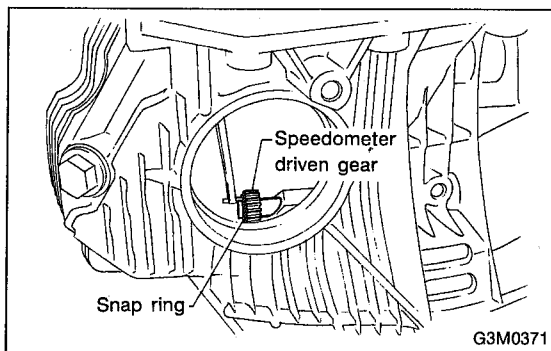
Do not reuse the circlip.



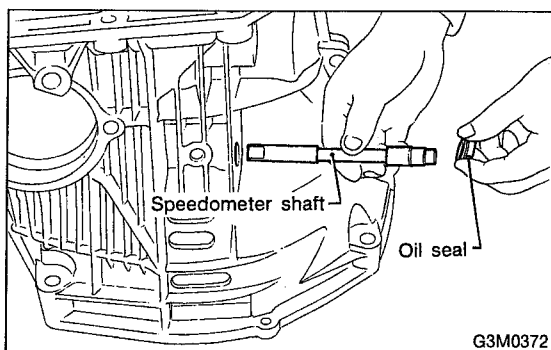
- 4) Remove the differential case assembly.

CAUTION:

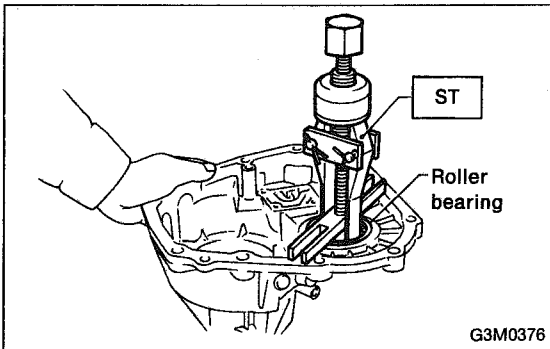
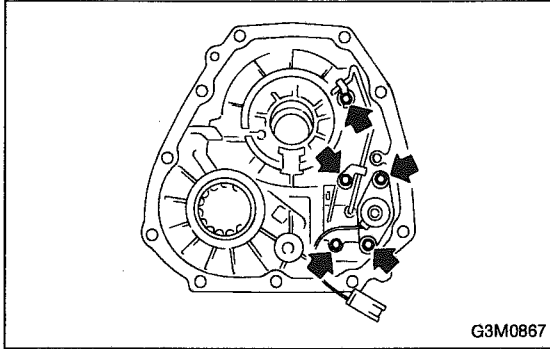
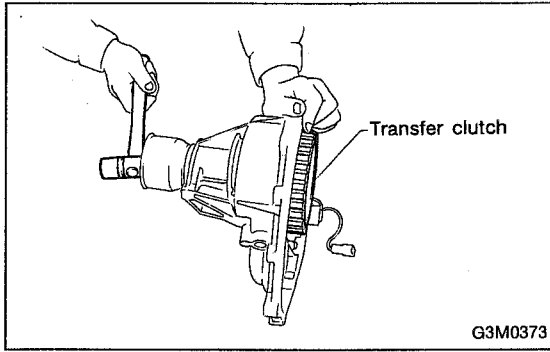
- Remove the seal pipe if it is attached. (Reusing is not allowed.)
- Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.



- 5) Remove the snap ring. Then remove the speedometer driven gear.



- 6) Tap out the speedometer shaft to the outside of the case, and remove the oil seal.



5. EXTENSION SECTION

1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

CAUTION:

Be careful not to damage the oil seal in the extension.

2) Remove duty solenoid C, transfer valve body and the transfer pipe.

CAUTION:

- Take out the inlet filter.
- Do not damage the O-ring.
- Be careful not to bend the pipe.

3) Take out the roller bearing with ST.

ST 398527700 PULLER

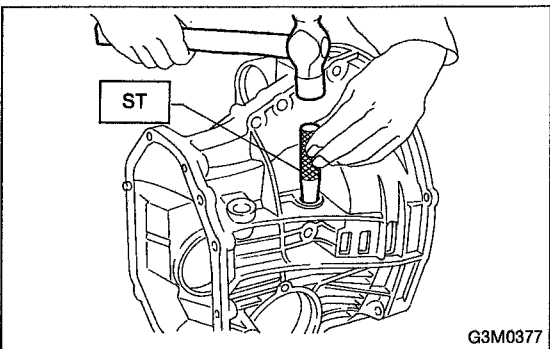
C: ASSEMBLY OF OVERALL TRANSMISSION

1. TORQUE CONVERTER CLUTCH CASE SECTION

1) Check the appearance of each component and clean.

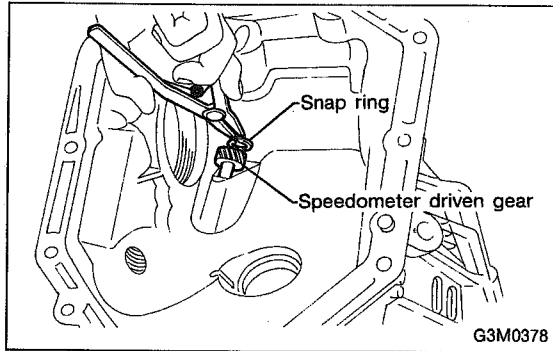
CAUTION:

Make sure each part is free of harmful cuts, damage and other faults.

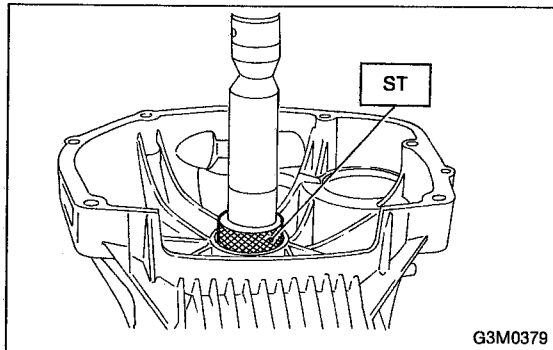


2) Install the washer and snap ring to the speedometer shaft with ST, and set the oil seal. Then force-fit the shaft to the torque converter clutch case.

ST 499827000 PRESS

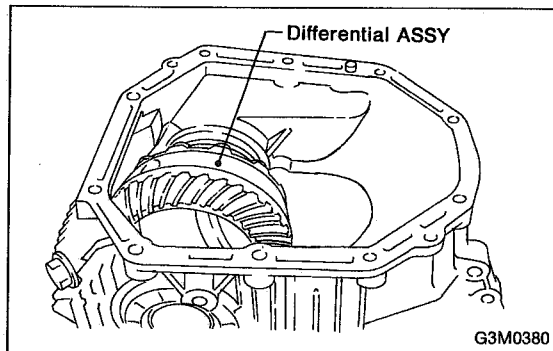


3) Install the speedometer driven gear to the speedometer shaft, and secure with a snap ring.



4) Force-fit the oil seal to the torque converter clutch case with ST.

ST 398437700 DRIFT



5) Install the differential assembly to the case, paying special attention not to damage the speedometer gears (drive and driven) and the inside of the case (particularly, the differential side retainer contact surface).

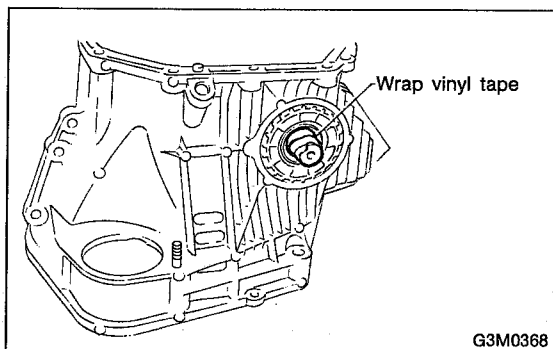
6) Install the circlip to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.

Thrust play:

Approx. 0.3 — 0.5 mm (0.012 — 0.020 in)

CAUTION:

- If no play is felt, check whether the shaft is fully inserted. If shaft insertion is correct, replace the axle shaft.
- Be sure to use a new circlip.

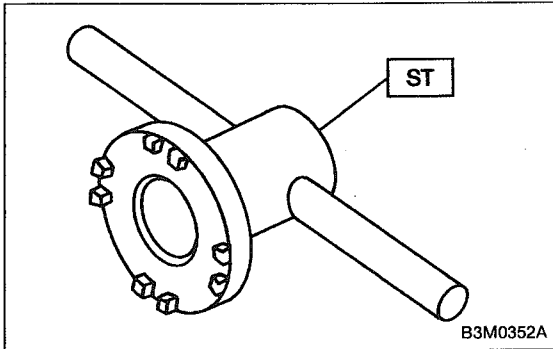


7) Wrap vinyl tape around the splined portion of the axle shaft.

8) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer and the O-ring after coating the threads with oil.

CAUTION:

- Pay attention not to damage the oil seal lips.
- Do not confuse the RH and LH oil seals.
- Keep the O-ring removed from the retainer.

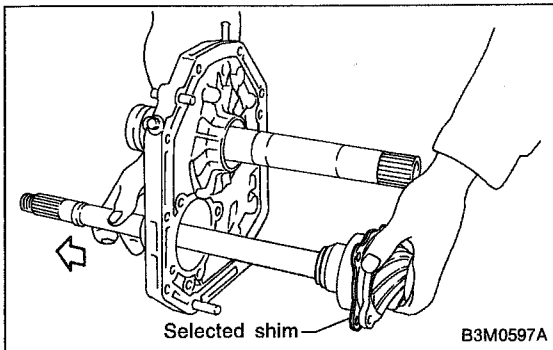


9) Using the ST, screw in the retainer until light contact is felt.

ST 499787000 WRENCH ASSY

NOTE:

Screw in the RH side slightly deeper than the LH side.

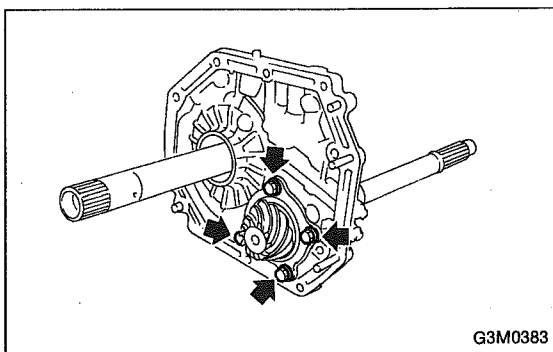


10) Hypoid gear backlash adjustment and tooth contact check

(1) Assemble the drive pinion assembly to the oil pump housing.

CAUTION:

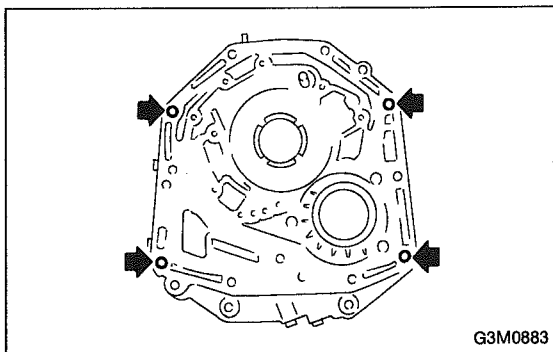
- Be careful not to bend the shims. <Ref. to 3-2 [W16C0].>
- Be careful not to force the pinion against the housing bore.



(2) Tighten four bolts to secure the roller bearing.

Tightening torque:

$39 \pm 3 \text{ N}\cdot\text{m}$ ($4.0 \pm 0.3 \text{ kg}\cdot\text{m}$, $28.9 \pm 2.2 \text{ ft}\cdot\text{lb}$)



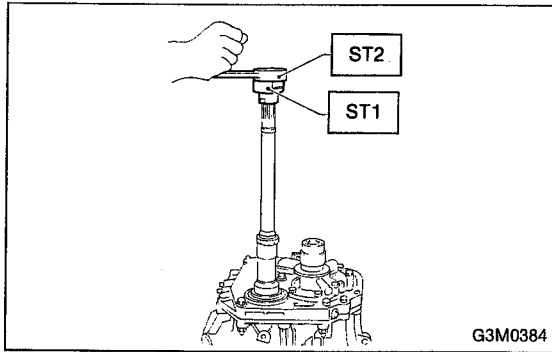
(3) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

Tightening torque:

$41 \pm 3 \text{ N}\cdot\text{m}$ ($4.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $30.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)

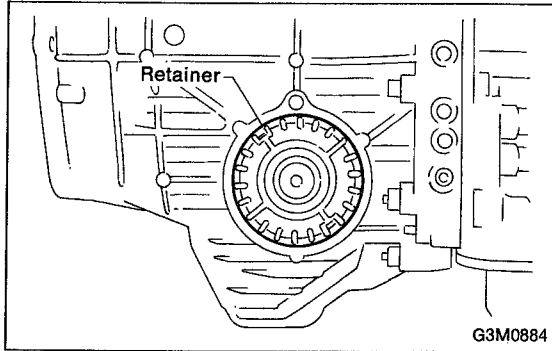
CAUTION:

- Thoroughly remove the liquid gasket from the case mating surface beforehand.
- Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

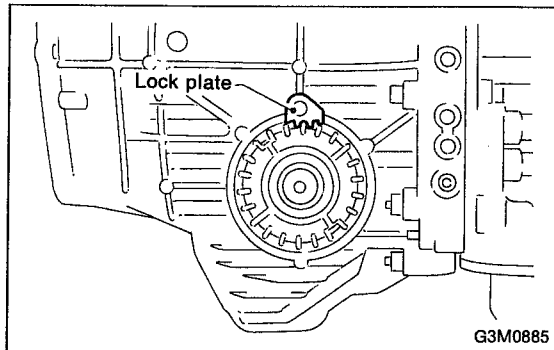


(4) Rotate the drive pinion several times with ST1 and ST2.

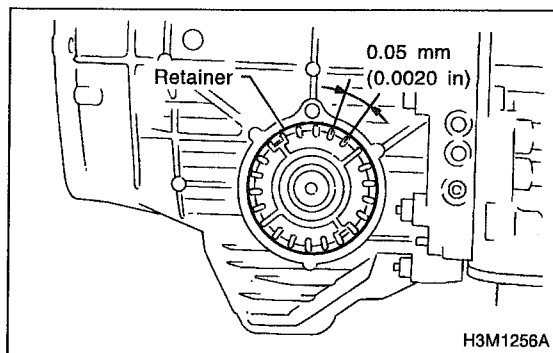
ST1 498937100 HOLDER
ST2 499787100 WRENCH



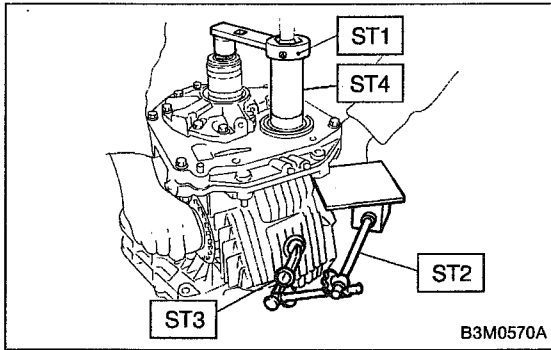
(5) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the "zero" state.



(6) After the "zero" state is established, back off the LH retainer 3 teeth and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Repeat this procedure several times. Tighten the RH retainer 1-3/4 teeth further. This sets the preload. Finally, secure the retainer with its lock plate.



NOTE:
Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).



(7) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3 and ST4.

ST1	499787100	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499757800	ADAPTER WRENCH

Backlash:

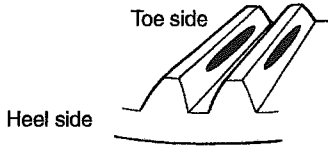
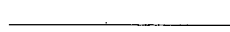
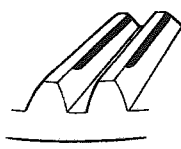
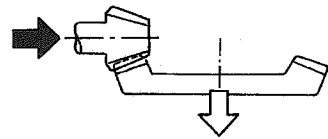
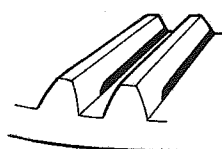
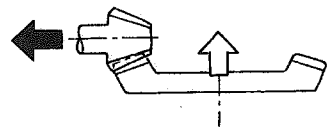
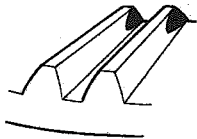
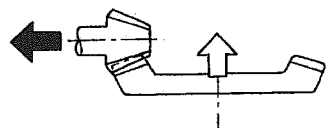
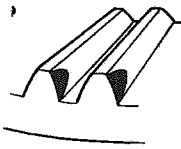
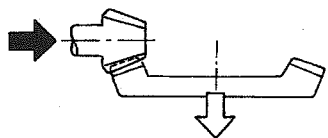
0.13 — 0.18 mm (0.0051 — 0.0071 in)

NOTE:

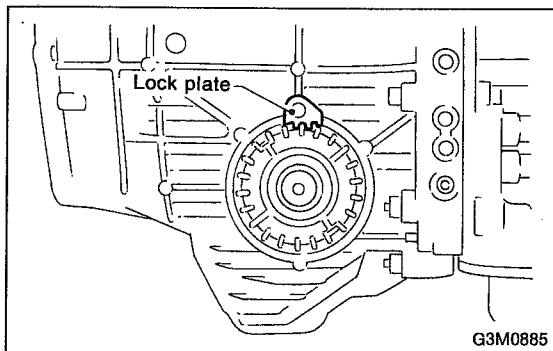
After confirming that the backlash is correct, check the tooth contact.

(8) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.

If tooth contact is improper, readjust the backlash or shim thickness.

Checking item	Contact pattern	Corrective action
<p>Tooth contact Tooth contact pattern is slightly shifted toward to under no-load rotation. [When loaded, contact pattern moves toward heel.]</p>	 <p style="text-align: right;">B3M0317A</p>	
<p>Face contact Backlash is too large.</p>	 <p style="text-align: right;">B3M0319</p>	<p>Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.</p>  <p style="text-align: right;">B3M0323</p>
<p>Flank contact Backlash is too small.</p>	 <p style="text-align: right;">B3M0320</p>	<p>Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.</p>  <p style="text-align: right;">B3M0324</p>
<p>Toe contact (Inside end contact) Contact areas is small.</p>	 <p style="text-align: right;">B3M0321</p>	<p>Adjust as for flank contact.</p>  <p style="text-align: right;">B3M0324</p>
<p>Heel contact (Outside end contact) Contact area is small.</p>	 <p style="text-align: right;">B3M0322</p>	<p>Adjust as for face contact.</p>  <p style="text-align: right;">B3M0323</p>

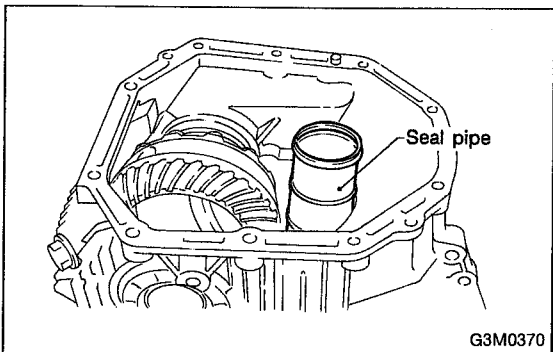
➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear



(9) If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

Tightening torque:

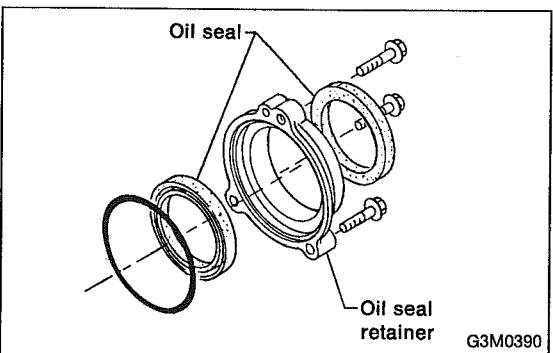
$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



11) Install the seal pipe to the torque converter clutch case.

CAUTION:

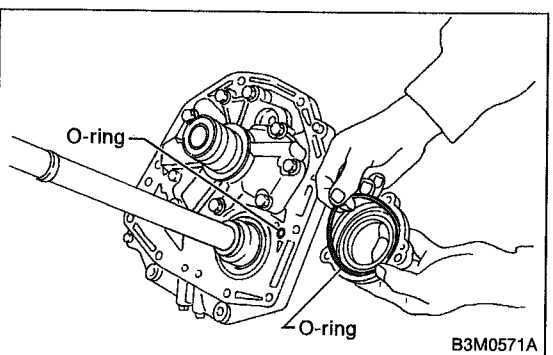
Be sure to use a new seal pipe.



12) Install two oil seals to the oil seal retainer with ST.
ST 499247300 INSTALLER

CAUTION:

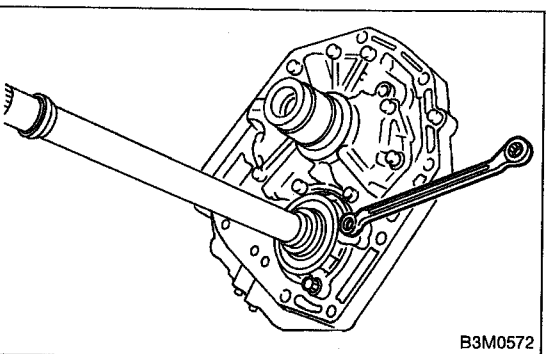
- Always discard old oil seals, and install new ones.
- Pay attention to the orientation of the oil seals.



13) Attach the O-ring to the oil seal retainer with vaseline. Install the seal to the oil pump housing bore.

CAUTION:

Always discard old O-rings and install new ones.



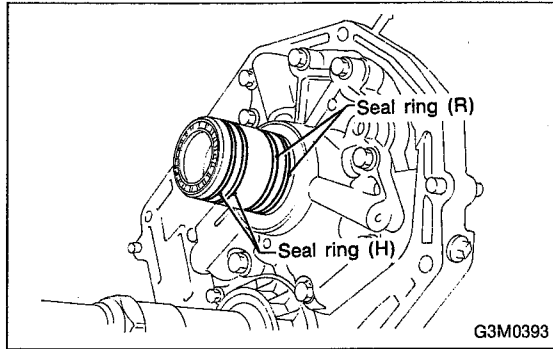
14) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with three bolts.

NOTE:

Make sure the O-ring is fitted correctly in position.

Tightening torque:

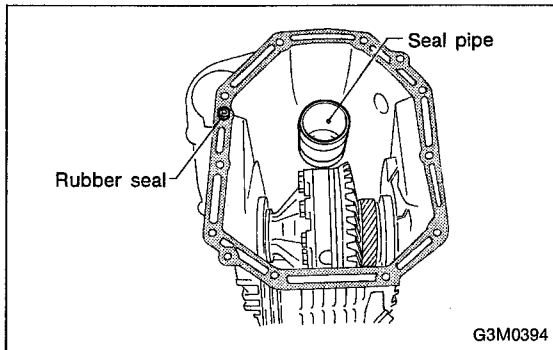
$7 \pm 1 \text{ N}\cdot\text{m}$ ($0.7 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.1 \pm 0.7 \text{ ft}\cdot\text{lb}$)



15) Apply vaseline to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.

NOTE:

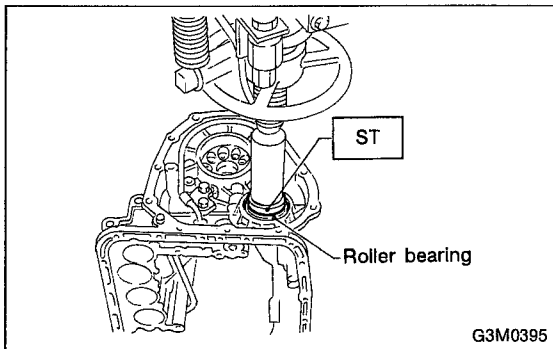
- Fit the seal ring after compressing, and rub vaseline into the seal ring to avoid expansion.
- The "R" seal ring has a large diameter, while "H" has small diameter.



16) Install the rubber seal to the torque converter clutch case.

CAUTION:

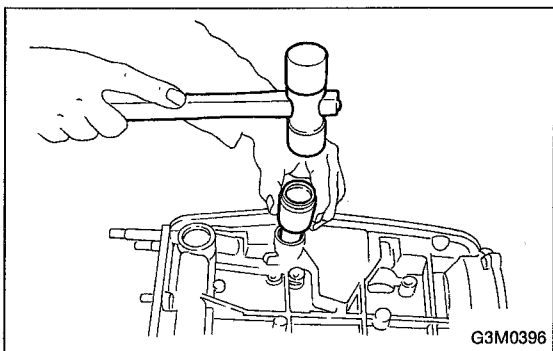
Be careful not to lose the rubber seal.



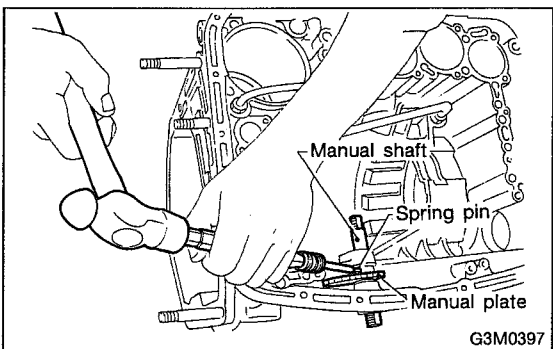
2. TRANSMISSION CASE SECTION

1) Press-fit the roller bearing to the transmission case with ST.

ST 398487700 DRIFT



2) Using a plastic hammer, force-fit the oil seal.



3) Install the manual plate and shaft, and secure with a spring pin.

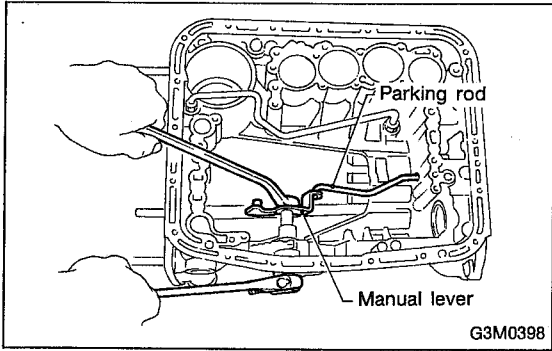
CAUTION:

Be careful not to damage the oil seal lip.

NOTE:

After installation, make sure of smooth movement.

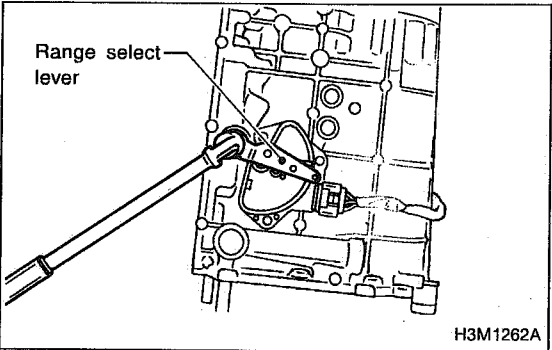
12. Overall Transmission



4) Assemble the manual lever and parking rod to the inside shaft, and secure with a nut.

Tightening torque:

$47 \pm 2 \text{ N}\cdot\text{m}$ ($4.8 \pm 0.2 \text{ kg}\cdot\text{m}$, $34.7 \pm 1.4 \text{ ft}\cdot\text{lb}$)



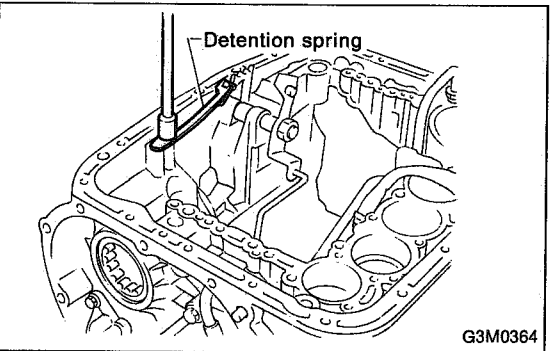
5) Install inhibitor switch.

(1) Install the inhibitor switch to the transmission case. Fit the projecting portion of the switch in the recessed portion of the case, and tighten three bolts temporarily.

(2) Insert the range select lever into the shaft, and tighten the nut.

Tightening torque:

$47 \pm 5 \text{ N}\cdot\text{m}$ ($4.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $34.7 \pm 3.6 \text{ ft}\cdot\text{lb}$)



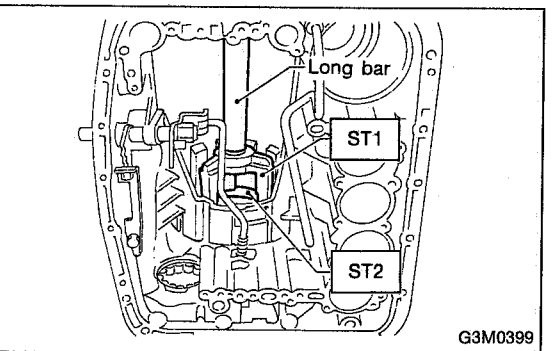
6) Install the detention spring.

NOTE:

Position the spring so that its center is aligned with the center of the manual plate.

Tightening torque:

$6 \pm 1 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.1 \text{ kg}\cdot\text{m}$, $4.3 \pm 0.7 \text{ ft}\cdot\text{lb}$)



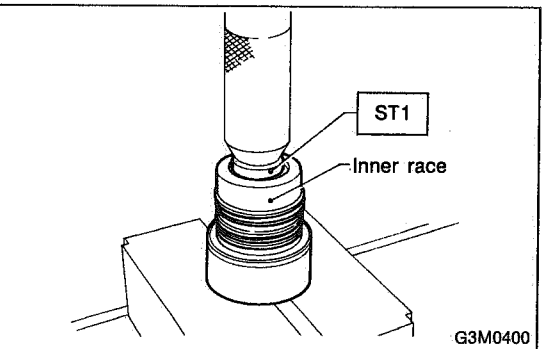
7) Install the lathe cut seal rings to the I.D./O.D. of the low and reverse piston. Then install the piston into the case with a press, ST1 and ST2.

ST1 398673600 COMPRESSOR

ST2 498627000 SEAT

CAUTION:

- Be careful not to tilt the piston when installing.
- Be careful not to damage the lip seal.



8) Install the one-way clutch inner race.

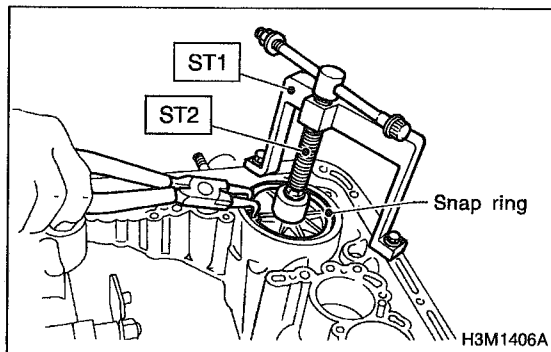
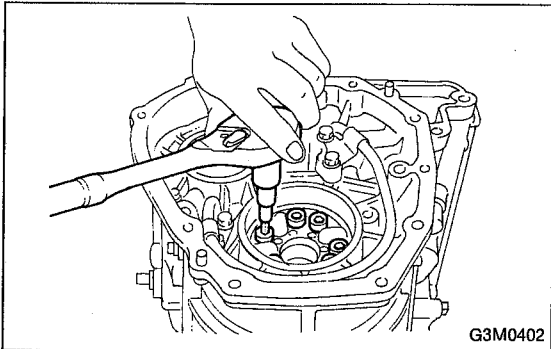
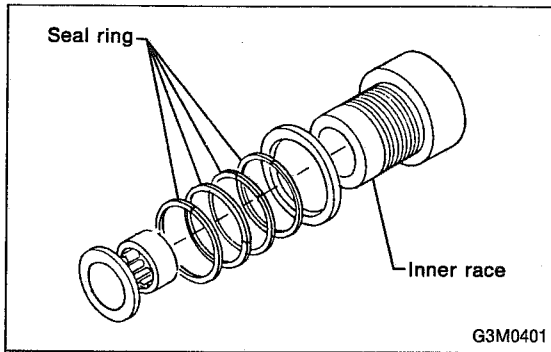
(1) Using a press and ST1, install the needle bearing to the inner race.

ST1 398497701 INSTALLER

NOTE:

Use the following ST when removing.

ST 398527700 PULLER ASSY



(2) Install four seal rings and thrust washer.

NOTE:

Apply vaseline to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.

(3) Place the spring retainer on the inner race. Install the spring to the recessed portion of the piston. Then tighten eight socket head bolts from the rear side of the transmission case.

Tightening torque:

$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

CAUTION:

Be sure to tighten evenly.

9) Install the band servo sub assembly.

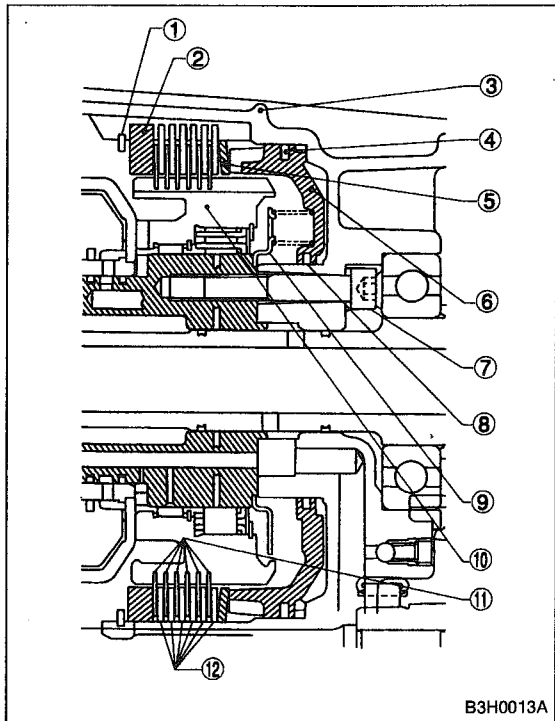
10) Press the O.D. servo retainer into position with ST1 and ST2, and secure with a snap ring.

ST1 498677010 COMPRESSOR

ST2 399703600 PULLER ASSY

CAUTION:

Perform the following operations with the transmission case set vertically on wooden blocks.



11) Measure the drive plates thickness of the low & reverse brake.

Standard value: 1.8 mm (0.071 in)

Allowable limit: 1.6 mm (0.063 in)

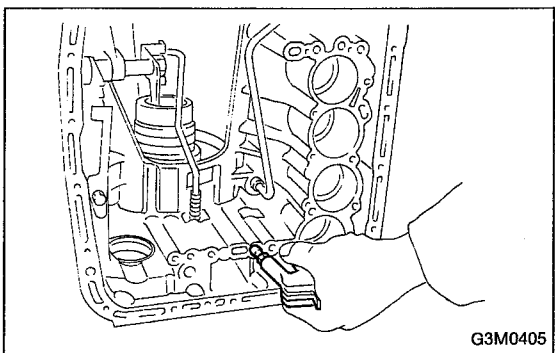
12) Installation of the low & reverse brake:

(1) Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

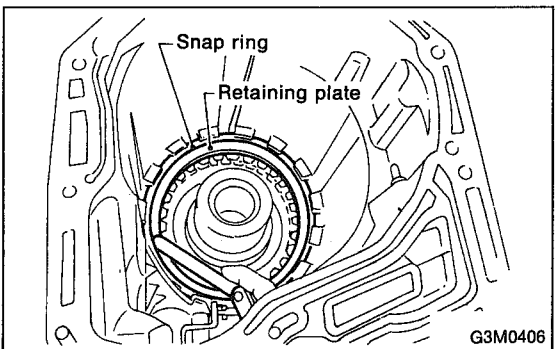
NOTE:

Pay attention to the orientation of the dish plate.

- ① Snap ring
- ② Retaining plate
- ③ Transmission case
- ④ Lathe cut seal ring
- ⑤ Dish plate
- ⑥ Piston
- ⑦ Bolt
- ⑧ Lathe cut seal ring
- ⑨ Clutch spring retainer
- ⑩ Forward clutch drum
- ⑪ Drive plate
- ⑫ Driven plate



(2) Apply compressed air intermittently to check for operation.



(3) Check the clearance. (Selection of retaining plate)

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

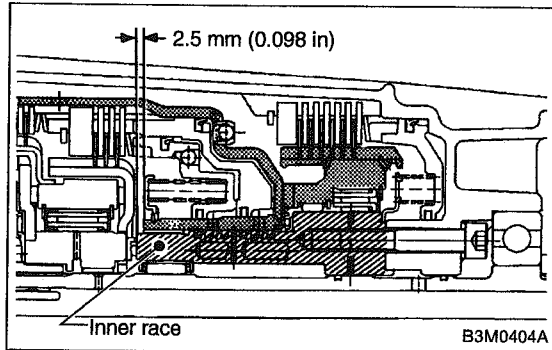
Standard value:

0.7 — 1.0 mm (0.028 — 0.039 in)

Allowable limit:

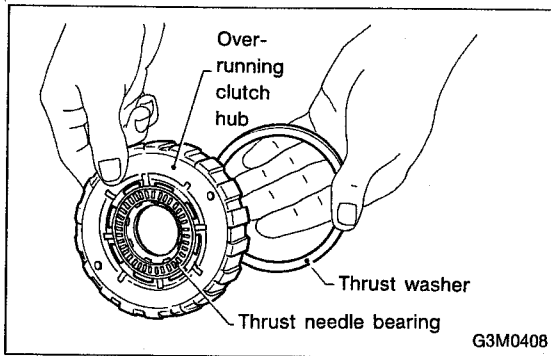
2.0 mm (0.079 in)

● Available retaining plates	Part No.	Thickness mm (in)
	31667AA180	6.5 (0.256)
31667AA190	6.8 (0.268)	
31667AA200	7.1 (0.280)	
31667AA210	7.4 (0.291)	
31667AA220	7.7 (0.303)	
31667AA230	8.0 (0.315)	
31667AA240	8.2 (0.323)	
31667AA250	8.4 (0.331)	
31667AA310	8.6 (0.339)	



13) Install the forward clutch drum.

- (1) Install carefully while rotating the forward drum slowly paying special attention not to damage the seal ring.
- (2) Installation is complete when the forward drum recedes 2.5 mm (0.098 in) from the inner race surface.



14) Assemble the overrunning clutch hub.

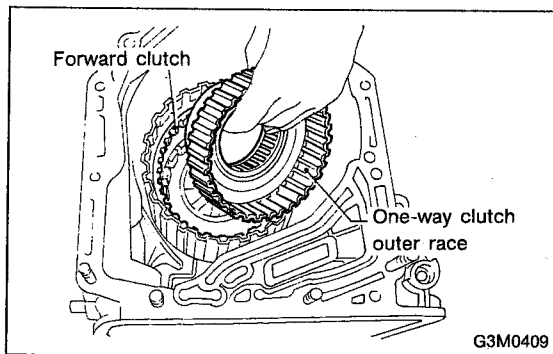
CAUTION:

Install thrust needle bearing in the correct direction.

< Ref. to 3-2 [S1C0]. >

NOTE:

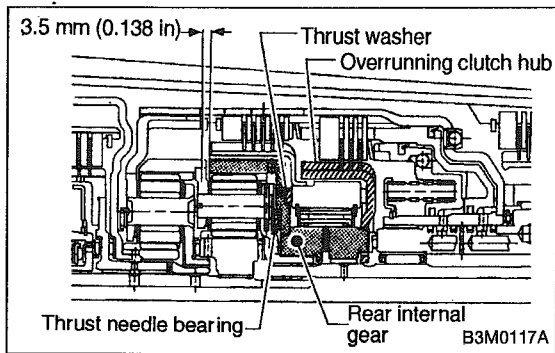
- Join the thrust needle bearing and thrust washer with vaseline, and then install them together.
- Make sure that the splines are engaged correctly.



15) Install the one-way clutch outer race.

NOTE:

Make sure the forward clutch splines are engaged correctly.



16) Assemble the rear internal gear.

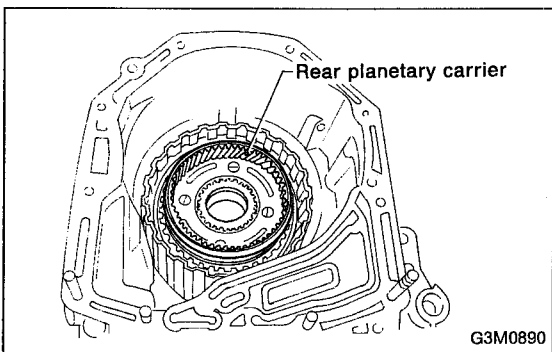
- (1) Join the thrust needle bearing and thrust washer to the internal gear with vaseline, and install the internal gear while rotating it.
- (2) Securely engage the bearing with the dog of the overrunning clutch hub.

CAUTION:

Install thrust needle bearing in the correct direction.
< Ref. to 3-2 [S1C0]. >

NOTE:

Installation is complete when the snap ring top surface of the forward clutch drum recedes approximately 3.5 mm (0.138 in).

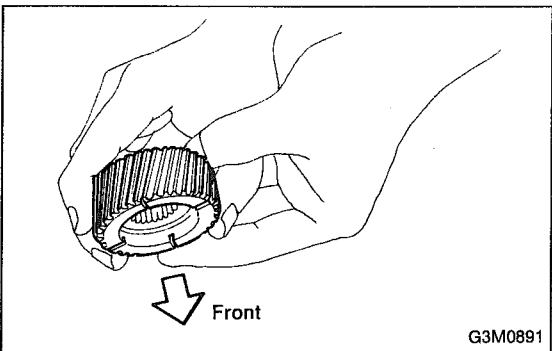


17) Install the rear planetary carrier.

Attach the thrust needle bearing to the inside of the carrier with vaseline. Then install the carrier while rotating slowly.

CAUTION:

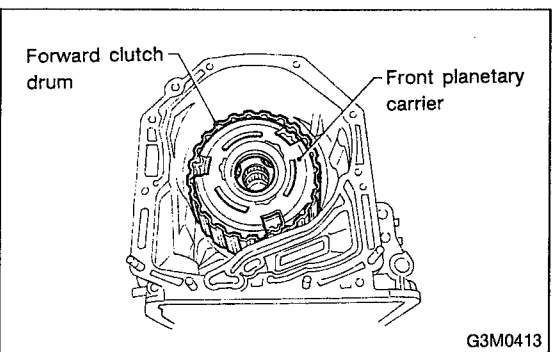
Install thrust needle bearing in the correct direction.
< Ref. to 3-2 [S1C0]. >



18) Install the rear sun gear.

NOTE:

Install the gear with the oil groove facing up.

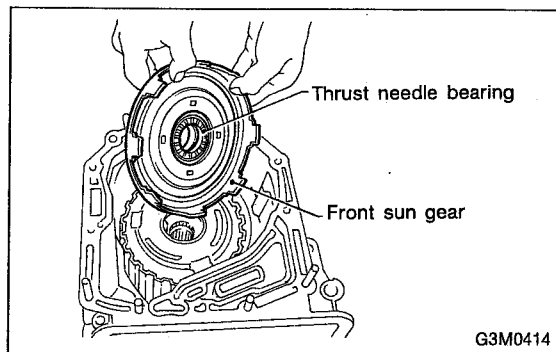


19) Install the front planetary carrier.

Attach the thrust needle bearings to both sides of the carrier with vaseline. Install the carrier carefully, while aligning with the splines of the forward clutch drum, and while rotating the pinion.

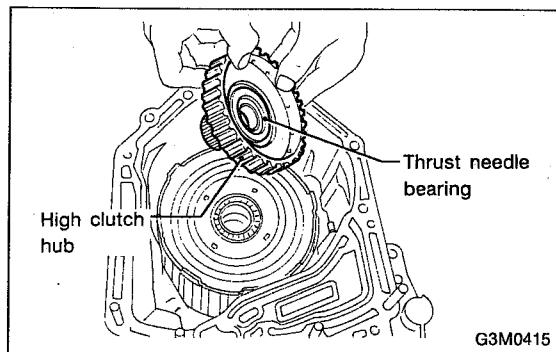
CAUTION:

Install thrust needle bearing in the correct direction.
< Ref. to 3-2 [S1C0]. >



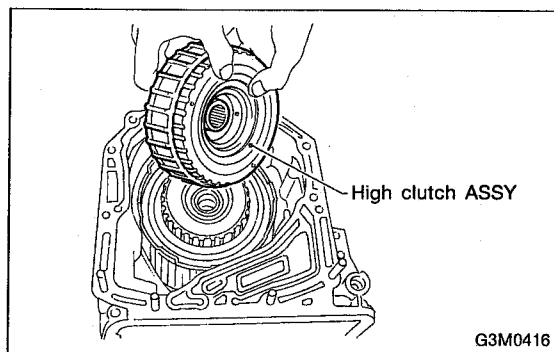
20) Install the front sun gear.
Attach the thrust needle bearing to the gear, and install the gear while turning slowly.

CAUTION:
Install thrust needle bearing in the correct direction.
< Ref. to 3-2 [S1C0]. >

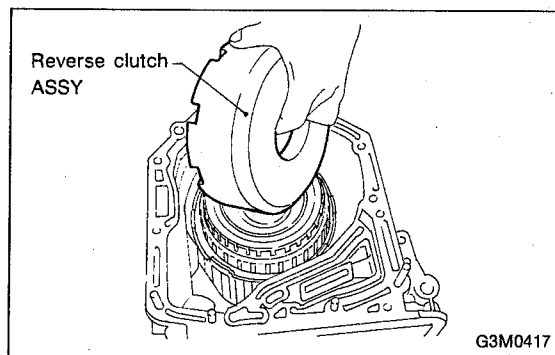


21) Install the high clutch hub.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

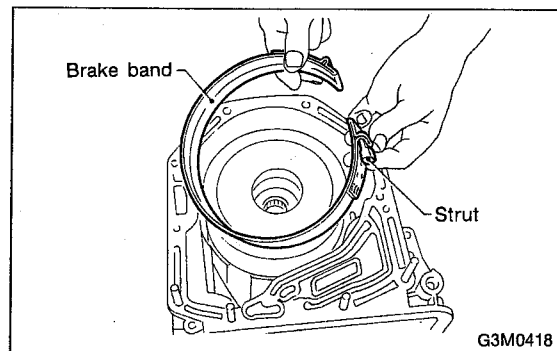
CAUTION:
Install thrust needle bearing in the correct direction.
< Ref. to 3-2 [S1C0]. >



22) Install the high clutch assembly.
NOTE:
Correctly engage the high clutch hub and clutch splines.



23) Install the reverse clutch assembly.
NOTE:
Engage the high clutch outer spline with the reverse clutch spline and the front sun gear with the cut-out portion of the reverse clutch drum correctly when installing.

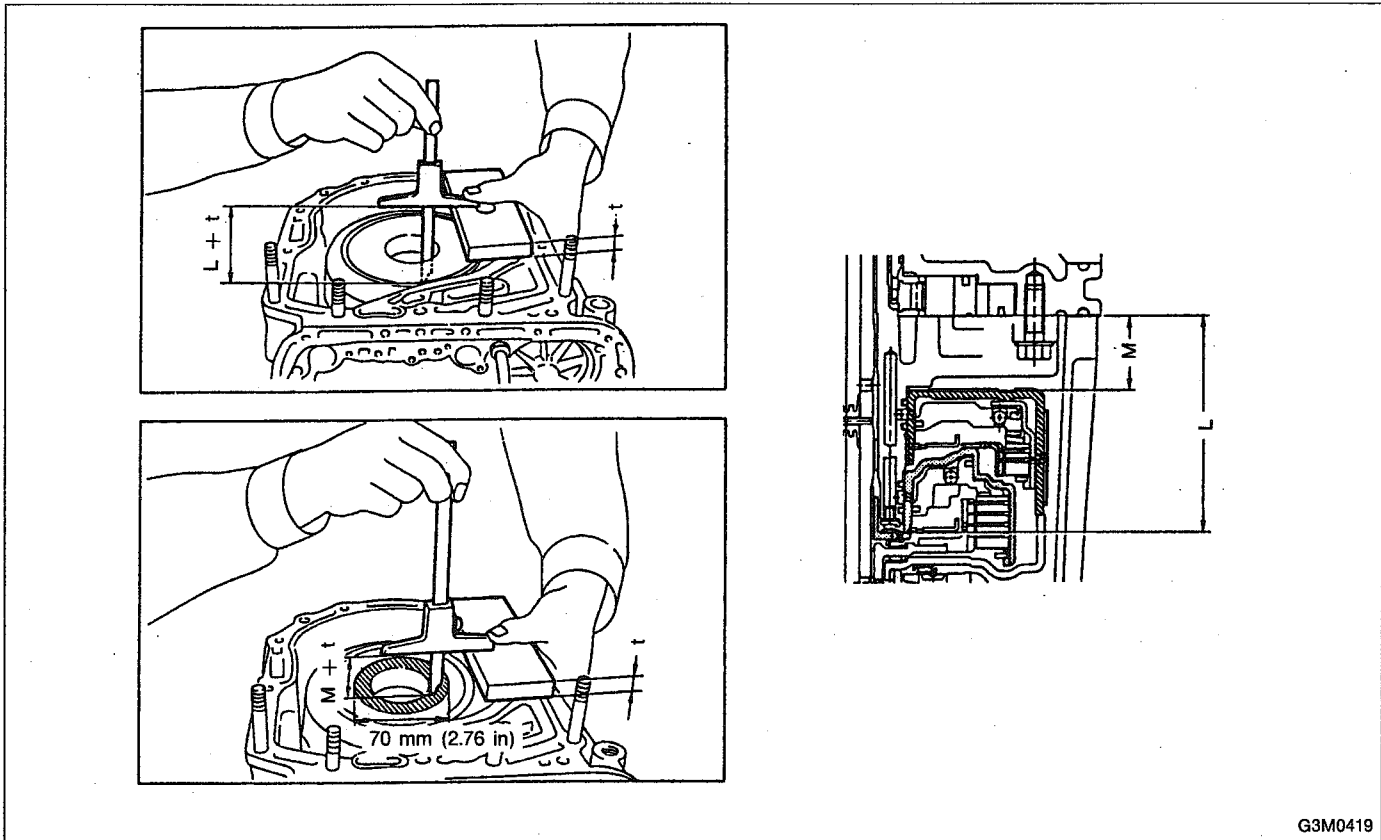


24) Install the brake band.
CAUTION:
Be careful not to damage the brake band when installing.

NOTE:
Install the strut to the band servo piston stem. Then tighten it temporarily to avoid tilting the band.

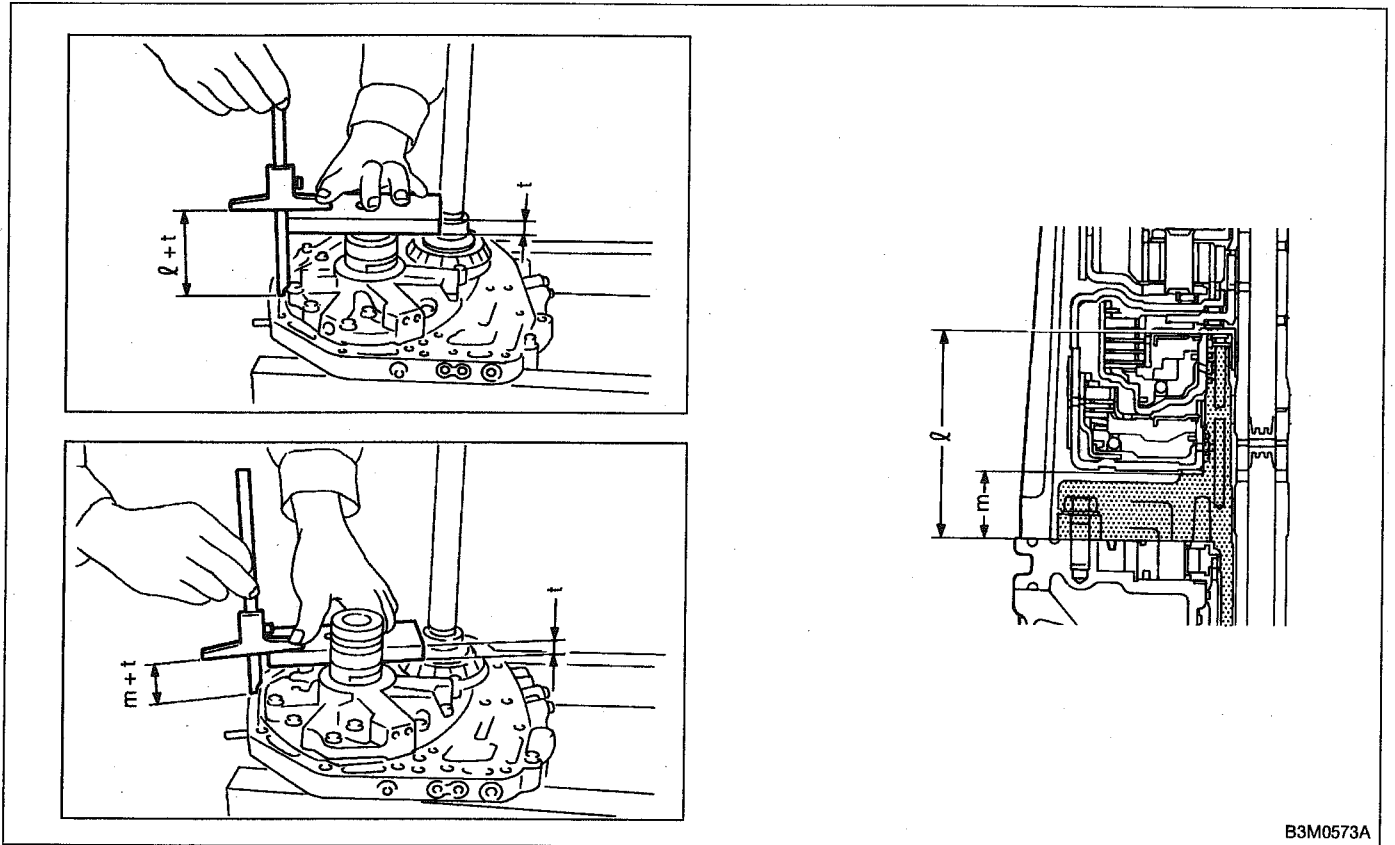
25) Adjustment of total end play and reverse clutch end play

- (1) Measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum "L", and the distance to the top surface of the reverse clutch drum "M".



G3M0419

(2) Measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with needle bearing, and to the thrust surface of the reverse clutch.



B3M0573A

(3) Equation for calculation

● Total end play

$$C = (L + 0.4 \text{ mm}) - \ell$$

C: Clearance between concave portion of high clutch and end of clutch drum support

L: Length from case mating surface to concave portion of high clutch

0.4: Gasket thickness

ℓ : Height from housing mating surface to upper surface of clutch drum support

	Part No.	Thickness mm (in)
Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 — 0.55 mm (0.0098 — 0.0217 in) range.	803031021	0.8 (0.031)
	803031022	1.0 (0.039)
	803031023	1.2 (0.047)
	803031024	1.4 (0.055)
	803031025	1.6 (0.063)
	803031026	1.8 (0.071)
	803031027	2.0 (0.079)

- Reverse clutch end play
 $C = (M + 0.4 \text{ mm}) - m$

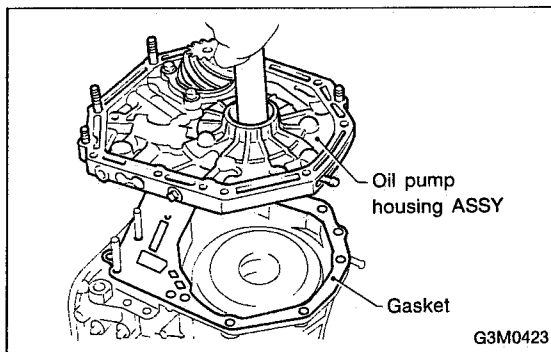
C : Clearance between oil pump housing hose and end of reverse clutch

M: Distance from case mating surface to upper surface of reverse clutch

0.4 : Gasket thickness

m: Height from housing mating surface to thrust-receiving area of reverse clutch

	Part No.	Thickness mm (in)
Select suitable thrust washer from among those listed in this table so that clearance C is in the 0.55 — 0.90 mm (0.0217 — 0.0354 in) range.	31299AA000	0.7 (0.028)
	31299AA010	0.9 (0.035)
	31299AA020	1.1 (0.043)
	31299AA030	1.3 (0.051)
	31299AA040	1.5 (0.059)
	31299AA050	1.7 (0.067)
	31299AA060	1.9 (0.075)



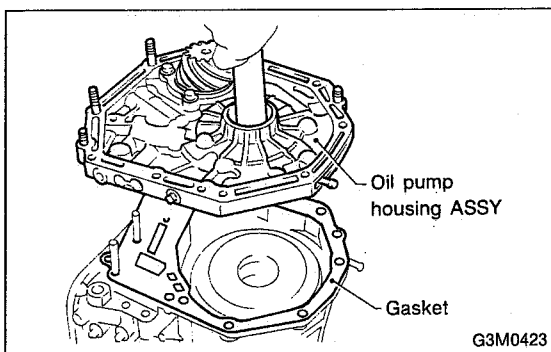
26) Install the oil pump housing assembly.

(1) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust washer and thrust needle bearing to the oil pump cover with vaseline.

(2) After correctly installing the gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

CAUTION:

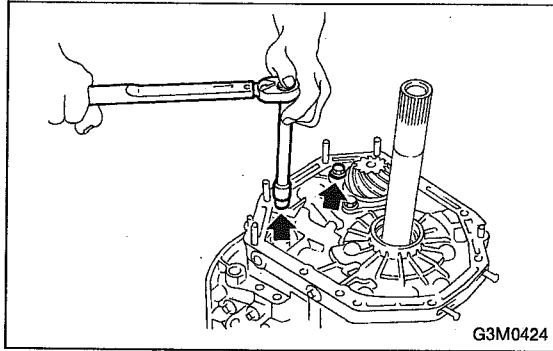
- Be careful not to damage the seal ring.
- Be sure to use a new gasket.



(3) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

NOTE:

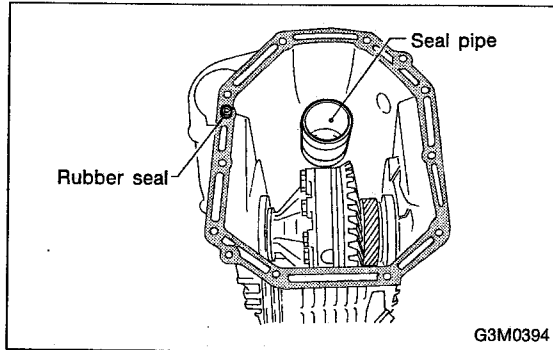
Any clearance suggests a damaged seal ring.



(4) Secure the housing with two nuts.

Tightening torque:

41 ± 3 N·m (4.2 ± 0.3 kg-m, 30.4 ± 2.2 ft-lb)

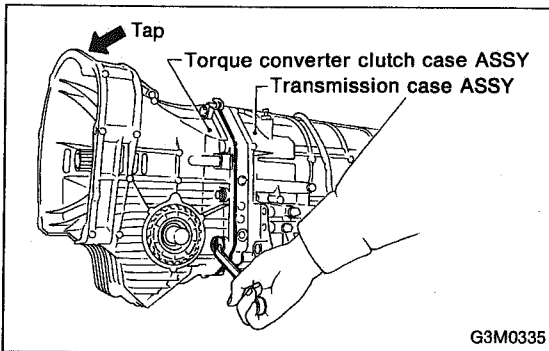


3. TORQUE CONVERTER CLUTCH CASE AND TRANSMISSION CASE

1) Apply proper amount of liquid gasket (THREE BOND Part No. 1215) to the entire torque converter clutch case mating surface.

NOTE:

Make sure that the rubber seal and seal pipe are fitted in position.



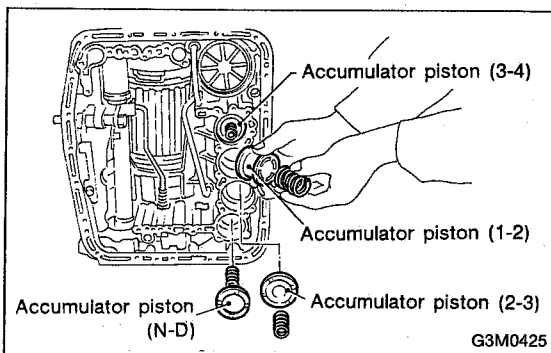
2) Install the torque converter clutch case assembly to the transmission case assembly, and secure with six bolts and four nuts.

Tightening torque:

41 ± 3 N·m (4.2 ± 0.3 kg-m, 30.4 ± 2.2 ft-lb)

CAUTION:

When installing, be careful not to damage the torque converter clutch case bushing and oil seal.



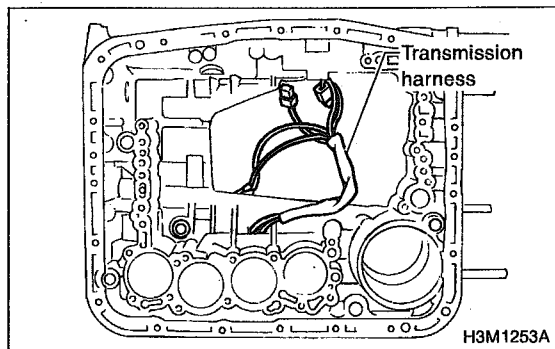
4. CONTROL VALVE AND OIL PAN

1) Install four accumulators with oil pans facing upward.

CAUTION:

Be careful not to confuse the springs and installation positions.

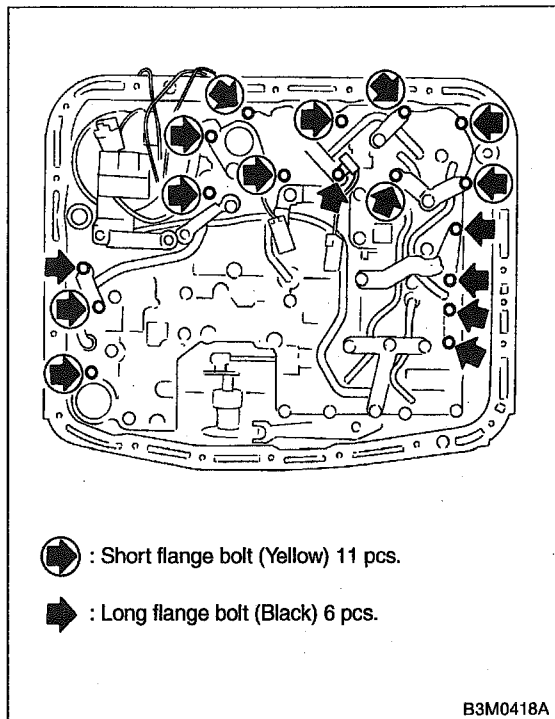
Spring specification		
Accumulator spring	Outer diameter mm (in)	Free length mm (in)
1 — 2	28.5 (1.122)	44.5 (1.752)
2 — 3	20.5 (0.807)	31.0 (1.220)
3 — 4	17.3 (0.681)	43.7 (1.720)
N — D	17.8 (0.701)	36.5 (1.437)



2) Install and route the transmission harness.

CAUTION:

Be careful not to damage the harness.



3) Install the control valve assembly.

(1) Set the select lever in range "2".

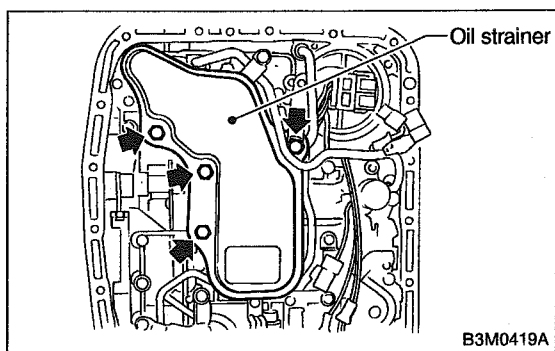
(2) Install the two brackets, ATF temperature sensor and the control valve by engaging the manual valve and manual lever, then tighten the 17 bolts.

Tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

CAUTION:

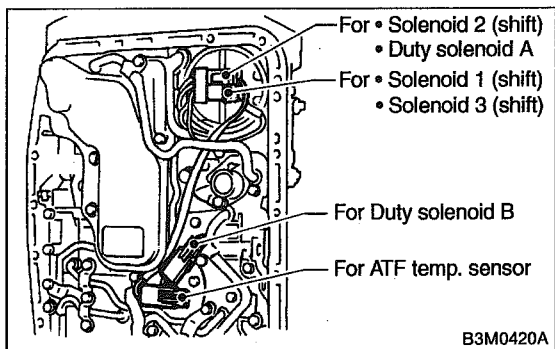
- Be careful not to pinch the harness roll the gasket.
- Tighten the control valve mounting bolts evenly.



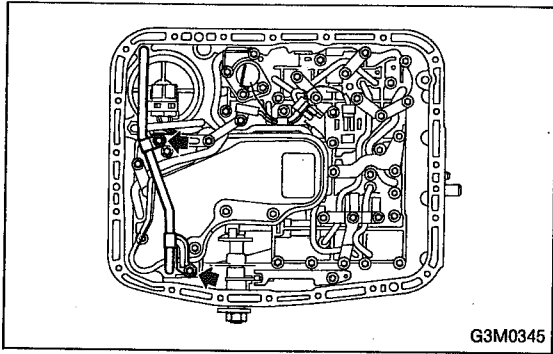
4) Install the oil strainer to the control valve. Be careful not to cut or break the O-ring. Then tighten four bolts.

Tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)



5) Secure four connectors.



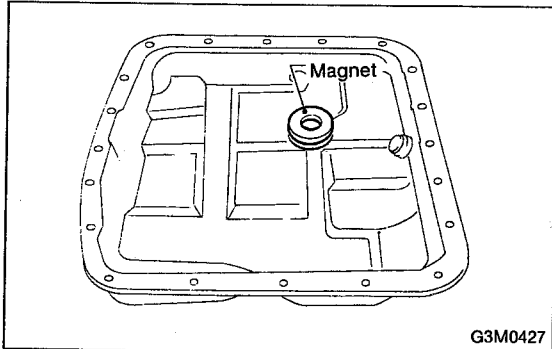
6) Install the oil cooler outlet pipe, and secure with two bolts.

Tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

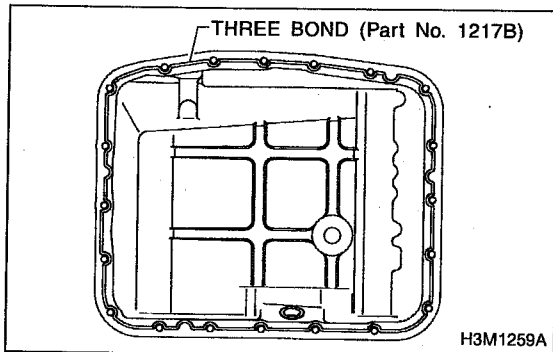
CAUTION:

Fit the pipe into position. Be careful to avoid twisting.

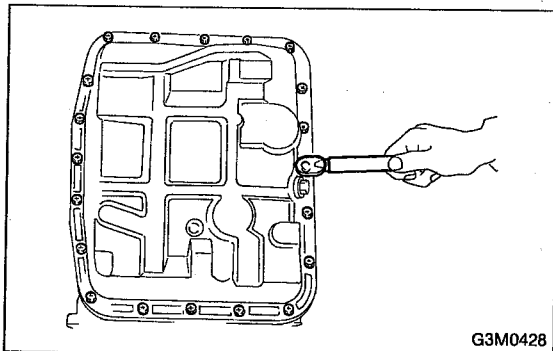


7) Install the oil pan.

(1) Attach the magnet at the specified position.



(2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



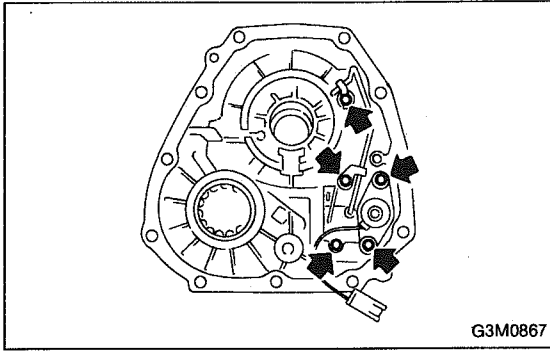
(3) Install the oil pan to transmission case.

Tightening torque:

$4.9 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.50 \pm 0.05 \text{ kg}\cdot\text{m}$, $3.6 \pm 0.4 \text{ ft}\cdot\text{lb}$)

NOTE:

Tighten the bolts evenly.



5. EXTENSION SECTION

NOTE:

When installing new oil seal into extension case, press it with ST.

ST 498057300 INSTALLER

1) Install the filter in the extension case.

NOTE:

Pay attention to the orientation of the filter.

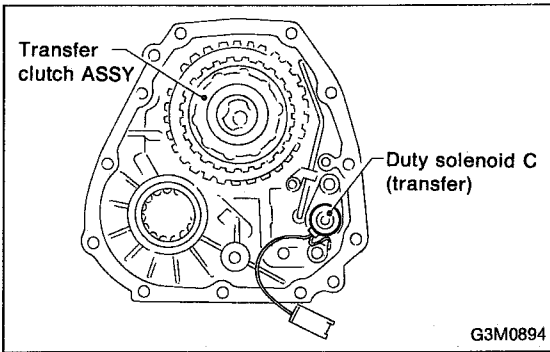
2) Install the transfer clutch valve assembly, transfer pipe, and the stay then secure with five bolts.

Tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

CAUTION:

- Be sure to tighten the going lead with one of these bolts.
- Be sure to use a new gasket.



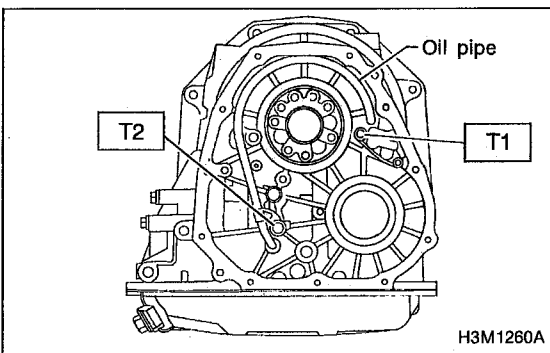
3) Install the transfer clutch assembly to the case.

CAUTION:

Be careful not to damage the seal rings.

NOTE:

Insert the clutch assembly fully into position until the bearing shoulder bottoms.



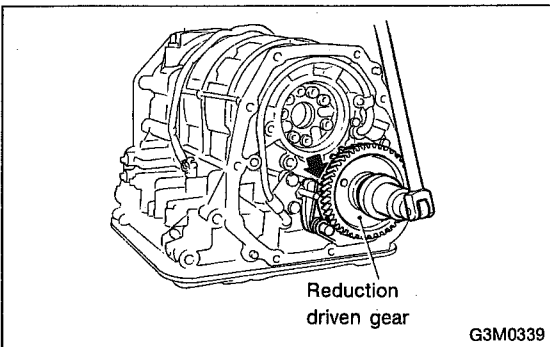
6. CONNECTION OF EACH SECTION

1) Install oil pipe.

Tightening torque:

$T1: 7.8 \pm 1.0 \text{ N}\cdot\text{m}$ ($0.80 \pm 0.10 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

$T2: 24.5 \pm 2.0 \text{ N}\cdot\text{m}$ ($2.50 \pm 0.20 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



2) Install the reduction driven gear.

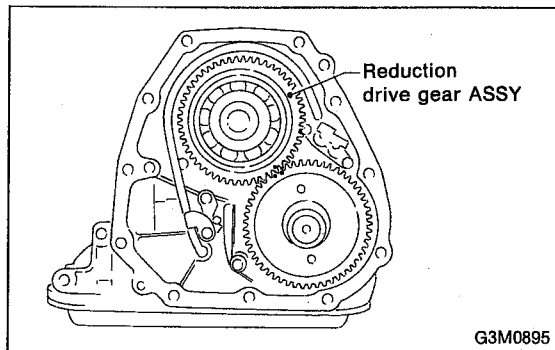
3) Install the parking pawl and shaft, set the select lever in the "P" range and tighten the drive pinion lock nut.

Tightening torque:

$98 \pm 5 \text{ N}\cdot\text{m}$ ($10.0 \pm 0.5 \text{ kg}\cdot\text{m}$, $72.3 \pm 3.6 \text{ ft}\cdot\text{lb}$)

NOTE:

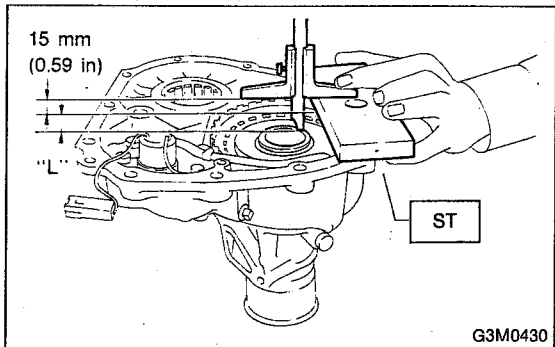
After tightening, stake the lock nut securely.



4) Install the reduction drive gear.

NOTE:

Insert it fully into position until the bearing shoulder bottoms.

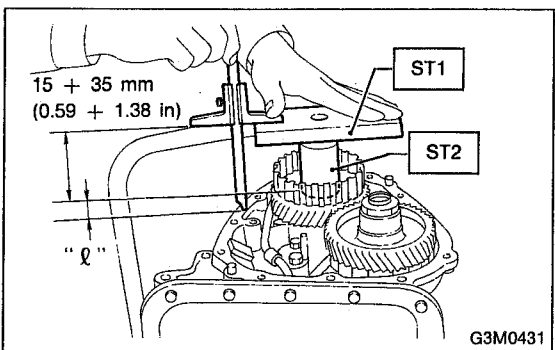


5) Measurement and adjustment of extension end play

(1) Measure distance L from end of extension case and rear drive shaft with ST.

ST 398643600 GAUGE

$L = \text{Measured value} - 15 \text{ mm}$



(2) Measure the distance "l" from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.

$l = \text{Measured value} - 50 \text{ mm}$

ST1 398643600 GAUGE

ST2 499577000 GAUGE

(3) Calculation equation:

$$T = (L + 0.4 \text{ mm}) - \ell$$

T : Clearance between end of reduction drive gear and end of rear drive shaft.

L : Distance from end of extension case to end of rear drive shaft.

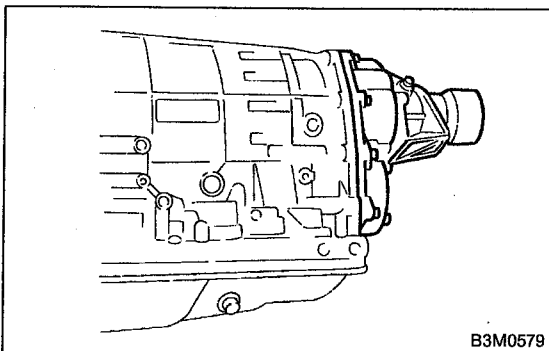
0.4: Gasket thickness

ℓ : Height from end of transmission case to end of reduction drive gear.

Select suitable thrust needle bearing from among those listed in the following table to adjust clearance in the 0.05 — 0.20 mm (0.0020 — 0.0079 in) range.

● Thrust needle bearing	Part No.	Thickness mm (in)
	806536020	3.8 (0.150)
806535030	4.0 (0.157)	
806535040	4.2 (0.165)	
806535050	4.4 (0.173)	
806535060	4.6 (0.181)	
806535070	4.8 (0.189)	
806535090	5.0 (0.197)	

Select from one to five shims so that clearance is within specifications.



6) Installation of extension case and transmission case.

(1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with vaseline.

(2) Set the parking return spring.

(3) Remove the transfer clutch from the extension case.

Set the needle bearing on the reduction drive shaft and then install transfer clutch to the transfer clutch hub.

NOTE:

Be sure to engage the spline teeth correctly.

(4) With gasket inserted between them, install the extension case to the transmission case.

CAUTION:

● Be sure to use a new gasket.

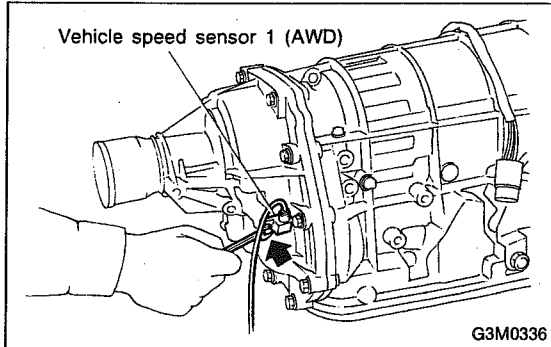
● After inserting the extension case halfway, connect the connector for duty solenoid C. Be careful not to jam the cord in the case.

● Be careful not to damage the rear drive shaft seal ring.

(5) Tighten bolts to secure the case.

Tightening torque:

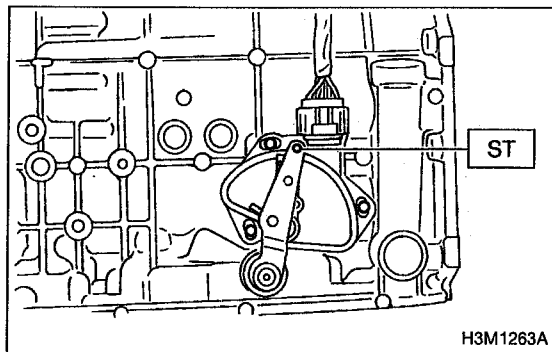
$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



7) Install the vehicle speed sensor 1.

Tightening torque:

$7 \pm 1 \text{ N}\cdot\text{m}$ ($0.7 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.1 \pm 0.7 \text{ ft}\cdot\text{lb}$)



7. EXTERNAL PARTS

1) Adjustment of inhibitor switch.

(1) With the selector lever set to "N" adjust the inhibitor switch so that the hole of range select lever is aligned with the inhibitor switch hole with ST.

ST 499267300 STOPPER PIN

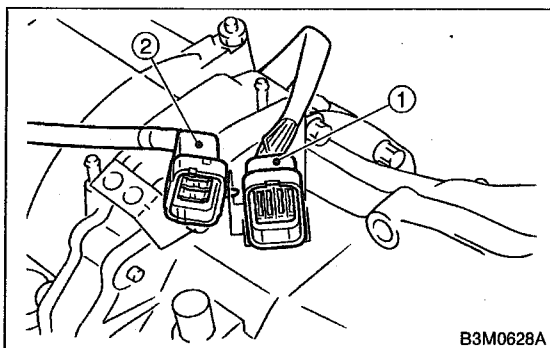
NOTE:

Ensure that gauge moves properly.

(2) With hole aligned, tighten three bolts to secure the inhibitor switch.

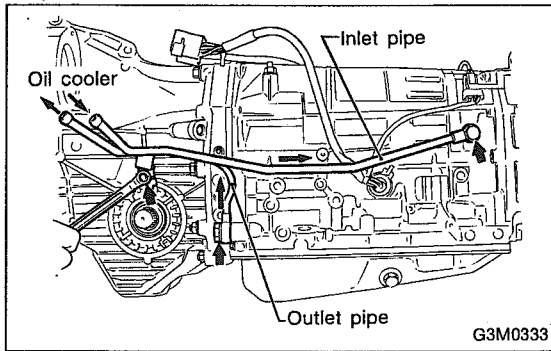
Tightening torque:

$3.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.05 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.4 \text{ ft}\cdot\text{lb}$)



2) Clip the following cords and harness.

- ① Transmission harness
- ② Inhibitor switch cord



3) Install the oil cooler outlet pipe.

Tightening torque:

$34 \pm 3 \text{ N}\cdot\text{m}$ ($3.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $25.3 \pm 2.2 \text{ ft}\cdot\text{lb}$)

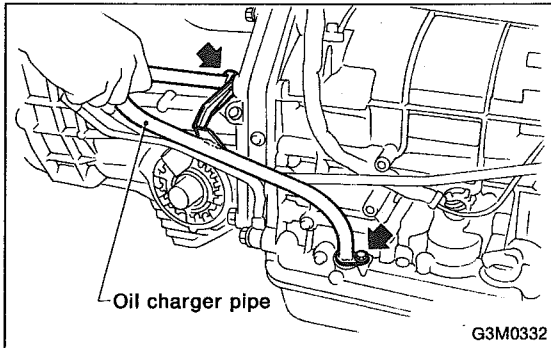
4) Install the oil cooler inlet pipe.

Tightening torque:

$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

CAUTION:

Be sure to use a new aluminum washer.



5) Install the oil charge pipe.

Tightening torque:

Upper

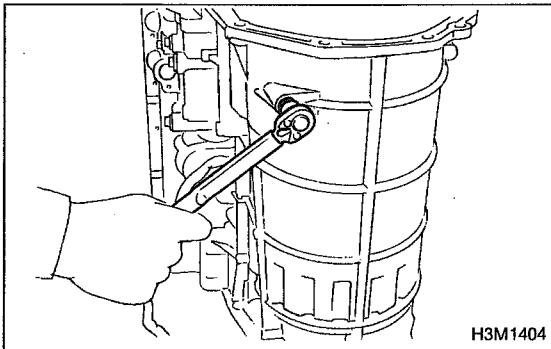
$41 \pm 3 \text{ N}\cdot\text{m}$ ($4.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $30.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)

Lower

$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)

CAUTION:

Be careful not to damage the O-ring.



6) Adjustment of brake band

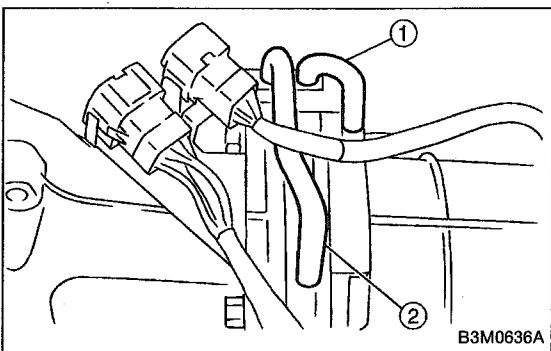
After tightening the brake band adjusting screw to 9 N·m (0.9 kg·m, 6.5 ft·lb) torque, back it off three turns. Then secure with a lock nut.

Tightening torque:

$26 \pm 2 \text{ N}\cdot\text{m}$ ($2.7 \pm 0.2 \text{ kg}\cdot\text{m}$, $19.5 \pm 1.4 \text{ ft}\cdot\text{lb}$)

NOTE:

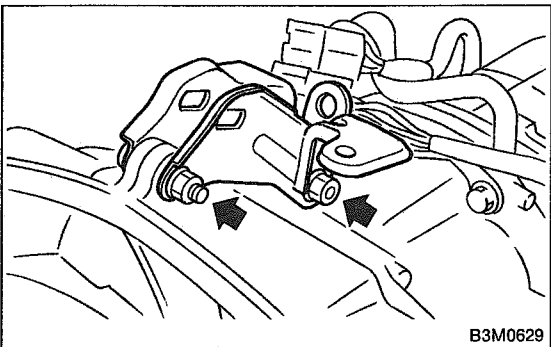
When tightening the lock nut, be careful not to turn the adjusting screw.



7) Install the air breather hose.

① Air breather hose (Transmission case)

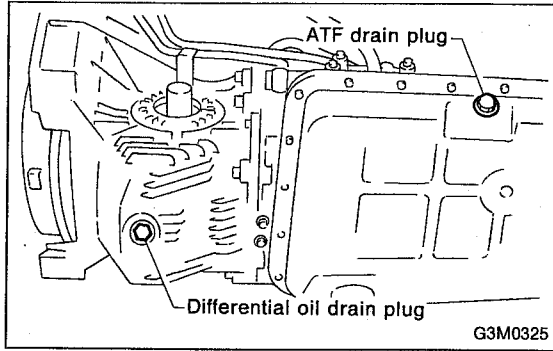
② Air breather hose (Oil pump housing)



8) Install the pitching stopper bracket.

Tightening torque:

$41 \pm 3 \text{ N}\cdot\text{m}$ ($4.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $30.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)



9) Tighten the drain plugs.

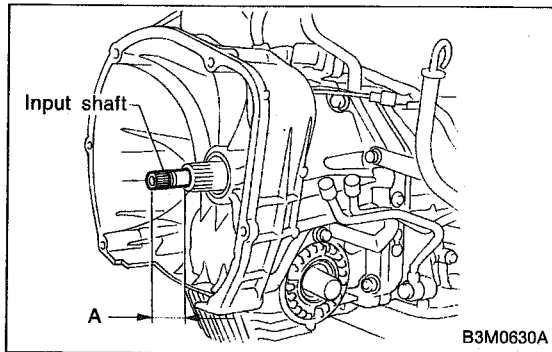
Tightening torque:

Diff.

44 ± 3 N·m (4.5 ± 0.3 kg-m, 32.5 ± 2.2 ft-lb)

ATF

25 ± 2 N·m (2.5 ± 0.2 kg-m, 18.1 ± 1.4 ft-lb)



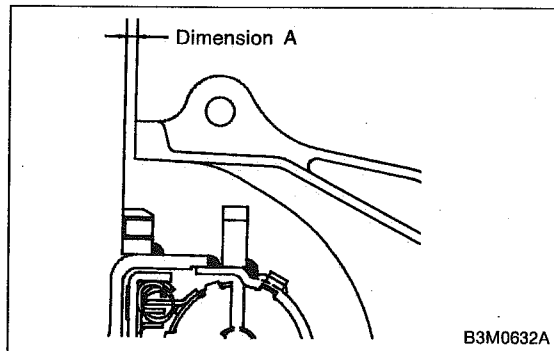
10) Insert the input shaft while turning lightly by hand.

CAUTION:

Be careful not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



11) Install the torque converter clutch assembly.

(1) Install the oil pump shaft to the torque converter clutch.

NOTE:

Make sure the clip fits securely in its groove.

(2) Holding the torque converter clutch assembly by hand, carefully install it to the torque converter clutch case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.

(3) Rotate the shaft lightly by hand to engage the splines securely.

Dimension A:

3.9 — 4.1 mm (0.154 — 0.161 in)

12) Fill ATF and differential gear oil.

<Ref. to 3-2 [S1A0].>

Differential gear oil capacity:

1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

Automatic transmission fluid capacity:

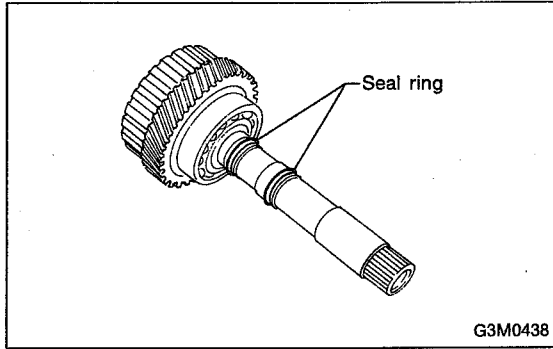
7.9 — 8.2 ℓ (8.4 — 8.7 US qt, 7.0 — 7.2 Imp qt)

Recommended fluid:

Dexron II or Dexron III type automatic transmission

NOTE:

After filling oil, insert the oil level gauge into the oil inlet.



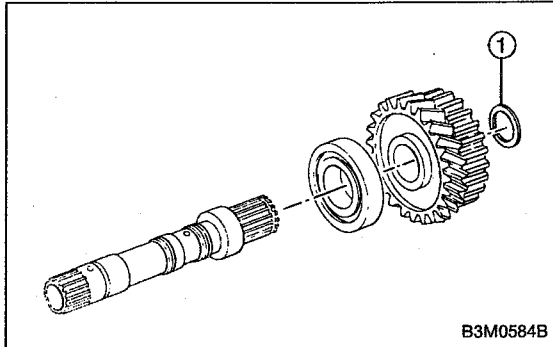
13. Reduction Drive Gear Assembly

A: DISASSEMBLY

1) Take out the seal rings.

CAUTION:

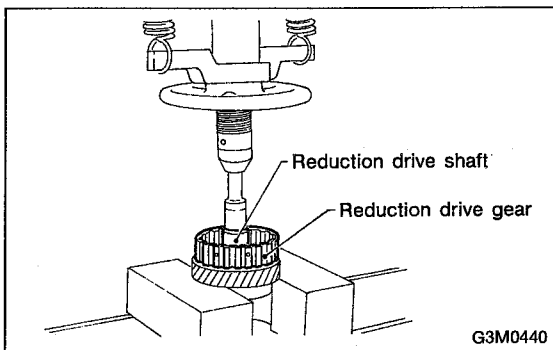
Be careful not to damage the seal rings.



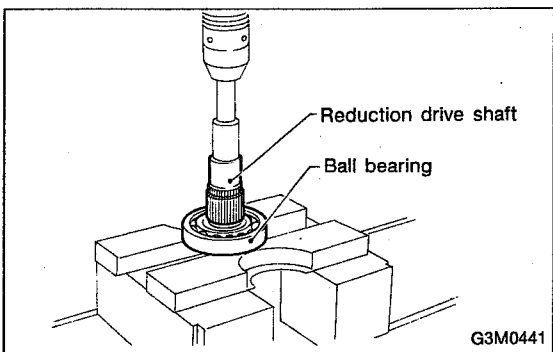
2) Take out the snap ring (outer ①).

CAUTION:

Be careful not to damage the splines.



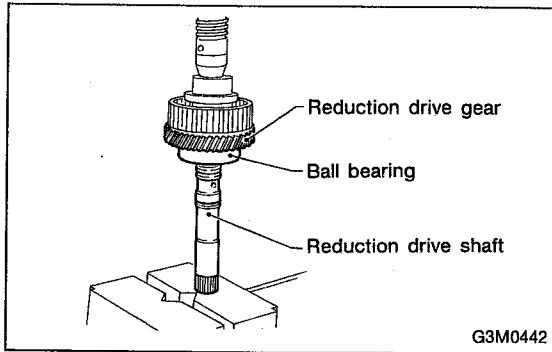
3) Using a press, remove the reduction drive gear.



4) Using a press, remove the ball bearing.

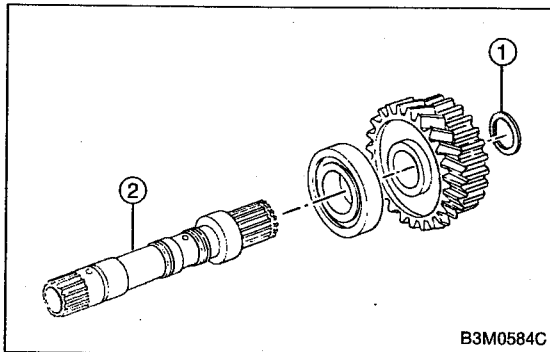
B: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

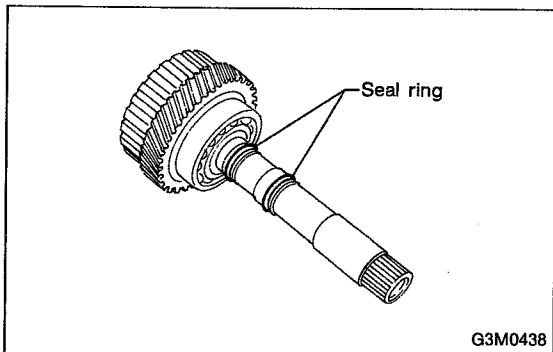


C: ASSEMBLY

1) Press-fit the ball bearing and reduction drive gear to the shaft.



2) Fit the snap ring ① securely in the snap ring groove on the shaft ②.



3) Attach two seal rings.

NOTE:

To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.

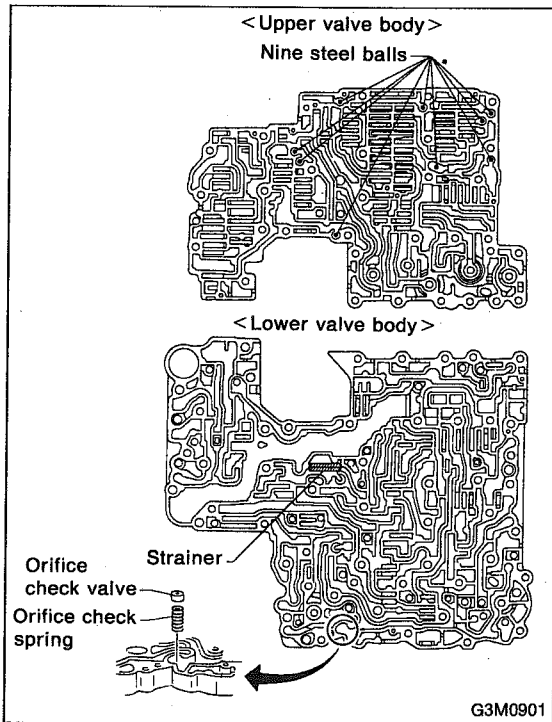
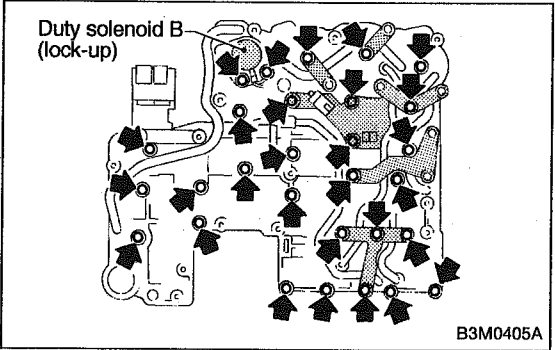
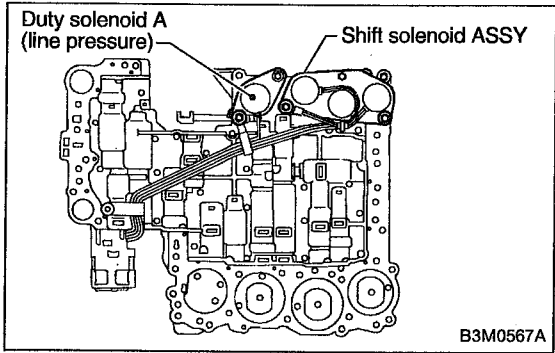
SERVICE PROCEDURE

[W1400] 3-2
14. Control Valve Body

Unit: mm (in)

No.	Part name	Wire dia.	Outer dia.	Effective turn	Free length
26	Lock-up control spring	0.75 (0.0295)	13.0 (0.512)	3.5	18.5 (0.728)
27	Pilot spring	1.1 (0.043)	9.1 (0.358)	8.3	25.7 (1.012)
28	Torque converter regulator spring	1.3 (0.051)	9.0 (0.354)	11.7	38.0 (1.496)
29	Pressure regulator spring	1.6 (0.063)	14.0 (0.551)	5.6	31.5 (1.240)
30	Pressure modifier spring	0.8 (0.031)	6.8 (0.268)	10.0	31.95 (1.2579)
31	Accumulator control spring	0.4 (0.016)	6.6 (0.260)	11.0	27.5 (1.083)
32	Shuttle shift spring	0.65 (0.0256)	5.65 (0.2224)	27.6	51.0 (2.008)
33	4-2 sequence spring	0.55 (0.0217)	6.95 (0.2736)	11.0	29.1 (1.146)
34	Shift B spring	0.65 (0.0256)	7.0 (0.276)	9.5	25.0 (0.984)
35	4-2 relay spring	0.55 (0.0217)	6.95 (0.2736)	11.0	29.1 (1.146)
36	Shift A spring	0.5 (0.020)	7.0 (0.276)	9.5	25.0 (0.984)
37	Overrunning clutch control spring	0.7 (0.028)	6.0 (0.236)	12.0	26.5 (1.043)
38	Overrunning clutch reducing spring	1.05 (0.0413)	7.05 (0.2776)	15.21	34.7 (1.366)
39	Shuttle duty shift spring	0.75 (0.0295)	5.65 (0.2224)	27.6	51.0 (2.008)
40	Modifier accumulator spring	1.3 (0.051)	9.8 (0.386)	8.8	30.5 (1.201)
41	1st reducing spring	0.75 (0.0295)	6.75 (0.2657)	12.5	25.4 (1.000)
42	3-2 timing spring	0.75 (0.0295)	6.75 (0.2657)	7.5	20.55 (0.8091)
43	Servo charger spring	0.7 (0.028)	6.7 (0.264)	9.0	23.0 (0.906)

14. Control Valve Body

**A: DISASSEMBLY**

- 1) Remove the following parts from the upper valve body.
 - (1) Shift solenoid assembly (shift 1-2-3)
 - (2) Duty solenoid A (line pressure)
- 2) Remove the following parts from the lower valve body.
 - (1) Duty solenoid B (lock-up)
 - (2) Bracket
- 3) Separate the upper valve body and lower valve body.

CAUTION:

- Do not lose the nine (9) steel balls contained in the upper valve body.
- Do not lose an orifice and a strainer contained in the lower valve body.

NOTE:

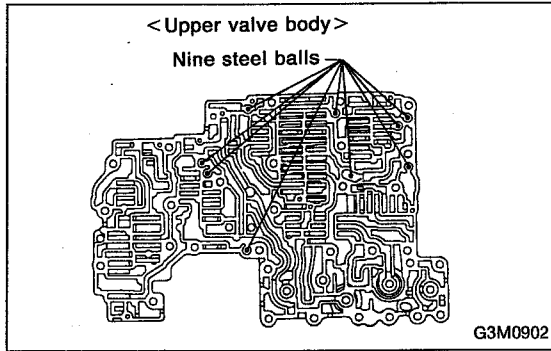
Remove the upper-lower valve body tightening bolts. Then remove two locating bolts. (←)

During ordinary servicing, clean the control valve bodies in this condition, without further disassembly.

In the event of a seized clutch or other problem, disassemble the control valve bodies further, and clean the component parts.

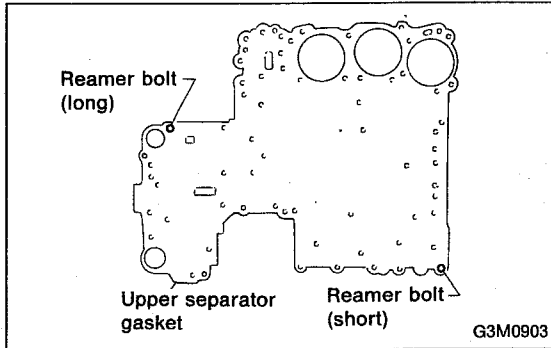
B: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

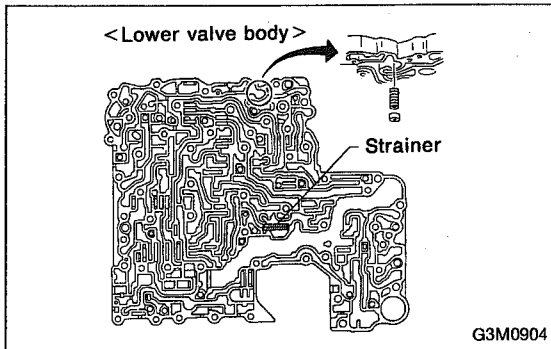


C: ASSEMBLY

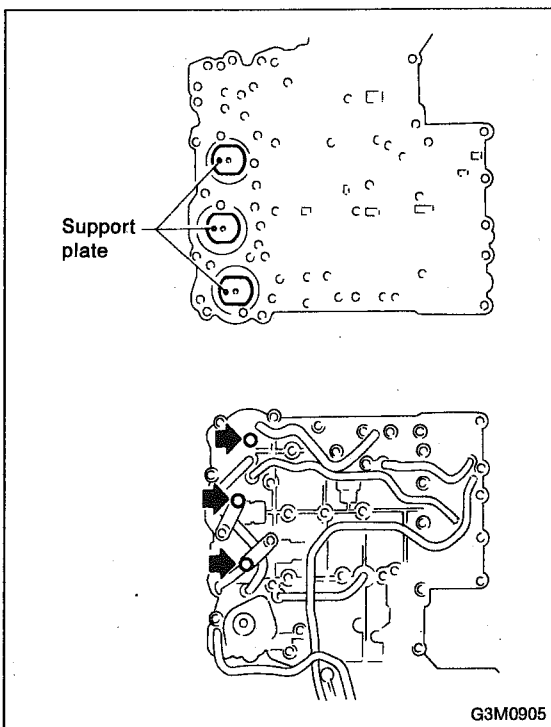
1) Install the nine steel balls to the upper valve body.



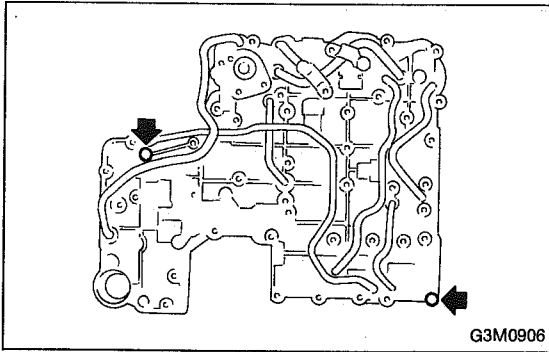
2) From under upper valve body, install two bolts using washers and position upper separator gasket.



3) Install the orifice check valve, orifice check spring and filter to the lower valve body.



4) Install lower separate gasket and separate plate on lower body in that order, then temporarily tighten three support plates and two brackets.



5) Temporarily assemble lower valve body to upper valve body.

CAUTION:

Be careful not to drop the upper body interior steel ball, or the lower body interior filter, orifice check spring, or orifice check valve.

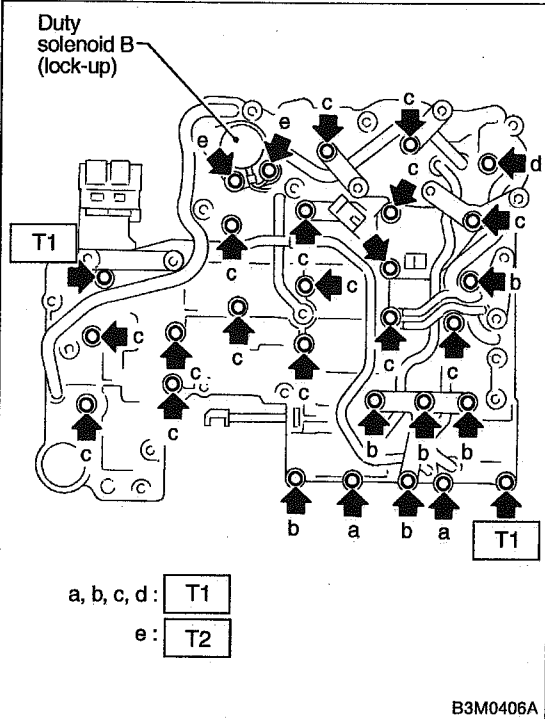
6) Install the duty solenoid B and the four brackets.

7) Tighten twenty seven bolts & washers and two reamer bolts.

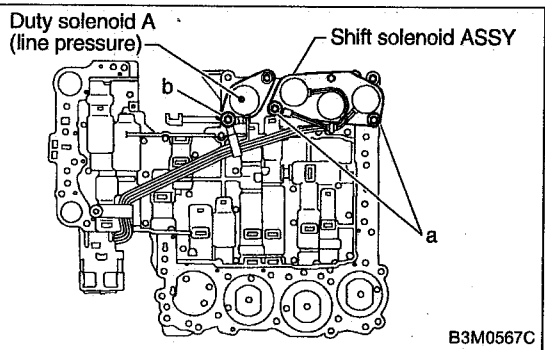
Tightening torque:

T1: 8 ± 1 N·m (0.8 ± 0.1 kg·m, 5.8 ± 0.7 ft·lb)

T2: 11.3 ± 1.5 N·m (1.15 ± 0.15 kg·m, 8.3 ± 1.1 ft·lb)



	a	b	c	d	e
Length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)	28 (1.10)
Numbers	2	6	16	1	2



8) Install the shift solenoid assembly and duty solenoid A.

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

Tightening torque:

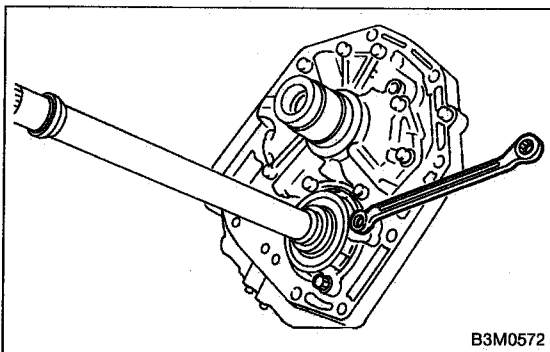
8 ± 1 N·m (0.8 ± 0.1 kg·m, 5.8 ± 0.7 ft·lb)

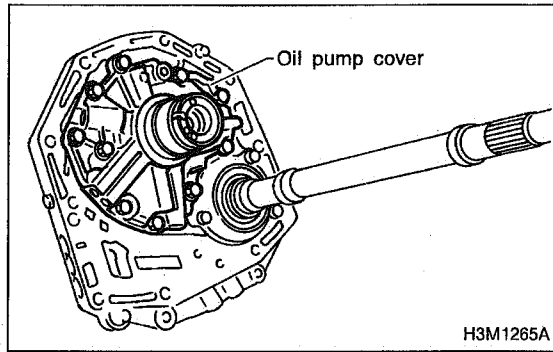
15. Oil Pump Assembly

A: DISASSEMBLY

1) Remove the oil seal retainer.

Also remove the O-ring and oil seal (air breather).

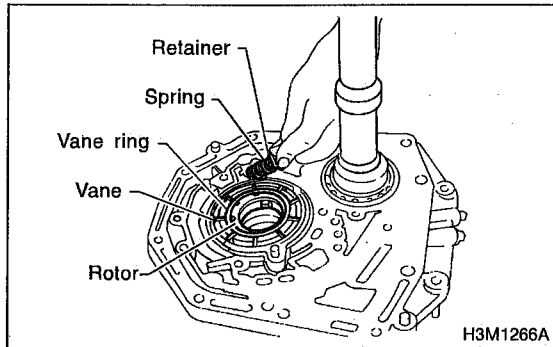




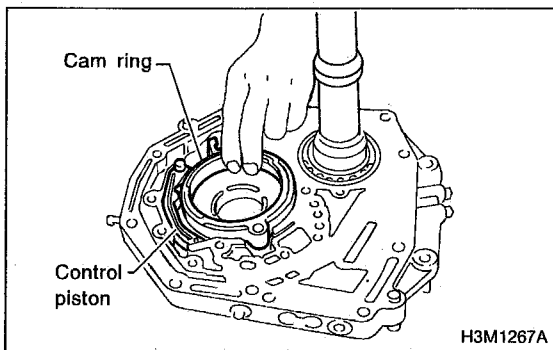
2) Remove the oil pump cover.

NOTE:

Lightly tap the end of the stator shaft to remove the cover.

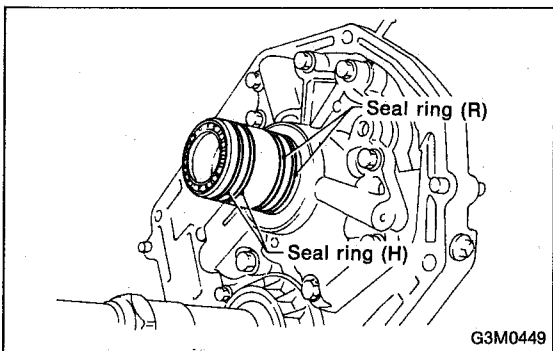


3) Remove the retainer and return spring. Then remove the rotor, two vane rings and nine vanes.



4) Remove the cam ring and control piston.

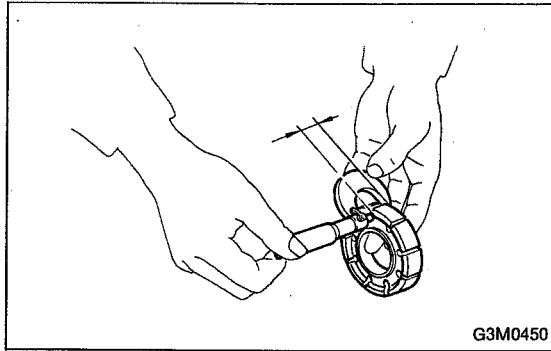
Also remove the O-ring, friction ring, two side seals, and plain seal.



5) Remove two seal rings (R) and two seal rings (H).

B: INSPECTION

1) Make sure that each component is free of harmful gouges, cuts, and dust.

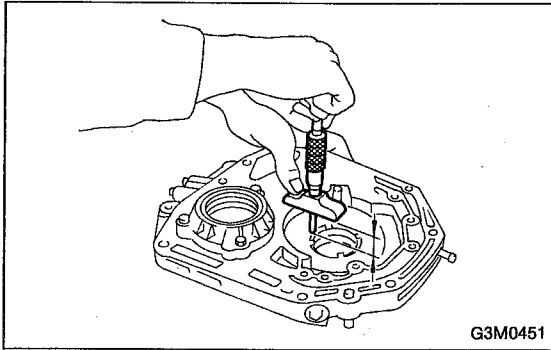


2) Selection of oil pump components (rotor, vanes, control piston and cam ring)

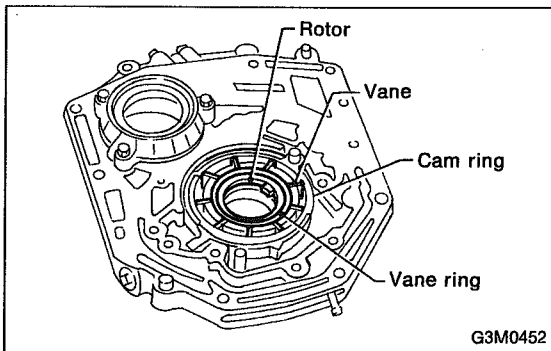
(1) Using a micrometer, measure the height of the rotor, vanes, control piston and cam ring in at least four positions. (Measure the height at one place for each of the nine vanes.)

NOTE:

- Remove the control piston seals when measuring.
- Remove the friction ring from the cam ring when measuring.



(2) Using a depth gauge, measure the depth of the oil pump housing from the contact/sliding surface of the above mentioned component parts in the same manner as above.

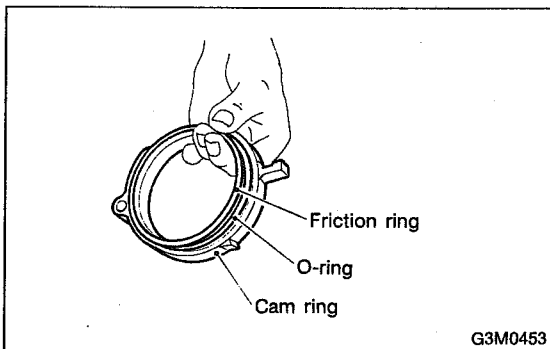


(3) Make sure that the clearances are within the specified wear limits. If the wear limit is exceeded, select pump components so that the standard clearance can be obtained.

NOTE:

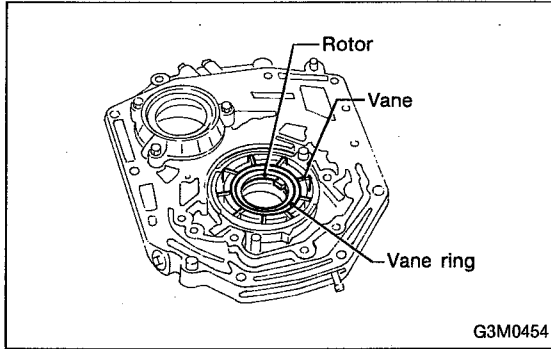
Select vanes which are the same height as the rotor.

Part name	Wear limit mm (in)	Standard value mm (in)
Rotor, control piston, vanes	0.054 (0.0021)	0.030 — 0.044 (0.0012 — 0.0017)
Cam ring	0.034 (0.0013)	0.010 — 0.024 (0.0004 — 0.0009)

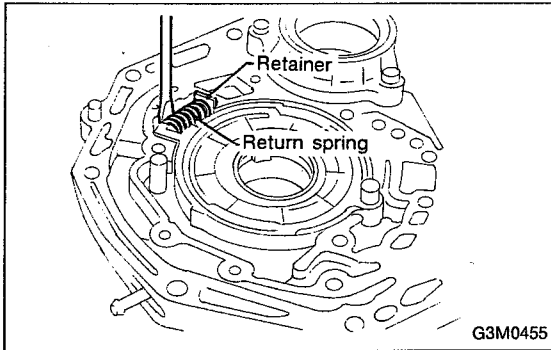


C: ASSEMBLY

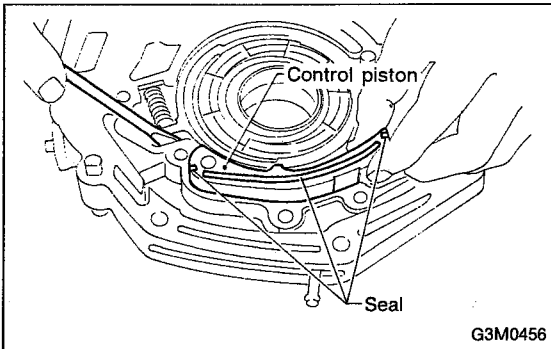
1) Coat both the O-ring and friction ring with vaseline and attach to the cam ring. Then fit them into the oil pump housing.



2) Install the vane ring, rotor and vanes into the housing in this sequence.



3) Install the return spring and retainer between the housing and cam ring.

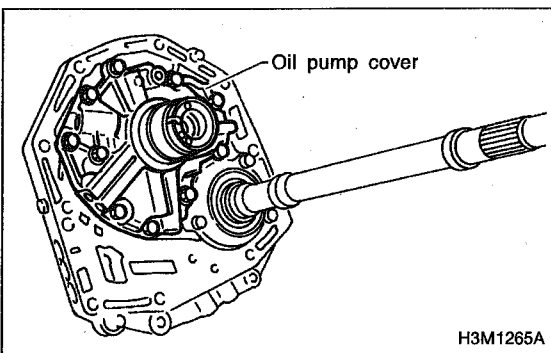


4) Install the control piston to the oil pump housing.

NOTE:

Fit the seal in the piston groove, with the red seals facing the top side. (Two side seals and one plain seal are attached.)

5) Set the rotor at the center of the housing bore. Apply ATF abundantly to each rotary portion.



6) Install the oil pump cover.

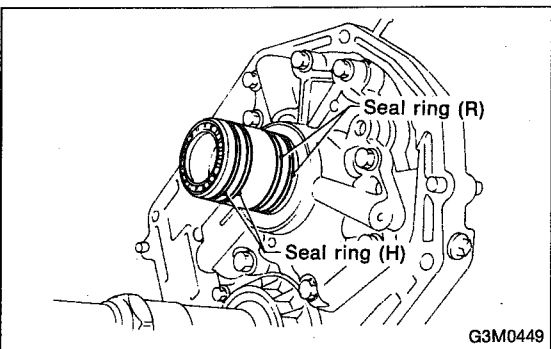
Tightening torque:

$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

NOTE:

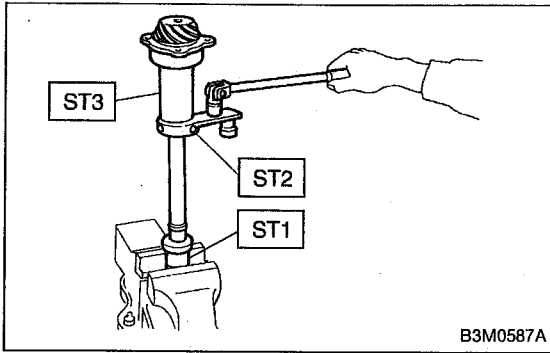
● Align both pivots with the pivot holes of the cover, and install the cover being careful not to apply undue force to the pivots.

● After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.



NOTE:

● Install the oil seal retainer and seal rings (R) and (H) after adjusting the drive pinion backlash and tooth contact.



16. Drive Pinion Shaft

A: DISASSEMBLY

1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.

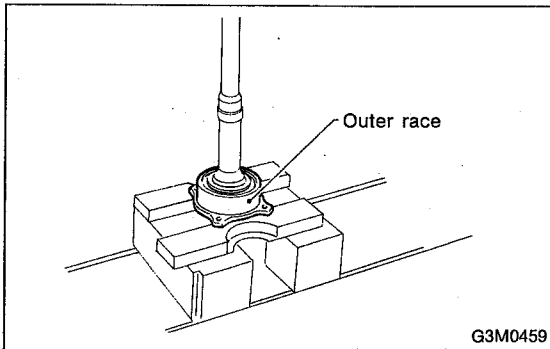
ST1 498937100 HOLDER

ST2 499787100 WRENCH

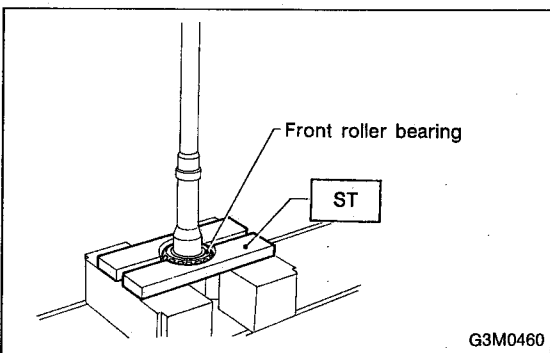
ST3 499757800 ADAPTER WRENCH

NOTE:

Remove the O-ring.



2) Using a press, separate the rear roller bearing and outer race from the shaft.

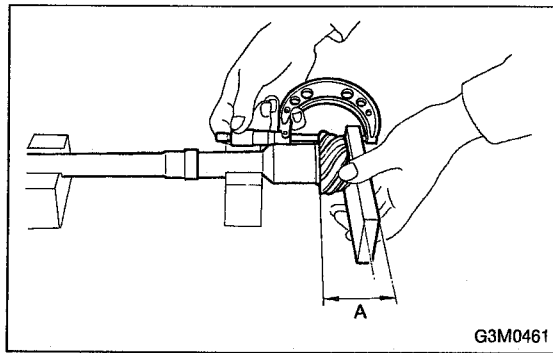


3) Using a press and ST, separate the front roller bearing from the shaft.

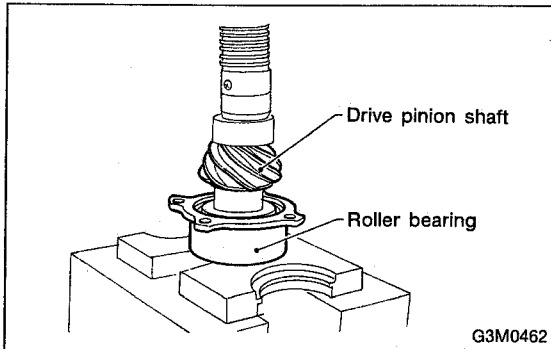
ST 498517000 REPLACER

B: INSPECTION

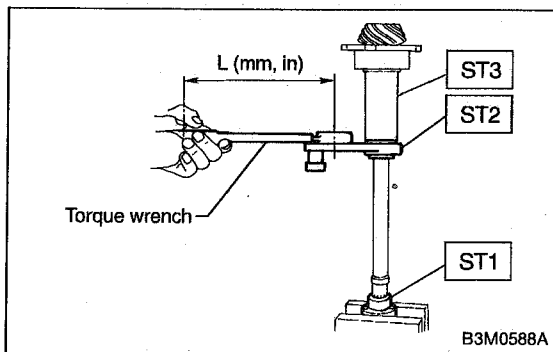
Make sure that all component parts are free of harmful cuts, gouges, and other faults.



G3M0461



G3M0462



B3M0588A

C: ASSEMBLY

1) Measure dimension "A" of the drive pinion shaft.

2) Using a press, force-fit the roller bearing in position.

CAUTION:

Do not change the relative positions of the outer race and bearing cone.

3) After fitting the O-ring to the shaft, attach the drive pinion collar to the shaft.

CAUTION:

Be careful not to damage the O-ring.

4) Tighten the lock washer and lock nut with ST1, ST2 and ST3.

ST1	498937100	HOLDER
ST2	499787100	WRENCH
ST3	499787500	ADAPTER WRENCH

Actual tightening torque:

$$113 \pm 5 \text{ N}\cdot\text{m} (11.5 \pm 0.5 \text{ kg}\cdot\text{m}, 83.2 \pm 3.6 \text{ ft}\cdot\text{lb})$$

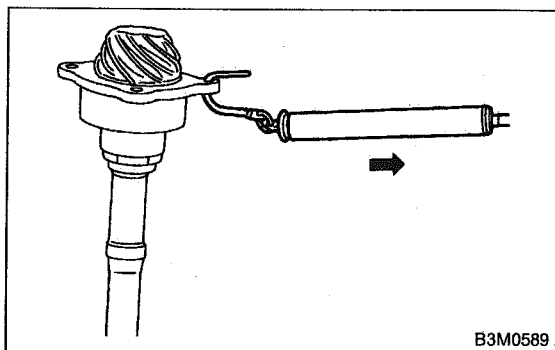
NOTE:

- Pay attention to the orientation of lock washer.
- Tightening torque using torque wrench is determined by the following equation:

$$T_1 = \frac{72.2}{L + 72.2} \times T$$

T: Actual tightening torque

- Install ST2 to torque wrench as straight as possible.

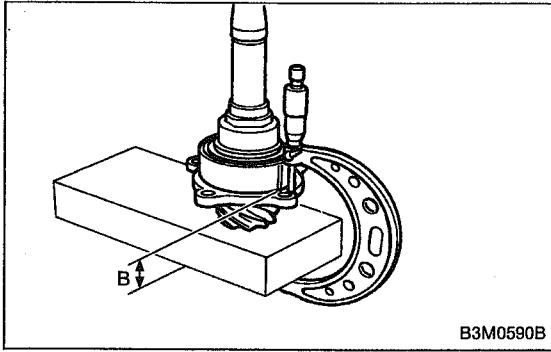


B3M0589

5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:

$$0.3 - 2.0 \text{ N}\cdot\text{m} (3 - 20 \text{ kg}\cdot\text{cm}, 2.6 - 17.4 \text{ ft}\cdot\text{lb})$$



- 6) Stake the lock nut securely at two places.
- 7) Measure dimension "B" of the drive pinion shaft.

- 8) Determine the thickness t (mm) of the drive pinion shim.

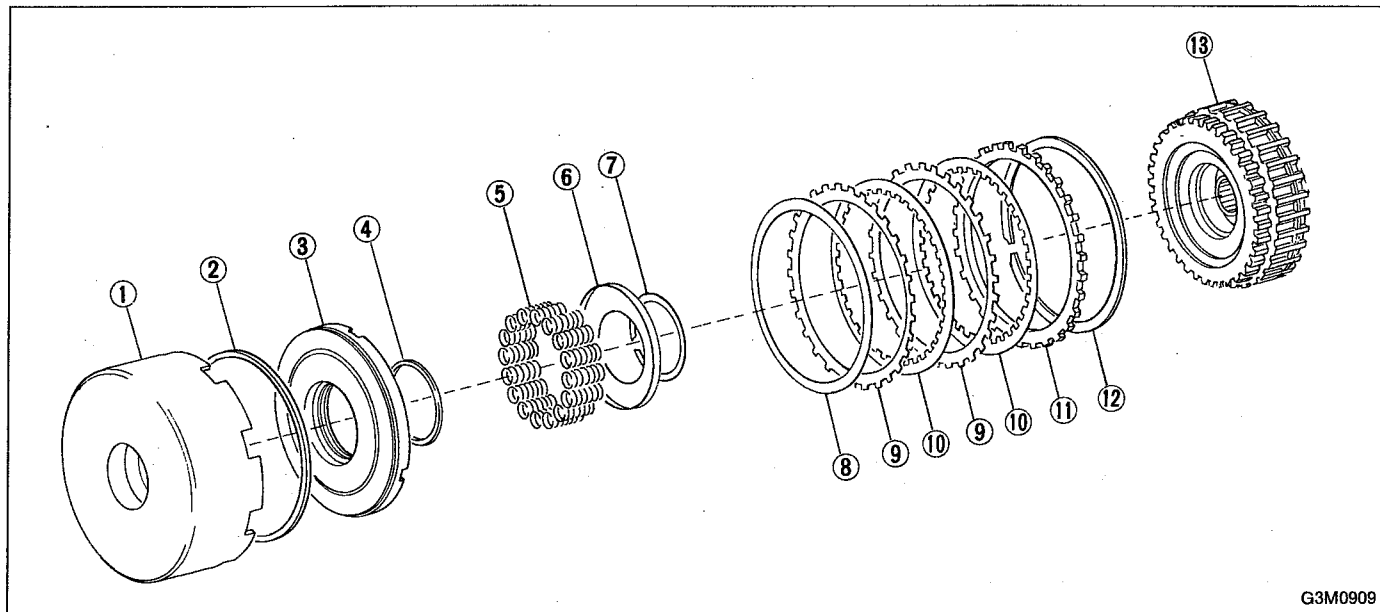
$$t = 6.5 \pm 0.0625 - (B - A)$$

NOTE:

The number of shims must be three or less.

	Part No.	Thickness mm (in)
	● Available drive pinion shims	31451AA050
31451AA060		0.175 (0.0069)
31451AA070		0.200 (0.0079)
31451AA080		0.225 (0.0089)
31451AA090		0.250 (0.0098)
31451AA100		0.275 (0.0108)

17. Reverse Clutch



G3M0909

- ① Reverse clutch drum
- ② Lip seal
- ③ Reverse clutch piston
- ④ Lathe cut seal ring
- ⑤ Spring
- ⑥ Spring retainer
- ⑦ Snap ring

- ⑧ Dish plate
- ⑨ Driven plate
- ⑩ Drive plate
- ⑪ Retaining plate
- ⑫ Snap ring
- ⑬ High clutch drum

A: DISASSEMBLY

1) Remove the snap ring ⑫, and take out the retaining plate ⑪, drive plates ⑩, driven plates ⑨, and dish plate ⑧.

2) Using the ST1, ST2 and ST3, remove the snap ring ⑦ and take out the spring retainer ⑥ and springs ⑤.

ST1 398673600 COMPRESSOR

ST2 398177700 INSTALLER

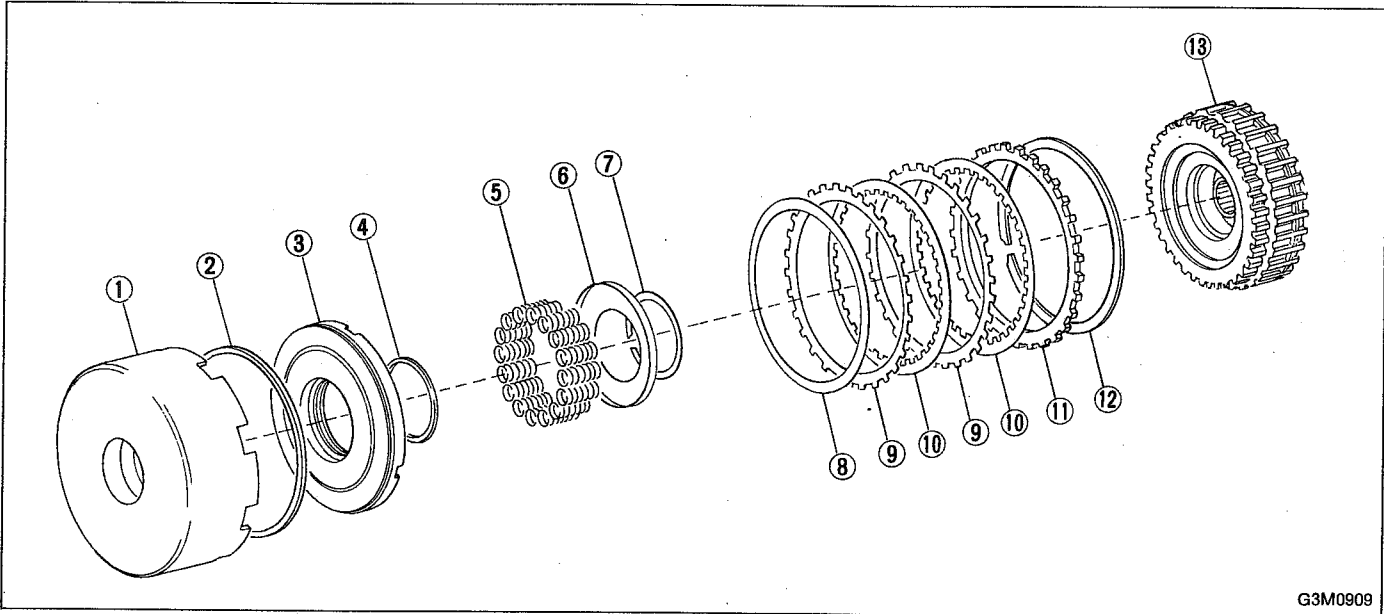
ST3 399893600 PLIERS

3) Take out the piston ③ by applying compressed air.

B: INSPECTION

- 1) Drive plate facing for wear and damage
- 2) Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
- 3) Lip seal and lathe cut seal ring for damage
- 4) Piston check ball for operation

C: ASSEMBLY



G3M0909

- | | | | |
|-------------------------|-------------------|----------------|--------------------|
| ① Reverse clutch drum | ⑤ Spring | ⑧ Dish plate | ⑪ Retaining plate |
| ② Lip seal | ⑥ Spring retainer | ⑨ Driven plate | ⑫ Snap ring |
| ③ Reverse clutch piston | ⑦ Snap ring | ⑩ Drive plate | ⑬ High clutch drum |
| ④ Lathe cut seal ring | | | |

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble piston ③ the springs ⑤, spring retainer ⑥ and snap ring ⑦.

ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS

2) Assemble the dish plate ⑧, driven plates ⑨, drive plates ⑩ and retaining plate ⑪ in that order and attach the snap ring ⑫.

NOTE:

Pay attention to the orientation of the dish plate.

3) Checking operation:

Apply compressed air intermittently to the oil hole, and check the reverse clutch for smooth operation.

4) Measuring clearance (Retaining plate selection):

Standard value:

0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:

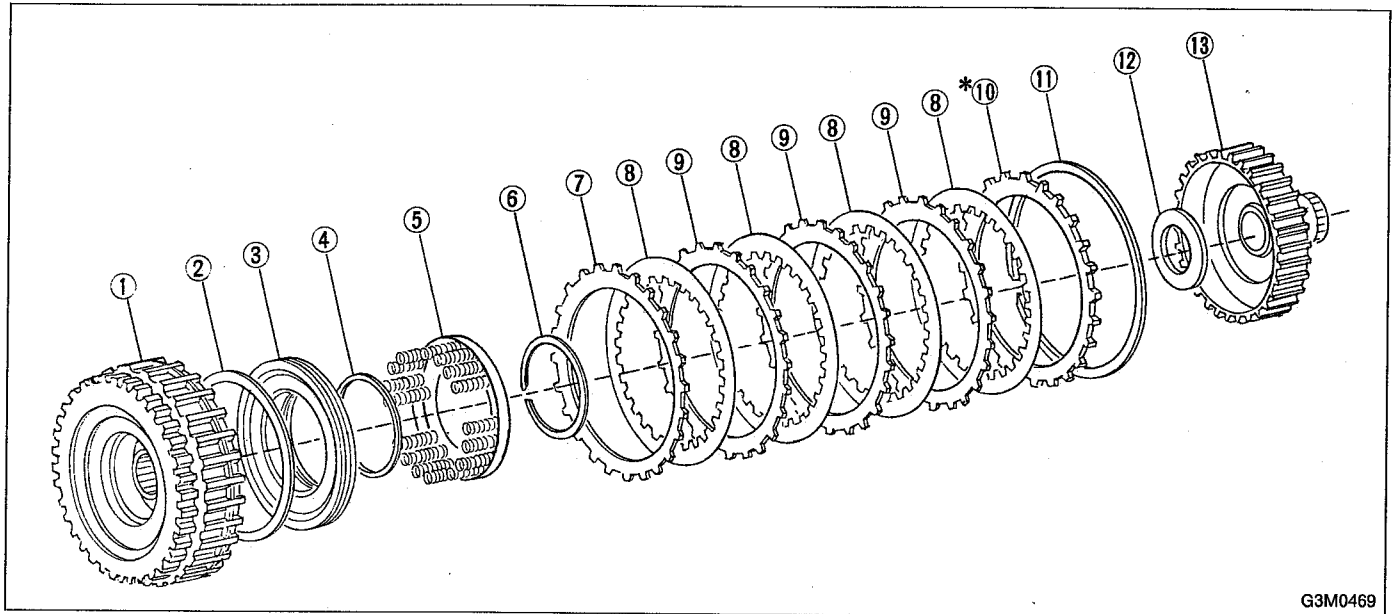
1.2 mm (0.047 in)

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

	Part No.	Thickness mm (in)
● Available retaining plates	31567AA350	4.6 (0.181)
	31567AA360	4.8 (0.189)
	31567AA370	5.0 (0.197)
	31567AA380	5.2 (0.205)
	31567AA390	5.4 (0.213)
	31567AA400	5.6 (0.220)

18. High Clutch



G3M0469

- ① High clutch drum
- ② Lathe cut seal ring
- ③ High clutch piston
- ④ Lathe cut seal ring
- ⑤ Spring retainer
- ⑥ Snap ring
- ⑦ Driven plate (Thinner)

- ⑧ Drive plate
- ⑨ Driven plate (Thicker)
- ⑩ Retaining plate
- ⑪ Snap ring
- ⑫ Thrust needle bearing
- ⑬ High clutch hub

A: DISASSEMBLY

- 1) Remove the snap ring ⑪, and take out the retaining plate ⑩, drive plates ⑧, and driven plates ⑦, ⑨.
- 2) Using the ST1, ST2 and ST3, remove the snap ring ⑥ and take out the spring retainer ⑤.

ST1 398673600 COMPRESSOR

ST2 398177700 INSTALLER

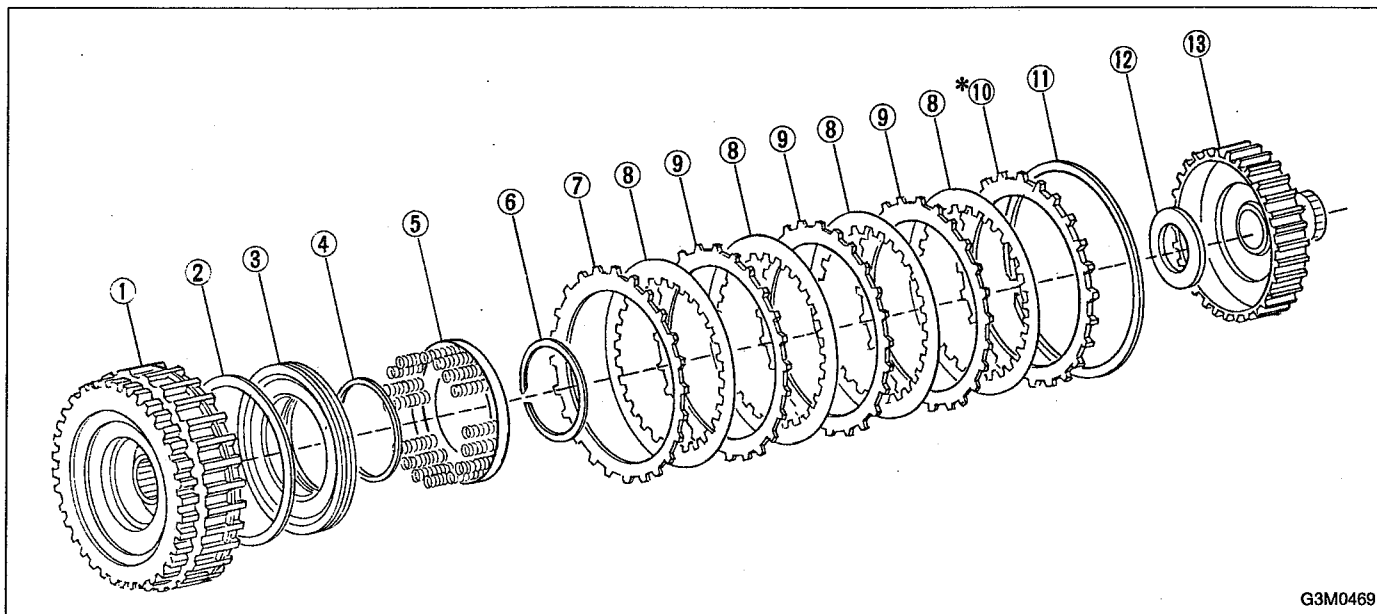
ST3 399893600 PLIERS

- 3) Apply compressed air to the clutch drum ① to remove the piston ③.

B: INSPECTION

- 1) Drive plate facing for wear and damage
- 2) Snap ring for wear, return spring for setting and breakage, and spring retainer for deformation
- 3) Lathe cut seal rings (large) (small) for damage
- 4) Piston check ball for smooth operation

C: ASSEMBLY



G3M0469

- ① High clutch drum
- ② Lathe cut seal ring
- ③ High clutch piston
- ④ Lathe cut seal ring
- ⑤ Spring retainer
- ⑥ Snap ring
- ⑦ Driven plate (Thinner)

- ⑧ Drive plate
- ⑨ Driven plate (Thicker)
- *⑩ Retaining plate
- ⑪ Snap ring
- ⑫ Thrust needle bearing
- ⑬ High clutch hub

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble the piston ③, spring retainer ⑤, and snap ring ⑥.

ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS

2) Install the driven plate (thinner) ⑦, drive plates ⑧, driven plates (thicker) ⑨, and retaining plate ⑩ in that order. Then attach the snap ring ⑪.

3) Checking operation:
Apply compressed air intermittently to the oil hole, and check the high clutch for smooth operation.

4) Measuring clearance (Retaining plate selection):

Standard value:

1.8 — 2.2 mm (0.071 — 0.087 in)

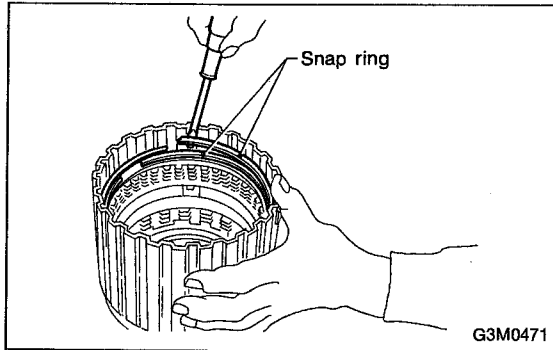
Allowable limit:

2.6 mm (0.102 in)

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

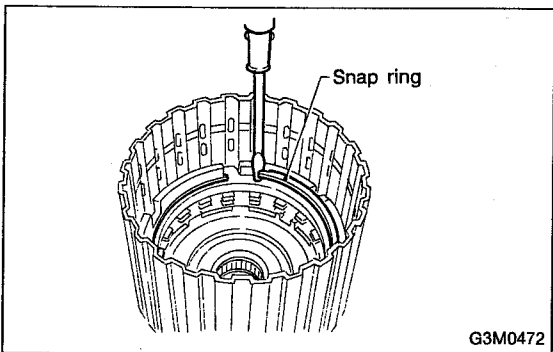
● Available retaining plates	Part No.	Thickness mm (in)
	31567AA190	3.6 (0.142)
31567AA200	3.8 (0.150)	
31567AA210	4.0 (0.157)	
31567AA220	4.2 (0.165)	
31567AA230	4.4 (0.173)	
31567AA240	4.6 (0.181)	
31567AA250	4.8 (0.189)	
31567AA260	5.0 (0.197)	



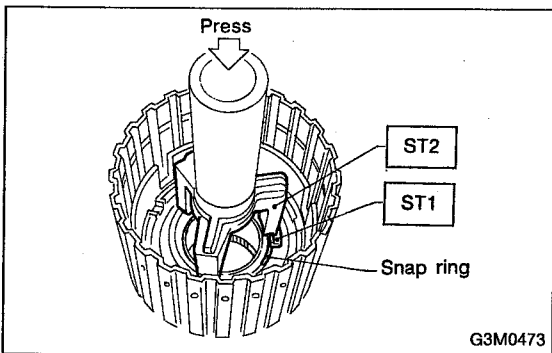
19. Forward Clutch Drum

A: DISASSEMBLY

- 1) Remove two snap rings from the forward clutch drum.
- 2) Remove the retaining plate, drive plates, driven plates and dish plate. (Forward clutch)

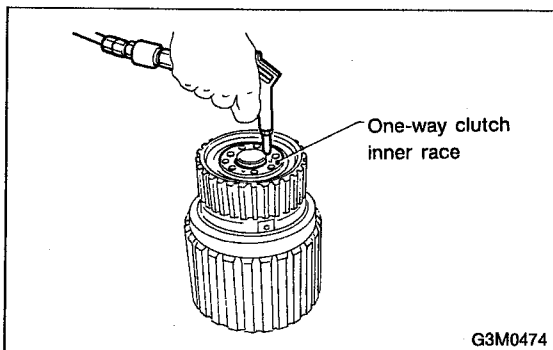


- 3) Remove the snap ring from the forward clutch drum.
- 4) Remove the retaining plate, drive plates, driven plates and dish plate. (Overrunning clutch)

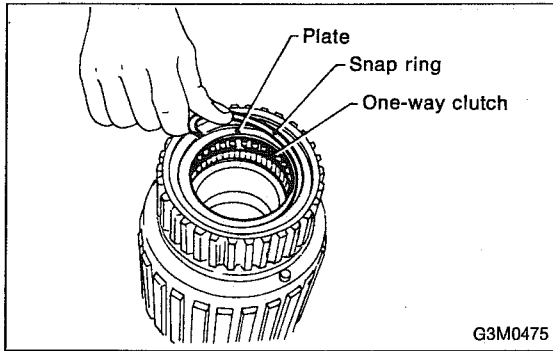


- 5) Compress the spring retainer, and remove the snap ring from the forward clutch, by using ST1 and ST2.

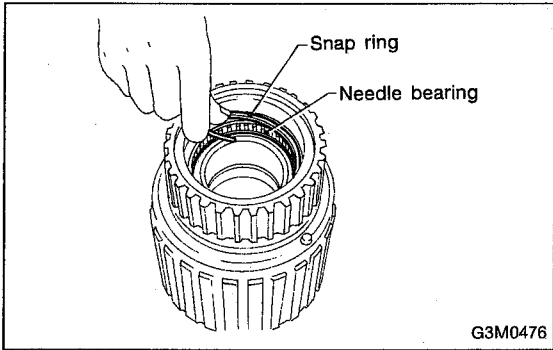
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



- 6) Install the one-way clutch inner race to the forward clutch drum, and apply compressed air to remove the overrunning piston and forward piston.



7) Remove the one-way clutch after taking out the snap ring.

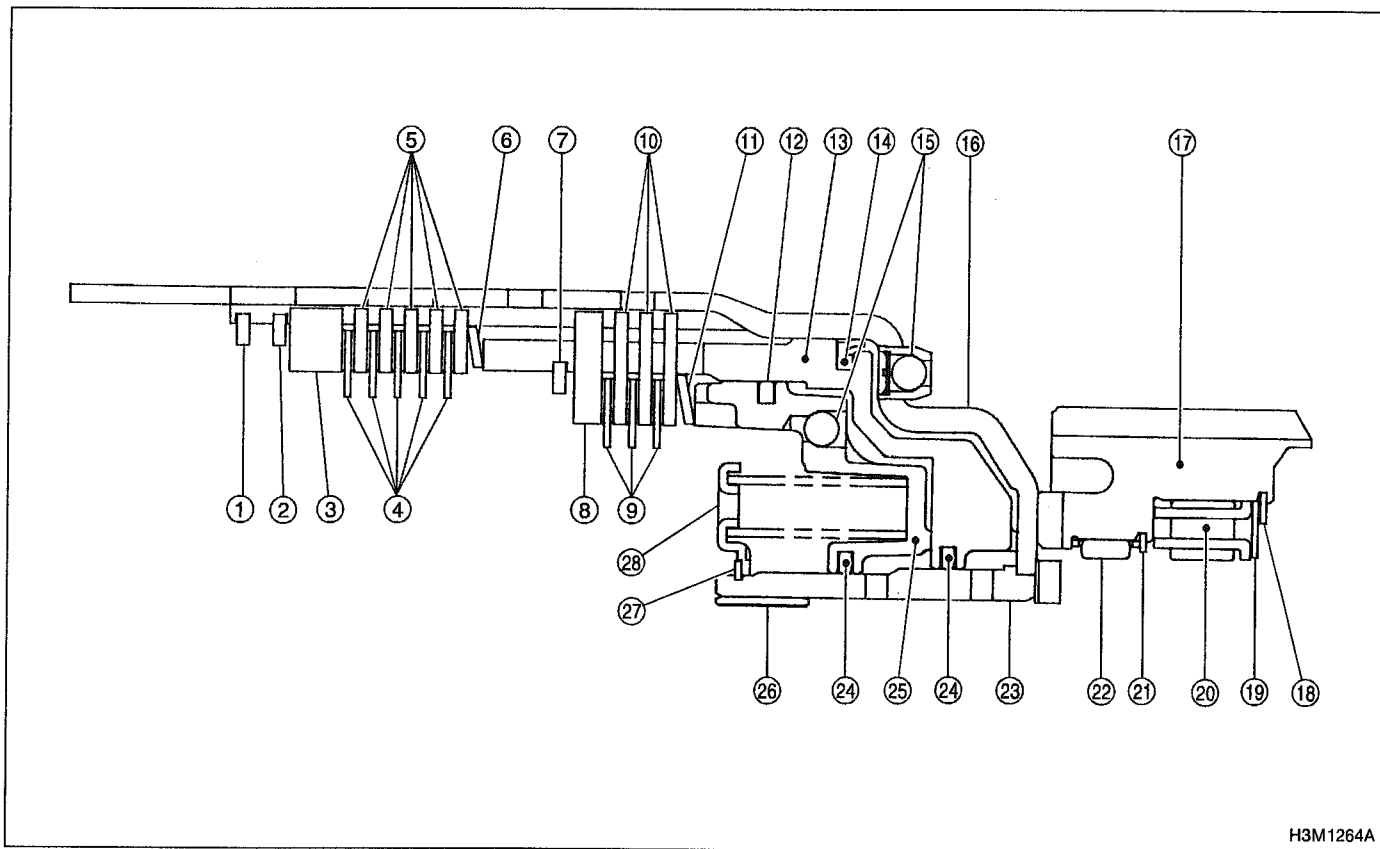


8) Remove the needle bearing after taking out the snap ring.

B: INSPECTION

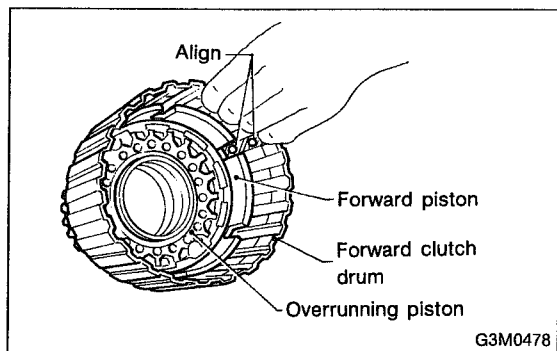
- 1) Drive plate facing for wear and damage
- 2) Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- 3) Lip seal and lathe cut ring for damage
- 4) Piston and drum check ball for operation

C: ASSEMBLY



H3M1264A

- | | | |
|--------------------------|-------------------------|-----------------------------|
| ① Snap ring | ⑪ Dish plate | ⑳ O.W.C. (1-2) |
| ② Snap ring | ⑫ Lathe cut seal ring | ㉑ Snap ring |
| ③ Retaining plate | ⑬ Forward clutch piston | ㉒ Needle bearing |
| ④ Driven plate (Thinner) | ⑭ Lathe cut seal ring | ㉓ Sleeve |
| ⑤ Driven plate (Thicker) | ⑮ Drift ball | ㉔ Lathe cut seal ring |
| ⑥ Dish plate | ⑯ Forward clutch drum | ㉕ Overrunning clutch piston |
| ⑦ Snap ring | ⑰ Outer race | ㉖ Bushing |
| ⑧ Retaining plate | ⑱ Snap ring | ㉗ Snap ring |
| ⑨ Drive plate | ㉚ Plate | ㉘ Retainer |
| ⑩ Driven plate | | |

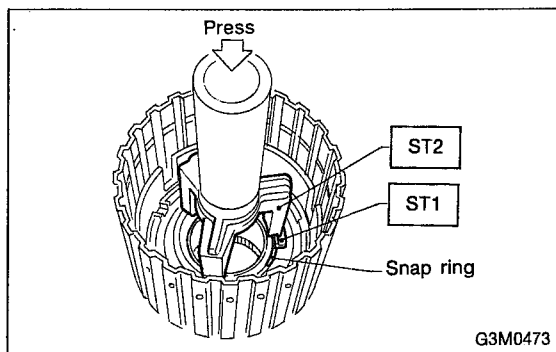


G3M0478

1) Fit the forward piston and overrunning piston to the forward clutch drum.

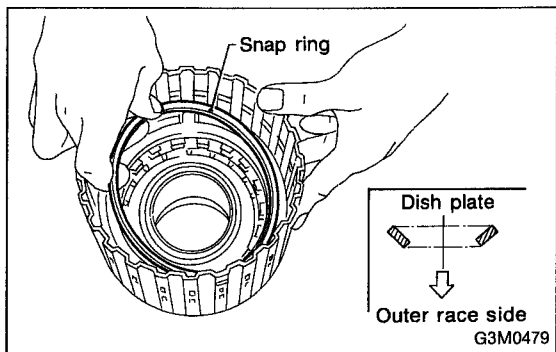
NOTE:

Align the forward piston cut-out portion with the spline of the drum.



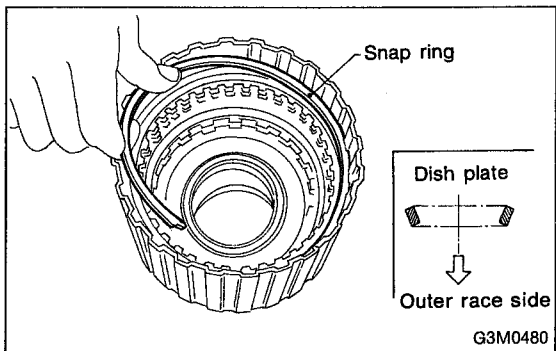
2) Set the retainer on the piston with a press using ST1 and ST2, and attach the snap ring.

ST1 498627000 SEAT
ST2 398673600 COMPRESSOR



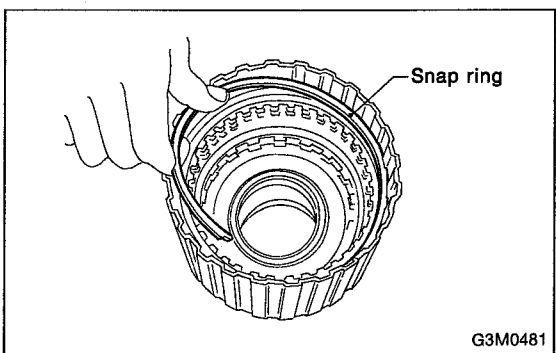
3) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Overrunning clutch)

NOTE:
Pay attention to the orientation of the dish plate.

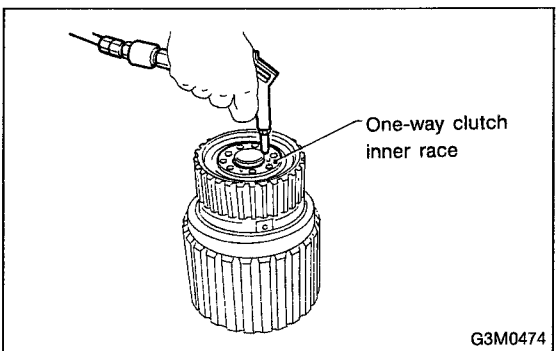


4) Install the dish plates, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Forward clutch)

NOTE:
Pay attention to the orientation of the dish plate.

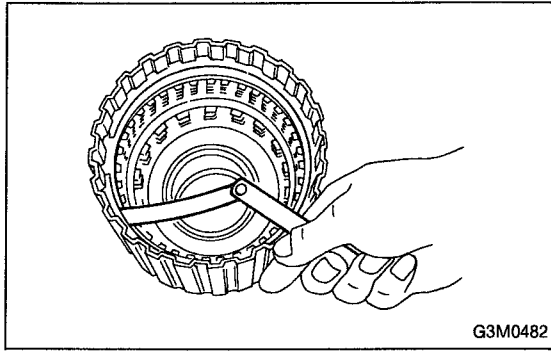


5) Install the snap ring (for front planetary carrier).



6) Check the forward clutch and overrunning clutch for operation.

Set the one-way clutch inner race, and apply compressed air for checking.



7) Checking forward clutch clearance:

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting. If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:

0.45 — 0.85 mm (0.0177 — 0.0335 in)

Allowable limit:

1.6 mm (0.063 in)

	Part No.	Thickness mm (in)
	● Forward clutch	31567AA270
31567AA280		4.2 (0.165)
31567AA290		4.4 (0.173)
31567AA300		4.6 (0.181)
31567AA310		4.8 (0.189)
31567AA320		5.0 (0.197)
31567AA330		5.2 (0.205)

8) Checking overrunning clutch clearance:

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting. If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

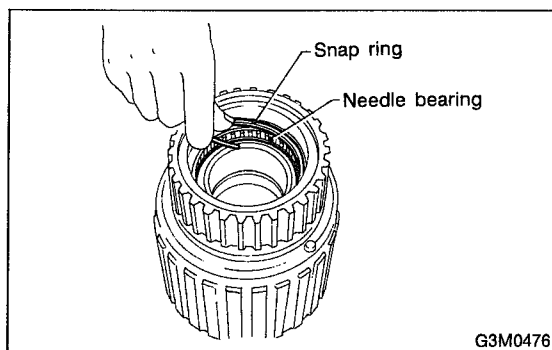
Standard value:

1.0 — 1.4 mm (0.039 — 0.055 in)

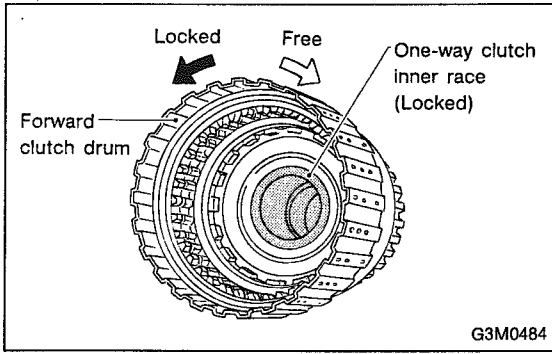
Allowable limit:

2.0 mm (0.079 in)

	Part No.	Thickness mm (in)
	● Overrunning clutch	31567AA120
31567AA130		8.2 (0.323)
31567AA140		8.4 (0.331)
31567AA150		8.6 (0.339)
31567AA160		8.8 (0.346)
31567AA170		9.0 (0.354)
31567AA180		9.2 (0.362)



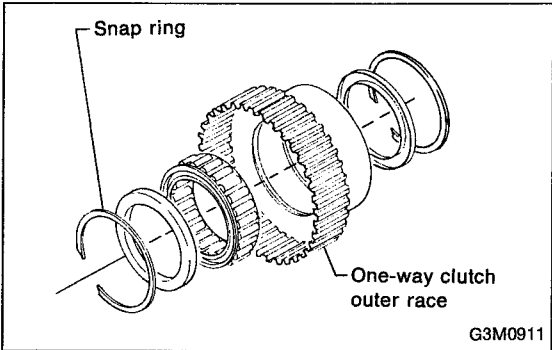
9) Install the needle bearing, and secure with the snap ring.



10) Install the one-way clutch (1-2) and plate, and secure with the snap ring.

NOTE:

Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counter-clockwise direction, as viewed from the front of the vehicle.



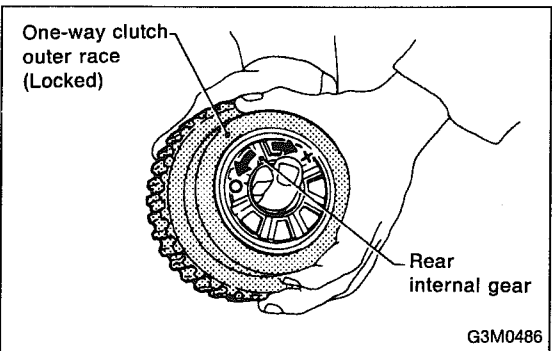
20. One-way Clutch Outer Race

A: DISASSEMBLY

Remove the snap ring. Then remove the one-way clutch (3-4).

B: INSPECTION

Check the sliding surface and one-way clutch (3-4) for any harmful cuts, damage, or other faults.



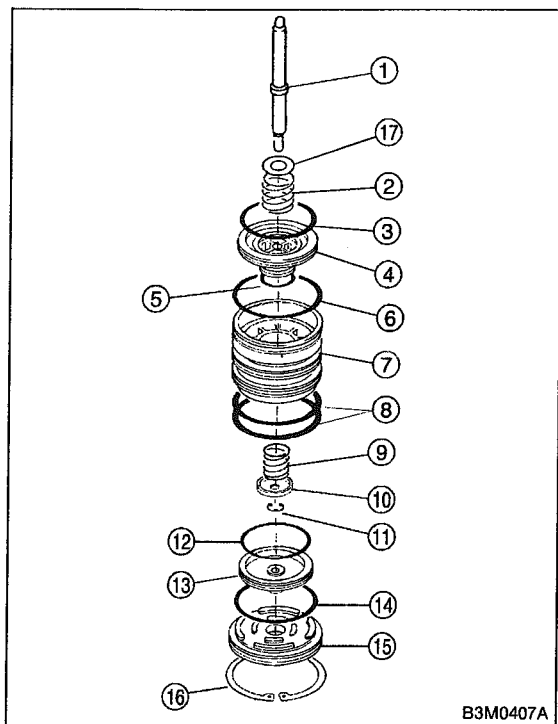
C: ASSEMBLY

1) Assemble the one-way clutch (3-4), and secure with the snap ring.

NOTE:

Pay attention to the orientation of the one-way clutch (3-4).

2) Assemble the rear internal gear, and secure the outer race. Make sure that the internal gear is locked in the clockwise direction, and free to rotate in the counterclockwise direction.



21. Servo Piston

- ① Band servo piston stem
- ② Spring
- ③ Lathe cut seal ring
- ④ Band servo piston (1-2)
- ⑤ Lathe cut seal ring
- ⑥ O-ring
- ⑦ Band servo retainer
- ⑧ O-ring
- ⑨ Spring
- ⑩ Retainer
- ⑪ Snap ring
- ⑫ Lathe cut seal ring
- ⑬ Band servo piston (3-4)
- ⑭ O-ring
- ⑮ O.D. servo retainer
- ⑯ Snap ring
- ⑰ Washer

A: DISASSEMBLY

- 1) Remove the spring.
- 2) Remove the band servo piston (3-4).
- 3) While compressing the retainer from above, remove the snap ring. Then remove the retainer, spring and stem.
- 4) Take out the band servo piston (1-2).

B: INSPECTION

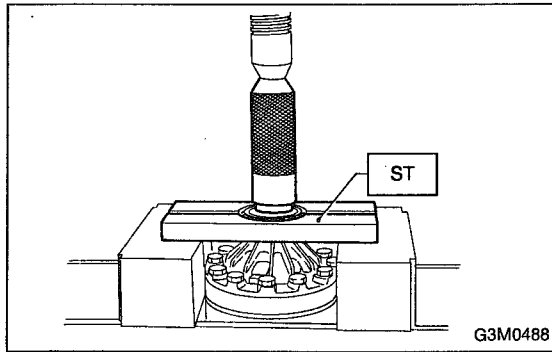
- 1) Check each component for harmful cuts, damage, or other faults.
- 2) Check the O-ring and lathe cut ring for damage.

C: ASSEMBLY

- 1) Install the band servo piston (1-2) to the retainer, and insert the stem.
- 2) Put the spring and retainer on the piston. Fit the snap ring securely while compressing the spring.
- 3) Install the band servo piston (3-4).
- 4) Install the spring securely to the band servo piston (1-2).

CAUTION:

- Many different O-rings and lathe cut rings are used. Be careful not to confuse them when installing.
- Be careful not to damage O-rings and lathe cut rings.



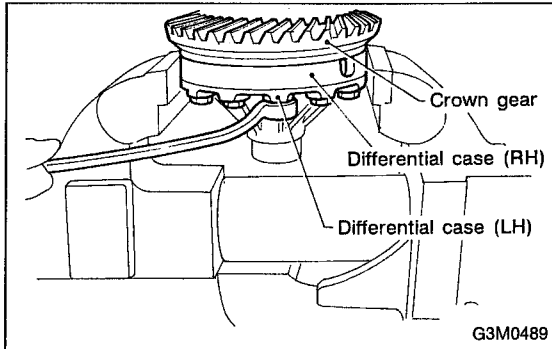
22. Differential Case Assembly

A: DISASSEMBLY

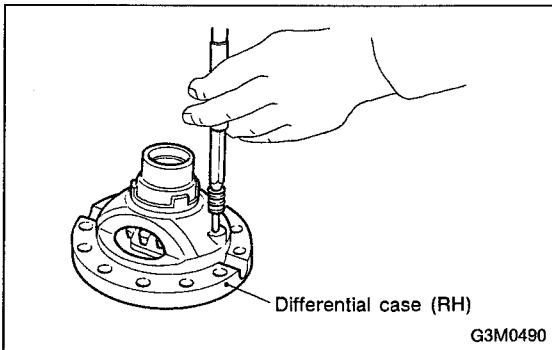
- 1) Using a press and ST, remove the taper roller bearing.
ST 498077000 REMOVER

CAUTION:

Be careful not to damage the speedometer drive gear.



- 2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



- 3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.

B: INSPECTION

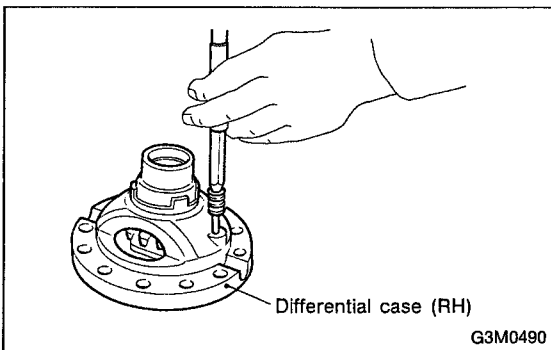
Check each component for harmful cuts, damage and other faults.

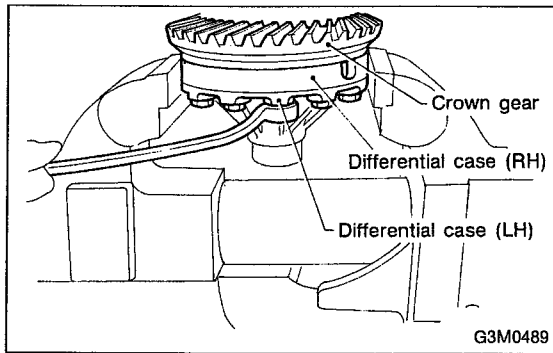
C: ASSEMBLY

- 1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

NOTE:

Install straight pin from reverse direction.

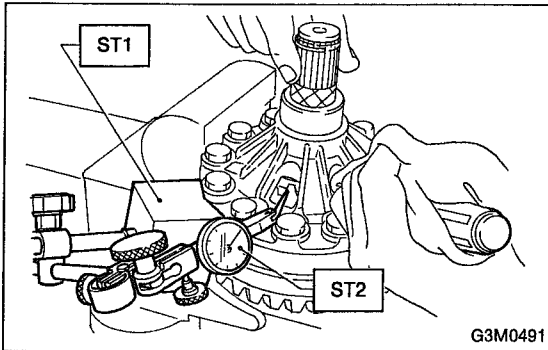




- 2) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
- 3) Install the crown gear and secure by tightening the bolt.

Standard tightening torque:

$62 \pm 5 \text{ N}\cdot\text{m}$ ($6.3 \pm 0.5 \text{ kg}\cdot\text{m}$, $45.6 \pm 3.6 \text{ ft}\cdot\text{lb}$)



- 4) Measurement of backlash (Selection of washer)
Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.

ST1 498247001 MAGNET BASE

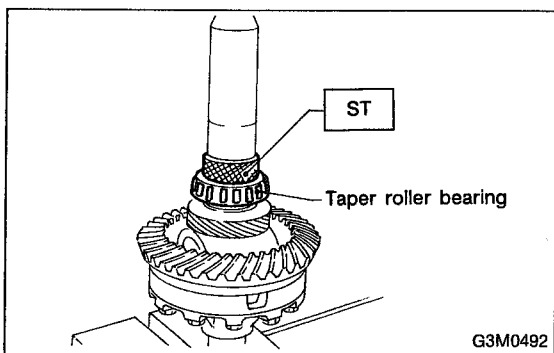
ST2 498247100 DIAL GAUGE

Standard value:

$0.13 - 0.18 \text{ mm}$ ($0.0051 - 0.0071 \text{ in}$)

NOTE:

Measure the backlash by applying a pinion tooth between two bevel gear teeth.

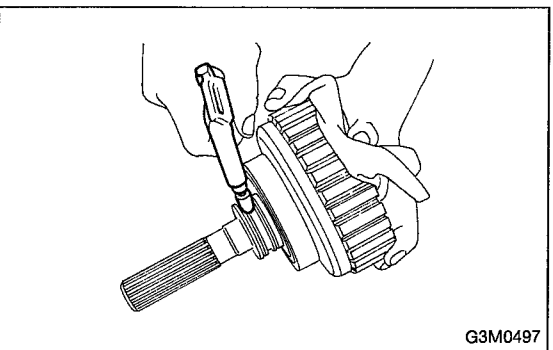
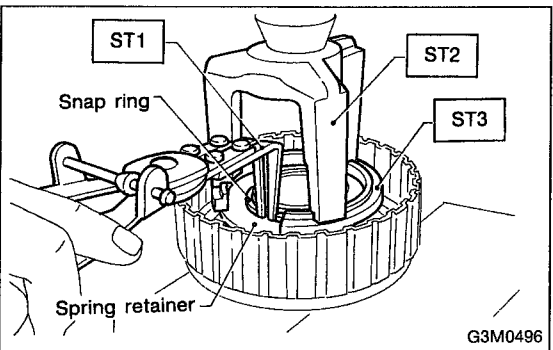
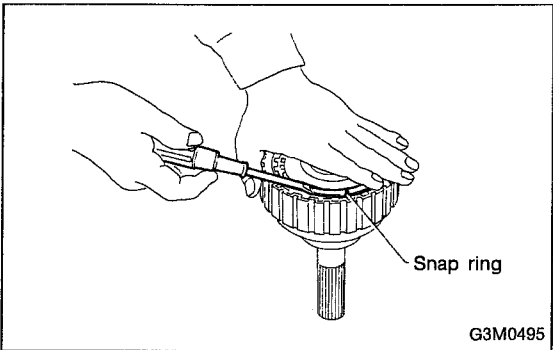
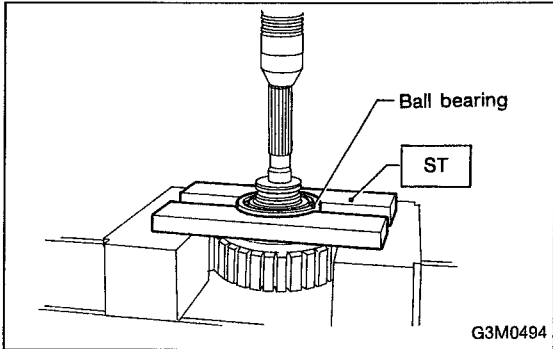
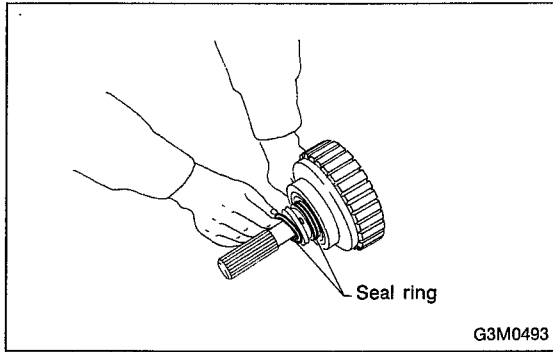


- 5) Install the speedometer drive gear. Then force-fit the taper roller bearing with a press and ST.

ST 398487700 DRIFT

CAUTION:

Be sure to position correctly the locking end of the speedometer drive gear.



23. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

CAUTION:

Be careful not to damage the seal ring.

2) Using a press and ST, remove the ball bearing.

ST 498077000 REMOVER

CAUTION:

Do not reuse the bearing.

3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.

4) Remove the snap ring with ST1, ST2 and ST3, and take out the spring retainer.

ST1 399893600 PLIERS

ST2 398673600 COMPRESSOR

ST3 498627000 SEAT

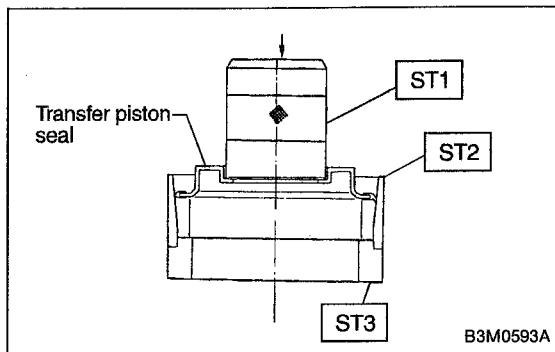
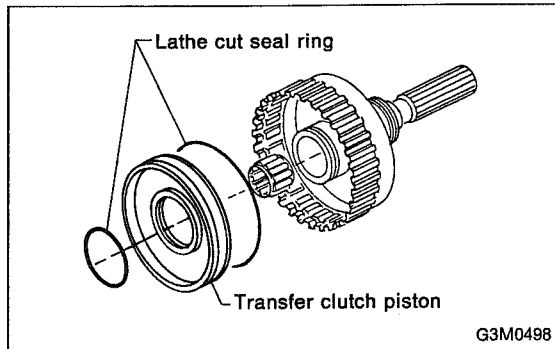
5) Apply compressed air to the rear drive shaft to remove the piston.

B: INSPECTION

- 1) Check the drive plate facing for wear and damage.
- 2) Check the snap ring for wear, return spring for permanent set and breakage, and spring retainer for deformation.
- 3) Check the lathe cut ring for damage.

C: ASSEMBLY

- 1) Install the lathe cut seal ring to the I.D./O.D. of the transfer clutch piston.

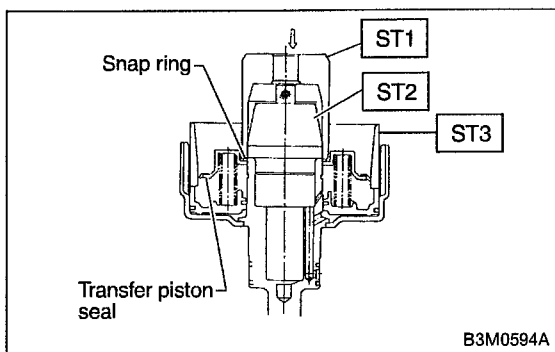


- 2) Install piston.
 - (1) Connect transfer clutch piston to rear drive shaft (until it reaches hole in valve body).
 - (2) Install spring retainer to transfer clutch piston.
 - (3) Using ST1, ST2 and ST3, attach transfer piston seal to ST2.

ST1	499247400	INSTALLER
ST2	499257400	PISTON GUIDE
ST3	498267400	TABLE

CAUTION:

Be careful not to tilt transfer piston seal.

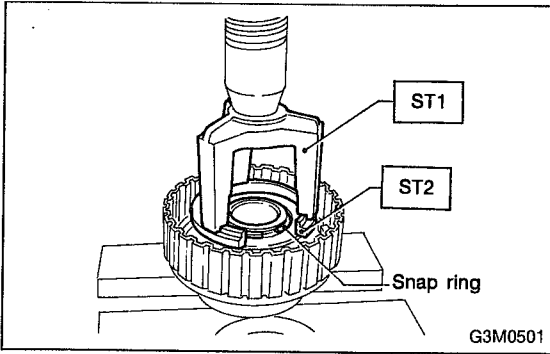


- (4) Place ST3 onto rear drive shaft so that spring can be inserted into hole in transfer piston seal.
- (5) Attach ST2 to rear drive shaft. Using ST1, press into place.

ST1	499247400	INSTALLER
ST2	499257300	SNAP RING OUTER GUIDE
ST3	499257400	PISTON GUIDE

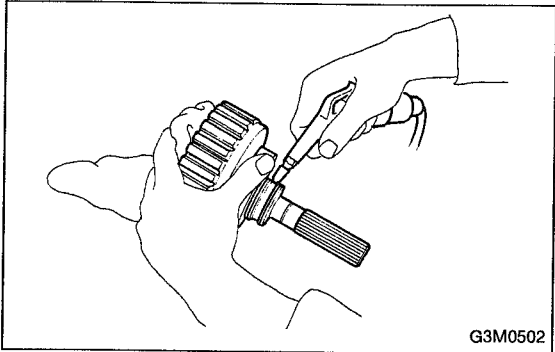
CAUTION:

Do not allow lip of transfer piston seal to fold back.

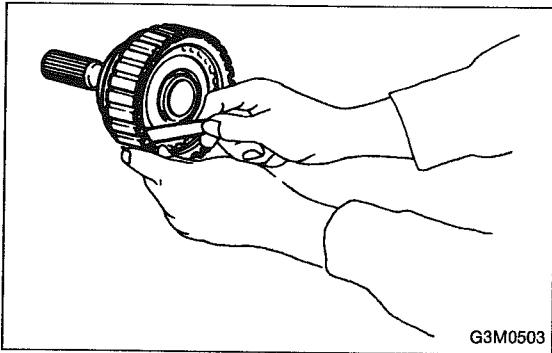


3) Install the driven plates, drive plates, and pressure plate, and secure with a snap ring with ST1, ST2 and a press.

ST1 398673600 COMPRESSOR
ST2 498627000 SEAT



4) Apply compressed air to see if the assembled parts move smoothly.



5) Check the clearance.

NOTE:

Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting. If the clearance is not within the specified range, select a proper pressure plate.

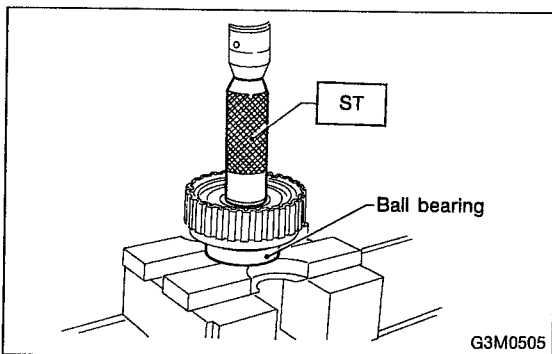
Standard value:

0.2 — 0.6 mm (0.008 — 0.024 in)

Allowable limit:

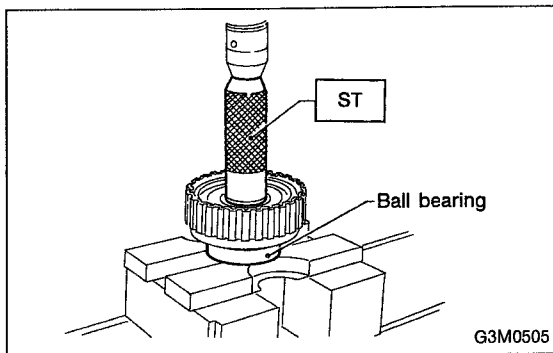
1.6 mm (0.063 in)

	Part No.	Thickness mm (in)
● Available pressure plates	31593AA151	3.3 (0.130)
	31593AA161	3.7 (0.146)
	31593AA171	4.1 (0.161)
	31593AA181	4.5 (0.177)



6) Press-fit the ball bearing with ST.

ST 899580100 INSTALLER

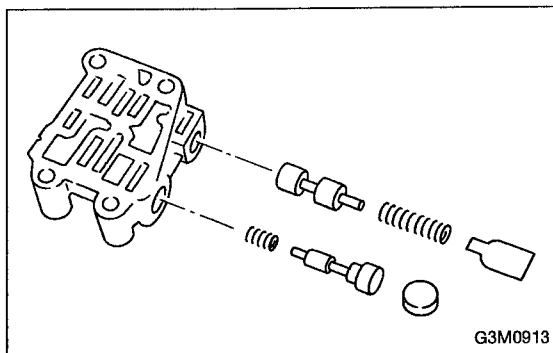


7) Coat the seal ring with vaseline, and install it in the seal ring groove of the shaft.

CAUTION:

Do not expand the seal ring excessively when installing.

ST 899580100 INSTALLER



24. Transfer Valve Body

A: DISASSEMBLY

1) Remove the plate. Then remove the spring and pilot valve together.

2) Remove the straight pin and pry out the plug with a screwdriver. Then extract the spring and transfer clutch valve together.

CAUTION:

Be careful not to damage the valve and valve body.

B: INSPECTION

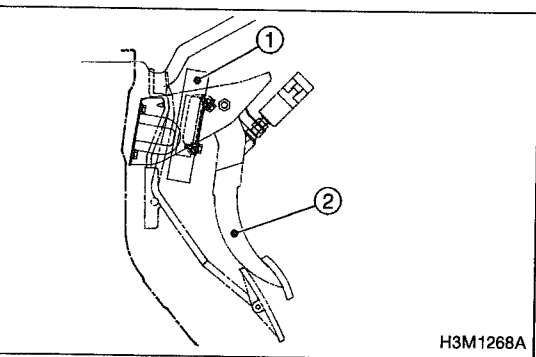
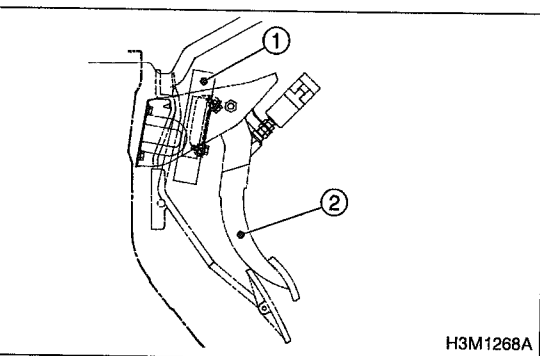
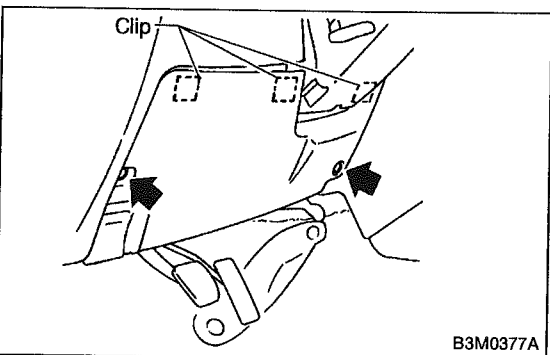
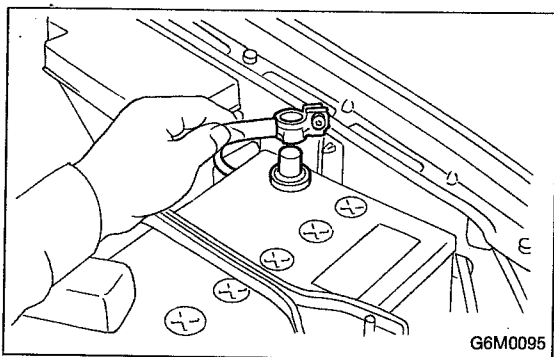
Check each component for harmful cuts, damage, or other faults.

C: ASSEMBLY

To assemble, reverse the removal sequence.

NOTE:

Make sure the valve slides smoothly after assembling.



25. Transmission Control Module

A: REMOVAL

- 1) Disconnect battery ground cable.
- 2) Remove lower cover and then disconnect connector.
- 3) Remove transmission control module.
 - ① Transmission control module
 - ② Brake pedal
- 4) Disconnect connectors from transmission control module.

B: INSTALLATION

- 1) Connect connectors to transmission control module.
 - ① Transmission control module
 - ② Brake pedal
- 2) Install transmission control module.

Tightening torque:

$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)

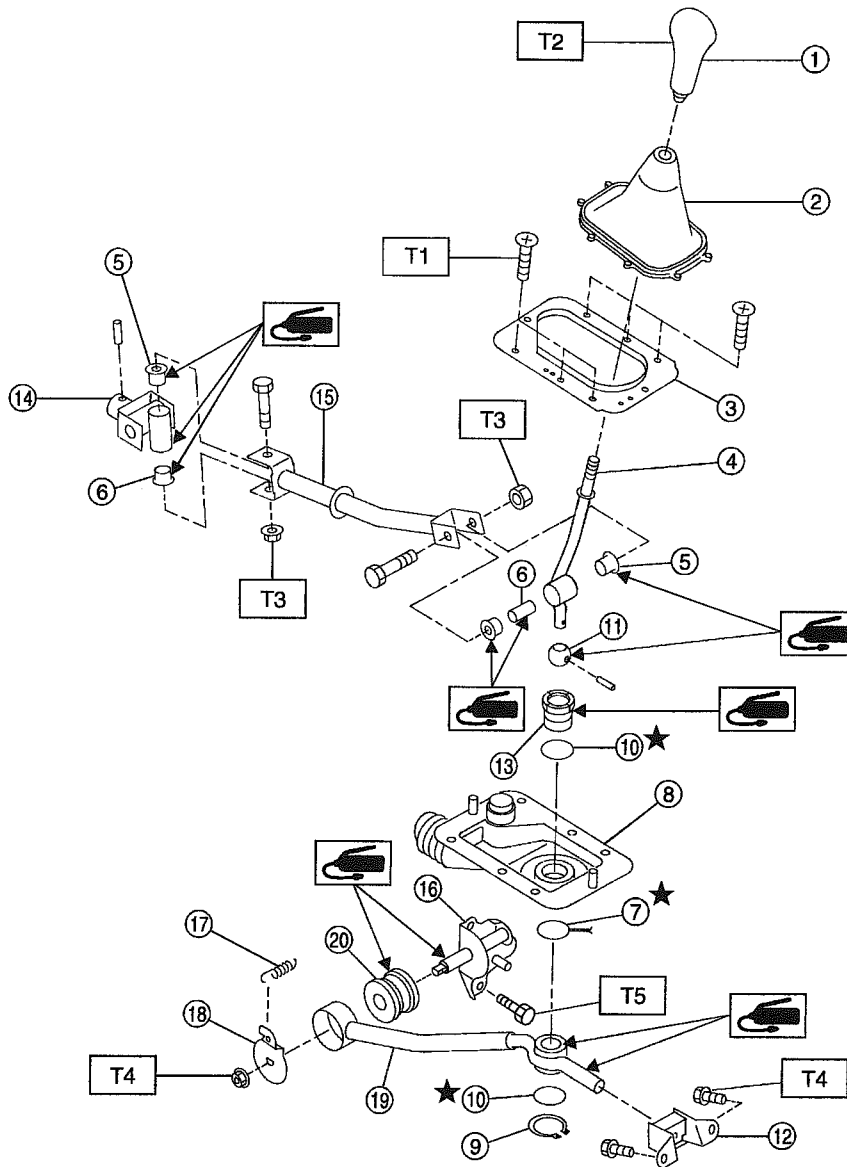
- 3) Installing procedure hereafter is in the reverse order of removal.

TRANSMISSION CONTROL SYSTEM **3-3**

	Page
C COMPONENT PARTS	2
1. Manual Transmission	2
2. Automatic Transmission	3
W SERVICE PROCEDURE	4
1. Manual Transmission	4
2. Automatic Transmission	10



1. Manual Transmission



H3M1189A

- ① Gear shift knob
- ② Console boot
- ③ Boot plate
- ④ Gear shift lever
- ⑤ Bush
- ⑥ Spacer
- ⑦ Locking wire
- ⑧ Boot
- ⑨ Snap ring
- ⑩ O-ring
- ⑪ Bush (Shift lever)
- ⑫ Cushion rubber
- ⑬ Bush (Stay rear)
- ⑭ Joint

- ⑮ Rod
- ⑯ Bracket
- ⑰ Spring
- ⑱ Washer
- ⑲ Stay
- ⑳ Bush (Stay front)

Tightening torque: N·m (kg·m, ft·lb)

T1: 4.4 ± 1.5 (0.45 ± 0.15, 3.3 ± 1.1)

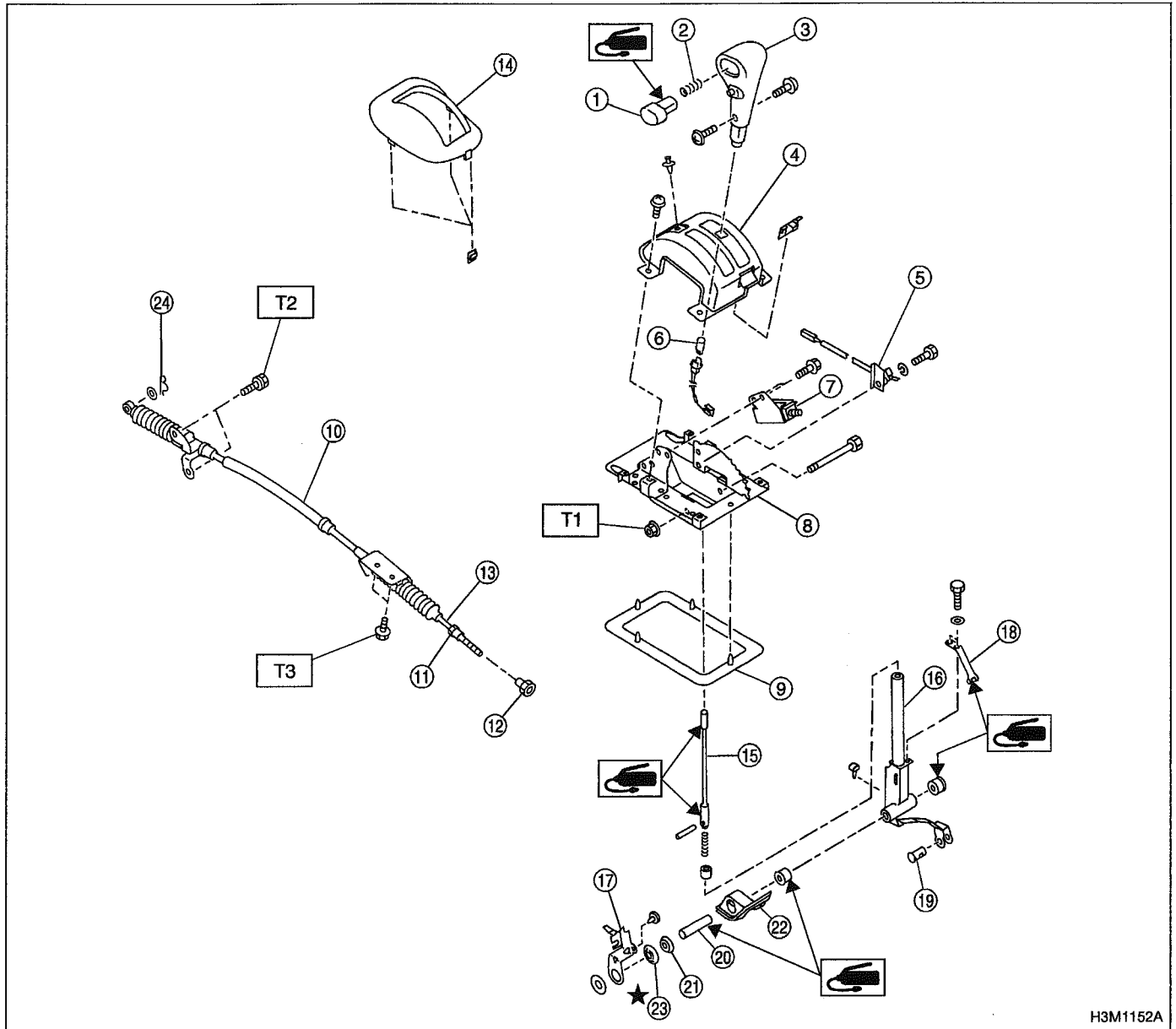
T2: 5 (0.51, 3.7)

T3: 12 ± 3 (1.2 ± 0.3, 8.7 ± 2.2)

T4: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)

T5: 24.5 ± 2 (2.50 ± 0.20, 18.07 ± 1.48)

2. Automatic Transmission



- ① Button
- ② Spring
- ③ Grip
- ④ Indicator cover
- ⑤ "P" position switch
- ⑥ Indicator light bulb
- ⑦ Shift-lock solenoid
- ⑧ Plate
- ⑨ Packing
- ⑩ Outer cable
- ⑪ Nut
- ⑫ Nut
- ⑬ Inner cable
- ⑭ Panel
- ⑮ Rod

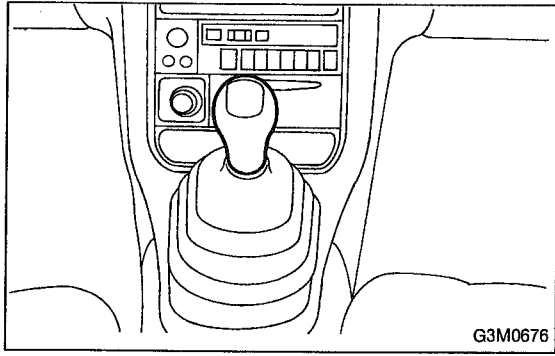
- ⑯ Selector lever
- ⑰ Lock plate
- ⑱ Detention spring
- ⑲ Pin
- ⑳ Spacer
- ㉑ Washer
- ㉒ Boot
- ㉓ Spacer
- ㉔ Snap pin

Tightening torque: N·m (kg·m, ft·lb)

T1: 14 ± 3 (1.43 ± 0.31, 10.3 ± 2.2)

T2: 14 ± 4 (1.43 ± 0.41, 10.3 ± 3.0)

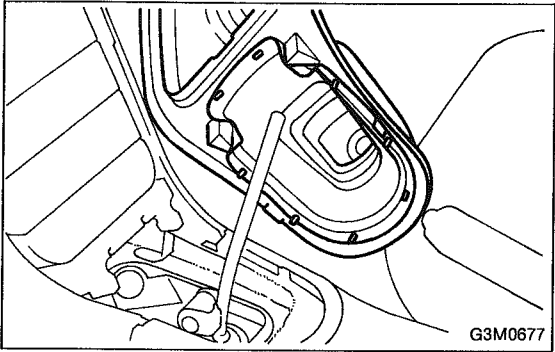
T3: 18 ± 5 (1.84 ± 0.51, 13.3 ± 3.7)



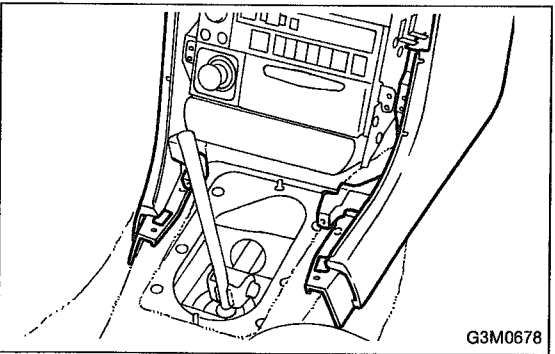
1. Manual Transmission

A: REMOVAL

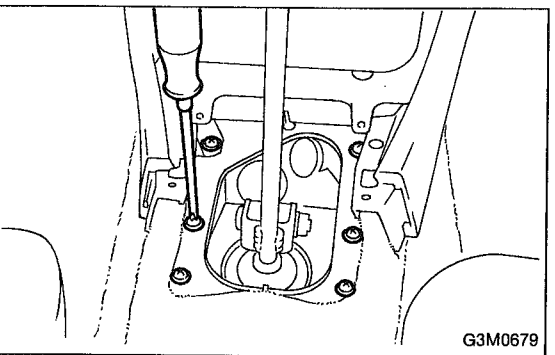
1) Remove knob from gearshift lever.



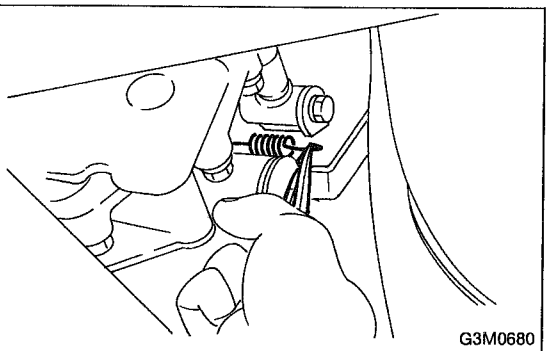
2) Remove console cover and console boot.



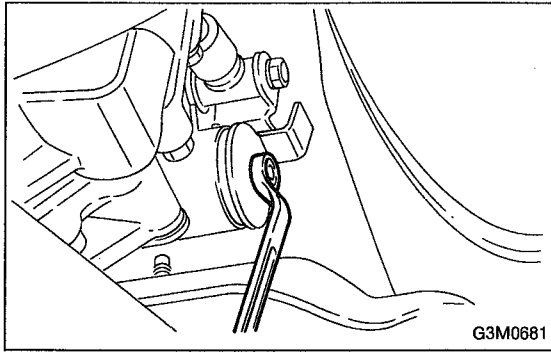
3) Remove rear console box, center console and instrument console.



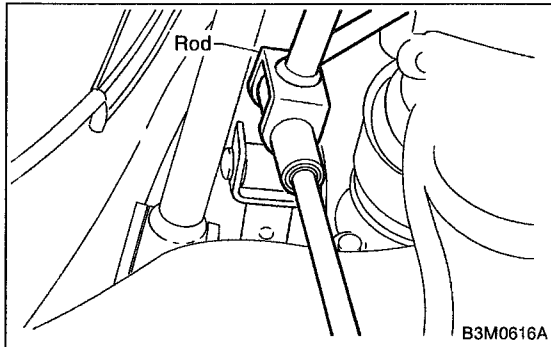
4) Remove boot plate from the body.



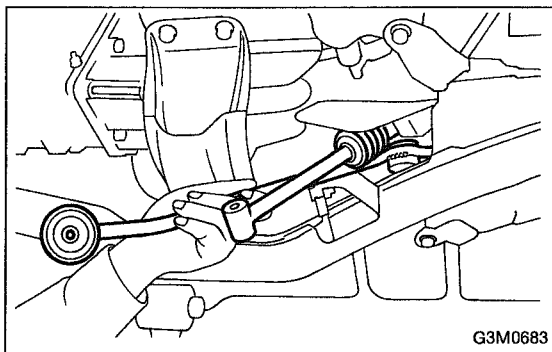
5) Remove the spring between the joint and bracket.



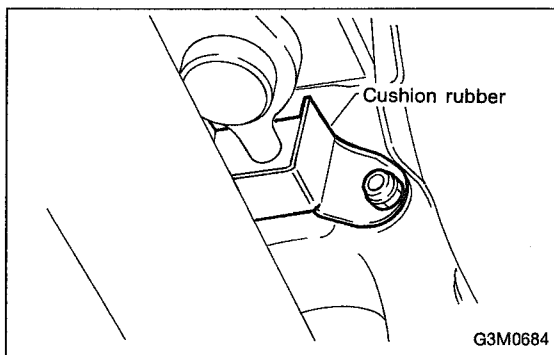
6) Remove stay from bracket.



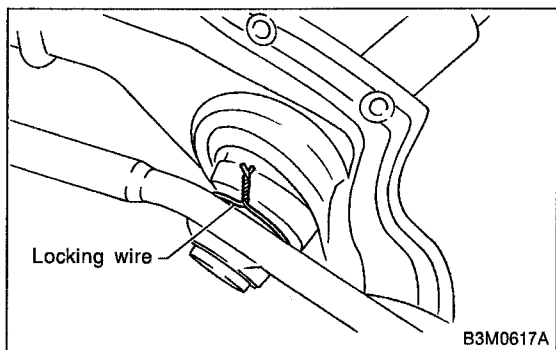
7) Remove rod from joint.



8) Remove gearshift lever.



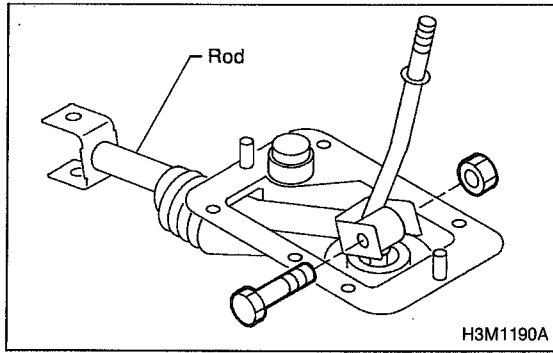
9) Remove the exhaust cover and remove cushion rubber from the body.



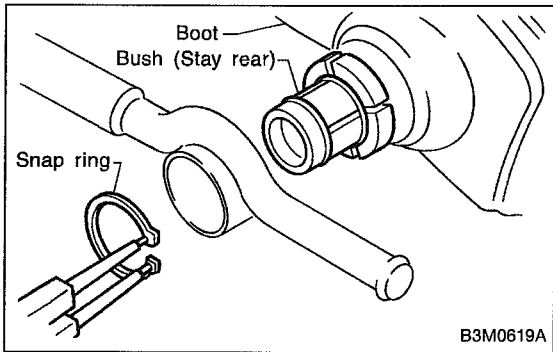
B: DISASSEMBLY

1) Disconnect locking wire.

1. Manual Transmission

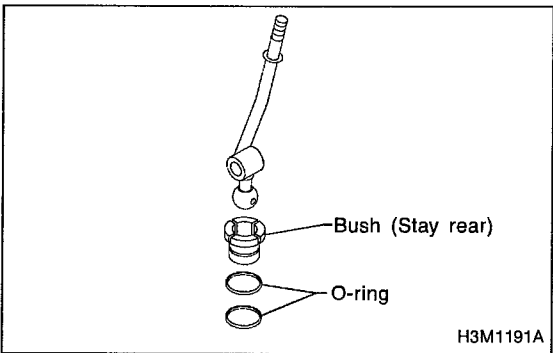


2) Remove rod from gearshift lever.

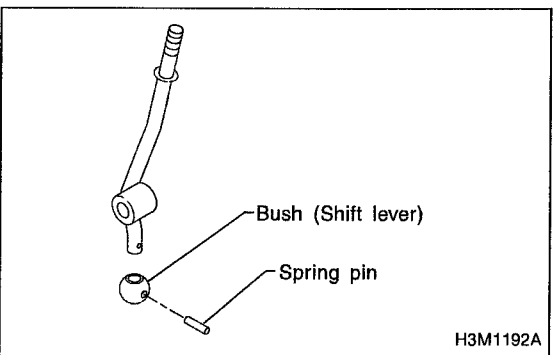


3) Remove snap ring, then disconnect gearshift lever from stay.

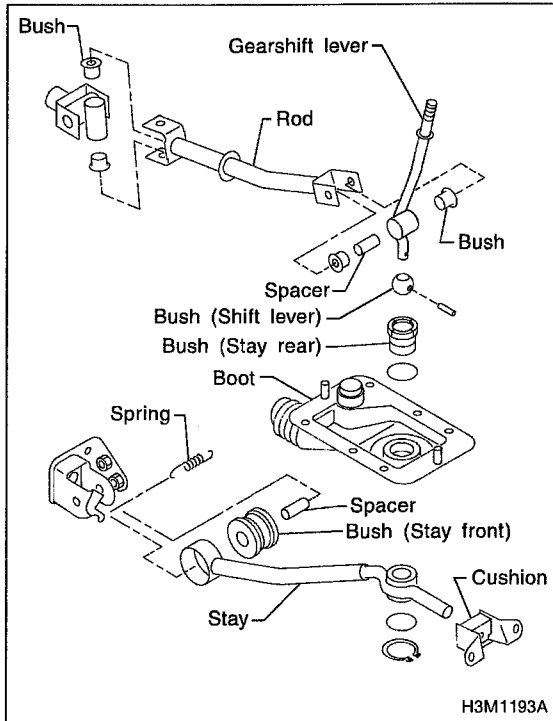
4) Remove boot from gearshift lever.



5) Remove O-ring, then disconnect bush (Stay rear).

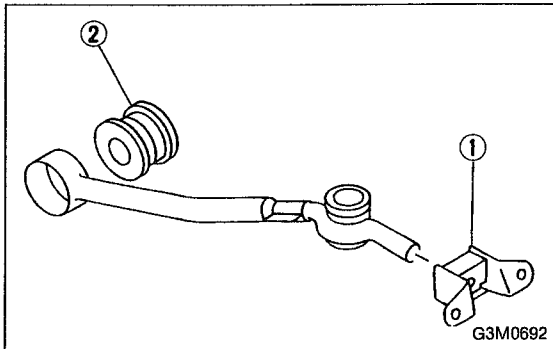


6) Draw out spring pin, then remove bush (Shift lever) from gearshift lever.



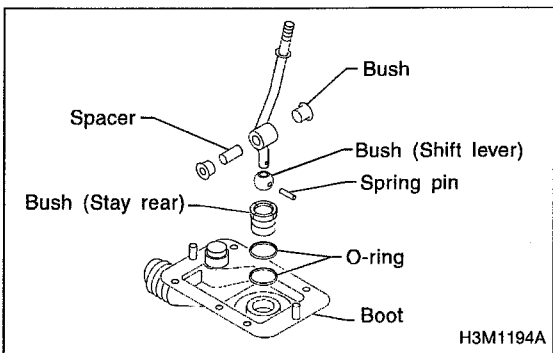
C: INSPECTION

Check each parts (Bush, cushion, spacer, boot, spring, stay and rod etc.) for deformation, damage and wear. Repair or replace any defective parts. Determine defective parts by comparing with new parts.



D: ASSEMBLY

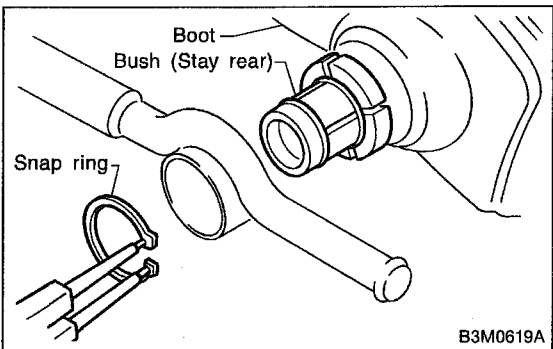
- 1) Clean all parts before assembly.
- 2) Mount the following parts on the stay.
 - ① Cushion rubber
 - ② Bush (Stay front)



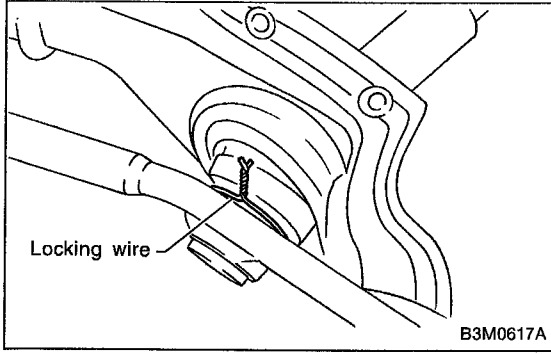
- 3) Mount each parts (Boot, O-ring, bush and spacer) on the gearshift lever.

CAUTION:

- Always use new O-rings.
- Apply grease [NIGTIGHT LYW No.2 or equivalent] to the inner and side surfaces of the bush when installing spacer.

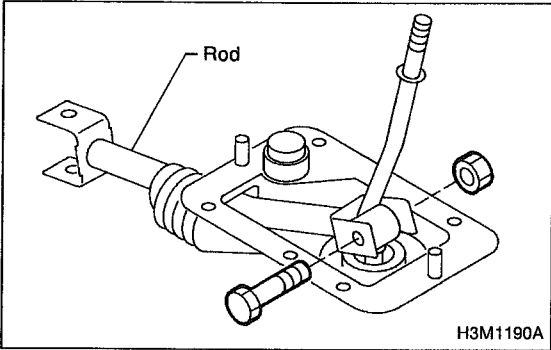


- 4) Insert the gearshift lever into the boot hole.
- 5) Mount gearshift lever on the stay.
- 6) Install snap ring to the bottom of the bush (Stay rear).



7) Tighten with locking wire to the extent that the boot will not come off.

CAUTION:
Always use new locking wire.

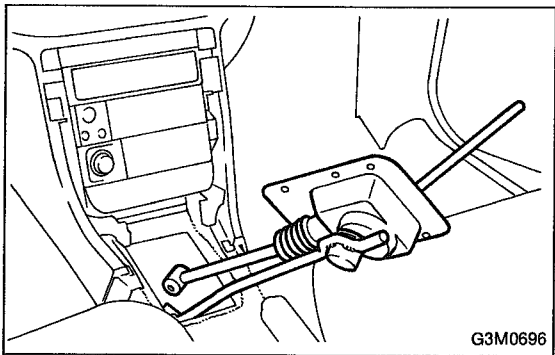


8) Insert the rod into the boot hole.
9) Connect rod to gearshift lever.

Tightening torque:
 $12 \pm 3 \text{ N}\cdot\text{m}$ ($1.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $8.7 \pm 2.2 \text{ ft}\cdot\text{lb}$)

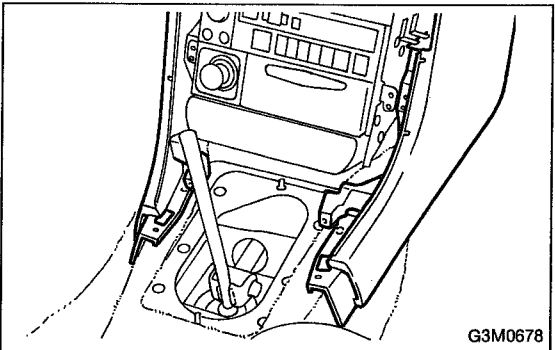
Rocking torque:
 $0.74 \pm 0.25 \text{ N}\cdot\text{m}$ ($0.075 \pm 0.025 \text{ kg}\cdot\text{m}$, $0.54 \pm 0.18 \text{ ft}\cdot\text{lb}$)
or less

10) Check that there is no excessive play and that parts move smoothly.

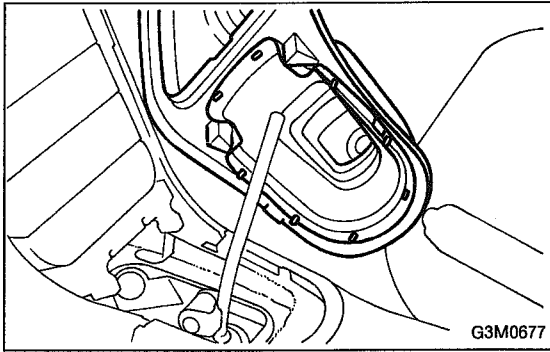


E: INSTALLATION

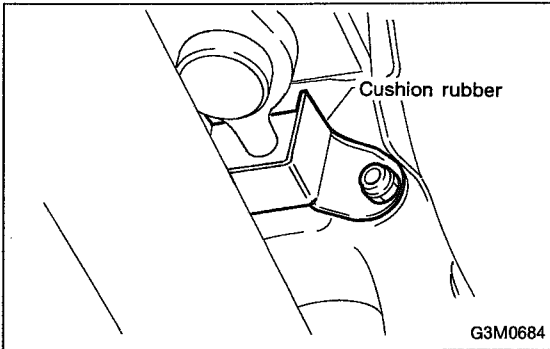
1) Put into gearshift lever from passenger compartment.
2) Mount boot plate on the body.



3) Install rear console box, center console and instrument console.

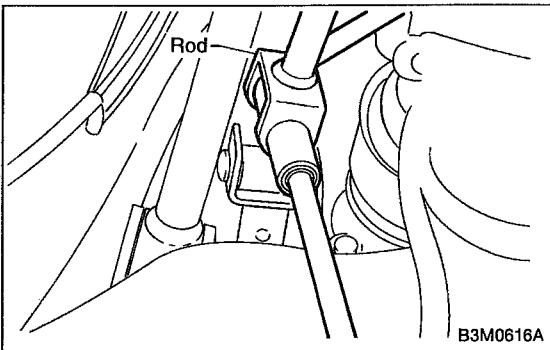


- 4) Install console cover and boot.
- 5) Install gearshift knob.



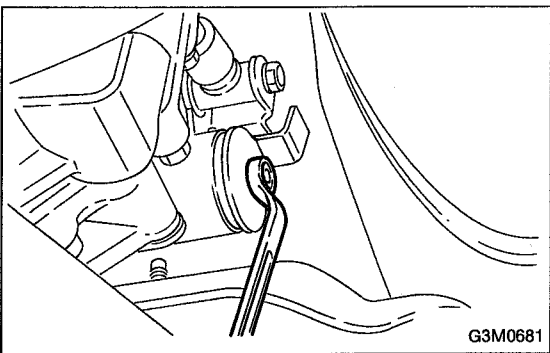
- 6) Mount cushion rubber on the body.

Tightening torque:
 $18 \pm 5 \text{ N}\cdot\text{m}$ ($1.84 \pm 0.51 \text{ kg}\cdot\text{m}$, $13.3 \pm 3.7 \text{ ft}\cdot\text{lb}$)



- 7) Connect rod to the joint.

Tightening torque:
 $12 \pm 3 \text{ N}\cdot\text{m}$ ($1.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $8.7 \pm 2.2 \text{ ft}\cdot\text{lb}$)



- 8) Connect stay to the bracket.

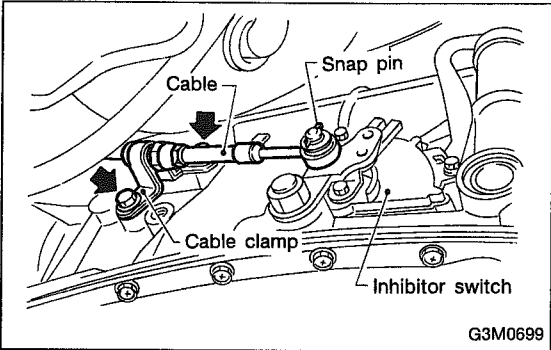
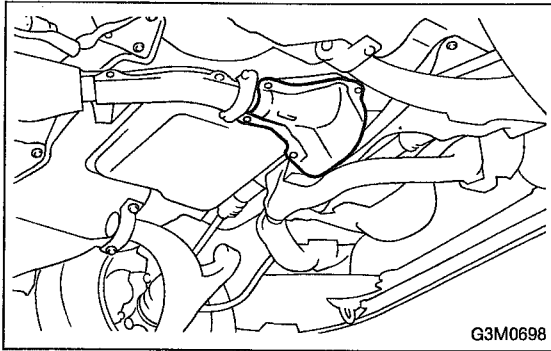
Tightening torque:
 $18 \pm 5 \text{ N}\cdot\text{m}$ ($1.84 \pm 0.51 \text{ kg}\cdot\text{m}$, $13.3 \pm 3.7 \text{ ft}\cdot\text{lb}$)

- 9) Install the exhaust cover.

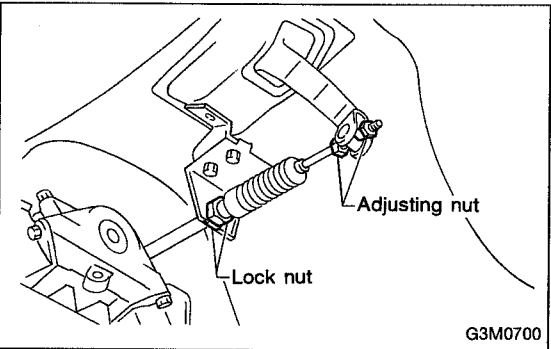
2. Automatic Transmission

A: REMOVAL

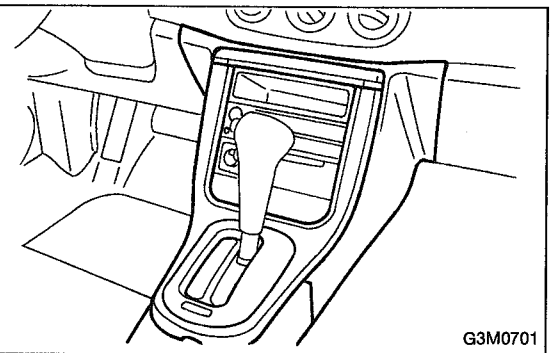
- 1) Remove the cable.
 - (1) Prior to removal, set lever to "N" position.
 - (2) Remove front exhaust pipe.



- (3) Separate cable from transmission lever.
- (4) Remove clamp from transmission case.

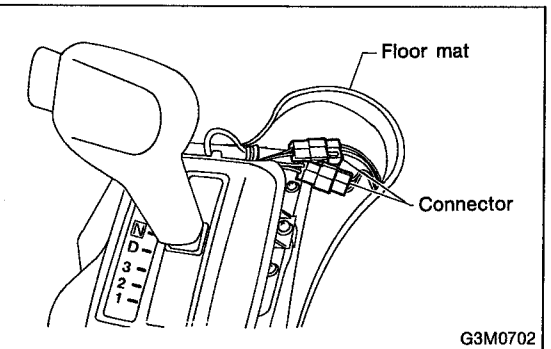


- (5) Disconnect cable from selector lever.

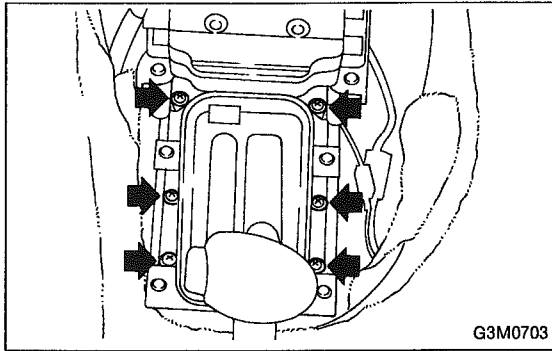


- 2) Remove all of the screws to take off the following console parts.

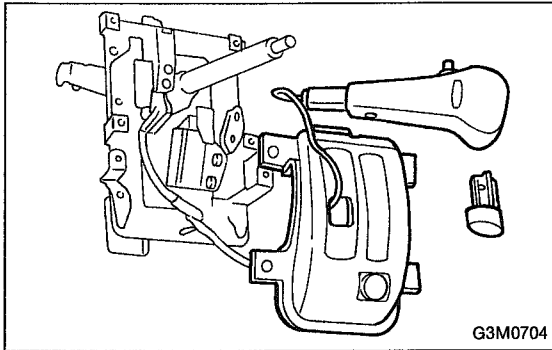
- Instrument console
- Center console
- Rear console box



- 3) Disconnect the connectors.

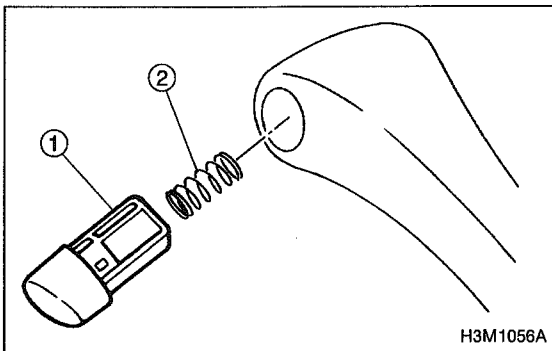


4) Remove the screws to take off the plate from the body.

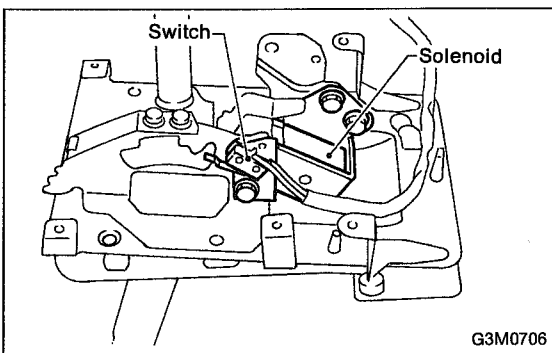


B: DISASSEMBLY

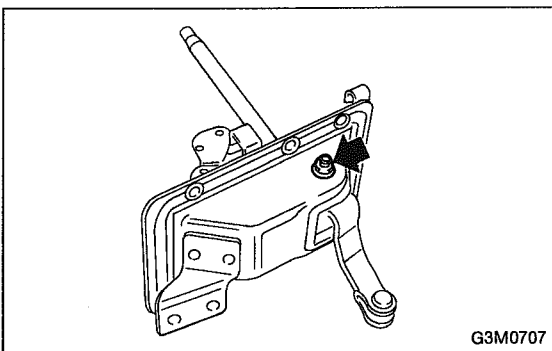
- 1) Remove grip from selector lever.
- 2) Remove indicator from plate.



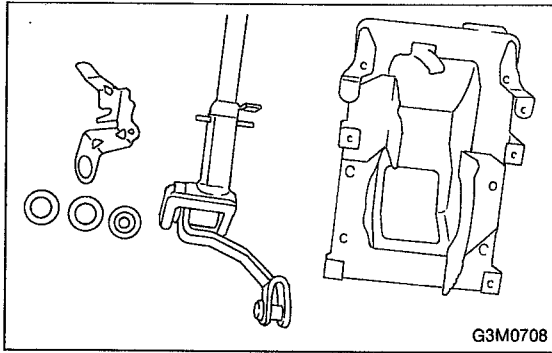
- 3) Remove the following parts from the grip.
 - ① Button
 - ② Spring



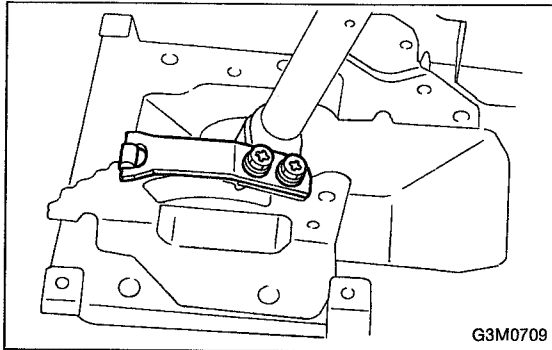
4) Remove shift-lock solenoid and "P" position switch.



5) Remove the bolt to take off the selector lever from the plate.



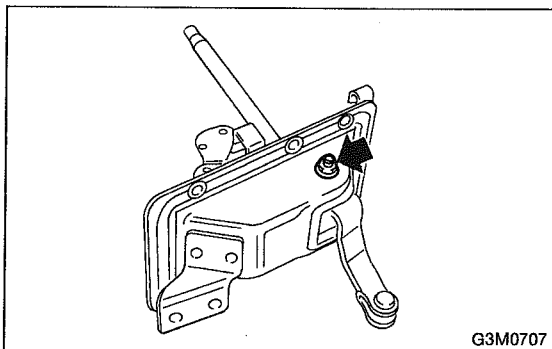
- 6) Remove lock plate.
- 7) Remove selector lever from the plate.



- 8) Remove detent spring.

C: INSPECTION

- 1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Confirm the following parts for operating condition before assembly.
 - (1) Sliding condition of the button in the grip ... it should move smoothly.
 - (2) Insertion of the grip on the selector lever ... when pushing the grip on the selector lever by hand, screw holes should be aligned.
 - (3) Operation of selector lever and rod ... they should move smoothly.
 - (4) Insertion of the spacer into the selector lever ... it should be inserted lightly by finger pressure.

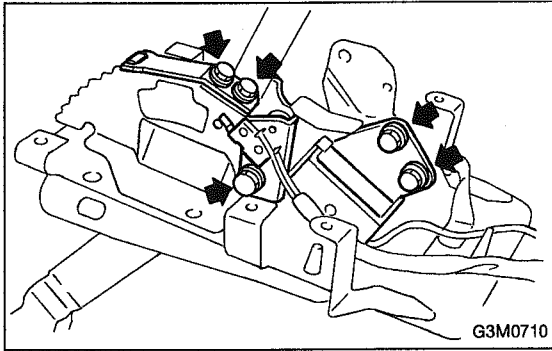


D: ASSEMBLY

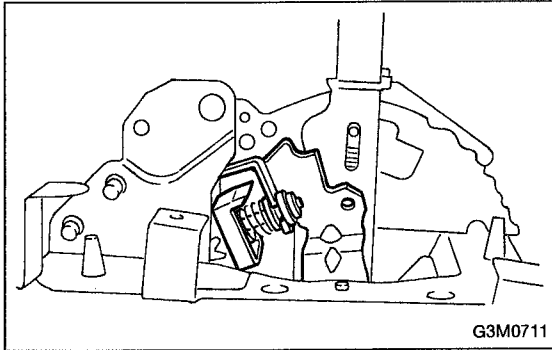
- 1) Clean all parts before assembly.
- 2) Assemble selector lever and lock plate to the plate.
- 3) Insert the bolt and tighten the flange nut to the specified torque.

Tightening torque (Flange nut):

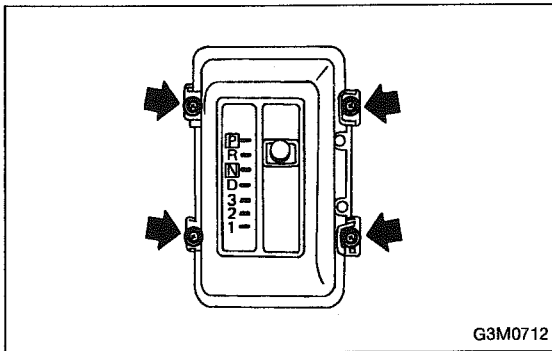
$14 \pm 3 \text{ N}\cdot\text{m}$ ($1.43 \pm 0.31 \text{ kg}\cdot\text{m}$, $10.3 \pm 2.2 \text{ ft}\cdot\text{lb}$)



4) Assemble detention spring, shift-lock solenoid and "P" position switch.



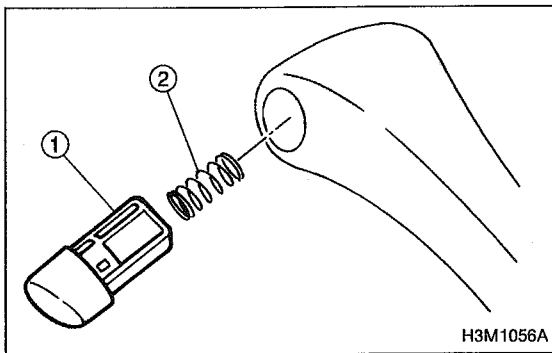
5) Adjust the position of shift-lock plate and solenoid. Then, tighten the bolts.



6) Assemble indicator to the plate.

Tightening torque:

$1.95 \pm 0.65 \text{ N}\cdot\text{m}$ ($1.999 \pm 0.066 \text{ kg}\cdot\text{m}$, $1.438 \pm 0.479 \text{ ft}\cdot\text{lb}$)

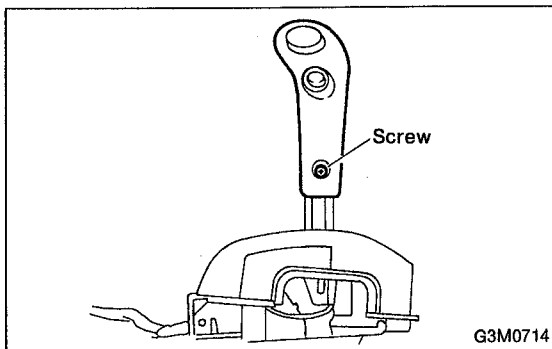


7) Assemble the following parts to the grip.

CAUTION:

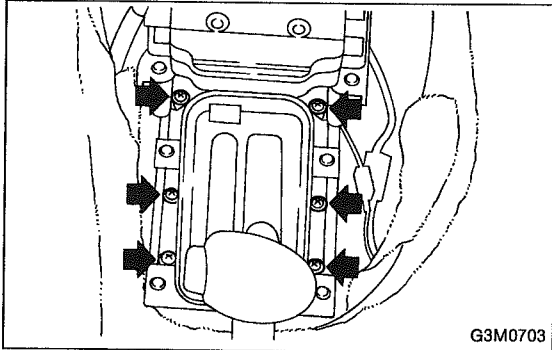
Apply grease on sliding surfaces of the following parts.

- ① Button
- ② Spring



8) Assemble the grip to the selector lever.

9) After completion of fitting, transfer selector lever to range "P" ~ "1", pressing the button of the grip; then check whether the indicator and select lever agree, whether the pointer and position mark agree and what the operating force is.



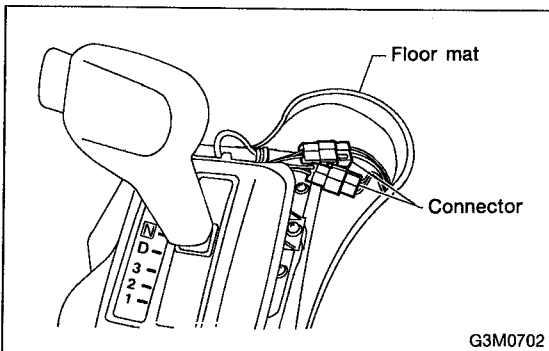
G3M0703

E: INSTALLATION

- 1) Mount the selector lever onto the car body.
- 2) Tighten the six bolts to install the selector lever to the car body.

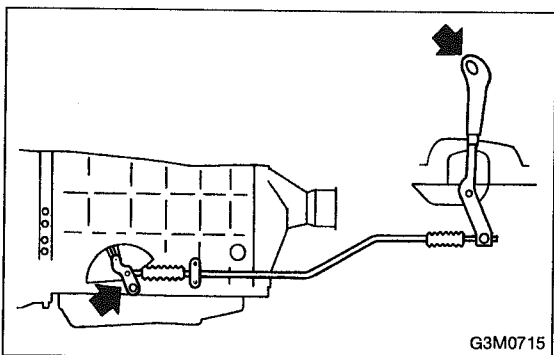
Tightening torque:

$4.5 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.46 \pm 0.153 \text{ kg}\cdot\text{m}$, $3.32 \pm 1.11 \text{ ft}\cdot\text{lb}$)



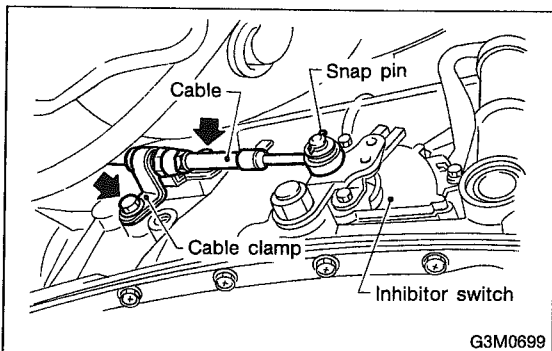
G3M0702

- 3) Connect connectors and install rear console, center console and instrument console.



G3M0715

- 4) Set location of selector lever at "N" position.
- 5) Set location of selector arm installed on the transmission body at "N" position.

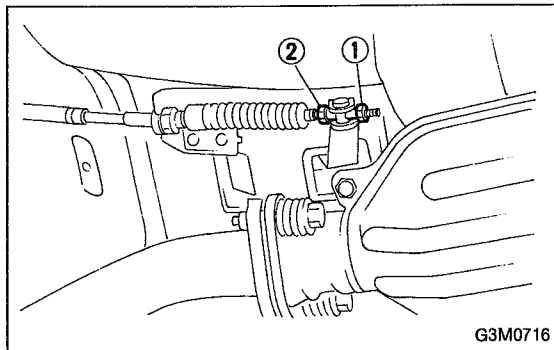


G3M0699

- 6) Pass inner cable through selector arm pin and then connect it using a washer and snap pin.
- 7) Attach outer cable to transmission case with the bolts.

Tightening torque:

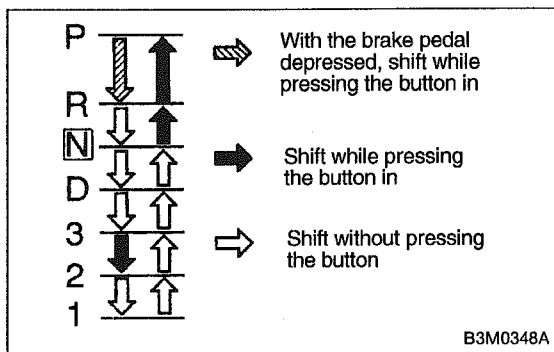
$14 \pm 4 \text{ N}\cdot\text{m}$ ($1.43 \pm 0.41 \text{ kg}\cdot\text{m}$, $10.3 \pm 3.0 \text{ ft}\cdot\text{lb}$)



- 8) Insert the thread portion of the other inner cable and into the connector hole of the selector lever, and fix the other outer cable end to the bracket.
- 9) Adjust the inner cable length.
 - (1) Put connector into contact with nut ②.
 - (2) Tighten nut ①.

Tightening torque:
 $7.35 \pm 1.95 \text{ N}\cdot\text{m}$ ($0.750 \pm 0.199 \text{ kg}\cdot\text{m}$, $5.421 \pm 1.438 \text{ ft}\cdot\text{lb}$)

- 10) After completion of fitting, make sure that the selector lever operates smoothly all across the operating range.
- 11) Connect the harnesses and check the following items.
 - (1) The engine starts operating when selector lever is in position "P", but not in other positions.
 - (2) The back-up light is lit when the selector lever is in position "R", but not in other positions.



- 12) Check selector lever operation.

WARNING:
Stop the engine while checking operation of selector lever.

- (1) Check that selector lever does not move from "N" to "R" without pushing the button.
 - (2) Check that selector lever does not move from "R" to "P" without pushing the button.
 - (3) Check that selector lever does not move from "P" to "R" without pushing the button.
 - (4) Check that selector lever does not move from "3" to "2" without pushing the button.
- 13) Check shift lock system.
 - (1) Ensure ignition switch rotates from "ACC" to "LOCK" when the selector lever is set at "P". Also check that ignition key can be removed from the "LOCK" position only.
 - (2) Ensure selector lever moves from "P" to any other position when the brake pedal is depressed with ignition key set at "ON" or "START".

MEMO:

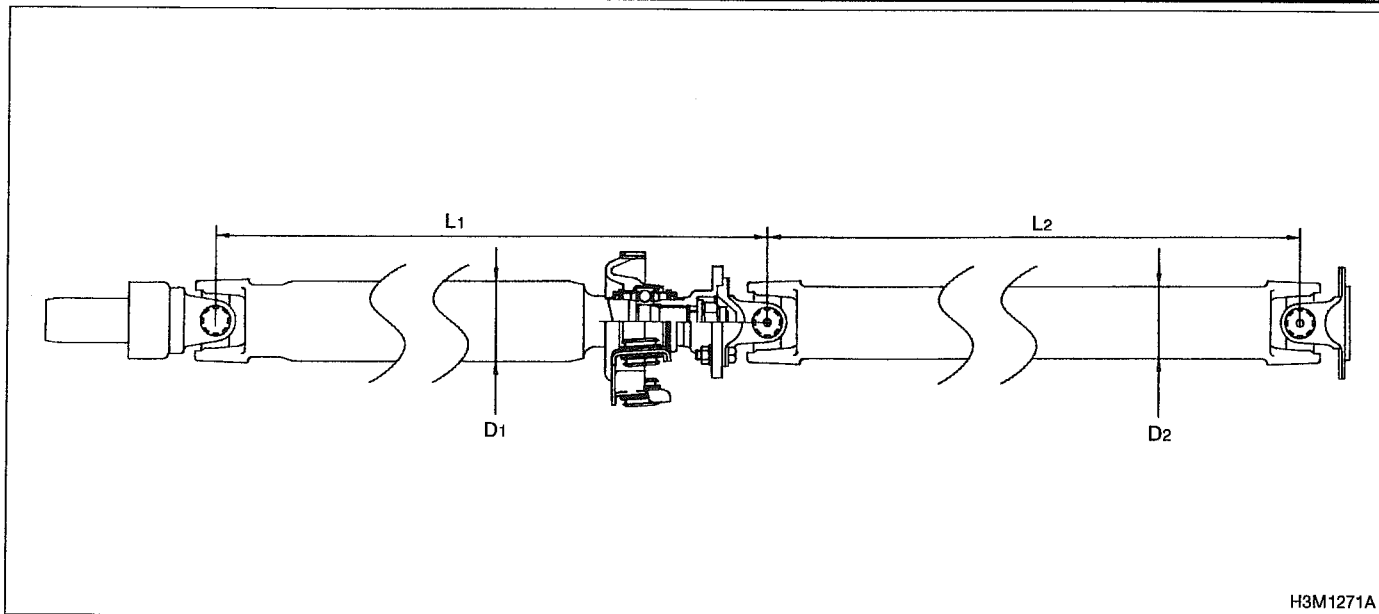
AWD SYSTEM **3-4**

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1. Specifications

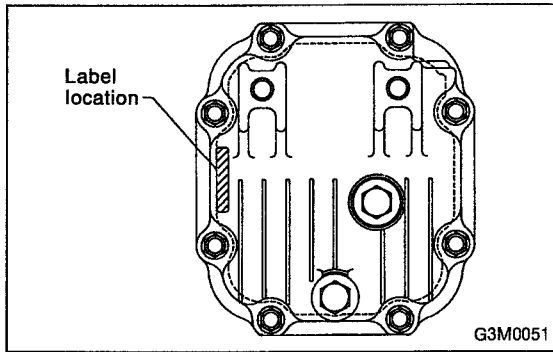
A: PROPELLER SHAFT

Front propeller shaft Joint-to-joint length: L ₁ mm (in)	AT	586 (23.07)
	MT	645 (25.39)
Rear propeller shaft Joint-to-joint length: L ₂ mm (in)		706 (27.80)
Outside dia. of tube mm (in)	D ₁	63.5 (2.500)
	D ₂	57.0 (2.244)



B: REAR DIFFERENTIAL

Type of gear	Hypoid	
	MT	AT
	1800 cc and 2200 cc	2200 cc
Gear ratio (Number of gear teeth)	3.900 (39/10)	4.111 (37/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)	
Rear differential gear oil	GL-5	

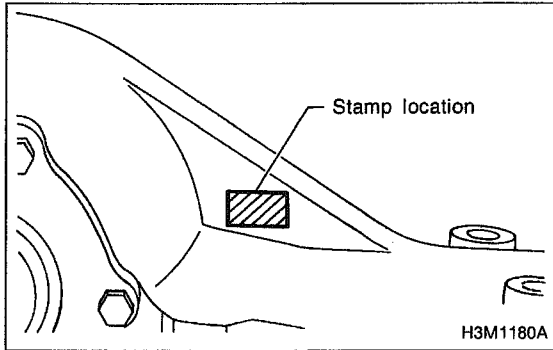


2. Identification

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.



Gear ratio		Label or stamp on rear differential
1800 cc MT	3.900	VA1RBF-XF <small>H3M1057</small>
2200 cc AT	4.111	VA1REF-XG <small>H3M1159</small>
2200 cc MT	3.900	T 1 <small>B3M0124</small>

3. Service Data

A: REAR DIFFERENTIAL (VA-TYPE)

Front and rear bearing preload at companion flange bolt hole	New bearing	12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb)
Preload adjusting washer length	Part No.	Length mm (in)
	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
38336AA210	1.738 (0.0684)	
38336AA100	1.750 (0.0689)	
38336AA220	1.763 (0.0694)	
38336AA110	1.775 (0.0699)	
Preload adjusting spacer length	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)	
Pinion height adjusting shim thickness	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)	

Side gear backlash	0.05 — 0.15 mm (0.0020 — 0.0059 in)	
Side gear thrust washer thickness	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)	
Crown gear to drive pinion backlash	0.10 — 0.15 (0.0039 — 0.0059)	
Crown gear runout on its back surface	Limit	0.05 (0.0020)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)	

B: REAR DIFFERENTIAL (T-TYPE)

Front and rear bearing preload at companion flange bolt hole	New bearing	19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
	Used bearing	8.34 — 16.67 N (0.85 — 1.70 kg, 1.87 — 3.75 lb)
Preload adjusting washer length	Part No.	Length
	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)
Preload adjusting spacer length	Part No.	Length
	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)

SPECIFICATIONS AND SERVICE DATA

Pinion height adjusting shim thickness	Part No.	Thickness
	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 backlash	0.10 — 0.20 mm (0.0039 — 0.0079 in)	
Side gear thrust washer thickness	Part No.	Thickness
	383445201	0.75 — 0.8 mm (0.0295 — 0.0315 in)
	383445202	0.8 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.9 mm (0.0335 — 0.0354 in)
Side bearing standard width	20.00 mm (0.7874 in)	
Side bearing retainer shim thickness	Part No.	Thickness
	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)
Crown gear to drive pinion backlash	Limit	0.10 — 0.20 mm (0.0039 — 0.0079 in)
Crown gear runout on its back surface		0.05 mm (0.0020 in)
Oil capacity		0.8 ℓ (0.8 US qt, 0.7 Imp qt)

ITEM						
• Rear differential gear oil						
API Classification						
GL-5						
SAE Viscosity No. and Application Temperature						
(°C)	-30	-26	-15	-5	0	15 25 30
(°F)	-22	-15	5	23	32	59 77 86

H3M1272A

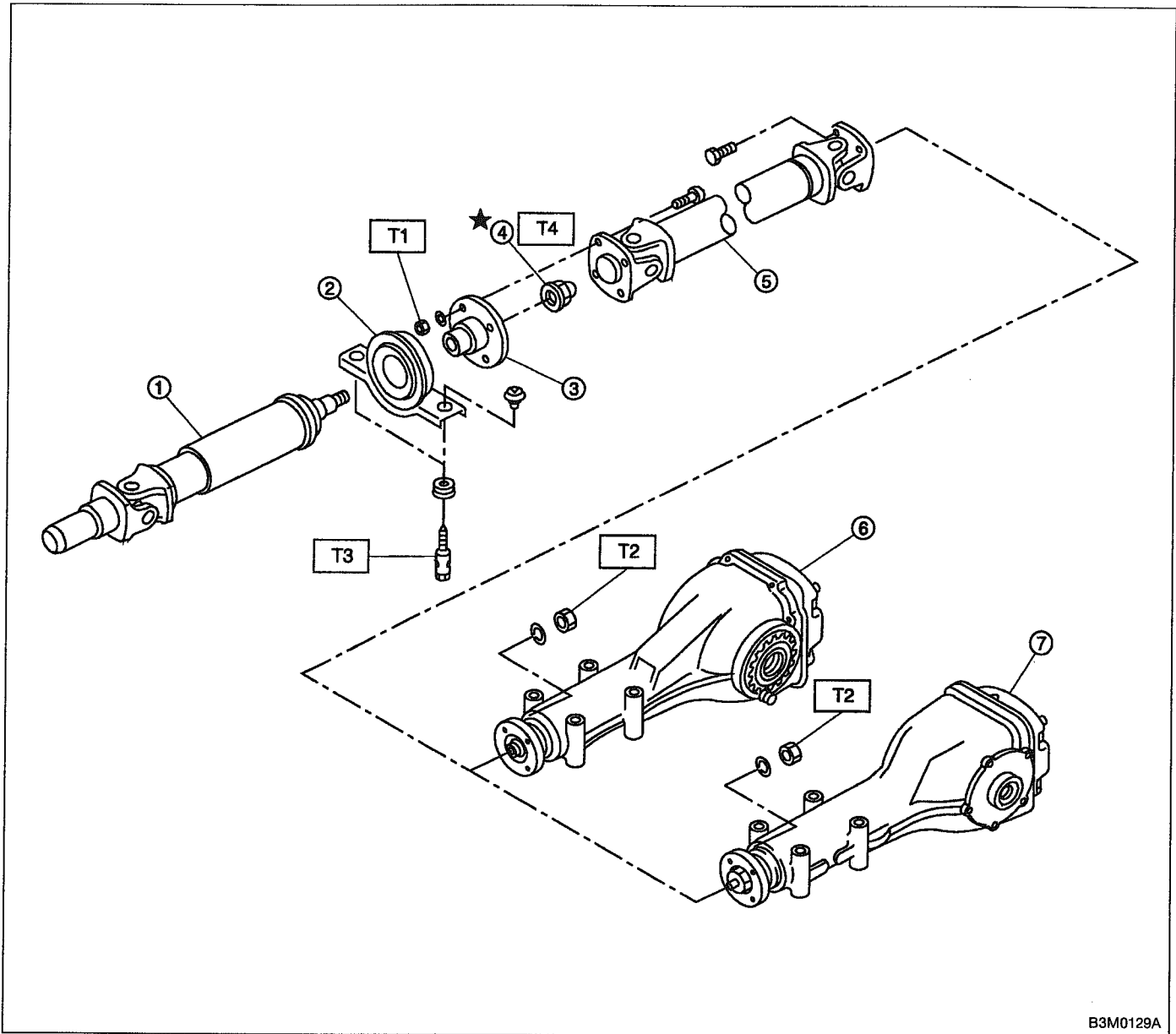
C: REAR DIFFERENTIAL GEAR OIL

- Recommended oil

CAUTION:

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

1. Propeller Shaft



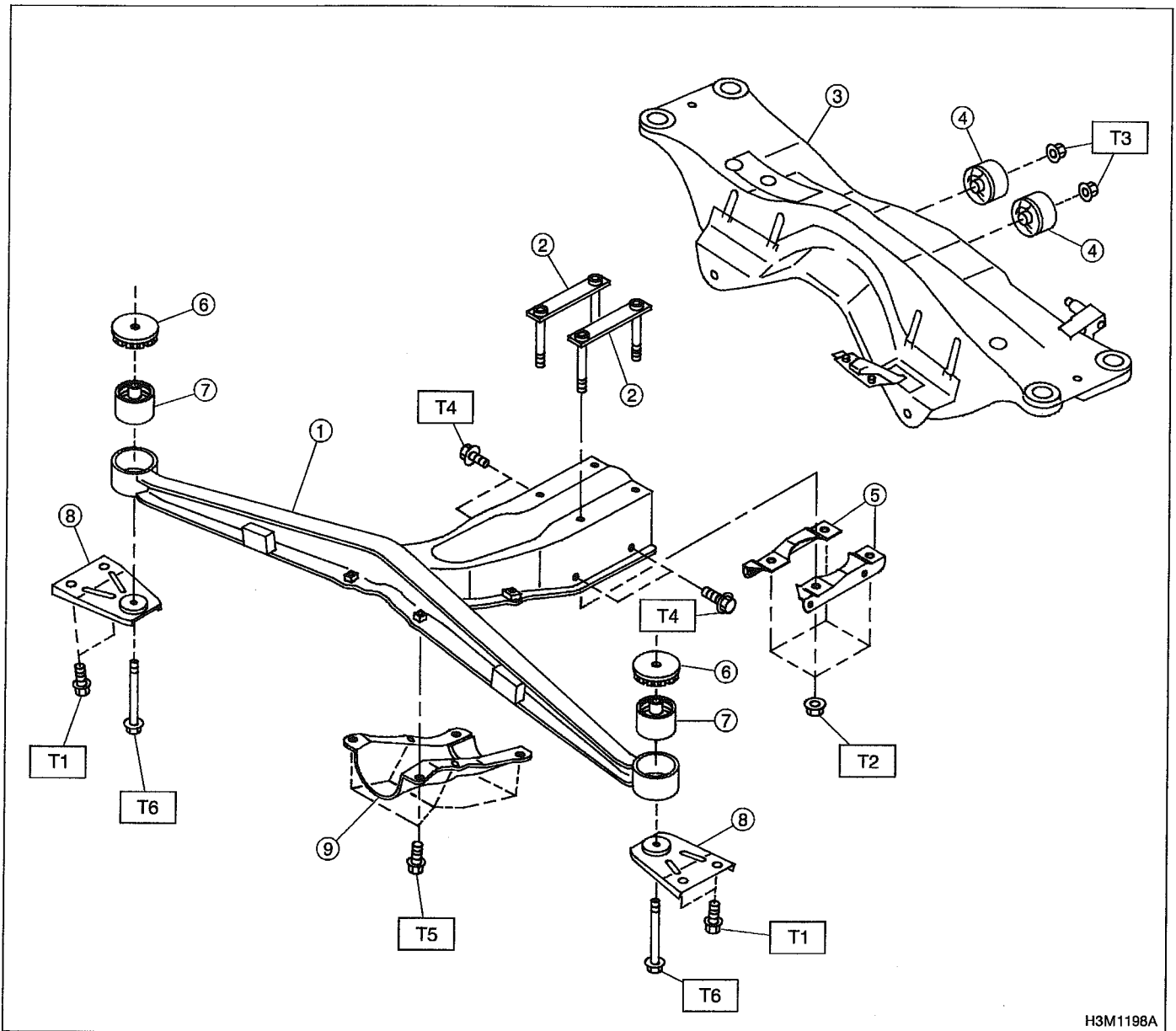
B3M0129A

- ① Front propeller shaft
- ② Center bearing
- ③ Companion flange
- ④ Stake nut
- ⑤ Rear propeller shaft
- ⑥ Rear differential (VA-type)
- ⑦ Rear differential (T-type)

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

T1:	27.9 ± 4.4	(2.85 ± 0.45 , 20.6 ± 3.3)
T2:	31 ± 8	(3.2 ± 0.8 , 23.1 ± 5.8)
T3:	52 ± 5	(5.3 ± 0.5 , 38.3 ± 3.6)
T4:	270 ± 25	(27.5 ± 2.5 , 199 ± 18)

2. Rear Differential Mounting System



H3M1198A

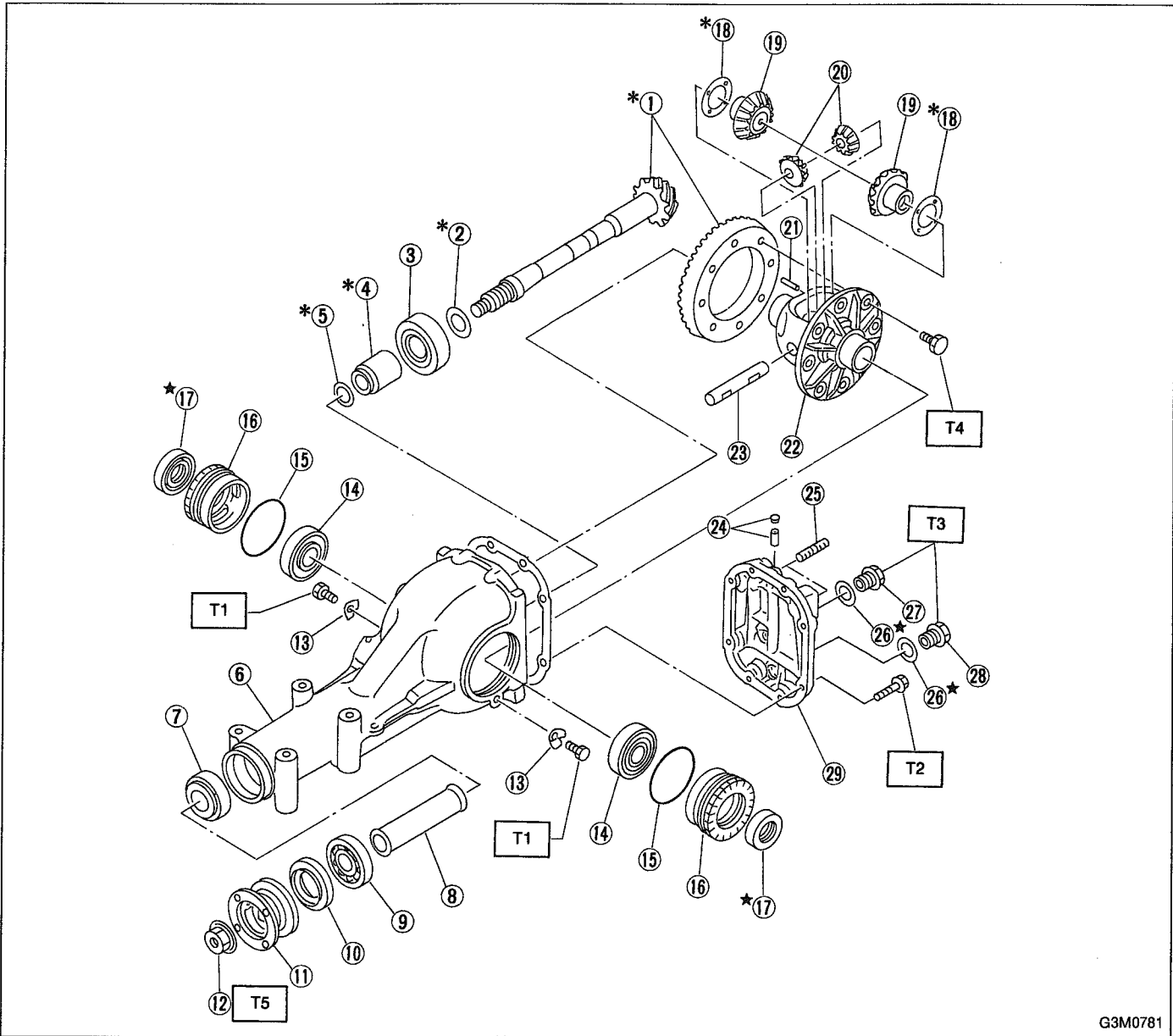
- ① Differential front member
- ② Plate
- ③ Crossmember
- ④ Rear bushing
- ⑤ Differential mount lower bracket
- ⑥ Stopper
- ⑦ Front bushing
- ⑧ Differential mount bracket
- ⑨ Differential mount front cover

Tightening torque: N·m (kg·m, ft·lb)

- T1: 32 ± 8 (3.3 ± 0.8, 23.9 ± 5.8)**
- T2: 64 ± 8 (6.5 ± 0.8, 47.0 ± 5.8)**
- T3: 69 ± 8 (7.0 ± 0.8, 50.6 ± 5.8)**
- T4: 69 ± 10 (7.0 ± 1.0, 51.0 ± 7.2)**
- T5: 88 ± 10 (9.0 ± 1.0, 65.0 ± 7.2)**
- T6: 98 ± 10 (10.0 ± 1.0, 72.0 ± 7.2)**

3. Rear Differential Assembly

A: VA-TYPE



G3M0781

- 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 (kg-m, ft-lb)

T1: 25 ± 3 (2.5 ± 0.3, 18.1 ± 2.2)

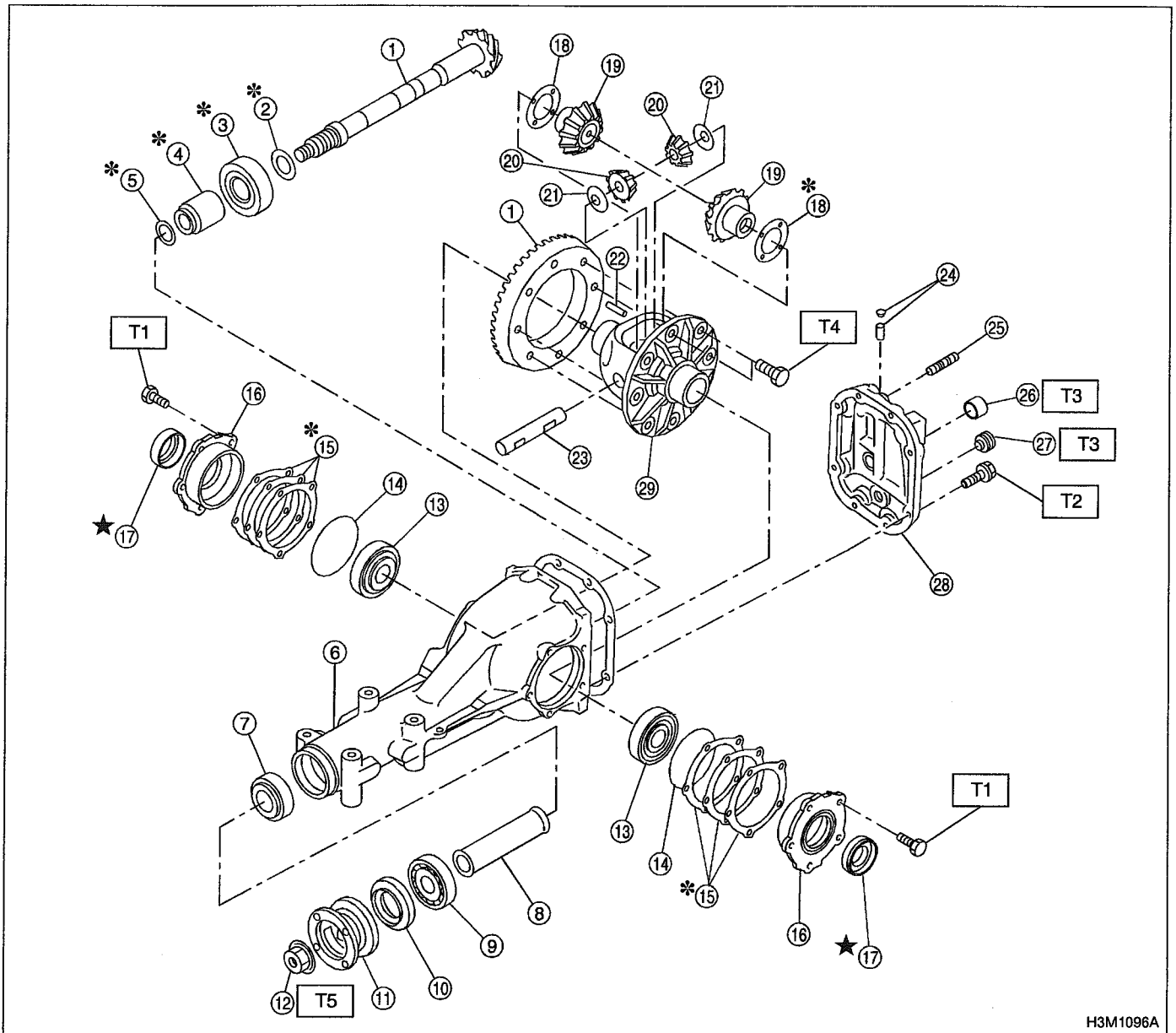
T2: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)

T3: 34 ± 4 (3.5 ± 0.4, 25.3 ± 2.9)

T4: 62 ± 5 (6.3 ± 0.5, 45.6 ± 3.6)

T5: 188 ± 26 (19.2 ± 2.7, 139 ± 20)

B: T-TYPE



H3M1096A

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

Tightening torque: N·m (kg·m, ft·lb)

- T1: 10.3 ± 1.5**
 (1.05 ± 0.15, 7.6 ± 1.1)
- T2: 29.4 ± 4.9**
 (3.00 ± 0.50, 21.7 ± 3.6)
- T3: 44.1 ± 3.9**
 (4.50 ± 0.40, 32.5 ± 2.9)
- T4: 103.0 ± 9.8**
 (10.50 ± 1.00, 75.9 ± 7.2)
- T5: 181.4 ± 14.7**
 (18.50 ± 1.50, 133.8 ± 10.8)

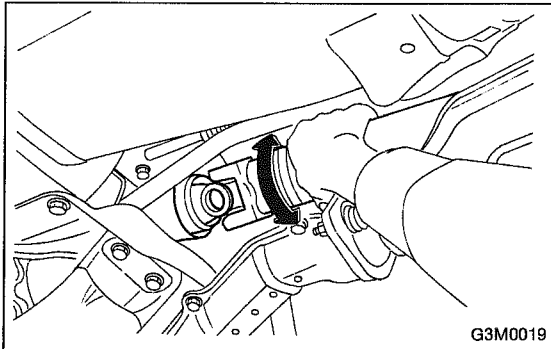
1. Propeller Shaft

A: ON-CAR SERVICE

Check the following points with propeller shaft installed in vehicle.

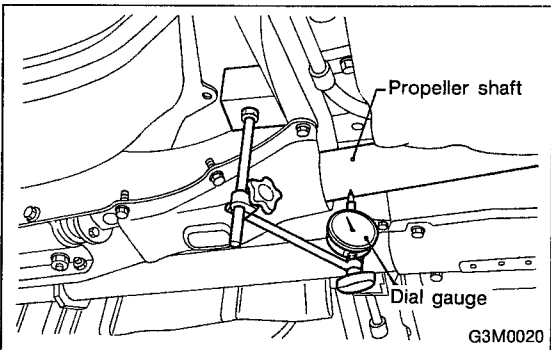
1) Joints and connections

Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.



2) Splines and bearing locations

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

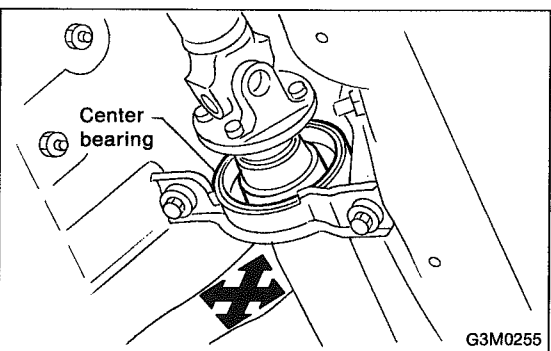
Turn rear wheels by hand to check for "runout" of propeller shaft.

Runout:

Limit 0.6 mm (0.024 in)

NOTE:

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



4) Center bearing free play

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.

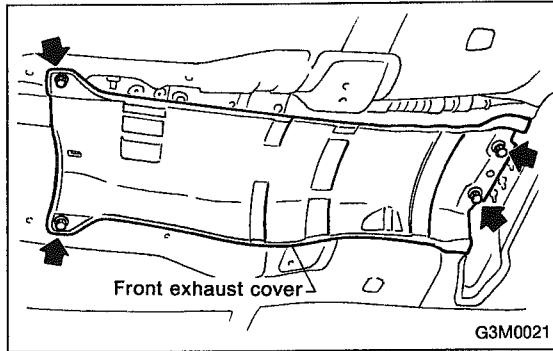
B: REMOVAL

NOTE:

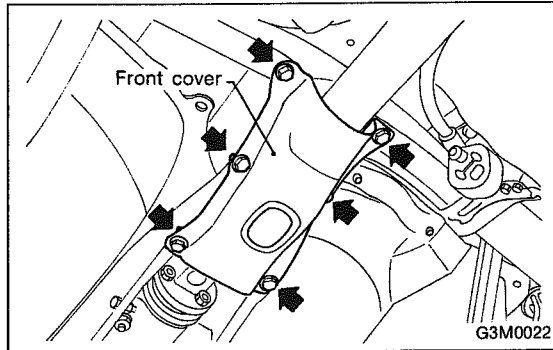
Before removing propeller shaft, wrap metal parts with a cloth or rubber material.

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Jack-up vehicle and support it with sturdy racks.
- 5) Remove rear exhaust pipe and muffler.

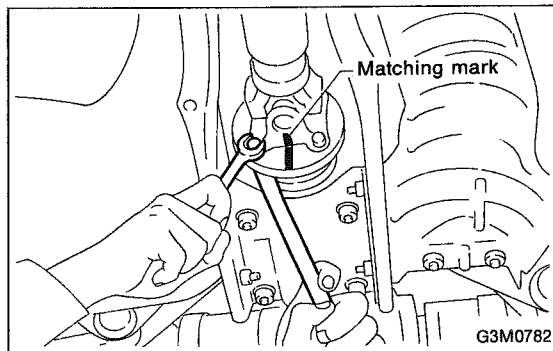
<Ref. to 2-9 [W2A0], [W3A0].>



6) Remove front exhaust cover.



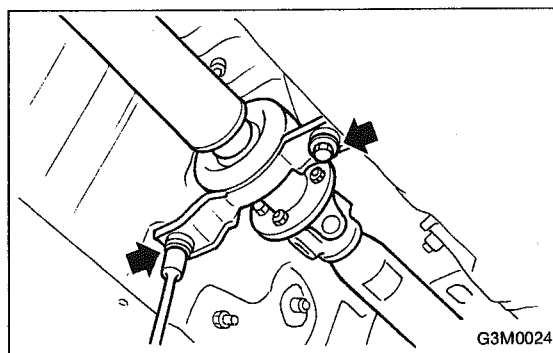
7) Remove differential mount front cover.



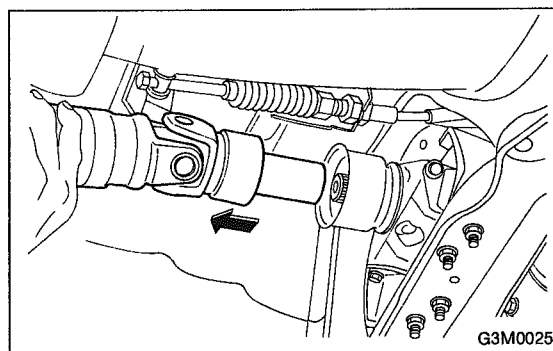
8) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:

- Put matching mark on affected parts before removal.
- Remove all but one bolt.



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



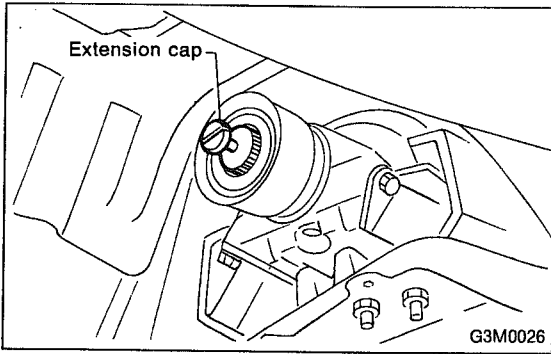
10) Remove propeller shaft from transmission.

CAUTION:

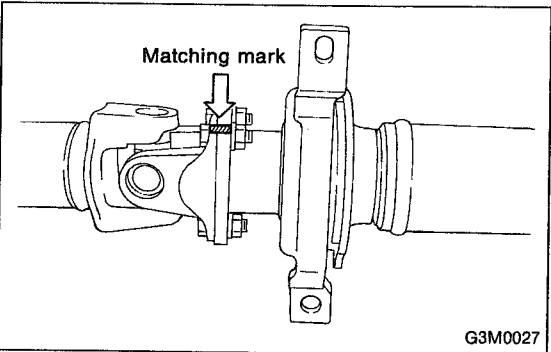
Be sure not to damage oil seals and the frictional surface of sleeve yoke.

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.



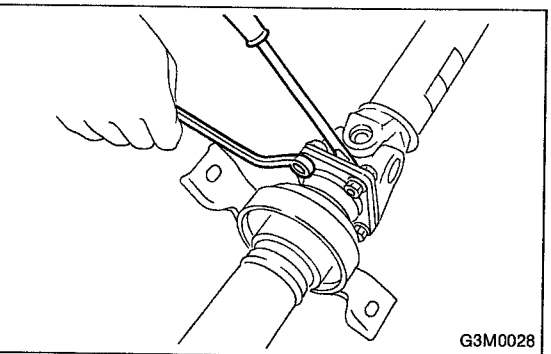
11) Install the extension cap to transmission.



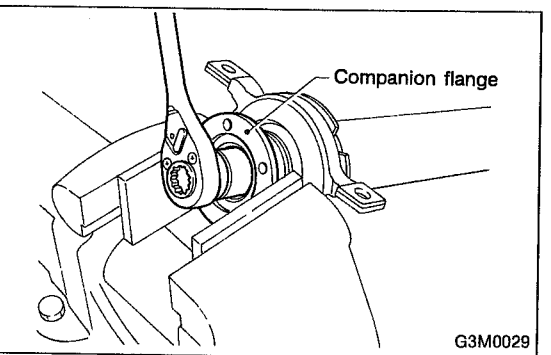
C: DISASSEMBLY

Before removing center bearing, check its condition. If it does not operate smoothly or if there is any free play or leakage, remove as follows:

1) Put matching marks on affected parts.



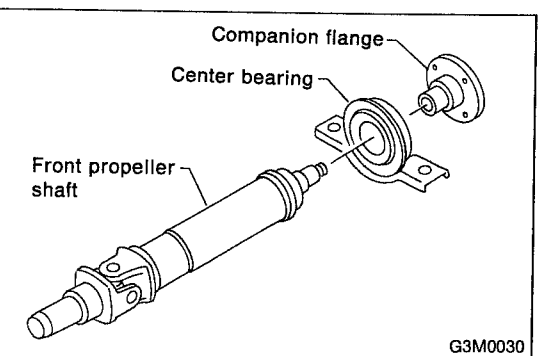
2) Remove bolts which hold front propeller shaft to rear propeller shaft.



3) Place companion flange in a vise and remove stake nut.

CAUTION:

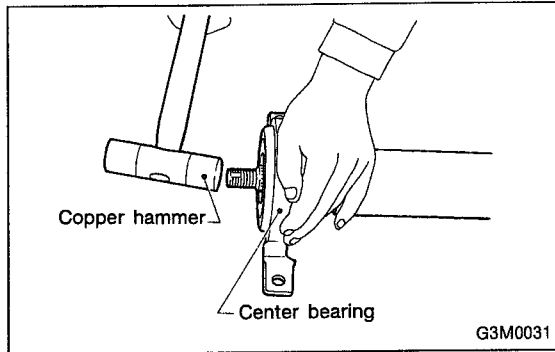
Be sure not to hold propeller shaft pipe portion in the vise.



4) Drive out center bearing with a puller or press.

NOTE:

Before disassembling, put matching mark on affected parts.



5) Lightly tap the head of front propeller shaft with a copper hammer until center bearing is removed.

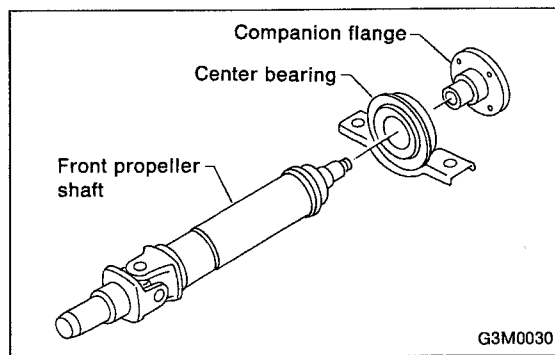
CAUTION:
Be careful not to damage the thread portion.

D: INSPECTION

NOTE:

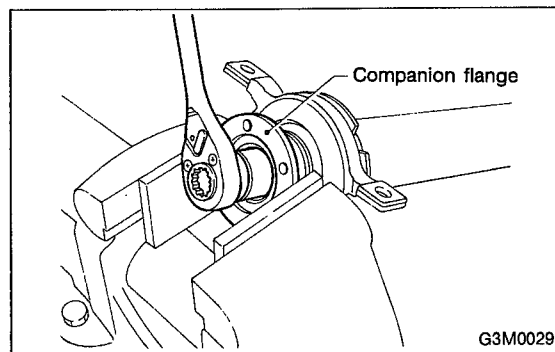
Do not disassemble propeller shaft. Check the following and replace if necessary.

- 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



E: ASSEMBLY

- 1) Install center bearing onto front propeller shaft.
- 2) Align marks and install companion flange.



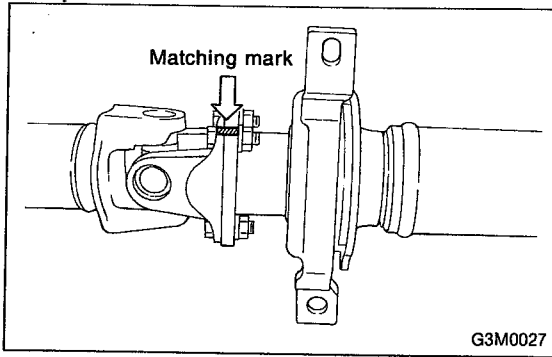
- 3) Tighten stake nut until center bearing is set in position.

CAUTION:
Be sure to install new stake nut.

Tightening torque:
270 ± 25 N·m (27.5 ± 2.5 kg-m, 199 ± 18 ft-lb)

NOTE:

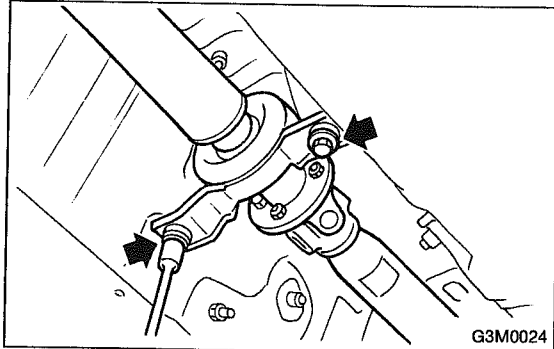
Stake the nut after tightening.



4) Align matching marks and connect front and rear propeller shafts.

Tightening torque:

$27.9 \pm 4.4 \text{ N}\cdot\text{m}$ ($2.85 \pm 0.45 \text{ kg}\cdot\text{m}$, $20.6 \pm 3.3 \text{ ft}\cdot\text{lb}$)

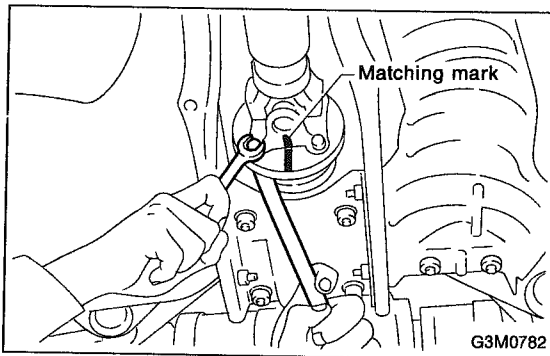


F: INSTALLATION

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

Tightening torque:

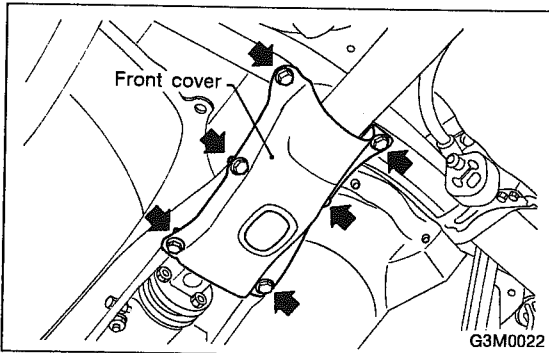
$52 \pm 5 \text{ N}\cdot\text{m}$ ($5.3 \pm 0.5 \text{ kg}\cdot\text{m}$, $38.3 \pm 3.6 \text{ ft}\cdot\text{lb}$)



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

Tightening torque:

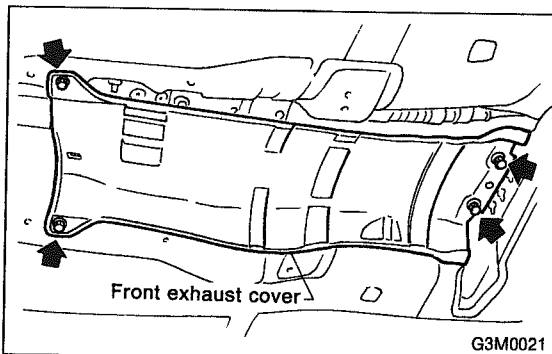
$31 \pm 8 \text{ N}\cdot\text{m}$ ($3.2 \pm 0.8 \text{ kg}\cdot\text{m}$, $23.1 \pm 5.8 \text{ ft}\cdot\text{lb}$)



3) Install differential mount front cover.

Tightening torque:

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



4) Install front exhaust cover.

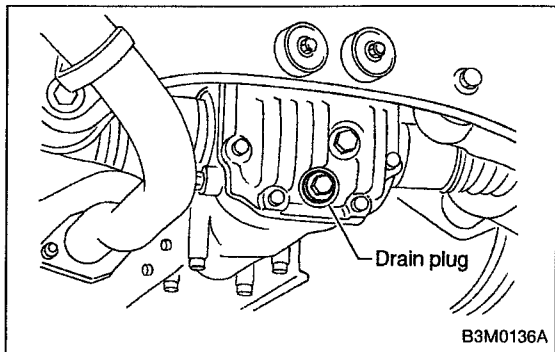
5) Install rear exhaust pipe and muffler.

2. Rear Differential (VA-Type)

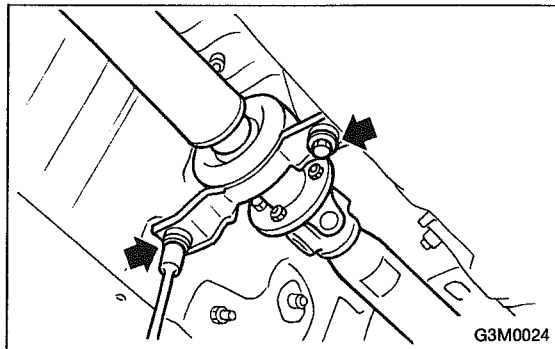
A: ON-CAR SERVICE

1. FRONT OIL SEAL

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.



- 4) Remove oil drain plug, and drain gear oil.

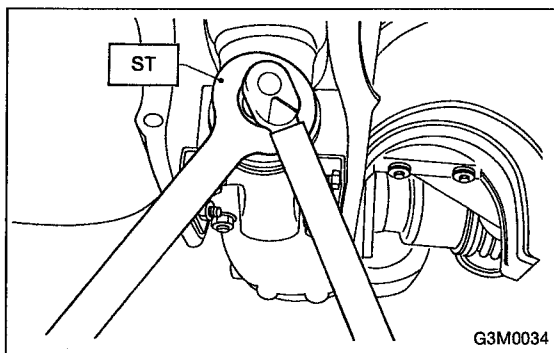


- 5) Jack-up rear wheels and support the vehicle body with sturdy racks.

- 6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

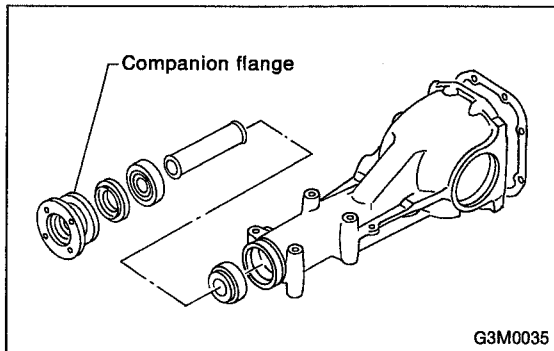
CAUTION:

Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.



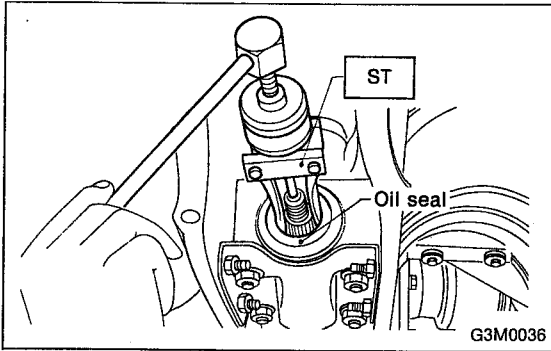
- 7) Remove self-locking nut while holding companion flange with ST.

ST 498427200 FLANGE WRENCH

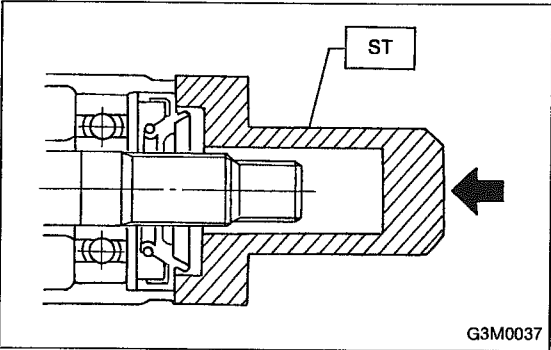


- 8) Extract companion flange with a puller.

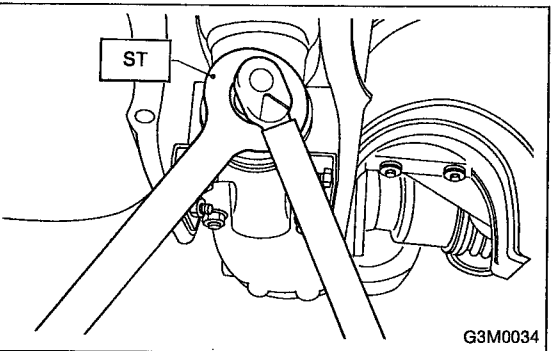
2. Rear Differential (VA-Type)



- 9) Remove oil seal using ST.
ST 398527700 PULLER ASSY



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



- 11) Install companion flange.
12) 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.

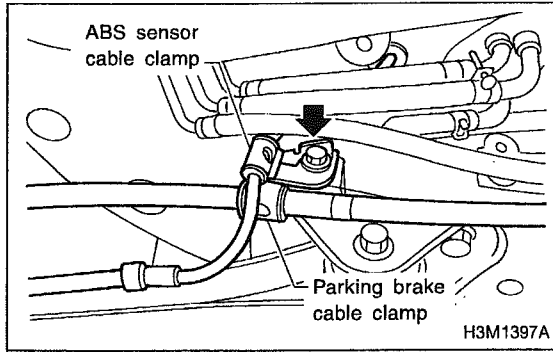
Tightening torque:

$188 \pm 26 \text{ N}\cdot\text{m}$ ($19.2 \pm 2.7 \text{ kg}\cdot\text{m}$, $139 \pm 20 \text{ ft}\cdot\text{lb}$)

- 13) Reassembling procedure hereafter is the reverse of the disassembling.

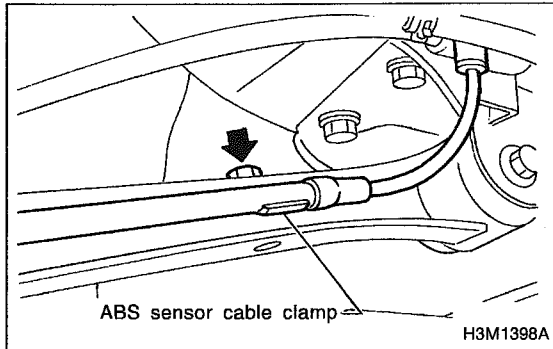
2. SIDE OIL SEAL

- 1) Disconnect ground cable from battery.
 - 2) Move selector lever or gear shift lever to "N".
 - 3) Release the parking brake.
 - 4) Loosen both wheel nuts.
 - 5) Jack-up the vehicle and support it with rigid racks.
 - 6) Remove wheels.
 - 7) Remove rear exhaust pipe and muffler.
- <Ref. to 2-9 [W2A0], [W3A0].>

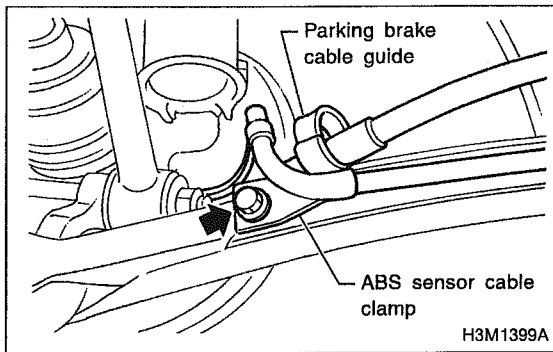


8) Remove the DOJ of rear drive shaft from rear differential.

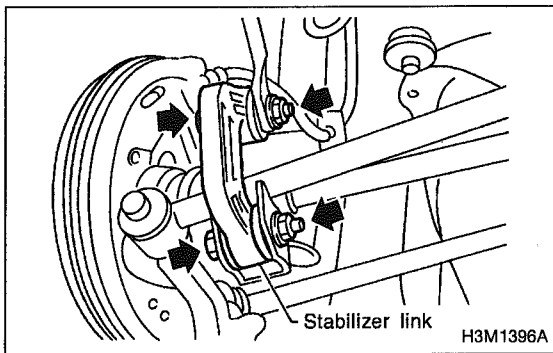
(1) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.



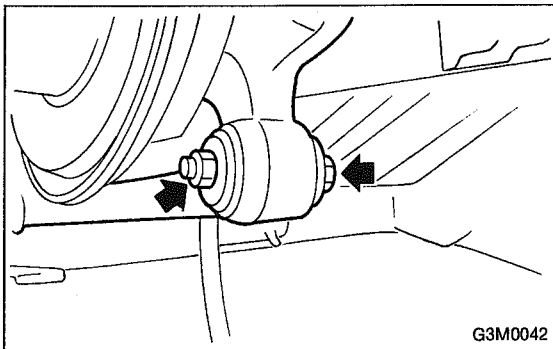
(2) Remove the ABS sensor cable clamp from the trailing link.



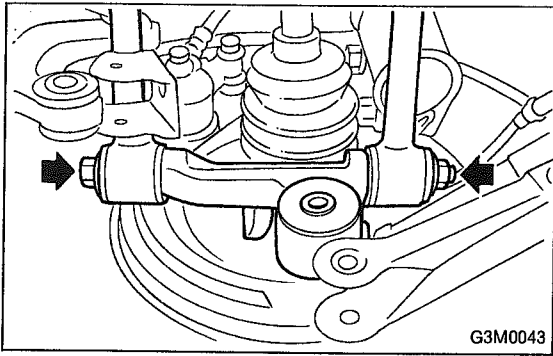
(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



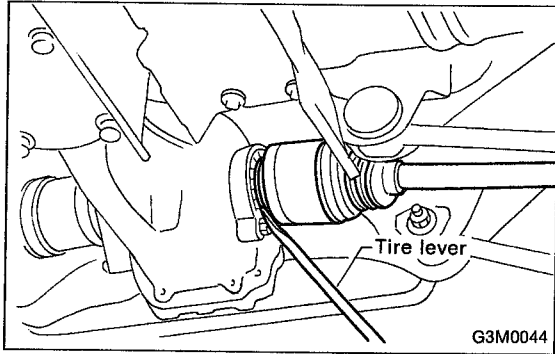
(4) Remove the rear stabilizer link.



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



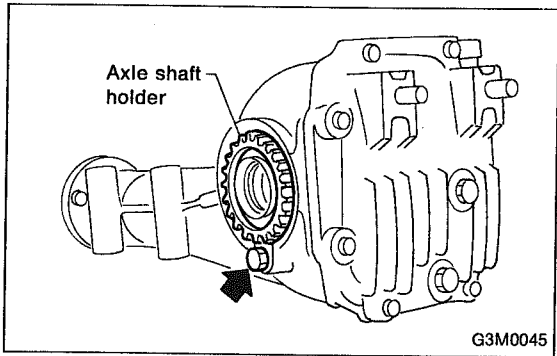
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



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

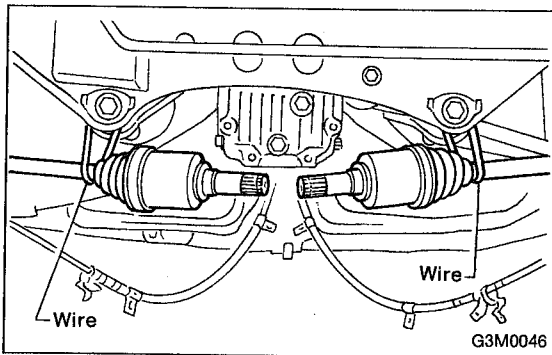
NOTE:

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

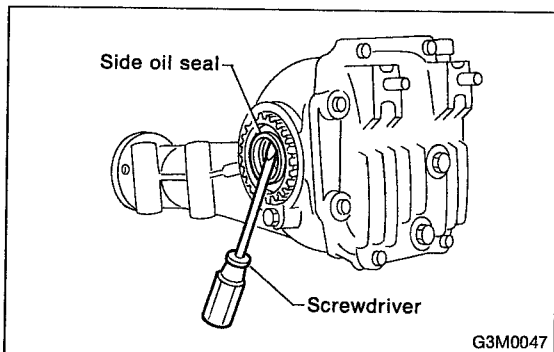


CAUTION:

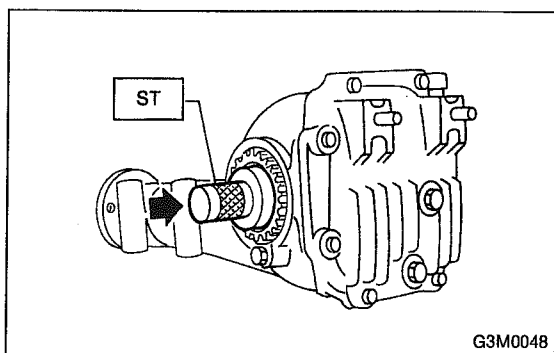
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



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



10) Remove oil seal with screwdriver.

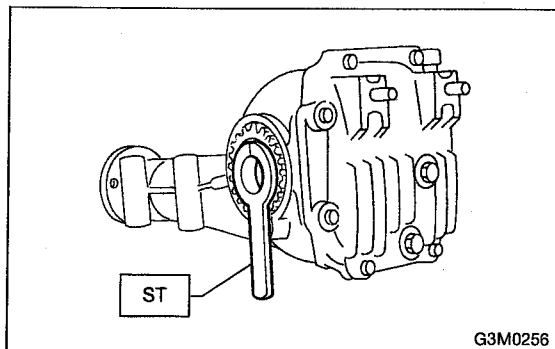


11) Drive in a new side oil seal with ST.

CAUTION:

Apply chassis grease between the oil seal lips.

ST 498447100 OIL SEAL INSTALLER



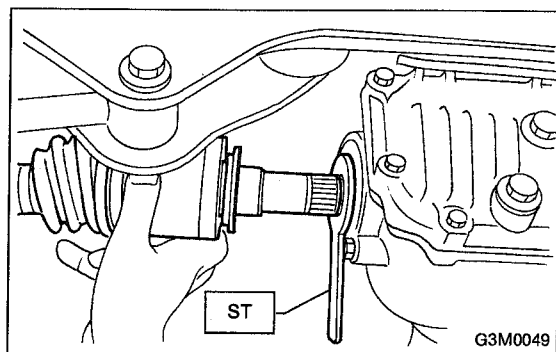
12) Insert the DOJ into rear differential.

CAUTION:

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

(1) Install ST to rear differential.

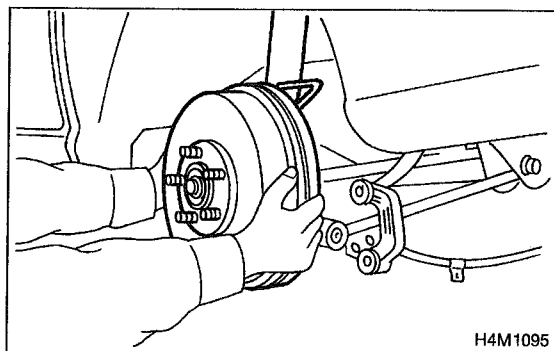
ST 28099PA090 SIDE OIL SEAL PROTECTOR



(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.

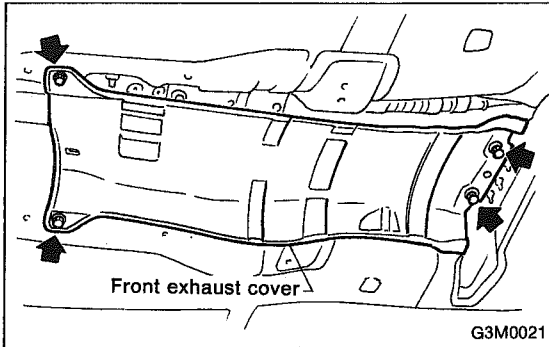
NOTE:

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

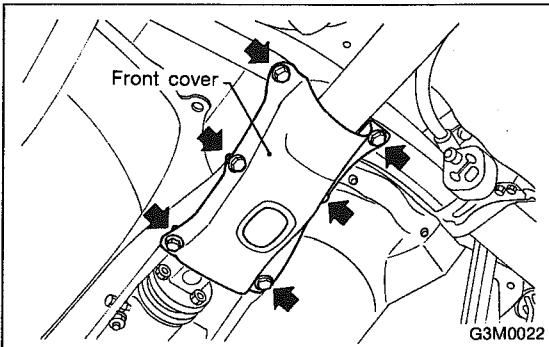
13) Hereafter, re-assemble in reverse order of disassembly.

B: REMOVAL

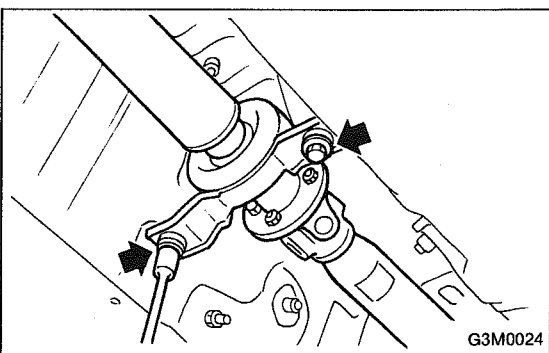
- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0], [W3A0].>



- 8) Remove front exhaust cover.



- 9) Remove front cover of rear differential mount.



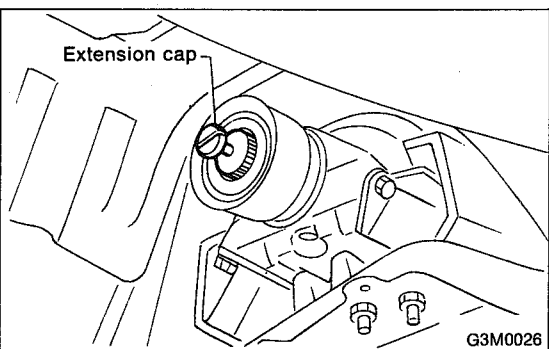
- 10) Remove propeller shaft.

CAUTION:

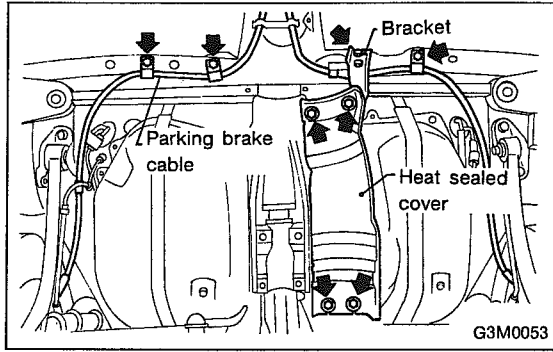
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

NOTE:

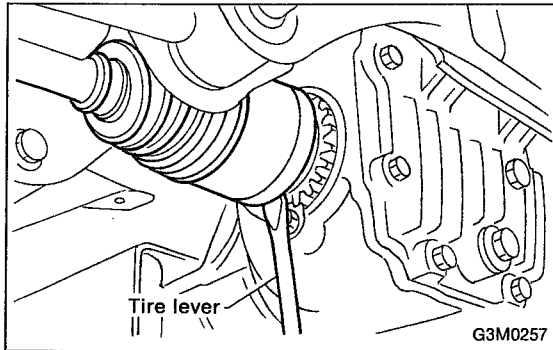
Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.

**NOTE:**

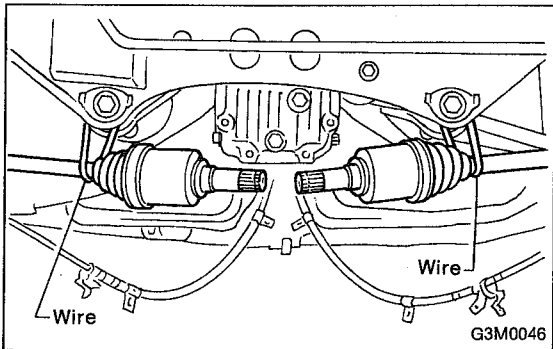
Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



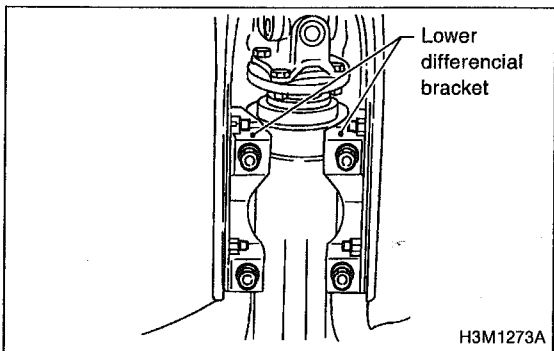
- 11) Remove heat sealed cover.
- 12) Remove clamps and bracket of parking brake cable.



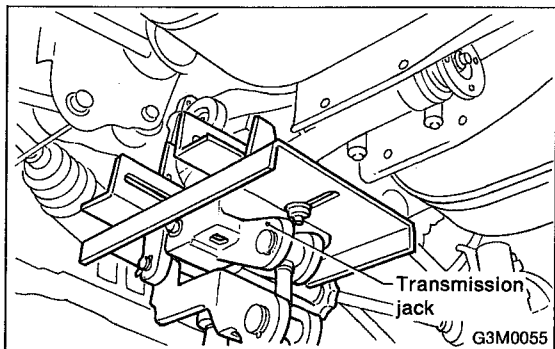
- 13) Remove DOJ of rear drive shaft from rear differential.
<Ref. to 3-4 [W2A2].>



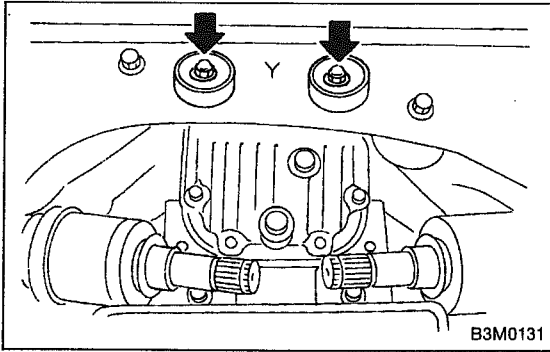
- 14) Secure rear drive shaft to rear crossmember using wire.



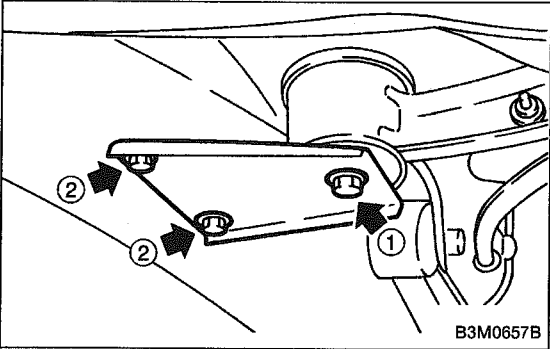
- 15) Remove lower differential bracket.



- 16) Support rear differential with transmission jack.



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

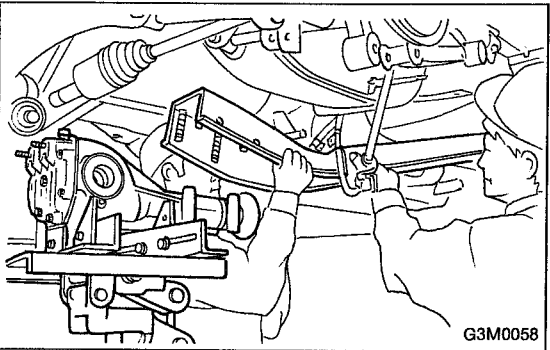


18) Remove bolts which secure rear differential front member to body.

Loosen bolt ① first, then removal bolts ② .

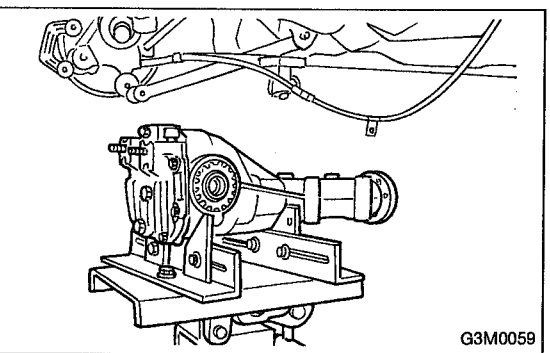
NOTE:

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



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

20) Remove front member from body.

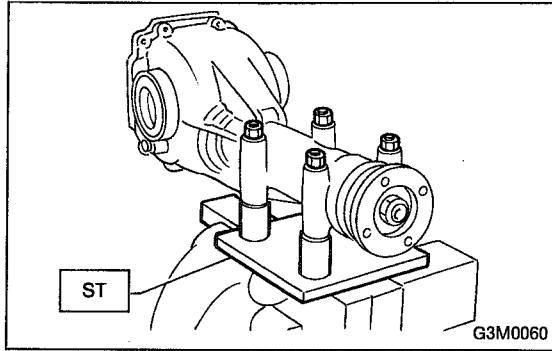


21) Remove rear differential from body.

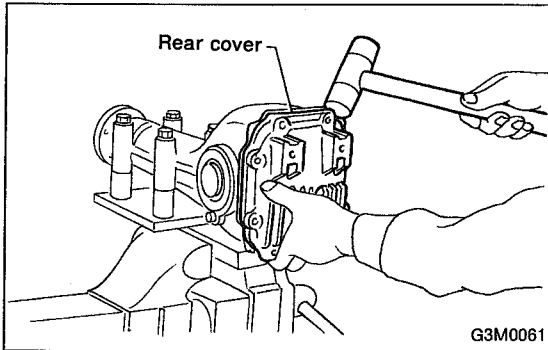
C: DISASSEMBLY

To detect real cause of trouble, inspect the following items before disassembling. <Ref. to 3-4 [W2E0].>

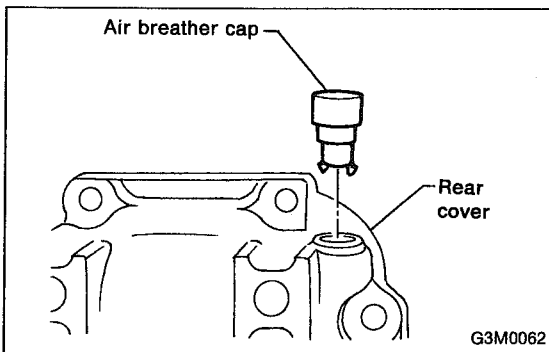
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion



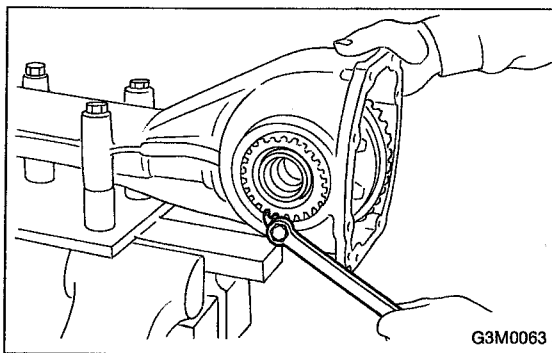
- 1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT
- 2) Drain gear oil by removing plug.



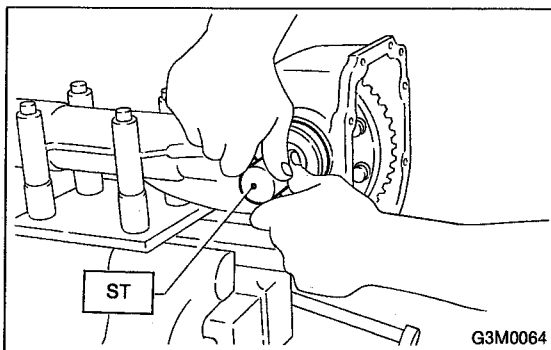
- 3) Remove rear cover by loosening retaining bolts.



- 4) Replace air breather cap.
NOTE:
Do not attempt to replace the air breather cap unless necessary.

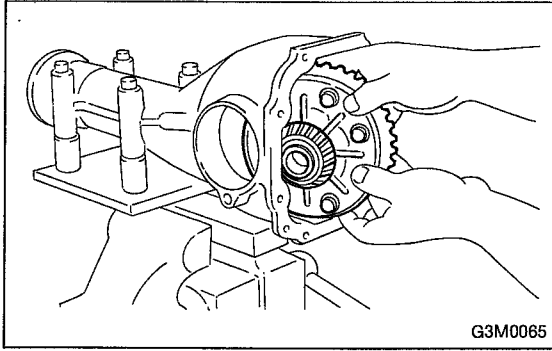


- 5) Remove right and left lock plates.



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

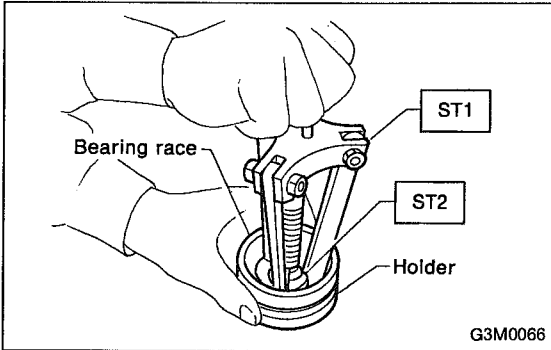
2. Rear Differential (VA-Type)



7) Pull out differential assembly from differential carrier.

CAUTION:

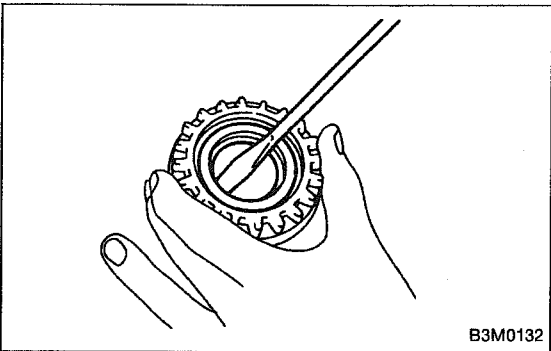
Be careful not to hit the teeth against the case.



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

ST1 499705401 BEARING OUTER RACE PULLER ASSY

ST2 499705404 OUTER RACE PULLER SEAT

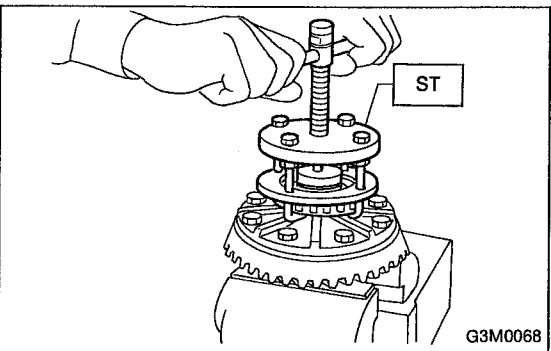


9) Remove oil seal from right and left holders with screwdriver.

CAUTION:

Perform this operation only when changing oil seal.

ST 899580100 INSTALLER



10) Extract bearing cone with ST.

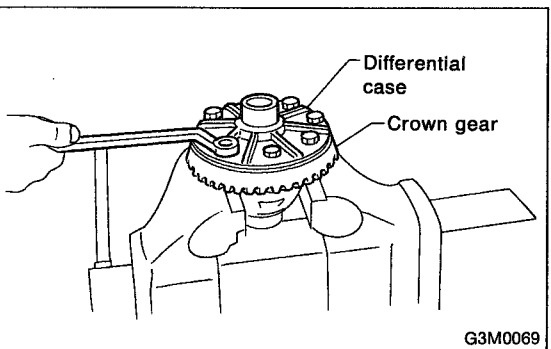
CAUTION:

Do not attempt to disassemble the parts unless necessary.

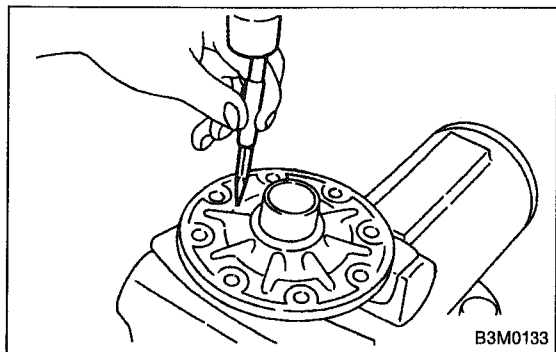
NOTE:

- Set Puller so that its claws catch the edge of the bearing cone.
- Never mix up the right and left hand bearing cups and cones.

ST 899524100 PULLER SET



11) Remove crown gear by loosening crown gear bolts.

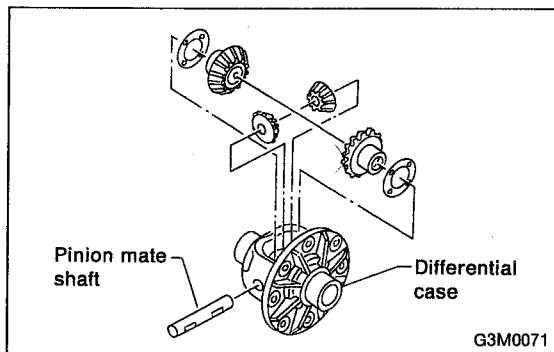


12) Drive out pinion shaft lock pin from crown gear side.

NOTE:

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

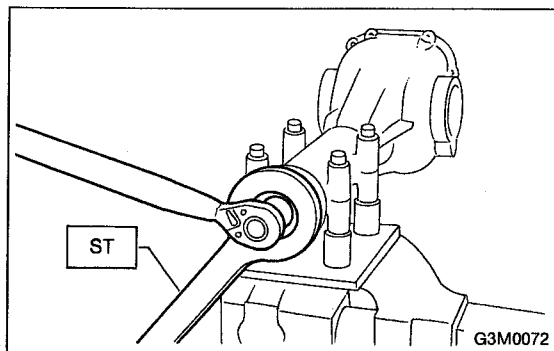
ST 899904100 STRAIGHT PIN REMOVER



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

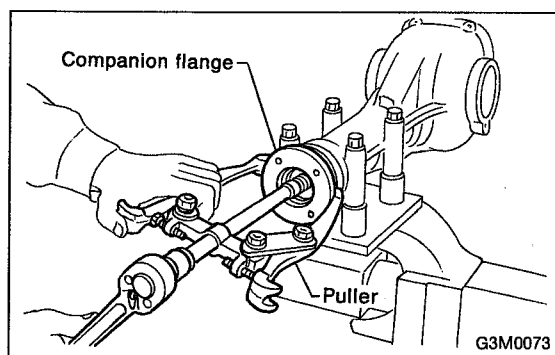
NOTE:

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

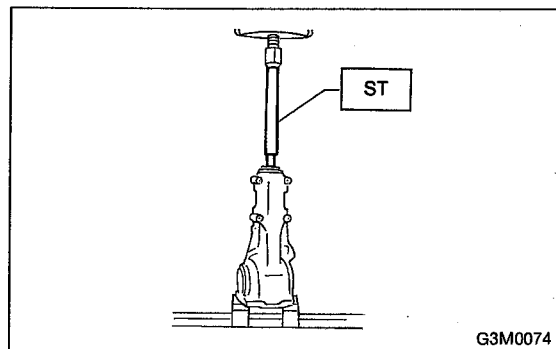


14) Hold companion flange with ST and remove drive pinion nut.

ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.



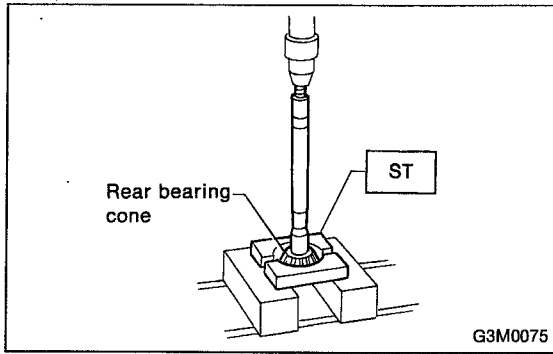
16) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

2. Rear Differential (VA-Type)

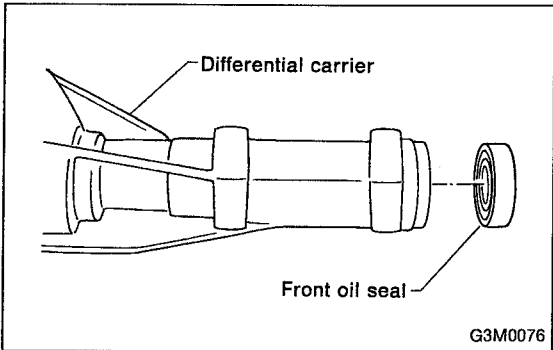


17) Remove rear bearing cone from drive pinion by supporting cone with ST.

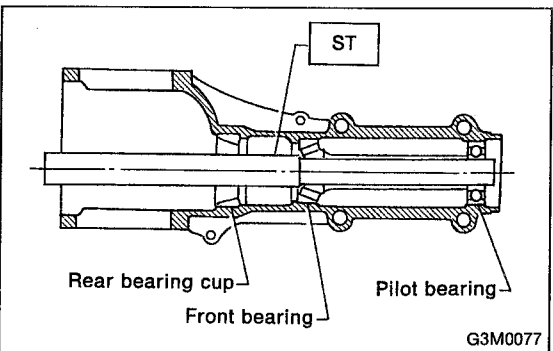
NOTE:

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

ST 498515500 REPLACER

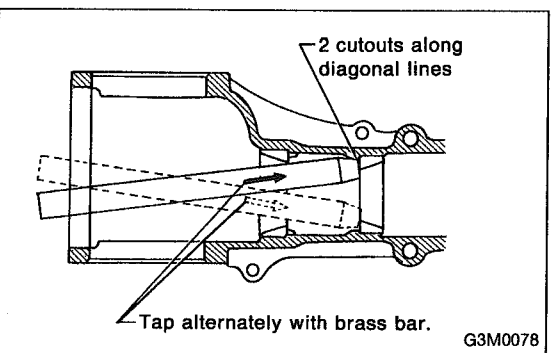


18) Remove front oil seal from differential carrier.



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

ST 398467700 DRIFT



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

D: INSPECTION

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

1) Crown gear and drive pinion

(1) 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.

(2) 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

(1) Replace if crack, score, or other defects are evident on tooth surface.

(2) 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.

E: ASSEMBLY

1) Precautions for assembling

(1) Assemble in the reverse order of disassembling.

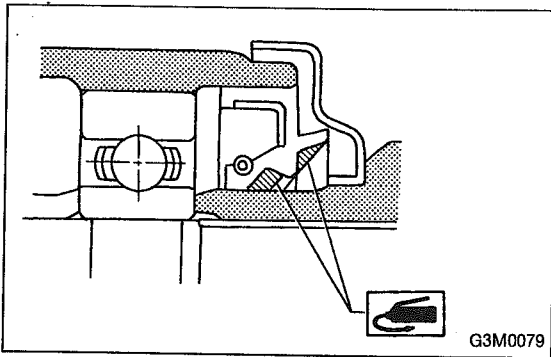
(2) Check and adjust each part during assembly.

(3) Keep the shims and washers in order, so that they are not misinstalled.

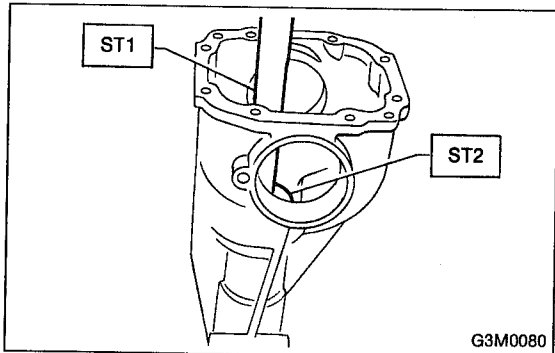
(4) Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.

(5) Apply gear oil when installing the bearings and thrust washers.

(6) Be careful not to mix up the right and left hand cups of the bearings.



(7) 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.

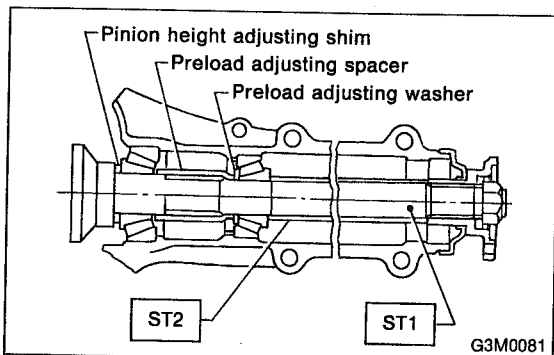
ST1 398477701 HANDLE

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:

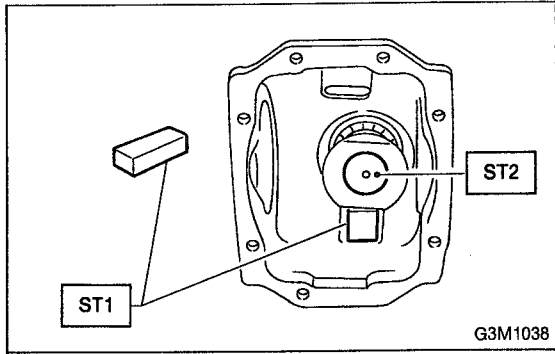
● **Re-use the used washer if not deformed.**

● **Use a new rear bearing cone.**

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

ST1 498447150 DUMMY SHAFT

ST2 32285AA000 DUMMY COLLAR



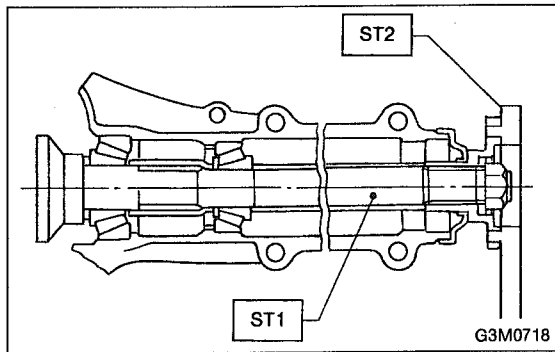
(6) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

- ST1 398507704 BLOCK
- ST2 498447150 DUMMY SHAFT

CAUTION:
Use a new lock nut.

NOTE:

- Be careful not to give excessive preload.

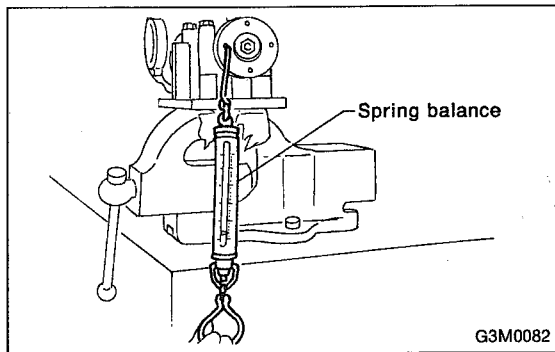


- When tightening the drive pinion nut, lock ST1 with ST2 as illustrated here.

- ST1 498447150 DUMMY SHAFT
- ST2 398427700 FLANGE WRENCH

Tightening torque:

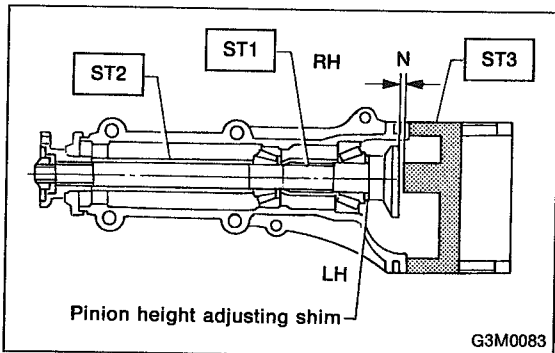
188 ± 26 N·m (19.2 ± 2.7 kg·m, 139 ± 20 ft·lb)



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

2. Rear Differential (VA-Type)

	Part No.	Length mm (in)
● Preload adjusting washer length	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
38336AA100	1.750 (0.0689)	
38336AA220	1.763 (0.0694)	
38336AA110	1.775 (0.0699)	
● Preload adjusting spacer length	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.

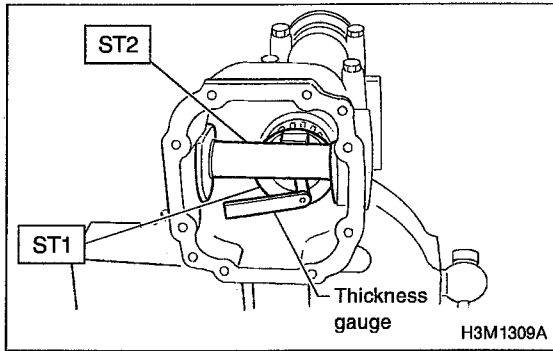
Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kg, 2.9 — 7.3 lb) at companion flange bolt hole

Adjust preload for front and rear bearings.

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

NOTE:

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



(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 ST3.

- ST1 498447150 DUMMY SHAFT
- ST2 498505501 DIFFERENTIAL CARRIER GAUGE

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

NOTE:

Use 1 to 3 shims as required for adjustment.

$$T = T_o + N - 0.35 \text{ (mm)}$$

where

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

(Example of calculation)

T_o = 0.15 mm

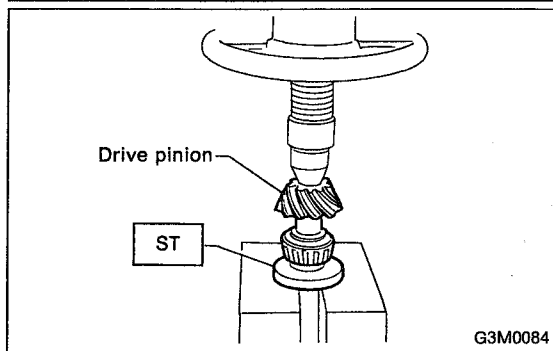
N = 0.4 mm

$$T = 0.15 + 0.4 - 0.35 = 0.2 \text{ mm}$$

Result: Thickness = 0.2 mm

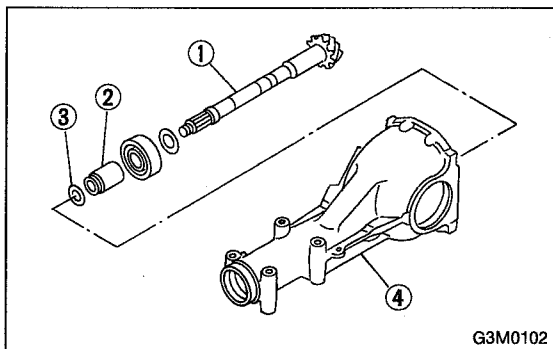
Therefore use the 32295AA220.

● Pinion height adjusting shim thickness	Part No.	Length mm (in)
		32295AA200
	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)



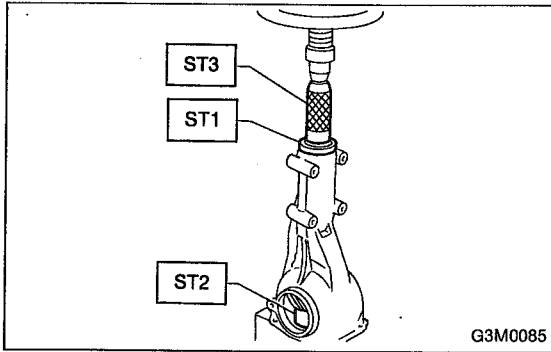
4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

- ST 498175500 INSTALLER



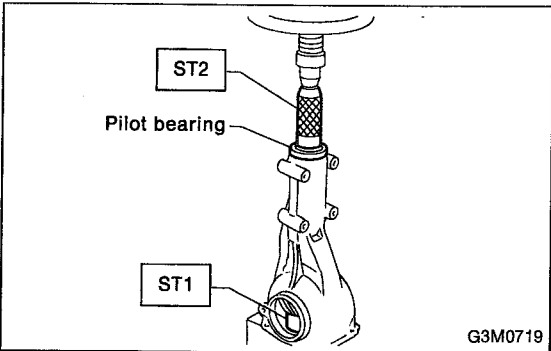
5) Insert drive pinion ① into differential carrier ④, install the previously selected bearing preload adjusting spacer ② and washer ③.

2. Rear Differential (VA-Type)



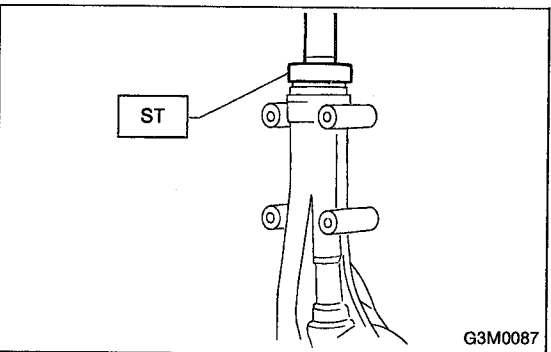
6) Press-fit front bearing cone into case with ST1, ST2 and ST3.

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



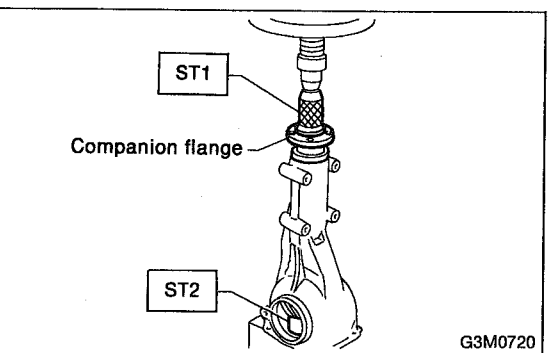
8) Fit a new oil seal with ST.

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

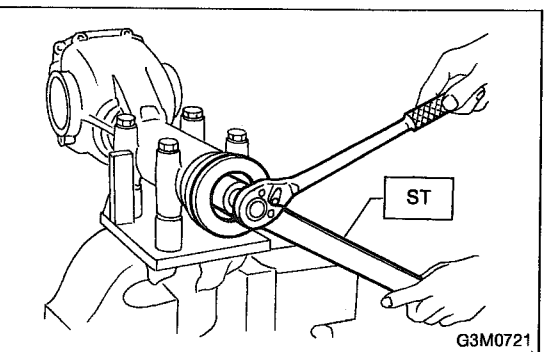


9) Press-fit companion flange with ST1 and ST2.

CAUTION:

Be careful not to damage bearing.

ST1 899874100 INSTALLER
 ST2 399780104 WEIGHT

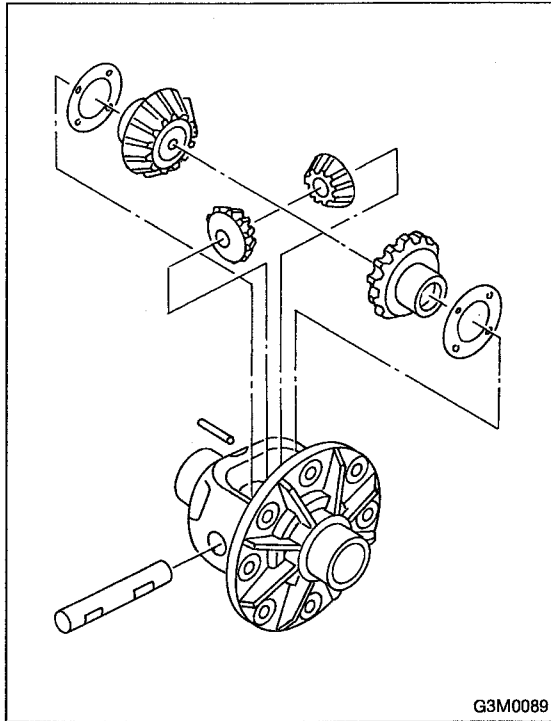


10) Install self-locking nut. Then tighten self-locking nut with ST.

ST 398427700 FLANGE WRENCH

Tightening torque:

188 ± 26 N·m (19.2 ± 2.7 kg·m, 139 ± 20 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 clearance between differential case and the back of side gear.

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

Side gear backlash:

0.05 — 0.15 mm (0.0020 — 0.0059 in)

● Side gear thrust washer thickness	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.

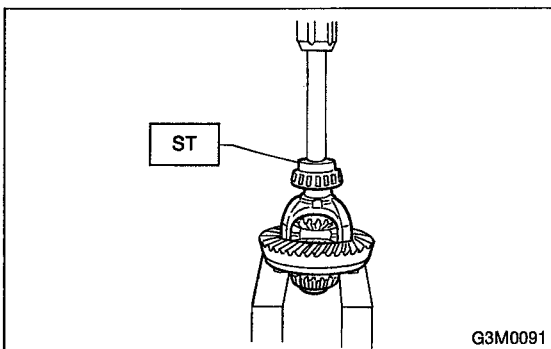
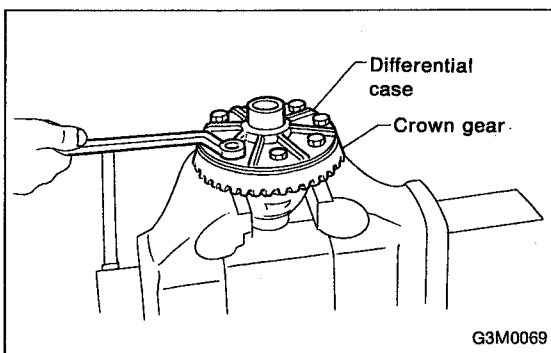
(5) Install crown gear on differential case.

Tightening torque:

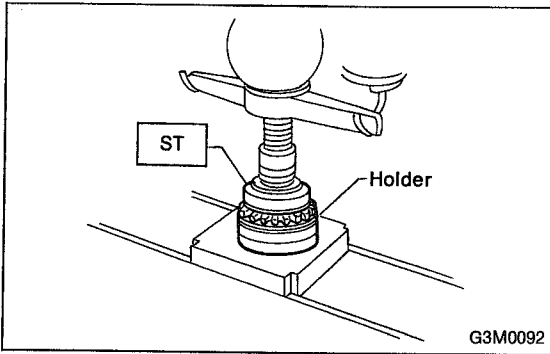
62 ± 5 N·m (6.3 ± 0.5 kg·m, 45.6 ± 3.6 ft·lb)

NOTE:

Tighten diagonally while tapping the bolt heads.



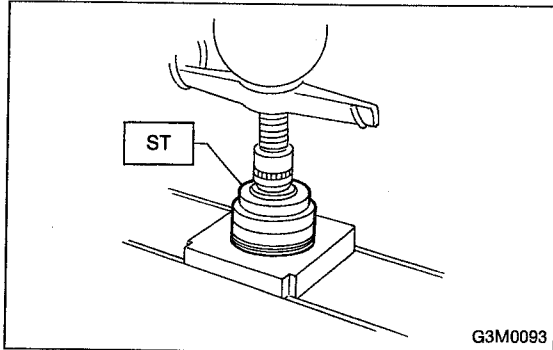
12) Press side bearing cone onto differential case with ST.
ST 498485400 DRIFT



13) Assemble holders.

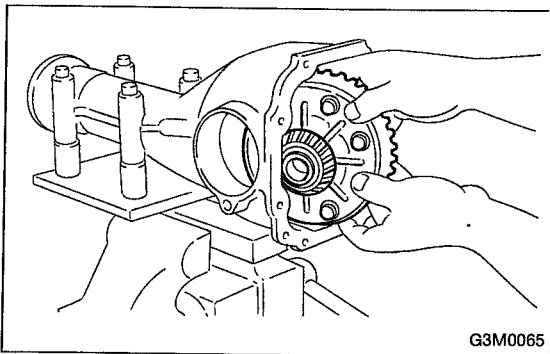
(1) Install oil seal into right and left holders.

ST 498447100 AXLE SHAFT OIL SEAL INSTALLER

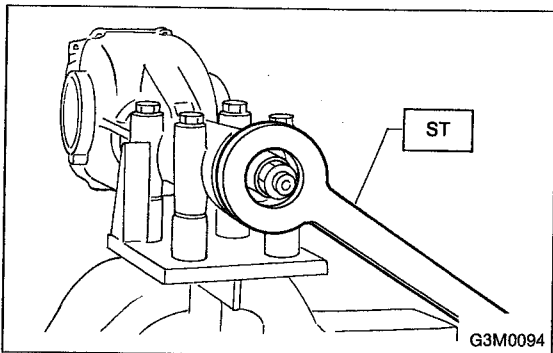


(2) Install bearing race into right and left holders.

ST 398477702 BEARING OUTER RACE DRIFT



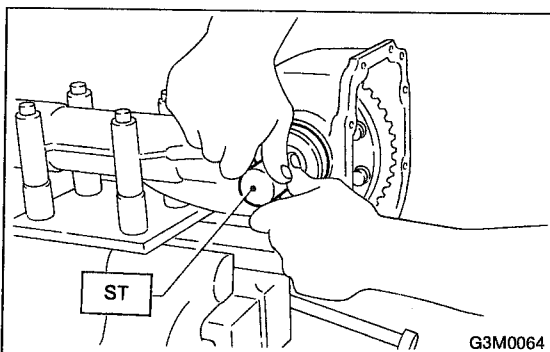
(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.



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

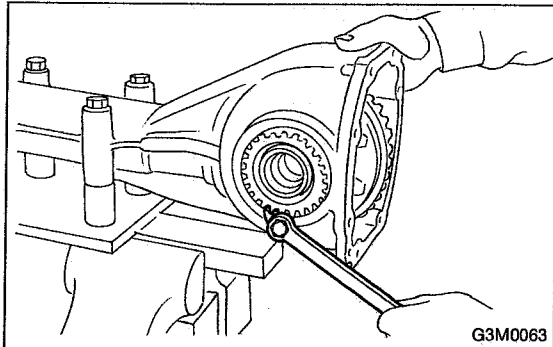


(2) Screw in side (left-side) holder until light contact is made with ST.

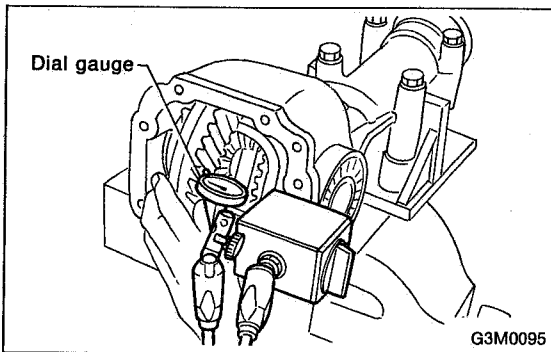
(3) Screw in left-side holder until light contact is made with ST.

ST 399780111 WRENCH

- (4) 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.



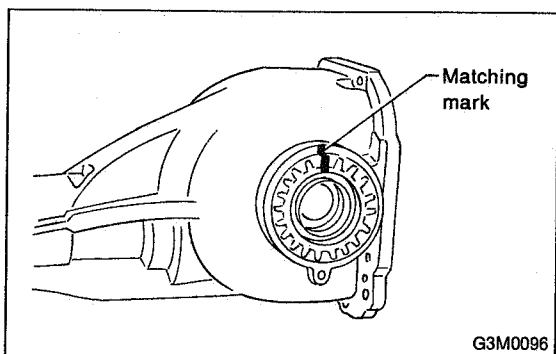
- (5) Temporarily tighten lock plate.
NOTE:
Turn over lock plate to displace holder 1/2 tooth.



- (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.

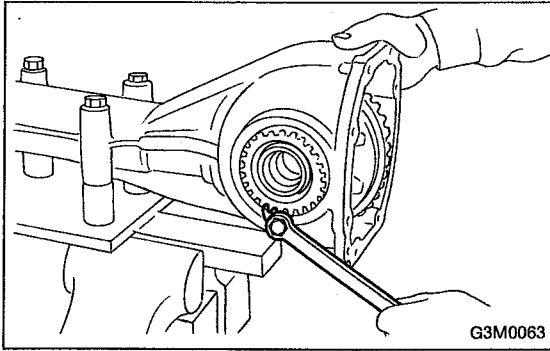
Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

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



- 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.

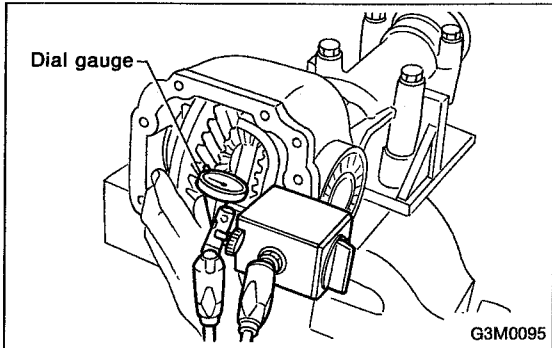
2. Rear Differential (VA-Type)



16) Tighten bolt of lock plate to specified torque.

Tightening torque:

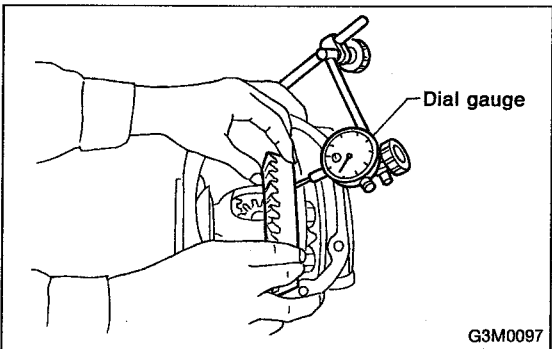
$25 \pm 3 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $18.1 \pm 2.2 \text{ ft}\cdot\text{lb}$)



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

Backlash:

$0.10 - 0.15 \text{ mm}$ ($0.0039 - 0.0059 \text{ in}$)



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.

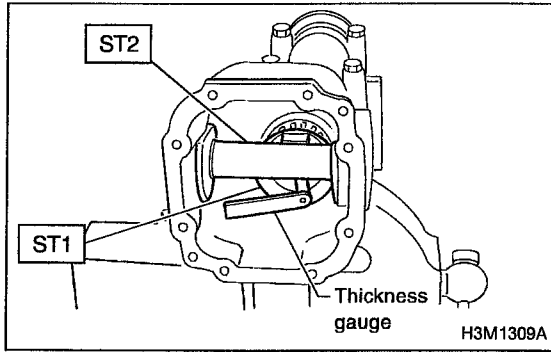
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

(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 (mentioned above) and the hypoid gear backlash.



- (1) Drive pinion height
 ST1 498447150 DUMMY SHAFT
 ST2 498505501 DIFFERENTIAL CARRIER GAUGE

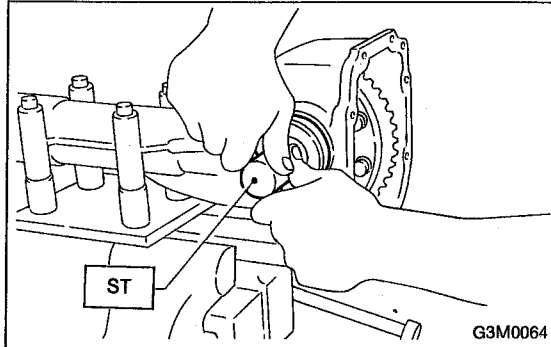
$$T = T_o + N - 0.35 \text{ (mm)}$$

where

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)



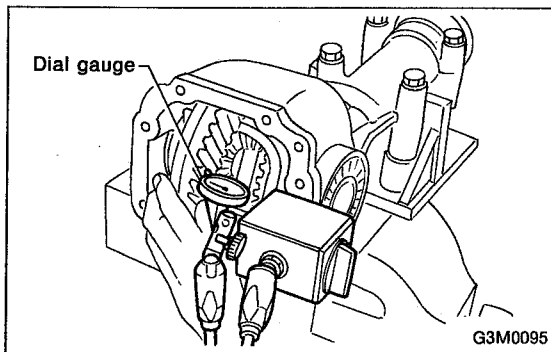
- (2) Differential side bearing preload

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.

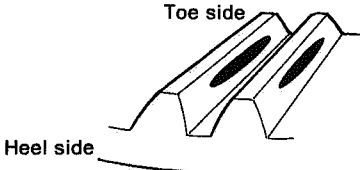
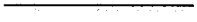
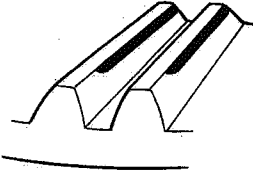
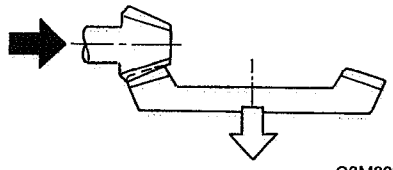
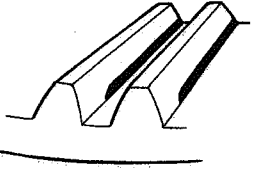
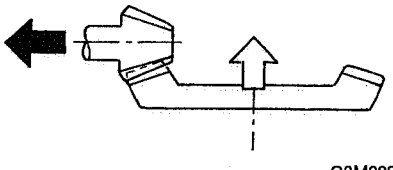
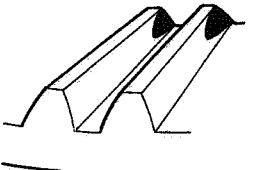
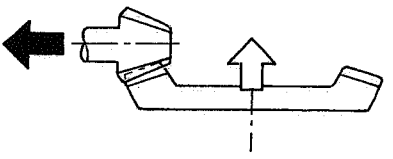
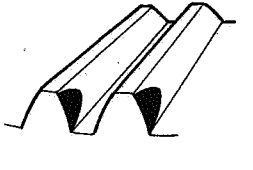
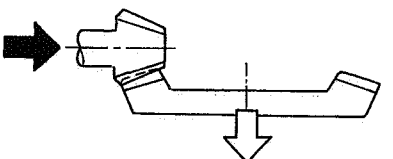
- ST 399780111 WRENCH



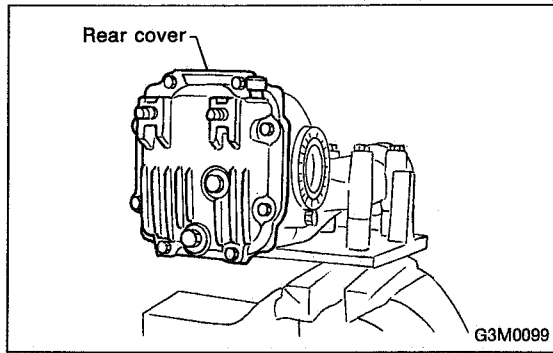
- (3) Hypoid gear backlash

Backlash:

0.10 — 0.15 mm (0.0039 — 0.0059 in)

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

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



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

Tightening torque:

$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

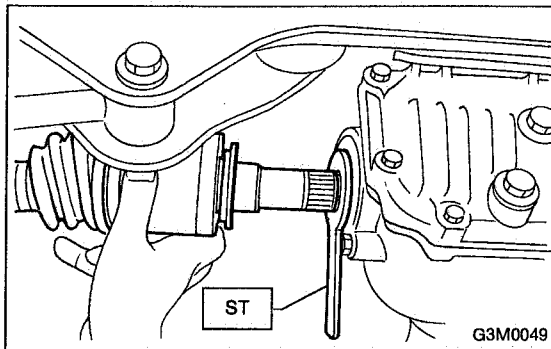
F: INSTALLATION

To install, reverse the removal sequence.

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

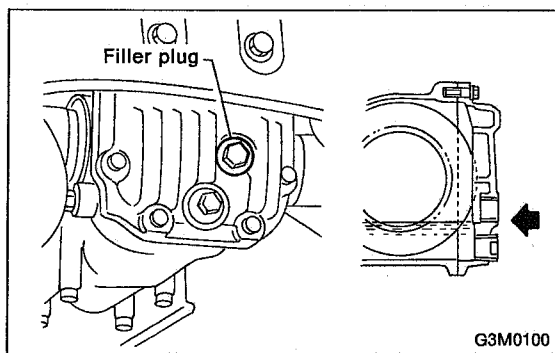
NOTE:

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.
<Ref. to 3-4 [W2A2].>

ST 28099PA090 SIDE OIL SEAL PROTECTOR



3) Installing procedure hereafter is in the reverse order of removal.

4) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:

Use a new aluminum gasket when installing the plug.

Oil capacity:

0.8 l (0.8 US qt , 0.7 Imp qt)

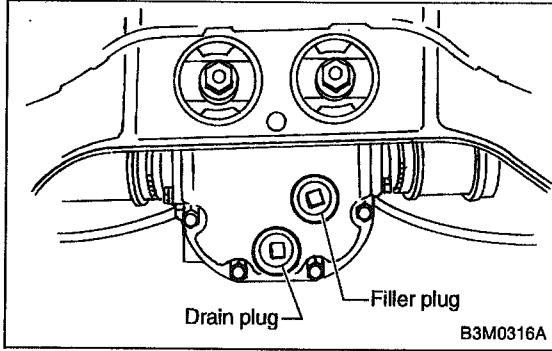
3. Rear Differential (T-Type)

A: ON-CAR SERVICE

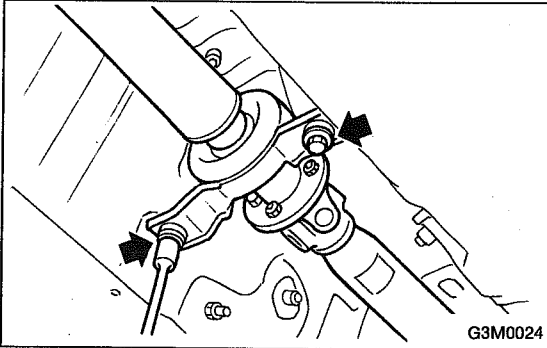
1. FRONT OIL SEAL

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.

3. Rear Differential (T-Type)



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

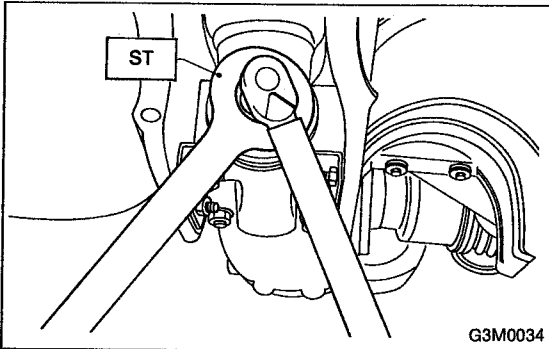


5) Jack-up rear wheels and support the vehicle body with sturdy racks.

6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

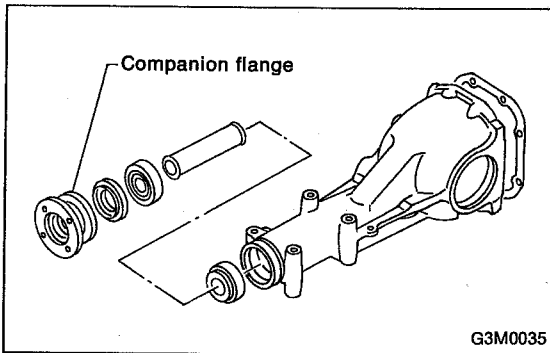
CAUTION:

Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.

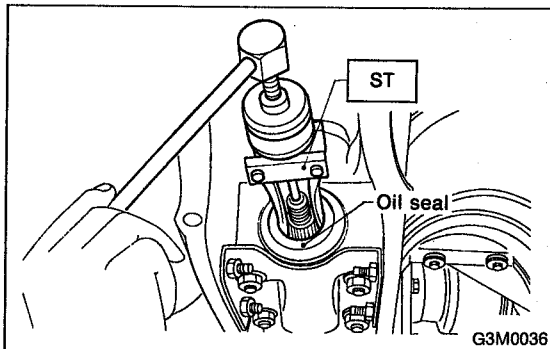


7) Remove self-locking nut while holding companion flange with ST.

ST 498427200 FLANGE WRENCH

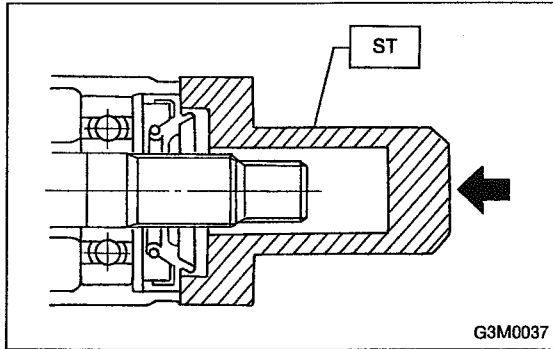


8) Extract companion flange with a puller.

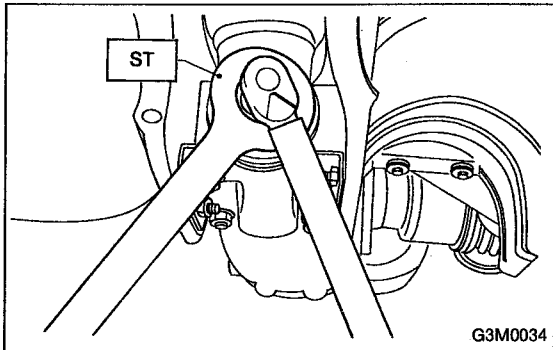


9) Remove oil seal using ST.

ST 499705401 PULLER ASSY



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



- 11) Install companion flange.
 12) 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

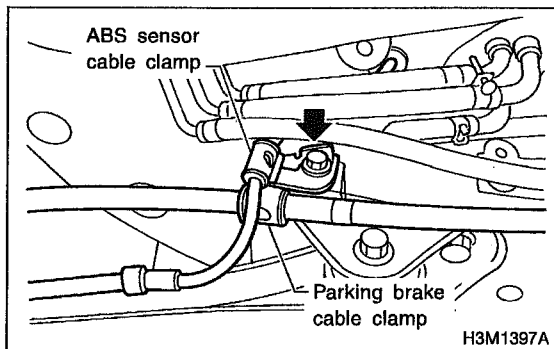
CAUTION:
 Use a new self-locking nut.

Tightening torque:
 $181.4 \pm 14.7 \text{ N}\cdot\text{m}$ ($18.50 \pm 1.50 \text{ kg}\cdot\text{m}$, $133.8 \pm 10.8 \text{ ft}\cdot\text{lb}$)

- 13) Reassembling procedure hereafter is the reverse of the disassembling.

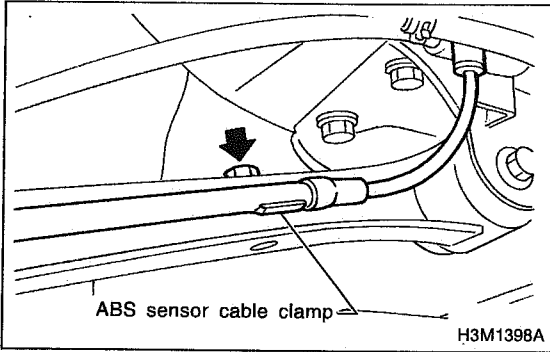
2. SIDE OIL SEAL

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen both wheel nuts.
- 5) Jack-up the vehicle and support it with rigid racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
 < Ref. to 2-9 [W2A0], [W3A0]. >

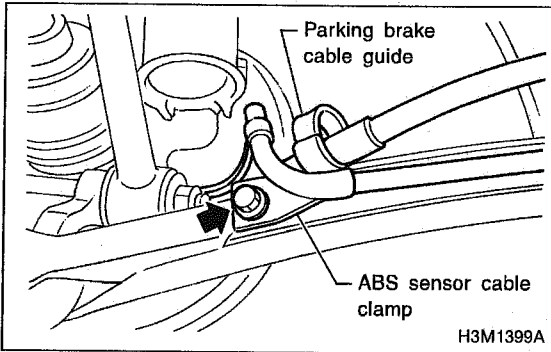


- 8) Remove the DOJ of rear drive shaft from rear differential.
 (1) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.

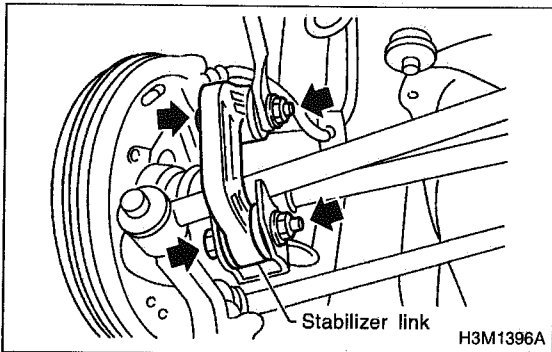
3. Rear Differential (T-Type)



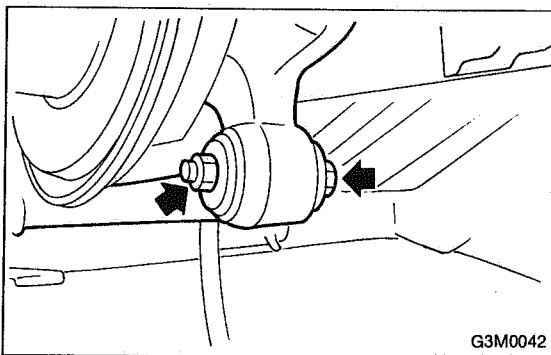
(2) Remove the ABS sensor cable clamp from the trailing link.



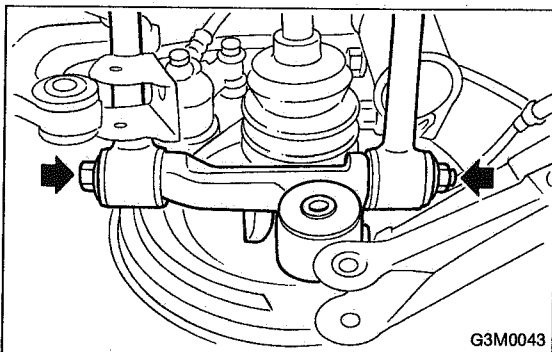
(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



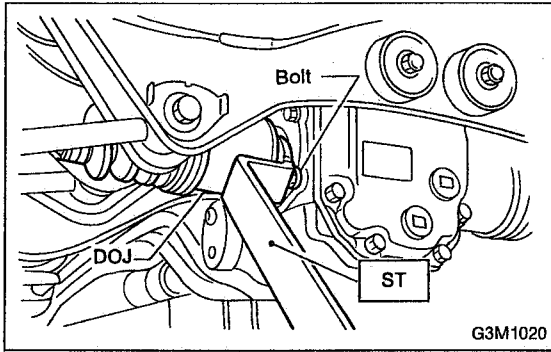
(4) Remove the rear stabilizer link.



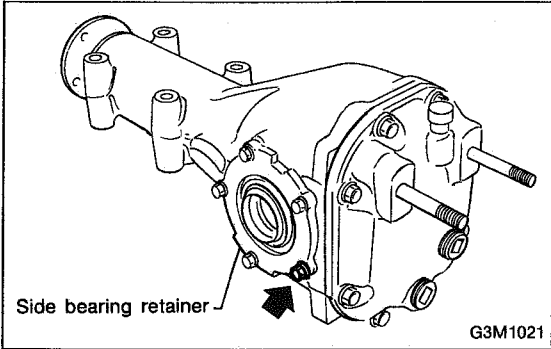
(5) Remove the bolts which secure the trailing link to the rear housing.



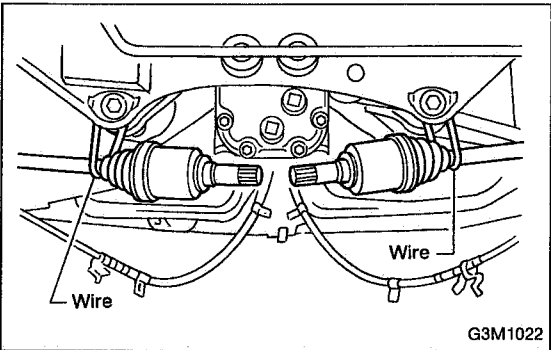
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



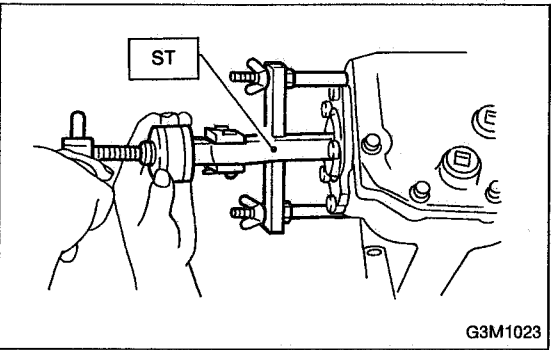
- (7) Remove the DOJ from the rear differential by using ST.
- ST 208099PA100 DRIVE SHAFT REMOVER



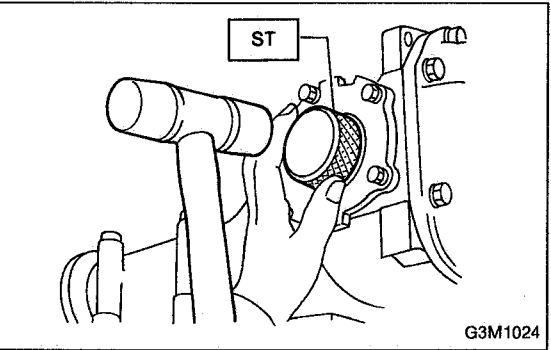
CAUTION:
When removing the DOJ from the rear differential, fit ST to the bolt as shown in figure so as not to damage the side bearing retainer.



- 9) Secure rear drive shaft to rear crossmember using wire.

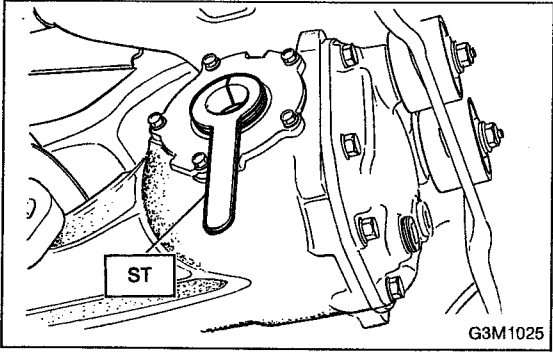


- 10) Remove side oil seal with ST.
- ST 398527700 PULLER ASSY



- 11) Drive in a new side oil seal with ST.
- CAUTION:**
Apply chassis grease between the oil seal lips.
- ST 398437700 DRIFT

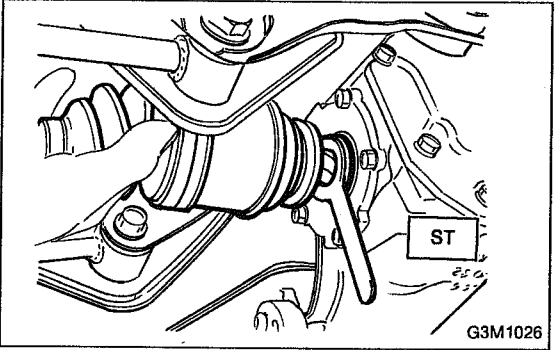
3. Rear Differential (T-Type)



12) 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.

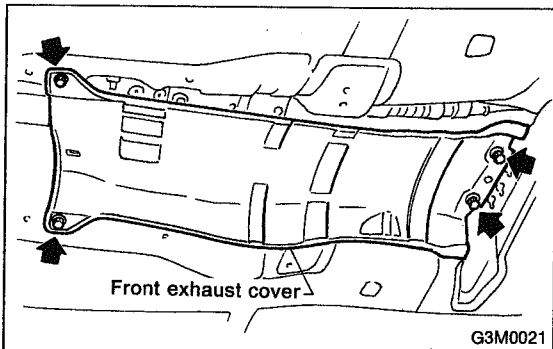
ST 28099PA090 SIDE OIL SEAL PROTECTOR

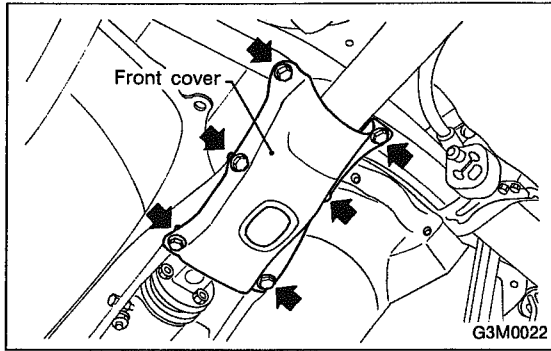
13) Hereafter, re-assemble in reverse order of disassembly.

B: REMOVAL

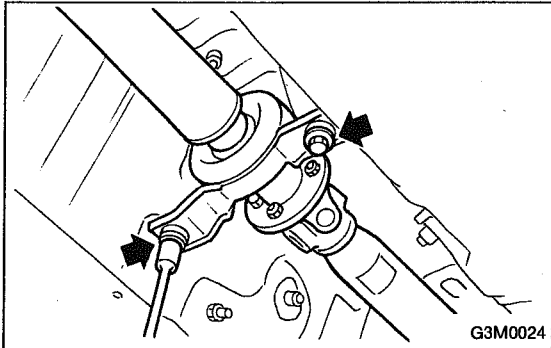
- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0], [W3A0].>

8) Remove front exhaust cover.





9) Remove front cover of rear differential mount.



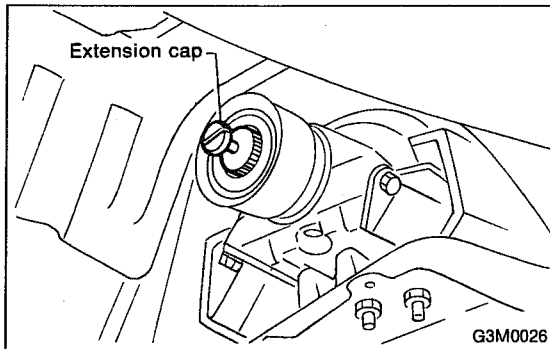
10) Remove propeller shaft.

CAUTION:

When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

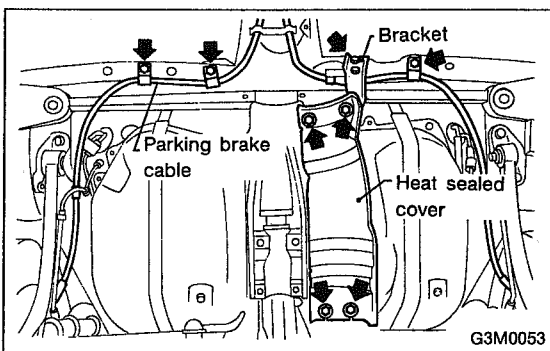
NOTE:

Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.



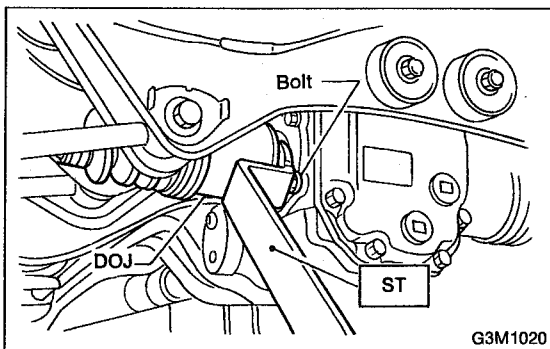
NOTE:

Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



11) Remove heat sealed cover.

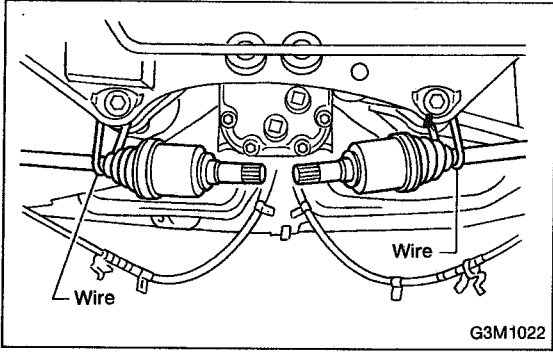
12) Remove clamps and bracket of parking brake cable.



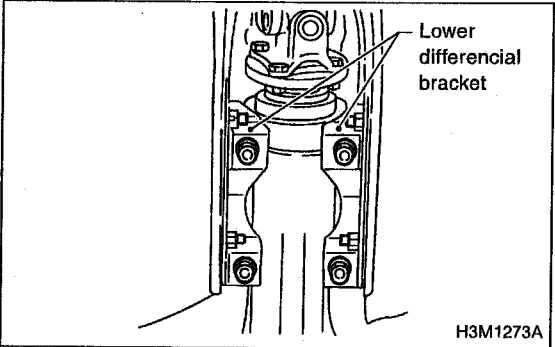
13) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to 3-4 [W3A2].>

ST 28099PA100 DRIVE SHAFT REMOVER

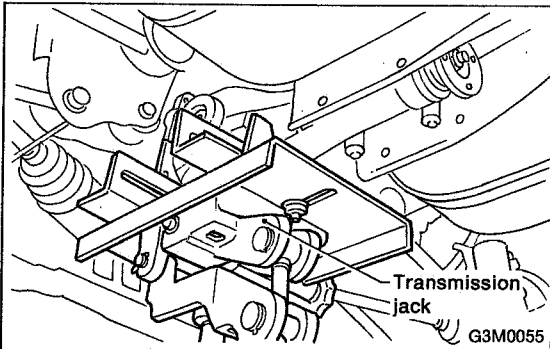
3. Rear Differential (T-Type)



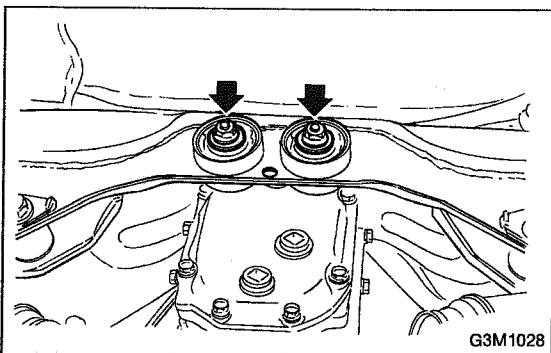
14) Secure rear drive shaft to rear crossmember using wire.



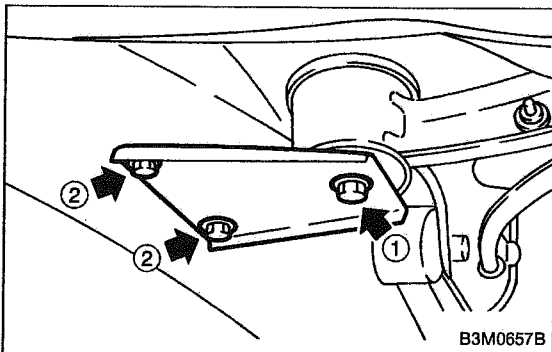
15) Remove lower differential bracket.



16) Support rear differential with transmission jack.



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



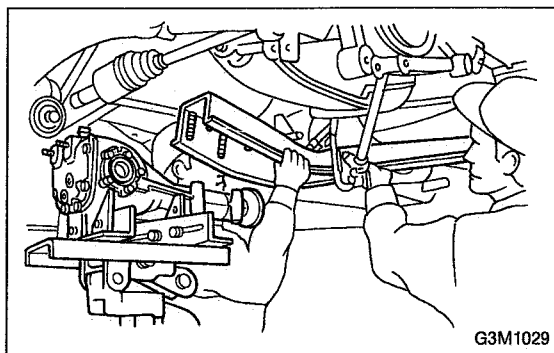
18) Remove bolts which secure rear differential front member to body.

Loosen bolt ① first, then remove bolts ②.

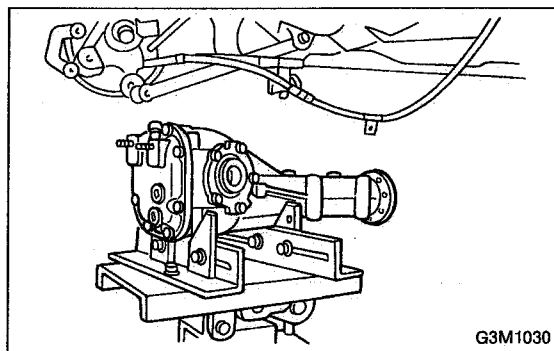
NOTE:

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

19) Remove bolt ①.



20) While slowly lowering transmission jack, move rear differential forward and remove front member and rear differential from body.

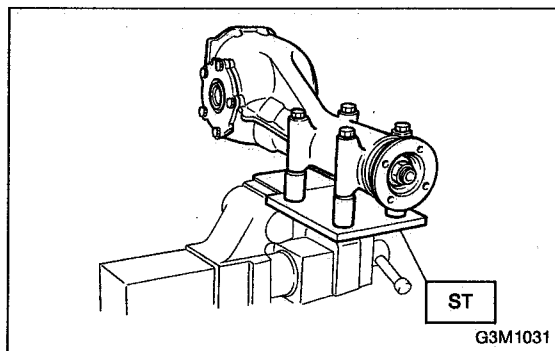


21) Remove rear differential from front member.

C: DISASSEMBLY

To detect real cause of trouble, inspect the following items before disassembling. <Ref. to 3-4 [W3E0].>

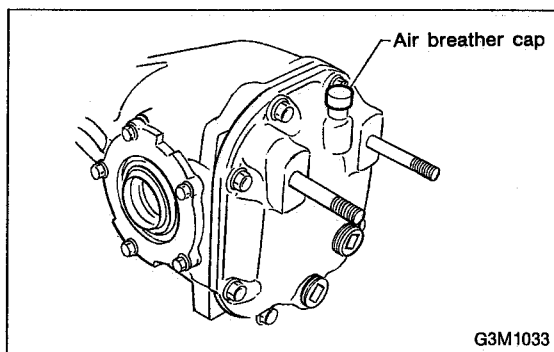
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion



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

ST 398217700 ATTACHMENT

2) Drain gear oil by removing plug.

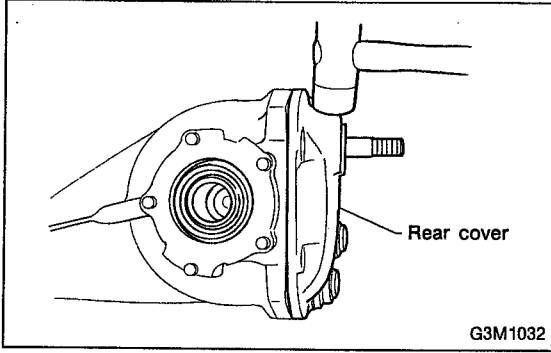


3) Remove the air breather cap.

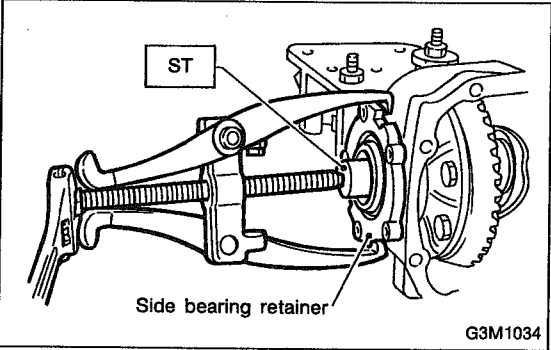
NOTE:

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

3. Rear Differential (T-Type)



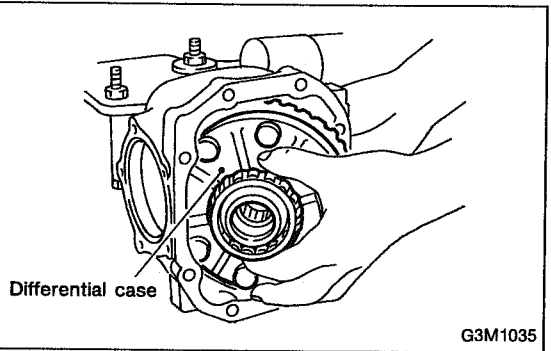
4) Remove rear cover by loosening retaining bolts.



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.
ST 398457700 ATTACHMENT

CAUTION:

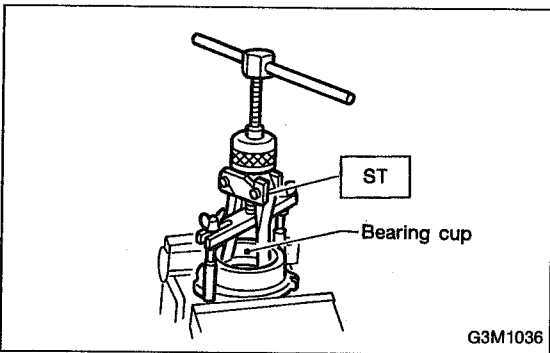
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.



6) Pull out differential assembly from differential carrier.

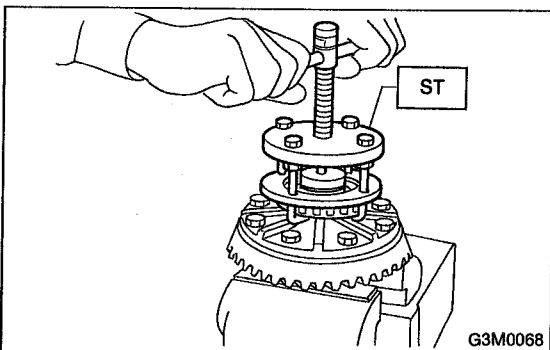
CAUTION:

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.

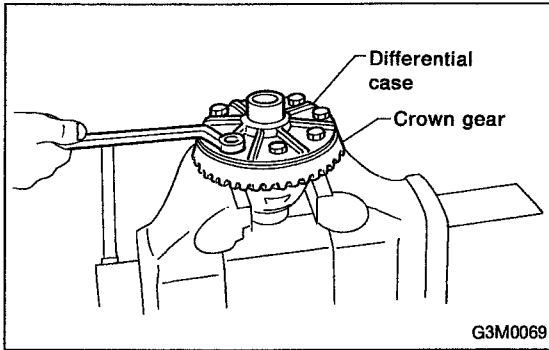
CAUTION:

Do not attempt to disassemble the parts unless necessary.

NOTE:

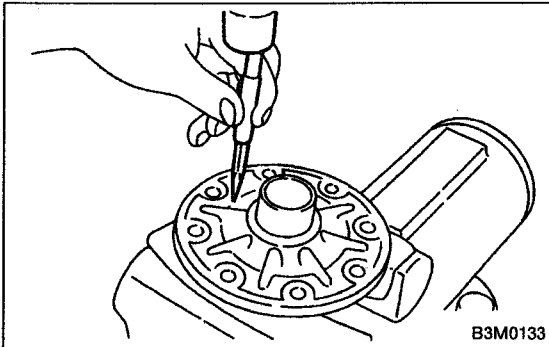
- Set puller so that its claw catch the edge of the bearing cone.
- Never mix up the right and left hand bearing cups and cones.

ST 399527700 PULLER SET



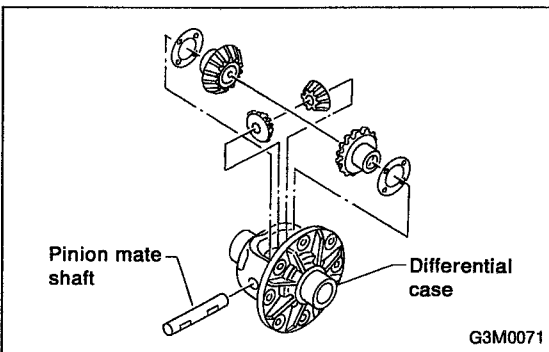
9) Remove crown gear by loosening crown gear bolts.

CAUTION:
Further disassembling is not allowed.



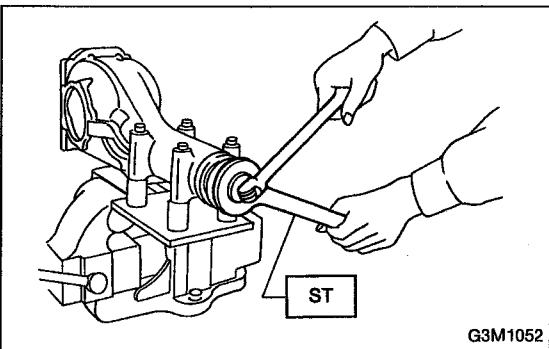
10) Drive out pinion shaft lock pin from crown gear side.

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



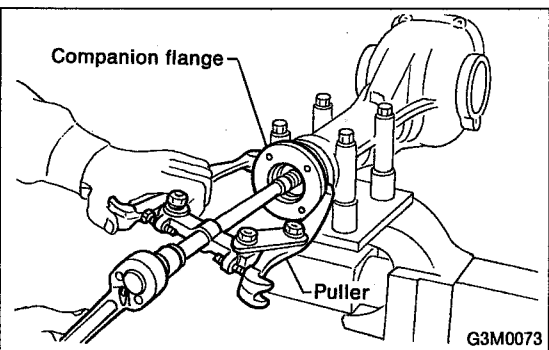
11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

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



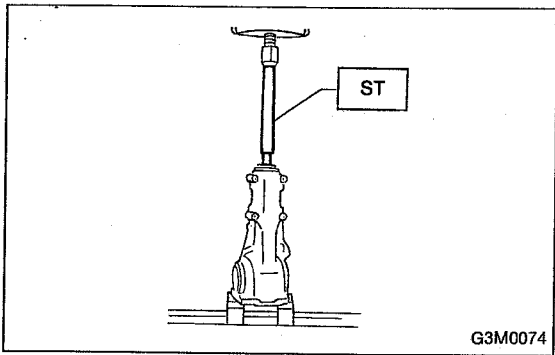
12) Hold companion flange with ST and remove drive pinion nut.

ST 498427200 FLANGE WRENCH



13) Extract the companion flange with a puller.

3. Rear Differential (T-Type)

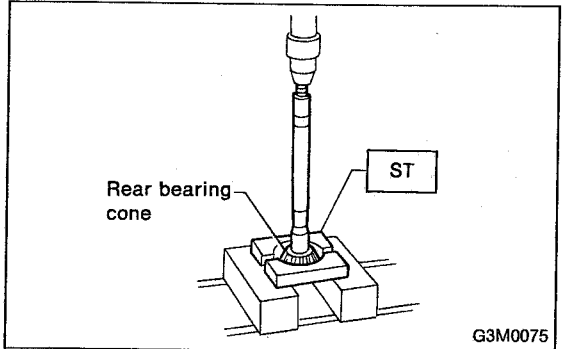


14) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT

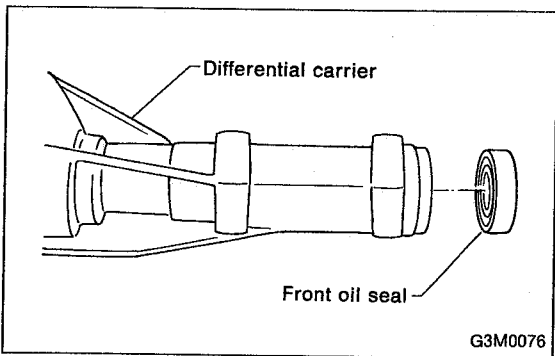


15) Remove rear bearing cone from drive pinion by supporting cone with ST.

NOTE:

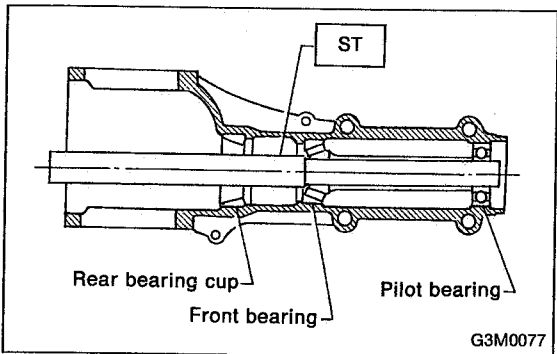
Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER



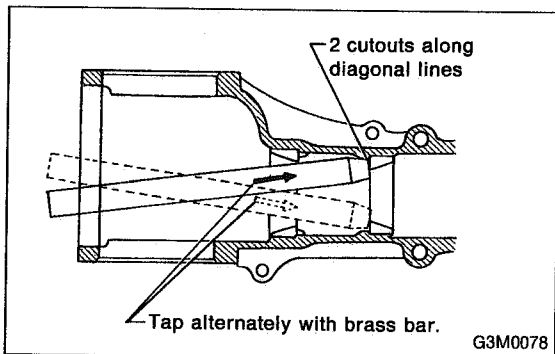
16) Remove front oil seal from differential carrier using ST.

ST 398527700 PULLER ASSY



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

ST 398467700 DRIFT



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

D: INSPECTION

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

1) Crown gear and drive pinion

(1) 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.

(2) 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

(1) Replace if crack, score, or other defects are evident on tooth surface.

(2) 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.

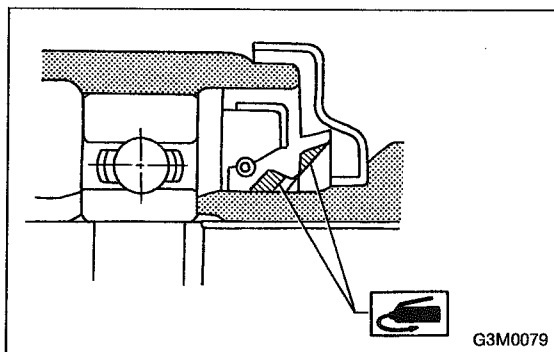
8) Companion flange

Replace if the oil seal lip contacting surfaces have flaws.

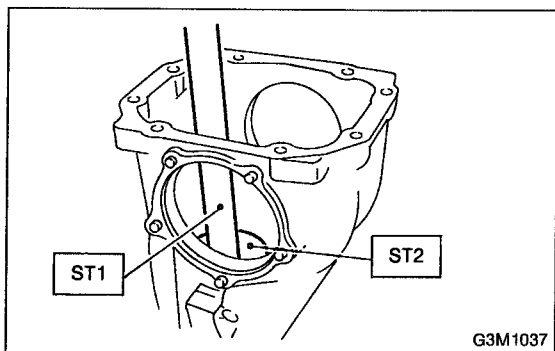
E: ASSEMBLY

1) Precautions for assembling

- (1) Assemble in the reverse order of disassembling.
- (2) Check and adjust each part during assembly.
- (3) Keep the shims and washers in order, so that they are not misinstalled.
- (4) Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- (5) Apply gear oil when installing the bearings and thrust washers.
- (6) Be careful not to mix up the right and left hand cups of the bearings.



- (7) Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.

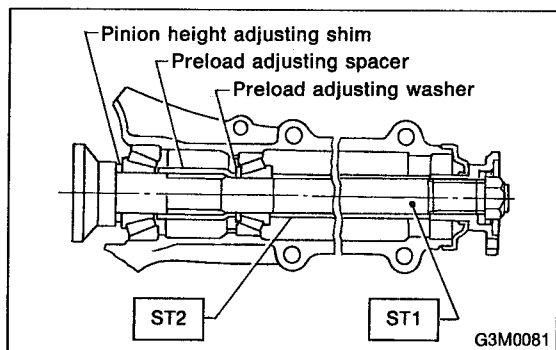


- 2) Adjusting preload for front and rear bearings
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

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

ST1 398477701 HANDLE

ST2 398427703 DRIFT 2



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

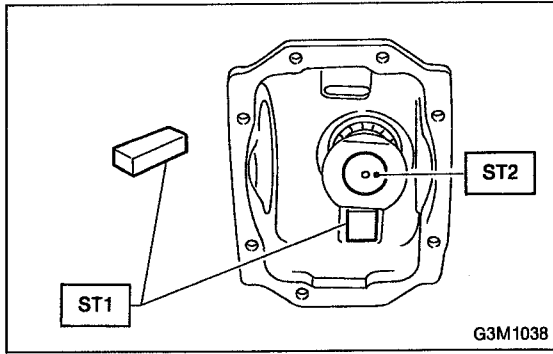
CAUTION:

- 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



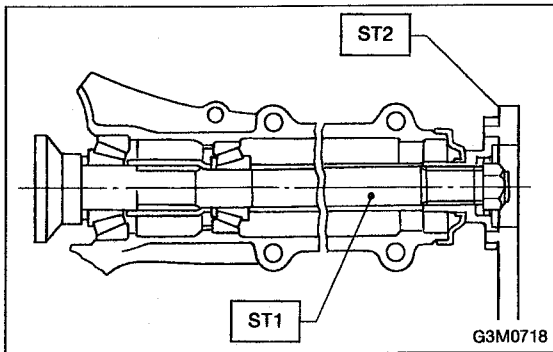
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

- ST1 398507704 BLOCK
- ST2 398507702 DUMMY SHAFT

CAUTION:
Use a new lock nut.

NOTE:

- Be careful not to give excessive preload.

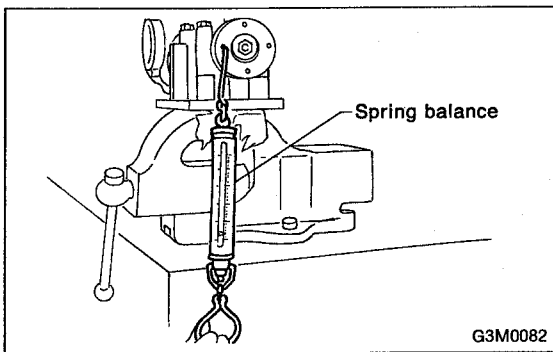


- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

- ST1 398507702 DUMMY SHAFT
- ST2 498427200 FLANGE WRENCH

Tightening torque:

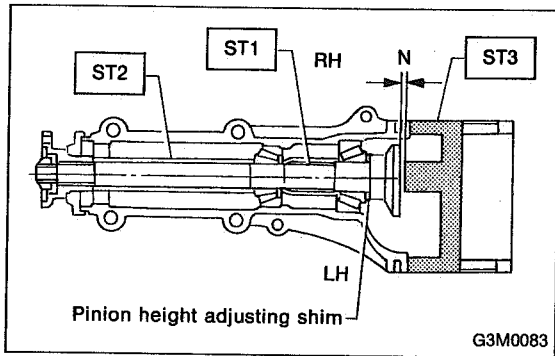
181 ± 15 N·m (18.5 ± 1.5 kg·m, 134 ± 11 ft·lb)



Front and rear bearing preload
For new bearing: 17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb) at companion flange bolt hole

3. Rear Differential (T-Type)

	Part No.	Length mm (in)
● Preload adjusting washer length	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
● Preload adjusting spacer length	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.

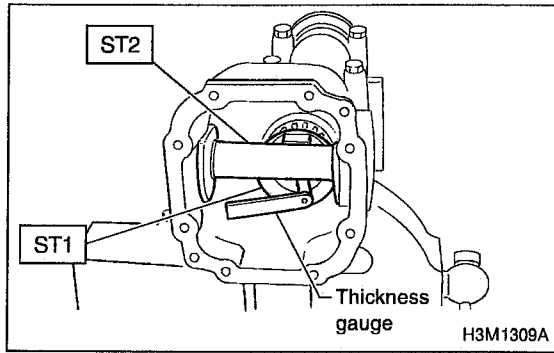
Front and rear bearing preload
For new bearing: 17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb) at companion flange bolt hole

Adjust preload for front and rear bearings.

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

NOTE:

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



(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 ST3.

ST1 398507702 DUMMY SHAFT

ST2 398507701 DIFFERENTIAL CARRIER GAUGE

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

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

Where:

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(Example of calculation)

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

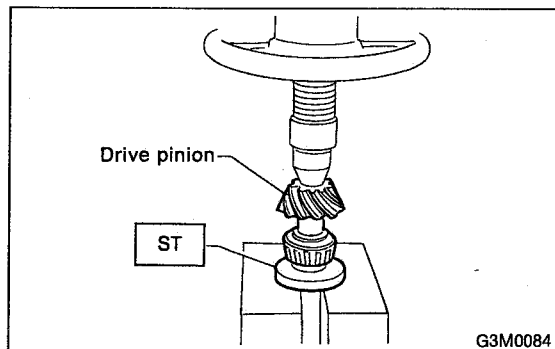
$$N = 0.23 \text{ mm } H = + 1,$$

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

Result: Thickness = 3.42 mm

Therefore use the shim 383605200.

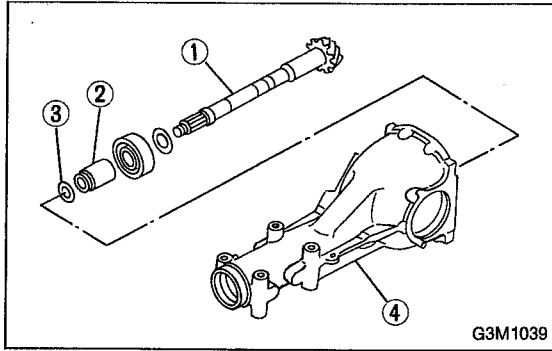
	Part No.	Thickness mm (in)
	● Pinion height adjusting shim thickness	383495200
383505200		3.12 (0.1228)
383515200		3.15 (0.1240)
383525200		3.18 (0.1252)
383535200		3.21 (0.1264)
383545200		3.24 (0.1276)
383555200		3.27 (0.1287)
383565200		3.30 (0.1299)
383575200		3.33 (0.1311)
383585200		3.36 (0.1323)
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)	



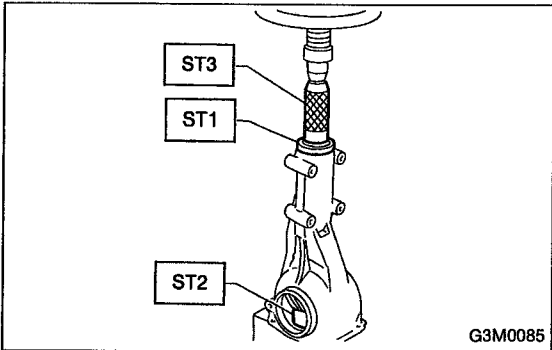
4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

ST 398177700 INSTALLER

3. Rear Differential (T-Type)

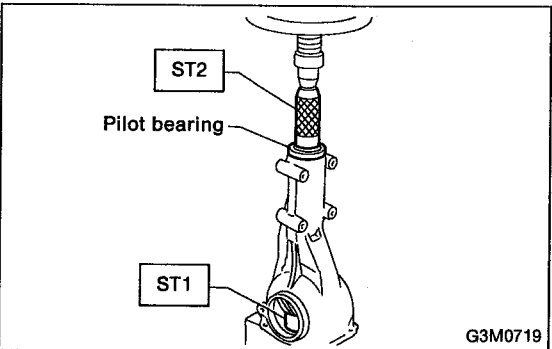


5) Insert drive pinion ① into differential carrier ④, install the previously selected bearing preload adjusting spacer ② and washer ③.



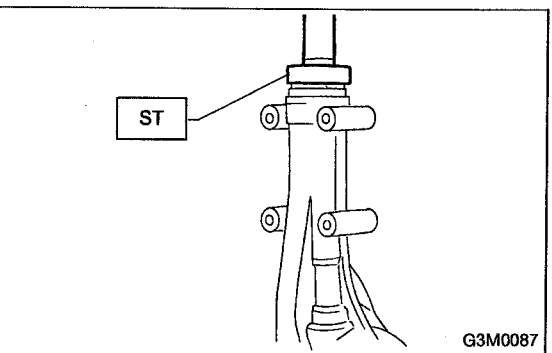
6) Press-fit front bearing cone into case with ST1, ST2 and ST3.

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



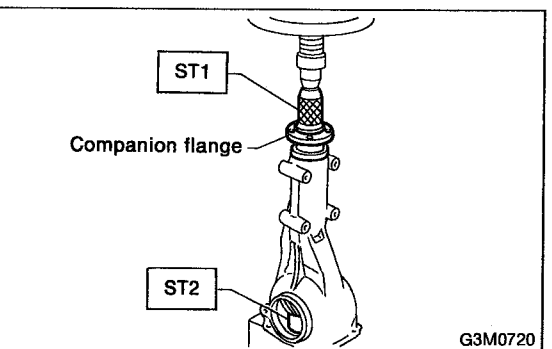
8) Fit a new oil seal with ST.

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 OIL SEAL INSTALLER

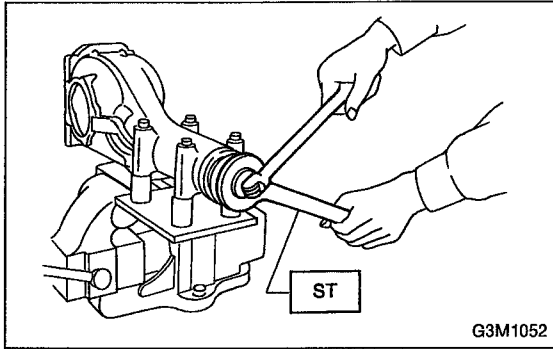


9) Press-fit companion flange with ST1 and ST2.

CAUTION:

Be careful not to damage bearing.

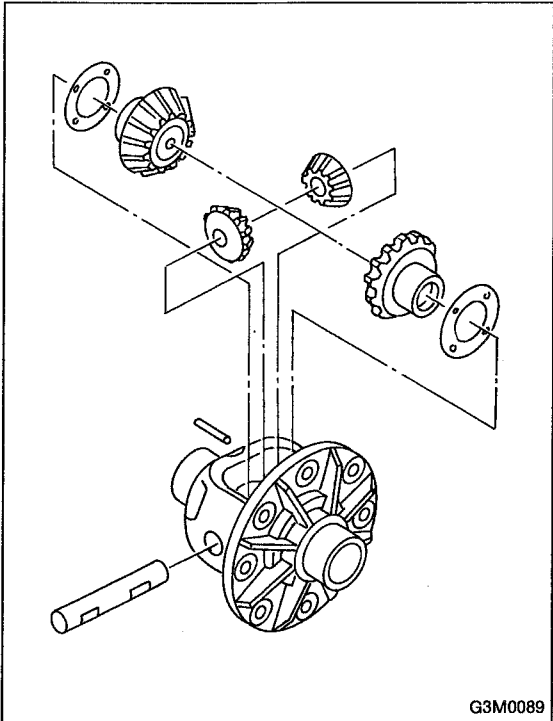
ST1 899874100 INSTALLER
 ST2 399780104 WEIGHT



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

Tightening torque:

181 ± 15 N·m (18.5 ± 1.5 kg-m, 134 ± 11 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 clearance between differential case and the back of side gear.

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

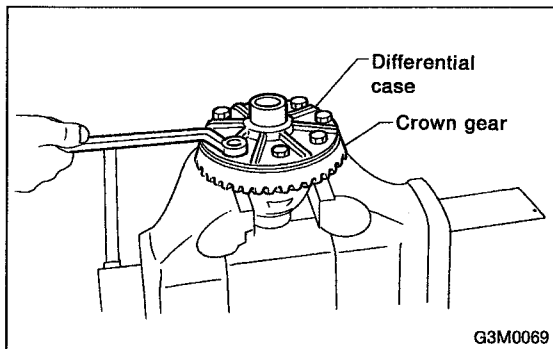
Side gear backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)

	Part No.	Thickness mm (in)
● Side gear thrust washer thickness	383445201	0.75 — 0.8 (0.0295 — 0.0315)
	383445202	0.8 — 0.85 (0.0315 — 0.0335)
	383445203	0.85 — 0.9 (0.0335 — 0.0345)

(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.



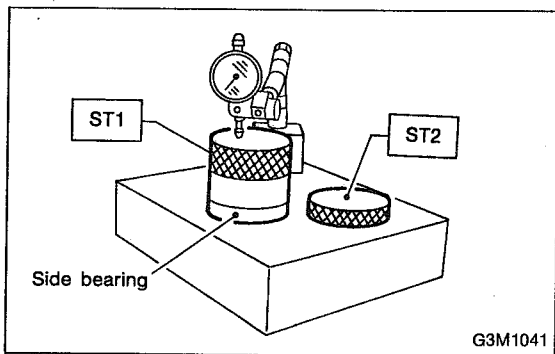
12) Install crown gear on differential case.

Tightening torque:

103 ± 10 N·m (10.5 ± 1.0 kg-m, 76 ± 7 ft-lb)

NOTE:

Tighten diagonally while tapping the bolt heads.



13) Before installing side bearing, measure the bearing width by using a dial gauge, ST1 and ST2.

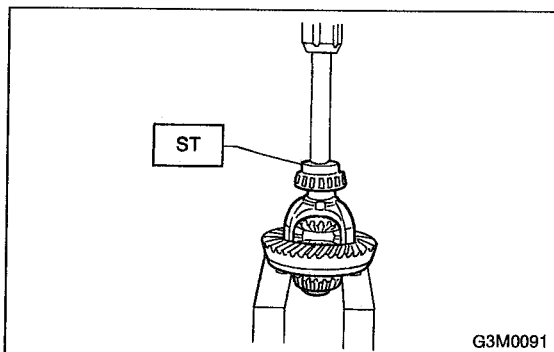
Standard bearing width:
20.00 mm (0.7874 in)

NOTE:

Set the dial gauge needle to zero, using a standard bearing or block of specified height in advance.

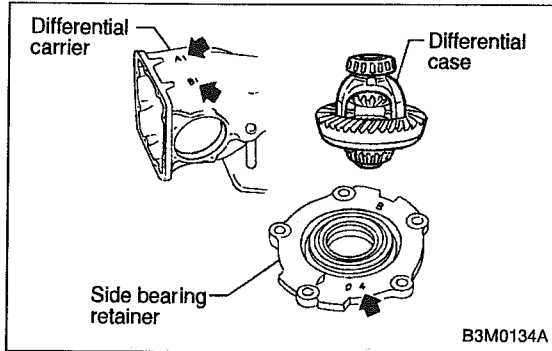
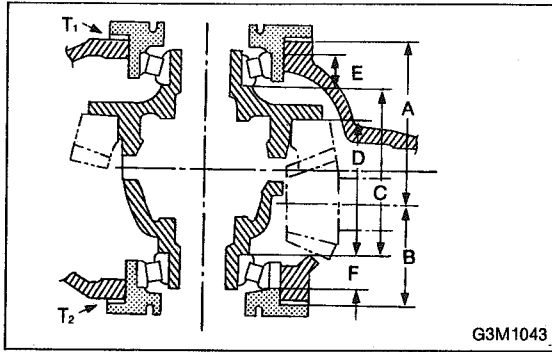
ST1 398227700 WEIGHT

ST2 398237700 GAUGE



14) Press side bearing cone onto differential case with ST1.

ST1 398487700 DRIFT



15) Adjusting side bearing retainer shims

(1) The drive gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.

(2) When replacing differential case, differential carrier, side bearing and side bearing retainer, obtain the right and left retainer shim thickness from the following formulas.

$$T_1 \text{ (Left)} = (A + C + G_1 - D) \times 0.01 + 0.76 - E \text{ (mm)}$$

$$T_2 \text{ (Right)} = (B + D + G_2) \times 0.01 + 0.76 - F \text{ (mm)}$$

T_1 & T_2 : Thickness of left and right side bearing retainer shim (mm)

A & B : Number marked on differential carrier

C & D : Number marked on differential case

E & F : Difference of width of left and right side bearing from standard width 20.0 mm, expressed in a unit of 0.01 mm. For example, if the bearing measured width is 19.89 mm, value of E or F is as follows.
 $20.00 - 19.89 = 0.11$ (E or F)

G_1 & G_2 : Number marked on side bearing retainer

If a number is not marked, regard it as zero.

NOTE:

Use several shims to obtain the calculated thickness.

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

Example of calculation

Ex. 1

$$A = 5, B = 5, C = 3, D = 3, G_1 = 4, G_2 = 1, \\ E = 0.10 \text{ mm}, F = 0.15 \text{ mm}$$

Left side

$$T_1 = (A + C + G_1 - D) \times 0.01 + 0.76 - E \\ = (5 + 3 + 4 - 3) \times 0.01 + 0.76 - 0.10 \\ = 0.09 + 0.76 - 0.10 = 0.75 \text{ mm}$$

The correct shims are as follows:

Thickness	Q'ty	
0.25	x 1	= 0.25
0.50	x 1	= 0.50
<hr/>		
Total shim thickness = 0.75 mm		

Right side

$$T_2 = (B + D + G_2) \times 0.01 + 0.76 - F \\ = (5 + 3 + 1) \times 0.01 + 0.76 - 0.15 \\ = 0.09 + 0.76 - 0.15 \\ = 0.70 \text{ mm}$$

The correct shims are as follows:

Thickness	Q'ty	
0.20	x 1	= 0.20
0.50	x 1	= 0.50
<hr/>		
Total shim thickness = 0.70 mm		

Ex. 2

$$A = 2, B = 3, C = 0, D = 3, G_1 = 2, G_2 = 3, \\ E = 0.22 \text{ mm}, F = 0.10 \text{ mm}$$

Left side

$$T_1 = (A + C + G_1 - D) \times 0.01 + 0.76 - E \\ = (2 + 0 + 2 - 3) \times 0.01 + 0.76 - 0.22 \\ = 0.01 + 0.76 - 0.22 \\ = 0.55 \text{ mm}$$

The correct shims are as follows:

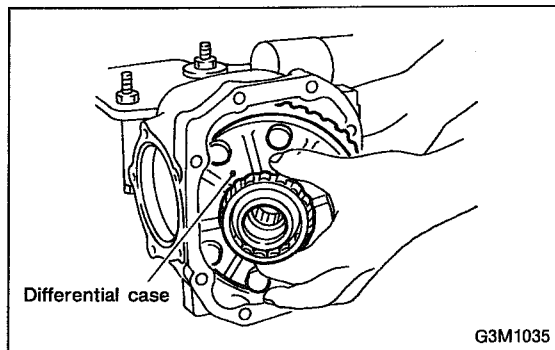
Thickness	Q'ty	
0.25	x 1	= 0.25
0.30	x 1	= 0.30
<hr/>		
Total shim thickness = 0.55 mm		

Right side

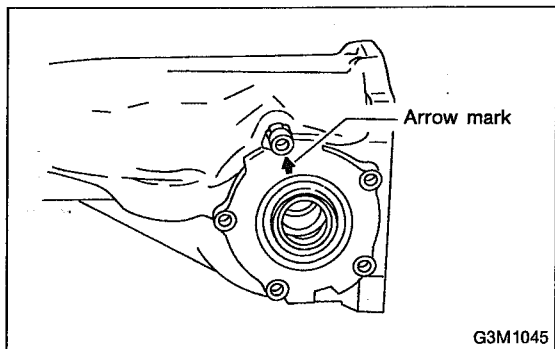
$$T_2 = (B + D + G_2) \times 0.01 + 0.76 - F \\ = (3 + 3 + 3) \times 0.01 + 0.76 - 0.10 \\ = 0.09 + 0.76 - 0.10 \\ = 0.75 \text{ mm}$$

The correct shims are as follows:

Thickness	Q'ty	
0.25	x 1	= 0.25
0.50	x 1	= 0.50
<hr/>		
Total shim thickness = 0.75 mm		



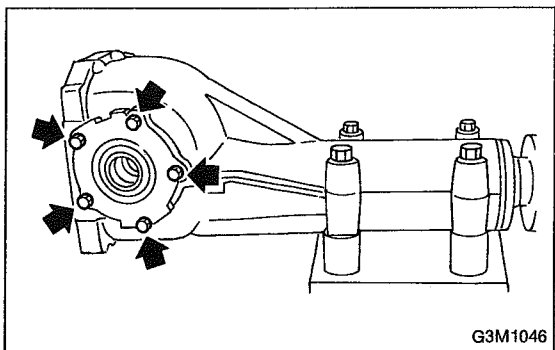
(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.



(4) Fit the selected shims and O-ring on side bearing retainer and install them on differential carrier with the arrow mark on the retainer directed as shown in figure.

CAUTION:

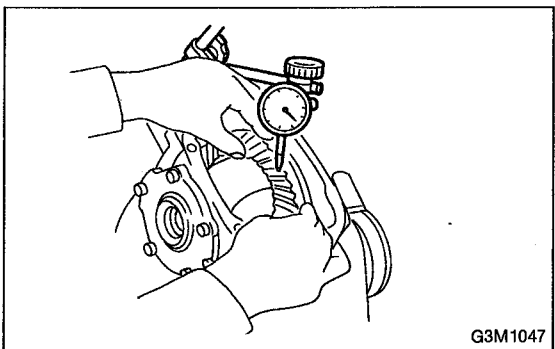
Be careful that side bearing cup is not damaged by bearing roller.



(5) Tighten side bearing retainer bolts.

Tightening torque:

$10.3 \pm 1.5 \text{ N}\cdot\text{m}$ ($1.05 \pm 0.15 \text{ kg}\cdot\text{m}$, $7.6 \pm 1.1 \text{ ft}\cdot\text{lb}$)



(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:

$0.10 - 0.20 \text{ mm}$ ($0.0039 - 0.0079 \text{ in}$)

(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.

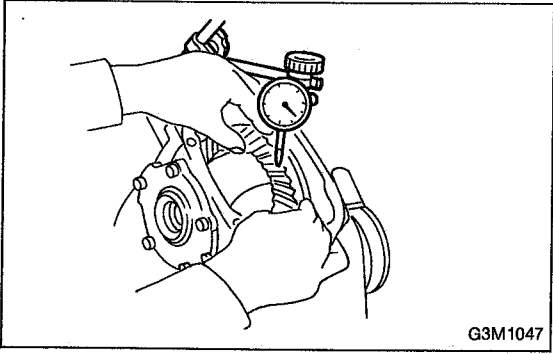
Turning resistance increase:

$0.1 - 0.6 \text{ N}\cdot\text{m}$ ($1 - 6 \text{ kg}\cdot\text{cm}$, $0.9 - 5.2 \text{ in}\cdot\text{lb}$)

NOTE:

If measured backlash is not within specified range, repeat procedure for side bearing retainer shims adjustment.

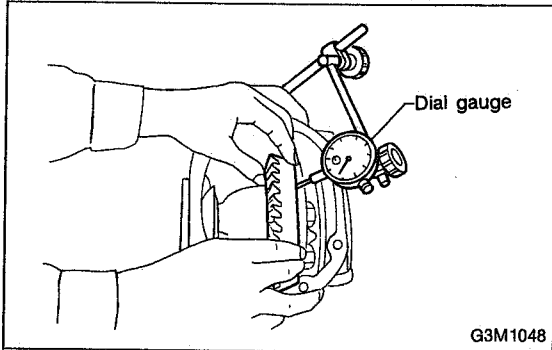
3. Rear Differential (T-Type)



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

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



17) 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)

18) Checking and adjusting tooth contact of crown gear

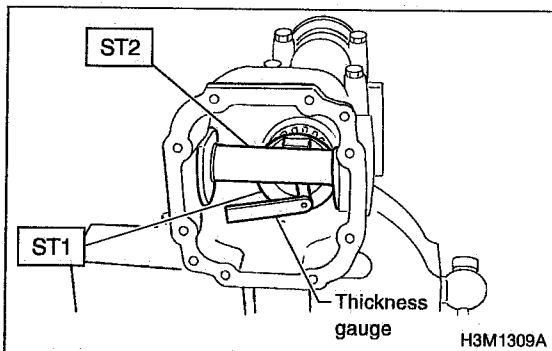
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.

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

NOTE:

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

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



(1) Drive pinion height

ST1 398507702 DUMMY SHAFT

ST2 398507701 DIFFERENTIAL CARRIER GAUGE

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

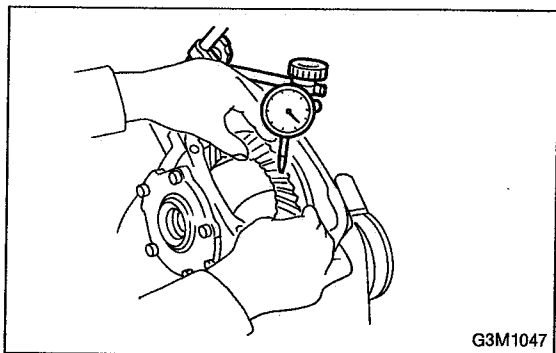
Where:

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

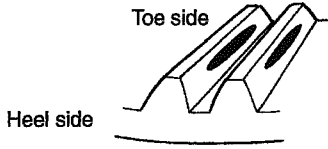

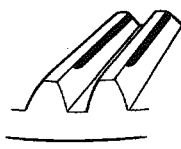
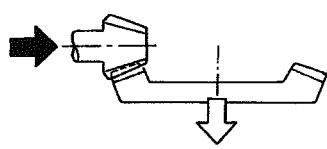
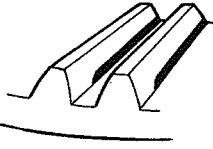
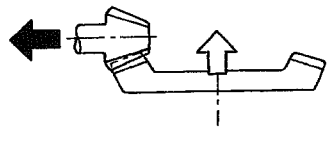
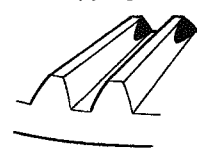
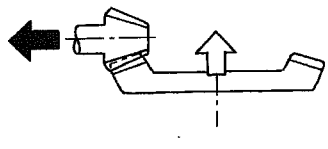
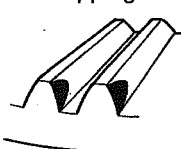
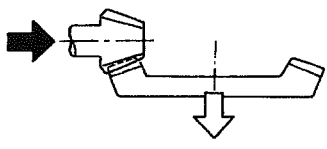
H = Figure marked on drive pinion head



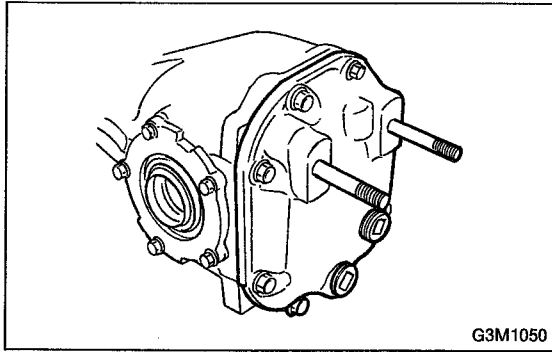
(2) Hypoid gear backlash

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
<p>Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)</p>	 <p style="text-align: center;">B3M0317A</p>	
<p>Face contact Backlash is too large.</p>	 <p style="text-align: center;">B3M0319</p>	<p>Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.</p>  <p style="text-align: right;">B3M0323</p>
<p>Flank contact Backlash is too small.</p>	 <p style="text-align: center;">B3M0320</p>	<p>Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.</p>  <p style="text-align: right;">B3M0324</p>
<p>Toe contact Contact area is small.</p>	 <p style="text-align: center;">B3M0321</p>	<p>Adjust as for flank contact.</p>  <p style="text-align: right;">B3M0324</p>
<p>Heel contact Contact area is small.</p>	 <p style="text-align: center;">B3M0322</p>	<p>Adjust as for face contact.</p>  <p style="text-align: right;">B3M0323</p>

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



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

Tightening torque:

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

F: INSTALLATION

To install, reverse the removal sequence.

1) Install the air breather cap tapping with a plastic hammer.

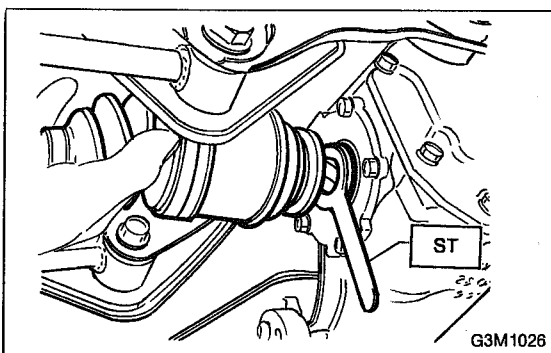
CAUTION:

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.
<Ref. to 3-4 [W3A2]. >

ST 28099PA090 SIDE OIL SEAL PROTECTOR

4) Installing procedure hereafter is in the reverse order of removal.

5) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:

Apply fluid packing to plug.

Fluid packing:

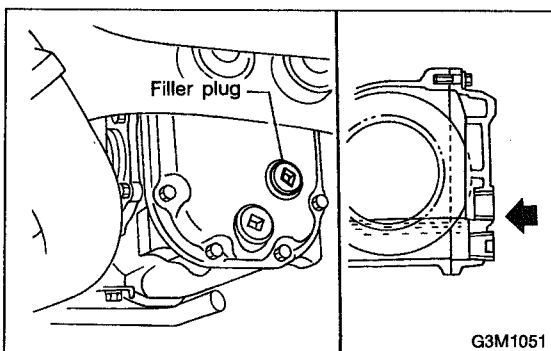
THREE BOND 1205 or equivalent

Oil capacity:

0.8 l (0.8 US qt, 0.7 Imp qt)

Tightening torque:

$44 \pm 4 \text{ N}\cdot\text{m}$ ($4.5 \pm 0.4 \text{ kg}\cdot\text{m}$, $32.5 \pm 2.9 \text{ ft}\cdot\text{lb}$)



4. Rear Differential Front Member

A: REMOVAL

1. VA-TYPE

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0], [W3A0].>
- 8) Remove rear differential front member.

NOTE:

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

<Ref. to 3-4 [W2C1].>

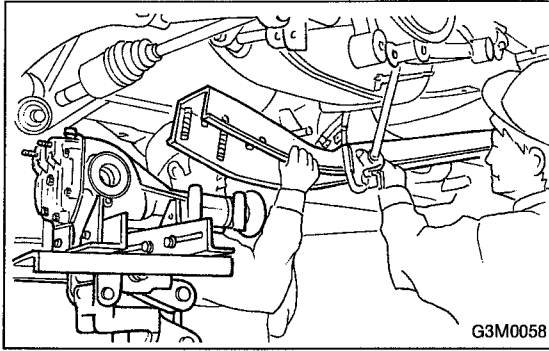
2. T-TYPE

- 1) Disconnect ground cable from battery.
- 2) Move selector lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0], [W3A0].>
- 8) Remove rear differential front member.

NOTE:

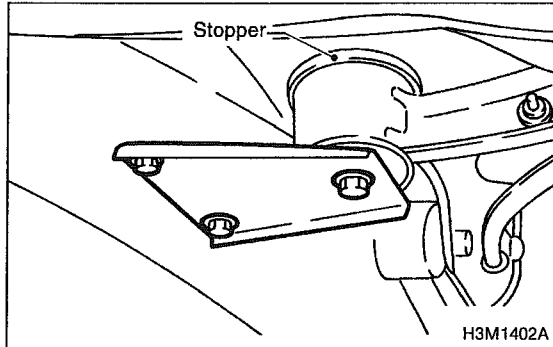
When removing rear differential front member, work the removal procedure as rear differential.

<Ref. to 3-4 [W3C2].>

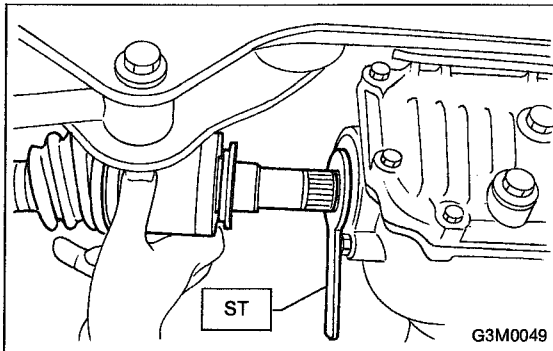
**B: INSTALLATION****1. VA-TYPE**

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.



- 2) Insert DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W2A2].>

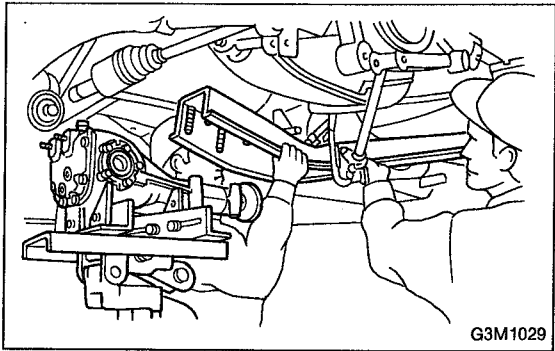
ST 28099PA090 SIDE OIL SEAL PROTECTOR

CAUTION:

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

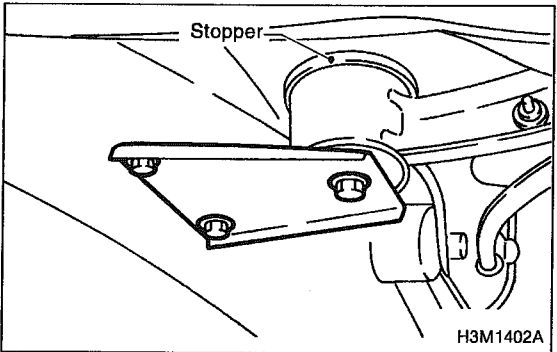
- 3) Installing procedure hereafter is in the reverse order of removal.

4. Rear Differential Front Member

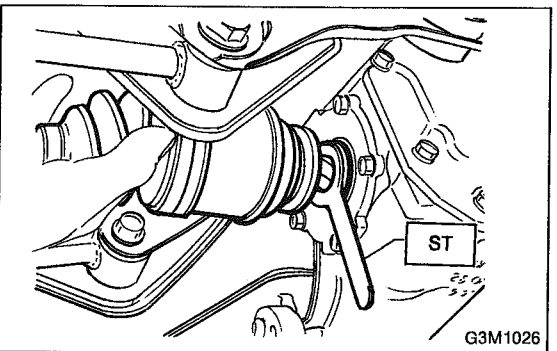
**2. T-TYPE**

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.



2) Insert DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W3A2].>

ST 28099PA090 SIDE OIL SEAL PROTECTOR

CAUTION:

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

3) Installing procedure hereafter is in the reverse order of removal.

1. Propeller Shaft

Symptom and possible cause	Remedy
1. Vibration of propeller shaft	
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.

NOTE:

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









2. Rear Differential

Symptom and possible cause	Remedy
1. Oil leakage	
① Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
② Clogged or damaged air breather.	Clean, repair or replace.
③ Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten bolts to specified torque. Replace O-ring.
④ Loose rear cover attaching bolts or damaged gasket.	Tighten bolts to specified torque. Replace gasket and apply liquid packing.
⑤ Loose oil filler or drain plug.	Retighten and apply liquid packing.
⑥ Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
2. Seizure	
Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	
① Insufficient backlash for hypoid gear.	Readjust or replace.
② Excessive preload for side, rear, or front bearing.	Readjust or replace.
③ Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.

2. Rear Differential

Symptom and possible cause	Remedy
3. Damage	
Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	
① Improper backlash for hypoid gear.	Replace.
② Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
③ Excessive backlash for differential gear.	Replace gear or thrust washer.
④ Loose bolts and nuts such as crown gear bolt.	Retighten.
⑤ Damage due to overloading.	Replace.
4. Noises when starting or shifting gears	
Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	
① Excessive backlash for hypoid gear.	Readjust.
② Excessive backlash for differential gear.	Replace gear or thrust washer.
③ Insufficient preload for front or rear bearing.	Readjust.
④ Loose drive pinion nut.	Tighten to specified torque.
⑤ Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	
① Damaged differential gear.	Replace.
② Excessive wear or damage of thrust washer.	Replace.
③ Broken pinion mate shaft.	Replace.
④ Seized or damaged side bearing.	Replace.
6. Gear noises	
Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	
① Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
② Improper backlash for hypoid gear.	Readjust.
③ Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
④ Seized hypoid gear.	Replace hypoid gear set.
⑤ Improper preload for front or rear bearings.	Readjust.
⑥ Seized, scored, or chipped front or rear bearing.	Replace.
⑦ Seized, scored, or chipped side bearing.	Replace.
⑧ Vibrating differential carrier.	Replace.

MECHANICAL COMPONENTS SECTION

				
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		STEERING SYSTEM	4-3	
		BRAKES	4-4	
		PEDAL SYSTEM AND CONTROL CABLES	4-5	
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SUSPENSION *4-1*

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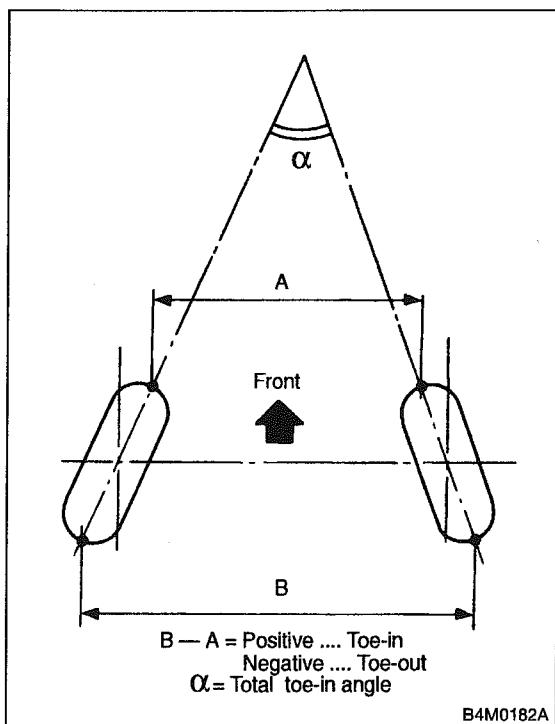
1. Specifications

A: STABILIZER

Model			Bar dia. mm (in)	
			Front	Rear
COUPE	AWD	1800 cc	19 (0.75)	—
		2200 cc	19 (0.75)	13 (0.51)
SEDAN	AWD	1800 cc	18 (0.71)	—
		2200 cc	19 (0.75)	13 (0.51)
WAGON	AWD	1800 cc	19 (0.75)	—
		2200 cc	19 (0.75)	13 (0.51)
OUTBACK	AWD	2200 cc	19 (0.75)	13 (0.51)

B: WHEEL ALIGNMENT

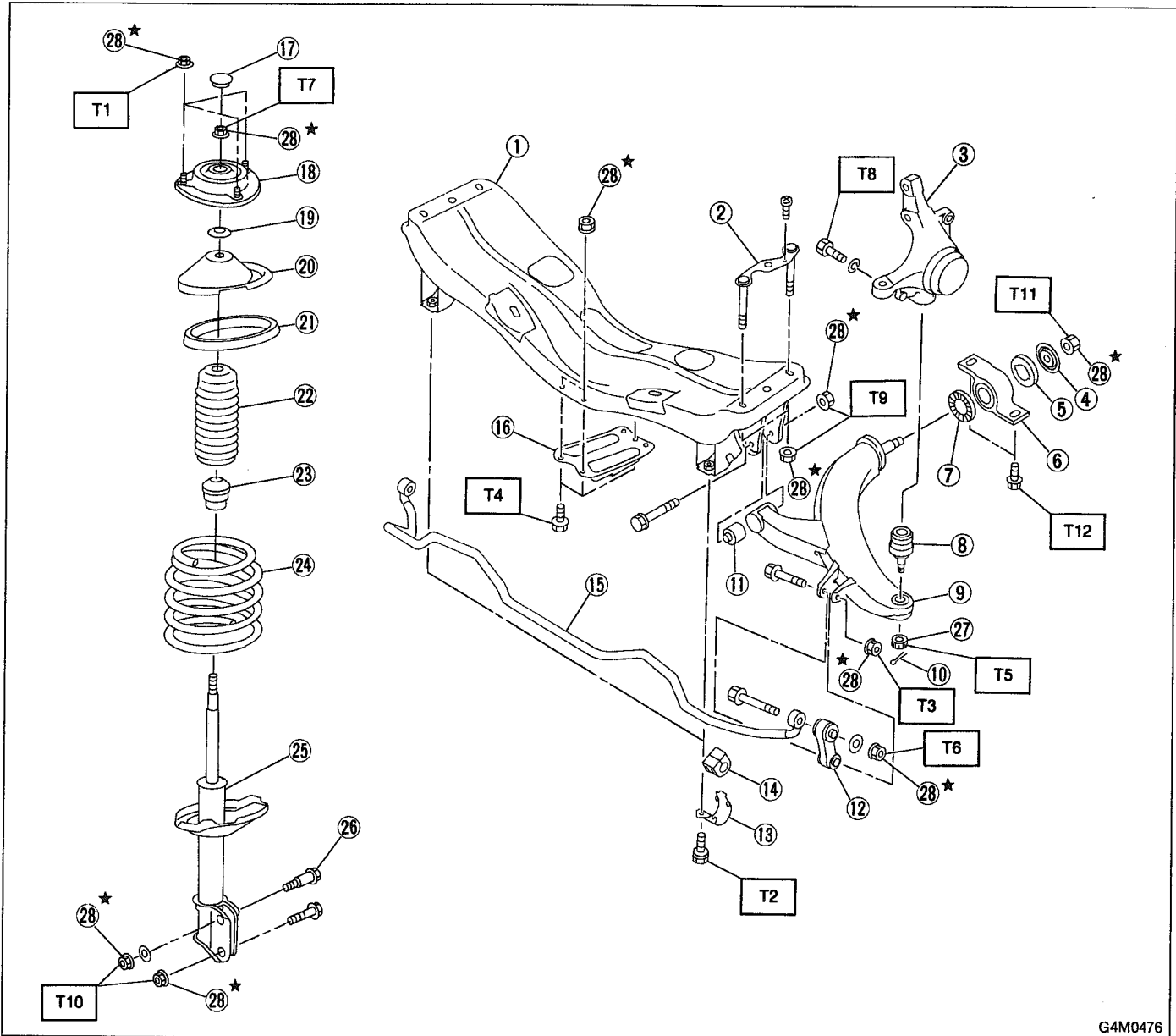
		Sedan, Coupe	Wagon	OUTBACK
		AWD	AWD	AWD
Front	Camber (tolerance: $\pm 0^{\circ}30'$)	0°	0°	0°
	Caster (common difference: $\pm 1^{\circ}$)	3°	3°	3°
	Toe-in mm (in)	0 \pm 3 (0 \pm 0.12) Toe-in angle: $-0^{\circ}09'$ [when toe-in is -3 (-0.12)] Toe-out angle: $0^{\circ}09'$ [when toe-out is 3 (0.12)]		
	Kingpin angle	14°	14°	14°
	Wheel arch height [tolerance: ± 12 mm (± 0.47 in)] mm (in)	391 (15.39)	391 (15.39)	394 (15.51)
Rear	Camber (tolerance: $\pm 0^{\circ}45'$)	$-0^{\circ}55'$	$-0^{\circ}55'$	$-0^{\circ}55'$
	Toe-in mm (in)	0 \pm 3 (0 \pm 0.12) Total toe angle: $0^{\circ} \pm 18'$		
	Wheel arch height [tolerance: ± 10 mm (± 0.39 in)] mm (in)	379 (14.92)	379 (14.92)	386 (15.20)
	Thrust angle (tolerance: $0^{\circ} \pm 20'$)	0°	0°	0°



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 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; and replace with new ones as required.

1. Front Suspension



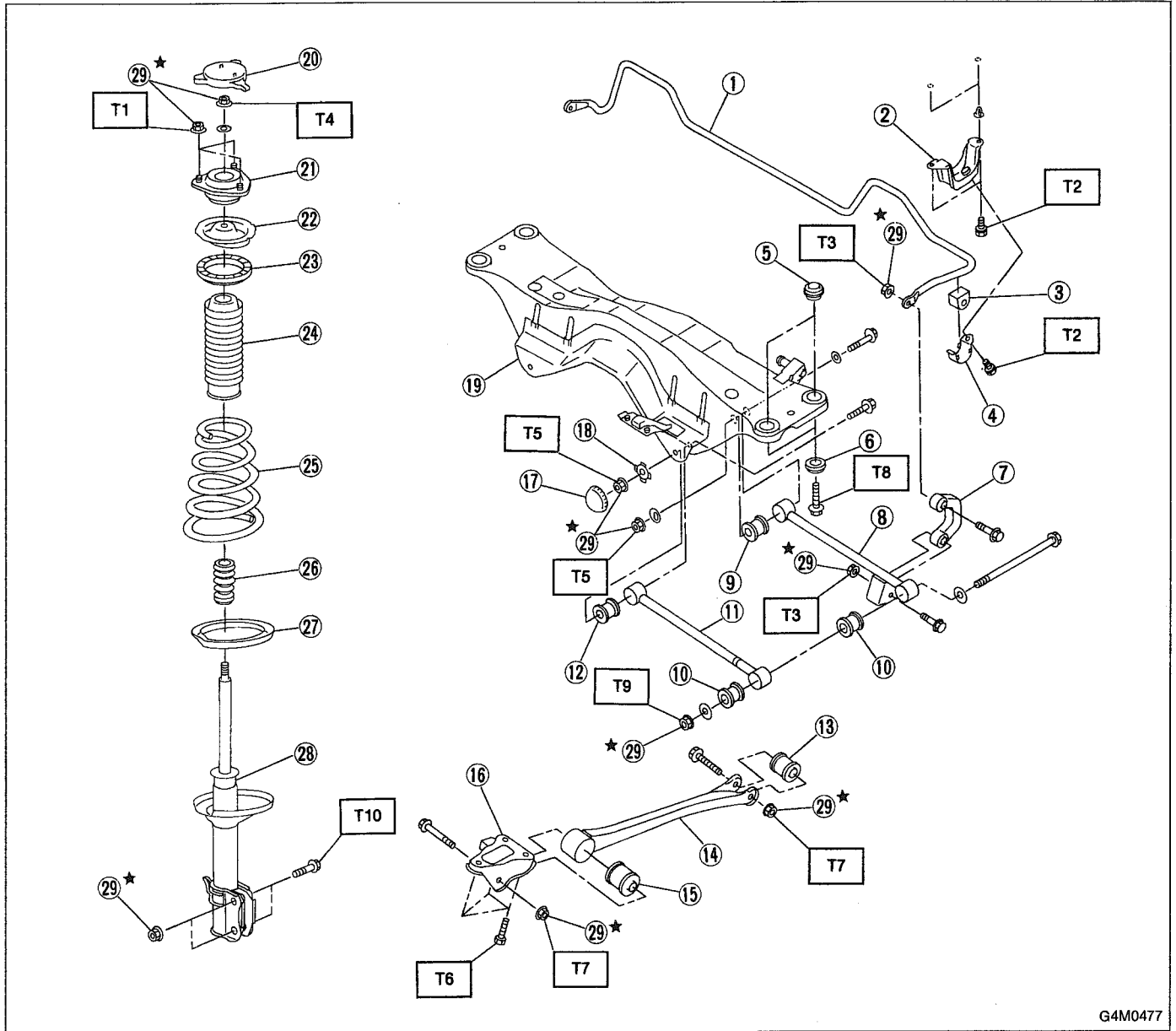
G4M0476

- ① Crossmember
- ② Bolt ASSY
- ③ Housing
- ④ Washer
- ⑤ Stop rubber (Rear)
- ⑥ Rear bushing
- ⑦ Stop rubber (Front)
- ⑧ Ball joint
- ⑨ Transverse link
- ⑩ Cotter pin
- ⑪ Front bushing
- ⑫ Stabilizer link
- ⑬ Clamp
- ⑭ Bushing
- 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

Tightening torque: N·m (kg·m, ft·lb)

- T1: 20 ± 6 (2.0 ± 0.6, 14.5 ± 4.3)
- T2: 25 ± 4 (2.5 ± 0.4, 18.1 ± 2.9)
- T3: 29 ± 5 (3.0 ± 0.5, 21.7 ± 3.6)
- T4: 32 ± 10 (3.3 ± 1.0, 24 ± 7)
- T5: 39 (4, 29)
- T6: 44 ± 6 (4.5 ± 0.6, 32.5 ± 4.3)
- T7: 49 ⁺¹⁰/₀ (5.0 ⁺¹⁰/₀, 36 ⁺⁷/₀)
- T8: 49 ± 10 (5.0 ± 1.0, 36 ± 7)
- T9: 98 ± 15 (10.0 ± 1.5, 72 ± 11)
- T10: 152 ± 20 (15.5 ± 2.0, 112 ± 14)
- T11: 196 ± 25 (20.0 ± 2.5, 145 ± 18)
- T12: 245 ± 49 (25.0 ± 5.0, 181 ± 36)

2. Rear Suspension



G4M0477

- 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
- ⑱ Washer
- ⑲ Crossmember
- ⑳ Cap
- ㉑ Strut mount
- ㉒ Spring seat
- ㉓ Rubber seat upper
- ㉔ Coil spring
- ㉕ Helper
- ㉖ Rubber seat lower
- ㉗ Damper strut
- ㉘ Self-locking nut

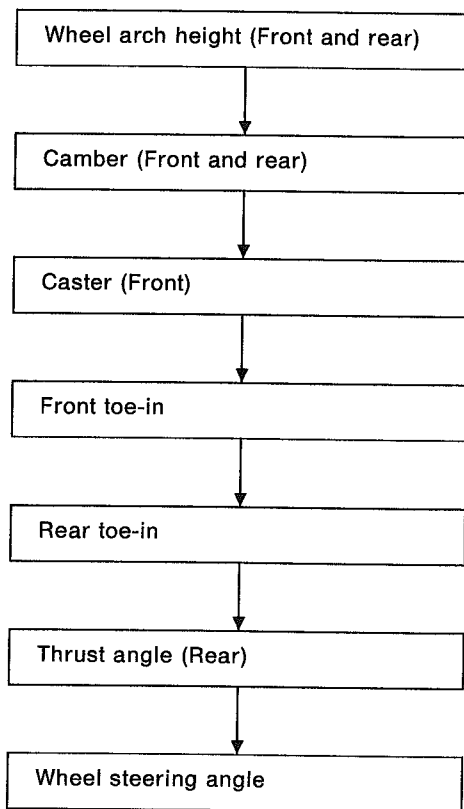
Tightening torque: N-m (kg-m, ft-lb)

T1:	20 ± 6 (2.0 ± 0.6, 14.5 ± 4.3)
T2:	25 ± 7 (2.5 ± 0.7, 18.1 ± 5.1)
T3:	44 ± 6 (4.5 ± 0.6, 32.5 ± 4.3)
T4:	59 ± 10 (6.0 ± 1.0, 43 ± 7)
T5:	98 ± 15 (10.0 ± 1.5, 72 ± 11)
T6:	98 ± 20 (10.0 ± 2.0, 72 ± 14)
T7:	113 ± 15 (11.5 ± 1.5, 83 ± 11)
T8:	127 ± 20 (13.0 ± 2.0, 94 ± 14)
T9:	137 ± 20 (14.0 ± 2.0, 101 ± 14)
T10:	196 ⁺³⁹ ₋₁₀ (20.0 ^{+4.0} _{-1.0} , 145 ⁺²⁹ ₋₇)

1. On-car Services

A: WHEEL ALIGNMENT PROCEDURES

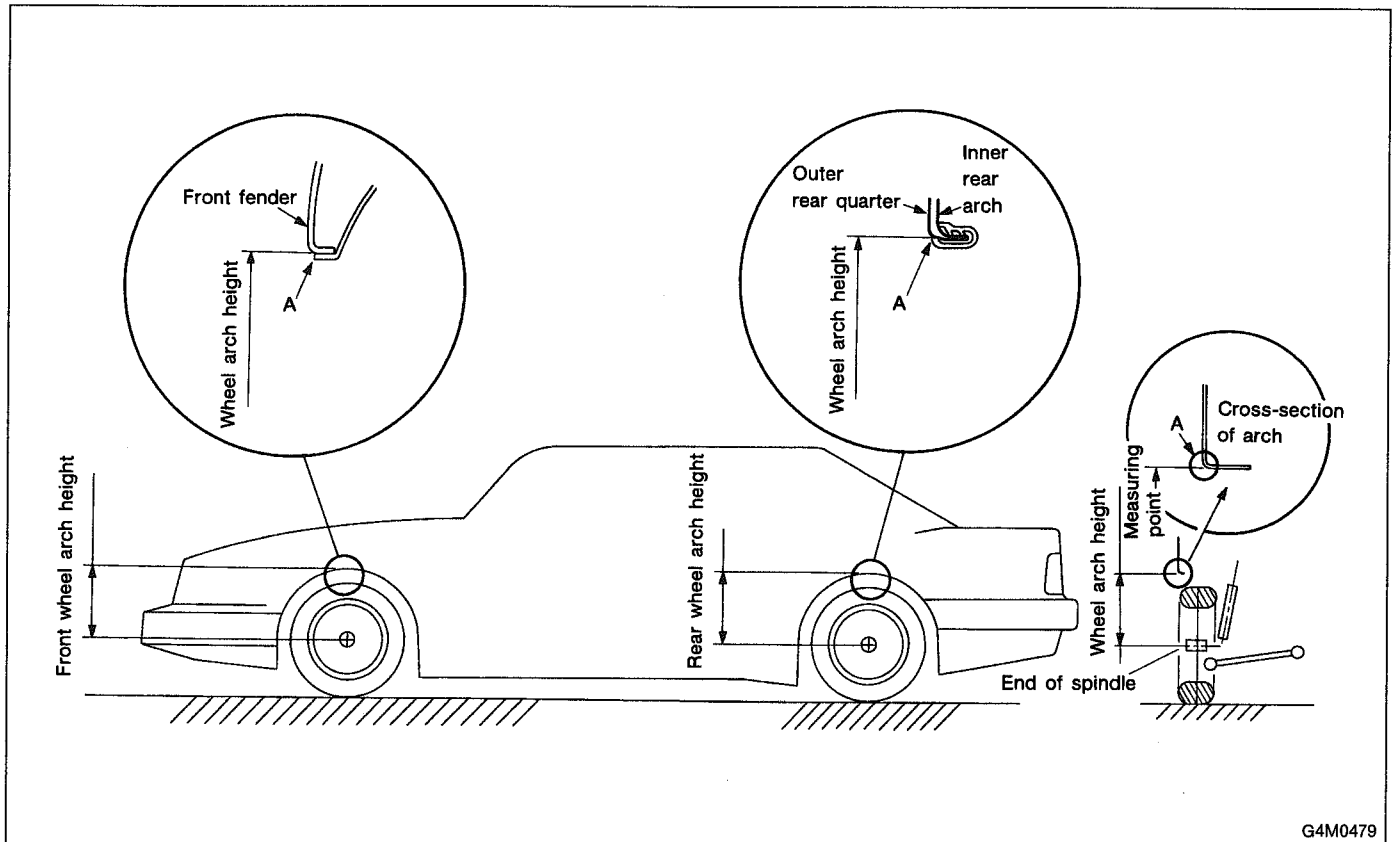
Check, adjust and/or measure wheel alignment in accordance with procedures indicated below:



B: INSPECTION AND ADJUSTMENT

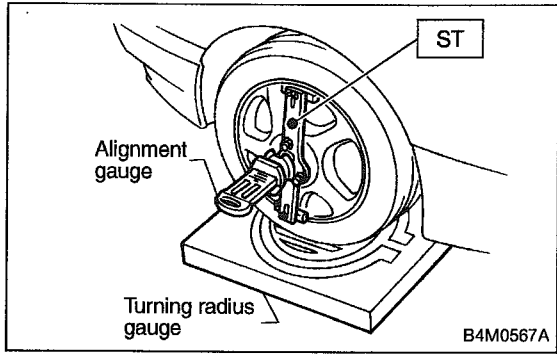
1. WHEEL ARCH HEIGHT

- 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.



G4M0479

Vehicles		Specified wheel arch height mm (in)	
		Front	Rear
Coupe, Sedan	AWD	391 ⁺¹² ₋₂₄ (15.39 ^{+0.47} _{-0.94})	379 ⁺¹² ₋₂₄ (14.92 ^{+0.47} _{-0.94})
Wagon	AWD	391 ⁺¹² ₋₂₄ (15.39 ^{+0.47} _{-0.94})	379 ⁺¹² ₋₂₄ (14.92 ^{+0.47} _{-0.94})
OUTBACK	AWD	394 ⁺¹² ₋₂₄ (15.51 ^{+0.47} _{-0.94})	386 ⁺¹² ₋₂₄ (15.20 ^{+0.47} _{-0.94})



2. CAMBER (FRONT AND REAR)

● Inspection

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

ST 927380000 ADAPTER

NOTE:

Refer to the "SPECIFICATIONS AND SERVICE DATA" for the camber values. <Ref. to 4-1 [S1B0].>

● Front camber adjustment

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

CAUTION:

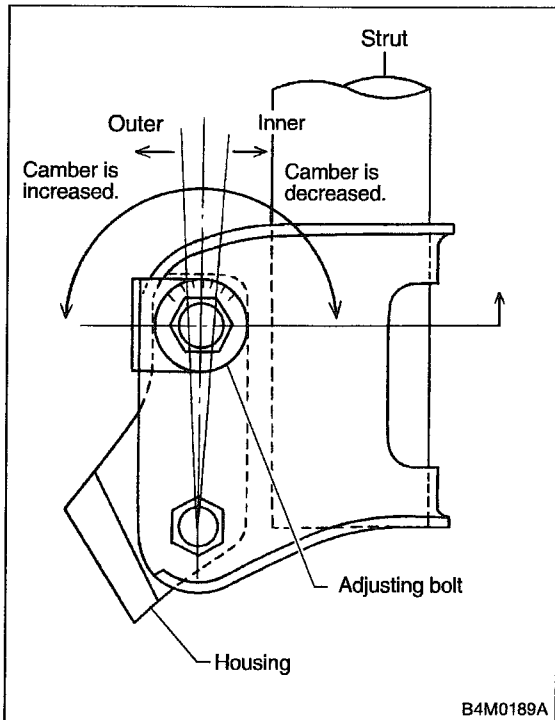
● When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.

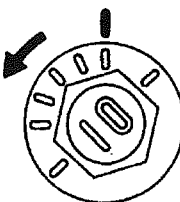
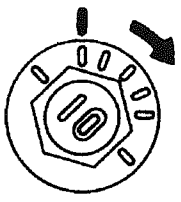
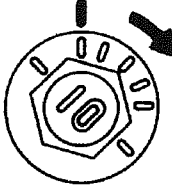
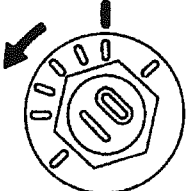
● Discard loosened self-locking nut and replace with a new one.

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

NOTE:

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

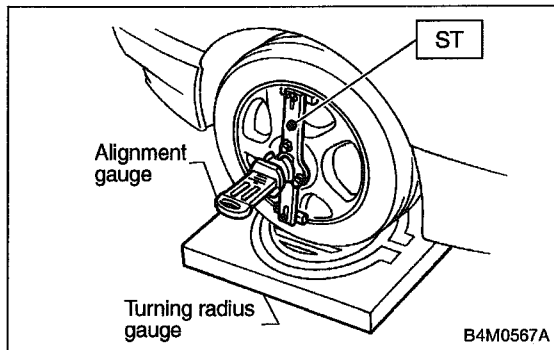


	Left side	Right side
Camber is increased.	 <p>Rotate counterclockwise.</p> <p>B4M0190</p>	 <p>Rotate clockwise.</p> <p>B4M0350</p>
Camber is decreased.	 <p>Rotate clockwise.</p> <p>B4M0350</p>	 <p>Rotate counterclockwise.</p> <p>B4M0190</p>

3) Tighten the two self-locking nuts.

Tightening torque:

$152 \pm 20 \text{ N}\cdot\text{m}$ ($15.5 \pm 2.0 \text{ kg}\cdot\text{m}$, $112 \pm 14 \text{ ft}\cdot\text{lb}$)



3. CASTER

● Inspection

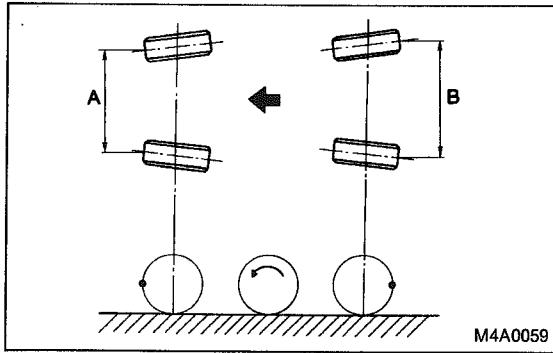
1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.

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

ST 927380000 ADAPTER

NOTE:

Refer to the "SPECIFICATIONS AND SERVICE DATA" for the caster value. <Ref. to 4-1 [S1B0].>



4. FRONT WHEEL TOE-IN

● Inspection

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

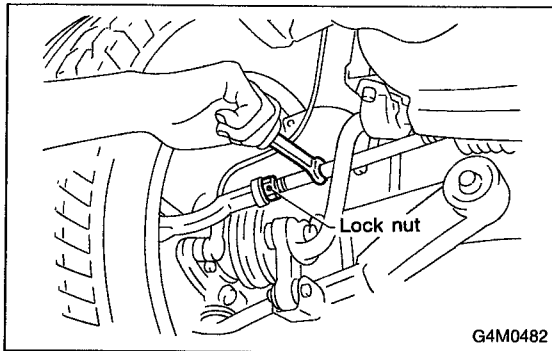
Toe-in: $0 \pm 3 \text{ mm}$ ($0 \pm 0.12 \text{ in}$)

- 2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance "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:

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



● Adjustment

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

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

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

- 3) Tighten tie-rod lock nut.

Tightening torque:

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

CAUTION:

Correct tie-rod boot, if it is twisted.

NOTE:

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

5. REAR WHEEL TOE-IN

● Inspection

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

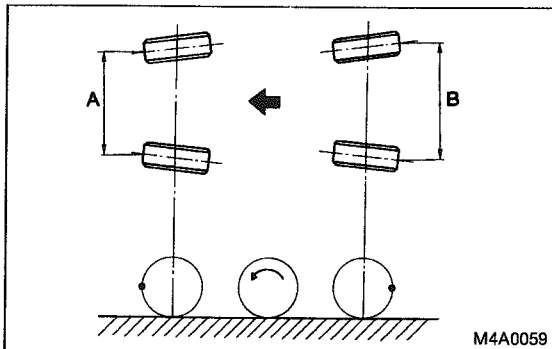
Toe-in: $0 \pm 3 \text{ mm}$ ($0 \pm 0.12 \text{ in}$)

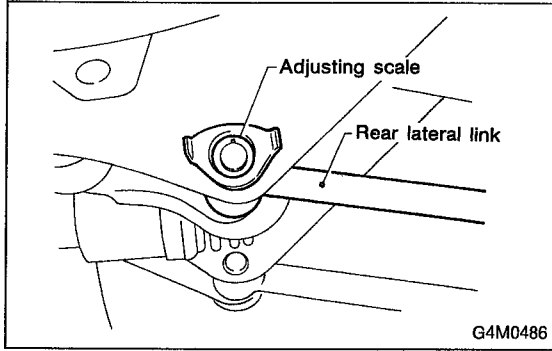
- 2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance "B" between marks.

- 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:

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





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

	Left side	Right side
Toe-in is increased.	<p>Rotate clockwise.</p> <p>B4M0192</p>	<p>Rotate counterclockwise.</p> <p>B4M0352</p>
Toe-in is decreased.	<p>Rotate counterclockwise.</p> <p>B4M0352</p>	<p>Rotate clockwise.</p> <p>B4M0192</p>

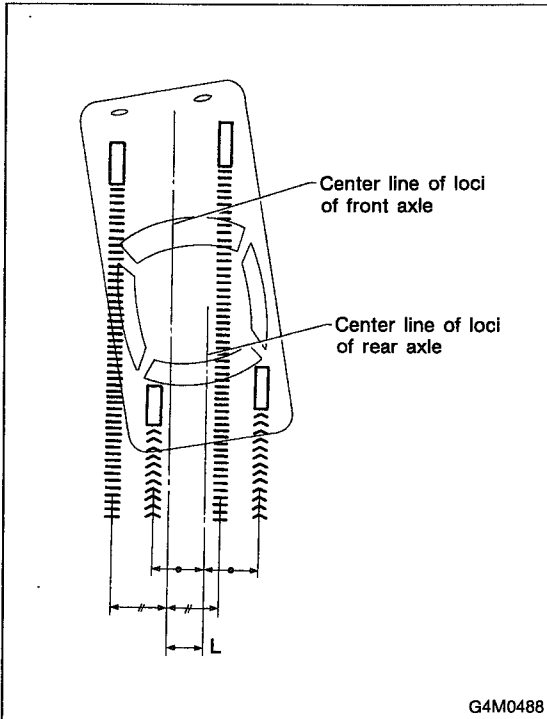
NOTE:

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).

- 3) Tighten self-locking nut.

Tightening torque:

98 ± 15 N·m (10 ± 1.5 kg-m, 72 ± 11 ft-lb)



6. THRUST ANGLE

● Inspection

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

Thrust angle:

Less than 20' when "L" is equal to or less than 15 mm (0.59 in).

● Adjustment

- 1) Make thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.

NOTE:

On FWD models, turn adjusting wheels one by one, by the same amount in the opposite direction of the adjusting bolts.

- 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.

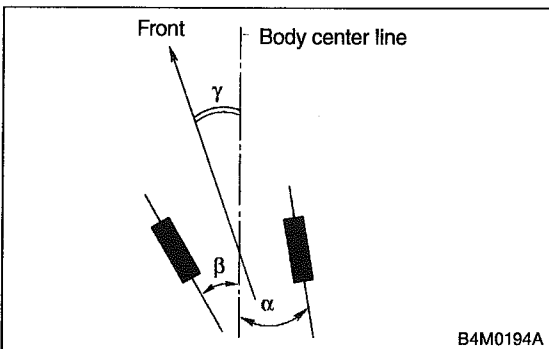
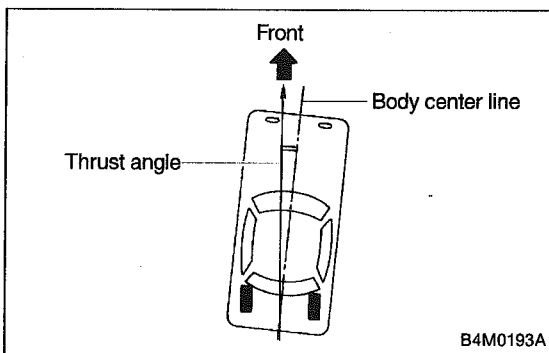
- 3) When left and right adjusting bolts are turned incrementally by one graduation in the same direction, the thrust angle of the AWD model will change approximately 10' ["L" is almost equal to 7.5 mm (0.295 in)] and the thrust angle of the FWD model will change approximately 12' ["L" is almost equal to 9 mm (0.35 in)].

Thrust angle:

0° ± 20'

NOTE:

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



Thrust angle: r

$$r = \frac{\alpha - \beta}{2}$$

α : Right rear wheel toe angle

β : Left rear wheel toe angle

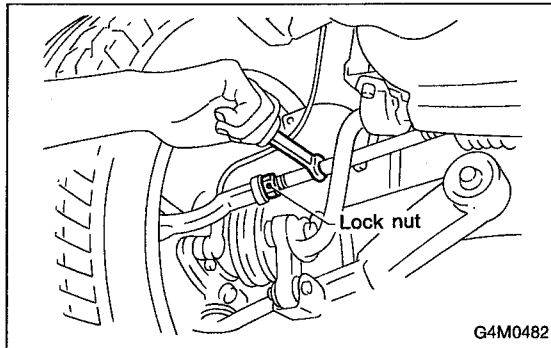
NOTE:

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

7. STEERING ANGLE

● Inspection

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

Steering angle:**Inner wheel** $37.4^{\circ} \pm 1.5^{\circ}$ **Outer wheel** $32.5^{\circ} \pm 1.5^{\circ}$ 

● Adjustment

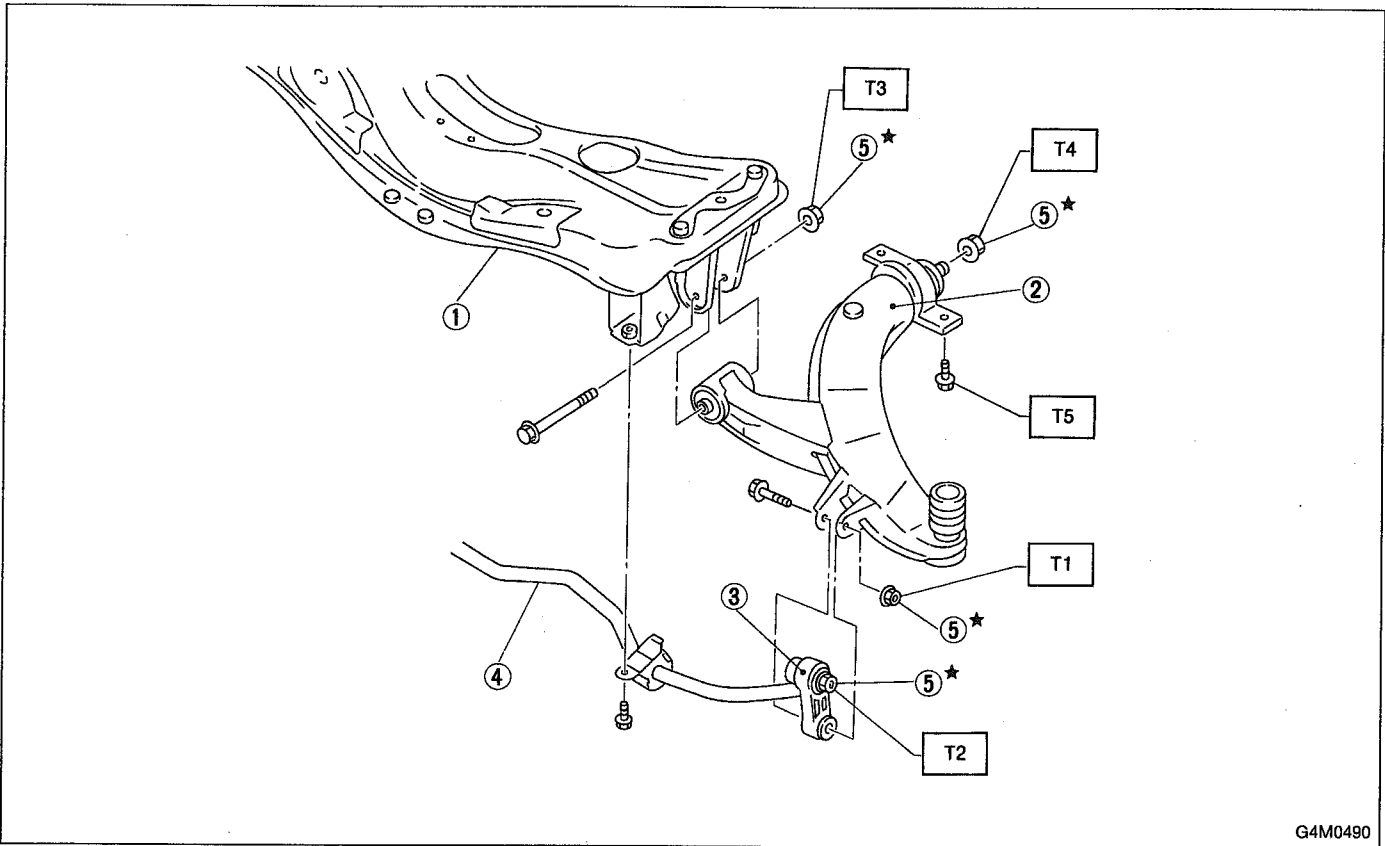
Turn tie-rod to adjust steering angle of both inner and outer wheels.

CAUTION:

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

2. Front Transverse Link

A: REMOVAL



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

Tightening torque: N·m (kg·m, ft·lb)

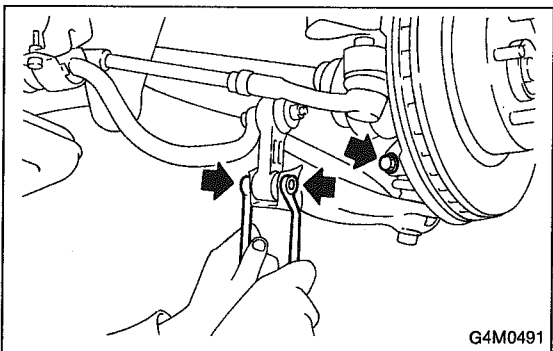
T1: 29 ± 5 (3.0 ± 0.5, 21.7 ± 3.6)

T2: 44 ± 6 (4.5 ± 0.6, 32.5 ± 4.3)

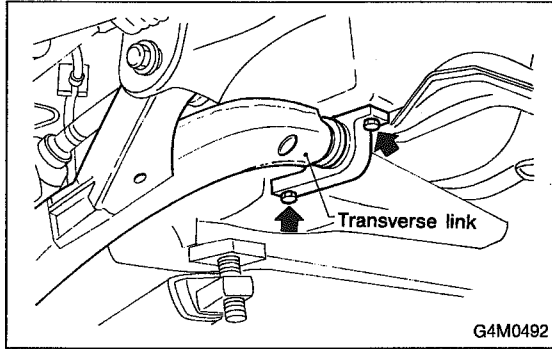
T3: 98 ± 15 (10.0 ± 1.5, 72 ± 11)

T4: 196 ± 25 (20.0 ± 2.5, 145 ± 18)

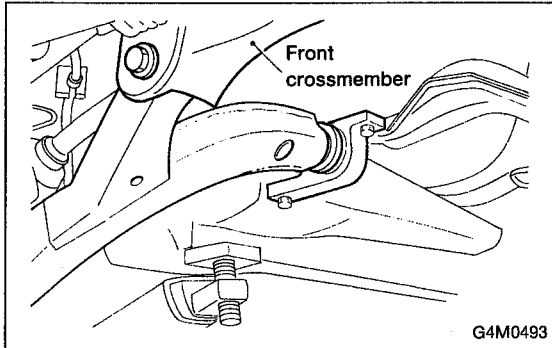
T5: 245 ± 49 (25.0 ± 5.0, 181 ± 36)



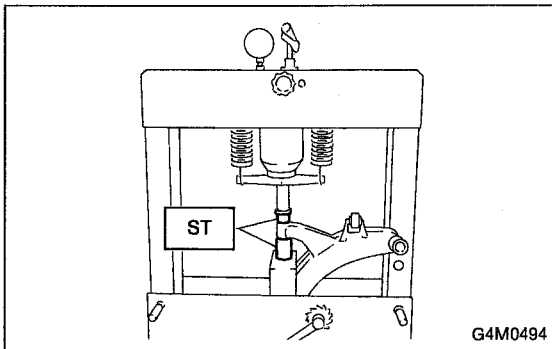
- 1) Disconnect stabilizer link from transverse link.
- 2) Remove bolt securing ball joint of transverse link to housing.



- 3) Remove nuts (do not remove bolts.) securing transverse link to crossmember.
- 4) Remove two bolts securing bushing bracket of transverse link to car body at rear bushing location.



- 5) Extract ball joint from housing.
- 6) Remove bolts securing transverse link to crossmember and extract transverse link from crossmember.

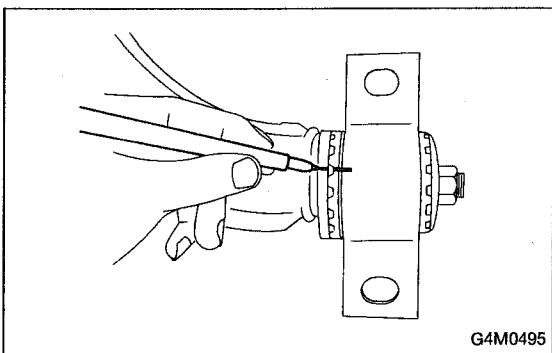


B: DISASSEMBLY

1. FRONT BUSHING

Using ST, press front bushing out of place.

ST 927680000 INSTALLER & REMOVER SET



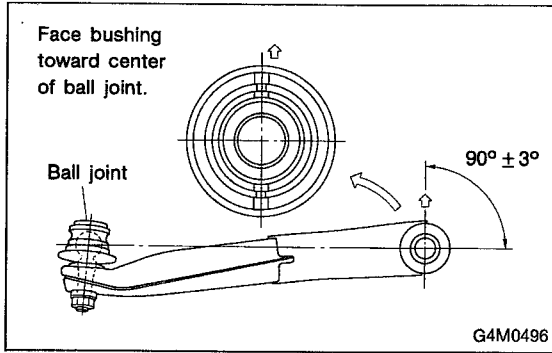
2. REAR BUSHING

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

C: INSPECTION

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

2. Front Transverse Link

**D: ASSEMBLY****1. FRONT BUSHING**

To reassemble, reverse disassembly procedures.

CAUTION:

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

2. REAR BUSHING

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

CAUTION:

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

Tightening torque:

$196 \pm 25 \text{ N}\cdot\text{m}$ ($20.0 \pm 2.5 \text{ kg}\cdot\text{m}$, $145 \pm 18 \text{ ft}\cdot\text{lb}$)

E: INSTALLATION

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

NOTE:

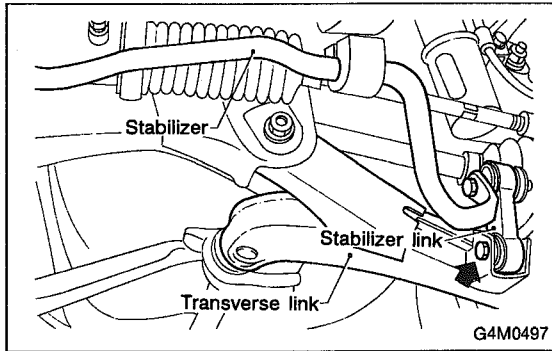
These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

- 2) Install bolts used to connect transverse link to cross-member and temporarily tighten with nuts.

CAUTION:

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

- 3) Insert ball joint into housing.



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

CAUTION:

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

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

- (1) Transverse link and stabilizer

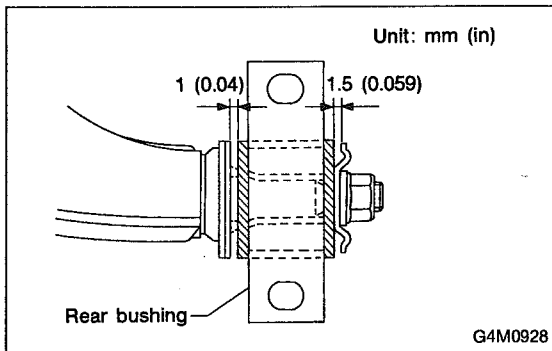
Tightening torque:

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

- (2) Transverse link and crossmember

Tightening torque:

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



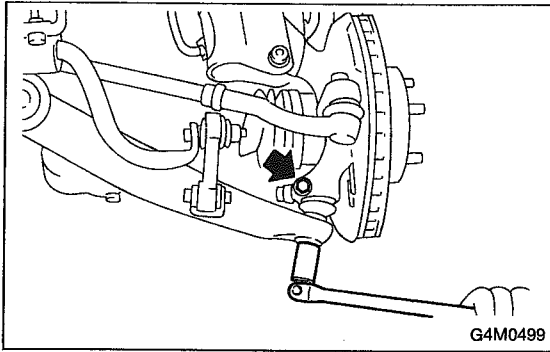
- (3) Transverse link rear bushing and body

Tightening torque:

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

NOTE:

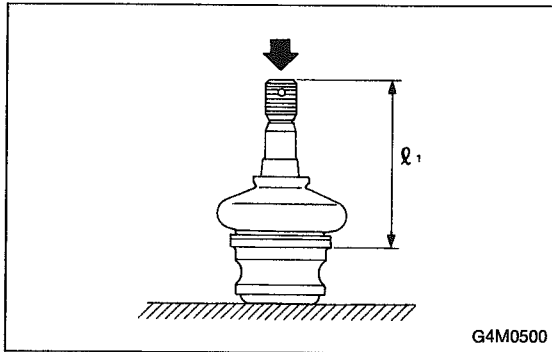
Move rear bushing back and forth until transverse link-to-rear bushing clearance is established (as indicated in figure.) before tightening.



3. Front Ball Joint

A: REMOVAL

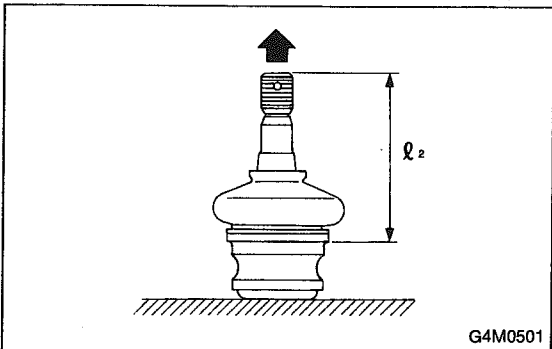
- 1) Remove the wheels.
- 2) Pull out the cotter pin from the ball stud, remove the castle nut, and extract the ball stud from the transverse link.
- 3) Remove the bolt securing the ball joint to the housing.
- 4) Extract the ball joint from the housing.



B: INSPECTION

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

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



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

(3) Calculate plays from the following formula.

$$S = l_2 - l_1$$

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

FRONT BALL JOINT

Specified play for replacement: S

Less than 0.3 mm (0.012 in)

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

C: INSTALLATION

- 1) Install ball joint onto housing.

Torque (Bolt):

49 N·m (5.0 kg-m, 36 ft-lb)

CAUTION:

Do not apply grease to tapered portion of ball stud.

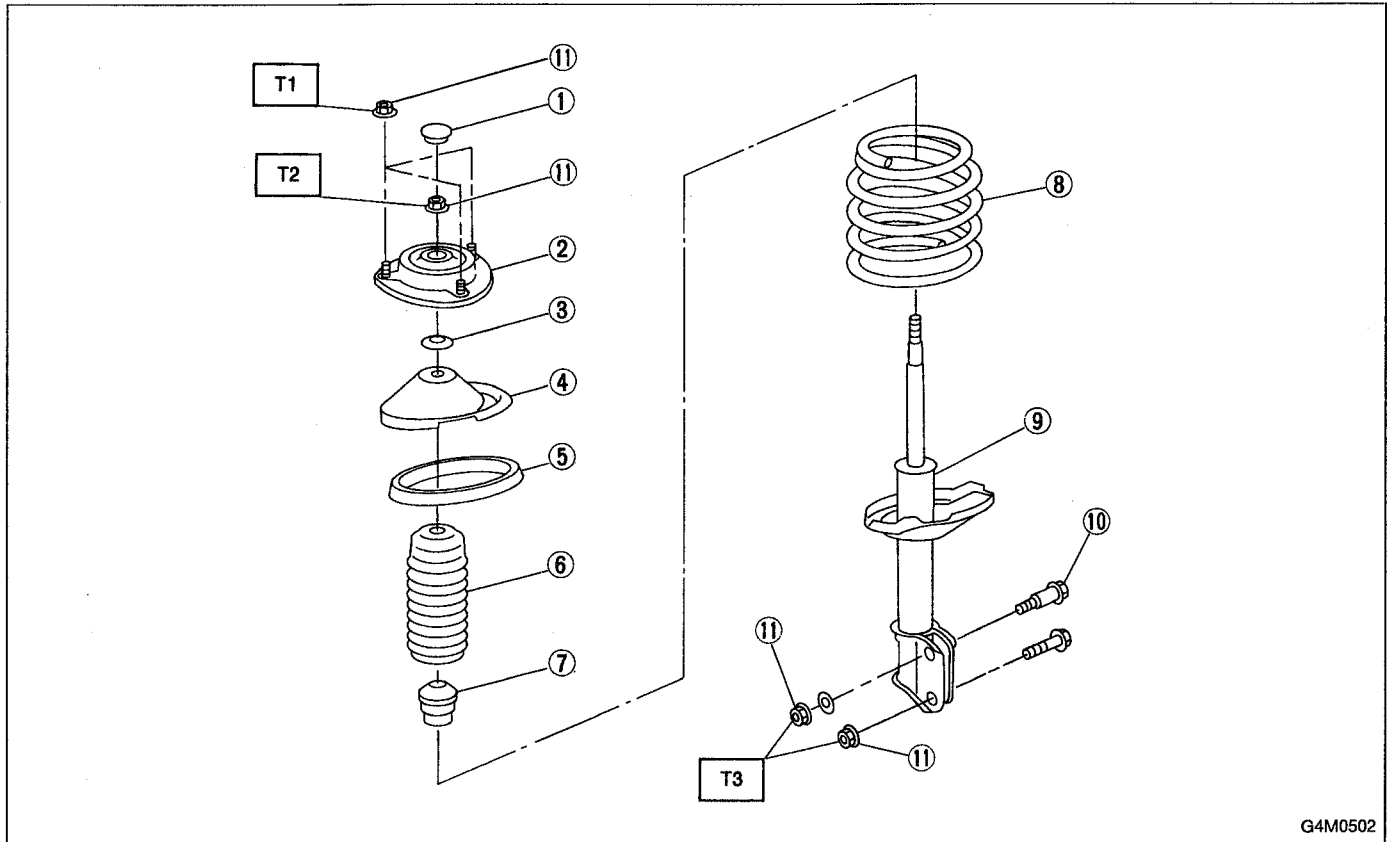
- 2) Connect ball joint to transverse link.

Torque (Castle nut):

39 N·m (4.0 kg-m, 29 ft-lb)

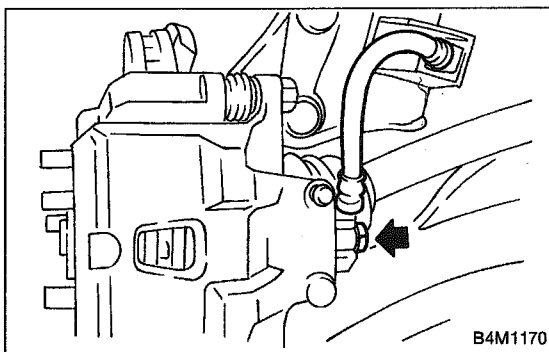
- 3) Retighten castle nut further within 60° until a slot in castle nut is aligned with the hole in ball stud end, then insert new cotter pin and bend it around castle nut.
- 4) Install front wheels.

4. Front Strut
A: REMOVAL



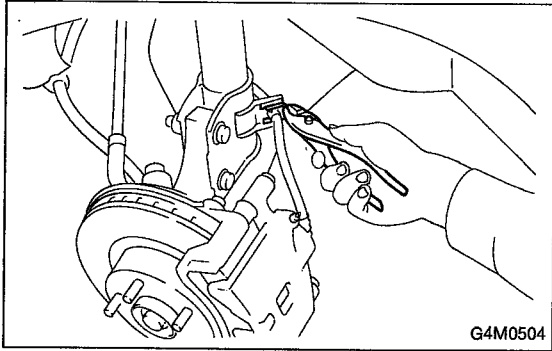
- | | |
|---------------------|--------------------|
| ① Dust seal | ⑦ Helper |
| ② Strut mount | ⑧ Coil spring |
| ③ Spacer | ⑨ Damper strut |
| ④ Upper spring seat | ⑩ Adjusting bolt |
| ⑤ Rubber seat | ⑪ Self-locking nut |
| ⑥ Dust cover | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 20 ± 6 (2.0 ± 0.6, 14.5 ± 4.3)
T2: 49 ⁺¹⁰/₀ (5.0 ⁺¹⁰/₀, 36 ⁺⁷/₀)
T3: 152 ± 20 (15.5 ± 2.0, 112 ± 14)



- 1) Remove wheel.
- 2) Depress brake pedal and hold it down using a wooden block etc.
- 3) Remove union bolts from caliper.

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



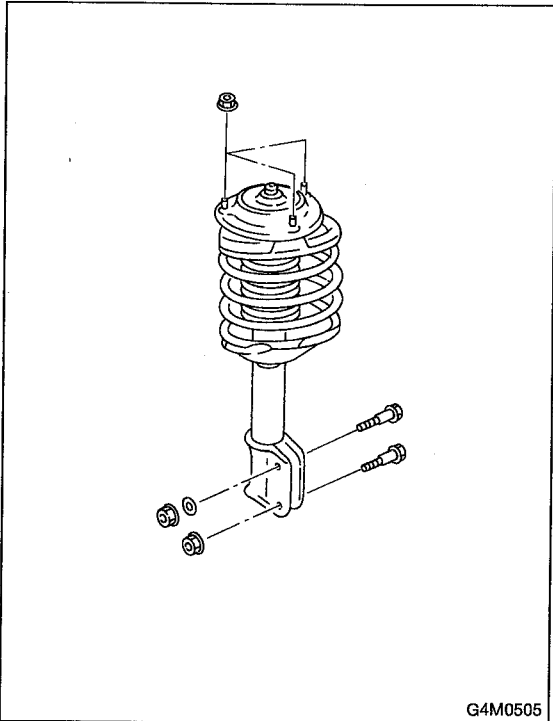
- 4) Remove brake hose clamp and disconnect brake hose from strut. Attach brake hose to body using gum tape.
- 5) Scribe an alignment mark on the camber adjusting bolt which secures strut to housing.
- 6) Remove bolt securing the ABS sensor harness on models equipped with ABS.

- 7) Remove two bolts securing housing to strut.

CAUTION:

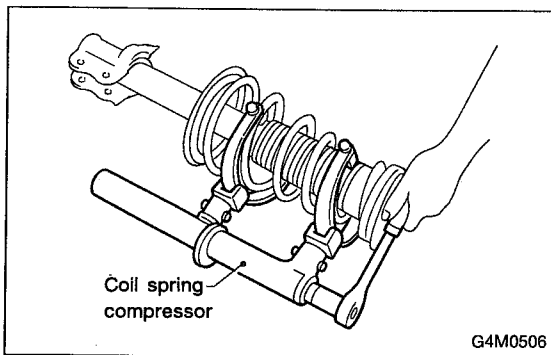
While holding head of adjusting bolt, loosen self-locking nut.

- 8) Remove the three nuts securing strut mount to body.



B: DISASSEMBLY

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



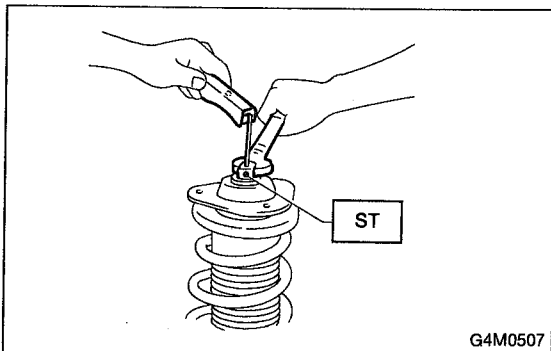
- 2) Using ST, remove self-locking nut.

ST 927760000 STRUT MOUNT SOCKET

- 3) Remove strut mount, upper spring seat and rubber seat from strut.

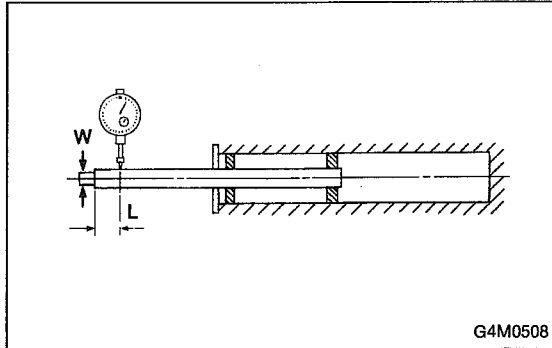
- 4) Gradually decreasing compression force, and remove coil spring.

- 5) Remove dust cover and helper spring.



C: INSPECTION

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

**1. DAMPER STRUT**

1) Check for oil leakage.
2) Move the piston rod up and down to check its operates smoothly without any binding.

3) Play of piston rod

● Measure the play as follows:

Fix outer shell and fully extend the rod. Set a dial gauge at the end of the rod: L [10 mm (0.39 in)], then apply a force of: W [± 20 N (± 2 kg, ± 4 lb)] to threaded portion. With the force of ± 20 N (± 2 kg, ± 4 lb) applied, read both dial gauge readings, P_1 and P_2 . The free play is determined by the following equation:

Limit of play:

Less than 0.8 mm (0.031 in)

If the play is greater, replace the strut.

2. STRUT MOUNT

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

3. DUST COVER

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

4. COIL SPRING

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

5. HELPER

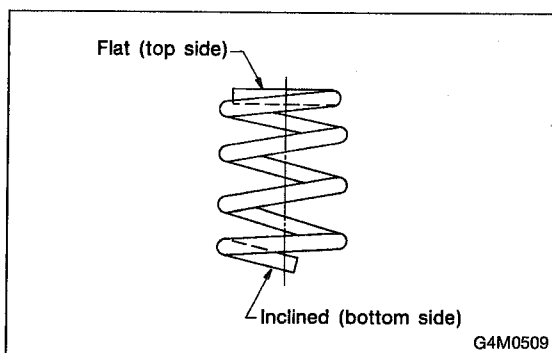
Replace it with new one if cracked or damaged.

D: ASSEMBLY

- 1) Before installing coil spring, strut mount, etc., on the strut, check for the presence of air in the dampening force generating mechanism of the strut since air prevents proper dampening force from being produced.
- 2) Checking for the presence of air
 - (1) Place the strut vertically with the piston rod facing up.
 - (2) Move the piston rod to the center of its entire stroke.
 - (3) While holding the piston rod end with fingertips, move the rod up and down.
 - (4) If the piston rod moves at least 10 mm (0.39 in) in step (3), 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 steps (1) through (4) above 3 or 4 times.

NOTE:

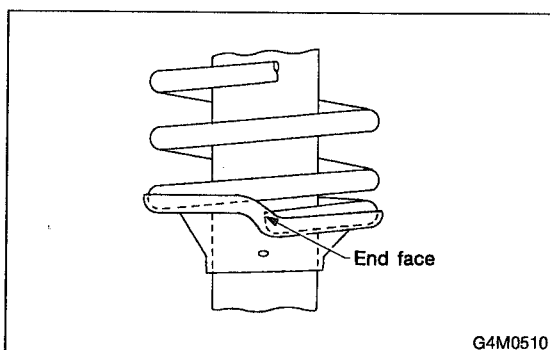
After completely purging air from the strut, be sure to place the strut with the piston rod facing up. If it is laid down, check for entry of air in the strut as outlined under item 2) above.



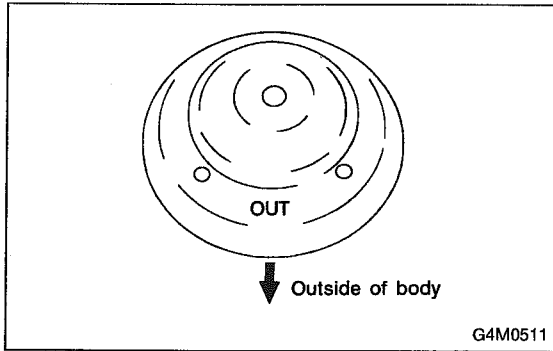
- 4) Using a coil spring compressor, compress the coil spring.

NOTE:

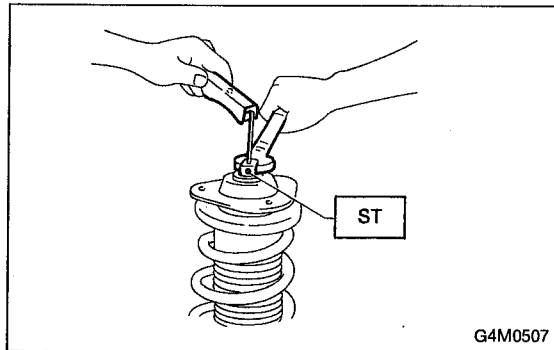
Make sure that the vertical installing direction of coil spring is as shown in figure.



- 5) Set the coil spring correctly so that its end face fits well into the spring seat as shown.
- 6) Install helper and dust cover to the piston rod.



G4M0511



G4M0507

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

NOTE:

Ensure that upper spring seat is positioned with "OUT" mark facing outward.

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) Loosen the coil spring carefully.

10) Using hexagon wrench to prevent strut rod from turning, tighten self-locking nut with ST.

Tightening torque:

49^{+10}_{-0} N·m ($5.0^{+1.0}_{-0}$ kg-m, 36^{+7}_{-0} ft-lb)

ST 927760000 STRUT MOUNT SOCKET

E: INSTALLATION

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

Tightening torque:

20 ± 6 N·m (2.0 ± 0.6 kg-m, 14.5 ± 4.3 ft-lb)

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

Tightening torque:

152 ± 20 N·m (15.5 ± 2.0 kg-m, 112 ± 14 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:

152 ± 20 N·m (15.5 ± 2.0 kg-m, 112 ± 14 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 ± 3 N·m (1.8 ± 0.3 kg-m, 13.0 ± 2.2 ft-lb)

CAUTION:

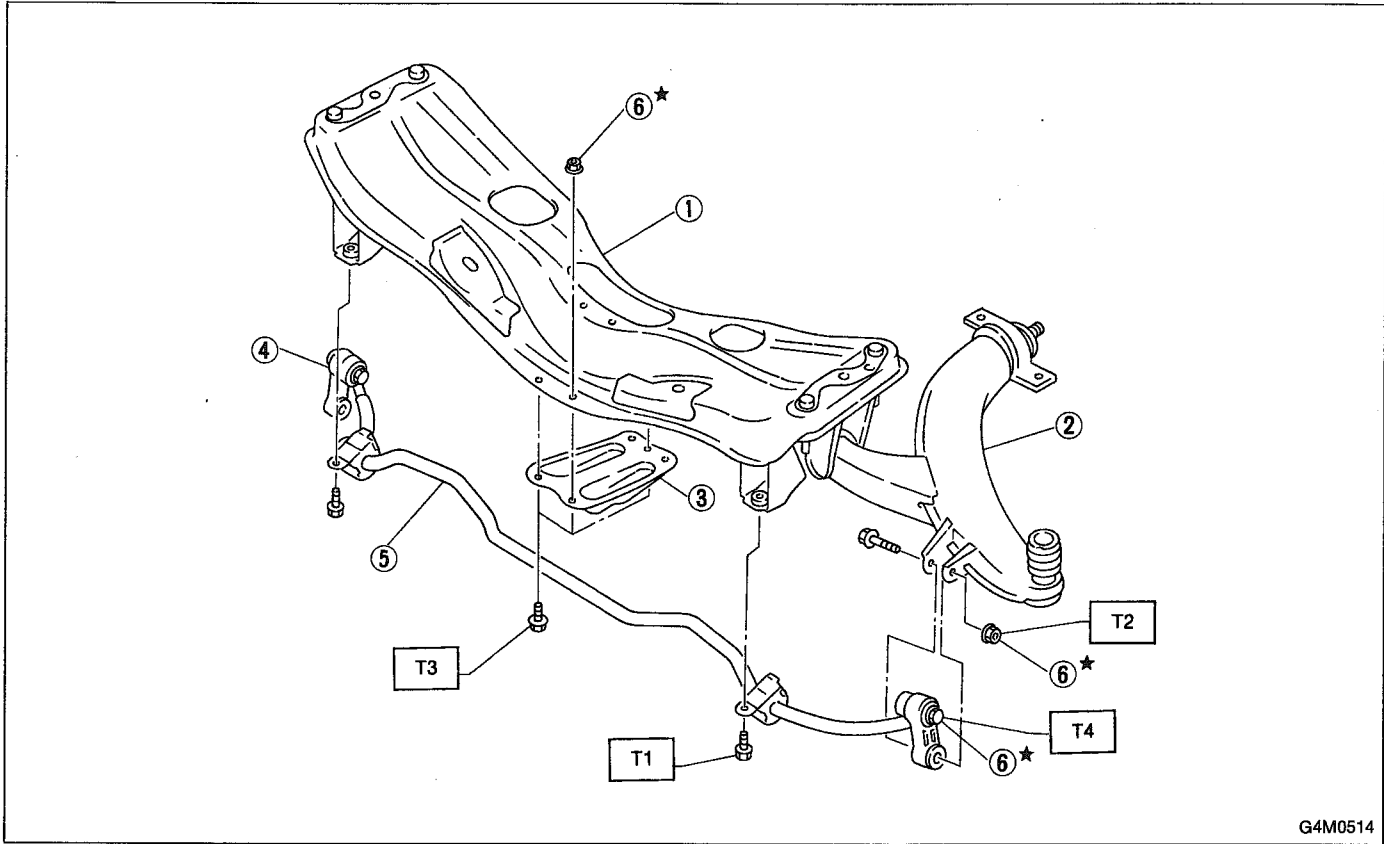
Be sure to bleed air from brake system.

6) Install wheels.

NOTE:

Check wheel alignment and adjust if necessary.

5. Front Stabilizer



- ① Front crossmember
- ② Transverse link
- ③ Jack-up plate
- ④ Stabilizer link
- ⑤ Front stabilizer
- ⑥ Self-locking nut

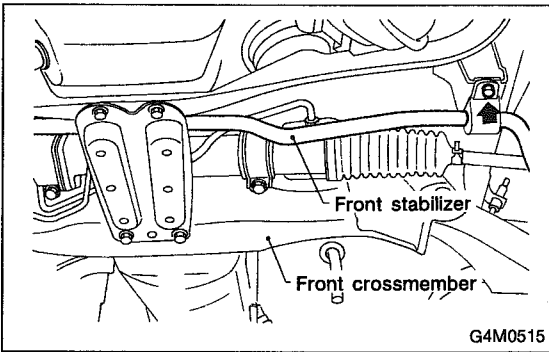
Tightening torque: N·m (kg·m, ft·lb)

T1: 25 ± 4 (2.5 ± 0.4, 18.1 ± 2.9)

T2: 29 ± 5 (3.0 ± 0.5, 21.7 ± 3.6)

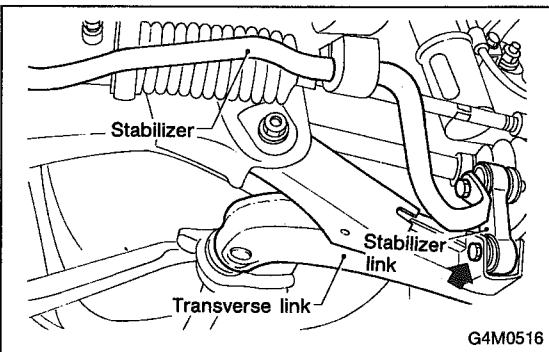
T3: 32 ± 10 (3.3 ± 1.0, 24 ± 7)

T4: 44 ± 6 (4.5 ± 0.6, 32.5 ± 4.3)



A: REMOVAL

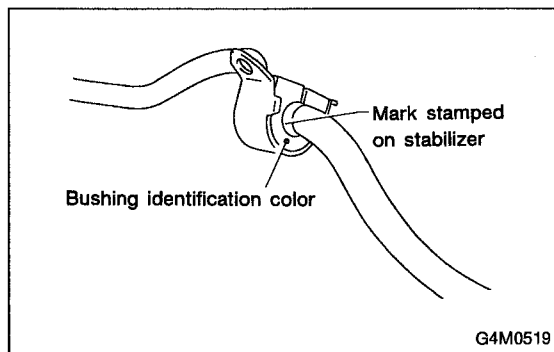
- 1) Jack-up the front part of the vehicle, support it with safety stands (rigid racks).
- 2) Remove bolts which secure stabilizer to crossmember.



- 3) Remove bolts which secure stabilizer link to front transverse link.
- 4) Remove jack-up plate from lower part of crossmember.

B: INSPECTION

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

**C: INSTALLATION**

- 1) To install, reverse the removal procedure.

NOTE:

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

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

- 3) Tightening torque:

Jack-up plate to crossmember:

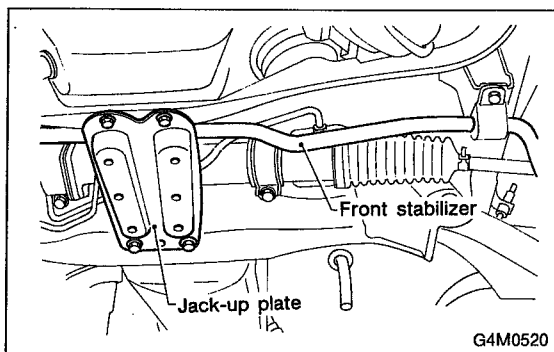
$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

Stabilizer link to front transverse link:

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

Stabilizer to crossmember:

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



6. Front Crossmember

A: REMOVAL

- 1) Disconnect ground cable from battery.
- 2) Loosen front wheel nuts.
- 3) Jack-up vehicle, support it with safety stands (rigid racks), and remove front tires and wheels.
- 4) Remove both stabilizer and jack-up plate.
- 5) Disconnect tie-rod end from housing.
- 6) Remove front exhaust pipe.
- 7) Remove front transverse link from front crossmember.
- 8) Remove nuts attaching engine mount cushion rubber to crossmember.
- 9) Remove self-locking nuts connecting steering U/J and pinion shaft.
- 10) Lift engine by approx. 10 mm (0.39 in) by using chain block.
- 11) Support crossmember with a jack, remove nuts securing crossmember to body and lower crossmember gradually along with steering gearbox.

CAUTION:

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

B: INSTALLATION

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

CAUTION:

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

- 2) Tightening torque

Transverse link bushing to crossmember:

98 ± 15 N·m (10.0 ± 1.5 kg·m, 72 ± 11 ft·lb)

Stabilizer to bush:

25 ± 4 N·m (2.5 ± 0.4 kg·m, 18.1 ± 2.9 ft·lb)

Tie-rod end to housing:

27.0 ± 2.5 N·m (2.75 ± 0.25 kg·m, 19.9 ± 1.8 ft·lb)

Front cushion rubber to crossmember:

69 ± 15 N·m (7.0 ± 1.5 kg·m, 51 ± 11 ft·lb)

Universal joint to pinion shaft:

24 ± 3 N·m (2.4 ± 0.3 kg·m, 17.4 ± 2.2 ft·lb)

Crossmember to body:

98 ± 15 N·m (10.0 ± 1.5 kg·m, 72 ± 11 ft·lb)

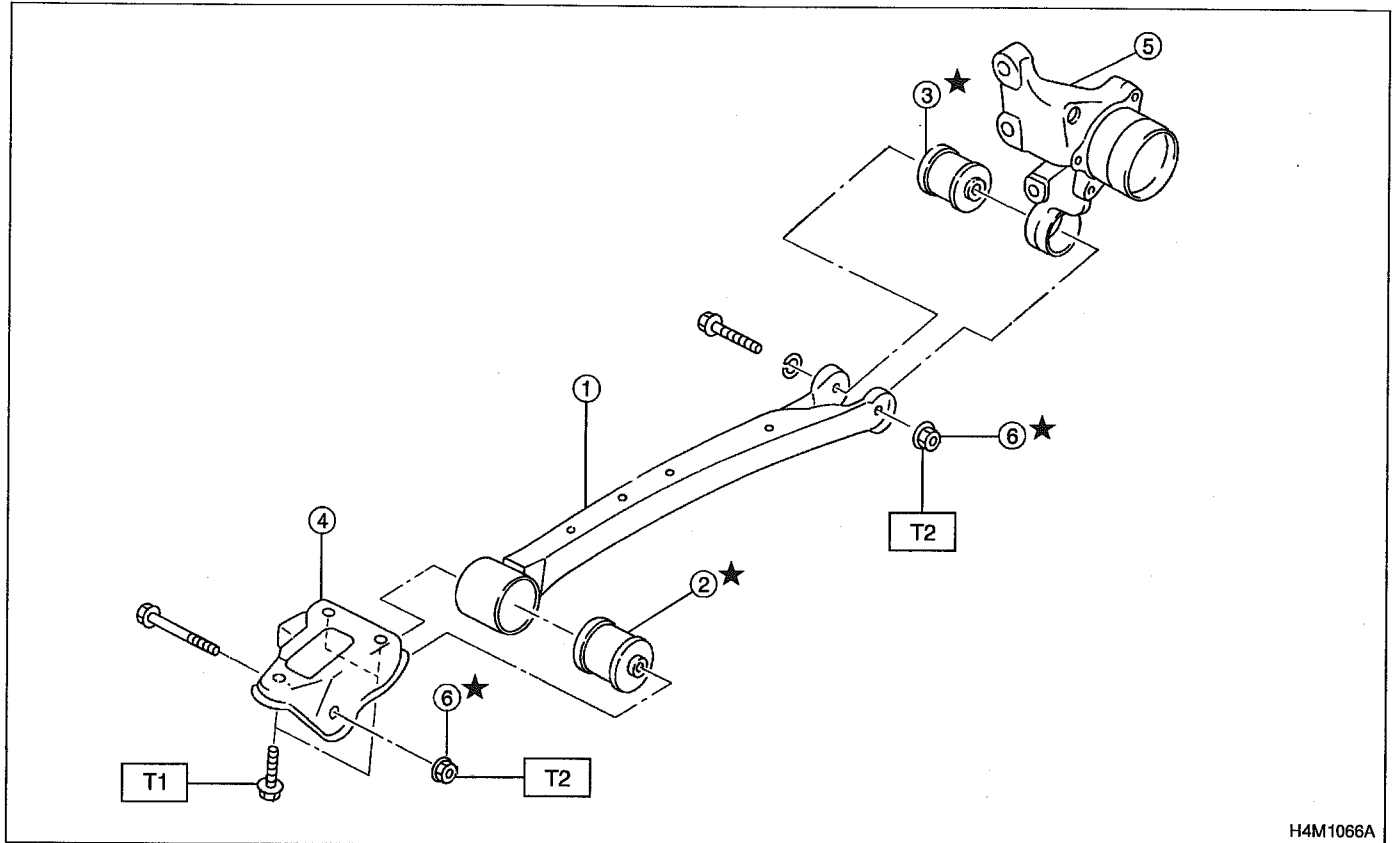
- 3) Purge air from power steering system.

NOTE:

Check wheel alignment and adjust if necessary.

7. Rear Trailing Link

A: REMOVAL



H4M1066A

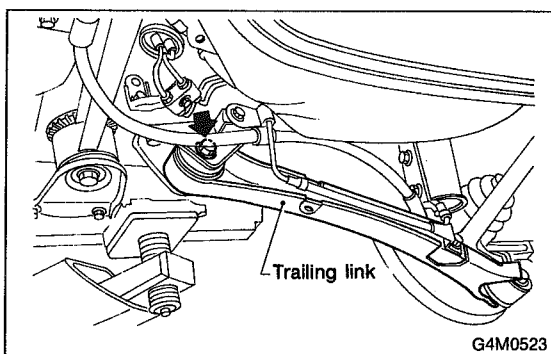
- ① Trailing link
- ② Front bushing
- ③ Rear bushing
- ④ Bracket
- ⑤ Housing
- ⑥ Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

T1: 98 ± 20 (10.0 ± 2.0, 72 ± 14)

T2: 113 ± 15 (11.5 ± 1.5, 83 ± 11)

- 1) Loosen rear wheel nuts.
- 2) Jack-up vehicle, support it with safety stands (rigid racks) and remove rear wheels.
- 3) Remove both rear parking brake clamp and ABS sensor harness. (only vehicle equipped with ABS)



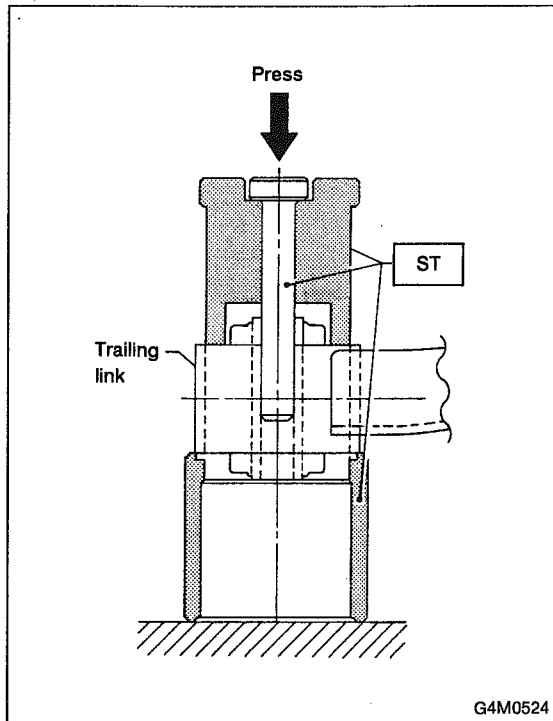
G4M0523

- 4) Remove bolt which secure trailing link to trailing link bracket.
- 5) Remove bolt which secure trailing link to rear housing.

B: DISASSEMBLY**1. FRONT BUSHING**

Using ST, press front bushing out of place.

ST 927720000 INSTALLER & REMOVER SET



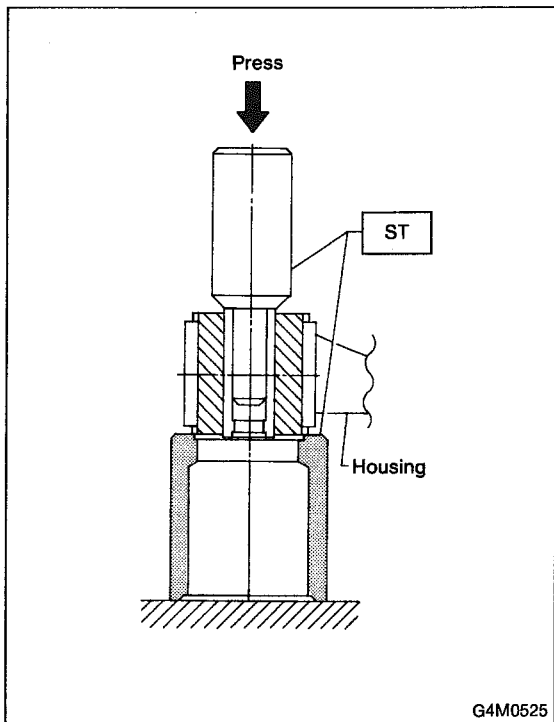
G4M0524

2. REAR BUSHING

1) Remove housing. <Ref. to 4-2 [W2A0].>

2) Using ST, press rear bushing out of place.

ST 927730000 INSTALLER & REMOVER SET



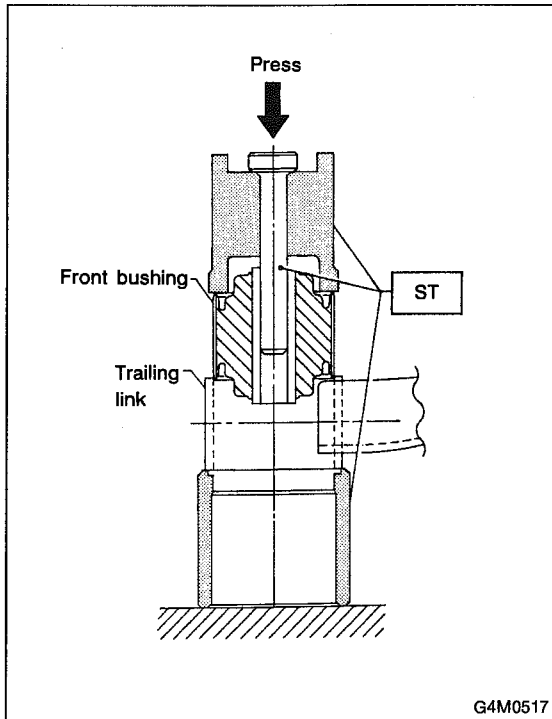
G4M0525

C: INSPECTION

Check trailing links for bends, corrosion or damage.

D: ASSEMBLY

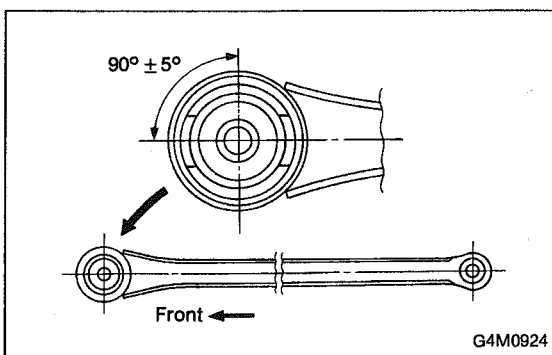
To assemble, reverse above disassembly procedures.



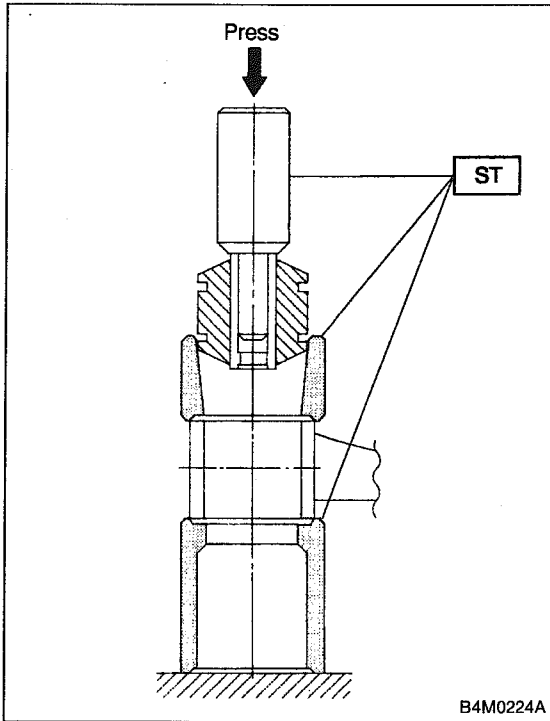
1. FRONT BUSHING

Using ST, press bushing into trailing link.

ST 927720000 INSTALLER & REMOVER SET



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



2. REAR BUSHING

1) Using ST, press bushing into trailing link.

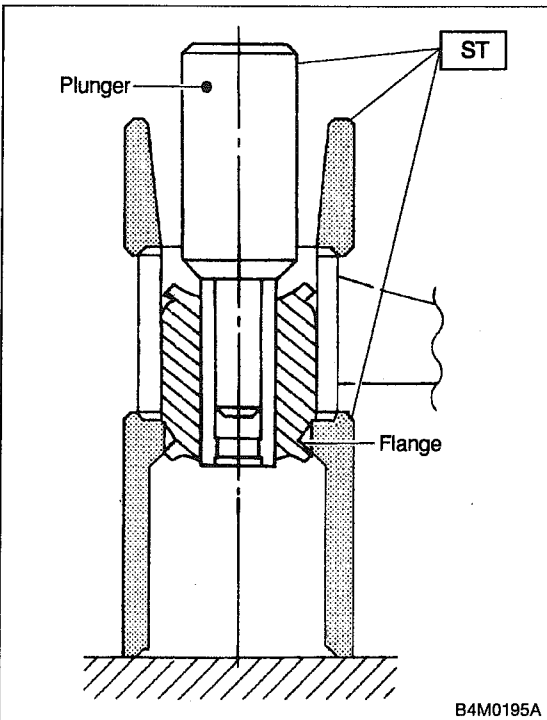
ST 927730000 INSTALLER & REMOVER SET

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.

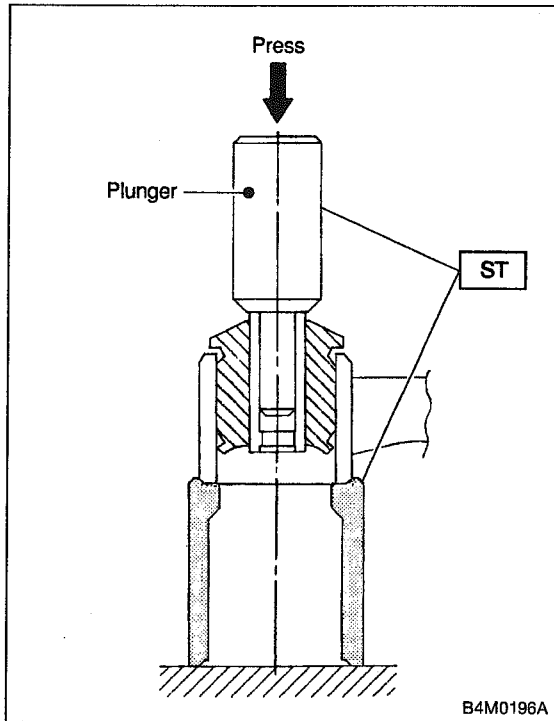
Specified lubricant:

TIRE LUBE : water = 1 : 3



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

ST 927730000 INSTALLER & REMOVER SET



3) Turn trailing link upside down. Press ST plunger in the direction opposite that outlined in step 2) until bushing is correctly positioned in trailing link.

ST 927730000 INSTALLER & REMOVER SET

E: INSTALLATION

Installation is in the reverse order of removal.

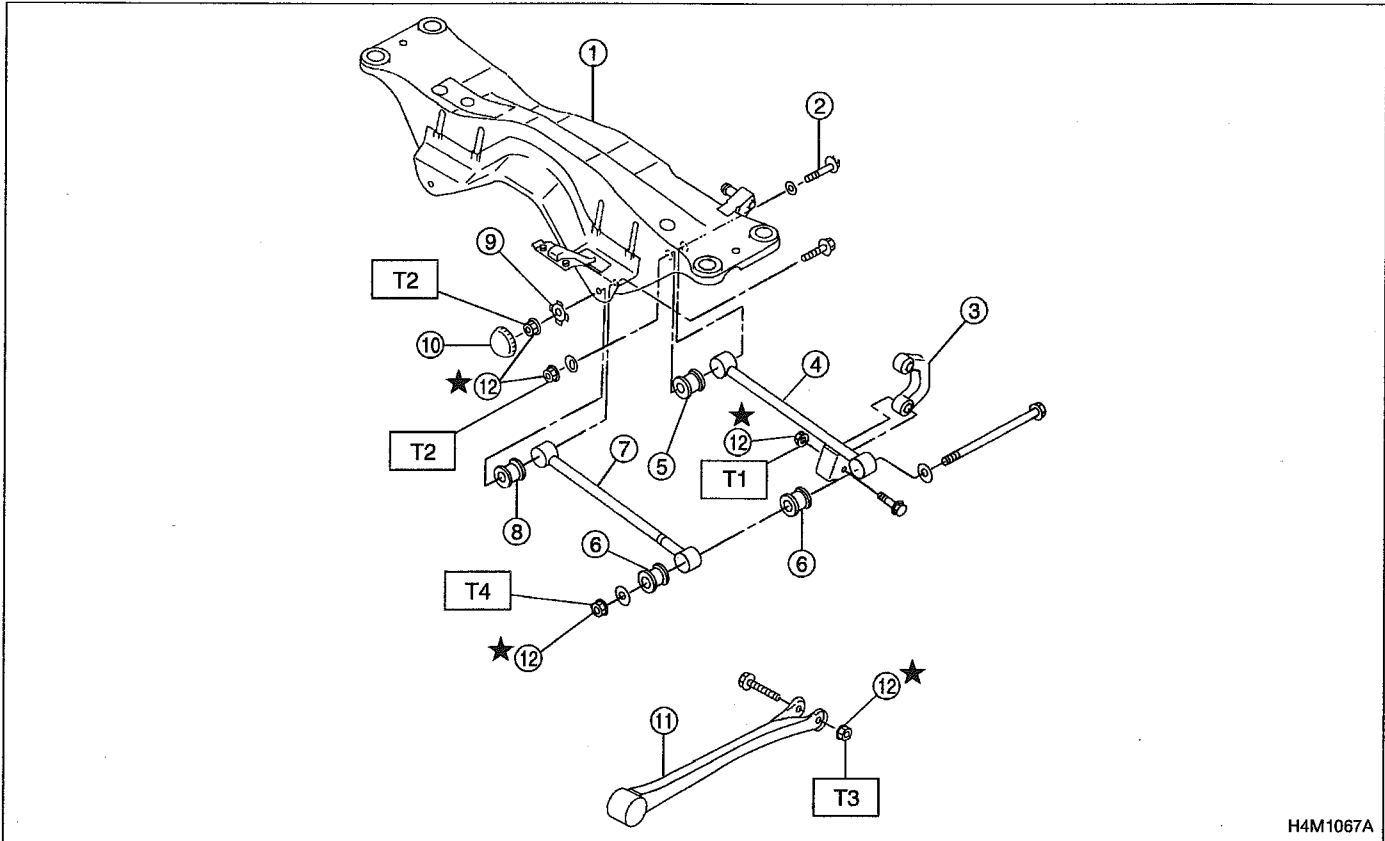
CAUTION:

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.

8. Lateral Link



H4M1067A

- ① Crossmember
- ② Adjusting bolt
- ③ Stabilizer link
- ④ Rear lateral link
- ⑤ Bushing (C)
- ⑥ Bushing (A)

- ⑦ Front lateral link
- ⑧ Bushing (B)
- ⑨ Washer
- ⑩ Cap
- ⑪ Trailing link
- ⑫ Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

T1: 44 ± 6 (4.5 ± 0.6, 32.5 ± 4.3)

T2: 98 ± 15 (10.0 ± 1.5, 72 ± 11)

T3: 113 ± 15 (11.5 ± 1.5, 83 ± 11)

T4: 137 ± 20 (14.0 ± 2.0, 101 ± 14)

A: REMOVAL

- 1) Loosen wheel nuts. Jack-up vehicle and remove wheel.
- 2) Remove stabilizers.
- 3) (Models equipped with ABS)
Remove ABS sensor harness from trailing link.
- 4) Remove bolts which secure lateral link assembly to rear housing.

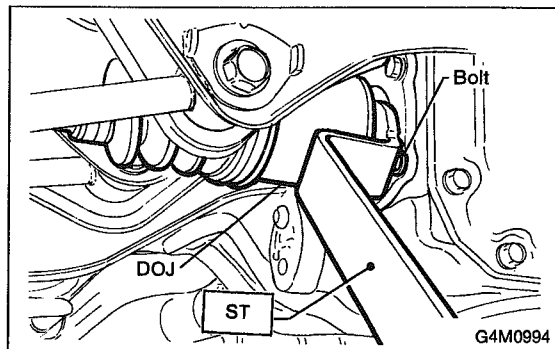
CAUTION:

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

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

CAUTION:

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

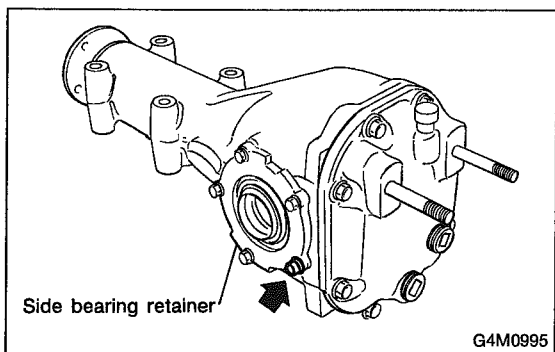


6) Remove DOJ from rear differential using ST. (2200 cc MT model)

ST 28099PA100 DRIVE SHAFT REMOVER

CAUTION:

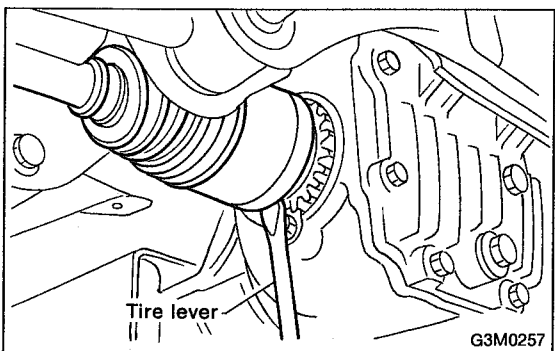
Do not remove circlip attached to inside of differential.



CAUTION:

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

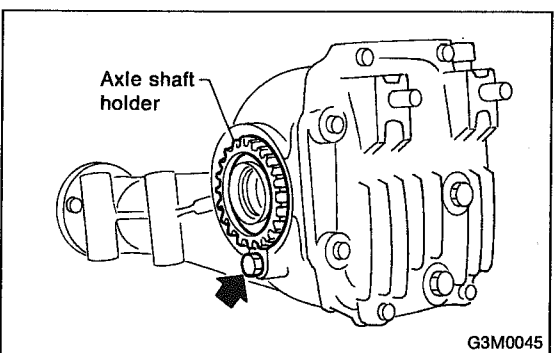
ST 28099PA100 DRIVE SHAFT REMOVER



7) Remove DOJ from rear differential using tire lever. (Except 2200 cc MT model)

NOTE:

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



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.

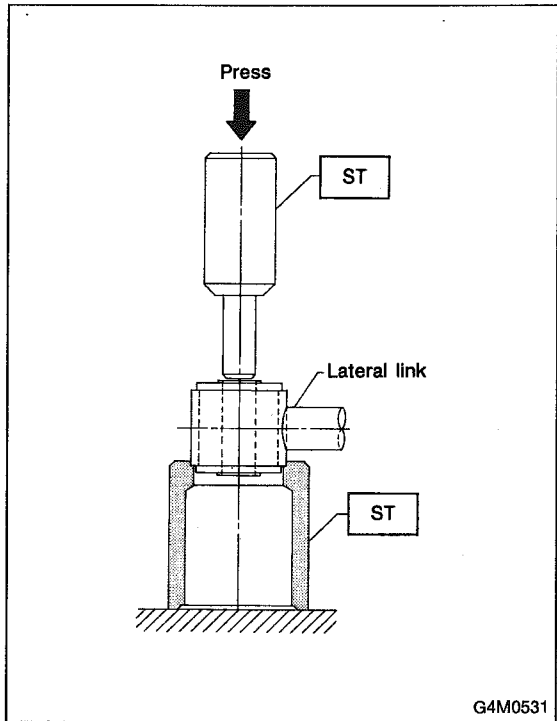
8) Scribe an alignment mark on rear lateral link adjusting bolt and crossmember.

9) Remove outer lateral link bolt securing lateral link to housing.

10) 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.



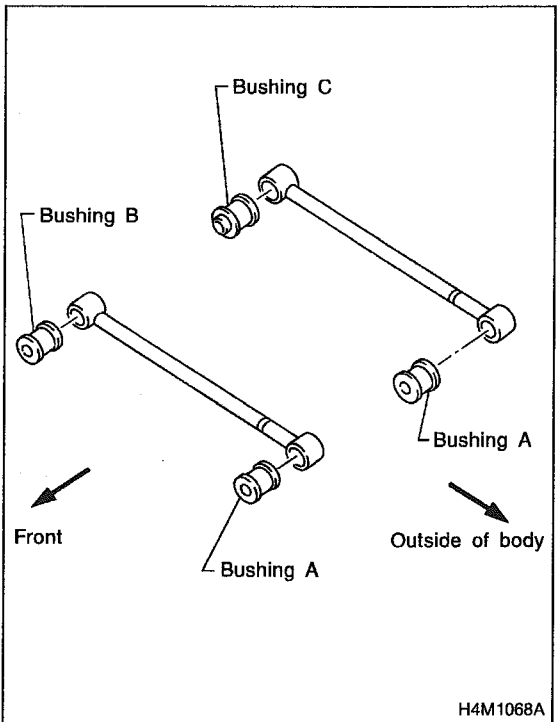
B: DISASSEMBLY

Using ST, press bushing out of place.

NOTE:

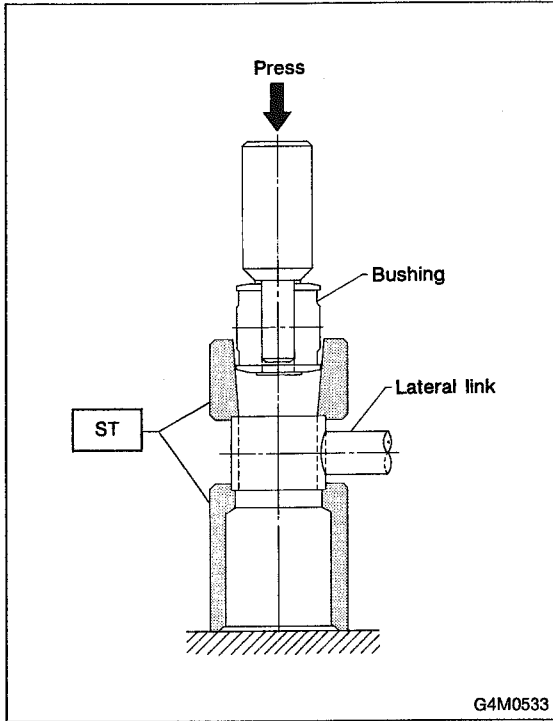
- Using the following figure as a guide, verify the type of bushings.
- Select ST according to the type of bushings used.

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



C: INSPECTION

Visually check lateral links for damage or bends.



D: ASSEMBLY

1) Using ST, press bushing into place.

CAUTION:

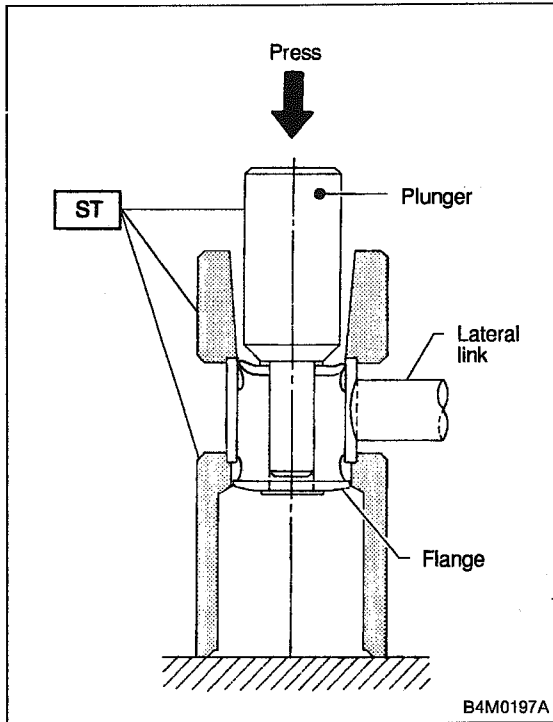
Select ST according to the type of bushings used.

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:

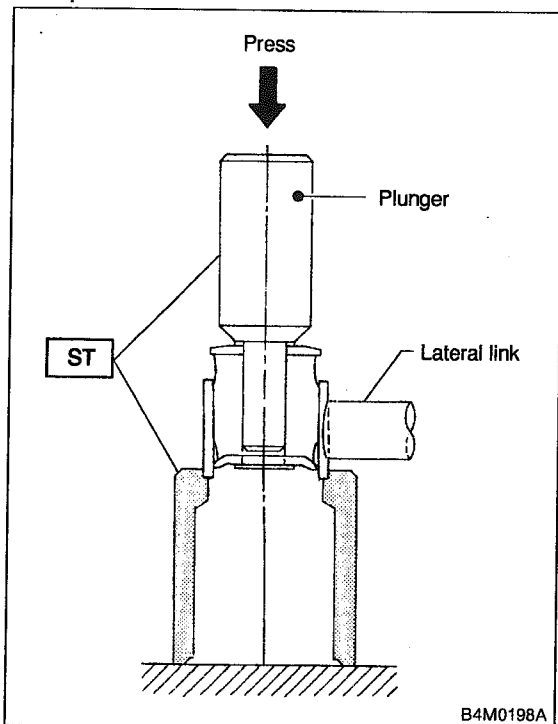
TIRE LUBE : water = 1 : 3



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

NOTE:

Use the same ST as that used during disassembly.



3) Turn lateral link upside down. Press ST plunger in the opposite direction that outlined in step 2) until bushing is correctly positioned in trailing link.

NOTE:

Use the same ST as that used during disassembly.

E: INSTALLATION

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

● Installation of DOJ to differential: <Ref. to 4-2 [W3E2].>

CAUTION:

- Do not allow DOJ splines to damage side oil seal.
- Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.
- Tighten nut when installing adjusting bolt.
- Replace self-locking nut and DOJ circlip with new ones.

NOTE:

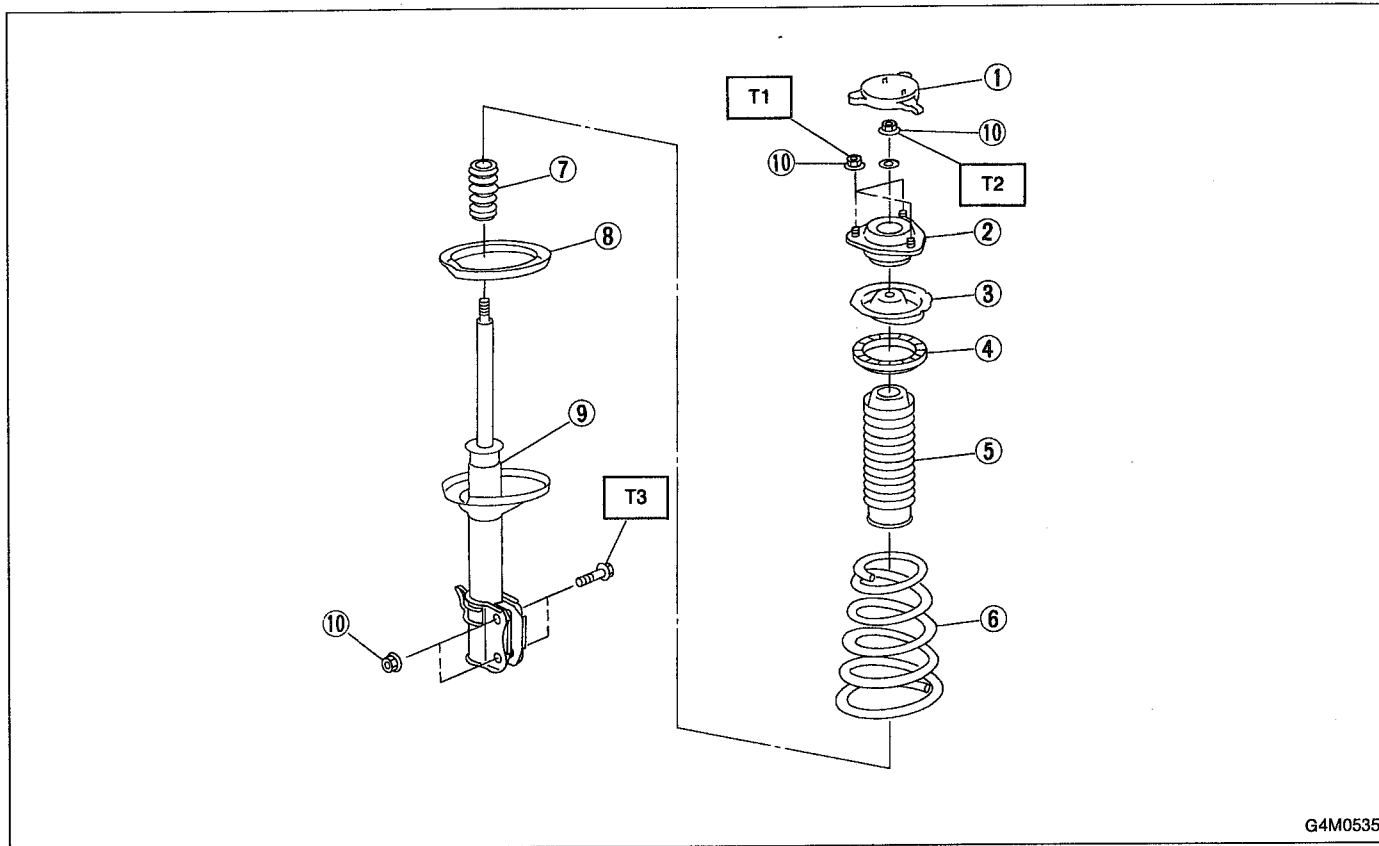
● Lateral link washers for AWD model can be identified by the following color:

Gold (AWD model)

- Check wheel alignment and adjust if necessary.

9. Rear Strut

A: REMOVAL



G4M0535

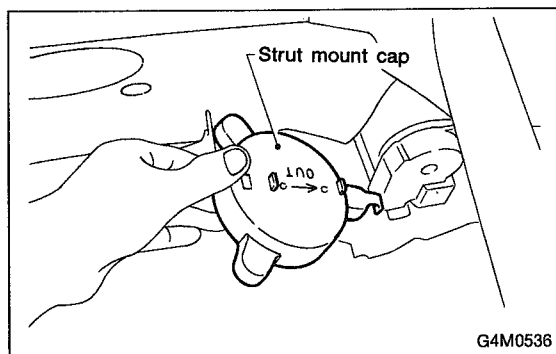
- ① Cap
- ② Strut mount
- ③ Spring seat
- ④ Rubber seat upper
- ⑤ Dust cover
- ⑥ Coil spring
- ⑦ Helper
- ⑧ Rubber seat lower
- ⑨ Damper strut
- ⑩ Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

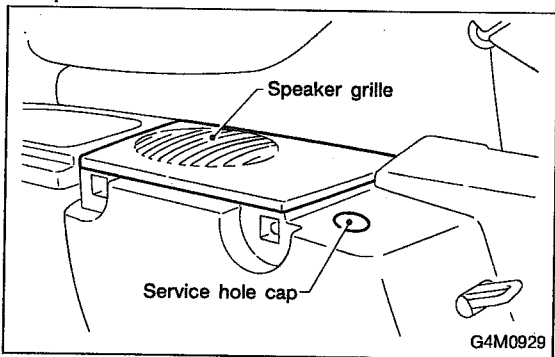
T1: 20 ± 6 (2.0 ± 0.6, 14.5 ± 4.3)

T2: 59 ± 10 (6.0 ± 1.0, 43 ± 7)

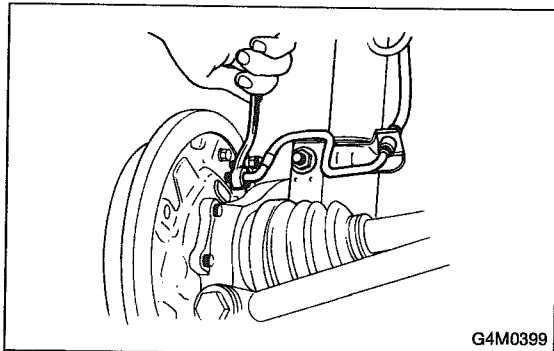
T3: 196 ⁺³⁹₋₁₀ (20.0 ^{+4.0}_{-1.0}, 145 ⁺²⁹₋₇)



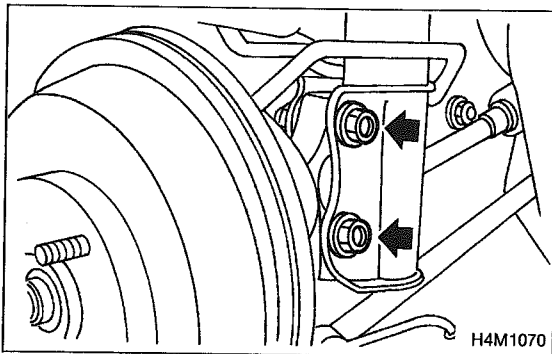
- 1) Depress brake pedal and secure it in that position using a wooden block, etc.
- 2) Remove rear seat cushion and backrest. (Sedan model)



- 3) Remove rear speaker grille and service hole cap. (Wagon model)
- 4) Remove strut mount cap.
- 5) Loosen rear wheel nuts.
- 6) Jack-up vehicle, support it with safety stands (rigid racks) and remove rear wheels.
- 7) Remove brake hose clip.



- 8) Disconnect brake hose from brake pipe from strut, and disconnect brake pipe from drum brake.



- 9) Remove bolts which secure rear strut to housing.
- 10) Remove nuts securing strut mount to body.

B: DISASSEMBLY

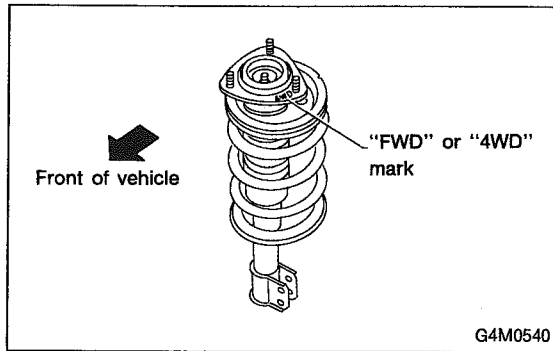
For disassembly of rear strut, refer to procedures outlined under front strut as a guide.

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

C: INSPECTION

Refer to Front Strut as a guide for inspection procedures.

<Ref. to 4-1 [W4C0].>

**D: ASSEMBLY**

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

CAUTION:

Install rear strut with "FWD" or "4WD" mark on strut mount facing outside of car body.

E: INSTALLATION

1) Tighten self-locking nut used to secure strut mount to car body.

CAUTION:

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

Tightening torque:

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

2) Tighten bolts which secure rear strut to housing.

Tightening torque:

$196^{+39}_{-10} \text{ N}\cdot\text{m}$ ($20.0^{+4.0}_{-1.0} \text{ kg}\cdot\text{m}$, $145^{+29}_{-7} \text{ ft}\cdot\text{lb}$)

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

3) Connect brake hose to brake pipe.

Tightening torque:

$15^{+3}_{-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2}_{-1.4} \text{ ft}\cdot\text{lb}$)

4) 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.
- (Model equipped with ABS)

Do not subject ABS sensor harness to excessive tension.

5) Be sure to bleed air from brake system.

6) Lower vehicle and tighten wheel nut.

Tightening torque:

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

7) Install strut mount cap.

8) (Sedan model)

Install rear seat backrest and rear seat cushion.

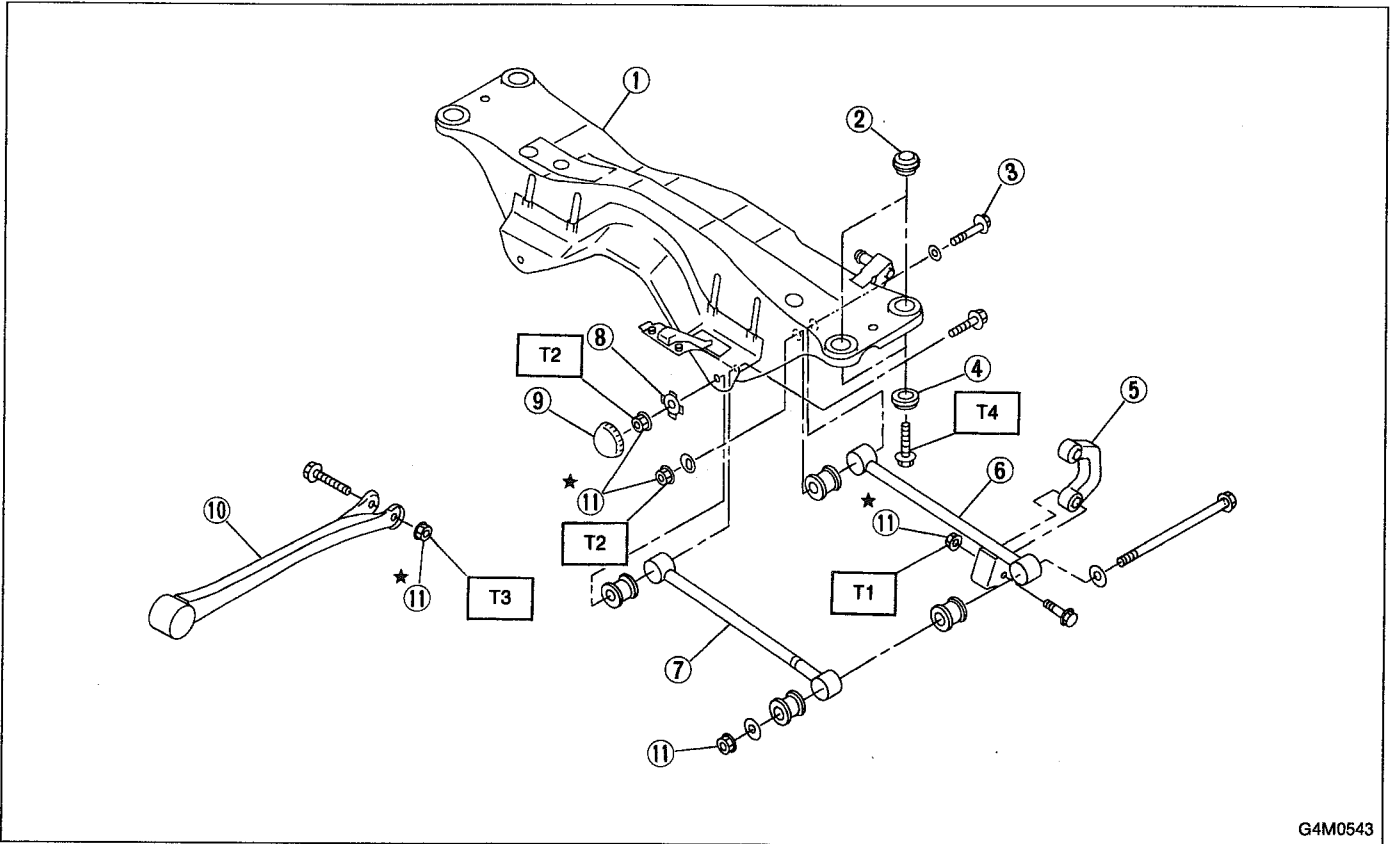
(Wagon model)

Install rear speaker grille.

NOTE:

Check wheel alignment and adjust if necessary.

10. Rear Crossmember
 A: REMOVAL



G4M0543

- ① Crossmember
- ② Floating bushing
- ③ Adjusting bolt
- ④ Stopper
- ⑤ Stabilizer link
- ⑥ Rear lateral link

- ⑦ Front lateral link
- ⑧ Washer
- ⑨ Cap
- ⑩ Trailing link
- ⑪ Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

T1: 44 ± 6 (4.5 ± 0.6, 32.5 ± 4.3)

T2: 98 ± 15 (10.0 ± 1.5, 72 ± 11)

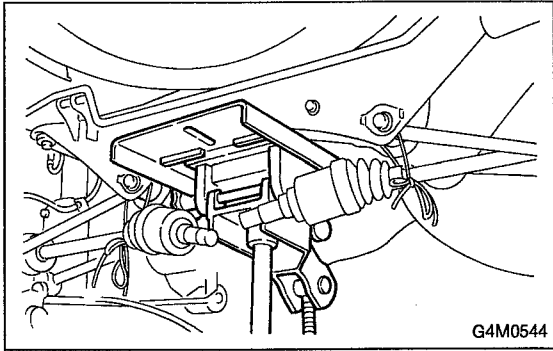
T3: 113 ± 15 (11.5 ± 1.5, 83 ± 11)

T4: 127 ± 20 (13.0 ± 2.0, 94 ± 14)

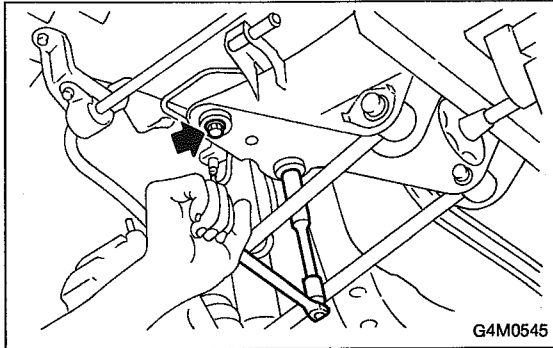
CAUTION:

Do not subject ABS sensor harness to excessive tension (if equipped).

- 1) Separate front exhaust pipe and rear exhaust pipe.
- 2) Remove rear exhaust pipe and muffler.
- 3) Remove rear differential. <Ref. to 3-4 [W2B0] or [W3B0].>



4) Place transmission jack under rear crossmember.



5) Remove bolts securing crossmember to car body, and remove crossmember.

6) Scribe an alignment mark on rear lateral link cam bolt and crossmember.

7) Remove front and rear lateral links by loosening nuts.

B: INSPECTION

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

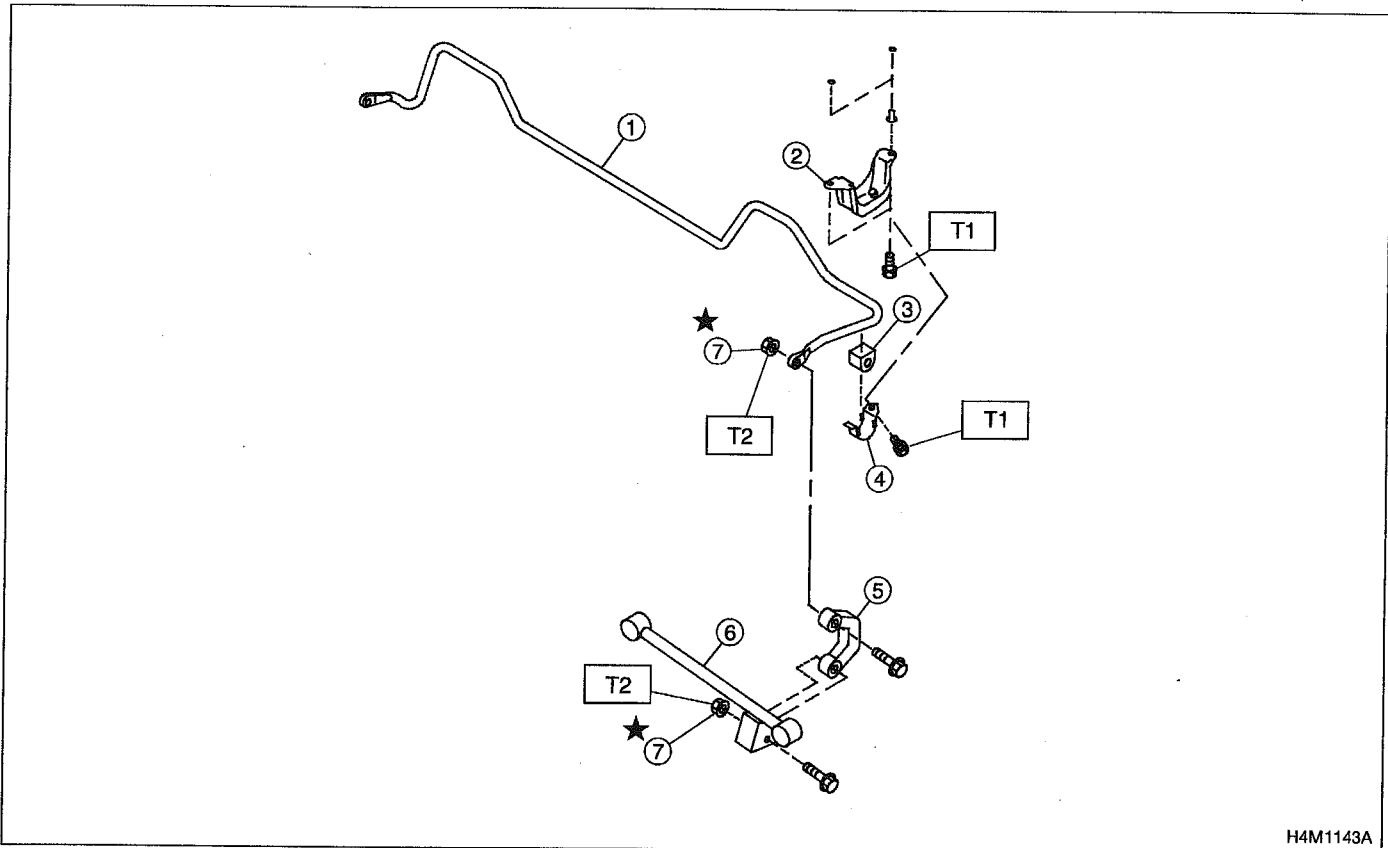
C: INSTALLATION

- 1) Install in reverse order of removal.
- 2) Install rear differential. <Ref. to 3-4 [W2F0] or [W3F0].>
- 3) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

NOTE:

Check wheel alignment and adjust if necessary.

11. Rear Stabilizer



- ① Rear stabilizer
- ② Stabilizer bracket
- ③ Stabilizer bushing
- ④ Clamp
- ⑤ Stabilizer link
- ⑥ Rear lateral link
- ⑦ Self-locking nut

Tightening torque: N·m (kg·m, ft·lb)

T1: 25 ± 7 (2.5 ± 0.7, 18.1 ± 5.1)

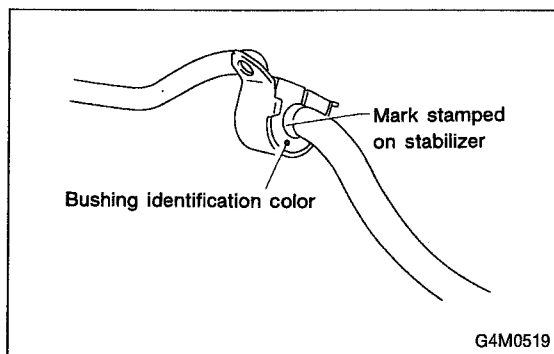
T2: 44 ± 6 (4.5 ± 0.6, 32.5 ± 4.3)

A: REMOVAL

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

B: INSPECTION

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



C: INSTALLATION

1) To install, reverse the removal procedure.

NOTE:

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

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

3) Tightening torque:

Stabilizer link to rear lateral link:

44 ± 6 N·m (4.5 ± 0.6 kg·m, 32.5 ± 4.3 ft·lb)

Stabilizer to stabilizer bracket:

25 ± 7 N·m (2.5 ± 0.7 kg·m, 18.1 ± 5.1 ft·lb)

1. Suspension

A: IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

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

B: POOR RIDE COMFORT

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

Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Overinflation pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace coil springs with new ones.
(4) Fault in operation of damper strut	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.

C: NOISE

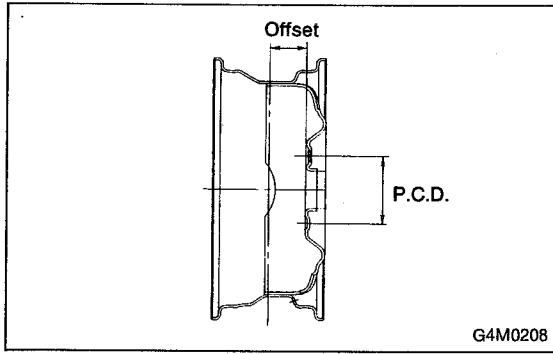
Possible causes	Countermeasures
(1) Wear or damage of damper strut component parts	Replace.
(2) Loosening of suspension link installing bolt	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum and/or minimum length of damper strut	Replace with proper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

WHEELS AND AXLES

4-2

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2. Service Data	4
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W SERVICE PROCEDURE	8
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SPECIFICATIONS AND SERVICE DATA



1. Specifications
A: TIRE AND WHEEL SIZE

Model		Front and Rear				Spare		
		Tire size	Rim size	Rim offset mm (in)	P.C.D. mm (in)	Tire size	Rim size	Rim offset mm (in)
1800 cc	COUPE WAGON	P175/70R14 84S	14 x 5 1/2JJ	55 (2.17)	100 (3.94) dia.	T125/70D16	16 x 4T	50 (1.97)
2200 cc	COUPE SEDAN WAGON	P195/160R15 87H	15 x 6JJ	55 (2.17)	100 (3.94) dia.	T135/70D16	16 x 4T	50 (1.97)
	OUTBACK	P205/60R15 90S P205/60R15 90H						

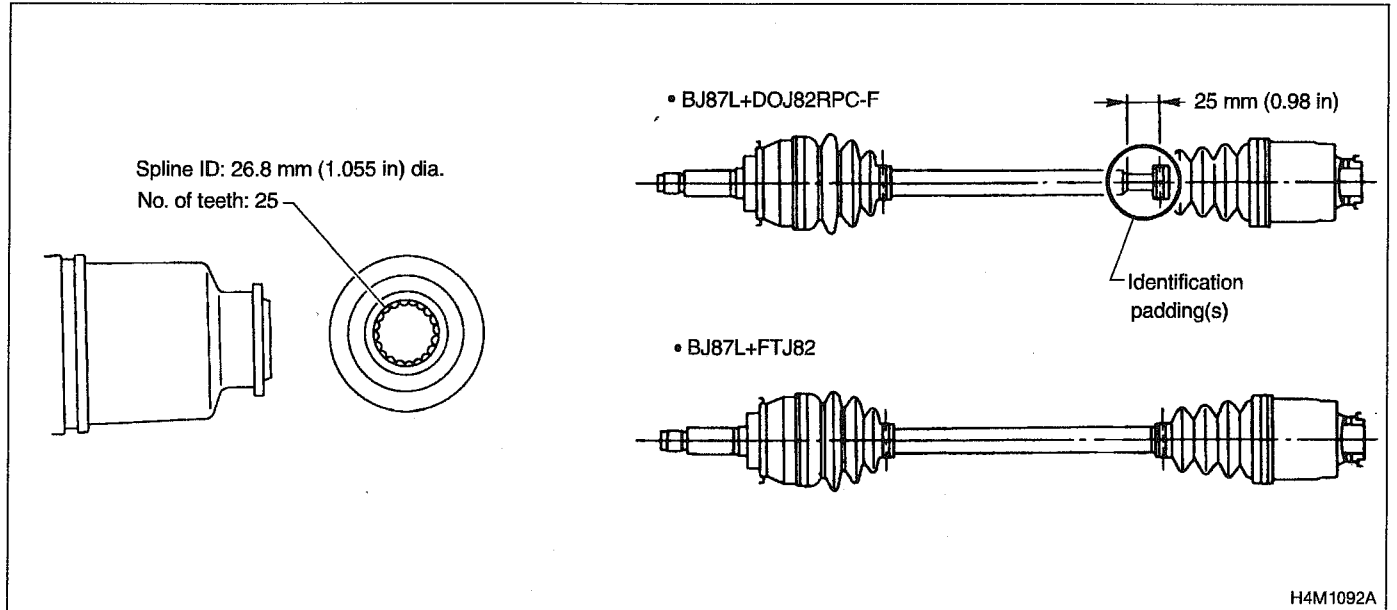
NOTE: "T-type" tire for temporary use is supplied as a spare tire.

B: TIRE INFLATION PRESSURE

Model	Tire size	Tire inflation pressure kPa (kg/cm ² , psi)	
		Light load	Full load
Coupe Sedan Wagon	P175/70R14 84S P195/60R15 87H	Ft: 220 (2.2, 31) Rr: 200 (2.0, 25)	
Outback	P205/60R15 90S P205/60R15 90H		
T-type tire	T125/70D16 T135/70D16	412 (4.2, 60)	

C: FRONT DRIVE SHAFT ASSEMBLY

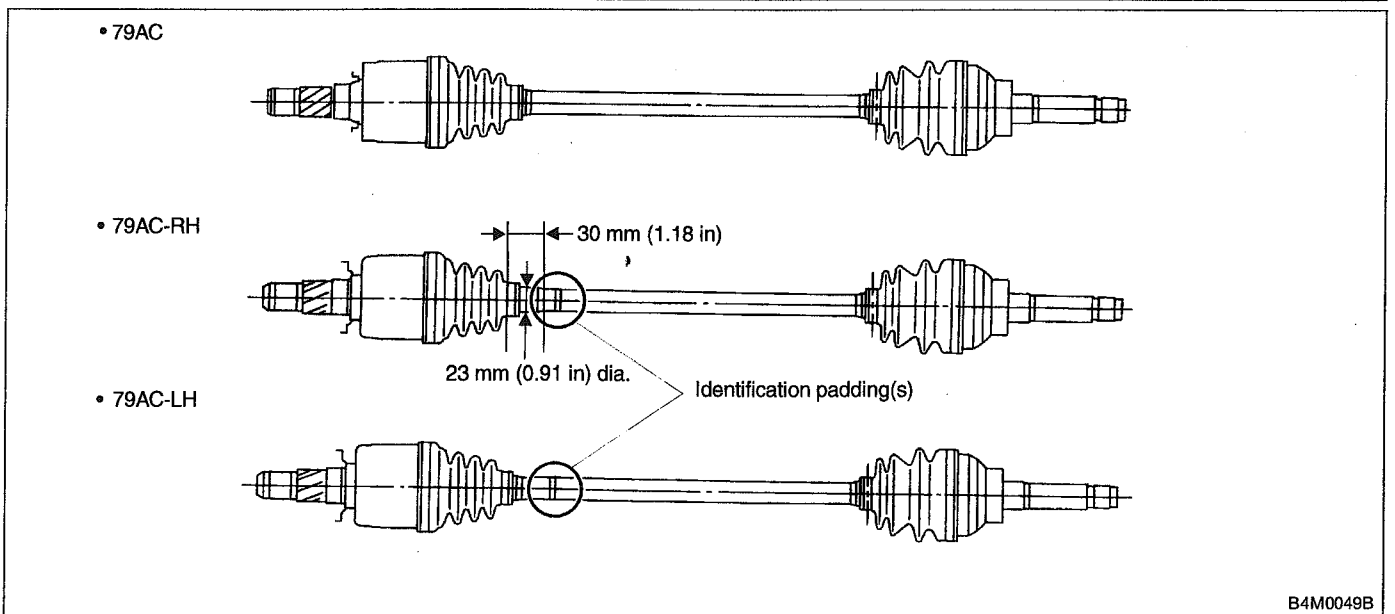
Type of axle shaft assembly	SHAFT	DOJ or FTJ
	No. of identification paddings on shaft	No. of spline teeth
BJ87L + DOJ82 RPC-F	1 (One)	25
BJ87L + FTJ82	—	25



H4M1092A

D: REAR DRIVE SHAFT ASSEMBLY (AWD MODEL)

Type of axle shaft assembly	SHAFT
	No. of identification paddings on shaft
79AC	None
79AC-RH	1 (One)
79AC-LH	1 (One)



B4M0049B

E: APPLICATION TABLE-

Model	Power unit	Front drive shaft		Rear drive shaft	
		5MT	4AT	5MT	4AT
AWD	1800 cc	BJ87L + DOJ82 RPC-F	—	79AC	79AC
AWD	2200 cc	BJ87L + DOJ82 RPC-F	BJ87L + FTJ82	79AC-RH 79AC-LH	79AC

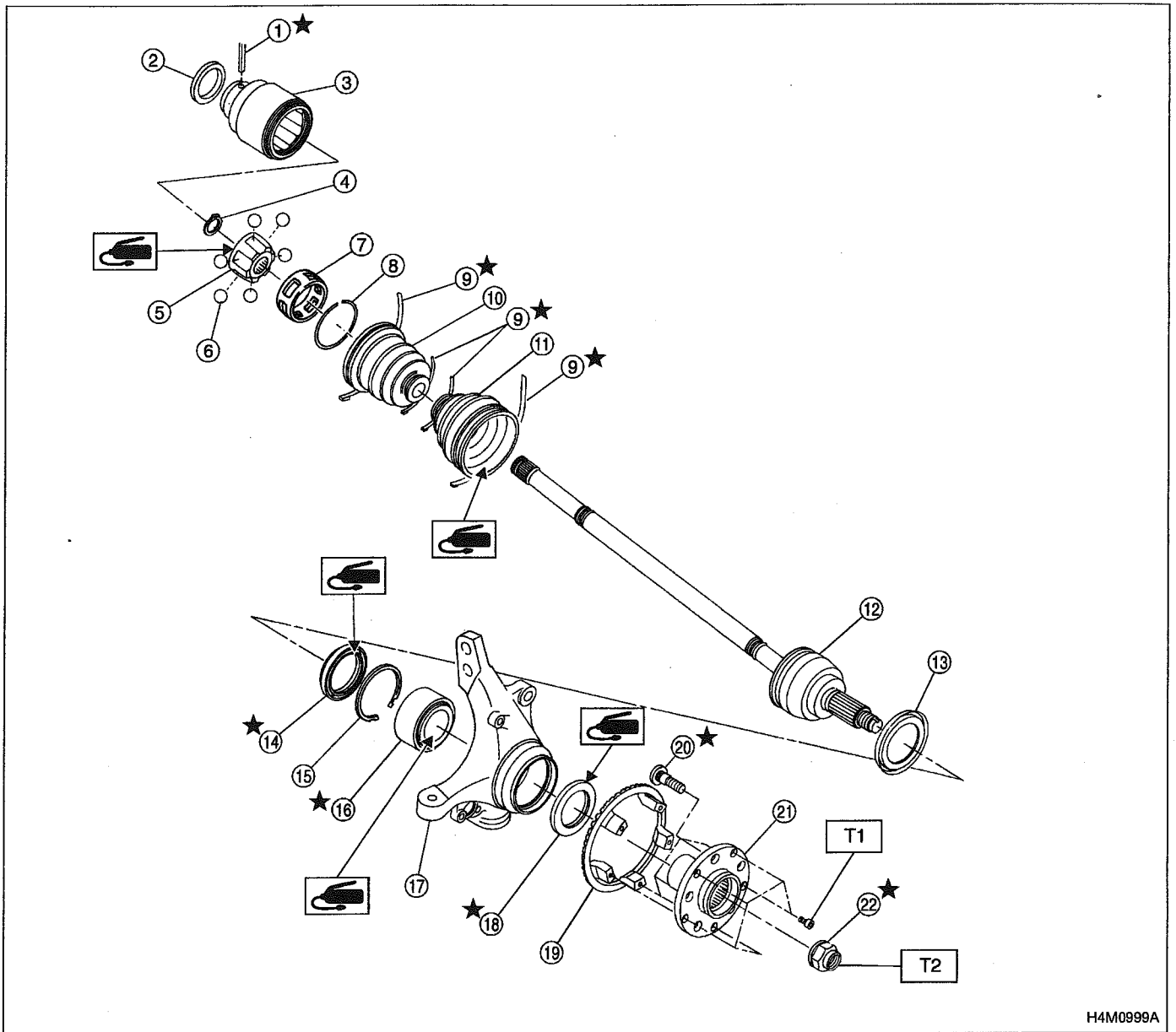
2. Service Data

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

Balance weight part number (For steel wheel)	Weight g (oz)
28101AA001	5 (0.18)
28101AA011	10 (0.35)
28101AA021	15 (0.53)
28101AA031	20 (0.71)
28101AA041	25 (0.88)
28101AA051	30 (1.06)
28101AA061	35 (1.23)
28101AA071	40 (1.41)
28101AA081	45 (1.59)
28101AA091	50 (1.76)
28101AA101	55 (1.94)
28101AA111	60 (2.12)

1. Front Axle

A: EXCEPT 2200 cc AT VEHICLES



H4M0999A

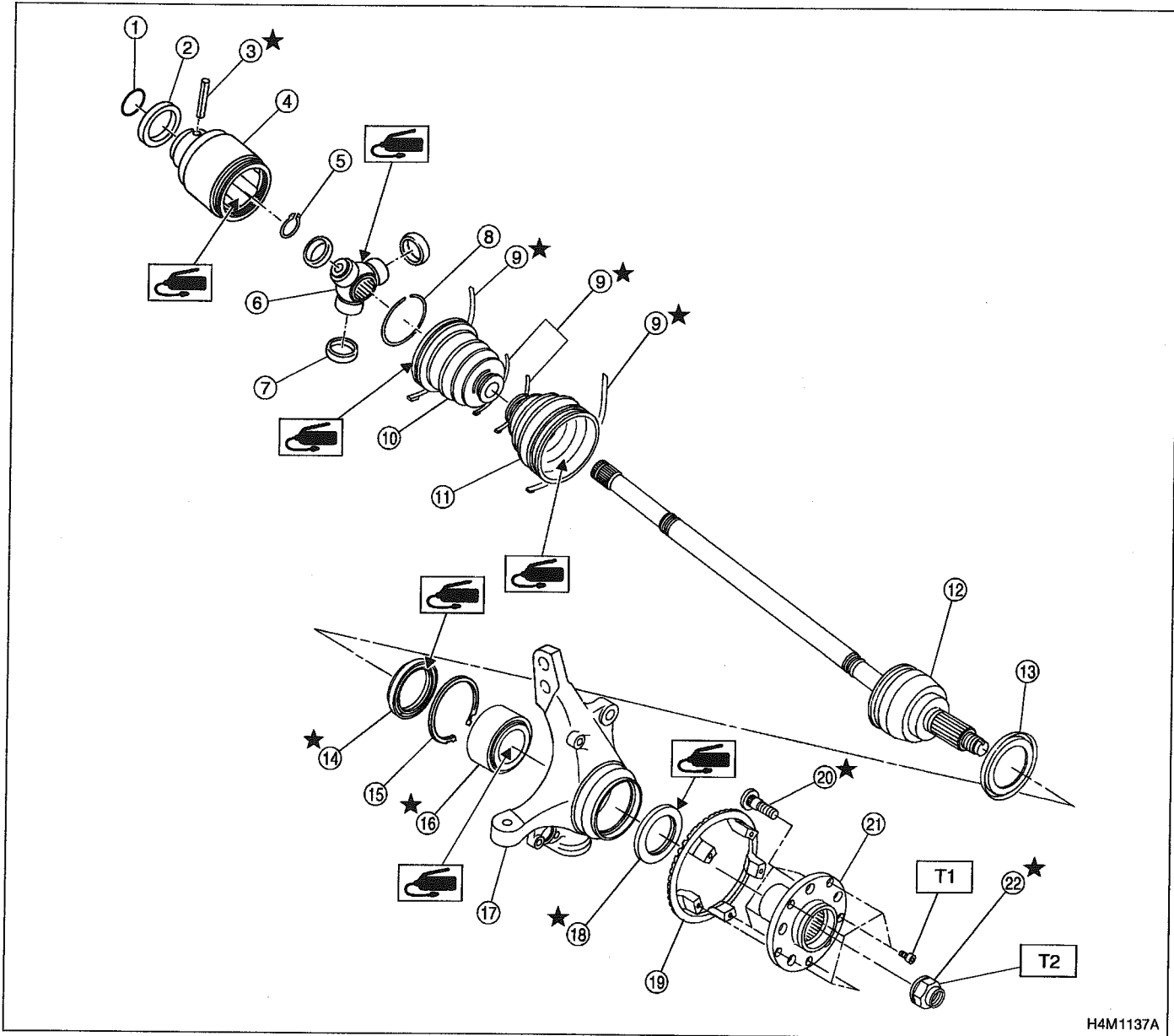
- ① Spring pin
- ② Baffle plate (DOJ)
- ③ Outer race (DOJ)
- ④ Snap ring
- ⑤ Inner race (DOJ)
- ⑥ Ball
- ⑦ Cage
- ⑧ Circlip
- ⑨ Boot band

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

- ⑲ Tone wheel
- ⑳ Hub bolt
- ㉑ Hub
- ㉒ Axle nut

Tightening torque: N·m (kg·m, ft·lb)
T1: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)
T2: 186 ± 20 (19 ± 2, 137 ± 14)

B: 2200 cc AT VEHICLES



H4M1137A

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

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

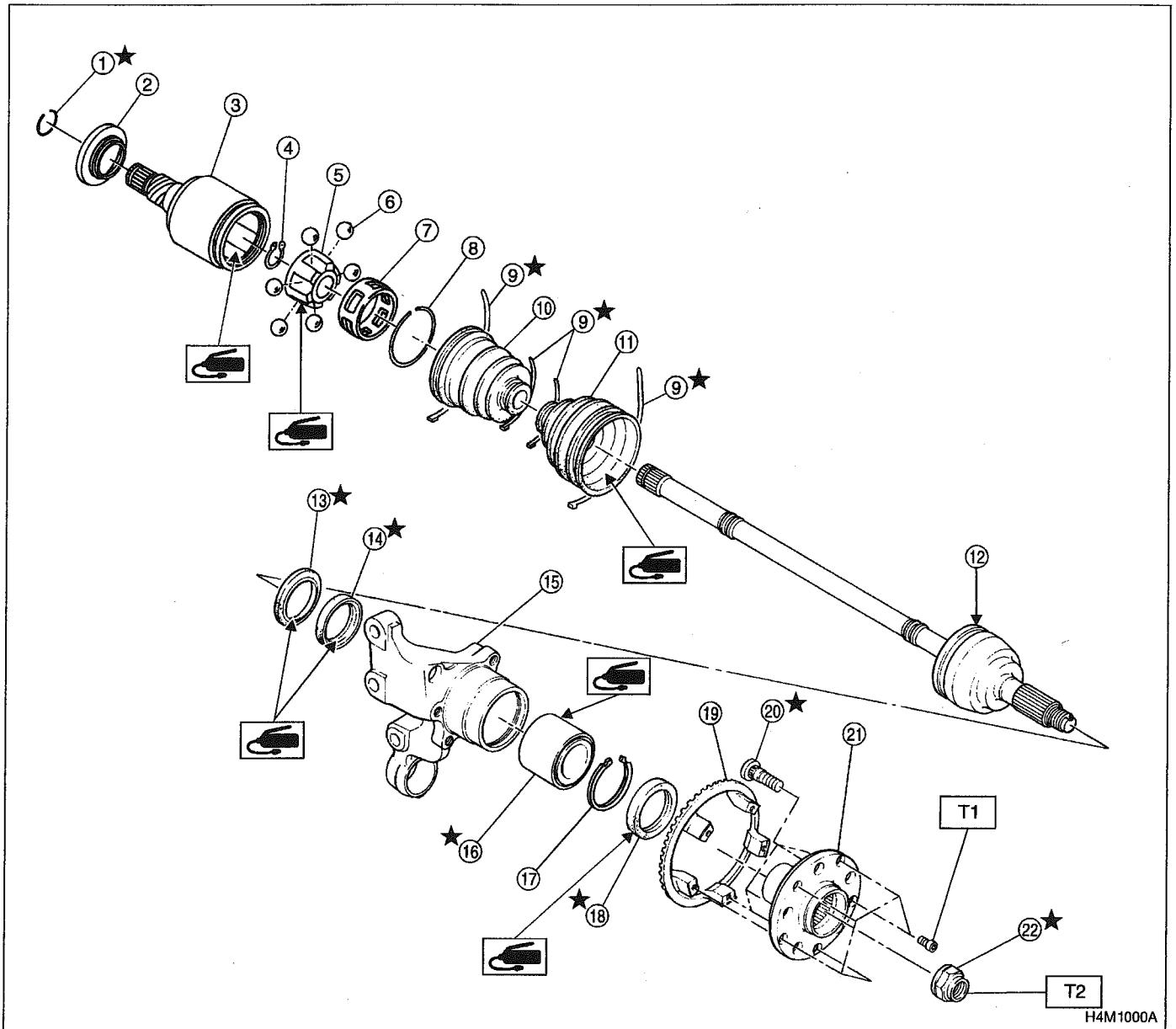
- ⑲ Tone wheel
- ⑳ Hub bolt
- ㉑ Hub
- ㉒ Axle nut

Tightening torque: N·m (kg·m, ft·lb)

T1: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)

T2: 186 ± 20 (19 ± 2, 137 ± 14)

2. Rear Axle



H4M1000A

- ① Circlip (1800 cc model)
- 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)
- ⑫ BJ ASSY
- ⑬ Oil seal (IN. No. 2)
- ⑭ Oil seal (IN. No. 3)
- ⑮ Housing
- ⑯ Bearing
- ⑰ Snap ring
- ⑱ Oil seal (OUT)

- ⑲ Tone wheel
- ⑳ Hub bolt
- ㉑ Hub
- ㉒ Axle nut

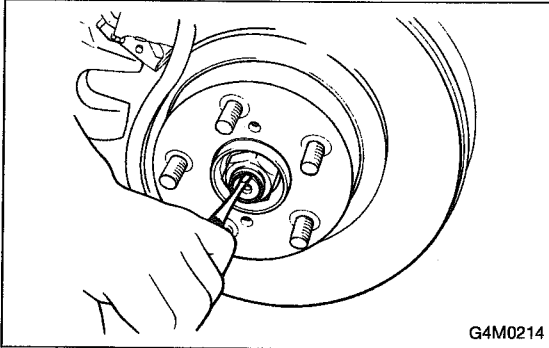
Tightening torque: N-m (kg-m, ft-lb)
T1: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)
T2: 186 ± 20 (19 ± 2, 137 ± 14)

1. Front Axle

1. Front Axle

A: REMOVAL

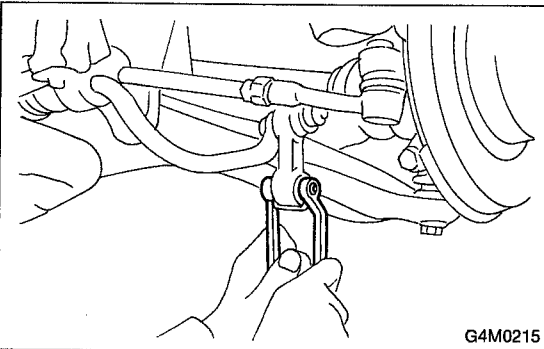
- 1) Disconnect ground cable from battery.
- 2) Jack-up vehicle, support it with safety stands, and remove front wheels.



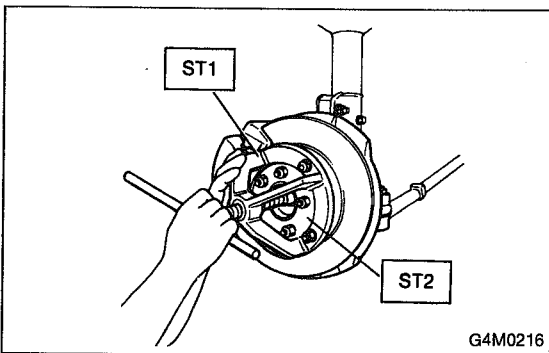
- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.

CAUTION:

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



- 5) Remove stabilizer link.



- 6) Remove DOJ/FTJ from transmission spindle.
- 7) Remove front drive shaft assembly from hub. If it is hard to remove, use STs.

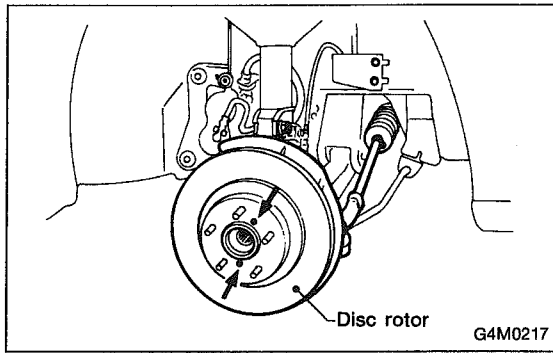
ST1 926470000 AXLE SHAFT PULLER

ST2 927140000 PLATE

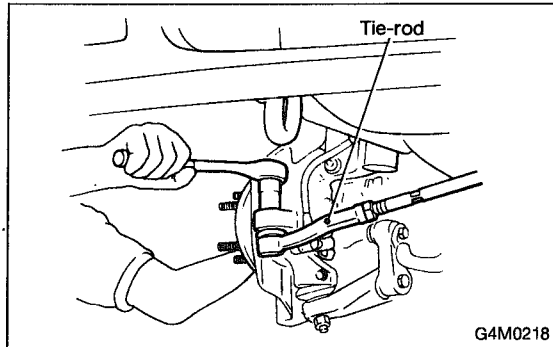
CAUTION:

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

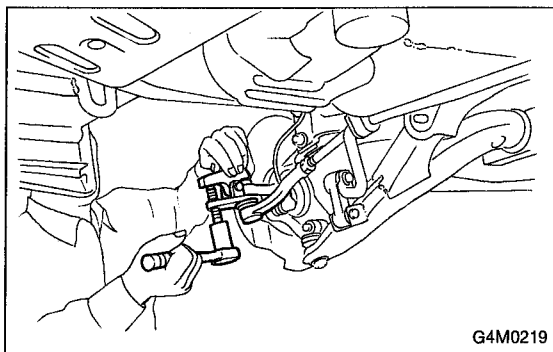
- 8) Remove disc brake caliper from housing, and suspend it from strut using a wire.



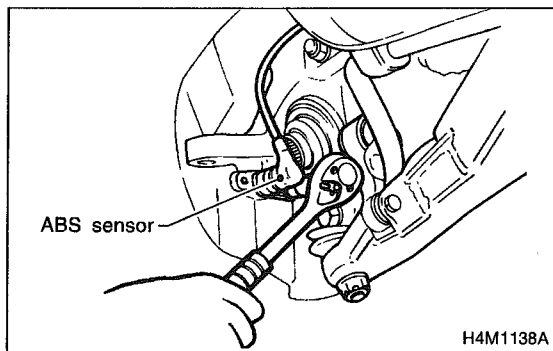
- 9) Remove disc rotor from hub.
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on the rotor.



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



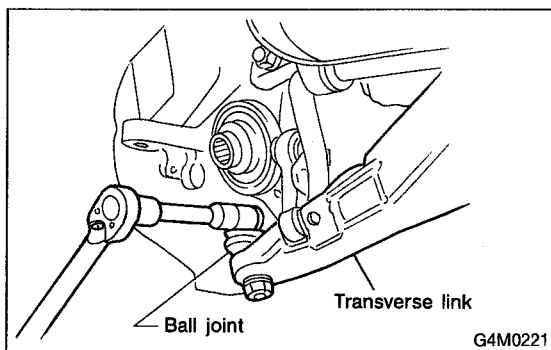
- 11) Using a puller, remove tie rod ball joint from knuckle arm.



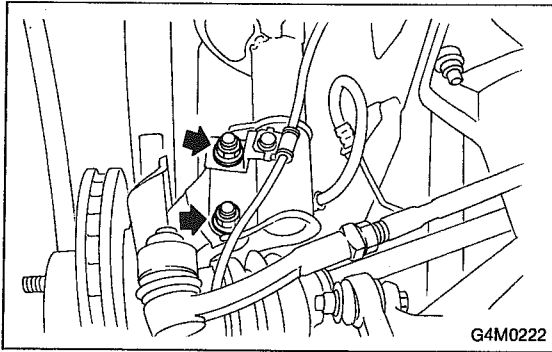
- 12) On ABS equipped models, remove ABS sensor assembly and harness in advance.

NOTE:

Be sure to use soft jaws (such as aluminum plates) when placing the mating surfaces of housing and strut in a vise.



- 13) Remove transverse link ball joint from housing.

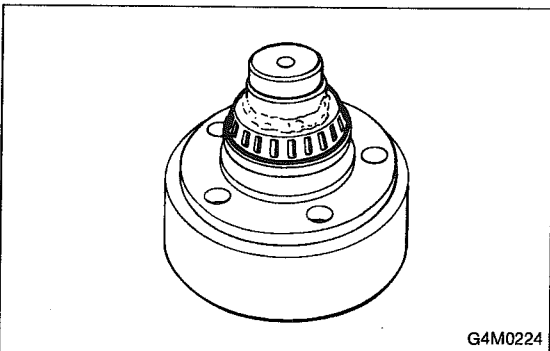
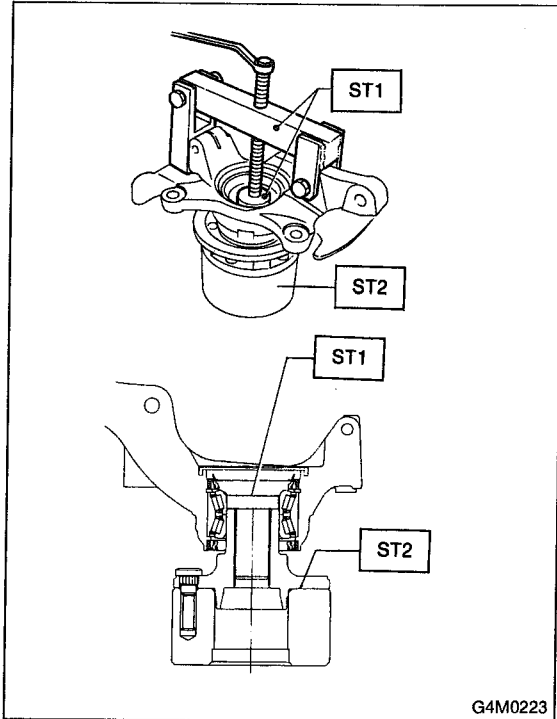


14) After scribing an alignment mark on camber adjusting bolt head, remove bolts which connect housing and strut, and disconnect housing from strut.

B: DISASSEMBLY

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

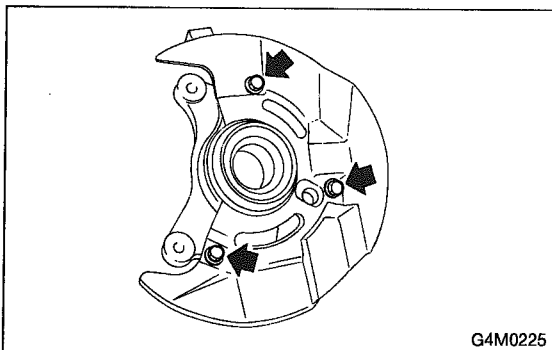
ST1 927060000 HUB REMOVER
ST2 927080000 HUB STAND



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

CAUTION:

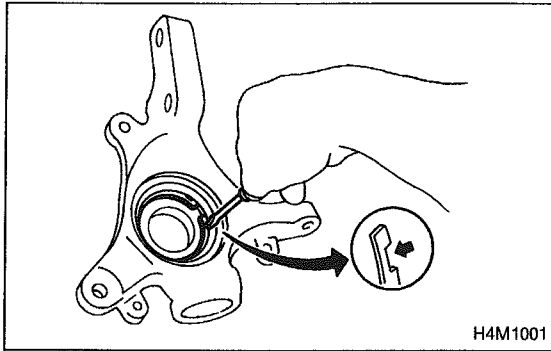
- Be careful not to scratch polished area of hub.
- Be sure to install inner race on the side of outer race from which it was removed.



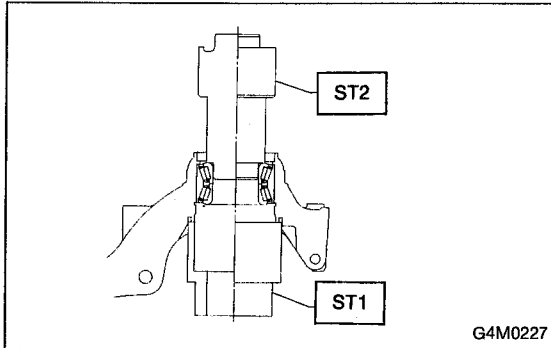
- 3) Remove disc cover from housing.
- 4) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:

Do not use old oil seals.



5) Using flat bladed screwdriver, remove snap ring.



6) Using ST1, support housing securely.
7) Using ST2, press inner race to drive out outer bearing.

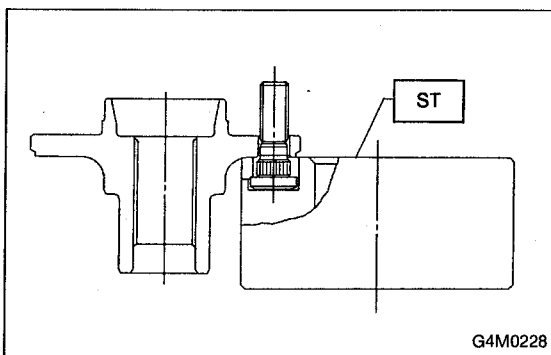
ST1 927400000 HOUSING STAND

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) Loosen bolts which secure tone wheel to hub. Remove tone wheel (only vehicle equipped with ABS).

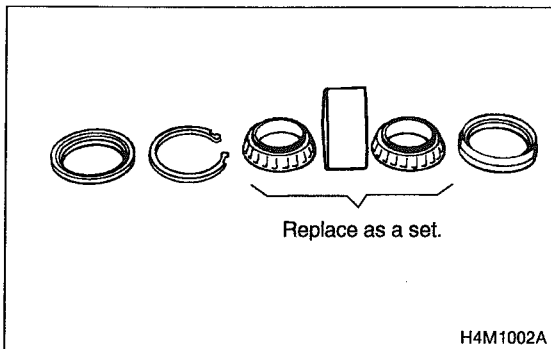


9) Using ST and a hydraulic press, drive hub bolts out.

ST 927080000 HUB STAND

CAUTION:

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

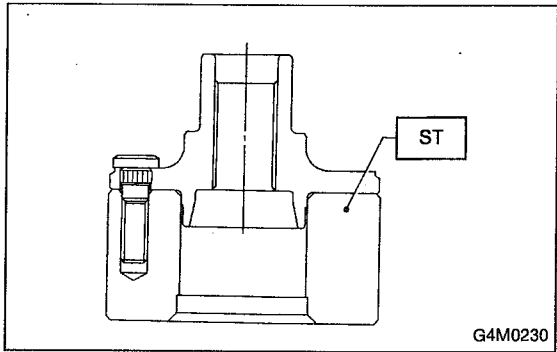


C: INSPECTION

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

CAUTION:

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

**D: ASSEMBLY**

1) Attach hub to ST securely.

ST 927080000 HUB STAND

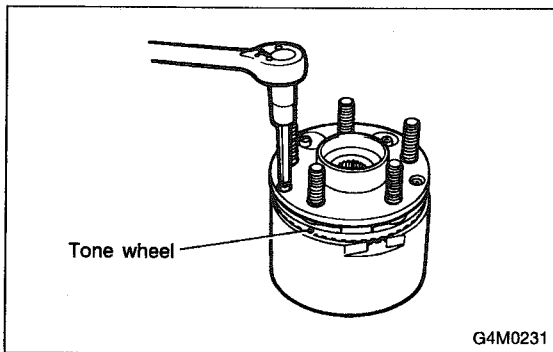
2) Using a hydraulic press, press new hub bolts into place.

CAUTION:

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

NOTE:

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

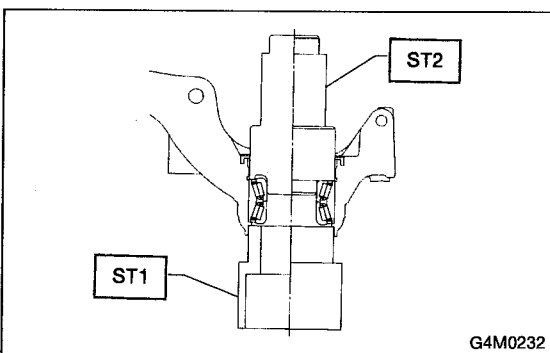


3) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

CAUTION:

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

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



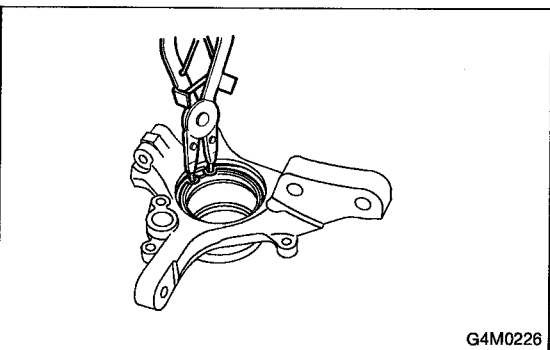
5) Using ST1 and ST2, press a new bearing into place.

ST1 927400000 HOUSING STAND

ST2 927100000 BEARING REMOVER

CAUTION:

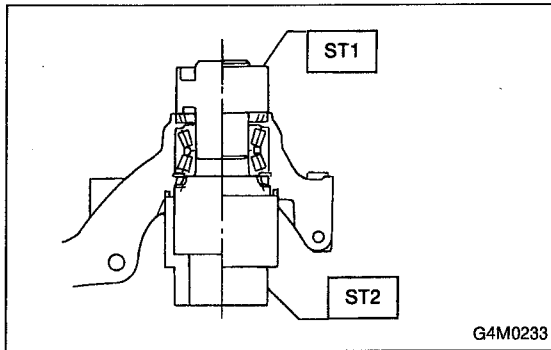
- Always press outer race when installing bearing.
- Be careful not to remove plastic lock from inner race when installing bearing.
- Charge bearing with new grease when outer race is not removed.



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

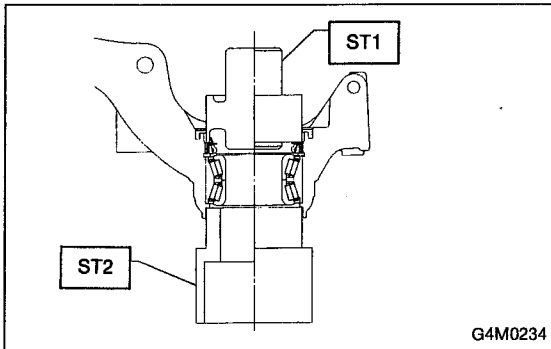
CAUTION:

Make sure to install it firmly to groove.



7) Using ST1 and ST2, press outer oil seal until it contacts the bottom of housing.

ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



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

ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND

9) Invert ST and housing.

ST 927400000 HOUSING STAND

10) Apply sufficient grease to oil seal lip.

Specified grease
SHELL 6459N

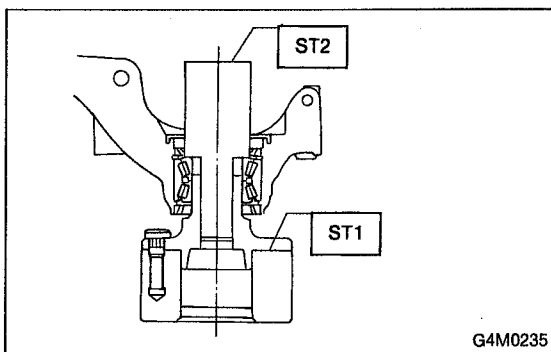
CAUTION:

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

11) Install disc cover to housing the three bolts.

Tightening torque:

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



12) Attach hub to ST1 securely.

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

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

ST1 927080000 HUB STAND
ST2 927120000 HUB INSTALLER

E: INSTALLATION

1) Install transverse link ball joint to housing.

Tightening torque:

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

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

CAUTION:

Use a new self-locking nut.

Tightening torque:

$147 \pm 15 \text{ N}\cdot\text{m}$ ($15 \pm 1.5 \text{ kg}\cdot\text{m}$, $108 \pm 11 \text{ ft}\cdot\text{lb}$)

3) Install speed sensor and harness on housing (only vehicle equipped with ABS).

4) Install disc rotor on hub.

5) Install disc brake caliper on housing.

Tightening torque:

$59 \pm 10 \text{ N}\cdot\text{m}$ ($6 \pm 1 \text{ kg}\cdot\text{m}$, $43 \pm 7 \text{ ft}\cdot\text{lb}$)

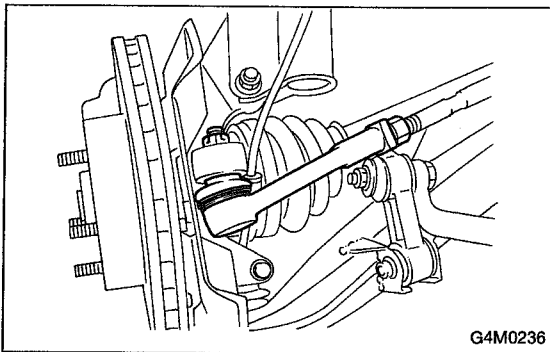
6) Install front drive shaft. <Ref. to 4-2 [W3E1].>

7) Connect stabilizer link.

8) Install tie-rod end ball joint on housing knuckle arm.

Tightening torque:

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



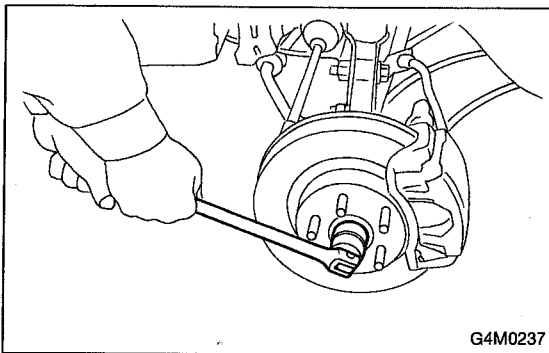
9) While depressing brake pedal, tighten axle nut and lock it securely.

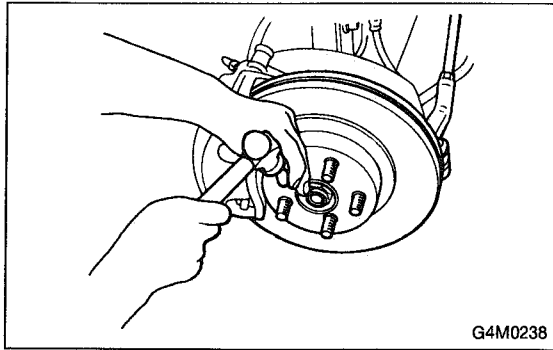
Tightening torque:

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

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.





- 10) After tightening axle nut, lock it securely.
- 11) Install wheel and tighten wheel nuts to specified torque.

Tightening torque:

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

2. Rear Axle

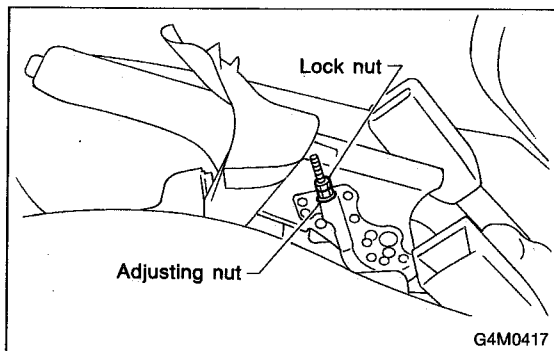
A: REMOVAL

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

CAUTION:

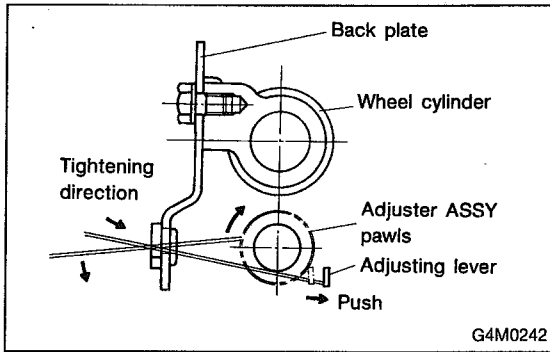
Be sure to loosen and retighten axle nut after removing wheel from vehicle. Failure to follow this rule may damage wheel bearings.

- 3) Unlock axle nut.
- 4) Remove axle nut using a socket wrench.

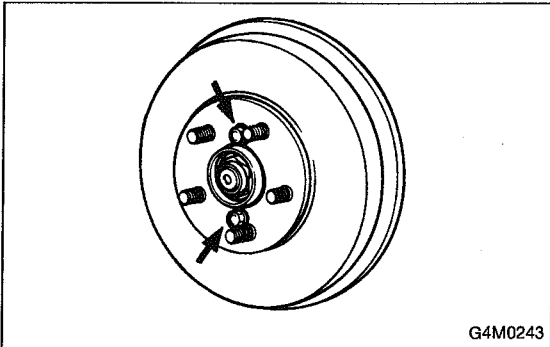


- 5) Return parking brake lever and loosen adjuster.

- 6) Remove brake drum from hub.

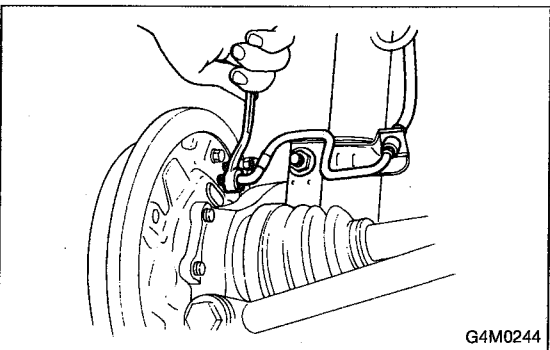


7) If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.



NOTE:

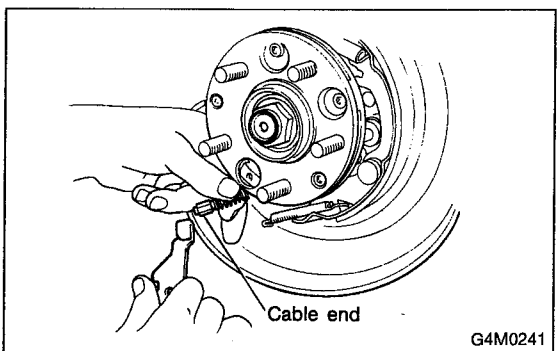
If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.



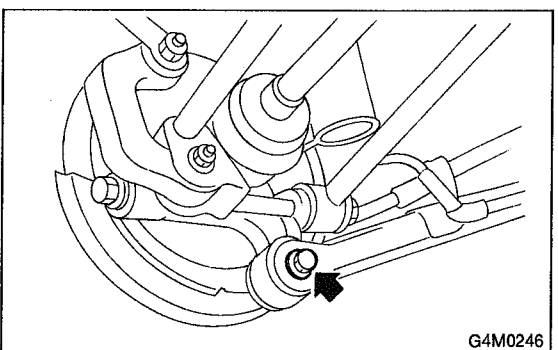
8) Using a flare-nut wrench, disconnect brake pipe from wheel cylinder.

CAUTION:

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



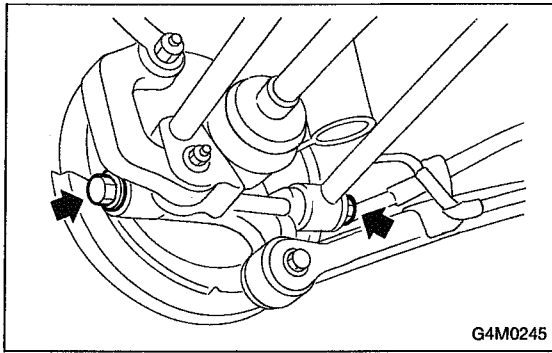
9) Disconnect end of parking brake cable.



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

CAUTION:

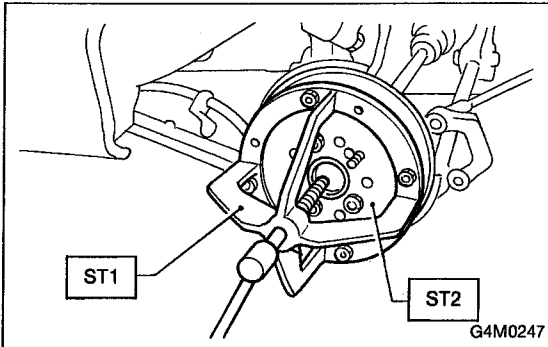
Discard old self-locking nut. Replace with a new one.



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.

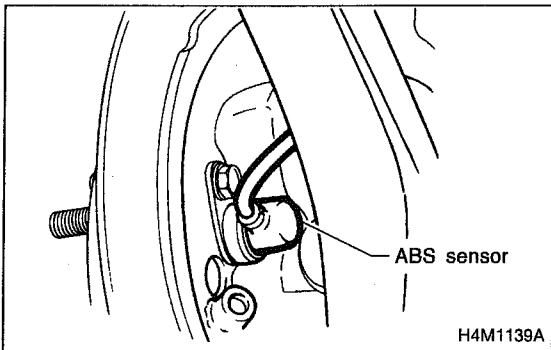
ST1 926470000 AXLE SHAFT PULLER

ST2 927140000 PLATE

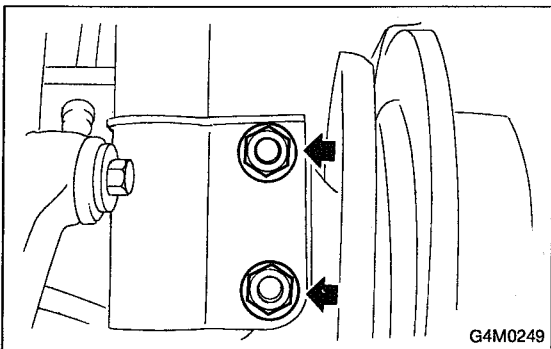
CAUTION:

● **Be careful not to damage oil seal lip when removing rear drive shaft.**

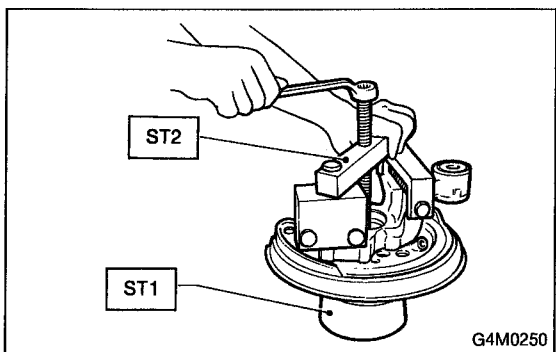
● **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**



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



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



B: DISASSEMBLY

1) Using ST1 and ST2, remove hub from rear housing.

ST1 927080000 HUB STAND

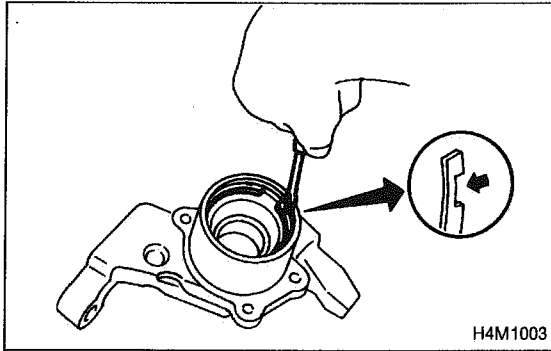
ST2 927420000 HUB REMOVER

2) Remove back plate from rear housing.

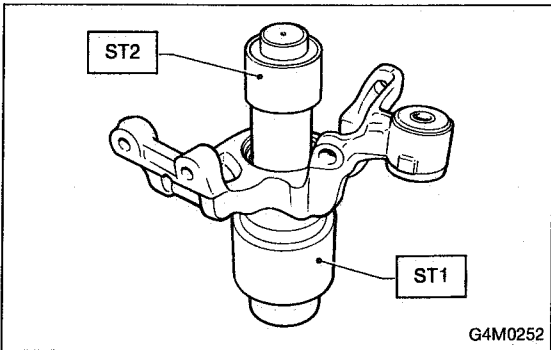
3) Using a standard screwdriver, remove outer and inner oil seals.

CAUTION:

Use new oil seals.



4) Using flat bladed screwdriver, remove snap ring.



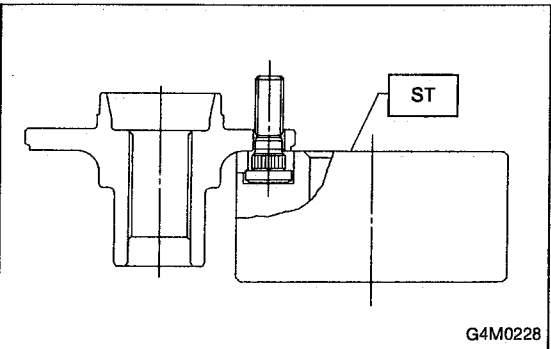
5) Using ST1 and ST2, remove bearing by pressing inner race.

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).

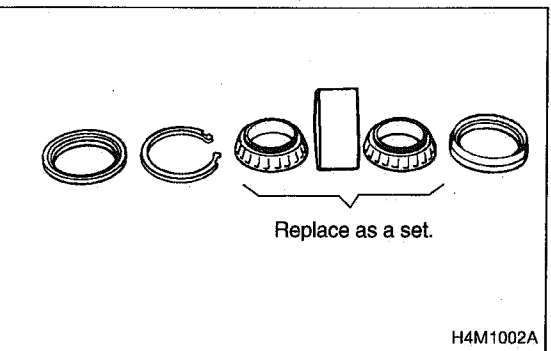


7) Using ST, press hub bolt out.

ST 927080000 HUB STAND

CAUTION:

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

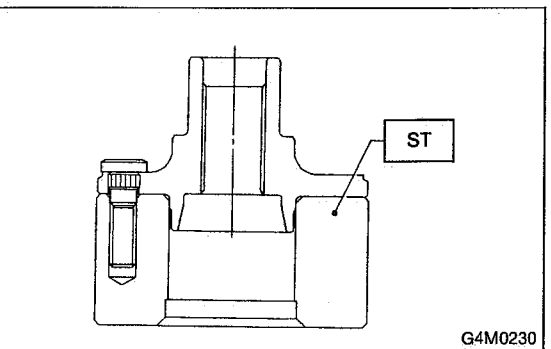


C: INSPECTION

Check 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.



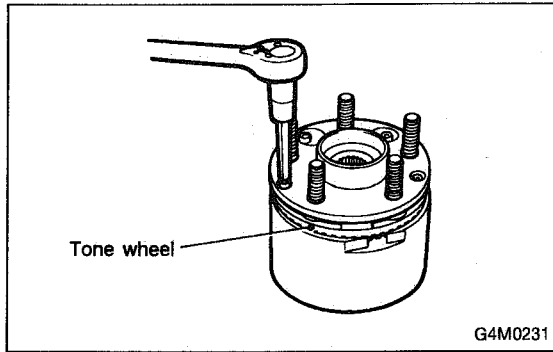
D: ASSEMBLY

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

CAUTION:

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

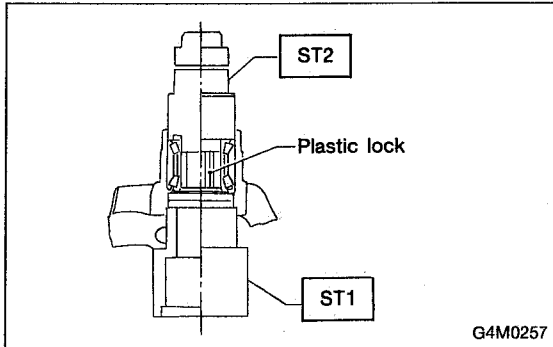
ST 927080000 HUB STAND



2) 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.

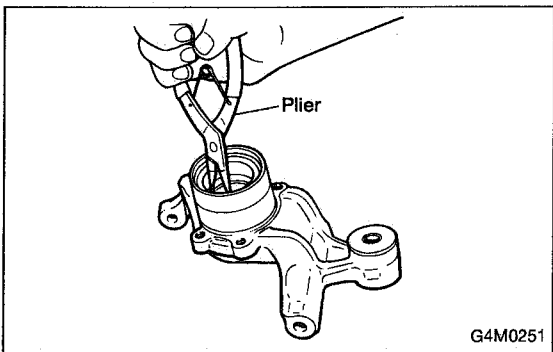


3) Clean housing interior completely. Using ST1 and ST2, press bearing into housing.

ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

CAUTION:

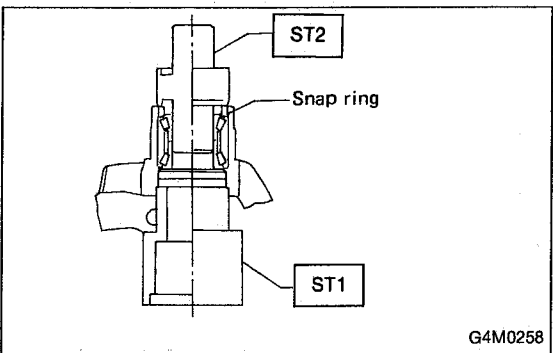
- Always press outer race when installing bearing.
- Be careful not to remove plastic lock from inner race when installing bearing.
- Charge bearing with new grease when outer race is not removed.



4) Using plier, install snap ring.

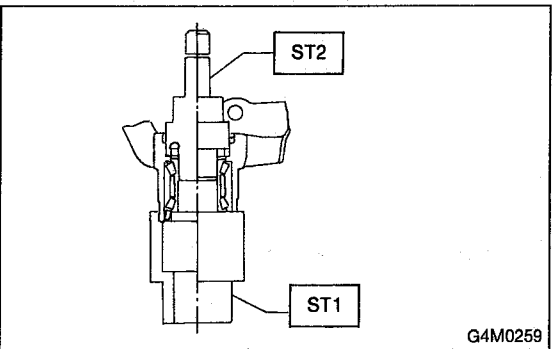
CAUTION:

Ensure snap ring fits in groove properly.



5) Using ST1 and ST2, press outer oil seal until it comes in contact with snap ring.

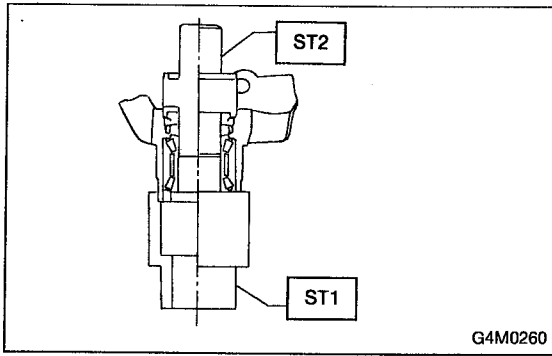
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



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

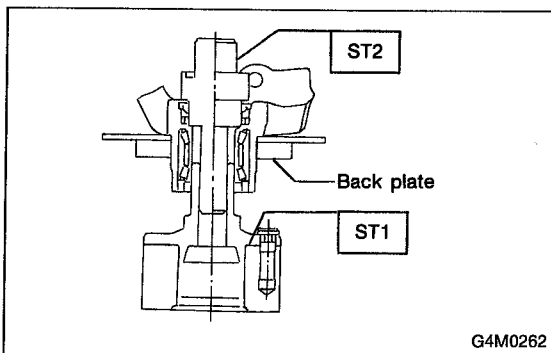
CAUTION:

- 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:

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



11) Using ST1 and ST2, press bearing into hub.

ST1 927080000 HUB STAND

ST2 927450000 HUB INSTALLER

E: INSTALLATION

1) Connect rear housing assembly and strut assembly.

CAUTION:

Use a new self-locking nut.

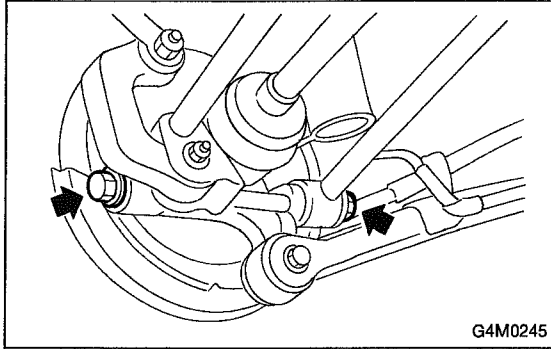
Tightening torque:

$147 \pm 15 \text{ N}\cdot\text{m}$ ($15 \pm 1.5 \text{ kg}\cdot\text{m}$, $108 \pm 11 \text{ ft}\cdot\text{lb}$)

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

CAUTION:

Be careful not to damage inner oil seal lip.



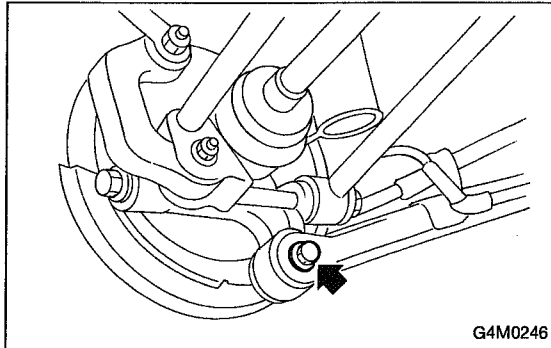
3) Connect rear housing assembly to lateral link assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$137 \pm 20 \text{ N}\cdot\text{m}$ ($14 \pm 2 \text{ kg}\cdot\text{m}$, $101 \pm 14 \text{ ft}\cdot\text{lb}$)



4) Connect rear housing assembly to trailing link assembly.

CAUTION:

Use a new self-locking nut.

Tightening torque:

$98 - 127 \text{ N}\cdot\text{m}$ ($10 - 13 \text{ kg}\cdot\text{m}$, $72 - 94 \text{ ft}\cdot\text{lb}$)

5) Clean brake pipe connection. Using a flare-nut wrench, connect brake pipe to wheel cylinder.

6) Connect parking brake cable to lever.

7) Install brake drum on rear housing assembly.

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

9) Bleed air from brake system. <Ref. to 4-4 [W8B0].>

10) Adjust parking brake lever stroke by turning adjuster.

11) 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:

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

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.**

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

Tightening torque:

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

3. Front and Rear Drive Shafts

A: REMOVAL

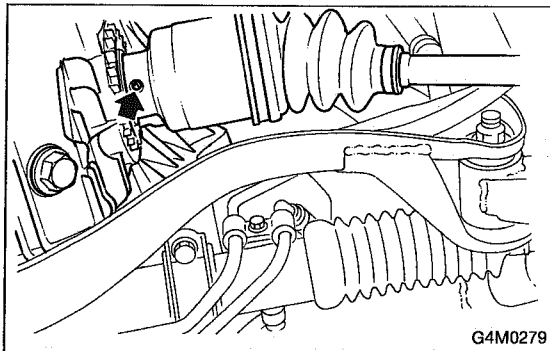
1. FRONT DRIVE SHAFT

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

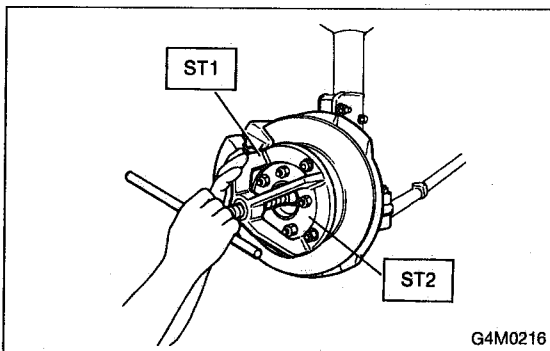
- 5) Disconnect transverse link from housing.



- 6) Remove spring pin which secures transmission spindle to DOJ/FTJ.

CAUTION:

Use a new spring pin.



- 7) 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 when removing front drive shaft.
- When front drive shaft is to be replaced, also replace inner oil seal.

2. REAR DRIVE SHAFT

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

CAUTION:

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

- 3) Unlock axle nut.
- 4) Loosen axle nut using a socket wrench.

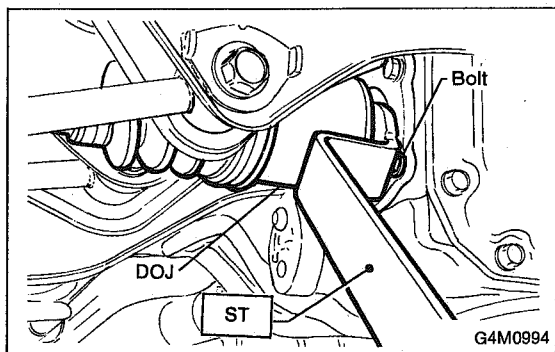
CAUTION:
Do not remove axle nut.

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

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

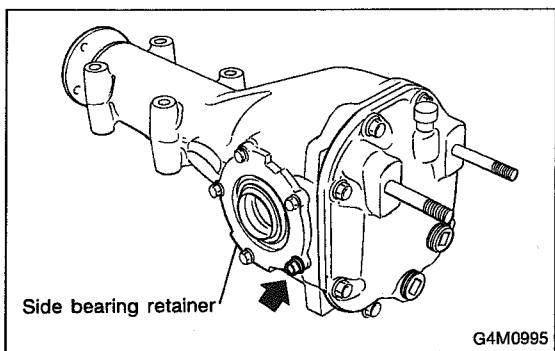
- 7) Remove bolts which secure trailing link assembly to rear housing.

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



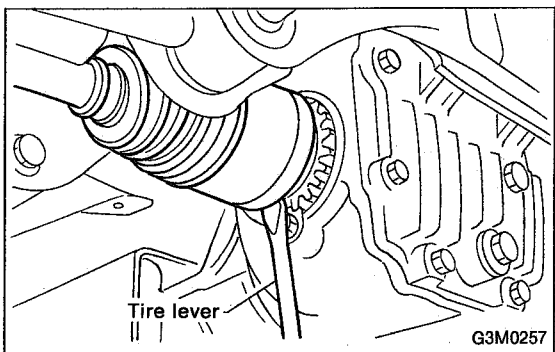
- 8) Remove DOJ from rear differential using ST. (2200 cc MT vehicles)
ST 28099PA100 DRIVE SHAFT REMOVER

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



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

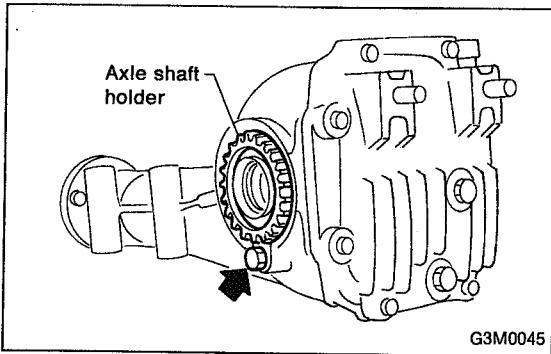
- ST 28099PA100 DRIVE SHAFT REMOVER



- 9) Remove DOJ from rear differential using tire lever. (Except 2200 cc MT vehicles)

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

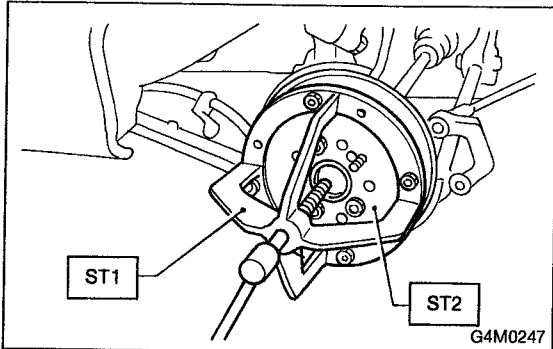
3. Front and Rear Drive Shafts



G3M0045

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.



G4M0247

10) 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: DISASSEMBLY**1. FRONT DRIVE SHAFT (EXCEPT 2200 cc AT VEHICLES)**

- 1) Straighten bent claw of larger end of DOJ boot.
- 2) Loosen band by means of screwdriver or pliers with care of not damaging boot.
- 3) Remove boot band on the small end of DOJ boot in the same manner.
- 4) Remove the larger end of DOJ boot from DOJ outer race.

- 5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.

- 6) Take out DOJ outer race from shaft assembly.

- 7) Wipe off grease and take out balls.

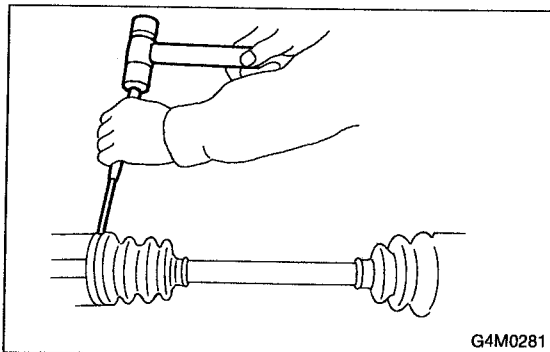
CAUTION:

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

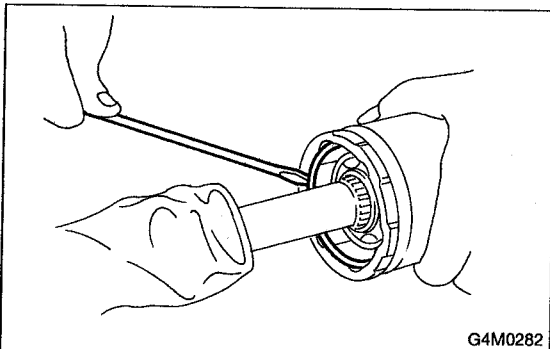
NOTE:

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

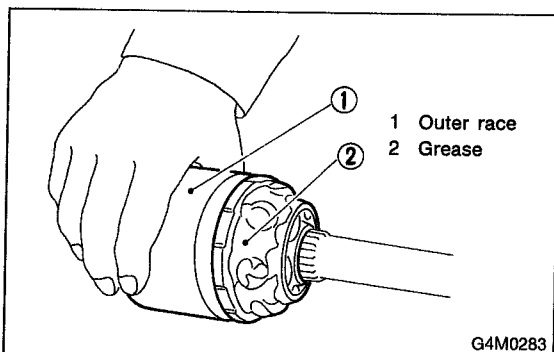
- 8) To remove the cage from the inner race, turn the cage by a half pitch to the track groove of the inner race and shift the cage.



G4M0281



G4M0282



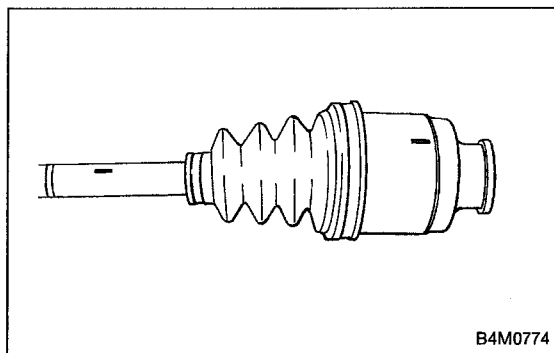
G4M0283

- 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:

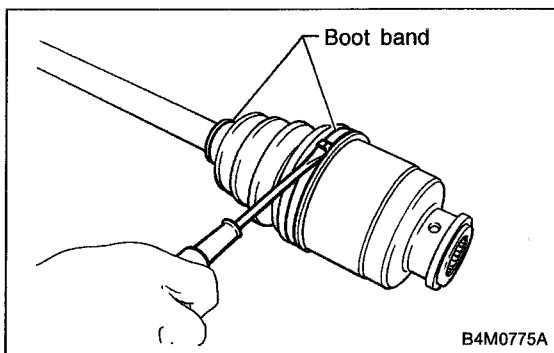
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

- 12) Remove BJ boot in the same procedure as steps 1) to 3).
- 13) Thus, disassembly of axle is completed, but BJ is unable to be disassembled.



2. FRONT DRIVE SHAFT (2200 cc AT VEHICLES)

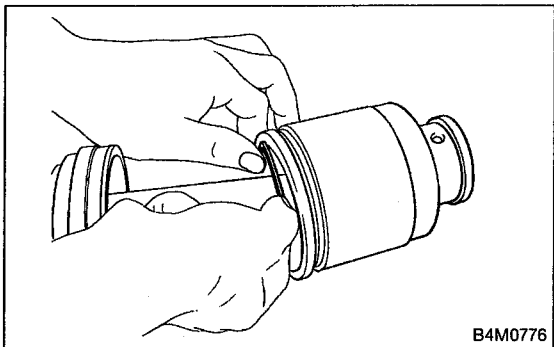
- 1) Place alignment marks on shaft and outer race.



- 2) Remove FTJ boot band and boot.

CAUTION:

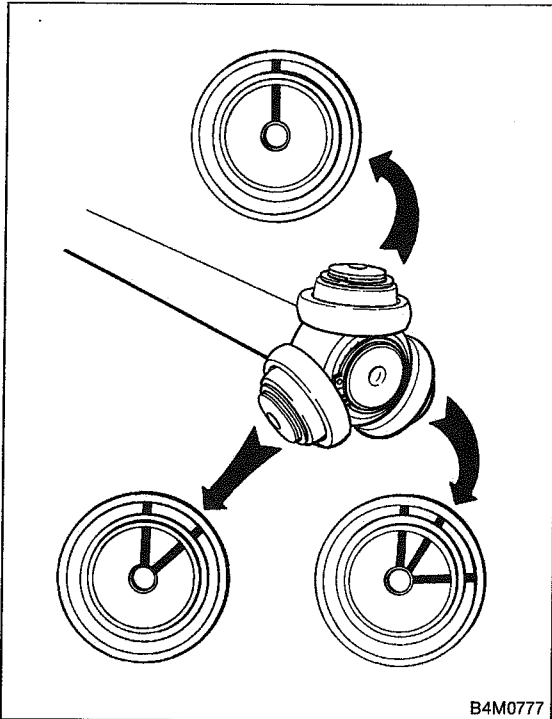
Be careful not to damage boot.



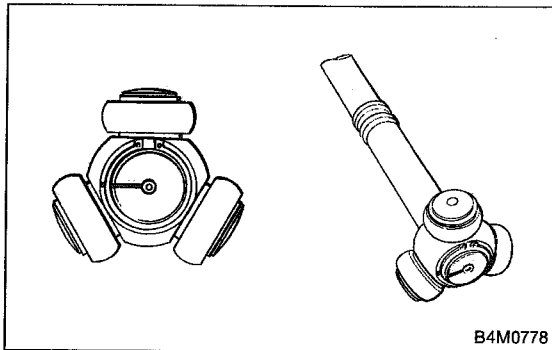
- 3) Remove circlip from FTJ outer race using screwdriver.
- 4) Remove FTJ outer race from shaft assembly.
- 5) Wipe off grease.

CAUTION:

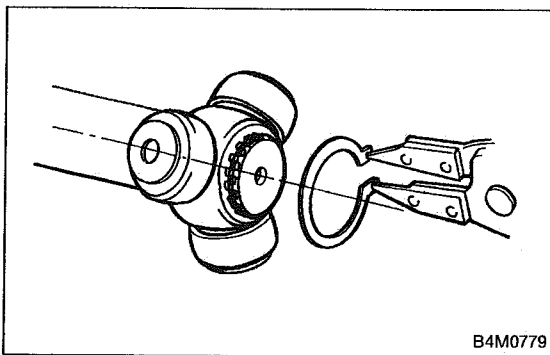
The grease is a special grease. Do not confuse with other greases.



- 6) Place alignment mark on free ring and trunnion.
- 7) Remove free ring from trunnion.



- 8) Place alignment mark on trunnion and shaft.



- 9) Remove snap ring and trunnion.

CAUTION:

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

- 10) Remove FTJ boot.
- 11) Remove BJ boot band and boot.

C: INSPECTION

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

- 1) DOJ and FTJ

Check seizure, corrosion, damage, wear and excessive play.

- 2) Shaft

Check excessive bending, twisting, damage and wear.

- 3) BJ

Check seizure, corrosion, damage and excessive play.

- 4) Boot
Check for wear, warping, breakage or scratches.
- 5) Grease
Check for discoloration or fluidity.

D: ASSEMBLY

1. FRONT DRIVE SHAFT (EXCEPT 2200 cc AT VEHICLES)

Use specified grease.

Front drive shaft:

BJ — NTG2218 (Part No. 28093AA020)

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

Rear drive shaft:

**BJ — Molylex No. 2 (Part No. 723223010) or
Sunlight TB2-A**

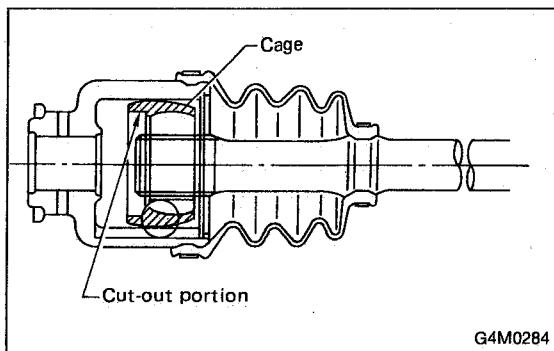
**DOJ (1800 cc model)
— Molylex No. 2 (Part No. 723223010) or
Sunlight TB2-A**

**DOJ (2200 cc model)
— VU-3A702 (Yellow)
(Part No. 23223GA050)**

- 1) Install BJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.
- 2) Place DOJ boot at the center of shaft.

CAUTION:

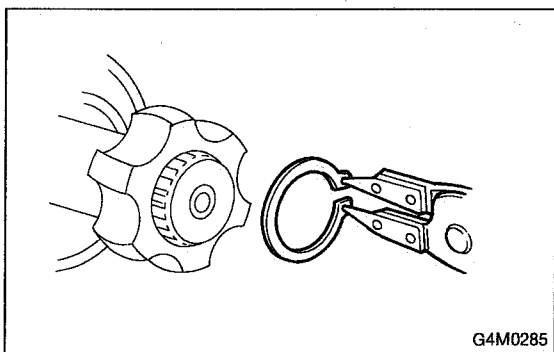
Be sure to wrap shaft splines with vinyltape to prevent boot from scratches.



- 3) Insert DOJ cage onto shaft.

NOTE:

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

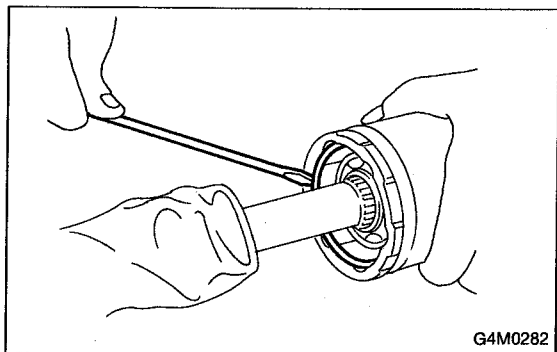
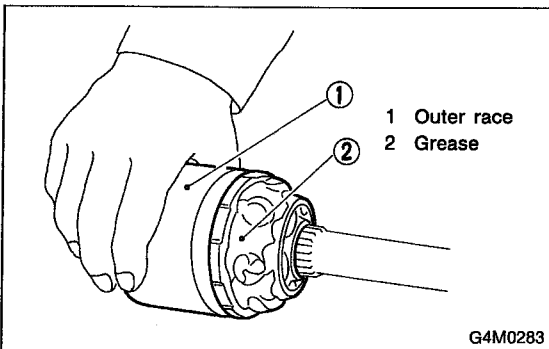
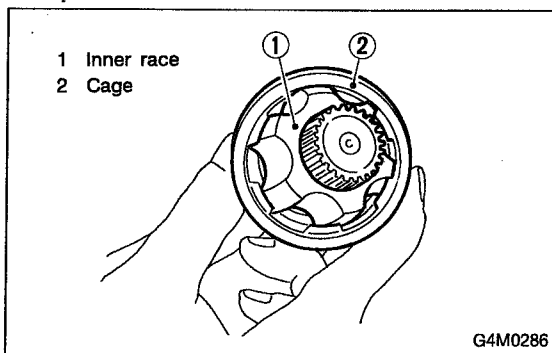


- 4) Install DOJ inner race on shaft and fit snap ring with pliers.

NOTE:

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

3. Front and Rear Drive Shafts



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

NOTE:

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

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

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

8) Insert six balls into the cage pocket.

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

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

NOTE:

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

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

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

NOTE:

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

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

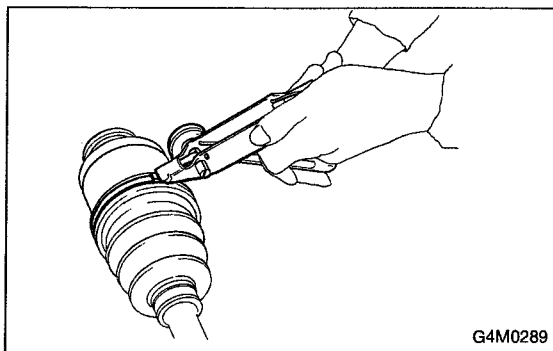
CAUTION:

Use a new band.

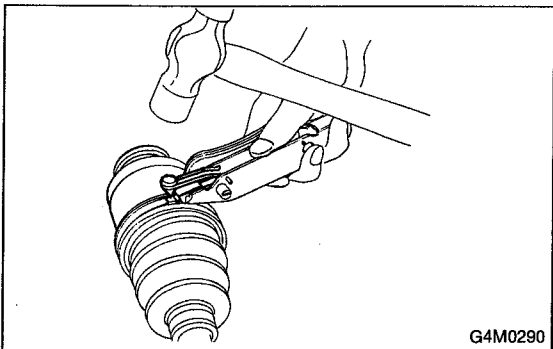
14) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:

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



15) Tighten band by using ST.
 ST 925091000 BAND TIGHTENING TOOL
 NOTE:
 Tighten band until it cannot be moved by hand.



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.

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

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

18) Fix up boot on BJ in the same manner.
 19) Install protector onto BJ boot band. (For rear side only)

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

2. FRONT DRIVE SHAFT (2200 cc AT VEHICLES)

CAUTION:
 Use specified grease.

BJ side:
 NTG2218 (Part No. 28093AA020)

FTJ side:
 SSG 6003

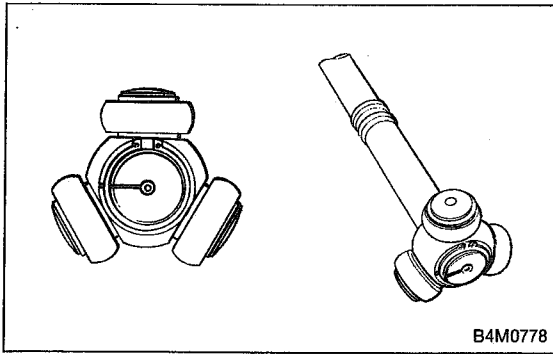
CAUTION:
 Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

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

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

2) Place FTJ boot at the center of shaft.

3. Front and Rear Drive Shafts

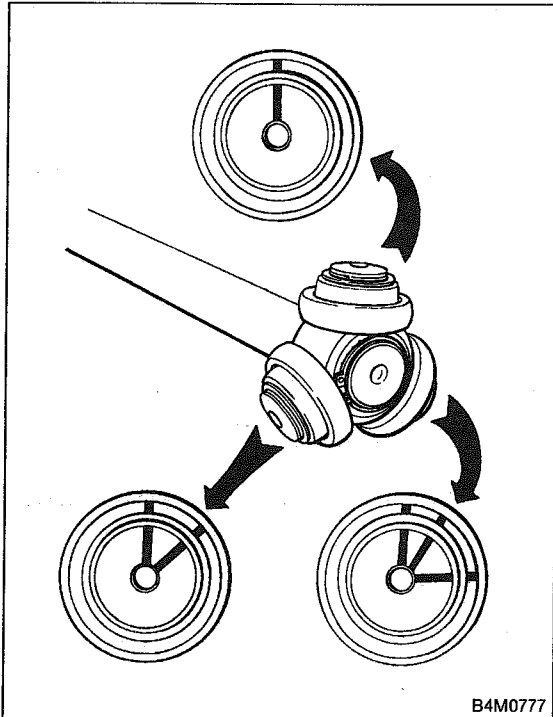


- 3) Align alignment marks and install trunnion on shaft.
- 4) Install snap ring to shaft.

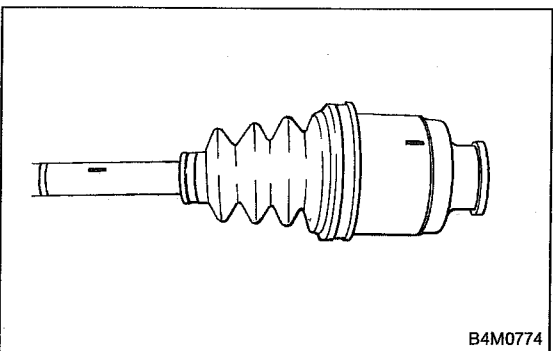
CAUTION:

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

- 5) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of FTJ outer race.
- 6) Apply a coat of specified grease to free ring and trunnion.



- 7) Align alignment marks on free ring and trunnion and install free ring.



- 8) Align alignment marks on shaft and outer race, and install outer race.
- 9) Install circlip in the groove on FTJ outer race.

CAUTION:

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

- 10) 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.
- 11) Install FTJ boot taking care not to twist it.

CAUTION:

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

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

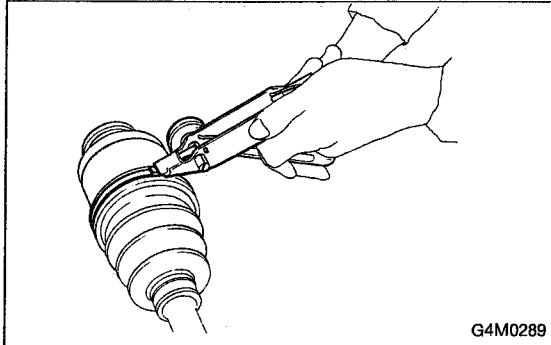
CAUTION:

Use a new band.

13) 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.



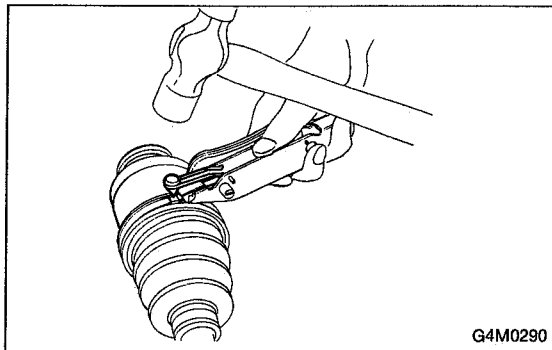
G4M0289

14) Tighten band by using ST.

ST 925091000 BAND TIGHTENING TOOL

NOTE:

Tighten band until it cannot be moved by hand.



G4M0290

15) 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.

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

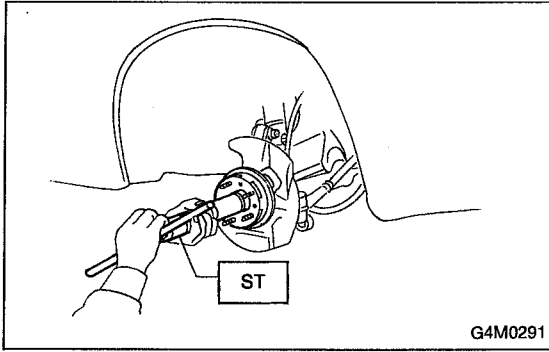
CAUTION:

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

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

NOTE:

Extend and retract FTJ to provide equal grease coating.

**E: INSTALLATION****1. FRONT DRIVE SHAFT**

- 1) Insert BJ into hub splines.

CAUTION:

Be careful not to damage inner oil seal lip.

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

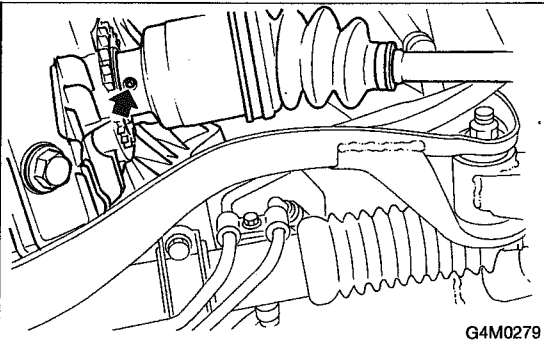
ST1 922431000 AXLE SHAFT INSTALLER

ST2 927390000 ADAPTER

CAUTION:

Do not hammer drive shaft when installing it.

- 3) Tighten axle nut temporarily.



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

CAUTION:

Always use a new spring pin.

- 5) Connect transverse link to housing.

Torque (self-locking nut):

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

CAUTION:

Use a new self-locking nut.

- 6) Install stabilizer bracket.

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

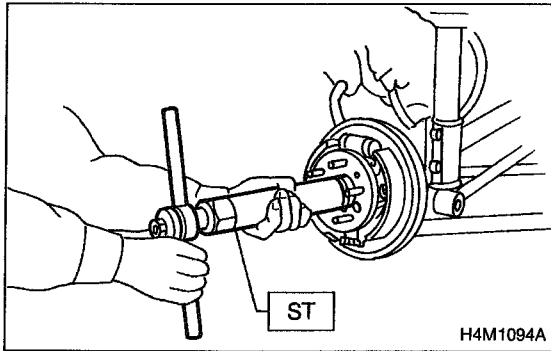
Tightening torque:

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

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.



2. REAR DRIVE SHAFT

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

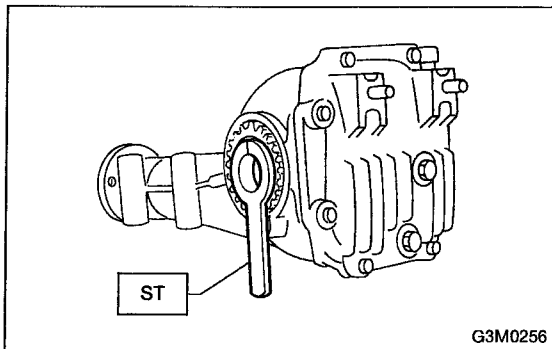
ST2 927390000 ADAPTER

CAUTION:

Do not hammer drive shaft when installing it.

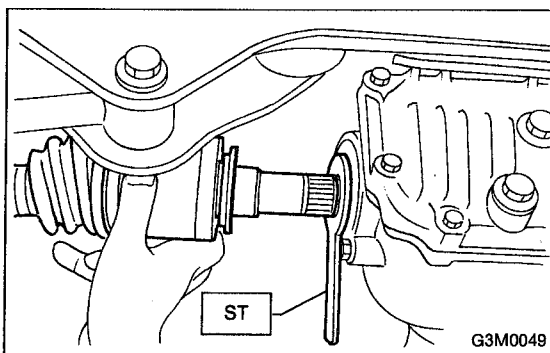
3) Tighten axle nut temporarily.

4) Replace circlips from DOJ spline with new one. (1800 cc vehicles only)



5) Using ST, install DOJ into differential.

ST 28099PA090 SIDE OIL SEAL PROTECTOR

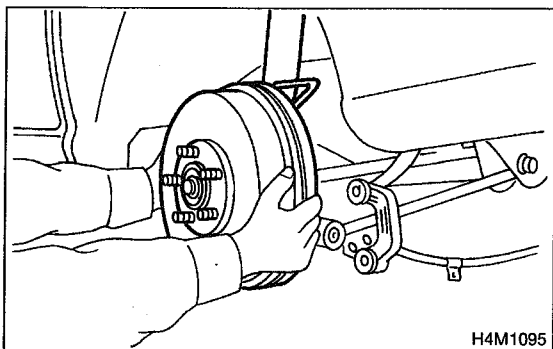


6) Insert DOJ spline end into bore of side oil seal, and remove ST.

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:

$113 \pm 15 \text{ N}\cdot\text{m}$ ($11.5 \pm 1.5 \text{ kg}\cdot\text{m}$, $83 \pm 11 \text{ ft}\cdot\text{lb}$)

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

Tightening torque:

$137 \pm 20 \text{ N}\cdot\text{m}$ ($14 \pm 2 \text{ kg}\cdot\text{m}$, $101 \pm 14 \text{ ft}\cdot\text{lb}$)

11) Install stabilizer bracket.

12) While depressing brake pedal, tighten axle nut using a socket wrench.

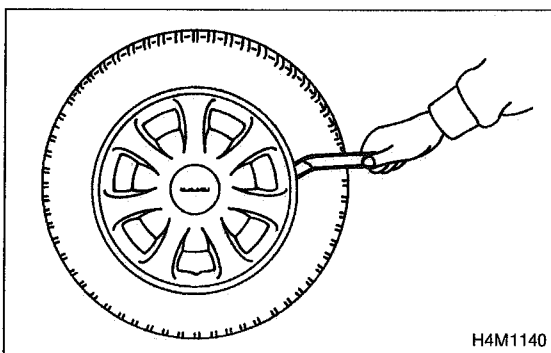
Tightening torque:

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

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.



4. Full Wheel Cap

A: REMOVAL

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

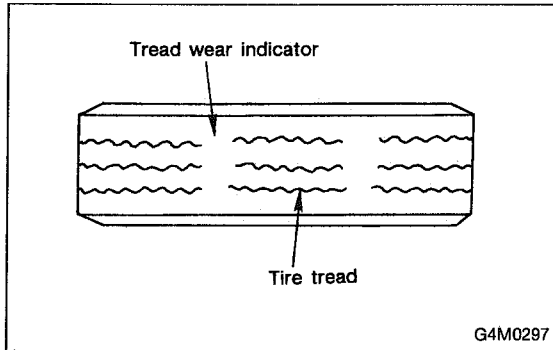
B: INSTALLATION

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

5. Steel Wheel and Tire

A: INSPECTION

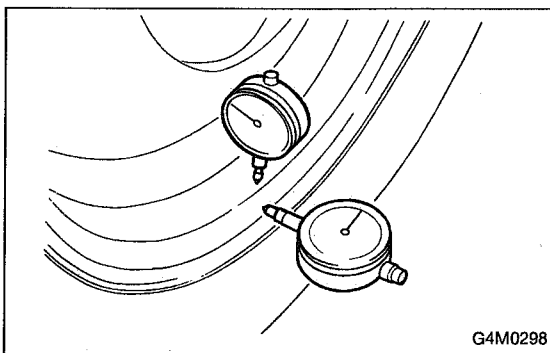
- 1) Deformation or damage on the rim can cause air leakage. Check the rim flange for deformation, crack, or damage, and repair or replace as necessary.
- 2) Take stone, glass, nail etc. off the tread groove.



- 3) Replace tire:
 - (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.

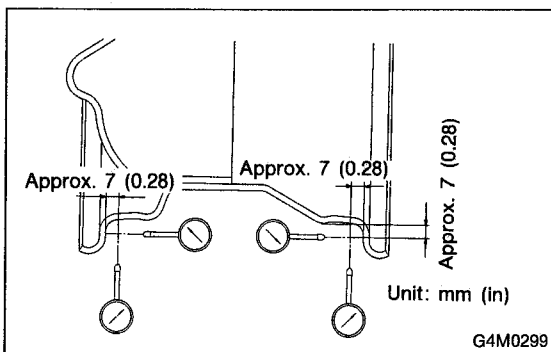
CAUTION:

- 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.



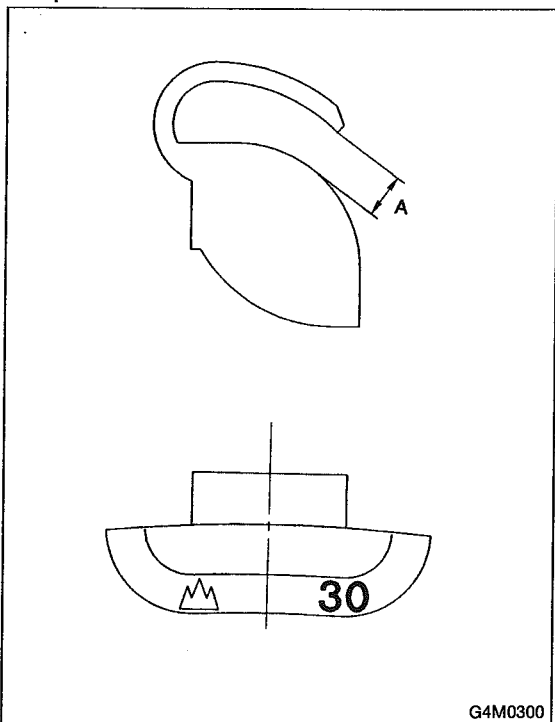
1. INSPECTION OF WHEEL RUNOUT

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



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

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



6. Wheel Balancing

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

Service limit: A

1.6 — 2.0 mm (0.063 — 0.079 in)

CAUTION:

Balance weights are available for use with any of 13- to 14-inch wheels.

7. Installation of Wheel Assembly to Vehicle

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

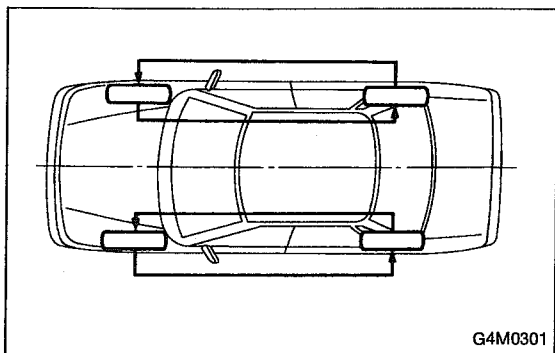
Wheel nut tightening torque:

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

CAUTION:

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

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



8. Tire Rotation

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

This lengthens service life of tires.

CAUTION:

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

9. "T-type" Tire

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

CAUTION:

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

MEMO:

STEERING SYSTEM **4-3**

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1. Power Steering	51

PRECAUTION FOR SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The Supplemental Restraint System "Airbag" helps to reduce the risk or severity of injury to the driver in a frontal collision.

The Supplemental Restraint System consists of an airbag module (located in the center of the steering wheel), sensors, a control module, warning light, wiring harness and roll connector.

Information necessary to service the safety is included in the "5-5. SUPPLEMENTAL RESTRAINT SYSTEM" of this Service Manual.

WARNING:

- To avoid rendering the Airbag system inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized SUBARU dealer.
- Improper maintenance, including incorrect removal and installation of the Airbag system, can lead to personal injury caused by unintentional activation of the Airbag system.
- All Airbag system electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the Supplemental Restraint System "Airbag".

1. Steering System

A: SPECIFICATIONS

Whole system	Minimum turning radius	m (ft)	5.1 (16.7)
	Steering angle (Inside-Outside)		37.4° ± 1.5° — 32.5° ± 1.5°
	Steering wheel diameter	mm (in)	385 (15.16)
	Overall gear ratio (Turns, lock to lock)		16.5 (3.2)
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 (0.439)
	Relief pressure	kPa (kg/cm ² , psi)	1800 cc model: 6,375 (65, 924) 2200 cc model: 7,355 (75, 1,067)
	Hydraulic fluid control		Dropping 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
	Revolving direction		Clockwise
Working fluid (Power steering system)	Name		ATF DEXRON II, IIE or III
	Capacity	Oil tank ℓ (US qt, Imp qt) Total	0.3 (0.3, 0.3) 0.7 (0.7, 0.6)

B: SERVICE DATA

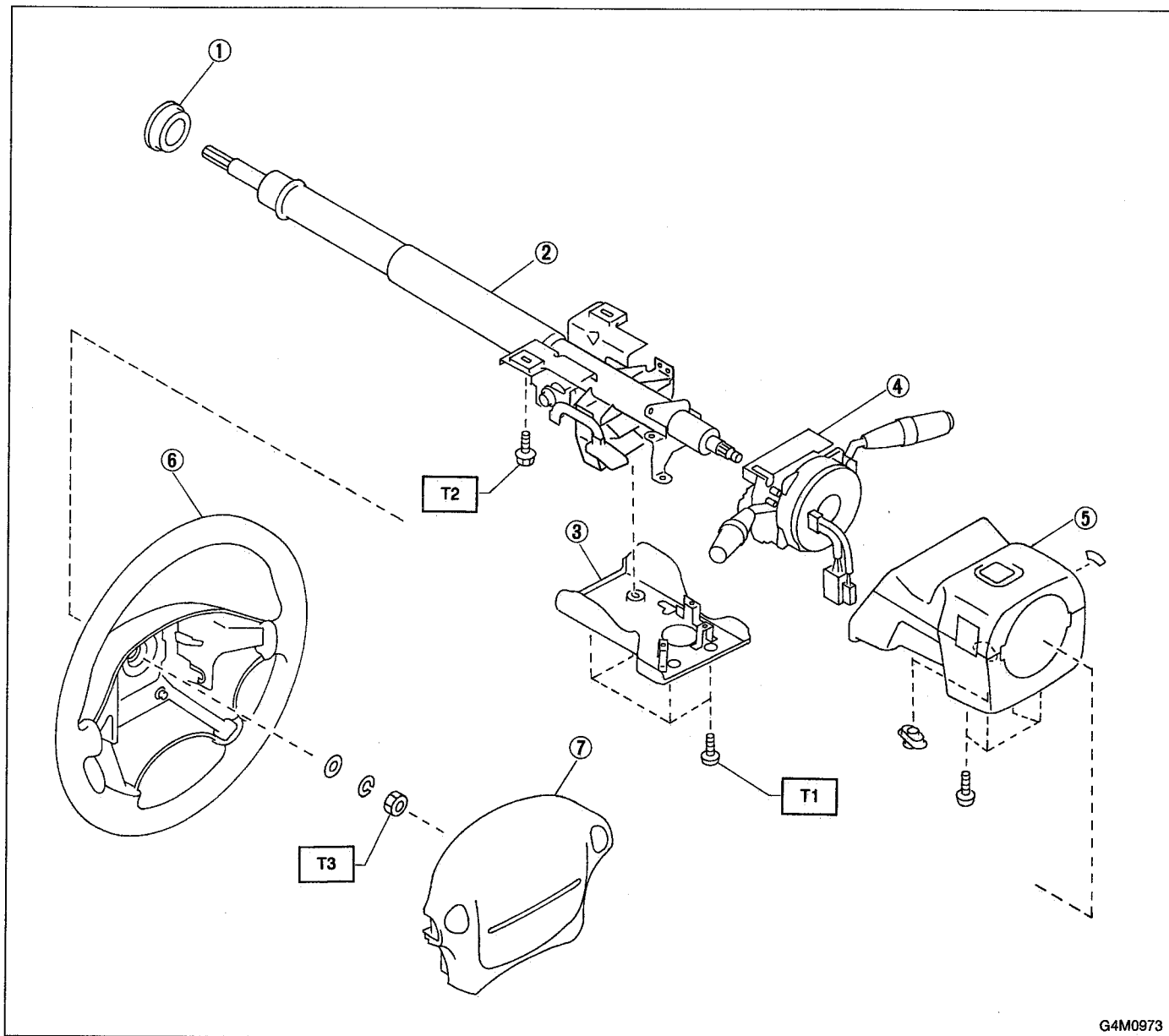
Steering wheel	Free play	mm (in)	17 (0.67)
Turning angle	Inner tire & wheel		37.4° ± 1.5°
	Outer tire & wheel		32.5° ± 1.5°
Steering shaft	Clearance between steering wheel and column cover	mm (in)	3.0 (0.118)
Steering gearbox (Power steering system)	Sliding resistance	N (kg, lb)	240.3 (24.5, 54.0) or less
	Rack shaft play in radial direction	mm (in)	0.15 (0.0059) or less
	Right-turn steering		Horizontal movement: 0.3 (0.012) or less
	Left-turn steering		Vertical movement: 0.15 (0.0059) or less
	Input shaft play	mm (in)	0.18 (0.0071) or less
	In radial direction		0.1 (0.004) or less
	In axial direction		
	Turning resistance	N (kg, lb)	Within 30 mm (1.18 in) from rack center in straight ahead position: Less than 11.18 (1.14, 2.51) Maximum allowable value: 12.7 (1.3, 2.9)
Oil pump (Power steering system)	Pulley shaft	mm (in)	0.4 (0.016) or less
	Radial play		0.9 (0.035) or less
	Axial play		
	Pulley		
	Ditch deflection	mm (in)	1.0 (0.039) or less
	Resistance to rotation	N (kg, lb)	9.22 (0.94, 2.07) or less
	Regular pressure	kPa (kg/cm ² , psi)	981 (10, 142) or less
	Relief pressure	kPa (kg/cm ² , psi)	6,375 (65, 924)
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road	N (kg, lb)	31.4 (3.2, 7.1) or less
	At standstill with engine stalled on a concrete road	N (kg, lb)	147 (15, 33) or less

C: RECOMMENDED POWER STEERING FLUID

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

MEMO:

1. Steering Wheel and Column (Tilt)

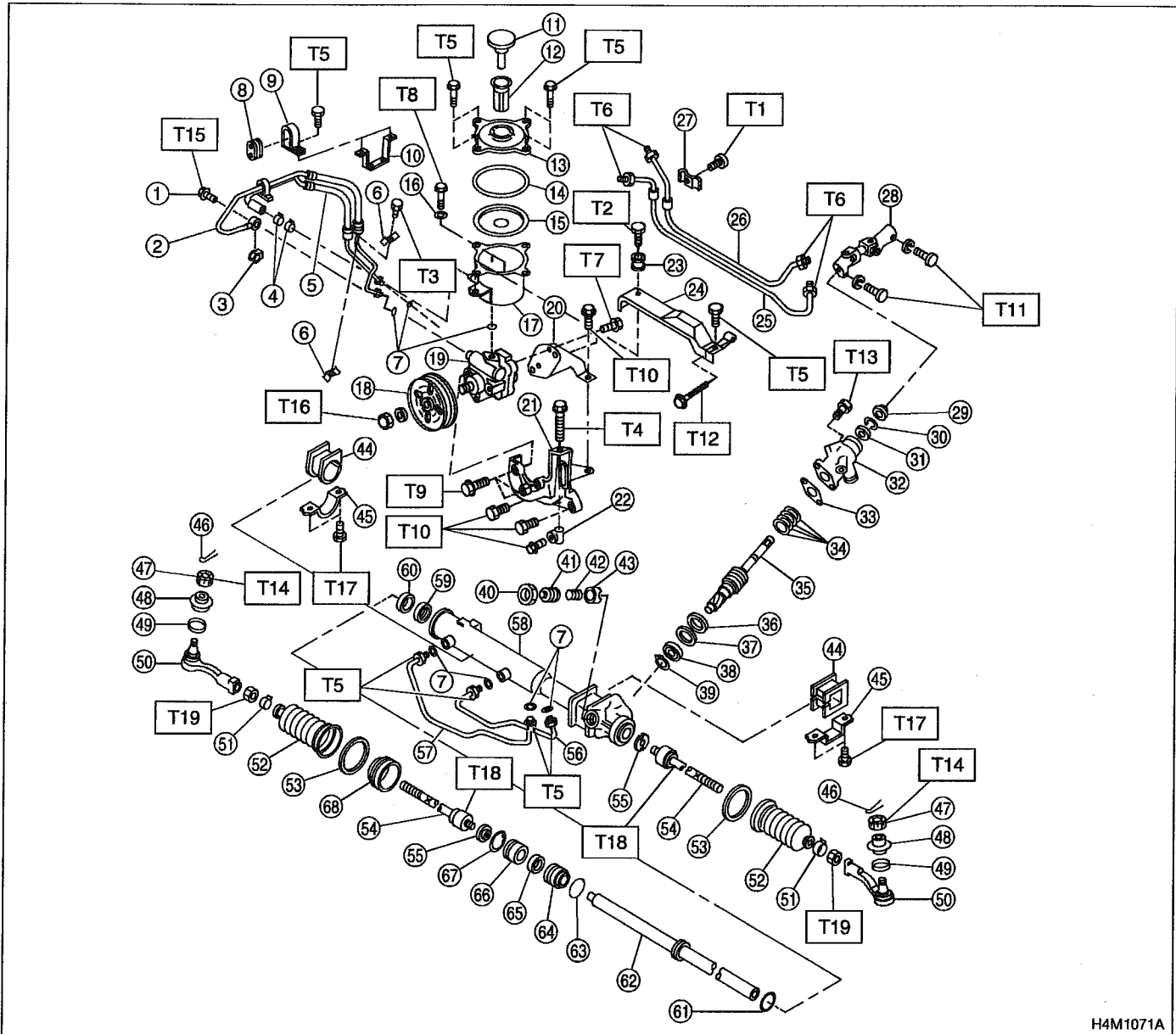


G4M0973

- 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 (kg·m, ft·lb)
T1: 3.4 ± 1.0 (0.35 ± 0.1, 2.5 ± 0.7)
T2: 25 ± 5 (2.5 ± 0.5, 18.1 ± 3.6)
T3: 34 ± 5 (3.5 ± 0.5, 25.3 ± 3.6)

2. Power Steering System



H4M1071A

Tightening torque: N·m (kg·m, ft·lb)

T1: 5.4 ± 1.5 (0.55 ± 0.15, 4.0 ± 1.1)

T2: 6.4 ± 1.0 (0.65 ± 0.1, 4.7 ± 0.7)

T3: 7.4 ± 2.0 (0.75 ± 0.20, 5.4 ± 1.4)

T4: 8 ± 2 (0.8 ± 0.2, 5.8 ± 1.4)

T5: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)

T6: 15 ± 5 (1.5 ± 0.5, 10.8 ± 3.6)

T7: 15.7 ± 2.4 (1.60 ± 0.24, 11.6 ± 1.7)

T8: 18⁺⁵₀ (1.8^{+0.5}₀, 13.0^{+3.6}₀)

T9: 20.1 ± 2.5 (2.05 ± 0.25, 14.8 ± 1.8)

T10: 22 ± 2 (2.2 ± 0.2, 15.9 ± 1.4)

T11: 24 ± 3 (2.4 ± 0.3, 17.4 ± 2.2)

T12: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)

T13: 25 ± 5 (2.5 ± 0.5, 18.1 ± 3.6)

T14: 27 ± 2 (2.75 ± 0.2, 19.9 ± 1.4)

T15: 39 ± 5 (4.0 ± 0.5, 28.9 ± 3.6)

T16: 52 ± 10 (5.3 ± 1.0, 38 ± 7)

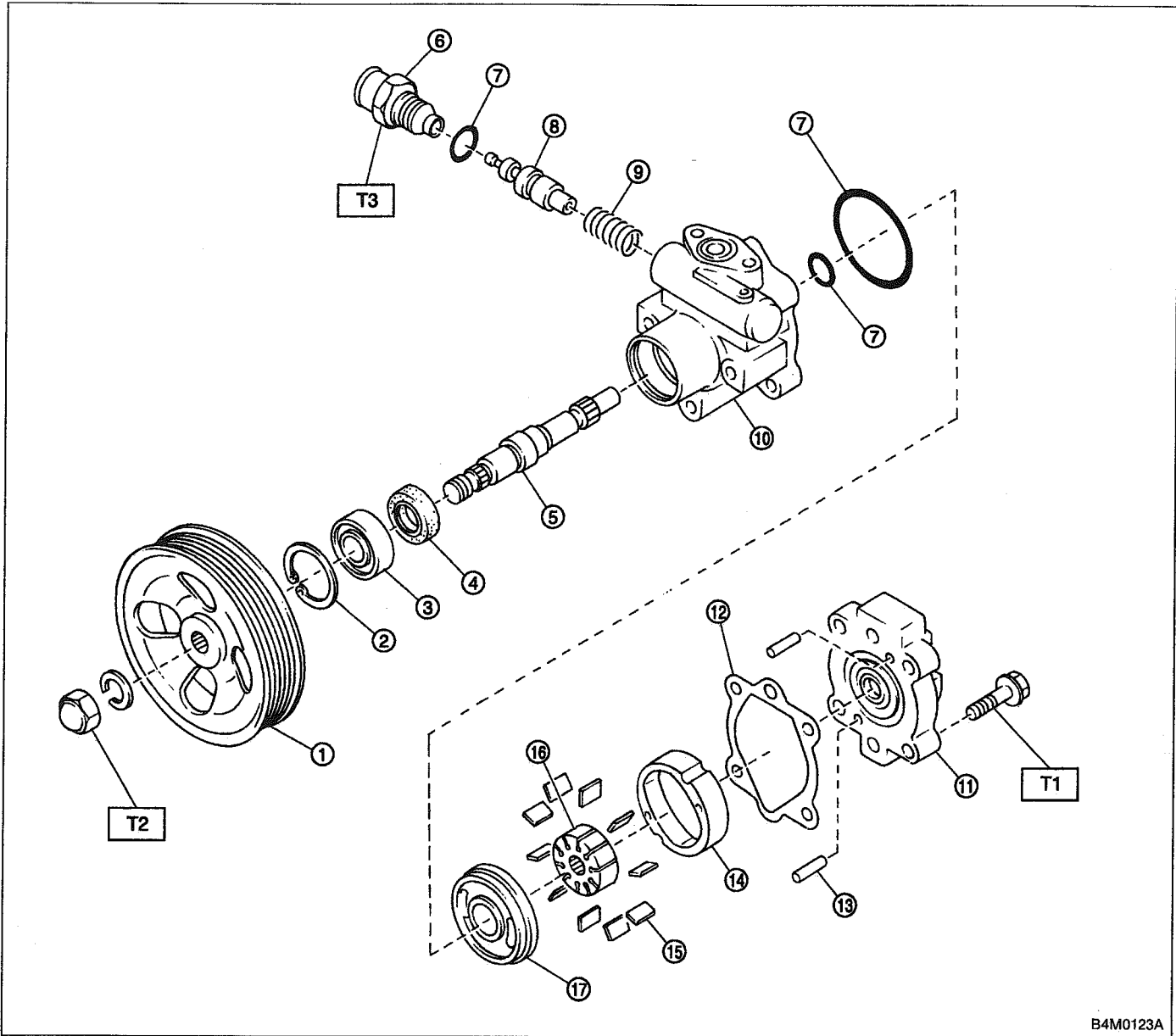
T17: 59 ± 12 (6.0 ± 1.2, 43 ± 9)

T18: 78 ± 10 (8.0 ± 1.0, 58 ± 7)

T19: 83 ± 5 (8.5 ± 0.5, 61.5 ± 3.6)

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

3. Power Steering Oil Pump



B4M0123A

- ① Pulley
- ② Snap ring
- ③ Bearing
- ④ Oil seal
- ⑤ Shaft
- ⑥ Connector
- ⑦ O-ring
- ⑧ Spool valve

- ⑨ Spring
- ⑩ Front casing
- ⑪ Rear cover
- ⑫ Gasket
- ⑬ Knock pin
- ⑭ Cam ring
- ⑮ Vane
- ⑯ Rotor

- ⑰ Side plate

Tightening torque: N·m (kg·m, ft·lb)

T1: 16 ± 2 (1.6 ± 0.2, 11.6 ± 1.4)

T2: 61 ± 7 (6.2 ± 0.7, 44.8 ± 5.1)

T3: 74 ± 5 (7.5 ± 0.5, 54.2 ± 3.6)

1. Supplemental Restraint System "Airbag"

A: PRECAUTION

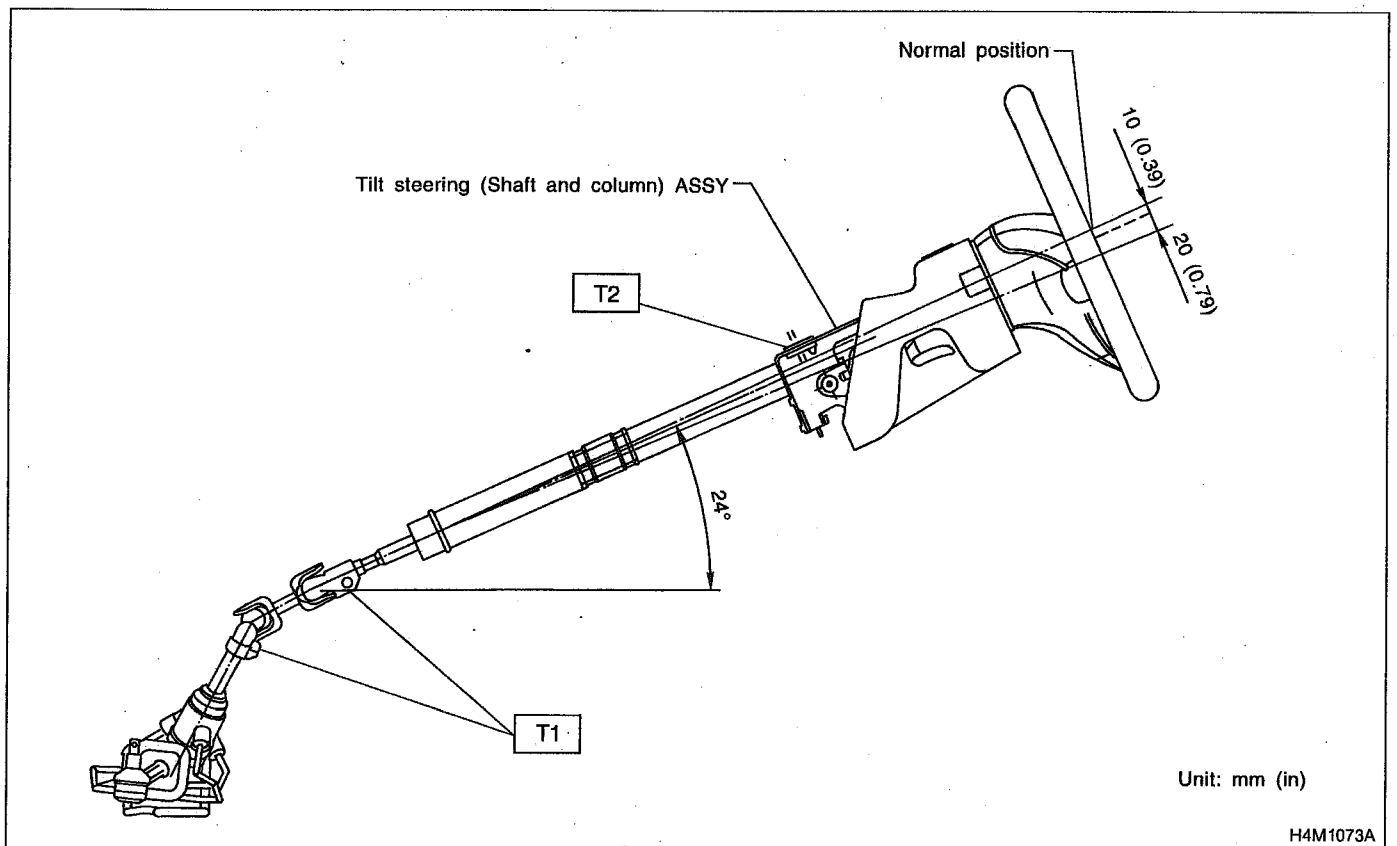
Airbag system wiring harness is routed near the steering wheel, steering shaft and column.

WARNING:

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

2. Tilt Steering Column

A: REMOVAL



Tightening torque: N·m (kg·m, ft·lb)

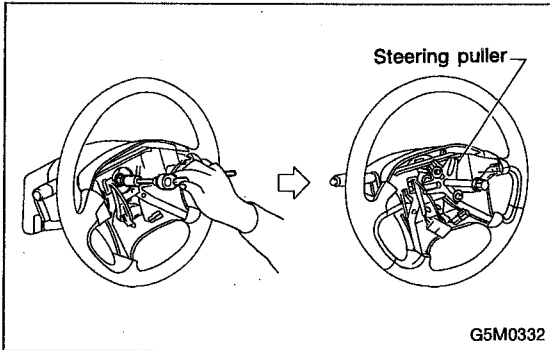
T1: 24 ± 3 (2.4 ± 0.3, 17.4 ± 2.2)

T2: 25 ± 5 (2.5 ± 0.5, 18.1 ± 3.6)

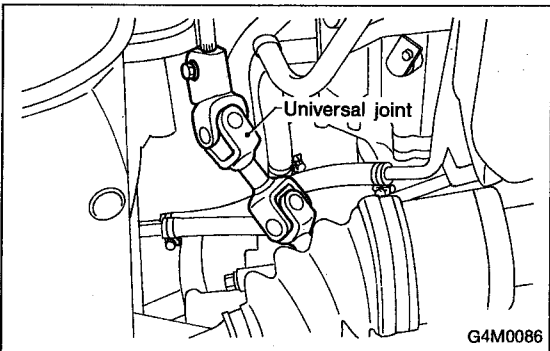
- 1) Disconnect battery minus terminal.
- 2) Lift-up vehicle.
- 3) Remove airbag module. (with airbag model) <Ref. to 5-5 [W2A0].>

WARNING:

Always refer to "5-5 Supplemental Restraint System" before performing airbag module service (if so equipped). < Ref. to 5-5 [W300]. >



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



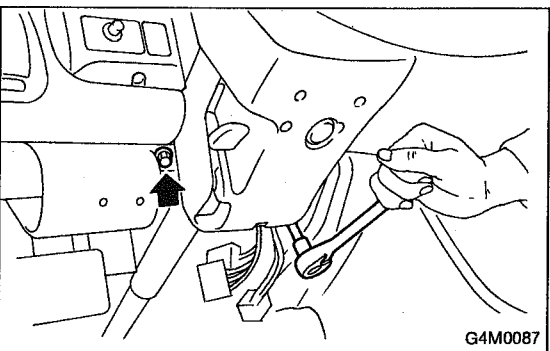
5) Remove universal joint bolts and then remove universal joint.

CAUTION:

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

6) Remove trim panel under instrument panel.

7) Disconnect connectors for ignition switch and combination switch wiring harness under instrument panel.

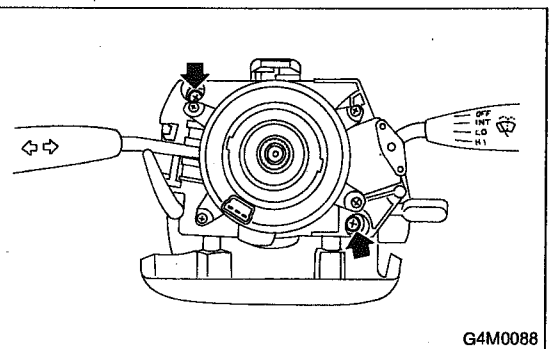


8) Remove the two bolts under instrument panel securing steering shaft.

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

CAUTION:

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



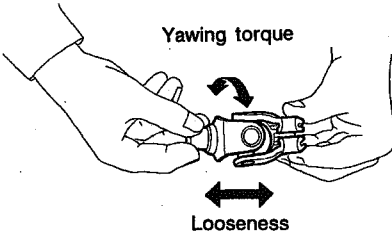
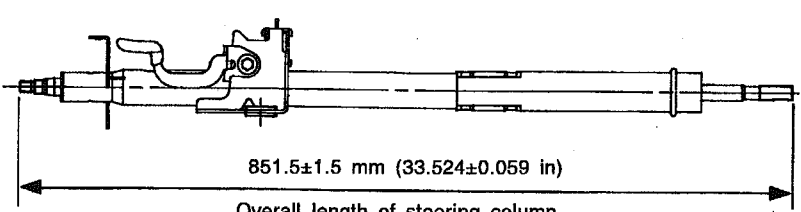
B: DISASSEMBLY

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

C: INSPECTION

1. BASIC INSPECTION

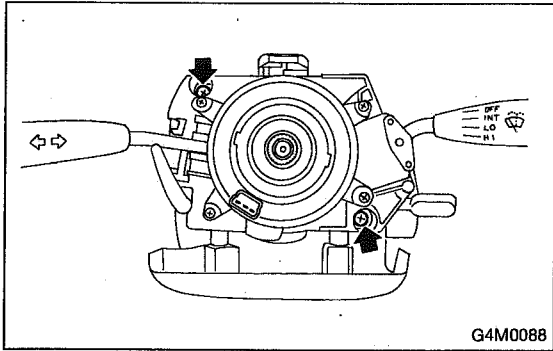
Clean the disassembled parts with a cloth, and check for wear, damage, or any other faults. If necessary, repair or replace faulty parts.

Part name	Inspection	Corrective action
Universal joint	<ul style="list-style-type: none"> ● Free play ● Swinging torque Yawing torque Looseness  <p>Standard value of universal joint free play: 0 mm (0 in) Max. value of universal joint swinging torque: 0.3 N·m (0.03 kg·m, 0.2 ft·lb)</p> <p style="text-align: right;">G4M0089</p>	Replace if faulty.
Steering column	<ul style="list-style-type: none"> ● Overall length of steering column <p>Measure overall length of steering column. Standard overall length of steering column:</p>  <p style="text-align: center;">851.5±1.5 mm (33.524±0.059 in) Overall length of steering column</p> <p style="text-align: right;">H4M1142A</p>	Replace steering column assembly.

2. AIRBAG MODEL INSPECTION

WARNING:

For airbag model inspection procedures, refer to 5-5 Supplemental Restraint System. < Ref. to 5-5 [W207] and [W208]. >



D: ASSEMBLY

- 1) Insert combination switch to upper column shaft, and install lower column cover with tilt lever held in the lowered position. Then route ignition key harness and combination switch harness between column cover mounting bosses.
- 2) Fit upper column cover to lower column cover, and tighten combination switch and column cover.

Tightening torque:

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

CAUTION:

Don't overtorque screw.

E: INSTALLATION

- 1) Insert end of steering shaft into toeboard grommet.
- 2) Tighten steering shaft mounting bolts under instrument panel.

Tightening torque:

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

- 3) Connect ignition and combination switch connectors under instrument panel.
- 4) Connect airbag system connector at harness spool.

NOTE:

Make sure to apply double lock.

- 5) Install universal joint.

(1) Align bolt hole on the long yoke side of universal joint with the cutout at the serrated section of shaft end, and insert universal joint.

(2) Align bolt hole on the short yoke side of universal joint with the cutout at the serrated section of gearbox assembly. Lower universal joint completely.

(3) Temporarily tighten bolt on the short yoke side. Raise universal joint to make sure the bolt is properly passing through the cutout at the serrated section.

(4) Tighten bolt on the long yoke side, then that on the short yoke side.

Tightening torque:

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

CAUTION:

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

Standard clearance between gearbox to DOJ:

Over 15 mm (0.59 in)

- 6) Align center of roll connector. (with airbag model)
< Ref. to 5-5 [W601]. >

CAUTION:

Ensure that front wheels are set in straight forward direction.

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

Tightening torque:

$34 \pm 5 \text{ N}\cdot\text{m}$ ($3.5 \pm 0.5 \text{ kg}\cdot\text{m}$, $25.3 \pm 3.6 \text{ ft}\cdot\text{lb}$)

Column cover-to-steering wheel clearance:

2 — 4 mm (0.08 — 0.16 in)

CAUTION:

Insert roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage.

Draw out airbag system connector, horn connector and cruise control connectors from guide hole of steering wheel lower end. (with airbag model)

8) Install airbag module to steering wheel. (with airbag model)

WARNING:

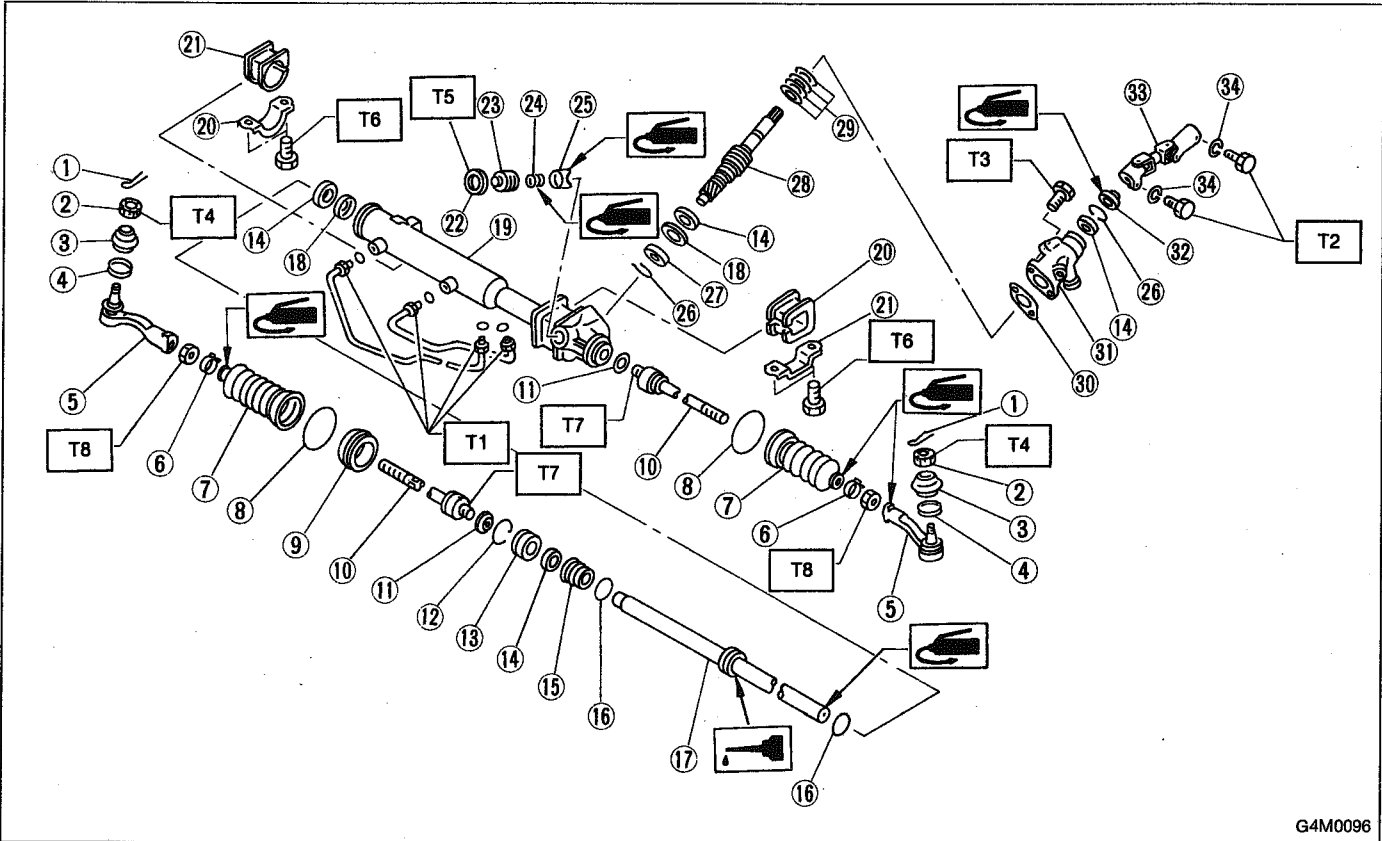
Always refer to 5-5 Supplemental Restraint System before performing the service operation. <Ref. to 5-5 [W3B1].>

3. Steering Gearbox (Power Steering System)

A: REMOVAL

NOTE:

For disassembly and assembly of gearbox unit, refer to section Control Valve (Power Steering Gearbox).



- ① Cotter pin
- ② Castle nut
- ③ Dust cover
- ④ Clip
- ⑤ Tie-rod end
- ⑥ Clip
- ⑦ Boot
- ⑧ Clip
- ⑨ Spacer
- ⑩ Tie-rod
- ⑪ Lock washer
- ⑫ Circlip
- ⑬ Rack stopper
- ⑭ Oil seal
- ⑮ Rack bushing

- ⑯ O-ring
- ⑰ Rack
- ⑱ Back-up washer
- ⑲ Rack housing
- ⑳ Adapter
- ㉑ Clamp
- ㉒ Lock nut
- ㉓ Adjusting screw
- ㉔ Spring
- ㉕ Sleeve
- ㉖ C-ring
- ㉗ Ball bearing
- ㉘ Valve
- ㉙ Seal ring
- ㉚ Packing

- ㉛ Valve housing
- ㉜ Dust seal
- ㉝ Universal joint
- ㉞ Spring washer

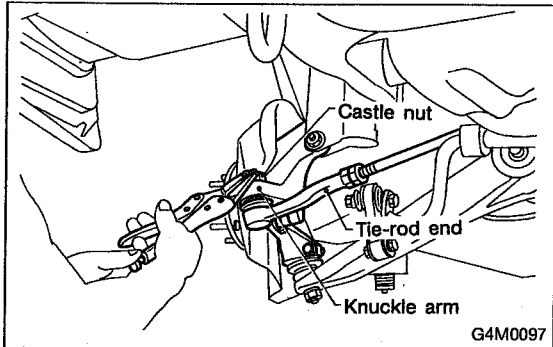
Tightening torque: N-m (kg-m, ft-lb)

- T1: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)**
- T2: 25 ± 5 (2.5 ± 0.5, 18.1 ± 3.6)**
- T3: 24 ± 3 (2.4 ± 0.3, 17.4 ± 2.2)**
- T4: 27.0 ± 2.5**
(2.75 ± 0.25, 19.9 ± 1.8)
- T5: 39 ± 10 (4.0 ± 1.0, 29 ± 7)**
- T6: 59 ± 12 (6.0 ± 1.2, 43 ± 9)**
- T7: 78 ± 10 (8.0 ± 1.0, 58 ± 7)**
- T8: 83 ± 5 (8.5 ± 0.5, 61.5 ± 3.6)**

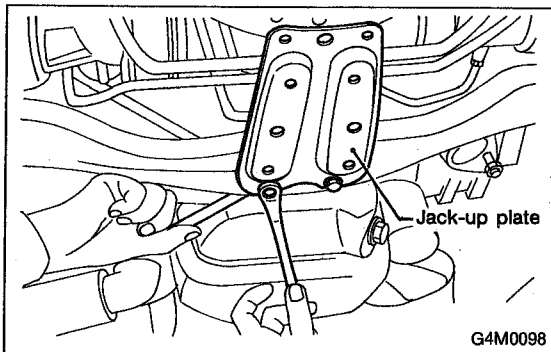
- 1) Disconnect battery minus terminal.
- 2) Loosen front wheel nut.
- 3) Lift vehicle and remove front wheels.
- 4) Remove front exhaust pipe assembly.

WARNING:

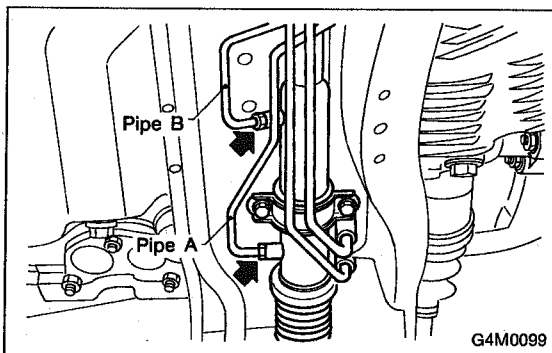
Be careful, exhaust pipe is hot.



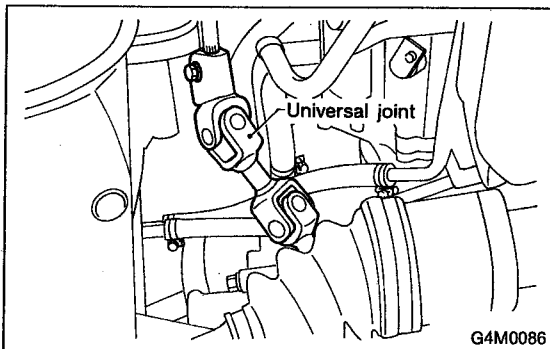
- 5) Using a puller, remove tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



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



- 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.

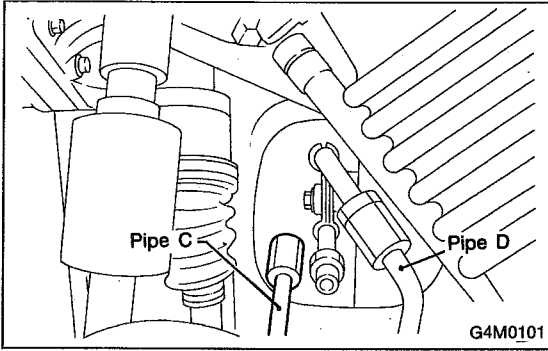


- 8) Remove lower side bolt of universal joint, then remove upper side bolt and lift the joint upward.

NOTE:

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

3. Steering Gearbox (Power Steering System)



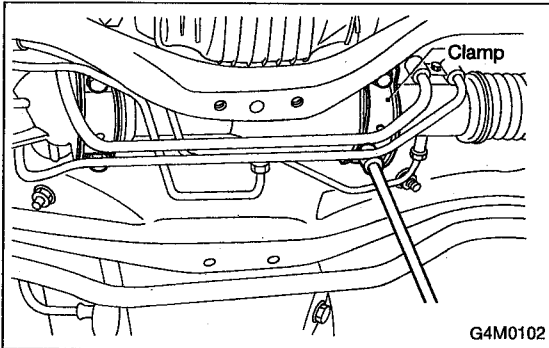
9) Disconnect pipes C and D from pipe of gearbox.

CAUTION:

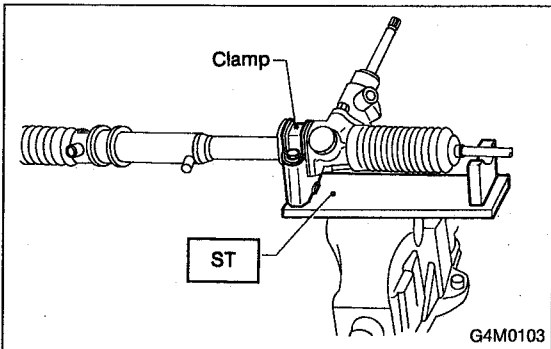
Be careful not to damage these pipes.

NOTE:

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



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

**B: DISASSEMBLY**

1) Disconnect four pipes from gearbox.

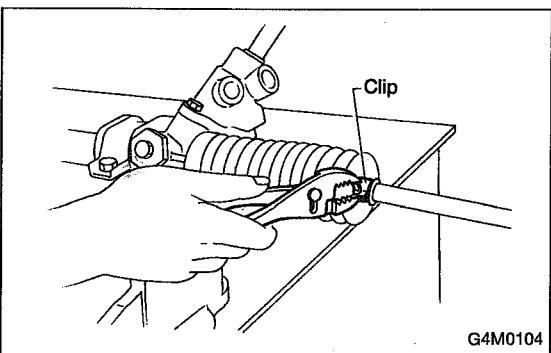
2) Secure gearbox removed from vehicle in vice using ST.

ST 926200000 STAND

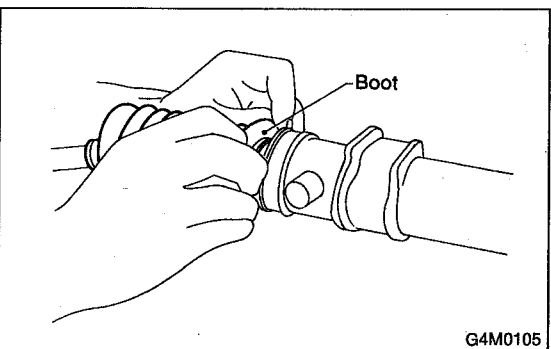
CAUTION:

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

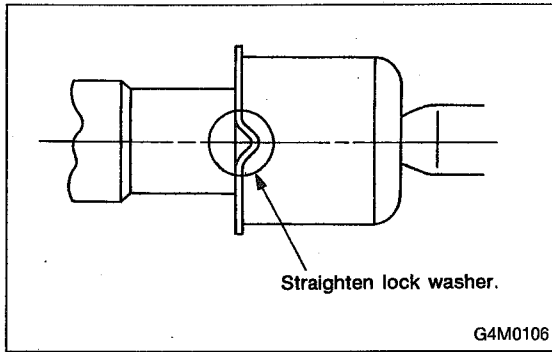
3) Remove tie-rod end and lock nut from gearbox.



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



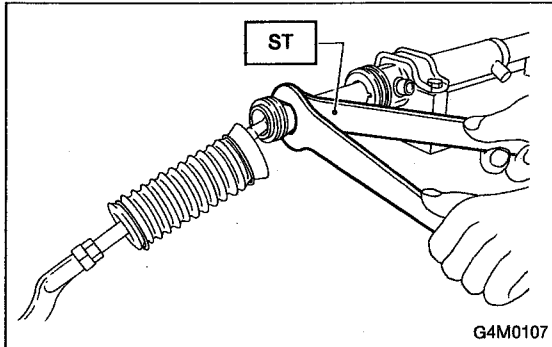
5) Remove boot together with large clips.



6) Straighten lock washer under ball joint.

CAUTION:

- Be extremely careful not to hit surface of right hand rack; otherwise, oil leakage may result.
- Tie-rod lock washer must be replaced with a new one whenever it is removed.

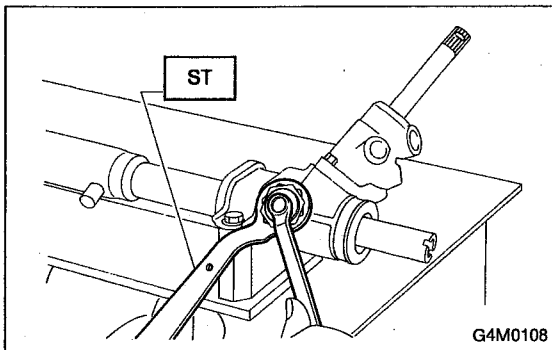


7) Loosen ball joint using ST and spanner and remove tie-rod from rack.

NOTE:

When loosening ball joint, securely fix the rack using ST.

ST 925700000 WRENCH



8) Loosen lock nut using ST, and remove adjusting screw.

ST 926230000 SPANNER

9) Remove spring and sleeve.

10) Remove dust seal.

CAUTION:

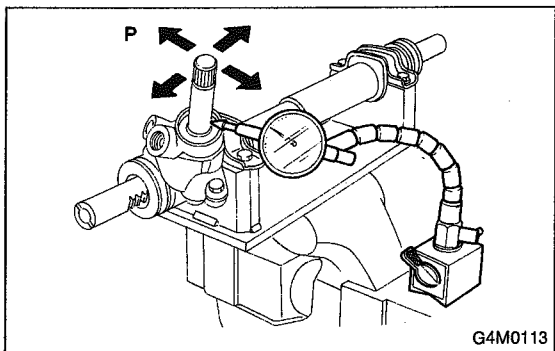
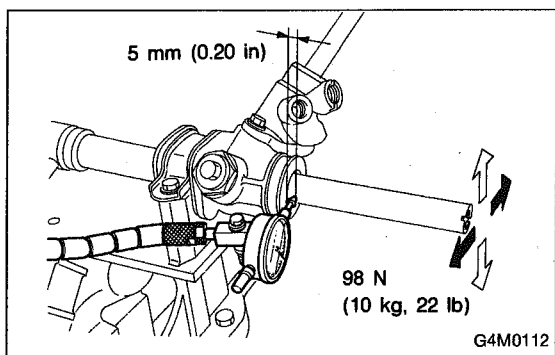
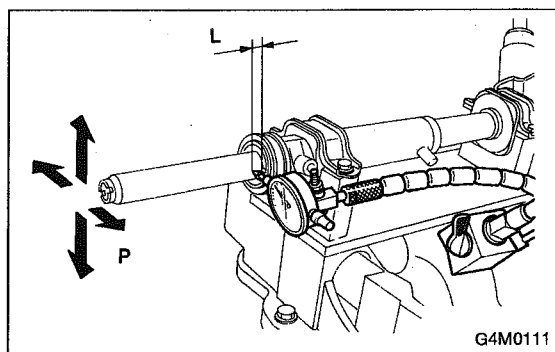
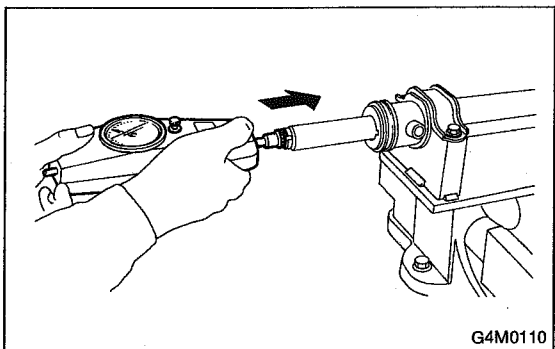
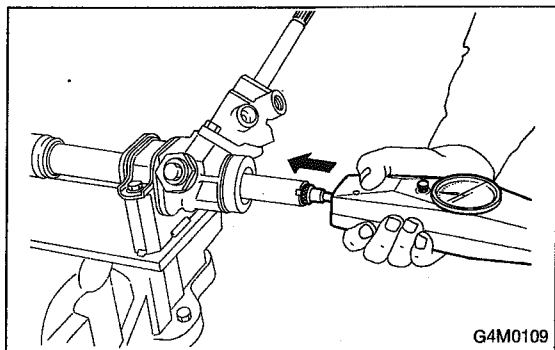
Be careful not to damage housing and input shaft, or to allow foreign matters to get inside when removing dust seal.

C: INSPECTION

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

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

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



1. SERVICE LIMIT

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

NOTE:

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

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit

240.3 N (24.5 kg, 54.0 lb) or less

2. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:

Service limit

0.15 mm (0.0059 in) or less

On condition

L: 5 mm (0.20 in)

P: 98 N (10 kg, 22 lb)

Left-turn steering:

Service limit

Direction ⇄

0.3 mm (0.012 in) or less

Direction ⇄

0.15 mm (0.0059 in) or less

3. INPUT SHAFT PLAY

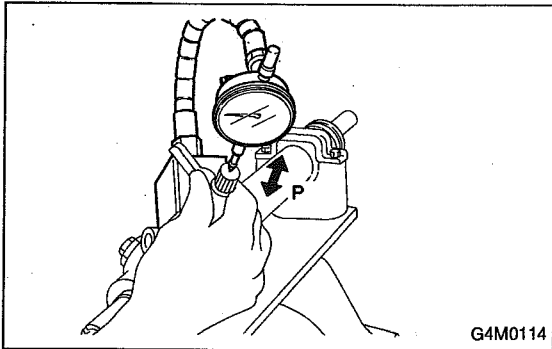
In radial direction:

Service limit

0.18 mm (0.0071 in) or less

On condition

P: 98 N (10 kg, 22 lb)



G4M0114

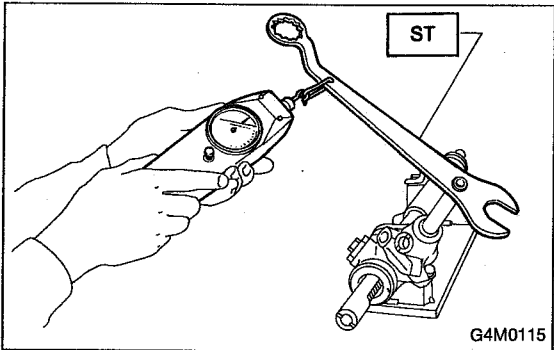
In axial direction:

Service limit

0.1 mm (0.004 in) or less

On condition

P: 20 — 49N (2 — 5 kg, 4 — 11 lb)



G4M0115

4. TURNING RESISTANCE OF GEARBOX

Using ST, measure gearbox turning resistance.

ST 926230000 SPANNER

Service limit:

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

Less than 11.18 N (1.14 kg, 2.51 lb)

Maximum allowable resistance

12.7 N (1.3 kg, 2.9 lb)

D: ASSEMBLY

CAUTION:

Use only SUBARU genuine grease for gearbox.

Grease:

VALIANT GREASE M2

[Part No. 003608001, net 0.5 kg (1.1 lb)]

1) 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.

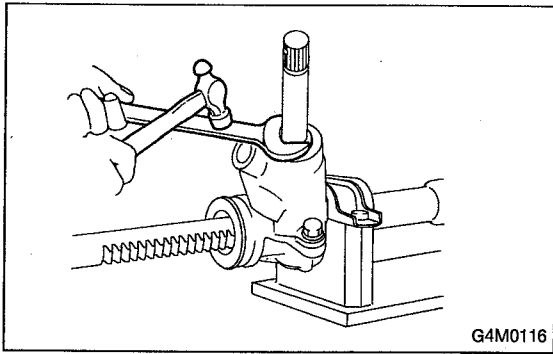
- Move rack shaft to stroke end two (2) or three (3) times to squeeze grease which accumulates on both ends. Remove grease to prevent it from choking air passage hole.

2) Apply grease to sleeve insertion hole.

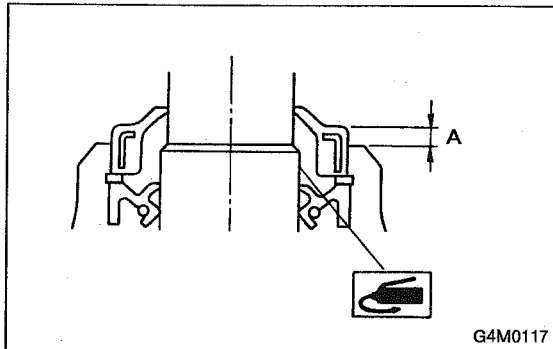
3) Apply grease to dust seal insertion hole.

CAUTION:

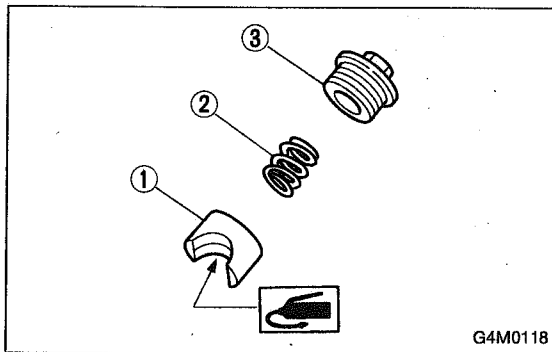
Apply clean grease with clean hands. If material having a sharp edge is used for applying grease, oil seal at the inside might be damaged.



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

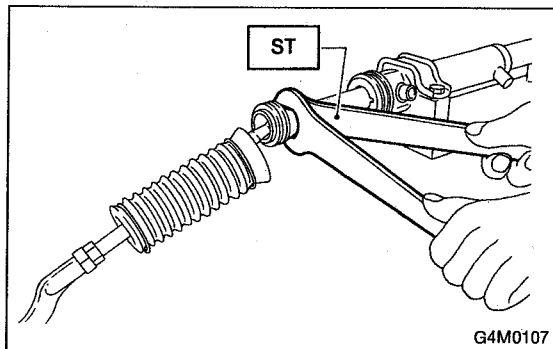


Depth: A
2 mm (0.08 in)



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 Sleeve
- ② Spring
- ③ Adjusting screw



6) Fit new lock washer on screwed portion of rack end. Aligning cut portion of rack and nail of washer, screw in and tighten ball joint by using ST and spanner.

ST 925700000 WRENCH

Tightening torque (Ball joint):

$78 \pm 10 \text{ N}\cdot\text{m}$ ($8.0 \pm 1.0 \text{ kg}\cdot\text{m}$, $58 \pm 7 \text{ ft}\cdot\text{lb}$)

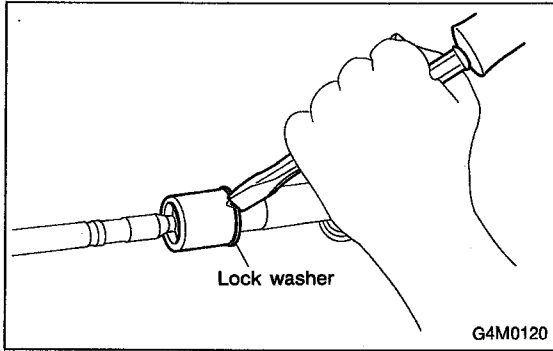
CAUTION:

Pay attention to prevent rack surface on the right side from being damaged by a tool or the like, otherwise oil leakage might be caused.

NOTE:

While tightening ball joint, hold rack with ST to prevent it from revolving.

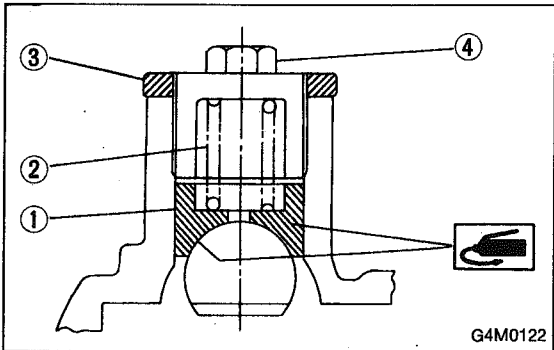
3. Steering Gearbox (Power Steering System)



7) Bend lock washer using a chisel.

CAUTION:

Be careful not to scratch rack when bending lock washer.



8) 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.

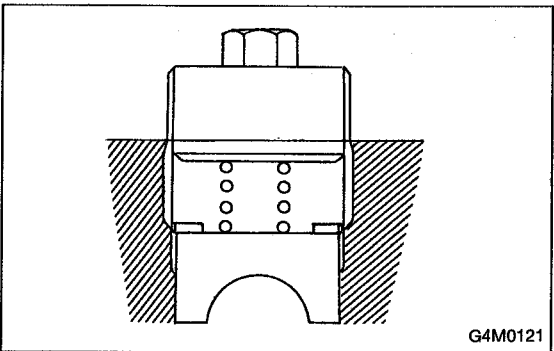
① Sleeve

② Spring

③ Lock nut

④ Adjusting screw

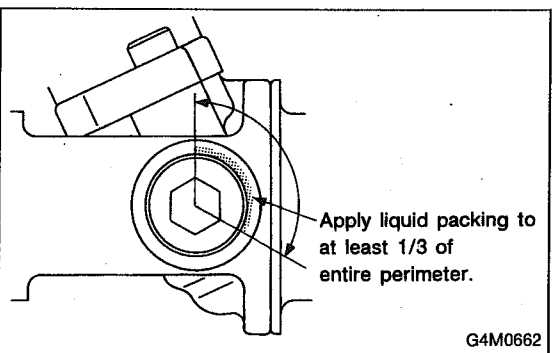
(4) Tighten adjusting screw by two threads.



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

Liquid packing:

THREE BOND 1141



(6) Tighten adjusting screw to 15 N·m (1.5 kg-m, 11 ft-lb) and back off 20°.

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

ST 926230000 SPANNER

Tightening torque (Lock nut):

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

NOTE:

● Hold adjusting screw with a wrench to prevent it from turning while tightening lock nut.

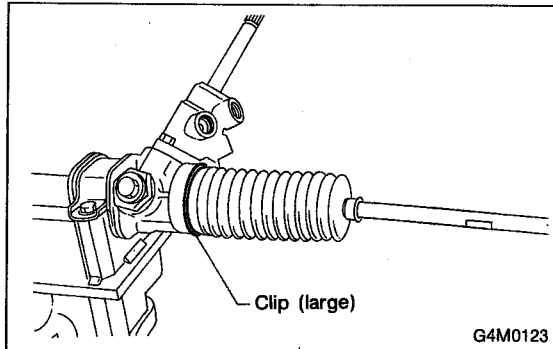
- Make adjustment so that steering wheel can be rotated fully from lock to lock without binding.

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

10) Install boot and mounting rubber to housing.

NOTE:

Apply grease through small hole in boot.



11) Fit clip (large) to boot, and then install boot to gear-box while holding boot flange.

After installing boot, fold back boot flange to the extent that large clip can not be seen.

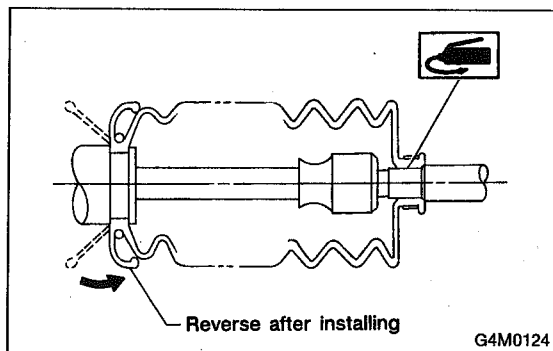
NOTE:

- Before installing boot, be sure to apply grease to the groove of tie-rod.

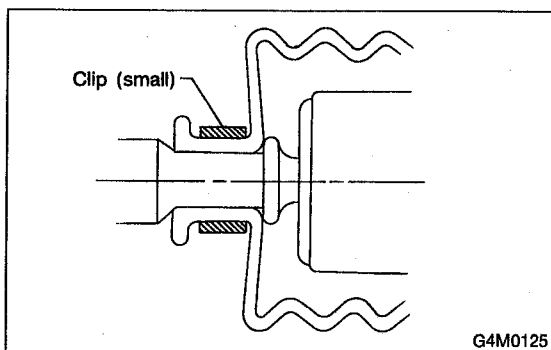
- Install fitting portions of boots to the following portions in both sides of assembled steering gearbox.

1. The groove on gearbox
2. The groove on the rod

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



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



13) Fix boot end with clip (small).

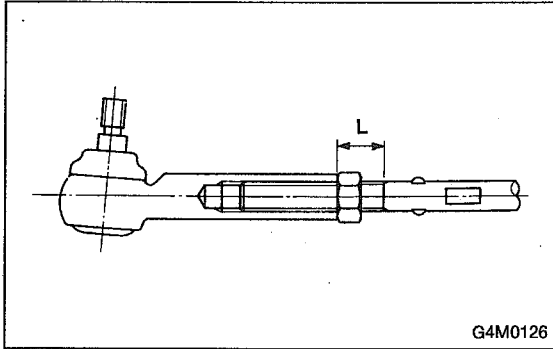
CAUTION:

Use screwdriver with blunted tip to prevent boot from damage, when installing.

NOTE:

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

3. Steering Gearbox (Power Steering System)



G4M0126

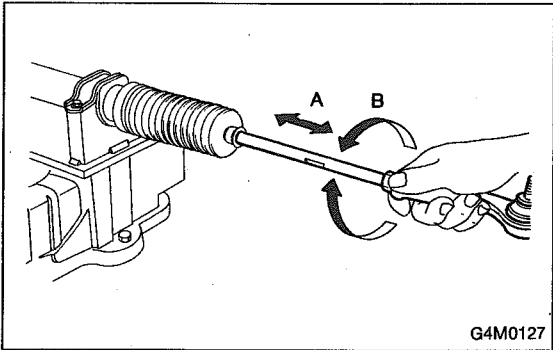
14) If tie-rod end was removed, screw in lock nut and tie-rod end to screwed portion of tie-rod, and tighten lock nut temporarily in a position as shown in figure.

Installed tie-rod length: L

15 mm (0.59 in)

NOTE:

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



G4M0127

15) Inspect gearbox as follows:

- A. Holding tie-rod end, repeat lock to lock two (2) or three (3) times as quickly as possible.
- B. Holding tie-rod end, turn it slowly at a radius one (1) or two (2) times as large as possible.

After all, make sure that boot is installed in the specified position without deflation.

16) Remove gearbox from ST.

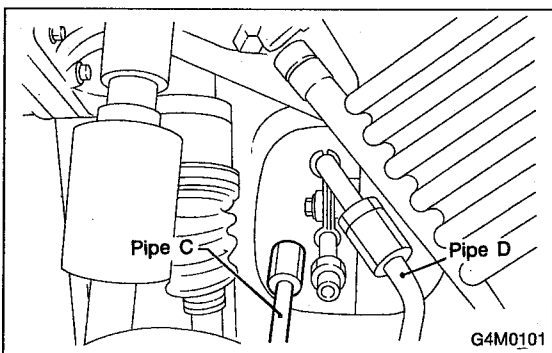
ST 926200000 STAND

17) 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:

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



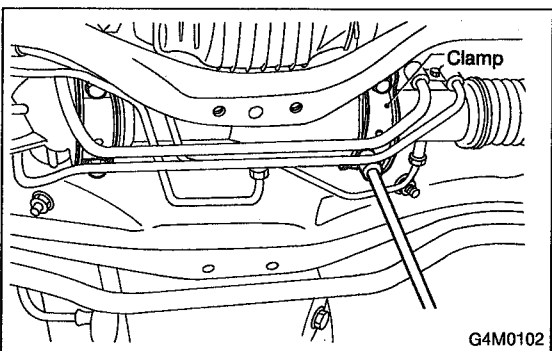
G4M0101

- (2) Connect pipes C and D to gearbox.

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

Tightening torque:

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



G4M0102

E: INSTALLATION

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

Tightening torque:

$59 \pm 12 \text{ N}\cdot\text{m}$ ($6.0 \pm 1.2 \text{ kg}\cdot\text{m}$, $43 \pm 9 \text{ ft}\cdot\text{lb}$)

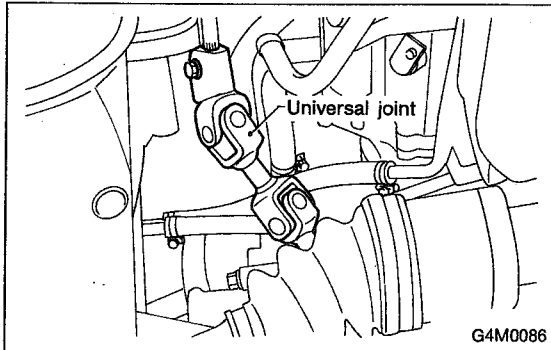
3) How to install the joint.

(1) Push the long yoke of the joint, all the way into the serrated portion of the steering shaft, setting the bolt hole in the cutout.

(2) Then pull the short yoke all way out of the serrated portion of the gear box, setting the bolt hole in the cutout.

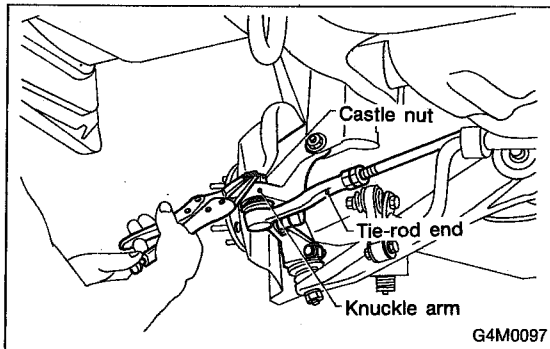
(3) Insert the bolt through the short yoke, pull the joint and confirm that the bolt is on cutout of the gearbox.

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



Tightening torque:

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



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

Castle nut tightening torque:

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

5) Install front stabilizer to vehicle.

6) Install front exhaust pipe assembly.

<Ref. to 2-9 [W1B0].>

7) Install tires.

8) Tighten wheel nuts to the specified torque.

Tightening torque:

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

9) Connect ground cable to battery.

10) Pour fluid into oil tank, and bleed air. <Ref. to 4-3 [W7A0].>

11) Check for fluid leaks.

12) Install jack-up plate.

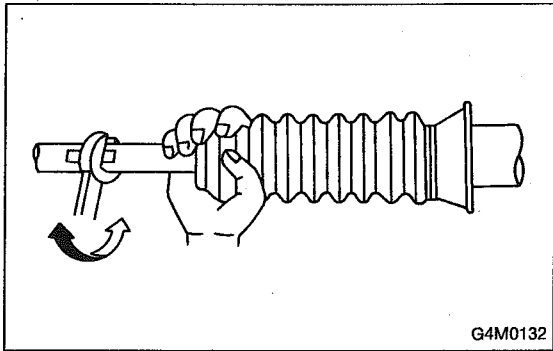
WARNING:

Be careful, exhaust manifold is hot.

13) Lower vehicle.

14) Check fluid level in oil tank.

3. Steering Gearbox (Power Steering System)



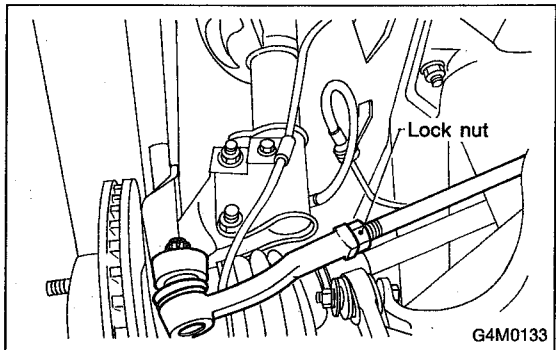
15) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:

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

CAUTION:

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

**F: ADJUSTMENT**

1) Adjust front toe.

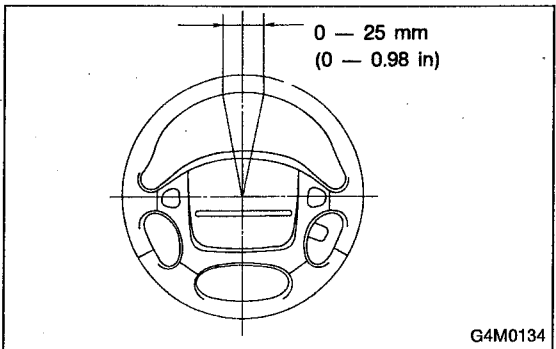
Standard of front toe:

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

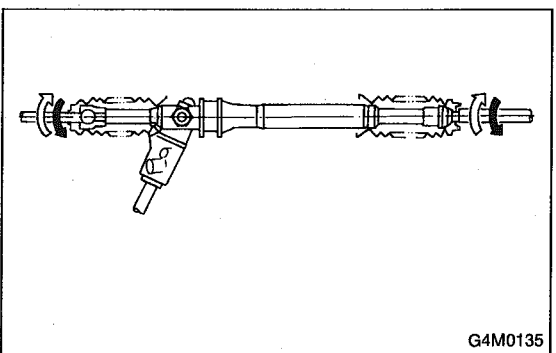
2) Adjust steering angle of wheels.

Inner wheel: $37.4^\circ \pm 1.5^\circ$

Outer wheel: $32.5^\circ \pm 1.5^\circ$



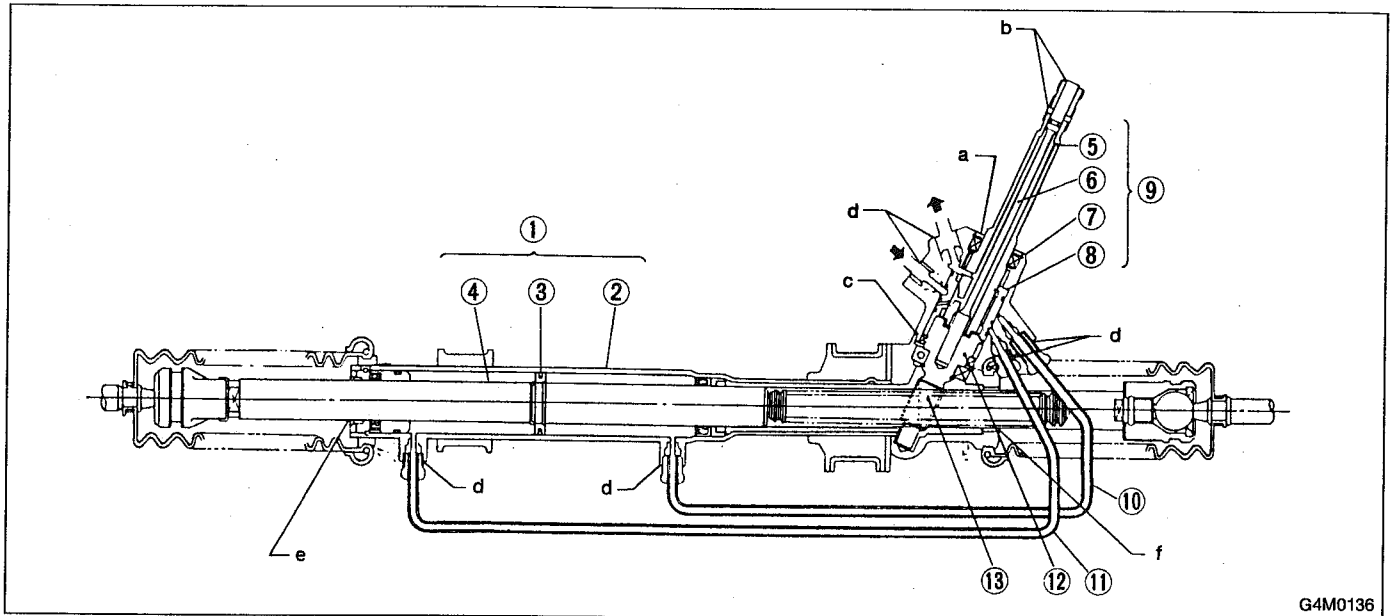
3) If steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



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

4. Control Valve (Power Steering Gearbox)

A: CHECKING OIL LEAKING POINTS



- ① Power cylinder
- ② Cylinder
- ③ Rack piston
- ④ Rack axle
- ⑤ Input shaft

- ⑥ Torsion bar
- ⑦ Valve housing
- ⑧ Valve body
- ⑨ Control valve

- ⑩ Pipe B
- ⑪ Pipe A
- ⑫ Pinion
- ⑬ Pinion axle

1. OIL LEAKING POINTS

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

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

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

2. OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS

NOTE:

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

1) Leakage from "a"

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

2) Leakage from "b"

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

3) Leakage from "c"

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

4) Leakage from "d"

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

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

(1) Leakage from "e"

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

(2) Leakage from "f"

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

ST 926420000 PLUG

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

CAUTION:

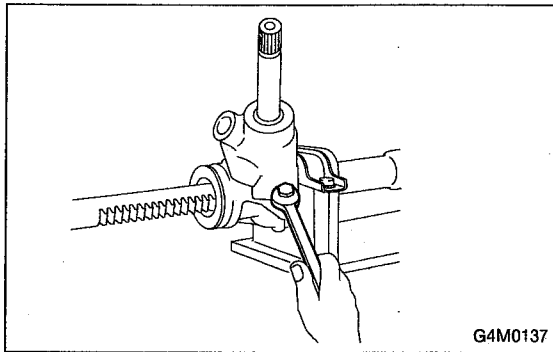
● If leakage from "f" is noted again:

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

● If oil stops leaking from "f":

The oil seal of rack housing is damaged.

Replace the oil seal and the parts that are damaged during disassembly with new ones.



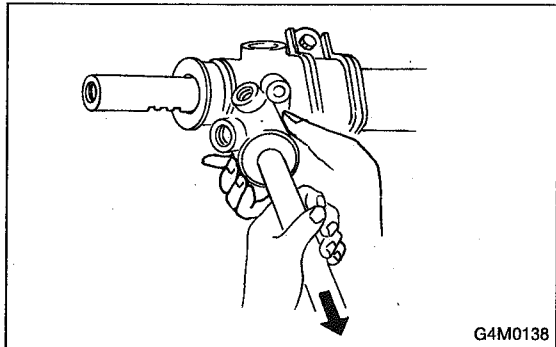
B: DISASSEMBLY

NOTE:

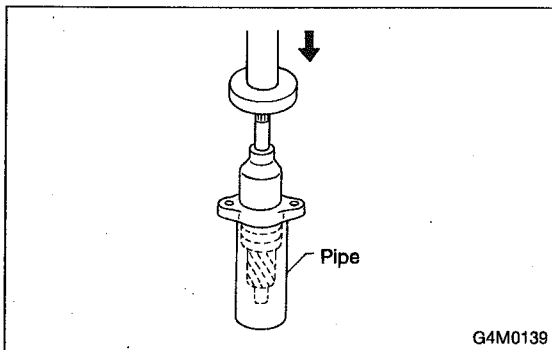
This section focuses on the disassembly and reassembly of control valve. For the inspection and adjustment and the service procedures for associated parts, refer to "Steering Gearbox" <Ref. to 4-3 [W3A0].>

1. VALVE ASSEMBLY

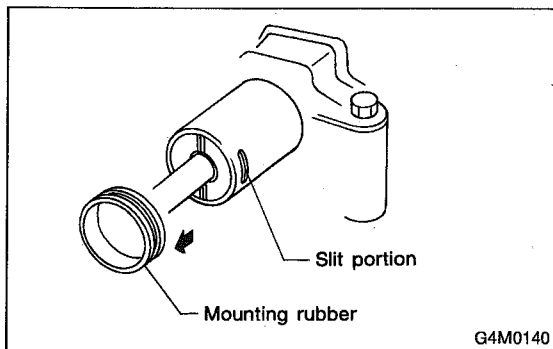
1) Loosen two bolts securing valve assembly.



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

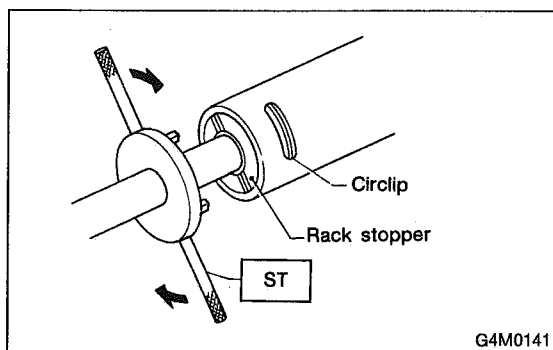


3) Draw out pinion and valve assembly from valve housing, as necessary, using pipe of I.D. 44 to 46 mm (1.73 to 1.81 in) and a press.



2. RACK ASSEMBLY

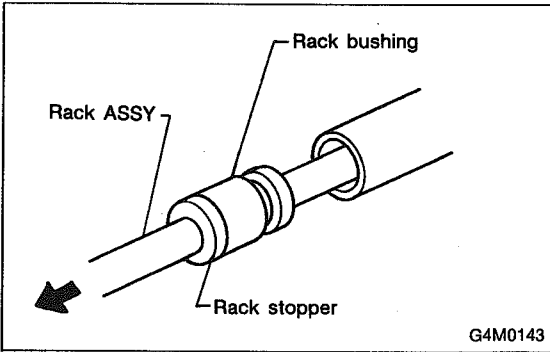
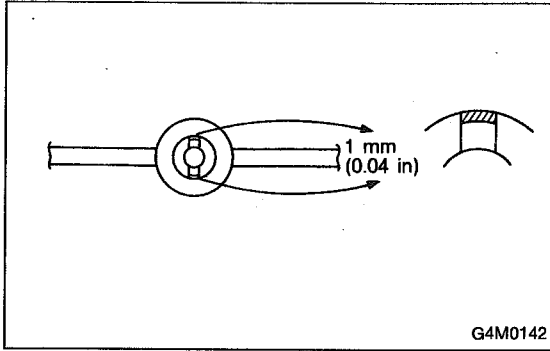
1) Slide mounting rubber to expose slit.



2) Rotate rack stopper in the direction of arrow using ST until the end of circlip comes out of stopper, then rotate it in the opposite direction, and pull out circlip.

ST 926340001 WRENCH

4. Control Valve (Power Steering Gearbox)



NOTE:

If ST is used, grind area (shown in figure) by 1 mm (0.04 in) in advance.

ST 926340000 WRENCH

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

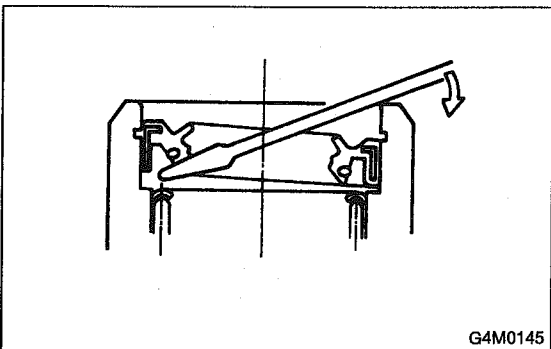
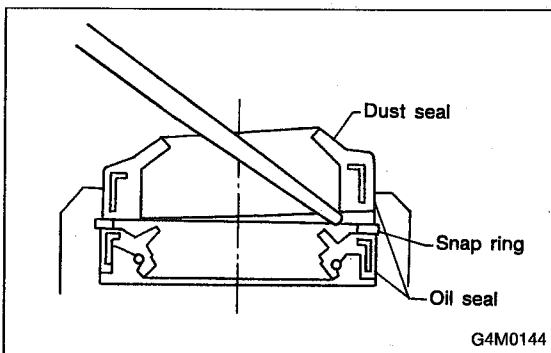
CAUTION:

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

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

CAUTION:

Do not reuse removed rack bushing and circlip.



C: REPLACEMENT OF SEAL AND PACKING

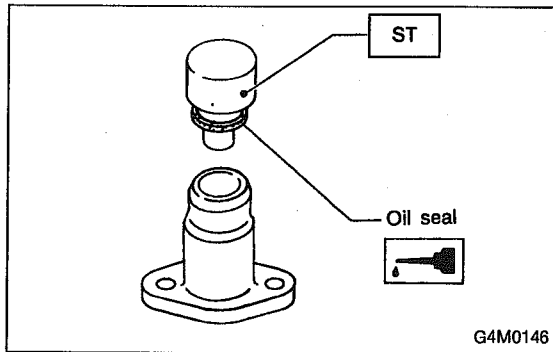
1. VALVE HOUSING OIL SEAL

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

3) Pry off oil seal using screwdriver.

CAUTION:

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



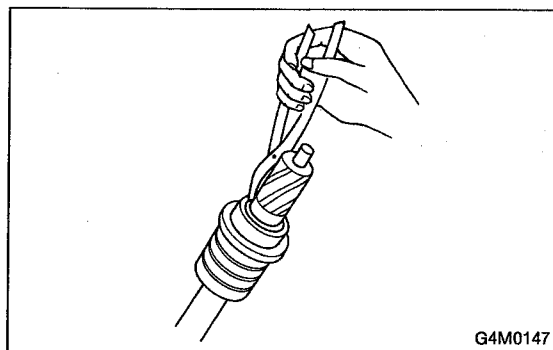
4) Press-fit oil seal into valve housing using ST and press.
ST 927610000 INSTALLER

NOTE:
Before fitting, coat oil seal fully with specified power steering fluid.

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

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

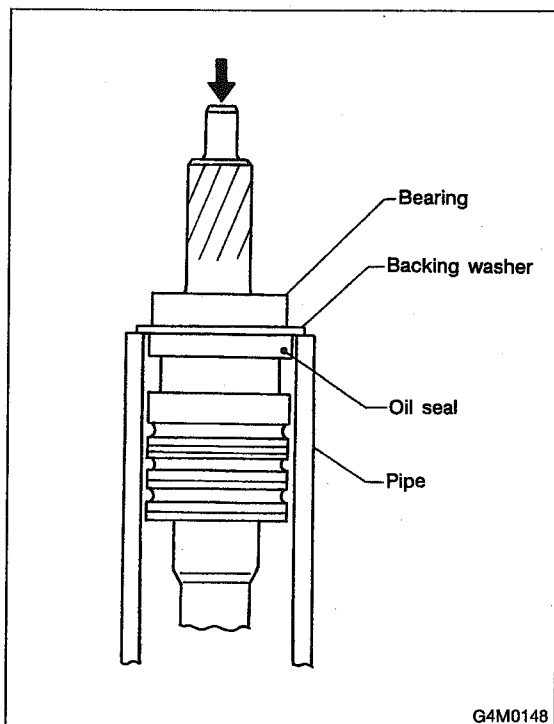
NOTE:
Rotate snap ring to check for proper installation.



2. PINION AND VALVE ASSEMBLY

1) Remove snap ring using snap ring pliers.

CAUTION:
● Do not reuse removed snap ring.
● Be careful not to scratch pinion and valve assembly.



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

CAUTION:
Do not reuse removed bearing.

3) Remove oil seal.

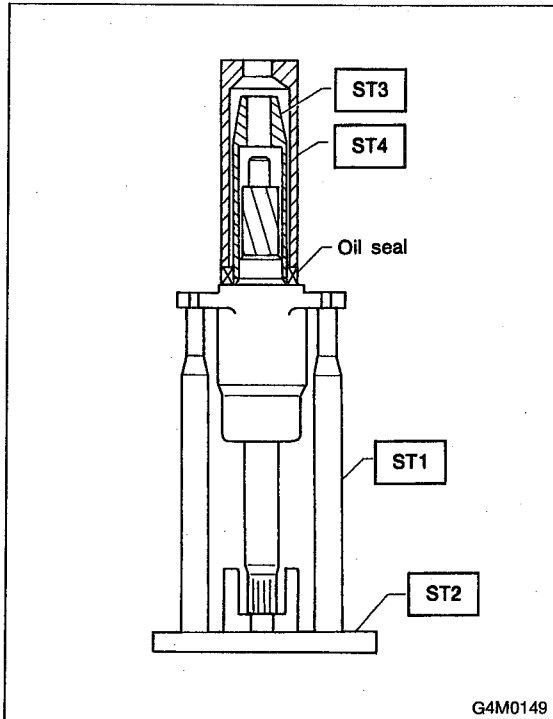
CAUTION:
Do not reuse removed oil seal.

4. Control Valve (Power Steering Gearbox)

4) 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.



5) Secure valve assembly to ST1 and ST2.

6) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.

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.

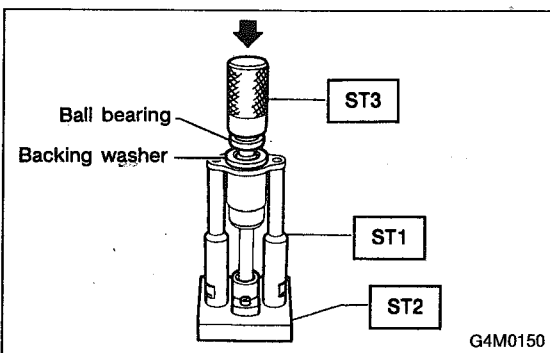
7) Remove ST3, and fit backing washer.

ST1 926370000 INSTALLER A

ST2 927630000 STAND BASE

ST3 926360000 INSTALLER A

ST4 927620000 INSTALLER B



8) Force-fit ball bearing using ST3.

ST1 926370000 INSTALLER A

ST2 927630000 STAND BASE

ST3 927640000 INSTALLER B

NOTE:

Be careful not to tilt ball bearing during installation.

9) Install snap ring using snap ring pliers.

NOTE:

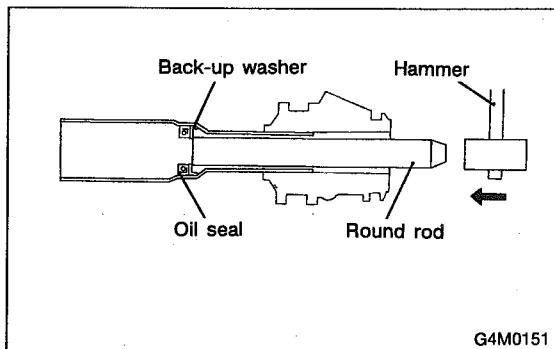
Rotate snap ring to check for proper installation.

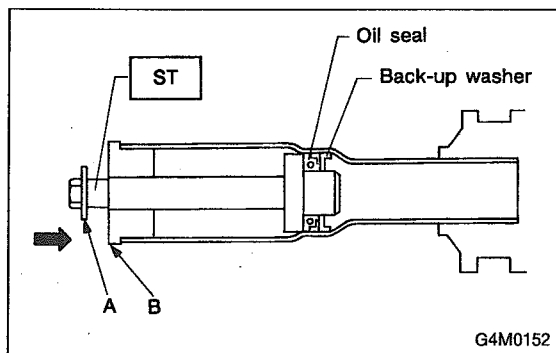
3. RACK HOUSING OIL SEAL AND BACK-UP WASHER

1) Insert a round rod [26 — 27 mm (1.02 — 1.06 in) dia.] from pinion housing side and remove oil seal and back-up washer by hammering the rod.

NOTE:

- Discard removed oil seal and back-up washer.
- Apply the unchamfered end of remover to back-up washer.





2) Force-fit oil seal and back-up washer using ST.

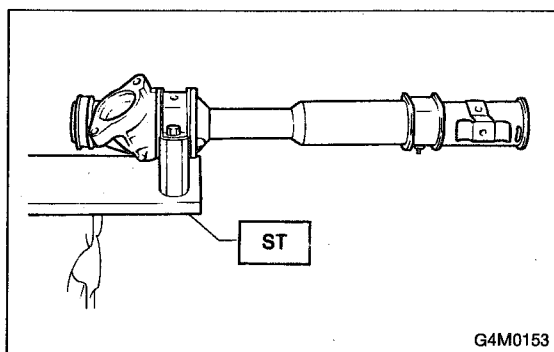
ST 927650000 INSTALLER

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 back-up washer and oil seal in wrong direction.
- Push oil seal until the stepped portion of A contacts end face of B.



D: ASSEMBLY

1. RACK ASSEMBLY

CAUTION:

Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:

VALIANT GREASE M2 (Part No. 003608001)

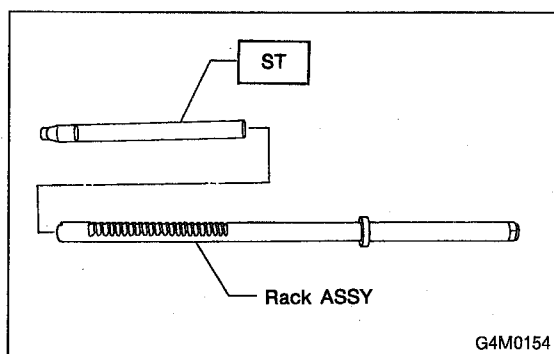
1) Fixing rack housing.

Fix rack housing in vice using ST.

ST 926200000 STAND

CAUTION:

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



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

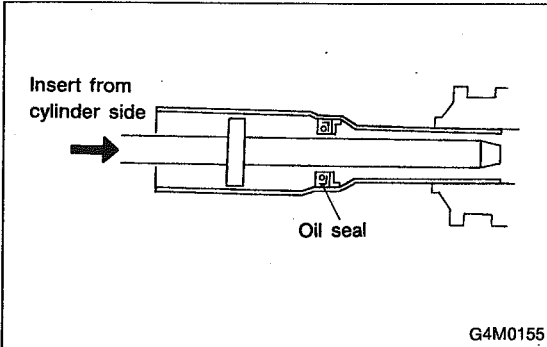
3) Apply genuine grease to teeth of thoroughly washed rack assembly, and fit ST over the toothed portion.

ST 926390001 COVER and REMOVER

CAUTION:

- Be careful not to block air passage with grease. Remove excessive grease.

- After fitting cover, check air passage hole for clogging. If clogged, open by removing grease from the hole.
- Check rack shaft for damage.
- Apply specified power steering fluid to this ST and surface of piston ring to prevent seal from being damaged.

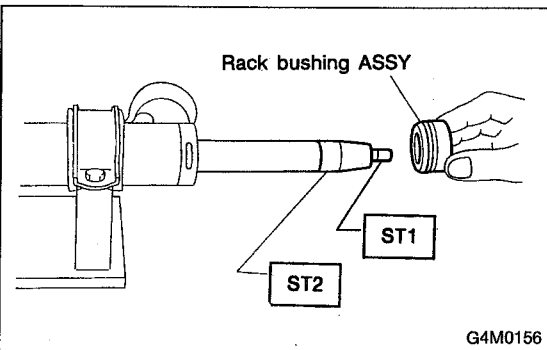


4) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

NOTE:

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

ST 926390001 COVER AND REMOVER



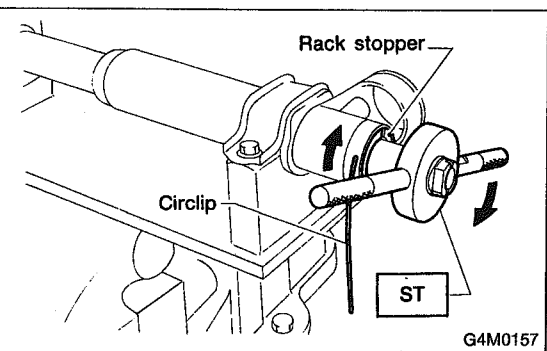
5) Fit ST1 and ST2 over the end of rack, and install rack bushing.

ST1 926400000 GUIDE

ST2 927660000 GUIDE

CAUTION:

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



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

7) Insert rack stopper into rack housing, and wrap circlip using ST to secure rack stopper in position.

ST 926340001 WRENCH

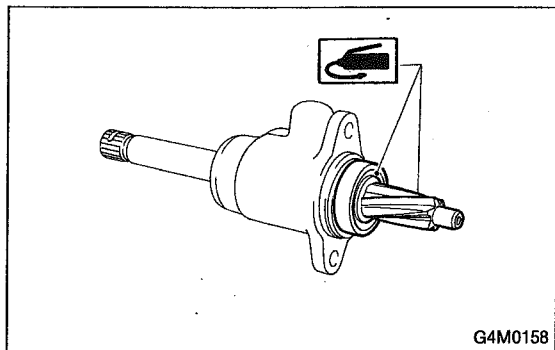
CAUTION:

Be careful not to scratch rack while winding circlip.

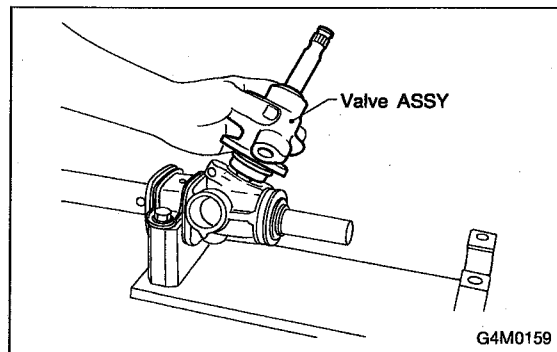
NOTE:

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

8) Fit mounting rubber onto rack housing.



G4M0158



G4M0159

2. VALVE ASSEMBLY

CAUTION:

Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:

VALIANT GREASE M2 (Part No. 003608001)

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

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

CAUTION:

Be sure to use a new packing.

NOTE:

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

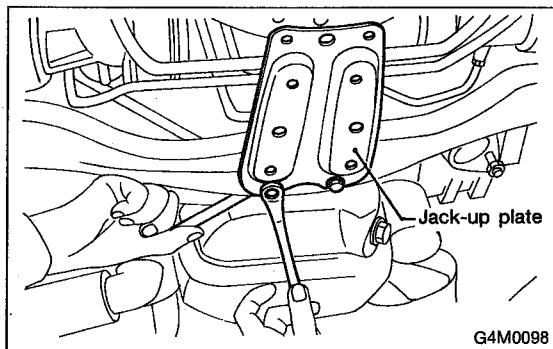
3) Tighten bolts alternately to secure valve assembly.

Tightening torque:

25 ± 5 N·m (2.5 ± 0.5 kg-m, 18.1 ± 3.6 ft-lb)

CAUTION:

Be sure to alternately tighten bolts.



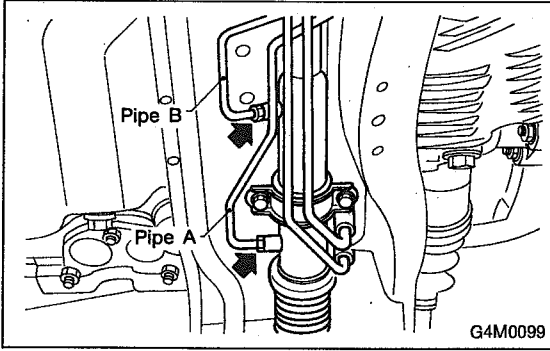
G4M0098

5. Pipe Assembly (Power Steering System)

A: REMOVAL

1) Disconnect battery minus terminal.

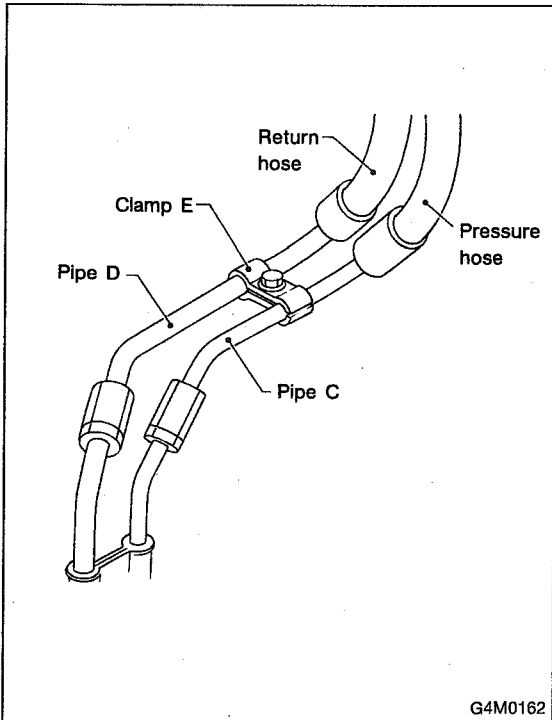
5. Pipe Assembly (Power Steering System)



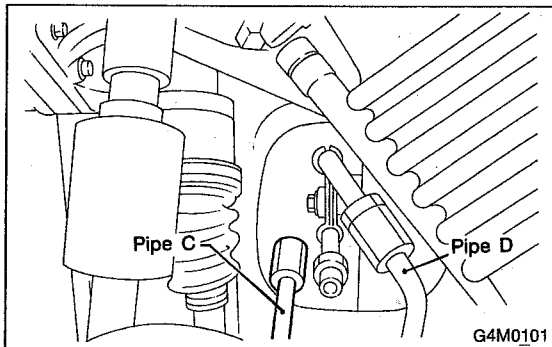
- 2) Lift vehicle and remove jack-up plate.
- 3) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

CAUTION:

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



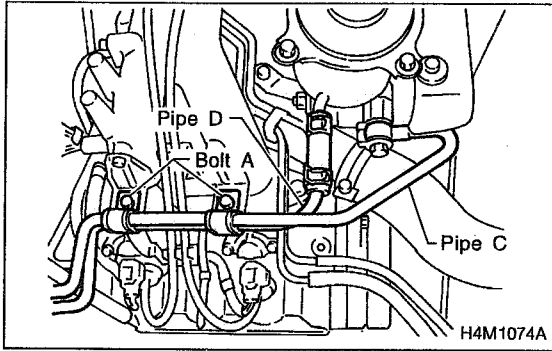
- 4) Remove clamp E from pipes C and D.



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

CAUTION:

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



6) Remove bolt A.
Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

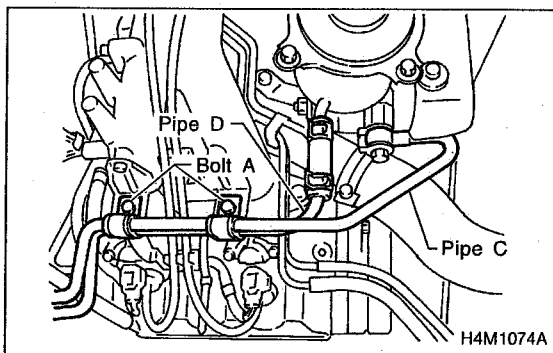
CAUTION:

- 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.

B: CHECK

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

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



C: ASSEMBLY

1) Interconnect pipes C and D.

Tightening torque:

Joint nut

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

CAUTION:

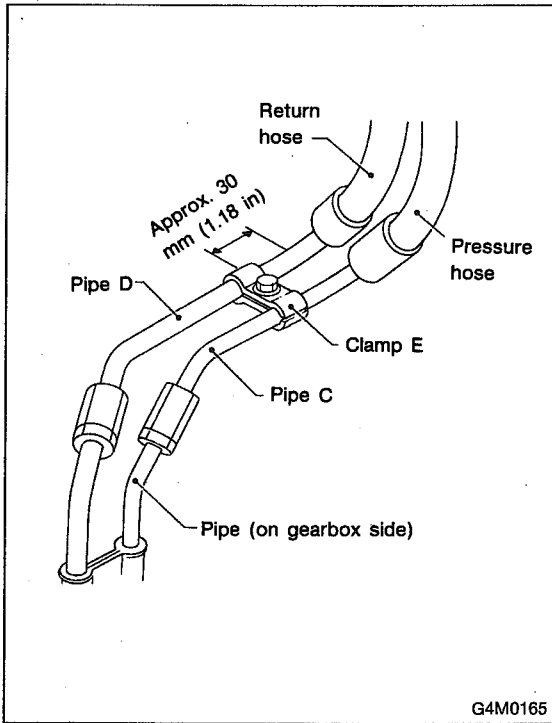
Visually check that hose between tank and pipe D is free from bending or twisting.

2), Tighten bolt A.

Tightening torque:

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

5. Pipe Assembly (Power Steering System)



- 3) Temporarily connect pipes C and D to pipes (on the gearbox side).
- 4) Temporarily install clamp E on pipes C and D.

CAUTION:

Ensure that the "8" letter side of clamp E is on the pipe C side.

- 5) Tighten joint nut.

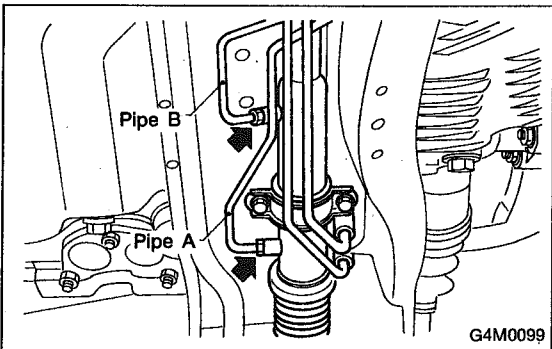
Tightening torque:

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

- 6) Tighten clamp E firmly.

Tightening torque:

$5.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.55 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.0 \pm 1.1 \text{ ft}\cdot\text{lb}$)



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

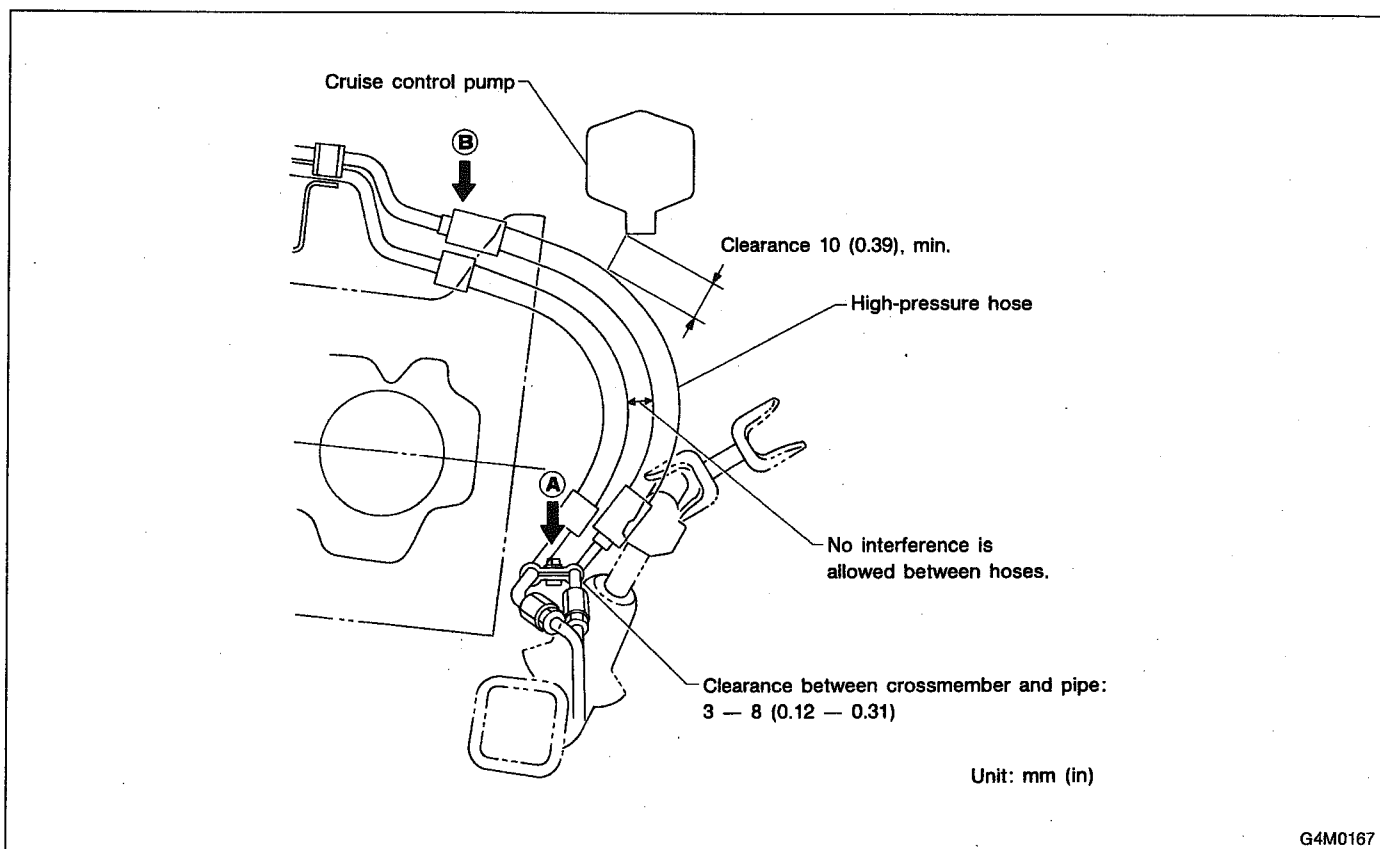
Tightening torque:

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

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

NOTE:

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



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:

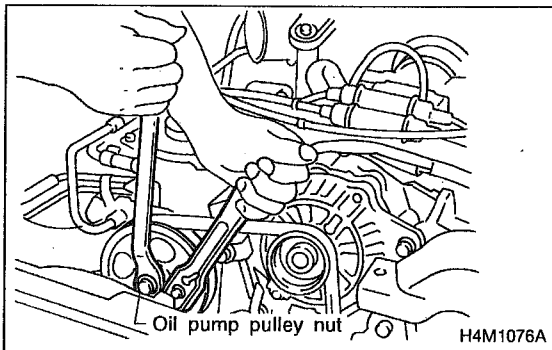
- (1) Move clamped section **A** (refer to figure above) down to a point where pipe is close to crossmember (pipe-to-crossmember clearance: 10 mm (0.39 in), min.).
- (2) Check that clearance between cruise control pump and power steering hose is at least 10 mm (0.39 in). If it is not, bend section **B** down until a clearance of at least 10 mm (0.39 in) is obtained.

6. Oil Pump (Power Steering System)

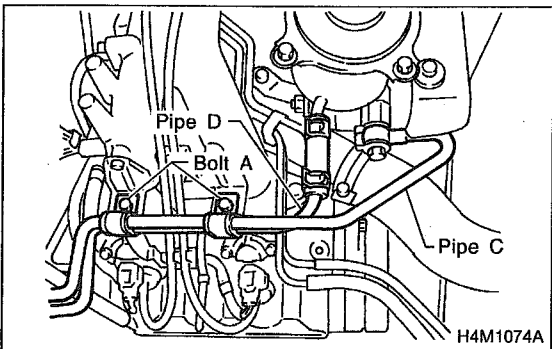
6. Oil Pump (Power Steering System)

A: REMOVAL

- 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.



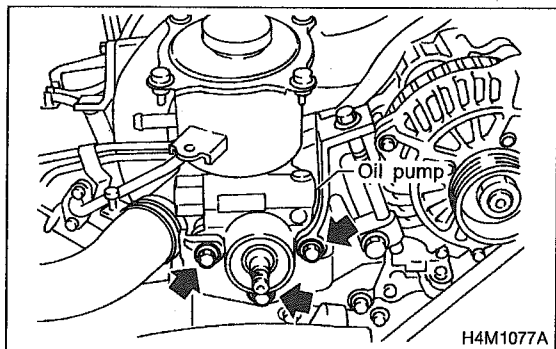
- 4) Loosen oil pump pulley nut, then remove bolts which secure alternator.
- 5) Loosen pulley belt(s).
- 6) Remove the nut and detach oil pump pulley.



- 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.



- 8) Remove three bolts from the front side of oil pump and detach the 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, remove two bolts from the upper side of oil tank and detach oil tank.

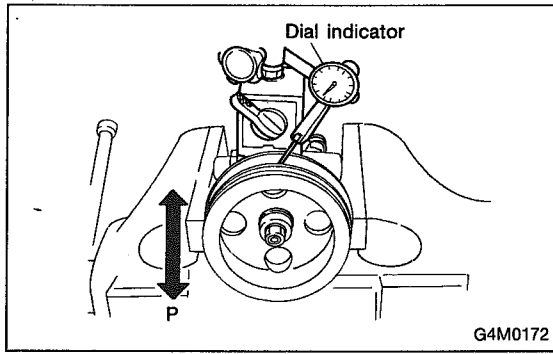
CAUTION:

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

B: CHECK

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

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

**1. SERVICE LIMIT**

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

CAUTION:

● Fix oil pump on a vise to make a measurement. At this time, hold oil pump with the least possible force between two wood pieces.

● Do not set outside of flow control valve or pulley on a vise; otherwise outside or pulley might be deformed. Select properly sized wood pieces.

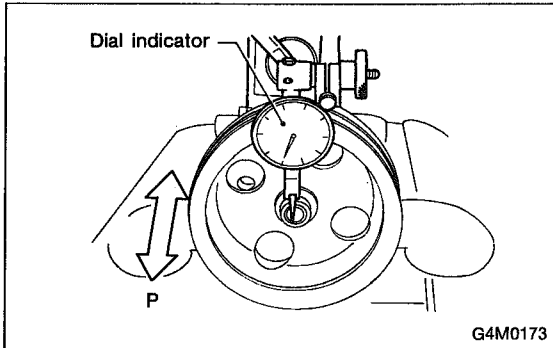
Play of pulley shaft**Service limit:**

Radial play (Direction \longleftrightarrow)

0.4 mm (0.016 in) or less

Axial play (Direction \longleftrightarrow)

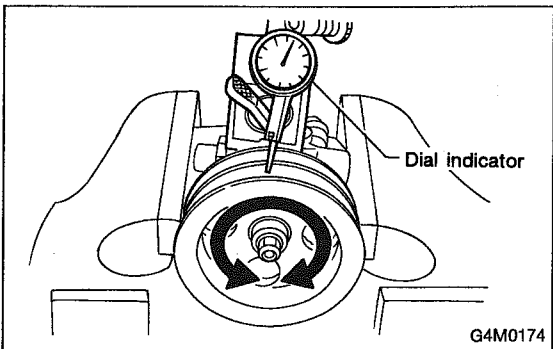
0.9 mm (0.035 in) or less

**Ditch deflection of pulley****Service limit:**

1.0 mm (0.039 in) or less

NOTE:

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

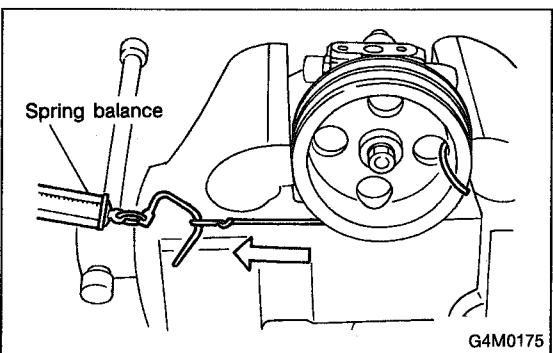
**Resistance to rotation of pulley****Service limit:**

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

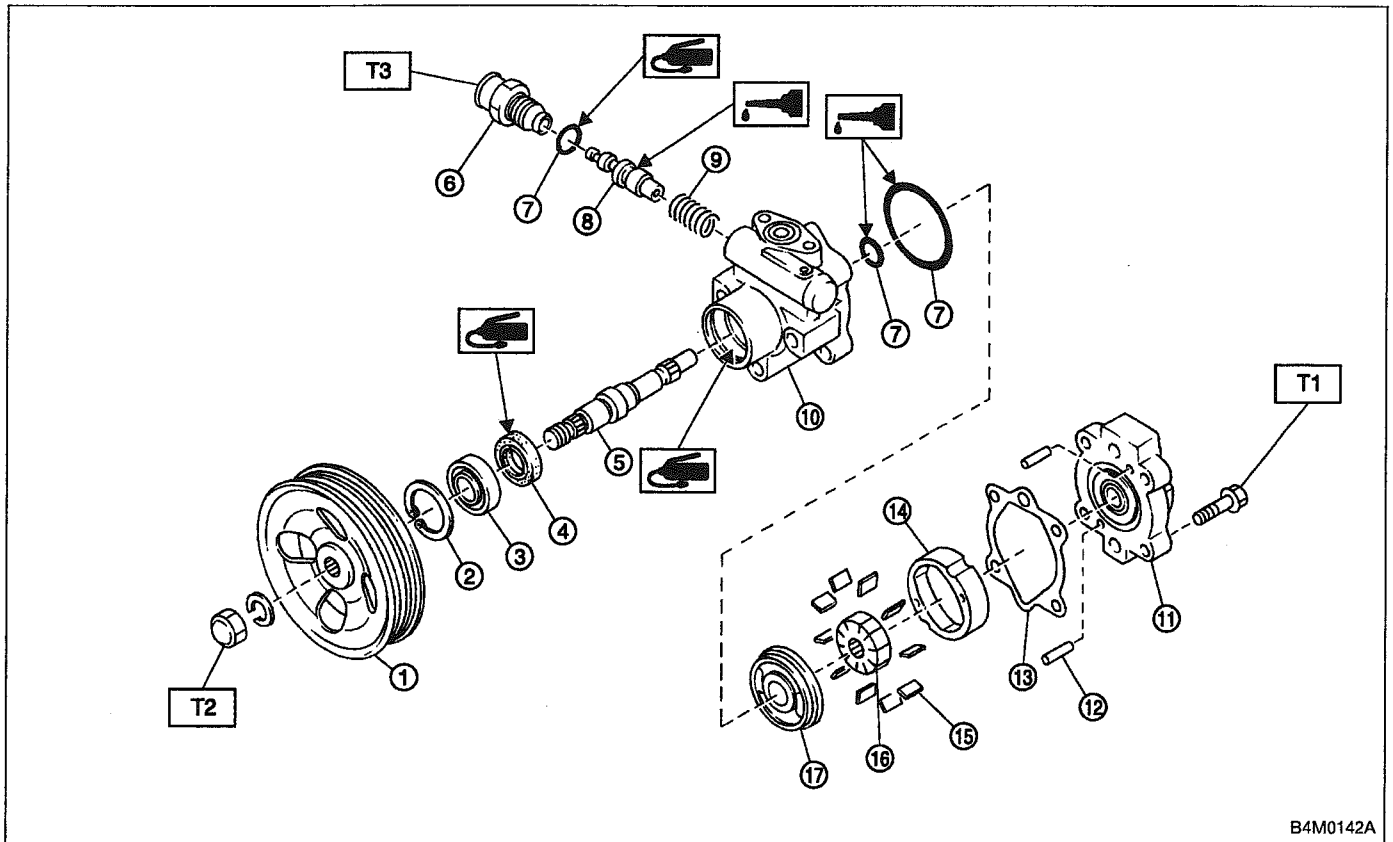
NOTE:

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

● Measure the load during rotation and make a judgment.



C: DISASSEMBLY



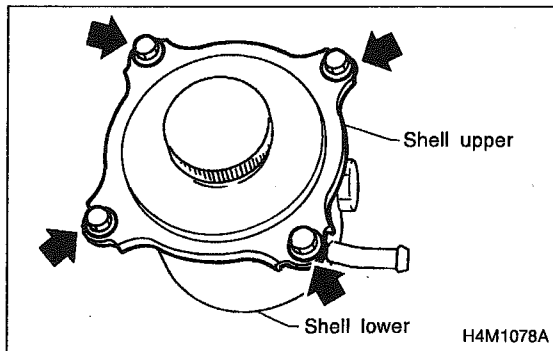
B4M0142A

- ① Pulley
- ② Snap ring
- ③ Bearing
- ④ Oil seal
- ⑤ Shaft
- ⑥ Connector
- ⑦ O-ring
- ⑧ Spool valve

- ⑨ Spring
- ⑩ Front casing
- ⑪ Rear cover
- ⑫ Knock pin
- ⑬ Seal washer
- ⑭ Cam ring
- ⑮ Vane
- ⑯ Rotor

- ⑰ Side plate

Tightening torque: N·m (kg·m, ft·lb)
T1: 16 ± 2 (1.6 ± 0.2, 11.6 ± 1.4)
T2: 61 ± 7 (6.2 ± 0.7, 45.0 ± 5.2)
T3: 74 ± 5 (7.5 ± 0.5, 54.2 ± 3.6)

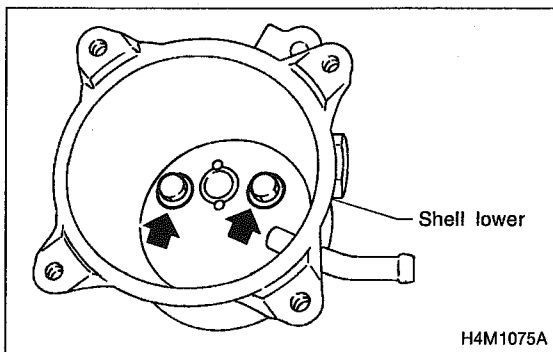


1) Oil pump body

(1) Place oil pump in a vise, and remove shell upper and baffle from shell lower.

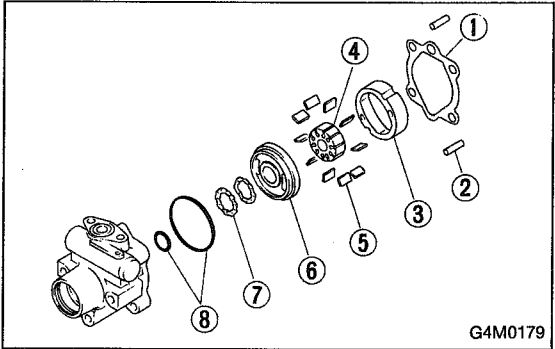
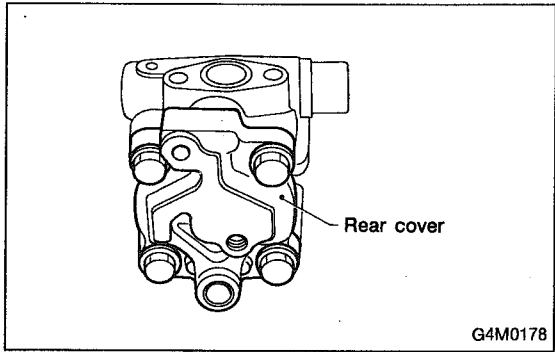
CAUTION:

Do not clamp oil pump too hard; otherwise oil pump may be dented.



- (2) Remove shell lower from oil pump.
- (3) Remove stay from oil pump.

6. Oil Pump (Power Steering System)



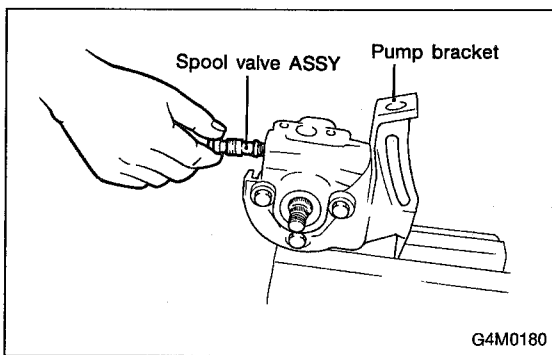
(4) Remove four bolts which secure rear cover.

(5) Remove the following parts from front casing.

- ① Seal washer
- ② Knock pin.....2 ea.
- ③ Cam ring
- ④ Rotor
- ⑤ Vane.....10 ea.
- ⑥ Side plate
- ⑦ Wave washer.....2 ea.
- ⑧ O-ring2 ea.

CAUTION:

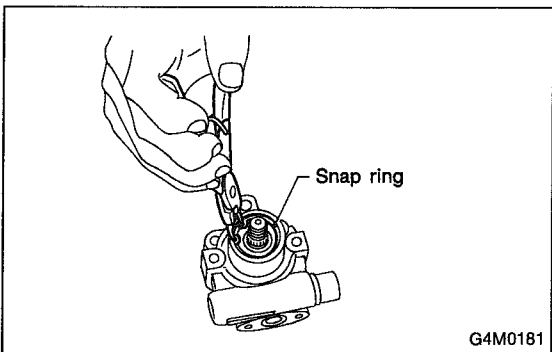
Discard old seal washer; replace with a new one.



2) Control valve

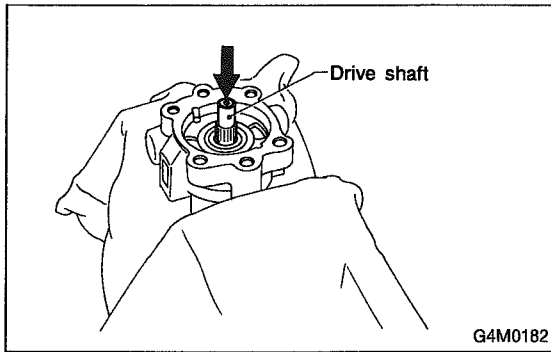
Slightly loosen outlet connector, and remove connector. Remove the following parts for pump casing.

- Spool valve assembly
- Flow control spring
- Connector
- O-ring



3) Shaft

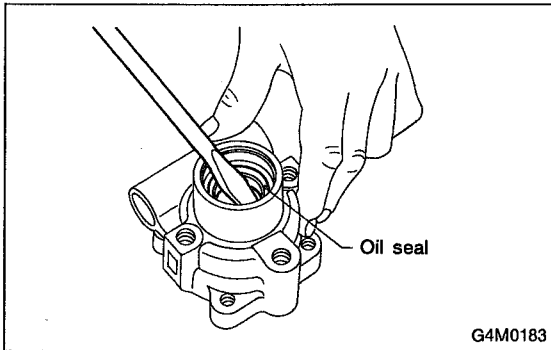
(1) Remove snap ring from front casing.



(2) Remove shaft using a hand press.

CAUTION:

- Discard old shaft assembly; replace with a new one.
- Be careful not to scratch or dent casing's surface which serves as a seal.



(3) Pry oil seal off using a screwdriver.

CAUTION:

Be careful not to scratch inner surface of casing.

D: INSPECTION

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

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

E: ASSEMBLY

1) Reassembly precautions

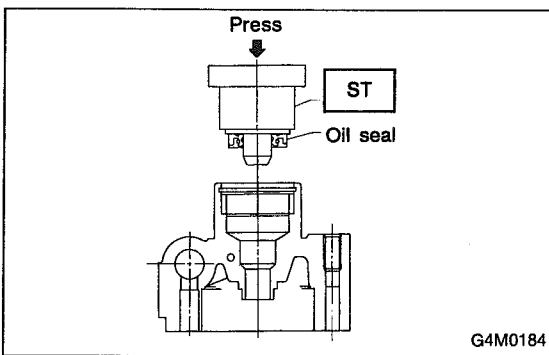
- (1) Whenever O-rings, oil seals, and snap rings are removed, they must be replaced with new ones.
- (2) Thoroughly wash parts and allow to dry. They must be kept free from cleaning oil and dust.
- (3) Reassembly procedure must be performed in clean place. Ensure that parts are kept away from waste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

2) Shaft

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

CAUTION:

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



- (2) Using ST, press-fit oil seal into front body.

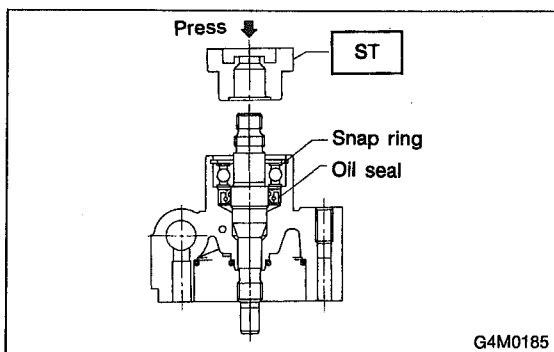
ST 340099AA000 INSTALLER

CAUTION:

When press-fitting, use care to prevent damage to surface mating with rear body.

NOTE:

Orient oil seal toward correct direction.

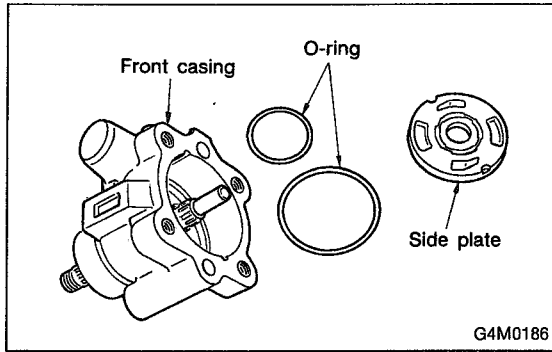


- (3) Using ST, press-fit shaft assembly into front body and mount snap ring.

ST 340099AA020 INSTALLER

NOTE:

Turn snap ring to ensure that it fits right into the groove.

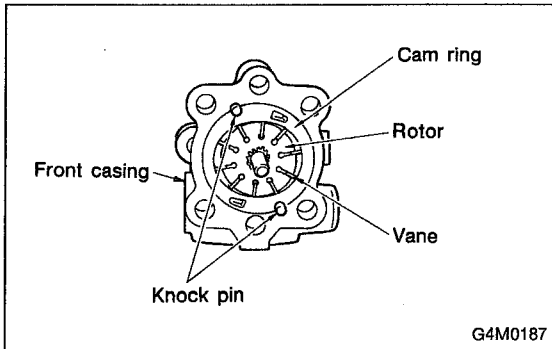


3) Cartridge assembly

- (1) Apply specified power steering fluid to O-rings and fit them into front casing.
- (2) Install side plate to front casing.

CAUTION:

Use care not to let side plate gall.



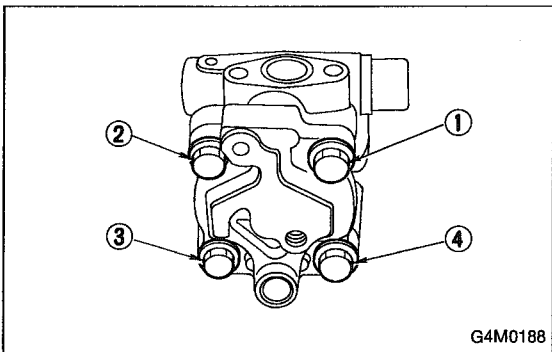
- (3) Mount rotor onto shaft.

- (4) Install 10 vanes into rotor with their nose radius facing toward cam ring.

- (5) Install cam ring to front casing, securing with knock pins.

CAUTION:

Do not use hammer to fit knock pins in position.



4) Rear cover

- (1) Mount seal washer on front casing.

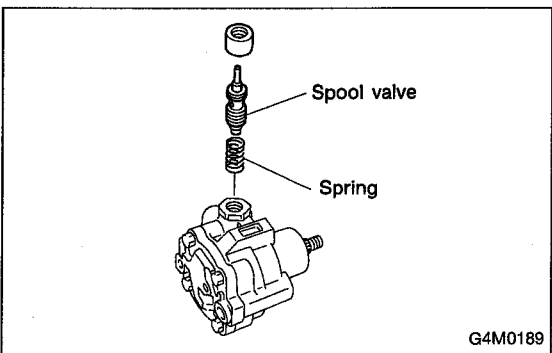
- (2) With knock pin positions aligned, install rear cover.

Tightening torque:

$16 \pm 2 \text{ N}\cdot\text{m}$ ($1.6 \pm 0.2 \text{ kg}\cdot\text{m}$, $11.6 \pm 1.4 \text{ ft}\cdot\text{lb}$)

CAUTION:

Loosely tighten bolts in the sequence ①, ③, ②, and ④ shown in figure. Then, tighten in the same sequence.



5) Spool Valve

- (1) Install spring into front casing. Then, with spool valve dipped in specified hydraulic oil, install it into the front casing.

- (2) Using a 5-mm dia. round bar, ensure that valve moves smoothly.

- (3) Set O-ring, with grease applied to it, onto connector and secure connector to front casing.

Tightening torque:

$74 \pm 5 \text{ N}\cdot\text{m}$ ($7.5 \pm 0.5 \text{ kg}\cdot\text{m}$, $54.2 \pm 3.6 \text{ ft}\cdot\text{lb}$)

CAUTION:

- Use care to prevent damage to O-ring at installation.
- When tightening connector, ensure that O-ring does not protrude or get caught.

6) Check

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

(2) Check followings by referring to "CHECK" article.

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

F: INSTALLATION

1) Install bracket on engine.

Tightening torque:

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

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.

(1) 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.

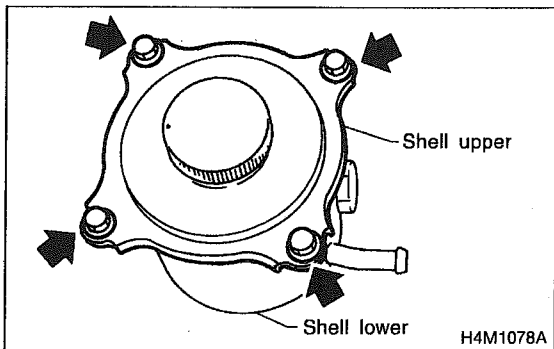
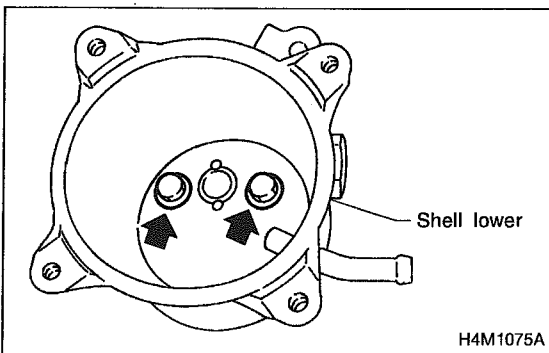
Tightening torque:

$15.7 \pm 2.4 \text{ N}\cdot\text{m}$ ($1.60 \pm 0.24 \text{ kg}\cdot\text{m}$, $11.6 \pm 1.7 \text{ ft}\cdot\text{lb}$)

(2) Install shell lower to oil pump.

Tightening torque:

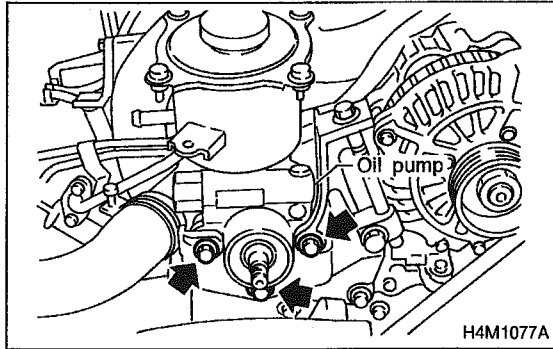
$18^{+5}_0 \text{ N}\cdot\text{m}$ ($1.8^{+0.5}_0 \text{ kg}\cdot\text{m}$, $13.0^{+3.6}_0 \text{ ft}\cdot\text{lb}$)



(3) Install shell upper and baffle to shell lower.

Tightening torque:

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

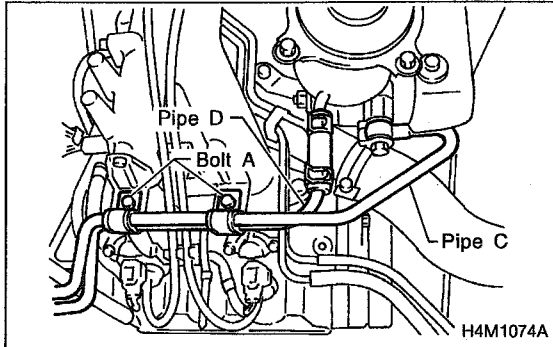


3) Install oil pump, previously assembled to oil tank, on bracket.

Tightening torque:

$20.1 \pm 2.5 \text{ N}\cdot\text{m}$ ($2.05 \pm 0.25 \text{ kg}\cdot\text{m}$, $14.8 \pm 1.8 \text{ ft}\cdot\text{lb}$)

4) Place oil pump pulley and tighten pulley nut temporarily.



5) Interconnect pipes C and D.

Tightening torque:

Joint nut

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

CAUTION:

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

6) Install pulley belt to oil pump.

7) Tighten oil pump pulley nut to the specified torque.

Tightening torque:

$52 \pm 10 \text{ N}\cdot\text{m}$ ($5.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $38 \pm 7 \text{ ft}\cdot\text{lb}$)

8) Check pulley belt tension. <Ref. to 1-5 [01A0].>

9) Tighten bolt belt tension.

Tightening torque:

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

10) Install pulley belt cover bracket.

11) Connect minus terminal of battery.

12) Feed the specified fluid and discharge air.

NOTE:

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

7. Power Steering Fluid

A: RECOMMENDED AIR BLEEDING AND POWER STEERING FLUID

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

1) Feed the specified fluid with its level being about 4 cm (1.6 in) lower than the mouth of tank.

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

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

4) Start, and idle the engine.

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

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

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

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

Then lower the vehicle, and idle the engine.

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

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

- (1) The fluid level changes over 3 mm (0.12 in).
- (2) Bubbles remain on the upper surface of the fluid.
- (3) Grinding noise is generated from oil pump.

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

CAUTION:

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

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

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

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

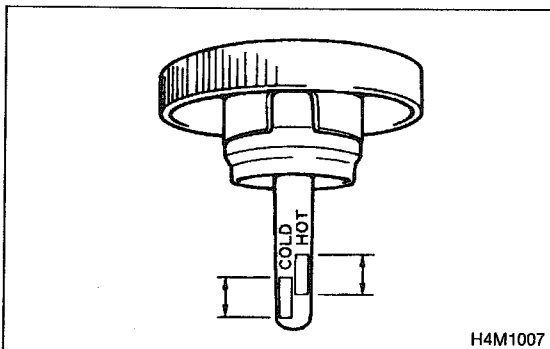
If the level is at lower point or below, add fluid to keep the level in the specified range of the indicator. If at upper point or above, drain fluid by using a syringe or the like.

Fluid capacity:

0.7 ℓ (0.7 US qt, 0.6 Imp qt)

(1) Check at temperature 21°C (70°F) on reservoir surface of oil pump, read the fluid level on the "COLD" side.

(2) Check at temperature 60°C (140°F) on reservoir surface of oil pump, read the fluid level on the "HOT" side.



1. Power Steering
A: STEERING CONDITION

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

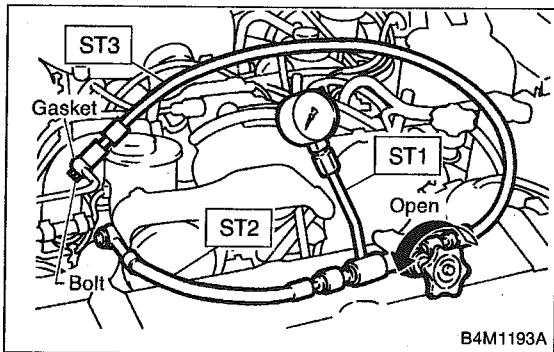
B: MEASUREMENT OF HYDRAULIC PRESSURE

CAUTION:

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

NOTE:

Keep engine idling during the measurement.



1B1 MEASURE REGULAR PRESSURE.

- 1) Install STs to power steering pump.
 - (1) Drain the power steering fluid about 0.35 l (0.4 US qt, 0.3 Imp qt) from oil tank.
 - (2) Remove two bolts securing power steering pipes to engine.
 - (3) Install ST1, 2 and 3 between power steering pump and pipes using gasket (Part No. 34621AC020) and bolt (Part No. 34620AC010).
 - (4) Replenish power steering fluid up to specified level.
- 2) Open valve, and start the engine.
- 3) Measure regular pressure.

ST1 925711000 PRESSURE GAUGE

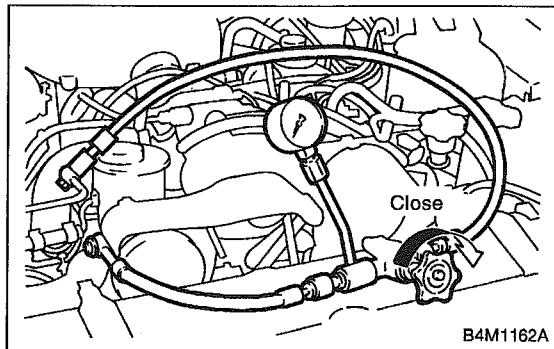
ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A

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

YES : Go to step 1B2.

NO : Trouble may be due to crushed pipe or hose, leakage from fluid line, foreign particles in fluid line, etc. Replace faulty parts with new ones.



1B2 MEASURE RELIEF PRESSURE.

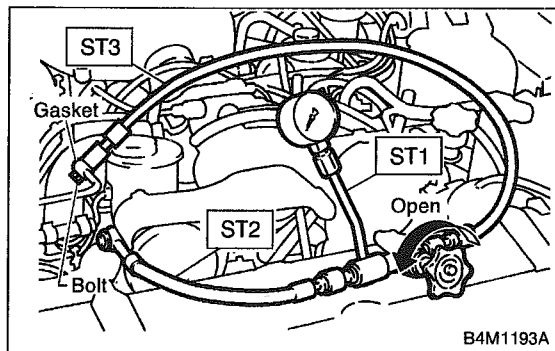
- 1) Using STs, measure relief pressure.
- 2) Close valve.

ST1 925711000 PRESSURE GAUGE
 ST2 34099AC020 ADAPTER HOSE B
 ST3 34099AC010 ADAPTER HOSE A

CHECK : Is 1800 cc model's pressure 6,178 — 6,767 kPa (63 — 69 kg/cm², 896 — 981 psi), and 2200 cc model's pressure 7,159 — 7,748 kPa (73 — 79 kg/cm², 1,038 — 1,123 psi)?

YES : Go to step 1B3.

NO : Trouble may be due to malfunctioning relief valve, fluid leaking into oil pump interior, abnormal wear of pump vanes, etc. Replace faulty parts with new ones.



1B3 MEASURE WORKING PRESSURE.

- 1) Using STs, measure working pressure.
- ST1 925711000 PRESSURE GAUGE
- ST2 34099AC020 ADAPTER HOSE B
- ST3 34099AC010 ADAPTER HOSE A
- 2) Open valve.
- 3) Measure working pressure of control valve by turning wheel from stop to stop.

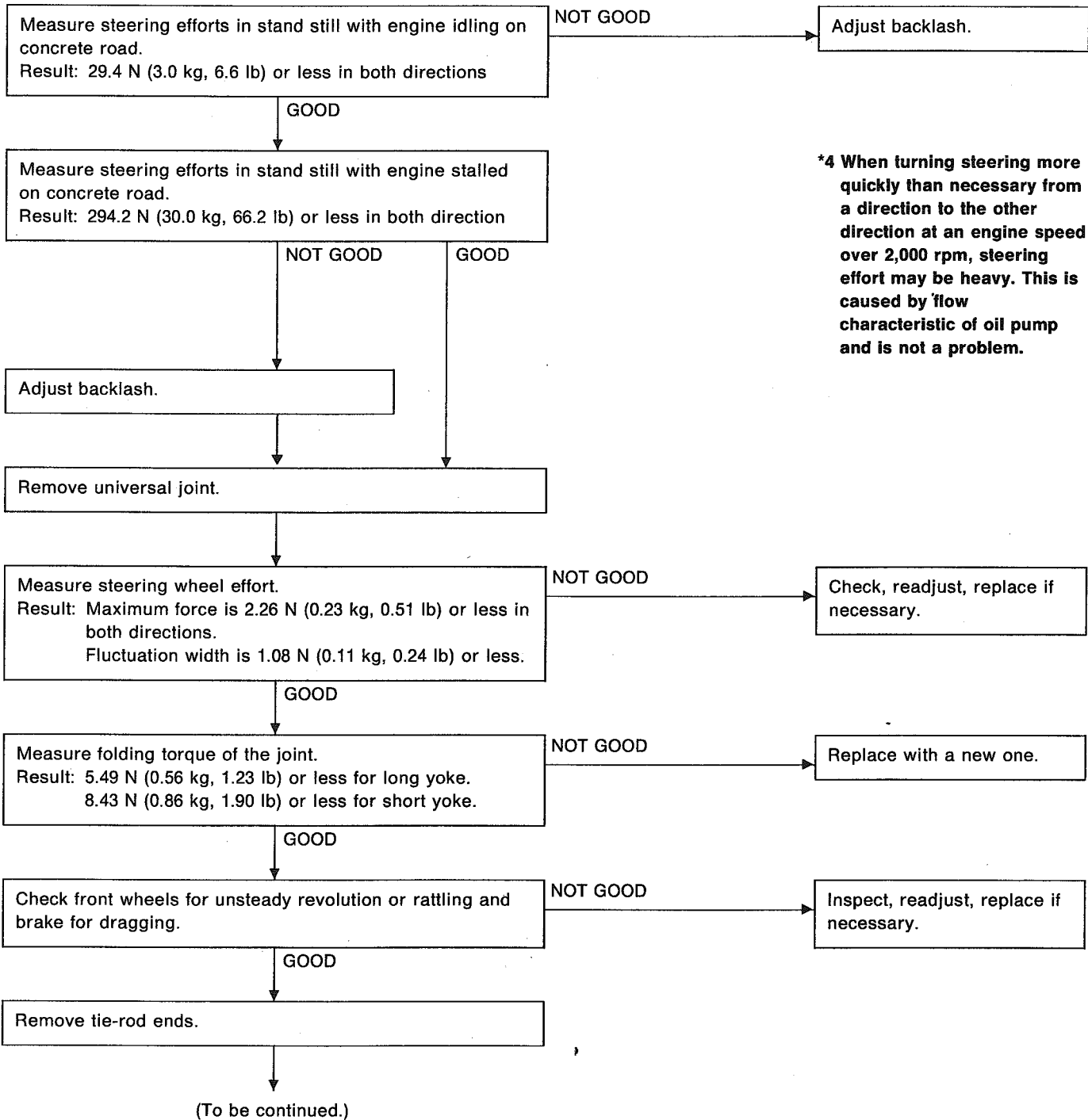
CHECK : Is 1800 cc model's pressure 6,178 — 6,767 kPa (63 — 69 kg/cm², 896 — 981 psi), and 2200 cc model's pressure 7,159 — 7,748 kPa (73 — 79 kg/cm², 1,038 — 1,123 psi)?

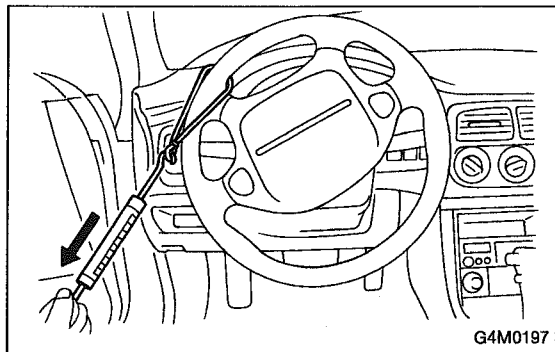
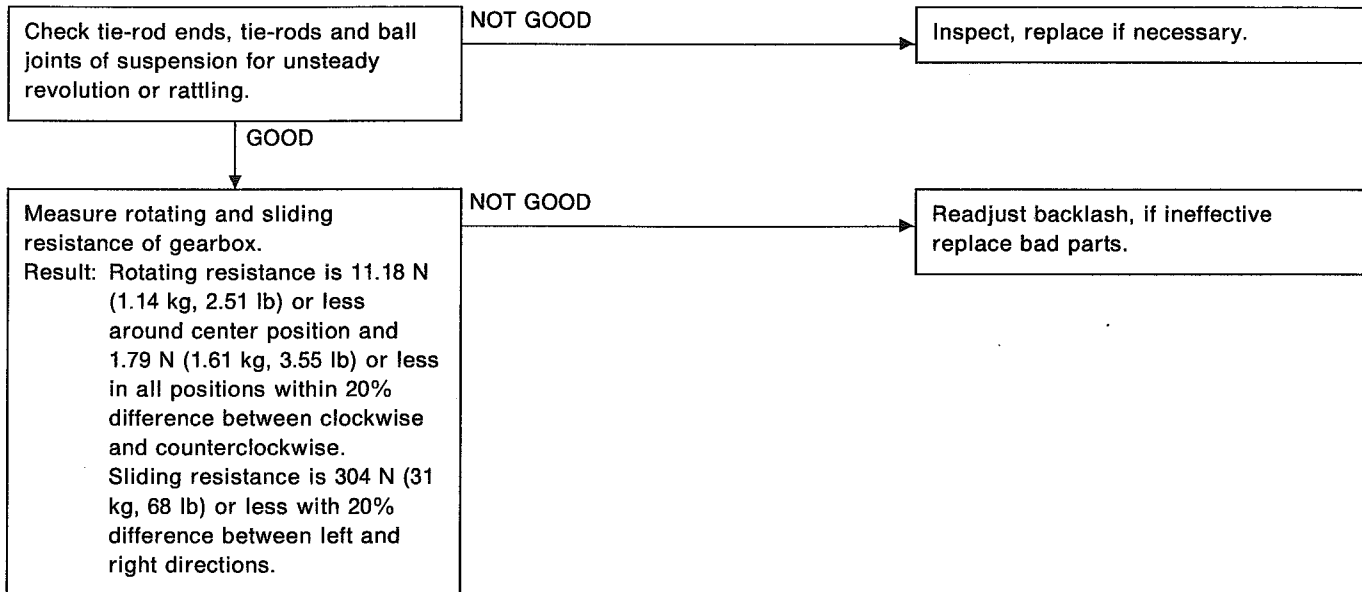
YES : Measure steering force. <Ref. to 4-3 [K1C0].>

NO : Control valve is inoperative. Replace control valve itself or control valve and pinion as a single unit with new ones.

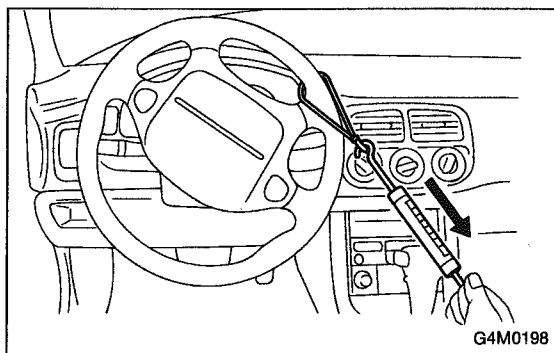
C: MEASUREMENT OF STEERING EFFORT

*4

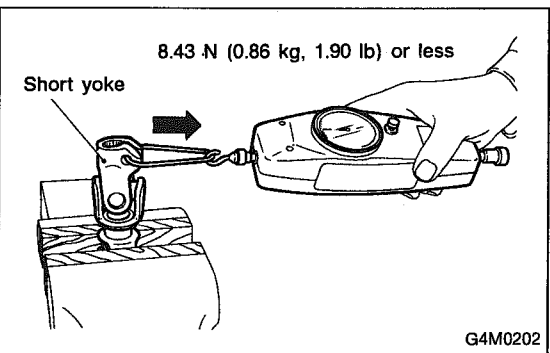
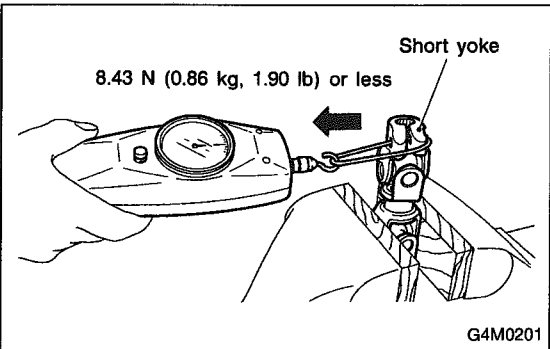
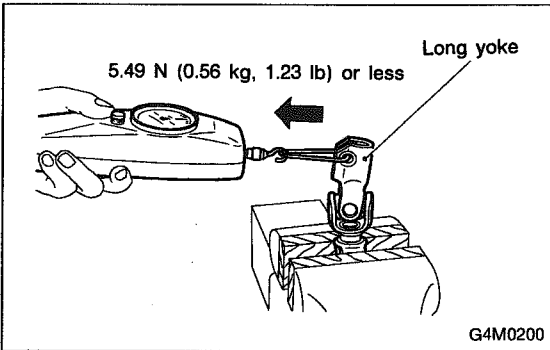
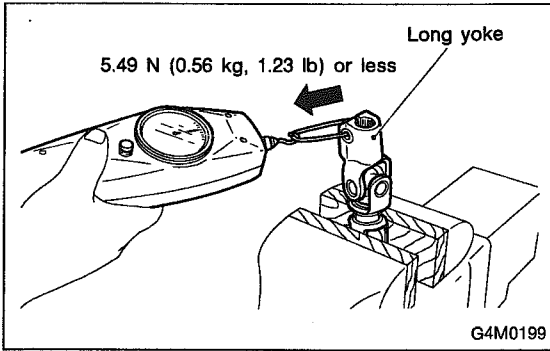


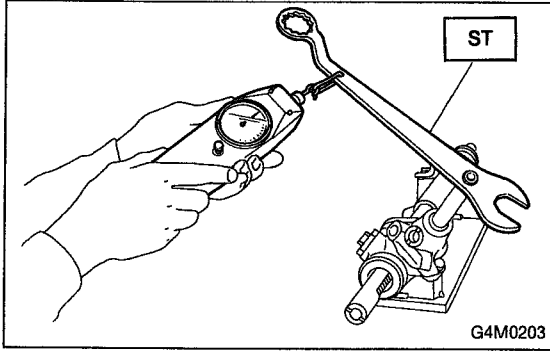


1) Measurement of steering effort is as shown in the figures.



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





3) Using ST, measure resistances of gearbox.

ST 926230000 SPANNER

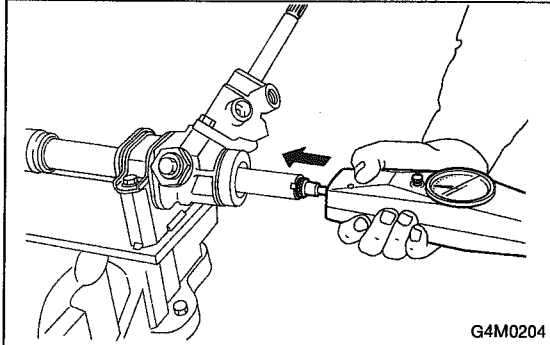
Rotating resistance:

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

Less than 11.18 N (1.14 kg, 2.51 lb)

Maximum allowable torque;

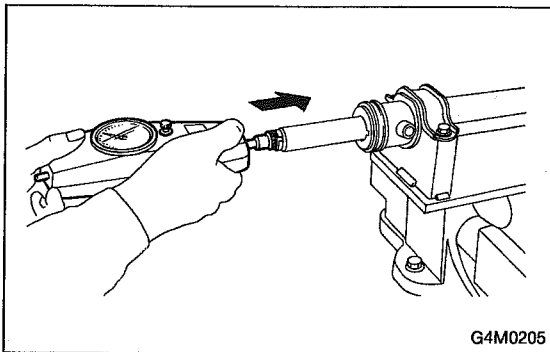
15.7 N (1.6 kg, 3.5 lb)



Sliding resistance:

Right-turn steering;

304 N (31 kg, 68 lb) or less



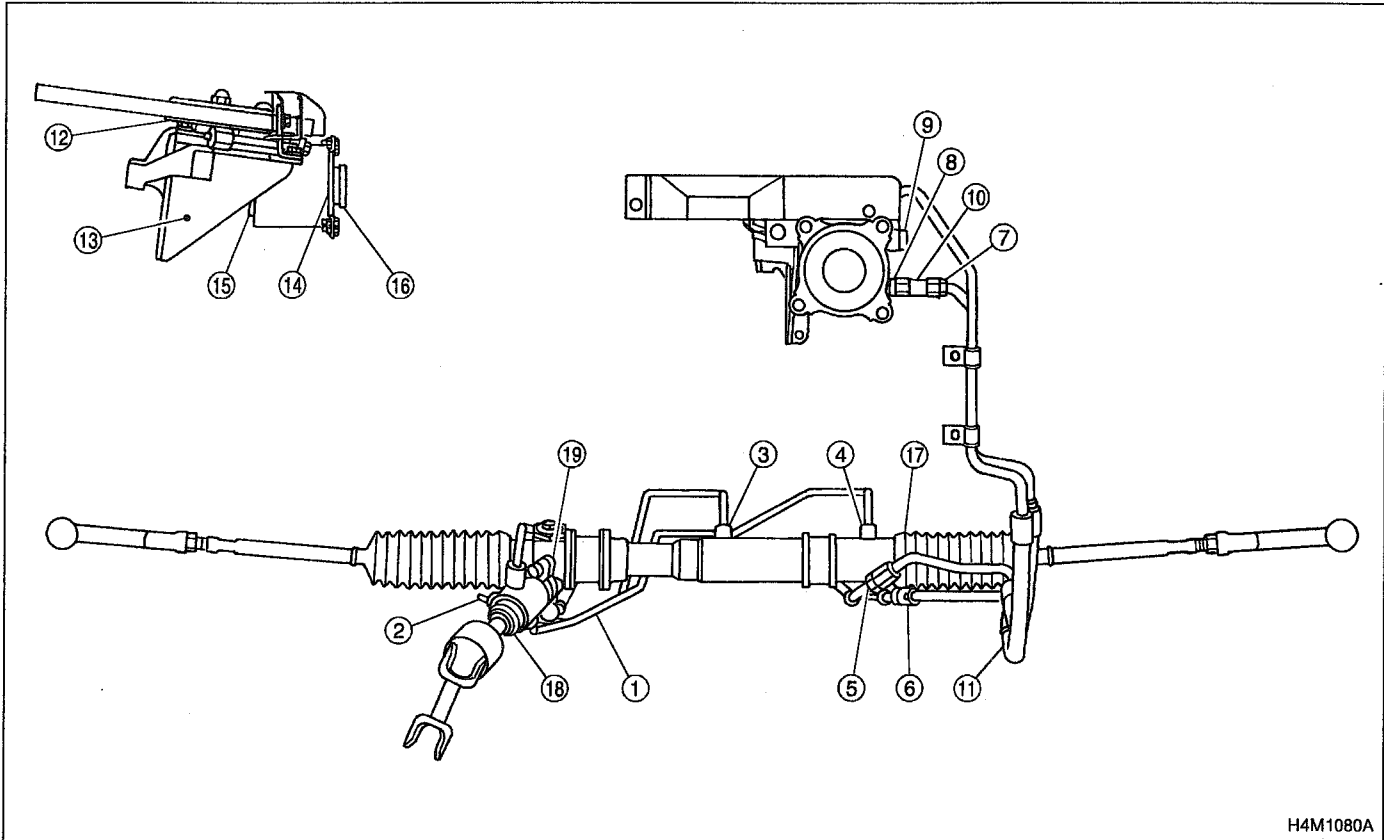
Left-turn steering;

304 N (31 kg, 68 lb) or less

D: FLUID LEAKAGE

CAUTION:

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



H4M1080A

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	Loosen and retighten, if ineffective, replace.
	Poor insertion of hose, poor clamping	Retighten or replace clamp.
	Damaged O-ring	Replace O-ring 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 O-ring.
	Damaged gasket	Replace gasket.
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.

*1 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 frequently than usual.

E: NOISE AND VIBRATION

CAUTION:

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

NOTE:

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

- There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts are properly adjusted and have no defects.

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

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

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

Trouble	Possible cause	Corrective action
Hiss noise (continuous) While engine is running.	Relief valve emits operating sound when steering wheel is completely turned in either direction. (Don't keep this condition over 5 seconds.)	Normal
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is faulty.	Defective Replace oil pump.
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check clearance. Correct if necessary. < Ref. to 4-3 [K1F0]. >
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loosened installation of oil pump pulley or other pulley(s)	Retighten.
	Loosened linkage or play of steering or suspension Loosened tightening of joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace 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.

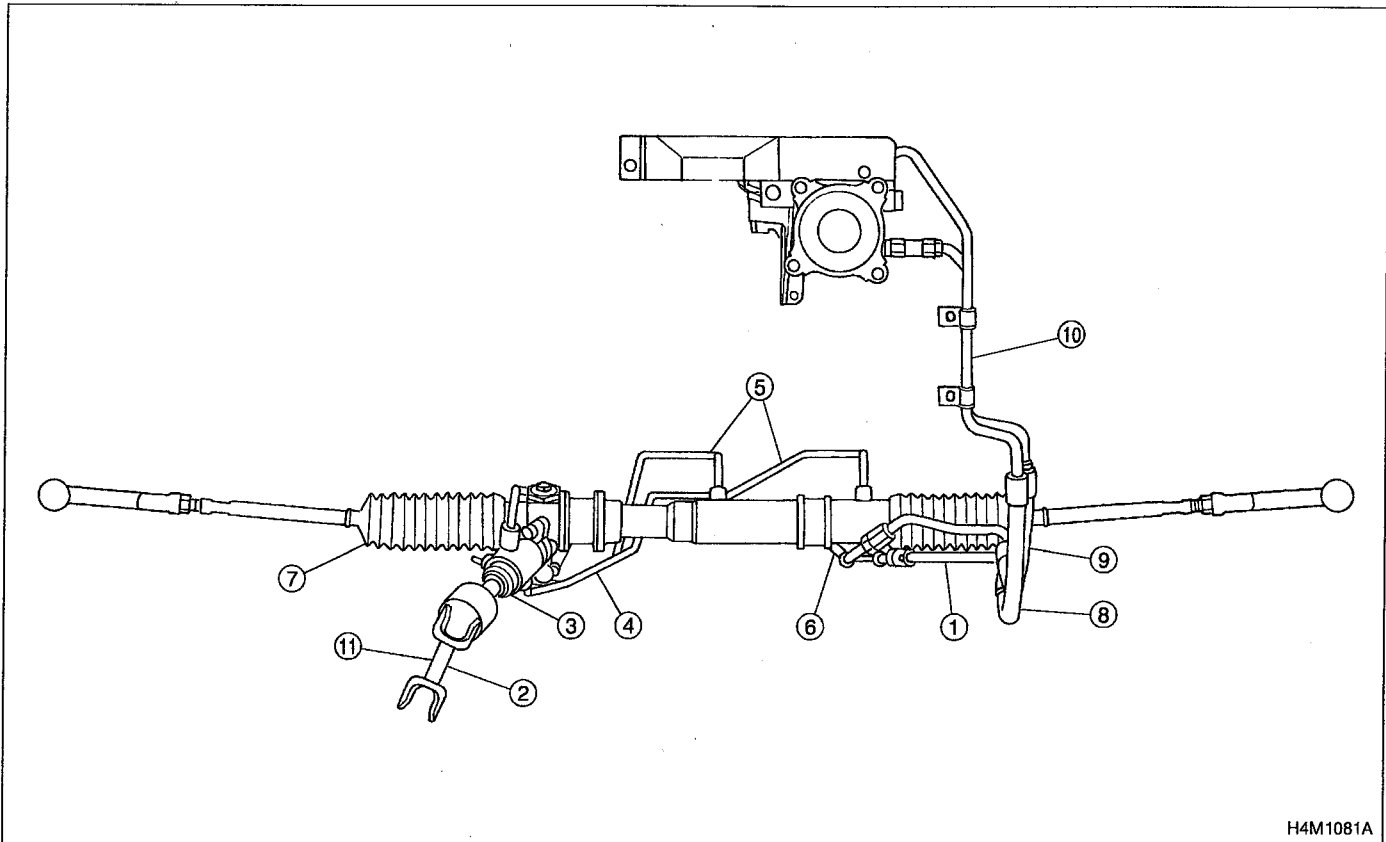
Trouble	Possible cause	Corrective action
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix wrong part causing aeration. Replace fluid and vent air.
	Damaged pipe of gearbox	Replace pipe.
	Abnormal inside of hose or pipe Flat hose or pipe	Rectify or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install cap.
Whistle (continuous) While engine is running.	Abnormal pipe of gearbox or abnormal inside of hose	Replace bad parts of gearbox or hose.
Whine or growl (continuous or intermittent) While engine is running with/ without steering turned.	Loosened installation of oil pump, oil pump bracket	Retighten.
	Abnormal inside of oil pump, hose	Replace oil pump, hose, if the noise can be heard when running as well as stand still.
	Torque converter growl, air conditioner compression growl	Remove power steering pulley belt and confirm.
Creaking noise (intermittent) While engine is running with steering turned.	Abnormal inside of gearbox	Replace bad parts of gearbox.
	Abnormal bearing for steering shaft	Apply grease or replace.
	Generates when turning steering wheel with brake (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running with/ without steering turned.	Too low engine speed at start	Adjust and instruct customers.
	Vane pump aeration	Fix wrong part. Vent air.
	Damaged valve in oil pump, gearbox	Replace oil pump, bad parts of gearbox.
	Looseness of play of steering, suspension parts	Retighten.

F: CLEARANCE TABLE

CAUTION:

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

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



H4M1081A

G: BREAKAGE OF HOSES**CAUTION:**

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

Since resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for the hoses and their service lives are shortening accordingly, it is necessary to perform careful inspection frequently when the vehicle is used in hot weather areas, cold weather area and/or a driving condition in which many steering operations are required in short time. Particularly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

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

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

MEMO:

BRAKES 4-4

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PRECAUTION FOR SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The Supplemental Restraint System "Airbag" helps to reduce the risk or severity of injury to the driver in a frontal collision.

The Supplemental Restraint System consists of an airbag module (located in the center of the steering wheel), sensors, a control module, warning light, wiring harness and roll connector.

Information necessary to service the safety is included in the "5-5. SUPPLEMENTAL RESTRAINT SYSTEM" of this Service Manual.

WARNING:

- To avoid rendering the Airbag system inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized SUBARU dealer.
- Improper maintenance, including incorrect removal and installation of the Airbag system, can lead to personal injury caused by unintentional activation of the Airbag system.
- All Airbag system electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the Supplemental Restraint System "Airbag".

1. Specifications

A: COUPE

	Engine (cc)	1800	2200
	Driving system	AWD	AWD
		Brighton	Brighton L
Front brake	Type	Disc (Floating type, ventilated)	
	Effective disc diameter mm (in)	210 (8.27)	
	Disc thickness x outer diameter mm (in)	24 x 260 (0.94 x 10.24)	
	Effective cylinder diameter mm (in)	57.15 (2.2500)	
	Pad dimensions (length x width x thickness) mm (in)	112.4 x 44.3 x 11.0 (4.43 x 1.744 x 0.433)	
	Clearance adjustment	Automatic adjustment	
Rear brake	Type	Drum (Leading-trailing type)	
	Effective drum diameter mm (in)	228.6 (9)	
	Effective cylinder diameter mm (in)	19.05 (0.7500)	
	Lining dimensions (length x width x thickness) mm (in)	218.8 x 35.0 x 4.1 (8.61 x 1.378 x 0.161)	
	Clearance adjustment	Automatic adjustment	
Parking brake	Type	Mechanical on rear brake drums	
	Effective drum diameter mm (in)	228.6 (9)	
	Lining dimensions (length x width x thickness) mm (in)	218.8 x 35.0 x 4.1 (8.61 x 1.378 x 0.161)	
	Clearance adjustment	Automatic adjustment	
Master cylinder	Type	Tandem	
	Effective diameter mm (in)	23.81 (0.9374)	
	Reservoir type	Sealed type	
	Brake fluid reservoir capacity cm ³ (cu in)	190 (11.59)	
Brake booster	Type	Vacuum suspended	
	Effective diameter mm (in)	230 (9.06)	
Proportioning valve	Split point kPa(kg/cm ² , psi)	2,942 (30.0, 427)	
	Reducing ratio	0.4	
Brake line		Dual circuit system	
ABS		—	

B: SEDAN

	Engine (cc)	2200
	Driving system	AWD
		L
Front brake	Type	Disc (Floating type, ventilated)
	Effective disc diameter mm (in)	210 (8.27)
	Disc thickness x outer diameter mm (in)	24 x 260 (0.94 x 10.24)
	Effective cylinder diameter mm (in)	57.15 (2.2500)
	Pad dimensions (length x width x thickness) mm (in)	112.4 x 44.3 x 11.0 (4.43 x 1.744 x 0.433)
	Clearance adjustment	Automatic adjustment
Rear brake	Type	Drum (Leading-trailing type)
	Effective drum diameter mm (in)	228.6 (9)
	Effective cylinder diameter mm (in)	19.05 (0.7500)
	Lining dimensions (length x width x thickness) mm (in)	218.8 x 35.0 x 4.1 (8.61 x 1.378 x 0.161)
	Clearance adjustment	Automatic adjustment
Parking brake	Type	Mechanical on rear brake drums
	Effective drum diameter mm (in)	228.6 (9)
	Lining dimensions (length x width x thickness) mm (in)	218.8 x 35.0 x 4.1 (8.61 x 1.378 x 0.161)
	Clearance adjustment	Automatic adjustment
Master cylinder	Type	Tandem
	Effective diameter mm (in)	23.81 (0.9374)
	Reservoir type	Sealed type
	Brake fluid reservoir capacity cm ³ (cu in)	190 (11.59)
Brake booster	Type	Vacuum suspended
	Effective diameter mm (in)	230 (9.06)
Proportioning valve	Split point kPa (kg/cm ² , psi)	2,942 (30.0, 427)
	Reducing ratio	0.4
Brake line		Dual circuit system
ABS		—

SPECIFICATIONS AND SERVICE DATA

C: WAGON

	Engine (cc)	1800	2200
	Driving system	AWD	AWD
		Brighton	L OUTBACK
Front brake	Type	Disc (Floating type, ventilated)	
	Effective disc diameter mm (in)	210 (8.27)	
	Disc thickness x outer diameter mm (in)	24 x 260 (0.94 x 10.24)	
	Effective cylinder diameter mm (in)	57.15 (2.2500)	
	Pad dimensions (length x width x thickness) mm (in)	112.4 x 44.3 x 11.0 (4.43 x 1.744 x 0.433)	
	Clearance adjustment	Automatic adjustment	
Rear brake	Type	Drum (Leading-trailing type)	
	Effective drum diameter mm (in)	228.6 (9)	
	Effective cylinder diameter mm (in)	19.05 (0.7500)	
	Lining dimensions (length x width x thickness) mm (in)	218.8 x 35.0 x 4.1 (8.61 x 1.378 x 0.161)	
	Clearance adjustment	Automatic adjustment	
Parking brake	Type	Mechanical on rear brake drums	
	Effective drum diameter mm (in)	228.6 (9)	
	Lining dimensions (length x width x thickness) mm (in)	218.8 x 35.0 x 4.1 (8.61 x 1.378 x 0.161)	
	Clearance adjustment	Automatic adjustment	
Master cylinder	Type	Tandem	
	Effective diameter mm (in)	23.81 (0.9374)	25.40 (1)
	Reservoir type	Sealed type	
	Brake fluid reservoir capacity cm ³ (cu in)	190 (11.59)	
Brake booster	Type	Vacuum suspended	
	Effective diameter mm (in)	230 (9.06)	180 + 205 (7.09 + 8.07)
Proportioning valve	Split point kPa (kg/cm ² , psi)	2,942 (30.0, 427)	
	Reducing ratio	0.4	
Brake line	Dual circuit system		
ABS	—		STD

2. Service Data

ITEM		STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	17 mm (0.67 in)	7.5 mm (0.295 in)
	Disc thickness	24 mm (0.94 in)	22 mm (0.87 in)
	Disc run-out	—	0.075 mm (0.0030 in)
Rear brake (Drum type)	Inside diameter	228.6 mm (9 in)	230.6 mm (9.079 in)
	Lining thickness	4.1 mm (0.161 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke	7 to 8 notches/196N (20 kg, 44 lb)	

			Without ABS	With ABS
Brake booster		Brake pedal force	Fluid pressure	
	Brake fluid pressure without engine running	147N (15 kg, 33 lb)	785 kPa (8 kg/cm ² , 114 psi)	588 kPa (6 kg/cm ² , 85 psi)
		294N (30kg, 66 lb)	2,158 kPa (22 kg/cm ² , 313 psi)	1,863 kPa (19 kg/cm ² , 270 psi)
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147N (15 kg, 33 lb)	5,492 kPa (56 kg/cm ² , 796 psi)	5,394 kPa (55 kg/cm ² , 782 psi)
		294N (30kg, 66 lb)	8,434 kPa (86 kg/cm ² , 1,223 psi)	9,219 kPa (94 kg/cm ² , 1,337 psi)

A: RECOMMENDED BRAKE FLUID

FMVSS No. 116, fresh DOT3 or 4 brake fluid

CAUTION:

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

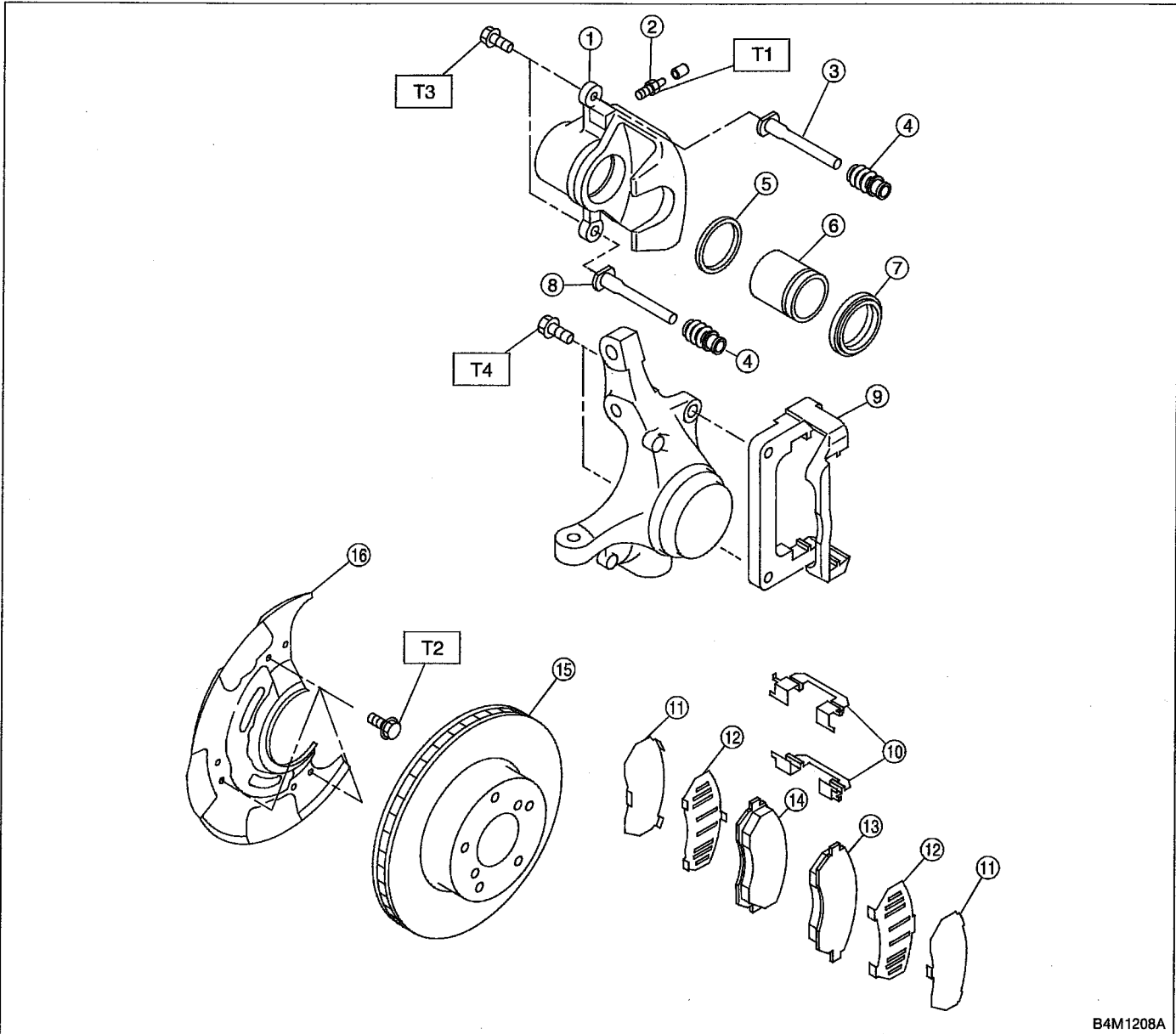
B: BRAKE FLUID LEVEL INDICATOR

Reserve tank with level indicator:

*Residual fluid quantity at light ON
Approx. 80 cm³ (80cc, 4.88 cu in)*

*Tank capacity
190 cm³ (190cc, 11.59 cu in)*

1. Front Disc Brake



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- | | |
|---------------------|-----------------|
| ① Caliper body | ⑨ Support |
| ② Air bleeder screw | ⑩ Pad clip |
| ③ Guide pin (Green) | ⑪ Outer shim |
| ④ Pin boot | ⑫ Inner shim |
| ⑤ Piston seal | ⑬ Pad (Outside) |
| ⑥ Piston | ⑭ Pad (Inside) |
| ⑦ Piston boot | ⑮ Disc rotor |
| ⑧ Lock pin (Yellow) | ⑯ Disc cover |

Tightening torque: N·m (kg·m, ft·lb)

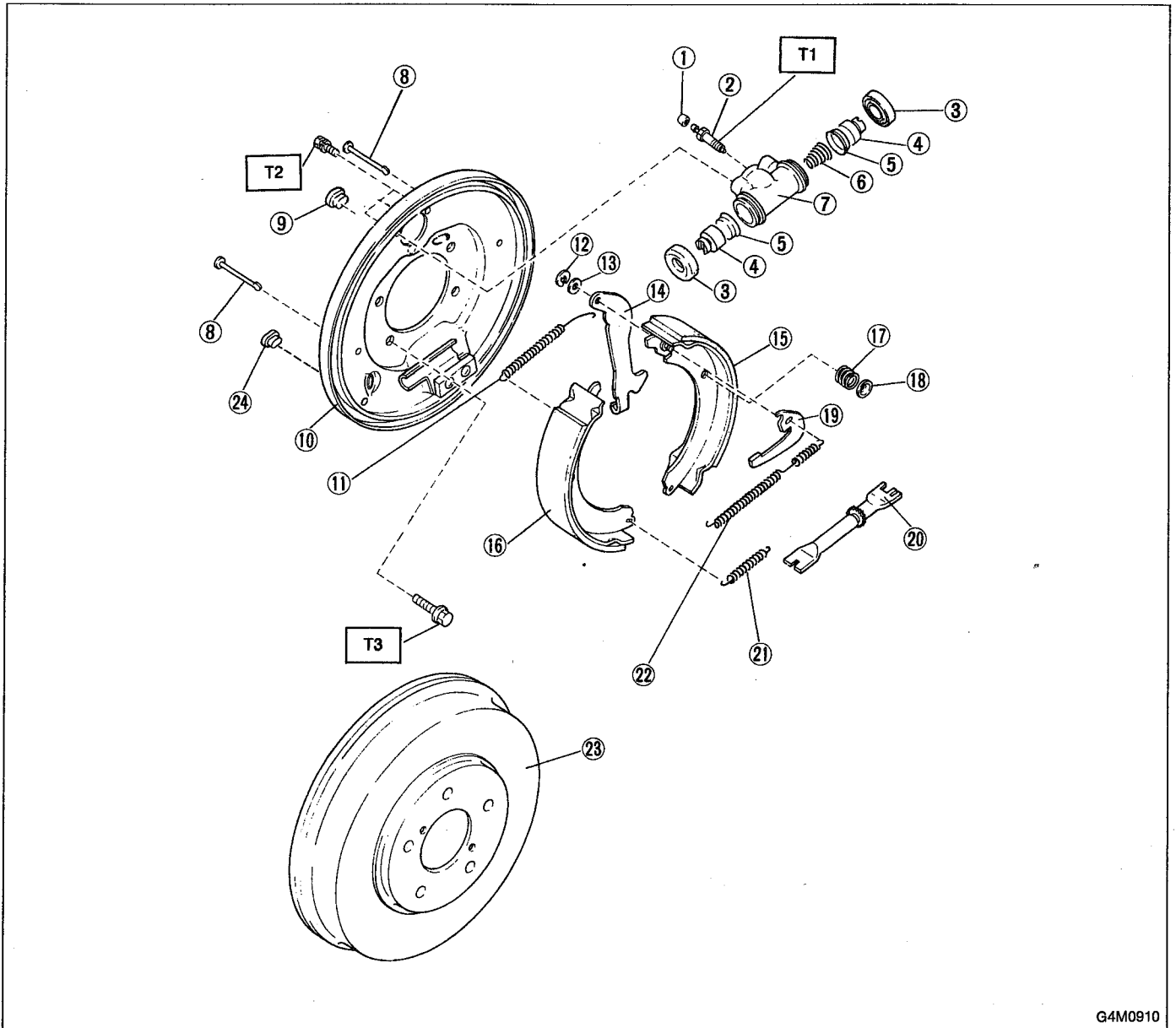
T1: 8 ± 1 (0.8 ± 0.1, 5.8 ± 0.7)

T2: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)

T3: 37 ± 5 (3.8 ± 0.5, 27.5 ± 3.6)

T4: 78 ± 10 (8.0 ± 1.0, 58 ± 7)

2. Rear Drum Brake



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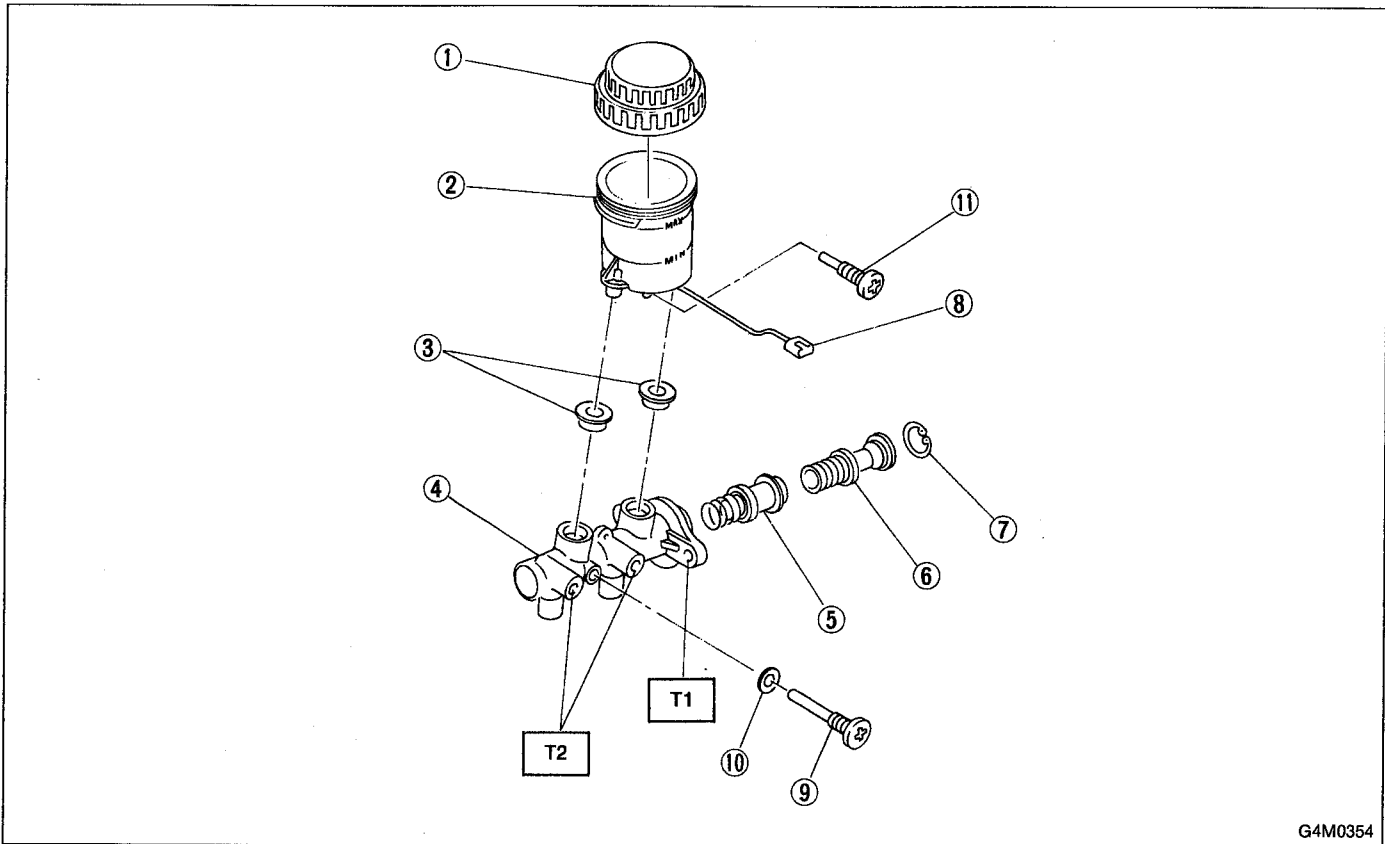
- ① Air bleeder cap
- ② Air bleeder screw
- ③ Boot
- ④ Piston
- ⑤ Cup
- ⑥ Spring
- ⑦ Wheel cylinder body
- ⑧ Pin
- ⑨ Plug
- ⑩ Back plate

- 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 Adjusting lever
- ⑳ Adjuster

- ㉑ Lower shoe return spring
- ㉒ Adjusting spring
- ㉓ Drum
- ㉔ Plug

Tightening torque: N·m (kg·m, ft·lb)
T1: 8 ± 1 (0.8 ± 0.1, 5.8 ± 0.7)
T2: 10 ± 2 (1.0 ± 0.2, 7.2 ± 1.4)
T3: 52 ± 6 (5.3 ± 0.6, 38.3 ± 4.3)

3. Master Cylinder

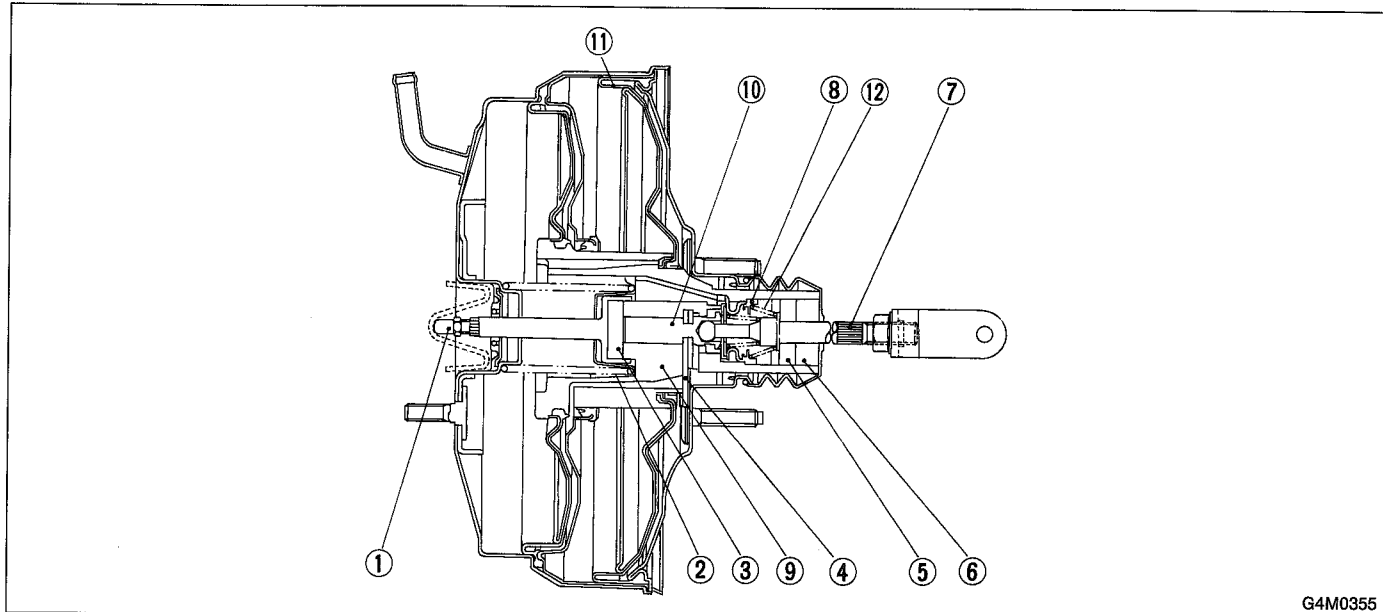


- | | |
|--------------------|--------------------------------------|
| ① Cap | ⑦ C-ring |
| ② Reserve tank | ⑧ Level indicator ASSY |
| ③ Seal | ⑨ Supply valve stopper
(With ABS) |
| ④ Cylinder body | ⑩ Gasket (With ABS) |
| ⑤ Secondary piston | ⑪ Reservoir stopper bolt |
| ⑥ Primary piston | |

Tightening torque: N·m (kg-m, ft-lb)
T1: 14 ± 4 (1.4 ± 0.4 , 10.1 ± 2.9)
T2: 14.7^{+3}
($1.5^{+0.3}$, $10.8^{+2.2}$)

4. Brake Booster

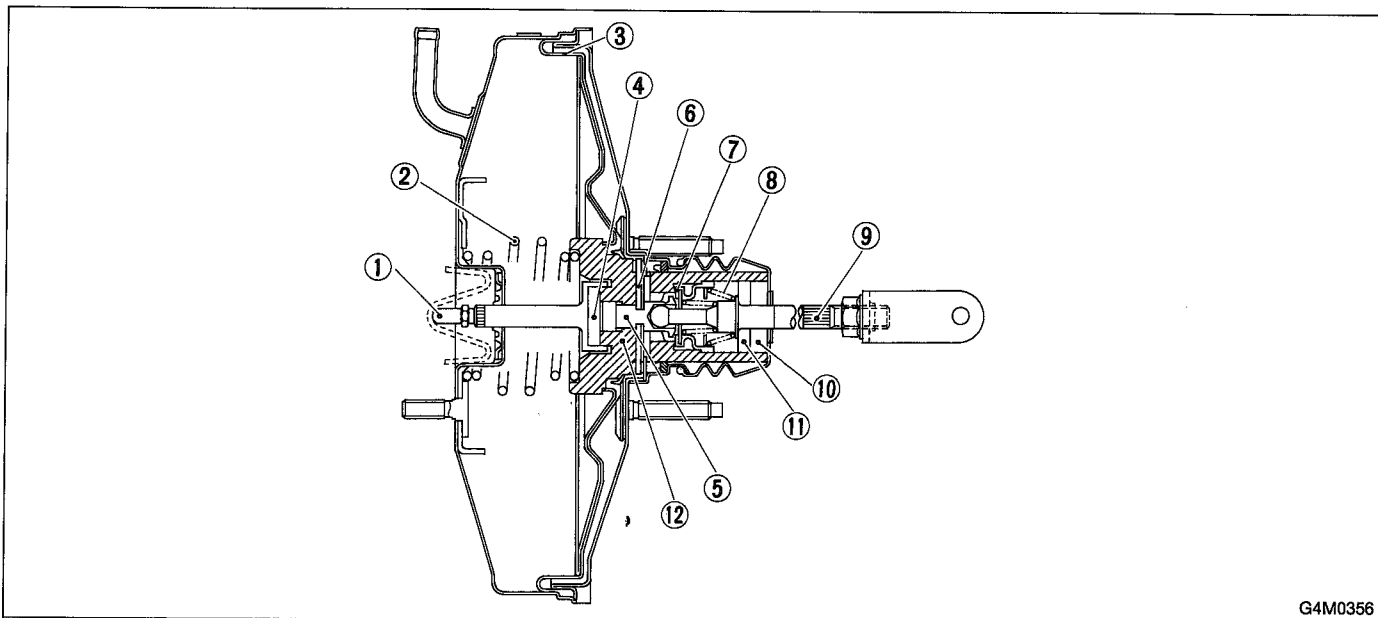
1. MODELS WITH ABS



G4M0355

- | | | |
|-----------------|-----------------|-----------------------|
| ① Push rod | ⑤ Filter | ⑨ Valve body |
| ② Return spring | ⑥ Silencer | ⑩ Plunger valve |
| ③ Reaction disc | ⑦ Operating rod | ⑪ Diaphragm plate |
| ④ Key | ⑧ Poppet valve | ⑫ Valve return spring |

2. MODELS WITHOUT ABS

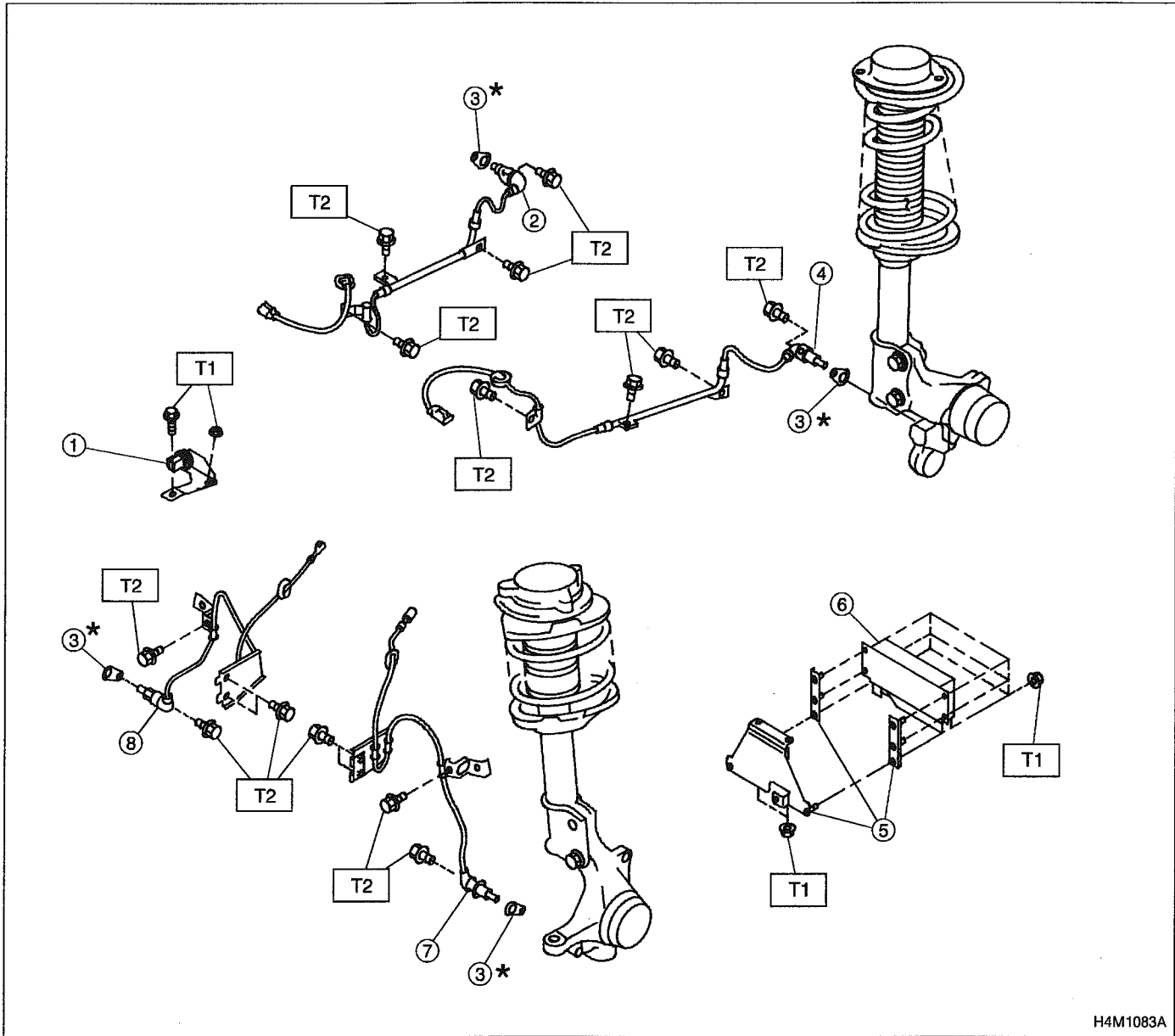


G4M0356

- | | | |
|-------------------|-----------------------|-----------------|
| ① Push rod | ⑤ Plunger valve | ⑨ Operating rod |
| ② Return spring | ⑥ Key | ⑩ Silencer |
| ③ Diaphragm plate | ⑦ Poppet valve | ⑪ Filter |
| ④ Reaction disc | ⑧ Valve return spring | ⑫ Valve body |

5. ABS System

A: SENSOR AND CONTROL MODULE



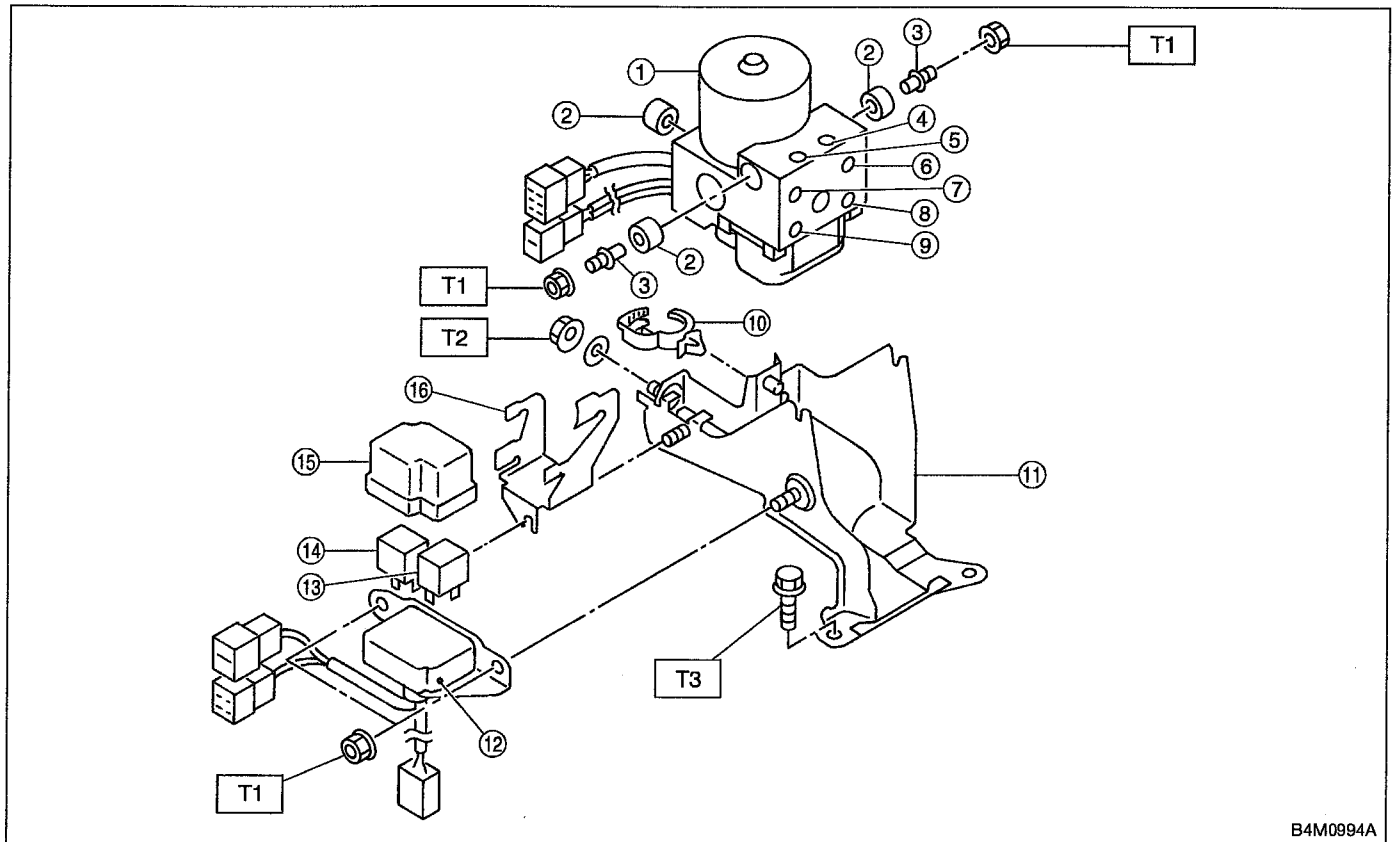
H4M1083A

- ① G sensor (AWD only)
- ② Rear ABS sensor RH
- ③ ABS spacer
- ④ Rear ABS sensor LH

- ⑤ Bracket
- ⑥ ABS control module
- ⑦ Front ABS sensor LH
- ⑧ Front ABS sensor RH

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T2: 32 ± 10 (3.3 ± 1.0, 24 ± 7)

B: HYDRAULIC CONTROL UNIT

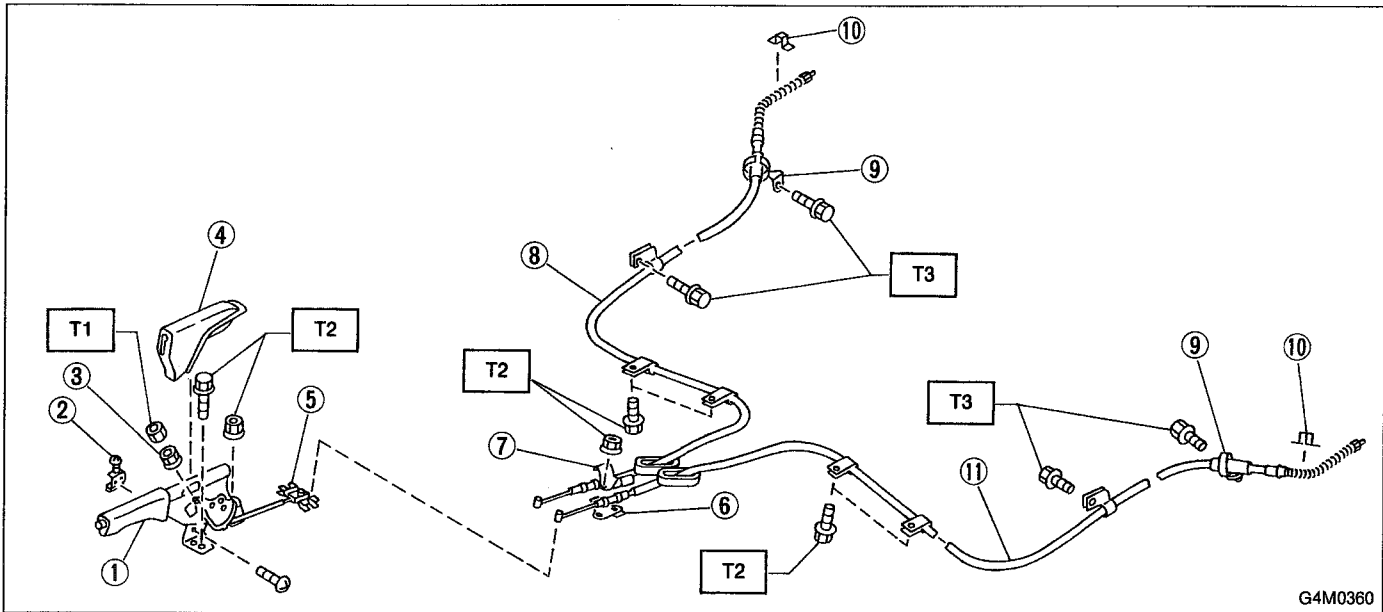


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- | | |
|--------------------------|---------------------|
| ① Hydraulic control unit | ⑩ Cable clip |
| ② Damper | ⑪ Bracket |
| ③ Stud bolt | ⑫ Relay box |
| ④ Rear-RH outlet | ⑬ Motor relay |
| ⑤ Rear-LH outlet | ⑭ Valve relay |
| ⑥ Secondary inlet | ⑮ Cap |
| ⑦ Primary inlet | ⑯ Connector bracket |
| ⑧ Front-LH outlet | |
| ⑨ Front-RH outlet | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)
T2: 29 ± 7 (3.0 ± 0.7, 21.7 ± 5.1)
T3: 32 ± 10 (3.3 ± 1.0, 24 ± 7)

6. Parking Brake

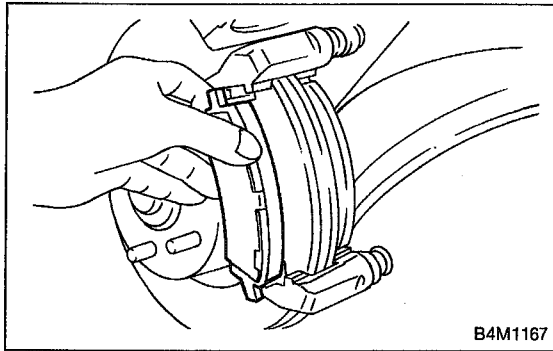


G4M0360

- ① Parking brake lever
- ② Parking brake switch
- ③ Adjusting nut
- ④ Cover
- 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 (kg·m, ft·lb)
T1: 5.9 ± 1.5 (0.60 ± 0.15, 4.3 ± 1.1)
T2: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)
T3: 32 ± 10 (3.3 ± 1.0, 24 ± 7)

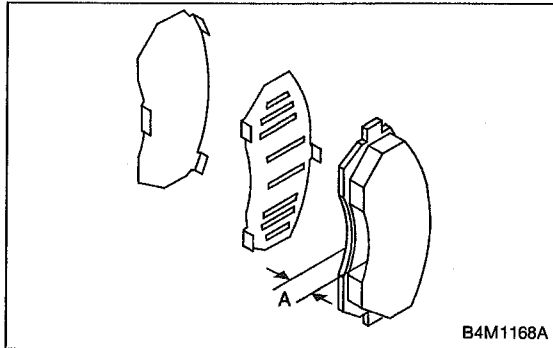


1. Front Disc Brake

A: ON-CAR SERVICE

1. PAD

- 1) Remove lock pin.
- 2) Raise caliper body.
- 3) Remove pad.

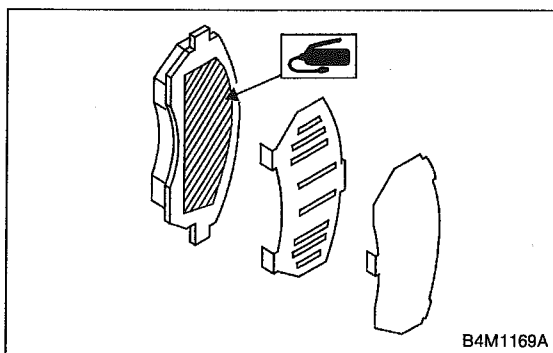


- 4) Check pad thickness A.

Pad thickness (including back metal) mm (in)	Standard value	17 (0.67)
	Wear limit	7.5 (0.295)

CAUTION:

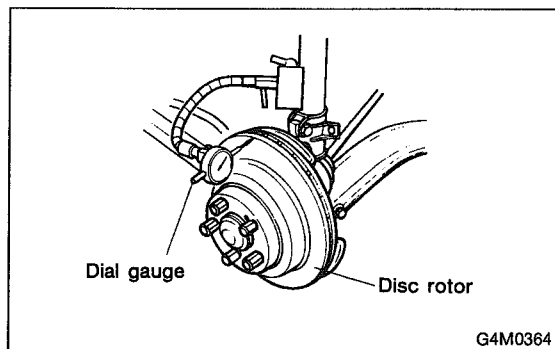
- Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace pad if there is oil or grease on it.



- 5) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.
- 6) Install pads on support.
- 7) Install caliper body on support.

NOTE:

If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.



2. DISC ROTOR

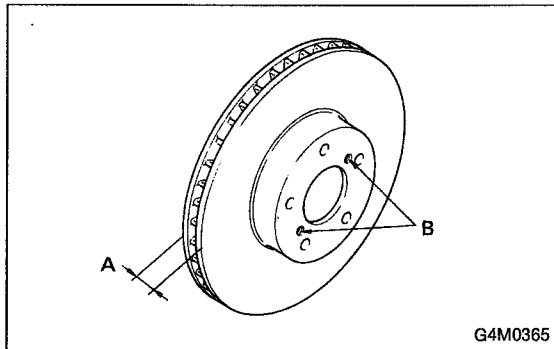
- 1) Install disc rotor by tightening the five wheel nuts.
- 2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.

NOTE:

Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:
0.075 mm (0.0030 in)

1. Front Disc Brake



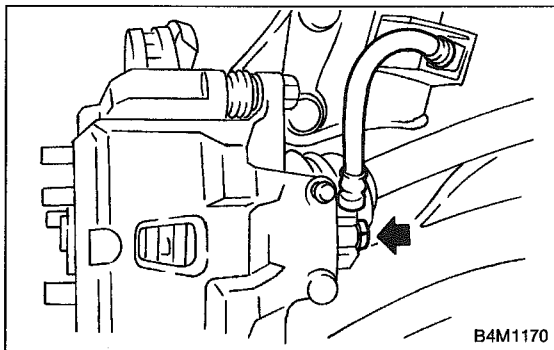
G4M0365

3) Measure disc rotor thickness.

NOTE:

Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

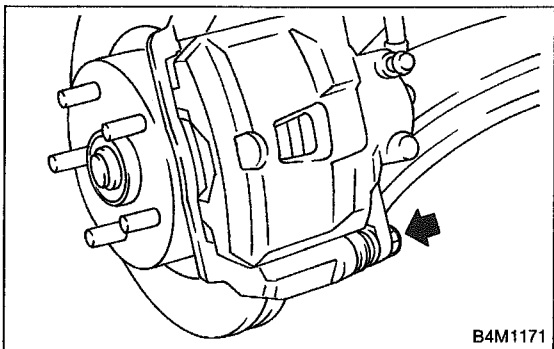
Disc rotor thickness A mm (in)	Standard value	Service limit	Disc outer dia.
	24.0 (0.945)	22.0 (0.866)	260 (10.24)



B4M1170

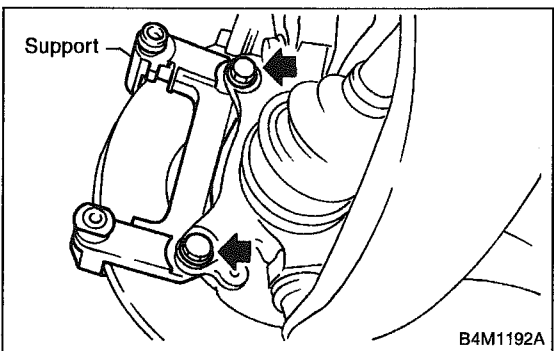
B: REMOVAL

1) Remove union bolt and disconnect brake hose from caliper body assembly.



B4M1171

2) Remove bolt securing lock pin to caliper body.
3) Raise caliper body and move it toward vehicle center to separate it from support.

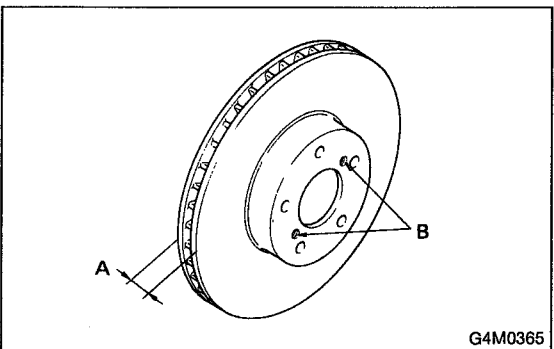


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4) Remove support from housing.

NOTE:

Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



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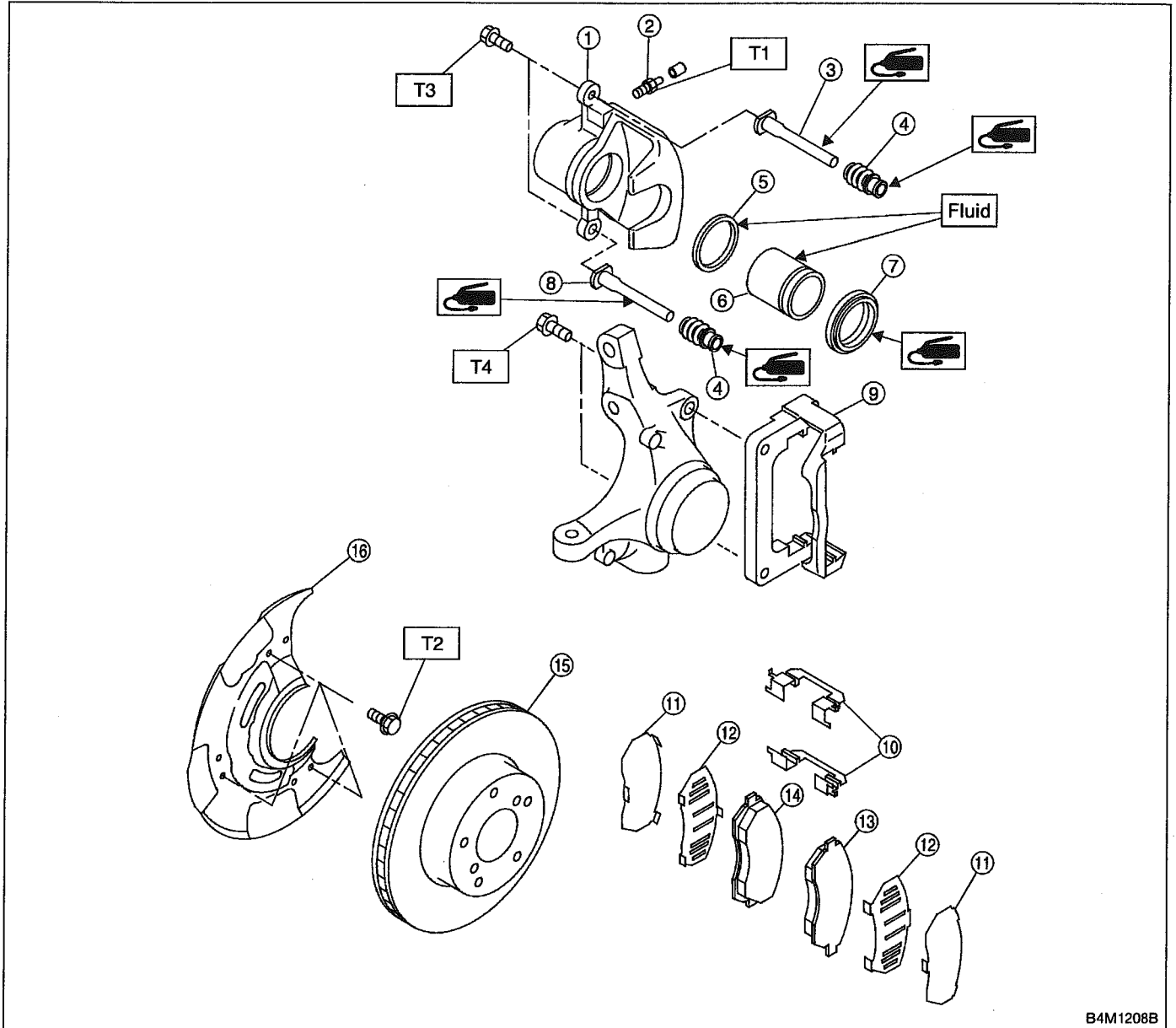
5) Remove disc rotor from hub.

NOTE:

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

6) Clean mud and foreign particles from caliper body assembly and support.

C: DISASSEMBLY



B4M1208B

- | | |
|---------------------|-----------------|
| ① Caliper body | ⑨ Support |
| ② Air bleeder screw | ⑩ Pad clip |
| ③ Guide pin (Green) | ⑪ Outer shim |
| ④ Pin boot | ⑫ Inner shim |
| ⑤ Piston seal | ⑬ Pad (Outside) |
| ⑥ Piston | ⑭ Pad (Inside) |
| ⑦ Piston boot | ⑮ Disc rotor |
| ⑧ Lock pin (Yellow) | ⑯ Disc cover |

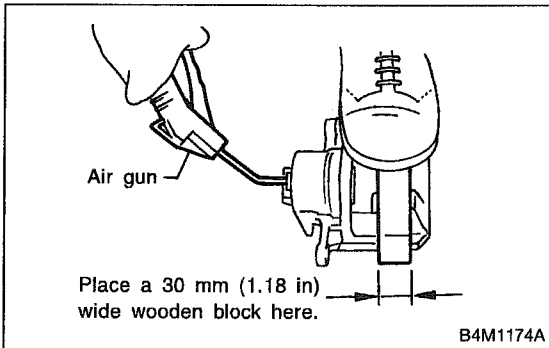
Tightening torque: N·m (kg·m, ft·lb)

- T1: 8 ± 1 (0.8 ± 0.1 , 5.8 ± 0.7)**
T2: 18 ± 5 (1.8 ± 0.5 , 13.0 ± 3.6)
T3: 37 ± 5 (3.8 ± 0.5 , 27.5 ± 3.6)
T4: 78 ± 10 (8.0 ± 1.0 , 58 ± 7)

- 1) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:

Be careful not to allow foreign particles to enter inlet (at brake hose connector).



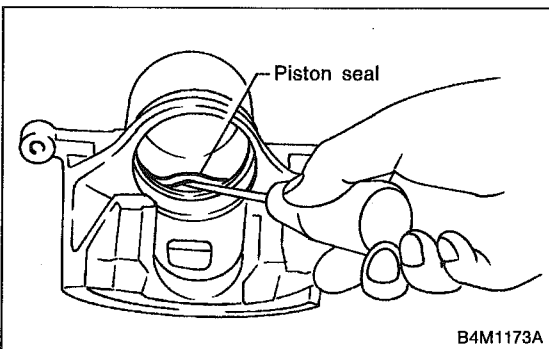
- 2) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:

● **Place a wooden block as shown in Figure to prevent damage to piston.**

● **Do not apply excessively high-pressure.**

- 3) Remove piston boot.



- 4) Remove piston seal from caliper body cylinder.
- 5) Remove guide pin and boot from caliper body.

D: INSPECTION

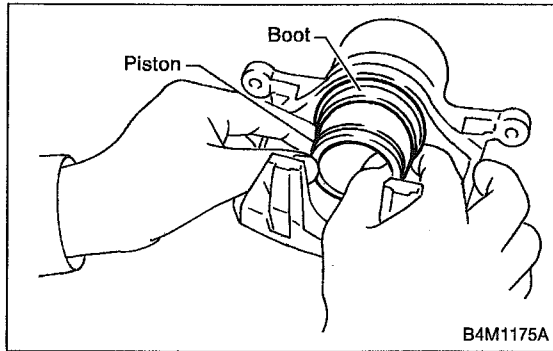
- 1) Repair or replace faulty parts.
- 2) Check caliper body and piston for uneven wear, damage or rust.
- 3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

- 1) Clean caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and install piston boot onto cylinder.

Grease:

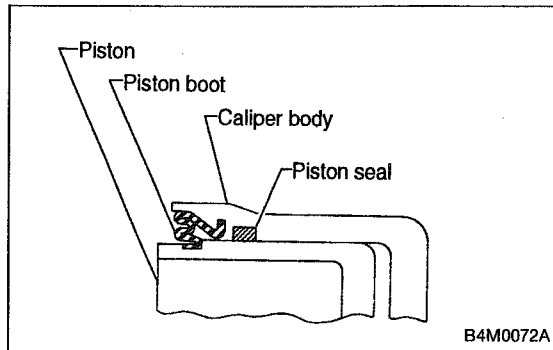
NIGLUBE RX-2 (Part No. 003606000)



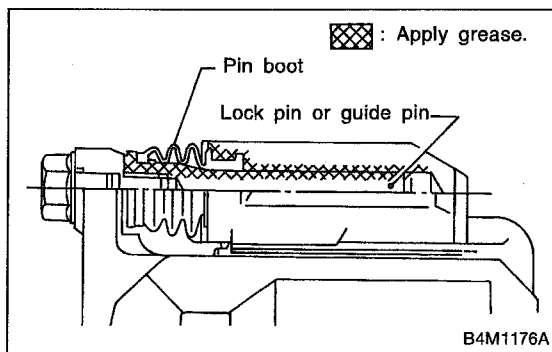
5) Insert piston into cylinder.

CAUTION:

Do not force piston into cylinder.



6) Position boot in grooves on cylinder and piston.



7) Apply a coat of specified grease to lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

Grease:

NIGLUBE RX-2 (Part No. 003606000)

8) Install lock and guide pin boot on support.

F: INSTALLATION

- 1) Install disc rotor on hub.
- 2) Install support on housing.

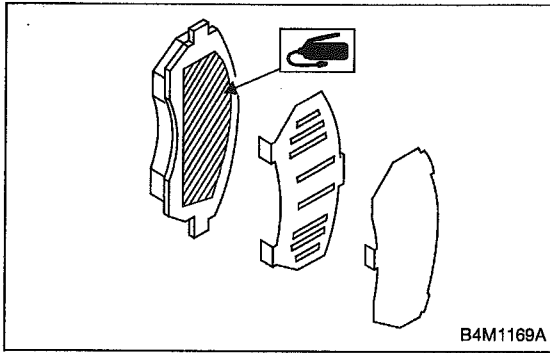
Tightening torque:

78 ± 10 N·m (8 ± 1 kg-m, 58 ± 7 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 pad, replace pads of the right and left wheels at the same time.

1. Front Disc Brake - 2. Rear Drum Brake



- 3) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.
- 4) Install pads, rubber coated shim and stainless shim on support.
- 5) Install caliper body on support.

Tightening torque:

39 ± 5 N·m (4 ± 0.5 kg-m, 28.9 ± 3.6 ft-lb)

- 6) Connect brake hose.

Tightening torque:

18 ± 3 N·m (1.8 ± 0.3 kg-m, 13.0 ± 2.2 ft-lb)

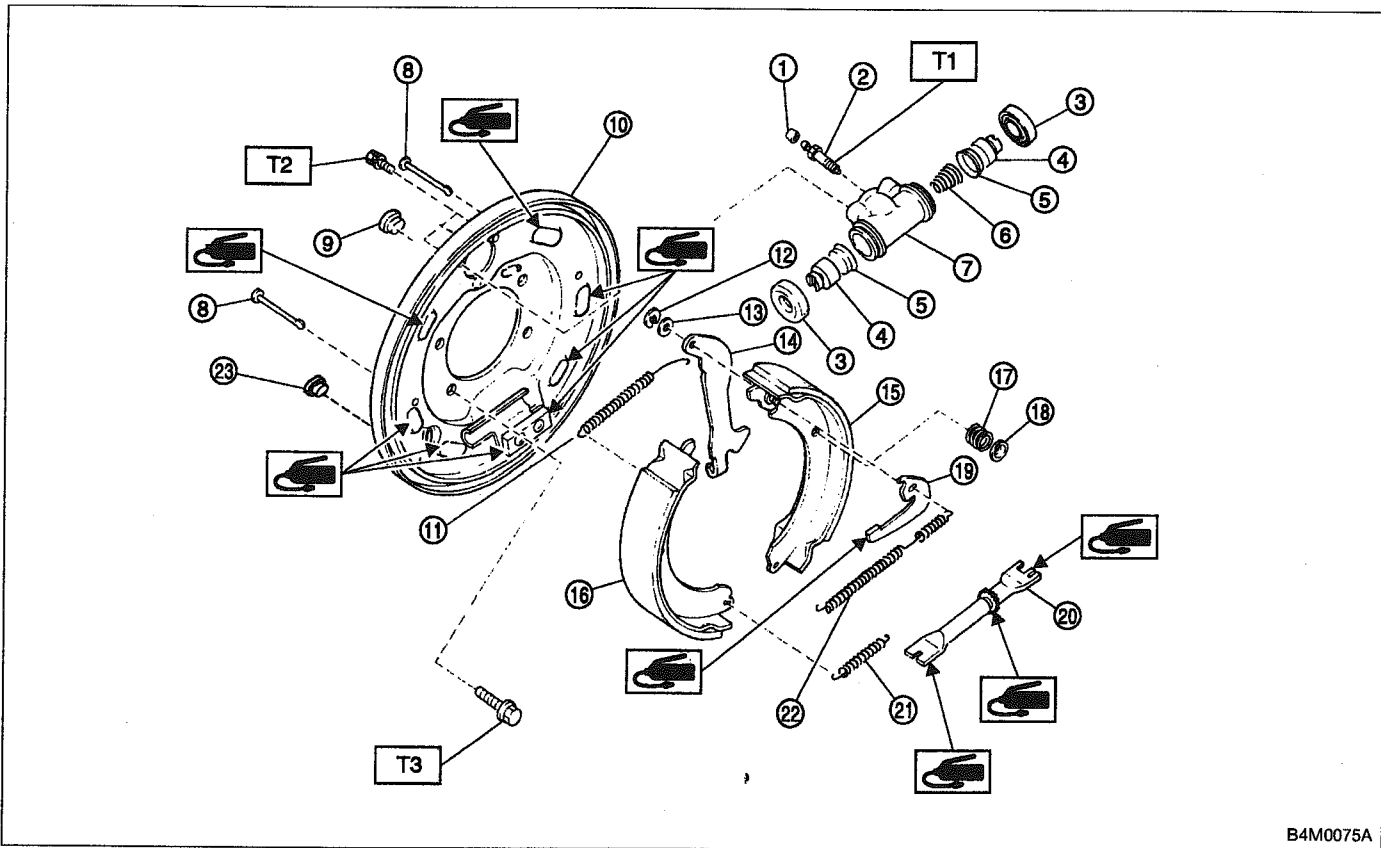
CAUTION:

Replace brake hose gaskets with new ones.

- 7) Bleed air from brake system.

2. Rear Drum Brake

A: REMOVAL



- 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

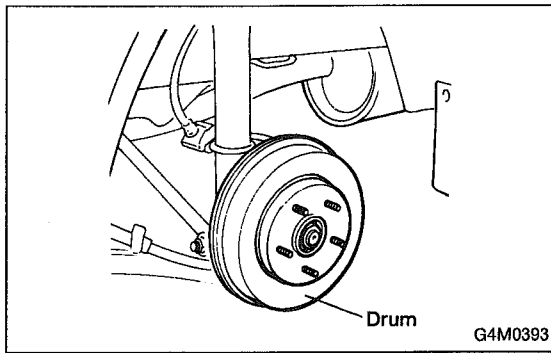
- ㉑ Lower shoe return spring
- ㉒ Adjusting spring
- ㉓ Plug

Tightening torque: N·m (kg-m, ft-lb)

T1: 8 ± 1 (0.8 ± 0.1, 5.8 ± 0.7)

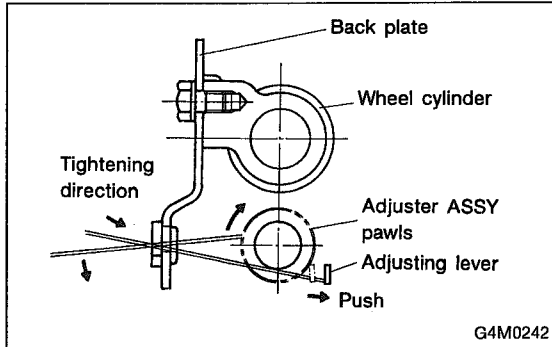
T2: 10 ± 2 (1.0 ± 0.2, 7.2 ± 1.4)

T3: 52 ± 6 (5.3 ± 0.6, 38.3 ± 4.3)



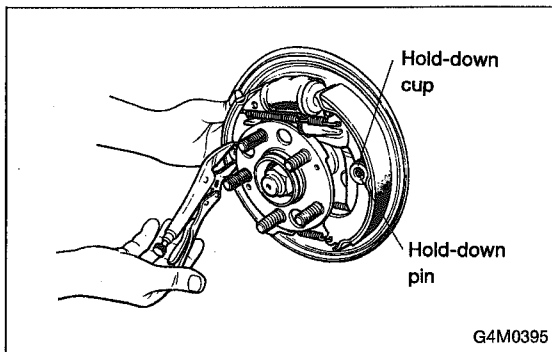
1. BRAKE DRUM AND SHOE

- 1) Loosen wheel nuts, jack-up vehicle, support it with rigid racks, and remove wheel.
- 2) Release parking brake.
- 3) Remove brake drum from brake assembly.

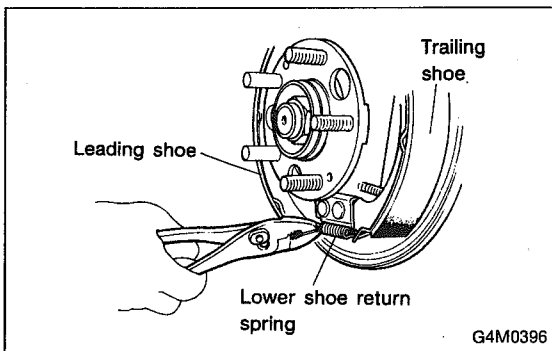


NOTE:

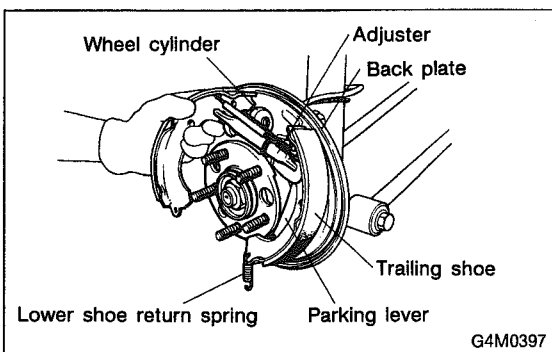
If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then, turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.



- 4) Hold hold-down pin by securing rear of back plate with your hand.
- 5) Disconnect hold-down cup from hold-down pin by rotating hold-down cup.



- 6) Disconnect lower shoe return spring from shoes.

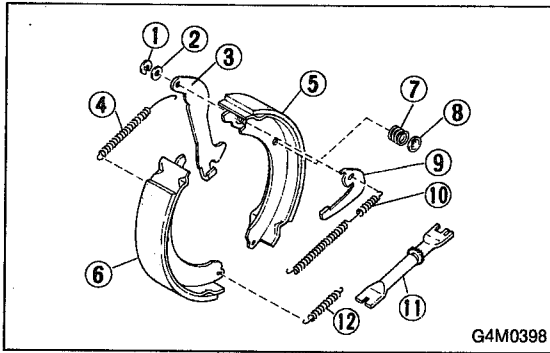


- 7) Remove shoes one by one from back plate with adjuster.

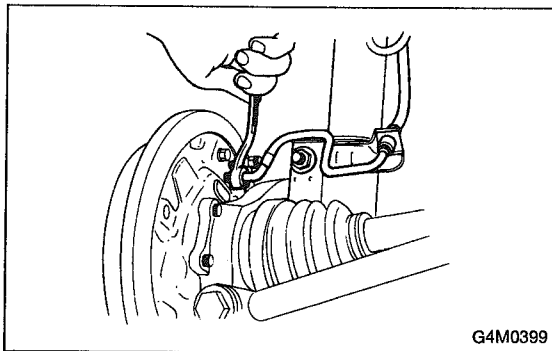
CAUTION:

Be careful not to bend parking brake cable excessively when removing brake shoes.

- 8) Disconnect parking brake cable from parking lever.

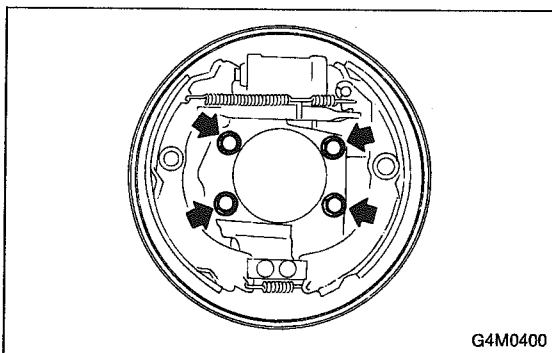


- 9) Remove the following.
- ① Retainer
 - ② Washer
 - ③ Parking lever
 - ④ Upper shoe return spring
 - ⑤ Trailing shoe
 - ⑥ Leading shoe
 - ⑦ Shoe hold-down spring
 - ⑧ Shoe hold-down cup
 - ⑨ Adjusting lever
 - ⑩ Adjuster spring
 - ⑪ Adjuster
 - ⑫ Lower shoe return spring

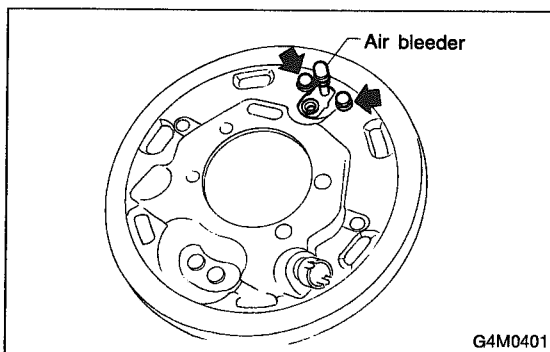


2. BRAKE ASSEMBLY

- 1) Remove wheel.
- 2) Remove axle nut.
- 3) Remove brake drum
- 4) Unscrew the brake pipe flare nut and disconnect brake pipe.
- 5) Remove hub. <Ref. to 4-2 [W2A0].>

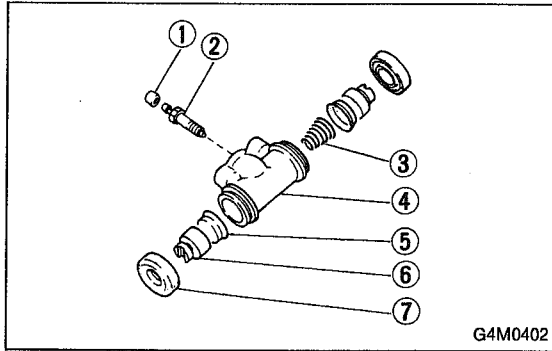


- 6) Remove the bolts installing back plate, and then, remove brake assembly.



3. WHEEL CYLINDER

- 1) Remove brake drum and shoes.
- 2) Unscrew brake pipe flare nut; and disconnect brake pipe.
- 3) Remove the bolts installing wheel cylinder on back plate, and remove it.



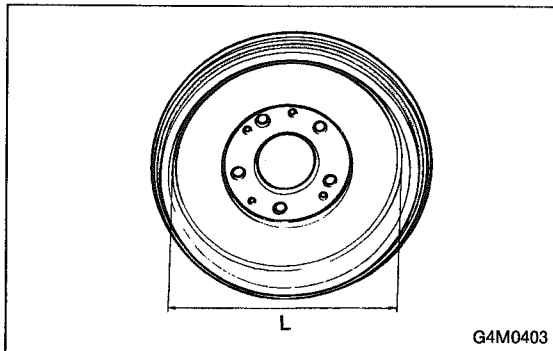
G4M0402

B: DISASSEMBLY

1. WHEEL CYLINDER

- 1) Remove right and left dust boots from wheel cylinder.
- 2) Remove piston, cup, spring and air bleeder screw and cap.

- ① Bleeder cap
- ② Bleeder screw
- ③ Spring
- ④ Cylinder
- ⑤ Cup
- ⑥ Piston
- ⑦ Boot



G4M0403

C: INSPECTION

- 1) If the inside surface of brake drum is streaked, correct the surface. And, if it is unevenly worn, taperingly streaked, or the outside surface of brake drum is damaged, correct or replace it.
- 2) Measure the drum inner diameter.

Drum inner diameter: "L"

Standard: 228.6 mm (9 in)

Service limit: 230.6 mm (9.08 in)

- 3) Measure the lining thickness.

Lining thickness:

Standard: 4.1 mm (0.161 in)

Service limit: 1.5 mm (0.059 in)

- 4) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
- 5) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

D: ASSEMBLY

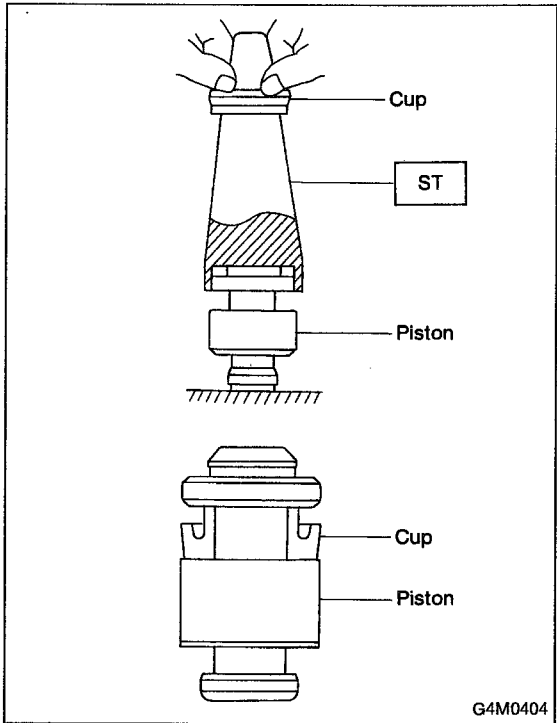
1. WHEEL CYLINDER

- 1) Clean all parts in brake fluid. Check and replace faulty parts.

- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

- 2) Assembly is the reverse order of disassembly.

2. Rear Drum Brake



(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:

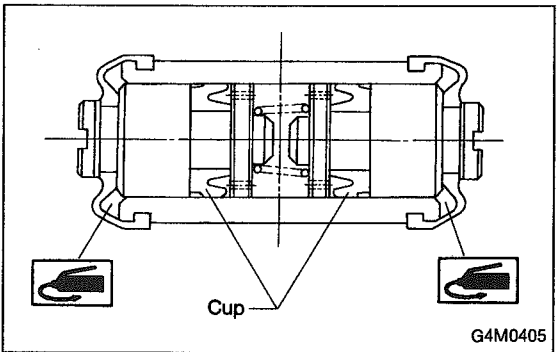
● When replacing the repair kit, make sure that the sizes of cylinder and cup are the same as those which were replaced.

● Use only the tool of the correct size.

ST: ADAPTER	
Applicable size	Part No.
19.05 mm (3/4 in)	926460000

CAUTION:

While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.



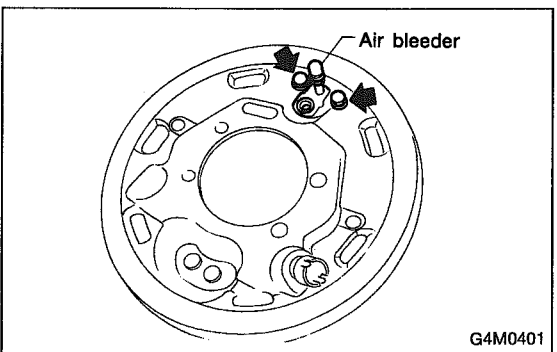
3) Apply rubber grease to the boot inside as shown in Figure.

Grease:

NIGLUBE RX-2 (Part No. 003606000)

CAUTION:

Never use brake grease.



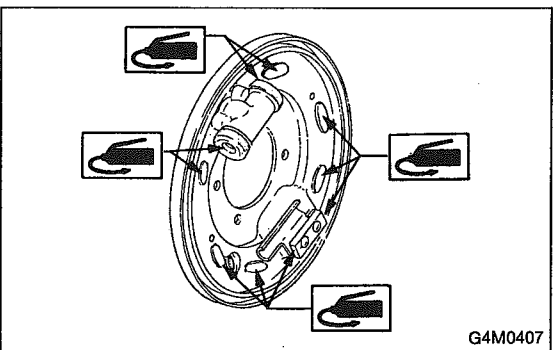
E: INSTALLATION

1. WHEEL CYLINDER

Install wheel cylinder on back plate, and tighten bolts.

Tightening torque:

10 ± 2 N·m (1.0 ± 0.2 kg-m, 7.2 ± 1.4 ft-lb)



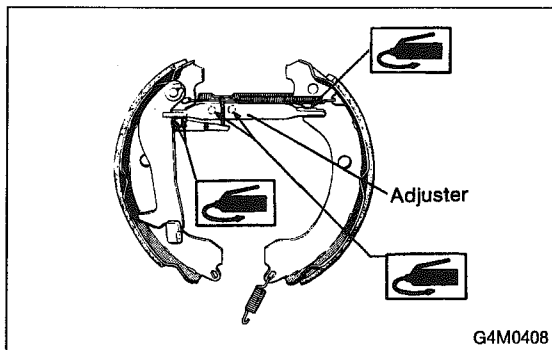
2. BRAKE DRUM AND SHOE

1) Clean back plate and wheel cylinder.

2) Apply grease to portions indicated by arrows in Figure.

Brake grease:

Dow Corning Molykote No. 7439 (Part No. 725191460)

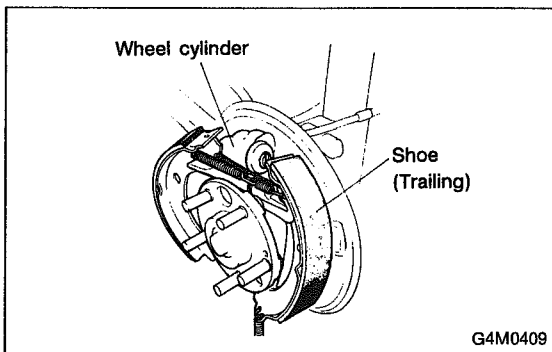


3) Apply grease to adjusting screw and both ends of adjuster.

Brake grease:

Dow Corning Molykote No. 7439 (Part No. 725191460)

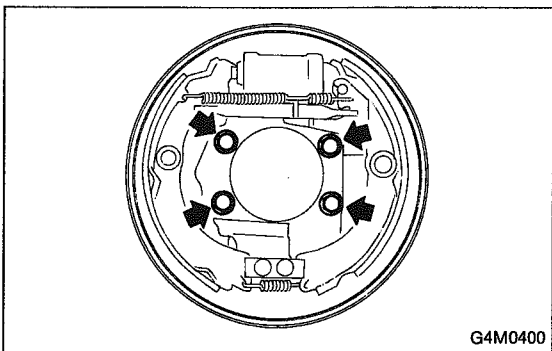
4) Connect upper shoe return spring to shoes.



5) While positioning shoes (one at a time) in groove on wheel cylinder, secure shoes.

6) Connect lower shoe return spring.

7) Fix shoes by connecting hold-down cup to hold-down pin.



3. BRAKE ASSEMBLY

1) Install brake assembly on housing, and tighten bolts to install back plate.

Tightening torque:

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

2) Install hub. <Ref. to 4-2 [W2D0].>

3) Connect brake pipe, and tighten brake pipe flange nut.

Tightening torque:

$14.7^{+3}_{-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2}_{-1.4} \text{ ft}\cdot\text{lb}$)

4) Set the outside diameter of brake shoes less than 0.5 — 0.8 mm (0.020 — 0.031 in) in comparison with the inside diameter of brake drum.

5) Install brake drum.

6) After installing brake assembly, bleed air from brake line.

3. Master Cylinder

A: REMOVAL

- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Disconnect fluid level indicator harness connector.
- 3) Remove brake pipes from master cylinder.
- 4) Remove master cylinder mounting nuts, and take out master cylinder from brake booster.

CAUTION:

Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wipe it off quickly if spilt.

B: DISASSEMBLY

1. PRECAUTIONS FOR DISASSEMBLING

- 1) Remove mud and dirt from the surface of brake master cylinder.
- 2) Prepare tools necessary for disassembly operation, and arrange them neatly on work bench.
- 3) Clean work bench.
- 4) Tools for disassembly operation:

- 1 Phillips screwdriver
- 1 C-ring pliers

2. DISASSEMBLING PROCEDURE

- 1) Remove supply valve stopper. (only vehicle equipped with ABS)
- 2) Remove C-ring with C-ring pliers pushing in primary piston slightly.

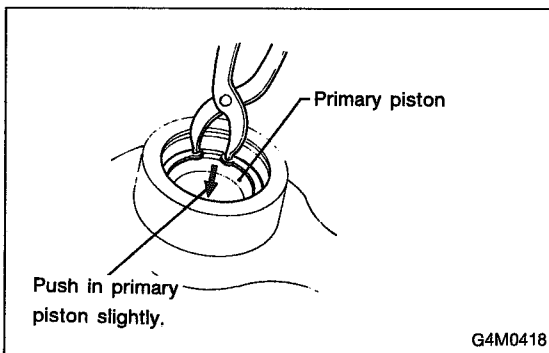
NOTE:

Piston may jump out from master cylinder.

- 3) Extract primary piston assembly and secondary piston assembly.

CAUTION:

- **Do not disassemble the piston assembly; otherwise, the spring set value may be changed.**
- **Use brake fluid or methanol to wash inside wall of cylinder, pistons and piston cups. Be careful not to damage parts when washing. If methanol is used for washing, do not dip rubber parts, such as piston cups, in it for more than 30 seconds; otherwise, they may become swelled.**



C: INSPECTION

If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

CAUTION:

- **The primary and secondary pistons must be replaced as complete assemblies.**
- **The service limit of the clearance between each piston and the master cylinder inner dia. is 0.11 mm (0.0043 in).**
- **When handling parts, be extremely careful not to damage or scratch the parts, or let any foreign matter get on them.**

D: ASSEMBLY**1. PRECAUTIONS FOR ASSEMBLING**

- 1) When assembling, be sure to use recommended brake fluid.
- 2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
- 3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
- 4) Do not drop parts. Never attempt to use any part that has been dropped accidentally.

2. ASSEMBLING OPERATION

- 1) Assembling piston assembly:
Apply recommended brake fluid to inside wall of cylinder, and to outer surface of piston assembly, and install piston assemblies carefully into cylinder.
- 2) Assembling supply valve stopper:
After installing piston into cylinder, push primary piston in about 10 mm (0.39 in), using a rod, such as push rod then assemble gasket and supply valve stopper.

Tightening torque:

$2.2 \pm 0.7 \text{ N}\cdot\text{m}$ ($0.225 \pm 0.075 \text{ kg}\cdot\text{m}$, $1.6 \pm 0.5 \text{ ft}\cdot\text{lb}$)

CAUTION:

If the gasket and supply valve stopper are assembled without pushing in the primary piston, scratches may be caused on the secondary piston, and no pressure may be built up in the secondary side. To avoid such an error, be sure to push in the primary piston before assembling these parts.

- 3) Assembling C-ring:
With primary piston pushed in slightly, attach C-ring by using C-ring pliers.

NOTE:

After assembling, ensure that the C-ring is fitted securely in the ring groove.

E: INSTALLATION

To install the master cylinder to the body, reverse the sequence of removal procedure.

Tightening torque:**Master cylinder mounting nut**

$14 \pm 4 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.4 \text{ kg}\cdot\text{m}$, $10.1 \pm 2.9 \text{ ft}\cdot\text{lb}$)

Piping flare nut

$14.7^{+3}_{-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2}_{-1.4} \text{ ft}\cdot\text{lb}$)

CAUTION:

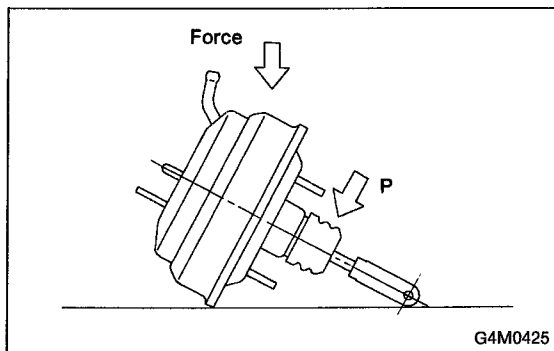
Be sure to use recommended brake fluid.

4. Brake Booster**A: REMOVAL**

- 1) Remove the following parts at engine compartment.
 - (1) Disconnect connector for brake fluid level indicator.
 - (2) Remove brake pipes from master cylinder.
 - (3) Remove master cylinder installing nuts.
 - (4) Disconnect vacuum hose from brake booster.
- 2) Remove the following parts from the pedal bracket.
 - (1) Snap pin and clevis pin.
 - (2) Four brake booster installing nuts.
- 3) Remove brake booster while shunning brake pipes.

B: HANDLING PRECAUTIONS

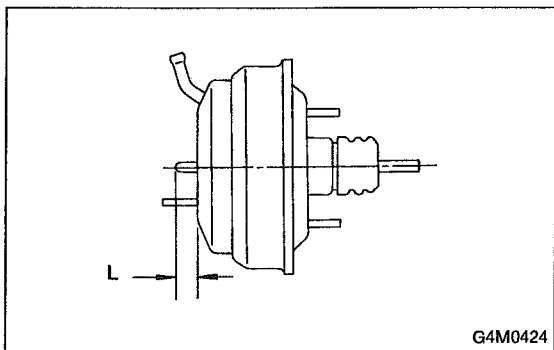
- 1) Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.
- 2) Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of $\pm 3^\circ$, it may result in damage to the power piston cylinder.



3) Use care when placing brake booster on the floor.

CAUTION:

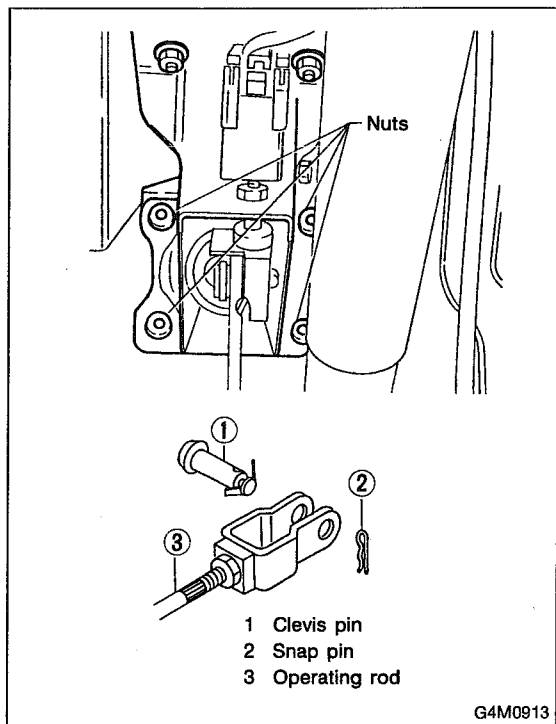
If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.



4) Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

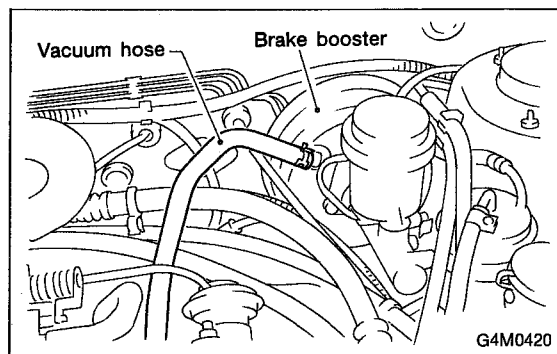
Standard:

L = 10 mm (0.39 in)

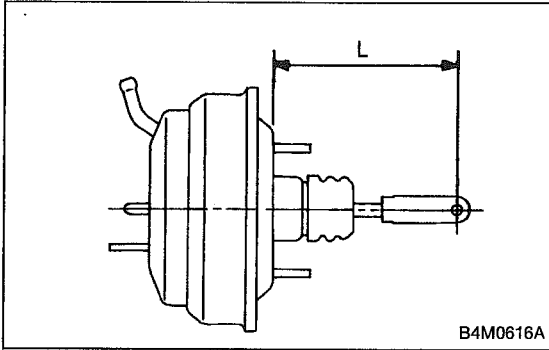


C: INSTALLATION

- 1) Mount brake booster in position.
- 2) Connect operating rod to brake pedal with clevis pin and snap pin.



- 3) Connect vacuum hose to brake booster.
- 4) Mount master cylinder onto brake booster.
- 5) Connect brake pipes to master cylinder.
- 6) Connect electric connector for brake fluid level indicator.



7) Adjust operating rod of brake booster.

Standard: L
145.3 mm (5.72 in)

If it is not in specified value, adjust it by adjusting brake booster operating rod.

8) Measure the clearance between threaded end of stop light switch and stopper.

If it is not in specified value, adjust it by adjusting position of stop light switch.

- ① Stop light switch
- ② Stopper
- ③ Brake pedal

CAUTION:

Be careful not to rotate stop light switch.

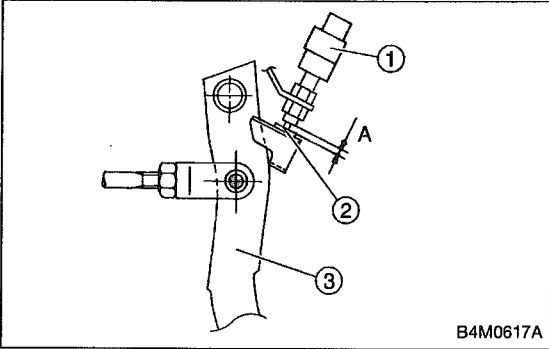
Stop light switch clearance: A
0.3 mm (0.012 in)

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 ± 1 N·m (0.8 ± 0.1 kg-m, 5.8 ± 0.7 ft-lb)

11) Conduct road tests to ensure brakes do not drag.



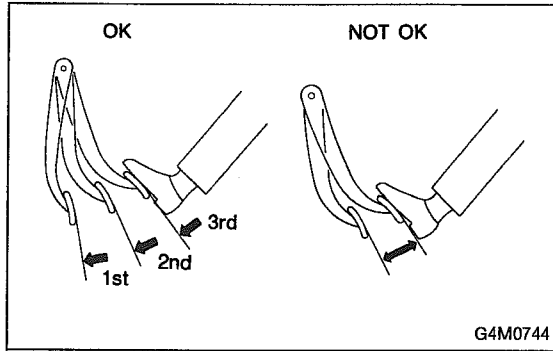
D: OPERATION CHECK (WITHOUT USING GAUGES)

CAUTION:

When checking operation, be sure to securely apply the hand brake.

1. CHECKING WITHOUT USING GAUGES

This method cannot determine the exact portion which has failed, but it can provide a rough understanding of the nature of the failure if checking is conducted in accordance with the following procedures.

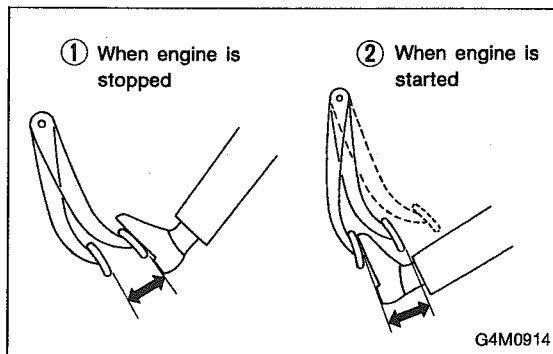


2. AIR TIGHTNESS CHECK

Start engine, and run it for 1 to 2 minutes, then turn it off. Depress brake pedal several times applying the same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on the 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, brake booster is faulty.

NOTE:

- In the event of defective operation, inspect the condition of the check valve and vacuum hose.
- Replace them if faulty and conduct the test again.
- If no improvement is observed, check precisely with gauges.



3. OPERATION CHECK

- 1) With engine off, depress brake pedal several times applying the same pedal force and make sure that the pedal height does not vary with each depression of the pedal.
- 2) With brake pedal depressed, start engine.
- 3) As engine starts, brake pedal should move slightly toward the floor. If no change occurs in the pedal height, brake booster is faulty.

NOTE:

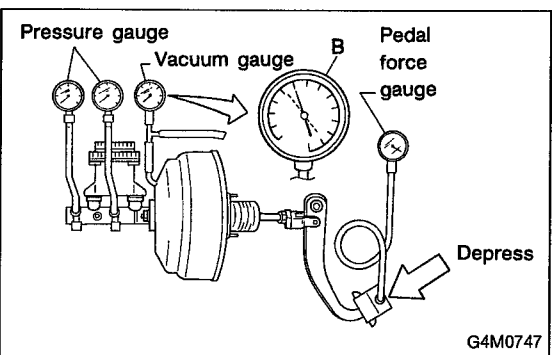
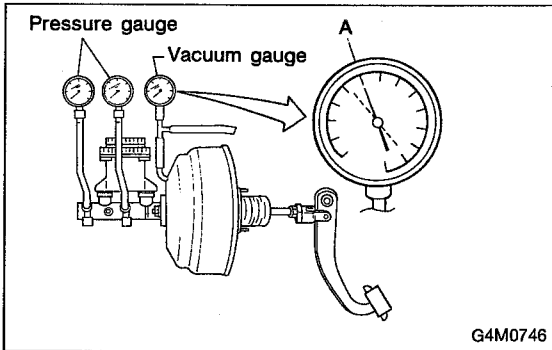
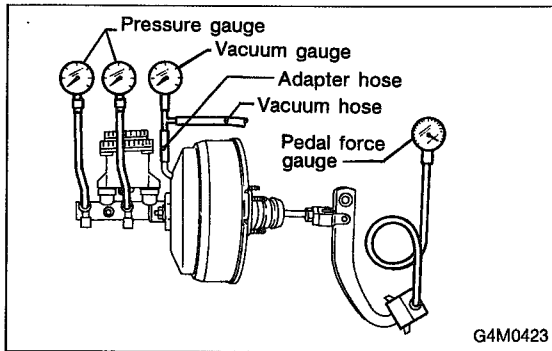
If faulty, check precisely with gauges.

4. LOADED AIR TIGHTNESS CHECK

Depress brake pedal while engine is running, and turn off engine while the pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, brake booster is functioning normally; if the pedal height increases, it is faulty.

NOTE:

If faulty, check precisely with gauges.



E: OPERATION CHECK (WITH GAUGES)

CAUTION:

When checking operation, be sure to securely apply the hand brake.

1. CHECKING WITH GAUGES

Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.

2. AIR TIGHTNESS CHECK

1) Start engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress brake pedal.

2) Stop engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly.

If defective, the cause may be one of those listed below.

- Check valve malfunction
- Leak from vacuum hose
- Leak from the shell jointed portion or stud bolt welded portion
- Damaged diaphragm
- Leak from valve body seal and bearing portion
- Leak from plate and seal assembly portion
- Leak from poppet valve assembly portion

3. LOADED AIR TIGHTNESS CHECK

1) Start engine and depress brake pedal with pedal force of 196 N (20 kg, 44 lb). Keep engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.

2) Stop engine and watch vacuum gauge.

If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, brake booster is functioning properly.

If defective, refer to "AIR TIGHTNESS CHECK". <Ref. to 4-4 [W4E2].>

4. LACK OF BOOSTING ACTION CHECK

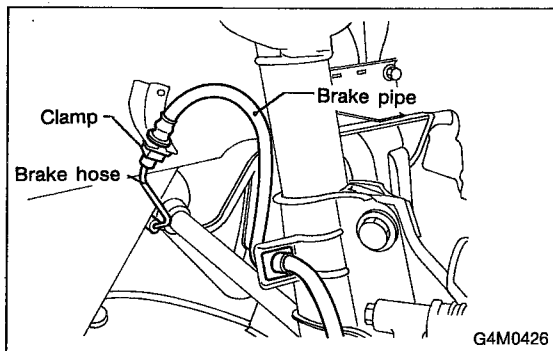
Turn off engine, and set the vacuum gauge reading at "0". Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed below.

Brake pedal force	147N (15 kg, 33 lb)	294N (30kg, 66 lb)
Models without ABS	785 kPa (8 kg/cm ² , 114 psi)	2,158 kPa (22 kg/cm ² , 313 psi)
Models with ABS	588 kPa (6 kg/cm ² , 85 psi)	1,863 kPa (19 kg/cm ² , 270 psi)

5. BOOSTING ACTION CHECK

Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed below.

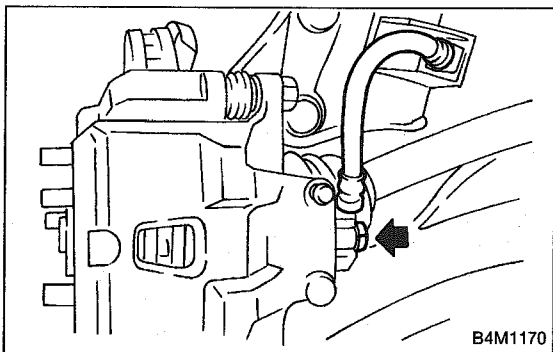
Brake pedal force	147N (15 kg, 33 lb)	294N (30kg, 66 lb)
Models without ABS	5,492 kPa (56 kg/cm ² , 796 psi)	8,434 kPa (86 kg/cm ² , 1,223 psi)
Models with ABS	5,394 kPa (55 kg/cm ² , 782 psi)	9,219 kPa (94 kg/cm ² , 1,337 psi)



5. Brake Hose

A: REMOVAL

- 1) Separate brake pipe from brake hose.
(Always use flare nut wrench and be careful not to deform flare nut.)
- 2) Pull out clamp to remove brake hose.
- 3) Remove clamp at strut and union bolt.



B: INSTALLATION

1. FRONT BRAKE HOSE

- 1) Route end of brake hose (on caliper side) through hole in brake hose bracket at strut location.
- 2) Tighten end of brake hose at caliper using a union bolt.

Torque (Union bolt):

$18 \pm 3 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.3 \text{ kg}\cdot\text{m}$, $13.0 \pm 2.2 \text{ ft}\cdot\text{lb}$)

- 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.

Torque (Brake pipe flare nut):

$14.7^{+3}_{-2} \text{ N}\cdot\text{m}$ ($1.5^{+0.3}_{-0.2} \text{ kg}\cdot\text{m}$, $10.8^{+2.2}_{-1.4} \text{ ft}\cdot\text{lb}$)

- 8) Bleed air from the brake system.

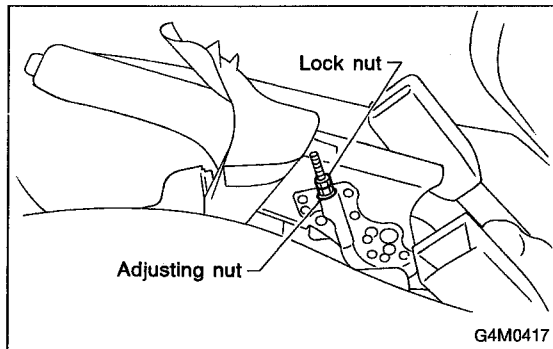
2. REAR BRAKE HOSE

- 1) Pass brake hose through the hole of bracket, and lightly tighten flare nut to connect brake pipe.
- 2) Insert clamp upward to fix brake hose.
- 3) Perform the same procedures as before mentioned in steps 7) and 8).

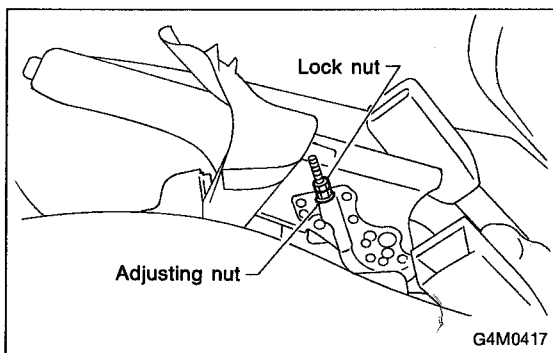
6. Parking Brake Lever

A: REPLACEMENT

- 1) Remove console box from front floor.
- 2) Disconnect electric connector for parking brake switch.
- 3) Loosen parking brake adjuster, and remove inner cable end from equalizer.
- 4) Remove parking brake lever.
- 5) Install parking brake lever in the reverse order of removal.

Torque (Lever installing bolt): **$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)**

- 6) Adjust parking brake lever by turning adjuster until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
- 7) Tighten lock nut.

Torque (Adjuster lock nut): **$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.60 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)**

B: PARKING BRAKE ADJUSTMENT

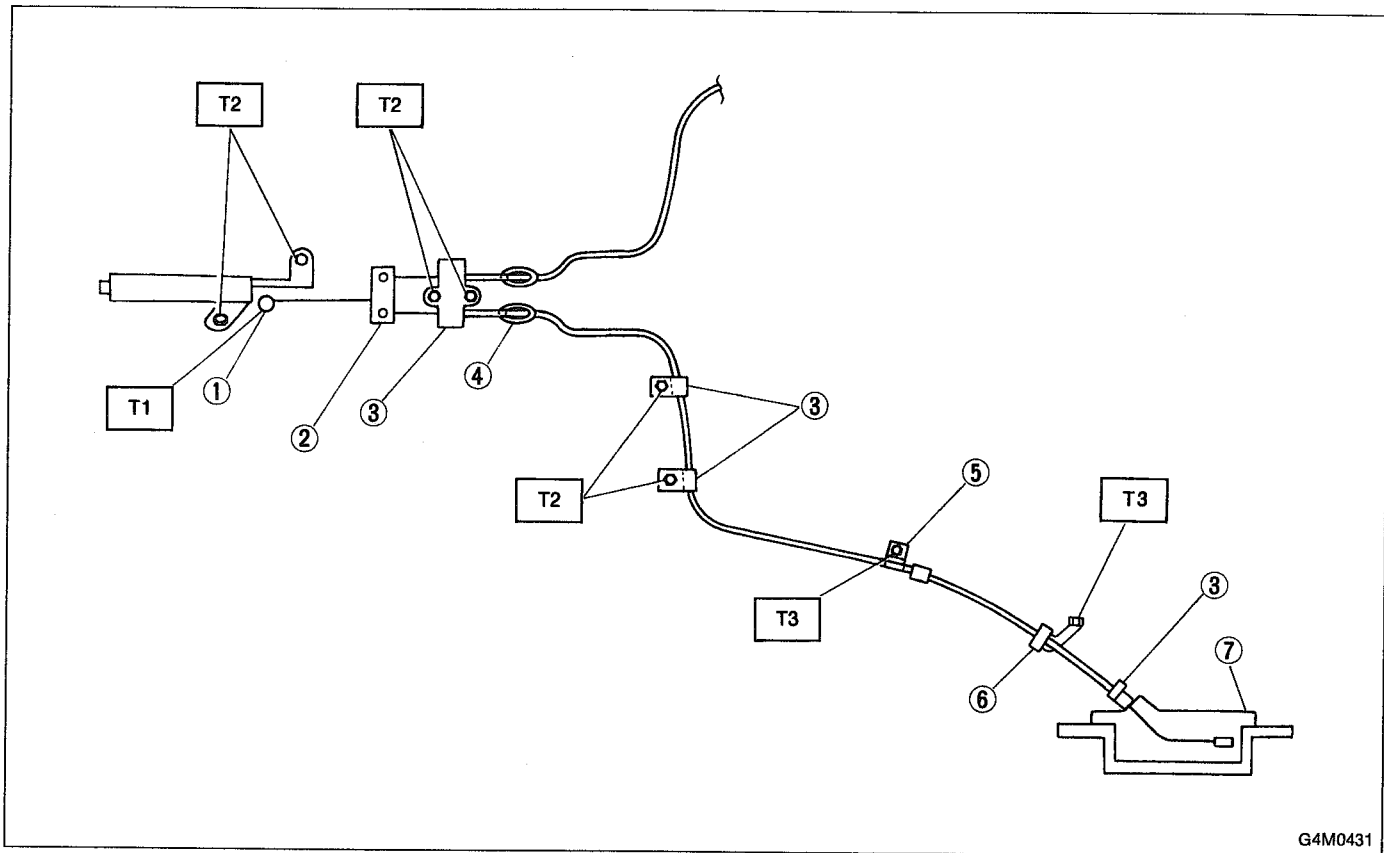
1. LEVER STROKE ADJUSTMENT

- 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 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
- 4) Tighten lock nut.
- 5) Install console box lid.

Lever stroke:**7 to 8 notches when pulled
with a force of 196 N (20 kg, 44 lb)****Tightening torque (Lock nut):** **$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.60 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)**

7. Parking Brake Cable

A: REPLACEMENT

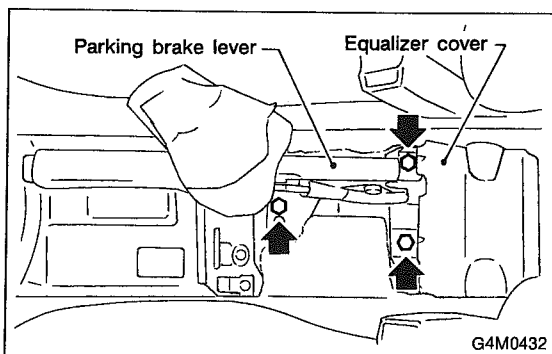


G4M0431

- ① Adjuster
- ② Equalizer
- ③ Clamp
- ④ Grommet
- ⑤ Bracket
- ⑥ Cable guide (Trailing link)
- ⑦ Parking brake ASSY

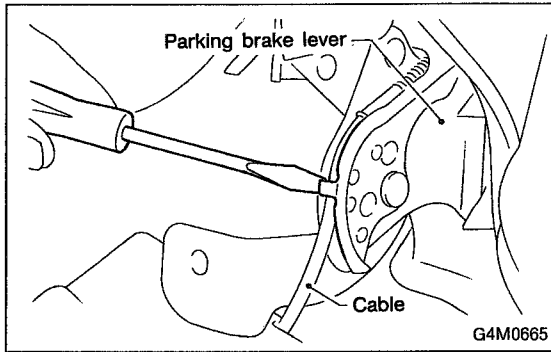
Tightening torque: N·m (kg·m, ft·lb)
T1: 5.9 ± 1.5 (0.60 ± 0.15 , 4.3 ± 1.1)
T2: 18 ± 5 (1.8 ± 0.5 , 13.0 ± 3.6)
T3: 32 ± 10 (3.3 ± 1.0 , 24 ± 7)

- 1) Lift-up vehicle.
- 2) Remove rear tires and wheels.
- 3) Remove rear cushion.
- 4) Remove console box from front floor.
- 5) Loosen parking cable adjuster, then remove inner cable end from equalizer, and detach clamps.

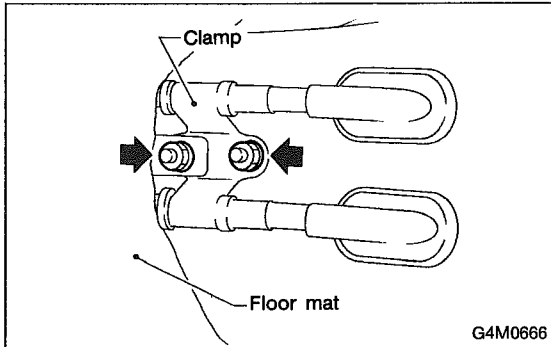


- 6) Remove parking brake lever.

G4M0432

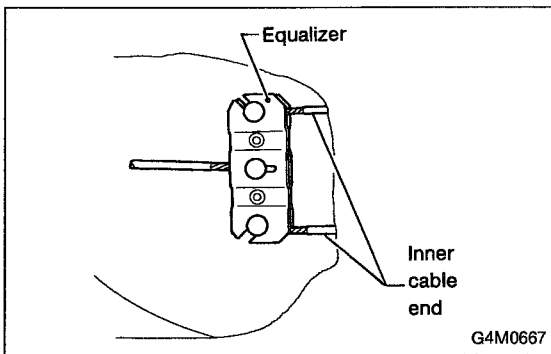


7) Unbend parking brake lever pawls and remove cable.



8) Roll up floor mat and remove clamps.

9) Remove equalizer cover.



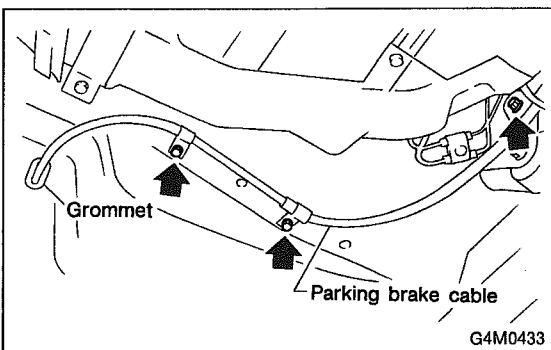
10) Remove inner cable end from equalizer.

11) Pull out parking brake cable from rear brake.

<Ref. to 4-4 [W2A0].>

12) Pull out clamp from rear brake.

13) Remove bolt and bracket from trailing link bracket.



14) Remove bolt and clamp from rear floor.

15) Detach grommet from rear floor.

16) Remove cable assembly from cabin by forcibly pulling it backward.

17) Detach parking brake cable from cable guide at rear trailing link.

18) Install (new) parking brake assembly in the reverse order of removal.

NOTE:

- Be sure to pass cable through cable guide inside the tunnel.
- Be sure to adjust the lever stroke. <Ref. to 4-4 [W6B1].>

8. Air Bleeding

A: GENERAL RULES FOR EFFECTIVE BLEEDING

- 1) Start with the brakes (wheels) connecting to the secondary chamber of the master cylinder.
- 2) The time interval between two brake pedal operations (from the time when the pedal is released to the time when it is depressed another time) shall be approximately 3 seconds.
- 3) The air bleeder on each brake shall be released for 1 to 2 seconds.

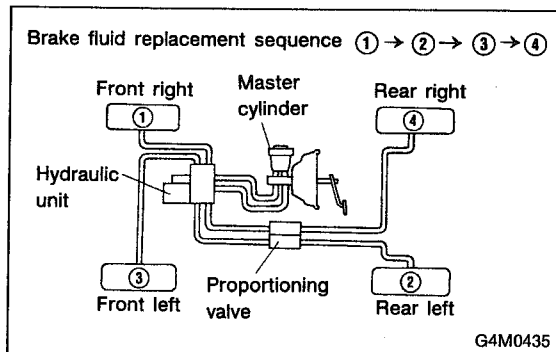
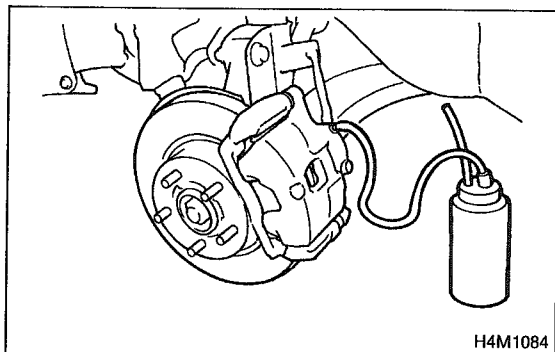
B: BLEEDING PROCEDURE

CAUTION:

- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

- During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
- Brake pedal operating must be very slow.
- For convenience and safety, it is advisable to have two men working.



- 1) Make sure that there is no leak from joints and connections of the brake system.
- 2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.
- 3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.

Release air bleeder for 1 to 2 seconds.

Next, with the bleeder closed, slowly release the brake pedal.

Repeat these steps until there are no more air bubbles in the vinyl tube.

Allow 3 to 4 seconds between two brake pedal operations.

CAUTION:

Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

NOTE:

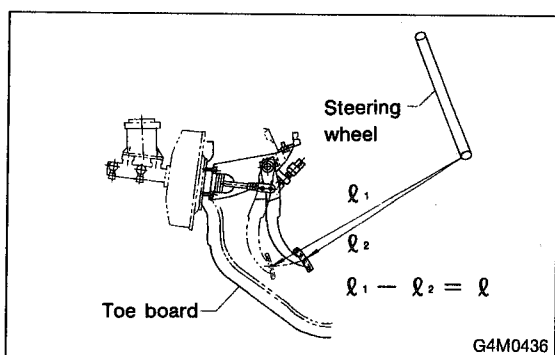
Brake pedal operating must be very slow.

- 4) Tighten air bleeder securely when no air bubbles are visible.

Air bleeder tightening torque:

$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

- 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) Perform sequence control. (With ABS model) <Ref. to 4-4 [W12D1].>

- 7) Check the pedal stroke.

While the engine is idling, depress the brake pedal with a 490 N (50 kg, 110 lb) load and measure the distance between the brake pedal and steering wheel. With the brake pedal released, measure the distance between the pedal and steering wheel again. The difference between the two measurements must be more than specified.

Specified pedal stroke:

Without ABS

90 mm (3.54 in)

With ABS

95 mm (3.74 in)

When depressing brake pedal with a 490 N (50 kg, 110 lb) load.

- (1) Models without ABS

If the distance is more than specifications, there is a possibility that air is in the brake line. Bleed air from the brake line.

(2) Models with ABS

If the distance is more than specifications, there is a possibility air is in the inside of the hydraulic unit. Therefore, air must be bled from the inside of the hydraulic unit to the brake pipes in accordance with the bleeding sequence control. <Ref. to 4-4 [W12D1].>

8) Add brake fluid to the required level (MAX. level) of reserve tank.

9) 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.

9. Brake Fluid Replacement

A: REPLACEMENT

CAUTION:

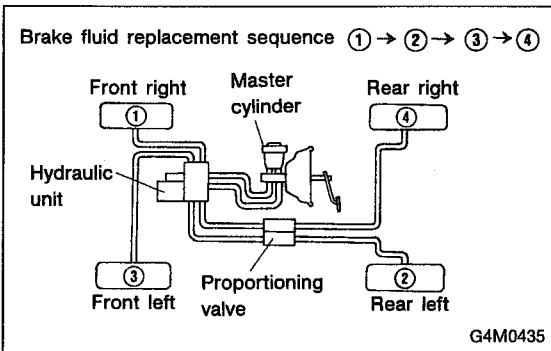
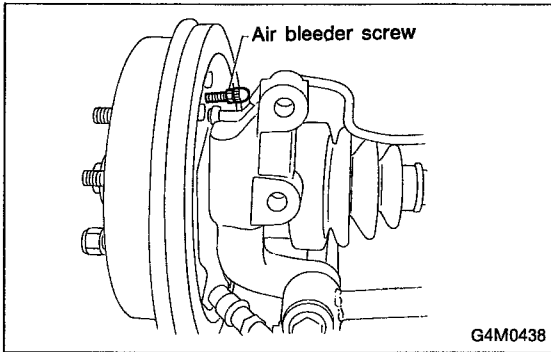
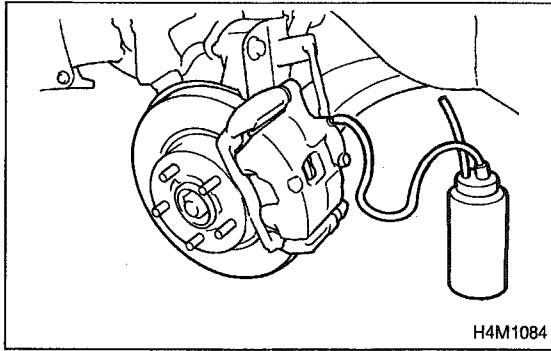
- To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

- During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
 - Brake pedal operating must be very slow.
 - For convenience and safety, it is advisable to have two men working.
 - The amount of brake fluid required is approximately 500 ml (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.
- 1) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
 - 2) Remove both front and rear wheels.
 - 3) Draw out the brake fluid from master cylinder with syringe.
 - 4) Refill reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid



5) Install one end of a vinyl tube onto the air bleeder of and insert the other end of the tube into a container to collect the brake fluid.

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):

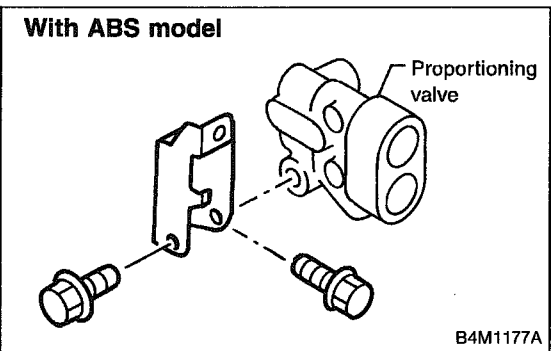
$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 7) above.

11) Depress brake pedal with a force of approximately 294 N (30 kg, 66 lb) and hold it there for approximately 20 seconds. At this time check pedal to see if it shows any unusual movement.

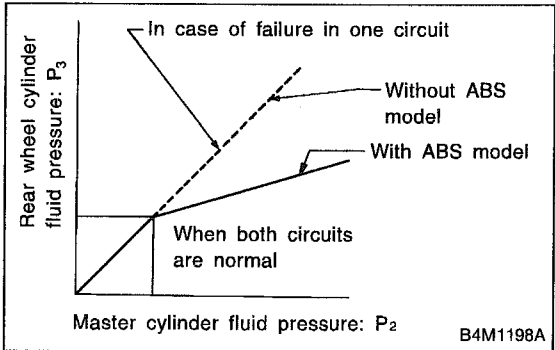
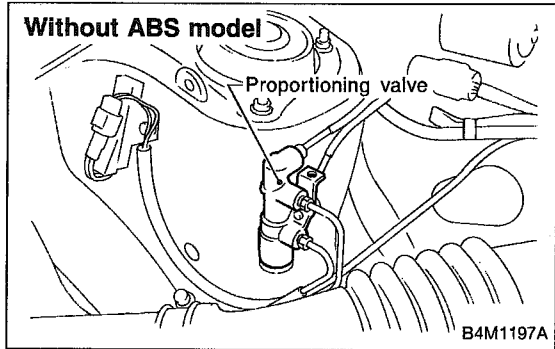
Visually inspect bleeder screws and brake pipe joints to make sure that there is no fluid leakage.

12) Install wheels, and drive car for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.



10. Proportioning Valve

10. Proportioning Valve

**A: INSPECTION**

- 1) Install the oil pressure gauges to measure the master cylinder fluid pressure (front wheel brake fluid pressure) and rear wheel cylinder fluid pressure.
- 2) Bleed air from the oil pressure gauges.
- 3) Check the master cylinder fluid pressure and rear wheel cylinder fluid pressure.

The standard values are shown in Figure.

- 4) For the oil pressure in case of split point, refer to A: SPECIFICATIONS [S0A0].

B: REMOVAL

- 1) Remove brake pipe from proportioning valve at four places.
- 2) Remove proportioning valve from its bracket.

CAUTION:

Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

C: INSTALLATION

- 1) Install proportioning valve to bracket.
- 2) Connect brake pipes correctly to proportioning valve.
- 3) Bleed air, then check each joint of brake pipe for oil leaks.

Tightening torque:

Proportioning valve to brake pipe flare nut:

$$15_{-2}^{+3} \text{ N}\cdot\text{m} \quad (1.5_{-0.2}^{+0.3} \text{ kg}\cdot\text{m}, 10.8_{-1.4}^{+2.2} \text{ ft}\cdot\text{lb})$$

Proportioning valve to bracket:

Normal brake vehicle:

$$22 \pm 4.4 \text{ N}\cdot\text{m} \quad (2.25 \pm 0.45 \text{ kg}\cdot\text{m}, 16.3 \pm 3.3 \text{ ft}\cdot\text{lb})$$

ABS equipped vehicle:

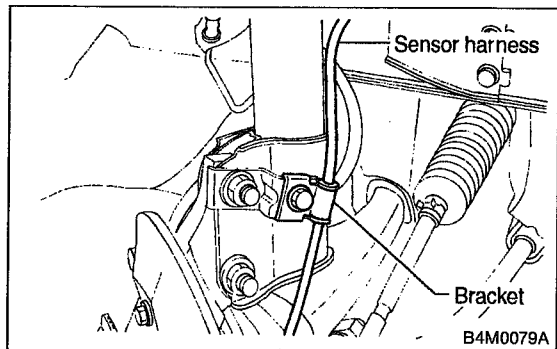
$$18 \pm 5 \text{ N}\cdot\text{m} \quad (1.8 \pm 0.5 \text{ kg}\cdot\text{m}, 13.0 \pm 3.6 \text{ ft}\cdot\text{lb})$$

11. ABS Sensor

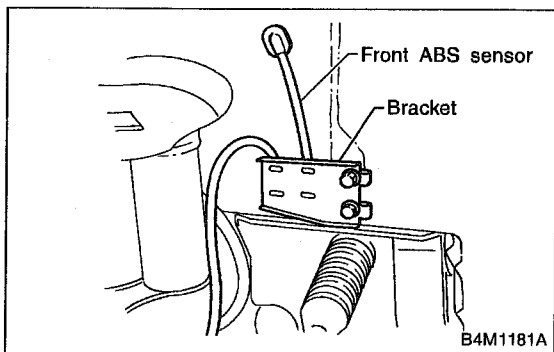
A: REMOVAL

1. FRONT ABS SENSOR

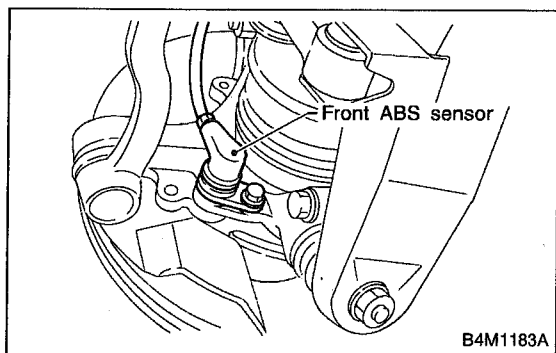
1) Disconnect front ABS sensor connector located in engine compartment.



2) Remove bolts which secure sensor harness to strut.



3) Remove bolts which secure sensor harness to body.



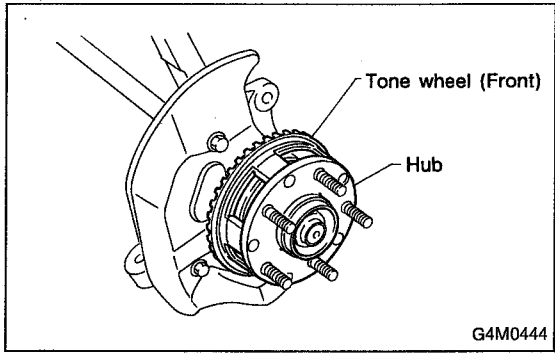
4) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

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.

5) Remove front disc brake caliper and disc rotor from housing after removing front tire.

6) Remove front drive shaft and housing and hub assembly. <Ref. to 4-2 [W1A0].>



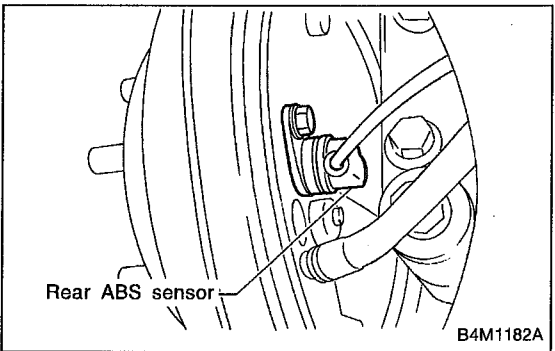
7) Remove tone wheel while removing hub from housing and hub assembly. <Ref. to 4-2 [W1B0].>

CAUTION:

Be careful not to damage teeth faces of tone wheel during removal.

2. REAR ABS SENSOR

- 1) Remove rear seat and disconnect rear ABS sensor connector.
- 2) Remove rear sensor harness bracket from rear trailing link and bracket.



- 3) Remove rear ABS sensor from rear back plate.
- 4) Remove rear tone wheel while removing hub from housing and hub assembly. <Ref. to 4-2 [W2A0].>

CAUTION:

- Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.
- Do not pull sensor harness during removal.

B: INSPECTION

1. ABS SENSOR

1) Check pole piece of ABS sensor for foreign particles or damage. If necessary, clean pole piece or replace ABS sensor.

2) Measure ABS sensor resistance.

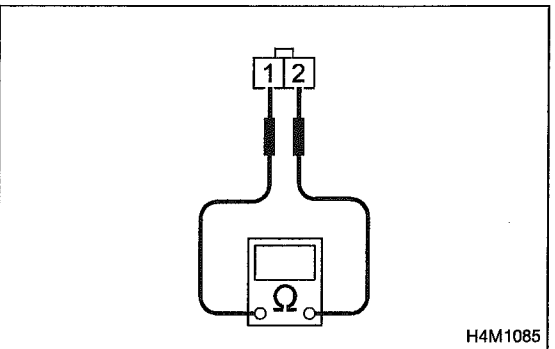
ABS sensor	Terminal No.	Standard
Front - LH	1 and 2	1.0 ± 0.2 kΩ
Front - RH	1 and 2	
Rear - LH	1 and 2	
Rear - RH	1 and 2	

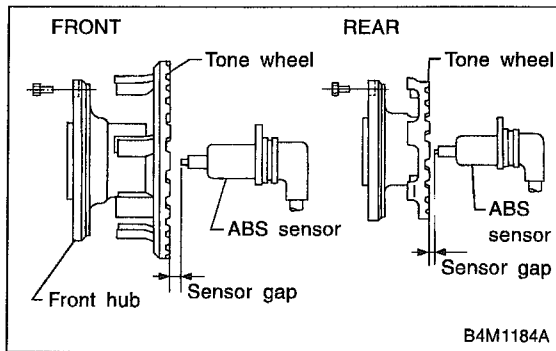
CAUTION:

If resistance is outside the standard value, replace ABS sensor with new one.

NOTE:

Check ABS sensor cable for discontinuity. If necessary, replace with a new one.





2. TONE WHEEL

- 1) Check tone wheel's teeth (44 pieces) for cracks or dents. If necessary, replace tone wheel with a new one.
- 2) Clearances (sensor gaps) should be measured one by one to ensure tone wheel and speed sensor are installed correctly.

ABS sensor clearance:

Front

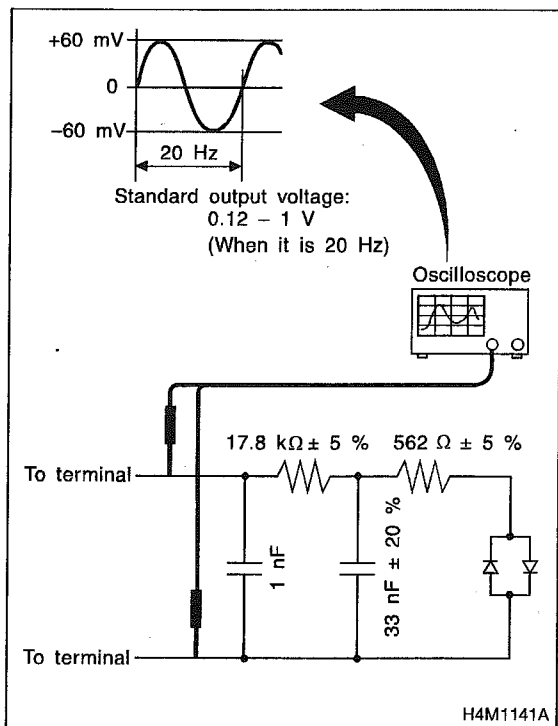
0.9 — 1.4 mm (0.035 — 0.055 in)

Rear

0.7 — 1.2 mm (0.028 — 0.047 in)

NOTE:

- If clearance is narrow, adjust by using spacer (Part No. 26755AA000).
- If clearance is wide, check the outputted voltage then replace ABS sensor or tone wheel if the outputted voltage is outside the specification.



3. OUTPUT VOLTAGE

Output voltage can be checked by the following method. Install resistor and condenser, then rotate wheel about 2.75 km/h (2 MPH) or equivalent.

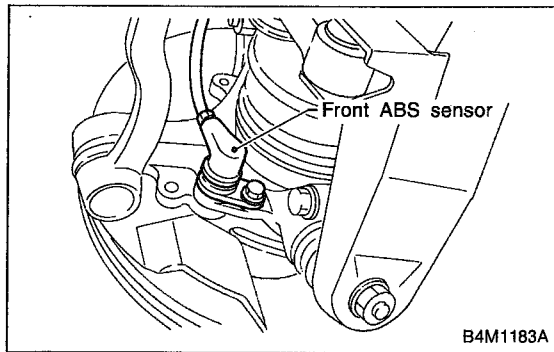
NOTE:

Regarding terminal No., please refer to item 1. ABS SENSOR.

C: INSTALLATION

1. FRONT ABS SENSOR

- 1) Install tone wheel on hub, then install housing on hub assembly. <Ref. to 4-2 [W1D0].>

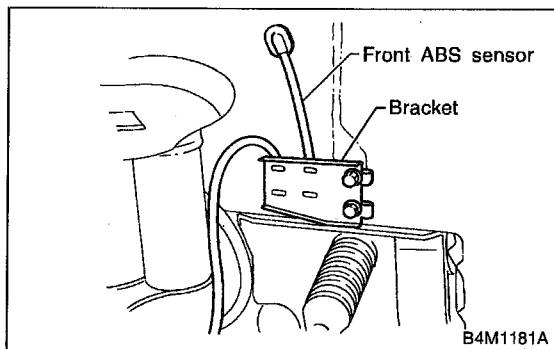


2) Temporarily install front ABS sensor on housing.

CAUTION:

Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.

3) Install front drive shaft to hub spline. <Ref. to 4-2 [W1E0].>



4) Install front ABS sensor on strut and wheel apron bracket.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

5) 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:

$0.9 - 1.4 \text{ mm}$ ($0.035 - 0.055 \text{ in}$)

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

CAUTION:

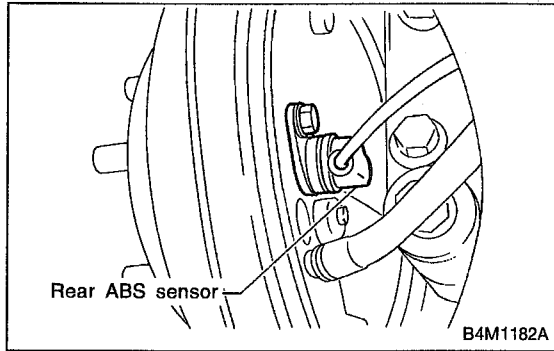
Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:

If the clearance is outside specifications, readjust.

2. REAR ABS SENSOR

1) Install rear tone wheel on hub, then rear housing on hub. <Ref. to 4-2 [W2D0].>

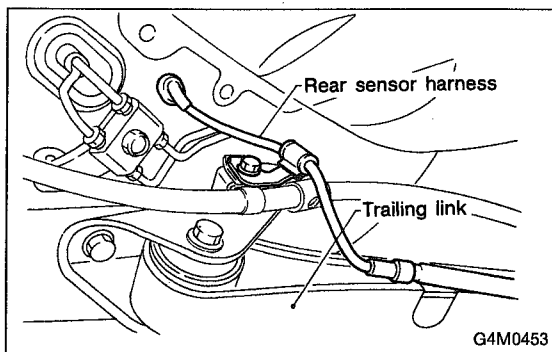


2) Temporarily install rear ABS sensor on back plate.

CAUTION:

Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.

3) Install rear drive shaft to rear housing and rear differential spindle. <Ref. to 4-2 [W2E0].>



4) Install rear sensor harness on rear trailing link.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

5) 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:

$0.7 - 1.2 \text{ mm}$ ($0.028 - 0.047 \text{ in}$)

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

CAUTION:

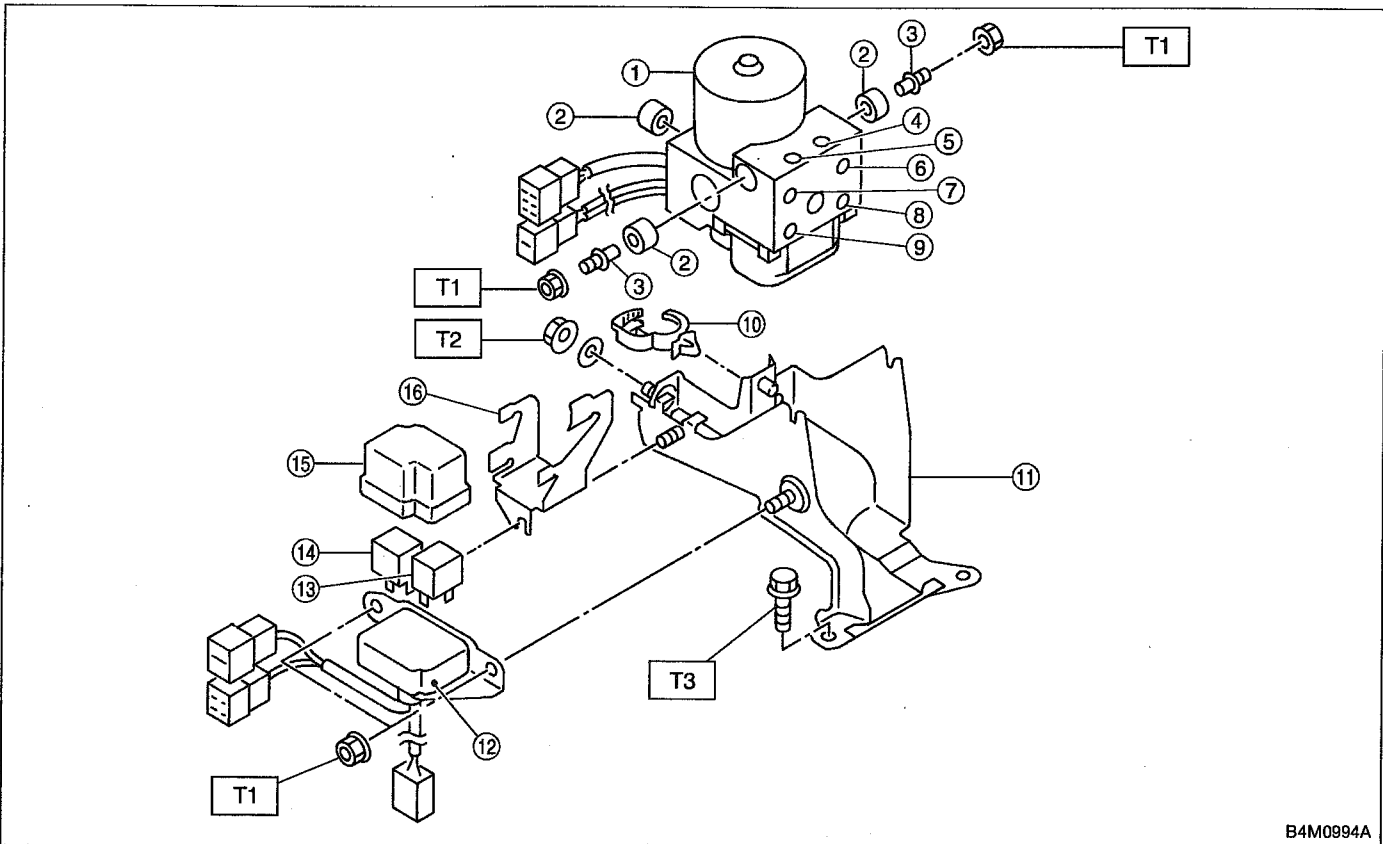
Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:

If the clearance is outside specifications, readjust.

12. Hydraulic Unit for ABS System

A: REMOVAL



B4M0994A

- ① Hydraulic control unit
- ② Damper
- ③ Stud bolt
- ④ Rear-RH outlet
- ⑤ Rear-LH outlet
- ⑥ Secondary inlet
- ⑦ Primary inlet
- ⑧ Front-LH outlet

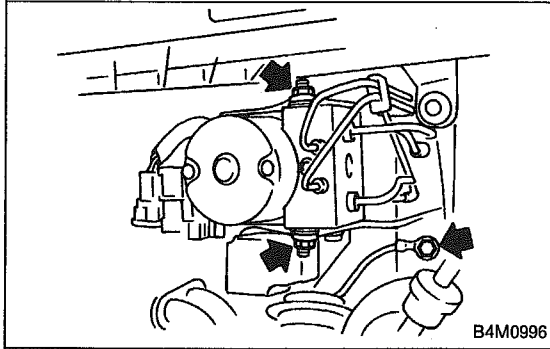
- ⑨ Front-RH outlet
- ⑩ Cable clip
- ⑪ Bracket
- ⑫ Relay box
- ⑬ Motor relay
- ⑭ Valve relay
- ⑮ Cap
- ⑯ Connector bracket

Tightening torque: N·m (kg·m, ft·lb)**T1: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)****T2: 29 ± 7 (3.0 ± 0.7, 21.7 ± 5.1)****T3: 32 ± 10 (3.3 ± 1.0, 24 ± 7)****1. HYDRAULIC UNIT**

- 1) Disconnect ground cable from battery.
- 2) Remove air intake duct and canister from engine compartment to facilitate removal of hydraulic unit.
- 3) Disconnect connector from hydraulic unit.
- 4) Unlock cable clip.
- 5) Disconnect brake pipes from hydraulic unit.

CAUTION:

Wrap brake pipes with vinyl bag to avoid spilling brake fluid on vehicle body.



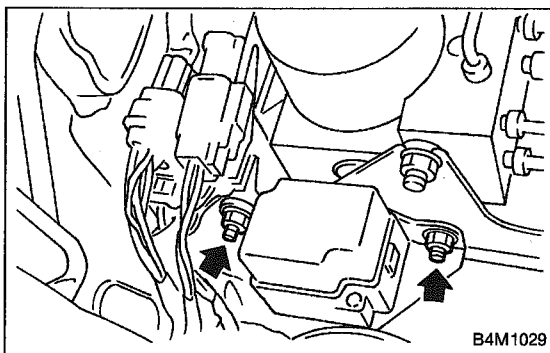
6) Remove nuts and bolt which secure hydraulic unit bracket, and remove hydraulic unit from engine compartment.

CAUTION:

- Hydraulic unit cannot be disassembled. Do not attempt to loosen bolts and nuts.
- Do not drop or bump hydraulic unit.
- Do not turn the hydraulic unit upside down or place it on its side.
- Be careful to prevent foreign particles from getting into hydraulic unit.
- When a new hydraulic unit is installed, apply a coat of rust-preventive wax (Nippeco LT or GB) to bracket attaching bolt after tightening.
- Do not pull harness disconnecting harness connector.

2. RELAY BOX

- 1) Disconnect ground cable from battery.
- 2) Remove air intake duct and canister from engine compartment to facilitate removal of relay box.



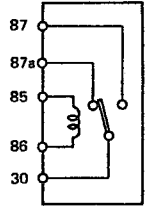
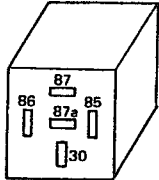
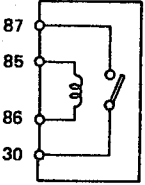
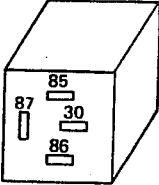
- 3) Disconnect connector from relay box.
- 4) Unlock cable clip.
- 5) Remove nuts which secure relay box, and remove relay box and connector bracket.

CAUTION:

Do not drop or bump relay box.

B: INSPECTION

- 1) Check connected and fixed condition of connector.
- 2) Check valve relay and motor relay for discontinuity or short circuits.

	Condition	Terminal number	Standard	Diagram	Terminal location
Valve relay	Turning off electricity.	85 — 86	$103 \pm 10 \Omega$	 G4M0456	 G4M0457
		30 — 87a	less than 0.5Ω		
		30 — 87	more than $1 M\Omega$		
	Turning on electricity between 85 and 86. (DC 12 V)	30 — 87a	more than $1 M\Omega$		
		30 — 87	less than 0.5Ω		
Motor relay	Turning off electricity.	85 — 86	$80 \pm 8 \Omega$	 G4M0458	 G4M0459
		30 — 87	more than $1 M\Omega$		
	Turning on electricity between 85 and 86. (DC 12 V)	30 — 87	less than 0.5Ω		

C: CHECKING THE HYDRAULIC UNIT ABS OPERATION**1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE**

- 1) Lift-up vehicle and remove wheels.
- 2) Disconnect the air bleeder screws from the FL and FR caliper bodies.

- 3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:

- Pressure gauges used exclusively for brake fluid must be used.
- Do not employ pressure gauge previously used for transmission since the piston seal is expanded which may lead to malfunction of the brake.

NOTE:

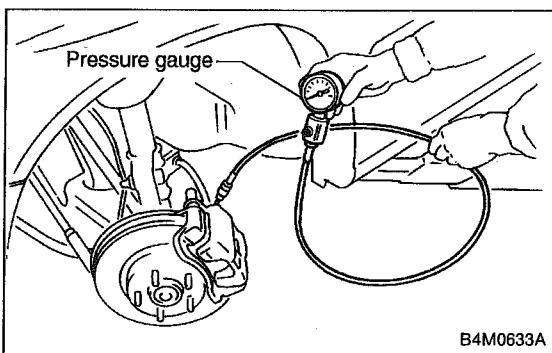
Wrap sealing tape around the pressure gauge.

- 4) Bleed air from the pressure gauges.

- 5) Perform ABS sequence control.

<Ref. to 4-4 [W12D1] or 4-4 [W12D2].>

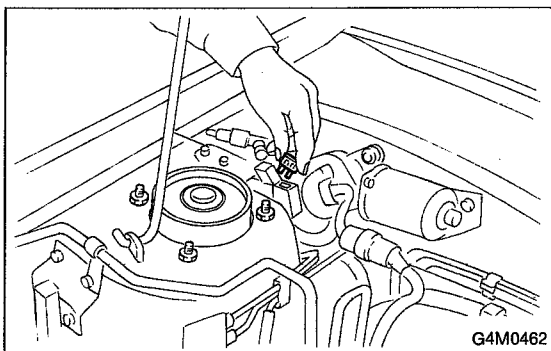
- 6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.



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.

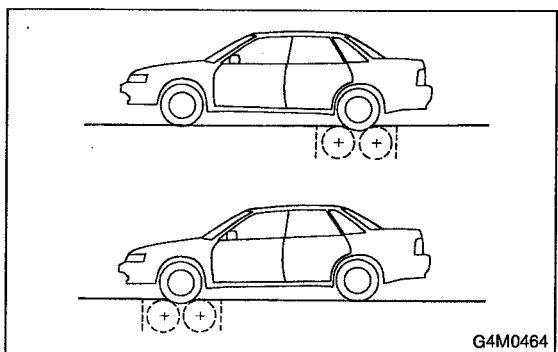
	Initial value	When decompressed	When compressed
Front wheel	3,432 kPa (35 kg/cm ² , 498 psi)	490 kPa (5 kg/cm ² , 71 psi) or less	3,432 kPa (35 kg/cm ² , 498 psi) or more
Rear wheel	3,432 kPa (35 kg/cm ² , 498 psi)	490 kPa (5 kg/cm ² , 71 psi) or less	3,432 kPa (35 kg/cm ² , 498 psi) or more

- 8) Remove pressure gauges from FL and FR caliper bodies.
- 9) Remove air bleeder screws from the RL and RR caliper bodies.
- 10) Connect the air bleeder screws to the FL and FR caliper bodies.
- 11) Connect two pressure gauges to the RL and RR caliper bodies.
- 12) Bleed air from the pressure gauges and the FL and FR caliper bodies.
- 13) Perform ABS sequence control.
<Ref. to 4-4 [W12D1] or 4-4 [W12D2].>
- 14) When the hydraulic unit begins to work, at first the RR side performs decompression, holding, and compression, and then the RL side performs decompression, holding, and compression.
- 15) Read values indicated on the pressure gauges and check if they meet the standard value.
- 16) After checking, remove the pressure gauges from caliper bodies.
- 17) Connect the air bleeder screws to RL and RR caliper bodies.
- 18) Bleed air from brake line.



2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

- 1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the engine compartment to simulate FWD vehicles.
- 2) Prepare for operating ABS sequence control. <Ref. to 4-4 [W12D1] or 4-4 [W12D2].>



3) Set the front wheels or rear wheels on the brake tester and set the select lever's position at "neutral".

4) Operate the brake tester.

5) Perform ABS sequence control. <Ref. to 4-4 [W12D1] or 4-4 [W12D2].>

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.

Unit: N (kg, lb)

	Initial value	When decompressed	When compressed
Front wheel	981 (100, 221)	490 (50, 110) or less	981 (100, 221) or more
Rear wheel	981 (100, 221)	490 (50, 110) or less	981 (100, 221) or more

8) After checking, also check if any irregular brake pedal tightness is felt.

D: ABS SEQUENCE CONTROL

1) Under the ABS sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or pressure gauge.

2) ABS sequence control can be started by diagnosis connector or select monitor.

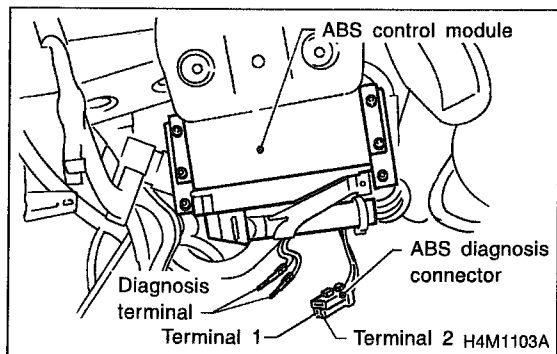
1. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH ABS DIAGNOSIS CONNECTOR

1) Connect diagnosis terminals to terminals No. 1 and No. 2 of the diagnosis connector beside driver's seat heater unit.

2) Set the speed of all wheels at 4 km/h (2 MPH) or less.

3) Turn ignition switch OFF.

4) Within 0.5 seconds after the ABS warning light goes out, depress the brake pedal and hold it immediately after ignition switch is turned to ON.



CAUTION:

Do not depress the clutch pedal.

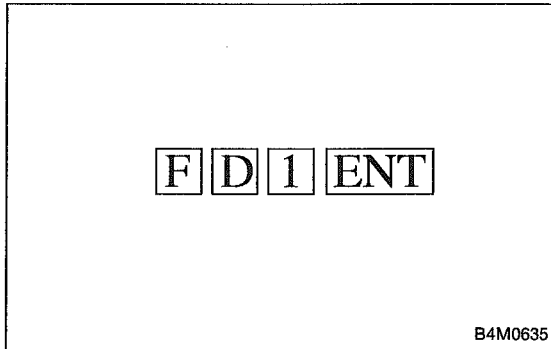
NOTE:

- When the ignition switch is set to on, the brake pedal must not be depressed.
- Engine must not operate.

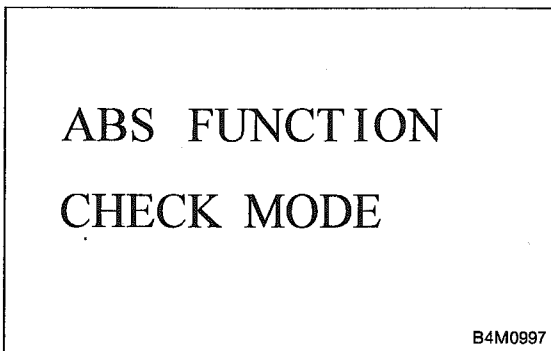
5) After completion of ABS sequence control, turn ignition switch OFF.

2. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH SELECT MONITOR

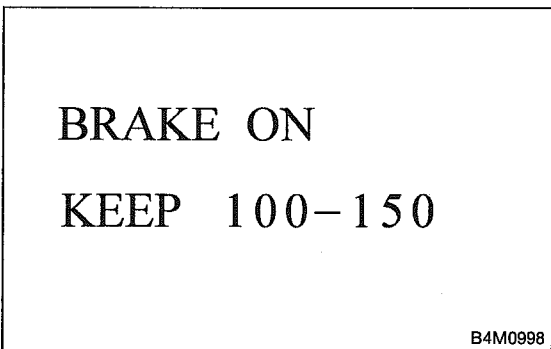
- 1) Connect select monitor to data link connector beside driver's seat heater unit.
- 2) Turn ignition switch ON.
- 3) Put select monitor to ABS mode.



4) Press F D 1 ENT key.



5) The message shown in the figure is displayed.



6) The message shown in the figure is displayed as follows:

- (1) When using the brake tester, depress brake pedal with braking force of 981 N (100 kg, 221 lb).
- (2) When using the pressure gauge, depress brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kg/cm², 498 psi).

CAUTION:

Do not depress the clutch pedal.

MODE START
PRESS ENT KEY

B4M0999

- 7) When the message shown in the figure is displayed, press ENT key.
- 8) Check points will be displayed on select monitor.

FUNCTION START
UNABLE

B4M1000

- 9) When ABS sequence control cannot be started (by system malfunction, etc.), the message shown in the figure will be displayed.

NOTE:

Read the trouble codes. Repair faulty parts.

ABS FUNCTION
CHECK END

B4M1030

- 10) After completion of ABS sequence control.

MODE RESTART?
0 : YES 1 : NO

H4M1144

- 11) Press 0 key to start ABS sequence control again and press 1 key to end.

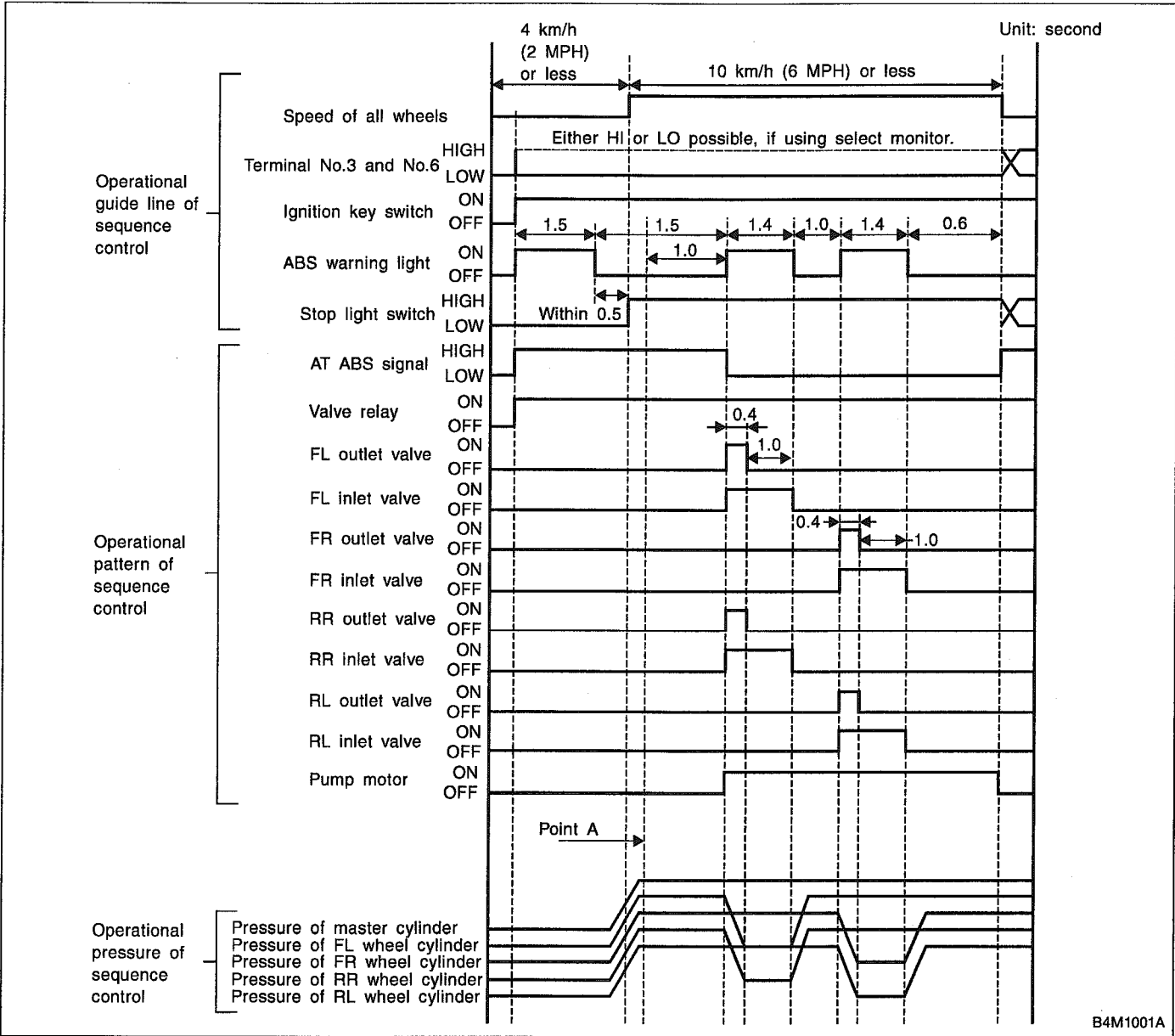
3. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL

When the following conditions develop, the ABS sequence control stops and ABS operation is returned to the normal control mode.

- 1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
- 2) When terminal No. 3 or No. 6 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.)

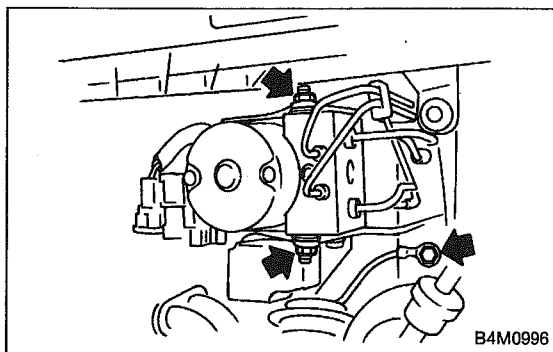
SERVICE PROCEDURE

4. CONDITIONS FOR ABS SEQUENCE CONTROL



NOTE:

- When select monitor is used, control operation starts at point A. The patterns from IGN key ON to the point A show that operation is started by diagnosis connector.
- HIGH means high voltage.
- LOW means low voltage.



E: INSTALLATION

1. HYDRAULIC UNIT

1) Install hydraulic unit.

Tightening torque:

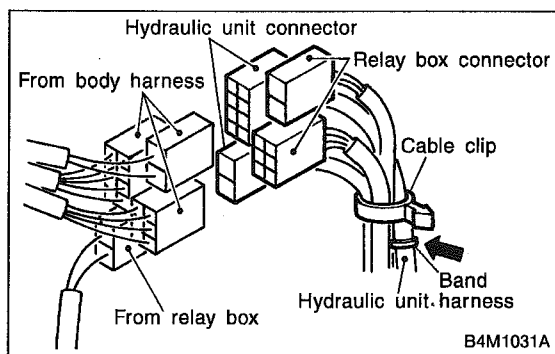
$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)

2) Connect hydraulic unit ground cable to body.

Tightening torque:

$32 \pm 10 \text{ N}\cdot\text{m}$ ($3.3 \pm 1.0 \text{ kg}\cdot\text{m}$, $24 \pm 7 \text{ ft}\cdot\text{lb}$)

3) Connect brake pipes to their correct hydraulic unit connections. <Ref. to 4-4 [W15A2].>



4) Secure hydraulic unit connector to connector bracket.

CAUTION:

Align connector with mating receptacle.

5) Using cable clip, secure hydraulic unit harness to relay box harness.

CAUTION:

Make sure hydraulic unit harness band is secured beneath cable clip.

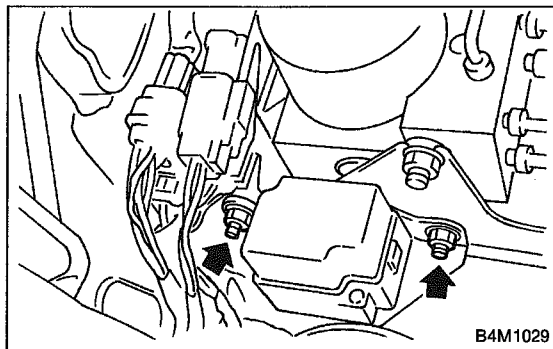
6) Connect connector to hydraulic unit.

7) Install canister.

8) Install air intake duct.

9) Connect ground cable to battery.

10) Bleed air from the brake system.

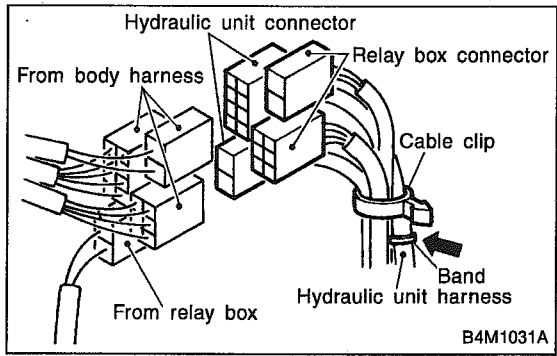


2. RELAY BOX

1) Install relay box and connector bracket.

Tightening torque:

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



2) Secure relay box connector to connector bracket.

CAUTION:

Align connector with mating receptacle.

3) Using cable clip, secure hydraulic unit harness to relay box harness.

CAUTION:

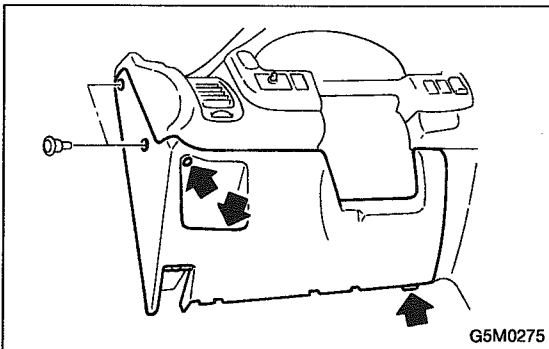
Make sure hydraulic unit harness band is secured beneath cable clip.

4) Connect connector to relay box.

5) Install canister.

6) Install air intake duct.

7) Connect ground cable to battery.



13. ABS Control Module

A: REMOVAL

1) Turn ignition switch to OFF.

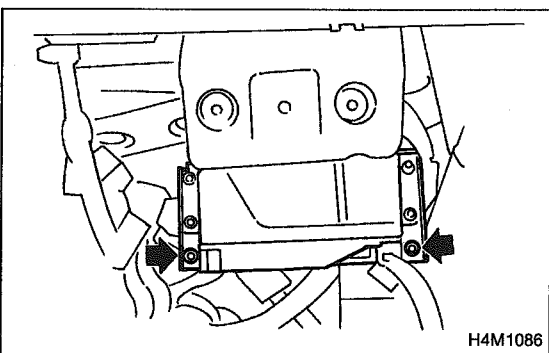
2) Remove lower cover from instrument panel.

3) Disconnect connector from ABSCM.

4) Remove ABSCM.

CAUTION:

Do not drop or bump ABSCM.



B: INSPECTION

Check that connector is connected correctly and that connector terminal sliding resistance is correct.

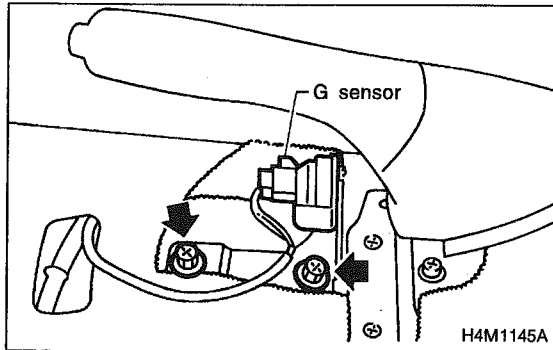
C: INSTALLATION

To install, reverse the removal procedure.

14. G Sensor for ABS System

A: REMOVAL AND INSTALLATION

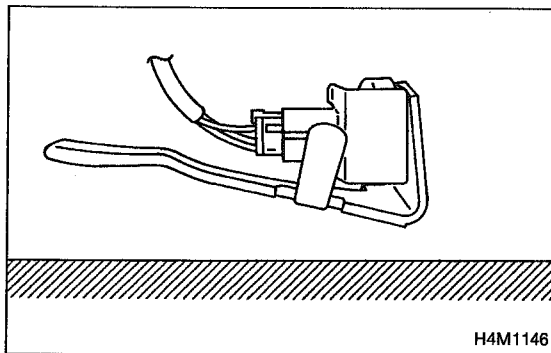
- 1) Turn ignition switch to OFF.
- 2) Remove console box. <Ref. to 5-4 [W1A0].>
- 3) Disconnect connector from G sensor.



- 4) Remove G sensor from body.
- 5) To install, reverse the removal procedure.

CAUTION:

Do not drop or bump G sensor.



B: INSPECTION WITH CIRCUIT TESTER

1. 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.

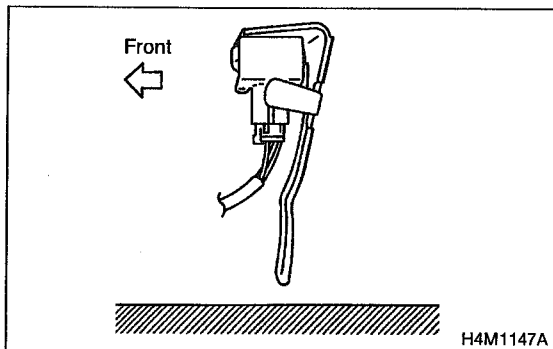
Connector & terminal

(P9) No. 2 (+) — No. 1 (-)

CHECK : Is the voltage 2.3 ± 0.2 V when G sensor is horizontal?

YES : Go to step 2.

NO : Replace G sensor.



2. CHECK G SENSOR (forwards)

Measure voltage between G sensor connector terminals.

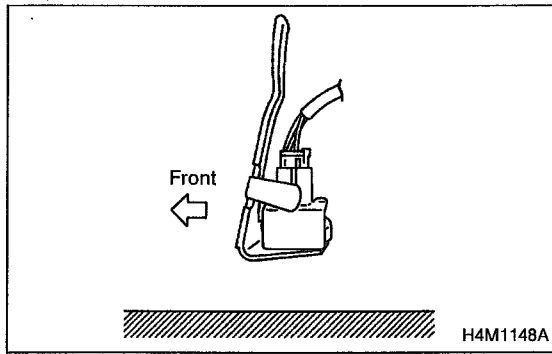
Connector & terminal

(P9) No. 2 (+) — No. 1 (-)

CHECK : Is the voltage 3.9 ± 0.2 V when G sensor is inclined forwards to 90° ?

YES : Go to step 3.

NO : Replace G sensor.

**3. CHECK G SENSOR (backwards)**

Measure voltage between G sensor connector terminals.

Connector & terminal
(P9) No. 2 (+) — No. 1 (-)

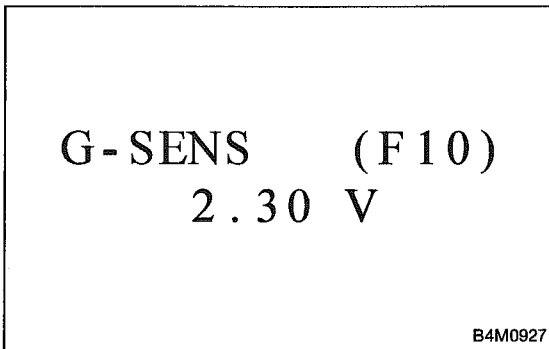
CHECK : Is the voltage 0.7 ± 0.2 V when G sensor is inclined backwards to 90° ?

YES : G sensor is normal.

NO : Replace G sensor.

C: INSPECTION WITH SELECT MONITOR**1. CHECK G SENSOR**

- 1) Turn ignition switch to OFF.
- 2) Connect select monitor connector to data link connector.
- 3) Turn select monitor into ABS mode.



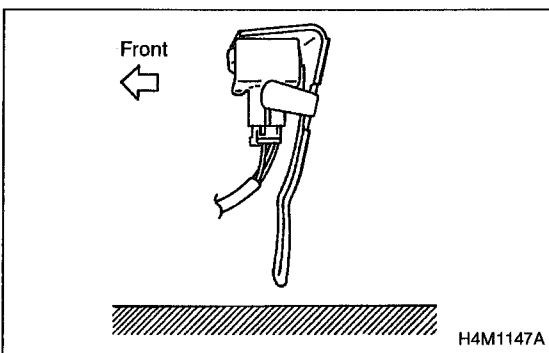
- 4) Press **F**, **1** and **0** on the select monitor.

- 5) Read the select monitor display.

CHECK : Is the indicated reading 2.3 ± 0.2 V when the vehicle is in horizontal position?

YES : Go to step 2.

NO : Replace G sensor.

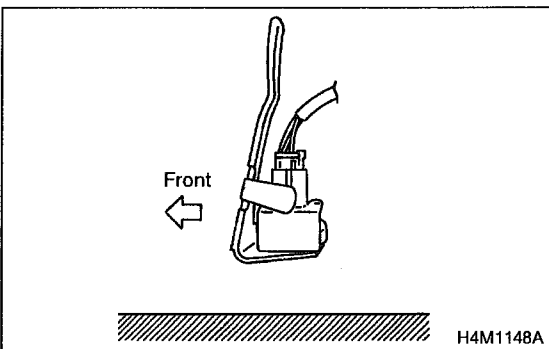
**2. CHECK G SENSOR (forwards)**

- 1) Remove console box.
- 2) Remove G sensor from vehicle. (Do not disconnect connector.)
- 3) Read the select monitor display.

CHECK : Is the indicated reading 3.9 ± 0.2 V when G sensor is inclined forwards to 90° ?

YES : Go to step 3.

NO : Replace G sensor.


**3. CHECK G SENSOR (backwards)**

Read the select monitor display.

CHECK : Is the indicated reading 0.7 ± 0.2 V when G sensor is inclined backwards to 90° ?

YES : G sensor is normal.

NO : Replace G sensor.

15. Brake Hose and Pipe **SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"**

Airbag system wiring harness is routed near the center brake pipe.

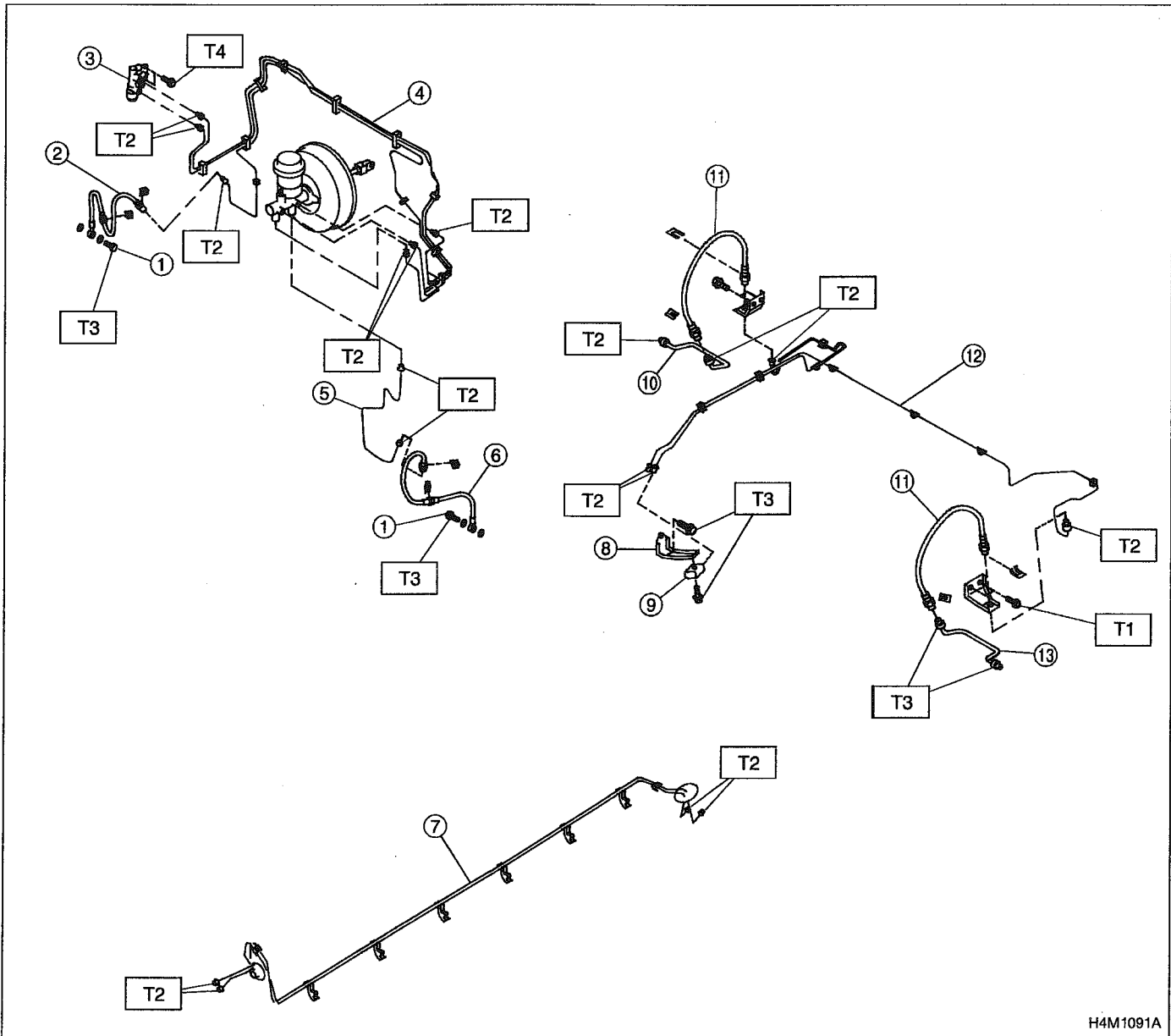
CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the center brake pipe.

A: REMOVAL AND INSTALLATION**CAUTION:**

- When removing and installing the brake pipe, make sure that it is not bent.
- After installing the brake pipe and hose, bleed the air.
- After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

1. MODELS WITHOUT ABS



H4M1091A

- | | |
|--------------------------|------------------------|
| ① Union bolt | ⑧ Connector bracket |
| ② Front brake hose RH | ⑨ Two-way connector |
| ③ Proportioning valve | ⑩ Rear brake pipe RH |
| ④ Front brake pipe ASSY | ⑪ Rear brake hose |
| ⑤ Front adapter pipe | ⑫ Rear brake pipe ASSY |
| ⑥ Front brake hose LH | ⑬ Rear brake pipe LH |
| ⑦ Center brake pipe ASSY | |

Tightening torque: N·m (kg·m, ft·lb)

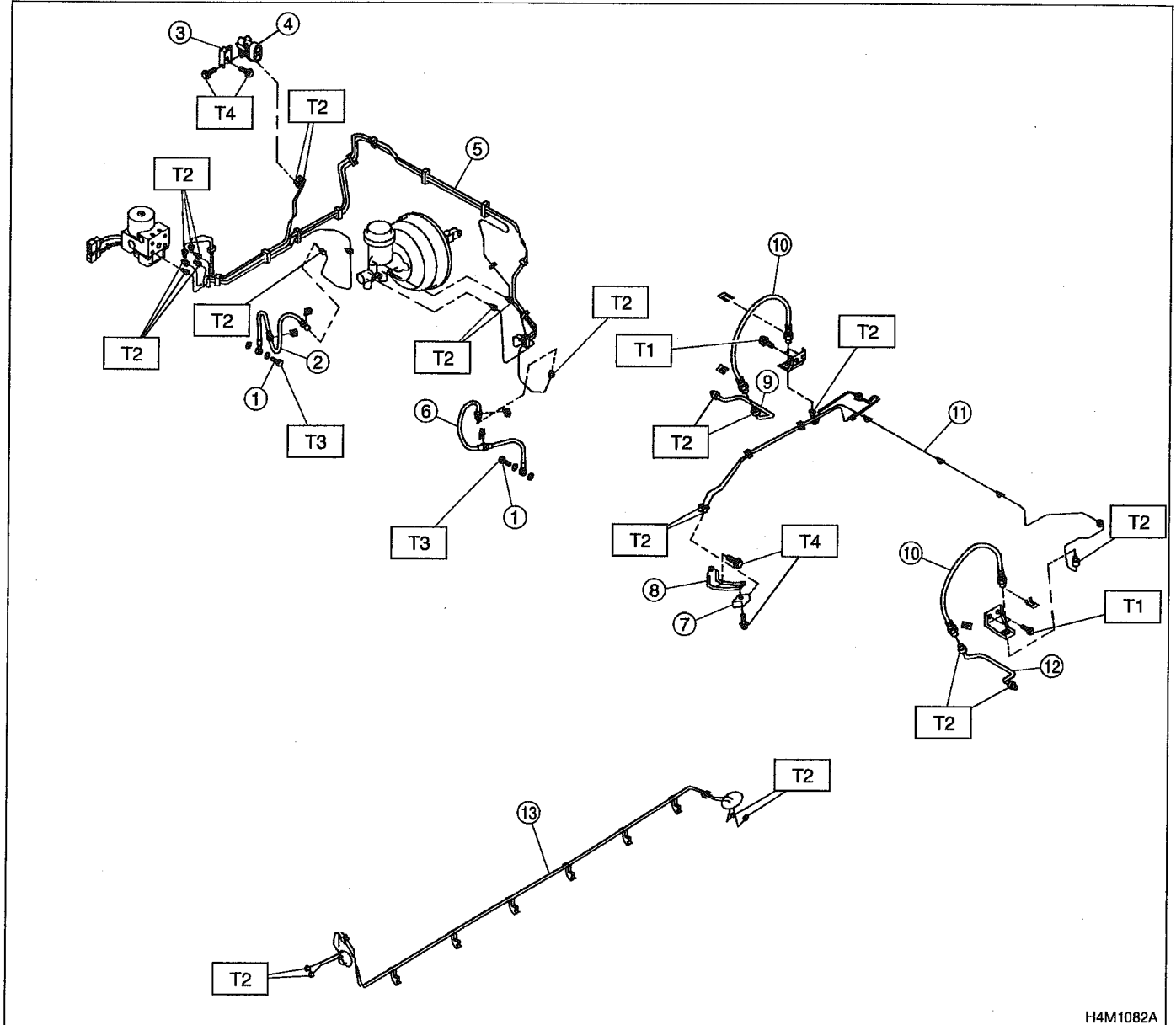
T1: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)

T2: 14.7⁺³₋₂ (1.5^{+0.3}_{-0.2}, 10.8^{+2.2}_{-1.4})

T3: 18 ± 3 (1.8 ± 0.3, 13.0 ± 2.2)

T4: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)

2. MODELS WITH ABS



H4M1082A

- | | |
|-------------------------|--------------------------|
| ① Union bolt | ⑧ Connector bracket |
| ② Front brake hose RH | ⑨ Rear brake pipe RH |
| ③ Valve bracket | ⑩ Rear brake hose |
| ④ Proportioning valve | ⑪ Rear brake pipe ASSY |
| ⑤ Front brake pipe ASSY | ⑫ Rear brake pipe LH |
| ⑥ Front brake hose LH | ⑬ Center brake pipe ASSY |
| ⑦ Two-way connector | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)

T2: 15 ⁺³₋₂ (1.5 ^{+0.3}_{-0.2}, 10.8 ^{+2.2}_{-1.4})

T3: 18 ± 3 (1.8 ± 0.3, 13.0 ± 2.2)

T4: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)

1. Entire Brake System

Trouble and possible cause	Corrective action
1. Insufficient braking	
(1) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(2) Entry of air into the hydraulic mechanism	Bleed the air.
(3) Excessively wide shoe clearance	Adjust the clearance.
(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	
(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
(5) Deformed back plate	Correct or replace.
(6) Improper tire inflation	Inflate to correct pressure.
(7) Disordered wheel alignment	Adjust alignment.
(8) Loosened back plate or the support installing bolts	Retighten.
(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
(11) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
3. Excessive pedal stroke	
(1) Entry of air into the hydraulic mechanism	Bleed the air.
(2) Excessive play in the master cylinder push rod	Adjust.
(3) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(4) Improperly adjusted shoe clearance	Adjust.
(5) Improper lining contact or worn lining	Correct or replace.

Trouble and possible cause	Corrective action
4. Brake dragging or improper brake return	
(1) Insufficient pedal play	Adjust play.
(2) Improper master cylinder return	Clean or replace the cylinder.
(3) Clogged hydraulic system	Replace.
(4) Improper return or adjustment of parking brake	Correct or adjust.
(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
(6) Excessively narrow shoe clearance	Adjust the clearance.
(7) Improper disc caliper operation	Correct or replace.
(8) Improper adjusted wheel bearing	Adjust or replace.
5. Brake noise (1) (creak sound)	
(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
(2) Worn lining	Replace the shoe assembly or pad.
(3) Loosened back plate or the support installing bolts	Retighten.
(4) Loose wheel bearing	Retighten to normal tightening torque.
(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.
6. Brake noise (2) (hissing sound)	
(1) Worn lining	Replace the shoe assembly or pad.
(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
(3) Loose or bent drum or rotor	Retighten or replace.
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.

MEMO:

PEDAL SYSTEM AND CONTROL CABLES

4-5

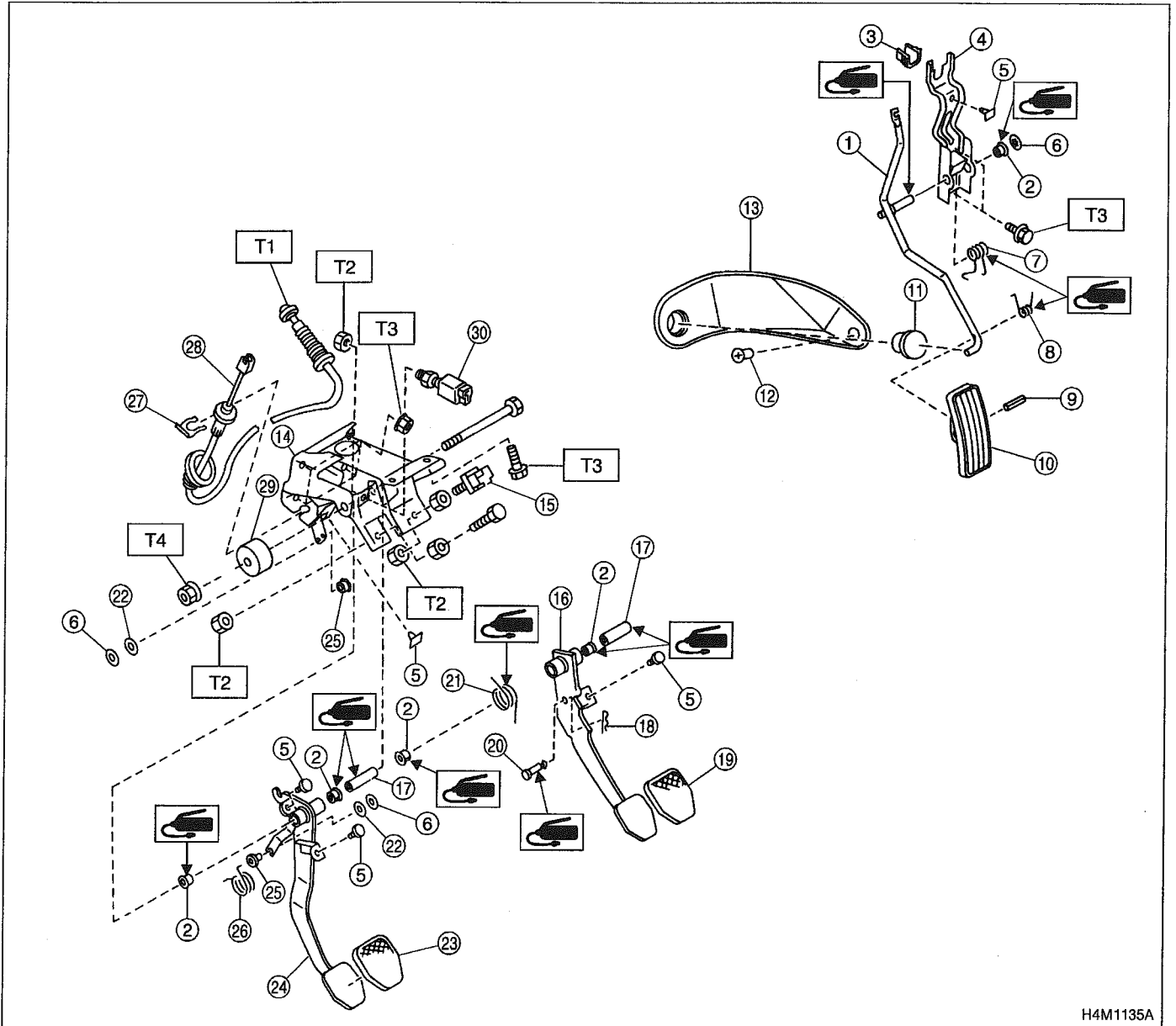
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S SPECIFICATIONS AND SERVICE DATA	2
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C COMPONENT PARTS	3
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W SERVICE PROCEDURE	5
1. Pedal	5
2. Clutch Cable	11
3. Accelerator Cable	12
4. Speedometer Cable	14
K DIAGNOSTICS	16
1. Pedal System and Control Cables	16

1. Service Data

Brake pedal	Free play		1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]
Clutch pedal	Free play	At clutch pedal pad	10 — 20 mm (0.39 — 0.79 in)
	Full stroke	At clutch pedal pad	140 — 145 mm (5.51 — 5.71 in)
Accelerator pedal	Free play	At pedal pad	1 — 4 mm (0.04 — 0.16 in)
	Stroke	At pedal pad	46 — 50 mm (1.81 — 1.97 in)

1. Pedal

A: MT MODEL

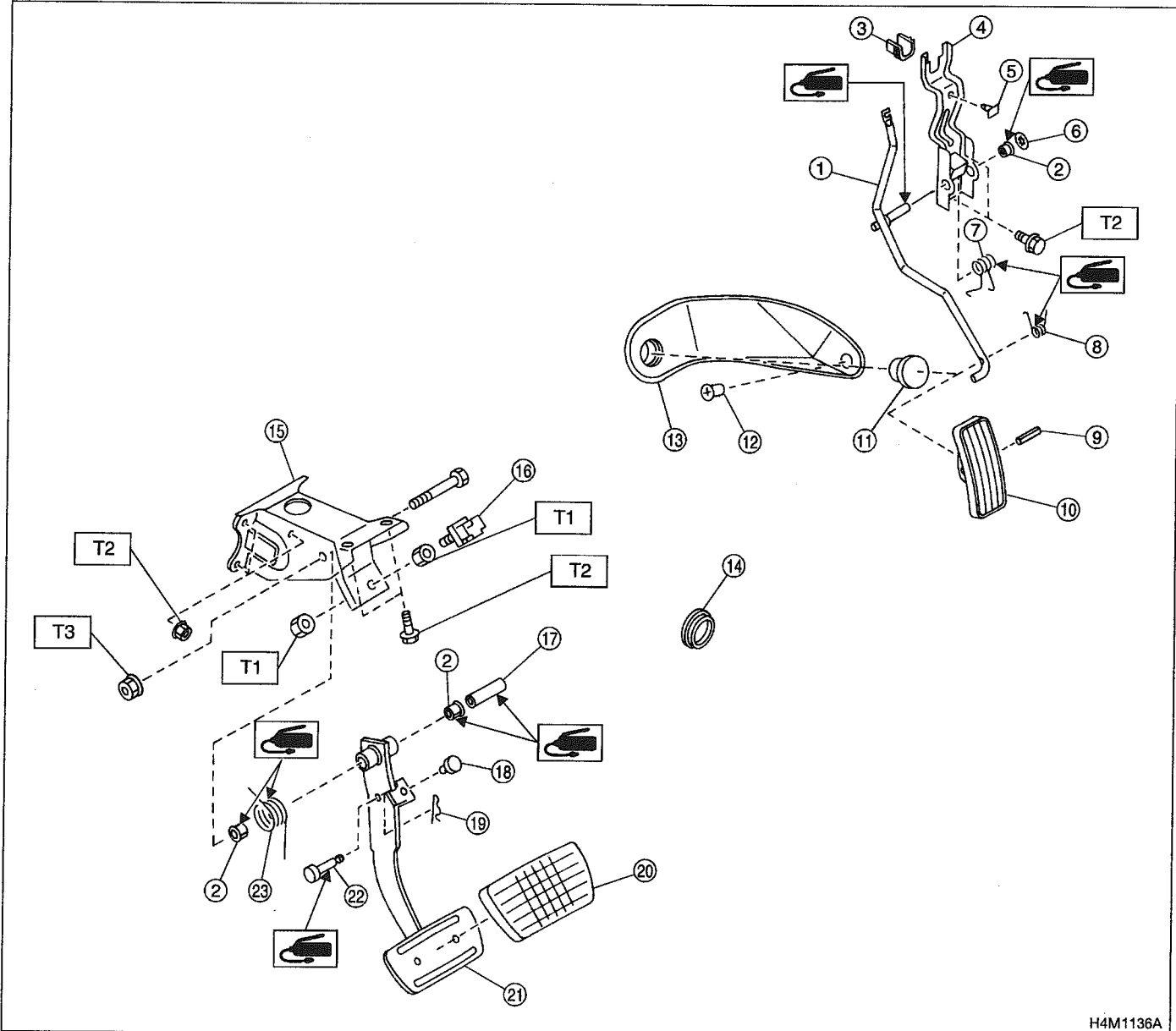


H4M1135A

- | | | |
|----------------------------|----------------------|-------------------------------------|
| ① Accelerator pedal | ⑬ Accelerator plate | ⑳ Bushing assist |
| ② Bushing | ⑭ Pedal bracket | ㉑ Spring assist |
| ③ Holder | ⑮ Stop light switch | ㉒ Clutch cable clamp |
| ④ Accelerator bracket | ⑯ Brake pedal | ㉓ Clutch cable |
| ⑤ Stopper | ⑰ Spacer | ㉔ Mass damper |
| ⑥ Clip | ⑱ Snap pin | ㉕ Clutch switch (Starter interlock) |
| ⑦ Accelerator spring | ⑲ Brake pedal pad | |
| ⑧ Accelerator pedal spring | ⑳ Clevis pin | |
| ⑨ Spring pin | ㉑ Brake pedal spring | |
| ⑩ Accelerator pedal pad | ㉒ Washer | |
| ⑪ Accelerator stopper | ㉓ Clutch pedal pad | |
| ⑫ Clip | ㉔ Clutch pedal | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 5.9 ± 1.5 (0.60 ± 0.15, 4.3 ± 1.1)
T2: 8 ± 2 (0.8 ± 0.2, 5.8 ± 1.4)
T3: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)
T4: 29 ± 7 (3.0 ± 0.7, 21.7 ± 5.1)

B: AT MODEL



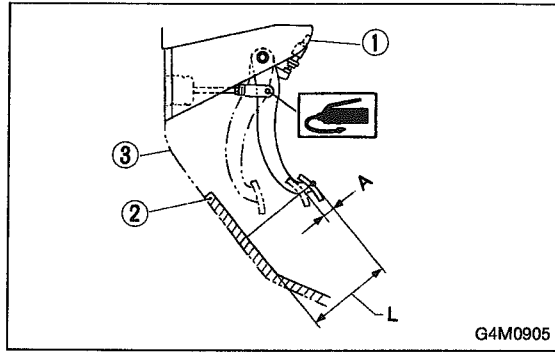
H4M1136A

- ① Accelerator pedal
- ② Bushing
- ③ Holder
- ④ Accelerator bracket
- ⑤ Stopper
- ⑥ Clip
- ⑦ Accelerator spring
- ⑧ Accelerator pedal spring
- ⑨ Spring pin
- ⑩ Accelerator pedal

- ⑪ Accelerator stopper
- ⑫ Clip
- ⑬ Accelerator plate
- ⑭ Plug
- ⑮ Pedal bracket
- ⑯ Stop light switch
- ⑰ Spacer
- ⑱ Stopper
- ⑲ Snap pin
- ⑳ Brake pedal pad

- ㉑ Brake pedal
- ㉒ Clevis pin
- ㉓ Brake pedal spring

Tightening torque: N·m (kg·m, ft·lb)**T1: 8 ± 2 (0.8 ± 0.2, 5.8 ± 1.4)****T2: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)****T3: 29 ± 7 (3.0 ± 0.7, 21.7 ± 5.1)**



G4M0905

1. Pedal

A: ON-CAR SERVICE

1. BRAKE PEDAL

1) Check position of pedal pad.

① Stop light switch

② Mat

③ Toe board

Pedal height: L

158 mm (6.22 in)

2) If it is not in specified value, adjust it by adjusting brake booster operating rod length.

3) Check free play by operating pedal by hand.

If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:

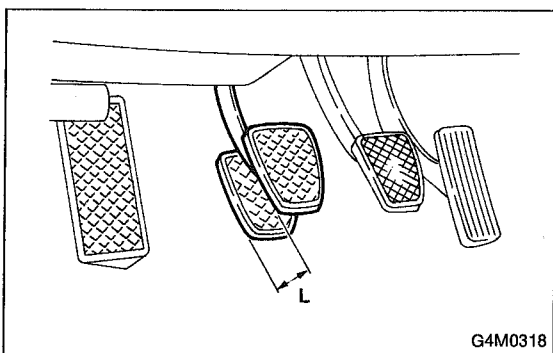
Be careful not to rotate stop light switch.

Brake pedal free play: A

1 — 3 mm (0.04 — 0.12 in)

[Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]

4) Apply grease to operating rod connecting pin to prevent it from wearing.



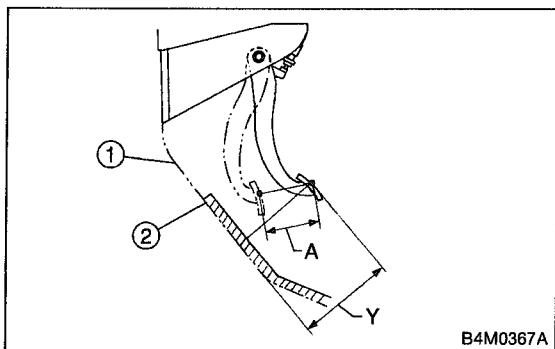
G4M0318

2. CLUTCH PEDAL

1) Check clutch pedal free play by operating pedal by hand.

Free play: L (At clutch pedal pad)

10 — 20 mm (0.39 — 0.79 in)



B4M0367A

Pedal height: Y

158 mm (6.22 in)

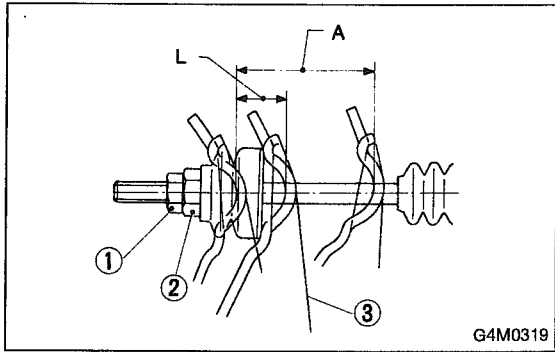
Pedal stroke: A

140 — 145 mm (5.51 — 5.71 in)

① Toe board

② Mat

1. Pedal



2) If it is not in specified value, adjust it by turning adjusting nut on engine side end of clutch cable.

Free play: L

2 — 4 mm (0.08 — 0.16 in)

Full stroke: A

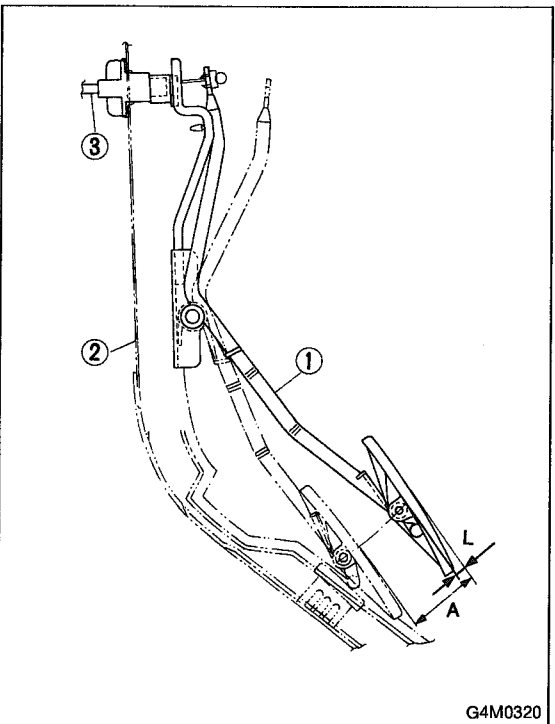
25.5 — 27 mm (1.004 — 1.063 in)

3) Apply grease to connecting portion of clutch pedal and clutch cable.

- ① Lock nut
- ② Adjusting nut
- ③ Release fork

Lock nut tightening torque:

5.9 ± 1.5 N·m (0.60 ± 0.15 kg-m, 4.3 ± 1.1 ft-lb)

**3. ACCELERATOR PEDAL**

Check pedal stroke and free play by operating accelerator pedal by hand.

If it is not within specified value, adjust it by turning nut connecting accelerator cable to throttle body.

Free play at pedal pad: L

1 — 4 mm (0.04 — 0.16 in)

Stroke at pedal pad: A

46 — 50 mm (1.81 — 1.97 in)

- ① Accelerator pedal
- ② Toe board
- ③ Accelerator cable

Accelerator cable lock nut tightening torque:

14 ± 4 N·m (1.4 ± 0.4 kg-m, 10.1 ± 2.9 ft-lb)

B: REMOVAL

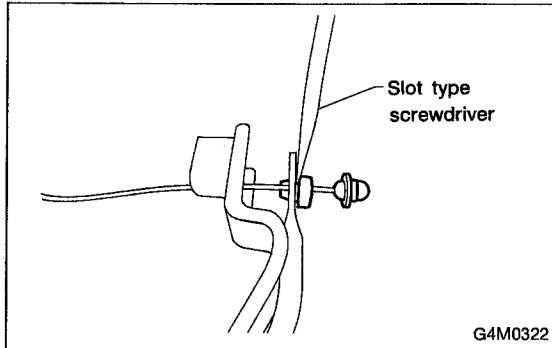
1. ACCELERATOR PEDAL

- 1) Disconnect ground cable from battery.
- 2) Disconnect accelerator cable from throttle body.

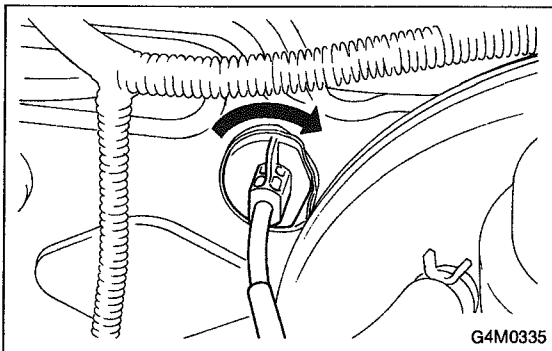
CAUTION:

Be careful not to kink accelerator cable.

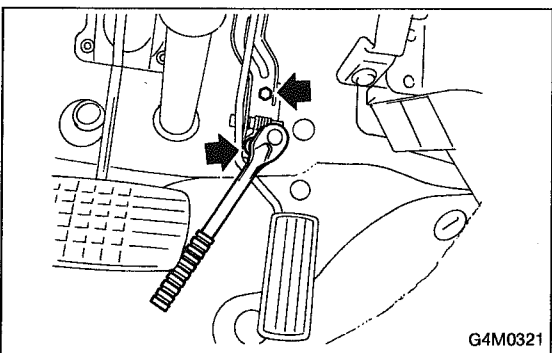
- 3) Remove instrument panel lower cover from instrument panel, and connector.



- 4) Disconnect accelerator cable from accelerator pedal lever.



- 5) Working inside engine compartment, remove casing cap out of the toe board by turning it clockwise.
- 6) Pull out the cable from the toe board hole.

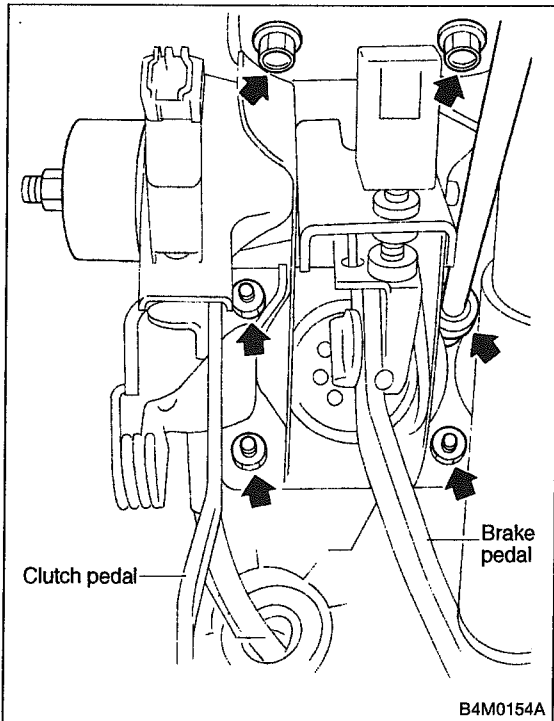


- 7) Remove accelerator pedal connecting bolt from accelerator pedal bracket.

2. BRAKE AND CLUTCH PEDAL (MT model)

- 1) Disconnect ground cable from battery.
- 2) Disconnect clutch cable from release lever.
- 3) Remove instrument panel lower cover from instrument panel.
- 4) Disconnect the following parts from pedal bracket.
 - (1) Operating rod of brake booster
 - (2) Electrical connectors (for stop light switch, etc.)
- 5) Remove clevis pin which secures pedal to push rod.

1. Pedal

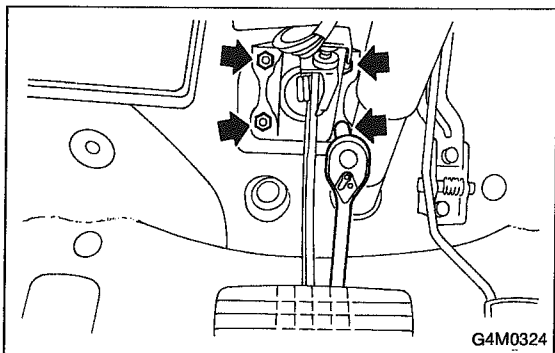


6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal bracket and clutch cable as a unit.

CAUTION:

Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.

7) Depress clutch pedal, disconnect clutch cable from clutch pedal.

**3. BRAKE PEDAL (AT model)**

- 1) Disconnect ground cable from battery.
- 2) Remove instrument panel lower cover from instrument panel.
- 3) Remove clevis pin which secures brake pedal to brake booster operating rod. Also disconnect stop lamp switch connector.
- 4) Remove two bolts and four nuts which secure brake pedal to pedal.

C: INSPECTION**1. BRAKE AND CLUTCH PEDALS**

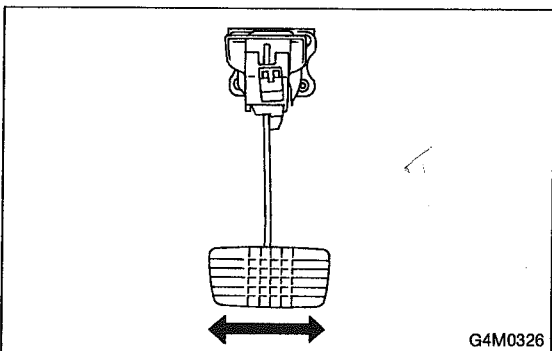
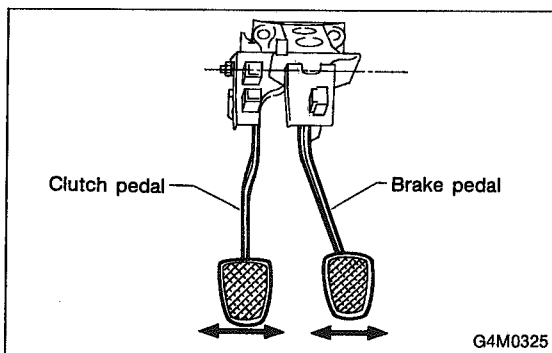
Move brake and clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kg, 2 lb) to ensure pedal deflection is in specified range.

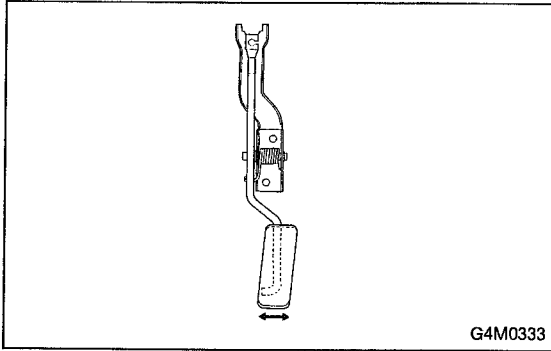
Deflection of brake and clutch pedal:**Service limit**

5.0 mm (0.197 in) or less

CAUTION:

If excessive deflection is noted, replace bushings with new ones.





G4M0333

2. ACCELERATOR PEDAL

Lightly move pedal pad in lateral the direction to ensure pedal deflection is in specified range.

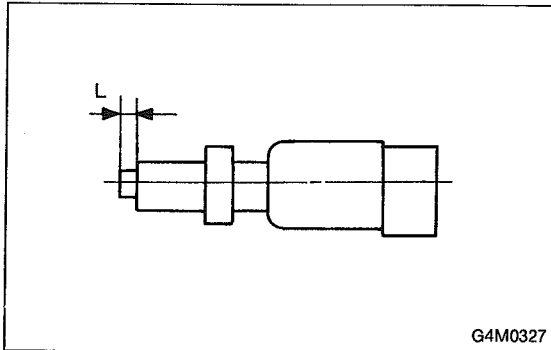
Deflection of accelerator pedal:

Service limit

5.0 mm (0.197 in) or less

CAUTION:

If excessive deflection is noted, replace bushing and clip with new ones.



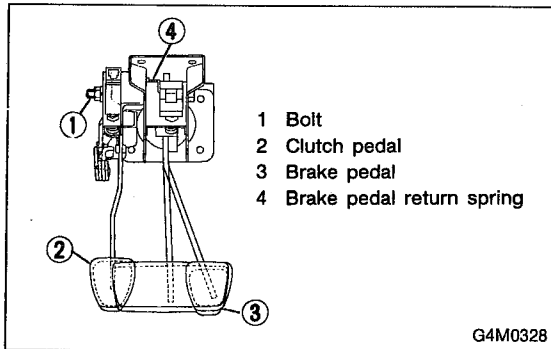
G4M0327

3. STOP LIGHT SWITCH

If stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L

$2^{+1.5}_0$ mm (0.079 $^{+0.059}_0$ in)



- 1 Bolt
- 2 Clutch pedal
- 3 Brake pedal
- 4 Brake pedal return spring

G4M0328

D: ASSEMBLY

1. BRAKE AND CLUTCH PEDAL

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.

Tightening torque:

T2: 29 ± 7 N·m (3.0 ± 0.7 kg·m, 21.7 ± 5.1 ft·lb)

NOTE:

Clean up inside of bushings and apply grease before installing spacer.

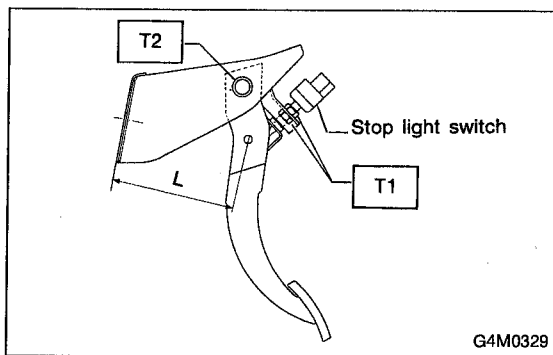
4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L

, 125.9 mm (4.96 in)

Tightening torque:

T1: 8 ± 2 N·m (0.8 ± 0.2 kg·m, 5.8 ± 1.4 ft·lb)



G4M0329

2. ACCELERATOR PEDAL

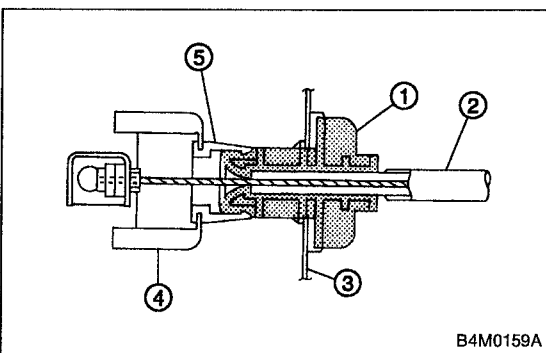
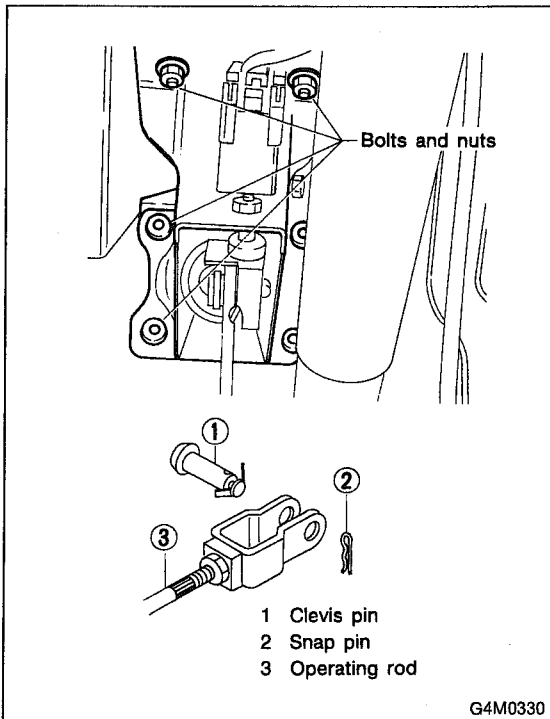
Clean and apply grease to spacer and inside bore of accelerator pedal. Install accelerator pedal onto pedal bracket.

E: INSTALLATION

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

CAUTION:

- 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.

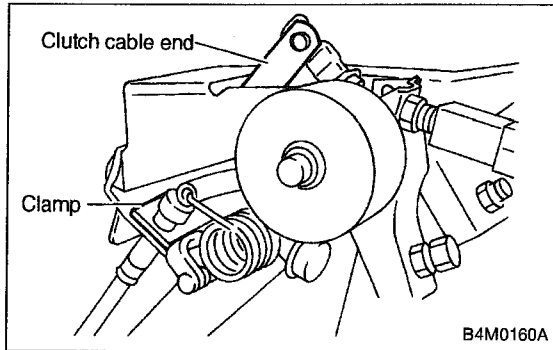
- ① Casing cap
- ② Accelerator cable
- ③ Toe board
- ④ Accelerator pedal bracket
- ⑤ Holder

2) Adjustment after pedal installation <Ref. to 4-5 [W1A1].>

2. Clutch Cable

A: REMOVAL

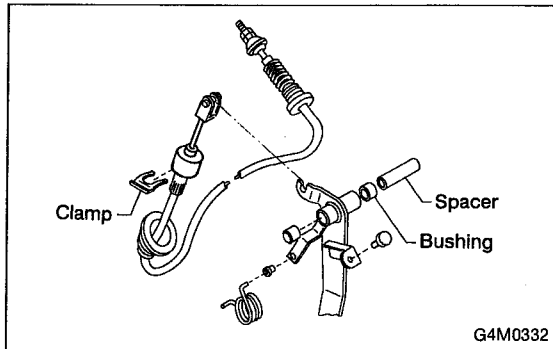
- 1) Disconnect clutch cable from release lever.



- 2) Remove clutch cable clamp from pedal bracket.
- 3) Disconnect clutch cable from pedal bracket and pedal end.
- 4) Remove clutch cable from body.

CAUTION:

Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.

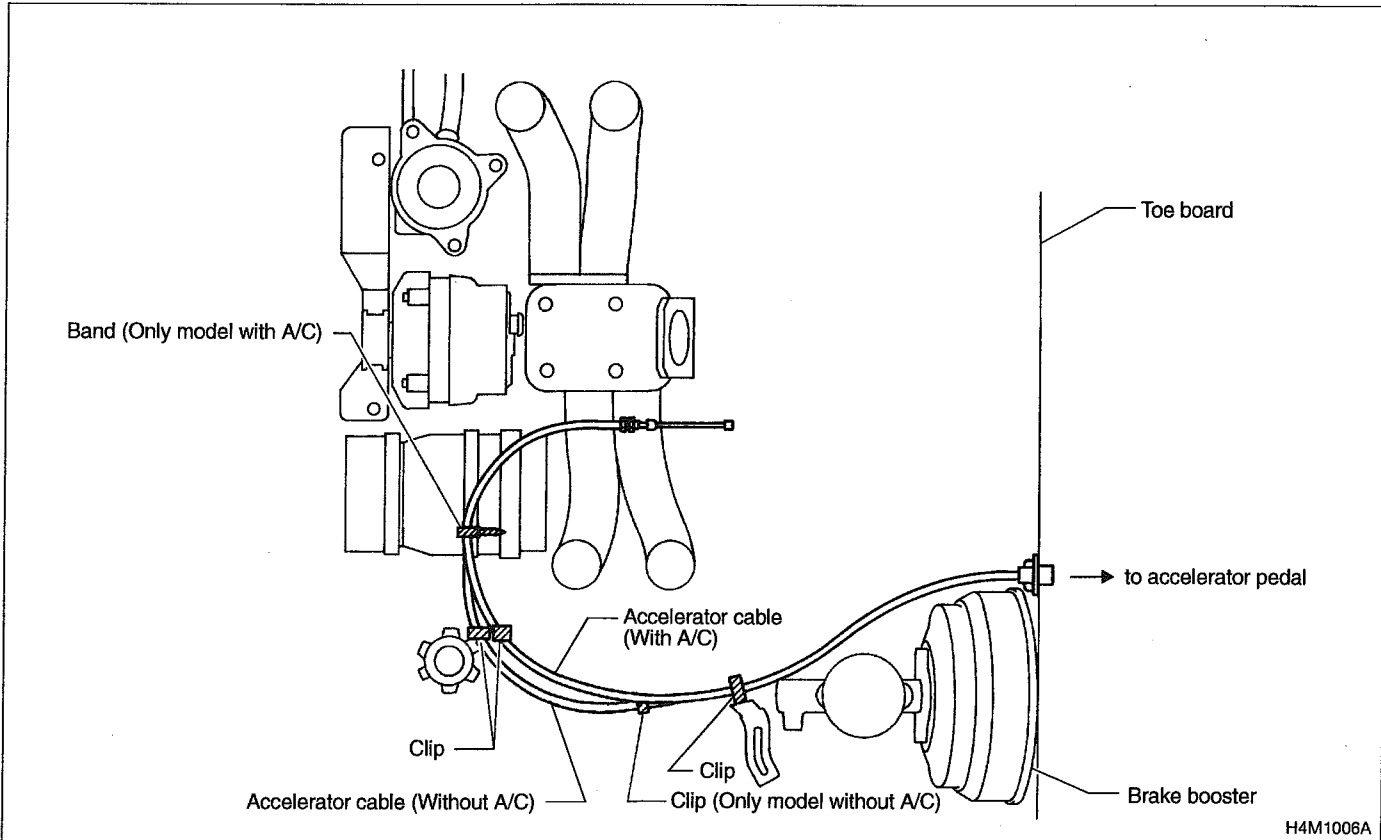


B: INSTALLATION

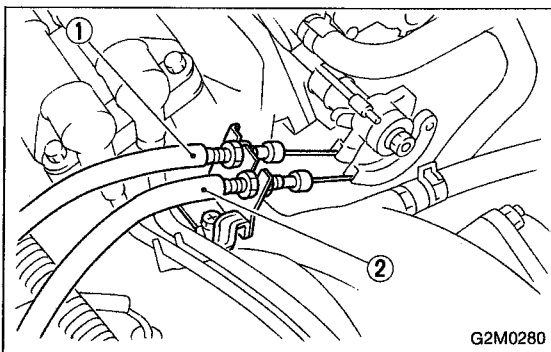
- 1) Clean clutch pedal fitting hole, and apply grease. Connect clutch cable to clutch pedal.
- 2) Fit clutch pedal to pedal bolt, and connect clutch cable to bracket with clamp.
- 3) Connect clutch cable end to pedal end.
- 4) Connect clutch cable from release lever.
- 5) Install grommet to toe board.
- 6) Adjustment after cable installation <Ref. to 4-5 [W1A2].>

3. Accelerator Cable

A: REMOVAL

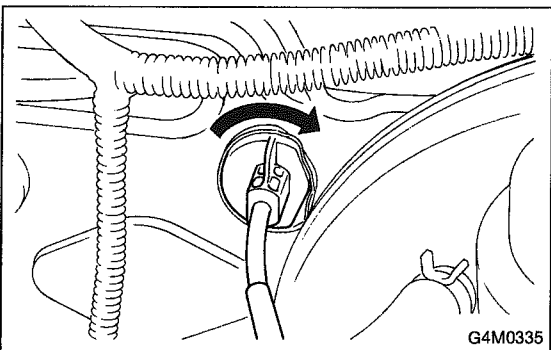


1) Disconnect accelerator cable from connector inside engine compartment first.



- 2) Remove lock nut from accelerator cable bracket.
- 3) Separate accelerator cable ① from bracket, then unlock inner cable.
- 4) Remove cable end from throttle cam using your fingertips.

CAUTION:
Be careful not to bend inner cable.



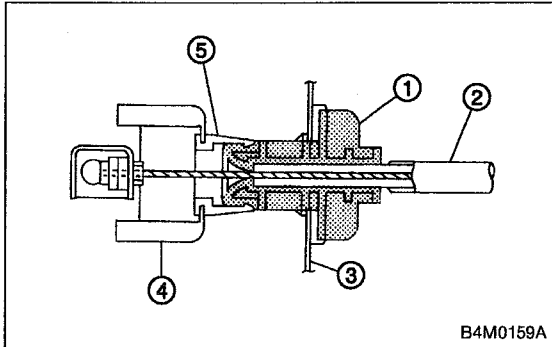
- 5) Disconnect cable end from accelerator cable bracket inside driver compartment.
- 6) Remove clip inside engine compartment.
- 7) Working inside engine compartment, remove cable connection by turning toe board clockwise.
- 8) Pull out the cable from the toe board hole.

B: INSTALLATION

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

CAUTION:

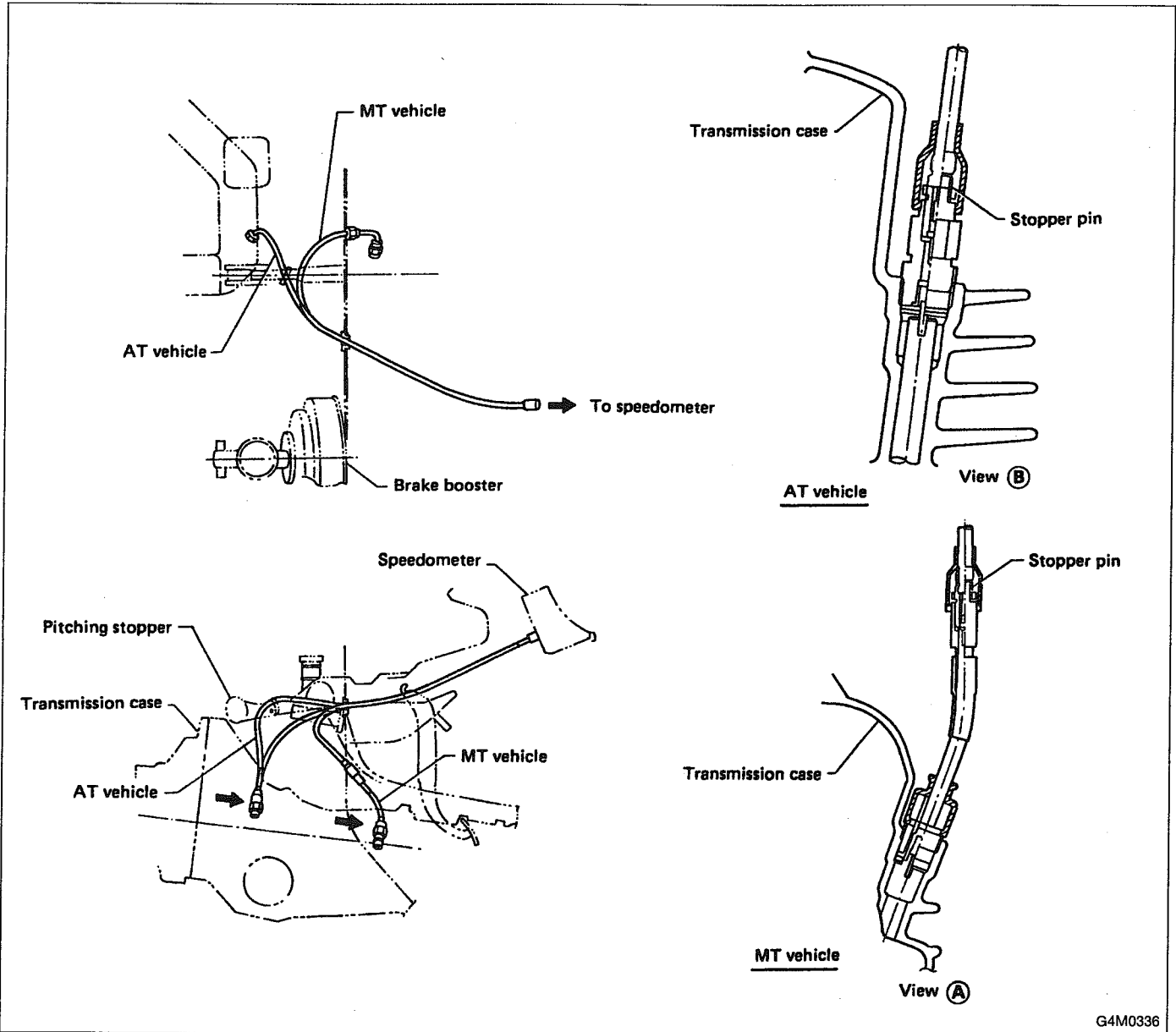
- Be careful not to kink accelerator cable.
- Make sure that holder and casing cap are securely connected.



- ① Casing cap
- ② Accelerator cable
- ③ Toe board
- ④ Accelerator pedal bracket
- ⑤ Holder

2) Adjustment after cable installation <Ref. to 4-4 [W1A3].>

4. Speedometer Cable



G4M0336

A: REMOVAL

- 1) Remove speedometer cable, starting with its midpoint connection inside engine compartment.
- 2) While holding up boot located at speedometer cable connection, slightly expand clip. Extract speedometer cable by pulling it upward 2 to 3 mm (0.08 to 0.12 in) on speedometer side. Then, release clip and remove speedometer cable.
- 3) After disconnecting cable from speedometer, pull it out of toe board.
- 4) Remove screw which secures speedometer cable to transmission side.

B: INSTALLATION

- 1) After manually screwing speedometer cable on transmission side, tighten it 45 to 90° using a wrench.
- 2) Securely install boot onto midpoint connection of speedometer cable to prevent entry of water.

1. Pedal System and Control Cables

Trouble	Corrective action
Excessively worn brake pedal pad	Replace.
Failure of clutch and/or accelerator pedals to operate	Connect cables correctly.
Speedometer does not work.	Connect speedometer cable correctly.
Stop light switch does not light up.	Adjust position of stop light switch.
Stop light switch is not smooth and/or stroke is not correct.	Replace.
Insufficient pedal play	Adjust pedal play.
Clutch and/or brake pedal free play insufficient	Adjust pedal free play.
Maladjustment of brake pedal or booster push rod	Inspect and adjust.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

HEATER AND VENTILATOR

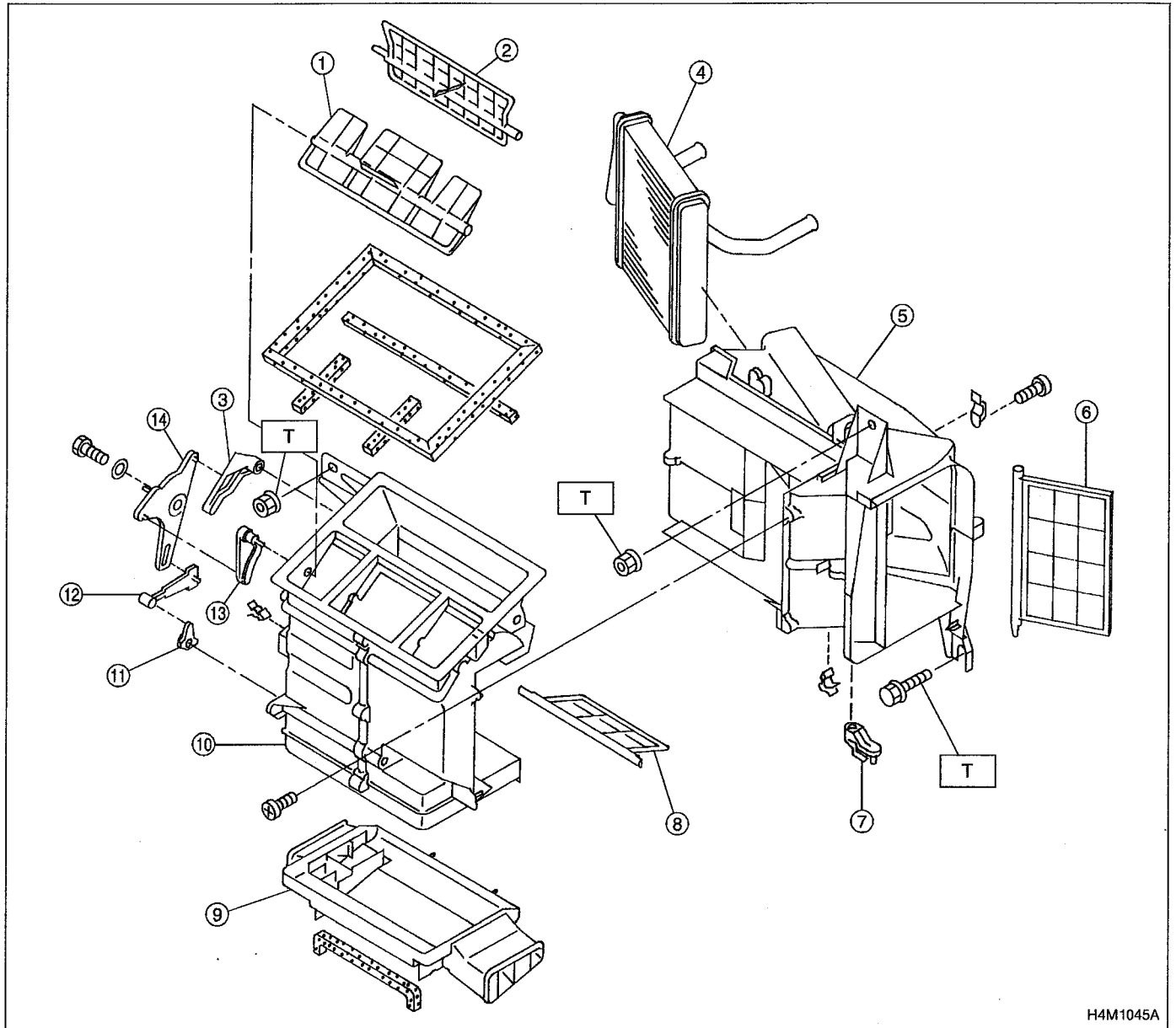
4-6

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S SPECIFICATIONS AND SERVICE DATA	2
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C COMPONENT PARTS	3
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2. Intake Unit	4
3. Control Unit	5
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1. Supplemental Restraint System "Airbag"	6
2. Heater Unit	6
3. Blower Motor Assembly	7
4. Control Unit	7

1. Specifications
A: HEATER SYSTEM

Item		Specifications	Condition
Heating capacity		4.652 kW (4,000 kcal/h, 15,872 BTU/h) or more	● Mode selector switch : HEAT
			● Temperature control switch : FULL HOT
			● Temperature difference between hot water and inlet air : 65°C (149°F)
			● Hot water flow rate : 360 ℓ (95.1 US gal, 79.2 Imp gal)/h
Air flow rate		270 m ³ (9,534 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V
Max air flow rate		480 m ³ (16,949 cu ft)/h	● Temperature control switch : FULL COLD
			● Blower fan speed : 4th position
			● Mode selector lever : RECIRC
Heater core size (height x length x width x thickness)		192.4 x 152.0 x 25.0 x 1.8 mm (7.57 x 5.98 x 0.984 x 0.071 in)	—
Blower motor	Type	Magnet motor 200 W or less	at 12 V
	Fan type and size (diameter x width)	Sirocco fan type 150 x 75 mm (5.91 x 2.95 in)	—

1. Heater Unit

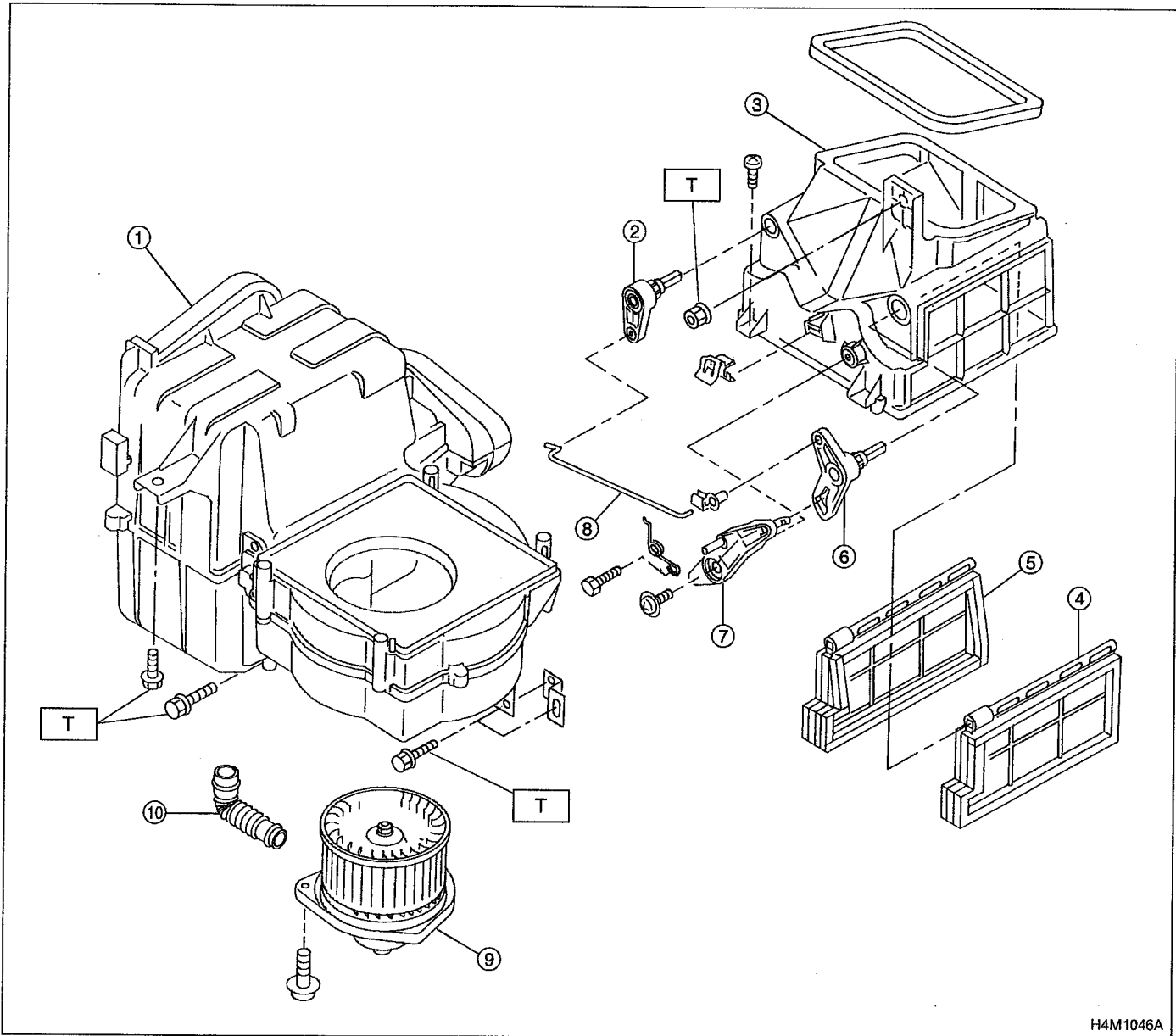


H4M1045A

- | | |
|---------------------|--------------------|
| ① Vent door | ⑧ Foot door |
| ② DEF door | ⑨ Foot duct |
| ③ DEF lever | ⑩ Heater case REAR |
| ④ Heater core | ⑪ Foot lever lower |
| ⑤ Heater case FRONT | ⑫ Foot lever upper |
| ⑥ Mix door | ⑬ Vent lever |
| ⑦ Mix lever | ⑭ Side link |

Tightening torque: N·m (kg·m, ft·lb)
T: 7.35 ± 1.96
(0.750 ± 0.200, 5.421 ± 1.446)

2. Intake Unit

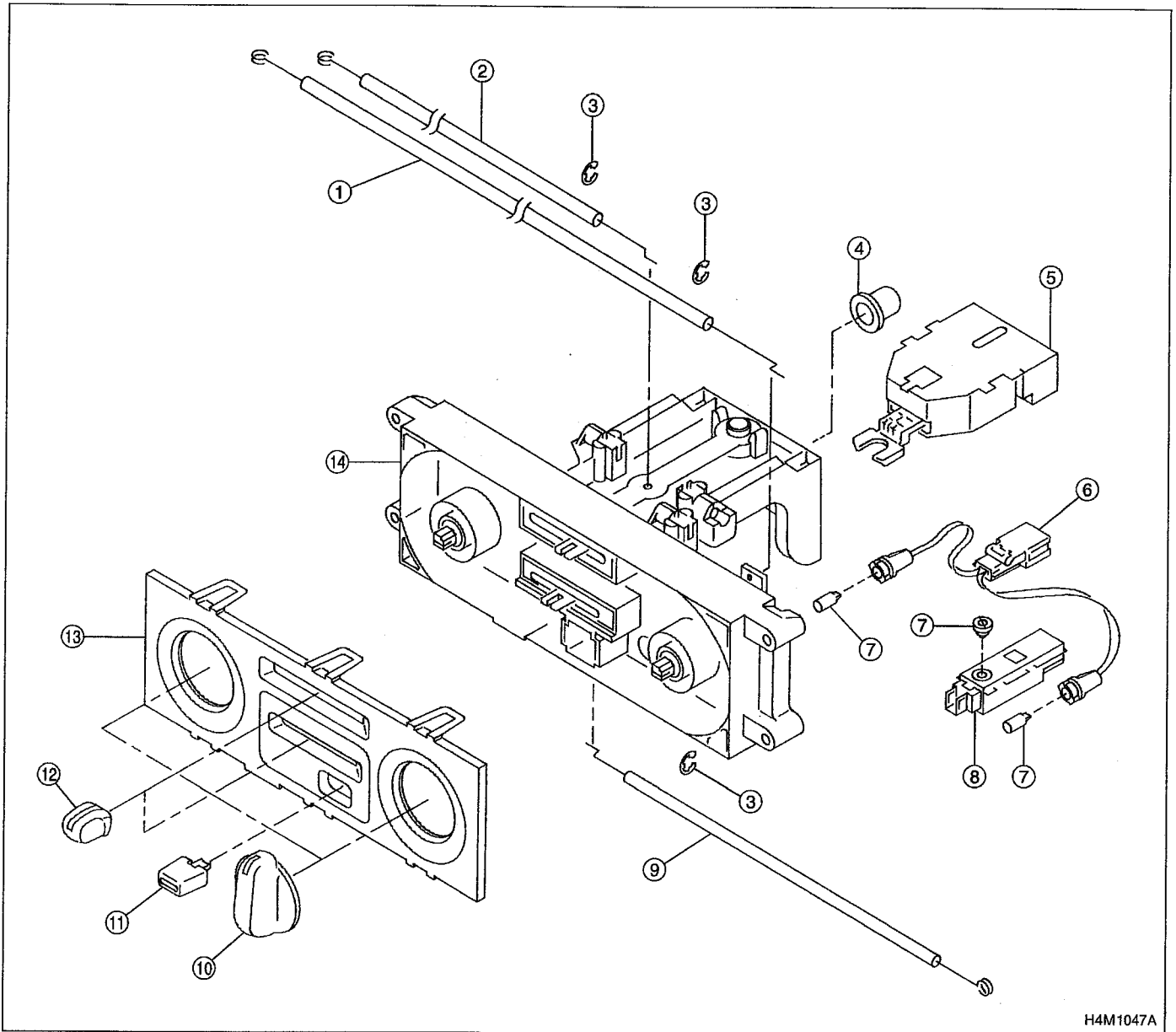


- ① Intake unit case lower
- ② Lever (B)
- ③ Intake unit case upper
- ④ Door (A)
- ⑤ Door (B)

- ⑥ Lever (A)
- ⑦ Link
- ⑧ Rod
- ⑨ Blower motor ASSY
- ⑩ Aspirator pipe

Tightening torque: N·m (kg-m, ft-lb)
T: 7.35 ± 1.96
(0.750 ± 0.200, 5.421 ± 1.446)

3. Control Unit



H4M1047A

- ① Temperature control cable
- ② Recirc control cable
- ③ Clip
- ④ Grommet
- ⑤ Blower switch ASSY

- ⑥ Harness ASSY
- ⑦ Bulb
- ⑧ A/C switch ASSY
- ⑨ Mode control cable
- ⑩ Control dial knob

- ⑪ A/C switch knob
- ⑫ Control lever knob
- ⑬ Plate
- ⑭ Base unit

1. Supplemental Restraint System "Airbag"

Airbag system wiring harness is routed near the instrument panel, heater unit, blower motor and control unit.

CAUTION:

- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage Airbag system wiring harness when servicing the instrument panel, heater unit, blower motor and control unit.

2. Heater Unit

A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove heater hoses (inlet, outlet) in engine compartment.

NOTE:

Drain as much coolant from heater unit as possible, and plug disconnected hose with cloth.

<Ref. to 2-5 [W200].>

- 3) Remove instrument panel.

<Ref. to 5-4 [W1A0].>

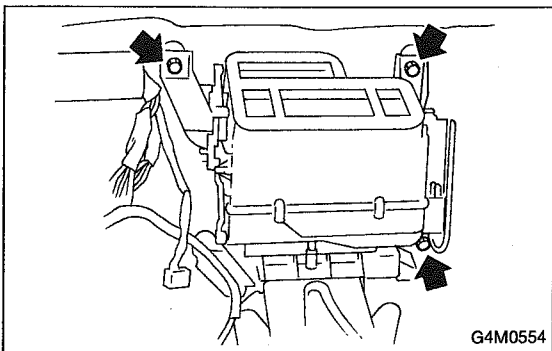
- 4) Remove steering support beam.

<Ref. to 5-1 [C600].>

- 5) Remove cooling unit.

<Ref. to 4-7 [W14A0].>

- 6) Remove heater unit.



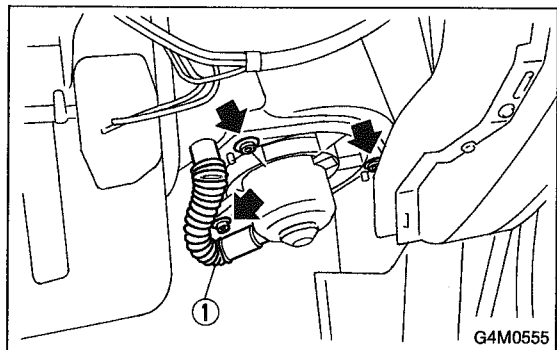
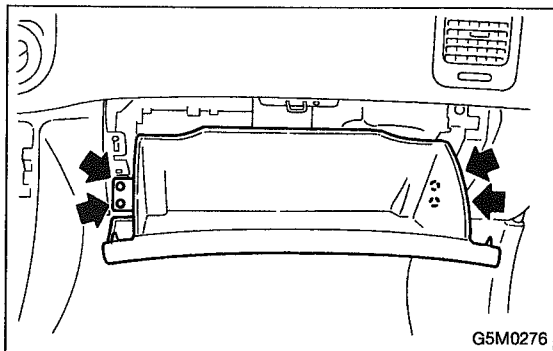
- 7) Installation is in the reverse order of removal.

Fitted length of heater hose over pipe:

$27.5 \pm 2.5 \text{ mm}$ ($1.083 \pm 0.098 \text{ in}$)

- 8) Pour coolant.

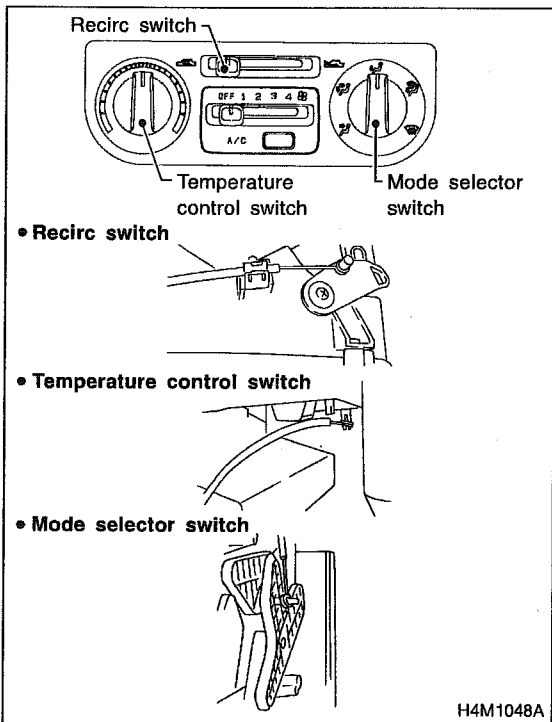
<Ref. to 2-5 [W200].>



3. Blower Motor Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect GND cable from battery.
- 2) Remove glove box.
- 3) Disconnect blower motor harness connector.
- 4) Disconnect aspirator pipe ①.
- 5) Remove blower motor mounting screw.
- 6) Remove blower motor assembly.
- 7) Installation is in the reverse order of removal.



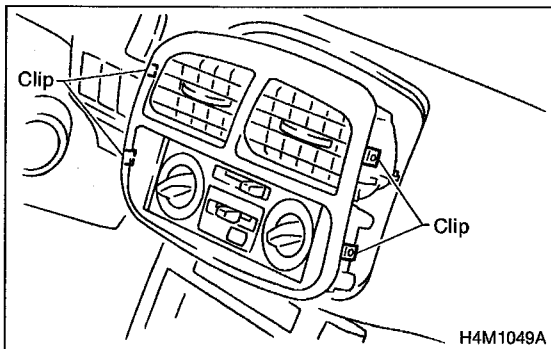
4. Control Unit

A: REMOVAL AND INSTALLATION

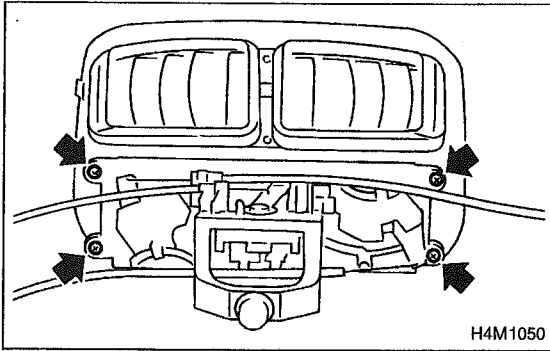
- 1) Disconnect GND cable from battery.
- 2) Set temperature control switch to "FULL HOT" and mode selector switch to "DEF" position and recirc switch to "FRESH" position.
- 3) Disconnect temperature control cable and mode door control cable from heater unit then disconnect recirc control cable from intake unit.

NOTE:

Do not attempt to move links during installation.



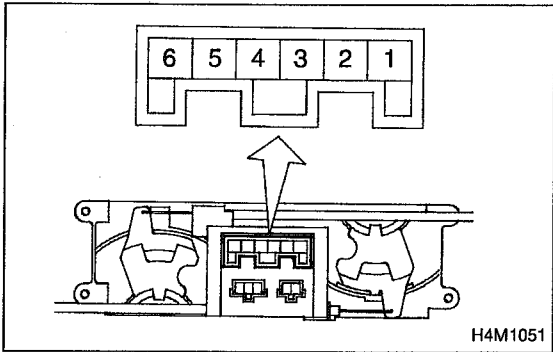
- 4) Remove center panel from instrument panel then disconnect connectors.



- 5) Remove control unit assembly from center panel.
- 6) Installation is in the reverse order of removal.

NOTE:

Before installing control unit, set temperature control switch to "FULL HOT" and mode selector switch to "DEF" position and recirc switch to "FRESH" position.

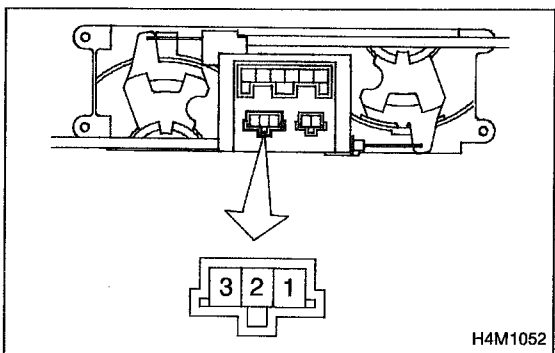


B: INSPECTION

1. FAN SWITCH

Check continuity between terminals at each switch position.

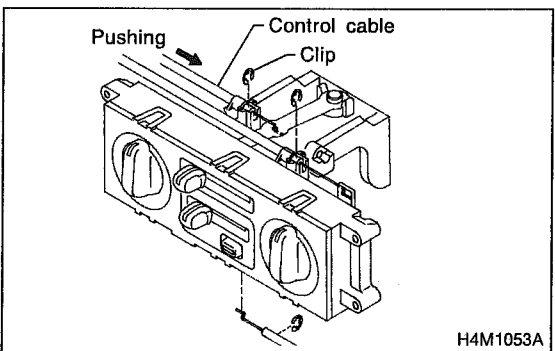
Switch position	Terminals					
	1	2	3	4	5	6
1	○				○	○
2	○			○		○
3	○		○			○
4	○	○				○
	IGN					GND



2. A/C SWITCH

Check A/C switch continuity between each terminal.

Terminal	Switch ON	Illumi.
1		○
2	○	○
3	○	○



C: ADJUSTMENT

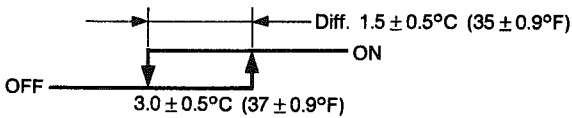
- 1) Operate temperature control switch to "FULL COLD" and mode selector switch to "VENT" position and recirc switch to "RECIRC" position.
- 2) Install control cable to lever. While pushing outer cable, secure control cable with clip.

AIR CONDITIONING SYSTEM

4-7

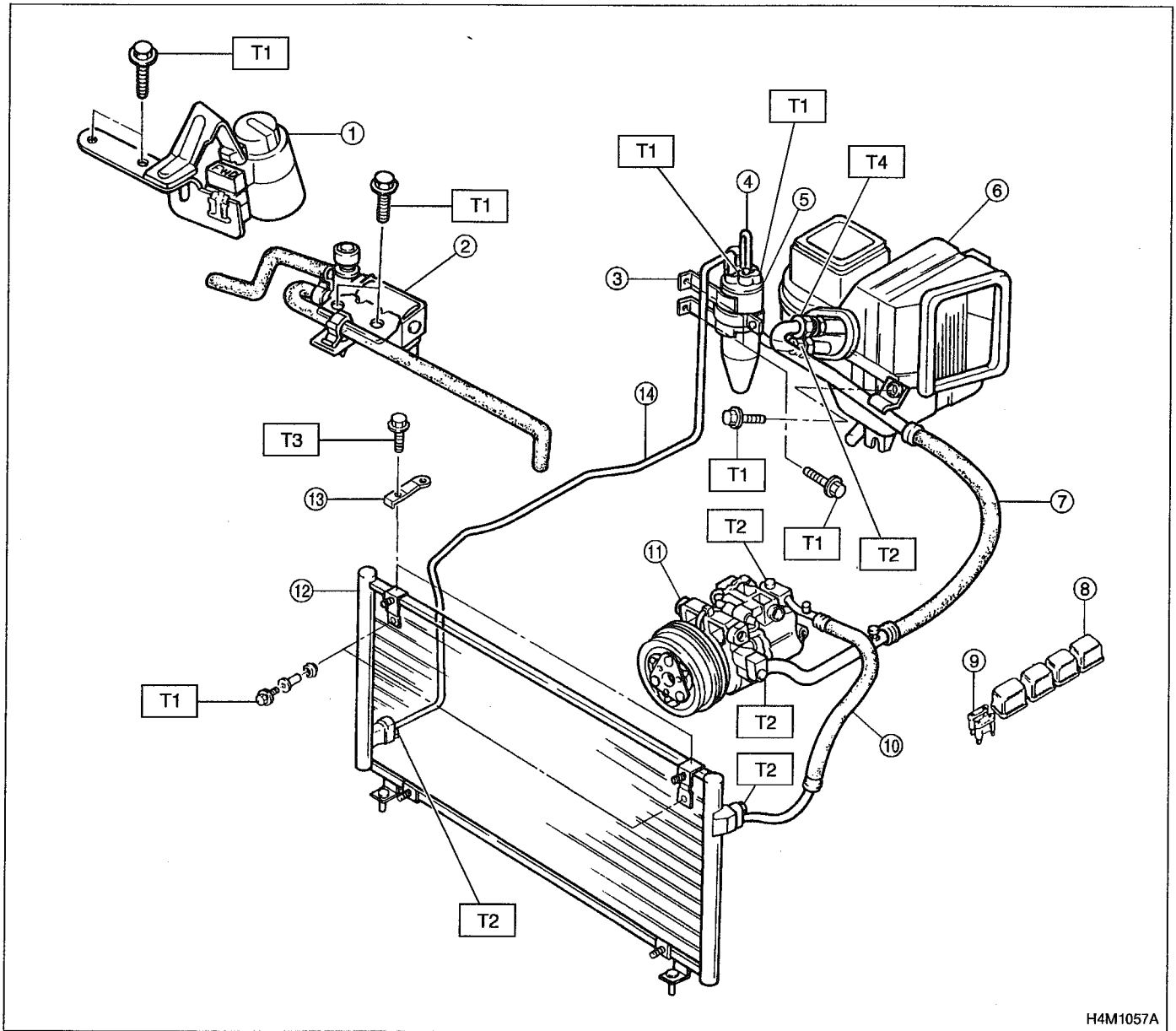
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1. Specifications

Item		Specifications	
Type of air conditioner		Reheat air-mix type	
Cooling capacity		5.234 kW (4,500 kcal/h, 17,856 BTU/h)	
Refrigerant		HFC-134a (CH ₂ FCF ₃) [0.6 ± 0.05 kg (1.3 ± 0.11 lb)]	
Compressor	Type	5-vane rotary, fix volume (CR-14)	
	Discharge	144 cm ³ (8.79 cu in)/rev	
	Max. permissible speed	7,000 rpm	
Magnet clutch	Type	Dry, single-disc type	
	Power consumption	47 W	
	Type of belt	V-Ribbed 4 PK	
	Pulley dia. (effective dia.)	125 mm (4.92 in)	
Condenser	Pulley ratio	2.0/1.8 model: 1.064, 1.6 model: 0.88	
	Type	Corrugated fin (Multi-flow)	
	Core face area	0.211 m ² (2.27 sq ft)	
Receiver drier	Core thickness	19 mm (0.75 in)	
	Radiation area	5.76 m ² (62 sq ft)	
	Effective inner capacity	250 cm ³ (15.26 cu in)	
Expansion valve	Type	Internal equalizing	
Evaporator	Type	Single tank	
	Dimensions (W x H x T)	74 x 222 x 235 mm (2.91 x 8.74 x 9.25 in)	
Blower fan	Fan type	Sirocco fan	
	Outer diameter x width	150 x 75 mm (5.91 x 2.95 in)	
	Power consumption	200 W at 12 V	
Condenser fan (Sub fan)	Motor type	Magnet	
	Power consumption	90 W at 12 V	
	Fan outer diameter	320 mm (12.60 in)	
Radiator fan (Main fan)	Motor type	Magnet	
	Power consumption	90 W at 12 V	
	Fan outer diameter	320 mm (12.60 in)	
Idling speed (A/C ON)		MPFI model 850 ± 100 rpm (700 ± 100 rpm "D" range in AT model)	
Dual switch (Pressure switch)	Low-pressure switch operating pressure kPa (kg/cm ² , psi)	ON → OFF	176 ± 29 (1.80 ± 0.30, 25.5 ± 4.3)
		OFF → ON	186 ⁺³⁹ ₋₂₅ (1.90 ^{+0.4} _{-0.25} , 27.0 ^{+5.7} _{-3.6})
	High-pressure switch operating pressure kPa (kg/cm ² , psi)	ON → OFF	2,746 ± 98 (28 ± 1, 398 ± 14)
		DIFF	588 ± 196 (6 ± 2, 85 ± 28)
Compressor relief valve blow-out pressure kPa (kg/cm ² , psi)		3,727 ± 196 (38 ± 2.0, 540 ± 28)	
Thermo control amplifier working temperature (Evaporator outlet air)		 <p>Diff. 1.5 ± 0.5°C (35 ± 0.9°F) 3.0 ± 0.5°C (37 ± 0.9°F)</p>	
Compressor thermocut temperature		140 ± 5°C (284 ± 9°F) Diff. 15 ± 5°C (59 ± 9°F)	

G4M0938

1. Air Conditioning System

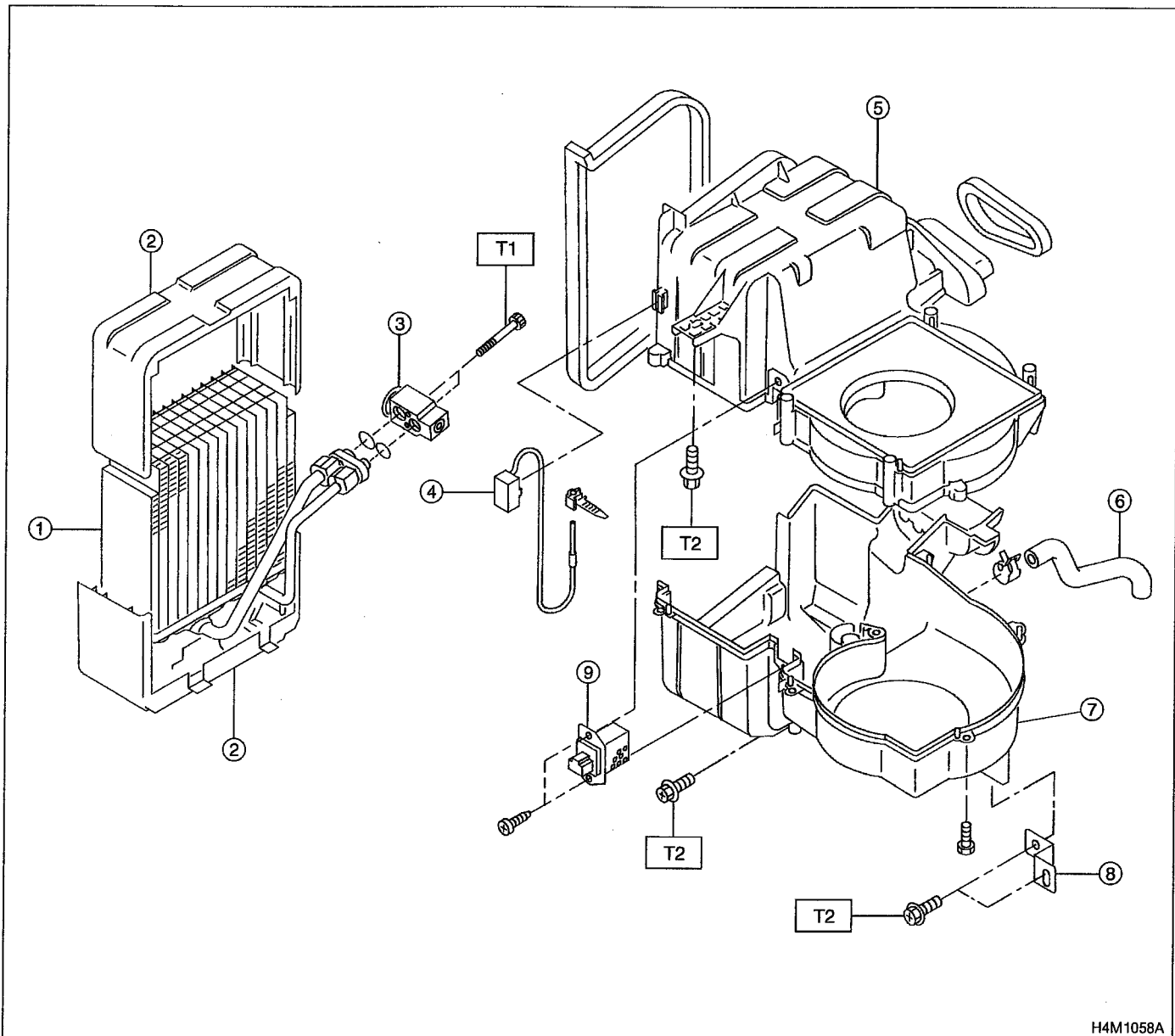


H4M1057A

- | | |
|----------------------------------|-------------------------------------|
| ① A/C cut relay | ⑨ Fuse |
| ② FICD (1800 cc model) | ⑩ Hose (High-pressure) |
| ③ Receiver drier bracket | ⑪ Compressor |
| ④ Pipe (Receiver drier — C/unit) | ⑫ Condenser |
| ⑤ Receiver drier | ⑬ Radiator bracket |
| ⑥ Cooling unit | ⑭ Pipe (Condenser — Receiver drier) |
| ⑦ Hose (Low-pressure) | |
| ⑧ A/C relay | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T2: 18 ± 5 (1.8 ± 0.5, 13 ± 3.6)
T3: 15 ± 5 (1.5 ± 0.5, 11 ± 3.6)
T4: 25 ± 5 (2.5 ± 0.5, 18 ± 3.6)

2. Intake Unit with Evaporator



- ① Evaporator
- ② Insulator
- ③ Block expansion valve
- ④ Thermo control amplifier
- ⑤ Intake unit case upper

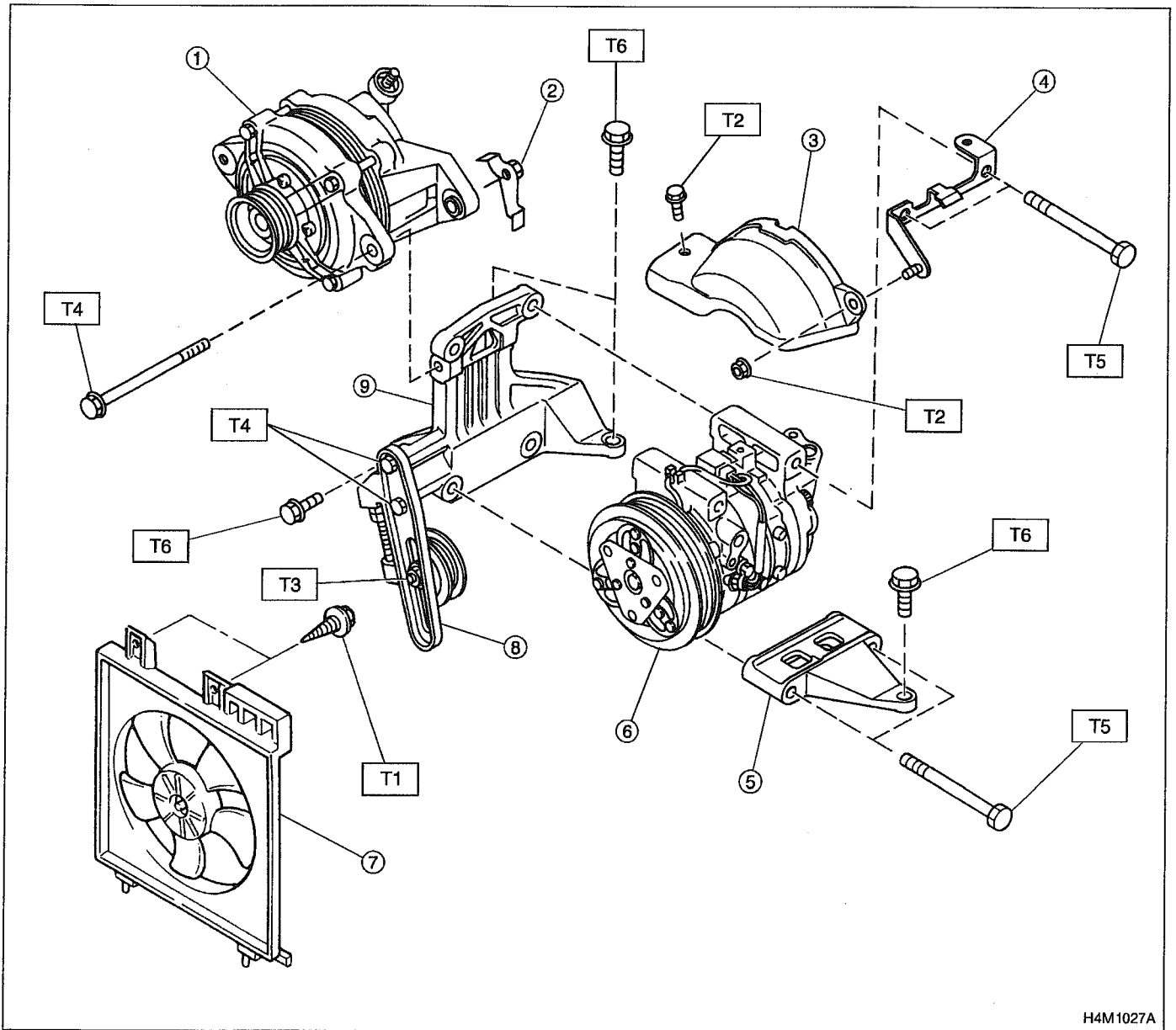
- ⑥ Drain hose
- ⑦ Intake unit case lower
- ⑧ Mount bracket
- ⑨ Resistor

Tightening torque: N·m (kg·m, ft·lb)

T1: 4 ± 1 (0.4 ± 0.1 , 2.9 ± 0.7)

T2: 7.4 ± 2.0 (0.75 ± 0.2 , 5.4 ± 1.4)

3. Compressor



H4M1027A

- | | |
|----------------------------|----------------------------|
| ① Alternator | ⑥ Compressor |
| ② Alternator bracket nut | ⑦ Condenser fan motor ASSY |
| ③ Compressor belt cover | ⑧ Idler pulley ASSY |
| ④ Bracket | ⑨ Compressor bracket upper |
| ⑤ Compressor bracket lower | |

Tightening torque: N·m (kg·m, ft·lb)

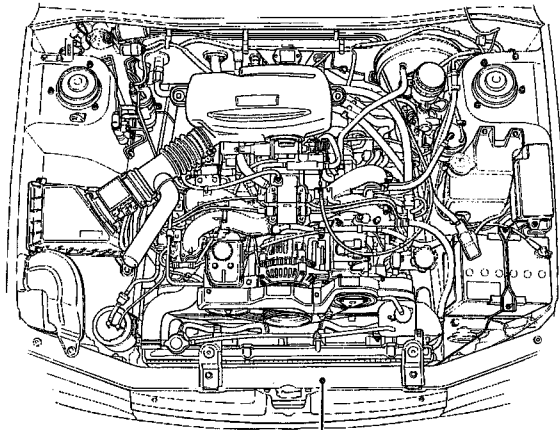
T1:	5 ± 1.5 (0.5 ± 0.15, 3.6 ± 1.1)
T2:	7.4 ± 2 (0.75 ± 0.2, 5.4 ± 1.4)
T3:	23 ± 3 (2.3 ± 0.3, 17 ± 2.2)
T4:	23.0 ± 3 (2.35 ± 0.3, 17.0 ± 2.2)
T5:	28.9 ± 4.4 (2.95 ± 0.45, 21.3 ± 3.3)
T6:	35 ± 4 (3.6 ± 0.4, 26 ± 2.9)

1. Safety Precautions

A: HFC-134a AIR CONDITIONING SYSTEM

Component parts of the cooling system, refrigerant, compressor oil, and other parts are not the same for the HFC-134a system and the older CFC-12 system. Do not interchange parts or liquid.

Vehicles with HFC-134a air conditioning systems, use only HFC-134a parts that are indicated on a label attached to the vehicle. Before performing any maintenance, verify the type of air conditioning system installed in the vehicle.



SUBARU TOKYO JAPAN
AIR CONDITIONER (LI-TYPE)

REFRIGERANT CHARGE:
HFC134a, 19-23 OZ (0.55-0.65kg)

COMPRESSOR OIL : DH-PR

COMPRESSOR BELT: 73323FA030 (1.6L)
73323AC000 or 73323AC010(1.8L,2.0L,2.2L)

REFRIGERANT UNDER HIGH PRESSURE.
CONSULT SERVICE MANUAL.

CAUTION: SYSTEM TO BE SERVICED
BY QUALIFIED PERSONNEL.
SAE J639

CAUTION: USE ONLY REFRIGERANT HFC134a AND OIL DH-PR FOR THIS AIR CONDITIONER. DON'T USE REFRIGERANT CFC12 AND OIL DH-150CX.

ATTENTION: UTILISEZ LE LIQUIDE RÉFRIGÉRANT HFC134a ET L'HUILE DH-PR DANS CE CLIMATISEUR. NE JAMAIS UTILISER LE RÉFRIGÉRANT CFC12 ET L'HUILE DH-150CX.

VORSICHT: NUR KÄL TEMITTEL HFC134a UND ÖL DH-PR FÜR DIESE KLIMAAANLAGE VERWENDEN. NIEMALS KÄL TEMITTEL CFC12 UND ÖL DH-150CX.

H4M1065A

B: COMPRESSOR OIL

Do not use any compressor oil that is not specifically designated for the HFC-134a air conditioning system; only use DH-PR. Also, do not use HFC-134a compressor oil in the CFC-12 air conditioning system. If compression oils are mixed, poor lubrication will result and the compressor itself may be damaged.

Because HFC-134a compressor oil is very hygroscopic (easily absorbs moisture), when parts of the air conditioning system are being removed, quickly install a blind plug to prevent contact with the outside air. Also, always make sure that the service container for compressor oil is tightly closed except when in use. Store compressor oil in a tightly closed steel container.

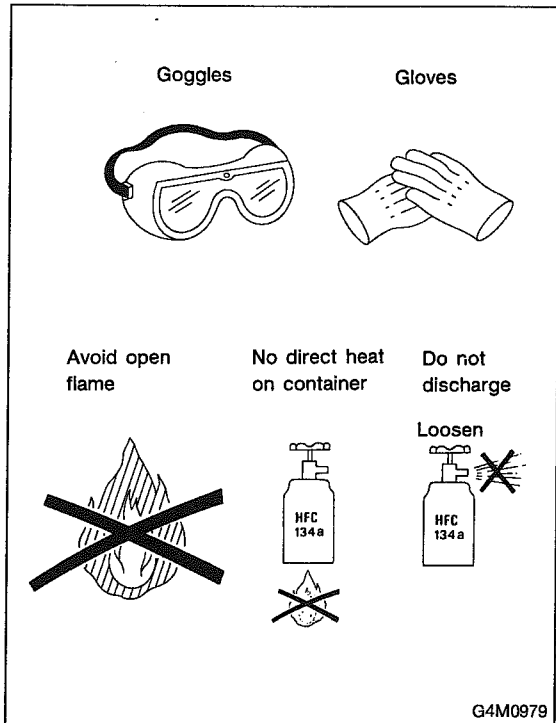
C: REFRIGERANT

Do not put CFC-12 refrigerant into a HFC-134a air conditioning system. Also, do not put HFC-134a refrigerant into a CFC-12 air conditioning system. If the wrong refrigerant is used, poor lubrication will result and the compressor itself may be destroyed.

D: HANDLING OF REFRIGERANT

Because refrigerant boils at approx. -30°C (-22°F) at sea level, it is cold enough to give you severe frostbite. Always wear goggles to protect your eyes and gloves to protect your hands. Also, even under the pressures normally found in CFC-12 containers, refrigerant will boil with the addition of heat. This could raise the pressure inside the container to a dangerous level.

Never expose a can of HFC-134a to direct sunlight, or to temperatures over 40°C (104°F). One more thing to remember about HFC-134a is that when it is exposed to an open flame or to hot metal, it forms phosgene, a deadly gas. Do not discharge HFC-134a into the atmosphere on purpose. Always read and follow the precautions on the HFC-134a bottle.



2. Basic Information

1) The combination of moisture and refrigerant forms acid, therefore, moisture should not be allowed to enter the refrigerant.

2) Refrigerant oil readily absorbs moisture, therefore, keep refrigerant oil containers tightly capped.

3) The process of evacuating the system is performed to remove small amounts of moisture. This is accomplished by lowering the pressure inside the system, which allows the moisture to boil off, in much the same way that a pot of water will boil away to nothing given enough time. The evacuation process does not suck the moisture out of the system.

4) A minimum level of vacuum must be reached to satisfactorily evacuate the system. This minimum level of vacuum depends on the temperature inside the system. The chart below shows the level of vacuum required to boil water at various temperatures.

Additionally, the vacuum level shown on a gauge will read approx. 4 kPa (25 mmHg, 1 inHg) less for each 304.8 m (1,000 ft) above sea level, due to the decrease in atmospheric pressure at altitude.

Vacuum level required to boil water (at sea level)	
Temperature °C (°F)	Vacuum kPa (mmHg, inHg)
1.7 (35)	100.9 (757, 29.8)
7.2 (45)	100.6 (754, 29.7)
12.8 (55)	99.9 (749, 29.5)
18.3 (65)	99.2 (744, 29.3)
23.9 (75)	98.5 (739, 29.1)
29.4 (85)	97.2 (729, 28.7)
35 (95)	95.8 (719, 28.3)

3. Tools and Equipment

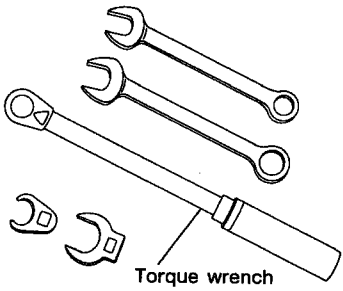
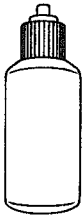
The following section provides information about the tools and equipment that will be necessary to properly service the A/C system.

Since equipment may vary slightly depending on the manufacturer, it is important to always read and follow the manufacturer's instructions.

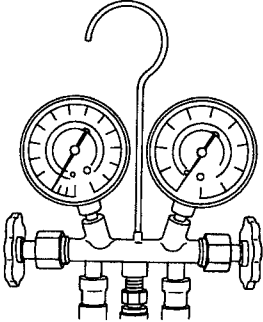
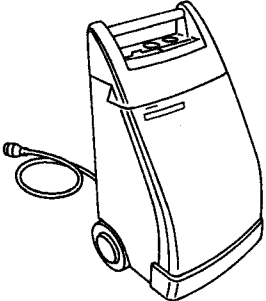
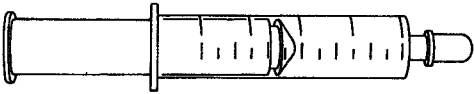
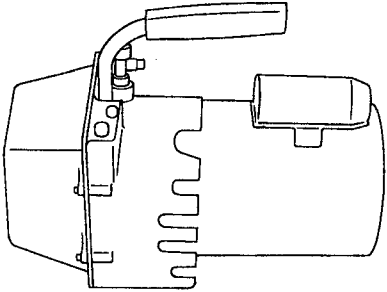
CAUTION:

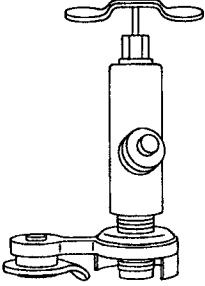
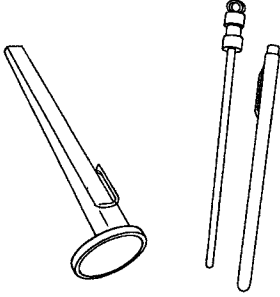
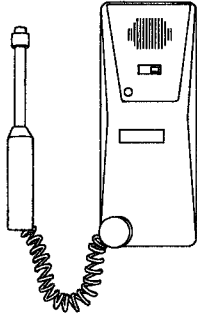
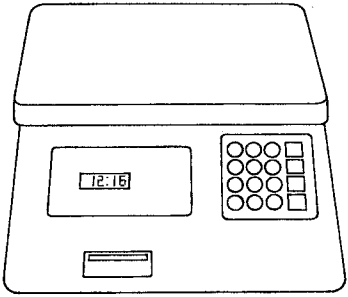
When working on vehicles with the HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, poor lubrication will result and the compressor itself may be destroyed. In order to help prevent mixing HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Tools and Equipment	Description
<p>● WRENCH</p> <p>Various WRENCHES will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kg-m, 5 to 30 ft-lb) torque wrench with various crowfoot wrenches will be needed. Open end or flare nut wrenches will be needed for back-up on the tube and hose fittings.</p>	 <p style="text-align: center;">Torque wrench</p> <p style="text-align: right;">G4M0571</p>
<p>● APPLICATOR BOTTLE</p> <p>A small APPLICATOR BOTTLE is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.</p>	 <p style="text-align: right;">G4M0572</p>

3. Tools and Equipment

Tools and Equipment	Description
<p>● MANIFOLD GAUGE SET</p> <p>A MANIFOLD GAUGE SET (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.</p>	 <p style="text-align: right;">G4M0573</p>
<p>● REFRIGERANT RECOVERY SYSTEM</p> <p>A REFRIGERANT RECOVERY SYSTEM is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.</p>	 <p style="text-align: right;">G4M0574</p>
<p>● SYRINGE</p> <p>A graduated plastic SYRINGE will be needed to add oil back into the system. The syringe can be found at a pharmacy or drug store.</p>	 <p style="text-align: right;">G4M0575</p>
<p>● VACUUM PUMP</p> <p>A VACUUM PUMP (in good working condition) is necessary, and may be obtained from either a commercial refrigeration supply house or an automotive equipment supplier.</p>	 <p style="text-align: right;">G4M0576</p>

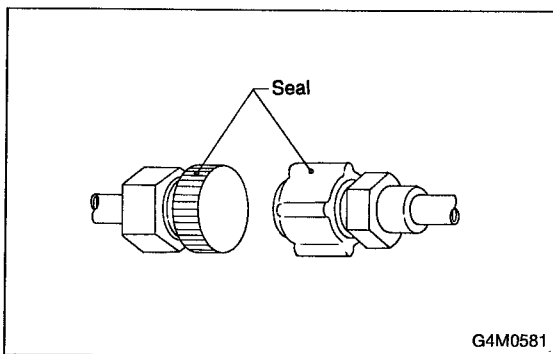
Tools and Equipment	Description
<p>● CAN TAP</p> <p>A CAN TAP for the 397 g (14 oz) can is available from an auto supply store.</p>	 <p style="text-align: right;">G4M0577</p>
<p>● THERMOMETER</p> <p>Pocket THERMOMETERS are available from either industrial hardware store or commercial refrigeration supply houses.</p>	 <p style="text-align: right;">G4M0578</p>
<p>● ELECTRONIC LEAK DETECTOR</p> <p>An ELECTRONIC LEAK DETECTOR can be obtained from either a specialty tool supply or an A/C equipment supplier.</p>	 <p style="text-align: right;">G4M0579</p>
<p>● WEIGHT SCALE</p> <p>A WEIGHT SCALE such as an electronic charging scale or a bathroom scale with digital display will be needed if a 13.6 kg (30 lb) refrigerant container is used.</p>	 <p style="text-align: right;">G4M0580</p>

4. O-ring Connections

A: GENERAL

The following points should be kept in mind when assembling O-ring connections:

- 1) Avoid unnecessary handling and contact of O-rings with your hands, since even clean fingers contain body acids, which can contaminate the O-ring surface.
- 2) Do not handle O-rings with gloves, shop towels, etc., since lint particles may cling to the O-ring, possibly causing a leak upon assembly.
- 3) Always lubricate O-rings before assembly to allow the O-ring to seat itself properly.
- 4) Be certain to use torque wrenches when tightening O-ring fittings, because overtightening can not only damage the O-ring, but it can distort the tube end as well.

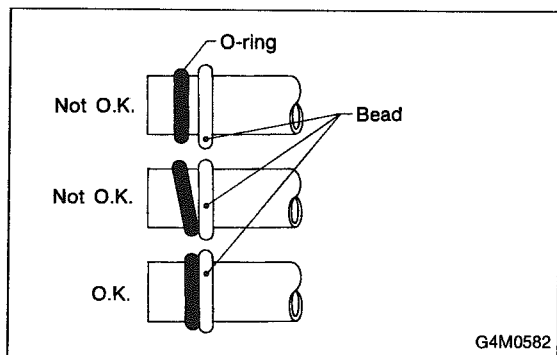


B: REMOVE PROTECTIVE SEALS

- 1) Just prior to making the connection, remove the protective seals.

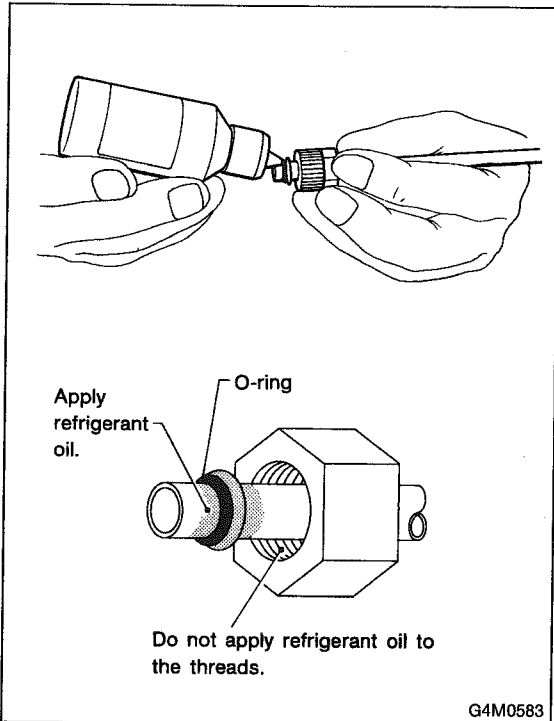
CAUTION:

If for any reason you have to stop before making a connection, recap the tube, component or fitting.



- 2) Visually inspect the O-ring surface, the O-ring mating surface, the threads and the connection points. If a defective part is found, replace it.

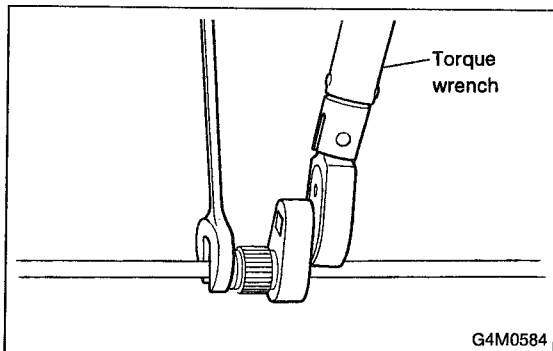
The O-ring must sit square against the tube bead. If necessary, slide the O-ring into proper position with clean hands.



C: LUBRICATE THE COMPONENTS

For lubrication of the components, use only refrigerant oil as described in the appropriate service manual. Apply oil from an oil squirt gun or other closed container. Do not use your finger to spread the oil over the O-ring.

Apply a small amount of refrigerant oil to the top and sides of the O-ring. The area covered by oil should include the O-ring and the tube bead.



D: TORQUE THE FITTING

Using a back-up wrench in conjunction with a calibrated torque wrench, torque the connection to the midrange of the specification.

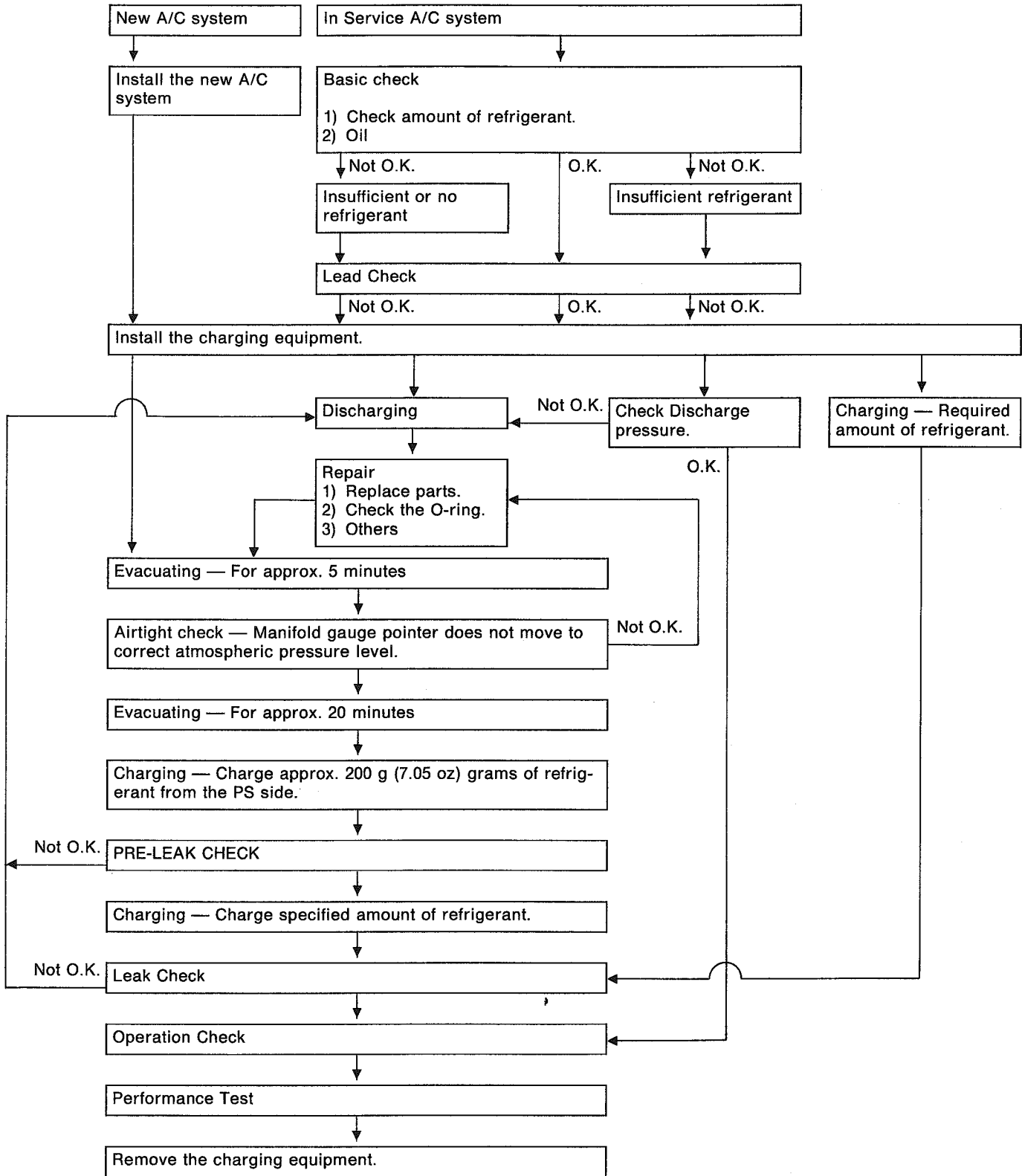
After completion of torquing, use a clean shop towel to remove any excess oil from the connection or any oil that may have dripped on the vehicle body or other parts.

CAUTION:

If a leak is suspected after torquing, do not retighten or retorque the connection. Instead, disassemble the connection, remove the O-ring, and inspect the O-ring, threads, joints and seating surfaces.

5. Refrigerant Service Procedure

A: WORK FLOW



6. Discharge the System

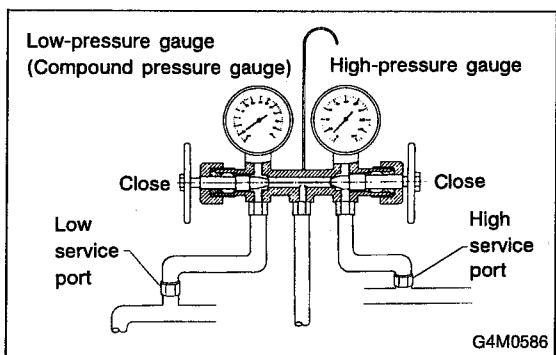
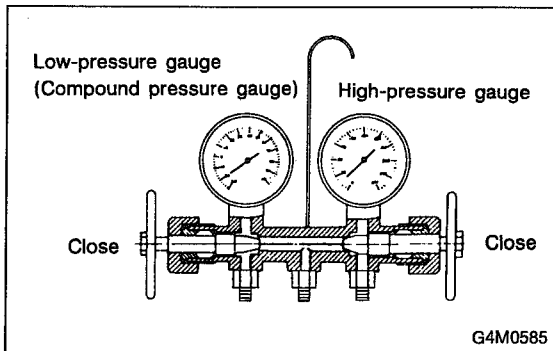
CAUTION:

The following points must be kept in mind when discharging the system.

- Be certain that goggles and gloves are worn.
- Connect refrigerant recovery system to manifold gauge set and remove recycle refrigerant from the A/C system.

NOTE:

Refer to that refrigerant recovery system instruction manual for operating procedures.

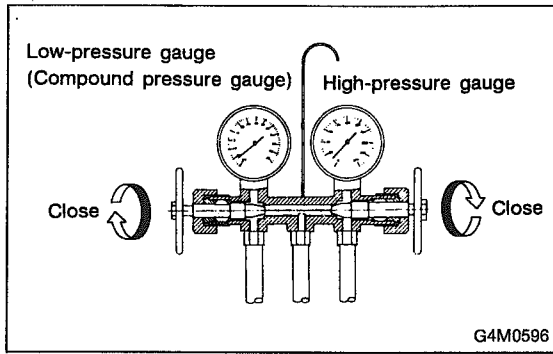


A: CONNECTING THE MANIFOLD GAUGE SET

- 1) Close the high and low side manifold valves
- 2) Turn the A/C system ON and turn the IG switch OFF.
- 3) Attach the high- and low-pressure manifolds to the high and low services port on the vehicle.

B: PREPARE FOR DISCHARGING

Connect center manifold hose to refrigerant recovery system to recycle refrigerant.



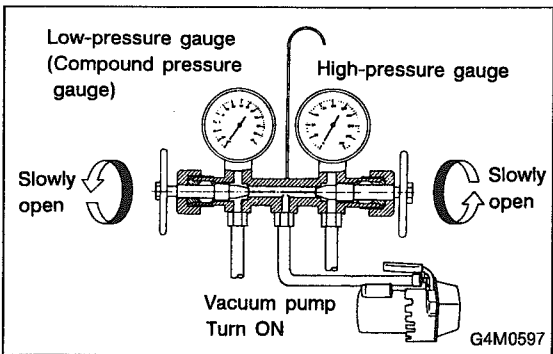
7. Evacuating and Charging

The following points should be kept in mind when evacuating and charging with a manifold gauge set:

- 1) Be certain that goggles and gloves are worn.
- 2) If bulk refrigerant [13.6 kg (30 lb) canister] is used, be certain to weigh the charge amount carefully, using the correct equipment, to avoid overcharging the system.
- 3) The charging procedure described in this section begins by charging liquid refrigerant into the high-pressure side of the system with the engine off. The procedure is completed by charging refrigerant vapor into the low-pressure side of the system with the engine running.

CAUTION:

Never open the high-pressure manifold valve when the engine is running.



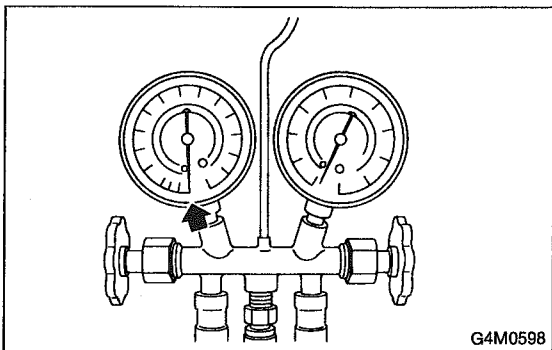
A: CONNECT THE GAUGE SET

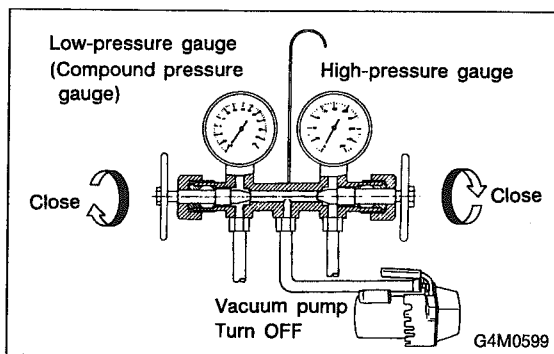
- 1) Close the high- and low-pressure manifold valves
- 2) Attach the low-pressure manifold hose to the low-pressure service port on the vehicle. Check the low-pressure gauge. If more than 68.6 kPa (0.70 kg/cm², 10 psi) is indicated, discharge the system prior to charging.
- 3) Attach the high-pressure manifold hose to the high-pressure service port on the vehicle.
- 4) Connect the center hose from the manifold to the vacuum pump.
- 5) Turn on the vacuum pump.
- 6) Slowly open the low-pressure manifold valve.
- 7) When the low-pressure gauge reaches approximately 66.43 kPa (498.3 mmHg, 19.62 inHg), slowly open the high-pressure manifold valve.

- 8) Maintain a minimum vacuum level of 100.56 kPa (754.4 mmHg, 29.70 inHg) for a minimum of 15 minutes on a new system or 30 minutes for an in-service system.

NOTE:

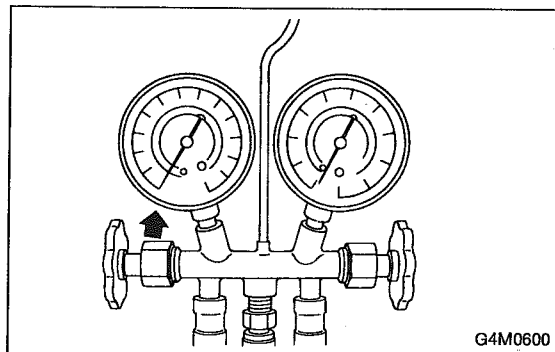
The gauge will read 4 kPa (25 mmHg, 1 inHg) less for every 304.8 m (1,000 ft) above sea level.



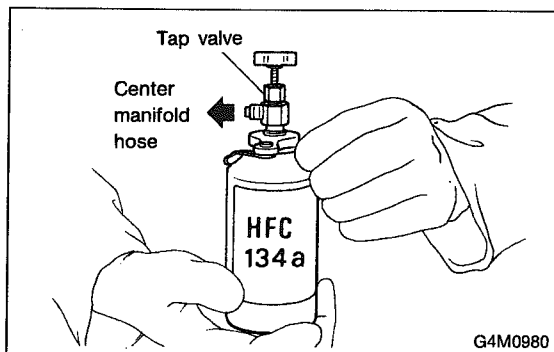


B: PERFORM A VACUUM LEAK TEST

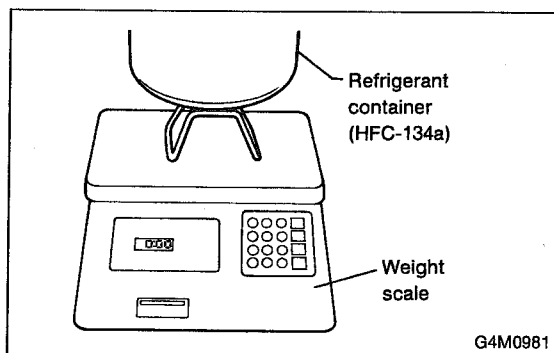
- 1) After 15 minutes (or more) of evacuation, close the high-pressure manifold valve.
- 2) Close the low-pressure manifold valve.
- 3) Turn off the vacuum pump.



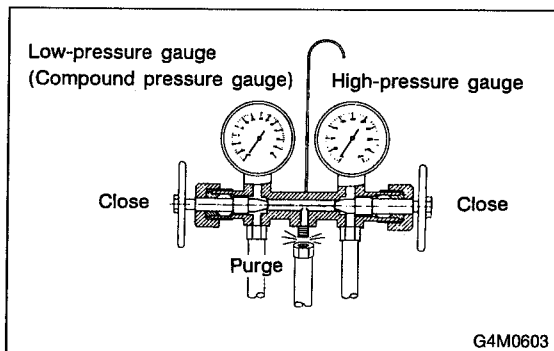
- 4) Note the low side gauge reading.
- 5) After 5 minutes, re-check the low-pressure gauge reading. If the vacuum level has changed more than 4 kPa (25 mmHg, 1 inHg), perform an HFC-134a leak test. If the vacuum reading is about the same as noted in step 4), continue on to next step.



- 6) Carefully attach the can tap to the refrigerant can by following the can tap manufacturer's instructions.
- 7) Disconnect the center manifold hose from the vacuum pump and connect the hose to the tap valve.



- 8) If a 13.6 kg (30 lb) container of refrigerant is used a weight scale will be needed. This scale is to determine the amount of refrigerant that is used. Connect the center hose from the manifold to the valve. Place the 13.6 kg (30 lb) container on the scale, valve end down.



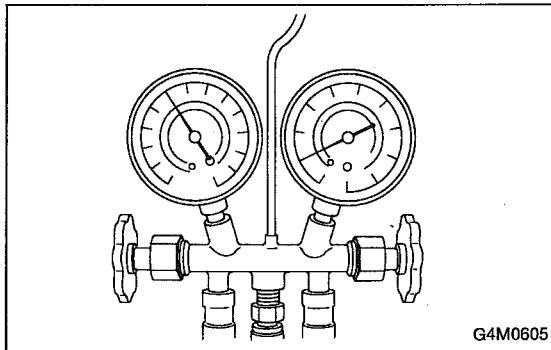
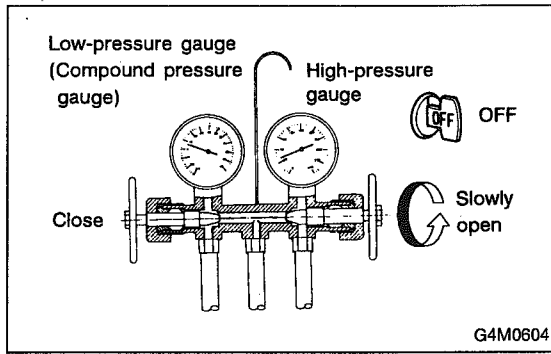
C: PURGE THE CENTER HOSE

CAUTION:

Be certain that goggles and gloves are worn.

- 1) Verify that all three hose connections are tight at the manifold gauge set.
- 2) Open the valve on the HFC-134a source.
- 3) Loosen the center hose connection at the manifold and allow the HFC-134a to escape for no more than two or three seconds, then quickly retighten the hose fitting at the manifold.

7. Evacuating and Charging

**D: INITIAL CHARGING THROUGH THE HIGH SIDE**

- 1) Connect a tachometer to the engine.
- 2) With the engine off, start charging by slowly opening the high-pressure manifold valve.

NOTE:

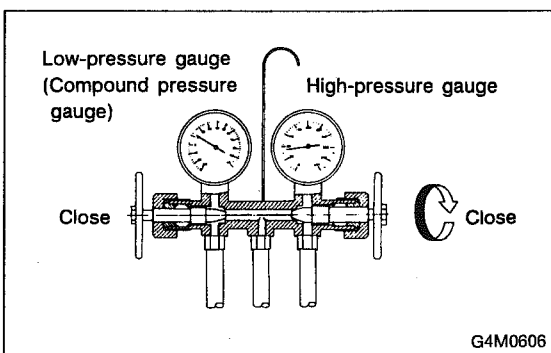
The initial charge rate can be increased by immersing the can in lukewarm [below 38°C (100°F)] water for a short time.

E: CHECK THE GAUGE READINGS

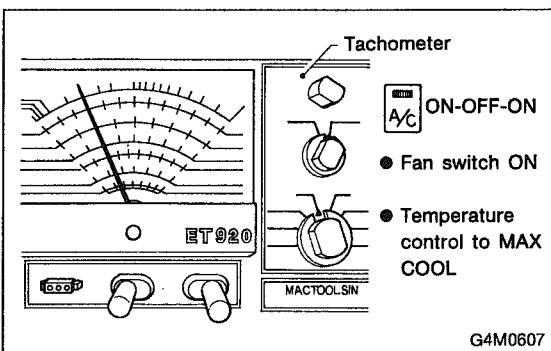
When both the high- and low-pressure gauge readings are about equal, or the HFC-134a source is empty, or the system has been filled to specifications, close the high-pressure manifold valve.

F: ADD ADDITIONAL CANS

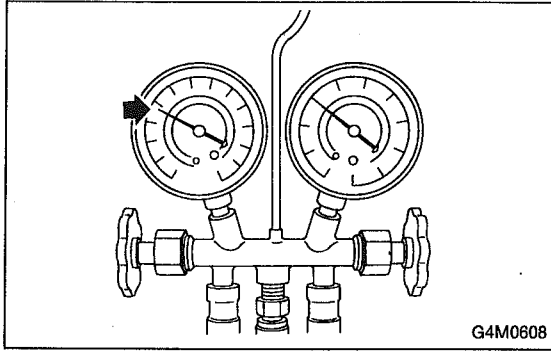
If the HFC-134a source is exhausted, first close the high-pressure manifold valve, second, close the can tap valve, then slowly purge the refrigerant from the service hose by loosening the fitting at the can tap.

**G: COMPLETE CHARGING THROUGH THE LOW SIDE**

- 1) Verify that the high-pressure manifold valve is closed (should have already been closed).
- 2) Verify that the low-pressure manifold valve is closed (should have already been closed).



- 3) With the A/C switch off and the windows rolled down, start the engine and run at idle rpm.
- 4) Set the A/C controls on maximum cool and set the blower speed on the highest setting.
- 5) Quickly turn the A/C switch on-off-on-off a few times to prevent initial compressor damage due to "load shock." Finish this operation with the A/C switch in the ON position.
- 6) Raise engine rpm to approximately 1,500 rpm.



H: CHARGE THE SYSTEM

1) With the refrigerant source connected and the service hose purged, slowly open the low-pressure manifold valve, while checking the low-pressure gauge reading.

CAUTION:

The refrigerant source must be positioned for vapor (valve up).

2) Keep the low side pressure below 276 kPa (2.81 kg/cm², 40 psi) by using the low-pressure manifold valve to regulate the flow of refrigerant into the system.

3) When the system is fully charged, close the low-pressure manifold valve.

4) Close the valve at the refrigerant source.

● Refrigerant capacity

Refrigerant	Minimum	Maximum
HFC-134a	0.55 (1.21)	0.65 (1.43)
Unit: kg (lb)		

I: COMPLETE ALL SYSTEM CHECKS

1) Evaluate the system performance. <Ref. to 4-7 [K200].>

2) Perform leak detection test. <Ref. to 4-7 [W800].>

CAUTION:

Always perform leak checking in an environment free of refrigerant pollution.

Do not disconnect the high- or low-pressure hoses from the vehicle before leak checking.

J: DISCONNECT THE MANIFOLD GAUGE SET

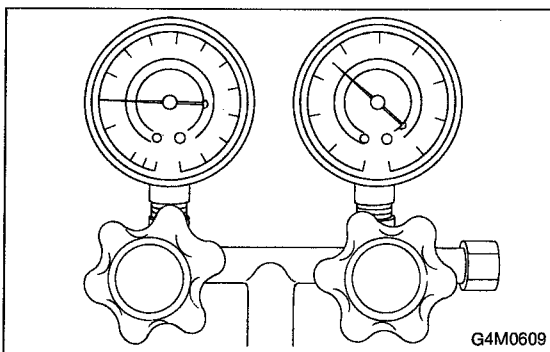
Remove the high- or low-pressure hoses from the service ports and install the service port caps.

8. Leak Testing

A: INSPECTION

The following points should be kept in mind when conducting a refrigerant leak test.

- 1) The A/C system to be tested must have an adequate refrigerant charge to begin with.
- 2) The area where the leak test is conducted must be free of wind and drafts, with still air being the ideal condition.
- 3) The atmosphere where the leak test is conducted must be free of refrigerant contamination.
- 4) Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.
- 5) Refrigerant gas is heavier than air, therefore always hold the probe below the connection being tested.
- 6) When checking for a leak along a length of hose or tube, the leak detector probe must be moved slowly, approx. 25 mm (1 in) per second making sure probe does not come in contact with the component being tested.
- 7) When checking for a leak at a certain point, the leak detector probe must be held at that point for at least 5 seconds.



1. CHECK THE SYSTEM PRESSURE

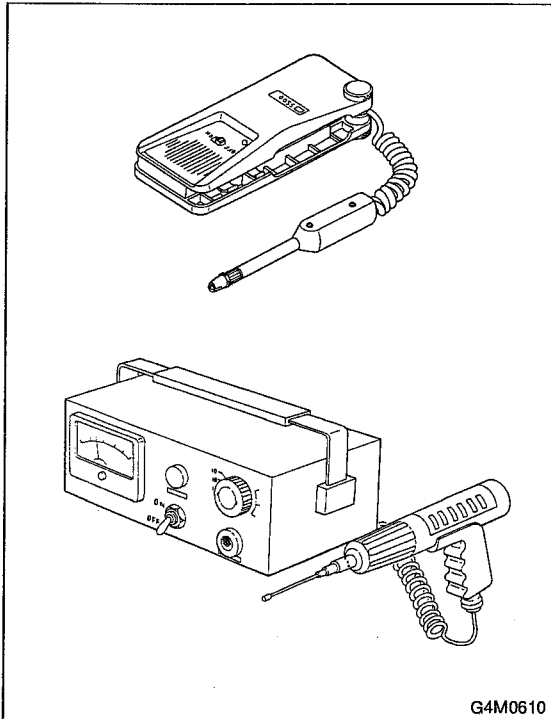
With gauges connected to the A/C system, operate the A/C and confirm that the high side pressure is above 690 kPa (7.03 kg/cm², 100 psi). If not, evacuate and charge the system before leak checking. < Ref. to 4-7 [W700]. >

2. CLEAN CONNECTIONS BEFORE TESTING

Before testing, use a clean shop towel to wipe off refrigerant oil, dirt, or foreign material from all of the connections and components to be tested.

NOTE:

Since refrigerant oil absorbs refrigerant, excess oil on or near a connection may falsely signal a leak.

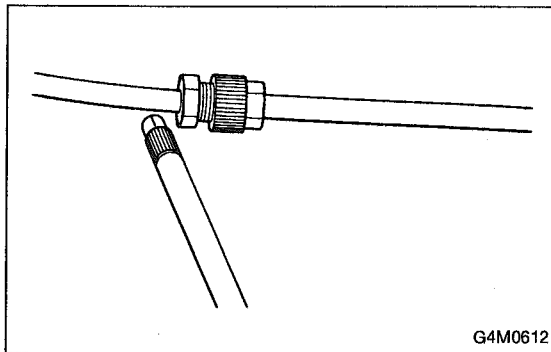


3. CALIBRATE LEAK DETECTOR

Refer to the manufacturer's instructions for the particular type of detector used and calibrate the instrument.

CAUTION:

Always make sure that the probe tip filter is clean and free of contamination.



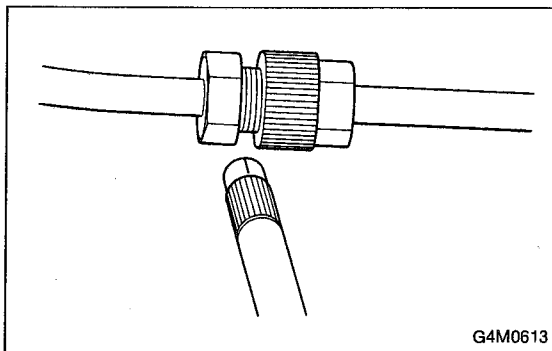
4. LEAK TEST — HIGH-PRESSURE SIDE

Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.

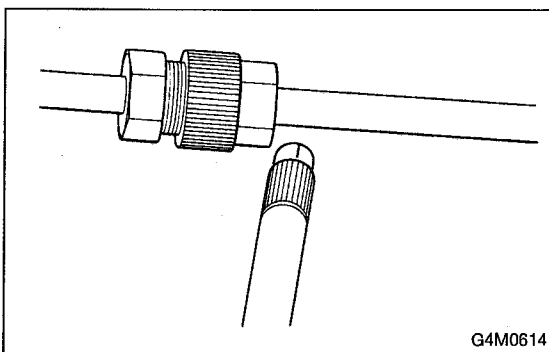
1) Begin at the connection of the high-pressure tube to the evaporator, and work your way along the high-pressure side of the system to the compressor. There are three places to check each tube connection.

2) Check the area.

- Check the area where the fitting meets the tube.
- Check the area where the two parts of the fitting join each other.



- Check the area where the nut meets the tube.



3) Check the area of the pressure switch (dual switch), and also check the seams of the receiver drier.

4) Check the connections of the tubes to the condenser, and also check any welded joints on the condenser.

CAUTION:

An oily area on the fins of the condenser may indicate a leak.

5) Check the area where the hoses attach to the compressor.

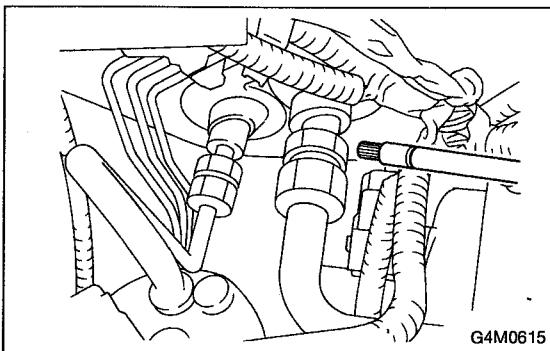
6) Check around the machined portions of the compressor (where the compressor sections join each other).

7) If equipped, check the thermal limiter on the compressor housing.

8) Check the compressor shaft seal by probing near the center of the compressor clutch pulley.

NOTE:

Some shaft seals have a very slight amount of normal leakage [approximately 28 g (1.0 oz) per year].



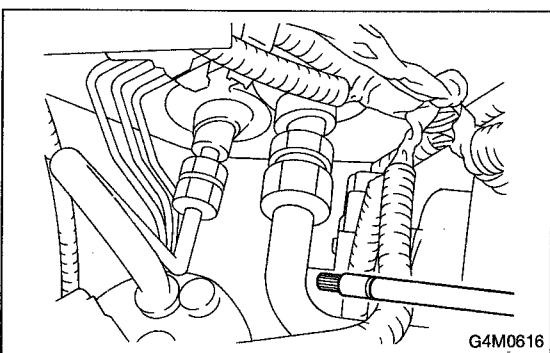
5. LEAK TEST — LOW-PRESSURE SIDE

1) Begin at the connection of the low pressure tube to the evaporator, and work your way along the low- pressure of the system to the compressor. There are three places to check on each tube connection.

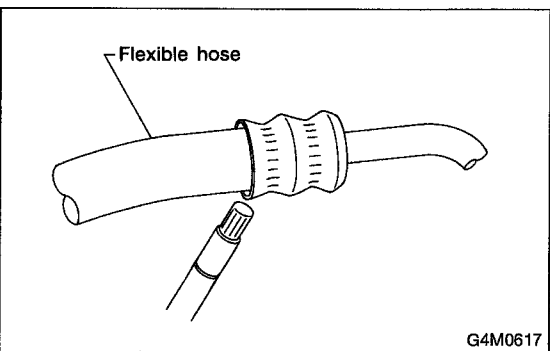
2) Check the area.

(1) Check the area where the fitting joins the tube.

(2) Check the area where the two parts of the fitting join each other.



(3) Check the area where the nut joins the tube.

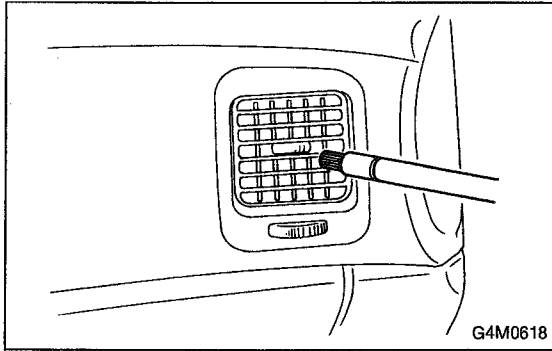


6. CHECK THE FLEXIBLE HOSES

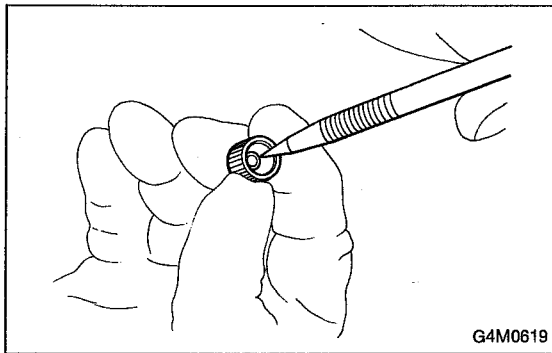
1) Visually inspect the rubber portions of the flexible hoses for cracking. Probe the rubber section, including the ends of any insulators or protectors which may cover sections of the rubber hose, and near the ends where the rubber meets the metal collar.

NOTE:

Be certain to move the probe slowly [approximately 25 mm (1 in) per second] when probing along any length of hose or tube.

**7. CHECK THE EVAPORATOR ASSEMBLY**

- 1) Use one or both of the following methods to check the evaporator assembly.
- 2) Remove the drain hose from the case drain nipple. Hold the probe at the end of the case drain nipple for at least 10 seconds. Be certain to reconnect the drain hose when finished.
- 3) With the ignition key in the "ACC" position, run the blower on high speed for 1 minute, then turn the blower off. Place the probe in the center instrument panel vent, and turn the blower on low speed for 1 to 2 seconds, then turn the blower off. Leave the probe in the vent for at least 10 seconds.

**8. CHECK THE SERVICE PORT CAPS**

Visually inspect the inside of the service port caps. Make sure the rubber seal is in place on the inside of the caps. Disconnect the gauges from the vehicle and install the service port caps.

9. Lubrication

A: ADJUSTMENT

1. SYSTEM OIL STABILIZATION

- 1) Prior to opening the refrigerant system for repairs (except compressor seizure) the system must be stabilized for correct oil replenishment.
- 2) Follow these procedures:
 - (1) Engine speed set to 1,500 rpm.
 - (2) A/C "ON".
 - (3) Air source to recirculate
 - (4) Blower 4th or high speed position
- Make sure the air entering the evaporator is above 26.7°C (80°F).
- The discharge (high) side pressure must be above 588 kPa (6 kg/cm², 85 psi).
- (5) Operate the A/C for 10 minutes.

2. SYSTEM DISCHARGE

Slowly, discharge the system starting with the high- pressure side until the pressure drops below 345 kPa (3.52 kg/cm², 50 psi), then open the low-pressure side.

B: REPLACEMENT

1. OIL REPLACEMENT

- 1) After stabilization and discharge, replace the component, adding the appropriate amount of oil (DH-PR) to the new component before installation.

Evaporator	114 ml (3.9 US fl oz, 4.0 Imp fl oz)
Receiver drier	5 ml (0.2 fl oz, 0.2 fl oz)
Condenser	2 ml (0.07 fl oz, 0.07 fl oz)
Hose	1 ml (0.03 fl oz, 0.04 fl oz)

- 2) If the compressor is replaced (after stabilization):
 - (1) Drain and measure the oil from the original compressor.
 - (2) Drain the oil from the replacement compressor and refill with the same amount that was drained from the original [20 ml (0.7 US fl oz, 0.7 Imp fl oz) minimum]. Always use DH-PR for the replacement oil.

10. Performance Test

A: INSPECTION

1. VEHICLE SET UP

In order to obtain meaningful test results, the vehicle must be set up to meet the following conditions:

- Vehicle in shade
- No wind
- All vehicle doors closed
- Front windows open
- Hood open
- Engine speed set at 1,500 rpm.
- A/C ON
- Temperature control dial — Maximum cold
- Air source — Recirculation
- Blower speed — 4th position (High)
- Operate A/C for 10 minutes (Minimum) before taking measurement.

2. MEASUREMENTS

After 10 minutes (Minimum) of A/C operation and using accurate test equipment, take the following measurements (in order):

- 1) Evaporator intake air temperature at recirculation door.
- 2) Evaporator discharge air temperature at center grill.
- 3) Condenser (Ambient) intake air temperature measured 0.9 m (3 ft) in front and in line with the center of the condenser
- 4) Suction (Low) side pressure
- 5) Discharge (High) side pressure

NOTE:

If only one thermometer is available; 1) take the ambient measurement first; then 2) the intake air; and 3) discharge air temperature.

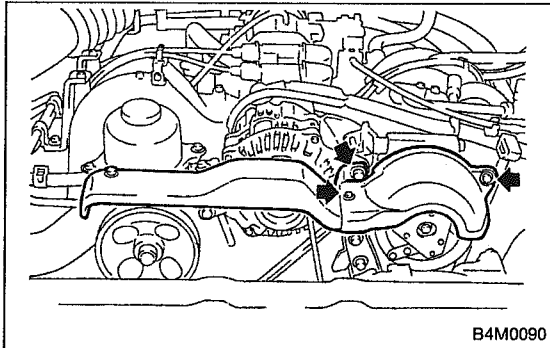
11. Compressor

A: INSPECTION

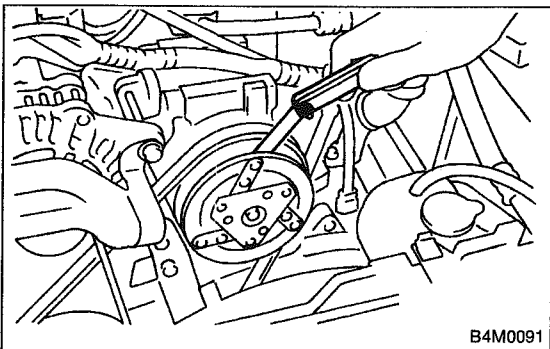
1. COMPRESSOR CLUTCH

NOTE:

- Compressor is a 5-vane rotary type. When trouble occurs, replace compressor as a single unit.
- Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.



1) Remove belt cover.



2) Check that clearance between drive plate and pulley over the entire perimeter is within specifications.

Clearance:

$0.45 \pm 0.15 \text{ mm}$ ($0.0177 \pm 0.0059 \text{ in}$)

- 3) Check that voltage applied to magnetic coil is at least 10.5 volts.
- 4) When noise is noted, check that it originates in either compressor or pulley bearing.

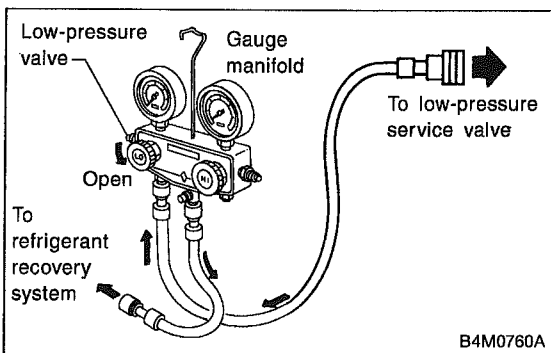
B: REMOVAL

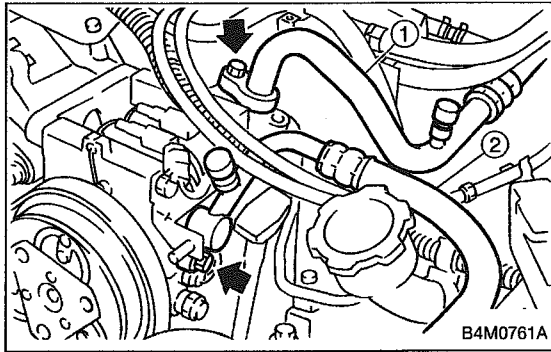
- 1) Disconnect ground cable from battery.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>

- (1) Fully close low-pressure valve of manifold gauge.
- (2) Connect low-pressure charging hose of manifold gauge to low-pressure service valve.
- (3) Open low-pressure manifold gauge valve slightly, and slowly discharge refrigerant from system.

CAUTION:

Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.

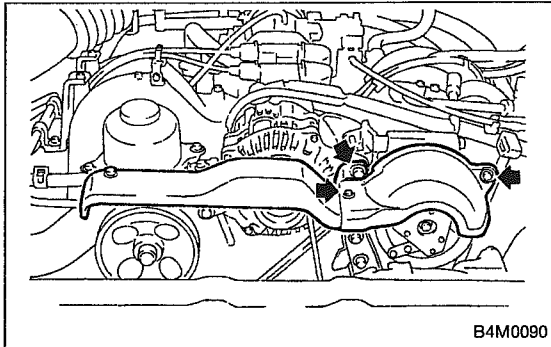




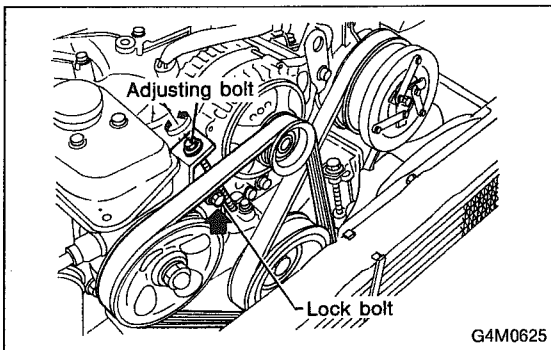
- 3) Remove low-pressure hose ① (Flexible hose Ps) and high-pressure hose ② (Flexible hose Pd).

CAUTION:

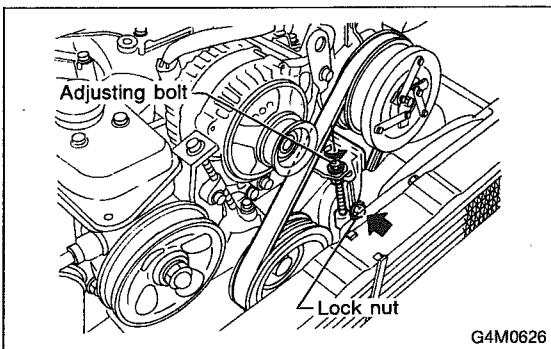
- Be careful not to lose O-ring of low-pressure hose.
- Plug the opening to prevent foreign matter from entering.



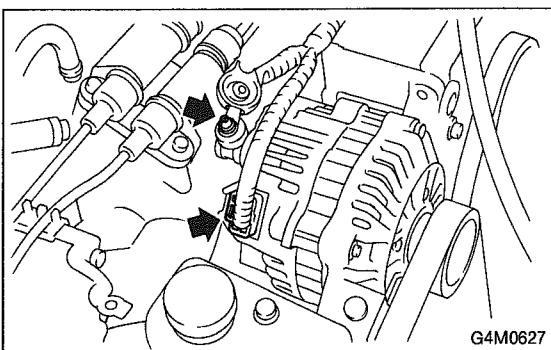
- 4) Compressor belt cover and generator belt cover: Remove bolts which secure belt covers.



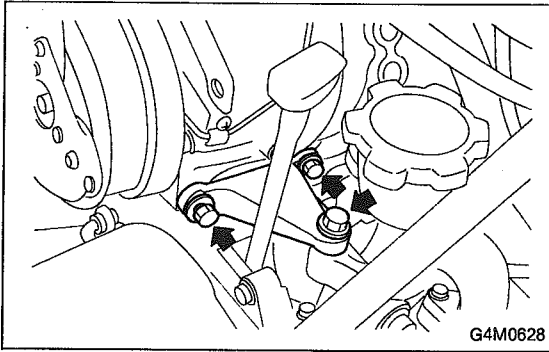
- 5) Remove alternator V-belt:
- (1) Loosen lock bolt on generator bracket.
 - (2) Turn adjusting bolt and remove V-belt.



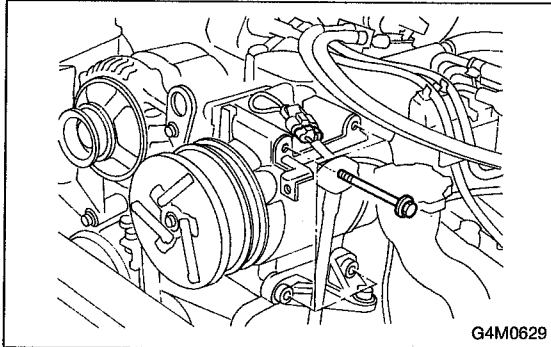
- 6) Remove compressor V-belt:
- (1) Loosen lock bolt on idler pulley.
 - (2) Turn adjusting bolt and remove V-belt.



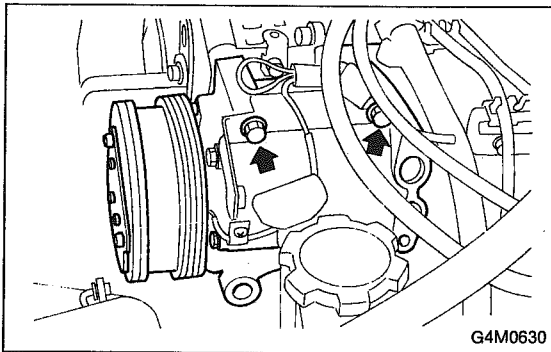
- 7) Disconnect alternator harness.



- 8) Disconnect compressor harness:
Disconnect compressor harness from body harness.
- 9) Remove lower bracket:
Remove bolts which secure lower compressor bracket.



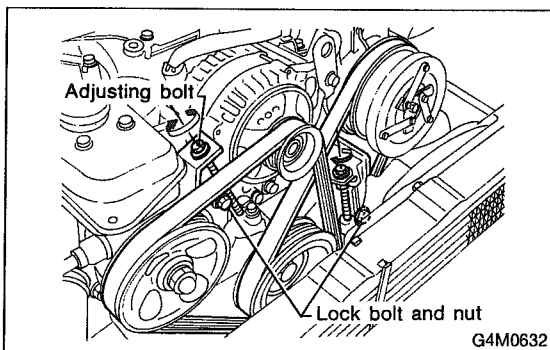
- 10) Remove compressor:
 - (1) Remove bolts which secure compressor.
 - (2) Remove compressor from bracket.



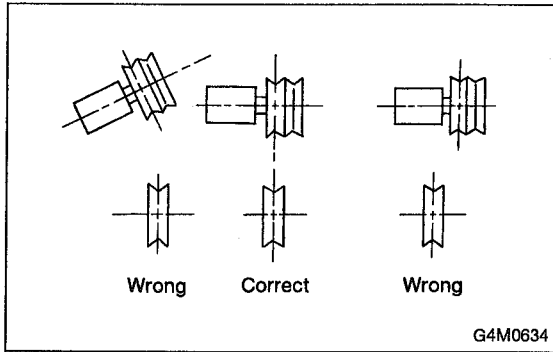
C: INSTALLATION

- 1) Install compressor:
Install compressor on bracket.

- 2) Connect compressor harness.
- 3) Connect alternator harness.
- 4) Install compressor V-belt (Rear):
After adjusting belt tension, tighten tension pulley lock bolt securely.



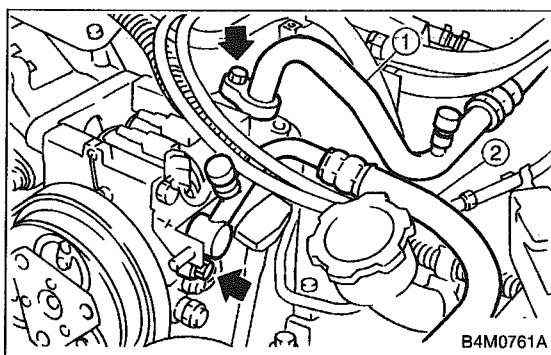
- 5) Install alternator V-belt:
After adjusting V-belt tension, tighten generator bracket lock bolt securely.
- 6) Check drive belt tension and adjust it if necessary by changing alternator position and/or idler pulley position.



CAUTION:

- Ensure that the V-belt is aligned correctly. If it is not, check for loose bolts.
- The V-belt should not be too tight or too loose. A belt which is too tight may break bearing or cause gas to leak from the shaft seal. A belt which is too loose slips, thereby causing the belt cut.
- After completing the compressor installation and testing the system operation, check and adjust the tension of both V-belts again.

Pulley arrangement	Tension mm (in)/98N (10 kg, 22 lb)	
	A	B
<p>Figures in table refer to the number of grooves in pulleys. C/P: Crankshaft pulley ALT: Alternator pulley P/S: Power steering oil pump pulley A/C: Air conditioner compressor pulley I/P: Idler pulley</p>	<p>*New belt: 7.0 – 9.0 (0.276 – 0.354) Existing belt: 9.0 – 11.0 (0.354 – 0.433)</p>	<p>*New belt: 7.5 – 8.5 (0.295 – 0.335) Existing belt: 9.0 – 10.0 (0.354 – 0.394)</p>
<p>*When replacing belts with new ones, adjust tensions to specification and then readjust to the same specification after running engine for 5 minutes.</p>		



- 7) Install high-pressure hose ② (Flexible hose Pd) and low-pressure hose ① (Flexible hose Ps); Connect high-pressure hose and low-pressure hose with compressor.

CAUTION:

Be sure to apply compressor oil to the periphery of O-ring.

- 8) Install belt cover.

CAUTION:

- After installing belt cover, make sure it is not misaligned or twisted.
- After installing belt cover, check the clearance between pulley and belt cover.

- 9) Connect ground cable to negative terminal of battery.
- 10) Charging refrigerant. <Ref. to 4-7 [W700].>

12. Condenser

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Remove front grille.

- 4) Remove the radiator bracket.
- 5) Disconnect high-pressure hose ① and high-pressure pipe ② from condenser.

- 6) Remove the two bolts which secure condenser. While lifting condenser, remove it through space between radiator and radiator panel.

- 7) The condenser should be installed in the reverse order in which it was removed.

When installing the condenser, pay attention to the following:

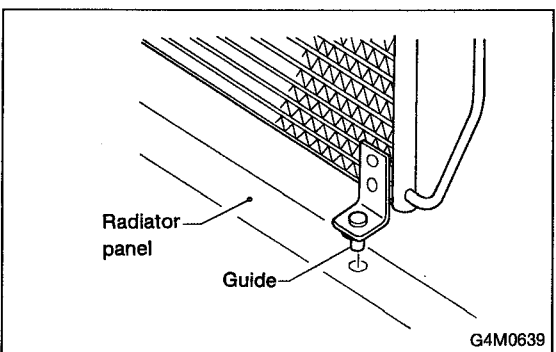
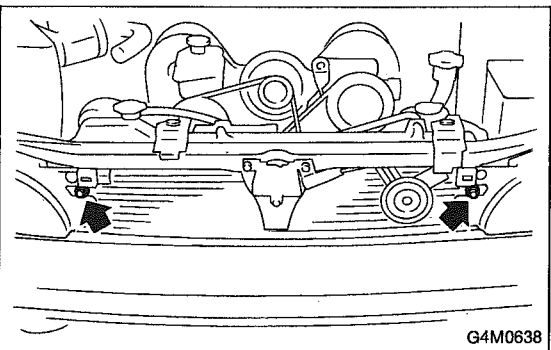
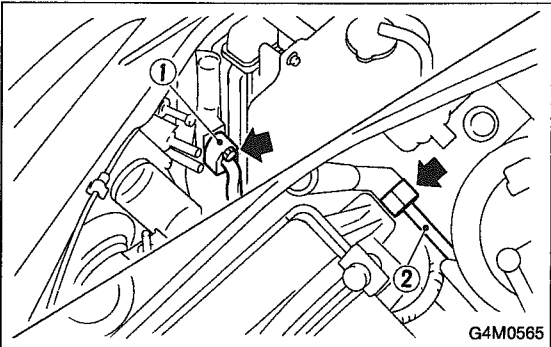
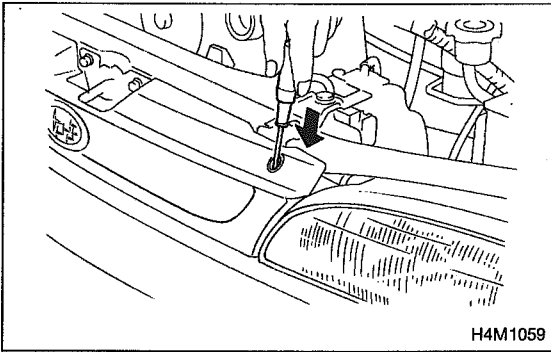
CAUTION:

Before connecting the pipe, be sure to apply oil to the periphery of O-ring.

NOTE:

After installing condenser, ensure that guide on lower side of condenser is inserted into hole in radiator panel. Tighten attaching bolts.

- 8) Charge refrigerant. <Ref. to 4-7 [W700].>



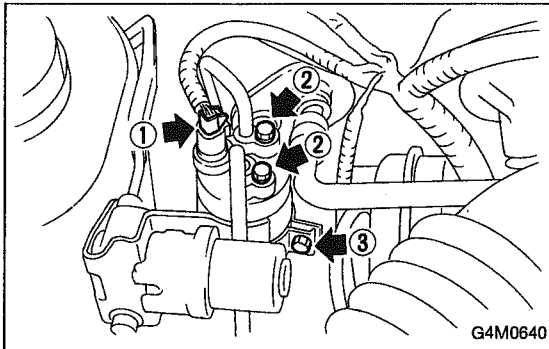
B: INSPECTION

1) Make sure the condenser fins are free from dust and insects. If the fins are clogged, clean by blowing air or water through them.

NOTE:

To prevent dust and water from getting into the condenser, this work must be done when the condenser is installed in an actual vehicle.

2) Check the condenser to see if it shows any sign of oil. If oil ooze or gas leak occur from the condenser, replace it with a new one.

**13. Receiver Drier****A: REMOVAL AND INSTALLATION**

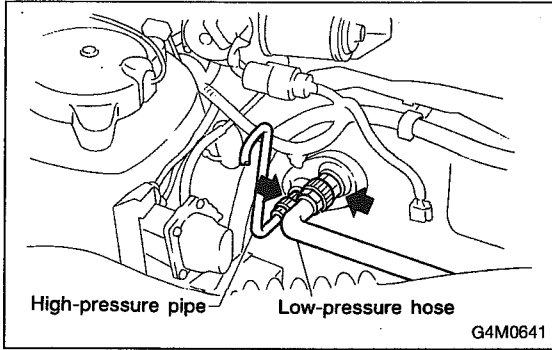
- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Disconnect pressure switch harness ①.
- 4) Disconnect pipes ②.
- 5) Remove mounting bolt ③ and remove receiver drier.

CAUTION:

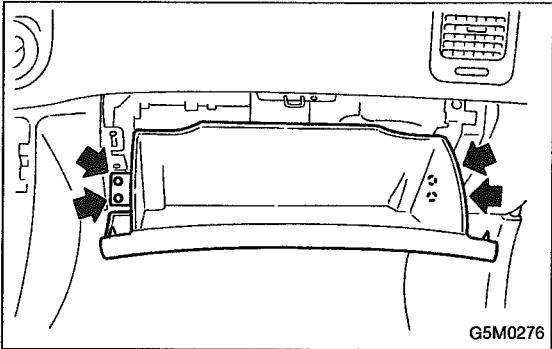
The receiver drier contains a desiccant. Be sure to put a blind plug in the detached receiver drier to protect it from moisture.

- 6) Install the receiver drier in the reverse order of removal.
- 7) Charge refrigerant. <Ref. to 4-7 [W700].>

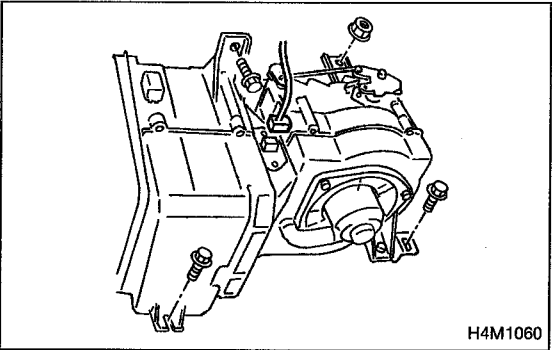
14. Intake Unit with Evaporator

**14. Intake Unit with Evaporator****A: REMOVAL AND INSTALLATION**

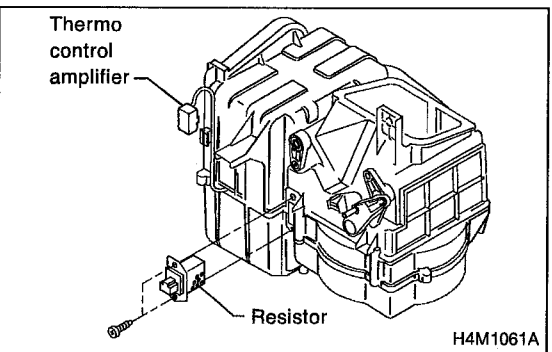
- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Disconnect discharge pipe, suction pipe and grommets.



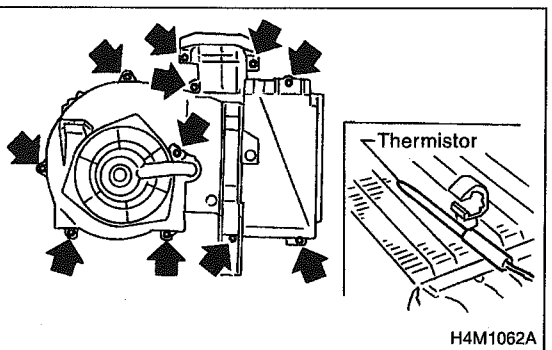
- 4) Remove glove box.



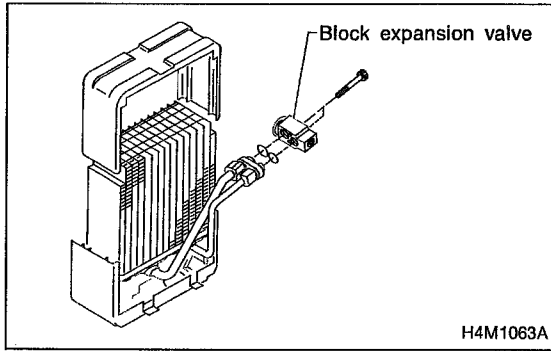
- 5) Disconnect the harness connector from intake unit.
- 6) Disconnect drain hose.
- 7) Remove intake unit mounting bolt and nut.
- 8) Install the intake unit in the reverse order of removal.
- 9) Charge refrigerant. <Ref. to 4-7 [W700].>

**B: DISASSEMBLY AND ASSEMBLY**

- 1) Remove resistor assembly and remove thermo control amplifier from intake unit case.



- 2) Remove some screws then separate intake unit case.
- 3) Remove thermistor from clip with the evaporator.

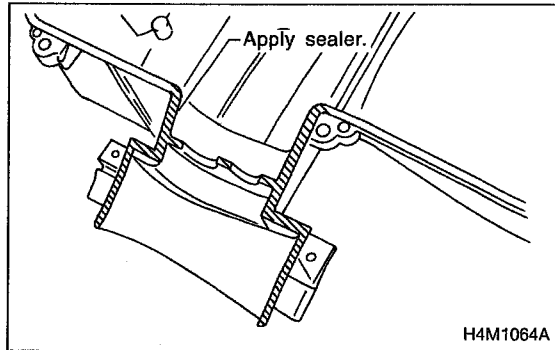


- 4) Remove the block expansion valve from pipes.
- 5) Check to see if the evaporator fins are clogged. If they are, clean them with compressed air.

CAUTION:

Water must never be used to clean the evaporator.

- 6) Check parts that have been removed for cracks or scratches, and repair or replace them with new ones, if necessary.



- 7) Before assembling intake unit, apply sealer to flange of intake unit case.

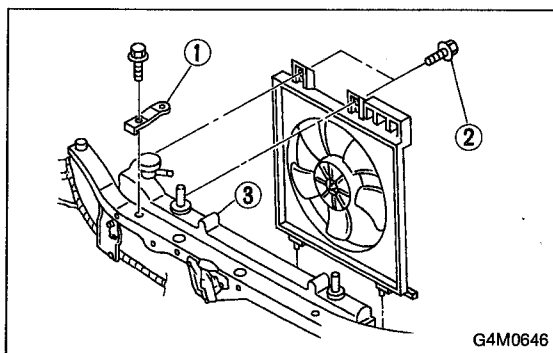
Sealer:

THREE BOND 1215 or equivalent

- 8) Reassemble the intake unit in the reverse order of disassembly.

NOTE:

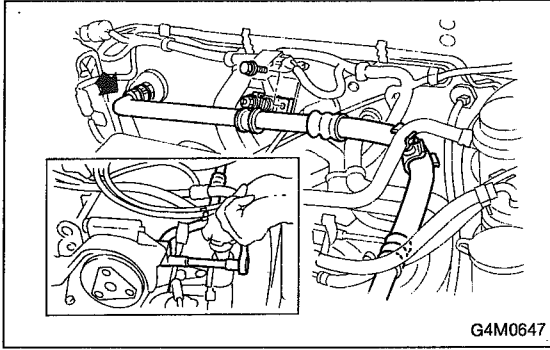
Confirm that the O-ring is inserted in the specified position.



15. Condenser Fan Assembly

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Disconnect harness connector from fan motor.
- 3) Remove radiator bracket (RH) ① and remove condenser fan bolt ② from radiator ③.
- 4) Pull condenser fan assembly.
- 5) Install the condenser fan assembly in the reverse order of removal.



16. Flexible Hose

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery negative terminal.
- 2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
- 3) Remove low-pressure hose:

CAUTION:

With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.

- The flexible hoses should be free from twists and tension after they have been connected.
- The flexible hoses must not be bent or twisted forcibly.

- (1) Remove hose attaching bolts.
- (2) Remove hose clip.

CAUTION:

Plug the opening to prevent foreign matter from getting in.

- (3) Disconnect the connector at evaporator unit.

- 4) Remove high-pressure hose:

CAUTION:

With the following cautions, replace flexible hoses with new ones if they are damaged or swollen.

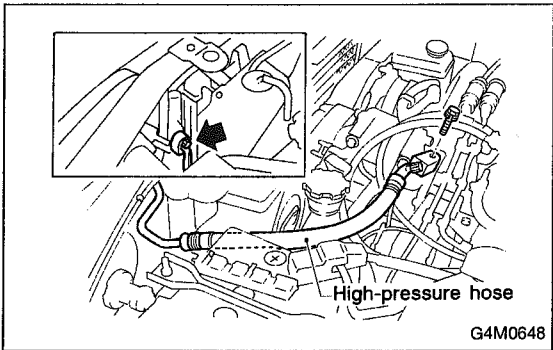
- The flexible hoses should be free from twists and tension after they have been connected.
- The flexible hoses must not be bent or twisted forcibly.

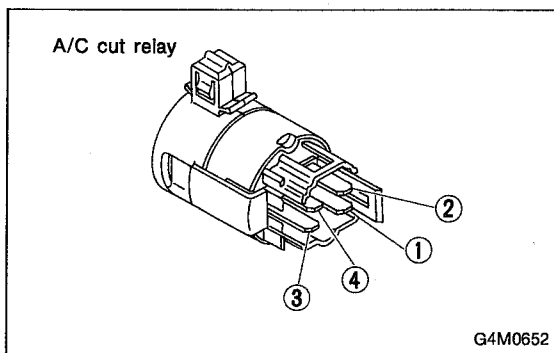
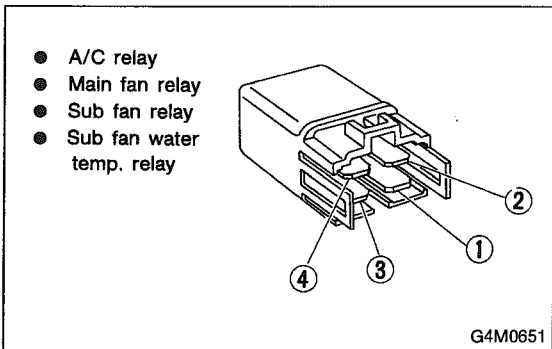
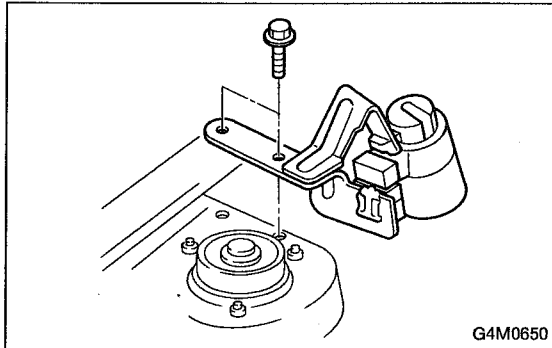
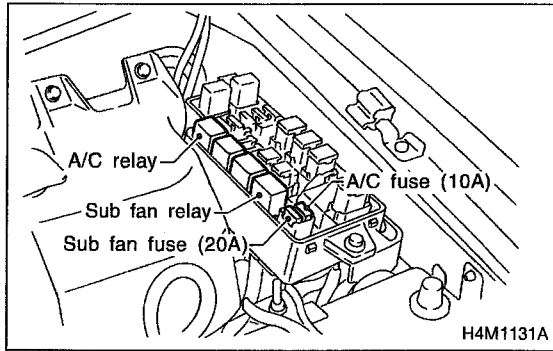
- (1) Disconnect hose attaching bolt (compressor side).
- (2) Disconnect hose attaching bolt (condenser side).

CAUTION:

Plug the opening to prevent foreign matter from getting in.

- 5) Installation is in the reverse order of removal.
- 6) Charge refrigerant. <Ref. to 4-7 [W700].>





A/C relay Main fan relay Sub fan relay Sub fan water temp. relay	A/C cut relay
About 100Ω between ① and ②	About 120Ω between ① and ②
∞Ω between ③ and ④	∞Ω between ③ and ④

G4M0653

17. Relay and Fuse

A: LOCATION

Relays used with A/C system are located as shown in figure.

- A/C relay
- Sub fan (condenser fan) relay
- Fuses (10 A and 20 A)

- A/C cut relay

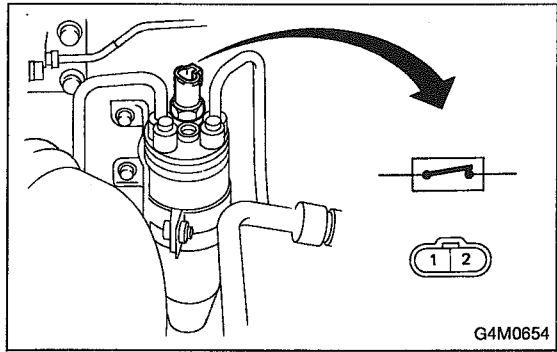
A/C cut relay is attached by a bolt to top of front suspension bracket (RH) via a bracket.

B: INSPECTION

1) Check conduction with a circuit tester (ohm range) according to the following table in figure.

2) Replace relays which do not meet specifications.

18. Pressure Switch (Dual Switch)



18. Pressure Switch (Dual Switch)

A: INSPECTION

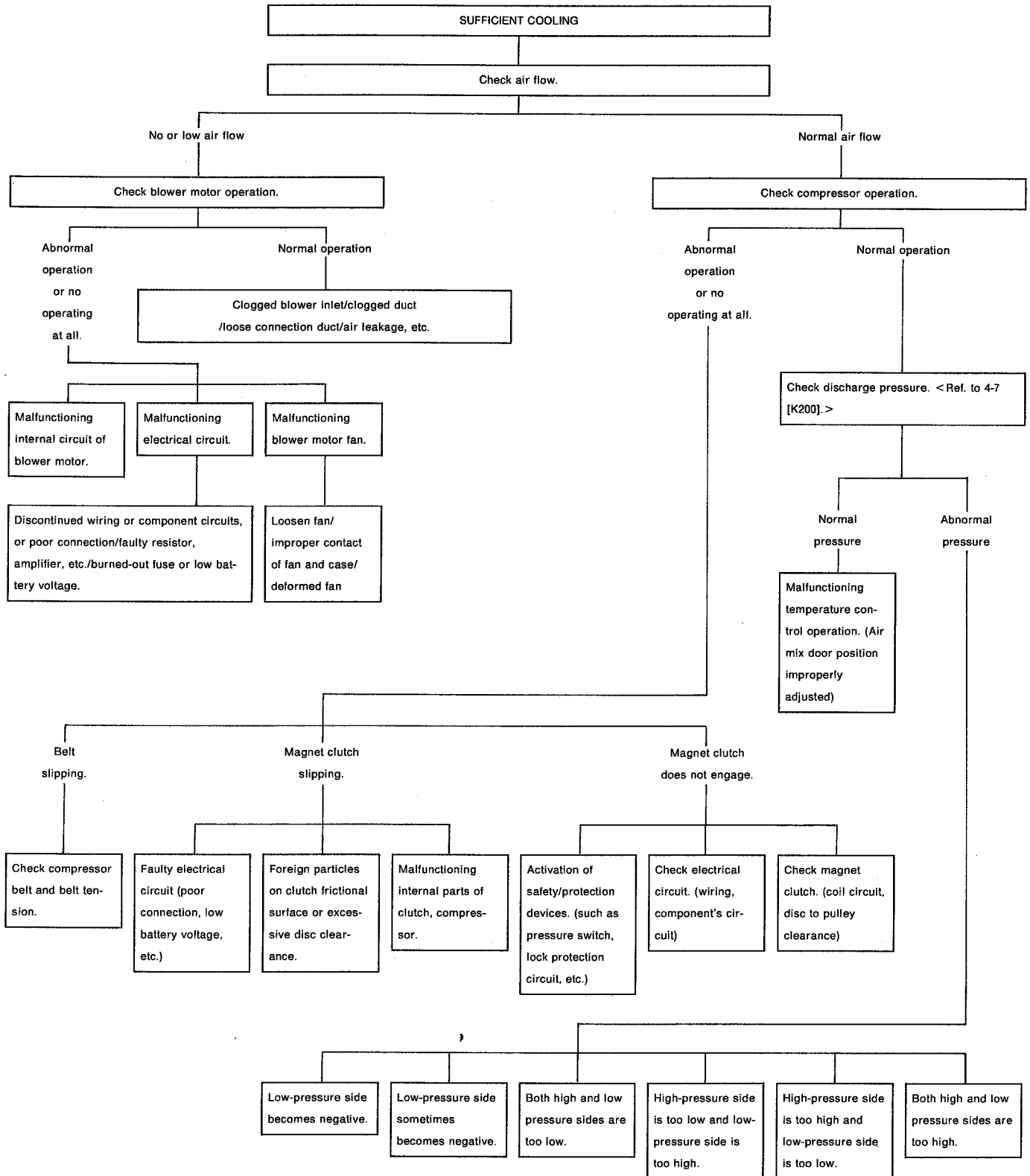
NOTE:

Pressure switch is attached to receiver dryer. It has two built-in switches.

- 1) Remove cap from high-pressure line service valve, and connect gauge manifold to service valve.
- 2) Disconnect pressure switch harness connector, and check pressure switch for proper ON-OFF operation. Use a circuit tester.

	Terminal	Operation	High-pressure side line pressure kPa (kg/cm ² , psi)
High and low pressure switch	① — ②	Turns OFF.	Increasing to 2,746 ± 98 (28 ± 1, 398 ± 14)
			Decreasing to 177 ± 29 (1.8 ± 0.3, 26 ± 4)
		Turns ON.	Increasing to 186 ⁺³⁹ ₋₂₅ (1.9 ^{+0.4} _{-0.25} , 27 ^{+5.7} _{-3.6})
			Decreasing to 2,059 ± 196 (21 ± 2, 299 ± 28)

1. Air Conditioning System Diagnosis



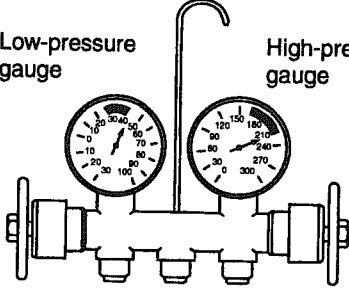
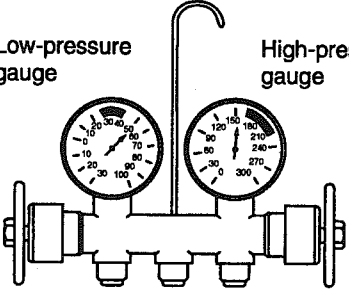
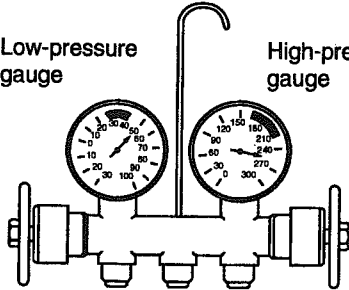
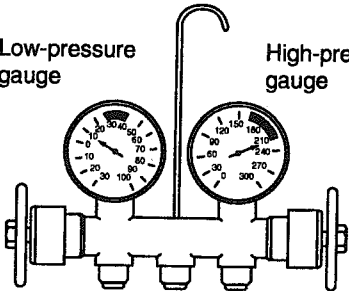
2. Performance Test Diagnosis

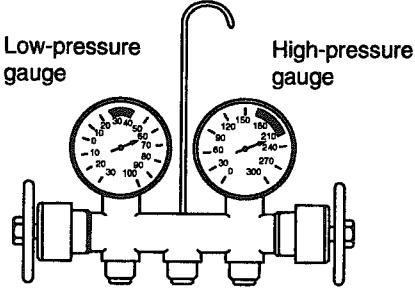
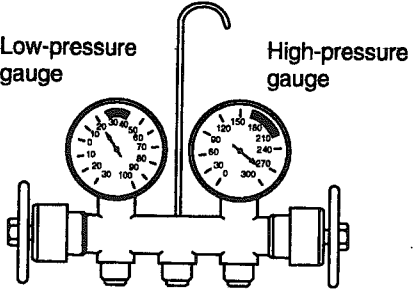
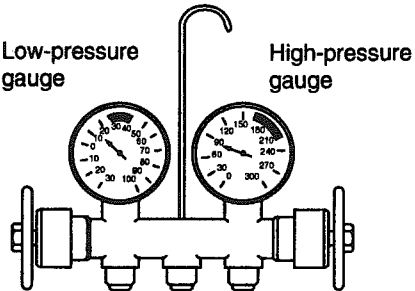
If various conditions caused to other air conditioning system, the characteristics revealed on manifold gauge reading are shown in the following.

As to the method of a performance test, refer to the item of "Performance Test".

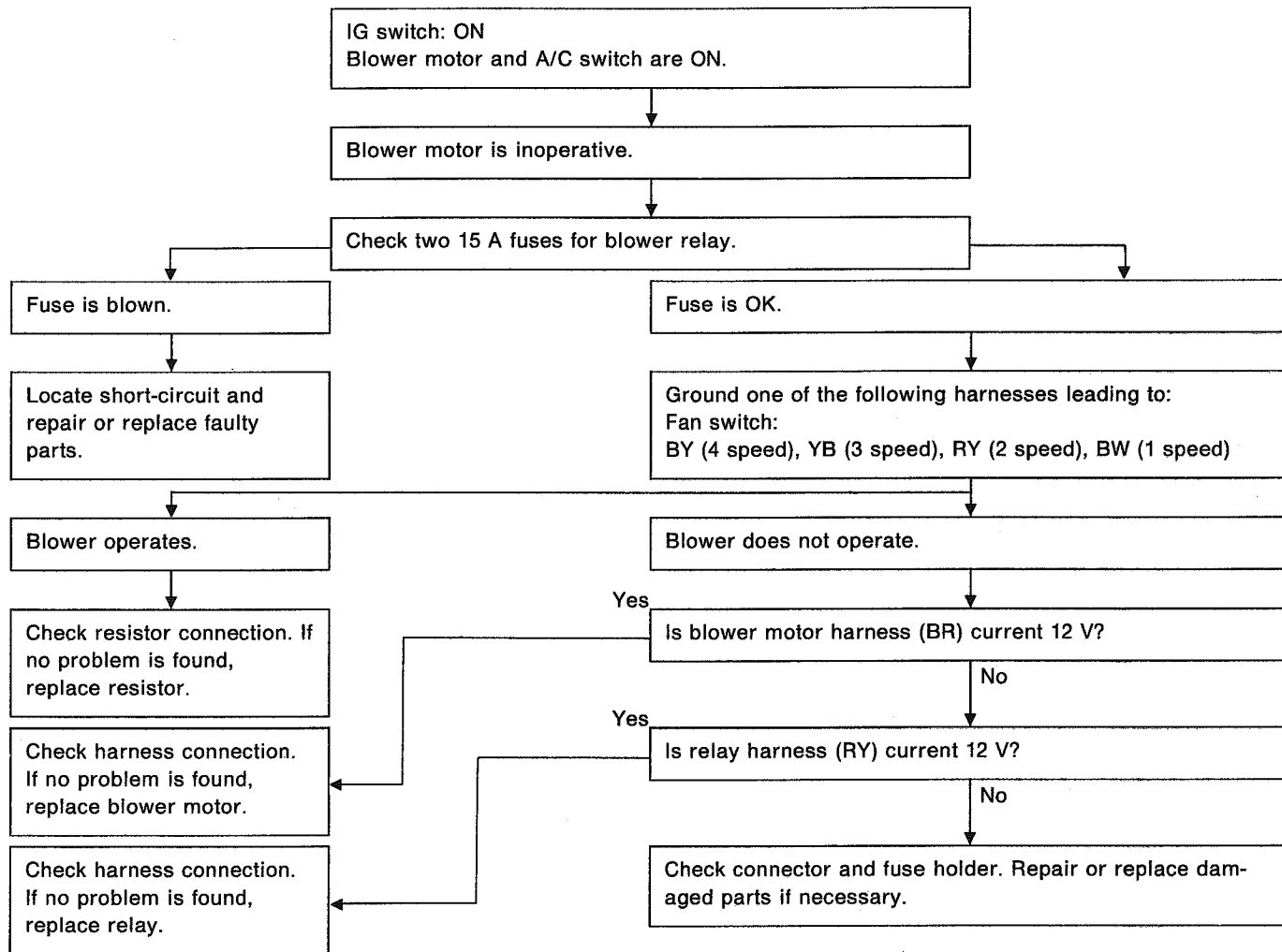
Each shaded area on the following tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (91°F).

Condition		Probable cause	Corrective action
<div style="border: 1px solid black; padding: 2px;">INSUFFICIENT REFRIGERANT CHARGE</div> <div style="text-align: center;"> <p>Low-pressure gauge High-pressure gauge</p> </div> <div style="text-align: right; font-size: small;">G4M0673</div>	Insufficient cooling.	Refrigerant is small, or leaking a little.	<ol style="list-style-type: none"> 1. Leak test. 2. Repair leak. 3. Charge system. <p>Evacuate, as necessary, and recharge system.</p>
<div style="border: 1px solid black; padding: 2px;">ALMOST NO REFRIGERANT</div> <div style="text-align: center;"> <p>Low-pressure gauge High-pressure gauge</p> </div> <div style="text-align: right; font-size: small;">G4M0674</div>	No cooling action.	Serious refrigerant leak.	<p>Stop compressor immediately.</p> <ol style="list-style-type: none"> 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
<div style="border: 1px solid black; padding: 2px;">FAULTY EXPANSION VALVE</div> <div style="text-align: center;"> <p>Low-pressure gauge High-pressure gauge</p> </div> <div style="text-align: right; font-size: small;">G4M0675</div>	Slight cooling. Sweating or frosted expansion valve inlet.	<p>Expansion valve restricts refrigerant flow.</p> <ul style="list-style-type: none"> ● Expansion valve is clogged. ● Expansion valve is inoperative. ● Valve stuck closed. Thermal bulb has lost charge. 	<p>If valve inlet reveals sweat or frost:</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. <p>If valve does not operate:</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

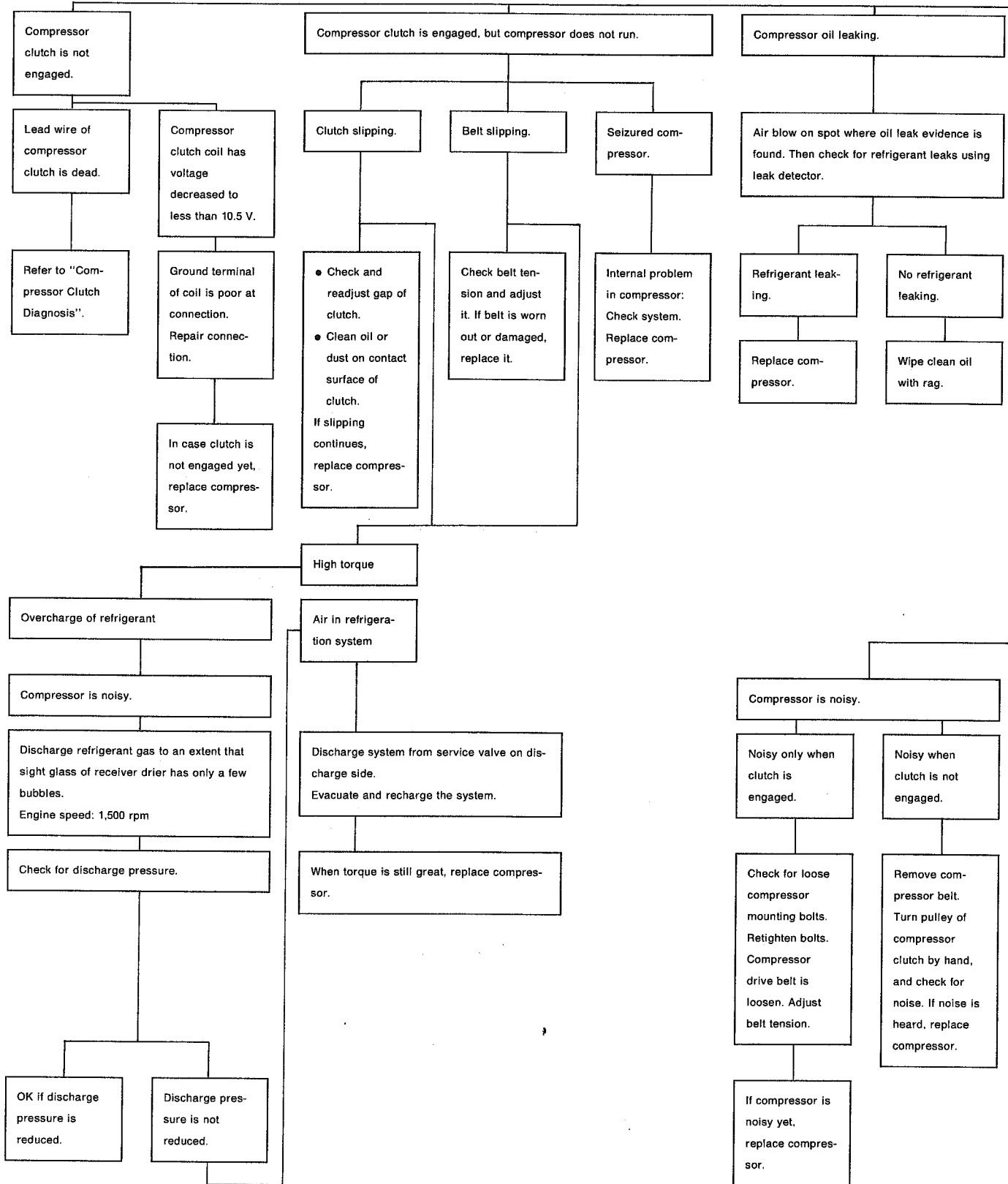
Condition	Probable cause	Corrective action
<p>Low-pressure gauge</p> <p>High-pressure gauge</p>  <p>G4M0676</p>  <p>G4M0677</p>	<p>Insufficient cooling. Sweated suction line. No cooling. Sweating or frosted suction line.</p>	<p>Expansion valve allows too much refrigerant through evaporator. Faulty seal of O-ring in expansion valve.</p> <p>Check valve for operation. If suction side does not show a pressure decrease, replace valve. 1. Discharge system. 2. Remove expansion valve and replace O-ring. 3. Evacuate and replace system.</p>
<p>AIR IN SYSTEM</p> <p>Low-pressure gauge</p> <p>High-pressure gauge</p>  <p>G4M0678</p>	<p>Insufficient cooling.</p>	<p>Air mixed with refrigerant in system.</p> <p>1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.</p>
<p>MOISTURE IN SYSTEM</p> <p>Low-pressure gauge</p> <p>High-pressure gauge</p>  <p>G4M0679</p>	<p>After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As warning of this, reading shows 39 kPa (0.4 kg/cm², 6 psi) vibration.</p>	<p>Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.</p> <p>1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely (Repeat 30 minute evacuating three times.). 4. Recharge system.</p>

Condition	Probable cause	Corrective action
<p>FAULTY CONDENSER</p>  <p>Low-pressure gauge</p> <p>High-pressure gauge</p> <p>G4M0680</p>	<p>No cooling action. Engine may overheat. Suction line is very hot.</p>	<p>Condenser is often found not functioning well.</p> <ul style="list-style-type: none"> ● Check condenser cooling fan. ● Check condenser for dirt accumulation. ● Check engine cooling system for overheat. ● Check for refrigerant overcharge. <p>If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.</p>
<p>HIGH-PRESSURE LINE BLOCKED</p>  <p>Low-pressure gauge</p> <p>High-pressure gauge</p> <p>G4M0681</p>	<p>Insufficient cooling. Frosted high-pressure liquid line.</p>	<p>Drier clogged, or restriction in high-pressure line.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Remove receiver drier or strainer and replace it. 3. Evacuate and charge system.
<p>FAULTY COMPRESSOR</p>  <p>Low-pressure gauge</p> <p>High-pressure gauge</p> <p>G4M0682</p>	<p>Insufficient cooling.</p>	<p>Internal problem in compressor, or damaged gasket and valve.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Remove and check compressor. 3. Repair or replace compressor. 4. Check oil level. 5. Replace receiver drier. 6. Evacuate and charge system.

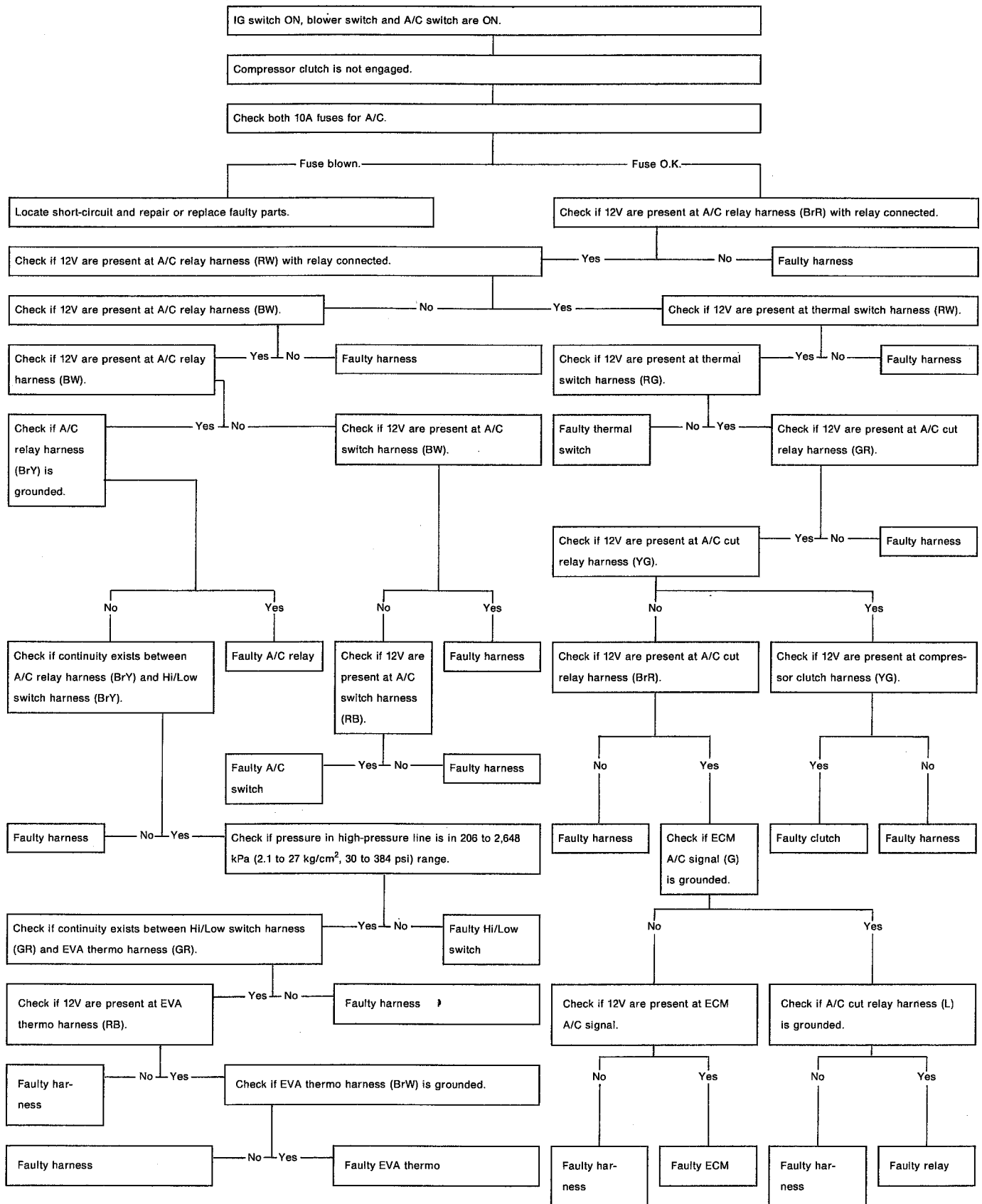
3. Blower Motor Diagnosis



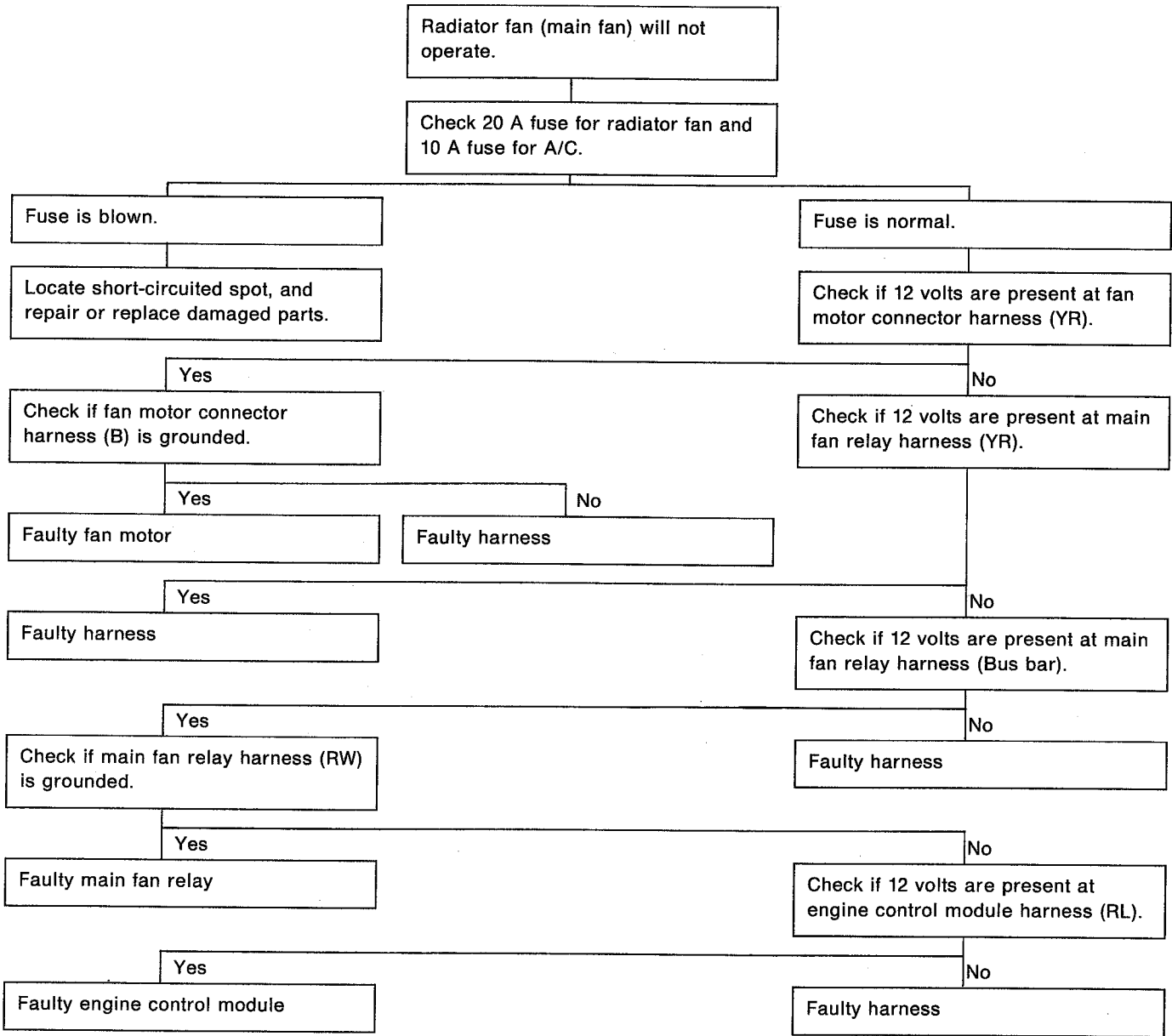
4. Compressor Diagnosis



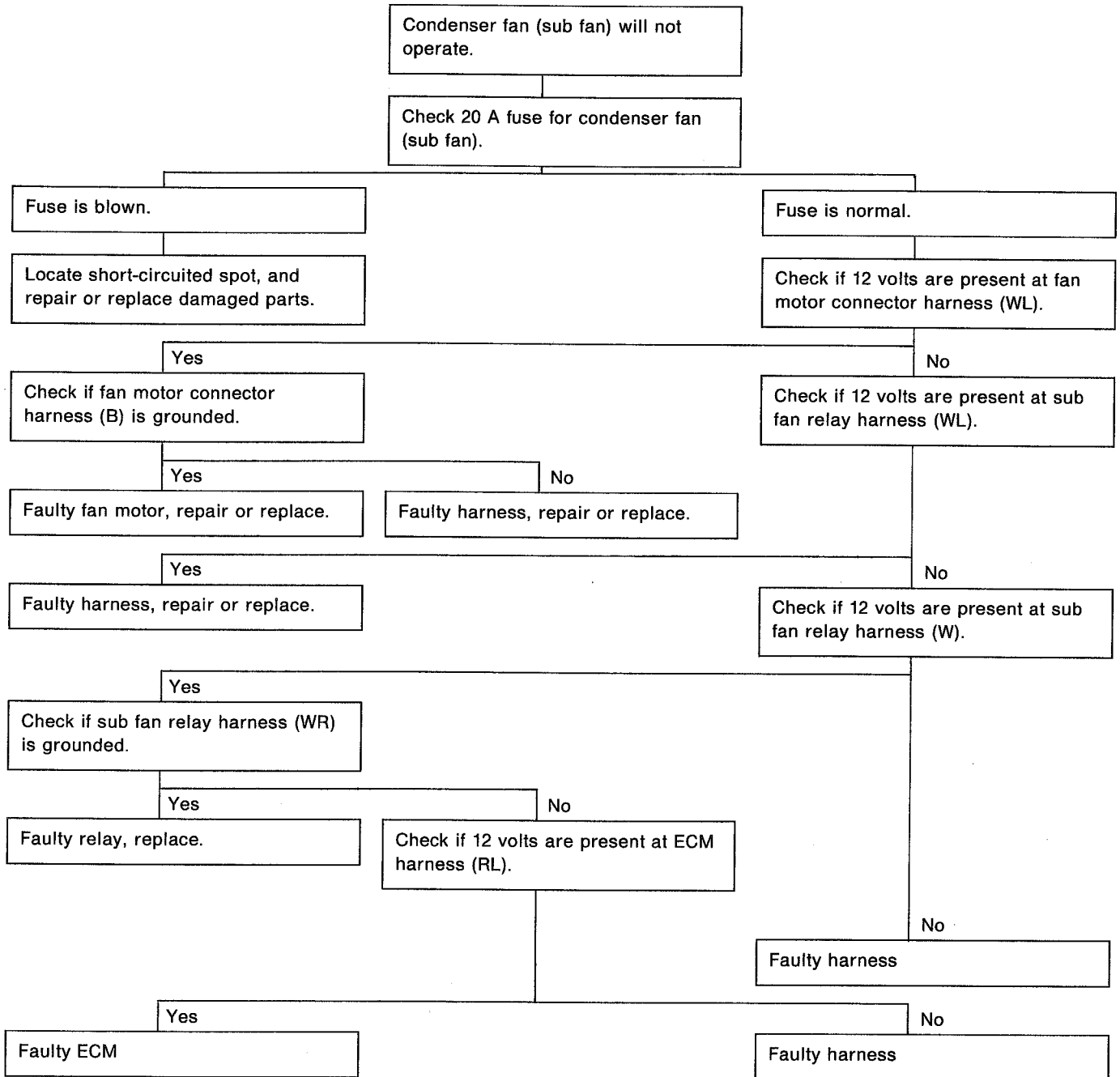
5. Compressor Clutch Diagnosis



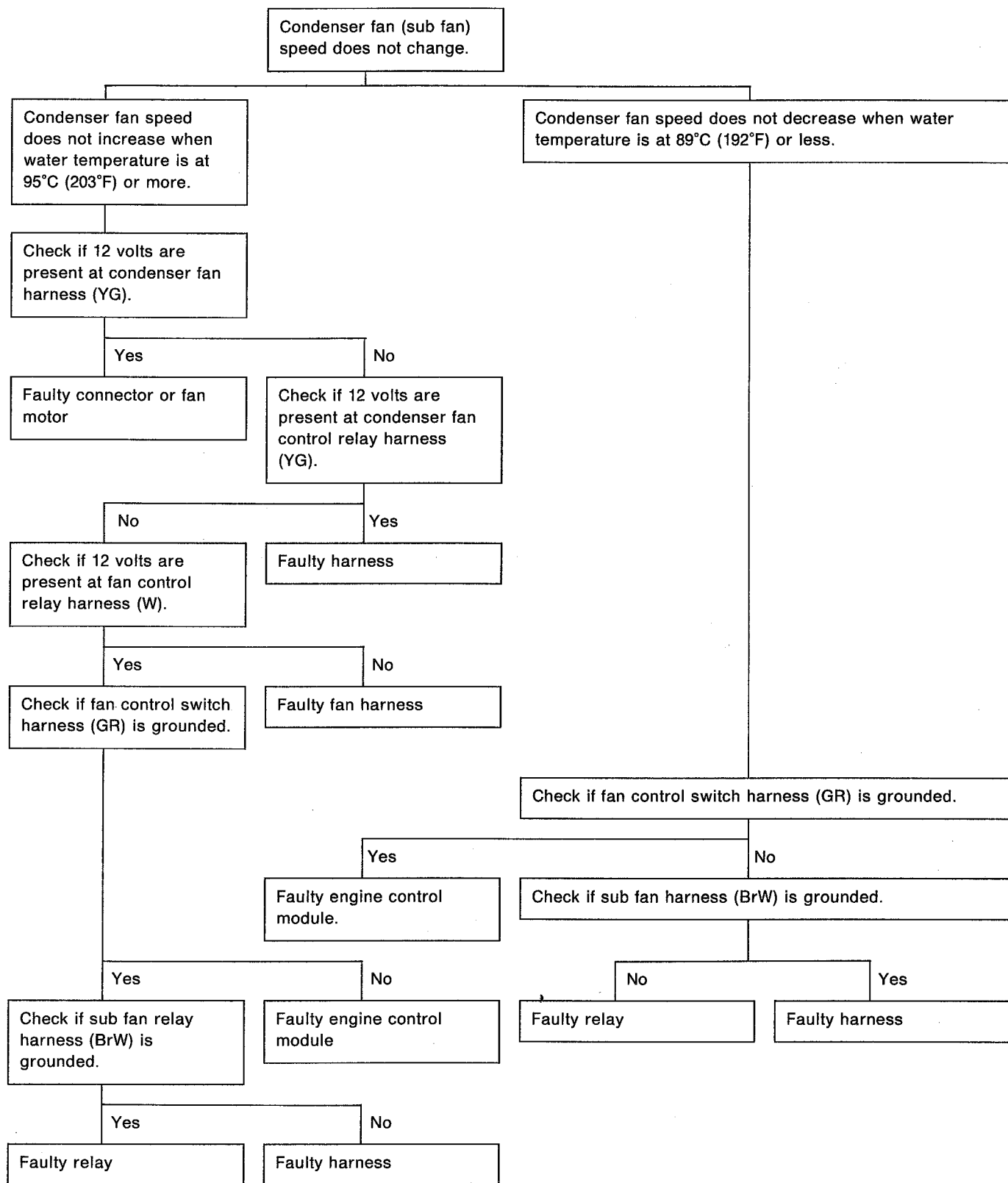
6. Radiator Fan (Main Fan) Diagnosis









7. Condenser Fan (Sub Fan) Diagnosis (I)

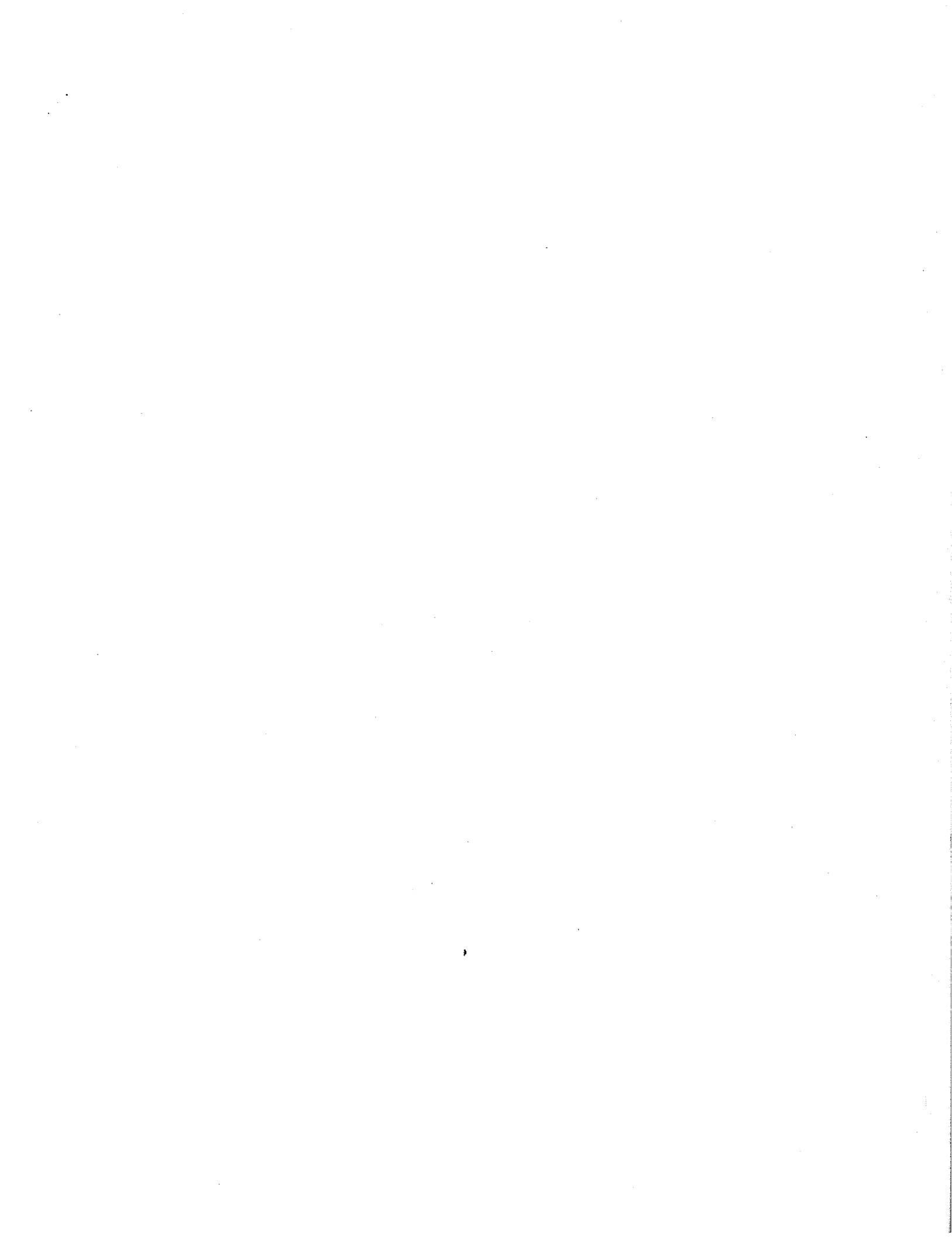


8. Condenser Fan (Sub Fan) Diagnosis (II)



BODY SECTION

			
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BODY AND EXTERIOR

5-1

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1. Supplemental Restraint System "Airbag"

Airbag system wiring harness is routed on and along body panels.

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 repairing the body panel.**

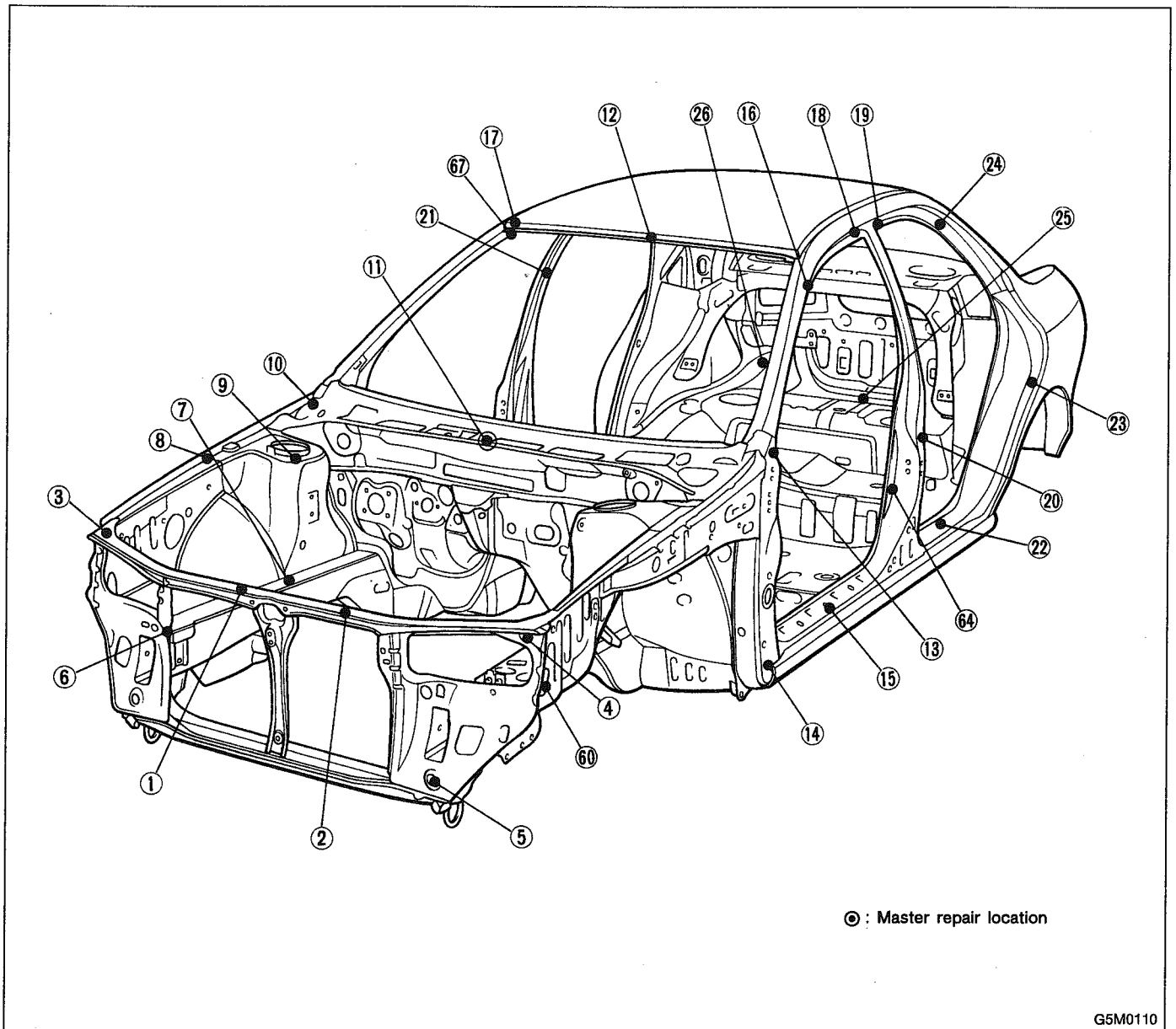
2. Body Datum Points

Various master repair locations are established as datum points used during body repairs. In addition, guide holes, locators and indents are provided to facilitate panel replacement and achieve alignment accuracy.

NOTE:

Left and right datum points are all symmetrical to each other.

A: ENGINE COMPARTMENT AND ROOM
1. SEDAN AND WAGON

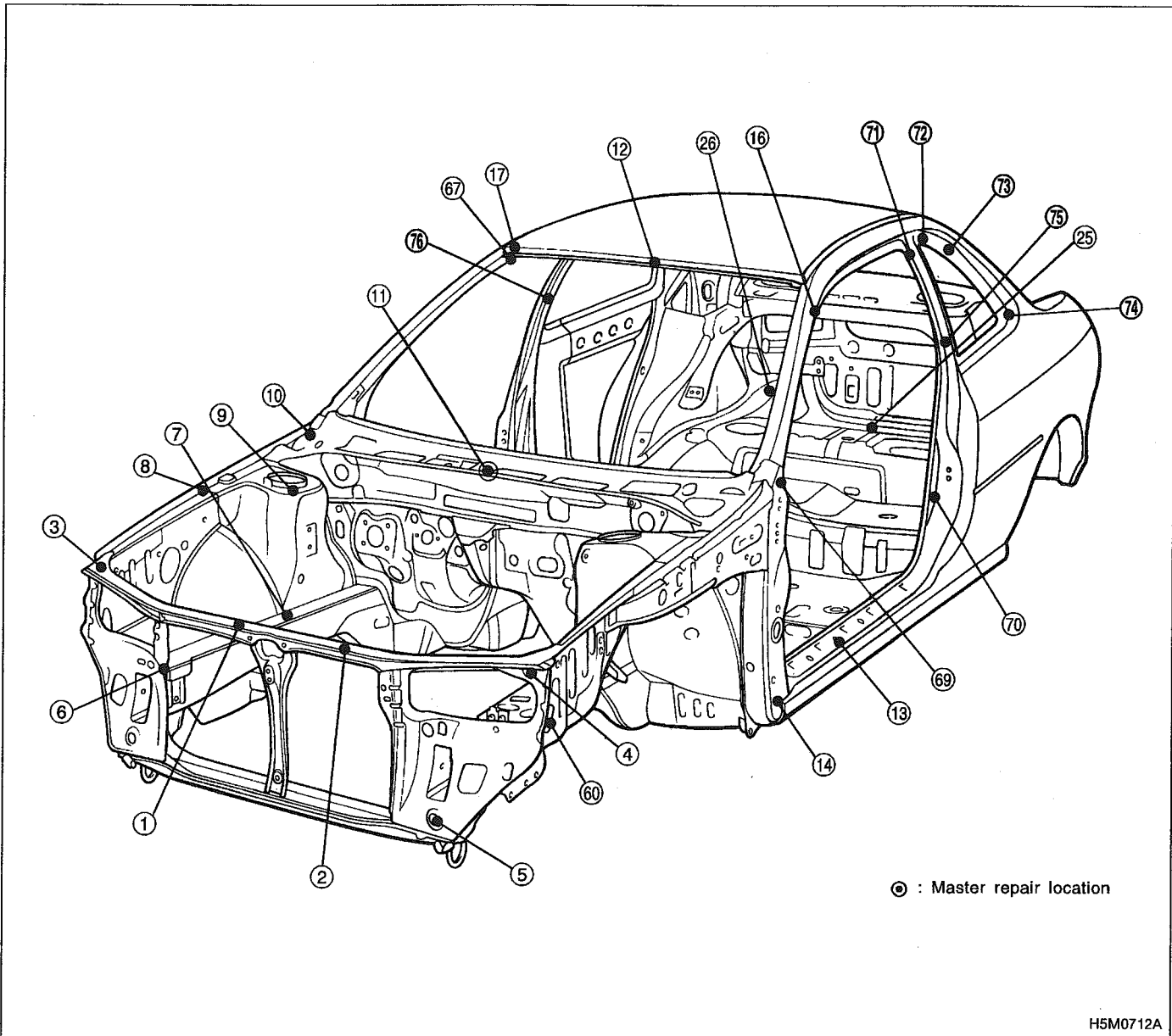


© : Master repair location

G5M0110

- | | |
|--|--|
| ① Radiator panel (UPR) repair bolt hole M8 (Right) | ⑮ Wax coat hole, 20 mm (0.79 in) dia. (Symmetrical) |
| ② Radiator panel (UPR) repair bolt hole M8 (Left) | ⑯ Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) |
| ③ Fender attaching bolt hole M6 (Symmetrical) | ⑰ Sun visor attaching hole 20 mm (0.79 in) dia. (Symmetrical) |
| ④ Headlight attaching bolt hole M6 (Symmetrical) | ⑱ Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) |
| ⑤ Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical) | ⑲ Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) |
| ⑥ Front bumper mounting hole 14 x 17 mm (0.55 x 0.67 in) dia. (Symmetrical) | ⑳ Center pillar gauge hole 10 mm (0.39 in) dia. (Symmetrical) |
| ⑦ Front crossmember attaching bolt hole 12.4 mm (0.488 in) dia. (Symmetrical) | ㉑ Belt anchor attaching bolt hole (Symmetrical) |
| ⑧ Fender attaching bolt hole M6 (Symmetrical) | ㉒ Wax coat hole, 20 mm (0.79 in) dia. (Symmetrical) |
| ⑨ Front strut mounting hole 10 mm (0.39 in) dia. (Symmetrical) | ㉓ Rear door switch attaching hole 20 mm (0.79 in) dia. (Symmetrical) |
| ⑩ Hood hinge attaching bolt hole M8 (Symmetrical) | ㉔ Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) |
| ⑪ Cowl panel mounting hole 5 mm (0.20 in) dia. (Located in center of vehicle.) | ㉕ Spare tire attaching bolt hole M8 |
| ⑫ Front rail (Inner) mirror attaching bolt hole 8 mm (0.31 in) dia. | ㉖ Air draw hole 7 mm (0.28 in) dia. (Symmetrical) |
| ⑬ Fender attaching bolt hole M6 (Symmetrical) | ⑳ Fender attaching bolt hole M6 (Symmetrical) |
| ⑭ Front pillar gauge hole 20 mm (0.79 in) dia. (Symmetrical) | ㉘ Door switch attaching hole 20 mm (0.79 in) dia. (Symmetrical) |
| | ⑶ Front glass attaching hole |
| | Right 6.5 mm (0.256 in) dia. |
| | Left 6.5 x 10 mm (0.256 x 0.39 in) dia. |

2. COUPE



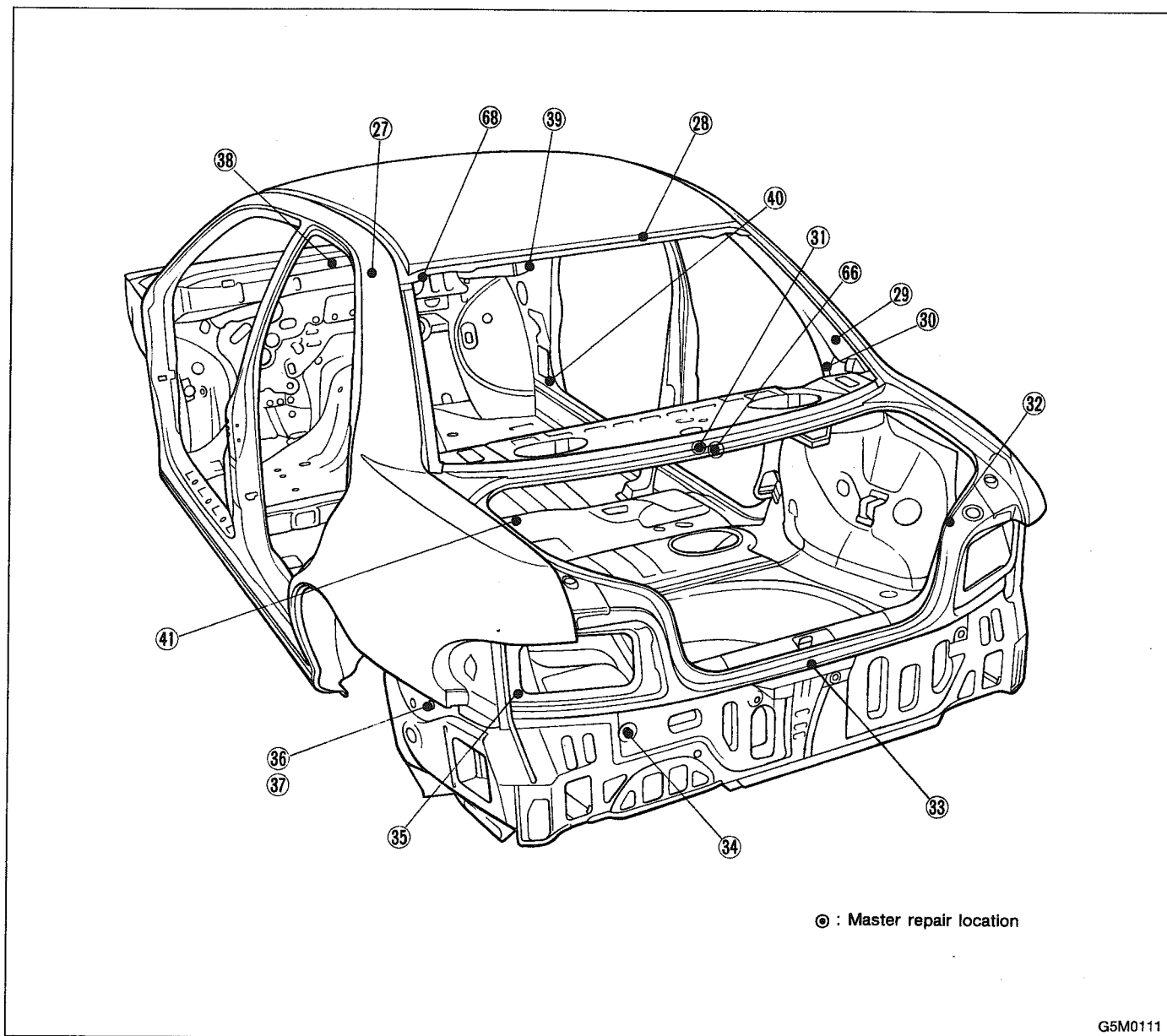
⊙ : Master repair location

H5M0712A

- | | |
|---|--|
| ① Radiator panel (UPR) repair bolt hole M8 (Right) | ⑩ Retainer attaching square hole 7 mm (0.28 in) (Symmetrical) |
| ② Radiator panel (UPR) repair bolt hole M8 (Left) | ⑪ Sun visor attaching hole 20 mm (0.79 in) dia. (Symmetrical) |
| ③ Fender attaching bolt hole M6 (Symmetrical) | ⑫ Spare tire attaching bolt hole M8 |
| ④ Headlight attaching bolt hole M6 (Symmetrical) | ⑬ Air draw hole 7 mm (0.28 in) dia. (Symmetrical) |
| ⑤ Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical) | ⑭ Fender attaching bolt hole M6 (Symmetrical) |
| ⑥ Front bumper mounting hole 14 x 17 mm (0.55 x 0.67 in) dia. (Symmetrical) | ⑮ Front glass attaching hole |
| ⑦ Front crossmember attaching bolt hole 12.4 mm (0.488 in) dia. (Symmetrical) | Right 6.5 mm (0.256 in) dia. |
| ⑧ Fender attaching bolt hole M6 (Symmetrical) | Left 6.5 x 10 mm (0.256 x 0.39 in) dia. |
| ⑨ Front strut mounting hole 10 mm (0.39 in) dia. (Symmetrical) | ⑯ Wax coat hole 20 mm (0.79 in) dia. (Symmetrical) |
| ⑩ Hood hinge attaching bolt hole M8 (Symmetrical) | ⑰ Door switch attaching hole 13.5 mm (0.531 in) dia. (Symmetrical) |
| ⑪ Cowl panel mounting hole 5 mm (0.20 in) dia.
(Located in center of vehicle.) | ⑱ Retainer attaching square hole 8 mm (0.31 in). (Symmetrical) |
| ⑫ Front rail (Inner) mirror attaching bolt hole 8 mm (0.31 in) dia. | ⑲ Rear quarter glass attaching hole 8 mm (0.31 in) dia. (Symmetrical) |
| ⑬ Fender attaching bolt hole M6 (Symmetrical) | ⑳ Rear quarter glass attaching hole 7 mm (0.28 in) dia. (Symmetrical) |
| ⑭ Front pillar gauge hole 20 mm (0.79 in) dia. (Symmetrical) | ㉑ Rear quarter glass attaching hole 8 x 5.5 mm (0.31 x 0.217 in) dia.
(Symmetrical) |
| | ㉒ Retainer attaching square hole 8 mm (0.31 in). (Symmetrical) |
| | ㉓ Seat belt anchor attaching bolt hole 16 mm (0.63 in) dia. (Symmetrical) |

B: LUGGAGE COMPARTMENT AND ROOM

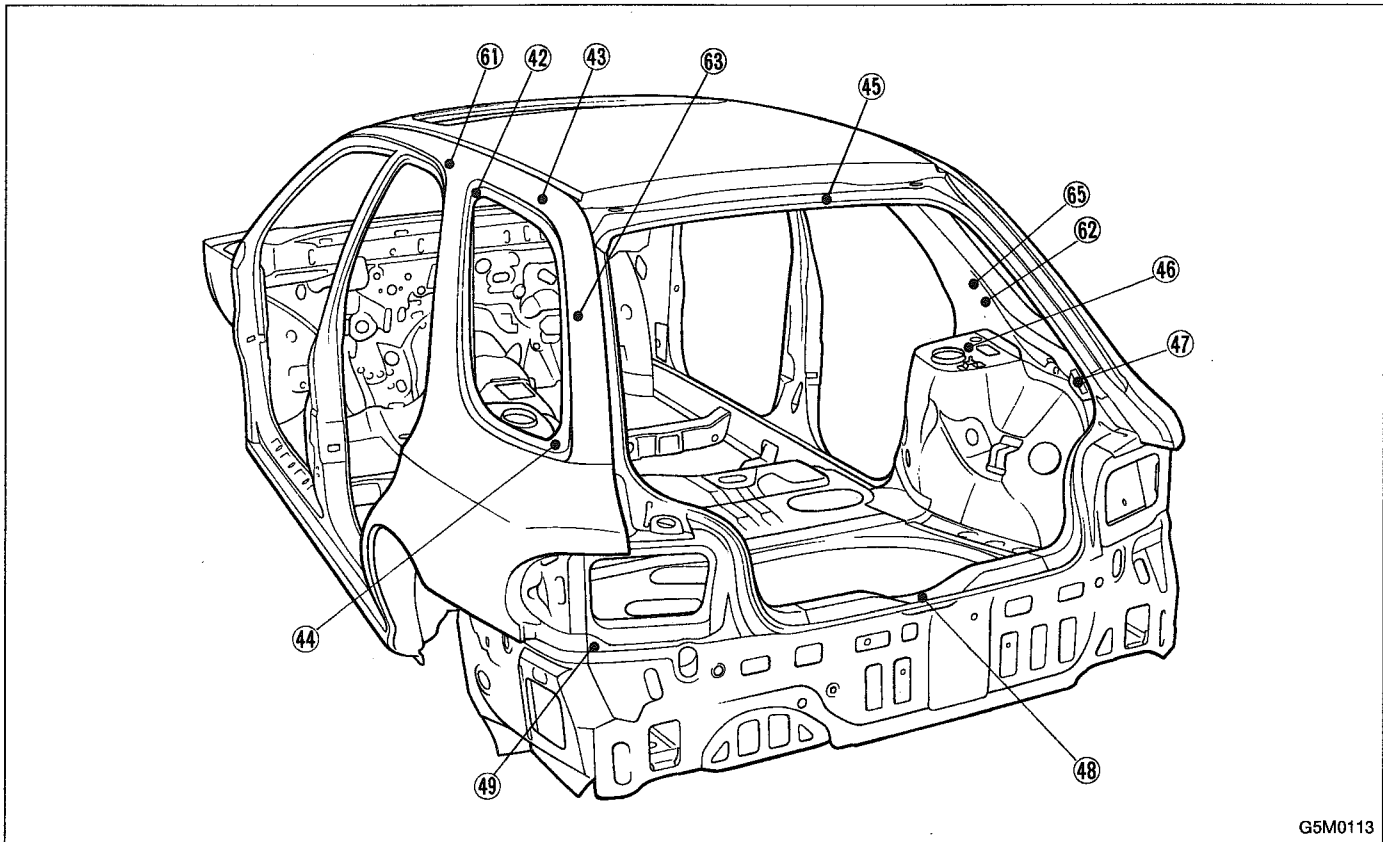
1. SEDAN AND COUPE



G5M0111

- 27 Rear pillar (Inner) gauge hole 8 mm (0.31 in) dia. (Symmetrical)
- 28 Rear roof trim attaching hole 8 mm (0.31 in) dia. (Symmetrical)
- 29 Rear quarter trim attaching hole 8 mm (0.31 in) dia. (Symmetrical)
- 30 Seat belt anchor attaching bolt hole (Symmetrical)
- 31 Reinforcement (Rear panel rear) repair locator (Located in center of vehicle)
- 32 Rear corner patch at flange (Symmetrical)
- 33 Rear skirt (UPR) cutout (Repair locator)
- 34 Rear skirt gauge hole 20 mm (0.79 in) dia. (Symmetrical)
- 35 Rear combination light mounting hole 9 mm (0.35 in) dia. (Symmetrical)
- 36 Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Left)
- 37 Rear quarter bumper side gauge hole 20 mm (0.79 in) dia. (Right)
- 38 Instrument panel attaching square hole 22 x 34.5 mm (0.87 x 1.358 in) (Right)
- 39 Steering support beam attaching bolt hole M8 (Symmetrical)
- 40 Front pillar (Inner) gauge hole 10 mm (0.39 in) dia. (Symmetrical)
- 41 Floor mat attaching clip hole 8 mm (0.31 in) dia. (Symmetrical)
- 66 Rear panel (Center) repair locator (Located in center of vehicle.)
- 68 Rear glass attaching hole
(Right): 6.5 mm (0.256 in) dia.
(Left): 6.5 x 10 mm (0.256 x 0.39 in) dia.

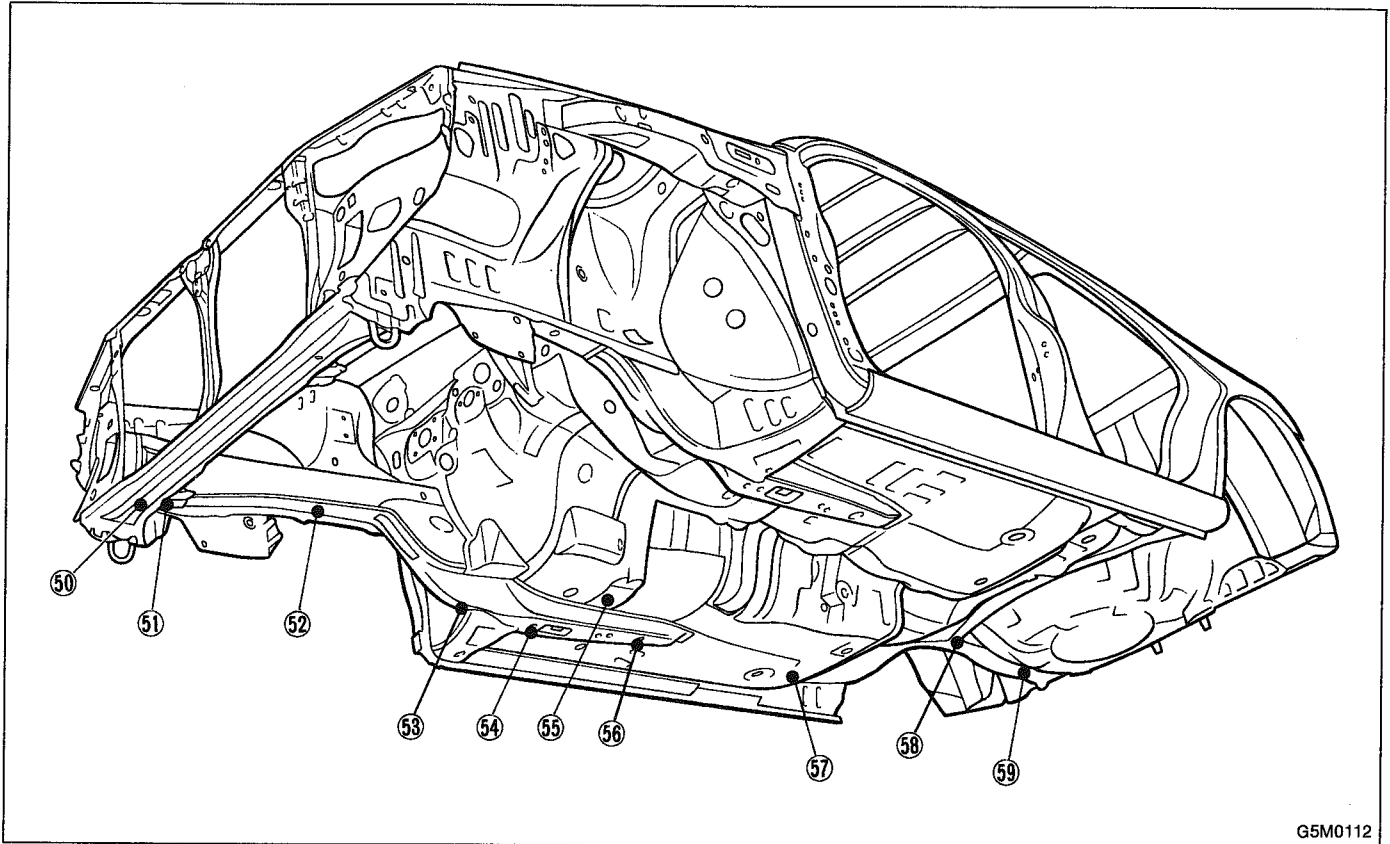
2. WAGON



G5M0113

- ④② Rear quarter glass attaching hole 8 mm (0.31 in) dia. (Symmetrical)
- ④③ Roof rail attaching hole 10 mm (0.39 in) dia. (Symmetrical)
- ④④ Rear quarter glass attaching hole 8 x 15 mm (0.31 x 0.59 in) dia. (Symmetrical)
- ④⑤ Rear roof trim attaching hole 8 mm (0.31 in) dia. (Symmetrical)
- ④⑥ Rear strut mounting hole 10 mm (0.39 in) dia. (Symmetrical)
- ④⑦ Rear gate stay attaching bolt hole M8 (Symmetrical)
- ④⑧ Child seat anchor attaching bolt hole
- ④⑨ Rear combination light mounting hole 10 mm (0.39 in) dia. (Symmetrical)
- ⑥① Side rail (Inner) gauge hole 8 mm (0.31 in) dia. (Symmetrical)
- ⑥② Rear quarter trim attaching hole 8 mm (0.31 in) dia. (Symmetrical)
- ⑥③ Rear quarter harness attaching clip hole 7 mm (0.28 in) dia. (Symmetrical)
- ⑥⑤ Seat belt anchor attaching bolt hole (Symmetrical)

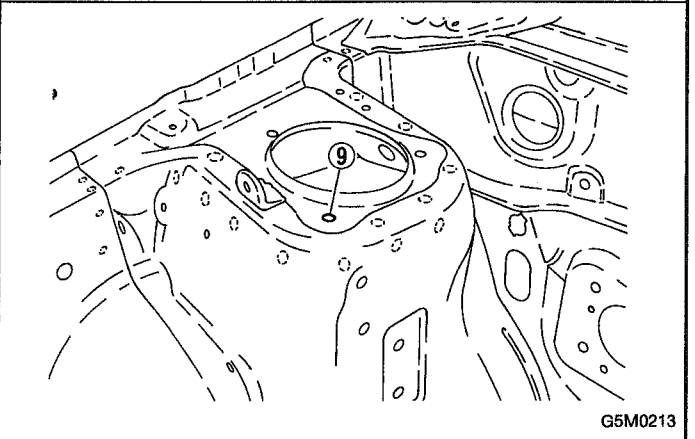
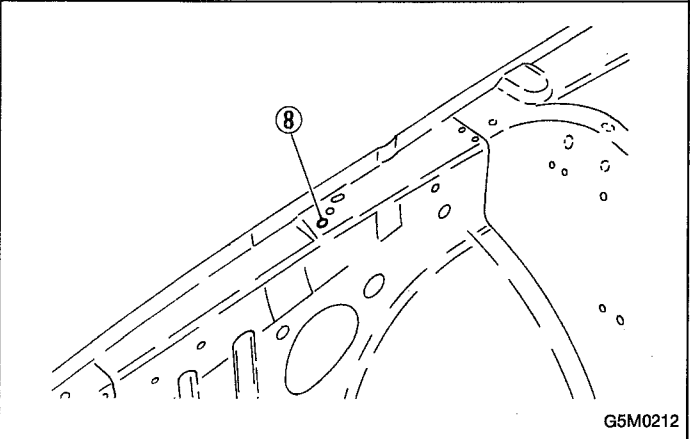
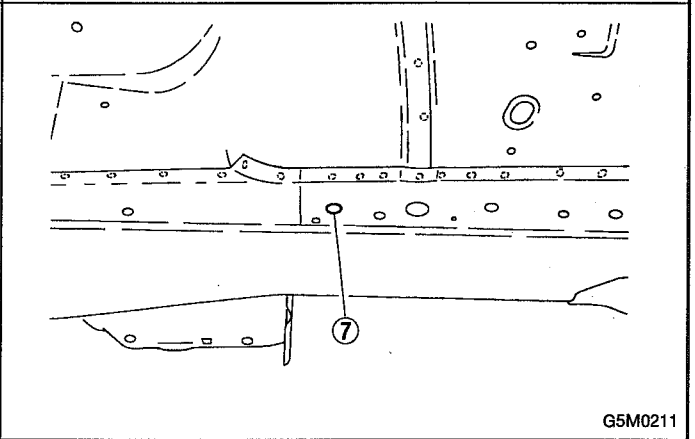
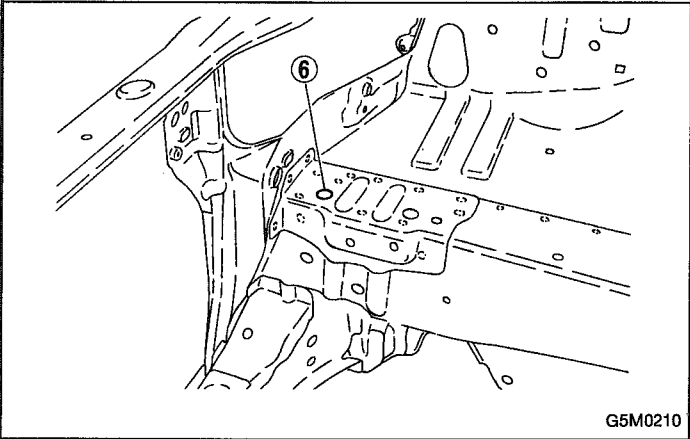
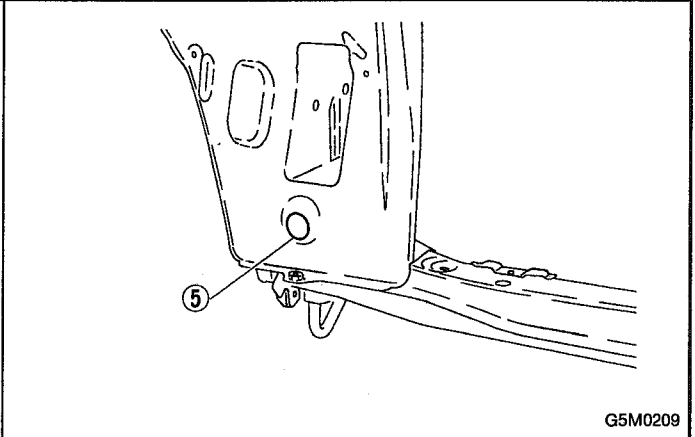
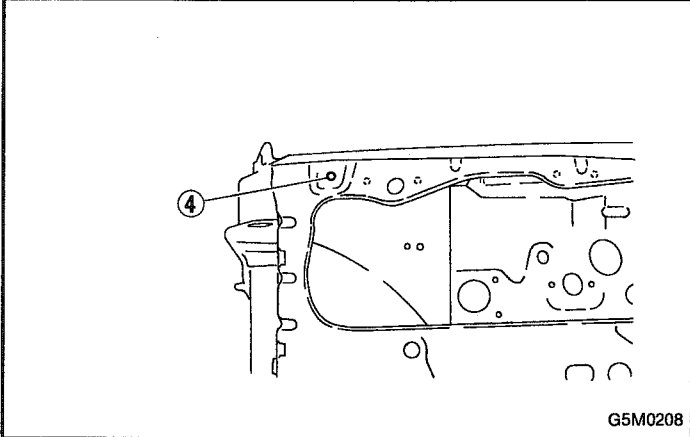
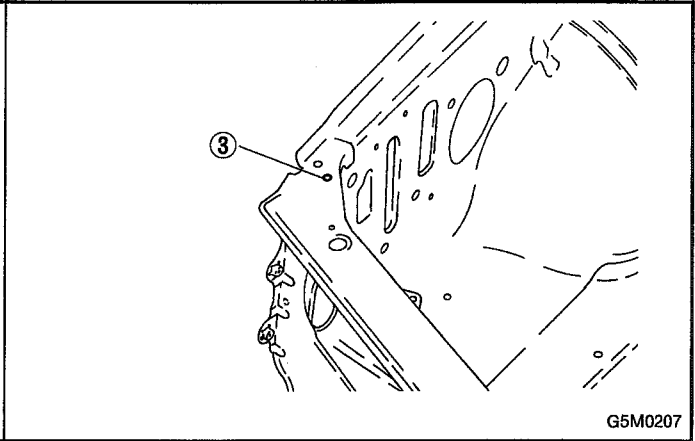
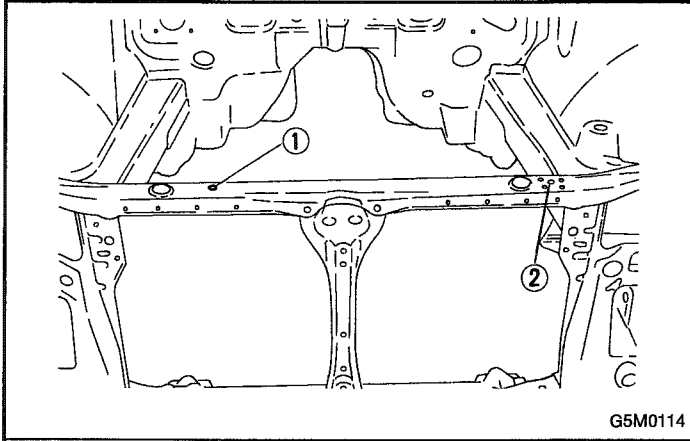
C: UNDER BODY

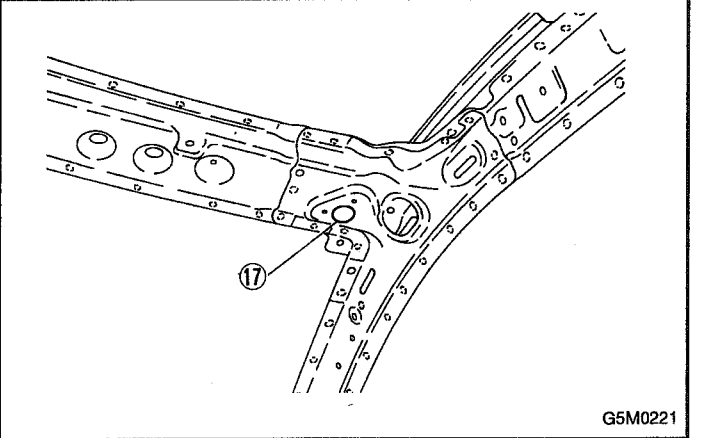
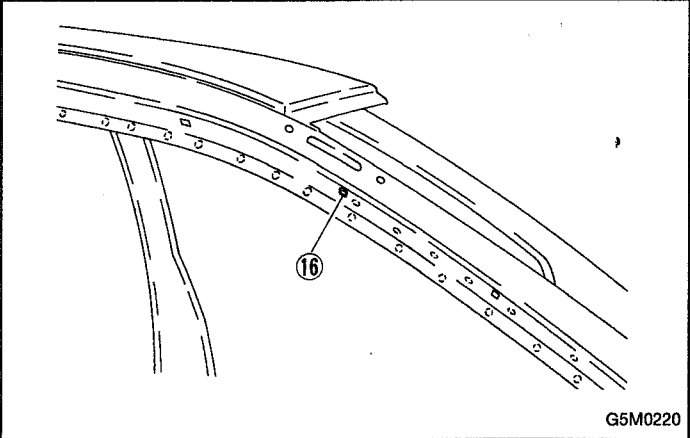
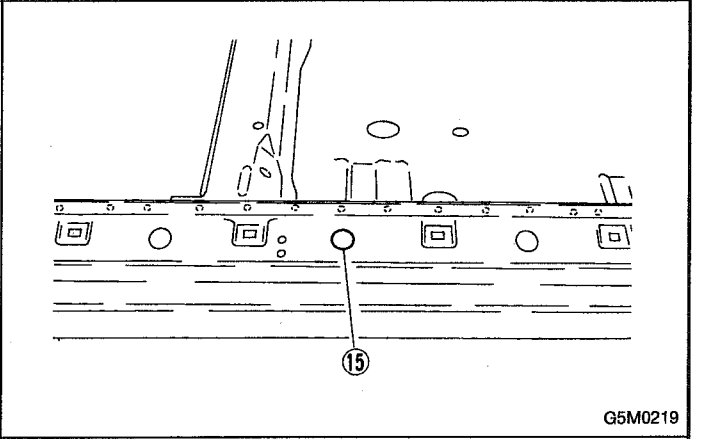
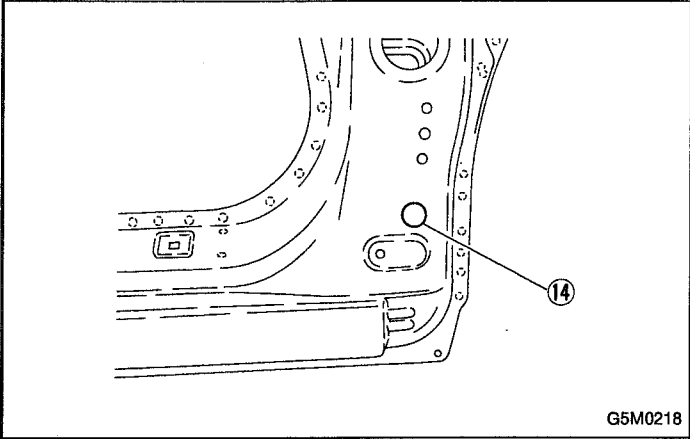
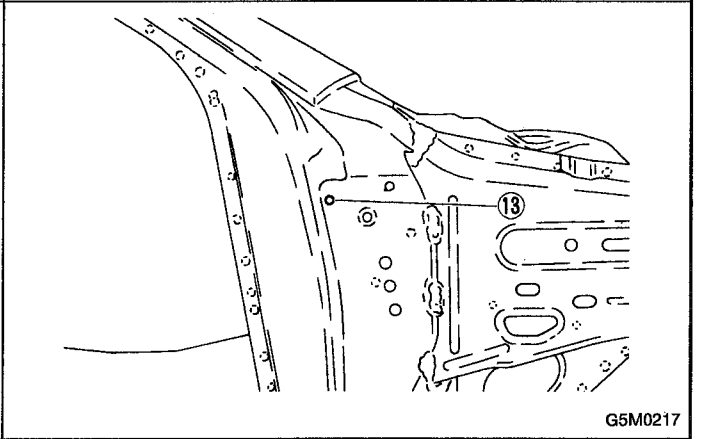
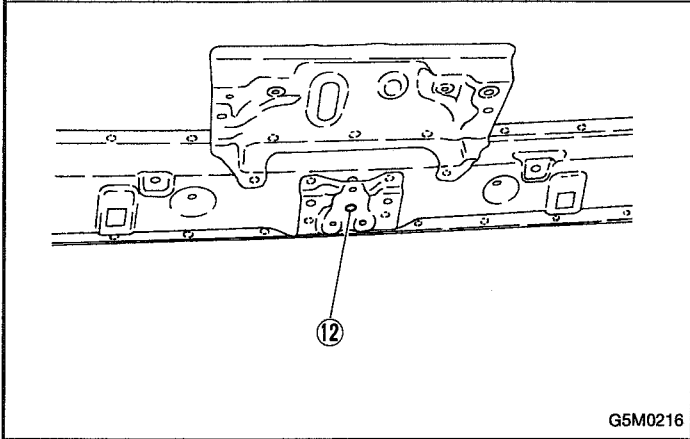
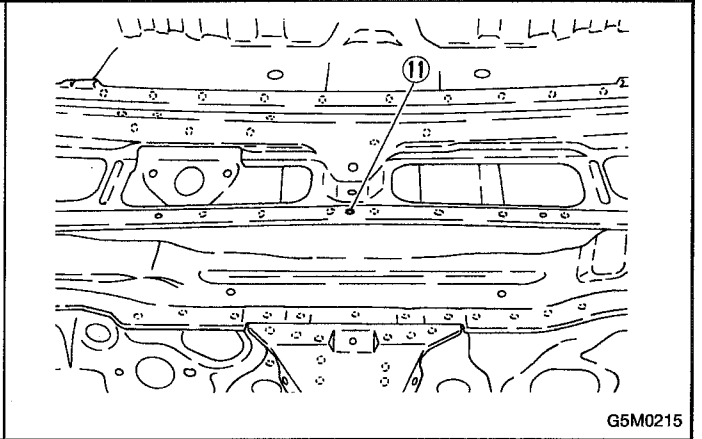
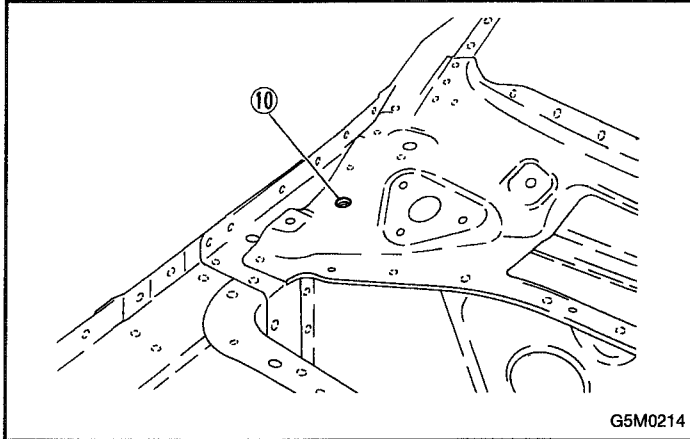


G5M0112

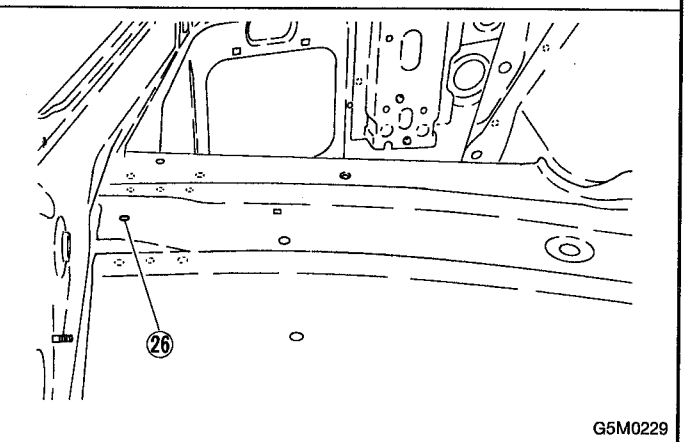
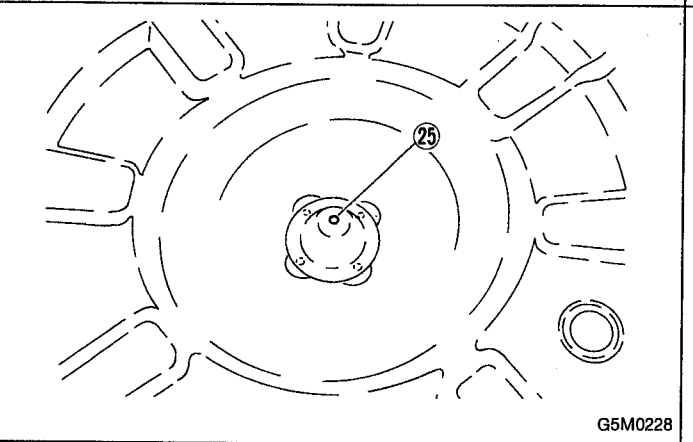
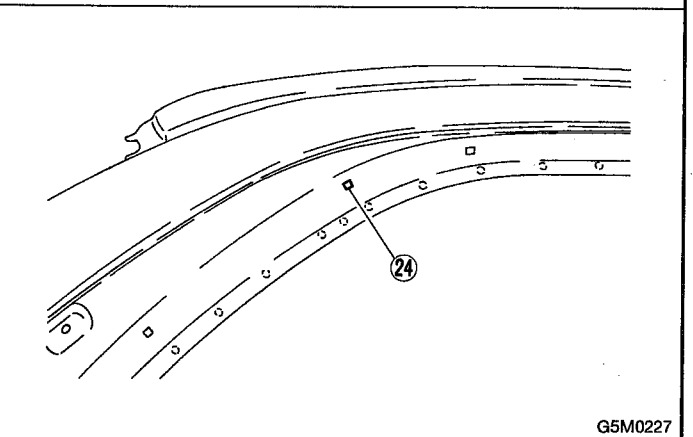
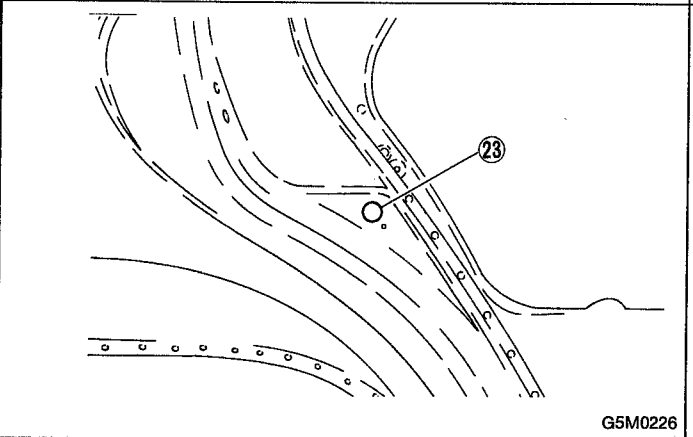
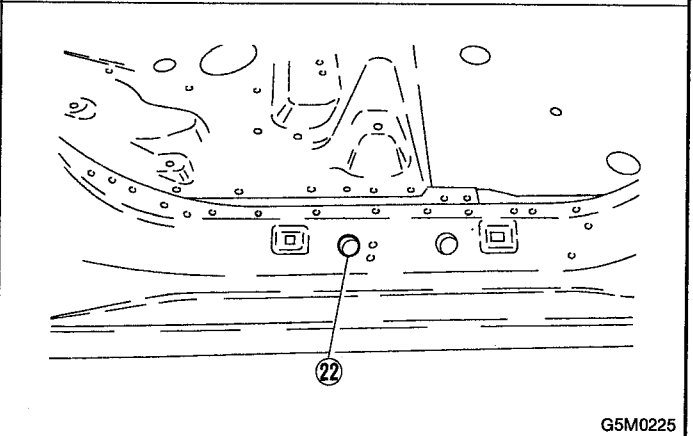
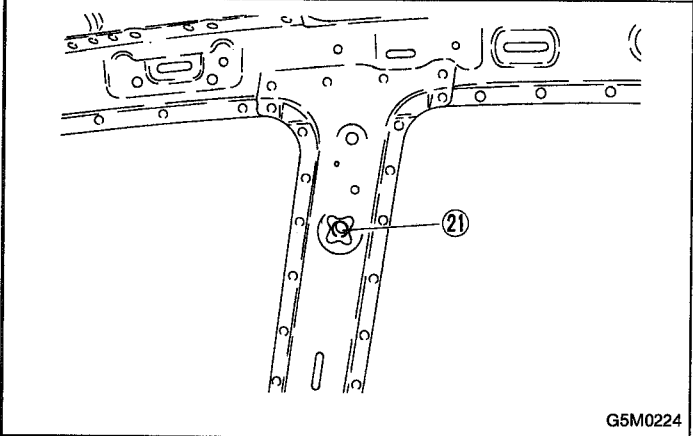
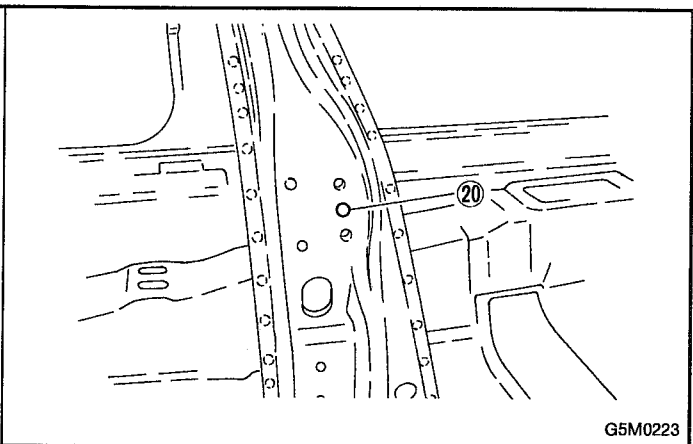
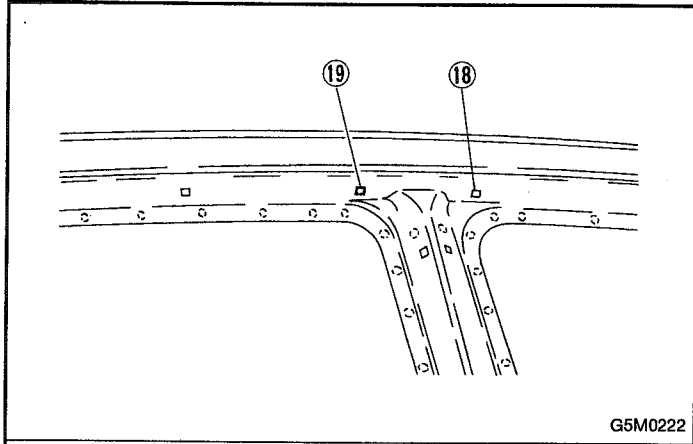
- ⑤⑩ Radiator panel (LWR) frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)
- ⑤① Front side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
- ⑤② Front crossmember attaching hole 12.4 mm (0.488 in) dia. (Symmetrical)
- ⑤③ Front suspension attaching bolt hole M14
- ⑤④ Side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
- ⑤⑤ Transmission mount attaching bolt hole M10 (Symmetrical)
- ⑤⑥ Side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)
- ⑤⑦ Rear differential attaching bolt hole M12 (Symmetrical)
- ⑤⑧ Rear suspension attaching bolt hole M12 (Symmetrical)
- ⑤⑨ Rear side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)

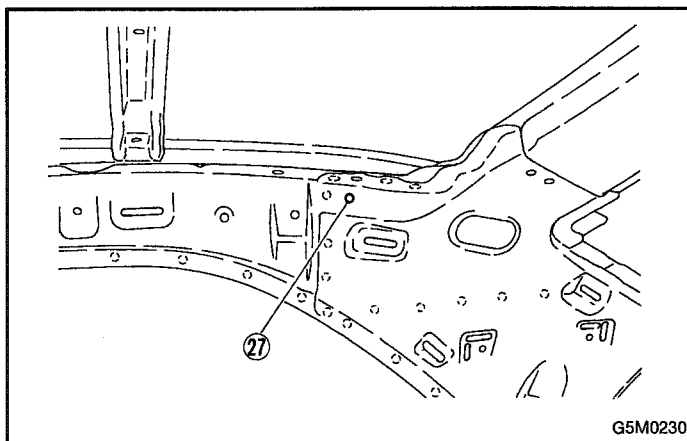
D: DATUM POINT LOCATION



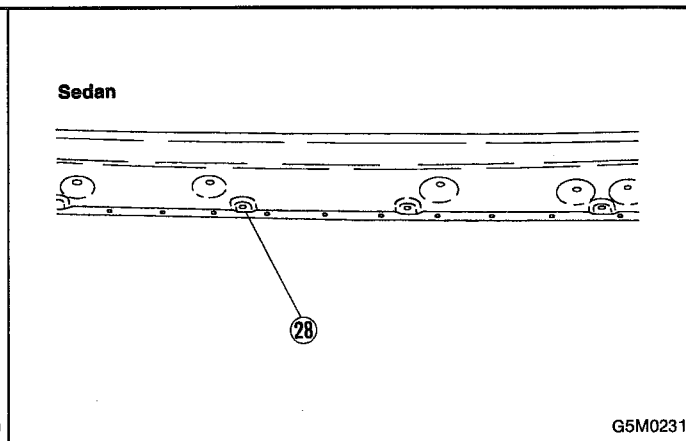


2. Body Datum Points



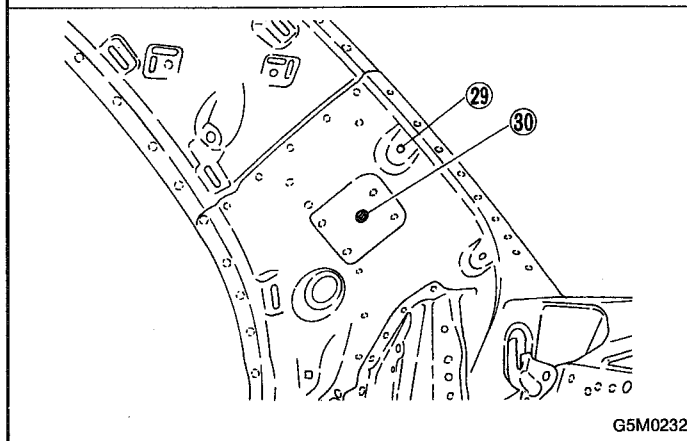


G5M0230

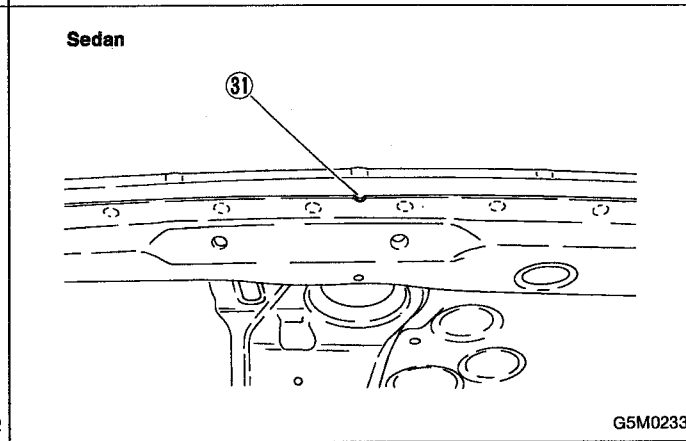


Sedan

G5M0231

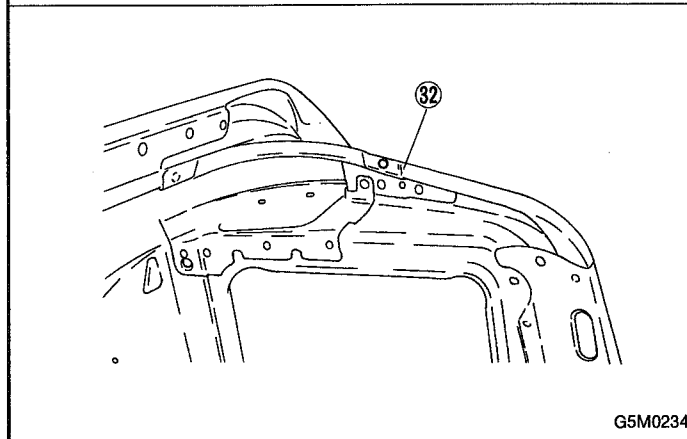


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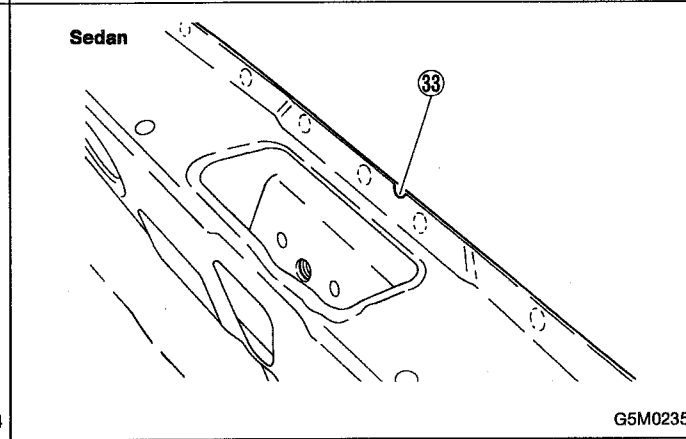


Sedan

G5M0233

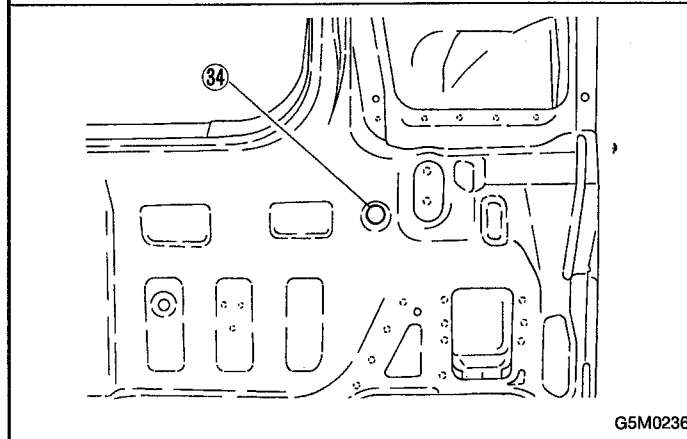


G5M0234

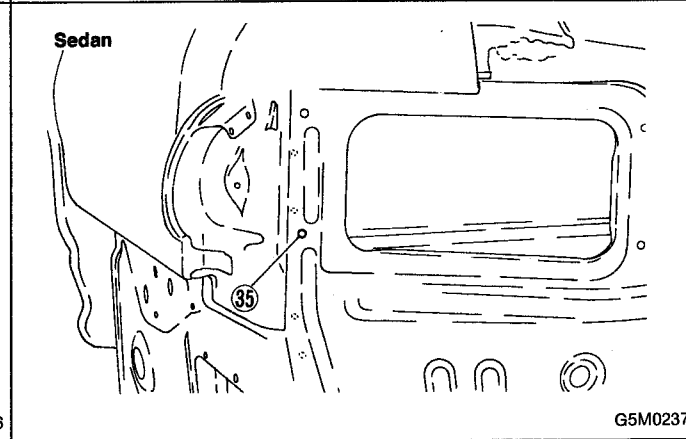


Sedan

G5M0235



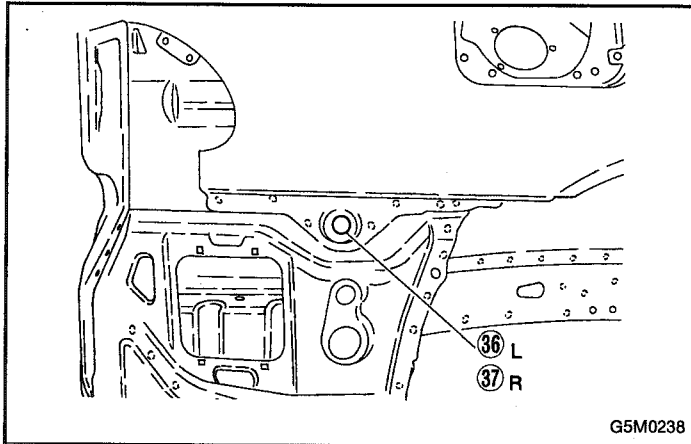
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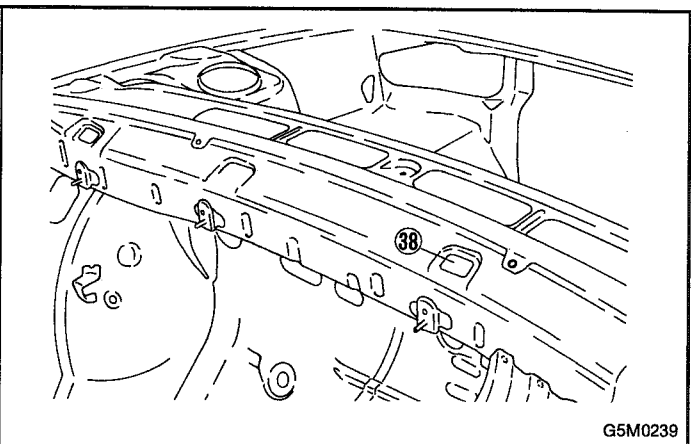
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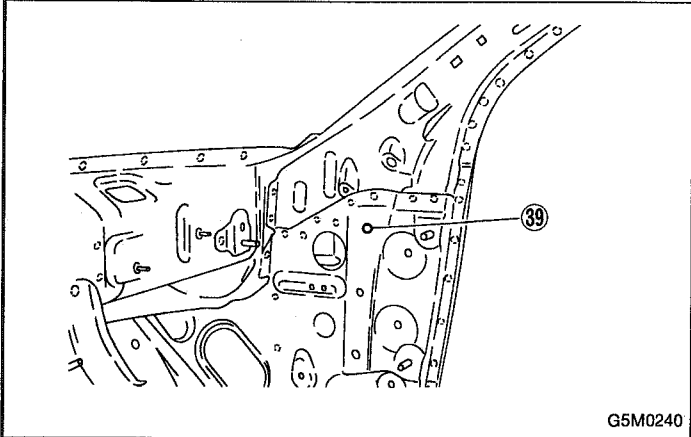
2. Body Datum Points



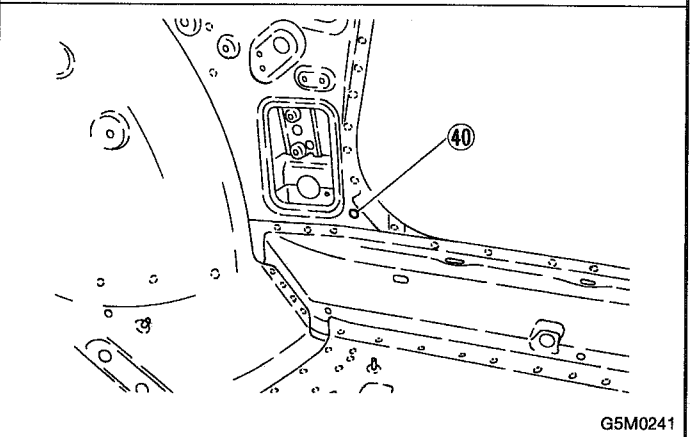
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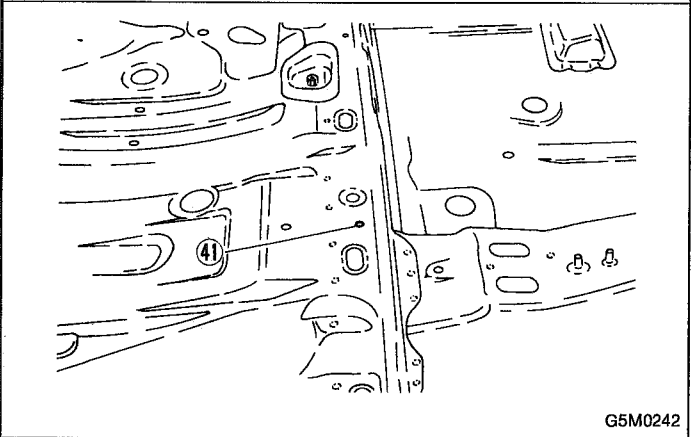
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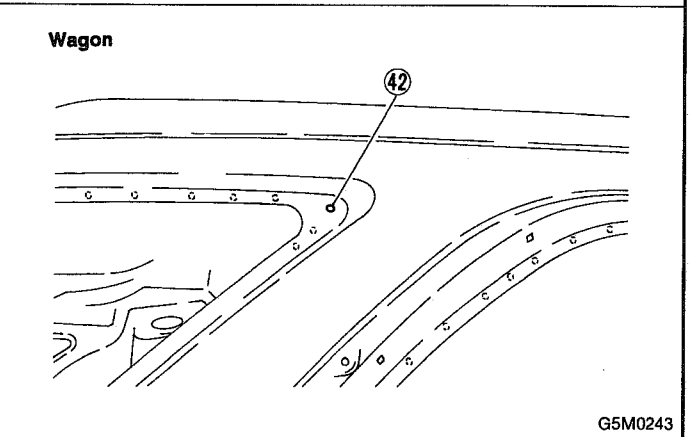
G5M0240



G5M0241

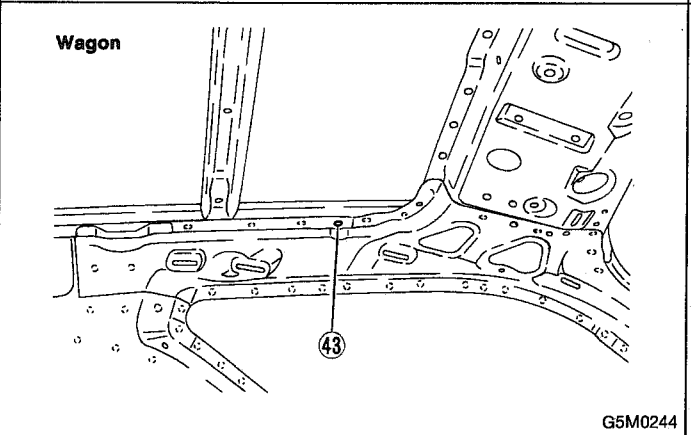


G5M0242



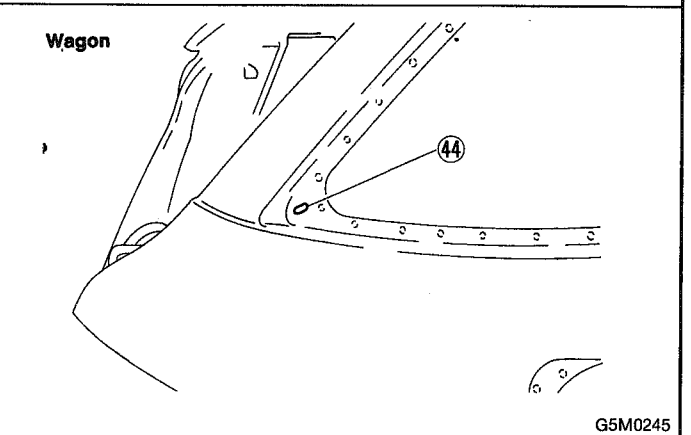
Wagon

G5M0243



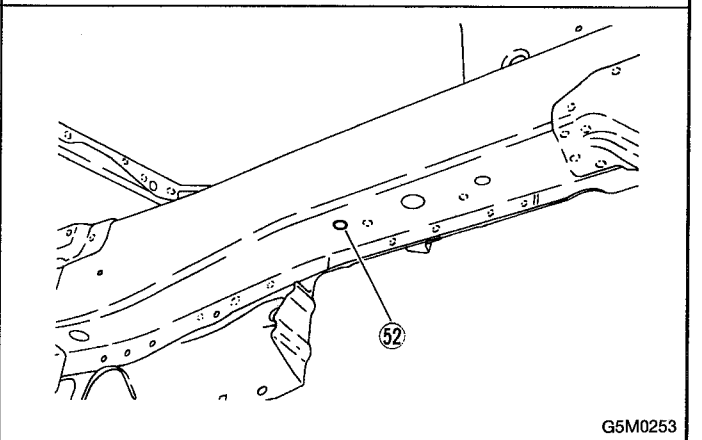
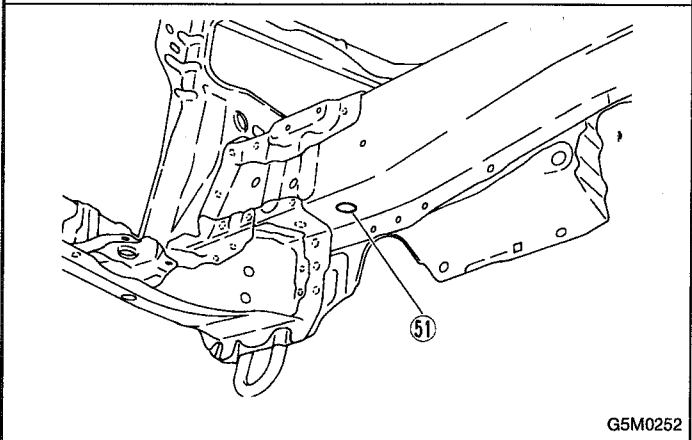
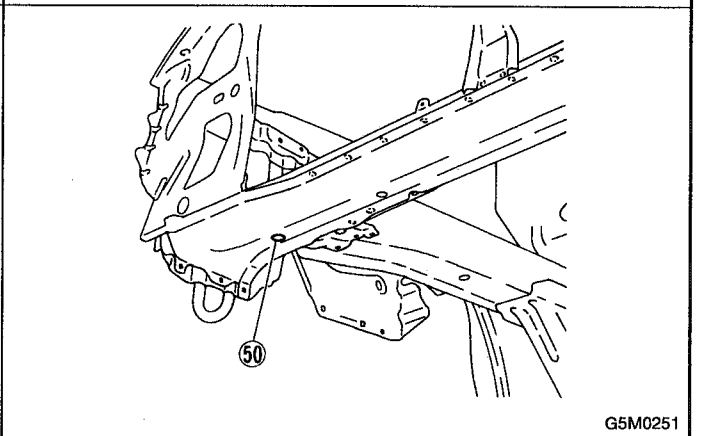
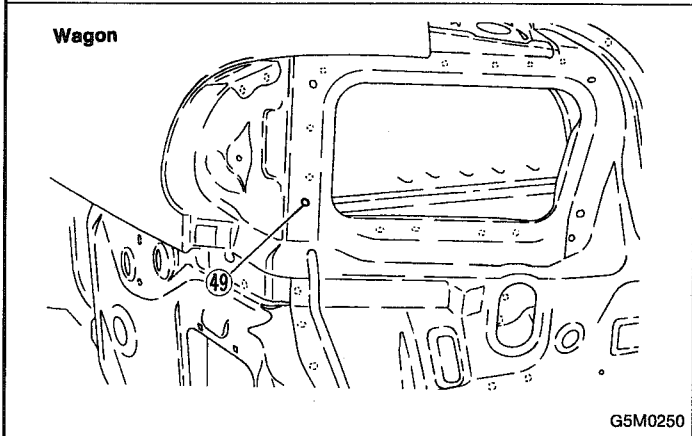
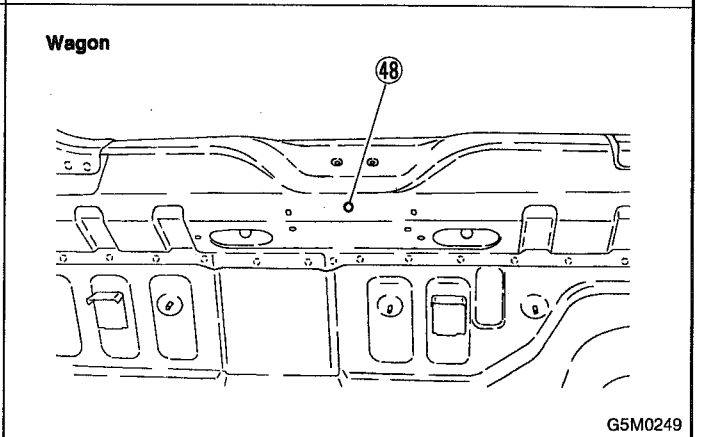
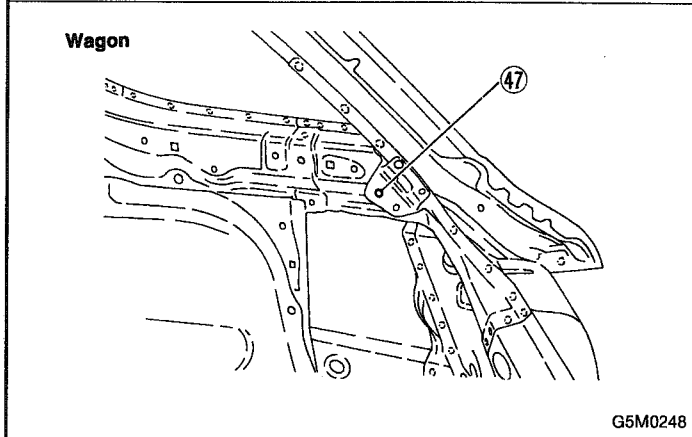
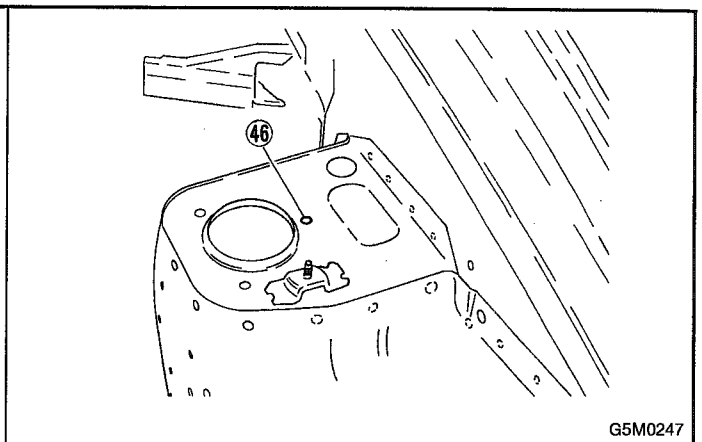
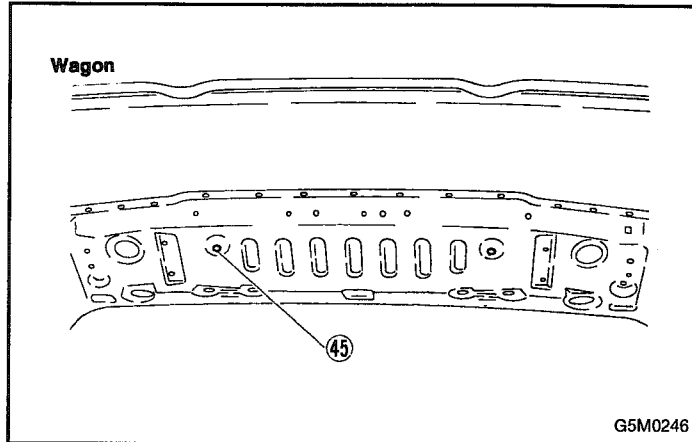
Wagon

G5M0244

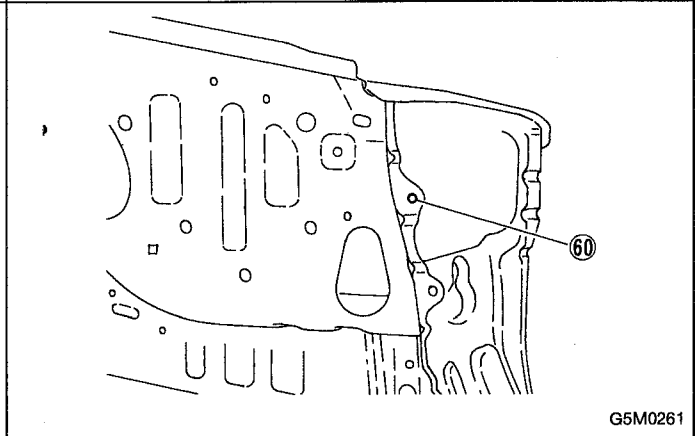
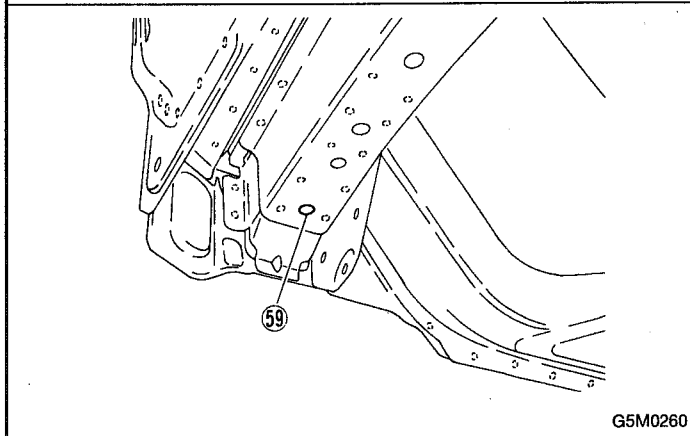
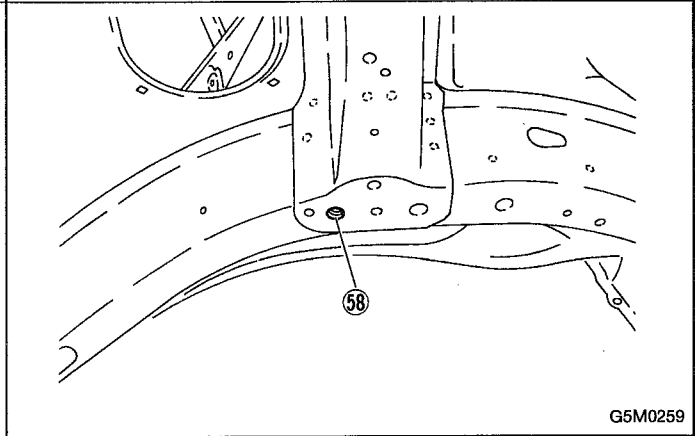
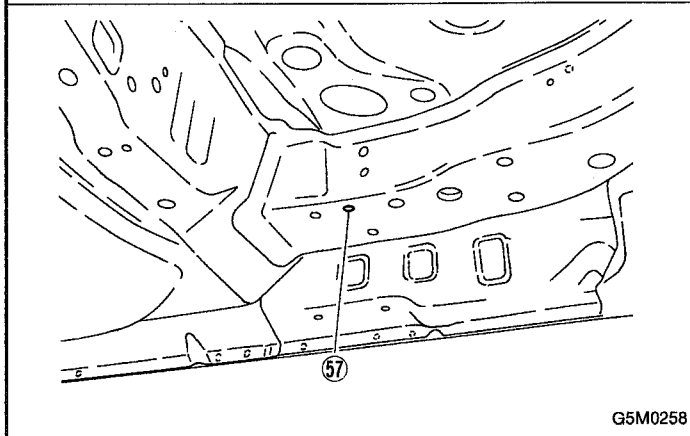
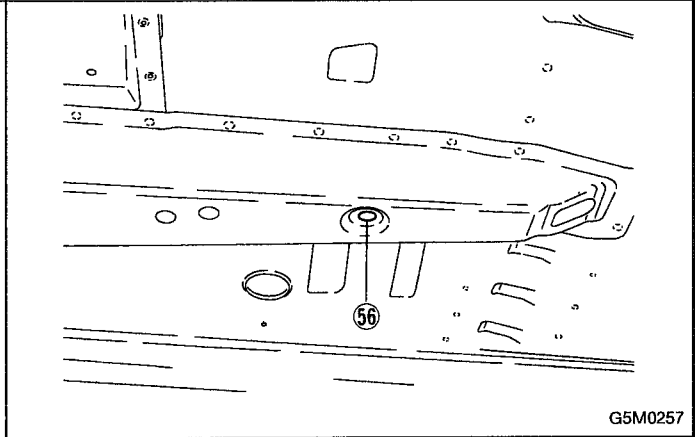
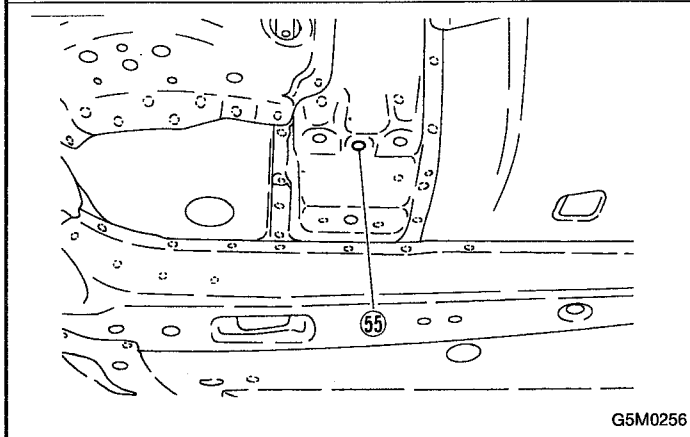
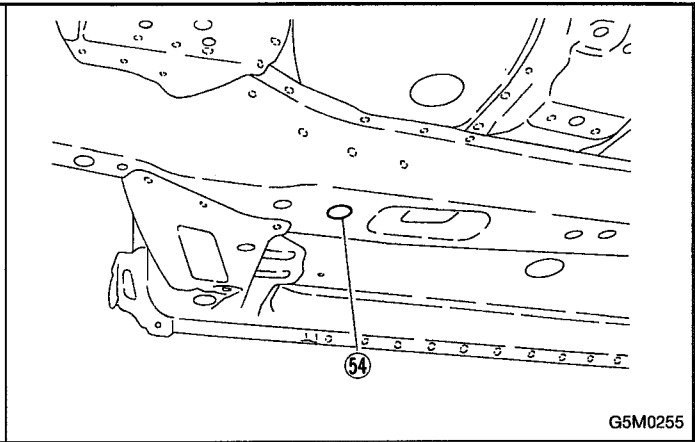
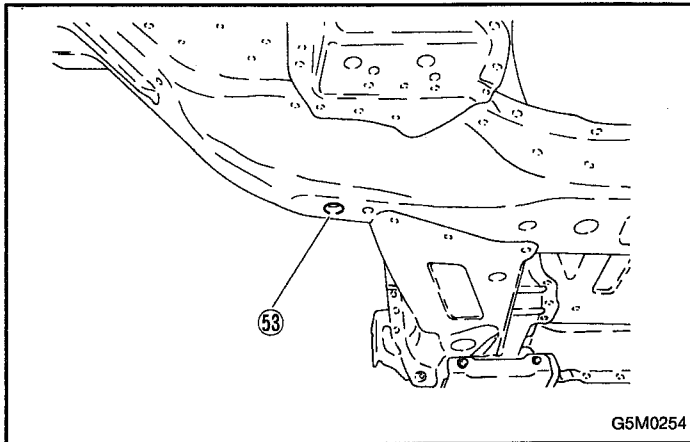


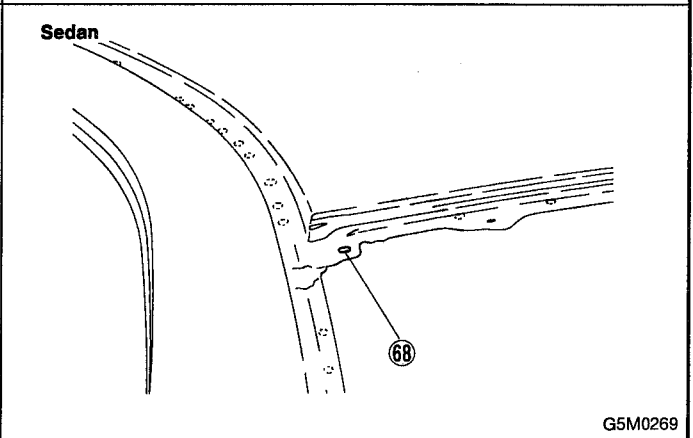
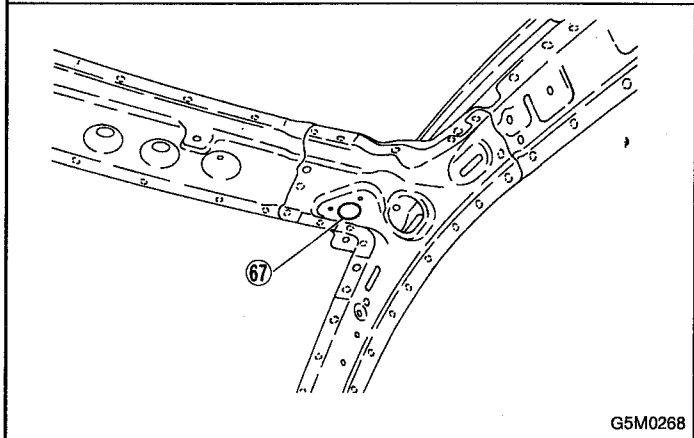
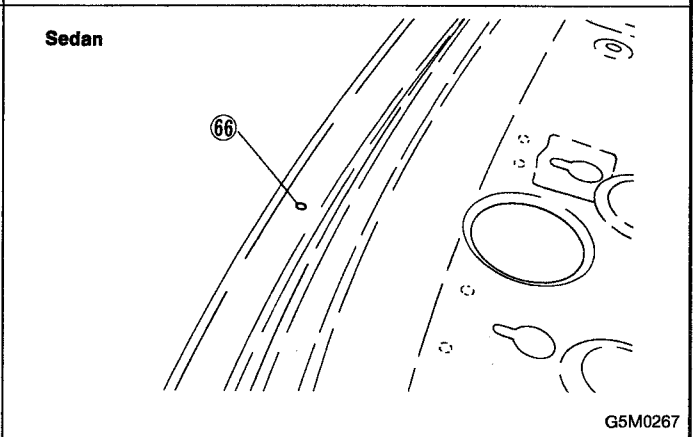
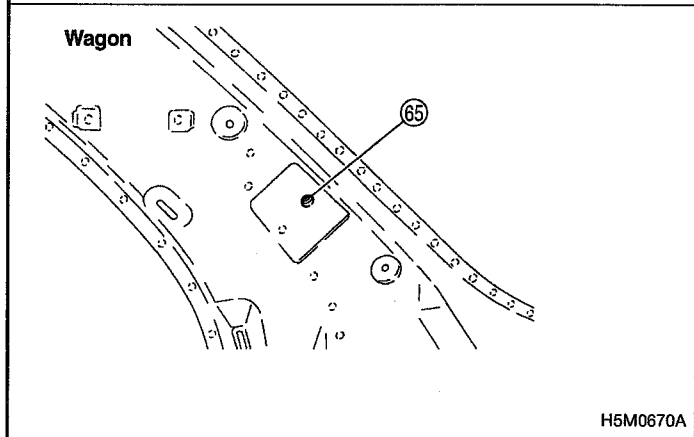
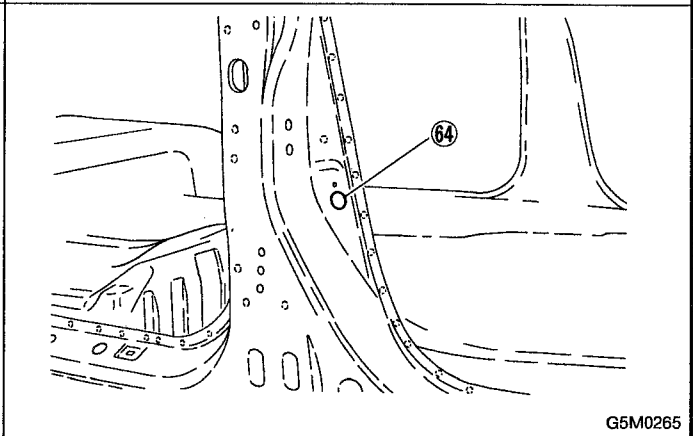
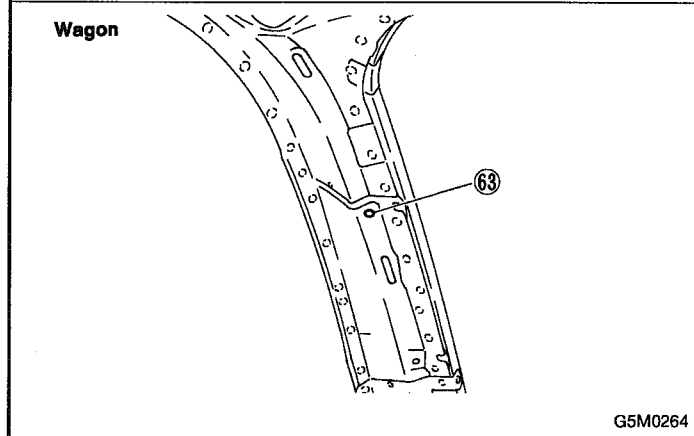
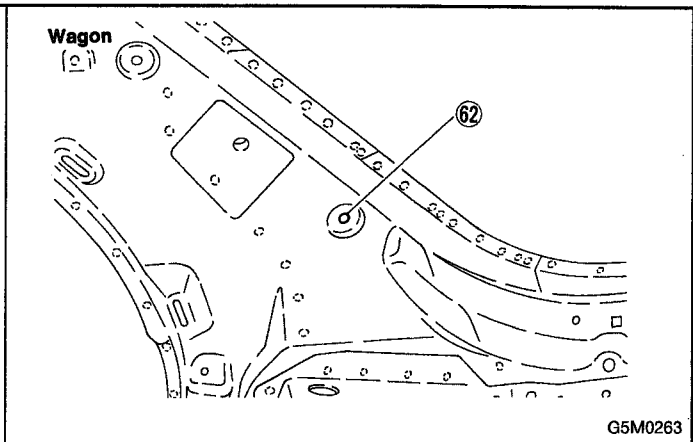
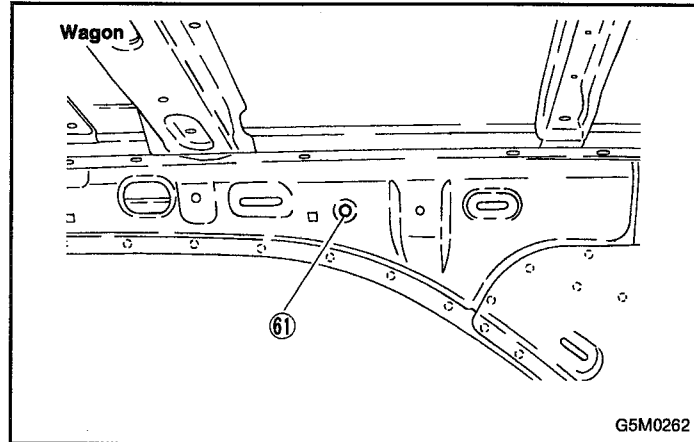
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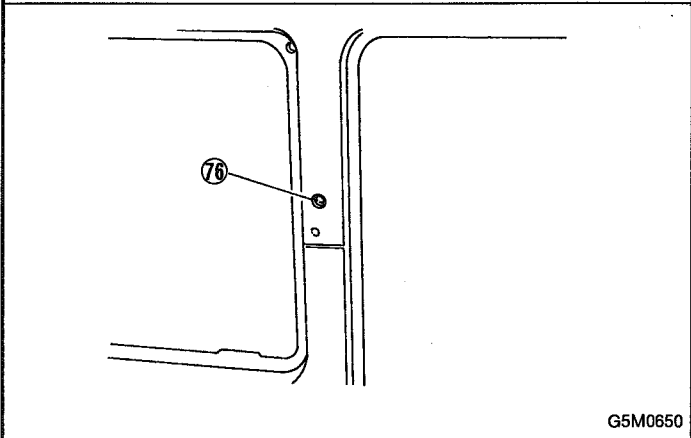
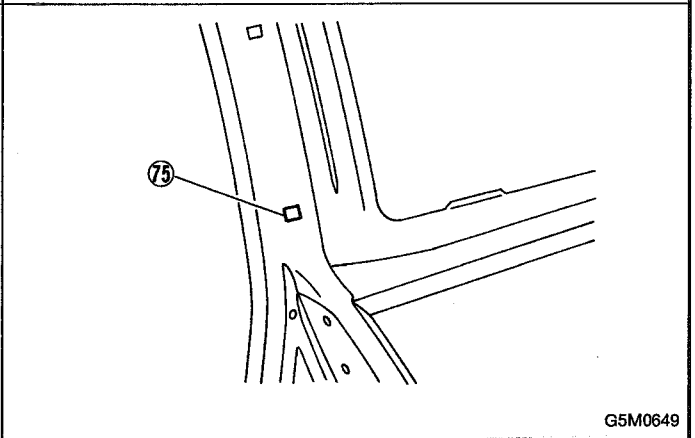
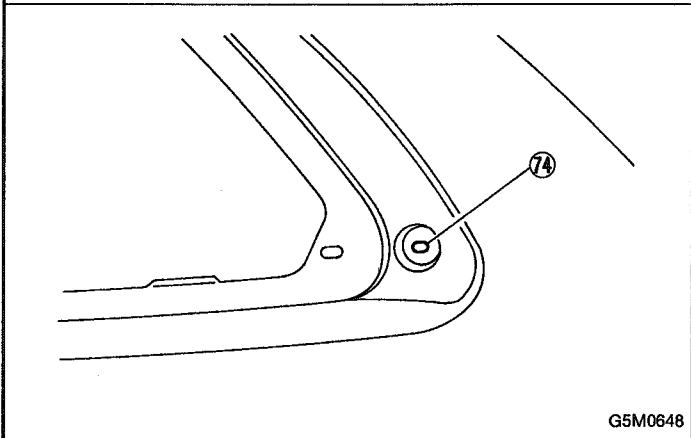
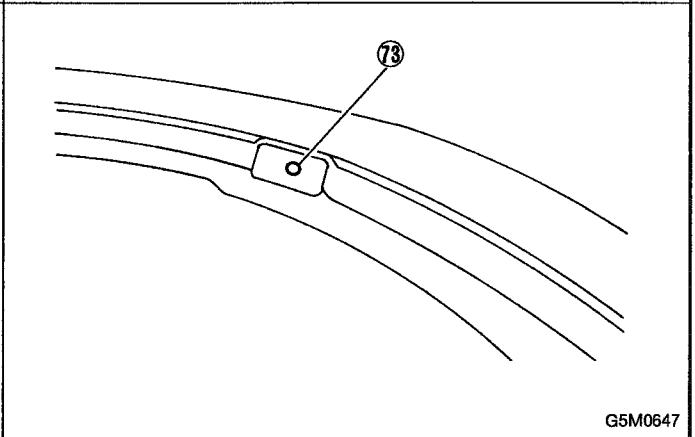
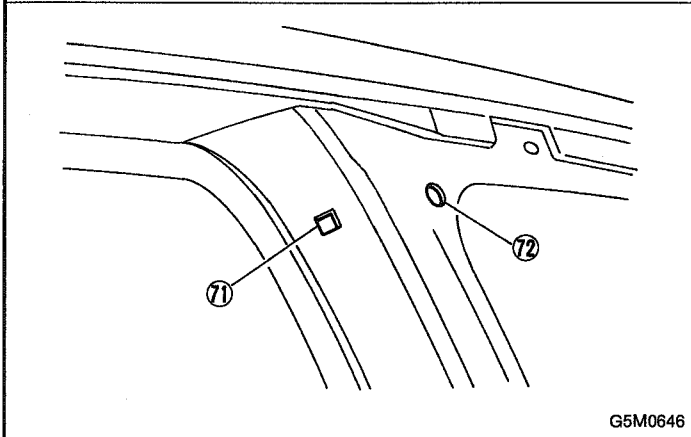
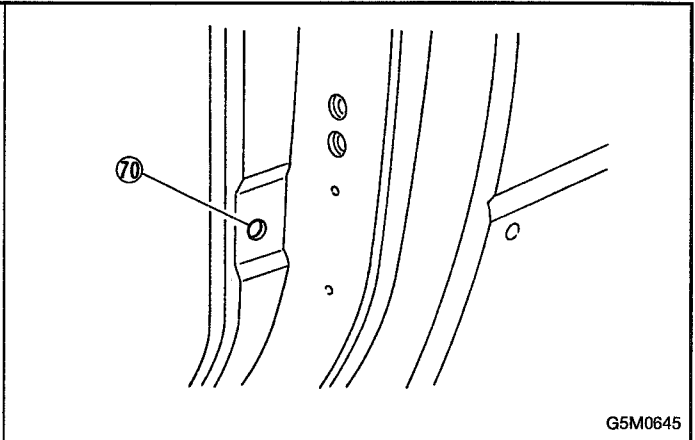
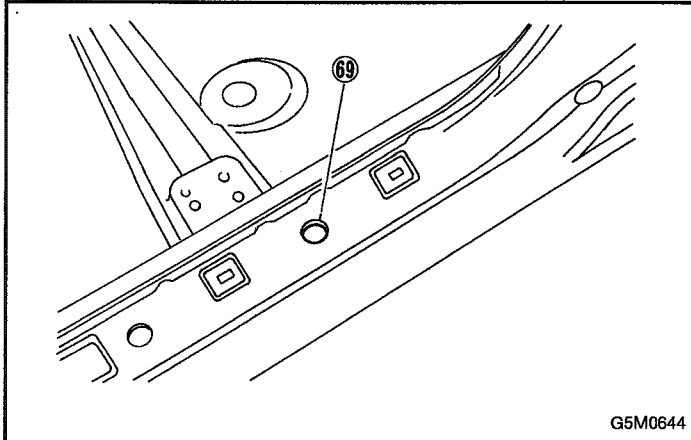
G5M0245

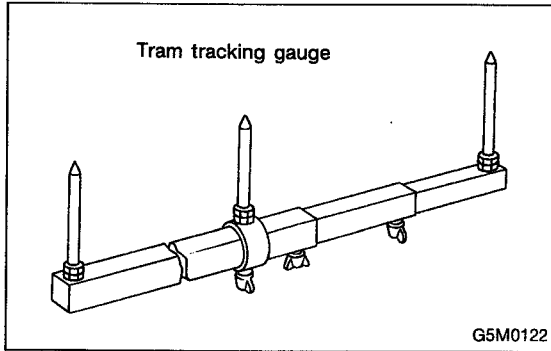


2. Body Datum Points









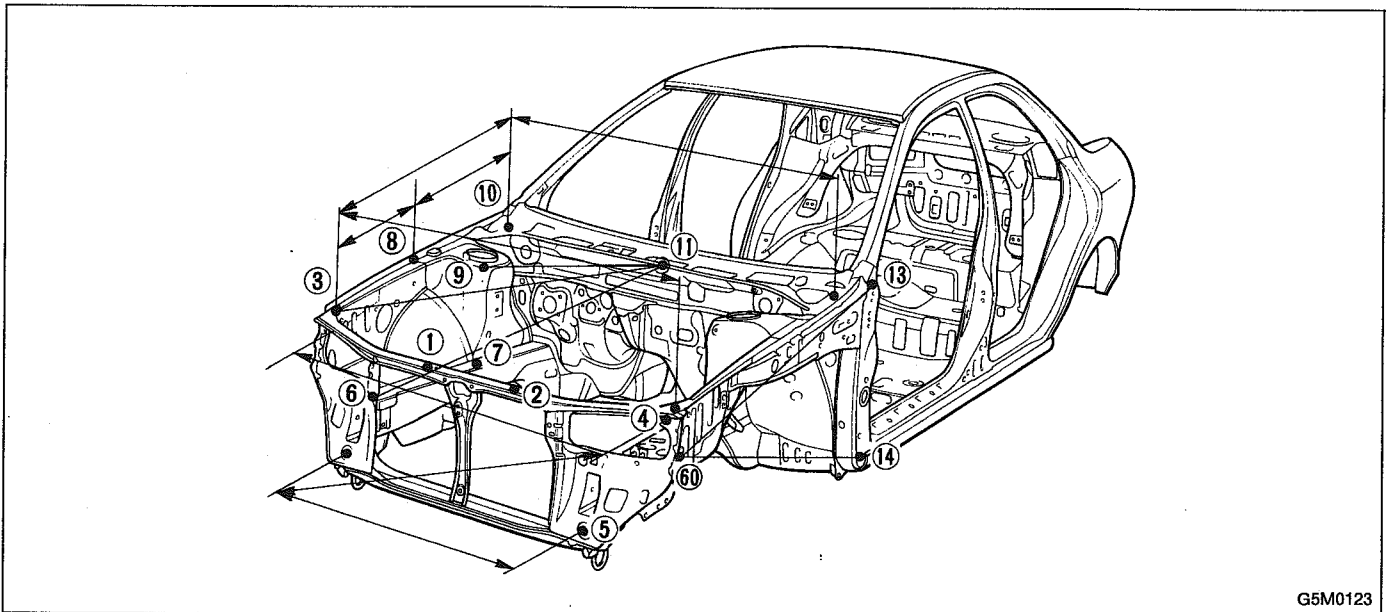
3. Datum Dimensions

Use a tram tracking gauge to measure all dimensions. If a measuring tape is used, be extremely careful because it tends to deflect or twist, which results in a false reading.

NOTE:

- A suffix character "R" or "L" refers to the right or the left.
- All dimensions refer to the distance between the centers of holes measured in a straight line.
- Each dimension indicates a projected dimension between hole centers.

A: FRONT STRUCTURE



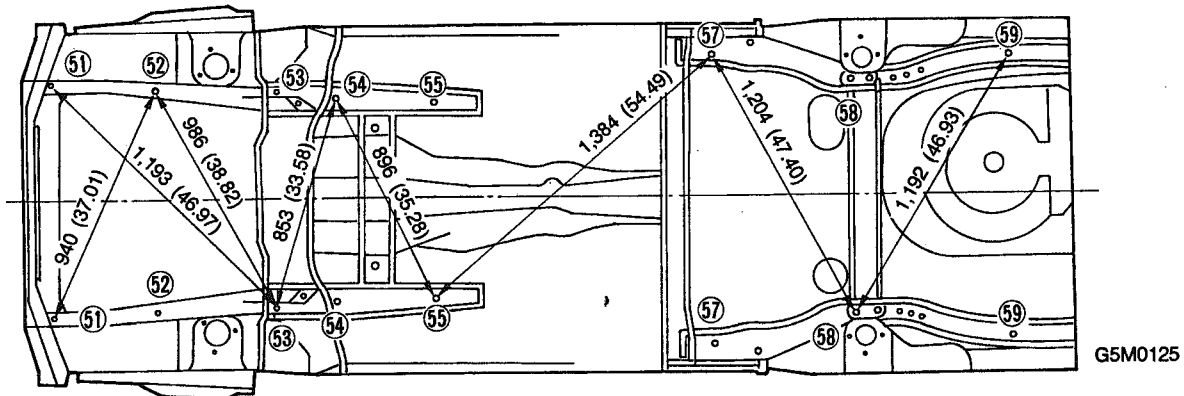
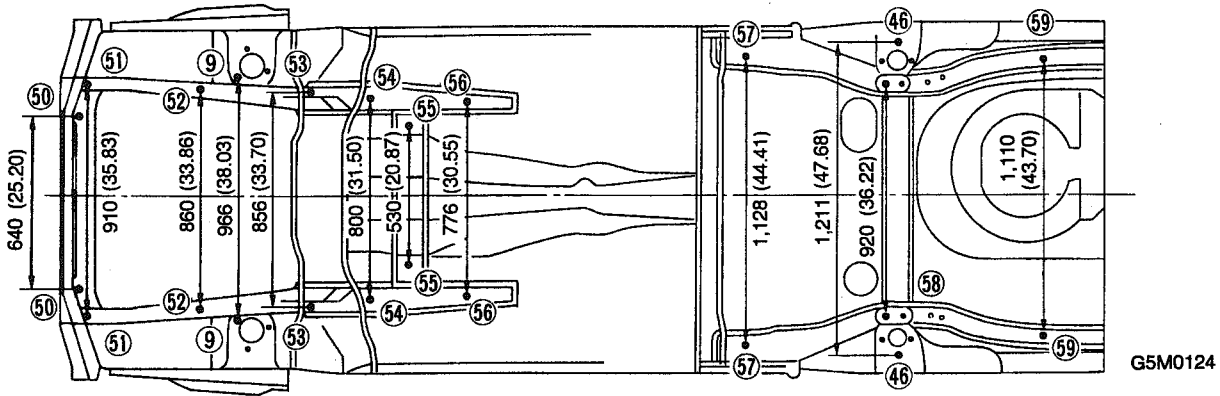
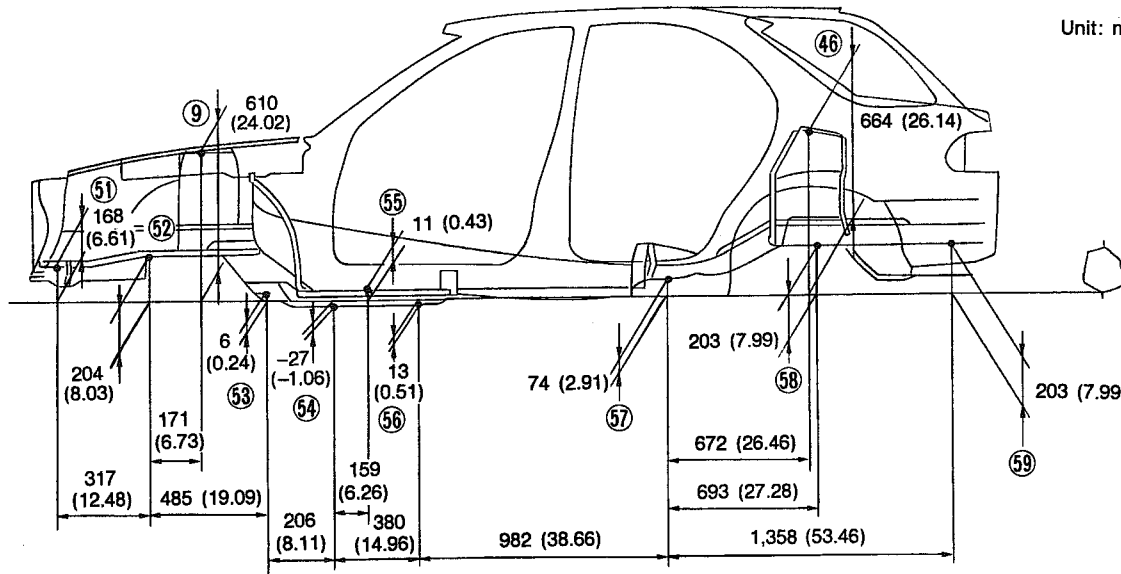
G5M0123

Unit: mm (in)

⑪	—	⑨ _R	}: 525 (20.67)	⑩ _R	—	⑩ _L	: 1,382 (54.41)
⑪	—	⑨ _L		③ _R	—	③ _L	: 1,336 (52.60)
⑪	—	⑥ _R	: 988 (38.90)	⑤ _R	—	⑤ _L	: 942 (37.09)
⑪	—	⑥ _L		⑤ _R	—	④ _R	}: 1,174 (46.22)
⑪	—	③ _R	: 990 (38.98)	⑤ _L	—	④ _L	
⑪	—	③ _L		④ _R	—	④ _L	: 1,269 (49.96)
⑩ _R	—	③ _R	: 829 (32.64)	⑥ _R	—	⑬ _R	}: 1,113 (43.82)
⑩ _L	—	③ _L		⑥ _L	—	⑬ _L	
⑩ _R	—	⑧ _R	: 567 (22.32)	⑥ _R	—	⑭ _R	}: 1,076 (42.36)
⑩ _L	—	⑧ _L		⑥ _L	—	⑭ _L	
⑧ _R	—	③ _R	: 264 (10.39)	①	—	⑪	: 882 (34.72)
⑧ _L	—	③ _L		②	—	⑪	: 913 (35.94)

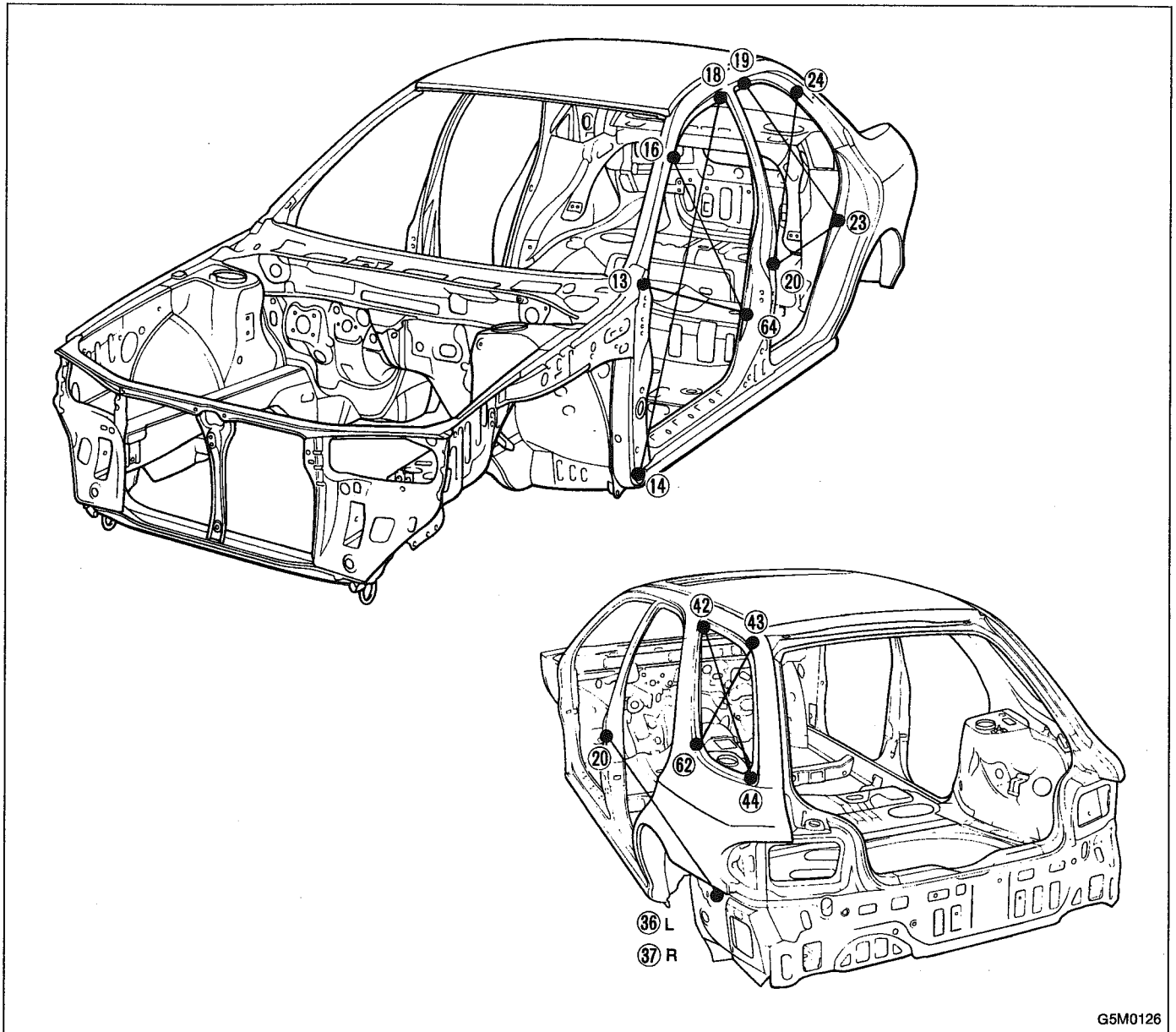
B: CENTER STRUCTURE

Unit: mm (in)



G5M0124

C: DOORS AND REAR QUARTER
1. SEDAN AND WAGON

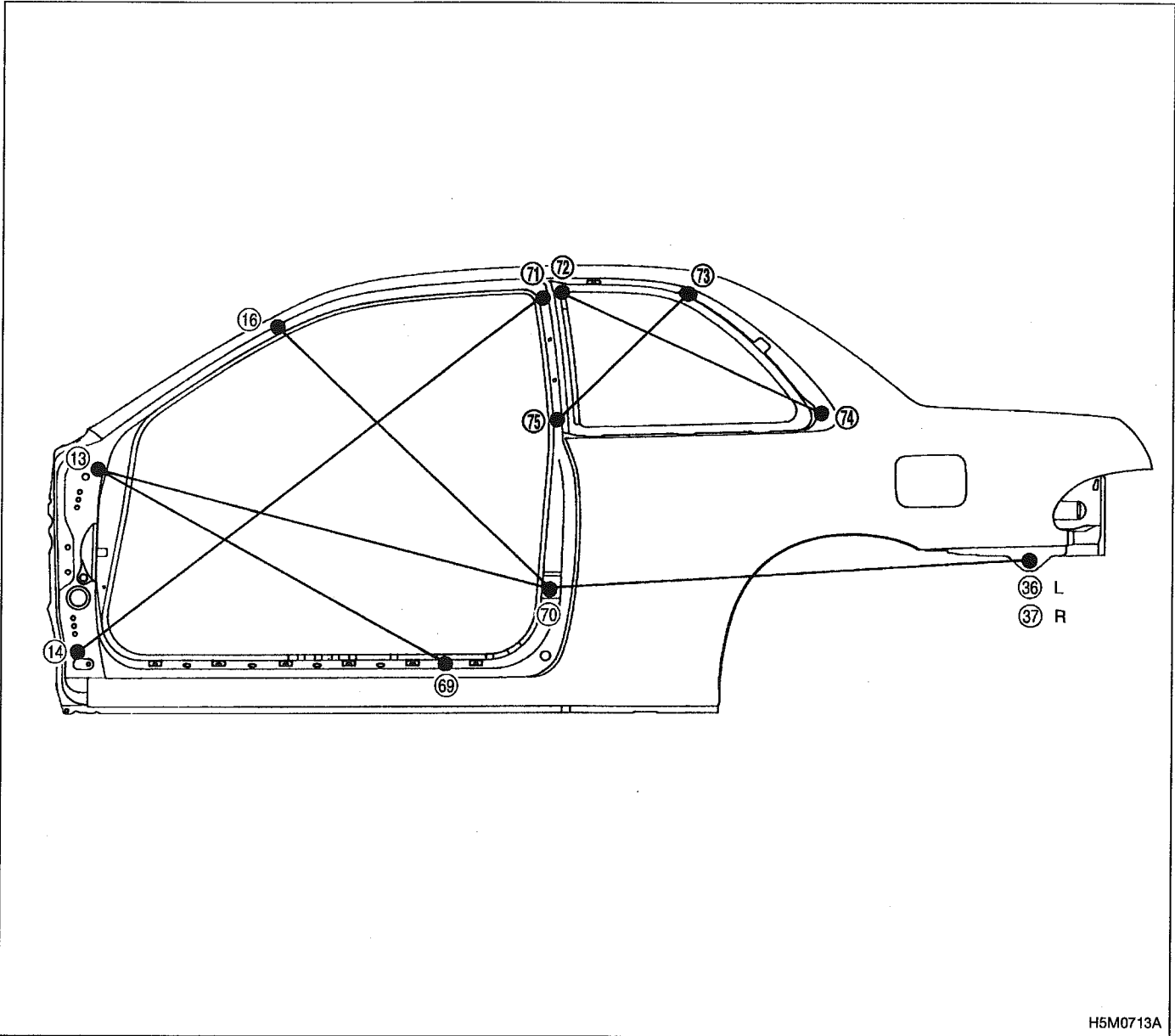


G5M0126

Unit: mm (in)

⑭	—	⑮	:	1,495 (58.86)		
⑬	—	⑮	:	947 (37.28)		
⑮	—	⑮	:	976 (38.43)		
⑳	—	㉓	:	803 (31.61)		
⑳	—	㉔	:	829 (32.64)		
⑲	—	㉓	:	912 (35.91)		
⑳	—	㉖ _L	:	1,462 (57.56)	} (Wagon)	
⑳	—	㉖ _R	:	1,481 (58.31)		
㉒	—	㉔	:	377 (14.84)	(Wagon)	
㉔	—	㉔	:	847 (33.35)	(Wagon)	

2. COUPE

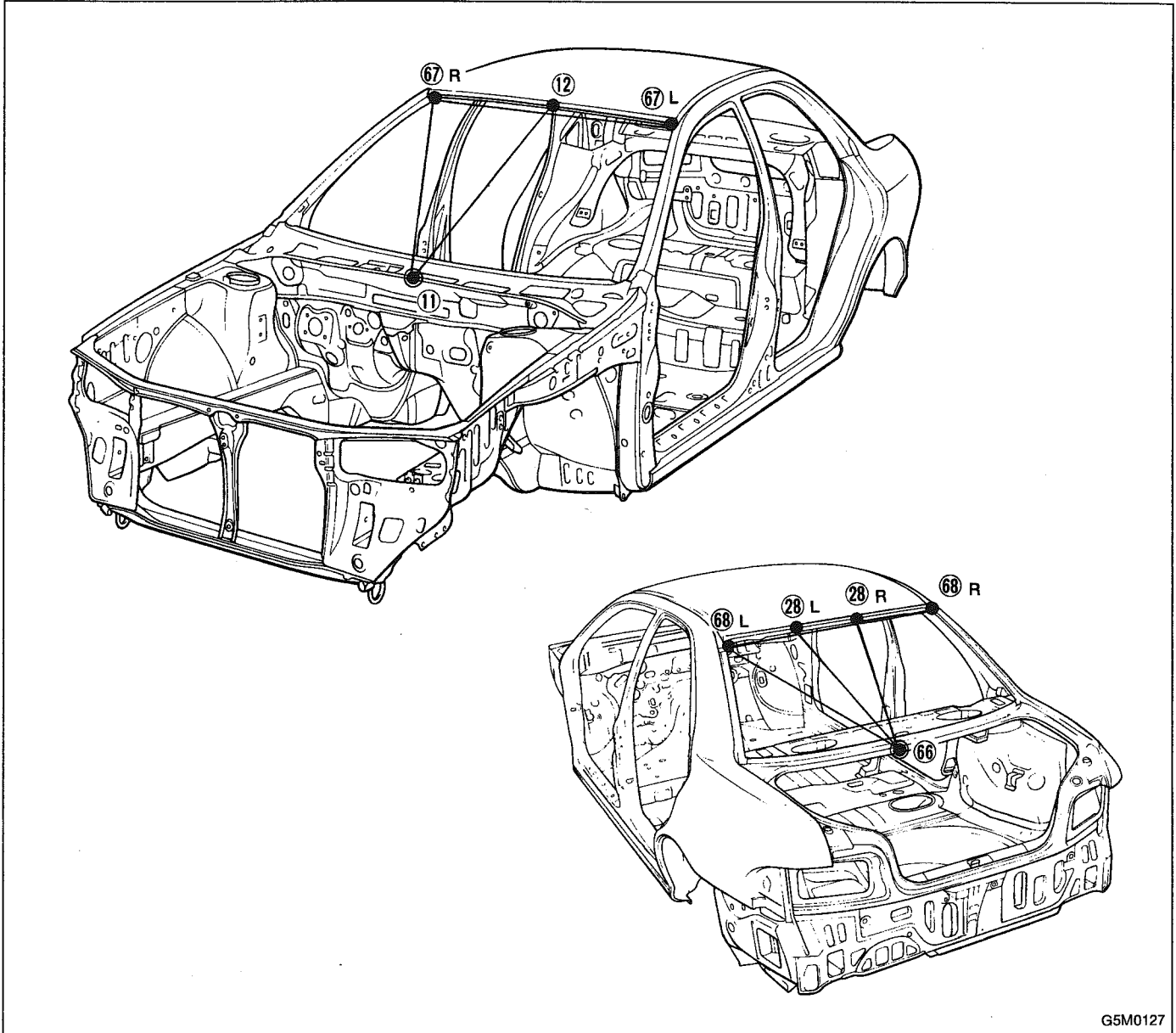


H5M0713A

Unit: mm (in)

14	—	71	:	1,576	(62.05)	73	—	75	:	512	(20.16)
13	—	70	:	1,251	(49.25)	70	—	36 _L	:	1,295	(50.98)
16	—	70	:	997	(39.25)	70	—	37 _R	:	1,243	(48.94)
13	—	69	:	1,063	(41.85)						
72	—	74	:	778	(30.63)						

D: FRONT WINDSHIELD AND REAR WINDOW

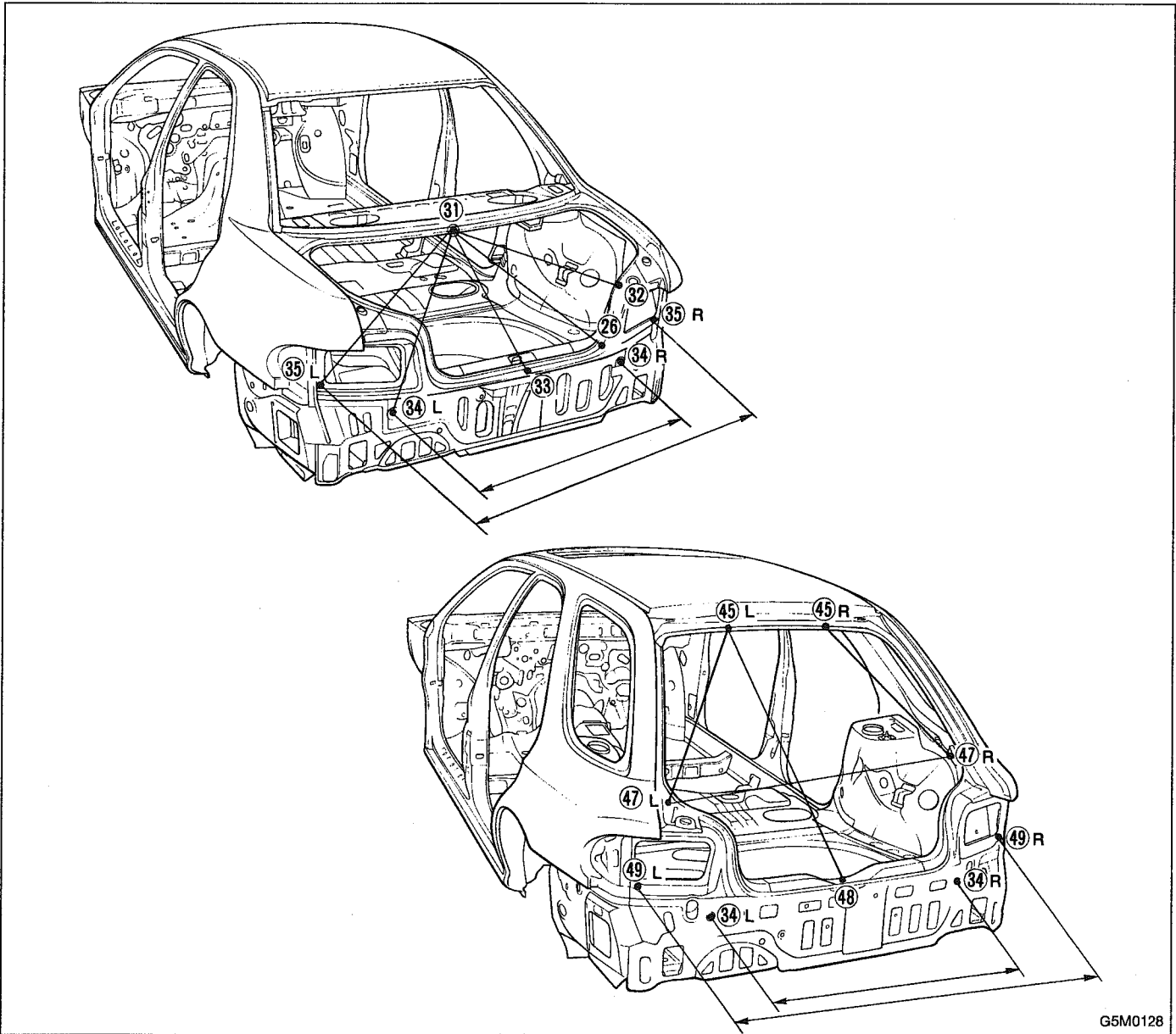


G5M0127

Unit: mm (in)

(11)	—	(12)	:	989 (38.94)	(66)	—	(28 _R)	}	714 (28.11)
(67 _R)	—	(67 _L)	:	1,012 (39.84)	(66)	—	(28 _L)		
(11)	—	(67 _R)	}	1,116 (43.94)	(66)	—	(68 _R)	}	856 (33.70)
(11)	—	(67 _L)			(66)	—	(68 _L)		
					(68 _R)	—	(68 _L)	:	1,012 (39.84)

E: TRUNK LID AND REAR GATE



G5M0128

Unit: mm (in)

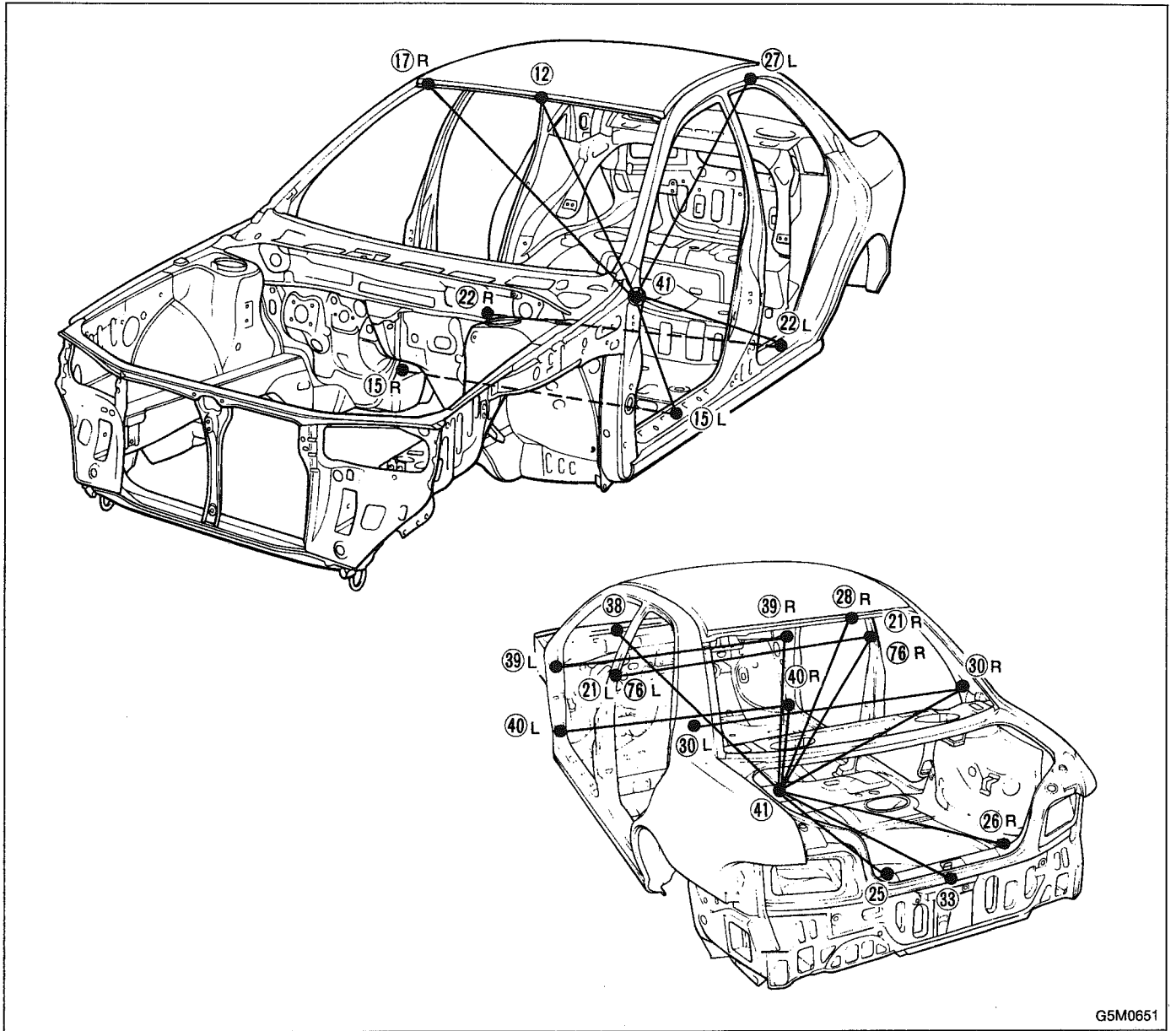
TRUNK LID

31	—	32 _R	: 575 (22.64)
31	—	32 _L	: 575 (22.64)
31	—	26 _R	: 812 (31.97)
31	—	26 _L	: 812 (31.97)
31	—	33	: 522 (20.55)
31	—	35 _R	: 794 (31.26)
31	—	35 _L	: 794 (31.26)
34 _R	—	34 _L	: 890 (35.04)
35 _R	—	35 _L	: 1,364 (53.70)

REAR GATE

45 _R	—	48	: 988 (38.90)
45 _L	—	48	: 988 (38.90)
45 _R	—	47 _R	: 926 (36.46)
45 _L	—	47 _L	: 926 (36.46)
47 _R	—	47 _L	: 1,043 (41.06)
49 _R	—	49 _L	: 1,335 (52.56)
34 _R	—	34 _L	: 890 (35.04)

F: COMPARTMENT

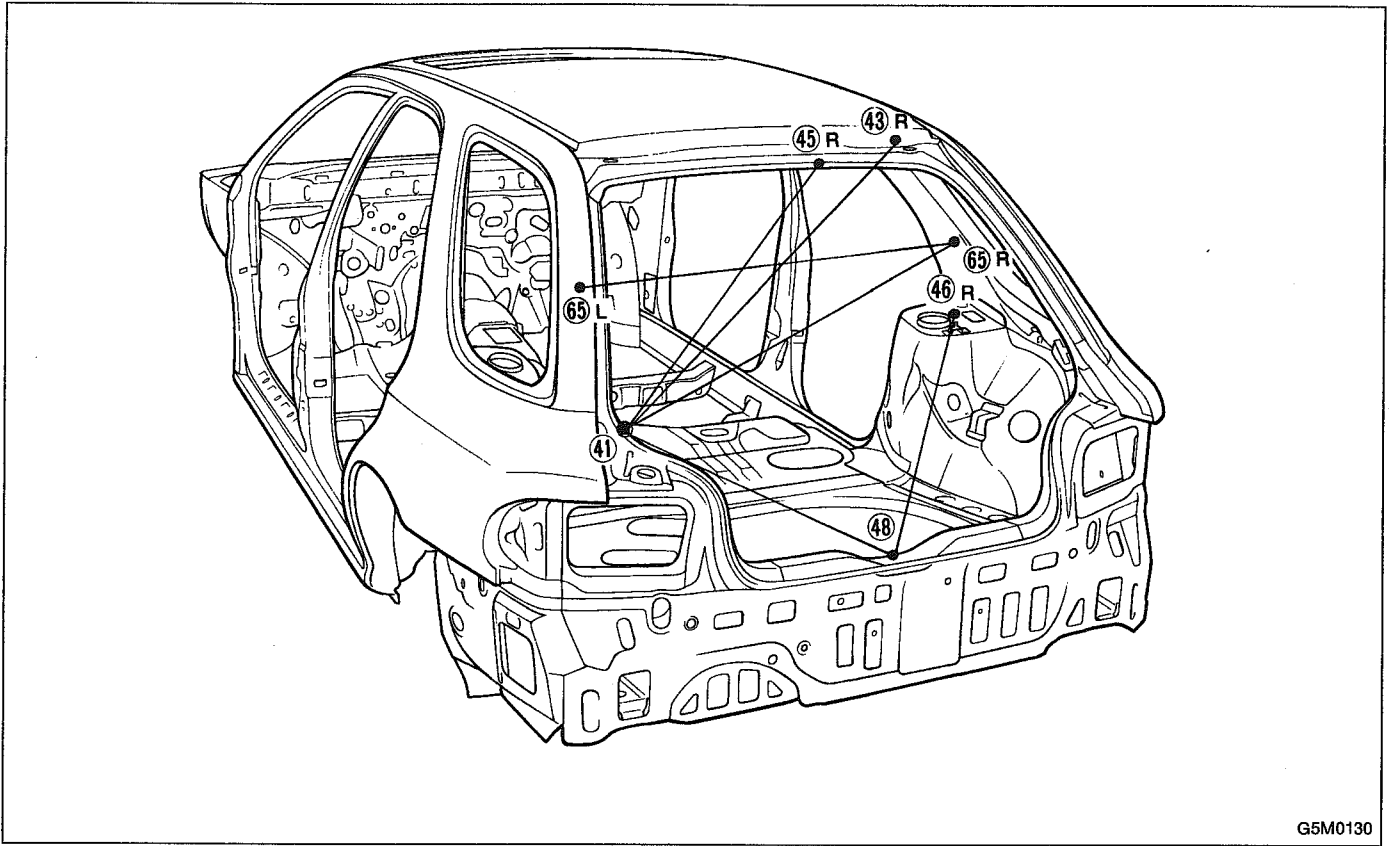


G5M0651

Unit: mm (in)

30 _R	—	30 _L	: 1,197 (47.13)	41	—	15 _R	: 1,140 (44.88)	41	—	30 _R	: 1,168 (45.98)	(Sedan)
21 _R	—	21 _L	: 1,061 (41.77)	41	—	15 _L	: 733 (28.86)	41	—	30 _L	: 1,050 (41.34)	(Sedan)
15 _R	—	15 _L	: 1,453 (57.20)	41	—	22 _R	: 1,156 (45.51)	41	—	28 _R	: 1,038 (40.87)	
22 _R	—	22 _L	: 1,453 (57.20)	41	—	22 _L	: 1,085 (42.72)	41	—	28 _L	: 1,208 (47.56)	
39 _R	—	39 _L	: 1,388 (54.65)	41	—	12	: 1,568 (61.73)	41	—	21 _R	: 1,569 (61.77)	(Sedan)
40 _R	—	40 _L	: 1,401 (55.16)	41	—	27 _R	: 1,184 (46.61)	41	—	21 _L	: 1,212 (47.72)	(Coupe)
41	—	38	: 1,527 (60.12)	41	—	27 _L		41	—	17 _R		
41	—	39 _R	: 1,524 (60.00)	41	—	26 _R		41	—	17 _L		
41	—	39 _L	: 1,756 (69.13)	41	—	26 _L		41	—	33		
41	—	40 _R		41	—	25		76 _R	—	76 _L		
41	—	40 _L										

G: LUGGAGE ROOM



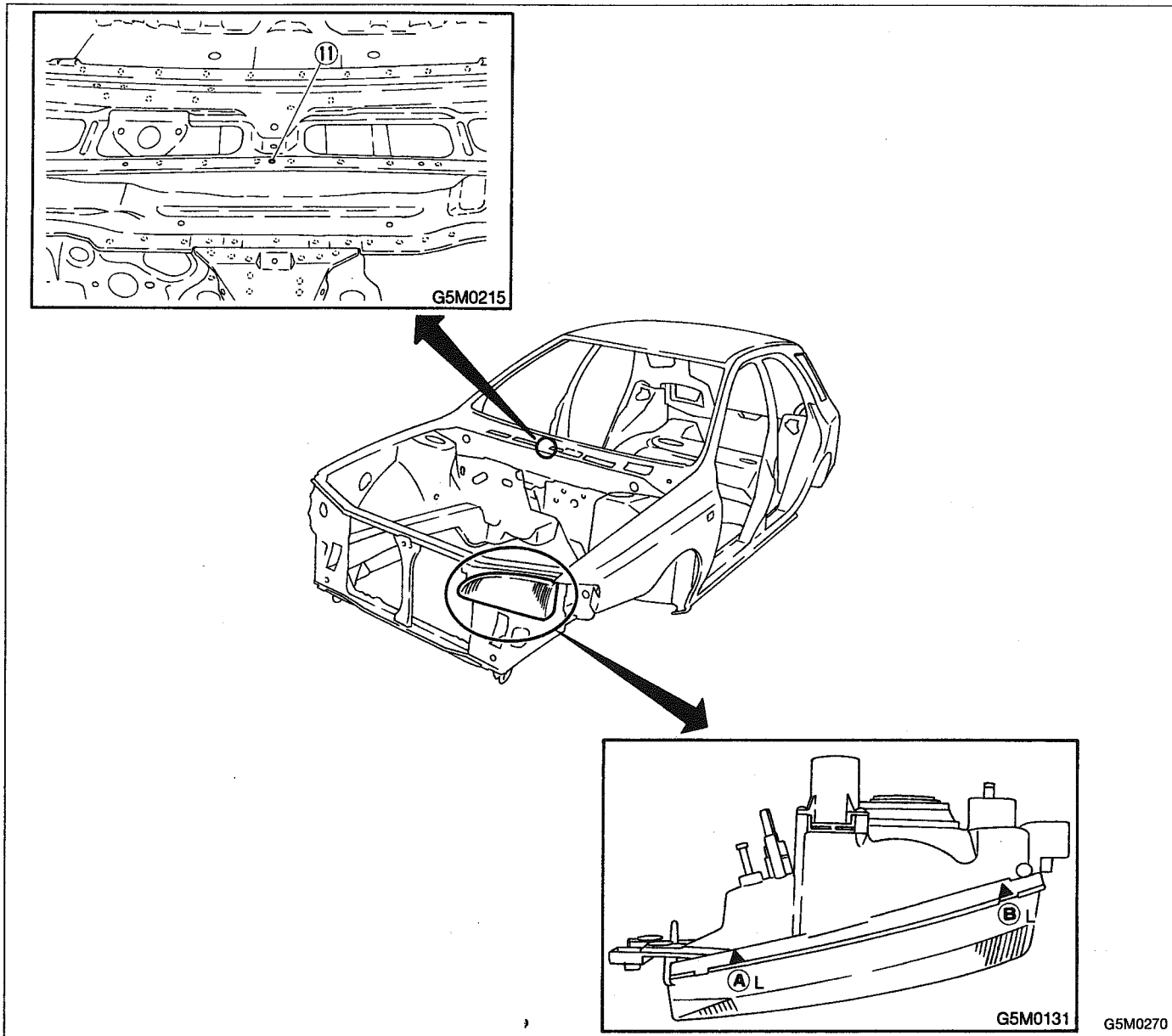
G5M0130

Unit: mm (in)

④①	—	⑥⑤ _R	} : 1,122 (44.17)	④①	—	④③ _R	} : 1,237 (48.70)
④①	—	⑥⑤ _L		④①	—	④③ _L	
④①	—	④⑤ _R	} : 1,225 (48.23)	④⑧	—	④⑥ _R	} : 971 (38.23)
④①	—	④⑤ _L		④⑧	—	④⑥ _L	
④①	—	④⑧	: 1,446 (56.93)	⑥⑤ _R	—	⑥⑤ _L	: 1,235 (48.62)

4. Datum Points and Dimensions Concerning On-Board Aiming Adjustment

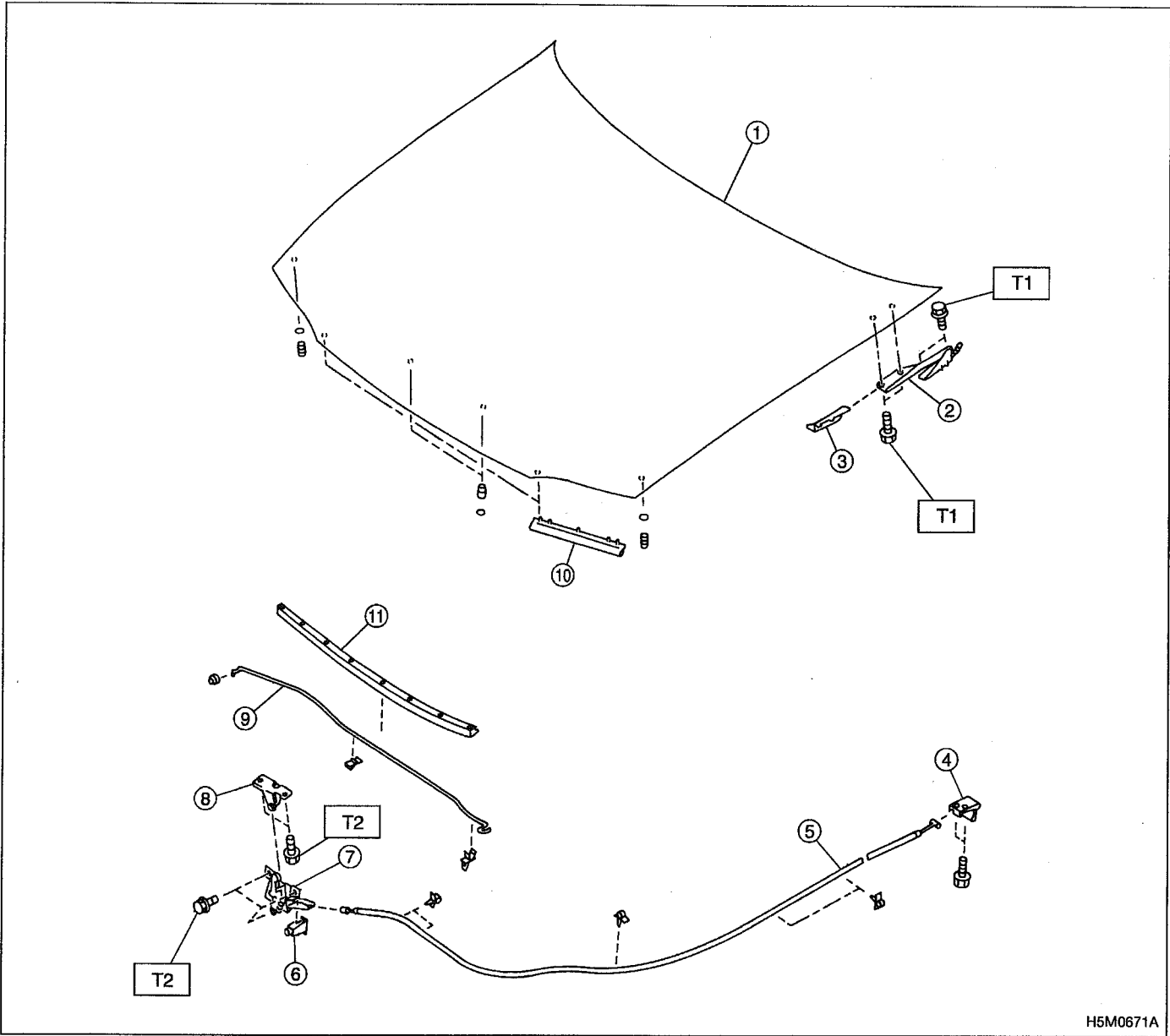
If headlight aiming is misaligned due to damaged body panel, repair headlight mating surface using body and headlight datum points as a guide.



Unit: mm (in)

⑪	—	Ⓐ _L	} : 993 (39.09)	⑪	—	Ⓑ _L	} : 1,048 (41.26)
⑪	—	Ⓐ _R		⑪	—	Ⓑ _R	

1. Front Hood and Hood Lock

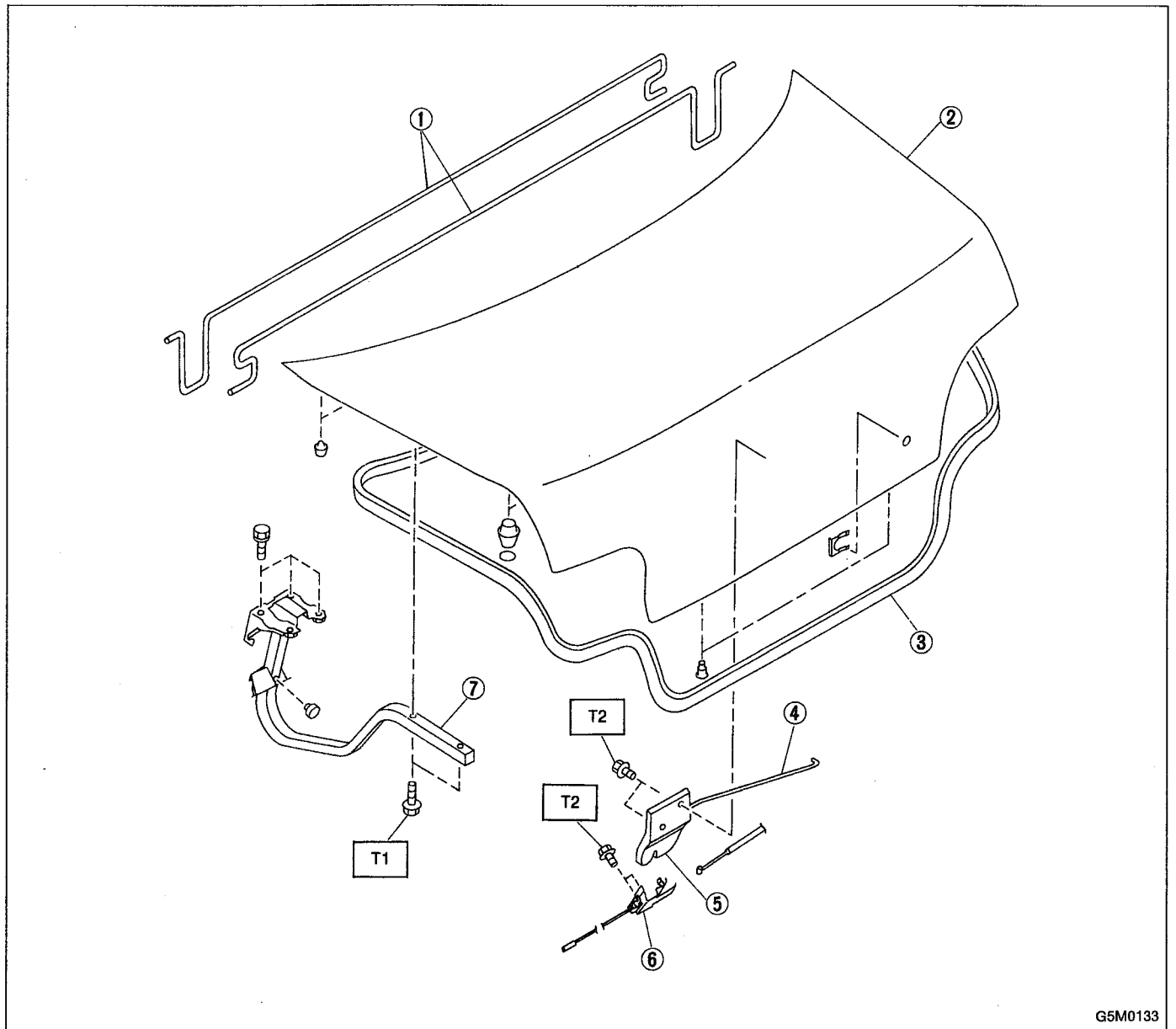


H5M0671A

- | | |
|-----------------------------|-------------------------|
| ① Front hood | ⑦ Hood lock ASSY |
| ② Hinge (RH, LH) | ⑧ Striker |
| ③ Hood hinge cover (RH, LH) | ⑨ Front hood stay |
| ④ Lever ASSY | ⑩ Seal (Front hood) SD |
| ⑤ Cable | ⑪ Seal (Front hood) CTR |
| ⑥ Stopper | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 14 ± 9 (1.4 ± 0.9, 10.1 ± 6.5)
T2: 32 ± 1 (3.3 ± 0.1, 23.9 ± 0.7)

2. Trunk Lid

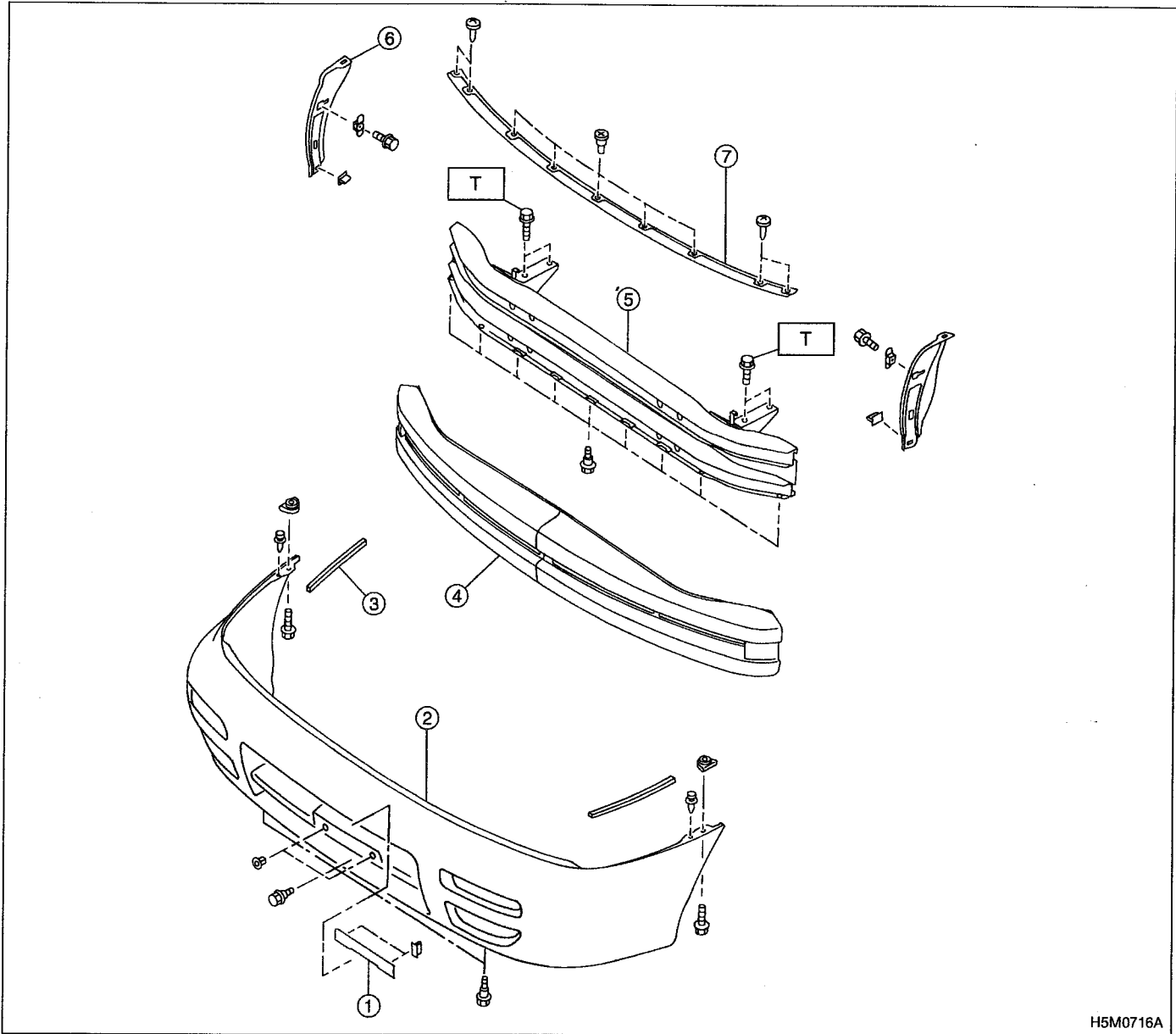


G5M0133

- | | |
|----------------|-----------------------|
| ① Torsion bar | ⑤ Trunk lid lock ASSY |
| ② Trunk lid | ⑥ Striker |
| ③ Weatherstrip | ⑦ Hinge ASSY |
| ④ Rod | |

Tightening torque: N-m (kg-m, ft-lb)
T1: 14 ± 4 (1.4 ± 0.4, 10.1 ± 2.9)
T2: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)

3. Front Bumper

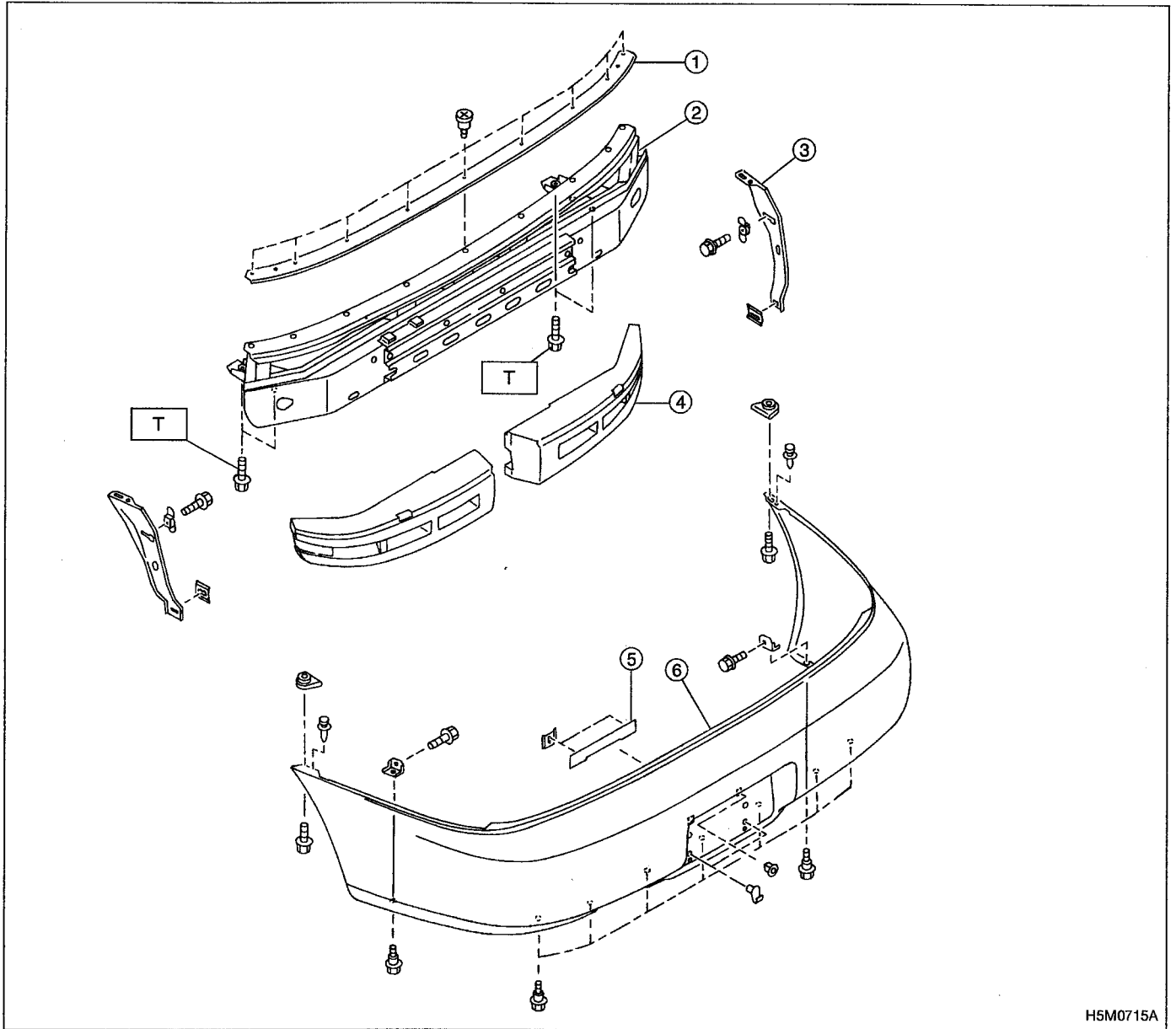


- ① Plate
- ② Bumper face
- ③ Spacer
- ④ E/A from bumper

- ⑤ Front beam
- ⑥ Bracket (Side)
- ⑦ Holder upper

Tightening torque: N·m (kg·m, ft·lb)
T: 93 ± 25 (9.5 ± 2.5, 69 ± 18)

4. Rear Bumper

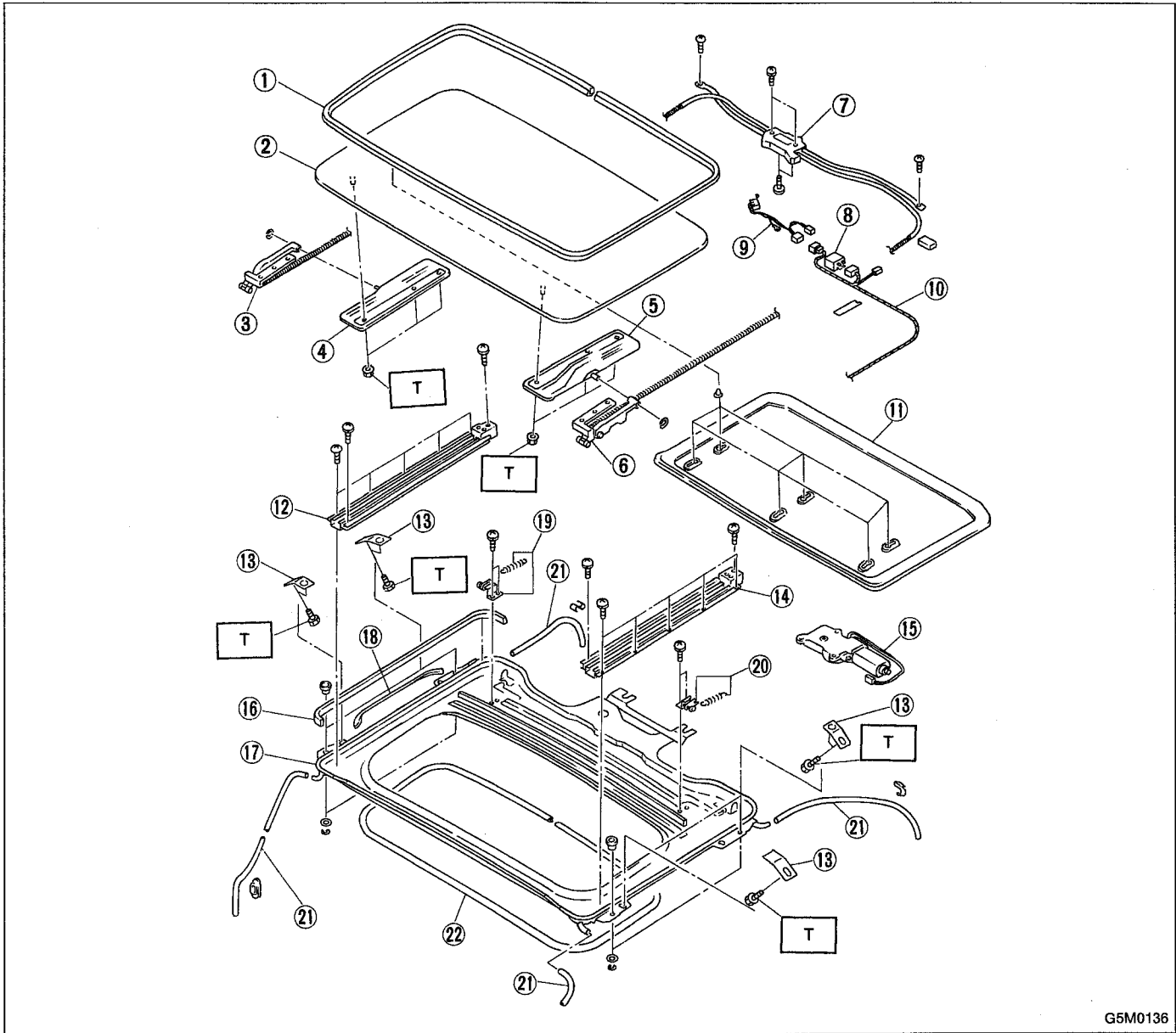


- ① Holder upper
- ② Bumper beam
- ③ Bracket (Side)

- ④ E/A from bumper
- ⑤ Plate
- ⑥ Bumper surface

Tightening torque: N·m (kg·m, ft·lb)
T: 93 ± 25 (9.5 ± 2.5, 69 ± 18)

5. Sunroof



G5M0136

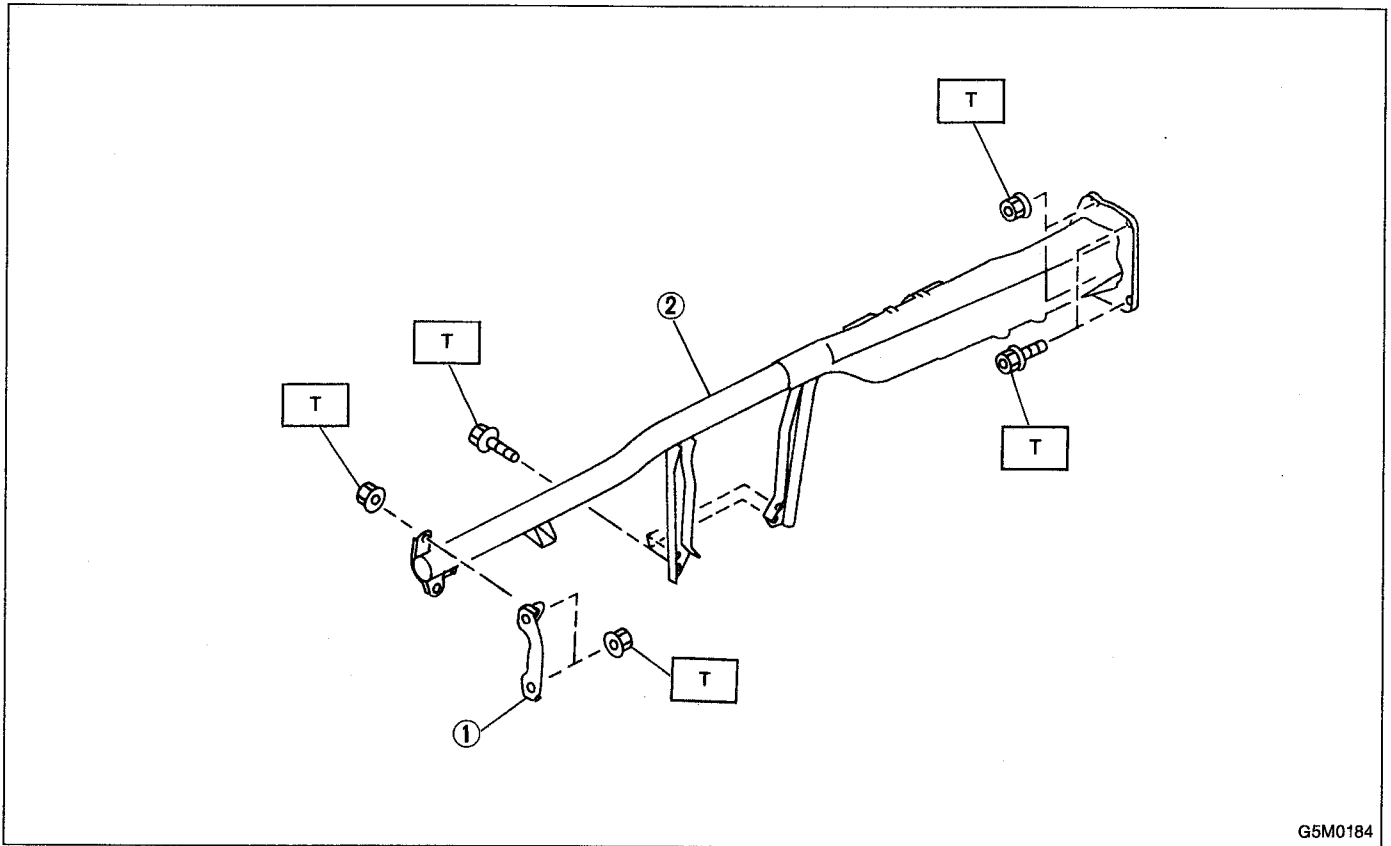
- ① Weatherstrip
- ② Sunroof panel
- ③ Rear guide ASSY
- ④ Lower panel
- ⑤ Lower panel
- ⑥ Rear guide ASSY
- ⑦ Drive unit
- ⑧ Relay
- ⑨ Harness

- ⑩ Harness
- ⑪ Sunroof trim
- ⑫ Guide rail
- ⑬ Set bracket
- ⑭ Guide rail
- ⑮ Motor ASSY
- ⑯ Sealed tape
- ⑰ Frame ASSY
- ⑱ Sealed cushion

- ⑲ Shutting ASSY (RH)
- ⑳ Shutting ASSY (LH)
- ㉑ Drain tube
- ㉒ Garnish

Tightening torque: N·m (kg·m, ft·lb)
T: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)

6. Steering Support Beam

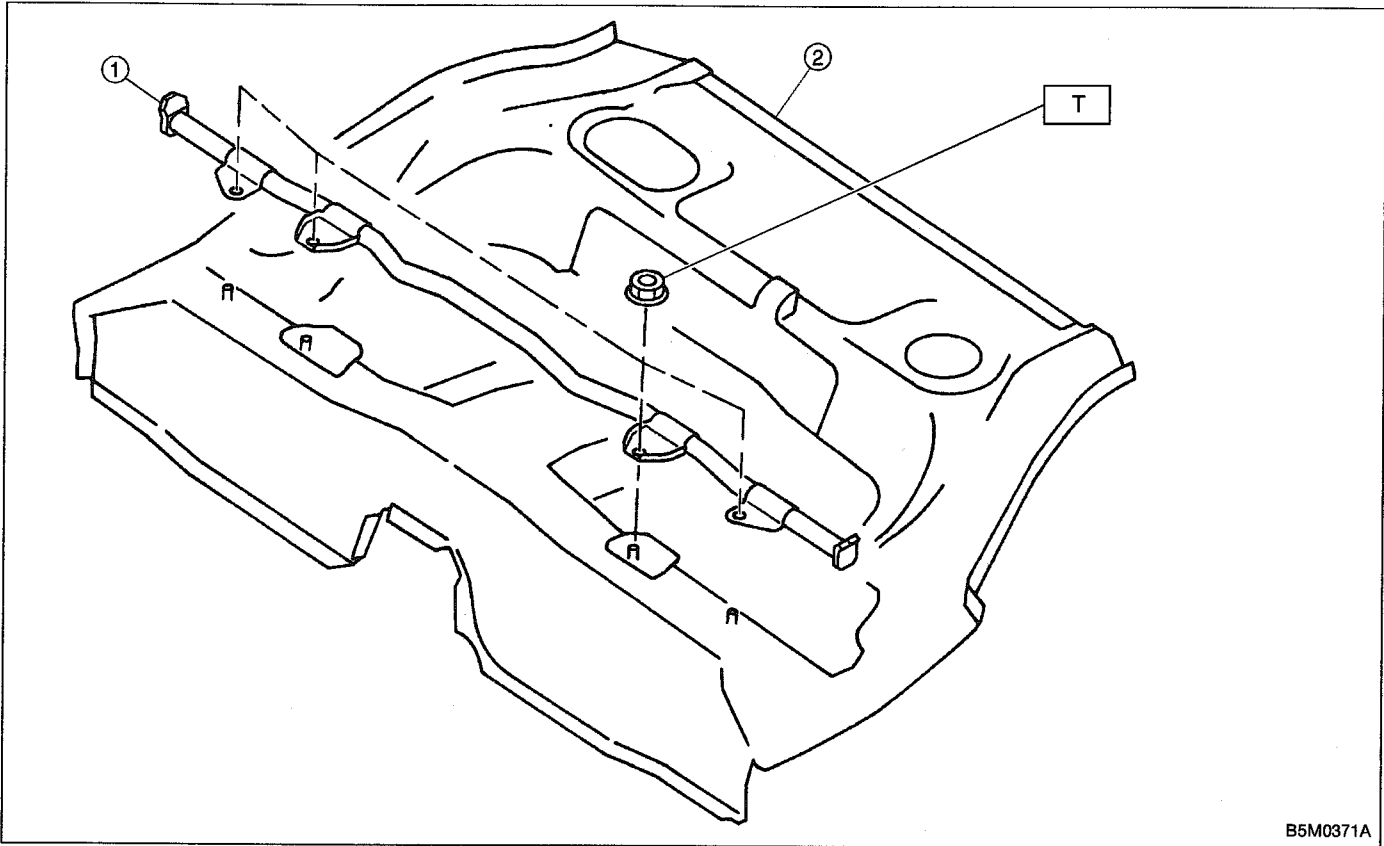


G5M0184

- ① Bracket
- ② Steering beam

Tightening torque: N·m (kg·m, ft·lb)
T: 18 ± 5 (1.8 ± 0.5, 13.0 ± 3.6)

7. Guard Pipe



B5M0371A

- ① Guard pipe
- ② Rear floor panel

Tightening torque: N·m (kg-m, ft-lb)
T: 32±10 (3.3±1.0, 23.9±7)

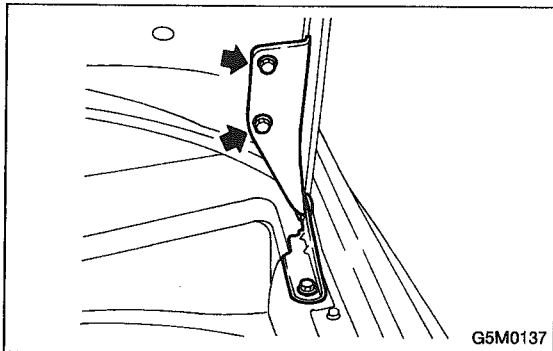
1. Hood

A: REMOVAL AND INSTALLATION

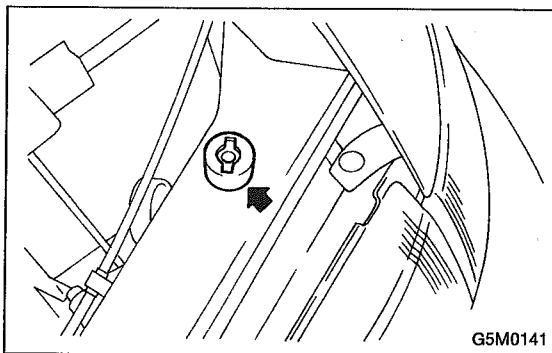
NOTE:

The hood lock has a dual locking design which consists of a main lock and a safety lock mechanism. When the release knob located at the front pillar on the driver's side is pulled back, the main lock is released through the cable attached to the knob.

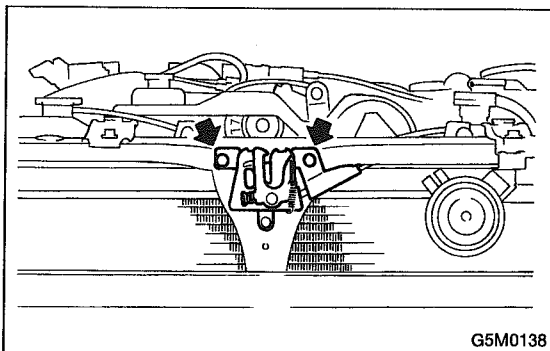
The safety lock can be released by pushing the lever protruding above the front grill while opening the hood.



G5M0137



G5M0141



G5M0138

1. HOOD

- 1) Open front hood, and remove washer hose.
- 2) Remove attaching bolts.
- 3) Detach front hood from hinges.

- 4) Installation is in the reverse order of removal.

CAUTION:

Adjust buffer assembly on each end so that main lock is applied securely when hood is released from a height of approx. 20 mm (0.79 in).

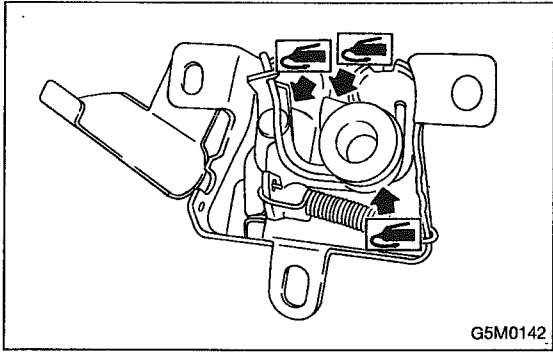
NOTE:

Align the center of striker with lock during installation. Make sure safety lever is properly caught by striker under the hood's own weight.

2. HOOD LOCK

- 1) Open front hood and remove front grille.
- 2) Remove bolts which secure lock assembly to radiator panel, and remove lock assembly.
- 3) Disconnect release cable from lock assembly.
- 4) Installation is in the reverse order of removal.

1. Hood



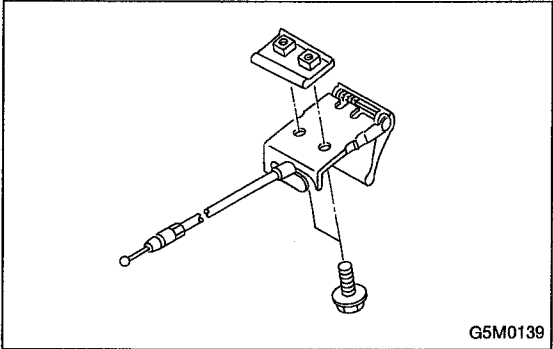
G5M0142

NOTE:

- Route hood lock release cable and hold with clips.
- After installing release cable, ensure it operates smoothly.
- Apply grease to sliding surfaces of parts.

3. RELEASE CABLE

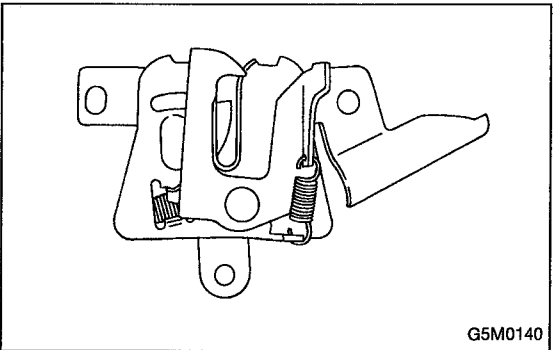
- 1) Remove front grille.
- 2) Remove release cable from lock assembly.
- 3) Remove cable clip from engine compartment.
- 4) Remove bracket from front pillar.
- 5) Installation is in the reverse order of removal.



G5M0139

B: POINTS TO CHECK

- 1) Check striker for bending or abnormal wear.
- 2) Check safety lever for improper movement.
- 3) Check other levers and spring for rust formation and unsmooth movement.



G5M0140

C: ADJUSTMENT

- 1) Fore-aft and left-right adjustments

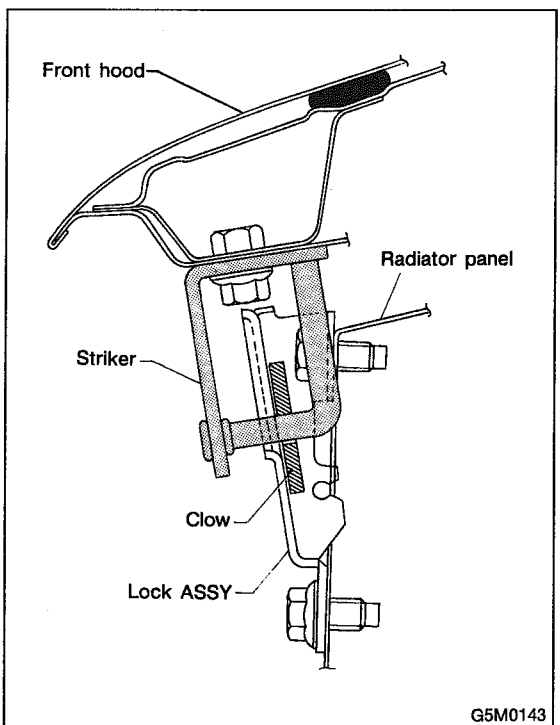
Loosen striker mounting bolts and adjust fore-and-aft position of striker.

CAUTION:

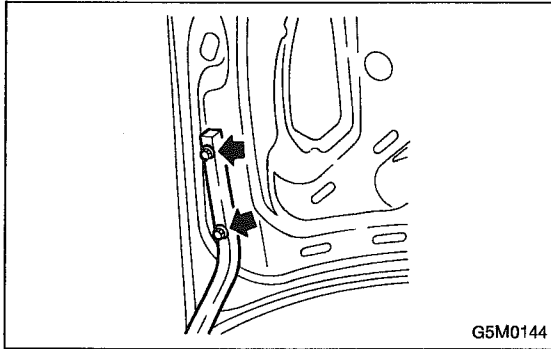
Do not adjust striker position using the lock. Doing so may result in a misaligned front grille.

- 2) Up-down adjustment

Make up-and-down adjustment of striker only when hood does not properly contact buffer or hood is not flush with fender, or when release cable does not properly operate. Adjustment can be made by adjusting the stroke length of striker after lock assembly mounting screws are removed.



G5M0143

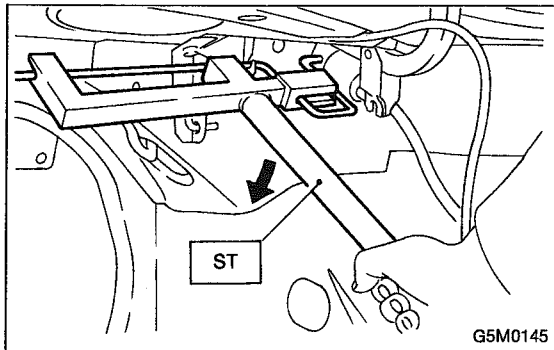


2. Trunk Lid

A: REMOVAL AND INSTALLATION

1. TRUNK LID

- 1) Open trunk lid.
- 2) Remove trunk lid mounting bolts and detach trunk lid from hinges.
- 3) Installation is in the reverse order of removal.



2. TORSION BAR

- 1) Open trunk lid. Remove torsion bars from hinge links using ST.

ST 927780000 REMOVER

CAUTION:

Be careful because torsion bar quickly swings back when released.

- 2) Remove the left and right torsion bars.

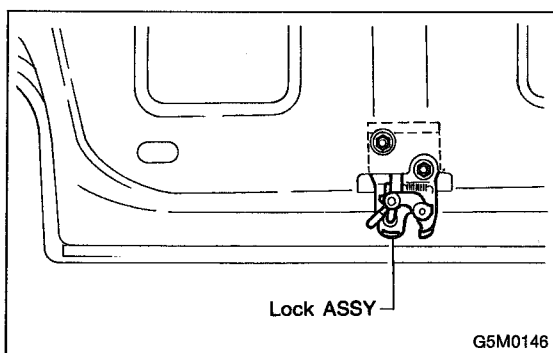
WARNING:

Be careful because trunk lid drops under its own weight when torsion bars are removed.

- 3) Installation is in the reverse order of removal.

NOTE:

Apply a coat of grease to the rotary section of hinges and contact surfaces of torsion bars.



3. TRUNK LID LOCK ASSEMBLY AND KEY CYLINDER

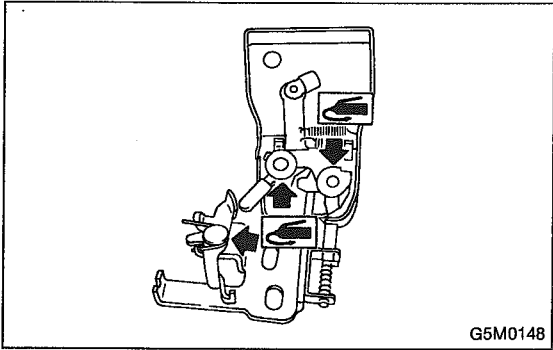
- 1) Remove rod of lock assembly from rod holder of key lock assembly.
- 2) Remove bolts which hold lock assembly and remove lock assembly.

NOTE:

- Always remove rear skirt trim panel beforehand, if so equipped.
- Be careful not to bend opener cable.

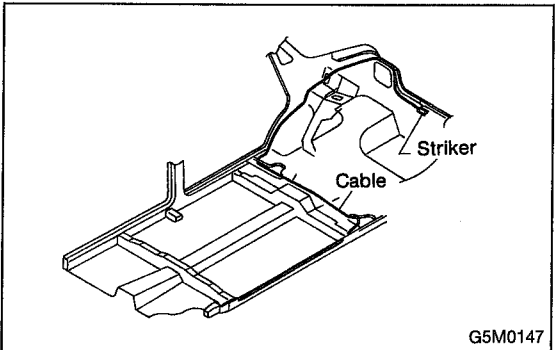
- 3) Remove clip and detach key cylinder from trunk lid.
- 4) Installation is in the reverse order of removal.

2. Trunk Lid - 3. Fuel Flap



NOTE:

Apply grease to sliding surfaces of lock assembly and striker.



4. TRUNK LID OPENER

- 1) Remove driver's seat, rear seats, center pillar lower cover, floor mat, rear arch cover and side sill cover (on the driver's side).
- 2) Remove all clips which hold cable.
- 3) Disconnect cable from pull handle assembly.
- 4) Remove bolts and detach pull handle assembly.
- 5) Loosen bolts which hold lock assembly, and remove it.
- 6) Remove striker from trunk lid.
- 7) Disconnect cable from striker.

NOTE:

Be careful not to bend or break cable.

- 8) Installation is in the reverse order of removal.

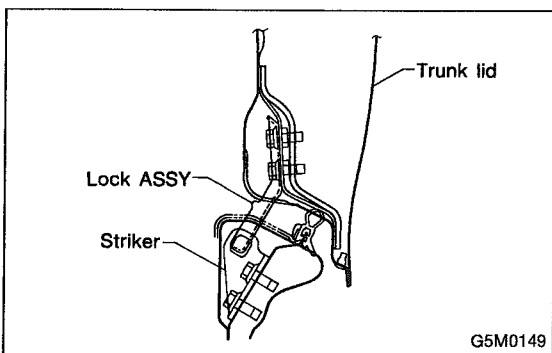
CAUTION:

● When installing cover to pull handle assembly, observe the following:

- Be careful not to catch harness.
- Engage pull handle assembly pawls firmly.

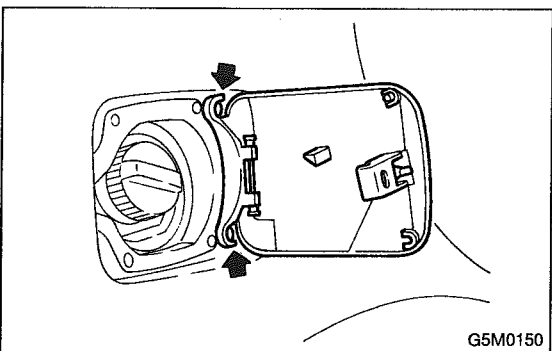
NOTE:

After installing opener cable, ensure it moves smoothly.

**B: ADJUSTMENT**

1. TRUNK LID

- 1) To adjust left-right lid positioning, loosen bolts which hold trunk lid to hinges.
- 2) To adjust up-down lid alignment, place washer(s) between trunk lid and hinges or move trunk lock assembly up or down.



3. Fuel Flap

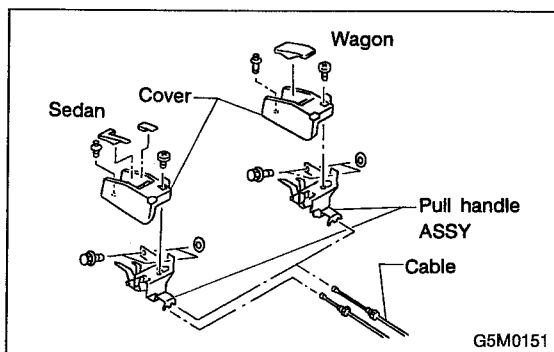
A: REMOVAL AND INSTALLATION

1. FUEL FLAP

- 1) Remove bolts which hold hinge to car body, and detach fuel flap and hinge as a unit.
- 2) Installation is in the reverse order of removal.

CAUTION:

Make sure the clearance between fuel flap and car body is equal at all points.

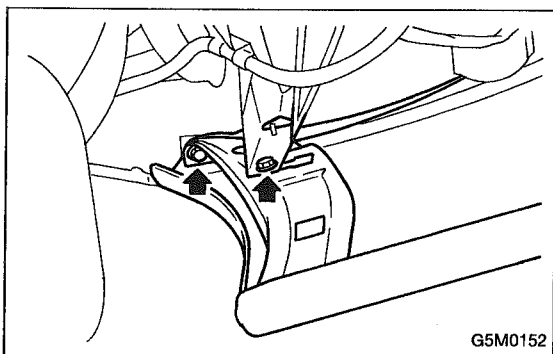


2. FUEL FLAP OPENER

- 1) Remove driver's seat, rear seats, center pillar lower cover, floor mat, rear arch cover/rear quarter trim (wagon), and side sill cover (on the driver's side).
- 2) Remove all clips which hold cable.
- 3) Disconnect cable from pull handle.
- 4) Detach pull handle by removing bolts.
- 5) Detach fuel lock holder by turning it.
- 6) Installation is in the reverse order of removal.

CAUTION:

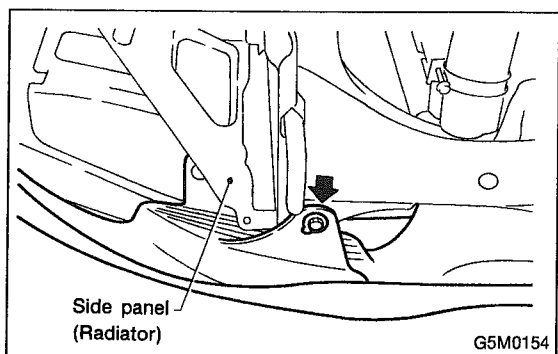
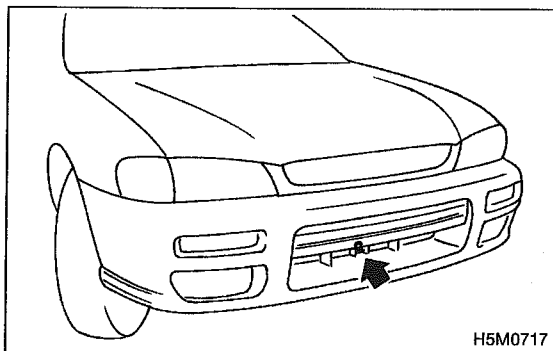
- When installing cover to pull handle assembly, observe the following:
 - Be careful not to catch harness.
 - Engage pull handle assembly pawls firmly.
- After installing opener cable, ensure it moves smoothly.



4. Front Bumper

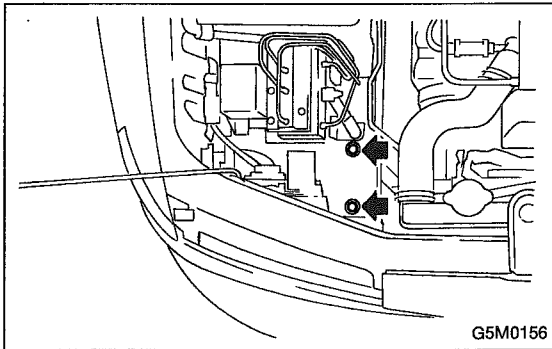
A: REMOVAL AND INSTALLATION

- 1) Disconnect the ground cable from the battery.
- 2) Remove the canister.
- 3) Remove the front grille.
- 4) Remove the parking light and headlight LH.
- 5) Remove the mud guard.
- 6) Remove bolts from side of bumper.
- 7) Remove bolt from lower center of bumper.

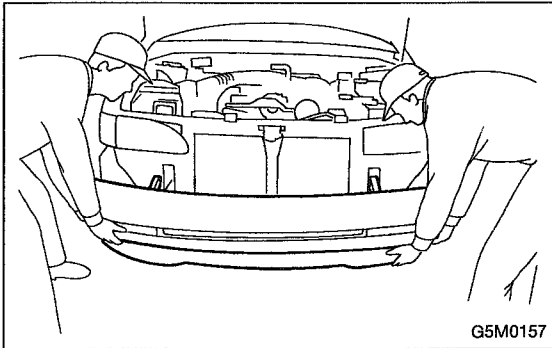


- 8) Remove bolts from lower side of bumper.

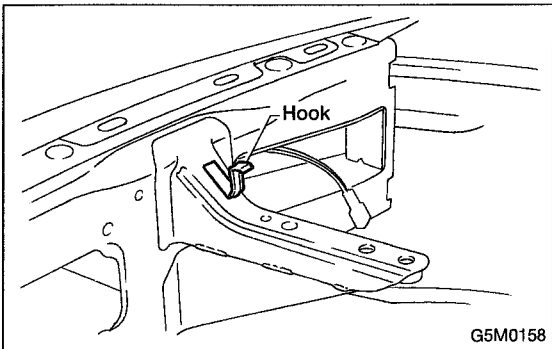
4. Front Bumper - 5. Rear Bumper



- 9) Remove bolts (engine compartment side) from bumper stays.
- 10) Remove turn signal light connector.



- 11) Remove bumper assembly.



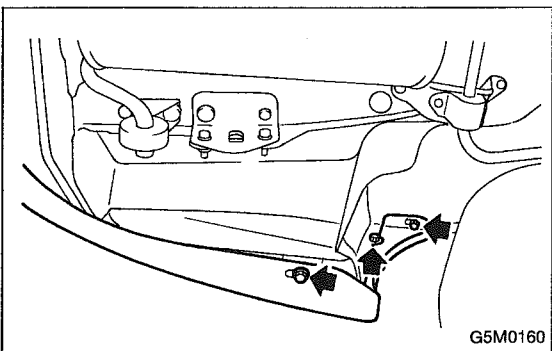
- 12) Installation is in the reverse order of removal.

CAUTION:

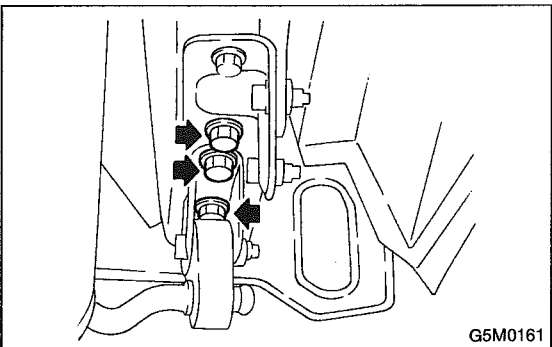
- Be extremely careful to prevent scratches on bumper face as it is made of resin.
- Be careful not to scratch the body when removing or installing the bumper.
- To facilitate installation of front bumper, attach hook (located at stay) to body panel.
- When installing canister, insert air vent hose of canister into the hole on body.

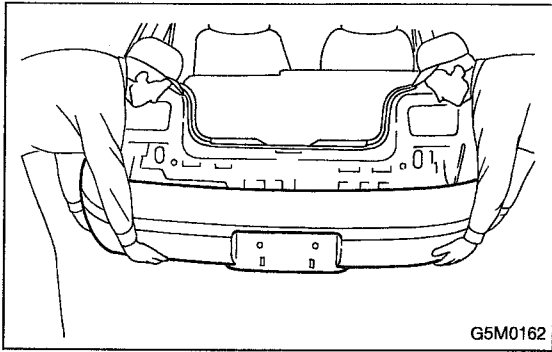
5. Rear Bumper**A: REMOVAL AND INSTALLATION****1. SEDAN**

- 1) Open trunk lid. Remove trunk trim panel clips and detach trim.
- 2) Disconnect license plate light connector.
- 3) Remove bolts from side of bumper.

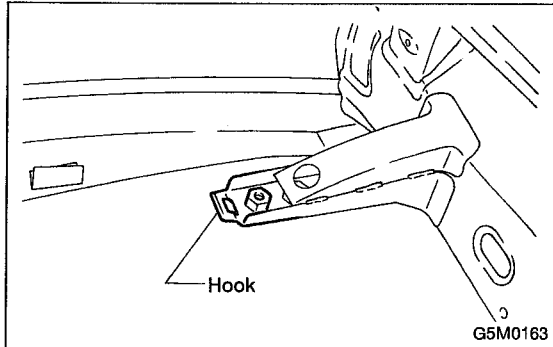


- 4) Remove bolts from bumper stay.





5) Remove rear bumper.



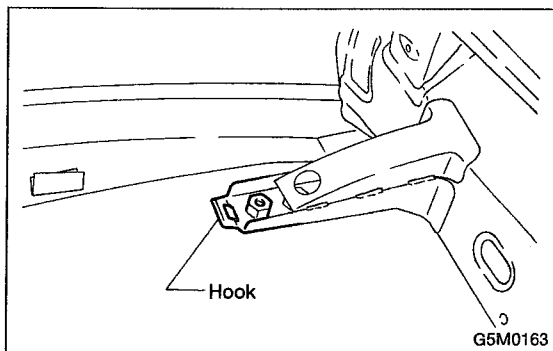
6) Installation is in the reverse order of removal.

CAUTION:

- Be extremely careful to prevent scratches on bumper face as it is made of resin.
- Be careful not to scratch the body when removing or installing bumper.
- To facilitate installation of rear bumper, attach hook (located at stay) to body panel.

2. WAGON

- 1) Open rear gate and rear quarter trim lid.
- 2) Disconnect license plate light connector.
- 3) Remove bolts from side of bumper.
- 4) Remove bolts from bumper stays.
- 5) Remove bumper assembly.



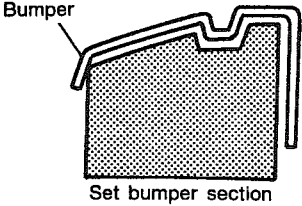
6) Installation is in the reverse order of removal.

CAUTION:

- Be extremely careful to prevent scratches on bumper face as it is made of resin.
- Be careful not to scratch the body when removing or installing bumper.
- To facilitate installation of rear bumper, attach hook (located at stay) to body panel.

6. Coating Method for PP Bumper

A: PROCESS STEPS

Process No.	Process name	Job contents	
1	Bumper mounting	Set bumper on paint worktable if required. Use paint worktable conforming to inner shape of bumper when possible.	 <p style="text-align: right;">G5M0164</p>
2	Masking	Mask specified part (black base) with masking tape. Use masking tape for PP (example, Nichiban No. 533, etc.).	
3	Degreasing, cleaning	Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.	
4	Primer paint	Apply primer one to all parts to be painted, using air gun. Use primer (clear).	
5	Drying	Dry at normal temperature [10 to 15 min. at 20°C (68°F)]. In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc. Therefore, if dust or dirt must be removed, use ordinary alcohol, etc.	
6	Top coat paint (I)	Solid color	Metallic color
		Use section (block) paint for top coat. ● Paint in use (for each color): Solid paint Hardener PB Thinner T-301 ● Mixing ratio: Main agent vs. hardener = 4:1 ● Viscosity: 10 — 13 sec/20°C (68°F) ● Film thickness: 35 — 45μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm ² , 36 — 50 psi)	Use section (block) paint for top coat. ● Paint in use (for each color): Metallic paint Hardener PB Thinner T-306 ● Mixing ratio: Main agent vs. hardener = 10:1 ● Viscosity: 10 — 13 sec/20°C (68°F) ● Film thickness: 15 — 20μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm ² , 36 — 50 psi)
7	Drying	Not required.	Dry at normal temperature [10 min. or more at 20°C (68°F)]. In half-dried condition, avoid dust, dirt.
8	Top coat paint (II)	Not required.	Apply a clear coat to parts with top coat paint (I), three times, at 5 — 7 minute intervals. ● Paint in use Metallic paint Hardener PB Thinner T-301 ● Mixing ratio: Clear vs. hardener = 6:1 ● Viscosity: 14 — 16 sec/20°C (68°F) ● Film thickness: 25 — 30μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm ² , 36 — 50 psi)
9	Drying	60°C (140°F), 60 min. or 80°C (176°F), 30 min. If higher than 80°C (176°F), PP may be deformed. Keep maximum temperature of 80°C (176°F).	
10	Inspection	Paint check.	
11	Masking removal	Remove masking in process No. 2.	

7. Repair Instructions for Colored PP Bumper

All PP bumpers are provided with a grained surface, and if the surface is damaged, it cannot normally be restored to its former condition. Damage limited to shallow scratches that cause only a change in the lustre of the base material or coating, can be almost fully restored. Before repairing a damaged area, explain this point to the customer and get an understanding about the matter. Repair methods are outlined below, based on a classification of the extent of damage.

A: MINOR DAMAGE CAUSING ONLY A CHANGE IN THE LUSTRE OF THE BUMPER DUE TO A LIGHT TOUCH

Almost restorable.

Process No.	Process name	Job contents	
1	Cleaning	Clean the area to be repaired using water.	
2	Sanding	Grind the repairing area with #500 sandpaper in a "feathering" motion.	
3	Finish	Resin section	Coated section
		Repeatedly apply wax to the affected area using a soft cloth (such as flannel). Recommended wax: NITTO KASEI Soft 99 TIRE WAX BLACK, or equivalent.	Perform either the same operation as for the resin section or process No. 18 and subsequent operations in the "(3)" section, depending on the degree and nature of damage.
		Polish the waxed area with a clean cloth after 5 to 10 minutes.	

B: DEEP DAMAGE CAUSED BY SCRATCHING FENCES, ETC.

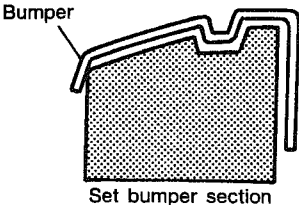
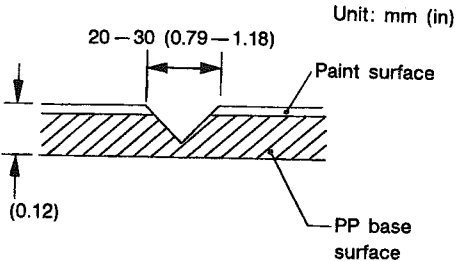
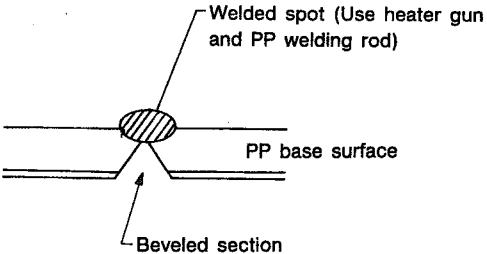
A dent cannot be repaired but a whitened or swelled part can be removed.

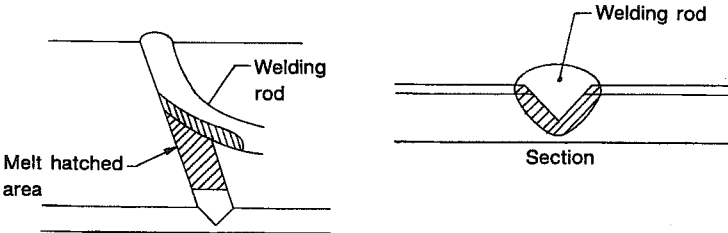
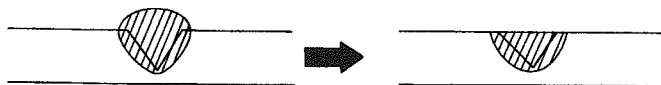
Process No.	Process name	Job contents	
1	Cleaning	Clean damaged area with water.	
2	Removal of damaged area	Cut off protruding area, if any, due to collision, using a putty knife.	
3	Sanding	Grind the affected area with #100 to #500 sandpaper.	
4	Finish	Resin section	Coated section
		Same as Process No. 3 in the "(1)" section.	Perform Process No. 12 and subsequent operations in the "(3)" section.

C: DEEP DAMAGE SUCH AS A BREAK OR HOLE THAT REQUIRES FILLING

Much of the peripheral grained surface must be sacrificed for repair, and the degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)

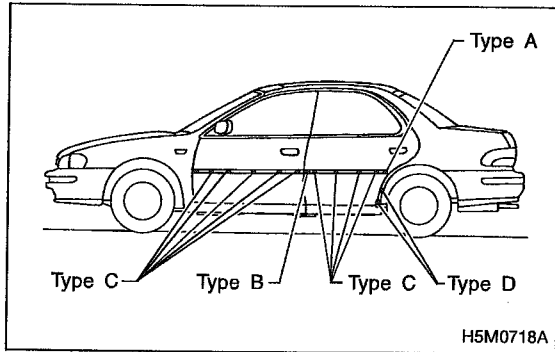
Recommended repair kit: PP Part Repair Kit (NRM)

Process No.	Process name	Job contents	
1	Bumper removal	Remove bumper as required.	
2	Part removal	Remove parts built into bumper as required.	
3	Bumper placement	Place bumper on a paint worktable as required. It is recommended that contour of worktable accommodate internal shape of bumper.	 <p style="text-align: right;">G5M0164</p>
4	Surface preparation	Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol).	
5	Cutting	If nature of damage is cracks or holes, cut a guide slit of 20 to 30 mm (0.79 to 1.18 in) in length along the crack or hole up to the bumper's base surface. Then, bevel or "vee-out" the affected area using a knife or grinder.	 <p style="text-align: right;">G5M0165</p>
6	Sanding (I)	Grind beveled surface with sandpaper (#40 to #60) to smooth finish.	
7	Cleaning	Clean the sanded surface with the same solvent as used in Process No. 4.	
8	Temporary welding	Grind the side just opposite the beveled area with sandpaper (#40 to #60) and clean using a solvent. Temporarily spot-weld the side, using a PP welding rod and heater gun.	 <p style="text-align: right;">G5M0166</p>
		<p>NOTE:</p> <ul style="list-style-type: none"> ● Do not melt welding rod until it flows out. This results in reduced strength. ● Leave the welded spot unattended until it cools completely. 	

Process No.	Process name	Job contents
9	Welding	<p>Using a heater gun and PP welding rod, weld the beveled spot while melting the rod and damaged area.</p>  <p style="text-align: right;">G5M0167</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Melt the sections indicated by hatched area. ● Do not melt welding rod until it flows out, in order to provide strength. ● Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot. ● Leave the welded spot unattended until it cools completely.
10	Sanding (II)	<p>Remove excess part of weld with a putty knife. If a drill or disc wheel is used instead of the knife, operate it at a rate lower than 1,500 rpm and grind the excess part little by little. A higher rpm will cause the PP substrate to melt from the heat.</p>  <p style="text-align: right;">G5M0168</p> <p>Sand the welded spot smooth with #240 sand paper.</p>
11	Masking	<p>Mask the black substrate section using masking tape. Recommended masking tape: Nichiban No. 533 or equivalent</p>
12	Cleaning/degreasing	<p>Completely clean the entire coated area, using solvent similar to that used in Process No. 4.</p>
13	Primer coating	<p>Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary. Recommended primer: Mp/ 364 PP Primer</p> <p>NOTE: Be sure to apply one coat of primer at a spraying pressure of 245 to 343 kPa (2.5 to 3.5 kg/cm², 36 to 50 psi) with a spray gun.</p>
14	Leave unattended.	<p>Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry.</p> <p>NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth dampened with alcohol. (Do not use thinner since the coated area tends to melt.)</p>
15	Primer surfacer coating	<p>Apply a coat of primer surfacer to the repaired area two or three times at an interval of 3 to 5 minutes.</p> <p>Recommended surfacer:</p> <ul style="list-style-type: none"> ● UPS 300 Flex Primer ● No. 303 UPS 300 Exclusive hardener ● NPS 725 Exclusive Reducer (thinner) <ul style="list-style-type: none"> ● Mixing ratio: 2 : 1 (UPS 300: No. 303) ● Viscosity: 12 — 14 sec/20°C (68°F) ● Coated film thickness: 40 — 50μ
16	Drying	<p>Allow the coated surface to dry for 60 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].</p>
17	Sanding (III)	<p>Sand the coated surface and its surrounding areas using #400 sandpaper and water.</p>

7. Repair Instructions for Colored PP Bumper

Process No.	Process name	Job contents	
18	Cleaning/ degreasing	Same as Process No. 12.	
19	Top coat (I)	Solid color	Metallic color
		Use a "block" coating method. <ul style="list-style-type: none"> ● Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) ● Mixing ratio: 3 : 1 (Suncryl: No. 307) ● Viscosity: 11 — 13 sec/20°C (68°F) ● Coated film thickness: 40 — 50μ ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi) 	Use a "block" coating method. <ul style="list-style-type: none"> ● Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) ● Mixing ratio: 3 : 1 (Suncryl: No. 307) ● Viscosity: 11 — 13 sec/20°C (68°F) ● Coated film thickness: 20 — 30μ ● Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)
20	Leave unattended.	Not required.	Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoated area is half-dry. NOTE: Be careful to keep dust or dirt from coming in contact with the affected area.
21	Top coat (II)	Not required.	Apply a clear coat three times at an interval of 3 to 5 minutes. <ul style="list-style-type: none"> ● Recommended paint: SC710 Overlay Clear No. 307 Flex Hardener SC Reducer (thinner) ● Mixing ratio: 3 : 1 (SC710: No. 307) ● Viscosity: 10 — 13 sec/20°C (68°F) ● Coated film thickness: 20 — 30μ ● Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm², 36 — 50 psi)
22	Drying	Allow the coated surface to dry at 20°C (68°F) for two hours or 60°C (140°F) for 30 minutes. NOTE: Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.	
23	Inspection	Carefully check the condition of the repaired area.	
24	Masking removal	Remove masking tape applied in Process No. 11 and 13.	
25	Parts installation	Install parts on bumper in reverse order of removal.	
26	Bumper installation	Install bumper.	

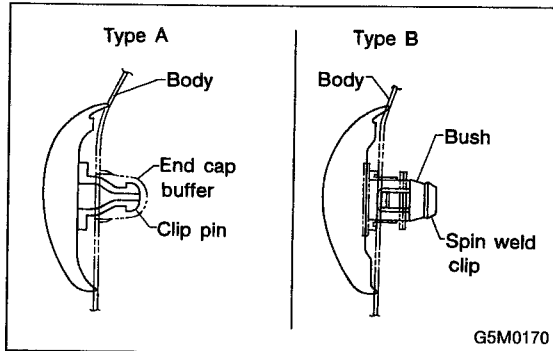


8. Side Protector

A: REMOVAL AND INSTALLATION

NOTE:

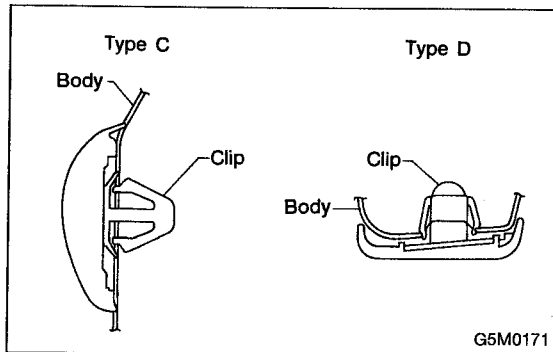
Do not re-use protector.



1) Type A and B:

Protector is attached to body with clips.

While holding end of protector by hand, force protector out.



2) Type C:

Protector is attached to body with clips.

Remove door inner trim, and detach protector by pushing clip pawl from inside.

3) Type D:

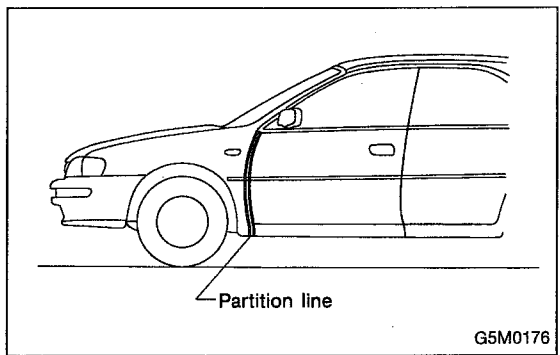
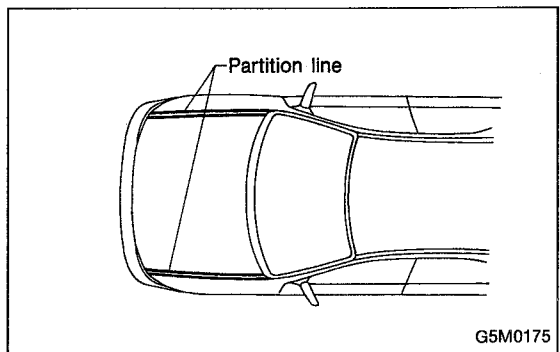
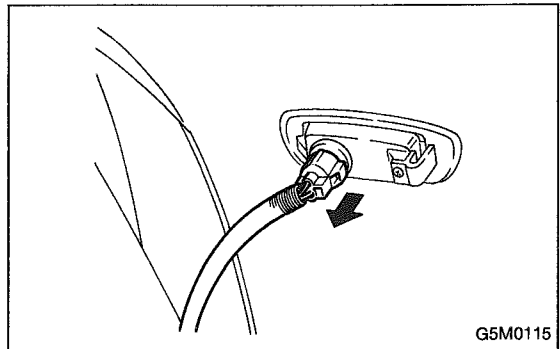
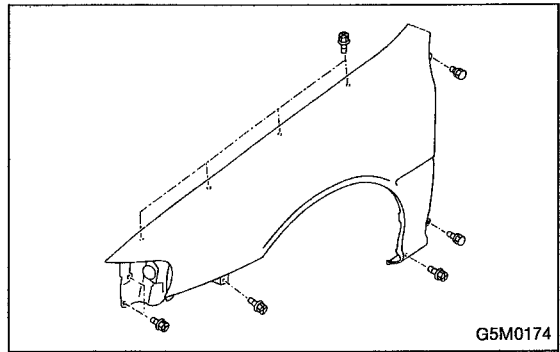
Protector is attached to body with clips.

While holding end of protector by hand, force protector out.

4) Installation is in the reverse order of removal.

NOTE:

- Type A: Insert clip pins into holes in body, then fit end cap buffers into place.
- Type B: Insert spin weld clips into holes in body, then fit bushings into place.
- Type C and D: Align the clips with holes in body and insert them.
- Install clips in standard holes first.



9. Front Fender

A: REMOVAL AND INSTALLATION

- 1) Disconnect ground cable from battery.
- 2) Remove mud guard.
- 3) Remove parking light and headlight.
- 4) Remove front bumper.
- 5) Remove bolts which secure fender to radiator panel and turn signal light connector.
- 6) Remove body protector. (This step may be skipped if fender is to be reused.)
- 7) Remove attaching bolt to remove fender.

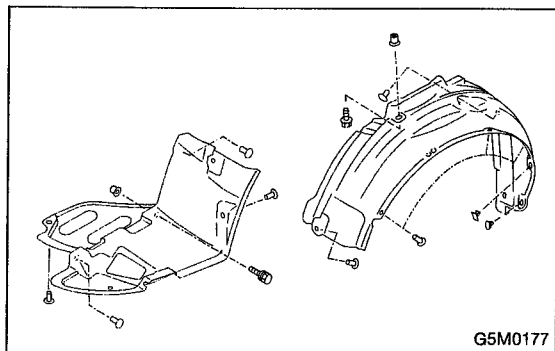
CAUTION:

Be careful not to scratch body panels with fender edges when removing it.

- 8) Installation is in the reverse order of removal.

NOTE:

Check for alignment of front fender with hood and front door with front fender at all points. Adjust, if necessary.



G5M0177

10. Mud Guard and Arch Protector

A: REMOVAL AND INSTALLATION

1. MUD GUARD

- 1) Jack-up vehicle to remove tire.
- 2) Remove screws and clips. Move mud guard toward the center of the body and remove mud guard.
- 3) Installation is in the reverse order of removal.

CAUTION:

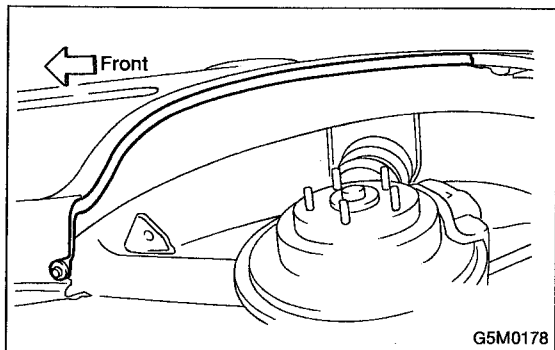
Only use new nuts and clips.

2. REAR ARCH PROTECTOR

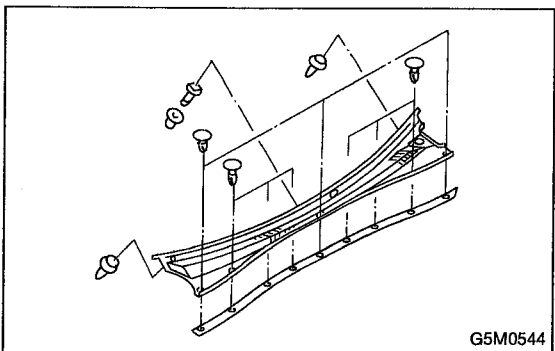
- 1) Remove clip and screws.
- 2) Remove arch protectors.
- 3) Installation is in the reverse order of removal.

CAUTION:

Only use new nuts and clips.



G5M0178



G5M0544

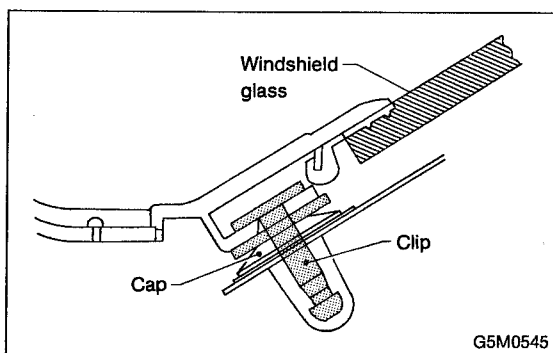
11. Cowl Panel

A: REMOVAL AND INSTALLATION

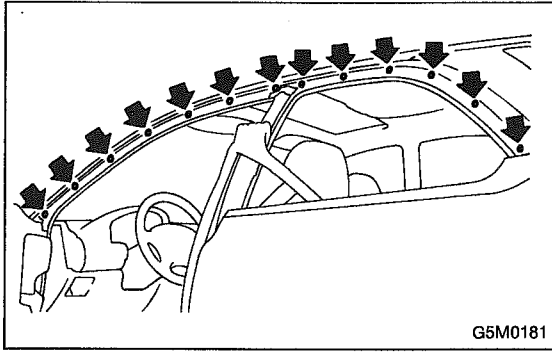
- 1) Remove wiper arms.
- 2) Open front hood.
- 3) Pry clip off front hood seal using a screwdriver.
- 4) Lift cowl panel and remove clips from windshield.
- 5) Installation is in the reverse order of removal.

NOTE:

Install middle clip and other clips in that order.



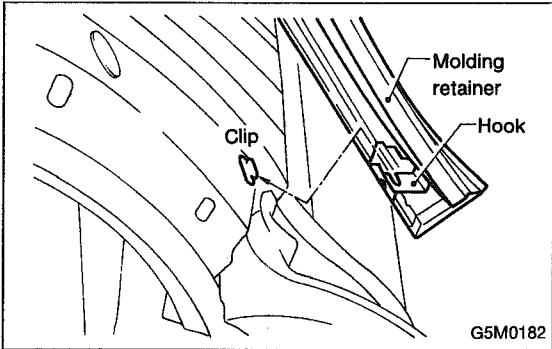
G5M0545



12. Molding and Retainer

A: REMOVAL AND INSTALLATION

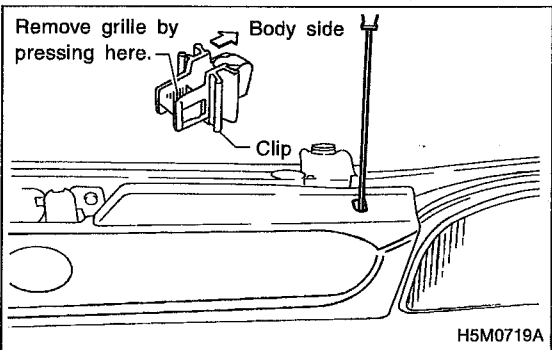
- 1) Remove weatherstrip.
- 2) Remove tapping screws.



- 3) Installation is in the reverse order of removal.

NOTE:

Insert clips onto hooks, then fasten with screws.



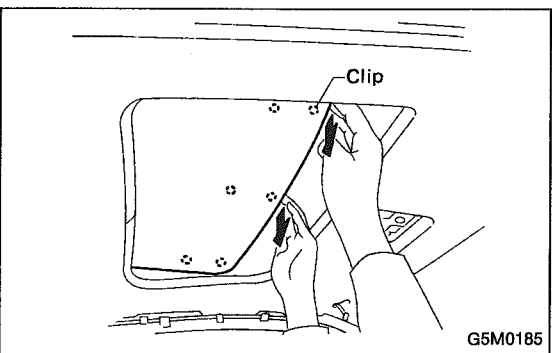
13. Front Grille

A: REMOVAL AND INSTALLATION

- 1) Remove two upper clips from body panel. To facilitate removal, press portion shown in figure using screwdriver while lightly pulling front grille.
- 2) Installation is in the reverse order of removal.

NOTE:

Attach all clips to grille. Align them with clip hole in body and push them into place.

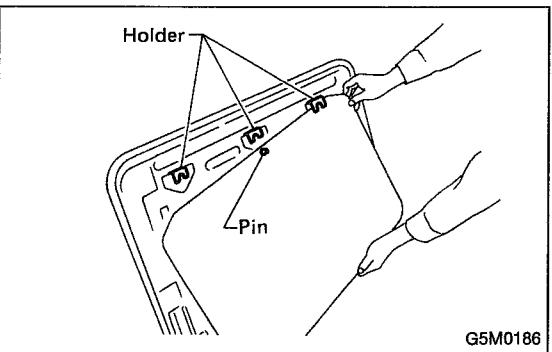


14. Sunroof

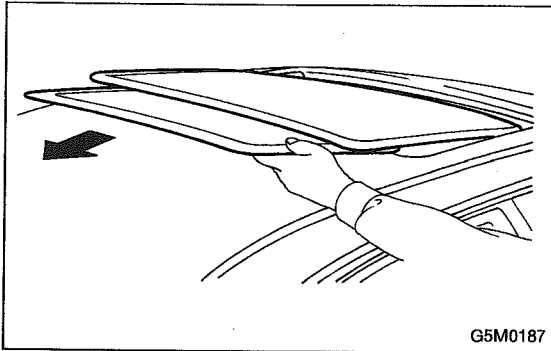
A: REMOVAL

1. SUNROOF PANEL

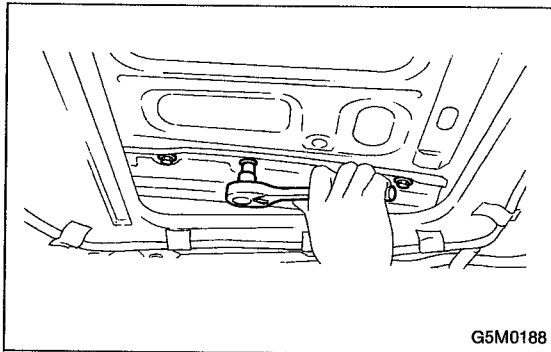
- 1) Open sunroof approx. 1/3.
- 2) Remove clips attached to front side of sunroof trim by pulling trim from inside of compartment.



- 3) Move trim forward, and detach trim end from holder.



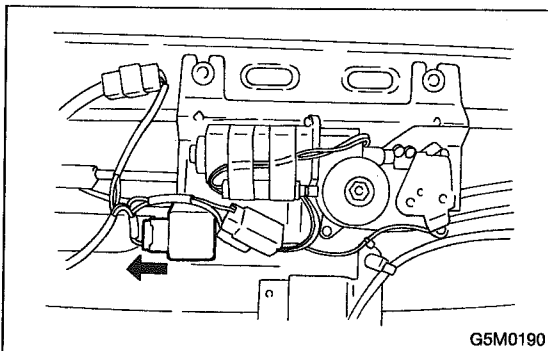
4) Detach trim.



5) Close sunroof and remove nuts.
6) Remove sunroof panel.
7) Installation is in the reverse order of removal.

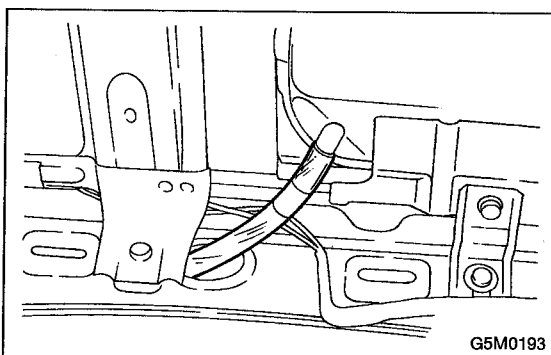
NOTE:

Sunroof trim reference pin must be fitted in holder notch.



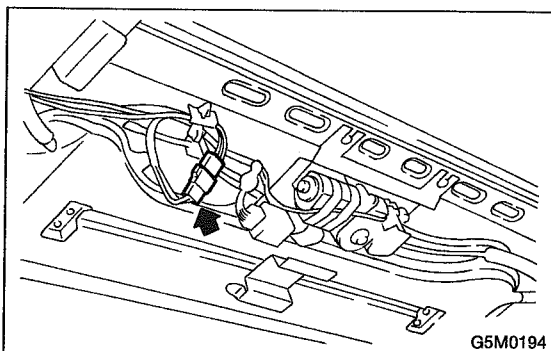
2. SUNROOF MOTOR AND RELAY

- 1) Remove roof trim, rear quarter trim, pillar trim, etc. <Ref. to 5-3 [W500].>
- 2) Remove screw.
- 3) Disconnect connector.
- 4) Remove relay by pulling it out.

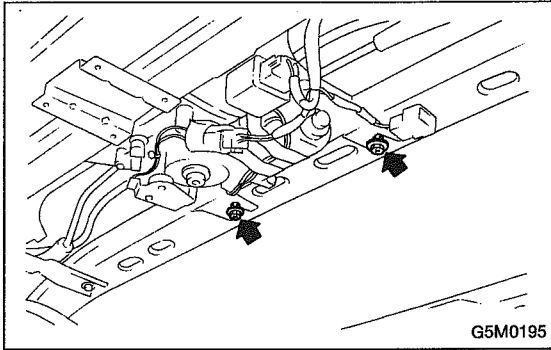


3. SUNROOF FRAME

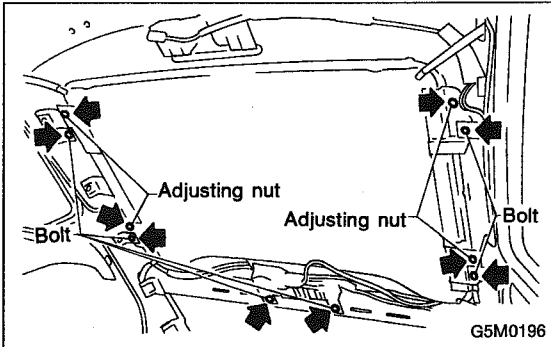
- 1) Remove roof trim, rear quarter trim, pillar trim, etc. <Ref. to 5-3 [W500].>
- 2) Remove sunroof panel.
- 3) Disconnect front and rear drain tubes.



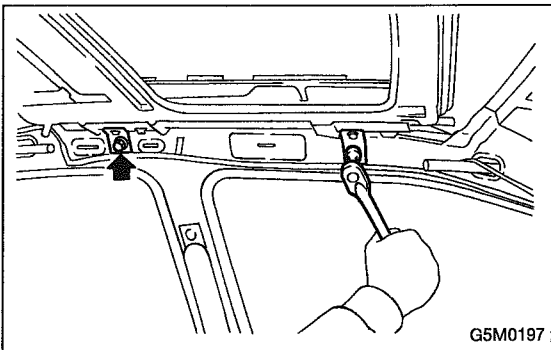
- 4) Disconnect connector between body harness and sunroof harness.



5) Loosen two mounting bolts near motor. (Do not remove bolts.)

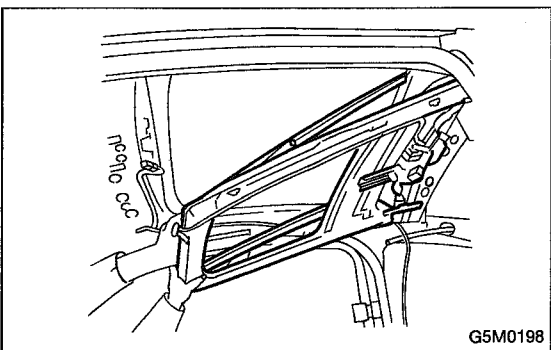


6) Remove six bolts, and four adjusting nuts.



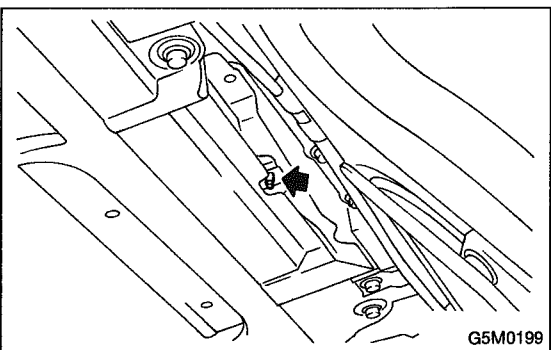
7) Remove sunroof frame.

8) Loosen set bracket mounting bolt.

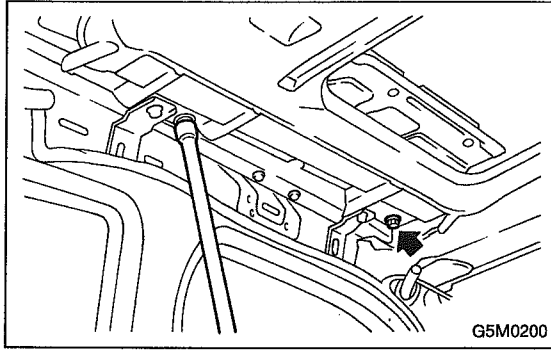


B: INSTALLATION

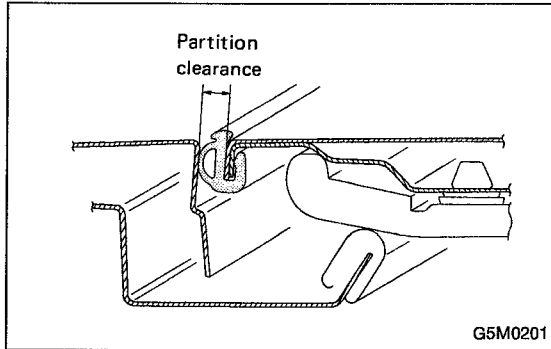
1) Insert frame rear end slit to two bolts fitted temporarily to roof brace.



2) Align frame to reference pin installed on roof.

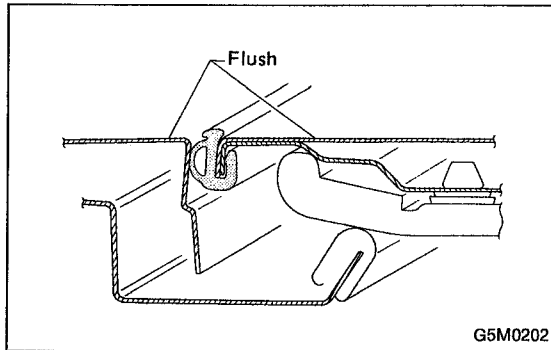


- 3) Tighten adjusting nut (that is, set frame at highest position).
Temporarily tighten bolts.

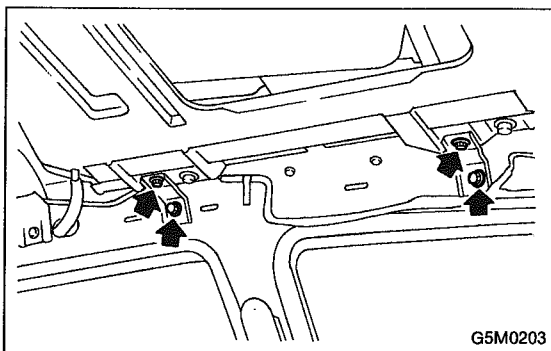


- 4) Install sunroof panel.
- 5) Adjust height by turning adjusting nut.
Also adjust front, rear, right, and left side partitions.

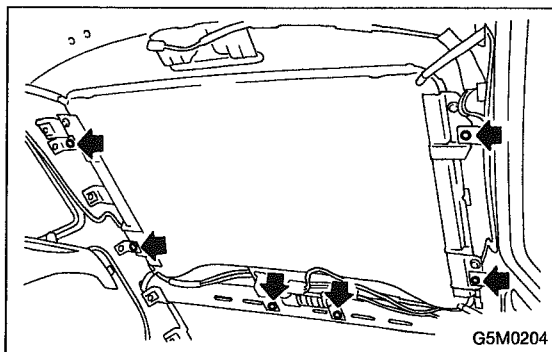
Partition clearance:
 $5.9 \pm 0.5 \text{ mm } (0.232 \pm 0.020 \text{ in})$



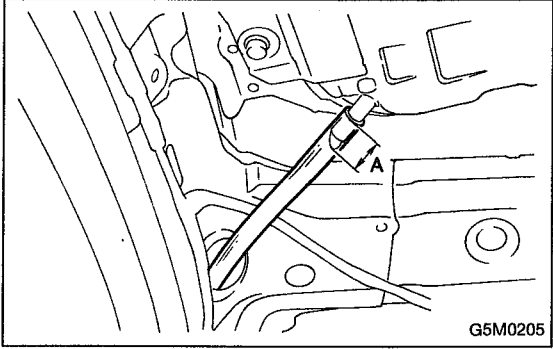
Difference in height between roof panel and sunroof panel:
 $0 \pm 1.0 \text{ mm } (0 \pm 0.039 \text{ in})$



- 6) Tighten set bracket mounting bolts.



- 7) Tighten bolts.



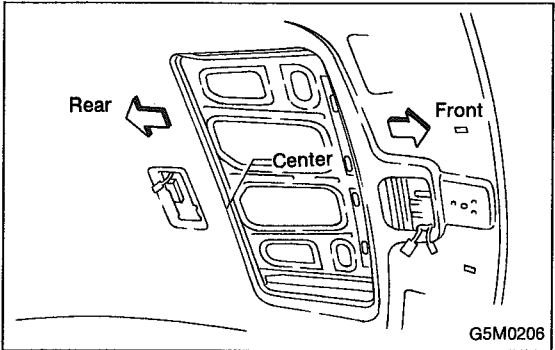
8) Install drain tubes.

CAUTION:

Insert drain tube securely into drain pipe.

Length: A

Approx. 20 mm (0.79 in)



9) Install roof trim.

10) Install garnish.

NOTE:

Place garnish joint at rear center of body.

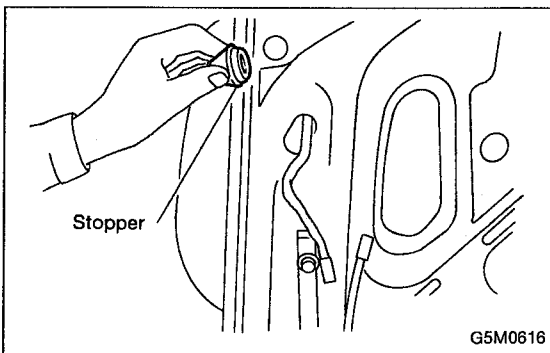
11) Install sunroof trim, pillar trim, rear quarter trim etc.

12) Check the following items after assembling all parts;

(1) Garnish must be free from waves.

(2) When sunroof is fully closed, must be no clearance between garnish and sunroof trim.

(3) Sunroof must be free from slack and noise when it is fully opened and closed.

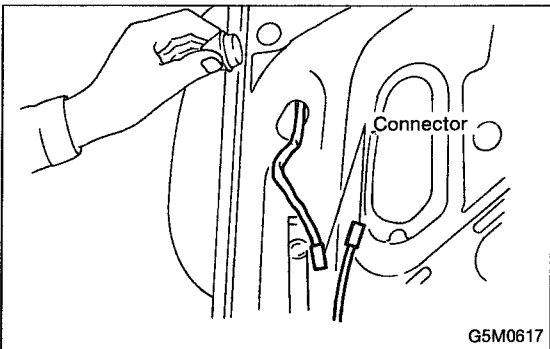


15. Rear Spoiler

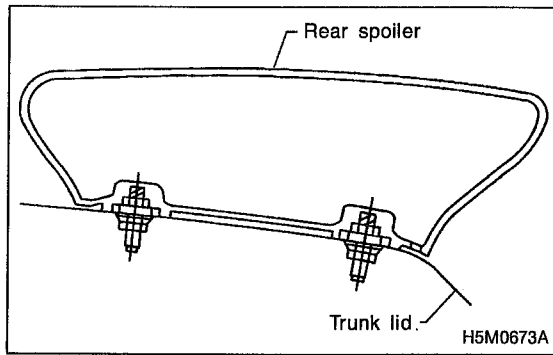
A: REMOVAL AND INSTALLATION

1. COUPE

1) Remove stoppers from both sides of trunk lid.



2) Disconnect high-mount stop light connector.



3) Remove nuts from rear spoiler.

CAUTION:

Be careful not to drop nuts into box section of trunk lid.

4) Lift rear spoiler and unfasten clips.

5) Remove spoiler from trunk lid.

CAUTION:

Be careful not to damage trunk lid.

6) Installation is in the reverse order of removal.

Tightening torque:

7.4 ± 2.0 N·m (0.75 ± 0.2 kg·m, 5.4 ± 1.4 ft·lb)

1. Sunroof

Entry of water into compartment	<ul style="list-style-type: none"> ① Check roof panel and sunroof panel for improper or poor sealing. ② Check drain tube for clogging. ③ Check sunroof frame seal and body for improper fit.
Booming noise	<ul style="list-style-type: none"> ① Check roof panel and roof panel for improper clearance. ② Check sunroof trim and roof trim for improper clearance.
Abnormal motor noise	<ul style="list-style-type: none"> ① Check motor for looseness. ② Check gears and bearings for wear. ③ Check cable for wear. ④ Check cable pipe for deformities.
Failure of sunroof to operate (Motor operates properly.)	<ul style="list-style-type: none"> ① Check guide rail for foreign particles. ② Check guide rail for improper installation. ③ Check parts for mutual interference. ④ Check cable slider for improper clinching. ⑤ Check cable for improper installation. ⑥ Check clutch adjustment nut for improper tightness.
Motor does not rotate or rotates improperly. (Use sunroof wrench to check operation.)	<ul style="list-style-type: none"> ① Check fuse for blowout. ② Check switch for improper function. ③ Check motor for incorrect terminal voltage. ④ Check relay for improper operation. ⑤ Check poor grounding system. ⑥ Check cords for discontinuity and terminals for poor connections. ⑦ Check limit switch for improper operation.

DOORS AND WINDOWS

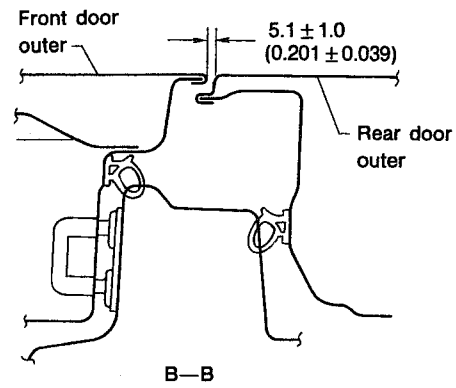
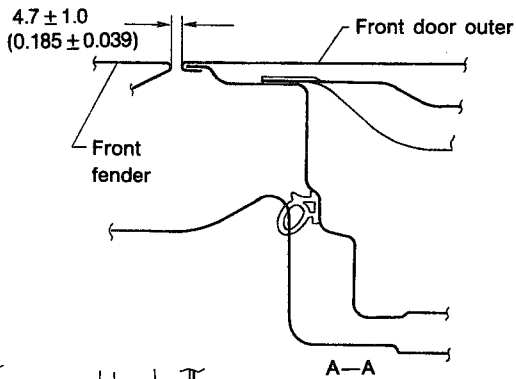
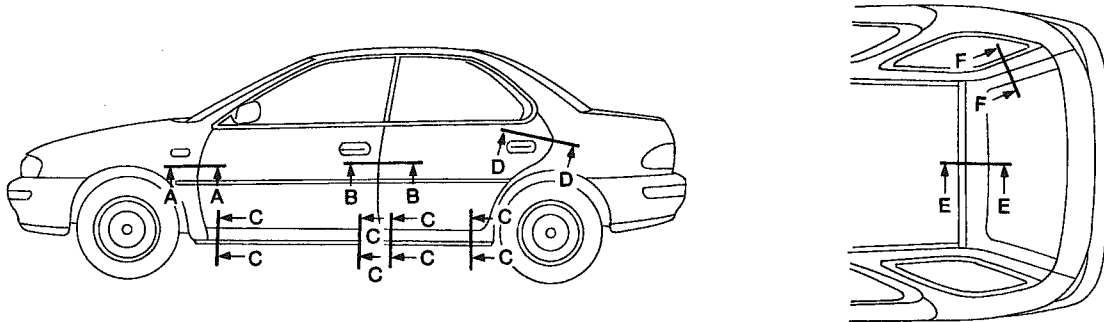
5-2

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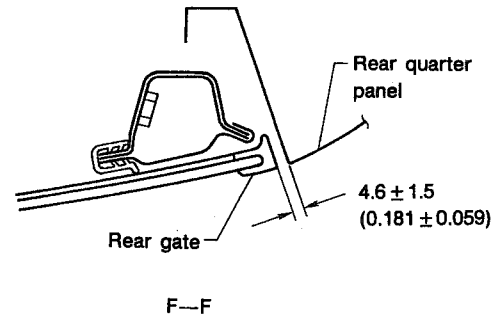
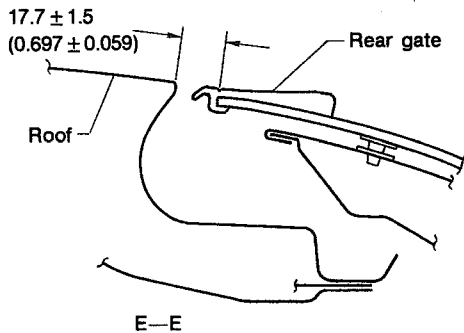
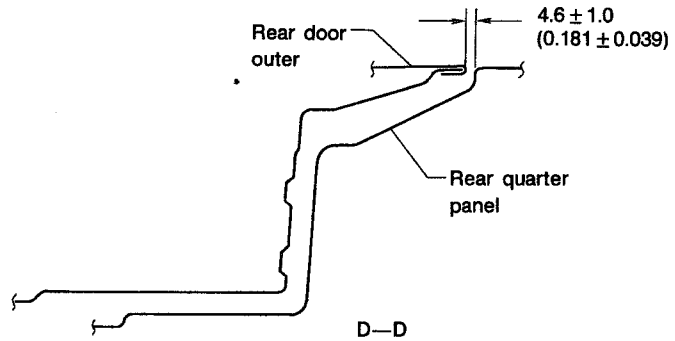
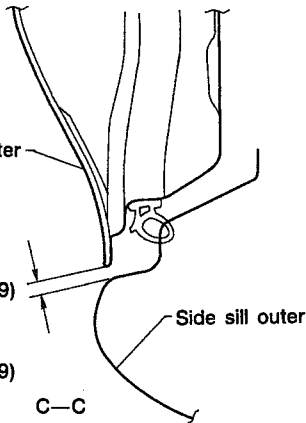
1. Service Data

A: DOOR ALIGNMENT

1. SEDAN AND WAGON MODEL



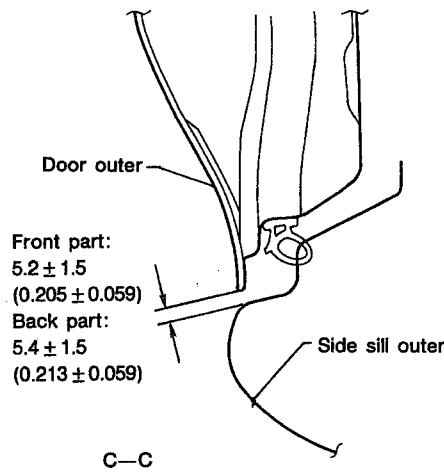
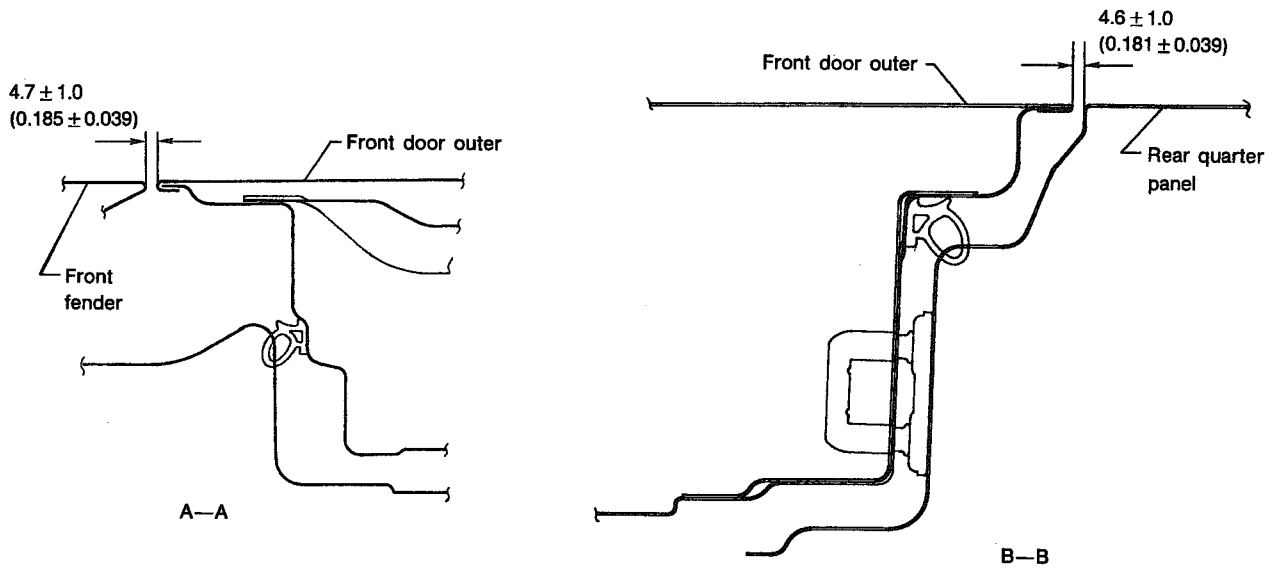
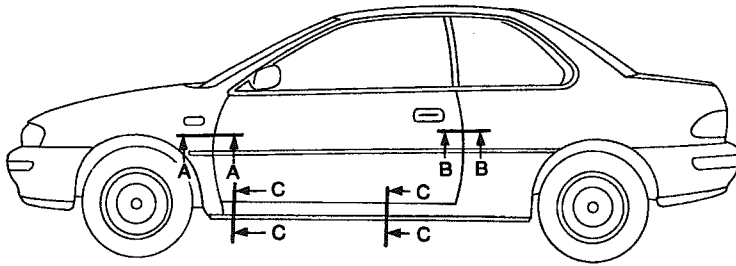
- Front door
Front part:
5.2 ± 1.5
(0.205 ± 0.059)
Back part:
5.4 ± 1.5
(0.213 ± 0.059)
- Rear door
Front part:
5.4 ± 1.5
(0.213 ± 0.059)
Back part:
6.1 ± 1.5
(0.240 ± 0.059)



Unit: mm (in)

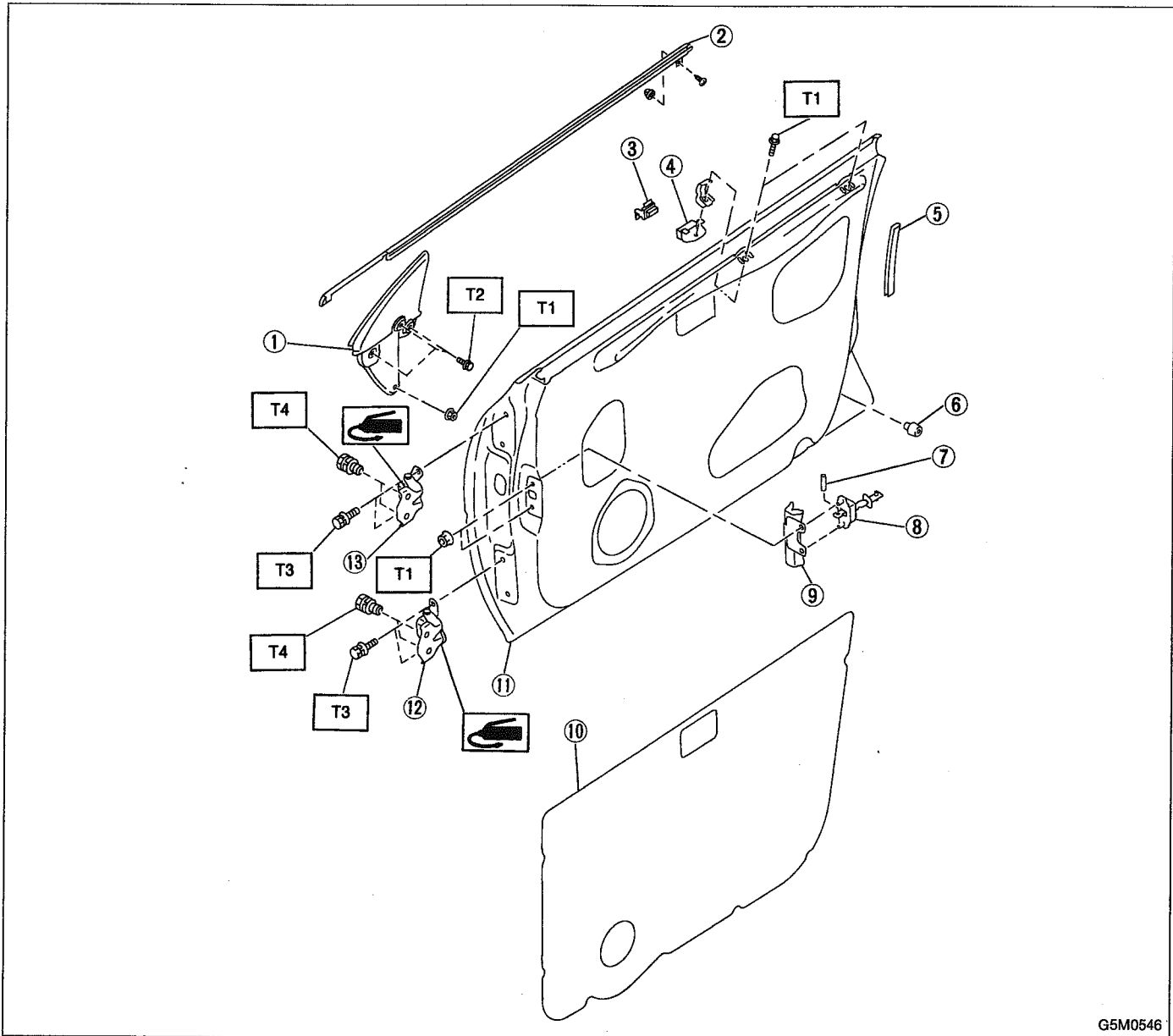
G5M0485

2. COUPE MODEL



Unit: mm (in)

1. Front Door



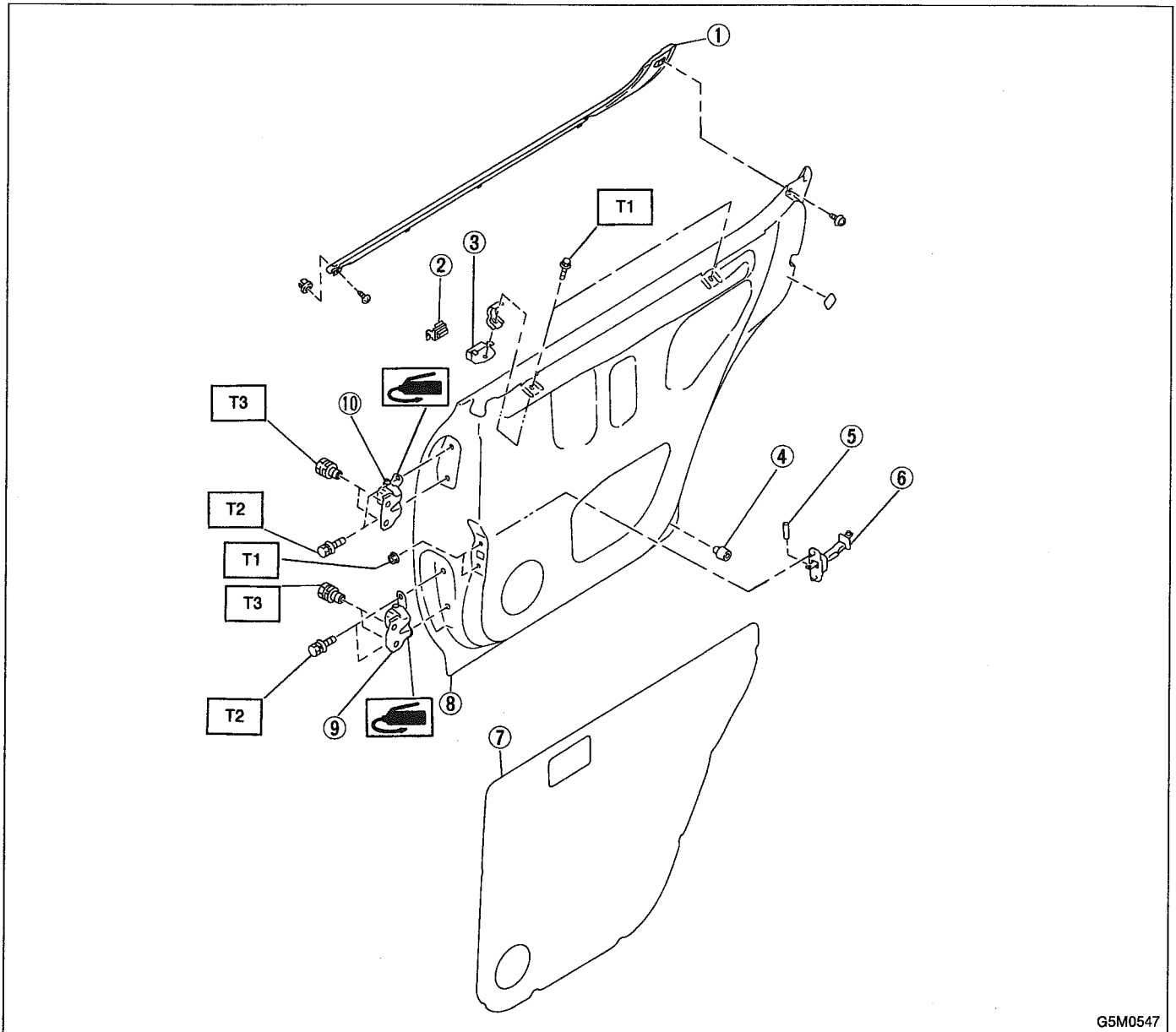
G5M0546

- ① Gusset
- ② Weatherstrip
- ③ Stabilizer (Outer)
- ④ Stabilizer (Inner)
- ⑤ Protector
- ⑥ Stopper
- ⑦ Knock pin

- ⑧ Checker
- ⑨ Guide
- ⑩ Sealing cover
- ⑪ Door panel
- ⑫ Lower hinge
- ⑬ Upper hinge

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T2: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)
T3: 25 ± 3 (2.5 ± 0.3, 18.1 ± 2.2)
T4: 29 ± 5 (3.0 ± 0.5, 21.7 ± 3.6)

2. Rear Door

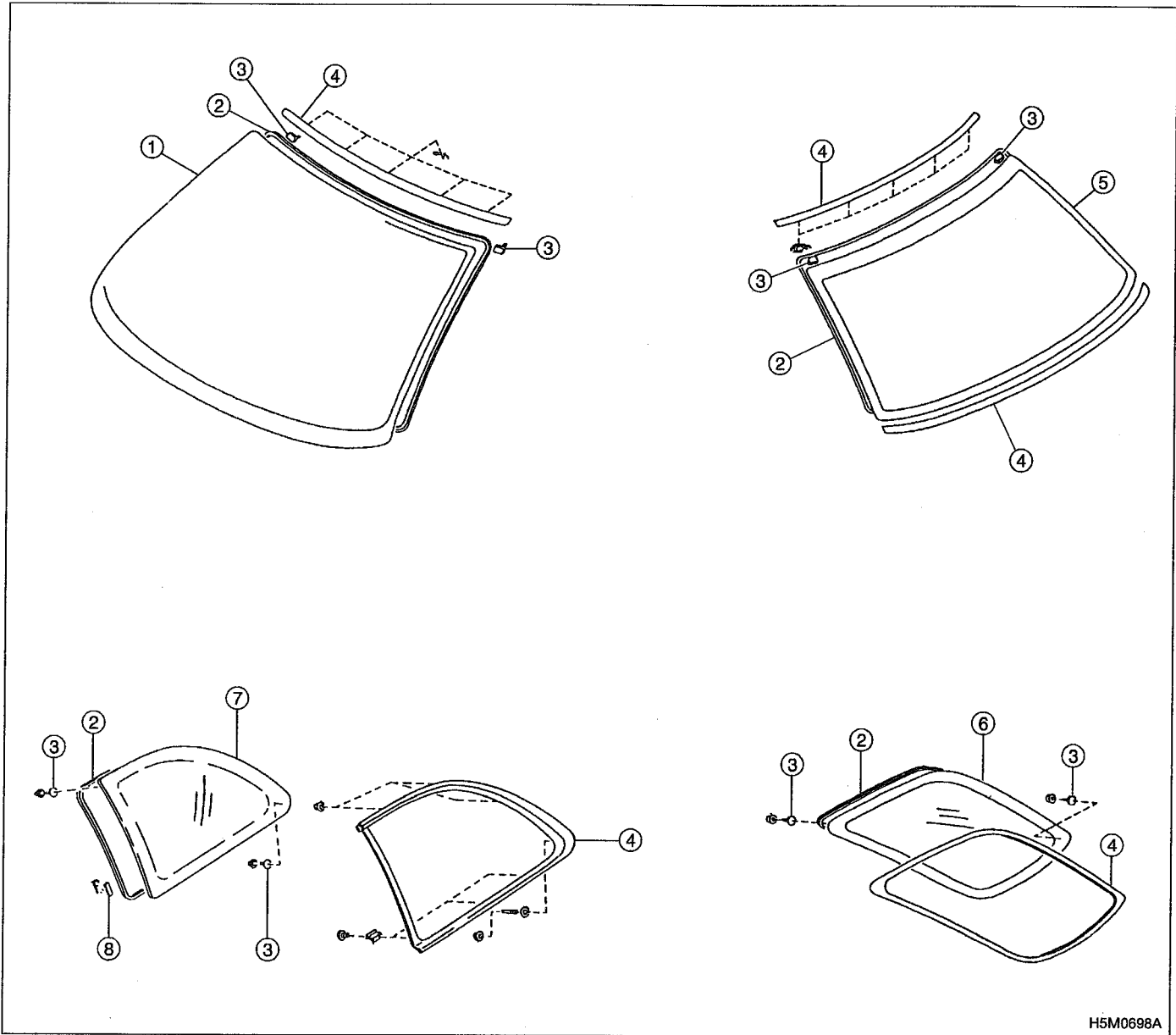


G5M0547

- | | |
|----------------------|-----------------|
| ① Weatherstrip | ⑥ Checker |
| ② Stabilizer (Outer) | ⑦ Seating cover |
| ③ Stabilizer (Inner) | ⑧ Door panel |
| ④ Stopper | ⑨ Lower hinge |
| ⑤ Knock pin | ⑩ Upper hinge |

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T2: 25 ± 3 (2.5 ± 0.3, 18.1 ± 2.2)
T3: 29 ± 5 (3.0 ± 0.5, 21.7 ± 3.6)

3. Fixed Glass

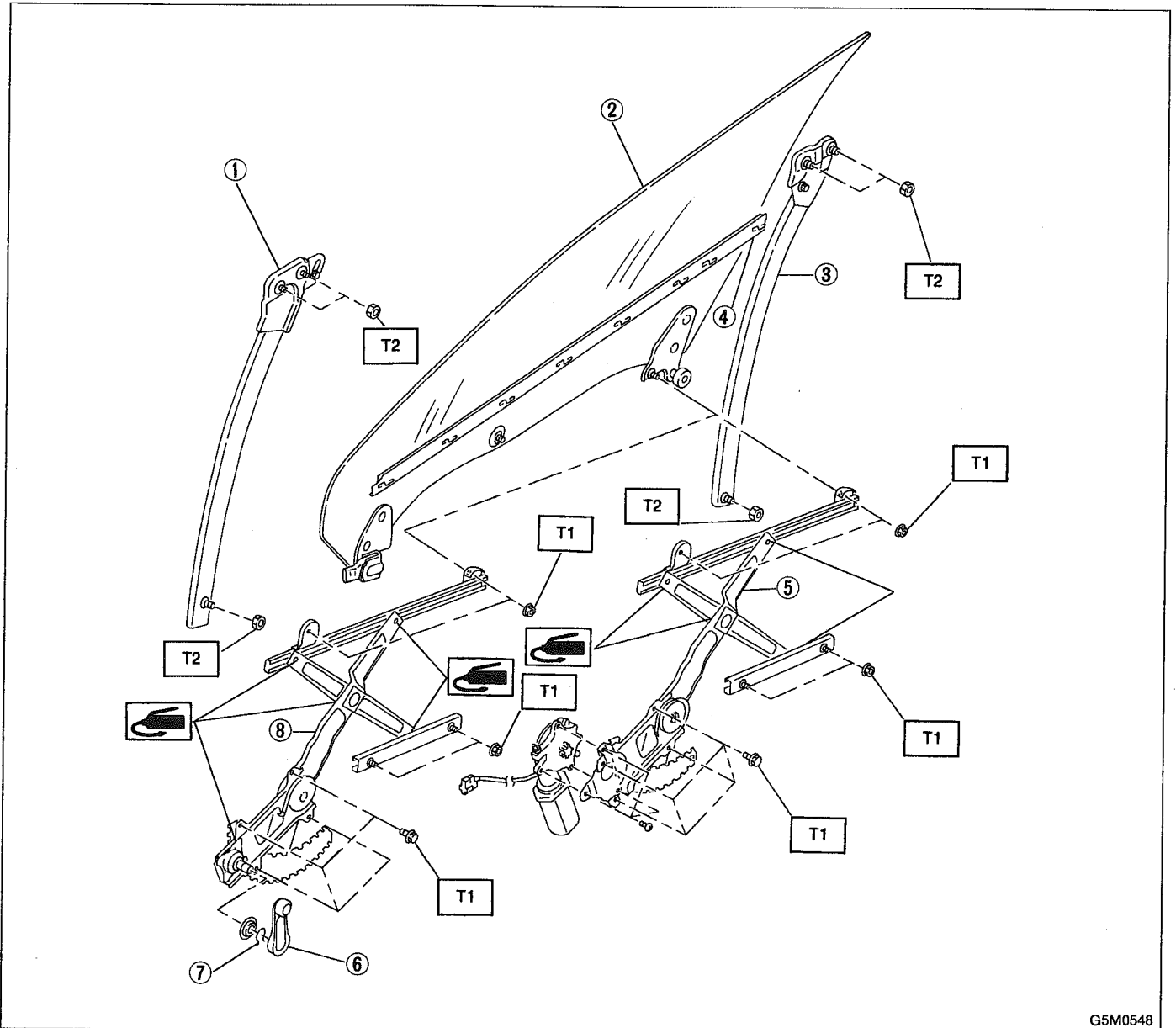


H5M0698A

- ① Windshield glass
- ② Dam rubber
- ③ Locate pin
- ④ Molding

- ⑤ Rear window glass
- ⑥ Rear quarter glass (Wagon)
- ⑦ Rear quarter glass (Coupe)
- ⑧ Fastener

4. Front Door Glass



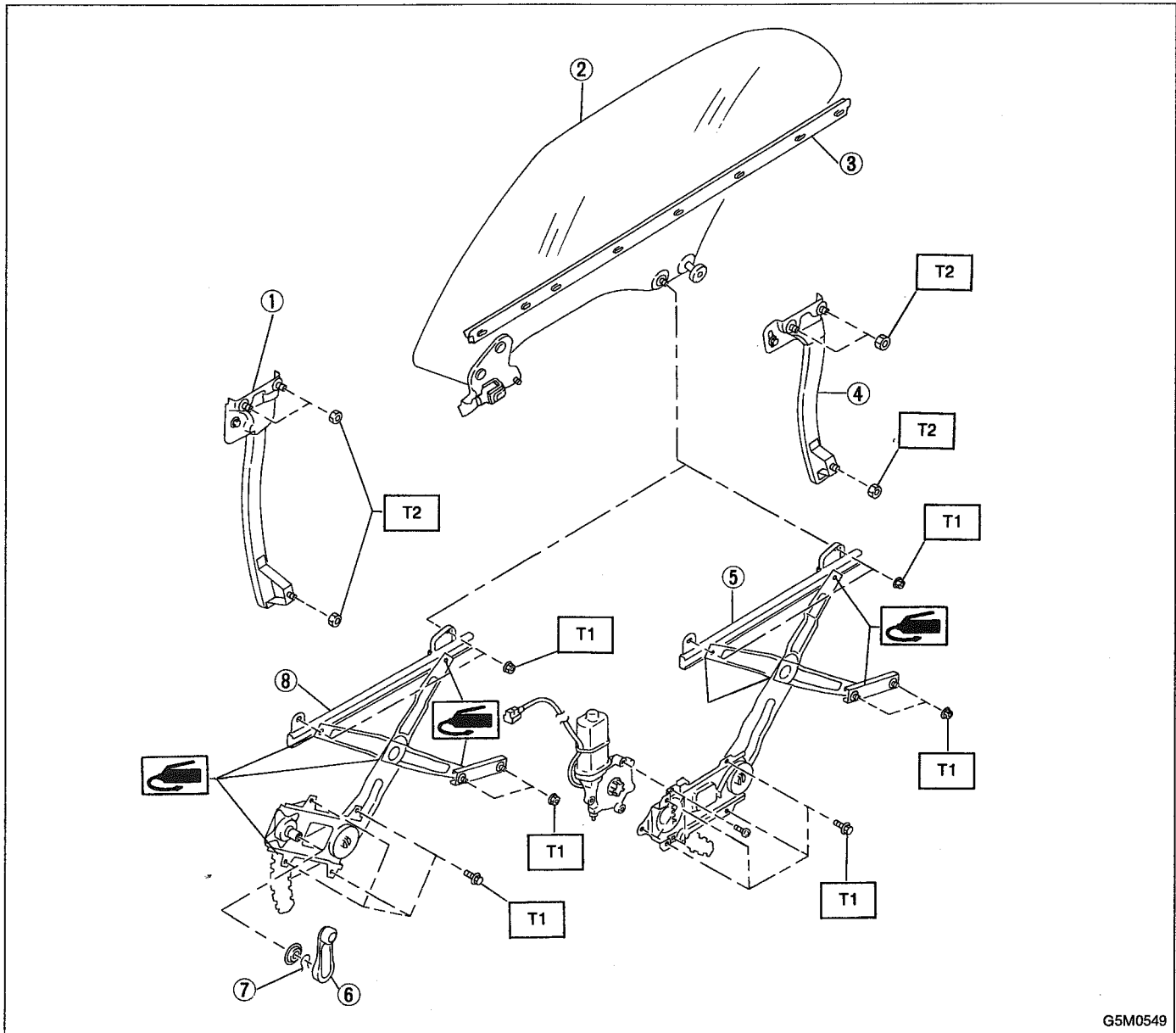
G5M0548

- ① Door sash (Front)
- ② Glass
- ③ Door sash (Rear)
- ④ Weatherstrip (Inner)
- ⑤ Regulator and motor ASSY

- ⑥ Regulator handle
(Except power window)
- ⑦ Retainer spring
- ⑧ Regulator ASSY

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T2: 14 ± 4 (1.4 ± 0.4, 10.1 ± 2.9)

5. Rear Door Glass



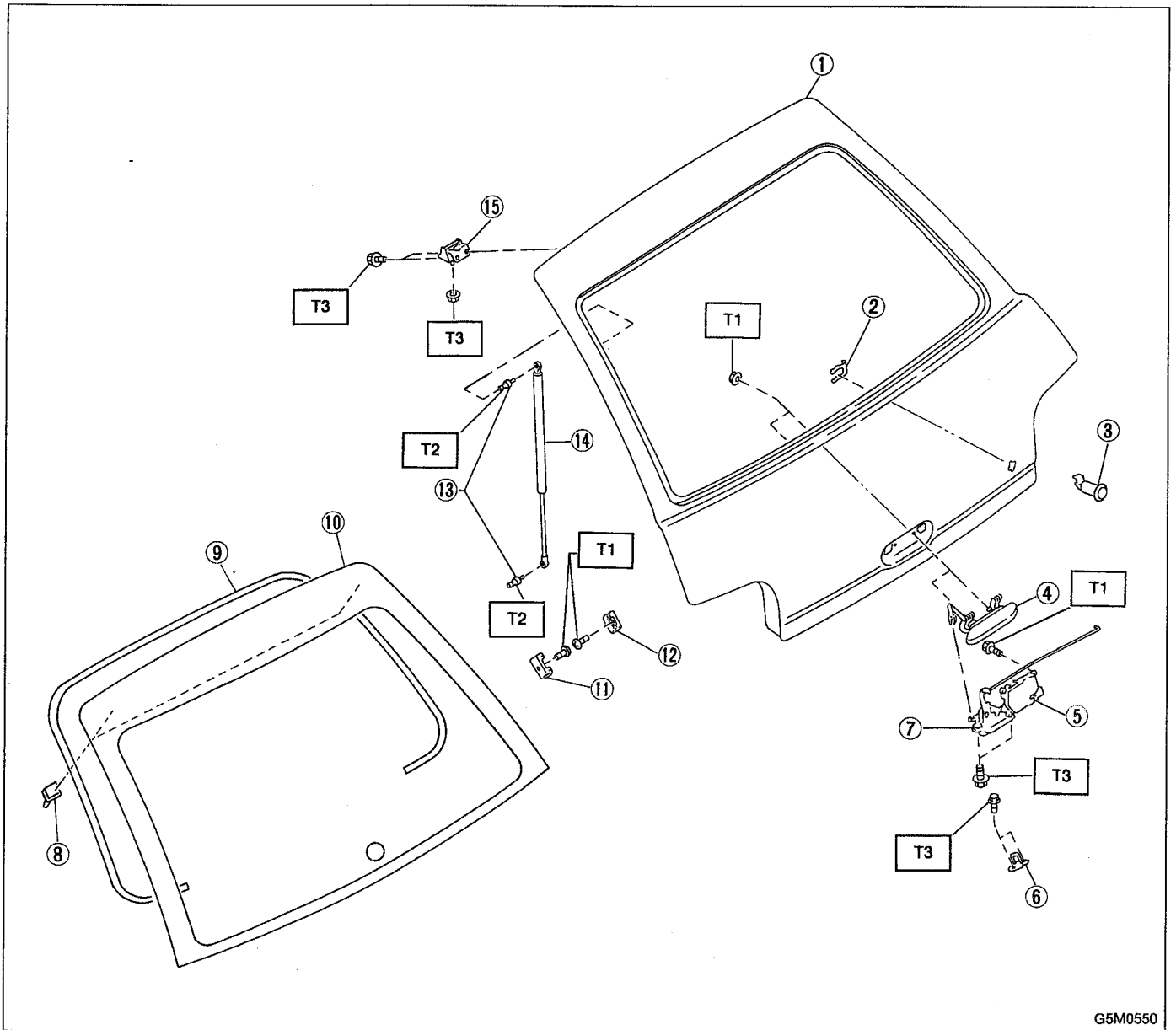
G5M0549

- ① Door sash (Front)
- ② Glass
- ③ Weatherstrip (Inner)
- ④ Door sash (Rear)
- ⑤ Regulator and motor ASSY

- ⑥ Regulator handle
(Except power window)
- ⑦ Retainer spring
- ⑧ Regulator ASSY

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T2: 14 ± 4 (1.4 ± 0.4, 10.1 ± 2.9)

6. Rear Gate and Glass



G5M0550

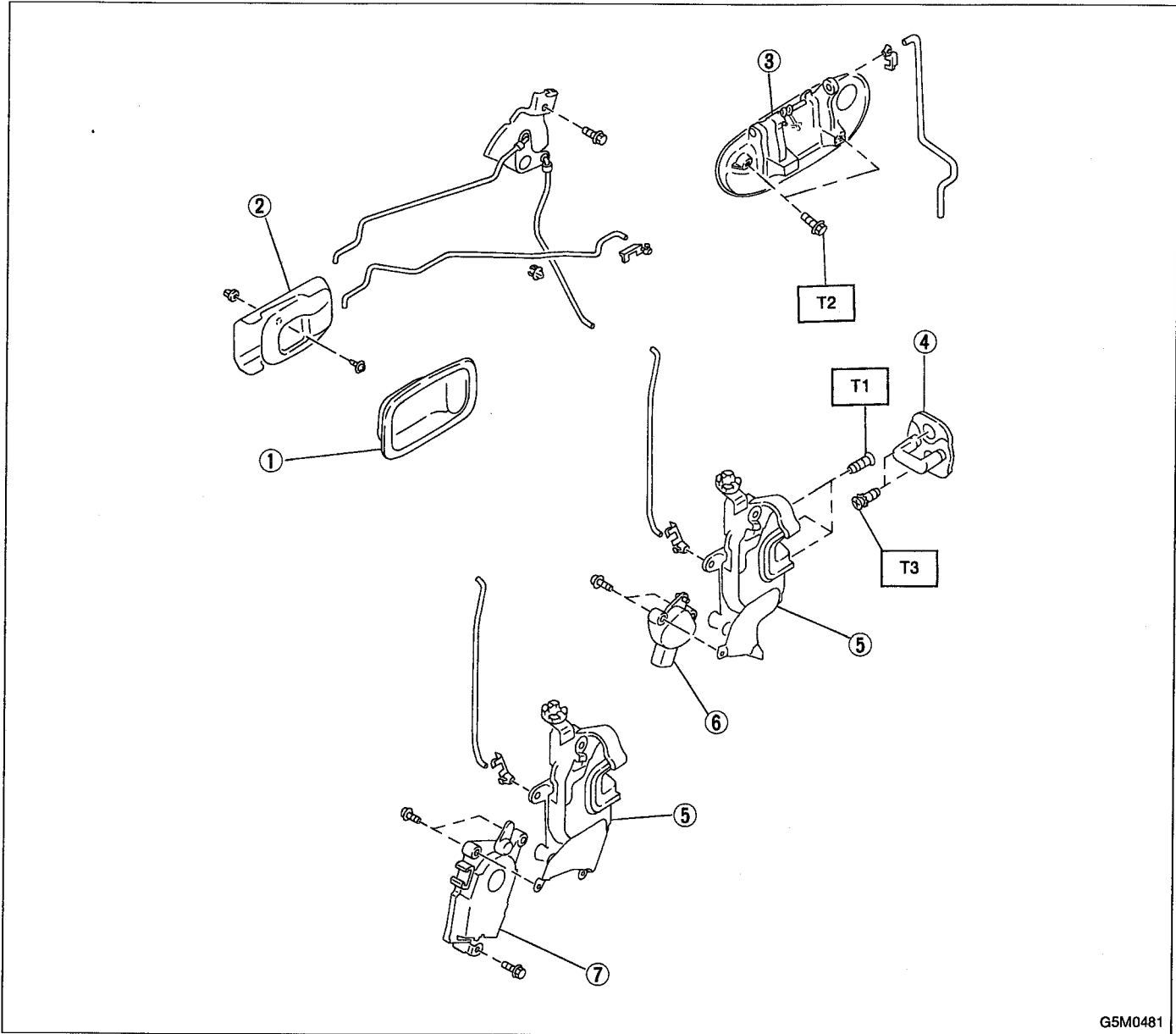
- ① Rear gate
- ② Clip
- ③ Key cylinder
- ④ Outer handle
- ⑤ Auto-door lock actuator
- ⑥ Striker
- ⑦ Latch

- ⑧ Glass pin
- ⑨ Trim
- ⑩ Glass
- ⑪ Buffer
- ⑫ Rear gate side buffer
- ⑬ Stud
- ⑭ Gas stay

- ⑮ Hinge

Tightening torque: N·m (kg·m, ft·lb)
T1: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T2: 14 ± 4 (1.4 ± 0.4, 10.1 ± 2.9)
T3: 25 ± 5 (2.5 ± 0.5, 18.1 ± 3.6)

7. Door Lock Assembly
A: FRONT DOOR

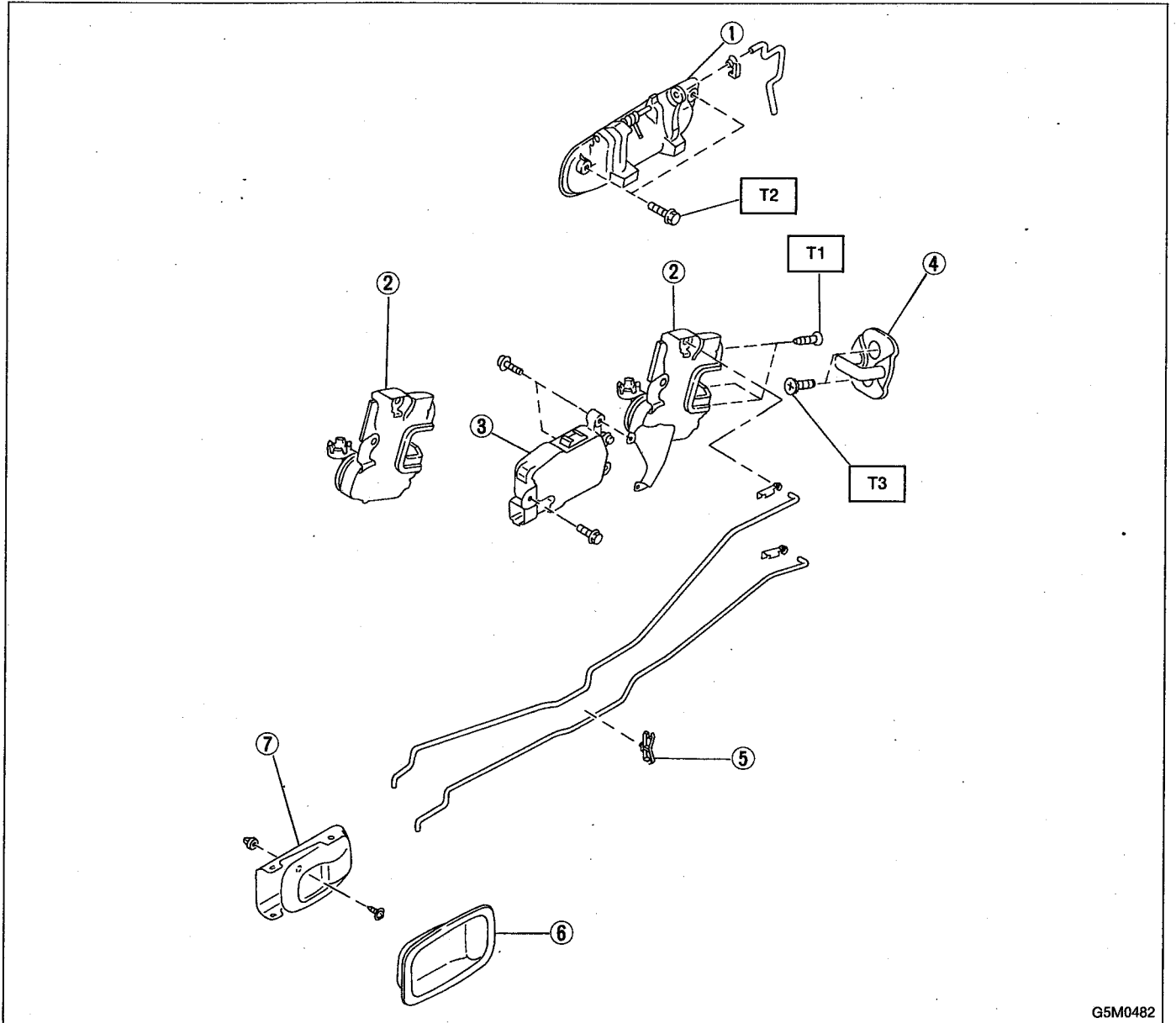


G5M0481

- | | |
|---------------------|---------------------------|
| ① Cover | ⑤ Door latch |
| ② Inner remote ASSY | ⑥ Switch ASSY |
| ③ Door outer handle | ⑦ Auto-door lock actuator |
| ④ Striker | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 6.4 ± 2.0 (0.65 ± 0.2, 4.7 ± 1.4)
T2: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T3: 14 ± 4 (1.4 ± 0.4, 10.1 ± 2.9)

B: REAR DOOR

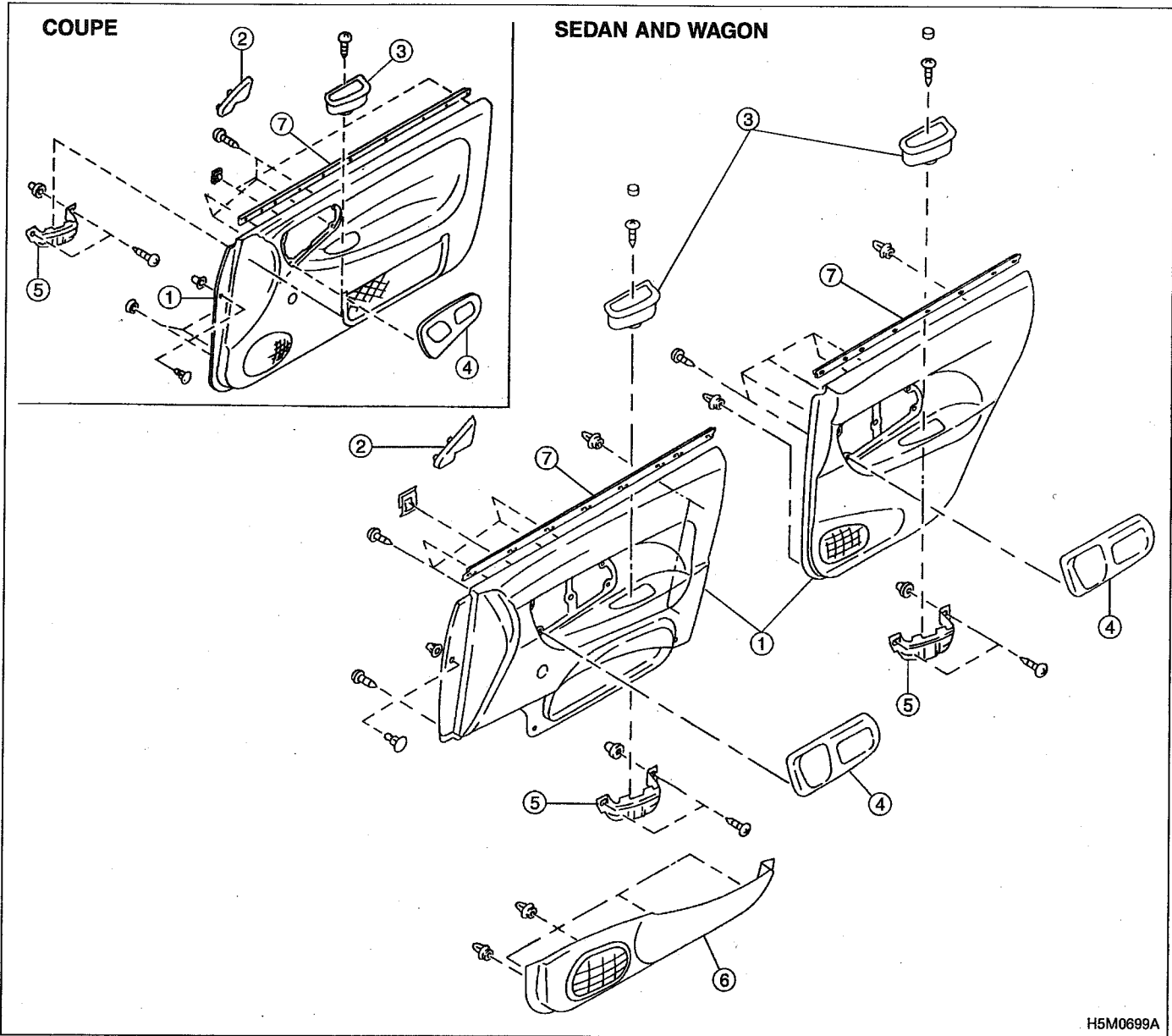


G5M0482

- ① Door outer handle
- ② Door latch
- ③ Auto-door lock actuator
- ④ Striker
- ⑤ Rod holder
- ⑥ Cover
- ⑦ Inner remote ASSY

Tightening torque: N·m (kg·m, ft·lb)
T1: 6.4 ± 2.0 (0.65 ± 0.2, 4.7 ± 1.4)
T2: 7.4 ± 2.0 (0.75 ± 0.2, 5.4 ± 1.4)
T3: 14 ± 4 (1.4 ± 0.4, 10.1 ± 2.9)

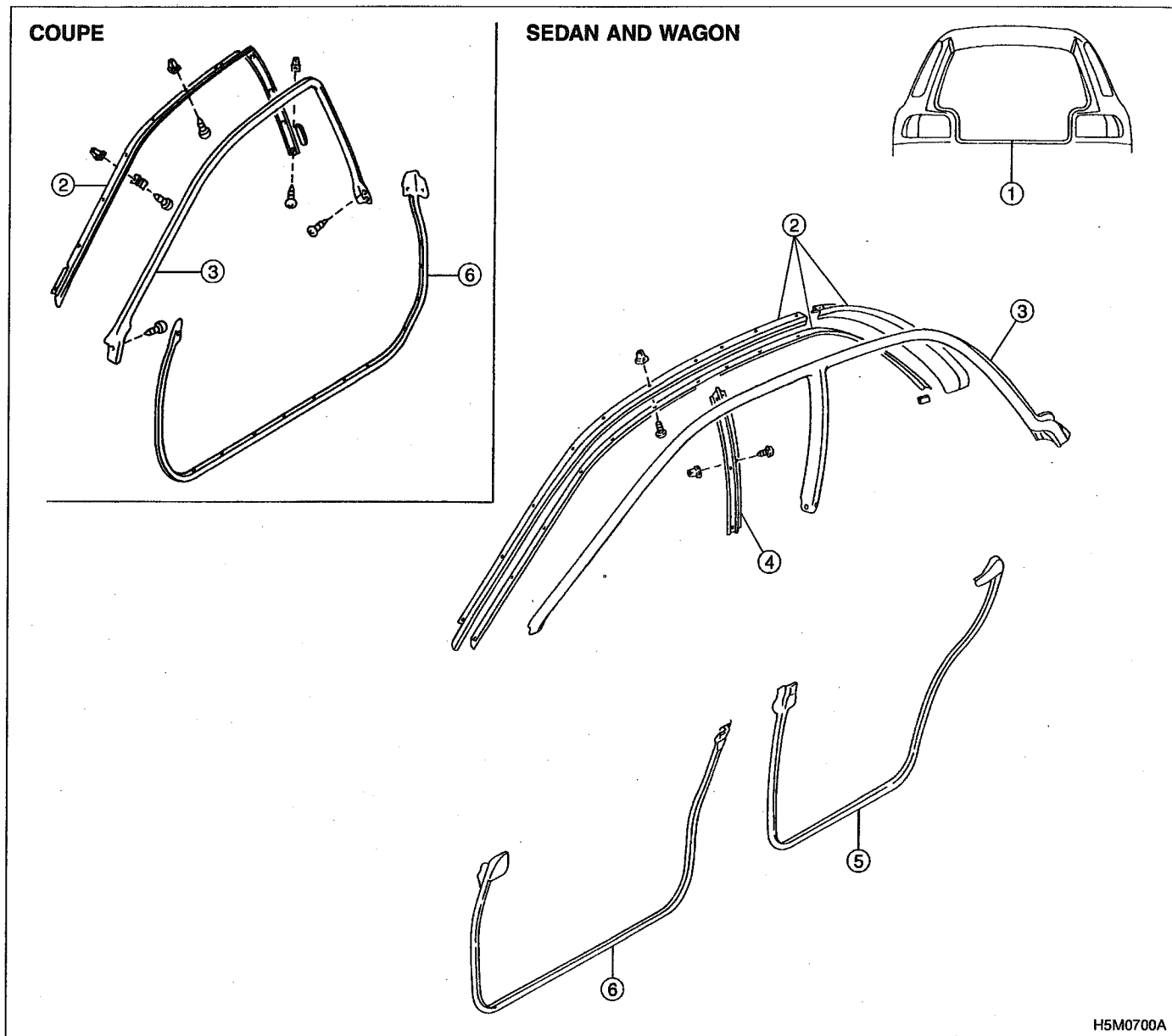
8. Door Trim



- ① Trim panel
- ② Gusset cover
- ③ Pull handle
- ④ Cover

- ⑤ Bracket
- ⑥ Pocket
- ⑦ Weatherstrip

9. Weatherstrip



H5M0700A

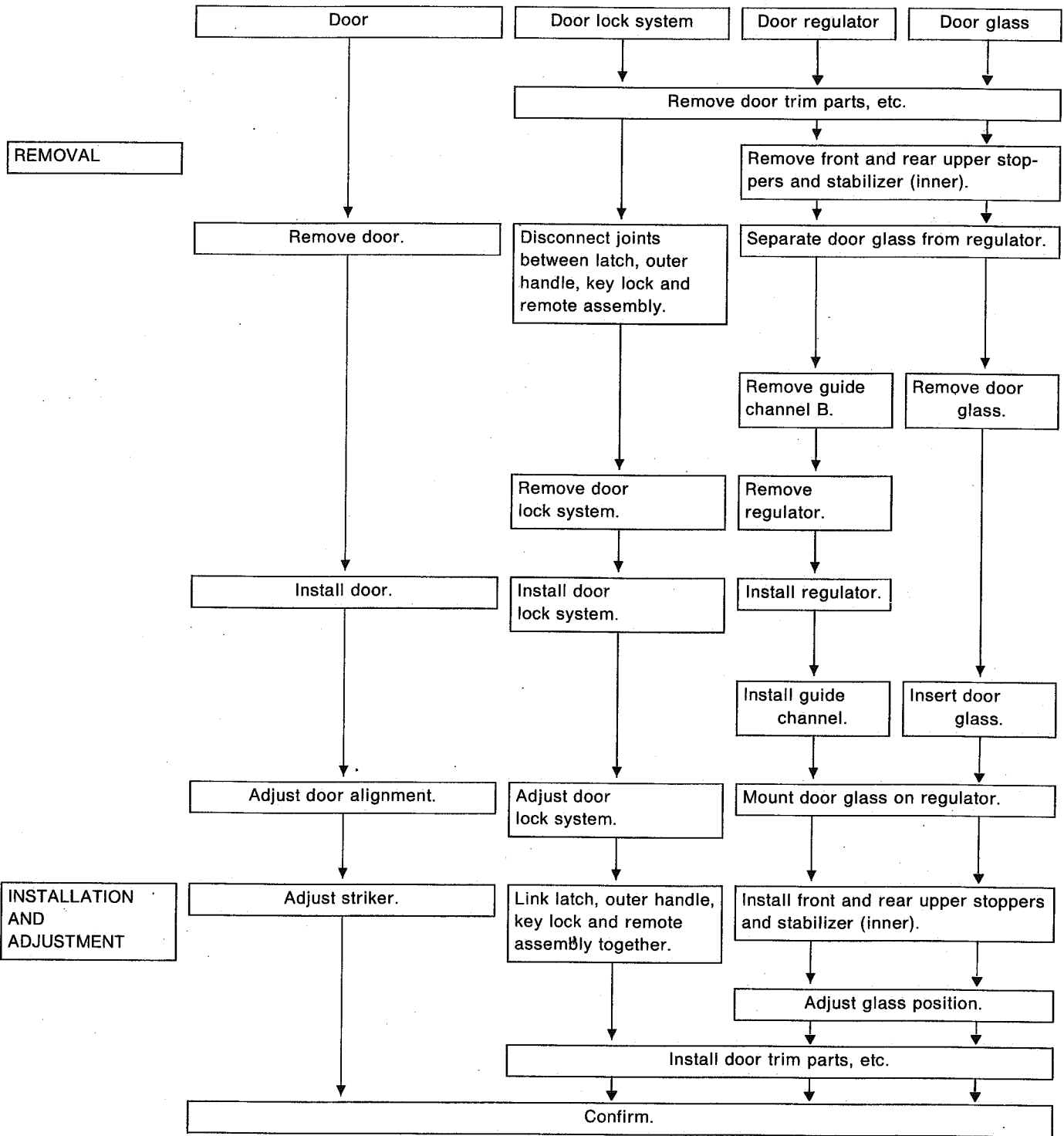
- ① Rear gate weatherstrip (Wagon only)
- ② Retainer and molding
- ③ Upper and side weatherstrip

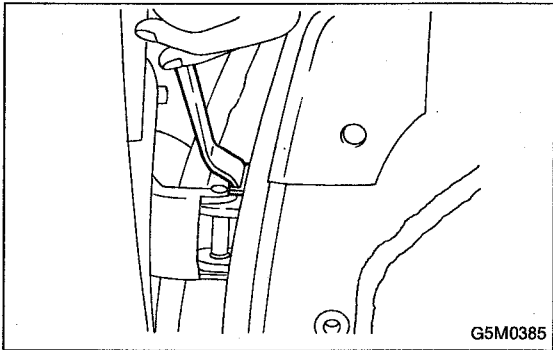
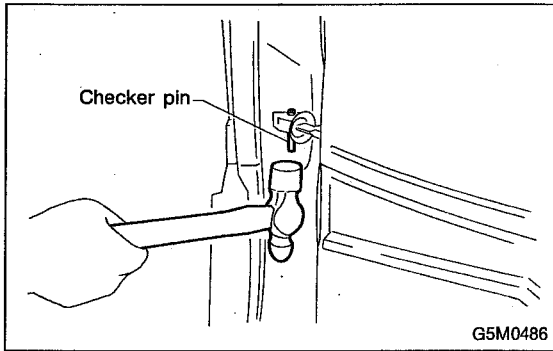
- ④ Retainer (Center)
- ⑤ Weatherstrip (Rear door)
- ⑥ Weatherstrip (Front door)

1. Procedure Chart for Removing and Installing Door and Related Parts

NOTE:

This flowchart shows the main procedures for removing and installing the door and its related parts. For details, refer to the text.





2. Door

A: REMOVAL AND INSTALLATION

1. DOOR ASSEMBLY

- 1) Remove lower trim and disconnect connectors from body harness.
- 2) Place a cloth or a wood block under door to prevent damage, and support it with a jack.
- 3) Remove checker pin by driving it upward. Be careful not to damage door and body.
- 4) Remove bolts (M8) securing upper and lower hinges to door, and remove door from hinges.

Tightening torque:

$25 \pm 3 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $18.1 \pm 2.2 \text{ ft}\cdot\text{lb}$)

- 5) Remove hinges by loosening hinges mounting bolt (M8) off of body.

Tightening torque:

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

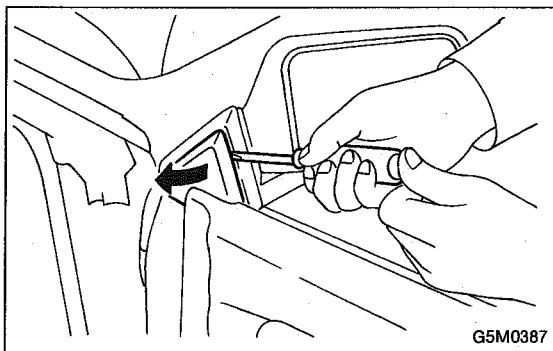
CAUTION:

Work carefully to avoid damaging door.

- 6) Installation is in the reverse order of removal.

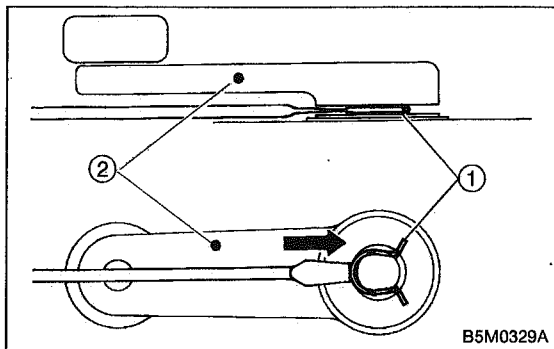
NOTE:

Apply grease to moving parts of door hinges.

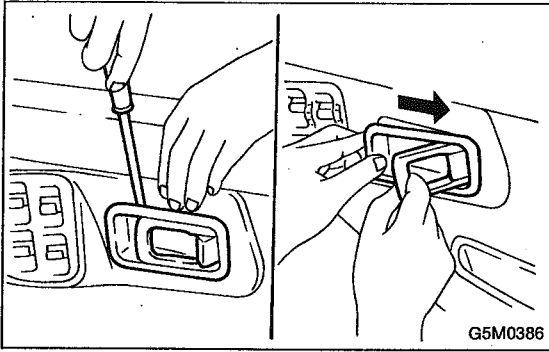


2. TRIM PANEL

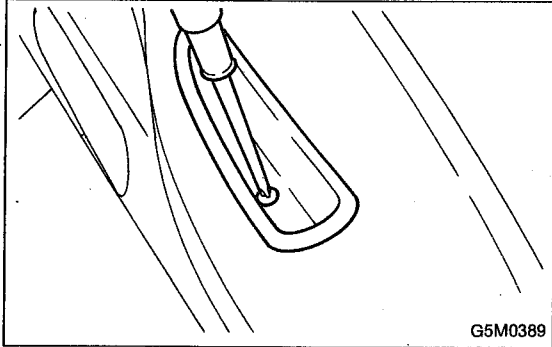
- 1) Remove gusset cover.



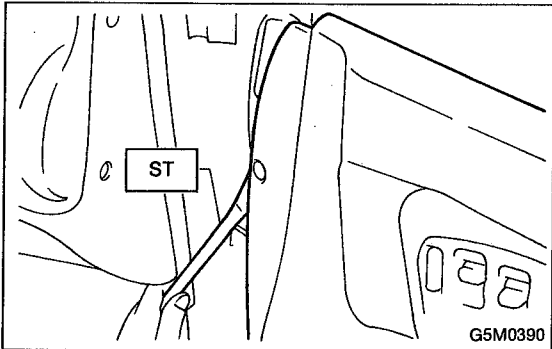
- 2) Press retainer spring ① with a thin flat-bladed screwdriver and then remove regulator handle ②. (models without power window)



3) Remove remote handle cover.



4) Remove pull handle attaching screw and then remove pull handle.



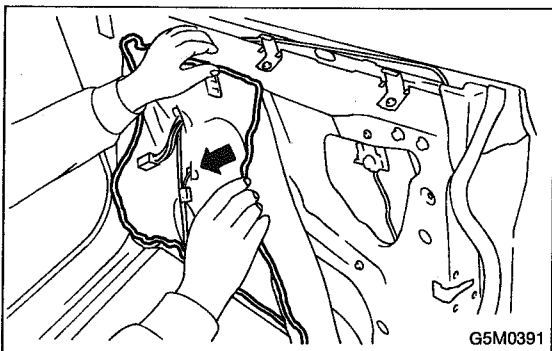
5) Using ST, disengage the clip.
ST 925580000 PULLER

6) Remove trim panel and then disconnect connector.
(models with power window)

CAUTION:

Be careful not to break clip by applying undue force.

7) Installation is in the reverse order of removal.



3. SEALING COVER

1) Remove trim panel.

2) Remove speaker, trim bracket and remote assembly and disconnect connectors.

3) Remove sealer with a spatula.

CAUTION:

Be careful because cover may break if sealer is removed forcefully.

4) Installation is in the reverse order of removal.

NOTE:

● Confirm that sealer is properly applied without breaks. Then install sealing cover.

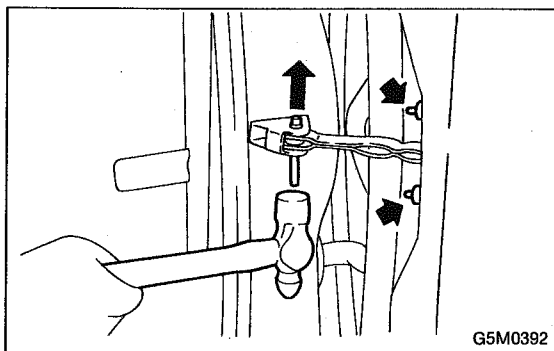
● When repairing or replacing sealing cover, use "CEMEDINE 5430L" as sealer. It may be overlaid on existing sealer.

Sealer:

CEMEDINE 5430L

CAUTION:

- Any breaks in sealer can cause water leakage or entry of air and dust. Be sure sealer is applied in a continuous line.
- Make sure sealing cover bonded areas are free from wrinkles or openings.



4. CHECKER

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Apply a cloth to door and body to prevent damaging them, and remove checker pin by driving it upward.

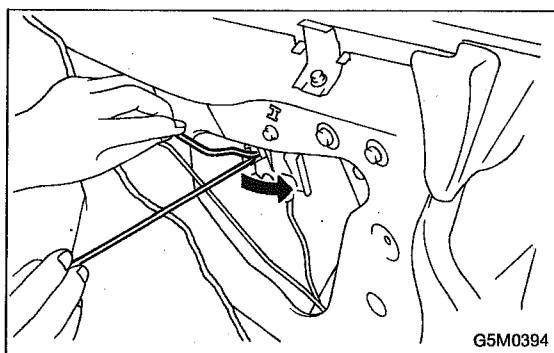
CAUTION:

Be careful not to damage door and body.

- 4) Completely close door glass.
- 5) Loosen two nuts securing checker, and take out checker through access hole in underside.
- 6) Installation should be made in the reverse order of removal.

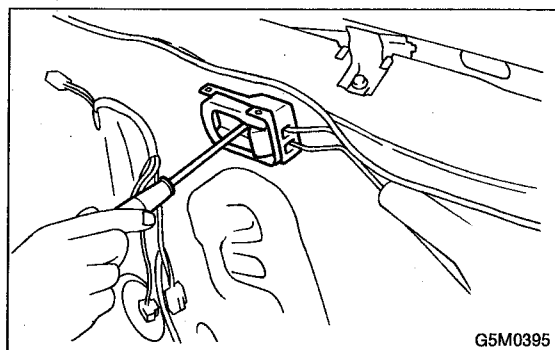
Tightening torque:

$7.5 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)



5. INNER REMOTE

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Disconnect joints of two rods.
- 4) Unlatch rod holder.



- 5) Remove screws holding remote assembly.

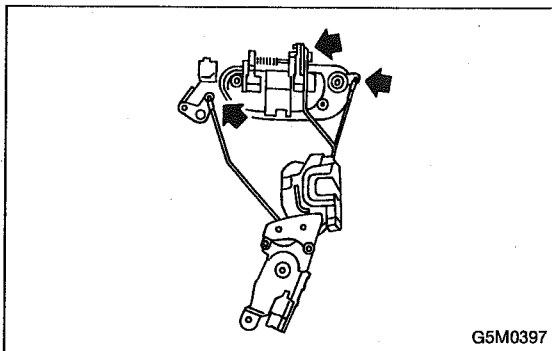
6) Installation is in the reverse order of removal.

NOTE:

If rear door is equipped with child safety lock, check that child lock lever moves without dragging.

6. DOOR LATCH

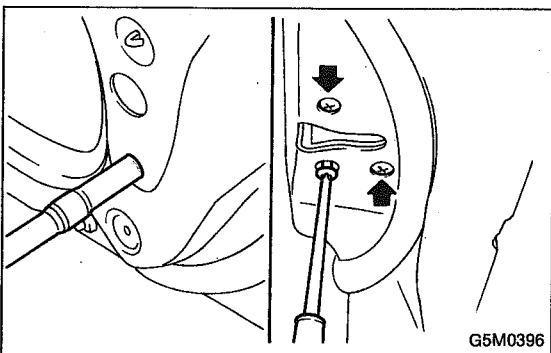
- 1) Remove trim panel.
- 2) Remove inner remote assembly.
- 3) Remove sealing cover around latch service hole.
- 4) Completely close door glass.



G5M0397

5) Remove latch and actuator assembly:

- (1) Turn rod holder to disconnect joint between key lock and rod.
- (2) Turn rod holder to disconnect joint between outer handle and rod.
- (3) Turn rod holder to disconnect joint between crank and rod.



G5M0396

6) Loosen screws securing both latch and actuator, then remove latch and actuator assembly through service hole in bottom.

Tightening torque (screw):

$6.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.2 \text{ kg}\cdot\text{m}$, $4.7 \pm 1.4 \text{ ft}\cdot\text{lb}$)

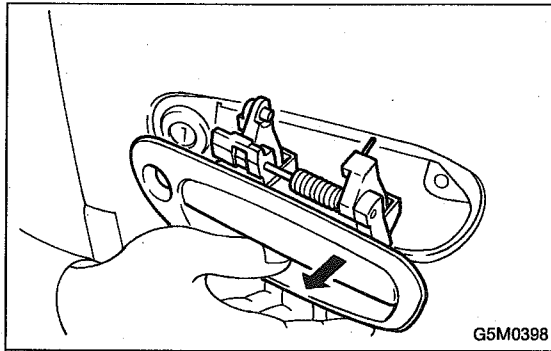
7) Installation is in the reverse order of removal.

NOTE:

- Check operation of each part.
- Check each sliding part for proper lubrication.

CAUTION:

After installation, be sure lock mechanism operates normally.



7. OUTER HANDLE

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Detach door latch rod from outer handle and key lock.
- 4) Loosen nut securing outer handle and then remove outer handle from outside.

CAUTION:

Be careful not to damage door.

- 5) Installation is in the reverse order of removal.

Tightening torque:

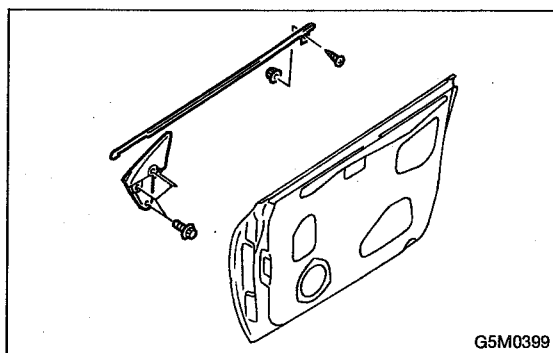
$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)

8. KEY LOCK

- 1) Remove trim panel.
- 2) Remove sealing cover.
- 3) Completely close door glass.
- 4) Remove outer handle.
- 5) Loosen spring securing key lock.
- 6) Remove key lock from outer handle.
- 7) Installation is in the reverse order of removal.

NOTE:

Install so that key slot in key lock comes to center of hole in outer handle.



9. GUSSET

- 1) Be sure window is all the way down.
- 2) Remove gusset cover.
- 3) Remove trim panel.
- 4) Remove door rearview mirror.
- 5) Remove outer weatherstrip.
- 6) Remove sealing cover.

NOTE:

Be careful not to drop nuts on the "IN" side.

- 7) Remove bolts and nuts which secure gusset.

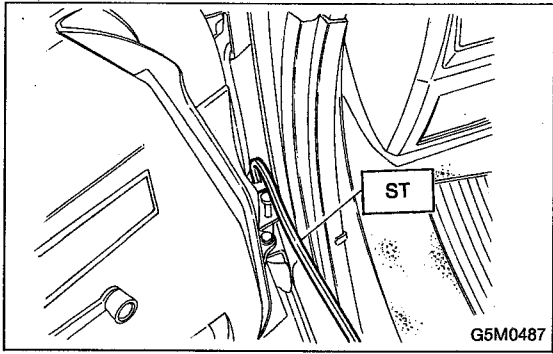
Tightening torque: Bolt

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

Tightening torque: Nut

$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)

- 8) Lift out gusset.
- 9) Installation is in the reverse order of removal.

**B: ADJUSTMENT****1. DOOR ASSEMBLY**

1) Using ST, loosen bolts securing upper and lower hinges to body, and adjust fore-and-aft and vertical alignment of door.

ST 925610000 DOOR HINGE WRENCH

2) Loosen screw one complete rotation, and adjust opening/closing direction of door using a hammer covered with a cloth.

CAUTION:

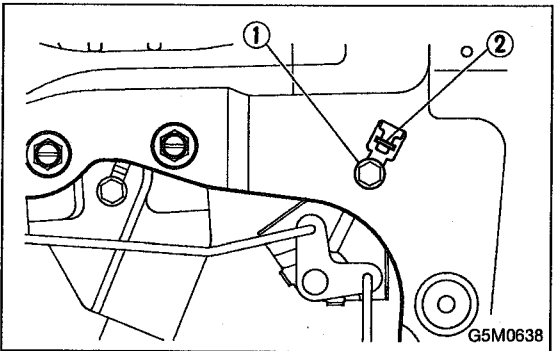
Be careful not to damage striker.

Hinge tightening torque (body side):

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

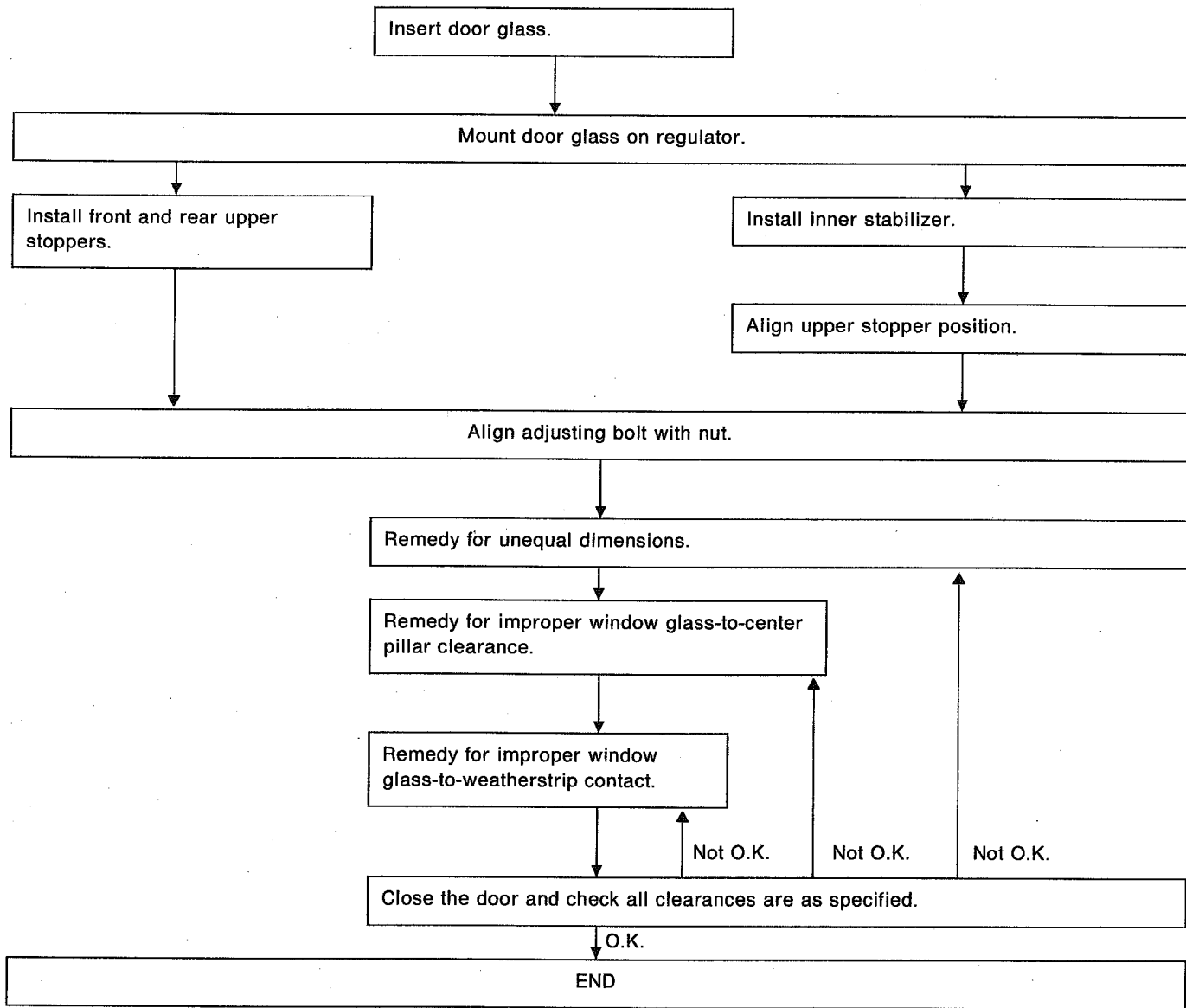
Striker tightening torque:

$14 \pm 4 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.4 \text{ kg}\cdot\text{m}$, $10.1 \pm 2.9 \text{ ft}\cdot\text{lb}$)

**2. INNER REMOTE**

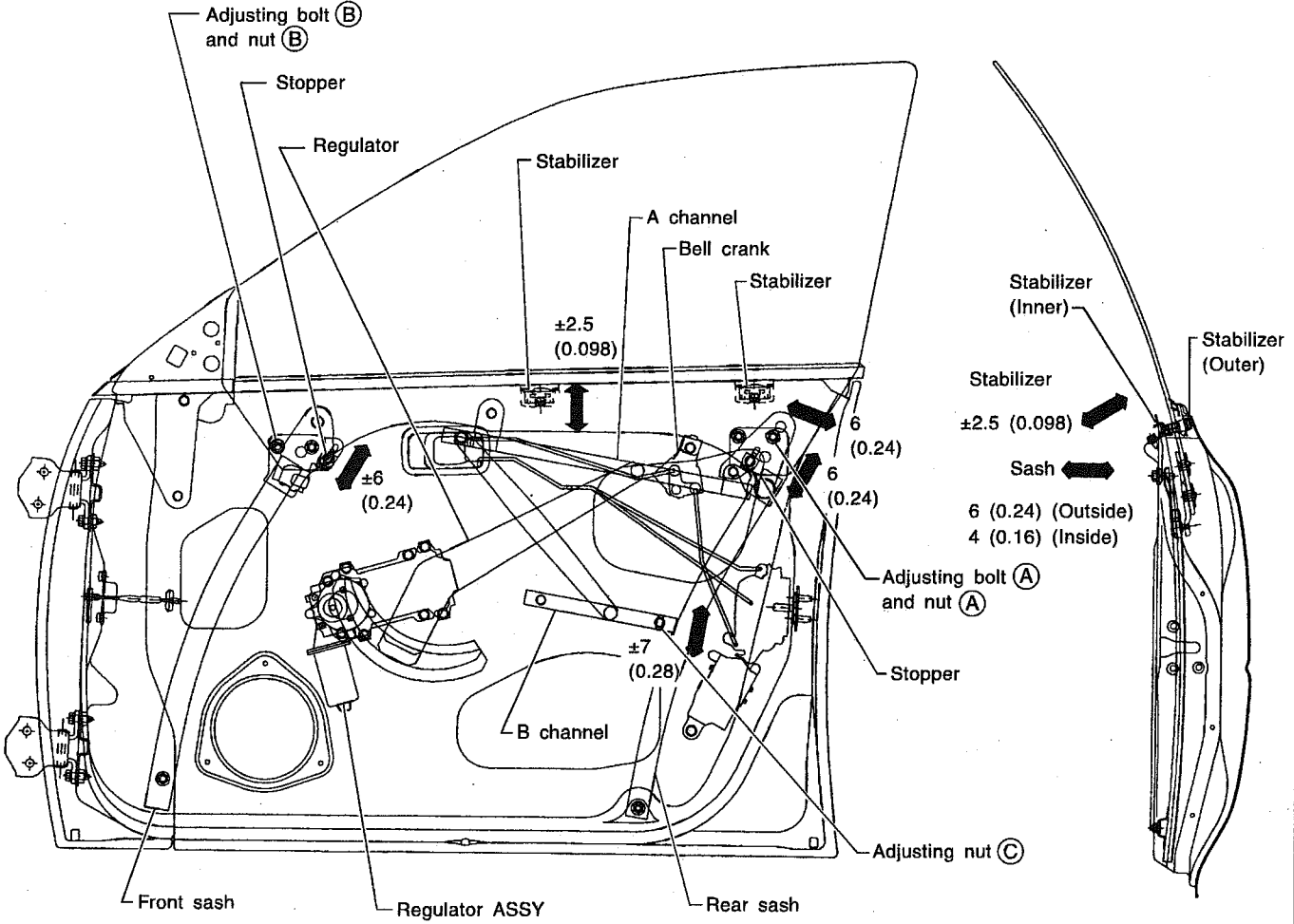
- 1) Lock the door.
- 2) Loosen bolt ①.
- 3) Lower bell crank ② and then tighten bolt ①.

3. PROCEDURE CHART FOR ADJUSTING DOOR GLASS



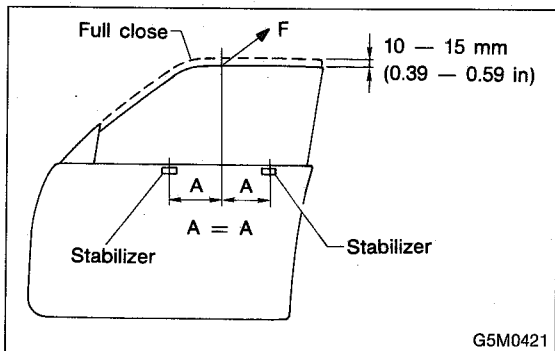
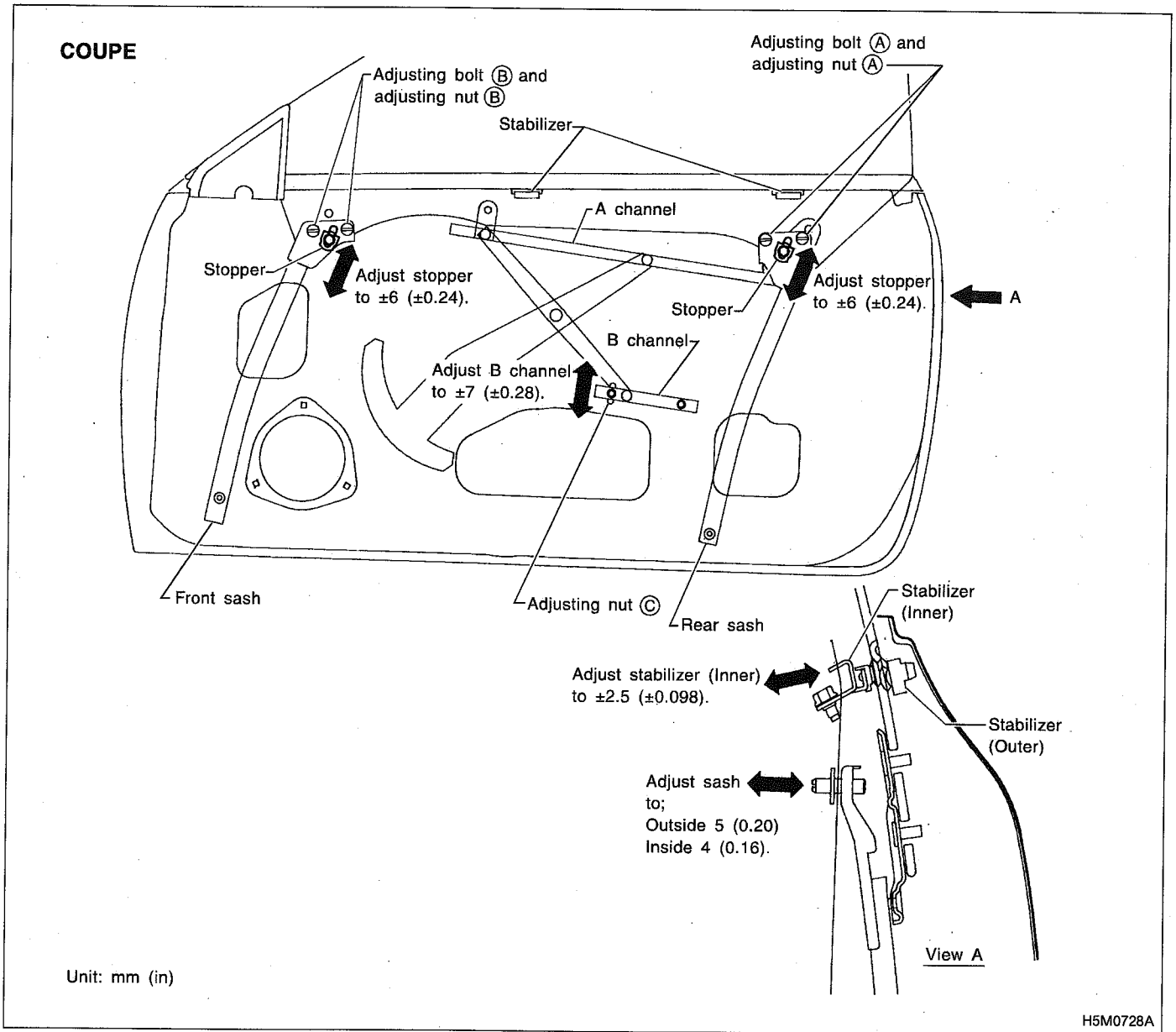
4. FRONT DOOR GLASS

SEDAN AND WAGON



Unit: mm (in)

H5M0697A



● **Door glass fit adjustment**

Before adjusting door glass alignment, ensure adjusting bolts for stabilizers, upper stoppers and sashes are loose and glass is raised so that it is in contact with upper and side weatherstrip.

- 1) Temporarily tighten one of the two rear sash adjusting bolts, at midpoint of oblong hole on inner panel.
- 2) Temporarily tighten regulator B channel at a position slightly lower than midpoint of oblong hole on inner panel.

3) Lower door glass 10 to 15 mm (0.39 to 0.59 in) from fully closed position. While applying outward pressure (load) to upper edge of glass above midpoint of two outer stabilizers, press inner stabilizer until it just touches the glass, then secure it.

Load: F

Front door glass 44.1 ± 4.9 N

(4.5 ± 0.5 kg, 9.9 ± 1.1 lb)

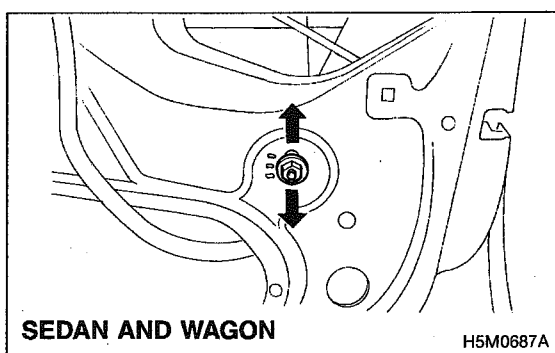
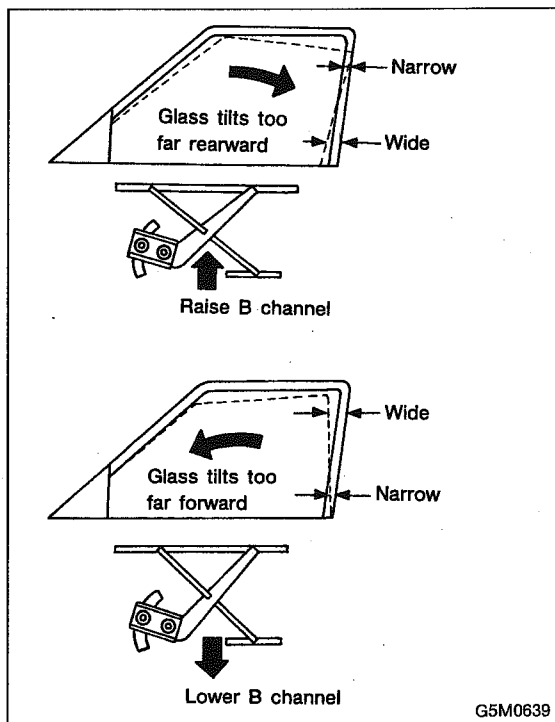
Rear door glass 44.1 ± 4.9 N

(4.5 ± 0.5 kg, 9.9 ± 1.1 lb)

● **Remedy for unequal dimensions, between upper, lower and center pillar sides**

1) Close front door and raise door glass.

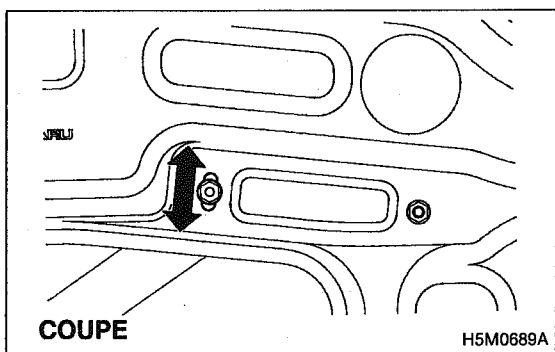
2) Make sure of unequal dimensions.

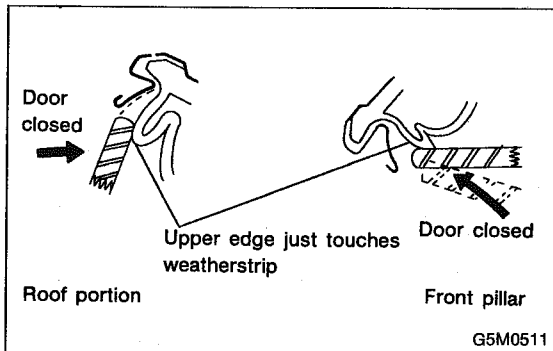
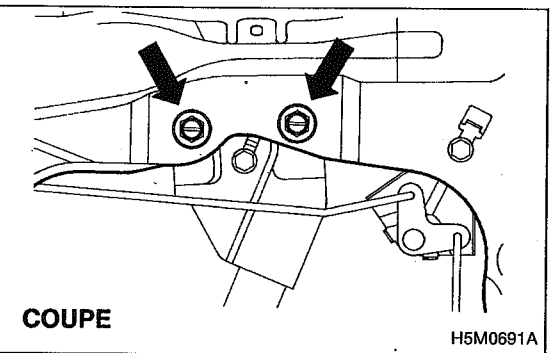
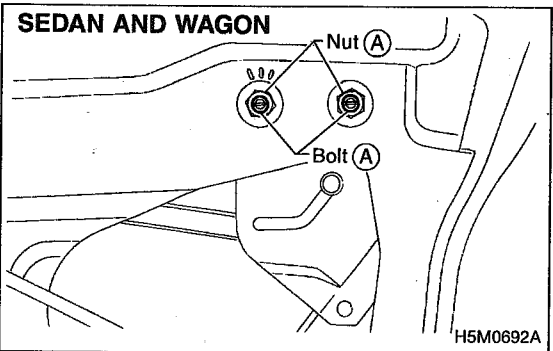
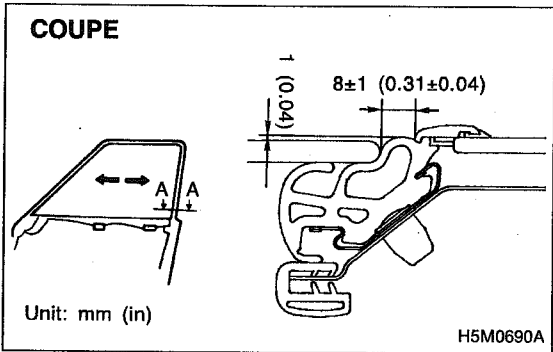
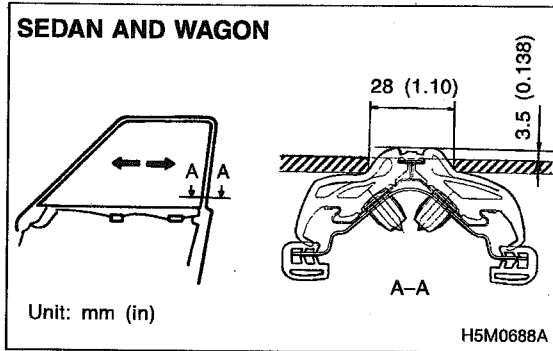


3) If glass tilts to far rearward, loosen adjusting nut ① and adjust glass to be parallel with center pillar, then after adjustment, tighten adjusting nut ①.

Tightening torque:

7.4 ± 2.0 N·m (0.75 ± 0.2 kg·m, 5.4 ± 1.4 ft·lb)





● **Remedy for improper glass to center pillar clearance**

- 1) Close front door and raise door glass.
- 2) Make sure of improper clearance.

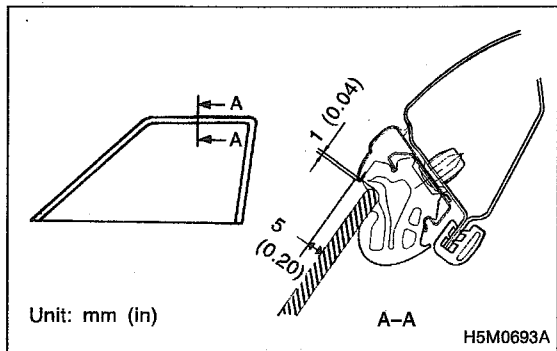
- 3) If clearance is improper, loosen adjusting nut (A), bolt (A) and adjust glass to center pillar.

● **Remedy for improper upper stop point of door glass**

- 1) Loosen front and rear sash stoppers.
- 2) Increase the upward travel of window glass up to the position where upper edge just touches weatherstrip surface with door closed.
- 3) After adjustment, temporarily tighten stoppers.

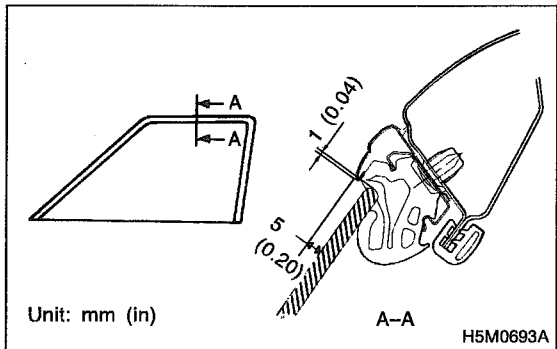
NOTE:

Make sure that each glass stopper is touched.



● Remedy for incorrect contact of door glass to weatherstrip

- 1) Close front door and raise door glass.
- 2) If clearance is below specifications, loosen bolt **(A)** and bolt **(B)**.
- 3) If clearance is over specifications, tighten bolt **(A)** and bolt **(B)**.



● Fit adjustment

Door glass fit is adjusted by displacing the glass front edge with a stabilizer.

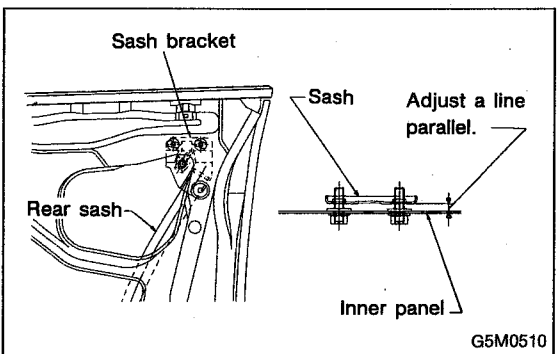
NOTE:

Before adjusting glass fit, visually check to determine relative adjusting positions of retainer and molding (on roof side) and glass surface.

- 1) Alternately adjust two rear sash adjusting bolts **(A)** until dimensions are obtained.

CAUTION:

Do not loosen two adjusting nuts **(A) at the same time, as this moves sash fore and aft, creating unequal glass-to-sash clearance. During adjustment, loosen only one nut and keep the other tightened.**



NOTE:

Always adjust two rear sash adjusting bolts **(A)** by the same amount. Do not adjust the adjusting bolts with sash bracket inclined toward inner panel, as this increases effort required to operate regulator.

- 2) Adjust front sash fit using rear sash adjustment procedure outlined in the former procedure as a guide. Two adjusting bolts must be adjusted by the same amount.

NOTE:

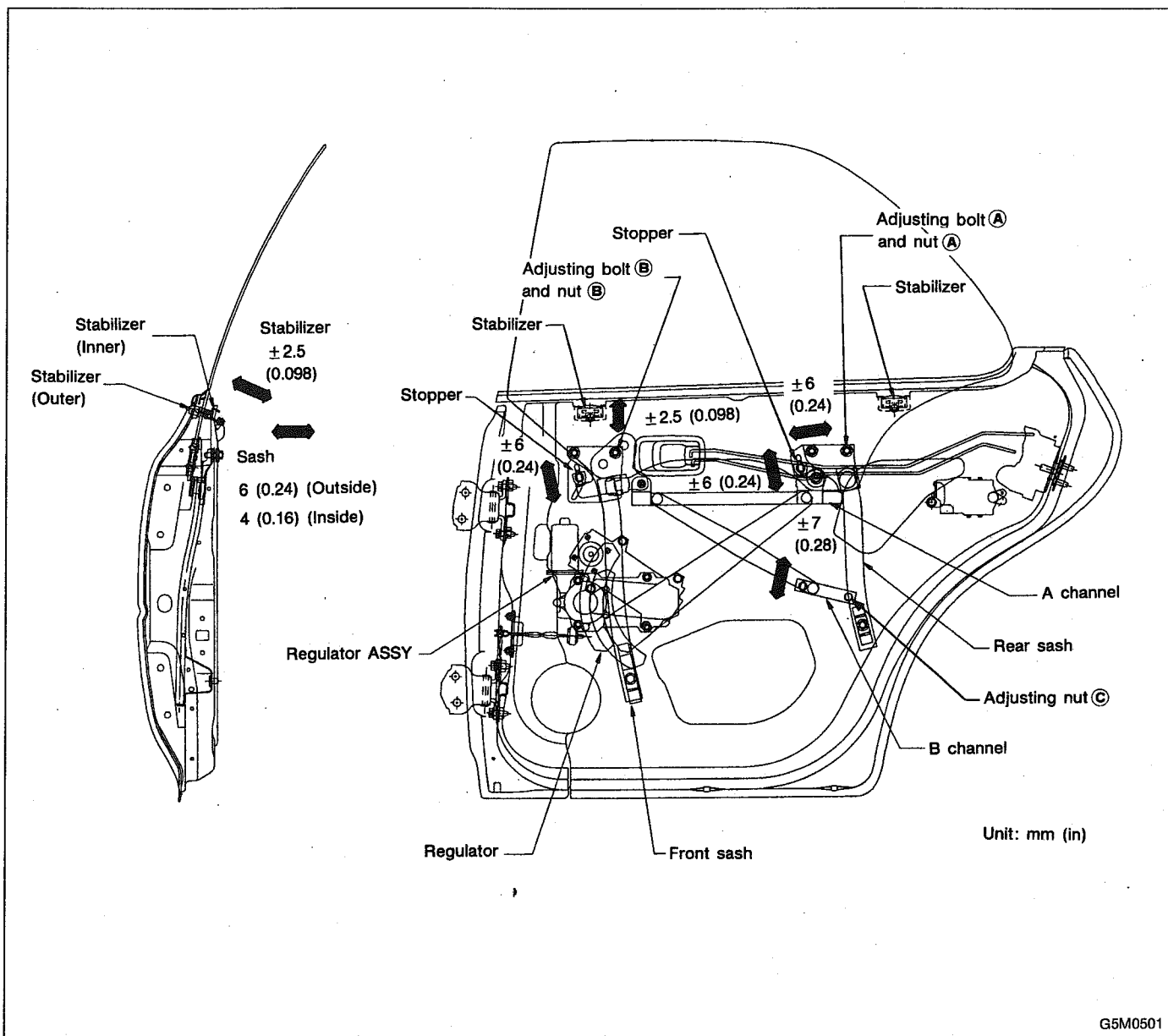
● Front and rear sash adjustment procedures are basically the same; however, the amount of adjustment is not always the same due to alignment dispersion of individual doors.

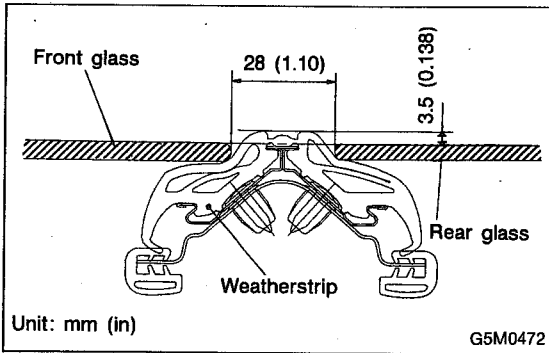
● Adjust front and rear sash fit, as equally as possible. Otherwise, effort required to operate regulator may increase.

3) After adjusting front sash-to-glass fit, secure front sash.

5. REAR DOOR GLASS

Alignment of rear door glass is basically the same as for the front door glass. Due to slight difference in adjustment dimensions for fore-aft, up-down, and in-out alignments, key points for rear door adjustment are described.





● **Fore-aft adjustment**

1) Door glass alignment must be adjusted so that glass-to-center pillar fit is equal at all points. Always use dimensions as a guide during adjustment.

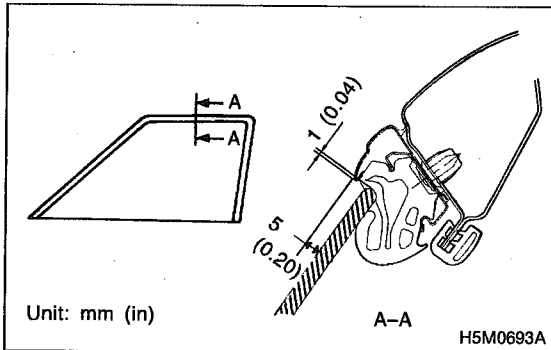
NOTE:

If dimensions are smaller than those indicated, glass will be caught in weatherstrip and may not raise to the fully closed position.

2) After making fore-aft adjustment, raise and lower glass to ensure it is free from any binding.

● **Fit adjustment**

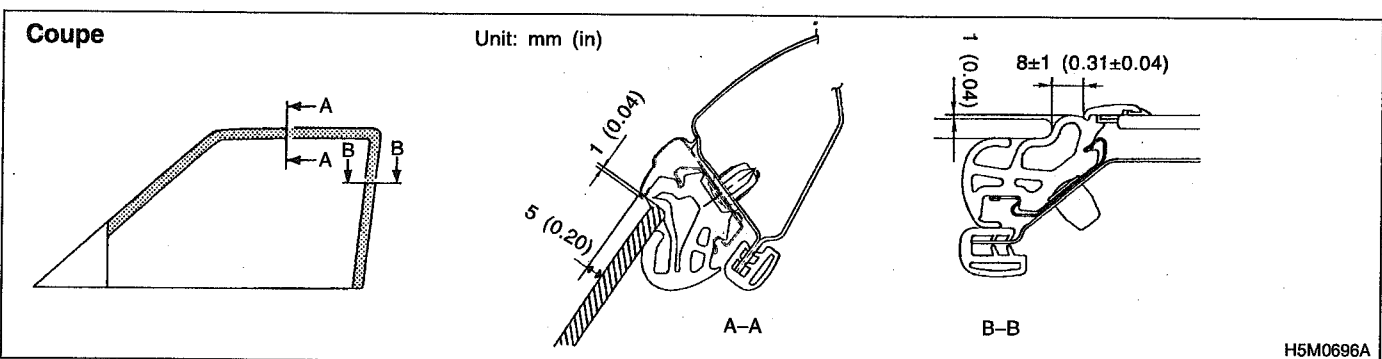
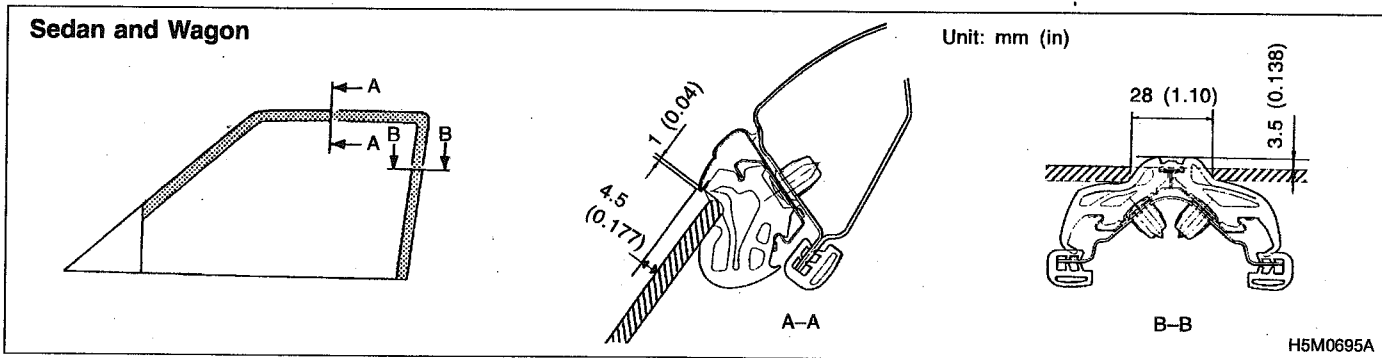
Increasing contact pressure causes rear door glass to be caught in center pillar upper and lower weatherstrip; this will cause premature weatherstrip wear. For this reason, always use dimensions indicated in figure as a guide during glass fit adjustment.



C: INSPECTION

1. FRONT DOOR GLASS

1) Close front door and make sure of all clearances.



2) If any clearance is not correct, adjust affected parts. Re-check that all clearances are correct.

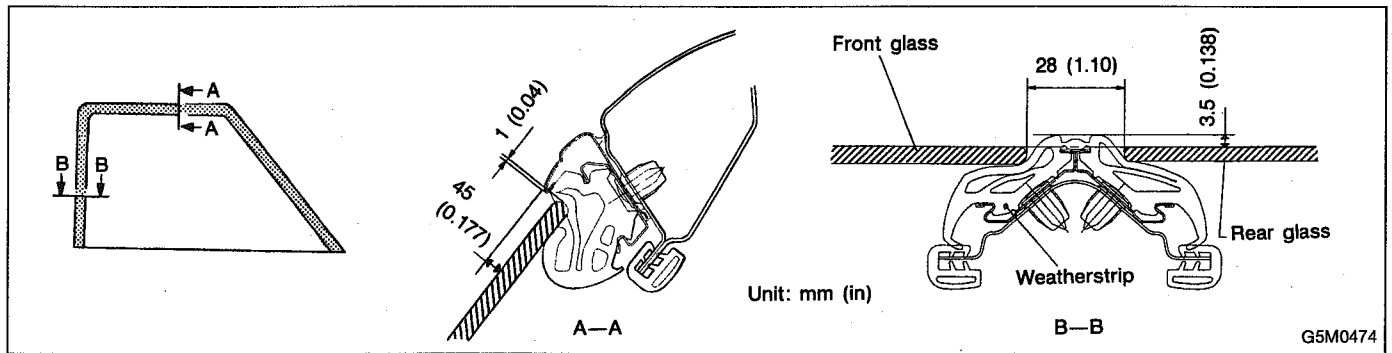
CAUTION:

● **Repeatedly adjust parts until all clearances are correct.**

- After clearance adjustment, make sure that all adjusting bolts and nuts are tightened.

2. REAR DOOR GLASS

- 1) Close rear door and make sure of all clearances.



- 2) If any clearance is not correct, adjust affected parts. Re-check that all clearances are correct.

CAUTION:

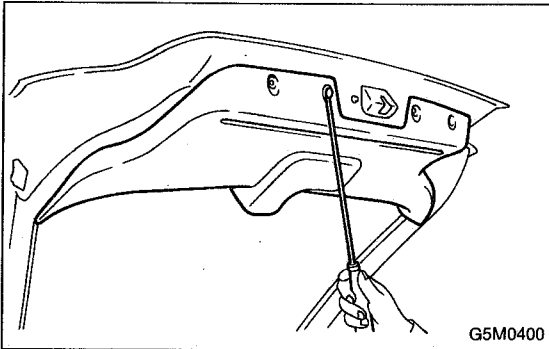
- Repeatedly adjust parts until all clearances are correct.
- After clearance adjustment, make sure that all adjusting bolts and nuts are tightened.

3. Rear Gate

A: REMOVAL AND INSTALLATION

CAUTION:

- Be careful not to scratch coated surfaces of vehicle body and window glass during removal. Place a cloth over the affected area.
- Be careful not to damage trim panels.
- Use an assistant when handling heavy parts.
- Be careful not to damage or lose small parts.



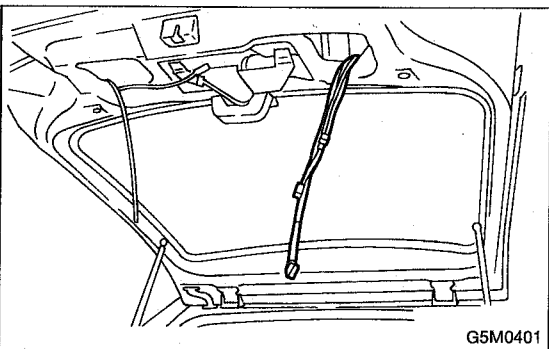
1. REAR GATE ASSEMBLY

- 1) Remove clips from trim panel and detach trim panel.

CAUTION:

Be careful not to damage clips or their holes.

- 2) Disconnect connectors and terminal.
- 3) Disconnect rear washer hose from wiper motor.
- 4) Remove high-mounted stop light.

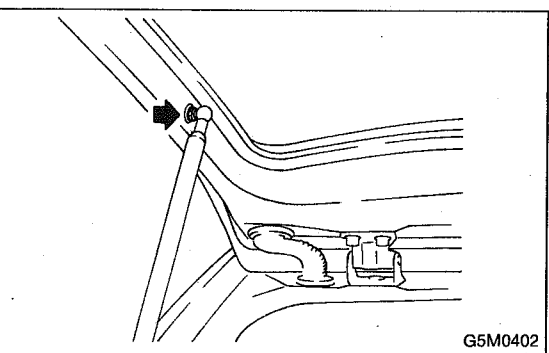


- 5) If disconnected harness is re-used, tie connector with a string and place on the upper side of rear gate for ready use.

CAUTION:

Do not forcefully pull cords, lead wires, etc. since damage may result; carefully extract them in a wavy motion while holding connectors.

- 6) Remove rear wiper. <Ref. to 6-2 [W600].>
- 7) Remove both rubber ducts and then extract washer hose and harness connector.

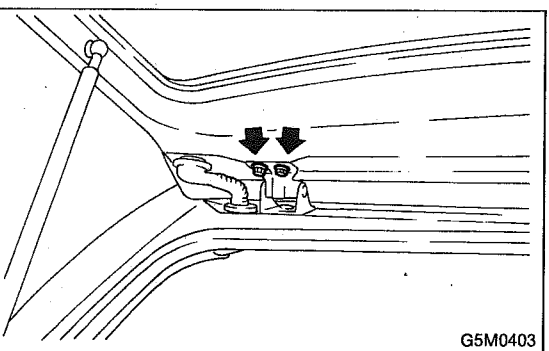


- 8) Gas stay:

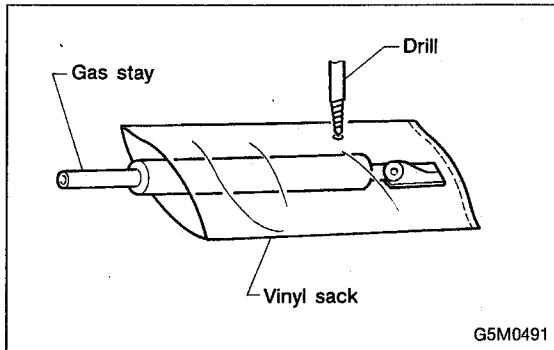
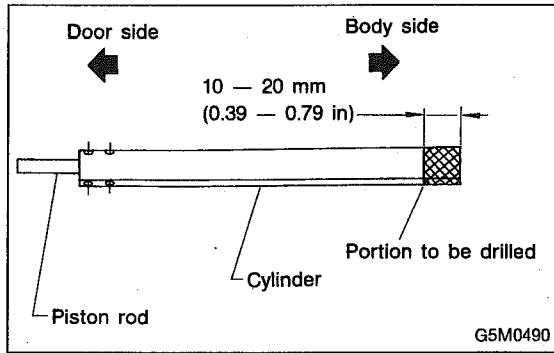
- (1) Completely open rear gate.
- (2) Remove bolts which hold gas stay to rear gate.

CAUTION:

- Be careful because rear gate drops while removing bolts. Have an assistant support it while removing bolts.
- Be sure to place a folded cloth between rear gate and body to prevent scratches.



- 9) Remove the bolts which hold rear gate to hinge and then detach rear gate.



10) General precautions in handling rear gate gas stay

CAUTION:

- Do not attempt to disassemble gas stay because its cylinder is filled with gas.
- Before discarding gas stay, place it at a slight angle with the cylinder body side facing up and drill a 2 to 3 mm (0.08 to 0.12 in) dia. hole to completely discharge the content. (Gas is odorless, colorless and harmless; however, metal powder may come out of the hole.)

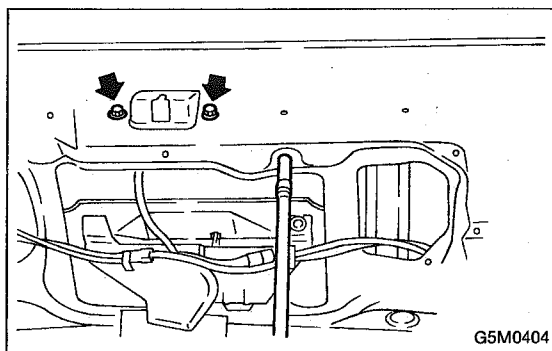
- It is good practice to place a vinyl sack over it before drilling the hole because oil may spurt out. Be careful to prevent vinyl cover from becoming entangled on the drill.

- Be careful not to scratch the exposed section of piston rod or allow oil or paint to come in contact with it.
- Do not attempt to rotate the extended piston rod.

11) Installation is in the reverse order of removal.

CAUTION:

- Be careful not to mistake RH and LH body side buffers.
- Be sure to add sealer to hinge.
- When installing rear gate, be careful not to damage coating on body and rear gate.

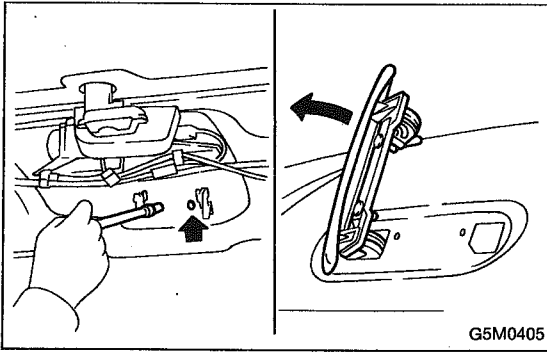


2. LATCH

- 1) Remove trim panel.
- 2) Disengage rod from holder (= key cylinder).
- 3) Remove bolts from auto-door lock actuator.
- 4) Remove bolts from latch, and detach latch.
- 5) Disconnect rear gate switch connector.
- 6) Disconnect auto-door lock actuator connector.
- 7) Detach latch.
- 8) Installation is in the reverse order of removal.

CAUTION:

Firmly join latch with key cylinder, and outer handle.

**3. OUTER HANDLE**

- 1) Remove trim panel.
- 2) Remove latch.
- 3) Remove two nuts used to hold outer handle to the inside of rear gate, and detach outer handle.

CAUTION:

Be careful not to damage packing when removing outer handle.

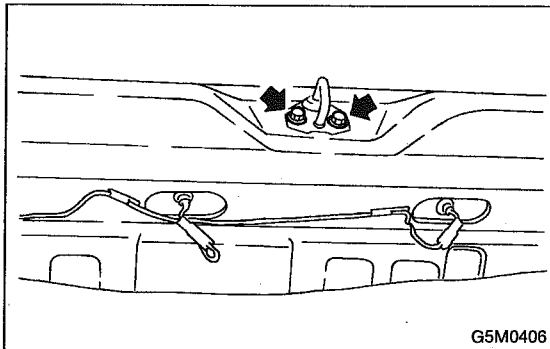
- 4) Installation is in the reverse order of removal.

CAUTION:

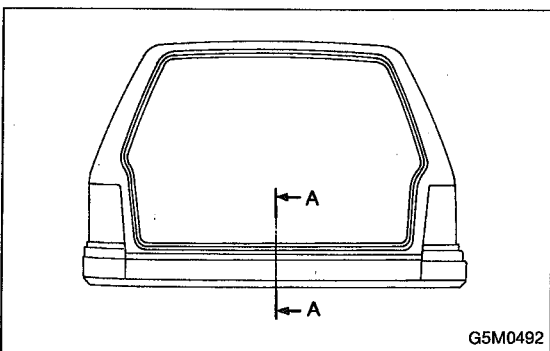
Completely insert latch pin into handle lever.

4. KEY CYLINDER

- 1) Remove trim panel.
- 2) Disengage rod from holder.
- 3) Remove retaining spring from key cylinder, and detach key cylinder from outside.
- 4) Installation is in the reverse order of removal.

**5. STRIKER**

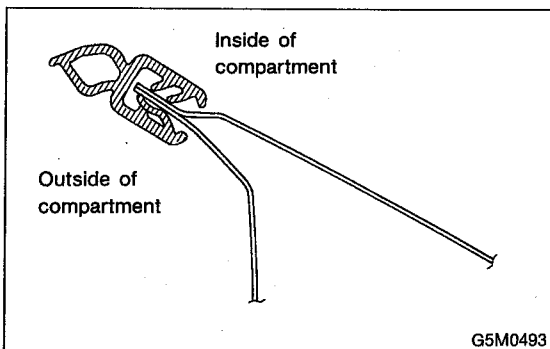
- 1) Remove rear skirt trim.
- 2) Remove two bolts from striker and detach striker.
- 3) Installation is in the reverse order of removal.

**6. WEATHERSTRIP**

- 1) Place weatherstrip so that its joints meet at lower center of vehicle body, and install by inserting flanged portion from below, as shown in section A—A in figure.
- 2) Tap along entire length with a rubber hammer to firmly insert body flange into weatherstrip.

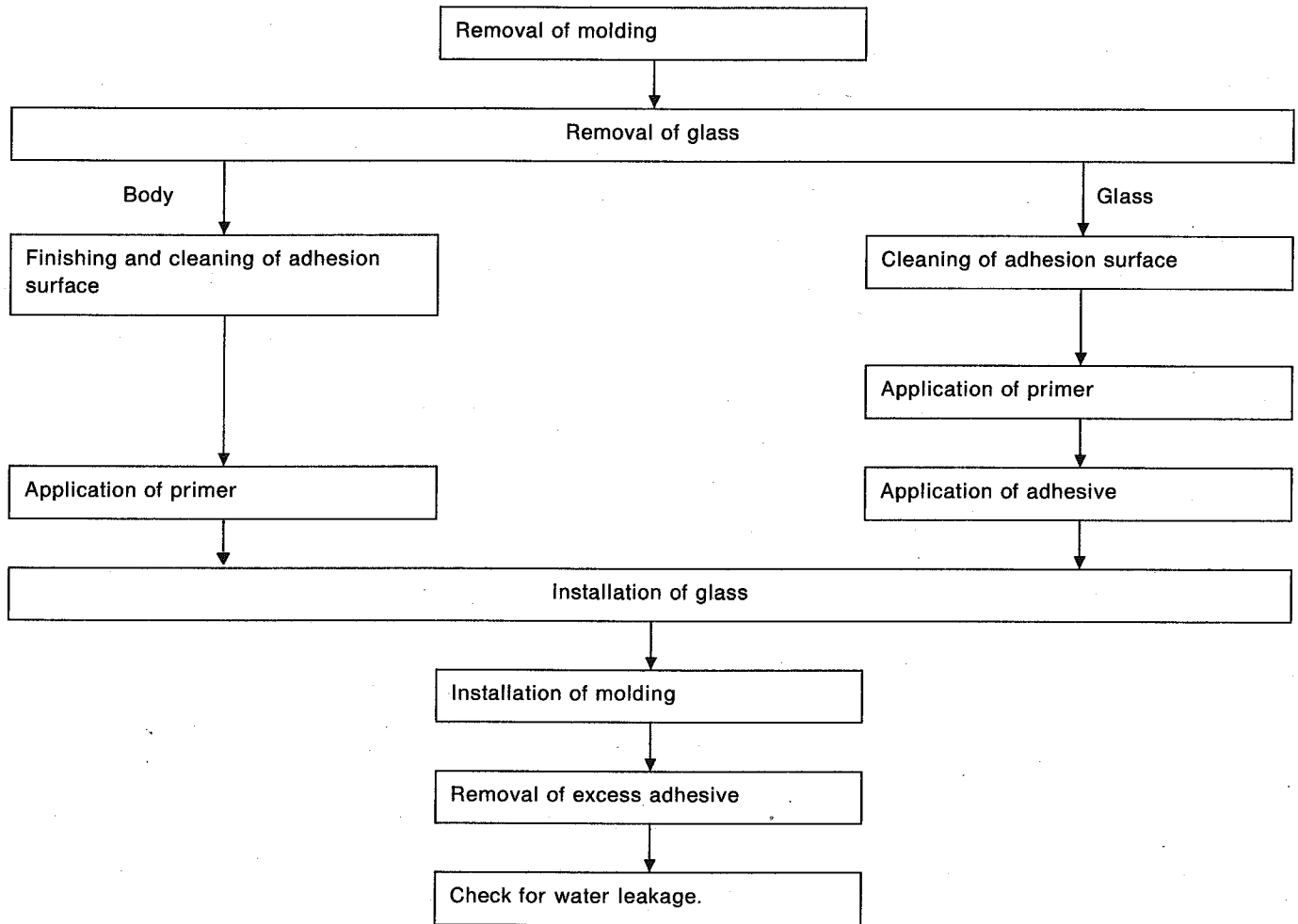
CAUTION:

- Be careful not to install in wrong direction.
- Install weatherstrip carefully and firmly.



4. Procedure Chart for Removal and Installing Window Glass

A: REMOVAL AND INSTALLATION



1. MATERIALS REQUIRED FOR APPLICATION

Description	Remarks
Repair adhesive set ● Cartridge of single-liquid urethane adhesive ● Primer for glass and body	Sunstar No. 580 or Essex Chemical Corp's Urethane E Sunstar No. 435-580
Windshield knife or piano wire	For cutting windshield
Sealant gun	For applying adhesive
Suction cups	For holding glass
Putty knife	For finishing adhesion surface and cutting spacer
Sponge	For applying primer
Gauze or cloth	For cleaning
Alcohol or white gasoline	For cleaning adhesion surface
Tape	For preventing damage to painted surface

5. Windshield

A: REMOVAL

1. USING WINDSHIELD KNIFE

The following procedure for the front windshield can also be applied to other window glass.

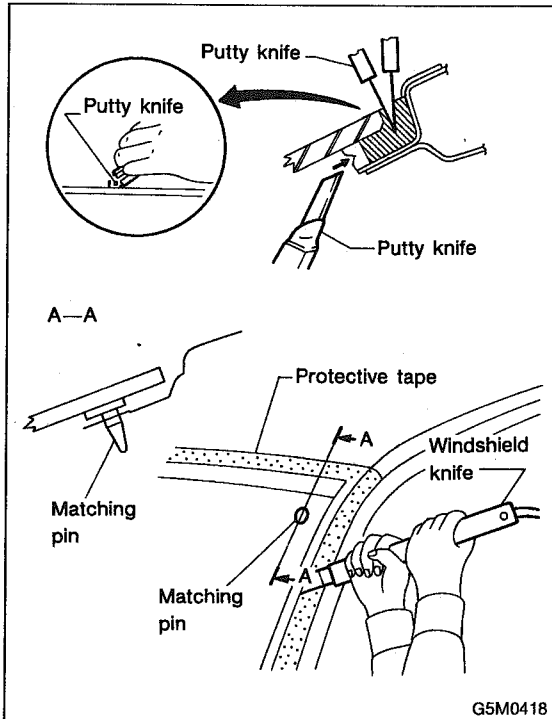
- 1) Remove wiper arm and cowl panel.
- 2) Remove roof molding and front window molding upper.

3) Remove glass:

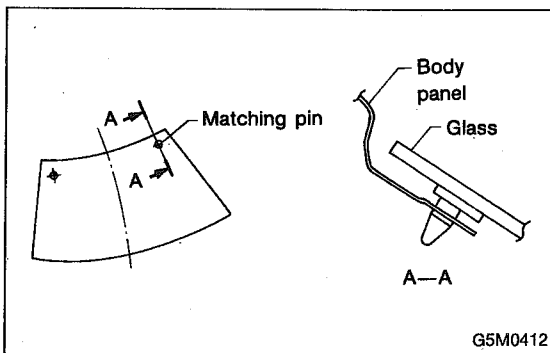
- (1) Put protective tape on body to prevent damage.
- (2) Apply soapy water to the surface of the adhesive agent so the knife blade slides smoothly.
- (3) Cut off excess adhesive agent.
- (4) Put windshield knife into layer of adhesive.
- (5) Cut adhesive layer with the windshield knife.

CAUTION:

- Keep knife edge along glass surface and end face.
- When first putting knife into layer of adhesive, select point with wide gap between body and glass.



G5M0418



G5M0412

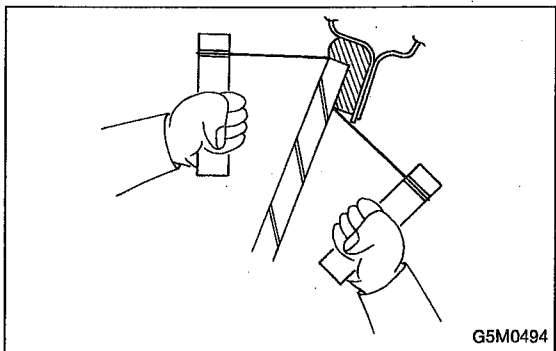
NOTE:

A matching pin is cemented to corners of glass on compartment side.

Use a piano wire when cutting each pin.

2. USING PIANO WIRE

- 1) Remove wiper arm and cowl panel.
- 2) Remove roof molding and front window molding upper.



3) Remove glass:

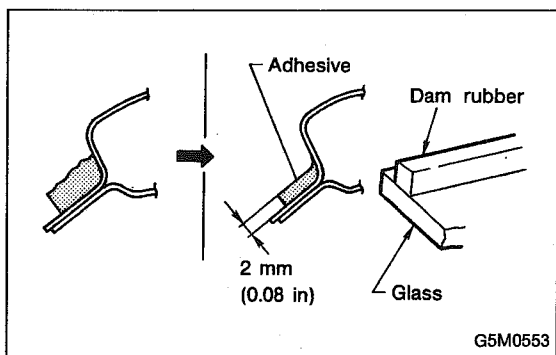
- (1) Put protective tape on body to prevent damage.
- (2) Using drill or putty knife, make through-hole (one place) in adhesive agent.
- (3) Pass piano wire through the hole from inside the compartment, and connect both ends of wire securely to wooden blocks.
- (4) Cut adhesive layer with the wire by pulling it back and forth.

CAUTION:

When making through-hole into adhesive layer and cutting the adhesive, be careful not to damage interior and exterior parts.

B: INSTALLATION

- 1) After cutting layer of adhesive, remove gum rubber remaining on body.



2) Finishing adhesion surface on body side:

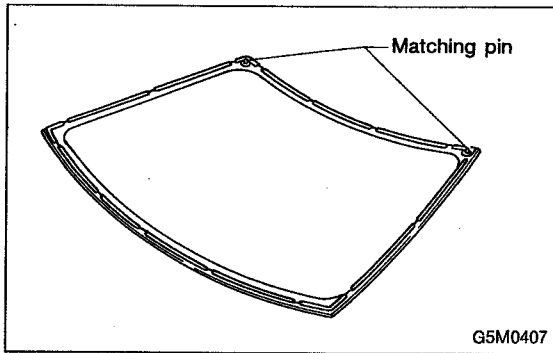
Using a cutter knife etc., cut layer of adhesive sticking firmly to body, and finish it to a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:

Take extra care not to cause damage to body paint.

3) Cleaning body surface:

- (1) Thoroughly remove chips, dirt and dust from body surface.
- (2) Clean body wall surface and upper surface of layer of adhesive with a solvent such as alcohol or white gasoline.

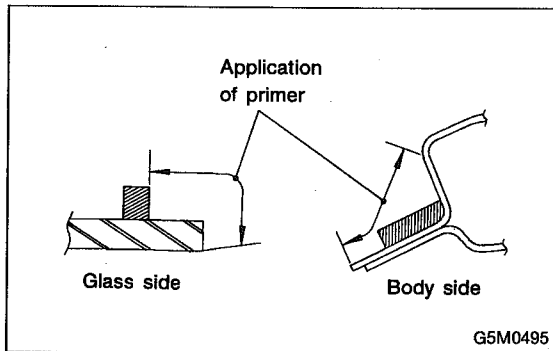


4) Positioning glass:

- (1) Mount glass on body.
- (2) Adjust position of glass so that gap between body and glass is uniform on all sides.
- (3) Put matching pin on body and glass in several places.

5) Cleaning glass:

- (1) Dismount glass from body.
- (2) Clean surface of glass to be adhered with alcohol or white gasoline.

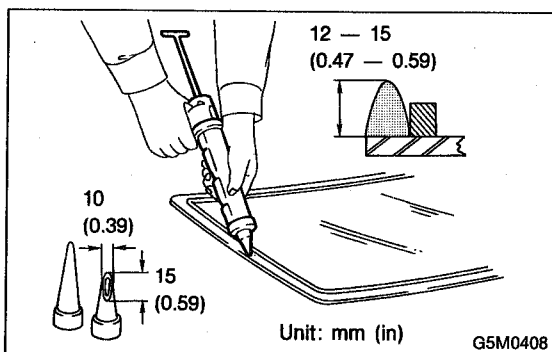


6) Application of primer:

- (1) Using a sponge, apply primer to part of glass to be adhered.
- (2) Apply primer to part of body to be adhered.

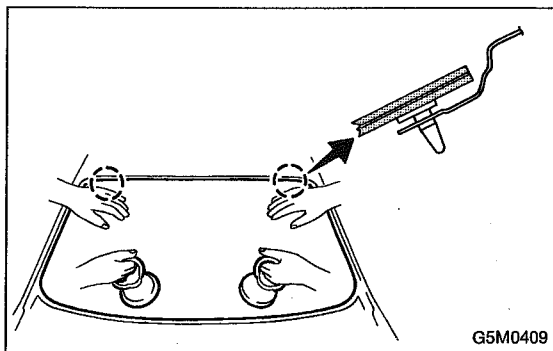
CAUTION:

- **Primer is hard to wipe off of body paint, instrument panel, inner trim, etc. So put masking around these areas for protection.**
- **After application, let 1st primer dry spontaneously for about 10 minutes.**
- **Do not touch primer-coated surface under any circumstances.**



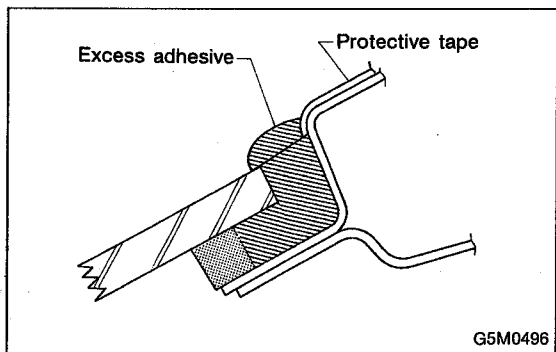
7) Application of adhesive:

- (1) Cut nozzle tip of cartridge as shown in figure.
- (2) Open cartridge and put it into a gun with nozzle attached.
- (3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.



8) Installation of glass:

- (1) Hold glass with rubber suction cups.
- (2) Mount glass on body with matching pin aligned.
- (3) Stick them fast by pressing all sides lightly.

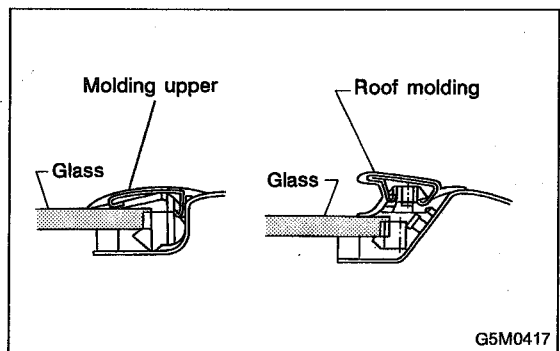


9) Installation of molding:

- (1) Remove adhesive overflowing from outside of glass until it becomes level with outer height of glass. Then, add adhesive to portions that need it, and clean with alcohol or white gasoline.
- (2) Firstly, press-fit front window molding upper and lastly, roof molding.

CAUTION:

Do not open and close door after moldings have been installed. When opening and closing door for unavoidable reason, lower door glass and gently move door.



10) Water leakage test:

Test for water leakage about one hour after installation.

CAUTION:

- Move vehicle very gently.
- Do not squirt strong hose stream on vehicle.

11) Spontaneous drying:

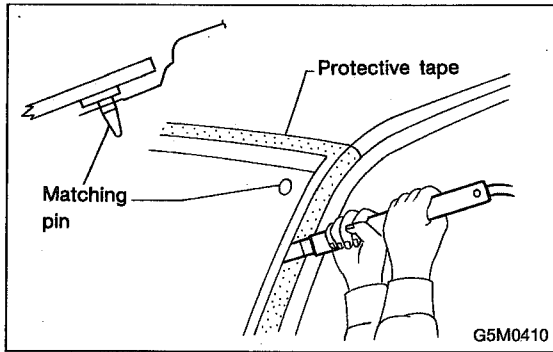
After completing all operations, leave vehicle alone for 24 hours.

CAUTION:

When delivering vehicle to user, tell him that vehicle should not be subjected to heavy shocks for at least three days.

12) Install cowl panel and wiper arm.

6. Rear Window Glass



6. Rear Window Glass

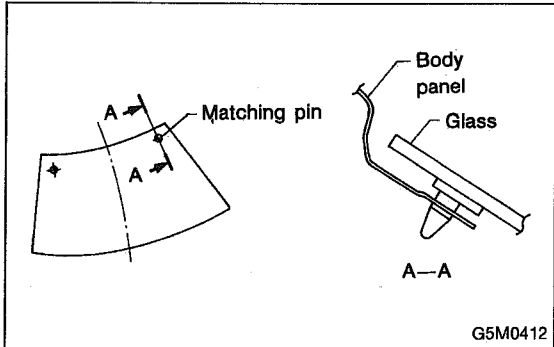
A: REMOVAL

1. SEDAN AND COUPE MODEL

- 1) Remove roof molding.
- 2) Remove rear window molding upper and lower.
- 3) Disconnect connector from rear defogger terminal.
- 4) Remove glass in same manner as in windshield.

NOTE:

A matching pin is cemented to the corners of glass on compartment side. Use a piano wire when cutting each pin.



2. WAGON MODEL

NOTE:

It is impossible to remove the molding from the glass. If molding is broken, replace rear glass.

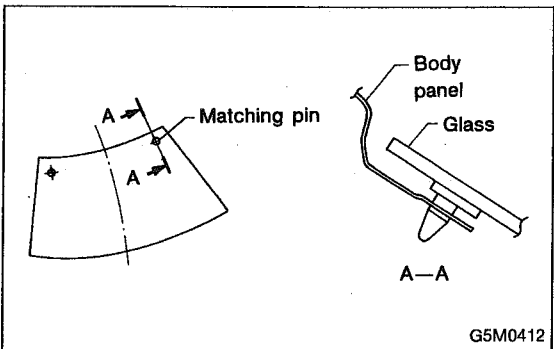
- 1) Remove rear wiper and rear gate trim.
- 2) Disconnect connector from rear defogger terminal.
- 3) Remove high mount stop light.
- 4) Remove glass in same manner as for windshield.

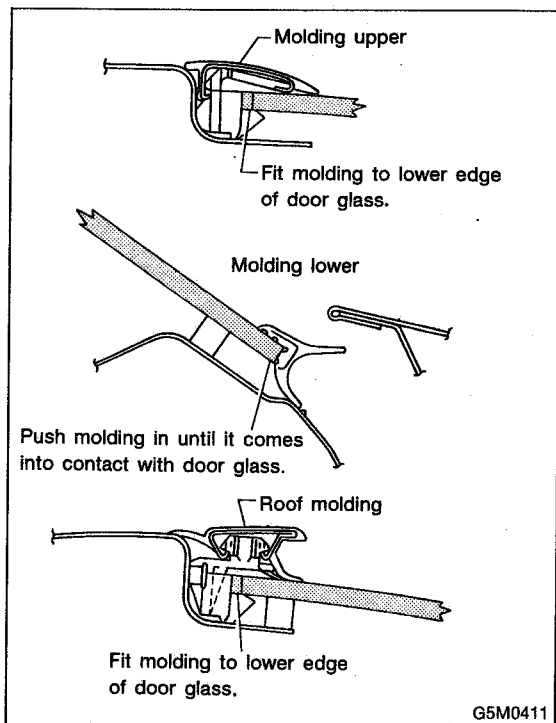
CAUTION:

Be careful not to damage molding re-installing the old rear window glass using a piano wire.

NOTE:

A matching pin is cemented to corners of glass on compartment side. Use a piano wire when cutting each pin.



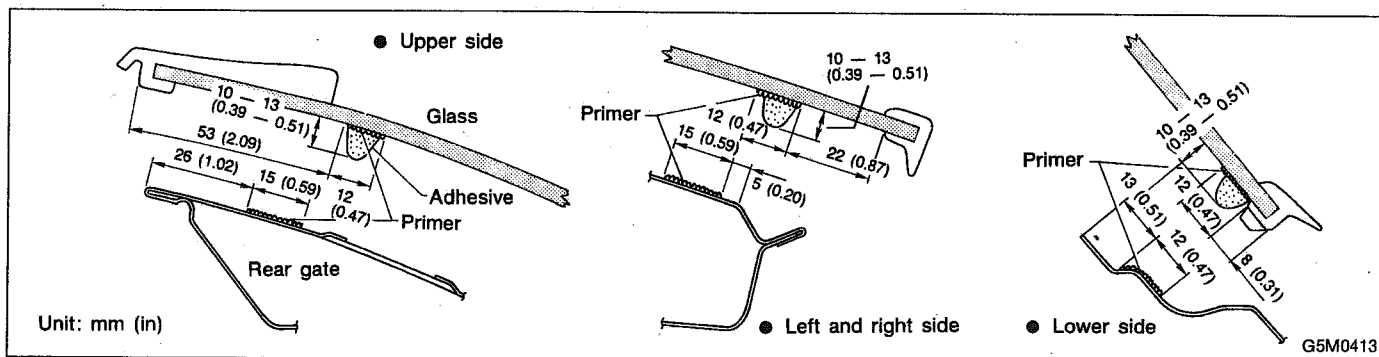


B: INSTALLATION

1. SEDAN AND COUPE MODEL

- 1) Install glass in same manner as in windshield.
- 2) Firstly, press-fit molding upper, then lower and lastly, roof molding.
- 3) After installation, test for water leakage after about one hour, and leave vehicle alone for 24 hours.
- 4) Make rear defogger connections.

2. WAGON MODEL

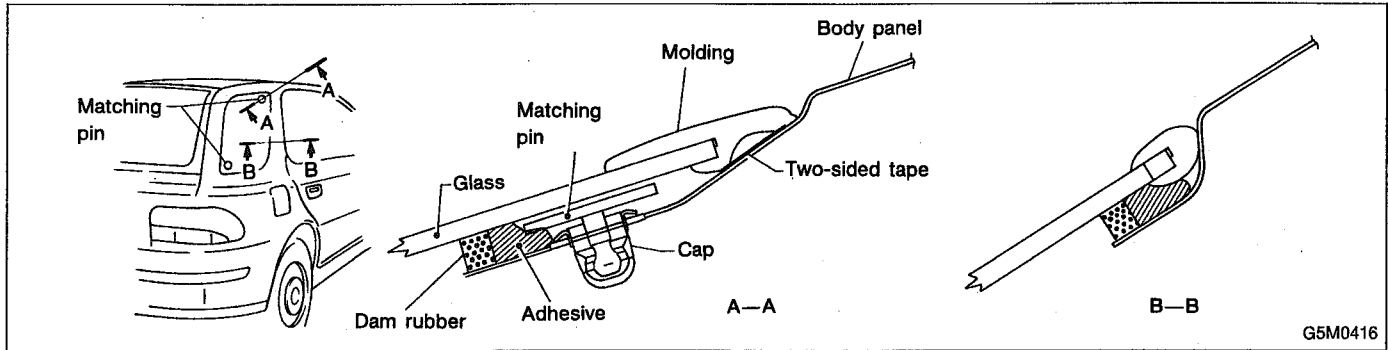


- 1) Install rear gate trim.
- 2) Install glass in same manner as windshield.
- 3) About one hour after installation, test for water leakage. Leave vehicle for 24 hours before using it.
- 4) Connect rear defogger connections.
- 5) Install high mount stop light and rear wiper.

7. Rear Quarter Glass

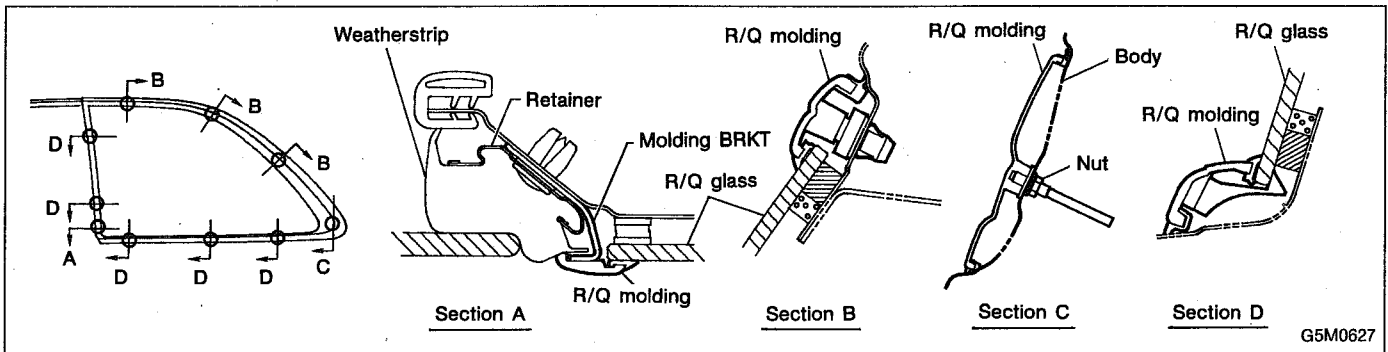
A: REMOVAL

1. WAGON MODEL

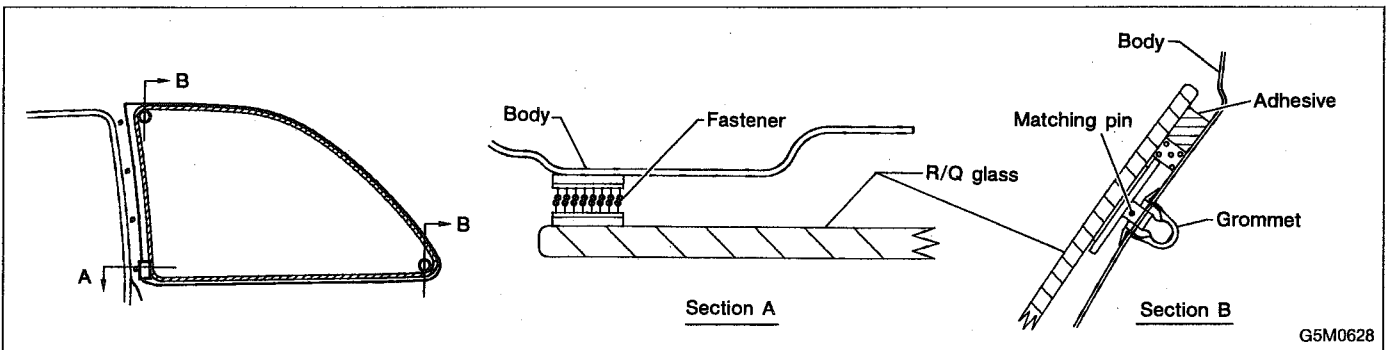


- 1) Remove rear quarter molding on corner.
- 2) Remove glass in same manner as in windshield.

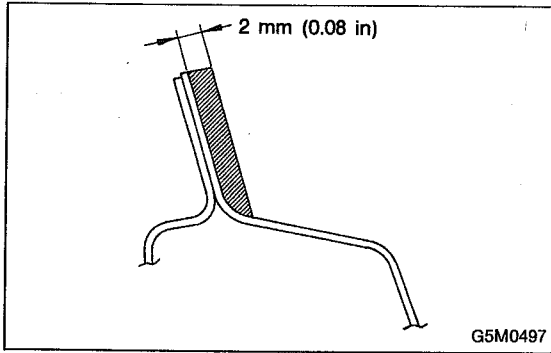
2. COUPE MODEL



- 1) Remove rear quarter molding.



- 2) Remove glass in same manner as in windshield.



B: INSTALLATION

1. WAGON MODEL

- 1) Finish surface of adhesive layer on body:
Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:

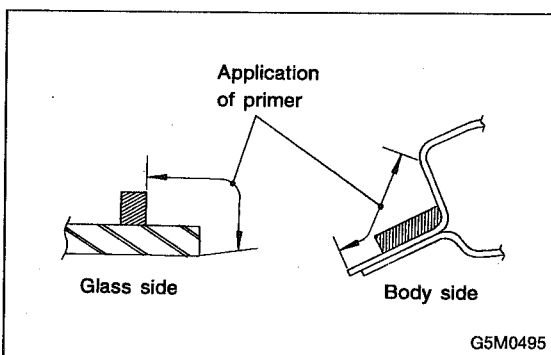
Be careful not to damage body finish.

- 2) Cleaning of body surface:

- (1) Remove chips, dirt and dust from body surface.
- (2) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.

- 3) Cleaning glass:

- (1) Remove dirt and dust from surface of glass to be adhered.
- (2) Clean surface of glass to be adhered with alcohol or white gasoline.



- 4) Application of primer:

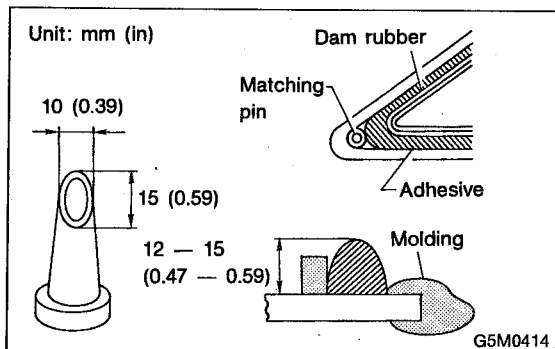
- (1) Using a sponge, apply primer to surface of glass to be adhered.
- (2) Apply primer to surface of body to be adhered.

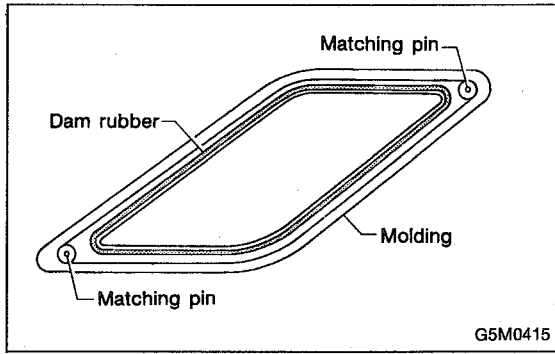
CAUTION:

- If primer has dropped on body finish, it is hard to wipe it off. So protect with masking.
- Primer must not project from black frame of glass.
- After applying primer, let it dry spontaneously for about 10 minutes.

- 5) Application of adhesive:

- (1) Cut nozzle tip as shown in figure.
- (2) Open cartridge and put it into a gun with nozzle attached.
- (3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.





6) Installation of glass:

- (1) Hold glass with rubber suction cups.
- (2) Mount glass on body with matching pin aligned.
- (3) Stick them fast by pressing all sides lightly.

7) Water leakage test:

After installing glass, test for water leakage after about one hour.

CAUTION:

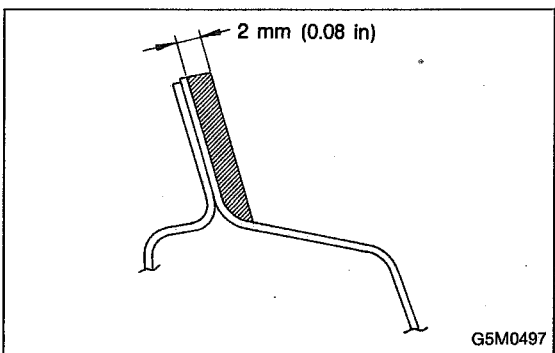
- Move vehicle slowly.
- When opening and closing door, lower door glass and move door gently.
- Do not squirt strong hose stream on vehicle.

8) Spontaneous drying:

After completing all operations, leave vehicle alone for 24 hours.

CAUTION:

When delivering vehicle to user, tell him or her that vehicle should not be subjected to heavy shocks for at least three days.

**2. COUPE MODEL**

1) Finish surface of adhesive layer on body:

Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:

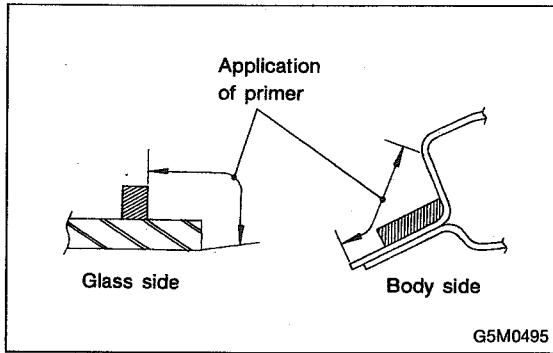
Be careful not to damage body finish.

2) Cleaning of body surface:

- (1) Remove chips, dirt and dust from body surface.
- (2) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.

3) Cleaning glass:

- (1) Remove dirt and dust from surface of glass to be adhered.
- (2) Clean surface of glass to be adhered with alcohol or white gasoline.

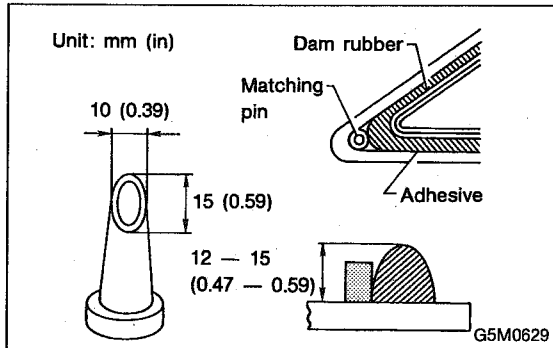


4) Application of primer:

- (1) Using a sponge, apply primer to surface of glass to be adhered.
- (2) Apply primer to surface of body to be adhered.

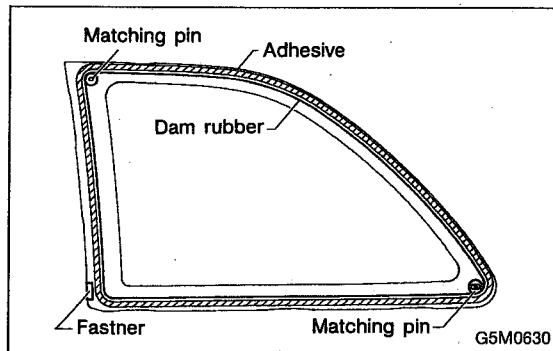
CAUTION:

- If primer has dropped on body finish, it is hard to wipe it off. So protect with masking.
- Primer must not project from black frame of glass.
- After applying primer, let it dry spontaneously for about 10 minutes.



5) Application of adhesive:

- (1) Cut nozzle tip as shown in figure.
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- (3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.



6) Installation of glass:

- (1) Hold glass with rubber suction cups.
- (2) Mount glass on body with matching pin aligned.
- (3) Stick them fast by pressing all sides lightly.

7) Water leakage test:

After installing glass, test for water leakage after about one hour.

CAUTION:

- Move vehicle slowly.
- When opening and closing door, lower door glass and move door gently.
- Do not squirt strong hose stream on vehicle.

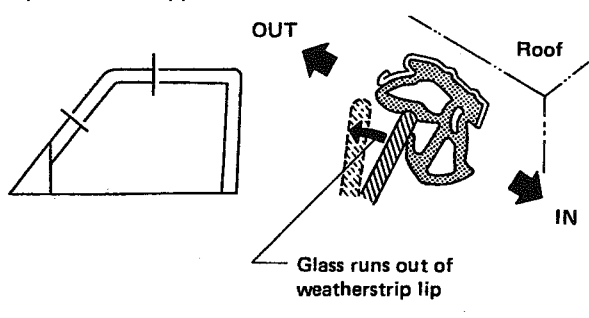
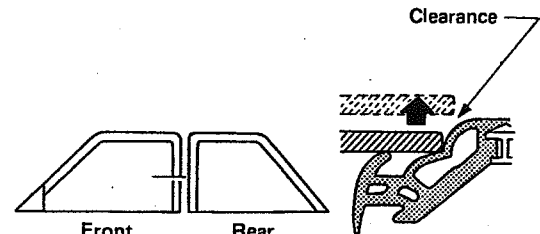
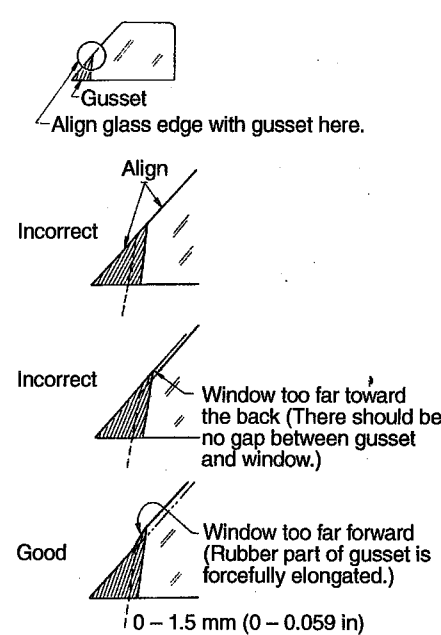
8) Spontaneous drying:

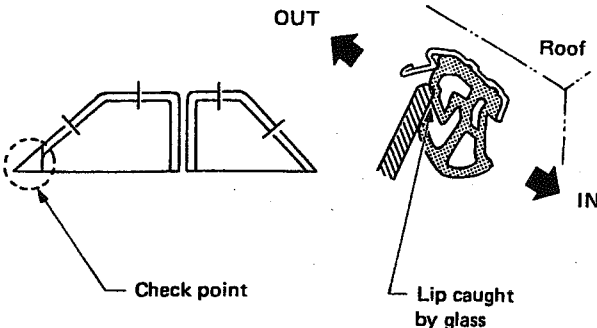
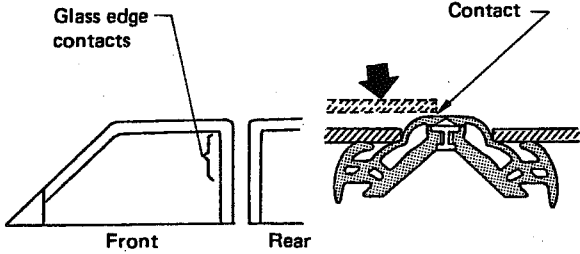
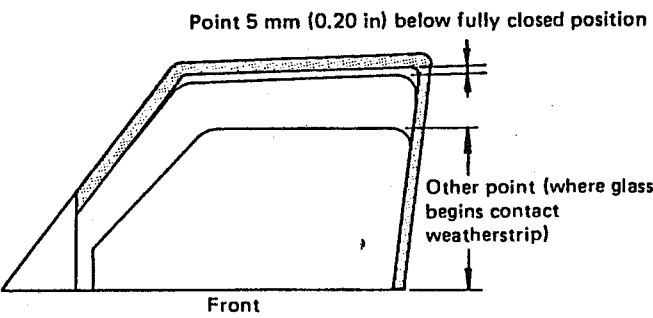
After completing all operations, leave vehicle alone for 24 hours.

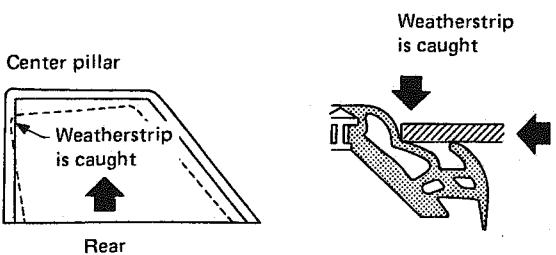
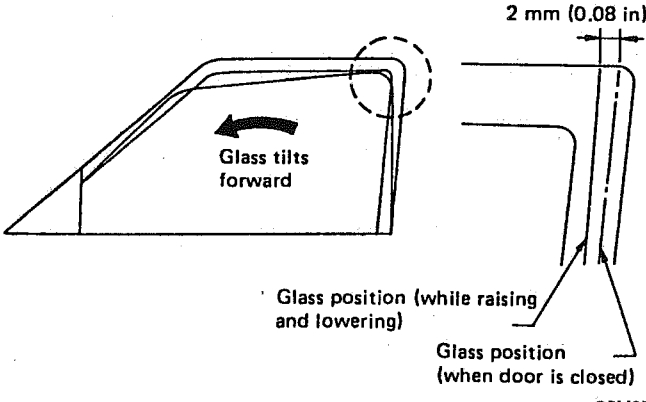
CAUTION:

When delivering vehicle to user, tell him or her that vehicle should not be subjected to heavy shocks for at least three days.

1. Door Glass

	Condition	Apparent cause/Correction
<p>Glass in fully closed position</p>	<p>1) Glass runs out of weatherstrip lip when considerable hand pressure is applied to it from inside.</p>  <p>(This condition may cause wind/booming noise during high-speed operation.)</p>	<ul style="list-style-type: none"> ● Insufficient upward travel of glass Increase upward travel of glass.
	<p>2) Clearance exists between glass and weatherstrip when light hand pressure is applied to it at center and rear pillar locations.</p>  <p>(This condition may cause wind noise and/or water leakage.)</p>	<ul style="list-style-type: none"> ● Insufficient glass-to-door weatherstrip contact Check stabilizer and glass for proper contact. Increase contact using upper sash adjustment bolt. ● Improper adjustment of striker in "in-out" direction Close door and check for alignment of striker with car body.
	<p>3) Adjust door glass so that it is aligned with door rearview mirror gusset.</p>  <p>0 - 1.5 mm (0 - 0.059 in)</p>	<ul style="list-style-type: none"> ● Window is not properly adjusted in up-down/fore-aft direction. Adjust window. If necessary, move "B" channel for regulator to eliminate window "tilt". ● Gusset is not properly adjusted in fore-aft direction. Adjust gusset after losing all bolts and nuts with tightening it.

	Condition	Apparent cause/Correction
<p>Door in fully closed/ open position</p>	<p>1) Glass rides over weatherstrip lip when door is closed.</p>  <p style="text-align: right;">G5M0505</p> <p>(This condition increases wind/booming noise, leakage and/or effort required to close door.)</p>	<ul style="list-style-type: none"> ● Improper up-down and in-out glass alignments Adjust glass for up-down and in-out alignments (incl. rear sash, upper stopper adjustment, etc.). If necessary, correct glass tilt by moving regulator "B" channel.
<p>Raise or lower window glass</p>	<p>2) Edge of glass contacts retainer when door is fully closed.</p>  <p style="text-align: right;">G5M0506</p>	<ul style="list-style-type: none"> ● Improper glass-to-center pillar weatherstrip or excessive glass contact to weatherstrip Excessive adjusting in contact to weatherstrip. Causes rear edge of glass to tilt inboard closer to center pillar. Adjust rear sash adjustment bolt to reduce glass contact to weatherstrip.
<p>Raise or lower window glass</p>	<p>1) Considerable effort or time is required to operate regulator. Standard operating effort:</p> <ul style="list-style-type: none"> ● Entire up-down travel except for point 5 mm (0.20 in) below fully closed position: 29.4 N (3.0 kg; 6.6 lb) ● Point 5 mm (0.20 in) below fully closed position: 45.0 N (4.5 kg, 10.12 lb)  <p style="text-align: right;">G5M0507</p>	<ul style="list-style-type: none"> ● Sliding resistance increased due to high stabilizer-to-glass contact pressure Reduce contact by mounting inner stabilizer to inside of the car. ● High glass-to-windshield contact pressure Reduce contact using upper sash adjustment bolt. ● Unequal contact adjustment stroke between front and rear sashes Set to equal stroke. ● Tilt of rear sash adjustment bolt mounting bracket Correct tilt of bracket so it is parallel to inner panel.

	Condition	Apparent cause/Correction
<p>Raise or lower window glass</p>	<p>2) Center pillar weatherstrip is caught by rear window glass when glass is raised.</p>  <p style="text-align: right;">G5M0508</p>	<ul style="list-style-type: none"> ● Improper fore-aft or in-out alignment of window glass Lower regulator "B" channel to tilt window glass back.
	<p>3) Glass tilts forward by more than 2 mm (0.08 in).</p>  <p style="text-align: right;">G5M0509</p> <p>(Excessive tilt of glass forward is due to excessive glass "contact" which causes reaction of center pillar weatherstrip.) Glass can be tilted forward due to increase in reaction of shoulder weatherstrip or free play between sash and roller. Taking these symptoms into account, glass should be aligned.</p>	<ul style="list-style-type: none"> ● Excessive glass contact pressure or improper in-out alignment 1) Lower regulator "B" channel to tilt glass rearward. 2) Reduce contact pressure using upper sash adjustment bolt.

2. Door Lock System

No.	Trouble	Possible cause	Remedy
1	Door cannot be opened by outer handle. (Door can be opened by inner handle.)	Disconnect outer handle rod.	Connect firmly.
2	Door cannot be opened by inner handle. (Door can be opened by outer handle.)	a. Joint of upper rod is disconnected. b. Rear door child lock lever is set to lock side.	Connect firmly. Functionally normal.
3	Door does not open when outer or inner handle is operated with inner lock knob set to unlock position.	a. Joint of lower rod is disconnected. b. Lock is not released due to improper adjustment of lower rod.	Connect firmly. Remove rod from latch. Adjust rod so that lock knob is set in "lock" position is locked.
4	Door opens even when inner lock knob is set to lock position. (Keyless locking is impossible.)	a. Lower rod joint is separated. b. Door is not locked due to improperly adjusted lower rod.	Same as a in No. 3. Same as a in No. 3.
5	Child lock lever will not come up.	a. Inner handle fails to return completely. b. Joint of upper rod is disconnected.	Refer to No. 6.
6	Inner handle stops halfway.	Contact of upper rod with inner handle mounting case.	Eliminate contact by bending upper rod properly.
7	Door cannot be locked or unlocked by key.	Joint of key lock rod is disconnected.	Connect firmly.
8	Auto door-lock switch does not act when inner lock knob is pushed.	Auto door-lock switch does not act due to improperly adjusted lower rod.	Same as a in No. 3.

3. Power Window

Symptom	Battery	Fuse in fuse box	Circuit breaker and relay	Main switch	Sub switch of each passenger side	Motor of driver side	Motor of each passenger side	Regulator assembly of each window	Power supply line of main switch	Ground line	Harness and connector
All windows does not move.	①	②	③	④					⑤	⑥	⑦
The window of driver side does not move.				①		②			③		④
The window of driver side does not move "AUTO" up-down.				①		②			③		④
The window of each passenger side does not move.				①	②		③	④			⑤
				①	②		③	④			⑤
				①	②		③	④			⑤

○: Figures in a circle refer to diagnostic procedures.

MEMO:

SEATS, SEAT BELTS, AND INTERIOR

5-3

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PRECAUTION FOR SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The Supplemental Restraint System "Airbag" helps to reduce the risk or severity of injury to the driver in a frontal collision.

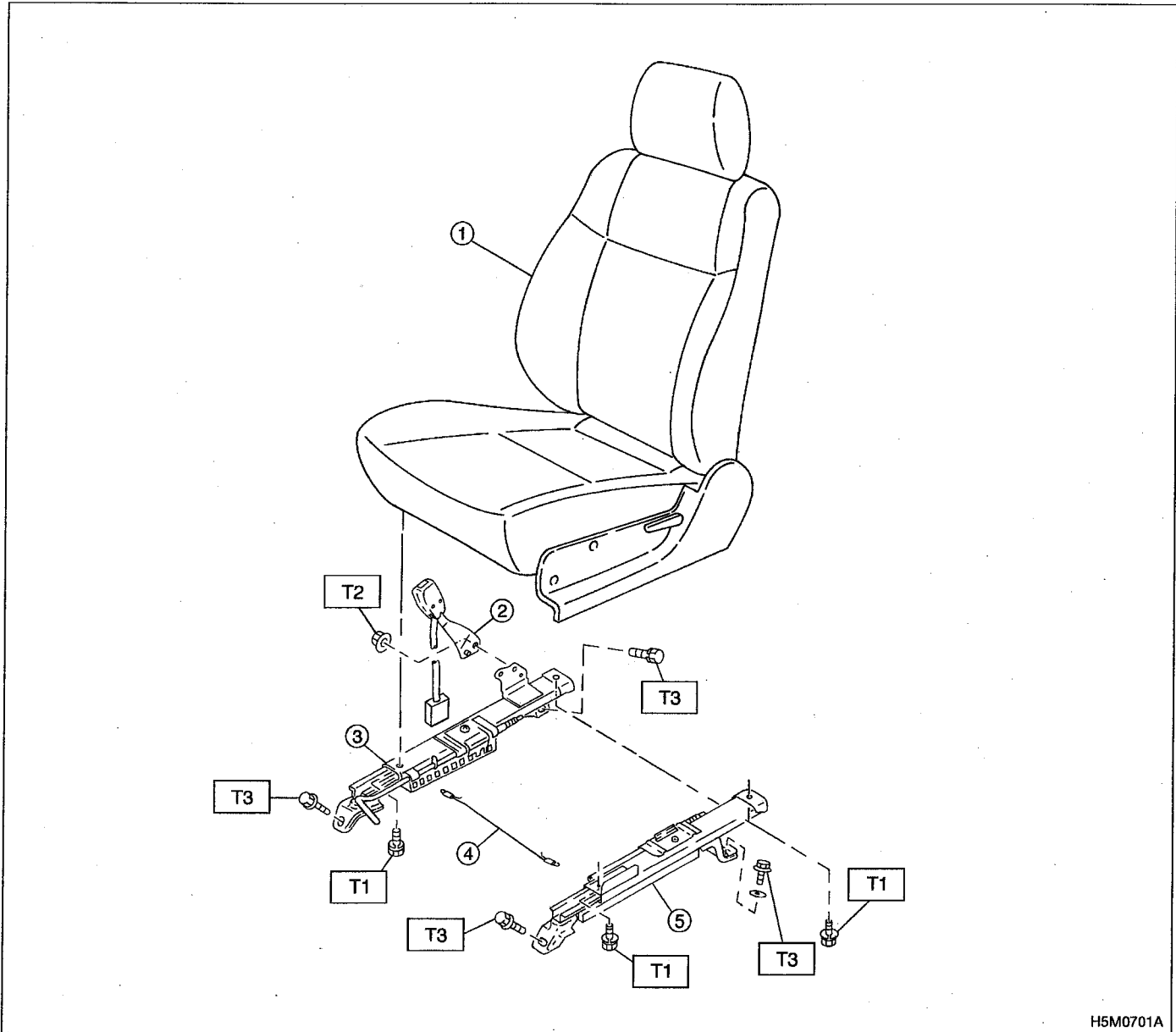
The Supplemental Restraint System consists of an airbag module (located in the center of the steering wheel), sensors, a control module, warning light, wiring harness and roll connector.

Information necessary to service the safety is included in the "5-5. SUPPLEMENTAL RESTRAINT SYSTEM" of this Service Manual.

WARNING:

- To avoid rendering the Airbag system inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized SUBARU dealer.
- Improper maintenance, including incorrect removal and installation of the Airbag system, can lead to personal injury caused by unintentional activation of the Airbag system.
- All Airbag system electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the Supplemental Restraint System "Airbag".

1. Front Seat



H5M0701A

- ① Front seat ASSY
- ② Inner belt ASSY
- ③ Inner slide rail ASSY
- ④ Connect wire
- ⑤ Outer slide rail ASSY

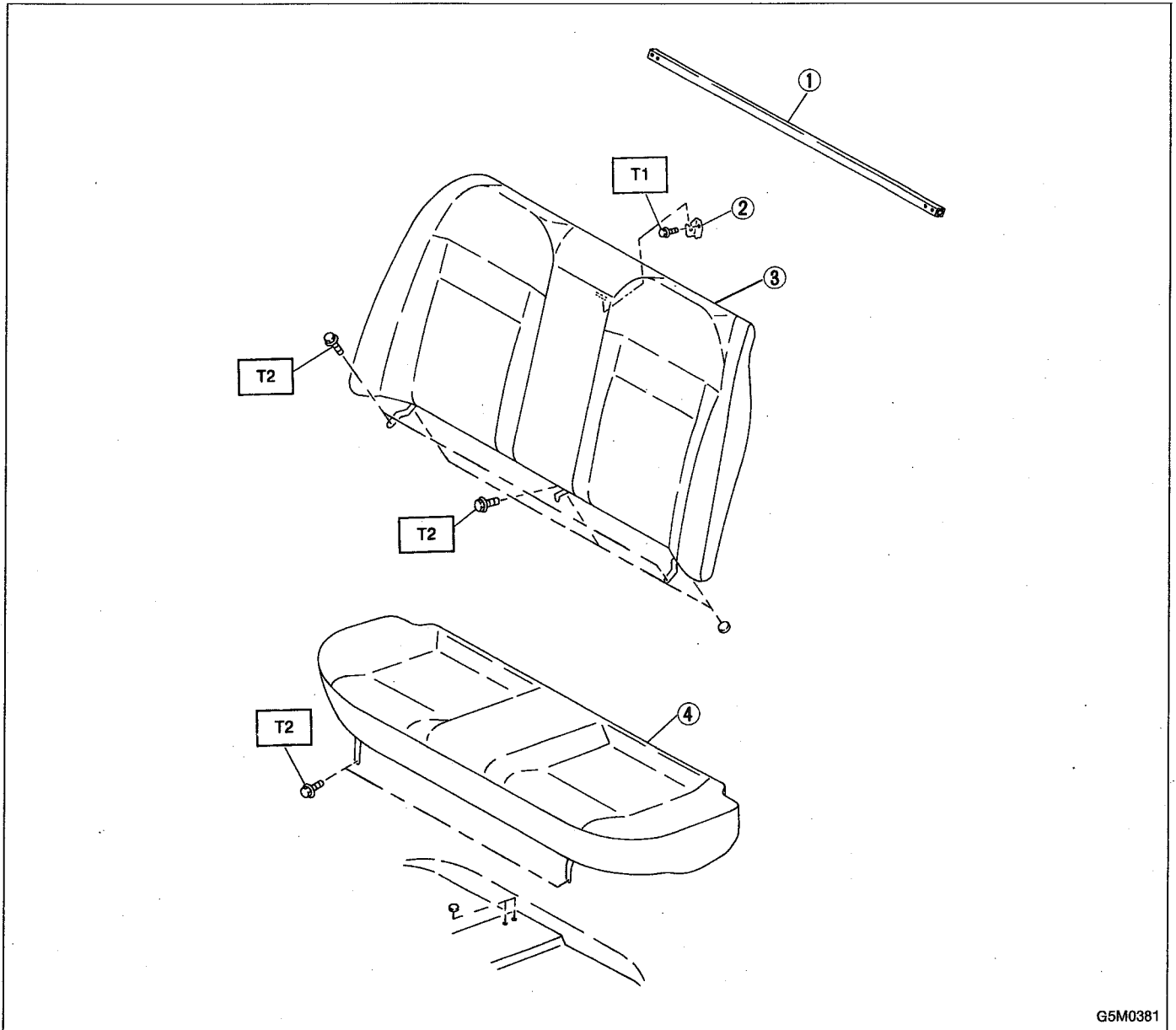
Tightening torque: N·m (kg·m, ft·lb)

T1: 23 ± 5 (2.3 ± 0.5, 16.6 ± 3.6)

T2: 29 ± 7 (3.0 ± 0.7, 21.7 ± 5.1)

T3: 52 ± 10 (5.3 ± 1.0, 38 ± 7)

2. Rear Seat
A: SEDAN AND COUPE MODEL



G5M0381

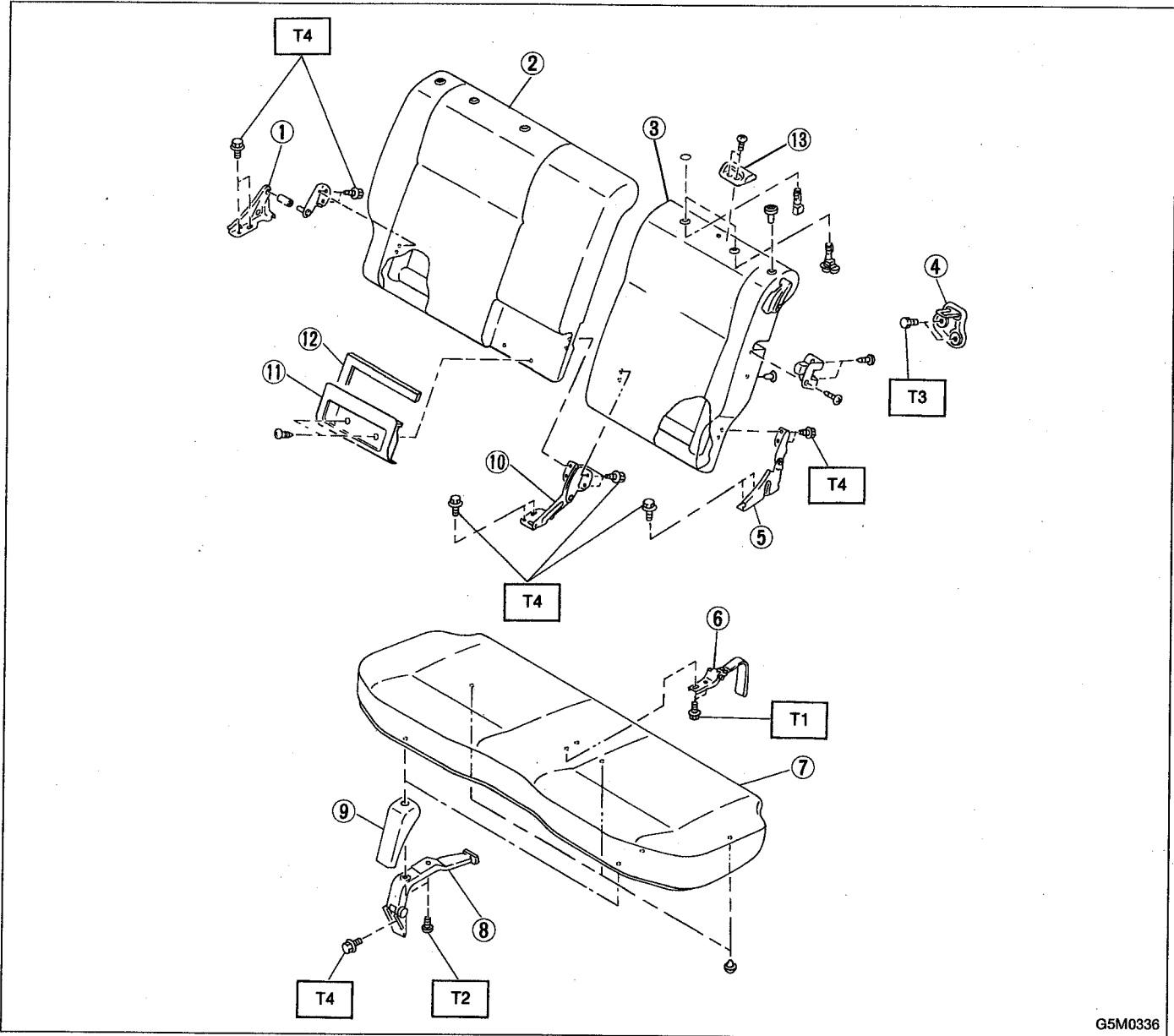
- ① Rear seat reinforcement
- ② Hook
- ③ Backrest
- ④ Rear cushion

Tightening torque: N·m (kg·m, ft·lb)

T1: 10 ± 3 (1.0 ± 0.3, 7.2 ± 2.2)

T2: 25 ± 7 (2.5 ± 0.7, 18.1 ± 5.1)

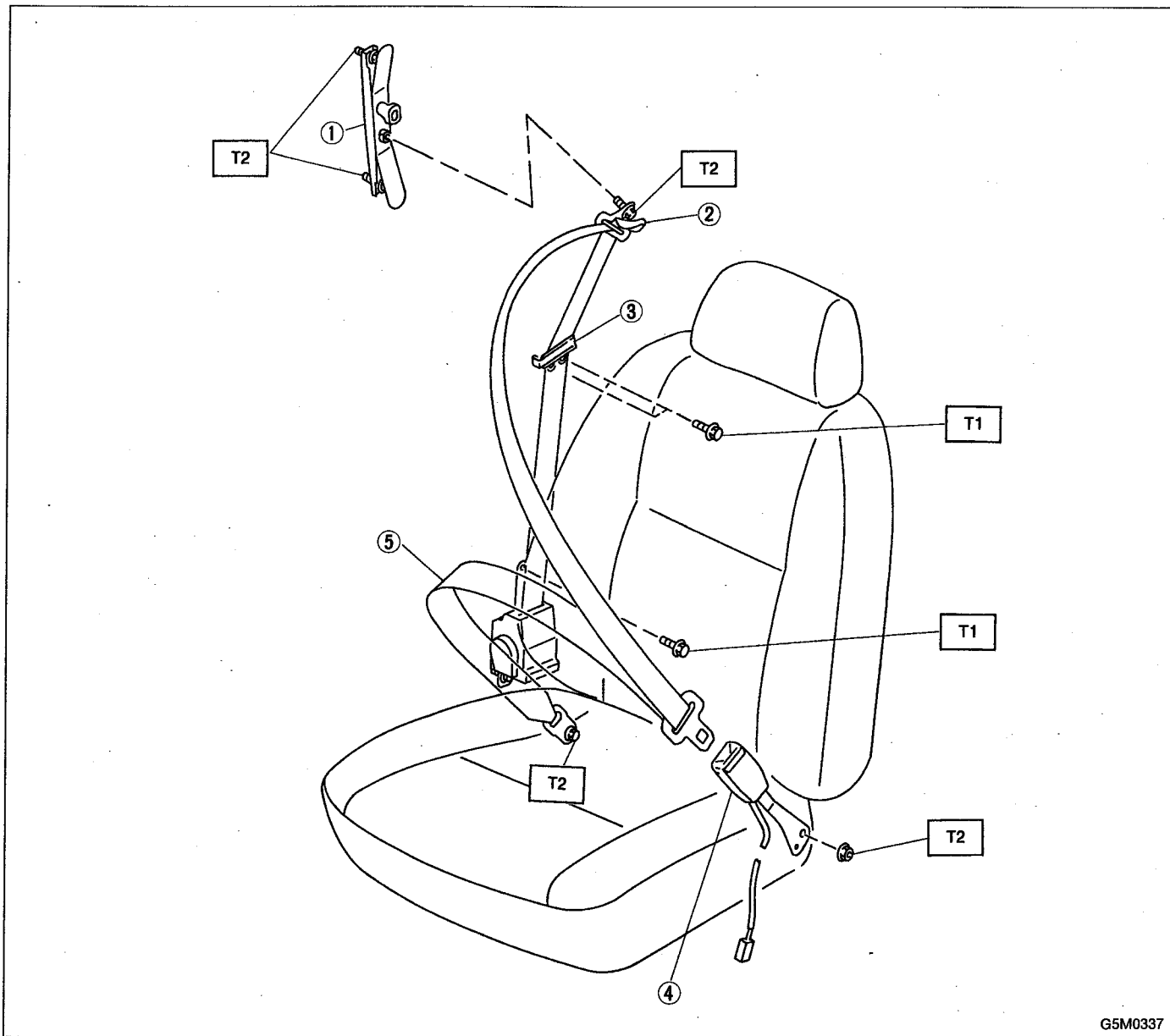
B: WAGON MODEL



- | | |
|----------------------|-------------------------|
| ① Hinge bracket (RH) | ⑧ Hinge |
| ② Backrest (RH) | ⑨ Hinge cover |
| ③ Backrest (LH) | ⑩ Backrest center hinge |
| ④ Striker | ⑪ Belt pocket |
| ⑤ Hinge bracket (LH) | ⑫ Pad ASSY pocket |
| ⑥ Lock hinge | ⑬ Hook |
| ⑦ Rear cushion | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 2 ± 1 (0.2 ± 0.1, 1.4 ± 0.7)
T2: 5.9 ± 1.5 (0.6 ± 0.15, 4.3 ± 1.1)
T3: 10 ± 3 (1.0 ± 0.3, 7.2 ± 2.2)
T4: 25 ± 7 (2.5 ± 0.7, 18.1 ± 5.1)

3. Front Seat Belt

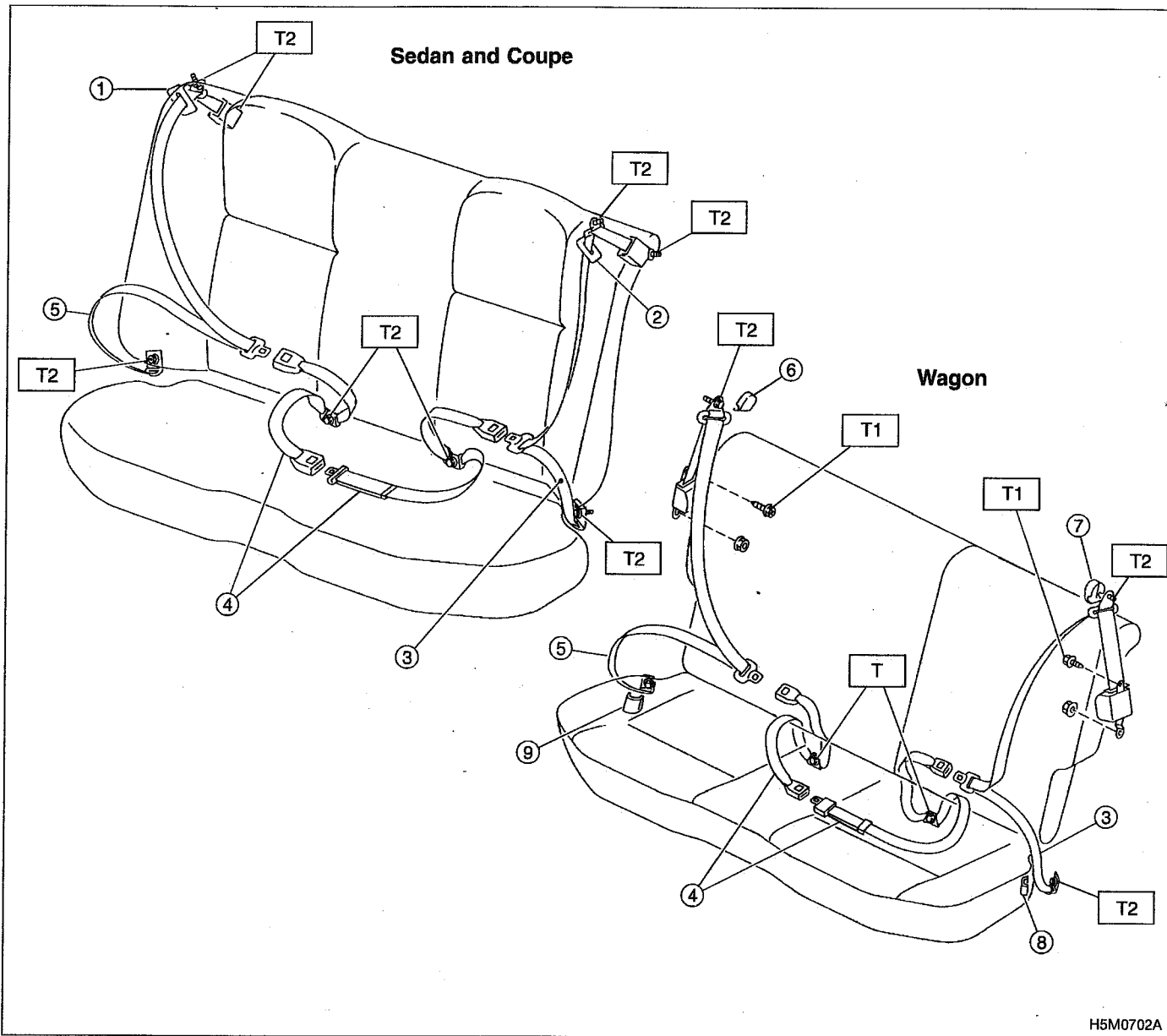


G5M0337

- ① Adjuster anchor ASSY
- ② Through cover
- ③ Webbing guide
- ④ Inner belt ASSY
- ⑤ Outer belt ASSY

Tightening torque: N·m (kg·m, ft·lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 35±13 (3.6±1.3, 26±9)

4. Rear Seat Belt

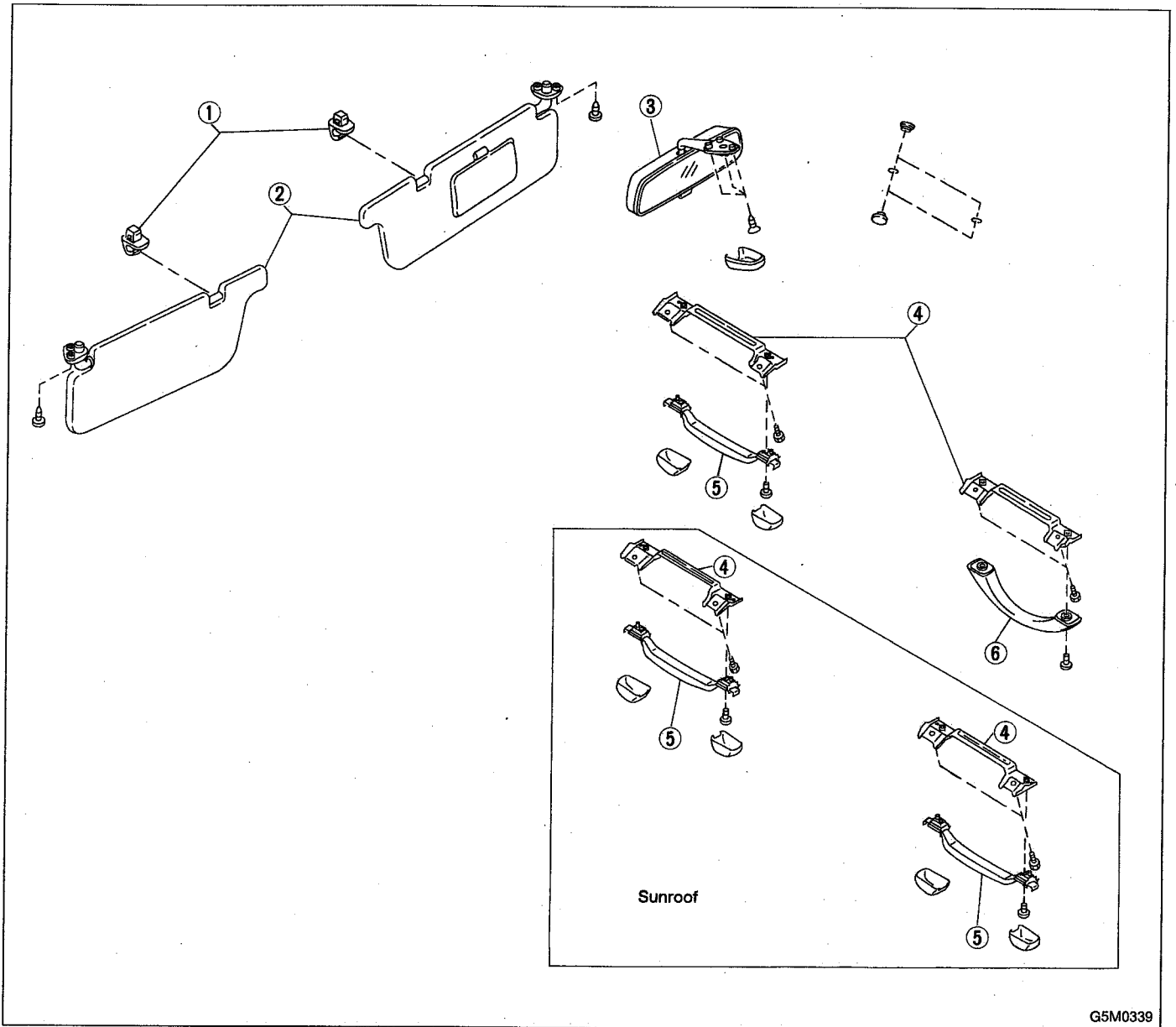


H5M0702A

- | | |
|------------------------|-------------------------|
| ① Webbing cover (RH) | ⑥ Through cap (RH) |
| ② Webbing cover (LH) | ⑦ Through cap (LH) |
| ③ Outer seat belt (LH) | ⑧ Lap anchor cover (LH) |
| ④ Center seat belt | ⑨ Lap anchor cover (RH) |
| ⑤ Outer seat belt (RH) | |

Tightening torque: N·m (kg·m, ft·lb)
T1: 13 ± 3 (1.3 ± 0.3, 9.4 ± 2.2)
T2: 35 ± 13 (3.6 ± 1.3, 26 ± 9)

5. Inner Accessories

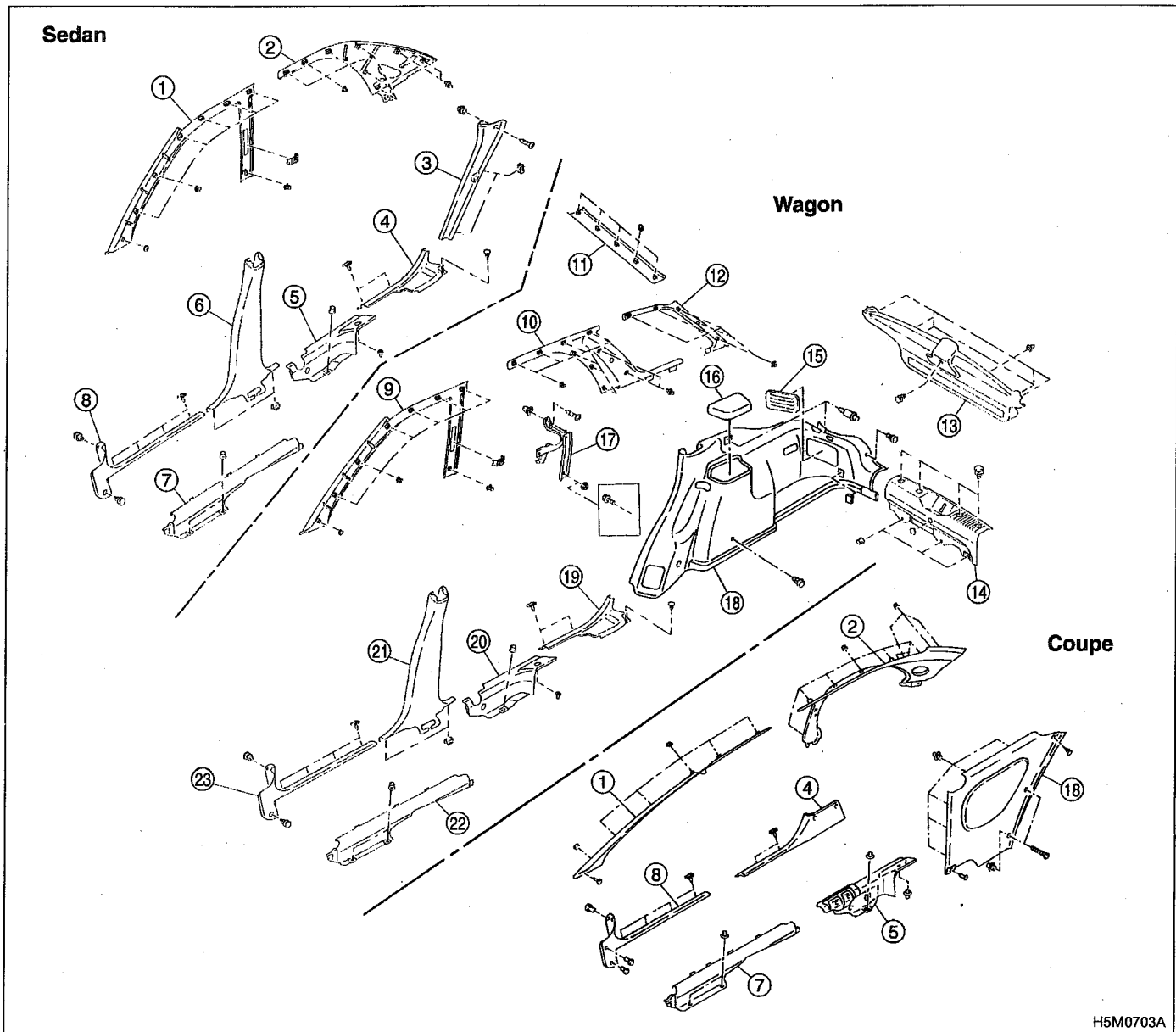


- ① Hook
- ② Sun visor
- ③ Rearview mirror

- ④ Assist rail bracket
- ⑤ Assist grip (retractable)
- ⑥ Assist grip (fixed)

G5M0339

6. Inner Trim

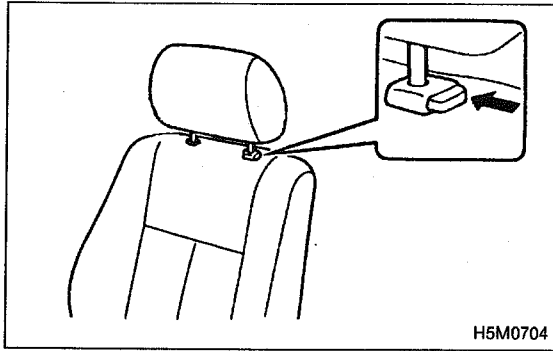


H5M0703A

- ① Front pillar upper trim
- ② Rear pillar upper trim
- ③ Rear pillar lower trim
- ④ Side sill rear upper cover
- ⑤ Side sill rear lower cover
- ⑥ Center pillar lower trim
- ⑦ Side sill front lower cover
- ⑧ Front pillar lower trim

- ⑨ Front pillar upper trim
- ⑩ Rear quarter upper front trim
- ⑪ Rear rail trim
- ⑫ Rear quarter upper rear trim
- ⑬ Rear gate trim
- ⑭ Rear skirt trim
- ⑮ Lamp cover
- ⑯ Cover

- ⑰ Trim bracket
- ⑱ Rear quarter lower trim
- ⑲ Side sill rear upper cover
- ⑳ Side sill rear lower cover
- ㉑ Center pillar lower trim
- ㉒ Side sill front lower cover
- ㉓ Front pillar lower trim

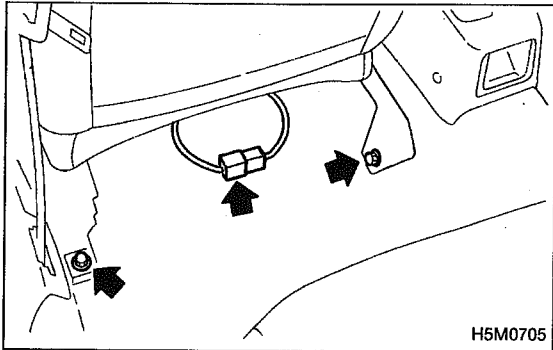


1. Front Seat

A: REMOVAL

1) While operating button (located on top of backrest), lift headrest out with hand placed between backrest and headrest.

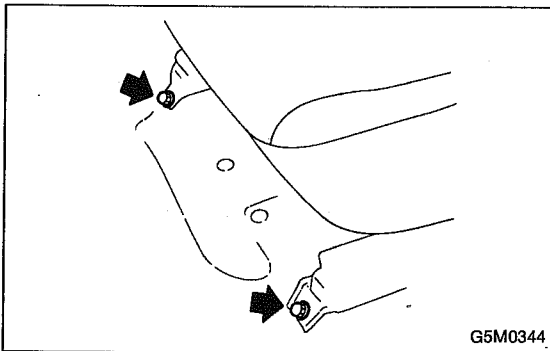
2) Pull reclining lever back to fold backrest all the way forward. While pulling slide adjuster lever, move seat all the way forward.



3) Disconnect connector under driver's seat.

4) Remove bolt cover at rear end of slide rail.

5) Remove bolts securing seat rear.



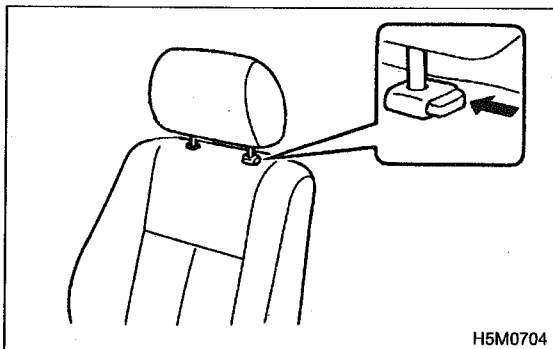
6) While pulling slide adjuster lever, slide seat all the way back.

7) Remove bolts securing front of seat.

8) Remove front seat from vehicle.

CAUTION:

Be careful not to scratch seat when removing it from vehicle.

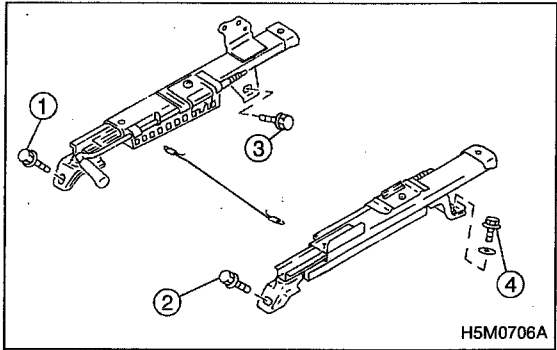


B: INSTALLATION

1) While operating button (located on top of backrest), lift headrest out by placing your hand between backrest and headrest.

2) Pull reclining lever back to fold backrest all the way forward. Pull slide adjuster lever and move lower slide rail all the way backward.

1. Front Seat - 2. Rear Seat



- 3) Position seat in compartment and align the holes on the seat with the holes on the car body side.
- 4) Secure the front of seat using inward and outward bolts ① and ② in that order.
- 5) While pulling slide adjuster lever, move seat all the way forward.
- 6) Secure the rear of seat using inward and outward bolts ③ and ④.
- 7) Connect connector under driver's seat.

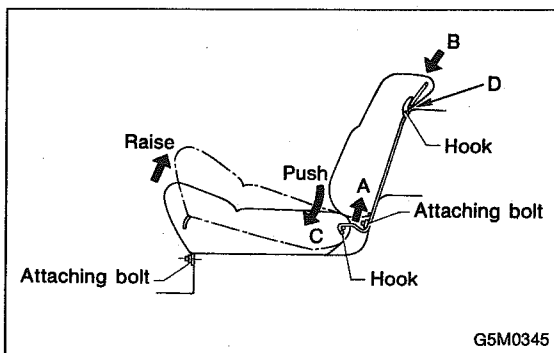
CAUTION:

Check that all lock plate pawls are completely and equally inserted into the holes in the slide rail brackets.

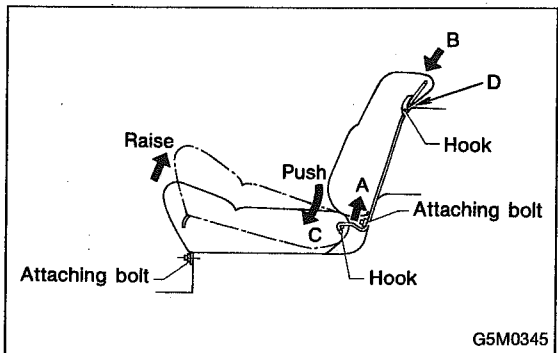
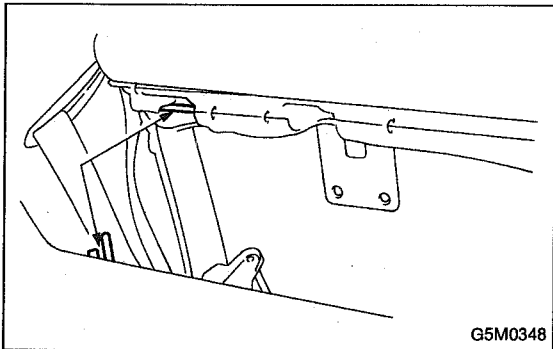
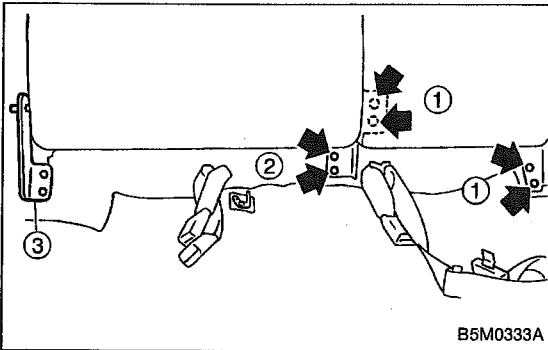
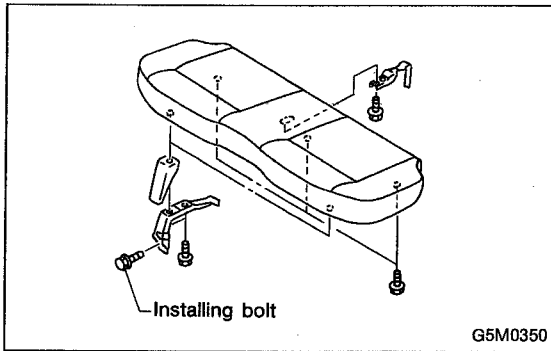
- 8) After installation, ensure that all mechanisms operate properly and lock.
- 9) If any mechanism does not function properly, loosen bolts ③ and ④, slide seat as required, insert all lock plate pawls into holes in slide rail brackets, and tighten bolts ③ and ④ in that order.
- 10) Install bolt cover on rear end of slide rail.
- 11) Install headrest on backrest.

NOTE:

Tighten bolts in the designated order.

**2. Rear Seat****A: REMOVAL****1. SEDAN AND COUPE MODEL**

- 1) Remove bolts securing hinges (located at front of cushion) to body.
- 2) Slightly raise front of cushion while pushing down on cushion in the direction of "C". With cushion held in that position, move it forward until it is unhooked.
- 3) Remove bolts securing lower portion of backrest to body.
- 4) Lift rear seat backrest in direction "A" until it is released from upper hooks.



2. WAGON MODEL

- 1) Remove bolts securing hinges (located at front of seat) to body.
- 2) Pull strap (located in middle rear portion of cushion) to release lock. Lift cushion out and away from body.
- 3) Pull knobs (located at each side of backrest's upper portion) up to release lock, and fold backrest all the way forward.

- 4) Remove the bolt ① and then remove backrest (LH side).
- 5) Remove the bolt ② and then remove backrest (RH side) from hinge bracket ③.

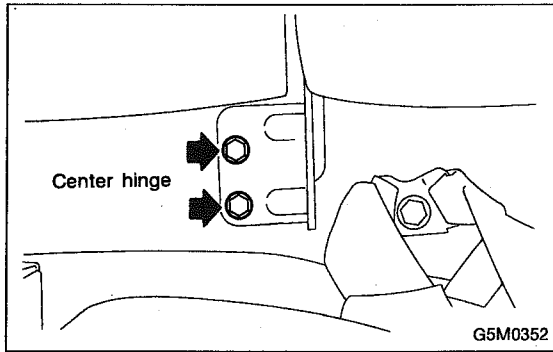
B: INSTALLATION

1. SEDAN AND COUPE MODEL

- 1) Before installing backrest, ensure that trim panel, insulator and seat belt are properly installed.
- 2) Transfer outer seat belt webbing to front of backrest and fold backrest forward. Attach seat belt webbing to upper hooks (2 places), and move pillow in the direction of "B" until backrest is aligned with lower mounting holes in body.
- 3) Secure lower center and both sides of backrest to body with bolts.
- 4) Slightly raise front section of cushion while pushing down on cushion in the direction of "C". With cushion held in that position, attach rear section of cushion to hooks at lower frame location.
- 5) Secure front of cushion to body with bolts.

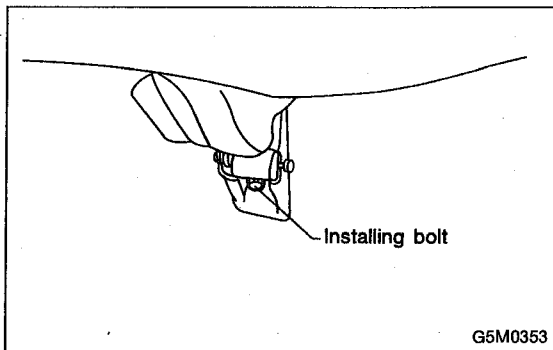
CAUTION:

- Before installing seat, ensure that seat belt is placed on cushion.
- Confirm that winding of three-point type seat belt can operate regularly.



2. WAGON MODEL

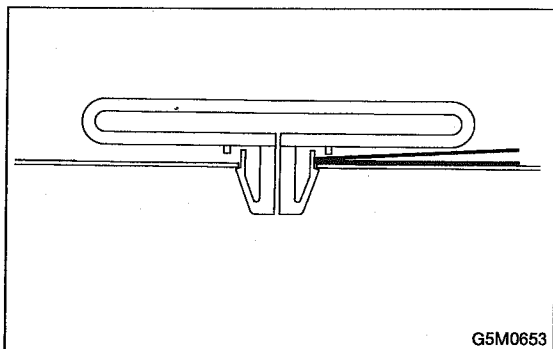
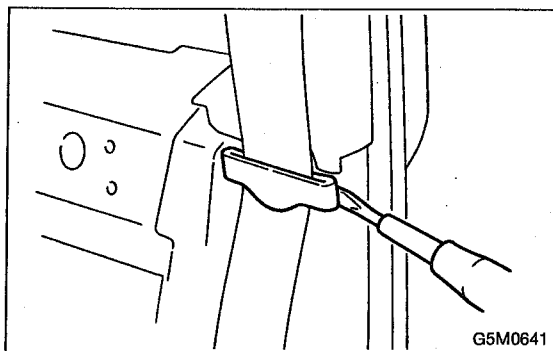
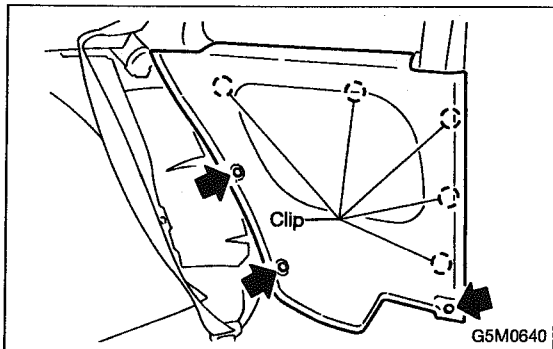
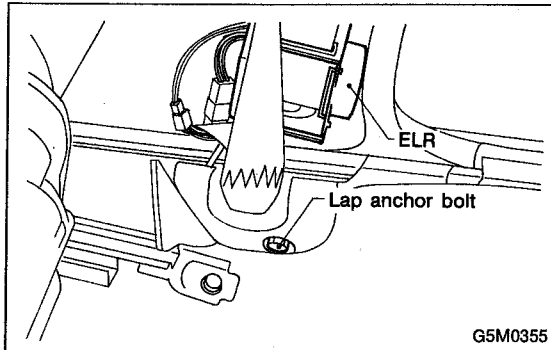
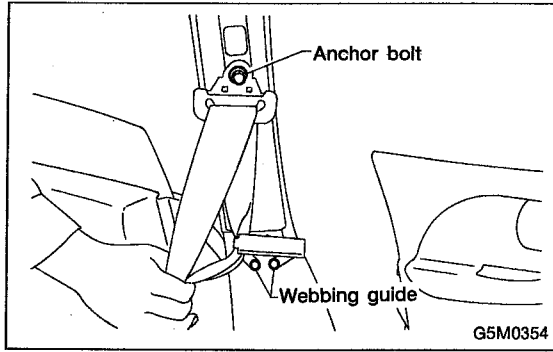
- 1) Install hinge bracket to body.
- 2) Insert right backrest hinge pin into hole in bracket. Tilt backrest backward until striker engages with lock.
- 3) Secure right backrest center hinge to body using a bolt.
- 4) Temporarily install left backrest side hinge to body using a bolt, and fold backrest forward to the floor.
- 5) Roll up mat (located at rear of left backrest), and install center hinge using a bolt.
- 6) Tilt left backrest until striker engages with lock, and tighten bolt.



- 7) Install hinges to front of cushion and tighten with bolts. Check that lock properly engages.
- 8) Fold backrest onto cushion and overlap trunk mat and mat at rear of backrest.

CAUTION:

- Do not allow center seat belt to get under cushion when folding cushion.
- Ensure that side seat belt tongue is free from cushion and trim panel.
- Lift front of cushion to ensure that cushion is properly locked.



3. Front Seat Belt

A: REMOVAL AND INSTALLATION

1. OUTER BELT (Sedan and Wagon)

- 1) Remove through-anchor cover cap.
- 2) Remove shoulder anchor bolt.
- 3) Remove webbing guide.

- 4) Remove center lower pillar trim panel.
- 5) Remove front cover side plate.
- 6) Roll up floor mat at the bottom of center pillar.
- 7) Remove lap anchor bolt.
- 8) Remove belt retractor and outer belt.
- 9) Installation is in the reverse order of removal.

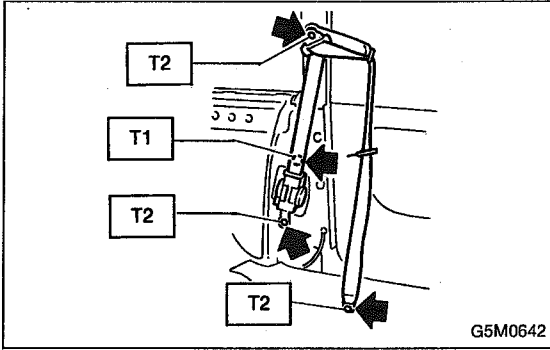
CAUTION:

- The left and right ELR's are not mutually interchangeable because different sensors are used.
- Be careful not to twist belts during installation.

2. OUTER BELT (Coupe)

- 1) Remove rear seat cushion and backrest.
<Ref. to 5-3 [W2A1].>
- 2) Remove rear quarter trim.

- 3) Remove webbing guide.



- 4) Remove anchor cover cap.
- 5) Remove four bolts and then belt retractor and outer belt.

Tightening torque:

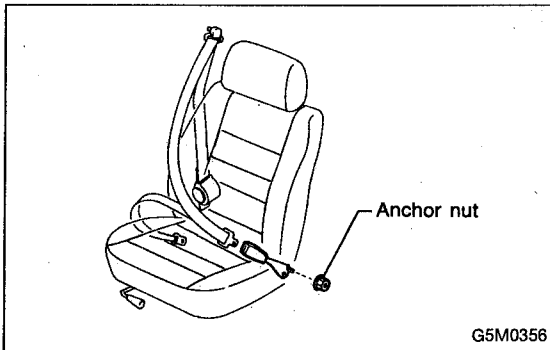
T1: 13 ± 3 N·m (1.3 ± 0.3 kg·m, 9.4 ± 2.2 ft·lb)

T2: 35 ± 13 N·m (3.6 ± 1.3 kg·m, 26 ± 9 ft·lb)

- 6) Installation is in the reverse order of removal.

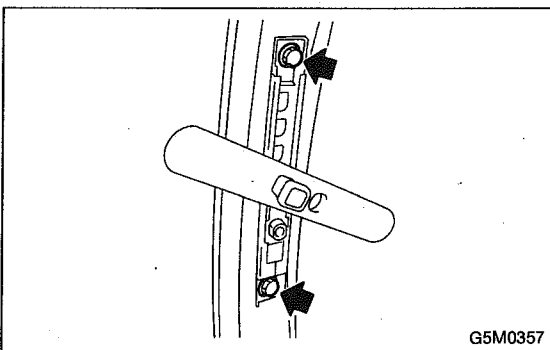
CAUTION:

- The left and right ELR's are not mutually interchangeable because different sensors are used.
- Be careful not to twist belts during installation.



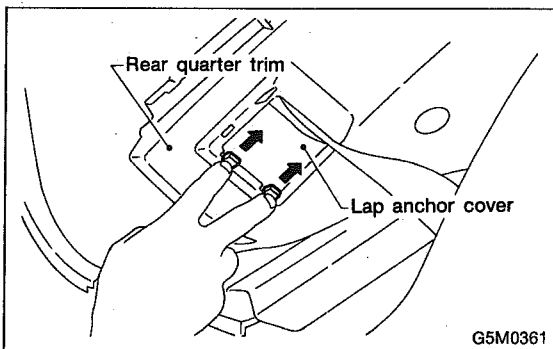
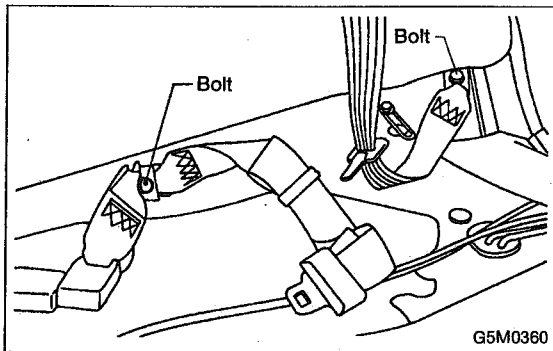
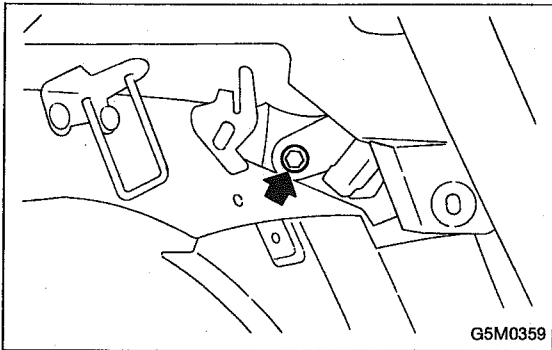
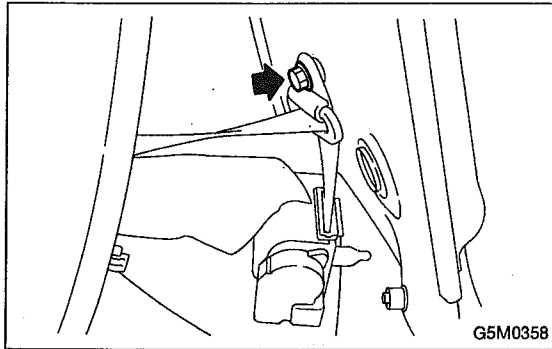
3. INNER BELT

Remove anchor nut.



4. ADJUSTABLE SHOULDER ANCHOR

- 1) Remove shoulder anchor bolt.
- 2) Remove lower center pillar trim.
- 3) Remove front and front pillar trim panel.
- 4) Remove adjustable shoulder anchor assembly.
- 5) Installation is in the reverse order of removal.



4. Rear Seat Belt

A: REMOVAL AND INSTALLATION

1. SEDAN AND COUPE MODEL

- 1) Remove rear cushion from body.
- 2) Remove rear backrest from body.
- 3) Remove screw from lower side of rear quarter trim, and lift-up lower side of rear quarter trim.
- 4) Remove trim panel rear bracket upper.
- 5) Remove rear quarter trim.
- 6) Remove outer anchor bolts.
- 7) Remove rear bolt from ELR.
- 8) Remove belt from outlet in rear quarter along slit.

- 9) Remove inner bolts which secure outer seat.
- 10) Remove washer from bolt, then remove bolt, belt assembly, and anchor plate bracket.
- 11) Remove inner bolts (2 places) from center seat.
- 12) Remove washer from bolt, and remove bolt, belt assembly and anchor plate bracket.
- 13) Installation is in the reverse order of removal. Ensure that seat belt is properly reeled on and off after installation of ELR.

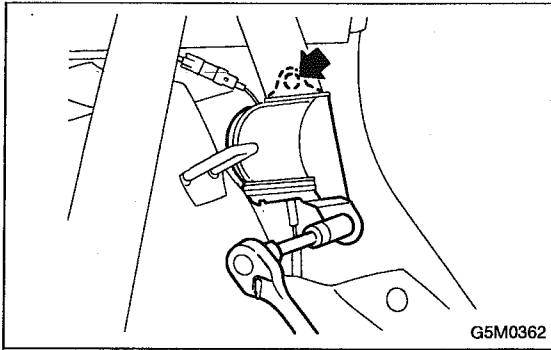
CAUTION:

- Be extremely careful not to confuse center seat anchor plate with outer seat anchor plate during installation.
- Ensure that seat belts are free from twisting after installation.
- Ensure that tongues, buckles and belts are properly placed on seat.

2. WAGON MODEL

- 1) Raise rear cushion.
- 2) Remove rear backrest from body.
Remove shoulder anchor cover and anchor bolt.
- 3) Remove lower portion of rear quarter trim.
- 4) Remove lap anchor cover and bolt.

4. Rear Seat Belt - 5. Inner Trim Panel



5) Remove 7/16-20 UNF nuts which secure ELR and remove ELR.

CAUTION:

Remove outer seat belt and center seat belt in similar manner used to remove those from Sedan.

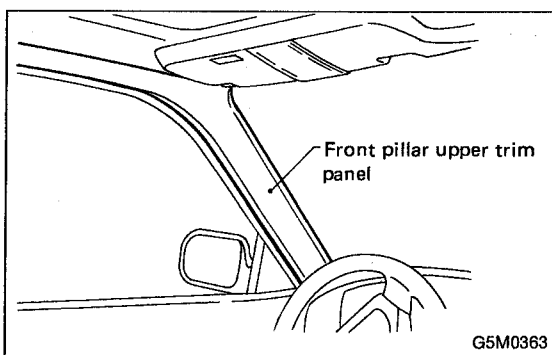
6) Installation is in the reverse order of removal. Ensure that seat belt is properly reeled on and off after installation of ELR.

CAUTION:

● **Be extremely careful not to confuse center seat anchor plate with outer seat anchor plate during installation.**

● **Ensure that seat belts are free from twisting after installation.**

● **Ensure that tongues, buckles and belts are properly placed on seat.**

**5. Inner Trim Panel****A: REMOVAL AND INSTALLATION****1. FRONT PILLAR UPPER TRIM PANEL**

1) Remove center pillar lower trim panel.

2) Remove seat belt anchor bolts.

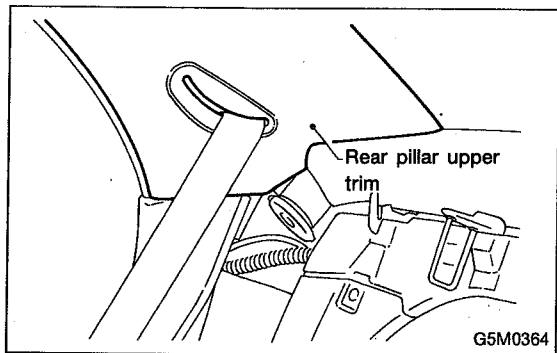
3) Pry pawls off body flange of front pillar upper trim panel using screwdriver.

4) Remove clips which hold front pillar upper trim panel, and lift trim panel out by moving it toward the compartment.

5) Installation is in the reverse order of removal.

CAUTION:

Be sure to securely hook pawls of front pillar upper trim panel on body flange.

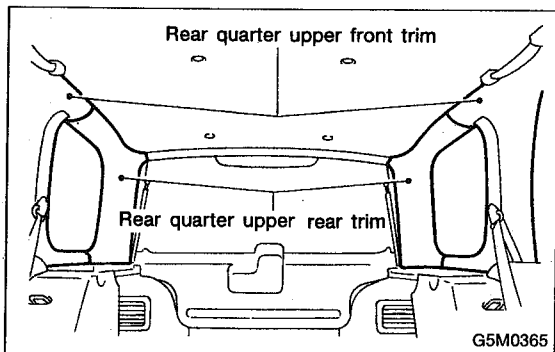


2. REAR PILLAR UPPER TRIM PANEL (Sedan)

- 1) Remove rear seat cushion and backrest.
- 2) Remove tapping screw from rear pillar lower trim panel, and remove trim panel by sliding it forward.
- 3) Remove front pillar upper trim end.
- 4) Pry the pawl off front end using screwdriver.
- 5) Remove clips which hold rear pillar upper trim, and remove trim panel by sliding it forward.
- 6) Installation is in the reverse order of removal.

CAUTION:

Be sure to securely hook pawls of rear pillar upper trim panel on body flange.

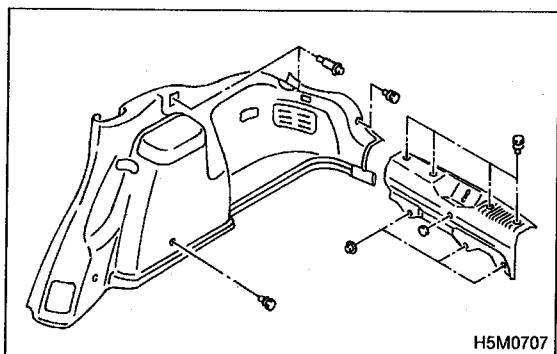


3. REAR QUARTER PILLAR UPPER TRIM PANEL (Wagon)

- 1) Set rear seat cushion up.
- 2) Remove rear seat backrest.
- 3) Remove rear quarter lower trim.
- 4) Remove rear rail trim.
- 5) Remove rear quarter upper front trim.
- 6) Remove rear quarter upper rear trim.
- 7) Installation is in the reverse order of removal.

CAUTION:

Be sure to securely hook pawls of rear quarter pillar trim panel on body flange.



4. REAR QUARTER LOWER TRIM PANEL (Wagon)

- 1) Remove luggage cover.
- 2) Set rear seat cushion up.
- 3) Remove rear seat backrest.
- 4) Remove rear skirt trim.
- 5) Remove clip and screw then disconnect connector (RH side).
- 6) Remove rear seat belt lower anchor then remove rear quarter lower trim.
- 7) Installation is in the reverse order of removal.

CAUTION:

Be careful not to ride trim panel over harness, insulators, etc.

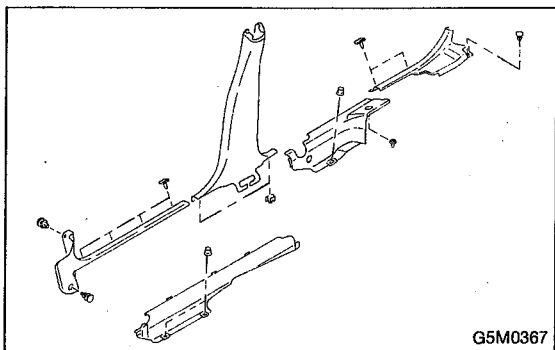
5. FLOOR MAT **AIRBAG**

Supplemental Restraint System "Airbag"

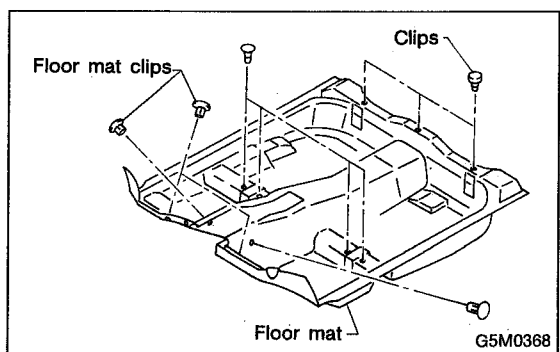
Airbag system wiring harness is routed near floor mat.

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 floor mat.



- 1) Remove front seats.
- 2) Remove rear seat cushion.
- 3) Remove center tray, indicator cover, cover assembly, and console box, depending on the specifications.
- 4) Remove front pillar lower trim panel.
- 5) Remove center pillar lower trim panel.
- 6) Remove three clips under rear seat cushion.
- 7) Remove rear cover side plate and rear pillar lower trim.
- 8) Pull out edge in the groove of side sill cover.



- 9) Remove four clips under front seat.
- 10) Remove four clips in toe board area.

NOTE:

When pulling out edge, do not pull mat alone; pull mat together with edge.

Pry off two steel clips on side sill front cover and one on side sill rear cover using screwdriver.

- 11) Remove mat hook.
- 12) Remove mat from toe board area.
- 13) Remove mat from heater unit.
- 14) Roll mat, and take it out of opened rear door.
- 15) Installation is in the reverse order of removal.

NOTE:

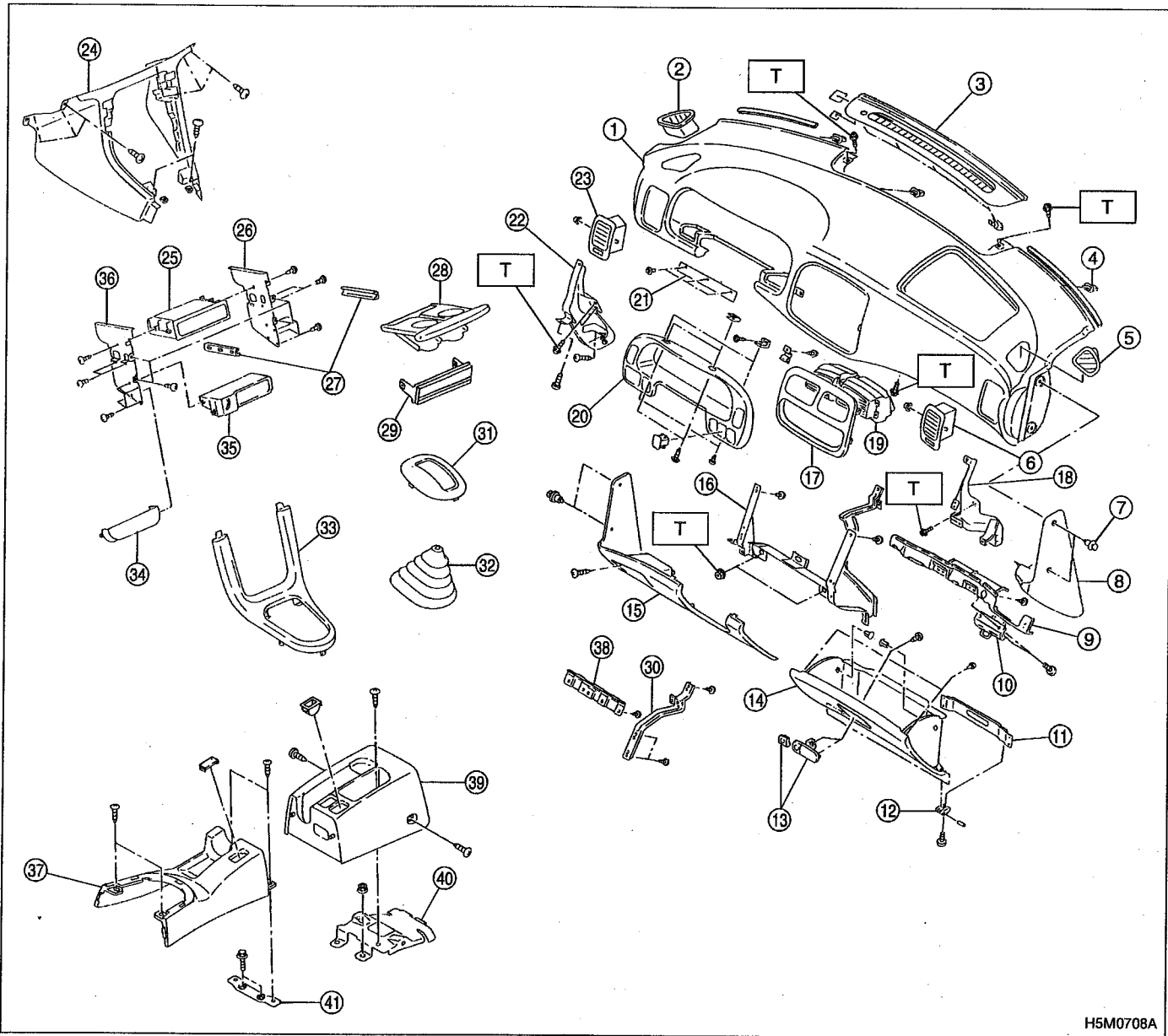
- Secure mat firmly with hook and velcro tape.
- Insert mat edge firmly into the groove of side sill cover.

INSTRUMENT PANEL **5-4**

	Page
C COMPONENT PARTS	2
1. Instrument Panel.....	2
W SERVICE PROCEDURE	3
1. Instrument Panel AIRBAG	3



1. Instrument Panel



H5M0708A

- ① Pad & frame
- ② Grille SD def. (D)
- ③ Front def. grille
- ④ Grommet
- ⑤ Grille SD def. (P)
- ⑥ Grille vent (P)
- ⑦ Clip
- ⑧ SD panel (P)
- ⑨ Reinf. airbag CTR
- ⑩ Striker
- ⑪ Frame pocket
- ⑫ Hinge
- ⑬ Lock ASSY
- ⑭ Pocket ASSY
- ⑮ Lower cover ASSY

- ⑯ Reinf. CTR
- ⑰ Panel CTR (A)
- ⑱ Reinf. (P)
- ⑲ Grille CTR def.
- ⑳ Meter visor
- ㉑ Cover
- ㉒ Reinf. (D)
- ㉓ Grille vent (D)
- ㉔ Instrument panel console
- ㉕ Pocket CTR
- ㉖ BRKT (Radio) RH
- ㉗ Rail (Cup holder)
- ㉘ Cup holder
- ㉙ Panel (Radio)
- ㉚ Reinf. airbag B

- ㉛ Panel (AT) ASSY
- ㉜ Shift boot
- ㉝ Console cover
- ㉞ Panel (Airbag)
- ㉟ Housing (Ash tray)
- ㊱ BRKT (Radio) LH
- ㊲ Center console
- ㊳ Reinf. airbag UPPER
- ㊴ Rear console box
- ㊵ Rear console BRKT
- ㊶ Center console BRKT

Tightening torque: N·m (kg·m, ft·lb)
T: 7±1 (0.7±0.1, 5.1±0.7)

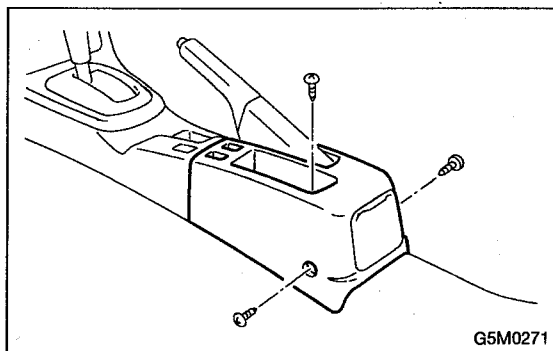
1. Instrument Panel AIRBAG

A: REMOVAL

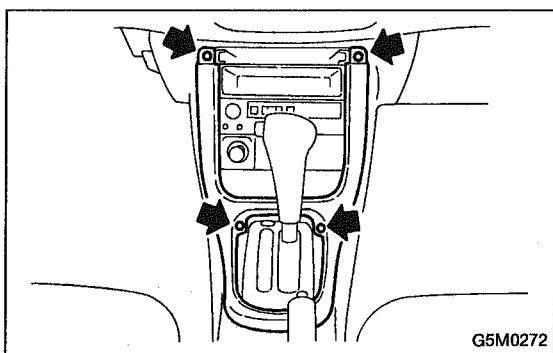
Airbag system wiring harness is routed near combination meter.

CAUTION:

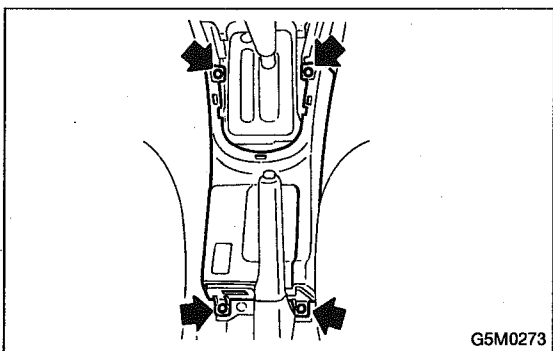
- All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage Airbag system wiring harness when servicing the combination meter.



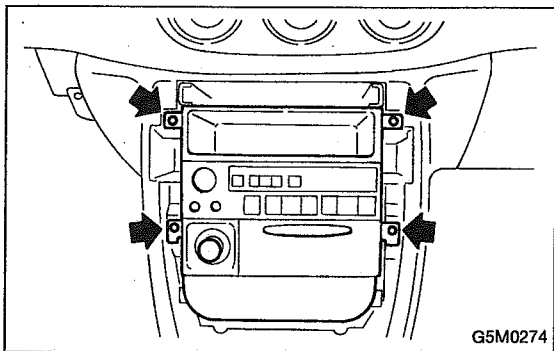
- 1) Disconnect GND cable from battery.
- 2) Remove rear console box.



- 3) Pull cup holder.
- 4) Turn over shift lever boot of front end (MT model). Remove select lever cover (AT model).
- 5) Remove console cover.

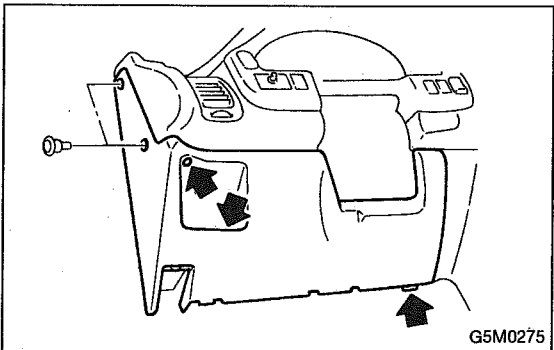


- 6) Remove center console.

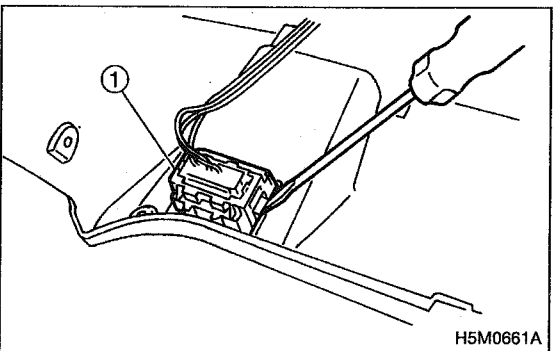


7) Remove audio assembly and then disconnect radio antenna feeder and connectors.

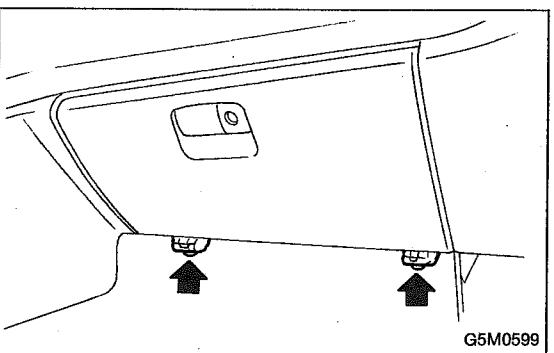
CAUTION:
Be sure to hold socket section and not harness when disconnecting.



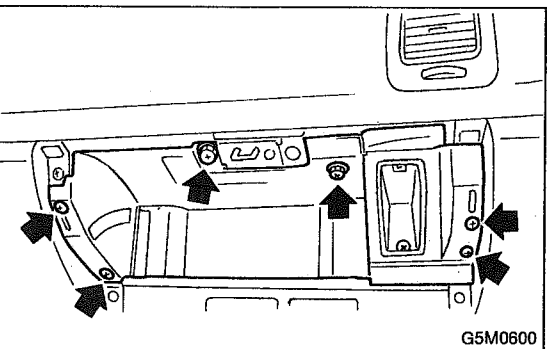
8) Remove lower cover and then disconnect connector.



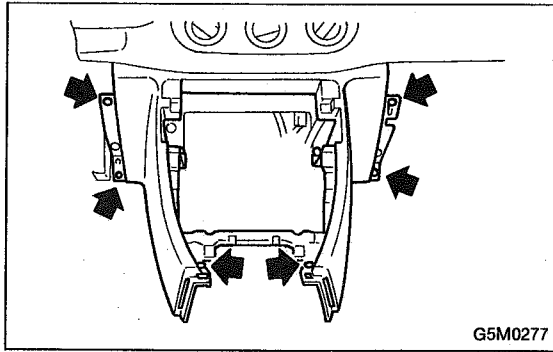
9) Disconnect data link connector ① from lower cover.



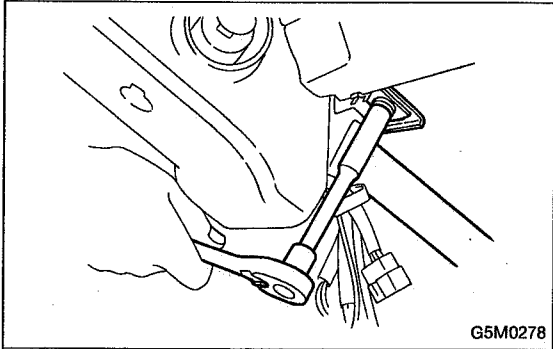
10) Remove glove box.



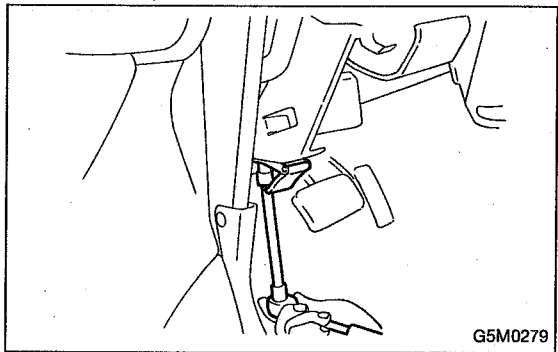
11) Remove pocket back panel.



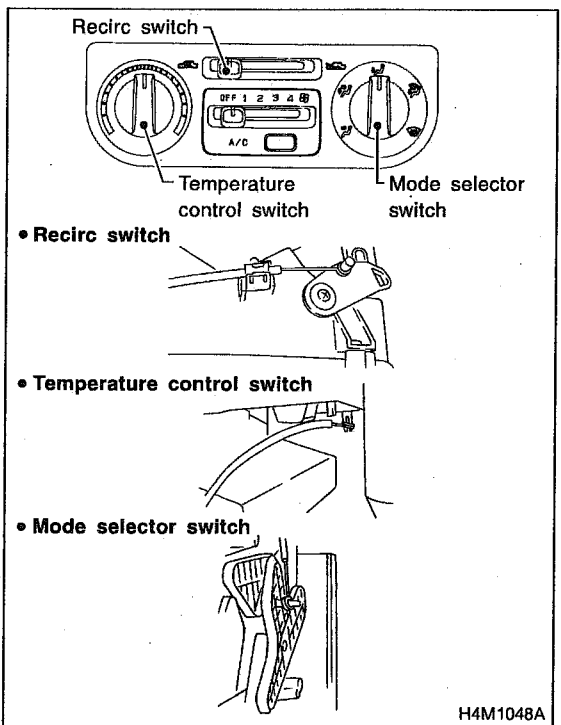
12) Remove instrument panel console.



13) Remove two bolts and lower steering column.



14) Remove hood opener lever.



15) Set temperature control switch to "FULL HOT", mode selector switch to "DEF" position and recirc switch to "FRESH" position.

16) Disconnect temperature control cable and mode control cable from heater unit then disconnect recirc control cable from intake unit.

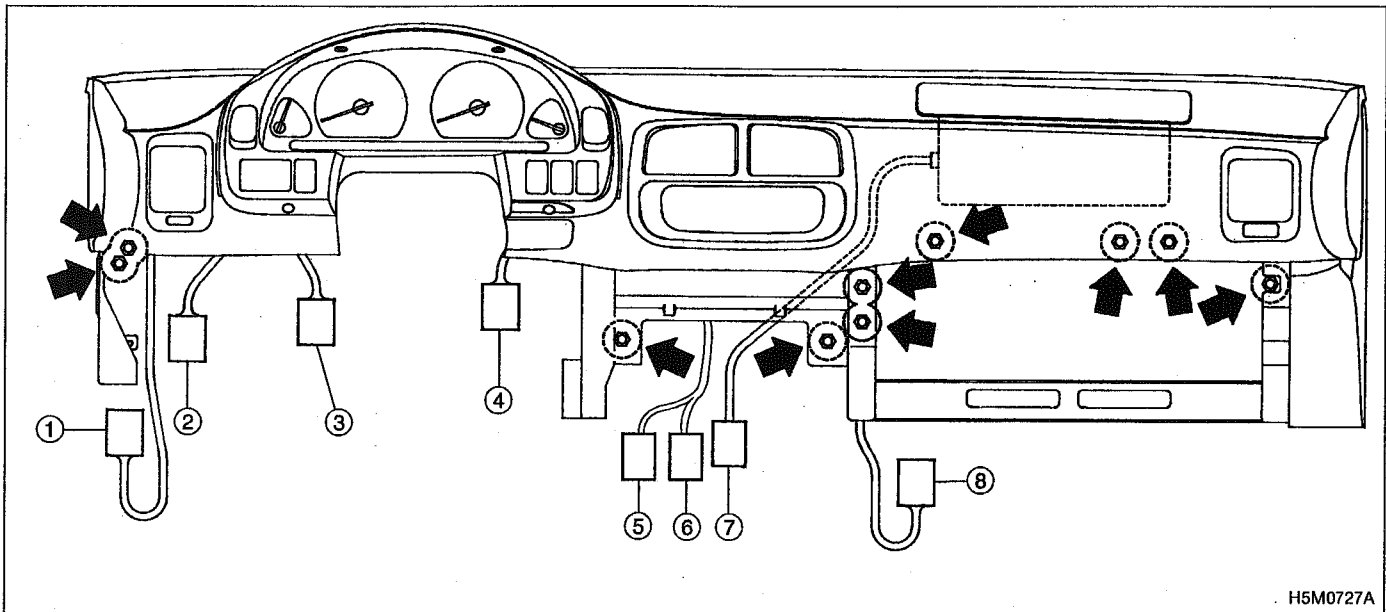
NOTE:

Do not move switch and link when installing.

SERVICE PROCEDURE

17) Disconnect harness connectors.

①	15P/Gray
②	24P/Black
③	8P/Natural & black
④	4P/Blue
⑤	12P/Natural
⑥	20P/Blue
⑦	Airbag connector (AB10)/Yellow
⑧	6P/Black



H5M0727A

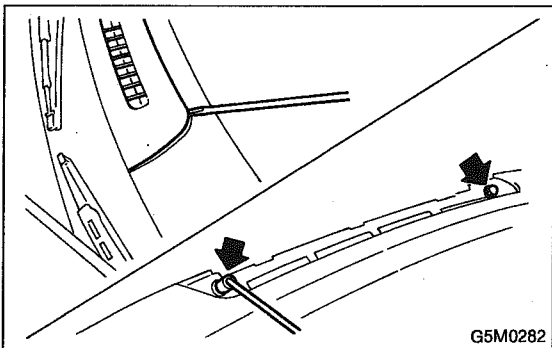
CAUTION:

Be sure to hold socket section and not harness when disconnecting.

NOTE:

Put matching mark, if necessary, for easy re-assembly.

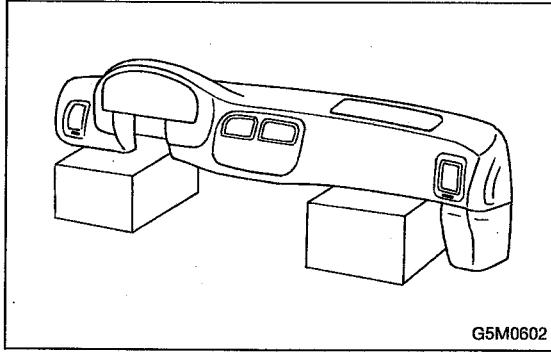
18) Remove the ten bolts and nuts.



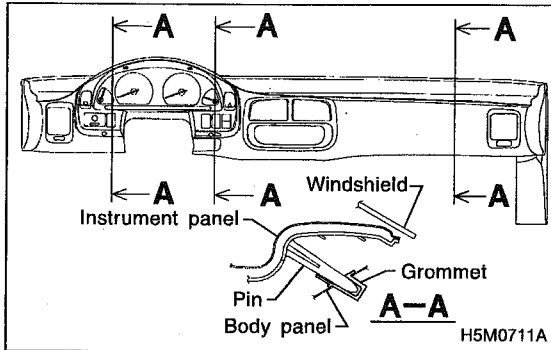
G5M0282

19) Remove front defroster grille and two bolts.

20) Remove instrument panel carefully from the body and then disconnect speedometer cable from back of combination meter.



CAUTION:
When storing removed instrument panel with passenger airbag module, place it standing up on the floor.



B: INSTALLATION

1) Installation is in the reverse order of removal.

NOTE:

When setting instrument panel into position, push three pins into grommet on body panel.

CAUTION:

- Be careful not to snag the harness.
- Make sure to connect harness connectors.
- Take care not to scratch the instrument panel and related parts.

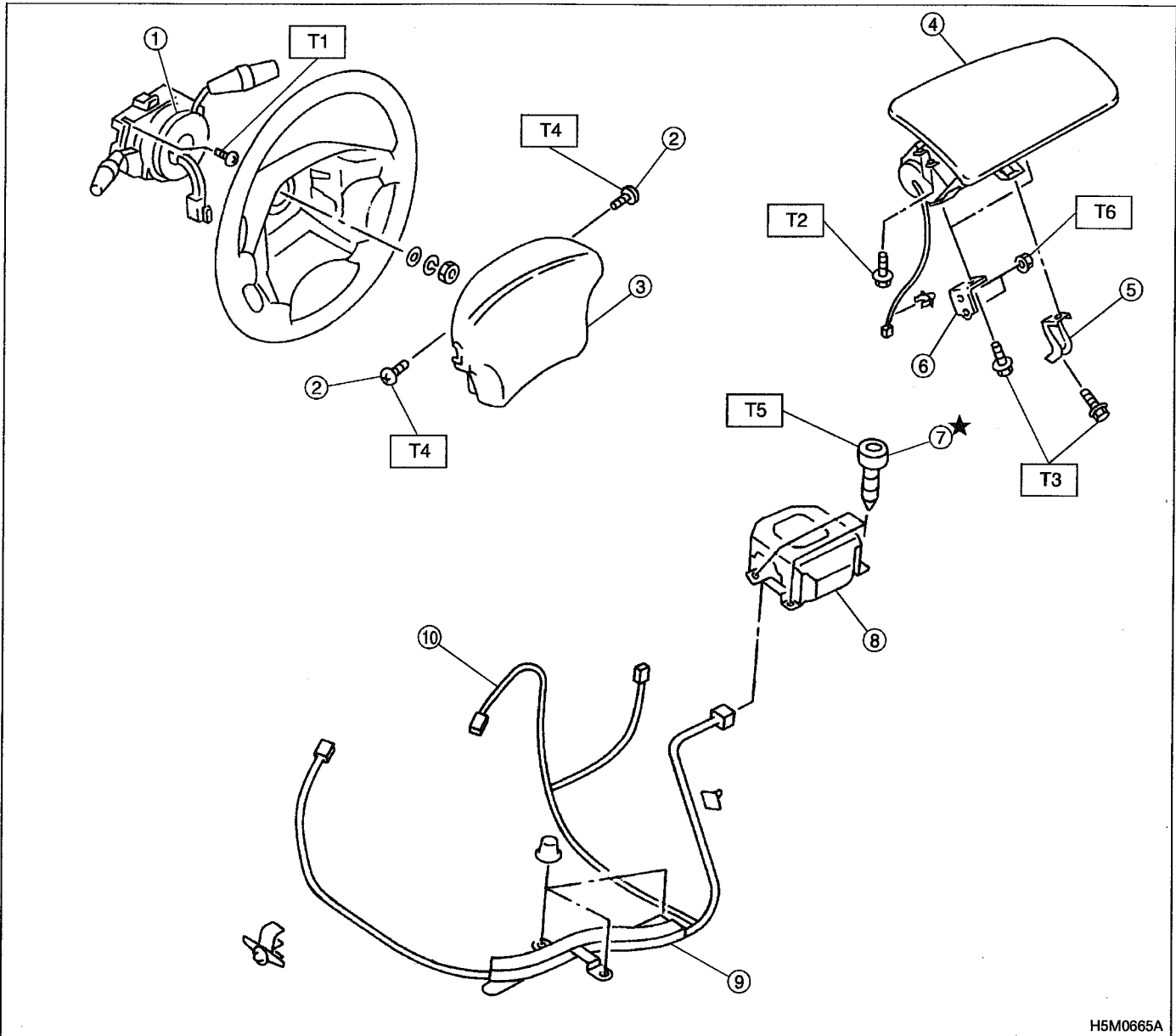
MEMO:

SUPPLEMENTAL RESTRAINT SYSTEM

5-5

	Page
C COMPONENT PARTS	2
1. SRS Airbag.....	2
W SERVICE PROCEDURE	3
1. Precaution	3
2. Inspection and Replacement Standards.....	5
3. Airbag Module	8
4. Main Harness.....	11
5. Airbag Control Module	12
6. Combination Switch	14

1. SRS Airbag

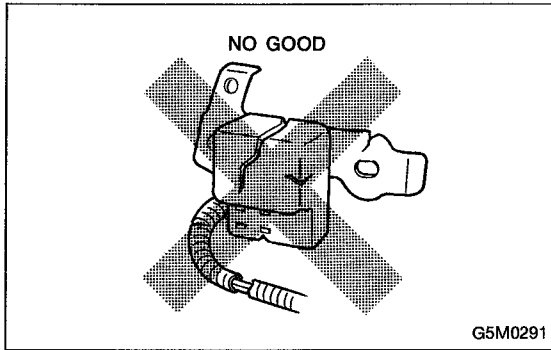


H5M0665A

- ① Combination switch ASSY with roll connector
- ② TORX® bolt
- ③ Airbag module ASSY (Driver)
- ④ Airbag module ASSY (Passenger)
- ⑤ BRKT A
- ⑥ BRKT B
- ⑦ TORX® bolt
- ⑧ Airbag control module
- ⑨ Protector LH
- ⑩ Airbag main harness

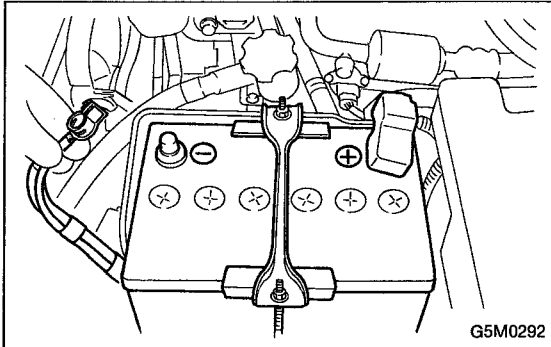
Tightening torque: N-m (kg-cm, in-lb)

- T1: 2.5 ± 0.5 (25 ± 5, 21.7 ± 4.3)
- T2: 4.4 ± 1.5 (45 ± 15, 39 ± 13)
- T3: 7.4 ± 0.2 (75 ± 2, 65.1 ± 1.7)
- T4: 9.8 ± 2.0 (100 ± 20, 87 ± 17)
- T5: 9.81 ± 2.45 (100.0 ± 25.0, 86.8 ± 21.7)
- T6: 17.7 ± 4.9 (180 ± 50, 156 ± 43)

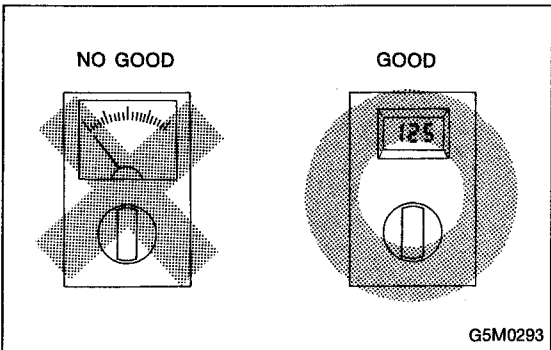


1. Precaution

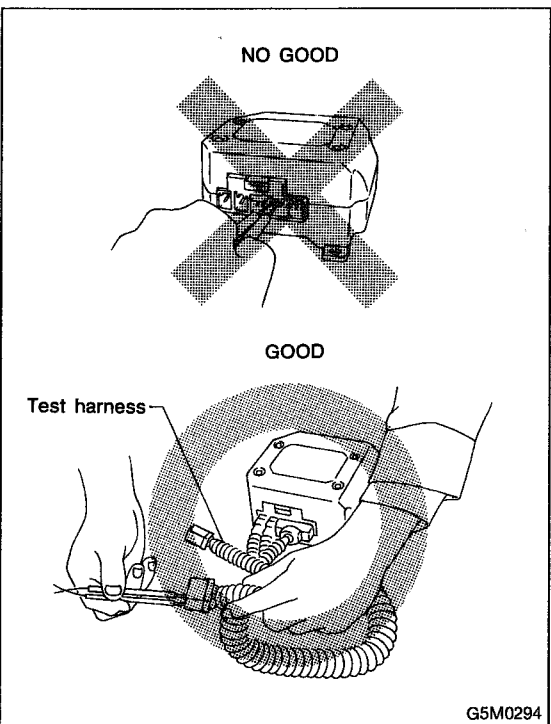
- If any of the airbag system parts such as sensors, airbag module, airbag control module and harness are damaged or deformed, replace with new genuine parts.



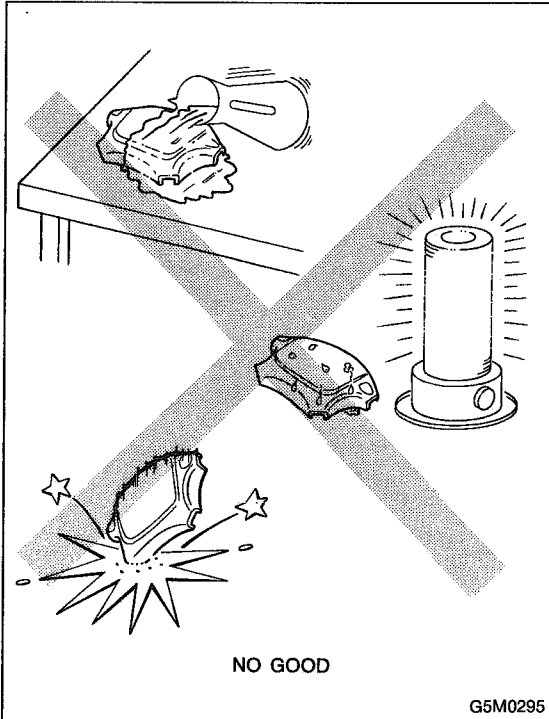
- When servicing, be sure to turn the ignition switch off, disconnect the negative (-) battery terminal then the positive (+) terminal in advance, and wait for more than 20 seconds before starting work.



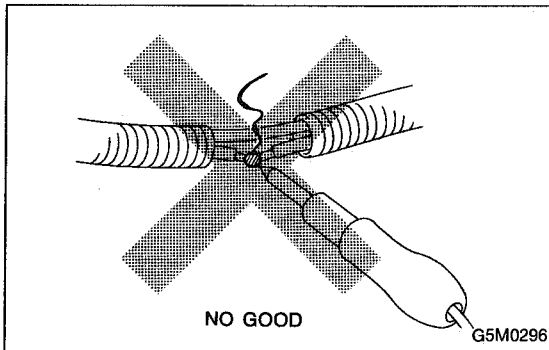
- When checking the system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously. Do not directly apply the tester probe to any connector terminal of the airbag. When checking, use a test harness.



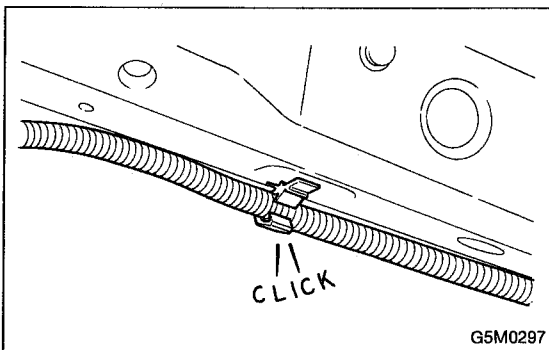
SERVICE PROCEDURE



- Do not drop the airbag modulator parts, subject it to high temperatures over 90°C (194°F), or apply oil, grease, or water to it; otherwise, the internal parts may be damaged and its reliability greatly lowered.

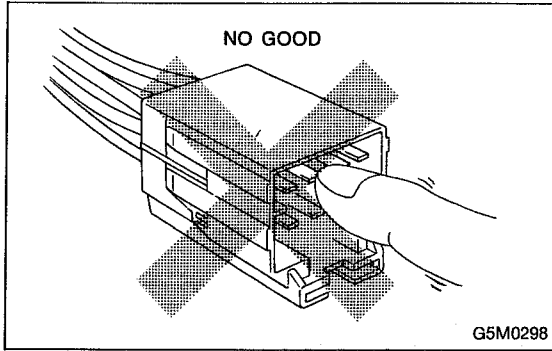


- If any damage or open is found on the SRS airbag system wire harness, do not attempt to repair using soldering, etc. Be sure to replace the faulty harness with a new genuine part.



- Install the wire harness securely with the specified clips so as to avoid interference or jamming with other parts.

- Before connecting the airbag system to ground, make sure that the grounding terminal is free from paint and contamination.



- Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.

2. Inspection and Replacement Standards

A: VEHICLES WHICH BECOME INVOLVED IN A COLLISION

If the vehicle equipped with an SRS airbag system is damaged in a collision, the airbag system parts must be checked and replaced in accordance with the following standards:

- After faulty parts are replaced, the warning light operation must be checked.
- When the ignition switch is turned ON, it lights up for 8 seconds and then it goes out for at least 30 seconds.
- The trouble code stored in memory must be erased after the check.

B: AIRBAG MODULE (DRIVER AND PASSENGER)

1. INSPECTION STANDARD

- The vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. (Refer to "Diagnostics" Section.)

2. REPLACEMENT STANDARD

- Airbag is deployed.
- The pad surface is scratched or cracked.
- Harness and/or connector is deformed or cracked, their circuits are broken, lead wire is exposed, etc.
- Mounting bracket is cracked or deformed.
- The module surface is fouled with foreign matter. (grease, oil, water, cleaning solvent, etc.)
- Airbag module dropped to the floor/ground.
- Airbag module determined as faulty during self-diagnosis.

C: MAIN HARNESS

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

- The designated trouble code is output during self-diagnosis. (Refer to "Diagnostics" Section.)

2. REPLACEMENT STANDARD

- Harness circuit is broken, lead wire is exposed, corrugated tube is cracked, etc.
- Connector is scratched or cracked.
- The designated trouble code is output during self-diagnosis.

D: AIRBAG CONTROL MODULE

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. (Refer to "Diagnostics" Section.)

2. REPLACEMENT STANDARD

- Control module is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched or cracked.
- Control module dropped to the floor/ground.
- Control module determined as faulty during diagnostics.
- Airbag is deployed.

E: COMBINATION SWITCH

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).
- The designated trouble code is output during self-diagnosis. (Refer to "Diagnostics" Section.)

2. REPLACEMENT STANDARD

- Combination switch or steering roll connector is deformed or cracked.

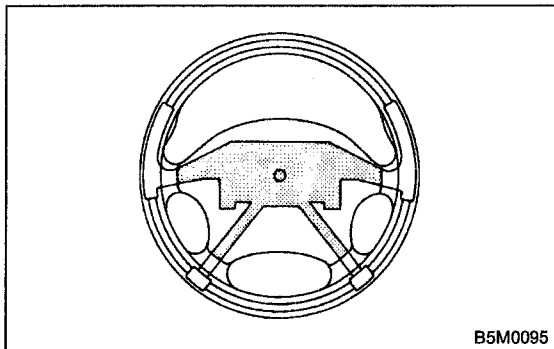
F: STEERING WHEEL

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

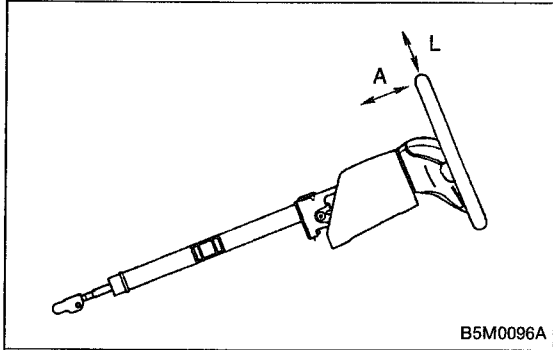
2. REPLACEMENT STANDARD

- Check steering wheel insert for cracks or deformities.
- Check to ensure that new airbag module is properly installed in steering wheel.



B5M0095

- After installing airbag module, check to ensure that it is free of interference with steering wheel and that clearance between the two is equal at all points.



G: STEERING COLUMN ASSEMBLY

1. INSPECTION STANDARD

- A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

2. REPLACEMENT STANDARD

- Check steering wheel free play in axial and radial directions.

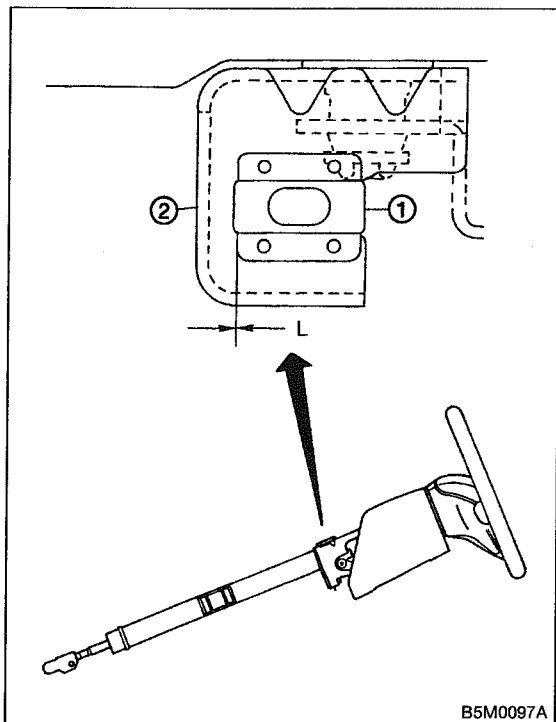
Specifications:

Axial free play A

Less than ± 6 mm (0.24 in)

Radial free play L

Less than ± 7 mm (0.28 in)



- Check to ensure that clearance between capsule ① (at steering column) and cutout portion of column bracket ② on steering column upper side is within specifications.

Clearance between capsule and cutout portion of column bracket: L

Less than 0.5 mm (0.020 in)

3. Airbag Module

A: REMOVAL AND INSTALLATION

CAUTION:

● The airbag module (driver side and passenger side) must not be disassembled. The airbag module cannot be used again once inflated.

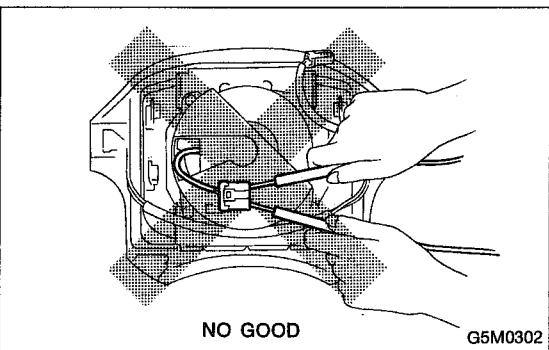
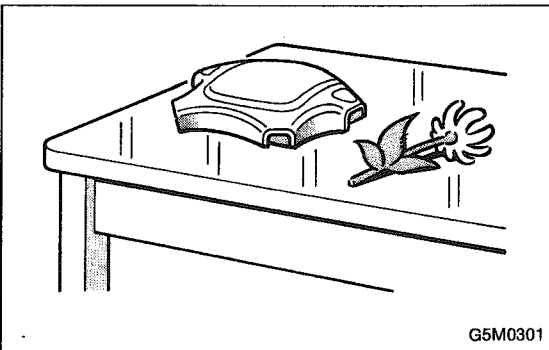
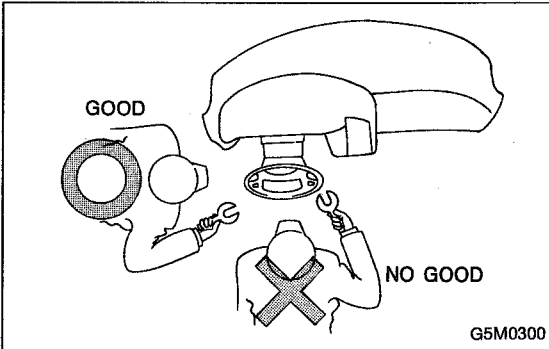
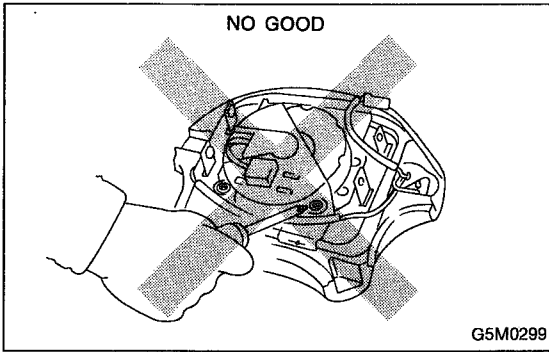
● When removing and installing the airbag module (driver side and passenger side), the operator should stand, as much as possible, on the side of the airbag module.

● After removal, the airbag module (driver side and passenger side) should be kept away from heat and light sources, and stored on a clean, flat surface to prevent from any damage to its lower structure.

● Do not check airbag module (driver side and passenger side) continuity with airbag removed from the vehicle body.

● Replace airbag module (driver side and passenger side) with a new one, should any of the following conditions develop:

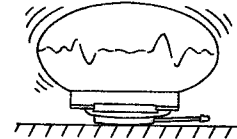
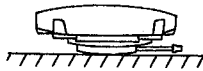
- Pad surface is scratched or cracked.
- Connector harness is damaged.
- Inflator side structure of module is cracked or deformed.
- Module is excessively stained with water, oil, etc.
- Module was accidentally dropped.



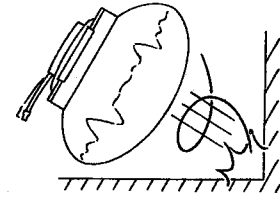
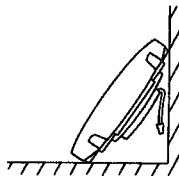
● When storing a removed airbag module (driver side and passenger side), be sure to place it in parallel with floor with the pad facing up. Do not place it against a wall, or place anything on the pad; otherwise, a dangerous condition may be created if the module malfunctions.

Driver side

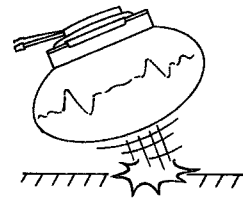
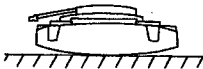
GOOD



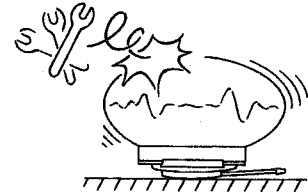
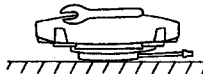
NO GOOD



NO GOOD

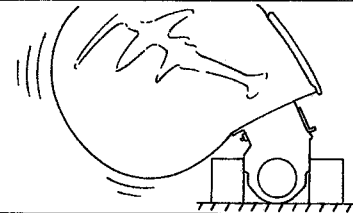
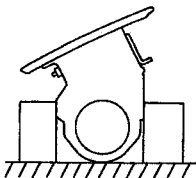


NO GOOD

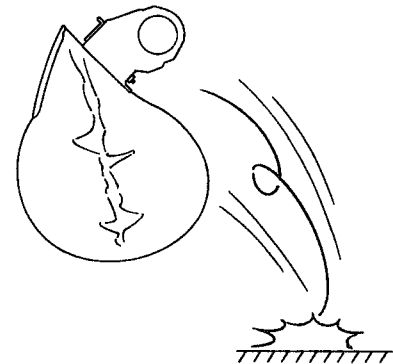
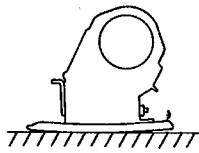


Passenger side

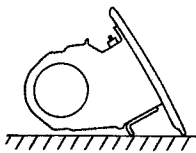
GOOD



NO GOOD

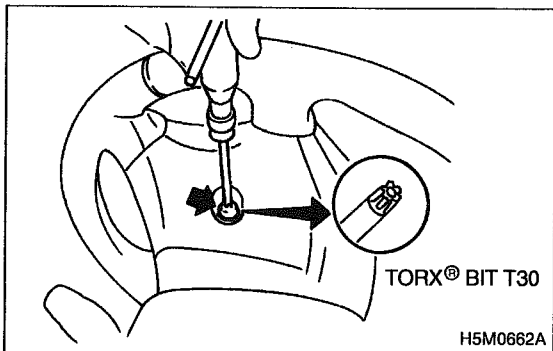


NO GOOD

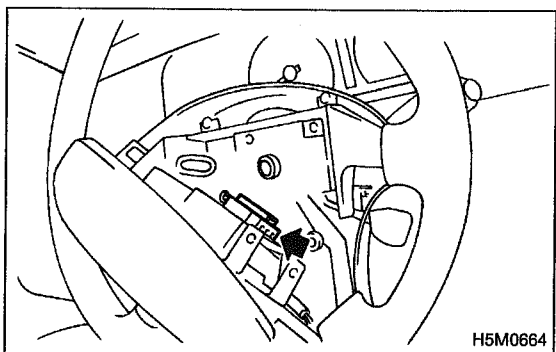


1. DRIVER SIDE

- 1) Set front wheels in straight ahead position.
- 2) Turn ignition switch off.
- 3) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.



- 4) Using TORX® BIT T30, remove two TORX® bolts.



- 5) Disconnect airbag connector on back of airbag module. <Ref. to 5-5 [M2E2].>

- 6) Refer to "**CAUTION:**" for handling of a removed airbag module. <Ref. to 5-5 [W3A0].>

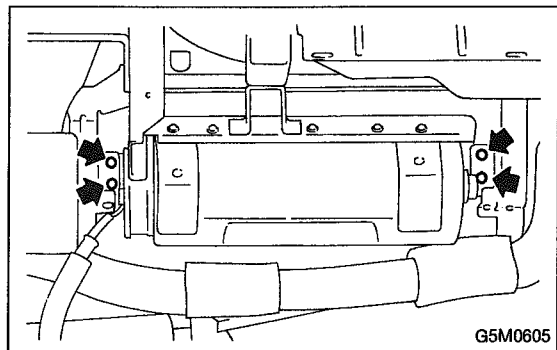
- 7) Installation is in the reverse order of removal.

CAUTION:

Do not allow harness and connectors to interfere or get caught with other parts.

2. PASSENGER SIDE

- 1) Remove instrument panel. <Ref. to 5-4 [W1A0].>



- 2) Remove four bolts and then carefully remove airbag module.
- 3) Refer to "CAUTION:" for handling of a removed airbag module. <Ref. to 5-5 [W3A0].>
- 4) Installation is in the reverse order of removal.

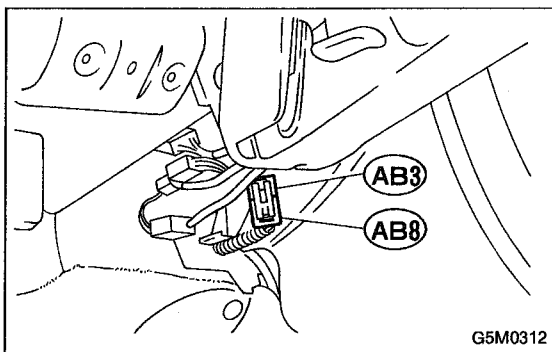
CAUTION:

Do not allow harness and connectors to interfere or get caught with other parts.

4. Main Harness

A: REMOVAL AND INSTALLATION

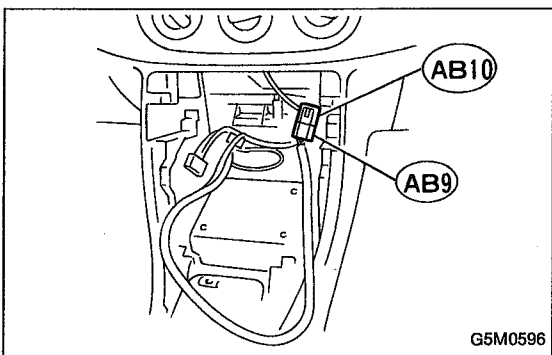
- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.



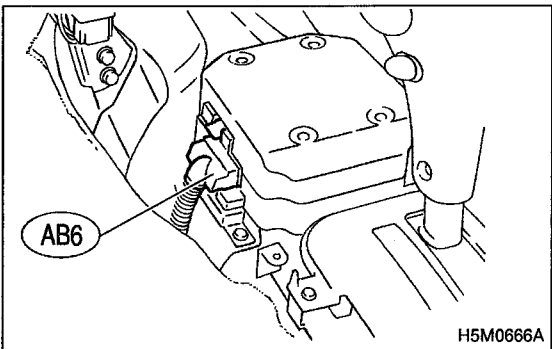
- 3) Remove lower cover. <Ref. to 5-4 [W1A0].> Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:

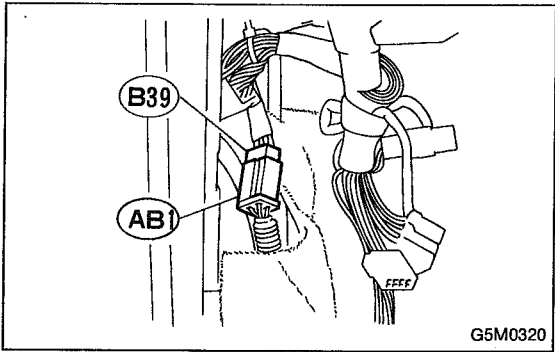
Do not reconnect airbag connector at steering column until main harness are securely re-installed.



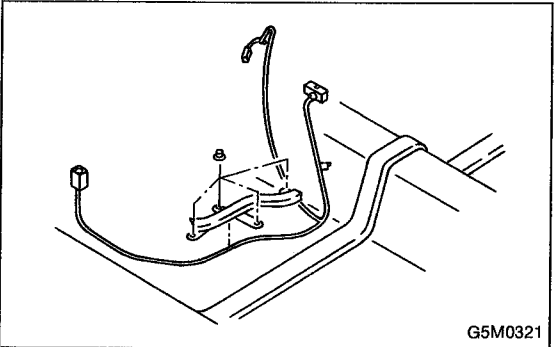
- 4) Disconnect airbag connector (AB9) and (AB10).



- 5) Remove instrument panel console. <Ref. to 5-4 [W1A0].>
- 6) Disconnect 12-pin yellow connector (AB6) from airbag control module. <Ref. to 5-5 [M2E1].>

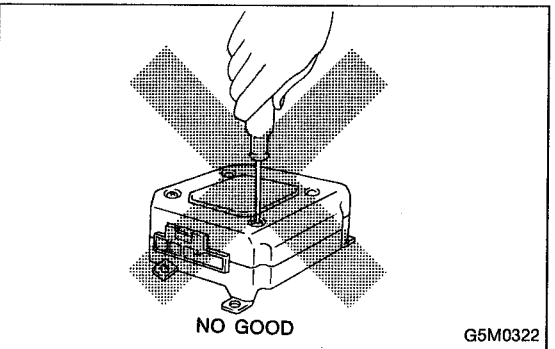


7) Disconnect body harness connector (B39) from connector (AB1).



8) Roll up floor mat and side sill cover (LH side). Remove main harness from clip and protector.

9) Installation is in the reverse order of removal.

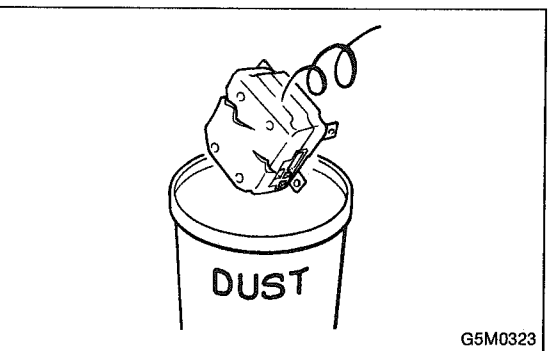


5. Airbag Control Module

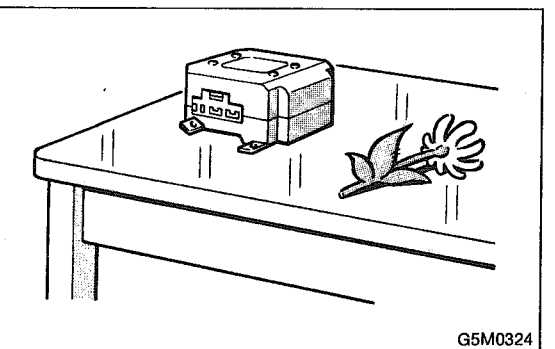
A: REMOVAL AND INSTALLATION

CAUTION:

- Do not disassemble the airbag control module.

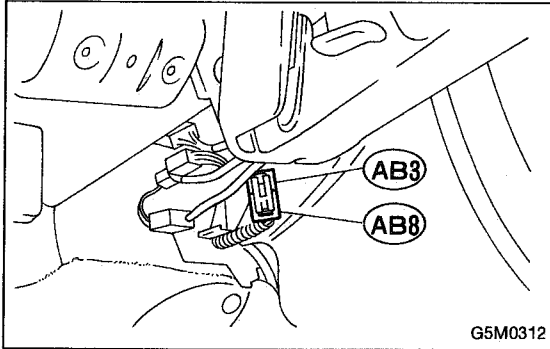


- If the airbag control module is deformed, or if water damage is suspected, replace the airbag control module with a new genuine part.



- After removal, keep the airbag control module on a dry, clean surface away from heat and light sources, and moisture and dust.

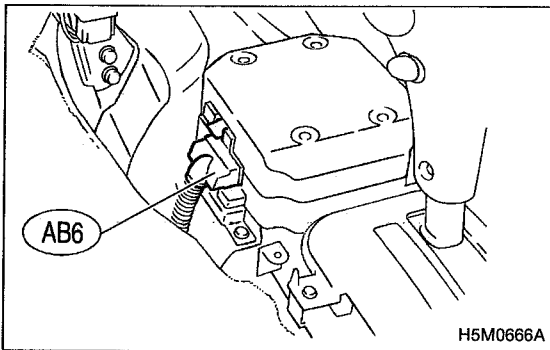
- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.



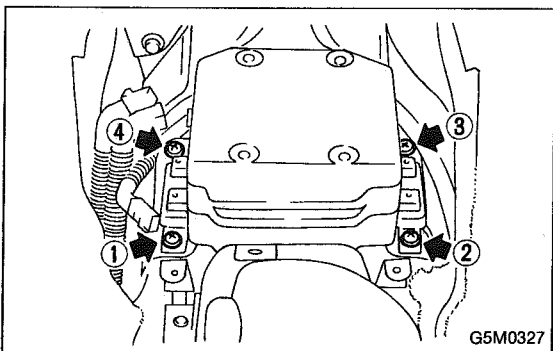
- 3) Remove lower cover. <Ref. to 5-4 [W1A0].>
Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:

Do not reconnect airbag connector at steering column until airbag control module is securely re-installed.



- 4) Remove instrument panel console. <Ref. to 5-4 [W1A0].>
- 5) Disconnect 12-pin yellow connector (AB6) from airbag control module. <Ref. to 5-5 [M2E1].>



- 6) Using T30 TORX® bit (Tamper resistant type), remove four TORX® bolts in numerical sequence shown in figure. Discard the old TORX® bolts.

CAUTION:

Use new TORX® bolts during re-assembly.

- 7) Installation is in the reverse order of removal.

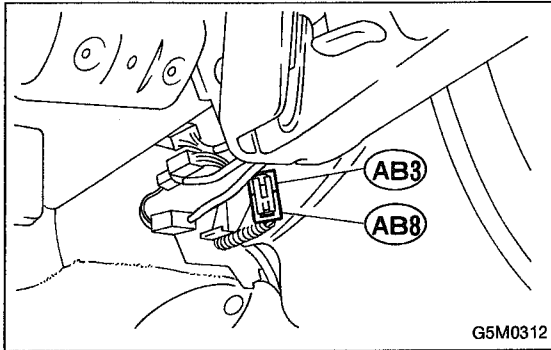
CAUTION:

Be sure to fully secure all airbag system connectors during re-assembly and confirm that all green double lock mechanisms are engaged.

6. Combination Switch

A: REMOVAL

- 1) Turn ignition switch off.
- 2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.

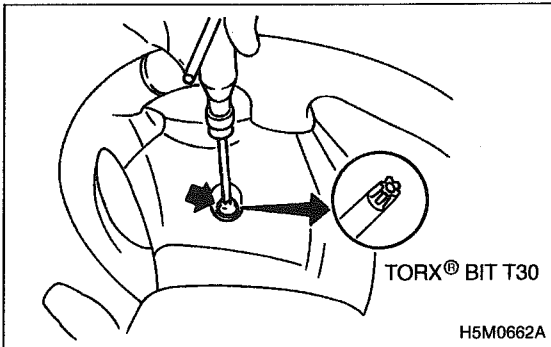


- 3) Remove lower cover. <Ref. to 5-4 [W1A0].> Disconnect airbag connector (AB3) and (AB8) below steering column.

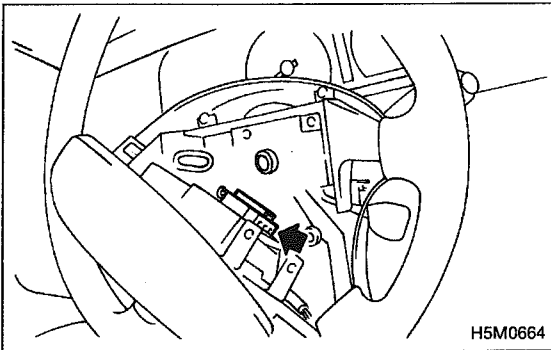
CAUTION:

Do not reconnect airbag connector at steering column until combination switch is securely re-installed.

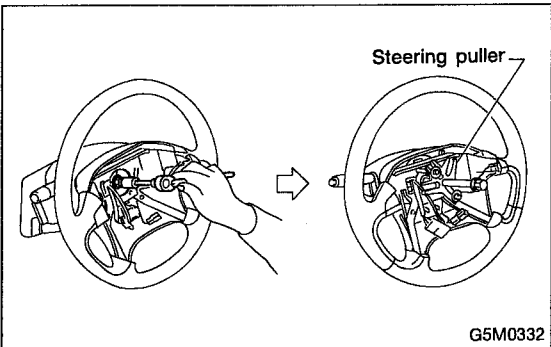
- 4) Disconnect combination switch connectors from body harness connector.



- 5) Set front wheels in straight ahead position. Using T30 TORX® bit, remove two TORX® bolts.



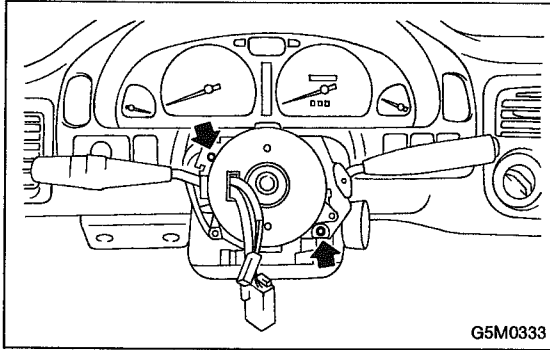
- 6) Disconnect airbag connector on back of airbag module. Remove airbag module, and place it with pad side facing upward. <Ref. to 5-5 [W3A0].>



- 7) Using steering puller, remove steering wheel.

CAUTION:

Do not allow connector to interfere when removing steering wheel.



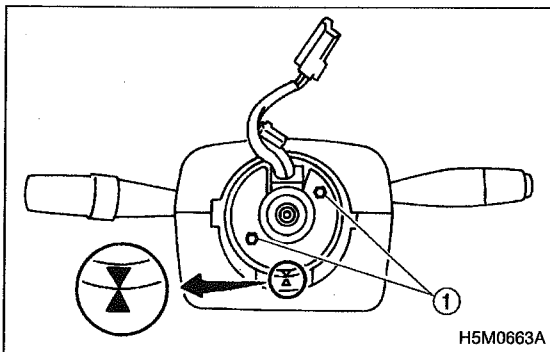
- 8) Remove steering column covers.
- 9) Removing two retaining screws, remove combination switch.

B: ADJUSTMENT

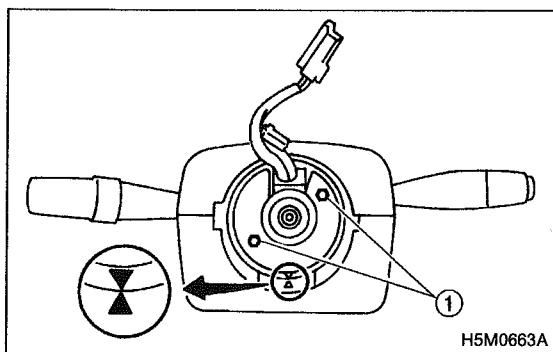
1. CENTERING ROLL CONNECTOR

Before installing steering wheel, make sure to center roll connector built into combination switch.

- 1) Make sure that front wheels are positioned straight ahead.



- 2) Install steering gearbox, steering shaft and combination switch properly. Turn roll connector pin ① **clockwise** until it stops.
- 3) Then, back off roll connector pin ① approximately 2.65 turns until "▲" marks aligned.



C: INSTALLATION

CAUTION:

Failure to do this might damage roll connector.

- 1) Before installing combination switch, check to ensure that combination switch is off and front wheels are set in the straight ahead position.
- 2) Install column cover and center roll connector. <Ref. to 5-5 [W6B1].>

- 3) Install steering wheel in neutral position. Carefully insert roll connector pin ① into hole on steering wheel.

NOTE:

If steering wheel angle requires fine adjustment, adjust tie-rod. <Ref. to 4-3 [W3F0].>

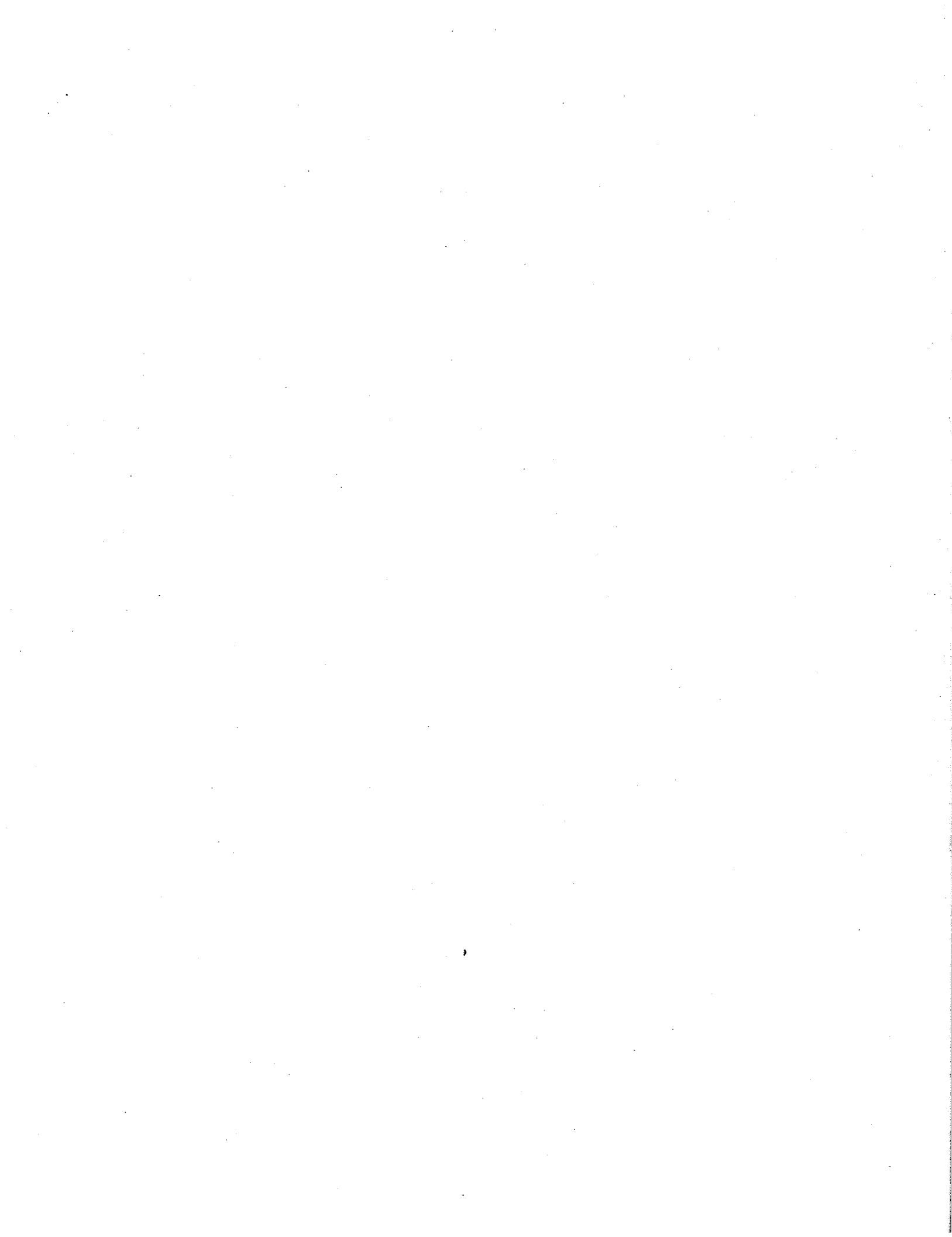
- 4) Install airbag module and lower cover in the reverse order of removal.

MEMO:

ELECTRICAL SECTION

ENGINE ELECTRICAL SYSTEM 6-1

BODY ELECTRICAL SYSTEM 6-2



ENGINE ELECTRICAL SYSTEM

6-1

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1. Specifications

A: 1800 cc MODEL

Item		Designation	
Starter	Type	Reduction type	
	Model	MT M001T77181	
	Manufacturer	MITSUBISHI	
	Voltage and output	12 V — 1.0 kW	
	Direction of rotation	Counterclockwise (when observed from pinion)	
	Number of pinion teeth	8	
	No-load characteristics	Voltage	11 V
		Current	90 A or less
		Rotating speed	3,000 rpm or more
	Load characteristics	Voltage	8 V
		Current	280 A or less
		Torque	8.5 N·m (0.87 kg-m, 6.3 ft-lb)
		Rotating speed	980 rpm or more
	Lock characteristics	Voltage	4 V
		Current	780 A or less
Torque		17.6 N·m (1.80 kg-m, 13.0 ft-lb) or more	
Generator	Type	Rotating-field three-phase type, Voltage regulator built-in type	
	Model	A2T39091	
	Manufacturer	Mitsubishi Electric	
	Voltage and output	12 V — 75 A	
	Polarity on ground side	Negative	
	Rotating direction	Clockwise (when observed from pulley side)	
	Armature connection	3-phase Y-type	
	Output current	1,500 rpm — 30 A or more 2,500 rpm — 64 A or more 5,000 rpm — 76 A or more	
	Regulated voltage	14.5 ^{+0.3} _{-0.4} V [20°C (68°F)]	
Ignition coil	Model	CM12-100	
	Manufacturer	HITACHI	
	Primary coil resistance	0.63 — 0.77 Ω	
	Secondary coil resistance	10.4 — 15.6 kΩ	
	Insulation resistance between primary terminal and case	More than 10 MΩ	
Spark plug	Type and manufacturer	BKR6E-11 NGK RC8YC4 CHAMPION	
	Thread size	mm 14, P = 1.25	
	Spark gap	mm (in) 1.0 — 1.1 (0.039 — 0.043)	

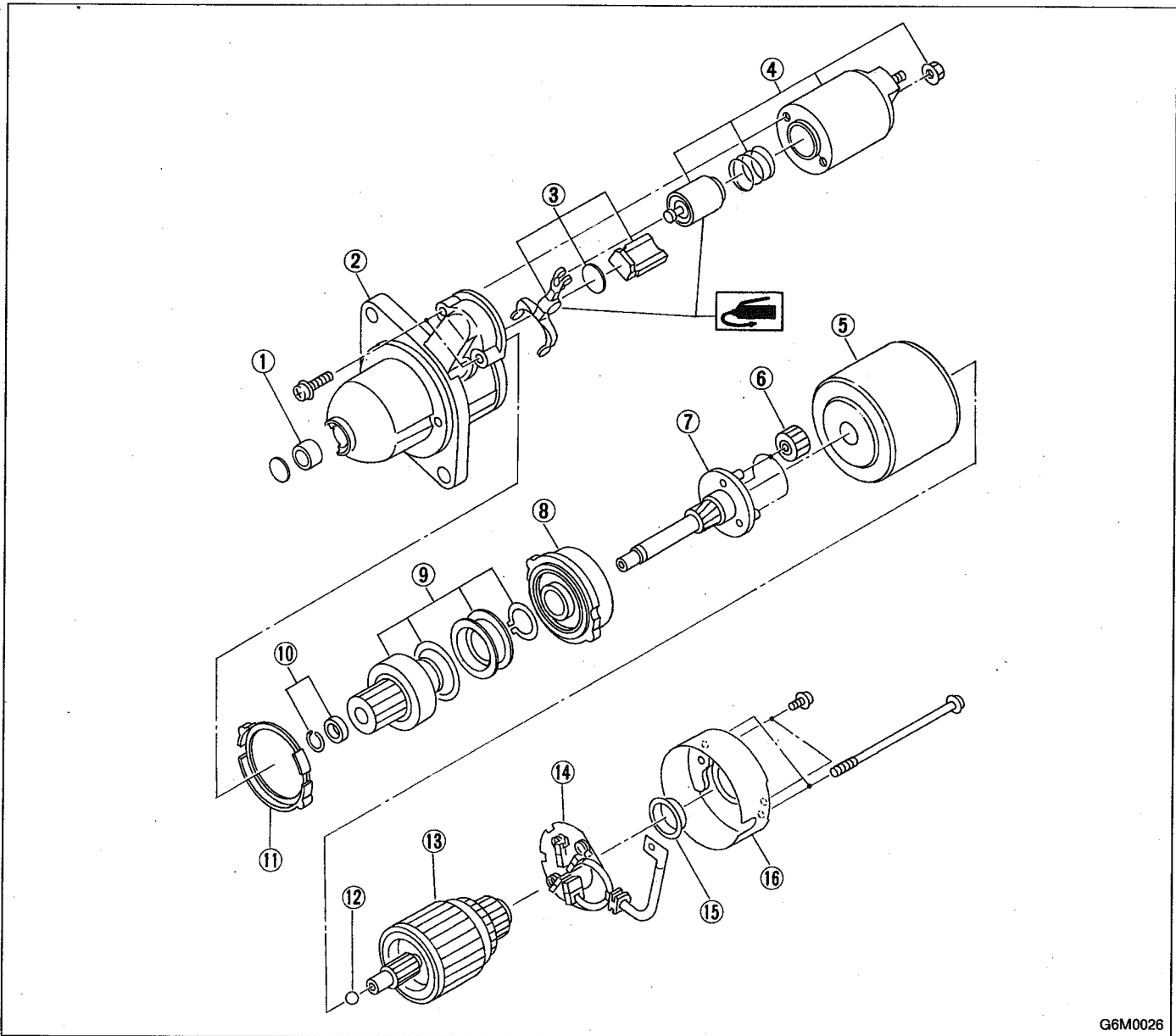
SPECIFICATIONS AND SERVICE DATA

[S1B0] 6-1
1. Specifications

B: 2200 cc MODEL

Item		Designation			
Starter	Type		Reduction type		
	Model		MT M001T77181	AT M001T75681	
	Manufacturer		MITSUBISHI		
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW	
	Direction of rotation		Counterclockwise (when observed from pinion)		
	Number of pinion teeth		8	9	
	No-load characteristics	Voltage		11 V	
		Current		90 A or less	
		Rotating speed		3,000 rpm or more	
	Load characteristics	Voltage		8 V	7.7 V
		Current		280 A or less	300 A or less
		Torque		8.5 N·m (0.87 kg-m, 6.27 ft-lb)	9.81 N·m (1.00 kg-m, 7.24 ft-lb)
		Rotating speed		980 rpm or more	1,000 rpm or more
	Lock characteristics	Voltage		4 V	
Current		780 A or less	980 A or less		
Torque		17.6 N·m (1.80 kg-m, 13.0 ft-lb) or more	23 N·m (2.3 kg-m, 17 ft-lb) or more		
Generator	Type		Rotating-field three-phase type, Voltage regulator built-in type		
	Model		A2T39091		
	Manufacturer		MITSUBISHI		
	Voltage and output		12 V — 75 A		
	Polarity on ground side		Negative		
	Rotating direction		Clockwise (when observed from pulley side)		
	Armature connection		3-phase Y-type		
	Output current		1,500 rpm — 30 A or more 2,500 rpm — 64 A or more 5,000 rpm — 76 A or more		
	Regulated voltage		14.5 ^{+0.3} _{-0.4} V [20°C (68°F)]		
Ignition coil	Model		FH0047-01R		
	Manufacturer		DEMCO		
	Primary coil resistance		0.73 Ω ± 10%		
	Secondary coil resistance		12.8 kΩ ± 15%		
	Insulation resistance between primary terminal and case		More than 10 MΩ		
Spark plug	Type and manufacturer		RC8YC4, RC10YC4 CHAMPION Alternate (BKR6E-11 NGK K20PR-U11 NIPPONDENSO)		
	Thread size mm		14, P = 1.25		
	Spark gap mm (in)		1.0 — 1.1 (0.039 — 0.043)		

1. Starter



G6M0026

① Sleeve bearing

② Front bracket

③ Lever set

④ Magnet switch Assy

⑤ Yoke

⑥ Gear ASSY

⑦ Shaft ASSY

⑧ Internal gear ASSY

⑨ Over running clutch

⑩ Stopper set

⑪ Packing

⑫ Ball

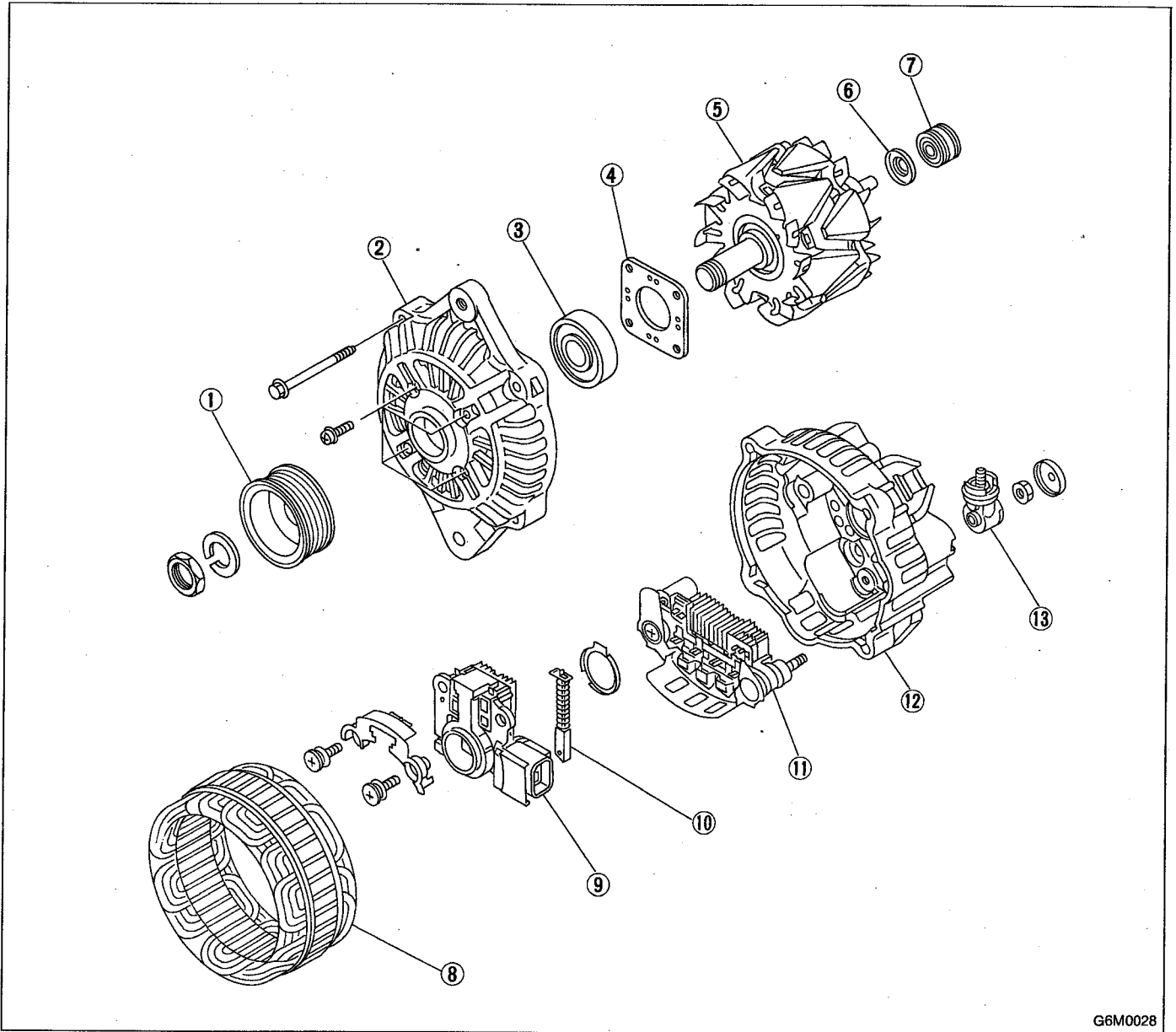
⑬ Armature

⑭ Brush holder

⑮ Bearing

⑯ Rear bracket

2. Generator



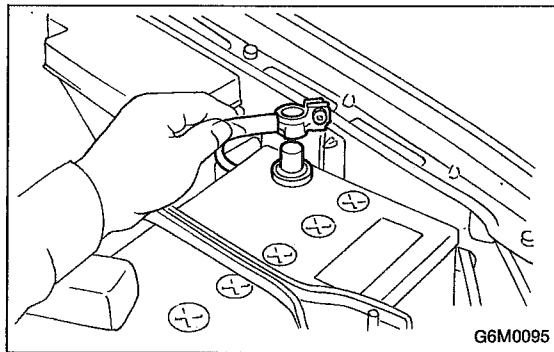
G6M0028

- ① Pulley
- ② Front cover
- ③ Ball bearing
- ④ Bearing retainer
- ⑤ Rotor

- ⑥ Holder
- ⑦ Bearing
- ⑧ Stator coil
- ⑨ Brush holder

- ⑩ Brush
- ⑪ IC regulator
- ⑫ Rear cover
- ⑬ Terminal

1. Starter

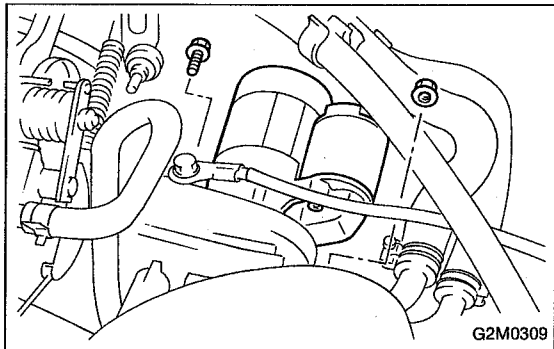


G6M0095

1. Starter

A: REMOVAL AND INSTALLATION

- 1) Disconnect battery ground cable.
- 2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>



G2M0309

- 3) Disconnect connector and terminal from starter.
- 4) Remove starter from transmission.
- 5) Installation is in the reverse order of removal.

Tightening torque:

$50 \pm 4 \text{ N}\cdot\text{m}$ ($5.1 \pm 0.4 \text{ kg}\cdot\text{m}$, $37 \pm 2.9 \text{ ft}\cdot\text{lb}$)

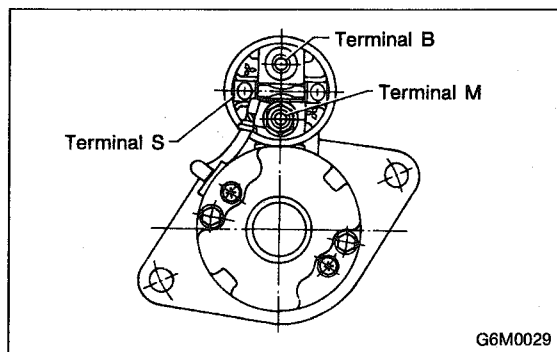
B: TEST

1. SWITCH ASSEMBLY OPERATION

- 1) Connect terminal S of switch assembly to positive terminal of battery with a lead wire, and starter body to ground terminal of battery. Pinion should be forced endwise on shaft.

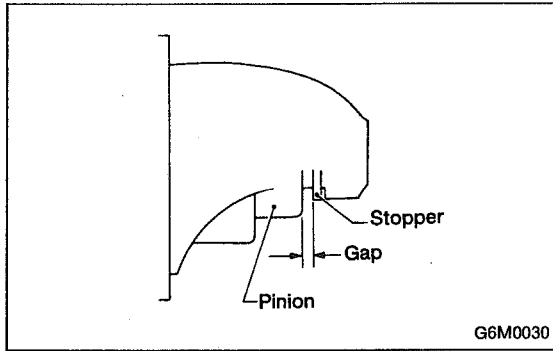
CAUTION:

With pinion forced endwise on shaft, starter motor can sometimes rotate because current flows, through pull-in coil, to motor. This is not a problem.



G6M0029

- 2) Disconnect connector from terminal M, and connect positive terminal of battery and terminal M using a lead wire and ground terminal to starter body. In this test set up, pinion should return to its original position even when it is pulled out with a screwdriver.



2. PINION GAP

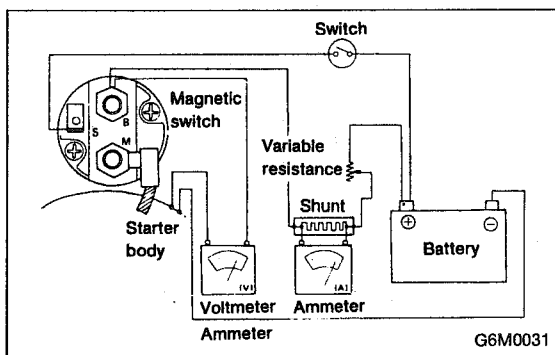
- 1) With pinion forced endwise on shaft, as outlined in step 1) above, measure pinion gap.

Pinion gap:

0.5 — 2.0 mm (0.020 — 0.079 in)

If motor is running with the pinion forced endwise on the shaft, disconnect connector from terminal M of switch assembly and connect terminal M to ground terminal (–) of battery with a lead wire. Next, gently push pinion back with your fingertips and measure pinion gap.

- 2) If pinion gap is outside specified range, remove or add number of adjustment washers used on the mounting surface of switch assembly until correct pinion gap is obtained.



3. PERFORMANCE TEST

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.

Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.

For these performance tests, use the circuit shown in figure.

- 1) No-load test

With switch on, adjust the variable resistance to obtain 11 V, take the ammeter reading and measure the starter speed. Compare these values with the specifications.

No-load test (Standard):

Voltage / Current

11 V / 90 A or less

Rotating speed

3,000 rpm or more

SERVICE PROCEDURE

2) Load test

Apply the specified braking torque to starter. The condition is satisfactory if the current draw and starter speed are within specifications.

Load test (Standard):● **MT vehicles**

Voltage / Load

8 V / 8.5 N·m (0.87 kg-m, 6.27 ft-lb)

Current / Speed

280 A / 980 rpm or more

● **AT vehicles**

Voltage / Load

7.7 V / 9.81 N·m (1.00 kg-m, 7.24 ft-lb)

Current / Speed

300 A max. / 1,000 rpm or more

3) Lock test

With starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to the specified voltage.

Lock test (Standard):● **MT vehicles**

Voltage / Load

4 V / 780 A or less

Torque

17.6 N·m (1.80 kg-m, 13.0 ft-lb) or more

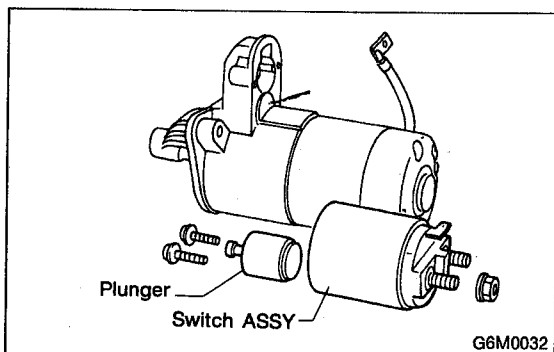
● **AT vehicles**

Voltage / Current

4 V / 980 A or less

Torque

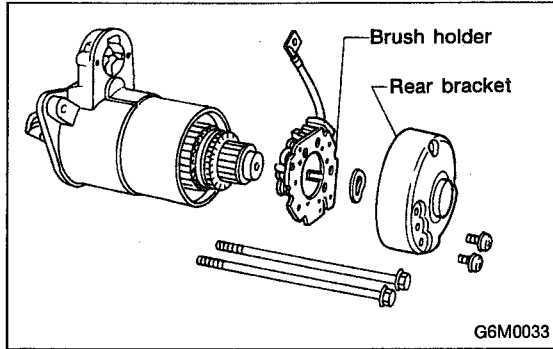
23 N·m (2.3 kg-m, 17 ft-lb) or more

**C: DISASSEMBLY**

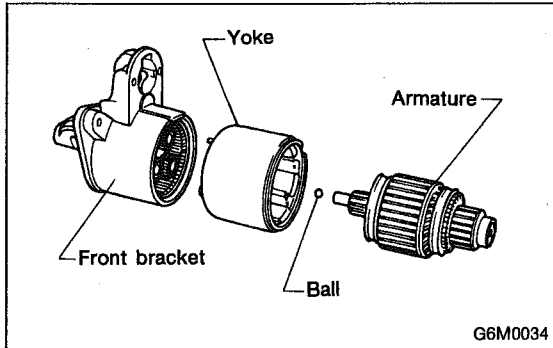
- 1) Loosen nut which holds terminal M of switch assembly, and disconnect connector.
- 2) Remove bolts which hold switch assembly, and remove switch assembly, plunger and plunger spring from starter as a unit.

CAUTION:

Be careful because pinion gap adjustment washer may sometimes be used on the mounting surface of switch assembly.



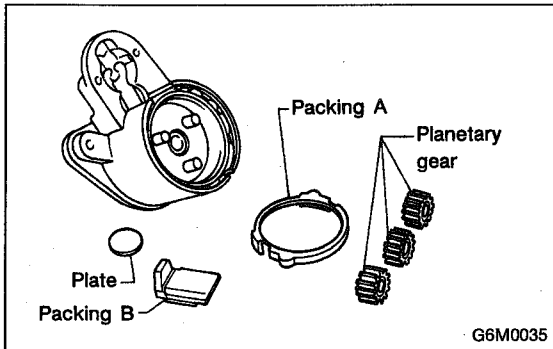
3) Remove both through-bolts and brush holder screws, and detach rear bracket and brush holder.



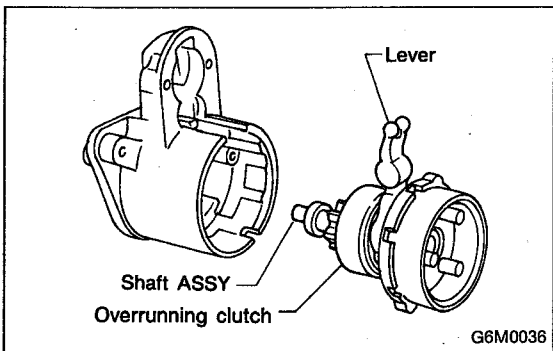
4) Remove armature and yoke. Ball used as a bearing will then be removed from the end of armature.

CAUTION:

Be sure to mark an alignment mark on yoke and front bracket before removing yoke.



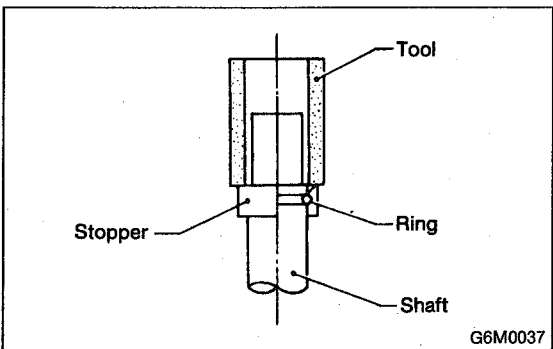
5) Remove packing A, three planetary gears, packing B and plate.



6) Remove shaft assembly and overrunning clutch as a unit.

CAUTION:

Record the direction of lever before removing.

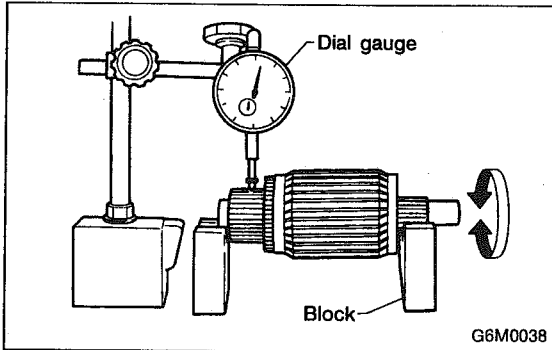


7) Remove overrunning clutch from shaft assembly as follows:

- (1) Remove stopper from ring by lightly tapping a fit tool placed on stopper.
- (2) Remove ring, stopper and clutch from shaft.

D: INSPECTION**1. ARMATURE**

1) Check commutator for any sign of burns or rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.



2) Run-out test

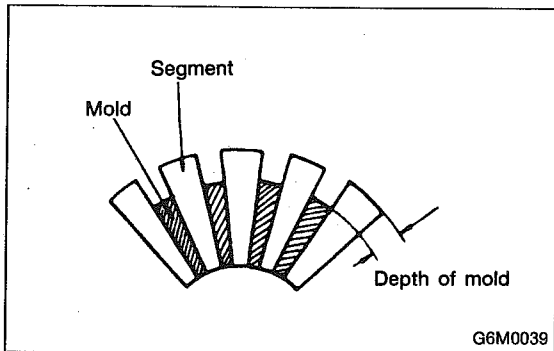
Check the commutator run-out and replace if it exceeds the limit.

Commutator run-out:**Standard**

0.05 mm (0.0020 in)

Service limit

Less than 0.10 mm (0.0039 in)

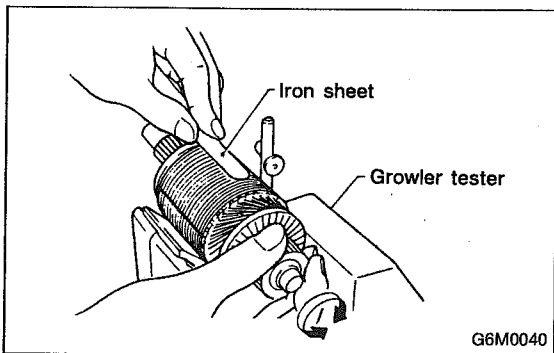


3) Depth of segment mold

Check the depth of segment mold.

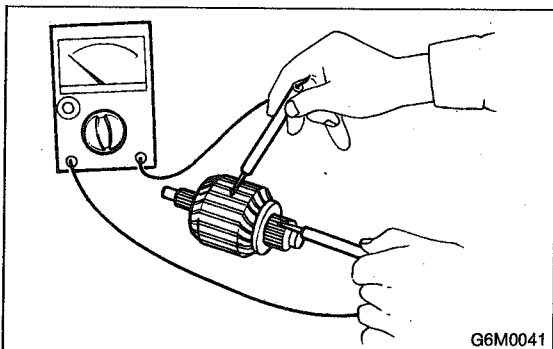
Depth of segment mold:

0.5 — 0.8 mm (0.020 — 0.031 in)



4) Armature short-circuit test

Check armature for short-circuit by placing it on growler tester. Hold a hacksaw blade against armature core while slowly rotating armature. A short-circuited armature will cause the blade to vibrate and to be attracted to core. If the hacksaw blade is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.



5) Armature ground test

Using circuit tester, touch one probe to the commutator segment and the other to shaft. There should be no continuity. If there is a continuity, armature is grounded.

Replace armature if it is grounded.

2. YOKE

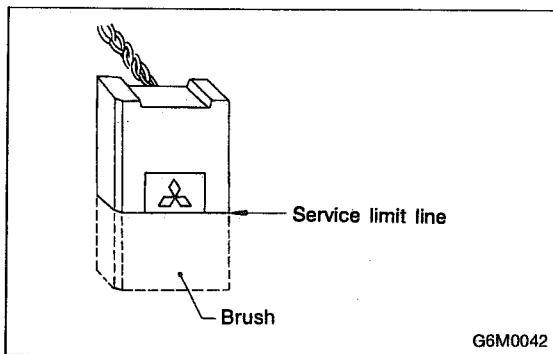
Make sure pole is set in position.

3. OVERRUNNING CLUTCH

Inspect teeth of pinion for wear and damage. Replace if it damaged. Rotate pinion in direction of rotation (clockwise). It should rotate smoothly. But in opposite direction, it should be locked.

CAUTION:

Do not clean overrunning clutch with oil to prevent grease from flowing out.



4. BRUSH AND BRUSH HOLDER

1) Brush length

Measure the brush length and replace if it exceeds the service limit.

Replace if abnormal wear or cracks are noticed.

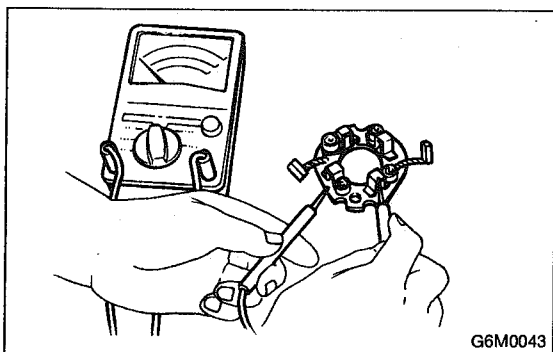
Brush length:

Standard **17.0 mm (0.669 in)**

Service limit **11.5 mm (0.453 in)**

2) Brush movement

Be sure brush moves smoothly inside brush holder.



3) Insulation resistance of brush holder

Be sure there is no continuity between brush holder and its plate.

4) Brush spring force

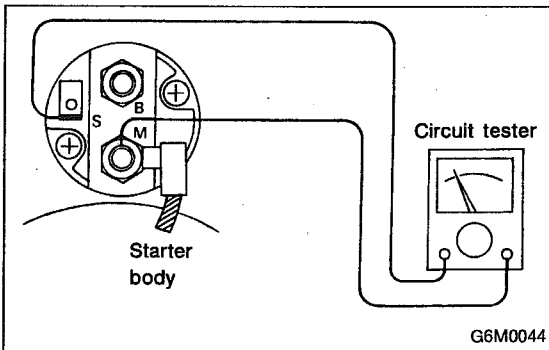
Measure brush spring force with a spring scale. If it is less than the service limit, replace brush spring.

Brush spring force:**Standard**

18.6 N (1.9 kg, 4.2 lb) (when new)

Service limit

6.9 N (0.7 kg, 1.5 lb)

**5. SWITCH ASSEMBLY**

Be sure there is continuity between terminals S and M, and between terminal S and ground. Use a circuit tester (set in "ohm").

Also check to be sure there is no continuity between terminal M and B.

Terminal / Specified resistance:

S — M / 10 Ω or less

S — Ground / 10 Ω or less

M — B / 1 MΩ or more

E: ASSEMBLY

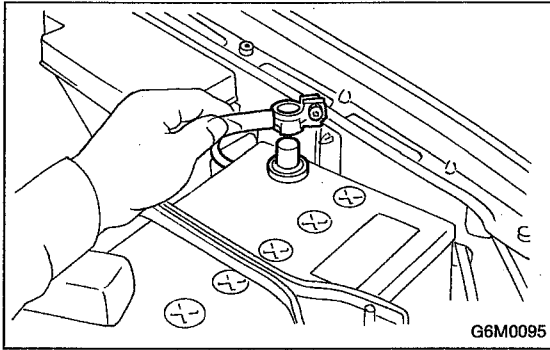
Assembly is in the reverse order of disassembly procedures. Observe the following:

1) Carefully assemble all parts in the order of assembly and occasionally inspect nothing has been overlooked.

2) Apply grease to the following parts during assembly.

- Front bracket sleeve bearing
- Armature shaft gear
- Outer periphery of plunger
- Mating surface of plunger and lever
- Gear shaft splines
- Mating surface of lever and clutch
- Ball at the armature shaft end
- Internal and planetary gears

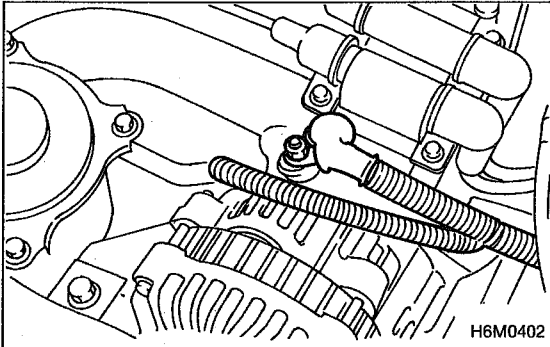
3) After assembling parts correctly, check to be sure starter operates properly.



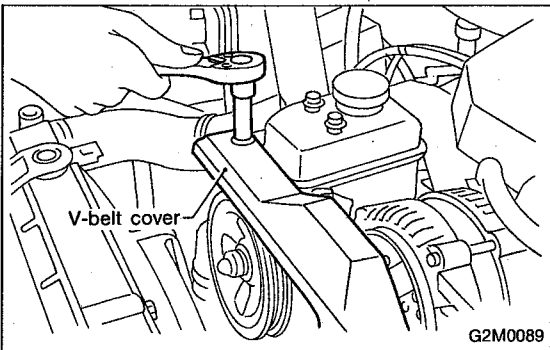
2. Generator

A: REMOVAL AND INSTALLATION

1) Disconnect battery ground cable.

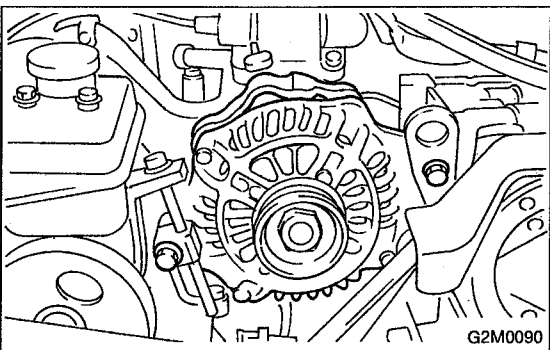


2) Disconnect connector and terminal from generator.

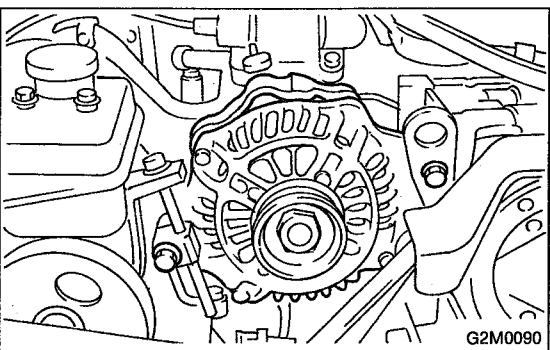


3) Remove V-belt cover.

4) Remove front side V-belt.



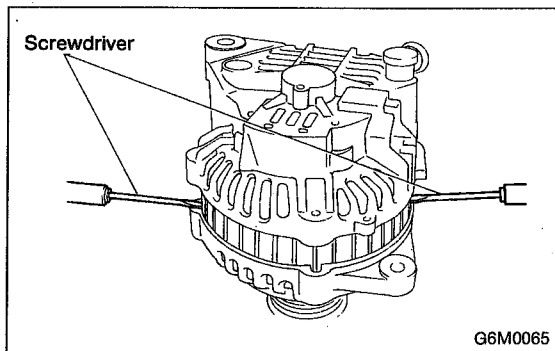
5) Remove bolts which install generator onto bracket.



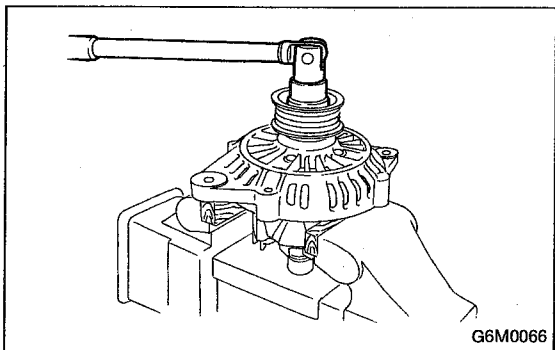
6) Installation is in the reverse order of removal.

CAUTION:

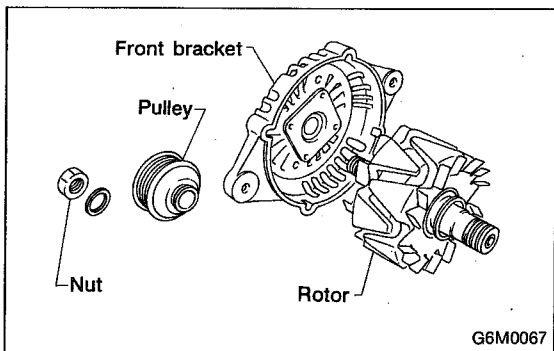
Check and adjust V-belt tension. < Ref. to 1-5 [W1A0]. >

**B: DISASSEMBLY**

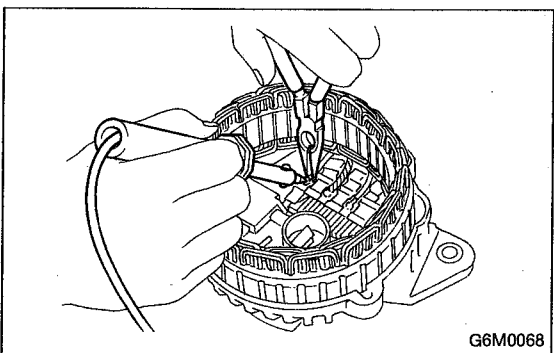
1) Remove the four through bolts. Then insert the tip of a flat-head screwdriver into the gap between the stator core and front bracket. Pry them apart to disassemble.



2) Hold rotor with a vise and remove pulley nut.

**CAUTION:**

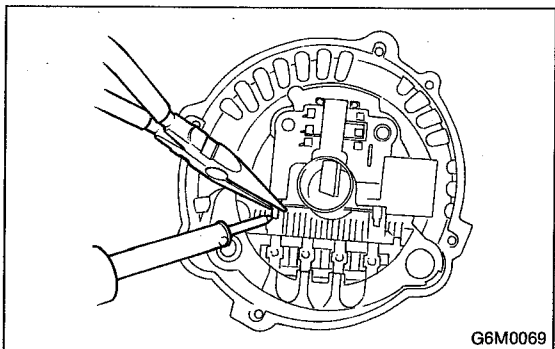
When holding rotor with vise, insert aluminum plates or wood pieces on the contact surfaces of the vise to prevent rotor from damage.



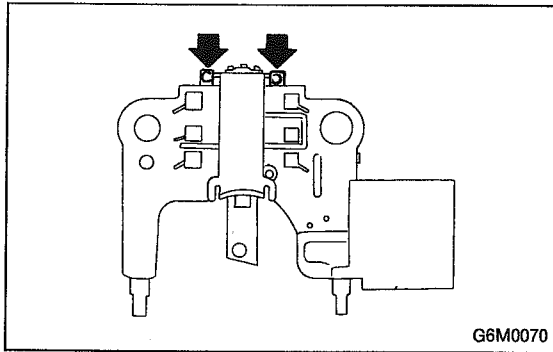
3) Unsolder connection between rectifier and stator coil to remove stator coil.

CAUTION:

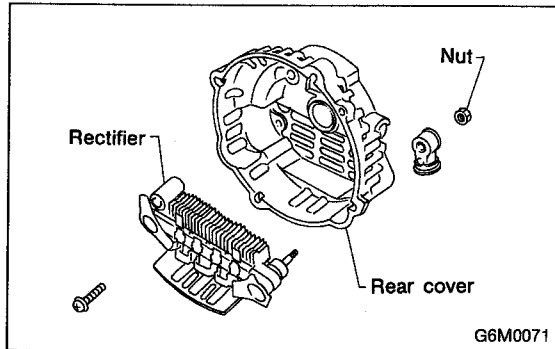
Finish the work rapidly (less than three seconds) because the rectifier cannot withstand heat very well.



4) Remove screws which secure IC regulator to rear cover, and unsolder connection between IC regulator and rectifier to remove IC regulator.



5) Remove the brushes by unsoldering at the pigtails.



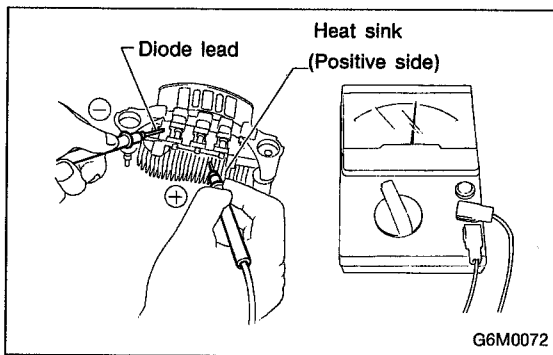
6) Remove the nut and insulating bushing at terminal B. Remove rectifier.

C: INSPECTION AND REPAIR

1. DIODE

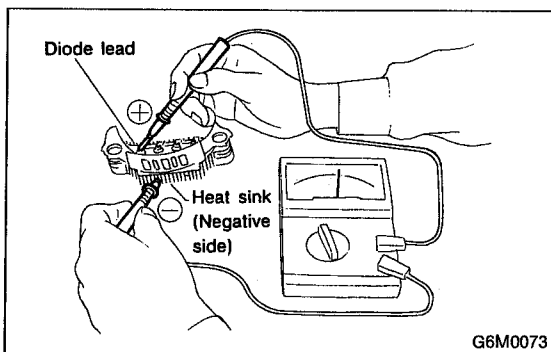
CAUTION:

Never use a megger tester (measuring use for high voltage) or any other similar measure for this test; otherwise, the diodes may be damaged.



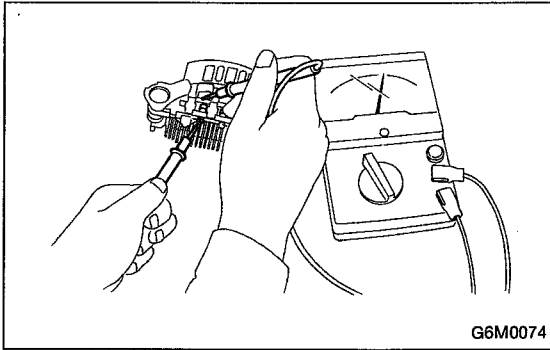
1) Checking positive diode

Check for continuity between the diode lead and the positive side heat sink. The positive diode is in good condition if continuity exists only in the direction from the diode lead to the heat sink.



2) Checking negative diode

Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if continuity exists only in the direction from the heat sink to the diode lead.



G6M0074

3) Checking trio diode

Check the trio diode using a circuit tester. It is in good condition if continuity exists only in one direction.

2. ROTOR

1) Slip ring surface

Inspect slip rings for contamination or any roughness of the sliding surface. Repair slip ring surface using a lathe or sand paper.

2) Slip ring outer diameter

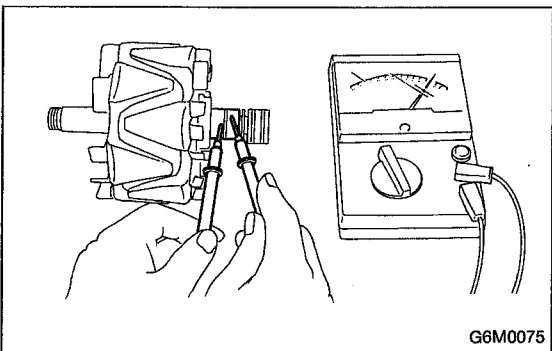
Measure slip ring outer diameter. If slip ring is worn replace rotor assembly.

Slip ring outer diameter:**Standard**

22.7 mm (0.894 in)

Limit

22.1 mm (0.870 in)



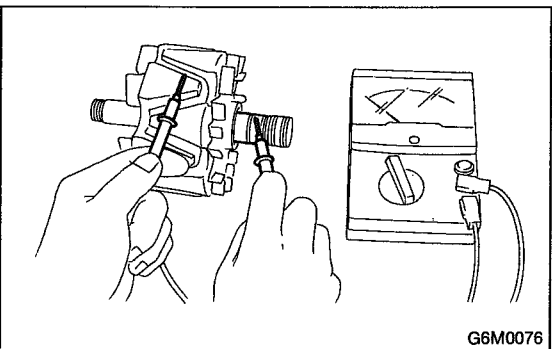
G6M0075

3) Continuity test

Check resistance between slip rings using circuit tester. If the resistance is not within specification, replace rotor assembly.

Specified resistance:

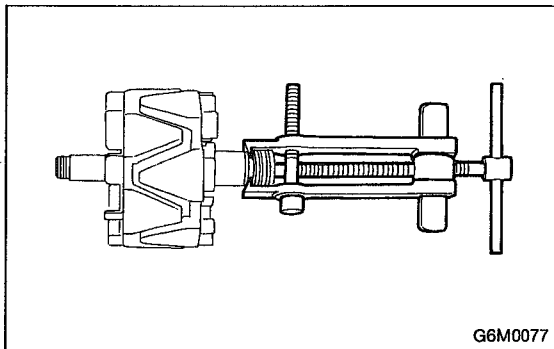
Approx. 3 Ω (A2T39091)



G6M0076

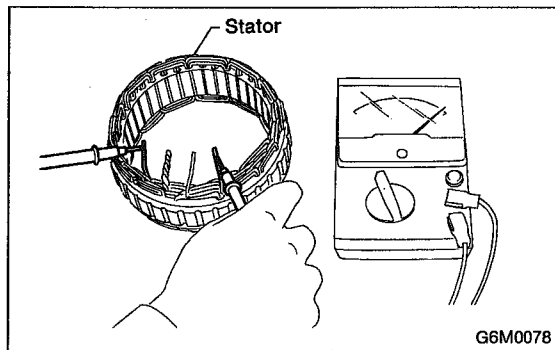
4) Insulation test

Check continuity between slip ring and rotor core or shaft. If continuity exists, the rotor coil is short-circuited, and so replace rotor assembly.



5) Ball bearing (rear side)

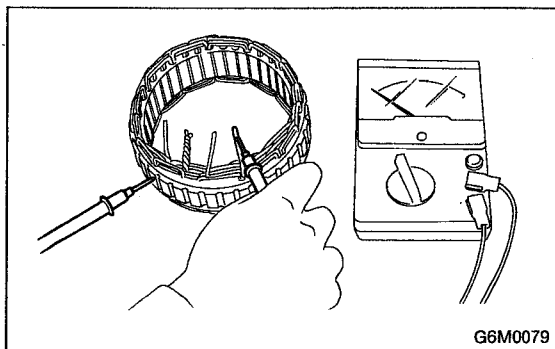
- (1) Check rear ball bearing. Replace if it is noisy or if rotor does not turn smoothly.
- (2) The rear bearing can be removed by using common bearing puller.



3. STATOR

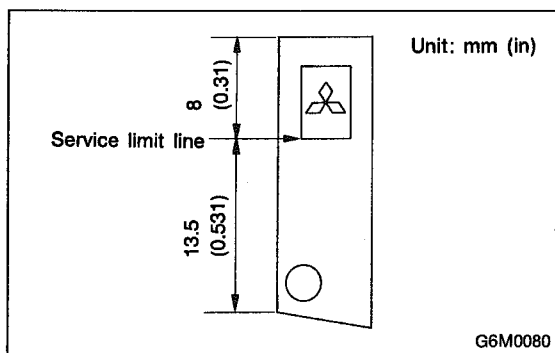
1) Continuity test

Inspect stator coil for continuity between each end of the lead wires. If there is no continuity between individual lead wires, the lead wire is broken, and so replace stator assembly.



2) Insulation test

Inspect stator coil for continuity between stator core and each end of the lead wire. If there is continuity, the stator coil is short-circuited, and so replace stator assembly.



4. BRUSH

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark on it.

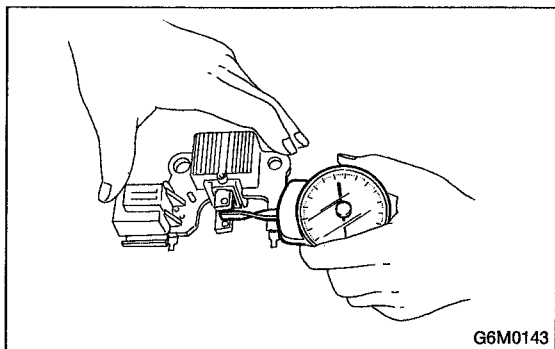
Brush length:

Standard

21.5 mm (0.846 in)

Service limit

8.0 mm (0.315 in)

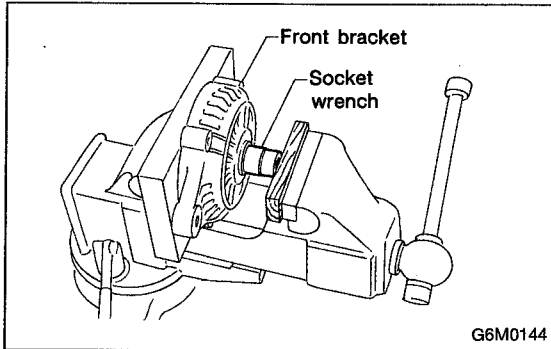


2) Checking brush spring for proper pressure

Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of the brush spring. If the pressure is less than 3.236 N (330 g, 11.64 oz), replace the brush spring with a new one. The new spring must have a pressure of 5.786 to 6.963 N (590 to 710 g, 20.81 to 25.04 oz).

5. BEARING (FRONT SIDE)

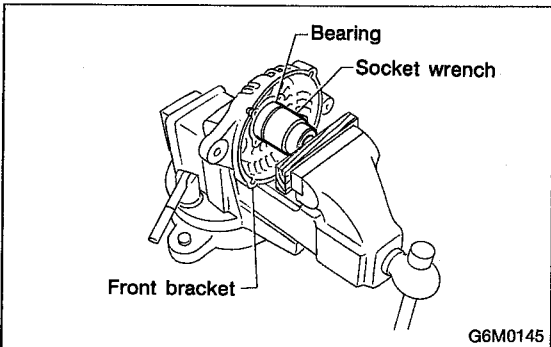
1) Check front ball bearing. If resistance is felt while rotating, or if abnormal noise is heard, replace the ball bearing.



2) Replacing front bearing

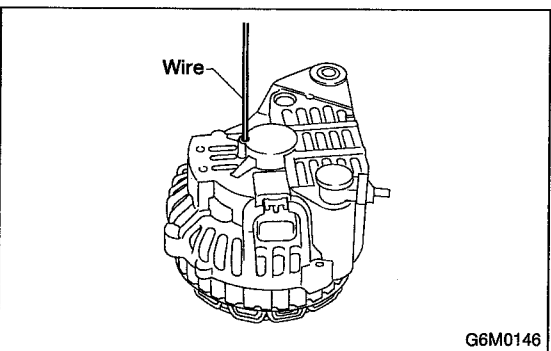
(1) Remove front bearing retainer.

(2) Closely install a fit tool on the bearing inner race. Press the bearing down out of front bracket with a hand press or vise. A socket wrench can serve as the tool.



(3) Set a new bearing and closely install a fit tool on the bearing outer race. Press the bearing down into place with a hand press or vise. A socket wrench can serve as the tool.

(4) Install front bearing retainer.

**D: ASSEMBLY**

To assemble, reverse order of disassembly.

1) Pulling up brush

Before assembling, press the brush down into the brush holder with your finger and secure in that position by passing a [2 mm (0.08 in) dia. length 4 to 5 cm (1.6 to 2.0 in)] wire through the hole shown in the figure.

CAUTION:

Be sure to remove the wire after reassembly.

2) Heat the rear bracket [50 to 60°C (122 to 140°F)] and press the rear bearing into the rear bracket. Then lubricate the rear bracket.

3) After reassembly, turn the pulley by hand to check that the rotor turns smoothly.

3. Spark Plug

A: REMOVAL AND INSTALLATION

CAUTION:

All spark plugs installed on an engine, must be of the same heat range.

Spark plug:

- 1800 cc model

NGK: BKR6E-11

CHAMPION: RC8YC4

- 2200 cc model

CHAMPION: RC8YC4, RC10YC4

(Alternate)

NGK: BKR6E-11

NIPPONDENSO: K20PR-U11

- 1) Remove spark plug cords by pulling boot, not cord itself.
- 2) Remove spark plugs.
- 3) When installing spark plugs on cylinder head, use spark plug wrench.

Tightening torque (Spark plug):

$21 \pm 3 \text{ N}\cdot\text{m}$ ($2.1 \pm 0.3 \text{ kg}\cdot\text{m}$, $15.2 \pm 2.2 \text{ ft}\cdot\text{lb}$)

CAUTION:

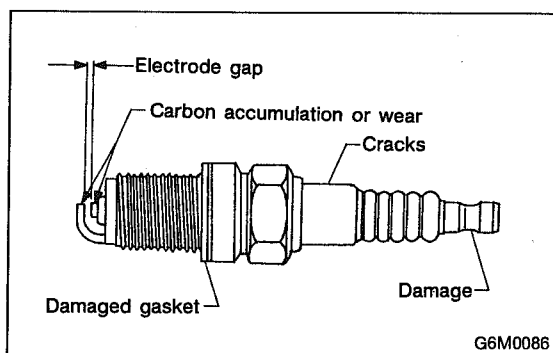
The above torque should be only applied to new spark plugs without oil on their threads.

In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid their over-stressing.

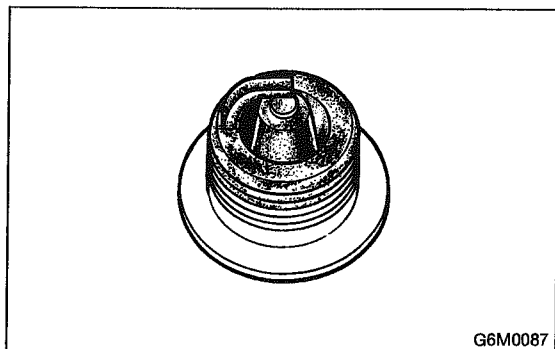
- 4) Connect spark plug cords.

B: INSPECTION

Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.



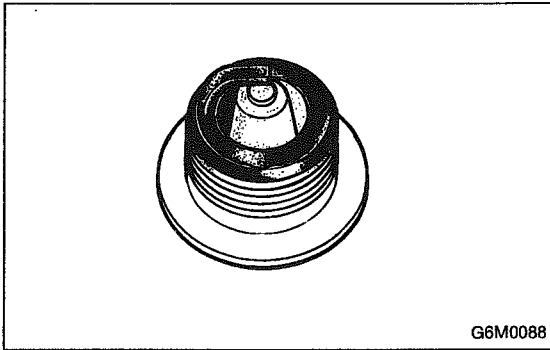
G6M0086



G6M0087

- 1) Normal

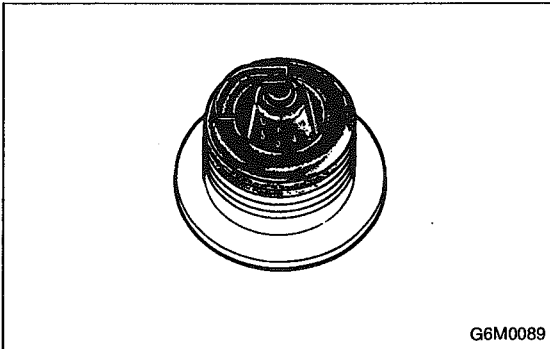
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



2) Carbon fouled

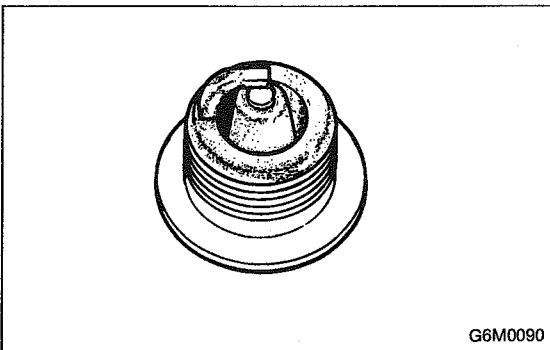
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.

It is advisable to replace with plugs having hotter heat range.



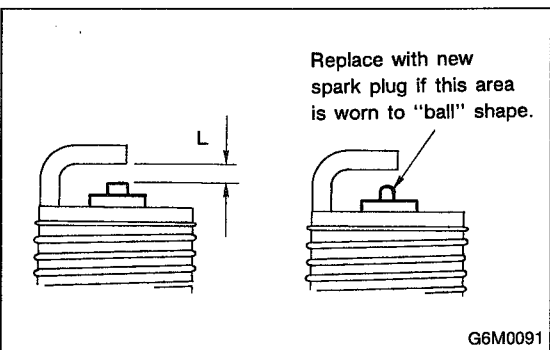
3) Oil fouled

Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If same condition remains after repair, use a hotter plug.



4) Overheating

White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.

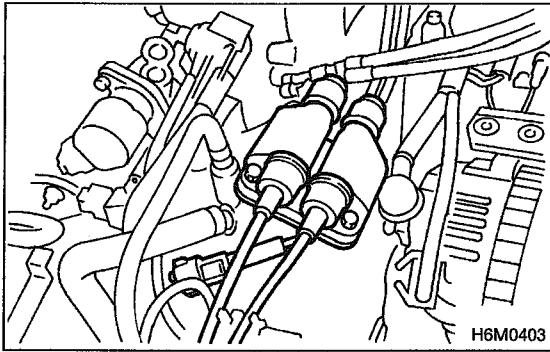


C: CLEANING AND REGAPPING

Clean spark plugs in a sand blast type cleaner. Avoid excessive blasting. Clean and remove carbon or oxide deposits, but do not wear away porcelain. If deposits are too stubborn, discard plugs. After cleaning spark plugs, recondition firing surface of electrodes with file. Then correct the spark plug gap using a gap gauge.

Spark plug gap: L

1.0 — 1.1 mm (0.039 — 0.043 in)



4. Ignition Coil

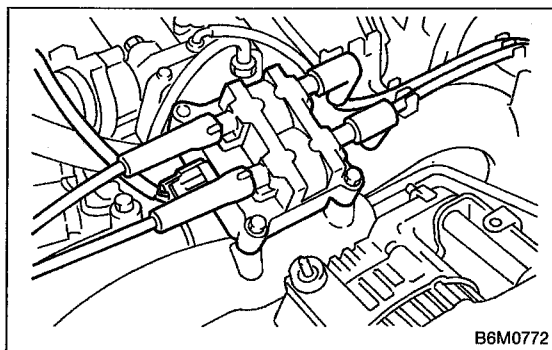
A: REMOVAL AND INSTALLATION

1. 1800 cc MODEL

- 1) Disconnect battery ground cable.
- 2) Disconnect connector from ignition coil.
- 3) Remove ignition coil.
- 4) Installation is in the reverse order of removal.

CAUTION:

Be sure to connect wires to their proper positions. Failure to do so will damage unit.

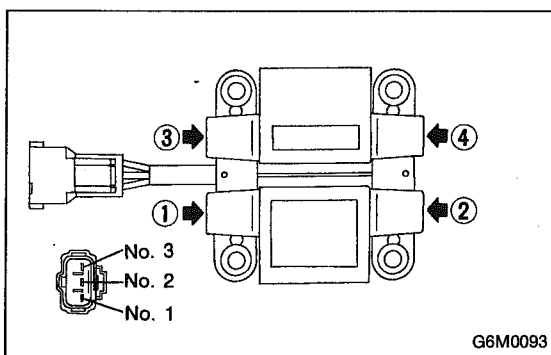


2. 2200 cc MODEL

- 1) Disconnect battery ground cable.
- 2) Disconnect connector from ignition coil.
- 3) Disconnect spark plug cords from ignition coil.
- 4) Remove ignition coil.
- 5) Installation is in the reverse order of removal.

CAUTION:

Be sure to connect wires to their proper positions. Failure to do so will damage unit.



B: INSPECTION

1. 1800 cc MODEL

Using accurate tester, inspect the following items, and replace if defective.

- 1) Primary resistance
- 2) Secondary coil resistance

CAUTION:

If the resistance is extremely low, this indicates the presence of a short-circuit.

Specified resistance:

[Primary side]

Between terminal No. 1 and No. 2

Between terminal No. 2 and No. 3

0.62 — 0.76 Ω

[Secondary side]

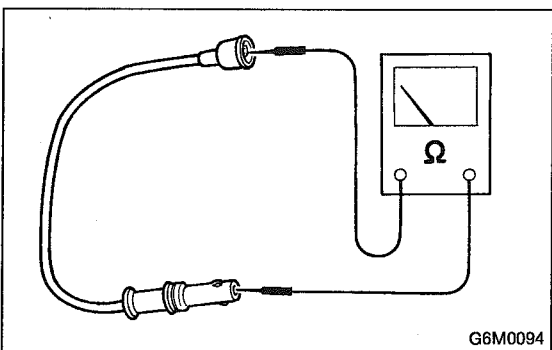
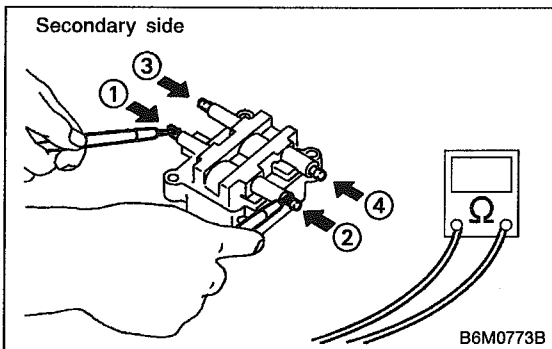
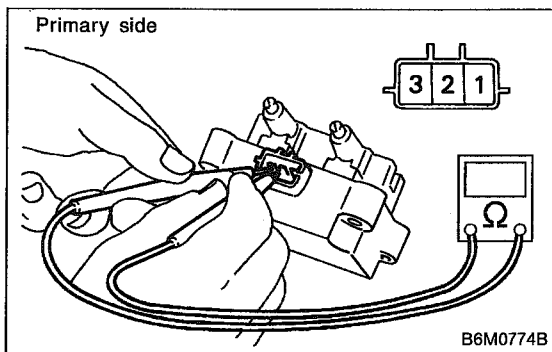
Between ① and ②

Between ③ and ④

17.9 — 24.5 kΩ

- 3) Insulation between primary terminal and case: 10 MΩ or more.

4. Ignition Coil - 6. Ignitor

**2. 2200 cc MODEL**

Using accurate tester, inspect the following items, and replace if defective.

- 1) Primary resistance
- 2) Secondary coil resistance

CAUTION:

If the resistance is extremely low, this indicates the presence of a short-circuit.

Specified resistance:

[Primary side]

Between terminal No. 1 and No. 2

Between terminal No. 2 and No. 3

$0.73 \Omega \pm 10\%$

[Secondary side]

Between ① and ②

Between ③ and ④

$12.8 \text{ k}\Omega \pm 15\%$

- 3) Insulation between primary terminal and case: $10 \text{ M}\Omega$ or more.

5. Spark Plug Cord**A: INSPECTION**

Check for:

- 1) Damage to cords, deformation, burring or rust formation of terminals
- 2) Resistance values of cords

Resistance value:● **1800 cc model**

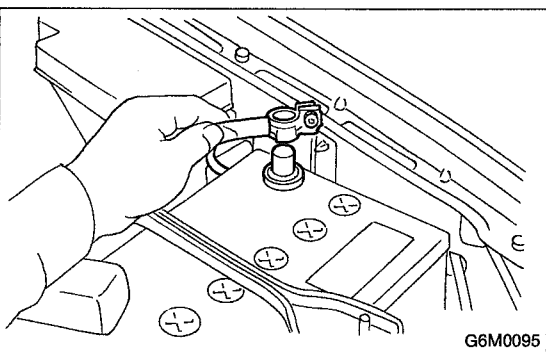
#1 and #3 cords 4.95 — 11.56 k Ω

#2 cord 4.86 — 11.33 k Ω

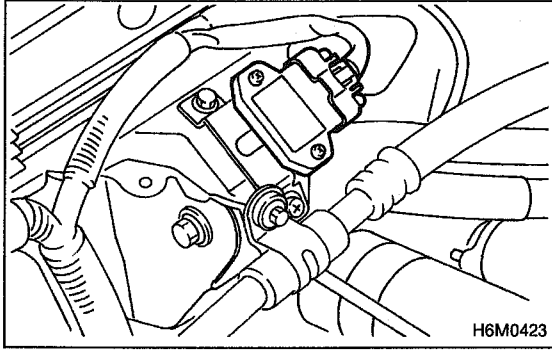
#4 cord 5.24 — 12.23 k Ω

● **2200 cc model**

5.12 — 12.34 k Ω

**6. Ignitor****A: REMOVAL AND INSTALLATION**

- 1) Disconnect battery ground cable.
- 2) Remove intake air chamber. <Ref. to 2-7 [W18A0].>



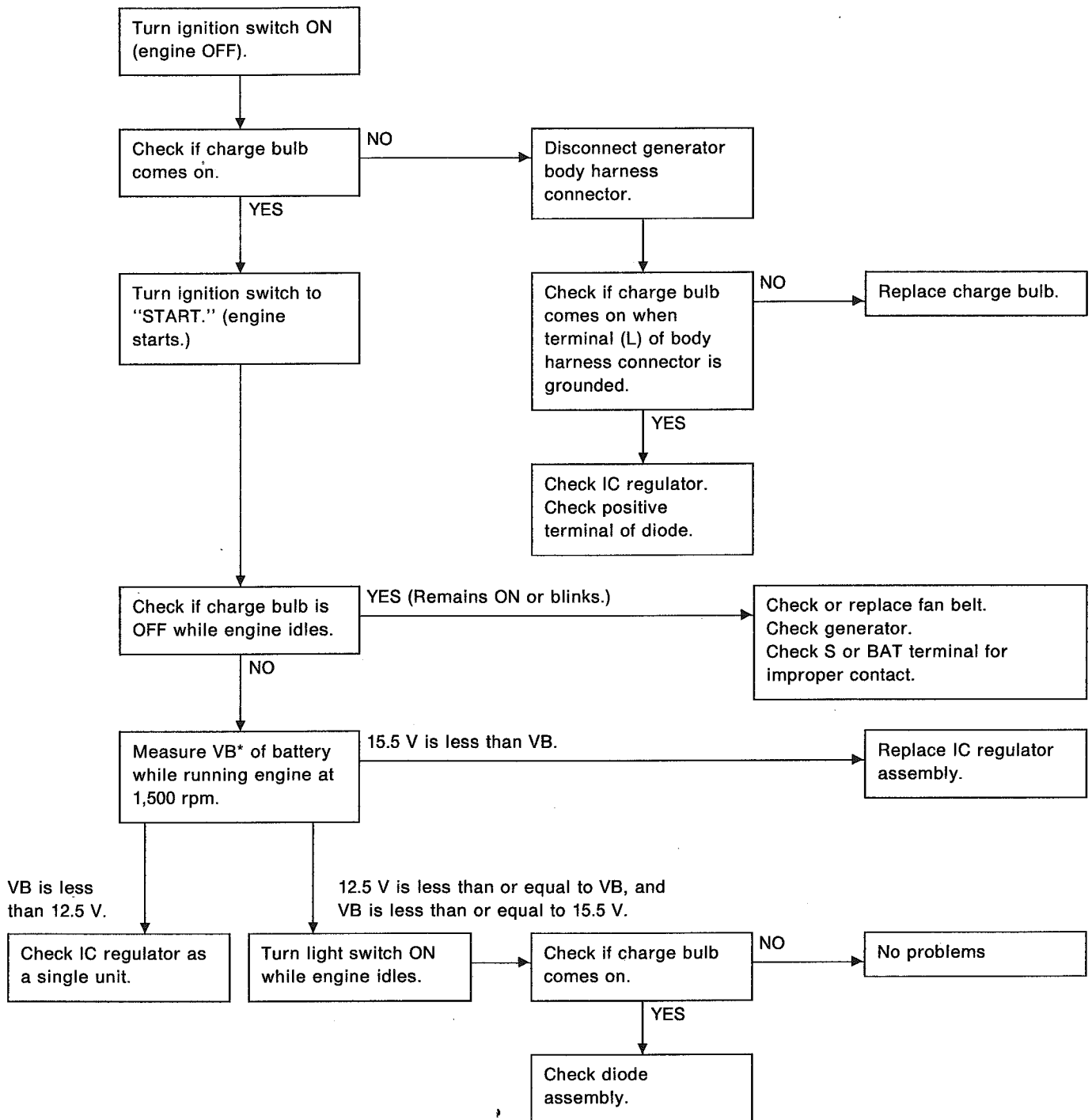
- 3) Disconnect connector from ignitor.
- 4) Remove screws which hold ignitor onto body.
- 5) Installation is in the reverse order of removal.

1. General Diagnostics

A: STARTER

Trouble		Probable cause
Starter does not start.	Magnet switch does not operate. (no clicks are heard.)	Magnet switch poor contact or discontinuity of pull-in coil circuit
		Improper sliding of magnet switch plunger
	Magnet switch operates. (clicks are issued.)	Poor contact of magnet switch's main contact point
		Layer short of armature
		Contaminants on armature commutator
		High armature mica
		Improper grounding of yoke field coil
		Insufficient carbon brush length
Insufficient brush spring pressure		
Starter starts but does not crank engine.	Failure of pinion gear to engage ring gear	Worn pinion teeth
		Improper sliding of overrunning clutch
		Improper adjustment of stud bolt
	Clutch slippage	Faulty clutch roller spring
Starter starts but engine cranks too slowly.		Poor contact of magnet switch's main contact point
		Layer short of armature
		Discontinuity, burning or wear of armature commutator
		Poor grounding of yoke field coil
		Insufficient brush length
		Insufficient brush spring pressure
Abnormal brush wear		
Starter overruns.		Magnet switch coil is a layer short.

B: GENERATOR



*: Terminal voltage

MEMO:

BODY ELECTRICAL SYSTEM **6-2**

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PRECAUTION FOR SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The Supplemental Restraint System "Airbag" helps to reduce the risk or severity of injury to the driver in a frontal collision.

The Supplemental Restraint System consists of an airbag module (located in the center of the steering wheel), sensors, a control module, warning light, wiring harness and roll connector.

Information necessary to service the safety is included in the "5-5. SUPPLEMENTAL RESTRAINT SYSTEM" of this Service Manual.

WARNING:

- **To avoid rendering the Airbag system inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized SUBARU dealer.**
- **Improper maintenance, including incorrect removal and installation of the Airbag system, can lead to personal injury caused by unintentional activation of the Airbag system.**
- **All Airbag system electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the Supplemental Restraint System "Airbag".**

1. Body Electrical

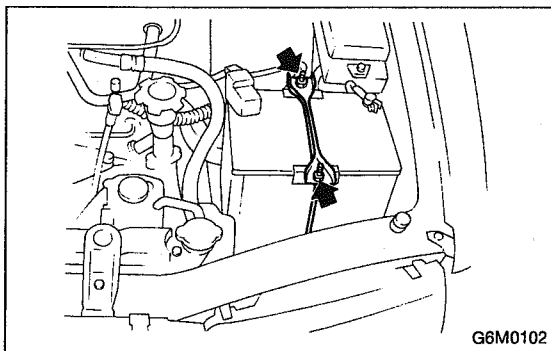
Battery	Type		MT model: 55D23L (MF)	AT model: 75D23L (MF)
	Capacity	Reverse capacity	MT model: 100 minutes	AT model: 120 minutes
		Cold cranking ampere	MT model: 430 amperes	AT model: 520 amperes
Combination meter	Speedometer		Eddy current type	
	Temperature gauge		Thermistor cross coil type	
	Fuel gauge		Resistance cross coil type	
	Tachometer		Electric impulse type	
	Turn signal indicator light		12 V — 1.4 W	
	Charge indicator light		12 V — 1.4 W	
	Oil pressure indicator light		12 V — 1.4 W	
	ABS warning light		12 V — 1.4 W	
	CHECK ENGINE warning light (Malfunction indicator light)		12 V — 1.4W	
	HI-beam indicator light		12 V — 3.4 W	
	Door open warning light		12 V — 1.4 W	
	Seat belt warning light		12 V — 1.4 W	
	Brake fluid and parking brake warning light		12 V — 3.4 W	
	FWD indicator light		12 V — 1.4 W	
	AIRBAG warning light		12 V — 1.4 W	
	Meter illumination light		12 V — 3.4 W	
AT OIL TEMP. warning light		12 V — 1.4 W		
Headlight			12 V — 60/55 W (Halogen)	
Front turn signal light			12 V — 27 W	
Side turn signal light			12 V — 3.8 W	
Side marker/Parking light			12 V — 3.8 W	
Rear combination light	Tail/Stop light		12 V — 8/27 W	
	Turn signal light		12 V — 27W	
	Back-up light		12 V — 27 W	
License plate light			12 V — 3.8 W	
High-mount stop light			Sedan: 12 V — 18 W Wagon: 12 V — 13 W	
Room light			12 V — 8 W	
Spot light			12 V — 8 W	
Trunk room light			12 V — 5 W	
Luggage room light			12 V — 5 W	
Front wiper motor	Input		12 V — 54 W or less	
Rear wiper motor	Input		12 V — 42 W or less	
Front washer motor	Pump type		Centrifugal	
	Input		12 V — 36 W or less	
Rear washer motor	Pump type		Centrifugal	
	Input		12 V — 36 W or less	
Horn			12 V — 350 Hz	
Cigarette lighter	Input		12 V — 120 W	
Rear window defogger	Input		12 V — 160 W	
	Indicator light		12 V — 50 mA	
Cargo socket	Input		12 V — 120 W	

1. Precaution

- Before disassembling or reassembling parts, always disconnect battery ground cable. When repairing radio, control units, etc. which are provided with memory functions, record memory contents before disconnecting battery ground cable. Otherwise, these contents are cancelled upon disconnection.
- Reassemble parts in reverse order of disassembly procedure unless otherwise indicated.
- Adjust parts to specifications contained in this manual if so designated.
- Connect connectors and hoses securely during reassembly.
- After reassembly, ensure functional parts operate smoothly.

CAUTION:

- Airbag system wiring harness is routed near the electrical parts and switch.
- 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 ignition key cylinder.



2. Battery

A: REMOVAL AND INSTALLATION

- 1) Disconnect the positive (+) terminal after disconnecting the negative (-) terminal of battery.
- 2) Remove flange nuts from battery rods and take off battery holder.
- 3) Remove battery.
- 4) Installation is in the reverse order of removal.

Tightening torque:

$3.4 \pm 1.0 \text{ N}\cdot\text{m}$ ($0.35 \pm 0.1 \text{ kg}\cdot\text{m}$, $2.5 \pm 0.7 \text{ ft}\cdot\text{lb}$)

NOTE:

- Clean battery cable terminals and apply grease to retard the formation of corrosion.
- Connect the positive (+) terminal of battery and then the negative (-) terminal of the battery.

B: INSPECTION**WARNING:**

- Electrolyte has toxicity; be careful handling the fluid.
- Avoid contact with skin, eyes or clothing. Especially at contact with eyes, bluish with water for 15 minutes and get prompt medical attention.
- Batteries produce explosive gasses. Keep sparks, flame, cigarettes away.
- Ventilate when charging or using in enclosed space.
- For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
- Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
- To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it WHILE you are at the same time in contact with any other metallic portion of the vehicle because a short circuit will be caused.

1. BATTERY

1) External parts:

Check for the existence of dirt or cracks on the battery case, top cover, vent plugs, and terminal posts. If necessary, clean with water and wipe with a dry cloth. Apply a thin coat of grease on the terminal posts to prevent corrosion.

2) Electrolyte level:

Check the electrolyte level in each cell. If the level is below MIN LEVEL, bring the level to MAX LEVEL by pouring distilled water into the battery cell. Do not fill beyond MAX LEVEL.

3) Specific gravity of electrolyte:

(1) Measure specific gravity of electrolyte using a hydrometer and a thermometer.

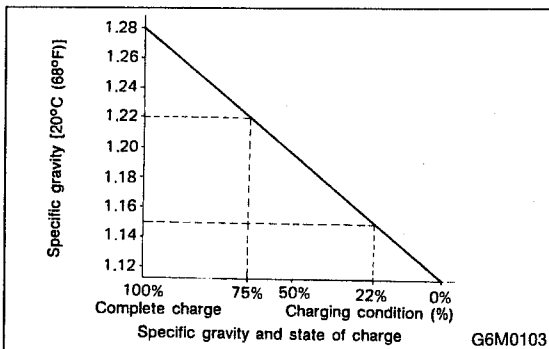
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following Equation:

$$S_{20} = S_t + 0.0007 \times (t - 20)$$

S_{20} : Specific gravity corrected at electrolyte temperature of 20°C

S_t : Measured specific gravity

t : Measured temperature (°C)



Determine whether or not battery must be charged, according to corrected specific gravity.

Standard specific gravity: 1.220 — 1.290 [at 20°C (68°F)]

(2) Measuring the specific gravity of the electrolyte in the battery will disclose the state of charge of the battery. The relation between the specific gravity and the state of charge is as shown in figure.

C: CHARGING

WARNING:

- **Do not bring an open flame close to the battery at this time.**

CAUTION:

- **Prior to charging, corroded terminals should be cleaned with a brush and common baking soda solution.**
- **Be careful since battery electrolyte overflows while charging the battery.**
- **Observe instructions when handling battery charger.**
- **Before charging the battery on vehicle, disconnect battery ground terminal. Failure to follow this rule may damage alternator's diodes or other electrical units.**

1. NORMAL CHARGING

Charge the battery at current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

2. QUICK CHARGING

Quick charging is a method in which the battery is charged in a short period of time with a relatively large current by using a quick charger.

Since a large current flow raises electrolyte temperature, the battery is subject to damage if the large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F). It should be also remembered that the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

CAUTION:

- **Observe the items in 1. NORMAL CHARGING.**
- **Never use more than 10 amperes when charging the battery because that will shorten battery life.**

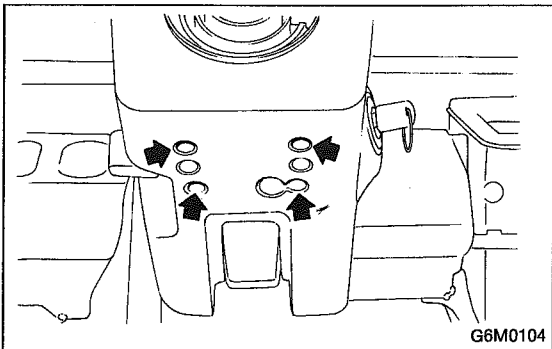
3. JUDGMENT OF BATTERY IN CHARGED CONDITION.

- 1) Specific gravity of electrolyte is held at a specific value in a range from 1.250 to 1.290 for more than one hour.
- 2) Voltage per battery cell is held at a specific value in a range from 2.5 to 2.8 volts for more than one hour.

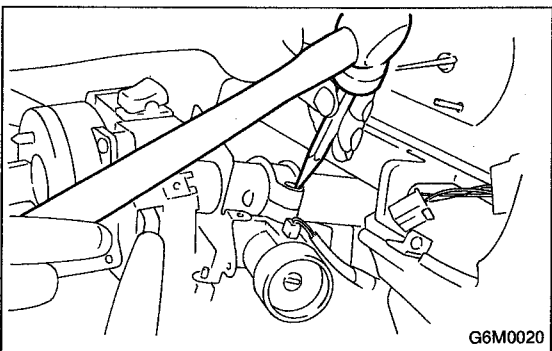
4. CHECK HYDROMETER FOR STATE OF CHARGE

Hydrometer indicator	State of charge	Required action
Green dot	Above 65%	Load test
Dark dot	Below 65%	Charge battery
Clear dot	Low electrolyte	Replace battery* (If cranking complaint)

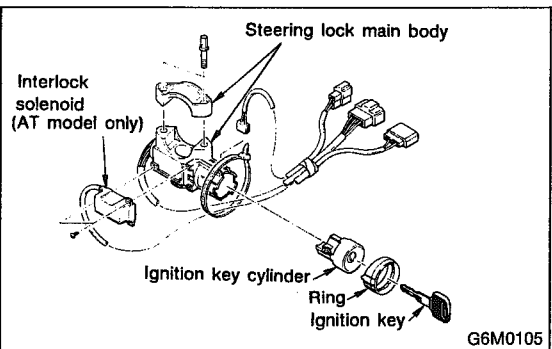
*: Check electrical system before replacement.

**3. Ignition Switch****A: REMOVAL AND INSTALLATION**

- 1) Remove screws, separate upper column cover and lower column cover.
- 2) Remove knee protector.
- 3) Remove meter visor.



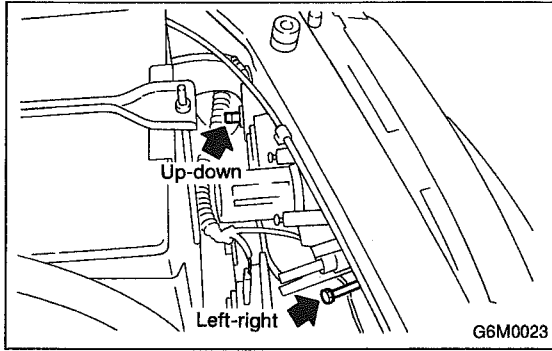
- 4) Disconnect ignition switch connector from body harness.
- 5) Using a drift and hammer, hit the torn bolt head to loosen and remove the ignition switch.



- 6) Installation is in the reverse order of removal.

NOTE:

When installing, tighten the connecting bolt until its head twists off.



4. Lighting

A: ADJUSTMENT

1. HEADLIGHT AIMING

1) Adjust the headlight aiming by turning the adjusting screws.

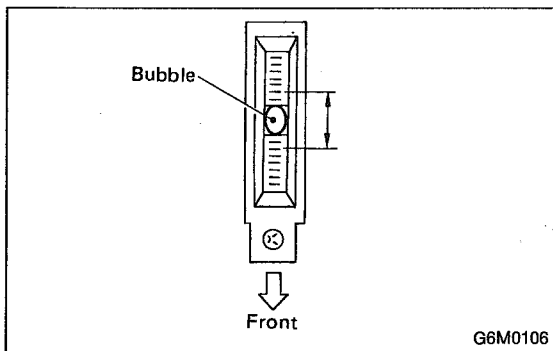
CAUTION:

Before checking the headlight aiming, be sure of the following:

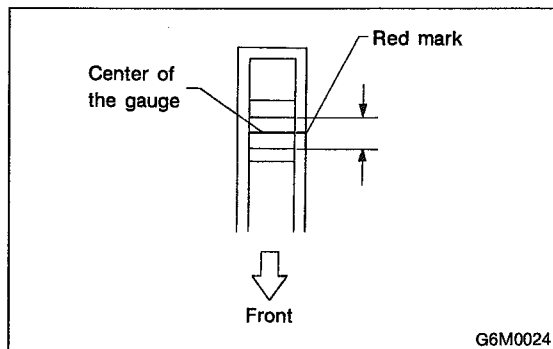
- Turn off the light before adjusting headlight aiming. If the light is necessary to check aiming, do not turn on for more than two minutes.
- The area around the headlight has not sustained any accident, damage or other type of deformation.
- Vehicle is parked on level ground.
- The inflation pressure of tires is correct.
- Vehicle's gas tank is fully charged.
- Bounce the vehicle several times to normalize the suspension.
- Make certain that someone is seated in the driver's seat.

NOTE:

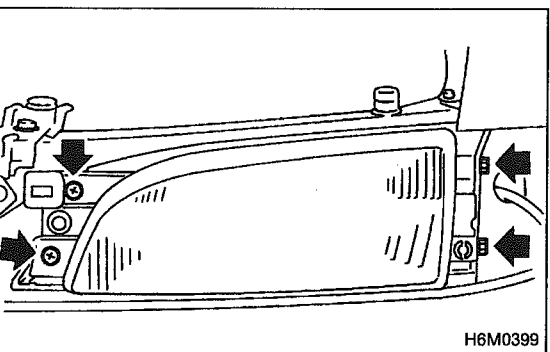
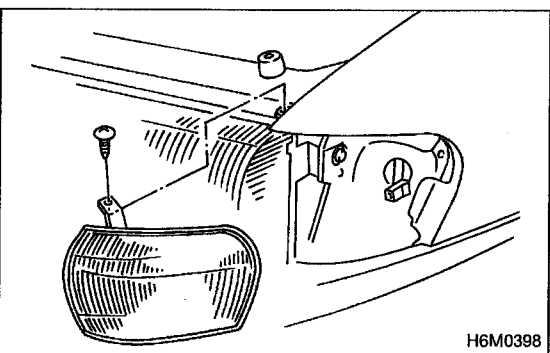
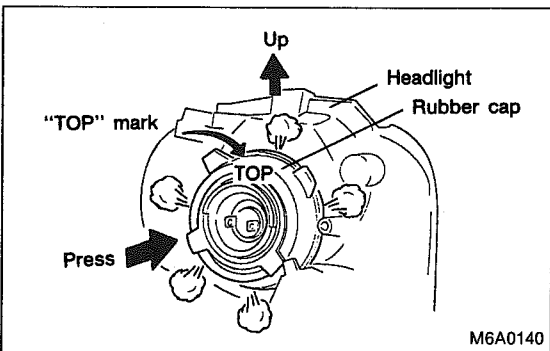
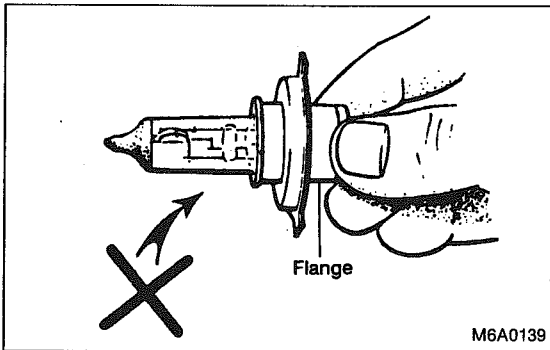
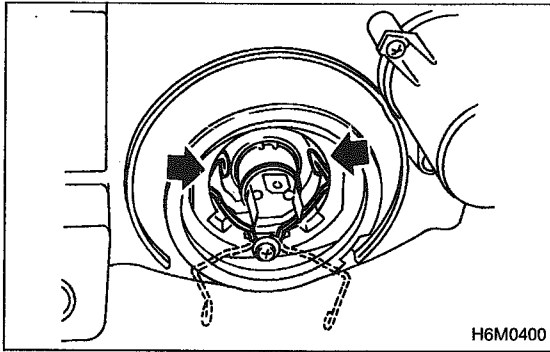
Adjust vertical aim first, then horizontal aim.



2) Look at the beam angle gauge (vertical movement). The bubble on the gauge should not deviate from the center of the gauge.



3) Look at the beam angle gauge (horizontal movement). The center mark (the red line on the inner scale) should not deviate from the red line on the outer case.



B: REMOVAL AND INSTALLATION

1. HEADLIGHT BULB

- 1) Disconnect the connector from inside of the engine compartment.
- 2) Remove rubber cap.
- 3) Remove the light bulb retaining spring to remove the bulb.
- 4) Replace the bulb with a new one and hook the spring.
- 5) Attach the rubber cap and connect the connector.

CAUTION:

● Since the tungsten halogen bulb operates at high temperature, dirt and oil on the bulb surface decreases the bulb's useful life. When replacing the bulb, hold the flange portion and do not touch the glass portion.

● Attach the rubber cap with letters TOP on the top so that the drain hole will be on the lower side.

● To keep water out, correctly engage the groove portion of the rubber cap.

2. HEADLIGHT AND SIDE MARKER LIGHT

- 1) Remove front grille and disconnect connector from headlight.
- 2) Remove screws which secure side marker light.
- 3) Remove side marker light while disconnecting connector.

- 4) Remove screws and bolts which secure headlight and remove headlight.

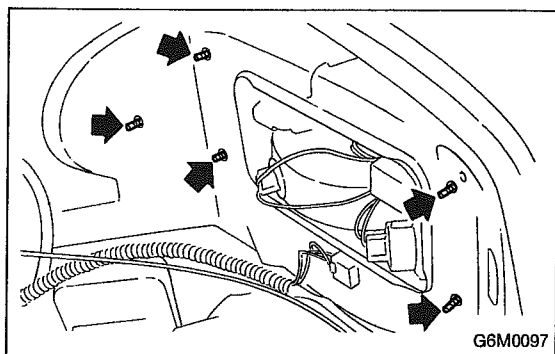
Tightening torque:

$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)

- 5) Installation is in the reverse order of removal.

NOTE:

When installing, securely fit clip (on fender side) into locating (on side marker light side).



3. REAR COMBINATION LIGHT

- 1) Remove rear trim.
- 2) Remove nuts and disconnect connector.

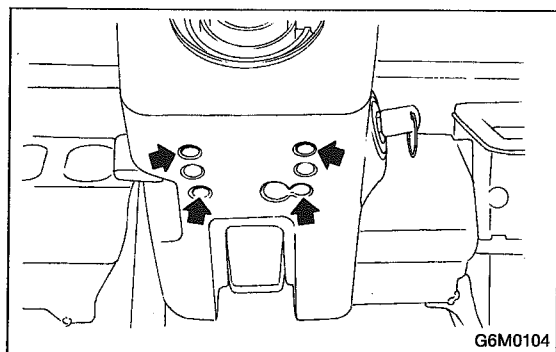
Tightening torque:

$6.4 \pm 0.5 \text{ N}\cdot\text{m}$ ($0.65 \pm 0.05 \text{ kg}\cdot\text{m}$, $4.7 \pm 0.4 \text{ ft}\cdot\text{lb}$)

- 3) Attach adhesive cloth tape to body area around rear combination light.
- 4) Using a standard screwdriver, carefully pry rear combination light off and away from the front of vehicle.
- 5) Installation is in the reverse order of removal.

CAUTION:

- Do not pry rear combination light forcefully as this may scratch vehicle body.
- Remove all traces of adhesive tape from body before installation.
- Attach butyl rubber tape to back of rear combination light before installing rear combination light on body for sealing purposes.



4. COMBINATION SWITCH (WITHOUT AIRBAG MODEL)

NOTE:

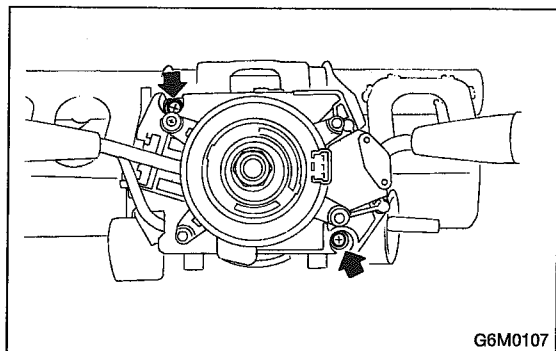
For the removal procedure of combination switch, refer to procedure for removal of combination switch on airbag equipped model. <Ref. to 5-5 [W6A0].>

- 1) Remove steering wheel.
- 2) Remove screws which secure upper column cover to lower column cover.
- 3) Remove screws which secure knee protector and remove knee protector.

CAUTION:

When installing knee protector, ensure that harness is not caught by adjacent parts.

- 4) Disconnect connector from body harness and undo holddown band.



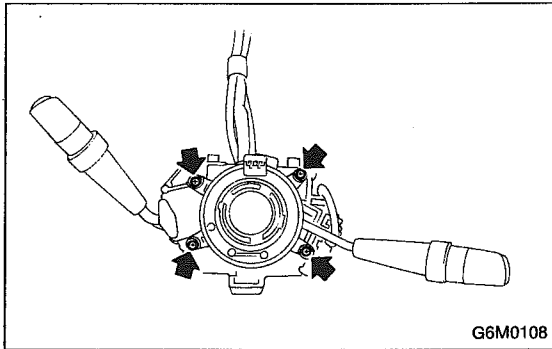
- 5) Remove screws which secure switch and remove switch.
- 6) Installation is in the reverse order of removal.

CAUTION:

During installation (with key interlock):

- When routing combination switch harness around steering system, do not place it over key interlock release knob.
- After installing lower column cover, ensure that key interlock release knob is accessible.

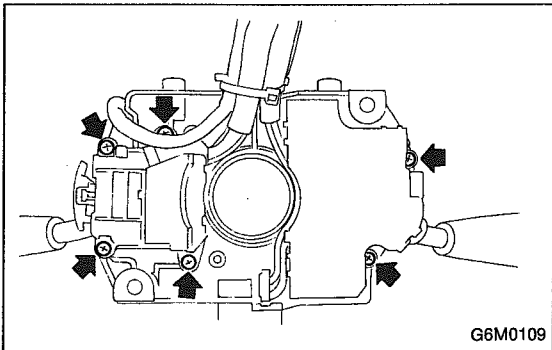
4. Lighting



C: DISASSEMBLY AND ASSEMBLY

1. COMBINATION SWITCH

1) Remove screws which secure slip ring to combination switch, and remove slip ring.



2) Remove screws which secure lighting switch, wiper and washer switch. Remove both switches.

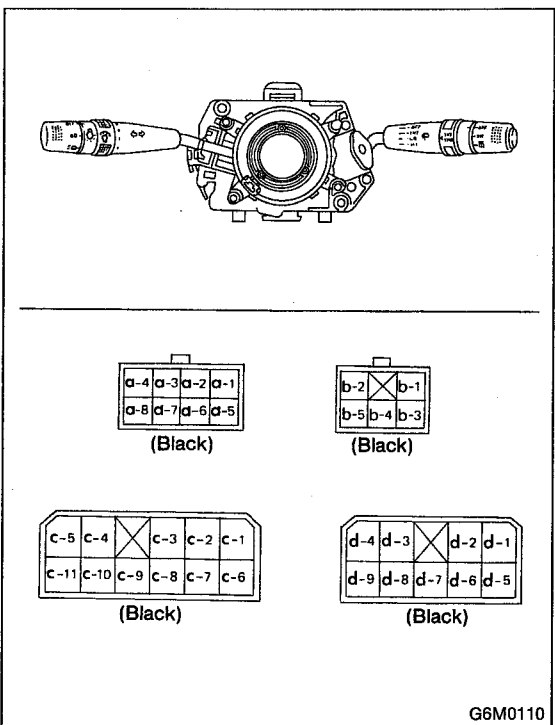
3) Assembly is in the reverse order of disassembly.

D: INSPECTION

1. COMBINATION SWITCH (ON-CAR)

1) Remove instrument panel lower cover.
2) Remove lower column cover.

3) Unfasten holddown clip which secures harness, and disconnect connectors from body harness.



4) Move combination switch to respective positions and check continuity between terminals.

LIGHTING SWITCH

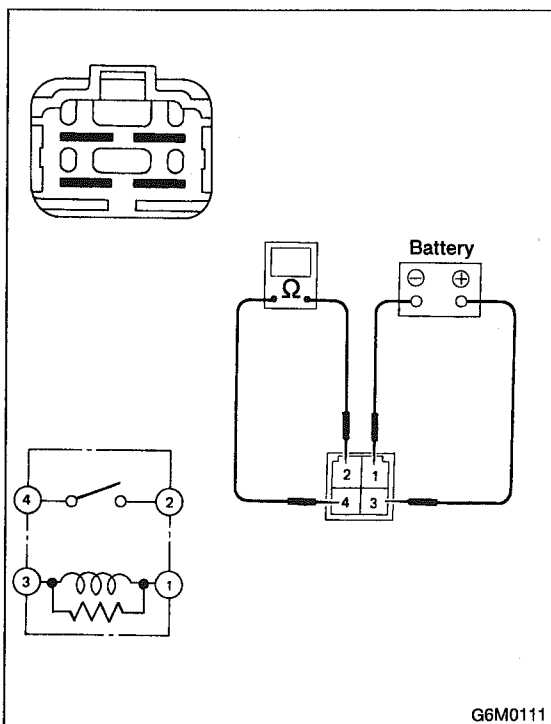
Terminal (Wire color)	c-1 (W)	c-2 (W)	c-3 (R)
Switch position			
OFF			
Tail	○	○	
Head	○	○	○

PARKING SWITCH

Terminal (Wire color)	c-10 (R)	c-11 (RG)	c-9 (RW)
Switch position			
OFF	○	○	
ON		○	○

DIMMER AND PASSING SWITCH

Terminal (Wire color)	a-3 (B)	a-2 (RB)	a-1 (RY)	a-4 (YR)
Switch position				
Flash	○		○	○
Low beam	○	○		
Hi-beam	○		○	



G6M0111

2. HEADLIGHT RELAY

Check continuity between terminals when terminal No. 3 is connected to battery and terminal No. 1 is grounded.

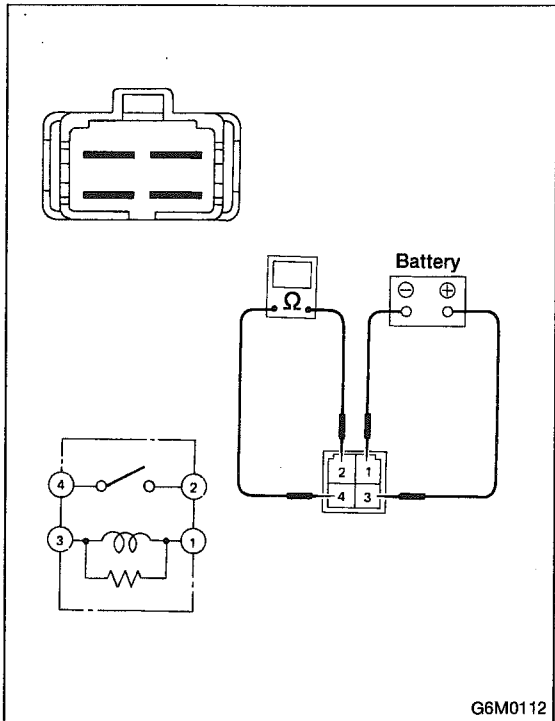
When current flows.	Between terminals No. 2 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 3	Continuity exists.

4. Lighting

3. TAIL AND ILLUMINATION RELAY

Check continuity between terminals (indicated in table below) when terminal No. 3 is connected to battery and terminal No. 1 is grounded.

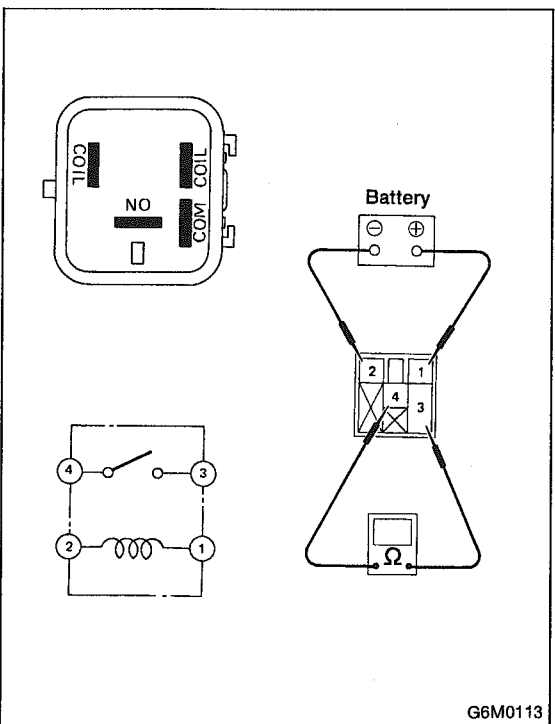
When current flows.	Between terminals No. 2 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 2 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 3	Continuity exists.

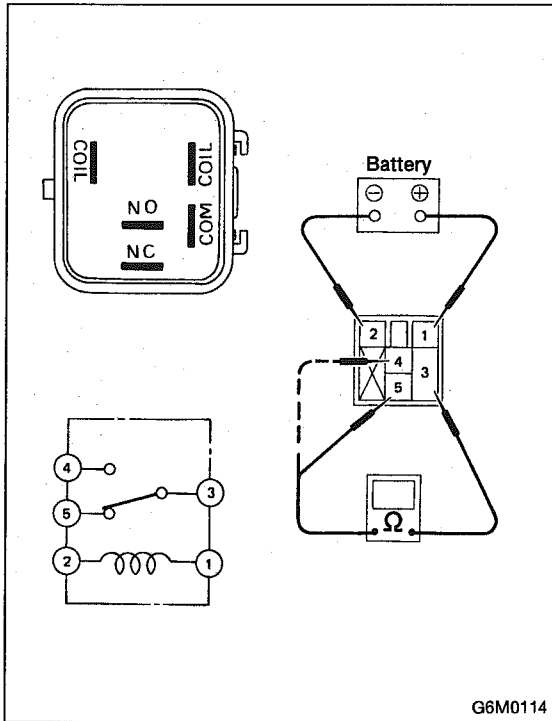


4. DAYTIME RUNNING LIGHT RELAY

1) Check continuity between terminals when terminal No. 1 is connected to battery and terminal No. 2 is grounded.

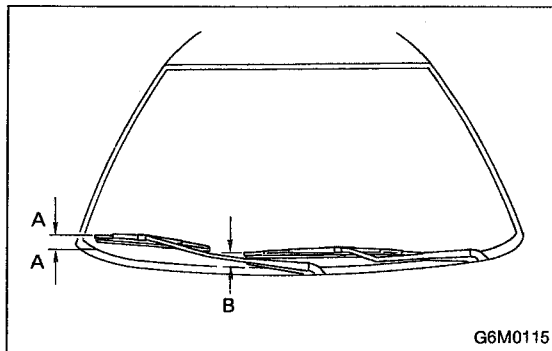
When current flows.	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.





2) Check continuity between terminals when terminal No. 1 is connected to battery and terminal No. 2 is grounded.

When current flows.	Between terminals No. 3 and No. 5	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 5	Continuity exists.
	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



5. Front Wiper and Washer

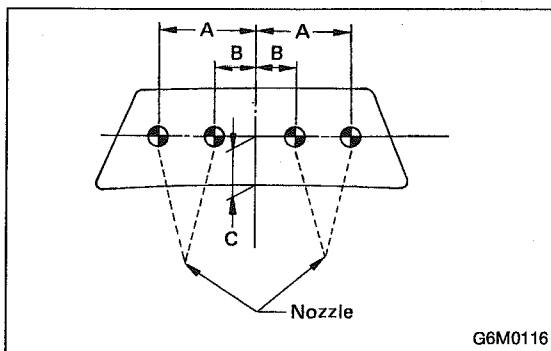
A: ADJUSTMENT

- 1) Turn the wiper switch to OFF position.
- 2) Adjust blades in original position as shown in figure by changing wiper arm installation.

Original position:

A: 22.5 ± 7.5 mm (0.886 ± 0.295 in)

B: 32.5 ± 7.5 mm (1.280 ± 0.295 in)



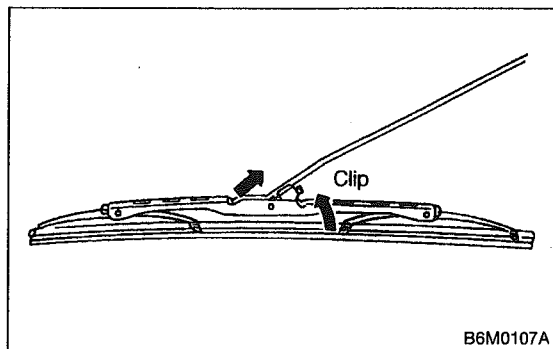
- 3) Adjust washer ejecting point on windshield glass as shown in figure when car stops.

Ejecting point:

A: 375 mm (14.76 in)

B: 150 mm (5.91 in)

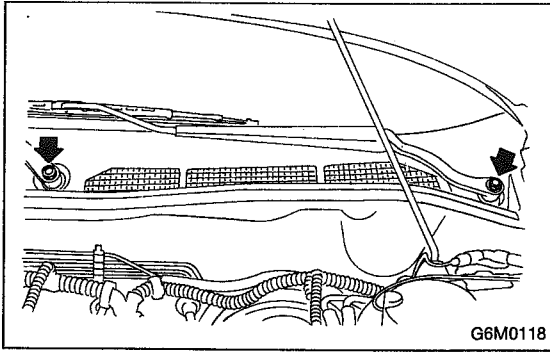
C: 350 mm (13.78 in)



B: REMOVAL AND INSTALLATION

1. BLADE

- 1) Pull out blade following the arrow direction, from arm while pushing up locking clip.
- 2) Installation is in the reverse order of removal.

**2. WIPER ARM**

- 1) Open front hood.
- 2) Remove cap. Remove the nut which secure wiper arm, and remove wiper arm.
- 3) Installation is in the reverse order of removal.

Tightening torque:

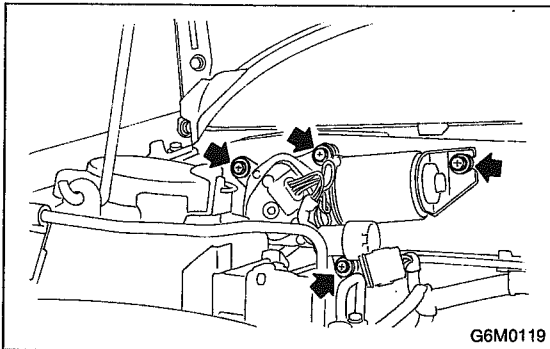
$14 \pm 4 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.4 \text{ kg}\cdot\text{m}$, $10.1 \pm 2.9 \text{ ft}\cdot\text{lb}$)

3. WIPER MOTOR AND LINK

- 1) Detach weatherstrip and cowl panel. <Ref. to 5-1 [W12A0].>

NOTE:

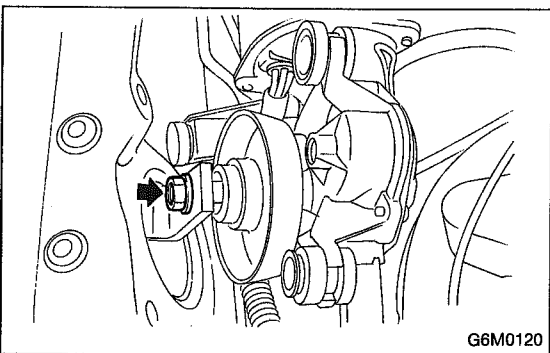
Apply silicone oil or soap water to both sides of cowl net to facilitate removal.



- 2) Disconnect electric connector, and remove motor attaching bolts.

Tightening torque:

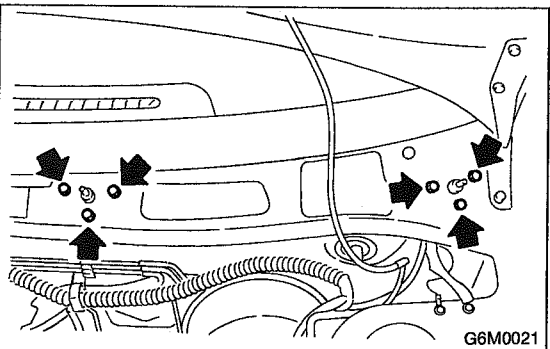
$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)



- 3) Remove nut securing motor link on the back side of motor.

Tightening torque:

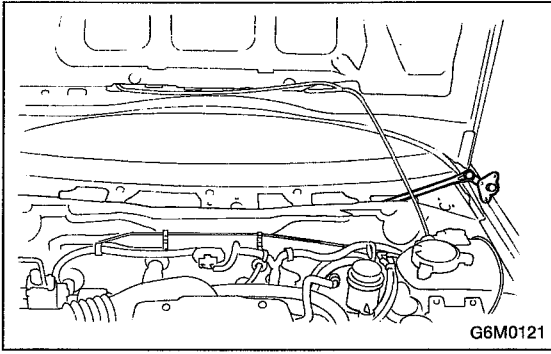
$15 \pm 3 \text{ N}\cdot\text{m}$ ($1.5 \pm 0.3 \text{ kg}\cdot\text{m}$, $11 \pm 2.2 \text{ ft}\cdot\text{lb}$)



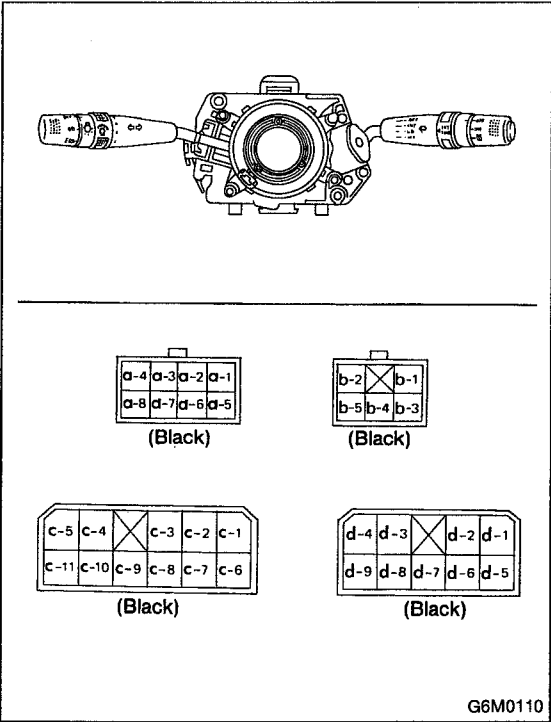
- 4) Remove nuts which secure sleeve unit.

Tightening torque:

$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)



- 5) Remove wiper link from service hole in front panel.
- 6) Installation is in the reverse order of removal.



C: INSPECTION

1. COMBINATION SWITCH (ON-CAR)

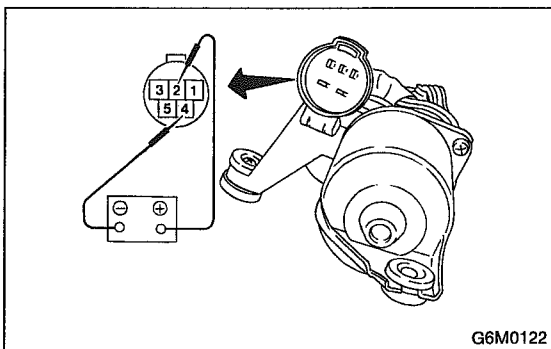
Set wiper switch to each position and check continuity between terminals.

Wiper switch

Terminal (Wire color)		d-9 (Y)	d-8 (L)	d-6 (LY)	d-7 (LW)	INT1	INT2
Switch position							
OFF	OFF	○—○					
	MIST	x—x		x			
INT	OFF	○—○				○—○	
	MIST	x—x		x		○—○	
LO	OFF		○—○				
	MIST		○—○				
HI	OFF			○—○			
	MIST			○—○	○—○		

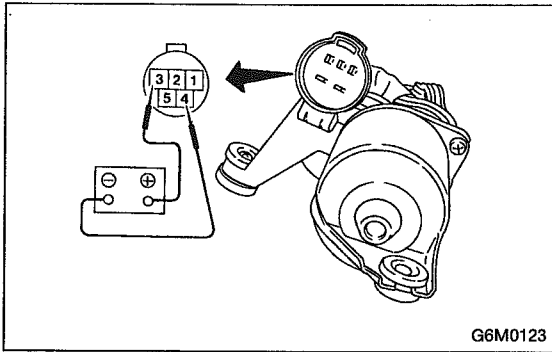
Washer switch

Terminal (Wire color)	d-5 (B)	d-2 (W)
Switch position		
OFF		
ON	○—○	○—○

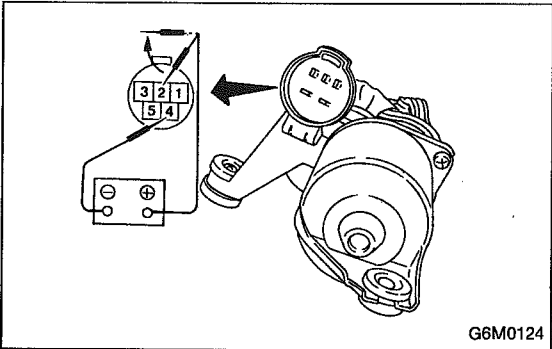


2. WIPER MOTOR

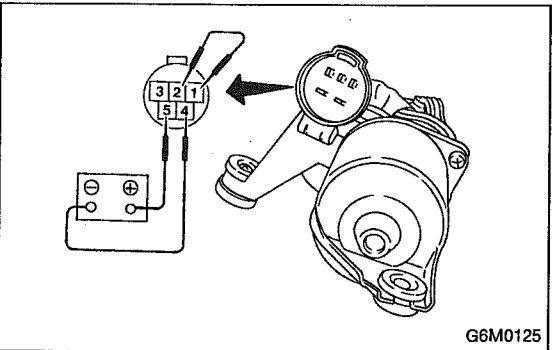
- 1) Check wiper motor operation at low speed: Connect battery to wiper motor. Check wiper motor for proper operation at low speed.



2) Check wiper motor operation at high speed:
Connect battery wiper motor. Check wiper motor for proper operation at high speed.



3) Check wiper motor for proper stoppage:
Connect battery to wiper motor. After operating wiper motor at low speed, disconnect battery to stop it.



4) Reconnect battery and ensure that wiper motor stops at "AUTO STOP" after operating at low speed.

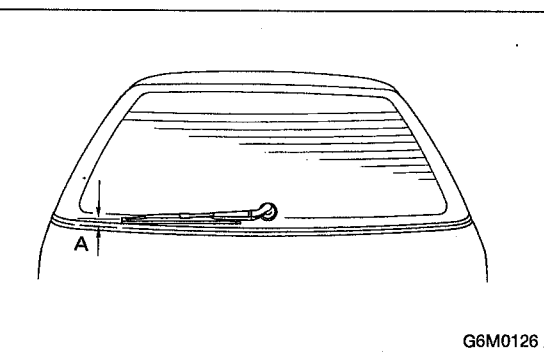
6. Rear Wiper and Washer

A: ADJUSTMENT

1) Adjust wiper blade in original position as shown in figure by changing wiper arm installation.

Original position:

A: $30 \pm 5 \text{ mm}$ (1.18 \pm 0.20 in)

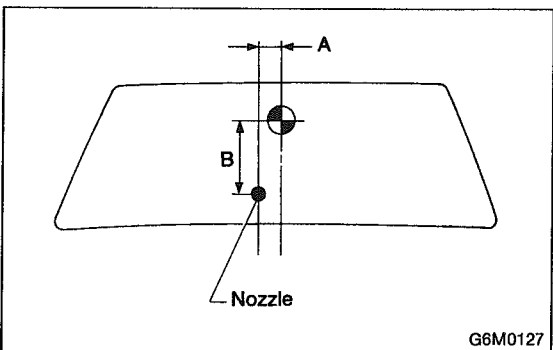


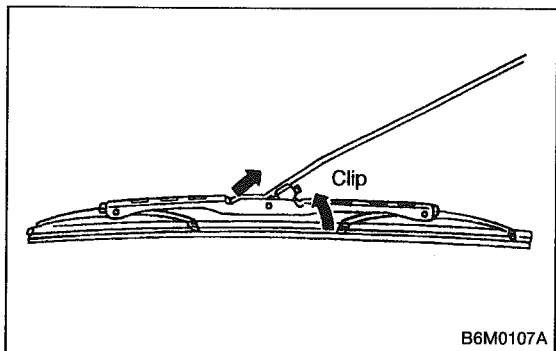
2) Adjust washer ejecting point on rear gate window as shown in figure when the vehicle stops.

Ejecting point:

A: 25 mm (0.98 in)

B: 200 — 300 mm (7.87 — 11.81 in)

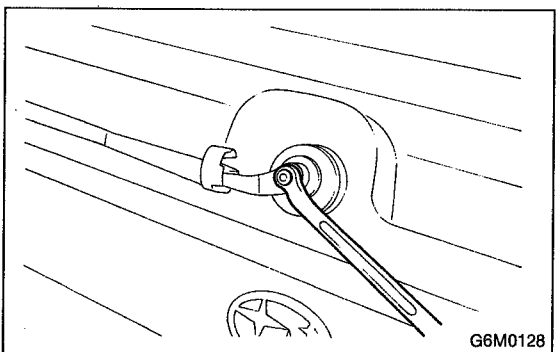




B: REMOVAL AND INSTALLATION

1. BLADE

- 1) Pull out blade following the arrow direction, from arm while pushing up locking clip.
- 2) Installation is in the reverse order of removal.

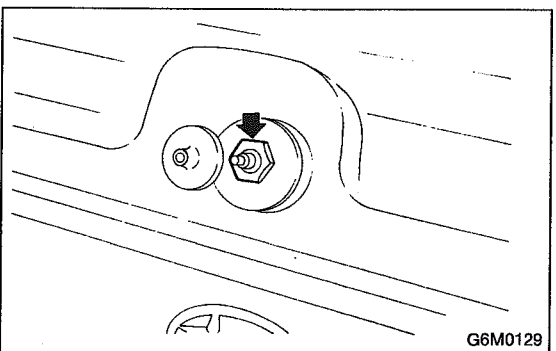


2. WIPER ARM

- 1) Remove head cover.
- 2) Remove nut and wiper arm.
- 3) Installation is in the reverse order of removal.

Tightening torque:

$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)



3. WIPER MOTOR

- 1) Remove cap and special nut.

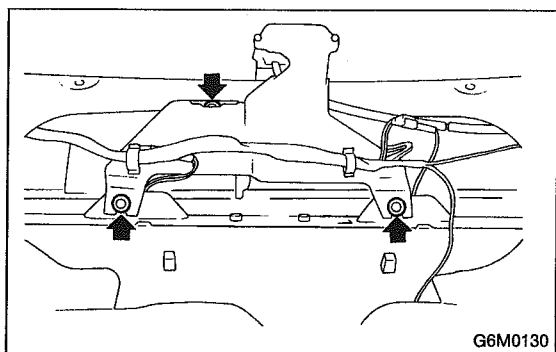
CAUTION:

Be careful not to strike service tool against nozzle during removal.

Tightening torque:

$7.4 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.15 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.1 \text{ ft}\cdot\text{lb}$)

- 2) Remove rear gate trim. <Ref. to 5-2 [W11A0].>
- 3) Undo clips which secure harness, and disconnect connector of wiper motor.



- 4) Separate washer hoses at joint.
- 5) Remove attaching screws and take out wiper motor assembly.

CAUTION:

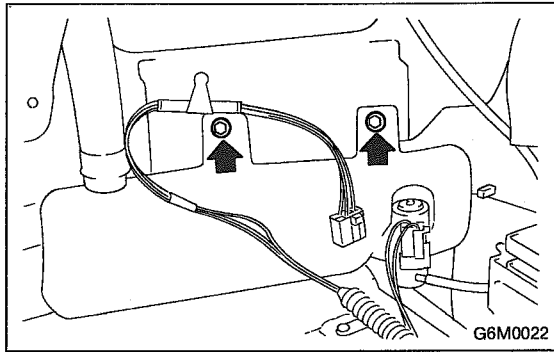
Be careful not to damage O-ring when removing wiper motor assembly.

- 6) Installation is in the reverse order of removal.

Tightening torque:

$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)

6. Rear Wiper and Washer

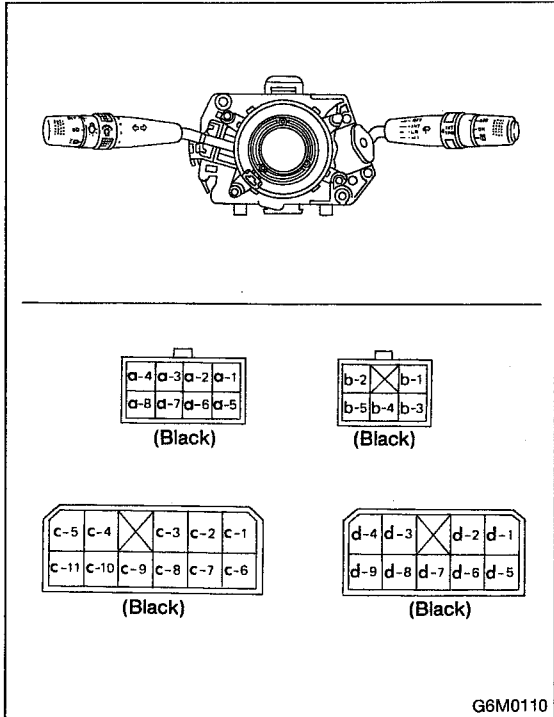


4. WASHER TANK

- 1) Remove rear quarter trim.
- 2) Disconnect washer hose and connector.
- 3) Remove attaching bolts.
- 4) Installation is in the reverse order of removal.

Tightening torque:

5.9 ± 1.5 N·m (0.6 ± 0.15 kg·m, 4.3 ± 1.1 ft·lb)



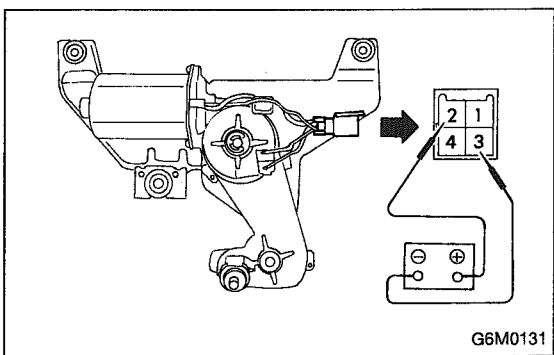
C: INSPECTION

1. COMBINATION SWITCH (ON-CAR)

Set rear wiper and washer switch to each position and check continuity between terminals.

WITHOUT INTERMITTENT REAR WIPER

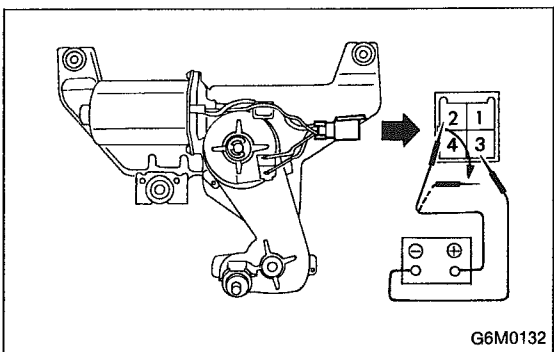
Switch position	Terminal d-2	Terminal d-1		Terminal d-3
WASH	○	○	—	○
OFF				
ON	○			○
WASH	○	○		○



2. WIPER MOTOR

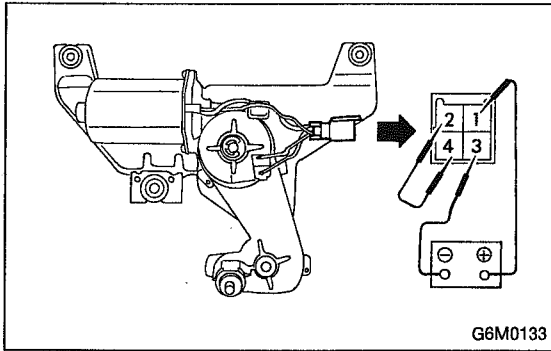
- 1) Operational check:

Connect battery to wiper motor and check operation of wiper motor.

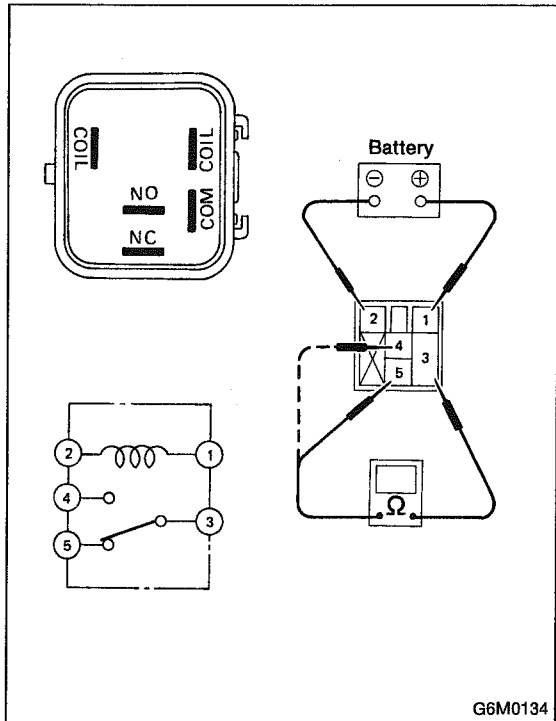


- 2) Check wiper motor for proper stoppage:

After operating wiper motor, disconnect battery from wiper motor.



3) Reconnect battery and ensure that wiper motor stops at "AUTO STOP" after it has been operated.

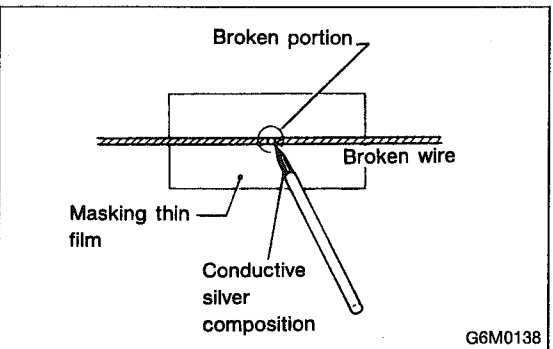
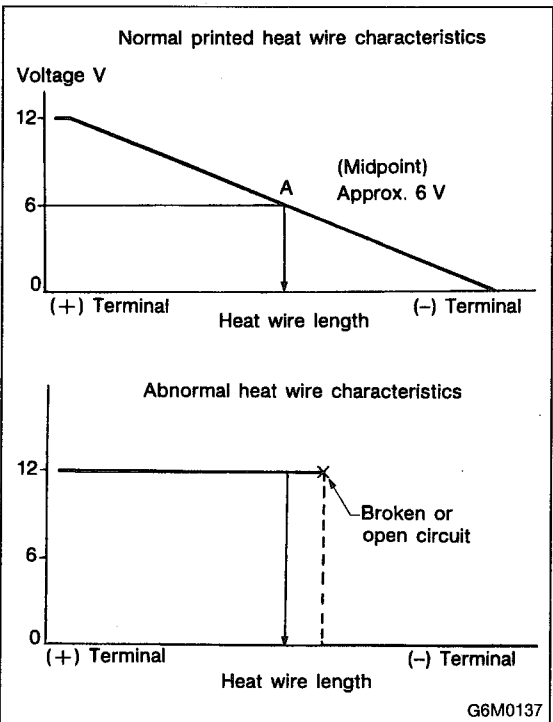
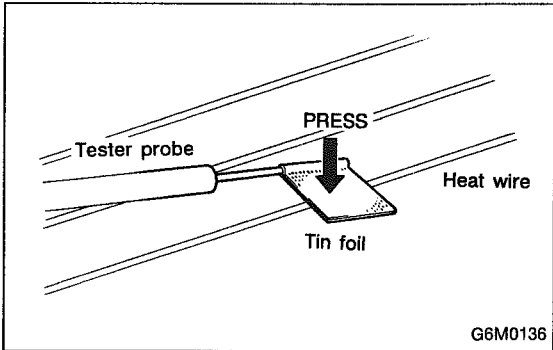
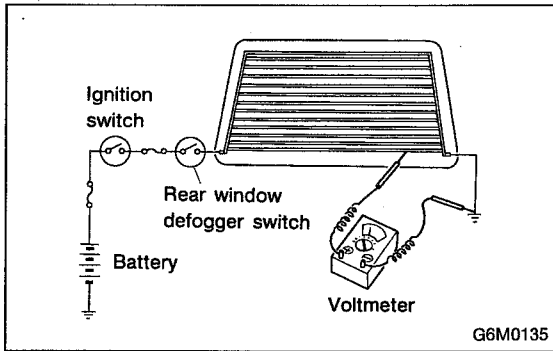


3. REAR WIPER RELAY

- 1) Connect battery to terminal No. 1 and ground terminal No. 2.
- 2) Check continuity between terminals.

When current flows.	Between terminals No. 3 and No. 5	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 5	Continuity exists.
	Between terminals No. 3 and No. 4	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.

7. Rear Window Defogger



7. Rear Window Defogger

A: INSPECTION

1. HEAT WIRES

- 1) Start the engine so that battery is being charged.
- 2) Turn defogger switch ON.
- 3) Check each heat wire at its center position for discontinuity by setting direct current voltmeter.

NOTE:

Normal indication is about 6 volts.

NOTE:

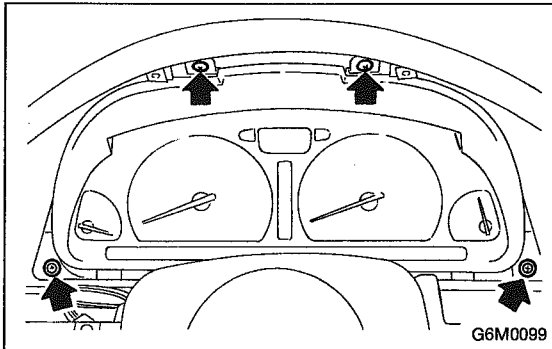
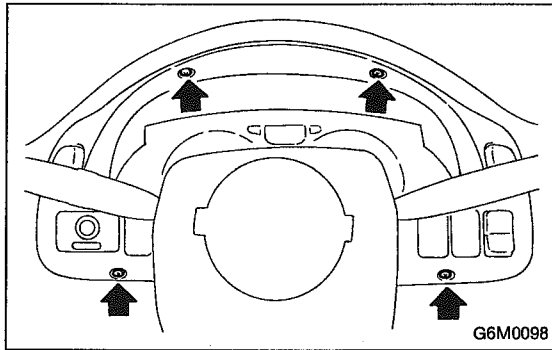
When measuring voltage, wind a piece of tin foil around the tip of the tester probe and press the foil against the wire with your finger.

- 4) When tester indicates 12 volts when its probe reaches point "A", a broken circuit occurs between point "A" and the negative terminal. Slowly move tester probe toward the negative terminal while contacting it on heat wire to locate point where tester indication changes abruptly (0 volts). This is the point where a broken circuit occurs.

When tester indicates 0 volts when its probe reaches point "A", a broken circuit occurs between point "A" and the positive terminal. Locate a point where tester indication changes abruptly (12 volts) while slowly moving tester probe toward the positive terminal.

B: REPAIR

- 1) Clean broken wire and its surrounding area.
- 2) Cut off slit on (used) thin film by 0.5 mm (0.020 in) width and 10 mm (0.39 in) length.
- 3) Place the slit on glass along the broken wire, and deposit conductive silver composition (DUPONT No. 4817) on the broken portion.
- 4) Dry out the deposited portion.
- 5) Inspect the repaired wire for continuity.



8. Combination Meter

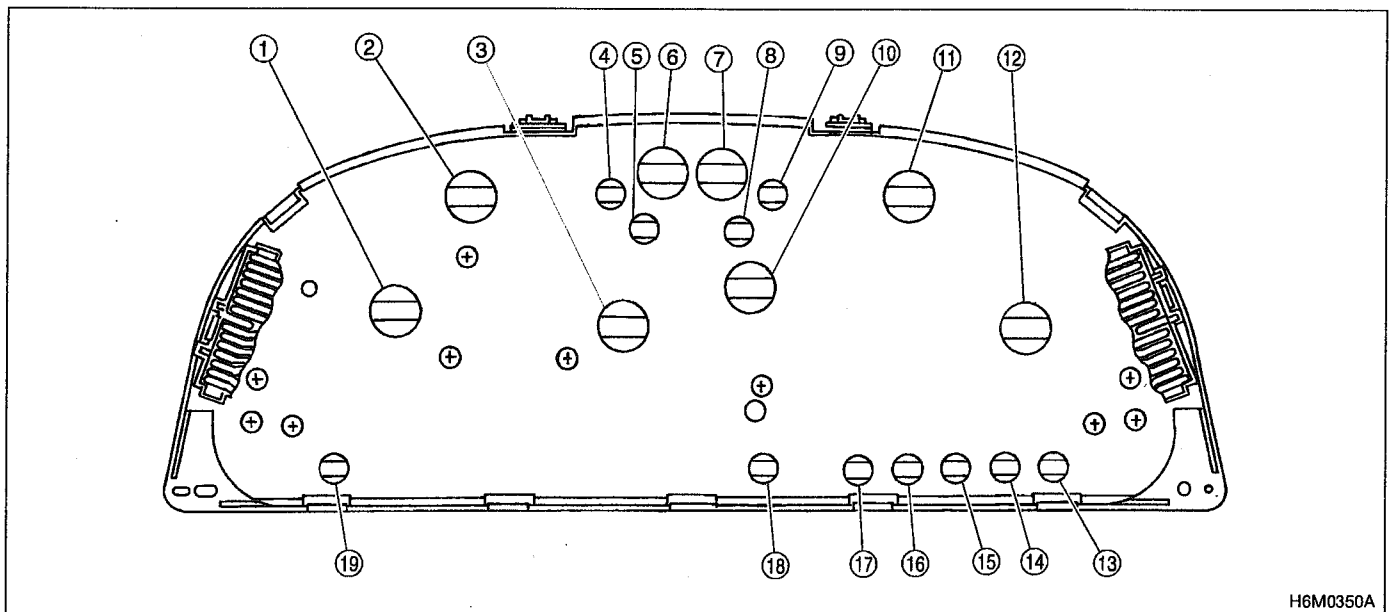
A: REMOVAL AND INSTALLATION

- 1) Move steering wheel down.
- 2) Remove screws which secure visor and remove visor.
- 3) Disconnect switch connectors.
- 4) Remove screws which secure combination meter, and pull combination meter out.
- 5) Disconnect connector and speedometer cable from back of combination meter.
- 6) Installation is in the reverse order of removal.

CAUTION:

When installing combination meter, be sure to connect speedometer cable and connectors to backside of combination meter.

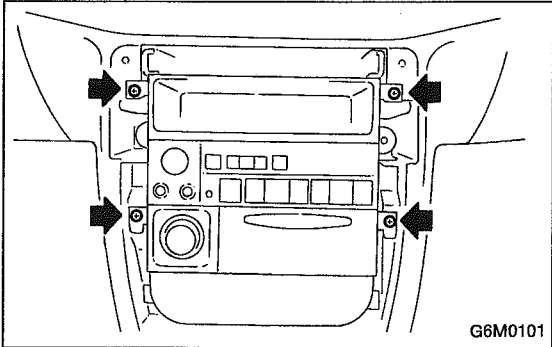
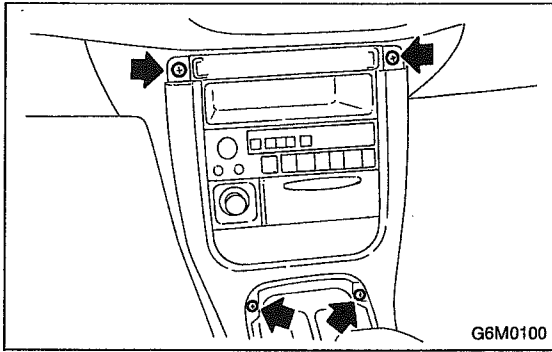
B: BULB REPLACEMENT



- ① Speedometer and fuel gauge
- ② Speedometer
- ③ Speedometer
- ④ Turn RH
- ⑤ Door open
- ⑥ HI-beam
- ⑦ Brake

- ⑧ Seat belt
- ⑨ Turn LH
- ⑩ Tachometer
- ⑪ Tachometer
- ⑫ Tachometer and temperature gauge
- ⑬ Check engine

- ⑭ Charge
- ⑮ Oil pressure
- ⑯ AT oil temp.
- ⑰ ABS
- ⑱ Rear defogger
- ⑲ FWD



9. Radio, Speaker and Antenna

A: REMOVAL AND INSTALLATION

1. RADIO BODY

- 1) Remove cup holder.
- 2) Remove AT cover (AT model).
- 3) Remove screws which secure center panel. Remove center panel.
- 4) Remove fitting screws, and slightly pull radio out of instrument panel.
- 5) Disconnect electric connectors and antenna feeder cord.
- 6) Installation is in the reverse order of removal.

2. FRONT SPEAKER

- 1) Remove front door trim and disconnect connector.
<Ref. to 5-2 [W2A2].>
- 2) Remove screws which secure front speaker.
- 3) Remove speaker and disconnect connector.
- 4) Installation is in the reverse order of removal.

3. REAR SPEAKER (WAGON)

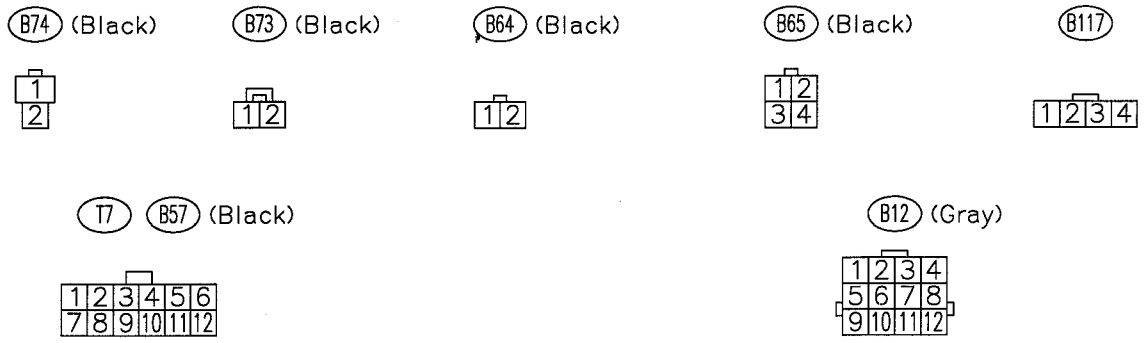
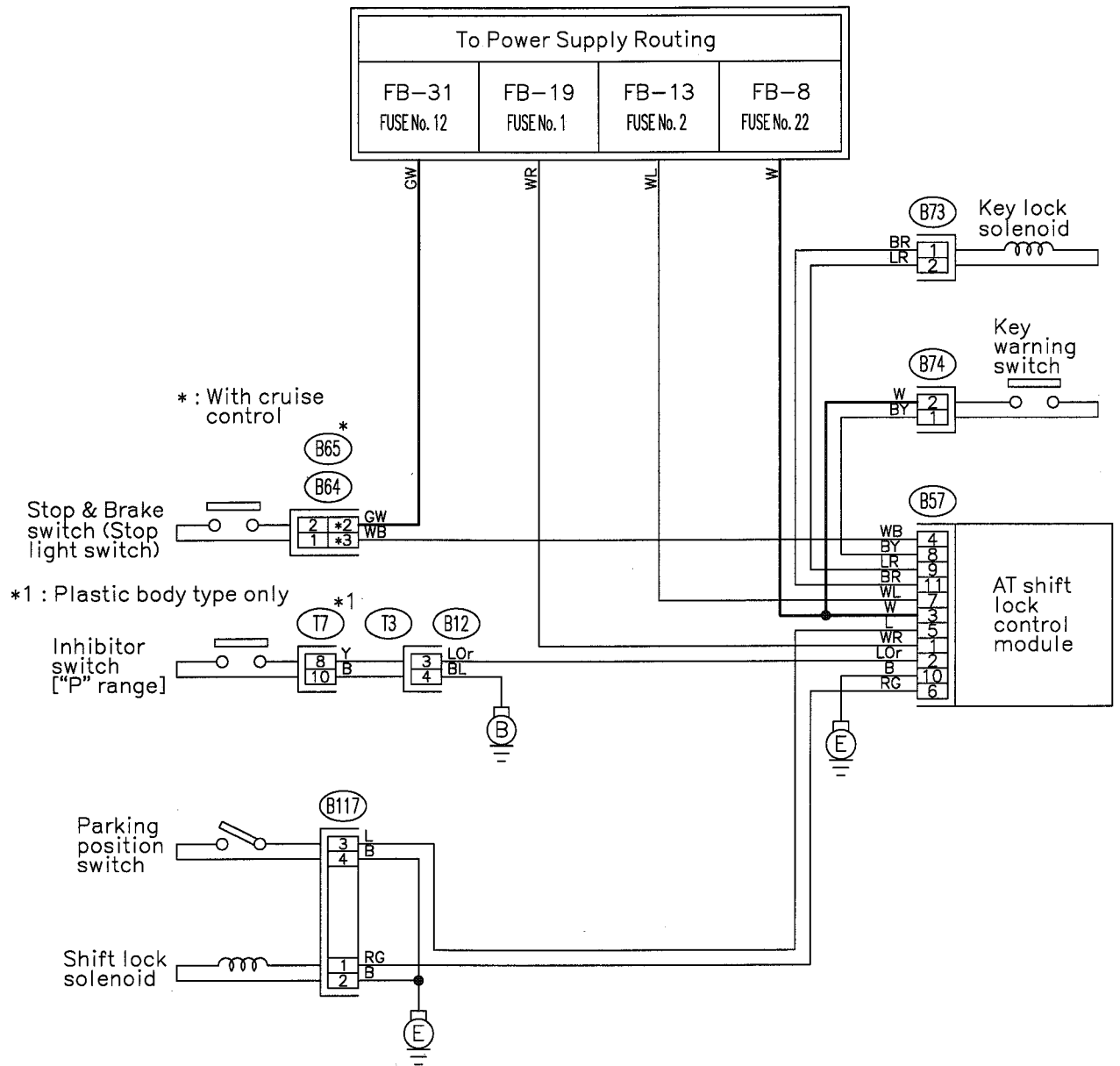
- 1) Remove rear door trim and disconnect connector.
<Ref. to 5-2 [W2A2].>
- 2) Remove screws which secure rear speaker.
- 3) Remove speaker and disconnect connector.
- 4) Installation is in the reverse order of removal.

4. REAR SPEAKER (SEDAN)

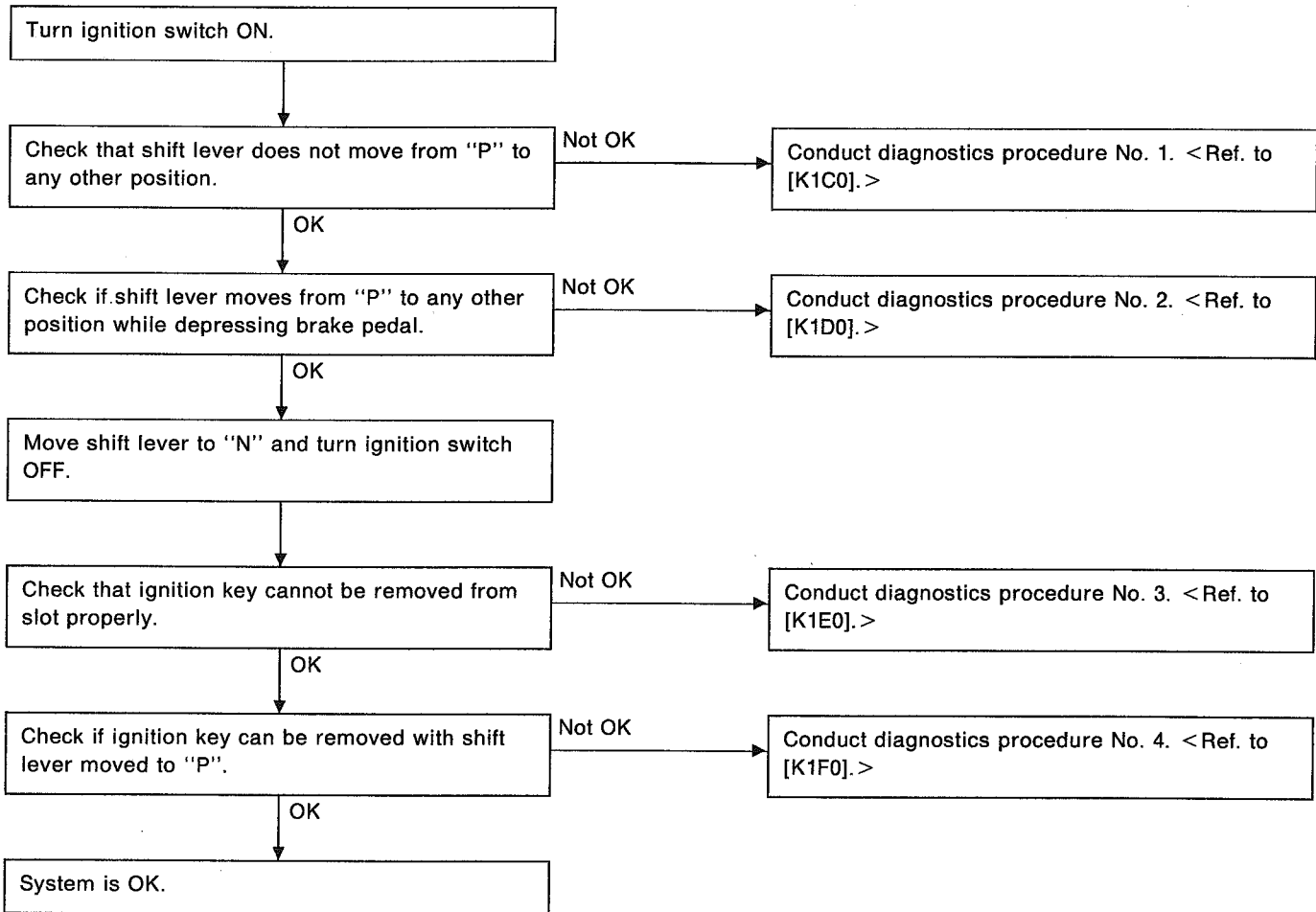
- 1) Remove rear shelf trim panels.
- 2) Remove screws which secure rear speakers.
- 3) Disconnect connector and remove speakers.
- 4) Installation is in the reverse order of removal.

1. AT Shift Lock System

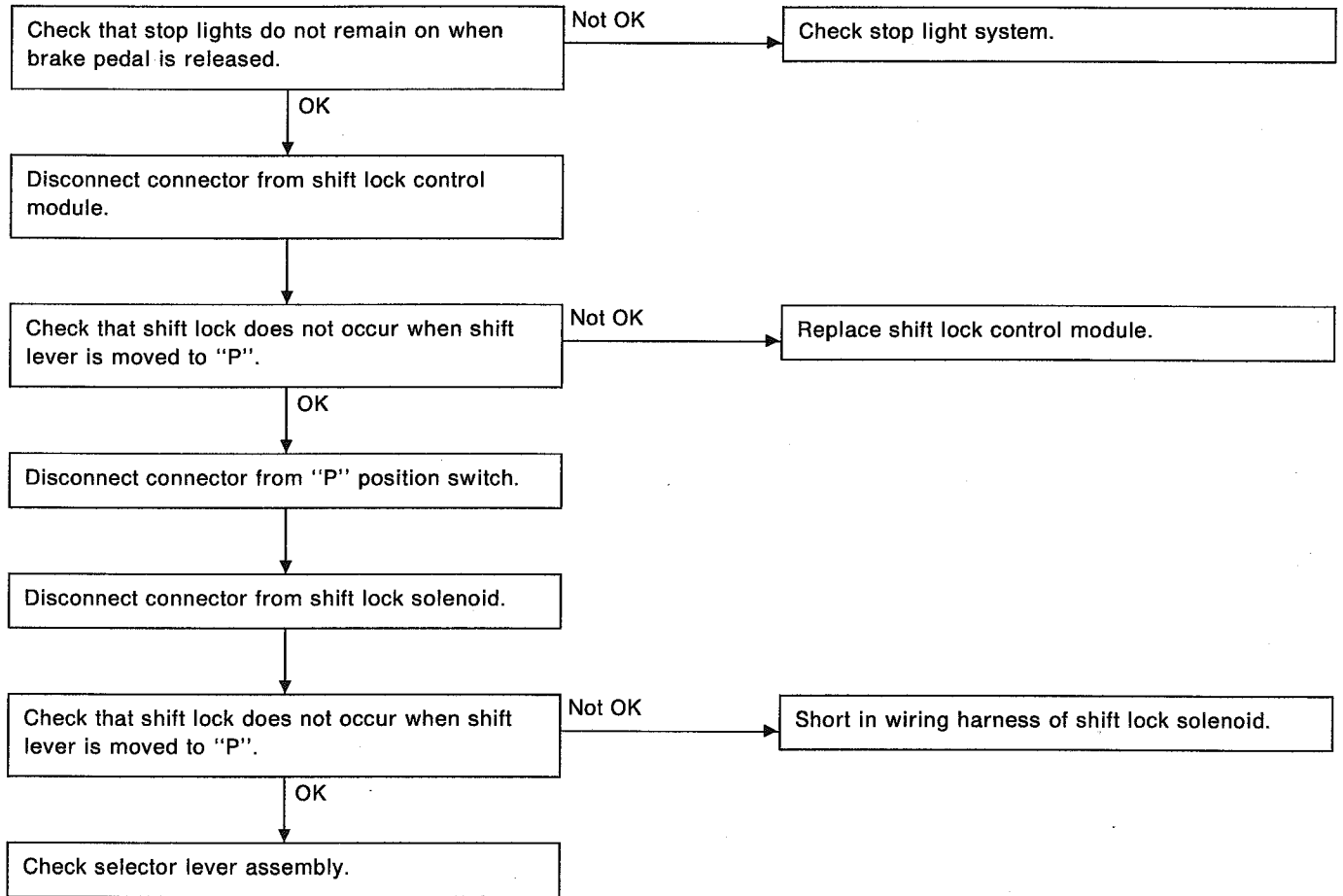
A: WIRING DIAGRAM

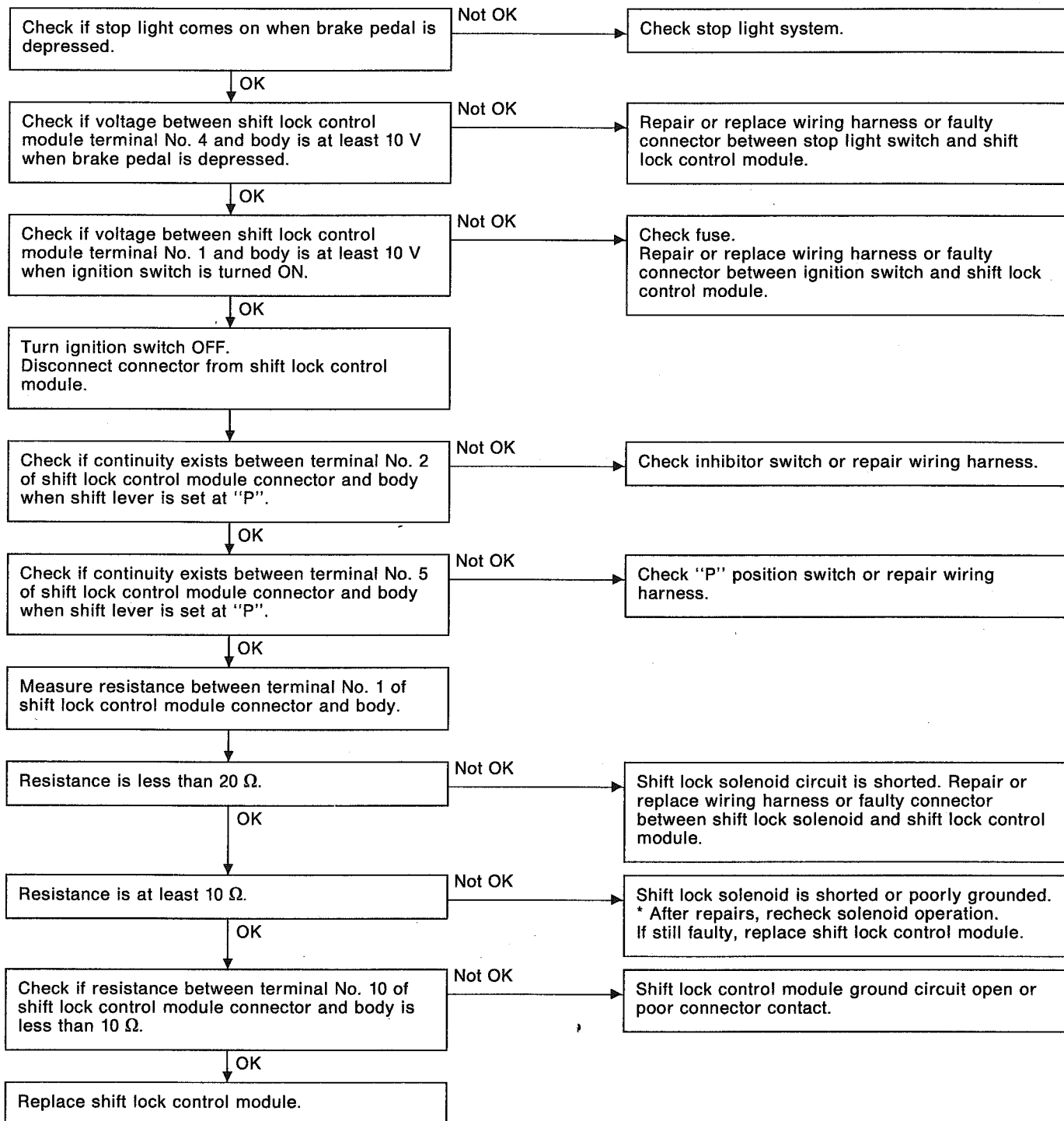


B: BASIC DIAGNOSTICS CHART

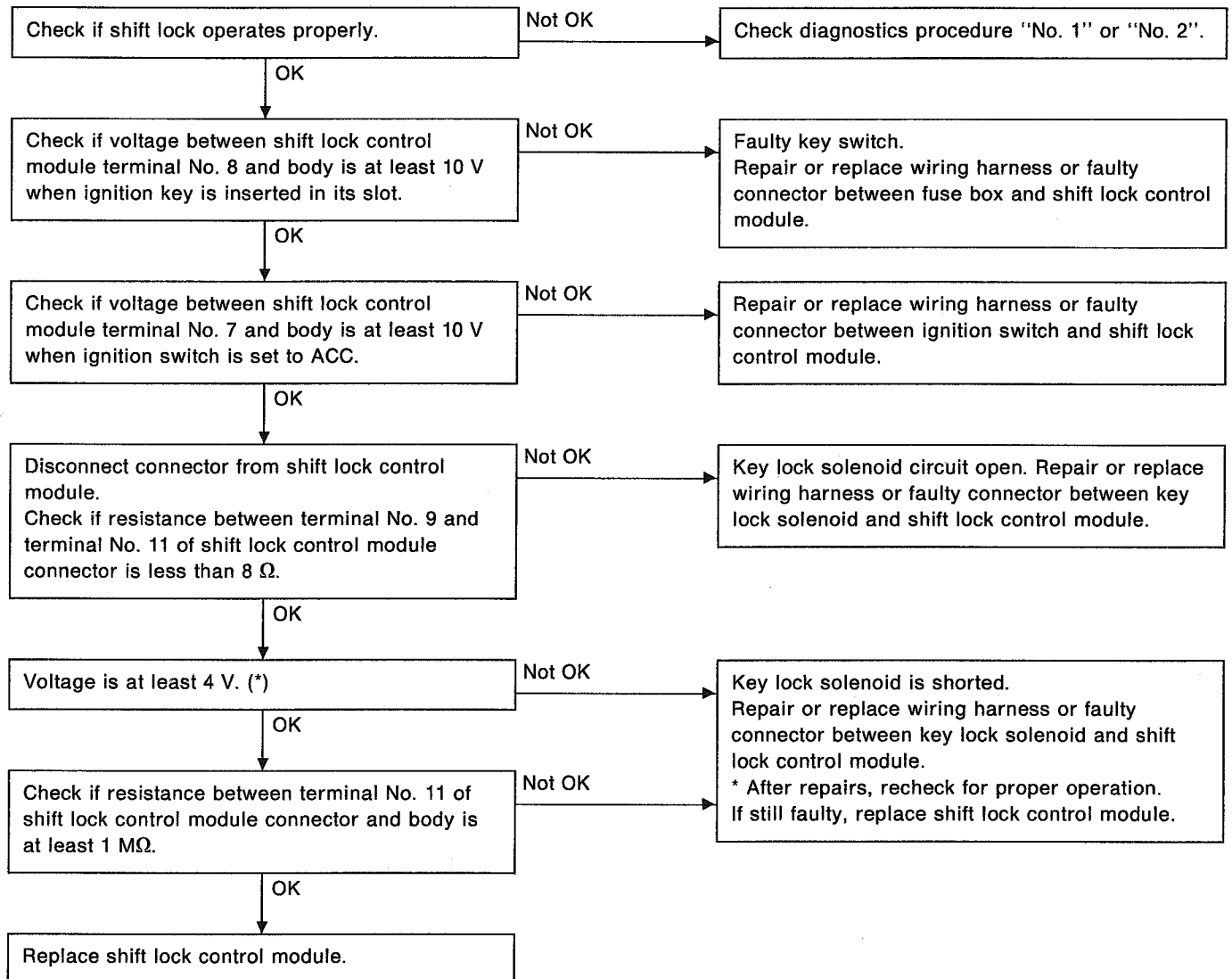


C: DIAGNOSTICS PROCEDURE No. 1



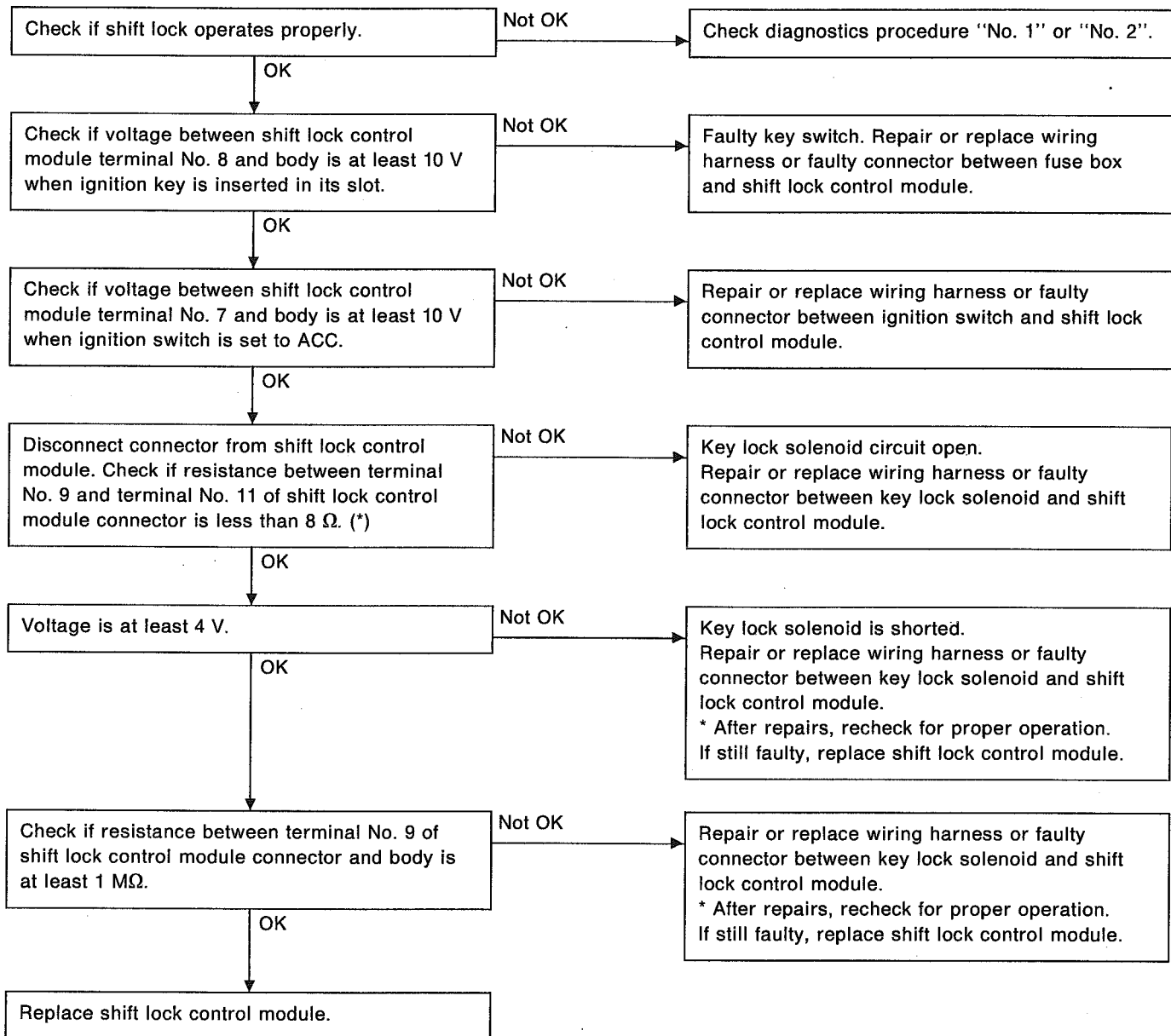
D: DIAGNOSTICS PROCEDURE No. 2 (SHIFT LOCK DOES NOT RELEASE.)

E: DIAGNOSTICS PROCEDURE No. 3 (KEY INTERLOCK DOES NOT OPERATE.)



*: When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.

F: DIAGNOSTICS PROCEDURE No. 4 (KEY INTERLOCK DOES NOT RELEASE.)



*: When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.

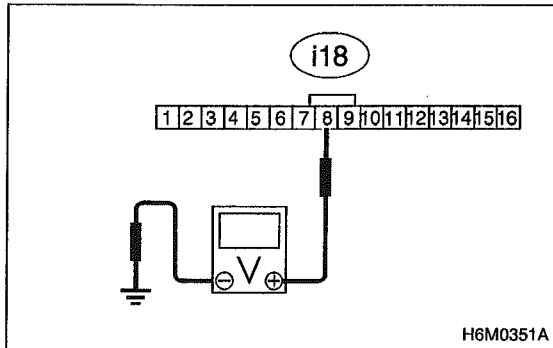
2. Combination Meter

A: DIAGNOSTICS PROCEDURE

If speedometer does not operate, or operates abnormally, check combination meter circuit.

CAUTION:

Make sure that trouble code of vehicle speed sensor 2 system appears in electrical system on-board diagnosis.



2A1 CHECK POWER SUPPLY FOR COMBINATION METER.

- 1) Remove combination meter.
- 2) Turn ignition switch to ON.
- 3) Measure voltage between combination meter connector and chassis ground.

CHECK : **Connector & terminal (i18) No. 8 (+) — Chassis ground (-): Is the voltage more than 10 V?**

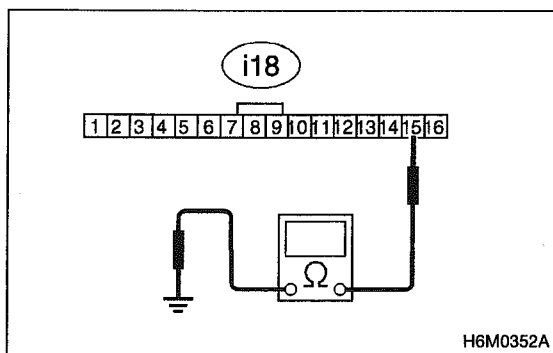
YES : Go to step **2A2**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between combination meter and battery.
- Poor contact in coupling connectors (i18) and combination meter connector. <Ref. to FOREWORD [T3C0].>



2A2 CHECK GROUND CIRCUIT OF COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between combination meter connector and chassis ground.

CHECK : **Connector & terminal (i18) No. 15 (+) — Chassis ground (-): Is the resistance less than 10 Ω?**

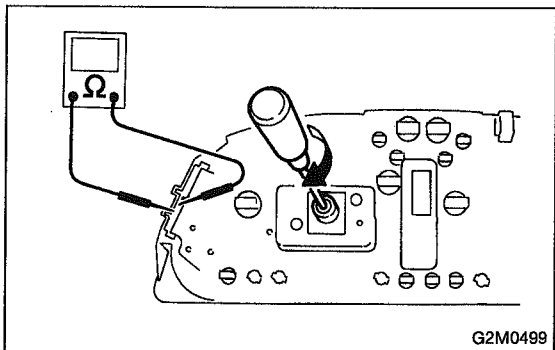
YES : Go to step **2A3**.

NO : Repair harness and connector.

2A3 CHECK VEHICLE SPEED SENSOR 2.

NOTE:

- If resistance between terminals of vehicle speed sensor 2 is out of specification, the sensor may have a failure.
- If resistance is OK, mechanical trouble may be present in combination meter, speedometer cable and speedometer drive/driven gears in transmission.



- 1) Remove combination meter.
- 2) Measure resistance between terminals of combination meter by rotating rotor of speedometer cable hole with screwdriver.

CHECK: **Terminals****No. 8 — No. 15:****Is the resistance between 10 Ω and 1 M Ω
(Four times per rotation)?****YES**

: Repair or replace combination meter.

NO

: Replace speedometer.

DIAGNOSTICS SECTION

FOREWORD

This portion of the 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.

The diagnostics relating to the Electronic Control System which is made up of various electronic components (ECM's etc.) are explained in this manual.

For the repair or exchange of defective parts, please refer to the SERVICE MANUAL (Repair Section).

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.

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1. Important Safety Notice

- Providing appropriate service and repair is a matter of great importance in the serviceman's safety maintenance and safe operation, function and performance which the SUBARU vehicle possesses.
- In case the replacement of parts or replenishment of consumables is required, genuine SUBARU parts whose parts numbers are designated or their equivalents must be utilized.
- It must be made well known that the safety of the serviceman and the safe operation of the vehicle would be jeopardized if he used any service parts, consumables, special tools and work procedure manuals which are not approved or designated by SUBARU.

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2. How to Use this Manual

● This Service Manual is divided into four volumes by section so that it can be used with ease at work. Refer to the Table of Contents, select and use the necessary section.

- GENERAL INFORMATION SECTION
- REPAIR SECTION
- DIAGNOSTICS SECTION
- WIRING DIAGRAM SECTION

● The description of each area is provided with four types of titles different in size as shown below. The Title No. or Symbol prefixes each title in order that the construction of the article and the flow of explanation can be easily understood.

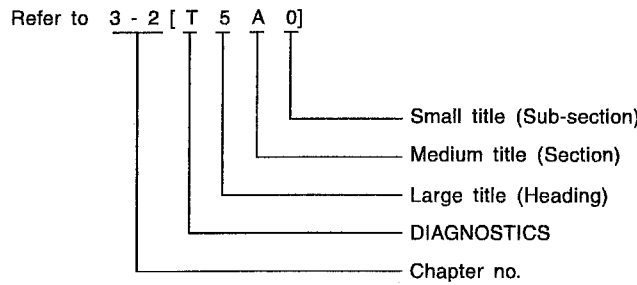
[Example of each title]

● Area title:	T. DIAGNOSTICS
● Large title (Heading):	1. Diagnostics Chart with Select Monitor (to denote the main item of explanation.)
● Medium title (Section):	A: BASIC DIAGNOSTICS CHART (to denote the type of work in principle.)
● Small title (Sub-section):	1. CHECK INPUT SIGNAL FOR ECM (to denote a derivative item of explanation.)

2. How to Use this Manual

- The Title Index No. is indicated on the top left (or right) side of the page as the book is opened. This is useful for retrieving the necessary portion.

(Example of usage)



Example of title placement
Title index No. 7

AUTOMATIC TRANSMISSION AND DIFFERENTIAL [T5A1] 3-2

5. Diagnostic Chart with Trouble Code

5. Diagnostic Chart with Trouble Code

A: TROUBLE CODE 11
— DUTY SOLENOID A —

DIAGNOSIS:
Output signal circuit of duty solenoid A or resistor is open or shorted

TROUBLE SYMPTOM:
Excessive shift shock

```

    graph TD
      Step1[1 Measure signal voltage output emitted from TCM.] -- Not OK --> Repair1[Repair TCM terminal poor contact. (Replace TCM.)]
      Step1 -- OK --> Step2[2 Check harness and connectors between TCM and duty solenoid A and TCM and resistor.]
      Step2 -- Not OK --> Repair2[Repair or replace harness/connector.]
      Step2 -- OK --> Repair3[Repair TCM terminal poor contact. (Replace TCM.)]
    
```



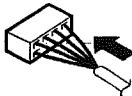
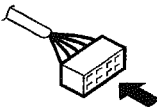
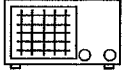


1. MEASURE SIGNAL VOLTAGE OUTPUT EMITTED FROM TCM.

- 1) Warm-up the engine and transmission.
- 2) Ignition switch ON (Engine OFF)
- 3) Move shift lever to "N"
- 4) While opening and closing throttle valve, measure voltage between TCM connector and body.

Connector & terminal / Specified resistance:
(B52) No. 11—No. 13 /
1.5—4.0 V (Throttle is fully closed.)
0.5 V, max. (Throttle is fully open.)

Small title

- In this manual, the following symbols are used.

Character	Description
 <p style="text-align: right;">B0M0002</p>	<p>Circuit tester</p> <ul style="list-style-type: none"> ● Voltage measurement
 <p style="text-align: right;">B0M0003</p>	<p>Circuit tester</p> <ul style="list-style-type: none"> ● Resistance measurement
 <p style="text-align: right;">B0M0004</p>	<p>The arrow indicates that insertion of the probe or numbering of the connector pins is made from the side.</p>
 <p style="text-align: right;">B0M0005</p>	<p>The arrow indicates that insertion of the probe or numbering of the connector pins is made from the side.</p>
 <p style="text-align: right;">B0M0006</p>	<p>Oscilloscope</p>
 <p style="text-align: right;">B0M0007</p>	<p>Oscilloscope positive probe</p>
 <p style="text-align: right;">B0M0008</p>	<p>Oscilloscope earth head</p>

● **WARNING, CAUTION, NOTE**

- **WARNING:** Indicates the item which must be observed precisely during performance of maintenance services in order to avoid injury to the mechanics and other persons.
- **CAUTION:** Indicates that item which must be followed precisely during performance of maintenance services so as to avoid damage and breakage to the vehicle and its parts and components.
- **NOTE:** Indicates the hints, knacks, etc. which make the maintenance job easier.

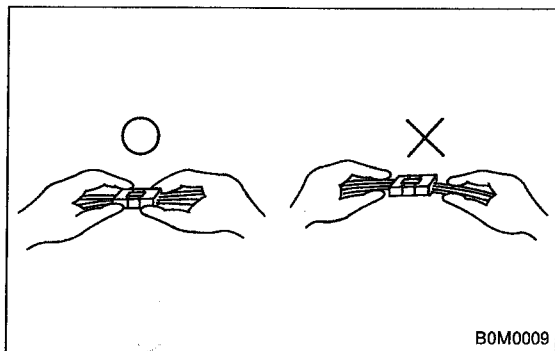
3. Basic Checks

A: DISCONNECTING CONNECTORS

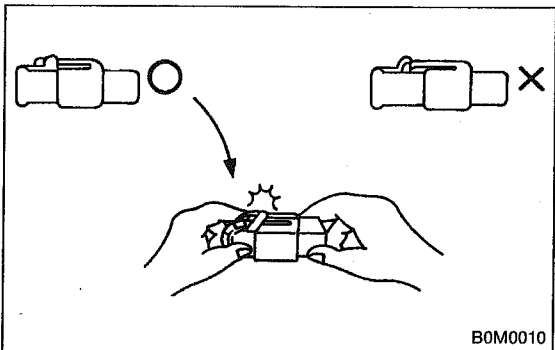
- Always hold the connector itself.

CAUTION:

Don't pull the harness.

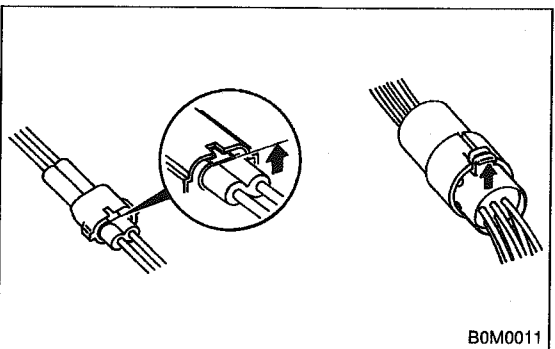


B0M0009



B0M0010

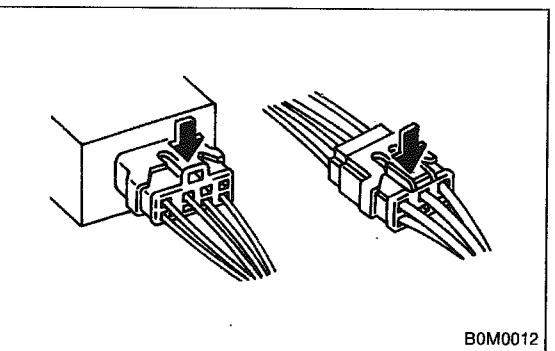
- Inspect a connector by pushing it all the way in. If the connector is equipped with a locking device, push it in until a clicking sound is heard.



B0M0011

- To disconnect a locking connector, first release the lock, then pull the connector off.

< Unlock by pulling the locking tab. >

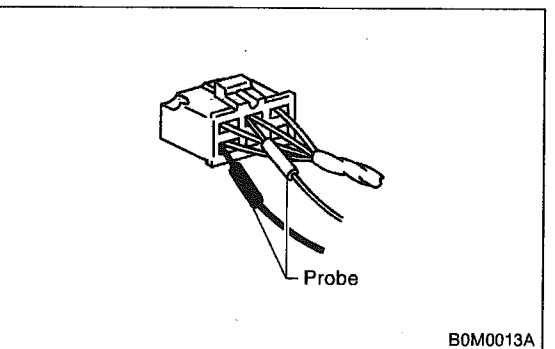


B0M0012

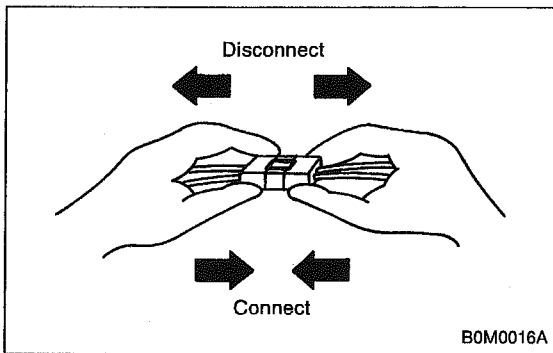
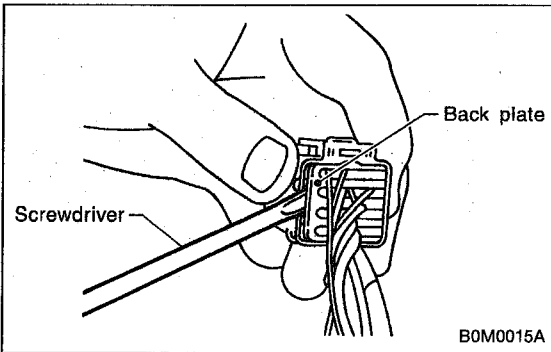
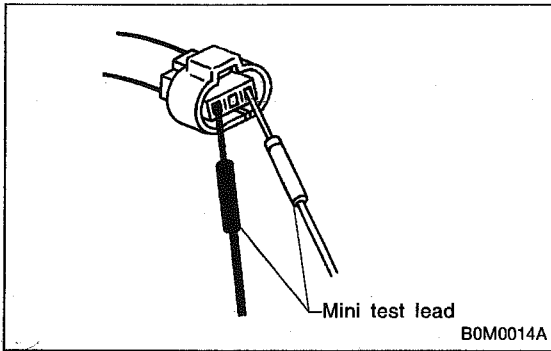
< Unlock by pushing the locking tab. >

B: INSERTING A PROBE

- Generally, probes are inserted into connectors from the rear side (wire side).
- When removing the shock protector take care not to deform it; this also applies to waterproof connectors, which cannot be tested from the wire side.



B0M0013A



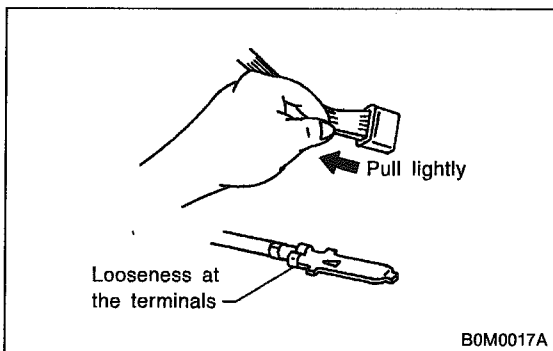
- Connectors equipped with shock protectors must be checked with a mini probe (thin), or it will be necessary to remove the shock protector.

- When the connector has a back plate, remove the plate after removing the projection of the plate first. (Be careful not to use excessive force, since the terminals might brake off.)

C: CHECKING FOR POOR CONTACT ON PLUG-IN CONNECTORS

1. POOR CONTACT

Poor contact is frequently caused by corroded terminals, dirt, foreign substances, weak contact points between male and female connectors, etc. Quite often a plug with poor contact will work perfectly again after it has been pulled off and reconnected. If harness and connector checks do not reveal any defect, it can be assumed that an intermittent contact in a connector is the source of trouble.

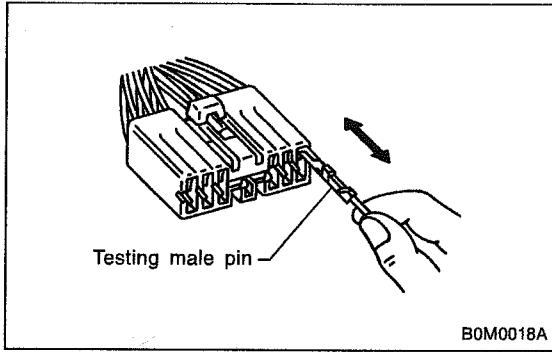


2. VISUAL INSPECTION

- 1) Disconnect the two connector halves.
- 2) Check the connector pins for signs of corrosion or foreign material.
- 3) Check the connector for loose and damaged terminals, and make sure they are set correctly in the connector.

NOTE:

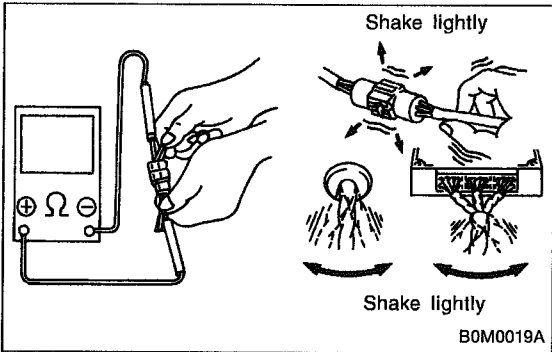
When the harness is pulled lightly, the terminals should not come out.



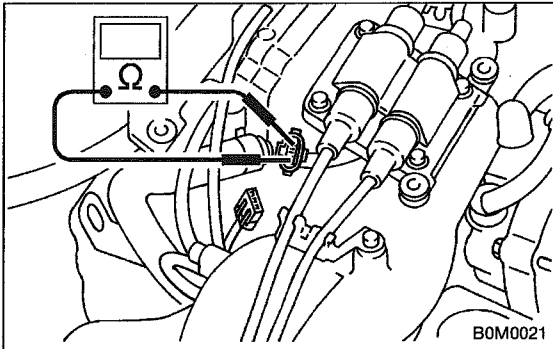
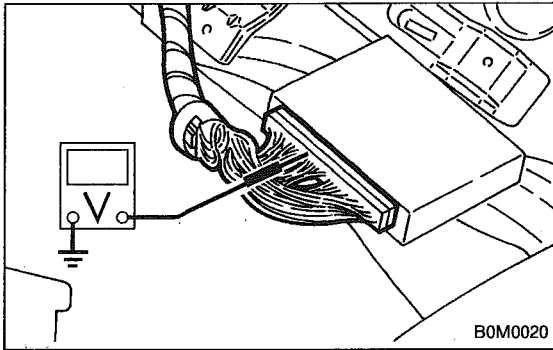
4) Insert the male pin of the connector into the female pin, then pull it out.

NOTE:

If one of the pins allows to pull out easily, it is a likely source of a malfunction.



5) Shake lightly the connector and the harness, and check for sudden changes in voltage or resistance.



4. Diagnosis and Checking Procedure Using Instruments

A: USING A CIRCUIT TESTER

1. VOLTAGE CHECK (range set to DC V)

Connect the positive probe to the terminal to be tested, and the negative probe to body ground. (or the ground terminal of the ECM)

2. CHECKING THE CONNECTION (range set to Ω)

Measure the resistance and check for open or shorted wire in the harness or the connector.

NOTE:

This check must be carried out with both connectors disconnected.

(This avoids by-passing the connection through other circuits.)

1) Check for open circuit. (range: $\Omega \times 1K$)

Measure the resistance between the respective pins in both connectors.

Specified resistance:

More than 1 M Ω (No continuity) Open circuit

Less than 10 Ω (Continuity) O.K.

2) Check for correct insulation value. (range: $\Omega \times 1K$)

Measure the resistance between the pins in both connectors, as well as between the suspected pin and the body. (body short)

Specified resistance:

More than 1 M Ω (No continuity) O.K.

Less than 10 Ω (Continuity) Short circuit

3) Resistance measurement (range set to Ω)

Measuring the internal resistance of sensors, solenoid valves etc. to check the operating condition of components.

NOTE:

- Select the appropriate range for measuring the internal resistance, or the measurement will result in an incorrect reading.

- Before changing the measurement range the gauge must be reset to zero.

B: USING A SUBARU SELECT MONITOR

With this testing procedure the defective component can be determined by directly monitoring input/output signals of the ECM or the trouble codes.

1. FEATURES

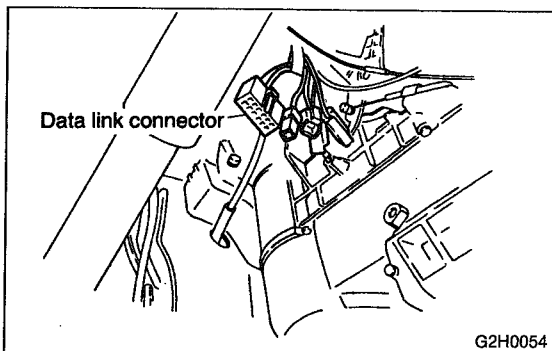
- A variety of data can be checked without movements from the drivers seat, passenger's seat or from outside the vehicle.
- This unit allows the identification of the type of malfunction, for example whether the cause is an open or shorted wire in the input/output signal line, or whether the breakdown of a component is caused by a lack of maintenance.

2. DIAGNOSIS

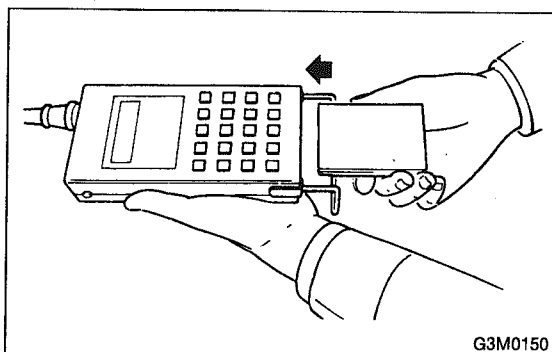
- Refer to the reference values for input/output and control data to determine whether the malfunction is caused by a worn out component, an open wire, a short etc.
- Perform the diagnostics procedure as described in chapter "Check based on trouble codes" by monitoring the trouble codes.

NOTE:

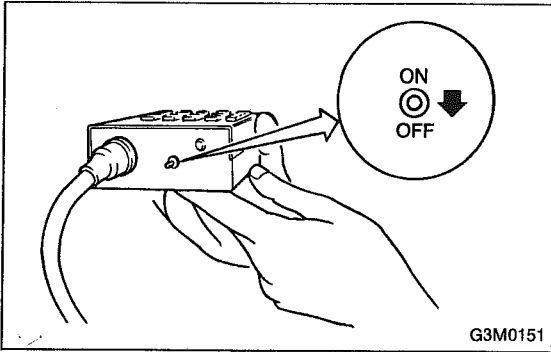
It will be easier to determine a malfunction if the vehicle data for normal conditions are available for comparison.

**3. CONNECT SELECT MONITOR.**

- 1) Connect select monitor to data link connector located under instrument panel. (on driver's side)

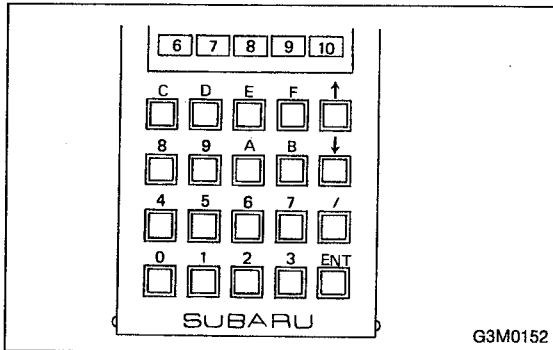


- 2) Insert cartridge into select monitor.



G3M0151

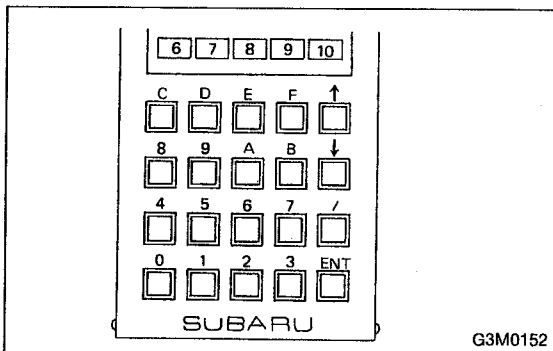
- 3) Turn ignition switch and select monitor switch ON.
- 4) After display is shown, press slash "/" key.
- 5) After AT mode is displayed, press function "[0]".
(Display returns to AT mode when slash "/" is pressed during on-board diagnostic operation.)



G3M0152

4. READ TROUBLE CODE SHOWN ON DISPLAY.

- 1) Connect select monitor.
- 2) Designate mode using function key.
Press [F] [B] [0] [ENT] in that order.
- 3) Ensure trouble code(s) is shown.



G3M0152

5. PREVIOUS TROUBLE CODE READING

- 1) Connect select monitor.
- 2) Designate mode using function key.
Press [F] [B] [1] [ENT] in that order.
- 3) Ensure displayed trouble code(s).

C: USING AN OSCILLOSCOPE

A malfunction can be determined by displaying the waveforms of input/output signals on the oscilloscope.

1. DIAGNOSIS

A simple comparison of the waveforms may lead to an incorrect diagnosis. To exactly determine the sources of the malfunction it will be necessary to determine them under consideration about information other than waveforms.

2. APPLYING INPUT/OUTPUT SIGNALS

Connect the probe directly with the terminal of the signal.

5. Table of Contents

DIAGNOSTICS SECTION	2-5	Engine Cooling System
	2-7	On-Board Diagnostics II System
	3-2	Automatic Transmission and Differential
	4-4	Brakes
	5-5	Supplemental Restraint System

ENGINE COOLING SYSTEM

2-5

	Page
T DIAGNOSTICS	2
1. Radiator Main Fan	2
2. Radiator Sub Fan (With A/C model only)	10

1. Radiator Main Fan

A: OPERATION (WITHOUT A/C MODEL)

DETECTING CONDITION:

- Engine coolant temperature is above 95°C (203°F).

TROUBLE SYMPTOM:

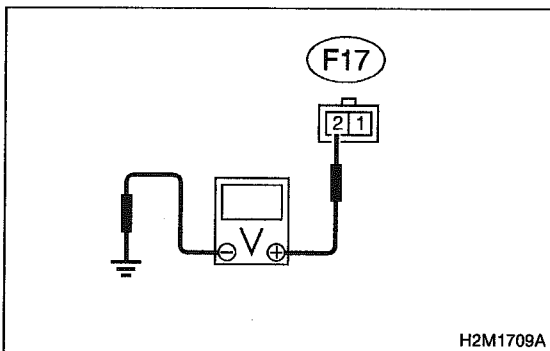
- Radiator main fan does not operate under the above condition.

1A1	CHECK POWER SUPPLY TO MAIN FAN MOTOR.
------------	--

CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from main fan motor.
- 3) Warm-up the engine until engine coolant temperature increases over 95°C (203°F).
- 4) Stop the engine and turn ignition switch to ON.



H2M1709A

- 5) Measure voltage between main fan motor connector and chassis ground.

Connector & terminal

(F17) No. 2 (+) — Chassis ground (-):

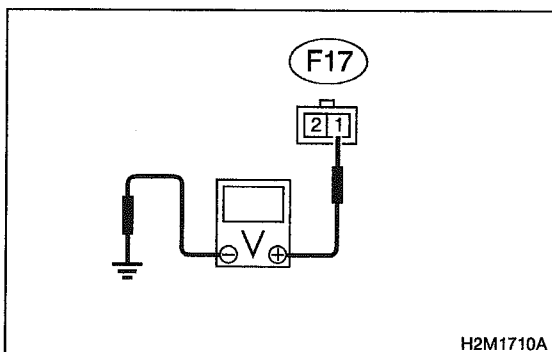
CHECK : Is the voltage more than 10 V?

YES : Go to step 1A2.

NO : Go to step 1A5.

1A2	CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.
------------	--

- 1) Turn ignition switch to OFF.



H2M1710A

- 2) Measure resistance between main fan motor connector and chassis ground.

Connector & terminal

(F17) No. 1 — Chassis ground:

CHECK : Is the resistance less than 5 Ω?

YES : Go to step 1A3.

NO : Repair open circuit in harness between main fan motor connector and chassis ground.

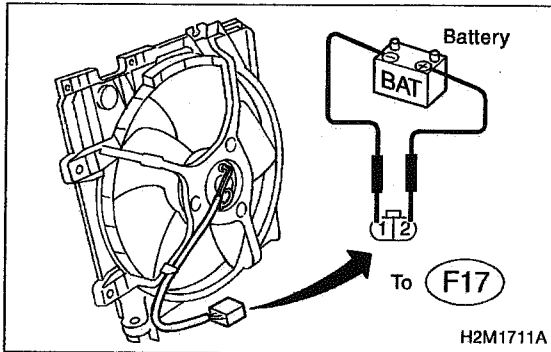
1A3 CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in main fan motor connector?*

YES : Repair poor contact in main fan motor connector.

NO : Go to step **1A4**.



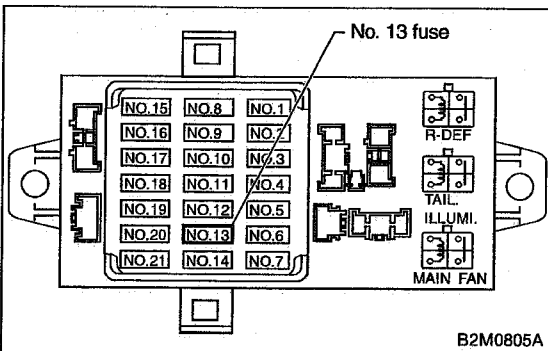
1A4 CHECK MAIN FAN MOTOR.

Connect battery positive (+) terminal to terminal No. 2 and negative (-) terminal to terminal No. 1 of main fan motor connector.

CHECK : *Does the main fan rotate?*

YES : Repair poor contact in main fan motor connector.

NO : Replace main fan motor with a new one.



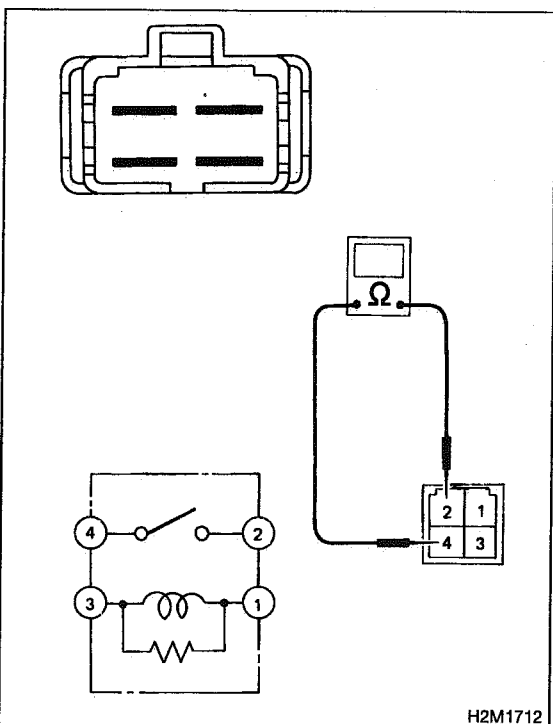
1A5 CHECK FUSE.

- 1) Turn ignition switch to OFF.
- 2) Remove fuse No. 13 from fuse and relay box.
- 3) Check condition of fuse.

CHECK : *Is the fuse blown-out?*

YES : Replace fuse.

NO : Go to step **1A6**.



1A6 CHECK MAIN FAN RELAY.

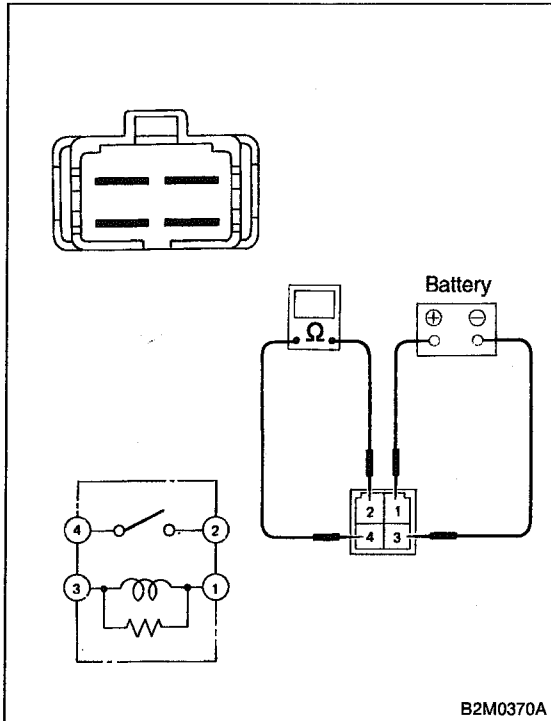
- 1) Remove main fan relay from fuse and relay box.
- 2) Check continuity between main fan relay terminals.

CHECK : *Does no continuity exist between terminals No. 2 and No. 4?*

YES : Go to step **1A7**.

NO : Replace main fan relay.

1. Radiator Main Fan

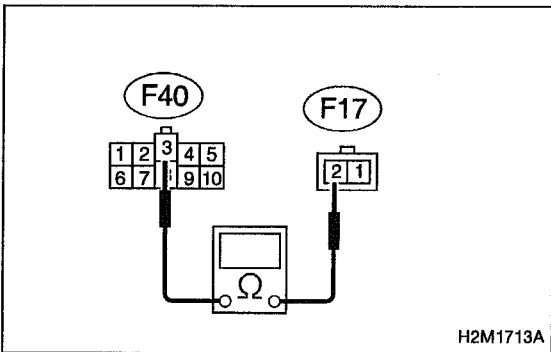
**1A7 CHECK MAIN FAN RELAY.**

- 1) Connect battery positive (+) terminal to terminal No. 1 of main fan relay, and negative (-) terminal to terminal No. 3.
- 2) Check continuity between main fan relay terminals.

CHECK : Does continuity exist between terminals No. 2 and No. 4?

YES : Go to step 1A8.

NO : Replace main fan relay.

**1A8 CHECK HARNESS CONNECTOR BETWEEN FUSE AND RELAY BOX AND MAIN FAN MOTOR.**

- 1) Disconnect connector from fuse and relay box.
- 2) Measure resistance of harness connector between fuse and relay box and main fan motor.

Connector & terminal
(F40) No. 3 — (F17) No. 2:

CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 1A9.

NO : Repair open circuit in harness between fuse and relay box and main fan motor connector.

1A9 CHECK POOR CONTACT.

Check poor contact in fuse and relay box connector.
<Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in fuse and relay box connector?

YES : Repair poor contact in fuse and relay box connector.

NO : Go to step 1A10.

1A10	CHECK POOR CONTACT.
------	---------------------

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in main fan motor connector?*

YES : Repair poor contact in main fan motor connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

B: OPERATION (WITH A/C MODEL)

DETECTING CONDITION:

Condition (1):

- Engine coolant temperature is below 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is below 19 km/h (12 MPH).

Condition (2):

- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

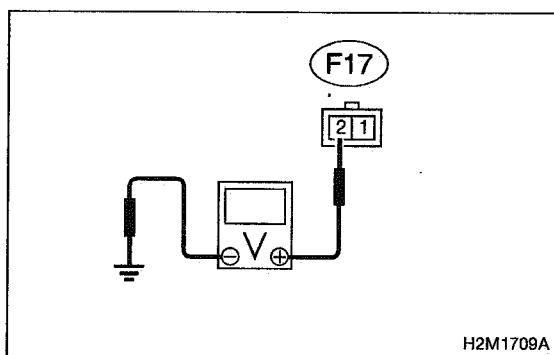
- Radiator main fan does not rotate under conditions (1) and (2) above.

1B1	CHECK POWER SUPPLY TO MAIN FAN MOTOR.
------------	--

CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from main fan motor.
- 3) Warm-up the engine until engine coolant temperature increases over 95°C (203°F).
- 4) Stop the engine and turn ignition switch to ON.



- 5) Measure voltage between main fan motor connector and chassis ground.

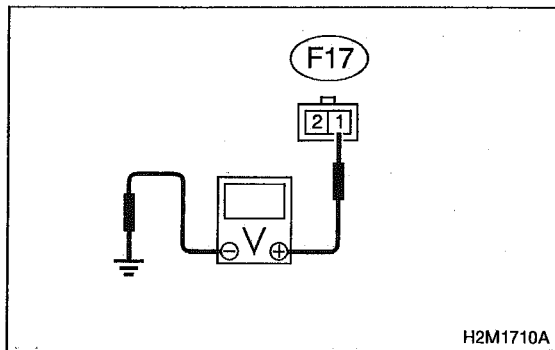
Connector & terminal

(F17) No. 2 (+) — Chassis ground (-):

CHECK : Is the voltage more than 10 V?

YES : Go to step 1B2.

NO : Go to step 1B5.

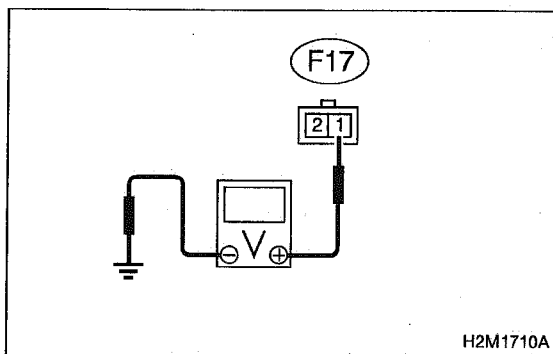


1B2 CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between main fan motor connector and chassis ground.

Connector & terminal (F17) No. 1 — Chassis ground:

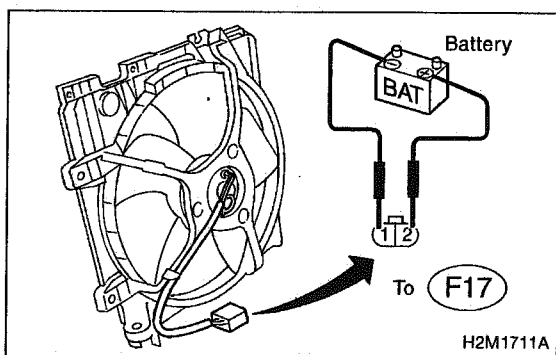
- CHECK** : Is the resistance less than 5 Ω?
- YES** : Go to step 1B3.
- NO** : Repair open circuit in harness between main fan motor connector and chassis ground.



1B3 CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

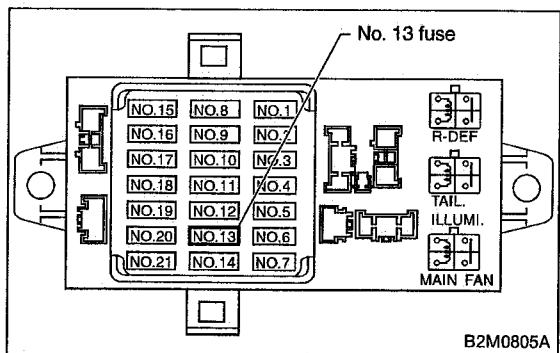
- CHECK** : Is there poor contact in main fan motor connector?
- YES** : Repair poor contact in main fan motor connector.
- NO** : Go to step 1B4.



1B4 CHECK MAIN FAN MOTOR.

Connect battery positive (+) terminal to terminal No. 2, and negative (-) terminal to terminal No. 1 of main fan motor connector.

- CHECK** : Does the main fan rotate?
- YES** : Repair poor contact in main fan motor connector.
- NO** : Replace main fan motor with a new one.

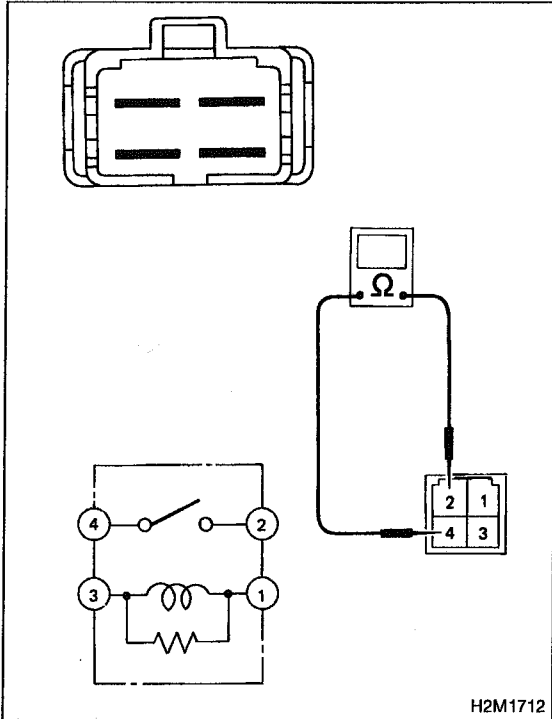


1B5 CHECK FUSE.

- 1) Turn ignition switch to OFF.
- 2) Remove fuse No. 13 from fuse and relay box.
- 3) Check condition of fuse.

- CHECK** : Is the fuse blown-out?
- YES** : Replace fuse.
- NO** : Go to step 1B6.

1. Radiator Main Fan

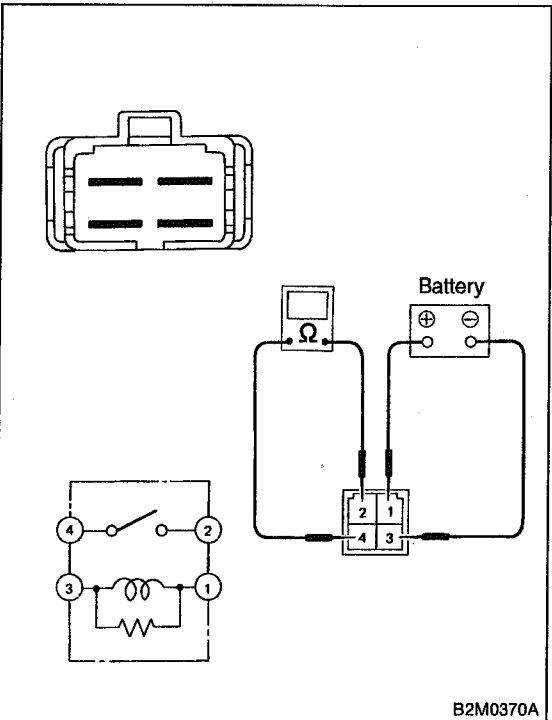
**1B6****CHECK MAIN FAN RELAY.**

- 1) Remove main fan relay from fuse and relay box.
- 2) Check continuity between main fan relay terminals.

CHECK : **Does no continuity exist between terminals No. 2 and No. 4?**

YES : Go to step **1B7**.

NO : Replace main fan relay.

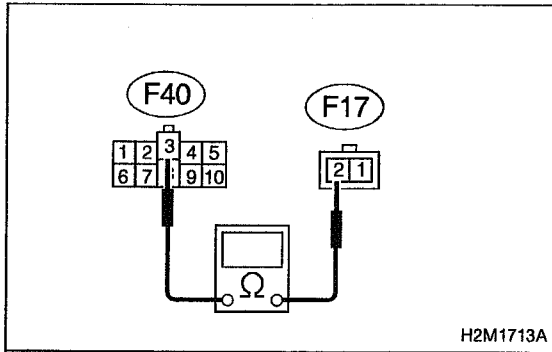
**1B7****CHECK MAIN FAN RELAY.**

- 1) Connect battery to terminals No. 1 and No. 3 of main fan relay.
- 2) Check continuity between main fan relay terminals.

CHECK : **Does continuity exist between terminals No. 2 and No. 4?**

YES : Go to step **1B8**.

NO : Replace main fan relay.



1B8	CHECK HARNESS CONNECTOR BETWEEN FUSE AND RELAY BOX AND MAIN FAN MOTOR.
------------	---

- 1) Disconnect connector from fuse and relay box.
- 2) Measure resistance of harness connector between fuse and relay box and main fan motor.

Connector & terminal (F40) No. 3 — (F17) No. 2:

- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **1B9**.
- NO** : Repair open circuit in harness between fuse and relay box and main fan motor connector.

1B9	CHECK POOR CONTACT.
------------	----------------------------

Check poor contact in fuse and relay box connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact fuse and relay box connector?*
- YES** : Repair poor contact in fuse and relay box connector.
- NO** : Go to step **1B10**.

1B10	CHECK POOR CONTACT.
-------------	----------------------------

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in main fan motor connector?*
- YES** : Repair poor contact in main fan motor connector.
- NO** : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

2. Radiator Sub Fan (With A/C model only)

A: OPERATION

DETECTING CONDITION:

Condition (1):

- Engine coolant temperature is below 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is below 19 km/h (12 MPH).

Condition (2):

- Engine coolant temperature is above 100°C (212°F).
- A/C switch is turned OFF.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

- Radiator sub fan does not rotate under conditions (1) and (2) above.

2A1	CHECK POWER SUPPLY TO SUB FAN MOTOR.
------------	---

CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from sub fan motor.
- 3) Warm-up the engine until engine coolant temperature increases over 100°C (212°F).
- 4) Stop the engine and turn ignition switch to ON.
- 5) Measure voltage between sub fan motor connector and chassis ground.

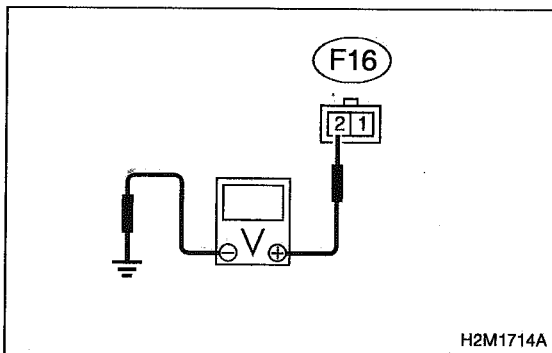
Connector & terminal

(F16) No. 2 (+) — Chassis ground (-):

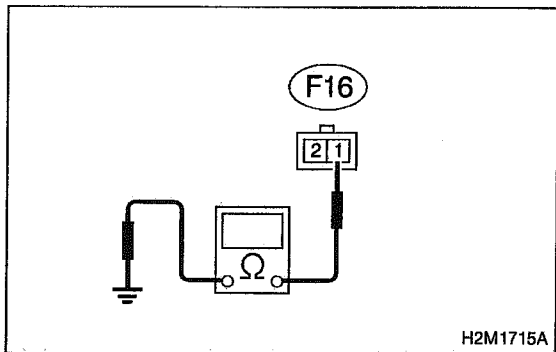
CHECK : Is the voltage more than 10 V?

YES : Go to step **2A2**.

NO : Go to step **2A5**.



H2M1714A



2A2	CHECK GROUND CIRCUIT OF SUB FAN MOTOR.
------------	---

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between sub fan motor connector and chassis ground.

Connector & terminal

(F16) No. 1 — Chassis ground:

CHECK : *Is the resistance less than 5 Ω?*

YES : Go to step **2A3**.

NO : Repair open circuit in harness between sub fan motor connector and chassis ground.

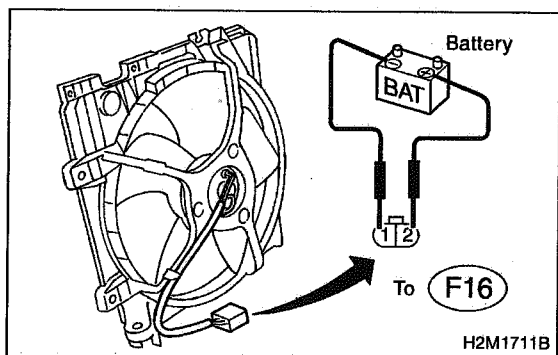
2A3	CHECK POOR CONTACT.
------------	----------------------------

Check poor contact in sub fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in sub fan motor connector?*

YES : Repair poor contact in sub fan motor connector.

NO : Go to step **2A4**.



2A4	CHECK SUB FAN MOTOR.
------------	-----------------------------

Connect battery positive (+) terminal to terminal No. 2, and negative (-) terminal to terminal No. 1 of sub fan motor connector.

CHECK : *Does the sub fan rotate?*

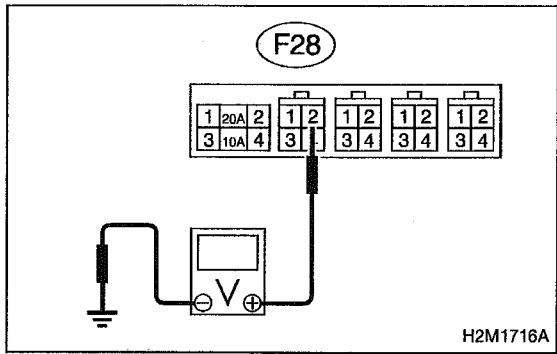
YES : Repair poor contact in sub fan motor connector.

NO : Replace sub fan motor with a new one.

2A5	CHECK POWER SUPPLY TO SUB FAN RELAY.
------------	---

- 1) Turn ignition switch to OFF.
- 2) Remove sub fan relay from A/C relay holder.

2. Radiator Sub Fan (With A/C model only)



3) Measure voltage between sub fan relay terminal and chassis ground.

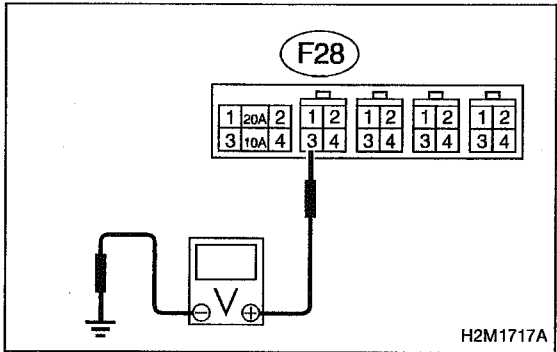
Connector & terminal

(F28) No. 2 (+) — Chassis ground (-):

CHECK : Is the voltage more than 10 V?

YES : Go to step 2A6.

NO : Go to step 2A7.



2A6	CHECK POWER SUPPLY TO SUB FAN RELAY.
------------	---

1) Turn ignition switch to ON.

2) Measure voltage between sub fan relay terminal and chassis ground.

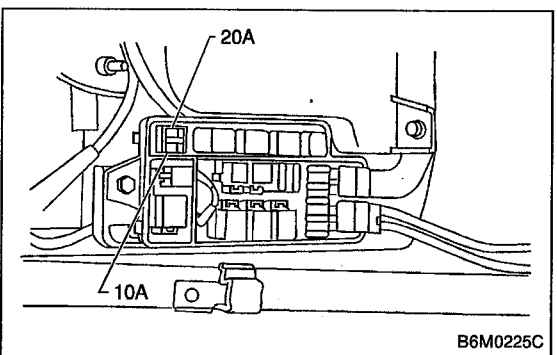
Connector & terminal

(F28) No. 3 (+) — Chassis ground (-):

CHECK : Is the voltage more than 10 V?

YES : Go to step 2A17.

NO : Go to step 2A12.



2A7	CHECK 20 A FUSE.
------------	-------------------------

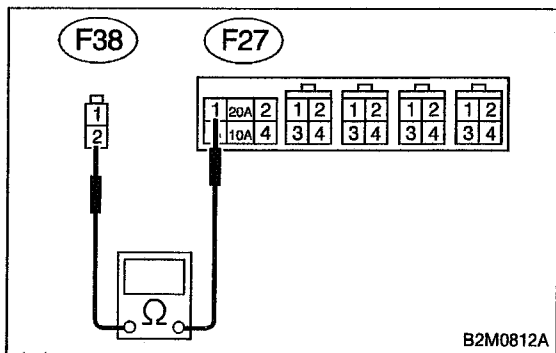
1) Remove 20 A fuse from A/C relay holder.

2) Check condition of fuse.

CHECK : Is the fuse blown-out?

YES : Replace fuse.

NO : Go to step 2A8.



2A8	CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND A/C RELAY HOLDER 20 A FUSE.
------------	--

- 1) Disconnect connector from main fuse box.
- 2) Disconnect connectors (F25) and (F26) from generator, and (F34) from SBF holder.
- 3) Measure resistance of harness connector between main fuse box connector and A/C relay holder 20 A fuse terminal.

Connector & terminal
(F38) No. 2 — (F27) No. 1:

- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **2A9**.
- NO** : Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.

2A9	CHECK POOR CONTACT.
------------	----------------------------

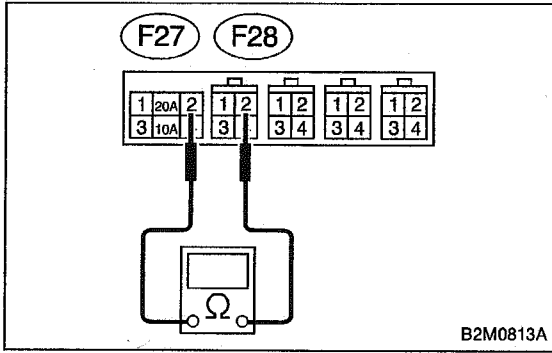
Check poor contact in main fuse box connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in main fuse box connector?*
- YES** : Repair poor contact in main fuse box connector.
- NO** : Go to step **2A10**.

2A10	CHECK POOR CONTACT.
-------------	----------------------------

Check poor contact in A/C relay holder 20 A fuse connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : *Is there poor contact in A/C relay holder 20 A fuse connector?*
- YES** : Repair poor contact in 20 A fuse connector.
- NO** : Go to step **2A11**.

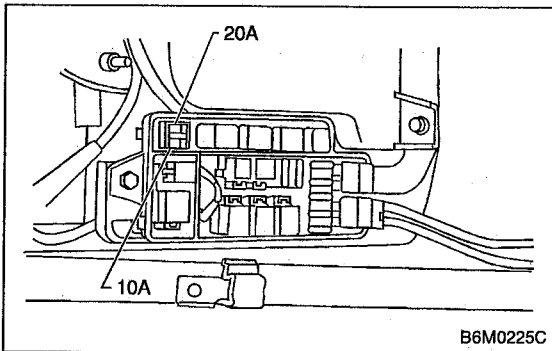


2A11 CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND SUB FAN RELAY IN A/C RELAY HOLDER.

Measure resistance of harness between 20 A fuse and sub fan relay terminal.

Connector & terminal (F27) No. 2 — (F28) No. 2:

- CHECK** : Is the resistance less than 1 Ω?
- YES** : Repair poor contact in sub fan relay connector.
- NO** : Repair open circuit in harness between 20 A fuse and sub fan relay connector.



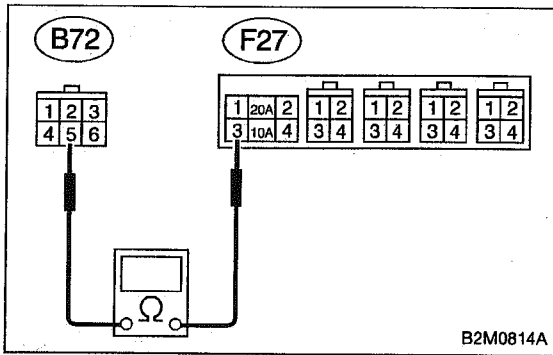
2A12 CHECK 10 A FUSE.

- 1) Turn ignition switch to OFF.
- 2) Remove 10 A fuse from A/C relay holder.
- 3) Check condition of fuse.

- CHECK** : Is the fuse blown-out?
- YES** : Replace fuse.
- NO** : Go to step 2A13.

2A13 CHECK HARNESS CONNECTOR BETWEEN IGNITION SWITCH AND A/C RELAY HOLDER 10 A FUSE.

- 1) Disconnect connector from ignition switch.
- 2) Disconnect connectors (F42) and (B52) from fuse and relay box, and (F39) from main fuse box.



3) Measure resistance of harness between ignition switch connector and A/C relay holder 10 A fuse terminal.

Connector & terminal
(B72) No. 5 — (F27) No. 3:

CHECK : *Is the resistance less than 1 Ω?*

YES : Go to step **2A14**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ignition switch connector and 10 A fuse terminal.
- Poor contact in coupling connector (B61).

2A14	CHECK POOR CONTACT.
-------------	----------------------------

Check poor contact in ignition switch connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ignition switch connector?*

YES : Repair poor contact in ignition switch connector.

NO : Go to step **2A15**.

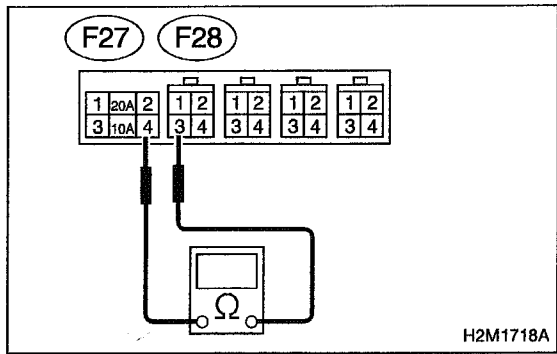
2A15	CHECK POOR CONTACT.
-------------	----------------------------

Check poor contact in A/C relay holder 10 A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in A/C relay holder 10 A fuse connector?*

YES : Repair poor contact in 10 A fuse connector.

NO : Go to step **2A16**.

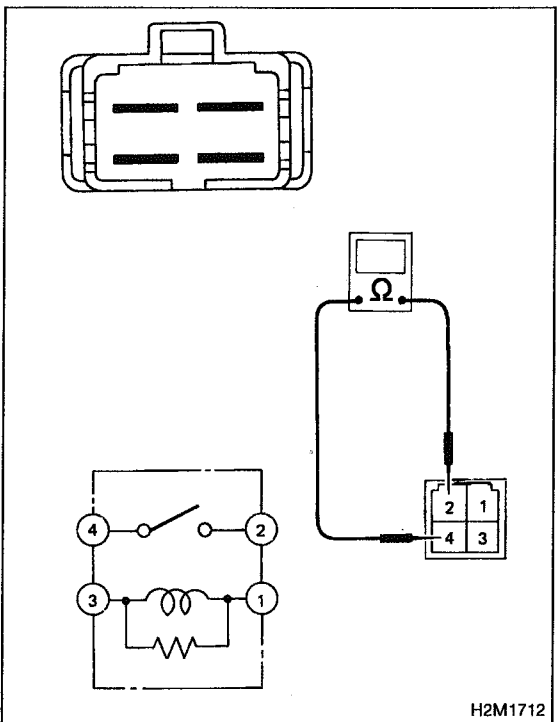


2A16 CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND SUB FAN RELAY IN A/C RELAY HOLDER.

Measure resistance of harness between 10 A fuse and sub fan relay terminal.

Connector & terminal (F27) No. 4 — (F28) No. 3:

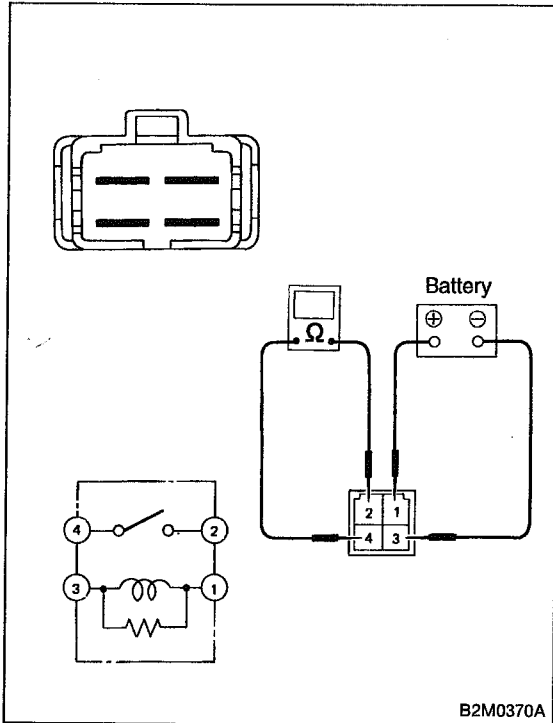
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Repair poor contact in sub fan relay connector.
- NO** : Repair open circuit in harness between 10 A fuse and sub fan relay connector.



2A17 CHECK SUB FAN RELAY.

- 1) Turn ignition switch to OFF.
- 2) Check continuity between sub fan relay terminals.

- CHECK** : Does no continuity exist between terminals No. 2 and No. 4?
- YES** : Go to step 2A18.
- NO** : Replace sub fan relay.



2A18 CHECK SUB FAN RELAY.

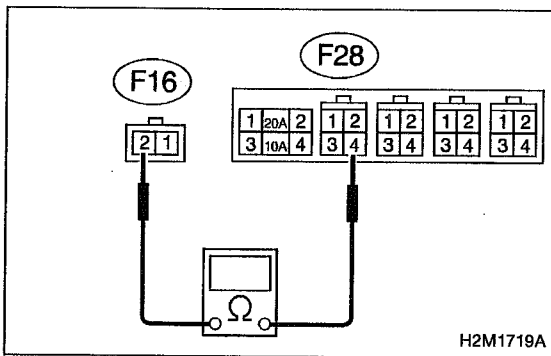
1) Connect battery to terminals No. 1 and No. 3 of sub fan relay.

2) Check continuity between sub fan relay terminals.

CHECK : Does continuity exist between terminals No. 2 and No. 4?

YES : Go to step 2A19.

NO : Replace sub fan relay.



2A19 CHECK HARNESS CONNECTOR BETWEEN SUB FAN RELAY AND SUB FAN MOTOR.

Measure resistance of harness between sub fan motor connector and sub fan relay terminal.

Connector & terminal (F16) No. 2 — (F28) No. 4:

CHECK : Is the resistance less than 1 Ω?

YES : Go to step 2A20.

NO : Repair open circuit in harness between sub fan motor and sub fan relay connector.

2A20 CHECK POOR CONTACT.

Check poor contact in sub fan relay connector. < Ref. to FOREWORD [T3C1]. >

CHECK : Is there poor contact in sub fan relay connector?

YES : Repair poor contact in sub fan relay connector.

NO : Go to step 2A21.

2A21**CHECK POOR CONTACT.**

Check poor contact in sub fan relay connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in sub fan motor connector?*

YES : Repair poor contact in sub fan motor connector.

NO : Contact with SOA service.

NOTE:

Inspection by DTM is required, because probable cause is deterioration of multiple parts.

ON-BOARD DIAGNOSTICS II SYSTEM

2-7

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1. General

A: GENERAL DESCRIPTION

- The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter indicates occurrence of a fault or trouble.
- Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
- The OBD system incorporated with the vehicles within this engine family complies with Section 1968.1, California Code of Regulations (OBD-II regulation). The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
- When the system decides that a malfunction occurs, MIL illuminates. At the same time of the MIL illumination or blinking, a diagnostic trouble code (DTC) and a freeze frame engine conditions are stored into on-board computer.
- The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction first.
- If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
- When the malfunction does not occur again for three consecutive driving cycles, MIL is turned off, but DTC remains at on-board computer.
- The OBD-II system is capable of communication with a general scan tool (OBD-II general scan tool) formed by ISO 9141 CARB.
- The OBD-II diagnostics procedure is different from the usual diagnostics procedure. When troubleshooting OBD-II vehicles, connect Subaru select monitor or the OBD-II general scan tool to the vehicle.

B: ENGINE

1. ENGINE AND EMISSION CONTROL SYSTEM

- The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.

With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required

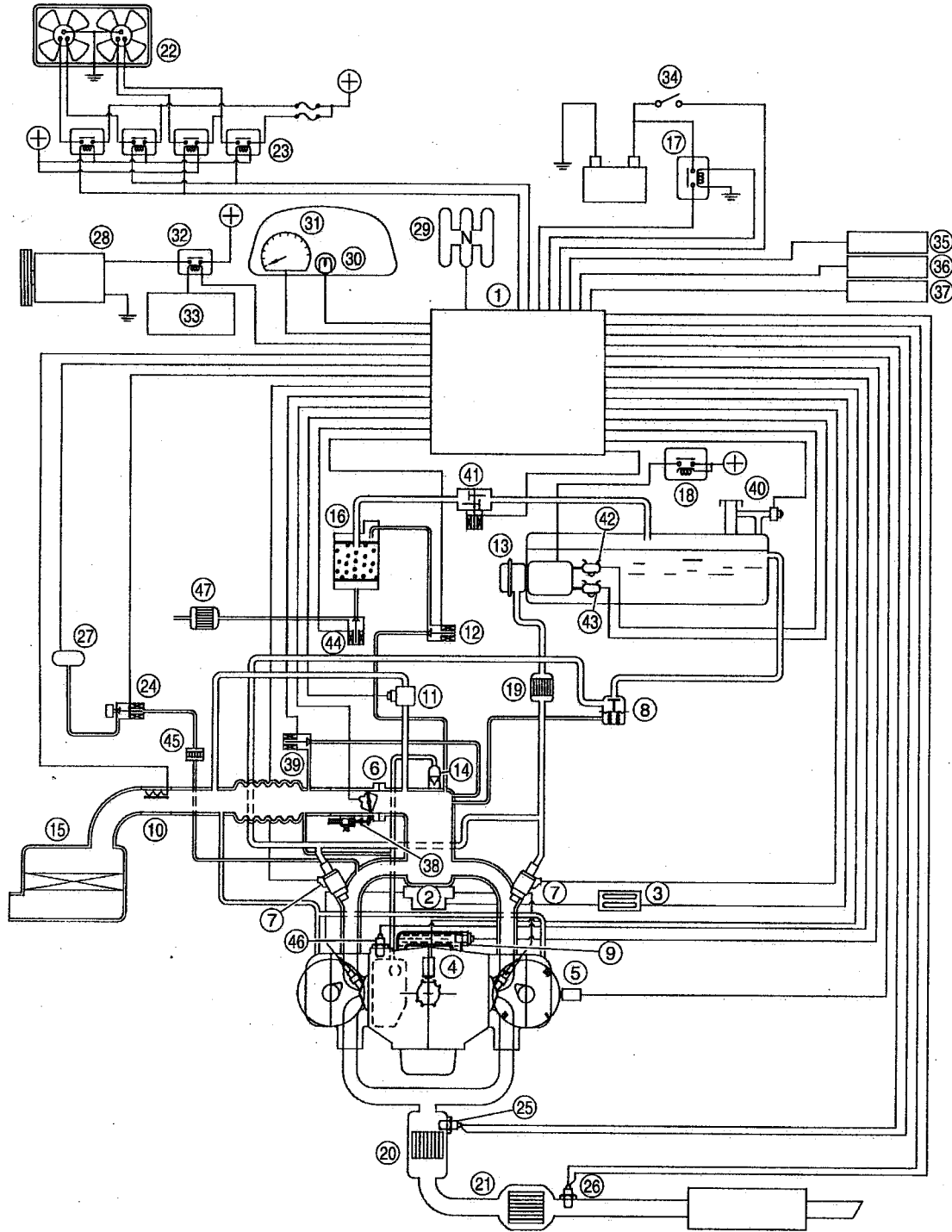
for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.

● Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc. The MFI system also has the following features:

- 1) Reduced emission of harmful exhaust gases.
- 2) Reduced in fuel consumption.
- 3) Increased engine output.
- 4) Superior acceleration and deceleration.
- 5) Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

ON-BOARD DIAGNOSTICS II SYSTEM

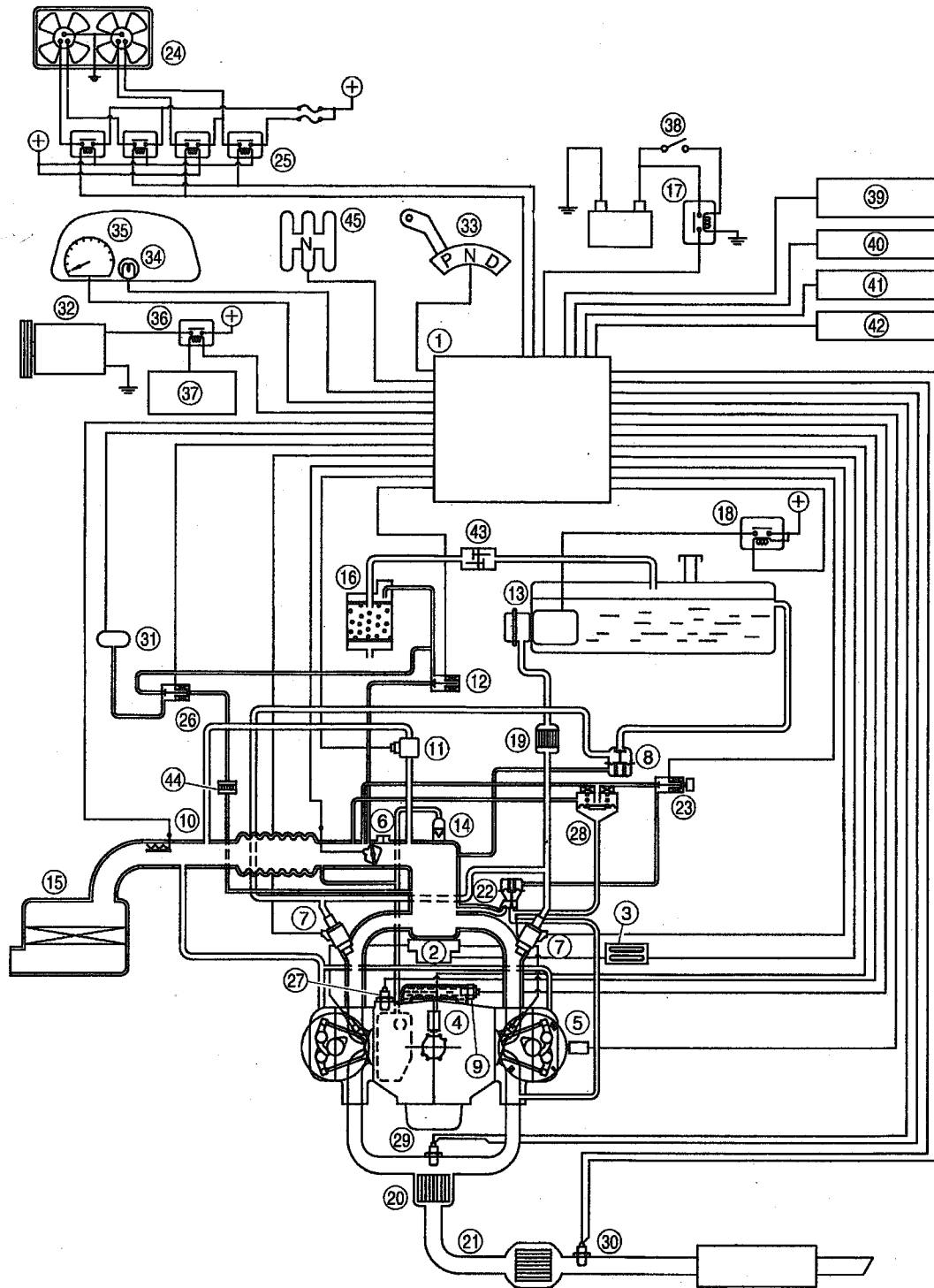
2. SCHEMATIC (1800 cc MODEL)



H2M1595A

- ① Engine control module (ECM)
- ② Ignition coil
- ③ Ignitor
- ④ Crankshaft position sensor
- ⑤ Camshaft position sensor
- ⑥ Throttle position sensor
- ⑦ Fuel injectors
- ⑧ Pressure regulator
- ⑨ Engine coolant temperature sensor
- ⑩ Mass air flow sensor
- ⑪ Idle air control solenoid valve
- ⑫ Purge control solenoid valve
- ⑬ Fuel pump
- ⑭ PCV valve
- ⑮ Air cleaner
- ⑯ Canister
- ⑰ Main relay
- ⑱ Fuel pump relay
- ⑲ Fuel filter
- ⑳ Front catalytic converter
- ㉑ Rear catalytic converter
- ㉒ Radiator fan
- ㉓ Radiator fan relay
- ㉔ Pressure sources switching solenoid valve
- ㉕ Front oxygen sensor
- ㉖ Rear oxygen sensor
- ㉗ Pressure sensor
- ㉘ A/C compressor (With A/C models)
- ㉙ Neutral position switch
- ㉚ CHECK ENGINE malfunction indicator lamp (MIL)
- ㉛ Tachometer
- ㉜ A/C relay (With A/C models)
- ㉝ A/C control module (With A/C models)
- ㉞ Ignition switch
- ㉟ Vehicle speed sensor
- ㊱ Data link connector (For Subaru select monitor)
- ㊲ Data link connector (For Subaru select monitor and OBD-II general scan tool)
- ㊳ Throttle opener
- ㊴ FICD solenoid valve (With A/C models)
- ㊵ Fuel tank pressure sensor
- ㊶ Pressure control solenoid valve
- ㊷ Fuel temperature sensor
- ㊸ Fuel level sensor
- ㊹ Vent control solenoid valve
- ㊺ Filter
- ㊻ Knock sensor
- ㊼ Air filter

3. SCHEMATIC (2200 cc MODEL)



H2M1311A

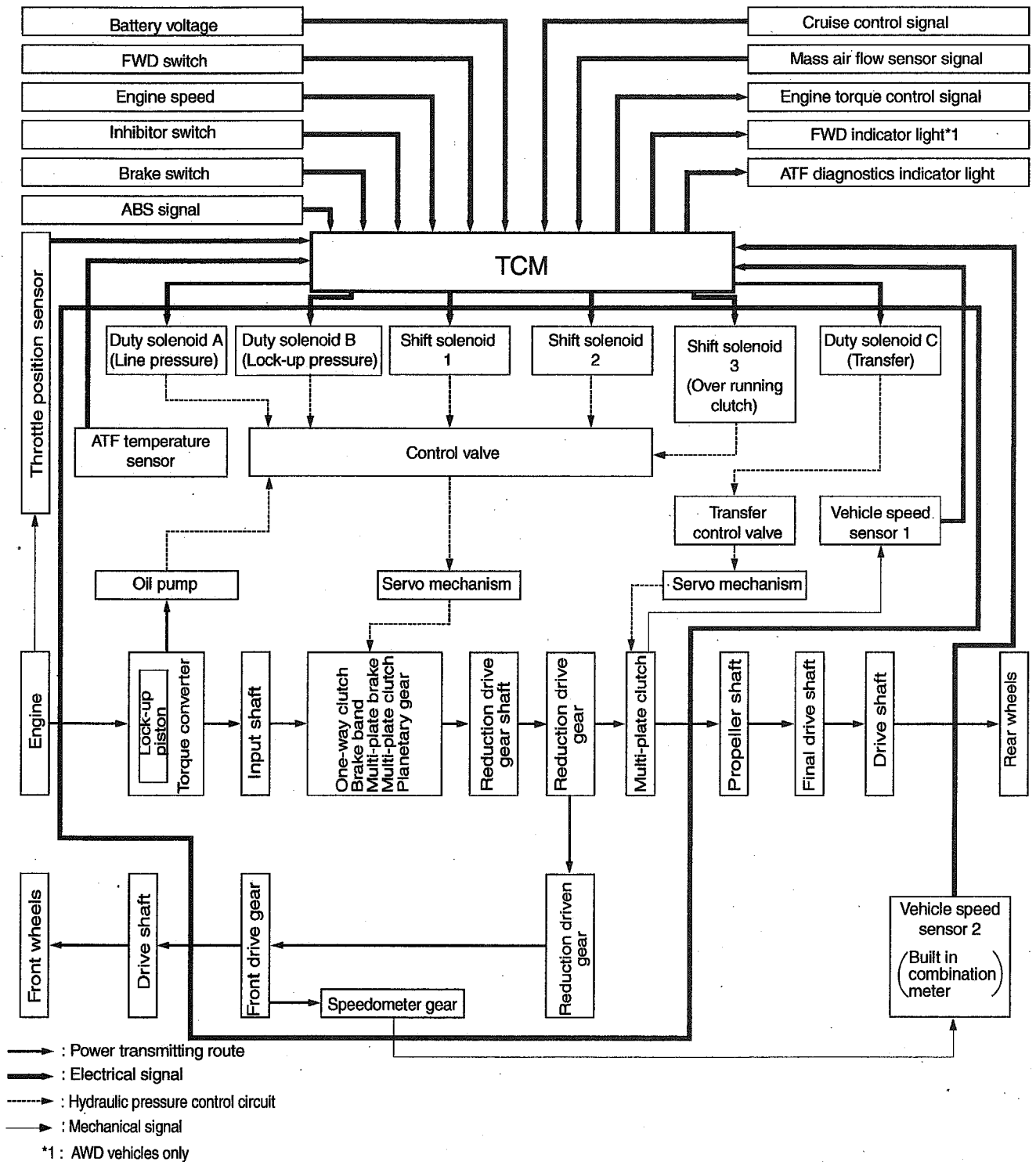
- ① Engine control module (ECM)
- ② Ignition coil
- ③ Ignitor
- ④ Crankshaft position sensor
- ⑤ Camshaft position sensor
- ⑥ Throttle position sensor
- ⑦ Fuel injectors
- ⑧ Pressure regulator
- ⑨ Engine coolant temperature sensor
- ⑩ Mass air flow sensor
- ⑪ Idle air control solenoid valve
- ⑫ Purge control solenoid valve
- ⑬ Fuel pump
- ⑭ PCV valve
- ⑮ Air cleaner
- ⑯ Canister
- ⑰ Main relay
- ⑱ Fuel pump relay
- ⑲ Fuel filter
- ⑳ Front catalytic converter
- ㉑ Rear catalytic converter
- ㉒ EGR valve (AT vehicles only)
- ㉓ EGR control solenoid valve (AT vehicles only)
- ㉔ Radiator fan
- ㉕ Radiator fan relay
- ㉖ Pressure sources switching solenoid valve
- ㉗ Knock sensor
- ㉘ Back-pressure transducer
- ㉙ Front oxygen sensor
- ㉚ Rear oxygen sensor
- ㉛ Pressure sensor
- ㉜ A/C compressor
- ㉝ Inhibitor switch (AT vehicles)
- ㉞ CHECK ENGINE malfunction indicator lamp (MIL)
- ㉟ Tachometer
- ㊱ A/C relay
- ㊲ A/C control module
- ㊳ Ignition switch
- ㊴ Transmission control module (TCM)
- ㊵ Vehicle speed sensor
- ㊶ Data link connector (Subaru select monitor)
- ㊷ Data link connector (OBD-II general scan tool)
- ㊸ Two way valve
- ㊹ Filter
- ㊺ Neutral position switch (MT vehicles)

C: AUTOMATIC TRANSMISSION

1. ELECTRONIC-HYDRAULIC CONTROL SYSTEM

The electronic-hydraulic control system consists of various sensors and switches, a transmission control module (TCM) and the hydraulic controller including solenoid valves. The system controls the transmission proper including shift control, lock-up control, overrunning clutch control, line pressure control and shift timing control. It also controls the AWD transfer clutch. In other words, the system detects various operating conditions from various input signals and sends output signals to shift solenoids 1, 2 and 3 and duty solenoids A, B and C (a total of six solenoids).

2. SCHEMATIC

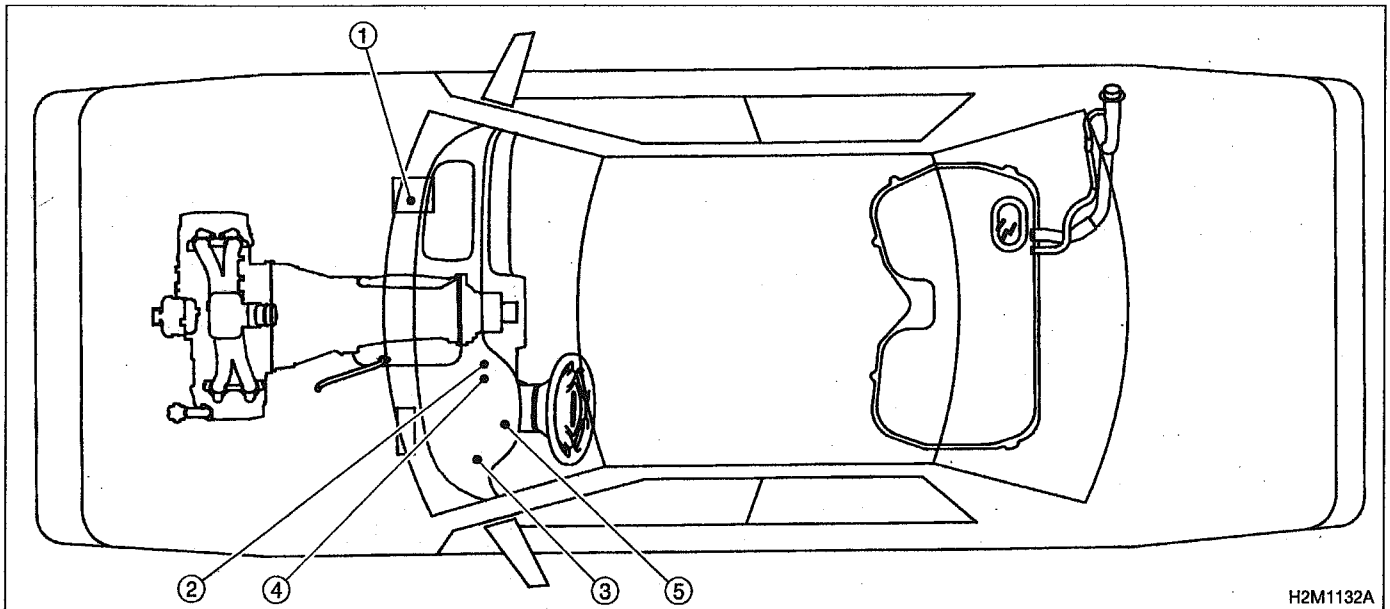


MEMO:

2. Electrical Components Location

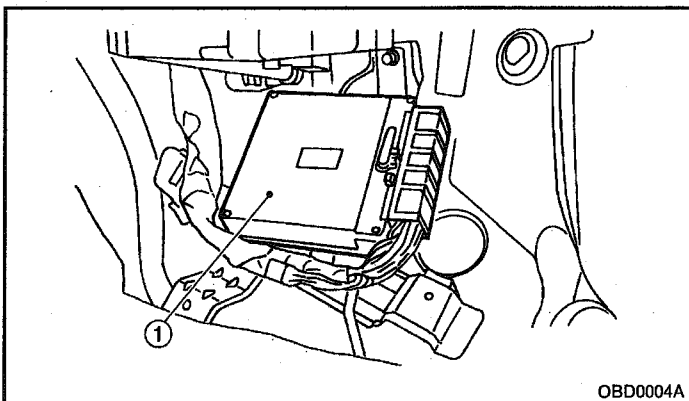
A: ENGINE (1800 cc MODEL)

1. MODULE

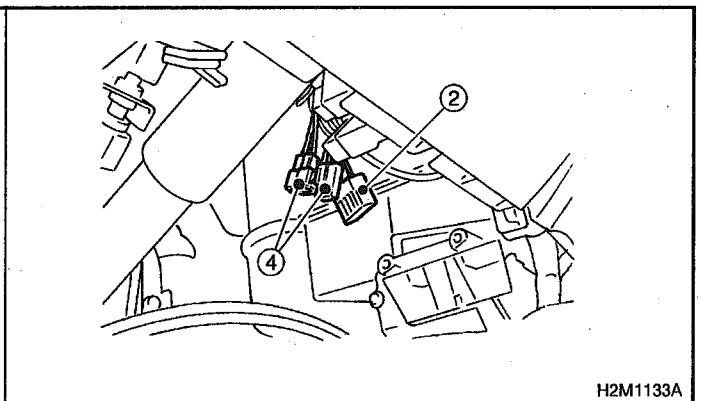


H2M1132A

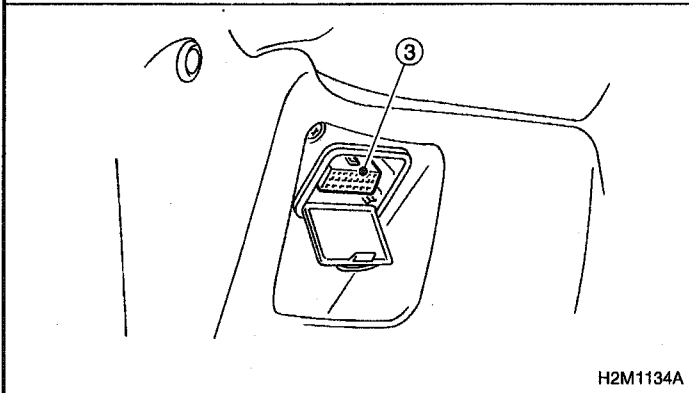
- ① Engine control module (ECM)
- ② Data link connector (for Subaru select monitor only)
- ③ Data link connector (for Subaru select monitor and OBD-II general scan tool)
- ④ Test mode connector
- ⑤ CHECK ENGINE malfunction indicator lamp (MIL)



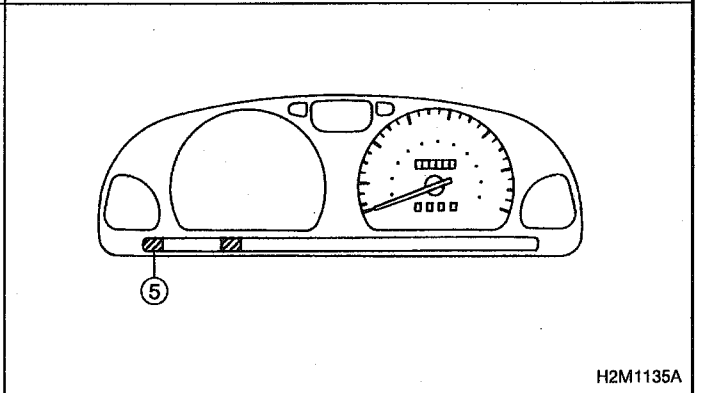
OBD0004A



H2M1133A

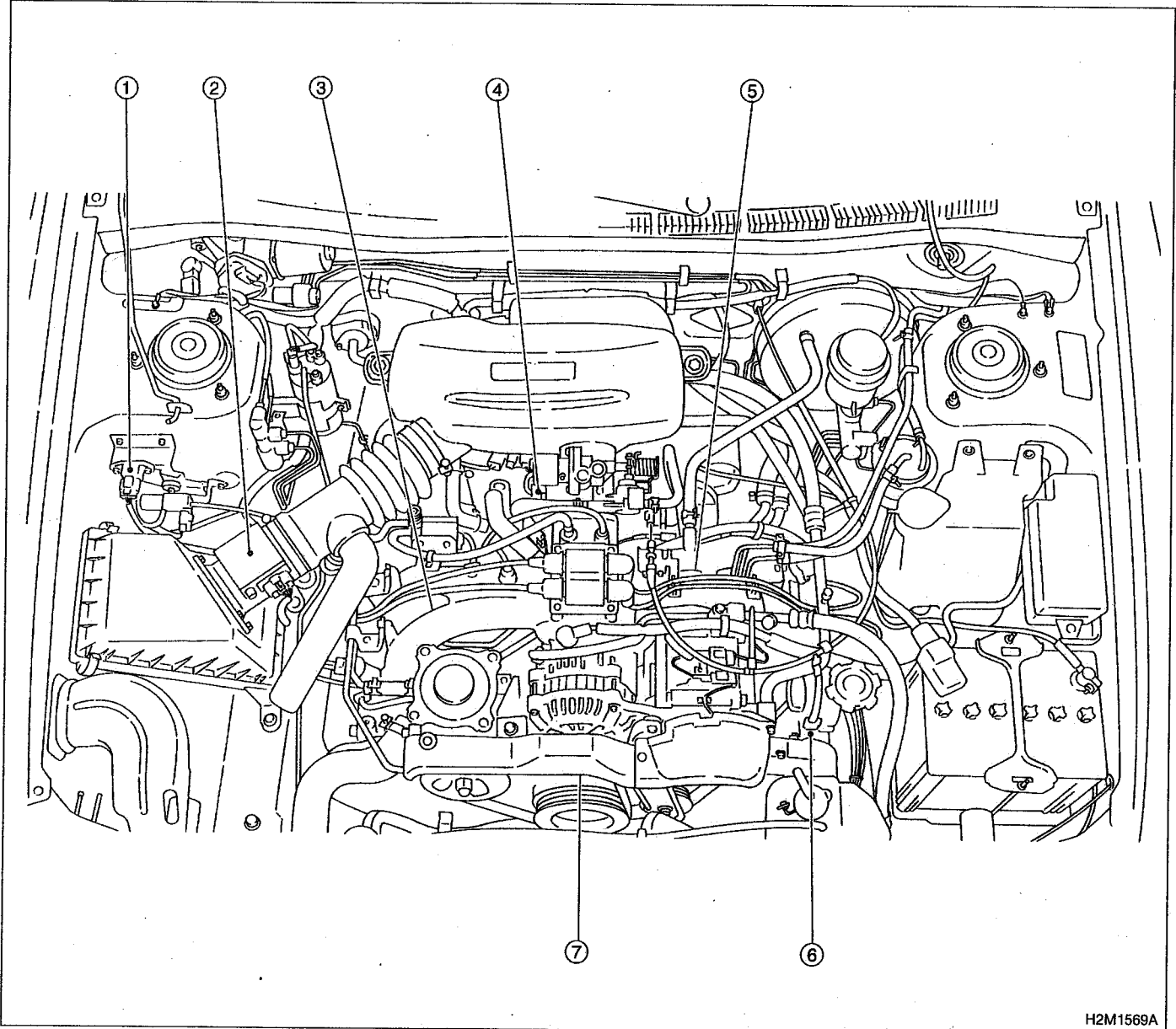


H2M1134A



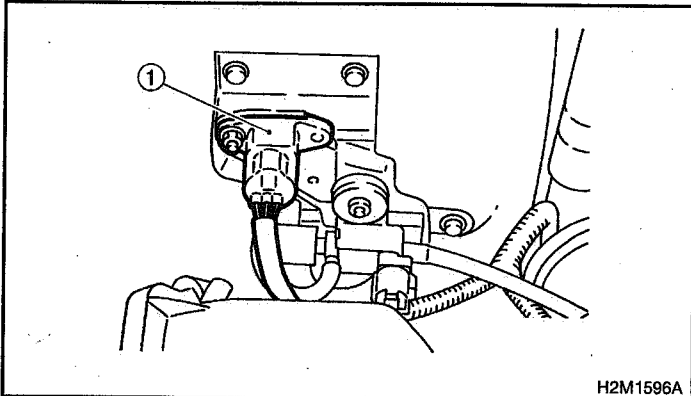
H2M1135A

2. SENSOR

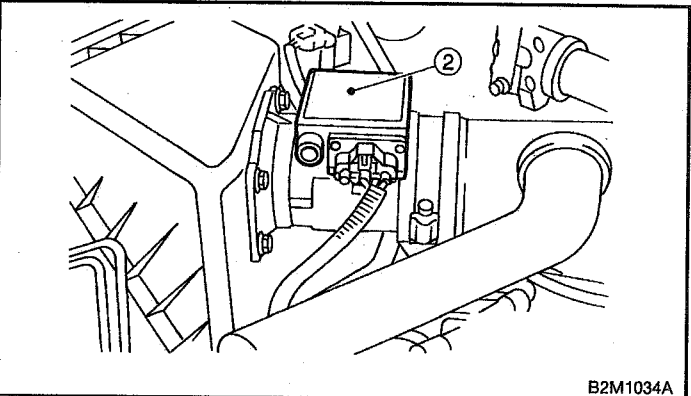


H2M1569A

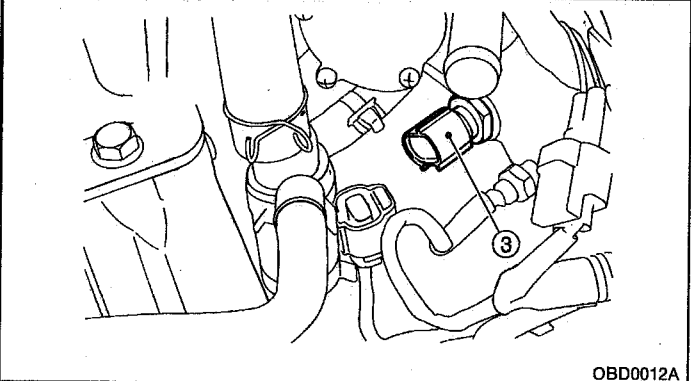
- ① Pressure sensor
- ② Mass air flow sensor
- ③ Engine coolant temperature sensor
- ④ Throttle position sensor
- ⑤ Knock sensor
- ⑥ Camshaft position sensor
- ⑦ Crankshaft position sensor



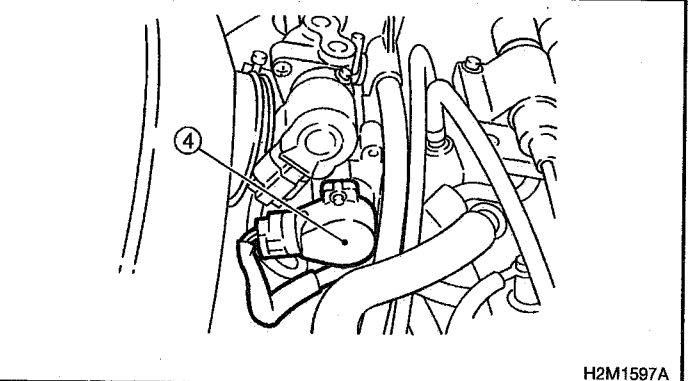
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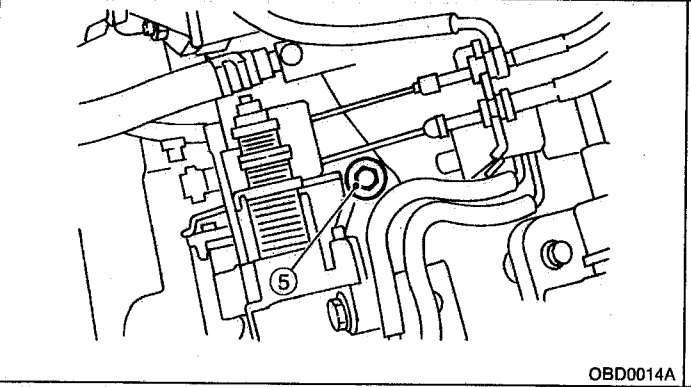
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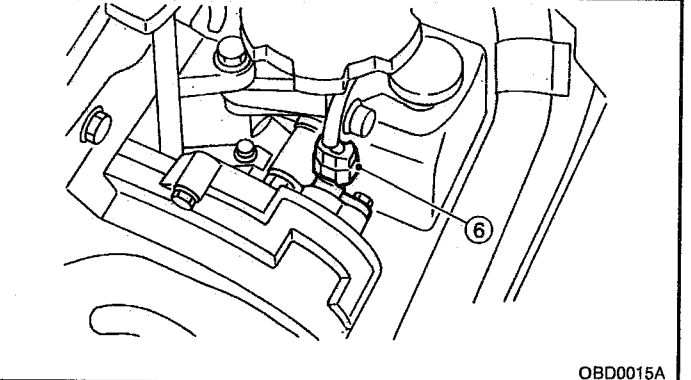
OBD0012A



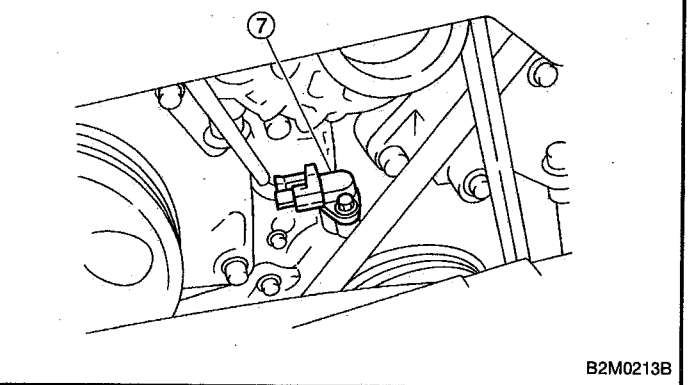
H2M1597A



OBD0014A

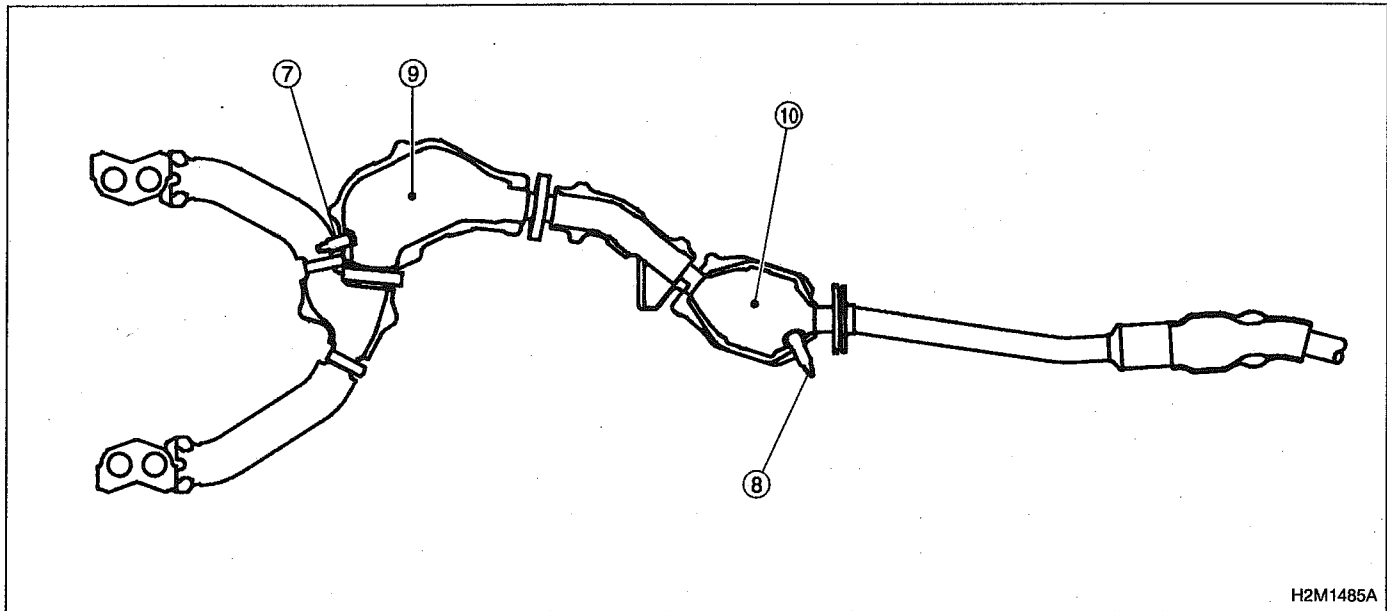


OBD0015A



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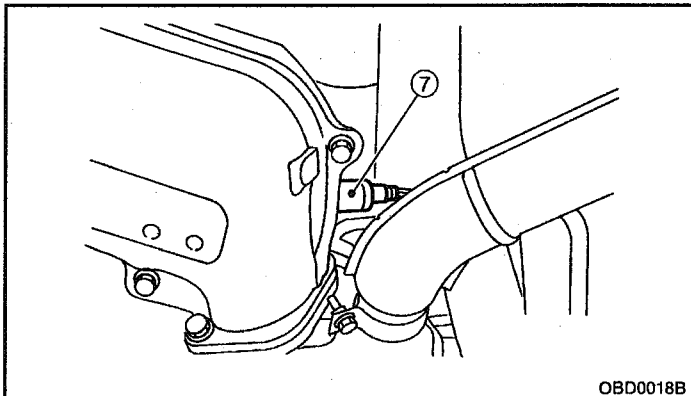
2. Electrical Components Location



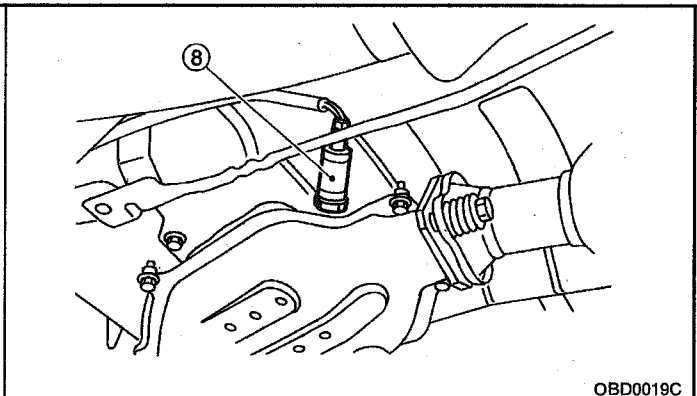
H2M1485A

- ⑦ Front oxygen sensor
- ⑧ Rear oxygen sensor

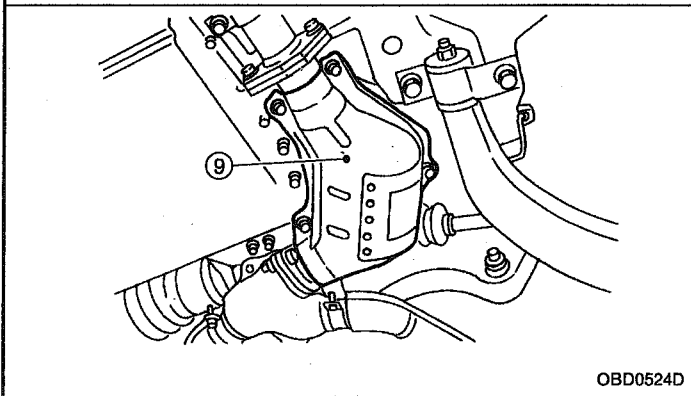
- ⑨ Front catalytic converter
- ⑩ Rear catalytic converter



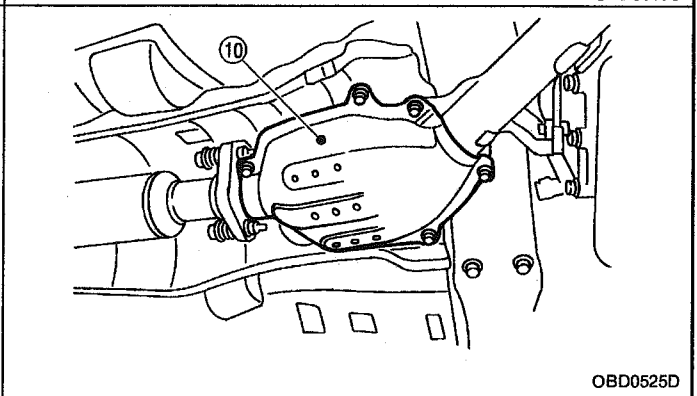
OBD0018B



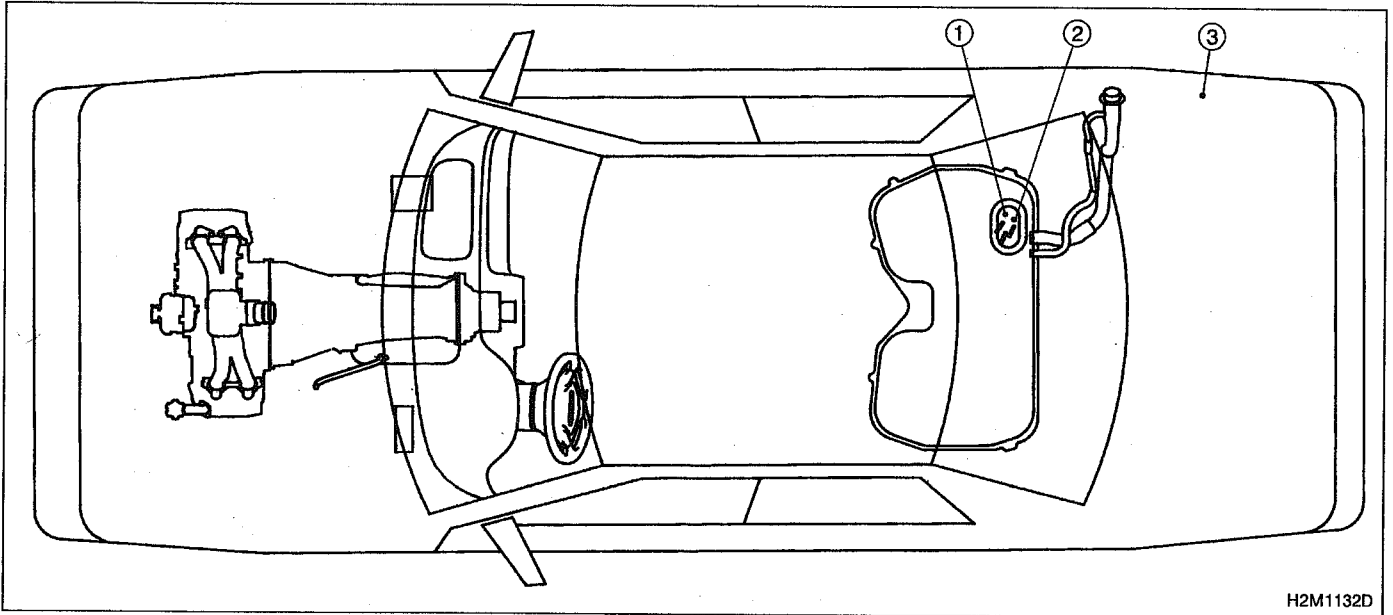
OBD0019C



OBD0524D



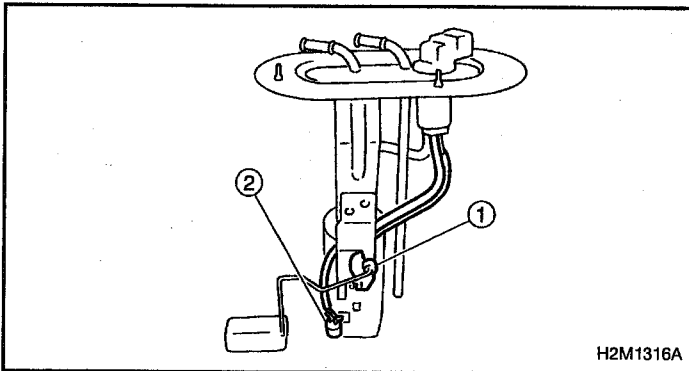
OBD0525D



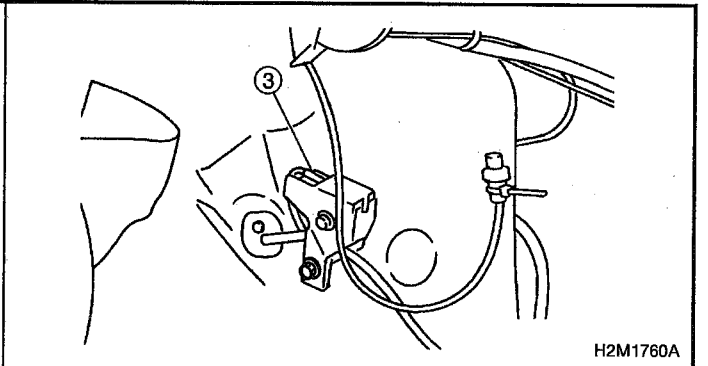
H2M1132D

- ① Fuel level sensor
- ② Fuel temperature sensor

- ③ Fuel tank pressure sensor

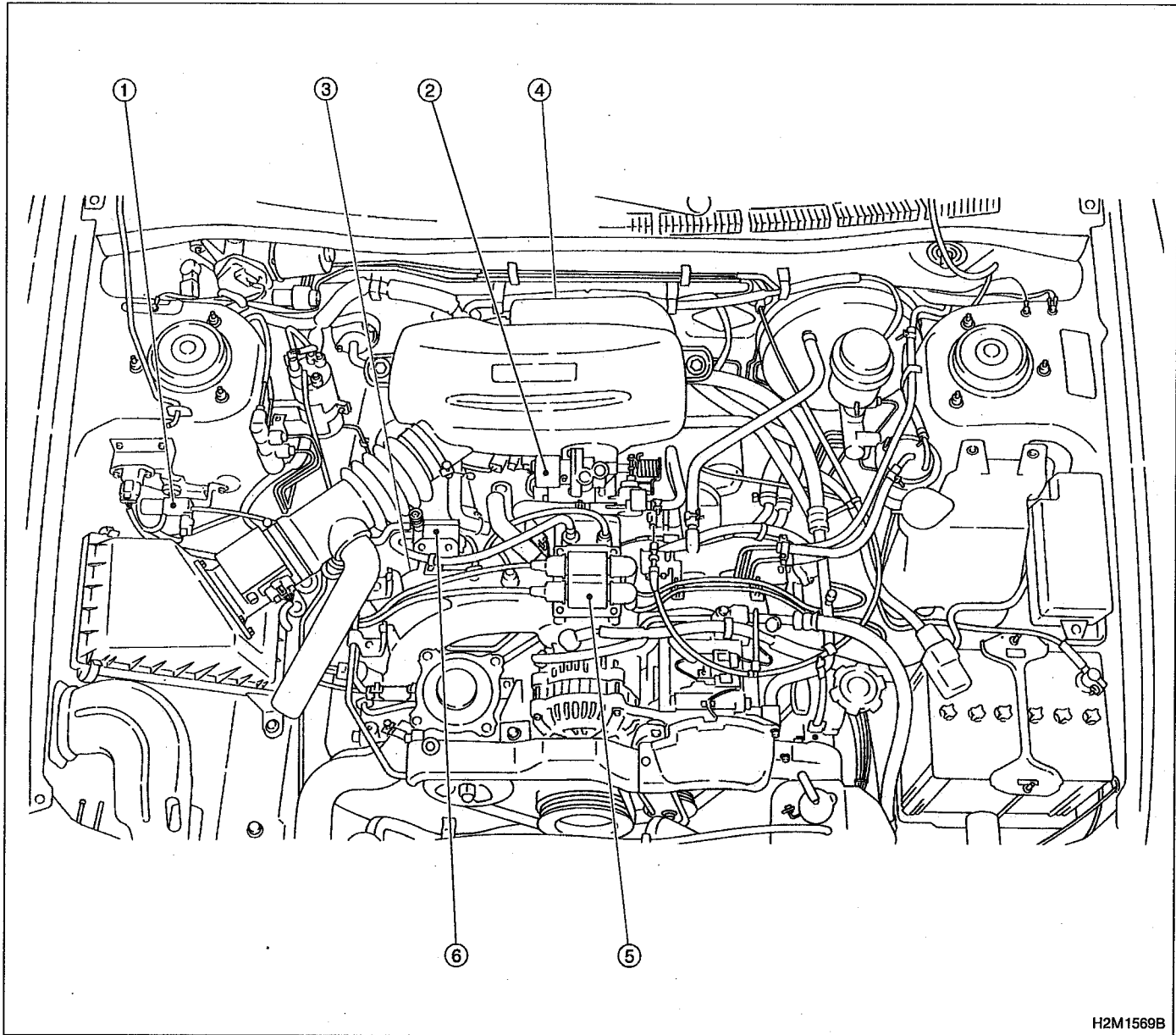


H2M1316A



H2M1760A

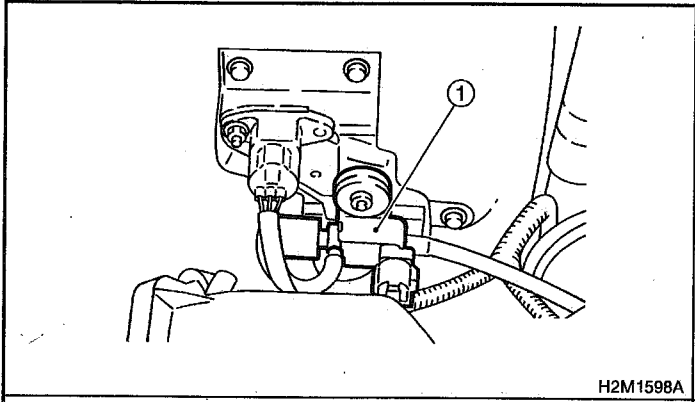
3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



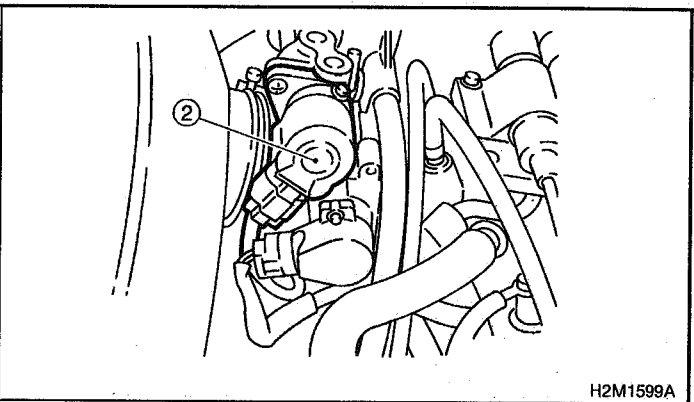
H2M1569B

- ① Pressure sources switching solenoid valve
- ② Idle air control solenoid valve
- ③ Purge control solenoid valve

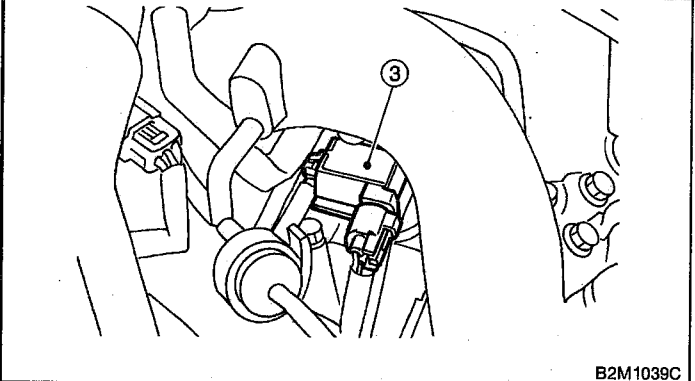
- ④ Ignitor
- ⑤ Ignition coil
- ⑥ FICD solenoid valve (With A/C models)



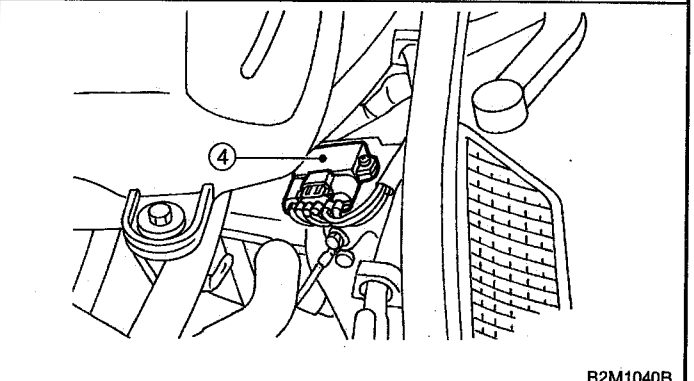
H2M1598A



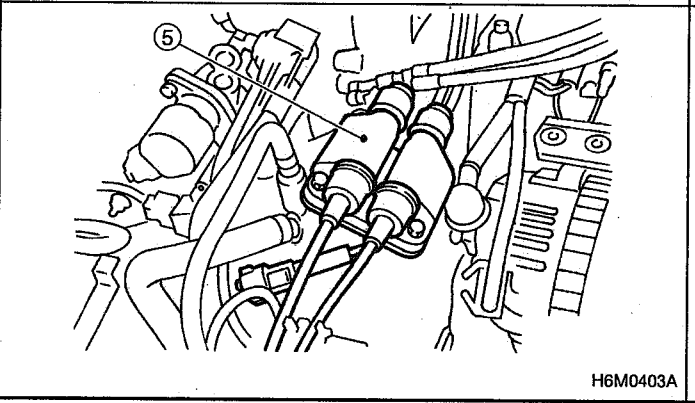
H2M1599A



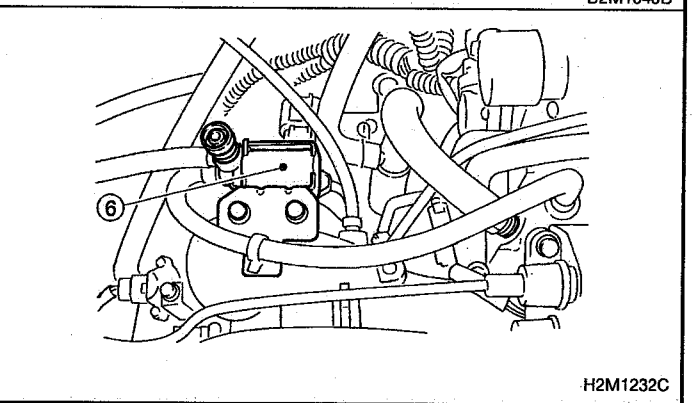
B2M1039C



B2M1040B

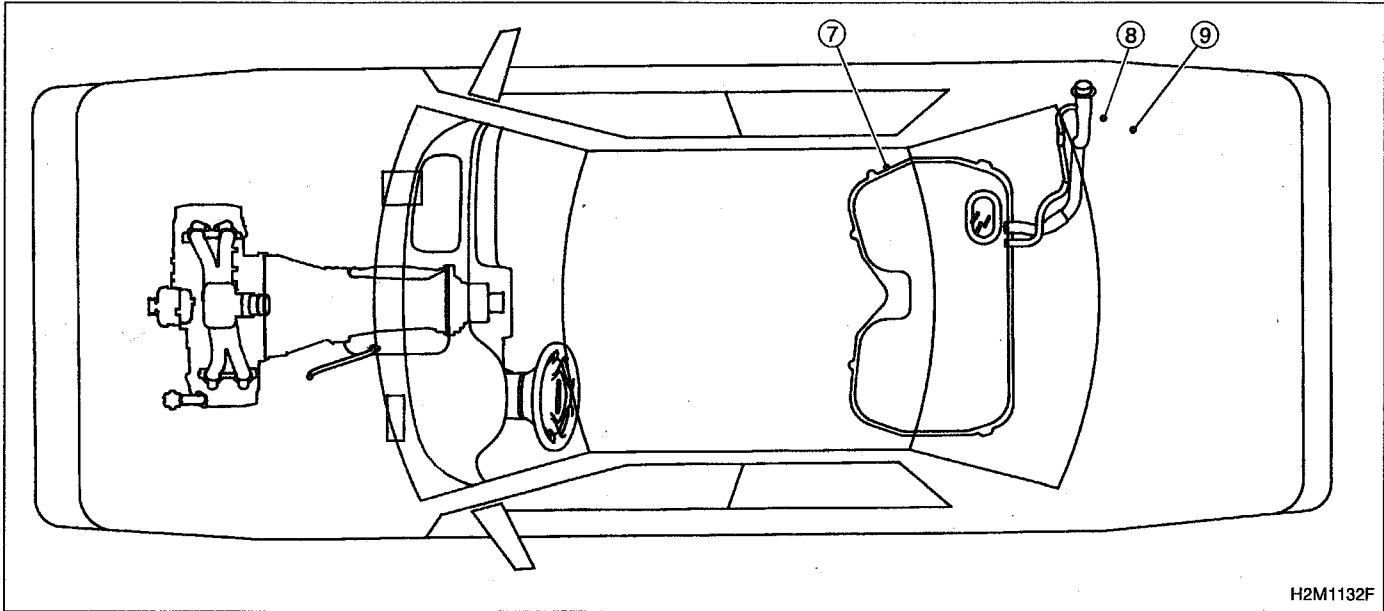


H6M0403A



H2M1232C

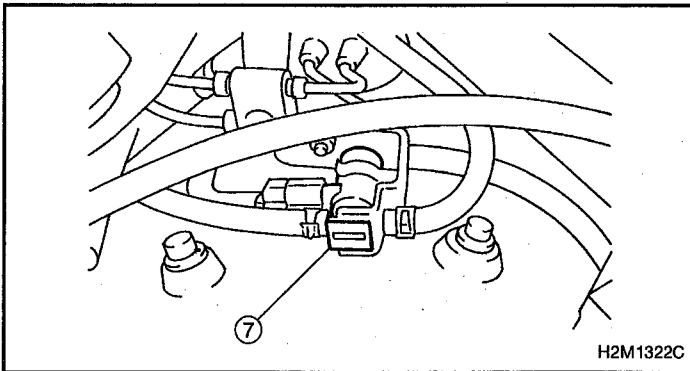
2. Electrical Components Location



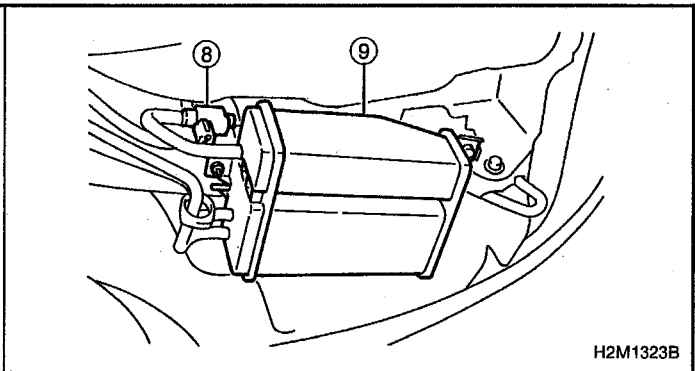
H2M1132F

- ⑦ Pressure control solenoid valve
- ⑧ Vent control solenoid valve

- ⑨ Canister



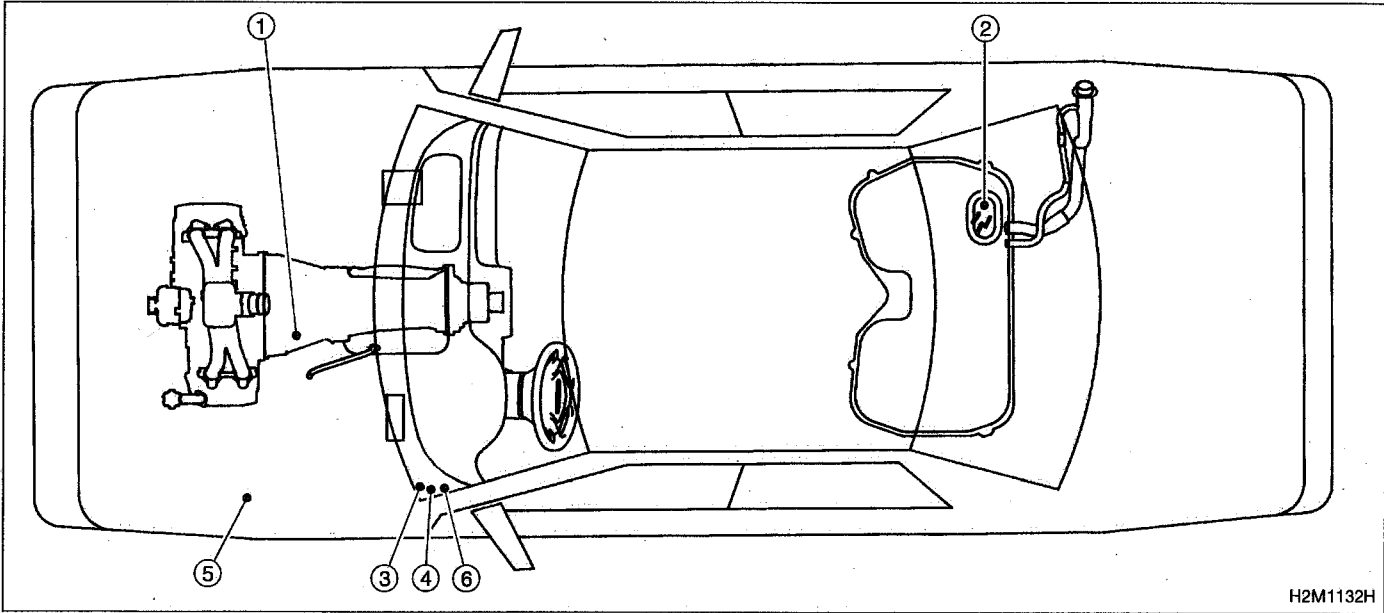
H2M1322C



H2M1323B

MEMO:

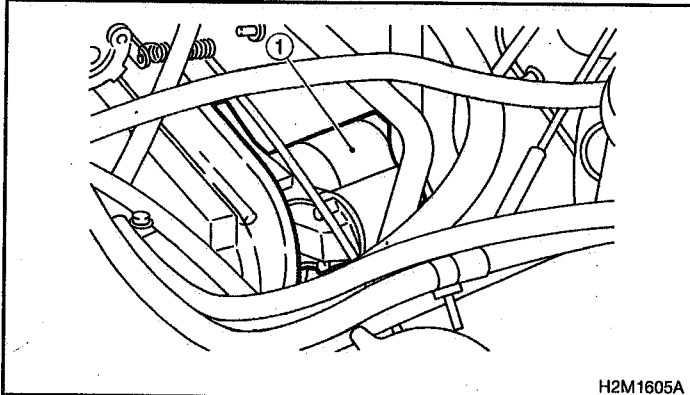
2. Electrical Components Location



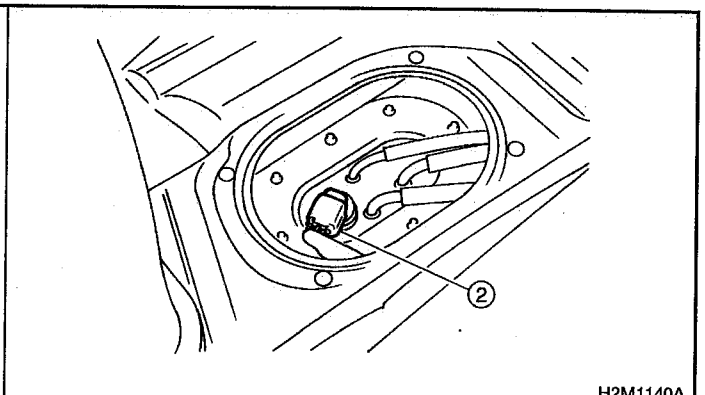
H2M1132H

- ① Starter
- ② Fuel pump
- ③ Main relay

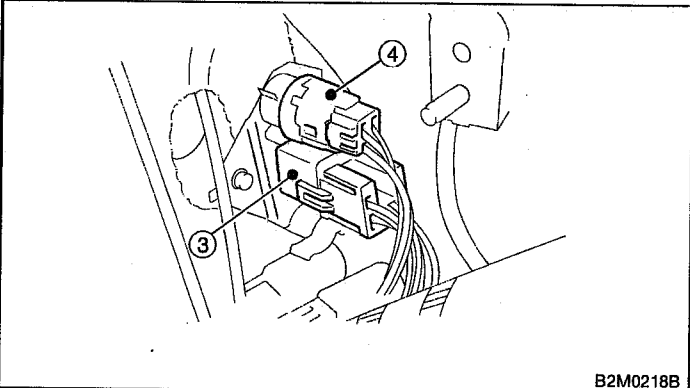
- ④ Fuel pump relay
- ⑤ Radiator sub fan relay (With A/C models only)
- ⑥ Main fan relay



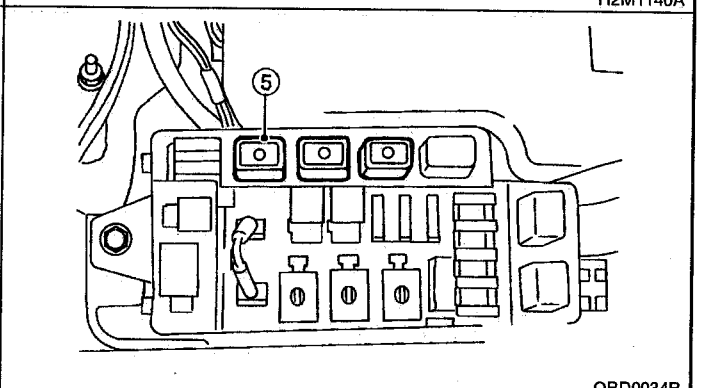
H2M1605A



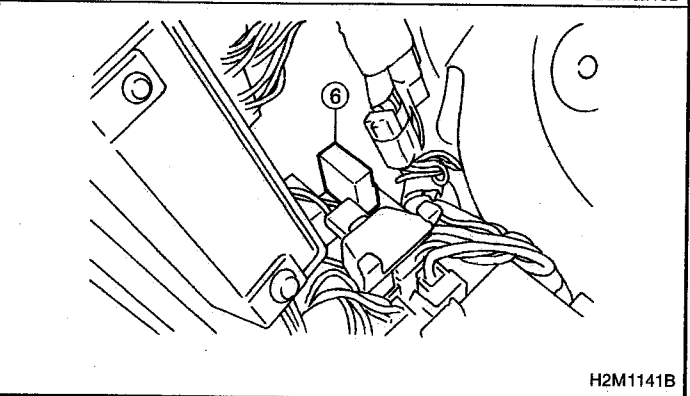
H2M1140A



B2M0218B



OBD0034B

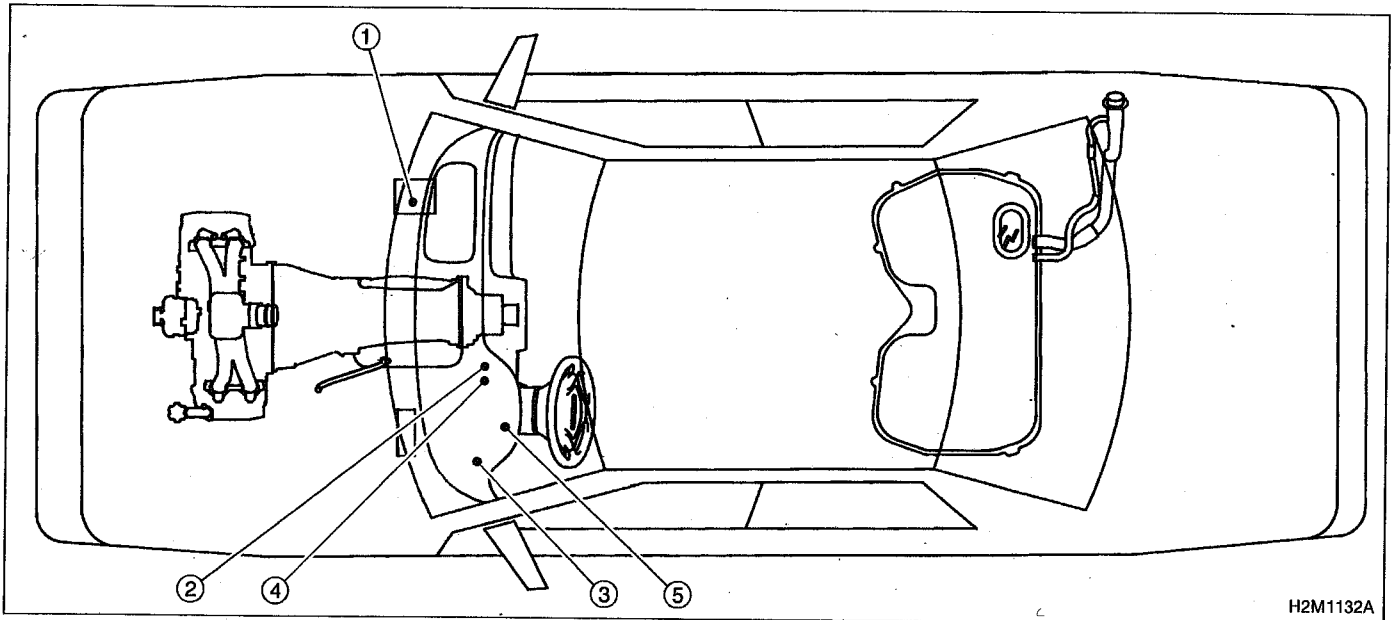


H2M1141B

MEMO:

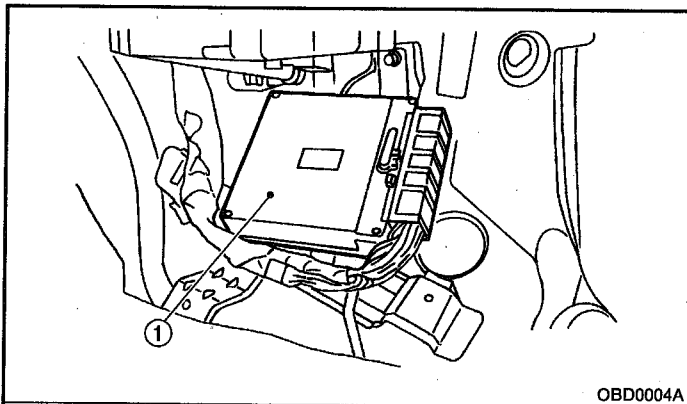
B: ENGINE (2200 cc MODEL)

1. MODULE

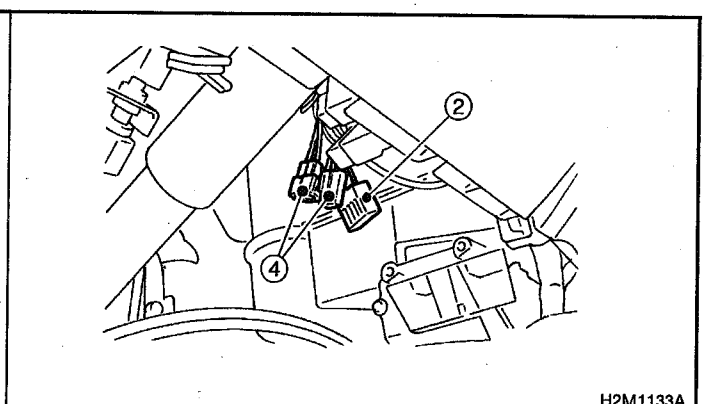


H2M1132A

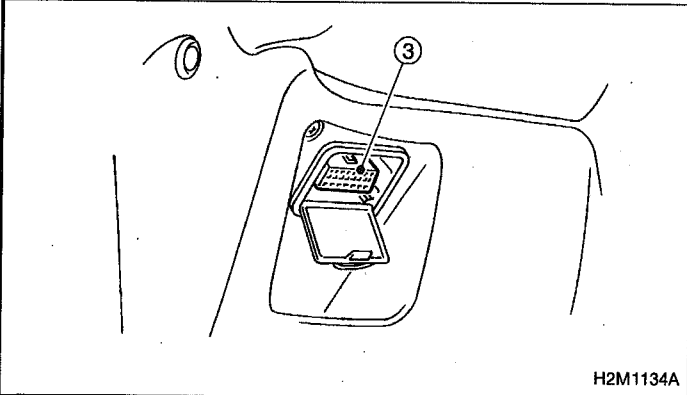
- ① Engine control module (ECM)
- ② Data link connector (for Subaru select monitor only)
- ③ Data link connector (for Subaru select monitor and OBD-II general scan tool)
- ④ Test mode connector
- ⑤ CHECK ENGINE malfunction indicator lamp (MIL)



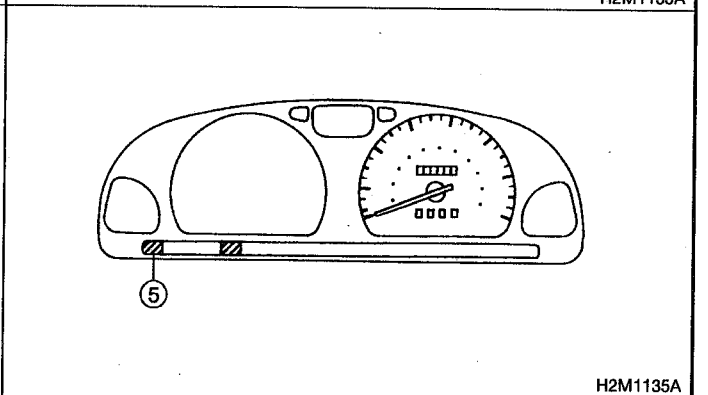
OBD0004A



H2M1133A

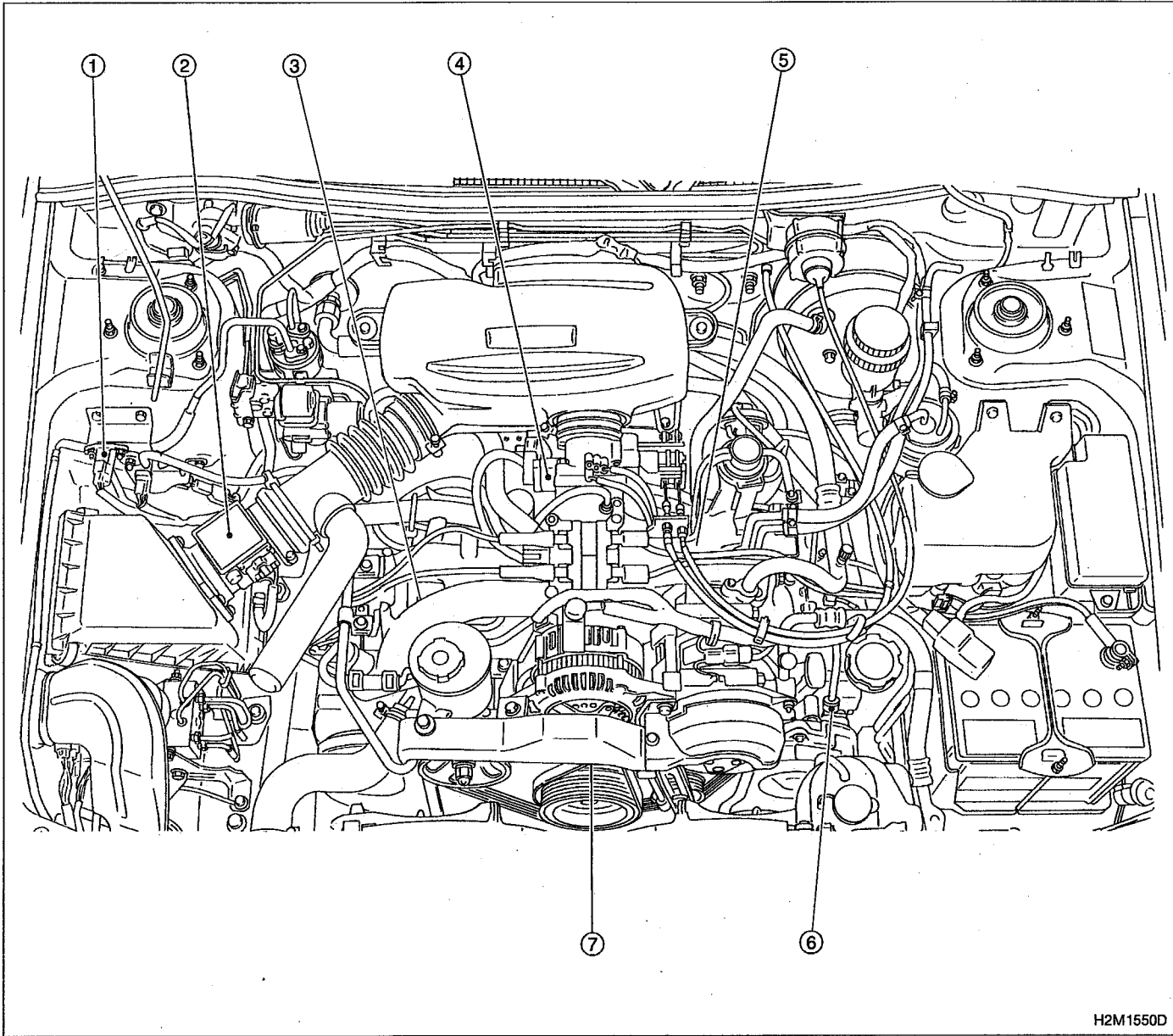


H2M1134A



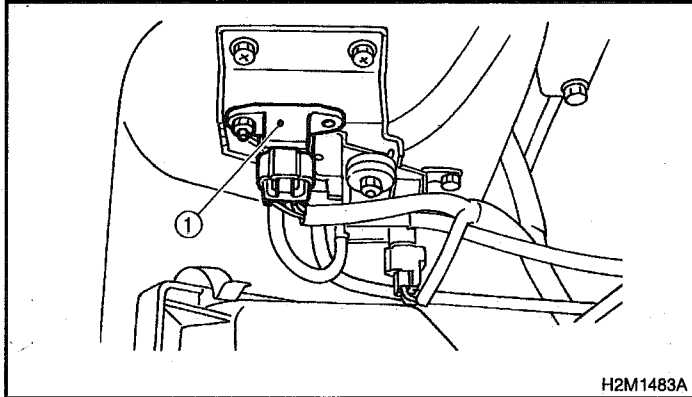
H2M1135A

2. SENSOR

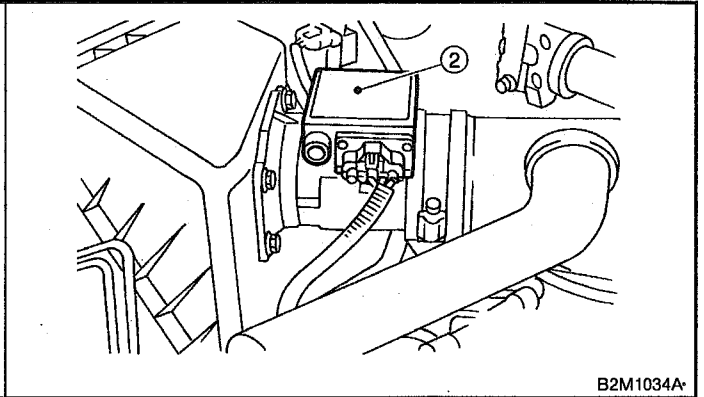


H2M1550D

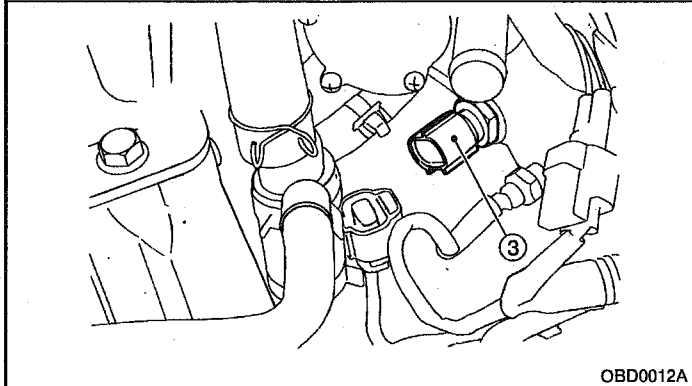
- ① Pressure sensor
- ② Mass air flow sensor
- ③ Engine coolant temperature sensor
- ④ Throttle position sensor
- ⑤ Knock sensor
- ⑥ Camshaft position sensor
- ⑦ Crankshaft position sensor



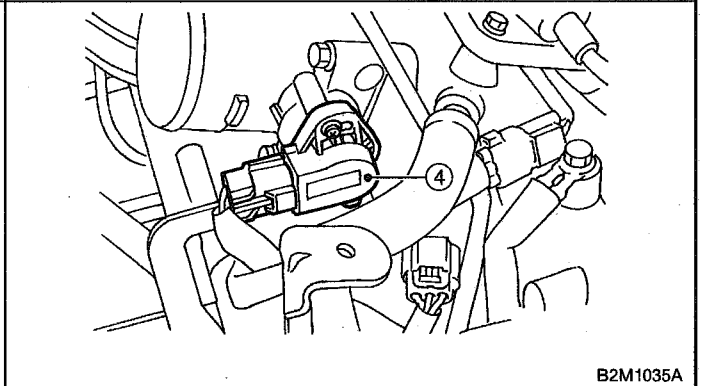
H2M1483A



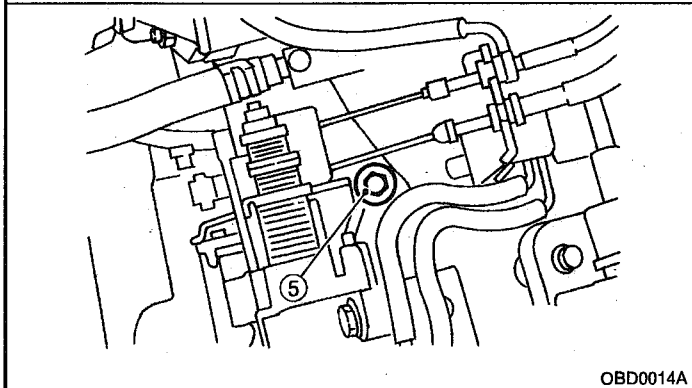
B2M1034A



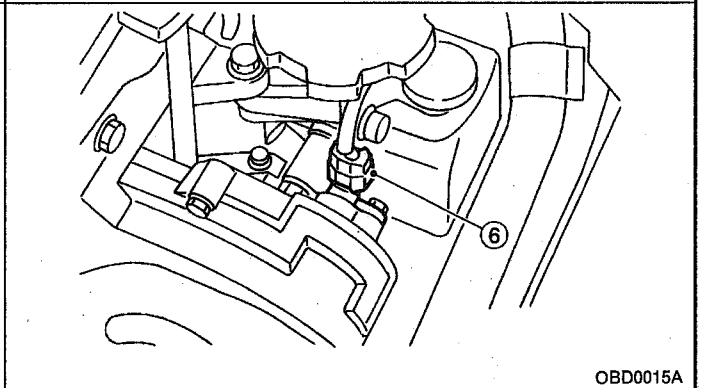
OBD0012A



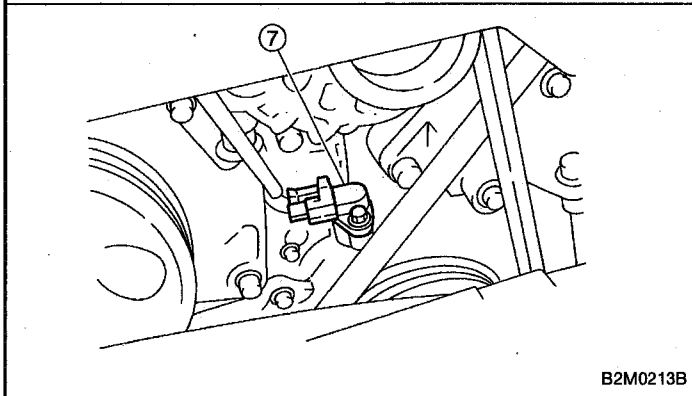
B2M1035A



OBD0014A

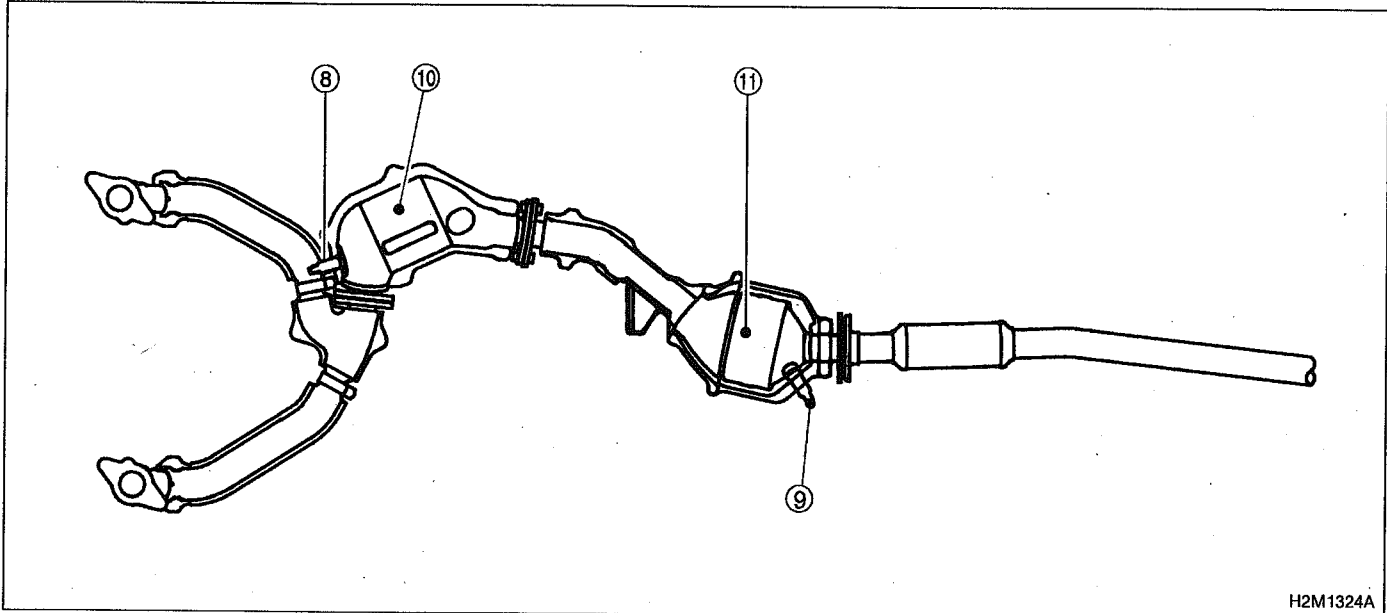


OBD0015A



B2M0213B

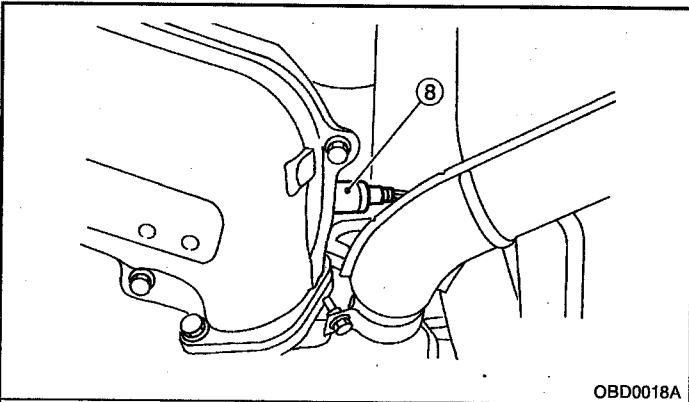
2. Electrical Components Location



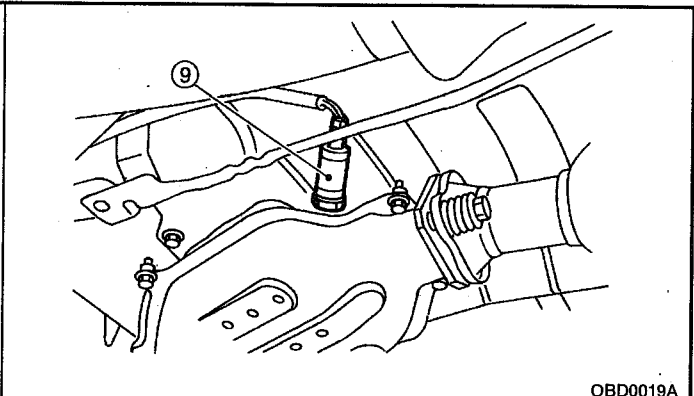
H2M1324A

- ⑧ Front oxygen sensor
- ⑨ Rear oxygen sensor

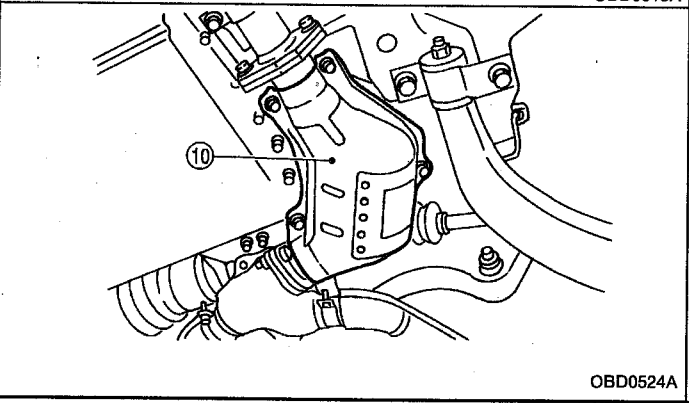
- ⑩ Front catalytic converter
- ⑪ Rear catalytic converter



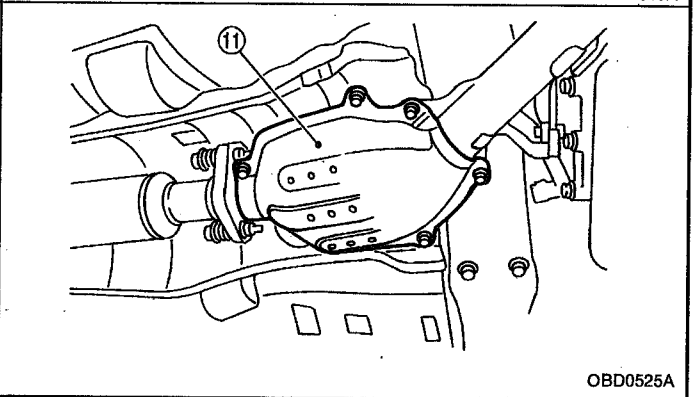
OBD0018A



OBD0019A



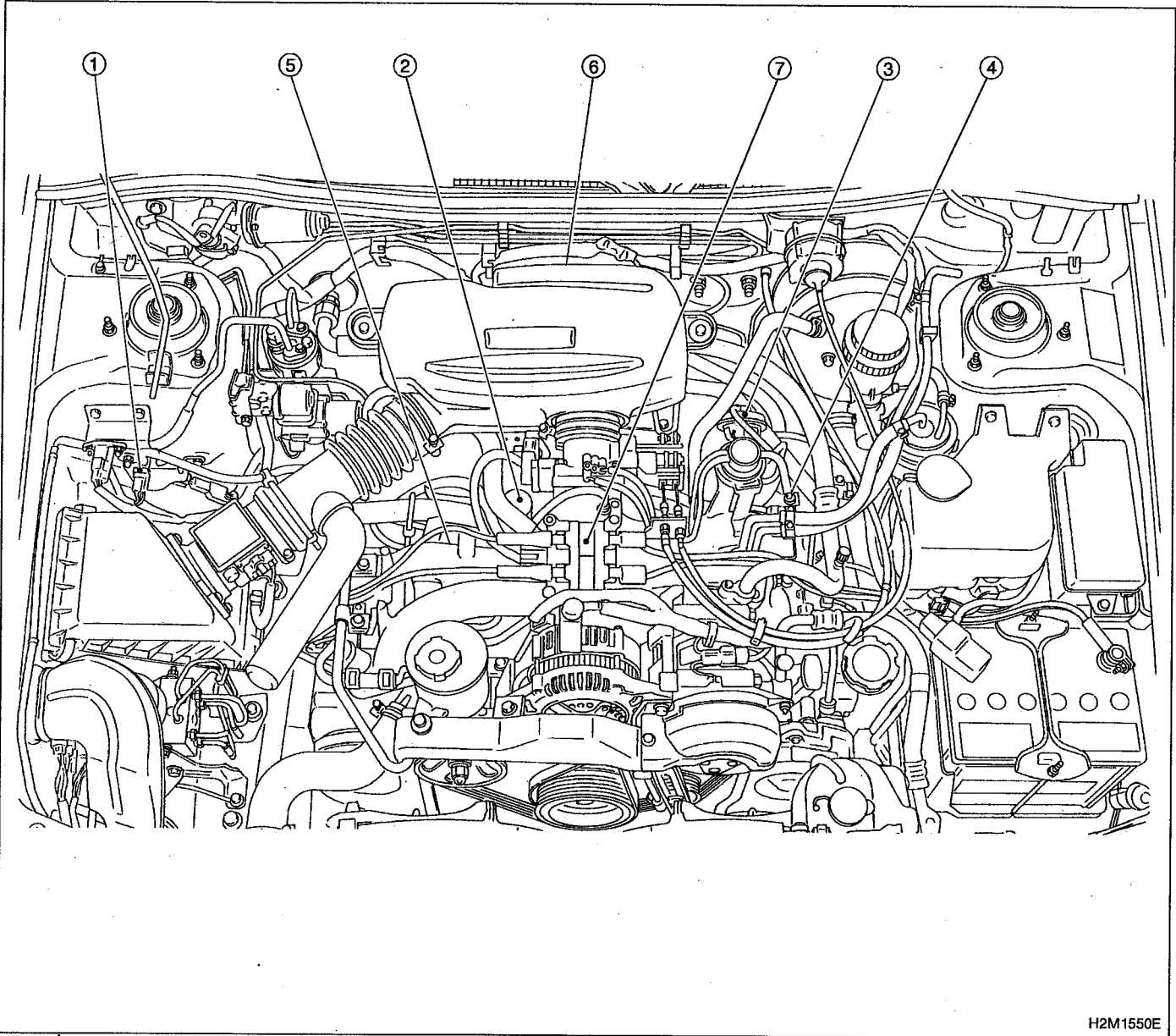
OBD0524A



OBD0525A

MEMO:

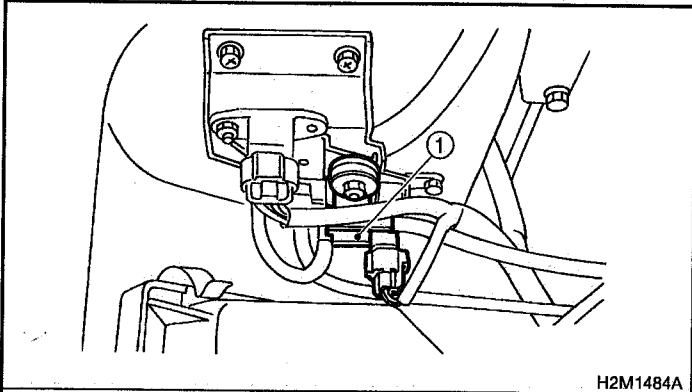
3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



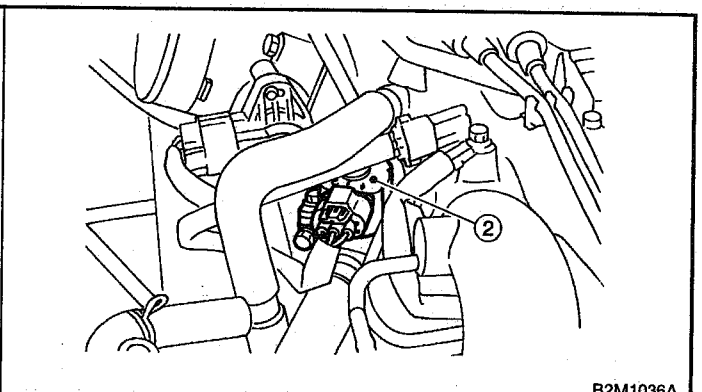
H2M1550E

- ① Pressure sources switching solenoid valve
- ② Idle air control solenoid valve
- ③ EGR valve (AT vehicles)
- ④ EGR control solenoid valve (AT vehicles)

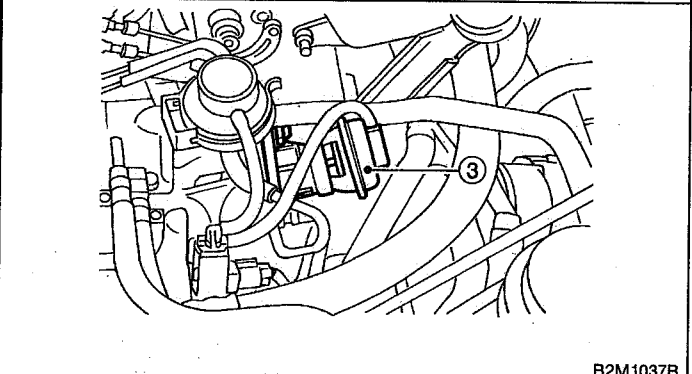
- ⑤ Purge control solenoid valve
- ⑥ Ignitor
- ⑦ Ignition coil



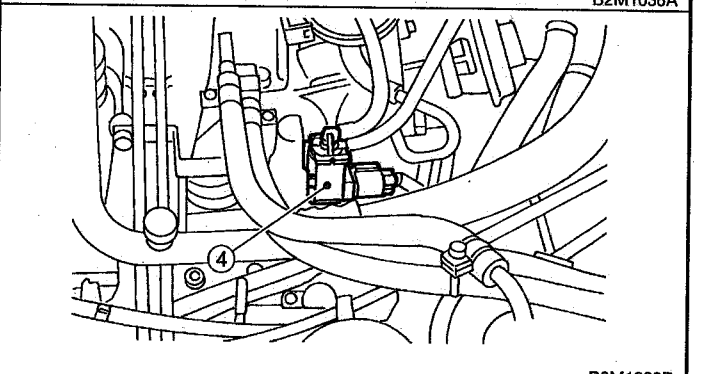
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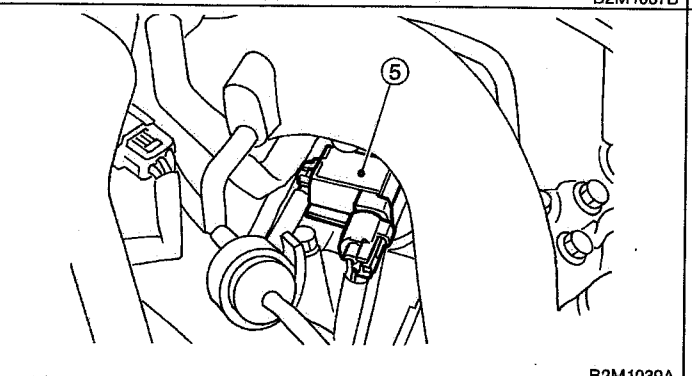
B2M1036A



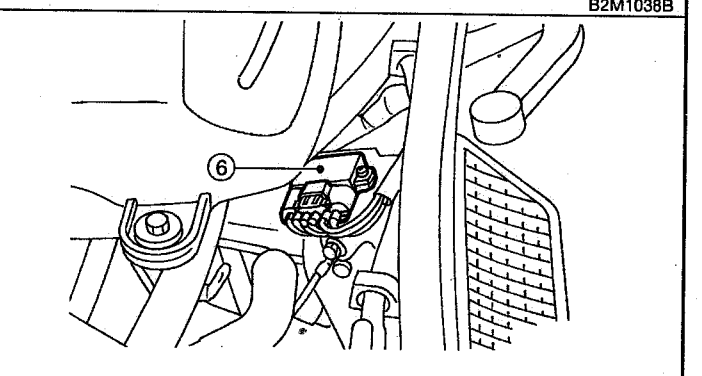
B2M1037B



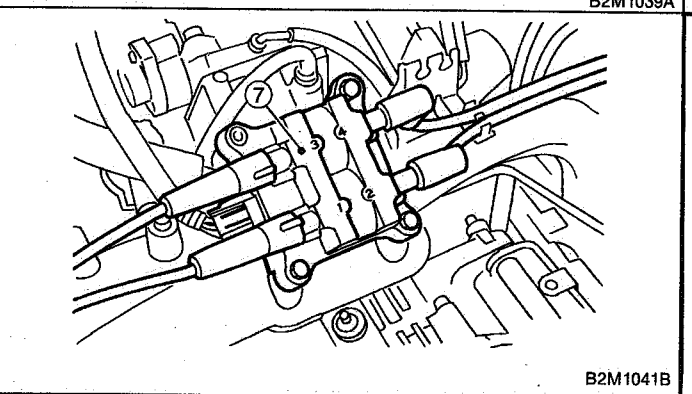
B2M1038B



B2M1039A

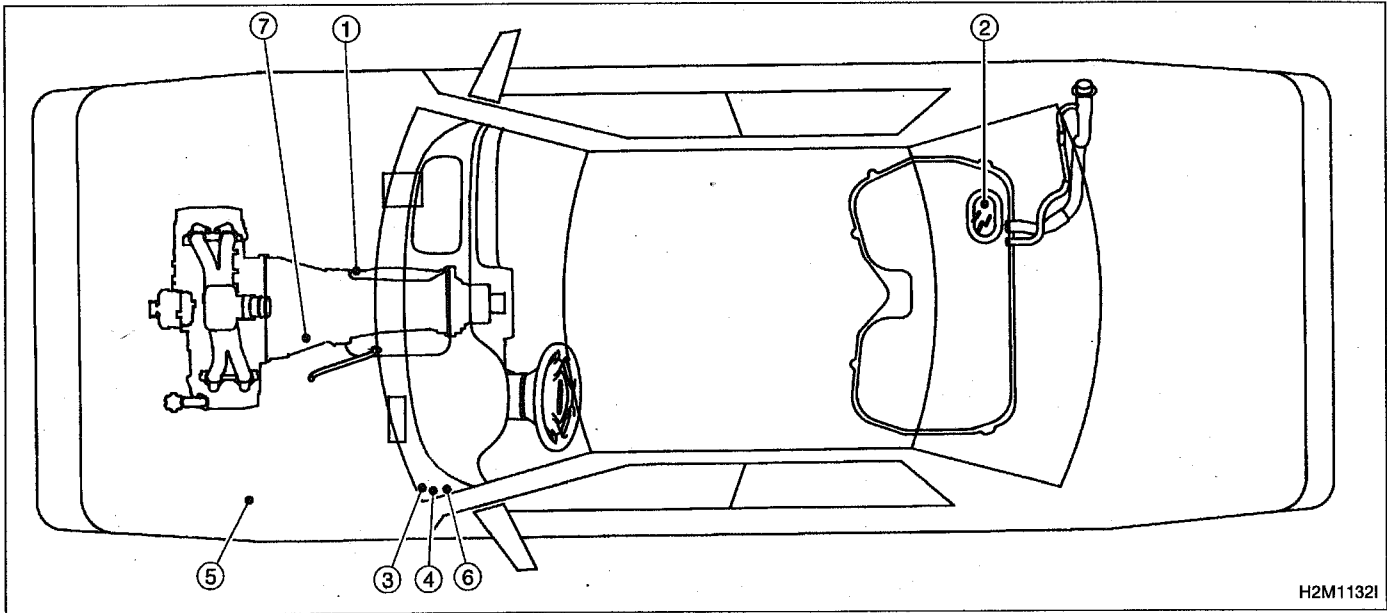


B2M1040A



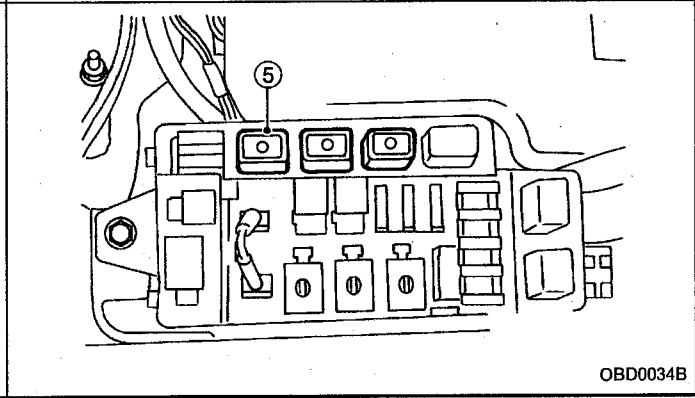
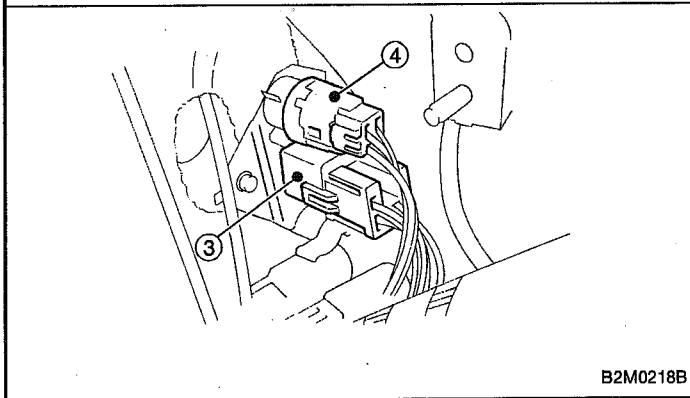
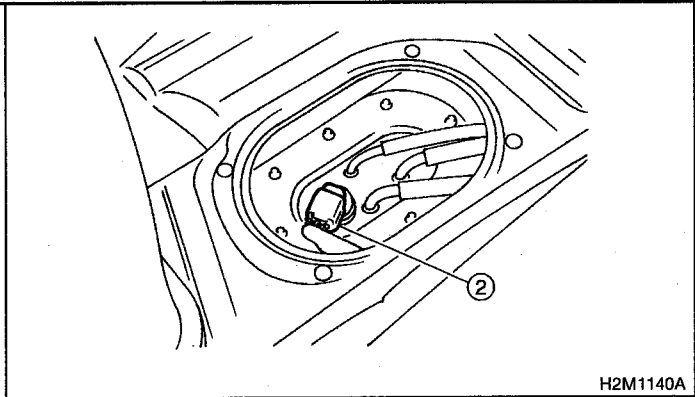
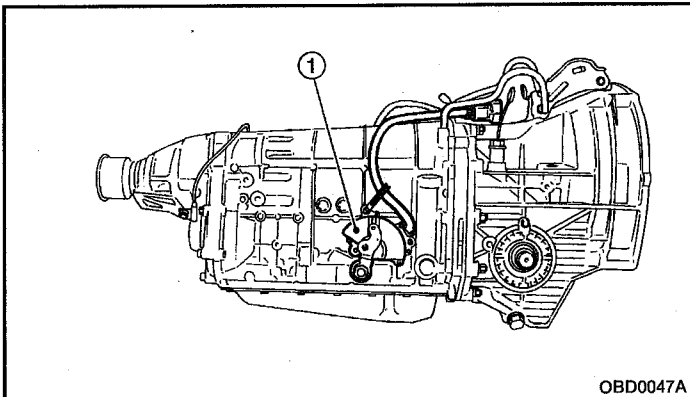
B2M1041B

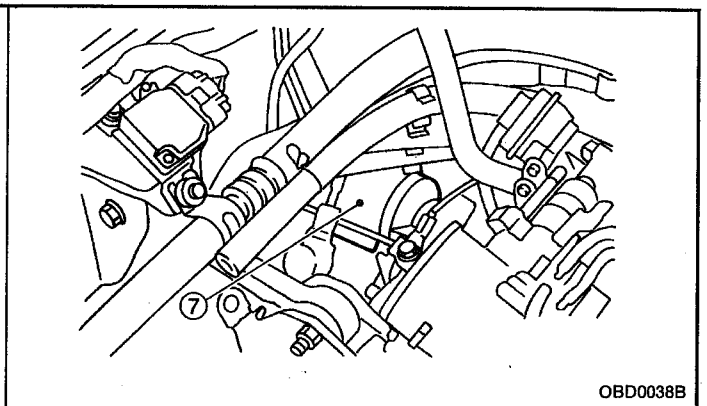
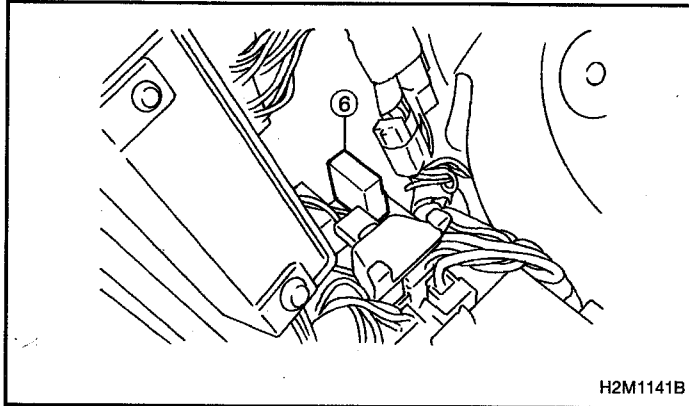
2. Electrical Components Location



- ① Inhibitor switch
- ② Fuel pump
- ③ Main relay
- ④ Fuel pump relay

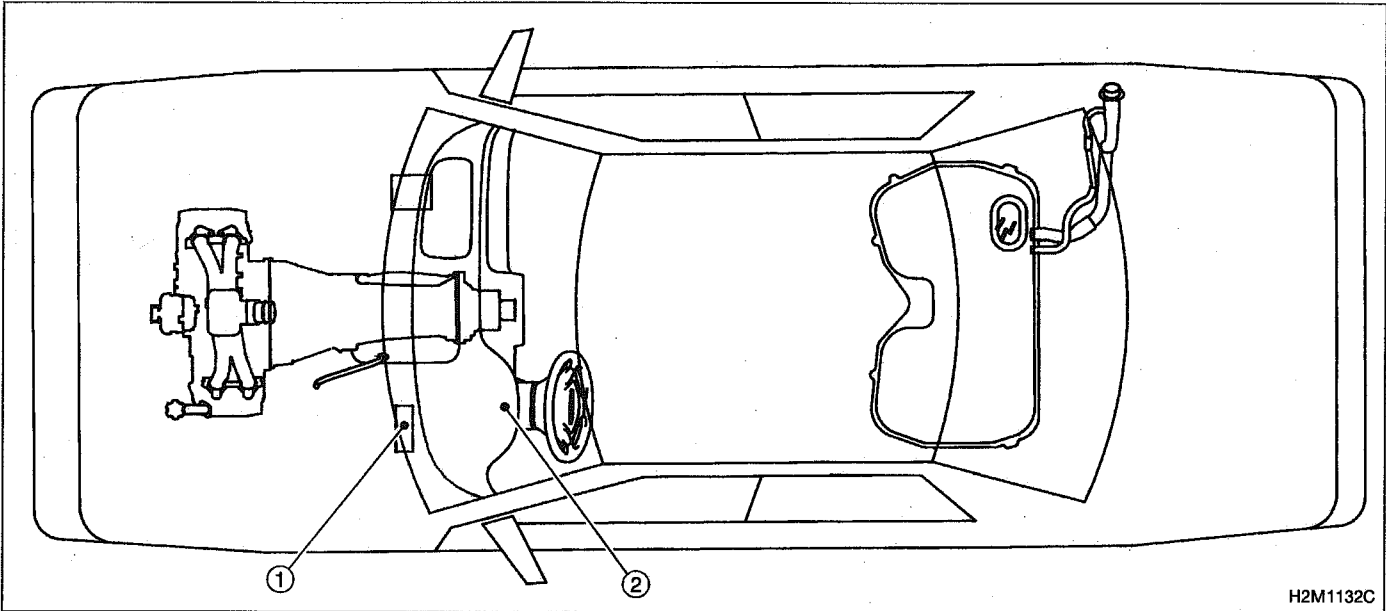
- ⑤ Radiator sub fan relay (With A/C models only)
- ⑥ Main fan relay
- ⑦ Starter





C: TRANSMISSION

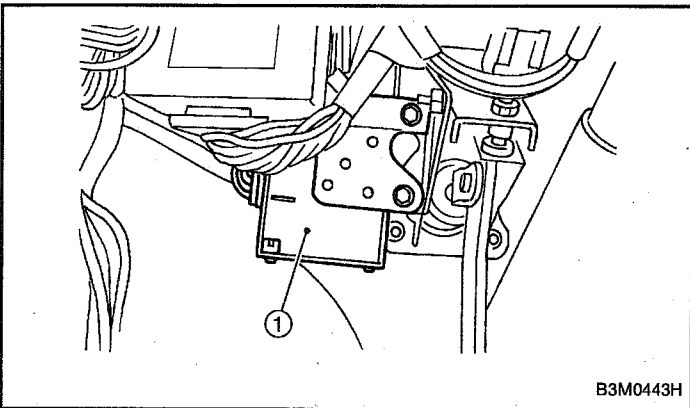
1. MODULE



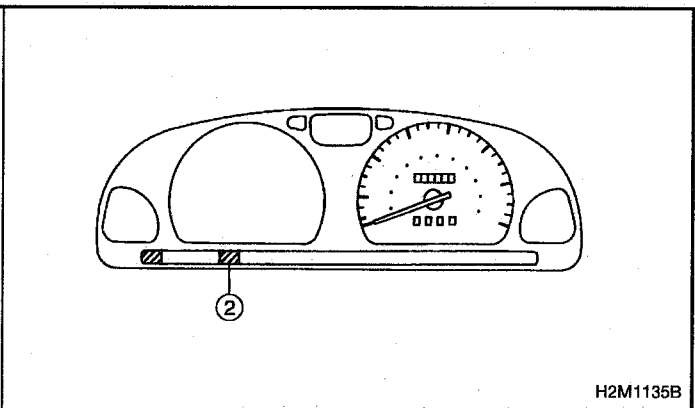
H2M1132C

① Transmission Control Module (TCM) (for AT vehicles)

② AT diagnostic indicator light (for AT vehicles)

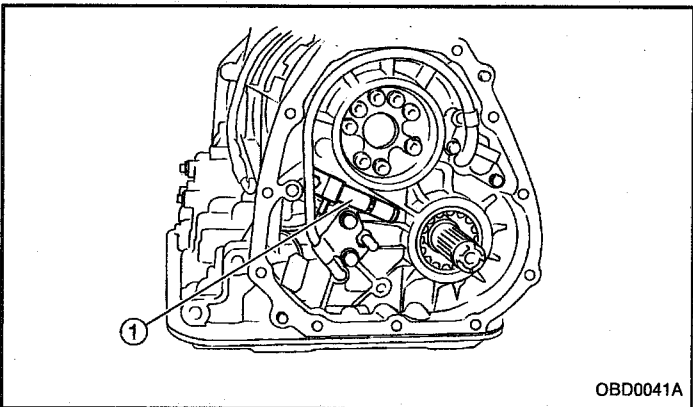


B3M0443H

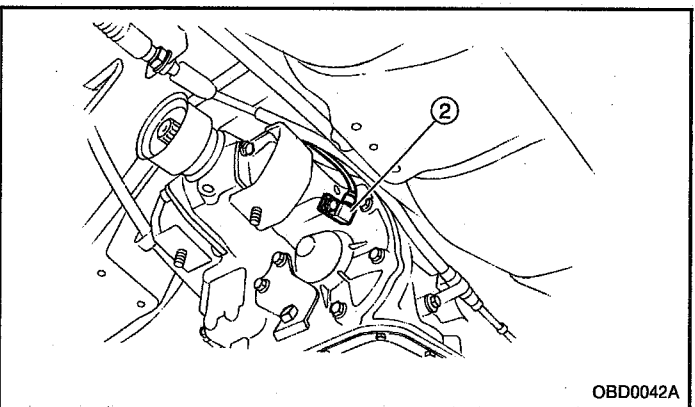


H2M1135B

2. SENSOR



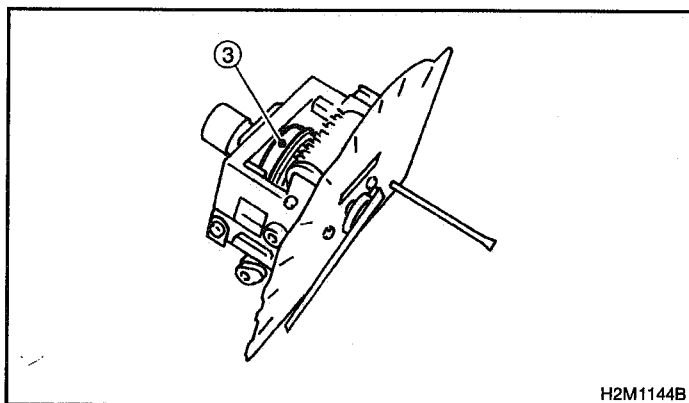
OBD0041A



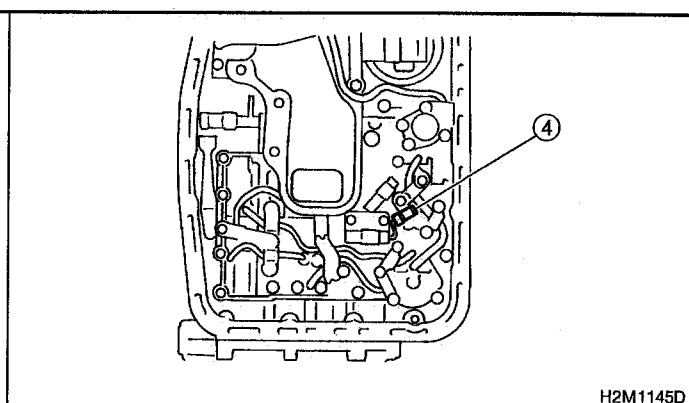
OBD0042A

① Vehicle speed sensor 1 (for AT FWD vehicles)

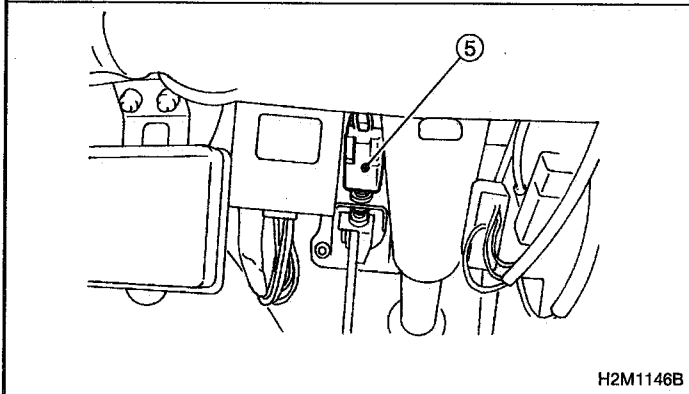
② Vehicle speed sensor 1 (for AT AWD vehicles)



H2M1144B



H2M1145D



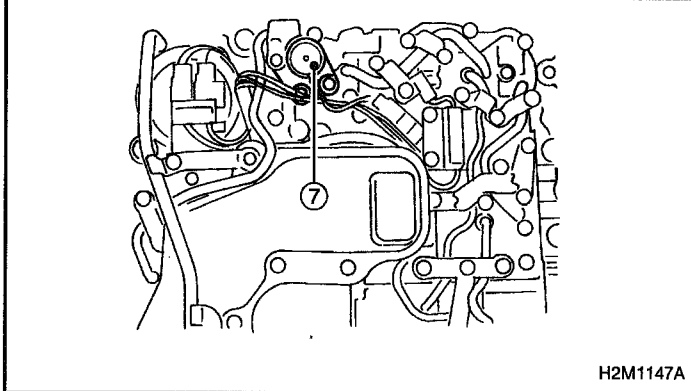
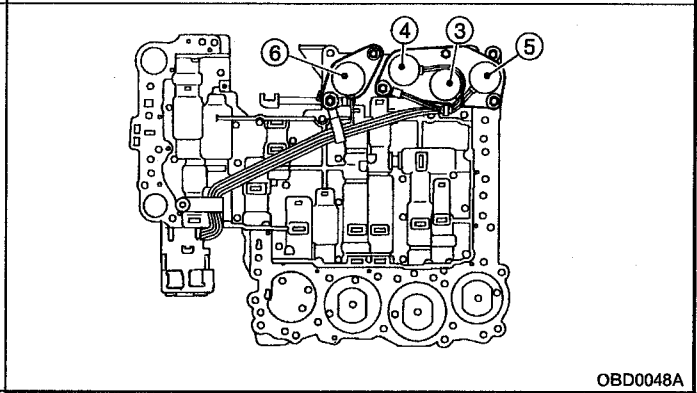
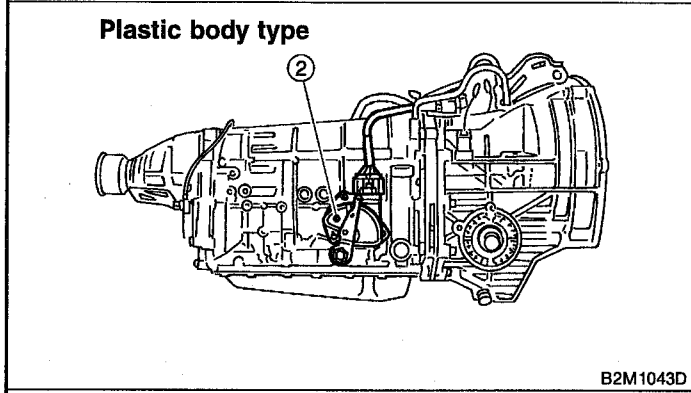
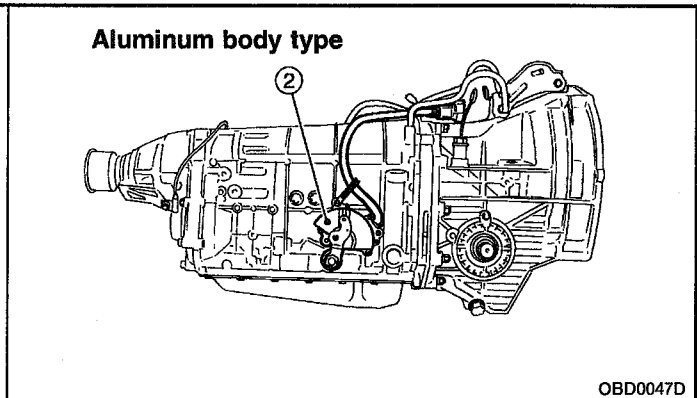
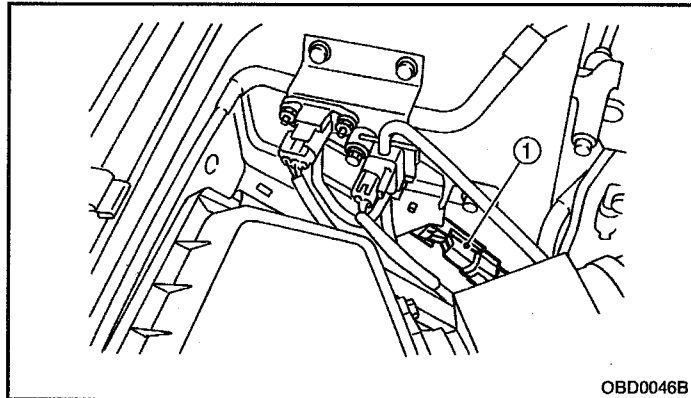
H2M1146B

- ③ Vehicle speed sensor 2
- ④ ATF temperature sensor (for AT vehicles)

- ⑤ Brake light switch

3. SOLENOID VALVE AND RELAY

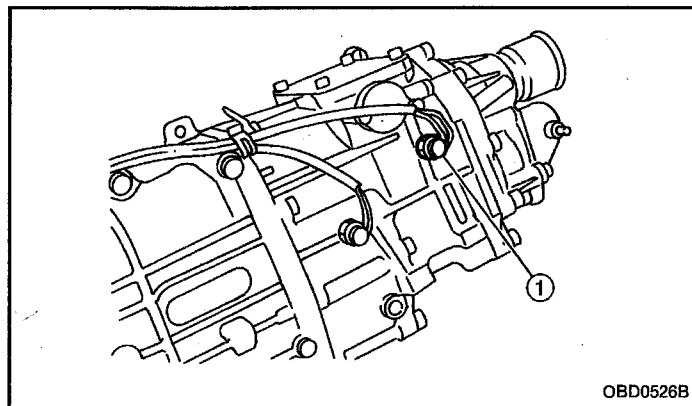
● For AT vehicles



- ① Dropping resistor
- ② Inhibitor switch
- ③ Shift solenoid valve 1
- ④ Shift solenoid valve 2

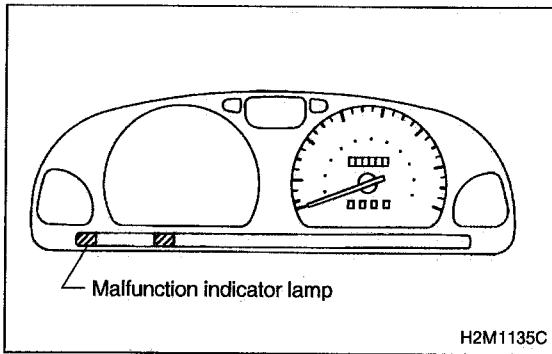
- ⑤ Shift solenoid valve 3
- ⑥ Duty solenoid valve A
- ⑦ Duty solenoid valve B

● For MT vehicles



OBD0526B

① Neutral position switch (AWD models)



3. Diagnosis System

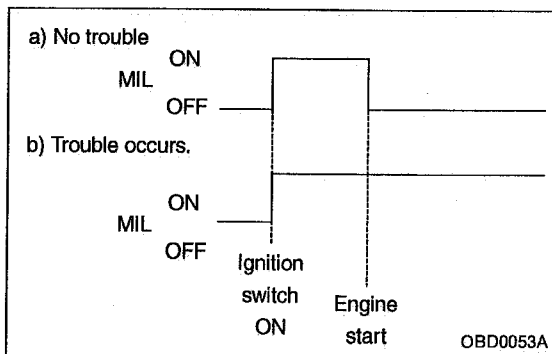
A: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

1. ACTIVATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL)

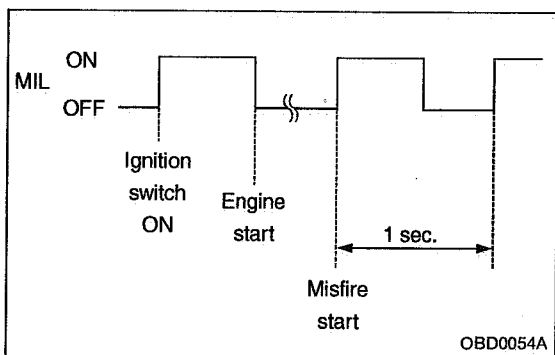
1) When ignition switch is turned to ON (engine off), the CHECK ENGINE malfunction indicator lamp (MIL) in the combination meter illuminates.

NOTE:

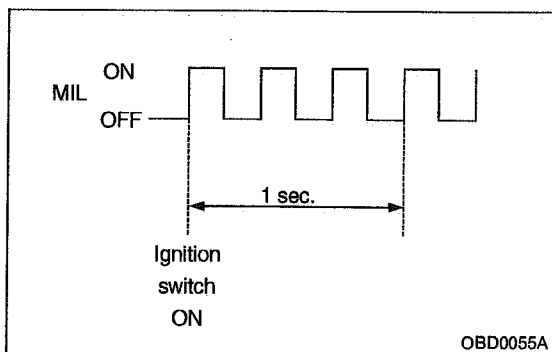
If the MIL does not illuminate, perform diagnostics of the CHECK ENGINE light circuit or the combination meter circuit. <Ref. to 2-7 [T700].>



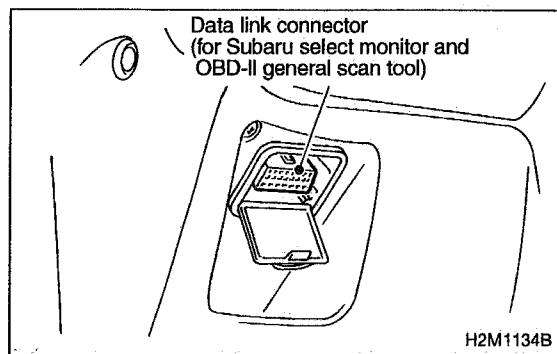
2) After starting the engine, the MIL goes out. If it does not, either the engine or the emission control system is malfunctioning.



3) If the diagnosis system senses a misfire which could damage the catalyzer, the MIL will blink at a cycle of 1 Hz.



4) When ignition switch is turned to ON (engine off) or to "START" with the test mode connector connected, the MIL blinks at a cycle of 3 Hz.



B: OBD-II GENERAL SCAN TOOL

1. HOW TO USE OBD-II GENERAL SCAN TOOL

- 1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
- 2) Open the cover and connect the OBD-II general scan tool to the data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.
- 3) Using the OBD-II general scan tool, call up diagnostic trouble code(s) and freeze frame data.

OBD-II general scan tool functions consist of:

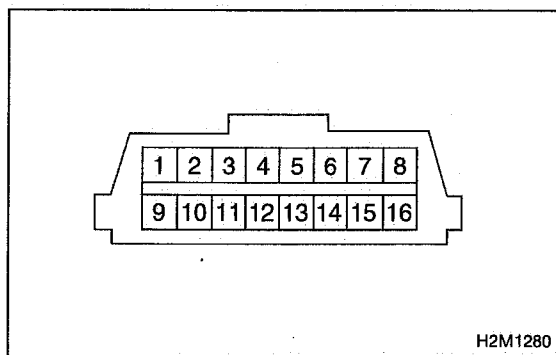
- (1) MODE \$01: Current powertrain diagnostic data
- (2) MODE \$02: Powertrain freeze frame data
- (3) MODE \$03: Emission-related powertrain diagnostic trouble codes
- (4) MODE \$04: Clear/Reset emission-related diagnostic information
- (5) MODE \$05: Oxygen sensor monitoring test results

Read out data according to repair procedures.

(For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.)

NOTE:

For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST, 2-7b [T10A0]☆4.



2. DATA LINK CONNECTOR (FOR OBD-II GENERAL SCAN TOOL AND SUBARU SELECT MONITOR)

- 1) This connector is used both for OBD-II general scan tools and the Subaru Select Monitor.
- 2) Terminal No. 4 to No. 6 of the data link connector is used for the Subaru Select Monitor signal.

CAUTION:

Do not connect any scan tools other than the OBD-II general scan tools and the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.

Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	K line of ISO 9141 CARB
3	Blank	11	Blank
4	Subaru Select Monitor signal (ECM to Subaru Select Monitor)*	12	Ground
5	Subaru Select Monitor signal (Subaru Select Monitor to ECM)*	13	Ground
6	Subaru Select Monitor clock*	14	Blank
7	Blank	15	Blank
8	Blank	16	Blank

*: Circuit only for Subaru Select Monitor

**3. CURRENT POWERTRAIN DIAGNOSTIC DATA
(MODE \$01)**

Refers to data denoting the current operating condition of analog input/output, digital input/output and/or the powertrain system.

A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain trouble codes and MIL status	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
10	Air flow rate from mass air flow sensor	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
14	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1	V and %
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 2	V and %
1C	On-board diagnosis system	—

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access generic OBD-II PIDs (MODE \$01).

4. POWERTRAIN FREEZE FRAME DATA (MODE \$02)

Refers to data denoting the operating condition when trouble is sensed by the on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	Trouble code that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access freeze frame data (MODE \$02).

5. EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE (MODE \$03)

Refers to data denoting emission-related powertrain diagnostic trouble codes.

For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].>

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access emission-related powertrain diagnostic trouble codes (MODE \$03).

6. CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION (MODE \$04)

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE \$04).

7. OXYGEN SENSOR MONITORING TEST RESULTS (MODE \$05)

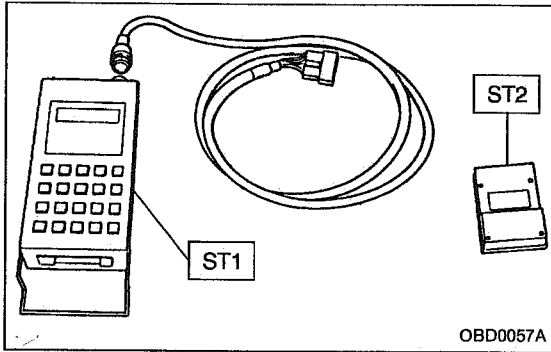
Refers to the mode using oxygen sensor output data while the on-board diagnosis system is performing diagnosis on the oxygen sensor.

A list of the support oxygen sensor output data and test ID (identification) are shown in the following table.

Test ID	Data	Unit of measure
01	Rich to lean sensor threshold voltage (constant)	V
02	Lean to rich sensor threshold voltage (constant)	V
03	Low sensor voltage for switch time calculation (constant)	V
04	High sensor voltage for switch time calculation (constant)	V
05	Rich to lean sensor switch time (calculated)	sec.
06	Lean to rich sensor switch time (calculated)	sec.
07	Minimum sensor voltage for test cycle (calculated)	V
08	Maximum sensor voltage for test cycle (calculated)	V

NOTE:

Refer to OBD-II general scan tool manufacturer's instruction manual to access oxygen sensor monitoring test results (MODE \$05).



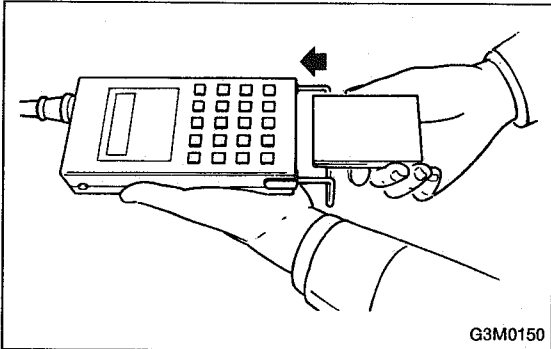
C: SUBARU SELECT MONITOR

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare Subaru select monitor and cartridge.

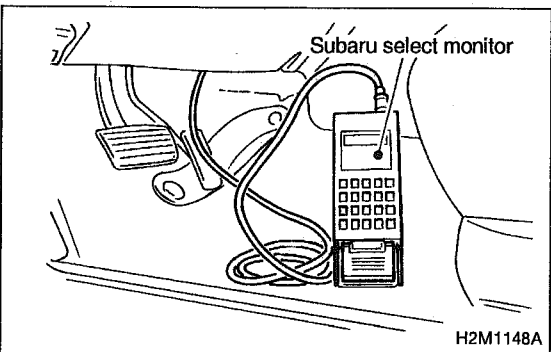
ST1 498307500 SELECT MONITOR KIT

ST2 498346200 CARTRIDGE



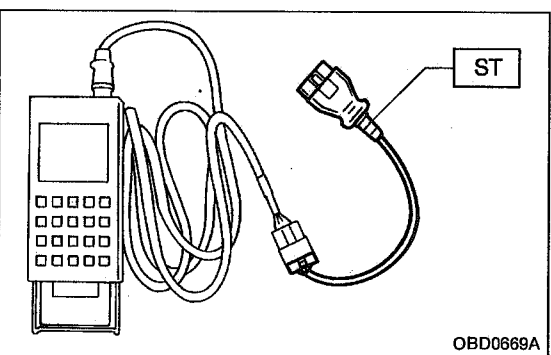
2) Turn ignition switch and Subaru select monitor switch to OFF.

3) Insert cartridge into Subaru select monitor.



4) Connect Subaru select monitor to data link connector.

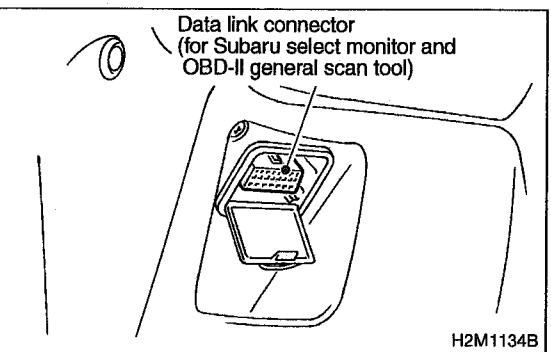
- Using data link connector for Subaru select monitor only, connect Subaru select monitor to its data link connector located in the lower portion of the instrument panel (on the driver's side), to the side of the center console box.



- Using data link connector for Subaru select monitor and OBD-II general scan tool;

(1) Connect ST to Subaru select monitor cable.

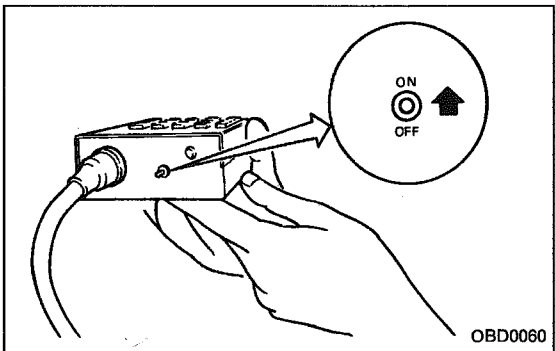
ST 498357200 ADAPTER CABLE



(2) Open the cover and connect Subaru select monitor to data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

CAUTION:

Do not connect scan tools except for Subaru select monitor and OBD-II general scan tool.

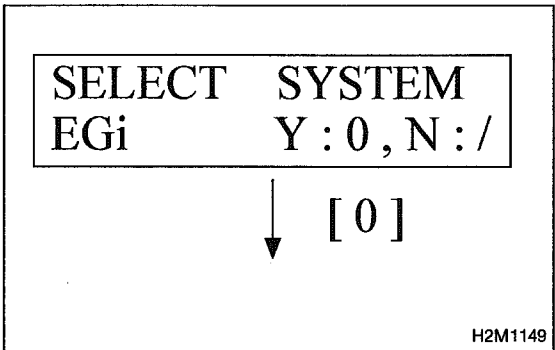


5) Turn ignition switch ON (engine OFF) and Subaru select monitor switch ON.

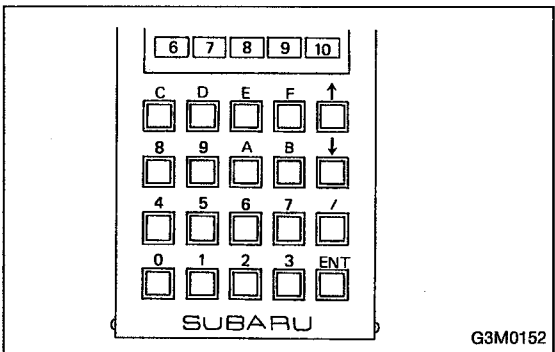
6) Using Subaru select monitor, call up diagnostic trouble code(s) and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) SHOWN ON DISPLAY. (MODE FB1)

1) Select engine mode using function key. Press the function key [0].

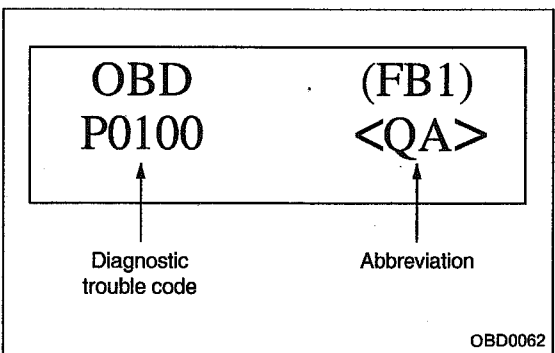


2) Designate mode using function key. Press [F] [B] [1] [ENT] in that order.



3) Ensure diagnostic trouble code(s) is shown.

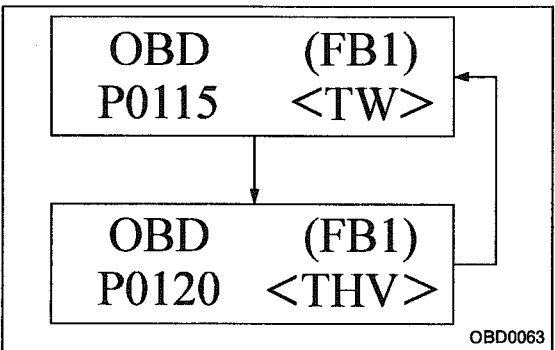
(1) When there is only one diagnostic trouble code.

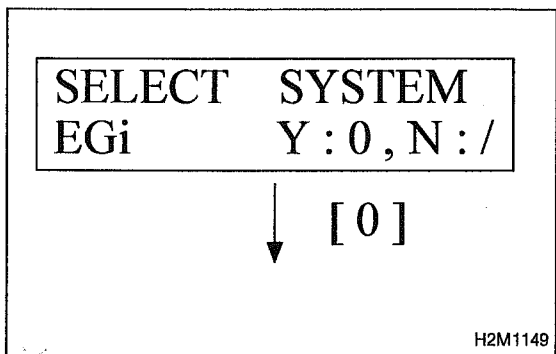


(2) When there are multiple diagnostic trouble codes.

NOTE:

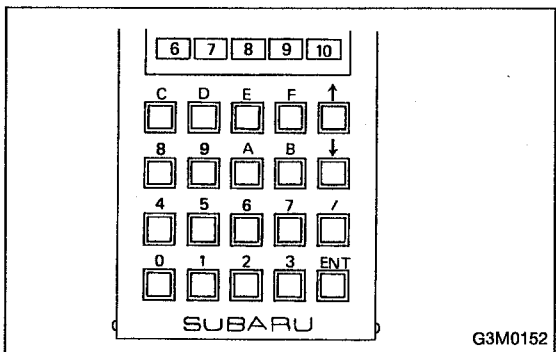
For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].>



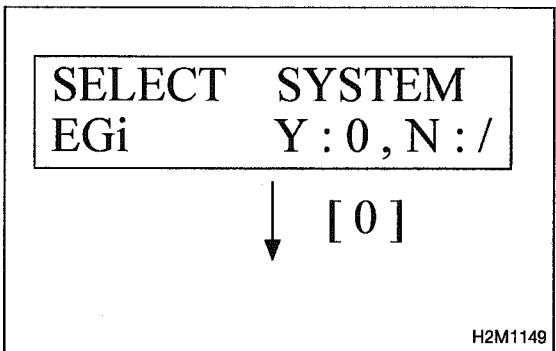


3. READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE. (FUNCTION MODE)

1) Select engine mode using function key.
Press the function key [0].

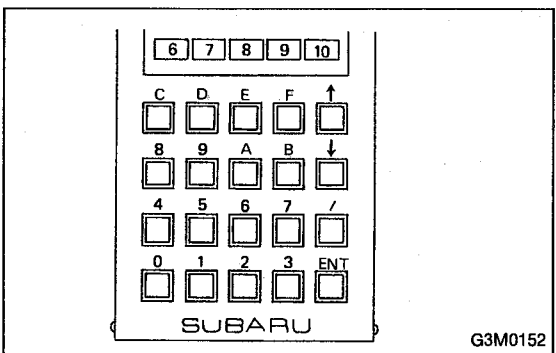


2) Designate mode using function key.
<Ref. to 2-7 [T3C6].>
(Example: Press [F] [0] [1] [ENT] in that order.)
3) Ensure data of input or output signal is shown.

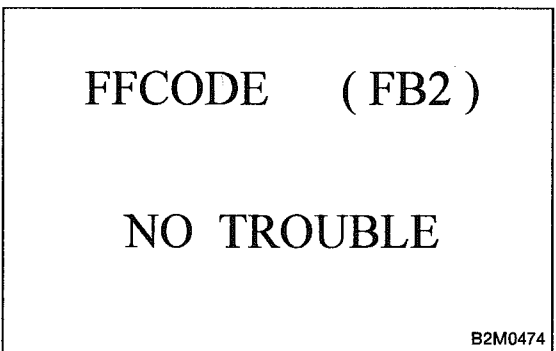


4. READ FREEZE FRAME DATA SHOWN ON DISPLAY. (MODE FB2)

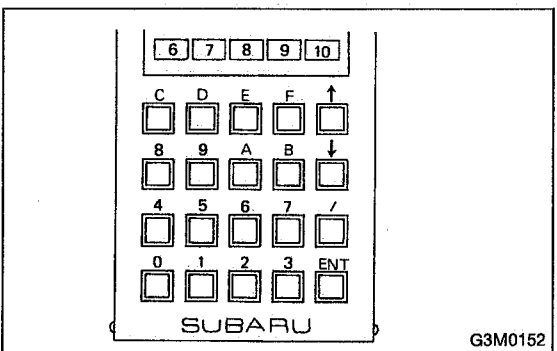
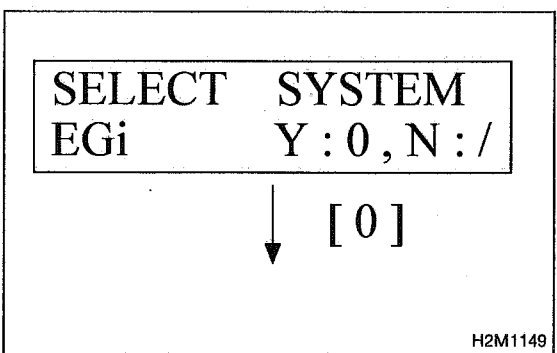
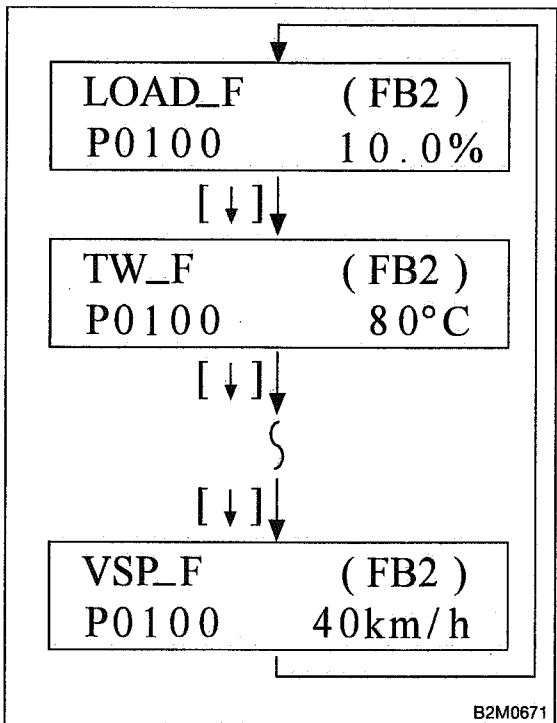
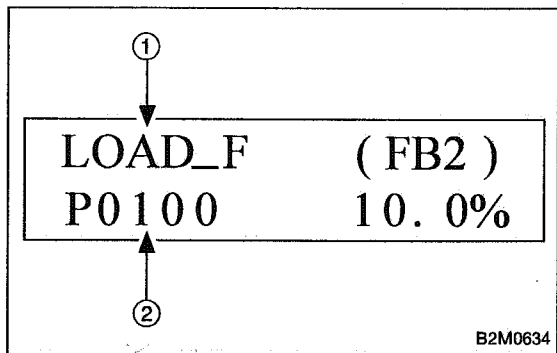
1) Select engine mode using function key.
Press the function key [0].



2) Designate mode using function key.
Press [F] [B] [2] [ENT] in that order.



3) Ensure freeze frame data(s) is (are) shown.
(1) When no trouble is detected, or after memory is cleared.



(2) When some trouble is detected.

- ① Abbreviation
- ② Diagnostic trouble code of trouble occurred

NOTE:

Other freeze frame data is shown on display by pushing the function key [↓].

5. READ FREEZE FRAME DATA SHOWN ON DISPLAY. (MODE FB3)

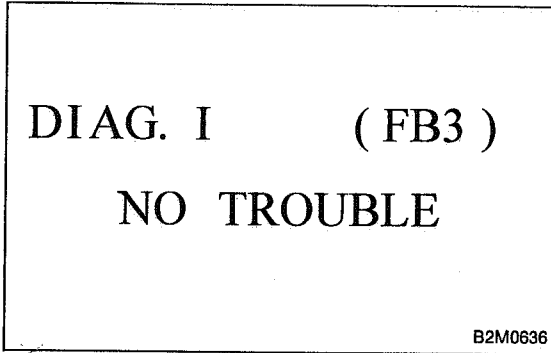
NOTE:

- For items and contents shown on display, refer to "6. READ DATA FUNCTION KEY LIST FOR ENGINE". <Ref. to 2-7 [T3C6].>

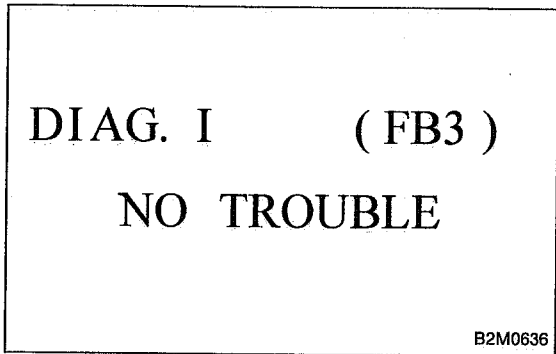
- Freeze frame data will not erase without clearing memory.

1) Select engine mode using function key. Press the function key [0].

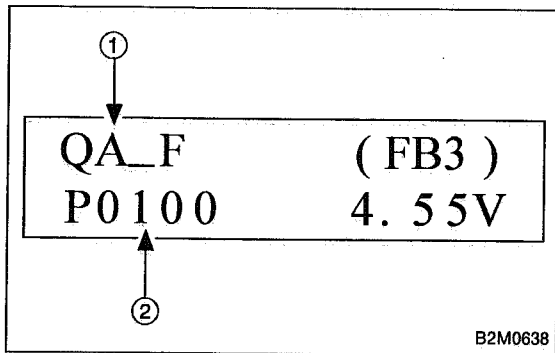
2) Designate mode using function key. Press [F] [B] [3] [ENT] in that order.



- 3) Ensure freeze frame data(s) is (are) shown.
(1) When no trouble is detected, or after memory is cleared.

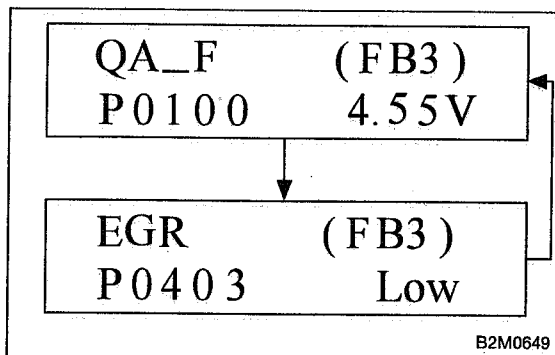


- (2) When a trouble occurs but the corresponding item is not displayed.



- (3) When only one trouble corresponding to the displayed item has occurred.

- ① Abbreviation
② Diagnostic trouble code of trouble occurred



- (4) When multiple troubles corresponding to the displayed item are detected.

NOTE:
Freeze frame data is shown on display for 2 seconds at a time.

6. READ DATA FUNCTION KEY LIST FOR ENGINE

Function mode	Contents	Abbreviation	Unit of measure
F00	ROM ID number	YEAR	—
F01	Battery voltage	VB	V
F02	Vehicle speed signal	VSP	km/h, MPH
F03	Engine speed signal	EREV	rpm
F04	Engine coolant temperature signal	TW	°C, °F
F05	Ignition signal	ADVS	deg
F06	Mass air flow signal	QA	g/s, V
F07	Throttle position signal	THV	%, V
F08	Injector pulse width	TIM	mS
F09	Idle air control signal	ISC	%
F10	Load data	LOAD	%
F11	Front oxygen sensor output signal	O2	V
F12	Front oxygen sensor maximum and minimum output signal	O2max - min	V, V
F13	Rear oxygen sensor output signal	RO2	V
F14	Rear oxygen sensor maximum and minimum output signal	RO2max - min	V, V
F17	Short term fuel trim	ALPHA	%
F19	Knock sensor signal	KNOCK	deg
F20	Atmospheric absolute pressure signal	BARO. P	kPa, mmHg
F21	Intake manifold absolute pressure signal	MANI. P	kPa, mmHg
F29	A/F correction (short term trim) by rear oxygen sensor	PHOS	%
F30	Long term fuel trim	KBLRC	%
F31	Long term whole fuel trim	K0	%
F32	Front oxygen sensor heater current	FO2H	A
F33	Rear oxygen sensor heater current	RO2H	A
F35	Purge control solenoid valve duty ratio (1800 cc models)	CPCD	%
F36	Maximum value of cylinder #1 misfire times during 100 rotations	MF1	%
F37	Maximum value of cylinder #2 misfire times during 100 rotations	MF2	%
F38	Maximum value of cylinder #3 misfire times during 100 rotations	MF3	%
F39	Maximum value of cylinder #4 misfire times during 100 rotations	MF4	%
F42	Maximum and minimum EGR system pressure value (AT vehicles only)	EGR max - min	kPa
F43	Fuel tank pressure signal (1800 cc models)	TNKP	kPa, mmHg
F44	Fuel temperature signal (1800 cc models)	TNKT	°C, °F
F45	Fuel level signal (1800 cc models)	FLEVEL	V
FA0	ON ↔ OFF signal	—	—
FA1	ON ↔ OFF signal	—	—
FA2	ON ↔ OFF signal	—	—
FA3	ON ↔ OFF signal	—	—
FA4	ON ↔ OFF signal	—	—
FA5	ON ↔ OFF signal	—	—
FB0	Diagnostic trouble code (DTC)	INSPECT	—
FB1	Diagnostic trouble code (DTC)	OBD	—

Function mode	Contents	Abbreviation	Unit of measure
FB2	Load data (Freeze frame data)	LOAD-F	%
	Engine coolant temperature signal (Freeze frame data)	TW-F	°C
	Short term fuel trim (Freeze frame data)	ALPH-F	%
	Long term fuel trim (Freeze frame data)	KBLR-F	%
	Intake manifold absolute pressure signal (Freeze frame data)	MANI-F	kPa
	Engine speed signal (Freeze frame data)	EREV-F	rpm
	Vehicle speed signal (Freeze frame data)	VSP-F	km/h
FB3	Mass air flow signal (Freeze frame data)	QA-F (P0100)	V
	Pressure signal (Freeze frame data)	PS-F (P0105)	V
	Pressure signal (Freeze frame data)	PR-F (P0106)	V
	Engine coolant temperature signal (Freeze frame data)	TW-F (P0115)	V
	Throttle position signal (Freeze frame data)	THV-F (P0120)	V
	EGR control solenoid valve signal (Freeze frame data)	EGR (P0403)	—*1
	Purge control solenoid valve signal (Freeze frame data)	CPC (P0443)	—*1
	Start switch signal (Freeze frame data)	STSW (P1100)	—*1
	Pressure sources switching solenoid valve signal (Freeze frame data)	BR1 (P1102)	—*1
	Radiator fan relay 1 signal (Freeze frame data)	FAN1 (P1500)	—*1
FC0	Clear memory	—	—
FD01	Compulsory fuel pump relay operation check	FUEL PUMP	—
FD02	Compulsory purge control solenoid valve operation check	CPC SOL	—
FD03	Compulsory radiator fan relay operation check	RAD FAN	—
FD04	Compulsory A/C relay operation check	A/C RELAY	—
FD05	Compulsory EGR control solenoid valve operation check	EGR SOL	—
FD07	Compulsory pressure control solenoid valve operation check	PCV SOL	—
FD08	Compulsory vent control solenoid valve operation check	VENT SOL	—
FD09	Compulsory FICD solenoid valve operation check	FICD SOL	—
FD10	Compulsory pressure sources switching solenoid valve operation check	BR SOL	—

NOTE:

- Subaru select monitor is also available for monitoring information other than that used for check and repair of the vehicle.
- F42 (Maximum and minimum EGR system pressure value) will not read accurately until the EGR flow diagnosis terminates.
EGR flow diagnosis terminates when LED No. 2 illuminates at function mode FA4.
- *1: "Hi" or "Low" is shown instead of measured value.
- Because ASV solenoid valve and air injection system diagnosis solenoid valve are not installed, FD06 and FD11 will be displayed but non-functional.

1997 (F00)
2.2 SOHC

B2M1045

7. FUNCTION MODE: F00
— ROM ID NUMBER (YEAR) —

CONDITION:
Ignition switch "ON"

SPECIFIED DATA:
Presentation display

● Probable cause (Item outside "specified data")

1. Error 1

Check for loose or disconnected connector, and discontinued circuit, etc.

2. Error 2

Check for poor contact of cartridge, or different type cartridge.

VB (F01)
12.4 V

B2M0270

8. FUNCTION MODE: F01
— BATTERY VOLTAGE (VB) —

CONDITION:
(1) Ignition switch "ON"
(2) Idling after warm-up

SPECIFIED DATA:
(1) 11 ± 1 V
(2) 13 ± 1 V

● Probable cause (Item outside "specified data")

1. Battery

Check battery voltage and electrolyte's specific gravity.

2. Charging system

● Check regulating voltage. (On no-load)
● Check alternator.

3. Power supply line

● Check main relay. <Ref. to [T8C0].>
● Check harness connector of ECM power supply line. <Ref. to [T8C0].>

VSP (F02)

24km/h 15MPH

B2M0754

9. FUNCTION MODE: F02**— VEHICLE SPEED SIGNAL (VSP) —**

- Vehicle speed is indicated in kilometer per hour (km/h) and mile per hour (MPH) at the same time.

EREV (F03)

1500 rpm

B2M0478

10. FUNCTION MODE: F03**— ENGINE SPEED SIGNAL (EREV) —**

TW (F04)

80 °C 176 °F

B2M0479

11. FUNCTION MODE: F04**— ENGINE COOLANT TEMPERATURE SIGNAL (TW) —**

- Engine coolant temperature is indicated in "°C" and "°F" at the same time.

ADVS (F05)

15 deg

B2M0480

12. FUNCTION MODE: F05**— IGNITION SIGNAL (ADVS) —**

NOTE:

The ignition timing value displayed in mode F05 is a value computed by ECM and will not always correspond with the value measured with a timing light.

QA (F06)

1.67g/s 2.02V

B2M0481

13. FUNCTION MODE: F06**— MASS AIR FLOW SIGNAL (QA) —**

- Mass air flow and voltage input from mass air flow sensor are shown on display at the same time.

THV (F07)
0% 0.21V
B2M0482

14. FUNCTION MODE: F07
— THROTTLE POSITION SIGNAL (THV) —
● Throttle position is indicated in percentage (%) and voltage (V) at the same time.
NOTE:
Be sure that the displayed value changes smoothly when changing throttle valve from fully closed to fully opened.

TIM (F08)
2.82 mS
B2M0483

15. FUNCTION MODE: F08
— INJECTOR PULSE WIDTH (TIM) —

ISC (F09)
35.7 %
B2M0484

16. FUNCTION MODE: F09
— IDLE AIR CONTROL SIGNAL (ISC) —

LOAD (F10)
10.0 %
B2M0485

17. FUNCTION MODE: F10
— LOAD DATA (LOAD) —

O2 (F11)
0.60 V
B2M0486

18. FUNCTION MODE: F11
— FRONT OXYGEN SENSOR OUTPUT SIGNAL (O2) —

O2max - min (F12)

0 . 80V 0 . 10V

B2M0487

19. FUNCTION MODE: F12
— FRONT OXYGEN SENSOR MAXIMUM AND MINIMUM OUTPUT SIGNAL (FO2MAX - MIN) —
● Front oxygen sensor maximum and minimum output signals are indicated at the same time.

RO2 (F13)

0 . 60 V

B2M0488

20. FUNCTION MODE: F13
— REAR OXYGEN SENSOR OUTPUT SIGNAL (RO2) —

RO2max - min (F14)

0 . 80V 0 . 10V

B2M0489

21. FUNCTION MODE: F14
— REAR OXYGEN SENSOR MAXIMUM AND MINIMUM OUTPUT SIGNAL (RO2MAX - MIN) —
● Rear oxygen sensor maximum and minimum output signals are indicated at the same time.

ALPHA (F17)

- 0 . 8 %

B2M0490

22. FUNCTION MODE: F17
— SHORT TERM FUEL TRIM [A/F CORRECTION COEFFICIENT] (ALPHA) —

KNOCK (F19)

3 . 0 deg

B2M0491

23. FUNCTION MODE: F19
— KNOCK SENSOR SIGNAL [IGNITION TIMING CORRECTION COEFFICIENT] (KNOCK) —

BARO.P (F20)
100kPa752mmHg
B2M0755

24. FUNCTION MODE: F20
— ATMOSPHERIC ABSOLUTE PRESSURE SIGNAL (BARO. P) —

- Atmospheric absolute pressure is indicated in "kPa" and "mmHg" at the same time.

MANI.P (F21)
29kPa218mmHg
B2M0756

25. FUNCTION MODE: F21
— INTAKE MANIFOLD ABSOLUTE PRESSURE SIGNAL (MANI. P) —

- Intake manifold absolute pressure is indicated in "kPa" and "mmHg" at the same time.

PHOS (F29)
0.78 %
B2M0494

26. FUNCTION MODE: F29
— A/F CORRECTION COEFFICIENT [SHORT TERM TRIM] BY REAR OXYGEN SENSOR (PHOS) —

KBLRC (F30)
5.5 %
B2M0495

27. FUNCTION MODE: F30
— LONG TERM FUEL TRIM [A/F LEARNING CORRECTION COEFFICIENT] (KBLRC) —

K0 (F31)
0.0 %
B2M0496

28. FUNCTION MODE: F31
— LONG TERM FUEL TRIM WHOLE [A/F LEARNING CONTROL COEFFICIENT] (K0) —

FO2H (F32)

1.00 A

B2M0497

29. FUNCTION MODE: F32
— FRONT OXYGEN SENSOR HEATER CURRENT (FO2H) —

RO2H (F33)

1.00 A

B2M0498

30. FUNCTION MODE: F33
— REAR OXYGEN SENSOR HEATER CURRENT (RO2H) —

CPCD (F35)

0%

H2M1325

31. FUNCTION MODE: F35
— PURGE CONTROL SOLENOID VALVE DUTY RATIO (CPCD) —

MF1 (F36)

0 %

B2M0499

32. FUNCTION MODE: F36
— MAXIMUM VALUE OF CYLINDER #1 MISFIRE RATE DURING 100 ROTATIONS (MF1) —

MF2 (F37)

0 %

B2M0500

33. FUNCTION MODE: F37
— MAXIMUM VALUE OF CYLINDER #2 MISFIRE RATE DURING 100 ROTATIONS (MF2) —

MF3 (F38)
0 %
B2M0501

34. FUNCTION MODE: F38
— MAXIMUM VALUE OF CYLINDER #3 MISFIRE RATE DURING 100 ROTATIONS (MF3) —

MF4 (F39)
0 %
B2M0502

35. FUNCTION MODE: F39
— MAXIMUM VALUE OF CYLINDER #4 MISFIRE RATE DURING 100 ROTATIONS (MF4) —

EGRmax-min (F42)
100kPa 4kPa
B2M0759

36. FUNCTION MODE: F42
— MAXIMUM AND MINIMUM EGR SYSTEM PRESSURE VALUE [AT VEHICLES] (EGRMAX-MIN) —
● Maximum and minimum EGR system pressure value are indicated at the same time.

TNKP (F43)
0.10kPa 1mmHg
H2M1326

37. FUNCTION MODE: F43
— FUEL TANK PRESSURE SIGNAL (TNKP) —

TNKT (F44)
20°C 68°F
H2M1308

38. FUNCTION MODE: F44
— FUEL TEMPERATURE SIGNAL (TNKT) —

FLEVEL (F45)
2.50V
H2M1327

39. FUNCTION MODE: F45
— FUEL LEVEL SIGNAL (FLEVEL) —

40. FA MODE FOR ENGINE

Function mode	LED No.	Contents	Display	LED "ON" requirements
FA0	3	Neutral switch	NT	When neutral position signal is entered.
	7	Test mode connector	UD	When test mode connector is connected.
	8	AT/MT identification signal	AT	When AT identification signal is entered.
	9	Ignition switch	IG	When ignition switch is turned ON.
FA1	1	Radiator fan relay 2	R2	When radiator fan relay 2 is in function.
	2	Knock signal	KS	When knock signal is entered.
	3	Purge control solenoid valve	CN	When purge control solenoid valve is in function.
	4	Fuel pump relay	FP	When fuel pump relay is in function.
	6	Radiator fan relay 1	R1	When radiator fan relay 1 is in function.
	7	Air conditioner relay	AR	When air conditioner relay is in function.
	8	Air conditioner switch	AC	When air conditioner switch is turned ON.
FA2	1	FICD solenoid valve	AF	When FICD solenoid valve is in function.
	2	AEC signal	EC	When AEC signal is entered.
	3	EAM signal	AM	When EAM signal is gone out.
	4	AEB signal	EB	When AEB signal is entered.
	6	AET signal	ET	When AET signal is entered.
	7	Engine torque control signal	TR	When engine torque control signal is entered.
FA3	7	Pressure sources switching solenoid valve	BR	When pressure sources switching solenoid valve is in function.
FA4	1	Catalyst	CA	When diagnosis of catalyzer is finished.
	2	EGR system	E1	When diagnosis of EGR system is finished.
	3	Federal spec. vehicle identification signal	FC	When Federal spec. vehicle identification signal is entered.
	8	Rear oxygen sensor signal	OR	When rear oxygen sensor mixture ratio is rich.
	9	Front oxygen sensor signal	O2	When front oxygen sensor mixture ratio is rich.
FA5	6	Vent control solenoid valve	AL	When vent control solenoid valve is in function.
	7	EGR solenoid valve	ER	When EGR solenoid valve is in function.
	8	Pressure control solenoid valve	PC	When pressure control solenoid valve is in function.

LED No.	Signal name	Display
1	—	—
2	—	—
3	Neutral switch	NT
4	—	—
5	—	—
6	—	—
7	Test mode connector	UD
8	Identification of AT model	AT
9	Ignition switch	IG
0	—	—

—	—	NT	—	—
—	UD	AT	IG	—

1	2	3	4	5
6	7	8	9	0

41. FUNCTION MODE: FA0

— ON ↔ OFF SIGNAL —

Requirement for LED "ON".

LED No. 3 ● On MT model, gear position is in neutral.
● On AT model, shift position is in "P" or "N".

LED No. 7 Test mode connector is connected.

LED No. 8 Vehicle is AT model.

LED No. 9 Ignition switch is turned ON.

LED No.	Signal name	Display
1	Radiator fan relay 2	R2
2	Knock signal	KS
3	Purge control solenoid valve	CN
4	Fuel pump relay	FP
5	—	—
6	Radiator fan relay 1	R1
7	A/C relay	AR
8	A/C switch	AC
9	—	—
0	—	—

R2	KS	CN	FP	—
R1	AR	AC	—	—

1	2	3	4	5
6	7	8	9	0

42. FUNCTION MODE: FA1

— ON ↔ OFF SIGNAL —

Requirement for LED "ON".

LED No. 1 Radiator fan relay 2 is turned ON.

LED No. 2 Engine is knocking.

LED No. 3 Purge control solenoid valve is in function.

LED No. 4 Fuel pump relay is turned ON.

LED No. 6 Radiator fan relay 1 is turned ON.

LED No. 7 A/C relay is turned ON.

LED No. 8 A/C switch is turned ON.

NOTE:

● When LED No. 1, 3, 4, 6 and 7 blinks with the test mode connector connected and the ignition switch turned to ON, the corresponding part is functioning properly.

● When LED No. 4 illuminates for only 2 seconds after the ignition switch is turned to ON, (and then goes out), the corresponding part is functioning properly.

● LED No. 3 is applicable only to the models not equipped with enhanced evaporative emission control system.

LED No.	Signal name	Display
1	FICD solenoid valve	AF
2	AEC signal	EC
3	EAM signal	AM
4	AEB signal	EB
5	—	—
6	AET signal	ET
7	Engine torque control signal	TR
8	—	—
9	—	—
0	—	—

AF	EC	AM	EB	—
ET	TR	—	—	—

1	2	3	4	5
---	---	---	---	---

6	7	8	9	0
---	---	---	---	---

LED No.	Signal name	Display
1	—	—
2	—	—
3	—	—
4	—	—
5	—	—
6	—	—
7	Pressure sources switching solenoid valve	BR
8	—	—
9	—	—
0	—	—

—	—	—	—	—
—	BR	—	—	—

1	2	3	4	5
---	---	---	---	---

6	7	8	9	0
---	---	---	---	---

43. FUNCTION MODE: FA2**— ON ↔ OFF SIGNAL —**

Requirement for LED "ON".

LED No. 1 FICD solenoid valve is in function.

LED No. 2 ECM entered the AEC signal emitted from TCS C/M.

LED No. 3 EAM signal goes out.

LED No. 4 ECM entered the AEB signal emitted from TCS C/M.

LED No. 6 ECM entered the AET signal emitted from TCS C/M.

LED No. 7 ECM entered the torque control signal emitted from TCM.

NOTE:

When LED No. 1 blinks with the test mode connector connected and the ignition switch turned to ON, the corresponding part is functioning properly.

44. FUNCTION MODE: FA3**— ON ↔ OFF SIGNAL —**

Requirement for LED "ON".

LED No. 7 Pressure sources switching solenoid valve is in function.

NOTE:

When LED No. 7 blinks with the test mode connector connected and the ignition switch turned to ON, the corresponding part is functioning properly.

LED No.	Signal name	Display
1	Catalyst	CA
2	EGR system	E1
3	Federal spec. vehicle identification signal	FC
4	—	—
5	—	—
6	—	—
7	—	—
8	Rear oxygen sensor signal	OR
9	Front oxygen sensor signal	O2
0	—	—

CA	E1	FC	—	—
—	—	OR	O2	—

1	2	3	4	5
6	7	8	9	0

LED No.	Signal name	Display
1	—	—
2	—	—
3	—	—
4	—	—
5	—	—
6	Vent control solenoid valve	AL
7	EGR solenoid valve	ER
8	Pressure control solenoid valve	PC
9	—	—
0	—	—

—	—	—	—	—
AL	ER	PC	—	—

1	2	3	4	5
6	7	8	9	0

45. FUNCTION MODE: FA4

— ON ↔ OFF SIGNAL —

Requirement for LED "ON".

- LED No. 1 Diagnosis of catalyzer is finished.
- LED No. 2 Diagnosis of EGR system is finished.
- LED No. 3 Vehicle is Federal spec. vehicles.
- LED No. 8 Rear oxygen sensor mixture ratio is rich.
- LED No. 9 Front oxygen sensor mixture ratio is rich.

46. FUNCTION MODE: FA5

— ON ↔ OFF SIGNAL —

Requirement for LED "ON".

- LED No. 6 Vent control solenoid valve is in function.
- LED No. 7 EGR solenoid valve is in function.
- LED No. 8 Pressure control solenoid valve is in function.

NOTE:

When LED No. 6, 7 and 8 blinks with the test mode connector connected and the ignition switch turned to ON, the corresponding part is functioning properly.

47. FB MODE FOR ENGINE

Function mode	Abbreviation	Contents	Contents of display	Page
FB0	INSPECT	On-board diagnostics (Inspection)	Current trouble code indicated by on-board diagnostics after clear memory.	69 < Ref. to 2-7 [T3E0]. >
FB1	OBD	On-board diagnostics (Read data)	Current trouble code indicated by on-board diagnostics.	42 < Ref. to 2-7 [T3C2]. >
FB2	LOAD-F	Load data	<ul style="list-style-type: none"> ● Freeze frame data ● Data stored at the time of trouble occurrence, is shown on display. 	43 < Ref. to 2-7 [T3C4]. >
	TW-F	Engine coolant temperature signal		
	ALPH-F	Throttle position signal		
	KBLR-F	Long term fuel trim		
	MANI-F	Intake manifold absolute pressure signal		
	EREV-F	Engine speed signal		
	VSP-F	Vehicle speed signal		
FB3	QA-F (P0100)	Mass air flow signal	<ul style="list-style-type: none"> ● Freeze frame data ● Data stored at the time of trouble occurrence, is shown on display. 	44 < Ref. to 2-7 [T3C5]. >
	PS-F (P0105)	Pressure signal		
	PR-F (P0106)	Pressure signal		
	TW-F (P0115)	Engine coolant temperature signal		
	THV-F (P0120)	Throttle position signal		
	EGR (P0403)	EGR control solenoid valve signal		
	CPC (P0443)	Purge control solenoid valve signal		
	STSW (P1100)	Start switch signal		
	BR1 (P1102)	Pressure sources switching solenoid valve signal		
	FAN1 (P1500)	Radiator fan relay 1 signal		

48. FC MODE FOR ENGINE

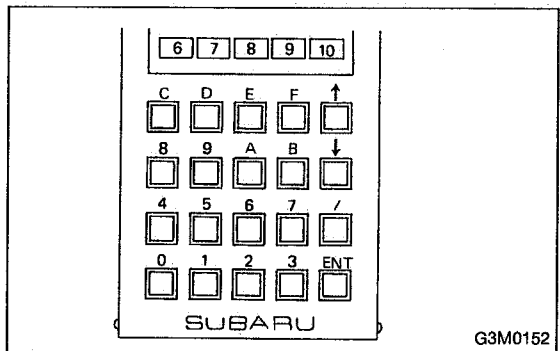
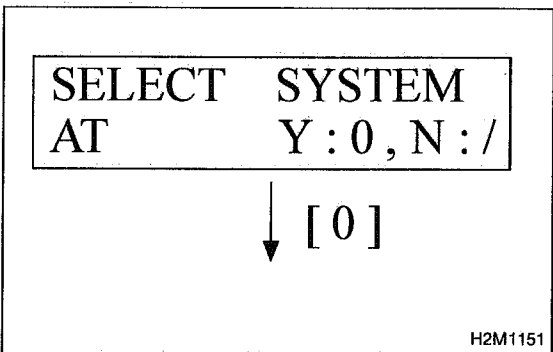
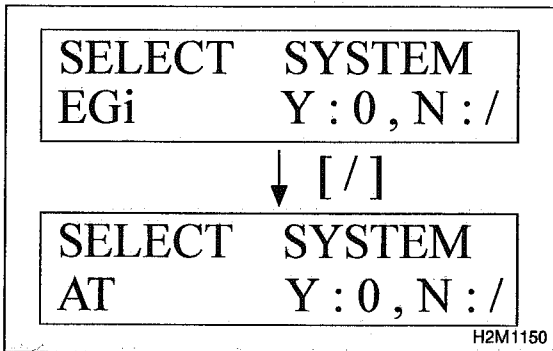
Function mode	Abbreviation	Contents	Contents of display	Page
FC0	MEMORY CLR	Back-up memory clear	Function of clearing trouble code stored in memory.	68 < Ref. to 2-7 [T3D0]. >

49. FD MODE FOR ENGINE

Function mode	Abbreviation	Contents	Contents of display	Page
FD01	FUEL PUMP	Compulsory valve operation check	Function of checking operation of fuel pump relay, purge control solenoid valve, radiator fan relay, A/C relay, EGR control solenoid valve, pressure control solenoid valve, vent control solenoid valve and pressure sources switching solenoid valve.	74 < Ref. to 2-7 [T3F0]. >
FD02	CPC SOL			
FD03	RAD FAN			
FD04	A/C RELAY			
FD05	EGR SOL			
FD07	PCV SOL			
FD08	VENT SOL			
FD09	FICD SOL			
FD10	BR SOL			

NOTE:

Because ASV solenoid valve and air injection system diagnosis solenoid valve are not installed, FD06 and FD11 will be displayed but non-functional.



50. READ CURRENT DATA SHOWN ON DISPLAY FOR AT. (FUNCTION MODE)

1) Select AT mode using function key.
Press the function key [/], and change to AT mode.

2) Press the function key [0].

3) Designate mode using function key.

<Ref. to 2-7 [T3C51].>

(Example: Press [F] [0] [2] [ENT] in that order.)

4) Ensure data of input or output signal is shown.

51. READ DATA FUNCTION KEY LIST FOR AT

Function mode	Contents	Abbr.	Unit
F00	Mode display	E-4AT	—
F01	Battery voltage	VB	V
F02	Vehicle speed sensor 1 signal	VSP1	m/h
F03	Vehicle speed sensor 1 signal	VSP1	km/h
F04	Vehicle speed sensor 2 signal	VSP2	m/h
F05	Vehicle speed sensor 2 signal	VSP2	km/h
F06	Engine speed	EREV	rpm
F07	ATF temperature sensor signal	ATFT	deg F
F08	ATF temperature sensor signal	ATFT	deg C
F09	Throttle position sensor signal	THV	V
F10	Gear position	GEAR	—
F11	Line pressure duty ratio	PLDTY	%
F12	Lock-up duty ratio	LUPTY	%
F13	AWD duty ratio	4WDTY	%
F14	Throttle position sensor power supply voltage	THVCC	V
F15	Mass air flow sensor signal	AFM	V

E - 4AT	(F00)
4WD	1997
B2M1046	

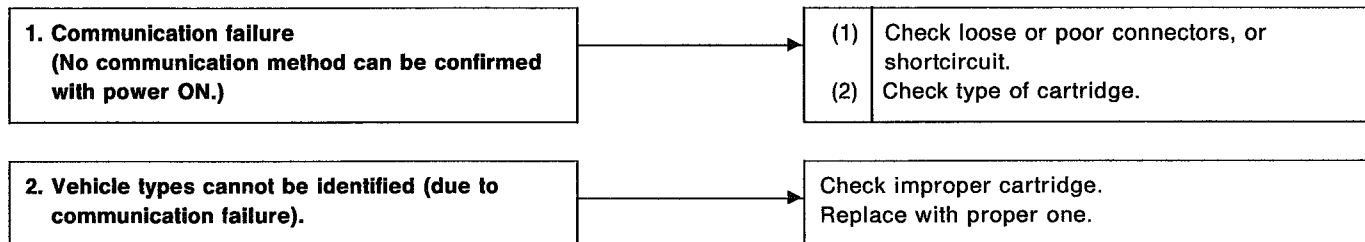
52. FUNCTION MODE: F00

— MODE DISPLAY —

SPECIFIED DATA:

Data at the left should be indicated.

Probable cause (if outside "specified data")



VB	(F01)
12.7 V	
OBD0673	

53. FUNCTION MODE: F01

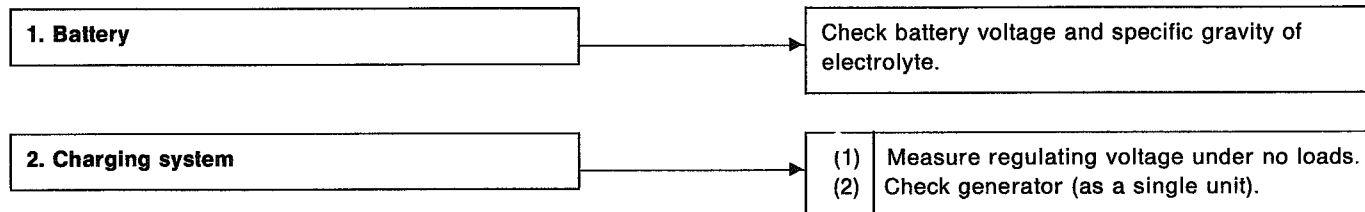
— BATTERY VOLTAGE (VB) —

CONDITION:

- (1) Ignition switch ON
- (2) Engine idling after warm-up

SPECIFIED DATA:

- (1) 12 ± 1 V
- (2) 13 ± 1 V



VSP1 (F02)

18 m/h

G3M0725

54. FUNCTION MODE: F02

— VEHICLE SPEED SENSOR 1 SIGNAL (VSP1) —

- F02: Vehicle speed is indicated in mile per hour (m/h).
- F03: Vehicle speed is indicated in kilometer per hour (km/h).

VSP2 (F04)

12 m/h

G3M0726

55. FUNCTION MODE: F04

— VEHICLE SPEED SENSOR 2 SIGNAL (VSP2) —

- F04: Vehicle speed is indicated in mile per hour (m/h).
- F05: Vehicle speed is indicated in kilometer per hour (km/h).

EREV (F06)

1,500 rpm

G3M0727

56. FUNCTION MODE: F06

— ENGINE SPEED (EREV) —

ATFT (F07)

176 deg F

OBD0386

57. FUNCTION MODE: F07

— ATF TEMPERATURE SENSOR SIGNAL (ATFT) —

- F07: ATF temperature is indicated in "deg F".
- F08: ATF temperature is indicated in "deg C".

THV (F09)

4.0 V

G3M0935

58. FUNCTION MODE: F09

— THROTTLE POSITION SENSOR SIGNAL (THV) —

GEAR (F10)

1st

G3M0730

59. FUNCTION MODE: F10
— GEAR POSITION (GEAR) —

PLDTY (F11)

50%

G3M0731

60. FUNCTION MODE: F11
— LINE PRESSURE DUTY RATIO (PLDTY) —

LUPTY (F12)

5%

G3M0732

61. FUNCTION MODE: F12
— LOCK-UP DUTY RATIO (LUPTY) —

4WDTY (F13)

95%

G3M0733

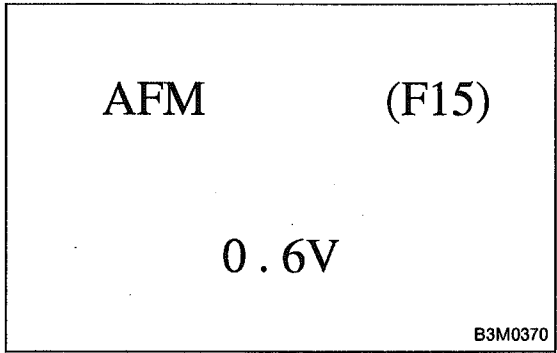
62. FUNCTION MODE: F13
— AWD DUTY RATIO (4WDTY) —

THVCC (F14)

5.2 V

B3M0259

63. FUNCTION MODE: F14
— THROTTLE POSITION SENSOR POWER SUPPLY
VOLTAGE (THVCC) —



64. FUNCTION MODE: F15
— MASS AIR FLOW SENSOR SIGNAL (AFM) —

LED No.	Signal name	Display
1	FWD switch	FF
2	Kick-down switch	KD
3	—	—
4	—	—
5	Brake switch	BR
6	ABS switch	AB
7	Cruise control set	CR
8	Power switch	PW
9	—	—
10	—	—

FF	KD	—	—	BR
AB	CR	PW	—	—

1	2	3	4	5
6	7	8	9	10

65. FUNCTION MODE: FA0

— ON ↔ OFF SIGNAL —

Requirement for LED "ON".

- LED No. 1 Fuse is installed in FWD switch.
- LED No. 2 Kick-down switch is turned ON. (Europe and General models only)
- LED No. 5 Brake pedal is depressed.
- LED No. 6 ABS signal is entered.
- LED No. 7 Cruise control is set.
- LED No. 8 Power switch is turned ON. (Europe and General models only)

LED No.	Signal name	Display
1	N/P range switch	NP
2	R range switch	RR
3	D range switch	RD
4	3 range switch	R3
5	2 range switch	R2
6	1 range switch	R1
7	Diagnosis switch	SS
8	—	—
9	—	—
10	—	—

NP	RR	RD	R3	R2
R1	SS	—	—	—

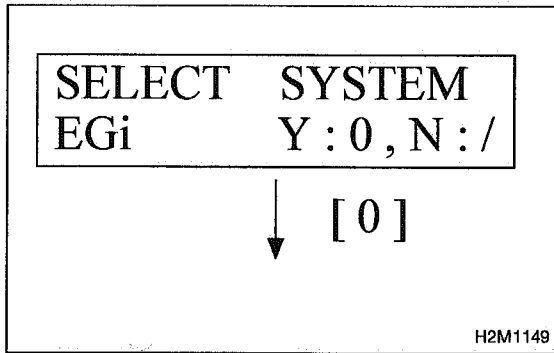
1	2	3	4	5
6	7	8	9	10

66. FUNCTION MODE: FA1

— ON ↔ OFF SIGNAL —

Requirement for LED "ON".

- LED No. 1 "N" or "P" range is selected.
- LED No. 2 "R" range is selected.
- LED No. 3 "D" range is selected.
- LED No. 4 "3" range is selected.
- LED No. 5 "2" range is selected.
- LED No. 6 "1" range is selected.
- LED No. 7 Diagnosis connector is connected.



D: CLEAR MEMORY MODE

1. SUBARU SELECT MONITOR

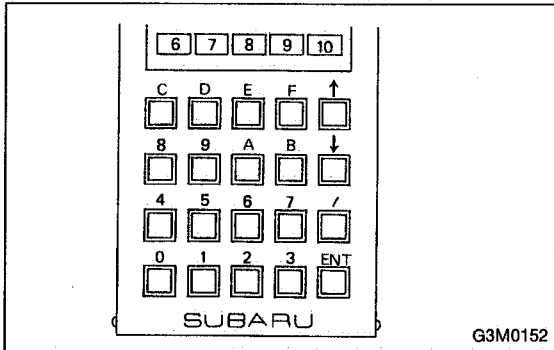
1) Select engine mode or AT mode using function key.

● Engine mode:

Press the function key [0].

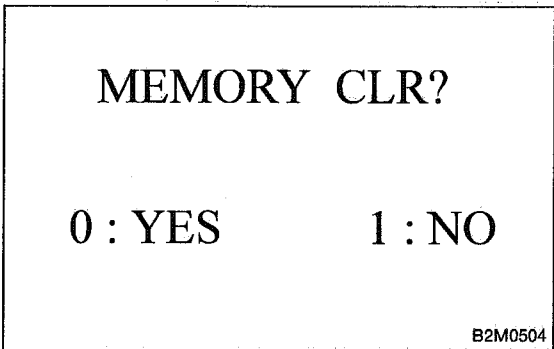
● AT mode:

Press the function key [/] [0] in that order.

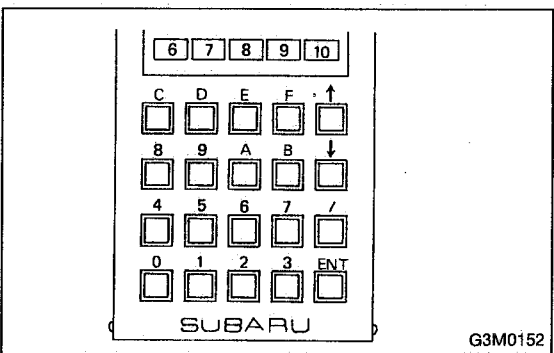


2) Designate mode using function key.

Press [F] [C] [0] [ENT] in that order.



3) Ensure displayed message.



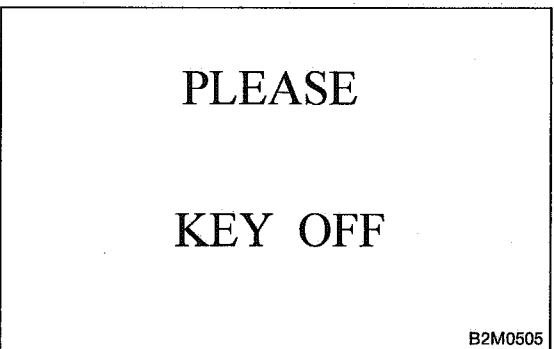
4) Press function key.

● When executing, (YES)

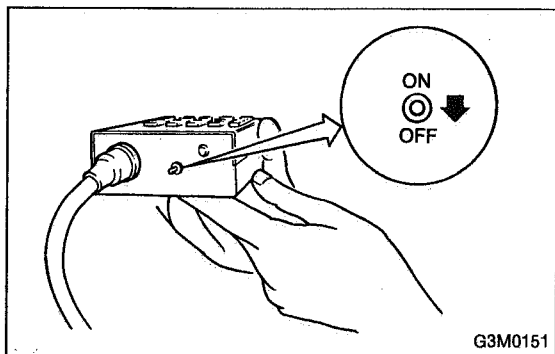
Press [0] [ENT] in that order.

● When not executing, (NO)

Press [1] [ENT] in that order.



5) When executed, the indication as shown here appears for approximately four seconds, and the past trouble history is deleted.



6) After the display is gone, turn Subaru select monitor switch and ignition switch to OFF.

NOTE:

When the ECM, battery terminals, etc. are disconnected after memory is cleared, idling speed may increase. This is not considered a problem because the ISC valve duty controlled learning value has been cleared. To return the engine to idling speed, idle for approximately 2 minutes with air conditioner off.

2. OBD-II GENERAL SCAN TOOL

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.

E: INSPECTION MODE

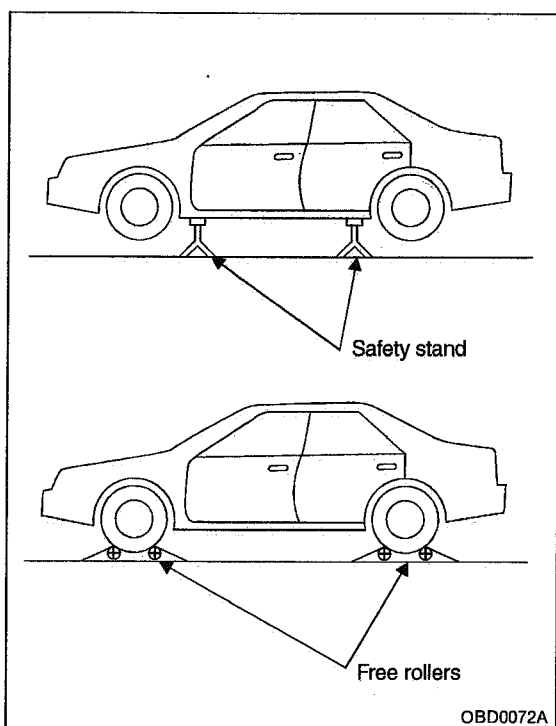
1. PREPARATIONS FOR THE INSPECTION MODE

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

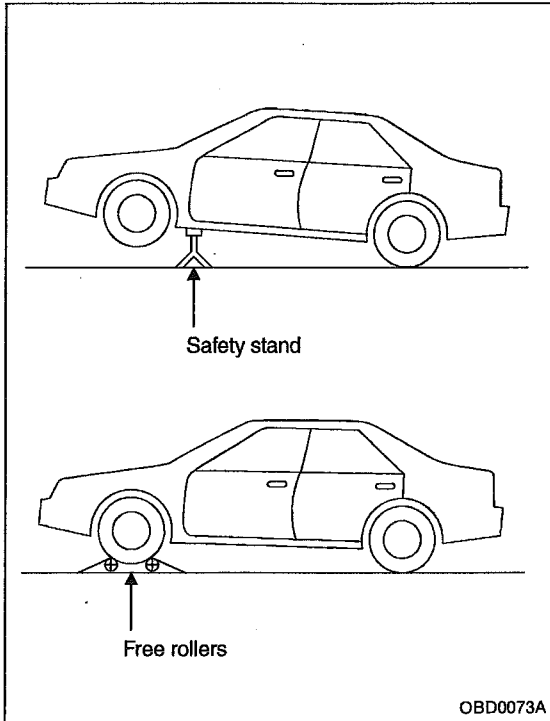
● **FULL-TIME AWD MODELS**

WARNING:

- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.



- Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



● FWD MODELS

WARNING:

- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- If only the front wheels are raised or placed on a free roller, apply parking brakes and lock the rear wheels.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
- Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.

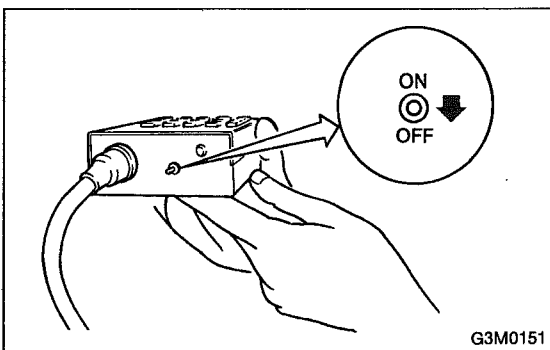
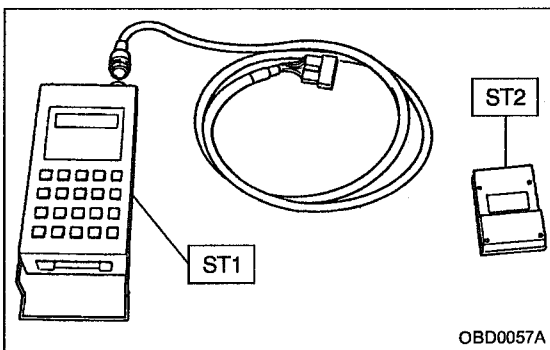
2. SUBARU SELECT MONITOR

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data.

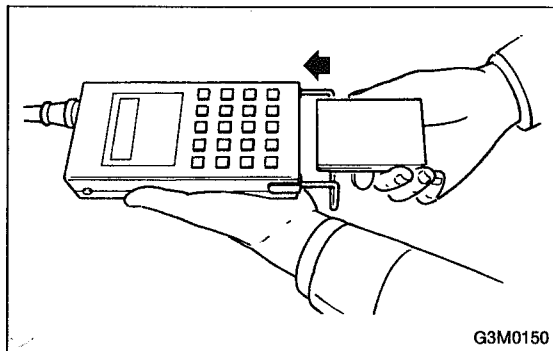
1) Prepare Subaru select monitor and cartridge.

ST1 498307500 SELECT MONITOR KIT

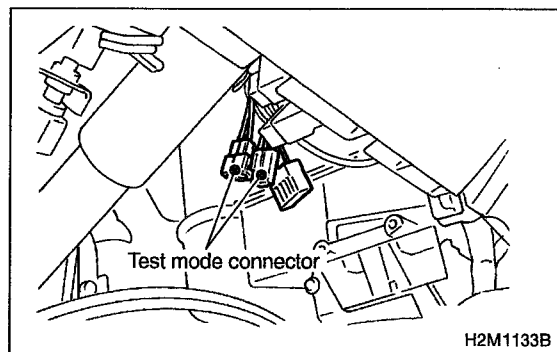
ST2 498346200 CARTRIDGE



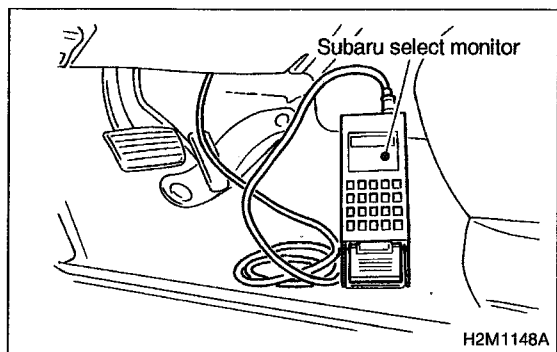
2) Turn ignition switch and Subaru select monitor switch to OFF.



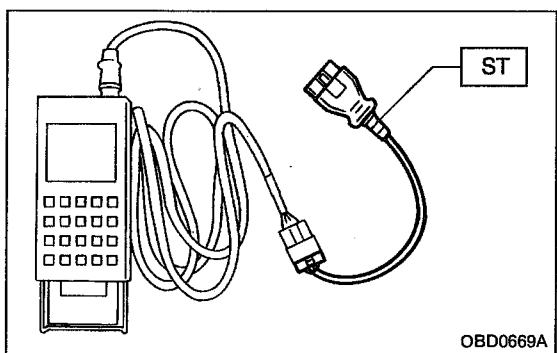
3) Insert cartridge into Subaru select monitor.



4) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.



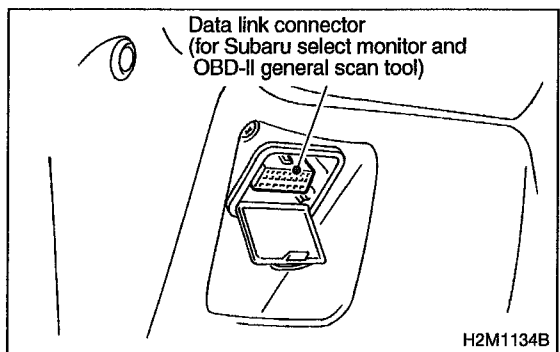
5) Connect Subaru select monitor to data link connector.
 ● Using data link connector for Subaru select monitor only:
 Connect Subaru select monitor to its data link connector located in the lower portion of the instrument panel (on the driver's side), to the side of the center console box.



● Using data link connector for Subaru select monitor and OBD-II general scan tool:

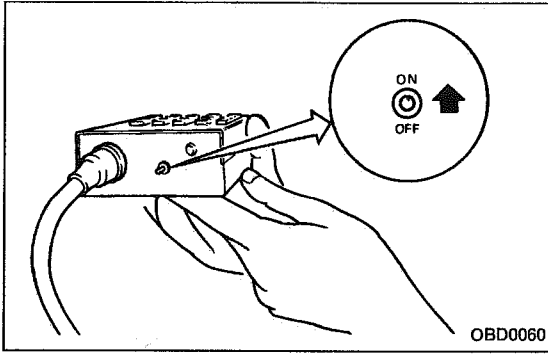
(1) Connect ST to Subaru select monitor cable.

ST 498357200 ADAPTER CABLE



(2) Open the cover and connect Subaru select monitor to data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

CAUTION:
 Do not connect scan tools except for Subaru select monitor and OBD-II general scan tool.



6) Turn ignition switch to ON (engine OFF) and Subaru select monitor switch to ON.

7) Start the engine.

NOTE:

- Ensure the selector lever is placed in the "P" position before starting. (AT vehicles)

- Depress clutch pedal when starting the engine. (MT vehicles)

8) Using the selector lever or shift lever, turn the "P" position switch and the "N" position switch to ON.

9) Depress the brake pedal to turn the brake switch ON. (AT vehicles)

10) Keep engine speed in the 2,500 — 3,000 rpm range for 40 seconds.

NOTE:

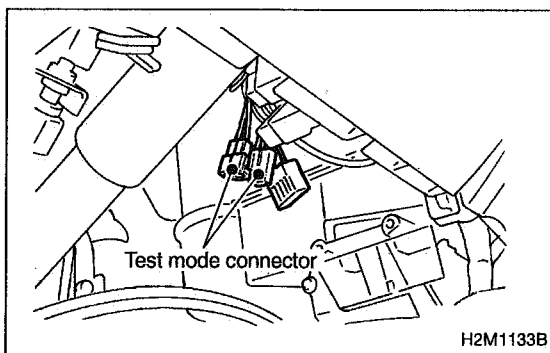
On models without tachometer, use the Subaru select monitor or tachometer (Secondary pickup type).

11) Place the selector lever or shift lever in the "D" position (AT vehicles) or "1st" gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:

- On AWD vehicles, release the parking brake.

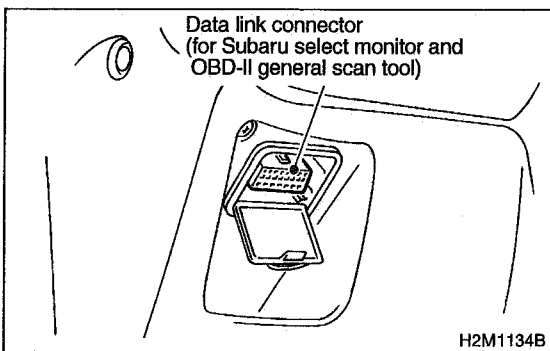
- The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to 4-4 [T6D2].> or <Ref. to 4-4 [T9J0].>



3. OBD-II GENERAL SCAN TOOL

After performing diagnostics and clearing the memory, check for any remaining unresolved trouble data:

1) Connect test mode connector at the lower side of the instrument panel (on the driver's side), to the side of the center console box.



2) Open the cover and connect the OBD-II general scan tool to its data link connector in the lower portion of the instrument panel (on the driver's side), to the lower cover.

CAUTION:

Do not connect the scan tools except for Subaru select monitor and OBD-II general scan tool.

3) Start the engine.

NOTE:

- Ensure the selector lever is placed in the "P" position before starting. (AT vehicles)

- Depress clutch pedal when starting the engine. (MT vehicles)

4) Using the selector lever or shift lever, turn the "P" position switch and the "N" position switch to ON.

5) Depress the brake pedal to turn the brake switch ON. (AT vehicles)

6) Keep engine speed in the 2,500 — 3,000 rpm range for 40 seconds.

NOTE:

On models without tachometer, use the Subaru select monitor or tachometer (Secondary pickup type).

7) Place the selector lever or shift lever in the "D" position (AT vehicles) or "1st" gear (MT vehicles) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:

- On AWD vehicles, release the parking brake.

- The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to 4-4 [T6D2].> or <Ref. to 4-4 [T9J0].>

8) Using the OBD-II general scan tool, check for diagnostic trouble code(s) and record the result(s).

NOTE:

- For detailed operation procedures, refer to the OBD-II General Scan Tool Instruction Manual.

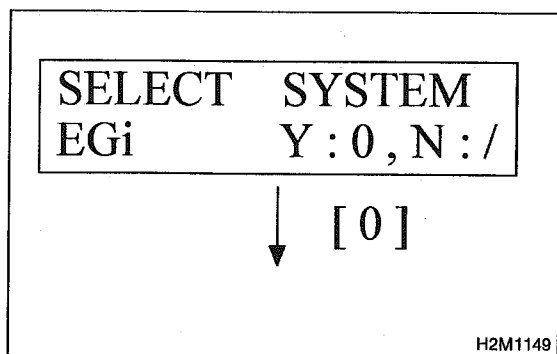
- For details concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].>

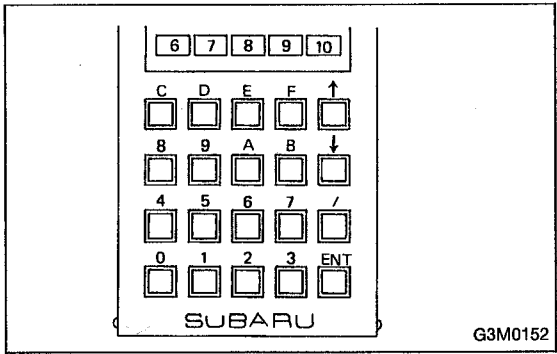
4. READ DIAGNOSTIC TROUBLE CODE (DTC) SHOWN ON DISPLAY. (MODE FB0 < INSPECTION MODE >)

Using Subaru select monitor, check for diagnostic trouble code(s) and record the result(s).

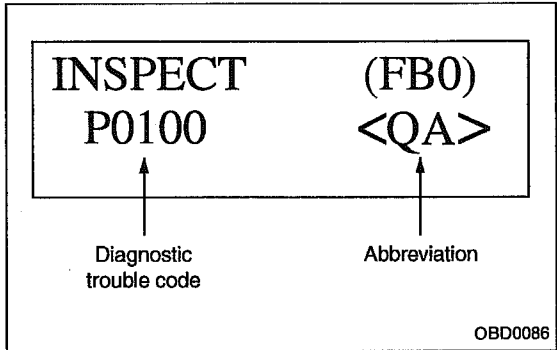
1) Select engine mode using function key.

Press the function key [0].

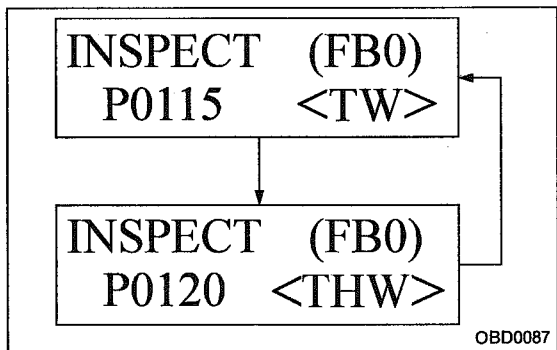




2) Designate mode using function key.
Press [F] [B] [0] [ENT] in that order.



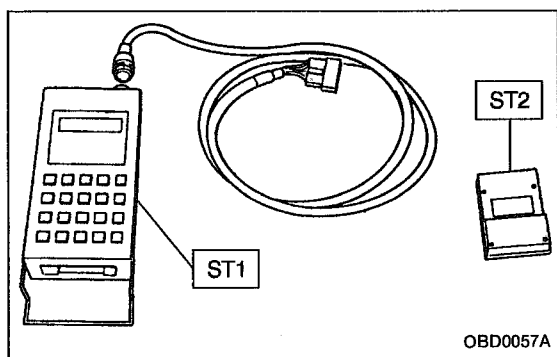
3) Ensure diagnostic trouble code(s) is shown.
(1) When there is only one diagnostic trouble code.



(2) When there are multiple diagnostic trouble codes.

NOTE:

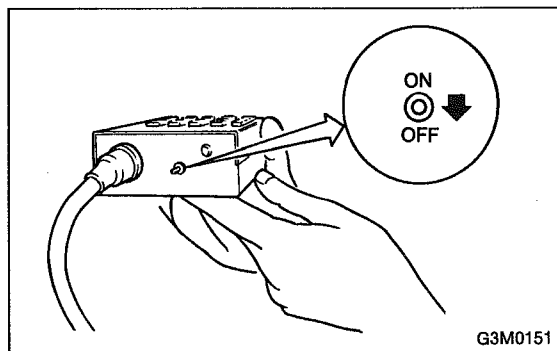
For details concerning diagnostic trouble code(s), refer to the DIAGNOSTIC TROUBLE CODE (DTC) LIST. <Ref. to 2-7 [T10A0].>



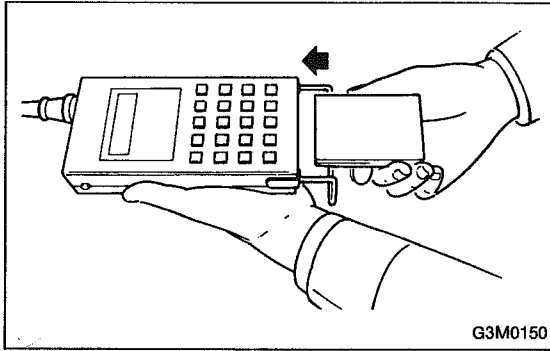
F: COMPULSORY VALVE OPERATION CHECK MODE (FD MODE)

1. SUBARU SELECT MONITOR

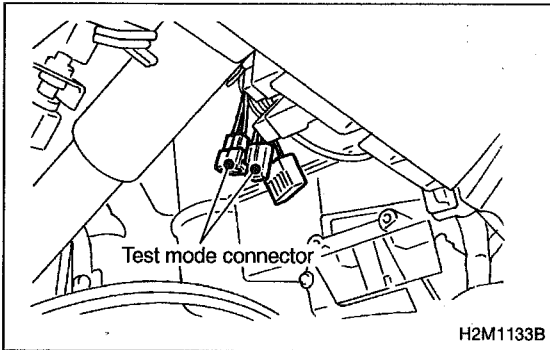
- 1) Prepare Subaru select monitor and cartridge.
ST1 498307500 SELECT MONITOR KIT
ST2 498346200 CARTRIDGE



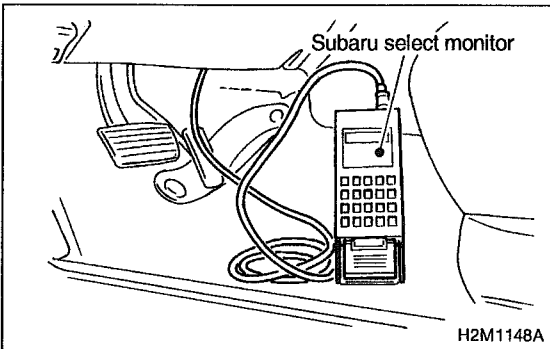
2) Turn ignition switch and Subaru select monitor switch to OFF.



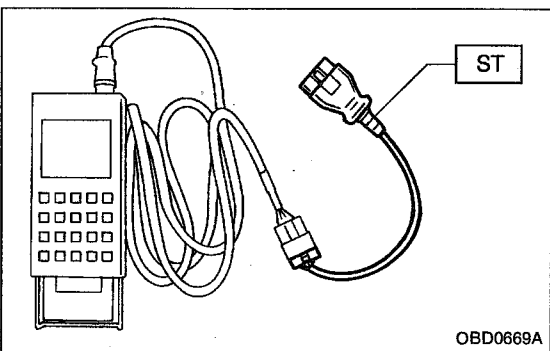
3) Insert cartridge into Subaru select monitor.



4) Connect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.

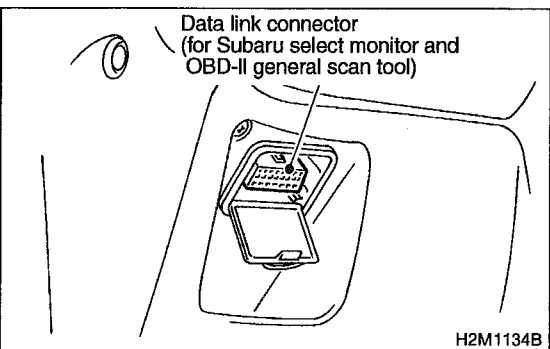


5) Connect Subaru select monitor to data link connector.
● Using data link connector for Subaru select monitor only:
Connect Subaru select monitor to its data link connector located in the lower portion of the instrument panel (on the driver's side), to the side of the center console box.



● Using data link connector for Subaru select monitor and OBD-II general scan tool:

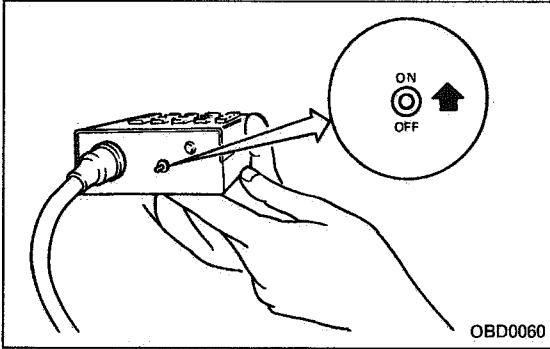
(1) Connect ST to Subaru select monitor cable.
ST1 498357200 ADAPTER CABLE



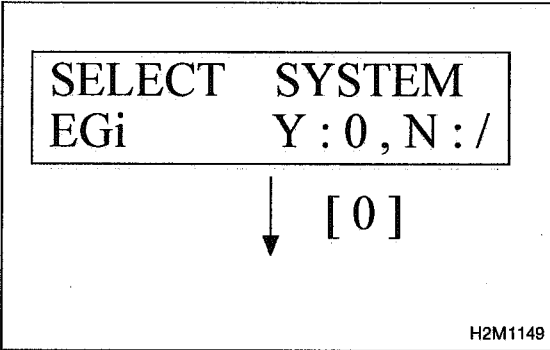
(2) Open the cover and connect Subaru select monitor to data link connector located in the lower portion of the instrument panel (on the driver's side), to the lower cover.

CAUTION:

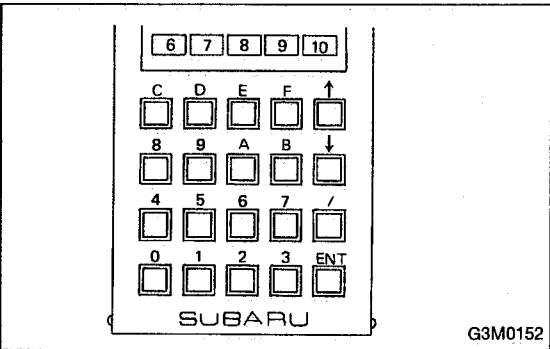
Do not connect scan tools except for Subaru select monitor and OBD-II general scan tool.



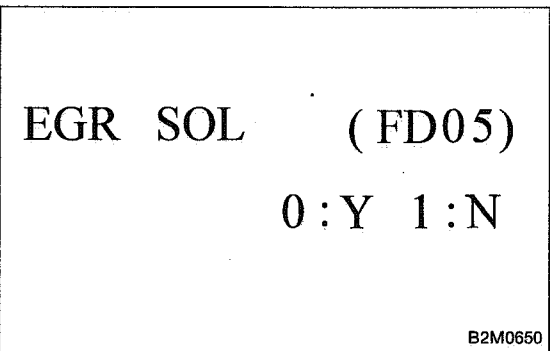
6) Turn ignition switch to ON (engine OFF) and Subaru select monitor switch to ON.



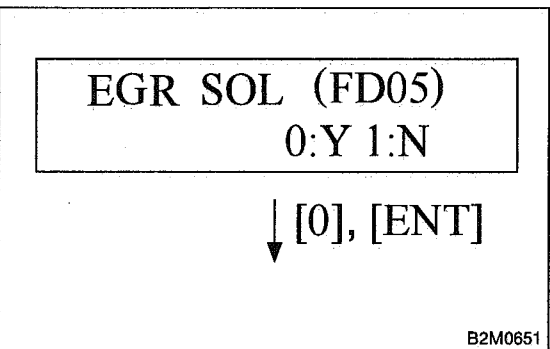
7) Select engine mode using function key.
Press the function key [0].



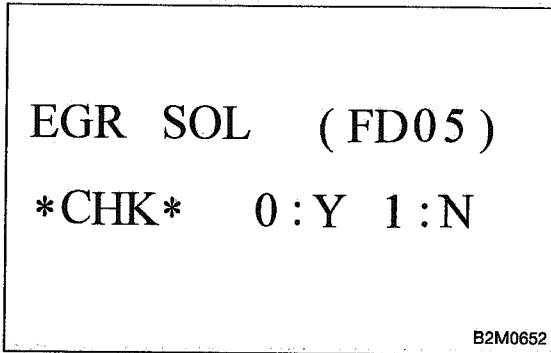
8) Designate mode using function key.
<Ref. to 2-7 [T3C6].>
(Example: Press [F] [D] [0] [5] [ENT] in that order.)



9) Ensure displayed message.

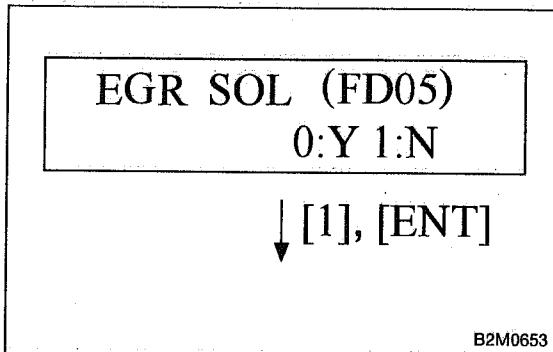


10) Press the function key.
(1) When executing, press the function key [0].

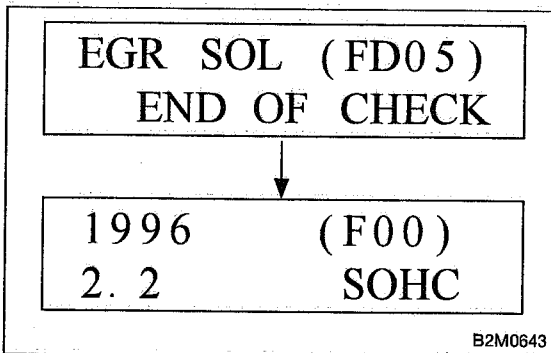


NOTE:

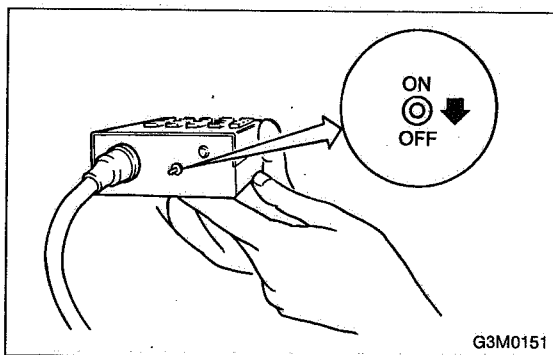
When in compulsory valve operation check mode the monitor indicates the execution of valve check on display.



(2) When not executing or stopping the compulsory valve check mode, press the function key [1].



11) When compulsory valve operation check mode is exited or check completed, the monitor indicates the completion of compulsory valve operation check on the display, and automatically returns to the initial mode (FUNCTION MODE: F00).



G: FINISHING DIAGNOSIS OPERATION

1. SUBARU SELECT MONITOR

- 1) Disconnect test mode connector at the lower portion of instrument panel (on the driver's side), to the side of the center console box.
- 2) Turn Subaru select monitor switch and ignition switch to OFF.
- 3) Disconnect Subaru select monitor from its data link connector.

4. Cautions

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

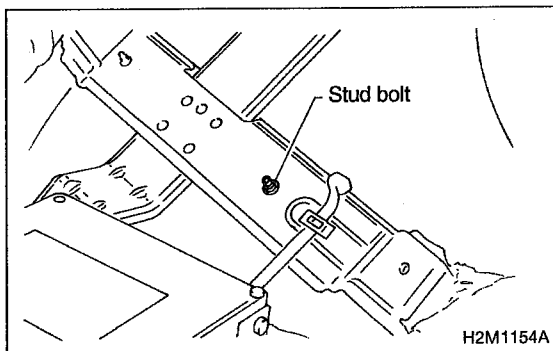
Airbag system wiring harness is routed near the engine control module (ECM), main relay and fuel pump relay.

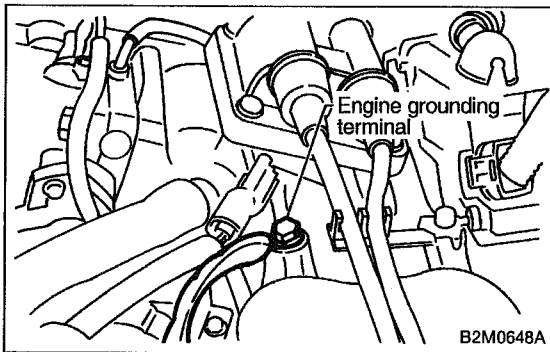
CAUTION:

- 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 engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

B: PRECAUTIONS

- 1) Never connect the battery in reverse polarity.
 - The ECM will be destroyed instantly.
 - The fuel injector and other part will be damaged in just a few minutes more.
- 2) Do not disconnect the battery terminals while the engine is running.
 - A large counter electromotive force will be generated in the alternator, and this voltage may damage electronic parts such as ECM, etc.
- 3) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.
- 4) Before removing ECM from the located position, disconnect two cables on battery.
 - Otherwise, the ECM may be damaged.
- 5) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.
- 6) Use ECM mounting stud bolts at the body head grounding point when measuring voltage and resistance inside the passenger compartment.





7) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.

8) Every MFI-related part is a precision part. Do not drop them.

9) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:

- The antenna must be kept as far apart as possible from the control unit.
(The ECM is located under the steering column, inside of the instrument panel lower trim panel.)
- The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
- Carefully adjust the antenna for correct matching.
- When mounting a large power type radio, pay special attention to the three items above mentioned.
- Incorrect installation of the radio may affect the operation of the ECM.

10) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.

11) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.

12) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.

13) In AT vehicles, do not continue the stall for more than five seconds at a time (from closed throttle, fully open throttle to stall engine speed).

14) On ABS vehicle, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to 4-4 [T6D2].> or <Ref. to 4-4 [T9J0].>

C: PRE-INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

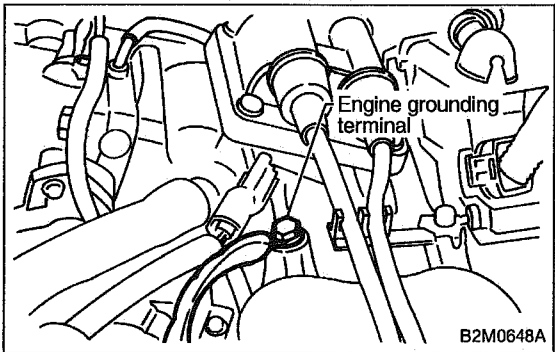
1. POWER SUPPLY

1) Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

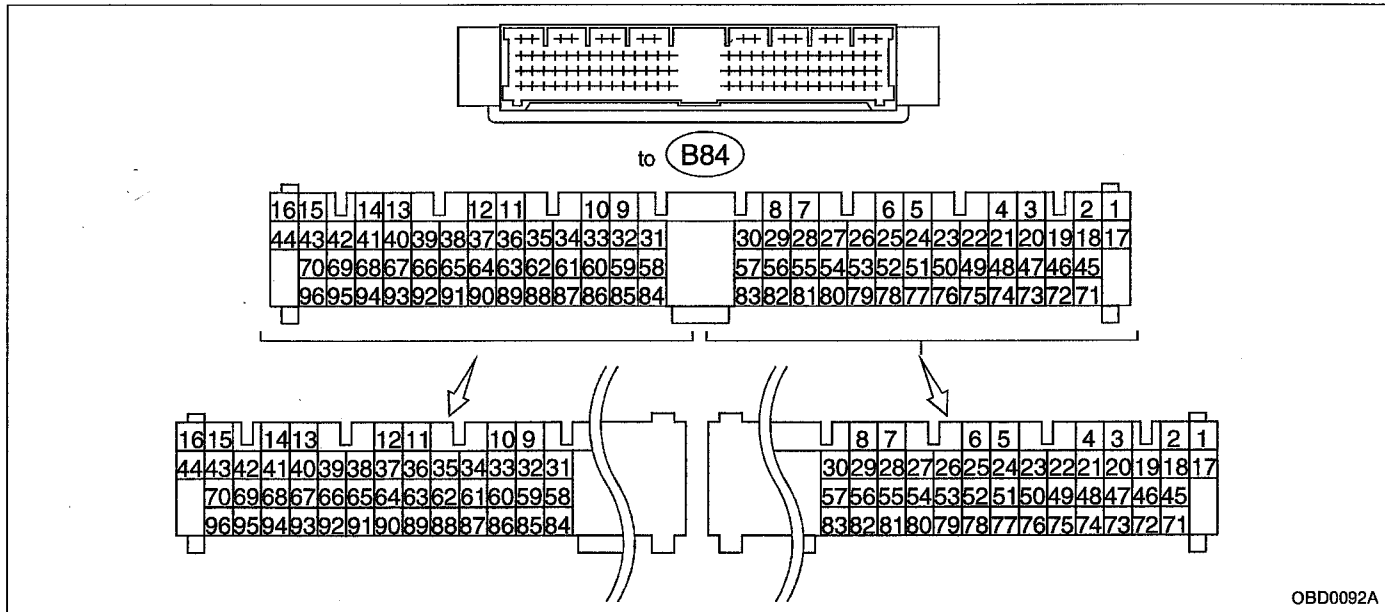
**2. ENGINE GROUNDING**

Make sure the engine grounding terminal is properly connected to the engine.

MEMO:

5. Specified Data

A: ENGINE CONTROL MODULE (ECM) I/O SIGNAL



OBD0092A

Content	Connector No.	Terminal No.	Signal (V)		Note	
			Ignition SW ON (Engine OFF)	Engine ON (Idling)		
Crankshaft position sensor	Signal (+)	B84	8	0	-7 — +7	Sensor output waveform
	Signal (-)	B84	29	0	0	—
	Shield	B84	20	0	0	1800 cc model
Camshaft position sensor	Shield	B84	54	0	0	2200 cc model
	Signal (+)	B84	7	0	-7 — +7	Sensor output waveform
	Signal (-)	B84	28	0	0	—
Mass air flow sensor	Shield	B84	20	0	0	1800 cc model
	Shield	B84	54	0	0	2200 cc model
	Signal	B84	5	0 — 0.3	0.8 — 1.2	—
Throttle position sensor	Shield	B84	57	0	0	—
	GND	B84	53	0	0	—
	Signal	B84	6	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
Front oxygen sensor	Power supply	B84	21	5	5	—
	GND	B84	20	0	0	—
	Signal	B84	23	0	0 — 0.9	—
Rear oxygen sensor	Shield	B84	56	0	0	—
	Signal	B84	24	0	0 — 0.9	—
Engine coolant temperature sensor	Shield	B84	56	0	0	—
		B84	22	1.0 — 1.4	1.0 — 1.4	After warm-up

ON-BOARD DIAGNOSTICS II SYSTEM

[T5A0] 2-7
5. Specified Data

Content	Connector No.	Terminal No.	Signal (V)		Note	
			Ignition SW ON (Engine OFF)	Engine ON (Idling)		
Vehicle speed sensor 2	B84	83	0 or 5	0 or 5	"5" and "0" are repeatedly displayed when vehicle is driven.	
Starter switch	B84	86	0	0	Cranking: 8 to 14	
A/C switch	B84	60	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—	
Ignition switch	B84	85	10 — 13	13 — 14	—	
Neutral position switch (MT)	B84	82	ON: 5.0±0.5 OFF: 0		● On MT vehicles; switch is ON when gear is in neutral position.	
Neutral position switch (AT)			ON: 0 OFF: 5.0±0.5		● On AT vehicles; switch is ON when shift is in "N" or "P" position.	
Test mode connector	B84	84	5	5	When connected: 0	
Knock sensor	Signal	B84	3	2.8	2200 cc model only	
	Shield	B84	56	0		
AT/MT identification	B84	81	(AT) 5 (MT) 0	(AT) 5 (MT) 0	When measuring voltage between ECM and body.	
Back-up power supply	B84	39	10 — 13	13 — 14	Ignition switch "OFF": 10 — 13	
Control unit power supply	B84	1	10 — 13	13 — 14	—	
		2				
Ignition control	# 1, # 2	B84	41	0	1 — 3.4	—
	# 3, # 4	B84	40	0	1 — 3.4	—
Fuel injector	# 1	B84	96	10 — 13	1 — 14	Waveform
	# 2	B84	70	10 — 13	1 — 14	Waveform
	# 3	B84	44	10 — 13	1 — 14	Waveform
	# 4	B84	16	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	OPEN end	B84	14	—	1 — 13	Waveform
	CLOSE end	B84	13	—	13 — 1	Waveform
Fuel pump relay control	B84	32	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—	
A/C relay control	B84	31	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—	
Radiator fan relay 1 control	B84	74	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—	
Radiator fan relay 2 control	B84	73	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	With A/C vehicles only	
Self-shutoff control	B84	63	10 — 13	13 — 14	—	
Malfunction indicator lamp	B84	58	—	—	Light "ON": 1, or less Light "OFF": 10 — 14	
Engine speed output	B84	64	—	0 — 13, or more	Waveform	
Torque control signal	B84	79	5	5	2200 cc model only	
Mass air flow signal for AT	B84	47	0 — 0.3	0.8 — 1.2	2200 cc model only	
Purge control solenoid valve	B84	72	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—	
Atmospheric pressure sensor	B84	26	3.9 — 4.1	2.0 — 2.3	—	

ON-BOARD DIAGNOSTICS II SYSTEM

Content	Connector No.	Terminal No.	Signal (V)		Note
			Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Pressure sources switching solenoid valve	B84	15	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
EGR solenoid valve	B84	71	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	2200 cc AT vehicles only
Front oxygen sensor heater signal	B84	38	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal	B84	37	0 — 1.0	0 — 1.0	—
Fuel temperature sensor	B84	25	2.5 — 3.8	2.5 — 3.8	● 1800 cc model only ● Ambient temperature: 25°C (77°F)
Fuel level sensor	B84	27	0.12 — 4.75	0.12 — 4.75	1800 cc model only
Fuel tank pressure sensor	Signal	B84	4	2.3 — 2.7	● 1800 cc model only ● The value obtained after the fuel filler cap was removed once and recapped.
	Power supply	B84	21	5	—
	GND	B84	20	0	—
Fuel tank pressure control solenoid valve	B84	10	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	1800 cc model only
Vent control solenoid valve	B84	35	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	1800 cc model only
FICD control solenoid valve	B84	9	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	● 1800 cc model only ● A/C equipped model
AT diagnosis input signal	B84	80	Less than 1 ↔ More than 4	Less than 1 ↔ More than 4	Waveform
GND (sensors)	B84	20	0	0	—
GND (injectors)	B84	69	0	0	—
		95			
GND (ignition system)	B84	94	0	0	—
GND (power supply)	B84	19	0	0	—
		46			
GND (control systems)	B84	17	0	0	—
		18			
GND (oxygen sensor heater)	B84	42	0	0	—

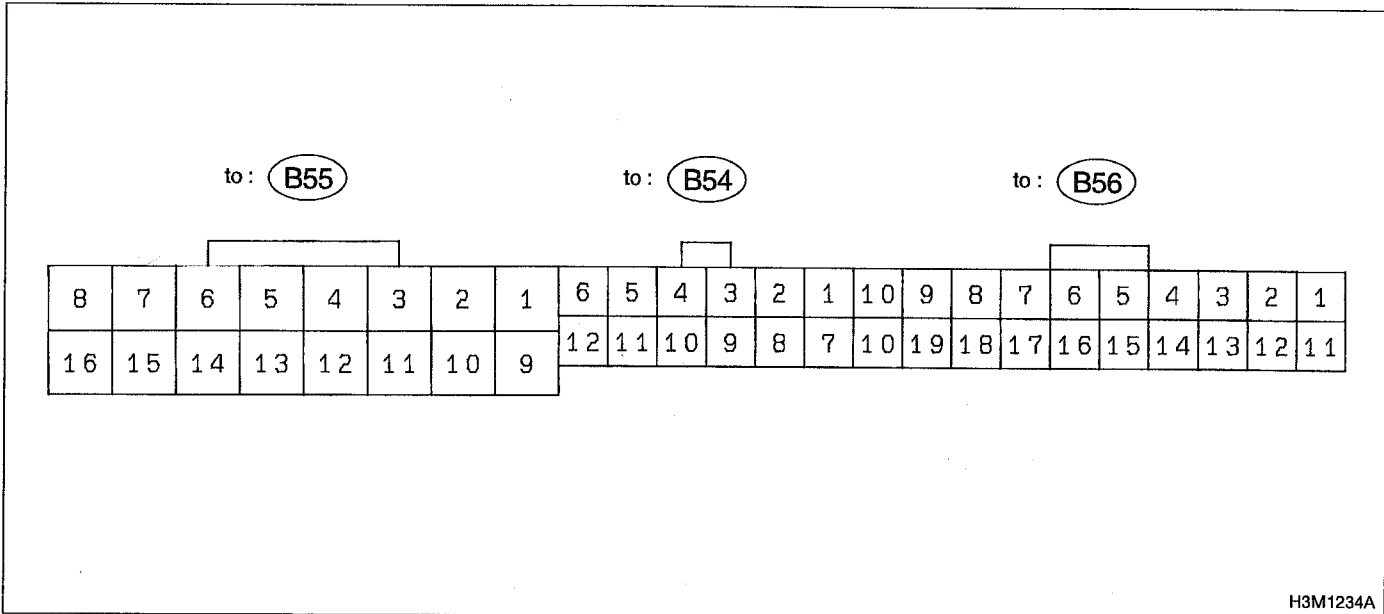
B: ENGINE CONDITION DATA

Content	Model	Specified data
Mass air flow	1800 cc	1.6 — 2.8 (g/sec): Idling
		6.1 — 10.3 (g/sec): 2,500 rpm racing
	2200 cc	1.7 — 3.3 (g/sec): Idling
		7.1 — 14.2 (g/sec): 2,500 rpm racing
Engine load	1800 cc	1.7 — 3.0 (%): Idling
		6.6 — 11.2 (%): 2,500 rpm racing
	2200 cc	1.6 — 2.9 (%): Idling
		6.4 — 12.8 (%): 2,500 rpm racing

Measuring condition:

- After warm-up the engine.
- Gear position is in "N" or "P" position.
- A/C is turned OFF.
- All accessory switches are turned OFF.

**C: TRANSMISSION CONTROL MODULE (TCM)
I/O SIGNAL**



H3M1234A

Check with ignition switch ON.

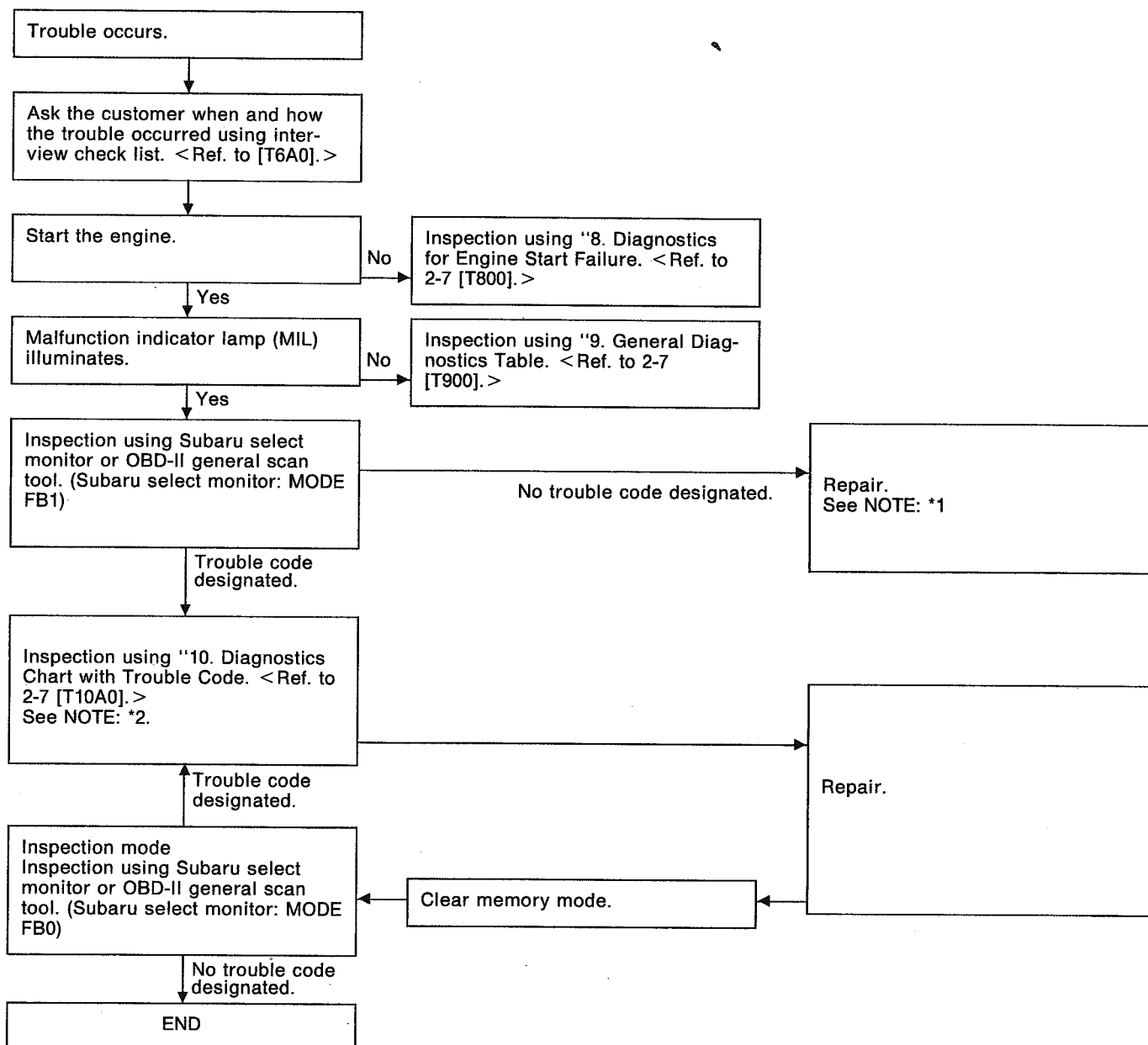
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)
Back-up power supply	B56	14	Ignition switch OFF	10 — 16
Ignition power supply	B54	6	Ignition switch ON (with engine OFF)	10 — 16
	B55	1		
Inhibitor switch	"P" range switch	9	Selector lever in "P" range	Less than 1
			Selector lever in any other than "P" range	More than 8
	"N" range switch	8	Selector lever in "N" range	Less than 1
			Selector lever in any other than "N" range	More than 8
	"R" range switch	10	Selector lever in "R" range	Less than 1
			Selector lever in any other than "R" range	More than 6
	"D" range switch	1	Selector lever in "D" range	Less than 1
			Selector lever in any other than "D" range	More than 6
	"3" range switch	2	Selector lever in "3" range	Less than 1
			Selector lever in any other than "3" range	More than 6
	"2" range switch	3	Selector lever in "2" range	Less than 1
			Selector lever in any other than "2" range	More than 6
	"1" range switch	4	Selector lever in "1" range	Less than 1
			Selector lever in any other than "1" range	More than 6
Brake switch	B56	7	Brake pedal depressed	More than 10.5
			Brake pedal released	Less than 1
ABS signal	B56	5	ABS switch ON	Less than 1
			ABS switch OFF	More than 6.5
AT diagnostics signal	B55	12	Ignition switch ON (with engine OFF)	Less than 1
			Ignition switch ON (with engine ON)	More than 10
Diagnosis switch	B56	6	Diagnosis connector connected.	Less than 1
			Diagnosis connector disconnected.	More than 6

ON-BOARD DIAGNOSTICS II SYSTEM

[T5C0] 2-7
5. Specified Data

Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Throttle position sensor	B54	8	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.3 — 4.9	
Throttle position sensor power supply	B56	19	Ignition switch ON (with engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	10	ATF temperature 20°C (68°F)	2.9 — 4.0	2.1 k — 2.9 k
			ATF temperature 80°C (176°F)	1.0 — 1.4	275 — 375
Vehicle speed sensor 1	B54	12	Vehicle stopped.	0	450 — 720
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed sensor 2	B56	11	When vehicle is slowly moved at least 2 meters (7ft).	Less than 1 ↔ More than 9	—
Engine speed signal	B54	5	Ignition switch ON (with engine OFF).	More than 10.5	—
			Ignition switch ON (with engine ON).	8 — 11	
Cruise set signal	B56	3	When cruise control is set (SET lamp ON).	Less than 1	—
			When cruise control is not set (SET lamp OFF).	More than 6.5	
Torque control signal	B55	16	Ignition switch ON	4 — 6	—
Mass air flow signal	B54	9	Engine idling after warm-up	0.5 — 1.2	—
Shift solenoid 1	B55	14	1st or 4th gear	More than 9	20 — 32
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B55	13	1st or 2nd gear	More than 9	20 — 32
			3rd or 4th gear	Less than 1	
Shift solenoid 3	B55	15	Selector lever in "N" range (with throttle fully closed).	Less than 1	20 — 32
			Selector lever in "D" range (with throttle fully closed).	More than 9	
Duty solenoid A	B55	8	Throttle fully closed (with engine OFF) after warm-up.	2.0 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Dropping resistor	B55	7	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	12 — 18
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Duty solenoid B	B55	5	When lock up occurs.	More than 8.5	9 — 17
			When lock up is released.	Less than 0.5	
Duty solenoid C (AWD model only)	B55	3	Fuse on FWD switch	More than 8.5	9 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
Sensor ground line 1	B54	7	—	0	Less than 1
Sensor ground line 2	B56	20	—	0	Less than 1
System ground line	B56	1	—	0	Less than 1
Power system ground line	B55	10	—	0	Less than 1
FWD switch (AWD model only)	B56	2	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	
Data link signal (Subaru select monitor)	B56	12	—	—	—
		13	—	—	
AT diagnosis signal	B56	11	Ignition switch ON	Less than 1 ↔ More than 4	—

6. Basic Diagnostic Procedure



NOTE:

- *1: If trouble code is not shown on display although the MIL illuminates, perform diagnostics of the MIL (CHECK ENGINE LIGHT) circuit or combination meter. <Ref. to 2-7 [T700].>
- *2: Carry out the basic check, only when trouble code about automatic transmission is shown on display. <Ref. to [T6A0].>

A: BASIC CHECK ITEMS FOR AT

When trouble code about automatic transmission is shown on display, carry out the following basic check. After that, carry out the replacement or repair work.

- 1) ATF level check <Ref. to 3-2 [W1B1].>
- 2) Differential gear oil level check <Ref. to 3-2 [W1B2].>
- 3) ATF leak check <Ref. to 3-2 [W1B3].>
- 4) Differential gear oil leak check <Ref. to 3-2 [W1B3].>
- 5) Brake band adjustment <Ref. to 3-2 [W2B0].>
- 6) Stall test <Ref. to 3-2 [W8A0].>
- 7) Line pressure test <Ref. to 3-2 [W10A0].>
- 8) Transfer clutch pressure test <Ref. to 3-2 [W11A0].>
- 9) Time lag test <Ref. to 3-2 [W9A0].>
- 10) Road test <Ref. to 3-2 [W7A0].>
- 11) Shift characteristics <Ref. to 3-2 [W7A0].>

B: CHECK LIST FOR INTERVIEW**1. CHECK LIST NO. 1**

Check the following items when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name		Engine no.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
Vin no.			miles
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Others:		
Outdoor temperature	F(°C)		
	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold		
Place	<input type="checkbox"/> Highway <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner city <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Rough road <input type="checkbox"/> Others:		
	<input type="checkbox"/> Cold <input type="checkbox"/> Warming-up <input type="checkbox"/> After warming-up <input type="checkbox"/> Any temperature <input type="checkbox"/> Others:		
Engine speed	rpm		
Vehicle speed	MPH		
Driving conditions	<input type="checkbox"/> Not affected <input type="checkbox"/> At starting <input type="checkbox"/> While idling <input type="checkbox"/> At racing <input type="checkbox"/> While accelerating <input type="checkbox"/> While cruising <input type="checkbox"/> While decelerating <input type="checkbox"/> While turning (RH/LH)		
Headlight	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Rear defogger	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Blower	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Radio	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
A/C compressor	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	CD/Cassette	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Cooling fan	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Car phone	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Front wiper	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	CB	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Rear wiper	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF		

2. CHECK LIST NO. 2

Check the following items about the vehicle's state when MIL turns on.

NOTE:

Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<input type="checkbox"/> Low fuel warning light <input type="checkbox"/> Charge indicator light <input type="checkbox"/> AT diagnostics indicator light <input type="checkbox"/> ABS warning light <input type="checkbox"/> Engine oil pressure warning light
b) Fuel level
<ul style="list-style-type: none"> ● Lack of gasoline: <input type="checkbox"/> Yes/<input type="checkbox"/> No ● Indicator position of fuel gauge:
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● What:
d) Intentional connecting or disconnecting of hoses: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● What:
e) Installing of parts other than genuine parts: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● What: ● Where:
f) Occurrence of noise: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● From where: ● What kind:
g) Occurrence of smell: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
<ul style="list-style-type: none"> ● From where: ● What kind:
h) Intrusion of water into engine compartment or passenger compartment: <input type="checkbox"/> Yes/ <input type="checkbox"/> No
i) Troubles occurred
<input type="checkbox"/> Engine does not start. <input type="checkbox"/> Engine stalls during idling. <input type="checkbox"/> Engine stalls while driving. <input type="checkbox"/> Engine speed decreases. <input type="checkbox"/> Engine speed does not decrease. <input type="checkbox"/> Rough idling <input type="checkbox"/> Poor acceleration <input type="checkbox"/> Back fire <input type="checkbox"/> After fire <input type="checkbox"/> No shift <input type="checkbox"/> Excessive shift shock

7. Diagnostics for CHECK ENGINE Malfunction Indicator Lamp (MIL)

A: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT COME ON.

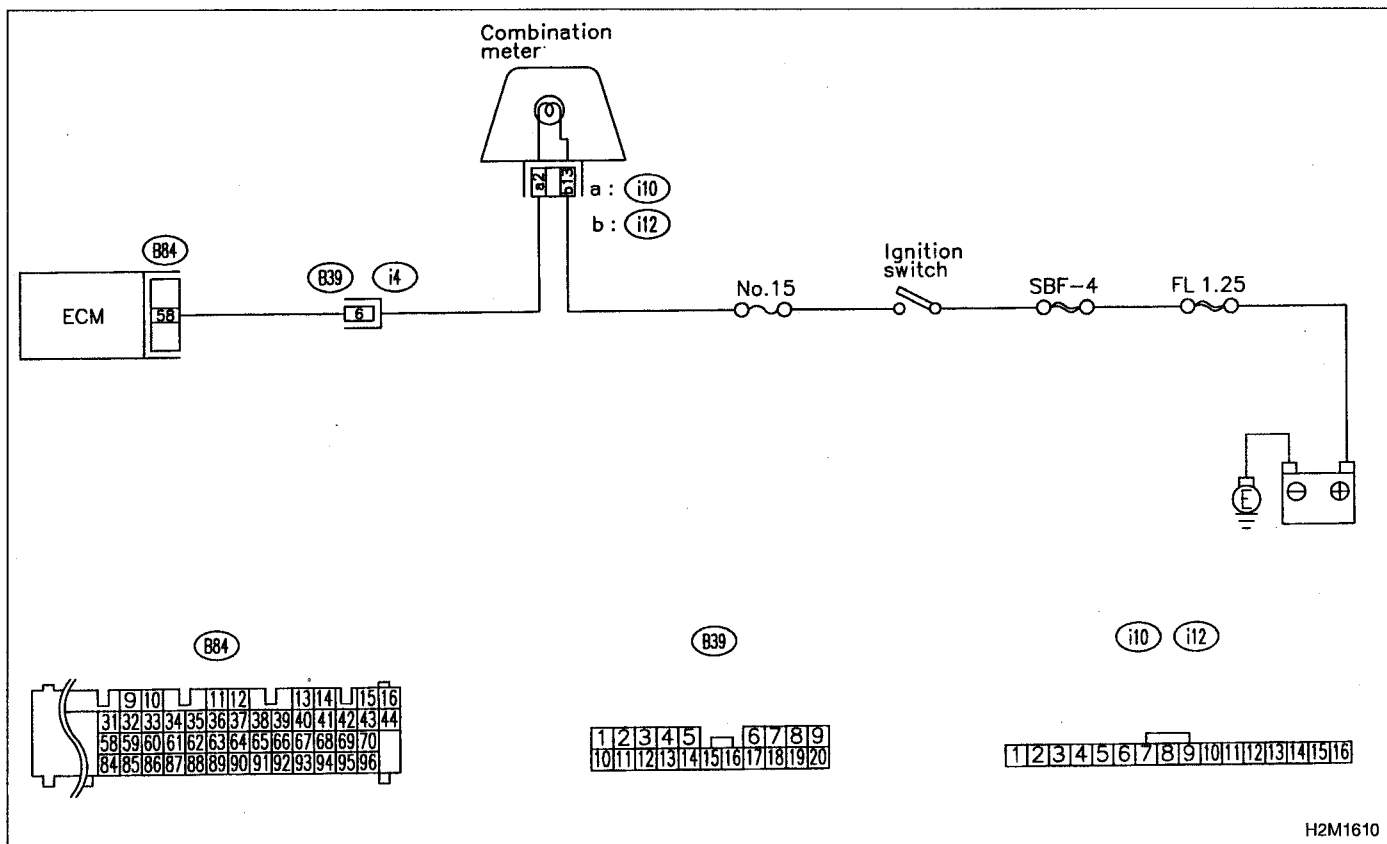
DIAGNOSIS:

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.

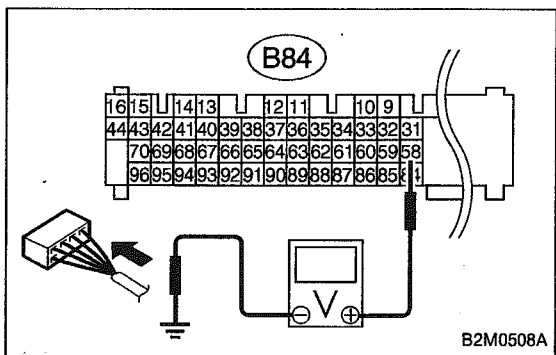
TROUBLE SYMPTOM:

- When ignition switch is turned ON (engine OFF), MIL does not come on.

WIRING DIAGRAM:



H2M1610

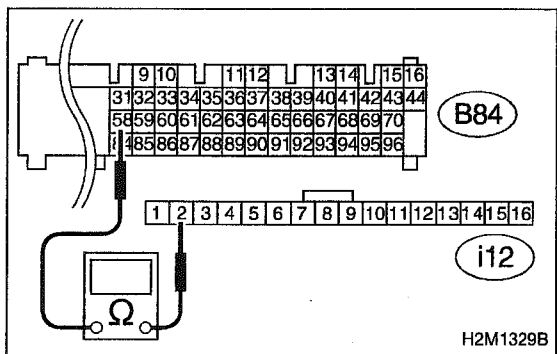


7A1 CHECK OUTPUT SIGNAL FROM ECM.

- 1) Turn ignition switch to ON.
- 2) Measure voltage between ECM connector and chassis ground.

Connector & terminal (B84) No. 58 (+) — Chassis ground (-):

- CHECK** : Is the voltage less than 1 V?
- YES** : Go to step **7A2**.
- NO** : Go to next **CHECK**.
- CHECK** : Does the MIL come on when shaking or pulling ECM connector and harness?
- YES** : Repair poor contact in ECM connector.
- NO** : Go to next **CHECK**.
- CHECK** : Is ECM connector correctly connected?
- YES** : Replace ECM.
- NO** : Repair connection of ECM connector.



7A2 CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Remove combination meter. <Ref. to 6-2 [W8A0].>
- 3) Disconnect connector from ECM and combination meter.
- 4) Measure resistance of harness between ECM and combination meter connector.

Connector & terminal (B84) No. 58 — (i12) No. 2:

- CHECK** : Is resistance less than 1 Ω?
- YES** : Go to step **7A3**.
- NO** : Repair harness and connector.

NOTE:

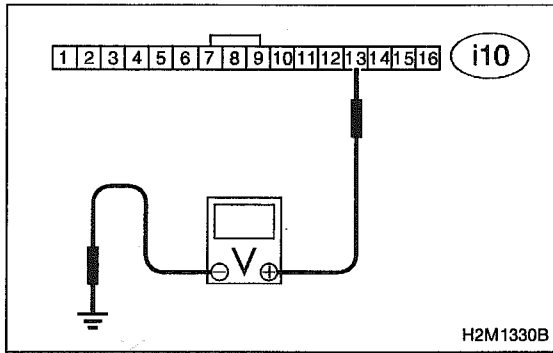
In this case, repair the following:

- Open circuit in harness between ECM and combination meter connector
- Poor contact in coupling connector (B39)

7A3 CHECK POOR CONTACT.

Check poor contact in combination meter connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in combination meter connector?
- YES** : Repair poor contact in combination meter connector.
- NO** : Go to step **7A4**.

**7A4****CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.**

- 1) Turn ignition switch to ON.
- 2) Measure voltage between combination meter connector and chassis ground.

Connector & terminal**(i10) No. 13 (+) — Chassis ground (-):****CHECK : Is voltage more than 10 V?****YES** : Go to step **7A5**.**NO** : Check the following and repair if necessary.

- Blown out fuse (No. 15).

NOTE:

If replaced fuse (No. 15) blows easily, check the harness for short circuit of harness between fuse (No. 15) and combination meter connector.

- Open or short circuit in harness between fuse (No. 15) and combination meter connector
- Open or short circuit in harness between fuse (No. 15) and ignition switch connector
- Poor contact in ignition switch connector

7A5**CHECK POOR CONTACT.**

Check poor contact in combination meter connector.
<Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in combination meter connector?**YES** : Repair poor contact in combination meter connector.**NO** : Replace bulb or combination meter.

MEMO:

B: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT GO OFF.

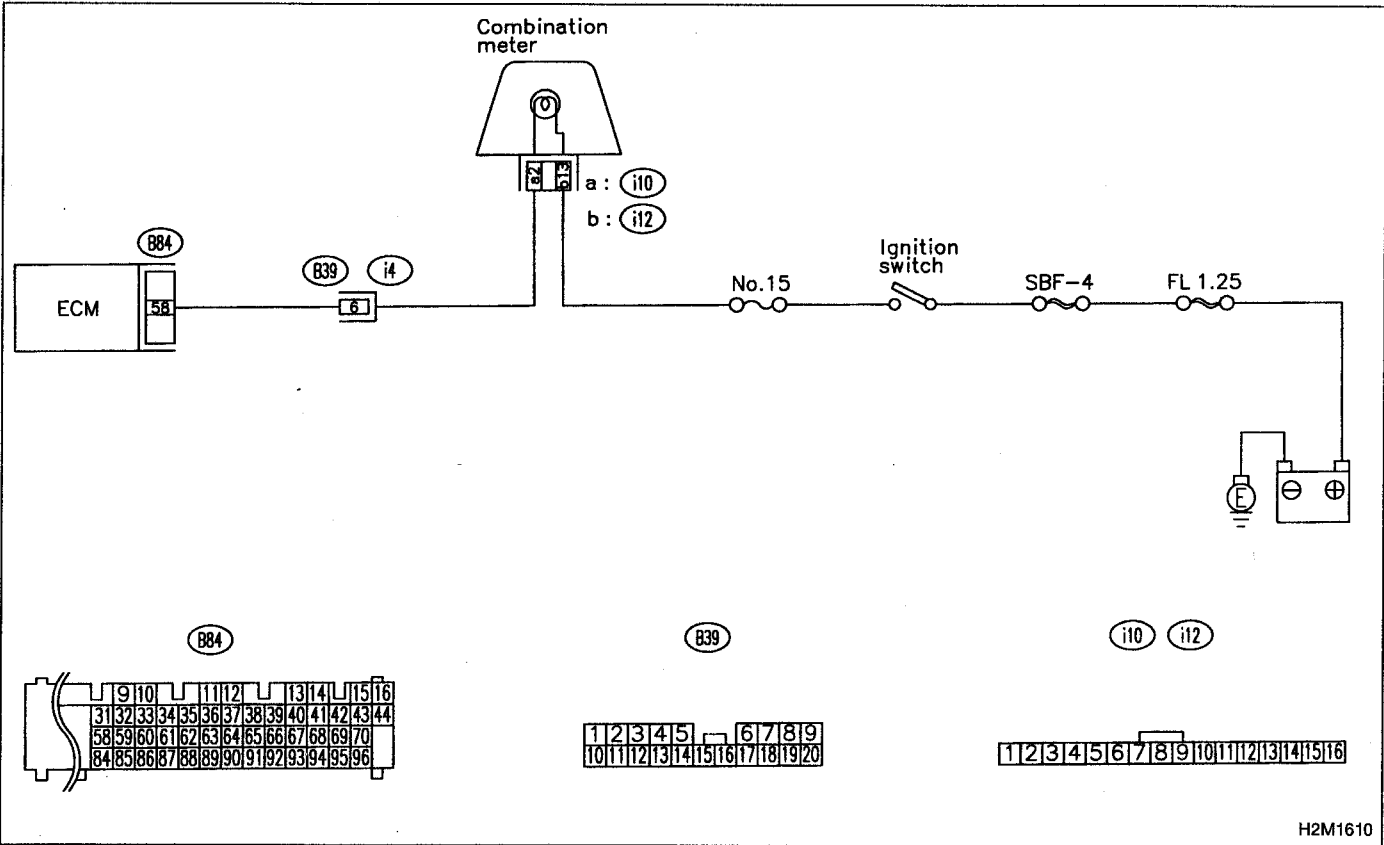
DIAGNOSIS:

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is shorted.

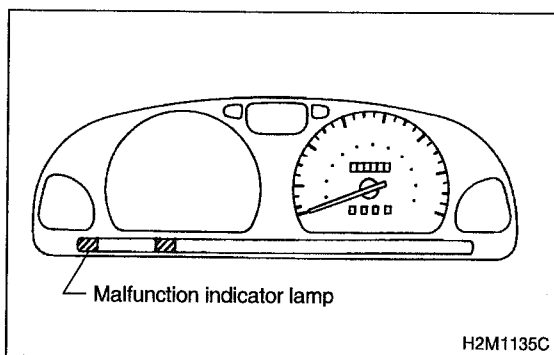
TROUBLE SYMPTOM:

- Although MIL comes on when engine runs, trouble code is not shown on Subaru select monitor or OBD-II general scan tool display.

WIRING DIAGRAM:



H2M1610

**7B1****CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.**

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Turn ignition switch to ON.

CHECK : **Does the MIL come on?****YES** : Repair short circuit in harness between combination meter and ECM connector.**NO** : Replace ECM.

C: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) DOES NOT BLINK AT A CYCLE OF 3 HZ.

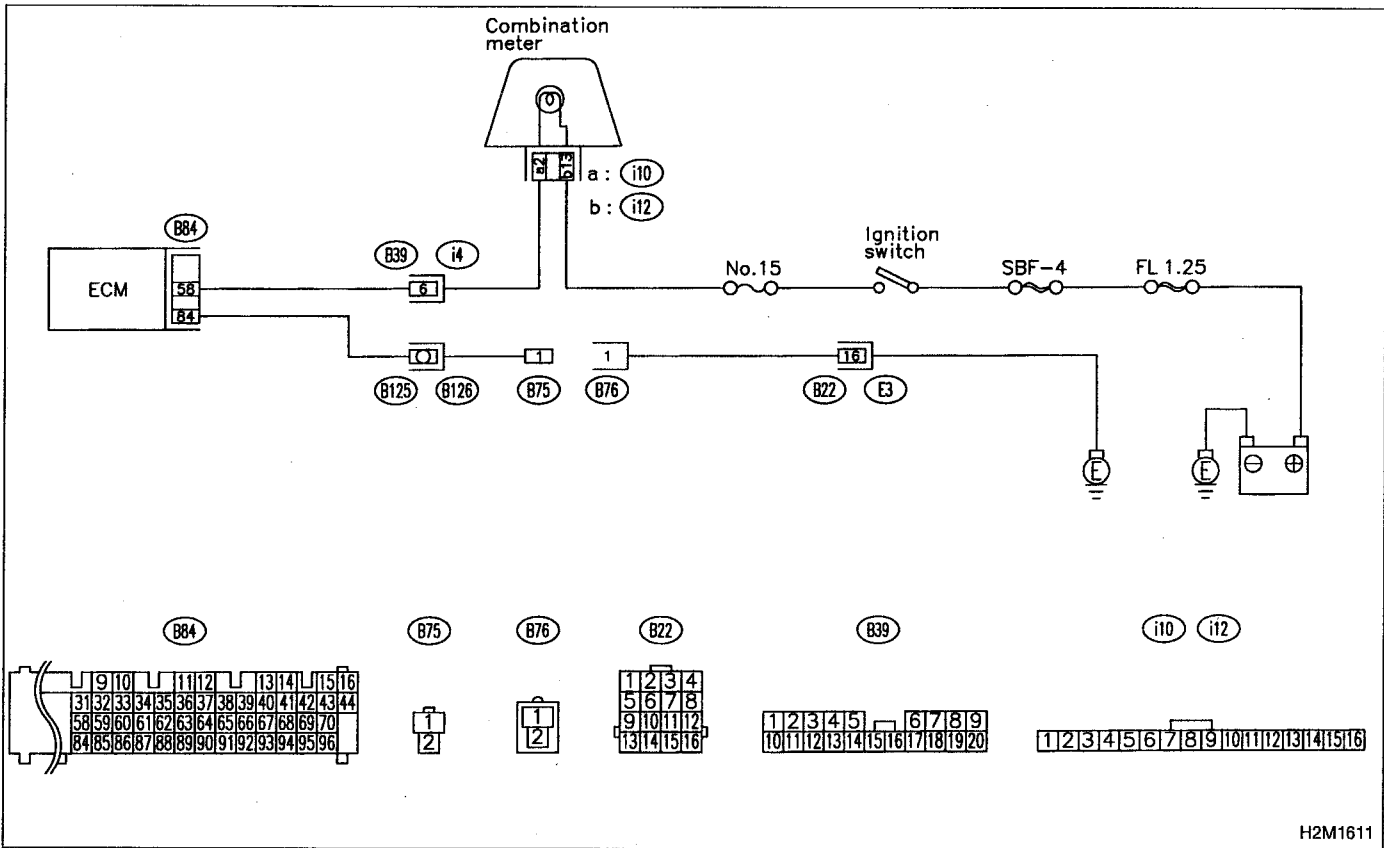
DIAGNOSIS:

- The CHECK ENGINE malfunction indicator lamp (MIL) circuit is open or shorted.
- Test mode connector circuit is in open.

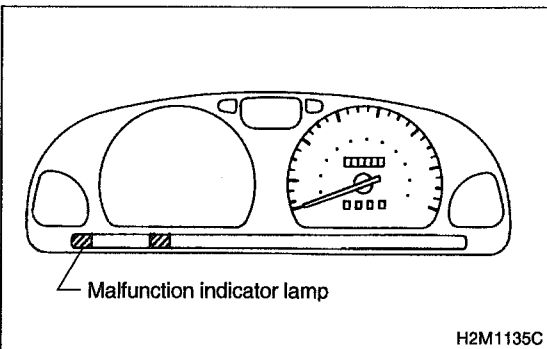
TROUBLE SYMPTOM:

- When inspection mode, MIL does not blink at a cycle of 3 Hz.

WIRING DIAGRAM:



H2M1611



H2M1135C

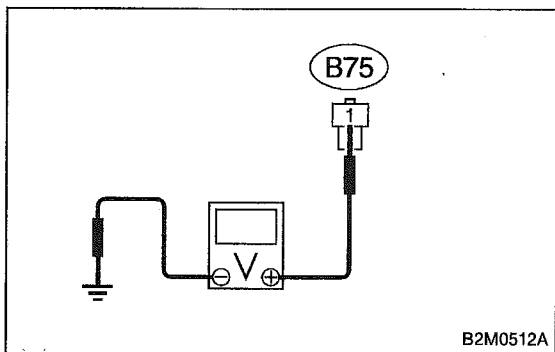
7C1 CHECK OPERATION OF CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL).

- 1) Turn ignition switch to OFF.
- 2) Disconnect test mode connector.
- 3) Turn ignition switch to ON.

CHECK : Does the MIL come on?

YES : Go to step 7C2.

NO : Repair the MIL circuit. <Ref. to 2-7 [T7A0].>



7C2 CHECK OUTPUT SIGNAL FROM ECM.

Measure voltage between test mode connector and chassis ground.

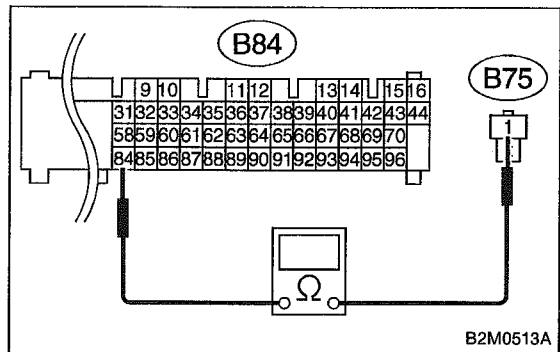
Connector & terminal

(B75) No.1 (+) — Chassis ground (-):

CHECK : Is voltage less than 1 V?

YES : Go to step 7C3.

NO : Go to step 7C5.



7C3 CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM and test mode connector.

Connector & terminal

(B84) No.84 — (B75) No.1:

CHECK : Is resistance less than 1 Ω?

YES : Go to step 7C4.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ECM and test mode connector
- Poor contact in coupling connector (B125)

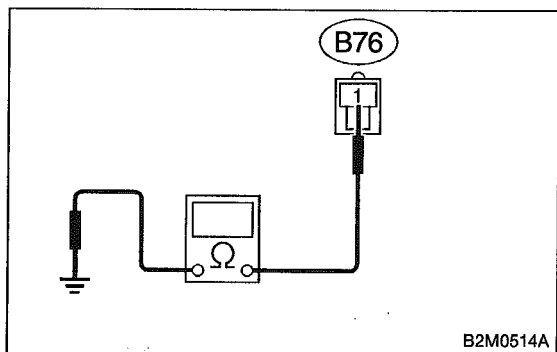
7C4 CHECK POOR CONTACT.

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in ECM connector?

YES : Repair poor contact in ECM connector.

NO : Replace ECM.

**7C5****CHECK GROUND CIRCUIT.**

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between test mode connector and chassis ground.

Connector & terminal**(B76) No.1 — Chassis ground:****CHECK** : Is resistance less than 5 Ω ?**YES** : Repair poor contact in test mode connector.**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between test mode and engine grounding terminal
- Poor contact in coupling connector (B22)

MEMO:

D: CHECK ENGINE MALFUNCTION INDICATOR LAMP (MIL) REMAINS BLINKING AT A CYCLE OF 3 Hz.

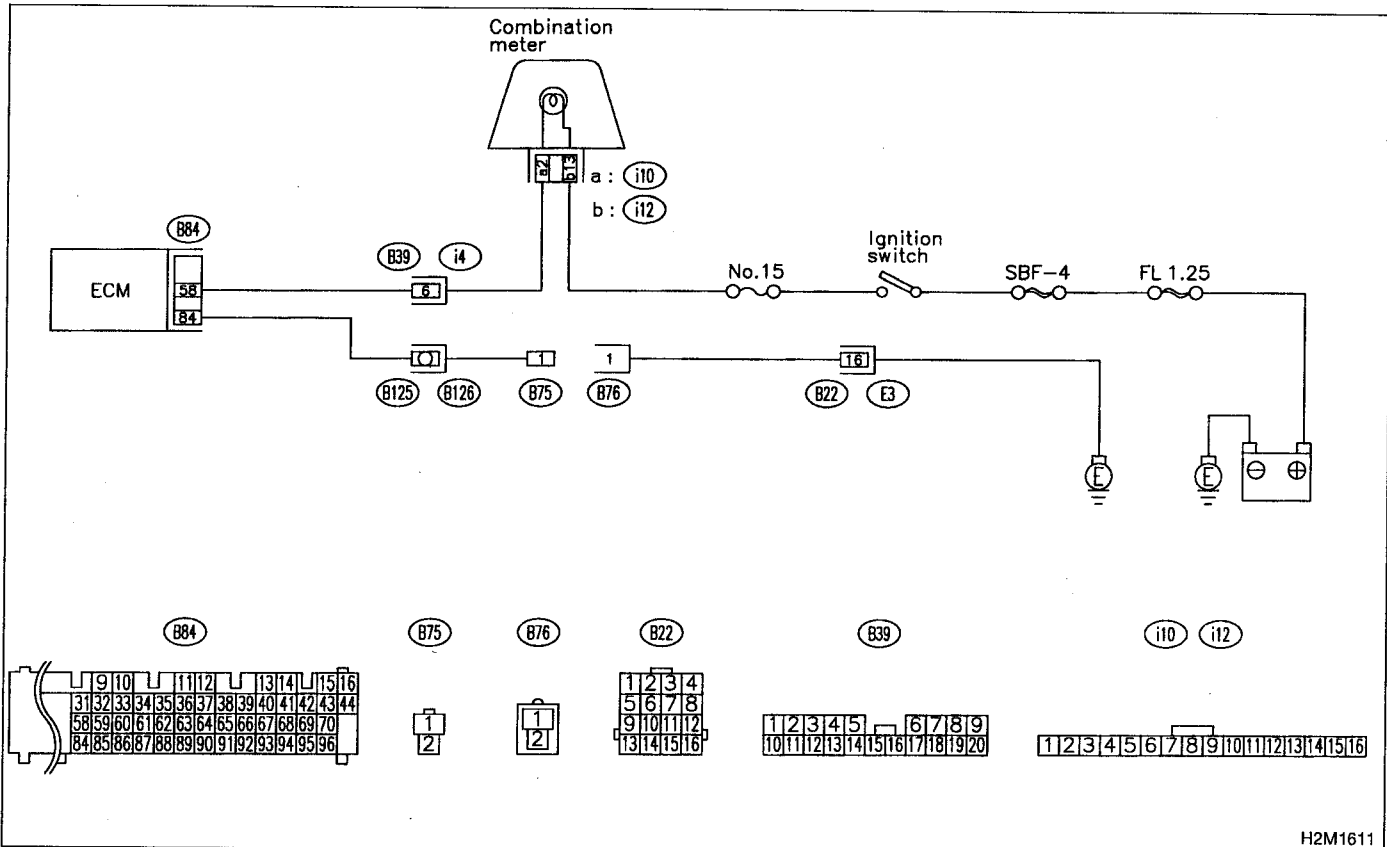
DIAGNOSIS:

- Test mode connector circuit is shorted.

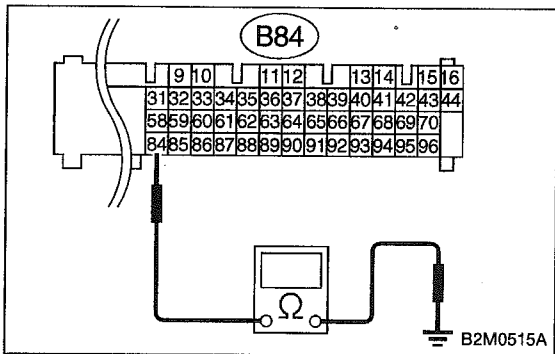
TROUBLE SYMPTOM:

- Even though test mode connector is disconnected, MIL blinks at a cycle of 3 Hz when ignition switch is turned ON.

WIRING DIAGRAM:



H2M1611



7D1 CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ECM.
- 3) Measure resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B84) No.84 — Chassis ground:

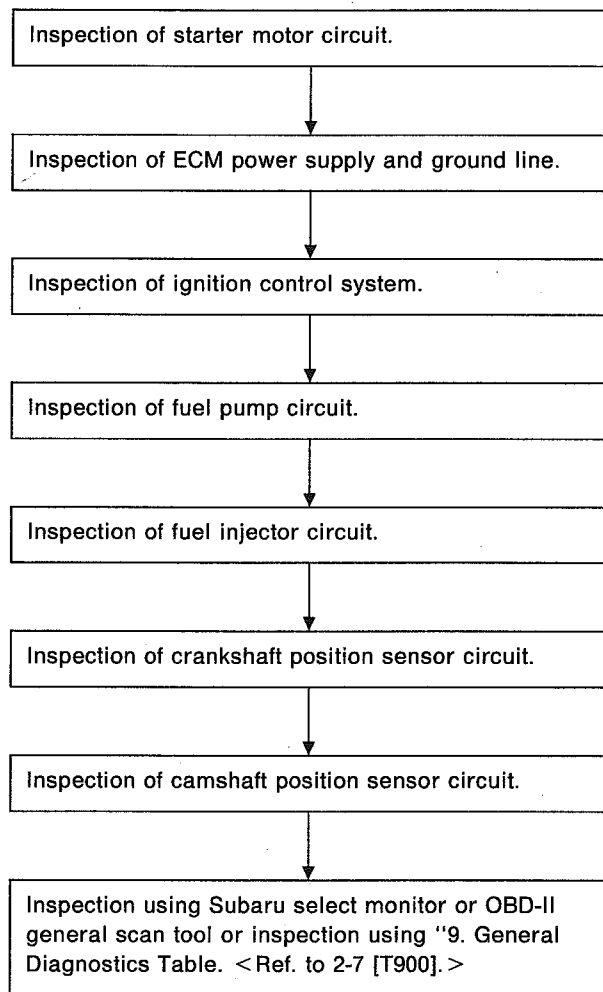
CHECK : Is resistance less than 5 Ω?

YES : Repair short circuit in harness between ECM and test mode connector.

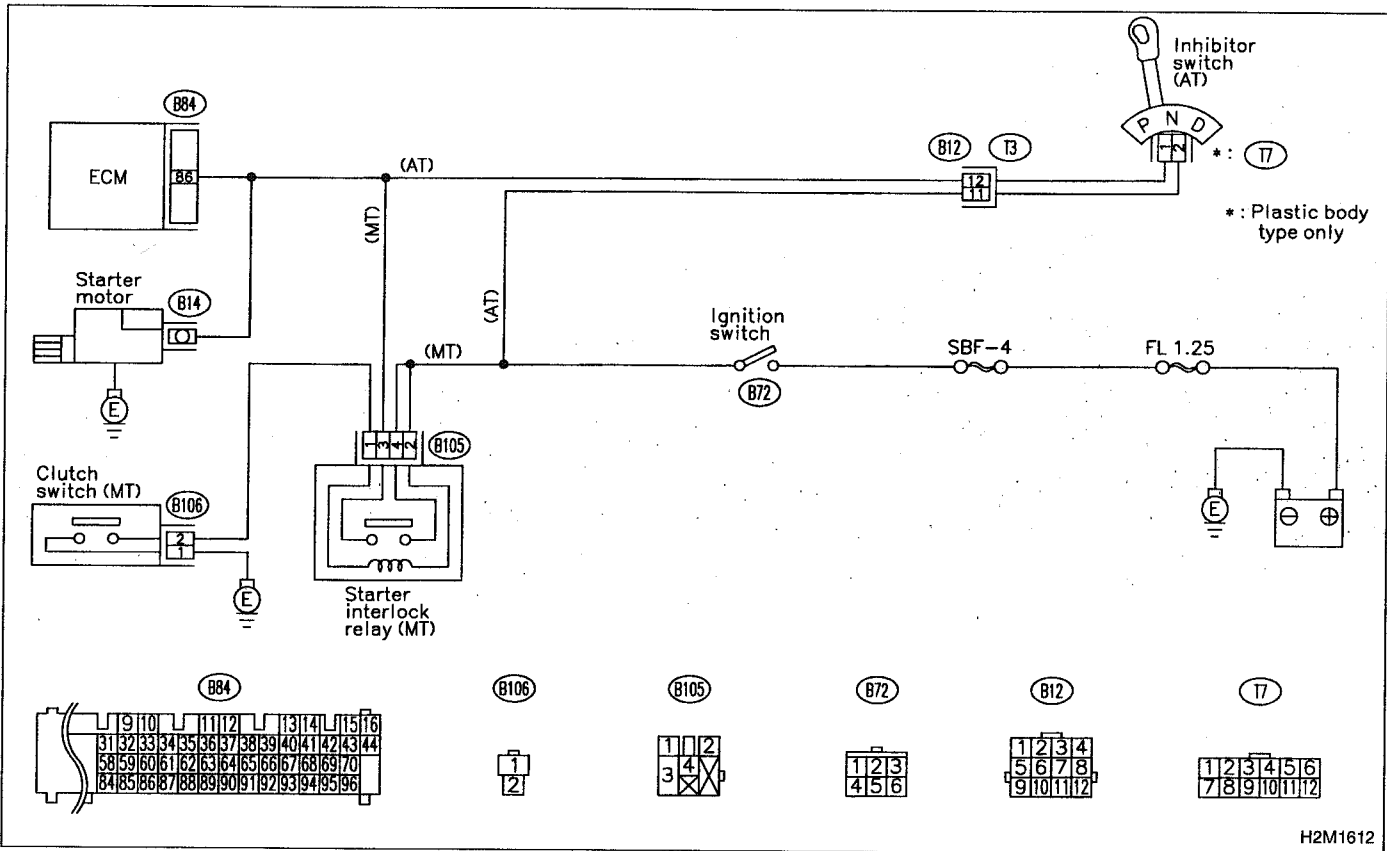
NO : Replace ECM.

8. Diagnostics for Engine Starting Failure

A: BASIC DIAGNOSTICS CHART



**B: STARTER MOTOR CIRCUIT
WIRING DIAGRAM:**

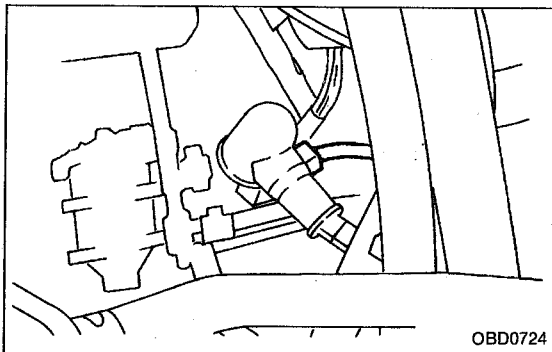


H2M1612

CAUTION:

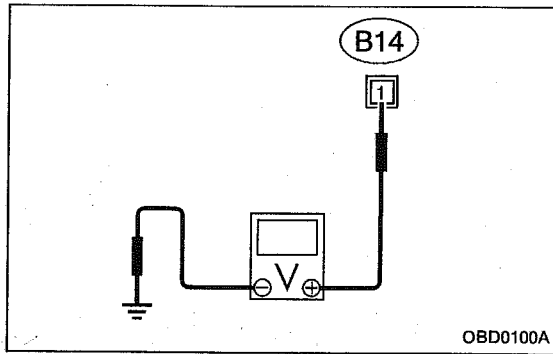
After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES.

< Ref. to 2-7 [T3D0] and [T3E0]. >



8B1 CHECK INPUT SIGNAL FOR STARTER MOTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from starter motor.
- 3) Turn ignition switch to ST.



4) Measure power supply voltage between starter motor connector terminal and engine ground.

Connector & terminal

(B14) No. 1 (+) — Engine ground (-):

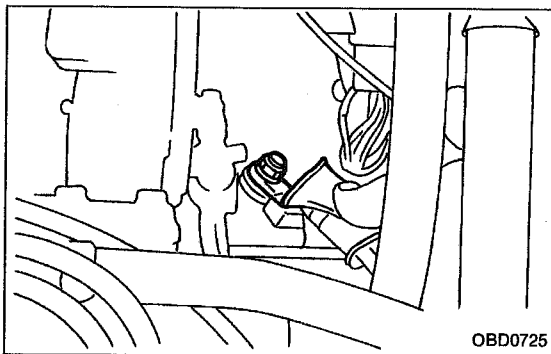
CHECK : Is the voltage more than 10 V?

NOTE:

- On AT vehicles, place the selector lever in the "P" or "N" position.
- On MT vehicles, depress the clutch pedal.

YES : Go to step **8B2**.

NO : Go to step **8B3**.



8B2	CHECK GROUND CIRCUIT OF STARTER MOTOR.
------------	---

- 1) Turn ignition switch to OFF.
- 2) Disconnect terminal from starter motor.
- 3) Measure resistance of ground cable between ground cable terminal and engine ground.

CHECK : Is resistance less than 5 Ω?

YES : Check starter motor. <Ref. to 6-1 [K100].>

NO : Repair open circuit of ground cable.

8B3	CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.
------------	---

- 1) Turn ignition switch to OFF.
- 2) Remove SBF No. 4 from main fuse box.
- 3) Measure resistance of fuse.

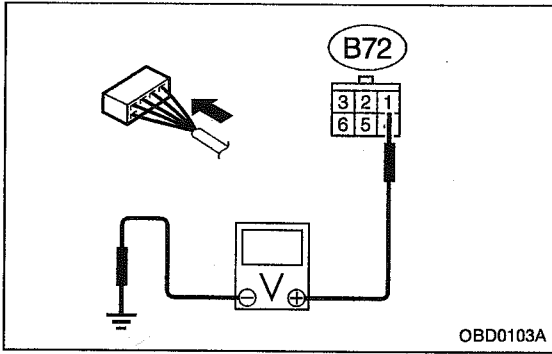
CHECK : Is resistance less than 1 Ω?

NO : Replace SBF No. 4.

YES : Go to next step 4).

4) Install SBF No. 4 to main fuse box.

5) Turn ignition switch to ON.



6) Measure power supply voltage between ignition switch connector and chassis ground.

Connector & terminal

(B72) No. 1 (+) — Chassis ground (-):

CHECK : *Is the voltage more than 10 V?*

YES : Go to step **8B4**.

NO : Repair open circuit in harness between ignition switch and SBF No. 4 connector.

8B4	CHECK TRANSMISSION TYPE.
------------	---------------------------------

CHECK : *Is transmission type AT?*

YES : Go to step **8B5**.

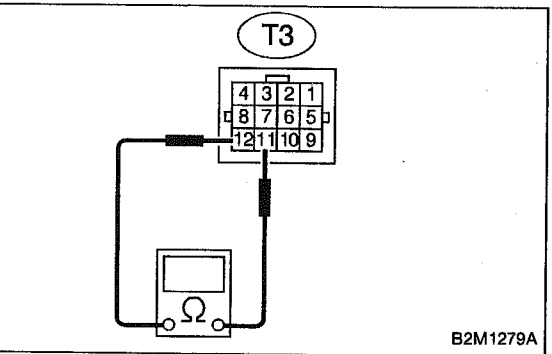
NO : Go to step **8B10**.

8B5	CHECK INHIBITOR SWITCH TYPE.
------------	-------------------------------------

CHECK : *Is inhibitor switch type plastic body?*

YES : Go to step **8B6**.

NO : Go to step **8B9**.



8B6	CHECK INHIBITOR SWITCH.
------------	--------------------------------

- 1) Turn ignition switch to OFF.
- 2) Place the selector lever in the "P" or "N" position.
- 3) Measure resistance between transmission harness connector receptacle's terminals.

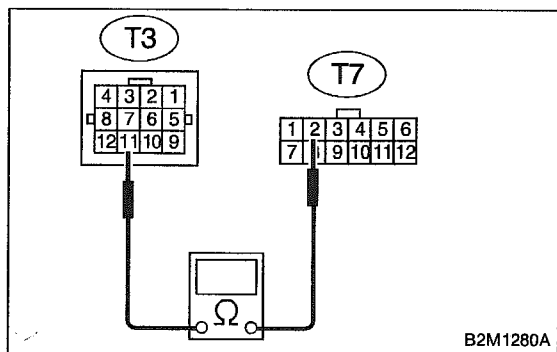
Connector & terminal

(T3) No. 11 — No. 12:

CHECK : *Is the resistance less than 1 Ω?*

YES : Repair open circuit in harness between starter motor and ignition switch connector.

NO : Go to step **8B7**.



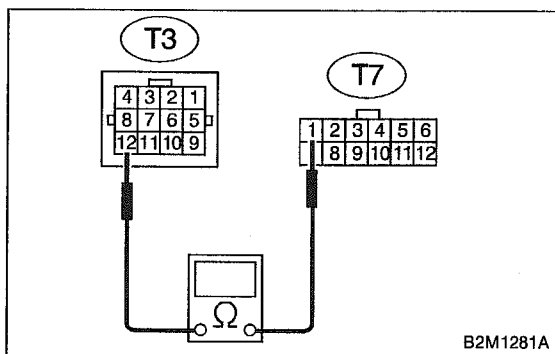
8B7 CHECK TRANSMISSION HARNESS.

- 1) Disconnect connector from inhibitor switch.
- 2) Measure resistance of harness between transmission harness and inhibitor switch connector.

Connector & terminal

(T3) No. 11 — (T7) No. 2:

- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to next step 3).
- NO** : Repair open circuit in harness between transmission harness and inhibitor switch connector.



- 3) Measure resistance of harness between transmission harness and inhibitor switch connector.

Connector & terminal

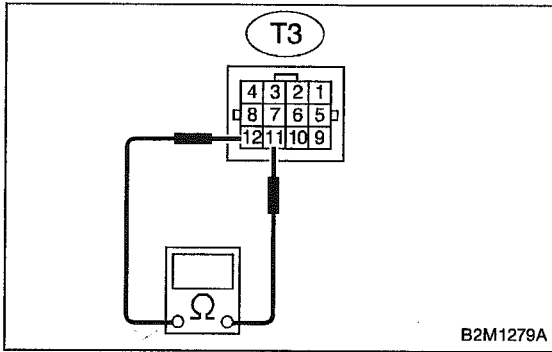
(T3) No. 12 — (T7) No. 1:

- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8B8.
- NO** : Repair open circuit in harness between transmission harness and inhibitor switch connector.

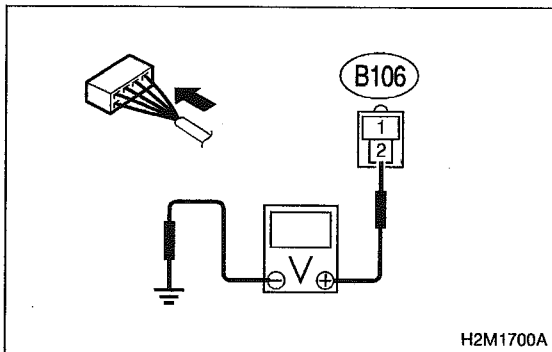
8B8 CHECK POOR CONTACT.

Check poor contact in inhibitor switch connector. <Ref. to FOREWORD [T3C1].>

- CHECK** : Is there poor contact in inhibitor switch connector?
- YES** : Repair poor contact in inhibitor switch connector.
- NO** : Replace inhibitor switch.

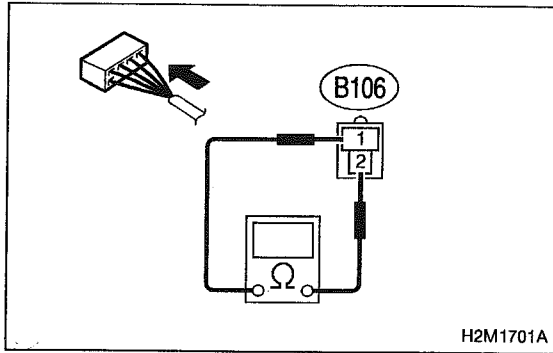
**8B9 CHECK INHIBITOR SWITCH.**

- 1) Turn ignition switch to OFF.
- 2) Place the selector lever in the "P" or "N" position.
- 3) Disconnect connector from transmission harness connector.
- 4) Measure resistance between transmission harness connector receptacle's terminals.

**Connector & terminal
(T3) No. 11 — No. 12:****CHECK** : Is the resistance less than 1 Ω ?**YES** : Repair open circuit in harness between starter motor and ignition switch connector.**NO** : Replace inhibitor switch.**8B10 CHECK STARTER INTERLOCK CIRCUIT.**

- 1) Turn ignition switch to "ST".
- 2) Measure voltage between clutch switch connector and chassis ground.

**Connector & terminal
(B106) No. 2 (+) — Chassis ground (-):****CHECK** : Is the voltage more than 10 V?**NO** : Replace starter interlock relay.**YES** : Go to next step 3).



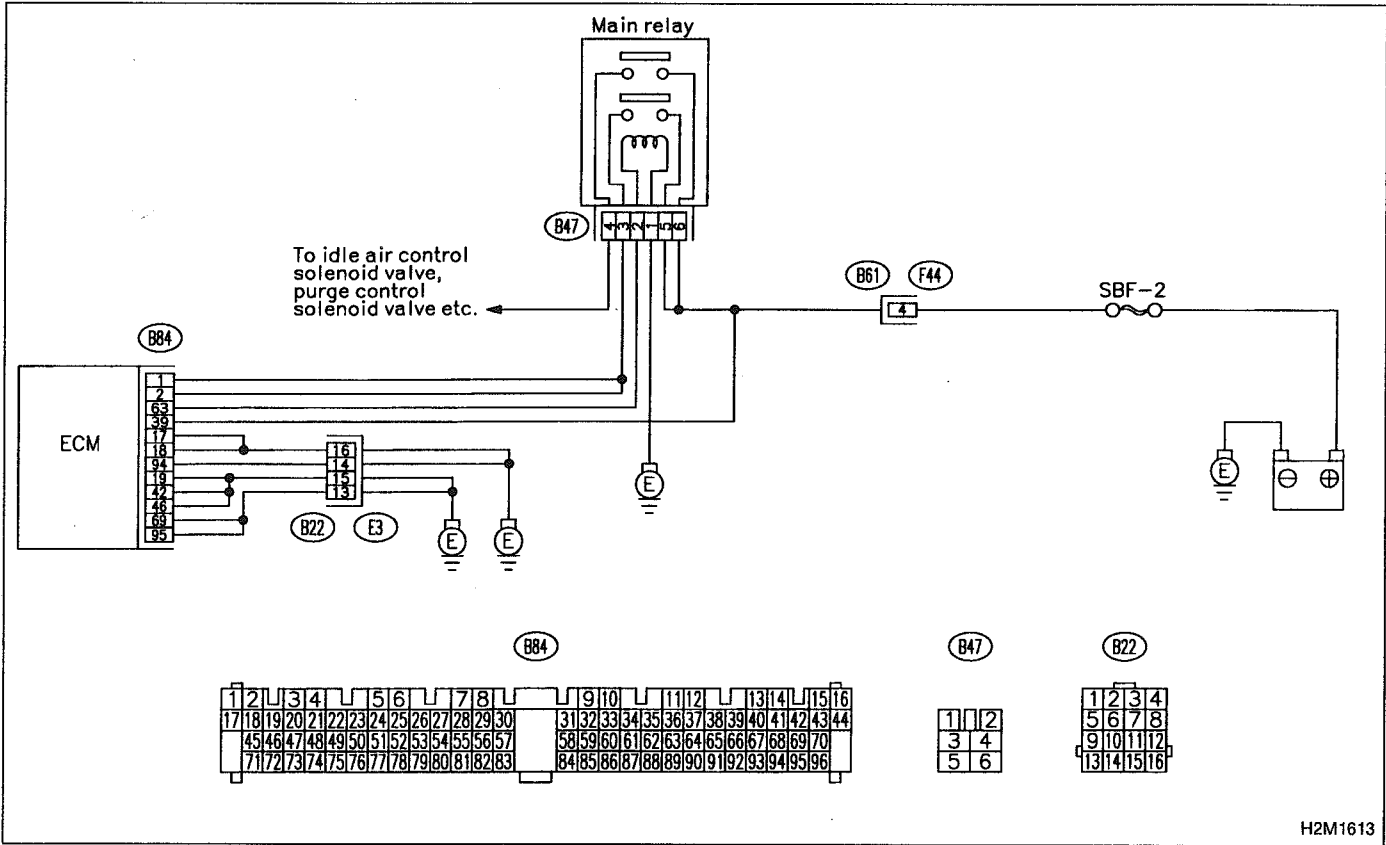
- 3) Turn ignition switch to OFF.
- 4) Measure resistance between clutch switch connector terminals while depressing the clutch pedal.

**Connector & terminal
(B106) No. 1 — No. 2:**

- CHECK** : Is the resistance less than 10 Ω ?
- YES** : Repair open circuit in harness between starter motor and ignition switch connector.
- NO** : Replace clutch switch.

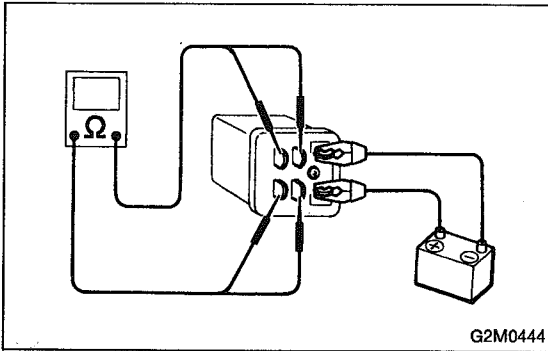
C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:



H2M1613

CAUTION:
 After repair or replacement of faulty parts, conduct
CLEAR MEMORY and INSPECTION MODES.
 < Ref. to 2-7 [T3D0] and [T3E0]. >



8C1	CHECK MAIN RELAY.
------------	--------------------------

- 1) Turn the ignition switch to OFF.
- 2) Remove main relay.
- 3) Connect battery to main relay terminals No. 1 and No. 2.
- 4) Measure resistance between main relay terminals.

Terminals

No. 3 — No. 5:

CHECK : Is the resistance less than 10 Ω?

YES : Go to next step 5).

YES : Replace main relay.

- 5) Measure resistance between main relay terminals.

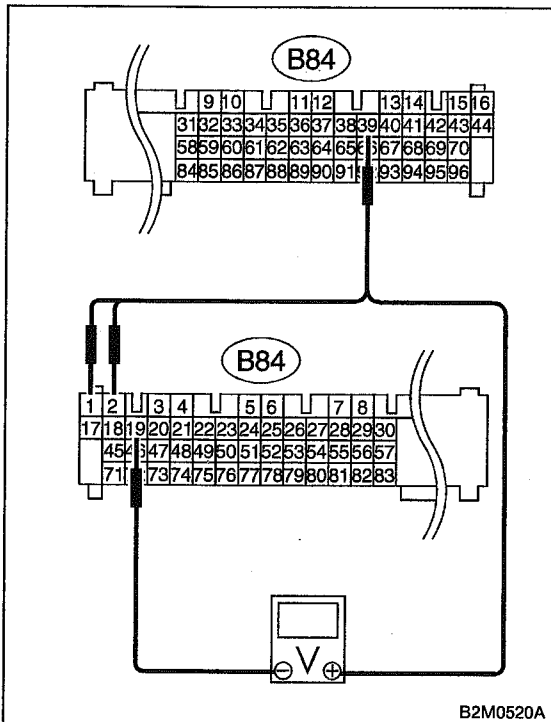
Terminals

No. 4 — No. 6:

CHECK : Is the resistance less than 10 Ω?

YES : Go to step **8C2**.

NO : Replace main relay.



8C2	CHECK POWER SUPPLY CIRCUIT OF ECM.
------------	---

- 1) Install main relay.
- 2) Disconnect connectors from ECM.
- 3) Turn ignition switch to ON.
- 4) Measure power supply voltage between ECM connector terminals.

Connector & terminal

(B84) No. 1 (+) — No. 19 (-):

CHECK : Is the voltage more than 10 V?

YES : Go to next step 5).

NO : Repair open or ground short circuit in harness of power supply circuit.

- 5) Measure power supply voltage between ECM connector terminals.

Connector & terminal

(B84) No. 2 (+) — No. 19 (-):

CHECK : Is the voltage more than 10 V?

YES : Go to next step 6).

NO : Repair open or ground short circuit in harness of power supply circuit.

- 6) Measure power supply voltage between ECM connector terminals.

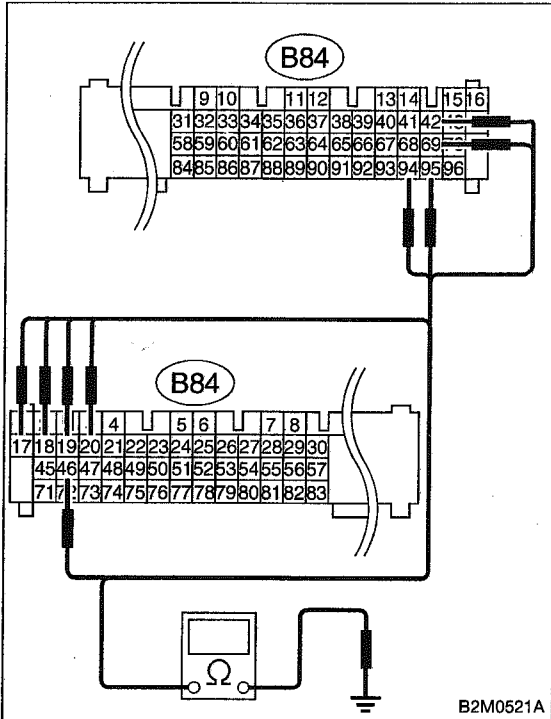
Connector & terminal

(B84) No. 39 (+) — No. 19 (-):

CHECK : Is the voltage more than 10 V?

YES : Go to step **8C3**.

NO : Repair open or ground short circuit in harness of power supply circuit.

**8C3****CHECK GROUND CIRCUIT OF ECM.**

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B84) No. 17 — Chassis ground:****(CHECK) : Is the resistance less than 5 Ω ?****(YES) :** Go to next step 3).**(NO) :** Repair open circuit in harness between ECM connector and engine grounding terminal.

- 3) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B84) No. 18 — Chassis ground:****(CHECK) : Is the resistance less than 5 Ω ?****(YES) :** Go to next step 4).**(NO) :** Repair open circuit in harness between ECM connector and engine grounding terminal.

- 4) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B84) No. 19 — Chassis ground:****(CHECK) : Is the resistance less than 5 Ω ?****(YES) :** Go to next step 5).**(NO) :** Repair open circuit in harness between ECM connector and engine grounding terminal.

- 5) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B84) No. 20 — Chassis ground:****(CHECK) : Is the resistance less than 5 Ω ?****(YES) :** Go to next step 6).**(NO) :** Repair open circuit in harness between ECM connector and engine grounding terminal.

- 6) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B84) No. 42 — Chassis ground:****(CHECK) : Is the resistance less than 5 Ω ?****(YES) :** Go to next step 7).**(NO) :** Repair open circuit in harness between ECM connector and engine grounding terminal.

7) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B84) No. 46 — Chassis ground:

CHECK : Is the resistance less than 5 Ω ?

YES : Go to next step 8).

NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B84) No. 69 — Chassis ground:

CHECK : Is the resistance less than 5 Ω ?

YES : Go to next step 9).

NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

9) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B84) No. 94 — Chassis ground:

CHECK : Is the resistance less than 5 Ω ?

YES : Go to next step 10).

NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

10) Measure resistance of harness between ECM and chassis ground.

Connector & terminal

(B84) No. 95 — Chassis ground:

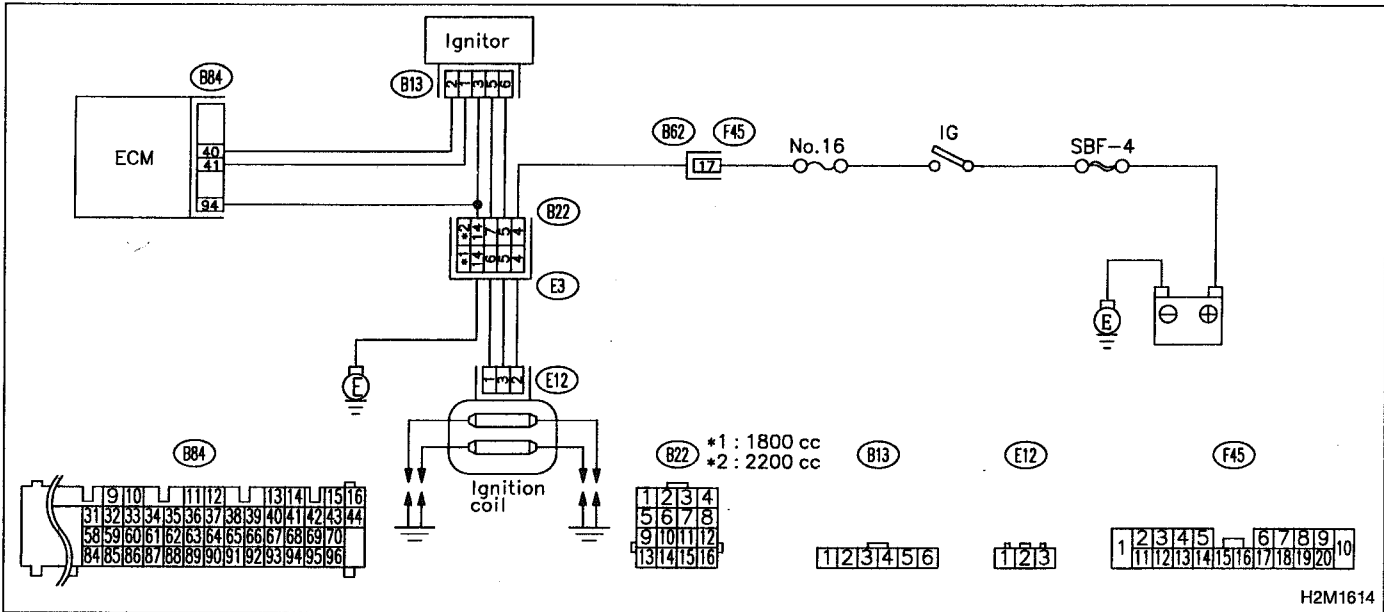
CHECK : Is the resistance less than 5 Ω ?

YES : Check ignition control system. <Ref. to 2-7 [T8D0].>

NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

D: IGNITION CONTROL SYSTEM

WIRING DIAGRAM:

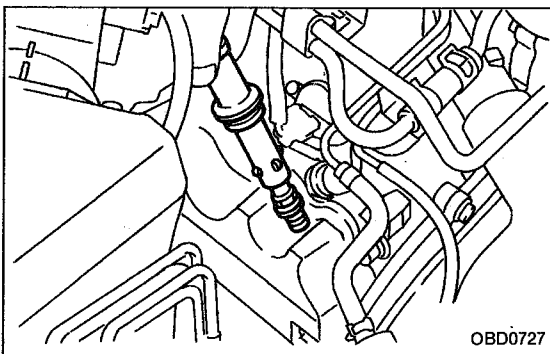


H2M1614

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES.

< Ref. to 2-7 [T3D0] and [T3E0]. >



8D1 CHECK IGNITION SYSTEM FOR SPARKS.

- 1) Remove plug cord cap from each spark plug.
- 2) Install new spark plug on plug cord cap.

CAUTION:

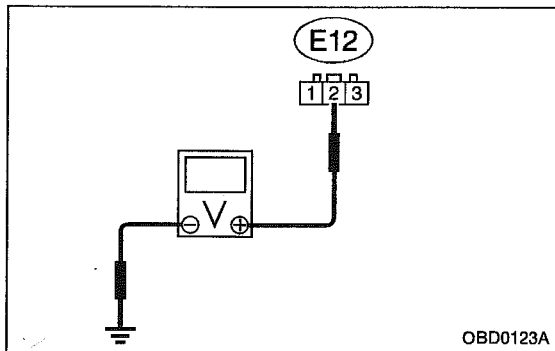
Do not remove spark plug from engine.

- 3) Contact spark plug's thread portion on engine.
- 4) While opening throttle valve fully, crank engine to check that spark occurs at each cylinder.

CHECK : Does spark occur at each cylinder?

YES : Check fuel pump system. <Ref. to 2-7 [T8E0].>

NO : Go to step 8D2.



8D2 CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ignition coil.
- 3) Turn ignition switch to ON.
- 4) Measure power supply voltage between ignition coil connector and engine ground.

Connector & terminal

(E12) No. 2 (+) — Engine ground (-):

CHECK : Is the voltage more than 10 V?

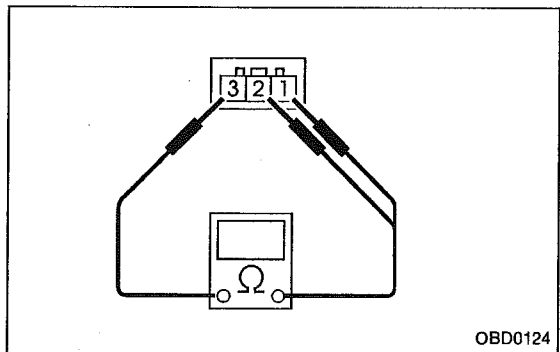
YES : Go to step 8D3.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ignition coil and ignition switch connector
- Poor contact in coupling connectors (B22 and F45)



8D3 CHECK IGNITION COIL.

- 1) Measure resistance between ignition coil terminals to check primary coil.

Terminals

No. 2 — No. 1:

CHECK : Is the resistance between 0.4 and 1.0 Ω?

YES : Go to next step 2).

NO : Replace ignition coil.

- 2) Measure resistance between ignition coil terminals to check primary coil.

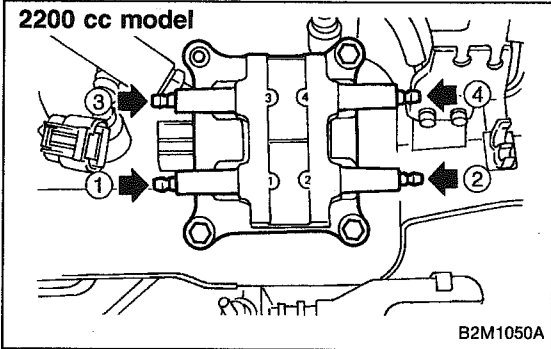
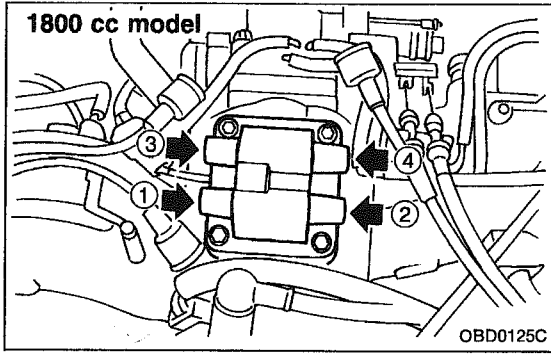
Terminals

No. 2 — No. 3:

CHECK : Is the resistance between 0.4 and 1.0 Ω?

NO : Replace ignition coil.

YES : Go to next step 3).



3) Measure resistance between spark plug cord contact portions to check secondary coil.

Terminals

#1 — #2:

- CHECK** : ● 1800 cc model
Is the resistance between 18 and 24 Ω?
- 2200 cc model
Is the resistance between 10 and 15 kΩ?

YES : Go to next step 4).

NO : Replace ignition coil.

4) Measure resistance between spark plug cord contact portions to check secondary coil.

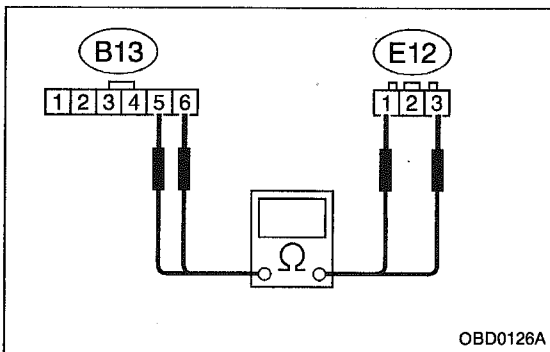
Terminals

#3 — #4:

- CHECK** : ● 1800 cc model
Is the resistance between 18 and 24 Ω?
- 2200 cc model
Is the resistance between 10 and 15 kΩ?

YES : Go to step 8D4.

NO : Replace ignition coil.



8D4	CHECK HARNESS BETWEEN IGNITOR AND IGNITION COIL CONNECTOR.
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- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ignitor.
- 3) Measure resistance of harness between ignition coil and ignitor connector.

Connector & terminal

(B13) No. 5 — (E12) No. 1:

CHECK : Is the resistance less than 1 Ω?

YES : Go to next step 4).

YES : Go to step 8D5.

- 4) Measure resistance of harness between ignition coil and ignitor connector.

Connector & terminal

(B13) No. 6 — (E12) No. 3:

CHECK : Is the resistance less than 1 Ω?

YES : Go to step 8D6.

NO : Go to step 8D5.

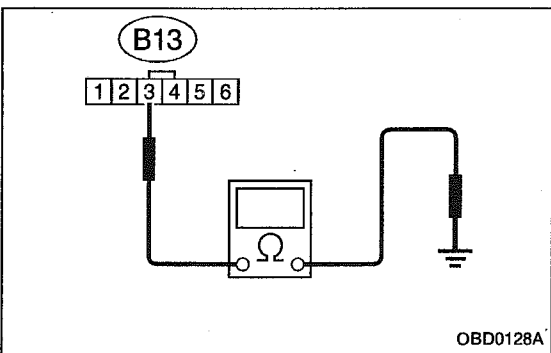
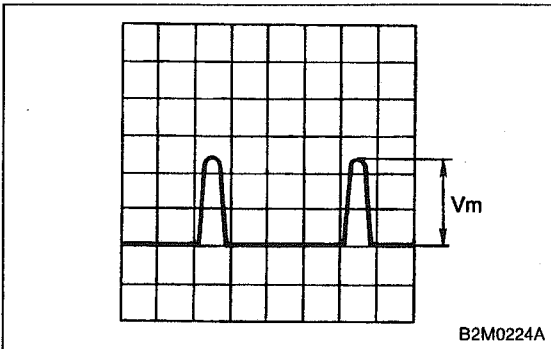
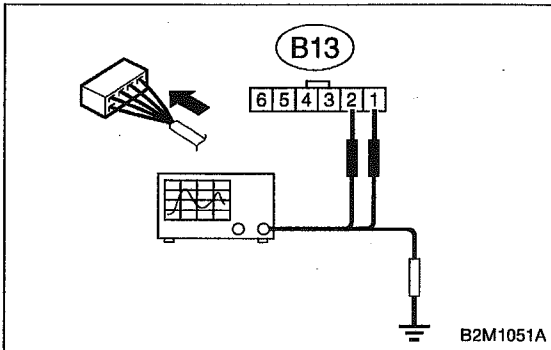
8D5 CHECK POOR CONTACT.

Check poor contact in coupling connector (B22). <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in coupling connector (B22)?

YES : Repair poor contact in coupling connector (B22).

NO : Repair open circuit in harness between ignition coil and ignitor connector.



8D6 CHECK INPUT SIGNAL FOR IGNITOR.

1) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignitor connector and engine ground.

Connector & terminal:

(B13) No. 1 (+) — Engine ground (-):

CHECK : Is the voltage more than 10 V?

YES : Go to next step 2).

NO : Replace ignitor.

2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignitor connector and engine ground.

Connector & terminal:

(B13) No. 2 (+) — Engine ground (-):

CHECK : Is the voltage more than 10 V?

YES : Go to step 8D7.

NO : Replace ignitor.

8D7 CHECK HARNESS OF IGNITOR GROUND CIRCUIT.

1) Turn ignition switch to OFF.

2) Measure resistance between ignitor and engine ground.

Connector & terminal

(B13) No. 3 — Engine ground:

CHECK : Is the resistance less than 5 Ω?

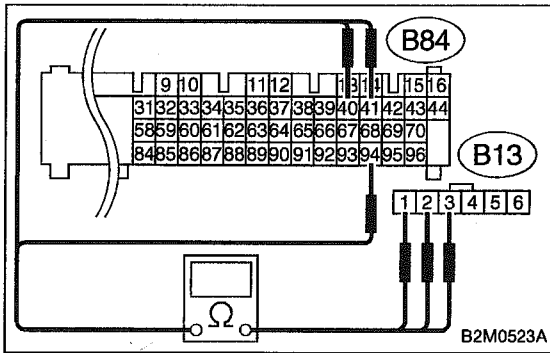
YES : Go to step 8D8.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ignitor connector and engine grounding terminal
- Poor contact in coupling connector (B22)

**8D8****CHECK HARNESS BETWEEN ECM AND IGNITOR CONNECTOR.**

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between ECM and ignitor connector.

Connector & terminal**(B84) No. 41 — (B13) No. 1:****(CHECK) : Is the resistance less than 1 Ω?****(YES) :** Go to next step 3).**(NO) :** Repair open circuit in harness between ECM and ignitor connector.

- 3) Measure resistance of harness between ECM and ignitor connector.

Connector & terminal**(B84) No. 40 — (B13) No. 2:****(CHECK) : Is the resistance less than 1 Ω?****(YES) :** Go to next step 4).**(NO) :** Repair open circuit in harness between ECM and ignitor connector.

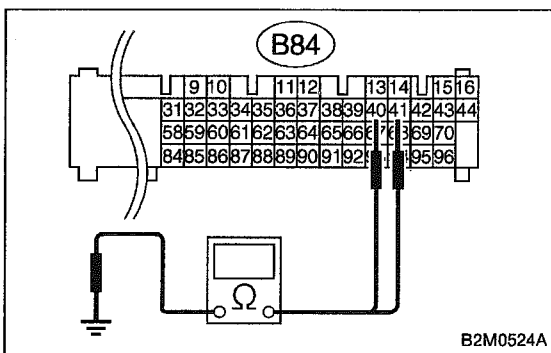
- 4) Measure resistance of harness between ECM and ignitor connector.

Connector & terminal**(B84) No. 94 — (B13) No. 3:****(CHECK) : Is the resistance less than 1 Ω?****(NO) :** Repair open circuit in harness between ECM and ignitor connector.**(YES) :** Go to next step 5).

- 5) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B84) No. 41 — Chassis ground:****(CHECK) : Is the resistance more than 1 MΩ?****(YES) :** Go to next step 6).**(NO) :** Repair ground short circuit in harness between ECM and ignitor connector.

- 6) Measure resistance of harness between ECM and chassis ground.

Connector & terminal**(B84) No. 40 — Chassis ground:****(CHECK) : Is the resistance more than 1 MΩ?****(YES) :** Go to step **8D9**.**(NO) :** Repair ground short circuit in harness between ECM and ignitor connector.

8D9**CHECK POOR CONTACT.**

Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

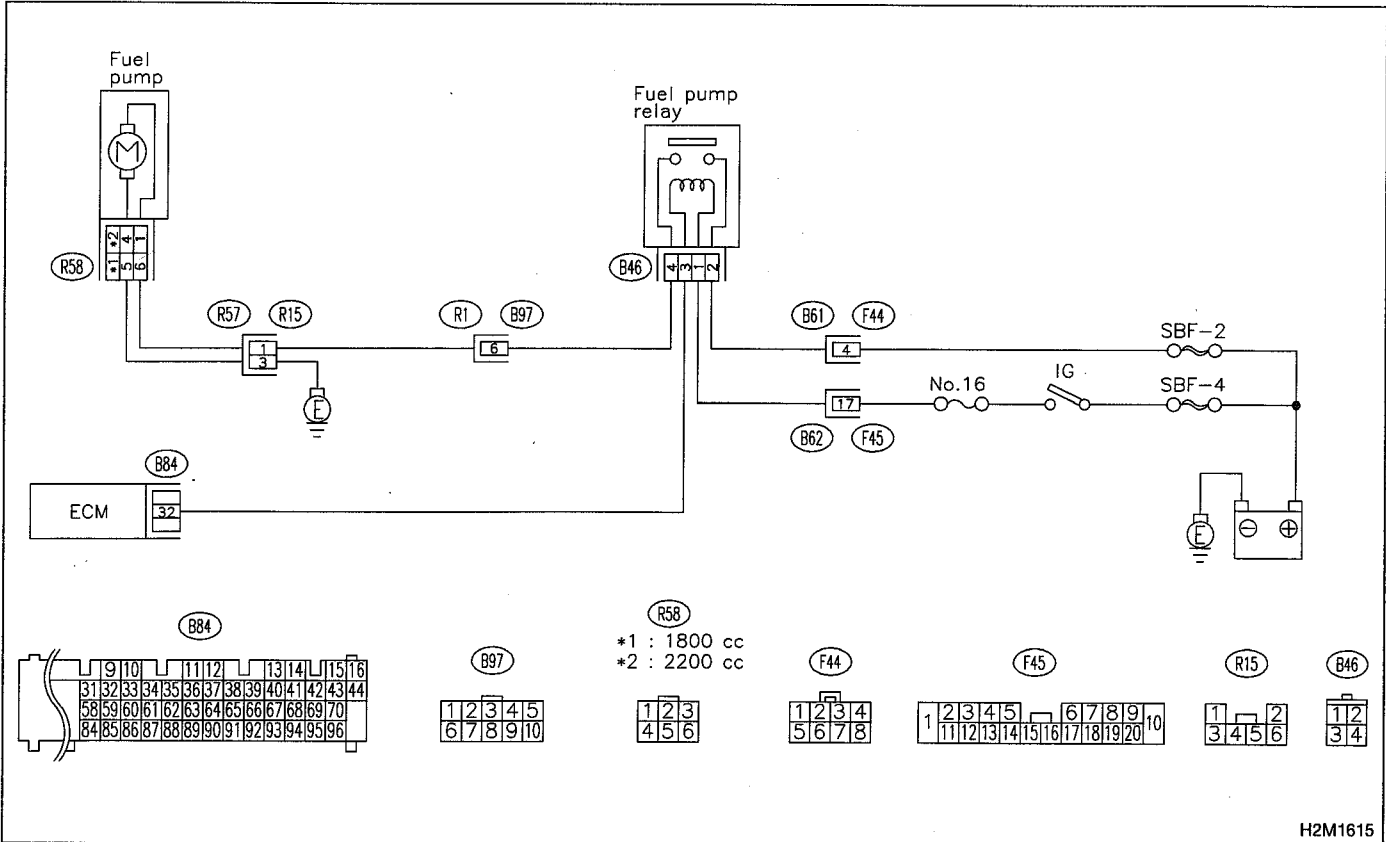
CHECK : *Is there poor contact in ECM connector?*

YES : Repair poor contact in ECM connector.

NO : Check fuel pump circuit. <Ref. to 2-7 [T8E0].>

E: FUEL PUMP CIRCUIT

WIRING DIAGRAM:



H2M1615

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES.

< Ref. to 2-7 [T3D0] and [T3E0]. >

8E1

CHECK OPERATING SOUND OF FUEL PUMP.

Make sure that fuel pump is in operation for two seconds when turning ignition switch to ON.

CHECK : Does fuel pump produce operating sound?

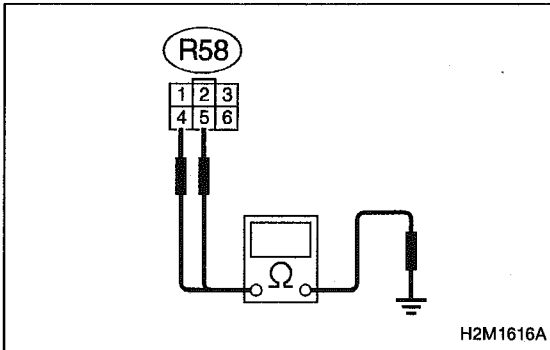
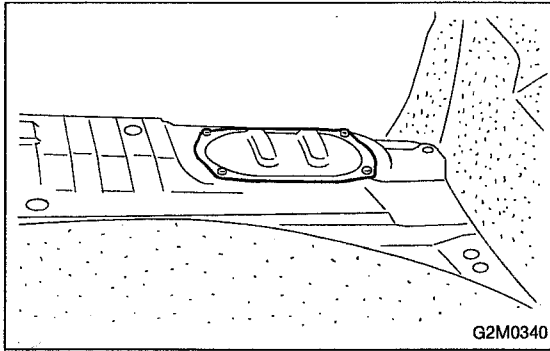
NOTE:

Fuel pump operation check can also be executed using Subaru Select Monitor (Function mode: FD01).

For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". < Ref. to 2-7 [T3F0]. >

YES : Check fuel injector circuit. < Ref. to 2-7 [T8G0]. >

NO : Go to step **8E2**.



8E2 CHECK GROUND CIRCUIT OF FUEL PUMP.

- 1) Turn ignition switch to OFF.
- 2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon).

- 3) Disconnect connector from fuel pump.
- 4) Measure resistance of harness connector between fuel pump and chassis ground.

Connector & terminal

- 1800 cc model

(R58) No. 5 — Chassis ground:

- 2200 cc model

(R58) No. 4 — Chassis ground:

CHECK : Is the resistance less than 5 Ω?

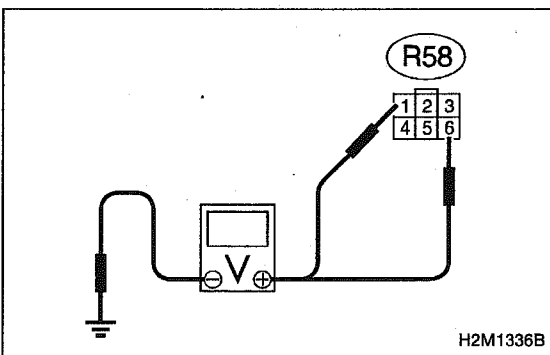
YES : Go to step **8E3**.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between fuel pump connector and chassis grounding terminal
- Poor contact in coupling connector (R15)



8E3 CHECK POWER SUPPLY TO FUEL PUMP.

- 1) Turn ignition switch to ON.
- 2) Measure voltage of power supply circuit between fuel pump connector and chassis ground.

Connector & terminal

- 1800 cc model

(R58) No. 6 (+) — Chassis ground (-):

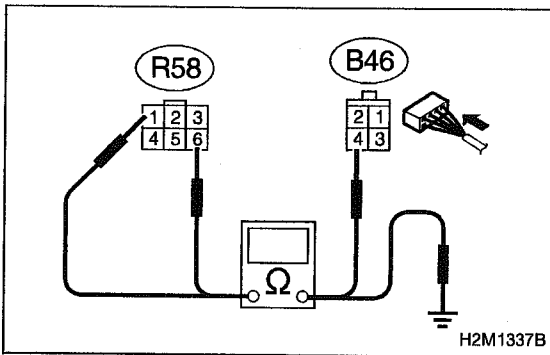
- 2200 cc model

(R58) No. 1 (+) — Chassis ground (-):

CHECK : Is the voltage more than 10 V?

YES : Replace fuel pump.

NO : Go to step **8E4**.

**8E4****CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.**

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between fuel pump and fuel pump relay connector.

Connector & terminal

- 1800 cc model

(R58) No. 6 — (B46) No. 4:

- 2200 cc model

(R58) No. 1 — (B46) No. 4:**CHECK** : Is the resistance less than 1 Ω ?**YES** : Go to next step 3).**NO** : Repair harness and connector.**NOTE:**

In this case, repair the following:

- Open circuit in harness between fuel pump and fuel pump relay connector
- Poor contact in coupling connectors (R15 and B97)

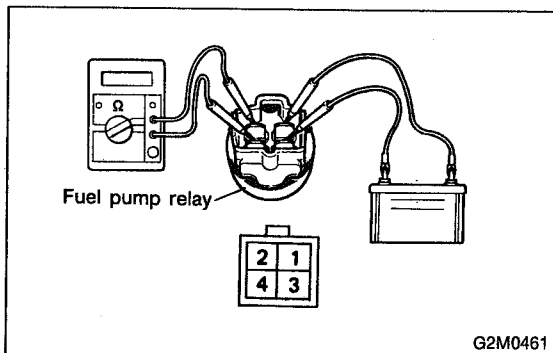
- 3) Measure resistance of harness between fuel pump and fuel pump relay connector.

Connector & terminal

- 1800 cc model

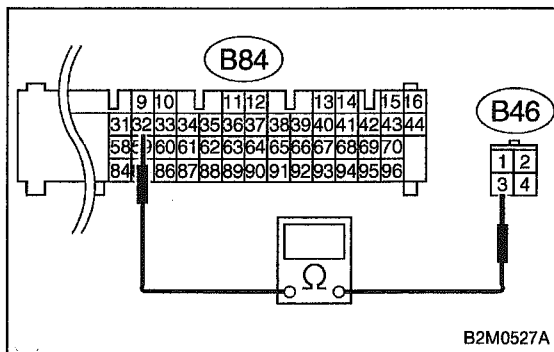
(R58) No. 6 — Chassis ground:

- 2200 cc model

(R58) No. 1 — Chassis ground:**CHECK** : Is the resistance more than 1 $M\Omega$?**YES** : Go to step 8E5.**NO** : Repair short circuit in harness between fuel pump and fuel pump relay connector.**8E5****CHECK FUEL PUMP RELAY.**

- 1) Disconnect connectors from fuel pump relay and main relay.
- 2) Remove fuel pump relay and main relay with bracket.
- 3) Connect battery to fuel pump relay connector terminals No. 1 and No. 3.
- 4) Measure resistance between connector terminals of fuel pump relay.

Terminals**No. 2 — No. 4:****CHECK** : Is the resistance less than 10 Ω ?**YES** : Go to step 8E6.**NO** : Replace fuel pump relay.



8E6	CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.
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- 1) Disconnect connectors from ECM.
- 2) Measure resistance of harness between ECM and fuel pump relay connector.

Connector & terminal
(B84) No. 32 — (B46) No. 3:

CHECK : *Is the resistance less than 1 Ω?*

YES : Go to step **8E7**.

NO : Repair open circuit in harness between ECM and fuel pump relay connector.

8E7	CHECK POOR CONTACT.
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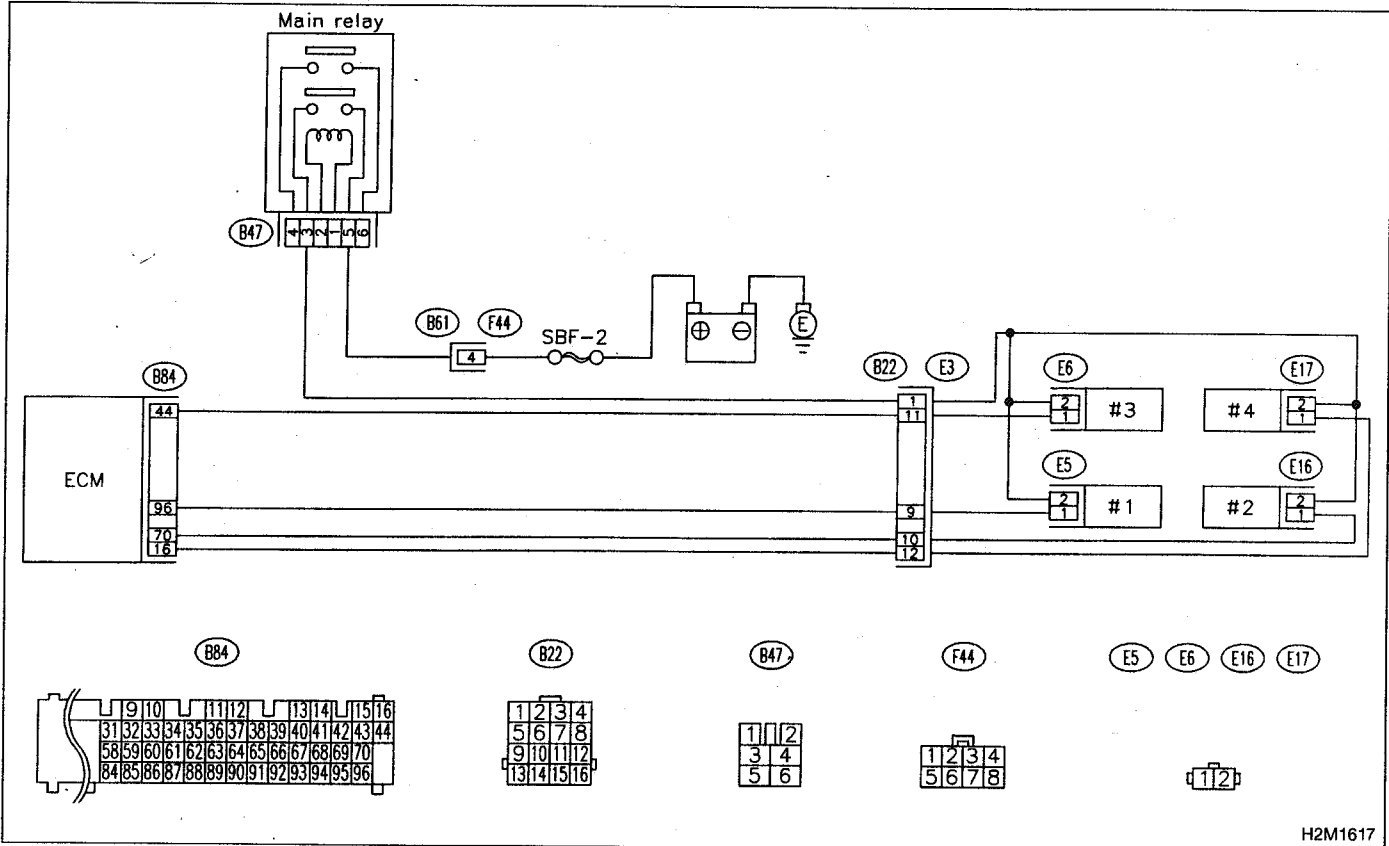
Check poor contact in ECM connector. <Ref. to FOREWORD [T3C1].>

CHECK : *Is there poor contact in ECM connector?*

YES : Repair poor contact in ECM connector.

NO : Check fuel injector circuit. <Ref. to 2-7 [T8G0].>

**F: FUEL INJECTOR CIRCUIT
WIRING DIAGRAM:**



CAUTION:

- Check or repair only faulty parts.
- After repair or replacement of faulty parts, conduct CLEAR MEMORY and INSPECTION MODES. <Ref. to 2-7 [T3D0] and [T3E0].>

NOTE:

Check fuel injector circuit. <Ref. to 2-7 [T10AA0] or [T10AE0].>